

## FEATURES

- Variety of Current Transfer Ratios at 5.0 mA
  - AA: 50–600%
  - AGB: 100–600%
  - AGR: 100–300%
  - ABM: 200–400%
  - ABL: 200–600%
  - AY: 50–150%
  - AB: 80–260%
- Low CTR Degradation
- Good CTR Linearity Depending on Forward Current
- Isolation Test Voltage, 5300 V<sub>RMS</sub>
- High Collector-emitter Voltage, V<sub>CEO</sub>=70 V
- Low Saturation Voltage
- Fast Switching Times
- Field-Effect Stable by TRIOS (TRansparent IOShield)
- 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

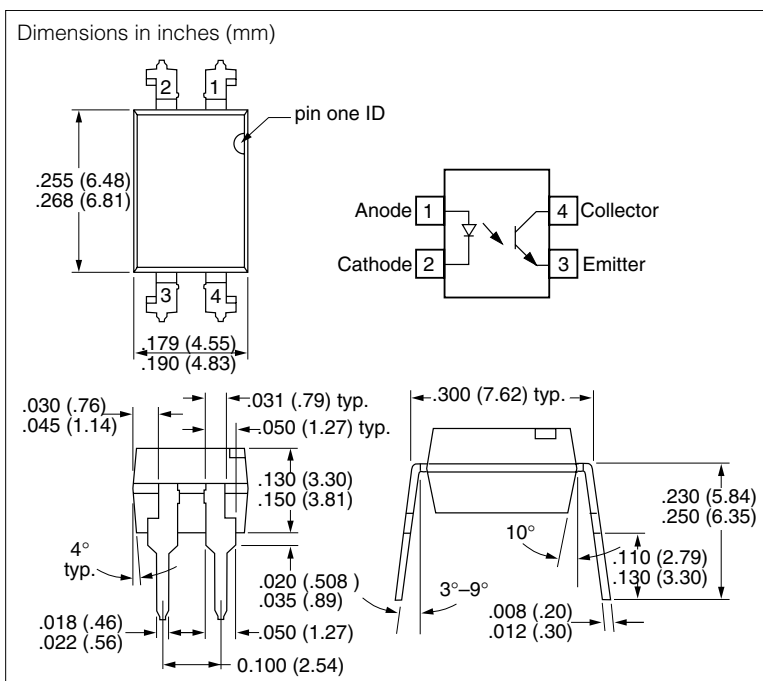
### DESCRIPTION

The 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 IEC 950 (DIN VDE 0805) for reinforced insulation up to an operation voltage of 400 V<sub>RMS</sub> or DC.



## 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..... | 5300 V <sub>RMS</sub> |
| 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 <sub>IO</sub> =500 V, T <sub>A</sub> =25°C .....                                                    | ≥10 <sup>12</sup> Ω   |
| V <sub>IO</sub> =500 V, T <sub>A</sub> =100°C .....                                                   | ≥10 <sup>11</sup> Ω   |
| Storage Temperature Range.....                                                                        | -55 to +150°C         |
| Ambient Temperature Range.....                                                                        | -55 to +100°C         |
| Junction Temperature .....                                                                            | 100°C                 |
| Soldering Temperature (max. 10 s. Dip Soldering Distance to Seating Plane ≥1.5 mm).....               | 260°C                 |

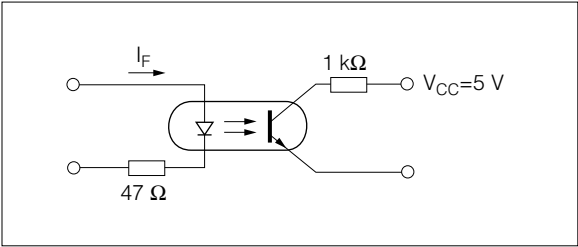
Table 1. Characteristics (T<sub>A</sub>=25°C)

| Parameter                            | Symbol             | Value       | Unit | Condition                                     |
|--------------------------------------|--------------------|-------------|------|-----------------------------------------------|
| <b>Emitter (IR GaAs)</b>             |                    |             |      |                                               |
| Forward Voltage                      | V <sub>F</sub>     | 1.25(≤1.65) | V    | I <sub>F</sub> =60 mA                         |
| Reverse Current                      | I <sub>R</sub>     | 0.01(≤10)   | μA   | V <sub>R</sub> =6.0 V                         |
| Capacitance                          | C <sub>0</sub>     | 13          | pF   | V <sub>R</sub> =0 V, f=1.0 MHz                |
| Thermal Resistance                   | R <sub>thJA</sub>  | 750         | K/W  | —                                             |
| <b>Detector (Si Phototransistor)</b> |                    |             |      |                                               |
| Capacitance                          | C <sub>CE</sub>    | 5.2         | pF   | V <sub>CE</sub> =5 V, f=1.0 MHz               |
| Thermal Resistance                   | R <sub>thJA</sub>  | 500         | K/W  | —                                             |
| <b>Package</b>                       |                    |             |      |                                               |
| Collector-Emitter Saturation Voltage | V <sub>CEsat</sub> | 0.25(≤0.4)  | V    | I <sub>F</sub> =10 mA, I <sub>C</sub> =2.5 mA |
| Coupling Capacitance                 | C <sub>C</sub>     | 0.4         | pF   | —                                             |

Table 2. Current Transfer Ratio (I<sub>C</sub>/I<sub>F</sub> at V<sub>CE</sub>=5.0 V) and Collector-emitter Leakage Current

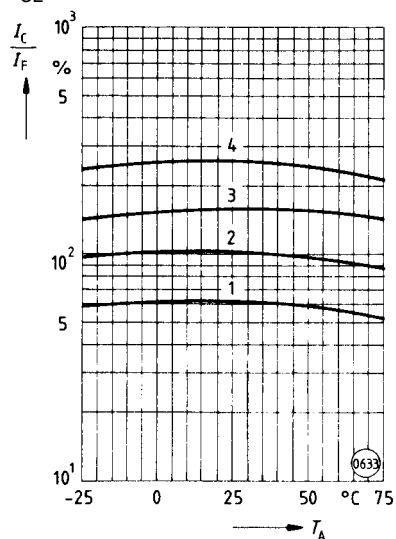
| Parameter                                                                    | AA       | AGB      | AGR      | ABM      | ABL      | AY       | AB       | Unit |
|------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|------|
| I <sub>C</sub> / I <sub>F</sub> (I <sub>F</sub> =5.0 mA)                     | 50–600   | 100–600  | 100–300  | 200–400  | 200–600  | 50–150   | 80–260   | %    |
| Collector-Emitter Leakage Current, I <sub>CEO</sub> , V <sub>CEO</sub> =10 V | 10(≤100) | 10(≤100) | 10(≤100) | 10(≤100) | 10(≤100) | 10(≤100) | 10(≤100) | nA   |

Switching Operation (with saturation)

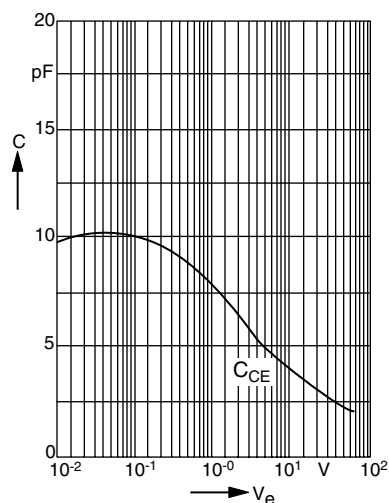


| Parameter     | Symbol           | Value | Unit | Condition              |
|---------------|------------------|-------|------|------------------------|
| Turn-on Time  | t <sub>on</sub>  | 2.0   | μs   | I <sub>F</sub> =5.0 mA |
| Turn-off Time | t <sub>off</sub> | 25    | μs   |                        |

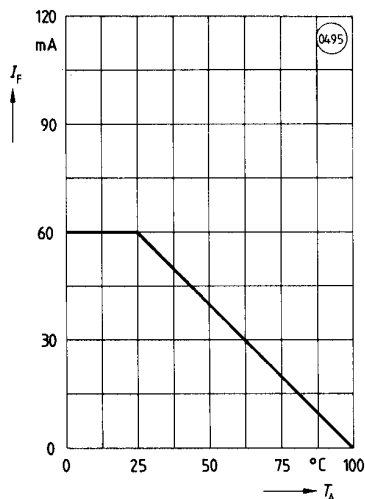
**Figure 1. Current Transfer Ratio (typical) vs. Temperature**  $I_F=10\text{ mA}$ ,  $V_{CE}=0.5\text{ V}$



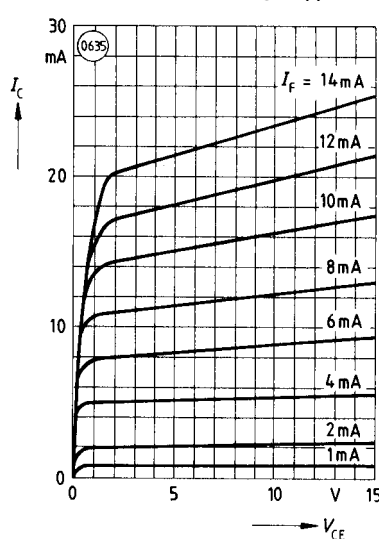
**Figure 2. Transistor Capacitance (typical) vs. Collector-emitter Voltage**  $T_A=25^\circ\text{C}$ ,  $f=1.0\text{ MHz}$



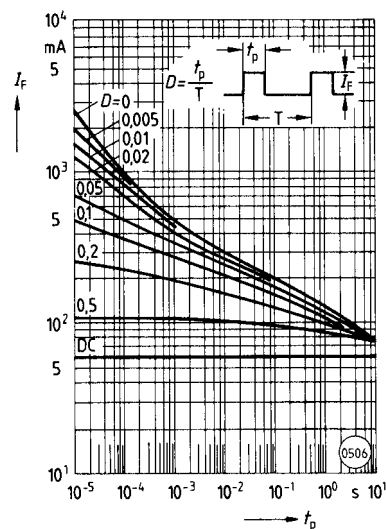
**Figure 3. Permissible Diode Forward Current vs. Ambient Temperature**



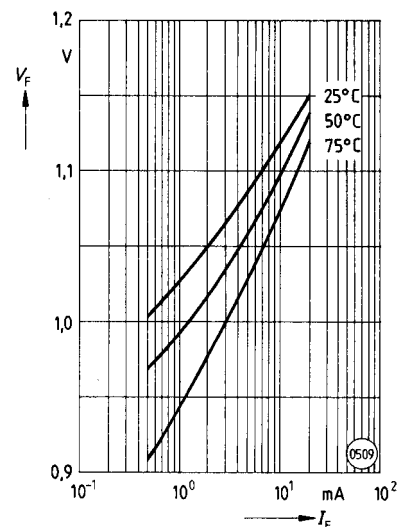
**Figure 4. Output Characteristics (typical). Collector Current vs. Collector-emitter Voltage**  $T_A=25^\circ\text{C}$



**Figure 5. Permissible Pulse Handling Capability. Forward Current vs. Pulse-width Pulse cycle D=parameter,  $T_A=25^\circ\text{C}$**



**Figure 6. Diode Forward Voltage (typical) vs. Forward Current**



**Figure 7. Permissible Power Dissipation vs. Ambient Temperature**

