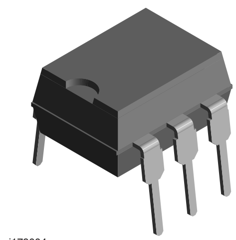
Optocoupler, Phototransistor Output, with Base Connection, 300 V BV_{CEO}



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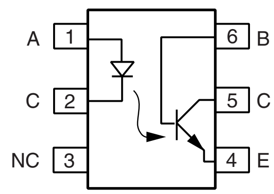


DESCRIPTION

The SFH 640 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
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and 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)/DIN EN 60747-5-5 pending available with option 1
- CSA 93751
- BSI IEC 60950; IEC 60065

ORDER INFORMATION

PART	REMARKS
SFH640-1	CTR 40 to 80 %, DIP-6
SFH640-2	CTR 63 to 125 %, DIP-6
SFH640-3	CTR 100 to 200 %, DIP-6
SFH640-2X007	CTR 63 to 125 %, SMD-6 (option 7)
SFH640-3X007	CTR 100 to 200 %, SMD-6 (option 7)
SFH640-3X009	CTR 100 to 200 %, SMD-6 (option 9)

Note
For additional information on the available options refer to option information.

ABSOLUTE MAXIMUM RATINGS (1)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Reverse voltage		V_R	6.0	V
DC forward current		I_F	60	mA
Surge forward current	$t_p \le 10$ µs	I_{FSM}	2.5	A
Total power dissipation		P_{diss}	100	mW
OUTPUT				
Collector emitter voltage		V_{CE}	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	$t_p \le 10$ ms	I_C	100	mA
Total power dissipation		P_{diss}	300	mW

ABSOLUTE MAXIMUM RATINGS (1)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
COUPLER				
Isolation test voltage between emitter and detector, refer to climate DIN 40046, part 2, Nov. 74		V_{ISO}	5300/7500	V_{RMS}/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 (2)	max. 10 s, dip soldering: distance to seating plane ≥ 1.5 mm	T_{sld}	260	°C

Notes

(1) T_{amb} = 25 °C, unless otherwise specified.
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 devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

ELECTRICAL CHARACTERISTICS

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	6.0			V
Reverse current	V_R = 6.0 V		I_R		0.01	10	µA
Capacitance	V_F = 0 V, f = 1.0 MHz		C_O		25		pF
Thermal resistance			R_{thja}		750		K/W
OUTPUT							
Collector emitter breakdown voltage	I_{CE} = 1.0 mA, R_{BE} = 1.0 MΩ		BV_{CER}	300			V
Voltage emitter base	I_{EB} = 10 µA		BV_{BEO}	7.0			V
Collector emitter capacitance	V_{CE} = 10 V, f = 1.0 MHz		C_{CE}		7.0		pF
Collector base capacitance	V_{CB} = 10 V, f = 1.0 MHz		C_{CB}		8.0		pF
Emitter base capacitance	V_{EB} = 5.0 V, f = 1.0 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 = 2.0 mA	SFH640-1	V_{CEsat}		0.25	0.4	V
	I_F = 10 mA, I_C = 3.2 mA	SFH640-2	V_{CEsat}		0.25	0.4	V
	I_F = 10 mA, I_C = 5.0 mA	SFH640-3	V_{CEsat}		0.25	0.4	V
Collector emitter leakage current	V_{CE} = 200 V, R_{BE} = 1.0 MΩ		I_{CER}		1.0	100	nA

Note

T_{amb} = 25 °C, unless otherwise specified.
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
Current transfer ratio	I_F = 10 mA, V_{CE} = 10 V	SFH640-1	I_C/I_F	40		80	%
	I_F = 1.0 mA, V_{CE} = 10 V	SFH640-1	I_C/I_F	13	30		%
	I_F = 10 mA, V_{CE} = 10 V	SFH640-2	I_C/I_F	63		125	%
	I_F = 1.0 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 = 1.0 mA, V_{CE} = 10 V	SFH640-3	I_C/I_F	34	70		%

SWITCHING CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Turn-on time	I_C = 2.0 mA, R_L = 100 Ω, V_{CC} = 10 V	t_{on}		5.0		µs
Rise time	I_C = 2.0 mA, R_L = 100 Ω, V_{CC} = 10 V	t_r		2.5		µs
Turn-off time	I_C = 2.0 mA, R_L = 100 Ω, V_{CC} = 10 V	t_{off}		6.0		µs
Fall time	I_C = 2.0 mA, R_L = 100 Ω, V_{CC} = 10 V	t_f		5.5		µs

TYPICAL CHARACTERISTICS

T_{amb} = 25 °C, unless otherwise specified

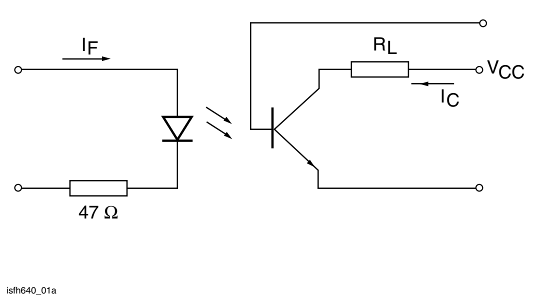


Fig. 1 - Switching Times Measurement Test Circuit and Waveform

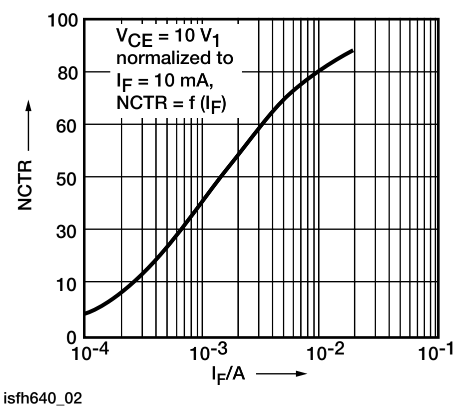


Fig. 3 - Current Transfer Ratio (Typ.)

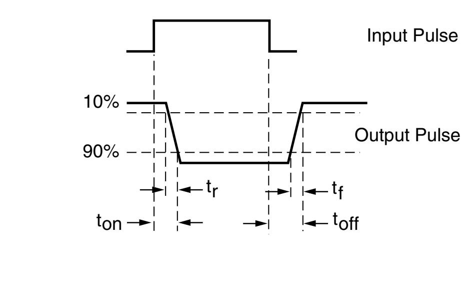


Fig. 2 - Switching Times Measurement Test Circuit and Waveform

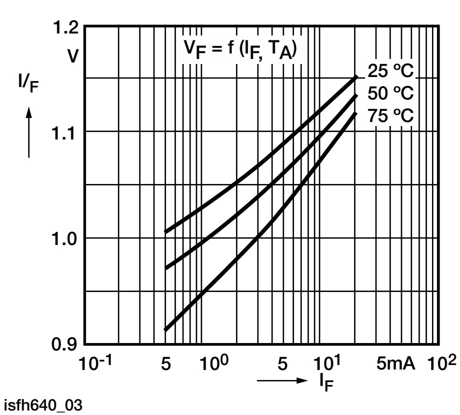


Fig. 4 - Diode Forward Voltage (Ttyp.)

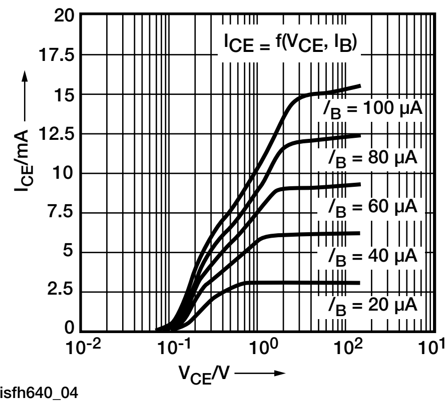


Fig. 5 - Output Characteristics (Typ.)

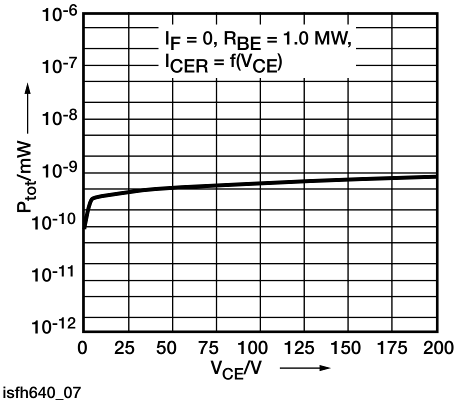


Fig. 8 - Collector-Emitter Leakage Current (Typ.)

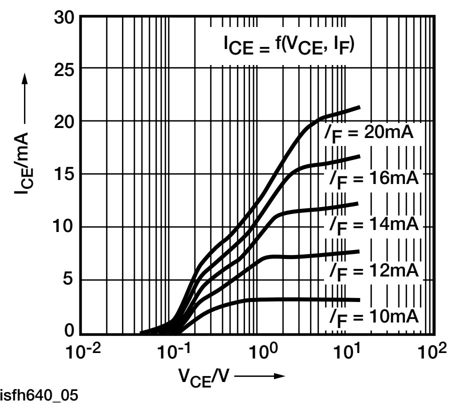


Fig. 6 - Output Characteristics (Typ.)

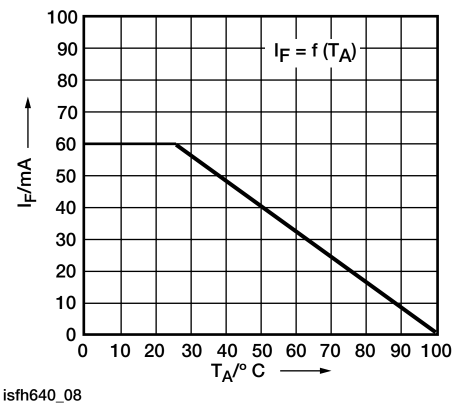


Fig. 9 - Permissible Loss Diode

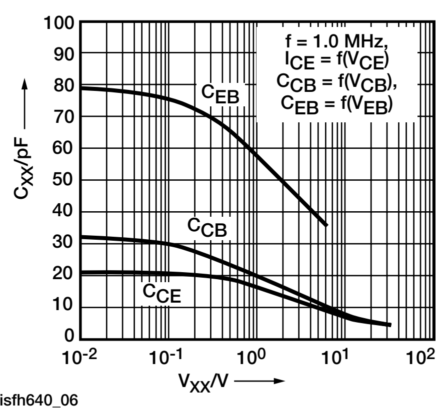


Fig. 7 - Transistor Capacitances (Typ.)

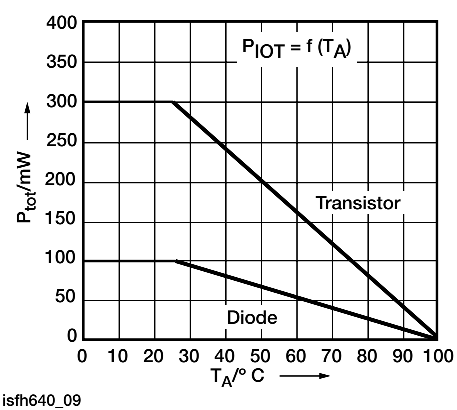
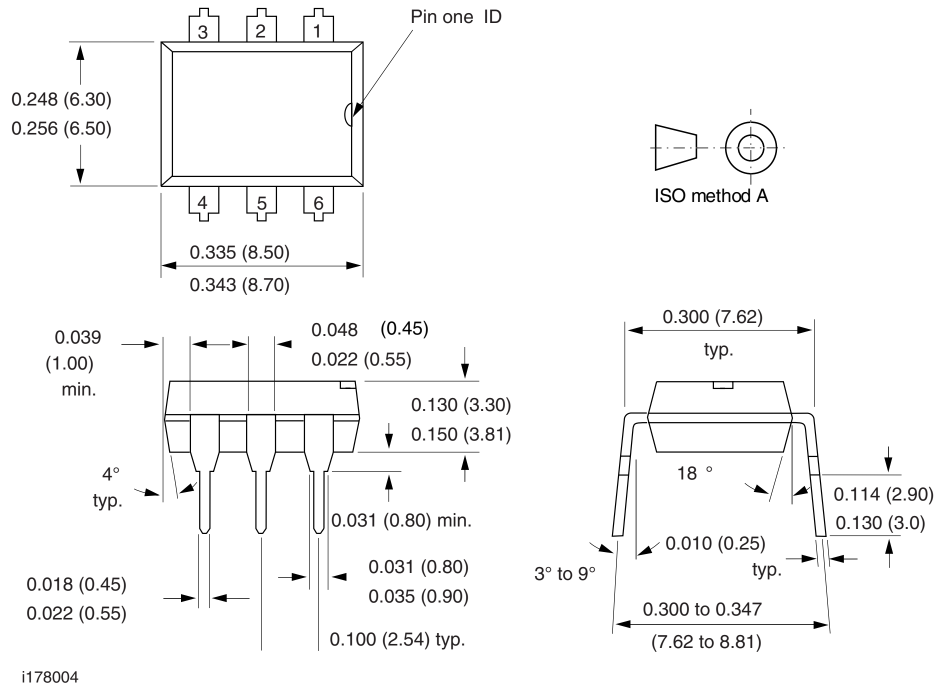
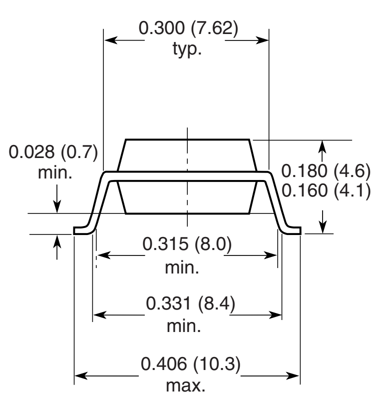


Fig. 10 - Permissible Power Dissipation

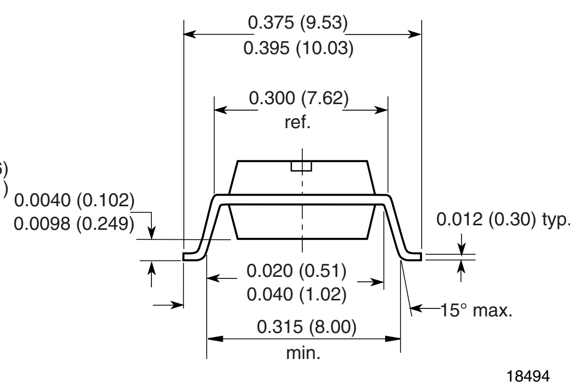
PACKAGE DIMENSIONS in inches (millimeters)



Option 7



Option 9



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It is the policy of Vishay Semiconductor GmbH to

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

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

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.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany

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(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).

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