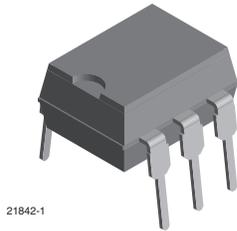
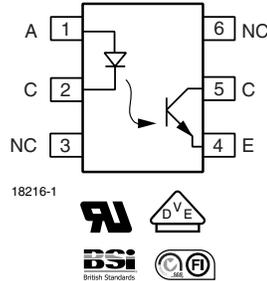


# Optocoupler, Phototransistor Output, no Base Connection



21842-1



18216-1



## FEATURES

- Isolation test voltage, 5300 V<sub>RMS</sub>
- No base terminal connection for improved common mode interface immunity
- Long term stability
- Industry standard dual-in-line package
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC


**RoHS**  
COMPLIANT

## AGENCY APPROVALS

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

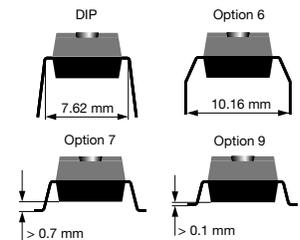
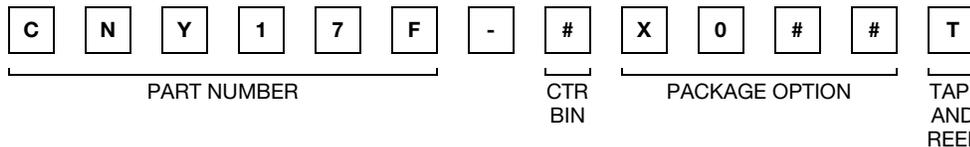
## DESCRIPTION

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.

## ORDERING INFORMATION



AGENCY CERTIFIED/PACKAGE	CTR (%)			
	40 to 80	63 to 125	100 to 200	160 to 320
<b>UL, BSI, FIMKO</b>	<b>40 to 80</b>	<b>63 to 125</b>	<b>100 to 200</b>	<b>160 to 320</b>
DIP-6	CNY17F-1	CNY17F-2	CNY17F-3	CNY17F-4
DIP-6, 400 mil, option 6	CNY17F-1X006	CNY17F-2X006	CNY17F-3X006	CNY17F-4X006
SMD-6, option 7	CNY17F-1X007 <sup>(1)</sup>	CNY17F-2X007T <sup>(1)</sup>	CNY17F-3X007T <sup>(1)</sup>	CNY17F-4X007T <sup>(1)</sup>
SMD-6, option 9	CNY17F-1X009T <sup>(1)</sup>	CNY17F-2X009T <sup>(1)</sup>	CNY17F-3X009T <sup>(1)</sup>	CNY17F-4X009T <sup>(1)</sup>
<b>VDE, UL, BSI, FIMKO</b>	<b>40 to 80</b>	<b>63 to 125</b>	<b>100 to 200</b>	<b>160 to 320</b>
DIP-6	CNY17F-1X001	CNY17F-2X001	CNY17F-3X001	CNY17F-4X001
DIP-6, 400 mil, option 6	CNY17F-1X016	CNY17F-2X016	CNY17F-3X016	CNY17F-4X016
SMD-6, option 7	CNY17F-1X017 <sup>(1)</sup>	CNY17F-2X017 <sup>(1)</sup>	CNY17F-3X017 <sup>(1)</sup>	CNY17F-4X017 <sup>(1)</sup>
SMD-6, option 9	CNY17F-1X019	CNY17F-2X019 <sup>(1)</sup>	CNY17F-3X019 <sup>(1)</sup>	-

## Note

<sup>(1)</sup> Also available in tubes; do not put T on end.

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<b>ABSOLUTE MAXIMUM RATINGS (1)</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		$V_R$	6	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
<b>OUTPUT</b>				
Collector emitter breakdown voltage		$BV_{CEO}$	70	V
Collector current		$I_C$	50	mA
	$t \leq 1\text{ ms}$	$I_C$	100	mA
Total power dissipation		$P_{diss}$	150	mW
<b>COUPLER</b>				
Isolation test voltage between emitter and detector		$V_{ISO}$	5300	$V_{RMS}$
Creepage distance			$\geq 7$	mm
Clearance distance			$\geq 7$	mm
Isolation thickness between emitter and detector			$\geq 0.4$	mm
Comparative tracking index per DIN IEC 112/VDE 0303, part 1			175	
Isolation resistance	$V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
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 (2)	max. 10 s, dip soldering: distance to seating plane $\geq 1.5\text{ mm}$	$T_{sld}$	260	$^{\circ}\text{C}$

### Note

(1) 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.

(2) Refer to reflow profile for soldering conditions for surface mounted parts (SMD). Refer to wave profile for soldering conditions for through hole parts (DIP).

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>							
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			V
Reverse current	$V_R = 6\text{ V}$		$I_R$		0.01	10	$\mu\text{A}$
Capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$		$C_O$		25		pF
Thermal resistance			$R_{th}$		750		K/W
<b>OUTPUT</b>							
Collector emitter capacitance	$V_{CE} = 5\text{ V}$ , $f = 1\text{ MHz}$		$C_{CE}$		5.2		pF
Base collector capacitance	$V_{CE} = 5\text{ V}$ , $f = 1\text{ MHz}$		$C_{BC}$		6.5		pF
Emitter base capacitance	$V_{CE} = 5\text{ V}$ , $f = 1\text{ MHz}$		$C_{EB}$		7.5		pF
Thermal resistance			$R_{th}$		500		K/W
<b>COUPLER</b>							
Collector emitter, saturation voltage	$I_F = 10\text{ mA}$ , $I_C = 2.5\text{ mA}$		$V_{CEsat}$		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	50	nA
		CNY17F-2	$I_{CEO}$		2	50	nA
		CNY17F-3	$I_{CEO}$		5	100	nA
		CNY17F-4	$I_{CEO}$		5	100	nA

### Note

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



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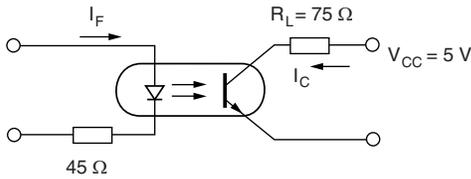
<b>CURRENT TRANSFER RATIO</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
$I_C/I_F$	$I_F = 10 \text{ mA}$	CNY17F-1	CTR	40		80	%
		CNY17F-2	CTR	63		125	%
		CNY17F-3	CTR	100		200	%
		CNY17F-4	CTR	160		320	%
	$I_F = 1 \text{ mA}$	CNY17F-1	CTR	13	30		%
		CNY17F-2	CTR	22	45		%
		CNY17F-3	CTR	34	70		%
		CNY17F-4	CTR	56	90		%

**Note**

- Current transfer ratio  $I_C/I_F$  at  $V_{CE} = 5 \text{ V}$ ,  $25 \text{ }^\circ\text{C}$  and collector emitter leakage current by dash number.

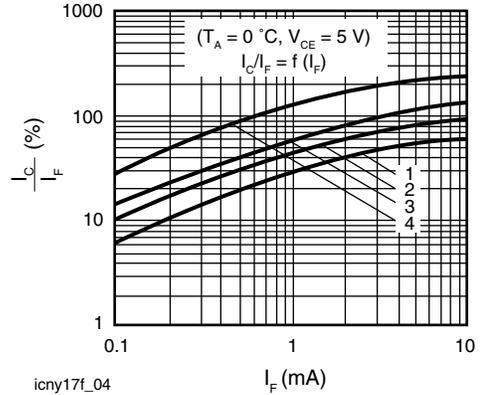
<b>SWITCHING CHARACTERISTICS</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>LINEAR OPERATION (without saturation)</b>							
Turn-on time	$I_F = 10 \text{ mA}$ , $V_{CC} = 5 \text{ V}$ , $R_L = 75 \text{ } \Omega$		$t_{on}$		3		$\mu\text{s}$
Rise time	$I_F = 10 \text{ mA}$ , $V_{CC} = 5 \text{ V}$ , $R_L = 75 \text{ } \Omega$		$t_r$		2		$\mu\text{s}$
Turn-off time	$I_F = 10 \text{ mA}$ , $V_{CC} = 5 \text{ V}$ , $R_L = 75 \text{ } \Omega$		$t_{off}$		2.3		$\mu\text{s}$
Fall time	$I_F = 10 \text{ mA}$ , $V_{CC} = 5 \text{ V}$ , $R_L = 75 \text{ } \Omega$		$t_f$		2		$\mu\text{s}$
Cut-off frequency	$I_F = 10 \text{ mA}$ , $V_{CC} = 5 \text{ V}$ , $R_L = 75 \text{ } \Omega$		$f_{CO}$		250		kHz
<b>SWITCHING OPERATION (with saturation)</b>							
Turn-on time	$I_F = 20 \text{ mA}$	CNY17F-1	$t_{on}$		3		$\mu\text{s}$
	$I_F = 10 \text{ mA}$	CNY17F-2	$t_{on}$		4.2		$\mu\text{s}$
		CNY17F-3	$t_{on}$		4.2		$\mu\text{s}$
		CNY17F-4	$t_{on}$		6		$\mu\text{s}$
Rise time	$I_F = 20 \text{ mA}$	CNY17F-1	$t_r$		2		$\mu\text{s}$
	$I_F = 10 \text{ mA}$	CNY17F-2	$t_r$		3		$\mu\text{s}$
		CNY17F-3	$t_r$		3		$\mu\text{s}$
		CNY17F-4	$t_r$		4.6		$\mu\text{s}$
Turn-off time	$I_F = 20 \text{ mA}$	CNY17F-1	$t_{off}$		18		$\mu\text{s}$
	$I_F = 10 \text{ mA}$	CNY17F-2	$t_{off}$		23		$\mu\text{s}$
		CNY17F-3	$t_{off}$		23		$\mu\text{s}$
		CNY17F-4	$t_{off}$		25		$\mu\text{s}$
Fall time	$I_F = 20 \text{ mA}$	CNY17F-1	$t_f$		11		$\mu\text{s}$
	$I_F = 10 \text{ mA}$	CNY17F-2	$t_f$		14		$\mu\text{s}$
		CNY17F-3	$t_f$		14		$\mu\text{s}$
		CNY17F-4	$t_f$		15		$\mu\text{s}$

**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)



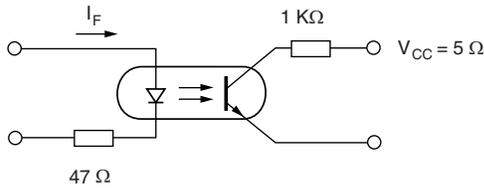
icny17f\_01

Fig. 1 - Linear Operation (without Saturation)



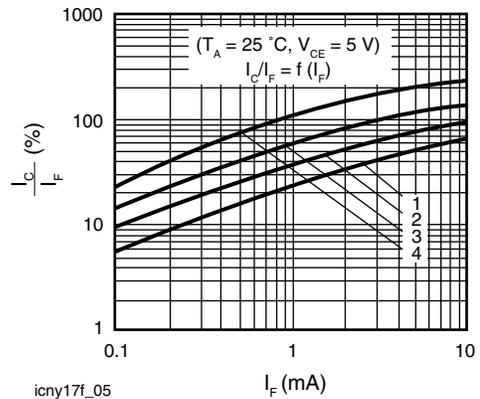
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Fig. 4 - Current Transfer Ratio vs. Diode Current



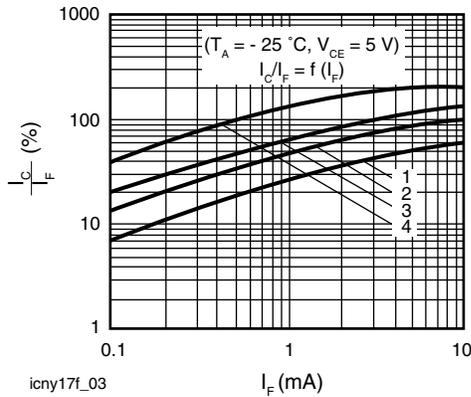
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Fig. 2 - Switching Operation (with Saturation)



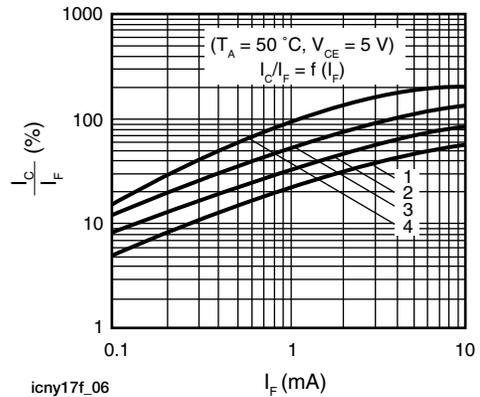
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Fig. 5 - Current Transfer Ratio vs. Diode Current



icny17f\_03

Fig. 3 - Current Transfer Ratio vs. Diode Current



icny17f\_06

Fig. 6 - Current Transfer Ratio vs. Diode Current

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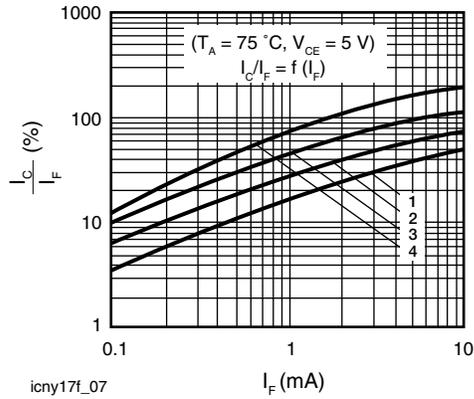


Fig. 7 - Current Transfer Ratio vs. Diode Current

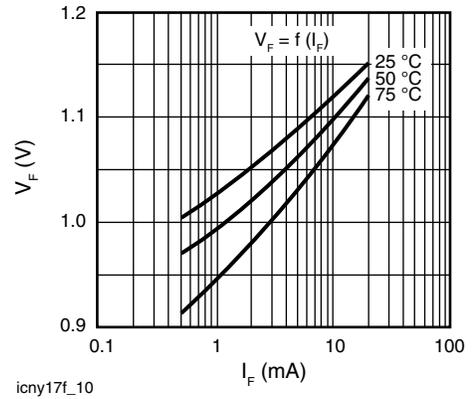


Fig. 10 - Forward Voltage

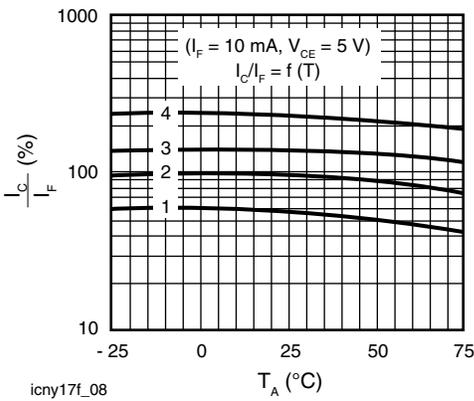


Fig. 8 - Current Transfer Ratio (CTR) vs. Temperature

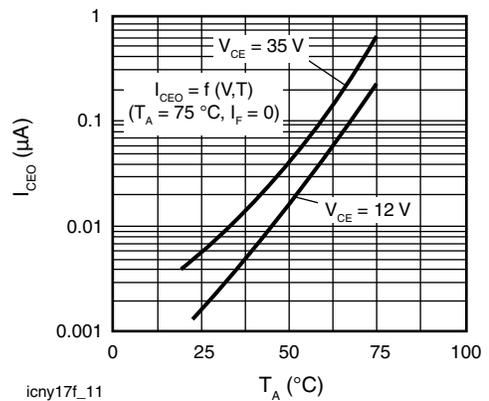


Fig. 11 - Collector Emitter Off-state Current

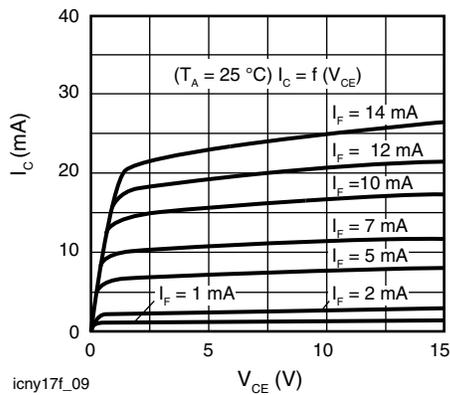


Fig. 9 - Output Characteristics CNY17F-2, -3

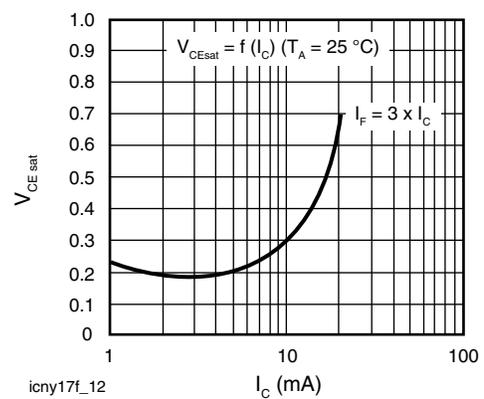


Fig. 12 - Saturation Voltage vs. Collector Current and Modulation Depth CNY17F-1

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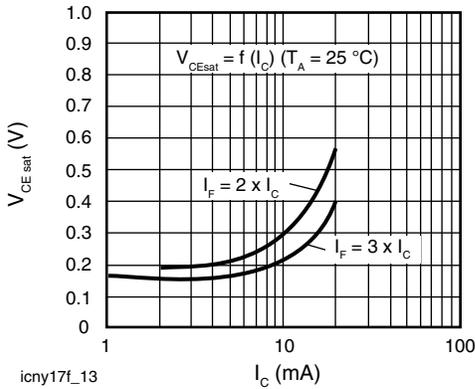


Fig. 13 - Saturation Voltage vs. Collector Current and Modulation Depth CNY17F-2

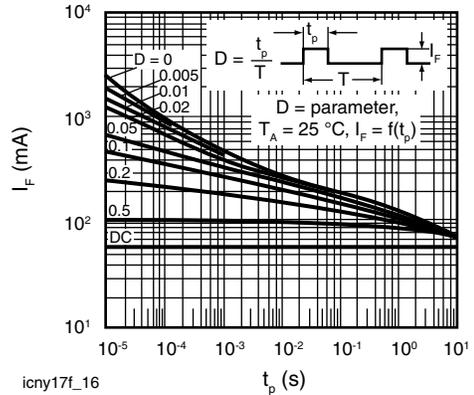


Fig. 16 - Permissible Pulse Load

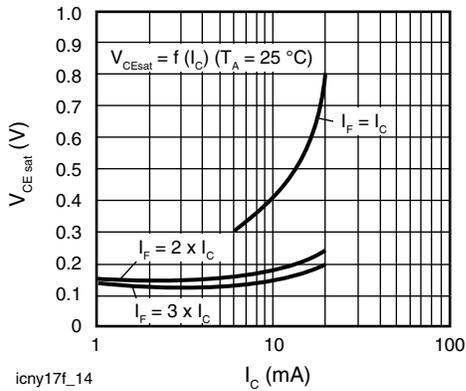


Fig. 14 - Saturation Voltage vs. Collector Current and Modulation Depth CNY17F-3

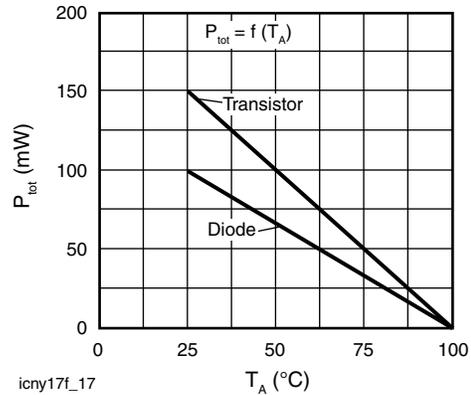


Fig. 17 - Permissible Power Dissipation for Transistor and Diode

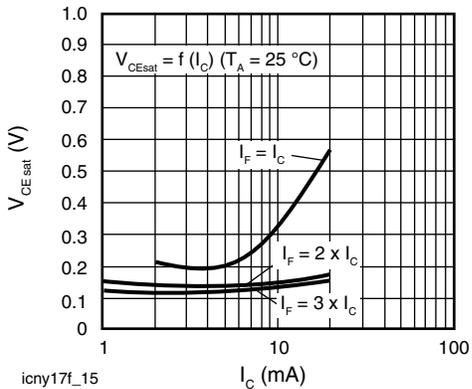


Fig. 15 - Saturation Voltage vs. Collector Current and Modulation Depth CNY17F-4

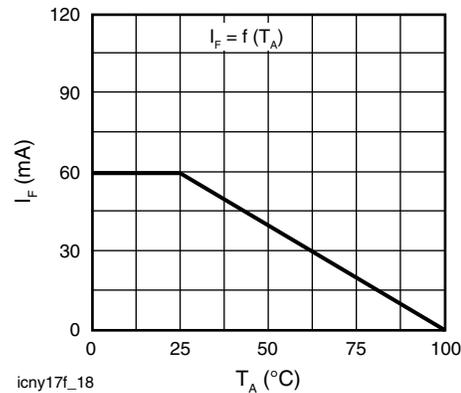


Fig. 18 - Permissible Forward Current Diode

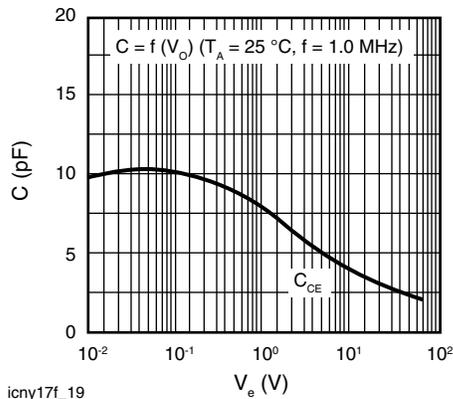
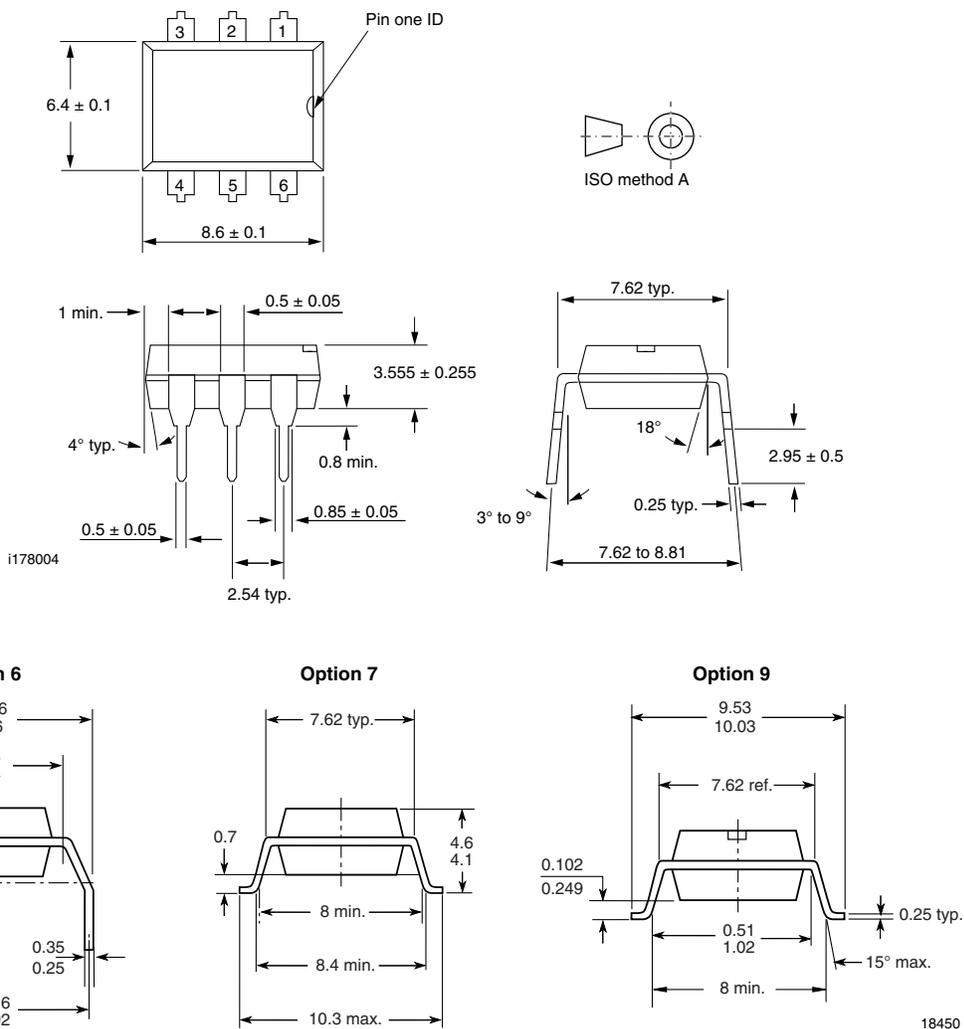


Fig. 19 - Transistor Capacitance

**PACKAGE DIMENSIONS** in millimeters




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