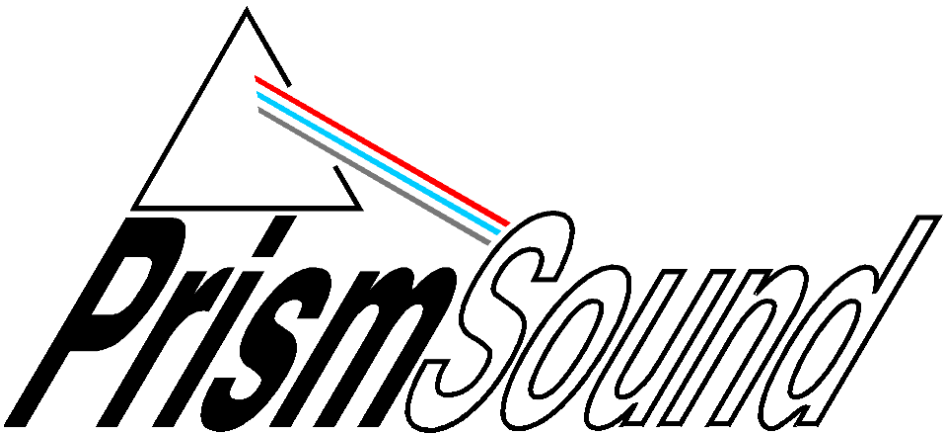


# dScope Series III M1

# Specifications

# 1 dScope M1 Unit Specifications

## Physical

| | |
|---|---|
| **Dimensions:** | 230x180x36mm (1U mounting kit available). |
| **Weight:** | 1.35kg. |
| **Power supply voltage:** | 12VDC, 1.25A. |
| **Power consumption:** | <15W. |
| **Operating temperature:** | 0 to 40ºC, max 85% relative humidity. |

## Host PC Requirement

| | |
|---|---|
| **Interface type:** | USB 2, compatible with USB 3.0 |
| **Operating System:** | Windows XP, Vista, 7, 8/8.1, 10 - Architecture 32 or 64 bit.. |
| **Processor:** | 4 cores, 2GHz or better. (M1 unit may require higher spec than dSIII |
| **Memory:** | 4GB minimum (less on XP 32-bit). |

## Signal Generator

*Drives both domains simultaneously (also optionally sound device)*

| | |
|---|---|
| **Channels:** | Two, with independent functions and parameters, or tied. |
| **Functions:** | Sine, square, ramp, sine-burst, white noise, pink noise, MLS, pulse, twin-tone; arbitrary & multi-tone (scripted or wavetable, 2–1024 tones). |
| **Amplitude range, accuracy:** | Determined by output domain; see Output sections below. |
| **Frequency range:** | 1Hz to maximum determined by output domain and sample rate. |
| **Frequency accuracy:** | ±0.0002% (±2ppm). |
| **Frequency resolution:** | Sine: fs/2^23, or approximately 0.01Hz at fs=96kHz; square, ramp, burst, twin-tone: 1Hz; arbitrary and multi-tone: fs/256k (0.37Hz at fs=96kHz, 0.73Hz at fs=192kHz, 1.46Hz at fs=384kHz). |

## Signal Analyzer

*Continuous input level, frequency and phase*

| | |
|---|---|
| **Channels:** | Two. |
| **Amplitude range, accuracy:** | Determined by selected input domain; see Input sections below. |
| **Frequency range:** | <5Hz to maximum of input domain; see Input sections below. |
| **Frequency accuracy:** | ±0.0002% (±2ppm). |
| **Phase accuracy:** | Determined by selected input domain. |
| **Phase resolution:** | 0.1º |

## Continuous-Time Analyzer

*Continuously-reading multi-function detector*

| | |
|---|---|
| **Channels:** | Two, single selectable measurement function. |
| **Functions:** | Amplitude, balance, band pass, band reject, cross-talk, gain, IMD CCIF, IMD SMPTE/DIN, noise, THD+N. |
| **Amplitude range, accuracy:** | Determined by selected input domain; see Input sections below. |
| **Frequency range:** | <5Hz to maximum of input domain; see Input sections below. |
| **High-pass filters:** | None (DC-coupled), DC-block, 10Hz, 22Hz, 100Hz, 400Hz. |
| **Low-pass filters:** | AES17, 22kHz, 30kHz, 40kHz, 80kHz, user-settable, none (fs/2). |
| **Weighting filters:** | A–weighting, C-weighting, CCIR 468–1k, CCIR468–2k. |
| **BP/BR filters:** | 1/3, 1/6, 1/12, 1/24 octave. |
| **Measurement rates:** | 4/s, 8/s, 16/s, 32/s, auto. |
| **Responses:** | RMS, peak, peak-sample, CCIR–468 Q–peak. |

## FFT Analyzer

*Sample-buffer-based multi-function detector*

| | |
|---|---|
| **Channels:** | Two, maximum of 40 simultaneous measurement functions. |

 

| | |
|---|---|
| **Functions:** | Amplitude, balance, band pass, band reject, cross-talk, gain, IMD CCIF, THD, THD+N, 2nd harmonic distortion, 3rd harmonic distortion, 4th harmonic distortion, user-scripted, user-calculation. |
| **Number of FFT points (n):** | 1k...1M (1024k) in binary multiples. |
| **FFT precision:** | 48+16 bit floating point. |
| **FFT window functions:** | Rectangular (none), triangular, gaussian, Blackman, Blackman-Harris 4, Hann, Hamming, Prism flat-top, Prism–5 (minimum spread), Prism–6, Prism–7 (maximum dynamic range), user-defined. |
| **Amplitude range, accuracy:** | Determined by selected input domain; see Input sections below. |
| **Frequency range:** | <1Hz (determined by frequency resolution) to fs/2 |
| **Frequency resolution:** | fs/n (0.045Hz at fs=48kHz, n=1024k). |
| **High-pass filters:** | None (DC-coupled), DC-block, 10Hz, 22Hz, 100Hz, 400Hz, user-defined. Brick-wall option at any frequency. |
| **Low-pass filters:** | 22kHz, 30kHz, 40kHz, 80kHz, user-defined, none (fs/2). Brick-wall option at any frequency. |
| **Weighting filters:** | A–weighting, C-weighting, CCIR 468–1k, CCIR468–2k, user-defined. |
| **BP/BR filters:** | 1/3, 1/6, 1/12, 1/24 octave, window-width notch. |
| **Graphical Traces:** | (both channels simultaneously) Scope, FFT, Sweep, CTD residual, FFT of CTD residual, multi-tone responses vs frequency. |
| **Multi-tone analysis:** | Allows simultaneous measurement of frequency response, noise, distortion, cross-talk etc. from single buffer acquisition. |
| **Impulse Response analysis:** | Allows measurement of transducers, rooms and other EUTs by windowed impulse response analysis from noise or chirp stimulus. |
| **Trigger:** | Scope-like trigger with variable threshhold and polarity, with normal, continuous, single-shot or manual operation. |

## Analogue Outputs

| | |
|---|---|
| **Channels:** | Two, with independent muting. |
| **Modes:** | Balanced, common-mode test, unbalanced |
| **Sample rate (fs):** | 48kHz, 96kHz, 192kHz or 384kHz. |
| **Amplitude range:** | Any fs <–120dBu..+26dBu, 15.46VRMS (bal) or +20dBu, 7.75VRMS (unbal). |
| **Amplitude accuracy:** | (1kHz): ±0.06dB (±0.7%). |
| **Frequency range:** | DC.. >200kHz at fs=768kHz, >150kHz at fs=384kHz.<br>DC..0.474fs (fs 48k, 96k, 192k) 91kHz at fs=192kHz, 45.5kHz at fs=96kHz, 22.75kHz at fs=48kHz. |
| **Residual THD+N:** | fs=48kHz to 384kHz, 1kHz, 22Hz..22kHz bandwidth, unweighted, RMS: <-106dB (0.00050%)+0.7uV*,typical -108dB +0.6uV* |
| **Residual noise:** | fs=96kHz, 22Hz..22kHz bandwidth, unweighted, RMS: <–116dBu (<1.25uV). |
| **Flatness (1kHz ref):** | fs=96kHz: ±0.05dB: DC..35kHz; +0.05/–0.1dB: DC..40kHz; +0.1/–2dB: DC..45.5kHz;<br>fs=192kHz: ±0.05dB: DC..67kHz; +0.05/–0.1dB: DC..70kHz; +0.1/–2dB: DC..91kHz |
| **Phase matching:** | 10Hz..5kHz: ±0.5º, 5kHz..20kHz: ±1.0º, 20kHz..50kHz: ±2.0º. |
| **DC offset:** | <1% of output range. |
| **Interchannel cross-talk:** | 1kHz: <130dB; 15kHz: <120dB, typically (22Hz–22kHz): <140dB. |
| **Output connectors:** | XLR (BNC/RCA adapters available at extra cost), maximum peak current 34mA (24mA rms), minimum load 1000R (2000R for M1HP). |
| **Output impedance:** | Balanced (normal or CM test): 50R Fixed (M1D/HP: also 150/200R 600R); Unbalanced: 25R Fixed (M1D/HP: also 600R). |
| **Grounding:** | Common to Analyzer; Semi floating with 750R tie to Chassis |

## Analogue Inputs

| | |
|---|---|
| **Channels:** | Two with independent gain ranging. |

| | |
|---|---|
| **Sample rate (fs):** | 48kHz, 96kHz, 192kHz, 384kHz or optional 768kHz (incl. on M1HP). |
| **Maximum amplitude:** | +42dBu (100V RMS). |
| **Amplitude accuracy:** | (1kHz): ±0.06dB (±0.7%). |
| **Frequency range:** | <1Hz.. >200kHz at fs=768kHz, >150kHz at fs=384kHz. <1Hz..0.49fs (94kHz at fs=192kHz, 47kHz at fs=96kHz, 23.5kHz at fs=48kHz); DC coupling by software control. |
| **Residual THD+N:** | (fs=48kHz to 384kHz, 1kHz, 22Hz..22kHz filters, unweighted, RMS): <–106dB (0.00050%)+0.7uV; typical –108dB (0.00040%)+0.6uV |
| **Residual noise:** | (fs=48kHz to 384kHz, 22Hz..22kHz filters, unweighted, RMS): <–120dBu (<0.8uV). |
| **Flatness (1kHz ref):** | fs=96kHz: ±0.05dB:DC..35kHz; +0.05/–0.1dB: DC..40kHz; +0.1/–2dB: DC..45.5kHz; fs=192kHz: ±0.05dB: DC..67kHz; +0.05/–0.1dB: DC..70kHz; +0.1/–2dB: DC..91kHz. |
| **Phase accuracy:** | 10Hz..5kHz: ±0.5º, 5kHz..20kHz: ±1.0º, 20kHz..50kHz: ±2.0º. |
| **DC offset:** | DC blocked: <0.0001% of range, DC coupled: <2% of range. |
| **Interchannel cross-talk:** | 1kHz: <130dB; 15kHz: <120dB, typically (22Hz–22kHz): <140dB . |
| **Input sources:** | XLR or coaxial BNC (balanced and unbalanced RCA adapters provided), demodulated digital input jitter, or direct from generator. |
| **Input impedance:** | 100kR Fixed (for M1D/HP also 600R or 150/200R software selection, maximum 0.25W). |
| **Small-signal CMRR:** | (20Hz..20kHz): >80dB. |
| **Microphone Power:** | 4mA CCP differential, or 48V Phantom power (common mode DC). |

## Digital Outputs (data)

| | |
|---|---|
| **Channels:** | Two in normal (one-wire) mode, independent muting; one in Split96 (two-wire) mode. |
| **Sample rate (fs):** | Any standard rate 8kHz to 192kHz. |
| **Sample rate accuracy:** | ±2ppm. |
| **Sample rate deviation:** | Settable ±1500ppm in 1ppm steps. |
| **Wordlength:** | 8..24 bits. |
| **Dither:** | White TPDF or RPDF dither or plain truncation. |
| **DC offset:** | User-defined, added to signal, 48-bit resolution. |
| **Frequency range:** | DC..0.499fs. |
| **Residual THD+N:** | (1kHz, 24 bits, FS, 22Hz..22kHz bandwidth, unweighted, RMS): <–140dB (<0.00001%). |
| **Flatness (1kHz ref):** | DC..0.49fs: ±0.001dB. |
| **Phase matching:** | Absolute. |
| **Channel Check mode:** | Generates data integrity sequence (PRBS) in 24, 20 or 16 bit wordlength which can be checked at digital input, or by Prism Sound DSA–1 hand-held analyzer. |
| **Channel Status:** | Professional or Consumer modes; all fields functionally or numerically settable for each channel (tied or split), with automatic options. |
| **User bits:** | Can generates EUT transparency check sequence. |
| **Valid bits:** | Settable for each channel. |
| **Ref Sync inputs:** | Wordclock (via BNC on rear) or DI. |
| **Ref Sync rates:** | Ref Sync measured to within ±2ppm. |
| **Ref Sync Outputs:** | Wordclock (BNC on rear) or DO. |

## Digital Outputs (carrier)

| | |
|---|---|
| **Carrier formats:** | AES3 (XLR); AES3–id (BNC) & S/PDIF with optional BNC or RCA adapters; TOSLINK (optical). Can be looped-through from digital inputs. |
| **Output impedance:** | 110R (XLR), 75R (Unbalanced/Coaxial BNC/RCA). |

 

| | |
|---|---|
| **Carrier amplitude:** | XLR and BNC outputs variable: XLR 0..5V (p-p loaded) in 240mV steps, accuracy ±5%+10mV; BNC/RCA: 0..3.3V (p-p loaded) in 160mV steps, accuracy ±5%+5mV. TOSLINK not variable. |
| **Carrier rise/fall time:** | Fixed 5nS. |
| **Carrier phase vs. Ref Sync:** | Variable from –128UI to +128UI in 0.5UI steps (–100% to +100% in 0.39% steps). |
| **Residual jitter:** | <1ns p–p (>700Hz). |
| **Added jitter functions:** | (Not currently supported). |
| **Added jitter amplitude:** | (Not currently supported). |
| **Differential interference:** | (Not currently supported). |
| **Common-mode interference:** | (Not currently supported). |

## Digital Inputs (data)

| | |
|---|---|
| **Channels:** | Two in normal (one-wire) mode, independent muting; |
| **Sample rate (fs):** | Any standard rate 8k to 216kHz except 96k~176.4k. |
| **fs measurement accuracy:** | ±2ppm. |
| **Wordlength:** | Can be masked as 8..24–bits. |
| **Data bit activity:** | All 24 bits of each channel indicated as high, low or moving. |
| **Amplitude range:** | <–140dBFS to 0dBFS sine-peak-referred. |
| **Amplitude accuracy:** | ±0.001dB+1LSB. |
| **Frequency range:** | DC..0.5fs. |
| **Residual THD+N:** | (1kHz, 24 bits, 0dBFS, 22Hz..22kHz filters, unweighted, RMS): CTD: <–138dB (<0.000013%); FFTD: <–140dB (<0.00001%). |
| **Flatness (1kHz ref):** | DC..0.49fs: ±0.001dB. |
| **Phase accuracy:** | DC..0.49fs: ±0.01º |
| **Channel Check mode:** | Verifies data integrity sequence (PRBS) at 24, 20 or 16 bit wordlength, as generated by digital output, or by Prism Sound DSA–1 hand-held analyzer. |
| **Channel Status:** | Professional or Consumer modes; all fields functionally or numerically displayed for each channel, with warning highlight modes. |
| **User bits:** | EUT transparency check sequence may be verified. |
| **Valid bits:** | Displayed for each channel. |

## Digital Inputs (carrier)

| | |
|---|---|
| **Carrier formats:** | AES3 (XLR); AES3–id (BNC), S/PDIF with optional BNC/RCA adapter; TOSLINK (optical). |
| **Input impedance:** | 110R (XLR), 75R (If BNC/RCA adapter used/selected); |
| **Amplitude measurement:** | Differential only; Range: 0..10.32V p-p TOSLINK: not measured. |
| **Jitter measurement, time-domain (JTA):** | (Not currently supported). |
| **Jitter measurement, via demodulator:** | (Not supported). |
| **Residual jitter:** | <2ns p–p (>700Hz). |
| **Eye-narrowing:** | (Not supported). |
| **Carrier Display:** | (Not supported). |
| **Carrier phase vs. Ref Sync:** | Range: ±64UI (±50%); resolution 0.25UI (0.2%); accuracy:±0.25UI (±0.2%). |
| **Carrier condition indicators:** | Unlock, biphase violation, block-length error, eye-narrowing>50%, asynchronous wrt generator Ref Sync. |

## Monitor Outputs

| | |
|---|---|
| **Not provided.** | Monitor functions may be supported using PC speaker/line out in a future update. |