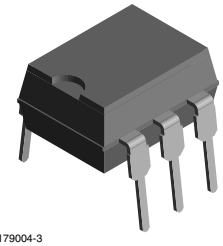
WINSOURCE ELECTRONICS

THE DATASHEET OF

SFH608-4X016

Optocoupler, Phototransistor Output, Low Input Current, With Base Connection, 5300 V_{RMS}



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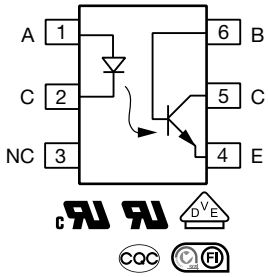


FEATURES

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

Pb-free

e3

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

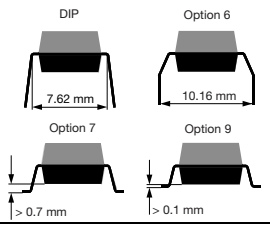
- UL 1577
- cUL
- DIN EN 60747-5-5 (VDE 0884), available with option 1
- BSI
- CQC GB4943.1
- CQC GB8898
- FIMKO

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 (1)	SFH608-4X007 (1)	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

(1) Also available in tubes; do not add T to end

For technical questions, contact: optocoupler.answers@vishay.com

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ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
Reverse voltage		V_R	6	V
DC forward current		I_F	50	mA
Surge forward current	$t_P \leq 10$ µs	I_{FSM}	2.5	A
Total power dissipation		P_{diss}	70	mW
OUTPUT				
Collector emitter voltage		V_{CEO}	55	V
Collector base voltage		V_{CBO}	55	V
Emitter base voltage		V_{EBO}	7	V
Collector current		I_C	50	mA
Surge collector current	$t_P \leq 1.0$ ms		100	mA
Total power dissipation		P_{diss}	150	mW
COUPLER				
Storage temperature range		T_{stg}	-55 to +150	°C
Operating temperature range		T_{amb}	-55 to +100	°C
Soldering temperature [1]	Max. 10 s, dip soldering: distance to seating plane ≥ 1.5 mm	T_{sld}	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.

(1) 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_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT							
Forward voltage	I_F = 5 mA		V_F	-	1.1	1.5	V
Reverse voltage	I_R = 10 µA		V_R	6	-	-	V
Reverse current	V_R = 6 V		I_R	-	0.01	10	µA
Capacitance	V_R = 0 V, f = 1 MHz		C_O	-	25	-	pF
Thermal resistance			R_{thja}	-	1070	-	K/W
OUTPUT							
Collector emitter voltage	I_{CE} = 10 µA		V_{CEO}	55	-	-	V
Emitter base voltage	I_{EB} = 10 µA		V_{EBO}	7	-	-	V
Collector emitter capacitance	V_{CE} = 5 V, f = 1 MHz		C_{CE}	-	10	-	pF
Collector base capacitance	V_{CE} = 5 V, f = 1 MHz		C_{CB}	-	16	-	pF
Emitter base capacitance	V_{CE} = 5 V, f = 1 MHz		C_{EB}	-	10	-	pF
Thermal resistance			R_{thja}	-	500	-	K/W
Collector emitter leakage current	V_{CE} = 10 V		I_{CEO}	-	10	200	nA
COUPLER							
Coupling capacitance			C_C	-	0.6	-	pF
Saturation voltage, collector emitter	I_C = 0.32 mA, I_F = 1 mA	SFH608-2	V_{CEsat}	-	0.25	0.4	V
	I_C = 0.5 mA, I_F = 1 mA	SFH608-3	V_{CEsat}	-	0.25	0.4	V
	I_C = 0.8 mA, I_F = 1 mA	SFH608-4	V_{CEsat}	-	0.25	0.4	V
	I_C = 1.25 mA, I_F = 1 mA	SFH608-5	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.

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CURRENT TRANSFER RATIO

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Coupling transfer ratio	I_F = 1 mA, V_{CC} = 0.5 V	SFH608-2	CTR	63	-	125	%
	I_F = 0.5 mA, V_{CC} = 1.5 V	SFH608-2	CTR	32	75	-	%
	I_F = 1 mA, V_{CC} = 0.5 V	SFH608-3	CTR	100	-	200	%
	I_F = 0.5 mA, V_{CC} = 1.5 V	SFH608-3	CTR	50	120	-	%
	I_F = 1 mA, V_{CC} = 0.5 V	SFH608-4	CTR	160	-	320	%
	I_F = 0.5 mA, V_{CC} = 1.5 V	SFH608-4	CTR	80	200	-	%
	I_F = 1 mA, V_{CC} = 0.5 V	SFH608-5	CTR	250	-	500	%
	I_F = 0.5 mA, V_{CC} = 1.5 V	SFH608-5	CTR	125	300	-	%

SWITCHING CHARACTERISTICS

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

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}	8000	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}	700	mW
Input safety current		I_{SI}	400	mA
Input safety temperature		T_{SI}	175	°C
Creepage distance	Standard DIP-4		≥ 7	mm
Clearance distance	Standard DIP-4		≥ 7	mm
Creepage distance	400 mil DIP-4		≥ 8	mm
Clearance distance	400 mil DIP-4		≥ 8	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.

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

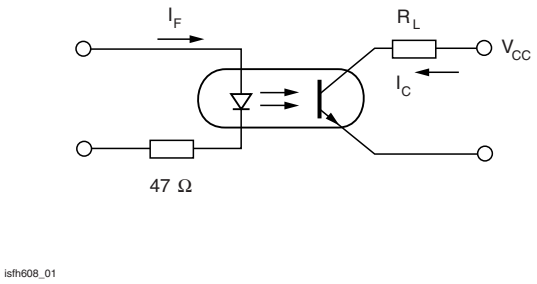

Fig. 1 - Switching Schematic

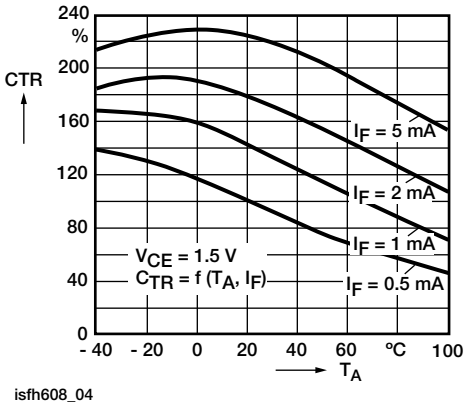

Fig. 4 - Current Transfer Ratio (typ.)

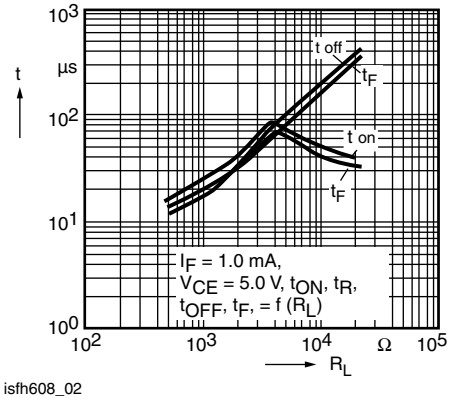

Fig. 2 - Switching Times

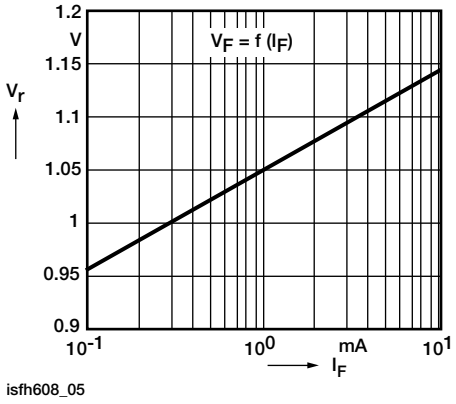

Fig. 5 - Diode Forward Voltage (typ.)

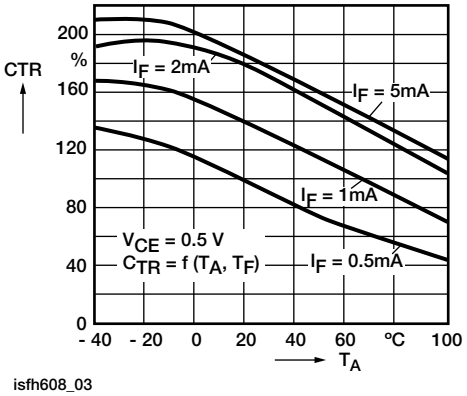

Fig. 3 - Current Transfer Ratio (typ.)

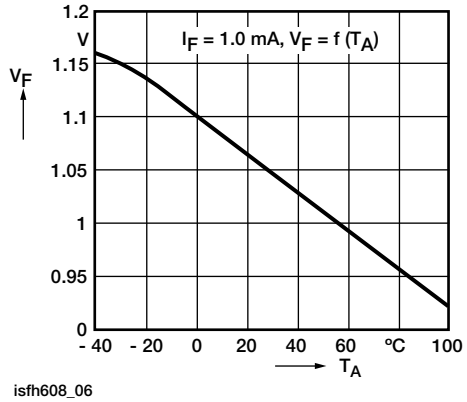

Fig. 6 - Diode Forward Voltage (typ.)

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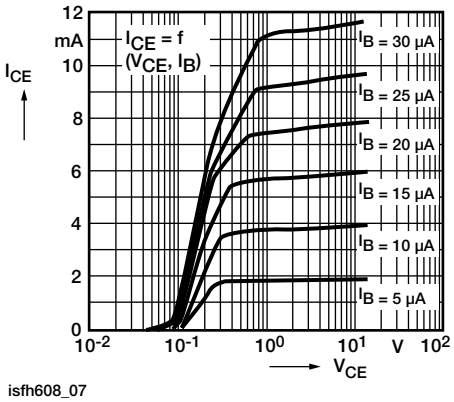

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Fig. 7 - Output Characteristics

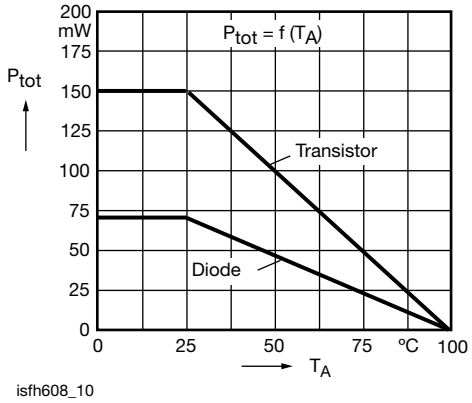

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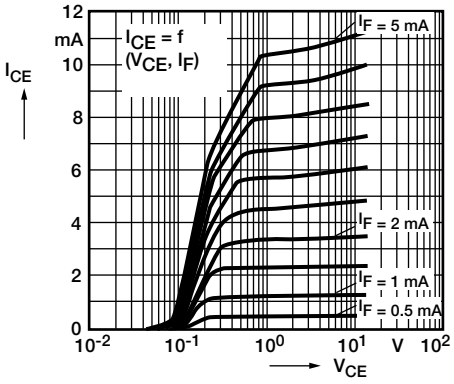
Fig. 10 - Permissible Power Dissipation for Transistor and Diode



isfh608_08

Fig. 8 - Output Characteristics

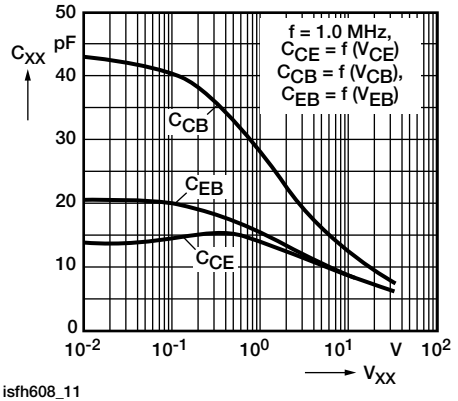


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Fig. 11 - Transistor Capacitance

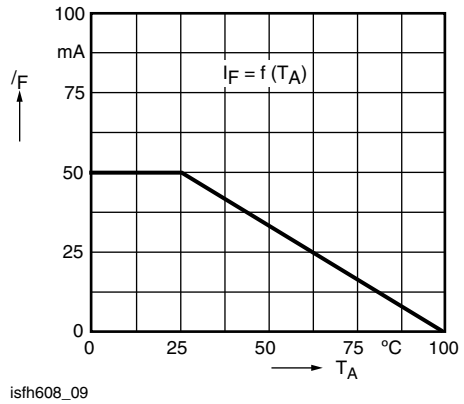

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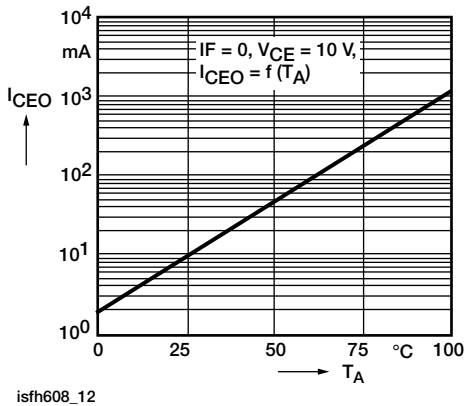
Fig. 9 - Permissible Forward Current Diode



isfh608_12

Fig. 12 - Collector Emitter Leakage Current vs. Temperature

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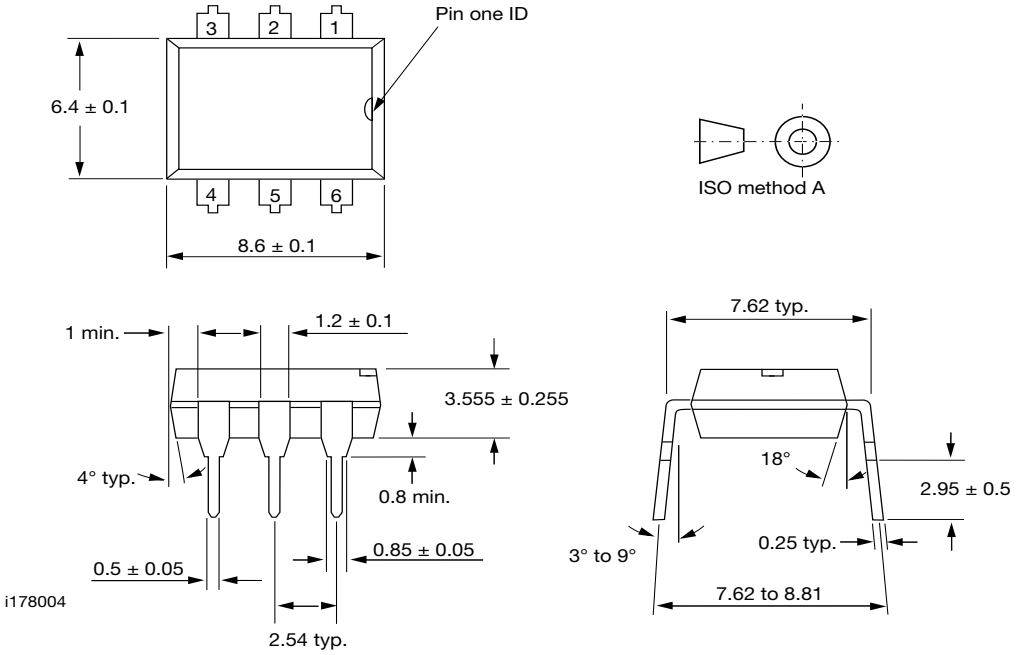
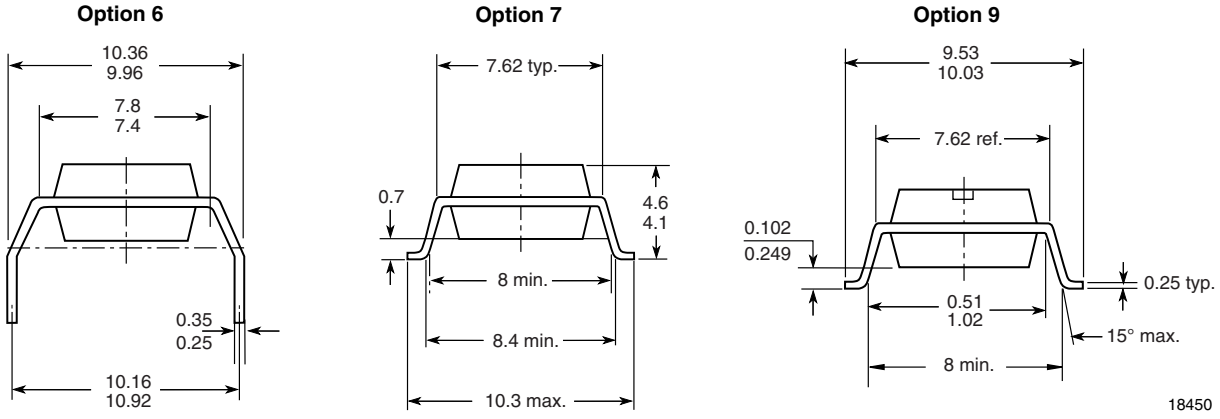
PACKAGE DIMENSIONS in inches (millimeters)





PACKAGE MARKING (example)

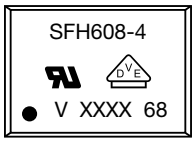


Fig. 13 - Example of SFH608-4X001

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

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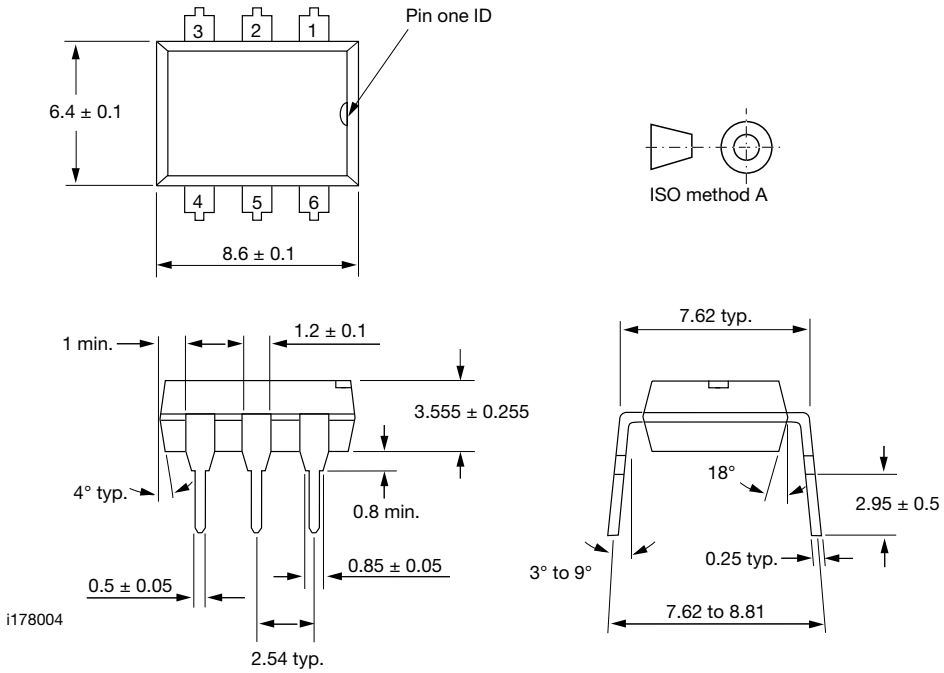
DIP-6A

PACKAGE DIMENSIONS in inches (millimeters)



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