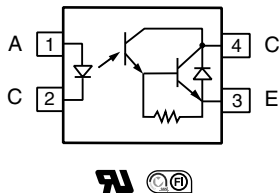




# Optocoupler, Photodarlington Output, High Gain, 300 V $BV_{CEO}$



## FEATURES

- High collector emitter voltage,  $V_{CEO} = 300\text{ V}$
- Low coupling capacitance
- High common mode transient immunity
- Isolation rated voltage  $5000\text{ V}_{RMS}$
- Standard plastic DIP-4 package
- Material categorization:  
for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

## APPLICATIONS

- Telecom
- Industrial controls
- Battery powered equipment
- Office machines
- Programmable controllers

## DESIGN SUPPORT TOOLS AVAILABLE



## DESCRIPTION

The SFH619A has a GaAs infrared emitting diode emitter, which is optically coupled to a silicon photodarlington detector, and is incorporated in a plastic DIP-4 package.

It features a high current transfer ratio, low coupling capacitance, and high isolation voltage.

The coupling device is designed for signal transmission between two electrically separated circuits.

## AGENCY APPROVALS

- [UL](#)
- [cUL](#)
- [CQC](#)

ORDERING INFORMATION												
S	F	H	6	1	9	A	-	X	0	0	#	T
PART NUMBER							PACKAGE OPTION			TAPE AND REEL		
<b>AGENCY CERTIFIED / PACKAGE</b>							<b>CTR (%)</b>					
<b>UL, BSI, FIMKO</b>							<b>≥ 1000</b>					
DIP-4							SFH619A					
SMD-4, option 7							SFH619A-X007T <sup>(1)</sup>					
SMD-4, option 9							SFH619A-X009T <sup>(1)</sup>					

## Notes

- Additional options may be possible, please contact sales office
- <sup>(1)</sup> Also available in tubes; do not put T on the end



ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		$V_R$	6	V
Forward current		$I_F$	50	mA
Power dissipation		$P_{diss}$	70	mW
<b>OUTPUT</b>				
Collector emitter voltage		$V_{CEO}$	300	V
Emitter collector voltage		$V_{ECO}$	0.3	V
Collector current		$I_C$	125	mA
Power dissipation		$P_{diss}$	150	mW
<b>COUPLER</b>				
Total power dissipation		$P_{tot}$	200	mW
Storage temperature		$T_{stg}$	-55 to +125	$^{\circ}\text{C}$
Operating temperature		$T_{amb}$	-55 to +100	$^{\circ}\text{C}$
Soldering temperature	$t = 10\text{ s}$	$T_{slid}$	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

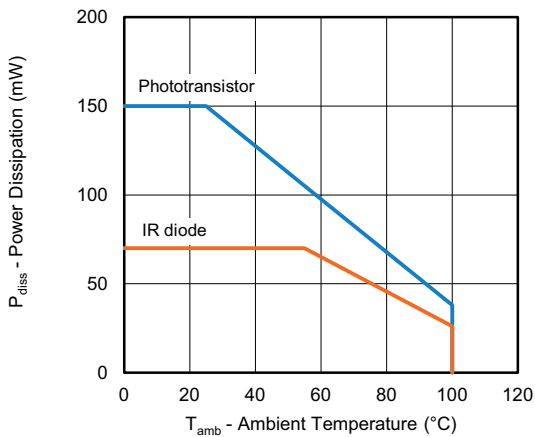


Fig. 1 - Power Dissipation vs. Ambient Temperature

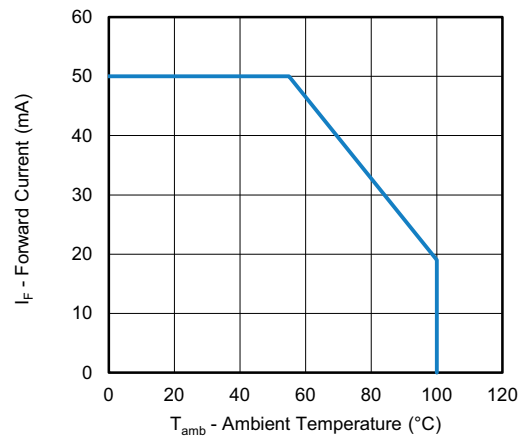


Fig. 2 - Maximum Forward Current vs. Ambient Temperature

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Forward voltage	$I_F = 10\text{ mA}$	$V_F$	-	1.2	1.5	V
Reverse current	$V_R = 6\text{ V}$	$I_R$	-	0.02	10	$\mu\text{A}$
Capacitance	$V_R = 0\text{ V}$	$C_I$	-	30	-	pF
<b>OUTPUT</b>						
Collector emitter breakdown voltage	$I_{CE} = 100\text{ }\mu\text{A}$	$BV_{CEO}$	300	-	-	V
Emitter collector breakdown voltage	$I_{EC} = 100\text{ }\mu\text{A}$	$BV_{ECO}$	0.3	-	-	V
Collector emitter leakage current	$V_{CE} = 200\text{ V}, T_{amb} = 25\text{ }^{\circ}\text{C}$	$I_{CEO}$	-	10	200	nA
	$V_{CE} = 200\text{ V}, T_{amb} = 100\text{ }^{\circ}\text{C}$	$I_{CEO}$	-	-	20	$\mu\text{A}$
<b>COUPLER</b>						
Collector emitter saturation voltage	$I_F = 1\text{ mA}, I_C = 10\text{ mA}$	$V_{CEsat}$	-	-	1	V
Coupling capacitance	$V_{I-O} = 0\text{ V}, f = 1\text{ MHz}$	$C_{I/O}$	-	0.6	-	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

<b>CURRENT TRANSFER RATIO</b>						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
$I_C/I_F$	$I_F = 1\text{ mA}, V_{CE} = 1\text{ V}$	CTR	1000	-	-	%

<b>SWITCHING CHARACTERISTICS</b>						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Turn-on time	$V_{CC} = 10\text{ V}, I_F = 5\text{ mA}, R_L = 100\text{ }\Omega$	$t_{on}$	-	6.5	-	$\mu\text{s}$
Turn-off time	$V_{CC} = 10\text{ V}, I_F = 5\text{ mA}, R_L = 100\text{ }\Omega$	$t_{off}$	-	72	-	$\mu\text{s}$

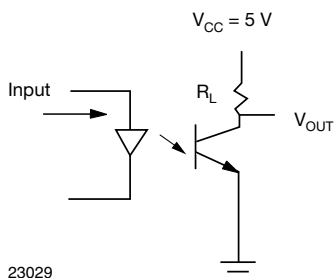


Fig. 3 - Test Circuit for Switching Characteristics

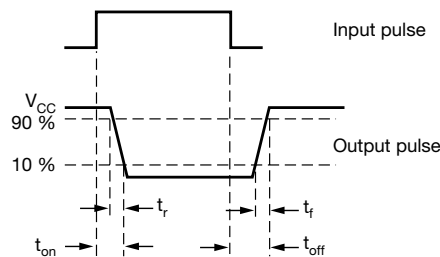


Fig. 4 - Parameter and Limit Definition



SAFETY AND INSULATION RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		55 / 115 / 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 min	$V_{ISO}$	5000	$V_{RMS}$
Maximum transient isolation voltage	According to DIN EN 60747-5-5	$V_{IOTM}$	8000	$V_{peak}$
Maximum repetitive peak isolation voltage	According to DIN EN 60747-5-5	$V_{IORM}$	890	$V_{peak}$
Isolation resistance	$V_{IO} = 500\text{ V}, T_{amb} = 25\text{ }^{\circ}\text{C}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$V_{IO} = 500\text{ V}, T_{amb} = 100\text{ }^{\circ}\text{C}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Output safety power		$P_{SO}$	700	mW
Input safety current		$I_{SI}$	400	mA
Input safety temperature		$T_S$	175	$^{\circ}\text{C}$
Creepage distance			$\geq 7$	mm
Clearance distance			$\geq 7$	mm
Insulation thickness		DTI	$\geq 0.4$	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)

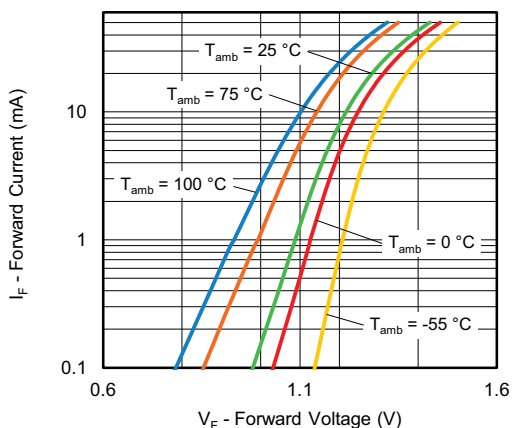


Fig. 5 - Forward Current vs. Forward Voltage

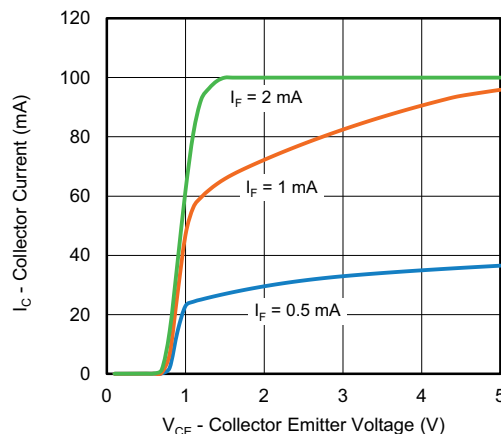


Fig. 6 - Collector Current vs. Collector Emitter Voltage (non-saturated)

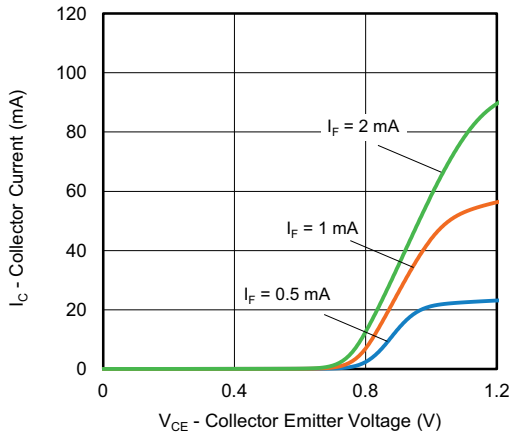


Fig. 7 - Collector Current vs. Collector Emitter Voltage (saturated)

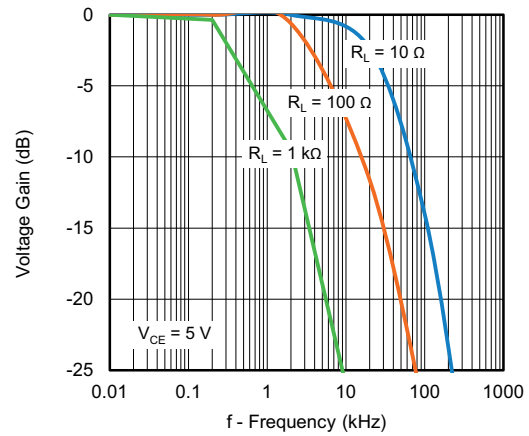


Fig. 10 - Voltage Gain vs. Frequency

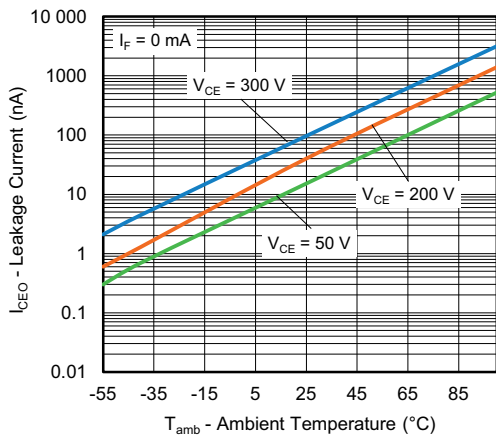


Fig. 8 - Leakage Current vs. Ambient Temperature

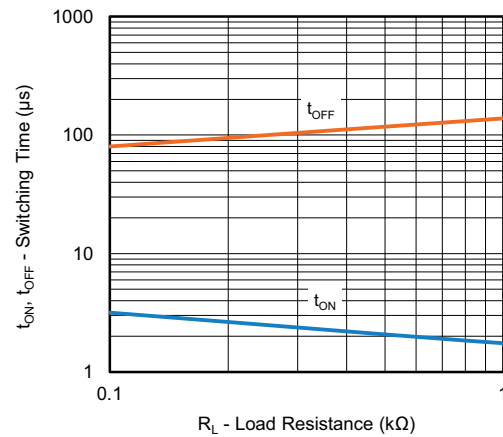


Fig. 11 - Switching Time vs. Load Resistance

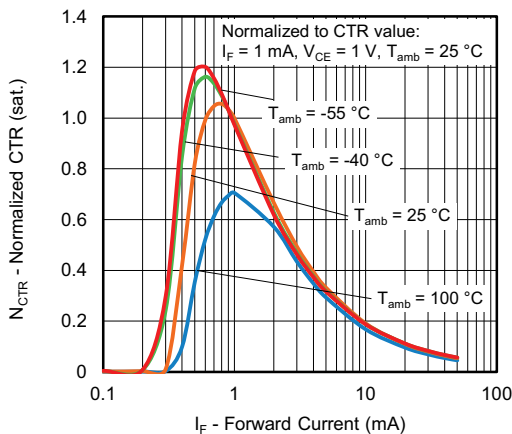
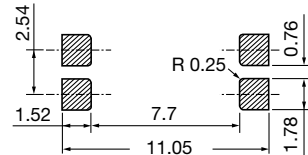
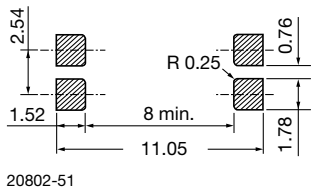
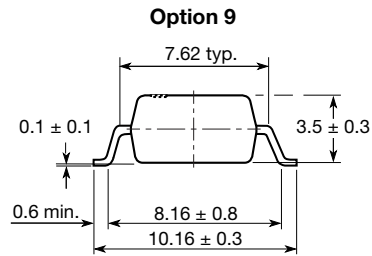
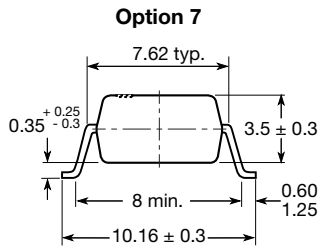
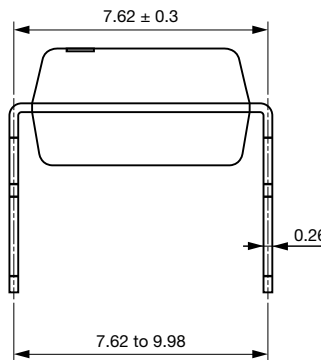
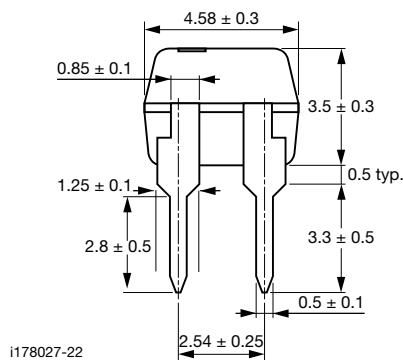
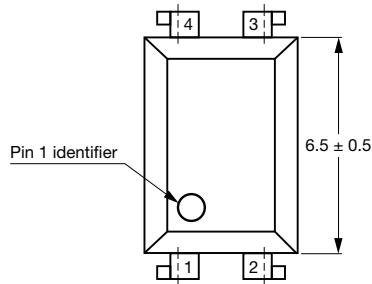


Fig. 9 - Normalized CTR vs. Forward Current



**PACKAGE DIMENSIONS** in millimeters

**4 Pin Package**



20802-51

**PACKAGE MARKING**

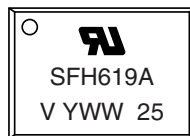


Fig. 12 - Example of SFH619A

**Note**

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



**PACKAGING INFORMATION**

DEVICES PER TUBE			
TYPE	UNITS/TUBE	TUBES/BOX	UNITS/BOX
DIP-4	100	40	4000
SMD-4, option 7	100	40	4000
SMD-4, option 9	100	40	4000

**DIP-4 Tube**

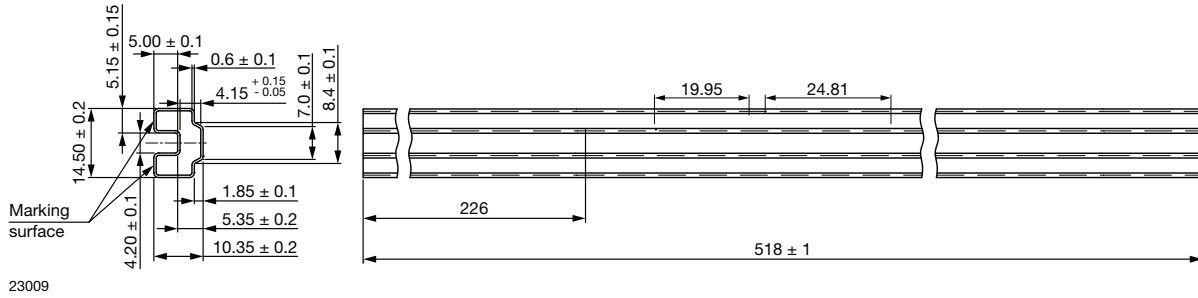


Fig. 13 - Tube

**SMD-4 Tape**

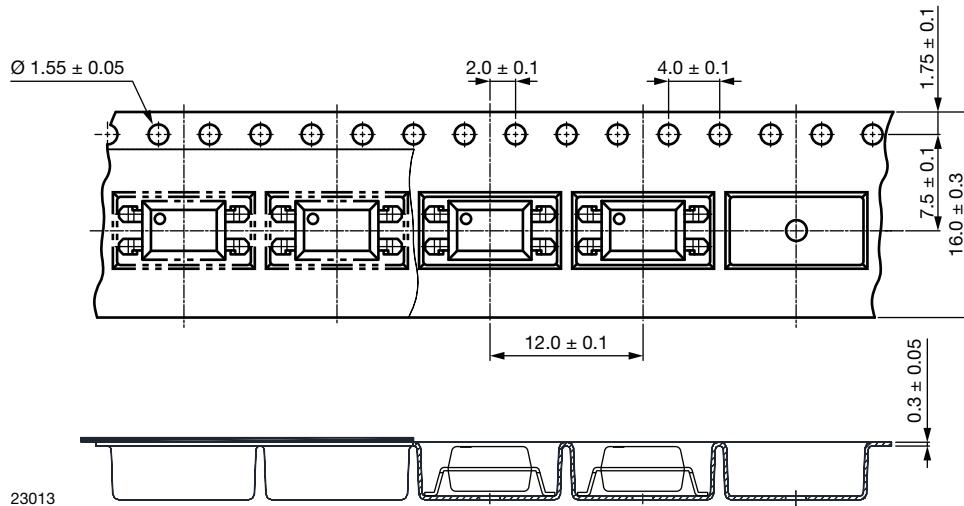


Fig. 14 - Tape and Reel Packaging (1000 pieces on reel)

Reel

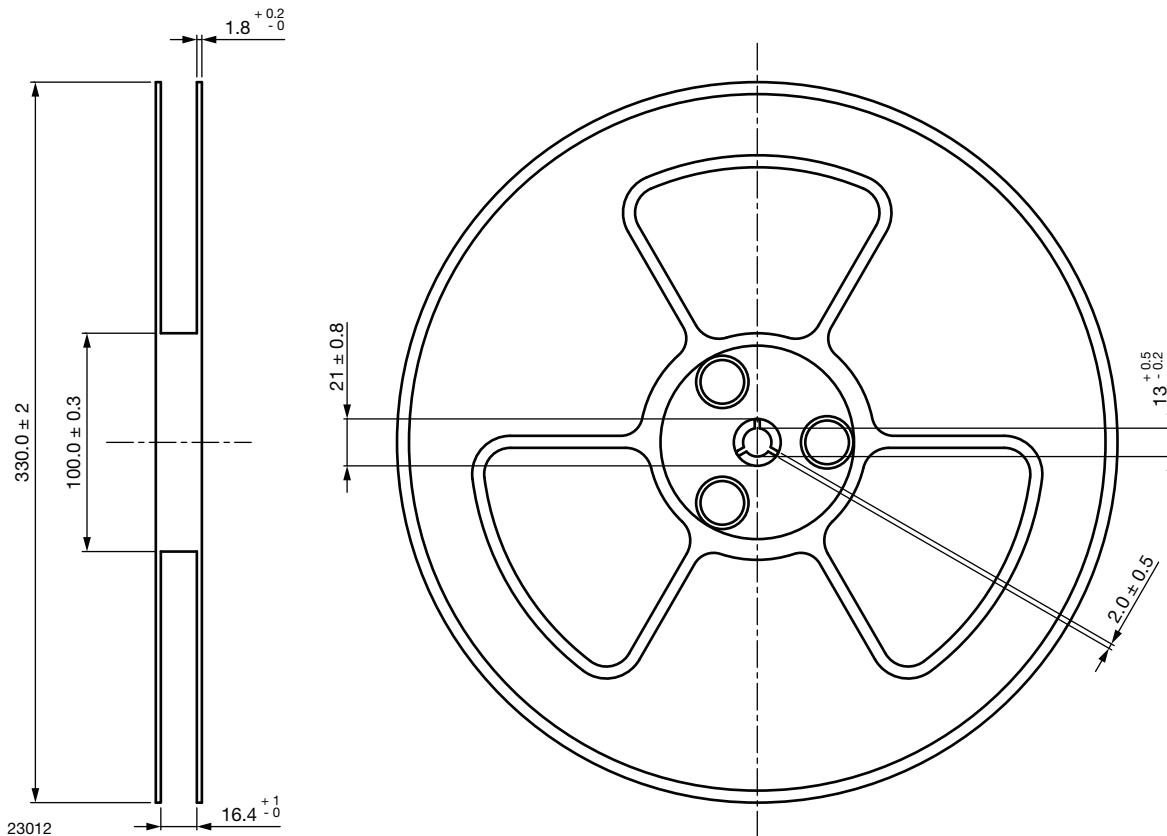


Fig. 15 - Tape and Reel Shipping Medium

**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 ( $T_{S \text{ min.}}$ )	150 °C
- Temperature maximum ( $T_{S \text{ max.}}$ )	200 °C
- Time (min. to max.) ( $t_S$ )	90 s ± 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

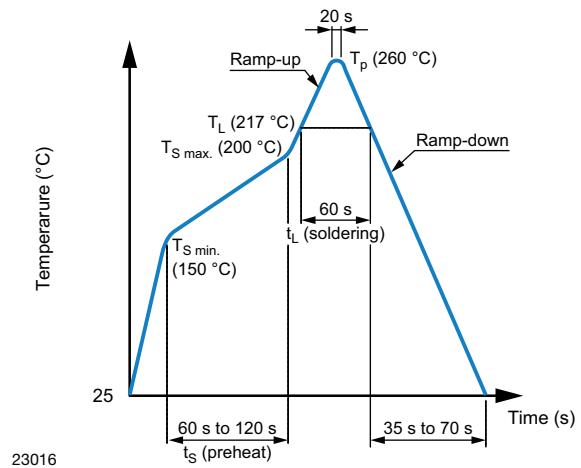


Fig. 16





**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

**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.

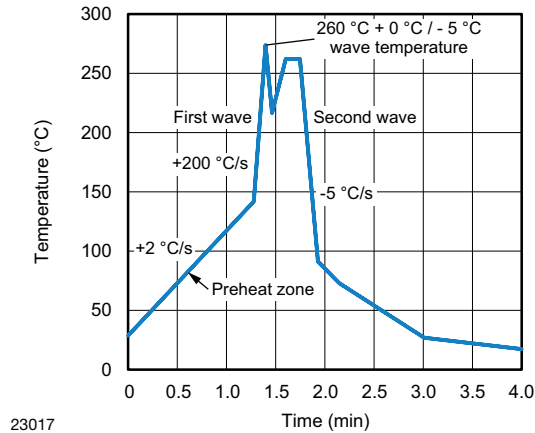


Fig. 17

23017



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