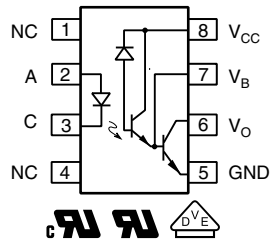
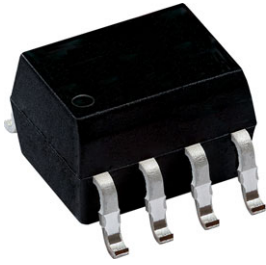


High Speed Optocoupler, 100 kBd, Low Input Current, High Gain



FEATURES

- High current transfer ratio of 2800 % (typ.)
- 0.5 mA low input current
- Small package outline
- Adjustable bandwidth access to base
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT

DESCRIPTION

The SFH6319 is best suited for low power logic applications involving CMOS and low power TTL. A very high current transfer ratio with only 0.5 mA of LED current is guaranteed from 0 °C to 70 °C.

The SFH6319 consists of an infrared LED, optically coupled with an integrated high gain photo detector in a small SOIC-8 package. Separate pins for the photo diode and output stage enable TTL compatible saturation voltages with high speed operation. A photodarlington operation is achieved by tying the V_{CC} and V_O terminals together. Access to the base terminal V_B allows adjustment to the gain bandwidth.

APPLICATIONS

- Logic ground isolation
- Logic voltage level conversion
- Electrical noise isolation

AGENCY APPROVALS

- UL (pending)
- cUL (pending)
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1 (pending)

ORDERING INFORMATION	
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px;">S</div> <div style="border: 1px solid black; padding: 2px 5px;">F</div> <div style="border: 1px solid black; padding: 2px 5px;">H</div> <div style="border: 1px solid black; padding: 2px 5px;">6</div> <div style="border: 1px solid black; padding: 2px 5px;">3</div> <div style="border: 1px solid black; padding: 2px 5px;">1</div> <div style="border: 1px solid black; padding: 2px 5px;">9</div> <div style="border: 1px solid black; padding: 2px 5px;">T</div> </div> <p style="text-align: center; margin-top: 5px;">PART NUMBER TAPE AND REEL</p>	
AGENCY CERTIFIED / PACKAGE	CTR (%)
UL, cUL	≥ 500
SOIC-8	SFH6319T

Note

- Additional options may be possible, please contact sales office



ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Reverse voltage		V _R	5	V
Input power dissipation		P _{diss}	35	mW
Average input forward current		I _F	20	mA
OUTPUT				
Output voltage		V _O	-0.5 to 18	V
Output current		I _O	60	mA
Supply voltage		V _{CC}	-0.5 to 18	V
Output power dissipation		P _{diss}	100	mW
COUPLER				
Storage temperature		T _{stg}	-55 to +125	°C
Lead soldering temperature	t = 10 s	T _{sld}	260	°C
Ambient temperature range		T _{amb}	-55 to +100	°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 °C to 70 °C; typical values are at T _{amb} = 25 °C)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
Reverse voltage	I _R = 10 μA	BV _R	5	-	-	V
Forward voltage	I _F = 1.6 mA	V _F	-	-	1.8	V
Temperature coefficient of forward voltage	I _F = 1.6 mA	ΔV _F /ΔT _{amb}	-	-1.8	-	mV/°C
Input capacitance	f = 1 MHz, V _F = 0	C _{IN}	-	24	-	pF
OUTPUT						
Logic low output voltage ⁽¹⁾	I _F = 0.5 mA, I _O = 2 mA, V _{CC} = 4.5 V	V _{OL}	-	0.06	0.1	V
	I _F = 1.6 mA, I _O = 8 mA, V _{CC} = 4.5 V	V _{OL}	-	0.1	0.4	V
	I _F = 5 mA, I _O = 15 mA, V _{CC} = 4.5 V	V _{OL}	-	0.1	0.4	V
	I _F = 12 mA, I _O = 24 mA, V _{CC} = 4.5 V	V _{OL}	-	0.2	0.4	V
Logic high output current ⁽¹⁾	I _F = 0 mA, V _O = V _{CC} = 18 V, T _{amb} = 25 °C	I _{OH}	-	0.3	100	μA
Logic low supply current ⁽¹⁾	I _F = 1.6 mA, V _O = OPEN, V _{CC} = 18 V	I _{CC} L	-	0.7	1.5	mA
Logic high supply current ⁽¹⁾	I _F = 0 mA, V _O = OPEN, V _{CC} = 18 V	I _{CC} H	-	0.07	10	μA
COUPLER						
Capacitance (input to output) ⁽²⁾	f = 1 MHz	C _{IO}	-	1.1	-	pF

Notes

- 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.

(1) Pin 7 open

(2) Device considered a two-terminal device: pins 1, 2, 3, and 4 shorted together and pins 5, 6, 7, and 8 shorted together

CURRENT TRANSFER RATIO (T _{amb} = 0 °C to 70 °C; typical values are at T _{amb} = 25 °C)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Current transfer ratio ⁽¹⁾	I _F = 0.5 mA, V _O = 0.4 V, V _{CC} = 4.5 V	CTR	400	1800	5000	%
	I _F = 1.6 mA, V _O = 0.5 V, V _{CC} = 4.5 V	CTR	500	2800	3500	%

Notes

- DC current transfer ratio is defined as the ratio of output collector current, I_O, to the forward LED input current, I_F times 100 %

(1) Pin 7 open

SWITCHING CHARACTERISTICS ($T_{amb} = 0\text{ }^{\circ}\text{C}$ to $70\text{ }^{\circ}\text{C}$; typical values are at $T_{amb} = 25\text{ }^{\circ}\text{C}$)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Propagation delay time to low output level ⁽¹⁾	$I_F = 0.5\text{ mA}$, $R_L = 4.7\text{ k}\Omega$	t_{PHL}	-	-	25	μs
Propagation delay time to high output level ⁽¹⁾	$I_F = 12\text{ mA}$, $R_L = 270\text{ }\Omega$	t_{PHL}	-	-	3	μs
Propagation delay time to high output level ⁽¹⁾	$I_F = 0.5\text{ mA}$, $R_L = 4.7\text{ k}\Omega$	t_{PLH}	-	-	60	μs
Propagation delay time to high output level ⁽¹⁾	$I_F = 12\text{ mA}$, $R_L = 270\text{ }\Omega$	t_{PLH}	-	-	20	μs

Note

(1) Pin 7 open

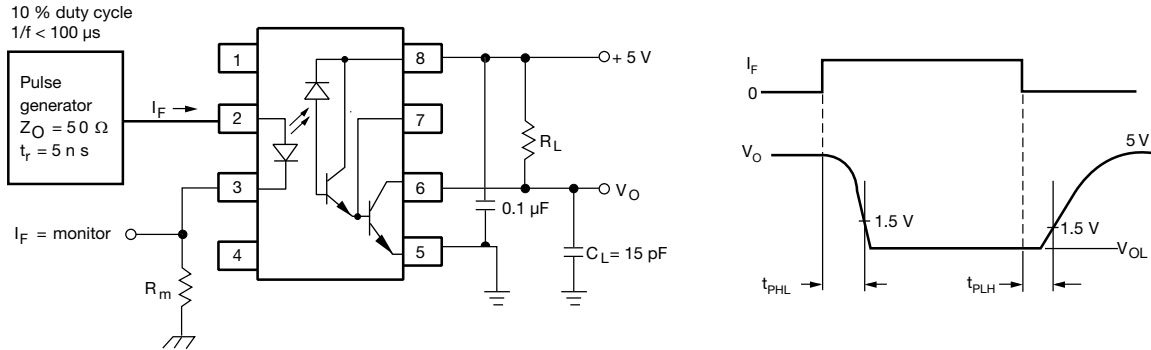


Fig. 1 - Switching Test Circuit

COMMON MODE TRANSIENT IMMUNITY ($T_{amb} = 25\text{ }^{\circ}\text{C}$)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Common mode transient immunity at logic high level output	$I_F = 0\text{ mA}$, $R_L = 2.2\text{ k}\Omega$, $V_{CM} = 10\text{ V}_{PP}$	$ CM_H $	1000	10 000	-	$\text{V}/\mu\text{s}$
Common mode transient immunity at logic low level output	$I_F = 1.6\text{ mA}$, $R_L = 2.2\text{ k}\Omega$, $V_{CM} = 10\text{ V}_{PP}$	$ CM_L $	1000	10 000	-	$\text{V}/\mu\text{s}$

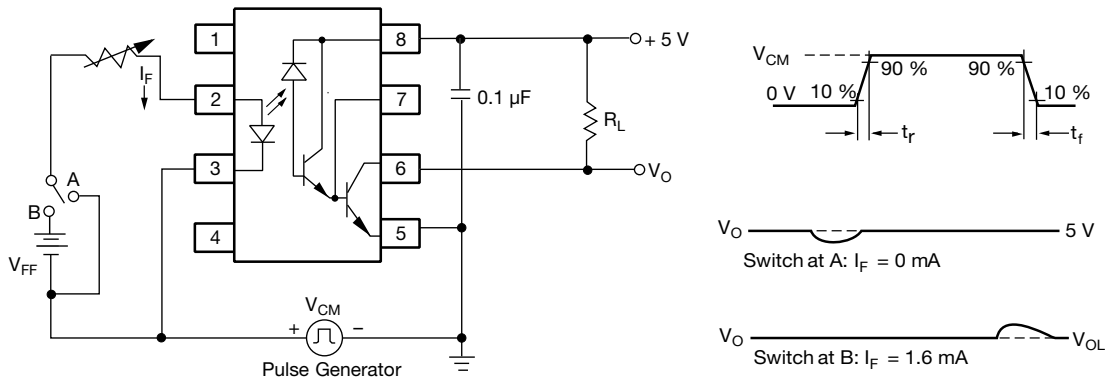


Fig. 2 - Test Circuit for Transient Immunity and Typical Waveforms

SAFETY AND INSULATION RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		40 / 100 / 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}	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}	560	V_{peak}
Isolation resistance	$V_{IO} = 500\text{ V}$, $T_{amb} = 25\text{ }^{\circ}\text{C}$	R_{IO}	$\geq 10^{12}$	Ω
	$V_{IO} = 500\text{ V}$, $T_{amb} = 100\text{ }^{\circ}\text{C}$	R_{IO}	$\geq 10^{11}$	Ω
	$V_{IO} = 500\text{ V}$, $T_{amb} = T_S$	R_{IO}	$\geq 10^9$	Ω
Output safety power		P_{SO}	100	mW
Input safety current		I_{SI}	20	mA
Safety temperature		T_S	150	$^{\circ}\text{C}$
Creepage distance			≥ 5	mm
Clearance distance			≥ 5	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.

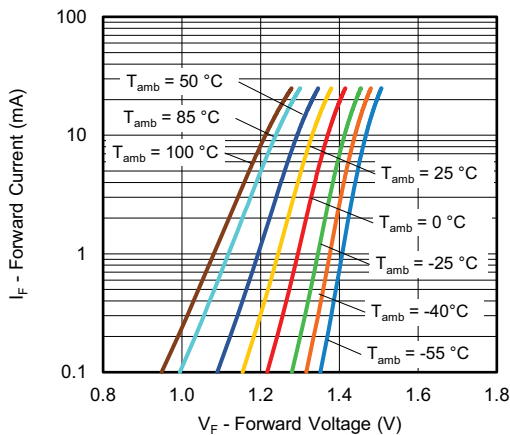
TYPICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)


Fig. 3 - Forward Current vs. Forward Voltage

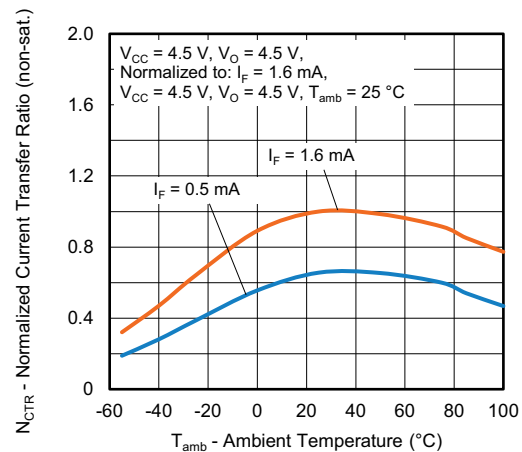


Fig. 4 - Normalized Current Transfer Ratio (non-saturated) vs. Ambient Temperature

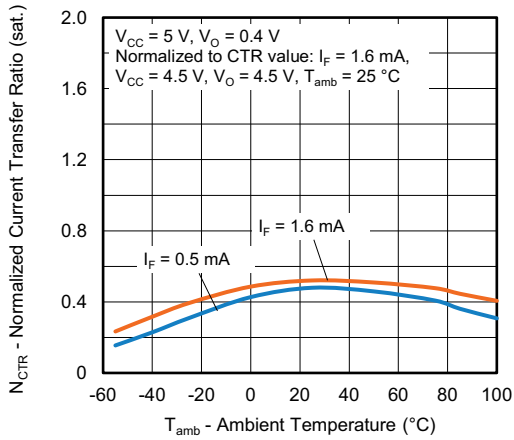


Fig. 5 - Normalized Current Transfer Ratio (saturated) vs. Ambient Temperature

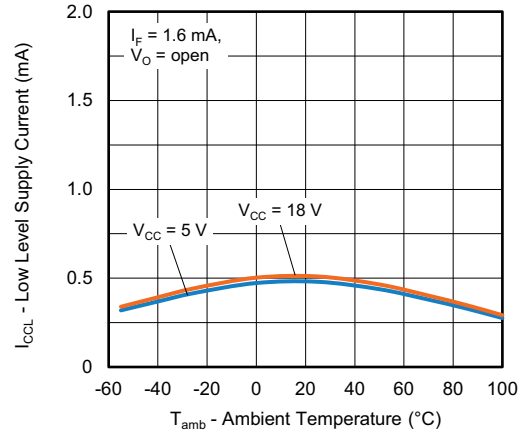


Fig. 8 - Low Level Supply Current vs. Ambient Temperature

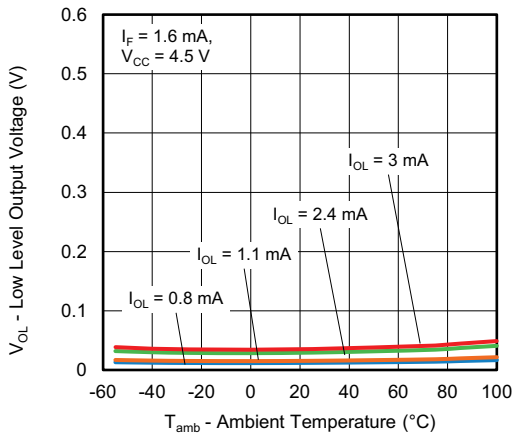


Fig. 6 - Low Level Output Voltage vs. Ambient Temperature

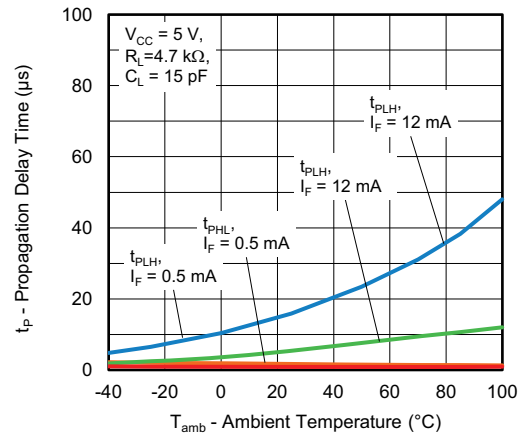


Fig. 9 - Propagation Delay Time vs. Ambient Temperature

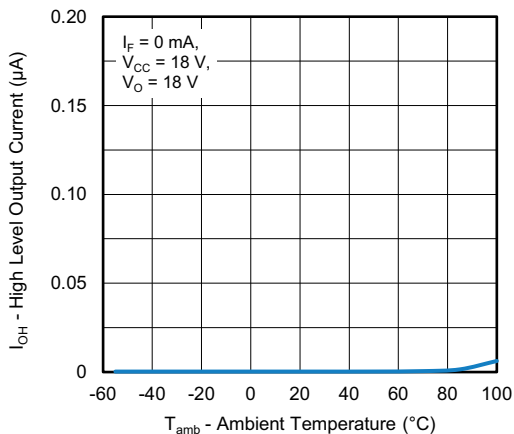


Fig. 7 - Low Level Supply Current vs. Ambient Temperature

PACKAGE DIMENSIONS (in millimeters)

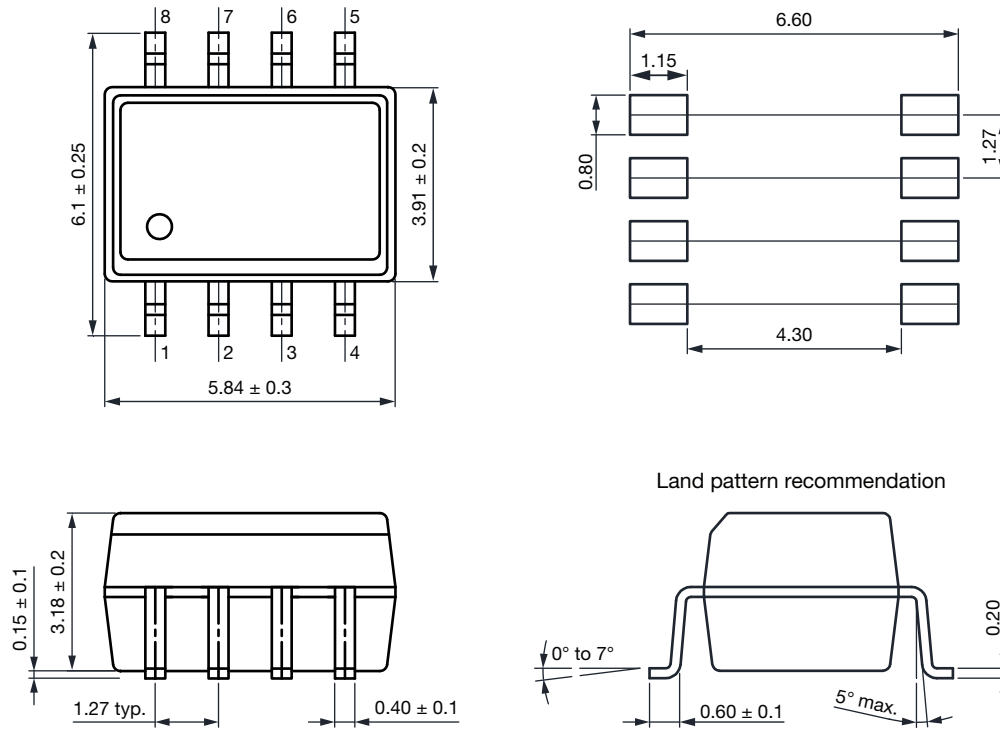


Fig. 10 - Package Drawing

PACKAGE MARKING

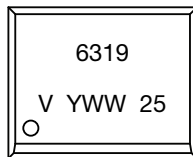


Fig. 11 - Example of SFH6319T

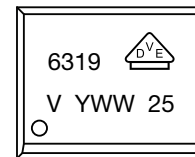


Fig. 12 - Example of SFH6319-X001T

Notes

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

PACKING INFORMATION (in millimeters)
SOIC-8 Tape

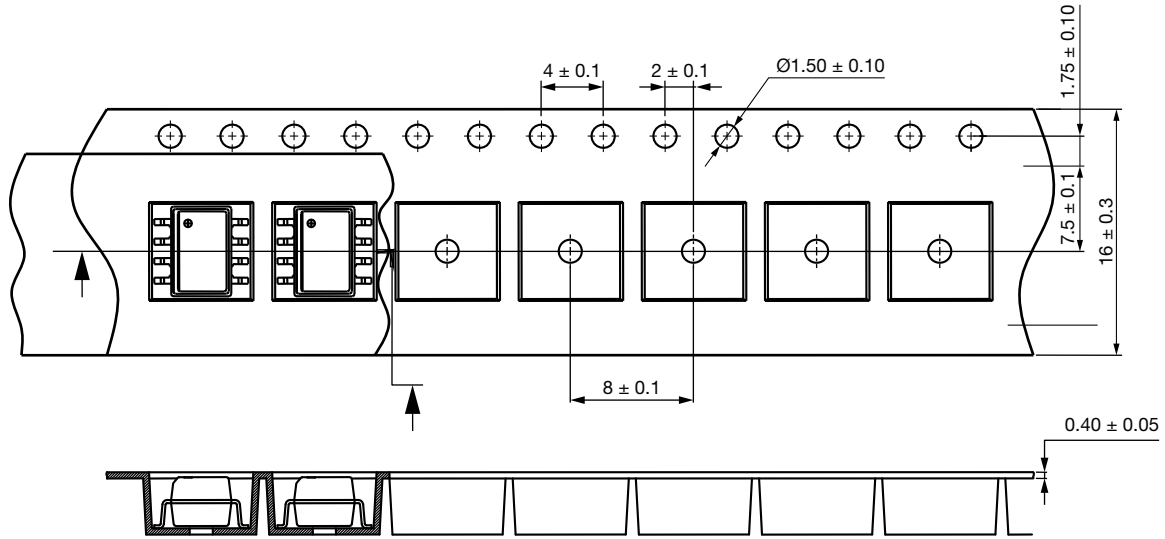


Fig. 13 - Tape and Reel Packaging (2000 pieces on reel)

Reel

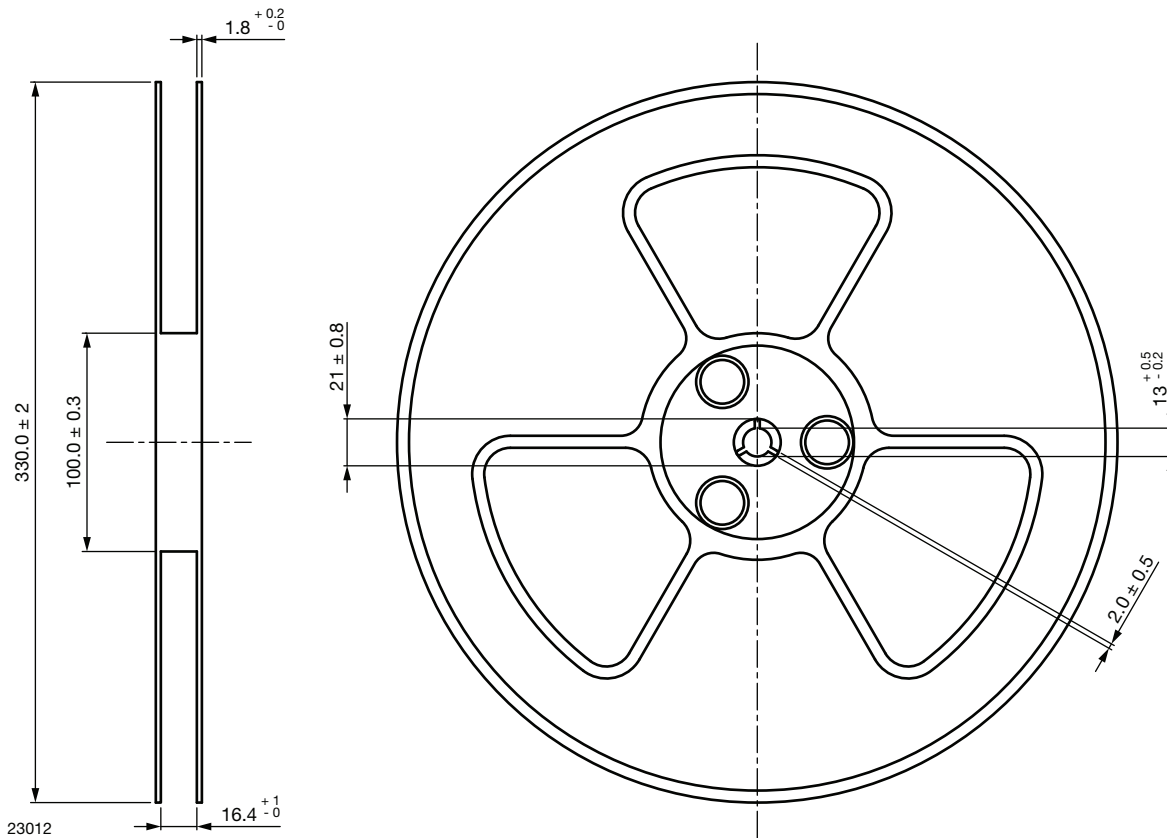


Fig. 14 - Tape and Reel Shipping Medium

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

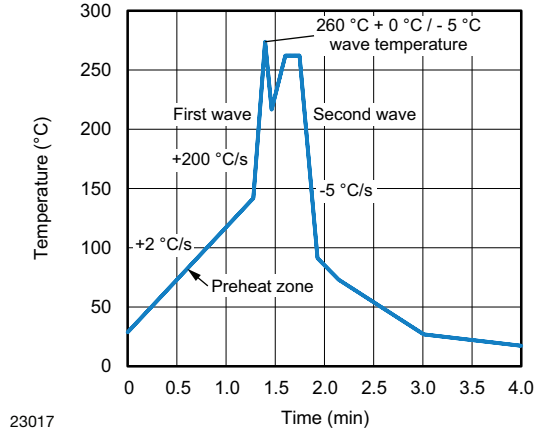


Fig. 16

23017

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 1C

Floor life: unlimited

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

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

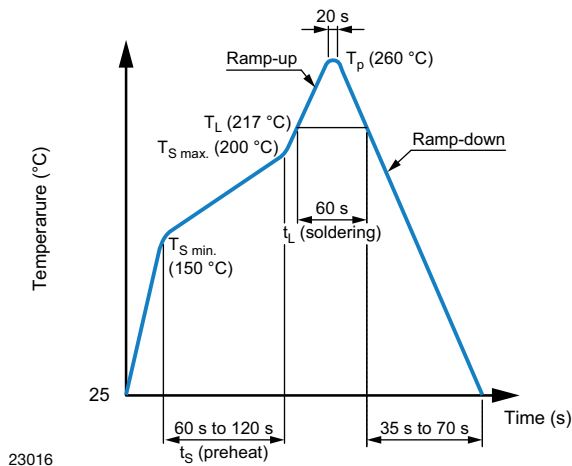


Fig. 15

23016

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



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