# Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 1 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, presenting flexible technical + commercial solutions and supplying a loan unit during warranty repair, if available.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based at Aldermaston in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our 40GHz in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

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*The SunLite E1 gives you the choice of 75Ω unbalanced or 120Ω balanced connectors.*

*A bright backlit LCD display is ideal for often encountered low light working conditions.*

*Bright LED indicators provide immediate circuit status and history at a glance.*

*With a single keystroke you can configure the SunLite E1 to your circuit and call up the menu for the test you wish to perform.*

*The speaker and microphone allow you to monitor the channel or to talk-and-listen.*

*The test set operates continuously from the charger.*

# SPECIFICATIONS

## Connectors/Ports
2.048 Mbit/s E1 interfaces: Tx, Rx, Ext Clock
  Standard: BNC (f), 75Ω unbalanced connectors
  Optional: BR2 (f) 120Ω balanced connectors; Bantam (f) 120Ω balanced connectors
  Serial Port: RS-232/V.24, RJ11, 6-pins connector
  Charger: 1 mm, DC jack

## Status/Alarm Indicators
13 super-bright LED indicators
Current status and alarm history
  Signal: red, no signal; green, signal; flash red, history PCM-30 (bi-color), CRC-4 (bi-color), SYNC (bi-color)
  TX: solid green, transmitter activated; flash green in selfloop mode; off, transmitter deactivated
  RUN: green, measurement running; off, measurement stop
  RAI: red, MFAS RAI or FAS RAI; flash red, history
  AIS: red, AIS; flash, history
  CODE: red, code error; flash, history
  ERROR: red, CRC-4, E-bit, FAS E; flash, history
  BIT: red, logical bit error; flash red, history
  Power/low batt: slow flash green, power on & battery fully charged; solid green, battery being charged; red, low battery

## E1 General
Bit Error test rates: 2.048 Mbit/s, N (contiguous) and M (non-contiguous) x 64 kbit/s (N & M=1 to 31)
Drop and insert to internal test circuitry N or Mx64 kbit/s μ/A-law decoded VF channel to built-in speaker
Line Coding: HDB3 & AMI
Framing: Unframed, PCM-30, PCM-30C, PCM-31, PCM-31C Conforms to ITU-T G.704

## Test Pattern Generator
General: 1111..., 0000..., 1010..., RICAR 3
PRBS: $2^n-1$, n= 9, 11, 15, 23. Conforms to ITU-T O.151, O.152, O.153, and ANSI V.52, V.57
Programmable: 3 patterns, up to 16 bits long each
Test pattern inversion

## Transmitter
Clock source
  Internal clock: 2.048 MHz $\pm$ 25 ppm
  Received: locked to received signal
  External: locked to Reference clock input signal
Line coding: HDB3 & AMI
Pulse shape: Conforms to ITU-T G.703. 75Ω/Unbal.: $\pm$2.37 Vbp ($\pm$10%)
Programmable Time slot 0: Programmable loop-up/loop-down code, programmable NFAS word
Set idle channel code and ABCD bits (IDLE/NOT IDLE state)
Transmit signal can be turned ON/OFF or internally looped
Error injection
  BIT, CODE (single or rate of $1x10^{-7}$ to $1x10^{-2}$)
  BIT+CODE (single or rate of $1x10^{-7}$ to $1x10^{-3}$)
  CRC-4, FRAME, E-bit (single)
  0-128 bit zero insertion in 8 bits steps

## Receiver
Frequency range: 2.048 Mbit/s $\pm$ 6000 bit/s for SLE1
Input Sensitivity
  Terminate Hi-Z: 6 to -43 dB with Automatic Line Build Out (ALBO)
  Monitor: -20 dB resistive loss with -6 dB cable loss
Auto configuration for framing (PCM-30, PCM-30C, PCM-31, PCM-31C, Unframed), and test pattern
Impedances
  Terminate, Monitor: 75Ω unbalanced
  Hi-Z: >2000Ω
Return loss performance according to ITU-T G.703
Jitter tolerance according to ITU-T G.823

## External Clock Interface
Input Impedance: 75Ω Unbalanced
Input Sensitivity: -20 dB resistive loss with -6 dB cable loss
Line Coding: HDB3 & AMI

## Measurements
E1 signal level: +0 to -43 dB resolution: 1 dB
Frequency measurement (Hz & ppm): Selectable frequency resolution (1Hz, 0.1Hz and 0.01Hz) Current, Max, Min
Clock slips count
Code errors: Error count and ratio
Frame errors: FAS and CRC-4 errors count and error ratios
Count of LOS, Loss of Sync (SYLS), LOF, AIS, FAS RAI, and MFAS RAI seconds
Bit errors: ITU-T G.821 analysis with allocation, programmable HRX%
ITU-T G.826 measurements
ITU-T M.2100 measurements (in conformance with M.2101)
E-bit errors: Error count and ratio
Setup and test results printing
Test duration programmable
Print interval programmable: NOW, 5 min., 15 min., 1 hr., 24 hrs., LAST, EVENT, OFF
Time stamped events printing
Delay timer settable up to 99 hrs., 59 min.
Audible alarm: Indicates an error or alarm, programmable ON/OFF
Alarm Generation: AIS, FAS RAI, MFAS RAI

## Other Measurments
Save 10 test results, available to screen view or print with user defined label
Histograms: G.821 basic measurements, up to 60 days of histograms, 1 day resolution and the last 24 hrs. with 1 min. resolution. 2 HISTOGRAMS stored; CURRENT and SAVED
Propagation Delay measurements in UI & μs, 1 μs resolution Range: From 100 μs to 10 seconds
View Received Data

## Voice Frequency Capability
Talk/listen by using the built-in microphone/speaker
Companding: A-law or μ-law (selectable)
Monitor and CAS modes
ABCD bits display for a selected timeslot

CAS signaling monitoring (IDLE/NOT IDLE state)
Set ABCD bits to 1 or 0 of selected timeslot
Set CAS state IDLE/NOT IDLE
Set Idle Channel code

## Frame Word Settings
Sa bits read, write with all 40 bits independently settable
Selectable loopback/release commands
Set Loop Up/Loop Down Sa4-8 bit code or transmit pattern

## SLE1-01 Clock Offset Optionn
Transmitter
  Frequency settable to 2.048 Mbit/s $\pm$ 24,400 ppm: 2.048 MHz
Accuracy: $\pm$ 2 ppm (after external calibration)
Receiver
  Frequency range: 2.048 Mbit/s $\pm$ 24,400 ppm
Other measurements: Automatic stress automatically determines the receiving equipment's upper and lower frequency capture range

## SLE1-02 VF Measurment Option
VF Measurement: 50 Hz to 3950 Hz, 1 Hz Resolution; +3 dBm0 to -60 dBm0, 1 dB resolution
Send/Receive tone: 50 to 3950 Hz, res. 1 Hz; +3 to -60 dBm0, res. 1 dB
Noise (S/N, psophometric, 3K) level measurement: +3 to -60 dBm0
Digital representation of sinusoidal signals in a selected timeslot: A-law and μ-law coding to ITU-T G.711
Coder offset and peak code measurement

## General
Store and recall 10 instrument configurations
122x32 dots (4x20 characters, 6x8 dots size) graphic display screen with LCD backlight
Internal Battery: NimH
Battery operation time: 4 hrs, transmitter off
  Unit charging time: 7 hrs
Charger: 5V @ 2A, 90 to 265 VAC, 50-60 Hz
Printer/Communication port: RS-232, RJ11, 6-PIN asynch
Language selection: English, Italian, French, German

## Environmental
Operating temperature: 0° C to 50° C
Storage temperature: -20° C to +70° C
Humidity: 5% to 90% non-condensing
Dimensions: 175 mm (l) x 75 mm (w) x 35 mm (d)
Weight: 0.4 kg (approx)

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