

FEATURES

- **Variety of Current Transfer Ratios at $I_F=10$ mA**
 - SFH615A-1, 40–80%
 - SFH615A-2, 63–125%
 - SFH615A-3, 100–200%
 - SFH615A-4, 160–320%
 - SFH615A-12, 40–125%
 - SFH615A-23, 63–200%
 - SFH615A-34, 100–320%
 - SFH615A-13, 40–200%
 - SFH615A-24, 63–320%
 - SFH615A-14, 40–320%
- **Low CTR Degradation**
- **Good CTR Linearity Depending on Forward Current**
- **Withstand Test Voltage, 5300 V_{RMS}**
- **High Collector-Emitter Voltage, $V_{CEO}=70$ V**
- **Low Saturation Voltage**
- **Fast Switching Times**
- **Field-Effect Stable by TRIOS (Transparent IOn Shield)**
- **Temperature Stable**
- **Low Coupling Capacitance**
- **End-Stackable, .100" (2.54 mm) Spacing**
- **High Common-Mode Interference Immunity (Unconnected Base)**
- **Underwriters Lab File #52744**
- **VDE 0884 Available with Option 1**

DESCRIPTION

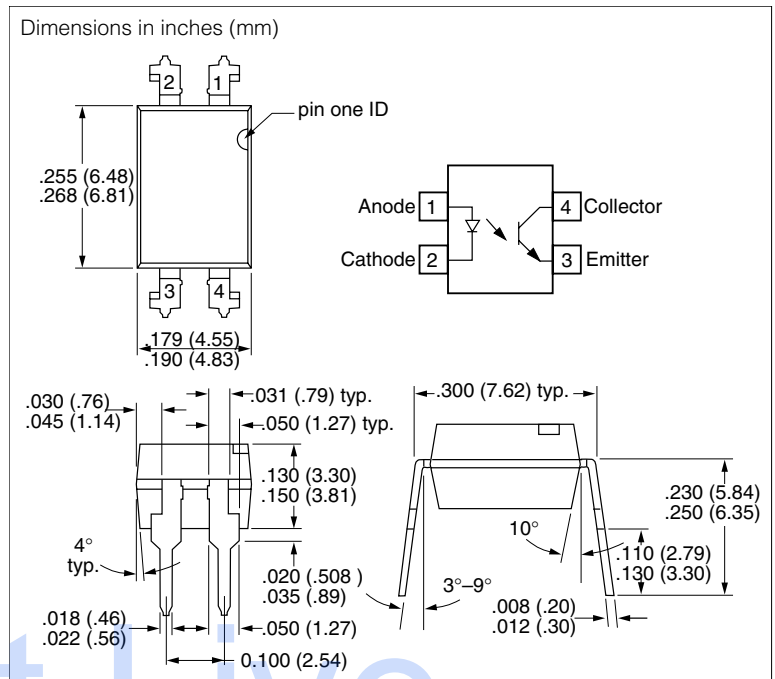
The SFH615A features a large variety of transfer ratio, low coupling capacitance and high isolation voltage. These couplers have a GaAs infrared emitting diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a plastic DIP-4 package.

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 >8.0 mm are achieved with option 6. This version complies with IEC 950 (DIN VDE 0805) for reinforced insulation up to an operation voltage of 400 V_{RMS} or DC.

Specifications subject to change.



Maximum Ratings

Emitter

Reverse Voltage	6.0 V
DC Forward Current	60 mA
Surge Forward Current ($t_p \leq 10 \mu s$)	2.5 A
Total Power Dissipation	100 mW

Detector

Collector-Emitter Voltage	70 V
Emitter-Collector Voltage	7.0 V
Collector Current	50 mA
Collector Current ($t_p \leq 1.0$ ms)	100 mA
Total Power Dissipation	150 mW

Package

Isolation Test Voltage between Emitter and Detector, refer to Climate DIN 40046, part 2, Nov. 74, $t=1.0$ s	5300 V _{RMS}
Creepage	≥ 7.0 mm
Clearance	≥ 7.0 mm
Insulation Thickness between Emitter and Detector	≥ 0.4 mm
Comparative Tracking Index per DIN IEC 112/VDE0 303, part 1	≥ 175
Isolation Resistance	
$V_{IO}=500$ V, $T_A=25^\circ C$	$\geq 10^{12} \Omega$
$V_{IO}=500$ V, $T_A=100^\circ C$	$\geq 10^{11} \Omega$
Storage Temperature Range	-55 to $+150^\circ C$
Ambient Temperature Range	-55 to $+100^\circ C$
Junction Temperature	$100^\circ C$
Soldering Temperature (max. 10 s. Dip Soldering Distance to Seating Plane ≥ 1.5 mm)	$260^\circ C$

Characteristics ($T_A=25^\circ\text{C}$)

Parameter	Sym.	Value	Unit	Condition
Emitter (IR GaAs)				
Forward Voltage	V_F	1.25(≤ 1.65)	V	$I_F=60\text{ mA}$
Reverse Current	I_R	0.01(≤ 10)	μA	$V_R=6.0\text{ V}$
Capacitance	C_0	13	pF	$V_R=0\text{ V}$, $f=1.0\text{ MHz}$
Thermal Resistance	R_{thJA}	750	K/W	—
Detector (Si Phototransistor)				
Capacitance	C_{CE}	5.2	pF	$V_{CE}=5.0\text{ V}$, $f=1.0\text{ MHz}$
Thermal Resistance	R_{thJA}	500	K/W	—
Package				
Collector-Emitter Saturation Voltage	V_{CEsat}	0.25(≤ 0.4)	V	$I_F=10\text{ mA}$, $I_C=2.5\text{ mA}$
Coupling Capacitance	C_C	0.4	pF	—

Current Transfer Ratio (I_C/I_F at $V_{CE}=5.0\text{ V}$) and Collector-emitter Leakage Current

Parameter	-1	-2	-3	-4	-12	-23	-34	-13	-24	-14	Unit
I_C/I_F ($I_F=10\text{ mA}$)	40–80	63–125	100–200	160–320	40–125	63–200	100–320	40–200	63–320	40–320	%
I_C/I_F ($I_F=1.0\text{ mA}$)	30(>13)	45(>22)	70(>34)	90(>56)	30(>13)	45(>22)	70(>34)	30(>13)	45(>22)	30(>13)	
Collector-Emitter Leakage Current, I_{CEO} , $V_{CE}=10\text{ V}$	2.0(≤ 50)	2.0(≤ 50)	5.0(≤ 100)	5.0(≤ 100)	2.0(≤ 50)	5.0(≤ 100)	5.0(≤ 100)	5.0(≤ 100)	5.0(≤ 100)	5.0(≤ 100)	nA

Table 1. $I_F=10\text{ mA}$, $V_{CC}=5.0\text{ V}$, $T_A=25^\circ\text{C}$, without Saturation

Parameter	Sym.	Value	Unit
Load Resistance	R_L	75	Ω
Turn-on Time	t_{on}	3.0	μs
Rise Time	t_r	2.0	
Turn-off Time	t_{off}	2.3	
Fall Time	t_f	2.0	
Cut-off Frequency	F_{CO}	250	

Table 2. $V_{CC}=5.0\text{ V}$, $T_A=25^\circ\text{C}$, with Saturation

Parameter	Sym.	Switching Time by Dash Numbers			Unit
		-1, -12, -13 $I_F=20\text{ mA}$	-2, -3, -23 $I_F=10\text{ mA}$	-4, -34, -24 $I_F=5.0\text{ mA}$	
Load Resistance	R_L	1000	1000	1000	Ω
Turn-on Time	t_{on}	3.0	4.2	6.0	μs
Rise Time	t_r	2.0	3.0	4.6	
Turn-off Time	t_{off}	18	23	25	
Fall Time	t_f	11	14	15	

Figure 1. Switching Times (Typical) Linear Operation (without saturation)

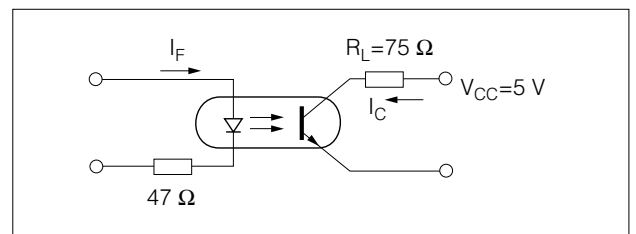


Figure 2. Switching Operation (with saturation)

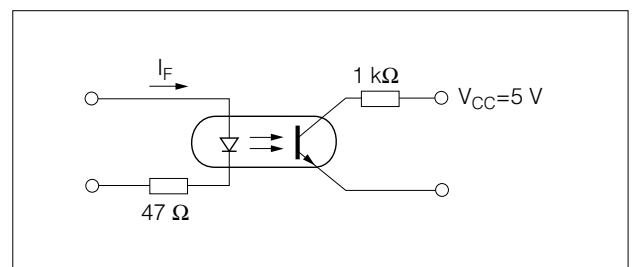


Figure 3. Current Transfer Ratio (typical) vs. Temperature
 $I_F=10\text{ mA}$, $V_{CE}=5.0\text{ V}$

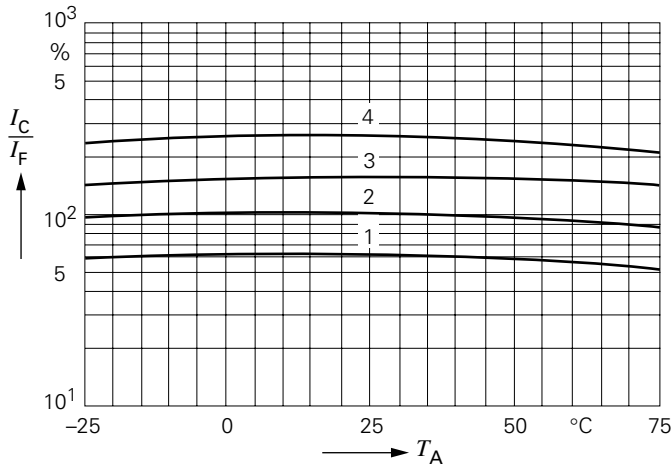


Figure 6. Transistor Capacitance (typical) vs. Collector-emitter Voltage
 $T_A=25^\circ\text{C}$, $f=1.0\text{ MHz}$

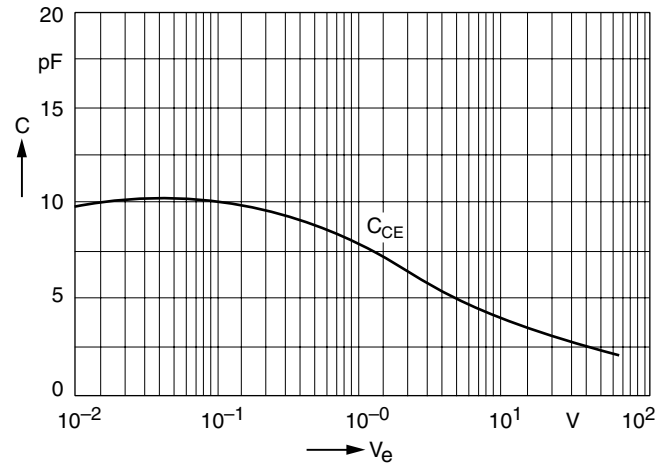


Figure 4. Output Characteristics (typical) Collector Current vs. Collector-emitter Voltage
 $T_A=25^\circ\text{C}$

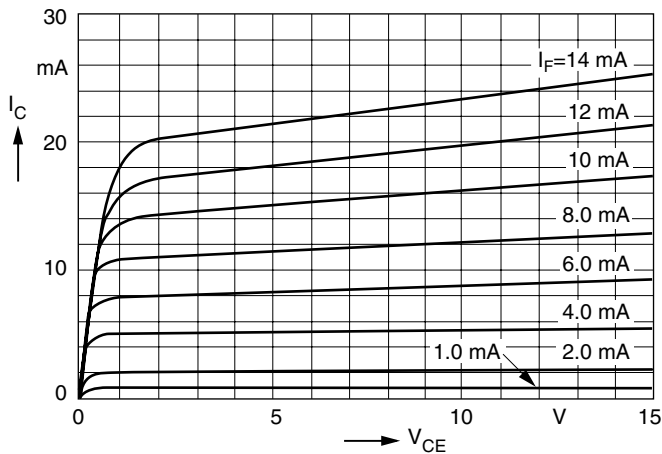


Figure 7. Permissible Pulse Handling Capability. Forward Current vs. Pulse Width
 Pulse cycle D =parameter, $T_A=25^\circ\text{C}$

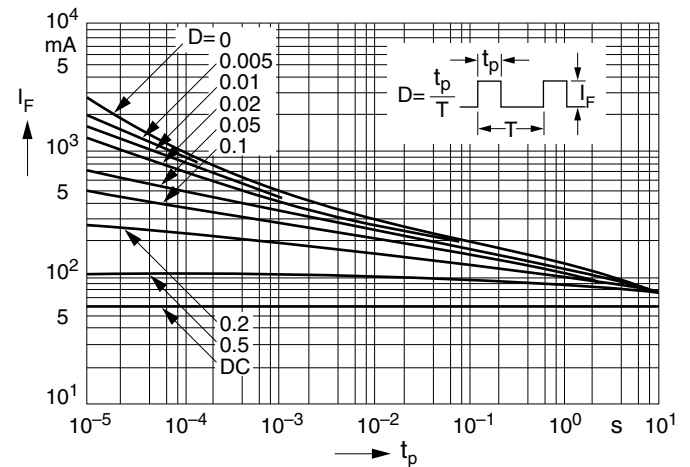


Figure 5. Diode Forward Voltage (typical) vs. Forward Current

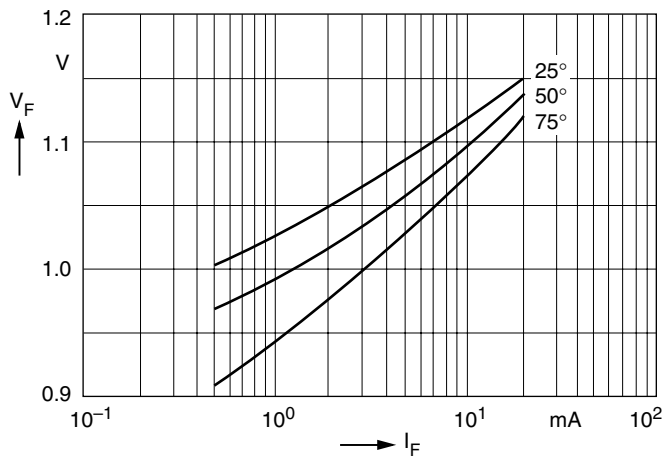


Figure 8. Permissible Power Dissipation vs. Ambient Temperature

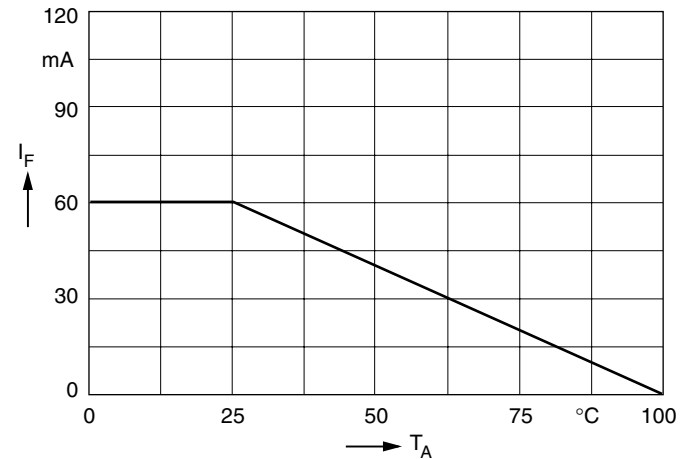


Figure 9. Permissible Diode Forward Current vs. Ambient Temperature

