光模块 Datasheet 规格书

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<th>研发/市场</th>
<th>版本号</th>
<th>修订状态</th>
<th>第二次修改</th>
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<tr>
<td>GHP-313G-L4XD</td>
<td>品名描述: 3G Video SFP 1310nm, 3Gbps, 40km</td>
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修改记录

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<td></td>
<td>2. 新增加全球联系方式；</td>
<td>周信均 2013/2/26</td>
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GHP-313G-L4x(D)
3Gbps Video SFP Optical Transceiver, 40km Reach

Features
- HD-SDI SFP Transceiver available
- SD-SDI SFP Transceiver available
- 3G-SDI SFP Transceiver available
- SMPTE 297-2006 Compatible.
- Metal enclosure for Lower EMI
- 1310nm DFB laser and PIN photodetector
- Supports video pathological patterns for SD-SDI, HD-SDI and 3G-SDI
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- Digital Diagnostic functions available through the I2C interface
- Compatible with RoHS
- +3.3V single power supply
- Operating case temperature:
  Standard: 0 to +70°C

Applications
- SMPTE 297-2006 Compatible Electrical-to-Optical Interfaces.
- HDTV/SDTV Service Interfaces.

Description

The video series transceivers are high performance, cost effective modules for duplex video transmission application over single mode fiber.

The transceiver is designed to transmit/receive data rates from 50Mbps to 2.97Gbps and is specifically designed for robust performance in the presence of SDI pathological patterns for SMPTE 259M, SMPTE 344M, SMPTE 292M and SMPTE 424M serial rates. The module is fully compliant with SMPTE 297M-2006.
The transceiver consists of three sections: a DFB laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

The transceivers are compatible with SFP Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA.

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**Absolute Maximum Ratings**

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<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
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<th>Unit</th>
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<tr>
<td>Supply Voltage</td>
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<td>-0.5</td>
<td>4.5</td>
<td>V</td>
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<tr>
<td>Storage Temperature</td>
<td>Ts</td>
<td>-40</td>
<td>+85</td>
<td>°C</td>
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<tr>
<td>Operating Humidity</td>
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<td>85</td>
<td>%</td>
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### Recommended Operating Conditions

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<th>Unit</th>
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<tbody>
<tr>
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<td>0</td>
<td>+70</td>
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<td>Power Supply Voltage</td>
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<td>3.3</td>
<td>3.47</td>
<td>V</td>
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<td>Power Supply Current</td>
<td>Icc</td>
<td></td>
<td>400</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Data Rate</td>
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<td></td>
<td>Gbps</td>
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### Optical and Electrical Characteristics

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<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
<th>Unit</th>
<th>Notes</th>
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<tbody>
<tr>
<td><strong>Transmitter</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Centre Wavelength</td>
<td>λc</td>
<td>1260</td>
<td>1310</td>
<td>1360</td>
<td>nm</td>
<td></td>
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<tr>
<td>Spectral Width (-20dB)</td>
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<td></td>
<td>1</td>
<td></td>
<td>nm</td>
<td></td>
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<td>Side Mode Suppression Ratio</td>
<td>SMSR</td>
<td>30</td>
<td></td>
<td></td>
<td>dB</td>
<td></td>
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<tr>
<td>Average Output Power</td>
<td>Pout</td>
<td>-2</td>
<td>0</td>
<td>+3</td>
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<tr>
<td>Extinction Ratio</td>
<td>ER</td>
<td>5</td>
<td></td>
<td></td>
<td>dB</td>
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<td>Rise/Fall Time (20%~80%)</td>
<td>SD-SDI</td>
<td></td>
<td>tr/tf</td>
<td>270</td>
<td>ps</td>
<td>2</td>
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<tr>
<td></td>
<td>HD-SDI</td>
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<td></td>
<td>270</td>
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<td></td>
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<tr>
<td></td>
<td>3G-SDI</td>
<td></td>
<td></td>
<td>270</td>
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<td><strong>Total Output Jitter</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td>PRBS and colour bar</td>
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<tr>
<td>SD-SDI</td>
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<td>70</td>
<td>200</td>
<td></td>
<td>ps</td>
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<tr>
<td>HD-SDI</td>
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<td>50</td>
<td>135</td>
<td></td>
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<td>3G-SDI</td>
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<td>100</td>
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<td>SD-SDI</td>
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<td>300</td>
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<td>HD-SDI</td>
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<td>3G-SDI</td>
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<td>120</td>
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<td>Data Input Swing Differential</td>
<td>V_IN</td>
<td>400</td>
<td>1800</td>
<td></td>
<td>mV</td>
<td>3</td>
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<tr>
<td>Input Differential Impedance</td>
<td>Z_IN</td>
<td>90</td>
<td>100</td>
<td>110</td>
<td>Ω</td>
<td></td>
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<tr>
<td>TX Disable</td>
<td>Disable</td>
<td>2.0</td>
<td>Vcc</td>
<td></td>
<td>V</td>
<td></td>
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<tr>
<td></td>
<td>Enable</td>
<td>0</td>
<td>0.8</td>
<td></td>
<td>V</td>
<td></td>
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<tr>
<td>TX Fault</td>
<td>Fault</td>
<td>2.0</td>
<td>Vcc</td>
<td></td>
<td>V</td>
<td></td>
</tr>
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<td>0.8</td>
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<td>------</td>
<td>------</td>
<td>----</td>
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<td></td>
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<tr>
<td>Receiver Sensitivity</td>
<td></td>
<td></td>
<td>-18</td>
<td>dBm</td>
<td>5</td>
<td></td>
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<td>Receiver Overload</td>
<td></td>
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<td>0</td>
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<td>LOS De-Assert</td>
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<td>4</td>
<td>dB</td>
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<td></td>
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<td>Data Output Swing</td>
<td>Vout</td>
<td>650</td>
<td>800</td>
<td>1000</td>
<td>mV</td>
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<td>Differential LOS High</td>
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<td>2.0</td>
<td>Vcc</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOS Low</td>
<td></td>
<td>0.8</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. The optical power is launched into SMF.
2. Rise and fall times, 20% to 80%, are measured following a fourth-order Bessel-Thompson filter with a bandwidth of 0.75 x clock frequency corresponding to the serial data rate.
3. PECL input, internally AC-coupled and terminated.
4. Internally AC-coupled.
5. The sensitivity and overload specification refers to the input power levels for BER = 1E-12 against both PRBS and pathological patterns at SMPTE 259M, SMPTE 292M and SMPTE 424M rates.
Timing and Electrical

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
<th>Unit</th>
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<tbody>
<tr>
<td>Tx Disable Negate Time</td>
<td>t_on</td>
<td>1</td>
<td></td>
<td>1</td>
<td>ms</td>
</tr>
<tr>
<td>Tx Disable Assert Time</td>
<td>t_off</td>
<td>10</td>
<td></td>
<td>10</td>
<td>µs</td>
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<tr>
<td>Time To Initialize, including Reset of Tx Fault</td>
<td>t_init</td>
<td>300</td>
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<td>300</td>
<td>ms</td>
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<tr>
<td>Tx Fault Assert Time</td>
<td>t_fault</td>
<td>100</td>
<td></td>
<td>100</td>
<td>µs</td>
</tr>
<tr>
<td>Tx Disable To Reset</td>
<td>t_reset</td>
<td>10</td>
<td></td>
<td>10</td>
<td>µs</td>
</tr>
<tr>
<td>LOS Assert Time</td>
<td>t_loss_on</td>
<td>100</td>
<td></td>
<td>100</td>
<td>µs</td>
</tr>
<tr>
<td>LOS De-assert Time</td>
<td>t_loss_off</td>
<td>100</td>
<td></td>
<td>100</td>
<td>µs</td>
</tr>
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<td>Serial ID Clock Rate</td>
<td>f_serial_clock</td>
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<td></td>
<td>100</td>
<td>KHz</td>
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<tr>
<td>MOD_DEF (0:2)-High</td>
<td>V_H</td>
<td>2</td>
<td></td>
<td>Vcc</td>
<td>V</td>
</tr>
<tr>
<td>MOD_DEF (0:2)-Low</td>
<td>V_L</td>
<td>0.8</td>
<td></td>
<td>V</td>
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Diagnostics Specification

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<th>Unit</th>
<th>Accuracy</th>
<th>Calibration</th>
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<tr>
<td>Temperature</td>
<td>0 to +70</td>
<td>°C</td>
<td>±3°C</td>
<td>Internal / External</td>
</tr>
<tr>
<td>Voltage</td>
<td>3.0 to 3.6</td>
<td>V</td>
<td>±3%</td>
<td>Internal / External</td>
</tr>
<tr>
<td>Bias Current</td>
<td>0 to 100</td>
<td>mA</td>
<td>±10%</td>
<td>Internal / External</td>
</tr>
<tr>
<td>TX Power</td>
<td>-2 to +3</td>
<td>dBm</td>
<td>±3dB</td>
<td>Internal / External</td>
</tr>
<tr>
<td>RX Power</td>
<td>-20 to -6</td>
<td>dBm</td>
<td>±3dB</td>
<td>Internal / External</td>
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</table>

I2C Bus Interface

The I2C bus interface uses the 2-wire serial CMOS E2PROM protocol. The serial interface meets the following specifications:
1. Support a maximum clock rate of 280Khz.
2. Input/Output levels comply with LVCMOS/LVTTL or compatible logics.
   - Low: 0 – 0.8 V
   - High: 2.0 – 3.3 V
   - Undefined: 0.8 – 2.0 V
Pin Definitions

Pin Diagram

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Name</th>
<th>Description</th>
<th>Plug Seq.</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>VeeT</td>
<td>Transmitter Ground</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>TX_FAULT</td>
<td>Transmitter Fault Indication</td>
<td>3</td>
<td>Note 1</td>
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<td>3</td>
<td>TX_DISABLE</td>
<td>Transmitter Disable</td>
<td>3</td>
<td>Note 2</td>
</tr>
<tr>
<td>4</td>
<td>MOD_DEF(2)</td>
<td>SDA Serial Data Signal</td>
<td>3</td>
<td>Note 3</td>
</tr>
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</table>
### Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.

2) TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7k~10kΩ resistor. Its states are:
   - Low (0 to 0.8V): Transmitter on
   - (>0.8V, < 2.0V): Undefined
   - High (2.0 to 3.465V): Transmitter Disabled
   - Open: Transmitter Disabled

3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board.
   - Mod-Def 0 is grounded by the module to indicate that the module is present
   - Mod-Def 1 is the clock line of two wire serial interface for serial ID
   - Mod-Def 2 is the data line of two wire serial interface for serial ID

4) LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and Vcc+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.

5) RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.

6) TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>MOD_DEF(1)</td>
<td>SCL Serial Clock Signal</td>
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</tr>
<tr>
<td>6</td>
<td>MOD_DEF(0)</td>
<td>TTL Low</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Rate Select</td>
<td>Not Connected</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>LOS</td>
<td>Loss of Signal</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>V_EER</td>
<td>Receiver ground</td>
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</tr>
<tr>
<td>10</td>
<td>V_EER</td>
<td>Receiver ground</td>
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<td>11</td>
<td>V_EER</td>
<td>Receiver ground</td>
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<tr>
<td>12</td>
<td>RD-</td>
<td>Inv. Received Data Out</td>
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<td>13</td>
<td>RD+</td>
<td>Received Data Out</td>
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<td>14</td>
<td>V_EER</td>
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<td>V_CCR</td>
<td>Receiver Power Supply</td>
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<td>16</td>
<td>V_CCT</td>
<td>Transmitter Power Supply</td>
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<td>18</td>
<td>TD+</td>
<td>Transmit Data In</td>
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<tr>
<td>19</td>
<td>TD-</td>
<td>Inv. Transmit Data In</td>
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<td>20</td>
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</table>
**Mechanical Dimensions**

![Mechanical Diagram]

**Ordering information**

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<thead>
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<th>Part Number</th>
<th>Product Description</th>
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<tr>
<td>GHP-313G-L4CD</td>
<td>1310nm, 3Gbps, 40km, 0°C ~ +70°C, With Digital Diagnostic Monitoring</td>
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**Important Notice**

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