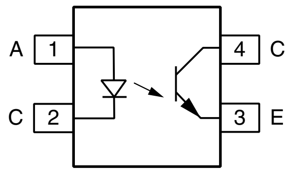
Optocoupler, Phototransistor Output, Low Input Current, SOP-4, Mini-Flat Package



FEATURES

- AEC-Q102 qualified
- High CTR with low input current
- SOP-4 low profile package
- High collector emitter voltage, V_{CEO} = 80 V
- Isolation test voltage = 3750 V_{RMS}
- Low coupling capacitance
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

LINKS TO ADDITIONAL RESOURCES

3D Models | Models | Related Documents

DESCRIPTION

The VOMA617A series has a GaAlAs infrared emitting diode, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a 4-pin mini-flat package.

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

The coupling devices are designed for signal transmission between two electrically separated circuits, specifically for use in automotive, as well as high reliable industrial applications.

APPLICATIONS

- Galvanic and noise isolation
- Signal transmission
- Hybrid / electric vehicle applications
- Battery management
- 48 V board net
- System control

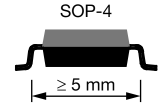
AGENCY APPROVALS

- UL1577
- cUL 1577
- DIN EN 60747-5-5 (VDE 0884-5)
- CQC GB4943.1-2011

ORDERING INFORMATION

V	O	M	A	6	1	7	A	-	#	X	0	0	1	T
PART NUMBER									CTR BIN	PACKAGE OPTION				TAPE AND REEL

SOP-4



AGENCY CERTIFIED / PACKAGE	CTR (%)			
	5 mA			
UL, cUL, VDE, CQC	**50 to 600**	**100 to 200**	**160 to 320**	**130 to 260**
SOP-4	VOMA617A-X001T	VOMA617A-3X001T	VOMA617A-4X001T	VOMA617A-8X001T

Note

- Additional options may be possible, please contact sales office

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ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
Reverse voltage		V_R	5	V
Power dissipation		P_{diss}	30	mW
Forward current		I_F	20	mA
Surge forward current	$t_p \leq 10$ μs	I_{FSM}	0.5	A
Junction temperature		T_j	125	°C
OUTPUT				
Collector emitter voltage		V_{CEO}	80	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	50	mA
Power dissipation		P_{diss}	150	mW
Junction temperature		T_j	125	°C
COUPLER				
Total power dissipation		P_{tot}	180	mW
Storage temperature range		T_{stg}	-40 to +150	°C
Ambient temperature range		T_{amb}	-40 to +110	°C
Soldering temperature	t = 10 s	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

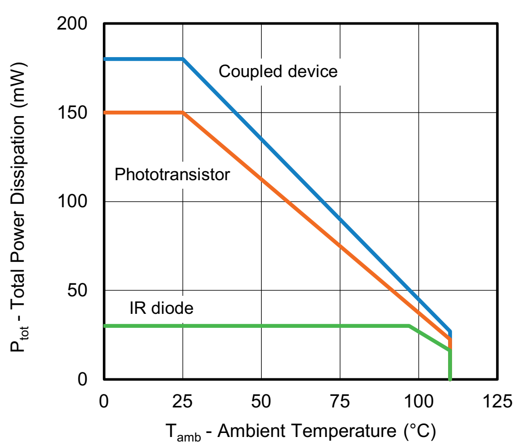

Fig. 1 - Power Dissipation vs. Ambient Temperature

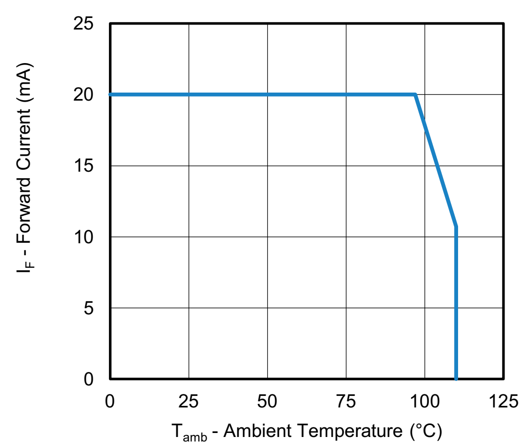

Fig. 2 - Maximum Forward Current vs. Ambient Temperature

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ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Forward voltage	I_F = 5 mA	V_F	-	1.33	1.5	V
Reverse current	V_R = 5 V	I_R	-	-	10	μA
Capacitance	V_R = 0 V, f = 1 MHz	C_I	-	40	-	pF
Thermal resistance		R_{thJA}	-	1000	-	K/W
OUTPUT						
Collector emitter leakage current	V_{CE} = 50 V	I_{CEO}	-	1	100	nA
Collector emitter breakdown voltage	I_C = 100 μA	BV_{CEO}	80	-	-	V
Collector emitter capacitance	V_{CE} = 5 V, f = 1 MHz	C_{CE}	-	7	-	pF
Thermal resistance		R_{thJA}	-	667	-	K/W
COUPLER						
Collector emitter saturation voltage	I_F = 5 mA, I_C = 1.25 mA	V_{CEsat}	-	0.25	0.4	V
Cut-off frequency	I_F = 10 mA, V_{CC} = 5 V, R_L = 100 Ω	f_{CTR}	-	165	-	kHz
Coupling capacitance	f = 1 MHz	C_{IO}	-	1.2	-	pF
Thermal resistance		R_{thJA}	-	556	-	K/W

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} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
I_C/I_F	I_F = 5 mA, V_{CE} = 5 V	VOMA617A	CTR	50	-	600	%
		VOMA617A-3	CTR	100	-	200	%
		VOMA617A-4	CTR	160	-	320	%
		VOMA617A-8	CTR	130	-	260	%

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
NON-SATURATED						
Rise time	I_C = 2 mA, V_{CC} = 5 V, R_L = 100 Ω	t_r	-	1.8	-	μs
Fall time		t_f	-	2.2	-	μs
Turn-on time		t_{on}	-	2.5	-	μs
Turn-off time		t_{off}	-	3.0	-	μs
SATURATED						
Rise time	I_F = 5 mA, V_{CC} = 5 V, R_L = 1.9 kΩ	t_r	-	1.2	-	μs
Fall time		t_f	-	5.7	-	μs
Turn-on time		t_{on}	-	1.7	-	μs
Turn-off time		t_{off}	-	11.2	-	μs

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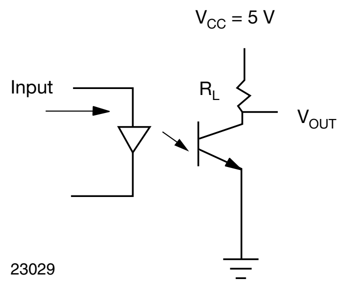

Fig. 3 - Test Circuit for Switching Characteristics

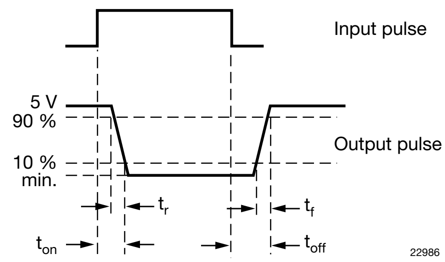

Fig. 4 - Parameter and Limit Definition

SAFETY AND INSULATION RATINGS				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Climatic classification	According to IEC 68 part 1		40 / 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 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
	T_{amb} = T_S, V_{IO} = 500 V	R_{IO}	$\geq 10^{9}$	Ω
Output safety power		P_{SO}	550	mW
Input safety current		I_{SI}	180	mA
Input safety temperature		T_S	175	°C
Creepage distance			≥ 5	mm
Clearance distance			≥ 5	mm

Note

- As per IEC 60747-5-5, § 5.5.4.9.3, 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.

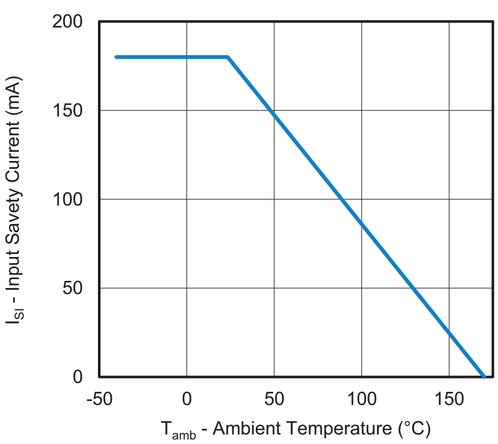

Fig. 5 - Input Safety Current vs. Ambient Temperature

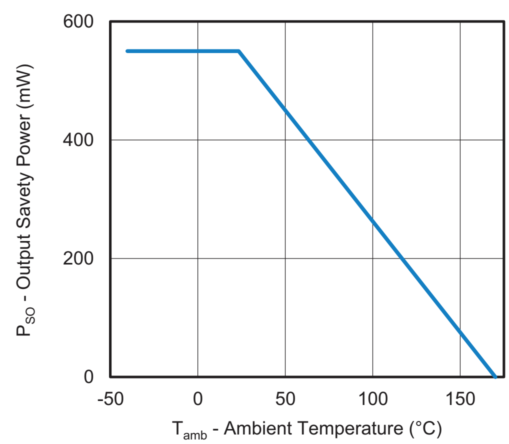

Fig. 6 - Output Safety Power vs. Ambient Temperature

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

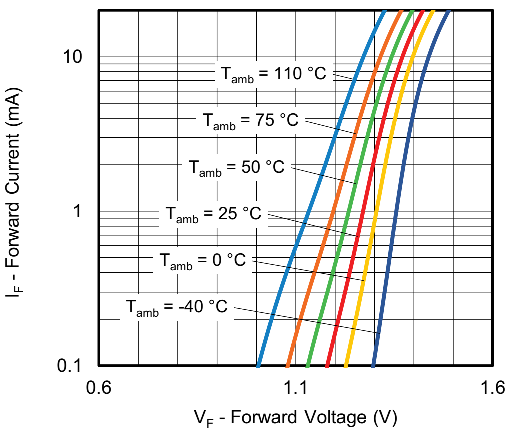

Fig. 7 - Forward Current vs. Forward Voltage

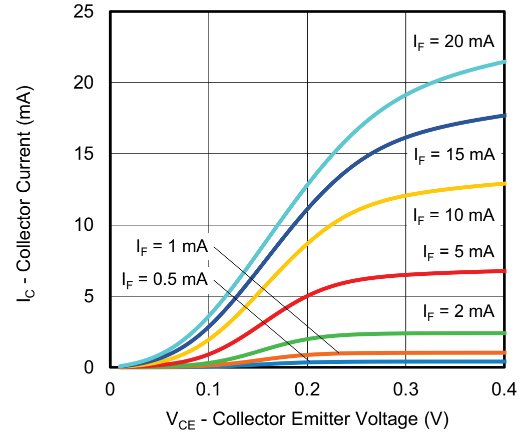

Fig. 10 - Collector Current vs. Collector Emitter Voltage (sat.)

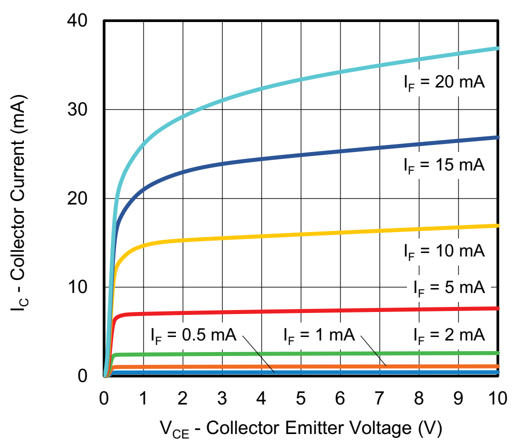

Fig. 8 - Collector Current vs. Collector Emitter Voltage (non-sat.)

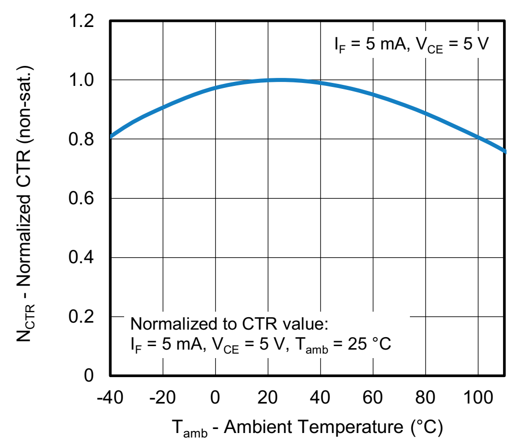

Fig. 11 - Normalized CTR (non-sat.) vs. Ambient Temperature

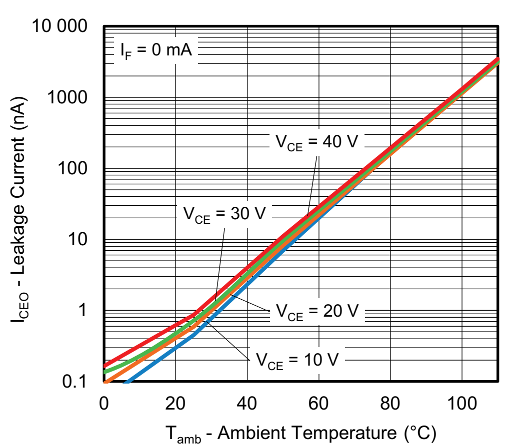

Fig. 9 - Leakage Current vs. Ambient Temperature

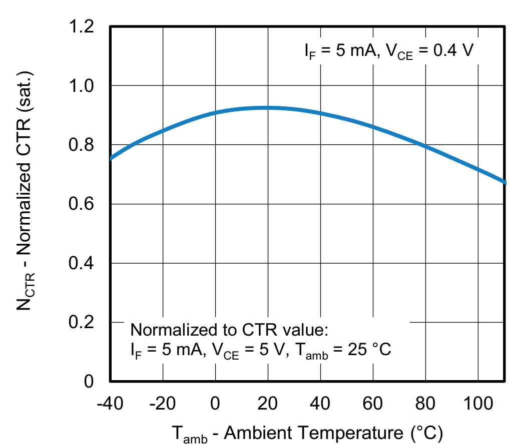

Fig. 12 - Normalized CTR (sat.) vs. Ambient Temperature

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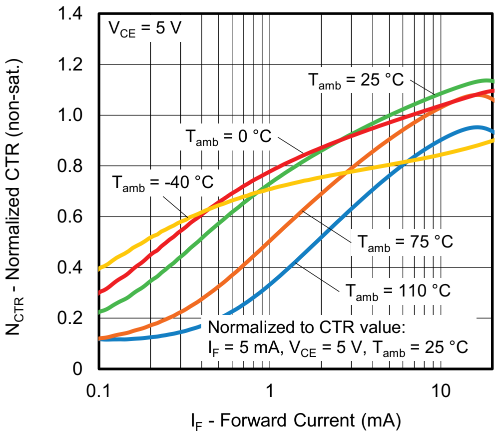

Fig. 13 - Normalized CTR (non-sat.) vs. Forward Current

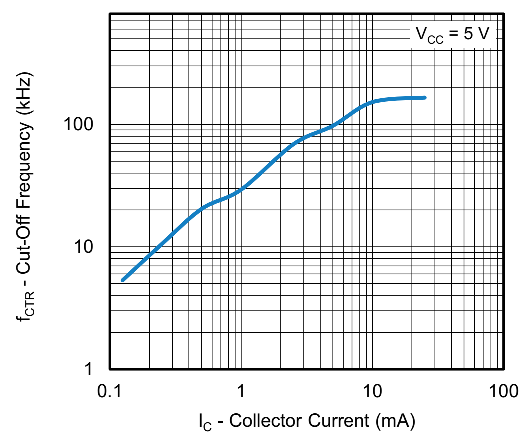

Fig. 16 - Cut-Off Frequency vs. Collector Current

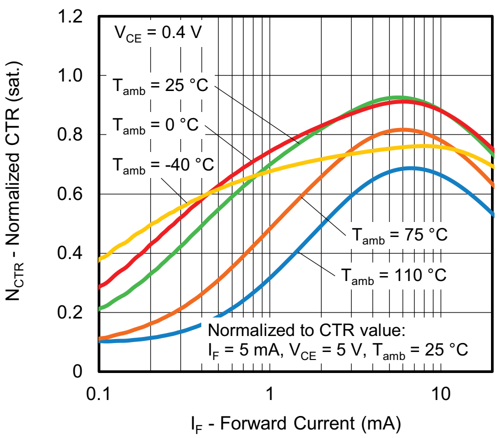

Fig. 14 - Normalized CTR (sat.) vs. Forward Current

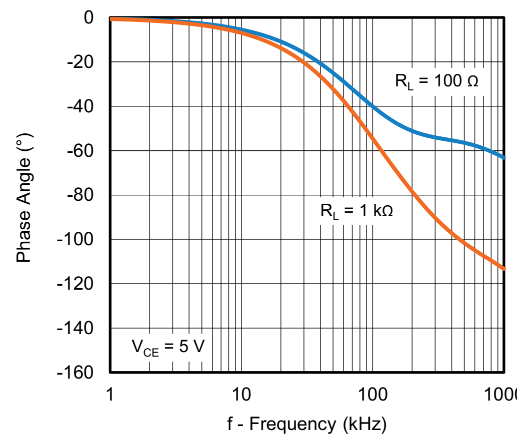

Fig. 17 - Phase Angle vs. Frequency

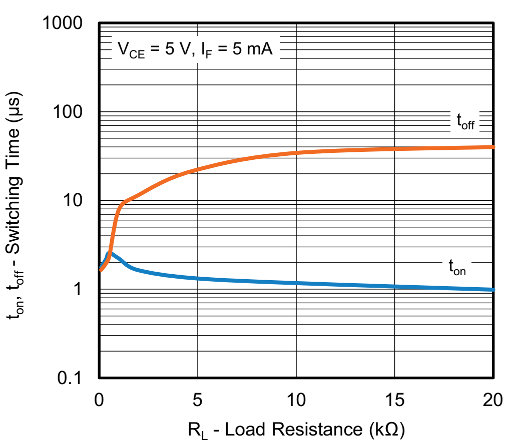

Fig. 15 - Switching Time vs. Load Resistance

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PACKAGE DIMENSIONS (in millimeters)

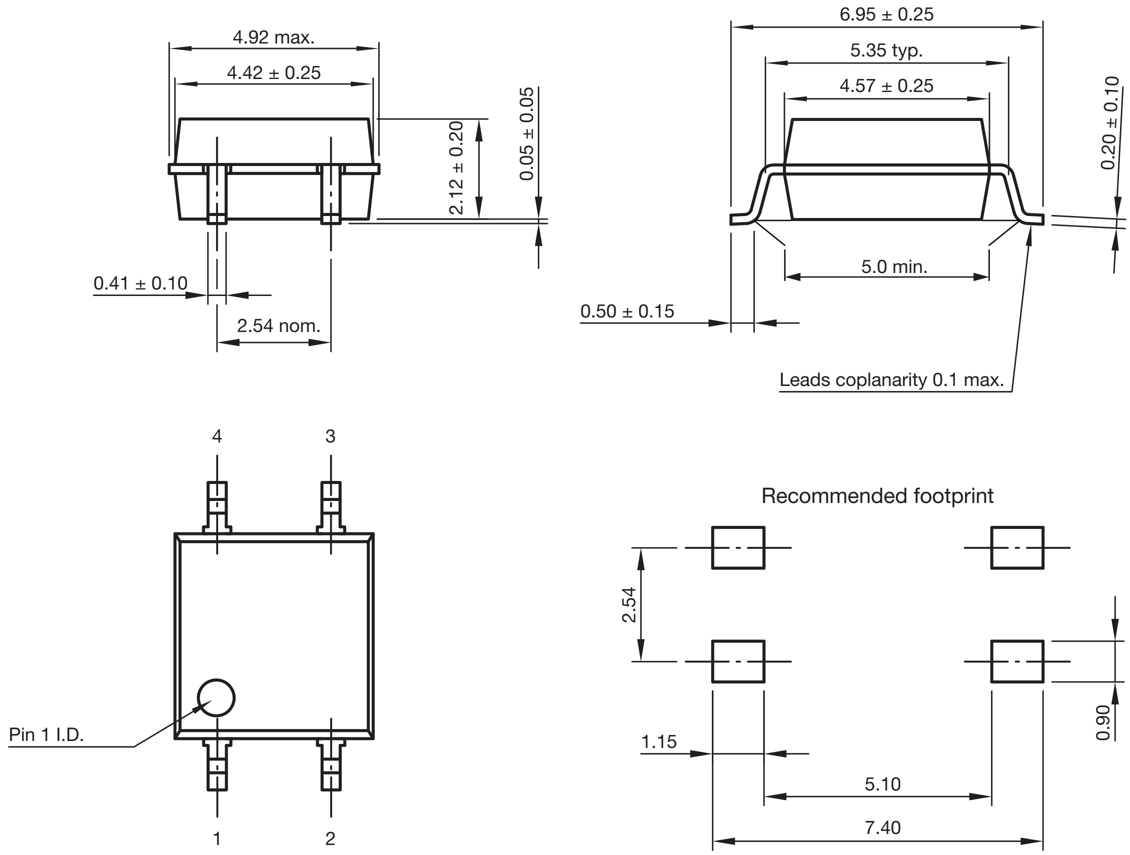
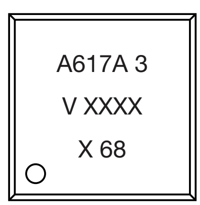


Fig. 18 - Package Drawing

PACKAGE MARKING (example of VOMA617A-3X001T)



Notes

- XXXX = LMC (lot marking code)
- Option 1 is reflected with letter "X"
- Tape and reel suffix (T) is not part of the package marking

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PACKAGING INFORMATION (in millimeters)

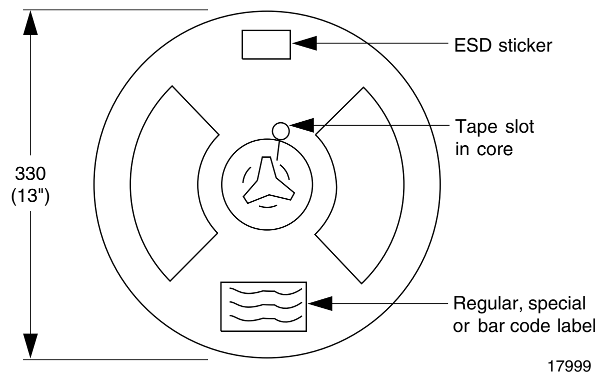
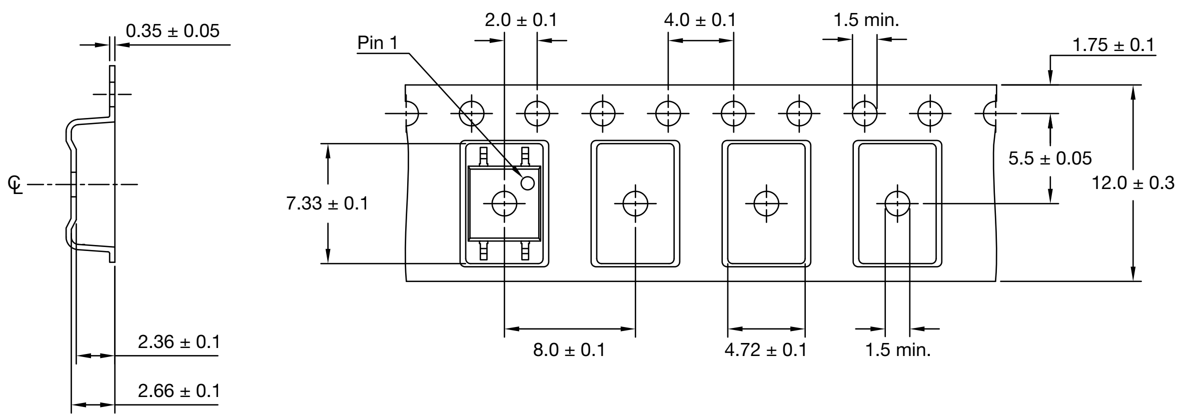


Fig. 19 - Tape and Reel Shipping Medium
(EIA-481, revision A, and IEC 60286)



Note

- Cummulative tolerance of 10 spocket holes is 0.20 mm

Fig. 20 - Tape and Reel Packing

TAPE AND REEL PACKING	
TYPE	**UNITS/REEL**
SOP-4	2000

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SOLDER PROFILES

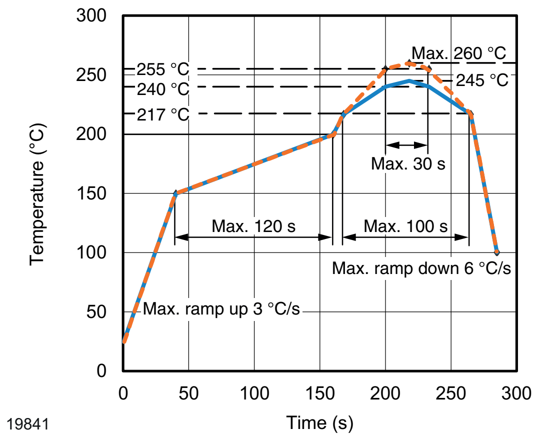

Fig. 21 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020 for SMD Devices

HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

DRYPACK

Devices are packed in moisture barrier bags (MBB) to prevent the products from moisture absorption during transportation and storage. Each bag contains a desiccant.

FLOOR LIFE

Floor life (time between soldering and removing from MBB) must not exceed the time indicated on MBB label:

Floor life: 168 h

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

Moisture sensitivity level 3, according to J-STD-020.

DRYING

In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-033D.

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