

# 28Gb/s Limiting PIN Coplanar Receiver


PT20GC-J57F



The PT20GC is a single channel coplanar receiver, utilizing a low bend radius fibre assembly aligned to single 15 $\mu$ m HSPIN detector. The detector is coupled to a single-channel limiting differential amplifier featuring complementary outputs, with associated control functions. The amplifier incorporates RSSI, input crossing level adjustment and bandwidth/peaking adjustment.

The package is derived from, and shares the same physical footprint as, the Oclaro 10G coplanar receiver family products.

## Features:

- 28Gb/s PIN receiver in common MSA compliant footprint
- Coplanar packaging enabling high density surface mount capability
- Adjustable receiver bandwidth and phase relationship
- Limiting amplifier with integrated threshold adjust
- DC coupled coplanar RF outputs
- C and L band capable
- Low bend radius single mode fiber tail
- Low Power Consumption
- RoHS compliant 

## Applications:

- 4 x 28Gb/s transceiver
- High bandwidth enhanced FEC, ODB modulation schemes

**Optical Characteristics**

The following parametric limits are for a case temperature range of -5°C to 80°C. Typical values reflect 25°C.

Parameter	Symbol	Min	Typ	Max	Unit
PIN bias voltage [1]	$V_{PD}$		5	5.5	V
Amplifier bias voltage	$V_{CC}$	3.15	3.3	3.45	V
Dark current [4]	$I_D$		1	300	nA
Amplifier current consumption	$I_{CC}$		45		mA
Operating wavelength range	$\lambda$	1525	1550	1575	nm
PIN responsivity	R	0.8	0.9	1.1	A/W
High frequency -3 dB corner [2]	$F_{H-3dB}$		18		GHz
Deviation from linear phase to 15GHz [2]	DLP		20		degrees
Low frequency -3dB corner	$F_{L-3dB}$		100		kHz
Differential transimpedance gain	$T_Z$		6000		Ohms
Maximum output voltage swing	$V_{OUTPP}$		500		mVpp diff
Operating input current range [3]	$I_{OP}$	0.03		3.2	mApp

**Notes:**

[1] The maximum limit is conferred by the voltage handling capability of the amplifier  $V_{pds}$  connection.

[2] The typical figures for bandwidth and DLP are defined for the optimum Zpk configuration when tested at 25°C against the defined frequency response masks with a small signal measurement in the linear region of the amplifier. The receiver bandwidth is variable over a fixed range by use of the Zpk control input function. See below for details of the Zpk function.

[3] Assuming a 1A/W responsivity, the amplifier will exhibit linear gain up to -11.7dBm and will be in its limiting region thereafter.

[4] Due to internal diode protection circuitry leakage within the amplifier, a dark current of ~ 0.9 – 1.0 $\mu$ A will be observed when a 5V bias is applied to the PD. Manufacturing Min/Max limits have been correlated with this characteristic to enable the intrinsic PD dark current to be controlled.

**Absolute Ratings**

Parameter	Symbol	Min	Max	Unit
Maximum PIN bias voltage	Vpd		+7	V
Amplifier bias voltage	Vcc	-0.5	4.5	V
Operating temperature [1]	Top	-5	85	°C
Storage temperature [2]	Tstg	-40	85	°C
Relative humidity range (non-condensing)		0	95	%
Maximum DC input current [3][4]	I <sub>max</sub>	5		mA
Fibre tensile strength		10		N
Fibre bend radius		7.5		mm
Soldering temperature [5]			260	°C
ESD handling restrictions [6]		Class II		

**Notes:**

[1] The operating temperature is defined as the temperature of the receiver case.

[2] The rating is referred to ambient temperature.

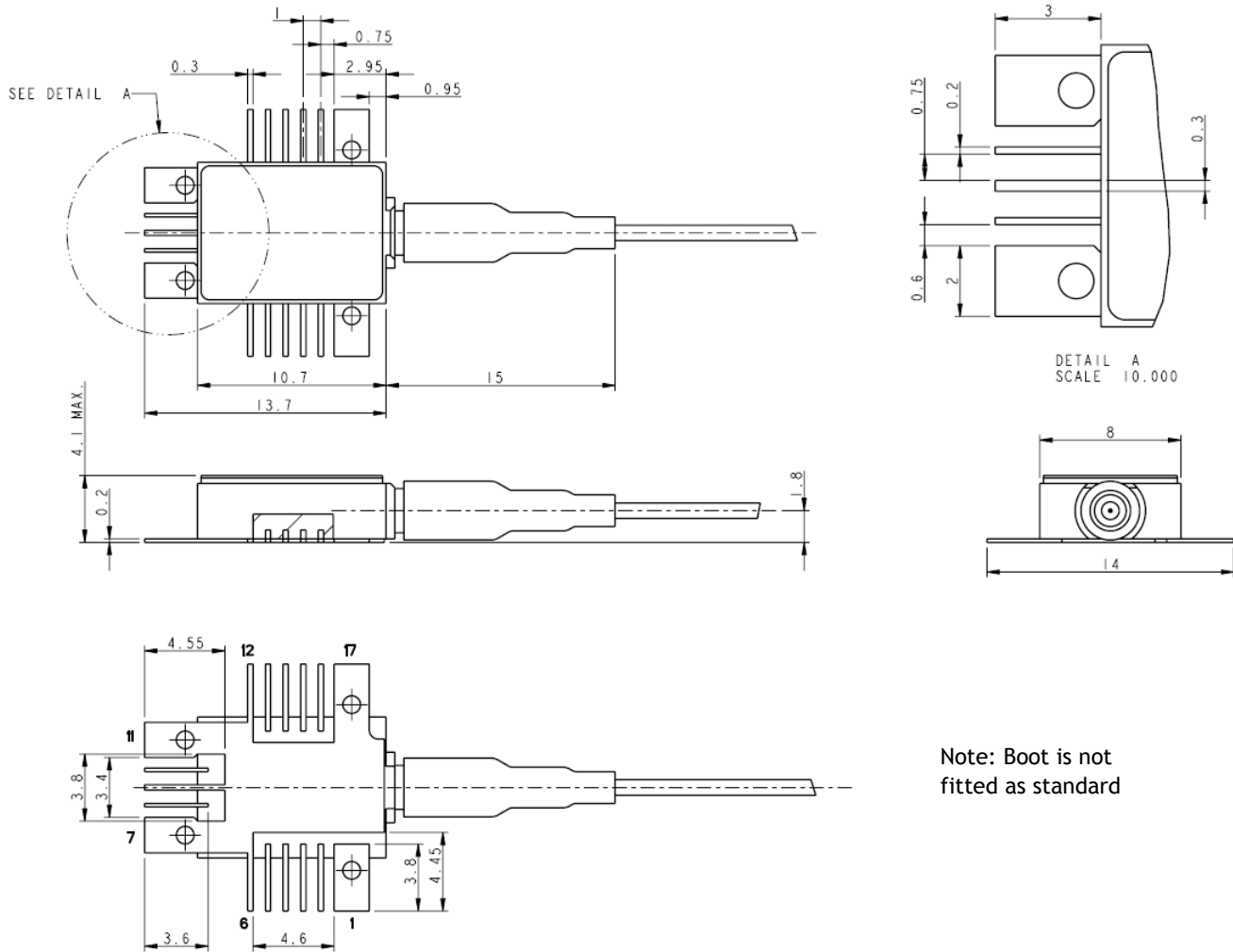
[3] This is the current corresponding to an optical level that causes no damage to the module. However, the electrical and optical performance specified in this document may not be guaranteed.

[4] For up to 6 seconds at 25°C, with 3.3V Vcc

[5] Applied to the receiver leads for up to 10 seconds, no closer than 1mm from the package body

[6] Testing of the amplifier component has been performed by the vendor. The part will tolerate in excess of 1kV on any connection; thus conferring class III rating. However, the HSPIN component is more sensitive, tolerating between 100 and 500V. Thus the receiver rating is restricted to class II according to Telcordia TR-NWT-000870.

Device Footprint and Pinout



Pin No	Pin Name	Description	Pin No	Pin Name	Description
1	DCA	TIA control input	10	OUT-P	Non-inverting data output
2	N/C	Not connected	11	GND	Case ground
3	N/C	Not connected	12	GND	Case ground
4	RSSI	TIA RSSI output	13	Zpk	BW adjust control input
5	Vcc	+3.3V TIA bias supply	14	N/C	Not connected
6	GND	Case ground	15	N/C	Not connected
7	GND	Case ground	16	Vpd	Photodiode bias voltage
8	OUT-N	Inverting data output	17	GND	Case ground
9	GND	Case ground			

Power Supply Sequencing

The following Power Supply sequencing is recommended:

Power Up: Vpd→Vcc→Vzpk (or other control inputs)

Power Down: Vzpk (or other control inputs)→Vcc→Vpd

## Fiber Pigtail

To help overcome the difficulty of fitting 4 receivers into the CFP module, low bend radius, tight-buffered fibre assemblies are used. Fiber type is DrakaElite, 900µm Hytel-Bendbright. Colour is green. The fiber secondary coating constitutes a fuel load of less than 1g and can therefore be considered exempt from flammability requirements in accordance with GR-63-CORE Requirement R4-44.

Fibre length from package wall to connector end face is 80mm +/-5mm.

To further save space, the fiber assembly will not have a boot, which would normally be fitted to the receiver at the fibre to package interface as shown above. The fiber assembly will be terminated with an LC ferrule (a CT connector) to save space and integrate into a faceplate mounted LC duplex adaptor expected to be used on the module.

## TIA Control Functions

### DCA Function (pin 1)

The amplifier includes an integrated feedback circuit to control the decision threshold of the limiting amplifier, thereby maintaining a 50% eye crossing. Leaving this pin floating, or applying a bias of 1.2V allows this facility to operate automatically. Application of a bias voltage above or below this level drives the crossing level up or down as follows:

Ground <  $V_{DCA}$  < 1.2V: drive eye crossing < 50%  
 $V_{DCA}$  = floating or 1.2V: automatic control to maintain 50% eye crossing  
 1.2V <  $V_{DCA}$  <  $V_{CC}$ : drive eye crossing > 50%

This is an analogue control input; no external decoupling capacitor is required

### Zpk Bandwidth Adjust Function (pin 13)

The Zpk function allows optimisation of the receive chain OSNR performance by tailoring the receiver bandwidth and phase relationship to suite the application. The Zpk input can be biased to achieve any one of three operating conditions. To align with the most likely operating condition of the receiver in its target application and to simplify production testing, the typical values stated in the operating characteristics table reflect the optimum condition when tested at 25°C. This optimum condition is normally the 1.2V setting and is provided as deliverable data.

This input control function is intended to allow variation of the receiver frequency response by setting one of three ranges.

ZPK = ground: minimum bandwidth and peaking  
 ZPK = floating or 1.2V: default bandwidth and peaking  
 ZPK = VCC: highest bandwidth and peaking

This is a tri-state digital control input; no external decoupling capacitor is required.

### RSSI Function (pin 4)

An indicator of received signal strength is provided through the RSSI function. The relationship between the RSSI current output and the current input to the TIA is non-linear, as shown below.

RSSIgain at 100µA  $I_{indc}$  = 1µA/µA  
 RSSIgain at 1000µA  $I_{indc}$  = 0.45µA/µA

RSSIgain at 2000µA  $I_{indc}$  = 0.25µA/µA

RoHS Compliance



Oclaro is fully committed to environment protection and sustainable development and has set in place a comprehensive program for removing polluting and hazardous substances from all of its products. The relevant evidence of RoHS compliance is held as part of our controlled documentation for each of our compliant products. RoHS compliance parts are available to order, please refer to the ordering information section for further details.

Ordering Information:

PT20GC-J57F

PT20GC-J57F is a RoHS 5/6 compliant PT20GC with an LC/UPC connector ferrule and a green coloured fibre.

Other connector and fibre options available on request.

Contact Information

[www.oclaro.com](http://www.oclaro.com)

Important Notice

Performance figures, data and any illustrative material provided in this data sheet are typical and must be specifically confirmed in writing by Oclaro before they become applicable to any particular order or contract. In accordance with the Oclaro policy of continuous improvement specifications may change without notice. Further details are available from any Oclaro sales representative.



Caution - use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

D00485-PB Issue 01 March 2013

©Oclaro 2013. Oclaro the Oclaro, Inc. logo, and all other Oclaro, Inc. product names and slogans are trademarks or registered trademarks of Oclaro, Inc. in the U.S.A. or other countries. Products described in this datasheet may be covered by one or more patents in the U.S.A. and abroad. Information in this datasheet is subject to change without notice.