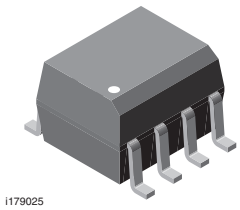
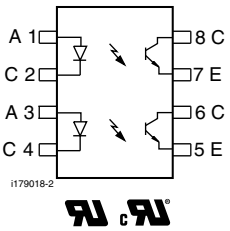
Optocoupler, Phototransistor Output, Dual Channel, SOIC-8 Package





FEATURES

- Two channel coupler
- SOIC-8 surface mountable package
- Standard lead spacing of 0.05"
- Available only on tape and reel option (conforms to EIA standard 481-2)
- Isolation test voltage, 4000 V_{RMS}
- Compatible with dual wave, vapor phase and IR reflow soldering
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

AGENCY APPROVALS

- UL1577, file no. E52744 system code Y
- cUL - file no. E52744, equivalent to CSA bulletin 5A

DESCRIPTION

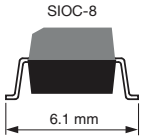
The ILD205T, ILD206T, ILD207T, ILD211T, and ILD213T are optically coupled pairs with a gallium arsenide infrared LED and a silicon NPN phototransistor. Signal information, including a DC level, can be transmitted by the device while maintaining a high degree of electrical isolation between input and output. The ILD205T, ILD206T, ILD207T, ILD211T, and ILD213T come in a standard SOIC-8 small outline package for surface mounting which makes it ideally suited for high density applications with limited space. In addition to eliminating through-holes requirements, this package conforms to standards for surface mounted devices.

A specified minimum and maximum CTR allows a narrow tolerance in the electrical design of the adjacent circuits. The high BV_{CEO} of 70 V gives a higher safety margin compared to the industry standard of 30 V.

ORDERING INFORMATION

I	L	D	2	#	#	T

PART NUMBER



AGENCY CERTIFIED/PACKAGE	CTR (%)				
	10 mA				
UL, cUL	40 to 80	63 to 125	100 to 200	≥ 20	≥ 100
SOIC-8	ILD205T	ILD206T	ILD207T	ILD211T	ILD213T

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
Peak reverse voltage		V_R	6	V
Peak pulsed current	1 µs, 300 pps		1	A
Continuous forward current per channel		I_F	30	mA
Power dissipation		P_{diss}	50	mW
OUTPUT				
Collector emitter breakdown voltage		BV_{CEO}	70	V
Emitter collector breakdown voltage		BV_{ECO}	7	V
Power dissipation per channel		P_{diss}	125	mW
COUPLER				
Total package dissipation ambient (2 LEDs and 2 detectors, 2 channels)		P_{tot}	350	mW
Storage temperature		T_{stg}	-55 to +150	°C
Operating temperature		T_{amb}	-55 to +100	°C
Soldering time from 260 °C (1)		T_{sld}	10	s

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) Refer to reflow profile for soldering conditions for surface mounted devices.

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Forward voltage	I_F = 10 mA	V_F	-	1.2	1.55	V
Reverse current	V_R = 6 V	I_R	-	0.1	100	µA
Capacitance	V_R = 0 V	C_O	-	25	-	pF
OUTPUT						
Collector emitter breakdown voltage	I_C = 10 µA	BV_{CEO}	70	-	-	V
Emitter collector breakdown voltage	I_E = 10 µA	BV_{ECO}	7	-	-	V
Collector emitter leakage current	V_{CE} = 10 V, I_F = 0 A	I_{CEO}	-	5	50	nA
Collector emitter capacitance	V_{CE} = 0 V	C_{CE}	-	10	-	pF
COUPLER						
Collector emitter saturation voltage	I_F = 10 mA, I_C = 2.5 mA	V_{CEsat}	-	-	0.4	V
Capacitance (input to output)		C_{IO}	-	0.5	-	pF

Note

- Minimum and maximum values were tested requierements. 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.

CURRENT TRANSFER RATIO (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
I_C/I_F	V_{CE} = 5 V, I_F = 10 mA	ILD205T	CTR_{DC}	40	-	80	%
		ILD206T	CTR_{DC}	63	-	125	%
		ILD207T	CTR_{DC}	100	-	200	%
		ILD211T	CTR_{DC}	20	-	-	%
		ILD213T	CTR_{DC}	100	-	-	%
	V_{CE} = 5 V, I_F = 1 mA	ILD205T	CTR_{DC}	13	30	-	%
		ILD206T	CTR_{DC}	22	45	-	%
		ILD207T	CTR_{DC}	34	70	-	%

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Delay time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 1)	t_d	-	3	-	µs
Rise time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 1)	t_r	-	3	-	µs
Fall time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 1)	t_f	-	4.7	-	µs
Storage time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 1)	t_s	-	0.3	-	µs
Turn-on time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 1)	t_{on}	-	6	-	µs
Turn-off time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see figure 1)	t_{off}	-	5	-	µs
Turn-on time	V_S = 5 V, I_F = 10 mA, R_L = 1 kΩ, (see figure 2)	t_{on}	-	3	-	µs
Turn-off time	V_S = 5 V, I_F = 10 mA, R_L = 1 kΩ, (see figure 2)	t_{off}	-	10	-	µs

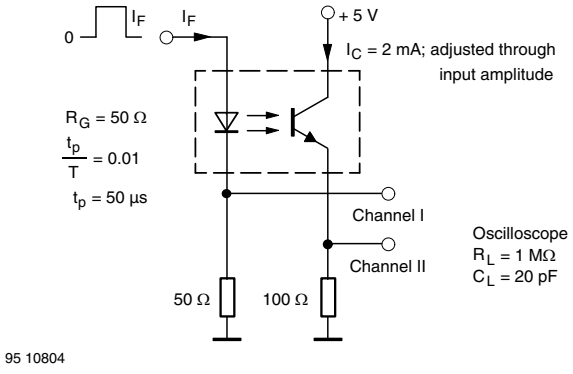


Fig. 1 - Test Circuit, Non-Saturated Operation

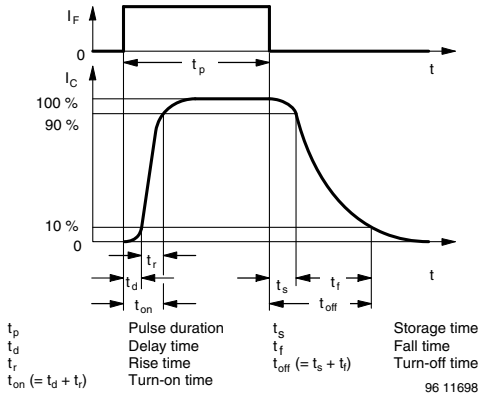


Fig. 3 - Switching Times

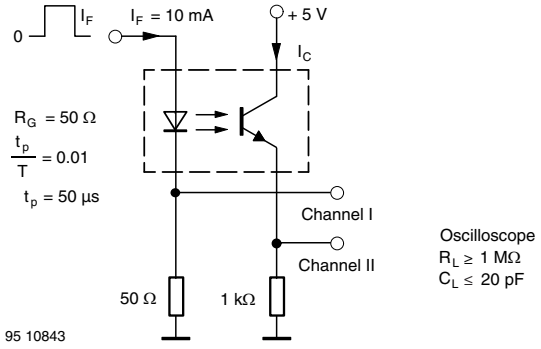


Fig. 2 - Test Circuit, Saturated Operation

SAFETY AND INSULATION RATINGS				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Climatic classification	According to IEC 68 part 1		55/100/21	
Comparative tracking index		CTI	175	
Tested withstanding isolation voltage	According to UL1577, t = 1 s	V_{ISO}	4000	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}	560	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
Creepage distance	DIP-6, option 6		4	mm
Clearance distance	DIP-6, option 6		4	mm
Insulation thickness			0.2	mm

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.

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

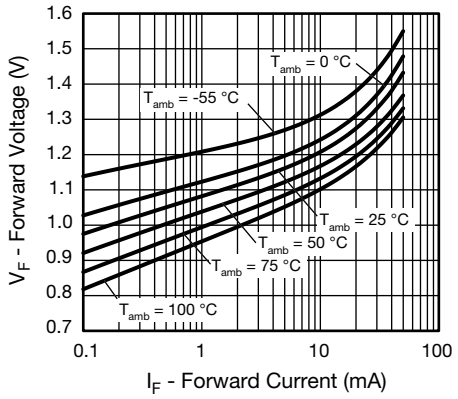


Fig. 4 - Forward Voltage vs. Forward Current

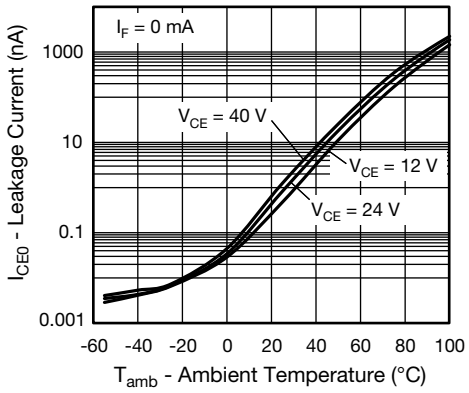


Fig. 6 - Leakage Current vs. Ambient Temperature

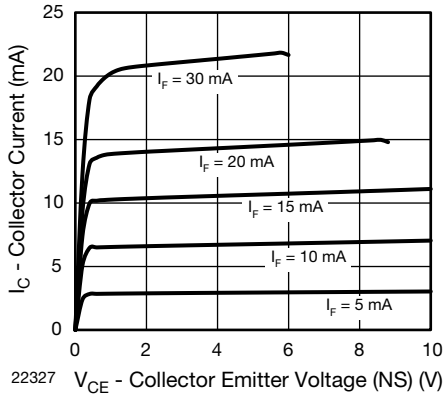


Fig. 5 - Collector Current vs. Collector Emitter Voltage (non-saturated)

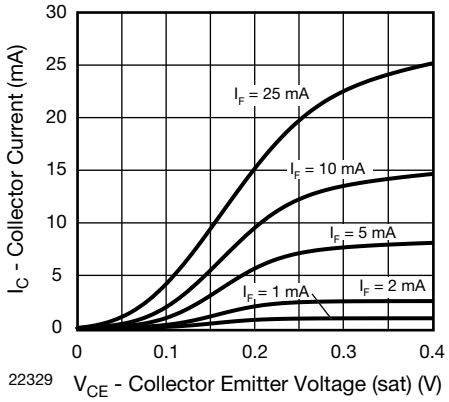


Fig. 7 - Collector Current vs. Collector Emitter Voltage (saturated)

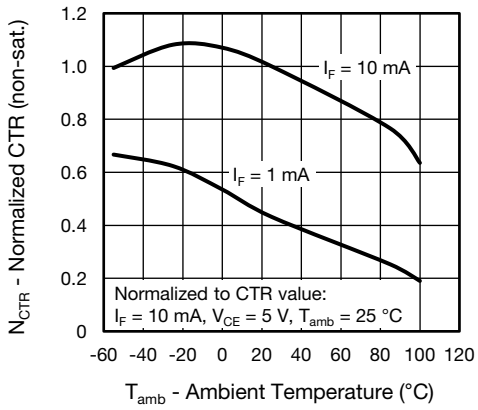


Fig. 8 - Normalized CTR (saturated) vs. Ambient Temperature

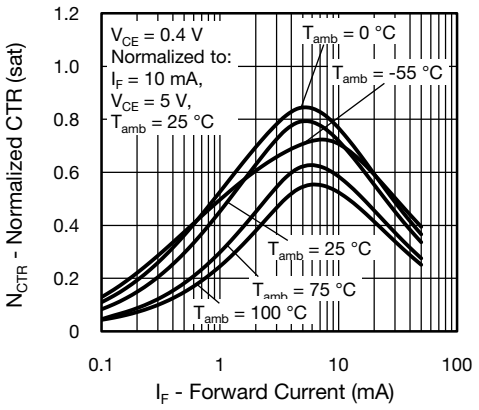


Fig. 11 - Normalized CTR (saturated) vs. Forward Current

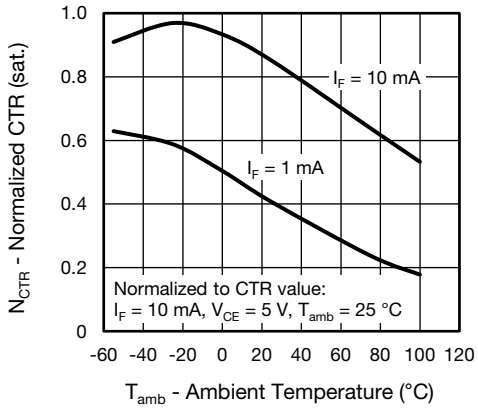


Fig. 9 - Normalized CTR (non-saturated) vs. Ambient Temperature

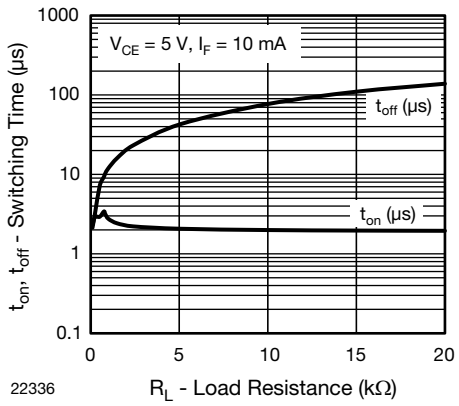


Fig. 12 - Switching Time vs. Load Resistance

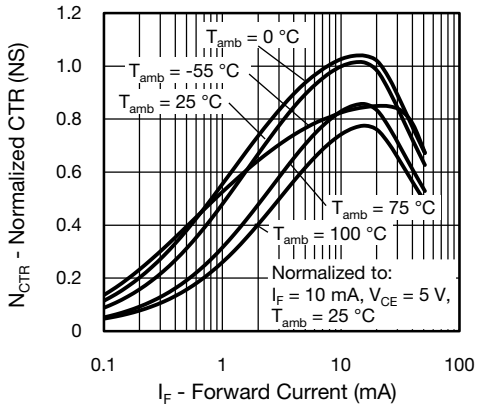


Fig. 10 - Normalized CTR (non-saturated) vs. Forward Current

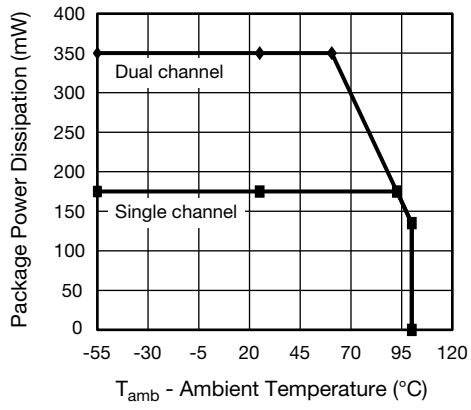
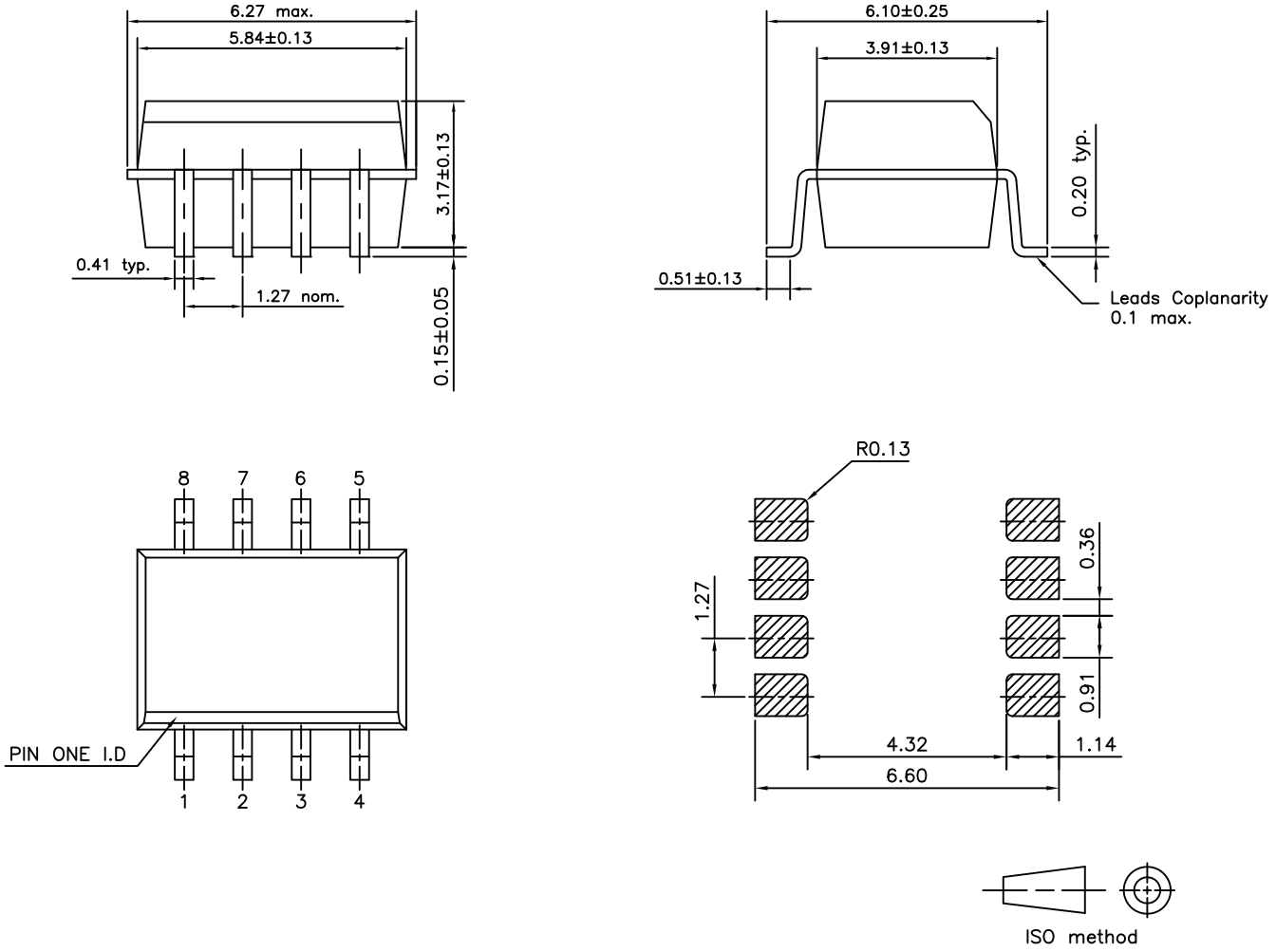
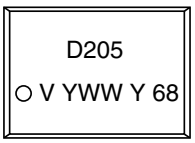


Fig. 13 - Power Dissipation vs. Ambient Temperature

PACKAGE DIMENSIONS (in millimeters)



PACKAGE MARKING (example)



Note

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

TAPE AND REEL PACKAGING FOR DUAL CHANNELS [1] (in millimeters)

Selected dual SOIC8 optocouplers are available in tape and reel format. To order surface mount ILD2XX optocoupler on tape and reel, add a suffix “T” after the part number, i.e., ILD207T.

The tape is 16 mm and is wound on a 33 cm reel. There are 2000 parts per reel. Taped and reeled dual SOIC8 optocouplers conform to EIA-481-2 and IEC 60286-3.

Note

(1) Select dual channel devices are available in the shorter SOIC-8 package and will be taped according to the single channel taping specification

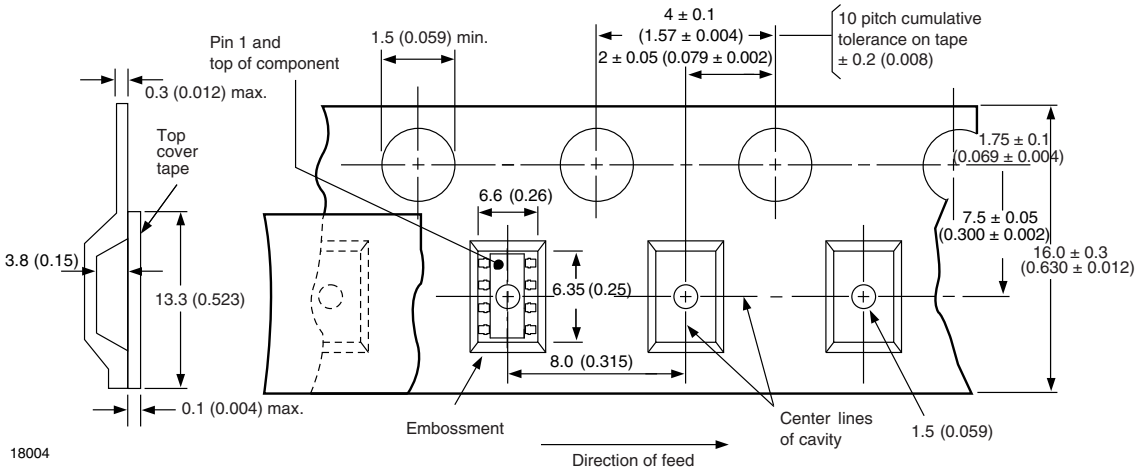


Fig. 14

SOLDER PROFILE

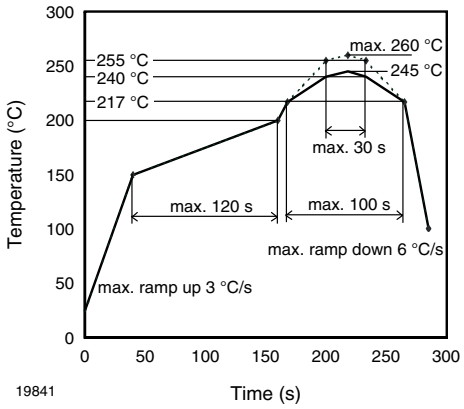


Fig. 15 - Lead (Pb)-free Reflow Solder Profile according to J-STD-020

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

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