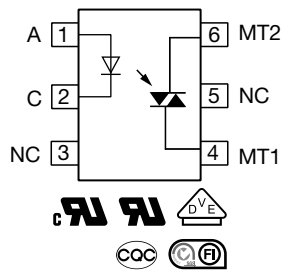




# Optocoupler, Phototriac Output, Non-Zero Crossing, 250 V<sub>DRM</sub>



22897-1



## FEATURES

- 250 V blocking voltage
- Wide range of trigger current
- 100 mA<sub>RMS</sub> on-state current
- Wide temperature range -55 °C to +100 °C
- Material categorization:  
for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

## APPLICATIONS

- Power TRIAC driver
- Isolated AC load switch
- Air condition
- Heaters
- White goods
- Industrial controls
- Office equipment

## LINKS TO ADDITIONAL RESOURCES



## DESCRIPTION

The K301xP series consists of a phototriac optically coupled to a gallium arsenide infrared-emitting diode in a 6-lead plastic dual inline package.

The non-zero crossing functionality enables full wave control. Featuring galvanic and electrical noise isolation, the output is able to directly switch AC loads or drive medium to high power TRIACs.

## AGENCY APPROVALS

- [UL](#)
- [cUL](#)
- [DIN EN 60747-5-5 \(VDE 0884-5\)](#)
- [CQC: GB4943-1-2011](#)
- [CQC: GB8898-2011](#)
- [FIMKO](#)

ORDERING INFORMATION		
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin: 2px;">K</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">3</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">0</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">1</div> </div> <p style="text-align: center;">PART NUMBER</p>	<div style="border: 1px solid black; padding: 5px; margin: 2px;">X</div> <p>TRIGGER CURRENT I<sub>FT</sub></p>	<div style="border: 1px solid black; padding: 5px; margin: 2px;">P</div>
AGENCY CERTIFIED / PACKAGE	TRIGGER CURRENT, I <sub>FT</sub>	
VDE, cUL, CQC, FIMKO	5 mA	15 mA
DIP-6	K3012P	K3010P

### Note

- Additional options may be possible, please contact sales office



ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		$V_R$	5	V
Forward current		$I_F$	80	mA
Forward surge current	$t_p \leq 10\text{ }\mu\text{s}$	$I_{FSM}$	3	A
Power dissipation		$P_{diss}$	100	mW
Junction temperature		$T_j$	125	$^{\circ}\text{C}$
<b>OUTPUT</b>				
Off state output terminal voltage		$V_{DRM}$	250	V
On state RMS current		$I_{TRM}$	100	mA
Peak surge current, non-repetitive	$t_p \leq 10\text{ ms}$	$I_{TMS}$	1.5	A
Power dissipation		$P_{diss}$	300	mW
Junction temperature		$T_j$	125	$^{\circ}\text{C}$
<b>COUPLER</b>				
Total power dissipation		$P_{tot}$	350	mW
Storage temperature range		$T_{stg}$	-55 to +150	$^{\circ}\text{C}$
Ambient temperature range		$T_{amb}$	-55 to +100	$^{\circ}\text{C}$
Soldering temperature	2 mm from case, $t \leq 10\text{ s}$	$T_{sld}$	260	$^{\circ}\text{C}$

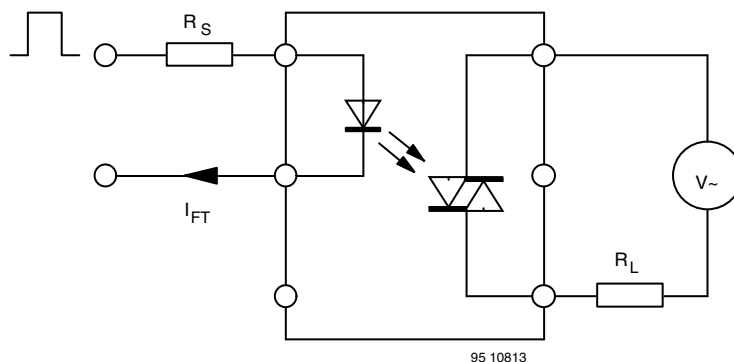
**Note**

- 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 ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>							
Forward voltage	$I_F = 50\text{ mA}$		$V_F$	-	1.25	1.6	V
Junction capacitance	$V_R = 0$ , $f = 1\text{ MHz}$		$C_j$	-	50	-	pF
<b>OUTPUT</b>							
Forward peak off-state voltage (repetitive)	$I_{RDM} = 100\text{ nA}$		$V_{DRM}^{(1)}$	250	-	-	V
Peak on-state voltage	$I_{TM} = 100\text{ mA}$		$V_{TM}$	-	1.5	3	V
Critical rate of rise of off-state voltage	$I_{FT} = 0$ , $I_{FT} = 30\text{ mA}$		$dV/dt_{cr}$	-	10	-	V/ $\mu\text{s}$
			$dV/dt_{crq}$	0.1	0.2	-	V/ $\mu\text{s}$
<b>COUPLER <sup>(2)</sup></b>							
Collector emitter trigger current	$V_S = 3\text{ V}$ , $R_L = 150\text{ }\Omega$	K3010P	$I_{FT}$	-	8	15	mA
		K3012P	$I_{FT}$	-	2	5	mA
Holding current	$I_F = 10\text{ mA}$ , $V_S \geq 3\text{ V}$		$I_H$	-	100	-	$\mu\text{A}$

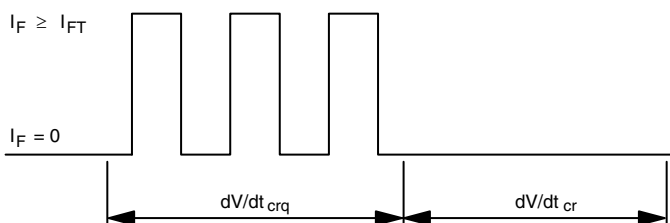
**Notes**

- 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
- <sup>(1)</sup> Test voltage must be applied within  $dV/dt$  ratings
- <sup>(2)</sup>  $I_{FT}$  is defined as a minimum trigger current



Test condition:  
 $dV/dt_{cr}$   
 $V_S = 2/3 V_{DRM}$   
 (sine wave)  
 $R_L = 33\text{ k}\Omega$   
 $dV/dt_{crq}$   
 $V_{eff} = 30\text{ V}$   
 (sine wave)  
 $R_L = 2\text{ k}\Omega$

Fig. 1 - Test Circuit for  $dV/dt_{cr}$  and  $dV/dt_{crq}$



$dV/dt_{cr}$  Highest value of the "rate of rise of off-state voltage" which does not cause any switching from the off state to the on state  
 $dV/dt_{crq}$  Highest value of the "rate of rise of communicating voltage" which does not switch on the device again, after the voltage has decreased to zero and the trigger current is switched from  $I_{FT}$  to zero

95 10814

Fig. 2

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		55 / 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, $t = 1\text{ min}$	$V_{ISO}$	4420	$V_{RMS}$
Tested withstanding isolation voltage	According to UL1577, $t = 1\text{ s}$	$V_{ISO}$	5300	$V_{RMS}$
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	$T_{amb} = 25\text{ }^\circ\text{C}$ , $V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$T_{amb} = 100\text{ }^\circ\text{C}$ , $V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Output safety power		$P_{SO}$	265	mW
Input safety current		$I_{SI}$	130	mA
Input safety temperature		$T_S$	150	$^\circ\text{C}$
Creepage distance	DIP-6		$\geq 7$	mm
Clearance distance			$\geq 7$	mm
Insulation thickness		DTI	$\geq 0.4$	mm
Input to output test voltage, method A	$V_{IORM} \times 1.6 = V_{PR}$ , 100 % sample test with $t_M = 10\text{ s}$ , partial discharge $< 5\text{ pC}$	$V_{PR}$	1424	$V_{peak}$

**Note**

- According to DIN EN60747-5-5 (see figure 4). This optocoupler is suitable for safe electrical isolation only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits

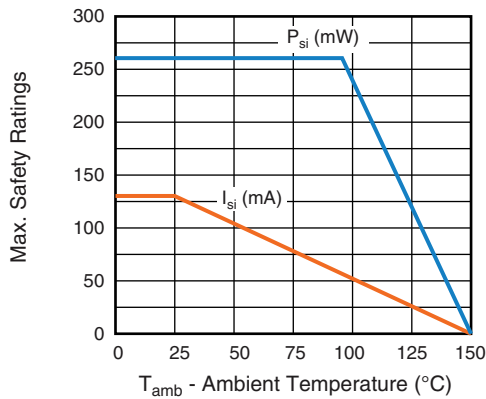


Fig. 3 - Safety Parameter Derating Diagram

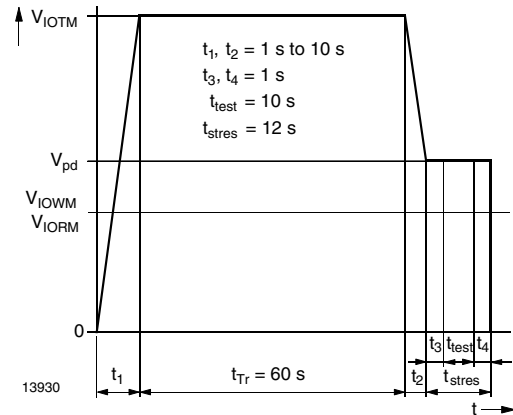


Fig. 4 - Test Pulse Diagram for Sample Test according to DIN EN60747-5-5 / DIN EN60747-; IEC 60747

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

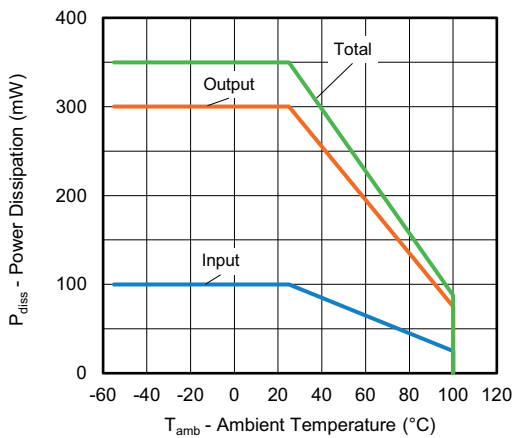


Fig. 5 - Total Power Dissipation vs. Ambient Temperature

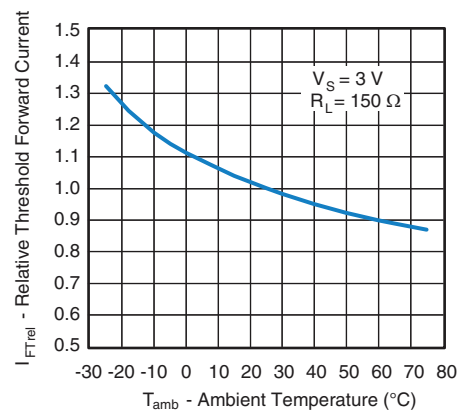


Fig. 7 - Relative Threshold Forward Current vs. Ambient Temperature

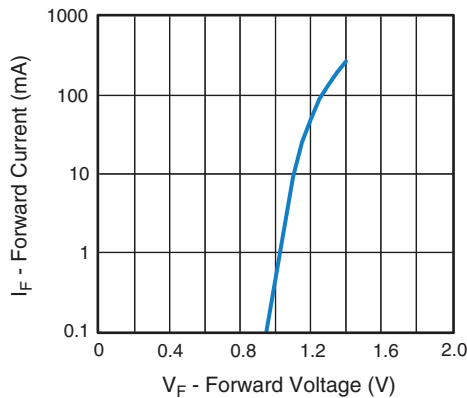


Fig. 6 - Forward Current vs. Forward Voltage

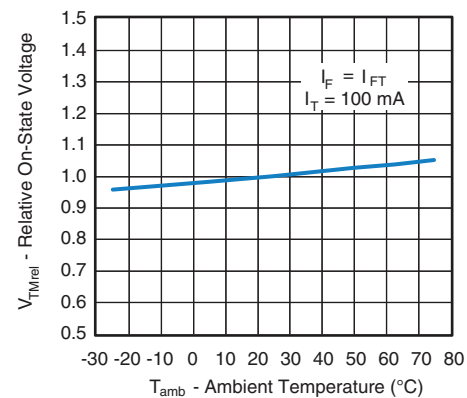


Fig. 8 - Relative On-State vs. Ambient Temperature

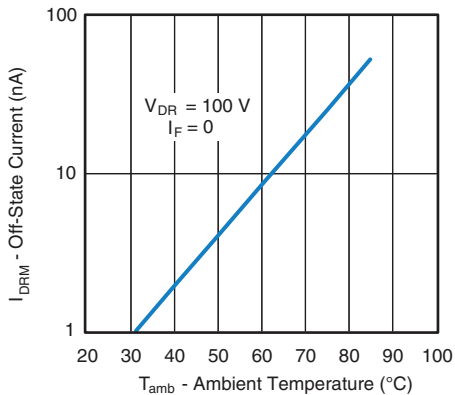


Fig. 9 - Off-State Current vs. Ambient Temperature

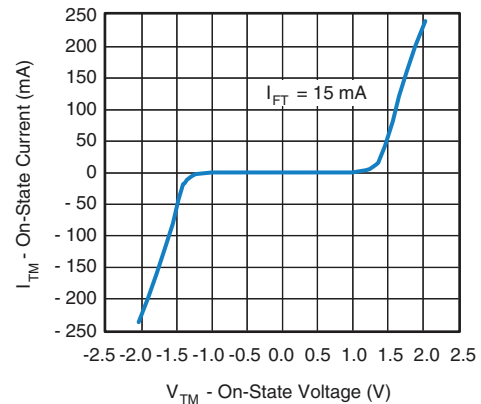
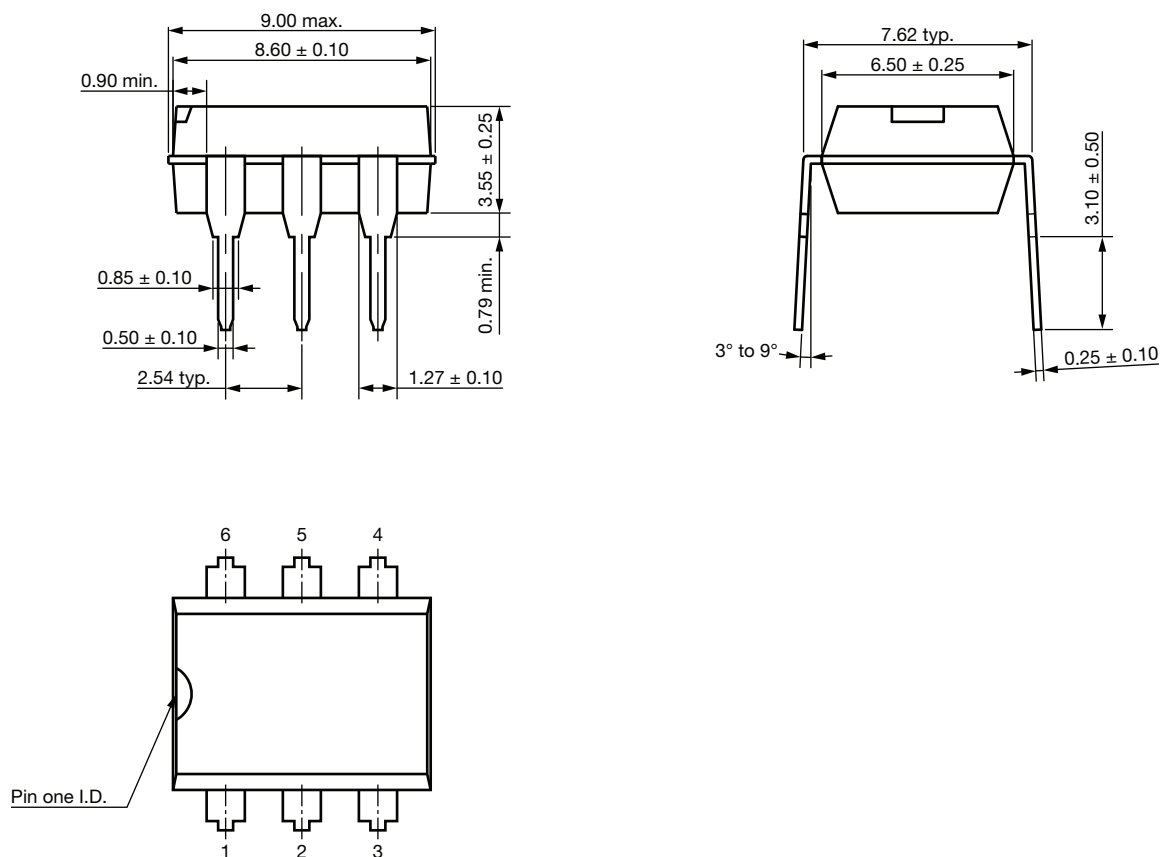


Fig. 10 - On-State Current vs. On-State Voltage

**PACKAGE DIMENSIONS** (in millimeters)

**DIP-6**





**PACKAGE MARKING**

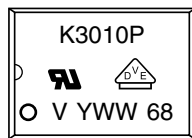


Fig. 11 - Example of K3010P

**Notes**

- “YWW” is the date code marking (Y = year code, WW = week code)
- The VDE logo is only marked on option1 parts

**PACKING INFORMATION** (in millimeters)

**Tube**

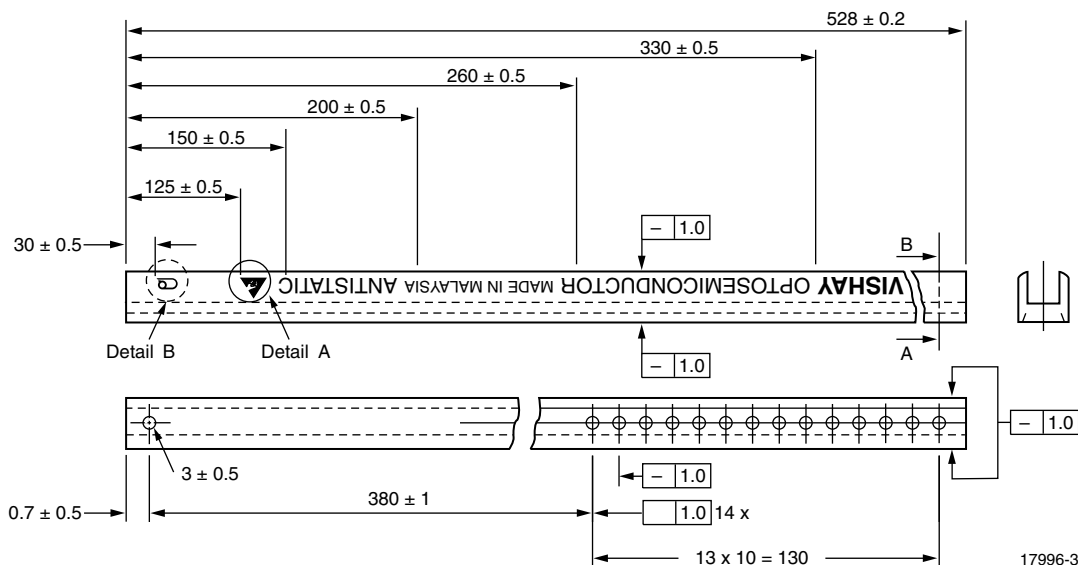


Fig. 12 - Shipping Tube Specifications for DIP Packages

DEVICES PER TUBES			
TYPE	UNITS/TUBE	TUBES/BOX	UNITS/BOX
DIP-6	50	40	2000

**DIP-6**

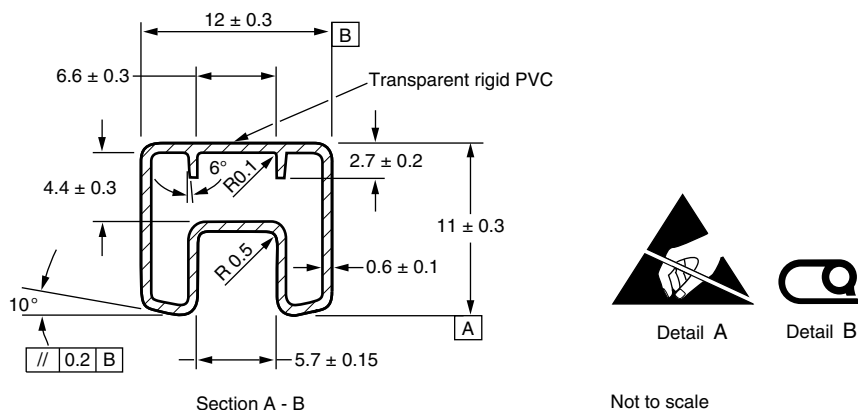
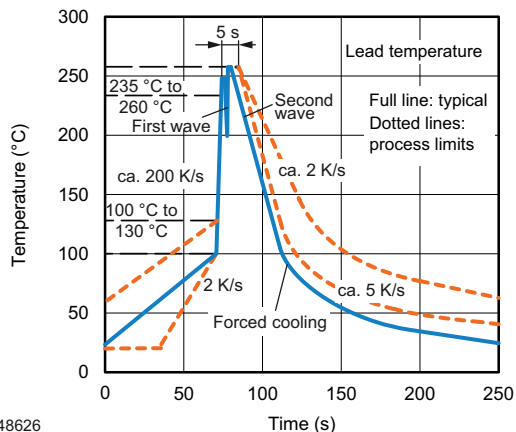


Fig. 13 - Tube Shipping Medium

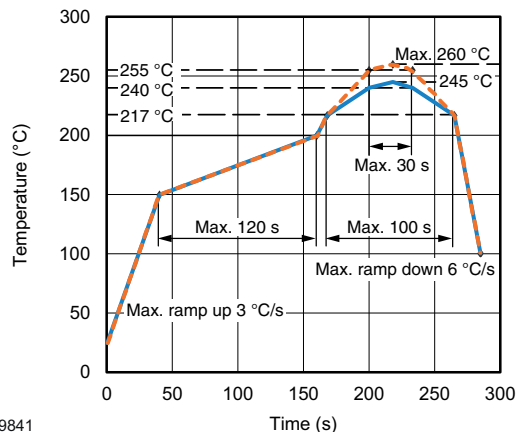


**SOLDER PROFILES**



948626

Fig. 14 - Wave Soldering Double Wave Profile According to J-STD-020 for DIP Devices



19841

Fig. 15 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020 for SMD Devices

**HANDLING AND STORAGE CONDITIONS**

ESD level: HBM class 2

Floor life: unlimited

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

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



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