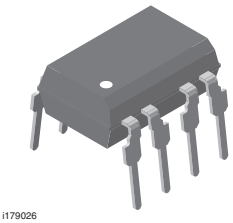
# High Speed Optocoupler, Dual Channel, 1 MBd, Transistor Output



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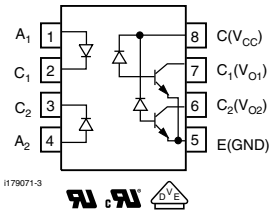



## FEATURES

- Isolation test voltage, 5300 $V_{RMS}$
- TTL compatible
- Bit rates: 1 MBit/s
- High common mode transient immunity
- Bandwidth 2 MHz
- Open collector output
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

Pb-free

e3

RoHS COMPLIANT

## DESCRIPTION

The SFH6325 and SFH6326 are dual channel optocouplers with a GaAlAs infrared emitting diode, optically coupled with an integrated photo detector which consists of a photo diode and a high-speed transistor in a DIP-8 plastic package. Signals can be transmitted between two electrically separated circuits up to frequencies of 2 MHz. The potential difference between the circuits to be coupled should not exceed the maximum permissible reference voltages.

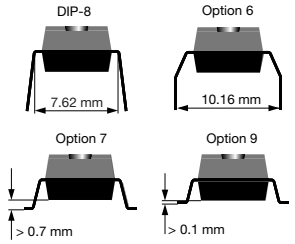
## AGENCY APPROVALS

- UL1577, file no. E52744 system code H double protection
- cUL tested to CSA 22.2 bulletin 5A
- DIN EN 60747-5-2 (VDE0884)/DIN EN 60747-5-5 (pending), available with option 1

## ORDERING INFORMATION

| S | F | H | 6 | 3 | 2 | # | - | X | 0 | # | # | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

PART NUMBER — PACKAGE OPTION — TAPE AND REEL




| AGENCY CERTIFIED/PACKAGE | CTR (%) | |
|---|---|---|
| **UL, cUL** | **≥ 7** | **≥ 19** |
| DIP-8 | SFH6325 | SFH6326 |
| DIP-8, 400 mil, option 6 | - | SFH6326-X006 |
| SMD-8, option 7 | - | SFH6326-X007T (1) |
| SMD-8, option 9 | SFH6325-X009T (1) | SFH6326-X009T (1) |
| **VDE, UL, cUL** | **≥ 7** | **≥ 19** |
| DIP-8 | - | SFH6326-X001 |
| SMD-8, option 7 | SFH6325-X017T | SFH6326-X017T (1) |

**Note**

- Additional options may be possible, please contact sales office.

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

## ABSOLUTE MAXIMUM RATINGS ($T_{amb}$ = 25 °C, unless otherwise specified)

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|---|---|---|---|---|
| **INPUT** | | | | |
| Reverse voltage | | $V_R$ | 4.5 | V |
| Forward continuous current | | $I_F$ | 25 | mA |
| Peak forward current | t = 1 ms, duty cycle 50 % | $I_{FM}$ | 50 | mA |
| Maximum surge forward current | t ≤ 1 µs, 300 pulses/s | $I_{FSM}$ | 1 | A |
| Derate linearly from 25 °C | | | 0.6 | mW/°C |
| Power dissipation | $T_{amb}$ ≤ 70 °C | $P_{diss}$ | 50 | mW |

| **ABSOLUTE MAXIMUM RATINGS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | |
|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **VALUE** | **UNIT** |
| **OUTPUT** | | | | |
| Supply voltage | | $V_S$ | - 0.5 to 30 | V |
| Output voltage | | $V_O$ | - 0.5 to 25 | V |
| Collector output current | | $I_{CO}$ | 8 | mA |
| Derate linearly from 25 °C | | | 1.33 | mW/°C |
| Power dissipation | $T_{amb} \leq 70$ °C | $P_{diss}$ | 50 | mW |
| **COUPLER** | | | | |
| Isolation test voltage | t = 1 s | $V_{ISO}$ | 5300 | $V_{RMS}$ |
| Pollution degree (DIN VDE0109) | | | 2 | |
| Creepage distance | | | ≥ 7 | mm |
| Clearance distance | | | ≥ 7 | mm |
| Derate linearly from 25 °C | | | 1.93 | mW/°C |
| Total package dissipation | | $P_{tot}$ | 145 | mW |
| Comparative tracking index per DIN IEC112/VDE0303 part 1, group IIIa per DIN VDE6110 | | | 175 | |
| Isolation resistance | $V_{IO}$ = 500 V, $T_{amb}$ = 25 °C | $R_{IO}$ | $\geq 10^{12}$ | Ω |
| | $V_{IO}$ = 500 V, $T_{amb}$ = 100 °C | $R_{IO}$ | $\geq 10^{11}$ | Ω |
| Storage temperature range | | $T_{stg}$ | - 55 to + 125 | °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 (1)** | | | | | | | |
| Forward voltage | $I_F$ = 16 mA | | $V_F$ | | 1.33 | 1.9 | V |
| Breakdown voltage | $I_R$ = 10 µA | | $V_{BR}$ | 4.5 | | | V |
| Reverse current | $V_R$ = 4.5 V | | $I_R$ | | 0.5 | 10 | µA |
| Capacitance | $V_R$ = 0 V, f = 1 MHz | | $C_O$ | | 30 | | pF |
| Temperature coefficient of forward voltage | $I_F$ = 16 mA | | $\Delta V_F/\Delta T_{amb}$ | | - 1.7 | | mV/°C |
| **OUTPUT** | | | | | | | |
| Logic low supply current | $I_F$ = 16 mA, $V_O$ = open, $V_{CC}$ = 4.5 V | | $I_{CCL}$ | | 100 | 200 | µA |
| Supply current, logic high | $I_F$ = 0 mA, $V_O$ = open, $V_{CC}$ = 15 V | | $I_{CCH}$ | | 0.01 | 4 | µA |
| Logic low output voltage | $I_F$ = 16 mA, $V_{CC}$ = 4.5 V, $I_O$ = 1.1 mA | SFH6325 | $V_{OL}$ | | 0.1 | 0.5 | V |
| | $I_F$ = 16 mA, $V_{CC}$ = 4.5 V, $I_O$ = 3 mA | SFH6326 | $V_{OL}$ | | 0.1 | 0.5 | V |
| Logic high output current | $I_F$ = 0 mA, $V_O$ = $V_{CC}$ = 5.5 V | | $I_{OH}$ | | 3 | 500 | nA |
| | $I_F$ = 0 mA, $V_O$ = $V_{CC}$ = 15 V | | $I_{OH}$ | | | 50 | µA |
| Channel to channel (2) crosstalk | $I_F$ = 16 mA, $V_O$ = $V_{CC}$ = 5.5 V | | $I_{OH-XT}$ | | | 500 | nA |
| **COUPLER** | | | | | | | |
| Capacitance (input to output) | f = 1 MHz | | $C_{IO}$ | | 0.6 | | pF |

**Notes**

- 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.

(1) $T_{amb}$ = 0 °C to 70 °C, unless otherwise specified.

(2) To measure crosstalk, turn on the LED for channel 1 and the output current for channel 2 in logic high. Repeat for channel 2.

| **CURRENT TRANSFER RATIO** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **PART** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Current transfer ratio | $I_F$ = 16 mA, $V_{CC}$ = 4.5 V, $V_O$ = 0.4 V, $T_{amb}$ = 25 °C | SFH6325 | CTR | 7 | 16 | | % |
| | | SFH6326 | CTR | 19 | 35 | | % |
| | $I_F$ = 16 mA, $V_{CC}$ = 4.5 V, $V_O$ = 0.5 V, $T_{amb}$ = 0 °C to 70 °C | SFH6325 | CTR | 5 | | | % |
| | | SFH6326 | CTR | 15 | | | % |

| **SWITCHING CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **PART** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| High to low | $I_F$ = 16 mA, $V_{CC}$ = 5 V, $R_L$ = 4.1 kΩ | SFH6325 | $t_{PHL}$ | | 0.3 | 1.5 | µs |
| | $I_F$ = 16 mA, $V_{CC}$ = 5 V, $R_L$ = 1.9 kΩ | SFH6326 | $t_{PHL}$ | | 0.2 | 0.8 | µs |
| Low to high | $I_F$ = 16 mA, $V_{CC}$ = 5 V, $R_L$ = 4.1 kΩ | SFH6325 | $t_{PLH}$ | | 0.6 | 1.5 | µs |
| | $I_F$ = 16 mA, $V_{CC}$ = 5 V, $R_L$ = 1.9 kΩ | SFH6326 | $t_{PLH}$ | | 0.5 | 0.8 | µs |

| **COMMON MODE TRANSIENT IMMUNITY** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **PART** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| CMTI at logic high level output | $I_F$ = 0 mA, $C_{CM}$ = 10 $V_{P-P}$, $V_{CC}$ = 5 V, $R_L$ = 4.1 kΩ | SFH6325 | $CM_H$ | | 1000 | | V/µs |
| | $I_F$ = 0 mA, $C_{CM}$ = 10 $V_{P-P}$, $V_{CC}$ = 5 V, $R_L$ = 1.9 kΩ | SFH6326 | $CM_H$ | | 1000 | | V/µs |
| CMTI at logic low level output | $I_F$ = 16 mA, $C_{CM}$ = 10 $V_{P-P}$, $V_{CC}$ = 5 V, $R_L$ = 4.1 kΩ | SFH6325 | $CM_L$ | | 1000 | | V/µs |
| | $I_F$ = 16 mA, $C_{CM}$ = 10 $V_{P-P}$, $V_{CC}$ = 5 V, $R_L$ = 1.9 kΩ | SFH6326 | $CM_L$ | | 1000 | | V/µs |

## TYPICAL CHARACTERISTICS ($T_{amb}$ = 25 °C, unless otherwise specified)

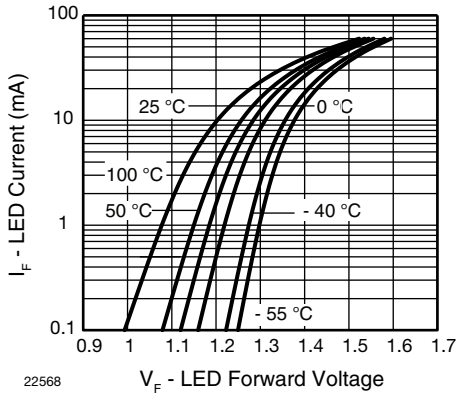



Fig. 1 - LED Forward Current vs. Forward Voltage

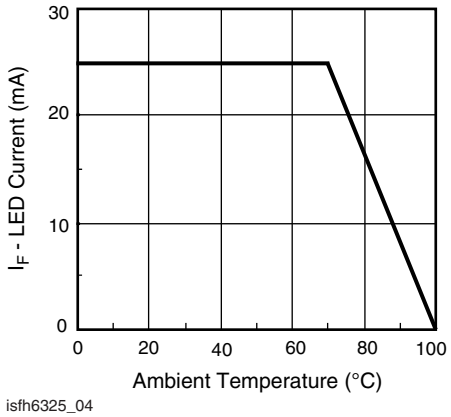



Fig. 2 - Permissible Forward LED Current vs. Temperature

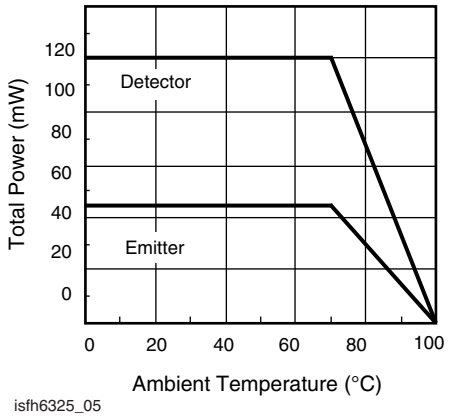



Fig. 3 - Permissible Power Dissipation vs. Temperature

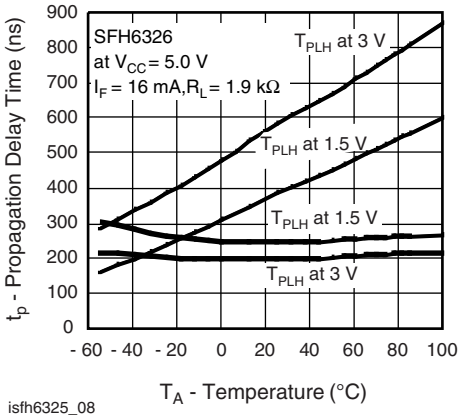



Fig. 6 - Propagation Delay vs. Ambient Temperature

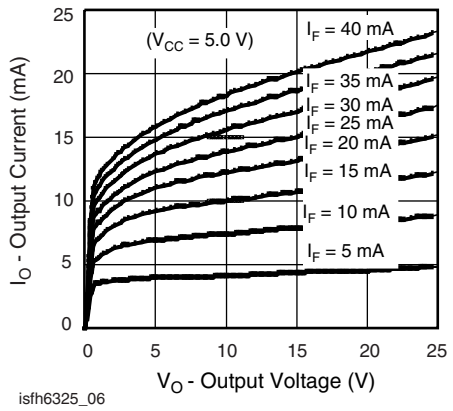



Fig. 4 - Output Current vs. Output Voltage

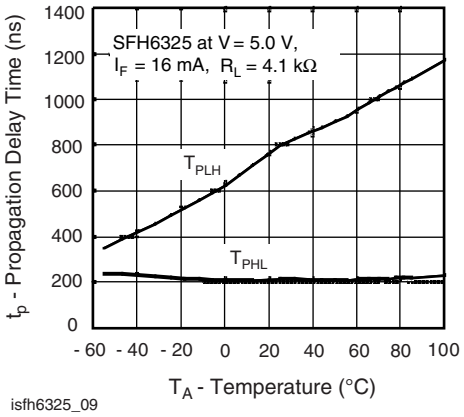



Fig. 7 - Propagation Delay vs. Ambient Temperature

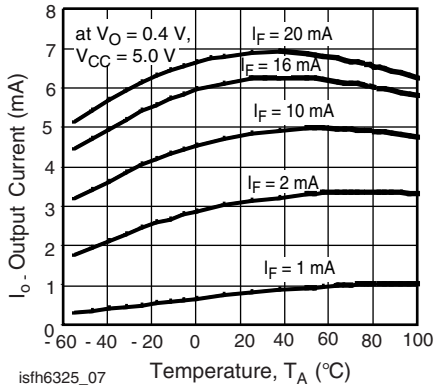



Fig. 5 - Output Current vs. Temperature

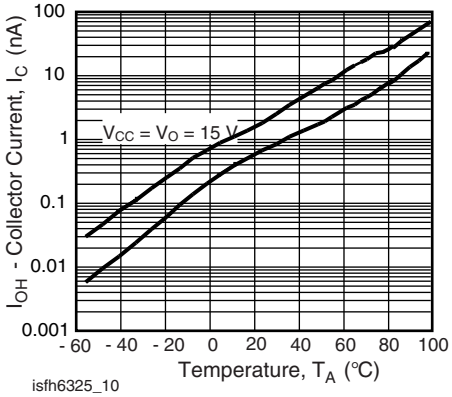



Fig. 8 - Logic High Output Current vs. Temperature

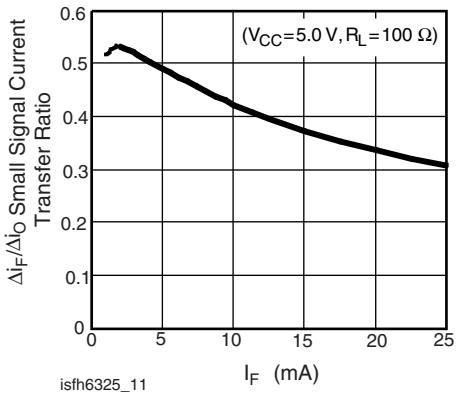



Fig. 9 - Small Signal Current Transfer Ratio vs. Input Current

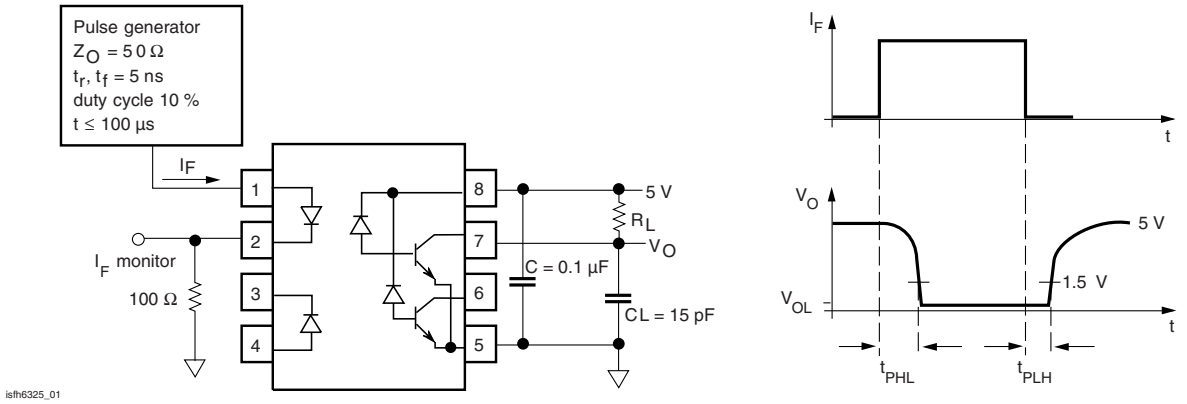



Fig. 10 - Switching Time and Test Circuit

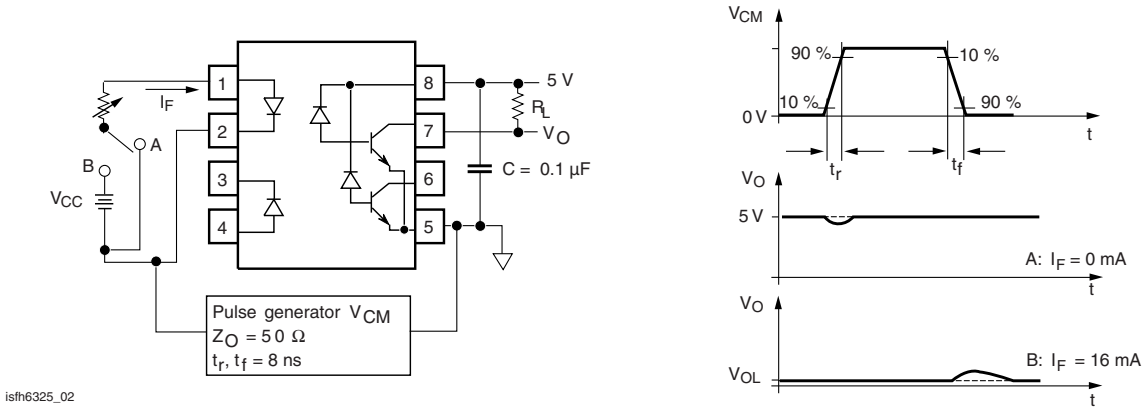
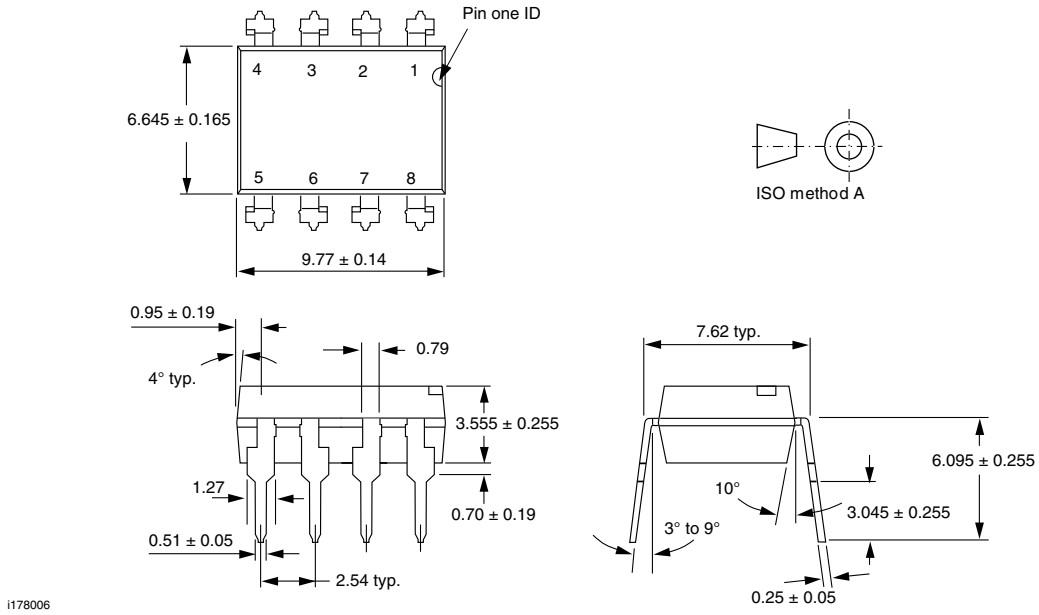
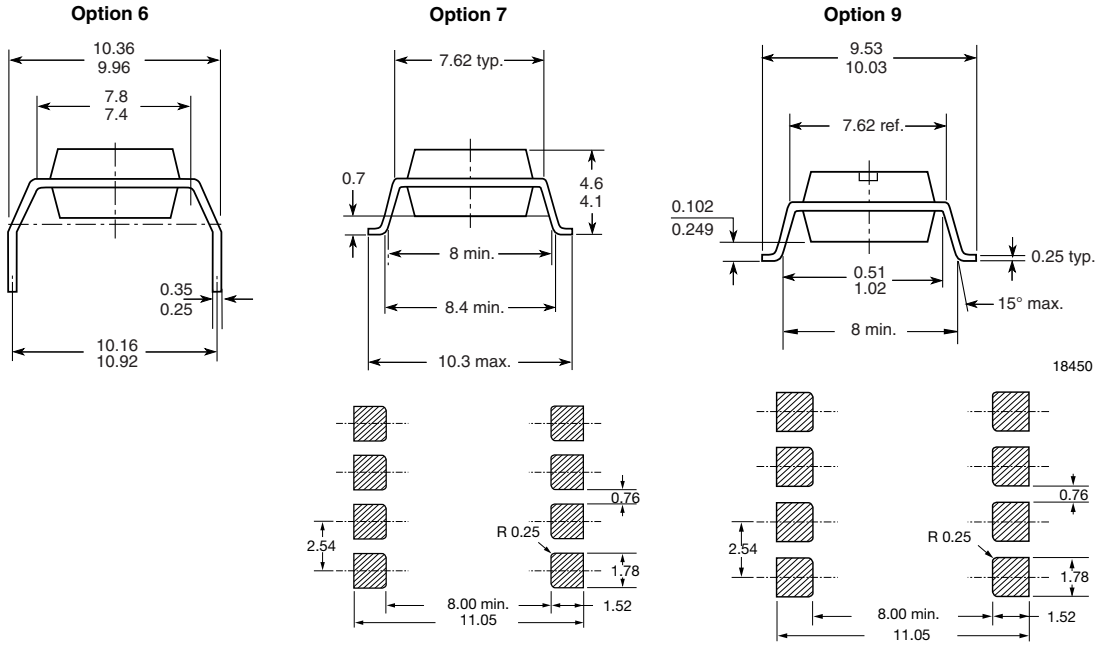


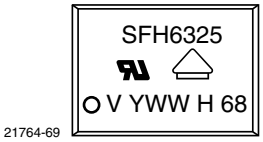

Fig. 11 - Waveform and Test Circuit for Common Mode Transient Immunity

## PACKAGE DIMENSIONS in millimeters




## PACKAGE MARKING




**Notes**

- Only options 1 and 7 are reflected in the package marking.
- The VDE Logo is only marked on option1 parts.
- Tape and reel suffix (T) is not part of the package marking.

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