



FEATURES

- Solid State Relay and an Autopolarity Optocoupler in a Single Package
- I/O Isolation, 5300 V_{RMS}
- Surface Mountable
- Optocoupler
 - Bidirectional Current Detection
- Solid State Relay
 - 1 Form B (LH1501 Type)
 - Load Voltage 350 V
 - Typical R_{ON} 20 Ω
 - Linear, AC/DC Operation
 - Clean, Bounce-free Switching
 - Low Power Consumption

AGENCY APPROVALS

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

APPLICATIONS

- General Telecom Switching
 - On/off-hook Control
 - Dial Pulse
 - Ring-current Detection
 - Loop-current sensing

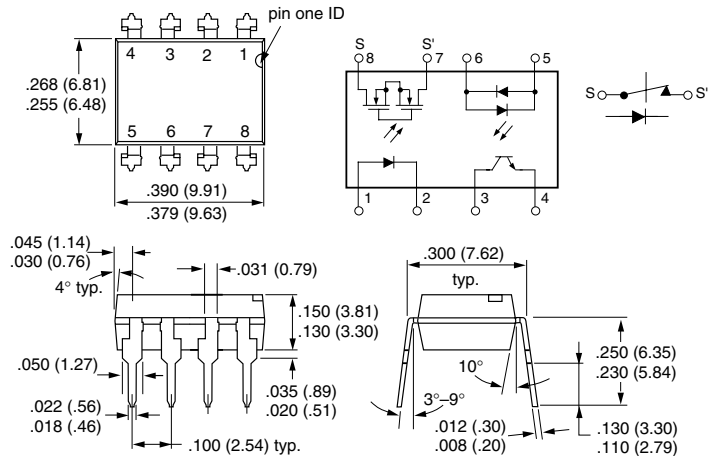
DESCRIPTION

The LH1528 Telecom switches consist of an optically coupled solid state relay (SSR) Form B, and a bidirectional input optocoupler. The SSR is ideal for performing switchhook and dial-pulse switching while the optocoupler performs ring detection and loop current sensing functions. Both the SSR and optocoupler provide 5300 V_{RMS} of input to output isolation.

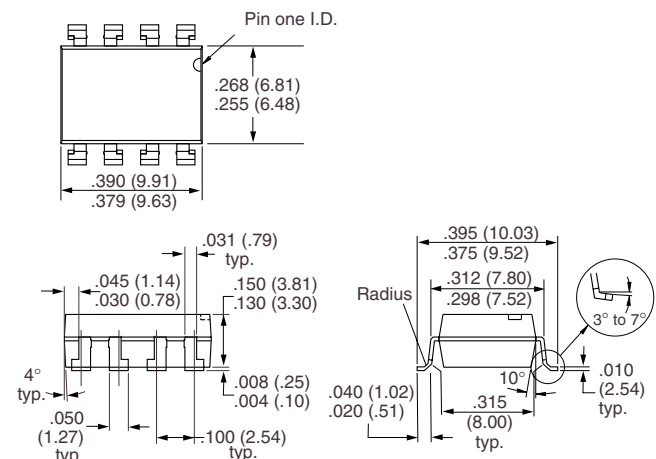
The SSR is integrated on a monolithic receptor die using high voltage technology. The optocoupler provides bidirectional current sensing via two antiparallel GaAs infrared emitting diodes.

Package Dimensions in Inches (mm)

DIP



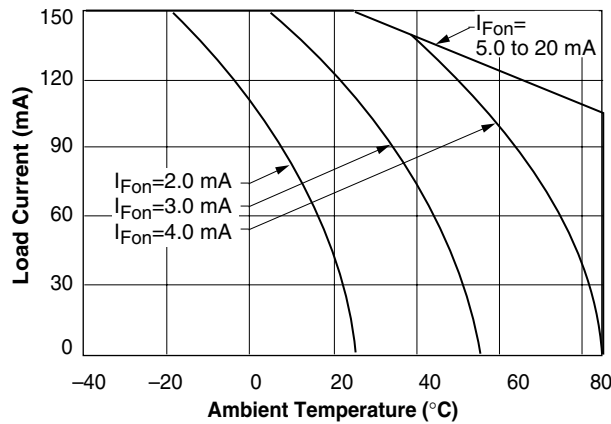
SMD



Part Identification

Part Number	Description
LH1528AB	8-pin DIP, Tubes
LH1528AAC	8-pin SMD, Gullwing, Tubes
LH1528AACTR	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 Operating Temperature Range (T_A) -40 to $+85^{\circ}\text{C}$
 Storage Temperature Range (T_{stg}) -40 to $+150^{\circ}\text{C}$
 Pin Soldering Temperature ($t=10$ s max) (T_S) 260°C
 Input/Output Isolation Test Voltage (V_{ISO}) $5300 V_{\text{RMS}}$

SSR Ratings

LED Continuous Forward Current (I_F) 50 mA
 LED Reverse Voltage ($I_R \leq 10 \mu\text{A}$) (V_R) 5.0 V
 dc or Peak ac Load Voltage ($I_L \leq 50 \mu\text{A}$) (V_L) 350 V
 Continuous dc Load Current (I_L)
 (Unidirectional Operation) 150 mA
 Output Power Dissipation (continuous) (P_{DISS}) 600 mW

Optocoupler Ratings

LED Continuous Forward Current (I_F) 50 mA
 Collector-emitter Breakdown Voltage (BV_{CEO}) 30 V
 Phototransistor Power Dissipation (P_{DISS}) 150 mW

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.

SSR Characteristics	Sym.	Min.	Typ.	Max.	Units	Test Conditions
Input						
LED Forward Current for Switch Turn-on	I_{Fon}	0.2	0.9	—	mA	$I_{\text{L}}=100$ mA, $t=10$ ms
LED Forward Current for Switch Turn-off	I_{Foff}	—	1.0	2.0	mA	$V_{\text{L}}=\pm 300$ mA
LED Forward Voltage	V_{F}	1.15	1.26	1.45	V	$I_{\text{F}}=10$ mA
Output						
ON-resistance ac/dc Pins 4 (±) to 6 (±)	R_{ON}	12	20	25	Ω	$I_{\text{F}}=0$ mA, $I_{\text{L}}=50$ mA
Current Limit ac/dc Pins 4 (±) to 6 (±)	I_{LMT}	—	—	—	mA	$I_{\text{F}}=5.0$ mA, $t=5.0$ ms
Off-state Leakage Current	—	—	70	1000	nA	$I_{\text{F}}=5.0$ mA, $V_{\text{L}}=100$ V
		—	0.08	1.0	μA	$I_{\text{F}}=5.0$ mA, $V_{\text{L}}=\pm 350$ V
Output Capacitance Pin 7 to 8	—	—	45	—	pF	$I_{\text{F}}=5.0$ mA, $V_{\text{L}}=1.0$ V
		—	10	—		$I_{\text{F}}=5.0$ mA, $V_{\text{L}}=50$ V
Transfer						
Input/Output Capacitance	C_{ISO}	—	1.3	—	pF	$V_{\text{ISO}}=1.0$ V
Turn-on Time	t_{on}	—	2.0	3.0	ms	$I_{\text{F}}=5.0$ mA, $I_{\text{L}}=50$ mA
Turn-off Time	t_{off}	—	1.0	3.0	ms	$I_{\text{F}}=5.0$ mA, $I_{\text{L}}=50$ mA
Optocoupler Characteristics	Sym.	Min.	Typ.	Max.	Units	Test Conditions
Input						
LED Forward Voltage	V_{F}	0.9	1.2	1.5	V	$I_{\text{F}}=10$ mA
Output						
Saturation Voltage	$V_{\text{CE(Sat)}}$	—	0.7	0.5	V	$I_{\text{F}}=16$ mA, $I_{\text{C}}=2.0$ mA
Leakage Current	I_{CEO}	—	—	500	nA	$I_{\text{F}}=0$ mA, $V_{\text{CE}}=5.0$ mA
Trickle Current Leakage	I_{CEO}	—	—	1.0	μA	$I_{\text{F}}=5.0$ μA, $V_{\text{CE}}=5.0$ mA
Transfer						
dc Current Transfer Ratio	CTR	33	165	—	%	$I_{\text{F}}=6.0$ mA, $V_{\text{CE}}=0.5$ V

Typical Performance Characteristics

Figure 1. LED Voltage vs. Temperature

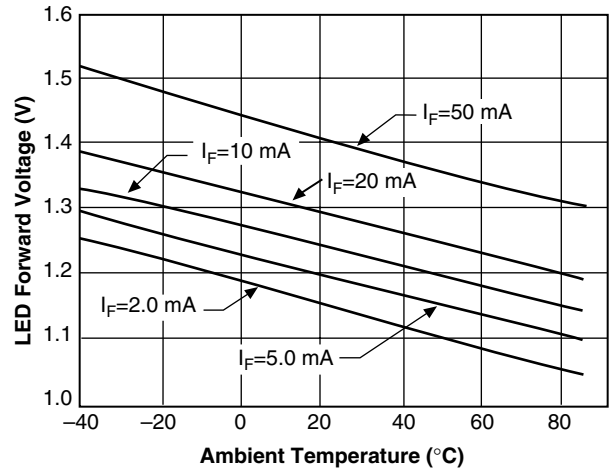


Figure 2. Current Limit vs. Temperature

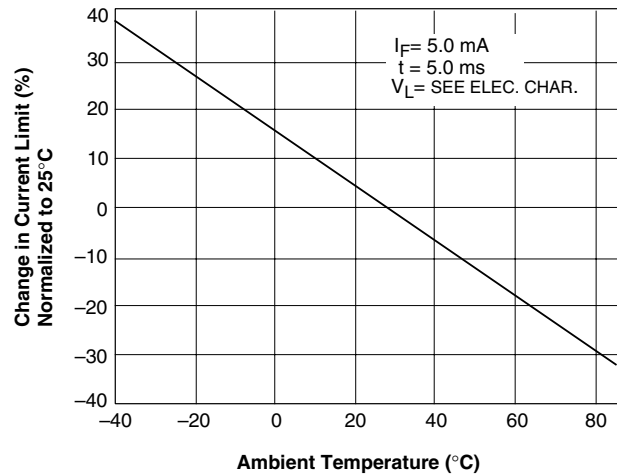


Figure 3. LED Current for Switch Turn-on vs. Temperature

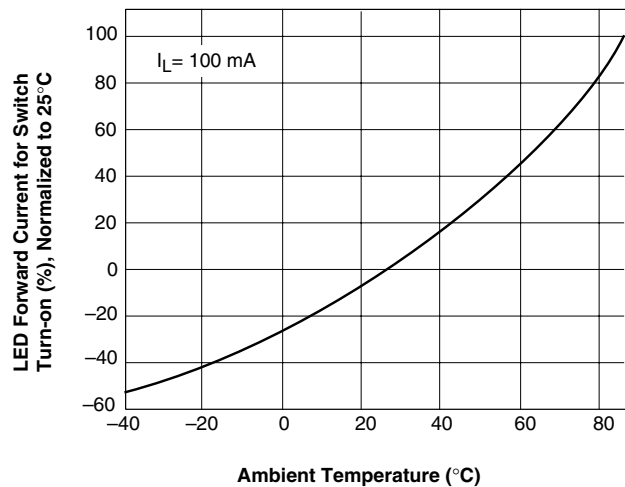


Figure 4. ON-resistance vs. Temperature

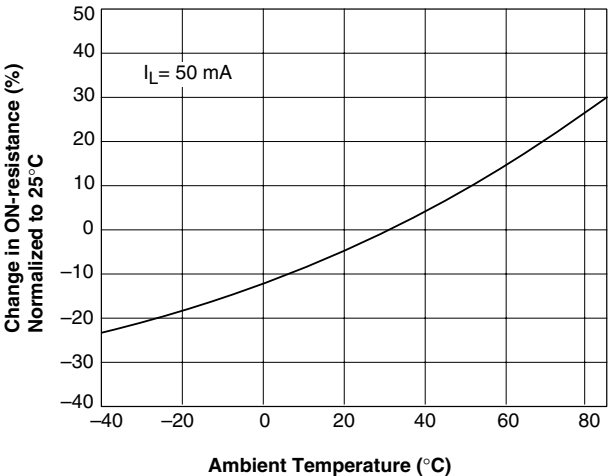


Figure 5. Switch Capacitance vs. Applied Voltage

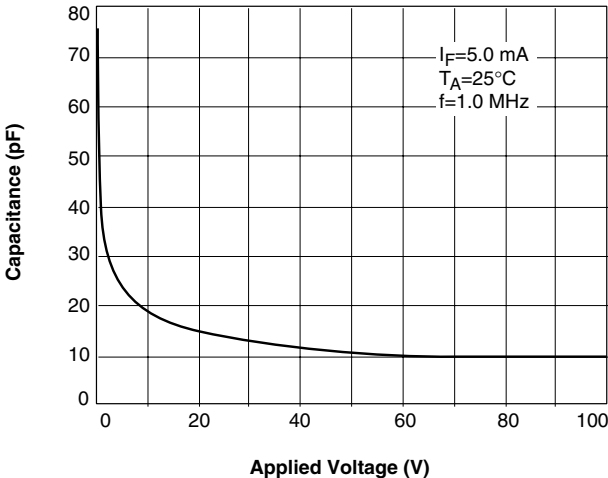


Figure 6. Insertion Loss vs. Frequency

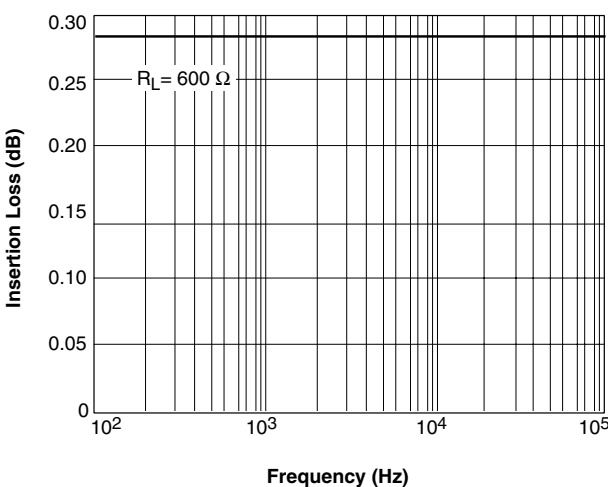


Figure 7. Output Isolation

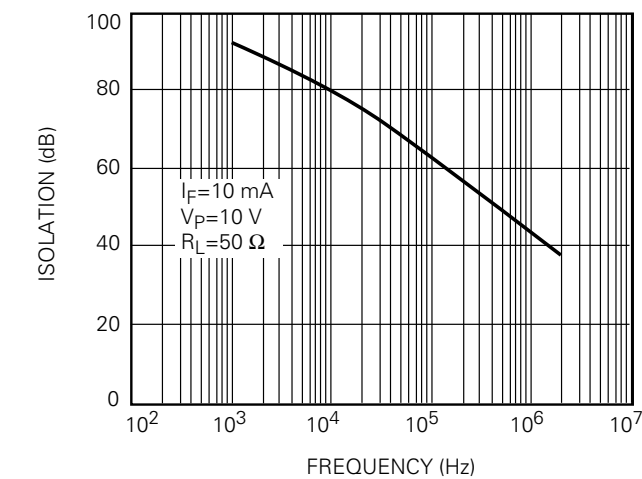


Figure 10. Leakage Current vs. Applied Voltage at 85°C

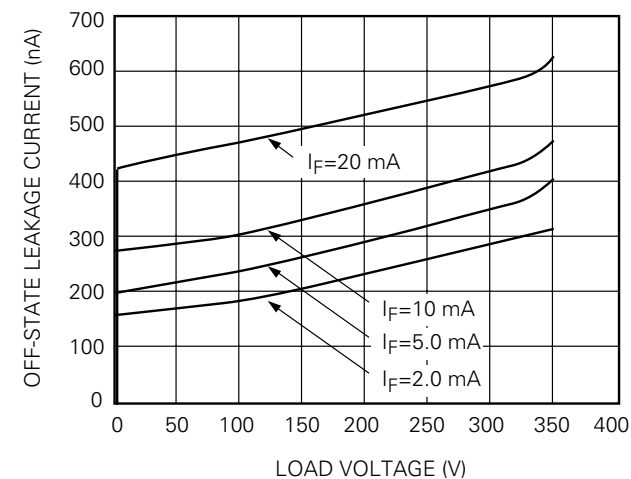


Figure 8. Leakage Current vs. Applied Voltage

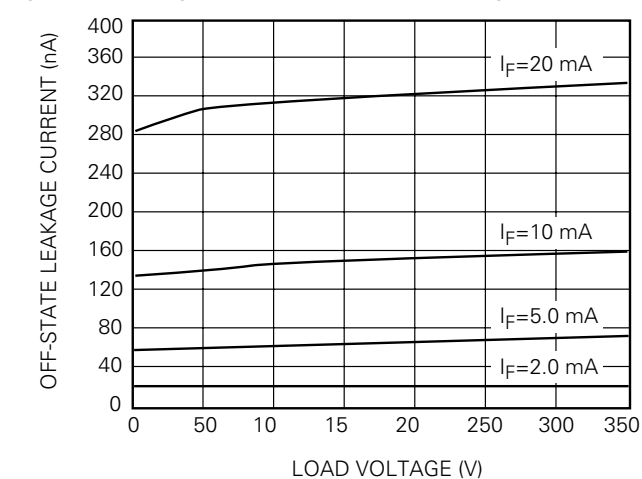


Figure 11. Leakage Current vs. Applied Voltage at 70°C

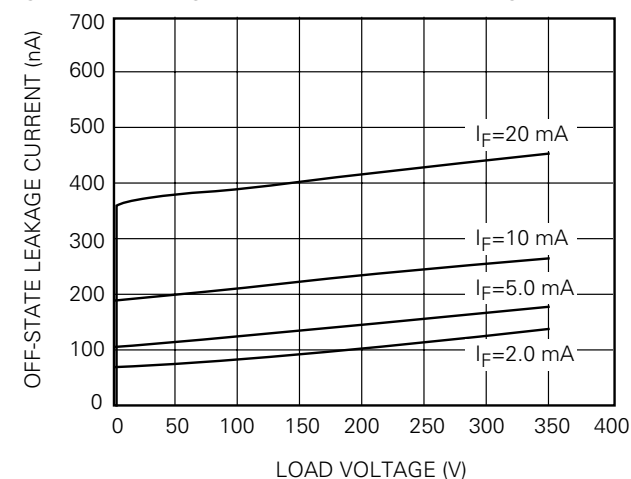


Figure 9. Leakage Current vs. Applied Voltage at 50°C

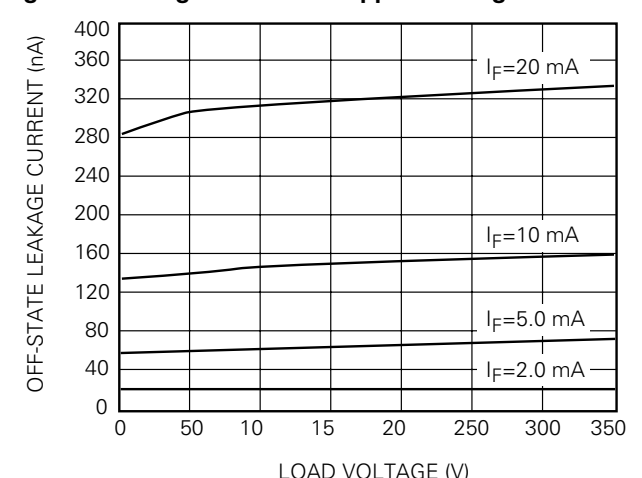


Figure 12. Switch Breakdown Voltage vs. Temperature

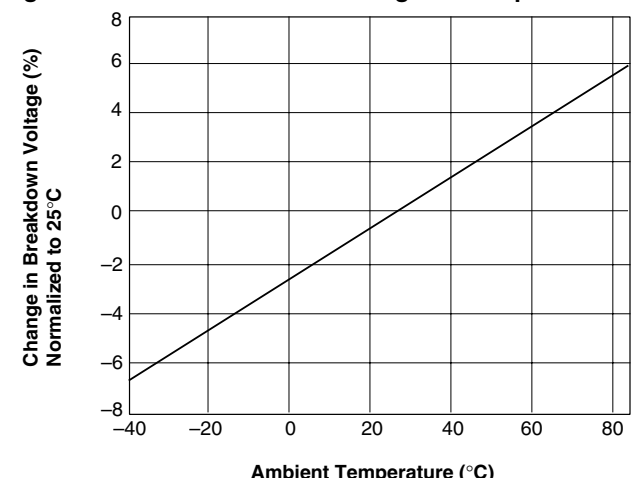


Figure 13. Turn-on/off Time vs. Temperature

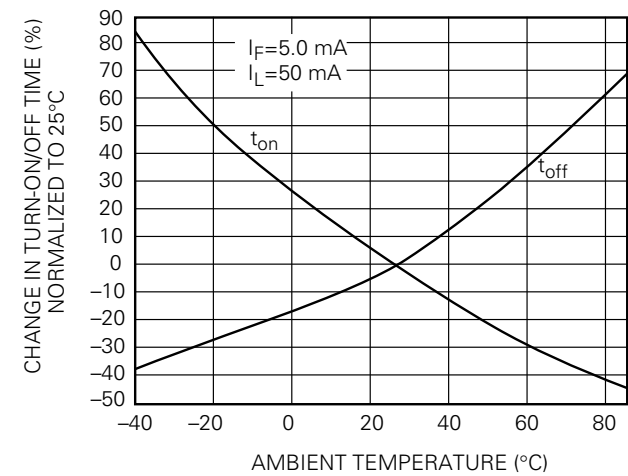


Figure 14. Turn-on Time vs. LED Current

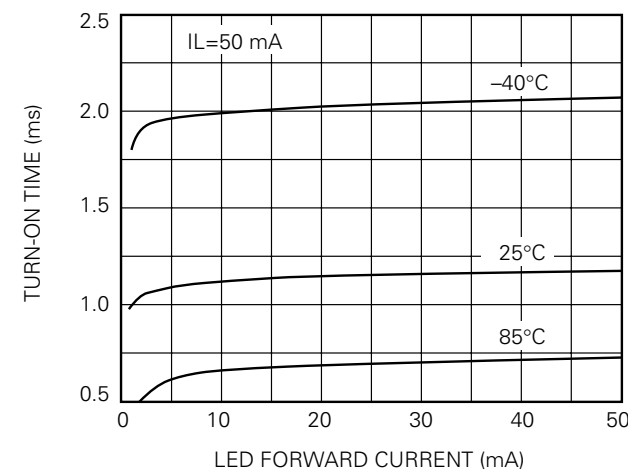
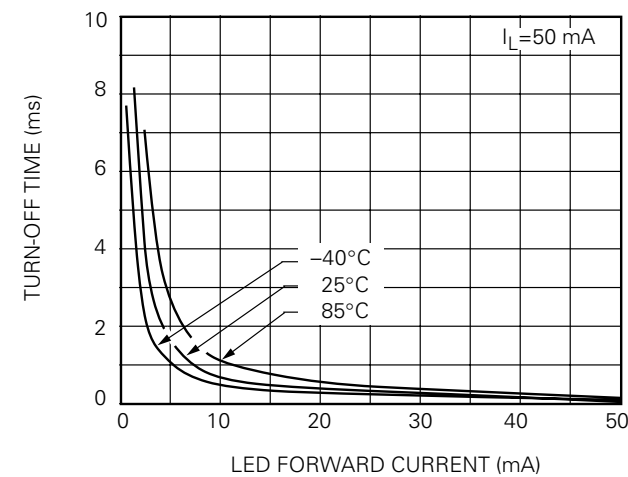


Figure 15. Turn-off Time vs. LED Current



Optocoupler Characteristics

Figure 16. LED Voltage vs. Temperature

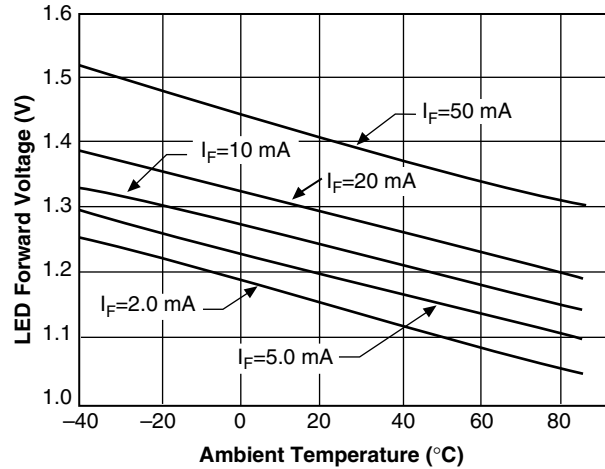


Figure 17. Dark Current Leakage vs. Temperature

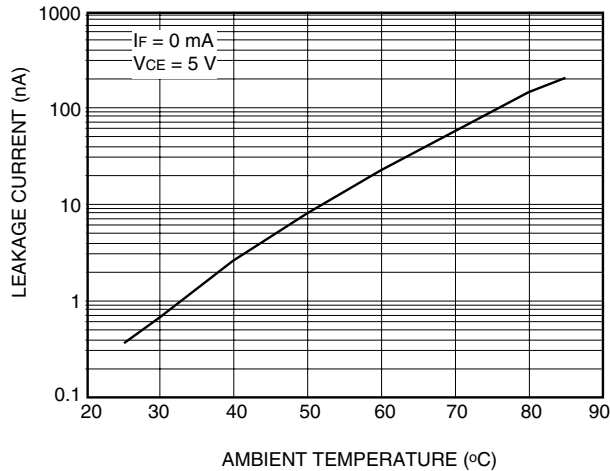


Figure 18. Symmetry

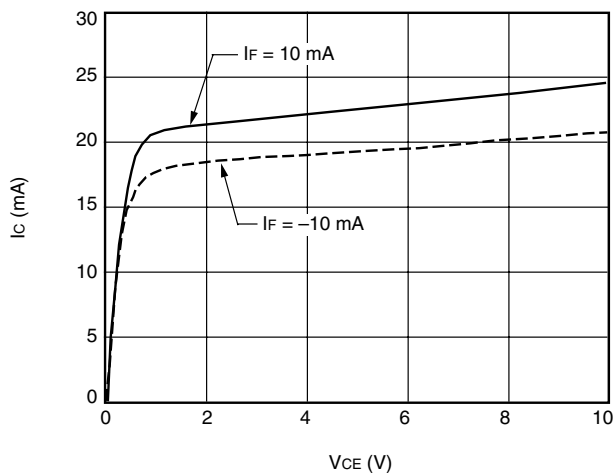


Figure 19. Transfer Characteristics

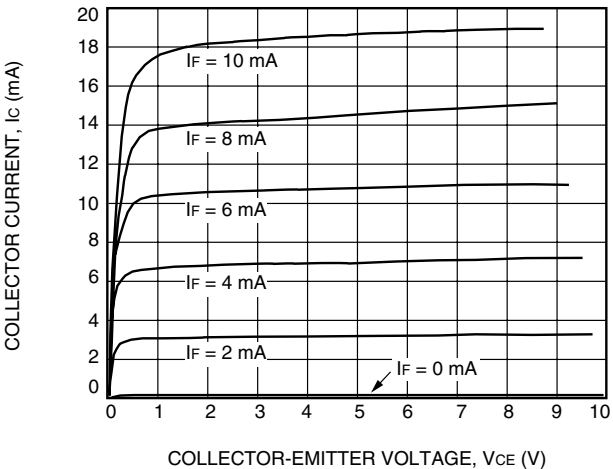


Figure 20. Trickle Leakage Current vs. Temperature

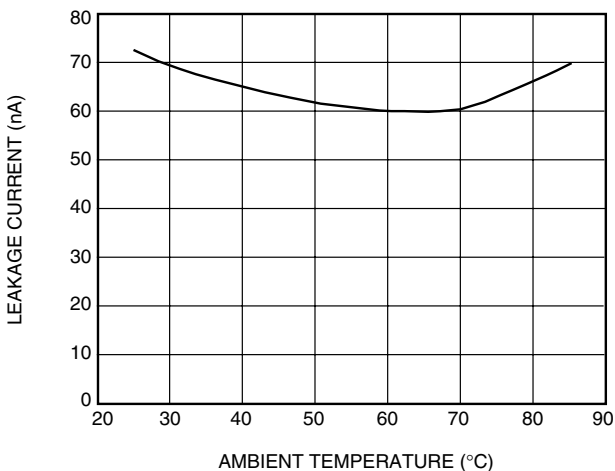


Figure 21. Current Transfer Ratio (CTR) vs. Temperature

