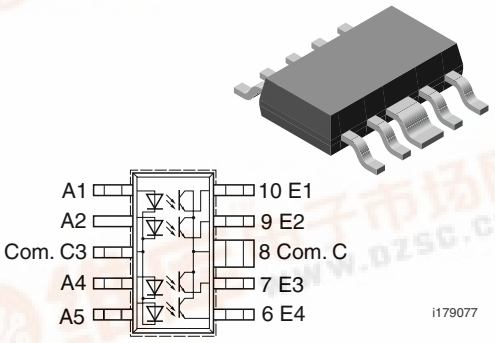
Optocoupler, Phototransistor Output, SOT-223/10, Quad Channel



FEATURES

- Transistor optocoupler in SOT-223/10 package
- End stackable, 1.27 mm spacing
- Low current input
- 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}
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

DESCRIPTION

The SFH6942A 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 SOT-223/10 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.

APPLICATIONS

- Telecommunication
- SMT
- PCMCIA
- Instrumentation

AGENCY APPROVALS

- UL1577, file no. E52744 system code V
- CSA 93751

ORDER INFORMATION

PART	REMARKS
SFH6942A	CTR 78 to 500 %, SOT-10
SFH6942AT	CTR 78 to 500 %, SOT-10, tape and reel

ABSOLUTE MAXIMUM RATINGS

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Reverse voltage		V_R	3	V
DC forward current		I_F	3	mA
Surge forward current	$t_p \leq 10$ µs	I_{FSM}	100	mA
Total power dissipation		P_{diss}	10	mW
OUTPUT				
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

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
OPTOCOUPLER				
Isolation test voltage between emitter and detector, refer to climate DIN 40046, part 2, Nov. 74	t = 1 s	V_{ISO}	1768	V_{RMS}
Creepage distance			≥ 4	mm
Clearance distance			≥ 4	mm
Comparative tracking index per DIN IEC 112/VDE 0303, part 1		CTI	175	
Isolation resistance	V_{IO} = 100 V, T_{amb} = 25 °C	R_{IO}	≥ 10^{11}	Ω
	V_{IO} = 100 V, T_{amb} = 100 °C	R_{IO}	≥ 10^{10}	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 (2)	t = 10 s maximum	T_{sld}	260	°C

Note

(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.

ELECTRICAL CHARACTERISTICS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Forward voltage	I_F = 3 mA	V_F		1.25		V
Reverse current	V_R = 3 V	I_R		0.10	10	µA
Capacitance	V_R = 0 V, f = 1 MHz	C_O		5		pF
Thermal resistance		R_{thja}		1000		K/W
OUTPUT						
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} = 4 V	I_{CEO}		50		nA
	V_{CE} = 40 V, T_C = 85 °C	I_{CEO}			20	µA
COUPLER						
Coupling capacitance		C_C		1		pF

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**
Coupling transfer ratio	I_F = 1 mA, V_{CC} = 0.5 V	SFH6942	I_E/I_F	78	100		%
	I_F = 1 mA, V_{CC} = 0.5 V, T_C = 85 °C	SFH6942	I_E/I_F	50			%

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

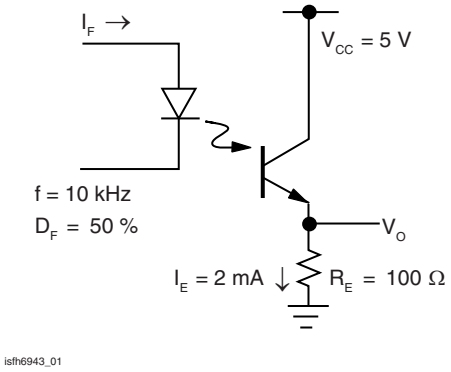


Fig. 3 - Switching times (Typ.)

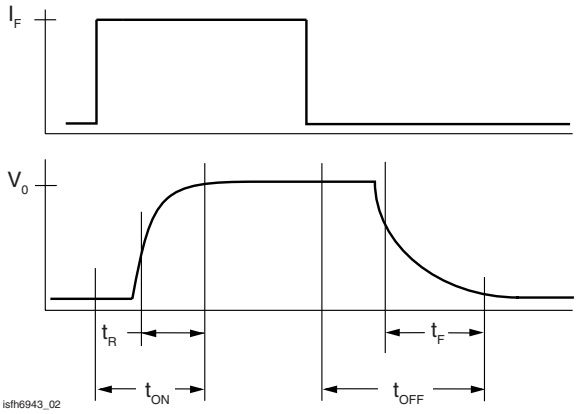


Fig. 4 - Switching Waveform

TYPICAL CHARACTERISTICS

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

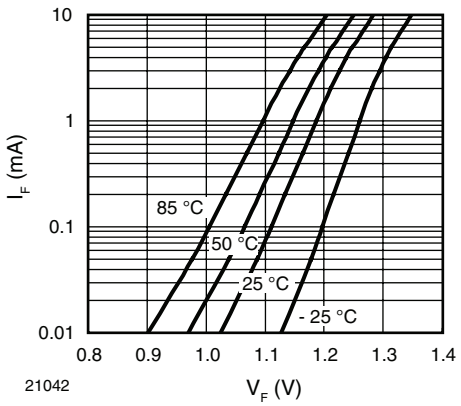


Fig. 5 - LED Current vs. LED Voltage

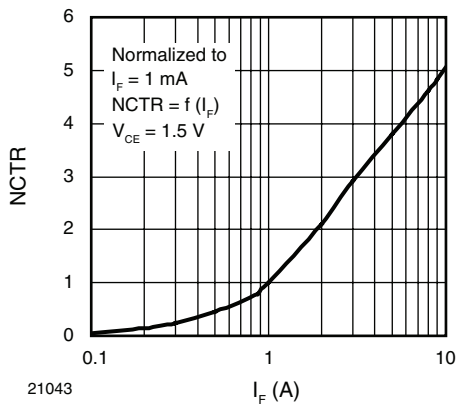


Fig. 6 - Non-Saturated Current Transfer

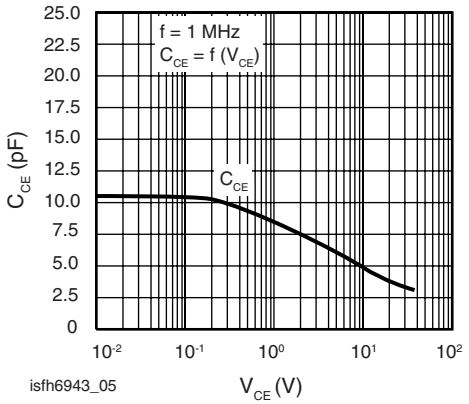


Fig. 7 - Transistor Capacitances (Typ.)

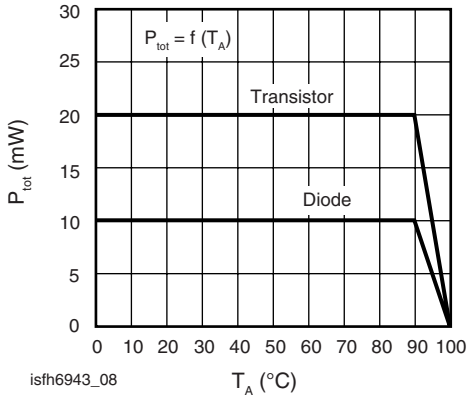


Fig. 10 - Permissible Power Dissipation

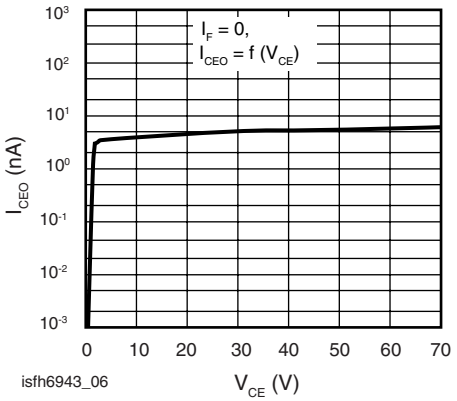


Fig. 8 - Collector Emitter Leakage Current (Typ.)

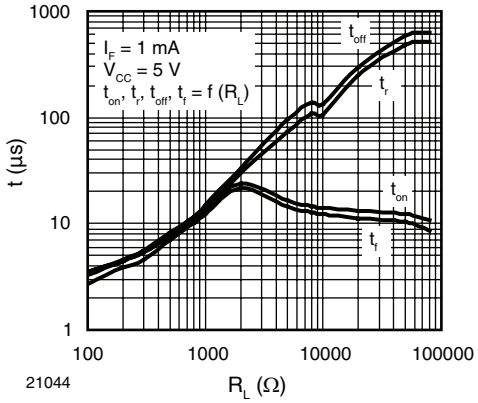


Fig. 11 - Switching Time

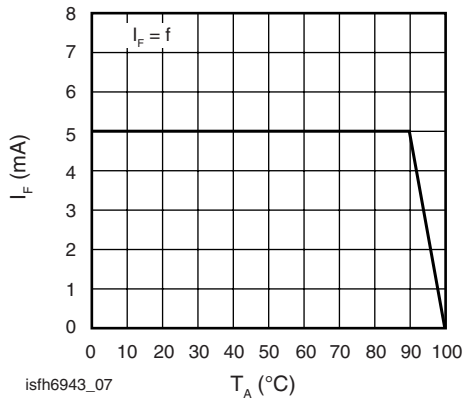


Fig. 9 - Permissible Forward Current Diode

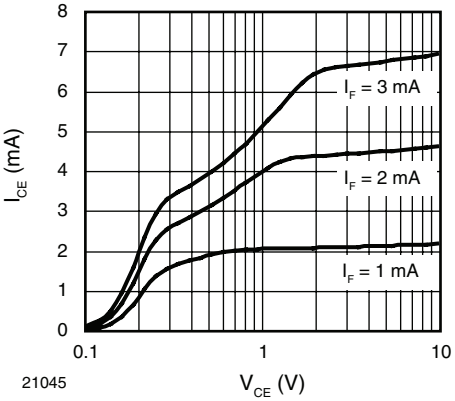
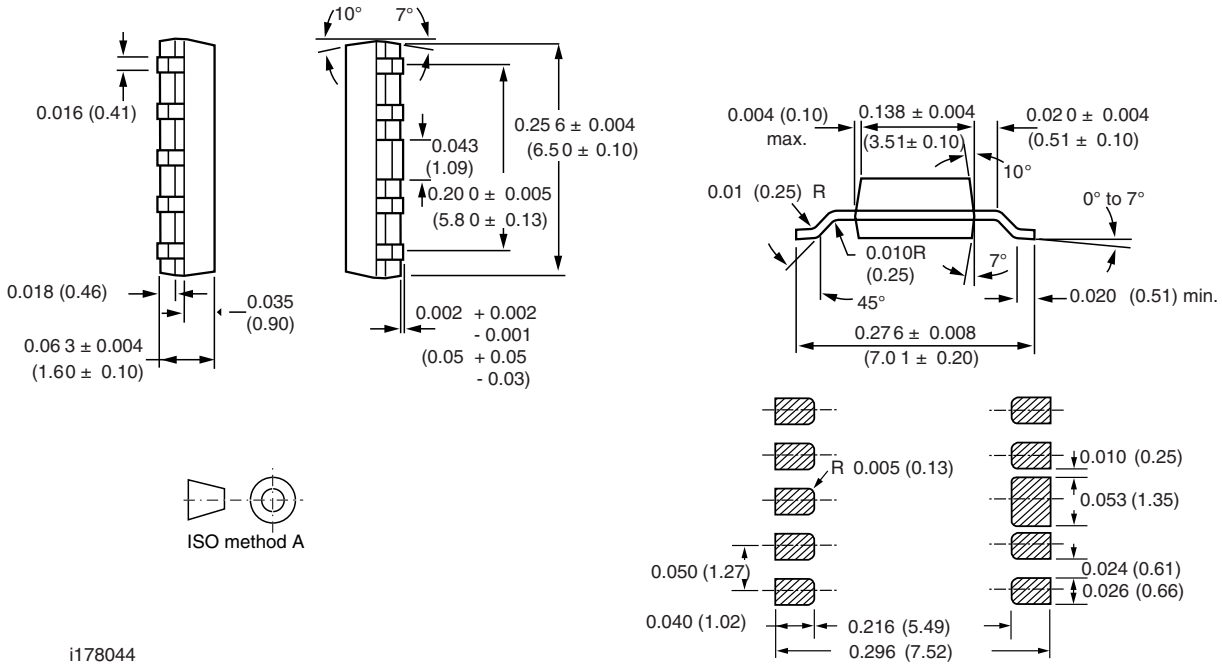


Fig. 12 - Transistor Output Characteristics

PACKAGE DIMENSIONS in inches (millimeters)



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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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