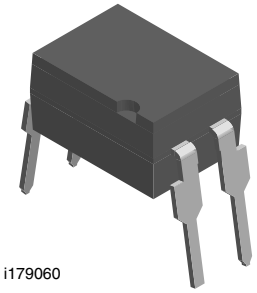
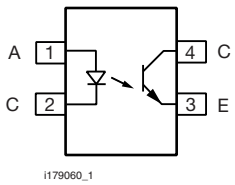
# SFH615AA, SFH615AGB, SFH615AGR, SFH615AY

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



i179060




i179060_1

### 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)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

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.

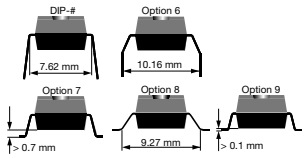
### AGENCY APPROVALS

- UL1577
- cUL
- DIN EN 60747-5-5 (VDE 0884) available with option 1
- BSI

### ORDERING INFORMATION

| S | F | H | 6 | 1 | 5 | A | x | x | X | 0 | 0 | # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

PART NUMBER — PACKAGE OPTION




| AGENCY CERTIFIED/PACKAGE | CTR (%) 5 mA | | | |
|---|---|---|---|---|
| **UL, cUL, BSI, FIMKO** | **50 to 600** | **100 to 600** | **100 to 300** | **50 to 150** |
| DIP-4 | SFH615AA | SFH615AGB | SFH615AGR | SFH615AY |
| DIP-4, 400 mil, option 6 | SFH615AA-X006 | - | - | - |
| SMD-4, option 7 | SFH615AA-X007 | - | SFH615AGR-X007T | SFH615AY-X007T |
| SMD-4, option 8 | - | - | - | SFH615AY-X008T |
| SMD-4, option 9 | - | SFH615AGB-X009T | - | SFH615AY-X009T (1) |
| **UL, cUL, VDE, BSI, FIMKO** | **50 to 600** | **100 to 600** | **100 to 300** | **50 to 150** |
| DIP-4 | SFH615AA-X001 | - | SFH615AGR-X001 | - |
| DIP-4, 400 mil, option 6 | - | - | SFH615AGR-X016 | SFH615AY-X016 |
| SMD-4, option 7 | SFH615AA-X017T (1) | - | SFH615AGR-X017T (1) | - |
| SMD-4, option 8 | - | - | - | SFH615AY-X018T (1) |
| SMD-4, option 9 | - | - | - | SFH615AY-X019T (1) |

**Notes**

- Additional options may be possible, please contact sales office

(1) Also available in tubes; do not add T to end



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| **ABSOLUTE MAXIMUM RATINGS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | |
|---|---|---|---|---|
| **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 | | $V_{CEO}$ | 70 | V |
| Emitter collector voltage | | $V_{ECO}$ | 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 [1] | max. 10 s, dip soldering distance to seating plane ≥ 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).

| **ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **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 |
| **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 |
| | | SFH615AY | $I_{CEO}$ | - | 10 | 100 | nA |

**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.


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| 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 | % |
| | | SFH615AY | CTR | 50 | - | 150 | % |

| 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)

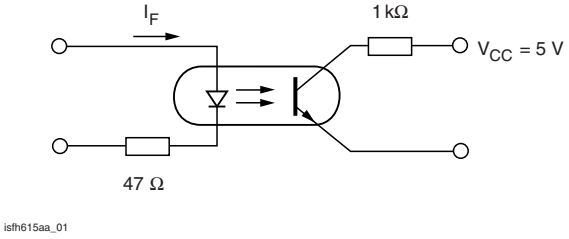



Fig. 1 - Switching Operation (with saturation)

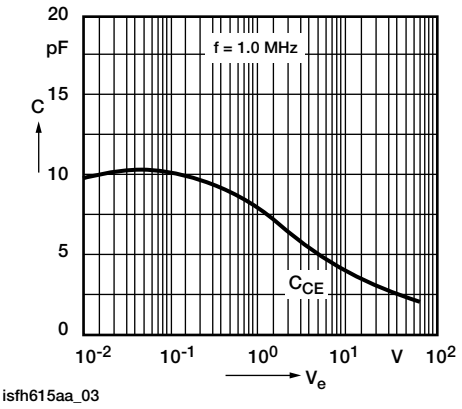



Fig. 3 - Transistor Capacitance (typ.) vs. Collector Emitter Voltage

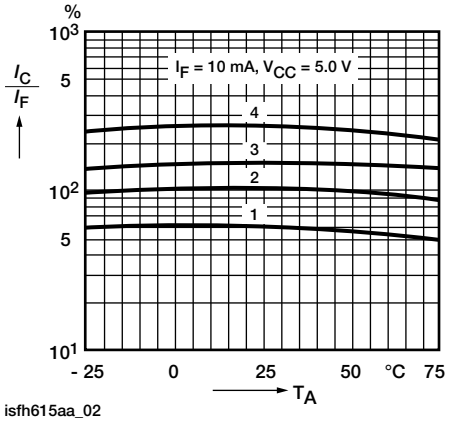



Fig. 2 - Current Transfer Ratio (typ.) vs. Temperature

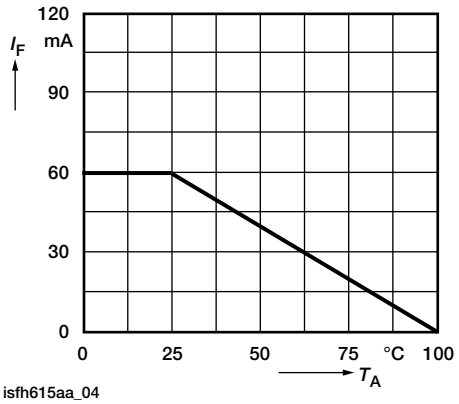



Fig. 4 - Permissible Diode Forward Current vs. Ambient Temperature


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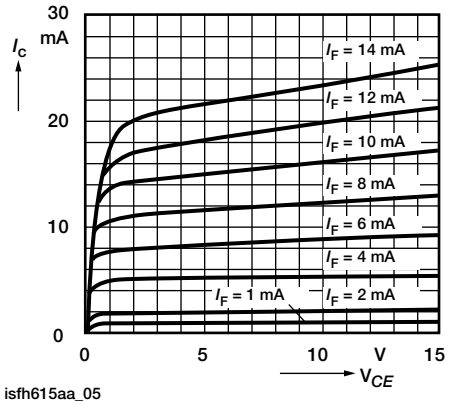



Fig. 5 - Output Characteristics (typ.) Collector Current vs. Collector Emitter Voltage

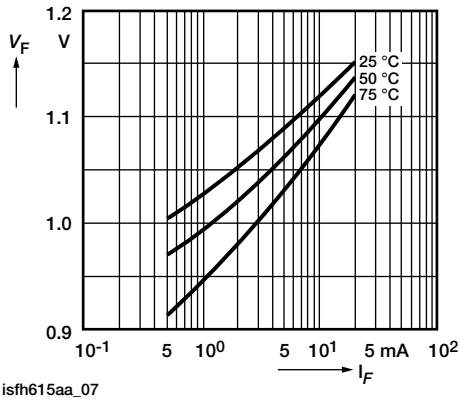



Fig. 7 - Diode Forward Voltage (typ.) vs. Forward Current

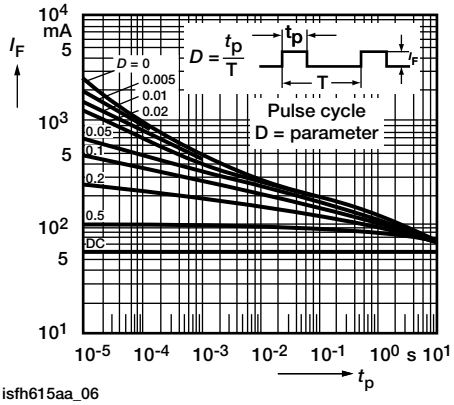



Fig. 6 - Permissible Pulse Handling Capability Forward Current vs. Pulse Width

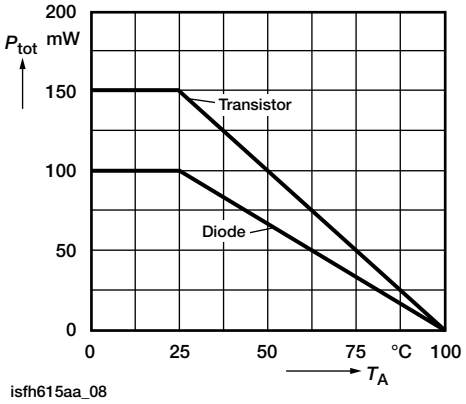
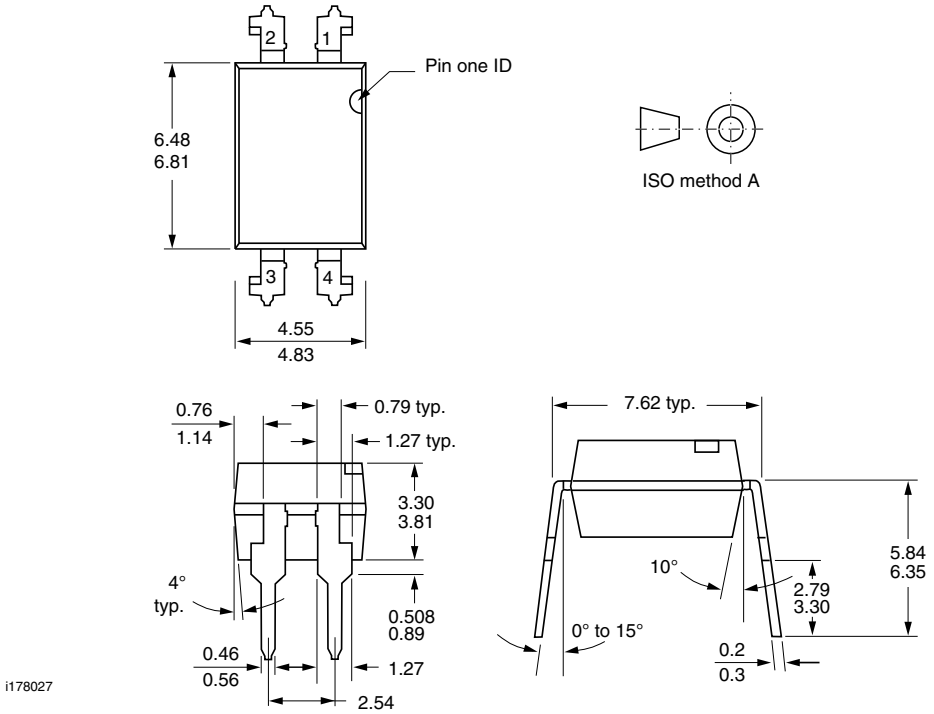


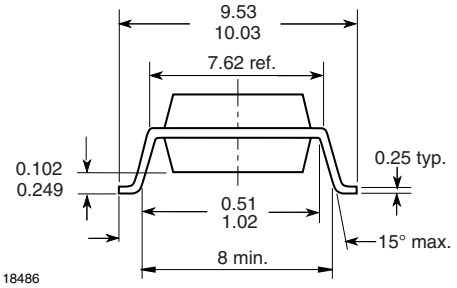

Fig. 8 - Permissible Power Dissipation vs. Temperature


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**PACKAGE DIMENSIONS** in inches (millimeters)




**Option 9**





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