



LH1512BB/BAC/BACTR

Dual 1 Form A/B, C
Solid State Relay

FEATURES

- Current Limit Protection
- I/O Isolation, 3750 V_{RMS}
- Typical R_{ON} 10 Ω
- Load Voltage 200 V
- Load Current 200 mA
- High Surge Capability
- Linear, AC/DC Operation
- Clean Bounce Free Switching
- Low Power Consumption
- SMD Lead Available on Tape and Reel

AGENCY APPROVALS

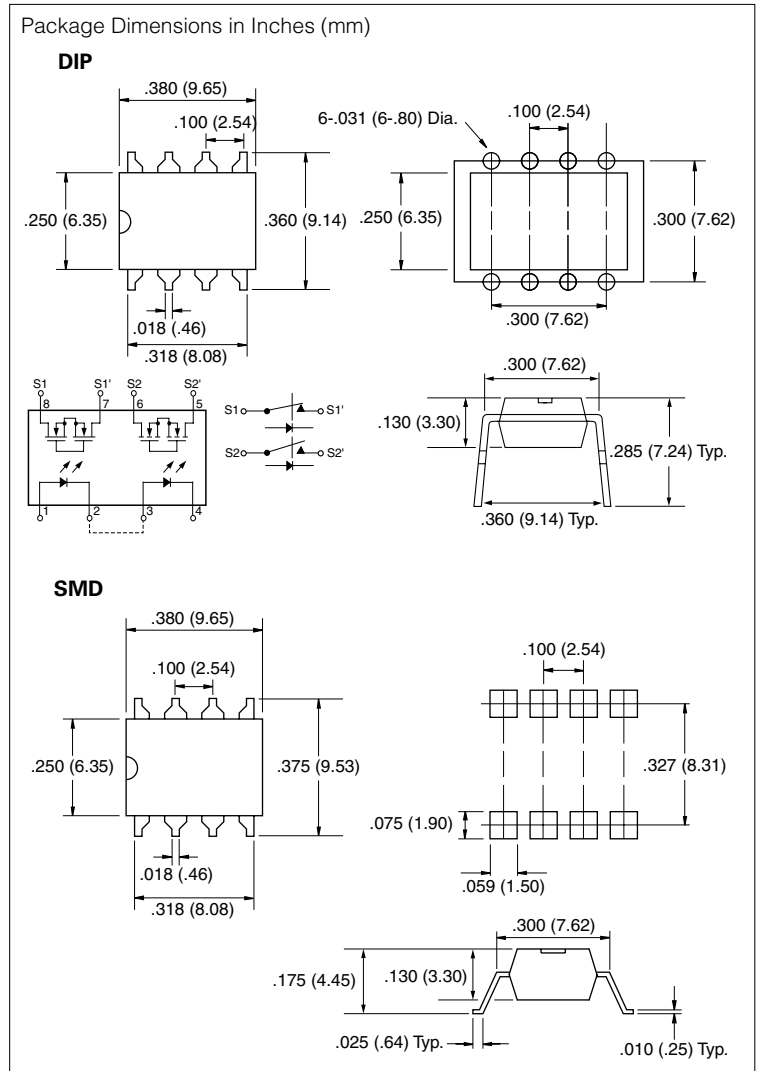
- UL—File No. E52744
- CSA—Certification 093751
- BSI

APPLICATIONS

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

DESCRIPTION

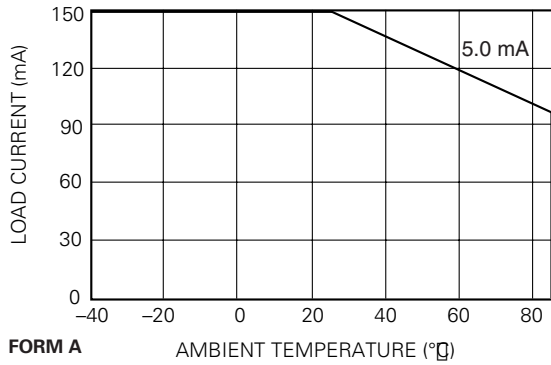
The LH1512 relays contain normally open and normally closed switches that can be used independently as a 1 Form A and 1 Form B relay, or when used together, as a 1 Form C relay. The relays are constructed as a multichip hybrid device. Actuation control is via an Infrared LED. The output switch is a combination of a photo-diode array with MOSFET switches and control circuitry.



Part Identification

Part Number	Description
LH1512BB	8-pin DIP, Tubes
LH1512BAC	8-pin SMD, Gullwing, Tubes
LH1512BACTR	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 the data sheet. Exposure to maximum rating conditions for extended periods can adversely affect device reliability.

Ambient Operating Temperature Range, T_A	-40 to +85°C
Storage Temperature Range, T_{stg}	-40 to +125°C
Pin Soldering Temperature, $t=10$ s max, T_S	260°C
Input/Output Isolation Test Voltage, $t=1.0$ s, $I_{ISO}=10$ μA max., V_{ISO}	3750 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, $I_R \leq 10$ μA , V_R	5.0 V
dc or Peak ac Load Voltage, $I_L \leq 50$ μA , V_L	200 V
Continuous dc Load Current, I_L (Form C Operation)	200 mA
Peak Load Current, I_P ($t=100$ ms) Form A	†
(single shot) Form B	400 mA
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, $T_A=25^\circ\text{C}$

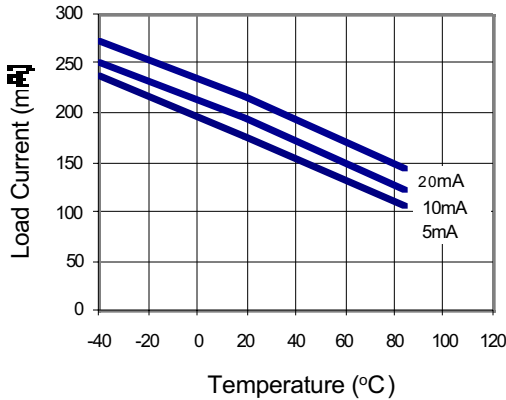
Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements.

Parameter	Sym.	Min.	Typ.	Max.	Units	Test Conditions
Input						
LED Forward Current for Switch Turn-on (NO)	I_{Fon}	—	0.6	2.0	mA	$I_L=100$ mA, $t=10$ ms
LED Forward Current for Switch Turn-off (NO)	I_{Foff}	0.2	0.5	—	mA	$V_L=\pm 150$ V
LED Forward Current for Switch Turn-on (NC)	I_{Fon}	0.2	0.9	—	mA	$I_L=100$ mA, $t=10$ ms
LED Forward Current for Switch Turn-off (NC)	I_{Foff}	—	1.0	2.0	mA	$V_L=\pm 150$ V
LED Forward Voltage	V_F	1.15	1.26	1.45	V	$I_F=10$ mA
Output						
ON-resistance: (NO, NC)	R_{ON}	—	10	15	Ω	$I_F=5.0$ mA (NO) 0 mA (NC) $I_L=50$ mA (NC)
OFF-resistance: (NO)	R_{OFF}	0.35	5000	—	G Ω	$I_F=0$ mA, $V_L=\pm 100$ V
(NC)		0.1	1.4	—		$I_F=5.0$ mA, $V_L=\pm 100$ V
Current Limit (NO)	I_{LMT}	270	360	460	mA	$I_F=5.0$ mA, $t=5.0$ ms $V_L=\pm 5.0$ V
Off-state Leakage Current: (NO)	—	—	0.02	1000	nA	$I_F=0$ mA, $V_L=\pm 100$ V
(NC)		—	0.07	1.0	μA	$I_F=5.0$ mA, $V_L=\pm 100$ V
(NO, NC)		—	—	1.0		$I_F=0$ mA (NO) $I_F=5.0$ mA, $V_L=\pm 200$ V
Output Capacitance: (NO)		—	60	—		$I_F=0$ mA, $V_L=50$ V
(NC)		—	60	—		$I_F=5.0$ mA, $V_L=50$ V
Transfer						
Input/Output Capacitance	C_{ISO}	—	3.0	—	pF	$V_{ISO}=1.0$ V

Parameter	Sym.	Min.	Typ.	Max.	Units	Test Conditions
Turn-on Time (NO)	t_{on}	—	1.4	3.0	ms	$I_F=10\text{ mA}, I_L=50\text{ mA}$
(NC)		—	1.2	3.0		$I_F=10\text{ mA}, I_L=50\text{ mA}$
Turn-off Time (NO)	t_{off}	—	0.7	3.0	ms	$I_F=10\text{ mA}, I_L=50\text{ mA}$
(NC)		—	2.0	3.0		$I_F=10\text{ mA}, I_L=50\text{ mA}$

Typical Performance Characteristics

Figure 1. Form A_Typical Load Current vs. Temperature



across Pin 5&6 or 7&8)

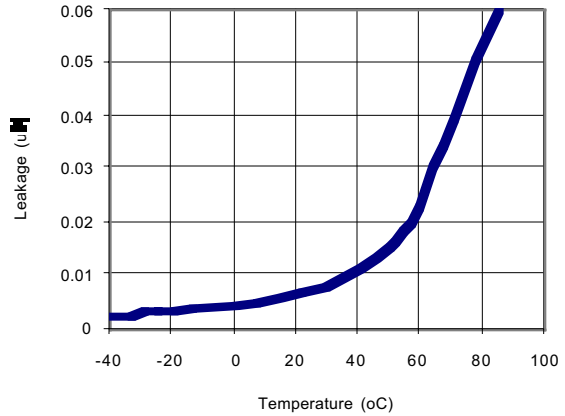


Figure 2. Form A_Typical Load Current vs. Load Voltage (Ambient Temp.= 25°C; $I_F=5\text{ mA}$)

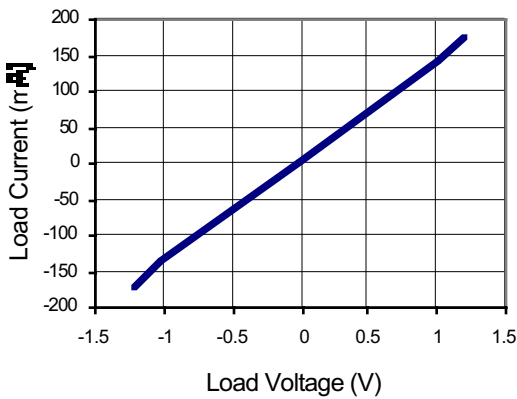


Figure 4. Form B_Typical Load Current vs. Temperature

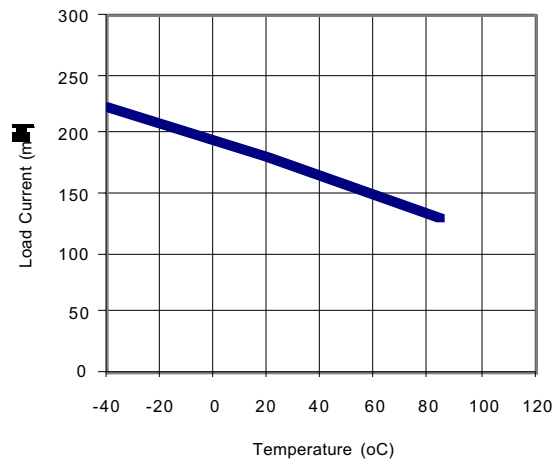


Figure 3. Typical Leakage vs. Temperature (Measured)

Figure 5. Form B_Typical Load Current vs. Load Voltage

(Ambient Temp.=25°C)

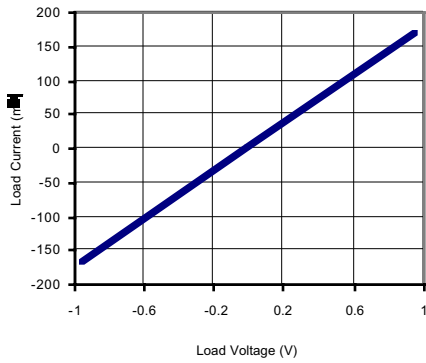


Figure 6. Typical LED Forward Voltage Drop vs. Temperature

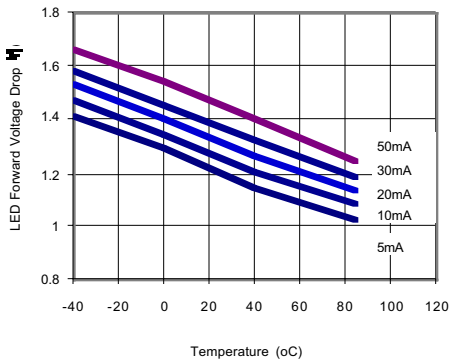


Figure 7. Form A_Typical Blocking Voltage vs. Temperature

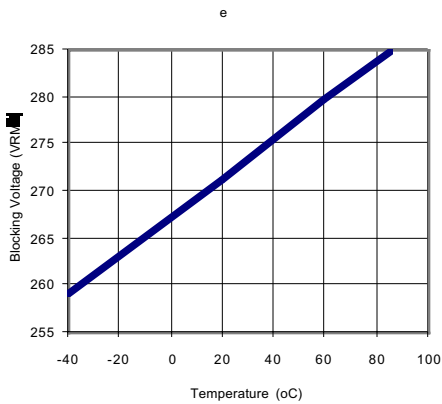
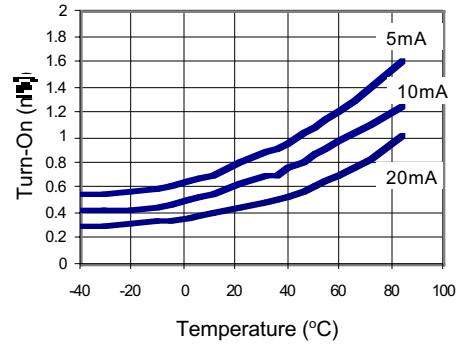


Figure 8. Form A_Typical Turn-On vs. Temperature (Load Current=170 mA)



Form A_Typical Turn-Off vs. Temperature (Load Current = 170 mA)

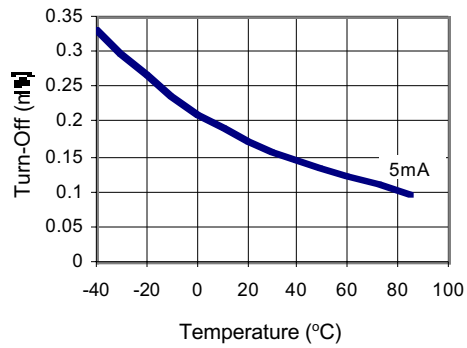


Figure 9. Form B_Typical Blocking Voltage vs. Temperature

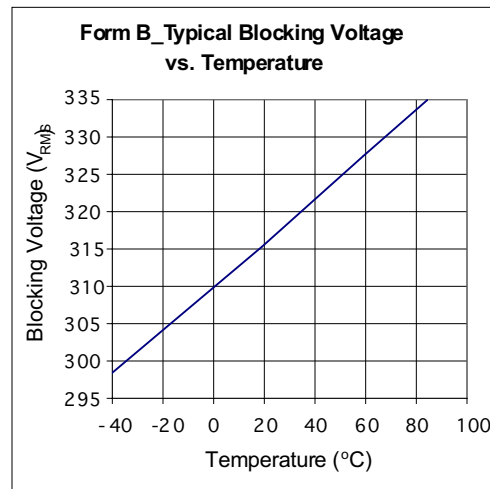
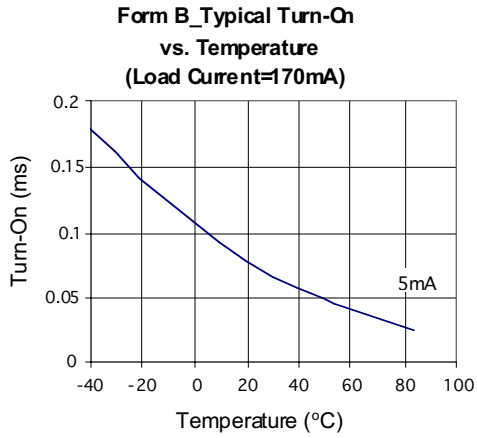


Figure 10. Form B_Typical Turn-On vs. Temperature (Load Current = 170 mA)

Current = 170 mA



Form A_Typical Turn-On vs. LED Forward Current (Load Current=170mA)

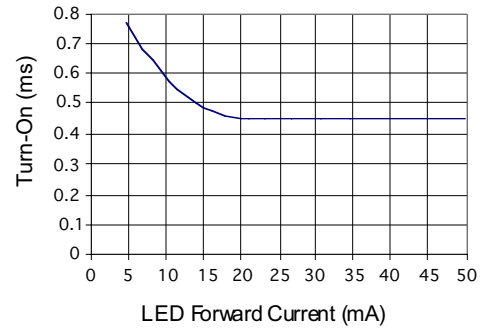
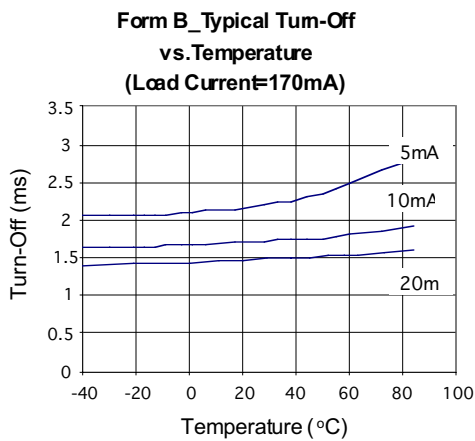
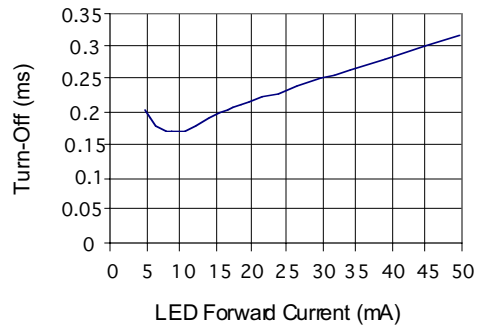


Figure 11. Form B_Typical Turn-Off vs. Temperature (Load Current = 170 mA)

Form A_Typical Turn-Off vs. LED Forward Current (Load Current = 170 mA)



Form A_Typical Turn-Off vs. LED Forward Current (Load Current=170mA)



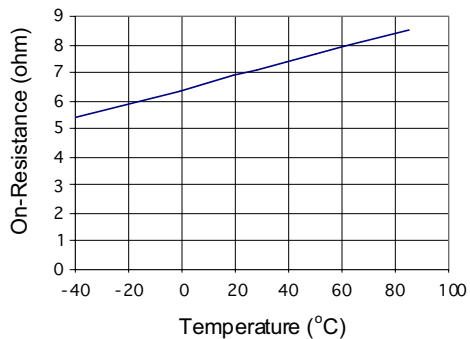
Form A_Typical Turn-On vs. LED Forward Current (Load Current = 170 mA)

Form A_Typical On-Resistance vs. Temperature (Load Current = 170 mA)

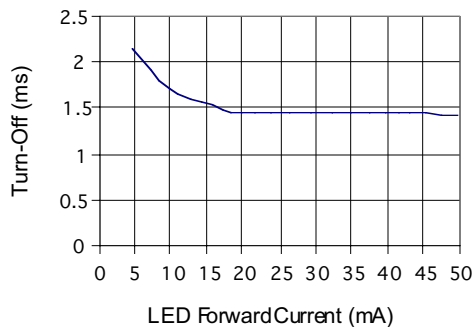
rent = 170 mA; I_F = 5 mA)

Current = 170 mA

Form A_Typical On-Resistance vs. Temperature (Load Current= 170mA; I_F=5mA)



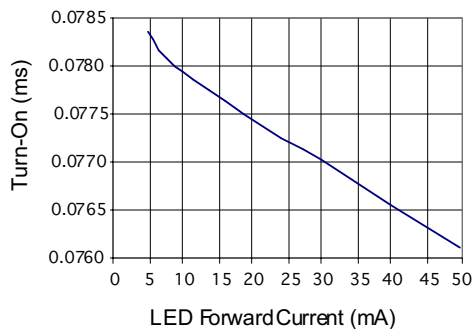
Form B_Typical Turn-Off vs. LED Forward Current (Load Current=170mA)



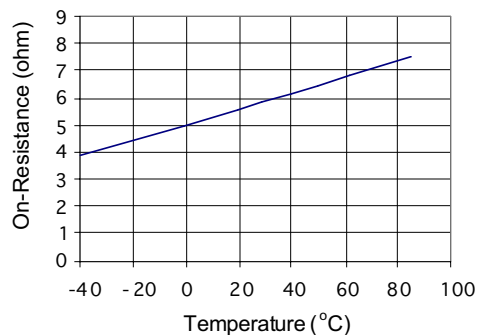
Form B_Typical Turn-On vs. LED Forward Current (Load Current = 170 mA)

Form B_Typical On-Resistance vs. Temperature (Load Current = 170mA; I_F= 0 mA)

Form B_Typical Turn-On vs. LED Forward Current (Load Current=170mA)



Form B_Typical On-Resistance vs. Temperature (Load Current= 170mA; I_F=0mA)

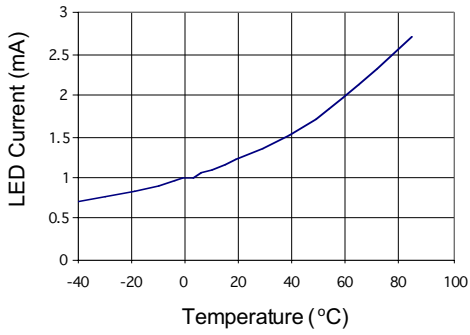


Form B_Typical Turn-Off vs. LED Forward Current (Load

Form A_Typical I_F for Switch Operation vs. Temperature

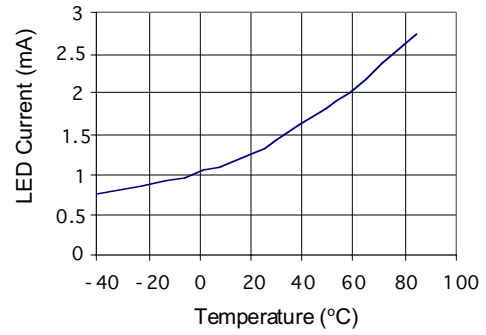
(Load Current = 170 mA)

Form A_Typical I_F for Switch Operation vs. Temperature (Load Current=170mA)



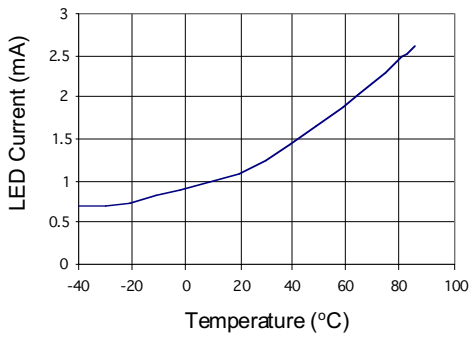
(Load Current = 170 mA)

Form B_Typical I_F for Switch Operation vs. Temperature (Load Current=170mA)



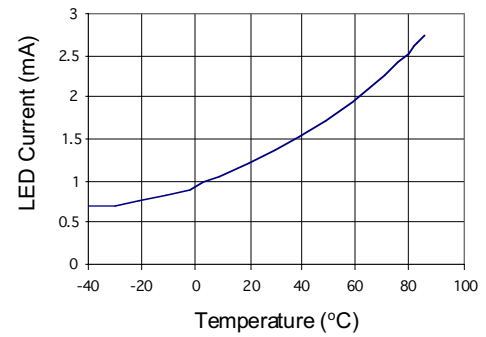
Form A_Typical I_F for Switch Dropout vs. Temperature (Load Current = 170 mA)

Form A_Typical I_F for Switch Dropout vs. Temperature (Load Current=170mA)



Form B_Typical I_F for Switch Dropout vs. Temperature (Load Current = 170 mA)

Form B_Typical I_F for Switch Dropout vs. Temperature (Load Current=170mA)



Form B_Typical I_F for Switch Operation vs. Temperature