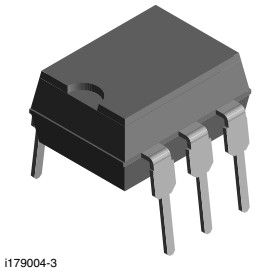
Optocoupler, Phototransistor Output, Low Input Current, With Base Connection



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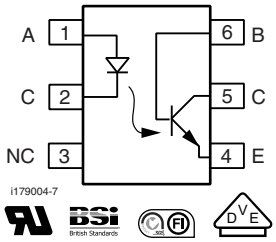


FEATURES

- Saturation CTR - MCT5211, > 100 % at I_F = 1.6 mA
- High isolation voltage, 5300 V_{RMS}
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

AGENCY APPROVALS

- UL1577, file no. E52744 system code H, double protection
- BSI IEC 60950; IEC 60065
- DIN EN 60747-5-2 (VDE 0884) / DIN EN 60747-5-5 (pending), available with option 1
- CSA 93751

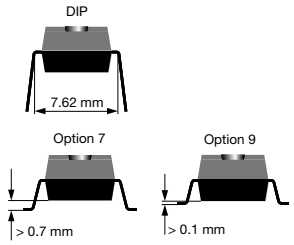
DESCRIPTION

The MCT5211 is a optocoupler with a high efficiency AlGaAs LED optically coupled to a NPN phototransistor. The high performance LED makes operation at low input currents practical. The coupler is housed in a six pin DIP package. Isolation test voltage is 5300 V_{RMS}.

Because these parts have guaranteed CTRs at 1 mA and 3 mA, they are ideally suitable for interfacing from CMOS to TTL or LSTTL to TTL. They are also ideal for telecommunications applications such as ring or off-hook detection.

ORDERING INFORMATION

M	C	T	5	2	1	1	-	X	0	#	#	T
PART NUMBER								PACKAGE OPTION				TAPE AND REEL



AGENCY CERTIFIED/PACKAGE	CTR (%)
	1 mA
UL, BSI, CSA	**> 110**
DIP-6	MCT5211
SMD-6, option 7	MCT5211-X007T (1)
SMD-6, option 9	MCT5211-X009T (1)
UL, BSI, CSA, VDE	**> 110**
SMD-6, option 7	MCT5211-X017T

Notes

- Additional options may be possible, please contact sales office

(1) Also available in tubes, do not put T on the end

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Input				
Peak reverse voltage		V_R	6	V
Forward continuous current		I_F	40	mA
Power dissipation		P_{diss}	75	mW
Derate linearly from 25 °C			1	mW/°C
Output				
Collector emitter breakdown voltage		BV_{CEO}	30	V
Emitter collector breakdown voltage		BV_{ECO}	7	V
Collector base breakdown voltage		BV_{CBO}	70	V
Power dissipation		P_{diss}	200	mW
Derate linearly from 25 °C			2.6	mW/°C
Coupler				
Total package dissipation (LED and detector)		P_{tot}	260	mW
Derate linearly from 25 °C			3.5	mW/°C
Operating temperature		T_{amb}	-55 to +100	°C
Storage temperature		T_{stg}	-55 to +150	°C

Note

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Input							
Forward voltage	I_F = 5 mA		V_F	-	1.2	1.5	V
Reverse voltage	I_R = 10 µA		V_R	6	-	-	V
Output							
DC forward current gain	V_{CE} = 5 V, I_C = 100 µA		h_{FE}	100	200	-	
Collector emitter breakdown voltage	I_C = 100 µA		BV_{CEO}	30	-	-	V
Emitter collector breakdown voltage	I_E = 100 µA		BV_{ECO}	7	-	-	V
Collector base breakdown voltage	I_E = 10 µA		BV_{CBO}	70	-	-	V
Collector emitter leakage voltage	V_{CE} = 10 V		I_{CEO}	-	5	100	nA
Coupler							
Saturation voltage	I_F = 1.6 mA, I_C = 1.6 mA	MCT5211	V_{CEsat}	-	0.25	0.4	V

Note

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements

CURRENT TRANSFER RATIO (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Current transfer ratio (collector emitter saturated)	V_{CE} = 0.4 V, I_F = 1.6 mA	MCT5211	CTR_{CEsat}	100	200	-	%
	V_{CE} = 0.4 V, I_F = 1 mA	MCT5211	CTR_{CEsat}	75	150	-	%
Current transfer ratio	V_{CE} = 5 V, I_F = 1.6 mA	MCT5211	CTR	150	300	-	%
	V_{CE} = 5 V, I_F = 1 mA	MCT5211	CTR	110	225	-	%
Current transfer ratio (collector base)	V_{CE} = 4.3 V, I_F = 1.6 mA	MCT5211	CTR_{CB}	0.3	0.6	-	%
	V_{CE} = 4.3 V, I_F = 1 mA	MCT5211	CTR_{CB}	0.25	0.5	-	%

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Propagation delay high to low	R_L = 750 Ω, I_F = 1.6 mA, V_{CC} = 5 V	MCT5211	t_{PHL}	-	20	-	µs
	R_L = 1.5 kΩ, I_F = 1 mA, V_{CC} = 5 V	MCT5211	t_{PHL}	-	40	-	µs
Propagation delay low to high	R_L = 750 Ω, I_F = 1.6 mA, V_{CC} = 5 V	MCT5211	t_{PLH}	-	20	-	µs
	R_L = 1.5 kΩ, I_F = 1 mA, V_{CC} = 5 V	MCT5211	t_{PLH}	-	40	-	µs

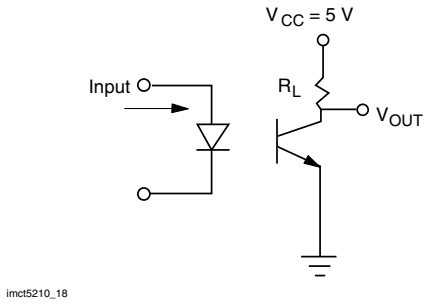


Fig. 1 - Switching Schematic

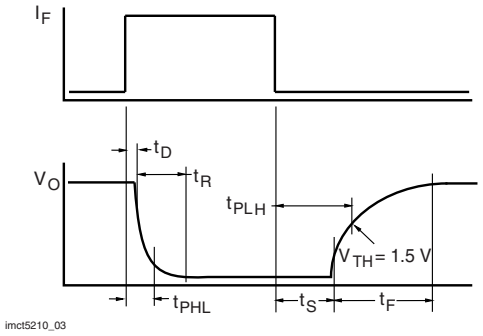


Fig. 2 - Switching Waveform

SAFETY AND INSULATION RATINGS				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Climatic classification	According to IEC 68 part 1		55 / 100 / 21	
Comparative tracking index		CTI	175	
Maximum rated withstanding isolation voltage	t = 1 min	V_{ISO}	4420	V_{RMS}
Maximum transient isolation voltage		V_{IOTM}	10 000	V
Maximum repetitive peak isolation voltage		V_{IORM}	890	V
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C	R_{IO}	≥ 10^{12}	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	≥ 10^{11}	Ω
Output safety power		P_{SO}	400	mW
Input safety current		I_{SI}	275	mA
Input safety temperature		T_{SI}	175	°C
Creepage distance			≥ 7	mm
Clearance distance			≥ 7	mm
Insulation thickness		DTI	≥ 0.4	mm

Note

- As per IEC 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

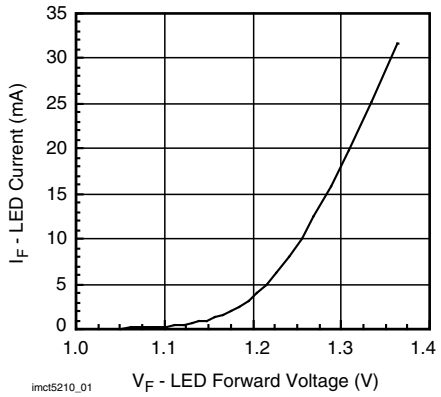


Fig. 1 Forward Current vs. Forward Voltage

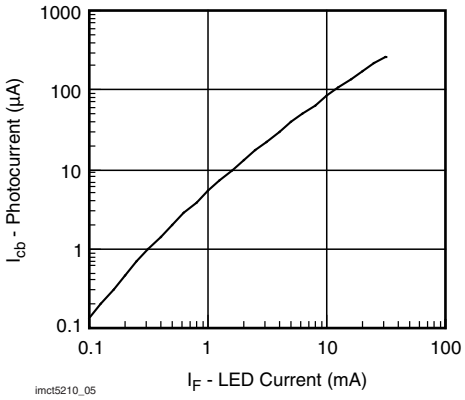


Fig. 5 - Photocurrent vs. LED Current

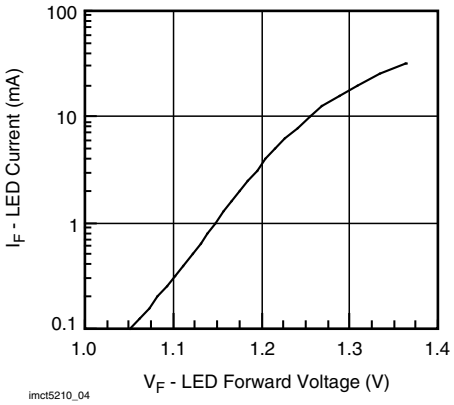


Fig. 3 - LED Forward Current vs. Forward Voltage

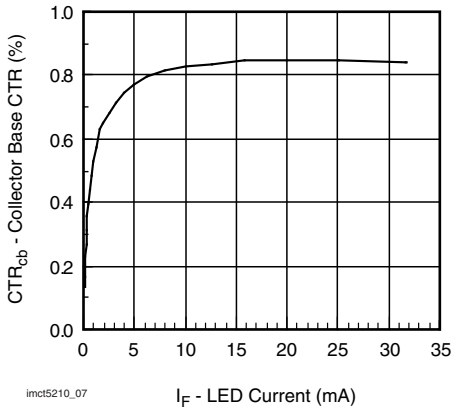


Fig. 6 - Collector Base CTR vs. LED Current

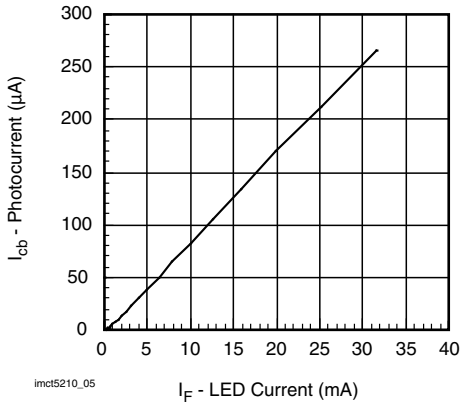


Fig. 4 - Collector Base Photocurrent vs. LED Current

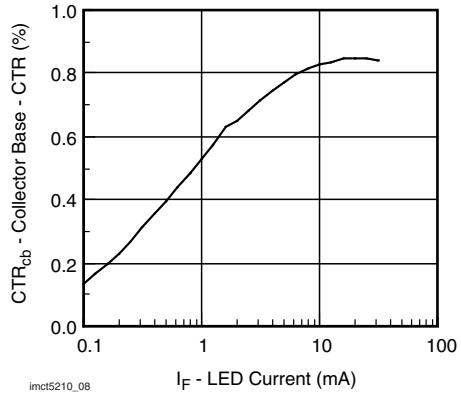


Fig. 7 - Collector Base CTR vs. LED Current

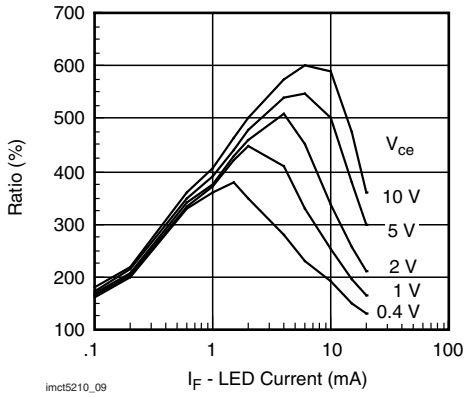


Fig. 8 - CTR vs. LED Current

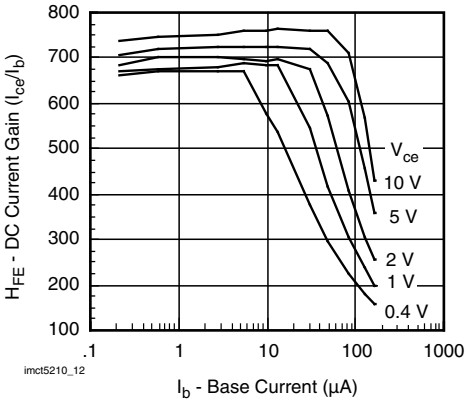


Fig. 11 - Transistor Current Gain vs. Base Current

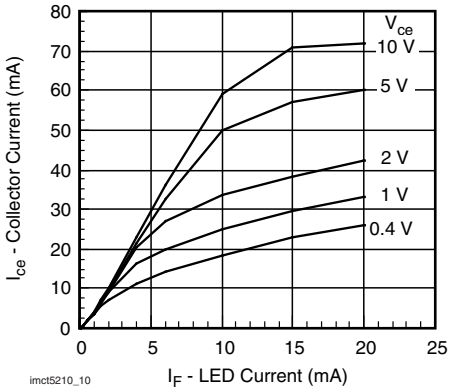


Fig. 9 - Collector Current vs. LED Current

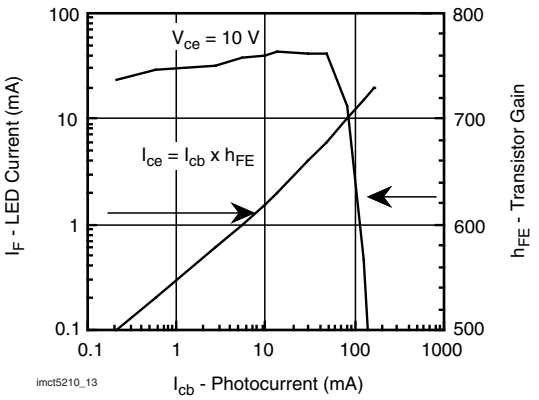


Fig. 12 - Transfer Curve

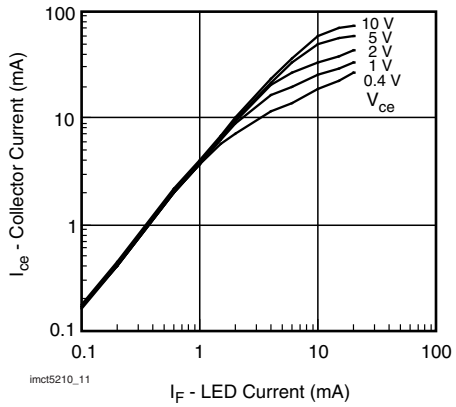


Fig. 10 - Collector Current vs. LED Current

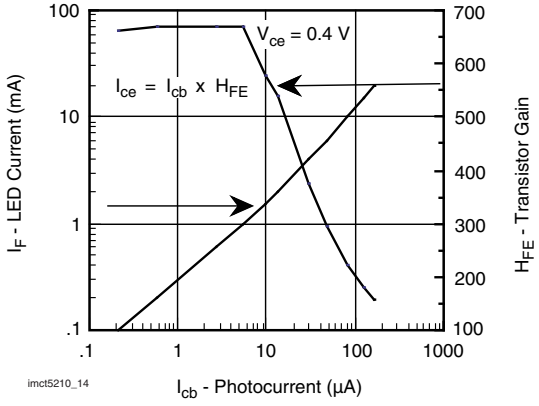


Fig. 13 - Transfer Curve

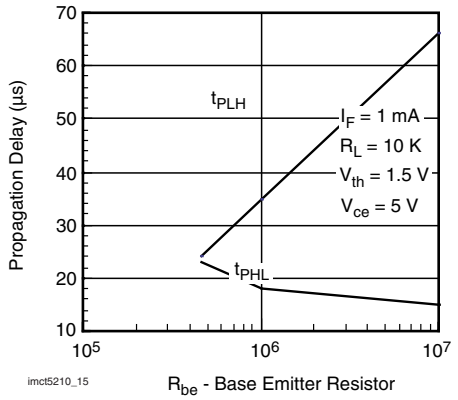


Fig. 14 - Propagation Delay vs. Base Emitter Resistor

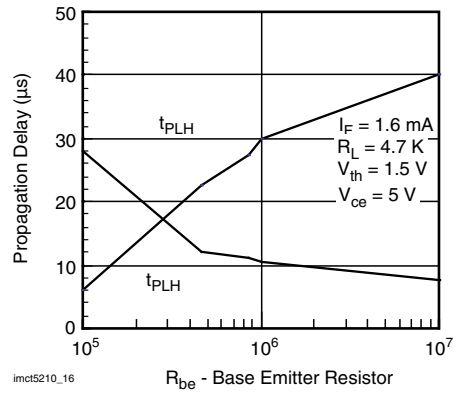


Fig. 15 - Propagation Delay vs. Base Emitter Resistor

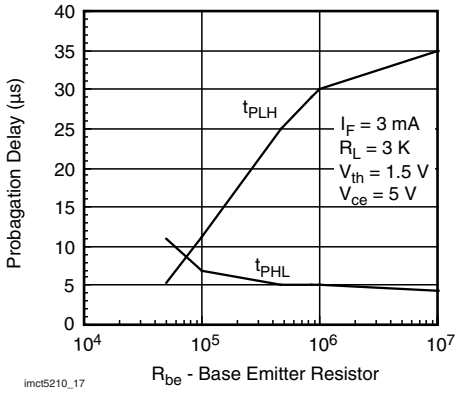
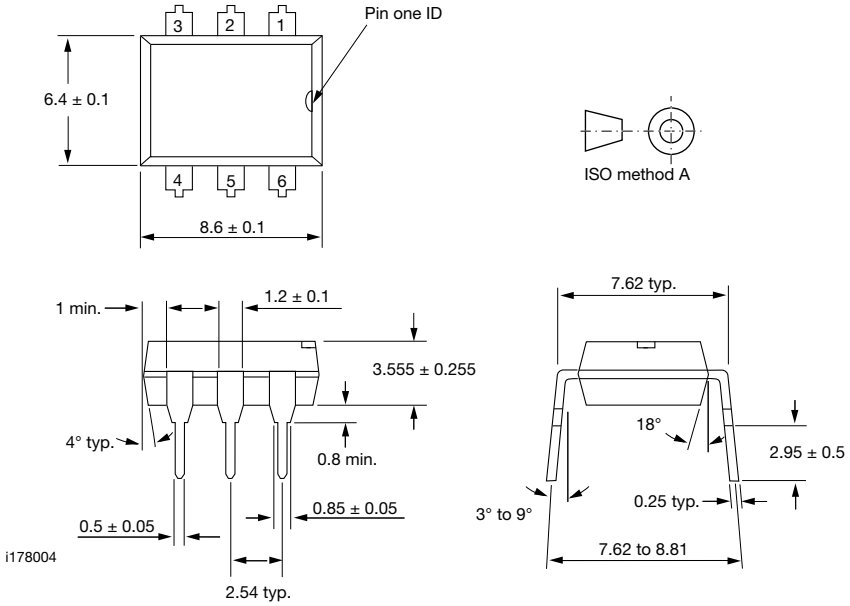
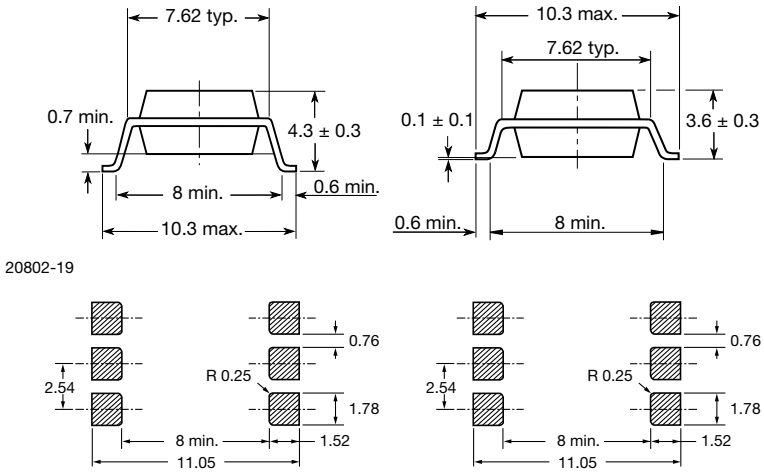


Fig. 16 - Propagation Delay vs. Base Emitter Resistor

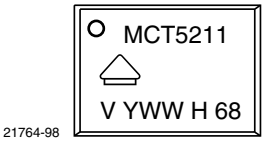
PACKAGE DIMENSIONS in millimeters



Option 7 **Option 9**



PACKAGE MARKING (example)

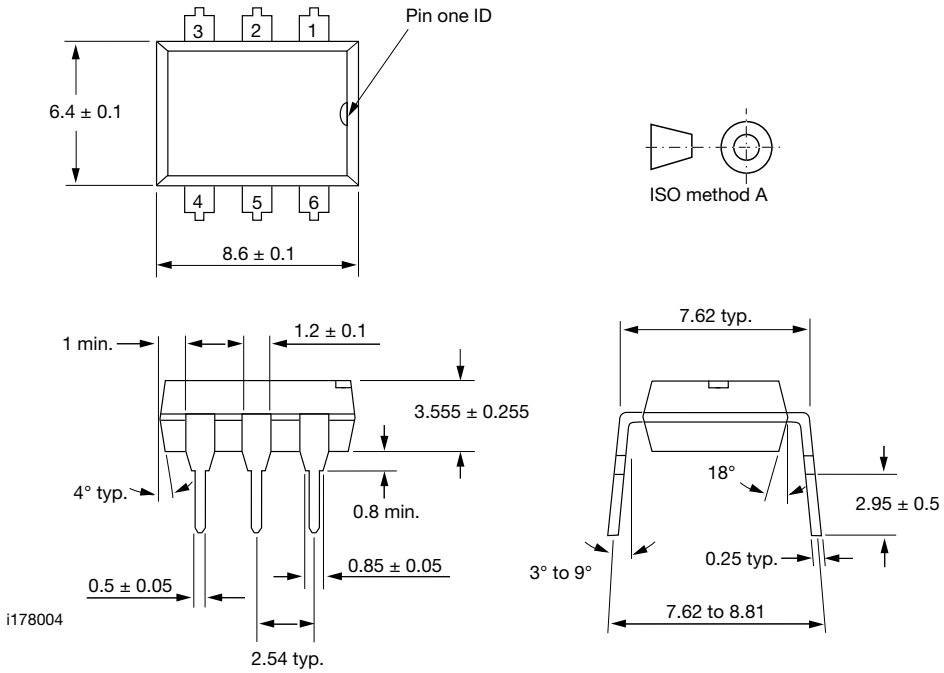


Notes

- Only option 7 is reflected in the package marking
- The VDE logo is only marked on option 1 parts
- Tape and reel suffix (T) is not part of the package marking

DIP-6A

PACKAGE DIMENSIONS in inches (millimeters)



Note

The information in this document provides generic information but for specific information on a product the appropriate product datasheet should be used.

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