VISHAY

LH1505AB/AAC/AACTR

Dual 1 Form A
Solid State Relay

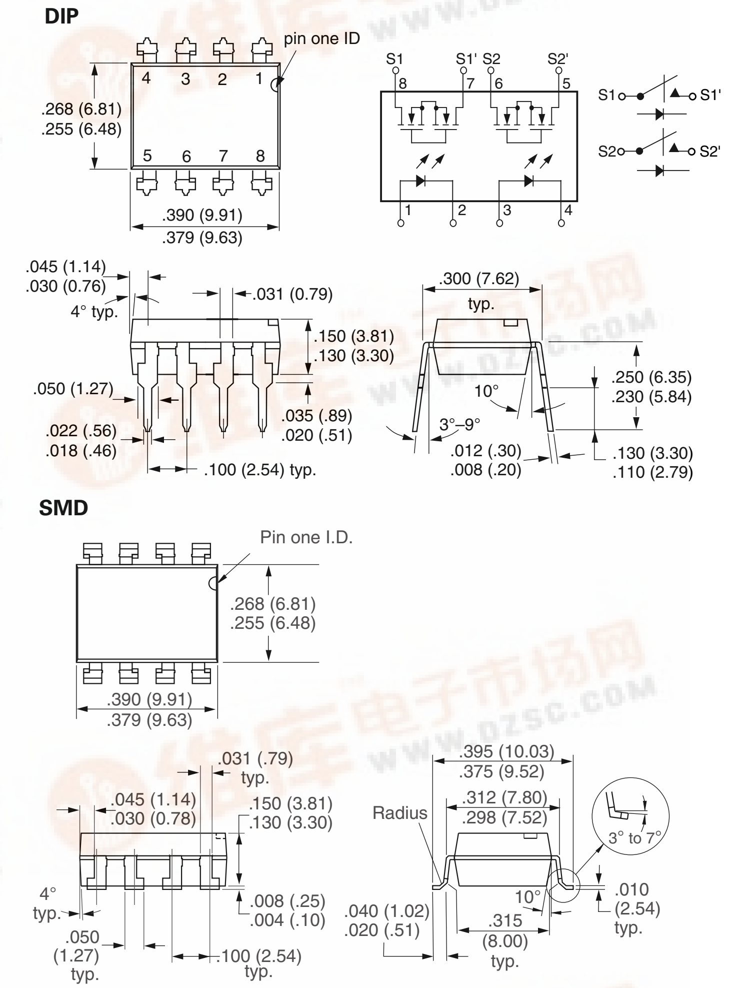
FEATURES
- **Two Independent Relays**
- **Current Limit Protection**
- **I/O Isolation, 5300 V_{RMS}**
- **Typical R_{ON} 15 Ω**
- **Load Voltage 350 V**
- **Load Current 120 mA**
- **High Surge Capability**
- **Linear, AC/DC Operation**
- **Clean Bounce Free Switching**
- **Low Power Consumption**
- **High Reliability Monolithic Receptor**
- **SMD Lead Available on Tape and Reel**

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 LH1505 contains two normally open switches that can be used as two independent SPST relays or as one DPST relay. The relay is constructed using a GaAlAs LED for actuation control and integrated monolithic dies for the switch outputs. The die, fabricated in a high-voltage dielectrically isolated technology, is comprised of a photodiode array, switch control circuity, and DMOS switches. In addition, the LH1505 relay employs current-limiting circuity, enabling it to pass FCC 68.302 and other regulatory voltage surge requirements when over-voltage protection is provided.

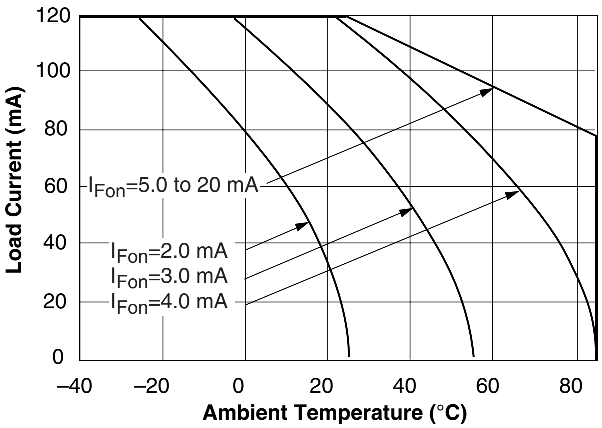
Package Dimensions in Inches (mm)



Part Identification

Part Number	Description
LH1505AB	8-pin DIP, Tubes
LH1505AAC	8-pin SMD, Gullwing, Tubes
LH1505AACTR	8-pin SMD, Gullwing, Tape and Reel

Recommended Operating Conditions



Absolute Maximum Ratings, T_A=25°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 (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, I_{ISO}=10 µA max) (V_{ISO}) .... 5300 V_{RMS}
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_R≤10 µA) (V_R) ....8.0 V
DC or Peak AC Load Voltage (I_L≤50 µA) (V_L) ....250 V
Continuous DC Load Current (I_L)
One Pole Operating...130 mA
Two Poles Operating ....120 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°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
Input						
LED Forward Current, Switch Turn-on	I_{Fon}	—	1.0	2.0	mA	I_L=100 mA, t=10 ms
LED Forward Current, Switch Turn-off	I_{Foff}	0.2	0.9	—	mA	V_L±200 V
LED Forward Voltage	V_F	1.15	1.26	1.45	V	I_F=10 mA
Output						
ON-resistance	R_{ON}	10	15	20	Ω	I_F=5.0 mA, I_L=50 mA
OFF-resistance	R_{OFF}	0.5	5000	—	GΩ	I_F=0 mA, V_L=±100 V
Current Limit	I_{LMT}	170	200	280	mA	I_F=5.0 mA, t=5.0 ms V_L±6.0 V
Off-state Leakage Current	—	—	0.02	200	nA	I_F=0 mA, V_L=±100 V
		—	—	1.0	µA	I_F=0 mA, V_L=±250 V
Output Capacitance	—	—	55	—	pF	I_F=0 mA, V_L=1.0 V
		—	10	—		I_F=0 mA, V_L=50 V
Pole-to-Pole Capacitance (S1 to S2)	—	—	0.5	—	pF	I_F=5.0 mA
Switch Offset	—	—	0.15	—	V	I_F=5.0 mA
Transfer						
Input/Output Capacitance	C_{ISO}	—	1.1	—	pF	V_{ISO}=1.0 V
Turn-on Time	t_{on}	—	1.4*	4.0*	ms	I_F=5.0 mA, I_L=50 mA
Turn-off Time	t_{off}	—	0.7*	4.0*	ms	I_F=5.0 mA, I_L=50 mA

* I_L=100 mA

Typical Performance Characteristics

Figure 1. LED Voltage vs. Temperature

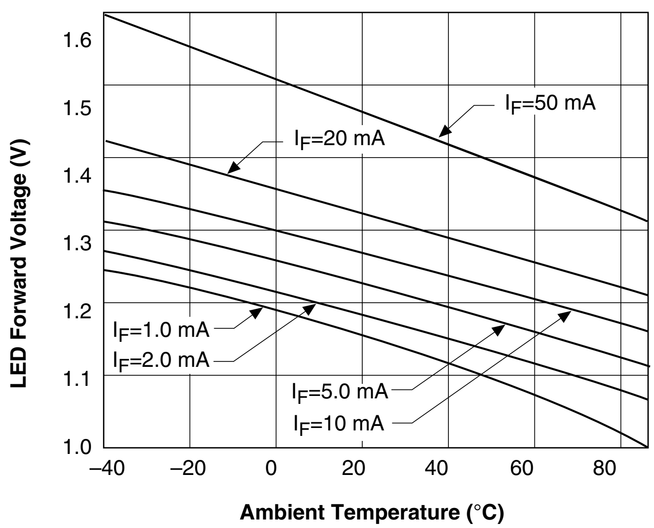


Figure 4. LED Dropout Voltage vs. Temperature

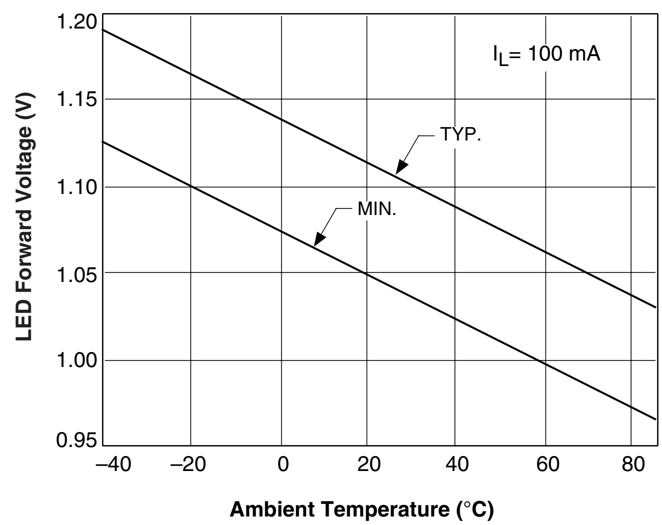


Figure 2. LED Current for Switch Turn-On vs. Temperature

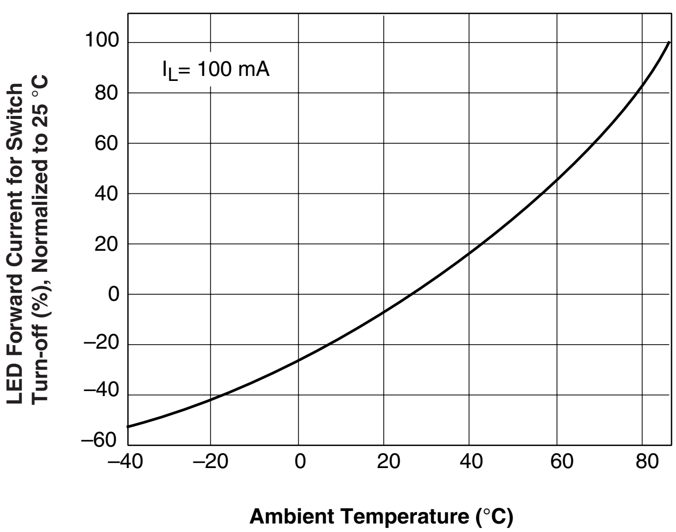


Figure 5. ON-Resistance vs. Temperature

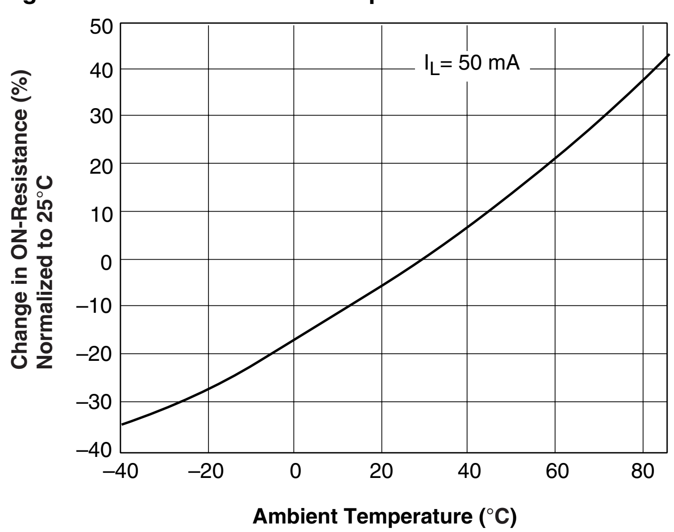


Figure 3. Current Limit vs. Temperature

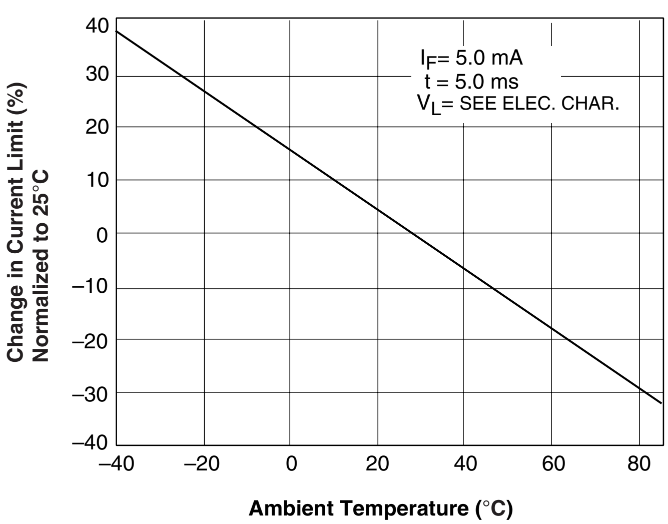


Figure 6. Variation in ON-Resistance vs. LED Current

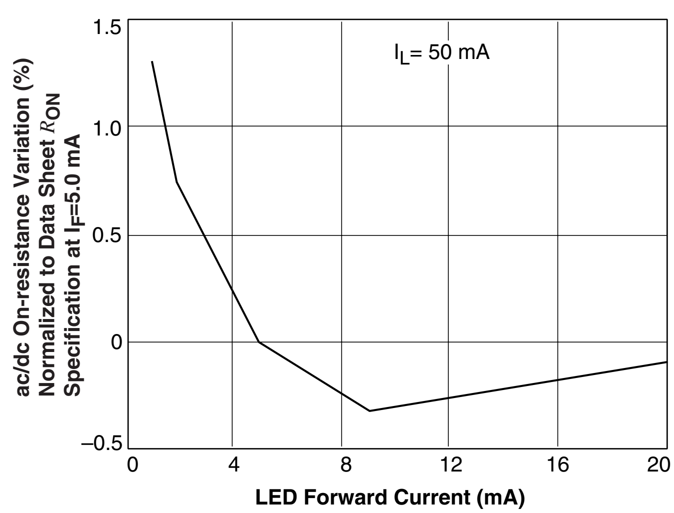


Figure 7. Switch Capacitance vs. Applied Voltage

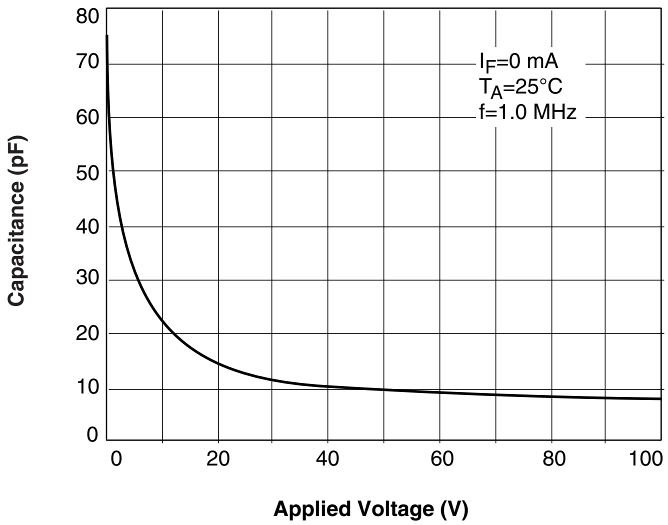


Figure 8. Insertion Loss vs. Frequency

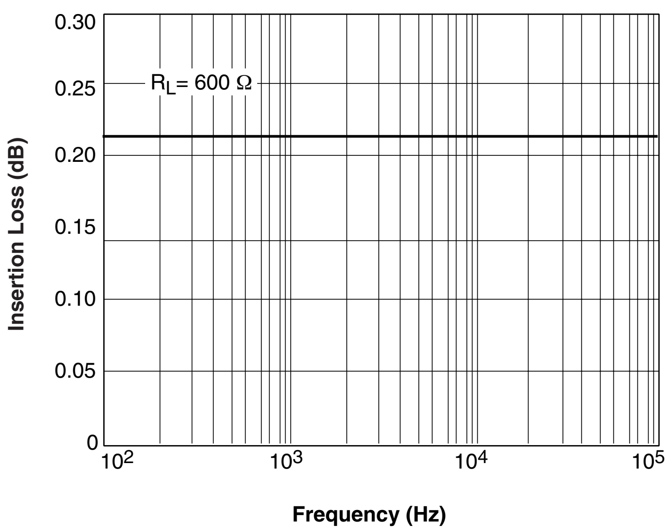


Figure 9. Output Isolation

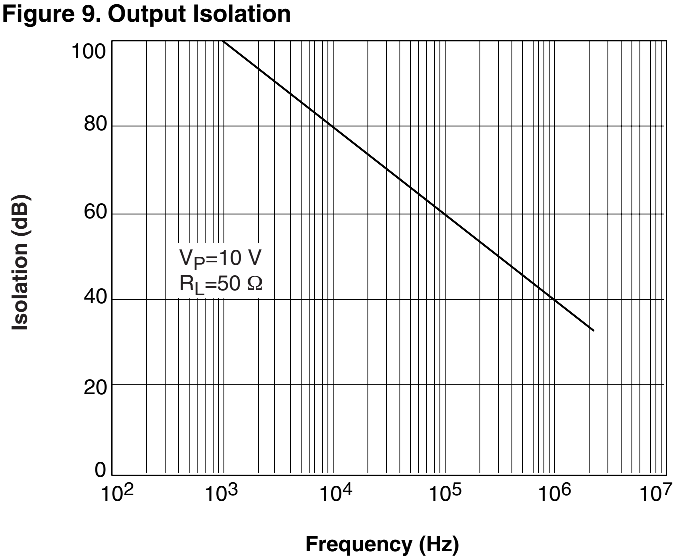


Figure 10. Leakage Current vs. Applied Voltage

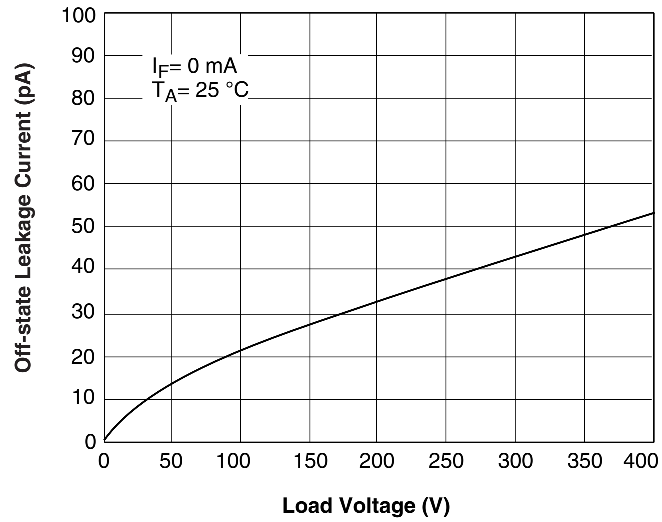


Figure 11. Leakage Current vs. Applied Voltage at Elevated Temperatures

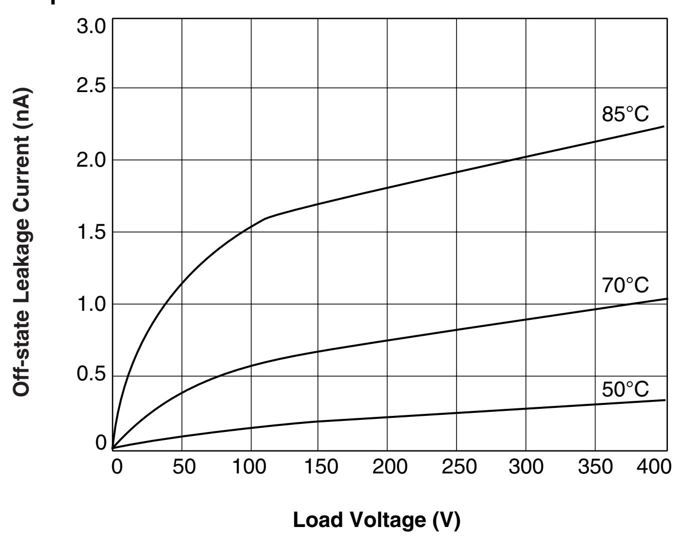


Figure 12. Switch Breakdown Voltage vs. Temperature

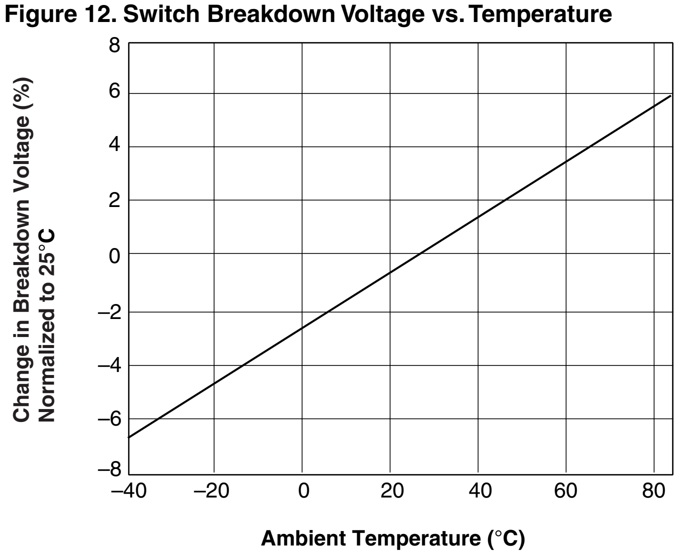


Figure 13. Switch Offset Voltage vs. Temperature

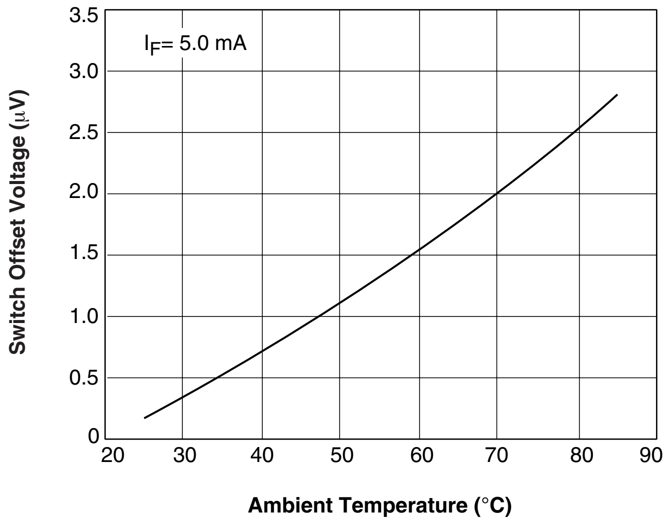


Figure 14. Switch Offset Voltage vs. LED Current

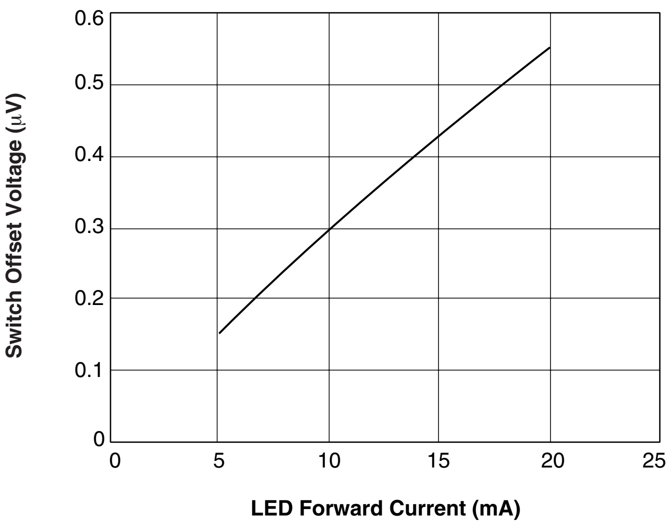


Figure 15. Turn-On Time vs. Temperature

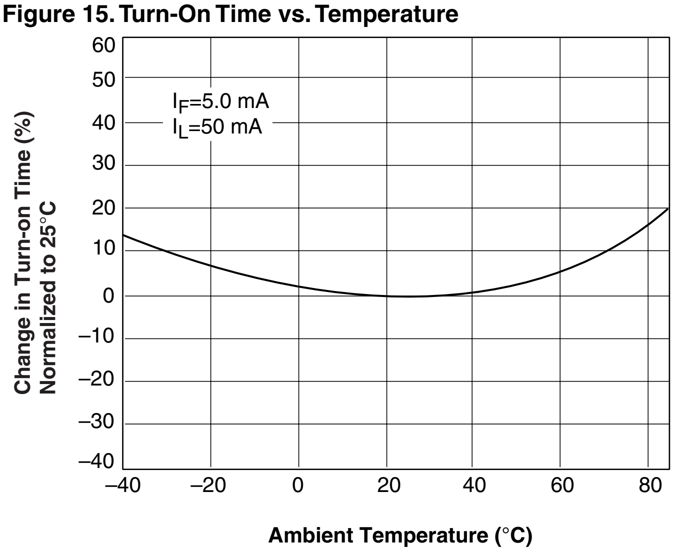


Figure 16. Turn-Off Time vs. Temperature

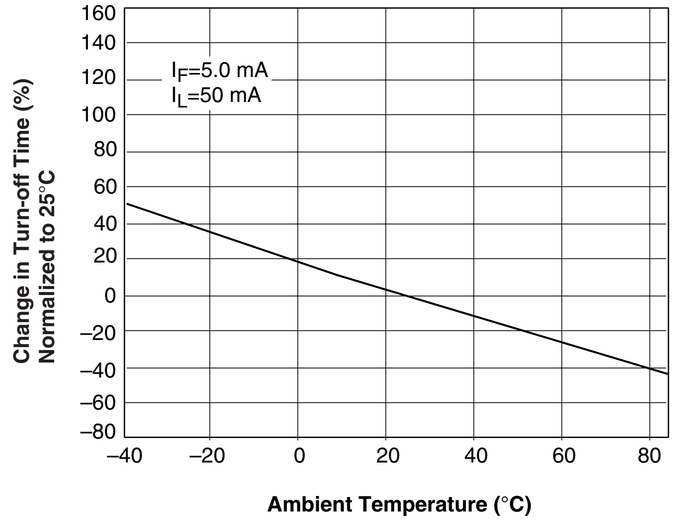


Figure 17. Turn-On Time vs. LED Current

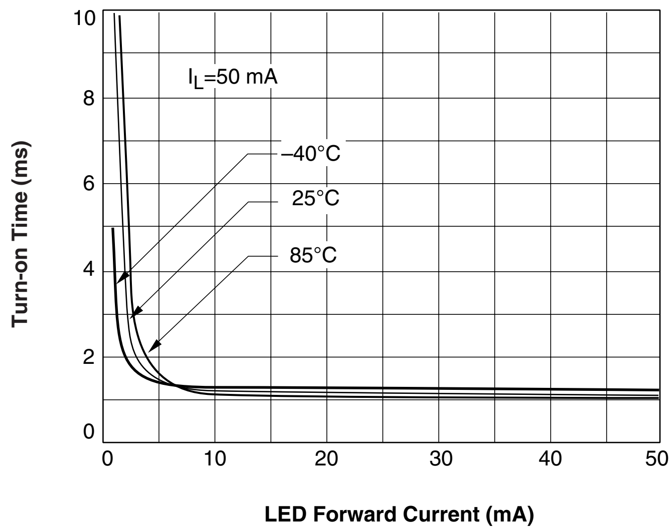


Figure 18. Turn-Off Time vs. LED Current