Challenge Series
Satellite High Speed DVB-S2 IP Modem
SK-IP

CCM, VCM, ACM Functionality

The satellite high speed DVB-S2 IP modem SK-IP provides a platform for transferring IP/Ethernet data over DVB-S2 satellite connections. Ethernet frames and IP packets are encapsulated directly within DVB-S2 base band frames, which results in low encapsulation overhead. In combination with the integrated OptiACM controller the modem provides adaptive or variable FEC- and modulation setting for point-to-point or point-to-multipoint applications.

The modulator provides the modulated signal at 70/140 MHz IF or at L-band. With the L-band output also a 10 MHz reference signal for a block-upconverter can be enabled on the TX port.

The demodulator accepts an L-Band signal in the range from 950 to 2150 MHz on two inputs or alternatively an IF signal in the range from 50 to 180 MHz on a single input. On L-Band devices LNBs can be powered directly over the inputs.

QPSK, 8PSK, 16APSK, 32APSK modulation is supported, which allows big flexibility in the satellite link design.

Operating and control – easy integration into your system

The modem can be operated via the push buttons on the front panel using self-explanatory display menus or via remote control (RS232, RS422/485, TCP/IP (over Ethernet). For the remote control either addressable packet based commands, a WEB interface (HTTP web browser interface) or SNMP can be used. Detailed monitoring of system parameters is possible.

Key features
- DVB-S2 satellite modem for IP/Ethernet data transmission.
- DVB-S2 compliant (EN 302 307)
- QPSK / 8PSK / 16APSK / 32APSK modulation
- Normal and short FEC frames, pilots on or off
- Physical layer framing (PL descrambling with codes 0..262141) according to DVB-S2 standard
- Symbol rates from 60 kbps to 60 Mps
- OptiACM system (programmable or automatic) for optimized bandwidth usage
- Gigabit Ethernet data interface
- Generic Stream Encapsulation (GSE) direct to DVB-S2 base band frames
- Operates as Layer 2 Bridge, Layer 3 Bridge or Layer 3 Router
- Remote control through RS232, RS422/485 (2-wire or 4-wire) interfaces, TCP/IP over Ethernet, Web browser interface, SNMP (MIBs are provided)
- 10 MHz Reference OCXO included
- Summary alarm output (dual change over switch contacts)
- Operating temperature range 0°C to 50°C (32°F to 122°F)
- CE compliant
- 3 years warranty
## Challenge Series
### Satellite High Speed DVB-S2 IP Modem
#### SK-IP

### Modulator Part of Modem Type:

<table>
<thead>
<tr>
<th>IF-Output Frequency:</th>
<th>SK-IP-V-50-x-x / SK-IP-V-75-x-x</th>
<th>SK-IP-L-50-x-x / SK-IP-L-75-x-x</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50...180 MHz</td>
<td>950...2150 MHz</td>
</tr>
</tbody>
</table>

#### Frequency Resolution:

<table>
<thead>
<tr>
<th></th>
<th>1 Hz</th>
<th>1 Hz</th>
</tr>
</thead>
</table>

#### Phase Noise:

<table>
<thead>
<tr>
<th></th>
<th>50...180 MHz</th>
<th>950...2150 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz</td>
<td>-70 dBc</td>
<td>-65 dBc</td>
</tr>
<tr>
<td>100 Hz</td>
<td>-80 dBc</td>
<td>-75 dBc</td>
</tr>
<tr>
<td>1 kHz</td>
<td>-88 dBc</td>
<td>-88 dBc</td>
</tr>
<tr>
<td>10 kHz</td>
<td>-90 dBc</td>
<td>-90 dBc</td>
</tr>
<tr>
<td>100 kHz</td>
<td>-100 dBc</td>
<td>-100 dBc</td>
</tr>
<tr>
<td>1 MHz</td>
<td>-115 dBc</td>
<td>-115 dBc</td>
</tr>
</tbody>
</table>

#### IF-Output Characteristics:

<table>
<thead>
<tr>
<th>Impedance: 50 Ω or 75 Ω</th>
<th>Return Loss: &gt; 20 dB</th>
<th>Output Power: -25 dBm ... -4 dBm, 0.1 dB steps, ±0.5 dBm accuracy</th>
<th>Output Power muted: &lt; -85 dBm</th>
<th>Connector: BNC female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

#### Spurious Outputs:

<table>
<thead>
<tr>
<th>Signal related: &lt; -70 dBc, unmodulated carrier, 50...90 MHz or 100...180 MHz</th>
<th>Signal related: &lt; -70 dBc, unmodulated carrier, 950...1900 MHz</th>
<th>Signal related: &lt; -45 dBc, unmodulated carrier, 1900...2150 MHz</th>
<th>Signal related: &lt; -45 dBc, unmodulated carrier, out of band</th>
</tr>
</thead>
</table>

#### Frequency and Clock Stability:

±5 x 10⁻⁶ (-30°C to 60°C), aging: ±1 x 10⁻⁸ per day, ±1 x 10⁻⁷ per year

#### Symbol Rate:

- Max. Range: 60 kbps – 60 Mbps (depending on firmware option)
- Step size: 1 sps

#### Modulation / Coding DVB-S2:

<table>
<thead>
<tr>
<th>Outer BCH Code: FEC-Frames</th>
<th>nldpc = 64800 (normal FEC Frame)</th>
<th>nldpc = 16200 (short FEC Frame)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner LDPC Code:</td>
<td>QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 6/9, 7/10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8PSK 3/5, 2/3, 3/4, 4/5, 5/6, 6/9, 7/10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16APSK 2/3, 3/4, 4/5, 5/6, 6/9, 7/10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>32APSK 3/4, 4/5, 5/6, 6/9, 7/10</td>
<td></td>
</tr>
<tr>
<td>Physical Layer Framing:</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Physical Layer Signalling:</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Pilots Insertion:</td>
<td>on / off</td>
<td></td>
</tr>
<tr>
<td>Physical Layer Scrambling:</td>
<td>N = 0…262141</td>
<td>all according EN 302307</td>
</tr>
</tbody>
</table>

#### Demodulator Part of Modem Type:

<table>
<thead>
<tr>
<th>IF-Input Frequency:</th>
<th>SK-IP-x-x-V-50 / SK-IP-x-x-V-75</th>
<th>SK-IP-x-x-L-75</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50...180 MHz</td>
<td>950...2150 MHz</td>
</tr>
</tbody>
</table>

#### IF-Input Characteristics:

<table>
<thead>
<tr>
<th>Impedance: 50 Ω or 75 Ω</th>
<th>Return Loss: &gt;18 dB</th>
<th>IF-Connector: BNC female</th>
<th>LNB DC-Feed: n/a</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impedance: 75 Ω</td>
<td>Return Loss: &gt;13 dB</td>
<td>IF-Connector: 2x F female, input selectable</td>
<td>LNB DC-Feed: 13.5V / 450mA or 18V / 450mA switchable, 22 kHz tone on/off, short circuit protected</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

#### Symbol Rate:

- Max. Range: 60 kbps – 60 Mbps (QPSK, 8PSK)
- Step size: 1 sps

#### Demodulation / Decoding DVB-S2:

<table>
<thead>
<tr>
<th>Outer BCH Code: FEC-Frames</th>
<th>nldpc = 64800 (normal FEC Frame)</th>
<th>nldpc = 16200 (short FEC Frame)</th>
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<tbody>
<tr>
<td>Inner LDPC Code:</td>
<td>QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 6/9, 7/10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8PSK 3/5, 2/3, 3/4, 4/5, 5/6, 6/9, 7/10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16APSK 2/3, 3/4, 4/5, 5/6, 6/9, 7/10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>32APSK 3/4, 4/5, 5/6, 6/9, 7/10</td>
<td></td>
</tr>
<tr>
<td>Demodulator auto detection:</td>
<td>Modulation- and FEC-type, pilots on/off are automatically detected</td>
<td></td>
</tr>
<tr>
<td>Physical Layer Scrambling:</td>
<td>N = 0…262141</td>
<td>all according EN 302307</td>
</tr>
</tbody>
</table>

Specifications continued next page
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SK-IP

Specifications continued:

<table>
<thead>
<tr>
<th>Common Parameters:</th>
<th>SK-IP-x</th>
</tr>
</thead>
</table>
| **OptiACM:**       | CCM / VCM / ACM functionality for point-to-point and point-to-multipoint links  
|                    | 16 ACM channels with separate MODCOD range and Es/N0 sensitivity  
|                    | ACM channels arbitrary assignable to baseband channels |
| **Signal Spectrum Mask:** | $\alpha = 0.35, 0.25, 0.20$ according EN 302307 |
| **Data Interface:** | Ethernet (1xRJ-45, 10/100/1000 Mbit/s auto sensing) |
| **Data Rate:**     | up to 160 Mbit/s (Layer 2 Mode)  
|                    | up to 128 Mbit/s (Layer 3 Mode) |
| **Network Operation:** | Layer 2: Bridge (Ethernet frame transmission)  
|                    | STP/RSTP  
|                    | Layer 3: Bridge/Router (IP packet transmission)  
|                    | 256 IP/subnet routes per port  
|                    | 16 DVB-S2 baseband channels |
| **Data Encapsulation:** | Generic Stream Encapsulation (GSE) according TS 102606 |
| **Monitoring and Control Interface:** | Protocol: SNMP  
| | Connection: UDP over Ethernet (10 or 100 Mbit/s, auto sensing), connector RJ-45 |
| | Protocol: HTTP (web browser interface)  
| | Connection: TCP/IP over Ethernet (10 or 100 Mbit/s, auto sensing), connector RJ-45 |
| | Protocol: Multipoint  
| | Connection: RS232 or RS422/RS485 (configurable), connector DSUB09 female or TCP/IP over Ethernet (10 or 100 Mbit/s, auto sensing), connector RJ-45 |
| **Alarm Interface:** | Alarm: two potential free contacts (DPDT), Mute Input: TTL logic input with internal pull up  
| | Connector DSUB09 |
| **Temperature Range:** | 0°C to 50°C operating  
| | -30°C to 80°C storage |
| **Relative Humidity:** | <95% non condensing |
| **User Interface:** | LCD-Display 2 x 40 characters, 4 cursor keys, 4 function keys |
| **Power Input:** | 85…264 V AC, 40…70 Hz, appr. 40 W / 55 VA |
| **Mains Fuse:** | 2 x 2 A time-lag fuse |
| **Dimension and Weight:** | 483 x 44 x 270 mm³, 1 RU (19")  
| | appr. 5.5 kg |

Specifications are subject to change

Order Information: SK-IP-[Output Band]-[Output Imp]-[Input Band]-[Input Imp]-[Modulator Firmware Option]

Examples:
- SK-IP-L-50-L-75-A2H
- SK-IP-L-50-V-75-P2N
- SK-IP-V-50-V-50-A2L

<table>
<thead>
<tr>
<th>Modulator Firmware Option</th>
<th>Max Symbol Rate, Supported Modulation Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>- P2L</td>
<td>15 Msps, QPSK / 8PSK</td>
</tr>
<tr>
<td>- P2N</td>
<td>30 Msps, QPSK / 8PSK</td>
</tr>
<tr>
<td>- P2M</td>
<td>45 Msps, QPSK / 8PSK</td>
</tr>
<tr>
<td>- P2H</td>
<td>60 Msps, QPSK / 8PSK</td>
</tr>
<tr>
<td>- A2L</td>
<td>15 Msps, QPSK / 8PSK / 16APSK / 32APSK</td>
</tr>
<tr>
<td>- A2N</td>
<td>30 Msps, QPSK / 8PSK / 16APSK / 32APSK</td>
</tr>
<tr>
<td>- A2M</td>
<td>45 Msps, QPSK / 8PSK / 16APSK / 32APSK</td>
</tr>
<tr>
<td>- A2H</td>
<td>60 Msps, QPSK / 8PSK / 16APSK / 32APSK</td>
</tr>
</tbody>
</table>

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