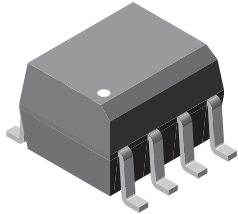
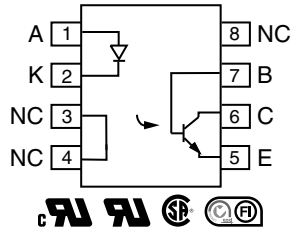


Optocoupler, Phototransistor Output, With Base Connection in SOIC-8 Package, 110 °C Rated



I179074



LINKS TO ADDITIONAL RESOURCES



DESCRIPTION

The 110 °C 1206AT, 1207AT, 1208AT are optically coupled pairs with a gallium arsenide infrared LED and a silicon NPN phototransistor. Signal information, including a DC level, can be transmitted by the device while maintaining a high degree of electrical isolation between input and output. This family comes in a standard SOIC-8 small outline package for surface mounting which makes them ideally suited for high density application with limited space. In addition to eliminating through-hole requirements, this package conforms to standards for surface mounted devices. A specified minimum and maximum CTR allows a narrow tolerance in the electrical design of the adjacent circuits. The high BV_{CEO} of 70 V gives a higher safety margin compared to the industry standard 30 V.

FEATURES

- Operating temperature from -55 °C to +110 °C
- High BV_{CEO} , 70 V
- Isolation test voltage, 4000 V_{RMS}
- Industry standard SOIC-8 surface mountable package
- Compatible with dual wave, vapor phase and IR reflow soldering
- Lead (Pb)-free component
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

APPLICATIONS

- AC adapters
- PLCs
- Switch mode power supplies
- DC/DC converters
- Microprocessor I/O interfaces
- General impedance matching circuits

AGENCY APPROVALS

- [UL1577](#) - file no. E52744 system code Y
- [cUL](#) - file no. E52744
- [DIN EN 60747-5-5 \(VDE 0884\)](#) available with option 1
- [CSA 93751](#)
- [FIMKO](#)

| ORDERING INFORMATION | | | |
|--|------------------|-------------------|-------------------|
| <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px;">I</div> <div style="border: 1px solid black; padding: 2px 5px;">L</div> <div style="border: 1px solid black; padding: 2px 5px;">1</div> <div style="border: 1px solid black; padding: 2px 5px;">2</div> <div style="border: 1px solid black; padding: 2px 5px;">0</div> <div style="border: 1px solid black; padding: 2px 5px;">6</div> <div style="border: 1px solid black; padding: 2px 5px;">A</div> <div style="border: 1px solid black; padding: 2px 5px;">T</div> </div> <p style="text-align: center; margin-top: 5px;">PART NUMBER TAPE AND REEL</p> | | | |
| AGENCY CERTIFIED / PACKAGE | CTR (%) | | |
| | 1 mA | | |
| UL, cUL, CSA, FIMKO | 63 to 125 | 100 to 200 | 160 to 320 |
| SOIC-8 | IL1206AT | IL1207AT | IL1208AT |

Note

- Additional options may be possible, please contact sales office



| ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | |
|--|--|------------|-------------|-----------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| INPUT | | | | |
| Continuous forward current | | I_F | 60 | mA |
| Peak reverse voltage | | V_R | 6.0 | V |
| Power dissipation | | P_{diss} | 90 | mW |
| Derate linearly from 25 °C | | | 0.9 | mW/°C |
| OUTPUT | | | | |
| Collector emitter voltage | | V_{CE} | 70 | V |
| Collector current | | I_C | 50 | mA |
| | $t < 1.0\text{ ms}$ | I_C | 100 | mA |
| Power dissipation | | P_{diss} | 150 | mW |
| Derate linearly from 25 °C | | | 1.5 | mW/°C |
| COUPLER | | | | |
| Isolation test voltage | | V_{ISO} | 4000 | V_{RMS} |
| Operating temperature | | T_{amb} | -55 to +110 | °C |
| Total package dissipation (LED and detector) | | P_{tot} | 240 | mW |
| Storage temperature | | T_{stg} | -55 to +150 | °C |
| Soldering temperature ⁽¹⁾ | Max. 10 s, dip soldering distance to seating plane ³ 1.5 mm | T_{sld} | 260 | °C |
| Derate linearly from 25 °C | | | 2.4 | mW/°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 (SOP / SOIC)

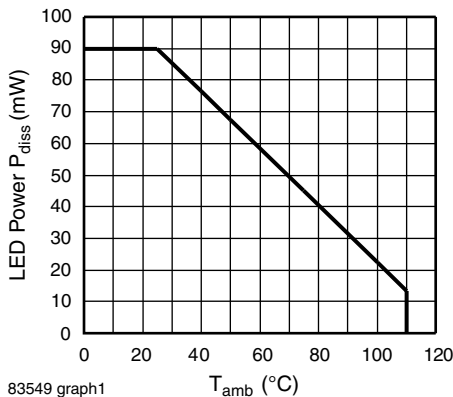


Fig. 1 - Input Power Dissipation (LED) vs. Ambient Temperature

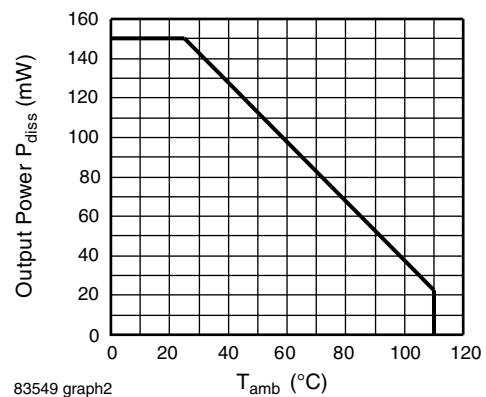


Fig. 2 - Output Power Dissipation vs. Ambient Temperature

| ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | | |
|--|--|----------|-------------|------|------|------|---------------|
| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| INPUT | | | | | | | |
| Forward voltage | $I_F = 10\text{ mA}$ | | V_F | - | 1.3 | 1.5 | V |
| Reverse current | $V_R = 6\text{ V}$ | | I_R | - | 0.1 | 100 | μA |
| Capacitance | $V_R = 0\text{ V}$ | | C_I | - | 13 | - | pF |
| OUTPUT | | | | | | | |
| Collector emitter leakage current | $V_{CE} = 10\text{ V}$ | | I_{CEO} | - | 5.0 | 50 | nA |
| Collector emitter breakdown voltage | $I_C = 100\text{ }\mu\text{A}$ | | BV_{CEO} | 70 | - | - | V |
| Emitter collector breakdown voltage | $I_E = 100\text{ }\mu\text{A}$ | | BV_{ECO} | 7.0 | 10 | - | V |
| Collector base breakdown current | | | BV_{CBO} | 70 | - | - | V |
| Saturation voltage, collector emitter | $I_C = 2\text{ mA}, I_F = 10\text{ mA}$ | | V_{CEsat} | - | - | 0.4 | V |
| COUPLER | | | | | | | |
| DC current transfer ratio | $I_F = 10\text{ mA}, V_{CE} = 5.0\text{ V}$ | IL1206AT | CTR | 63 | - | 125 | % |
| | | IL1207AT | CTR | 100 | - | 200 | % |
| | | IL1208AT | CTR | 100 | - | 320 | % |
| | $I_F = 1.0\text{ mA}, V_{CE} = 5.0\text{ V}$ | IL1206AT | CTR | 22 | 40 | - | % |
| | | IL1207AT | CTR | 34 | 60 | - | % |
| | | IL1208AT | CTR | 56 | 95 | - | % |
| Capacitance (input to output) | | | C_{IO} | - | 0.5 | - | pF |

Note

- Minimum and maximum values were tested requirements. 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

| SWITCHING CHARACTERISTICS | | | | | | | |
|----------------------------------|--|-----------|------|------|------|---------------|--|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT | |
| Turn-on time | $I_C = 2\text{ mA}, R_L = 100\text{ }\Omega, V_{CC} = 10\text{ V}$ | t_{on} | - | 3.0 | - | μs | |
| Turn-off time | $I_C = 2\text{ mA}, R_L = 100\text{ }\Omega, V_{CC} = 10\text{ V}$ | t_{off} | - | 3.0 | - | μs | |

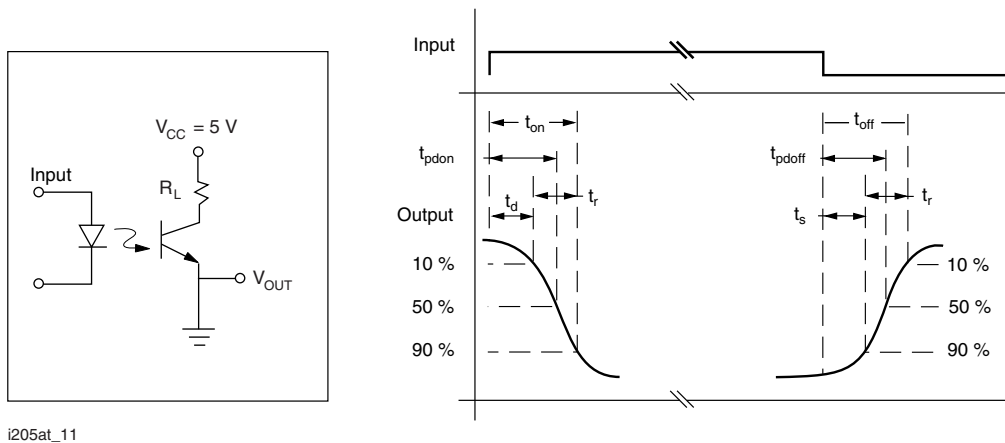


Fig. 1 - Switching Test Circuit

| SAFETY AND INSULATION RATINGS | | | | | | |
|---------------------------------|--|------------|------|---------------|------|-------------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Climatic classification | According to IEC 68 part 1 | | - | 55 / 110 / 21 | - | |
| Pollution degree (DIN VDE 0109) | | | - | 2.0 | - | |
| Comparative tracking index | | CTI | 175 | - | 399 | |
| V_{IOTM} | DIN IEC 112 / VDE 0303 part 1, group IIIa per DIN VDE 6110 175 399 | V_{IOTM} | 6000 | - | - | V |
| V_{IORM} | | V_{IORM} | 560 | - | - | V |
| Resistance (input to output) | | R_{IO} | - | 10^{12} | - | Ω |
| P_{SI} | | | - | - | 350 | mW |
| I_{SI} | | | - | - | 150 | mA |
| T_{SI} | | | - | - | 165 | $^{\circ}C$ |
| Creepage distance | | | 4.0 | - | - | mm |
| Clearance distance | | | 4.0 | - | - | mm |

Note

- As per IEC 60747-5-2, §7.4.3.8.1, 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

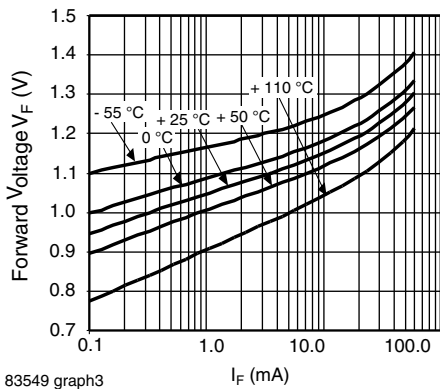
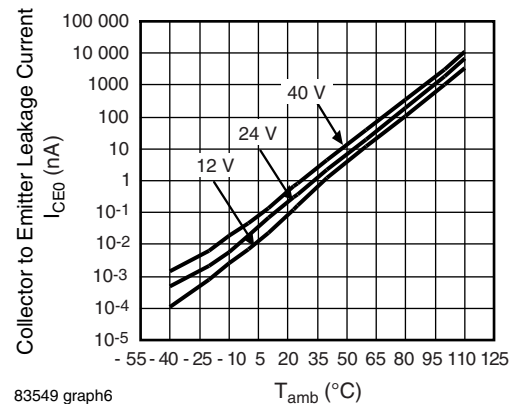
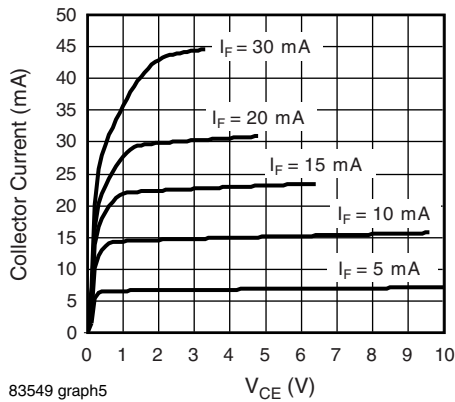
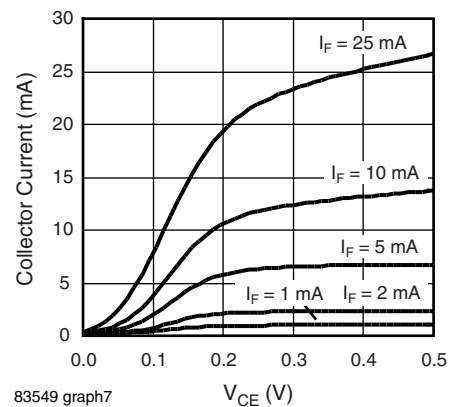
TYPICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}C$, unless otherwise specified)

 Fig. 2 - Diode Forward Voltage V_F vs. Forward Current


Fig. 4 - Collector to Emitter Current vs. Ambient Temperature


 Fig. 3 - I_C (non-saturated) vs. V_{CE}

 Fig. 5 - I_C (saturated) vs. V_{CE}

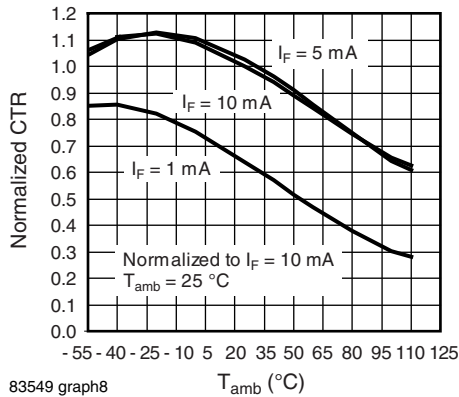


Fig. 6 - CTR Normalized to $I_F = 10$ mA vs. Ambient Temperature, (Saturated, $V_{CE} = 0.4$ V)

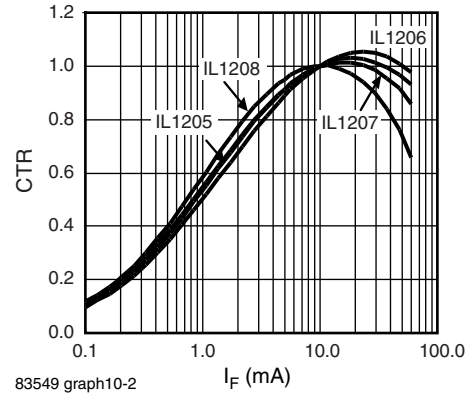


Fig. 9 - CTR vs. I_F , ($V_{CE} = 5$ V, $T_{amb} = 25$ °C) Normalized to $I_F = 10$ mA, $T_{amb} = 25$ °C

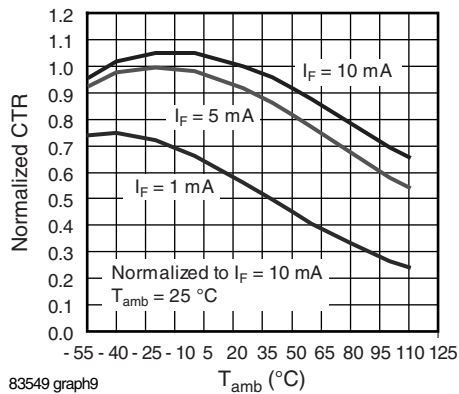


Fig. 7 - CTR Normalized to $I_F = 10$ mA vs. Ambient Temperature, (Non-Saturated, $V_{CE} = 5$ V)

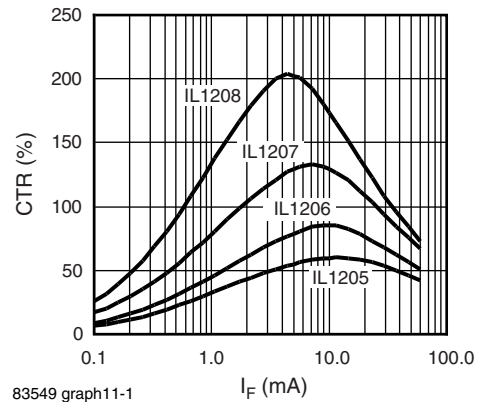


Fig. 10 - CTR vs. I_F Saturated, ($V_{CE} = 0.4$ V, $T_{amb} = 25$ °C)

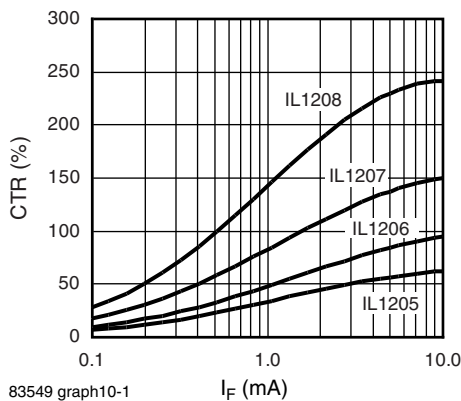


Fig. 8 - CTR vs. I_F , ($V_{CE} = 5$ V, $T_{amb} = 25$ °C) (Not Normalized)

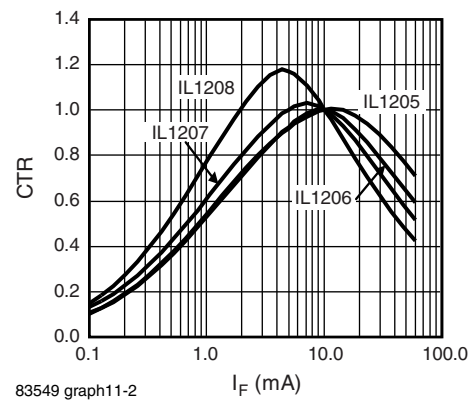


Fig. 11 - CTR vs. I_F Saturated, Normalized to $I_F = 10$ mA, $T_{amb} = 25$ °C

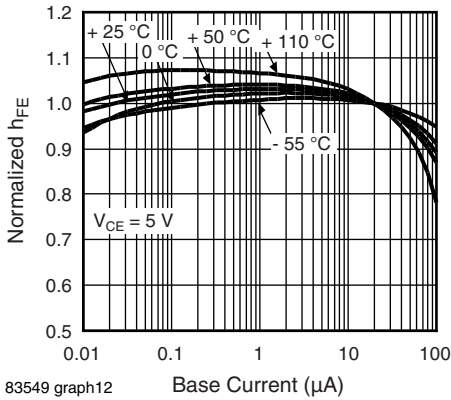


Fig. 12 - Normalized h_{FE} vs. Base Current and T_{amb} (Non-Saturated Condition)

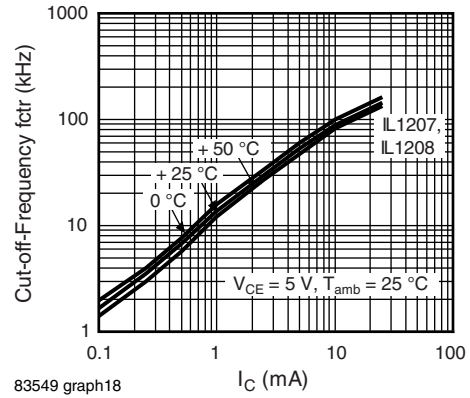


Fig. 15 - Cut-Off-Frequency (- 3 dB) vs. Collector Current

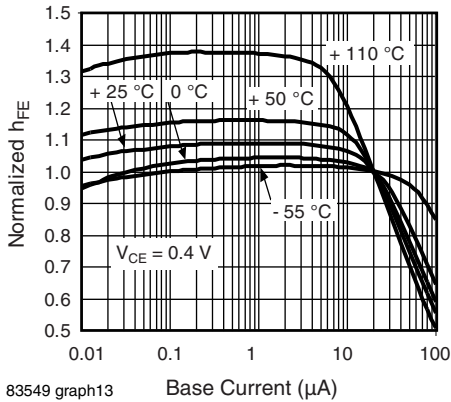


Fig. 13 - Normalized h_{FE} vs. Base Current and T_{amb} (Saturated Condition)

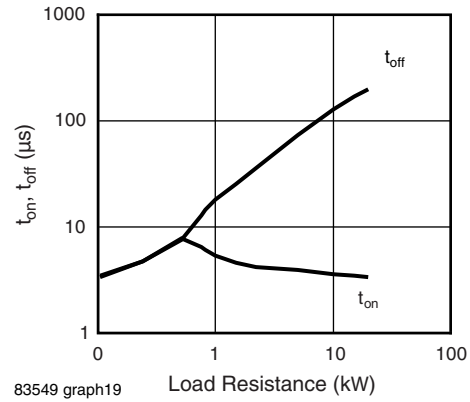


Fig. 16 - Switching Time t_{on} , t_{off} vs. Load Resistance

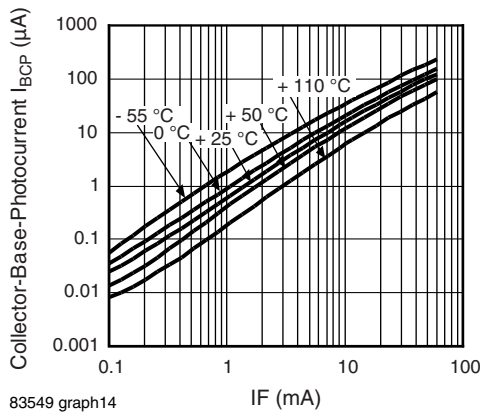


Fig. 14 - Collector Base Photocurrent vs. I_F

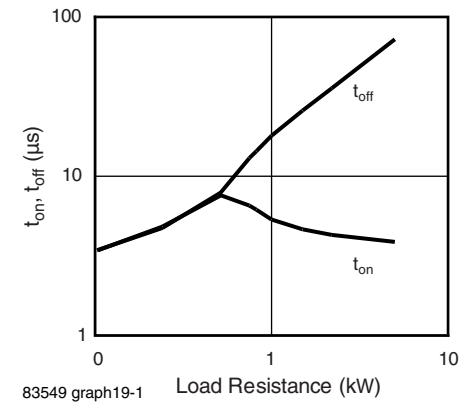


Fig. 17 - Switching Time t_{on} , t_{off} vs. Load Resistance (100 Ω to 5000 Ω)

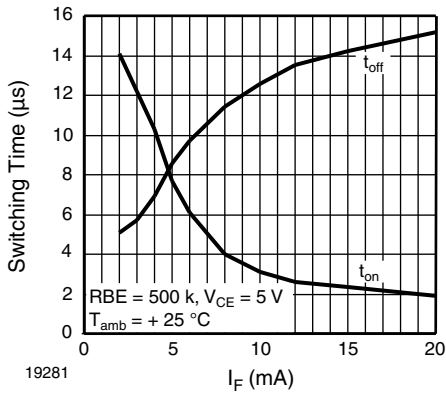


Fig. 18 - Switching Time vs. I_F

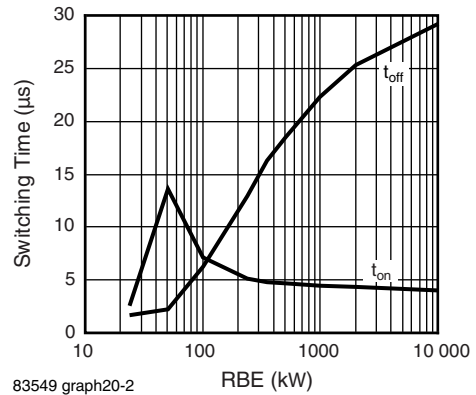
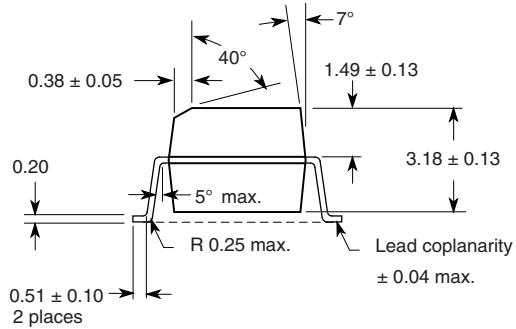
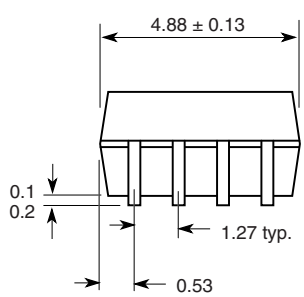
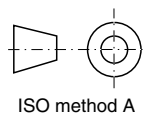
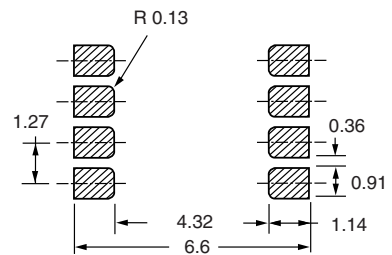
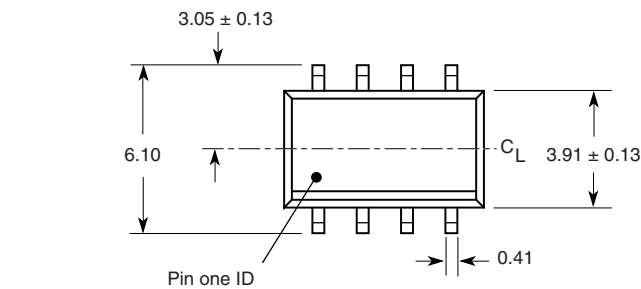


Fig. 19 - Switching Time vs. RBE, $I_F = 10$ mA

PACKAGE DIMENSIONS in millimeters



i178003



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