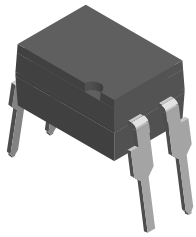
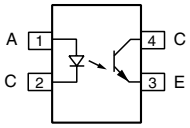
Optocoupler, Phototransistor Output, High Reliability, 5300 V_{RMS}





i179060

FEATURES

- Low CTR degradation
- Good CTR linearity depending on forward current
- Isolation test voltage, 5300 V_{RMS}
- High collector emitter voltage, V_{CEO} = 70 V
- Low saturation voltage
- Fast switching times
- Temperature stable
- Low coupling capacitance
- End stackable, 0.100" (2.54 mm) spacing
- High common mode interference immunity (unconnected base)
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Pb-free

e3

RoHS COMPLIANT

DESCRIPTION

The SFH615XXX features a large assortment of current transfer ratio, low coupling capacitance and high isolation voltage. These couplers have a GaAs infrared emitting diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a plastic DIP-4 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 60950 (DIN VDE 0805) for reinforced insulation up to operation voltage of 400 V_{RMS} or DC.

AGENCY APPROVALS

- UL1577, file no. E52744 system code H or J, double protection
- DIN EN 60747-5-5 (VDE 0884) available with option 1
- BSI IEC 60950; IEC 60065

ORDER INFORMATION

PART	REMARKS
SFH615AA	CTR 50 to 600 %, DIP-4
SFH615AB	CTR 80 to 260 %, DIP-4
SFH615ABL	CTR 200 to 600 %, DIP-4
SFH615ABM	CTR 200 to 400 %, DIP-4
SFH615AGB	CTR 100 to 600 %, DIP-4
SFH615AGR	CTR 100 to 300 %, DIP-4
SFH615AY	CTR 50 to 150 %, DIP-4
SFH615AA-X006	CTR 50 to 600 %, DIP-4 400 mil (option 6)
SFH615AA-X007	CTR 50 to 600 %, SMD-4 (option 7)
SFH615ABM-X006	CTR 200 to 400 %, DIP-4 400 mil (option 6)
SFH615ABM-X007	CTR 200 to 400 %, SMD-4 (option 7)
SFH615AGB-X006	CTR 100 to 600 %, DIP-4 400 mil (option 6)
SFH615AGB-X009	CTR 100 to 600 %, SMD-4 (option 9)
SFH615AGR-X006	CTR 100 to 300 %, DIP-4 400 mil (option 6)
SFH615AGR-X007	CTR 100 to 300 %, SMD-4 (option 7)
SFH615AY-X006	CTR 50 to 150 %, DIP-4 400 mil (option 6)
SFH615AY-X008	CTR 50 to 150 %,SMD-4 (option 8)
SFH615AY-X009	CTR 50 to 150 %,SMD-4 (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	V
DC forward current		I_F	60	mA
Surge forward current	$t_P \leq 10$ ms	I_{FSM}	2.5	A
Power dissipation		P_{diss}	100	mW
OUTPUT				
Collector emitter voltage		V_{CE}	70	V
Emitter collector voltage		V_{EC}	7	V
Collector current		I_C	50	mA
	$t_P \leq 10$ ms	I_C	100	mA
Total power dissipation		P_{diss}	150	mW
COUPLER				
Isolation test voltage between emitter and detector		V_{ISO}	5300	V_{RMS}
Creepage distance			≥ 7	mm
Clearance distance			≥ 7	mm
Isolation thickness between emitter and detector Comparative tracking index per DIN IEC 112/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).

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
Thermal resistance			R_{thja}		750		K/W
OUTPUT							
Collector emitter capacitance	V_{CE} = 5 V, f = 1 MHz		C_{CE}		5.2		pF
Thermal resistance			R_{thja}		500		K/W
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

ELECTRICAL CHARACTERISTICS							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
COUPLER							
Collector emitter leakage current	V_{CEO} = 10 V	SFH615AA	I_{CEO}		10	100	nA
		SFH615AGB	I_{CEO}		10	100	nA
		SFH615AGR	I_{CEO}		10	100	nA
		SFH615ABM	I_{CEO}		10	100	nA
		SFH615ABL	I_{CEO}		10	100	nA
		SFH615AY	I_{CEO}		10	100	nA
		SFH615AB	I_{CEO}		10	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**
I_C/I_F	I_F = 5 mA, V_{CE} = 5 V	SFH615AA	CTR	50		600	%
		SFH615AGB	CTR	100		600	%
		SFH615AGR	CTR	100		300	%
		SFH615ABM	CTR	200		400	%
		SFH615ABL	CTR	200		600	%
		SFH615AY	CTR	50		150	%
		SFH615AB	CTR	80		260	%

SWITCHING CHARACTERISTICS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Turn-on time	I_F = 5 mA	t_{on}		2		µs
Turn-off time	I_F = 5 mA	t_{off}		25		µs

TYPICAL CHARACTERISTICS

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

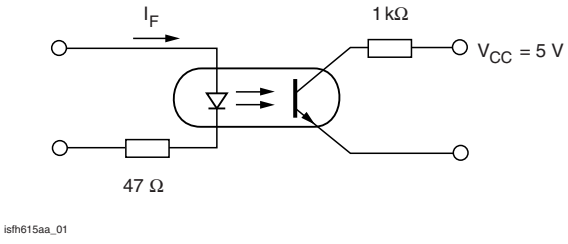


Fig. 1 - Switching Operation (with Saturation)

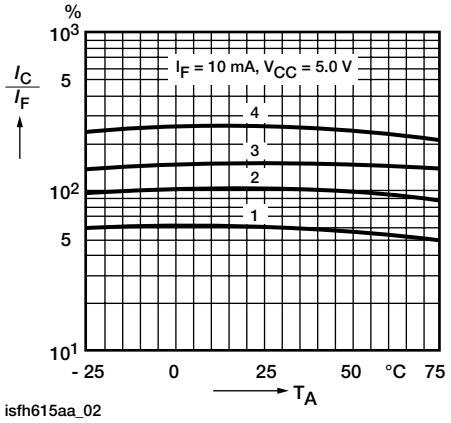


Fig. 2 - Current Transfer Ratio (Typ.) vs. Temperature

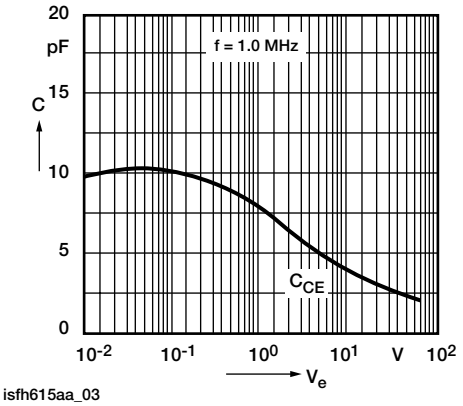


Fig. 3 - Transistor Capacitance (Typ.) vs. Collector Emitter Voltage

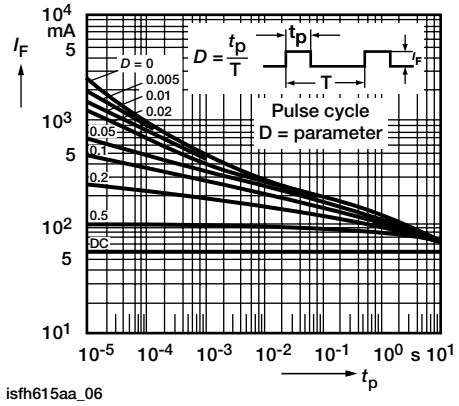


Fig. 6 - Permissible Pulse Handling Capability Forward Current vs. Pulse Width

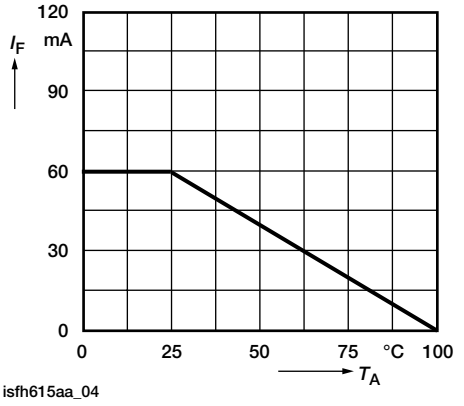


Fig. 4 - Permissible Diode Forward Current vs. Ambient Temperature

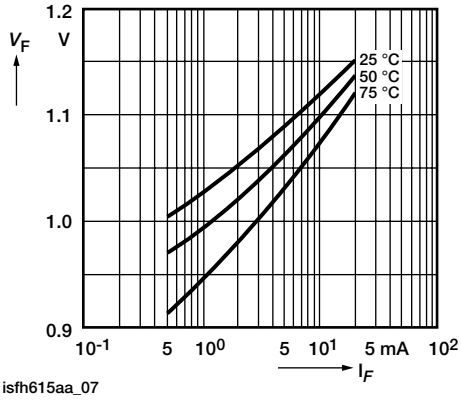


Fig. 7 - Diode Forward Voltage (Typ.) vs. Forward Current

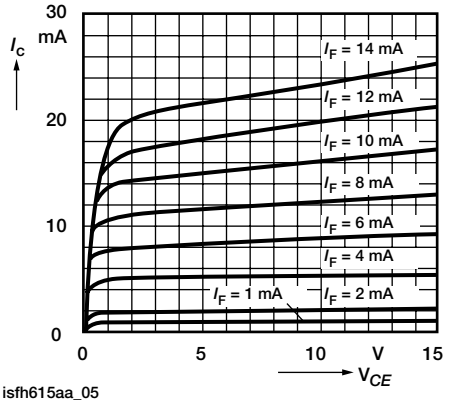


Fig. 5 - Output Characteristics (Typ.) Collector Current vs. Collector Emitter Voltage

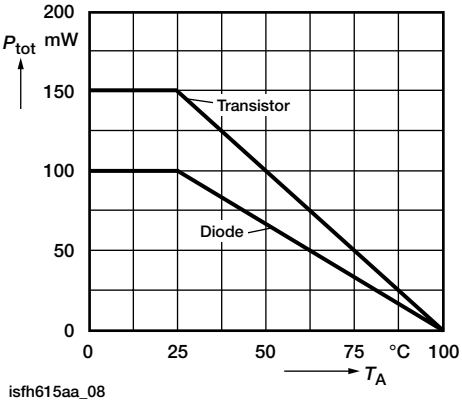
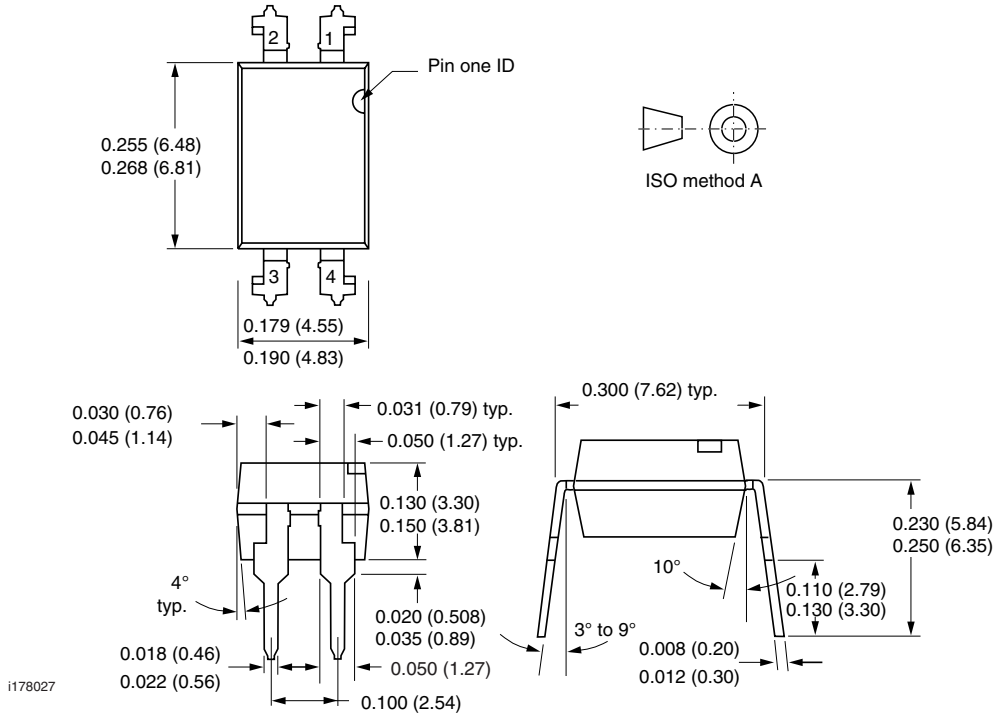
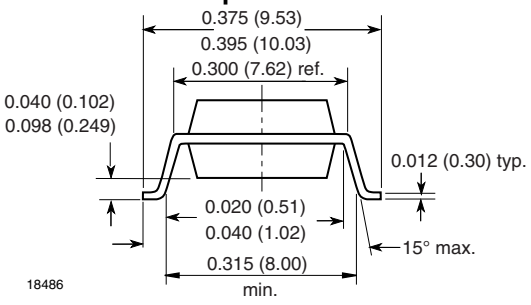


Fig. 8 - Permissible Power Dissipation vs. Temperature

PACKAGE DIMENSIONS in inches (millimeters)



Option 9



OZONE DEPLETING SUBSTANCES POLICY STATEMENT

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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