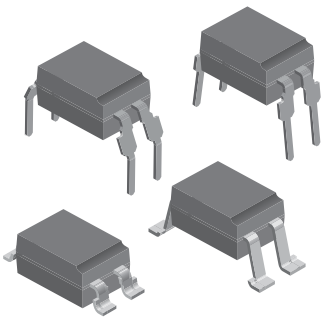
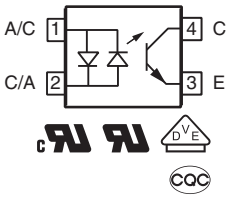
Optocoupler, Phototransistor Output, AC Input





FEATURES

- Good CTR linearity depending on forward current
- Isolation test voltage, 5300 V_{RMS}
- High collector emitter voltage, V_{CEO} = 70 V
- Low saturation voltage
- Fast switching times
- Low CTR degradation
- Temperature stable
- Low coupling capacitance
- End-stackable, 0.100" (2.54 mm) spacing
- High common-mode interference immunity
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

DESCRIPTION

The SFH620A (DIP) and SFH6206 (SMD) feature a high current transfer ratio, low coupling capacitance and high isolation voltage. These couplers have a GaAs infrared diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a plastic DIP-4 or SMD package.

The coupling devices are designed for signal transmission between two electrically separated circuits. The couplers are end-stackable with 2.54 mm lead spacing. Creepage and clearance distances of > 8 mm are achieved with option 6. This version complies with IEC 60950 (DIN VDE 0805) for reinforced insulation to an operation voltage of 400 V_{RMS} or DC.

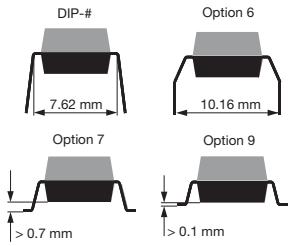
AGENCY APPROVALS

The safety application model number covering all products in this datasheet is SFH620A and SHF6206. This model number should be used when consulting safety agency documents.

- UL1577, file no. E52744 system code H, double protection
- CSA 93751
- BSI EN 60950, EN 60065
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1
- CQC GB8898-2011, GB4943.1-2011

ORDERING INFORMATION

S	F	H	6	2	0	x	-	#	X	0	#	#	T
PART NUMBER								CTR BIN	PACKAGE OPTION				TAPE AND REEL



AGENCY CERTIFIED/PACKAGE	CTR (%) ± 10 mA					
	SFH620A			SFH6206		
UL, cUL, BSI	**40 to 125**	**63 to 200**	**100 to 320**	**40 to 125**	**63 to 200**	**100 to 320**
DIP-4	SFH620A-1	SFH620A-2	SFH620A-3	-	-	-
DIP-4, 400 mil, option 6	SFH620A-1X006	SFH620A-2X006	SFH620A-3X006	-	-	-
SMD-4, option 7	-	SFH620A-2X007T (1)	-	-	-	-
SMD-4, option 9	-	-	-	SFH6206-1T (1)	SFH6206-2T (1)	SFH6206-3T (1)
VDE, UL, CUL, BSI	**40 to 125**	**63 to 200**	**100 to 320**	**40 to 125**	**63 to 200**	**100 to 320**
DIP-4	SFH620A-1X001	SFH620A-2X001	SFH620A-3X001	-	-	-
DIP-4, 400 mil, option 6	-	SFH620A-2X016	SFH620A-3X016	-	-	-
SMD-4, option 7	-	SFH620A-2X017T	-	-	-	-
SMD-4, option 9	-	-	-	-	SFH6206-2X001T (1)	SFH6206-3X001T (1)

Notes

- Additional options may be possible, please contact sales office.

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

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
DC forward current		I_F	± 60	mA
Surge forward current	$t_p \leq 10$ µs	I_{FSM}	± 2.5	A
Power dissipation		P_{diss}	100	mW
OUTPUT				
Collector emitter voltage		V_{CEO}	70	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	50	mA
	$t_p \leq 1$ µs	I_C	100	mA
Power dissipation		P_{diss}	150	mW
COUPLER				
Total power dissipation		P_{tot}	250	mW
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 [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 = ± 60 mA		V_F		1.25	1.65	V
Capacitance	V_R = 0 V, f = 1 MHz		C_O		50		pF
Thermal resistance			R_{thja}		750		K/W
OUTPUT							
Collector emitter capacitance	V_{CE} = 5 V, f = 1 MHz		C_{CE}		6.8		pF
Thermal resistance			R_{thja}		500		°C/W
COUPLER							
Collector emitter saturation voltage	I_F = ± 10 mA, I_C = 2.5 mA		V_{CEsat}		0.25	0.4	V
Coupling capacitance			C_C		0.2		pF
Collector emitter leakage current	V_{CE} = 10 V	SFH620A-1	I_{CEO}		2	50	nA
		SFH6206-1	I_{CEO}		2	50	nA
		SFH620A-2	I_{CEO}		2	50	nA
		SFH6206-2	I_{CEO}		2	50	nA
		SFH620A-3	I_{CEO}		5	100	nA
		SFH6206-3	I_{CEO}		5	100	nA

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.
  Still air, coupler soldered to PCB or base.

CURRENT TRANSFER RATIO (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
I_C/I_F	V_{CE} = 5 V, I_F = ± 10 mA	SFH620A-1	CTR	40		125	%
		SFH6206-1	CTR	40		125	%
		SFH620A-2	CTR	63		200	%
		SFH6206-2	CTR	63		200	%
		SFH620A-3	CTR	100		320	%
		SFH6206-3	CTR	100		320	%
	V_{CE} = 5 V, I_F = ± 1 mA	SFH620A-1	CTR	13	30		%
		SFH6206-1	CTR	13	30		%
		SFH620A-2	CTR	22	45		%
		SFH6206-2	CTR	22	45		%
		SFH620A-3	CTR	34	70		%
		SFH6206-3	CTR	34	70		%

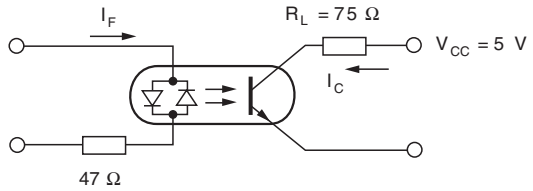


Fig. 1 - Switching Times Linear Operation (without Saturation)

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Turn-on time	R_L = 75 Ω, I_F = ± 10 mA, V_{CC} = 5 V	t_{on}		3		µs
Rise time	R_L = 75 Ω, I_F = ± 10 mA, V_{CC} = 5 V	t_r		2		µs
Turn-off time	R_L = 75 Ω, I_F = ± 10 mA, V_{CC} = 5 V	t_{off}		2.3		µs
Fall time	R_L = 75 Ω, I_F = ± 10 mA, V_{CC} = 5 V	t_f		2		µs
Cut-off frequency	R_L = 75 Ω, I_F = ± 10 mA, V_{CC} = 5 V	t_{ctr}		208		kHz

SAFETY AND INSULATION RATINGS				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Climatic classification	According to IEC 68 part 1		55/115/21	
Pollution degree	According to DIN VDE 0109		2	
Comparative tracking index	Insulation group IIIa	CTI	175	
Maximum rated withstanding isolation voltage	According to UL1577, t = 1 min	V_{ISO}	4470	V_{RMS}
Tested withstanding isolation voltage	According to UL1577, t = 1 s	V_{ISO}	5300	V_{RMS}
Maximum transient isolation voltage	According to DIN EN 60747-5-5	V_{IOTM}	8000	V_{peak}
Maximum repetitive peak isolation voltage	According to DIN EN 60747-5-5	V_{IORM}	890	V_{peak}
Isolation resistance	T_{amb} = 25 °C, V_{IO} = 500 V	R_{IO}	≥ 10^{12}	Ω
	T_{amb} = 100 °C, V_{IO} = 500 V	R_{IO}	≥ 10^{11}	Ω
Output safety power		P_{SO}	700	mW
Input safety current		I_{SI}	400	mA
Input safety temperature		T_S	175	°C
Creepage distance	DIP-4		≥ 7	mm
Clearance distance	DIP-4		≥ 7	mm
Creepage distance	DIP-4, 400 mil, option 6		≥ 8	mm
Clearance distance	DIP-4, 400 mil, option 6		≥ 8	mm
Creepage distance	SMD-4, option 7 and option 9		≥ 7	mm
Clearance distance	SMD-4, option 7 and option 9		≥ 7	mm
Insulation thickness		DTI	≥ 0.4	mm

Note

- As per DIN EN 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 °C, unless otherwise specified)

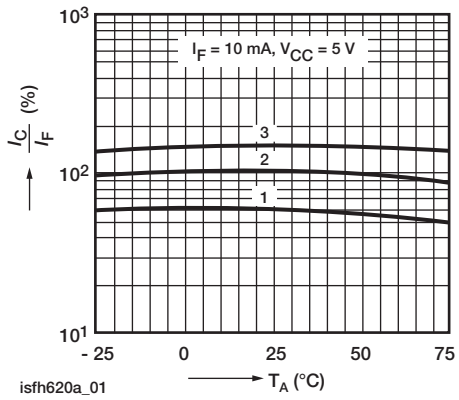


Fig. 2 - Current Transfer Ratio (CTR) vs. Temperature

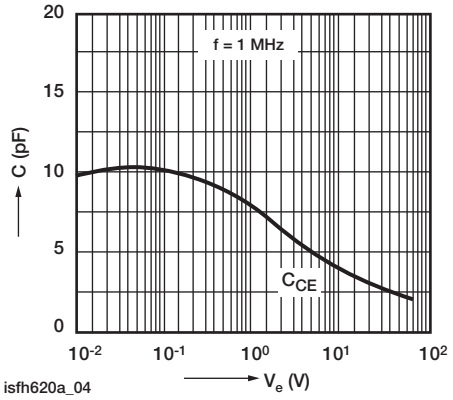


Fig. 5 - Transistor Capacitance (Typ.) vs. Collector Emitter Voltage

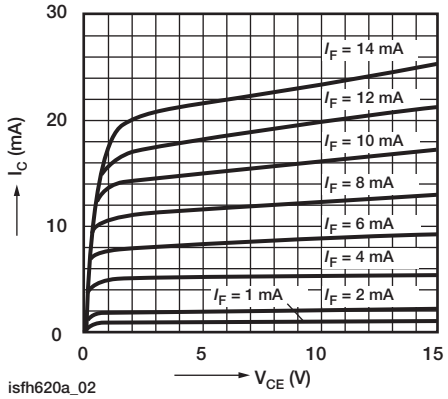


Fig. 3 - Output Characteristics (Typ.) Collector Current vs. Collector Emitter Voltage

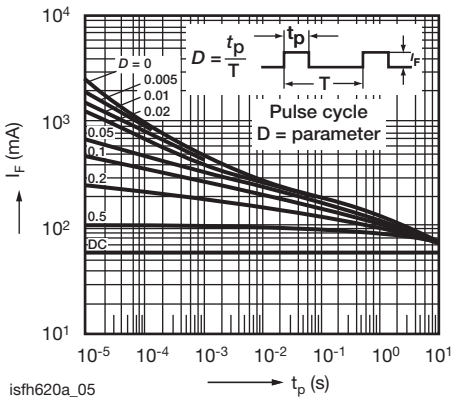


Fig. 6 - Permissible Pulse Handling Capability Forward Current vs. Pulse Width

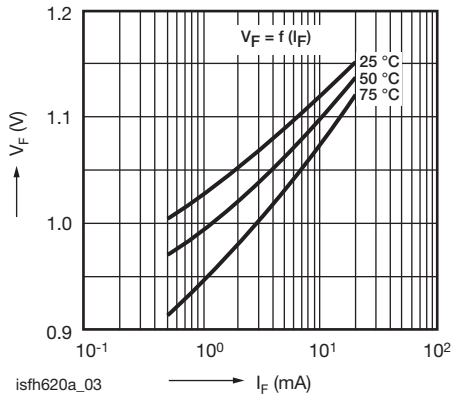


Fig. 4 - Diode Forward Voltage (Typ.) vs. Forward Current

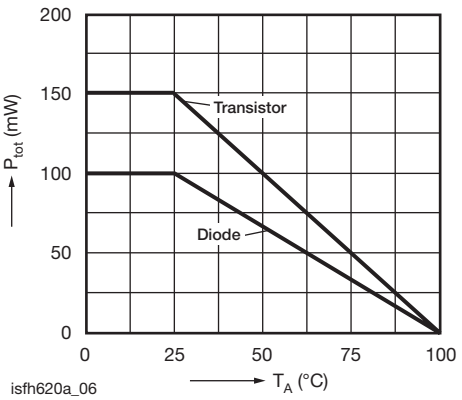


Fig. 7 - Permissible Power Dissipation vs. Ambient Temperature

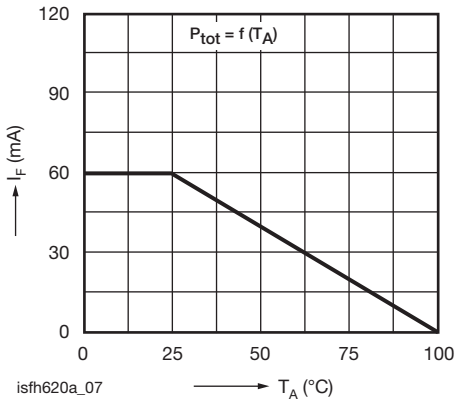
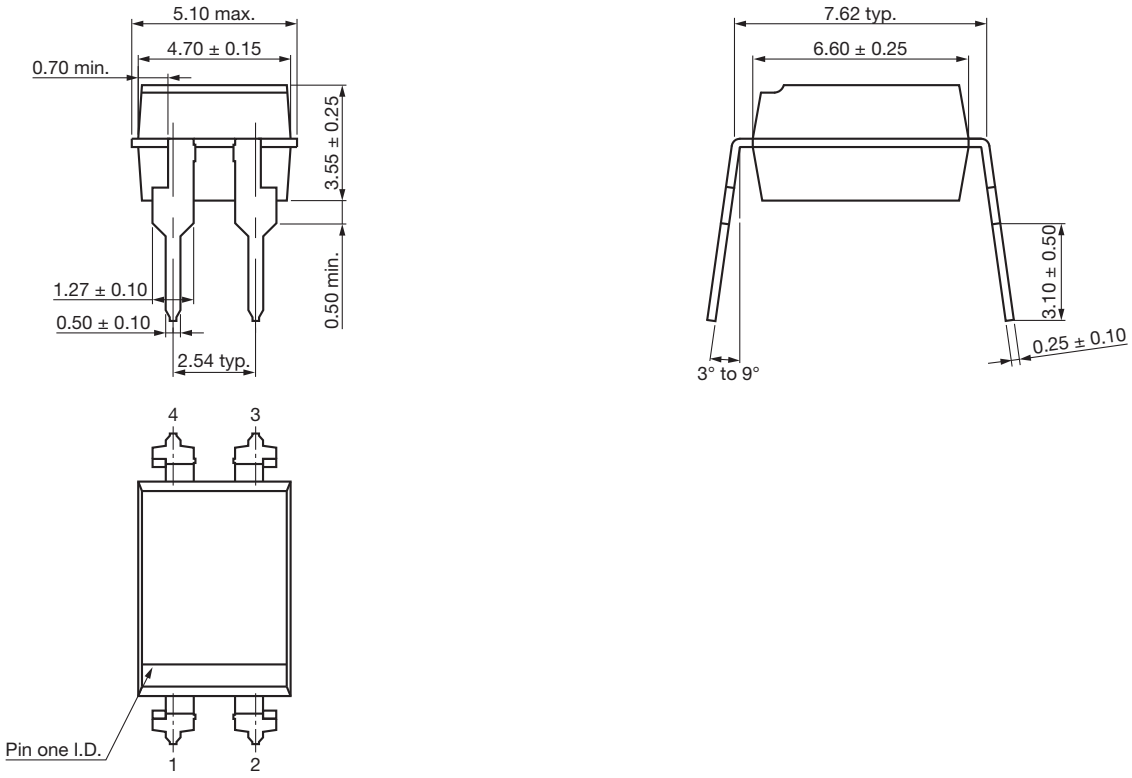


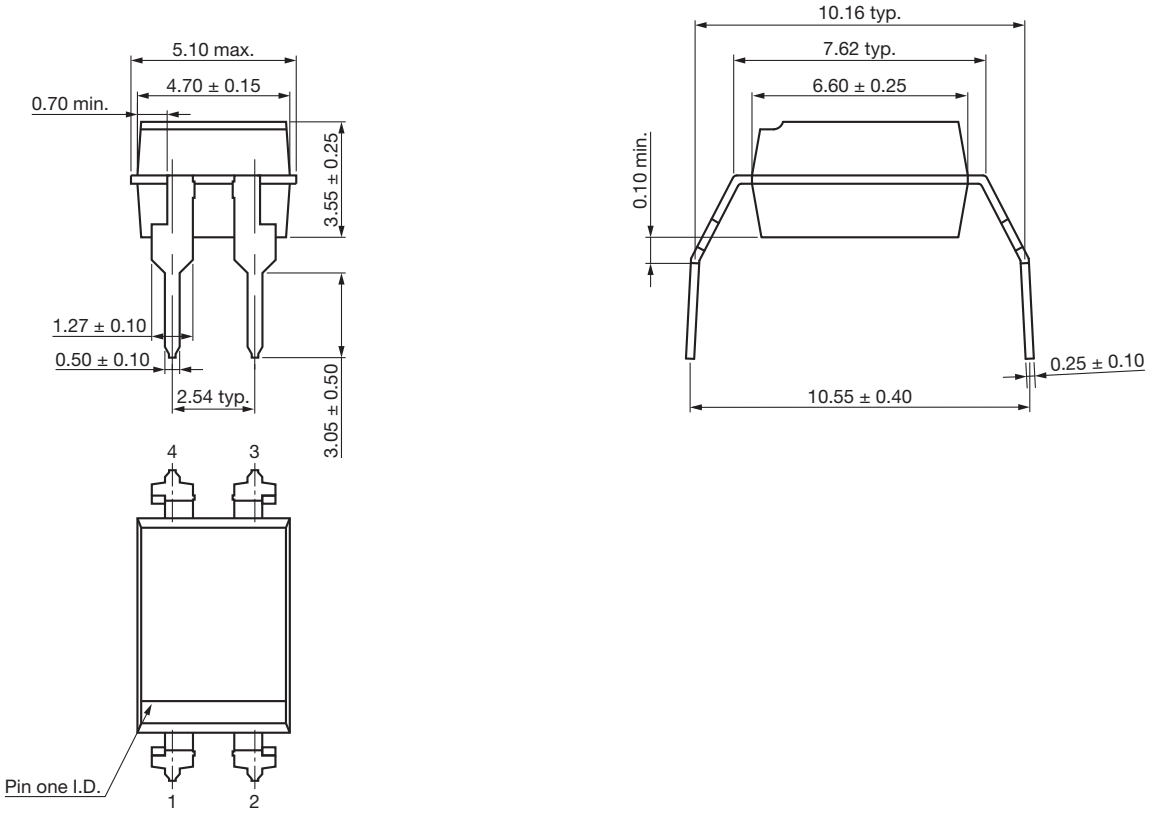
Fig. 8 - Permissible Diode Forward Current vs. Ambient Temperature

PACKAGE DIMENSIONS in millimeters

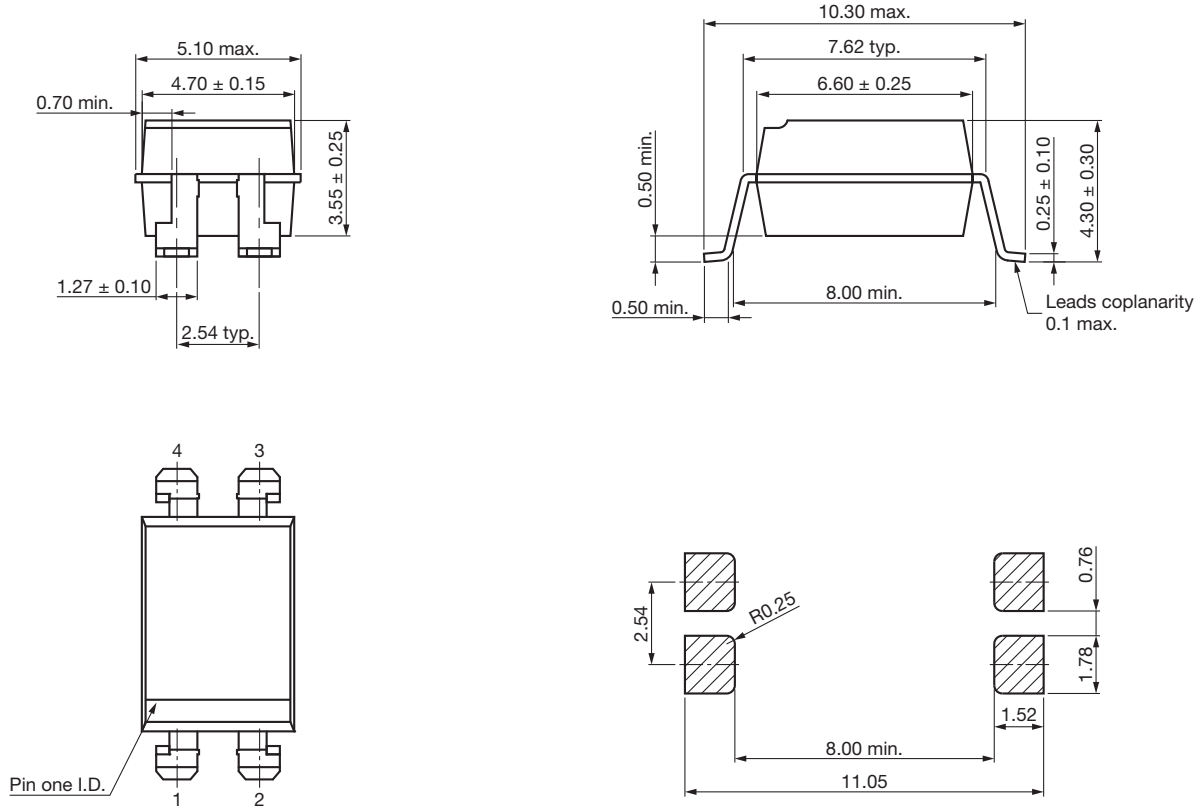
DIP-4, Standard



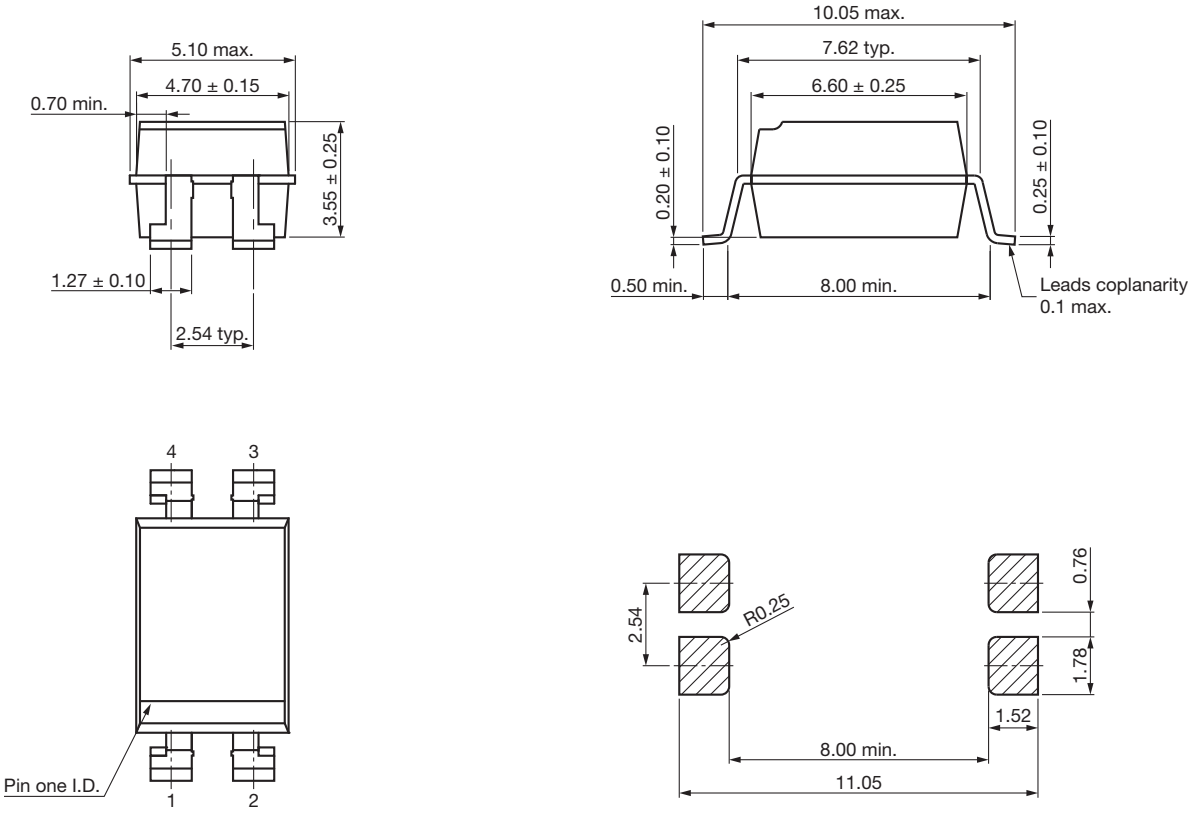
DIP-4, Option 6



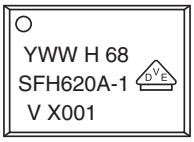
SMD-4, Option 7



SMD-4, Option 9



PACKAGE MARKING (example)



Notes

- Only options 1 and 7 are reflected in the package marking.
- The VDE logo is only marked on option1 parts.
- Tape and reel suffix (T) is not part of the package marking.

SOLDER PROFILES

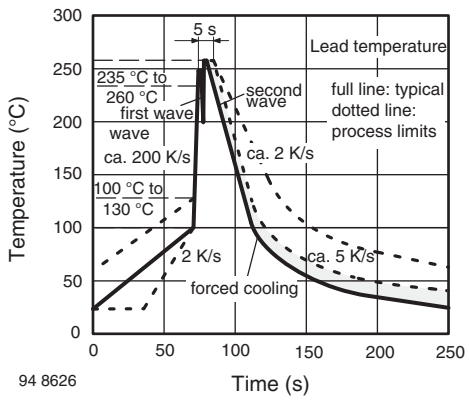


Fig. 9 - Wave Soldering Double Wave Profile According to J-STD-020 for DIP-8 Devices

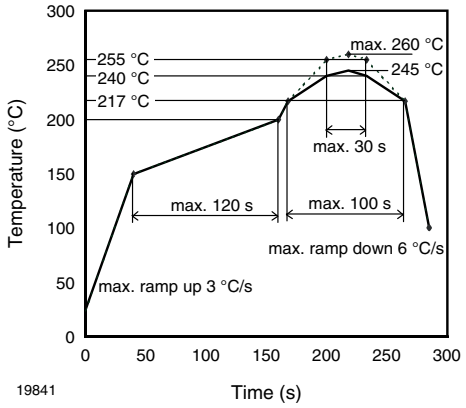


Fig. 10 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020 for SMD-8 Devices

HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: unlimited

Conditions: T_{amb} < 30 °C, RH < 85 %

Moisture sensitivity level 1, according to J-STD-020

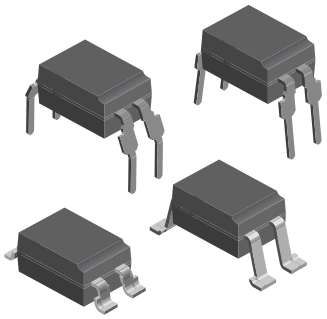
Footprint and Schematic Information for SFH6206

The footprint and schematic symbols for the following parts can be accessed using the associated links. They are available in Eagle, Altium, KiCad, OrCAD / Allegro, Pulsonix, and PADS.

Note that the 3D models for these parts can be found on the Vishay product page.

PART NUMBER	FOOTPRINT / SCHEMATIC
SFH6206-1T	www.snapeda.com/parts/SFH6206-1T/Vishay/view-part
SFH6206-2T	www.snapeda.com/parts/SFH6206-2T/Vishay/view-part
SFH6206-2X001T	www.snapeda.com/parts/SFH6206-2X001T/Vishay/view-part
SFH6206-3T	www.snapeda.com/parts/SFH6206-3T/Vishay/view-part
SFH6206-3X001T	www.snapeda.com/parts/SFH6206-3X001T/Vishay/view-part

For technical issues and product support, please contact optocoupleranswers@vishay.com.



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