

Advance Product Information VSC7807

Photodetector/Transimpedance Amplifier
Family for Optical Communication

Features

- Integrated Photodetector/Transimpedance Amplifier Optimized for High-Speed Optical Communications Applications
- Fibre Channel/Gigabit Ethernet-Compatible
- High Bandwidth: 1300MHz
- Low Input Noise Equivalent Power: 2.2 μ W
- Large Optically Active Area
- Single 3.3V Power Supply
- 2.125Gb/s Data Rate

Applications

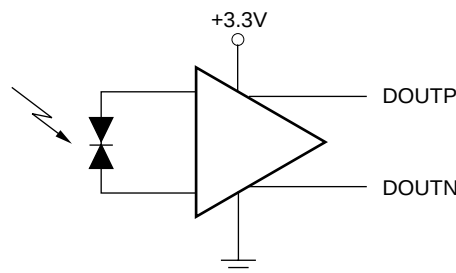
- 70 μ m Optically Active Area
- Packages: TO-46, TO-56, Bare Die
- Gigabit Ethernet Optical Receivers
- Fibre Channel Optical Receivers
- ATM Optical Receivers

General Description

The VSC7807 integrated Photodetector/Transimpedance Amplifier provides a highly integrated solution for converting 850nm light from a fiber optic communications channel into a differential output voltage. The benefits of Vitesse Semiconductor's Gallium Arsenide H-GaAs process are fully utilized to provide very high bandwidth and low noise in a product with a large optically active area for easy alignment. The sensitivity, duty cycle distortion and jitter meet or exceed all Fibre Channel and Gigabit Ethernet application requirements. The VSC7807 is available in either die form, flat-windowed packages or ball-lens packages.

By using a Metal-Semiconductor-Metal (MSM) photodetector with a monolithic integrated transimpedance amplifier, the input capacitance is lowered which allows for a larger optically active area than in discrete photodetectors. Integration also allows superior tracking over process, temperature and voltage between the photodetector and the amplifier, resulting in higher performance. The VSC7807 can easily be used in developing Fibre Channel Electro-Optic Receivers which exhibit very high performance and ease of use.

VSC7807 Block Diagram



Both DOUTP and DOUTN are back-terminated to 25 Ω .

Table 1: Electro-Optical Specifications⁽¹⁾

Symbol	Parameters	Min	Typ ⁽²⁾	Max	Units	Conditions
V _{SS}	Supply Voltage	3.0	3.3	3.6	V	
I _{DD}	Supply Current			40	mA	
PSRR	Power Supply Rejection Ratio		-10		dB	Frequencies up to 40MHz. Use external filter to get PSRR of -35dB ⁽³⁾ .
λ	Wavelength	700	840	850	nm	
F _c	Low Frequency Cutoff		1.0	2.5	MHz	-3dB, P ⁽⁴⁾ = -15dBm
BW	Optical Modulation Bandwidth		1300		MHz	-3dB, P = -15dBm
S	Sensitivity		20		dBm	2.125Gb/s, BER10 ⁻¹² ⁽⁵⁾
R _o	Single-Ended Output Impedance		25		Ω	
V _D	Differential Output Voltage	0.2			V	P = -6 dBm, R _L = 100 Ω differential
R _D	Differential Responsivity	3.2	4.0		mV/ μ W	R _L = 100 Ω At 50MHz
Z _T	Differential Transimpedance		7.0		k Ω	
V _{DC}	Output Bias Voltage	1.0			V	
ΔV_{DC}	Bias Offset Voltage			200	mV	
NEP _O	Input Noise Equivalent Power		0.8	1.1	μ W rms	P = 0mW
V _{NO}	Output Noise Voltage			1.40	mV rms	P = 0mW, single-ended
DCD	Duty Cycle Distortion			4.5	%	P = -5dBm
I _{OUT}	Output Drive Current	2.0	2.6		mA	P = -5dBm
PDJ	Pattern Dependent Jitter			40	ps	P = -5dBm +/-10% Voltage Window
	Optically Active Area		70		μ m	Diameter
PPJ	Peak-to-Peak Jitter		100	200	ps	P = -5dBm
T _R	Rise Time			200	ps	20% to 80% P = -5dBm
T _F	Fall Time			200	ps	20% to 80% P = -5dBm

NOTES: (1) Specified over 10°C to 90°C junction. (2) Typical conditions 25°C and 3.3V power supply. (3) See Note 1 in Application Note 48. (4) P = Incident Optical Power. (5) See Note 2 In Application Note 48.

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Absolute Maximum Ratings⁽¹⁾

Power Supply Voltage (V_{SS})	6V
Storage Humidity s(relative humidity, including condensation)	5% to 95%
Operating Humidity (relative humidity, excluding condensation)	8% to 80%
Impact Shock (IS) ⁽²⁾	500G
Incident Optical Power	+3dBm
Storage Temperature Range (case temperature under bias)	-55°C to +125°C

NOTES: (1) CAUTION: Stresses listed under "Absolute Maximum Ratings" may be applied to devices one at a time without causing permanent damage. Functionality at or above the values listed is not implied. Exposure to these values for extended periods may affect device reliability. (2) Half sine wave, pulse duration $1 \pm 0.5\text{ms}$, 3 blows in each direction.

Recommended Operating Conditions

Positive Voltage Rail (V_{SS})	3.0V to 3.6V
Optical Power	0dBm
Operating Temperature Range (T_A)	0°C Ambient to +85°C Case

ESD Ratings

Proper ESD procedures should be used when handling this product. The VSC7807 is rated to <TBD> based on the Human Body Model.

Figure 1: Pin Diagram (TO-46 and TO-56 packages)

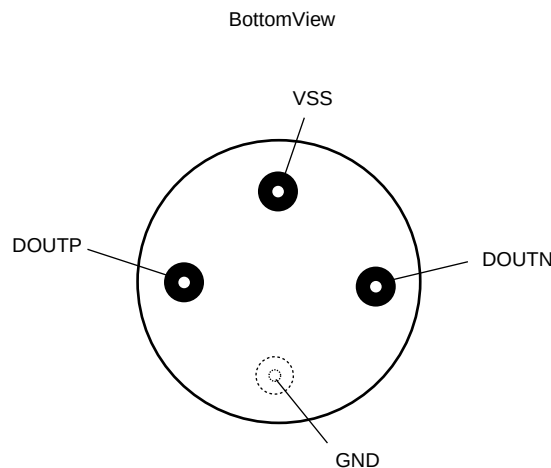


Table 2: Pin Table Specifications for Ball Lens Packages, Flat Window Packages and Bare Die

Symbol	Description
DOUTP	Data output normal (with reference to incident light)
DOUTN	Data output complement (inverting) (with reference to incident light)
VSS	Power supply
GND	Ground (package case)

Figure 2: Pad Assignments

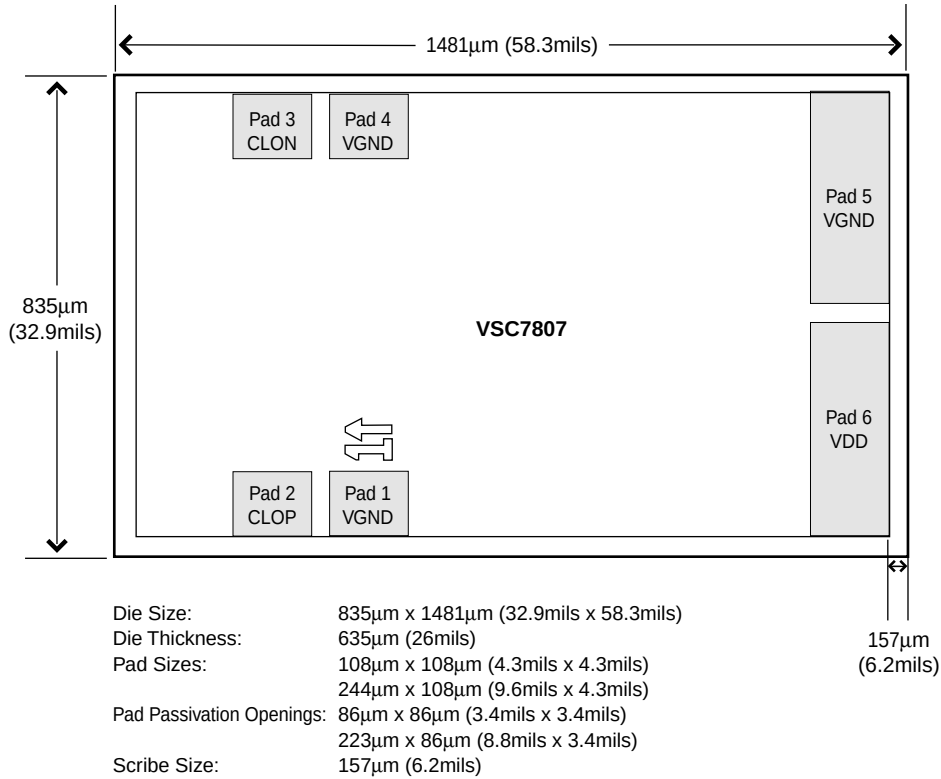


Table 3: Pad Coordinates

Signal Name	Pad Number	Coordinates (µm)		Description
		X	Y	
VGND	1	55	943.6	Ground
CLOP	2	55	1093.6	Data output, true (with reference to incident light)
CLON	3	780	1093.6	Data output, complement (with reference to incident light)
VGND	4	780	943.6	Ground
VGND	5	596.7	61.4	Ground
VDD	6	244.2	61.4	Power Supply

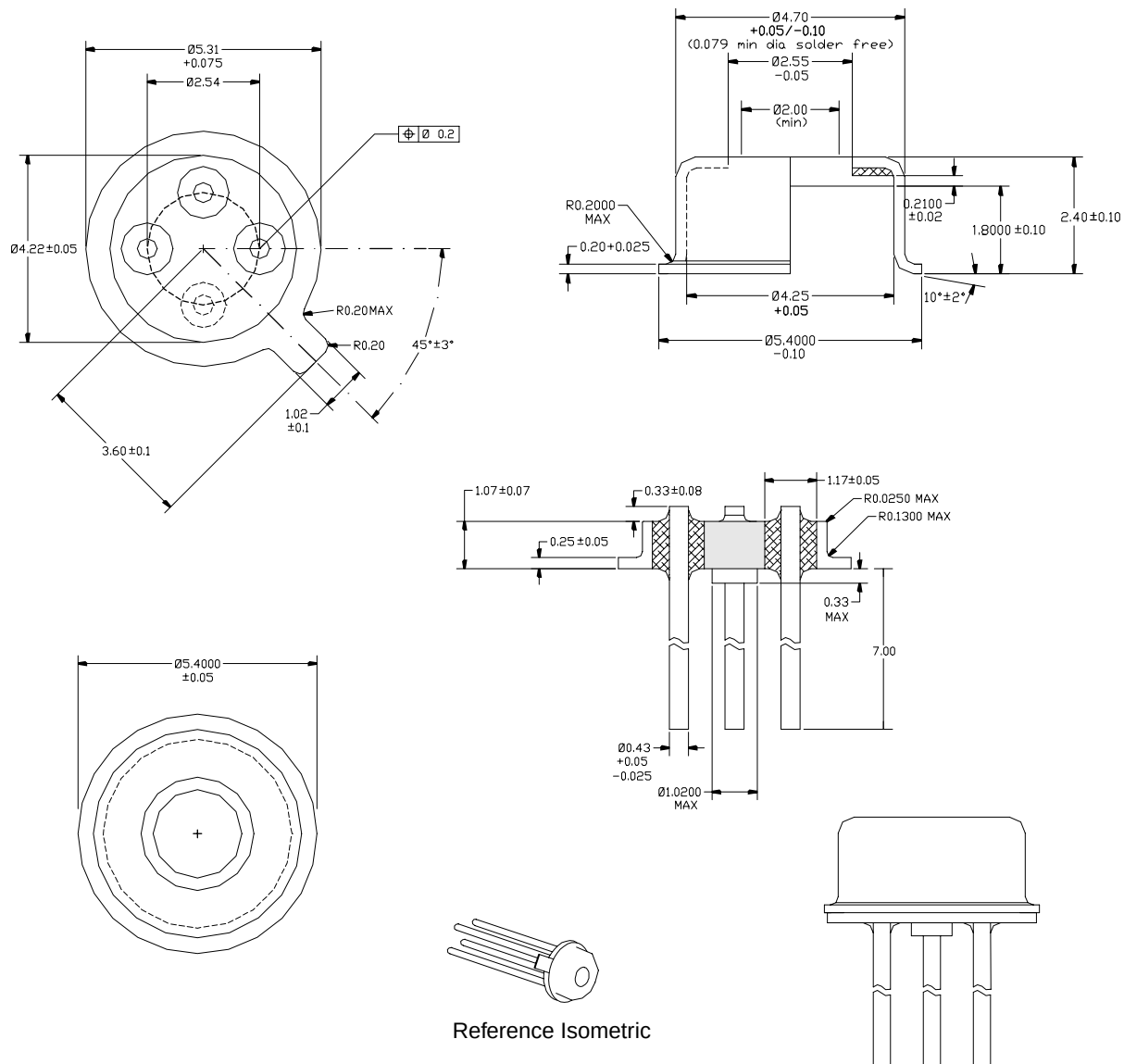
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Package Information

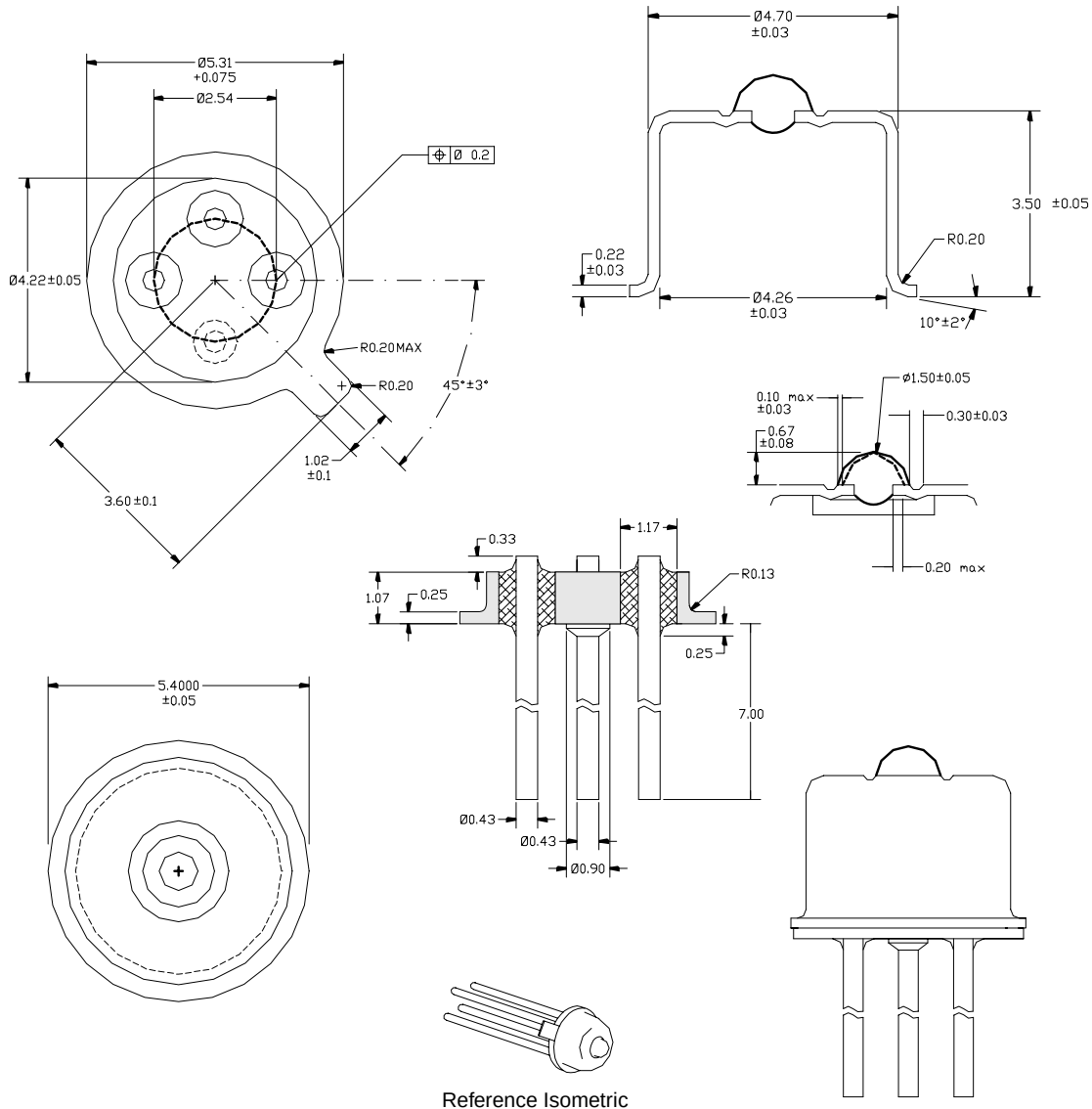
TO-46 Flat Window Package



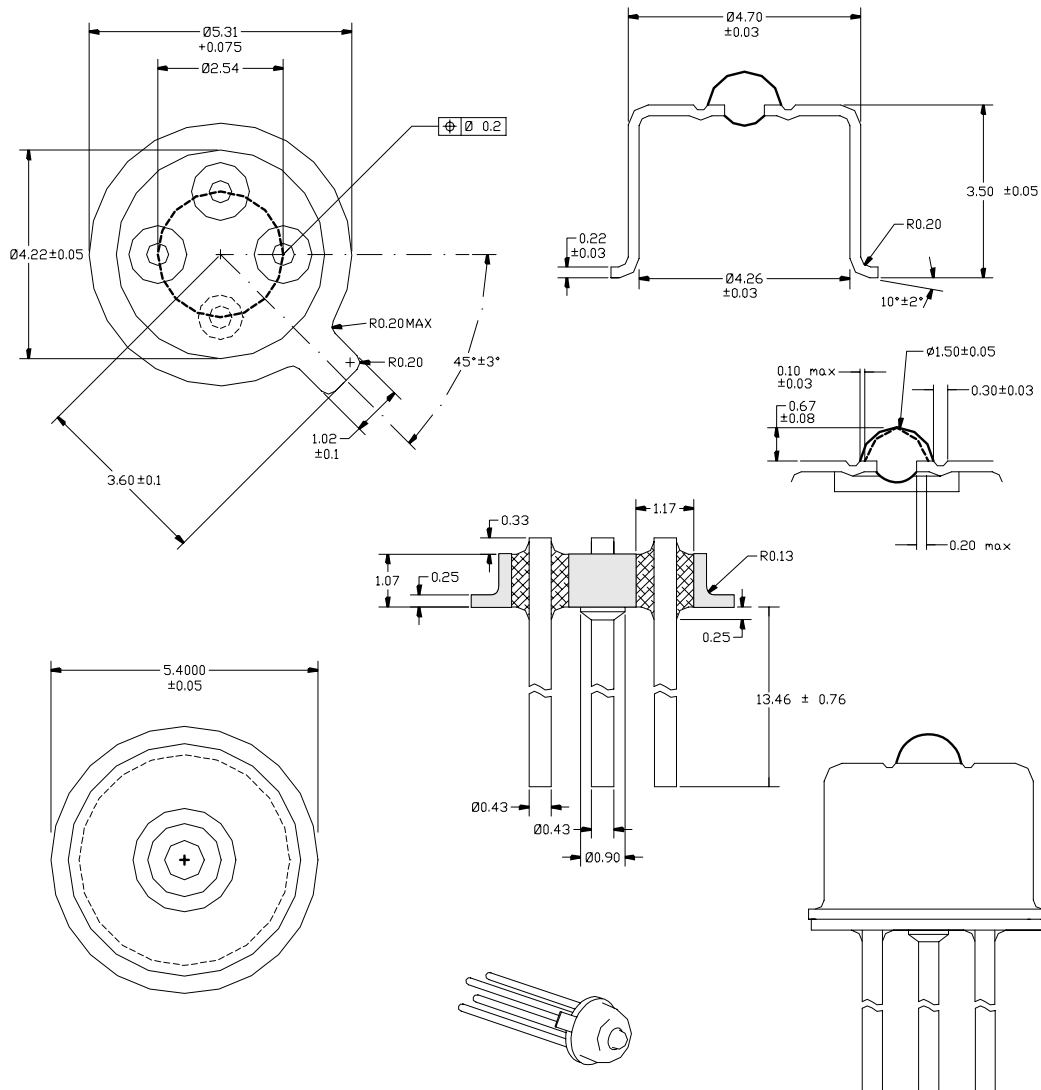
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TO-46 Ball Lens Package—7mm Lead Length



TO-46 Ball Lens Package—13mm Lead Length



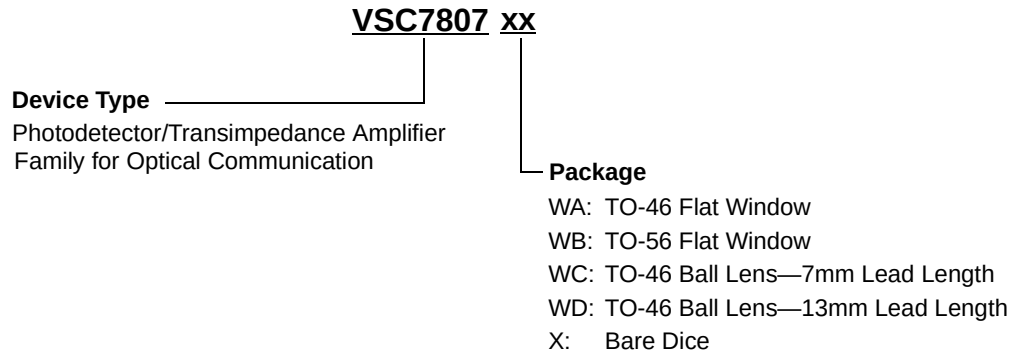
Reference Isometric

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Ordering Information

The order number for this product is formed by a combination of the device type and package type.



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