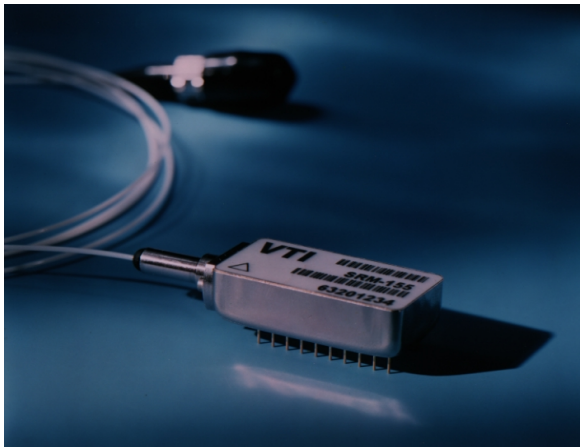


## RXM-155 SONET/SDH Fiber-Optic Receiver Module



The RXM-155 SONET/SDH Fiber-Optic Receiver Module

### Features

- SONET OC-3 and SDH STM-1 Compatible
- PECL Data Outputs
- Single +5 Volt Supply
- PECL Loss of Signal Flag
- Operation at 1300 nm and 1550 nm
- -45° to +85°C Operation
- -34dBm minimum sensitivity
- Wide Dynamic Range
- Multi-Sourced 20 Pin DIL Footprint

### Applications

- Telecom Receiver Applications  
Medium and Long Haul SONET/SDH @ 155 Mb/s
- High Performance Datacom Receiver Applications  
ATM @ 155 Mb/s

### Description

VI's RXM-155 is an integrated fiber-optic receiver module. It is powered by a single +5v power supply and is housed in a 20 Pin DIL package. It is ideally suited for SONET OC-3, SDH STM-1 and other 155 Mb/s fiber-optic transmission applications that demand superior performance. It is available with a multi-mode fiber pigtail with either FC/PC, ST or SC connector.

# RXM-155 SONET/SDH Receiver Module

## Product Data Sheet

### Functional Overview

This highly integrated module converts a 155 Mb/s fiber-optic NRZ signal to differential PECL data outputs. A PECL flag alerts the user to a loss of signal condition when the optical input falls below an acceptable level.

A single +5 Volt supply provides bias for the module's preamplifier, and Quantizer. The photodiode may be biased with -5 Volts or Grounded. All elements are integrated into fiber-coupled 1.3" X 0.635" 20 pin DIL package. The RXM-155 footprint and pinout are industry common for ease of integration.

The optical signal is coupled through a short length of 50.0  $\mu\text{m}$  multimode or single mode optical fiber to a hermetic module which encases an InGaAs PiN-photodiode and preamplifier. The PiN-photodiode converts the optical signal to an electrical current. The signal is then converted to a voltage and amplified by a low noise transimpedance amplifier.

Further gain is provided by the quantizer, which also provides a Flag output when the optical signal falls below an acceptable level.

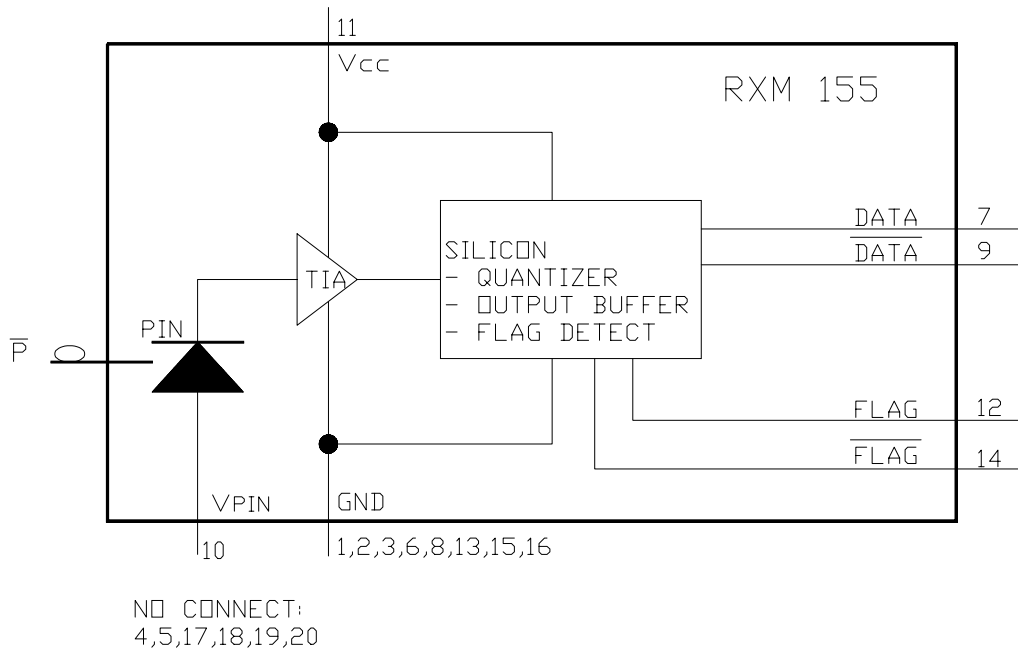
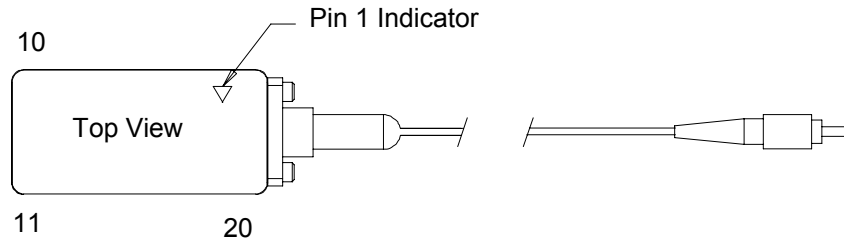


Figure 1. RXM-155 Functional Block Diagram

# RXM-155 SONET/SDH Receiver Module

## Product Data Sheet



**Figure 2. Pin Diagram (Top View)**

**Table 1. Pin Function**

| Pin                | Symbol   | Function   |
|--------------------|----------|--|
| 7                  | Data     | PECL Data Output.  |
| 9                  | Data     | PECL Complementary Data Output.  |
| 10                 | $V_D$    | Detector Anode Bias. Connect to GND or a -5V biased series resistor for received optical power monitoring. <sup>1</sup>  |
| 11                 | $V_{CC}$ | 5 Volt Supply Voltage.   |
| 12                 | Flag     | Input Signal Level Status. This PECL output switches low when the received optical power falls below the flag threshold. |
| 14                 | Flag     | Complementary Input Signal Status. PECL complement of Flag.  |
| 1,2,3,6,8,13,15,16 | GND      | Ground.  |
| 4,5,17,18,19,20    | NC       | No User Connection.  |

1. By connecting pin 10 to a -5 Volt bias through a series resistor (e.g. 1 k $\Omega$ ) received optical power can be monitored as a voltage drop across the resistor.

## Absolute Maximum Ratings

Absolute maximum ratings are provided here as worst case and short duration exposure conditions only. Exposure to conditions more severe than the Absolute Maximum Ratings may result in permanent damage. Exposure to conditions at the Absolute

Maximum Ratings for extended periods may also adversely affect device performance or reliability. Functional operation of the device is not implied at these conditions.

**Table 2. Absolute Maximum Ratings**

| Parameter                 | Symbol   | Minimum | Maximum | Units                |
|---------------------------|----------|---------|---------|----------------------|
| Storage Temperature Range | $T_s$    | -40     | 85      | $^{\circ}\text{C}$   |
| Supply Voltage            | $V_{CC}$ | 0       | +6      | V                    |
| pin Detector Bias         | $V_D$    | -15     | 0       | V                    |
| Lead Soldering Conditions |          |         | 250/10  | $^{\circ}\text{C/s}$ |

# RXM-155 SONET/SDH Receiver Module

## Product Data Sheet

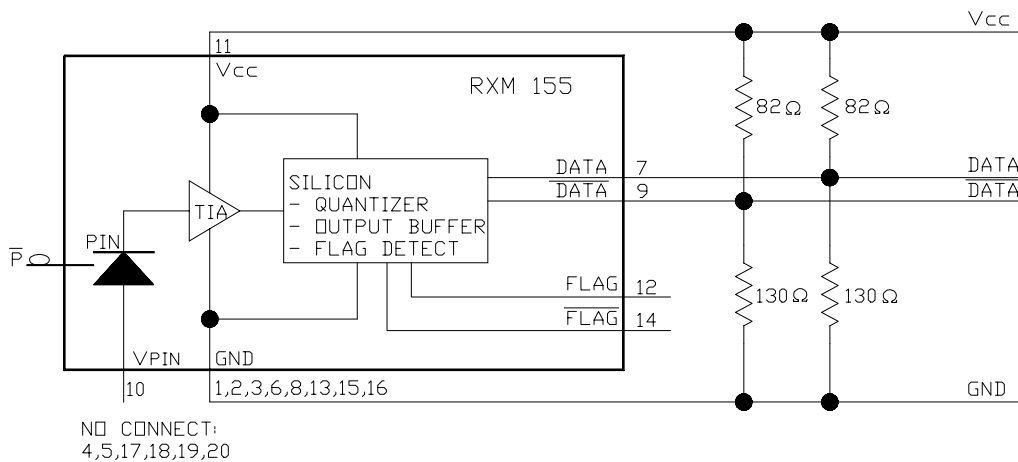
### Performance Characteristics

**Table 3. Electrical Performance**

| Parameter                                    | Symbol     | Minimum         | Typical | Maximum         | Units |
|--|------------|-----------------|---------|-----------------|-------|
| Input Signal Rate                            | $f_o$      | 120             | 155.52  | 175             | Mb/s  |
| Operating Temperature                        | $T_O$      | -40             |         | +85             | °C    |
| Power Supply Voltage                         | $V_{CC}$   | 4.5             | 5.0     | 5.5             | V     |
| pin Detector Bias Voltage (pin10)            | $V_D$      | -15             | 0       | 0               | V     |
| Power Supply Current                         | $I_{CC}$   |                 |         | 200             | mA    |
| Data Output Levels <sup>1</sup>              |            |                 |         |                 |       |
| Low  | $V_{OL}$   | $V_{CC} - 1.95$ |         | $V_{CC} - 1.63$ | V     |
| High   | $V_{OH}$   | $V_{CC} - 1.03$ |         | $V_{CC} - 0.88$ | V     |
| Data Output Rise and Fall Times <sup>2</sup> | $T_R, T_F$ | 275             | 375     | 575             | ps    |
| Received Power Level Flag                    | LOS        |                 |         |                 |       |
| Decreasing Optical Power                     |            |                 | -37     |                 | dBm   |
| Increasing Optical Power                     |            |                 | -35     |                 | dBm   |
| Flag Hysteresis                              | Hyst       |                 | 2       |                 | dB    |

1. Measured with a load of  $R_L = 50\Omega$  to  $V_{CC} - 2V$ . See figures 3 and 4. ECL levels are specified for dc measurement, an additional tolerance of 50 mV should be included for dynamic measurements.

2. Measured at 20% to 80% levels.



**Figure 3. PECL Interface**

# RXM-155 SONET/SDH Receiver Module

## Product Data Sheet

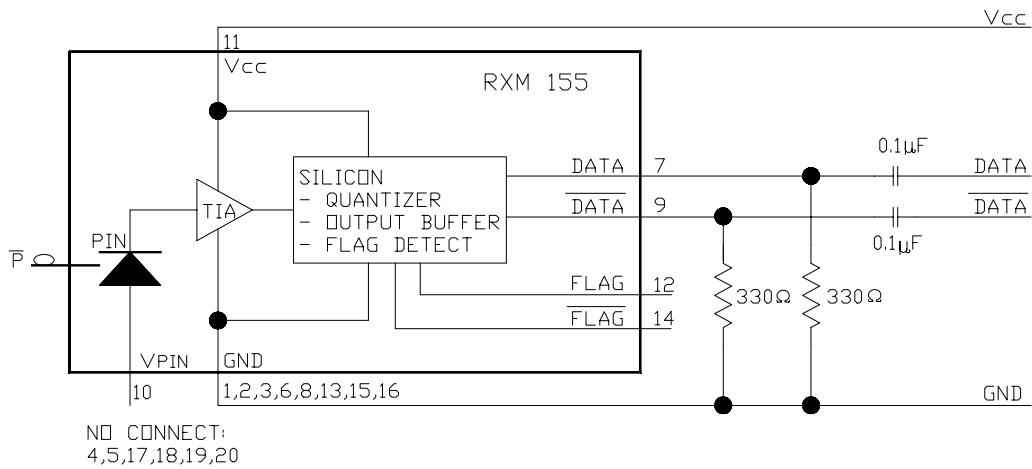


Figure 4. ECL (AC Coupled) Interface

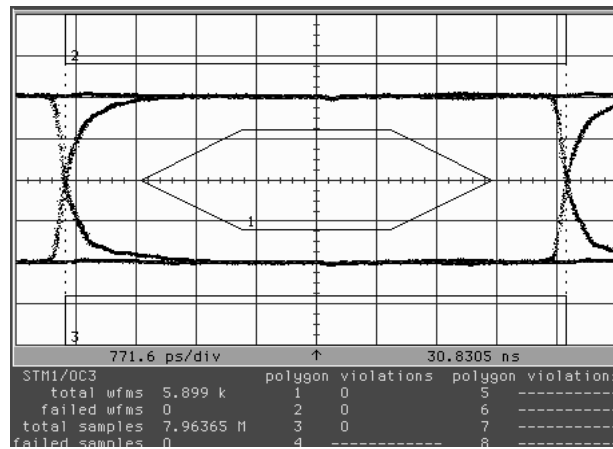


Figure 5. Typical Performance @ 155.52MHz

Table 4. Optical Performance

| Parameter                                | Symbol           | Minimum | Typical | Maximum | Units |
|--|------------------|---------|---------|---------|-------|
| Minimum Average Sensitivity <sup>1</sup> | Sens.            | -34.0   |         |         | dBm   |
| Maximum Optical Input <sup>1</sup>       | P <sub>MAX</sub> |         |         | 0       | dBm   |
| Input Wavelength                         | λ                | 1280    |         | 1580    | nm    |

1. For a BER less than 1E-10. Measured using a 2<sup>23</sup> - 1 pseudorandom word and a 50% average optical duty cycle and a 10 dB Extinction Ratio.

# RXM-155 SONET/SDH Receiver Module

## Product Data Sheet

### Qualification

The RXM-155 has been designed to comply with the requirements of Bellcore specifications GR-468-CORE, Reliability Assurance for Optoelectronic devices and will be subject to a complete qualification test plan to demonstrate full compliance. All of the technologies used in the assembly of the module represent standard microelectronic and optical

technologies that are used in similar products, and have extensive field reliability data.

All components and technologies used in the optical receiver are backed by qualification data covering mechanical and environmental tests along with accelerated life tests. Typical tests, test conditions and sample sizes are listed below.

**Table 5. Qualification Plan**

| Test                          | Test Method                      | Sample Size |
|-------------------------------|----------------------------------|-------------|
| Physical Dimensions           | MIL-STD-883, Method 2016         | 11          |
| Mechanical Shock              | MIL-STD-883, Method 2002, Test B | 11          |
| Vibration, variable frequency | MIL-STD-883, Method 2007, Test A | 11          |
| Lead Solderability            | MIL-STD-883, Method 2003         | 22 Leads    |
| Lead Integrity                | MIL-STD-883, Method 2004         | 15 Leads    |
| Temperature Cycling           | -40°C/85°C, 300 cycles           | 11          |
| High Temperature Aging        | 85°C under bias, 2000 hours      | 11          |
| Damp Bake                     | 85°C/85% RH/ 1000 hrs            | 11          |
| Low Temperature Storage       | -40°C, 168 hours                 | 11          |
| ESD                           | MIL-STD-883, Method 3015         | 3           |
| Destructive Bond Pull         | MIL-STD-883, Method 2011         | 40          |

**Table 6. Optical Fiber Characteristics**

| Parameter    | Minimum | Typical | Maximum | Units |
|--------------|---------|---------|---------|-------|
| Fiber Length |         | 1000    |         | mm    |
| Fiber Core   |         | 50      |         | um    |
| Fiber Buffer |         | 900     |         | µm    |

# RXM-155 SONET/SDH Receiver Module

## Product Data Sheet

### Outline Diagram

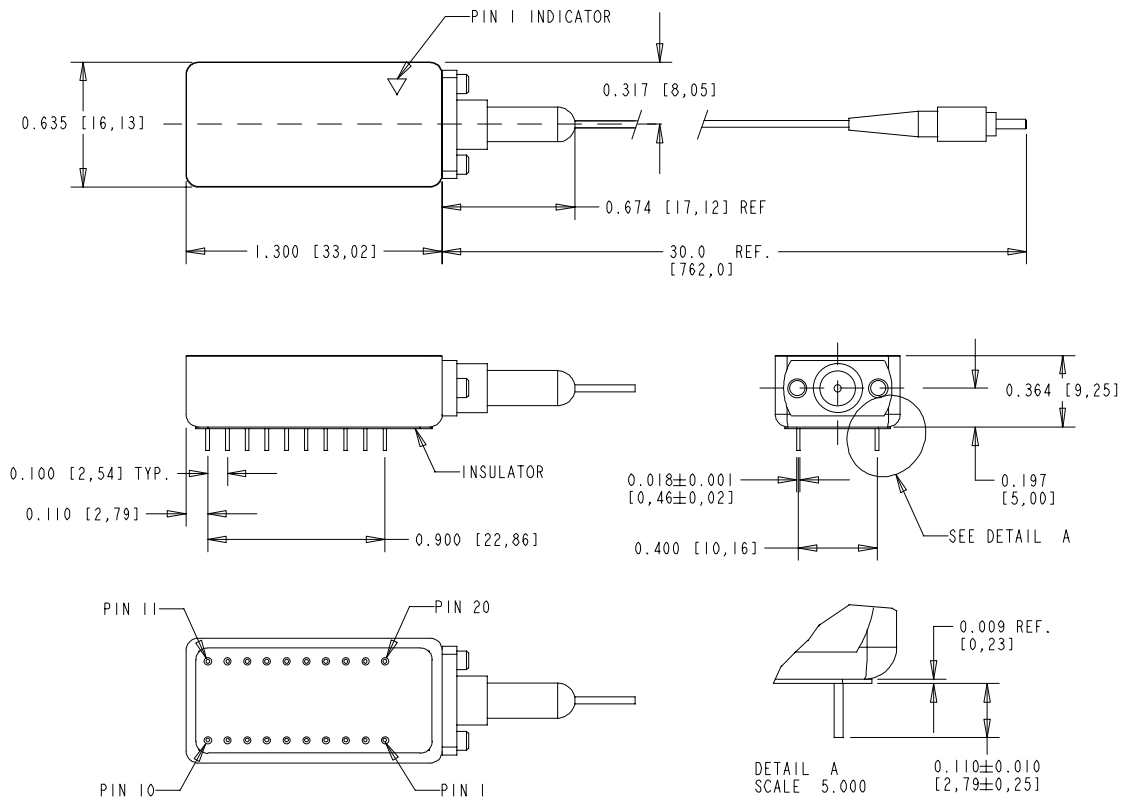


Figure 6. Outline Diagram

### Ordering Information

Standard modules are built with 50um MM fiber, with an outer jacket diameter of 900um. Alternative fiber type, connector type and fiber lengths are available upon request. Contact factory for specific details.

Table 7. Part Numbers

| Fiber-Optic Connector <sup>1</sup> | Model Number | VI Code Number |
|------------------------------------|--------------|----------------|
| FC/PC                              | RXM-155A     | 330018265      |
| ST                                 | RXM-155B     | 330003674      |
| SC                                 | RXM-155C     | 330018276      |

1. Other connectors or fiber requirements are available to meet specific application requirements.

# RXM-155 SONET/SDH Receiver Module

## Product Data Sheet

Notes:



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