

Preliminary Datasheet VSC7802/7805

Photodetector/Transimpedance Amplifier Family for Optical Communication

Features

- Integrated Photodetector/Transimpedance Amplifier Family Optimized for High Speed Optical Communications Applications
- Integrated AGC
- Fibre Channel Compatible Speed: [1/4 & 1/2 Speed]
- High Bandwidth
- Low Input Noise Equivalent Power
- Large Optically Active Area
- Single 5V Power Supply

Part Number	Fibre Channel Speed	Bandwidth (MHz)	Input Noise (μW rms)	Optically Active Area (μm diameter)
VSC7802	1/4 Speed: 266 Mb/s	300	0.75	500
VSC7805	1/2 Speed: 531 Mb/s	650	1.0	100

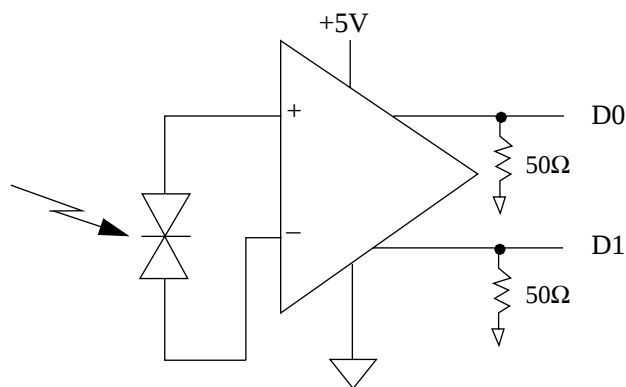
General Description

The VSC7802/VSC7805 series of integrated Photodetector/Transimpedance Amplifiers provide a highly integrated solution for converting light from a fiber optic communications channel into a differential output voltage. The benefits of Vitesse Semiconductor's Gallium Arsenide H-GaAs-III 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 application requirements. Parts are available in either die form or in flat-windowed packages.

By using an integrated MSM (Metal-Semiconductor-Metal) photodetector with an 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. These parts can easily be used in developing Fibre Channel Electro-Optic Receivers which exhibit very high performance and ease of use.

VSC7802/7805 Block Diagram

Photodetector/Transimpedance Amplifier



Both D0 and D1 have an internal 50Ω termination resistor to GND

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Table 1: Electro-Optical Specifications

Symbol	Parameter	Part #	Min.	Typ.	Max.	Units	Conditions
V _{cc}	Supply Voltage		4.5	5.0	5.5	V	
I _{cc}	Supply Current		13	30	40	mA	
PSRR	Power Supply Rejection Ratio		35	----	----	db	f = 1 to 40 MHz (Includes External Filter)
λ	Wavelength		770	840	850	nm	
F _c	Low Frequency Cutoff		----	----	1.8	MHz	-3db, P = -17 dBm @ 50 MHz
BW	Optical Modulation Bandwidth	7802	150	----	300	MHz	-3db, P = -17 dBm @ 50 MHz
		7805	350		650		
D _r	Dynamic Range	7802	24.2	----	----	dB	
		7805	22.9				
S	Sensitivity	7802	-22.8	----	----	dBm	266 Mb/s
		7805	-21.5				531 Mb/s
R _o	Single Ended Output Impedance		25	----	60	Ω	
V _d	Differential Output Voltage		0.25	----	0.8	V	P = 1.4 dBm, R = 100 Ω differential
R _d	Differential Responsivity		1.2	----	----	mV/μV	R _{load} = 100 Ω P = -17 dBm @ 50 MHz
V _{dc}	Output Bias Voltage		1.0	----	2.5	V	
ΔV _{dc}	Bias Offset Voltage		----	----	150	mV	
NEP _o	Input Noise Equivalent Power	7802	----	----	0.75	μW rms	BW = 1 GHz P = 0 mW
		7805			1.0		
V _{no}	Output Noise Voltage	7802	----	----	0.6	mV rms	BW = 1 GHz P = 0 mW
		7805			1.2		
DCD	Duty Cycle Distortion		----	----	8	%	P = 1.4 dBm
T _r , T _f	Output Rise & Fall Time	7802	1300	----	----	psec.	20 - 80% P = 1.4 dBm
		7805	600				
I _{out}	Output Drive Current		2.5	----	8	mA	Normal Test Conditions 50Ω
PDJ	Pattern Dependent Jitter	7802	----	----	170	psec.	P = -5 dBm ± -10% Voltage Window
		7805			100		
----	Optically Active Area	7802	----	500	----	μm	Diameter
		7805		100			

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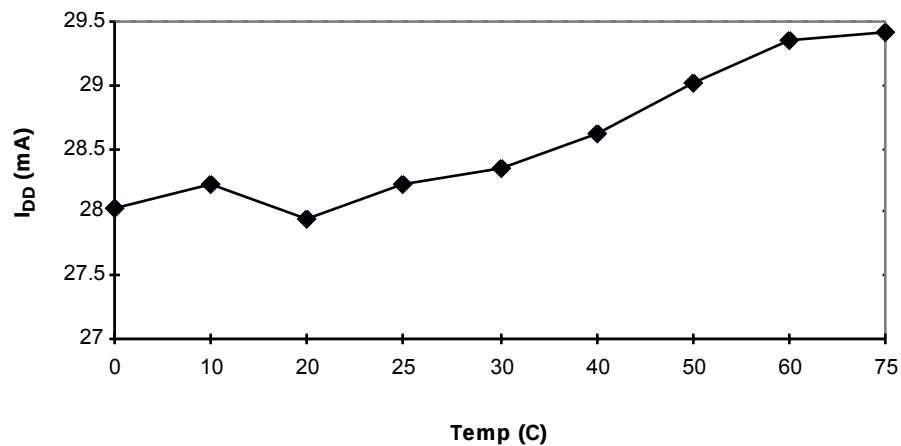
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Table 2: Absolute Maximum Ratings

Symbol	Parameter	Limits
V_{cc}	Power Supply	6V
$T_{stg}^{(1)}$	Storage Temperature	-40°C to +85°C
$H_{stg}^{(1)}$	Storage Humidity	5 to 95 %R.H. (Including Condensation)
$T_{op}^{(1)}$	Operating Temperature	0° to 70°C
$H_{op}^{(1)}$	Operating Humidity	8 to 80%R.H. (Excluding Condensation)
P_{inc}	Incident Optical Power	+3 dBm
$S^{(1)}$	Impact Shock	500 G. Half Sine Wave Pulse Duration 1 +/-0.5 ms 3 Blows in each direction
$V_{ib}^{(1)}$	Vibration	20 > 2000 > 20 Hz, 10 Minutes 10 G. Peak Acceleration 4 Complete Cycles, 3 Perpendicular Axes

(1) These specifications are for the 5.6mm package only.

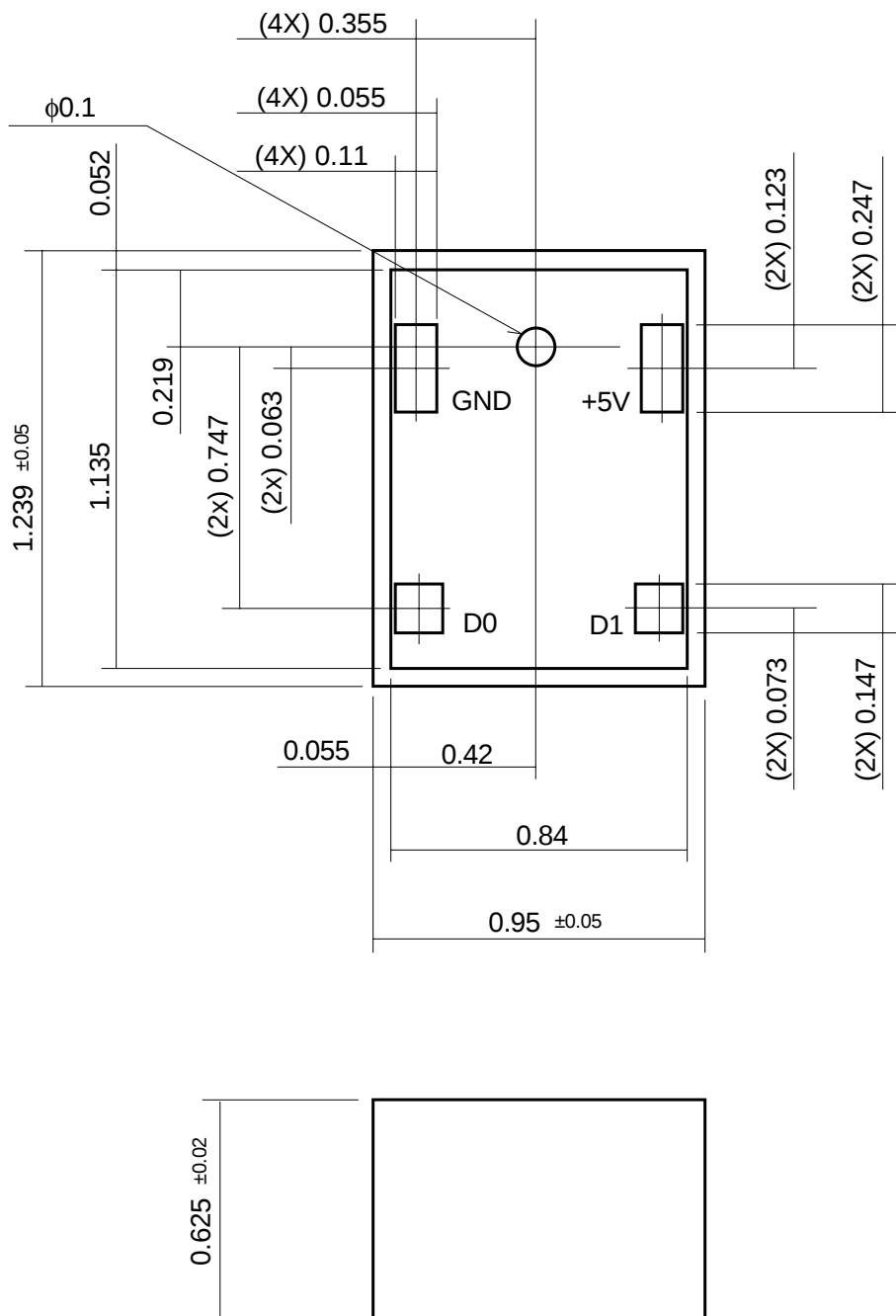
Figure 1: DIE I_{DD} vs Temperature



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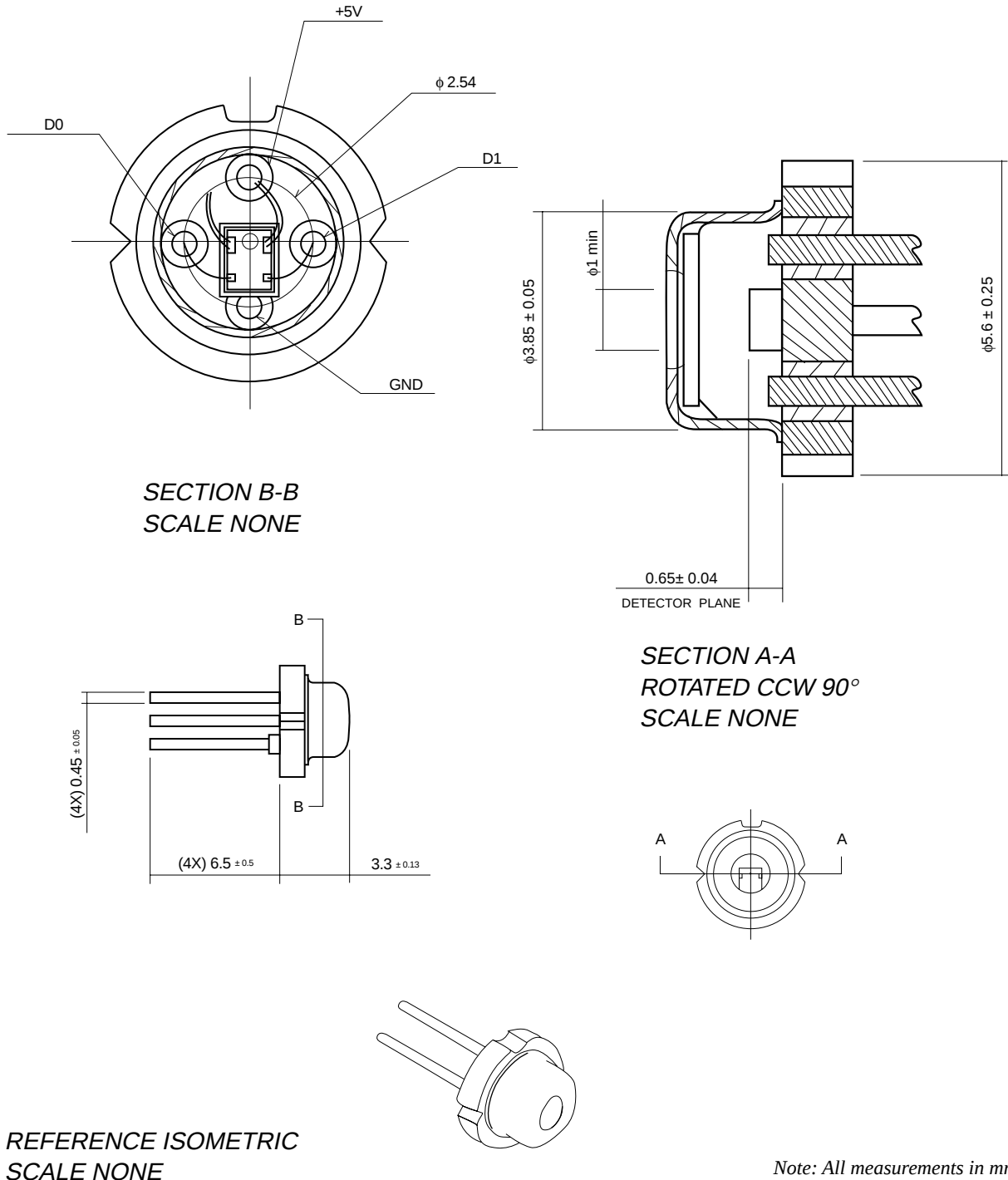
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Figure 3: Mechanical Specifications (Individual Die)



VSC7805 DIE

Figure 4: Mechanical Package Specifications (5.6 mm Package)



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Ordering Information

Part Numbering Scheme:

VSC78XXYY

Where:

XX = Speed Grade

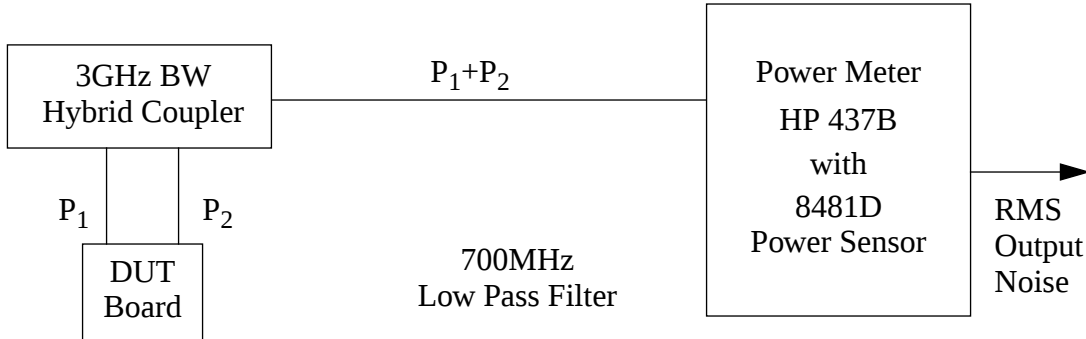
02	266 Mb/sec
05	531 Mb/sec

YY = Package Style

X	Individual Die
WB	5.6 mm Package

Notes on Measurement Conditions & Applications

Note 1: Noise Measurement Method



$$V_n = \sqrt{P_n \bullet 50}$$

The noise voltage, V_n , at the output is referred back to the noise power at the input through the responsivity R (with R in volts/watts)

$$NEP = \frac{V_n}{R}$$

The bit error rate can be expressed as

Where:

$$BER = \frac{\exp(-Q^2/2)}{\sqrt{2\pi}Q} .$$

For a $BER = 1 \times 10^{-12}$ the parameter $Q = 7$.

The sensitivity(s) at a bit error rate of 1×10^{-12} is calculated as follows:

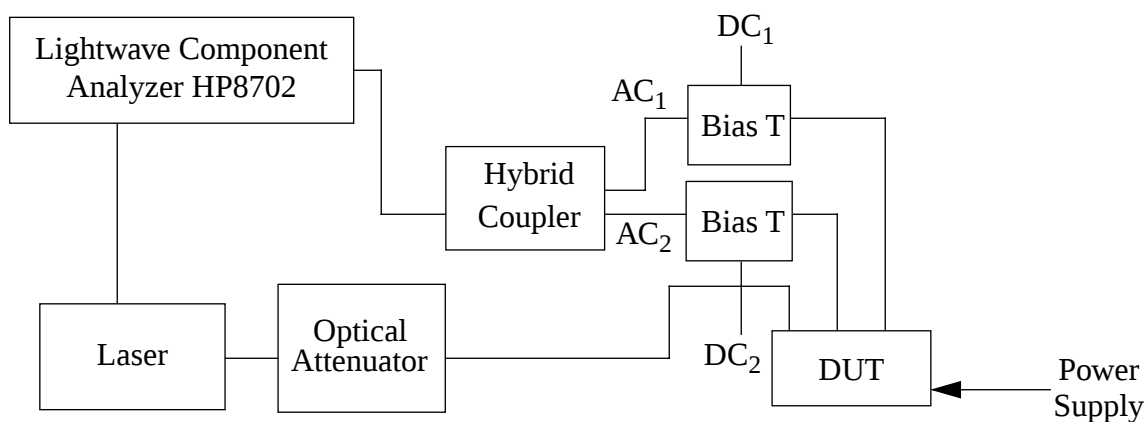
$$S = 10 \log_{10} \left(Q \frac{NEP}{1mW} \right) ,$$

where the NEP is in units of milliwatts and S is in dBm, respectively.

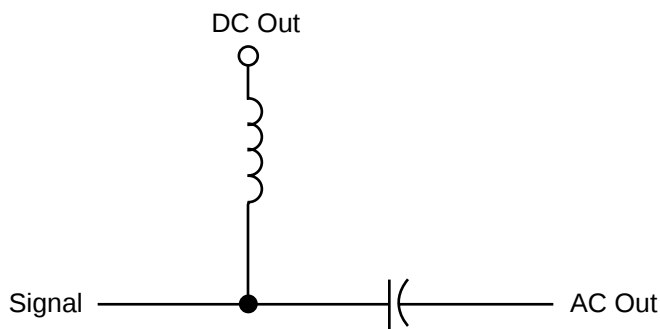
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Note 2: Measurement Setup for Frequency Response



Note 3: Bias T Schematic



Notice

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Warning

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