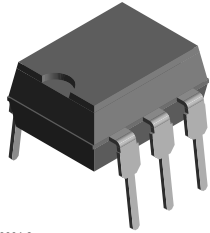
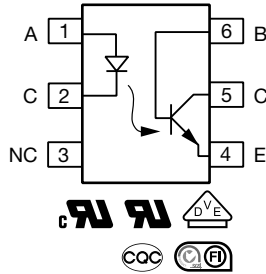


# Optocoupler, Phototransistor Output, Low Input Current, With Base Connection, 5300 V<sub>RMS</sub>



i179004-3



## FEATURES

- Very high CTR at  $I_F = 1.0 \text{ mA}$ ,  $V_{CE} = 0.5 \text{ V}$
- Specified minimum CTR at  $I_F = 0.5 \text{ mA}$
- $V_{CE} = 1.5 \text{ V} \geq 32 \%$  (typ. 120 %)
- Good CTR linearity with forward current
- Low CTR degradation
- High collector-emitter voltage,  $V_{CEO} = 55 \text{ V}$
- Isolation test voltage: 5300 V<sub>RMS</sub>
- Low current input
- Low coupling capacitance
- High common mode transient immunity
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS COMPLIANT

## LINKS TO ADDITIONAL RESOURCES



Product Page

## DESCRIPTION

The SFH608 is an optocoupler designed for high current transfer ratio at low input currents with the output transistor saturated. This makes the device ideal for low current switching applications. The SFH608 is packaged in a six pin plastic DIP.

## AGENCY APPROVALS

- [UL 1577](#)
- [cUL](#)
- [DIN EN 60747-5-5 \(VDE 0884\)](#), available with option 1
- [BSI](#)
- [CQC GB4943.1](#)
- [CQC GB8898](#)
- [FIMKO](#)

## APPLICATIONS

- Telecommunications
- Industrial controls
- Office machines
- Microprocessor system interfaces

ORDERING INFORMATION				
S	F	H	6	0
8	-	#	X	0
#	#	#	T	
PART NUMBER			CTR BIN	PACKAGE OPTION
			TAPE AND REEL	
AGENCY CERTIFIED / PACKAGE	CTR (%)			
UL, cUL, BSI, CQC	63 to 125	100 to 200	160 to 320	250 to 500
DIP-6	SFH608-2	SFH608-3	SFH608-4	SFH608-5
DIP-6, 400 mil, option 6	SFH608-2X006	SFH608-3X006	-	-
SMD-6, option 7	-	SFH608-3X007 <sup>(1)</sup>	SFH608-4X007 <sup>(1)</sup>	SFH608-5X007
UL, cUL, BSI, CQC, VDE (option 1)	63 to 125	100 to 200	160 to 320	250 to 500
DIP-6	-	SFH608-3X001	SFH608-4X001	-
DIP-6, 400 mil, option 6	-	-	SFH608-4X016	-

## Notes

- Additional options may be possible, please contact sales office
- <sup>(1)</sup> Also available in tubes; do not add T to end



ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		V <sub>R</sub>	6	V
DC forward current		I <sub>F</sub>	50	mA
Surge forward current	t <sub>p</sub> ≤ 10 μs	I <sub>FSM</sub>	2.5	A
Total power dissipation		P <sub>diss</sub>	70	mW
<b>OUTPUT</b>				
Collector emitter voltage		V <sub>CE</sub>	55	V
Collector base voltage		V <sub>CBO</sub>	55	V
Emitter base voltage		V <sub>EBO</sub>	7	V
Collector current		I <sub>C</sub>	50	mA
Surge collector current	t <sub>p</sub> ≤ 1.0 ms		100	mA
Total power dissipation		P <sub>diss</sub>	150	mW
<b>COUPLER</b>				
Storage temperature range		T <sub>stg</sub>	-55 to +150	°C
Operating temperature range		T <sub>amb</sub>	-55 to +100	°C
Soldering temperature <sup>(1)</sup>	Max. 10 s, dip soldering; distance to seating plane ≥ 1.5 mm	T <sub>slid</sub>	260	°C

**Notes**

- 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.
- <sup>(1)</sup> Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>							
Forward voltage	I <sub>F</sub> = 5 mA		V <sub>F</sub>	-	1.1	1.5	V
Reverse voltage	I <sub>R</sub> = 10 μA		V <sub>R</sub>	6	-	-	V
Reverse current	V <sub>R</sub> = 6 V		I <sub>R</sub>	-	0.01	10	μA
Capacitance	V <sub>R</sub> = 0 V, f = 1 MHz		C <sub>O</sub>	-	25	-	pF
Thermal resistance			R <sub>thja</sub>	-	1070	-	K/W
<b>OUTPUT</b>							
Collector emitter voltage	I <sub>CE</sub> = 10 μA		V <sub>CEO</sub>	55	-	-	V
Emitter base voltage	I <sub>EB</sub> = 10 μA		V <sub>EBO</sub>	7	-	-	V
Collector emitter capacitance	V <sub>CE</sub> = 5 V, f = 1 MHz		C <sub>CE</sub>	-	10	-	pF
Collector base capacitance	V <sub>CE</sub> = 5 V, f = 1 MHz		C <sub>CB</sub>	-	16	-	pF
Emitter base capacitance	V <sub>CE</sub> = 5 V, f = 1 MHz		C <sub>EB</sub>	-	10	-	pF
Thermal resistance			R <sub>thja</sub>	-	500	-	K/W
Collector emitter leakage current	V <sub>CE</sub> = 10 V		I <sub>CEO</sub>	-	10	200	nA
<b>COUPLER</b>							
Coupling capacitance			C <sub>C</sub>	-	0.6	-	pF
Saturation voltage, collector emitter	I <sub>C</sub> = 0.32 mA, I <sub>F</sub> = 1 mA	SFH608-2	V <sub>CEsat</sub>	-	0.25	0.4	V
	I <sub>C</sub> = 0.5 mA, I <sub>F</sub> = 1 mA	SFH608-3	V <sub>CEsat</sub>	-	0.25	0.4	V
	I <sub>C</sub> = 0.8 mA, I <sub>F</sub> = 1 mA	SFH608-4	V <sub>CEsat</sub>	-	0.25	0.4	V
	I <sub>C</sub> = 1.25 mA, I <sub>F</sub> = 1 mA	SFH608-5	V <sub>CEsat</sub>	-	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							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Coupling transfer ratio	$I_F = 1 \text{ mA}, V_{CC} = 0.5 \text{ V}$	SFH608-2	CTR	63	-	125	%
	$I_F = 0.5 \text{ mA}, V_{CC} = 1.5 \text{ V}$	SFH608-2	CTR	32	75	-	%
	$I_F = 1 \text{ mA}, V_{CC} = 0.5 \text{ V}$	SFH608-3	CTR	100	-	200	%
	$I_F = 0.5 \text{ mA}, V_{CC} = 1.5 \text{ V}$	SFH608-3	CTR	50	120	-	%
	$I_F = 1 \text{ mA}, V_{CC} = 0.5 \text{ V}$	SFH608-4	CTR	160	-	320	%
	$I_F = 0.5 \text{ mA}, V_{CC} = 1.5 \text{ V}$	SFH608-4	CTR	80	200	-	%
	$I_F = 1 \text{ mA}, V_{CC} = 0.5 \text{ V}$	SFH608-5	CTR	250	-	500	%
	$I_F = 0.5 \text{ mA}, V_{CC} = 1.5 \text{ V}$	SFH608-5	CTR	125	300	-	%

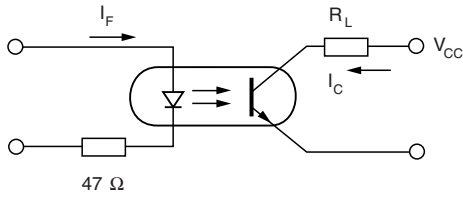
SWITCHING CHARACTERISTICS							
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT	
Turn-on time	$I_C = 2 \text{ mA}$ (to adjust by $I_F$ ), $R_L = 100 \Omega, V_{CC} = 5 \text{ V}$	$t_{on}$	-	8	-	$\mu\text{s}$	
Rise time	$I_C = 2 \text{ mA}$ (to adjust by $I_F$ ), $R_L = 100 \Omega, V_{CC} = 5 \text{ V}$	$t_r$	-	5	-	$\mu\text{s}$	
Turn-off time	$I_C = 2 \text{ mA}$ (to adjust by $I_F$ ), $R_L = 100 \Omega, V_{CC} = 5 \text{ V}$	$t_{off}$	-	7.5	-	$\mu\text{s}$	
Fall time	$I_C = 2 \text{ mA}$ (to adjust by $I_F$ ), $R_L = 100 \Omega, V_{CC} = 5 \text{ V}$	$t_f$	-	7	-	$\mu\text{s}$	

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	$t = 1 \text{ min}$	$V_{ISO}$	4420	$V_{RMS}$
Maximum transient isolation voltage		$V_{IOTM}$	8000	V
Maximum repetitive peak isolation voltage		$V_{IORM}$	890	V
Isolation resistance	$V_{IO} = 500 \text{ V}, T_{amb} = 25 \text{ }^\circ\text{C}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$V_{IO} = 500 \text{ V}, T_{amb} = 100 \text{ }^\circ\text{C}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Output safety power		$P_{SO}$	700	mW
Input safety current		$I_{SI}$	400	mA
Input safety temperature		$T_{SI}$	175	$^\circ\text{C}$
Creepage distance	Standard DIP-4		$\geq 7$	mm
Clearance distance	Standard DIP-4		$\geq 7$	mm
Creepage distance	400 mil DIP-4		$\geq 8$	mm
Clearance distance	400 mil DIP-4		$\geq 8$	mm
Insulation thickness		DTI	$\geq 0.4$	mm

**Note**

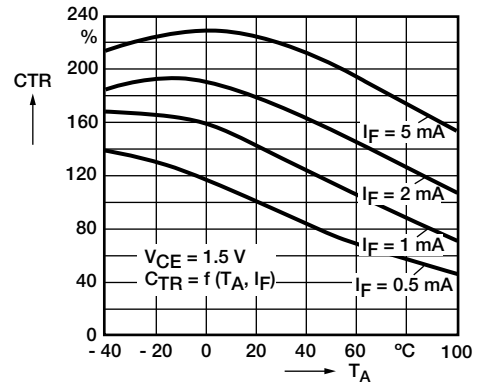
- As per IEC 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for "safe electrical insulation" only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

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



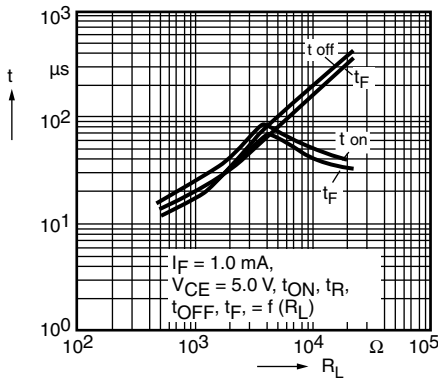
isfh608\_01

Fig. 1 - Switching Schematic



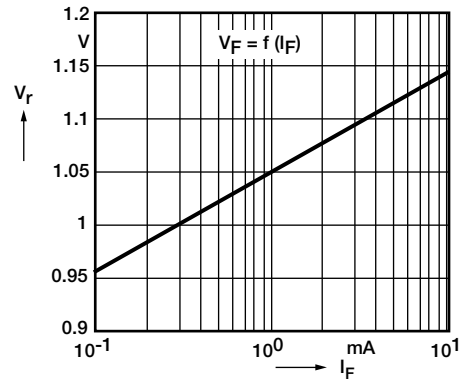
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Fig. 4 - Current Transfer Ratio (typ.)



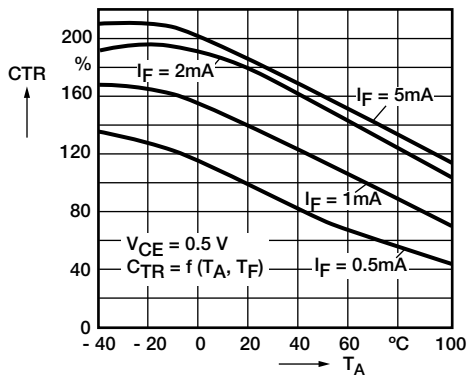
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Fig. 2 - Switching Times



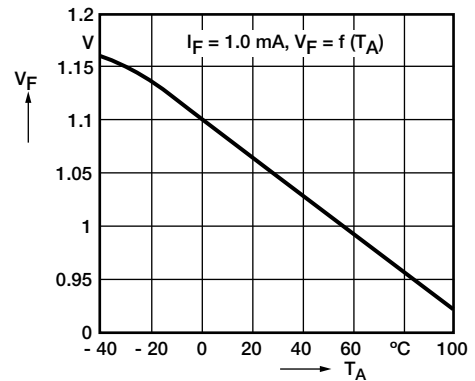
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Fig. 5 - Diode Forward Voltage (typ.)



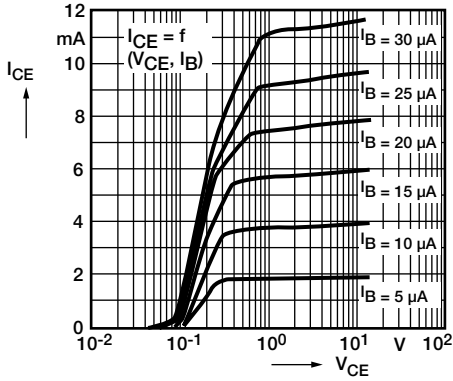
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Fig. 3 - Current Transfer Ratio (typ.)



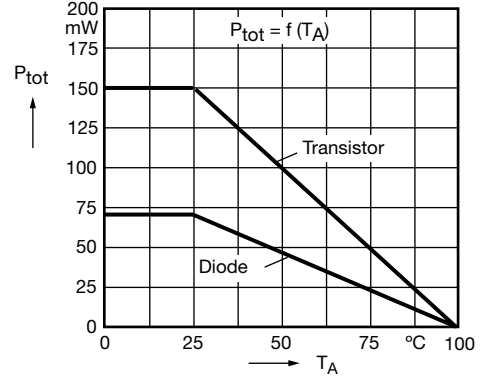
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Fig. 6 - Diode Forward Voltage (typ.)



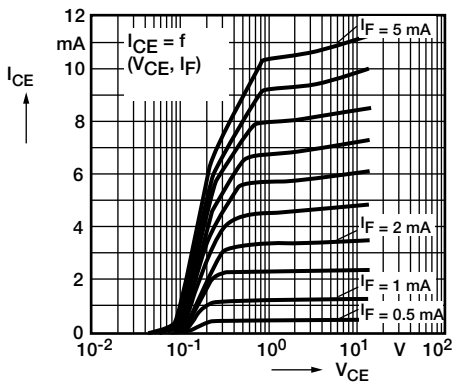
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Fig. 7 - Output Characteristics



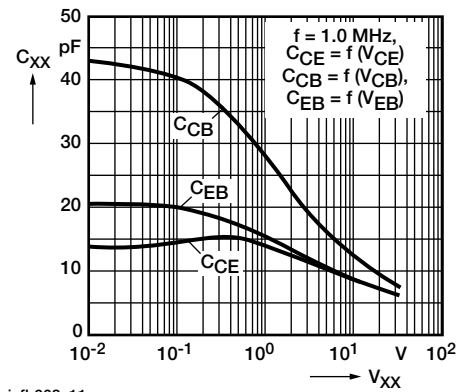
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Fig. 10 - Permissible Power Dissipation for Transistor and Diode



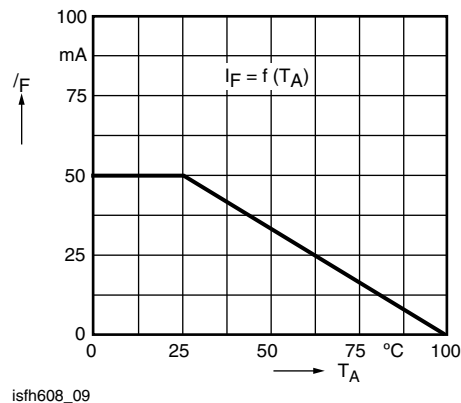
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Fig. 8 - Output Characteristics



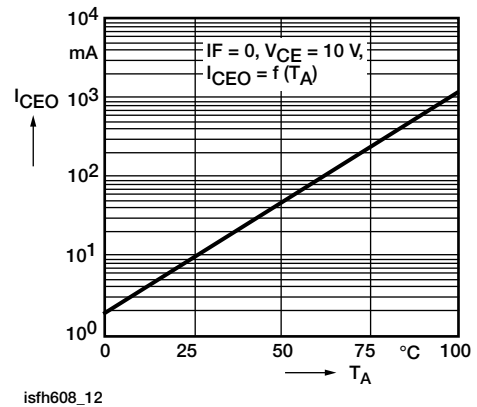
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Fig. 11 - Transistor Capacitance



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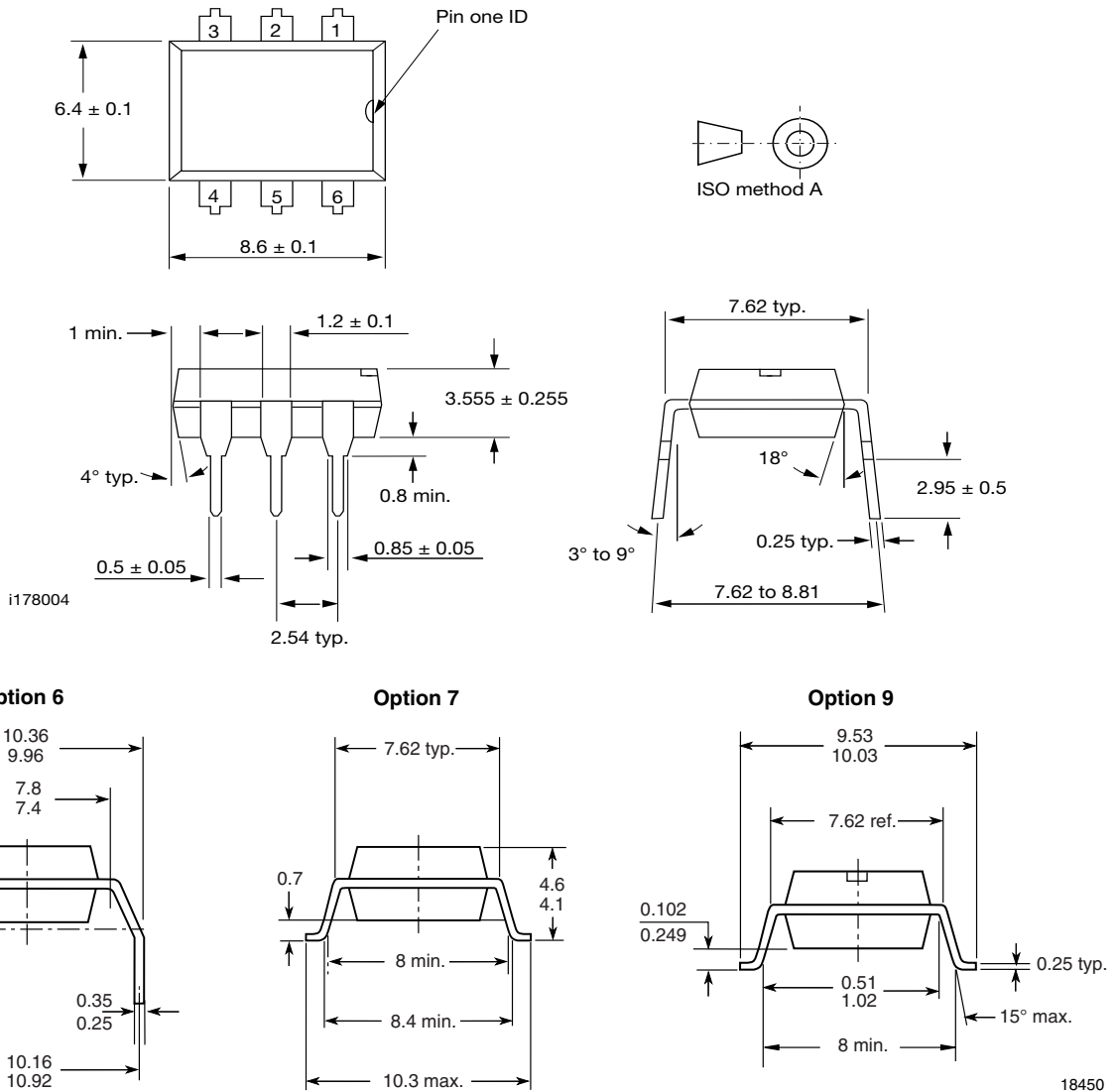
Fig. 9 - Permissible Forward Current Diode



isfh608\_12

Fig. 12 - Collector Emitter Leakage Current vs. Temperature

**PACKAGE DIMENSIONS** in inches (millimeters)



**PACKAGE MARKING** (example)

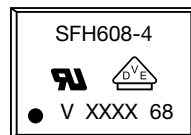


Fig. 13 - Example of SFH608-4X001

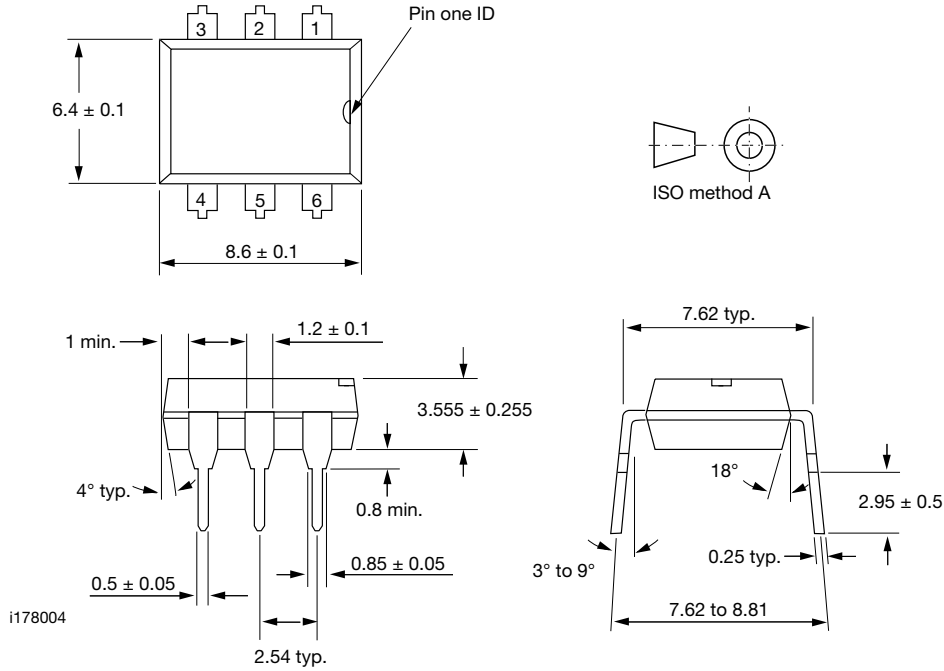
**Notes**

- XXXX = LMC (lot marking code)
- 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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