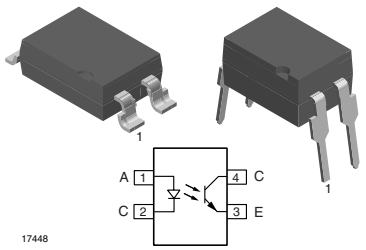
Optocoupler, Phototransistor Output, High Reliability, 5300 V_{RMS}



FEATURES

- Excellent CTR linearity depending on forward current
- Isolation test voltage, 5300 V_{RMS}
- Fast switching times
- Low CTR degradation
- Low coupling capacitance
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC

Pb-free

e3

RoHS COMPLIANT

DESCRIPTION

The SFH615A (DIP) and SFH6156 (SMD) feature a variety of transfer ratios, 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 up to an operation voltage of 400 V_{RMS} or DC. Specifications subject to change.

APPLICATIONS

- Switchmode power supply
- Telecom
- Battery powered equipment

AGENCY APPROVALS

- UL1577, file no. E52744 system code H or J, double protection
- DIN EN 60747-5-5 (VDE 0884) available with option 1

ORDER INFORMATION

PART	REMARKS
SFH615A-1	CTR 40 % to 80 %, DIP-4
SFH615A-2	CTR 63 % to 125 %, DIP-4
SFH615A-3	CTR 100 % to 200 %, DIP-4
SFH615A-4	CTR 160 % to 320 %, DIP-4
SFH6156-1	CTR 40 % to 80 %, SMD-4
SFH6156-2	CTR 63 % to 125 %, SMD-4
SFH6156-3	CTR 100 % to 200 %, SMD-4
SFH6156-4	CTR 160 % to 320 %, SMD-4
SFH615A-1X006	CTR 40 % to 80 %, DIP-4 400 mil (option 6)
SFH615A-1X007	CTR 40 % to 80 %, SMD-4 (option 7)
SFH615A-2X006	CTR 63 % to 125 %, DIP-4 400 mil (option 6)
SFH615A-2X007	CTR 63 % to 125 %, SMD-4 (option 7)
SFH615A-2X009	CTR 63 % to 125 %, SMD-4 (option 9)
SFH615A-3X006	CTR 100 % to 200 %, DIP-4 400 mil (option 6)
SFH615A-3X007	CTR 100 % to 200 %, SMD-4 (option 7)
SFH615A-3X008	CTR 100 % to 200 %, SMD-4 (option 8)
SFH615A-3X009	CTR 100 % to 200 %, SMD-4 (option 9)
SFH615A-4X006	CTR 160 % to 320 %, DIP-4 400 mil (option 6)
SFH615A-4X007	CTR 160 % to 320 %, SMD-4 (option 7)
SFH615A-4X008	CTR 160 % to 320 %, SMD-4 (option 8)
SFH615A-4X009	CTR 160 % to 320 %, SMD-4 (option 9)

Note

For additional information on the available options refer to option information. See tape and reel section for 4 pin optocouplers T0 with 90° rotation.

ABSOLUTE MAXIMUM RATINGS (1)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
Reverse voltage		V_R	6	V
DC forward current		I_F	60	mA
Surge forward current	$t_p \leq 10$ µs	I_{FSM}	2.5	A
OUTPUT				
Collector emitter voltage		V_{CE}	70	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	50	mA
	$t_p \leq 1$ ms	I_C	100	mA
COUPLER				
Isolation test voltage between emitter and detector	t = 1 s	V_{ISO}	5300	V_{RMS}
Creepage distance			≥ 7	mm
Clearance distance			≥ 7	mm
Insulation thickness between emitter and detector			≥ 0.4	mm
Comparative tracking index per DIN IEC112/VDE 0303 part 1		CTI	≥ 175	
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C	R_{IO}	≥ 10^{12}	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	≥ 10^{11}	Ω
Storage temperature range		T_{stg}	- 55 to + 150	°C
Ambient 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).

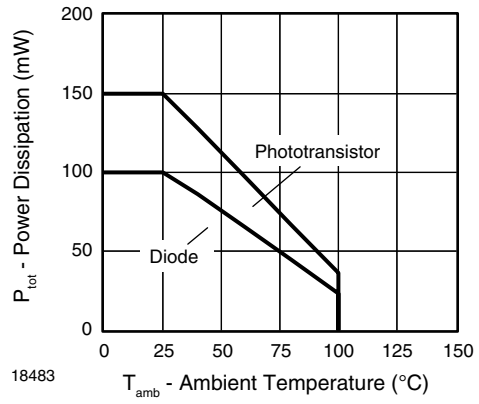
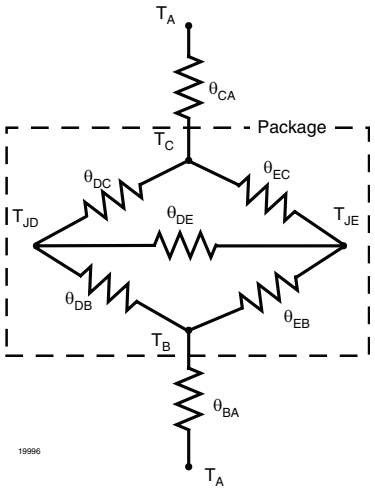


Fig. 1 - Permissible Power Dissipation vs. Ambient Temperature

THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	VALUE	UNIT
LED power dissipation	P_{diss}	100	mW
Output power dissipation	P_{diss}	150	mW
Maximum LED junction temperature	$T_{jmax.}$	125	°C
Maximum output die junction temperature	$T_{jmax.}$	125	°C
Thermal resistance, junction emitter to board	θ_{EB}	173	°C/W
Thermal resistance, junction emitter to case	θ_{EC}	149	°C/W
Thermal resistance, junction detector to board	θ_{DB}	111	°C/W
Thermal resistance, junction detector to case	θ_{DC}	127	°C/W
Thermal resistance, junction emitter to junction detector	θ_{ED}	95	°C/W
Thermal resistance, board to ambient (2)	θ_{BA}	195	°C/W
Thermal resistance, case to ambient (2)	θ_{CA}	3573	°C/W



Notes

(1) The thermal model is represented in the thermal network below. Each resistance value given in this model can be used to calculate the temperatures at each node for a given operating condition. The thermal resistance from board to ambient will be dependent on the type of PCB, layout and thickness of copper traces. For a detailed explanation of the thermal model, please reference Vishay's thermal characteristics of optocouplers application note.

(2) For 2 layer FR4 board (4" x 3" x 0.062")

ELECTRICAL CHARACTERISTICS

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT							
Forward voltage	I_F = 60 mA		V_F		1.25	1.65	V
Reverse current	V_R = 6 V		I_R		0.01	10	µA
Capacitance	V_R = 0 V, f = 1 MHz		C_O		13		pF
OUTPUT							
Collector emitter capacitance	V_{CE} = 5 V, f = 1 MHz		C_{CE}		5.2		pF
Collector emitter leakage current	V_{CE} = 10 V	SFH615A-1	I_{CEO}		2	50	nA
		SFH6156-1	I_{CEO}		2	50	nA
		SFH615A-2	I_{CEO}		2	50	nA
		SFH6156-2	I_{CEO}		2	50	nA
		SFH615A-3	I_{CEO}		5	100	nA
		SFH6156-3	I_{CEO}		5	100	nA
		SFH615A-4	I_{CEO}		5	100	nA
		SFH6156-4	I_{CEO}		5	100	nA
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		0.4		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**
I_C/I_F	I_F = 10 mA, V_{CE} = 5 V	SFH615A-1	CTR	40		80	%
		SFH6156-1	CTR	40		80	%
		SFH615A-2	CTR	63		125	%
		SFH6156-2	CTR	63		125	%
		SFH615A-3	CTR	100		200	%
		SFH6156-3	CTR	100		200	%
		SFH615A-4	CTR	160		320	%
		SFH6156-4	CTR	160		320	%
	I_F = 1 mA, V_{CE} = 5 V	SFH615A-1	CTR	13	30		%
		SFH6156-1	CTR	13	30		%
		SFH615A-2	CTR	22	45		%
		SFH6156-2	CTR	22	45		%
		SFH615A-3	CTR	34	70		%
		SFH6156-3	CTR	34	70		%
		SFH615A-4	CTR	56	90		%
		SFH6156-4	CTR	56	90		%

SWITCHING CHARACTERISTICS							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
NON-SATURATED							
Rise time	I_F = 10 mA, V_{CC} = 5 V, T_A = 25 °C, R_L = 75 Ω		t_r		2		µs
Fall time	I_F = 10 mA, V_{CC} = 5 V, T_A = 25 °C, R_L = 75 Ω		t_f		2		µs
Turn-on time	I_F = 10 mA, V_{CC} = 5 V, T_A = 25 °C, R_L = 75 Ω		t_{on}		3		µs
Turn-off time	I_F = 10 mA, V_{CC} = 5 V, T_A = 25 °C, R_L = 75 Ω		t_{off}		2.3		µs
Cut-off frequency	I_F = 10 mA, V_{CC} = 5 V, T_A = 25 °C, R_L = 75 Ω		f_{ctr}		250		kHz
SATURATED							
Rise time	V_{CC} = 5 V, T_A = 25 °C, R_L = 1 kΩ, I_F = 20 mA	SFH615A-1	t_r		2		µs
		SFH6156-1					
	V_{CC} = 5 V, T_A = 25 °C, R_L = 1 kΩ, I_F = 10 mA	SFH615A-2	t_r		3		µs
		SFH6156-2					
		SFH615A-3	t_r		3		µs
		SFH6156-3					
	V_{CC} = 5 V, T_A = 25 °C, R_L = 1 kΩ, I_F = 5 mA	SFH615A-4	t_r		4		µs
		SFH6156-4					
Fall time	V_{CC} = 5 V, T_A = 25 °C, R_L = 1 kΩ, I_F = 20 mA	SFH615A-1	t_f		11		µs
		SFH6156-1					
	V_{CC} = 5 V, T_A = 25 °C, R_L = 1 kΩ, I_F = 10 mA	SFH615A-2	t_f		14		µs
		SFH6156-2					
		SFH615A-3	t_f		14		µs
		SFH6156-3					
	V_{CC} = 5 V, T_A = 25 °C, R_L = 1 kΩ, I_F = 5 mA	SFH615A-4	t_f		15		µs
		SFH6156-4					

SWITCHING CHARACTERISTICS

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
SATURATED							
Turn-on time	V_{CC} = 5 V, T_A = 25 °C, R_L = 1 kΩ, I_F = 20 mA	SFH615A-1 SFH6156-1	t_{on}		3		µs
	V_{CC} = 5 V, T_A = 25 °C, R_L = 1 kΩ, I_F = 10 mA	SFH615A-2 SFH6156-2	t_{on}		4.2		µs
		SFH615A-3 SFH6156-3	t_{on}		4.2		µs
	V_{CC} = 5 V, T_A = 25 °C, R_L = 1 kΩ, I_F = 5 mA	SFH615A-4 SFH6156-4	t_{on}		6		µs
Turn-off time	V_{CC} = 5 V, T_A = 25 °C, R_L = 1 kΩ, I_F = 20 mA	SFH615A-1 SFH6156-1	t_{off}		18		µs
	V_{CC} = 5 V, T_A = 25 °C, R_L = 1 kΩ, I_F = 10 mA	SFH615A-2 SFH6156-2	t_{off}		23		µs
		SFH615A-3 SFH6156-3	t_{off}		23		µs
	V_{CC} = 5 V, T_A = 25 °C, R_L = 1 kΩ, I_F = 5 mA	SFH615A-4 SFH6156-4	t_{off}		25		µs

SAFETY AND INSULATION RATINGS

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Climatic classification (according to IEC 68 part 1)				55/100/21		
Comparative tracking index		CTI	175		399	
V_{IOTM}			10 000			V
V_{IORM}			890			V
P_{SO}					400	mW
I_{SI}					275	mA
T_{SI}					175	°C
Creepage distance	standard DIP-4		7			mm
Clearance distance	standard DIP-4		7			mm
Creepage distance	400 mil DIP-4		8			mm
Clearance distance	400 mil DIP-4		8			mm
Insulation thickness, reinforced rated	per IEC 60950 2.10.5.1		0.4			mm

Note

As per IEC 60747-5-2, § 7.4.3.8.1, 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

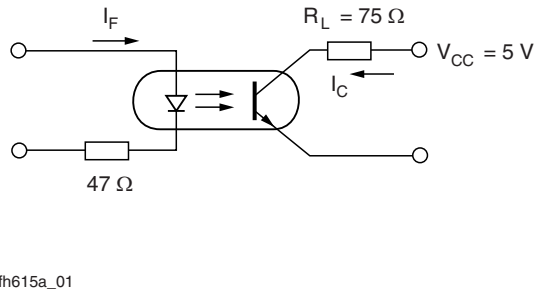


Fig. 2 - Linear Operation (without Saturation)

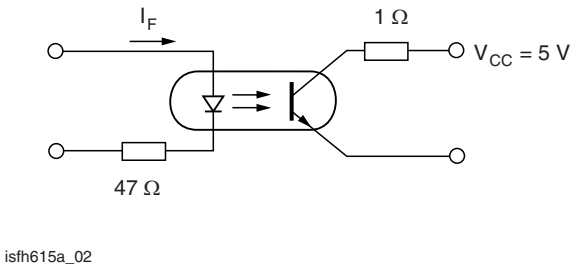


Fig. 3 - Switching Operation (with Saturation)

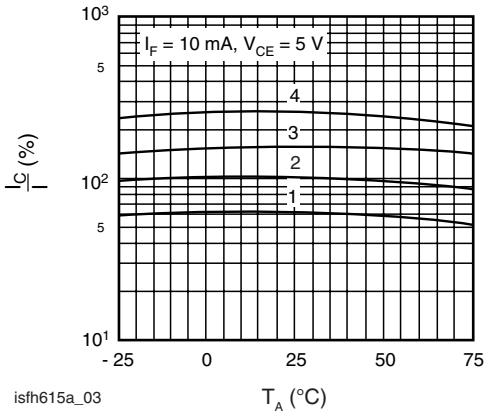


Fig. 4 - Current Transfer Ratio (Typ.) vs. Temperature

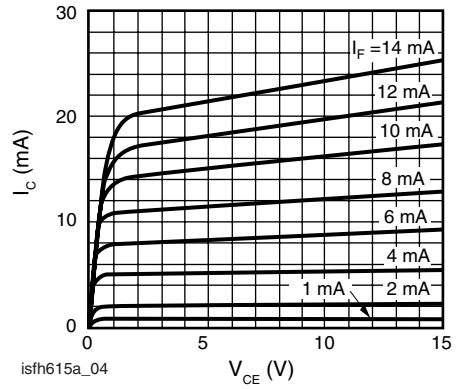


Fig. 5 - Output Characteristics (Typ.) Collector Current vs. Collector Emitter Voltage

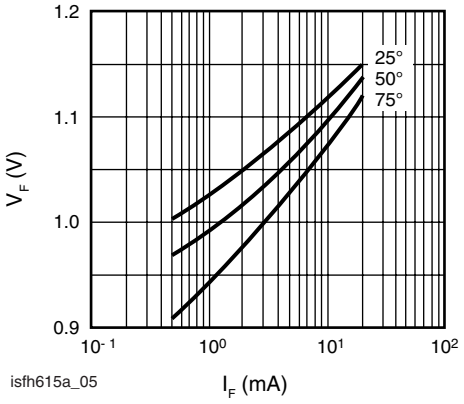


Fig. 6 - Diode Forward Voltage (Typ.) vs. Forward Current

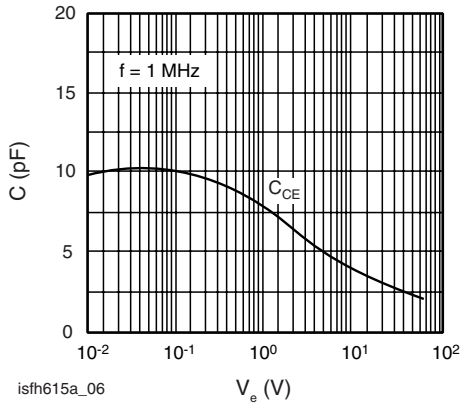


Fig. 7 - Transistor Capacitance (Typ.) vs. Collector Emitter Voltage

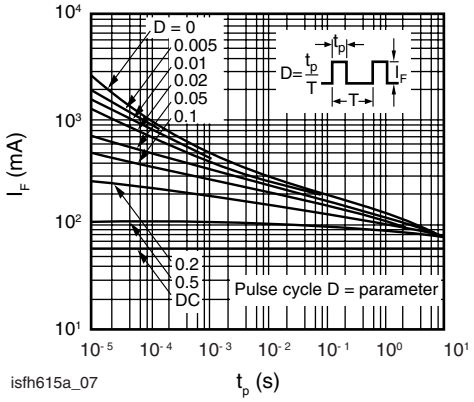
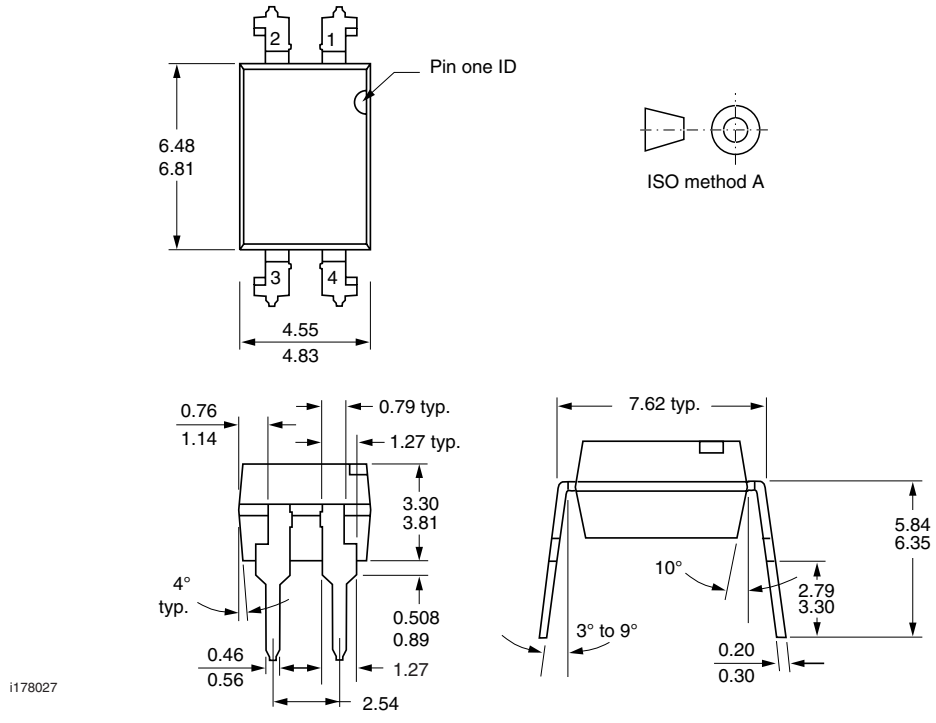
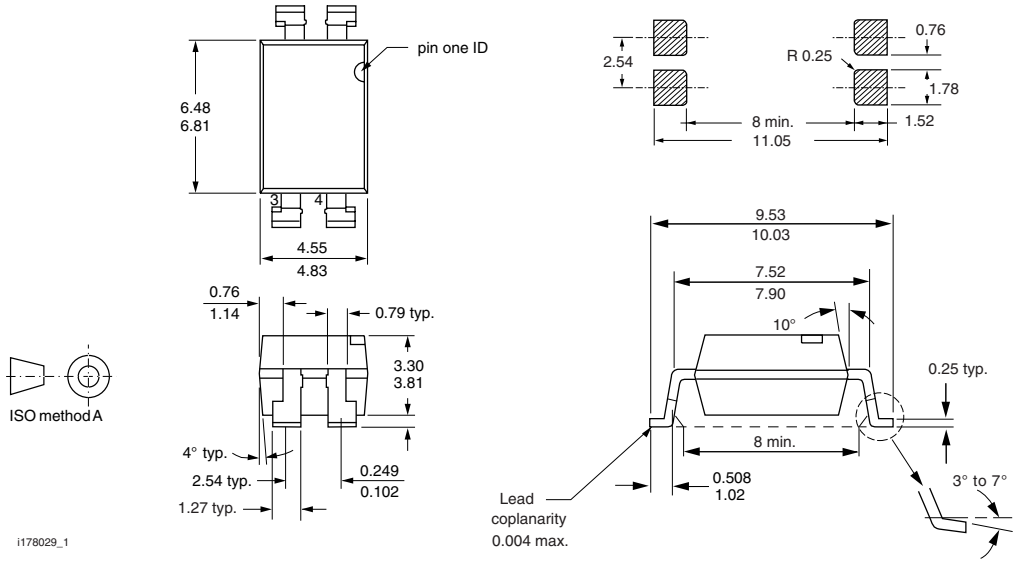


Fig. 8 - Permissible Pulse Handling Capability Forward Current vs. Pulse Width

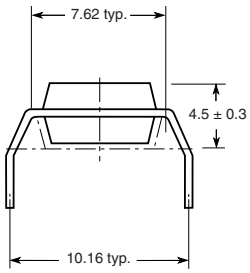
PACKAGE DIMENSIONS millimeters



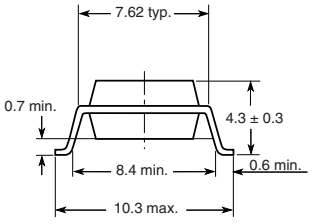
SMD, option 7 (only available on SFH615A products)



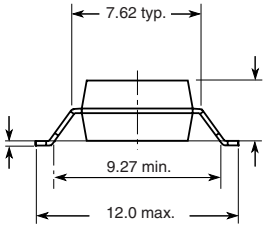
Option 6



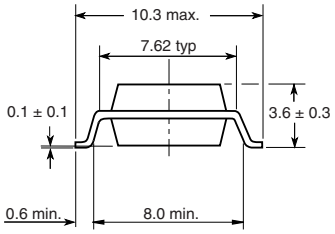
Option 7



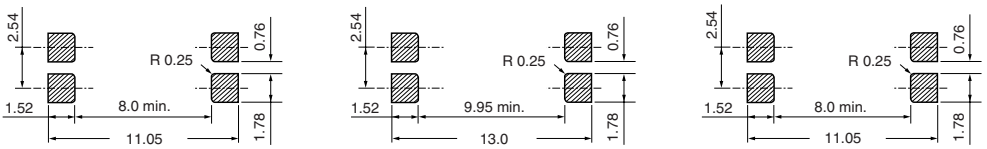
Option 8



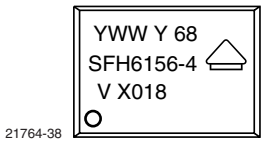
Option 9 or SFH6156



20802-6



PACKAGE MARKING



This is an example of the marking used on the SFH6156-4X018T

Disclaimer

All product specifications and data are subject to change without notice.

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Option Information

Optocoupler lead-bend configurations are available as options. In addition, partial discharge testing as per VDE/IEC is also available as an option.
See the order information section in the data sheet to determine if and which options are available to a specific product. Contact the Vishay sales office for other option configurations. The options are:

Option 1 VDE option

Option 6 400 mil (10.16 mm) lead spread DIP configuration

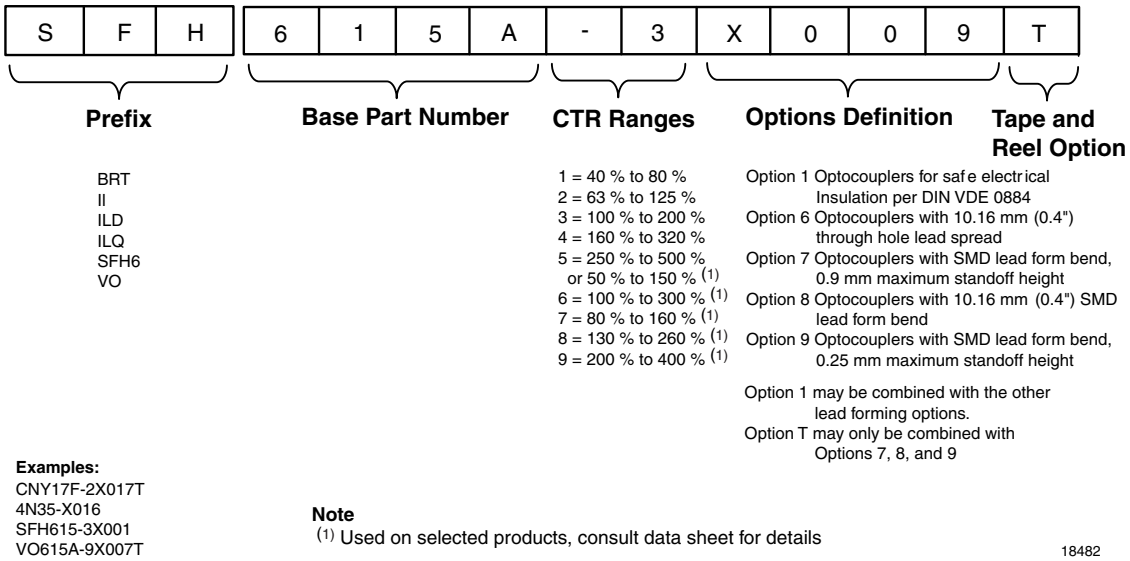
Option 7 Surface mount, gull wing DIP configuration with standoff

Option 8 Surface mount, gull wing DIP configuration with increased clearance

Option 9 Surface mount, gull wing DIP configuration

ORDERING OPTIONS

A specific option or combination of options can be ordered by add the options definition field following the base part number and CTR range (if applicable) as presented in the following example:



This field is always 4 characters long and commences with the character X. In the case of surface mounted products in Tape and Reel format, the tape and reel option character “T” will follow this field. The possible combinations for these Fields (1) are:

X001, X006, X007, X008, X009, X001T (2), X007T, X008T, X009T, X016, X017, X018, X019, X017T, X018T, X019T

Notes

(1) Not all options are available for all product types.

(2) The X001T option is only available on products that are available on the following SMD products SFH6106, SFH6156, SFH6186, SFH6206 and SFH6286 series, e.g. SFH6106-3X001T .

OPTION 1
OPTOCOUPLERS FOR SAFE ELECTRICAL INSULATION PER DIN EN 60747-5-5 (VDE 0884) (1)

The optocoupler listed are suitable for safe electrical insulation only within the safety maximum ratings. Compliance with the safety maximum ratings must be ensured by protective circuits.
The partial discharge measurement ensures that no partial discharge occurs during operation at maximum permissible operating insulation voltage (V_{IORM}). Permanent partial discharge affects the insulating materials and can result in a high voltage breakdown.
It is recommended that tests with the insulation test voltage (V_{ISOL}) should not be made, otherwise partial discharge may occur impairing the insulation characteristics. Thus partial discharges also may occur at the maximum permissible operating insulation voltage.
The insulation test per DIN EN 60747-5-5 (VDE 0884) is carried out after all the other tests

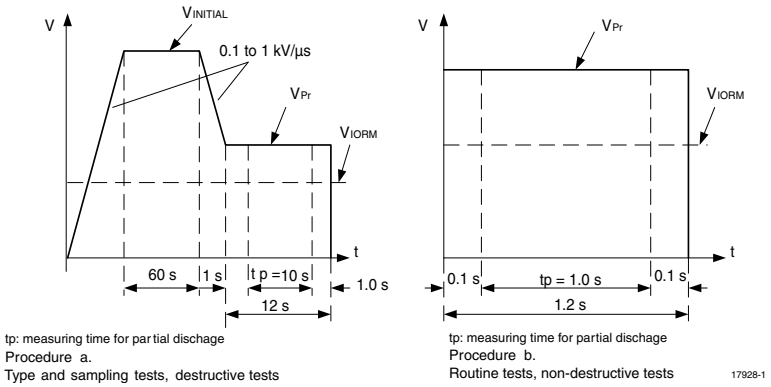


Fig. 1 - Time Voltage Diagram per DIN EN 60747-5-2 (VDE 0884)/DIN EN 60747-5-5 (pending)

DESCRIPTION	SYMBOL	SYSTEM 1			UNIT
		DIP4	DIP8	DIP16	
		SFH610A-..	ILCT6	ILQ1/2/5/74	
		SFH615A-..	ILD1/2/5/74	ILQ30/31/55	
		SFH615AA-..	ILD30/31/55	ILQ32	
		SFH615AGB-..	ILD32	ILQ66-..	
		SFH615AGR-..	ILD66-..	ILQ615-..	
		SFH617A-..	ILD250/1/2	ILQ620-..	
		SFH618A-..	ILD255	ILQ620GB-..	
		SFH620A-..	ILD621GB-..	ILQ621-..	
		SFH620AA-..	ILD621-..	ILQ621GB-..	
		SFH620AGB-..	ILD621GB-..		
		SFH628A-..	ILD755-..		
		SFH6106-..	ILD766-..		
		SFH6116-..	MCT6		
		SFH6156-..			
		SFH6186-..			
		SFH6206-..			
		SFH6286-..			
Installation category (DIN VDE 0110)					
For rated line voltages ≤ 300 V_{RMS}		I - IV			
For rated line voltages ≤ 600 V_{RMS}		I - IV			
For rated line voltages ≤ 1000 V_{RMS}					
IEC climatic category (DIN IEC 60068 Part 1/9.80)		55/100/21			
Pollution degree (DIN VDE 0110 Part 1/1.89)		2			
Maximum operation insulating voltage (1)	V_{IORM}	890			V
Test voltage input/output, procedure b (1) V_{Pr} = 1.875 x V_{IORM}, routine 100 % test, t_p = 1 s, partial discharge < 5 pC	V_{Pr}	1669			V
Test voltage input/output, procedure a (1) V_{Pr} = 1.5 x V_{IORM}, type and sampling test t_p = 60 s, partial discharge < 5 pC	V_{Pr}	1335			V
Maximum permissible overvoltage (transient overvoltage)	V_{IOTM}	8000			V
Partial discharge test voltage (1)	$V_{INITIAL}$	8000			V
Safety maximum ratings (maximum permissible ratings in case of a fault, also refer to d diagram) Package temperature Current (input current I_F, P_{Si} = 0, T_A = 25 °C) Derating with higher ambient temperature Power (output or total power dissipation, T_A = 25 °C) Derating with higher ambient temperature	 T_{si} I_{si} DI_{Si} P_{Si} ΔP_{Si}	 175 275 - 1.83 400 - 2.67			 °C mA mA/K mW mW/K
Insulation resistance at T_{Si} $V_{I/O}$ = 500 V	R_{IS}	> 10^9			W

DESCRIPTION	SYMBOL	SYSTEM 2			UNIT
		4N25/26/27/28	IL250	MCT5210	
		4N35/36/37/38/39	IL251	MCT5211	
		4N32/33	IL252	SFH600-..	
		CNY17-..	IL255-..	SFH601-..	
		CNY17F-..	IL400	SFH608-..	
		H11A-..	IL755-..	SFH640-..	
		H11AA1-..	IL755B-..	MOC8050	
		H11B-..	IL766-..	IL56B-..	
		H11B1-..	IL766B-..	MOC8021	
		H11C-..	MCA230/231	MOC8112	
		H11D-..	MCA255	MOC8102/03/04/05	
		IL1/2/5/74	MCT2/2E		
		IL2B-..	MCT270/271		
		IL30/31/55	MCT272		
		IL55B-..	MCT273/274		
		IL66-..	MCT275		
		IL66B-..	MCT276/277		
		IL201/202/203			
Installation category (DIN VDE 0110)					
For rated line voltages ≤ 300 V_{RMS}		I - IV			
For rated line voltages ≤ 600 V_{RMS}		I - IV			
For rated line voltages ≤ 1000 V_{RMS}					
IEC climatic category (DIN IEC 60068 Part 1/9.80)		55/100/21			
Pollution degree (DIN VDE 0110 Part 1/1.89)		2			
Maximum operation insulating voltage (1)	V_{IORM}	890			V
Test voltage input/output, procedure b (1) V_{Pr} = 1.875 x V_{IORM}, routine 100 % test, t_p = 1 s, partial discharge < 5 pC	V_{Pr}	1669			V
Test voltage input/output, procedure a (1) V_{Pr} = 1.5 x V_{IORM}, type and sampling test t_p = 60 s, partial discharge < 5 pC	V_{Pr}	1335			V
Maximum permissible overvoltage (transient overvoltage)	V_{IOTM}	8000			V
Partial discharge test voltage (1)	$V_{INITIAL}$	8000			V
Safety maximum ratings (maximum permissible ratings in case of a fault, also refer to diagram) Package temperature Current (input current I_F, P_{Si} = 0, T_A = 25 °C) Derating with higher ambient temperature Power (output or total power dissipation, T_A = 25 °C) Derating with higher ambient temperature	 T_{si} I_{si} DI_{Si} P_{Si} ΔP_{Si}	 175 400 - 2.67 700 - 4.67			 °C mA mA/K mW mW/K
Insulation resistance at T_{Si} $V_{I/O}$ = 500 V	R_{IS}	> 10^9			W

DESCRIPTION	SYMBOL	SYSTEM 4 (2)	SYSTEM 5	SYSTEM 7	UNIT
		IL410	6N135	IL300	
		IL420	6N136	IL300E	
		IL4116	SFH6135	IL300F	
		IL4117	SFH6136	IL300EF	
		IL4118	6N138	IL300DEFG	
		IL4216	SFH6138		
		IL4217	SFH6139		
		IL4218	6N139		
			SFH6345		
Installation category (DIN VDE 0110)					
For rated line voltages ≤ 300 V_{RMS}		I - IV	I - IV	I - IV	
For rated line voltages ≤ 600 V_{RMS}		I - III	I - IV	I - IV	
For rated line voltages ≤ 1000 V_{RMS}					
IEC climatic category (DIN IEC 60068 Part 1/9.80)		55/100/21	55/100/21	55/100/21	
Pollution degree (DIN VDE 0110 Part 1/1.89)		2	2	2	
Maximum operation insulating voltage (1)	V_{IORM}	850	630	890	V
Test voltage input/output, procedure b (1) V_{Pr} = 1.875 x V_{IORM}, routine 100 % test, t_p = 1 s, partial discharge < 5 pC	V_{Pr}	1594	1181	1669	V
Test voltage input/output, procedure a (1) V_{Pr} = 1.5 x V_{IORM}, type and sampling Test t_p = 60 s, partial discharge < 5 pC	V_{Pr}	1275	945	1335	V
Maximum permissible overvoltage (transient overvoltage)	V_{IOTM}	6000	8000	8000	V
Partial discharge test voltage (1)	$V_{INITIAL}$	6000	8000	8000	V
Safety maximum ratings (maximum permissible ratings in case of a fault, also refer to diagram) Package temperature Current (input current I_F, P_{Si} = 0, T_A = 25 °C) Derating with higher ambient temperature Power (output or total power dissipation, T_A = 25 °C) Derating with higher ambient temperature	 T_{si} I_{si} DI_{Si} P_{Si} ΔP_{Si}	 175 250 - 1.65 500 - 3.33	 175 300 - 2 500 - 3.33	 165 235 - 1.57 465 - 3.1	 °C mA mA/K mW mW/K
Insulation resistance at T_{Si} $V_{I/O}$ = 500 V	R_{IS}	> 10^9	> 10^9	> 10^9	W

Notes

All voltages referred to are peak values except otherwise specified.

(1) See time-test voltage diagram

(2) In preparation

Testing input/output voltage requires all input pins and all output pins to be shorted
Option 1: Tested per DIN EN 60747-5-2 (VDE 0884)/DIN EN 60747-5-5 (pending)
Option 6: Wide lead spacing (10.16 mm creepage/clearance distances > 8 mm)
Option 7: Surface mount leads (creepage/clearance distances > 8 mm)
Option 8: Surface mount leads
Option 9: Surface mount leads
See CECC 00802, edition 1, for soldering conditions for SMT devices (option 7 and 9).
"-.." means dash selections

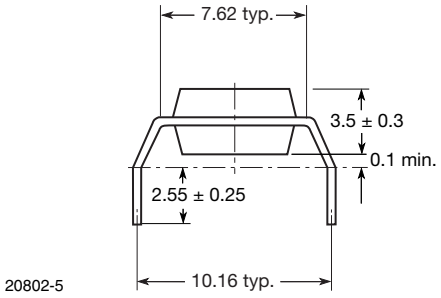
OPTION 6
DIP OPTOCOUPLERS WITH 0.4" (10.16 mm) LEAD SPREAD

The leads of the optocouplers are bent according to a spacing of 0.4" (10.16 mm). Dimensions deviating from the standard type are:

Lead spacing 10.16 mm (0.4")
Creepage distance > 8 mm
Clearance > 8 mm

This version additionally complies with the following standards:

- IEC 60950 DIN VDE 0805/05 90 (System 2 and 3 only) Reinforced insulation up to an operating voltage of 400 V_{RMS} or DC



Clearance-creepage distance = 8 mm min.
See standard version for pin configuration

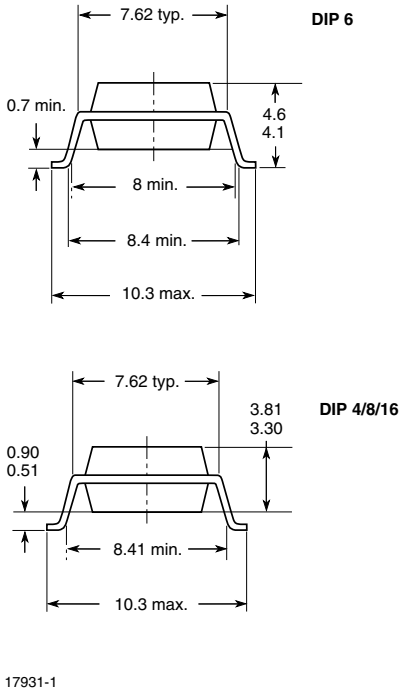
OPTION 7
LEAD BENDS FOR SURFACE MOUNT OPTOCOUPLERS

These optocouplers are suitable for surface mounting. Dimensions deviating from the standard type are:
Creepage distance > 8 mm
Clearance distance > 8 mm

This version additionally complies with the following standards:

- IEC 60950 DIN VDE 0805/05 90 (system 2 and 3 only) Reinforced insulation up to an operating voltage of 400 V_{RMS} or DC

During the soldering process, the package should not be wetted with tin-lead solder to prevent the impairment of the isolation features. Apart from iron soldering, only reflow soldering methods (vapor phase, infrared and hot gas) are permissible.
Permissible soldering conditions for SMD bending options: please see reflow soldering profile
The soldering process may be repeated two times at the most. Attention must be paid to the cooling down of the device to 25 °C between the soldering processes.



Clearance and creepage distances must be considered for the solder pad design.
Clearance-creepage distance = 8 mm min.
See standard version for pin configuration.

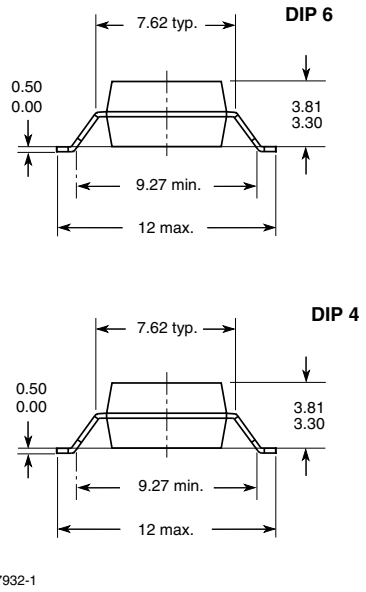
OPTION 8
LEAD BENDS FOR SURFACE MOUNT OPTOCOUPLERS

These optocouplers are suitable for surface mounting. Dimensions deviating from the standard type are:
Creepage distance > 8 mm
Clearance distance > 8 mm

This version additionally complies with the following standards:

- IEC 60950 DIN VDE 0805/05 90 (system 2 and 3 only) Reinforced insulation up to an operating voltage of 400 V_{RMS} or DC

During the soldering process, the package should not be wetted with tin-lead solder to prevent the impairment of the isolation features. Apart from iron soldering, only reflow soldering methods (vapor phase, infrared and hot gas) are permissible.
Permissible soldering conditionsfor SMD bending options: please see reflow soldering profile
The soldering process may be repeated two times at the most. Attention must be paid to the cooling down of the device to 25 °C between the soldering processes

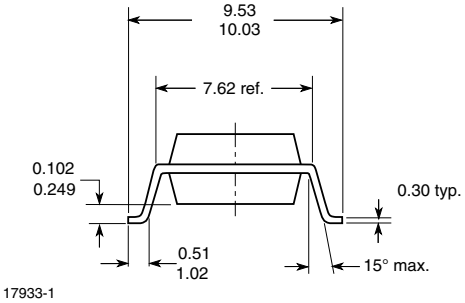


17932-1

Clearance and creepage distances must be considered for the solder pad design.
Clearance-creepage distance = 8 mm min.
See standard version for pin configuration.

OPTION 9
LEAD BENDS FOR SURFACE MOUNT OPTOCOUPLERS

During the soldering process, the package should not be wetted with tin-lead solder to prevent the impairment of the isolation features. Apart from iron soldering, only reflow soldering methods (vapor phase, infrared and hot gas) are permissible.
Permissible soldering conditionsfor SMD bending options: please see reflow soldering profile
The soldering process may be repeated two times at the most. Attention must be paid to the cooling down of the device to 25 °C between the soldering processes.



17933-1

MARKINGS

Product marking is defined in the data sheets. In the cases where marking is not defined in the datasheet, the following table defines the option information that is marked on the product.

OPTION TYPE	MARKING
X001, X001T	X001, X1 (1)
X006	No mark
X007, X007T	X007
X008, X008T	X008
X009, X009T	No mark
X016	X001
X017, X017T	X017
X018, X018T	X018
X019, X019T	X001

Note

(1) X1 is used on the SOP and SOIC-8 where there are space constraints.