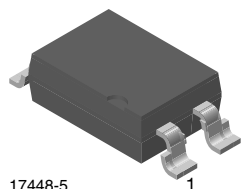
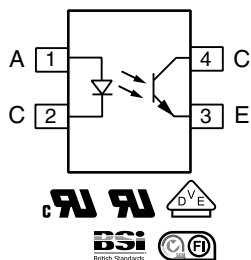


Optocoupler, Phototransistor Output, High Reliability, 5300 V_{RMS}

17448-5

1

**FEATURES**

- Excellent CTR linearity depending on forward current
- Isolation test voltage, 5300 V_{RMS}
- Fast switching times
- Low CTR degradation
- Low coupling capacitance
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

RoHS
COMPLIANT**DESCRIPTION**

The SFH6156 features a variety of transfer ratios, low coupling capacitance and high isolation voltage. This coupler has a GaAs infrared diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a plastic SMD package.

The coupling devices are designed for signal transmission between two electrically separated circuits.

APPLICATIONS

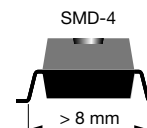
- Switchmode power supply
- Telecom
- Battery powered equipment

AGENCY APPROVALS

- UL1577, file no. E52744 system code H or J, double protection
- DIN EN 60747-5-5 (VDE 0884-5) available with option 1
- cUL tested to CSA 22.2 bulletin 5A
- BSI IEC 60950, IEC 60065
- FIMKO EN6005, EN60950-1

ORDERING INFORMATION

| | | | | | | | | | | | | | |
|-------------|---|---|---|---|---|---|---|---------|----------------|---|---|---------------|---|
| S | F | H | 6 | 1 | 5 | 6 | - | # | X | 0 | 0 | 1 | T |
| PART NUMBER | | | | | | | | CTR BIN | PACKAGE OPTION | | | TAPE AND REEL | |



| AGENCY CERTIFIED/PACKAGE | CTR (%) | | | |
|---------------------------------|-----------------|------------------|-------------------|-------------------|
| | 10 mA | | | |
| UL, cUL, BSI, FIMKO | 40 to 80 | 63 to 125 | 100 to 200 | 160 to 320 |
| SMD-4, 100 mil, pitch | SFH6156-1 | SFH6156-2 | SFH6156-3 | SFH6156-4 |
| | SFH6156-1T | SFH6156-2T | SFH6156-3T | SFH6156-4T |
| VDE, UL, cUL, BSI, FIMKO | 40 to 80 | 63 to 125 | 100 to 200 | 160 to 320 |
| SMD-4, 100 mil, pitch | SFH6156-1X001 | SFH6156-2X001 | SFH6156-3X001 | SFH6156-4X001 |
| | SFH6156-1X001T | SFH6156-2X001T | SFH6156-3X001T | SFH6156-4X001T |



| ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, 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 | $t_p \leq 10\text{ }\mu\text{s}$ | I_{FSM} | 2.5 | A |
| OUTPUT | | | | |
| Collector emitter voltage | | V_{CEO} | 70 | V |
| Emitter collector voltage | | V_{ECO} | 7 | V |
| Collector current | | I_C | 50 | mA |
| | $t_p \leq 1\text{ ms}$ | I_C | 100 | mA |
| COUPLER | | | | |
| Isolation test voltage between emitter and detector | $t = 1\text{ s}$ | V_{ISO} | 5300 | V_{RMS} |
| Creepage distance | | | ≥ 7 | mm |
| Clearance distance | | | ≥ 7 | mm |
| Insulation thickness between emitter and detector | | | ≥ 0.4 | mm |
| Comparative tracking index per DIN IEC112/VDE0303 part 1 | | CTI | ≥ 175 | |
| Isolation resistance | $V_{IO} = 500\text{ V}, T_{amb} = 25\text{ }^{\circ}\text{C}$ | R_{IO} | $\geq 10^{12}$ | Ω |
| | $V_{IO} = 500\text{ V}, T_{amb} = 100\text{ }^{\circ}\text{C}$ | R_{IO} | $\geq 10^{11}$ | Ω |
| Storage temperature range | | T_{stg} | - 55 to + 150 | $^{\circ}\text{C}$ |
| Ambient temperature range | | T_{amb} | - 55 to +100 | $^{\circ}\text{C}$ |
| Soldering temperature ⁽¹⁾ | max. 10 s | T_{sld} | 260 | $^{\circ}\text{C}$ |

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).

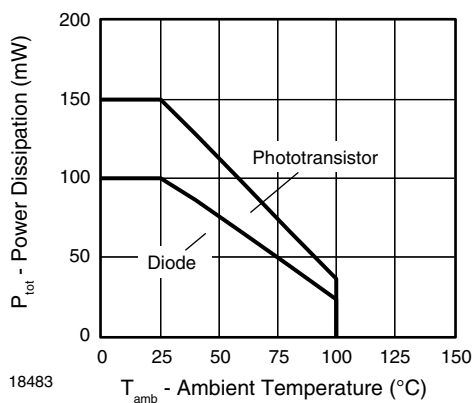


Fig. 1 - Permissible Power Dissipation vs. Ambient Temperature



| SWITCHING CHARACTERISTICS | | | | | | | |
|---------------------------|---|-----------|-----------|------|------|------|---------------|
| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| NON-SATURATED | | | | | | | |
| Rise time | $I_F = 10 \text{ mA}$, $V_{CC} = 5 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $R_L = 75 \text{ } \Omega$ | | t_r | | 2 | | μs |
| Fall time | $I_F = 10 \text{ mA}$, $V_{CC} = 5 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $R_L = 75 \text{ } \Omega$ | | t_f | | 2 | | μs |
| Turn-on time | $I_F = 10 \text{ mA}$, $V_{CC} = 5 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $R_L = 75 \text{ } \Omega$ | | t_{on} | | 3 | | μs |
| Turn-off time | $I_F = 10 \text{ mA}$, $V_{CC} = 5 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $R_L = 75 \text{ } \Omega$ | | t_{off} | | 2.3 | | μs |
| Cut-off frequency | $I_F = 10 \text{ mA}$, $V_{CC} = 5 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $R_L = 75 \text{ } \Omega$ | | f_{ctr} | | 250 | | kHz |
| SATURATED | | | | | | | |
| Rise time | $V_{CC} = 5 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $R_L = 1 \text{ k}\Omega$, $I_F = 20 \text{ mA}$ | SFH6156-1 | t_r | | 2 | | μs |
| | $V_{CC} = 5 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $R_L = 1 \text{ k}\Omega$, $I_F = 10 \text{ mA}$ | SFH6156-2 | t_r | | 3 | | μs |
| | | SFH6156-3 | t_r | | 3 | | μs |
| Fall time | $V_{CC} = 5 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $R_L = 1 \text{ k}\Omega$, $I_F = 20 \text{ mA}$ | SFH6156-1 | t_f | | 11 | | μs |
| | $V_{CC} = 5 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $R_L = 1 \text{ k}\Omega$, $I_F = 10 \text{ mA}$ | SFH6156-2 | t_f | | 14 | | μs |
| | | SFH6156-3 | t_f | | 14 | | μs |
| Turn-on time | $V_{CC} = 5 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $R_L = 1 \text{ k}\Omega$, $I_F = 20 \text{ mA}$ | SFH6156-1 | t_{on} | | 3 | | μs |
| | $V_{CC} = 5 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $R_L = 1 \text{ k}\Omega$, $I_F = 10 \text{ mA}$ | SFH6156-2 | t_{on} | | 4.2 | | μs |
| | | SFH6156-3 | t_{on} | | 4.2 | | μs |
| Turn-off time | $V_{CC} = 5 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $R_L = 1 \text{ k}\Omega$, $I_F = 20 \text{ mA}$ | SFH6156-1 | t_{off} | | 18 | | μs |
| | $V_{CC} = 5 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $R_L = 1 \text{ k}\Omega$, $I_F = 10 \text{ mA}$ | SFH6156-2 | t_{off} | | 23 | | μs |
| | | SFH6156-3 | t_{off} | | 23 | | μs |

| SAFETY AND INSULATION RATINGS | | | | | | | |
|--|------------------------|------------|--------|-----------|------|------------------|--|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT | |
| Climatic classification (according to IEC 68 part 1) | | | | 55/100/21 | | | |
| Comparative tracking index | | CTI | 175 | | 399 | | |
| V_{IOTM} | | V_{IOTM} | 10 000 | | | V_{peak} | |
| V_{IORM} | | V_{IORM} | 890 | | | V_{peak} | |
| P_{SO} | | P_{SO} | | | 400 | mW | |
| I_{SI} | | I_{SI} | | | 275 | mA | |
| T_{SI} | | T_{SI} | | | 175 | $^\circ\text{C}$ | |
| Creepage distance | | | 7 | | | mm | |
| Clearance distance | | | 7 | | | mm | |
| Insulation thickness, reinforced rated | per IEC 60950 2.10.5.1 | | 0.4 | | | mm | |

Note

- As per IEC 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for "safe electrical insulation" only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

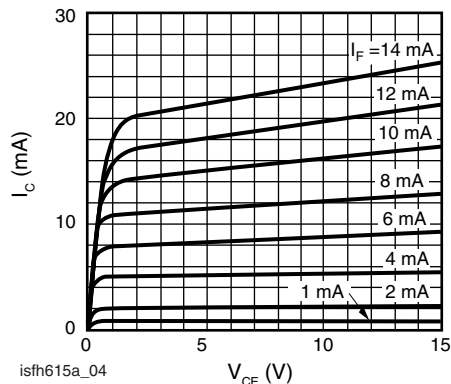


TYPICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)



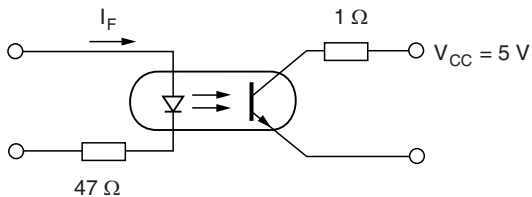
isfh615a_01

Fig. 2 - Linear Operation (without Saturation)



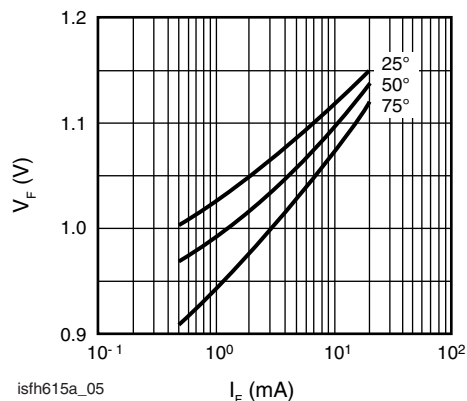
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Fig. 5 - Output Characteristics (Typ.) Collector Current vs. Collector Emitter Voltage



isfh615a_02

Fig. 3 - Switching Operation (with Saturation)



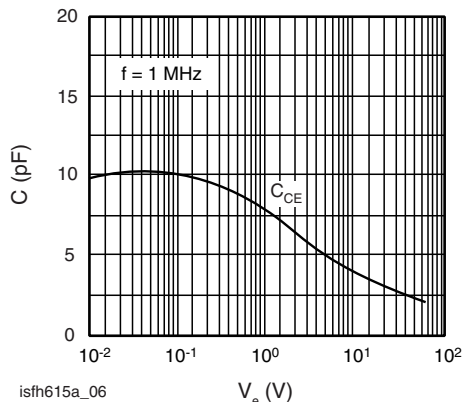
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Fig. 6 - Diode Forward Voltage (Typ.) vs. Forward Current



isfh615a_03

Fig. 4 - Current Transfer Ratio (Typ.) vs. Temperature



isfh615a_06

Fig. 7 - Transistor Capacitance (Typ.) vs. Collector Emitter Voltage

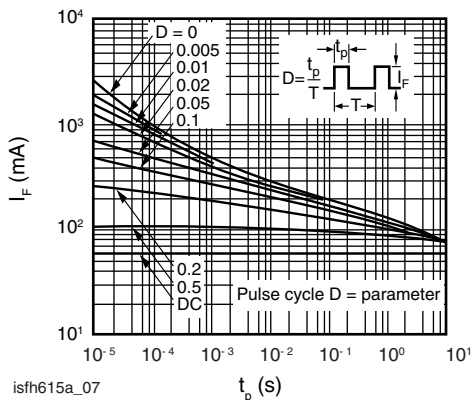


Fig. 8 - Permissible Pulse Handling Capability Forward Current vs. Pulse Width

PACKAGE DIMENSIONS millimeters



i178029_11

PACKAGE MARKING (example of SFH6156-2X001T)



Notes

- VDE logo is only marked on option 1 parts.
- Tape and reel suffix (T) is not part of the package marking.



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