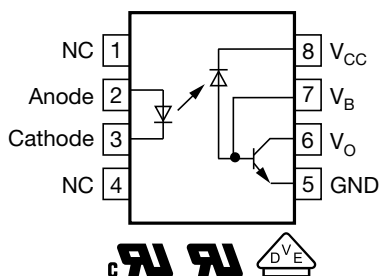
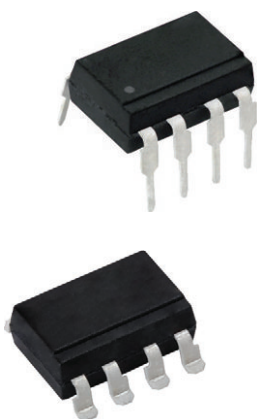


High Speed Optocoupler, 1 MBd



DESCRIPTION

The 6N136 is an optocoupler with a GaAlAs infrared emitting diode, optically coupled with an integrated photo detector which consists of a photo diode and a high speed transistor in a DIP-8 plastic package.

Signals can be transmitted between two electrically separated circuits up to frequencies of 2 MHz. The potential difference between the circuits to be coupled should not exceed the maximum permissible reference voltages.

FEATURES

- 1 MBd high speed
- High common-mode interference immunity
- Bandwidth 2 MHz
- Open-collector output
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

AGENCY APPROVALS

- [UL](#)
- [cUL](#)
- [DIN EN 60747-5-5 \(VDE0884-5\)](#), available with option 1

LINKS TO ADDITIONAL RESOURCES



**ORDERING INFORMATION**

6 N 1 3 6 - X 0 # # T PART NUMBER PACKAGE OPTION TAPE AND REEL											
AGENCY CERTIFIED / PACKAGE					CTR (%)						
UL, cUL					≥ 19						
DIP-8					6N136						
UL, cUL, VDE (Option 1)					≥ 19						
SMD-8, option 7					6N136-X017T						

Note

(1) Also available in tubes; do not add T to end

ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Reverse input voltage		V_R	5	V
Input Forward Current		I_F	25	mA
Surge input forward current	$t \leq 1\text{ }\mu\text{s}$, 300 pulses/s	$I_{F(surge)}$	1	A
Power dissipation		P_{diss}	45	mW
OUTPUT				
Supply voltage		V_{CC}	30	V
Output voltage		V_O	20	V
Output current		I_O	8	mA
Power dissipation		P_{diss}	100	mW
COUPLER				
Storage temperature range		T_{stg}	-55 to +125	$^{\circ}\text{C}$
Ambient temperature range		T_{amb}	-55 to +100	$^{\circ}\text{C}$
Soldering temperature	Max. $\leq 10\text{ s}$, dip soldering $\geq 0.5\text{ mm}$ from case bottom	T_{sld}	260	$^{\circ}\text{C}$

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

($T_{amb} = 0^{\circ}\text{C}$ to $+70^{\circ}\text{C}$, unless otherwise specified; typical values are at $T_{amb} = 25^{\circ}\text{C}$)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
Input forward voltage	$I_F = 16\text{ mA}$	V_F	-	1.4	1.7	V
Breakdown voltage	$I_R = 10\text{ }\mu\text{A}$	V_{BR}	5	-	-	V
Input capacitance	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$	C_{IN}	-	33	-	pF
OUTPUT						
Logic low supply current	$I_F = 16\text{ mA}$, $V_O = \text{open}$, $V_{CC} = 15\text{ V}$	I_{CCL}	-	170	-	μA
Logic high supply current	$I_F = 0\text{ mA}$, $V_O = \text{open}$, $V_{CC} = 15\text{ V}$	I_{CCH}	-	-	1	μA
Output voltage, output low	$I_F = 16\text{ mA}$, $I_O = 3.0\text{ mA}$, $V_{CC} = 4.5\text{ V}$	V_{OL}	-	-	0.4	V
Output current, output high	$I_F = 0\text{ mA}$, $V_O = V_{CC} = 15\text{ V}$	I_{OH}	-	-	1	μA
COUPLER						
Capacitance (input to output)	$f = 1\text{ MHz}$	C_{IO}	-	1	-	pF

Note

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

CURRENT TRANSFER RATIO

($T_{amb} = 0^{\circ}\text{C}$ to $+70^{\circ}\text{C}$, unless otherwise specified; typical values are at $T_{amb} = 25^{\circ}\text{C}$)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Current transfer ratio	$I_F = 16\text{ mA}$, $V_O = 0.4\text{ V}$, $V_{CC} = 4.5\text{ V}$	CTR	19	38	60	%

SWITCHING CHARACTERISTICS

($T_{amb} = 0^{\circ}\text{C}$ to $+70^{\circ}\text{C}$, unless otherwise specified; typical values are at $T_{amb} = 25^{\circ}\text{C}$)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Propagation delay time to low output level	$V_{CC} = 5\text{ V}$, $R_L = 1.9\text{ k}\Omega$, $C_L = 15\text{ pF}$	t_{PHL}	-	0.2	0.8	μs
Propagation delay time to high output level	$V_{CC} = 5\text{ V}$, $R_L = 1.9\text{ k}\Omega$, $C_L = 15\text{ pF}$	t_{PLH}	-	0.6	0.8	μs

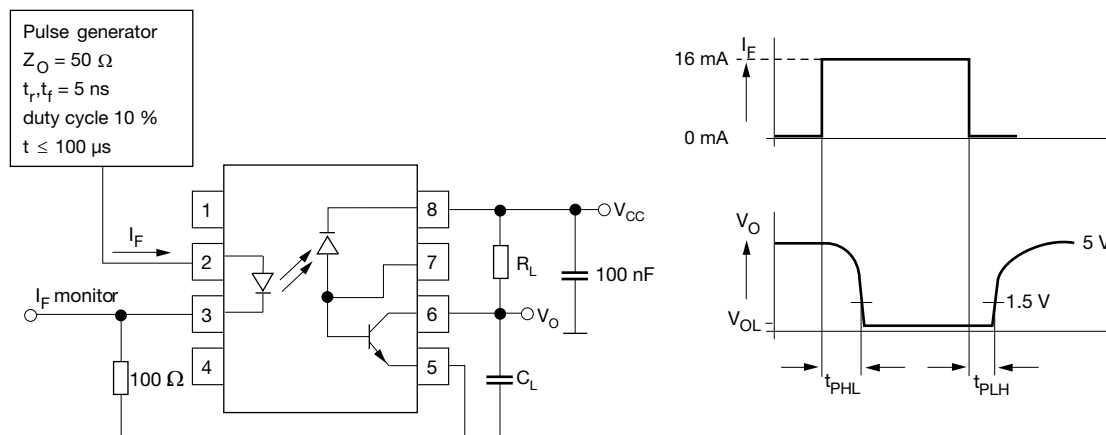


Fig. 1 - Switching Times

COMMON MODE TRANSIENT IMMUNITY ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
High	$I_F = 0\text{ mA}$, $V_{CM} = 10\text{ V}$, $V_{CC} = 5\text{ V}$, $R_L = 1.9\text{ k}\Omega$	$ CM_H $	-	1000	-	V/ μs
Low	$I_F = 16\text{ mA}$, $V_{CM} = 10\text{ V}$, $V_{CC} = 5\text{ V}$, $R_L = 1.9\text{ k}\Omega$	$ CM_L $	-	1000	-	V/ μs

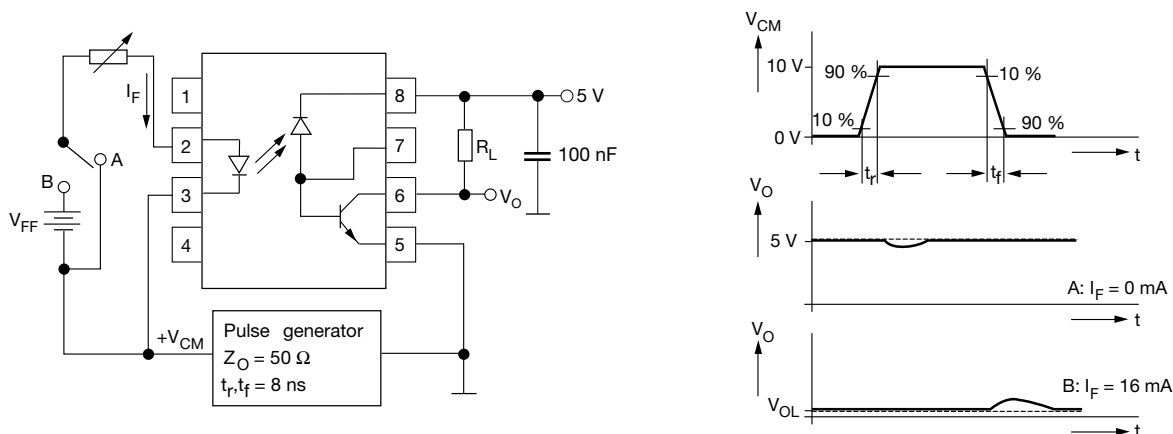


Fig. 2 - Common-Mode Interference Immunity

SAFETY AND INSULATION RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		55 / 110 / 21	
Pollution degree	According to DIN VDE 0109		2	
Comparative tracking index	Insulation group IIIa	CTI	175	
Maximum rated withstanding isolation voltage	According to UL1577, $t = 1\text{ min}$	V_{ISO}	5000	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}	630	V_{peak}
Isolation resistance	$T_{amb} = 25\text{ }^{\circ}\text{C}$, $V_{IO} = 500\text{ V}$	R_{IO}	$\geq 10^{12}$	Ω
	$T_{amb} = 100\text{ }^{\circ}\text{C}$, $V_{IO} = 500\text{ V}$	R_{IO}	$\geq 10^{11}$	Ω
Output safety power		P_{SO}	600	mW
Input safety current		I_{SI}	230	mA
Input safety temperature		T_S	175	$^{\circ}\text{C}$
Creepage distance	DIP-8		≥ 7	mm
Clearance distance	DIP-8		≥ 7	mm
Creepage distance	SMD-8, option 7		≥ 8	mm
Clearance distance	SMD-8, option 7		≥ 8	mm
Insulation thickness		DTI	≥ 0.4	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.

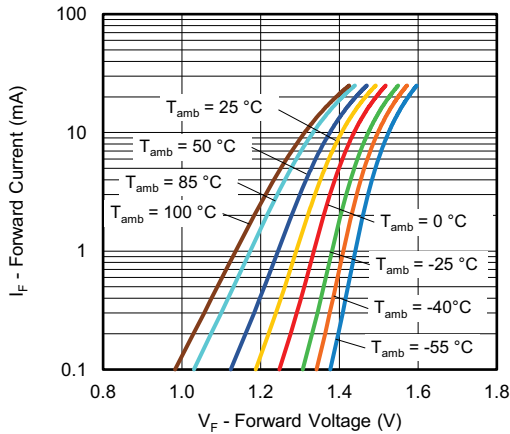
TYPICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)


Fig. 3 - LED Forward Current vs. Forward Voltage

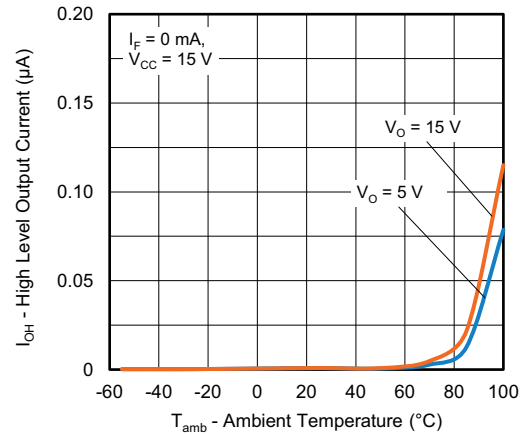


Fig. 6 - High Level Output Current vs. Ambient Temperature

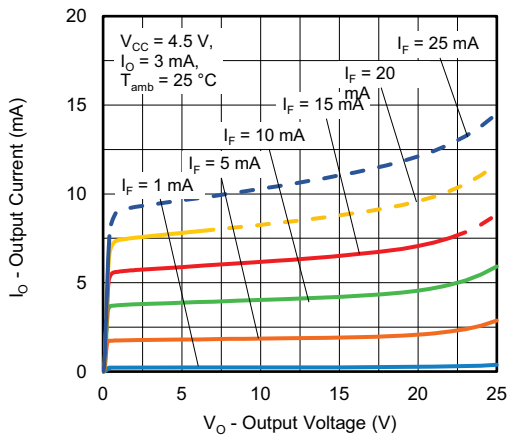


Fig. 4 - Output Current vs. Output Voltage

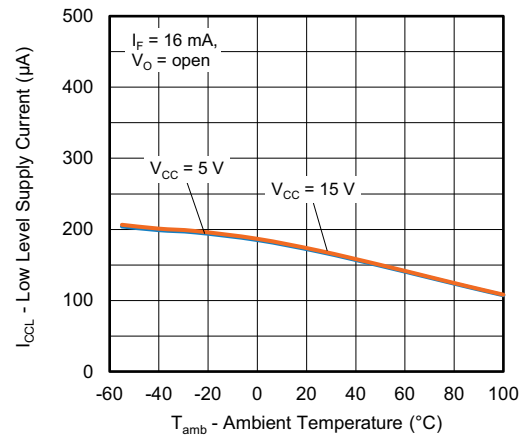


Fig. 7 - Low Level Supply Current vs. Ambient Temperature

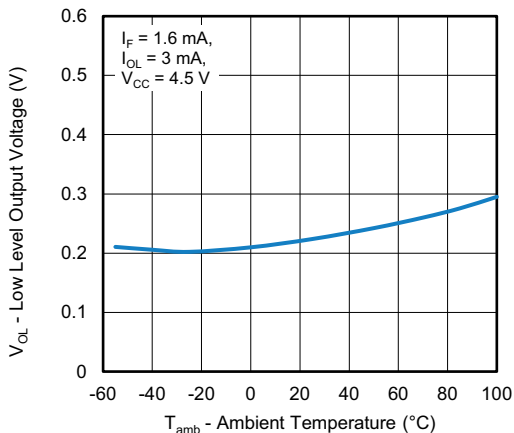


Fig. 5 - Low Level Output Voltage vs. Ambient Temperature

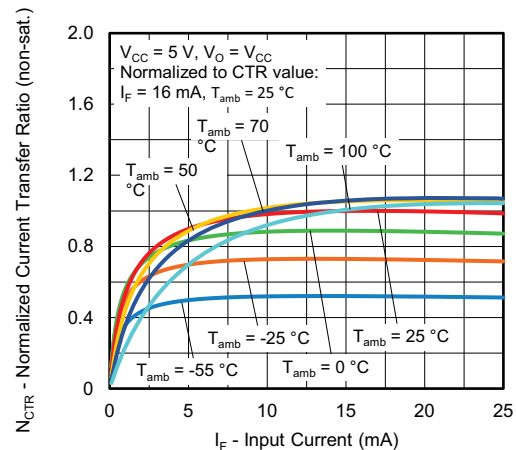


Fig. 8 - Normalized Current Transfer Ratio (non-saturated) vs. Input Current

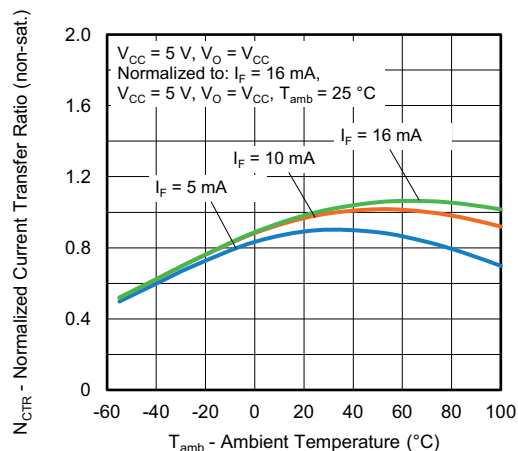


Fig. 9 - Normalized Current Transfer Ratio (non-saturated) vs. Ambient Temperature

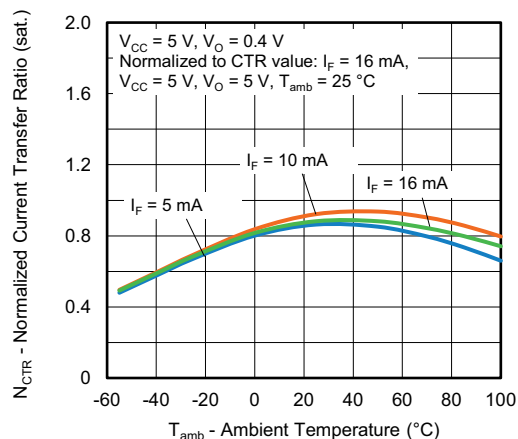


Fig. 10 - Normalized Current Transfer Ratio (saturated) vs. Ambient Temperature

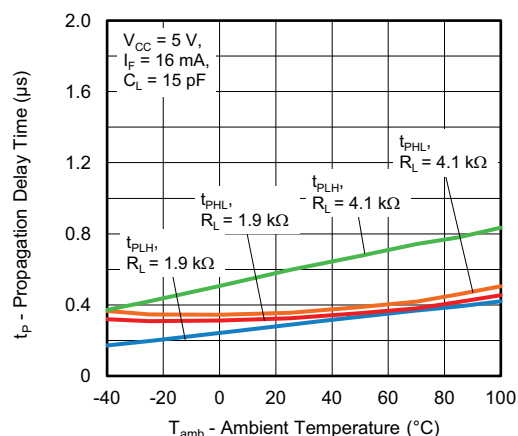


Fig. 11 - Propagation Delay Time vs. Ambient Temperature

PACKAGE DIMENSIONS (in millimeters)

DIP-8

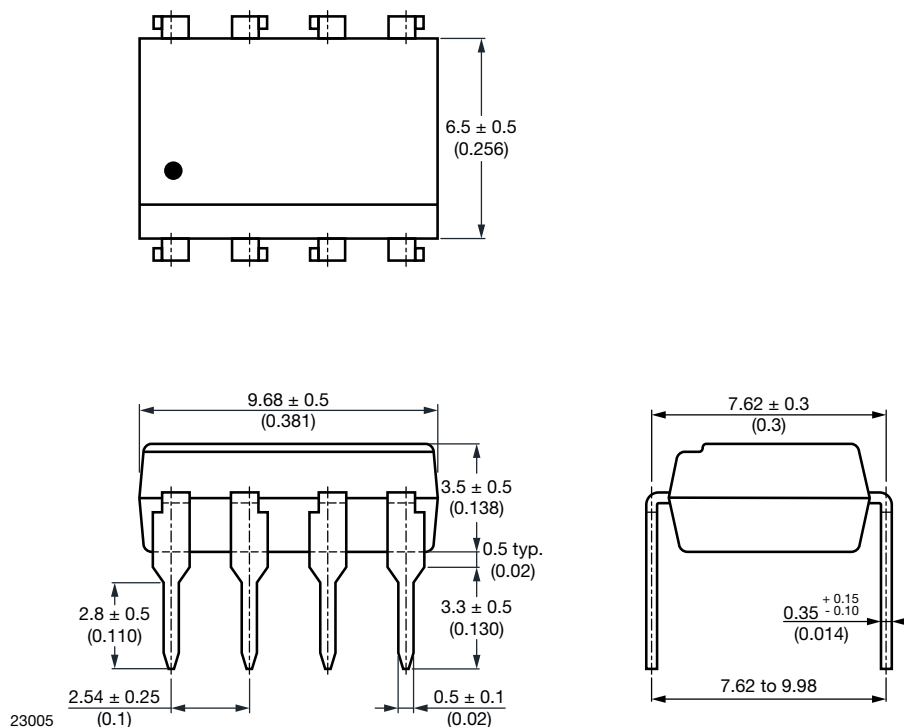


Fig. 12

SMD-8, Option 7

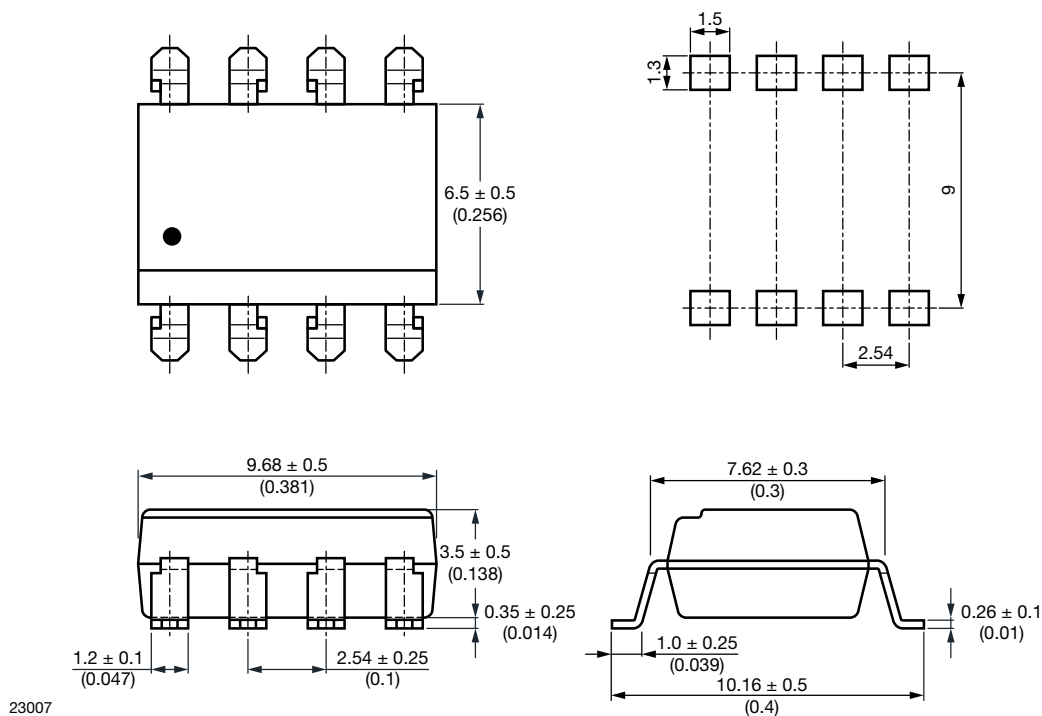


Fig. 13

PACKAGE MARKING

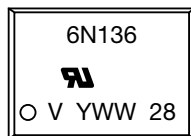


Fig. 14 - Example of 6N136

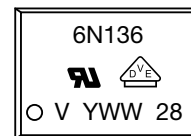


Fig. 15 - Example of 6N136-X017T

Notes

- “YWW” is the date code marking (Y = year code, WW = week code)
- VDE logo is only marked on VDE (option 1) parts
- Tape and reel suffix (T) is not part of the package marking

SOLDER PROFILES

IR Reflow Soldering (JEDEC® J-STD-020C compliant)

One time soldering reflow is recommended within the condition of temperature and time profile shown below. Do not solder more than three times.

PROFILE ITEM	CONDITIONS
Preheat	
- Temperature minimum ($T_{S \min.}$)	150 °C
- Temperature maximum ($T_{S \max.}$)	200 °C
- Time (min. to max.) (t_s)	90 s $\pm$ 30 s
Soldering zone	
- Temperature (T_L)	217 °C
- Time (t_L)	60 s
Peak temperature (T_p)	260 °C
Ramp-up rate	3 °C/s max.
Ramp-down rate	3 °C/s to 6 °C/s

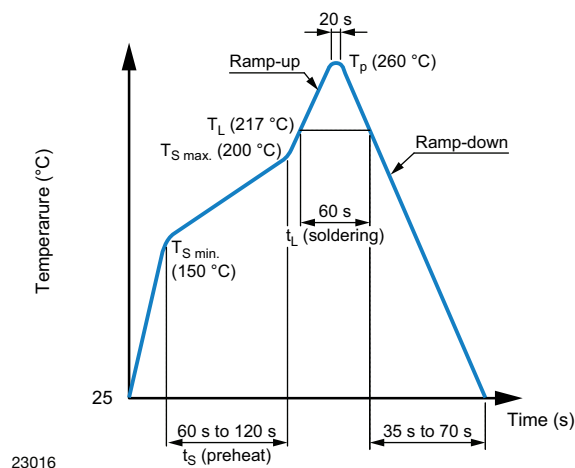


Fig. 16

Wave Soldering (JEDEC JESD22-A111 compliant)

One time soldering is recommended within the condition of temperature.

Temperature: 260 °C + 0 °C / - 5 °C

Time: 10 s

Preheat temperature: 25 °C to 140 °C

Preheat time: 30 s to 80 s

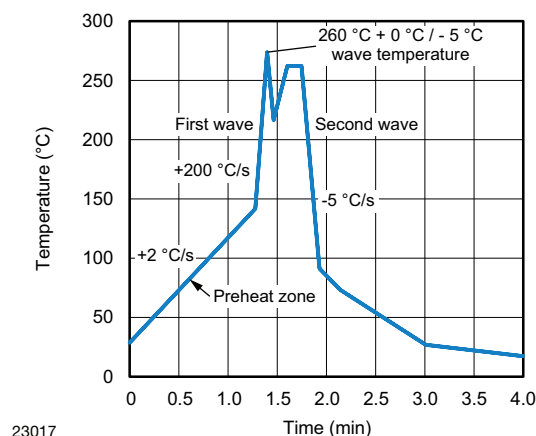


Fig. 17

Hand Soldering by Soldering Iron

Allow single lead soldering in every single process. One time soldering is recommended.

Temperature: 380 °C + 0 °C / - 5 °C

Time: 3 s max.

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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