

Common Interface Unit

Bidirectional IF Interface for Sub-6 GHz RF Signal Up- or Down-Conversion

Introduction

The Keysight E7770A Common Interface Unit (CIU) provides a bidirectional Intermediate Frequency (IF) interface to the Device Under Test (DUT) by up- or down-converting a sub-6 GHz uplink or downlink RF signal into a 6 to 12 GHz, or 7.7 to 14.5 GHz IF signal. This solution gives you the control, power, and local oscillator frequency input to the Keysight M1740A millimeter-wave (mmWave) transceiver for 5G Remote Radio Heads (RRHs). As an up/down converter and RRH controller, the CIU supports the extension of the frequency coverage from sub-6 GHz to a high IF and mmWave bands.

The CIU is a key component of a wide range of Keysight 5G solutions. These solutions provide the stimulus and analysis capabilities necessary to verify transceiver (Tx) and receiver (Rx) performance for 5G chipsets, devices, and base stations.



Definitions and Conditions

The Common Interface Unit (CIU) will meet its specifications when:

- The CIU is within its calibration cycle.
- The CIU has been stored at an ambient temperature within the allowed operating range for at least two hours before being turned on; if it had previously been stored at a temperature range inside the allowed storage range, but outside the allowed operating range.
- The CIU has been turned on for at least 30 minutes.

Specification

Specifications describe the performance parameters covered by the product warranty and are valid from 20 to 30 °C unless otherwise noted.

Typical

Typical describes additional product performance information that is not covered by the product warranty. It is performance beyond specifications that 95 percent of the units exhibit with a 95 percent confidence level. This data, shown in italics, does not include measurement uncertainty, and is valid only at room temperature, 23 °C.

Nominal

Nominal values indicate expected performance or describe product performance that is useful in the application of the product but are not covered by the product warranty.

Unit Specifications

Frequency and Time

Parameter	Model	Value
Operating frequency range	Option E7770A-HB1	6-12 GHz (400 MHz Channel BW), Nominal
	Option E7770A-HB2	7.7-14.3 GHz (1.4 GHz Channel BW), Nominal
	Option E7770A-HC1	6-12 GHz (400 MHz Channel BW for VXT WLAN), Nominal
	Option E7770A-LA1/LD1	6-13.5 GHz
	Option E7770A-LA2/LD2	6-18.5 GHz, Nominal
Frequency setting resolution	All options	1 Hz, analogue resolution
Frequency accuracy	All options	See Time-Base specifications
Channel bandwidth	Option E7770A-HB1/HC1	800 MHz (max) ($F_c = 6\text{--}8.6\text{ GHz}$ and $9\text{--}12\text{ GHz}$), Nominal
	Option E7770A-HB2	1400 MHz (max) ($F_c = 7.7\text{--}14.3\text{ GHz}$), Nominal
	Option E7770A-LA1/LA2/LD1/LD2	Not applicable

Amplitude and Range

Parameter	Model	Value
Channel power output (When driven by Keysight channel / Network emulator)	Option E7770A-HB1/HC1	0 dBm to noise floor (15 dB Crest Factor), Nominal
	Option E7770A-HB2	-10 dBm to noise floor (15 dB Crest Factor), Nominal
	Option E7770A-LA1/LA2	-5 dBm, Typical
	Option E7770A-LD1/LD2	0 dBm, Typical
Tx gain level accuracy	Option E7770A-HB1	$\leq \pm 1.5$ dB (@ 25 °C) Typical, $\leq \pm 2.5$ dB (for 25 °C ± 5 °C)
	Option E7770A-HB2/HC1	$\leq \pm 1.5$ dB (@ 25 °C) Typical, $\leq \pm 2.5$ dB (for 25 °C ± 5 °C), Nominal
Rx gain level accuracy	Option E7770A-HB1	$\leq \pm 1.5$ dB (@ 25 °C) Typical, $\leq \pm 2.5$ dB (for 25 °C ± 5 °C)
	Option E7770A-HB2/HC1	$\leq \pm 1.5$ dB (@ 25 °C) Typical, $\leq \pm 2.5$ dB (for 25 °C ± 5 °C), Nominal
Lo level accuracy	Option E7770A-LA1	$\leq \pm 3$ dB (@ 25 °C) Typical, $\leq \pm 4.5$ dB (for 25 °C ± 5 °C)
	Option E7770A-LA2	$\leq \pm 3$ dB (@ 25 °C) Typical, $\leq \pm 4.5$ dB (for 25 °C ± 5 °C), Nominal
Maximum forward/reverse power (operating)	DUT IF In/Out ports, front panel	+18 dBm CW power, Nominal
	IF In ports, front panel	+18 dBm CW power, Nominal
	DUT IF OUT/HEAD OUT	+18 dBm CW power, Nominal
Maximum forward/reverse power (damage)	DUT IF In/Out ports, front panel	+21 dBm CW power, Nominal
	IF In ports, front panel	+21 dBm CW power, Nominal
	DUT IF OUT/HEAD OUT	+21 dBm CW power, Nominal

Loadout Configurations

Cfg. No	Configuration Description	Channel Card A	Channel Card B	Channel Card C	Channel Card D	LO Source	LO Distribution	Channel Slot Blocker
1	2 Head ¹ /DUT - IF Support	1 ²	-	-	-	1	1	3
2	4 Head/DUT - IF Support	1 ²	1 ²	-	-	1	1	2
3	6 Head/DUT - IF Support	1 ²	1 ²	1 ²	-	1	1	1
4	8 Head/DUT - IF Support	1 ²	1 ²	1 ²	1 ²	1	1	-
5 ³	1 Head/DUT - IF Support (Duplex Frequency) Support	1	X	X	X	1	1	X
6	Two LO Source Card configuration used with EXM Test System	1	1	1	1	2	-	-

1. M1740A Remote Radio Head supported.

2. Channel card type can be either E7770A-HA1, E7770A-HB1, E7770A-HB2 or E7770A-HC1.

3. Number of Channel modules and slot blockers dependent on customer channel requirement.

Input Power Requirements

Parameter	Value
Voltage and frequency	100/120/220/240 VAC, 50/60 Hz
Power consumption (Fully loaded configuration)	600 W max

Additional Specifications

Parameter	Value
Dimensions (H x W x L)	132.5 mm x 445 mm x 382 mm (without feet and handles) 145.6 mm x 449 mm x 424 mm (with feet and handles)
Weight	25 Kg (fully loaded configuration)
Operating temperature	+10 to +40 °C, 30 g/m ³ absolute humidity, 5 to 85% non-condensing relative humidity
Storage temperature	-40 to +70 °C, 50 g/m ³ absolute humidity, 5 to 85% non-condensing relative humidity
Forced airflow direction	Left to Right
Altitude	Up to 2000 m
EMC	Complies with European EMC Directive 2004/108/EC IEC/EN 61326-1 CISPR Pub 11 Group 1, class A AS/NZS CISPR 11 ICES/NMB-001 This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-001 du Canada. South Korean Class A EMC declaration: This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home. A급 기기 (업무용 방송통신기 자재) 이기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
Mechanical resistance	EN60068-2-6, EN60068-2-27, EN60068-2-64
RoHS compliant	
Safety	Complies with European Low Voltage Directive 2006/95/EC IEC/EN 61010-1, 3rd edition Canada: CAN/CSA C22.2 No. 61010-1012 USA: UL std no. 61010-1, 3rd Edition Acoustic statement (European Machinery Directive 2002/42/EC, 1.7.4.2u) Acoustic noise emission, LpA <70 dB, Operator position, Normal operation mode, Per ISO 7779

Front Panel

Connector Name	Number / Card	Connector Type	Description
IF Out A	1x per channel card	N type	UL IF output channel A (into Network Emulator)
IF Out B	1x per channel card	N type	UL IF output channel B (into Network Emulator)
DUT IF In/Out A	1x per channel card	SMA	IN/OUT connection channel A for testing a DUT with a high IF
DUT IF In/Out B	1x per channel card	SMA	IN/OUT connection channel B for testing a DUT with a high IF
IF In A	1x per channel card	N type	DL IF input channel A (from Network Emulator)
IF In B	1x per channel card	N type	DL IF input channel B (from Network Emulator)
LO In	1x per channel card	SMA	Local oscillator input for the channel card
10 MHz In	1x per LO card	BNC	10 MHz Reference in
LO Out	1x per LO card	SMA	Local oscillator output 1
LO Aux Out	1x per LO card	SMA	Local oscillator (auxiliary) output 2
Ref Out	1x per LO card	SMA	Not used by customer
Clk In	1x per LO card	SMA	Not used by customer
LO In	1x per LO Distribution Card	SMA	Local oscillator input
LO Out 1	1x per LO Distribution Card	SMA	Local oscillator output 1
LO Out 2	1x per LO Distribution Card	SMA	Local oscillator output 2
LO Out 3	1x per LO Distribution Card	SMA	Local oscillator output 3
LO Out 4	1x per LO Distribution Card	SMA	Local oscillator output 4
LO Aux In	1x per LO Distribution Card	SMA	Local oscillator auxiliary input
LO Aux 1	1x per LO Distribution Card	SMA	Local oscillator auxiliary output 1
LO Aux 2	1x per LO Distribution Card	SMA	Local oscillator auxiliary output 2

LO Aux 3	1x per LO Distribution Card	SMA	Local oscillator auxiliary output 3
LO Aux 4	1x per LO Distribution Card	SMA	Local oscillator auxiliary output 4
LO In 2	1x per LO Distribution Card	SMA	Local oscillator auxiliary input 2

Back Panel

Connector Name	Number / Card	Connector Type	Description
DUT IF OUT / HEAD OUT	2x per channel card	N type	Output port for connecting to DUT for High IF testing OR Output for connecting to a mmWave head IF input A and B channels for each card
LO/ CTRL/ PWR	2x per channel card	TNC	Local oscillator, control and power for a mmWave head
DUT IF IN / HEAD IN	2x per channel card	N type	Input port for connecting to DUT for High IF testing OR Input for connecting to a mmWave head IF output A and B channels for each card
CTRL 1	1x on controller card	Micro HDMI	Provision for future usage
CTRL 2	1x on controller card	Micro HDMI	Provision for future usage
	1x on controller card	USB 2	Service port
TRIG 1	1x on controller card	BNC	Configurable trigger
TRIG 2	1x on controller card	BNC	Configurable trigger
TRIG 3	1x on controller card	BNC	Configurable trigger
TRIG 4	1x on controller card	BNC	Configurable trigger

Time Base

The CIU Requires the Following External 10 mhz Frequency Reference:

Parameter	Value
Maximum frequency drift	± 50 ppb/2 years
Warm-up time	30 min

External Clock Time Reference

Parameter	Value
Connector type	BNC connector 10 MHz In, front panel
Frequency	• Sine wave • Square wave (greater than 40% ON duty cycle)
Input range	-10 dBm to +20 dBm (0.2 - 6.32Vpp), Nominal
Impedance	50 Ω , Nominal

Calibration

Recommended Calibration Cycle: One Year.

As a mission-critical design enablement partner, Keysight connects design, emulation, and test so customers can solve the world's most complex engineering challenges. Accelerate innovation at www.keysight.com.



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