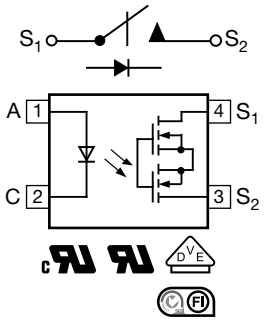
1 Form A Solid-State Relay (Normally Open)



FEATURES

- Isolation test voltage 3750 V_{RMS}
- Typical R_{ON} 22 Ω
- Load voltage 350 V
- Load current 120 mA
- High surge capability
- Clean bounce free switching
- Low power consumption
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

LINKS TO ADDITIONAL RESOURCES

Related Documents | Design Tools | SPICE Models

DESCRIPTION

The LH1546AEF (4 pin SOP) is robust, ideal for telecom and ground fault applications. It is an SPST normally open switch (1 Form A) that replaces electromechanical relays in many applications. It is constructed using a GaAlAs LED for actuation control and MOSFETs for the switch output.

APPLICATIONS

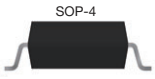
- General telecom switching
- Instrumentation
- Industrial controls

AGENCY APPROVALS

- UL
- cUL
- BSI
- VDE
- FIMKO

ORDERING INFORMATION

L	H	1	5	4	6	A	#	#	T	R
PART NUMBER						ELECTR. VARIATION	PACKAGE CONFIG.		TAPE AND REEL	



PACKAGE	UL, cUL, BSI, VDE, FIMKO
SOP-4, tape and reel	LH1546AEFTR
SOP-4, tubes	LH1546AEF

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**CONDITIONS**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
IRED continuous forward current		I_F	50	mA
IRED reverse voltage		V_R	5	V
Input power dissipation		P_{diss}	80	mW
OUTPUT				
DC or peak AC load voltage		V_L	350	V
Continuous DC load current		I_L	120	mA
SSR output power dissipation		P_{diss}	550	mW
SSR				
Ambient temperature range		T_{amb}	-40 to +85	°C
Storage temperature range		T_{stg}	-40 to +150	°C
Soldering temperature	t = 10 s max.	T_{sld}	260	°C

Note

- 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.

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
IRED forward current, switch turn-on	I_L = 100 mA, t = 10 ms	I_{Fon}	-	0.3	2	mA
IRED forward current, switch turn-off	V_L = ± 350 V, I_L < 1 µA	I_{Foff}	0.05	0.2	-	mA
IRED forward voltage	I_F = 10 mA	V_F	-	1.4	1.6	V
OUTPUT						
On-resistance	I_F = 5 mA, I_L = 50 mA	R_{ON}	-	22	27	Ω
Off-resistance	I_F = 0 mA, V_L = ± 100 V	R_{OFF}	0.5	850	-	GΩ
Off-state leakage current	I_F = 0 mA, V_L = ± 100 V	I_{leak}	-	< 1	200	nA
	I_F = 0 mA, V_L = ± 350 V	I_{leak}	-	-	1	µA
Output capacitance	I_F = 0 mA, V_L = 1 V, 1 MHz	C_O	-	39	-	pF
	I_F = 0 mA, V_L = 50 V, 1 MHz	C_O	-	6	-	pF
COUPLER						
Capacitance (input to output)	V_{IO} = 1 V	C_{IO}	-	0.6	-	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	I_F = 5 mA, I_L = 50 mA	t_{on}	-	0.2	3	ms
Turn-off time	I_F = 5 mA, I_L = 50 mA	t_{off}	-	0.05	3	ms

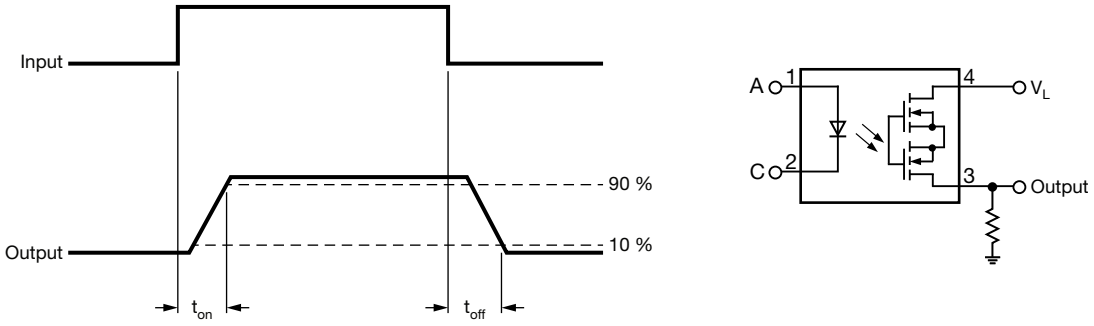


Fig. 1 - Timing Schematic

SAFETY AND INSULATION RATINGS				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Climatic classification	According to IEC 68 part 1		40 / 85 / 21	
Pollution degree	According to DIN VDE 0109		2	
Comparative tracking index		CTI	175	
Maximum rated withstanding isolation voltage	According to UL1577, t = 1 min	V_{ISO}	3750	V_{RMS}
Maximum transient isolation voltage	According to DIN EN 60747-5-5	V_{IOTM}	6000	V_{peak}
Maximum repetitive peak isolation voltage	According to DIN EN 60747-5-5	V_{IORM}	707	V_{peak}
Isolation resistance	T_{amb} = 25 °C, V_{IO} = 500 V	R_{IO}	$\geq 10^{12}$	Ω
	T_{amb} = 100 °C, V_{IO} = 500 V	R_{IO}	$\geq 10^{11}$	Ω
Output safety power		P_{SO}	350	mW
Input safety current		I_{SI}	150	mA
Input safety temperature		T_S	165	°C
Clearance distance	SOP-4		≥ 5	mm
Creepage distance	SOP-4		≥ 5	mm
Input to output test voltage, method B	V_{IORM} x 1.875 = V_{PR}, 100 % production test with t_M = 1 s, partial discharge < 5 pC	V_{PR}	1326	V_{peak}
Input to output test voltage, method A	V_{IORM} x 1.6 = V_{PR}, sample test with t_M = 10 s, partial discharge < 5 pC	V_{PR}	1131	V_{peak}

Note

- As per IEC 60747-5-5, §7.4.3.8.2, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

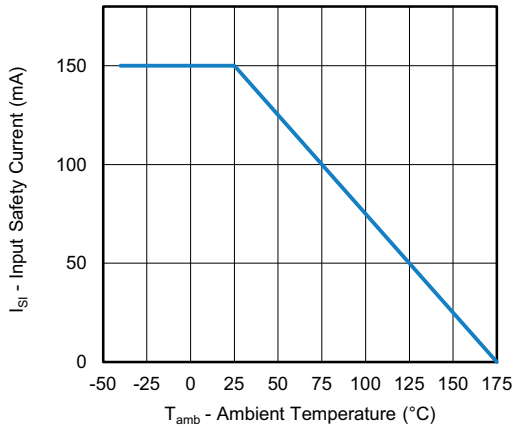


Fig. 2 - Safety Input Current vs. Ambient Temperature

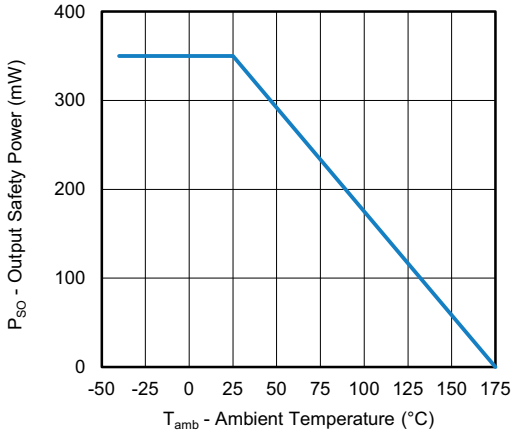


Fig. 3 - Safety Power Dissipation vs. Ambient Temperature

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

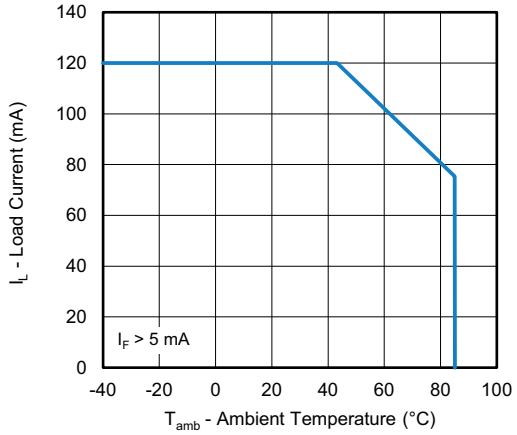


Fig. 4 - Maximum Load Current vs. Ambient Temperature

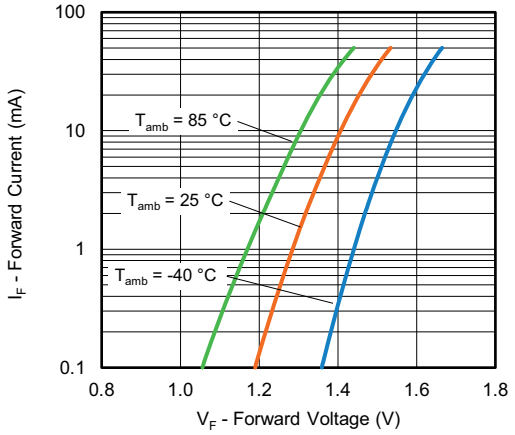


Fig. 6 - Forward Current vs. Forward Voltage

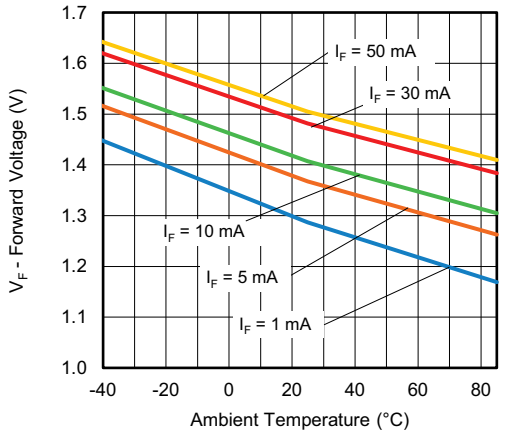


Fig. 5 - Forward Voltage vs. Ambient Temperature

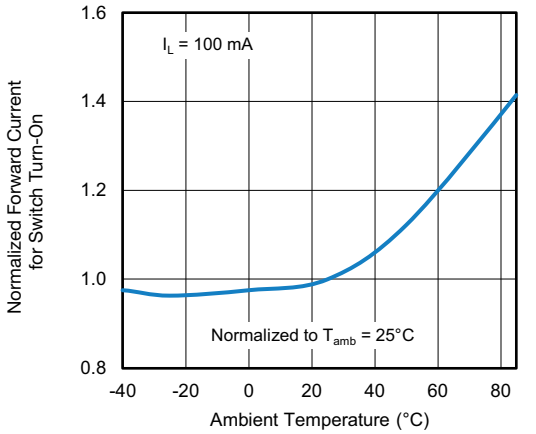


Fig. 7 - Normalized Forward Current for Switch Turn-On vs. Ambient Temperature

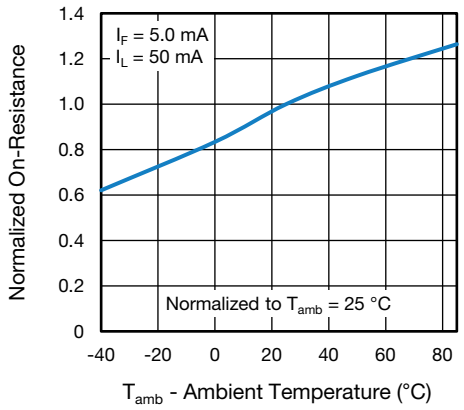


Fig. 8 - Normalized On-Resistance vs. Ambient Temperature

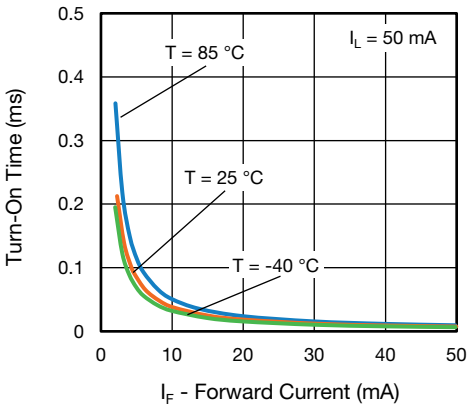


Fig. 11 - Turn-On Time vs. Forward Current

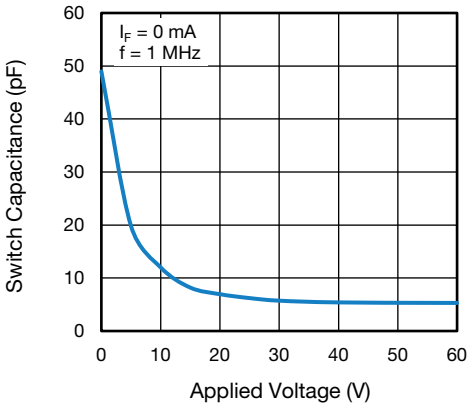


Fig. 9 - Output Capacitance vs. Load Voltage

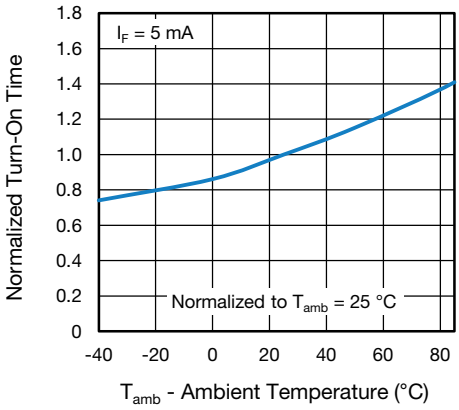


Fig. 12 - Normalized Turn-On Time vs. Ambient Temperature

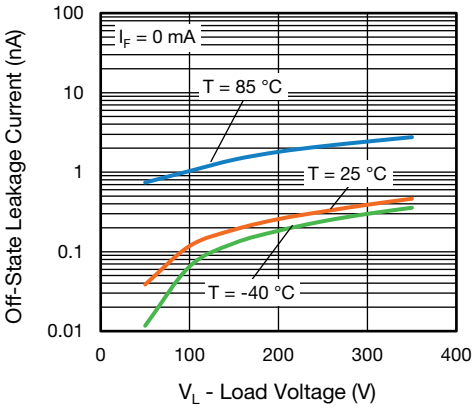


Fig. 10 - Off-State Leakage Current vs. Load Voltage

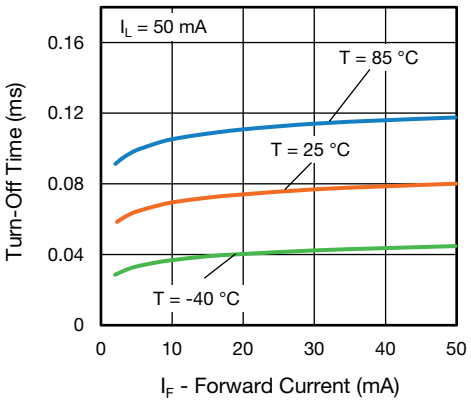


Fig. 13 - Turn-Off Time vs. Forward Current

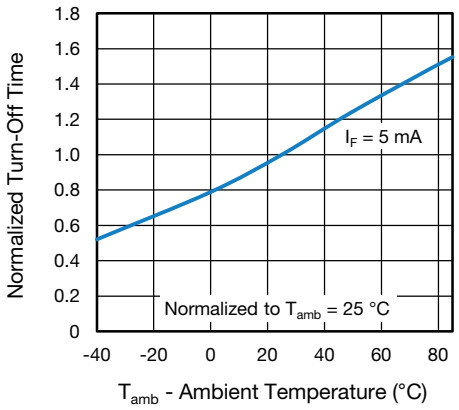


Fig. 14 - Normalized Turn-Off Time vs. Ambient Temperature

PACKAGE DIMENSIONS (in millimeters)

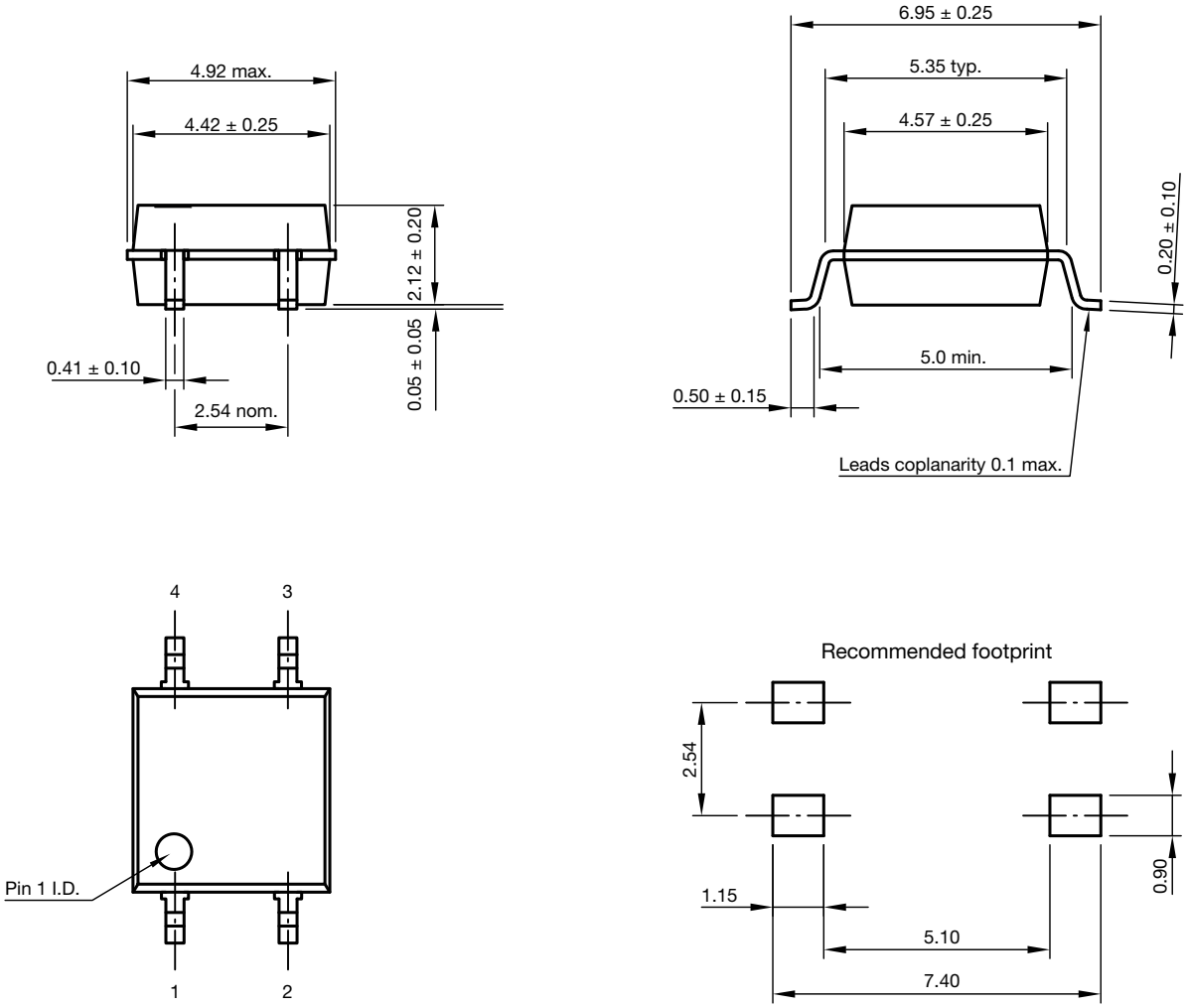


Fig. 15 - Package Drawing

PACKAGE MARKING (example)

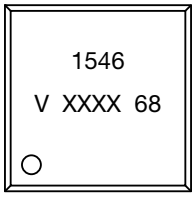


Fig. 16 - LH1546AEF

Notes

- XXXX = LMC (lot marking code)
- Tape and reel suffix (TR) is not part of the package marking

PACKAGING INFORMATION (in millimeters)

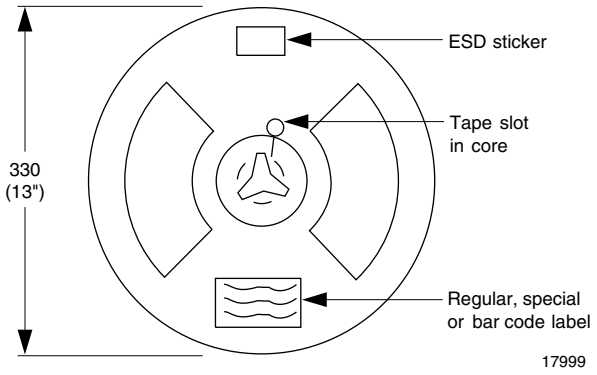


Fig. 17 - Tape and Reel Shipping Medium
(EIA-481, revision A, and IEC 60286), 2000 units per reel

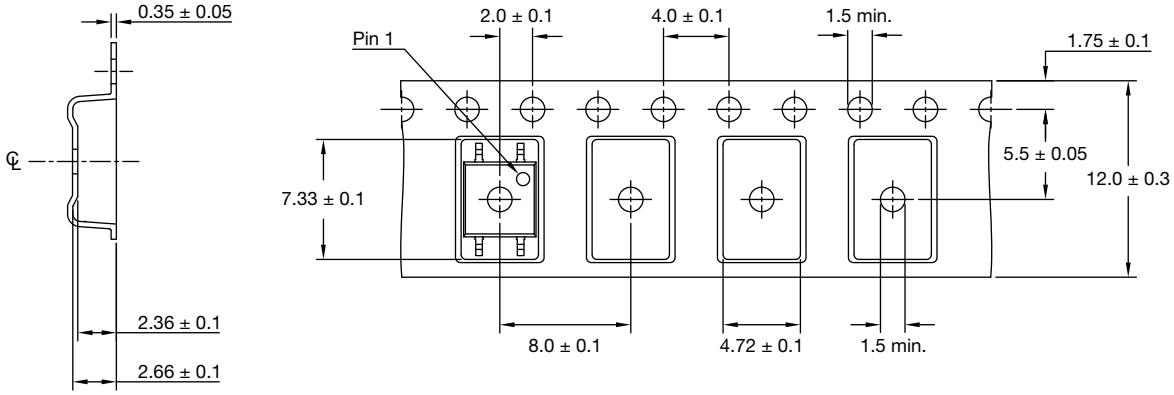


Fig. 18 - Tape and Reel Packing

Notes

- Cumulative tolerance of 10 sprocket holes is 0.20 mm
- Applicable orientation as below:

DEVICES PER REEL	
TYPE	**UNITS/REEL**
SOP-4	2000

SOLDER PROFILES

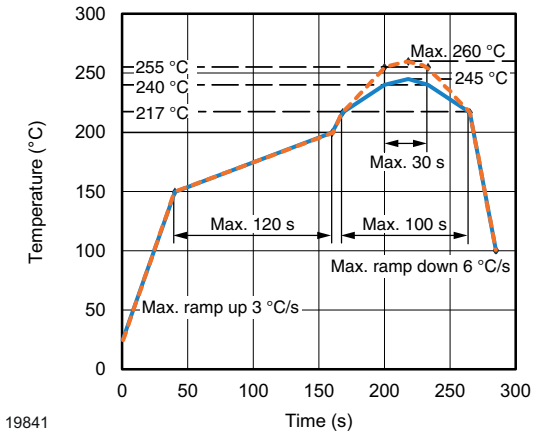


Fig. 19 - Lead (Pb)-free Reflow Solder Profile
According to J-STD-020 for SMD Devices

HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: unlimited

Conditions: T_{amb} < 30 °C, RH < 60 %

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

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