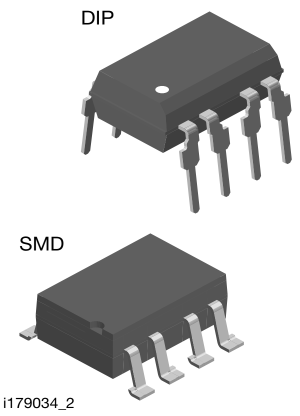
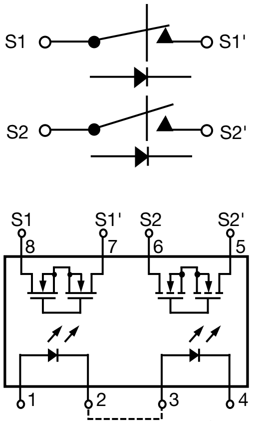
Dual 1 Form A/B, C Solid-State Relay





LINKS TO ADDITIONAL RESOURCES

Design Tools 3D Models SPICE Models

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 mult.-chip hybrid device. Actuation control is via an infrared LED. The output switch is a combination of a photodiode array with MOSFET switches and control circuity.

FEATURES

- Current limit protection
- Isolation test voltage 3750 V_{RMS}
- Typical R_{ON} 10 Ω
- Load voltage 200 V
- Load current 200 mA
- High surge capability
- Clean bounce free switching
- Low power consumption
- SMD lead available on tape and reel
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free
e3
RoHS
COMPLIANT

APPLICATIONS

- General telecom switching
  - On / off hook control
  - Ring delay
  - Dial pulse
  - Ground start
  - Ground fault protection
- Instrumentation
- Industrial controls

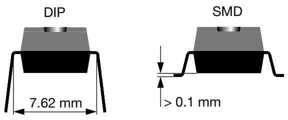
AGENCY APPROVALS

- UL
- VDE
- CQC
- FIMKO

ORDERING INFORMATION

L	H	1	5	1	2	B	#	#	T	R

PART NUMBER — ELECTR. VARIATION — PACKAGE CONFIG. — TAPE AND REEL



PACKAGE	UL, CSA, FIMKO
SMD-8, tubes	LH1512BAC
SMD-8, tape and reel	LH1512BACTR
DIP-8, tubes	LH1512BB

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
LED continuous forward current		I_F	50	mA
LED reverse voltage	$I_R \leq 10\ \mu A$	V_R	5	V
OUTPUT				
DC or peak AC load voltage	$I_L \leq 50\ \mu A$	V_L	200	V
Continuous DC load current (form C operation)		I_L	200	mA
Peak load current, form A	t = 100 ms	I_P	(2)	
Peak load current (single shot), form B		I_P	400	mA
SSR				
Ambient operating temperature range		T_{amb}	-40 to +85	°C
Storage temperature range		T_{stg}	-40 to +125	°C
Pin soldering temperature (3)	t = 10 s max.	T_{sld}	260	°C
Input to output isolation test voltage	t = 1 s, I_{ISO} = 10 μA max.	V_{ISO}	3750	V_{RMS}
Pole-to-pole isolation voltage (S1 to S2) (1) (dry air, dust free, at sea level)			1600	V
Output power dissipation (continuous)		P_{diss}	600	mW

Notes

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. 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 the time can adversely affect reliability

(1) Breakdown occurs between the output pins external to the package

(2) Refer to current limit performance application note for a discussion on relay operation during transient currents

(3) Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP)

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
LED forward current switch turn-on (NO)	I_L = 100 mA, t = 10 ms	I_{Fon}	-	0.6	2	mA
LED forward current switch turn-off (NO)	$V_L = \pm 150$ V	I_{Foff}	0.2	0.5	-	mA
LED forward current switch turn-on (NC)	I_L = 100 mA, t = 10 ms	I_{Fon}	0.2	0.9	-	mA
LED forward current switch turn-off (NC)	$V_L = \pm 150$ V	I_{Foff}	-	1	2	mA
LED forward voltage	I_F = 10 mA	V_F	1.15	1.26	1.45	V
OUTPUT						
On-resistance: (NO, NC)	I_F = 5 mA (NO), I_F = 0 (NC), I_L = 50 mA (NC)	R_{ON}	-	10	15	Ω
Off-resistance: (NO)	I_F = 0 mA, $V_L = \pm 100$ V	R_{OFF}	0.35	5000	-	GΩ
Off-resistance: (NC)	I_F = 5 mA, $V_L = \pm 100$ V	R_{OFF}	0.1	1.4	-	GΩ
Current limit: (NO)	I_F = 5 mA, t = 5 ms, $V_L = \pm 5$ V	I_{LMT}	270	360	460	mA
Off-state leakage current: (NO)	I_F = 0 mA, $V_L = \pm 100$ V	I_O	-	0.02	1000	nA
Off-state leakage current: (NC)	I_F = 5 mA, $V_L = \pm 100$ V	I_O	-	0.07	1	μA
Off-state leakage current: (NO, NC)	I_F = 0 mA (NO), I_F = 5 mA, $V_L = \pm 200$ V	I_O	-		1	μA
Output capacitance: (NO)	I_F = 0 mA, V_L = 50 V	C_O	-	60	-	pF
Output capacitance: (NC)	I_F = 5 mA, V_L = 50 V	C_O	-	60	-	pF
TRANSFER						
Capacitance (input to output)	V_{ISO} = 1 V	C_{IO}	-	3	-	pF

Note

- 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

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Turn-on time (NO)	I_F = 10 mA, I_L = 50 mA	t_{on}	-	1.4	3	ms
Turn-on time (NC)	I_F = 10 mA, I_L = 50 mA	t_{on}	-	1.2	3	ms
Turn-off time (NO)	I_F = 10 mA, I_L = 50 mA	t_{off}	-	0.7	3	ms
Turn-off time (NC)	I_F = 10 mA, I_L = 50 mA	t_{off}	-	2	3	ms

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

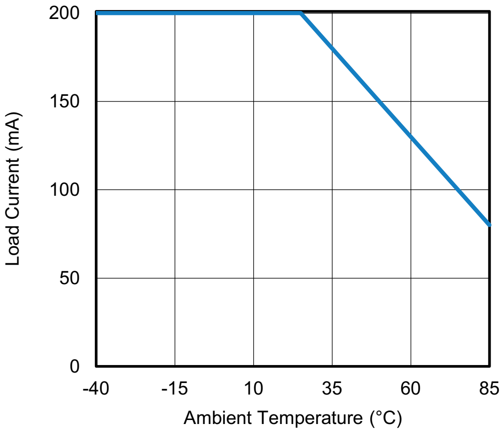


Fig. 1 - Maximum Load Current vs. Ambient Temperature

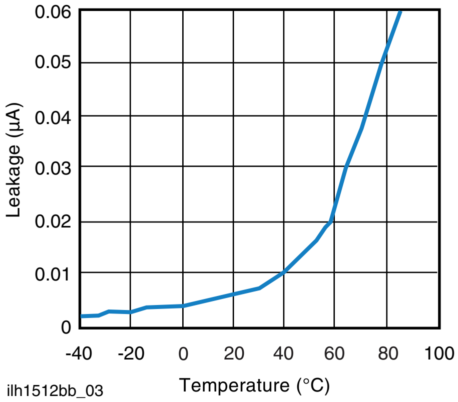


Fig. 4 - Typical Leakage vs. Temperature
(Measured across Pin 5 and 6 or 7 and 8)

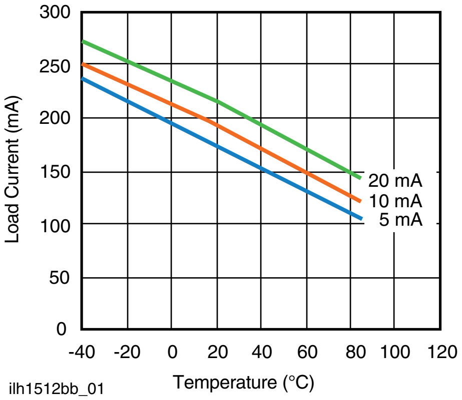


Fig. 2 - Form A Typical Load Current vs. Temperature

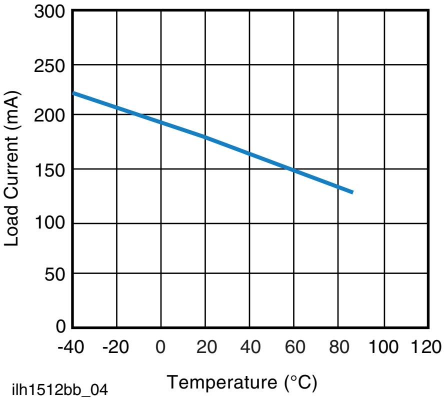


Fig. 5 - Form B Typical Load Current vs. Temperature

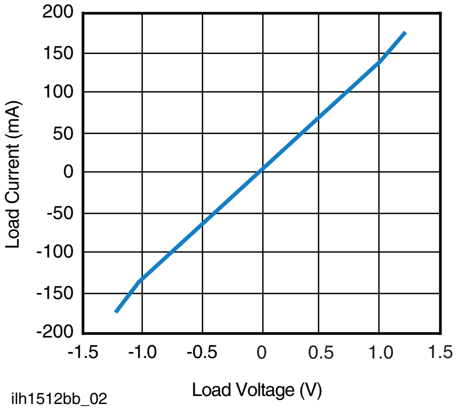


Fig. 3 - Form A Typical Load Current vs. Load Voltage

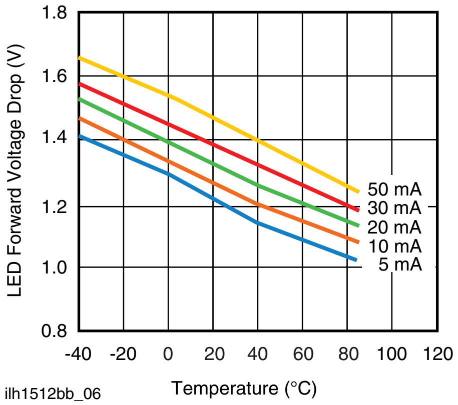


Fig. 6 - Typical LED Forward Voltage Drop vs. Temperature

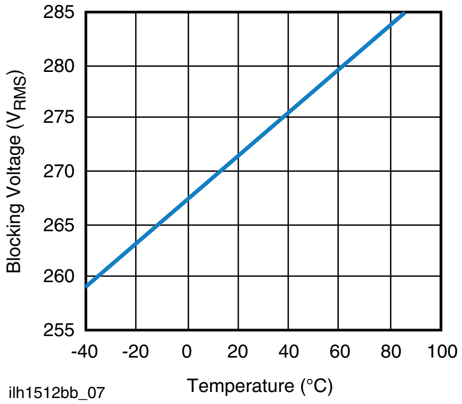


Fig. 7 - Form A Typical Blocking Voltage vs. Temperature

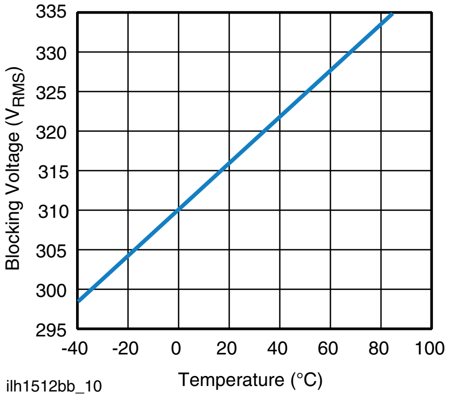


Fig. 10 - Form B Typical Blocking Voltage vs. Temperature

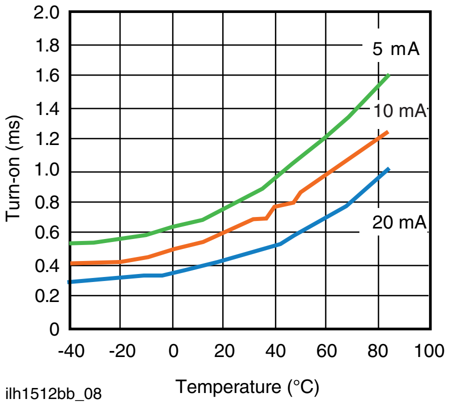


Fig. 8 - Form A Typical Turn-On vs. Temperature

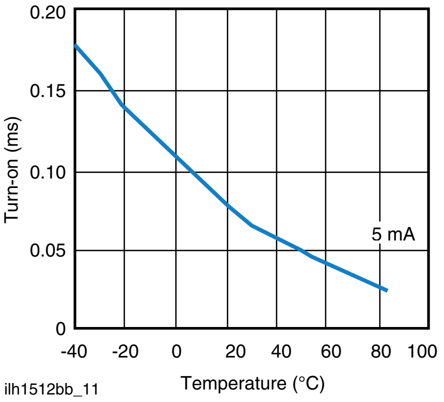


Fig. 11 - Form B Typical Turn-On vs. Temperature

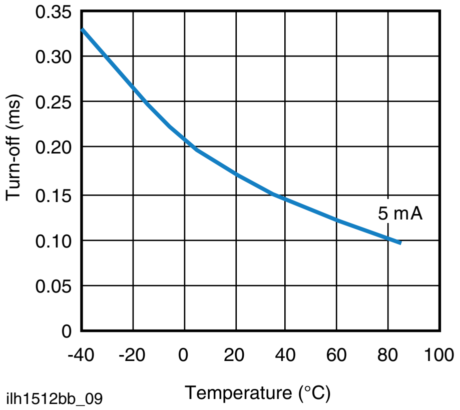


Fig. 9 - Form A Typical Turn-Off vs. Temperature

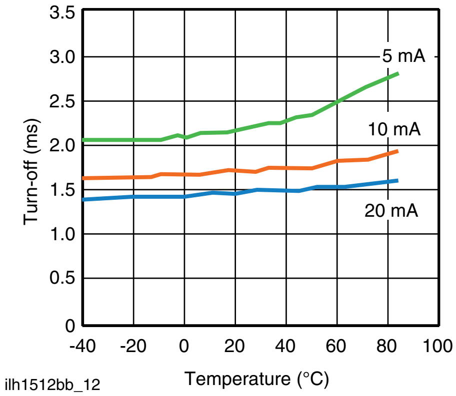


Fig. 12 - Form B Typical Turn-Off vs. Temperature

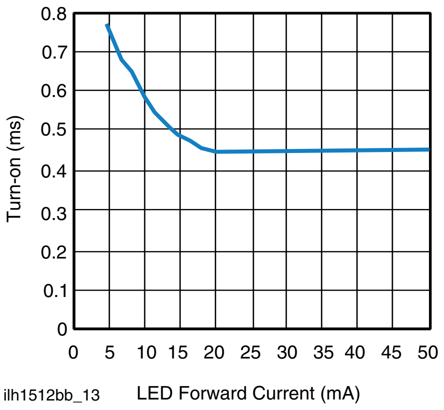


Fig. 13 - Form A Typical Turn-On vs. LED Forward Current

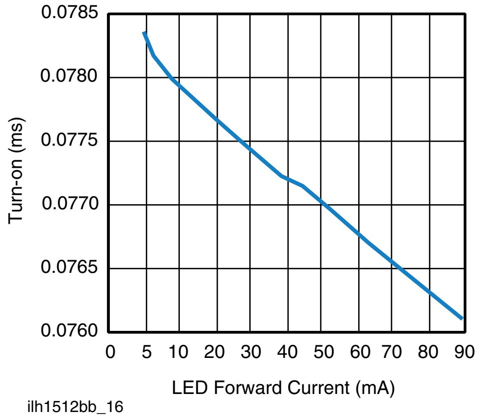


Fig. 16 - Form B Typical Turn-On vs. LED Forward Current

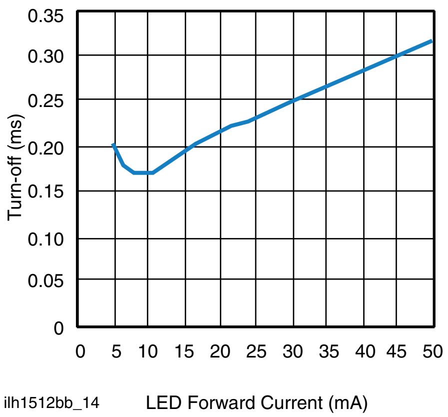


Fig. 14 - Form A Typical Turn-Off vs. LED Forward Current

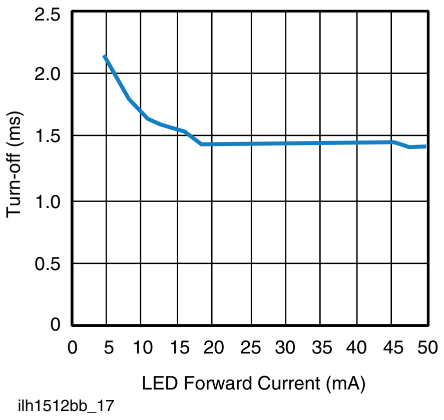


Fig. 17 - Form B Typical Turn-Off vs. LED Forward Current

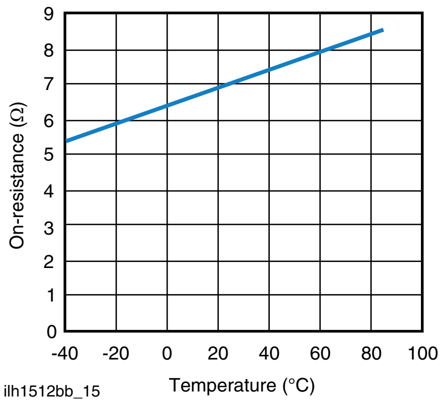


Fig. 15 - Form A Typical On-Resistance vs. Temperature

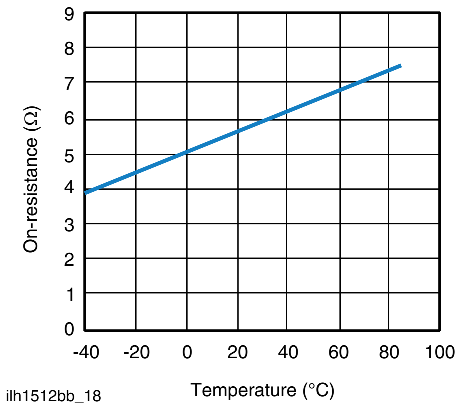


Fig. 18 - Form B Typical On-Resistance vs. Temperature

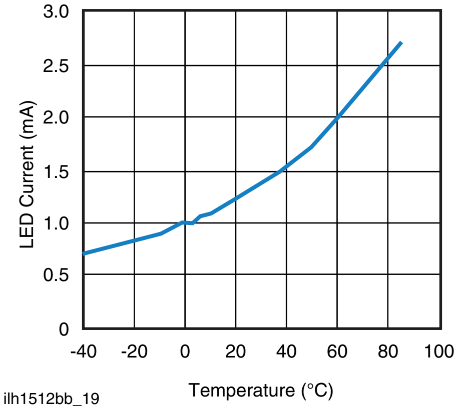


Fig. 19 - Form A Typical I_F for Switch Operation vs. Temperature

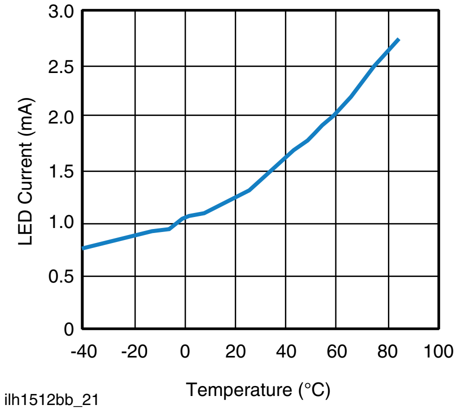


Fig. 21 - Form B Typical I_F for Switch Operation vs. Temperature

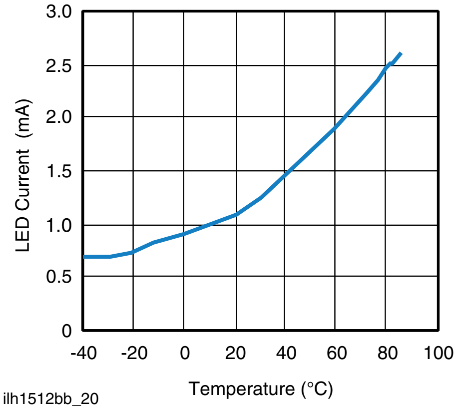


Fig. 20 - Form A Typical I_F for Switch Dropout vs. Temperature

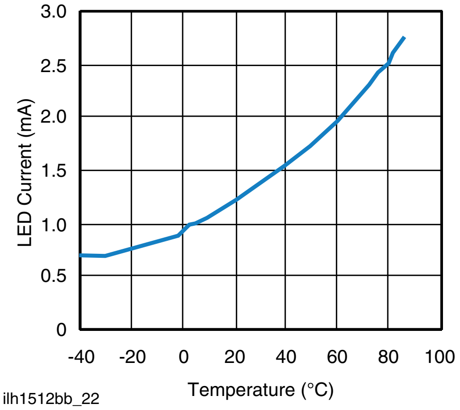
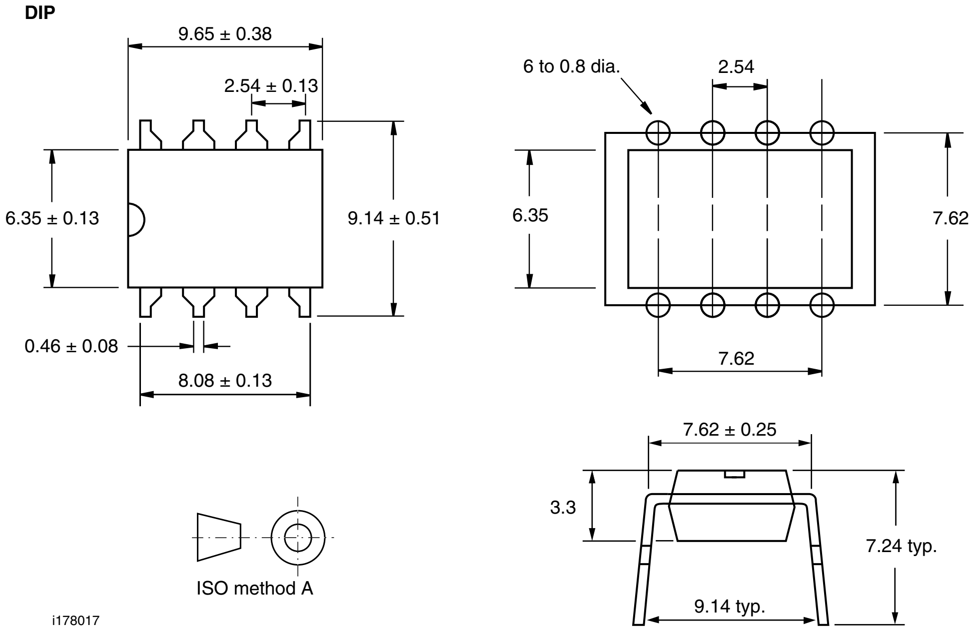
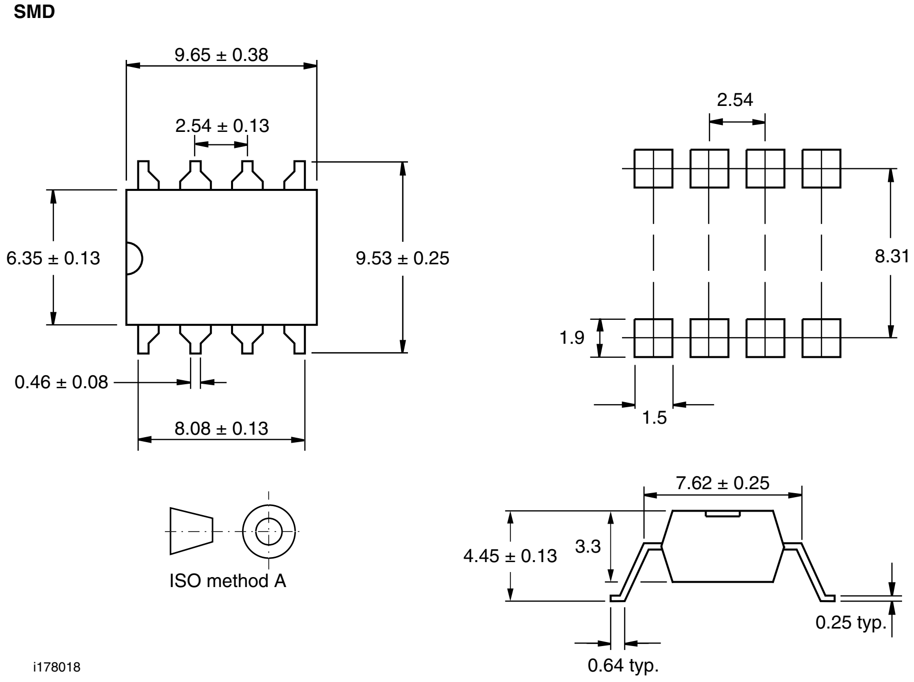


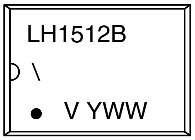
Fig. 22 - Form B Typical I_F for Switch Dropout vs. Temperature

PACKAGE DIMENSIONS in millimeters





PACKAGE MARKING (example)



Note

- Tape and reel suffix (TR) is not part of the package marking

SOLDER PROFILES

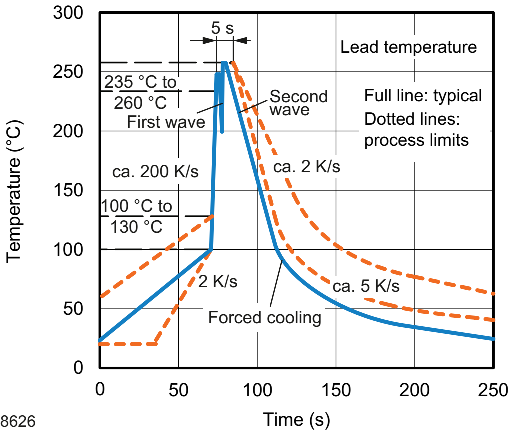


Fig. 23 - Wave Soldering Double Wave Profile According to J-STD-020 for DIP Devices

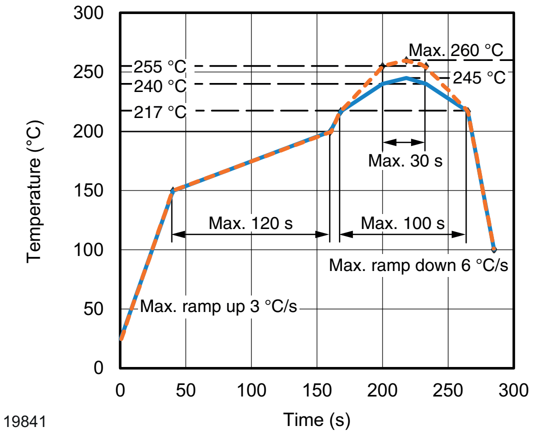


Fig. 24 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020 for SMD Devices

HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: unlimited

Conditions: $T_{amb} < 30$ °C, RH < 85 %

Moisture sensitivity level 1, according to J-STD-020

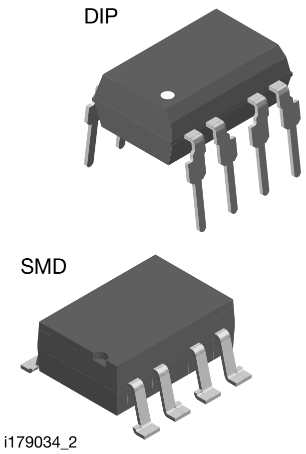
Footprint and Schematic Information for LH1512BAC, LH1512BACTR, LH1512BB

The footprint and schematic symbols for the following parts can be accessed using the associated links. They are available in Eagle, Altium, KiCad, OrCAD / Allegro, Pulsonix, and PADS.

Note that the 3D models for these parts can be found on the Vishay product page.

PART NUMBER	FOOTPRINT / SCHEMATIC
LH1512BAC	www.snapeda.com/parts/LH1512BAC/Vishay/view-part
LH1512BACTR	www.snapeda.com/parts/LH1512BACTR/Vishay/view-part
LH1512BB	www.snapeda.com/parts/LH1512BB/Vishay/view-part

For technical issues and product support, please contact optocoupleranswers@vishay.com.



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