Changing the economics of space

High-Speed Data Recorder

The High-Speed Data Recorder (HSDR) provides an onboard data acquisition, storage, and playback capability for Earth observation and space science missions.

The HSDR is based around a Xilinx Virtex-4 FPGA (Field Programmable Gate Array with integral PowerPCs) and 16 GB high-speed DDR2 (Double Data Rate) memory.

The HSDR supports very high data acquisition and downlink rates while its FPGA also allows for the implementation of various data processing tasks such as encryption and data compression. The HSDR builds upon Surrey’s Solid State Data Recorder (SSDR) product, which has significant flight heritage. The HSDR itself has flown on four Surrey missions and is baselined for a further five, including three third-party missions.

Features
- Data I/O processing: >5 Gbps
- Adaptable modular architecture
- Data protection against SEU (single event upset)
- Real-time data acquisition/downlink
- Encryption and encoding options

Benefits
- Flight proven
- Low cost
- 12 months typical delivery
- 7+ years design life
- Reconfigurable in-orbit

Heritage
- Deimos-1 (2009)
- UK-DMC-2 (2009)
- NigeriaSat-2 (2011)
- ExactView-1 (2012)
- TechDemoSat-1 (2014)
- KazEOSat-2 (2014)
- DMC-3 constellation (2014)
- NovaSAR-S (2015)
- Three third-party missions
The small satellite revolution started 30 years ago with Surrey Satellite Technology—the world’s premier provider of operational and commercial satellite programs with over 40 satellites launched successfully and 240 years of on-orbit experience gained.

From its Englewood, Colorado, facilities, Surrey supplies complete in-house design, manufacture, launch, and operation of small satellites, to include remote sensing, navigation, and communications payloads, avionics suites and subsystems, ground infrastructure, and training and consulting services.

### High-Speed Data Recorder

#### Physical Characteristics

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>320 x 170 x 55 mm</td>
</tr>
<tr>
<td>Power</td>
<td>15 to 50 V, 3.5 W standby, 15 W peak</td>
</tr>
<tr>
<td>Mass</td>
<td>1 kg</td>
</tr>
<tr>
<td>Radiation</td>
<td>5 kRad (Si)</td>
</tr>
<tr>
<td>Random Vibration</td>
<td>15 g&lt;sub&gt;max&lt;/sub&gt; in all axes</td>
</tr>
<tr>
<td>Lifetime</td>
<td>7+ years</td>
</tr>
<tr>
<td>Temperature</td>
<td>-20°C to +50°C operating, -30°C to +60°C non-operating</td>
</tr>
</tbody>
</table>

#### Baseline Performance Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Capacity</td>
<td>16 GB</td>
</tr>
<tr>
<td>Data Interface</td>
<td>20 (up to 42) LVDS I/O @ 150 Mbps</td>
</tr>
<tr>
<td></td>
<td>5 SerDes inputs @ up to 2 Gbps</td>
</tr>
<tr>
<td></td>
<td>16 LVDS outputs @ 150 Mbps</td>
</tr>
<tr>
<td>Other Inputs</td>
<td>Pulse-per-second synchronization</td>
</tr>
<tr>
<td>TTC Interface</td>
<td>CAN-SU or RS422</td>
</tr>
</tbody>
</table>

#### Typical Use

![Diagram](image.png)

Available as part of Surrey’s heritage X-band payload downlink chain:

- XTx105 X-Band Transmitter
  - 105 Mbps data rate
  - QPSK modulation with ½ rate k=7 convolutional encoding
  - 6 W RF output power
- High Speed Data Recorder (HSDR)
- Antenna Pointing Mechanism (APM)
  - Agile two-axis steerable antenna
  - +15 dBi high gain X-band horn
- Complete chain flown on NigeriaSat-2

Also available as part of Surrey’s next-generation X-band payload downlink chain:

- XTx400 X-Band Transmitter
  - 500 Mbps data rate
  - 8PSK modulation with 2/3 TCM
  - 12 W RF output power
- High Speed Data Recorder (HSDR)
- Flash Mass Memory Unit (FMMU)
  - 256 GB non-volatile memory
- Antenna Pointing Mechanism (APM)
  - +18 dBi high gain X-band horn
- Complete chain flying on TechDemoSat-1

Product specification subject to change without notification.

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