



#### FEATURES

- Current Limit Protection
- I/O Isolation, 5300 V<sub>RMS</sub>
- Typical R<sub>ON</sub> 20  $\Omega$
- Load Voltage 350 V
- Load Current 120 mA
- High Surge Capability
- Linear, AC/DC Operation
- Clean Bounce Free Switching
- Low Power Consumption
- High Reliability Monolithic Receptor
- SMD lead available on tape and reel
- Equivalent to CP Clare LCA110

#### AGENCY APPROVALS

- UL – File No. E52744
- BSI/BABT Cert. No. 7980
- FIMKO Approval
- CSA – Certification 093751

#### APPLICATIONS

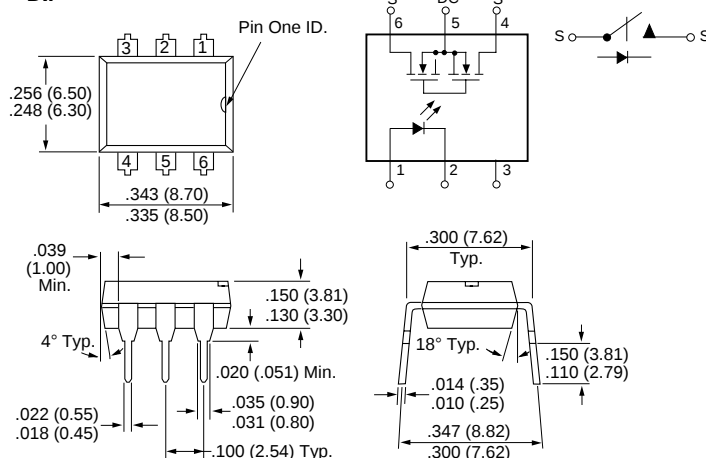
- General Telecom Switching
  - On/off Hook Control
  - Ring Delay
  - Dial Pulse
  - Ground Start
  - Ground Fault Protection
- Instrumentation
- Industrial Controls
- See Application Note 56

#### DESCRIPTION

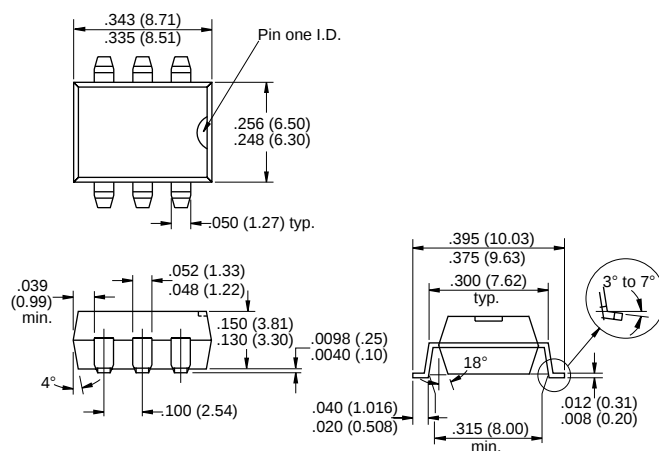
The LH1546 is robust, ideal for telecom and ground fault applications. It is a SPST normally open switch (1 Form A) that replaces electromechanical relays in many applications. It is constructed using a GaAlAs LED for actuation control and an integrated monolithic die for the switch output. The die, fabricated in a high-voltage dielectrically isolated technology, is comprised of a photodiode array, switch control circuitry and MOSFET switches. In addition, it employs current-limiting circuitry which meets FCC 68.302 and other regulatory voltage surge requirements when overvoltage protection is provided.

#### Package Dimensions in Inches (mm)

##### DIP



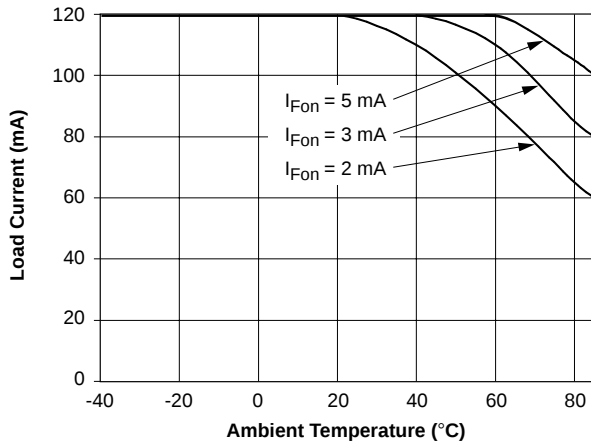
##### SMD



#### Part Identification

| Part Number | Description              |
|-------------|--------------------------|
| LH1546AT    | 6-pin DIP, Tubes         |
| LH1546AAB   | 6-pin SMD, Tubes         |
| LH1546AABTR | 6-pin SMD, Tape and Reel |

## Recommended Operating Conditions



## Absolute Maximum Ratings, $T_A=25^\circ\text{C}$

Stresses in excess of the Absolute Maximum Ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to maximum rating conditions for extended periods can adversely affect device reliability.

|                                                              |                        |
|--------------------------------------------------------------|------------------------|
| Ambient Temperature Range .....                              | -40 to +85°C           |
| Storage Temperature Range .....                              | -40 to +150°C          |
| Soldering Temperature (t=10 s max.) .....                    | 260°C                  |
| Isolation Test Voltage (for 1.0 s) .....                     | 5300 V <sub>RMS</sub>  |
| Isolation Resistance                                         |                        |
| $V_{IO}=500\text{ V}$ , $T_A=25^\circ\text{C}$ .....         | $\geq 10^{12}\ \Omega$ |
| $V_{IO}=500\text{ V}$ , $T_A=100^\circ\text{C}$ .....        | $\geq 10^{11}\ \Omega$ |
| SSR Output Power Dissipation (continuous) .....              | 550 mW                 |
| LED Continuous Forward Current .....                         | 50 mA                  |
| LED Reverse Voltage ( $I_R \leq 10\text{ mA}$ ) .....        | 8.0 V                  |
| DC or Peak AC Load Voltage ( $I_L \leq 50\text{ mA}$ ) ..... | 350 V                  |
| Continuous DC Load Current at 25°C                           |                        |
| Bidirectional .....                                          | 120 mA                 |
| Unidirectional .....                                         | 200 mA                 |

## Electrical Characteristics, $T_A=25^\circ\text{C}$

Minimum and maximum values are testing 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.

| Parameter                                            | Symbol     | Min. | Typ.  | Max. | Units         | Test Conditions                                               |
|------------------------------------------------------|------------|------|-------|------|---------------|---------------------------------------------------------------|
| <b>Input</b>                                         |            |      |       |      |               |                                                               |
| LED Forward Current, Switch Turn-on                  | $I_{Fon}$  | —    | 1.1   | 2.0  | mA            | $I_L=100\text{ mA}$ , $t=10\text{ ms}$                        |
| LED Forward Current, Switch Turn-off                 | $I_{Foff}$ | 0.2  | 1.0   | —    | mA            | $V_L \pm 350\text{ V}$                                        |
| LED Forward Voltage                                  | $V_F$      | 1.15 | 1.26  | 1.45 | V             | $I_F=10\text{ mA}$                                            |
| <b>Output</b>                                        |            |      |       |      |               |                                                               |
| ON-resistance, ac/dc: Pin 4 ( $\pm$ ) to 6 ( $\pm$ ) | $R_{ON}$   | —    | 28    | 35   | $\Omega$      | $I_F=5.0\text{ mA}$ , $I_L=50\text{ mA}$                      |
| ON-resistance, dc: Pin 4, 6 (+) to 5 (-)             |            | —    | 7.0   | 10.0 | $\Omega$      | $I_F=5.0\text{ mA}$ , $I_L=100\text{ mA}$                     |
| OFF-resistance                                       | $R_{OFF}$  | 0.5  | 300   | —    | G $\Omega$    | $I_F=0\text{ mA}$ , $V_L=\pm 100\text{ V}$                    |
| Current Limit ac/dc                                  | $I_{LMT}$  | 170  | 210   | 250  | mA            | $I_F=5.0\text{ mA}$ , $t=5.0\text{ ms}$<br>$V_L=6.0\text{ V}$ |
| Off-state Leakage Current                            | $I_O$      | —    | 0.35  | 200  | nA            | $I_F=0\text{ mA}$ , $V_L=\pm 100\text{ V}$                    |
|                                                      |            | —    | 0.096 | 1.0  | $\mu\text{A}$ | $I_F=0\text{ mA}$ , $V_L=\pm 350\text{ V}$                    |
| Output Capacitance, Pin 4 to 6                       | $C_O$      | —    | 18    | —    | pF            | $I_F=0\text{ mA}$ , $V_L=1.0\text{ V}$                        |
|                                                      |            | —    | 6.7   | —    | pF            | $I_F=0\text{ mA}$ , $V_L=50\text{ V}$                         |
| Switch Offset                                        | $V_{OS}$   | —    | 0.3   | —    | $\mu\text{V}$ | $I_F=5.0\text{ mA}$                                           |
| <b>Transfer</b>                                      |            |      |       |      |               |                                                               |
| Input/Output Capacitance                             | $C_{ISO}$  | —    | 0.67  | —    | pF            | $V_{ISO}=1.0\text{ V}$                                        |
| Turn-on Time                                         | $t_{on}$   | —    | 1.14  | 3.0  | ms            | $I_F=5.0\text{ mA}$ , $I_L=50\text{ mA}$                      |
| Turn-off Time                                        | $t_{off}$  | —    | 0.71  | 3.0  | ms            | $I_F=5.0\text{ mA}$ , $I_L=50\text{ mA}$                      |

Typical Performance Characteristics

Figure 1. LED Voltage vs. Temperature

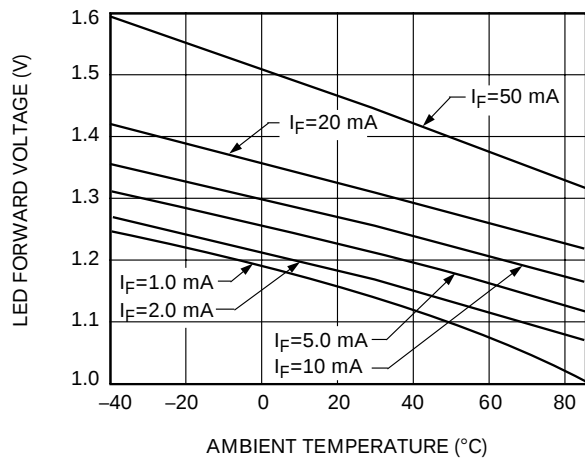


Figure 2. LED Forward Current vs. LED Forward Voltage

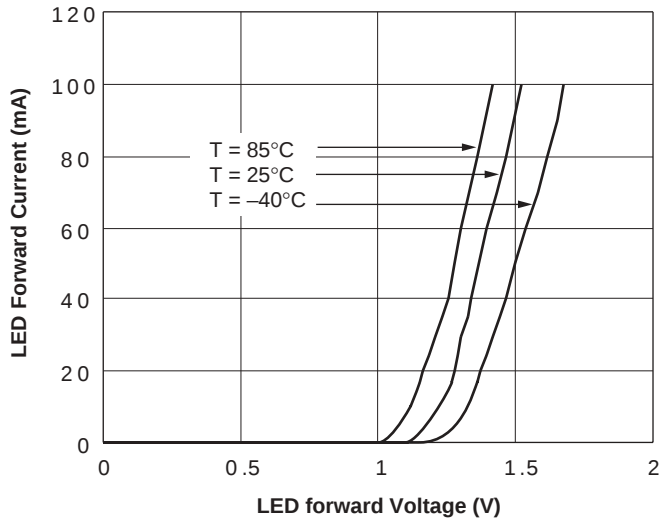


Figure 3. LED Reverse Current vs. LED Reverse Voltage

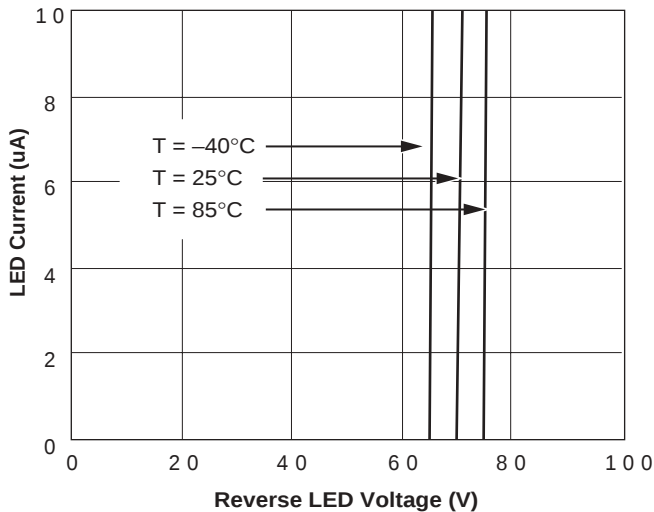


Figure 4. LED Current for Switch Turn-on vs. Temperature

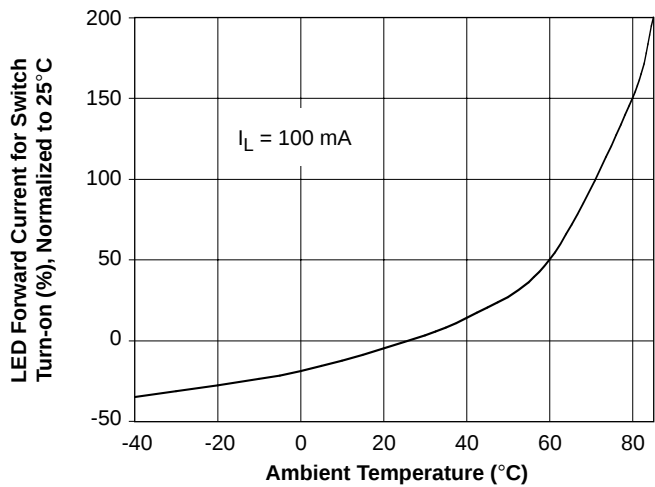


Figure 5. LED Dropout Voltage vs. Temperature

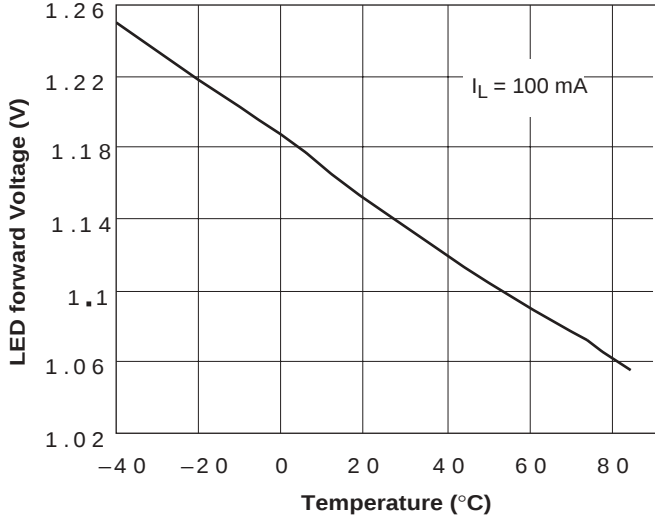


Figure 6. Load Current vs. Load Voltage

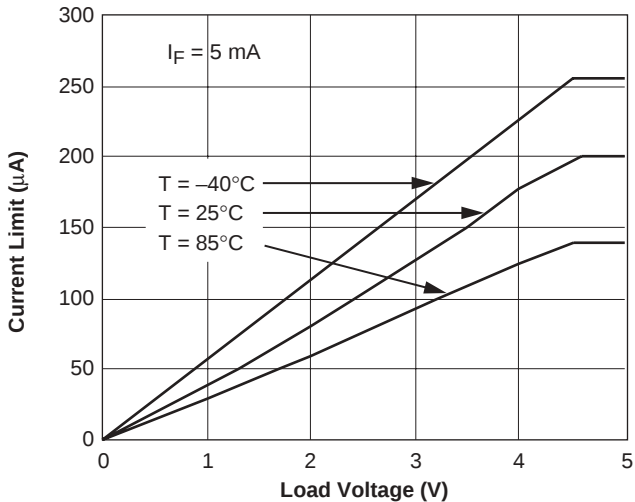


Figure 7. Current Limit vs. Temperature

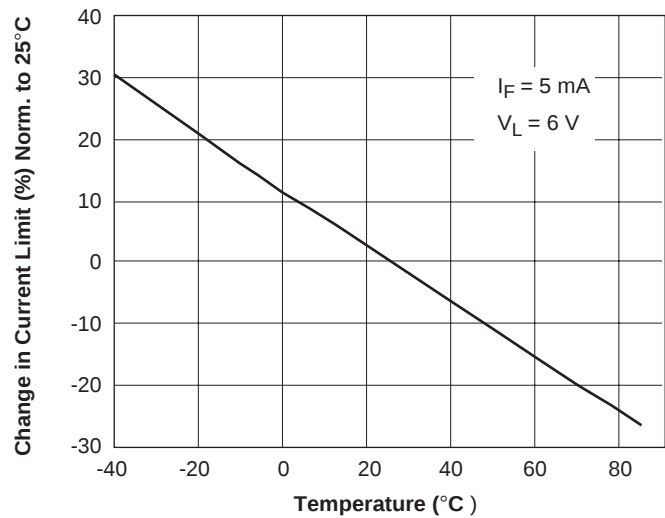


Figure 10. ON-Resistance vs. Temperature

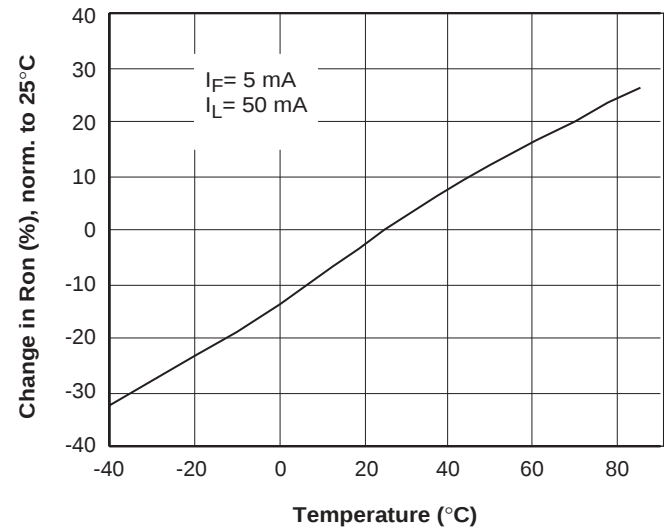


Figure 8. Switch Breakdown Voltage vs. Load Current

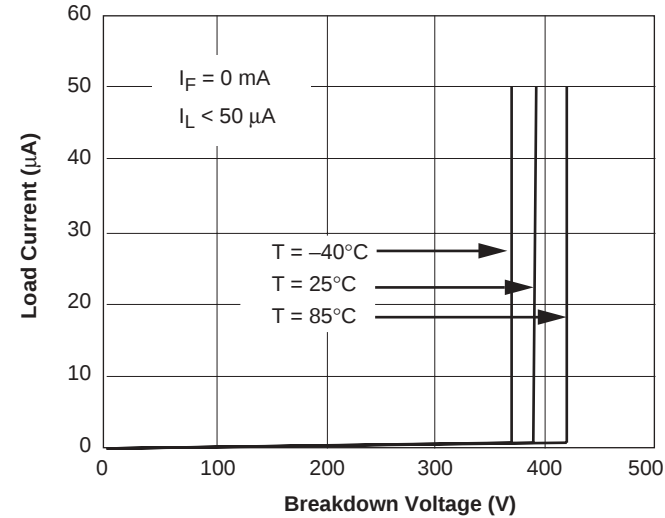


Figure 11. Variation in ON-Resistance vs. LED Current

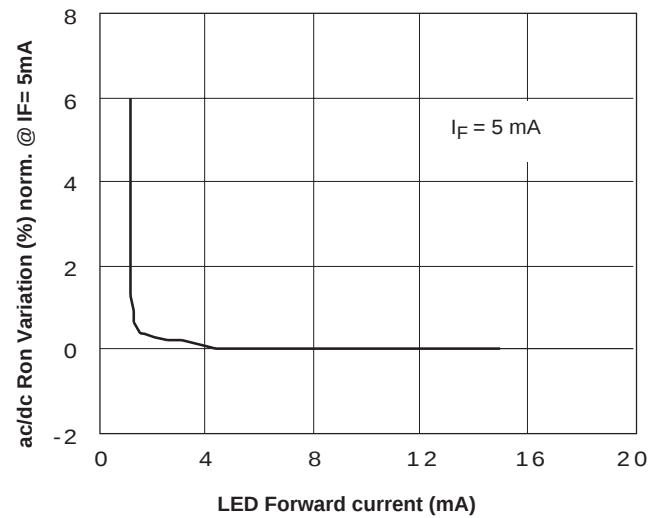


Figure 9. Switch Offset Voltage vs. LED Current

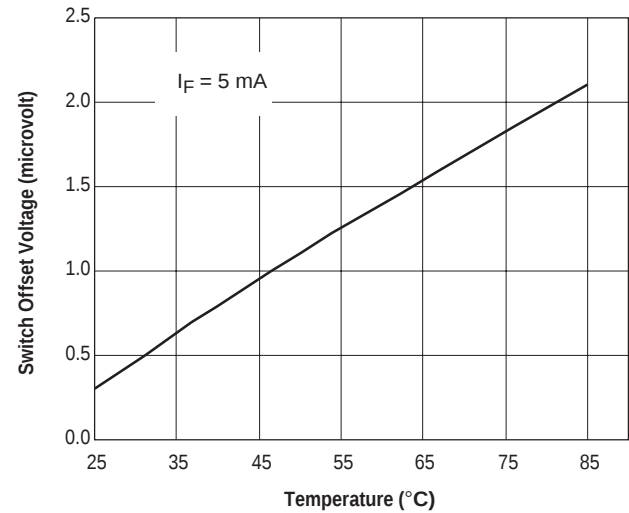


Figure 12. Switch Capacitance vs. Applied Voltage

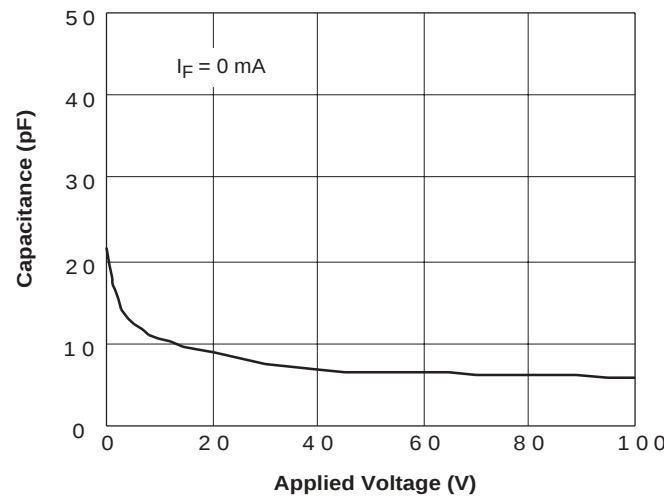


Figure 13. Insertion Loss vs. Frequency

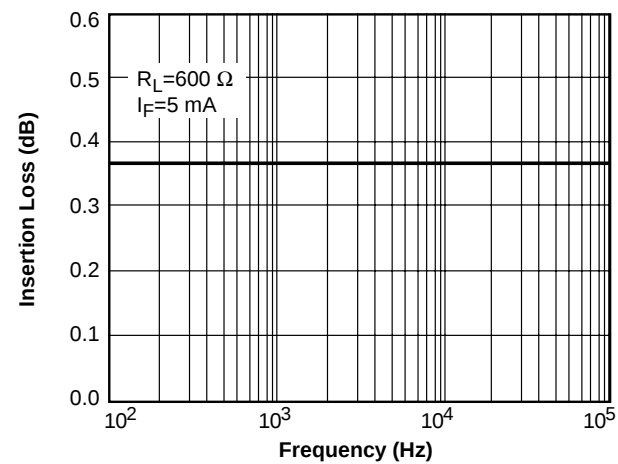


Figure 16. Switch Breakdown Voltage vs. Temperature

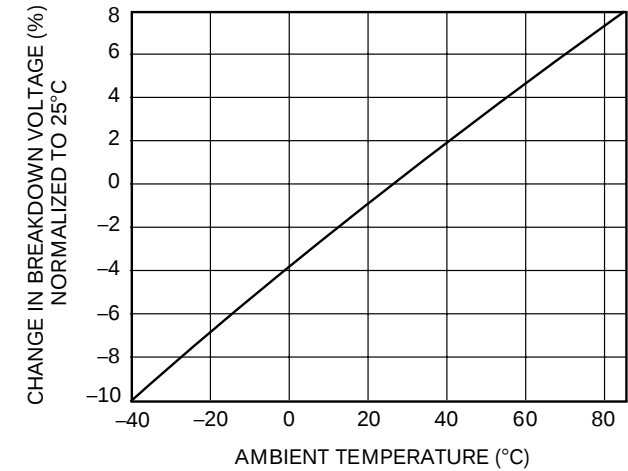


Figure 14. Output Isolation

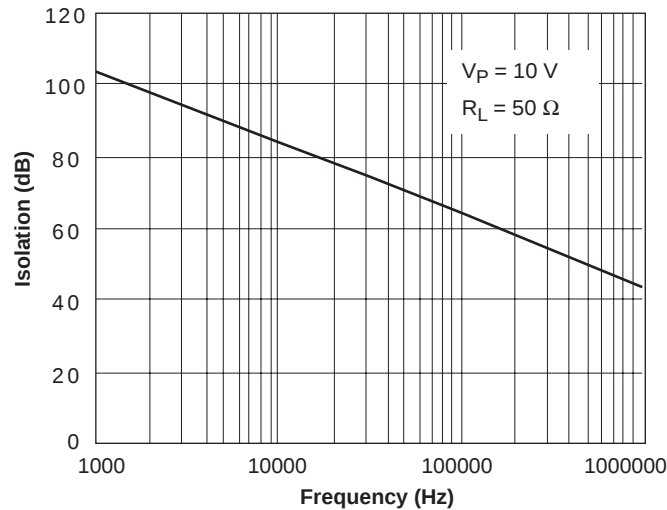


Figure 17. Switch Offset Voltage vs. Temperature

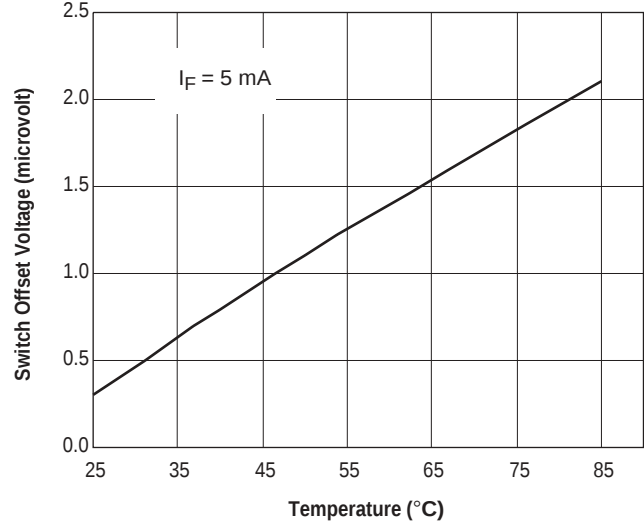


Figure 15. Leakage Current vs. Applied Voltage at Elevated Temperatures

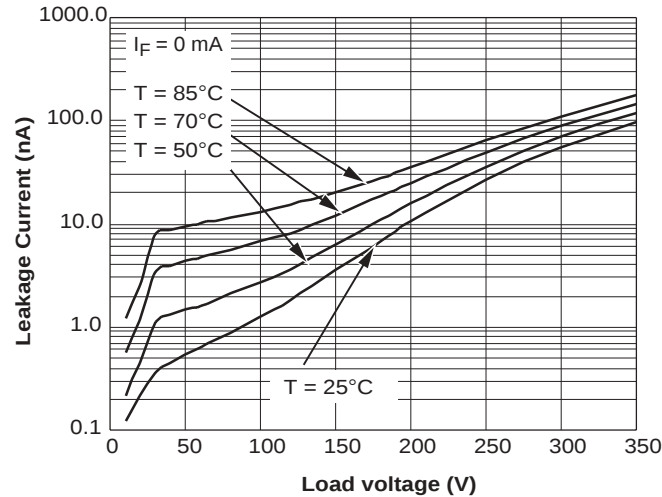


Figure 18. Turn-On Time vs. Temperature

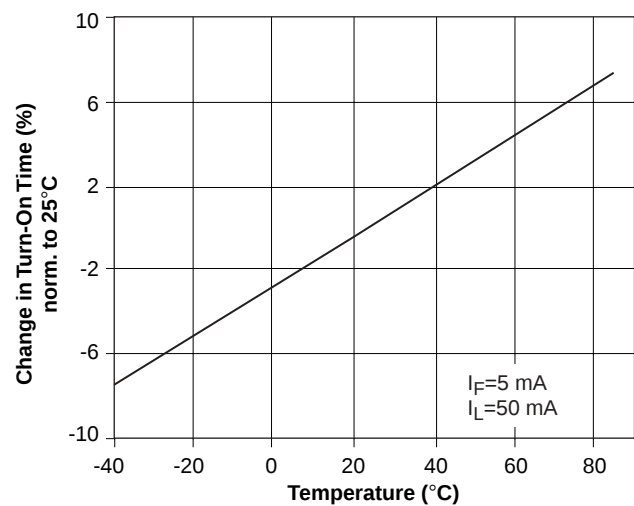


Figure 19. Turn-Off Time vs. Temperature

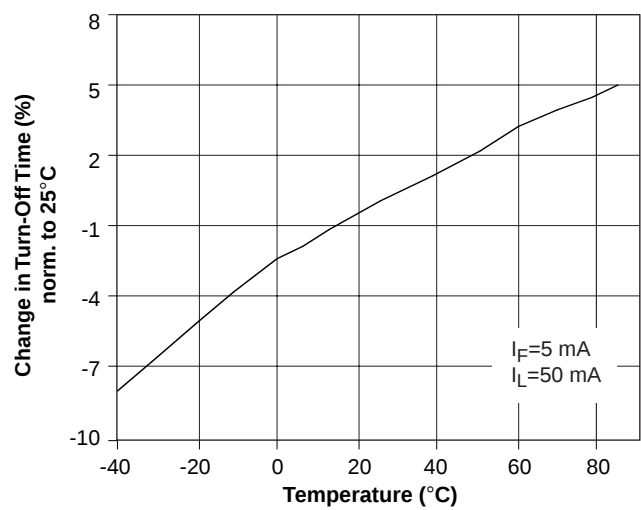


Figure 21. Turn-Off Time vs. LED Current

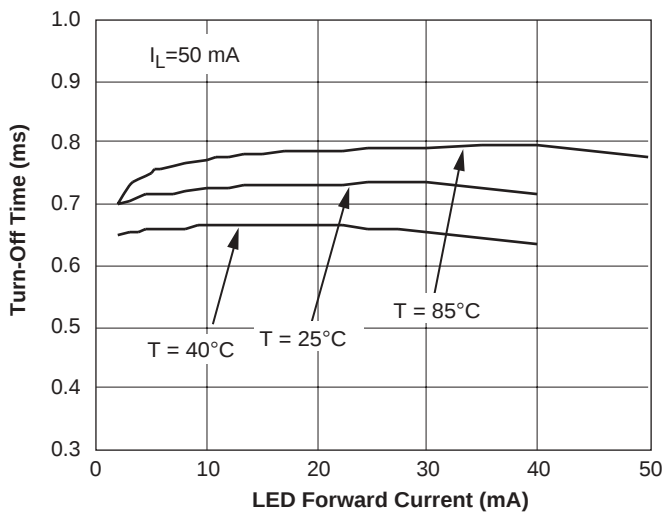


Figure 20. Turn-On Time vs. LED Current

