Solid State Data Recorders

Specialist Electronics Services Ltd

Solution Engineering

Compact Recorders

S3DR-C

Ultra compact size with very low power and weight
High speed recording with simple status indicators
Many types of signal interface available as standard

S3DR-C+

Compact size with bayonet style connectors
Multiple highspeed interfaces
Increased number and combination of interfaces

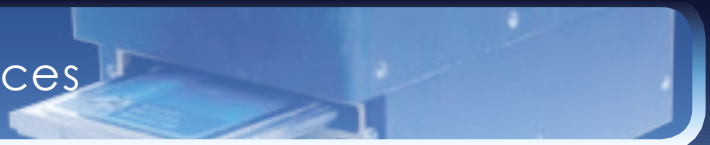
S3DR-CE

Compact and robust solution for high channel-count recording
Comprehensive multi-channel analogue and audio capabilities
Provides combinations of serial and data bus interfaces

SES Solid State
Data Recorder - Compact

S3DR-C Family

S3DR-C Family Interfaces



Selectable Standard Interfaces	S3DR-C	S3DR-C+	S3DR-CE
RS232 or RS485 Rx	3	4	4
RS422 Rx	2	4	4
RS422/232 Tx/Rx	-	1	1
ARINC 429	2	2	4
CAN Bus	2	2	2
IRIG106 PCM	1	2	2
Digital Inputs	6	8 TTL or	8 TTL or
Digital Outputs	2	4 Opto	4 Opto
IRIG B Timecode Input	1	1	1
10bit A/D, 625KSps	4	4	4
10bit Voice, 44.1KSps	4	4	4

Optional Interfaces	S3DR-C	S3DR-C+	S3DR-CE
MPEG2 Encoded Video	-	-	2
Mil-Std 1553 B	-	-	1, 2 or 4
A/D or Voice	-	-	8
A/D +Conditioning	-	-	16
ARINC 429 Rx	-	-	16
CCDL	-	-	4

Connectors + Memory	S3DR-C	S3DR-C+	S3DR-CE
Glenair Mighty Mouse Type	800 series screw	803 series bayonet	803 series bayonet
Memory Card	1x 16GB	1x 32GB	1x 32GB

Operating Temperature:	-40ºC to 85ºC
Storage Temperature:	-55ºC to 90ºC
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:	Protected to IP 64. Tested to Mil-Std 810F Method 506.1 Proc III

S3DR-C Family

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High Speed Recorders
With Control Panel

S3DR-F+

Records industry standard digital interfaces including Ethernet on one or two PCMCIA format memory cards
Optional video or 1553 interfaces, remote control as standard
Includes intuitive menu-driven MMI with display

S3DR-FE, S3DR-BE

Multiple digital interfaces and high-speed recording
Optional video or 1553 interfaces, remote control as standard
Menu driven MMI with display
Expansion area houses special purpose interfaces
PCMCIA Version (S3DR-FE) or Cartridge Version (S3DR-BE)

S3DR-B

High capacity recording using data cartridge up to 256GB
Includes intuitive menu-driven MMI with display

SES Solid State
Data Recorder - Fascia Mounted

S3DR-F Family

S3DR-F, S3DR-B Series Interfaces

S3DR-B Family

Standard Interfaces	S3DR-F+	S3DR-B	S3DR-FE
Ethernet 10/100 Mbps	1	1	1
RS422 Rx/Tx	2	2	2
IRIG106 PCM	2	2	2
Discrete Input	3	3	3
Discrete Output	1	1	1
IRIG B Input	1	1	1
ARINC 429 Rx	4	4	4
Remote Control RCCM	Yes	Yes	Yes
Event Button	Yes	Yes	Yes
Active Front Panel	Yes	Yes	Yes
PCMCIA Memory Card	2	-	2
Memory Cartridge	-	to 256GB	-

Optional Interfaces	S3DR-F+	S3DR-B	S3DR-FE
MPEG2 Encoded Video (PAL, NTSC, CCIR Composite, S-Video)	2	-	2
Mil-Std 1553B	2	2	6
User Defined (PMC Based)	-	-	Yes

Connectors: Glenair Mighty Mouse 803 Series Bayonet Type

Operating Temperature:	-40ºC to 80ºC
Storage Temperature:	-55ºC to 90ºC
Temp/Humidity:	10%-95% (Non-condensing)
EMC:	Tested to Def-Stan 59-41 Part 3 DCE01, DCE02, DCE03, DRE01, DRE02, DCS01, DCS02, DCS03, DRS01, DRS02
Vibration:	Random to Mil-Std 810E Method 514.4 Proc. I (Category IV and V)
Acceleration:	Mil-Std 810E Method 513 Proc. I (±25g in all axes for 10s)
Shock Acceleration:	Mil-Std 810E Method 516.4 Proc. I Functional, 40g 11ms Terminal Peak Sawtooth
Magnetic Influence:	BS3G100 Part 2
Altitude:	up to 50,000ft
Ingress:	Def 133 Proc. 15.2

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Mission Recorder

Dimensions:	146mm (w) x 113mm (h) x 182mm (d)
Weight:	3.0kg
Standard Interfaces:	up to 6x MPEG2 Encoded Video (Stanag 3350B RGB) 2x Audio 1x 10/100 Ethernet 5x Discrete Inputs 2x Discrete Outputs 1x RS422 Serial
Optional Interfaces:	1x IRIGB Timecode Input 2x 1553 (BM) 4x ARINC 429 Rx 2x IRIG 106 PCM 2x RS232/422/485 Serial 1x PAL, NTSC, CCIR, Composite, S-Video
Power:	28V Nominal, 40W

MVDR

The SES MVDR is a customisation of the S3DR-BE data recorder, designed to record up to six full resolution channels of video, audio and data. It has been designed to withstand challenging environments, such as those found in fast jet aircraft. Data is recorded on a data cartridge, which is then removed and processed with SES REVEAL software to provide synchronised playback of all recorded data channels.

SES Multichannel Video Data Recorder

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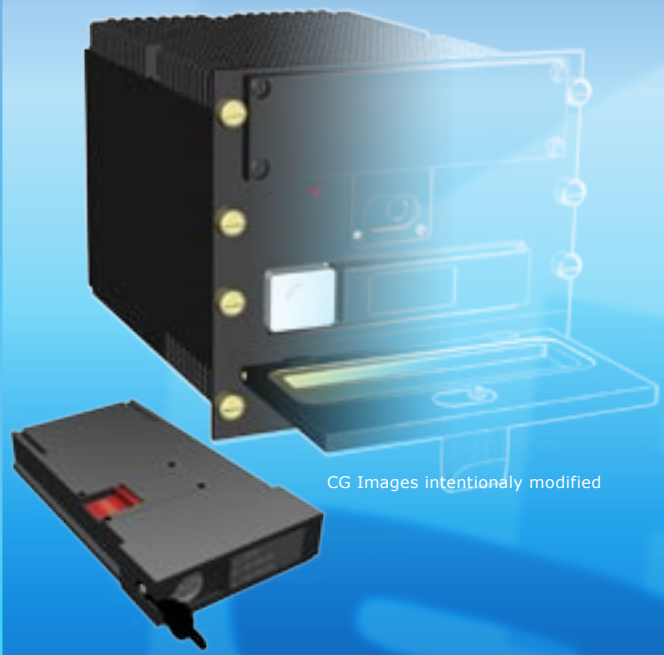
Secure Mission Computing



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Secure mission computing demands both extreme processor performance and encryption technology to secure data held within the computer. SES Secure Mission Processors offer both. These new products provide a high capacity removable secure cartridge together with high performance graphics and computing all within a compact, DZUS mountable processing unit.

SES Secure Mission Processors make use of multi-processor architectures employing Intel processors. These processors are complemented by extreme graphics performance from PCIe accelerated graphics processors, and provide comprehensive aircraft interfaces including ARINC429, Mil-Std 1553, STANAG 3350 Video Output, RS422, Gigabit Ethernet and Discrete IO.

A secure high-speed high capacity cartridge, up to 256GB is available with onboard crypto functions able to fully meet specific security requirements.

Support is available for Operating Systems including VX Works, RTOS 32, Windows XP/XPe and Linux.

SES Solid State Secure Data Processing

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Memory Cards

PCMCIA Memory Card

SES Solid State Data Recorders utilise high-speed, high-capacity PCMCIA ATA Flash memory, providing low-cost removable media, with added advantage that they can be read using a standard laptop, or a special high-speed reader.

SES Solid State Memory Cards are available in capacities from 256MB to 32GB. All SES Solid State Memory Cards are ruggedised to achieve exceptional environmental performance.

NATO Stock Numbers are available on request.

REVEAL Card Reader

The REVEAL USB 2.0 Card Reader assures rapid and reliable retrieval of recorded data on PCMCIA media and is optimised for use with for all memory cards supplied by SES.

The SES REVEAL Card Reader is Windows Vista/XP Plug and Play compatible, for effortless setup and use with standard PC equipment, without requiring dedicated driver software.

SES Solid State
Data Recording - Media

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Data Cartridges

SES Solid State Data Cartridge

The SES Data Cartridge is a rugged solid state disk with excellent read and write performance provided by a SATA interface. The cartridge offers capacities from 32GB to 256GB, with read/write speeds up to 480/320 Mbits/s.

REVEAL Cartridge Reader

The REVEAL Cartridge Reader allows data to be read from the SES Data Cartridge and when used with REVEAL, allows the Cartridge to be prepared for future use in an S3DR Recorder. It uses a native SATA interface and supports data transfer from a host PC at the maximum speed of the selected interface.

SES Solid State
Data Recording - Media

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Data Processors

S3DP-F and S3DP-FE

The SES range of solid state rugged processors (S3DP Family) offer an extremely powerful, solid state, processing solution with a significant range of preconfigured inputs and outputs.

The SES Solid State Data Processors support all mainstream operating systems. Available in two variants, the S3DP-F and S3DP-FE (Expanded), the product delivers familiar PC technology in demanding aerospace and military applications.

The baseline product offers all standard PC interfaces with a number of additional interfaces typically useful in aircraft applications including ARINC 429, Mil-Std 1553, STANAG 3350 Video Output, RS422, Ethernet and Discrete IO. The S3DP-F product provides maximum processing power and interfaces into the minimum space and where further expansion is required, the S3DP-FE provides additional space supporting further PMC or USB devices.

Onboard solid state memory supports an embedded operating system while two further removable ATA flash memory devices (up to 32GB each) allow data gathering or large data intensive applications to be hosted.

Variants of the product can be configured with security specific features.

Dimensions

146mm x 162mm x 57mm

CPU:	AMD Geode LX800
Memory:	Up to 512MB SDRAM
Ethernet:	10/100 BaseT
Serial:	2x RS232/422
USB (Ext):	2 Ports USB 2.0
Kb/Mouse:	via USB port at front of unit

SES Solid State
Data Processor - Fascia Mounted

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Data Processors

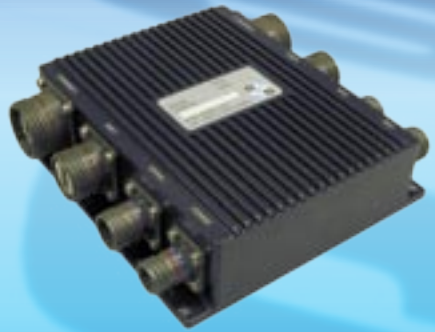
S3DP-V

The S3DP-V provides a rugged solution to general purpose computing requirements. The unit is a solid state data processor that can be used in extreme environments including vehicle and naval as well as airborne applications. It has a wide operating temperature performance (-40°C to +80°C), as well as extreme resilience to shock, vibration and acceleration.

The product is fitted with military specification connectors which can be capped when not in use, ensuring protection to IP67 standard against water and dust ingress.

The enclosure is of rugged two part aluminium construction with a high performance, scratch resistance finish that provides total protection against corrosion and all common contaminants.

S3DP-V employs filtering and isolation to achieve high levels of EMC immunity and emissions performance.



Dimensions

164mm x 170mm x 47mm

CPU:	Intel Atom 1.1GHz/1.6GHz
Memory:	DDR2 RAM Up to 1GB
Ethernet:	2x 10/100/1000 Mbps
Serial:	2x RS232/422/485
USB:	2x Ruggedised USB 2.0
Kb/Mouse:	via USB 2.0 port

SES Solid State
Data Processor - Vehicle Mounted

Voice Recording

Dimensions:	115mm (d) x 85mm (w) x 28mm (h)
Weight:	0.5kg with card
Duration:	120min with 2GB 30min with 512MB
Power:	28V Nominal, 3.5W

S3DR-CVR

The SES Cockpit Voice Recorder, S3DR-CVR, and the SES Area Microphone are in service fleetwide with UK Lynx, Puma, Gazelle and EC350 Squirrel helicopter fleets. NATO Stock Numbers available on request.

S3DR-CVR provides continuous high-quality recording of two intercom channels and one area microphone.

SES Area Microphone

The SES Area Microphone combines rugged construction with high quality omnidirectional acoustic response and is ideal for use in aggressive environments. Designed for use with the SES Cockpit Voice Recorder, and widely used in aircraft installations, its application is not limited to use in aircraft. Integral preamp optionally available.

SES Solid State Data Recorder - Cockpit Voice Recorder

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Engine Monitoring

EMU

The SES Engine Monitoring Unit is suitable for in-service monitoring of aerospace engines. The unit provides long-term data logging of engine parameters, monitoring exceedance incidents and providing enhanced data resolution around those events. Timestamped data can be downloaded from the unit using its USB 2.0 interface and analysed using the SES EMU software utility.

Dimensions:	128mm (d) x 121mm (w) x 40mm (h)
Weight:	0.65kg
Duration:	2000 hours data logging
Inputs:	1x Thermocouple 2x Frequency (Variable Reluctance VRS) 1x High Level Voltage Input
Logging Rate:	1 Sample Per Second Standard, 16 Samples Per Second High Granularity
Data Download:	USB 2.0
Power:	28V Nominal, 3.5W

Engine Monitoring Unit

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Data Management

REVEAL is a partner product to the S3DR data recorder range. It allows the user to extract and manipulate data from a removable memory cartridge and prepare the cartridge for reuse by the S3DR. 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 features 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
- Visualisation of data to allow visual analysis within Reveal using a framework that supports real-time and high-speed playback where suitable hardware is available
- Analysis of data to identify when defined conditions are met
- Archive data to hard disk, CD or DVD for later analysis or long term storage
- Declassification of S3DR data storage media

SES S3DR Retrieval and Management Tool

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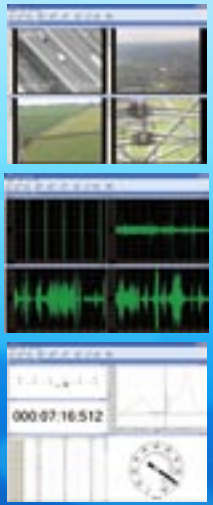
Visualisation

REVEAL provides an extensive suite of data visualisation tools, allowing the recorded data to be thoroughly reviewed in-depth while in the field, or during later analysis without the need of third-party tools.

Any of the streams can be visualised and utilise the REVEAL inbuilt data definition format to define the structure of recorded data, allowing the parameters to be visualised in a variety of meaningful ways, including:

- High Speed Multi Parameter Line Graph
- Tabulated Data Grid
- Digital Readouts
- Range of Gauges (including standard flight panel gauges)
- Time Display (Including IRIG B)
- Hexadecimal
- Video
- Audio
- Map (including Aerial Photography)
- Mil-Std 1553 Formatted Text
- ARINC 429 Formatted Text



These windows allow the user rapidly to find critical or key events in an intuitive fashion and mark them for further analysis.

All visualisations can be synchronised with each other using a recorded time reference channel, or using the recorder internal time reference.

Conversion

Central to the functionality of REVEAL is the ability to convert recorded data streams from a range of proprietary and industry-standard formats into other formats allowing further analysis using domain specific tools.

Output formats include: CSV, RAW Binary, Time Stamped Binary, IRIG106 Ch10, IRIG106 Ch8 for Mil-Std 1553B, MPEG2, WAV, JPG.

Analysis

REVEAL allows raw data streams of recorded data to be enhanced with user defined event markers, allowing key points in the recording to be highlighted and accessed for review.

These may be created in a number of ways.

- Conditional
  REVEAL scans the data stream and automatically adds an event marker whenever the data meets preset user-defined criteria.
- Recorder Based
  REVEAL reads and displays the event markers inserted by the data recorder during the recording process, for example when an event button is pressed.
- Manual
  REVEAL allows the user to move to any given point in the recording timeline and insert an event marker.

These events can then be saved as part of the session data, and become available for any future reviews of the data set.

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SES small and rugged solid state data products are in service on Fast Jets and Helicopters, UAVs and UCAVs, Transporters, Land Vehicles and many other platforms.

Configuration

SES solid state data recorders are Commercial Off The Shelf (COTS) products, which have been designed to allow configuration for specific applications. This Configurable COTS approach enables highly tailored product variants to be brought rapidly into service.

Support

SES products are designed for high reliability, and are backed by comprehensive support. Both In-Service and Post-Design Support contracts are available for added assurance and obsolescence management in long term programmes.

www.sesltd.com

Specialist Electronics Services Ltd
Craven Court • Stanhope Road • Camberley
Surrey • GU15 3BS • United Kingdom
Tel: +44 (0) 1276 63483 • Fax: +44 (0) 1276 63327
email: info@sesltd.com • web: www.sesltd.com