

Appendix D - Specifications

ANALOG SIGNAL OUTPUTS

Low Distortion Sine Wave

Frequency Range	10 Hz to 120 kHz
Frequency Accuracy	±0.5%
Frequency Resolution	0.02%
Amplitude Range (20 Hz - 30 kHz) ¹	
Balanced	0.25 mV to 25.00 Vrms [-70 to +30.17 dBu]
Unbalanced	0.25 mV to 12.50 Vrms [-70 to +24.16 dBu]
Amplitude Range (full frequency range) ¹	
Balanced	0.25 mV to 12.28 Vrms [-70 to +24.00 dBu]
Unbalanced	0.25 mV to 6.14 Vrms [-70 to +18.00 dBu]
Amplitude Accuracy (1kHz)	±0.2dB [±2.3%]
Amplitude Resolution	0.01 dB
Flatness (1 kHz ref)	
10 Hz-20 kHz	±0.05 dB
20 kHz-120 kHz	±0.30 dB
Residual THD+N ²	
25 Hz-20 kHz	≤(0.0025% + 3 μV), 80 kHz BW [-92 dB]
10 Hz-50 kHz	≤(0.010% + 10 μV), >300 kHz BW [-80 dB]

Square Wave

Frequency Range	20 Hz – 30 kHz
Frequency Accuracy	Same as Sinewave
Amplitude Range ¹	
Balanced	0.71 mVpp to 34.73 Vpp
Unbalanced	0.71 mVpp to 17.36 Vpp
Amplitude Accuracy	±0.3 dB [±3.5 %] at 400 Hz
Rise/fall time	Typically 2.5 – 3.0 μs

Note 1 Calibration with other amplitude units is based upon an equivalent sinewave having the same Vpp amplitude.

Note 2 System specification including contributions from both generator and analyzer. Generator load must be ≥600 Ω.

SMPTE (or DIN) Test Signals *with option IMD*

LF Tone	50, 60, 70, or 250; all $\pm 1.0\%$
HF Tone Range	7 kHz or 8 kHz ($\pm 1\%$)
Mix Ratio	4:1 (LF:HF)
Amplitude Range ¹	
Balanced	0.71 mVpp to 70.71 Vpp
Unbalanced	0.71 mVpp to 35.35 Vpp
Amplitude Accuracy	± 0.3 dB [$\pm 3.5\%$]
Residual IMD ²	0.0015% [-96.5 dB], 60+7 kHz or 250+8 kHz

OUTPUT CHARACTERISTICS

Source Configuration	Selectable balanced or unbalanced
Source Impedances	
Balanced	50 Ω (± 2 Ω), 150 Ω^3 (± 2 Ω), or 600 Ω (± 2 Ω)
Unbalanced	50 Ω (± 2 Ω)
Max Float Voltage	42 Vpp
Output Current Limit	
Balanced	Typically >75 mA
Unbalanced	Typically >150 mA
Max Output Power	
Balanced	+29.5 dBm into 600 Ω ($R_s = 50$ Ω)
Unbalanced	+23.5 dBm into 600 Ω ($R_s = 50$ Ω)
Output Related Crosstalk (10Hz-20kHz)	≤ -110 dB or 10 μ V, whichever is greater

Note 1 Calibration with other amplitude units is based upon an equivalent sinewave having the same Vpp amplitude.

Note 2 System specification including contributions from both generator and analyzer. Generator load must be ≥ 600 Ω .

Note 3 200 Ω with option EURZ.

ANALOG ANALYZER

ANALOG INPUT CHARACTERISTICS

Input Ranges	80 mV to 250 V in 10 dB steps
Maximum Rated Input	350 Vpk, 140 Vrms (dc to 20 kHz); overload protected in all ranges
Input Impedance	
Balanced (each side)	Nominally 100 k Ω // 150-200 pF
Unbalanced	Nominally 100 k Ω // 150-200 pF
Terminations	Selectable 600 Ω \pm 1%; 1 Watt [+30 dBm] maximum power
CMRR	
80mV-2.5V ranges	\geq 70 dB, 50 Hz – 20 kHz
8V-250V ranges	\geq 50 dB, 50 Hz – 1 kHz
Input Related Crosstalk	\leq -120 dB or 1 μ V, whichever is greater
10 Hz-20 kHz	

Level Meter Related (both channels)

Measurement Range	10 mV – 140 V [-38 dBu to + 45 dBu] for specified accuracy and flatness, usable to <100 μ V
Accuracy (1 kHz)	\pm 0.1 dB + 100 μ V
Flatness (1 kHz ref)	
20 Hz-20 kHz	\pm 0.05 dB
10 Hz-50 kHz	\pm 0.2 dB
50 kHz-120 kHz	\pm 0.50 dB (-3 dB BW typically >300 kHz)

Frequency Meter Related (both channels)

Measurement Range	10 Hz – 200 kHz
Accuracy	\pm 0.01% [\pm 100 PPM]
Resolution	5 digits
Minimum Input	25 mV ⁴

Note 4 For fully specified performance. Usable with inputs as low as 10 mV. Readings are disabled for inputs below approximately 7 - 8 mV.

Phase Measurement Related

Measurement Ranges	± 180 , $+90/-270$, or $-90/+270$ deg
Accuracy	
20 Hz-20 kHz	± 2.0 deg
10 kHz-50 kHz	± 5.0 deg
Resolution	0.1 deg
Minimum Input	25 mV, both inputs ⁴

Wideband Amplitude/Noise Function

Measurement Range	$<1 \mu\text{V} - 140 \text{ V}_{\text{rms}}$ [-118 dBu to + 45 dBu]
Accuracy (1 kHz)	± 0.2 dB [± 2.3 %] unweighted
Flatness (1 kHz ref)	
20 Hz-20 kHz	± 0.05 dB
10 Hz-50 kHz	± 0.2 dB
50 kHz-120 kHz	± 0.5 dB (-3 dB BW typically >300 kHz)
Bandwidth Limiting Filters	
LF -3 dB	<10 Hz, 400 Hz $\pm 5\%$ (3-pole)
HF -3 dB	22 kHz $\pm 5\%$ (5-pole) ⁵ , 30 kHz $\pm 5\%$ (3-pole), 80 kHz $\pm 5\%$ (3-pole), or >300 kHz
Weighting filters	ANSI-IEC "A" per IEC 179 CCIR-QPK per CCIR Rec 468 CCIR-ARM per Dolby Bulletin 19/4 CCIR-1k (rms, 0 dB at 1 kHz) CCIR-2k (rms, 0 dB at 2 kHz)
Optional Filters	up to 2 (Aux 1 and Aux 2)
Detection	RMS ($\tau = 60$ ms), AVG, QPk per CCIR Rec 468,

Note 4 For fully specified performance. Usable with inputs as low as 10 mV. Readings are disabled for inputs below approximately 7 – 8 mV.

Note 5 Combined with 22 Hz highpass per CCIR Rec 468.

Residual Noise	
22 Hz-22 kHz BW	$\leq 1.5 \mu\text{V}$ [-114 dBu]
A-weighted	$\leq 1.0 \mu\text{V}$ [-118 dBu]
CCIR-QPk	$\leq 5.0 \mu\text{V}$ [-104 dBu]

Bandpass Amplitude Function

Tuning Range (f_0)	20 Hz to 120 kHz
Tuning Accuracy	$\pm 2\%$
Bandpass Response	Q = 5 (2-pole)
Accuracy (at f_0)	± 0.3 dB, 20 Hz - 120 kHz
Residual Noise	
10 Hz-5 kHz	$\leq 0.25 \mu\text{V}$ [-130 dBu]
5 kHz-20 kHz	$\leq 0.5 \mu\text{V}$ [-124 dBu]
20 kHz-200 kHz	$\leq 1.5 \mu\text{V}$ [-114 dBu]

THD+N / SINAD Function

Fundamental Range	10 Hz to 100 kHz, THD+N mode 400 Hz or 1 kHz, SINAD mode
Measurement Range	<0.001% – 100%
Accuracy	± 1 dB, 20 Hz – 120 kHz harmonics
Measurement Bandwidth	
LF -3 dB	<10, 22 or 400 Hz
HF -3 dB	22K, 30k, 80k, or >300 kHz; option filters are also functional
Residual THD+N ⁶	
25 Hz-20 kHz	$\leq (0.0025\% + 3.0 \mu\text{V})$, 80 kHz BW [-92 dB]
10 Hz-50 kHz	$\leq (0.010\% + 10 \mu\text{V})$, >300 kHz BW [-80 dB]
Minimum Input	25 mV for specified accuracy in AUTO TUNE mode, 800 μV [-60 dBu] in other modes.
Nulling Time	Typically 2-3 seconds above 25 Hz, Increases in a "1/V" fashion for inputs below 25 mV [-30 dBu]

Note 6 System specification including contribution from generator. Generator residual THD may limit system performance below 25 Hz if output is >20.0 Vrms balanced, or 10.0 Vrms unbalanced.

Crosstalk Function

Frequency Range	10 Hz to 120 kHz
Measurement Range	-140 dB to 0 dB
Accuracy ⁷	±0.5 dB
Residual Crosstalk ⁷	≤-120 dB at 20 kHz, R _s = 600 Ω
Minimum Input	25 mV for reference channel ⁸

SMPTE (DIN) IMD Function with option IMD

Test Signal Compatibility	Any combination of 40 – 250 Hz (LF) and 3 kHz – 20 kHz (HF) tones, mixed in any ratio from 0:1 to 8:1 (LF:HF)
IMD Measured	Amplitude modulation products of the HF tone. -3 dB measurement bandwidth is typically 20Hz - 750Hz
Measurement Range	<0.0025% – 20%
Accuracy	±1 dB per SMPTE RP-120-1983, DIN 45403
Residual IMD (V _{in} ≥200mV) ⁹	≤0.0025% [-92 dB], 60 + 7 kHz or 250 + 8 kHz
Minimum Input	100 mV

Ratio Function

Measurement Range	-80 dB to +100 dB, 0.01 dB resolution
Accuracy	±0.1 dB, 20 Hz – 20 kHz
Minimum Input	
Mode 1	10 mV [-38 dBu], denominator signal 10 μV [-98 dBu], numerator signal
Mode 2	10 μV [-98 dBu], denominator signal 10 mV [-38 dBu], numerator signal

Note 7 Uses the 1/3 octave bandpass filter to enhance the measured range in the presence of wideband noise. Alternate (interfering) channel input must be ≥5 mV.

Note 8 For fully specified performance. Usable with inputs as low as 10 mV. Readings are disabled for inputs below approximately 7 – 8 mV.

Note 9 System specification including contribution from generator.

AC Mains Check Function

Measurement Range	0.85 – 1.10 of nominal setting
Voltage Accuracy	±1%

Gen Load Function

Measurement Range	<1 Ω to 20 k Ω
Accuracy	±[5 % + 0.5 Ω] for readings <1 k Ω Degrades rapidly above 1 k Ω or with reactive loads
Frequency Range	20 Hz – 20 kHz
Test Voltage	200 mV default. Usable from 10 mV to generator maximum

Wow & Flutter Function

Test Signal Compatibility	2.80 kHz – 3.35 kHz
Measurement Range	<0.005% to 3% (single range)
Accuracy (4 Hz)	±(5% of reading + 0.002%)
Detection Modes	IEC/DIN (quasi-peak per IEC-386), NAB (average), JIS (per JIS 5551)
Response Selections	
Weighted	4 Hz bandpass per IEC/DIN/NAB
Unweighted	0.5 Hz – 200 Hz
Residual W+F	
Weighted	≤0.005%
Unweighted	≤0.01%
Minimum Input	25 mV ¹⁰
Settling Time	
IEC/DIN or NAB	Typically 3 – 6 seconds
JIS	Typically 15 – 20 seconds

Note 10 For fully specified performance. Usable with inputs as low as 10 mV. Readings are disabled for inputs below approximately 7 – 8 mV.

AUXILIARY SIGNALS

Analog Sync Output	LSTTL compatible signal that is intended to be used as a trigger for stable oscilloscope displays.
Input Monitor	Buffered version of the analog or digital input signal. Amplitude is typically 0 – 2.83 Vpp.
Reading Monitor	Buffered version of the analog or digital analyzer output signal after all filtering and gain stages. Amplitude is typically 0 – 2.83 Vpp.

AUDIO MONITOR

Power Output	Typically 1 watt
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GENERAL / ENVIRONMENTAL

Power Requirements	100/120/230/240 Vac (-10%/+6%), 50 – 60 Hz, 60 VA max
Temperature Range	
Operating	0°C to +50°C
Storage	-20°C to +60°C
Humidity	80% RH to at least +40°C (non-condensing)
Altitude	Up to 2000 meters
EMC ¹¹	Complies with FCC subpart J - Class B Complies with 89/336/EEC, 92/31/EEC, and 93/68/EEC. EN 50081-1 (1992) Emissions Class B EN 50082-1 (1992) Immunity
Safety	Complies with 73/23/EEC and 93/68/EEC EN61010-1 (1993) - IEC 1010-1 (1990) + Amendment 1 (1992) + Amendment 2 (1995) Installation Category II – Pollution Degree 2
Dimensions	16.5 x 6.0 x 13.6 inches [41.9 x 15.2 x 34.5 cm]
Weight	Approximately 20 lbs [9.1 kg]

Note 11 Emission and Immunity levels are influenced by the shielding performance of the connecting cables. The shielding performance of the cable will depend on the internal design of the cable, connector quality, and the assembly methods used. EMC compliance was evaluated using Audio Precision XLR type cables, part number CAB-AES.