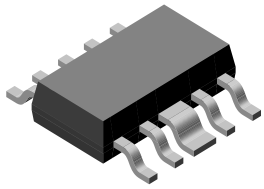
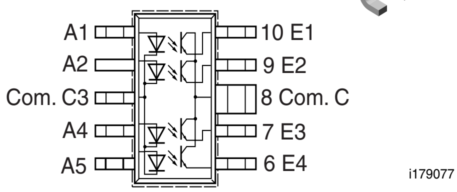
Optocoupler, Phototransistor Output, SOT223/10, Quad Channel

Features
- Transistor Optocoupler in SOT223/10 Package
- End Stackable, 1.27 mm Spacing
- Low Current Input
- Very High CTR, 150 % Typical at I_F = 1 mA, V_{CE} = 5 V
- Good CTR Linearity Versus Forward Current
- Minor CTR Degradation
- High Collector-Emitter Voltage, V_{CEO}=70 V
- Low Coupling Capacitance
- High Common Mode Transient Immunity
- Isolation Test Voltage: 1768 V_{RMS}





Agency Approvals
- UL File #E76222 System Code V
- CSA 93751

Applications
Telecommunication
SMT
PCMCIA
Instrumentation

Description
The SFH6943 is a four channel mini-optocoupler suitable for high density packaged PCB application. It has a minimum of 1768 V_{RMS} isolation from input to output. The device consists of four phototransistors as detectors. Each channel is individually controlled. The optocoupler is housed in a SOT223/10 package. All the cathodes of the input LEDs and all the collectors of the output transistors are common enabling a pin count reduction from 16 pins to 10 pins-a significant space savings as compared to four channels that are electrically isolated individually.

Order Information

Part	Remarks
SFH6943-2	CTR 63 - 200 %, SMD-10
SFH6943-3	CTR 100 - 320 %, SMD-10
SFH6943-4	CTR 160 - 500 %, SMD-10

For additional information on the available options refer to Option Information.

Absolute Maximum Ratings
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 Rating for extended periods of the time can adversely affect reliability.

Input

Parameter	Test condition	Symbol	Value	Unit
Reverse voltage		V_R	3	V
DC forward current		I_F	5	mA
Surge forward current	$t_P \leq 10\ \mu s$	I_{FSM}	100	mA
Total power dissipation		P_{diss}	10	mW

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Output

Parameter	Test condition	Symbol	Value	Unit
Collector-emitter voltage		V_{CE}	70	V
Emitter-collector voltage		V_{EC}	7	V
Collector current		I_C	10	mA
Surge collector current	t_P < 1 ms	I_{FSM}	20	mA
Total power dissipation		P_{diss}	20	mW

Coupler

Parameter	Test condition	Symbol	Value	Unit
Isolation test voltage (between emitter and detector, refer to climate DIN 40046, part 2, Nov. 74)	t = 1 sec.	V_{ISO}	1768	V_{RMS}
Creepage			≥ 4	mm
Clearance			≥ 4	mm
Comparative tracking index per DIN IEC 112/VDE0303, part 1			175	
Isolation resistance	V_{IO} = 100 V, T_{amb} = 25 °C	R_{IO}	$\geq 10^{11}$	Ω
	V_{IO} = 100 V, T_{amb} = 100 °C	R_{IO}	$\geq 10^{12}$	Ω
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, Dip soldering plus reflow soldering processes	t = 10 sec. max	T_{sld}	260	°C

Electrical Characteristics

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.

Input

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward voltage	I_F = 5 mA	V_F		1.25		V
Reverse current	V_R = 3 V	I_R		0.01	10	µA
Capacitance	V_R = 0 V, f = 1 MHz	C_O		5		pF
Thermal resistance		R_{thja}		1000		K/W

Output

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector-emitter voltage	I_{CE} = 10 µA	V_{CEO}	70			V
Emitter-collector voltage	I_{EC} = 10 µA	V_{ECO}	7			V
Collector-emitter capacitance	V_{CE} = 5 V, f = 1 MHz	C_{CE}		6		pF
Thermal resistance		R_{thja}		500		K/W
Collector-emitter leakage current	V_{CE} = 10 V	I_{CEO}		50		nA

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Coupler

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Coupling capacitance		C_C		1		pF

Current Transfer Ratio

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Coupling Transfer Ratio	I_F = 1 mA, V_{CE} = 1.5 V	SFH6943-2	I_E/I_F	63		200	%
		SFH6943-3	I_E/I_F	100		320	%
		SFH6943-4	I_E/I_F	160		500	%
	I_F = 0.5 mA, V_{CC} = 5 V	SFH6943-2	I_E/I_F	32	100		%
		SFH6943-3	I_E/I_F	50	160		%
		SFH6943-4	I_E/I_F	80	250		%

Switching Characteristics

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Turn-on time	I_E = 2 mA, R_E = 100 Ω, V_{CC} = 5 V	t_{on}		3		µs
Rise time	I_E = 2 mA, R_E = 100 Ω, V_{CC} = 5 V	t_r		2.6		µs
Turn-off time	I_E = 2 mA, R_E = 100 Ω, V_{CC} = 5 V	t_{off}		3.1		µs
Fall time	I_E = 2 mA, R_E = 100 Ω, V_{CC} = 5 V	t_f		2.8		µs

Typical Characteristics (T_{amb} = 25 °C unless otherwise specified)

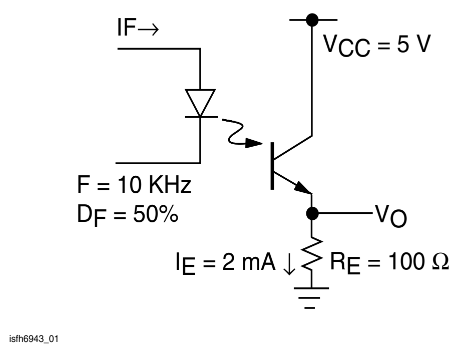

Fig. 1 Switching times (typ.)

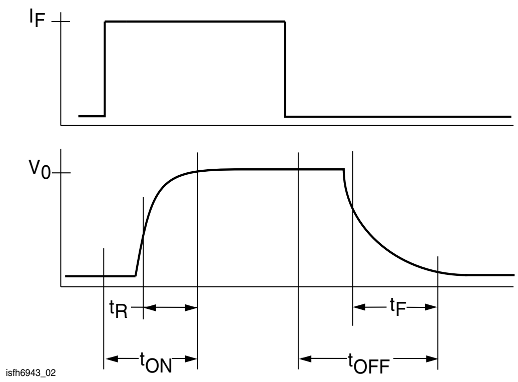

Fig. 2 Switching Waveform

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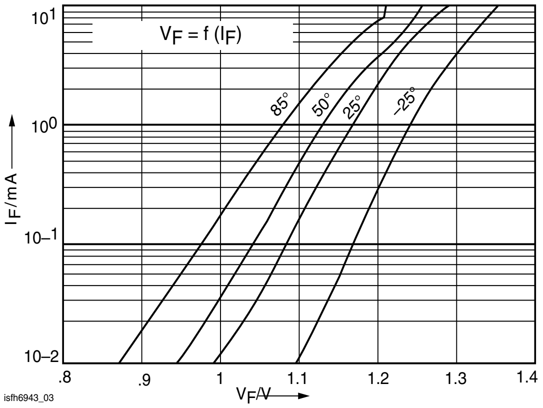

Fig. 3 LED Current vs. LED Voltage

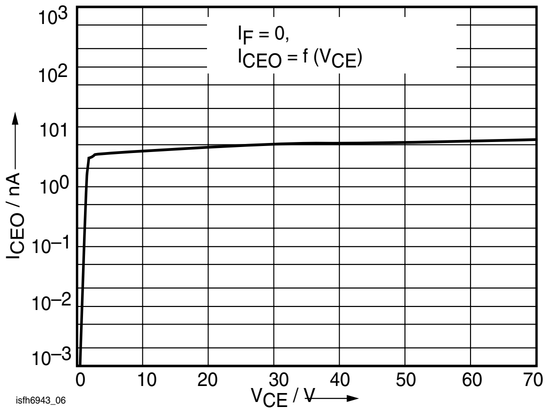

Fig. 6 Collector-Emitter Leakage Current (typ.)

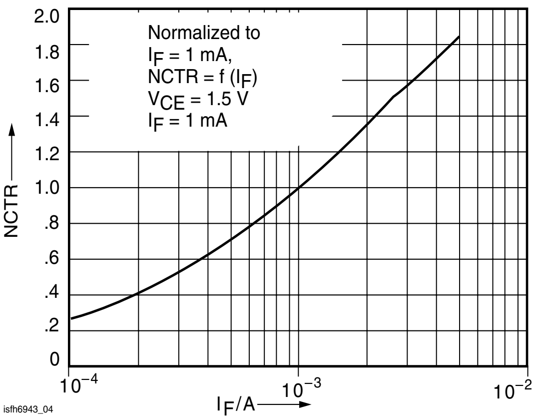

Fig. 4 Non-Saturated Current Transfer

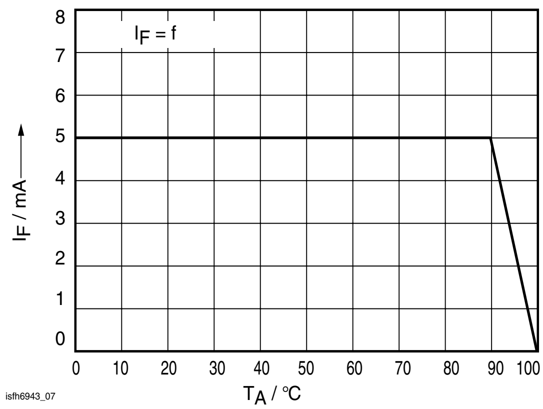

Fig. 7 Permissible Forward Current Diode

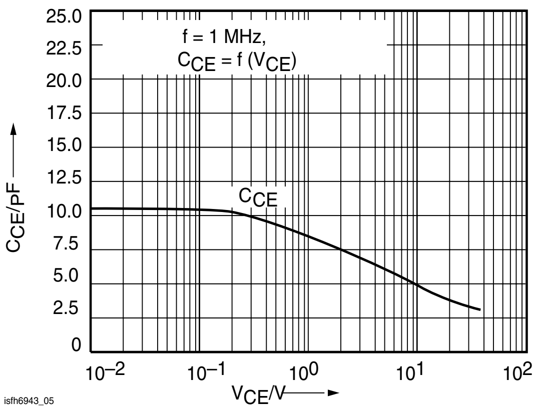

Fig. 5 Transistor Capacitances (typ.)

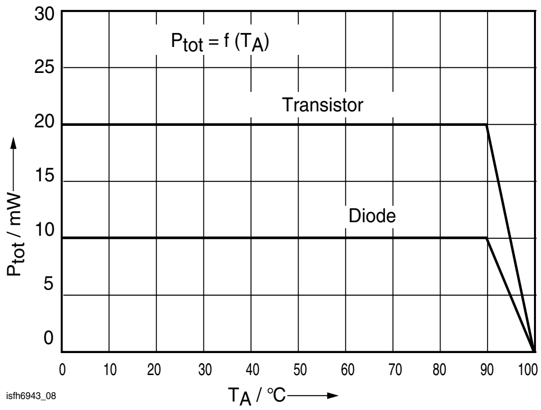

Fig. 8 Permissible Power Dissipation

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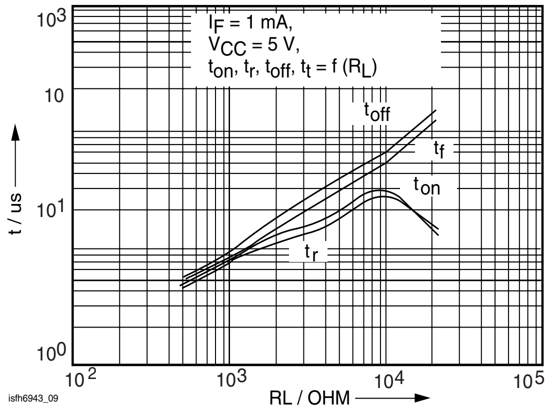


Fig. 9

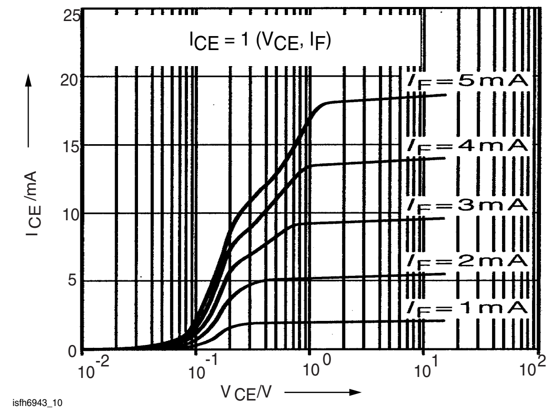
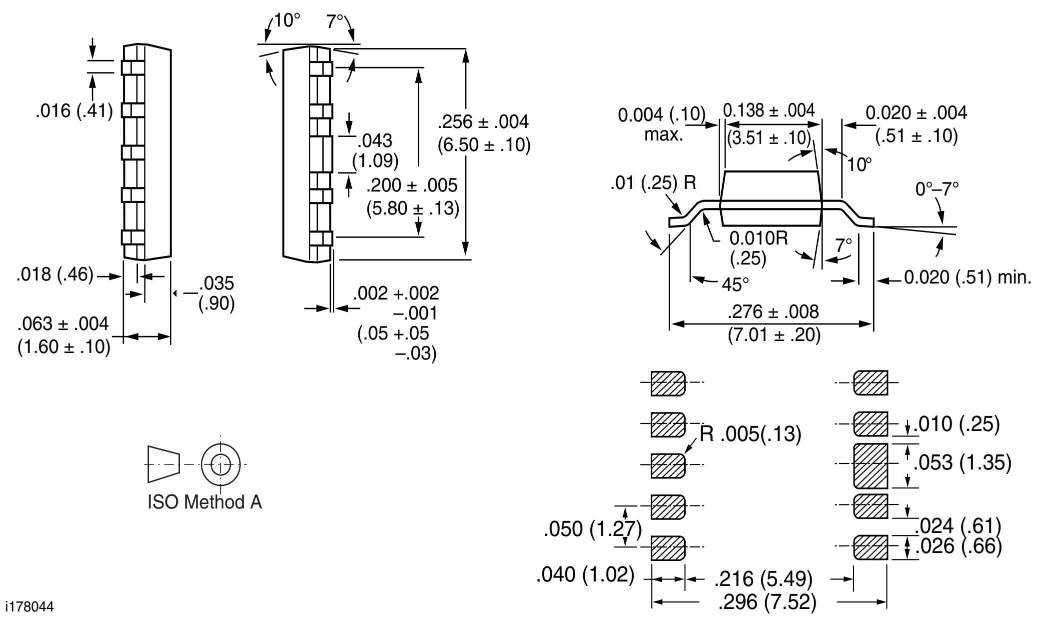


Fig. 10 Transistor Output Characteristics

Package Dimensions in Inches (mm)



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Ozone Depleting Substances Policy Statement

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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.

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

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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.

We reserve the right to make changes to improve technical design and may do so without further notice.

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