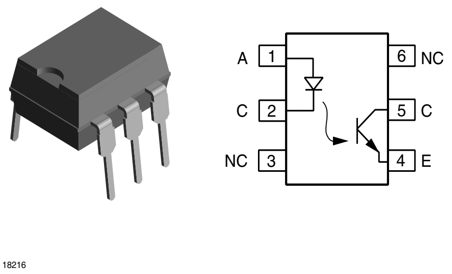
Optocoupler, Phototransistor Output, No Base Connection

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



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 af 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 conected, 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.

Absolute Maximum Ratings

T_{amb} = 25 °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 ≤ 10 µs	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 ≤ 1.0 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 V	R_{IO}	$\geq 10^{11}$	Ω
Storage temperature range		T_{stg}	- 55 to + 150	°C
Ambient temperature range		T_{amb}	- 55 to + 100	°C
Junction temperature		T_j	100	°C
Soldering temperature	max. 10 s, dip soldering: distance to seating plane ≥ 1.5 mm	T_{sld}	260	°C

Electrical Characteristics

T_{amb} = 25 °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 mA	V_F		1.25	1.65	V
Breakdown voltage	I_R = 10 µA	V_{BR}	6.0			V
Reserve current	V_R = 6.0 V	I_R		0.01	10	µA
Capacitance	V_R = 0 V, f = 1.0 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 V, f = 1.0 MHz	C_{CE}		5.2		pF
Base - collector capacitance	V_{CE} = 5.0 V, f = 1.0 MHz	C_{BC}		6.5		pF
Emitter - base capacitance	V_{CE} = 5.0 V, f = 1.0 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 mA, I_C = 2.5 mA		V_{CEsat}		0.25	0.4	V
Coupling capacitance			C_C		0.6		pF
Collector-emitter leakage current	V_{CE} = 10 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 V, 25 °C and Collector-Emitter Leakage Current by dash number

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Current Transfer Ratio	I_F = 10 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 mA	CNY17F-1	CTR	13	30		%
		CNY17F-2	CTR	22	45		%
		CNY17F-3	CTR	34	70		%
		CNY17F-4	CTR	56	90		%

Switching Characteristics

Linear operation (without saturation)

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

Switching operation (with saturation)

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

Typical Characteristics (Tamb = 25 °C unless otherwise specified)

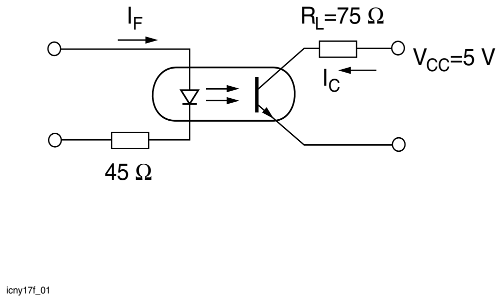


Figure 1. Linear Operation (without Saturation)

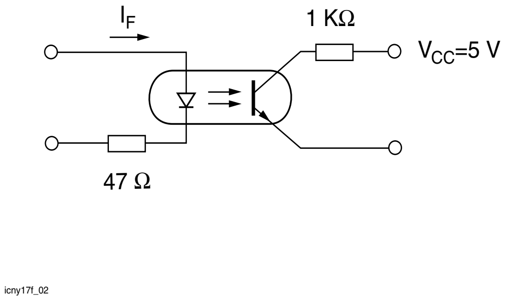


Figure 2. Switching Operation (with Saturation)

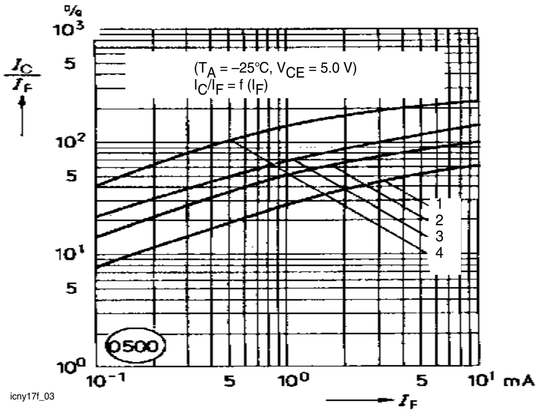


Figure 3. Current Transfer Ratio vs. Diode Current

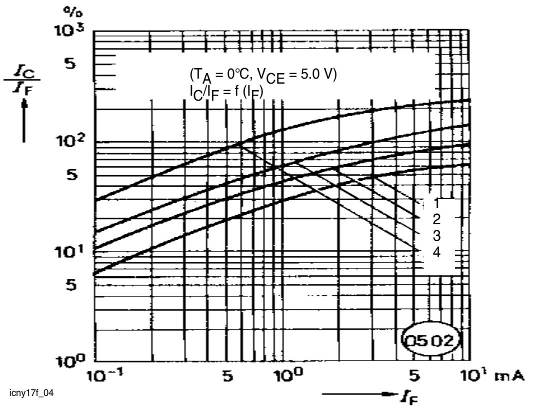


Figure 4. Current Transfer Ratio vs. Diode Current

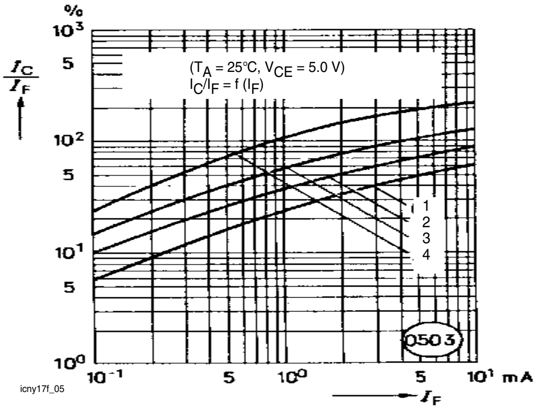


Figure 5. Current Transfer Ratio vs. Diode Current

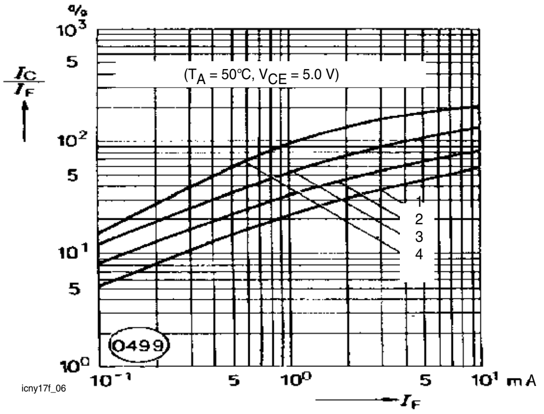


Figure 6. Current Transfer Ratio vs. Diode Current

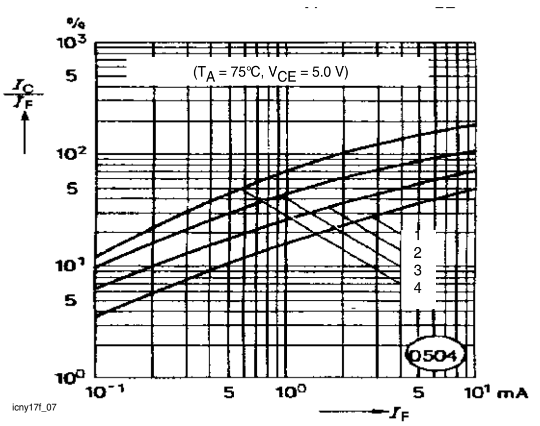


Figure 7. Current Transfer Ratio vs. Diode Current

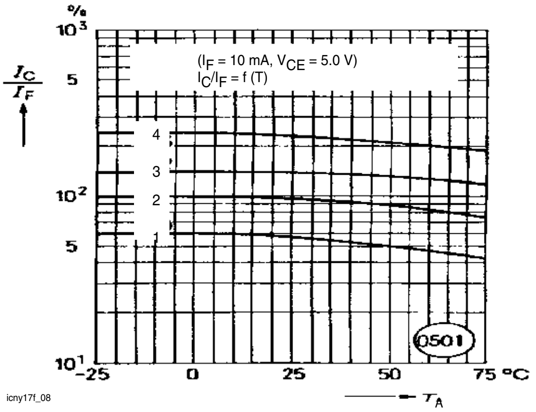


Figure 8. Current Transfer Ratio (CTR) vs. Temperature

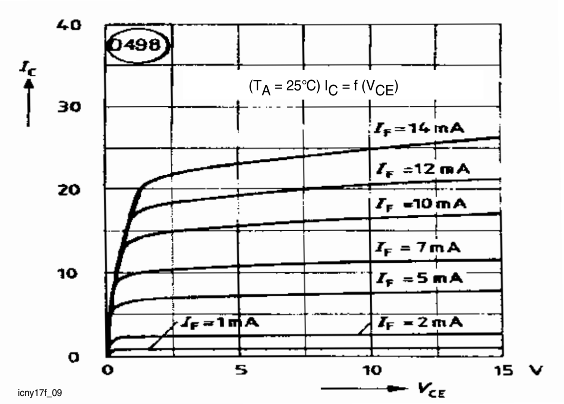


Figure 9. Output Characteristics CNY17F-2, -3

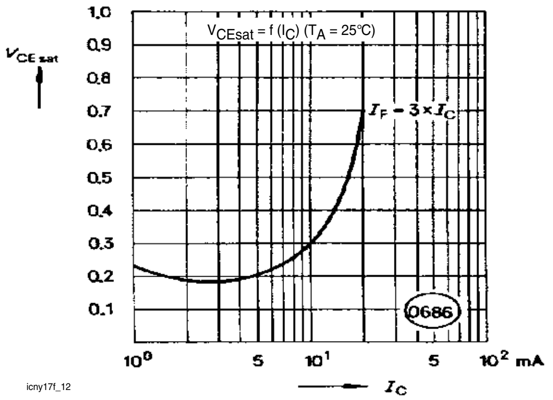


Figure 12. Saturation Voltage vs. Collector Current and Modulation Depth CNY17F-1

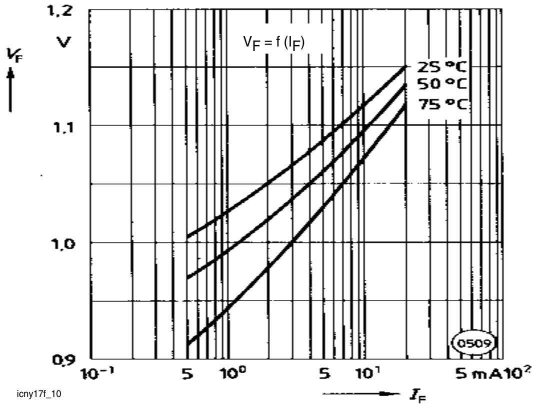


Figure 10. Forward Voltage

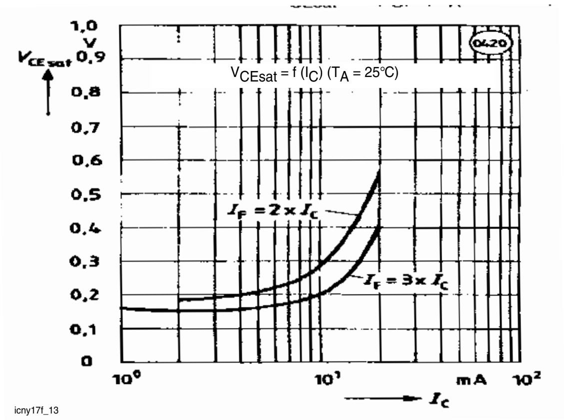


Figure 13. Saturation Voltage vs. Collector Current and Modulation Depth CNY17F-2

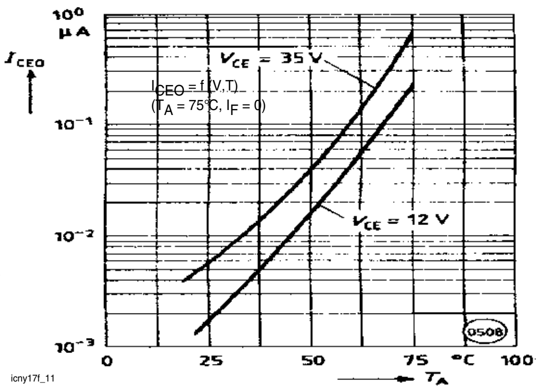


Figure 11. Collector-Emitter off-state Current

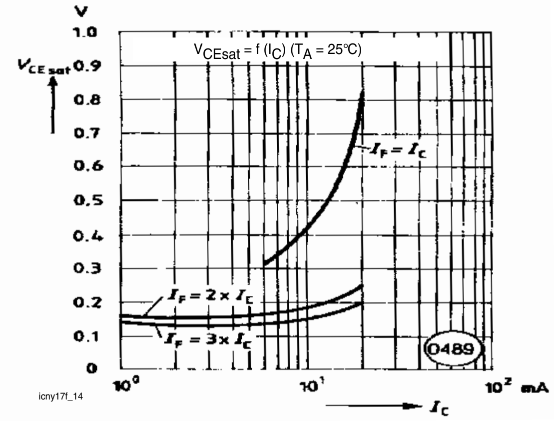


Figure 14. Saturation Voltage vs. Collector Current and Modulation Depth CNY17F-3

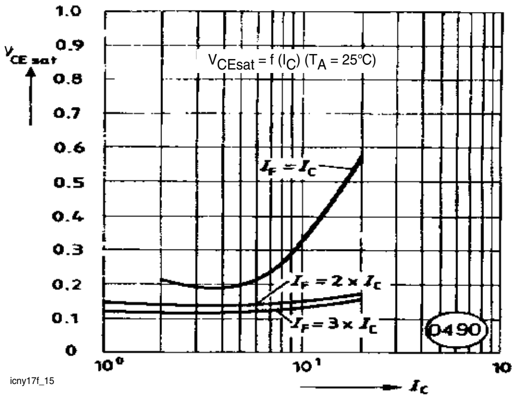


Figure 15. Saturation Voltage vs. Collector Current and Modulation Depth CNY17F-4

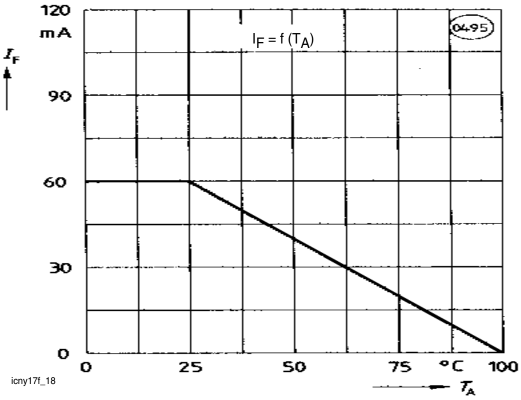


Figure 18. Permissible Forward Current Diode

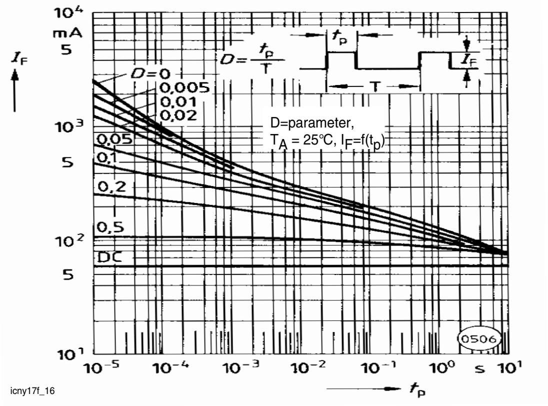


Figure 16. Permissible Pulse Load

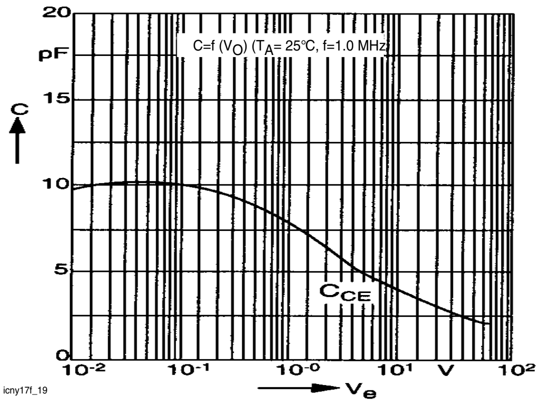


Figure 19. Transistor Capacitance

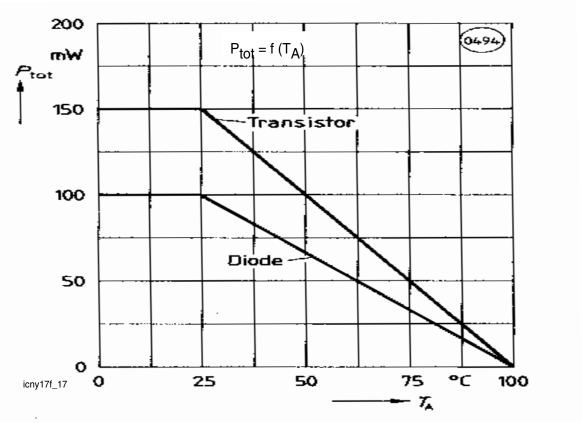
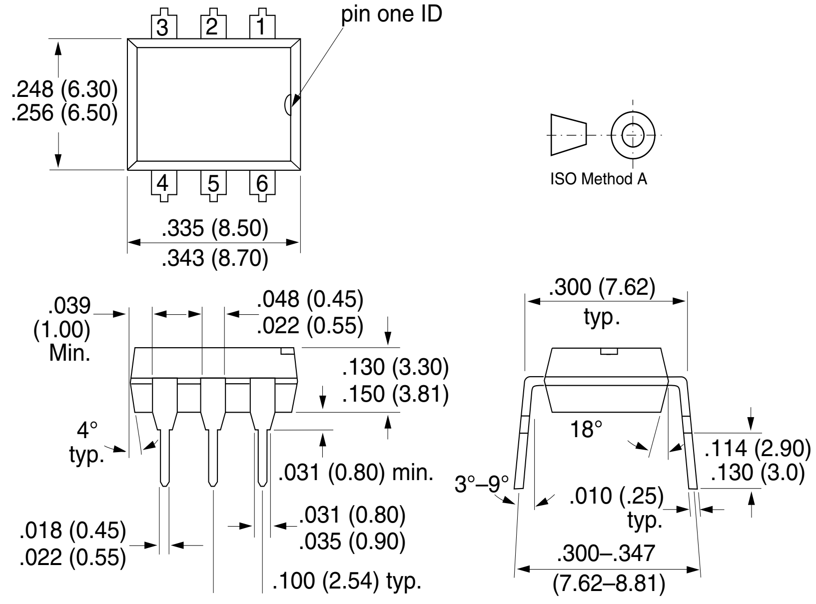


Figure 17. Permissible Power Dissipation for Transistor and Diode

Package Dimensions in Inches (mm)



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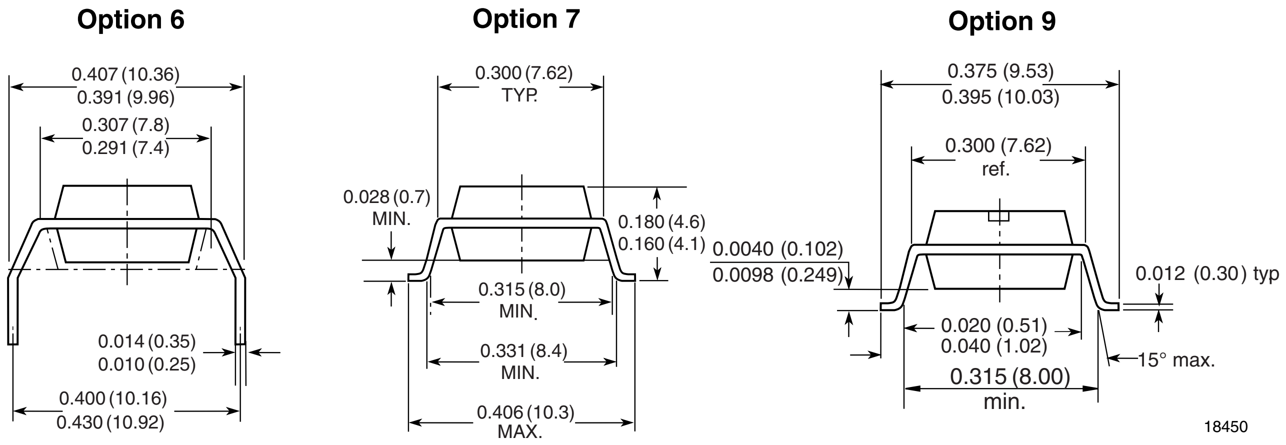
Option 6

Option 7

Option 9

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