

N701xA Series Active Termination Adapters

Introduction

Keysight Technologies' N701xA Series of single-ended active termination adapters provide extremely low noise measurement performance with a user adjustable common termination voltage (V_{term}). As signal levels of high-speed buses continue to decrease, Higher Signal-to-Noise Ratio (SNR) measurements are essential for accurate design characterization and verification.



Overview

- 30/40/59 GHz Single-ended active termination adapters
- Low attenuation settings for high SNR, low noise measurements
- Ability to terminate signal to a 50 Ω non-ground voltage (V_{term})

To date, most oscilloscopes with 50 Ω inputs terminate to ground by definition. However, a particular communication system often requires the 50 Ω termination to a voltage rather than to ground. The Keysight N701xA-Series single-ended active termination adapters feature a user-adjustable common termination voltage (V_{term}) and extremely low noise performance. The termination voltage between -4.0 to $+4.0$ V can be controlled internally by the oscilloscope. Two oscilloscope channels and two adapters are needed for making a differential measurement, which allows the A-to-GND, B-to-GND and differential (A-B) signals to be viewed in real time.

Utilizing low attenuation ratio settings, the adapters enable an extremely low noise floor, especially at high-sensitivity vertical scales (< 400 mV) when compared to Keysight InfiniiMax III probing solutions.

Electrical Specifications and Characteristics

	N7010A	N7011A	N7012A
Bandwidth (-3 dB) ¹	30 GHz	40 GHz	59 GHz
Input connector size	2.92 mm (m) / 3.5 mm (m)	1.85 mm (m) / 2.4 mm (m)	
Probe interface	AutoProbe II	AutoProbe III	
Rise time (10 to 90%)	14.5 ps	10.9 ps	7.4 ps
Attenuation ratio	1.16:1	1.18:1	
Noise with oscilloscope	Refer to “N7010A Noise Floor Plot” on page 4	Refer to “N7011A/12A Noise Floor Plots” on page 5	
V _{in} maximum active signal	1.2 V _{pp} (not including DC component)		
V _{term} range	—4 to +4 V		
V _{term} accuracy	± 2 mV		
V _{offset} range	—4 to +4 V		
Input signal range (V _{in} - V _{term} difference)	—0.6 V ≤ (V _{in} — V _{term}) ≤ +0.6 V		
Input resistance at DC ¹	50 Ω ± 3 %		
Maximum non-destructive input voltage	± 8 V	± 4 VDC to 50 kHz, 2.8 V _{rms} above 50 kHz	

1. Denotes warranted specifications, all others are typical.

Environmental Characteristics

N7010A / 11A / 12A

Temperature	Operating: -10 °C to +55 °C Non-operating: -30 °C to +70 °C
Altitude	Operating: 3,000 m (9,842 feet) Non-operating: 15,300 m (50,196 feet)
Humidity	Operating: 25 – 85% room humidity Non-operating: 25 – 85% room humidity
Pollution degree	2

Unlock unprecedented measurement capabilities with Keysight active termination adapters through leveraging the ultra-low noise floor of UXR oscilloscopes. By minimizing reflections through proper signal termination, these adapters ensure the true waveform is displayed, leading to more accurate measurements.

They meet active termination requirements in Compliance Test Specifications for HDMI and DisplayPort, with a user-selectable V_{term} ranging from -4V to +4V, ideal for testing both standards. Additionally, these active termination requirements in widely used data transfer standards such as MIPI M-PHY, achieving accurate representation and analysis of differential pair signals with two single-ended adapters.



Included Accessories

Part #	Description	N7010A	N7011A	N7012A
5061-5311	3.5 mm (f) to 3.5 mm (f) connector adapter	Qty (1)		
1250-3782	2.4 mm (f) to 2.92 mm (f) connector adapter		Qty (1)	
N5520B	1.85 mm (f) to 1.85 mm (f) connector adapter			Qty (1)

Performance Plots and Graphs (Typical)

N7010A noise plot

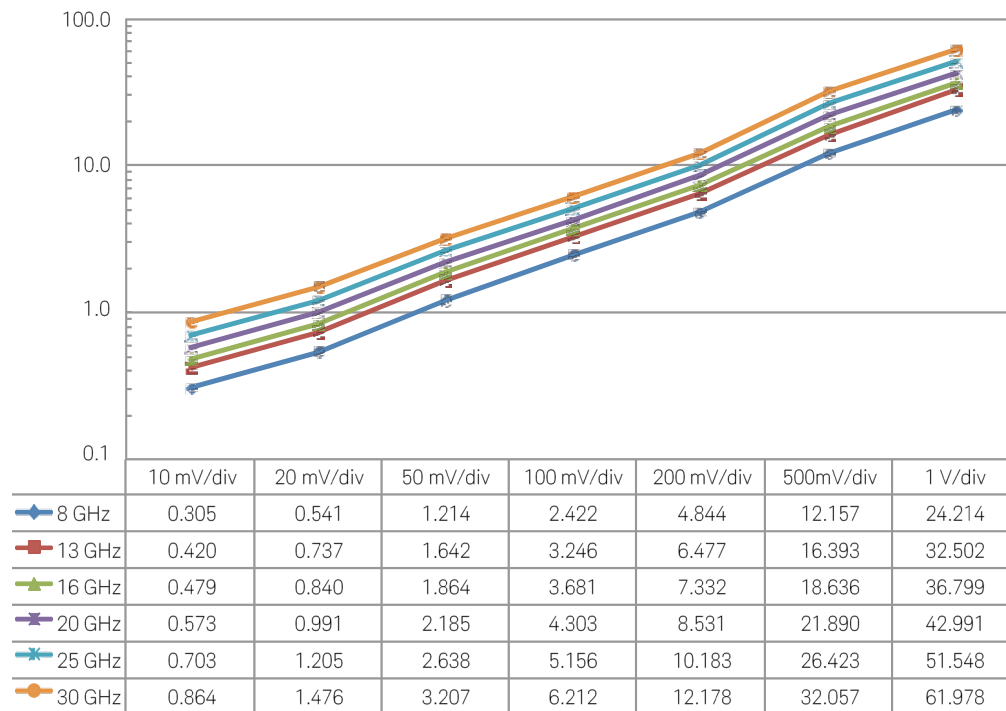


Figure 1. N7010A Noise at various oscilloscope bandwidths and vertical scales with V-series

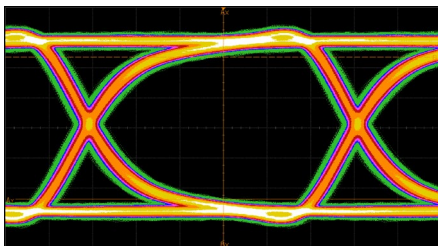


Figure 2. Direct Signal Connect to Infiniium Scope Without N7010A

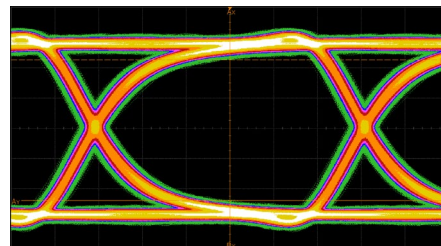


Figure 3. Signal Connected to Infiniium Scope Through N7010A

N7011A/12A performance plots

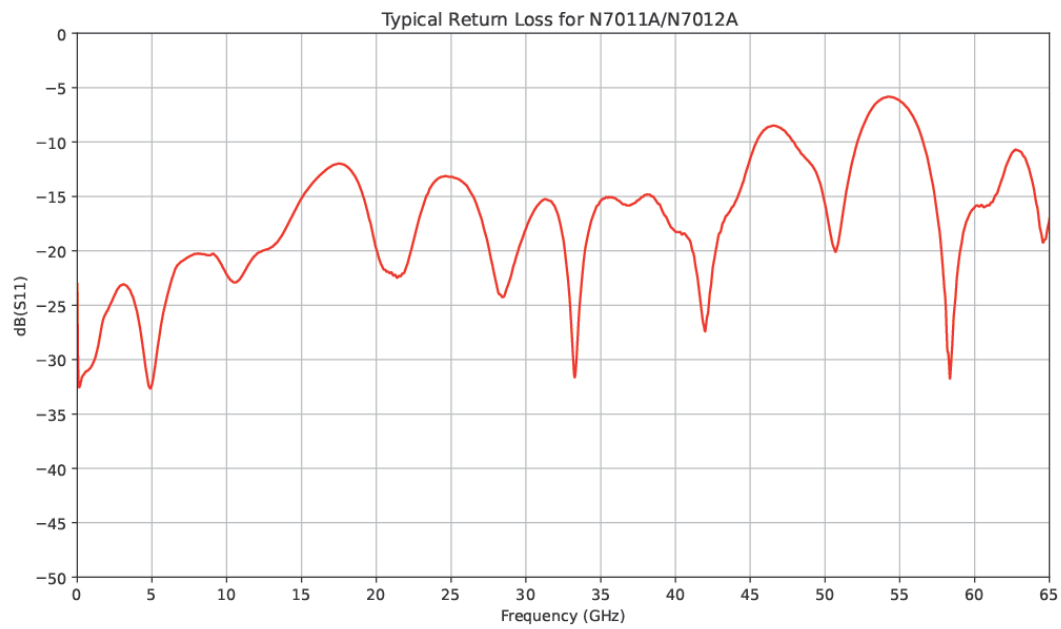


Figure 4. N7011A/12A Return Loss Plot (Typical)

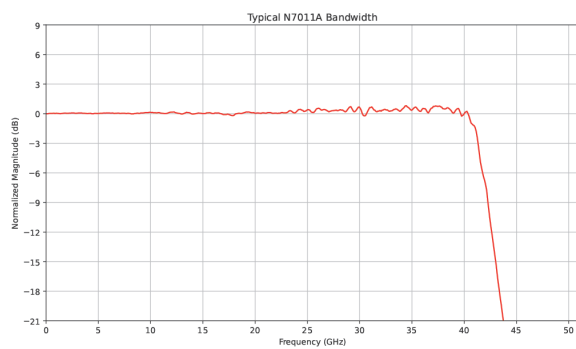


Figure 5. N7011A Bandwidth Plot

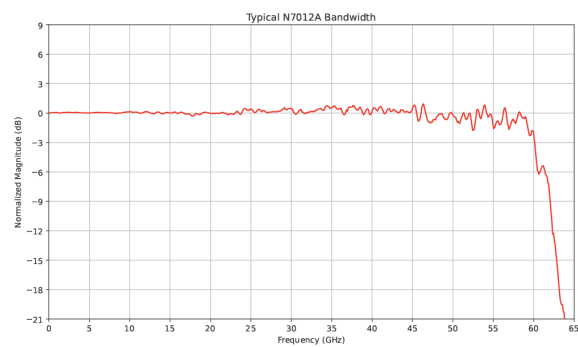


Figure 6. N7012A Bandwidth Plot

Oscilloscope Compatibility

To assist you in selecting the proper termination adapter for your oscilloscope use our compatibility table below. For the most up-to-date probe compatibility information, check out the [Probe Resource Center](#).

V-Series, 90000X/Q, Z-Series		UXR A/B Series		UXR AP/BP Series
Scope bandwidth	8 to 33 GHz (V-Series) 13 to 33 GHz (90000X) 16 to 63 GHz (90000Q) 20 to 63 GHz (Z-Series)	10 to 33 GHz	40 GHz to 110 GHz	5 GHz to 110 GHz
Probe interface	AutoProbe II	AutoProbe II	AutoProbe III	
Connector size	3.5 mm	3.5 mm	1.85 mm and 1 mm ^{1,2}	1 mm
Active termination adapter	N7010A	N7010A ¹	N7010A ¹ / 11A / 12A	
Infiniium software revision	5.50.30 or higher	11.71 or higher		

1. UXR with AutoProbe III interface (1 and 1.85 mm models) requires a N2852A interface adapter to accommodate probes with AutoProbe II interface

2. UXR A/B Series Connectors:

- 10 to 33 GHz (3.5 mm)
- 40 to 70 GHz (1.85 mm)
- 80 to 110 GHz (1.0 mm)



Ruggedized 1 mm Male Bulkhead Connector with AutoProbe III Interface



Standard 1.85 mm Male Bulkhead Connector with AutoProbe III Interface



Ruggedized 3.55 mm Male Bulkhead Connector with AutoProbe II Interface

Figure 7. Keysight oscilloscope front-end channel input connectors and AutoProbe interfaces

Ordering Information

Product description	Model number	Services
Active Termination Adapter, 30 GHz	N7010A	1-year warranty with the option to extend to 3 and 5 years
Active Termination Adapter, 40 GHz	N7011A	1-year calibration with Calibration Assurance Plan and the option to extend to 3 or 5 years
Active Termination Adapter, 59 GHz	N7012A	

Related Literature

Literature description
N7010A Active Termination Adapter User's Guide
Infiniium 90000 X-Series Oscilloscopes Data Sheet
Infiniium V-Series Oscilloscopes Data Sheet
Infiniium Z-Series Oscilloscopes Data Sheet
Infiniium UXR B-Series Oscilloscopes Data Sheet
Infiniium Oscilloscope Probes and Accessories Data Sheet
Understanding Oscilloscope Probe Specifications Application Note
HDMI Compliance Testing with the BitfEye BIT-2100 Switch and Keysight N7010A Adapters Application Note

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