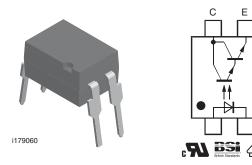
SFH655A



Vishay Semiconductors

Optocoupler, Photodarlington Output



DESCRIPTION

The SFH655A is optically coupled isolators with a gallium arsenide infrared LED and a silicon photodarlington detector. Switching can be achieved while maintaining a high degree of isolation between driving and load circuits.

This optocouplers can be used to replace reed and mercury relays with advantages of long life, high speed switching and elimination of magnetic fields.

FEATURES

- High isolation test voltage 5300 V_{RMS}
- Standard plastic DIP-4 package
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

AGENCY APPROVALS

- UL file no. E52744 system code H, double protection
- DIN EN 60747-5-2 (VDE 0884), IEC 60747-5-5
- DIN EN 60747-5-5 (VDE 0884) pending
- BSI IEC 60950; IEC 60065

# A - # # # # DIP Option 9					
CTR (%)					
> 600					
SFH655A					
SFH655A-X009					

Note

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

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Peak reverse voltage		V _{RM}	6	V
Forward continuous current		I _F	60	mA
Surge forward current	t _p ≤ 10μs	I _{FSM}	2.5	A
Derate linearly from 25 °C			1.33	mW/°C
Power dissipation		P _{diss}	100	mW
OUTPUT				
Collector emitter breakdown voltage		BV _{CEO}	55	V
Emitter collector breakdown voltage		BV _{ECO}	6	V
Collector (load) current		Ι _C	125	mA
Derate linearly from 25 °C			2	mW/°C
Power dissipation		P _{diss}	150	mW

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ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified)									
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT					
COUPLER									
Derate linearly from 25 °C			3.33	mW/°C					
Total power dissipation		P _{tot}	250	mW					
Isolation voltage		V _{IORM}	890	VP					
Isolation test voltage between input and output, climate acc. to IEC 60068 - 1:1988		V _{ISO}	5300	V _{RMS}					
Creepage distance			≥7	mm					
Clearance distance			≥7	mm					
Comparative tracking index acc. to DIN IEC 112/VDE 0303, part 1:06-84			≥ 175						
Isolation resistance	$V_{IO} = 500 \text{ V}, \text{ T}_{amb} = 25 ^{\circ}\text{C}$	R _{IO}	≥ 10 ¹²	Ω					
Isolation resistance	$V_{IO} = 500 \text{ V}, \text{ T}_{amb} = 100 ^{\circ}\text{C}$	R _{IO}	≥ 10 ¹¹	Ω					
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 \geq 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).

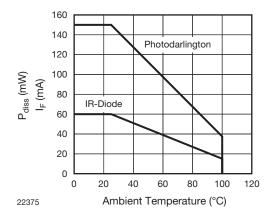


Fig. 1 - Power Dissipation vs. Ambient Temperature



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ELECTRICAL CHARACTERISTICS ($T_{amb} = 25 \text{ °C}$, unless otherwise specified)								
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT	
INPUT								
Forward voltage	I _F = 10 mA		V _F		1.15	1.5	V	
Reverse current	V _R = 6 V		I _R		0.02	10	μA	
Capacitance	$V_R = 0 V$, f = 1 MHz		Co		50		pF	
OUTPUT								
Collector emitter breakdown voltage	I _{CE} = 100 μA		BV _{CEO}	55			V	
Emitter collector breakdown voltage	I _{EC} = 10 μA		BV _{ECO}	6			V	
Collector emitter dark current	V _{CE} = 40 V		I _{CEO}		12	400	nA	
Collector emitter capacitance	V _{CE} = 0 V, f = 1 MHz		C _{CE}		13.5		pF	
COUPLER								
Collector emitter saturation voltage	$I_{\rm F} = 20$ mA, $I_{\rm C} = 5$ mA	SFH655A	V _{CEsat}			1	V	
Coupling capacitance	V _{I-O} = 0 V, f = 1 MHz		C _C		0.45		pF	

Note

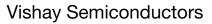
• Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

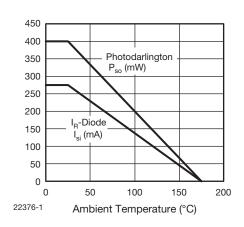
CURRENT TRANSFER RATIO (T _{amb} = 25 °C, unless otherwise specified)									
PARAMETER TEST CONDITION PART SYMBOL MIN. TYP. MAX. UNIT							UNIT		
Current transfer ratio	$I_F = 1 \text{ mA}, V_{CE} = 2 \text{ V}$	SFH655A	CTR	600			%		

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Partial discharge test voltage - routine test	100 %, t _{test} = 1 s	V _{pd}	1.669			kV
Partial discharge test voltage - lot test (sample test)	$t_{Tr} = 60 \text{ s, } t_{test} = 10 \text{ s,}$ (see fig. 2)	V _{pd}	1.424			kV
	V _{IO} = 500 V	R _{IO}	10 ¹²			Ω
Insulation resistance	$V_{IO} = 500 \text{ V}, \text{ T}_{amb} = 100 ^{\circ}\text{C}$	R _{IO}	10 ¹¹			Ω
	V _{IO} = 500 V, T _{amb} = 150 °C (construction test only)	R _{IO}	10 ⁹			Ω
Climatic classification (according to IEC 68 part 1)				55/100/21		
Comparative tracking index		CTI	175		399	
Creepage distance	standard DIP-4		7			mm
Clearance distance	standard DIP-4		7			mm
Insulation thickness, reinforced rated	per IEC 60950 2.10.5.1		0.4			mm
Forward current		I _{si}			275	mA
Power dissipation		P _{so}			400	mW
Safety temperature		T _{si}			175	°C

Note

 According to DIN EN 60747-5-2 (VDE 0884) (see fig. 2). This optocoupler is suitable for safe electrical isolation only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.





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Fig. 2 - Derating Diagram

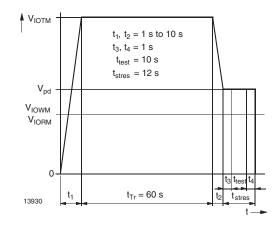
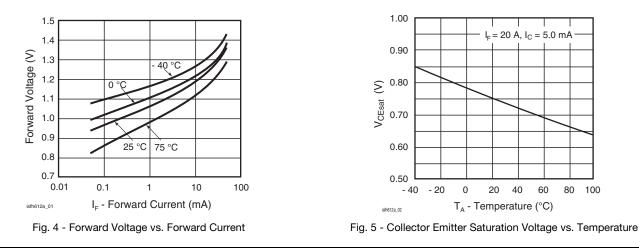


Fig. 3 - Test Pulse Diagram for Sample Test according to DIN EN 60747-5-2 (VDE 0884); IEC 60747-5-5

SWITCHING CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)								
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT	
Turn-on time (fig. 10, test circuit 1)	V_{CC} = 10 V, I _C = 2 mA, R _L = 100 Ω	SFH612A	t _{on}		16		μs	
Turn-off time (fig. 10, test circuit 1)	V_{CC} = 10 V, I _C = 2 mA, R _L = 100 Ω	SFH612A	t _{off}		15		μs	
Rise time (fig. 10, test circuit 1)	V_{CC} = 10 V, I _C = 2 mA, R _L = 100 Ω	SFH612A	t _r		14		μs	
Fall time (fig. 10, test circuit 1)	V_{CC} = 10 V, I _C = 2 mA, R _L = 100 Ω	SFH612A	t _f		14		μs	
Turn-on time (fig. 11, test circuit 2)	V_{CC} = 2 V, I_{C} = 10 mA, R_{L} = 100 Ω	SFH655A	t _{on}		31		μs	
Turn-off time (fig. 11, test circuit 2)	V_{CC} = 2 V, I_{C} = 10 mA, R_{L} = 100 Ω	SFH655A	t _{off}		55		μs	
Rise time (fig. 11, test circuit 2)	V_{CC} = 2 V, I_{C} = 10 mA, R_{L} = 100 Ω	SFH655A	t _r		27	250	μs	
Fall time (fig. 11, test circuit 2)	V_{CC} = 2 V, I_{C} = 10 mA, R_{L} = 100 Ω	SFH655A	t _f		56	200	μs	

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



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4 For technical questions, contact: <u>optocoupleranswers@vishay.com</u>

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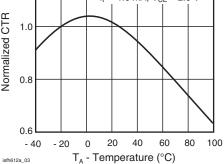


Fig. 6 - Normalized CTR vs. Temperature

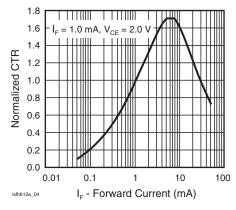


Fig. 7 - Normalized CTR vs. Forward Current

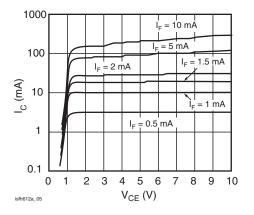


Fig. 8 - Collector Current vs. Collector Emitter Voltage

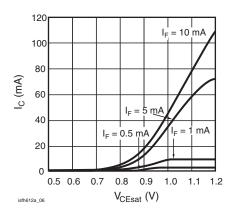


Fig. 9 - Collector Current vs. Collector Emitter Saturation Voltage

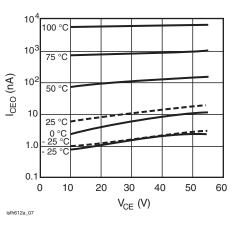


Fig. 10 - Collector Emitter Dark Current vs. Collector Emitter Voltage over Temperature

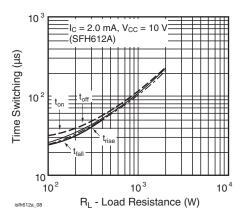


Fig. 11 - Switching Time vs. Load Resistor

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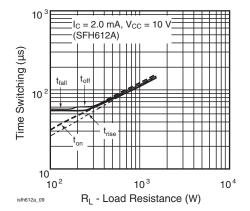
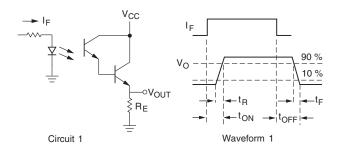
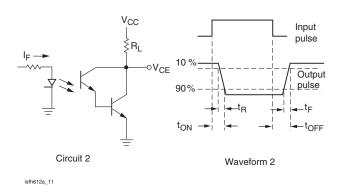


Fig. 12 - Switching Time vs. Load Resistor



isfh612a_10

Fig. 13 - Switching Time Test Circuit and Waveforms





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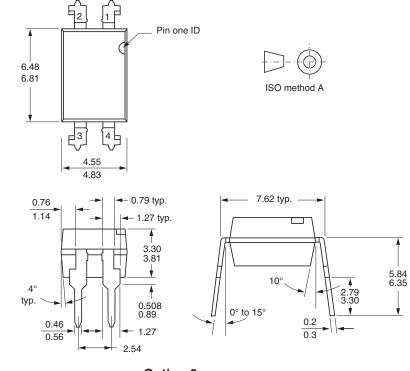
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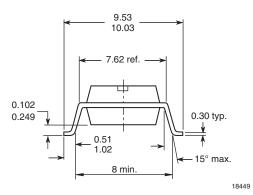
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PACKAGE DIMENSIONS in millimeters

i178027



Option 9



PACKAGE MARKING



Note

• VDE logo is only printed on option 1 parts. Option information is not marked on the part.



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