

# SmartClass™ E1/Datacom

## Service Installation and Maintenance Tester



### Key Features

- Performs E1/Datacom service installation and maintenance in easy-to-use, lightweight, and rugged form-factor
- Significantly reduces field technician training with Smart AutoConfiguration (AutoConfig) feature
- Works with PC software—download results for report preparation
- Provides additional E1 and Datacom testing with available software options
- Includes Event Log and Histogram for troubleshooting
- Capable of bidirectional monitoring and troubleshooting via dual E1 ports
- Offers color graphical user interface (GUI) available in multiple languages
- Supports G.703 Codirectional, Contradirectional, and Centralized interface testing

### Applications

#### E1

- Provides terminate, monitor, bridge, and local loopback modes
- Provides G.703—2 Mb/s testing
- Conducts 2 M (Bulk), n x 64 kb/s BERT
- Measures performance G.821, G.826, and M.2100
- Provides audio monitor (VF drop)
- Provides transmit frequency offset
- Performs VF level and frequency measurements, VF tone insert
- Measures E1 signal level measurement
- Provides ABCD/Sa monitoring
- Provides round-trip delay
- Offers alarms (defects) and errors (anomalies) insertion
- Pulse shape (optional)
- Jitter (optional)
- MFC-R2 (optional)

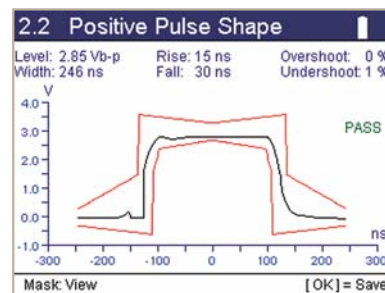
#### Datacom

- Offers DTE emulate, DCE emulate, and monitor mode
- Interfaces with X.21, V.24 (RS232), V.35, V.36 (RS449), and EIA530
- Provides round-trip delay
- Frame Relay (optional)
- Conducts G.703 Codirectional, Contradirectional, and Centralized interface testing

#### Others

- Provides VT-100 terminal emulation (optional)
- Offers remote control (optional)

The JDSU SmartClass E1/Datacom is a handheld field tester for the installation and commissioning of E1 and Datacom service that offers multiple test modes for E1 and Datacom signal analysis. An economical and easy-to-use point solution, the SmartClass E1/Datacom has a Smart AutoConfiguration (AutoConfig) feature and large, easy-to-read color display that make the lightweight, rugged, battery-operated tester ideal for both service provider and contractor field technicians. It also meets the needs of mobile operators in the construction of E1 backhaul infrastructure.



Pulse shape for extra E1 testing capability

## Specifications

**E1 Circuit Testing****Interfaces**

Dual RJ48 ports (port 1 Rx/Tx, port 2 Rx only)

120 balanced RJ48 (by default)

120 balanced CF, 75 unbalanced BNC (via adapter cable)

Line Code AMI, HDB3

Tx Timing Internal  
Recovered

External (via adapter cable on Port 2)

Tx Frequency Offset  $\pm 100$  ppm in 1 ppm intervals

Framing Unframed, PCM31, PCM31C, PCM30, PCM30C

Test Mode Terminate, monitor, bridge, local loopback  
2M (Bulk), n x 64 kbps BERT

AutoConfig for framing and test pattern

LED Indicators SYNC, ALARM, ERROR, DATA, LPBK, BATT

**Performance Monitoring**

G.821, G.826, and M.2100

ABCD/Sa monitoring

Round-trip delay

**Test Patterns**

All ones, All zeros

1:1, 1:3 (1 in 4), 1:4 (1 in 5), 1:7 (1 in 8),

63 (2<sup>6-1</sup>), 511 (2<sup>9-1</sup>), 2047 (2<sup>11-1</sup>), ITU INV2<sup>15-1</sup>, ITU2<sup>15-1</sup>, ITUINV2<sup>20-1</sup>, ITU2<sup>20-1</sup>, ITU INV2<sup>23-1</sup>, ITU2<sup>23-1</sup>, QBF, QRSS, LIVE

User bit pattern (3 to 32 bits)

User byte pattern (1 to 64 bytes)

**Key Results**

Loss alarms, LOS seconds

Code error count, code error rate, timing slips, frame slips,

LOF alarms, LOF seconds, AIS alarms, AIS seconds, RDI alarms

RDI seconds, MF AIS alarms, MF AIS seconds, MF RDI alarms,

MF RDI seconds

FAS bit error count, FAS bit error rate, FAS word error count,

MFAS word error count, MFAS word error rate, CRC error Count,

CRC error rate, CRC sync loss count

FAS sync loss count, MFAS sync loss count, remote end block

error (E-Bit/REBE), NFAS word, MFAS word, NMFAS word

Si bit, A bit, Sa-bit sequence (Sa4–Sa8)

TSE/bit error count, TSE/bit error rate, block error count

pattern slips, pattern slip seconds

Pattern synchronization loss count, pattern synchronization

loss seconds, round trip delay ( $\mu$ s), elapsed time, time,

date/time-slot Rx byte, time-slot signaling data

**Errors (Anomalies) Insert**

2M code Single

2M FAS Single, 2, 3, 4

2M MFAS Single, 2

2M CRC Single

BERT pattern slip Single

E-Bit/REBE Single, Continuous

Bit (TSE) Single-rate 1e-2, 1e-3, 1e-4, 1e-5, 1e-6, 1e-7,  
Multiple 1 to 50**Alarms (Defects) Insertion**

LOS Continuous

Loss of frame (LOF) Continuous

AIS

RDI/FAS Dist

MF AIS

MF RDI/MFAS dist

**VF Tests**

VF level and frequency measurement

VF tone insert 404, 1004, 2713, 2804 Hz,

–13.0, –3.0, 0.0, 3.0 dBm

VF drop to built-in speaker

**Pulse Shape (optional)****Parameter Specification**

Results Pulse shape graph

G.703 mask Pass/Fail

Pulse width resolution 2.75 ns

Rise time resolution 1 ns

Fall time resolution 1 ns

Undershoot resolution 1% of nominal level

Overshoot resolution 1% of nominal level

Signal level in [V] base-peak

**Jitter (optional)**

Test Modes Terminal, Monitor, Bridge

Jitter measurements available Manual Jitter Measurement

Maximum Tolerable Jitter Measurement (MTJ)

Fast Maximum Tolerable Jitter Measurement (FMTJ)

Jitter Transfer Measurement (JTF)

**Manual Jitter Measurement**

Rx accuracy 0.05UI or 3%, whichever is greater

Rx resolution 1/128UI

Rx frequency range 20 Hz to 100 kHz

Range of Rx jitter amplitude (UIpp) 16UI

Rx clock source Recovered clock

Tx accuracy 0.03UI or 3%, whichever is greater

Tx resolution 1/64UI

Tx frequency range (nominal) 20 Hz to 100 kHz

Range of Tx jitter amplitude (UIpp) 0.1 to 10UI

Tx clock source Internal clock

**Maximum Tolerable Jitter Measurement**

Tx accuracy 0.03UI or 3%, whichever is greater

Tx resolution 1/64UI

Tx frequency range (nominal) 20 Hz to 100 kHz

Range of Tx jitter amplitude (UIpp) 0.1 to 10UI

Results format Table and graphical

**Fast Maximum Tolerable Jitter Measurement**

Tx accuracy 0.03UI or 3%, whichever is greater

Tx resolution 1/64UI

Tx frequency range (nominal) 20 Hz to 100 kHz

Range of Tx jitter amplitude (UIpp) 0.1 to 10UI

Results format Table

## Specifications

### Jitter Transfer Measurement

Rx accuracy	0.05UI or 3%, whichever is greater
Rx resolution	1/128UI
Rx frequency range	20 Hz to 100 kHz
Tx accuracy	0.03UI or 3%, whichever is greater
Tx resolution	1/64UI
Range of Tx jitter amplitude (U <sub>pp</sub> )	0.1 to 5UI
Tx frequency range (nominal)	20 Hz to 100 kHz
Results format	Table and graphical
Intrinsic jitter of instrument	<0.07UI
Results approximate to	ITU-T G.823 and 0.171

### MFC-R2 (optional)

Test Modes	Monitor, Simulate (Call in or out)
Country selection	ITU-T, Brazil, Mexico, India, China, Philippines, or User Defined

### Datacom Circuit Testing

#### Interfaces

X.21, V.24 (RS232), V.35, V.36 (RS449), and EIA530 via adapter cable

G.703 Codirectional, Contradirectional, and Centralized Interface testing via adapter cable

#### Data Rates (Emulate and Monitor)

X.21	Sync 50 bps to 10 Mbps
V.24 (RS232)	Async 50 bps to 128 kbps
V.24 (RS232)	Sync 50 bps to 128 kbps
V.35	Sync 50 bps to 2048 kbps
V.36 (RS449)	Sync 50 bps to 10 Mbps
EIA-530	Sync 50 bps to 10 Mbps

#### BERT Patterns

All Ones, All Zeros,  
1:1, 1:3 (1 in 4), 1:4 (1 in 5), 1:7 (1 in 8), 3:1, 7:1,  
63 (2<sup>6-1</sup>), 511 (2<sup>9-1</sup>), 2047 (2<sup>11-1</sup>), 2047R, 2047R INV, 2<sup>15-1</sup>  
(ANSI, ITU), 2<sup>20-1</sup> (ANSI, ITU), 2<sup>23-1</sup> (ANSI, ITU), QRSS, QBF, Delay  
User Bit Pattern (3 to 32 bits)  
User Byte Pattern (1 to 64 bytes)

#### Transmit Clock Sources

Internal ±3 ppm, 1 ppm per year aging

#### Interface

#### Signaling Lead Control

Emulate DTE

RTS, DTR, LL, RL

Emulate DCE

CTS, DSR, DCD, TMA

Monitor

#### Self Loop

Internal

External Cable Test

#### Result Categories

Summary, Clock, BERT, Data, Control Signal, G.821, Time

#### Frame Relay (optional)

Interface	Datacom
Test Mode	Terminate and Monitor (UNI-U, UNI-N, NNI)

Link Management	Auto-Detect (default setting), ANSI T1.617 Annex D, ITU-T Q.933 Annex A, LMI Rev 1, None
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DLCI	0 – 1023
Link Trace	Simple, Verbose, Text, Hex, Text, and Hex
Long Frame	5 – 9999

#### Load Test

Test of CIR (load)	Off, Fixed, Burst, Ping
CIR Fixed Rate	1 – 10,000 kb/s
Frame Lengths	5 – 9999
Payload	Sequence, User 1, User 2, Sequence + User
Control Bits	FECN, BECN, DE, C/R
Burst Settings	Tx time, Idle time

#### Ping

Settings	Source IP Address, Destination IP Address, Inverse ARP, Ping Length
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Encapsulation	NLPID, Ethertype
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#### Result Categories

Frame Relay (DLCI, Link, Ping, LMI, DLCI List, Trace) and Datacom

### Other Software Options

#### VT-100 (optional)

This option enables the instrument to emulate a VT-100 terminal and to connect to network device via instrument 9-pin RS232 interface.

#### Remote Control (optional)

Lets the user use command lines to control the tester via serial interface. Command guide is available with the option.

### General Tester

#### Languages

English, French, German, Italian, Japanese, Korean, Portuguese, Russian, Simplified Chinese, and Spanish

#### Power

4 AA field-replaceable batteries (NiMH or Alkaline)

NiMH battery operating (at 25°C) under typical conditions provides up to 5 hours of continuous use for E1 application and 2 hours of continuous use for Datacom application

Supports sleep mode

AC line operation via external adapter

Charging time (at 25°C) under typical conditions for empty to full charge: with unit OFF up to 5 hours; with unit ON up to 7 hours

#### Permissible Ambient Temperature

Nominal range of use 0 to +50°C

Storage and transport –10 to +60°C

#### Humidity

Operating humidity 10 to 90%

#### Physical

Size (H x W x D) 230 x 120 x 50 mm

Weight, including batteries <1 kg (2 lb)

Display 320 x 240 color display

#### CE Marked

**Ordering Information**

Order Number	Description
CSC-E1DC-P1	SmartClass E1 Datacom Package (No software options included)
CSC-E1DC-P2	SmartClass E1 Datacom Pulse Shape and Frame Relay Package (Pulse Shape and Frame Relay software option included)
CSC-E1DC-P3	SmartClass E1 Datacom Premium Package (Pulse Shape, MFC-R2, Frame Relay, and VT-100 software option included)
CSC-E1DC-P4	SmartClass E1 Datacom Pulse Shape and Jitter Package (Pulse Shape and Jitter software option included)
CSC-E1DC-P5	SmartClass E1 Datacom Complete Package (Pulse Shape, Jitter, MFC-R2, Frame Relay, and VT-100 software option included)

**Accessories included with any package**

AC power adapter with plug kit (USA, UK, Australia, Europe)
4 x AA NiMH batteries
CD-ROM (including PC utility, USB driver, and User Guide)
1 x RJ48-to-RJ48 cable
1 x USB cable
Small carrying bag

**Miscellaneous**

CC-120101	Large Carrying Bag
AC-009801	Large Strand Hook
SCACARCHARGER	Car Adapter Charging Kit
ML-21107607	Printed User Manual SC E1 (English)
ML-21121114	Printed SC E1 Remote Control Reference Guide (English)

**Software Options**

CSC-E1-PS	Pulse Shape
CSC-E1-JIT	Jitter
CSC-E1-SIG	MFC-R2
CSC-E1-FR	Frame Relay
CSC-E1-VT100	VT-100
CSC-E1-RC	Remote Control

**Optional Accessories**
**E1 Cables**

K1597	RJ48 to CF Y cable (120 $\Omega$ balanced)
CB-44995	RJ48 to Dual BNC cable (75 $\Omega$ unbalanced)
CB-0045402	2M External Clock Reference cable

**Datacom Cables**

CB-44391	X.21 10M DTE/DCE Emulate (Support up to 10 Mb/s)
CB-44346	X.21 Monitor
CB-44385	V.24 DTE/DCE Emulate
CB-44348	V.24 Monitor
CB-44389	V.35 DTE/DCE Emulate
CB-44341	V.35 Monitor
CB-44388	V.36 DTE/DCE Emulate
CB-44347	V.36 Monitor
CB-21118474	68-pin MDR to Bananas
CB-21128081	68-pin MDR to DB15 (CB-21118474 and CB-21128081 for G.703 Codirectional, Contradirectional, and Centralized interface testing)

**Test & Measurement Regional Sales**

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