The LTA8520 is a QSFP+ Optical transceiver for 4 x 14Gb/s optical links. It is compliant with the QSFP+ MSA. It operates at 14.0625Gb/s up to 60m over OM3 fiber.

Applications

- Infiniband FDR interconnects
- Multi Channel 16GFC
- High performance computing interconnection

Features

- 4 independent parallel optical channels
- Each channel data rate up to 14.0625Gb/s
- Hot Pluggable
- Up to 60m link on OM3 Multi-mode Fiber
- 850nm VCSEL/PD Array Technology
- CML Compatible electrical I/O
- Low power consumption of 1.0W
- QSFP+ MSA Compliance

Case Operating Temperature:

- Commercial: 0 to 70°C
- RoHS II compliance

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Case Operating Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTA8520-PC+</td>
<td>0 to 70 °C</td>
</tr>
</tbody>
</table>

Recommended Operating Conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Operating Temperature</td>
<td>T_{case}</td>
<td>0</td>
<td>+25</td>
<td>+70</td>
<td>°C</td>
<td>Temperature Range = C</td>
</tr>
<tr>
<td>Module Supply Voltage</td>
<td>V_{CC}</td>
<td>3.14</td>
<td>3.3</td>
<td>3.46</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Module Supply Current</td>
<td>I_{IN}</td>
<td>-</td>
<td>-</td>
<td>350</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Signaling Speed Per Channel</td>
<td>S</td>
<td>-</td>
<td>14.0625</td>
<td>-</td>
<td>Gb/s</td>
<td></td>
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### Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Max</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Ambient Temperature</td>
<td>T_{stg}</td>
<td>-40</td>
<td>+100</td>
<td>ºC</td>
<td></td>
</tr>
<tr>
<td>Relative Humidity - Storage</td>
<td>RH_{s}</td>
<td>0</td>
<td>95</td>
<td>%</td>
<td></td>
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<tr>
<td>Relative Humidity - Operating</td>
<td>RH_{o}</td>
<td>0</td>
<td>85</td>
<td>%</td>
<td></td>
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<tr>
<td>Module Supply Voltage</td>
<td>V_{CC}</td>
<td>-0.5</td>
<td>3.6</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Damage Input Optical Power</td>
<td>P_{IN(MAX)}</td>
<td>-</td>
<td>3.4</td>
<td>dBm</td>
<td></td>
</tr>
</tbody>
</table>

Exceeding the Absolute Maximum Ratings may cause irreversible damage to the device. The device is not intended to be operated under the condition of simultaneous Absolute Maximum Ratings, a condition which may cause irreversible damage to the device.

### Transmitter Electrical Interfaces

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>Tx_Data Differential Input Voltage</td>
<td>V_{IN}</td>
<td>200</td>
<td>-</td>
<td>1200</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>Tx_Data Differential Input Impedance</td>
<td>Z_{IN}</td>
<td>-</td>
<td>100</td>
<td>-</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>Differential Input Return Loss</td>
<td>SDD11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>dB</td>
<td>50MHz to 14.1GHz</td>
</tr>
<tr>
<td>Differential to Common Mode Conversion Loss</td>
<td>SCD11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>dB</td>
<td>50MHz to 14.1GHz</td>
</tr>
<tr>
<td>J2 Jitter output</td>
<td>T_{J2}</td>
<td>-</td>
<td>-</td>
<td>0.16</td>
<td>UI</td>
<td></td>
</tr>
<tr>
<td>J9 Jitter output</td>
<td>T_{J9}</td>
<td>-</td>
<td>-</td>
<td>0.29</td>
<td>UI</td>
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### Receiver Electrical Interfaces

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Rx_Data Differential Output Voltage</td>
<td>V_{OUT}</td>
<td>-</td>
<td>420</td>
<td>-</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>Rx_Data Differential Output Impedance</td>
<td>Z_{OUT}</td>
<td>90</td>
<td>100</td>
<td>110</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>Differential Output Return Loss</td>
<td>SDD22</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>dB</td>
<td>500MHz to 15GHz</td>
</tr>
<tr>
<td>Common Mode Output Return Loss</td>
<td>SCC22</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>dB</td>
<td>200MHz to 15GHz</td>
</tr>
<tr>
<td>J2 Jitter output</td>
<td>T_{J2}</td>
<td>-</td>
<td>-</td>
<td>0.42</td>
<td>UI</td>
<td></td>
</tr>
<tr>
<td>J9 Jitter output</td>
<td>T_{J9}</td>
<td>-</td>
<td>-</td>
<td>0.65</td>
<td>UI</td>
<td></td>
</tr>
<tr>
<td>Rx Output Data Rising Time (20% to 80%)</td>
<td>Tr</td>
<td>28</td>
<td>-</td>
<td>-</td>
<td>ps</td>
<td></td>
</tr>
<tr>
<td>Rx Output Data Falling Time (20% to 80%)</td>
<td>Tf</td>
<td>28</td>
<td>-</td>
<td>-</td>
<td>ps</td>
<td></td>
</tr>
</tbody>
</table>
### Transmitter Optical Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>LTA8520</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Launch Power ,each lane</td>
<td>P_{OUT}</td>
<td>-7.6</td>
<td>-</td>
<td>2.4 dBm</td>
</tr>
<tr>
<td>Optical Output with Tx OFF</td>
<td>P_{OFF}</td>
<td>-</td>
<td>-</td>
<td>-30 dBm</td>
</tr>
<tr>
<td>Center Wavelength</td>
<td>\lambda</td>
<td>840</td>
<td>850</td>
<td>860 nm</td>
</tr>
<tr>
<td>RMS Spectral Width</td>
<td>\Delta \lambda</td>
<td>-</td>
<td>-</td>
<td>0.65 nm</td>
</tr>
<tr>
<td>Extinction Ratio</td>
<td>ER</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Optical Rise and Fall Time</td>
<td>t_r, t_f</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Optical modulation Amplitude , each lane</td>
<td>OMA</td>
<td>-</td>
<td>-</td>
<td>3 dBm</td>
</tr>
<tr>
<td>Difference in launch power between any two lane</td>
<td>\Delta OMA</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Optical return loss tolerance</td>
<td>ORL</td>
<td>-</td>
<td>-</td>
<td>12 dB</td>
</tr>
<tr>
<td>Transmitter eye mask definition</td>
<td></td>
<td></td>
<td></td>
<td>0.23, 0.34, 0.43, 0.27, 0.35, 0.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hit ratio 5 \times 10^{-5} hits per sample</td>
</tr>
</tbody>
</table>

### Receiver Optical Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>LTA8520</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average power at receive input, each lane</td>
<td>P_{IN}</td>
<td>-5.6</td>
<td>-</td>
<td>2.4 dBm</td>
</tr>
<tr>
<td>Center Wavelength</td>
<td>\lambda</td>
<td>840</td>
<td>850</td>
<td>860 nm</td>
</tr>
<tr>
<td>Receiver Reflectance</td>
<td>RFL</td>
<td>-</td>
<td>-</td>
<td>-12 dB</td>
</tr>
<tr>
<td>Rx_LOS of Signal - Assert</td>
<td>P_A</td>
<td>-30</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rx_LOS of Signal - Deassert (OMA)</td>
<td>P_D</td>
<td>-</td>
<td>-</td>
<td>-7.5 dB</td>
</tr>
<tr>
<td>Rx_LOS of Signal - Hysteresis</td>
<td>P_{HY}</td>
<td>0.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stressed receiver sensitivity in OMA, each lane</td>
<td>R_{SS}</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Peak power, each lane</td>
<td></td>
<td>-</td>
<td>-</td>
<td>4 dBm</td>
</tr>
</tbody>
</table>

Note 1: Average received power where the BER = 10^{-12}, measured with a PRBS 2^{31}-1 test pattern@14.0625Gb/s
LTA8520 Block Diagram
**QSFP Monitoring Interface**

Monitoring is available on the QSFP+ AOC modules. A 2-wire serial interface provides user to contact with module. The module provides real-time per channel received power monitoring (optional), per channel transmitted laser bias current monitoring, supply voltage and temperature monitoring.

The memory is structured as a single address, multiple page approach. The address is given as A0h. The structure of the memory is shown in the followed figure. The memory space is arranged into a lower, single page, address space of 128 bytes and multiple upper address space pages of 128 bytes each. This structure permits timely access to addresses in the lower page, e.g. Interrupt Flags and Monitors. Less time critical entries, e.g. serial ID information and threshold settings are available with the Page Select function.
### I2C Memory Map (Upper memory map Page00-Serial ID: Data Fields, Unlisted Fields are Blank / Empty)

<table>
<thead>
<tr>
<th>I2C Addr</th>
<th>Size (byte)</th>
<th>Name</th>
<th>Description</th>
<th>Values (HEX)</th>
</tr>
</thead>
<tbody>
<tr>
<td>128</td>
<td>1</td>
<td>Identifier</td>
<td>Identifier Type of serial Module</td>
<td>0D</td>
</tr>
<tr>
<td>129</td>
<td>1</td>
<td>Ext. Identifier</td>
<td>Extended Identifier of Serial Module</td>
<td>00</td>
</tr>
<tr>
<td>130</td>
<td>1</td>
<td>Connector</td>
<td>Code for connector type</td>
<td>0C</td>
</tr>
<tr>
<td>131-138</td>
<td>8</td>
<td>Specification compliance</td>
<td>Code for electronic compatibility or optical compatibility</td>
<td>04 00 00 00 40 40 02 D5</td>
</tr>
<tr>
<td>139</td>
<td>1</td>
<td>Encoding</td>
<td>Code for serial encoding algorithm</td>
<td>05</td>
</tr>
<tr>
<td>140</td>
<td>1</td>
<td>BR, nominal</td>
<td>Nominal bit rate, units of 100 Mbps</td>
<td>8C</td>
</tr>
<tr>
<td>141</td>
<td>1</td>
<td>Extended rateselect</td>
<td>Tags for extended rate select compliance</td>
<td>00</td>
</tr>
<tr>
<td>142</td>
<td>1</td>
<td>Length(SMF)</td>
<td>Link length supported for SMF fiber in km (note 1)</td>
<td>00</td>
</tr>
<tr>
<td>143</td>
<td>1</td>
<td>Length(OM3 50 um)</td>
<td>Link length supported for EBW 50/125 um fiber (OM3), units of 2m (note 1)</td>
<td>1E</td>
</tr>
<tr>
<td>144</td>
<td>1</td>
<td>Length(OM2 50 um)</td>
<td>Link length supported for 50/125 um fiber (OM2), units of 1m (note 1)</td>
<td>00</td>
</tr>
<tr>
<td>145</td>
<td>1</td>
<td>Length(OM1 62.5 um)</td>
<td>Link length supported for 62.5/125 um fiber (OM1), units of 1m (note 1)</td>
<td>00</td>
</tr>
<tr>
<td>146</td>
<td>1</td>
<td>Length (Copper/AOC)</td>
<td>Link length of copper or active cable, units of 1 m</td>
<td>00</td>
</tr>
<tr>
<td>147</td>
<td>1</td>
<td>Device tech</td>
<td>Device technology</td>
<td>00</td>
</tr>
<tr>
<td>148-163</td>
<td>16</td>
<td>Vendor name</td>
<td>QSFP+ vendor name (ASCII)</td>
<td>Hisense</td>
</tr>
<tr>
<td>164</td>
<td>1</td>
<td>Extended Module</td>
<td>Extended Module codes for Module</td>
<td>04</td>
</tr>
<tr>
<td>165-167</td>
<td>3</td>
<td>Vendor OUI</td>
<td>QSFP+ vendor IEEE company ID</td>
<td>AC 4A FE</td>
</tr>
<tr>
<td>168-183</td>
<td>16</td>
<td>Vendor PN</td>
<td>Part number provided by QSFP+ vendor (ASCII)</td>
<td>LTA8520-PC+</td>
</tr>
<tr>
<td>184-185</td>
<td>2</td>
<td>Vendor rev</td>
<td>Revision level for part number provided by vendor (ASCII)</td>
<td>1</td>
</tr>
<tr>
<td>186-187</td>
<td>2</td>
<td>Wave length</td>
<td>Nominal laser wavelength (wavelength=value/20 in nm)</td>
<td>42 68</td>
</tr>
<tr>
<td>188-189</td>
<td>2</td>
<td>Wavelength tolerance</td>
<td>Guaranteed range of laser wavelength(+/value) from nominal wavelength,(wavelength Tol.=value/200 in nm)</td>
<td>07 D0</td>
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<tr>
<td>190</td>
<td>1</td>
<td>Max case temp.</td>
<td>Maximum case temperature in degrees C</td>
<td>00</td>
</tr>
<tr>
<td>191</td>
<td>1</td>
<td>CC_BASE</td>
<td>Check code for base ID fields (addresses 128-190)</td>
<td></td>
</tr>
<tr>
<td>192-195</td>
<td>4</td>
<td>Options</td>
<td>Rate Select, TX Disable, TX Fault, LOS, Warning indicators for: Temperature, VCC, RX power, TX Bias</td>
<td>00 00 04 98</td>
</tr>
<tr>
<td>196-211</td>
<td>16</td>
<td>Vendor SN</td>
<td>Serial number provided by vendor (ASCII)</td>
<td>Programmed by Factory</td>
</tr>
<tr>
<td>212-219</td>
<td>8</td>
<td>Date Code</td>
<td>Vendor's manufacturing date code</td>
<td>Programmed by Factory</td>
</tr>
<tr>
<td>220</td>
<td>1</td>
<td>Monitoring Type</td>
<td>Indicates which types of monitoring are implemented (if any) in the Module. Bit 1,0 Reserved</td>
<td>08</td>
</tr>
<tr>
<td>221</td>
<td>1</td>
<td>Enhanced Options</td>
<td>Indicates which optional enhanced features are implemented in the Module.</td>
<td>00</td>
</tr>
<tr>
<td>222</td>
<td>1</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>223</td>
<td>1</td>
<td>CC_EXT</td>
<td>Check code for the Extended ID Fields (addresses 192-222)</td>
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<tr>
<td>224-255</td>
<td>32</td>
<td>Vendor Specific EEPROM</td>
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<td></td>
</tr>
<tr>
<td>IIC Addr</td>
<td>Byte</td>
<td>Name</td>
<td>Description</td>
<td>Values</td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
<td>-----------------------------------</td>
<td>--------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>128-129</td>
<td>2</td>
<td>Case temp High Alarm (°C)</td>
<td>MSB at low address</td>
<td>80</td>
</tr>
<tr>
<td>130-131</td>
<td>2</td>
<td>Case temp Low Alarm (°C)</td>
<td>MSB at low address</td>
<td>-10</td>
</tr>
<tr>
<td>132-133</td>
<td>2</td>
<td>Case temp High Warning (°C)</td>
<td>MSB at low address</td>
<td>75</td>
</tr>
<tr>
<td>134-135</td>
<td>2</td>
<td>Case temp Low Warning (°C)</td>
<td>MSB at low address</td>
<td>-5</td>
</tr>
<tr>
<td>136-143</td>
<td>8</td>
<td>Reserved</td>
<td>MSB at low address</td>
<td></td>
</tr>
<tr>
<td>144-145</td>
<td>2</td>
<td>Vcc High Alarm (V)</td>
<td>MSB at low address</td>
<td>3.6</td>
</tr>
<tr>
<td>146-147</td>
<td>2</td>
<td>Vcc Low Alarm (V)</td>
<td>MSB at low address</td>
<td>3.0</td>
</tr>
<tr>
<td>148-149</td>
<td>2</td>
<td>Vcc High Warning (V)</td>
<td>MSB at low address</td>
<td>3.5</td>
</tr>
<tr>
<td>150-151</td>
<td>2</td>
<td>Vcc Low Warning (V)</td>
<td>MSB at low address</td>
<td>3.1</td>
</tr>
<tr>
<td>152-159</td>
<td>8</td>
<td>Reserved</td>
<td>MSB at low address</td>
<td></td>
</tr>
<tr>
<td>160-175</td>
<td>16</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>184-185</td>
<td>2</td>
<td>Tx Bias High Alarm (mA)</td>
<td>MSB at low address</td>
<td>12</td>
</tr>
<tr>
<td>186-187</td>
<td>2</td>
<td>Tx Bias Low Alarm (mA)</td>
<td>MSB at low address</td>
<td>0</td>
</tr>
<tr>
<td>188-189</td>
<td>2</td>
<td>Tx Bias High Warning (mA)</td>
<td>MSB at low address</td>
<td>10</td>
</tr>
<tr>
<td>190-191</td>
<td>2</td>
<td>Tx Bias Low Warning (mA)</td>
<td>MSB at low address</td>
<td>0</td>
</tr>
<tr>
<td>192-199</td>
<td>8</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200-207</td>
<td>8</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>208-223</td>
<td>16</td>
<td>Reserved</td>
<td></td>
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## Pin Assignment

<table>
<thead>
<tr>
<th>Pin</th>
<th>Symbol</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Tx2n</td>
<td>Transmitter Inverted Data Input</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Tx2p</td>
<td>Transmitter Non Inverted Data Input</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Tx4n</td>
<td>Transmitter Inverted Data Input</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Tx4p</td>
<td>Transmitter Non Inverted Data Input</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>ModSelL</td>
<td>Module Select</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>RetSelL</td>
<td>Module Reset</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>VCC Rx</td>
<td>Receiver +3.3V DC Power Supply</td>
<td></td>
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<td>38</td>
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</table>
Electrical Interface

- **SCL**: 1 μH
- **10 μF 0.1 μF**
- **+3.3V VCC**
- **VCC1 0.1 μF**
- **GND**
- **Rx**
- **Tx**
- **Z=50 Ω**
- **Quad Laser Driver**
- **Quad TIA & Limiting Amplifier**
- **Micro Controller**
- **PLD/PAL**
- **Tx Data Bus**
- **Rx Data Bus**
- **QSFP+ Module**
- **Quad SerDes IC**
- **Protocol IC**

To other QSFP+ modules

Hisense Broadband Multimedia. Technology: 204 Yan’An 3 Road, Qingdao,China 266071
Hisense Broadband,Inc. : 800 West Fifth Avenue, Suite 201A· Naperville· Illinois 60563
Mechanical Dimensions

Dimensions are mm
Tolerance is ± 0.1mm
Others according to MSA Drawing
Warnings

Handling Precautions:
This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

Laser Safety:
Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

Notice:
The information provided on this page contains the product target specifications which are subject to change without notice.
Check with your Hisense Sales Office for product updates, changes in specifications, sample availability and production release dates.

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