

# Keysight 86100A/B/C/D Wide-Bandwidth Oscilloscope

A.13.03 DCA & A.05.62  
FlexDCA and Below

Firmware  
Release Notes

# Notices

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# 1 N1010A FlexDCA

Revision A.05.62, June 2017

## New Features

- Support for new N1046A 75/85/>100 GHz electrical module. One, two, or four channel remote heads.
- N1092X extension to SIRC to include enhanced BW for 53 GBd TDECQ reference receiver.
- Made the following changes to the user-defined measurements and user-defined operators:
  - The input variable *BitRate* that is passed to the script has been deprecated. Instead, the new *SymbolRate* input variable is passed. Python and compiled MATLAB scripts will remain backwards compatible so you do not need to update your existing scripts.
  - For user measurements, the *BER* and *bits* measurement units are no longer supported. The new baud (*Bd*) measurement unit is used instead.
- In response to the change in the IEEE 802.3bs Draft specification:
  - Added the following two new factory Presets for the TDECQ reference equalizer: *IEEE 802.3bs Draft 2.2* preset which specifies two taps per UI and *IEEE 802.3bs Draft 3.2* preset which specifies one tap per UI.
- For TDECQ measurements, the oscilloscope's reference bandwidth has been decreased from (0.75)(symbol rate) to approximately (0.5)(symbol rate).
- Reference filter selections in the drop-down lists for optical channels now include additional information for both hardware filters and SIRC rates. In addition to the baud rate, the filter name now includes the 3 dB frequency. Previously, only the baud rate was displayed. This change allows for additional selections within the same data rate. For example, the following three SIRC filters are now be available at 26.5625 GBd:
  - 26.5625 GBd NRZ
  - 26.5625 GBd TDEC
  - 26.5625 GBd TDECQ

## Defects Fixed

- Fixed a defect that could prevent querying the statistics (Min, Max, Mean) of the TDECQ measurements via SCPI.

- Fixed a defect that resulted in the message “*The data analysis engine has recovered from an unexpected software problem*” when optimizing the taps of the TDECQ equalizer.
- Fixed an issue that caused Autoscale to detect the incorrect data rate in some cases when using Free Run with Precision Timebase.
- Fixed a condition where repeatedly locking an N1076A to a stressed signal using SCPI commands resulted in a SCPI timeout that occurred for all SCPI commands.
- Fixed an issue where an N1076A's front-panel *Locked* indicator light remained on even when the N1076A was not locked.
- Fixed an error that prevented simultaneous data acquisition from multiple acquisitions systems such as an N1076A with JSA and an N109X-series sampling oscilloscope.

## Revision A.05.61, March 2017

### New Features

- For RIN measurements in Jitter mode, you can now select results that are based on FlexDCA's standard algorithm or the IEEE algorithm. The result of the IEEE based measurement is approximately 6 dB greater than FlexDCA's standard measurement.

### Defects Fixed

- In remote mode, the clock recovery *Attempting Lock* dialog box is no longer displayed.

### MEASure Subsystem

:AMPLitude:DEFine:RINoise:DEFinition (new)

## Revision A.05.60, January 2017

### New Features

- Jitter Mode now supports measurements on PAM-4 signals.
- With the advent of PAM-4 support, some terms shown in the GUI, measurements, and remote programming commands have been renamed to support these usage changes. The following list includes some of the changes:
  - bits to unit interval (UI)
  - bits/second (b/s) to Baud (Bd)
  - data rate to symbol rate
  - bit rate to symbol rate
  - samples/bit to samples/UI
  - BER (Bit Error Rate) to SER (Symbol Error Rate)
  - Jitter mode's DDJ Vs Bit graph has been renamed DDJ Vs Symbol.



- Jitter mode's ISI Vs Bit graph has been renamed ISI Vs Symbol.
- Jitter mode's BER Jitter Bathtub graph has been renamed SER Jitter Bathtub.
- Jitter mode's BER Amplitude Bathtub graph has been renamed SER Amplitude Bathtub.
- Changed the :DISPlay:JITTer:GRAPh:TYPE command's arguments that are used to display the DDJ Vs Symbol and ISI Vs Symbol graphs.
- Enhanced selections in the PAM-N Analysis Setup dialog box.
- Added new Thresholds tab to the Jitter Mode Measurement Setup dialog box.
- In Eye/Mask Mode, added the new PAM-4 Outer Extinction Ratio measurement.
- In Eye/Mask Mode, added the new PAM-4 Outer OMA measurement.
- In Eye/Mask Mode, added the new PAM-4 TDECQ measurement.
- Added new signal processing TDECQ Equalizer Operator.
- Added the ability to preserve input waveform noise on the output waveform of the following signal processing operators:
  - Bessel operator
  - Butterworth operator
  - Continuous Time Linear Equalizer (CTLE) operator
  - Linear Feedforward Equalizer operator
  - Gaussian operator
  - Sin(x)/x operator
  - TDECQ Equalizer operator
- In Jitter Mode, when the source is a PAM-4 waveform, the Jitter and Amplitude NRZ results tables are replaced by the PAM-4 Eye and Level results tables.
- FlexDCA's help system (FlexDCA.chm) can now be viewed on mobile devices depending on the operating system and installed CHM reader application. This help has been tested on an iPhone 5 and iPad mini with the CHM+ Reader application installed from the Apple's App store. The use of a stylus is recommended.

### Defects Fixed

- Corrected an error in the following 100G-SR4 Ethernet eye mask: 25.78125 - 100GBASE-SR4\_Rx\_SEC\_Optical.msx. The error was in the definition of Standard Mask Violations for Region 1.

### ACQuire Subsystem

```
:ACQuire:RSPEC (modified)
:ACQuire:SPUI (new)
:ACQuire:SPUI:MODE (new)
:ACQuire:SPBit (deprecated)
:ACQuire:SPBit:MODE (deprecated)
```

### CRECovey Subsystem

:CRECovey:ADRatio? (new)

### DISK Subsystem

:DISK:DWIZard:JPEYe:SDATa (new)  
:DISK:DWIZard:JPLeveL:SDATa (new)

### DISPlay Subsystem

:DISPlay:AMPLitude:LEVeL (modified)  
:DISPlay:JITTer:ASPeCtrum:EDGE (new)  
:DISPlay:JITTer:EYE (new)  
:DISPlay:JITTer:GRAPh:TYPe (modified)  
:DISPlay:JITTer:SGRaph:RANGe (new)  
:DISPlay:JITTer:SGRaph:STARt (new)  
:DISPlay:JITTer:DDJVsbIt:NBITs (deprecated)  
:DISPlay:JITTer:DDJVsbIt:STARt (deprecated)

### MEASure Subsystem

Substantial changes have been made to the MEASure subsystem's AMPLitude-series commands, which initiate Jitter Mode's interference/noise measurements. For example, one new NRZ/PAM-4 compatible command replaces and deprecates two current NRZ compatible commands. The new command applies to both NRZ and PAM-4 signals and comes with a new :LEVeL child command that selects the desired level to measure. In addition, BER commands have been replaced by SER commands. For Jitter Mode's measurements that are based on an eye, a new :EYE child command has been added to selects the desired eye to measure on PAM-4 signals.

The following table compares three deprecated commands with their new replacement commands.

Although the deprecated commands continue to be available, it is strongly recommended that you use the new commands.

**Table 1** Examples of Old and New Commands

New Commands	Old Deprecated Commands
:MEASure:AMPLitude:HSYMBOL	:MEASure:AMPLitude:HONe :MEASure:AMPLitude:HZERo
:MEASure:AMPLitude:SERFloor	:MEASure:AMPLitude:BERFloor
:MEASure:AMPLitude:SERLimit	:MEASure:AMPLitude:BERLimit

### Bit Number of Highest Level (at Specified Level)

:MEASure:AMPLitude:HSYMBOL (new)  
:MEASure:AMPLitude:HSYMBOL:LEVeL (new)  
:MEASure:AMPLitude:HSYMBOL:LOCation? (new)

:MEASure:AMPLitude:HSYMBOL:SOURce (new)  
 :MEASure:AMPLitude:HSYMBOL:STATus? (new)  
 :MEASure:AMPLitude:HSYMBOL:STATus:REASon? (new)  
 :MEASure:AMPLitude:HONe (deprecated)  
 :MEASure:AMPLitude:HONe:LOCation? (deprecated)  
 :MEASure:AMPLitude:HONe:SOURce (deprecated)  
 :MEASure:AMPLitude:HONe:STATus? (deprecated)  
 :MEASure:AMPLitude:HONe:STATus:REASon? (deprecated)  
 :MEASure:AMPLitude:HZERo (deprecated)  
 :MEASure:AMPLitude:HZERo:LOCation? (deprecated)  
 :MEASure:AMPLitude:HZERo:SOURce (deprecated)  
 :MEASure:AMPLitude:HZERo:STATus? (deprecated)  
 :MEASure:AMPLitude:HZERo:STATus:REASon? (deprecated)

### Bit Number of Lowest Level (at Specified Level)

:MEASure:AMPLitude:LSYMBOL (new)  
 :MEASure:AMPLitude:LSYMBOL:LEVEl (new)  
 :MEASure:AMPLitude:LSYMBOL:LOCation? (new)  
 :MEASure:AMPLitude:LSYMBOL:SOURce (new)  
 :MEASure:AMPLitude:LSYMBOL:STATus? (new)  
 :MEASure:AMPLitude:LSYMBOL:STATus:REASon? (new)  
 :MEASure:AMPLitude:LZERo (deprecated)  
 :MEASure:AMPLitude:LZERo:LOCation? (deprecated)  
 :MEASure:AMPLitude:LZERo:SOURce (deprecated)  
 :MEASure:AMPLitude:LZERo:STATus? (deprecated)  
 :MEASure:AMPLitude:LZERo:STATus:REASon? (deprecated)  
 :MEASure:AMPLitude:LONe (deprecated)  
 :MEASure:AMPLitude:LONe:LOCation? (deprecated)  
 :MEASure:AMPLitude:LONe:SOURce (deprecated)  
 :MEASure:AMPLitude:LONe:STATus? (deprecated)  
 :MEASure:AMPLitude:LONe:STATus:REASon? (deprecated)

### Deterministic Interference

:MEASure:AMPLitude:DI (new)  
 :MEASure:AMPLitude:DI:LEVEl (new)  
 :MEASure:AMPLitude:DI:LOCation? (new)  
 :MEASure:AMPLitude:DI:SOURce (new)  
 :MEASure:AMPLitude:DI:STATus? (new)  
 :MEASure:AMPLitude:DI:STATus:REASon? (new)  
 :MEASure:AMPLitude:DIONes (deprecated)  
 :MEASure:AMPLitude:DIONes:LOCation? (deprecated)  
 :MEASure:AMPLitude:DIONes:SOURce (deprecated)  
 :MEASure:AMPLitude:DIONes:STATus? (deprecated)  
 :MEASure:AMPLitude:DIONes:STATus:REASon? (deprecated)  
 :MEASure:AMPLitude:DIZERos (deprecated)  
 :MEASure:AMPLitude:DIZERos:LOCation? (deprecated)  
 :MEASure:AMPLitude:DIZERos:SOURce (deprecated)  
 :MEASure:AMPLitude:DIZERos:STATus? (deprecated)  
 :MEASure:AMPLitude:DIZERos:STATus:REASon? (deprecated)

### Eye Height

:MEASure:AMPLitude:EHEight (new)

:MEASure:AMPLitude:EHEight:EYE (new)  
 :MEASure:AMPLitude:EHEight:LOCation? (new)  
 :MEASure:AMPLitude:EHEight:SOURce (new)  
 :MEASure:AMPLitude:EHEight:STATus? (new)  
 :MEASure:AMPLitude:EHEight:STATus:REASon? (new)

### Eye Opening

:MEASure:AMPLitude:EOPening:EYE (new)

### Inter-Symbol Interference

:MEASure:AMPLitude:ISI (new)  
 :MEASure:AMPLitude:ISI:LEVe1 (new)  
 :MEASure:AMPLitude:ISI:LOCation? (new)  
 :MEASure:AMPLitude:ISI:SOURce (new)  
 :MEASure:AMPLitude:ISI:STATus? (new)  
 :MEASure:AMPLitude:ISI:STATus:REASon? (new)  
 :MEASure:AMPLitude:ISIOnes (deprecated)  
 :MEASure:AMPLitude:ISIOnes:LOCation? (deprecated)  
 :MEASure:AMPLitude:ISIOnes:SOURce (deprecated)  
 :MEASure:AMPLitude:ISIOnes:STATus? (deprecated)  
 :MEASure:AMPLitude:ISIOnes:STATus:REASon? (deprecated)  
 :MEASure:AMPLitude:ISIZeros (deprecated)  
 :MEASure:AMPLitude:ISIZeros:LOCation? (deprecated)  
 :MEASure:AMPLitude:ISIZeros:SOURce (deprecated)  
 :MEASure:AMPLitude:ISIZeros:STATus? (deprecated)  
 :MEASure:AMPLitude:ISIZeros:STATus:REASon? (deprecated)

### Inter-Symbol Interference Versus Symbol

:MEASure:AMPLitude:ISISymbol? (new)  
 :MEASure:AMPLitude:ISISymbol:HIGHeSt? (new)  
 :MEASure:AMPLitude:ISISymbol:LOWeSt? (new)  
 :MEASure:AMPLitude:ISISymbol:SYMBols? (new)  
 :MEASure:AMPLitude:ISIVsbit? (deprecated)  
 :MEASure:AMPLitude:ISIVsbit:BITS (deprecated)  
 :MEASure:AMPLitude:ISIVsbit:HIGHeSt (deprecated)  
 :MEASure:AMPLitude:ISIVsbit:LOWeSt (deprecated)

### Periodic Interference / BIR (rms) (Bounded Uncorrelated Interference)

:MEASure:AMPLitude:PIR (new)  
 :MEASure:AMPLitude:PIR:LEVe1 (new)  
 :MEASure:AMPLitude:PIR:LOCation? (new)  
 :MEASure:AMPLitude:PIR:SOURce (new)  
 :MEASure:AMPLitude:PIR:STATus? (new)  
 :MEASure:AMPLitude:PIR:STATus:REASon? (new)  
 :MEASure:AMPLitude:PIROnes (deprecated)  
 :MEASure:AMPLitude:PIROnes:LOCation? (deprecated)  
 :MEASure:AMPLitude:PIROnes:SOURce (deprecated)  
 :MEASure:AMPLitude:PIROnes:STATus? (deprecated)  
 :MEASure:AMPLitude:PIROnes:STATus:REASon? (deprecated)  
 :MEASure:AMPLitude:PIRZeros (deprecated)  
 :MEASure:AMPLitude:PIRZeros:LOCation? (deprecated)

:MEASure:AMPLitude:PIRZeros:SOURce (deprecated)  
 :MEASure:AMPLitude:PIRZeros:STATus? (deprecated)  
 :MEASure:AMPLitude:PIRZeros:STATus:REASon? (deprecated)  
 :MEASure:AMPLitude:BIROnes (deprecated)  
 :MEASure:AMPLitude:BIROnes:LOCation? (deprecated)  
 :MEASure:AMPLitude:BIROnes:SOURce (deprecated)  
 :MEASure:AMPLitude:BIROnes:STATus? (deprecated)  
 :MEASure:AMPLitude:BIROnes:STATus:REASon? (deprecated)  
 :MEASure:AMPLitude:BIRZeros (deprecated)  
 :MEASure:AMPLitude:BIRZeros:LOCation? (deprecated)  
 :MEASure:AMPLitude:BIRZeros:SOURce (deprecated)  
 :MEASure:AMPLitude:BIRZeros:STATus? (deprecated)  
 :MEASure:AMPLitude:BIRZeros:STATus:REASon? (deprecated)

### Periodic Interference (dual-dirac) or BUI (Bounded Uncorrelated Interference)

:MEASure:AMPLitude:PI (new)  
 :MEASure:AMPLitude:PI:LEVeL (new)  
 :MEASure:AMPLitude:PI:LOCation? (new)  
 :MEASure:AMPLitude:PI:SOURce (new)  
 :MEASure:AMPLitude:PI:STATus? (new)  
 :MEASure:AMPLitude:PI:STATus:REASon? (new)  
 :MEASure:AMPLitude:PIONes (deprecated)  
 :MEASure:AMPLitude:PIONes:LOCation? (deprecated)  
 :MEASure:AMPLitude:PIONes:SOURce (deprecated)  
 :MEASure:AMPLitude:PIONes:STATus? (deprecated)  
 :MEASure:AMPLitude:PIONes:STATus:REASon? (deprecated)  
 :MEASure:AMPLitude:PIZeros (deprecated)  
 :MEASure:AMPLitude:PIZeros:LOCation? (deprecated)  
 :MEASure:AMPLitude:PIZeros:SOURce (deprecated)  
 :MEASure:AMPLitude:PIZeros:STATus? (deprecated)  
 :MEASure:AMPLitude:PIZeros:STATus:REASon? (deprecated)  
 :MEASure:AMPLitude:BUIONes (deprecated)  
 :MEASure:AMPLitude:BUIONes:LOCation? (deprecated)  
 :MEASure:AMPLitude:BUIONes:SOURce (deprecated)  
 :MEASure:AMPLitude:BUIONes:STATus? (deprecated)  
 :MEASure:AMPLitude:BUIONes:STATus:REASon? (deprecated)  
 :MEASure:AMPLitude:BUIZeros (deprecated)  
 :MEASure:AMPLitude:BUIZeros:LOCation? (deprecated)  
 :MEASure:AMPLitude:BUIZeros:SOURce (deprecated)  
 :MEASure:AMPLitude:BUIZeros:STATus? (deprecated)  
 :MEASure:AMPLitude:BUIZeros:STATus:REASon? (deprecated)

### Q Measurement

:MEASure:AMPLitude:Q:EYE (new)

### Random Noise

:MEASure:AMPLitude:RN (new)  
 :MEASure:AMPLitude:RN:LEVeL (new)  
 :MEASure:AMPLitude:RN:LOCation? (new)  
 :MEASure:AMPLitude:RN:SOURce (new)  
 :MEASure:AMPLitude:RN:STATus? (new)  
 :MEASure:AMPLitude:RN:STATus:REASon? (new)

:MEASure:AMPLitude:RNONes (deprecated)  
 :MEASure:AMPLitude:RNONes:LOCation? (deprecated)  
 :MEASure:AMPLitude:RNONes:SOURce (deprecated)  
 :MEASure:AMPLitude:RNONes:STATus? (deprecated)  
 :MEASure:AMPLitude:RNONes:STATus:REASon? (deprecated)  
 :MEASure:AMPLitude:RNZeros (deprecated)  
 :MEASure:AMPLitude:RNZeros:LOCation? (deprecated)  
 :MEASure:AMPLitude:RNZeros:SOURce (deprecated)  
 :MEASure:AMPLitude:RNZeros:STATus? (deprecated)  
 :MEASure:AMPLitude:RNZeros:STATus:REASon? (deprecated)

### SER (Symbol Error Rate) Floor

:MEASure:AMPLitude:SERFloor (new)  
 :MEASure:AMPLitude:SERFloor:EYE (new)  
 :MEASure:AMPLitude:SERFloor:LOCation? (new)  
 :MEASure:AMPLitude:SERFloor:SOURce (new)  
 :MEASure:AMPLitude:SERFloor:STATus? (new)  
 :MEASure:AMPLitude:SERFloor:STATus:REASon? (new)  
 :MEASure:AMPLitude:BERFloor (deprecated)  
 :MEASure:AMPLitude:BERFloor:LOCation? (deprecated)  
 :MEASure:AMPLitude:BERFloor:SOURce (deprecated)  
 :MEASure:AMPLitude:BERFloor:STATus? (deprecated)  
 :MEASure:AMPLitude:BERFloor:STATus:REASon? (deprecated)

### SER (Symbol Error Rate) Limit

:MEASure:AMPLitude:SERLimit (new)  
 :MEASure:AMPLitude:SERLimit:EYE (new)  
 :MEASure:AMPLitude:SERLimit:LOCation? (new)  
 :MEASure:AMPLitude:SERLimit:SOURce (new)  
 :MEASure:AMPLitude:SERLimit:STATus? (new)  
 :MEASure:AMPLitude:SERLimit:STATus:REASon? (new)  
 :MEASure:AMPLitude:BERLimit (deprecated)  
 :MEASure:AMPLitude:BERLimit:LOCation? (deprecated)  
 :MEASure:AMPLitude:BERLimit:SOURce (deprecated)  
 :MEASure:AMPLitude:BERLimit:STATus? (deprecated)  
 :MEASure:AMPLitude:BERLimit:STATus:REASon? (deprecated)

### Symbol Level

:MEASure:AMPLitude:LEVel (new)  
 :MEASure:AMPLitude:LEVel:LEVel (new)  
 :MEASure:AMPLitude:LEVel:LOCation? (new)  
 :MEASure:AMPLitude:LEVel:SOURce (new)  
 :MEASure:AMPLitude:LEVel:STATus? (new)  
 :MEASure:AMPLitude:LEVel:STATus:REASon? (new)  
 :MEASure:AMPLitude:OLEVel (deprecated)  
 :MEASure:AMPLitude:OLEVel:LOCation? (deprecated)  
 :MEASure:AMPLitude:OLEVel:SOURce (deprecated)  
 :MEASure:AMPLitude:OLEVel:STATus? (deprecated)  
 :MEASure:AMPLitude:OLEVel:STATus:REASon? (deprecated)  
 :MEASure:AMPLitude:ZLEVel (deprecated)  
 :MEASure:AMPLitude:ZLEVel:LOCation? (deprecated)  
 :MEASure:AMPLitude:ZLEVel:SOURce (deprecated)

:MEASure:AMPLitude:ZLEVel:STATus? (deprecated)  
 :MEASure:AMPLitude:ZLEVel:STATus:REASon? (deprecated)

### Total Interference

:MEASure:AMPLitude:TI (new)  
 :MEASure:AMPLitude:TI:LEVel (new)  
 :MEASure:AMPLitude:TI:LOCation? (new)  
 :MEASure:AMPLitude:TI:SOURce (new)  
 :MEASure:AMPLitude:TI:STATus? (new)  
 :MEASure:AMPLitude:TI:STATus:REASon? (new)  
 :MEASure:AMPLitude:TIONes (deprecated)  
 :MEASure:AMPLitude:TIONes:LOCation? (deprecated)  
 :MEASure:AMPLitude:TIONes:SOURce (deprecated)  
 :MEASure:AMPLitude:TIONes:STATus? (deprecated)  
 :MEASure:AMPLitude:TIONes:STATus:REASon? (deprecated)  
 :MEASure:AMPLitude:TIZeros (deprecated)  
 :MEASure:AMPLitude:TIZeros:LOCation? (deprecated)  
 :MEASure:AMPLitude:TIZeros:SOURce (deprecated)  
 :MEASure:AMPLitude:TIZeros:STATus? (deprecated)  
 :MEASure:AMPLitude:TIZeros:STATus:REASon? (deprecated)

### Uncorrelated Noise

:MEASure:AMPLitude:UN (new)  
 :MEASure:AMPLitude:UN:LEVel (new)  
 :MEASure:AMPLitude:UN:LOCation? (new)  
 :MEASure:AMPLitude:UN:SOURce (new)  
 :MEASure:AMPLitude:UN:STATus? (new)  
 :MEASure:AMPLitude:UN:STATus:REASon? (new)  
 :MEASure:AMPLitude:UNONes (deprecated)  
 :MEASure:AMPLitude:UNONes:LOCation? (deprecated)  
 :MEASure:AMPLitude:UNONes:SOURce (deprecated)  
 :MEASure:AMPLitude:UNONes:STATus? (deprecated)  
 :MEASure:AMPLitude:UNONes:STATus:REASon? (deprecated)  
 :MEASure:AMPLitude:UNZeros (deprecated)  
 :MEASure:AMPLitude:UNZeros:LOCation? (deprecated)  
 :MEASure:AMPLitude:UNZeros:SOURce (deprecated)  
 :MEASure:AMPLitude:UNZeros:STATus? (deprecated)  
 :MEASure:AMPLitude:UNZeros:STATus:REASon? (deprecated)

### Outer Extinction Ratio

:MEASure:EYE:OER (new)  
 :MEASure:EYE:OER:LOCation? (new)  
 :MEASure:EYE:OER:SOURce (new)  
 :MEASure:EYE:OER:STATus? (new)  
 :MEASure:EYE:OER:STATus:REASon? (new)  
 :MEASure:EYE:OER:UNITs (new)

### Outer OMA measurement

:MEASure:EYE:OOMA (new)  
 :MEASure:EYE:OOMA:LOCation? (new)  
 :MEASure:EYE:OOMA:SOURce (new)

:MEASure:EYE:00MA:STATus? (new)  
:MEASure:EYE:00MA:STATus:REASon? (new)

### Transmitter and Dispersion Eye Closure for PAM4 (TDECQ)

:MEASure:EYE:TDEQ (new)  
:MEASure:EYE:TDEQ:LOCation? (new)  
:MEASure:EYE:TDEQ:OMA:METHOD (new)  
:MEASure:EYE:TDEQ:OMA:VALue (new)  
:MEASure:EYE:TDEQ:SOURce (new)  
:MEASure:EYE:TDEQ:STATus? (new)  
:MEASure:EYE:TDEQ:STATus:REASon? (new)  
:MEASure:TDEQ:HWIDth (new)  
:MEASure:TDEQ:PRESets (new)  
:MEASure:TDEQ:PRESets:SELECTIONs (new)  
:MEASure:TDEQ:TSER (new)

### Duty Cycle Distortion (DCD)

:MEASure:JITTer:DCD:EYE (new)

### Data-Dependent Jitter (DDJ)

:MEASure:JITTer:DDJ:EYE (new)

### Data-Dependent Jitter Versus Symbol

:MEASure:JITTer:DDJSymbol? (new)  
:MEASure:JITTer:DDJSymbol:EARLiest? (new)  
:MEASure:JITTer:DDJSymbol:LATEST? (new)  
:MEASure:JITTer:DDJSymbol:SYMBOLs? (new)  
:MEASure:JITTer:DDJVsbIt? (deprecated)  
:MEASure:JITTer:DDJVsbIt:BITS? (deprecated)  
:MEASure:JITTer:DDJVsbIt:EARLiest? (deprecated)  
:MEASure:JITTer:DDJVsbIt:LATEST? (deprecated)

### Data Dependant Pulse Width Shrinkage (DDPWS)

:MEASure:JITTer:DDPWS:EYE (new)

### Deterministic Jitter (DJ)

:MEASure:JITTer:DJ:EYE (new)

### Eye Skew

:MEASure:JITTer:ESKew (new)  
:MEASure:JITTer:ESKew:EYE (new)  
:MEASure:JITTer:ESKew:LOCation? (new)  
:MEASure:JITTer:ESKew:SOURce (new)  
:MEASure:JITTer:ESKew:STATus? (new)  
:MEASure:JITTer:ESKew:STATus:REASon? (new)

### Eye Width

:MEASure:JITTer:EWIDth (new)



:MEASure:JITTer:EWIDth:EYE (new)  
 :MEASure:JITTer:EWIDth:LOCation? (new)  
 :MEASure:JITTer:EWIDth:SOURce (new)  
 :MEASure:JITTer:EWIDth:STATus? (new)  
 :MEASure:JITTer:EWIDth:STATus:REASon? (new)

### **F/2 jitter**

:MEASure:JITTer:FOVer:EYE (new)

### **Inter-Symbol Interference (ISI)**

:MEASure:JITTer:ISI:EYE (new)

### **J1, J2, J3, J4, J5, J6, J7, J8, or J9**

:MEASure:JITTer:JN:EYE (new)

### **Jitter Sampling Level**

:MEASure:JITTer:LEVel:EYE (new)

### **Select a Measurement Listing in Eye and Level Results Tables**

:MEASure:JITTer:PAM:EYE:LIST:SElect (new)  
 :MEASure:JITTer:PAM:LEVel:LIST:SElect (new)

### **Periodic Jitter (PJ)**

:MEASure:JITTer:PJ:EYE (new)

### **Periodic Jitter (PJ) RMS**

:MEASure:JITTer:PJRMs:EYE (new)

### **Random Jitter**

:MEASure:JITTer:RJ:EYE (new)

### **Total Jitter**

:MEASure:JITTer:TJ:EYE (new)

### **Uncorrelated Jitter (UJ)**

:MEASure:JITTer:UJ:EYE (new)

### **Return ordered list of edge symbol numbers**

:MEASure:JITTer:ESYMBOLs? (new)  
 :MEASure:JITTer:EBITs? (deprecated A.05.60)

### **Measurement Definitions**

:MEASure:AMPLitude:DEFine:LOCation:PERCent:LEVel (new)  
 :MEASure:AMPLitude:DEFine:LOCation:TYPE (new)

:MEASure:AMPLitude:DEFine:RNCValue:LEVel (new)  
 :MEASure:AMPLitude:DEFine:RNCValue:ONE (deprecated)  
 :MEASure:AMPLitude:DEFine:RNCValue:ZERO (deprecated)  
 :MEASure:AMPLitude:DEFine:RNSValue:LEVel (new)  
 :MEASure:AMPLitude:DEFine:RNSValue:ONE (deprecated)  
 :MEASure:AMPLitude:DEFine:RNSValue:ZERO (deprecated)  
 :MEASure:JITTer:DEFine:EOpening (new)  
 :MEASure:JITTer:DEFine:EOpening:PROBability (new)  
 :MEASure:JITTer:DEFine:LEVel:CUSTom (deprecated)  
 :MEASure:JITTer:DEFine:LEVel:CUSTom:EYE (new)  
 :MEASure:JITTer:DEFine:LEVel:PERCent (deprecated)  
 :MEASure:JITTer:DEFine:LEVel:PERCent:EYE (new)  
 :MEASure:JITTer:DEFine:LEVel:TYPe (modified)  
 :MEASure:JITTer:DEFine:LWIDth (new)  
 :MEASure:JITTer:DEFine:LWIDth:PERCent (new)  
 :MEASure:JITTer:DEFine:THReshold:ECDefinition (new)  
 :MEASure:JITTer:DEFine:THReshold:ESTiming (new)  
 :MEASure:JITTer:DEFine:THReshold:PRESets (new)  
 :MEASure:JITTer:DEFine:THReshold:PRESets:SElections? (new)  
 :MEASure:JITTer:DEFine:THReshold:PROBability (new)

### Eye Contours and Advanced Eye Analysis Configuration

:MEASure:PAM:OSCilloscope:LRMS:GALL (new)  
 :MEASure:PAM:OSCilloscope:LRMS:LEVel (new)

### SLOT Subsystem

:SLOT:TRIGger:SRATe (new)  
 :SLOT:TRIGger:SRATe:AUTodetect (new)  
 :SLOT:TRIGger:BRATe (deprecated)  
 :SLOT:TRIGger:BRATe:AUTodetect (deprecated)

### SOURce Subsystem

:SOURce:SRATe (new)  
 :SOURce:DRATe (deprecated)

### SPRocess Subsystem

#### Align Math Operator

:SPRocess:ALIGn:TIMe:AUTO (modified)  
 :SPRocess:ALIGn:TIMe:RECalculate (modified)

#### Bessel Filter Math Operator

:SPRocess:BESSel:PNOise (new)  
 :SPRocess:BESSel:PNOise:BANDwidth (new)  
 :SPRocess:BESSel:PNOise:BANDwidth:AUTO (new)

#### Butterworth Filter Math Operator

:SPRocess:BUTTerworth:PNOise (new)  
 :SPRocess:BUTTerworth:PNOise:BANDwidth (new)  
 :SPRocess:BUTTerworth:PNOise:BANDwidth:AUTO (new)

**Continuous Time Linear Equalizer (CTLE) Math Operator**

:SPRocess:CTLequalizer:PNOise (new)  
 :SPRocess:CTLequalizer:PNOise:BANDwidth (new)  
 :SPRocess:CTLequalizer:PNOise:BANDwidth:AUTO (new)

**Decision Feedback Equalizer Math Operator**

:SPRocess:DFEQualizer:TAPS (modified)  
 :SPRocess:DFEQualizer:TAPS:AUTO (modified)  
 :SPRocess:DFEQualizer:TAPS:COUNT (modified)  
 :SPRocess:DFEQualizer:TAPS:LLIMit (modified)  
 :SPRocess:DFEQualizer:TAPS:RECalculate (modified)  
 :SPRocess:DFEQualizer:TAPS:ULIMit (modified)

**Linear Equalizer Math Operator**

:SPRocess:FFEQualizer:NPRecursors (modified)  
 :SPRocess:FFEQualizer:PNOise (new)  
 :SPRocess:FFEQualizer:PNOise:BANDwidth (new)  
 :SPRocess:FFEQualizer:PNOise:BANDwidth:AUTO (new)  
 :SPRocess:FFEQualizer:TAPS (modified)  
 :SPRocess:FFEQualizer:TAPS:AUTO (modified)  
 :SPRocess:FFEQualizer:TAPS:COUNT (modified)  
 :SPRocess:FFEQualizer:TAPS:NORMALize (modified)  
 :SPRocess:FFEQualizer:TAPS:RECalculate (modified)  
 :SPRocess:FFEQualizer:TSPacing (modified)  
 :SPRocess:FFEQualizer:TSPacing:TPUI (new)  
 :SPRocess:FFEQualizer:TSPacing:TPBit (deprecated)

**Gaussian Filter Math Operator**

:SPRocess:GAUSSian:PNOise (new)  
 :SPRocess:GAUSSian:PNOise:BANDwidth (new)  
 :SPRocess:GAUSSian:PNOise:BANDwidth:AUTO (new)

**Sin(x)/x Math Operator**

:SPRocess:SINC:BANDwidth (new)  
 :SPRocess:SINC:PNOise (new)  
 :SPRocess:SINC:PNOise:BANDwidth (new)  
 :SPRocess:SINC:PNOise:BANDwidth:AUTO (new)

**TDECQ (Transmitter and Dispersion Eye Closure Quaternary) Equalizer Math Operator**

:SPRocess:TEQualizer:DCGain? (new)  
 :SPRocess:TEQualizer:NPRecursors (new)  
 :SPRocess:TEQualizer:PNOise (new)  
 :SPRocess:TEQualizer:PNOise:BANDwidth (new)  
 :SPRocess:TEQualizer:PNOise:BANDwidth:AUTO (new)  
 :SPRocess:TEQualizer:PRESets (new)  
 :SPRocess:TEQualizer:PRESets:SElections (new)  
 :SPRocess:TEQualizer:TAPS (new)  
 :SPRocess:TEQualizer:TAPS:AUTO (new)  
 :SPRocess:TEQualizer:TAPS:COUNT (new)  
 :SPRocess:TEQualizer:TAPS:NORMALize (new)

:SPRocess:TEQualizer:TAPS:RECalculate (new)  
:SPRocess:TEQualizer:TSPacing:TPUI (new)

### SYSTem Subsystem

:SYSTem:SIGNA1:TYPE? (new)

### TI梅base Subsystem

:TI梅base:SRATe (new)  
:TI梅base:UIPosition (new)  
:TI梅base:UIRange (new)  
:TI梅base:UNITs (modified)  
:TI梅base:BPOStion (deprecated)  
:TI梅base:BRANge (deprecated)  
:TI梅base:BRATe (deprecated)

### TRIGger Subsystem

:TRIGger:SRATe (new)  
:TRIGger:SRATe:AUTodetect (new)  
:TRIGger:BRATe (deprecated)  
:TRIGger:BRATe:AUTodetect (deprecated)

### WAVEform Subsystem

:WAVEform:PATTern:NSYMBOLs? (new)  
:WAVEform:PATTern:PPUI? (new)  
:WAVEform:PATTern:SRATe? (new)  
:WAVEform:PATTern:BITS? (deprecated)  
:WAVEform:PATTern:PPBit? (deprecated))  
:WAVEform:PATTern:BRATe? (deprecated)

### WMEMory Subsystem

:WMEMory:SRATe (new)  
:WMEMory:BRATe (deprecated)

## Revision A.05.51, October 2016

Differences from revision A.05.50.

### New Features

- Revised specifications for N1092A/B/C/D/E and N1094A/B DCA-M multiple-channel sampling oscilloscopes.

### Defects Fixed

- Fixed a problem that could occur when attempting to autoscale a signal with free run trigger.
- Fixed a problem with the 86115D-004.
- Fixed a problem where the Uncertainty for the Mask Test Auto-margin Hit Ratio was reporting an artificially low number after a large amount of data was acquired.

- Fixed a problem where differential signals with a large common mode offset would be incorrectly auto scaled.
- Fixed a problem on calibrated TDR traces when measuring the end of a long device where not enough data was being acquired to properly correct the response.

## Revision A.05.50, September 2016

Differences from revision A.05.41.

### New Features

- FlexDCA is compatible with Windows 7, Windows 8, and Windows 10 but is *not* compatible with Windows XP.
- Support for new N1092C and N1092E DCA-M multiple-channel optical/electrical sampling oscilloscopes.
- Support for new N1094A/B DCA-M multiple-channel electrical sampling oscilloscopes.
- Support for new N1076A electrical clock recovery extended module.
- Support for new N1077A optical/electrical clock recovery extended module.
- Ability to configure a 3rd pole for the CTLE math function.
- New Eye mode OMA at Crossing measurement for optical NRZ signals.
- New Eye mode VECP measurement for optical NRZ signals.
- Changed existing TDEC eye measurement to calculate OMA using the new Eye-mode OMA at Crossing measurement.

### Defects Fixed

- Fixed a defect that prevents jitter mode measurements on PRBS-15 patterns when running FlexDCA in compatibility mode or when connected remotely to an 86100C instrument.
- Fixed a defect that caused incorrect measurements across TDR modules when TDR calibration was active.
- Fixed a defect that would occasionally prevent TDR De-Embedding on multiple ports of a single DUT.
- Fixed a hang that would occur if a screen capture was initiated from SCPI while, in the GUI, the user was dragging the FlexDCA application across the screen.
- Fixed a defect in Jitter Mode's Eye Opening measurement.

### MEASure Subsystem

```
:MEASure:EYE:OMAXp (new)
:MEASure:EYE:OMAXp:LOCation? (new)
:MEASure:EYE:OMAXp:SOURce (new)
:MEASure:EYE:OMAXp:STATus? (new)
:MEASure:EYE:OMAXp:STATus:REASon? (new)
```

:MEASure:EYE:TDEC:OMA:METHOD (modified)  
:MEASure:EYE:VECP (new)  
:MEASure:EYE:VECP:LOCation? (new)  
:MEASure:EYE:VECP:OMA:METHOD (new)  
:MEASure:EYE:VECP:OMA:VALue (new)  
:MEASure:EYE:VECP:SOURce (new)  
:MEASure:EYE:VECP:STATus? (new)  
:MEASure:EYE:VECP:STATus:REASon? (new)

### SPRocess Subsystem

:SPRocess:CTLequalizer:PCOunt (new)  
:SPRocess:CTLequalizer:POLe3 (modified)  
:SPRocess:CTLequalizer:ZERo2 (modified)

## Revision A.05.41, June 2016

Differences from revision A.05.40.

### General Comments

- Support for Windows 10.
- Support for SCPI over VXI-11 with Windows 8 and Windows 10.
- For optical channel reference filters, added the ability to specify the filter using the filter 3 dB bandwidth (Hz) in addition to the existing capability of specifying them by data rate (b/s).
- When an Extinction Ratio Correction Factor (ERCF) is applied, added the ability to turn on or off the display of the ERCF values in the measurement results panel.
- Added the ability to remotely break a Flex-on-Flex connection *from* the 86100D.
- Added a response to the :SYSTem:HAL? programming query that indicates that FlexDCA is running as an independent FlexEye session instance in Eye/Mask mode's FlexEye Independent Eye Acquisition.
- Updated the Python example programs to use the new keyflex module. This module makes your programs easier to create and provides many functions that you can leverage.

### Defects Fixed

- Fixed a defect that could cause a SCPI timeout error when using the N4877A Clock/Data Recovery and Demultiplexer.

### APPLication Subsystem

:APPLication:CNAME? (new)  
:APPLication:CState? (new)  
:APPLication:RDISconnect? (new)

### CHANnel Subsystem

```
:CHANnel:Bandwidth:FREquency (preferred over :CHANnel:Bandwidth because
selection is made explicitly instead of implicitly)
:CHANnel:FSElect:Bandwidth (new) (preferred over :CHANnel:FSElect because
selection is made explicitly instead of implicitly)
:CHANnel:FSElect:Bandwidth:MAXimum (new)
:CHANnel:FSElect:Bandwidth:MINimum (new)
:CHANnel:FSElect:Bandwidth:VSET (new)
:CHANnel:FSElect:RATE (preferred over :CHANnel:FSElect because selection
is made explicitly instead of implicitly)
:CHANnel:WAVelength:VALue (preferred over :CHANnel:WAVelength because
selection is made explicitly instead of implicitly)
```

### MEASure Subsystem

```
:MEASure:ERATio:DCFactor (new)
```

### SYSTem Subsystem

- :SYSTem:HAL? (revised)

## Revision A.05.40, May 2016

Differences from revision A.05.31.

### General Comments

- Support for new N1092A/B/D DCA-M multiple-channel optical sampling oscilloscope extended module.
- New FlexEye Independent Eye Acquisition and Analysis.
- In TDR/TDT mode, added N1930B PLTS Automatic Fixture Removal (AFR). Automatic Fixture Removal requires FlexDCA option N1010A-AFR.
- When defining an external transducer, you can now indicate signal inversion (negative gain).
- Added new 100G SR4 stressed receiver mask (25.78125 - 100GBASE-SR4\_Rx\_SEC\_Optical.mskx) as an available mask in Eye/Mask mode.
- Added the ability to copy signal processing operators within the signal processing construction area. By holding the control key while dragging, you can duplicate an operator including its configuration.
- Expanded offering of Python example programs.

### CHANnel Subsystem

```
:CHANnel:TRANsducer:INVert
```

### DISK Subsystem

```
:DISPlay:DWIZard:T:OHMS:SDATa
:DISPlay:DWIZard:T:PERCent:SDATa
:DISPlay:DWIZard:T:VOLTs:SDATa
```

:DISPlay:DWIZard:TOHMs:SDATa (deprecated)  
:DISPlay:DWIZard:TPERcent:SDATa (deprecated)  
:DISPlay:DWIZard:TVOLts:SDATa (deprecated)

#### DISPlay Subsystem

:DISPlay:TSMoDe

#### FEYE Subsystem (new)

:FEYE:CHANne1:ENABled  
:FEYE:CHANne1:SID  
:FEYE:DIFF:ENABled  
:FEYE:DIFF:SID  
:FEYE:SAMPles  
:FEYE:STATe  
:FEYE:VIEW

#### SLOT Subsystem

TRIGger:BRATe  
TRIGger:BRATe:AUToDeTect  
TRIGger:DCDRatio  
TRIGger:DCDRatio:AUToDeTect  
TRIGger:PLENgtH  
TRIGger:PLENgtH:AUToDeTect  
TRIGger:TRACking

## Revision A.05.31, March 2016

Differences from revision A.05.30.

#### General Comments

- Improved the ability of the 86108A and 86108B to lock clock recovery to PAM-4 signals.

#### Defects Fixed

- Fixed a defect that could cause the eye diagram to be mis-aligned in Jitter Mode when SIRC or other signal processing was in use.
- Fixed a defect in differential de-embedding when a block was defined as "Dual 2-port" and the second port pair was a combination of sub-circuits.

## Revision A.05.30, January 2016

Differences from revision A.05.01.

#### General Comments

- Documented support for new N1055A TDR/TDT module option FS1 (fast sample rate). Option FS1 is automatically included on new N1055A modules.
- Documented N1090A electrical input connector (N1090A Option EEC).



## New Features

- Single-ended and differential de-embedding of TDR/TDT responses
- N1010A FlexDCA can now connect directly to the 86100D's FlexDCA application. As a result, N1010A FlexDCA supports TDR/TDT mode and all mini one-slot modules such as the N1055A TDR/TDT. The firmware version of N1010A FlexDCA and the 86100D's FlexDCA should be the same version (≥A.05.30).
- Draw eye contours on eye diagrams with Eye/Mask mode's Advanced Eye.
- New limit-line tools for creating and editing limit-lines in TDR/TDT and oscilloscope mode. The editor allows you to create and edit limit lines using a graphical user interface rather than directly modifying ASCII limit-line definition files in a text editor.
- Added DI, RN, and TI Advanced Eye measurements for NRZ signals. If the PAM-4 license is also installed these measurements can also be made on PAM-4 signals.
- For DJ, Jn, RJ, and TJ Advanced Eye measurements added the ability to select an individual eye within an eye diagram on which to perform the measurement. These measurements work with NRZ signals and PAM-4 signals (if the PAM-4 license is also installed).
- Simplified selection of TDR/TDT mode's measurement setup. The two setup tools, TDR DUT Based Setup and TDR Basic Control are still available, however the TDR DUT Based Setup has been emphasized while the TDR Basic Control setup can now only be accessed from the menu (click Setup > TDR Basic Control). The TDR DUT Based Setup is the recommended method to use.
- Display of in-phase and quadrature input waveforms on the setup dialog boxes for precision timebase references such as the 86100D-PTB, 86108B-PTD, and 86107A. To remotely query the waveform data, use the :WAVEform:SOURce command.
- Added to this help nine example programs for controlling FlexDCA. These are Python examples provided for both Python 3.4 and 2.7.

## CHANnel Subsystem

```
:CHANnel:BANDwidth:FREQuency (added command form)
:CHANnel:BANDwidth:FREQuency:MAXimum
:CHANnel:BANDwidth:FREQuency:MINimum
:CHANnel:BANDwidth:FREQuency:VSET?
:CHANnel:FSElect:RATE (added command form)
:CHANnel:FSElect:RATE:MAXimum
:CHANnel:FSElect:RATE:MINimum
:CHANnel:FSElect:RATE:VSET?
:CHANnel:WAVElength:VALue (added command form)
:CHANnel:WAVElength:VALue:VSET?
```

## DISK Subsystem

```
:DISK:DWIZard:ECResults:SDATa
:DISK:FILE:ASCIi:READ?
:DISK:FILE:EXISTS?
:DISK:FILE:READ?
:DISK:FILE:SIZE?
```

:DISK:FILE:WRITE?  
 :DISK:FILE:BFILe (deprecated)  
 :DISK:FILE:TFILe (deprecated)

### DISPlay Subsystem

:DISPlay:WINDow:ECLEgend  
 :DISPlay:WINDow:TIME:LEGEnd:ECExPAND

### ECONtour Subsystem

:ECONtour:BERates  
 :ECONtour:DISPlay  
 :ECONtour:PSpec  
 :ECONtour:RJStabilize  
 :ECONtour:RJSValue:EYE  
 :ECONtour:RNStabilize  
 :ECONtour:RNSValue:LEVe1  
 :ECONtour:SOURce

### LLINe Subsystem

:LLINe:SFILe  
 :LLINe:SFName

### :MEASure Subsystem (Acquisition)

:MEASure:ACQuire:ECOunt?

### :MEASure Subsystem (Advanced Eye)

:MEASure:EYE:DI  
 :MEASure:EYE:DI:LEVe1  
 :MEASure:EYE:DI:LOCation  
 :MEASure:EYE:DI:RNStabilize  
 :MEASure:EYE:DI:RNSValue:LEVe1  
 :MEASure:EYE:DI:SOURce  
 :MEASure:EYE:DI:STATus  
 :MEASure:EYE:DI:STATus:REASon  
 :MEASure:EYE:DJ:EYE  
 :MEASure:EYE:DJ:RJSValue (deprecated)  
 :MEASure:EYE:DJ:RJSValue:EYE  
 :MEASure:EYE:JN:EYE  
 :MEASure:EYE:JN:RJSValue (deprecated)  
 :MEASure:EYE:JN:RJSValue:EYE  
 :MEASure:EYE:RJ:EYE  
 :MEASure:EYE:RJ:RJSValue (deprecated)  
 :MEASure:EYE:RJ:RJSValue:EYE  
 :MEASure:EYE:RN  
 :MEASure:EYE:RN:LEVe1  
 :MEASure:EYE:RN:LOCation  
 :MEASure:EYE:RN:RNStabilize  
 :MEASure:EYE:RN:RNSValue:LEVe1  
 :MEASure:EYE:RN:SOURce  
 :MEASure:EYE:RN:STATus  
 :MEASure:EYE:RN:STATus:REASon  
 :MEASure:EYE:TI

```

:MEASure:EYE:TI:LEVel
:MEASure:EYE:TI:LOCation
:MEASure:EYE:TI:RNStabilize
:MEASure:EYE:TI:RNSValue:LEVel
:MEASure:EYE:TI:SOURce
:MEASure:EYE:TI:STATus
:MEASure:EYE:TI:STATus:REASon
:MEASure:EYE:TI:TIBer
:MEASure:EYE:TJ:EYE
:MEASure:EYE:TJ:RJSValue:EYE
:MEASure:EYE:TJ:RJSValue (deprecated)

```

#### :MEASure Subsystem (PAM 4)

```

:MEASure:EYE:PAM:EHeight:DEFine:EOpening:RJStabilize
:MEASure:EYE:PAM:EHeight:DEFine:EOpening:RJSValue:EYE
:MEASure:EYE:PAM:EHeight:DEFine:EOpening:RNStabilize
:MEASure:EYE:PAM:EHeight:DEFine:EOpening:RNSValue:LEVel
:MEASure:EYE:PAM:EWIDth:DEFine:EOpening:RJStabilize
:MEASure:EYE:PAM:EWIDth:DEFine:EOpening:RJSValue:EYE
:MEASure:EYE:PAM:EWIDth:DEFine:EOpening:RNStabilize
:MEASure:EYE:PAM:EWIDth:DEFine:EOpening:RNSValue:LEVel

```

#### :MEASure Subsystem (Limit Tests)

```

:MEASure:LTESt:ACQuire:COUNT?

```

#### PTIMEbase Subsystem

```

:PTIMEbase:VPTBsignals

```

#### RDCA Subsystem

```

:RDCA:CONNect:MODE
:RDCA:CONNect:TSETtings
:RDCA:DISConnect:TSETtings

```

#### SLOT Subsystem

```

:TRIGger:BRATe
:TRIGger:BRATe:AUTodetect
:TRIGger:DCDRatio
:TRIGger:DCDRatio:AUTodetect
:TRIGger:PLENght
:TRIGger:PLENght:AUTodetect
:TRIGger:TRACKing

```

#### SYSTEM Subsystem

```

:SYSTEM:ERRor:COUNT?
:SYSTEM:UTCNow?

```

#### TDR Subsystem

```

:TDR:DEEMbed:DUT:Enable
:TDR:DEEMbed:DUT:PORT:DPORT
:TDR:DEEMbed:DUT:PORT:FIXTure
:TDR:DEEMbed:DUT:PORT:TPORT

```

```
:TDR:FCOMponent:CLEar  
:TDR:FCOMponent:LOAD  
:TDR:FCOMponent:LOAD:FNAME  
:TDR:DEEMbed:FCOMponent:NOPorts?  
:TDR:DEEMbed:FCOMponent:PORDer  
:TDR:DEEMbed:FCOMponent:STATus?  
:TDR:DEEMbed:FCOMponent:STATus:REASon?
```

#### TI梅base Subsystem

```
:TI梅base:PTI梅base:VPTBsignals
```

## Revision A.05.01, October 2015

Differences from revision A.05.00.

#### General Comments

- Added 100G-CLR4 FEC mask
- Added TWDP and VECPq demo MATLAB user measurement scripts.
- For the N1090A DCA-M Single Optical Channel Sampling Oscilloscope, replaced the Clock Input Bandwidth specification with Clock Input Frequency. The N1090A can now be used with divided triggers down to 100 MHz, provided that the data rate exceeds 455 MHz. Added the Minimum Slew Rate specification.
- Improved measurement throughput for the N1055A module when FlexDCA is in TDR/TDT mode.
- Improved the accuracy and precision of fixture deskew.
- Added support for 32-bit versions of Windows 7 and 8. Windows XP is not supported.
- Renamed the File menu command “S-Parameter Memories” to “S-Parameter Viewer / Memories”.

#### Defects Fixed

- Fixed a defect that could cause autoscale to fail when using free-run PTB.
- Fixed a defect that could cause poor horizontal autoscale results when using a differential signal with the constituent channels not displayed.
- Fixed a defect where limit-line violation pixels were not being drawn correctly when the source signal was changed.
- Fixed defect where horizontal signal panning (via touch screen/mouse) did not work on waveform memories whose horizontal tracking was turned off.
- Fixed defect where BER Bathtub and JSA Spectrum graph did not have visible X and Y axis labels with the default black background.
- Fixed a problem preventing an 86107A PTB module from being used in an 86100D with the internal PTB option.

- Fixed defect that prevented help from being displayed when the help button was pressed on the module setup dialog for a USB module such as the N1090A.

## Revision A.05.00, July 2015

Differences from revision A.04.53.

### General Comments

- FlexDCA A.05.00 cannot be installed on 86100D mainframes running Windows XP. A mainframe upgrade to windows 7 is available.
- When installing FlexDCA on a PC, only 64 bit versions of Windows are supported.
- The VXI-11 server for controlling FlexDCA via SCPI remote commands cannot be enabled on Windows 8.1. SCPI connections via GPIB, Telnet, sockets, and HiSLIP do work with Windows 8.1.
- The skew range for the N1045A modules has been increased. To make use of this additional range, perform a skew calibration, which is available from the Skew tab in the Calibrations dialog box.

### New Features

- Support for new N1090A DCA-M Optical Sampling Oscilloscope extended module.
- Ability to perform user optical calibrations on an N1090A extended module within FlexDCA.
- User-defined measurements that are based on Python, MATLAB, and Compiled MATLAB in Oscilloscope, Eye/Mask, and TDR/TDT modes. Requires the N1010A-201 Advanced Waveform Analysis license and the installation of Python or MATLAB.
- User-defined signal processing functions that are based on Python, MATLAB, and Compiled MATLAB. Requires the N1010A-201 Advanced Waveform Analysis license and the installation of Python or MATLAB.
- TDEC measurement in Eye/Mask mode (activated with N1010A-500 Productivity Package License).
- S-parameter memory for saving and viewing multiple S-parameter waveforms.
- Added programming Quick Start Guide with Python examples.
- Switch between black or white backgrounds on all windows that display signals.
- Hide or display the measurement annotations on waveforms.
- Define Waveform pan and zoom behavior. In addition, if FlexDCA is installed on a PC or 86100D with a capacitive display, you can select between mouse control or multi-touch gestures.
- Ability to include metadata in screen captures (jpg, tiff).

### Defects Fixed

- Fixed a defect in the signal type detection autoscale algorithm when using PTB and a Free Run trigger.

### :CALibrate Subsystem Commands

```
:CALibrate:DARK:CHANnel:DISCard
:CALibrate:OPTical:CONVersion?
:CALibrate:OPTical:USER:CHANnel:OPower
:CALibrate:OPTical:USER:CHANnel:START
:CALibrate:OPTical:USER:CHANnel:WAVelength
```

### DISK Subsystem Commands

```
:DISK:SIMage:IMETadata
:DISK:SPARameter:EADifferenti
:DISK:SPARameter:LFName
:DISK:SPARameter:RECall
:DISK:SPARameter:RECall:DESTination
```

### :DISPlay Subsystem Command

```
:DISPlay:GRATicule:CURSor
:DISPlay:MULTitouch:STATe
:DISPlay:SWINdows:INVert:STATe
```

### :EMODules Subsystem Commands

```
:EMODules:DCAM:DEVICE?
:EMODules:SLOT:CMETHOD?
```

### LTEST Subsystem

```
:LTEST:ACQuire:SIMage:IMETadata
:LTEST:LLIne:SIMage:IMETadata
:LTEST:MEASure:SIMage:IMETadata
:LTEST:MTESt:SIMage:IMETadata
```

### :MEASure Subsystem Commands

```
:MEASure:ANNotations:STATe
:MEASure:EYE:TDEC
:MEASure:EYE:TDEC:LOCation?
:MEASure:EYE:TDEC:OMA:METHOD
:MEASure:EYE:TDEC:OMA:VALue
:MEASure:EYE:TDEC:SOURce
:MEASure:EYE:TDEC:STATus?
:MEASure:EYE:TDEC:STATus:REASon?
:MEASure:EYE:USER
:MEASure:EYE:USER:ABBReviation?
:MEASure:EYE:USER:CFILe
:MEASure:EYE:USER:CFILe:CLear
:MEASure:EYE:USER:CFILe:RELoad
:MEASure:EYE:USER:CFLoaded?
:MEASure:EYE:USER:COMMENTS?
:MEASure:EYE:USER:LOCation?
```

```

:MEASure:EYE:USER:LStatus?
:MEASure:EYE:USER:LStatus:REASon?
:MEASure:EYE:USER:NAME?
:MEASure:EYE:USER:SOURce
:MEASure:EYE:USER:STATus?
:MEASure:EYE:USER:STATus:REASon?
:MEASure:OSCilloscope:USER
:MEASure:OSCilloscope:USER:ABBReviation?
:MEASure:OSCilloscope:USER:CFILe
:MEASure:OSCilloscope:USER:CFILe:CLear
:MEASure:OSCilloscope:USER:CFILe:RELoad
:MEASure:OSCilloscope:USER:CFLoaded?
:MEASure:OSCilloscope:USER:COMMENTS?
:MEASure:OSCilloscope:USER:LOCation?
:MEASure:OSCilloscope:USER:LStatus?
:MEASure:OSCilloscope:USER:LStatus:REASon?
:MEASure:OSCilloscope:USER:NAME?
:MEASure:OSCilloscope:USER:REGion
:MEASure:OSCilloscope:USER:SOURce
:MEASure:OSCilloscope:USER:STATus?
:MEASure:OSCilloscope:USER:STATus:REASon?
:MEASure:TDEC:HWIDth
:MEASure:TDEC:MNFactor
:MEASure:TDEC:MPNFactor
:MEASure:TDEC:PRESets
:MEASure:TDEC:PRESets:SElections
:MEASure:TDEC:TBER
:MEASure:TDR:USER
:MEASure:TDR:USER:ABBReviation?
:MEASure:TDR:USER:CFILe
:MEASure:TDR:USER:CFILe:CLear
:MEASure:TDR:USER:CFILe:RELoad
:MEASure:TDR:USER:CFLoaded?
:MEASure:TDR:USER:COMMENTS?
:MEASure:TDR:USER:LOCation?
:MEASure:TDR:USER:LStatus?
:MEASure:TDR:USER:LStatus:REASon?
:MEASure:TDR:USER:NAME?
:MEASure:TDR:USER:REGion
:MEASure:TDR:USER:SOURce
:MEASure:TDR:USER:STATus?
:MEASure:TDR:USER:STATus:REASon?

```

#### :SLOT Subsystem Commands

```

:SLOT:TRIGger:MODE
:SLOT:TRIGger:MRATe?
:SLOT:TRIGger:SOURce

```

#### :SPRocess Subsystem Commands

```

:SPRocess:BUSer:ABBReviation
:SPRocess:BUSer:CFILe
:SPRocess:BUSer:CFILe:RELoad
:SPRocess:BUSer:CFLoaded
:SPRocess:BUSer:COMMENTS

```

:SPRocess:BUser:CONTRol:DOUBle  
:SPRocess:BUser:CONTRol:ENUM  
:SPRocess:BUser:CONTRol:FILE  
:SPRocess:BUser:CONTRol:INTeger  
:SPRocess:BUser:CONTRol:STRing  
:SPRocess:BUser:LSTatus  
:SPRocess:BUser:LSTatus:REASon  
:SPRocess:BUser:NAME  
:SPRocess:USER:ABBReviatiOn  
:SPRocess:USER:CFILe  
:SPRocess:USER:CFILe:RELOad  
:SPRocess:USER:CFLOaded  
:SPRocess:USER:COMMeNts  
:SPRocess:USER:CONTRol:DOUBle  
:SPRocess:USER:CONTRol:ENUM  
:SPRocess:USER:CONTRol:FILE  
:SPRocess:USER:CONTRol:INTeger  
:SPRocess:USER:CONTRol:STRing  
:SPRocess:USER:LSTatus  
:SPRocess:USER:LSTatus:REASon  
:SPRocess:USER:NAME

#### :SYSTEM Subsystem

:SYSTEM:MPButton:SIMage:IMETadata

#### :TDR Subsystem Commands

:TDR:SPMemory:CLEar  
:TDR:SPMemory:DTYPE  
:TDR:SPMemory:ENABle  
:TDR:SPMemory:LOAD  
:TDR:SPMemory:SOURce

## Revision A.04.54, October 2015

Differences from revision A.04.53.

**This is the last FlexDCA revision that supports Windows XP.**

### NOTE

#### New Features

- The skew range for N1045A modules has been increased. To make use of this additional range, perform a skew calibration, which is available from the Skew tab in the Calibrations dialog box.
- Improved measurement throughput for the N1055A module when FlexDCA is in TDR/TDT mode.

#### Defects Fixed

- Fixed a defect in the signal type detection autoscale algorithm when using PTB and a Free Run trigger.



## Revision A.04.53, June 2015

Differences from revision A.04.51.

### New Features

- Added a new PAM measurement in Eye/Mask Mode: PAM Levels Peak-to-Peak.
- Added Infiniband EDR and FDR masks.
- Added 100 GE-SR4 mask.
- Feedthrough compensation in TDR mode can now be turned off. Feedthrough compensation improves the flatness of the step response, but acquisition is slower.
- Improved reliability of RN/PI measurements in Jitter Mode. The measurement now always searches for locations in the pattern that are minimally impacted by jitter.
- Improved acquisition throughput when making TDR measurements.

### Defects Fixed

- Fixed an occasional calibration failure in the N1055A TDR Step Calibration.
- Fixed a defect that would cause vertical calibration to fail for some 86117A modules.
- Fixed a defect that would cause Jitter Mode to under report Sub Rate Jitter (SRJ) in certain situations.
- Fixed a defect that would result in errors in the waveform for certain combinations of data rate, pattern length, and bandwidth when SIRC, De-Embedding, or other Signal Processing operations were active.
- Fixed a defect that could cause TDR waveform charts to stop updating.
- Fixed a rounding error in skew calculations for TDR/TDT calibrations.
- Fixed a problem causing reduced responsiveness in Jitter Mode when working with long patterns.

### :ACQuire Subsystem Commands

:ACQuire:FEEDthru (new)

### :MEASure Subsystem Commands

:MEASure:EYE:PAM:PP (new)

:MEASure:EYE:PAM:PP:LEVe1 (new)

:MEASure:EYE:PAM:PP:LOCation? (new)

:MEASure:EYE:PAM:PP:SOURce (new)

:MEASure:EYE:PAM:PP:STATus? (new)

:MEASure:EYE:PAM:PP:STATus:REASon? (new)

## Revision A.04.51

Differences from revision A.04.50.

### Defects Fixed

- Fixed a defect that could cause user licenses to not be properly detected following a system reboot.

## Revision A.04.50, February 2015

Differences from revision A.04.20.

### General Comments

- The number of colors available for waveforms has been increased from 12 to 16 colors.

### Defects Fixed

- Dark calibration no longer fails if the precision timebase is active.

### New Features

- Pulse Amplitude Modulation (PAM-4) measurement capability in both Oscilloscope and Eye/Mask modes. In addition, Jitter analysis can be made on PAM-4 measurements in Jitter mode. Requires options 9FP or 9TP, PAM-N Analysis software license.
- Signals can now be automatically or manually selected be one of three signal types: Unspecified, NRZ format, or PAM4 format. The Signal Type setting is located on the various setup dialog boxes. If options 9FP or 9TP PAM-N Analysis software license is installed, also use the PAM-N Analysis Setup dialog box.
- Autoscale now identifies the signal type of each displayed waveform: Unspecified, NRZ format, and PAM4 format. Signal types can also be manually set.
- Multi-Purpose button on the 86100D's front-panel can now be assigned one of four actions:
  - Capture a screen image to a file.
  - Load an instrument setup file.
  - Play back a SCPI script.
  - Save a Documentation Wizard file.
- New Documentation Wizard that places user-selectable information into a zip file so that you can archive and transport them. The following list shows some of the items that can be placed in the zip file:
  - Screen capture
  - Instrument setup
  - Waveform data

- Results data shown on measurement panels
- System information
- Presets, which allow you to save your configuration settings. Presets significantly reduce setup time and are available for the following items:
  - 86108A/B Clock Recovery Configuration.
  - 83496A/B Clock Recovery Configuration.
  - Decision Feedback Equalizer (DFE) function configuration.
  - Continuous Time Linear Equalizer (CTLE) function configuration.
  - Linear Feedforward Equalizer function configuration.
- Limit Line Testing in TDR and Oscilloscope Modes.
- Waveform pixel intensity that makes waveforms easier to see in screen captures or when the display is viewed at a distance, such as during a presentation. Although thin traces and clusters of data points appear thicker and brighter on the display, the acquired data is not changed and all measurements, markers, histograms, saved waveforms, and other items are not affected.
- New Phase measurement in Oscilloscope Mode.
- New Jitter Mode Even-Odd (F/2) measurement, which is labeled F/2 (p-p) on the Jitter measurement results table. You can also add F/2 even-odd jitter to simulated signals.

#### :CHANnel Subsystem Commands

```
:CHANnel:PROBe:ATTenuation? (new)
:CHANnel:SIGNal:TYPE (new)
:CHANnel:SIGNal:TYPE:AUTO (new)
:CHANnel:SIGNal:TYPE:DETECT (new)
```

#### :CMODE Subsystem Commands (New Subsystem)

```
:CMODE:SIGNal:TYPE (new)
:CMODE:SIGNal:TYPE:AUTO (new)
:CMODE:SIGNal:TYPE:DETECT (new)
```

#### :CRECOVERY Subsystem Commands

```
:CRECOVERY:PRESets (new)
:CRECOVERY:PRESets:SELECTIONS? (new)
```

#### :DIFF Subsystem Commands

```
:DIFF:SIGNal:TYPE (new)
:DIFF:SIGNal:TYPE:AUTO (new)
:DIFF:SIGNal:TYPE:DETECT (new)
```

#### :DISK Subsystem Commands

```
:DISK:DWIZard:AMPLitude:SDATa (new)
:DISK:DWIZard:FNAME (new)
:DISK:DWIZard:GDElay:SDATa (new)
:DISK:DWIZard:HISTograms:SDATa (new)
```

:DISK:DWIZard:JGRaphs:SDATa (new)  
 :DISK:DWIZard:JITTer:SDATa (new)  
 :DISK:DWIZard:JSAResults:SDATa (new)  
 :DISK:DWIZard:JSASpectrum:SDATa (new)  
 :DISK:DWIZard:LLTResults:SDATa (new)  
 :DISK:DWIZard:MAGNitude:SDATa (new)  
 :DISK:DWIZard:MARKers:SDATa (new)  
 :DISK:DWIZard:MTESt:SDATa (new)  
 :DISK:DWIZard:PHASe:SDATa (new)  
 :DISK:DWIZard:RESuIts:SDATa (new)  
 :DISK:DWIZard:SAVE (new)  
 :DISK:DWIZard:SSCReen (new)  
 :DISK:DWIZard:SSETup (new)  
 :DISK:DWIZard:SSINfo (new)  
 :DISK:DWIZard:SSParam (new)  
 :DISK:DWIZard:TIME:SDATa (new)  
 :DISK:DWIZard:TOHMs:SDATa (new)  
 :DISK:DWIZard:TPERcent:SDATa (new)  
 :DISK:DWIZard:TVOLts:SDATa (new)

#### :DISPlay Subsystem Commands

:DISPlay:PINTensity (new)  
 :DISPlay:WINDow:AMPLitude:RVMode (new)  
 :DISPlay:WINDow:JITTer:RVMode (new)  
 :DISPlay:WINDow:RESuIts:RVMode (new)

#### :EMEMory Subsystem Commands

:EMEMory:SIGNa1:TYPE (new)

#### :FUNCTion Subsystem Commands

:FUNCTion:SIGNa1:TYPE (new)  
 :FUNCTion:SIGNa1:TYPE:TRACKing (new)

#### :LLINE Subsystem Commands (New Subsystem)

:LLINE:DISPlay (new)  
 :LLINE:HOFFset (new)  
 :LLINE:LOAD:FNAME (new)  
 :LLINE:SOURce (new)

#### :LTEST Subsystem Commands

:LTEST:LLINE:SIMage:FNAME (new)  
 :LTEST:LLINE:SIMage:INVert (new)  
 :LTEST:LLINE:SIMage:MONochrome (new)  
 :LTEST:LLINE:SIMage:SAVE (new)  
 :LTEST:LLINE:SIMage:SINClude (new)  
 :LTEST:LLINE:SIMage:STATE (new)  
 :LTEST:LLINE:SIMage:WINDow (new)  
 :LTEST:LLINE:SSUMmary:FNAME (new)  
 :LTEST:LLINE:SSUMmary:STATE (new)  
 :LTEST:LLINE:SWAVEform:CHANnel:FNAME (new)  
 :LTEST:LLINE:SWAVEform:CHANnel:STATE (new)  
 :LTEST:LLINE:SWAVEform:CHANnel:WMEMory (new)

```

:LTESt:LLINe:SWAVeform:CMODE:FNAME (new)
:LTESt:LLINe:SWAVeform:CMODE:STATE (new)
:LTESt:LLINe:SWAVeform:CMODE:WMEMemory (new)
:LTESt:LLINe:SWAVeform:DIFF:FNAME (new)
:LTESt:LLINe:SWAVeform:DIFF:STATE (new)
:LTESt:LLINe:SWAVeform:DIFF:WMEMemory (new)
:LTESt:LLINe:SWAVeform:FUNCTion:FNAME (new)
:LTESt:LLINe:SWAVeform:FUNCTion:STATE (new)
:LTESt:LLINe:SWAVeform:FUNCTion:WMEMemory (new)
:LTESt:LLINe:SWAVeform:RESet (new)
:LTESt:LLINe:TEST:MODE (new)
:LTESt:LLINe:TEST:STATE (new)

```

### :MEASure Subsystem Commands

```

:MEASure:EYE:PAM:EHeight (new)
:MEASure:EYE:PAM:EHeight:DEFine:EOPening (new)
:MEASure:EYE:PAM:EHeight:DEFine:EOPening:PROBability (new)
:MEASure:EYE:PAM:EHeight:EYE (new)
:MEASure:EYE:PAM:EHeight:LOCation (new)
:MEASure:EYE:PAM:EHeight:SOURce (new)
:MEASure:EYE:PAM:EHeight:STATus (new)
:MEASure:EYE:PAM:EHeight:STATus:REASon (new)
:MEASure:EYE:PAM:ELEVe1 (new)
:MEASure:EYE:PAM:ELEVe1:EYE (new)
:MEASure:EYE:PAM:ELEVe1:LOCation (new)
:MEASure:EYE:PAM:ELEVe1:SOURce (new)
:MEASure:EYE:PAM:ELEVe1:STATus (new)
:MEASure:EYE:PAM:ELEVe1:STATus:REASon (new)
:MEASure:EYE:PAM:ESKew (new)
:MEASure:EYE:PAM:ESKew:EYE (new)
:MEASure:EYE:PAM:ESKew:LOCation (new)
:MEASure:EYE:PAM:ESKew:SOURce (new)
:MEASure:EYE:PAM:ESKew:STATus (new)
:MEASure:EYE:PAM:ESKew:STATus:REASon (new)
:MEASure:EYE:PAM:EWidth (new)
:MEASure:EYE:PAM:EWidth:DEFine:EOPening (new)
:MEASure:EYE:PAM:EWidth:DEFine:EOPening:PROBability (new)
:MEASure:EYE:PAM:EWidth:EYE (new)
:MEASure:EYE:PAM:EWidth:LOCation (new)
:MEASure:EYE:PAM:EWidth:SOURce (new)
:MEASure:EYE:PAM:EWidth:STATus (new)
:MEASure:EYE:PAM:EWidth:STATus:REASon (new)
:MEASure:EYE:PAM:LEVe1 (new)
:MEASure:EYE:PAM:LEVe1:LEVe1 (new)
:MEASure:EYE:PAM:LEVe1:LOCation (new)
:MEASure:EYE:PAM:LEVe1:SOURce (new)
:MEASure:EYE:PAM:LEVe1:STATus (new)
:MEASure:EYE:PAM:LEVe1:STATus:REASon (new)
:MEASure:EYE:PAM:LINearity (new)
:MEASure:EYE:PAM:LINearity:LOCation (new)
:MEASure:EYE:PAM:LINearity:SOURce (new)
:MEASure:EYE:PAM:LINearity:STATus? (new)
:MEASure:EYE:PAM:LINearity:STATus:REASon? (new)
:MEASure:EYE:PAM:RMS (new)

```

```

:MEASure:EYE:PAM:RMS:LEVel (new)
:MEASure:EYE:PAM:RMS:LOCation (new)
:MEASure:EYE:PAM:RMS:SOURce (new)
:MEASure:EYE:PAM:RMS:STATus (new)
:MEASure:EYE:PAM:RMS:STATus:REASon (new)
:MEASure:EYE:PAM:SKEW (new)
:MEASure:EYE:PAM:SKEW:LEVel (new)
:MEASure:EYE:PAM:SKEW:LOCation (new)
:MEASure:EYE:PAM:SKEW:SOURce (new)
:MEASure:EYE:PAM:SKEW:STATus (new)
:MEASure:EYE:PAM:SKEW:STATus:REASon (new)
:MEASure:JITTer:FOVer2 (new)
:MEASure:JITTer:FOVer2:LOCation (new)
:MEASure:JITTer:FOVer2:SOURce (new)
:MEASure:JITTer:FOVer2:STATus (new)
:MEASure:JITTer:FOVer2:STATus:REASon (new)
:MEASure:LLIne:FPOints (new)
:MEASure:LLIne:FPOints:STATus? (new)
:MEASure:LLIne:FPOints:STATus:REASon? (new)
:MEASure:LLIne:LINE:FPOints (new)
:MEASure:LLIne:LINE:FPOints:STATus? (new)
:MEASure:LLIne:LINE:FPOints:STATus:REASon? (new)
:MEASure:LLIne:LINE:MARGin (new)
:MEASure:LLIne:LINE:MARGin:STATus? (new)
:MEASure:LLIne:LINE:MARGin:STATus:REASon? (new)
:MEASure:LLIne:LINE:MLOCation (new)
:MEASure:LLIne:LINE:MLOCation:STATus? (new)
:MEASure:LLIne:LINE:MLOCation:STATus:REASon? (new)
:MEASure:LLIne:MARGin (new)
:MEASure:LLIne:MARGin:STATus? (new)
:MEASure:LLIne:MARGin:STATus:REASon? (new)
:MEASure:LLIne:MLOCation (new)
:MEASure:LLIne:MLOCation:STATus? (new)
:MEASure:LLIne:MLOCation:STATus:REASon? (new)
:MEASure:OSCilloscope:PAM:LEVel (new)
:MEASure:OSCilloscope:PAM:LEVel:LEVel (new)
:MEASure:OSCilloscope:PAM:LEVel:LOCation? (new)
:MEASure:OSCilloscope:PAM:LEVel:REGion (new)
:MEASure:OSCilloscope:PAM:LEVel:SOURce (new)
:MEASure:OSCilloscope:PAM:LEVel:STATus? (new)
:MEASure:OSCilloscope:PAM:LEVel:STATus:REASon? (new)
:MEASure:OSCilloscope:PAM:LINearity (new)
:MEASure:OSCilloscope:PAM:LINearity:LOCation? (new)
:MEASure:OSCilloscope:PAM:LINearity:REGion (new)
:MEASure:OSCilloscope:PAM:LINearity:SOURce (new)
:MEASure:OSCilloscope:PAM:LINearity:STATus? (new)
:MEASure:OSCilloscope:PAM:LINearity:STATus:REASon? (new)
:MEASure:OSCilloscope:PAM:RMS (new)
:MEASure:OSCilloscope:PAM:RMS:LEVel (new)
:MEASure:OSCilloscope:PAM:RMS:LOCation? (new)
:MEASure:OSCilloscope:PAM:RMS:REGion (new)
:MEASure:OSCilloscope:PAM:RMS:SOURce (new)
:MEASure:OSCilloscope:PAM:RMS:STATus? (new)
:MEASure:OSCilloscope:PAM:RMS:STATus:REASon? (new)
:MEASure:OSCilloscope:PHASe (new)

```

```

:MEASure:OSCilloscope:PHASe:EDIRection (new)
:MEASure:OSCilloscope:PHASe:ENUMber (new)
:MEASure:OSCilloscope:PHASe:ETHReshold (new)
:MEASure:OSCilloscope:PHASe:LOCation (new)
:MEASure:OSCilloscope:PHASe:REGion (new)
:MEASure:OSCilloscope:PHASe:SOURce (new)
:MEASure:OSCilloscope:PHASe:STATus (new)
:MEASure:OSCilloscope:PHASe:STATus:REASon (new)
:MEASure:PAM:AMPLitude:UNITs (new)
:MEASure:PAM:EYE:ELMethoD (new)
:MEASure:PAM:EYE:ESTiming (new)
:MEASure:PAM:EYE:PPERcent (new)
:MEASure:PAM:EYE:TIME:LTDefinition (new)
:MEASure:PAM:EYE:TIME:UNITs (new)
:MEASure:TDR:ECAPacitance:REFerence:TYPE (revised)
:MEASure:TDR:ECAPacitance:REFerence:VALue (new)
:MEASure:TDR:EINDuctance:REFerence:TYPE (revised)
:MEASure:TDR:EINDuctance:REFerence:VALue (new)

```

#### :SPRocess Subsystem Commands

```

:SPRocess:CTLequalizer:PRESets (new)
:SPRocess:CTLequalizer:PRESets:SELECTIONs? (new)
:SPRocess:DFEQualizer:PRESets (new)
:SPRocess:DFEQualizer:PRESets:SELECTIONs? (new)
:SPRocess:FFEQualizer:PRESets (new)
:SPRocess:FFEQualizer:PRESets:SELECTIONs? (new)

```

#### :SOURce Subsystem Commands

```

:SOURce:FOTWo:JITTer (new)
:SOURce:FOTWo:STATe (new)
:SOURce:FORMat (new)

```

#### :STATus Subsystem Commands

Addition of new limit-line event register.

```

:STATus:LLINE:ENABle (new)
:STATus:LLINE:EVENT? (new)

```

#### :SYSTem Subsystem Commands

```

:SYSTem:MPButton:DOCWizard:BFName (new)
:SYSTem:MPButton:FUNCTion (new)
:SYSTem:MPButton:QSETup:FNAME (new)
:SYSTem:MPButton:QSPBack:EYE:FNAME (new)
:SYSTem:MPButton:QSPBack:FNAME (new)
:SYSTem:MPButton:QSPBack:JITTer:FNAME (new)
:SYSTem:MPButton:QSPBack:OSCilloscope:FNAME (new)
:SYSTem:MPButton:QSPBack:SSCRipt (new)
:SYSTem:MPButton:QSPBack:TDR:FNAME (new)
:SYSTem:MPButton:SIMage:BFName (new)
:SYSTem:MPButton:SIMage:INVert (new)
:SYSTem:MPButton:SIMage:MONochrome (new)
:SYSTem:MPButton:SIMage:SAVE (new)
:SYSTem:OSYSTem (new)

```

:SYSTem:PERSONa:MANUFACTURer (new)  
:SYSTem:PERSONa:MANUFACTURer:DEFault (new)  
:SYSTem:PERSONa:MODEl (new)  
:SYSTem:PERSONa:MODEl:DEFault (new)  
:SYSTem:STAutodetect (new)

#### :WMEMory Subsystem Commands

- :WMEMory:SIGNal:TYPE (new)

## Revision A.04.20, October 2014

Differences from revision A.04.00.

#### New Features

- For TDR/TDT mode's Time-Ohms, Time-Volts, and Time-% T-parameter graphs, added the ability to configure the X-axis in distance (meters).

#### :GRAPh Subsystem Commands (New Subsystem)

:GRAPh:T:OHMS:X:DCONstant (new)  
:GRAPh:T:OHMS:X:POSition (new)  
:GRAPh:T:OHMS:X:SCALE (new)  
:GRAPh:T:OHMS:X:UNITs (new)  
:GRAPh:T:OHMS:X:VFACtor (new)  
:GRAPh:T:PERCent:X:DCONstant (new)  
:GRAPh:T:PERCent:X:POSition (new)  
:GRAPh:T:PERCent:X:SCALE (new)  
:GRAPh:T:PERCent:X:UNITs (new)  
:GRAPh:T:PERCent:X:VFACtor (new)  
:GRAPh:T:VOLTS:X:DCONstant (new)  
:GRAPh:T:VOLTS:X:POSition (new)  
:GRAPh:T:VOLTS:X:SCALE (new)  
:GRAPh:T:VOLTS:X:UNITs (new)  
:GRAPh:T:VOLTS:X:VFACtor (new)

#### :MEASure Subsystem Commands

:MEASure:RESults? (new)

## Revision A.04.00, August 2014

Differences from revision A.03.00.

#### New Features

- TDR/TDT Mode.
- Support for new N1055A 35/50 GHz TDR/TDT Remote Head module.



- For TDR Mode's S-parameter waveforms, a tracking-marker pair reports the Y values on magnitude, phase, and group delay waveforms for a single common X position. Set one X position value and get three Y values. The Magnitude and  $\Delta$  Mag values are reported in the Marker results table.
- Common Mode Operator

#### :CALibrate Subsystem Commands

```
:CALibrate:SLOT:STEP (new)
:CALibrate:SLOT:STEP:STATus? (new)
:CALibrate:SLOT:STEP:STATus:DETailS (new)
:CALibrate:SLOT:STEP:STATus:DTEmpErature (new)
:CALibrate:SLOT:STEP:STATus:TIME (new)
```

#### :CHANnel Subsystem Commands (New Subsystem)

##### :CHANnel:YUNits (command form added)

```
:CMODE Subsystem Commands (new)
:CMODE:COLor (new)
:CMODE:CWINDow (new)
:CMODE:DISPlay (new)
:CMODE:STATus? (new)
:CMODE:UNDEFined:BASE (new)
:CMODE:UNDEFined:DISTal (new)
:CMODE:UNDEFined:MESial (new)
:CMODE:UNDEFined:PROXimal (new)
:CMODE:UNDEFined:TOP (new)
:CMODE:UNAME (new)
:CMODE:YBOTtom (new)
:CMODE:YOFFset (new)
:CMODE:YSCale (new)
:CMODE:YTOP (new)
:CMODE:YUNits (new)
```

##### :DIFF Subsystem Commands

```
:DIFF:YUNits (command form added)
```

##### :DISK Subsystem Commands

```
:DISK:SPARAmeter:DSDiff (new)
:DISK:SPARAmeter:DSIoutput (new)
:DISK:SPARAmeter:DSReciprocal (new)
:DISK:SPARAmeter:DUT (new)
:DISK:SPARAmeter:FNAME (new)
:DISK:SPARAmeter:FWBehavior (new)
:DISK:SPARAmeter:PSET (new)
:DISK:SPARAmeter:SAVE (new)
```

##### :DISPlay Subsystem Command

```
:DISPlay:WINDow:T:OHMS:DMODE (new)
:DISPlay:WINDow:T:OHMS:LEGend:EXPand (new)
:DISPlay:WINDow:T:OHMS:ZSIGnal (new)
```

```
:DISPlay:WINDow:T:PERCent:DMODE (new)
:DISPlay:WINDow:T:PERCent:LEGend:EXPand (new)
:DISPlay:WINDow:T:PERCent:ZSIGnal (new)
:DISPlay:WINDow:T:VOLTs:DMODE (new)
:DISPlay:WINDow:T:VOLTs:LEGend:EXPand (new)
:DISPlay:WINDow:T:VOLTs:ZSIGnal (new)
```

### :FUNction Subsystem Commands

```
:FUNction:FOPerator INTegrate (deprecated argument)
:FUNction:FOPerator SUMMation (new argument)
```

### :GRAPh Subsystem Commands (New Subsystem)

```
:GRAPh:T:OHMS:AUToscale (new)
:GRAPh:T:OHMS:Y:AUToscale (new)
:GRAPh:T:OHMS:Y:OFFSet (new)
:GRAPh:T:OHMS:Y:SCALE (new)
:GRAPh:T:PERCent:AUToscale (new)
:GRAPh:T:PERCent:Y:AUToscale (new)
:GRAPh:T:PERCent:Y:OFFSet (new)
:GRAPh:T:PERCent:Y:SCALE (new)
:GRAPh:T:VOLTs:AUToscale (new)
:GRAPh:T:VOLTs:Y:AUToscale (new)
:GRAPh:T:VOLTs:Y:OFFSet (new)
:GRAPh:T:VOLTs:Y:SCALE (new)
```

### :JSAMemory Subsystem Commands

```
:JSAMemory:JSANalysis:SPECTrum:ASCii:YDATA? (new)
:JSAMemory:JSANalysis:SPECTrum:DOUBle:YDATA? (new)
:JSAMemory:JSANalysis:SPECTrum:FLOat:YDATA? (new)
:JSAMemory:JSANalysis:SPECTrum:PEAKs? (new)
:JSAMemory:JSANalysis:SPECTrum:PEAKs:ALL? (new)
:JSAMemory:JSANalysis:SPECTrum:POINts? (new)
:JSAMemory:JSANalysis:SPECTrum:XINCrement? (new)
:JSAMemory:JSANalysis:SPECTrum:XORigin? (new)
```

### :LTEST Subsystem Commands

```
:LTEST:ACQUIRE:SWAVEform:CMODE:FNAME (new)
:LTEST:ACQUIRE:SWAVEform:CMODE:STATE (new)
:LTEST:ACQUIRE:SWAVEform:CMODE:WMEMORY (new)
:LTEST:MEASURE:SWAVEform:CMODE:FNAME (new)
:LTEST:MEASURE:SWAVEform:CMODE:STATE (new)
:LTEST:MEASURE:SWAVEform:CMODE:WMEMORY (new)
:LTEST:MTTEST:SWAVEform:CMODE:FNAME (new)
:LTEST:MTTEST:SWAVEform:CMODE:STATE (new)
:LTEST:MTTEST:SWAVEform:CMODE:WMEMORY (new)
```

### :MARKer Subsystem Commands

```
:MARKer:X:SOURce:DUT (new)
:MARKer:X:SOURce:SPARAmeter (new)
:MARKer:X:SOURce:TYPE (new)
:MARKer:Y:SOURce:DUT (new)
:MARKer:Y:SOURce:SPARAmeter (new)
```

:MARKer:Y:SOURce:TYPE (new)

### :MEASure Subsystem Commands

:MEASure:JSAMemory:DJ? (new)  
 :MEASure:JSAMemory:DJ:STATus? (new)  
 :MEASure:JSAMemory:DJ:STATus:REASon? (new)  
 :MEASure:JSAMemory:RJ? (new)  
 :MEASure:JSAMemory:RJ:STATus? (new)  
 :MEASure:JSAMemory:RJ:STATus:REASon? (new)  
 :MEASure:JSAMemory:TJ? (new)  
 :MEASure:JSAMemory:TJ:STATus? (new)  
 :MEASure:JSAMemory:TJ:STATus:REASon? (new)  
 :MEASure:LTESt:MLIMit:FAILures (new)  
 :MEASure:LTESt:MLIMit:WAVEforms (new)  
 :MEASure:TDR:DELTatime (new)  
 :MEASure:TDR:DELTatime:EDIRection (new)  
 :MEASure:TDR:DELTatime:ENUMber (new)  
 :MEASure:TDR:DELTatime:ETHReshold (new)  
 :MEASure:TDR:DELTatime:LOCation? (new)  
 :MEASure:TDR:DELTatime:REGion (new)  
 :MEASure:TDR:DELTatime:SOURce (new)  
 :MEASure:TDR:DELTatime:STATus? (new)  
 :MEASure:TDR:DELTatime:STATus:REASon? (new)  
 :MEASure:TDR:ECAPacitance (new)  
 :MEASure:TDR:ECAPacitance:LOCation? (new)  
 :MEASure:TDR:ECAPacitance:REFerence:TYPE (new)  
 :MEASure:TDR:ECAPacitance:REGion (new)  
 :MEASure:TDR:ECAPacitance:SOURce (new)  
 :MEASure:TDR:ECAPacitance:STATus? (new)  
 :MEASure:TDR:ECAPacitance:STATus:REASon? (new)  
 :MEASure:TDR:EINDuctance (new)  
 :MEASure:TDR:EINDuctance:LOCation? (new)  
 :MEASure:TDR:EINDuctance:REFerence:TYPE (new)  
 :MEASure:TDR:EINDuctance:REGion (new)  
 :MEASure:TDR:EINDuctance:SOURce (new)  
 :MEASure:TDR:EINDuctance:STATus? (new)  
 :MEASure:TDR:EINDuctance:STATus:REASon? (new)  
 :MEASure:TDR:FALLtime (new)  
 :MEASure:TDR:FALLtime:LOCation? (new)  
 :MEASure:TDR:FALLtime:REGion (new)  
 :MEASure:TDR:FALLtime:SOURce (new)  
 :MEASure:TDR:FALLtime:STATus? (new)  
 :MEASure:TDR:FALLtime:STATus:REASon? (new)  
 :MEASure:TDR:LIST:CLEar (new)  
 :MEASure:TDR:LIST:REMOve (new)  
 :MEASure:TDR:LIST:SELEct (new)  
 :MEASure:TDR:RISetime (new)  
 :MEASure:TDR:RISetime:LOCation? (new)  
 :MEASure:TDR:RISetime:REGion (new)  
 :MEASure:TDR:RISetime:SOURce (new)  
 :MEASure:TDR:RISetime:STATus? (new)  
 :MEASure:TDR:RISetime:STATus:REASon? (new)  
 :MEASure:TDR:TEDGE (new)  
 :MEASure:TDR:TEDGE:DIRection (new)

```

:MEASure:TDR:TEDGe:LOCation? (new)
:MEASure:TDR:TEDGe:NUMBer (new)
:MEASure:TDR:TEDGe:REGion (new)
:MEASure:TDR:TEDGe:SOURce (new)
:MEASure:TDR:TEDGe:STATus? (new)
:MEASure:TDR:TEDGe:STATus:REASon? (new)
:MEASure:TDR:TEDGe:THReshold (new)
:MEASure:TDR:TMAXimum (new)
:MEASure:TDR:TMAXimum:LOCation? (new)
:MEASure:TDR:TMAXimum:REGion (new)
:MEASure:TDR:TMAXimum:SOURce (new)
:MEASure:TDR:TMAXimum:STATus? (new)
:MEASure:TDR:TMAXimum:STATus:REASon? (new)
:MEASure:TDR:TMINimum (new)
:MEASure:TDR:TMINimum:LOCation? (new)
:MEASure:TDR:TMINimum:REGion (new)
:MEASure:TDR:TMINimum:SOURce (new)
:MEASure:TDR:TMINimum:STATus? (new)
:MEASure:TDR:TMINimum:STATus:REASon? (new)
:MEASure:TDR:TVOLt (new)
:MEASure:TDR:TVOLt:EDIRection (new)
:MEASure:TDR:TVOLt:ENUMber (new)
:MEASure:TDR:TVOLt:LOCation? (new)
:MEASure:TDR:TVOLt:REGion (new)
:MEASure:TDR:TVOLt:SOURce (new)
:MEASure:TDR:TVOLt:STATus? (new)
:MEASure:TDR:TVOLt:STATus:REASon? (new)
:MEASure:TDR:TVOLt:YVALue (new)
:MEASure:TDR:VAverage (new)
:MEASure:TDR:VAverage:AREa (new)
:MEASure:TDR:VAverage:LOCation? (new)
:MEASure:TDR:VAverage:REGion (new)
:MEASure:TDR:VAverage:SOURce (new)
:MEASure:TDR:VAverage:STATus? (new)
:MEASure:TDR:VAverage:STATus:REASon? (new)
:MEASure:TDR:VMAXimum (new)
:MEASure:TDR:VMAXimum:LOCation? (new)
:MEASure:TDR:VMAXimum:REGion (new)
:MEASure:TDR:VMAXimum:SOURce (new)
:MEASure:TDR:VMAXimum:STATus? (new)
:MEASure:TDR:VMAXimum:STATus:REASon? (new)
:MEASure:TDR:VMINimum (new)
:MEASure:TDR:VMINimum:LOCation? (new)
:MEASure:TDR:VMINimum:REGion (new)
:MEASure:TDR:VMINimum:SOURce (new)
:MEASure:TDR:VMINimum:STATus? (new)
:MEASure:TDR:VMINimum:STATus:REASon? (new)
:MEASure:TDR:VTIME (new)
:MEASure:TDR:VTIME:LOCation? (new)
:MEASure:TDR:VTIME:REGion (new)
:MEASure:TDR:VTIME:SOURce (new)
:MEASure:TDR:VTIME:STATus? (new)
:MEASure:TDR:VTIME:STATus:REASon? (new)
:MEASure:TDR:VTIME:TIME (new)

```

**:SYSTem Subsystem Commands**

:SYSTem:BORDer (new)

**:TDR Subsystem Commands**

:TDR:ADAPters:CANCe1 (new)  
 :TDR:ADAPters:CONNeCtor (new)  
 :TDR:ADAPters:CONTInue (new)  
 :TDR:ADAPters:DELAy (new)  
 :TDR:ADAPters:DSPEC (new)  
 :TDR:ADAPters:NAME (new)  
 :TDR:ADAPters:OVERwrite (new)  
 :TDR:ADAPters:SCHANnel (new)  
 :TDR:ADAPters:SDONe? (new)  
 :TDR:ADAPters:STARt (new)  
 :TDR:AMODE (new)  
 :TDR:ASNaming (new)  
 :TDR:CALibration:ATIMEbase (new)  
 :TDR:CALibration:AVERages (new)  
 :TDR:CALibration:CANCe1 (new)  
 :TDR:CALibration:CONTInue (new)  
 :TDR:CALibration:DRMCA1 (new)  
 :TDR:CALibration:DUT:CDATA? (new)  
 :TDR:CALibration:DUT:CDATA:REASon? (new)  
 :TDR:CALibration:DUT:LOAD (new)  
 :TDR:CALibration:DUT:LOAD:FNAME (new)  
 :TDR:CALibration:DUT:CDRSet (new)  
 :TDR:CALibration:DUT:CLEar (new)  
 :TDR:CALibration:DUT:CONFIg? (new)  
 :TDR:CALibration:DUT:CONFIg:REASon? (new)  
 :TDR:CALibration:DUT:CRSet (new)  
 :TDR:CALibration:DUT:DRSet (new)  
 :TDR:CALibration:DUT:ECAL:ADAPters:A (new)  
 :TDR:CALibration:DUT:ECAL:ADAPters:B (new)  
 :TDR:CALibration:DUT:ECAL:CHAR (new)  
 :TDR:CALibration:DUT:ECAL:MODUle (new)  
 :TDR:CALibration:DUT:ECAL:STATus? (new)  
 :TDR:CALibration:DUT:ECAL:STATus:REASon? (new)  
 :TDR:CALibration:DUT:ENABle (new)  
 :TDR:CALibration:DUT:FDRSet (new)  
 :TDR:CALibration:DUT:METHod (new)  
 :TDR:CALibration:DUT:NOCSteps (new)  
 :TDR:CALibration:DUT:RDUT (new)  
 :TDR:CALibration:DUT:SENDED:PORT:CKIT (new)  
 :TDR:CALibration:DUT:SENDED:PORT:CONNeCtor (new)  
 :TDR:CALibration:DUT:SKAPorts (new)  
 :TDR:CALibration:DUT:STARt (new)  
 :TDR:CALibration:SDONe (new)  
 :TDR:CALibration:STEP? (new)  
 :TDR:CALibration:STEP:COUNT? (new)  
 :TDR:CALibration:STEP:SELEct (new)  
 :TDR:CALibration:UCURrent (new)  
 :TDR:CHANnel:DUT (new)  
 :TDR:CHANnel:PORT (new)  
 :TDR:DESKew:CANCe1 (new)

```

:TDR:DESKew:CONTinue (new)
:TDR:DESKew:DUT (new)
:TDR:DESKew:FNAME (new)
:TDR:DESKew:SAVE (new)
:TDR:DESKew:SCHannel (new)
:TDR:DESKew:SDONE? (new)
:TDR:DESKew:STARt (new)
:TDR:DUT:ACMatch (new)
:TDR:DUT:ACONnect (new)
:TDR:DUT:ADPNaming (new)
:TDR:DUT:DIFFerential:NPORT:UNAME (new)
:TDR:DUT:DIFFerential:PPORT:UNAME (new)
:TDR:DUT:DIFFerential:SIGNal:UNAME (new)
:TDR:DUT:DTYPe (new)
:TDR:DUT:ENABle (new)
:TDR:DUT:RISetime (new)
:TDR:DUT:SENDEd:PORT:UNAME (new)
:TDR:DUT:STATus? (new)
:TDR:DUT:STATus:REASon? (new)
:TDR:EXPerience (new)
:TDR:FINCrement (new)
:TDR:STATus? (new)
:TDR:STATus:REASon? (new)
:TDR:STIMulus:CHANnel:AMPLitude (new)
:TDR:STIMulus:CHANnel:METHod (new)
:TDR:STIMulus:CHANnel:POLarity (new)
:TDR:STIMulus:CHANnel:SKEW (new)
:TDR:STIMulus:CHANnel:STATus? (new)
:TDR:STIMulus:CHANnel:STEP (new)
:TDR:STIMulus:CHANnel:TYPe (new)
:TDR:STIMulus:SLOT:RATE (new)
:TDR:STIMulus:SLOT:RATE:AUTomatic (new)

```

### :TRACe Subsystem Commands

```

:TRACe:COLor (new)
:TRACe:CWINDow (new)
:TRACe:DISPlay (new)
:TRACe:DUT (new)
:TRACe:OPERator (new)
:TRACe:PARAmeter (new)
:TRACe:STATus? (new)
:TRACe:UDEfined:BASE (new)
:TRACe:UDEfined:DIStal (new)
:TRACe:UDEfined:MESial (new)
:TRACe:UDEfined:PROXimal (new)
:TRACe:UDEfined:TOP (new)
:TRACe:UNAME (new)
:TRACe:XLEFt? (new)
:TRACe:XPOSITION? (new)
:TRACe:XREFERence? (new)
:TRACe:XRIGHT? (new)
:TRACe:XSCALE? (new)
:TRACe:XUNits? (new)
:TRACe:YBOTtom? (new)

```

```
:TRACe:YOFFset? (new)
:TRACe:YSCale? (new)
:TRACe:YTOP? (new)
:TRACe:YUNits? (new)
```

## Revision A.03.00, May, 2014

Differences from revision A.02.51.

### General Comments

- FlexDCA is compatible with Windows XP and Windows 7 but is not compatible with Windows 8.
- The acquisition buttons located on the menu bar are now always displayed. Previously, these buttons could be hidden using the **Show Run/Stop Controls in Title Bar** check box that was located in the **Display Setup** dialog box. This check box has been removed.

### New Feature List

- Support for new 86100D-PTB option, an internal precision timebase.
- Perform multiple mask tests at the same time.
- Up to 16 measurement limit tests (including mask limit tests for specific regions of a mask).
- Increased the number of markers. The number of Tracking Markers have been increased from two to four. The number of Manual Line Markers have been increased from four to eight.
- Content windows for displaying Waveform, Magnitude, Phase, and Group Delay waveforms that have incompatible vertical or horizontal units from the primary time-based Waveform window.
- Content window toolbar replaces the toolbar flyout. The new buttons provide tasks such as markers and viewing waveforms as overlapped, tiled, stacked, or zoom tiled.
- Ability to add waveform labels with a meaningful custom user name.

### :CALibrate Subsystem Commands

```
:CALibrate:FRAMe:PTIMEbase:STARt (new)
:CALibrate:FRAMe:PTIMEbase:STATus (new)
:CALibrate:FRAMe:PTIMEbase:STATus:DETailS (new)
:CALibrate:FRAMe:PTIMEbase:STATus:DTEmpereature (new)
:CALibrate:FRAMe:PTIMEbase:STATus:TIME (new)
:CALibrate:FRAMe:TIMEbase:STATus (new)
:CALibrate:FRAMe:TIMEbase:STATus:DETailS (new)
:CALibrate:FRAMe:TIMEbase:STATus:DTEmpereature (new)
:CALibrate:FRAMe:TIMEbase:STATus:TIME (new)
:CALibrate:TIMEbase:SLOT:STARt (new)
:CALibrate:TIMEbase:SLOT:STATus (new)
:CALibrate:TIMEbase:SLOT:STATus:DETailS (new)
:CALibrate:TIMEbase:SLOT:STATus:DTEmpereature (new)
```

```

:CALibrate:TIMEbase:SLOT:STATUS:TIME (new)
:CALibrate:FRAME:STATUS? (deprecated)
:CALibrate:FRAME:STATUS:DETAILS? (deprecated)
:CALibrate:FRAME:STATUS:DTEMPERATURE? (deprecated)
:CALibrate:FRAME:STATUS:TIME? (deprecated)
:CHANnel Subsystem Commands
:CHANnel:CWINDOW (new)
:CHANnel:UNAME (new)
:DIFF Subsystem Commands
:DIFF:CWINDOW (new)
:DIFF:UNAME (new)
:DISK Subsystem Command
:DISK:SIMage:GONLy (deprecated)
:DISK:SIMage:WINDOW (new)
:DISPlay Subsystem Command
:DISPlay:FDOmain:LEGend (new)
:DISPlay:GRATicule:MCONtrols (removed)
:DISPlay:LOCation:LSECondary:AWINDOW (new)
:DISPlay:LOCation:PRIMary:AWINDOW (new)
:DISPlay:LOCation:RSECondary:AWINDOW (new)
:DISPlay:TBControls (removed)
:DISPlay:TDOmain:LEGend (new)
:DISPlay:TMAsk (new)
:DISPlay:WINDOW:GDElay:DMODE (new)
:DISPlay:WINDOW:GDElay:ZSIGNal (new)
:DISPlay:WINDOW:MAGNitude:DMODE (new)
:DISPlay:WINDOW:MAGNitude:ZSIGNal (new)
:DISPlay:WINDOW:PHASe:DMODE (new)
:DISPlay:WINDOW:PHASe:ZSIGNal (new)
:DISPlay:WINDOW:TIME:DMODE (new)
:DISPlay:WINDOW:TIME:ZSIGNal (new)
:EMEMory Subsystem Command
:EMEMory:CWINDOW (new)
:EMEMory:UNAME (new)
:FUNCTion Subsystem Command
:FUNCTion:CWINDOW (new)
:FUNCTion:UNAME (new)
:GRAPh Subsystem Commands (new)
:GRAPh:GDElay:AUTOscale (new)
:GRAPh:GDElay:X:AUTOscale (new)
:GRAPh:GDElay:X:CENTer (new)
:GRAPh:GDElay:X:SPAN (new)
:GRAPh:GDElay:X:START (new)
:GRAPh:GDElay:X:STOP (new)
:GRAPh:GDElay:Y:AUTOscale (new)
:GRAPh:GDElay:Y:OFFSet (new)
:GRAPh:GDElay:Y:SCALE (new)
:GRAPh:MAGNitude:AUTOscale (new)
:GRAPh:MAGNitude:X:AUTOscale (new)
:GRAPh:MAGNitude:X:CENTer (new)
:GRAPh:MAGNitude:X:SPAN (new)
:GRAPh:MAGNitude:X:START (new)
:GRAPh:MAGNitude:X:STOP (new)
:GRAPh:MAGNitude:Y:AUTOscale (new)
:GRAPh:MAGNitude:Y:OFFSet (new)

```



```

:GRAPh:MAGNitude:Y:SCALe (new)
:GRAPh:PHASe:AUToscale (new)
:GRAPh:PHASe:X:AUToscale (new)
:GRAPh:PHASe:X:CENTer (new)
:GRAPh:PHASe:X:SPAN (new)
:GRAPh:PHASe:X:STARt (new)
:GRAPh:PHASe:X:STOP (new)
:GRAPh:PHASe:Y:AUToscale (new)
:GRAPh:PHASe:Y:OFFSet (new)
:GRAPh:PHASe:Y:SCALe (new)
:JDMemory Subsystem Command
:JDMemory:CWINdow (new)
:LTEST Subsystem Commands
:LTEST:ACQuire:SIMage:WINDow (new)
:LTEST:MEASure:MLIMit:FAILures (new)
:LTEST:MEASure:MLIMit:FREGion (new)
:LTEST:MEASure:MLIMit:LLIMit (new)
:LTEST:MEASure:MLIMit:SOURce:LOCation (new)
:LTEST:MEASure:MLIMit:SOURce:TYPE (new)
:LTEST:MEASure:MLIMit:STATe (new)
:LTEST:MEASure:MLIMit:ULIMit (new)
:LTEST:MEASure:MLIMit:UPACTion (new)
:LTEST:MEASure:SIMage:WINDow (new)
:LTEST:MTESt:MRESult:FAILures (new)
:LTEST:MTESt:MRESult:STATe (new)
:LTEST:MTESt:SIMage:WINDow (new)
:LTEST:ACQuire:SIMage:GONLy (deprecated)
:LTEST:MEASure:AMPLitude:LOCation:FAILures (removed)
:LTEST:MEASure:AMPLitude:LOCation:FREGion (removed)
:LTEST:MEASure:AMPLitude:LOCation:LLIMit (removed)
:LTEST:MEASure:AMPLitude:LOCation:STATe (removed)
:LTEST:MEASure:AMPLitude:LOCation:ULIMit (removed)
:LTEST:MEASure:AMPLitude:LOCation:UPACTion (removed)
:LTEST:MEASure:CRECovey:LOCation:FAILures (removed)
:LTEST:MEASure:CRECovey:LOCation:FREGion (removed)
:LTEST:MEASure:CRECovey:LOCation:LLIMit (removed)
:LTEST:MEASure:CRECovey:LOCation:STATe (removed)
:LTEST:MEASure:CRECovey:LOCation:ULIMit (removed)
:LTEST:MEASure:CRECovey:LOCation:UPACTion (removed)
:LTEST:MEASure:EYE:LOCation:FAILures (removed)
:LTEST:MEASure:EYE:LOCation:FREGion (removed)
:LTEST:MEASure:EYE:LOCation:LLIMit (removed)
:LTEST:MEASure:EYE:LOCation:STATe (removed)
:LTEST:MEASure:EYE:LOCation:ULIMit (removed)
:LTEST:MEASure:EYE:LOCation:UPACTion (removed)
:LTEST:MEASure:JITTer:LOCation:FAILures (removed)
:LTEST:MEASure:JITTer:LOCation:FREGion (removed)
:LTEST:MEASure:JITTer:LOCation:LLIMit (removed)
:LTEST:MEASure:JITTer:LOCation:STATe (removed)
:LTEST:MEASure:JITTer:LOCation:ULIMit (removed)
:LTEST:MEASure:JITTer:LOCation:UPACTion (removed)
:LTEST:MEASure:MTESt:LOCation:FAILures (removed)
:LTEST:MEASure:MTESt:LOCation:FREGion (removed)
:LTEST:MEASure:MTESt:LOCation:LLIMit (removed)
:LTEST:MEASure:MTESt:LOCation:STATe (removed)

```

```

:LTESt:MEASure:MTESt:LOCation:ULIMit (removed)
:LTESt:MEASure:MTESt:LOCation:UPACtion (removed)
:LTESt:MEASure:OSCilloscope:LOCation:FAILures (removed)
:LTESt:MEASure:OSCilloscope:LOCation:FREGion (removed)
:LTESt:MEASure:OSCilloscope:LOCation:LLIMit (removed)
:LTESt:MEASure:OSCilloscope:LOCation:STATe (removed)
:LTESt:MEASure:OSCilloscope:LOCation:ULIMit (removed)
:LTESt:MEASure:OSCilloscope:LOCation:UPACtion (removed)
:LTESt:MEASure:SIMage:GONLy (deprecated)
:LTESt:MTESt:FAILures (deprecated)
:LTESt:MTESt:SIMage:GONLy (deprecated)
:LTESt:MTESt:STATe (deprecated)
:MARKer Subsystem Commands
:MARKer:REFerence (new)
:MEASure Subsystem Commands
:MEASure:MARKer:IDX? (new)
:MEASure:MARKer:IDX:STATus? (new)
:MEASure:MARKer:IDX:STATus:REASon? (new)
:MEASure:MARKer:DX? (new)
:MEASure:MARKer:DX:STATus? (new)
:MEASure:MARKer:DX:STATus:REASon? (new)
:MEASure:MARKer:DY? (new)
:MEASure:MARKer:DY:STATus? (new)
:MEASure:MARKer:DY:STATus:REASon? (new)
:MARKer:IXDELta? (deprecated)
:MARKer:IXDELta:STATus? (deprecated)
:MARKer:IXDELta:STATus:REASon? (deprecated)
:MARKer:XDELta? (deprecated)
:MARKer:XDELta:STATus? (deprecated)
:MARKer:XDELta:STATus:REASon? (deprecated)
:MARKer:YDELta? (deprecated)
:MARKer:YDELta:STATus? (deprecated)
:MARKer:YDELta:STATus:REASon? (deprecated)
:MTESt Subsystem Commands
:MTESt:ALIGNment:X (new)
:MTESt:ALIGNment:X:METHOD (new)
:MTESt:ALIGNment:Y (new)
:MTESt:ALIGNment:Y:METHOD (new)
:MTESt:AMETHOD (deprecated)
:MTESt:SMODE (deprecated)
:MTESt:YALign (deprecated)
:SPROcess Subsystem Commands
:SPROcess:FFT:DISPlay (revised)
:SPROcess:FFT:PREFerence (new)
:SPROcess:FFT:PREFerence:TORigin (new)
:TIMebase Subsystem Commands
:TIMebase:PTIMebase:QPHase (new)
:TIMebase:PTIMebase:RFRequency (new)
:TIMebase:PTIMebase:RFRequency:AUTO (new)
:TIMebase:PTIMebase:RMETHOD (new)
:TIMebase:PTIMebase:RTReference (new)
:TIMebase:PTIMebase:STATe (new)
:TRIGger Subsystem Commands
:TRIGger:MODE (new)
:TRIGger:BWLimit (removed)

```

```

:WAVEform Subsystem Commands
:WAVEform:XYFormat:POINts:CLIPped:HIGH? (new)
:WAVEform:XYFormat:POINts:CLIPped:LOW? (new)
:WAVEform:XYFormat:POINts:HOLes? (new)
:WAVEform:YFormat:POINts:CLIPped:HIGH? (new)
:WAVEform:YFormat:POINts:CLIPped:LOW? (new)
:WAVEform:YFormat:POINts:HOLes? (new)
:WAVEform:YFormat:WORD:ENCoding:CHIGH? (revised)
:WMEMory Subsystem Command
:WMEMory:CWINdow (new)
:WMEMory:UNAMe (new)

```

## Revision A.02.51, January, 2014

Differences from revision A.02.50.

### General Comments

An improved phase detector gain algorithm was implemented that allows for more accurate JSA measurements.

### New Feature List

Support for N108xA-Series IEEE 802.3 Ethernet KR/CR Compliance and Debug Application.

## Revision A.02.50, October, 2013

Differences from revision A.02.02

### General Comments

- Edited the 86118A module specification topic for adjusted 86118-H01 the channel skew specification and for information added concerning 86118-H02 module's 1 mm input connectors.
- Added specifications for the 86105D-281 module.
- Added specifications for the 86115D-282 module.

### General Defects Fixed

- Fixed a memory leak in the precision timebase synchronization. This leak would cause the instrument to report insufficient memory error messages after several days.
- Fixed a bug that prevented use of the knobs on the 86112A-HBW module.
- Improved the precision timebase synchronization to be less sensitive to signal drift.

### New Feature List

- New Jitter Spectrum Analysis (JSA) memory and ability to save JSA data files (\*.jsax). This allows JSA data to be viewed offline.

- When the jitter database is saved to disk, JSA is included if Clock Recovery Emulation (CRE) is active.
- New tail fit method available in Jitter Mode, which enables the following new scalar measurements:
  - BUI (rms) for ones and zeros
  - BUI ( $\delta$ - $\delta$ ) for ones and zeros
  - BUJ
  - BUJ (rms)
- Ability to measure TJ (Total Jitter), DJ (Deterministic Jitter), RJ (Random Jitter), J2, J5, and J9 on long patterns such as PRBS31. This is accomplished within FlexDCA with an option 401 license but without the use of the option 401 spreadsheet. A new Advanced Eye tab is enabled in Eye/Mask Mode. This feature requires the option 401 Advanced Eye Analysis Software license.

### New Command Subsystem

:JSAMemory

### New :DISK Subsystem Programming Command

:DISK:JSANalysis:FNAME  
 :DISK:JSANalysis:RECall  
 :DISK:JSANalysis:RECall:DESTination  
 :DISK:JSANalysis:SAVE

### New :DISPlay Subsystem Commands

:DISPlay:JITTer:CCEdge

### New :MEASure Subsystem Commands

:MEASure:AMPLitude:BIROnes  
 :MEASure:AMPLitude:BIROnes:LOCation  
 :MEASure:AMPLitude:BIROnes:SOURce  
 :MEASure:AMPLitude:BIROnes:STATus  
 :MEASure:AMPLitude:BIROnes:STATus:REASon  
 :MEASure:AMPLitude:BIrZeros  
 :MEASure:AMPLitude:BIrZeros:LOCation  
 :MEASure:AMPLitude:BIrZeros:SOURce  
 :MEASure:AMPLitude:BIrZeros:STATus  
 :MEASure:AMPLitude:BIrZeros:STATus:REASon  
 :MEASure:AMPLitude:BUIOnes  
 :MEASure:AMPLitude:BUIOnes:LOCation  
 :MEASure:AMPLitude:BUIOnes:SOURce  
 :MEASure:AMPLitude:BUIOnes:STATus  
 :MEASure:AMPLitude:BUIOnes:STATus:REASon  
 :MEASure:AMPLitude:BUIZeros  
 :MEASure:AMPLitude:BUIZeros:LOCation  
 :MEASure:AMPLitude:BUIZeros:SOURce  
 :MEASure:AMPLitude:BUIZeros:STATus  
 :MEASure:AMPLitude:BUIZeros:STATus:REASon  
 :MEASure:AMPLitude:ISIHist:SAMPles?

```

:MEASure:AMPLitude:RNPIhist:SAMPles?
:MEASure:AMPLitude:SMETHod?
:MEASure:AMPLitude:TIHist:SAMPles?
:MEASure:EYE:DJ
:MEASure:EYE:DJ:RJSTabilize
:MEASure:EYE:DJ:RJSValue
:MEASure:EYE:JN
:MEASure:EYE:JN:RJSTabilize
:MEASure:EYE:JN:RJSValue
:MEASure:EYE:JN:SJN
:MEASure:EYE:RJ
:MEASure:EYE:TJ
:MEASure:EYE:TJ:RJSTabilize
:MEASure:EYE:TJ:RJSValue
:MEASure:EYE:TJ:TJBer
:MEASure:JITTer:BUJ
:MEASure:JITTer:BUJ:LOCation
:MEASure:JITTer:BUJ:SOURce
:MEASure:JITTer:BUJ:STATus
:MEASure:JITTer:BUJ:STATus:REASon
:MEASure:JITTer:BUJRms
:MEASure:JITTer:BUJRms:LOCation
:MEASure:JITTer:BUJRms:SOURce
:MEASure:JITTer:BUJRms:STATus
:MEASure:JITTer:BUJRms:STATus:REASon
:MEASure:JITTer:DDJHist:SAMPles?
:MEASure:JITTer:DEFine:SMETHod
:MEASure:JITTer:LJMode
:MEASure:JITTer:RJPJhist:SAMPles?
:MEASure:JITTer:SMETHod?
:MEASure:JITTer:TJHist:SAMPles?

```

## Revision A.02.02, May, 2013

Differences from revision A.02.00.

### General Comments

- Improvements added to eye measurement algorithms.
- Support added for N1012A OIF CEI 3.0 Compliance and Debug Application version 2.00.

### New Feature List

- Skew calibration added for 86118A H01 modules.
- Fixture deskew added for 86118A H01 modules.
- Ability to open legacy Color Grade-Gray Scale memory files (.cgs).

## Revision A.02.00, January, 2013

Differences from revision A.01.80.

### General Comments

- FlexDCA is now the 86100D's default user interface. The 86100D can be placed in one of three configurations: Standard, Hybrid, or Legacy.
- For working offline, the DCA's data simulation state is now integrated with standard live channels. Open FlexDCA normally without using a command-line switch.
- Added two example programs for performing calibrations. Each program illustrates a different method of controlling execution timing.

## NOTE

**FlexDCA is compatible with Windows XP and Windows 7 but is not compatible with Windows 8.**

### New Feature List

- Ability to use one-slot mini modules.
- Added new N1045A one-slot mini-module with two or four remote electrical heads.
- Extended Module feature to control supported external instruments (via LAN) such as the N4877A clock data recovery and demultiplexer.
- Added automatic fixture deskew.
- Added Skew Calibration to remove difference in electrical length between the remote sampling heads on N1045A and 86118A-H01 modules.
- Added automatic differential deskew to apply Hardware Skew to two differential channels.
- Added probe support and setup to Standard configuration.
- In Standard configuration, the 86100D supports SCPI connectivity via GPIB, VXI--11 LAN, Telnet, Sockets, and HiSlip.
- Ability to adjust the 86100D front-panel calibration output (DC Cal) voltage.
- Added Absolute and Square Root math operators.
- Added Decision Feedback Equalizer and Sin(X)/X signal-processing operators.
- Support for the N1014A SFF-8431 Compliance Application.
- Added Undo, Redo, and History.
- Added new Ethernet Mask: 100G-SR10 10.3125
- Added new OIF-CEI masks and SFF-8431 masks.

### CALibrate Subsystem Programming Commands

```
:CALibrate:CHAN:ENABled (new)
:CALibrate:CHAN:STATus (new)
:CALibrate:CHAN:STATus:DETailS (new)
:CALibrate:CHAN:STATus:DTEmpErature (new)
:CALibrate:CHAN:STATus:TIME (new)
:CALibrate:OUTPut (new)
:CALibrate:SKEW:SLOT:STARt (new)
```

```

:CALibrate:SKEW:SLOT:STATus? (new)
:CALibrate:SKEW:SLOT:STATus:DETAils? (new)
:CALibrate:SKEW:SLOT:STATus:DTEMPerature? (new)
:CALibrate:SKEW:SLOT:STATus:TIME? (new)
:CHANnel Subsystem Programming Commands
:CHANnel:BANDwidth:FREQUency (new)
:CHANnel:FSElect:RATE (new)
:CHANnel:PROBe (new)
:CHANnel:WAVElength:VALue (new)
:CRECovey Subsystem Programming Commands
:CRECovey:CFRequency? (new)
:CRECovey:TDENSity? (new)
:CRECovey:OUTPut:DMODE (new)
:DISPlay Subsystem Programming Commands
:DISPlay:JITTer:GRAPh:TYPE (new)
:DISPlay:JITTer:GRAPh? (deprecated)
:DISPlay:MDISPlay:DOCK (new)
:EMODules Subsystem Programming Commands (new)
The :EMODules extended modules subsystem controls the connection of
extended and simulated modules.
:EMODules:CRECovey:SADDress (new)
:EMODules:CRECovey:VADDress (new)
:EMODules:REConnect (new)
:EMODules:SIMulator:SRATE (new)
:EMODules:SLOT:ADDRes (new)
:EMODules:SLOT:CONNect (new)
:EMODules:SLOT:DISConnect (new)
:EMODules:SLOT:SELECTION (new)
:EMODules:SLOT:STATe (new)
:PTIMEbase Subsystem Programming Commands
:PTIMEbase:RIPROgress (deprecated)
:SIMulator Subsystem Programming Commands (deprecated)
This entire subsystem has been deprecated. Use the :SOUR subsystem
instead.

```

### **:SOURce Subsystem Programming Commands (new)**

The new :SOURce subsystem configures the source signal of extended and simulated modules.

```

:SOURce:AMPLitude (new)
:SOURce:DIFFerential (new)
:SOURce:DRATE (new)
:SOURce:FILTer:CUTOFF (new)
:SOURce:FILTer:STATe (new)
:SOURce:FILTer:TYPE (new)
:SOURce:FNAME (new)
:SOURce:FUNCTion (new)
:SOURce:INVert (new)
:SOURce:JITTer:RJ (new)
:SOURce:JITTer:STATe (new)
:SOURce:NOISE:RN (new)
:SOURce:NOISE:STATe (new)
:SOURce:OENable (new)
:SOURce:OFFSet (new)
:SOURce:PATTern (new)

```

```
:SOURCE:WType (new)
:SPROcess Subsystem Programming Commands
:SPROcess:DFEQualizer:BANDwidth (new)
:SPROcess:DFEQualizer:BANDwidth:AUTO (new)
:SPROcess:DFEQualizer:CLKDelay (new)
:SPROcess:DFEQualizer:DWAVEform (new)
:SPROcess:DFEQualizer:TAPS (new)
:SPROcess:DFEQualizer:TAPS:AUTO (new)
:SPROcess:DFEQualizer:TAPS:COUNT (new)
:SPROcess:DFEQualizer:TAPS:RECalculate (new)
:SPROcess:DFEQualizer:TARGET:AUTO (new)
:SPROcess:DFEQualizer:TARGET:LOWer (new)
:SPROcess:DFEQualizer:TARGET:UPPer (new)
:SYSTEM Programming Commands Subsystem
:SYSTEM:FCONfig (new)
:SYSTEM:GTLocal (new)
:SYSTEM:LAUNch (new)
:SYSTEM:TEMPerature (new)
:SYSTEM:UAUToscale (deprecated)
:SYSTEM:UDEFault (deprecated)
```

## Revision A.01.80, June, 2012

Differences from revision A.01.70.

### General Comments

- FlexDCA requires Agilent IO Libraries 16.2 or later. If you have a prior version installed, it will be upgraded to version 16.2.
- FlexDCA requires the Agilent licensing system 4.3 or later. This includes "Agilent License Manager", "Agilent ACCL Licensing", and "Agilent Host Processor Platform".
- Removed the Control menu. The Auto Scale, Run, Stop, Single, and Clear functions can more easily be accomplished by clicking the buttons that are shown to the right of the menu bar. The Undo Auto Scale command has been moved to the top of the Setup menu.

### New Feature List

- Ability to use 86100D DCA-X applications. Added the Apps menu to the menu bar for launching applications.
- Support for the N1012A OIF CEI Compliance 3.0 Application and N1019A User Defined Application Tool. The new menu also supports user-added shortcuts to files and Windows applications.



- FlexDCA now includes the ability to take into account the effect of external devices such as attenuators or transducers. With this feature, FlexDCA will report waveform and measurement results referenced to the input of the external device instead of the input of the oscilloscope channel. Additionally, if you have configured external attenuator or transducer settings in the 86100C/D firmware, they will be transferred to FlexDCA when using "Transfer Basic" on connection to the DCA.
- New copy-to-clipboard buttons on the shortcut menus for pasting waveform images or measurement data to external applications.
- Ability to find a bit sequence in a pattern waveform.
- Ability to select one of four color schemes for displaying color-grade persistence waveforms. This includes a color scheme that matches the classic 86100A/B/C/D firmware.
- Ability to select color or monochrome display of gray-scale persistence waveforms.
- The remote SCPI interface is fully supported on 64-bit operating systems.
- The bandwidth of a differential signal can be configured from a single drop-down in the GUI.
- The message area can now be "docked" so that it is permanently visible. To enable this feature, access the "Display Setup" dialog from the "Setup" menu. Near the bottom of the "Appearance" tab is a checkbox called "Dock Message Area".

#### General Defects Fixed

- Changed the default trigger bandwidth on the 86100D-STR frame from "Filtered Edge" to "Standard Edge".
- The waveform save feature will only allow you to save waveforms that are currently displayed. Previously, waveforms that had been acquired but not displayed could also be saved, which made it easy to accidentally save the wrong waveform.
- Fixed the remote command ":DISK:SIMage:SINclude" in eye mode.
- Fixed a defect that caused Precision Timebase Synchronization to take a very long time to complete when a PRBS 23 pattern was in use.

#### Common Programming Commands

```
*IDN? (revised)
:ACQuire Subsystem Programming Commands
:ACQuire:REnGth:AUTO (deprecated)
:ACQuire:REnGth:MODE (new)
:ACQuire:SPBit:AUTO (deprecated)
:ACQuire:SPBit:MODE (new)
:CHANnel Subsystem Programming Commands
:CHANnel:ATTenuator:DECibels (new)
:CHANnel:ATTenuator:RATio (new)
:CHANnel:ATTenuator:RESet (new)
:CHANnel:ATTenuator:STATe? (new)
:CHANnel:TRANsdncer:GAIN (new)
:CHANnel:TRANsdncer:OFFSet (new)
```

```

:CHANnel:TRANsducer:STATe (new)
:CHANnel:TRANsducer:UNITs (new)
:CREcovery Subsystem Programming Commands
:CREcovery:JSAAnalysis:SPECTrum:PEAKs? (new)
:DISPlay Subsystem Programming Commands
:DISPlay:CGSPepectrum (new)
:DISPlay:GSSPepectrum (new)
:SYSTem Subsystem Programming Commands
:SYSTem:MODEl? (revised)
:TIMEbase Subsystem Programming Commands
:TIMEbase:FIND:NEXT (new)
:TIMEbase:FIND:SEQuence (new)
:TIMEbase:FIND:SIGNa1 (new)

```

## Revision A.01.70, April, 2012

Differences from revision A.01.61

### New Feature List

- Support for 86108B Precision Waveform Analyzer module.
- Added Measurement Regions in Oscilloscope Mode.
- Improved Signals Palette with three display modes: Full, Compact, and Mini.
- Jitter Spectrum Analysis and Software Clock Recovery Emulation.
- Added new Ethernet Mask: OTU4 G.959.1
- Improvements to precision timebase synchronization.

### New and Changed :CALibrate Subsystem Programming Commands

```

:CALibrate:CREcovery:{SLOT[1:4] | LMODule | RMODule}:START? (deprecated)
:CALibrate:CREcovery:{SLOT[1:4] | LMODule | RMODule}:STATUS? (deprecated)
:CALibrate:CREcovery:{SLOT[1:4] | LMODule | RMODule}:STATUS:DETAilS?
(deprecated)
:CALibrate:CREcovery:{SLOT[1:4] | LMODule | RMODule}:STATUS:TEMPeRature?
(deprecated)
:CALibrate:CREcovery:{SLOT[1:4] | LMODule | RMODule}:STATUS:TIME?
(deprecated)
:CALibrate:DARK:CHAN<N>:STATUS:DTEMPeRature? (new)
:CALibrate:DARK:CHAN<N>:STATUS:TEMPeRature? (deprecated)
:CALibrate:MODule:{SLOT[1:4] | LMODule | RMODule}:START (deprecated)
:CALibrate:MODule:{SLOT[1:4] | LMODule | RMODule}:STATUS? (deprecated)
:CALibrate:MODule:{SLOT[1:4] | LMODule | RMODule}:STATUS:DETAilS?
(deprecated)
:CALibrate:MODule:{SLOT[1:4] | LMODule | RMODule}:STATUS:TEMPeRature?
(deprecated)
:CALibrate:MODule:{SLOT[1:4] | LMODule | RMODule}:STATUS:TIME?
(deprecated)
:CALibrate:SLOT[1:4]:CREcovery? (new)
:CALibrate:SLOT[1:4]:CREcovery:STATUS? (new)
:CALibrate:SLOT[1:4]:CREcovery:STATUS:DETAilS? (new)
:CALibrate:SLOT[1:4]:CREcovery:STATUS:DTEMPeRature? (new)
:CALibrate:SLOT[1:4]:CREcovery:STATUS:TIME? (new)

```

```

:CALibrate:SLOT[1:4]:ENABled (new)
:CALibrate:SLOT[1:4]:STARt (new)
:CALibrate:SLOT[1:4]:STATus? (new)
:CALibrate:SLOT[1:4]:STATus:DETAils? (new)
:CALibrate:SLOT[1:4]:STATus:DEmperature? (new)
:CALibrate:SLOT[1:4]:STATus:TIME? (new)
:CALibrate:SLOT[1:4]:PTIMEbase (new)
:CALibrate:SLOT[1:4]:PTIMEbase:STATus (new)
:CALibrate:SLOT[1:4]:PTIMEbase:STATus:DETAils (new)
:CALibrate:SLOT[1:4]:PTIMEbase:STATus:DEmperature (new)
:CALibrate:SLOT[1:4]:PTIMEbase:STATus:TIME (new)
:CALibrate:SLOT[1:4]:VERTical (new)
:CALibrate:SLOT[1:4]:VERTical:STATus? (new)
:CALibrate:SLOT[1:4]:VERTical:STATus:DETAils? (new)
:CALibrate:SLOT[1:4]:VERTical:STATus:DEmperature? (new)
:CALibrate:SLOT[1:4]:VERTical:STATus:TIME? (new)
:CALibrate:VERTical:{SLOT[1:4] | LMODule | RMODule}:STARt (deprecated)
:CALibrate:VERTical:{SLOT[1:4] | LMODule | RMODule}:STATus? (deprecated)
:CALibrate:VERTical:{SLOT[1:4] | LMODule | RMODule}:STATus:DETAils?
(deprecated)
:CALibrate:VERTical:{SLOT[1:4] | LMODule | RMODule}:STATus:TEMPerature?
(deprecated)
:CALibrate:VERTical:{SLOT[1:4] | LMODule | RMODule}:STATus:TIME?
(deprecated)
New and Changed :DISPlay Subsystem Programming Commands
:DISPlay:SPAlette:MODE (new)
:DISPlay:SPAlette:COMpact (deprecated)
:CREcovery, :DISPlay, and :MEASure Subsystem Option JSA Commands
:DISPlay:JSANalysis:SGRAph (new)
:CREcovery[1:4]:JSANalysis:ACQuire (new)
:CREcovery[1:4]:JSANalysis:FFTMagnitude:ECOunt (new)
:CREcovery[1:4]:JSANalysis:FFTMagnitude:SMOothing (new)
:CREcovery[1:4]:JSANalysis:INTEgrate:F (new)
:CREcovery[1:4]:JSANalysis:PLLorder:FGAIIn (new)
:CREcovery[1:4]:JSANalysis:PLLorder:FPOLe (new)
:CREcovery[1:4]:JSANalysis:PLLorder:FZERo (new)
:CREcovery[1:4]:JSANalysis:PLLorder:JTF:BWIDth (new)
:CREcovery[1:4]:JSANalysis:PLLorder:JTF:PEAKing (new)
:CREcovery[1:4]:JSANalysis:PLLorder:MODE (new)
:CREcovery[1:4]:JSANalysis:PLLorder:OJTF:BWIDth (new)
:CREcovery[1:4]:JSANalysis:PLLorder:OJTF:DFACTor (new)
:CREcovery[1:4]:JSANalysis:PLLorder:ORDER (new)
:CREcovery[1:4]:JSANalysis:RJCorrection (new)
:CREcovery[1:4]:JSANalysis:SPECTrum (new)
:MEASure:CREcovery[1:4]:DJ (new)
:MEASure:CREcovery[1:4]:RJ (new)
:MEASure:CREcovery[1:4]:TJ (new)
:MEASure Subsystem Region Commands
:MEASure:AMPLitude:BERLimit (revised)
:MEASure:REGions:COUnT (new)
:MEASure:REGions:REGion (new)
:MEASure:REGions:STATe (new)
General Defects Fixed

```

- For programming commands that have discrete parameters, (for example, :ACquire:SMOothing) the :DEFault, :VSET, :NEXT, and :PREV child commands are no longer documented.
- For programming commands that have numerical values, the :DEFault, :MINimum, and :MAXimum child commands are no longer documented.
- Added programming topics for :SOURce, :LOCation, :STATus, and :STATus:REASon child commands to the measurement commands within the :MEASure subsystem.

#### Known Issues

- The remote SCPI interface is limited to the HiSLIP, Telnet, and Sockets protocols when running on a 64-bit Windows OS. To make use of this functionality, the program "Agilent.N1000.x86.exe" needs to be launched instead of the default "Agilent.N1000.exe".

## Revision A.01.61, February, 2012

Differences from revision A.01.60.

#### General Comments

- Connecting to a remote instrument requires 86100C/D firmware A.10.60 or later.

#### New Feature List

- Added an "Auto Scale" button to top of the main GUI.

#### General Defects Fixed

- Resolved a defect that prevented Jitter Mode measurements if SIRC and Precision Timebase were active.
- Fixed a defect that would cause jitter mode to poorly auto scale differential signals causing Amplitude Analysis measurements to be made at the wrong time.
- Extended the "Transfer Basic" option of FlexDCA to bring over the following categories of settings from the remote instrument:
  - Channel configuration (including bandwidth, wavelength, and reference filter).
  - Timebase scale configuration.
  - Trigger source and bandwidth configuration.
  - Pattern Lock configuration.
  - Precision Timebase configuration.
  - Clock Recovery configuration (86108A and 83496A/B).
  - Differential signal (if the remote instrument has a subtract math function on a differential pair).
- Fixed a defect that would cause the results of "Transfer Basic" to vary based on the prior configuration.

- Resolved a number of usability issues when performing calibrations of the 86108A.
- The "Relock" dialog will no longer come up when the user is instructed to disable signals as part of the calibration.
- At the end of calibration, the user is instructed to reconnect signals, clock recovery is re-locked, and precision timebase is synchronized automatically.
- Resolved a defect that would cause clock recovery modules to have the wrong loop bandwidth when defining loop bandwidth as a rate divisor.

#### Known Issues

- The remote SCPI interface is limited to the HiSLIP, Telnet, and Sockets protocols when running on a 64-bit Windows OS. To make use of this functionality, the program "Agilent.N1000.x86.exe" needs to be launched instead of the default "Agilent.N1000.exe".

## Revision A.01.60, December, 2011

Differences from revision A.01.50.

#### General Comments

- Connecting to a remote instrument requires 86100C/D firmware A.10.60 or later.

#### New Feature List

- Added a Continuous Time Linear Equalizer (CTLE) math function. The CTLE requires option 201, Advanced Waveform Analysis.
- Added a Delay math function. The Delay function adds a customizable time delay to the input waveform.
- Added an Align math function. The Align function delays one input waveform to align it with a second input waveform.
- Added support for Option 500, Productivity Package, which includes Rapid Eye. Rapid Eye significantly reduces the time required to acquire eye-diagram samples. If several eye diagrams are displayed, Auto Scale can be configured to apply software skew to align all of the eye diagrams.
- Eye Tuning enables a variable persistence display in Eye/Mask mode. Eye Tuning can be used to tune a device while simultaneously watching changes to the eye diagram and eye diagram measurements.
- Eye mask margins can now be based on a user-specified target Hit Ratio.
- When saving screen captures, added the capability to select one out of many displayed waveforms to include in the saved graphics file.
- Added comprehensive capability (approximately 800 commands) to remotely control FlexDCA via SCPI programming commands.
- Added an Uncorrelated Noise measurement to Jitter Mode.

- Added the ability to align waveforms on the display, similar to the Horizontal Skew capability of the 86100D firmware. This Time Delay setting is available from the Channel Setup dialog box's Advanced tab.
- The RJ/RN compensation feature can now be used with signal processing operators, such as de-embedding.
- Added mask files for OTU2 and OTU2e.

#### General Defects Fixed

- Fixed a problem where the continuous loop bandwidth setting for clock data recovery hardware could be set to values less than 15 kHz.
- Fixed an occasional crash when using a precision timebase.
- When Jitter Mode is used to measure a clock, the clock frequency is reported in unit of Hertz instead of bits-per-second.
- Fixed unreliable detection of the precision timebase reference frequency in Pattern Lock.

#### Known Issues

- The remote SCPI interface is limited to the HiSLIP, Telnet, and Sockets protocols when running on a 64-bit Windows OS. To make use of this functionality, the program "Agilent.N1000.x86.exe" needs to be launched instead of the default "Agilent.N1000.exe".

## Revision A.01.50, September, 2011

Differences from revision A.01.03.

#### New Feature List

- Ability to apply SIRC (System Impulse Response Capability) correction data for 86105C, 86105D, 86115D, or 86116C optical modules. SIRC data corrects for a module's specific response.
- Perform vertical module calibrations and dark calibrations from within FlexDCA, as well as view the calibration status.
- FlexDCA now has a remote SCPI interface.
- When running on an 86100D mainframe, FlexDCA can be controlled using the HiSLIP, Telnet, or Sockets protocols.
- When running on a 32-bit Windows operating system, FlexDCA can be controlled using HiSLIP, Telnet, VXI-11, Sockets, GPIB, or USB (hardware permitting).
- New tools to explore and learn the SCPI command set:
- A new SCPI Recorder control that records and displays the equivalent SCPI commands as the user interacts with the graphical user interface.
- A new Interactive SCPI Command Tree that allows the user to explore the entire

SCPI command set and execute individual commands directly from the tree view.

- New optical channel measurements added:
- Average Power (Oscilloscope mode)
- Average Power (Eye/Mask mode)
- Extinction Ratio (Eye/Mask mode)
- Ability to apply RJ and RN compensation factors to compensate for the measurement system's intrinsic RJ and RN. It is not yet available in conjunction with signal processing operators, such as de-embedding.
- New Amplify and Square math functions.
- Added the following Fibre Channel masks:
  - 4.25 Gb/s Fibre Channel Delta R
  - 4.25 Gb/s Fibre Channel Delta T
  - 4.25 Gb/s Fibre Channel Delta T (Norm)
  - 8.5 Gb/s Fibre Channel Delta R
  - 8.5 Gb/s Fibre Channel Delta T
  - 16x Fibre Channel Delta R
  - 16x Fibre Channel Delta T
- The 83496A/B/C and 86108A clock recovery modules now support an additional front panel clock sub-rate of divide-by-32, as well as new super-rates of x2, x4, and x8.
- Added new standard bit rate 41.25 Gb/s (40Gb Ethernet) selection for pattern lock triggering and clock recovery, external precision timebase frequency, and horizontal (timebase) scale units of bits.
- Added CPRI and OBSAI bit rates to the standard rate selection lists.
- Optimized waveform graticule size to fill its available space. Towards this end, the marker control-panel button has been moved inside the graticule area (upper right-hand corner). The acquisition limit status and smoothing status annotations now reside directly below the top menu area and, as before, are visible when the associated feature is active.
- Sharper mini signal waveforms (displayed in the signals palette and the source select dialog).

#### General Defects Fixed

- Differential skew values from the 86118A-H01 are properly transferred from the instrument to FlexDCA.
- Fixed a defect that would cause the waveform jitter to increase when using pattern lock at large horizontal position values.
- Waveforms files can be loaded from Agilent real-time oscilloscopes, if they were saved in verbose text formats (header included).

- The Message Log Viewer dialog is now fixed width, which prevents the width from potentially jumping around as the user scrolled through a list of messages.
- The on-screen keyboard is no longer invoked when the user clicks on a read-only or disabled textbox widget.
- The RN/PI amplitude histogram now displays a legend when simultaneously displaying both the zero-level and one-level data.
- Fixed the 39.8 Gb/s OC-768 mask.

#### Known Issues

- The new RJ/RN compensation feature cannot be used with signal processing operators, such as de-embedding
- The remote SCPI interface is limited to the HiSLIP, Telnet, and Sockets protocols when running on a 64-bit Windows OS. To make use of this functionality, the program "Agilent.N1000.x86.exe" needs to be launched instead of the default "Agilent.N1000.exe".

## Revision A.01.03, April, 2011

Differences from revision A.01.02

#### General Comments

- FlexDCA now requires Microsoft .NET Framework version 4.0. If it is not already installed, FlexDCA will install the Microsoft .NET Framework 4.0 Client Profile.
- There is now a free version of FlexDCA available. The free version does *not* require the following items:
  - Agilent Licensing system
  - Agilent IO Libraries
  - MATLAB Compiler Runtime

The free version does *not* enable any of the licensed features, such as:

- Jitter Mode,
- De-Embedding filters, or
- connecting to a remote DCA.

What is enabled in the free version is basic oscilloscope and eye diagram measurements using the built-in waveform simulator or the Agilent SystemVue product.

#### New Feature List

- Data simulation and analysis are now able to take advantage of multi-core CPUs.
- Waveform and eye memories can be cleared.
- Support for the 86115D-004 module's B channels.



- The data simulator now loads pattern waveforms that are stored in the .wfm format as well as the .csv format.
- The data simulation rate can be reduced to avoid 100% CPU usage whenever the data simulator is running. This is available from the Data Simulator Setup dialog.
- Waveform Signal Processing functionality is now available from a new, translucent slide-up panel accessed via the new Math button in the lower right-hand corner of the application.
- Annotations have been added to the upper right-hand corner of the Jitter Measurement Results window to denote large jitter mode (LJM) and jitter measurements on signal processed waveforms (SP).

#### General Defects Fixed

- Fixed a bug that allowed multiple conflicting instances of FlexDCA to be launched at the same time.
- Improved the performance of Jitter Mode on long patterns.
- Improved the reliability of autoscale.
- Fixed an alignment issue with certain masks.
- Fixed a defect that prevented pattern waveform saves from remembering the last saved location.
- Fixed a defect that could, under certain conditions, result in an empty measurement toolbar after the application had been manually resized.
- Fixed a defect that could cause the application to crash if a jitter graph in an undocked window was double-clicked.
- Fixed a bug that prevented jitter measurements from being made on a function of a waveform memory (partial results only).
- Added annotation to the RJ and RN measurements when the values are fixed by the user.
- Fixed a limit tests defect in Jitter Mode. Limit tests now report out-of-limit failures.
- Fixed a defect that prevented a remote FlexDCA session from being able to end a different active FlexDCA session that is connected to the same 86100 DCA.



## 2 86100D

### Revision A.13.03, July, 2015

Differences from revision A.13.00

#### General Comments

- Improvements to RZ Eye Measurements.
- Added support for IO Libraries 17.1 installed on the instrument.

### Revision A.13.00, May, 2014

Differences from revision A.12.02

#### General Comments

- On 86100D instruments running Windows 7, option licensing is now managed using the Agilent License Manager.
- Added specifications for the 86118-H01 module.
- Added specifications for the 86118-H02 module.
- Added specifications for the 86105D-281 module.
- Added specifications for the 86115D-282 module.

#### Known Issues

- The 86100D (Legacy mode) supports the 32-bit version of MATLAB. The 64-bit version of MATLAB is not compatible.
- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.
- 86100C Mainframes are not supported on DCA Firmware Revision A.13.00.

## Revision A.12.02, May, 2013

Differences from revision A.12.00

### General Comments

- Improvements added to eye measurement algorithms.

### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.
- 86100C Mainframes are not supported on DCA Firmware Revision A.12.02.

## Revision A.12.00, January, 2013

Differences from revision A.10.80

### New Features

- Support for new 86100D instrument configurations.
- New programming command for changing instrument configuration, `:SYSTem:FCONfig` (new).
- Added new OIF-CEI masks and SFF-8431 masks.

### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.
- 86100C Mainframes are not supported on DCA Firmware Revision A.12.00.

## 3 86100C/D

### Revision A.10.80, June, 2012

Differences from revision A.10.70

#### New Features

- Support for the N2800A-series InfiniiMax III probes. New arguments added to the :CHANnel:PROBe:SElect programming command as documented in the programmer's guide.

#### General Defects Fixed

- Fixed a crash in the extinction ratio calibration on the electrical channel of the 86105C and 86105D modules.

#### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

### Revision A.10.70, April, 2012

Differences from revision A.10.60

#### General Comments

- Requires Windows XP Service pack 2 or later.
- Added new Ethernet Mask: OTU4 G.959.1

#### New Features

- Support for 86108B Precision Waveform Analyzer module.

#### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

## Revision A.10.60, December, 2011

Differences from revision A.10.50

### General Comments

- Supports connections from FlexDCA version A.1.60 and earlier.
- Requires Windows XP Service pack 2 or later.

### New Features

- Added support for Option 500, Productivity Package, which includes Rapid Eye. Rapid Eye significantly reduces the time required to acquire eye-diagram samples.
- Autoscale performance is significantly improved when Rapid Eye is enabled.
- Ability to calibrate the optical channel of 86105C, 86105D, and 86116C modules, even if the electrical channel is damaged.
- Ability to select if data acquisition immediately begins upon starting a mask test. This feature is located on the new Mks Tests tab in the Configure Measurements dialog box. In addition, the Y-Axis Mask Align Measurement controls have been moved to this new tab from the Eye Boundary tab.
- When saving screen captures via remote programming, the ability to select one out of many displayed waveforms to include in the saved graphics file. This capability is not available from the front panel.
- Added mask files for OTU2 and OTU2e.

### General Defects Fixed

- Fixed a problem where the continuous loop bandwidth setting for clock data recovery hardware could be set to values less than 15 kHz.
- Fixed a bug that would cause the instrument to be unresponsive from remote if a single sweep was interrupted. A device clear was required to work around this problem.
- Fixed a bug with the 86115D and other dual optical modules that would cause the average power measurement to appear blank in certain circumstances.

### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

## Revision A.10.50, September, 2011

Differences from revision A.10.03

### General Comments

- Support for the 86112A Option HBW module (30 GHz bandwidth).

- Support for the 86115D options 144 and 104.
- Supports connections from FlexDCA version A.1.50 and earlier.
- Requires Windows XP Service pack 2 or later. If you have an 86100C instrument with Windows XP Service pack 1 installed on it, you must upgrade to Service Pack 2 before you can use firmware release A.10.03 or later.

#### New Features

- Ability to compensate the average power measurement using the extinction ratio calibration (dark calibration).
- Added a wrapper script to allow performing the VECpq (Vertical Eye Closure Penalty) as defined for 16x Fibre Channel (FC-PI5). Requires software option 201 and MATLAB installed on the instrument.
- The 83496A/B/C and 86108A clock recovery modules now support an additional front panel clock sub-rate of divide-by-32, as well as new super-rates of x2, x4, and x8.
- Added the following Fibre Channel masks:
  - 4.25 Gb/s Fibre Channel Delta R
  - 4.25 Gb/s Fibre Channel Delta T
  - 4.25 Gb/s Fibre Channel Delta T (Norm
  - 8.5 Gb/s Fibre Channel Delta R
  - 8.5 Gb/s Fibre Channel Delta T
  - 16x Fibre Channel Delta R
  - 16x Fibre Channel Delta T

#### General Defects Fixed

- Fixed a defect with TDR calibrations (normalization) at long time ranges.

#### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

## Revision A.10.03, April, 2011

Differences from revision A.10.02

#### General Comments

- Various improvements made to support the N1010A FlexDCA application.
- Requires Windows XP Service pack 2 or later. If you have an 86100C instrument with Windows XP Service pack 1 installed on it, you must upgrade to Service Pack 2 before you can use firmware release A.10.03 or later.

#### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

### Revision A.10.02, December, 2010

Differences from revision A.10.01

#### New Feature List

- Various improvements made to support the N1010A FlexDCA application.

#### General Defects Fixed

- Fixed a defect that would cause a decrease in throughput when using the 86115D module if one channel had the reference filter enabled while the other channel was unfiltered.
- Fixed a defect that would cause incorrect behavior of markers on S-Parameters when using the 86100D mainframe.
- Fixed a defect that would cause unpredictable frequency spacing when saving Touchstone files on either the 86100C or 86100D mainframes.
- Fixed a defect that would cause measurement errors in the vertical histogram if the histogram window encompassed the entire display.
- Various defects fixed to support the N1010A FlexDCA application.

#### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

### Revision A.10.01, September, 2010

Differences from revision A.10.00

#### New Feature List

- Various improvements made to support the N1010A FlexDCA application. In the clock recovery event register (see 86100A/B/C/D programmer's guide), added definition for bit 6 (FIN). The FIN bit indicates that a clock recovery relock operation has completed.

#### General Defects Fixed

- Fixed a defect that would occasionally cause corrupt files when saving XY waveforms with the Precision Timebase active.
- Various defects fixed to support the N1010A FlexDCA application.



#### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

## Revision A.10.00, July, 2010

Differences from revision A.09.00

#### New Feature List

- Support for 86100D.
- Support for N1010A FlexDCA Remote control of 86100C.
- Support for InfiniiSim-DCA Waveform Transformation Software (86100DU-SIM) on 86100D mainframes.
- Support for 86108A-400 front-panel AUX Input.
- Ability to save S4P TDR/TDT S-parameter files.
- Ability to save files on USB removable drives.

#### General Defects Fixed

- None

#### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.



# 4 86100C

## Revision A.10.82, May, 2013

Differences from revision A.09.01

### General Comments

- Improvements added to eye measurement algorithms.

## Revision A.09.01, July, 2010

Differences from revision A.09.00

### General Defects Fixed

- Improved the behavior of Autoscale and Jitter mode when using the precision timebase with spread-spectrum clocks.

### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

## Revision A.09.00, June 10, 2010

Differences from revision A.08.10

### New Feature List

- Support for new 86115D 20 GHz optical module.
- Seven new standard masks. Five cover 802.3, Revision D3.1 and two cover FC-PI5, Revision 1.0.
- Eye tuning in Eye/Mask mode adds the ability to tune a device while simultaneously watching changes to the eye diagram and eye diagram measurements.
- Improved online help system with search capability.

### General Defects Fixed

- Jitter Database file (.CSV) now correctly saves the TI CDF one level data.

- Several eye-measurements bugs were fixed.
- Increased number of digits in touchstone format.
- Fixed impedance values when saving differential and common mode s-parameters in touchstone files.
- Fixed a crash that occurred after vertical calibration if histograms are turned on.
- Increased maximum average count in TDR mode.

#### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

## Revision A.08.10, April 8, 2009

Differences from revision A.08.00

#### New Feature List

- Clock Recovery Up To 14.2 Gb/s: The 86108A Precision Waveform Analyzer and 83496B Clock Recovery modules now run from 50 Mb/s to 14.2 Gb/s, allowing customers to recover embedded clocks from optical and electrical signals up to 16X Fibre Channel.
- Support for 86105D Optical/Electrical Module: The 86105D is a new module supporting 8X and 16X Fibre Channel as well as 10 Gb Ethernet and 10 G SONET/SDH line rates.
- Improved Clock Recovery Support For SATA: The upper limit for the loop bandwidth (LBW) has been increased to line rate/250, allowing 6 MHz LBW required for SATA I signals (1.5 Gb/s). The absolute LBW limit remains at 10 MHz.
- J2 and J9 TJ Measurements: J2 and J9 are new Total Jitter (TJ) measurements from standards requiring stressed eye analysis for optical and electrical receiver compliance.
- TJ Upper Limit Increased To 10E-1: The upper limit for the BER used in of Total Jitter (TJ) measurement BER has been increased from 1E-3 to 1E-1.
- I-Q Diagram in Color Grade: The math function @Versus $\pi$  allows color-graded I-Q diagrams, a key insight tool to visualize the I/Q signals after demodulation of a complex optical modulation.
- Remote Skew Control For 86118A-H01: New GP-IB commands now allow remote skew control for option H01 of the 86118A, a dual remote sampling head with over 70 GHz electrical bandwidth.
- Additional Trigger Divide Ratio: 1:55 has been added to support more applications using substrate clocks to trigger the oscilloscope.
- Additional Loop Bandwidth Value: Added 637.5 kHz to "Select from List" for target loop bandwidth (LBW) of the clock recovery.

- Calibration Timeout Increased to 30 Seconds: During most calibrations the hardware reacts within a fraction of a second. External programs, such as anti-virus and anti-spyware software, may keep the CPU busy for seconds. The long timeout ensures successful calibration in most if not all cases.

#### General Defects Fixed

- Fixed corner case where too much jitter was reported
- Fixed issue: jitter algorithm related to transition density that resulted in over-reported DJ/TJ numbers.
- Fixed occasional ghost error message (@Reset PTB~~n~~) when no precision timebase was installed.

#### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

## Revision A.08.00, June 18, 2008

Differences from revision A.07.00

#### New Feature List

- Support for the new 86108A Precision Waveform Analyzer module. The 86108A is a double wide module that features two electrical inputs, clock recovery and a precision timebase. Previously, the combination of these required three separate modules. Now they are incorporated into a single, double wide module.
- Support for reference receiver options 86116C-025 and 86116C-040. The 86116C has been replaced with the 86116C-040 and 86116C-025. Option 040 is a direct replacement for the legacy 86116C as a reference receiver for 39.8 GB/s and 43.0 Gb/s NRZ signals. Option 025 offers reference receiver capability for 17, 25.8 and 27.7 Gb/s NRZ signals which were previously not available in the 86116C.
- Support for the 86100CU-400 PLL / Jitter Transfer Analysis option.
- Support for the Bulk Optics change on the 83496B Clock Recovery Modules.
- 86108A Setup Wizard to help configure the 86108A module. This wizard has preset configurations for a number of use cases to make the configuration as simple as possible.
- Advanced Clock Data Recovery Setup for the 86108A allowing user to specify Type 2 Transition Frequency (peaking) of the loop.
- Support for MATLAB measurements with scripts created by the user. Now the user can make custom measurements on the DCA. These measurements run just like internal measurements, with results on the Measurement Tab, including statistics.

- Improved jitter measurement accuracy for very large jitter. Increased limit for maximum amount of measureable jitter.
- Added Large Jitter Mode for extending jitter measurement capabilities. This mode is enabled when the amount of jitter exceeds the transition time of the signal. As with the new edge model, Large Jitter Mode will also increase the accuracy of large jitter measurements and increases the maximum amount of measureable jitter.
- New S-parameter plots, phase and group delay, for 86100C-202 Enhanced Impedance and S-Parameter Software package.
- Auto Mask Margin is a new enhancement to the Eye Mode Mask Margin feature which will search for a scaled mask that matches a user specified bit error rate.
- Auto Relock is a new feature for clock recovery modules. Previously, when a recovered clock had lost lock, the user would have to manually relock. The 8.0 release now has the functionality to do this automatically.
- Users can now send remote commands to the instrument directly over Ethernet LAN. GPIB is no longer required for remote operation.
- Increased the maximum record length from 4,096 to 16,384.
- Now @Pattern Lock on 86100Cs with option 001 removes the 4 ns discontinuities on long spans (no time tears) as long as the trigger delay is at or close to its minimum value. In this case the instrument synchronizes the timebase to the pattern and force samples to be taken at the correct locations.
- Increased the maximum timebase range while using Pattern Lock from 250.0 ns/div to 250.0 us/div.
- Increased the speed of the Pattern Waveform Save feature.
- Reduced the minimum points/bit of Pattern Waveform Save from 16 to 1.
- Added support for Trigger Divide Ratios of 1:18 and 1:36.

#### General Defects Fixed

- XY Verbose values now correspond to the values being shown on the display with account for the reference plane.
- Fixed crash that would happen when attempting to run the Linear Forward Equalizer from a MATLAB script which was not available.
- Fixed issues with changing the trigger source while precision timebase is on.
- Fixed two issues referring to DTA messages complaining about precision timebase issues. One would complain about the time reference being out of band when the precision timebase was not on, and the other message would ask user to restore reference clock after long continuous usage of Pattern Lock and precision timebase.
- Fixed a issue where bad data would get reported on clipped signals with precision timebase.
- Fixed an issue where math signals were not auto scaling properly.

- If TDR calibration is valid and then a vertical cal later becomes invalid/recommended, now a message will tell user TDR calibration is recommended.
- Fixed bug where :DISK:MDIRECTORY command would give error message upon proper use of command.
- The minimum, maximum, and average impedance measurements can now be applied to math functions as well as channels and responses.
- Fixed issues with using Pattern Lock and precision timebase with a sub-rate reference clock.

#### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

## Revision A.07.00, March 15, 2007

Differences from revision A.06.01

#### New Features List

- The following features are available only with Option 300, Advanced Amplitude Analysis/RIN/Q-factor (which requires Option 200, Enhanced Jitter Analysis Software and 86100C Option 001, Enhanced Trigger): Amplitude Analysis, Separation and display of amplitude interference components (similar to jitter mode), RIN/RINoma, Q factor
- Added Optical Modulation Amplitude measurement to oscilloscope mode.
- Support for 83496B clock recovery module with the capability to lock on data streams that employ a Spread Spectrum Clock (SSC). Enables phase noise analysis on clocks.
- Support for Option 83496A-UAB, upgrade to 83496B capability.
- Support for new 86116C high speed optical and electrical module. The 86116C offers reference receiver performance for the OC768 standard.
- Upper limit on LBW increased to 24M/n , which allows wider bandwidth for signals with .5 transition density.
- Added queries DISK:TFILE? and DISK:BFILe? To transfer text and binary files over GPIB
- New setting can automatically turn on Quick Measure when entering Eye/Mask mode or Oscilloscope mode.

#### General Defects Fixed

- The queries time:pos?, time:range?, time:scale?, wav:xdis?, wav:xran? Now properly return zoomed parameters.
- Waveform display for TDR common mode response now update properly after zoom.
- ER calibration delta temp now uses the module temperature.

- RZ One and Zero level measurements now make measurement at the peak of the pulse instead of the center.
- DISPLAY:DATA? And DISK:SIMage with GRATICule parameter will not include the mask test results tab in the screen image.
- Saving pattern waveform now uses \*OPC when finished.
- Fixed Differential TDR calibration update problem when changing timebase settings.
- Repaired an issue that could occur when trying to load a Calibration file, that does not exist, over GPIB.
- Load jitter data base is no longer available outside jitter mode.
- Horizontal Auto Skew functionality improved.
- Zoom in DDJ vs. Bit plot is now properly limited to 2 bits.
- Repaired an issue that could occur when using LFE or Matlab with no modules present.
- Mask test always includes hits from final acquisition when stop is pressed during mask test.

#### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

## Revision A.06.01, September 21, 2006

Differences from revision A.06.00

#### New Feature List

- Added eye masks for 10G BASE LRM, 1000Base-LX10, 100Base-BX10, ITU g.984.2

#### General Defects Fixed

- Corrected the 100Base-BX/LX mask scale to now have Delta T set to 8E-9 seconds
- Function<N>:Vertical? Now returns correct value.
- Differential TDR deskew is correctly locked out when calibration is active.
- Missing specification for max input for 83496A included in help file.
- Missing note on specification for 83491/2/3 included in help file.
- Changed module vertical calibration messages for 86118A modules to say "Connect all necessary cables and adaptors for measurement to the <Left | Right> module.
- Addressed MEAS:TDR:MAX, MIN, AVE queries after default setup causing a crash.
- No longer issues a GPIB hardware missing error using autoscale after tdr/tdt cal.
- LTER? Now correctly sets bit 0 (COMP) when acquisition is complete.
- :TDR:STIMulus:EXTernal:POLarity? now returns correct data when longform is on.



- Fixed a problem when reading in a pattern waveform csv file written by hand.
- Fixed intermittent application crash during certain TDR mode recall setups.
- Fixed crash that happened with :MEAS:VTIM? .000001 in TDR mode right after default setup.
- Fixed a bug causing probe calibrations to fail (Traces may be displayed during calibrations).
- Added special options H93 and H95 for 5.00Gb/s and 6.25Gb/s to the 86105C.

#### Software Option Packages (#200 and #202) Defects Fixed

- Fixed problems with jitter plots after default setup (#200).
- Fixed problem where PJ is greater than DJ in some cases. (Still possible for PJ to be greater than DJ if DJ/PJ small enough since they are calculated from different histograms) (#200).
- Added new S-parameter specs to TDR (#202).
- Fixed defect preventing the save of differential or common mode S-Parameters from remote (#202).

#### Known Issues

- PLTS customers should not upgrade to A.06.00 and above software at this time since the executable properly. PLTS customers should use DCA firmware version A.04.11.
- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.
- 86100A/B Mainframes are not supported on DCA Firmware Revision A.06.00 and above.

## Revision A.06.00, December 15, 2005

Differences from revision A.04.20

#### New Feature List

- Added Enhanced Impedance and S-parameters (#202)
- Support for S-parameter results for single-ended (S11, S21, S12, and S22), differential (SDD11, SDD21, SDD22, SDD12), and common modes (SCC11, SCC21, SCC22, SCC12).
- S-parameter display graphs feature markers, graph formatting, Autoscale, and print support
- S-parameter is calculated between two time periods which allows customers to using time gating before converting to S-parameter
- Corrected impedance profile for single-ended and differential signals
- Allows export of S-parameter measurements into either .s1p or .s2p Touchstone data format for import into circuit simulators

- Support for 86100C Mainframe
- New TDR User Interface for measurement setup and display
- Improved TDR Calibration that supports time base changes, time delays, and zooming into data
- Guided TDR Calibration Procedure to improve usability
- Support of external TDR edge accelerators in TDR Mode
- Extensive support for math functions like derivatives, constant multiplications, add, subtract, and scaling
- Maximum/Minimum/Average Measurements in TDR Mode
- Export of time data in X & Y format
- Display of ER Cal factor
- Changed from hardware graphics to software graphics

#### General Firmware Defects Fixed in A.06.00

- Increased maximum allowable time base delay in TDR mode to 100 ns.
- 86100B + 54754A previously did not invert white trace color on print. The waveform color is set to gray during printing to prevent a white waveform trace on a white background.
- Repaired 86106B not successfully completing Autoscale with filter on
- Resolved :DISK:SIM 'filename.jpg' causing instrument to hang when file specified is read-only. Added error checking before attempting to save file.
- Phase is correct now for reference clock frequencies between 25 GHz and 39 GHz on the 40 GHz input of an 86107A Option 40 module.
- Added a remote command to raise the jitter shade :DISPlay:JITTer:SHADe
- Allow TDR mode to accept maximum time base delay up to 100ns
- Extinction Ratio calibration factor is always loaded into dialog boxes
- After 86100C power cycle, TDR mode is recalled properly

#### Known Issues

- PLTS customers should not upgrade to A.06.00 software at this time since the executable will fail to run properly. PLTS customers should use DCA firmware version A.04.11.
- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.
- 86100A/B Mainframes are not supported on DCA Firmware Revision A.06.00

# 5 86100A/B/C

Revision A.05.00, February 16, 2005

Differences from revision A.04.20

## New Feature List

- Support for 86100A/B/C Mainframe
- Maximum/Minimum/Average Measurements in TDR Mode
- Export of waveform data in X & Y format
- Display of ER Cal factor
- Added the following masks (100BASE-BX\_LX10.msk, SATA 1.5Gb TX 250 cycles.msk, SATA 1.5GB TX 5 Cycles.msk)
- General Firmware Defects Fixed in A.05.00
- 86100B + 54754A previously did not invert white trace color on print. The waveform color is set to gray during printing to prevent a white waveform trace on a white background.
- Repaired 86106B and other modules with un-labeled filter rates not successfully completing Autoscale when filter is enabled
- Phase is correct now for reference clock frequencies between 25 GHz and 39 GHz on the 40 GHz input of an 86107A Option 40 module.
- Repaired inconsistent pattern waveform loading behavior
- Extinction Ratio calibration factor is always loaded into dialog boxes
- Removed stray entry out of range message at end of ER calibration
- After 86100C power cycle, TDR mode is recalled properly
- Removed the ability to load and store TDR/TDT calibration data since not all instrument states were being saved properly.
- Allowed TDT normalization to work with external TDR stimulus
- Repaired a crash if remote commands (:MEAS:TDR: MAX MIN AVE) was sent without putting the oscilloscope in TDR mode first.

### Known Issues

- PLTS customers should not upgrade to 5.0 software at this time since the executable will fail to run properly. PLTS customers should use DCA firmware version 4.11.
- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

## Revision A.04.20, June 9, 2005

Differences from revision A.04.11

### New Feature List

- Support for 83496A Clock Recovery Module
- Supports Picosecond Pulse Lab 4020 Single ended TDR sources and Picosecond Pulse Lab 4022 Differential TDR/T Sources. Provides external common and differential mode normalization to enable faster edges.
- Support for InfiniiMax II Series Probe
- Enables calibration debugging for module vertical calibration.
- Adds a method for stabilizing RJ value for jitter measurements. Remote commands added for RJ stabilization capability (#200).
- Determines linear feed forward equalizer tap values automatically (#201)
- Adds support for 8xFibre Channel filter rate (86105C #197)
- General Firmware Defects Fixed in 4.20
- Repaired probe calibration date disappearing after autoscale or probe calibration on other channel.
- Fixed autoscale with no channels turned on does nothing. Autoscale now displays a dynamic text area message when autoscale is performed with no channels activated.
- Repaired autoscale with limit test activated causing software to hang.
- In TDR mode, fixed (:TIM:RANG 6.0E-001 and :MARK:STATE X1Y1,MANual,TRACk) remote commands sent quickly in succession causing a software crash.
- In TDR mode, resolved transducer settings are not always correct. Channel units picks are now fixed.
- In TDR mode, delta marker units track channel units, not marker units. This has been resolved.
- Repaired TDR normalization problem with center time reference. Responses are now being recalled even if reference is set to 'Center'.
- In TDR mode, resolved normalization staying valid after channel vertical calibration is performed.
- Provided excess reactance measurement which was not previously available for differential TDR responses.

- Added a remote query to see if TDR normalization is valid over GPIB.
- In TDR mode, fixed Ohms scale not available on Channel 2 after default setup
- Repaired extinction ratio calibration failing after precision time base is enabled. Extinction ratio calibration could fail with precision time base on if the horizontal scale was set for less than one period of the reference clock on screen. The calibration has been modified so that at least one period of the reference clock is on screen when dark level data is measured.
- Resolved oscilloscope hanging with 86107A when limit test is turned on. Disabled acquisition limit when setting the precision time base time reference. Hang no longer occurs.
- Resolved broken time base calibration. Hardware was left in an inconsistent setting relative to the control system, causing the next calibration to fail.
- Repaired ASSERTS when dialog is opened and DCA application is minimized. When minimized, application will be maximized on all front panel events (button press or knob movement) before event is processed.
- Repaired turning on of pattern lock after undo default setup with 86107A. Changed how the valid setup is built to account for priorities of controls for pattern lock and precision time base.
- Resolved application hang from Setup file load with divided trigger on. Reorganized acquisition limit display update to prevent excessive Windows messages from being generated and added code to remote commands to gracefully handle failure if occurs when placing windows messages. Hang no longer happens.
- Repaired release assertion during undo default setup. Fixed interaction between recall setup, autoscale, and the auto-record length control.
- Fixed combination of TIM:BRAT + :TRIG:RBIT + SYST:MODE JITT causing application exit
- Resolved STOP CHAN1 :TIME:RANG:MEAS:VTIM? causes abrupt application exit
- Repaired MEASure:CGR:SOUR CGMemory causing application hang
- Resolved TRIGger:BRATe plus \*RCL remote command causing application hang
- Fixed MTES:ALIG causing release assertion
- Resolved "DIG FUNCTION2 and :SYSTem:MODE: JITT" being sent causing an application hang
- Resolved MEAS:CGR:JITT? command causing application exit
- Addressed :DISP:SCOL? CGR1 causing application exit
- Fixed TDR:DCALib RPCalib sequence creating application error
- Repaired ACQUIRE:RUNTi? CHANnel<N> query causing time out
- Repaired VIEW:RESP4 Crashing in Eye Mode
- Fixed MEASure:DELtatime? CHANnel3,FUNcTION1 causing a crash
- Resolved :MEASure:APOWer?' command causing application crash

### Software Option Packages (#200 and #201) Defects Fixed

- Addressed Total Jitter and Deterministic Jitter being optimistic by 1/10000 UI. The TJ histogram data had been missing the rightmost bin. This results in an optimistic estimate of TJ and DJ by up to 0.0001 UI, or about 10fs at 10GB/s (#200).
- Repaired TJ measurement being incorrectly identified in comma separated file. Fixed RJ value is also now indicated in exported jitter CSV file (#200).
- Resolved Periodic Jitter (PJ) Shape plot displaying bad data when data rate is an odd number. Previously, the result was a noisy trace (#200).
- Disabled Frequency resolve feature from working when jitter measurement results are questionable (#200).
- Repaired MatLab scripts without pipeline causing horizontal quantization in data display (#201).
- Enabled average power measurements when either equalizer or MatLab feature is enabled (#201).
- Fixed incorrect time base scale wrong with precision time base and equalizer in Eye mode. The time base for a channel is now scaled correctly when precision time base and equalizer are activated (#201).
- Resolved MatLab script and switch to TDR mode causing software crash. Added a check to verify whether or not the waveform being measured has any points at all (#201).

### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

## Revision A.04.11, December 10, 2004

Differences from revision A.04.10

### New Feature List

- None

### Defects Fixed

- Repaired Autoscale function resulting in 3 eyes being displayed on Graticule with 86105C reference receivers.
- Resolved TDR cannot set scale to Ohms after default setup on channels 2 and 4. Previously, only channels 1 and 3 could be set to Ohms.
- Fixed average power monitor offset showing up on some reference receiver monitor. Added additional settling time when setting the gain of the average power monitor.
- Repaired Extinction ratio calibration creating offset when 86107A precision timebase is active. The dark level measured during extinction ratio cal is too high when the cal is performed with precision timebase on.

- Fixed O/E calibration failing on 86105C Option 100 modules. Added an additional signal path to allow for completion of calibration for 86105C #100.
- Added support for 86105C unfiltered path.

#### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

## Revision A.04.10, November 1, 2004

Differences from revision A.04.01

#### New Feature List

- Support for 86105C Reference Receiver Module
- Provide the Enhanced Jitter Analysis Software Package (#200), which includes all previous jitter separation measurement capability, demonstrated in #100.
- The Bathtub jitter feature consists of two parts: the ability to display a plot of the extrapolated bathtub curve against the measured TJ histogram and the ability to select the BER at which TJ is measured.
- Increase pattern length supported by jitter mode to  $2^{16}$
- The Jitter Frequency Analysis feature will provide insight into the frequency content of periodic jitter. It will analyze both jitter that is correlated to the data rate (sub-rate jitter) as well as jitter that is uncorrelated from the data rate (asynchronous PJ). The items of interest are: jitter frequency, jitter magnitude, and relationship of jitter frequency to bit rate (i.e. is it a sub-rate)
- Added a Frequency component shape graph. After frequency analysis is turned on, the user will be able to display the shape of the jitter associated with a particular frequency. This aids in the identification of complicated jitter waveforms such as square waves, which has a large number of harmonically related frequencies.
- Added Advanced Waveform Analysis (#201)
- Built-in Linear Feedforward Equalizer application with up to 15 digital tap filter values
- Integrated MATLAB interface to allow signal processing using MATLAB (customer must purchase and install their own MATLAB licenses separately)
- Allow the customer to save and recall pattern waveforms which are long single-valued waveforms that span multiple bits, up to the entire pattern length of  $2^{23}$ . Up to 4096
- points can be saved for each bit, which allows the file to be exported to other software applications like Excel or MATLAB for further analysis
- Support for 86100C Mainframe

The following features are available only with 86100C mainframe:

- Added Windows XP Operating System Service Pack 2. We recommend that all existing 86100C with Service Pack 1 installed update to Service Pack 2 because the additional security capabilities.
- The following feature is also available for 86100C mainframe and Option 001 Wide Bandwidth Trigger. Pattern Lock ("Eyeline") trigger will work when an 86107A precision time base module installed.
- The following feature is available with 86100C mainframe with Option 001 and Option 100 Jitter Software. Enabled 86107A precision time base to work in jitter mode, which reduces the noise floor of jitter measurements down to 200 fs in most circumstances.
- Enhancements for 86100A/B/C Mainframes: Allow the 86107A precision time base modules to operate over continuous frequency bands. No hardware upgrade needed to existing modules, but customers must either provide their own filter or a clean sine wave with low total harmonic distortion.

Defects Fixed

- Repaired remote rise time measurement always returns data from lowest channel
- Fixed Remote Command to measure Extinction Ratio Factor (:MEAS...:ERF
- Resolved Differential TDR Inverted channel marker values reporting incorrect value
- Addressed Auto Scale incorrectly aligns in time when multiple waveforms present on screen. There is now an optional bit rate parameter for the ":AUToscale" remote command. If bit rate information provided remotely, autoscale is much more robust (and much quicker!). Note that this parameter only applies to NRZ eye diagrams and clock signals.
- Repaired start of mask test aligns immediately even without sufficient data. Alignment will now be postponed up to 5 seconds if there is not enough data to align.
- Added remote command for reading TDR excess reactance. Added :MARKer:REACTance query command. It returns the value as follows: <reactance\_value>, <units> where reactance value is in scientific notation and units are F or H. When there is no reactance value, a value of zero is returned and units of F.
- Repaired the remote command Disk:Simage to Network drive breaking after excessive calls because a network drive resource was being opened and not closed.
- Fixed error in Scope Measurement - :MEASure:DELtatime [source][,source]]. Instrument behavior is now consistent with documentation.
- Resolved Channel Input-Autoscale failed to send error message on marginally large signals. The correct notification occurs now for clipped signals.
- Repaired Horizontal scale being incorrect for clock signals while in jitter mode by adjusting the scales properly.
- Repaired remote command :System:DSP cmd with parameter '%' or '?' doesn't seem to work by fixing the instrument parser to recognize some more special characters.
- Fixed color pallet being incorrect when screens are saved in .JPG mode.



- Resolved @Control at limit error? showing up when loading old setups by fixing the setting with the screen savers. There was a difference between 86100A/B and 86100C setups.
- Resolved Scope Measurement - :MEASure:TMIN returns Err: -224,Illegal parameter value.
- Repaired Channel Input - :CHAN:FDES? does not return Headers when :system:header on
- Changed default gain settings for 86117A Module Initialization to improve field servicing
- Fixed remote command Trig:Plock:Autodetect turns off pattern lock if autodetect fails
- Corrected Color grade incorrect when loading database memory in oscilloscope mode
- Repaired Histogram - Measure:Histogram:ppos? returns 9.99999E+37 while in TDR mode
- Fixed STM64\_OC192SuperFEC\_12\_5.msk mask file. It should be a scaled version of the STM-64 OC-192 mask (rectangular, not hexagonal).
- \*OPC now operates properly in Jitter Mode. \*OPC, OPC? and \*WAI should work properly now when switching to jitter mode using :SYStem:MODE JITTER or :DISK:LOAD "filename.jd",JDMemory.
- Disable mainframe ID check so 86110A is never reported when the instrument is queried
- Precision time bases 86107 using in geographies with Eastern time zones were reporting incorrect timebases. Setting the precision timebase time reference is limited in its repetition rate when pressing the dialog button. The way this timing is done has been changed so that it is no longer affected by changes to the system clock. Improved autoscaling with small signal levels
- 83495A Clock Recovery user interface for low loop BW should say 300 kHz not 30 kHz
- Repaired differential TDR normalized individual response looking like wrong scale

#### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

## Revision A.04.01, June 23, 2004

Differences from revision A.04.00

#### New Feature List

- None

#### Defects Fixed

- Fixed TDR measurement issue that was present on the 86100C only. Added 250 uS delay to allow step generator to settle.

- Fixed a modal dialog box defect on 86100C. If there was no trigger signal applied while in jitter mode, autoscale would proceed. Instead of reporting an autoscale failure due to an invalid trigger signal, it was possible that the @pattern lock lost? dialog would appear in an endless loop.
- Fixed an 86100C jitter mode sequence that could cause the software to lock up.

#### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

## Revision A.04.00, February 19, 2004

Differences from revision A.03.05

#### New Feature List

- Extinction Ratio correction factor
- Support for 83495A Clock Recovery Module
- Added software licensing. Permits the installation of optional software features.
- Support for 86100C Mainframe

#### The following features are available only with 86100C mainframe

- Added Windows XP Operating System. This allows user to access Windows features and applications.
- Disk recovery from D: partition. Allows recovery from software crash of main C: partition without external CD
- Uses standard Windows Installer to upgrade software

#### The following features are available only with 86100C mainframe and Option 001 Wide Bandwidth Trigger

- Pattern Lock ("Eyeline") trigger. Will display single valued waveforms for repetitive patterns.
- Auto-detection of pattern parameters. Relieves user of task of entering length and bit rate manually.
- The following features are available with 86100C mainframe with Option 001 and Option 100 Jitter Software
- Added Jitter Mode. This is a fourth mode for the instrument that provides measurements of timing jitter.
- Separation and display of jitter components. Adds the pull down graphical display area.
- Save and recall of jitter memory. For use with jitter analysis data.

### Defects Fixed

- Improved Touch Screen calibration for 86100C
- Fixed a debug assertion related to 54754A differential reference plane calibration
- Fixed a problem with saving an Instrument setup file on top of an existing setup file
- Fixed TDR remote command problem: If the right module is set to ON4 and TDTdest is Channel 3 and you issue the command to turn on both 3 and 4 an assertion error happens. The exact command was :TDR4:STIM ON3AND4;RESP3:TDTDest CHANNEL1
- Fixed problem with normalization of 54753A TDR module
- Fixed incorrect differential normalization (risetime of second channel). This was only broken in revision 3.06.
- Fixed a function that returns whether the TDR stimulus is differential/common mode or not. The incorrect value was returned if two TDR modules were installed and the right module was differential or common mode.
- Fixed a problem when using two TDR modules. Previously, when the command TDR2:STIM ON2 was followed by the command TDR2:STIM OFF, the left module was correctly turned off. However the right module was then inaccessible.
- Fixed problem where differential TDT cal data was not being saved and recalled correctly
- Fixed defects that were causing normalization cal data to be invalidated unnecessarily
- Fixed problem where TDT reference plane was lost when switching between stimulus channels
- Fixed defect where instrument could hang with the following command sequence in TDR mode: \*rst;\*cls;;autoscale;\*opc?
- Fixed a problem with repetitive remote loading of instrument setup files
- Fixed a defect in the code that loads TDR/TDT cal data files. TDT data was being loaded but not fully resolved as valid.
- The :DIGitize command now works correctly with RESPonse<N> parameters. To digitize differential responses the type of each response must be specified by turning on the response before executing the :DIGitize command.

### Known Issues

- 86119A (Optical Sampling Oscilloscope) is designed to work on software versions A.03.06 and A.03.05 only.

## Revision A.03.06, October 30, 2003

Differences from revision A.03.05

### New Feature List

- None

### Defects Fixed

- Differential normalization was not working correctly because each stimulus channel was using a different risetime value. Both channels now share the risetime setting of the first channel.
- Stopped circular dependencies that were causing autoscale to hang.
- Function that returns if TDR stimulus is differential/common mode was broken when two TDR modules were installed and the right module had differential or common mode stimulus. This prevented the :DIGitize remote command from working.
- Set of valid choices for the other module is now set correctly when turning off stimulus of 2 only or 4 only. Differential TDT data was not being saved and recalled properly.
- Normalization cal data was being invalidated inconsistently and unnecessarily when TDR settings were changed.
- Differential normalization behavior was based on the current setting of the differential mode control and not on the setting at the time the cal was performed.
- Fixed a bug where you would get "Control is set to limit" error messages the first time you power up an instrument.
- Single-ended TDT normalization data is now recalled properly when loading a TDR/TDT cal file. Previously the normalization cal data was read from the file but not fully resolved as valid.
- Enhanced TDT normalization so that thru measurements from calibration are stored independently from TDR short measurements. This allows greater flexibility in switching between stimulus channels.
- Fixed threading synchronization problem that caused the instrument to hang under certain conditions when a setup was recalled remotely.
- The :DIGitize remote command now works properly with RESPonse<N> parameters. If the response is differential or common mode it must be turned on before executing the :DIGitize command.

### Revision A.03.05, April 21, 2003

Differences from revision A.03.04

#### New Feature List

- Added support for the 86119A Optical Sampling Oscilloscope
- Added support for the new N1022A probe adaptor. This probe adaptor provides support for the InfiniiMax 3.5 to 7 GHz probes. This includes the following Agilent probes: 1131A, 1132A, 1134A, 1156A, 1157A and 1158A.

- Added support for horizontal mask alignment recommendation as per ITU-T G.691 for STM16 mask testing. This allows the mask center region to be positioned optimally along the horizontal axis to achieve the minimum number of mask violations. Along with this implementation, the following mask file was added:
- STM016\_G.691\_V2.0.msk
- Added the following NRZ masks to support testing to the Fibre Channel Physical Interface (FC-PI) Rev 13 standard for the following data rates: 1063, 2125 and 4250 MB/s.
- The mask file names are as follows: FC1063\_PI\_R13\_Dec01.msk, FC2125\_PI\_R13\_Dec01.msk, FC4250\_PI\_R13\_Dec01.msk

#### Defects Fixed

- Improved color contrast between mask regions when saving screens with Invert Background Color checked. Previously, the mask margins appeared to be the same color as the mask.
- Corrected problem when loading waveform memories, scale and offset limits were incorrect. They were too limited when channel attenuation was a large value.
- Corrected problem with dropouts on channels when in differential TDR mode.
- Corrected problem with dropouts using high bandwidth modules when in TDT mode.
- Corrected problem with signal response being clipped when performing a differential TDR normalization
- Corrected problem with multiple presses of Stop/Single button causing data acquisition to halt.
- Corrected problem with Autoscale not completing when Histograms are enabled and acquisition is stopped.
- Corrected documentation with remote Programmer's Guide. Had incorrect syntax for probe calibration. Indicated command was :CAL:PROB:CHAN<n>, should be :CAL:PROB:CHAN<N>.
- Corrected debug assertion when the remote query :TRIGger:GATed? was sent.
- Corrected problem with :HARDcopy:DPRinter 0 printing remote command halting application.

### Revision A.03.04, October 10, 2002

Differences from revision A.03.03

### New Feature List

- Add new vertical mask alignment method as specified by the OFSTP-4A standard. Alignment method can be selected from either GUI or remote access. GUI selection is done through Eye Boundary tab in the Configure Measurements dialog. Vertical alignment can be performed as originally implemented using the entire display (Vtop/Vbase) or as specified by OFSTP-4A, using the eye boundary 1/0 levels
- Modified NRZ eye measurement algorithms for rising and crossing point to better detect sharper edges
- 86117A/B optimized gain settings for better performance
- Add support for the 86109B Opt K10 . An enhanced version of the 86109B O/E receiver with 40 GHz optical bandwidth and 50 GHz electrical bandwidth
- Add support for the 86116B . High speed O/E receiver with 65 GHz optical bandwidth and warranted 80 GHz electrical bandwidth, typically 90 GHz

### Defects Fixed:

- Mask files 10GbE\_10\_3125\_May02.msk and 10GbE\_9\_953\_May02.msk modified to align to eye boundary to be compliant with OFSTP-4A standard
- Corrected a problem with histogram mean always returning invalid data
- Corrected problems with TDR and TDT calibrations, markers and interactions with 54754A, 54753A, 83484A and other modules
- Corrected a problem with response waveform not yielding excess reactance
- \*RST was not resetting source for math functions to channel1
- \*RST was returning Error 241 Hardware missing
- Pressing Default Setup with no modules was displaying "Entry was not a valid selection" in the Dynamic Text Area
- Corrected problem with software upgrade process, cycling power too quickly could prevent upgrade from completing

## Revision A.03.03, July 18, 2002

Differences from revision A.03.03

### New Feature List

- Add warning when attempting to save a file to a full floppy disk
- Add RZ/NRZ Eye mode selection GUI button
- Renamed horizontal and vertical calibration dialog box to avoid confusion with the precision timebase module
- TDR Differential Normalization feature added
- New masks: Infiniband, 10 GbE, Xaui

- Changes to electrical channel offset DAC for 86101A and 86103A modules
- The following new modules are supported: 86105B, 86107A Opt 010, 86117A/B, 86118A

#### Defects Fixed

- Modified the RZ algorithm to take care of unsymmetrical edges
- Corrected a problem with mask file names with a zero instead of an @0 i.e. STM64\_OC192 written as STM64\_OC1920
- Acquisition Limits misbehave with long patterns is now fixed





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Revision A.03.01, February 15, 2002

Differences from revision A.02.20

## New Feature List

- Ability to acquire multiple channels at once in Eye Mode
- Ability to make measurement and mask analysis on multiple eyes at the same time
- Measurement results tab has a new look: clear meas button replaced by @x@ on meas results tab and tab up/down button replaced by @P@ on meas results tab
- Parametric mask creation
- Ohms/Division setting added for TDR mode
- Ability to annotate and delete individual measurements
- Add support for the following new modules: 86111U, 86111A, 86115B, 86113A, 86102A, 86103B, 86116A, 86107A, 83494A Options 103 and 107

## Defects Fixed:

- When filter is turned on, autoscale switches filter when completed for no reason
- Trigger setting changes after autoscale
- System crash when non-TDR module is autoscaled in TDR mode
- Stop Menu item behaves as Stop/Single
- Source parameter is not being accepted with 'MEASure' subsystem commands
- Sending DISP:PERS INF in eye mode sets it to CGR
- Screen capture when in color grade saves files in grayscale
- Saving .jpg on full diskette results in 0 record length file
- Remote uploaded waveform memories are not stored on disk
- Remote command returns mainframe calibrated when it is not; added :CAL:REC CHAn<N> command
- Quickmeasure attempts to measure waveform memories in eye mode
- Querying waveform values without waveform displayed hung the GUI
- Probe calibration hangs up box after remote command. We no longer initiate optical cal if chan is electrical.

- Need more digits in read-out of X Markers at low time/div setting
- MTEST:START fails after running MTEST:LOAD on bad mask name, but displays no warning
- MTEST:SAVE .msk saves as !.msk.pcm ? Measurement Results Tab drops in height when changing modes
- Measurement limits do not work when restored from saved setups
- Mask test align failure does not cause an error in the queue
- Mask margins not working with CG-GS waveforms
- Markers could be moved outside of the window
- Incorrect max string length reported with remote SYST:DSP command
- Inconsistent behavior when saving a file to a full floppy
- Horizontal Scale/Division setting didn't do anything
- Can't remove unused measurement from measurement results tab
- Binblock download of versus function does not work
- Autoscale resets transducer conversion factors
- Autoscale hung when acquisition stopped before using autoscale
- Autoscale failure on math waveform turns on other waveforms
- :VIEW CGM does not work after BLANK if a measurement command is sent first
- :DISplay:DATA? returns inconsistent color scheme
- :DISK:LOAD returns error 46 if in Oscilloscope mode
- TDR fails vertical calibration if Threshold is set to "Units"
- RZ eye width algorithm seems to place L open too close to mean; modified algorithm for unsymmetrical edges
- Module Delta Temperature reflects Mainframe temperature, not module
- Module calibration time comes from 2 different sources; problem during daylight savings time change
- Measurement Limit Test still displays measurement after it's been turned off
- Histogram tab stops displaying histogram data after math function
- Delta Y now only shows value in Measurement Results tab when the units are the same
- Databases dump when switching between RZ & NRZ measurements
- Cannot select CGM as source with :WAVEFORM:SOURCE+B34 command
- Cannot change channel offset for differential TDR channels
- :WAVEFORM:DATA? Returns incorrect values in ASCII mode
- :MEAS:CGRADE:JITTER? Does not return correct values; wasn't using source specified in :MEAS:SOURCE
- :CHAN#:UNIT:ATT, :CHAN#:UNIT:OFF and :CHAN#:PROBE now blocked when stimulus is on

## Revision A.02.20, August 2, 2001

Differences from revision A.02.10

### New Feature List

- Japanese Language Help
- Support for 86106B
- Support for 86109B
- Support for 86102U

### Defects Fixed:

- Fixed defect that prevents the mask margins from being enabled when a setup file containing margin information is loaded.
- Fixed defect that forced users to reload masks after performing an autoscale while running mask test.
- The acquisition speed while eye measurements are turned on, which had been previously degraded by a factor of four or five, is now fixed.
- GPIB disk store goes to setup directory instead of specified directory, this is now fixed.
- Resolved a problem with the RZ remote query for contrast ratio which causes the instrument to crash while in eye mode.
- The remote command mask load (MTES:LOAD) does not work in "C:\User Files\ Directory, this defect has been resolved.
- Modules insufficiently inserted produce an error message in the mainframe that tell the user to reinsert with more force.

## Revision A.02.10, May 1, 2001

Differences from revision A.02.01

### New Feature List

- New Return to Zero measurements
- Added math function MIN/MAX
- Added JPEG and TIFF File Support
- Added scope measurements Vavg, Tmin, Tmax, Tedge, Delta Time
- Added Histogram Measurement Peak
- Ability to Show Histograms Window Boundary at all times when Histograms feature is turned on
- Added remote command to save screen image to hard or networked drive
- Added remote command to save file in any supported format

### Defects Fixed:

- DCA crashes after default setup while in TDR mode
- Remote command :MARKER:Y1POSITION? now correctly returns answer in volts or ohms
- Resolved measurement resolution issue, introduced in version A.02.01. In Eye Mode on electrical channels the vertical scale resolution was fixed at 10 mV.
- Fixed text on Limit Setup button doesn't reset
- Filter rate values displayed correctly now
- Instrument Hangs when trying to move Y-Axis Markers
- Waveform colors no longer changed when invert waveform background color is selected
- Mask save screen command no longer overwrites previous data
- The remote command :MTEST:SCALE:SOURce query now returns SCPI standard character text, e.g. "CHAN1"
- Fixed a release assertion problem when mapping a Sun Unix drive
- Disk error message addressed because file overwriting itself
- Long Filenames entered from File\Save menu causes problem
- Waveform memory2 tab highlighted but information is about Waveform memory1
- Resolved a problem with mask load & reset after print causes illegal op & shutdown
- Fixed Display Data Query in INVERT format & printout showing non-invert
- Measurement Results Duplicate entry in Setup & Info
- Fixed remote command :DISPlay:LABel causes DCA to freeze in some remote sequences
- Can't format floppy drive when full of waveform files
- Signal goes to the bottom of screen at various vertical scale settings i.e. 6.1mV/div
- Fixed remote command :WAV:FORM WORD;SOURC CGR;DATA?

### Measurement Enhancements

- Improved built in Jitter measurement. The algorithm now uses a smaller window (3 pixels high) about the crossing point of the eye.
- The EYE measurement is based on the histogram database.
- In the case of jitter measurement, we need a "window" with vertical boundaries of [y1,y2] and horizontal [x1,x2]. The jitter value is simply derived from the histogram within this window, e.g. the jitter RMS is the standard deviation of the histogram. The smaller the window, the smaller the jitter.
- In firmware versions previous to A.02.10, 5% of the [Ymax,Ymin] is used, assuming that the "crossing" position is Ycross, then

$$y1 = Y_{cross} - 5\%(Y_{max}-Y_{min})/2 \text{ and } y2 = Y_{cross} + 5\%(Y_{max}-Y_{min})/2$$

(Ymax is the max value in the database , Ymin the minimum

In this version, A.02.10, it is changed to:

$$y1 = Y_{\text{cross}} - 1, y2 = Y_{\text{cross}} + 2$$

Since  $5\%(Y_{\text{max}}-Y_{\text{min}}) \gg 3$  in most cases, therefore the current Y window is much smaller, when leads into smaller jitter measurement results.

## Revision A.02.01, January 30, 2001

Differences from revision A.02.00

### New Feature List

- None

### Defects Fixed

- Fixed a defect that can cause instrument lock-up if the markers are used below 40uW/div and off the 1/2/5 sequence
- Fixed a defect that caused linearity correction problems in 83486A modules. This resulted in potential vertical accuracy problems with these modules
- Fixed a defect that incorrectly identified the 83486A module and options. This also affected all modules that had an option number

### Factory Only Enhancement

- Relaxed the test limits for timebase linearity on the horizontal calibration routine to help with production yield. This change has no impact on instrument performance

## Revision A.02.00, November 29, 2000

Differences from revision A.01.22

### New Feature List

- Added Time Domain Reflectometry capabilities. The Agilent 54753A and 54754A TDR plug-in modules will work with the 86100A.
- Added the following Scope Measurements - Vbase, Vtop, Frequency, Pos Width, Neg Width, Duty Cycle, Vamp Eye, Bit Rate and Jitter RMS and Jitter Peak to Peak.
- Changed the finest resolution of the timebase from 10ps/div to 2ps/div.
- Changed the wavelength limit on User Optical Calibration from 1600 to 1625nm; however functionality beyond 1600 nm is not warranted or supported.

- Added the ability to create custom masks on a PC and input them into the DCA through the file manager.
- Provided the ability to remotely program the clock recovery modules.
- Added Zoom Box, the ability to zoom into a signal with multiple levels and to zoom back out.
- Added a wait cursor and new message give visual feedback that something is happening when a user inserts a module into the chassis.
- The Marker Select dialog box now supports OK/Cancel functionality.

### Defects Fixed

- Fixed a defect that was causing the trace to jump to the top of the graticule when vertical offset was increased (the trace was moved down the screen).
- Release assertion on accessing algorithm for ACVrms. The MeasID for ACVrms and its corresponding HelpID were not in the measurement help search list.
- Fixed issues with waveform memory dialog box.
- Fixed a defect where 40 GBit/s would not highlight in the timebase dialog, when the user would choose it via the BitRateCtrl.
- Fixed a defect where failure occurred while bringing up saved waveform from file.
- Fixed a defect where saving screen image in .ps or .eps format causes a crash. A data buffer wasn't being allocated large enough which caused the stack and memory to be corrupted.
- The :DISK commands: CDIRectory and DIRectory now accept the long form of the token WAVEforms. WAVEforms was misspelled in the yuc code.
- "Orphan" radio controls - single radio controls which are not grouped with any other controls - now appear as text labels. These "display only" radio controls do not respond to any user action.
- 83485B and 86106A modules were defaulting to incorrect bandwidth for optical channels. Changed code to default optical channels to high bandwidth. The user can still set to low bandwidth via remote interface only.
- BackLight will not go off. Fixed this defect by ensuring that the screen saver timer only resets in the event of an actual change in mouse coordinates.
- WAV:DATA? returns extra carriage return. Carriage return only appears at the end of the output stream.
- The title of the cal failed dialog specifies the type of cal that failed instead of a generic 'Calibration failed' title.
- Exceeding # of display labels hangs the instrument. When the user tries to create more than 32 labels from the remote, a dialog box is displayed. The user needs to click on the continue button to continue. Since the front panel is locked by the remote, the user cannot continue. The dialog was replaced with a message in the display and a remote error.

- Default Setup was generating hardware missing errors when clock recovery modules were installed.
- Module channels of non clock modules were not being enabled when a clock module was installed upon default setup or module install.
- Measurement queries repeated in fast succession caused invalid result to be returned.
- Resolved MEAS:RES returning bad data.
- Fixed issue where the electrical bandwidth for 86106A and 86109A modules are incorrect. Changed Module script to reflect the actual bandwidth. Made changes so that the correct IFGain is used for building the acquisition look through table.
- Remote command to create directories only accepts drive A: or User Files, resolved.
- Remote disk commands don't permit the use of mapped drives, resolved.
- Autoscale resets power units from dBm to Watts when Quick measure is on, resolved.
- Autoscale improved to accommodate more waveforms.

#### Factory Only Enhancements

- Improved timebase calibration routine by making the polynomial calibration internal. This allows field timebase calibration, prior revisions can not be supported

## Revision A.01.22, September 6, 2000

Differences from revision A.01.21

### NOTE

**This firmware release is not supported.**

#### New Feature List

- None

#### Defects Fixed

- The eye crossing algorithm is now more tolerant of heavily filtered eye waveforms. The Start-Mask-Test will align to larger variety of eye waveforms. Eye Measurements, which rely on an accurate eye crossing point, will perform better on these filtered waveforms.

## Revision A.01.21, August 9, 2000

Differences from revision A.01.20.

### NOTE

**This firmware release is not supported.**

**New Feature List**

- None

**Defects Fixed**

- None

**Factory-only Enhancement**

- New routine added to increase the efficiency of the factory horizontal calibration process. This improvement does not change the functionality of the product.

**Revision A.01.20, July 11, 2000**

Differences from revision A.01.13.

**NOTE**

**This firmware release is not supported.**

**New Feature List**

- External Scaling for vertical channel and trigger
- LAN capability for printing and file sharing

**Defects Fixed**

- With external keyboard connected, pressing ALT F4 allowed access to Windows which is bad. This "feature" is now unavailable.
- Vertical cal temperature window is changed from >1 deg C to >5 deg C.
- Changed variable persistence default time to 300 ms.
- If the touchscreen is disabled and a message, such as "Autoscale Failed" is displayed, the instrument will appear to be locked up because there is no way to dismiss the Message Box. The fix was to re-enable the touchscreen before displaying the Message box and the disabling it after it has been dismissed.
- If a vertical calibration fails and the module is removed before dismissing the Message Box an illegal operation error occurs. The Fix is to check for the presence of the module before reading from it.
- Timebase resolution changed from 3 digits to 4, giving the same behavior as the 83480A.
- Remotely invoking an extinction ratio cal, where a vertical cal is required, brings up a dialog box that cannot be cleared. The dialog box is replaced with a status message in the status bar.
- Remotely sending the TEDGE command caused various problems. The fix is to only allow TEDGE? query and to reject TEDGE command.



- Remotely selecting vertical markers from a time waveform to a versus waveform caused a "data out of range" error message; this has been fixed.
- Invalid dates remotely sent to the instrument cause several problems, which are now resolved.

## Revision A.01.13, May 2, 2000

Differences from revision A.01.12.

### NOTE

**This firmware release is not supported.**

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#### New Feature List

- None

#### Defects Fixed

- User Vertical Calibration routine that causes vertical calibration failures

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