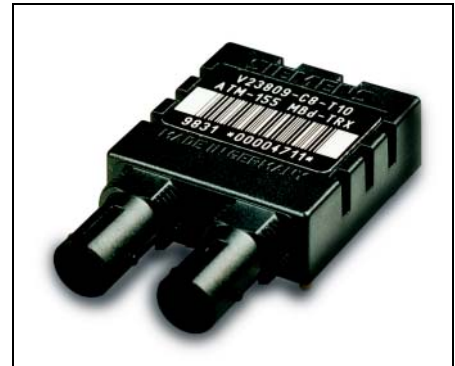


**Multimode 1300 nm LED Fast Ethernet/FDDI/ATM
170 MBd 1x9 Transceiver with ST® Connector**

V23809-C8-T10

Features

- Compliant with Fast Ethernet, FDDI, Fibre Channel, ATM/SONET/SDH standards
- Meets mezzanine standard height of 9.8 mm
- Compact integrated transceiver unit with duplex SC receptacle
- Single power supply with 3.0 V to 5.5 V range
- Extremely low power consumption < 0.7 W at 3.3 V
- PECL differential inputs and outputs
- System optimized for 62.5/50 µm graded index fiber
- Industry standard multisource footprint
- Testboard available
- UL-94 V-0 certified
- ESD Class 2 per MIL-STD 883 Method 3015
- Compliant with FCC (Class B) and EN 55022
- For distances of up to 2 km on multimode fiber

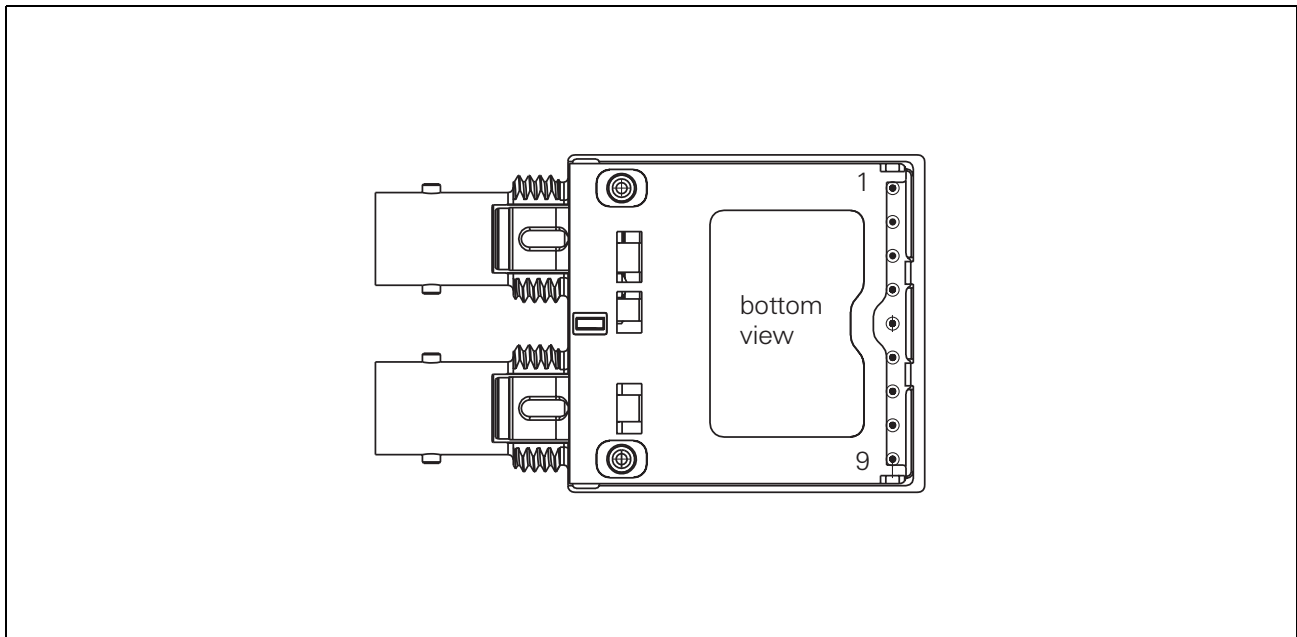


Applications

- ATM switches/bridges/routers
- Fast Ethernet, FDDI
- High speed computer links
- Local area networks
- Switching systems

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Part Number	Optical Power	Comments
V23809-C8-T10	11 dB	
V23809-C8-T11	8 dB	Available on request

Pin Configuration

Figure 1
Pin Description

Pin No.	Symbol	Level/Logic	Function	Description
1	RxV _{EE}	Power Supply	Rx Ground	Negative power supply, normally ground
2	RD	PECL Output	Rx Output Data	Receiver output data
3	RDn			Inverted receiver output data
4	RxSD	PECL Output active high	Rx Signal Detect	High level on this output shows there is an optical signal.
5	RxV _{CC}	Power Supply	Rx +3.3 V ... 5 V	Positive power supply, +3.3 V ... 5 V
6	TxV _{CC}		Tx +3.3 V ... 5 V	
7	TxDn	PECL Input	Tx Input Data	Inverted transmitter input data
8	TxD			Transmitter input data
9	TxV _{EE}	Power Supply	Tx Ground	Negative power supply, normally ground
S1/S2	Case	Not Connected	Support	Support stud, not connected

Description

This data sheet describes the Infineon Fast Ethernet/FDDI/ATM transceiver-part of Infineon Multistandard Transceiver Family. It is fully compliant with the Asynchronous Transfer Mode (ATM) OC-3 standard, the Fiber Distributed Data Interface (FDDI) Low Cost Fiber Physical Layer Medium Dependent (LCF-PMD) draft standard¹⁾, and the FDDI PMD standard²⁾.

ATM was developed because of the need for multimedia applications, including real time transmission. The data rate is scalable and the ATM protocol is the basis of the broadband public networks being standardized in the International Telegraph and Telephone Consultative Committee (CCITT). ATM can also be used in local private applications.

FDDI is a Dual Token Ring standard developed in the U.S. by the Accredited National Standards Committee (ANSC) X3T9, within the Technical Committee X3T9.5. It is applied to the local area networks of stations, transferring data at 100 Mbits/s with a 125 MBaud transmission rate. LCF FDDI is specially developed for short distance applications of up to 500 m (fiber-to-the-desk) as compared to 2 km for backbone applications.

Fast Ethernet was developed because of the higher bandwidth requirement in local area networking. It is based on the proven effectiveness of millions of installed Ethernet systems.

The Infineon multimode transceiver is a single unit comprised of a transmitter, a receiver, and an ST receptacle. This design frees the customer from many alignment and PC board layout concerns. The modules are designed for low cost applications.

The inputs/outputs are PECL compatible and the unit operates from a 3.0 V to 5.5 V power supply. As an option, the data output stages can be switched to static levels during absence of light, as indicated by the Signal Detect function. It can be directly interfaced with available chipsets.

¹⁾ FDDI Token Ring, Low Cost Fiber Physical Layer Medium Dependent (LCF-PMD) ANSI X3T9.5 / 92 LCF-PMD / Proposed Rev. 1.3, September 1, 1992. American National Standard.

²⁾ FDDI Token Ring, Physical Layer Medium Dependent (PMD) ANSI X3.166-1990 American National Standard. ISO/IEC 9314-3: 1990.

Description

Regulatory Compliance

Feature	Standard	Comments
Electromagnetic Interference (EMI)	FCC Class B EN 55022 Class B CISPR 22	Noise frequency range: 30 MHz to 1 GHz
Immunity: Electrostatic Discharge	EN 61000-4-2 IEC 1000-4-2	Discharges of ± 15 kV with an air discharge probe on the receptacle cause no damage.
Immunity: Radio Frequency Electromagnetic Field	EN 61000-4-3 IEC 1000-4-3	With a field strength of 10 V/m rms, noise frequency ranges from 10 MHz to 1 GHz
Eye Safety	IEC 825-1	Class 1

Technical Data
Absolute Maximum Ratings

Parameter	Symbol	Limit Values		Unit
		min.	max.	
Supply Voltage	$V_{CC} - V_{EE}$	-0.5	7	V
Data Input Levels (PECL)	V_{IN}		$V_{EE} - V_{CC}$	
Differential Data Input Voltage			3	
Operating Ambient Temperature	T_{AMB}	0	85	°C
Storage Ambient Temperature		-40	85	
Soldering Conditions, Temp/Time (MIL-STD 883C, Method 2003)	$T_{SOLD}/$ t_{SOLD}		270/10	°C/s
ESD Resistance (all pins to V_{EE} , human body)			1.5	kV
Output Current	I_O		50	mA

Exceeding any one of these values may destroy the device immediately.

Recommended Operating Conditions

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Ambient Temperature	T_{AMB}	0		70	°C
Power Supply Voltage	$V_{CC} - V_{EE}$	3		5.5	V
Supply Current 3.3 V	I_{CC}			230	mA
Supply Current 5 V ¹⁾				260	

Transmitter

Data Input High Voltage	$V_{IH} - V_{CC}$	-1165		-880	mV
Data Input Low Voltage	$V_{IL} - V_{CC}$	-1810		-1475	
Threshold Voltage	$V_{BB} - V_{CC}$	-1380		-1260	
Input Data Rise/Fall, 20% - 80%	t_R, t_F	0.4		1.3	ns
Data High Time ²⁾	t_{on}			1000	

Receiver

Output Current	I_O			25	mA
Input Duty Cycle Distortion	t_{DCD}			1	ns
Input Data Dependent Jitter	t_{DDJ}			1	
Input Random Jitter	t_{RJ}			0.76	
Input Center Wavelength	I_C	1260		1380	nm
Electrical Output Load ³⁾	R_L		50		Ω

¹⁾ For $V_{CC} - V_{EE}$ (min., max.). 50% duty cycle. The supply current ($I_{CC2} + I_{CC3}$) does not include the load drive current (I_{CC1}). Add max. 45 mA for the three outputs. Load is 50 Ω into $V_{CC} - 2$ V.

²⁾ To maintain good LED reliability, the device should not be held in the ON state for more than the specified time. Normal operation should be done with 50% duty cycle.

³⁾ To achieve proper PECL output levels the 50 Ω termination should be done to $V_{CC} - 2$ V. For correct termination see the application notes.

The electro-optical characteristics described in the following tables are valid only for use under the recommended operating conditions.

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Data Rate	DR			170	MBd
Launched Power (Average) into 62.5 μm Fiber for -C8-C10 ^{1), 2)}	P_O	-20	-16	-14	dBm
Launched Power (Average) into 62.5 μm Fiber for -C8-C11 ^{1), 2)}		-22	-17	-14	
Center Wavelength ^{2), 3)}	λ_C	1270		1360	nm
Spectral Width (FWHM) ^{2), 4)}	D_I			170	
Output Rise/Fall Time, 10% - 90% ^{2), 5)}	t_R, t_F	0.6		2.5	ns
Temperature Coefficient of Optical Output Power	TC_P			0.03	dB/°C
Extinction Ratio (Dynamic) ^{2), 6)}	ER			10	%
Optical Power Low ⁷⁾	P_{TD}			-45	dBm
Overshoot	OS			10	%
Duty Cycle Distortion ^{8), 9)}	t_{DCD}			0.6	ns
Data Dependent Jitter ^{8), 10)}	t_{DDJ}			0.3	
Random Jitter ^{8), 11)}	t_{RJ}			0.6	

¹⁾ Measured at the end of 5 meters of 62.5/125/0.275 graded index fiber using calibrated power meter and a precision test ferrule. Cladding modes are removed. Values valid for EOL and worst-case temperature.

²⁾ The input data pattern is a 12.5 MHz square wave pattern.

³⁾ Center wavelength is defined as the midpoint between the two 50% levels of the optical spectrum of the LED.

⁴⁾ Spectral width (full width, half max) is defined as the difference between 50% levels of the optical spectrum of the LED.

⁵⁾ 10% to 90% levels. Measured using the 12.5 MHz square wave pattern with an optoelectronic measurement system (detector and oscilloscope) having 3 dB bandwidth ranging from less than 0.1 MHz to more than 750 MHz.

⁶⁾ Extinction Ratio is defined as PL/PH x 100%. Measurement system as in [Note 5](#).

⁷⁾ Optical Power Low is the output power level when a steady state low data pattern (FDDI Quiet Line state) is used to drive the transmitter. Value valid < 1 ms after input low.

⁸⁾ Test method as for FDDI-PMD. Jitter values are peak-to-peak.

⁹⁾ Duty Cycle Distortion is defined as 0.5 [(width of wider state) minus (width of narrower state)]. It is measured with stream of Idle Symbols (62.5 MHz square wave).

¹⁰⁾ Measured with the same pattern as for FDDI-PMD.

¹¹⁾ Measured with the Halt Line state (12.5 MHz square wave).

Receiver Electro-Optical Characteristics

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Data Rate	DR	5 ¹⁾		170	MBd
Sensitivity Average Power ²⁾	P_{IN}		-33	-31	dBm
Sensitivity (Average Power) Center ³⁾			-35.5		
Saturation (Average Power) ³⁾	P_{SAT}	-14	-11		
Duty Cycle Distortion ^{4), 5)}	t_{DCD}			1	ns
Deterministic Jitter ^{5), 6)}	t_{DJ}			1	
Random Jitter ^{5), 7)}	t_{RJ}			1	
Signal Detect Assert Level ⁸⁾	P_{SDA}	-42.5		-30	dBm
Signal Detect Deassert Level ⁹⁾	P_{SDD}	-45		-31.5	
Signal Detect Hysteresis	$P_{SDA} - P_{SDD}$	1			dB
Output Low Voltage ¹⁰⁾	$V_{OL} - V_{CC}$	-1810		-1620	mV
Output High Voltage ¹⁰⁾	$V_{OH} - V_{CC}$	-1025		-880	
Output Data Rise/Fall Time, 20% - 80%	t_R, t_F			1.3	ns
Output SD Rise/Fall Time, 20% - 80%				40	

¹⁾ Pattern: Manchester coding / NRZI (no scrambling)

²⁾ For a bit error rate (BER) of less than 1×10^{-12} over a receiver eye opening of least 1.5 ns. Measured with a $2^{23} - 1$ PRBS at 155 MBd.

³⁾ For a BER of less than 1×10^{-12} . Measured in the center of the eye opening with a $2^{23} - 1$ PRBS at 155 MBd.

⁴⁾ Measured at an average optical power level of -20 dBm with a 62.5 MHz square wave.

⁵⁾ All jitter values are peak-to-peak. Rx output jitter requirements are not considered in the ATM standard draft. In general the same requirements as for FDDI are met.

⁶⁾ Measured at an average optical power level of -20 dBm.

⁷⁾ Measured at -33 dBm average power.

⁸⁾ An increase in optical power through the specified level will cause the SIGNAL detect output to switch from a Low state to a High state.

⁹⁾ A decrease in optical power through the specified level will cause the SIGNAL detect output to switch from a High state to a Low state.

¹⁰⁾ PECL compatible. Load is 50Ω into $V_{CC} - 2 V$. Measured under DC conditions. For dynamic measurements a tolerance of 50 mV should be added for $V_{CC} = 5 V$.

Application Notes

Multimode 1300 nm 1x9 Transceiver

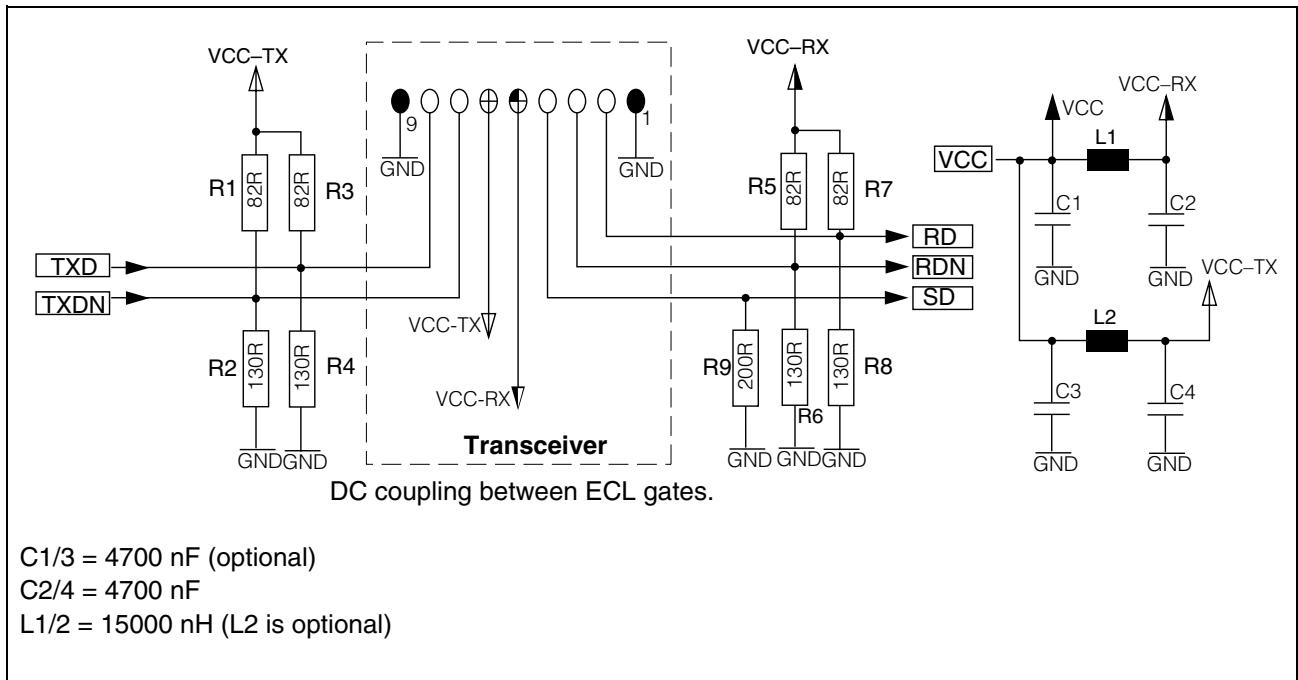


Figure 2

R [Ω] ¹⁾	5 V	4 V	3.3 V
R1/3	82	100	127
R2/4	130	100	83
R5/7	82	100	127
R6/8	130	100	83

¹⁾ R9 = 200 Ω

The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module V_{CC-Rx}/V_{CC-Tx} .

A GND plane under the module is recommended for good EMI and sensitivity performance.

Multimode 1300 nm LED Transceiver

Solutions for connecting a Infineon 3.3 V Fiber Optic Transceiver to a 5.0 V Framer-/Phy-Device.

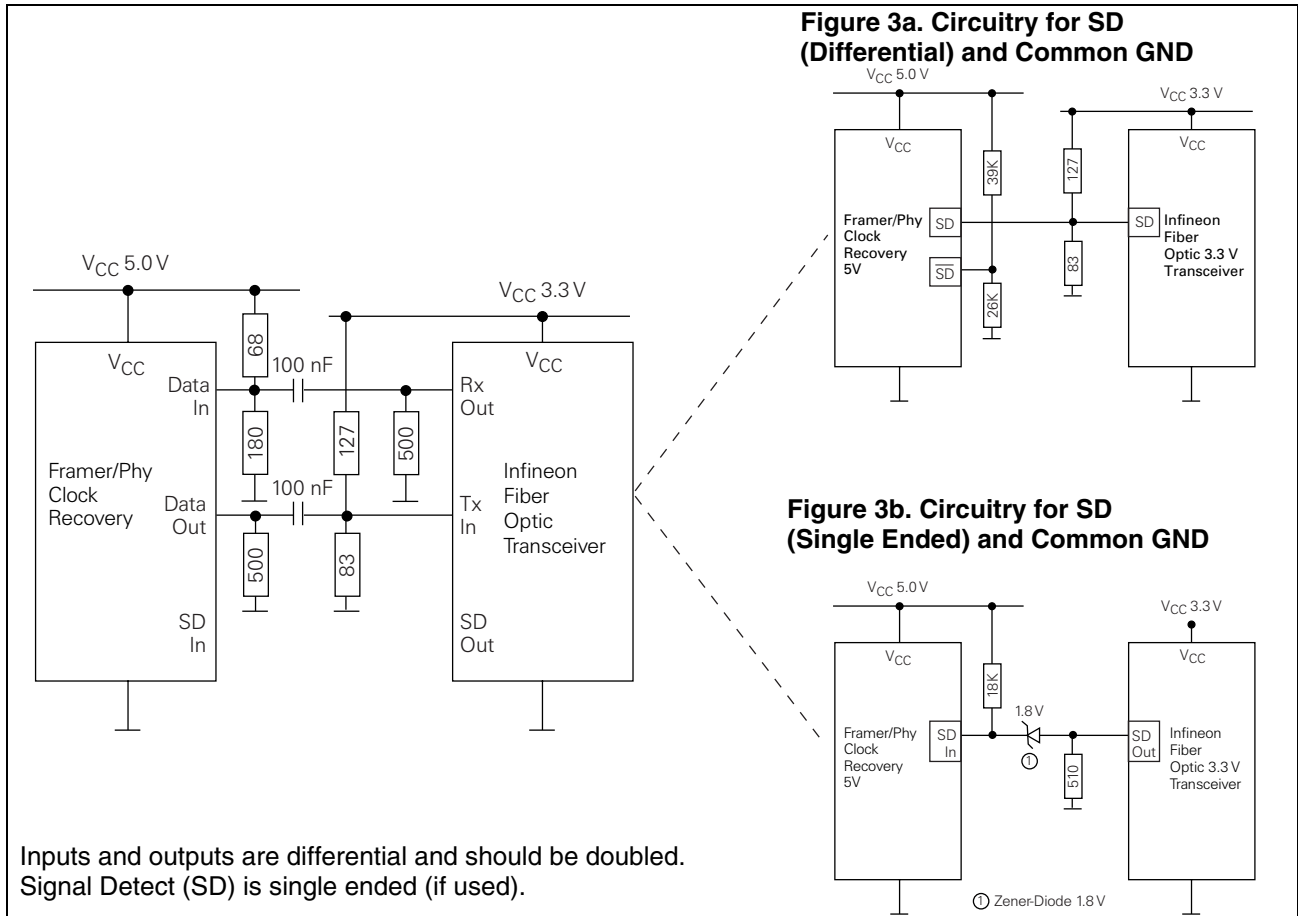


Figure 3 Common GND

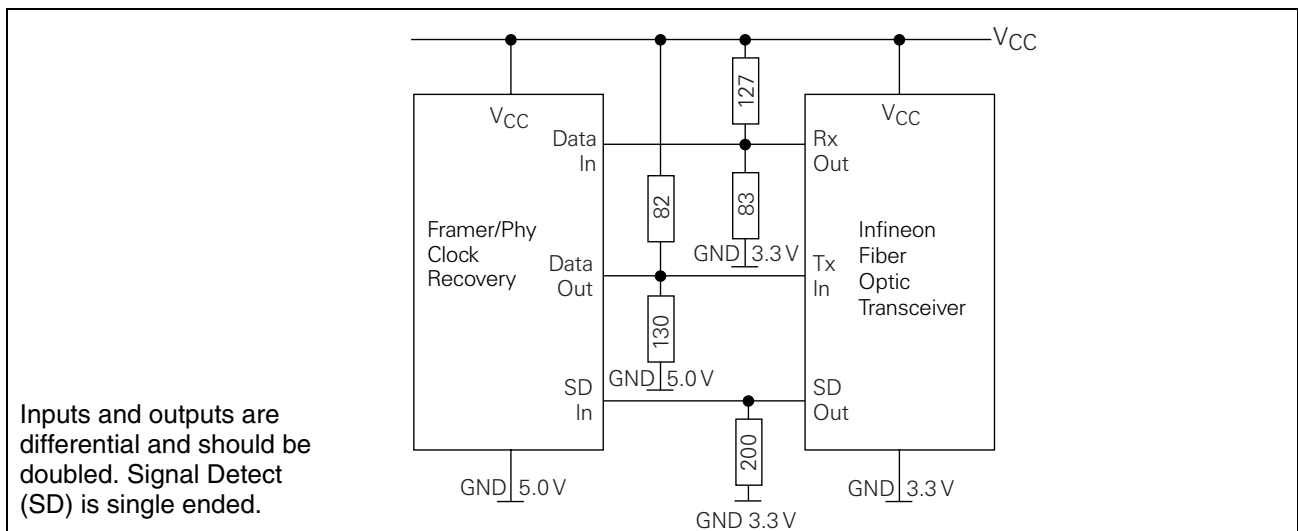


Figure 4 Common V_{CC}

Package Outlines

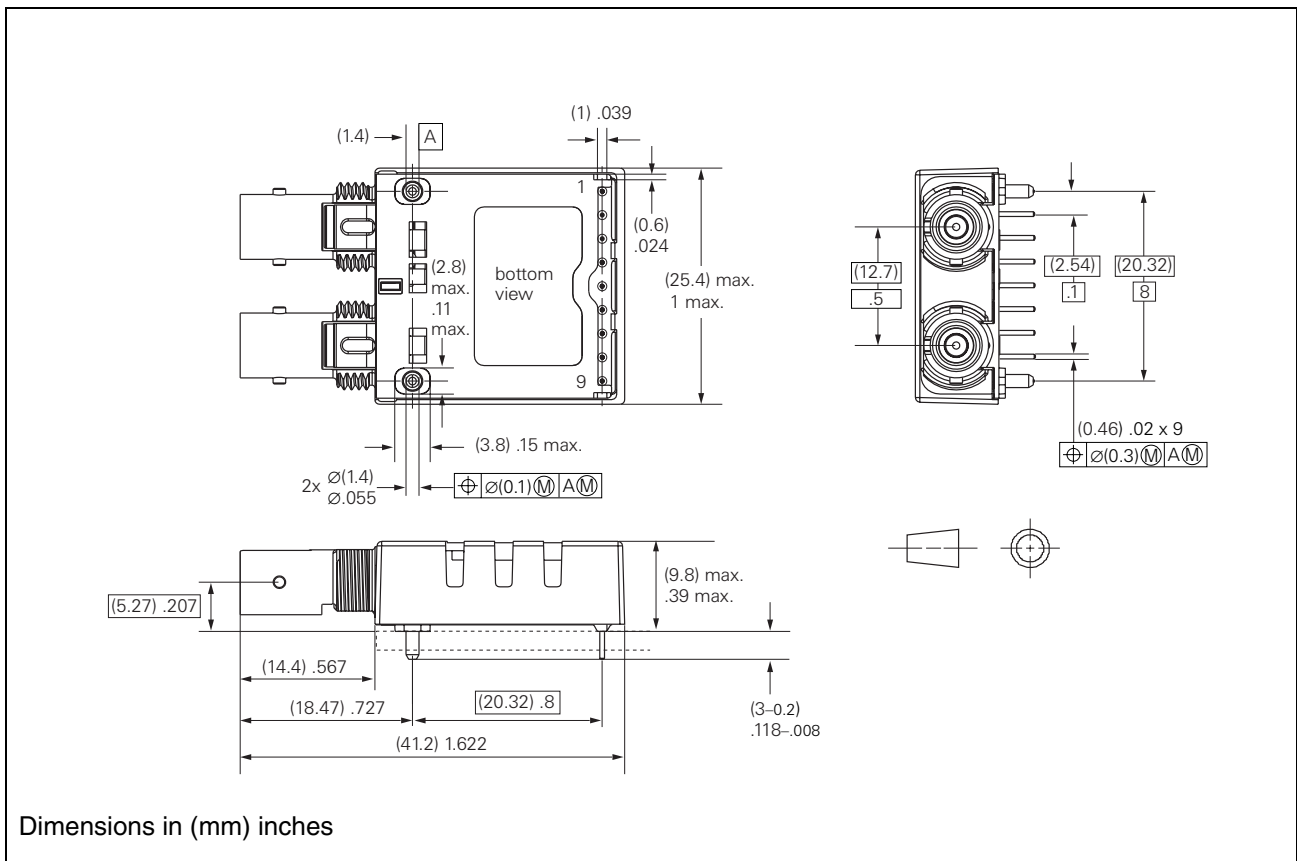


Figure 5

Previous Version:

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