Audio precision®

Testing for Optimal Results

Portable One

Audio Precision Quality in a Portable Test Set

Unmatched Portable Performance

Available from:

TTi

Measurably better value

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Web: **www.tti-test.com** or **www.tti.co.uk**

Portable One family of audio test instruments—at home on the bench or rugged in the field.

With thousands of units sold, you'll find the Portable One family of audio analyzers in operation around the world in maintenance, engineering and production facilities. Whether in broadcast and communications or bench and production use, Portable One offers a complete easy-to-use audio test set housed in a rugged case ready for almost anything. With twelve different measurement functions selectable with the push of a button, Portable One is comprehensive but user-friendly. But the popularity of Portable One is no less due to its outstanding performance specifications, even though it is priced just as affordable as lesser test sets.

Analog Only or full Dual Domain—Analog and Digital

Portable One *Plus* Access includes comprehensive analog generation and measurement, two outputs and two inputs. Easy to set up sweep capability produces graphs of frequency response, distortion vs. frequency, even amplitude sweeps. Non-volatile storage of up to 30 tests allows easy one-button recall of your favorite test setup. Connect Portable One to a compatible printer to produce reports including high resolution graphs. If your needs include digital domain audio and digital interface measurements, **Portable One Dual Domain** adds digital audio capability to the comprehensive analog capabilities of the Portable One family.

Unparalleled Precision

Low Distortion
Analog System THD+N 20kHz BW **-92dB**
Digital Distortion THD+N ≤**-140dB**

High Analog Bandwidth
Signal Generation to **120kHz**

Low Noise
22–22kHz **< -114dBu**
A-weighted **< -118dBu**

Wide Input Voltage Range
Input Range 80mv—250V in 10dB steps

Flat Response
20–20kHz typically **±0.05dB**

Low Crosstalk
Input **< -120dB**
Output **< -110dB**

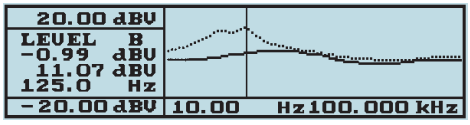
Analog+Digital+AES/EBU/IEC:

Portable One Dual Domain® is a comprehensive audio test set for both analog and digital audio, as well as for generation and measurement of AES/EBU/IEC digital characteristics such as jitter. Like our System Two Cascade family, Portable One Dual Domain features true Dual Domain architecture. Digital signals are generated and measured purely in the digital domain, resulting in extremely low distortion and noise residuals necessary for making useful digital audio measurements.

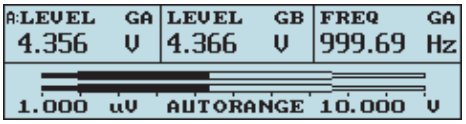
Performance, Measurement Power, and Ease-of-Use

Easy to Use:

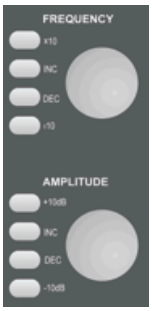
Measurement functions are simply selected from the front panel. Just press a button and make the measurement. Selection of analog and digital inputs is clearly indicated on the front panel with LED legends. Portable One Dual Domain makes *graphs* of *swept measurements* in real time on the high contrast back-lit LCD display, including both Frequency and Amplitude sweeps. Hard copy high-resolution graphs, compact



screen-sized graphs or tabular data listings are made from Portable One Dual Domain to laser, ink jet or dot matrix printers at the touch of a button. *Bargraphs* can display measurements ranging from AC mains power line



distortion to digital interface error rate ... and nearly everything in between. Separate buttons and knobs provide independent control of frequency and amplitude. The buttons provide large and medium steps (decade and 1/3 octave steps for frequency, 10 dB and 1 dB for amplitude), with knobs for finer



resolution. When not otherwise used, the setting knobs and buttons also provide a convenient human interface for scrolling display cursors and for entry of other settings and data.

Stereo:

Portable One Dual Domain is a true two channel instrument. Both analog and digital level functions measure both inputs simultaneously. Phase and level ratio measurements are also available.

Full Range of Analog & Digital Testing Facilities:

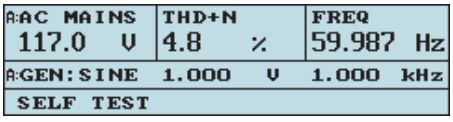
Portable One Dual Domain provides complete and parallel measurement capabilities for both analog and digital audio signals. Measurements common to both domains include: Amplitude, Noise, Level (2 channels simultaneously), Frequency, Phase, THD+N, SMPTE/DIN, IMD, Crosstalk and Level Ratio. Standard A-weighting, CCIR 468, and LP/HP filters are included in both domains. RMS and quasi-peak (CCIR 468) detectors are available in both domains.

Analog Performance:

The low distortion transformer-coupled analog generator supplies a full 30.6 dBu (+30 dBm into 600 ohms) at selectable (40,150,600Ω) source impedances. Extremely low analyzer noise and residual distortion support measurement of high performance digital devices.

Analog Convenience Functions:

In addition to the above measurements, the analog *GEN LOAD* function measures the input resistance of your device at any frequency you choose and makes swept impedance measurements (including loudspeakers).
AC MAINS CHECK measures the voltage, frequency and distortion of the power line without hazardous direct connections. BARGRAPH display in AC MAINS CHECK function provides a visible history of maximum and minimum mains voltage excursions.



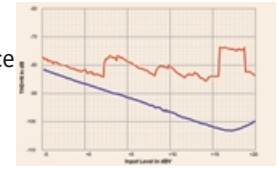
The *dBg unit* (dB referred to the present analog generator amplitude) is useful for compression threshold measurements or rapid response sweeps at several different absolute levels, as well as for input to output gain/loss measurements. 600 ohm *Analog Input Terminations* are individually switchable for each channel of the analog analyzer.

Comprehensive Analog and Digital Functions

Digital Performance:

Portable One Dual Domain uses a true DSP-implemented analyzer for digital measurements, which results in -130 dB residual THD+N, 0.01 dB flatness, and -140 dBFS residual noise. Other mixed-signal test sets in the same price

range have no digital analyzer, but use a D/A converter and an analog analyzer. These architectures "bottom out" at –70 to –84 dB residual THD+N (12-14 bit effective performance), and 0.1 dB flatness. With today's best A/D converters measuring –104 to –108 dB THD+N, their real performance is invisible to these mixed signal analyzers ... buried under the analyzer's noise and distortion floor.



Competitive analyzer lacking DSP analyzer produces false THD+N readings (red trace) from a popular A/D converter. Both Portable One Dual Domain and System Two Dual Domain graph the true performance of the converter (from 5 dB to 28 dB lower), as represented by the trace in blue.

Separate & Independent Analog & Digital Generators:

Often necessary for dual domain testing. You may, for example, drive the inputs of an A/D converter with the low-distortion analog sine while simultaneously driving the converter's digital reference (house sync) input with the digital generator. Then, add jitter or vary the sample rate to see the effect on THD+N, IMD, or noise. Competitive units can drive only one domain at a time or use their analog generator to create the digital jitter, and thus can't make this measurement at all.

Separate Digital Inputs & Outputs:

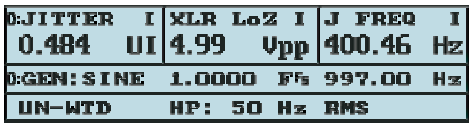
Three I/O formats: XLR, BNC, and optical (Toslink®). All are completely separate from the analog audio XLR connectors, permitting both digital and analog generators to operate simultaneously. No cable changes required to go from A/D to D/A to D/D to A/A testing of a digital tape machine, for example.

Digital & Analog Monitors:

Listen to all measurements in the digital and analog domains over the internal loudspeaker or a pair of headphones. In analog domain, monitor signals or distortion. In digital domain, the incoming signal, distortion, or jitter can all be monitored.

Jitter Meter:

Portable One Dual Domain includes jitter measurement in nanoseconds or Unit Intervals and with a choice of 50Hz or 700 Hz high pass filters.



Other Interface Signal Measurements:

Portable One Dual Domain measures key digital I/O interface parameters in addition to jitter, including sample rate, AES signal voltage, frame delay through the device

under test, and delay of the input signal relative to a house sync reference (frame or block).

Flexible Interface Impairment Simulation:

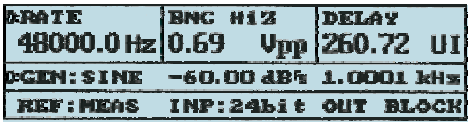
Flexible digital interface testing is vital for troubleshooting and verifying performance of digital audio at the systems level. Portable One Dual Domain allows simulation of real world transmission and interface problems.

Vary the digital output signal to test the acceptance range of your digital devices. Set sample rate anywhere from 28.8 to 52.8 kHz, not just at the three standard frequencies. Inject jitter amplitude from zero to 2.5 UI (415 nanoseconds at 48 kHz) in 0.01 UI (1.6 ns) steps or zero to 25.5 UI (4150 ns) in 0.1 UI (16 ns) steps.

Injected jitter frequency can be set from 10 Hz to 38.8 kHz, not just to a fixed frequency. Adjust output signal amplitude continuously from zero to 5.12 Volts in 5 mV increments, not just at a few steps. Only Portable One Dual Domain provides this flexibility in a Portable analyzer.

Independent Interface I/O Word Widths:

Word width of digital input & output are independently set from 12 to 24 bits. Output width is set to match the device under test to assure proper dither. Input



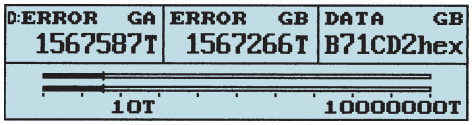
width must be set to exclude signal in the AUX bits or other low-level bit activity meaningless to the desired measurement.

Independent Input & Output Sample Rates:

Lets you test sample rate converters. Measurement of the incoming embedded audio signal can be referred to the incoming sample rate, status byte indication of rate, or the outgoing generator rate.

Data✓ Error Testing Capability for Digital Audio Signals:

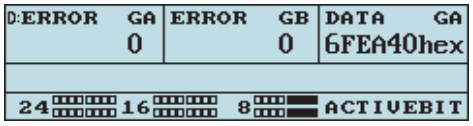
Stimulate the test device with random data and display current or totaled error measurements on both channels. The signal and analysis techniques are compatible with the BITTEST feature of our System products, so you can test a transmission link



end-to-end with a Portable One Dual Domain at one end and a System Two, System Two Cascade or Cascade Plus Dual Domain at the other.

Other Digital Convenience Functions:

Digital Status bytes are displayed and set in high-level English.



Error flag displays for confidence, lock, coding, parity errors and the validity bit are included.

Additional active bit and actual bit displays on the panel help determine the word width of the incoming signal & detect stuck bits.

Digital Dither:

Portable One Dual Domain includes a full complement of dither selections—triangular and rectangular probability distribution functions; white or shaped spectrum.

Dither amplitude is automatically set to the proper value for the output word width and the selected probability function.

Sample & Frame Sync:

Synchronize Portable One Dual Domain sample and frame sync to the digital reference (house sync) input.

Digital Pass Mode:

Sends the input digital audio content to the output while modifying status bytes, validity bit, etc. Portable One Dual Domain can thus be used as a problem-solver between incompatible equipment.

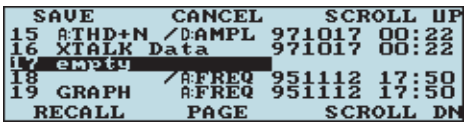
Signal Monitoring Outputs:

A digital signal appropriate for synching an external oscilloscope may be derived from the input sample rate, output sample rate, input block rate, output block rate, digital audio waveform, jitter signal, or the detected interface errors. A buffered version of the balanced AES/EBU signal from the XLR input is also available, which coupled with the high input impedance of the XLR in bridging mode allows non-intrusive digital line measurements with conventional ground referenced oscilloscopes.

Save your Test Setups—with measured data and print reports

SAVE & RECALL TESTS:

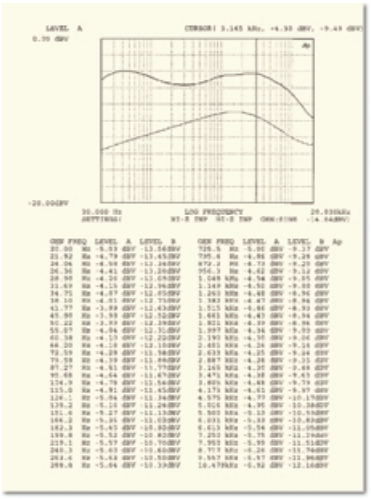
Save 30 instrument setups, including results data, time-stamped from the internal clock calendar. Use for repeatable, easy bench and production testing or when in the field, for storing test data to be printed or analyzed later. Each saved test includes all settings for the



entire instrument, a default description or your own title for the test, the date and time, and the last test result data.

Print Graphs and Test Results:

Portable One Dual Domain prints graphs, panel setups and measured data either to laser (PCL compatible), inkjet or dot matrix (PCL or IBM Graphics mode) printers. Front panel keys select two sizes



of graph output (including cursor data), tabular sweep data, bargraphs and front panels for printing.

For a quick print, a compact graph provides a direct replication of the LCD screen. A larger graph printout covering approximately half a page (360x280 pixels with grid lines) allows finer detail to be shown. Both graphs show key instrument setup parameters as well. Tabular data values for all swept points may be printed in order to preserve exact reading values.

The bargraph displays, with their useful minimum/maximum indicators print just as they are seen on the display, as do any desired instrument panels. Various printouts may be combined on one page, to include graphs, bargraphs and numeric data.

INTERNAL CLOCK/CALENDAR:

An internal clock/calendar automatically stamps the time and date on setups and data as they are saved.

PRINTER PCL GRAPH	97 10 17 00:20:44	FREQ STEP 1.0000 kHz
	INVERT DISPLAY	AMPL STEP 100.0 mV

You can view or set the clock/calendar from the Setup panel.

GPIB Control:

An IEEE-488 Interface is built in to allow control of the instrument in an automatic test environment. National Instruments LabWindows/CVI and LabVIEW drivers are available. A LabWindows/CVI soft front panel program is provided with a Windows user interface for real-time instrument control through the GPIB interface. The LabVIEW driver is provided with a Getting Started VI and sample VIs.

specifications

ANALOG SIGNAL OUTPUTS

Low Distortion Sine Wave	
Frequency Range	10 Hz to 120 kHz
Frequency Accuracy	±0.5%
Amplitude Range	(20 Hz to 30 kHz)
Balanced	<0.25 mV to 26.25 Vrms [+30.6 dBu]
Unbalanced	<0.25 mV to 12.50 Vrms [+24.6 dBu]
Amplitude Accuracy	±0.2dB [±2.3%] at 1 kHz
Amplitude Resolution	0.01 dB
Flatness (1 kHz ref)	
10 Hz-20 kHz	±0.05 dB
Residual THD+N	
25 Hz-20 kHz	≤(0.0025% + 3 μV), 80 kHz BW [-92 dB]

Square Wave	
Frequency Range	20 Hz-30 kHz
Amplitude Range	
Balanced	0.25 mVpp to 34.4 Vpp
Unbalanced	0.25 mVpp to 17.2 Vpp
Amplitude Accuracy	±0.3 dB [±3.5 %] at 400 Hz
Rise/fall time	Typically 2.5 - 3.0 μsec

SMPTE (or DIN) Test Signals with option "P1-IMD"	
LF Tone	50, 60, 70, or 250; all ±1.0%
HF Tone Range	7 kHz or 8 kHz (±1%)
Mix Ratio	4:1 (LF:HF)
Residual IMD	0.0015% [-96.5 dB], 60+7 kHz or 250+8 kHz

OUTPUT CHARACTERISTICS	
Source Configuration	Selectable balanced or unbalanced
Source Impedances	
Balanced	40Ω (±2Ω), 150Ω (±2Ω), or 600Ω (±2Ω)
Unbalanced	40Ω (±2Ω)
Output Current Limit	75 mA peak
Max Output Power	
Balanced	+30.1 dBm into 600* (Rs = 40*)
Unbalanced	+24.4 dBm into 600* (Rs = 20*)
Output Related Crosstalk (10Hz–20kHz)	≤-110 dB or 10 μV, whichever is greater

ANALOG ANALYZER

ANALOG INPUT CHARACTERISTICS	
Input Ranges	80 mV to 250 V in 10 dB steps
Maximum Rated Input	350Vpk, 140Vrms (dc to 20kHz); overload protected
Input Impedance	
Balanced (each side)	Nominally 100 kΩ // 150-200pF
Unbalanced	Nominally 100 kΩ // 150-200pF
Terminations	Selectable 600 Ω ±1%
CMRR 80mV-2.5V range	≥70 dB, 50 Hz–20 kHz
Input Related Crosstalk 10 Hz–20 kHz	≤-120 dB or 1 μV, whichever is greater

Wideband Amplitude/Noise Function	
Measurement Range	<1 μV-140 Vrms [-118 dBu to + 45 dBu]
Accuracy (1 kHz)	±2.0% [*0.2 dB] unweighted
Flatness (1 kHz ref)	±0.05 dB (20 Hz–20 kHz)
Bandwidth Limiting Filters	
LF -3 dB	<10 Hz; 400 Hz ±5% (3-pole)
HF -3 dB	22 kHz; 30 kHz; 80 kHz (3-pole), or 300 kHz
Weighting Filters	ANSI-IEC "A"; CCIR-QPK; CCIR-ARM; CCIR-RMS
Optional Filters	Up to 2 (Aux 1 and Aux 2)
Detection	RMS (τ=60 msec); AVG; QPK (CCIR Rec 468)
Residual Noise	
22 Hz-22 kHz BW	≤1.5 μV [-114 dBu]
A-weighted	≤1.0 μV [-118 dBu]
CCIR-QPK	≤5.0 μV [-104 dBu]

Frequency Meter Related (both channels)	
Measurement Range	10 Hz–200 kHz
Accuracy	±0.01% [±100 PPM]
Resolution	5 digits

Phase Measurement Related	
Measurement Ranges	±180, +90/-270, or -90/+270 deg
Accuracy 20 Hz–20 kHz	±2.0 deg
Resolution	0.1 deg

Level Meter Related (both channels)	
Measurement Range	10 mV–140 V for specified accuracy and flatness, useable to <100 μV [-38 dBu to + 45 dBu]
Accuracy (1 kHz)	±0.1 dB + 100 μV
Flatness (1 kHz ref)	(Vin >10 mV) ±0.05 dB (20 Hz–20 kHz)

Bandpass Amplitude Function	
Tuning Range (f_0)	20 Hz to 120 kHz
Bandpass Response	Q=5 (2-pole)
Accuracy (at f_0)	±0.3 dB, 20 Hz–120 kHz

THD+N / SINAD Function	
Fundamental Range	10 Hz to 100 kHz, THD+N mode
Measurement Range	.001%-100%
Accuracy	±1 dB, 20 Hz–120 kHz harmonics
Measurement Bandwidth	
LF -3 dB	<10 or 400 Hz
HF -3 dB	22K, 30k, 80k, or 300 kHz
Residual THD+N	
25 Hz-20 kHz	≤(0.0025% + 3.0 μV), 80 kHz BW [-92 dB]

Crosstalk Function	
Frequency Range	10 Hz to 120 kHz
Measurement Range	-140 dB to 0 dB
Accuracy	±0.5 dB

SMPTE (DIN) IMD Function with option "P1-IMD"	
Test Signal Compatibility	40-250 Hz and 3 kHz-20 kHz in 0:1 to 8:1 ratio
IMD Measured	Amplitude modulation products of the HF tone.
Measurement Range	<0.0025%–20%
Accuracy	±1 dB per SMPTE RP-120-1983, DIN 45403
Residual IMD	≤0.0025% [-92 dB], 60 + 7 kHz or 250 + 8 kHz

Wow & Flutter Function	
Test Signal Compatibility	2.80 kHz–3.35 kHz
Accuracy (4 Hz)	±(5% of reading + 0.002%)
Detection Modes	IEC/DIN; NAB; JIS
Residual W+F	≤0.005% Weighted; ≤0.01% Unweighted

DIGITAL SIGNAL GENERATOR

DIGITAL OUTPUT CHARACTERISTICS	
Output Formats	AES/EBU (per AES3-1992); SPDIF-EIAJ; Optical
Sample Rates	28.8 kHz–52.8 kHz AES/EBU
Sample Rate Accuracy	±0.002% [±20 PPM] lockable to external reference
Word Width	12 to 24 bits (even values)

Sine Wave	
Frequency Range	10 Hz to 47% of sample rate (22.56 kHz at 48 ks/s)
Frequency Resolution	Sample Rate ÷ 223 (typically 0.006 Hz at 48 ks/sec)
Flatness	±0.001 dB
Residual Distortion	±0.00001% [-140 dB]

Square Wave	
Frequency Range	10 Hz to 1/6 sample rate
Frequencies available	f_s ÷ 4096 to f_s ÷ 6, in even integer divisors

SMPTE/DIN IMD Waveform with option "P1-IMD"	
Upper Tone Range	Choice of 7 kHz or 8 kHz
Lower Tone Range	Choice of 50 Hz, 60 Hz, 70 Hz, or 250 Hz
Amplitude Ratio	4:1 (LF:HF)
Residual Distortion	≤0.00001% [-140 dB] at 4:1 ratio

Random Generator Waveform	
Waveform	Compatible with BITTEST used in System One

Dither (all waveforms)	
Probability Distribution	Triangular or rectangular; independent each channel
Spectral Distribution	Flat (white) or Shaped (+6 dB/oct, triangular only)
Amplitude	Automatically tracks word width or off

AES/EBU INTERFACE GENERATION

Interface Signal	
Amplitude Range	
Balanced (XLR)	0–5.12 Vpp, into 110Ω in 5 mV steps
Unbalanced (BNC)	0–1.28 Vpp, into 75Ω in 1.25 mV steps
Channel Status Bits	English language decoded, Professional/Consumer
Validity Flag	Selectable, set or cleared

AES/EBU Impairments	
Induced Jitter	Sinewave
Jitter Freq Range	10 Hz to 38.8 kHz
Jitter Amplitude	0–1.28 UI (pk), in steps of 0.005 UI or better 1.3–12.75 UI, in steps of 0.05 UI or better
Residual Jitter	(total generator/analyzer) peak calibrated
RMS response	≤0.005 UI (700 Hz–30 kHz BW)
Peak response	≤0.015 UI (700 Hz–30 kHz BW)
Spurious Jitter Products	
Jitter & Ref Delay Off	≤0.0005 UI
Jitter On	≤-30 dB below jitter signal

REFERENCE INPUT CHARACTERISTICS	
Input Formats	AES/EBU (per AES 3-1992)
Input Sample Rates	28.8 kHz-52.8 kHz AES/EBU
Lock Range	±0.0025% [±25 PPM]

DIGITAL ANALYZER

DIGITAL INPUT CHARACTERISTICS	
Input Formats	AES/EBU (per AES 3-1992); SPDIF-EIAJ; Optical
Sample Rates	28.8 kHz–52.8 kHz AES/EBU
With 96k Option	Add 57.6 kHz–105.6 kHz
Word Width	12 to 24 bits

EMBEDDED AUDIO MEASUREMENTS	
Wideband Level/Amplitude	
Range	0 dBFS to -140 dBFS
Frequency Range	<10 Hz–22.0 kHz at 48 ks/sec
Accuracy	±0.01 dB, ±-90 dBFS
Flatness	±0.01 dB, 15 Hz–22 kHz
High pass Filters	22 Hz, 400 Hz, 2-pole Butterworth
Low pass Filters	15 kHz, 20 kHz 6-pole elliptic low-pass
Weighting Filters	ANSI-IEC "A" weighting; CCIR QPK; CCIR RMS
Residual Noise	-140 dBFS unweighted; -142 dBFS A-weighted
Narrow Band Amplitude	
Frequency Range	0.04% to 40% of sample rate (10 Hz–19.2 kHz at 48.0 ks/sec)
Filter Shape	10-pole, Q=19 (BW = 5.3% of f_0)
THD+N Measurements	
Fundamental Range	0.02% to 45% of sample rate (10 Hz-22.0 kHz at 48.0 ks/sec
Residual THD+N	≤-136 dBFS
High pass Filters	22 Hz, 400 Hz 2-pole Butterworth
Low pass Filters	15 kHz, 20 kHz 6-pole elliptic low-pass
Weighting Filters	ANSI-IEC "A" weighting; CCIR QPK; CCIR RMS
Residual Noise	-140 dBFS unweighted; -142 dBFS A-weighted

SMPTE (DIN) IMD Function with option "P1-IMD"	
Test Signal Compatibility	40-250 Hz and 3 kHz-20 kHz in 1:1 to 4:1 ratio
IMD Measured	Amplitude modulation products of the HF tone.
Measurement Range	<0.0001%–10%
Accuracy	±1 dB per SMPTE RP-120-1983, DIN 45403
Residual IMD (0dBFS)	≤0.0001% [-120 dB], 60 + 7 kHz or 250 + 8 kHz

Frequency Measurements	
Range	5 Hz to 47% of sample rate

Phase Measurement Related	
Measurement Ranges	±180, +90/-270, or -90/+270 deg
Accuracy	±2.0 deg (20 Hz–20 kHz)
Resolution	0.1 deg

BITTEST Measurement	
Measurement	Compatible with random mode of our System Products' BITTEST

DIGITAL INTERFACE MEASUREMENTS

AES/EBU Impairments, Real Time Displays	
Input Sample Rate	±0.002% [±20 PPM] internal ref,±0.0001% [*1 PPM] external ref
Output to Input or Reference Input to Input Delay	Measures status propagation from the AES/EBU output to the input. Range is 0–192 (frames), resolution ±60 ns.
AES/EBU Input Voltage	
Balanced	200 mV to 10.24 Vpp, ±(5% + 50 mV)
Unbalanced	100 mV to 2.56 Vpp, ±(5% + 12 mV)
Jitter Amplitude (500 Hz)	(peak-peak sinewave calibrated) 0-10 UI,
Jitter Flatness	±1.5 dB, 100 Hz–22 kHz (50 Hz HP selection, RMS detection, 48 kHz sample rate)
Residual Jitter, peak calibrated	(analyzer only) (700 Hz–30 kHz BW)≤0.01 UI RMS; ≤0.03 UI Peak
Spurious Jitter Products	≤0.002 UI (1.2 kHz) or 0 dB below jitter signal
Channel Status Bits	English language decoded (Professional/Consumer)
Validity Flag	Displayed for selected channel
Parity; Signal Confidence; Receiver Lock; Coding Error	Displayed for total signal (both channels combined)

AUXILIARY SIGNALS

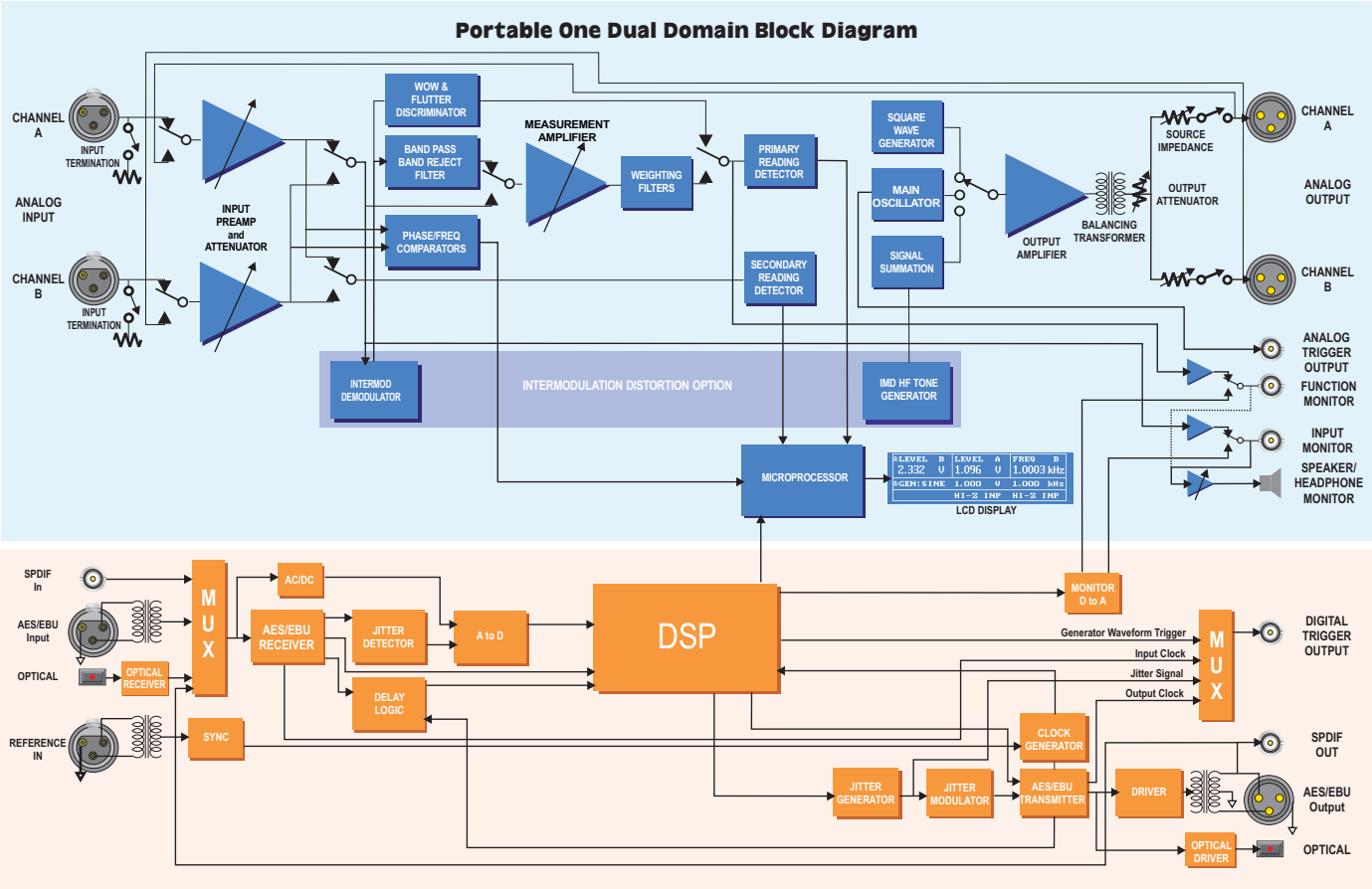
Generator Analog Sync Output; Digital Sync Output; Analyzer Input Monitor; Analyzer Reading

AUDIO MONITOR

Power Output	Typically 1 Watt

GENERAL / ENVIRONMENTAL

Power Requirements	100/120/230/240 Vac (-10%/+6%), 50-60 Hz, 50 VA max
Temperature Range	0° C to +40° C Operating; -20° C to +60° C Storage
Humidity	90% RH to at least +40° C (non-condensing)
EMC	Complies with 89/336/EEC, CISPR 22 (class B), and FCC 15 subpart J (class B)
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]
Safety	Complies with 73/23/EEC, 93/68/EEC, EN61010, and IEC 1010 (including Amendments 1 and 2)



Ordering Information

P1PA	Portable One *Plus* Access Audio Test System with GPIB interface
P1DD	Portable One Dual Domain (digital and analog) Audio Test System with GPIB interface

Options and Accessories for Portable One Instruments

P1-IMD	SMPTE/DIN intermodulation distortion measurement and generation (analog and digital)
P-CAS	Protective soft carrying case with shoulder strap and internal/external pockets
RAK-P1	Rack mount shelf for Portable One *Plus* Access or Portable One Dual Domain
96K-P1DD	96kHz Digital Audio sampling rate option for Portable One Dual Domain(at time of original instrument order)
MAN-P1PA	Additional Portable One *Plus* Access operator's manual (one included with instrument)
MAN-P1DD	Additional Portable One Dual Domain operator's manual (one included with instrument)
MAN-P488	GPIB manual for Portable One *Plus* Access or Portable One Dual Domain
SVC-P1	Service manual for Portable One *Plus* Access or Portable One Dual Domain
SC-P1	1 Year Service Contract
CAB-XMF	Set of four XLR male to XLR female cables
CAB-XBR	Set of four XLR male/female to RCA/BNC cables
CAB-AES	Set of two AES/EBU cables, 1 meter
CAB-AES2	Set of two AES/EBU cables, 2 meters
CAB-AES4	Set of two AES/EBU cables, 4 meters

Soft carrying case option
Padded interior protects Portable One. Extra pocket for documentation, and cables.

BUYING A PORTABLE ANALYZER FOR ANALOG AND DIGITAL AUDIO:

What to look for when evaluating competitive instruments

Digital Architecture and Features: Not all analyzers that accept a digital input signal are actually digital analyzers. Does the instrument have a real (DSP-implemented) digital domain analyzer, or just a D/A converter from the digital input connector to an analog hardware analyzer? This latter approach in a competitive unit yields distortion performance in the 12-14 bit range (-70 to –85 dB THD+N, for example). There's just not that much 12-bit digital audio around to measure anymore. Portable One Dual Domain's digital analyzer guarantees –130 dB residual distortion (nearly 22 bit performance), far in excess of the –105 to –108 dB actual linearity of today's best A/D converters.

Analog Performance: Does the instrument have an analog hardware generator and an analog hardware analyzer? Some competitive units (at twice the price of Portable One Dual Domain) use DSP techniques for all generation and analysis, so analog signals pass through converters inside the instrument. The result is THD+N as high as –79 dB, flatness as poor as –0.2 dB — inadequate for most modern audio devices.

Interface Testing: Does the instrument have independent analog, digital, and jitter generators? If it can only provide analog or digital output at any one time, you can't test a house-synchronized A/D converter for jitter rejection. Without independent, flexible digital audio and jitter generators, you can't measure jitter sensitivity of a D/A converter at various audio and jitter frequency combinations.

True Dual Domain: True Dual Domain hardware by definition guarantees a full range of analysis capabilities in both analog and digital domains. Everyone measures level and some measure THD+N (although implemented with extremely limited performance, as noted above). Be sure that other useful measurements such as IMD (Intermodulation Distortion), Phase, and Crosstalk are available for both analog and digital signals, not just analog.

Audio precision®
Testing for Optimal Results

Available from: Thurlby Thandar Instruments Ltd. Glebe Road, Huntingdon, Cambs. PE29 7DR U.K. **Tel: 01480 412451** e-mail: sales@tti-test.com
Web: www.tti-test.com or **www.tti.co.uk**