

S3DR-C+

SES Solid State Data Recorder - Compact Plus



Product Design Hardware Design Software Design Mechanical Design Electronic Design

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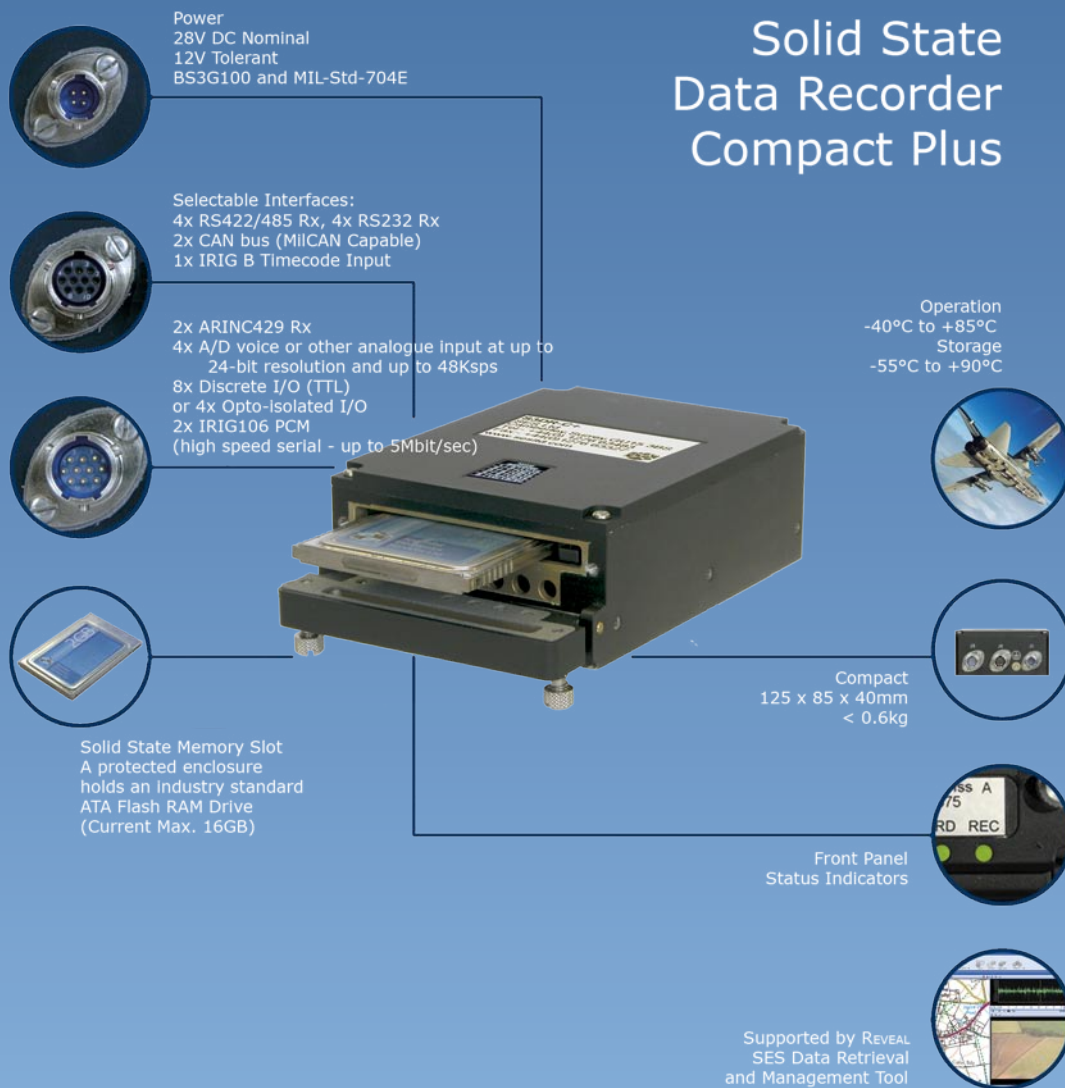


SES Solid State Data Recorder - Compact Plus

SES Solid State Data Recorders

The S3DR product family is a low cost, high performance, rugged solution to the processing and data recording needs of environmentally challenging embedded systems, such as those found in aerospace, defence, naval and safety-related or high performance industrial applications.

The S3DR product family is designed with flexibility and expandability in mind. S3DR-C+ (Compact Plus) is a specialisation of the more generic product family providing communications, data acquisition and data recording functions where space and mass are at a premium. The unit features a high-speed solid state memory recording function, that is able to write data to memory media from multiple monitored interfaces at combined speeds of up to 60 Mbits (7.5 Mbytes) per second.



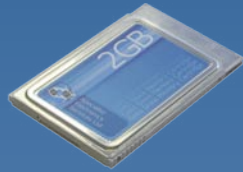
The S3DR-C+ supports PCMCIA style high capacity solid state cartridges (with max storage capacity 16GByte).

The S3DR-C+ is extremely configurable through the presence of an onboard embedded computer and flexible FPGA, allowing application specific data gathering regimes and various I/O options to be accommodated.

Typical applications of S3DR-C+ include use as flight test recorder, Quick Access Recorder, engine test data acquisition unit or incident investigation recorder. Typical configurations can be specified focusing on IRIG106 PCM, Data bus, Ethernet or Voice monitoring.

Solid State Removable Memory Module

S3DR-C+ utilises high speed, high capacity PCMCIA ATA flash, providing low-cost high-performance removable media, with the added advantage that they can be read using a standard laptop, or a special high-speed reader.



SES have qualified a number of extended performance PCMCIA ATA flash cards which can be used with S3DR-C+, but the recommended solution is to use SES own design of solid state removable memory modules. These have extended environmental performance and functionality, which when used in conjunction with an SES recorder, provide optimal performance.

SES solid state removable modules are available in the following capacities 256MB, 512MB, 1GB, 2GB, 4GB, 6GB, 8GB and 16GB. All SES cartridges are environmentally enhanced to achieve exceptional environmental performance:

Performance:

Data Transfer Rates: Sustained read/write rate: 80 MBits per sec(min)

Enhanced Functionality:

Sanitise (Secure) Erase of all data on media using DoD approved algorithms
Purge (Destructive) Erase of media.
Data security (blocking unauthorised access)

Reliability:

MTBF: >4,000,000 power-on hours.
Error Rate: Less than 1 bit in error in 10^{14} bits read.
ECC: High reliability based on internal Error Correcting Code function.

Ruggedness:

Shock: Operating or non-operating 2000G, any axis or direction.
Vibration: Operating or non-operating 30G peak to peak (sine), 10-2000Hz, any axis or direction, 14G (random)
Temperature: -40°C to 85°C (operating), -40°C to 100°C (non operating)
Humidity: >95% condensing $\pm 4\%$ to Mil-Std-810F Method 507
Altitude: 80,000ft
Water/Dust Ingress: Fully Sealed to IP68
Water Immersion Depth (non operating): 10m
Case Strength: Bend <4mm at 100N, Torsion 5NM <3°
Connector Durability: Plug Cycles 10,000 insertions

REVEAL

REVEAL is a partner product to the S3DR-C+ data recorder. It allows the user to extract and manipulate data from a removable memory cartridge and prepare the cartridge for reuse by the S3DR-C+. REVEAL is an application for Microsoft Windows that provides a wealth of features for extracting, interpreting, visualising and analysing data captured using an SES data recorder. Key feature of the tool include:

- Convert data to a variety of formats to allow analysis with domain specific tools
- Interpret data to demultiplex or decommutate a data stream into its constituent parameters
- Archive data to hard disk, CD or DVD for later analysis or long term storage
- Visualisation of audio data, supporting real-time and fast-time playback
- Declassification of S3DR data storage media
- Annotation of recorded data with supplementary data, for example Form 725

The REVEAL architecture allows for easy customisation of the application to suit specific requirements, for example; the introduction of a new plug-in to output data in a different format, or the automation of repeated processing functions.



Connectors and Power

Three circular military connectors are utilised, and are sealed against sand, dust and fluids. One of these connectors is always power, the other 2 connectors provide 20 I/O pins that can be used to select the required functionality of the S3DR-C+.

Wide input range power supply (11-32V, 5 Watt at 28V nom.) tested to BS3G100 and Mil-Std 704F, providing all power conditioning for internal supplies. (Power requirements depend on configuration, typically < 5W)

Hot-swappable solid state removable memory module (PCMCIA ATA Flash format).

Can be configured to start from power-on, from discrete input or from an external trigger.



CASE STUDY S3DR-C+ with NMEA Time Stream and Dual Synchronous Serial IRIG106 PCM

One popular configuration of S3DR-C+ is as a PCM recorder with GPS timebase. For this configuration, (SES Part No. 24400) the recorder provides:

- 2x Synchronous Serial Inputs, IRIG106 PCM
- GPS NMEA Timebase
- 2x Discrete Inputs

When used with the REVEAL data visualisation tool, captured data is displayed against the recorded NMEA time stream in a synchronised manner on multiple display screens of a Windows XP analysis workstation.

IRIG106 data can be interpreted, decommutated into its constituent parameters, and displayed in a wide range of visual formats. Finally data can be archived or exported to further tools for more in-depth analysis.



S3DR-C+ Specification



Size:	125mm(d) x 85mm(w) x 40mm(h) (excluding connectors)
Weight:	0.5kg
Case Construction:	Aluminium Alloy Casing
Standard Interfaces Selectable From:	4x RS422/485 Rx, 4x RS232 Rx 2x CAN bus (MilCAN Capable) IRIG B Timecode Input 4x ARINC429 Rx 4 x A/D voice or other analogue input at up to 24-bit resolution and up to 48Ksps 8x Discrete I/O (TTL) or 4x Opto-isolated I/O 2x IRIG106 PCM (high speed serial – up to 5Mbit/sec)
Recording Memory Media:	PCMCIA Card (Types I and II)
Max Recording Rate:	60 Mbit/s (from all sources)
Power Requirements:	28V, 5W (Nominal)

OPERATING TEMPERATURE:	-40°C to 85°C
STORAGE TEMPERATURE:	-55°C to 90°C
TEMP/HUMIDITY:	Tested to MIL-STD-810F method 507.4
EMC:	Tested to Def-Stan 59-41 Part 3 DCE01, DCE02, DCE03, DRE01, DRE02, DCS01, DCS02, DCS03, DRS01, DRS02
VIBRATION:	Tested to MIL-STD-810F method 514.5 Procedure I (Category 12 - Jet Aircraft)
NORMAL ACCELERATION:	±25g in all axes for 10s
SHOCK ACCELERATION:	Normal working with 3 impacts, ±40g peak in all axes 11m/s, terminal peak sawtooth
MAGNETIC INFLUENCE:	BS3G100 Part 2, Section 2
ALTITUDE:	Up to 50,000ft
INGRESS:	Tested to MIL-STD-810F Method 506.4 Proc III

Specialist Electronics Services Ltd

Head Office
Craven Court
Stanhope Road
Camberley
Surrey
GU15 3BS
United Kingdom
Tel: +44 (0) 1276 63483
Fax: +44 (0) 1276 63327



Northern Office
Unit 32, Trinity Enterprise Centre
Furness Business Park
Ironworks Road
Barrow-in-Furness
Cumbria, LA14 2PN
United Kingdom
Tel: +44 (0) 1229 408300
Fax: +44 (0) 1229 408301

email: info@sesltd.com • web: www.sesltd.com