



CE0JR065

DA 4084 Programmable Distortion Analyzer

Section 1 SPECIFICATION

Instrument Description

The DA 4084 is a fully automatic programmable distortion analyzer in a dedicated power supply. This instrument offers true rms voltage measurement capabilities. Volts, dBm or dB ratio display modes are provided. The DA 4084 features a 0 dB set reference memory in the dB ratio mode. A 3 1/2 digit readout and an analog display for nulling and peaking indications are included.

Level setting, tuning and nulling are fully automatic. Input level range and distortion measurement range selections are fully automatic or manual. A selection of predetection filters, functional in all modes, is included. These filters provide conditioning to minimize the effects of extraneous signals. A position for an auxiliary filter is also provided.

CAUTION

This power supply is not compatible with Tektronix TM 500 or TM 5000 plug-ins.

Performance Conditions

The electrical characteristics in this specification are valid only if the DA 4084 has been adjusted at an ambient temperature between +20°C and +30°C. The instrument must be in a noncondensing environment whose limits are described under environmental. Allow twenty minutes warm-up time for operation to specified accuracy; sixty minutes after exposure to or storage in a high humidity (condensing) environment. Any conditions that are unique to a particular characteristic are expressly stated as part of that characteristic.

Unless specifically noted, all performance specifications are valid using only rms response.

The electrical and environmental performance limits, together with their related validation procedures, comprise a complete statement of the electrical and environmental performance of a calibrated instrument.

Items listed in the Performance Requirements column of the Electrical Characteristics are verified by completing the Performance Check in this manual.

Table 1-1
ELECTRICAL CHARACTERISTICS

Characteristics	Performance Requirement	Supplemental Information
INPUT (ALL FUNCTIONS)		
Impedance	100 k Ω \pm 2%, each side to ground	Full differential. Each side ac coupled through 1 μ F and shunted to ground by approximately equal to 200 pF. Dual banana jack connectors at 0.750 inch spacing with ground connector additionally provided.
Input ranges	200 μ V to 200 V in 10 steps	2-6 sequence from 200 μ V to 200 V Range selection is manual or automatic. Autoranging time is typically < 1 second. Separate increase range and decrease range indicators illuminate whenever input level does not fall within optimum window for selected range. For specified instrument performance both indicators must be extinguished.
Maximum input voltage		300 V peak, 200 V rms either input to ground or differentially. Will recover without damage from continuous overloads of 120 V rms or 200 V rms for 30 minutes on all ranges. For linear response peak input voltage must not exceed 3 times INPUT LEVEL RANGE setting.
Common mode rejection (inputs shorted)	\geq 50 dB at 50 or 60 Hz decreasing to 40 dB at 800 Hz for common mode signals up to one-half of selected input range or 50 mV, whichever is greater.	Typically \geq 40 dB to 300 kHz.
LEVEL FUNCTION		
Modes		Volts, dBm (600 Ω), or dB ratio with push to set 0 dB reference. Input range determines display range. Single effective range in dB modes with 0.1 dB resolution. Stored 0 dB reference is unaffected by subsequent changes in mode or function.

**Table 1-1 (cont.)
ELECTRICAL CHARACTERISTICS**

Characteristics	Performance Requirement		Supplemental Information
Accuracy (level ranging indicators extinguished)	Volts	dB Modes	
20 Hz to 20 kHz	Within $\pm 2\%$ +1 count	± 0.3 dB	
10 Hz to 20 Hz 20 kHz to 100 kHz	Within $\pm 4\%$ +2 counts	± 0.5 dB	
Bandwidth (no filters selected)	At least 300 kHz		
Residual noise (Inputs shorted, $T \leq +40^\circ\text{C}$)	$\leq 3.0 \mu\text{V}$ (-108 dBm) with 80 kHz, 400 Hz filters. $\leq 1.5 \mu\text{V}$ (-114 dBm) with A weighting filter.		
TOTAL HARMONIC DISTORTION PLUS NOISE AND SINAD FUNCTION Fundamental frequency range	10 Hz to 100 kHz		Fully automatic tuning and nulling. For proper tuning $\text{THD} + \text{N} \leq 10\%$. After initial tuning $\text{THD} + \text{N}$ can degrade to 50% without loss of lock for SINAD testing. Typical nulling time is less than 6 seconds above 20 Hz.
Minimum input level	100 mV (-17.8 dBm)		
Distortion ranges			Auto range, 20%, 2%, 0.2%, and dB. dB is internally autoranging with single effective display range. Auto range allows measurements above 20%.
Accuracy ($\text{THD} \leq 50\%$ and readings $\geq 4\%$ of selected distortion range).			Accuracy is limited by residual $\text{THD} + \text{N}$ and filter selection

**Table 1-1 (cont.)
ELECTRICAL CHARACTERISTICS**

Characteristics	Performance Requirement	Supplemental Information
Fundamental frequency 10 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz	± 1 dB (0.1%–50%) ± 2 dB (0.1%–50%) +3 dB, –4 dB (0.1%–50%)	
Residual THD+N (Vin ≥ 250 mV, all distortion, noise, and nulling error sources combined, T $\leq 40^\circ\text{C}$) 20 Hz to 20 kHz with 80 kHz noise limiting filter 10 Hz to 20 Hz 20 kHz to 100 kHz	Measured with a low-distortion sine wave oscillator. $\leq 0.005\%$ (–86 dB) $\leq 0.015\%$ (–76.5 dB)	
Typical fundamental rejection		At least 10 dB below specified residual THD+N or the actual signal THD, whichever is greater.
FILTERS		
400 Hz high pass	–3 dB at 400 Hz $\pm 5\%$; at least –40 dB rejection at 60 Hz.	Three pole Butterworth response
80 kHz low pass 30 kHz low Pass	–3 dB at 80 kHz $\pm 5\%$ –3 dB at 30 kHz $\pm 5\%$	Three pole Butterworth response Three pole Butterworth response
A weighting		Within specifications for type 1 sound level meters listed in ANSI S 1.4 1971 (revised 1976) and IEC Recommendation 179.
External filter		Selects front panel AUXILIARY INPUT allowing connection of external filter between it and FUNCTION OUTPUT.

**Table 1-1 (cont.)
ELECTRICAL CHARACTERISTICS**

Characteristics	Performance Requirement	Supplemental Information
FRONT PANEL SIGNALS		
INPUT MONITOR		
$V_{in} \geq 50$ mV	1 Vrms $\pm 10\%$	10 Hz to 100 kHz Constant amplitude (average response) version of differential input signal. THD is typically $\leq 0.0010\%$ (-100 dB) from 20 Hz to 20 kHz.
$V_{in} \leq 50$ mV		Approximately 20 times input signal
Impedance	1 k Ω $\pm 5\%$	
FUNCTION OUTPUT		
Signal	1 V $\pm 3\%$ for 1000 count volts or % display	Selected and filtered ac signal actually measured
Impedance	600 Ω $\pm 5\%$	
AUXILIARY INPUT		
Sensitivity	1 V $\pm 3\%$ for 1000 count volts or % display	Loop through accuracy from FUNCTION OUTPUT is $\pm 3\%$
Maximum input voltage		15 V peak, 6 V peak for linear response
Impedance	100 k Ω $\pm 5\%$	Ac coupled
DISTORTION ANALYZER REAR INTERFACE SIGNALS		
Rear interface input		Pins 28B (+), 28A (-), 27B and 27A (common) are front panel selectable and independent of main front panel input. All characteristics are the same as main INPUT except maximum input voltage is limited to 42 V peak, 30 V rms. Due to potential crosstalk at the rear interface, noise and distortion performance may be degraded.
Input monitor		Pins 24A and 23A (gnd) same as front panel INPUT MONITOR

**Table 1-1 (cont.)
ELECTRICAL CHARACTERISTICS**

Characteristics	Performance Requirement	Supplemental Information
Function output		Pins 23B and 24B (gnd) same as front panel FUNCTION OUTPUT.
Auxiliary input		Pins 25B and 26B (gnd) same as front panel AUXILIARY INPUT. Maximum input voltage is 15 V peak, 6 V peak for linear operation.
Ac/dc converter output		Pins 20A and 19A (gnd). Dc output of the selected ac to dc converter. 1 V \pm 5% for 1000 count display with 500 Ω \pm 5% source resistance.
dB converter output		Pins 19B and 20B (gnd). Dc output of the logarithmic dB converter. 10 mV \pm 5% equals 1 dB of display with 1 k Ω \pm 5% source resistance. Changes in level or distortion range will cause brief ac transients.
DETECTORS AND DISPLAYS		
Detectors (Response) RMS		True rms detection
AVG		Average detection, rms calibrated for sinewaves. Typically reads 1 to 2 dB lower than true rms detection for noise, and THD + N measurements.
Displays Digital		3 1/2 digit, 2000 count LED. Overrange indication is 1, blank, blank, blank.
Analog bar graph		10 segment LED intensity modulated bar graph display of digital readout. Segments are logarithmically activated with approximately 2.5 dB/segment.

**Table 1-1 (cont.)
ELECTRICAL CHARACTERISTICS**

Characteristics	Performance Requirement	Supplemental Information
SOURCE POWER REQUIREMENTS		
Voltage ranges	Selectable 100 V, 120 V, 220 V, and 240 V nominal line $\pm 10\%$	
Line frequency	48 Hz to 440 Hz	
Fuse data 100 V, 120 V ranges 220 V, 240 V ranges	3 AG, 0.6A, 250 V, slow blow 3 AG, 0.3A, 250 V, medium blow	
Power consumption	Approximately equal to 36 watts	
MISCELLANEOUS		
Internal power supplies +15 -15 +5		Nominally +15.1 V $\pm 3\%$ Nominally -15.1 V $\pm 5\%$ Nominally +5.25 V $\pm 5\%$
Fuse data F4060 F4061 F4062		3 AG, 1 A, 250 V, fast blow 3 AG, 1 A, 250 V, fast blow 3 AG, 1.5 A, 250 V, fast blow
Recommended adjustment interval		2000 hours or 12 months, whichever occurs first.
Warm-up time		20 minutes; 60 minutes after storage in high humidity environment.

Table 1-2
ENVIRONMENTAL CHARACTERISTICS

Characteristics	Description	
Temperature Operating Nonoperating	0°C to +50°C – 40°C to +75°C	
Humidity	95% RH, 0° C to 30° C 75% RH, to 40° C 45% RH, to 50° C	Meets MIL-T-28800C, class 5.
Altitude Operating Nonoperating	4.6 km (15,000 ft) 15 km (50,000 ft)	Exceeds MIL-T-28800C, class 5.
Vibration	0.38 mm (0.015") peak to peak, 5 Hz to 55 Hz, 75 minutes.	Meets MIL-T-28800C, class 5.
Shock	30 g's (1/2 sine), 6 shocks in each direction along 3 major axes, 18 total shocks.	Meets MIL-T-28800C, class 5.
Bench Handling (plug-in only)	12 drops from 45°, 4" or equilibrium, whichever occurs first.	Meets MIL-T-28800C, class 5.
Packaged Product Vibration and Shock	Qualified under National Safe Transit Association Preshipment Test Procedures 1A-B-1 and 1A-B-2.	
Electromagnetic Interference	Within limits of F.C.C. Regulations, Part 15, Subpart J, Class A; VDE 0871 category B, VDE 0875; and MIL-STD-461B (April 1, 1980) Class B, CE02, CE04, CS02, CS06, RE02, RE02.1.	
Electromagnetic Susceptibility	Within limits of MIL-STD-461B (April 1, 1980) Class B, RS03.	
Electrostatic Immunity	At least 15 kV discharge from 500 pF in series with 100 Ω to instrument case or any front panel connector without damage or permanent performance degradation.	

Table 1-3
PHYSICAL CHARACTERISTICS

Characteristics	Description
Finish	Laminated polycarbonate front panel with anodized aluminum chassis.
Net Weight	Approximately equal to 16 lbs. (7.2 kg)
Overall Dimensions	Height 193.8 mm (7.63 inches) Width 229.84 mm (9.049 inches) Length 476 mm (18.74 inches)