

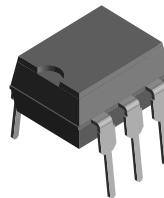
CNY17F

Vishay Semiconductors

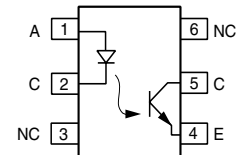
Optocoupler, Phototransistor Output, No Base Connection

Features

- Breakdown Voltage, 5300 V_{RMS}
- No Base Terminal Connection for Improved Common Mode Interface Immunity
- Long Term Stability
- Industry Standard Dual-in-Line Package
- Lead-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



18216



Agency Approvals

- UL1577, File No. E52744 System Code H or J, Double Protection
- DIN EN 60747-5-2 (VDE0884)
DIN EN 60747-5-5 pending
- BSI IEC60950 IEC60065
- FIMKO

Description

The CNY17F is an optocoupler consisting of a Gallium Arsenide infrared emitting diode optically coupled to a silicon planar phototransistor detector in a plastic plug-in DIP-6 package.

The coupling device is suitable for signal transmission between two electrically separated circuits. The potential difference between the circuits to be coupled is not allowed to exceed the maximum permissible reference voltages.

In contrast to the CNY17 Series, the base terminal of the F type is not connected, resulting in a substantially improved common-mode interference immunity.

Order Information

Part	Remarks
CNY17F-1	CTR 40 - 80 %, DIP-6
CNY17F-2	CTR 63 - 125 %, DIP-6
CNY17F-3	CTR 100 - 200 %, DIP-6
CNY17F-4	CTR 160 - 320 %, DIP-6
CNY17F-1X006	CTR 40 - 80 %, DIP-6 400 mil (option 6)
CNY17F-1X007	CTR 40 - 80 %, SMD-6 (option 7)
CNY17F-1X009	CTR 40 - 80 %, SMD-6 (option 9)
CNY17F-2X006	CTR 63 - 125 %, DIP-6 400 mil (option 6)
CNY17F-2X007	CTR 63 - 125 %, SMD-6 (option 7)
CNY17F-2X009	CTR 63 - 125 %, SMD-6 (option 9)
CNY17F-3X006	CTR 100 - 200 %, DIP-6 400 mil (option 6)
CNY17F-3X007	CTR 100 - 200 %, SMD-6 (option 7)
CNY17F-3X009	CTR 100 - 200 %, SMD-6 (option 9)
CNY17F-4X006	CTR 160 - 320 %, DIP-6 400 mil (option 6)
CNY17F-4X007	CTR 160 - 320 %, SMD-6 (option 7)
CNY17F-4X009	CTR 160 - 320 %, SMD-6 (option 9)

For additional information on the available options refer to Option Information.

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Absolute Maximum Ratings

$T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

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 Rating for extended periods of the time can adversely affect reliability.

Input

Parameter	Test condition	Symbol	Value	Unit
Reverse voltage		V_R	6.0	V
DC forward current		I_F	60	mA
Surge forward current	$t \leq 10\text{ }\mu\text{s}$	I_{FSM}	2.5	A
Power dissipation		P_{diss}	100	mW

Output

Parameter	Test condition	Symbol	Value	Unit
Collector-emitter breakdown voltage		BV_{CEO}	70	V
Collector current		I_C	50	mA
	$t \leq 1.0\text{ ms}$	I_C	100	mA
Total power dissipation		P_{diss}	150	mW

Coupler

Parameter	Test condition	Symbol	Value	Unit
Isolation test voltage (between emitter and detector referred to standard climate 23/50 DIN 50014)		V_{ISO}	5300	V_{RMS}
Creepage			≥ 7.0	mm
Clearance			≥ 7.0	mm
Isolation thickness between emitter and detector			≥ 0.4	mm
Comparative tracking index per DIN IEC 112/VDE 0303, part 1			175	
Isolation resistance	$V_{IO} = 500\text{ V}$	R_{IO}	$\geq 10^{11}$	Ω
Storage temperature range		T_{stg}	- 55 to + 150	$^{\circ}\text{C}$
Ambient temperature range		T_{amb}	- 55 to + 100	$^{\circ}\text{C}$
Junction temperature		T_j	100	$^{\circ}\text{C}$
Soldering temperature	max. 10 s, dip soldering: distance to seating plane $\geq 1.5\text{ mm}$	T_{sld}	260	$^{\circ}\text{C}$

Electrical Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

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.

Input

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward voltage	$I_F = 60\text{ mA}$	V_F		1.25	1.65	V
Breakdown voltage	$I_R = 10\text{ }\mu\text{A}$	V_{BR}	6.0			V
Reserve current	$V_R = 6.0\text{ V}$	I_R		0.01	10	μA
Capacitance	$V_R = 0\text{ V}$, $f = 1.0\text{ MHz}$	C_O		25		pF
Thermal resistance		R_{th}		750		K/W

Output

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector-emitter capacitance	$V_{CE} = 5.0\text{ V}$, $f = 1.0\text{ MHz}$	C_{CE}		5.2		pF
Base - collector capacitance	$V_{CE} = 5.0\text{ V}$, $f = 1.0\text{ MHz}$	C_{BC}		6.5		pF
Emitter - base capacitance	$V_{CE} = 5.0\text{ V}$, $f = 1.0\text{ MHz}$	C_{EB}		7.5		pF
Thermal resistance		R_{th}		500		K/W

Coupler

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Saturation voltage, collector-emitter	$I_F = 10\text{ mA}$, $I_C = 2.5\text{ mA}$		V_{CEsat}		0.25	0.4	V
Coupling capacitance			C_C		0.6		pF
Collector-emitter leakage current	$V_{CE} = 10\text{ V}$	CNY17F-1	I_{CEO}		2.0	50	nA
		CNY17F-2	I_{CEO}		2.0	50	nA
		CNY17F-3	I_{CEO}		5.0	100	nA
		CNY17F-4	I_{CEO}		5.0	100	nA

Current Transfer Ratio

Current Transfer Ratio I_C/I_F at $V_{CE} = 5.0\text{ V}$, $25\text{ }^{\circ}\text{C}$ and Collector-Emitter Leakage Current by dash number

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Current Transfer Ratio	$I_F = 10\text{ mA}$	CNY17F-1	CTR	40		80	%
		CNY17F-2	CTR	63		125	%
		CNY17F-3	CTR	100		200	%
		CNY17F-4	CTR	160		320	%
	$I_F = 1.0\text{ mA}$	CNY17F-1	CTR	13	30		%
		CNY17F-2	CTR	22	45		%
		CNY17F-3	CTR	34	70		%
		CNY17F-4	CTR	56	90		%

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Switching Characteristics

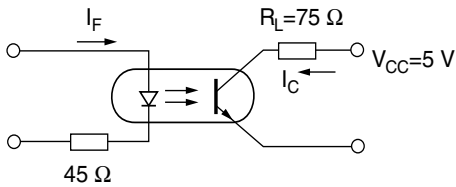
Linear operation (without saturation)

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Turn-on time	$I_F = 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 75 \text{ } \Omega$	t_{on}		3.0		μs
Rise time	$I_F = 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 75 \text{ } \Omega$	t_r		2.0		μs
Turn-off time	$I_F = 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 75 \text{ } \Omega$	t_{off}		2.3		μs
Fall time	$I_F = 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 75 \text{ } \Omega$	t_f		2.0		μs
Cut-off frequency	$I_F = 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 75 \text{ } \Omega$	f_{CO}		250		kHz

Switching operation (with saturation)

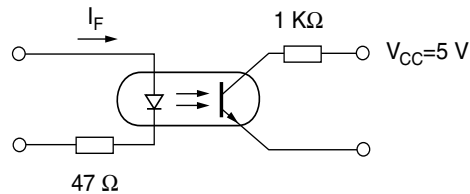
Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Turn-on time	$I_F = 20 \text{ mA}$	CNY17F-1	t_{on}		3.0		μs
	$I_F = 10 \text{ mA}$	CNY17F-2	t_{on}		4.2		μs
		CNY17F-3	t_{on}		4.2		μs
	$I_F = 5.0 \text{ mA}$	CNY17F-4	t_{on}		6.0		μs
Rise time	$I_F = 20 \text{ mA}$	CNY17F-1	t_r		2.0		μs
	$I_F = 10 \text{ mA}$	CNY17F-2	t_r		3.0		μs
		CNY17F-3	t_r		3.0		μs
	$I_F = 5.0 \text{ mA}$	CNY17F-4	t_r		4.6		μs
Turn-off time	$I_F = 20 \text{ mA}$	CNY17F-1	t_{off}		18		μs
	$I_F = 10 \text{ mA}$	CNY17F-2	t_{off}		23		μs
		CNY17F-3	t_{off}		23		μs
	$I_F = 5.0 \text{ mA}$	CNY17F-4	t_{off}		25		μs
Fall time	$I_F = 20 \text{ mA}$	CNY17F-1	t_f		11		μs
	$I_F = 10 \text{ mA}$	CNY17F-2	t_f		14		μs
		CNY17F-3	t_f		14		μs
	$I_F = 5.0 \text{ mA}$	CNY17F-4	t_f		15		μs

Typical Characteristics ($T_{amb} = 25 \text{ } ^\circ\text{C}$ unless otherwise specified)



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Figure 1. Linear Operation (without Saturation)



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Figure 2. Switching Operation (with Saturation)

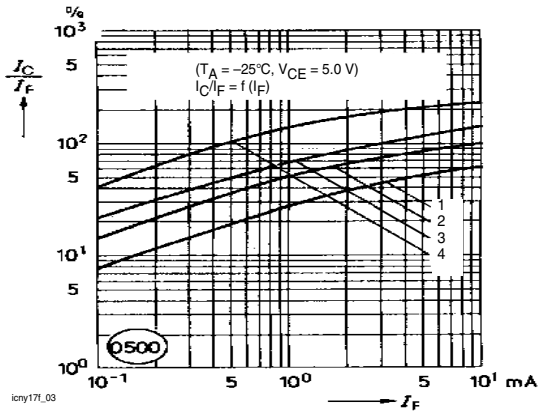


Figure 3. Current Transfer Ratio vs. Diode Current

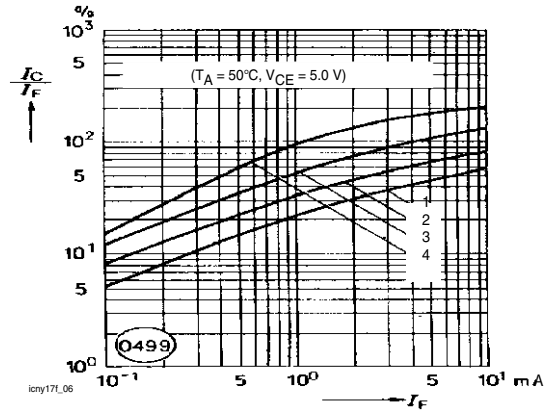


Figure 6. Current Transfer Ratio vs. Diode Current

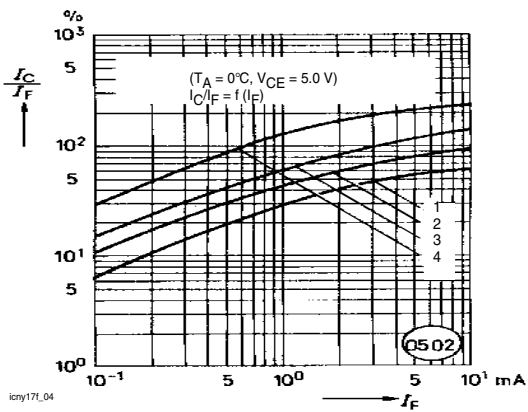


Figure 4. Current Transfer Ratio vs. Diode Current

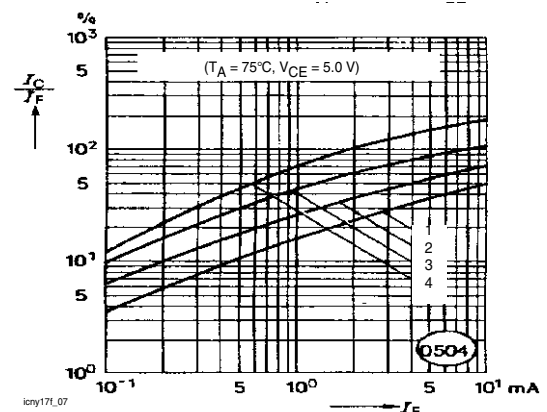


Figure 7. Current Transfer Ratio vs. Diode Current

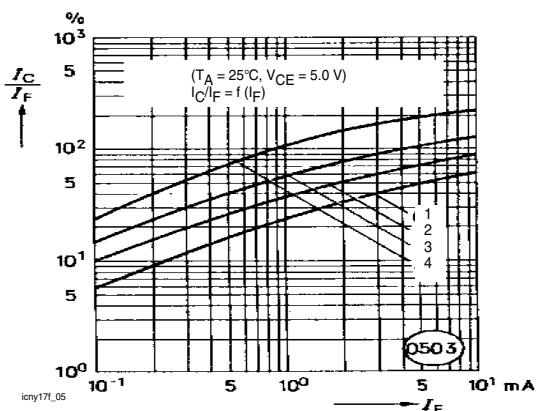


Figure 5. Current Transfer Ratio vs. Diode Current

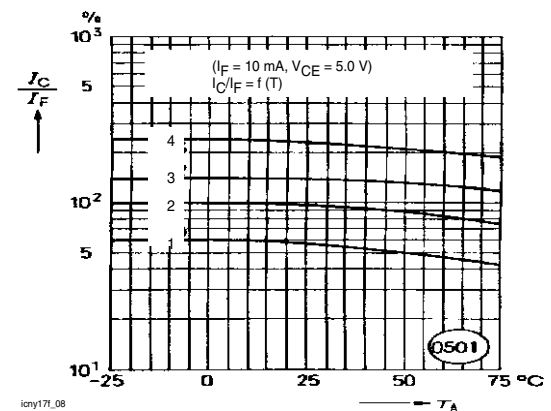


Figure 8. Current Transfer Ratio (CTR) vs. Temperature

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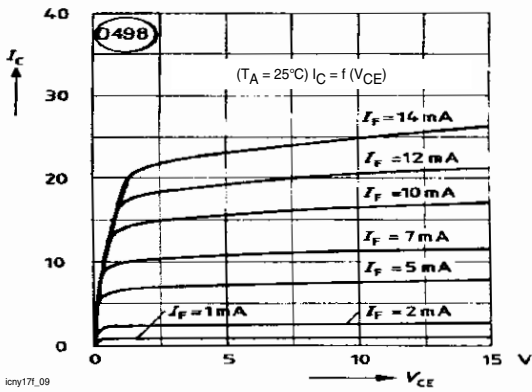


Figure 9. Output Characteristics CNY17F-2, -3

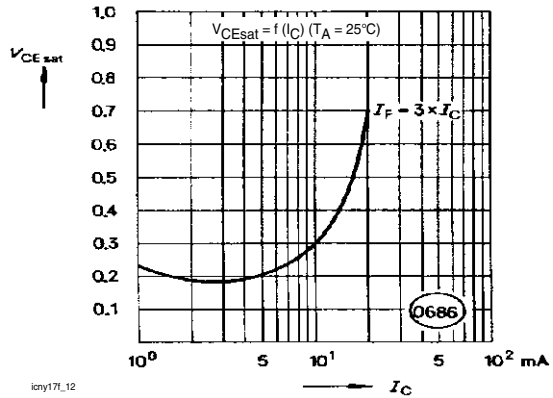


Figure 12. Saturation Voltage vs. Collector Current and Modulation Depth CNY17F-1

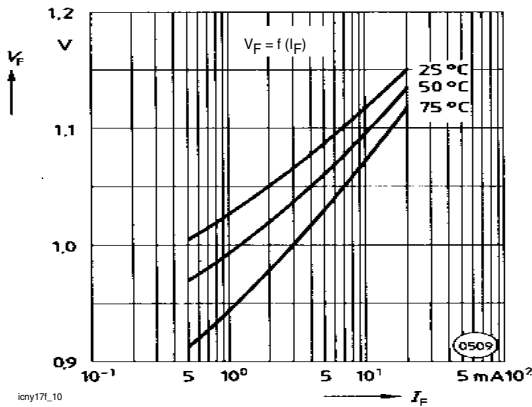


Figure 10. Forward Voltage

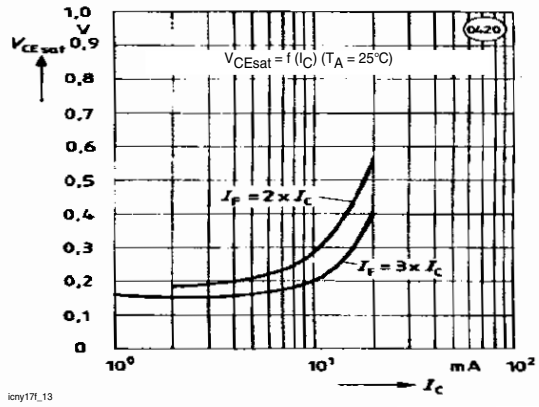


Figure 13. Saturation Voltage vs. Collector Current and Modulation Depth CNY17F-2

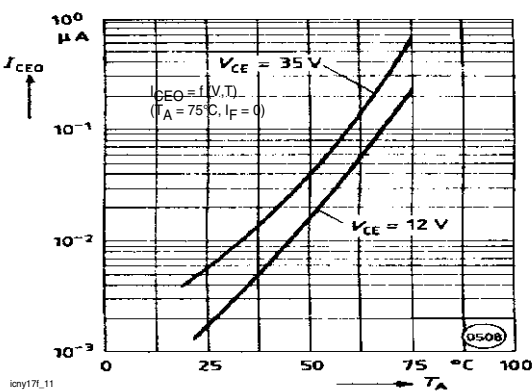


Figure 11. Collector-Emitter off-state Current

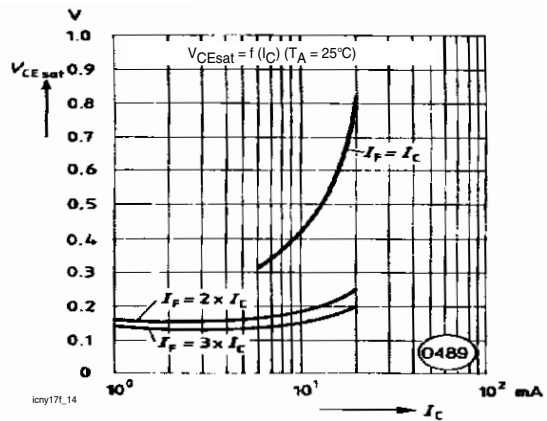


Figure 14. Saturation Voltage vs. Collector Current and Modulation Depth CNY17F-3

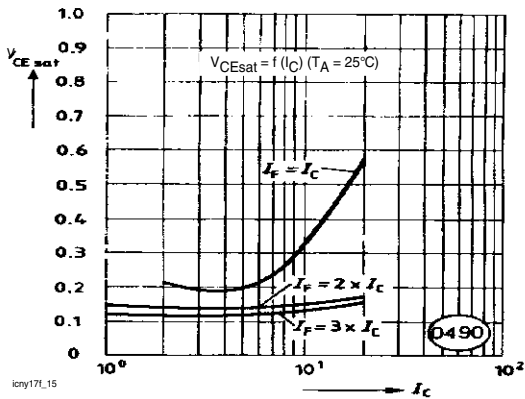


Figure 15. Saturation Voltage vs. Collector Current and Modulation Depth CNY17F-4

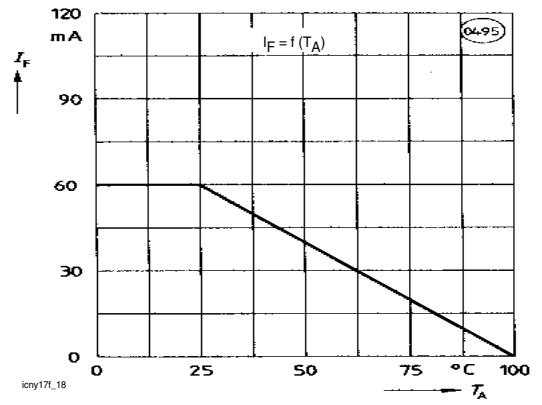


Figure 18. Permissible Forward Current Diode

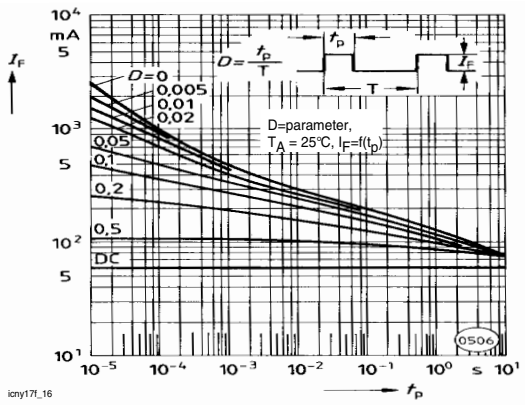


Figure 16. Permissible Pulse Load

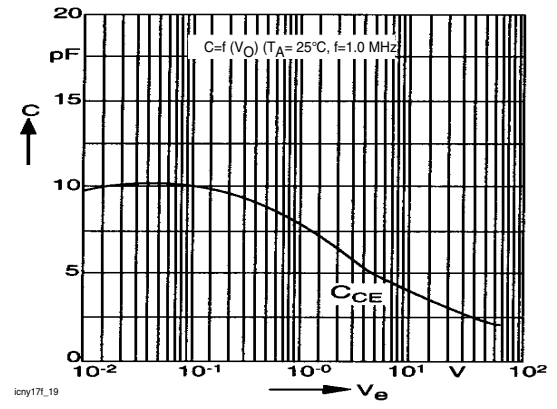


Figure 19. Transistor Capacitance

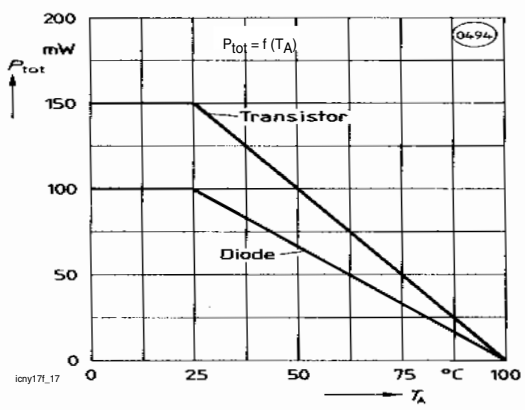
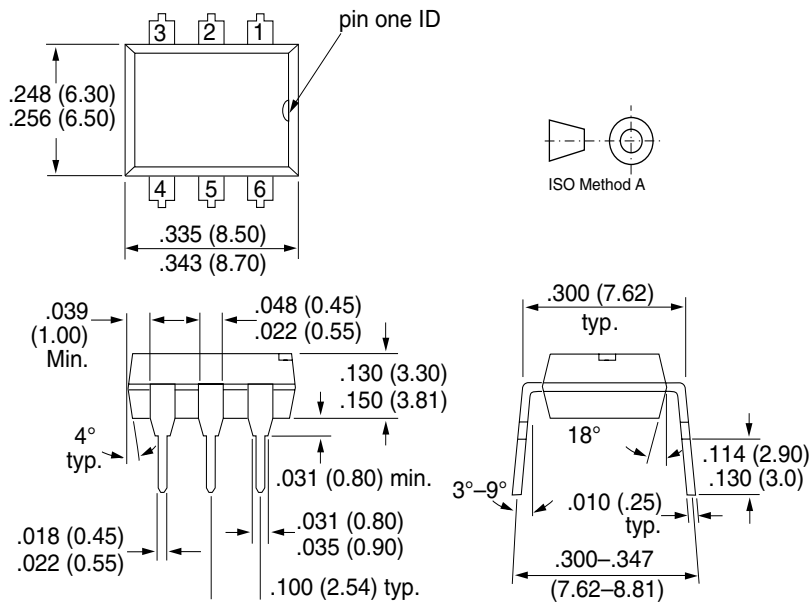


Figure 17. Permissible Power Dissipation for Transistor and Diode

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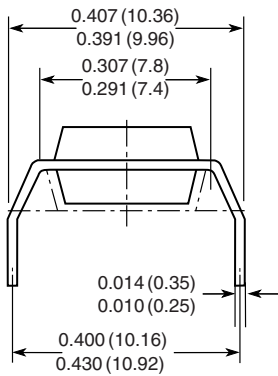
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Package Dimensions in Inches (mm)

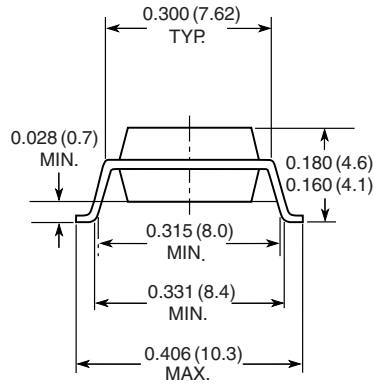


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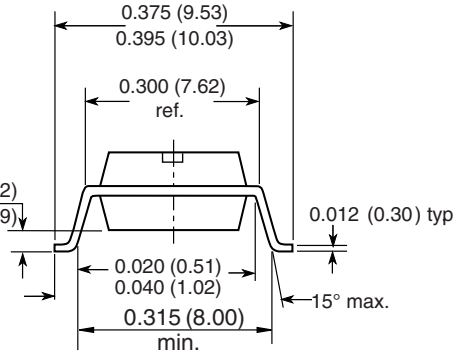
Option 6



Option 7



Option 9



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