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April 2016

FODM100x Series
Single Channel, DC Sensing Input, Phototransistor Optocoupler In Stretched Body SOP 4-Pin

Features

- ≥ 8 mm Creepage and Clearance Distance, and ≥ 0.4 mm Insulation Distance to Achieve Reliable and High Voltage Insulation
- Safety and Regulatory Approvals
- UL1577, 5,000 VAC_{RMS} for 1 min.
- DIN_EN/IEC60747-5-5, 890 V_Peak Working Voltage (pending approval)
- High Breakdown Collector to Emitter Voltage, BV_{CEO} = 70 V minimum
- Extended Industrial Temperate Range, -40 to 110°C
- Current Transfer Ratio at I_F = 5 mA, V_{CE} = 5 V, T_A = 25ºC
- FODM1007: 80 to 160%
- FODM1008: 130 to 260%
- FODM1009: 200 to 400%

Related Resources

- www.fairchildsemi.com/products/optoelectronics/
- www.fairchildsemi.com/datasheets/HM/HMHA2801.pdf

Description

The FODM100x Series, single channel, DC sensing input, optocoupler consists of one gallium arsenide (GaAs) infrared light emitting diode optically coupled to one phototransistor, in a stretched body SOP 4-pin package. The input-output isolation voltage, V_{ISO}, is rated at 5,000 VAC_{RMS}.

Applications

- Primarily suited for DC-DC Converters
- For ground loop isolation, signal to noise isolation
- Communications – adapters, chargers
- Consumer – appliances, set top boxes
- Industrial – power supplies, motor control, programmable logic control

Schematic

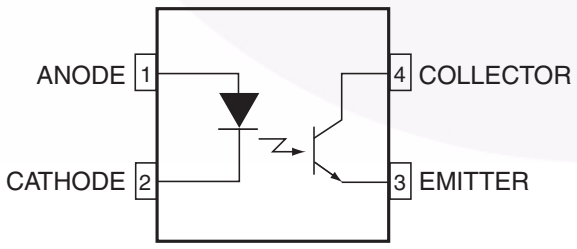

Figure 1. Schematic

Package

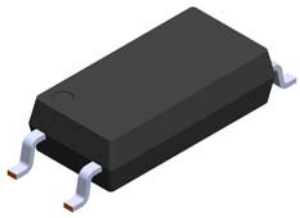

Figure 2. Package Outline

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Safety and Insulation Ratings

As per DIN EN/IEC 60747-5-5 (pending approval), this optocoupler is suitable for “safe electrical insulation” only within the safety limit data. Compliance with the safety ratings shall be ensured by means of protective circuits.

Parameter		Characteristics
Installation Classifications per DIN VDE 0110/1.89 Table 1, For Rated Mains Voltage	< 150 V_{RMS}	I–IV
	< 300 V_{RMS}	I–III
Climatic Classification		40/110/21
Pollution Degree (DIN VDE 0110/1.89)		2
Comparative Tracking Index		175

Symbol	Parameter	Value	Unit
V_{PR}	Input-to-Output Test Voltage, Method A, V_{IORM} x 1.6 = V_{PR}, Type and Sample Test with t_m = 10 s, Partial Discharge < 5 pC	1,426	V_{peak}
	Input-to-Output Test Voltage, Method B, V_{IORM} x 1.875 = V_{PR}, 100% Production Test with t_m = 1 s, Partial Discharge < 5 pC	1,671	V_{peak}
V_{IORM}	Maximum Working Insulation Voltage	890	V_{peak}
V_{IOTM}	Highest Allowable Over-Voltage	6,000	V_{peak}
	External Creepage	≥ 8.0	mm
	External Clearance	≥ 8.0	mm
DTI	Distance Through Insulation (Insulation Thickness)	≥ 0.4	mm
T_S	Case Temperature(1)	150	°C
$I_{S,INPUT}$	Input Current(1)	200	mA
$P_{S,OUTPUT}$	Output Power(1)	300	mW
R_{IO}	Insulation Resistance at T_S, V_{IO} = 500 V(1)	> 10^9	Ω

Note:
1. Safety limit values – maximum values allowed in the event of a failure

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. TA = 25°C unless otherwise specified.

Symbol	Parameter	Value	Unit
TOTAL PACKAGE			
T_{STG}	Storage Temperature	-55 to +150	°C
T_{OPR}	Operating Temperature	-40 to +110	°C
T_J	Junction Temperature	-40 to +125	°C
EMITTER			
$I_{F\ (avg)}$	Continuous Forward Current	50	mA
$I_{F\ (pk)}$	Peak Forward Current (1 µs pulse, 300 pps)	1	A
V_R	Reverse Input Voltage	6	V
PD_{LED}	LED Power Dissipation @ T_A = 25°C (2)	100	mW
	Derate Above 25°C	0.9	mW/°C
DETECTOR			
I_C	Continuous Collector Current	50	mA
V_{CEO}	Collector-Emitter Voltage	70	V
V_{ECO}	Emitter-Collector Voltage	7	V
PD_C	Detector Power Dissipation @ T_A = 25°C (2)	150	mW
	Derate Above 25°C	1.47	mW/°C

Note:

2. Functional operation under these conditions is not implied. Permanent damage may occur if the device is subjected to conditions outside these ratings.

Electrical Characteristics

T_A = 25°C unless otherwise specified.

Individual Component Characteristics

Symbol	Parameter	Device	Test Conditions	Min.	Typ.	Max.	Unit
EMITTER							
V_F	Forward Voltage	All	I_F = 50 mA		1.4	1.6	V
I_R	Reverse Current	All	V_R = 4 V			10	µA
DETECTOR							
BV_{CEO}	Breakdown Voltage Collector to Emitter	All	I_C = 1 mA, I_F = 0	70			V
BV_{ECO}	Emitter to Collector	All	I_E = 0.1 mA, I_F = 0	7			V
I_{CEO}	Collector Dark Current	All	V_{CE} = 70 V, I_F = 0			100	nA
C_{CE}	Capacitance	All	V_{CE} = 0 V, f = 1 MHz		5		pF

DC Transfer Characteristics

Symbol	Parameter	Device	Test Conditions	Min.	Typ.	Max.	Unit
CTR	DC Current Transfer Ratio	FODM1007	I_F = 5 mA, V_{CE} = 5 V	80		160	%
		FODM1008		130		260	
		FODM1009		200		400	
$V_{CE\ (SAT)}$	Saturation Voltage	All	I_F = 10 mA, I_C = 1 mA			0.3	V

AC Transfer Characteristics

Symbol	Parameter	Device	Test Conditions	Min.	Typ.	Max.	Unit
t_r	Rise Time (Non-Saturated)	All	I_C = 2 mA, V_{CE} = 5 V, R_L = 100 Ω		5.7	18.0	µs
t_f	Fall Time (Non-Saturated)	All	I_C = 2 mA, V_{CE} = 5 V, R_L = 100 Ω		8.5	18.0	

Isolation Characteristics

Symbol	Parameter	Device	Test Conditions	Min.	Typ.	Max.	Unit
V_{ISO}	Steady State Isolation Voltage	All	T_A = 25 °C, R.H. < 50%, t = 1.0 minute, I_{I-O} ≤ 20 µA	5,000			VAC_{RMS}

Typical Performance Characteristics

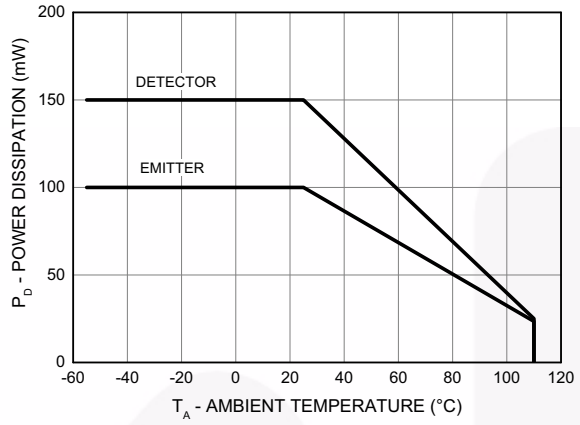


Figure 3. Power Dissipation vs. Ambient Temperature

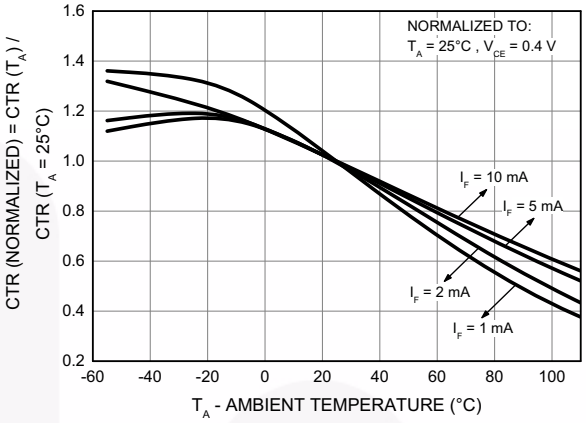


Figure 4. Saturated Normalized Current Transfer Ratio vs. Ambient Temperature

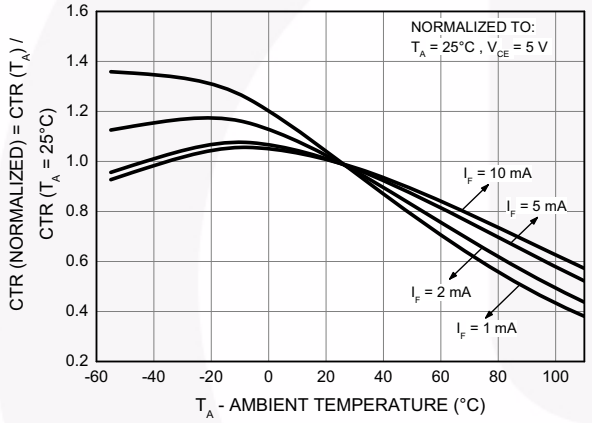


Figure 5. Non-Saturated Normalized Current Transfer Ratio vs. Ambient Temperature

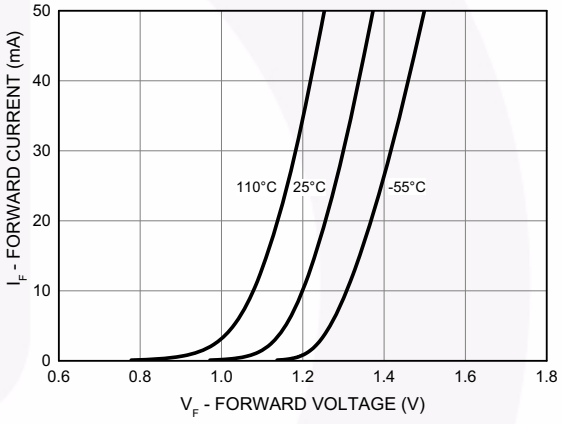


Figure 6. Forward Current vs. Forward Voltage

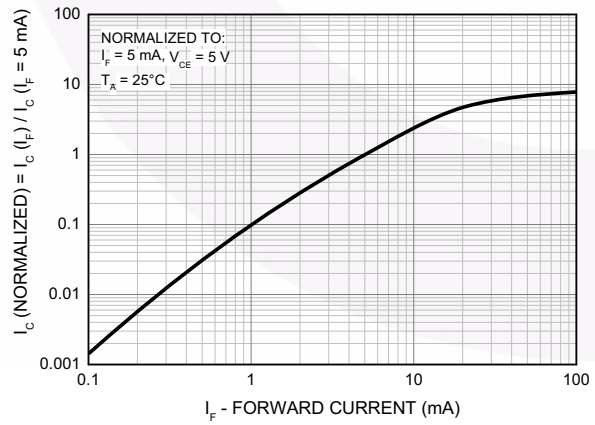


Figure 7. Normalized Current Collector vs. Forward Current

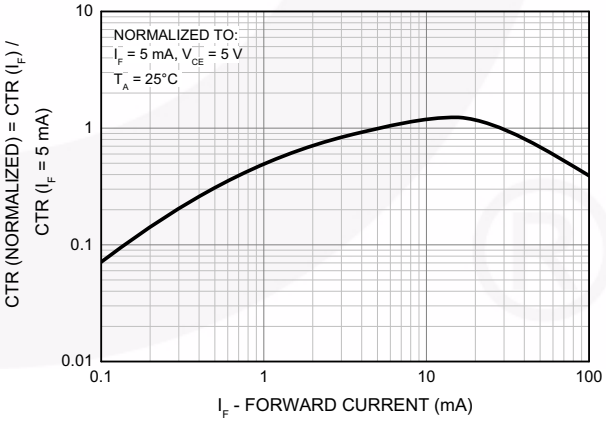


Figure 8. Normalized Current Transfer Ratio vs. Forward Current

Typical Performance Characteristics (Continued)

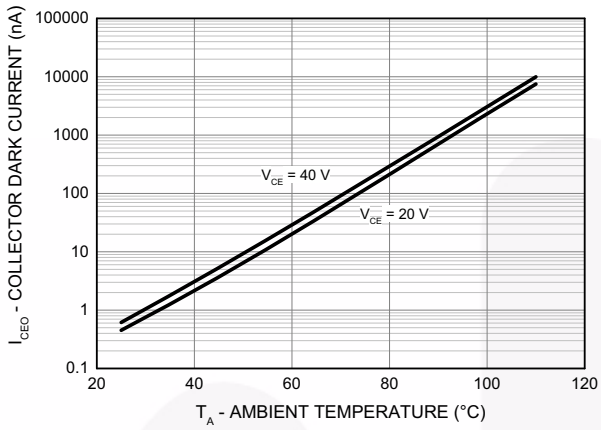


Figure 9. Collector Dark Current vs. Ambient Temperature

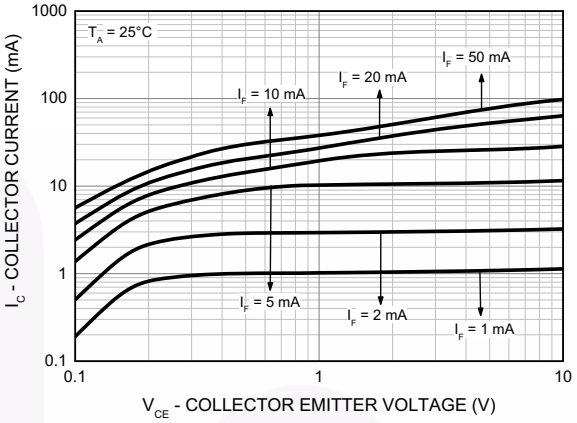


Figure 10. Collector Current vs. Collector Emitter Voltage

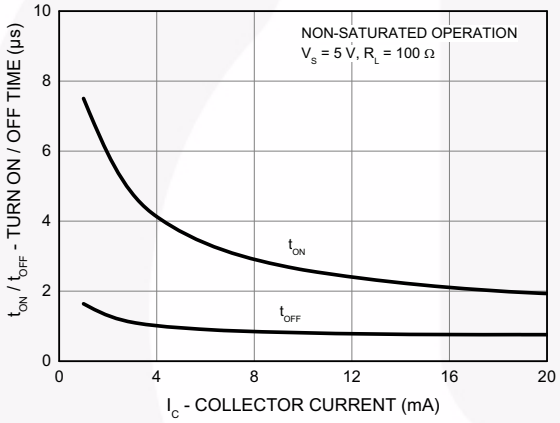


Figure 11. Turn On/ Turn Off Time vs. Collector Current

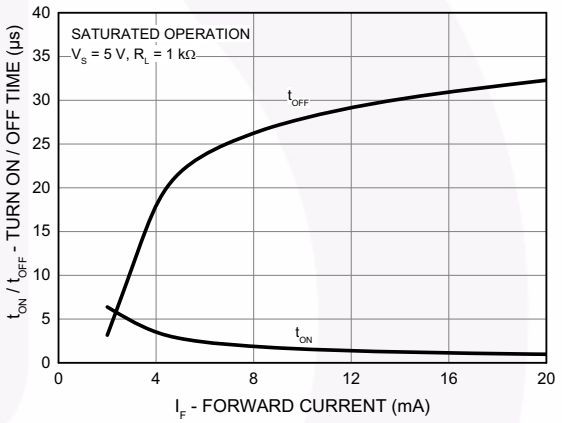
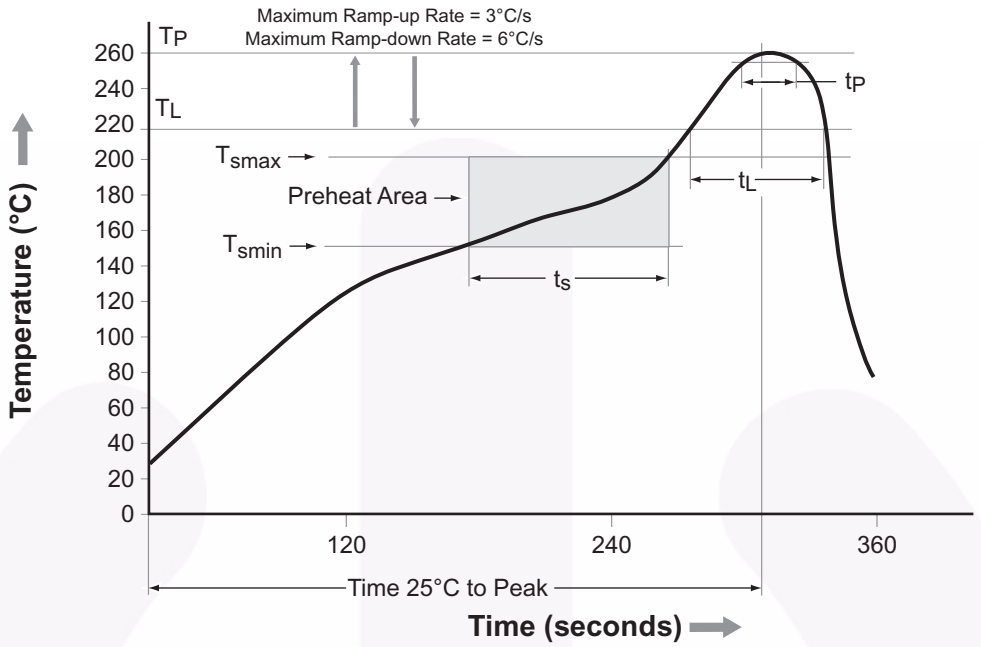


Figure 12. Turn On/ Turn Off Time vs. Forward Current

Reflow Profile



Profile Freature	Pb-Free Assembly Profile
Temperature Minimum (T_{smin})	150°C
Temperature Maximum (T_{smax})	200°C
Time (t_S) from (T_{smin} to T_{smax})	60 s to 120 s
Ramp-up Rate (t_L to t_P)	3°C/second maximum
Liquidous Temperature (T_L)	217°C
Time (t_L) Maintained Above (T_L)	60 s to 150 s
Peak Body Package Temperature	260°C +0°C / –5°C
Time (t_P) within 5°C of 260°C	30 s
Ramp-Down Rate (T_P to T_L)	6°C/s maximum
Time 25°C to Peak Temperature	8 minutes maximum

Figure 13. Reflow Profile

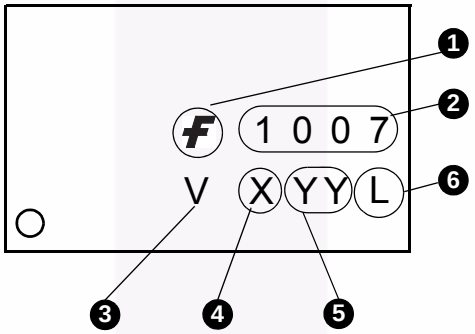
Ordering Information

Part Number	Package	Packing Method
FODM1007	Stretched Body SOP 4-Pin	Tube (100 units per tube)
FODM1007R2	Stretched Body SOP 4-Pin	Tape and Reel (3,000 units per reel)
FODM1007V	Stretched Body SOP 4-Pin, DIN EN/IEC60747-5-5 Option (pending approval)	Tube (100 units per tube)
FODM1007R2V	Stretched Body SOP 4-Pin, DIN EN/IEC60747-5-5 Option (pending approval)	Tape and Reel (3,000 units per reel)

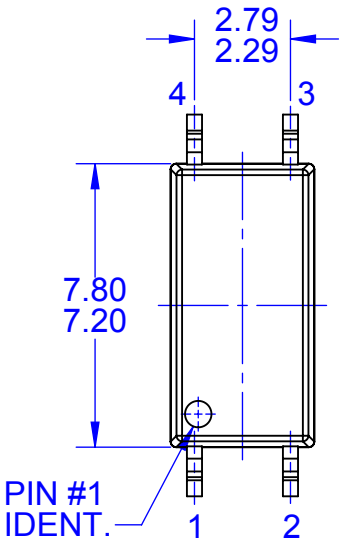
Note:

2. The product orderable part number system listed in this table also applies to the FODM1008, and FODM1009 products.

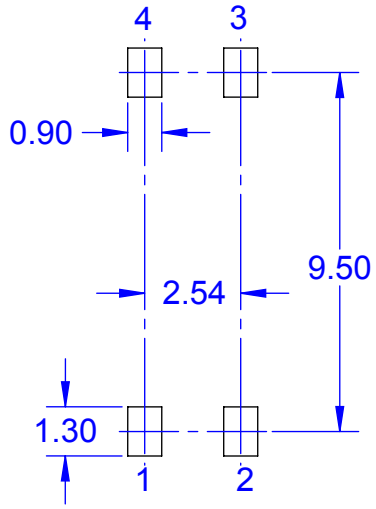
Marking Information



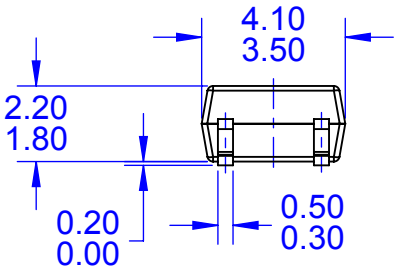
Definitions	
1	Fairchild Logo
2	Device Number, e.g. 1007
3	DIN EN/IEC60747-5-5 Option (only appears on component ordered with this option) (pending for approval)
4	Last Digit Year Code, e.g. ‘6’
5	Two Digit Work Week Ranging from ‘01’ to ‘53’
6	Assembly Package Code



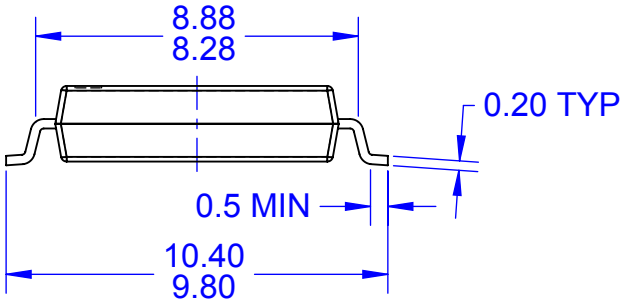
TOP VIEW



LAND PATTERN RECOMMENDATION



FRONT VIEW



SIDE VIEW

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No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
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