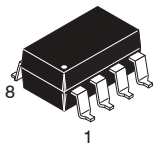
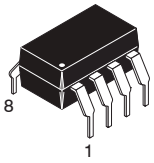
8-pin Dual-Channel Phototransistor Optocouplers

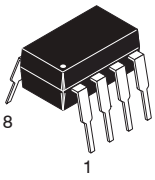
MCT6, MCT61, MCT62



PDIP8 GW
CASE 709AF



PDIP8 9.68x6.5, 2.54P
CASE 646CJ



PDIP8 9.655x6.6, 2.54P
CASE 646CQ

Description

The general purpose optocouplers, MCT6, MCT61, and MCT62, have two isolated channels in a standard plastic 8−pin dual−in−line (DIP) package for density applications. Each channel consists of a gallium arsenide infrared emitting diode driving a NPN silicon planar phototransistor. For four channel applications, two packages fit into a standard 16−pin DIP socket.

Features

- Two Isolated Channels Per Package
- Safety and Regulatory Approvals:
  – UL1577, 5,000 VAC_{RMS} for 1 Minute
  – DIN−EN/IEC60747−5−5, 890 V Peak Working Insulation Voltage
- These are Pb−Free Devices

Applications

- AC Line/Digital Logic – Isolate High Voltage Transients
- Digital Logic/Digital Logic – Eliminate Spurious Grounds
- Digital Logic/AC Triac Control – Isolate High Voltage Transients
- Twisted Pair Line Receiver – Eliminate Ground Loop Feedthrough
- Telephone/Telegraph Line Receiver – Isolate High Voltage Transients
- High Frequency Power Supply Feedback Control– Maintain Floating Grounds and Transients
- Relay Contact Monitor – Isolate Floating Grounds and Transients
- Power Supply Monitor – Isolate Transients

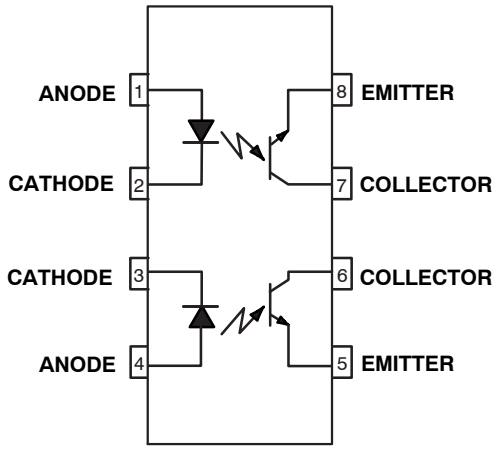


Figure 1. Schematic

MARKING DIAGRAM



MCT6 = Specific Device Code
V = DIN EN/IEC 60747−5−5 option (only appears on component ordered with this option)
XX = Two Digit Year Code, e.g., “16”
YY = Digit Work Week Ranging from “01” to “53”
H = Assembly Package Code

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

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Safety and Insulation Ratings

As per DIN EN/IEC 60747−5−5, 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		55/100/21
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	1424	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	1668	V_{peak}
V_{IORM}	Maximum Working Insulation Voltage	890	V_{peak}
V_{IOTM}	Highest Allowable Over−Voltage	8000	V_{peak}
	External Creepage	≥7	mm
	External Clearance	≥7	mm
DTI	Distance Through Insulation (Insulation Thickness)	≥0.4	mm
T_S	Case Temperature (Note 1)	175	°C
$I_{S,INPUT}$	Input Current (Note 1)	60	mA
$P_{S,OUTPUT}$	Output Power (Note 1)	150	mW
R_{IO}	Insulation Resistance at T_S, V_{IO} = 500 V (Note 1)	$>10^9$	Ω

1. Safety limit values − maximum values allowed in the event of a failure.

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Symbol	Rating	Value	Unit
TOTAL DEVICE			
T_{STG}	Storage Temperature	−55 to +150	°C
T_{OPR}	Operating Temperature	−55 to +100	°C
T_J	Junction Temperature	−55 to +125	°C
T_{SOL}	Lead Solder Temperature	260 for 10 seconds	°C
P_D	Total Device Power Dissipation @ T_A = 25°C	400	mW
	Derate Above 25°C	5.33	mW/°C
EMITTER (Each channel)			
I_F	DC / Average Forward Input Current	60	mA
I_F(pk)	Forward Current − Peak (PW = 1 μs, 300 pps)	3	A
V_R	Reverse Input Voltage	3	V
$P_{D(EMITTER)}$	Total Power Dissipation @ T_A = 25°C	100	mW
	Derate Above 25°C	1.3	mW/°C
DETECTOR			
I_C	Continuous Collector Current	30	mA
$P_{D(DETECTOR)}$	Total Power Dissipation @ T_A = 25°C	150	mW
	Derate Above 25°C	2.0	mW/°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Individual Component Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
EMITTER						
V_F	Input Forward Voltage	I_F = 20 mA	–	1.2	1.5	V
V_R	Reverse Voltage	I_R = 10 μA	3	25	–	V
I_R	Reverse Leakage Current	V_R = 5 V	–	0.001	10	μA
C_J	Junction Capacitance	V_F = 0 V, f = 1 MHz	–	50	–	pF
DETECTOR						
BV_{CEO}	Collector−to−Emitter Breakdown Voltage	I_C = 1.0 mA, I_F = 0	30	85	–	V
BV_{ECO}	Emitter−to−Collector Breakdown Voltage	I_E = 100 μA, I_F = 0	6	13	–	V
I_{CEO}	Collector−to−Emitter Dark Current	V_{CE} = 10 V, , I_F = 0	–	5	100	nA
C_{CE}	Capacitance	V_{CE} = 0 V, f = 1 MHz,	–	8	–	pF

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

Transfer Characteristics

Symbol	Parameter	Device	Test Conditions	Min	Typ	Max	Unit
DC CHARACTERISTICS							
C_{TR}	Current Transfer Ratio, Collector−to−Emitter	MCT6	I_F = 10 mA, V_{CE} = 10 V	20	–	–	%
		MCT61	I_F = 5 mA, V_{CE} = 5 V	50	–	–	
		MCT62		100	–	–	
$V_{CE(SAT)}$	Saturation Voltage, Collector−to−Emitter	ALL	I_F = 16 mA, I_C = 2 mA	–	0.15	0.4	V

AC CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Non−Saturated						
t_{on}	Turn−On Time	R_L = 100 Ω, I_C = 2 mA, V_{CC} = 10 V	–	3.0	–	μs
t_{off}	Turn−Off Time		–	3.0	–	μs
t_r	Rise Time		–	2.4	–	μs
t_f	Fall Time		–	2.4	–	μs
Saturated						
t_{on}	Turn−On Time	I_F = 16 mA, R_L = 1.9 kΩ, V_{CE} = 5 V	–	2.4	–	μs
t_{off}	Turn−Off Time		–	25.0	–	μs

Isolation Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{ISO}	Input−Output Isolation Voltage	$I_{I-O} \le$ 10 μA, t = 1 Minute	5,000	–	–	VAC_{RMS}
C_{ISO}	Isolation Capacitance	f = 1 MHz	–	0.5	–	pF
R_{ISO}	Isolation Resistance	V_{I-O} = 500 VDC	10^{11}	–	–	Ω

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TYPICAL PERFORMANCE CURVES

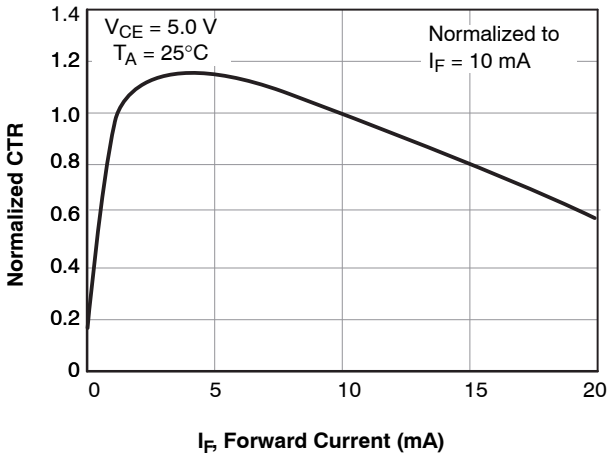


Figure 2. Normalized CTR vs. Forward Current

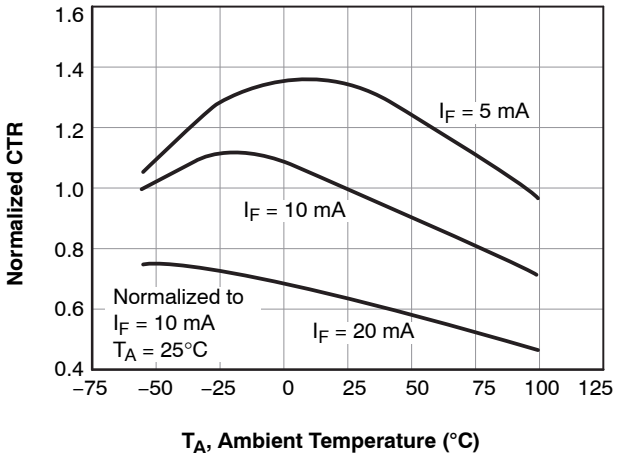


Figure 3. Normalized CTR vs. Ambient Temperature

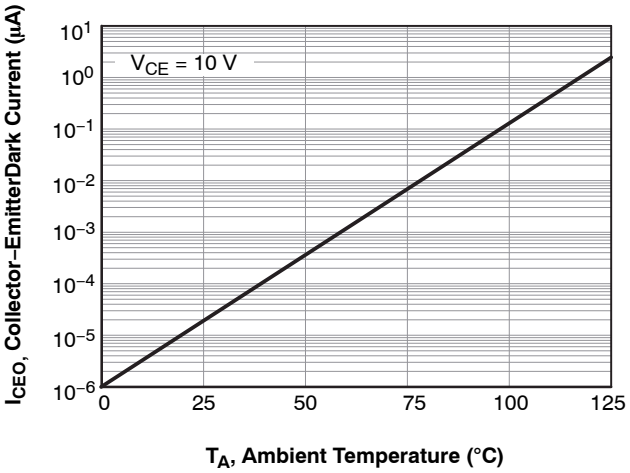


Figure 4. Dark Current vs. Ambient Temperature

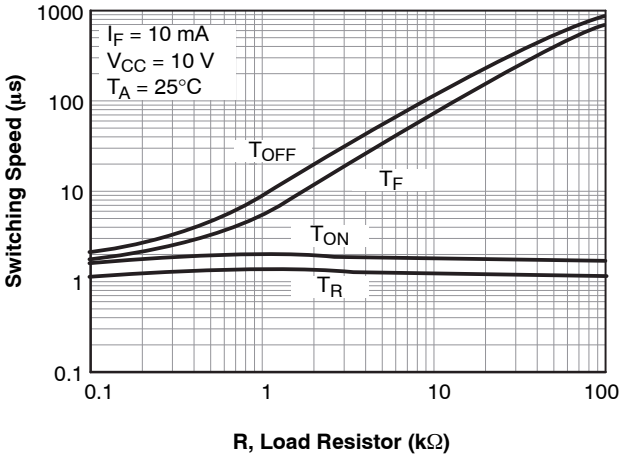


Figure 5. Switching Speed vs. Load Resistor

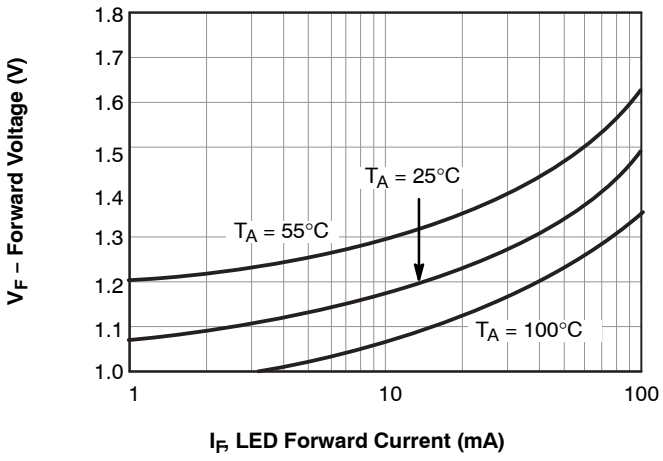


Figure 6. LED Forward Voltage vs. Forward Current

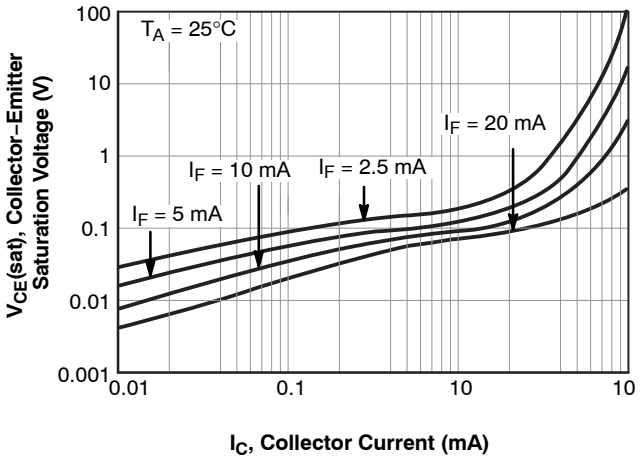


Figure 7. Collector−Emitter Saturation Voltage vs. Collector Current

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SWITCHING TIME TEST CIRCUIT AND WAVEFORMS

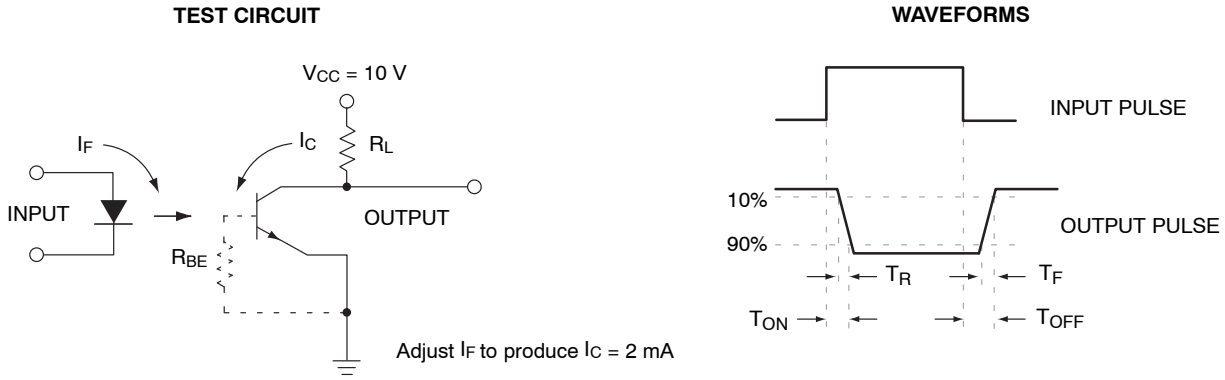


Figure 8. Switching Time Test Circuit and Waveforms

REFLOW PROFILE

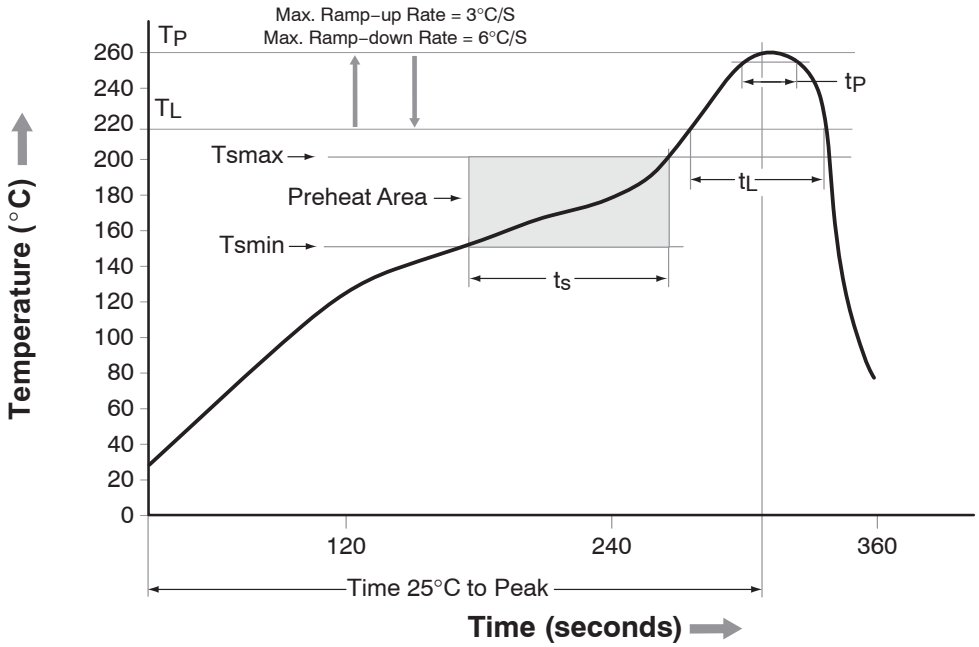


Figure 9. Reflow Profile

Profile Feature	Pb−Free Assembly Profile
Temperature Minimum (Tsmin)	150°C
Temperature Maximum (Tsmax)	200°C
Time (t_S) from (Tsmin to Tsmax)	60 – 120 seconds
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 – 150 seconds
Peak Body Package Temperature	260°C +0°C / −5°C
Time (t_P) within 5°C of 260°C	30 seconds
Ramp−down Rate (T_P to T_L)	6°C/second maximum
Time 25°C to Peak Temperature	8 minutes maximum

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ORDERING INFORMATION

Part Number	Package	Packing Method†
MCT6	DIP 8−Pin	50 Units / Tube
MCT6S	SMT 8−Pin (Lead Bend)	50 Units / Tube
MCT6SD	SMT 8−Pin	1,000 Units / Tape & Reel
MCT6300	DIN EN/IEC 60747−5−5 Option	50 Units / Tube
MCT63S	SMT 8−Pin (Lead Bend); DIN EN/IEC 60747−5−5 Option	50 Units / Tube
MCT63SD	SMT 8−Pin; DIN EN/IEC 60747−5−5 Option	1,000 Units / Tape & Reel
MCT6300W	0.4” Lead Spacing; DIN EN/IEC 60747−5−5 Option	50 Units / Tube

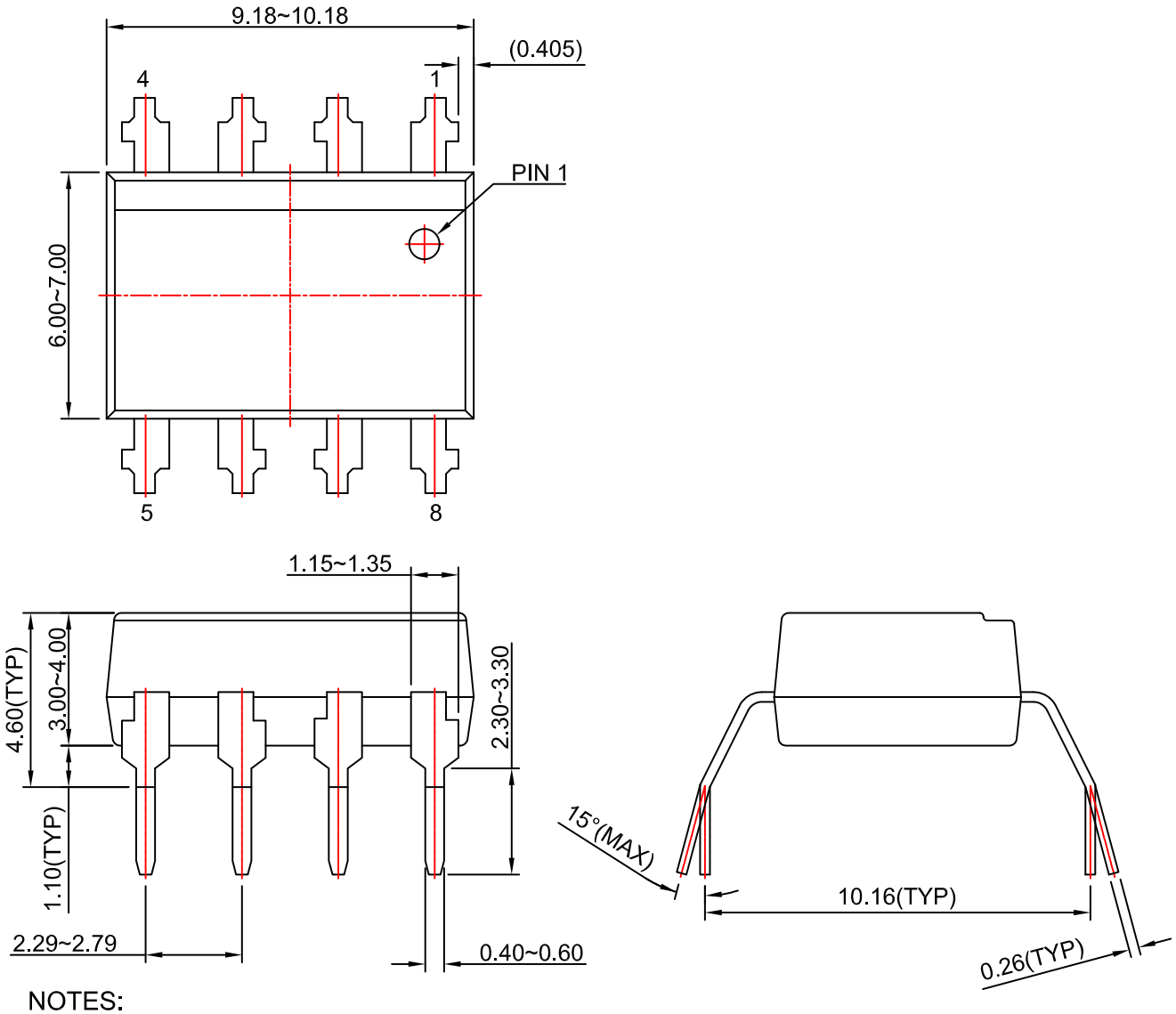
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

NOTE: The product orderable part number system listed in this table also applies to the MCT61 and MCT62.

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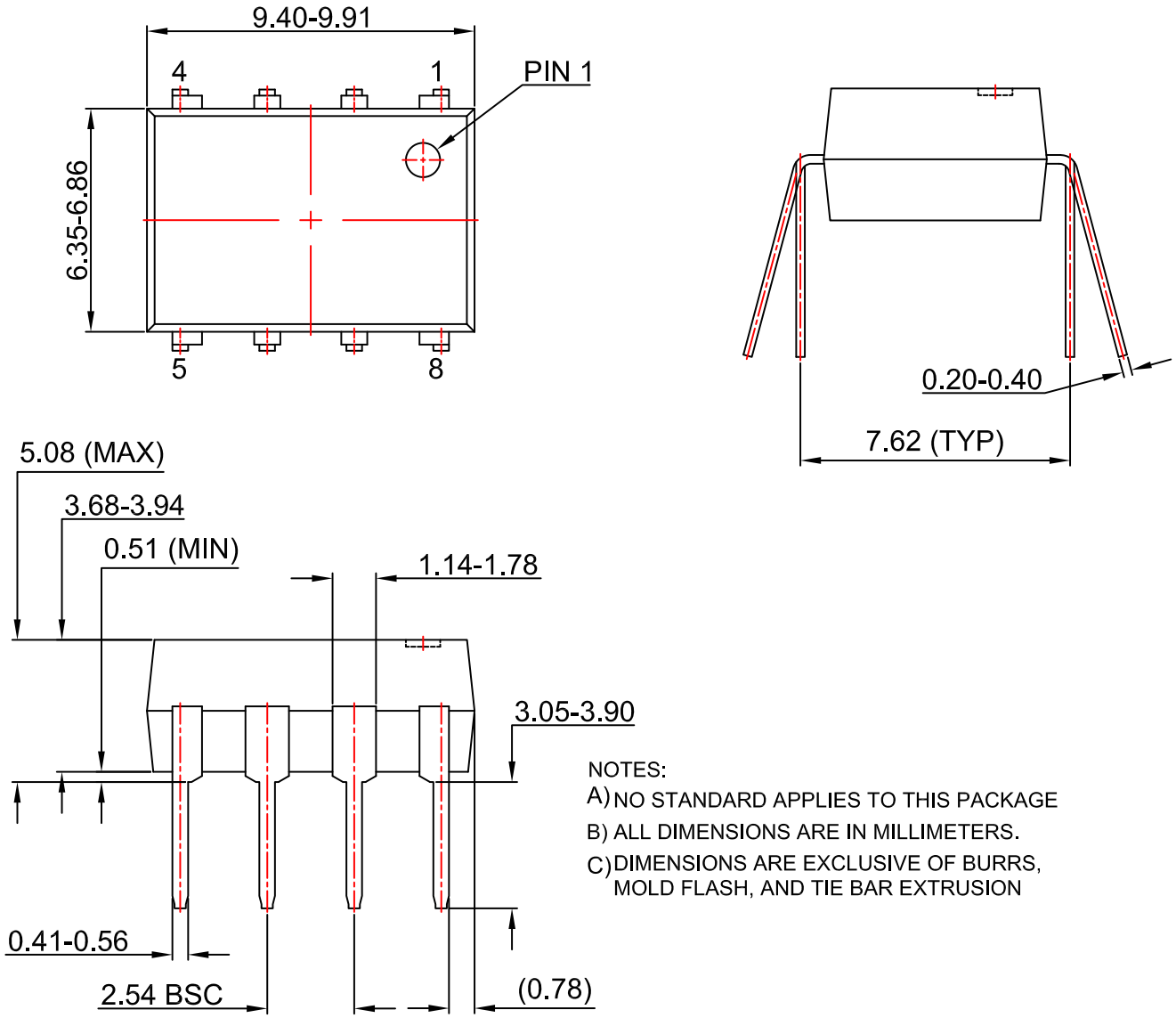
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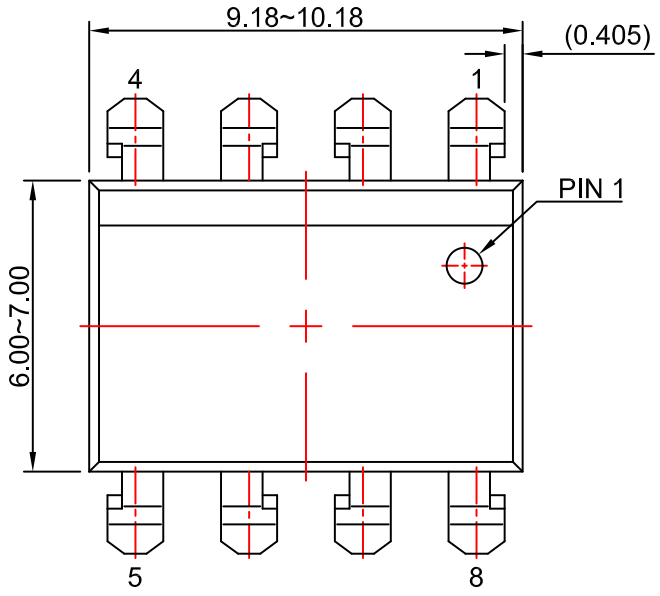
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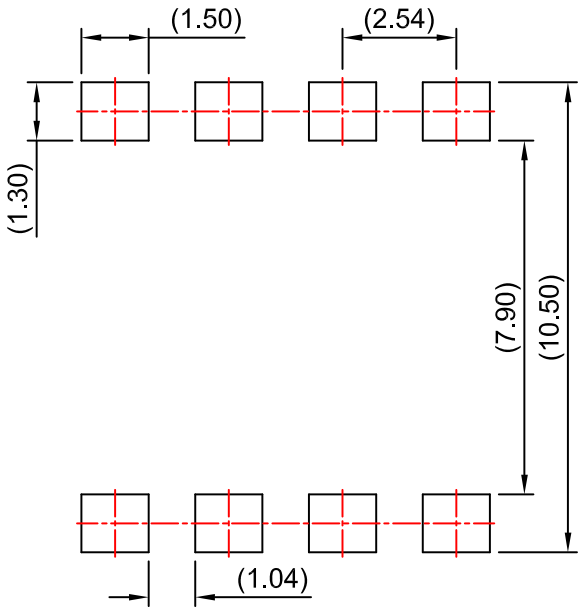
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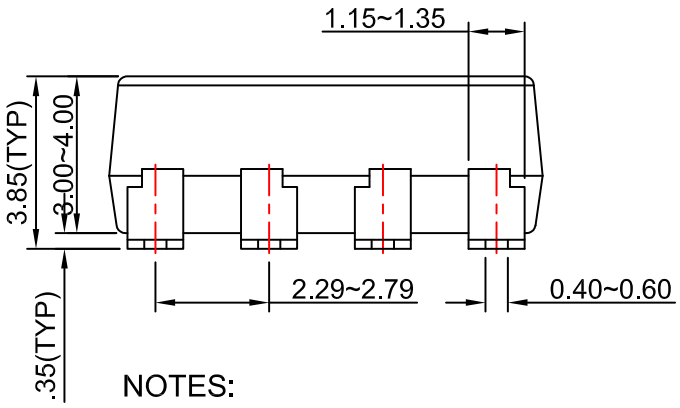
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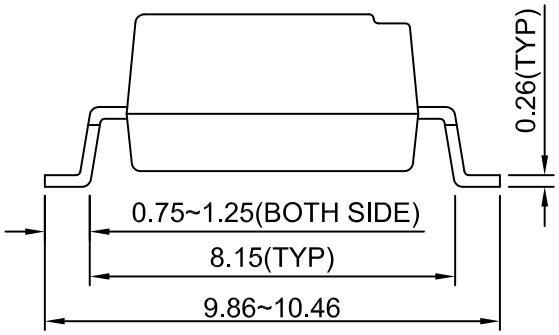
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