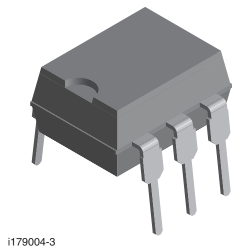
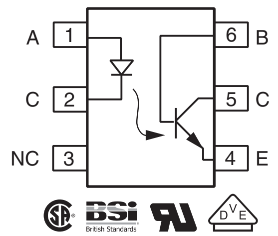
Optocoupler, Phototransistor Output, with Base Connection, 300 V BV_{CEO}





DESCRIPTION

The SFH640 is an optocoupler with very high BV_{CER}, a minimum of 300 V. It is intended for telecommunications applications or any DC application requiring a high blocking voltage.

FEATURES

- Good CTR linearity with forward current
- Low CTR degradation
- Very high collector emitter breakdown voltage, BV_{CER} = 300 V
- Isolation test voltage: 5300 V_{RMS}
- Low coupling capacitance
- High common mode transient immunity
- Phototransistor optocoupler 6 pin DIP package with base connection
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

Pb-free
e3
RoHS
COMPLIANT

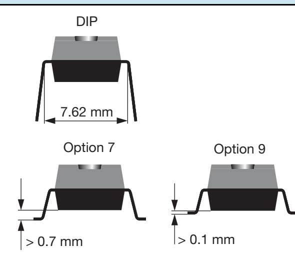
AGENCY APPROVALS

- UL1577, file no. E52744 system code H or J, double protection
- DIN EN 60747-5-2 (VDE 0884) available with option 1
- CSA 93751
- BSI IEC 60950; IEC 60065

ORDERING INFORMATION

S F H 6 4 0 - # X 0 # # T

PART NUMBER (S F H 6 4 0); CTR BIN (#); PACKAGE OPTION (X 0 # #); TAPE AND REEL (T)



AGENCY CERTIFIED/PACKAGE	CTR (%)	
	10 mA	
UL, CSA, BSI	**63 to 125**	**100 to 200**
DIP-6	SFH640-2	SFH640-3
SMD-6, option 7	SFH640-2X007	SFH640-3X007T [(1)]
VDE, UL, CSA, BSI	**63 to 125**	**100 to 200**
SMD-6, option 9	-	SFH640-3X019T [(1)]

Notes

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

(1) Also available in tubes, do not put T on the end.

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Reverse voltage		V_R	6.0	V
DC forward current		I_F	60	mA
Surge forward current	$t_p \leq 10$ µs	I_{FSM}	2.5	A
Total power dissipation		P_{diss}	100	mW

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
OUTPUT				
Collector emitter voltage		V_{CEO}	300	V
Collector base voltage		V_{CBO}	300	V
Emitter base voltage		V_{EBO}	7.0	V
Collector current		I_C	50	mA
Surge collector current	$t_p \leq$ 10 ms	I_C	100	mA
Total power dissipation		P_{diss}	300	mW
COUPLER				
Isolation test voltage between emitter and detector		V_{ISO}	5300	V_{RMS}
			7500	V_{PK}
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C	R_{IO}	$\geq 10^{12}$	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	$\geq 10^{11}$	Ω
Insulation thickness between emitter and detector			≥ 0.4	mm
Creepage distance			≥ 7	mm
Clearance distance			≥ 7	mm
Comparative tracking index per DIN IEC 112/VDE 0303, part 1		CTI	175	
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 = 10 mA		V_V		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_F = 0 V, f = 1 MHz		C_O		25		pF
Thermal resistance			R_{thja}		750		K/W
OUTPUT							
Collector emitter breakdown voltage	I_{CE} = 1 mA, R_{BE} = 1 MΩ		BV_{CER}	300			V
Voltage emitter base	I_{EB} = 10 µA		BV_{BEO}	7			V
Collector emitter capacitance	V_{CE} = 10 V, f = 1 MHz		C_{CE}		7		pF
Collector base capacitance	V_{CB} = 10 V, f = 1 MHz		C_{CB}		8		pF
Emitter base capacitance	V_{EB} = 5 V, f = 1 MHz		C_{EB}		38		pF
Thermal resistance			R_{thja}		250		K/W
COUPLER							
Coupling capacitance			C_C		0.6		pF
Saturation voltage collector emitter	I_F = 10 mA, I_C = 3.2 mA	SFH640-2	V_{CEsat}		0.25	0.4	V
	I_F = 10 mA, I_C = 5 mA	SFH640-3	V_{CEsat}		0.25	0.4	V
Collector emitter leakage current	V_{CE} = 200 V, R_{BE} = 1 MΩ		I_{CER}		1	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.

CURRENT TRANSFER RATIO (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Current transfer ratio	I_F = 10 mA, V_{CE} = 10 V	SFH640-2	I_C/I_F	63		125	%
	I_F = 1 mA, V_{CE} = 10 V	SFH640-2	I_C/I_F	22	45		%
	I_F = 10 mA, V_{CE} = 10 V	SFH640-3	I_C/I_F	100		200	%
	I_F = 1 mA, V_{CE} = 10 V	SFH640-3	I_C/I_F	34	70		%

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Turn-on time	I_C = 2 mA, R_L = 100 Ω, V_{CC} = 10 V	t_{on}		5		μs
Rise time	I_C = 2 mA, R_L = 100 Ω, V_{CC} = 10 V	t_r		2.5		μs
Turn-off time	I_C = 2 mA, R_L = 100 Ω, V_{CC} = 10 V	t_{off}		6		μs
Fall time	I_C = 2 mA, R_L = 100 Ω, V_{CC} = 10 V	t_f		5.5		μs

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

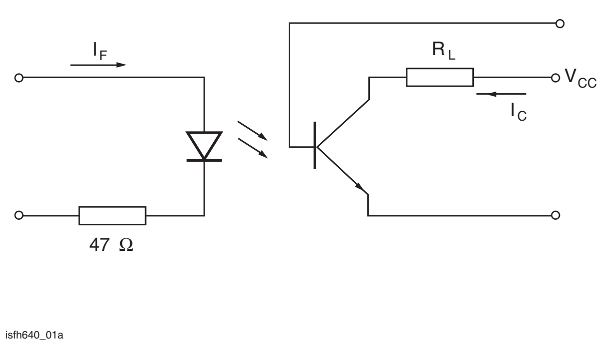


Fig. 1 - Switching Times Measurement Test Circuit and Waveform

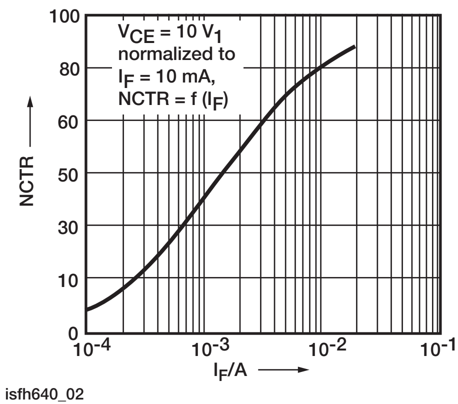


Fig. 3 - Current Transfer Ratio (typ.)

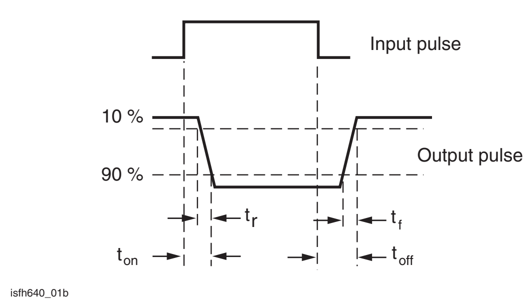


Fig. 2 - Switching Times Measurement Test Circuit and Waveform

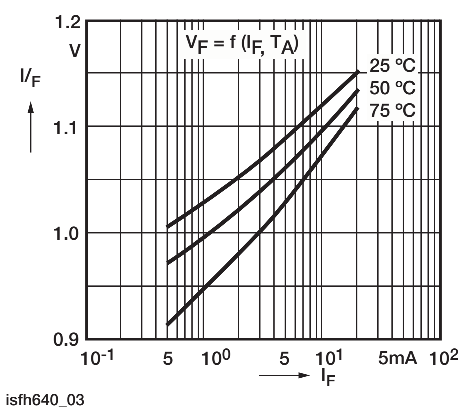


Fig. 4 - Diode Forward Voltage (typ.)

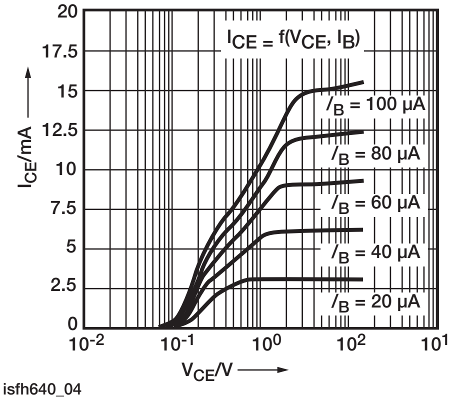


Fig. 5 - Output Characteristics (typ.)

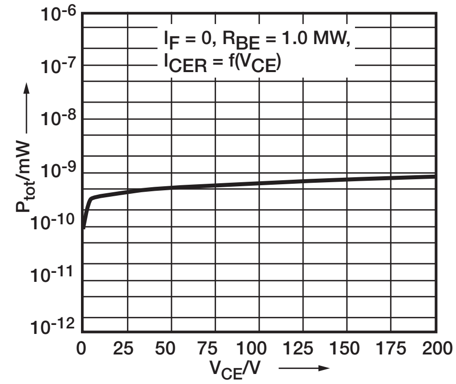


Fig. 8 - Collector-Emitter Leakage Current (typ.)

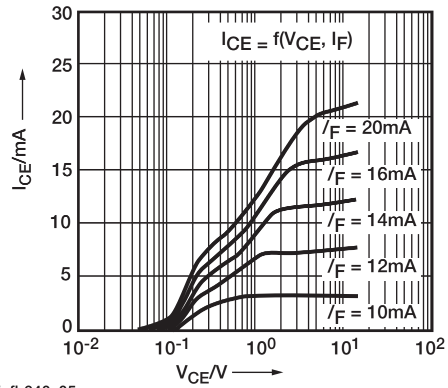


Fig. 6 - Output Characteristics (typ.)

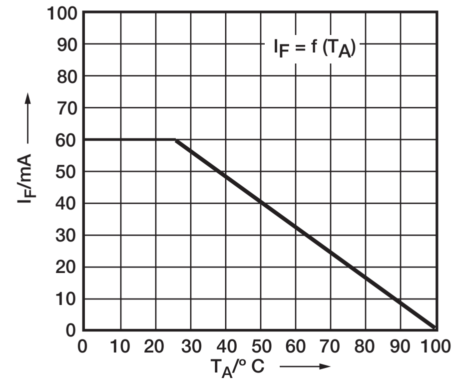


Fig. 9 - Permissible Loss Diode

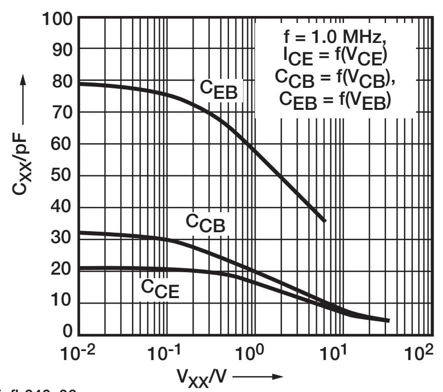


Fig. 7 - Transistor Capacitances (typ.)

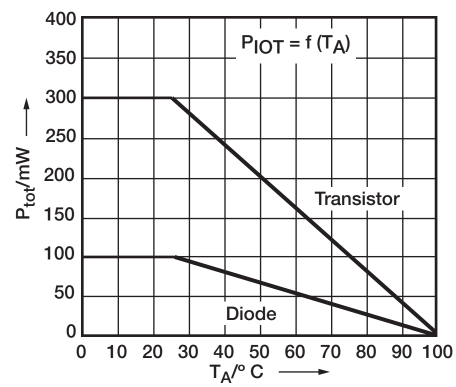
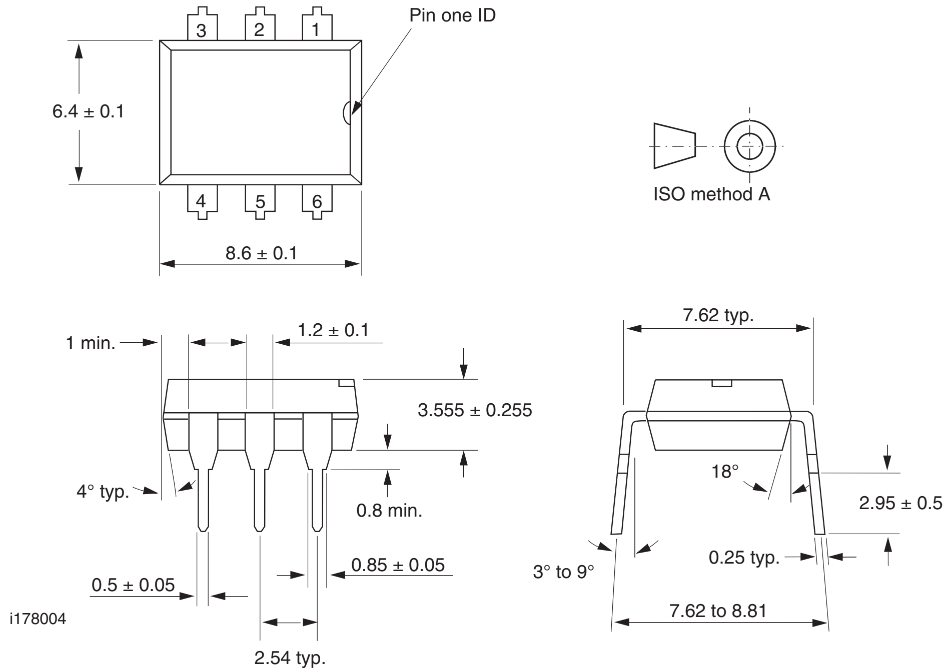
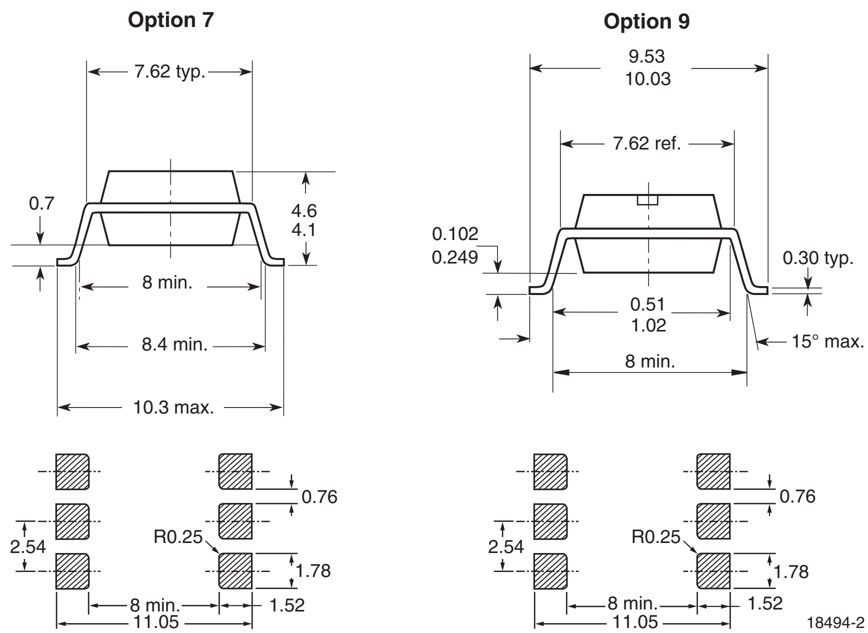


Fig. 10 - Permissible Power Dissipation

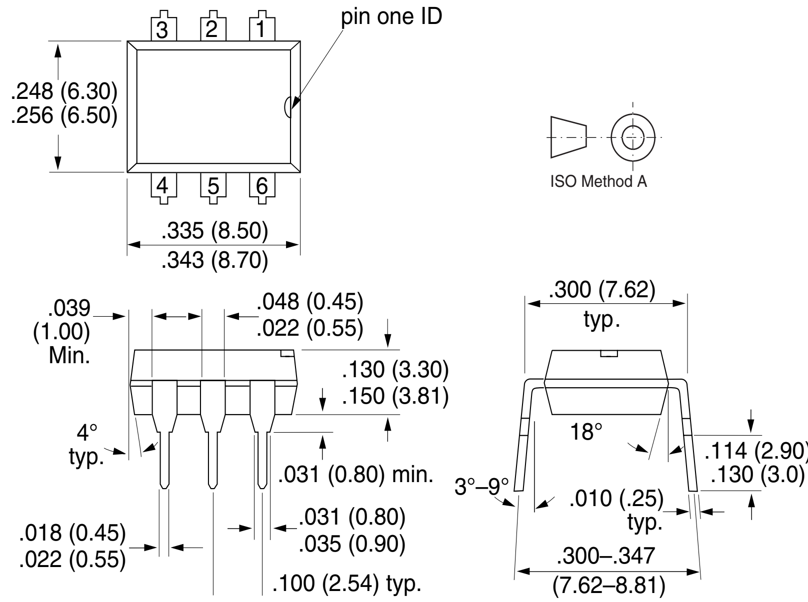
PACKAGE DIMENSIONS in millimeters





DIP-6A

Package Dimensions in Inches (mm)



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1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operatingsystems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

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The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

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