

| ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | |
|--|--|---------------------|---------------|--------------------|
| PARAMETER | CONDITIONS | SYMBOL | VALUE | UNIT |
| INPUT | | | | |
| Input forward current | | I_F | 25 | mA |
| Peak transient input current | < 1 μs pulse width, 300 pps | $I_{F(TRAN)}$ | 1 | A |
| Reverse input voltage | | V_R | 5 | V |
| Output power dissipation | | P_{diss} | 40 | mW |
| LED junction temperature | | T_j | 125 | $^{\circ}\text{C}$ |
| OUTPUT | | | | |
| High peak output current ⁽¹⁾ | | $I_{OH(PEAK)}$ | 2.5 | A |
| Low peak output current ⁽¹⁾ | | $I_{OL(PEAK)}$ | 2.5 | A |
| Supply voltage | | $(V_{CC} - V_{EE})$ | 0 to 35 | V |
| Output voltage | | $V_{O(PEAK)}$ | 0 to V_{CC} | V |
| Output power dissipation | | P_{diss} | 220 | mW |
| Output junction temperature | | T_j | 125 | $^{\circ}\text{C}$ |
| OPTOCOUPLER | | | | |
| Storage temperature range | | T_{stg} | -55 to +150 | $^{\circ}\text{C}$ |
| Ambient operating temperature range | | T_{amb} | -40 to +100 | $^{\circ}\text{C}$ |
| Total power dissipation | | P_{tot} | 260 | mW |
| Lead solder temperature | For 10 s, 1.6 mm below seating plane | 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⁾ Maximum pulse width = 10 μs , maximum duty cycle = 0.2 %. This value is intended to allow for component tolerances for designs with I_{O} peak minimum = 2.5 A. See applications section for additional details on limiting I_{OH} peak.

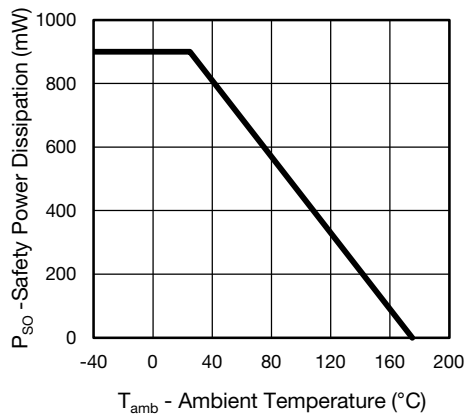


Fig. 1 - Safety Power Dissipation vs. Ambient Temperature

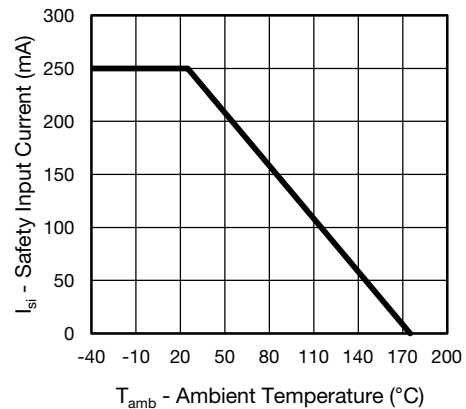


Fig. 2 - Safety Input Current vs. Ambient Temperature



| RECOMMENDED OPERATING CONDITIONS | | | | |
|---|-------------------|------|------|------|
| PARAMETER | SYMBOL | MIN. | MAX. | UNIT |
| Power supply voltage | $V_{CC} - V_{EE}$ | 15 | 32 | V |
| Input LED current (on) | I_F | 10 | - | mA |
| Input voltage (off) | $V_{F(OFF)}$ | -3 | 0.8 | V |
| Operating temperature | T_{amb} | -40 | +100 | °C |

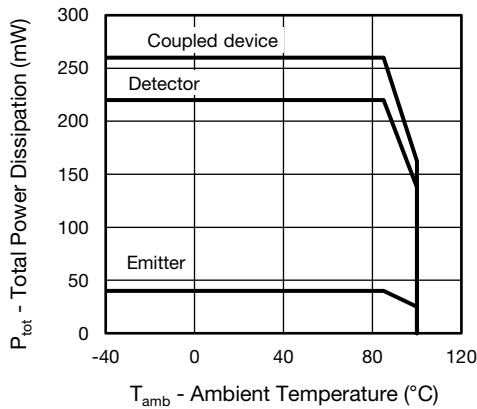


Fig. 3 - Power Dissipation vs. Ambient Temperature

| ELECTRICAL CHARACTERISTICS | | | | | | |
|--|---------------------------------------|-------------------------------|--------------|------|------|-------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| High level output current | $V_O = (V_{CC} - 4 V)$ | I_{OH} | 0.5 | - | - | A |
| | $V_O = (V_{CC} - 15 V)$ | I_{OH} | 2.5 | - | - | A |
| Low level output current | $V_O = (V_{EE} + 2.5 V)$ | I_{OL} | 0.5 | - | - | A |
| | $V_O = (V_{EE} + 15 V)$ | I_{OL} | 2.5 | - | - | A |
| High level output voltage | $I_O = -100 mA$ | V_{OH} | $V_{CC} - 4$ | - | - | V |
| Low level output voltage | $I_O = 100 mA$ | V_{OL} | - | 0.2 | 0.5 | V |
| High level supply current | Output open, $I_F = 10 mA$ to $16 mA$ | I_{CCH} | - | - | 2.5 | mA |
| Low level supply current | Output open, $V_F = -3 V$ to $+0.8 V$ | I_{CCL} | - | - | 2.5 | mA |
| Threshold input current low to high | $I_O = 0 mA$, $V_O > 5 V$ | I_{FLH} | - | 3.4 | 8 | mA |
| Threshold input voltage high to low | | V_{FHL} | 0.8 | - | - | V |
| Input forward voltage | $I_F = 10 mA$ | V_F | 1 | 1.36 | 1.6 | V |
| Temperature coefficient of forward voltage | $I_F = 10 mA$ | $\Delta V_F / \Delta T_{amb}$ | - | -1.4 | - | mV/°C |
| Input reverse breakdown voltage | $I_R = 10 \mu A$ | V_{BR} | 5 | - | - | V |
| Input capacitance | $f = 1 MHz$, $V_F = 0 V$ | C_{IN} | - | 45 | - | pF |
| UVLO threshold | $V_O \geq 5 V$, $I_F = 10 mA$ | V_{UVLO+} | 11 | - | 13.5 | V |
| | | V_{UVLO-} | 9.5 | - | 12 | V |
| UVLO hysteresis | | $UVLO_{HYS}$ | - | 1.6 | - | V |
| Capacitance (Input to Output) | $f = 1 MHz$, $V_F = 0 V$ | C_{IO} | - | 0.9 | - | pF |

Note

- Minimum and maximum values were tested over recommended operating conditions ($T_{amb} = -40\text{ }^\circ\text{C}$ to $+100\text{ }^\circ\text{C}$, $I_{F(ON)} = 10\text{ mA}$ to 16 mA , $V_{F(OFF)} = -3\text{ V}$ to 0.8 V , $V_{CC} = 15\text{ V}$ to 32 V , $V_{EE} = \text{ground}$) unless otherwise specified. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements. All typical values were measured at $T_{amb} = 25\text{ }^\circ\text{C}$ and with $V_{CC} - V_{EE} = 32\text{ V}$.

| SWITCHING CHARACTERISTICS | | | | | | |
|---|---|-----------------------|------|------|------|---------------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Propagation delay time to logic low output | $R_g = 10 \Omega, C_g = 10 \text{ nF}, f = 10 \text{ kHz}, \text{duty cycle} = 50 \%$ | t_{PHL} | 0.1 | 0.25 | 0.5 | μs |
| Propagation delay time to logic high output | $R_g = 10 \Omega, C_g = 10 \text{ nF}, f = 10 \text{ kHz}, \text{duty cycle} = 50 \%$ | t_{PLH} | 0.1 | 0.25 | 0.5 | μs |
| Pulse width distortion | $R_g = 10 \Omega, C_g = 10 \text{ nF}, f = 10 \text{ kHz}, \text{duty cycle} = 50 \%$ | PWD | - | - | 0.3 | μs |
| Rise time | $R_g = 10 \Omega, C_g = 10 \text{ nF}, f = 10 \text{ kHz}, \text{duty cycle} = 50 \%$ | t_r | - | 0.1 | - | μs |
| Fall time | $R_g = 10 \Omega, C_g = 10 \text{ nF}, f = 10 \text{ kHz}, \text{duty cycle} = 50 \%$ | t_f | - | 0.1 | - | μs |
| UVLO turn on delay | $V_O > 5 \text{ V}, I_F = 10 \text{ mA}$ | $T_{\text{UVLO-ON}}$ | - | 0.8 | - | μs |
| UVLO turn off delay | $V_O < 5 \text{ V}, I_F = 10 \text{ mA}$ | $T_{\text{UVLO-OFF}}$ | - | 0.6 | - | μs |

Note

- Minimum and maximum values were tested over recommended operating conditions ($T_{\text{amb}} = -40 \text{ }^\circ\text{C}$ to $+100 \text{ }^\circ\text{C}$, $I_{\text{F(ON)}} = 10 \text{ mA}$ to 16 mA , $V_{\text{F(OFF)}} = -3 \text{ V}$ to 0.8 V , $V_{\text{CC}} = 15 \text{ V}$ to 32 V , $V_{\text{EE}} = \text{ground}$) unless otherwise specified. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements. All typical values were measured at $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ and with $V_{\text{CC}} - V_{\text{EE}} = 32 \text{ V}$.

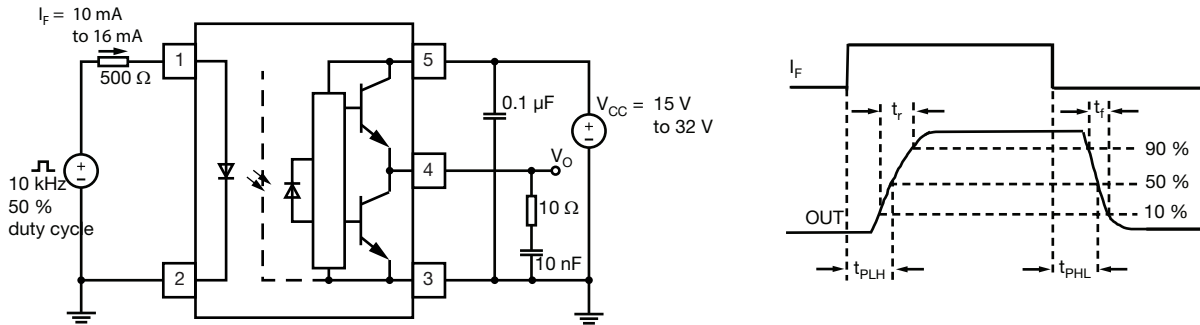


Fig. 4 - t_{PLH} , t_{PHL} , t_r and t_f Test Circuit and Waveforms

| COMMON MODE TRANSIENT IMMUNITY | | | | | | |
|---|---|------------------------|------|------|------|-------------------------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Common mode transient immunity at logic high output | $T_{\text{amb}} = 25 \text{ }^\circ\text{C}, I_F = 10 \text{ mA to } 16 \text{ mA}, V_{\text{CM}} = 1500 \text{ V}, V_{\text{CC}} = 32 \text{ V}$ | $ \text{CM}_\text{H} $ | 48 | - | - | $\text{kV}/\mu\text{s}$ |
| Common mode transient immunity at logic low output | $T_{\text{amb}} = 25 \text{ }^\circ\text{C}, V_{\text{CM}} = 1500 \text{ V}, V_{\text{CC}} = 32 \text{ V}, V_F = 0 \text{ V}$ | $ \text{CM}_\text{L} $ | 48 | - | - | $\text{kV}/\mu\text{s}$ |

Note

- Minimum and maximum values were tested over recommended operating conditions ($T_{\text{amb}} = -40 \text{ }^\circ\text{C}$ to $+100 \text{ }^\circ\text{C}$, $I_{\text{F(ON)}} = 10 \text{ mA}$ to 16 mA , $V_{\text{F(OFF)}} = -3 \text{ V}$ to 0.8 V , $V_{\text{CC}} = 15 \text{ V}$ to 32 V , $V_{\text{EE}} = \text{ground}$) unless otherwise specified. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements. All typical values were measured at $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ and with $V_{\text{CC}} - V_{\text{EE}} = 32 \text{ V}$.

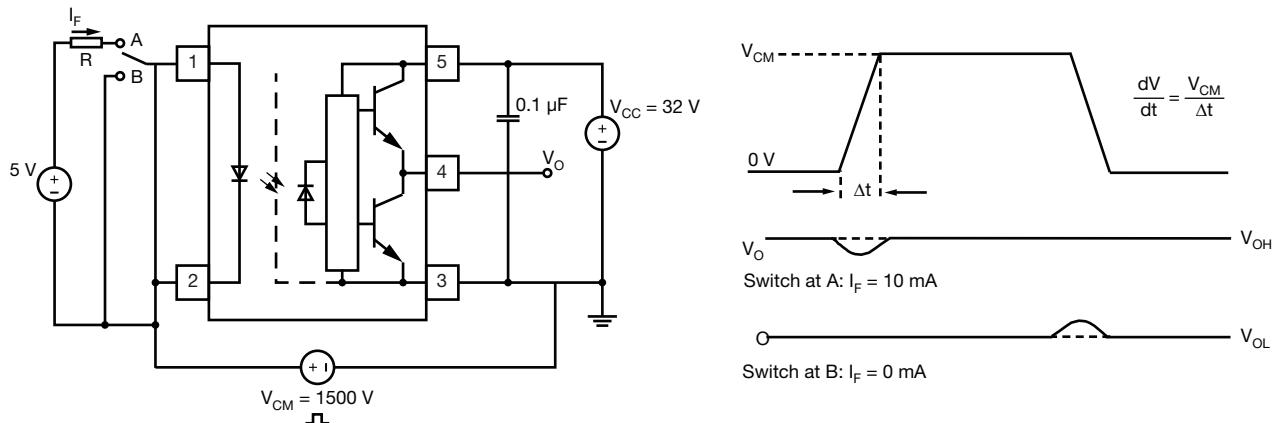


Fig. 5 - CMR Test Circuit and Waveforms

| SAFETY AND INSULATION RATINGS | | | | |
|--|---|-------------------|--------------------|-------------------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| Climatic classification | According to IEC 68 part 1 | | 40 / 100 / 21 | |
| Comparative tracking index | | CTI | 175 | |
| Maximum rated withstanding isolation voltage | t = 1 min | V _{ISO} | 5300 | V _{RMS} |
| Maximum transient isolation voltage | | V _{IOTM} | 8000 | V |
| Maximum repetitive peak isolation voltage | | V _{IORM} | 1050 | V |
| Isolation resistance | T _{amb} = 25 °C, V _{DC} = 500 V | R _{IO} | ≥ 10 ¹² | Ω |
| | T _{amb} = 100 °C, V _{DC} = 500 V | R _{IO} | ≥ 10 ¹¹ | Ω |
| Output safety power | | P _{SO} | 900 | mW |
| Input safety current | | I _{SI} | 250 | mA |
| Safety temperature | | T _S | 175 | °C |
| Creepage distance | | | ≥ 8 | mm |
| Clearance distance | | | ≥ 8 | mm |
| Insulation thickness | | DTI | ≥ 0.4 | mm |
| Input to output test voltage, method B | V _{IORM} × 1.875 = V _{PR} , 100 % production test with t _M = 1 s, partial discharge < 5 pC | V _{PR} | 1969 | V _{peak} |
| Input to output test voltage, method A | V _{IORM} × 1.6 = V _{PR} , 100 % production test with t _M = 10 s, partial discharge < 5 pC | V _{PR} | 1680 | V _{peak} |
| Environment (pollution degree in accordance to DIN VDE 0109) | | | 2 | |

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.

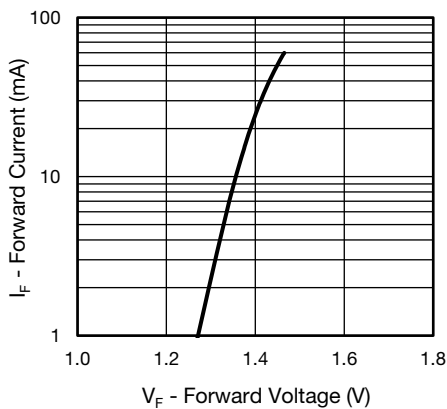
TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)


Fig. 6 - Forward Current vs. Forward Voltage

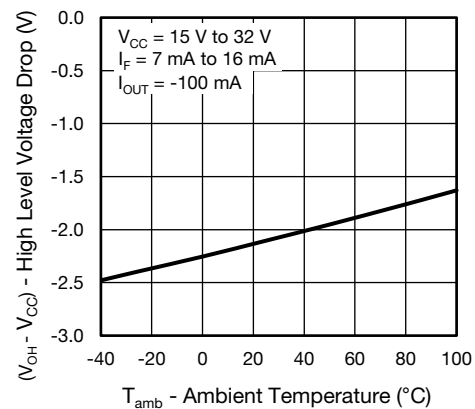


Fig. 7 - High Level Voltage Drop vs. Ambient Temperature

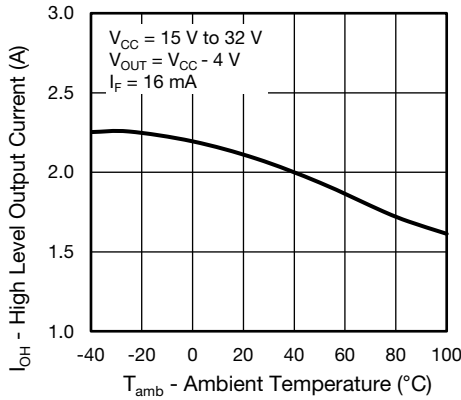


Fig. 8 - High Level Output Current vs. Ambient Temperature

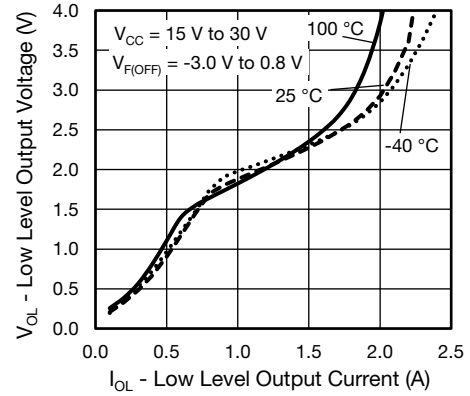


Fig. 11 - Low Level Output Voltage vs. Low Level Output Current

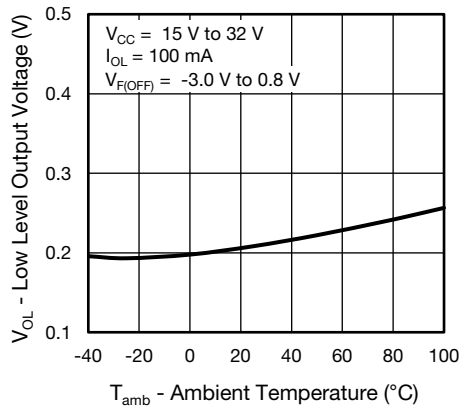


Fig. 9 - Low Level Output Voltage vs. Ambient Temperature

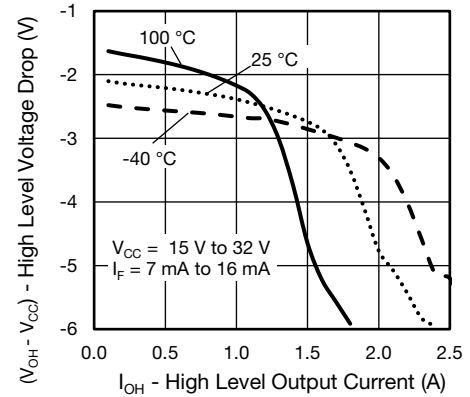


Fig. 12 - High Level Voltage Drop vs. High Level Output Current

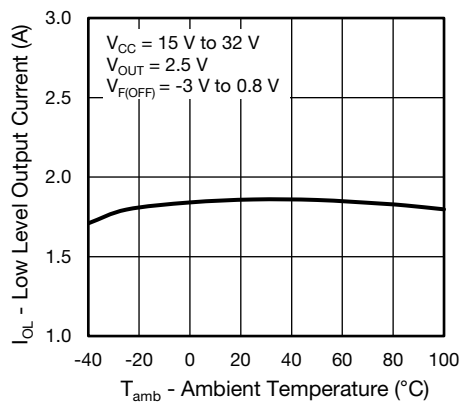


Fig. 10 - Low Level Output Current vs. Ambient Temperature

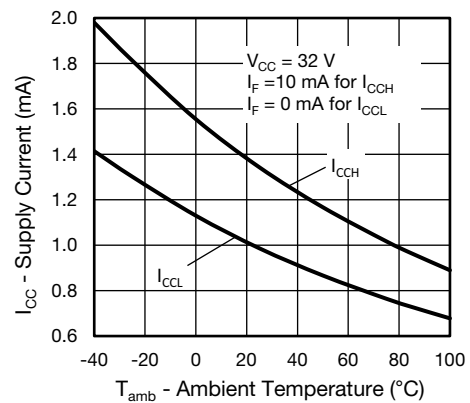


Fig. 13 - Supply Current vs. Ambient Temperature

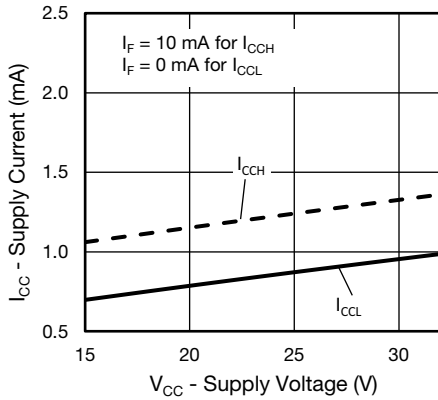


Fig. 14 - Supply Current vs. Supply Voltage

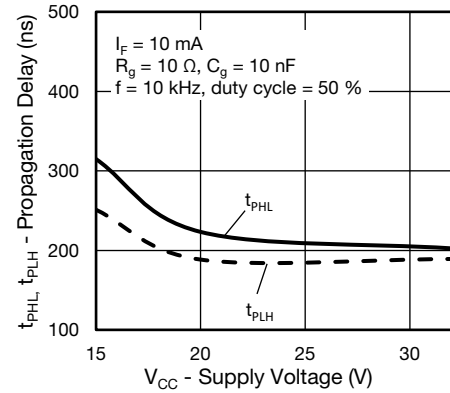


Fig. 17 - Propagation Delay vs. Supply Voltage

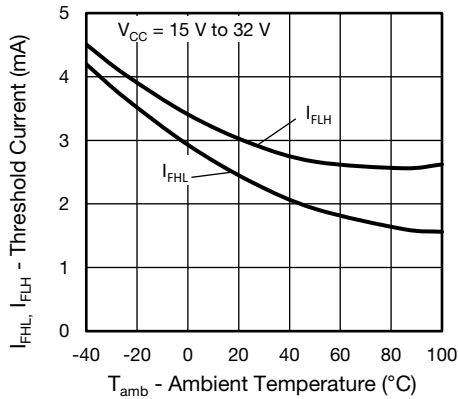


Fig. 15 - Threshold Current vs. Ambient Temperature

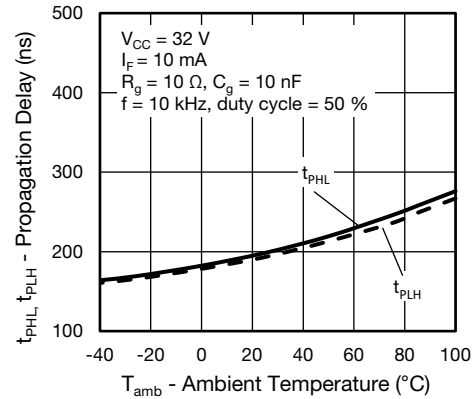


Fig. 18 - Propagation Delay vs. Ambient Temperature

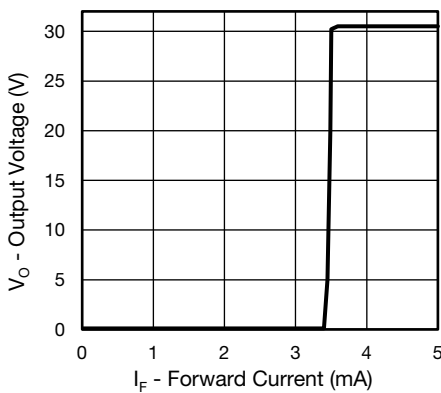


Fig. 16 - Output Voltage vs. Forward Current

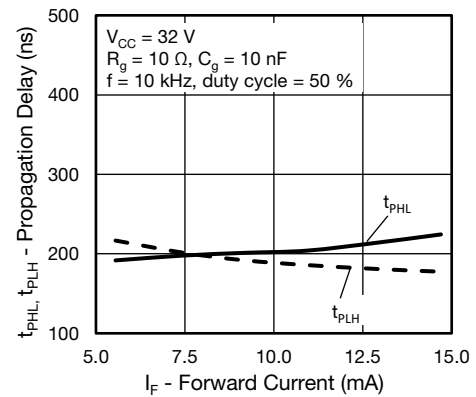


Fig. 19 - Propagation Delay vs. Forward Current

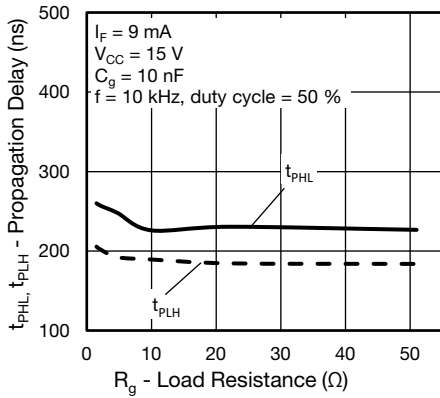


Fig. 20 - Propagation Delay vs. Load Resistance

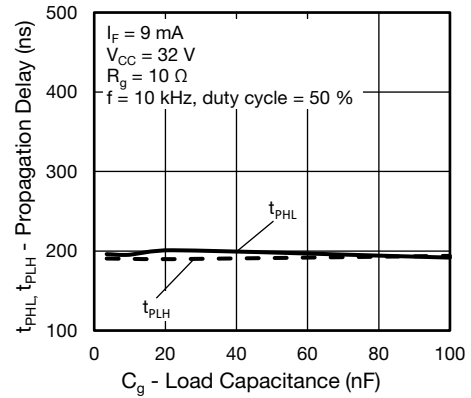


Fig. 21 - Propagation Delay vs. Load Capacitance

PACKAGE DIMENSIONS (in millimeters)

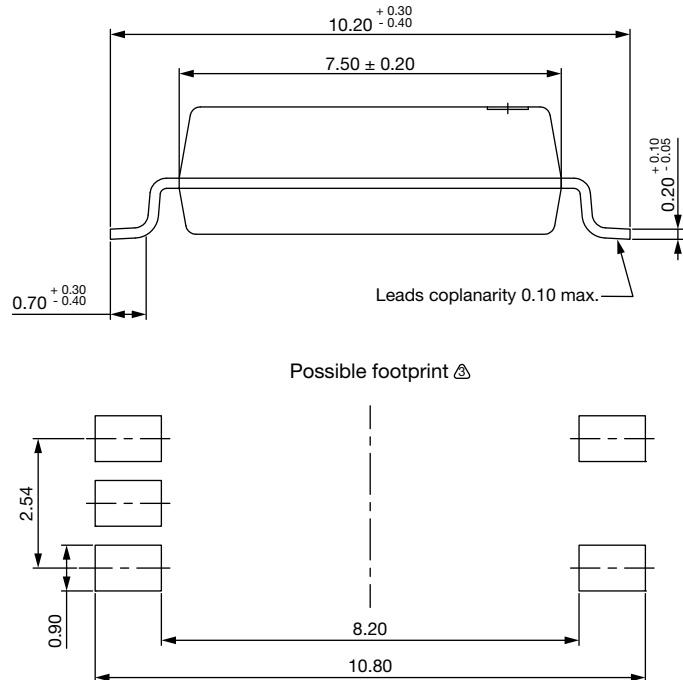
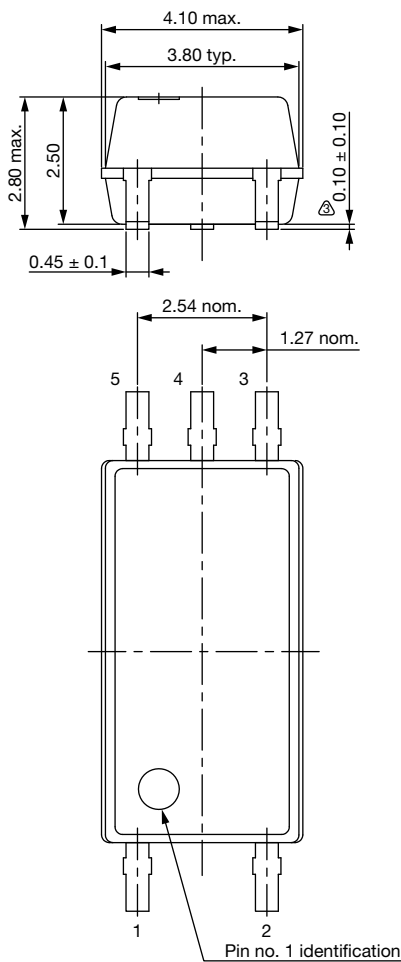


Fig. 22 - Package Drawing

PACKAGE MARKING

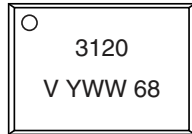


Fig. 23 - VOL3120T

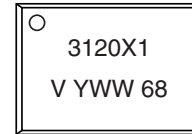


Fig. 24 - VOL3120-X001T

PACKING INFORMATION (tape and reel)

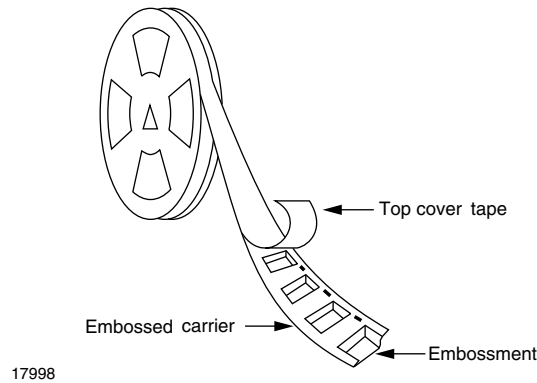
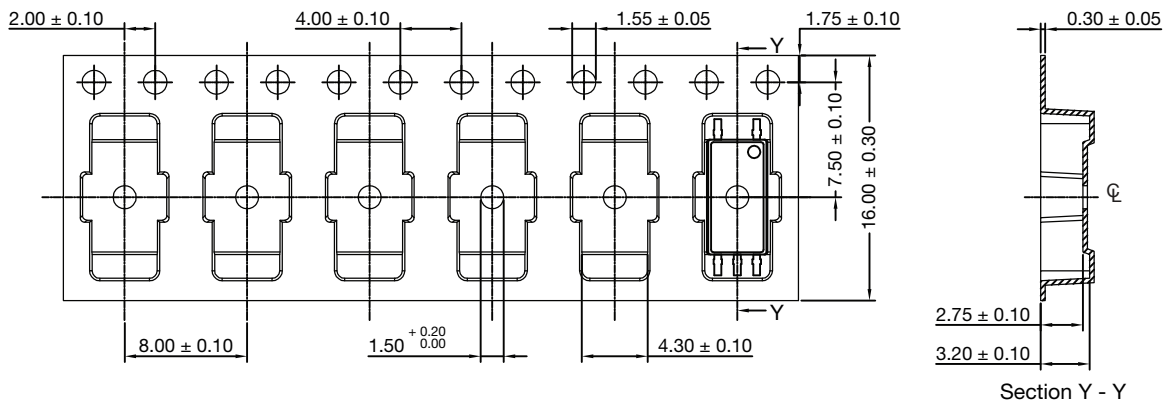


Fig. 25 - Tape and Reel Shipping Medium

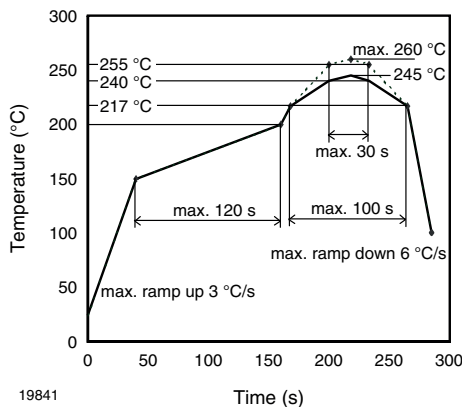


Note:

- 1. Cumulative tolerance of 10 spocket holes is ± 0.20 .

Fig. 26 - Tape and Reel Packing (2000 pieces on reel)

SOLDER PROFILE



19841

Fig. 27 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020

HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: unlimited

Conditions: $T_{amb} < 30\text{ °C}$, $RH < 85\%$

Moisture sensitivity level 1, according to J-STD-020



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