



# LH1532AB/AAC/AACTR

## Dual 1 Form A Solid State Relay

### FEATURES

- Dual Channel (LH1540)
- Current Limit Protection
- I/O Isolation, 5300 V<sub>RMS</sub>
- Typical R<sub>ON</sub> 20 Ω
- Load Voltage 350 V
- Load Current 120 mA
- High Surge Capability
- Linear, AC/DC Operation
- Clean Bounce Free Switching
- Low Power Consumption
- SMD Lead Available on Tape and Reel

### AGENCY APPROVALS

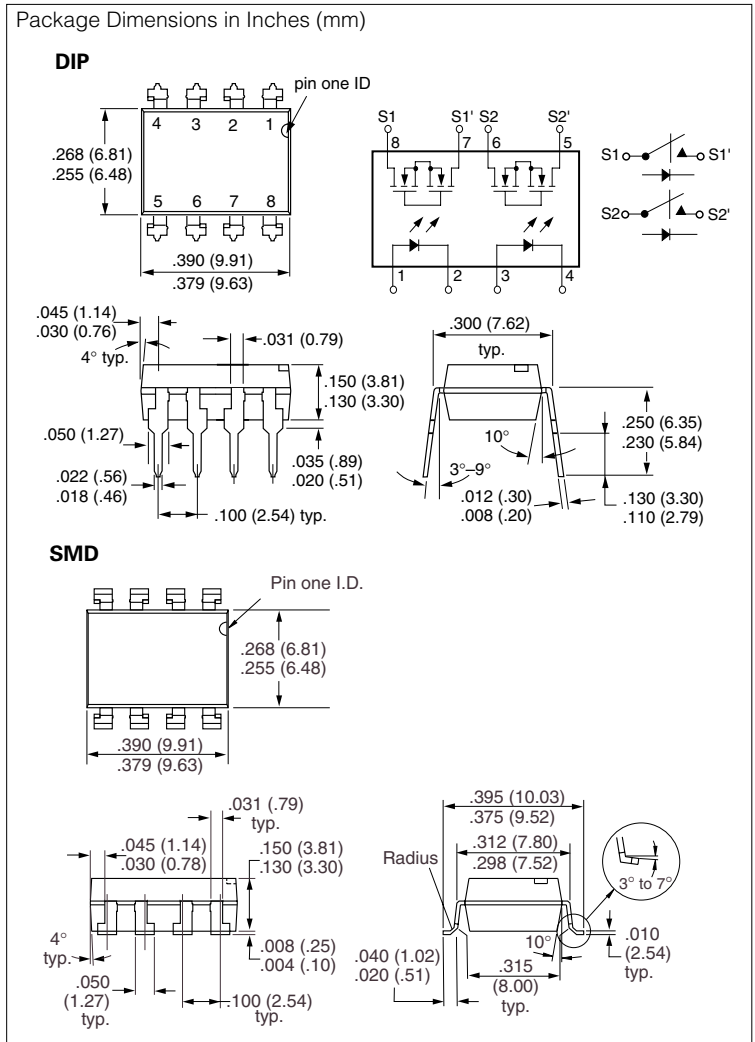
- UL – File No. E52744
- CSA – Certification 093751
- BSI/BABT Cert. No. 7980
- VDE 0884 Approval
- FIMKO Approval

### APPLICATIONS

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

### DESCRIPTION

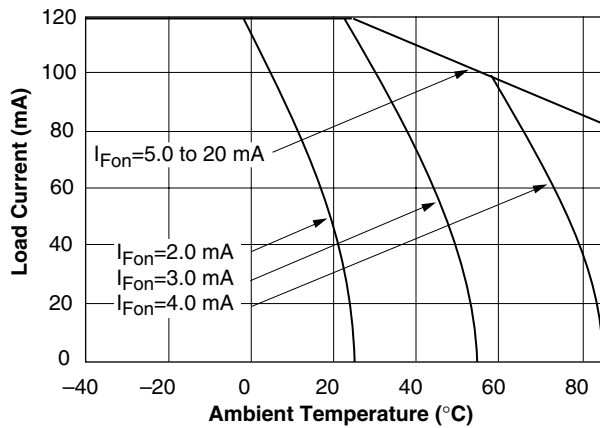
The LH1532 dual 1 Form A relays are SPST normally open switches that can replace electromechanical relays in many applications. They are constructed using a GaAlAs LED for actuation control and an integrated monolithic die for the switch output. The die, fabricated in a high-voltage dielectrically isolated technology is comprised of a photodiode array, switch control circuitry, and MOSFET switches. In addition, the LH1532 SSRs employ current-limiting circuitry, enabling them to pass FCC 68.302 and other regulatory surge requirements when overvoltage protection is provided.



### Part Identification

| Part Number | Description                        |
|-------------|------------------------------------|
| LH1532AB    | 8-pin DIP, Tubes                   |
| LH1532AAC   | 8-pin SMD, Gullwing, Tubes         |
| LH1532AACTR | 8-pin SMD, Gullwing, 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 this document. Exposure to absolute Maximum Ratings for extended periods of time can adversely affect reliability.

|   |       |                       |
|---|-------|-----------------------|
| Ambient Temperature Range ( $T_A$ )   | ..... | -40 to +85°C          |
| Storage Temperature Range ( $T_{stg}$ )                                       | ..... | -40 to +150°C         |
| Pin Soldering Temperature (t=10 s max) ( $T_S$ )                              | ..... | 260°C                 |
| Input/Output Isolation Voltage (t=1.0 s) ( $V_{ISO}$ )                        | ..... | 5300 V <sub>RMS</sub> |
| Pole-to-Pole Isolation Voltage (S1 to S2)* (dry air, dust free, at sea level) | ..... | 1600 V                |
| LED Continuous Forward Current ( $I_F$ )                                      | ..... | 50 mA                 |
| LED Reverse Voltage ( $I_F \leq 10 \mu\text{A}$ ) ( $V_R$ )                   | ..... | 8.0 V                 |
| DC or Peak AC Load Voltage ( $I_L \leq 50 \mu\text{A}$ ) ( $V_L$ )            | ..... | 350 V                 |
| Continuous DC Load Current ( $I_L$ )  |       |                       |
| One Pole Operating  | ..... | 120 mA                |
| Two Poles Operating   | ..... | 110 mA                |
| Peak Load Current (t=100 ms) (single shot) ( $I_P$ )                          | ..... | †                     |
| Output Power Dissipation (continuous) ( $P_{DISS}$ )                          | ..... | 600 mW                |

\* Breakdown occurs between the output pins external to the package.

† Refer to Current Limit Performance Application Note for a discussion on relay operation during transient currents.

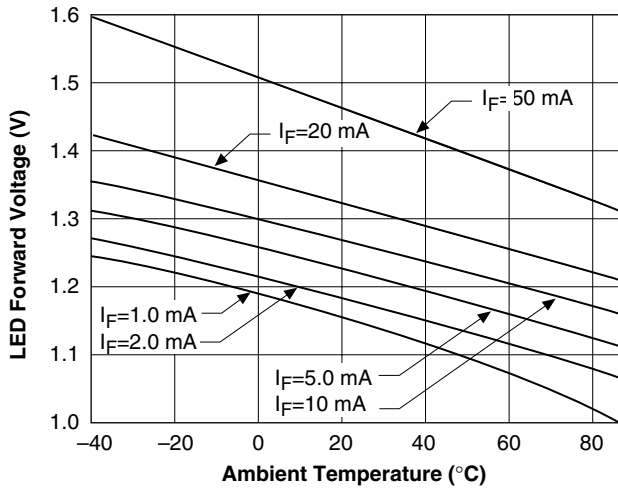
### Electrical Characteristics, $T_A=25^\circ\text{C}$

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.

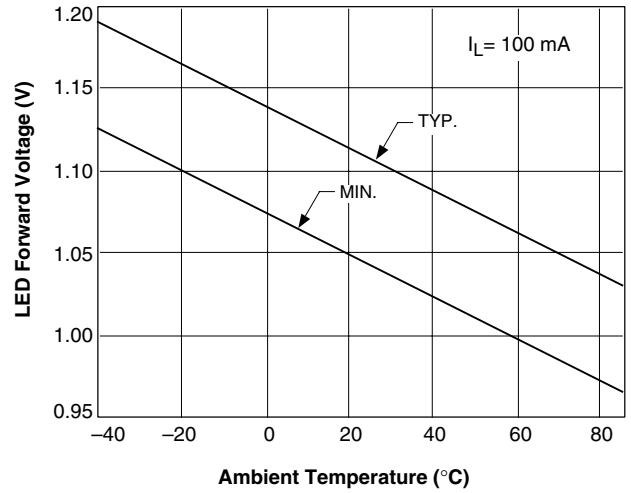
| Parameter                            | Sym.       | Min. | Typ. | Max. | Units         | Test Conditions  |
|--------------------------------------|------------|------|------|------|---------------|--|
| <b>Input</b>                         |            |      |      |      |               |  |
| LED Forward Current, Switch Turn-on  | $I_{Fon}$  | —    | 1.0  | 2.0  | mA            | $I_L=100 \text{ mA}$ , t=10 ms                             |
| LED Forward Current, Switch Turn-off | $I_{Foff}$ | 0.2  | 0.9  | —    | mA            | $V_L \pm 300 \text{ V}$                                    |
| LED Forward Voltage                  | $V_F$      | 1.15 | 1.26 | 1.45 | V             | $I_F=10 \text{ mA}$  |
| <b>Output</b>                        |            |      |      |      |               |  |
| ON-resistance                        | $R_{ON}$   | 12   | 20   | 25   | $\Omega$      | $I_F=5.0 \text{ mA}$ , $I_L=50 \text{ mA}$                 |
| OFF-resistance                       | $R_{OFF}$  | 0.5  | 5000 | —    | G $\Omega$    | $I_F=0 \text{ mA}$ , $V_L=\pm 100 \text{ V}$               |
| Current Limit                        | $I_{LMT}$  | 170  | 210  | 250  | mA            | $I_F=5.0 \text{ mA}$ , t=5.0 ms<br>$V_L=\pm 6.0 \text{ V}$ |
| Off-state Leakage Current            | —          | —    | 0.02 | 200  | nA            | $I_F=0 \text{ mA}$ , $V_L=\pm 100 \text{ V}$               |
|                                      |            |      | —    | 1.0  | $\mu\text{A}$ | $I_F=0 \text{ mA}$ , $V_L=\pm 350 \text{ V}$               |
| Output Capacitance                   | —          | —    | 55   | —    | pF            | $I_F=0 \text{ mA}$ , $V_L=1.0 \text{ V}$                   |
|                                      |            |      | 10   | —    |               | $I_F=0 \text{ mA}$ , $V_L=50 \text{ V}$                    |
| Pole-to-Pole Capacitance (S1 to S2)  | —          | —    | 0.5  | —    | pF            | $I_F=5.0 \text{ mA}$                                       |
| Switch Offset                        | —          | —    | 0.15 | —    | V             | $I_F=5.0 \text{ mA}$                                       |
| <b>Transfer</b>                      |            |      |      |      |               |  |
| Input/Output Capacitance             | $C_{ISO}$  | —    | 1.1  | —    | pF            | $V_{ISO}=1.0 \text{ V}$                                    |
| Turn-on Time                         | $t_{on}$   | —    | 1.4  | 2.5  | ms            | $I_F=5.0 \text{ mA}$ , $I_L=50 \text{ mA}$                 |
| Turn-off Time                        | $t_{off}$  | —    | 0.7  | 2.5  | ms            | $I_F=5.0 \text{ mA}$ , $I_L=50 \text{ mA}$                 |

**Typical Performance Characteristics**

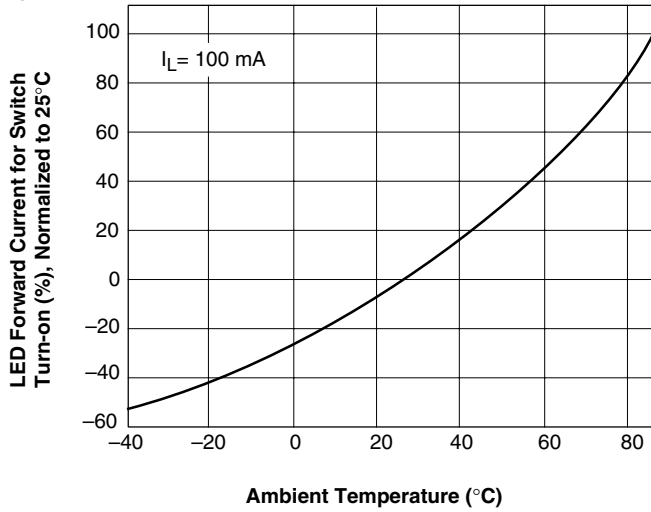
**Figure 1. LED Voltage vs. Temperature**



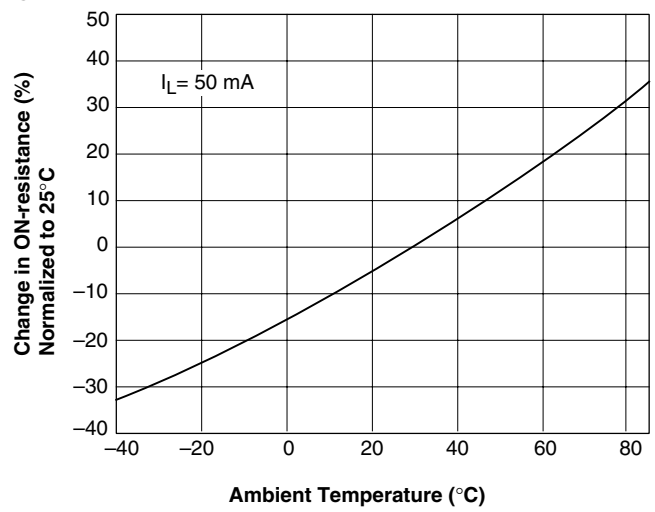
**Figure 4. LED Dropout Voltage vs. Temperature**



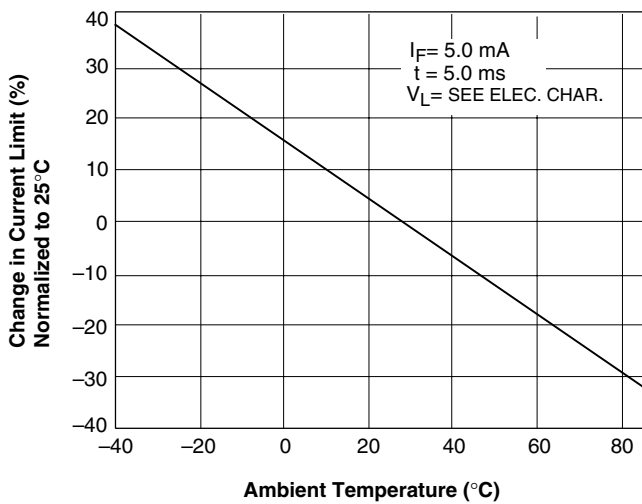
**Figure 2. LED Current for Switch Turn-on vs. Temperature**



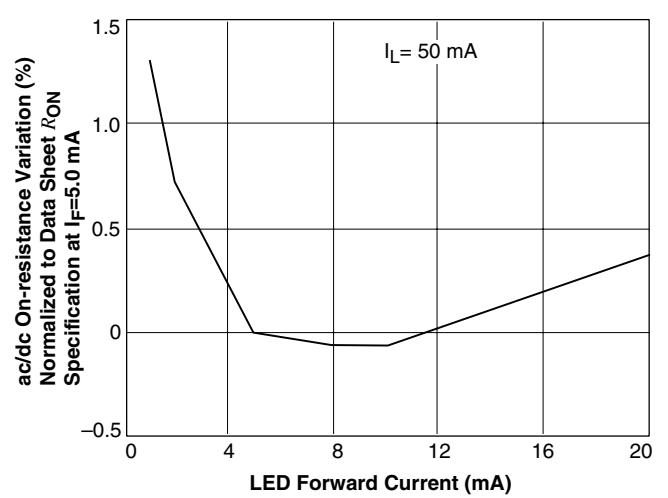
**Figure 5. On-resistance vs. Temperature**



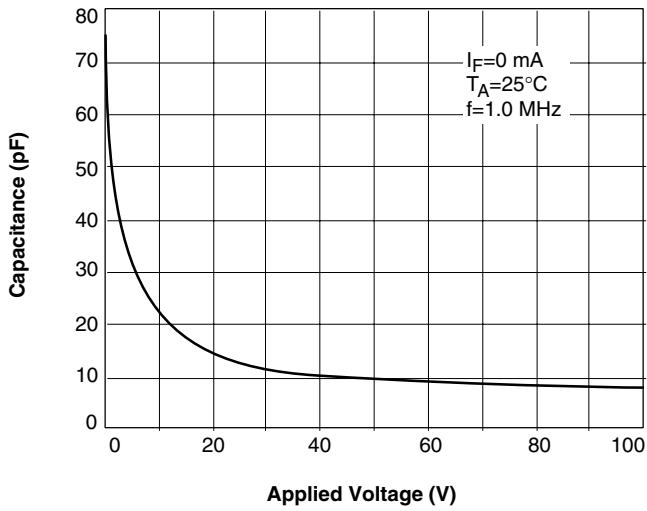
**Figure 3. Current Limit vs. Temperature**



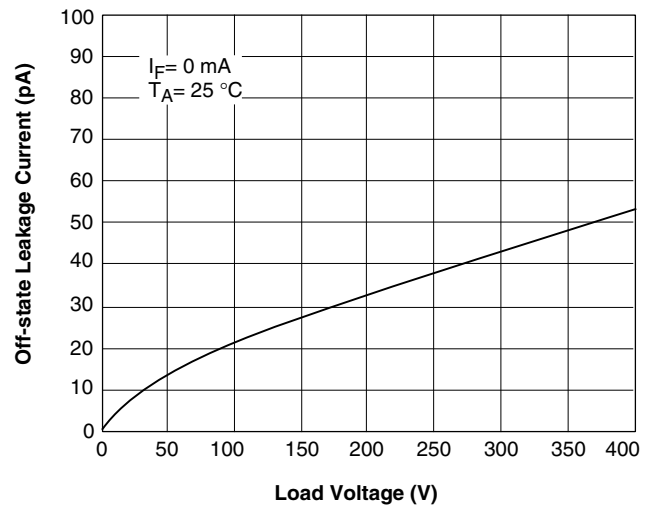
**Figure 6. Variation in On-resistance vs. LED Current**



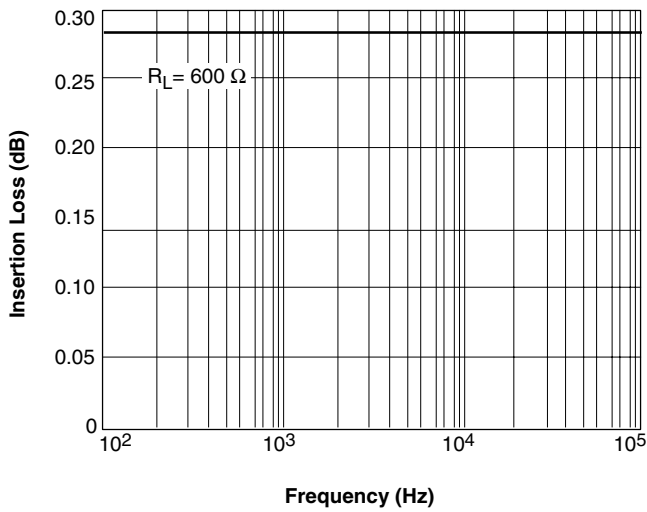
**Figure 7. Switch Capacitance vs. Applied Voltage**



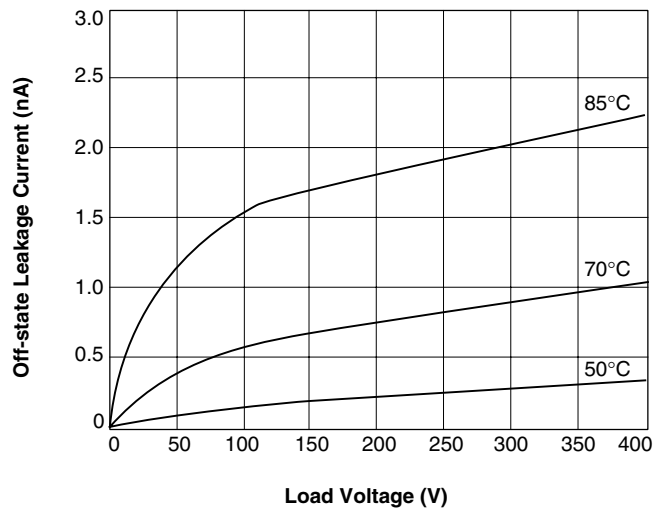
**Figure 10. Leakage Current vs. Applied Voltage**



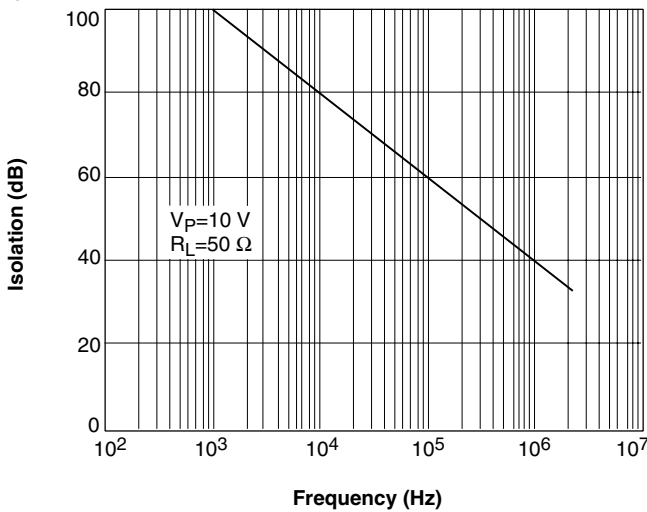
**Figure 8. Insertion Loss vs. Frequency**



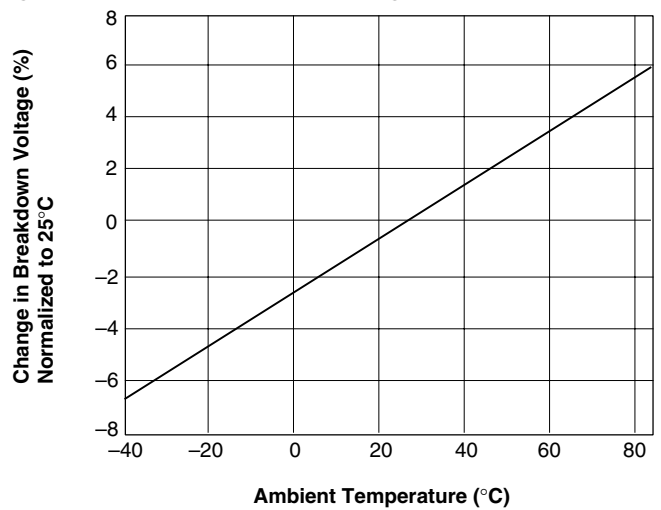
**Figure 11. Leakage Current vs. Applied Voltage at Elevated Temperatures**



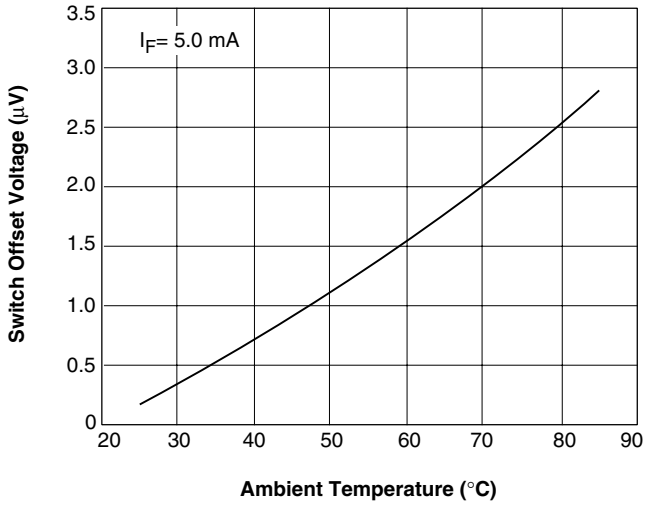
**Figure 9. Output Isolation**



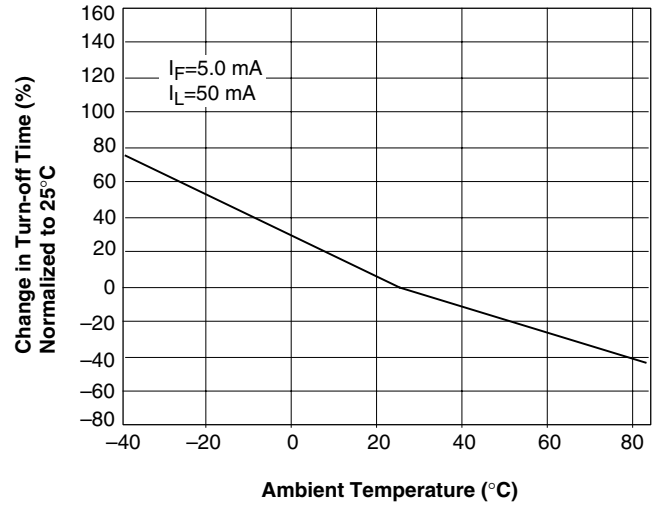
**Figure 12. Switch Breakdown Voltage vs. Temperature**



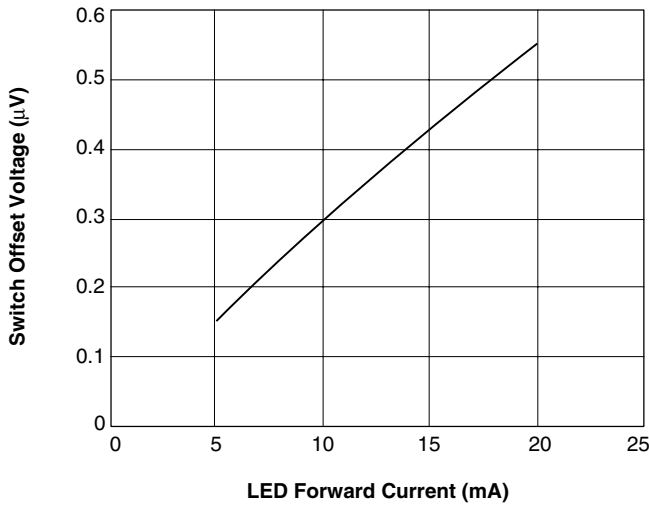
**Figure 13. Switch Offset Voltage vs. Temperature**



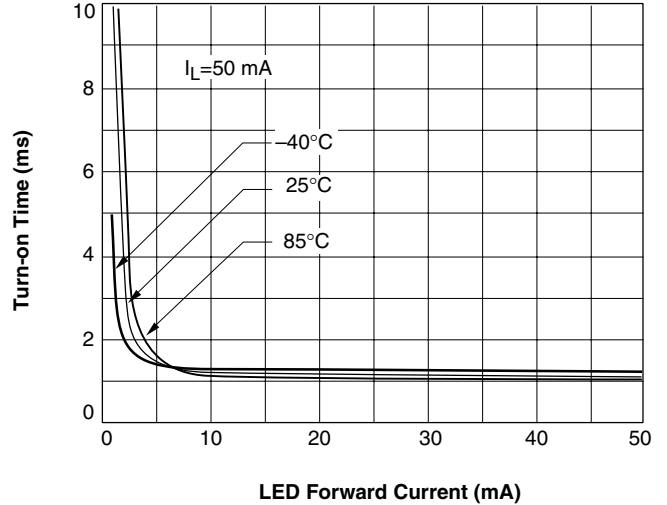
**Figure 16. Turn-off Time vs. Temperature**



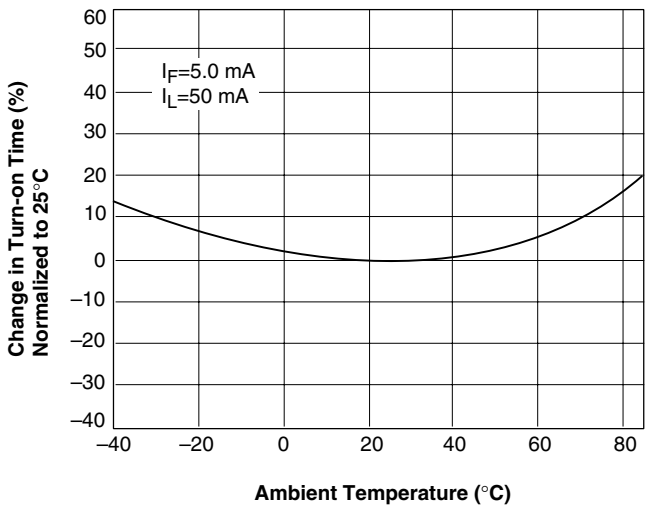
**Figure 14. Switch Offset Voltage vs. LED Current**



**Figure 17. Turn-on Time vs. LED Current**



**Figure 15. Turn-on Time vs. Temperature**



**Figure 18. Turn-off Time vs. LED Current**

