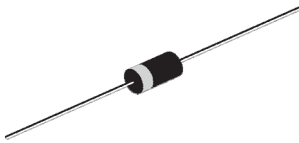
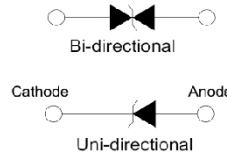


## 600W Axial Leaded Transient Voltage Suppressors

P6KEXX



DO-15



**DO-15 Axial  
Leaded Plastic Package  
RoHS compliant**

### Description:

The P6KE series of high current uni/bi-directional transient suppressors are designed for A.C. line protection and high power DC bus clamping applications. These devices offer uni/bi-directional port protection from 6.8 volts to 600 volts They provide a clamping voltage lower than the avalanche voltage. Therefore, any voltage rise due to increased current conduction is contained to a minimum, providing the best possible protection level. They can also be connected in series and/or parallel to create very high capacity protection solutions.

### Features:

1. Peak power dissipation 600W @10 x 1000 us Pulse
2. Low profile package.
3. Excellent clamping capability.
4. Glass passivated junction.
5. Fast response time: typically less than 1ps from 0 Volts to BV min
6. Typical IR less than 1uA when VBR min above 12V.
7. IEC 61000-4-2 ESD 30KV(Air), 30KV(Contact)
8. ESD protection of data lines in accordance with IEC 61000-4-2
9. EFT protection of data lines in accordance with IEC 61000-4-4
10. RoHS compliant
11. Lead-free finish
12. This product is available in AEC-Q101 Compliant and PPAP Capable also.

**NOTE:** For AEC-Q101 compliant products, please use suffix -AQ in the part number while ordering

**APPLICATION:** Protection of I/O Interfaces, VCC bus and other vulnerable circuits used in telecom, computer, Industrial and consumer electronic applications.

### ABSOLUTE MAXIMUM RATINGS (Ta = 25 °C Unless otherwise specified)

PARAMETER	SYMBOL	VALUE	UNIT
Peak Pulse Power Dissipation on 10/1000 us Waveform <sup>1</sup> ( FIG.1)	P <sub>PPM</sub>	Min 600	W
Power Dissipation on Infinite Heat Sink at T <sub>L</sub> =75°C	P <sub>D</sub>	5.0	W
Peak Pulse Current of on 10/1000us Waveform <sup>1</sup> ( FIG.3)	I <sub>PPM</sub>	See Table 1	A
Peak Forward Surge Current, 8.3ms Single Half Sine-Wave <sup>2</sup>	I <sub>FSM</sub>	100	A
Typical Thermal Resistance Junction to Lead	R <sub>θJL</sub>	20	°C/W
Typical Thermal Resistance Junction to Lead	R <sub>θJLA</sub>	100	°C/W
Operating Junction Temperature Range	T <sub>J</sub>	-55 to +150	°C
Storage Temperature Range	T <sub>STG</sub>	-55 to +150	°C

### Notes:

1. Non-repetitive current pulse, per Fig.3 and derated above TA=25°C per Fig.2

<sup>2</sup> Measured on 8.3ms single half sine-wave, or equivalent square wave, for Unidirectional device only

Rev04 07112023ESW



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**ELECTRICAL CHARACTERISTICS at** (Ta = 25 °C Unless otherwise specified)

Type Number		Reverse Stand-Off Voltage	Breakdown Voltage Min. @I <sub>T</sub>	Breakdown Voltage Max. @ I <sub>T</sub>	Test Current	Maximum Clamping Voltage @I <sub>PP</sub>	Peak Pulse Current	Reverse Leakage @V <sub>RMW</sub>
(Uni)	(Bi)	V <sub>RMW</sub> (V)	V <sub>BR MIN</sub> (V)	V <sub>BR MAX</sub> (V)	I <sub>T</sub> (mA)	V <sub>C</sub> (V)	I <sub>PP</sub> (A)	I <sub>R</sub> (uA)
P6KE6.8A	P6KE6.8CA	5.80	6.45	7.14	10	10.5	58.1	1000
P6KE7.5A	P6KE7.5CA	6.40	7.13	7.88	10	11.3	54.0	500
P6KE8.2A	P6KE8.2CA	7.02	7.79	8.61	10	12.1	50.4	200
P6KE9.1A	P6KE9.1CA	7.78	8.65	9.55	1	13.4	45.5	50
P6KE10A	P6KE10CA	8.55	9.50	10.50	1	14.5	42.1	10
P6KE11A	P6KE11CA	9.40	10.50	11.60	1	15.6	39.1	5
P6KE12A	P6KE12CA	10.20	11.40	12.60	1	16.7	36.5	5
P6KE13A	P6KE13CA	11.10	12.40	13.70	1	18.2	33.5	1
P6KE15A	P6KE15CA	12.80	14.30	15.80	1	21.2	28.8	1
P6KE16A	P6KE16CA	13.60	15.20	16.80	1	22.5	27.1	1
P6KE18A	P6KE18CA	15.30	17.10	18.90	1	25.2	24.2	1
P6KE20A	P6KE20CA	17.10	19.00	21.00	1	27.7	22.0	1
P6KE22A	P6KE22CA	18.80	20.90	23.10	1	30.6	19.9	1
P6KE24A	P6KE24CA	20.50	22.80	25.20	1	33.2	18.4	1
P6KE27A	P6KE27CA	23.10	25.70	28.40	1	37.5	16.3	1
P6KE30A	P6KE30CA	25.60	28.50	31.50	1	41.4	14.7	1
P6KE33A	P6KE33CA	28.20	31.40	34.70	1	45.7	13.3	1
P6KE36A	P6KE36CA	30.80	34.20	37.80	1	49.9	12.2	1
P6KE39A	P6KE39CA	33.30	37.10	41.00	1	53.9	11.3	1
P6KE43A	P6KE43CA	36.80	40.90	45.20	1	59.3	10.3	1
P6KE47A	P6KE47CA	40.20	44.70	49.40	1	64.8	9.4	1
P6KE51A	P6KE51CA	43.60	48.50	53.60	1	70.1	8.7	1
P6KE56A	P6KE56CA	47.80	53.20	58.80	1	77.0	7.9	1
P6KE62A	P6KE62CA	53.00	58.90	65.10	1	85.0	7.2	1
P6KE68A	P6KE68CA	58.10	64.60	71.40	1	92.0	6.6	1
P6KE75A	P6KE75CA	64.10	71.30	78.80	1	103.0	5.9	1
P6KE82A	P6KE82CA	70.10	77.90	86.10	1	113.0	5.4	1
P6KE91A	P6KE91CA	77.80	86.50	95.50	1	125.0	4.9	1
P6KE100A	P6KE100CA	85.50	95.00	105.00	1	137.0	4.5	1
P6KE110A	P6KE110CA	94.00	105.00	116.00	1	152.0	4.0	1
P6KE120A	P6KE120CA	102.00	114.00	126.00	1	165.0	3.7	1
P6KE130A	P6KE130CA	111.00	124.00	137.00	1	179.0	3.4	1
P6KE150A	P6KE150CA	128.00	143.00	158.00	1	207.0	2.9	1
P6KE160A	P6KE160CA	136.00	152.00	168.00	1	219.0	2.8	1
P6KE170A	P6KE170CA	145.00	162.00	179.00	1	234.0	2.6	1

P6KEXX  
Rev04 07112023ESW



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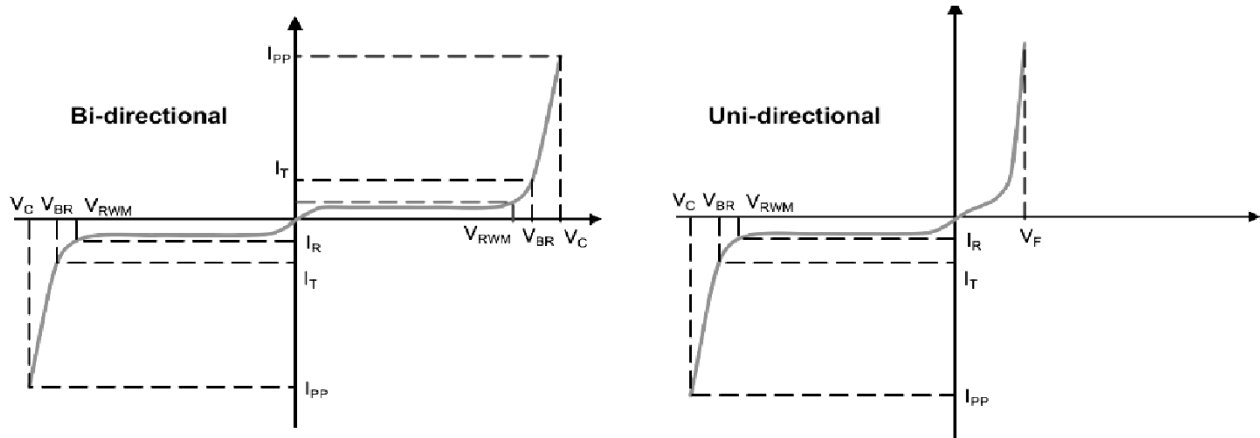
**ELECTRICAL CHARACTERISTICS at** (Ta = 25 °C Unless otherwise specified)

Type Number		Reverse Stand-Off Voltage	Breakdown Voltage Min. @I <sub>T</sub>	Breakdown Voltage Max. @ I <sub>T</sub>	Test Current	Maximum Clamping Voltage @I <sub>PP</sub>	Peak Pulse Current	Reverse Leakage @V <sub>RWM</sub>
(Uni)	(Bi)	V <sub>RWM</sub> (V)	V <sub>BR MIN</sub> (V)	V <sub>BR MAX</sub> (V)	I <sub>T</sub> (mA)	V <sub>C</sub> (V)	I <sub>PP</sub> (A)	I <sub>R</sub> (uA)
P6KE180A	P6KE180CA	154.00	171.00	189.00	1	246.0	2.5	1
P6KE200A	P6KE200CA	171.00	190.00	210.00	1	274.0	2.2	1
P6KE220A	P6KE220CA	185.00	209.00	231.00	1	328.0	1.9	1
P6KE250A	P6KE250CA	214.00	237.00	263.00	1	344.0	1.8	1
P6KE300A	P6KE300CA	256.00	285.00	315.00	1	414.0	1.5	1
P6KE350A	P6KE350CA	300.00	332.00	368.00	1	482.0	1.3	1
P6KE400A	P6KE400CA	342.00	380.00	420.00	1	548.0	1.1	1
P6KE440A	P6KE440CA	376.00	418.00	462.00	1	602.0	1.0	1
P6KE480A	P6KE480CA	408.00	456.00	504.00	1	658.0	0.9	1
P6KE510A	P6KE510CA	434.00	485.00	535.00	1	698.0	0.9	1
P6KE530A	P6KE530CA	451.00	503.50	556.50	1	725.0	0.8	1
P6KE540A	P6KE540CA	460.00	513.00	567.00	1	740.0	0.8	1
P6KE550A	P6KE550CA	468.00	522.50	577.50	1	760.0	0.8	1
P6KE600A	P6KE600CA	512.00	570.00	630.00	1	828.0	0.75	1

**Notes:**

3. For Bi-directional type having V<sub>RWM</sub> of 10 Volts and less, the I<sub>R</sub> limit is double.
4. For parts without A, the V<sub>BR</sub> is ± 10% and V<sub>C</sub> is 5% higher than with A parts.

## CHARACTERISTICS CURVE



$P_{PPM}$ : Peak Pulse Power Dissipation - Max power dissipation

$V_{RWM}$ : Reverse Stand-off Voltage - Maximum voltage that can be applied to TVS without operation

$V_{BR}$ : Breakdown Voltage – Maximum voltage that flows though the TVS at a specified current ( $I_T$ )

$V_C$ : Clamping Voltage – Peak voltage measured across the TVS at a specified  $I_{PPM}$  (peak impulse current)

$I_R$ : Reverse Leakage Current – Current measured at VR

$V_F$ : Forward Voltage Drop for Uni-directional

## TYPICAL CHARACTERISTICS CURVES

Fig 1: Peak Pulse Power Rating

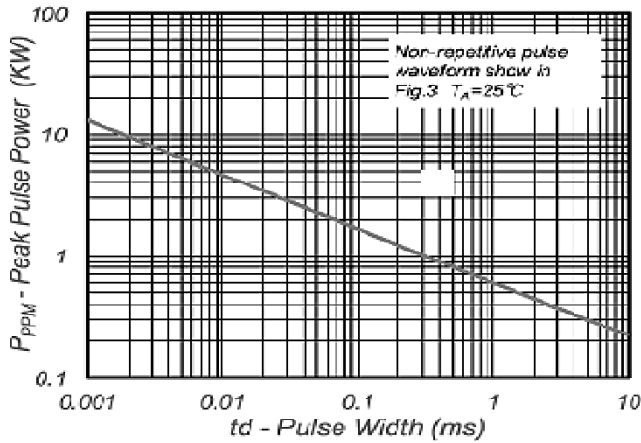


Fig 2 : Pulse Waveform

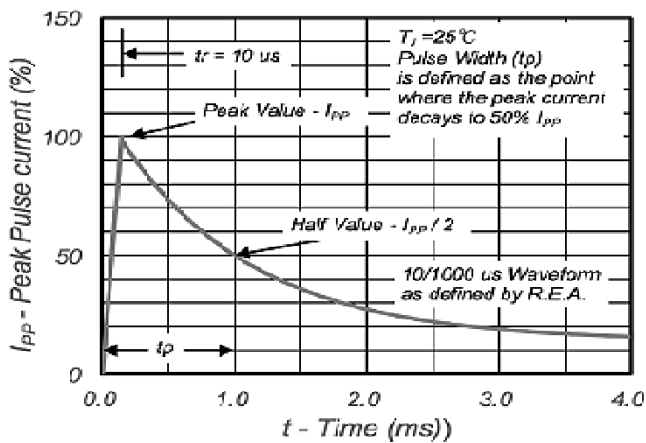


Fig 3: Pulse Derating Curves

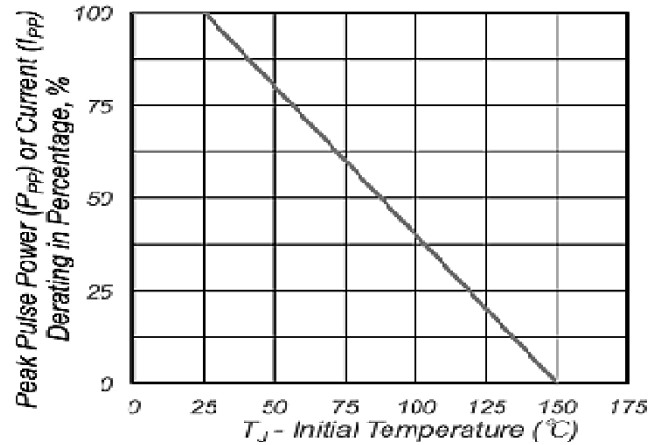
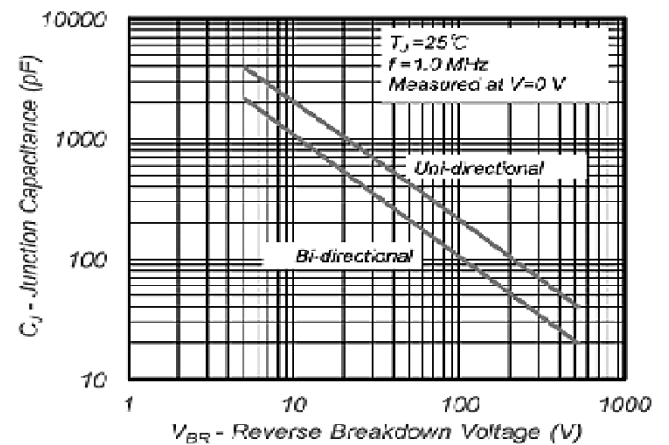
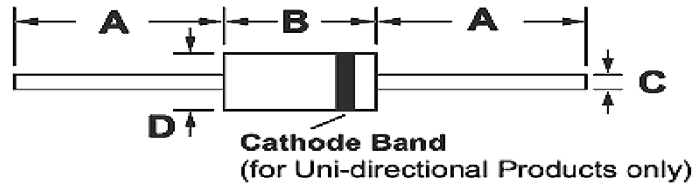


Fig 4: Typical Junction Capacitance



## PACKAGE DETAIL

DO-15 Axial Leaded Plastic Package



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	25.4	--	1.000	--
B	5.8	7.62	0.230	0.300
C	0.70	0.90	0.028	0.034
D	2.60	3.60	0.104	0.140

### Mechanical Characteristics

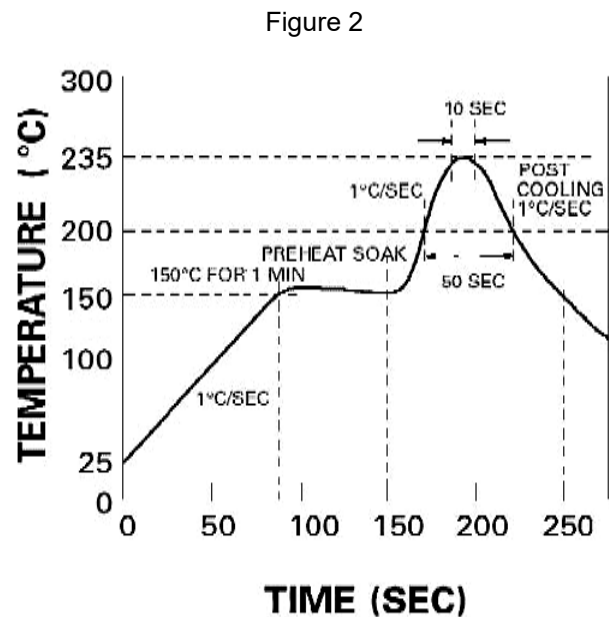
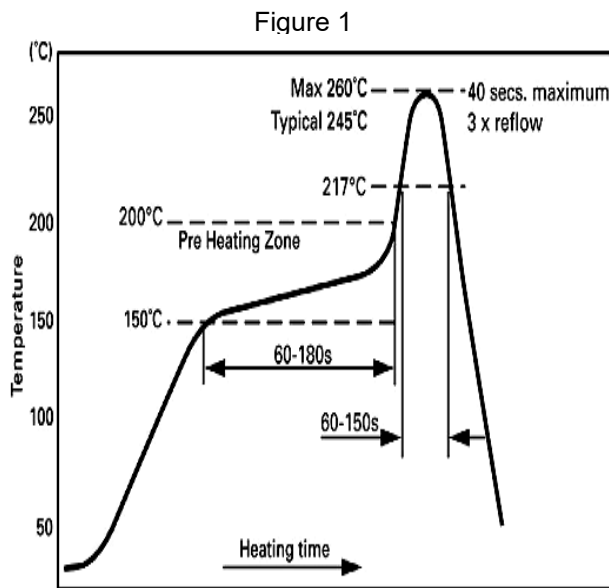
1. CASE: DO-15 Molded Plastic
2. Mounting Position: Any
3. Polarity: by cathode band denotes uni-directional device, none cathode band denotes bi-directional device.
4. Terminal: Solder plated

### Recommended Reflow Solder Profiles

The recommended reflow solder profiles for Pb and Pb-free devices are shown below.

Figure 1 shows the recommended solder profile for devices that have Pb-free terminal plating, and where a Pb-free solder is used.

Figure 2 shows the recommended solder profile for devices with Pb-free terminal plating used with leaded solder, or for devices with leaded terminal plating used with a leaded solder.

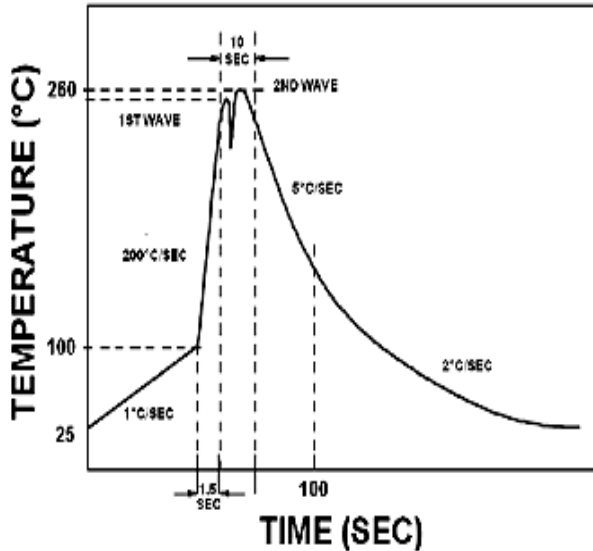


Reflow profiles in tabular form

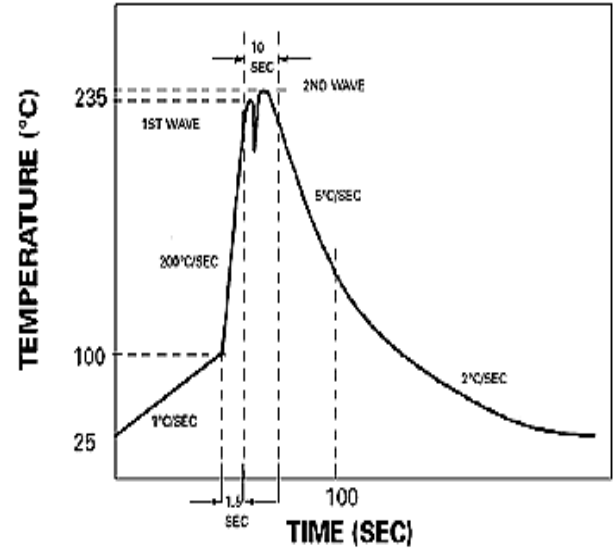
Profile Feature	Sn-Pb System	Pb-Free System
Average Ramp-Up Rate	~3°C/second	~3°C/second
<b>Preheat</b>		
– Temperature Range	150-170°C	150-200°C
– Time	60-180 seconds	60-180 seconds
Time maintained above:		
– Temperature	200°C	217°C
– Tim	30-50 seconds	60-150 seconds
Peak Temperature	235°C	260°C max.
Time within +0 -5°C of actual Peak	10 seconds	40 seconds
Ramp-Down Rate	3°C/second max.	6°C/second max.

### Recommended Wave Solder Profiles

The Recommended solder Profile For Devices with Pb-free terminal plating where a Pb-free solder is used



The Recommended solder Profile For Devices with Pb-free terminal plating used with leaded solder, or for devices with leaded terminal plating used with leaded solder



### Wave Profiles in Tabular Form

Profile Feature	Sn-Pb System	Pb-free System
Average Ramp-Up Rate	~200°C/second	~200°C/second
Heating rate during preheat	Typical 1-2, Max 4°C/sec	Typical 1-2, Max 4°C/Sec
Final preheat Temperature	Within 125°C of Solder Temp	Within 125°C of Solder Temp
Peak Temperature	235°C	260°C max.
Time within +0 -5°C of actual Peak	10 seconds	10 seconds
Ramp-Down Rate	5°C/second max.	5°C/second max





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## Recommended Product Storage Environment for Discrete Semiconductor Devices

This storage environment assumes that the Diodes and transistors are packed properly inside the original packing supplied by CDIL.

- Temperature 5 °C to 30 °C
- Humidity between 40 to 70 %RH
- Air should be clean.
- Avoid harmful gas or dust.
- Avoid outdoor exposure or storage in areas subject to rain or water spraying .
- Avoid storage in areas subject to corrosive gas or dust. Product shall not be stored in areas exposed to direct sunlight.
- Avoid rapid change of temperature.
- Avoid condensation.
- Mechanical stress such as vibration and impact shall be avoided.
- The product shall not be placed directly on the floor.
- The product shall be stored on a plane area. They should not be turned upside down. They should not be placed against the wall.

### Shelf Life of CDIL Products

The shelf life of products is the period from product manufacture to shipment to customers. The product can be unconditionally shipped within this period. The period is defined as 2 years.

If products are stored longer than the shelf life of 2 years the products shall be subjected to quality check as per CDIL quality procedure.

The products are further warranted for another one year after the date of shipment subject to the above conditions in CDIL original packing.

### Floor Life of CDIL Products and MSL Level

When the products are opened from the original packing, the floor life will start.

For this, the following JEDEC table may be referred:

JEDEC MSL Level		
Level	Time	Condition
1	Unlimited	≤30 °C / 85% RH
2	1 Year	≤30 °C / 60% RH
2a	4 Weeks	≤30 °C / 60% RH
3	168 Hours	≤30 °C / 60% RH
4	72 Hours	≤30 °C / 60% RH
5	48 Hours	≤30 °C / 60% RH
5a	24 Hours	≤30 °C / 60% RH
6	Time on Label(TOL)	≤30 °C / 60% RH

P6KEXX

Rev04 07112023ESW



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## Customer Notes

### Component Disposal Instructions

1. CDIL Semiconductor Devices are RoHS compliant, customers are requested to please dispose as per prevailing Environmental Legislation of their Country.
2. In Europe, please dispose as per EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

## Disclaimer

The product information and the selection guides facilitate selection of the CDIL's Semiconductor Device(s) best suited for application in your product(s) as per your requirement. It is recommended that you completely review our Data Sheet(s) so as to confirm that the Device(s) meet functionality parameters for your application. The information furnished in the Data Sheet and on the CDIL Web Site/CD are believed to be accurate and reliable. CDIL however, does not assume responsibility for inaccuracies or incomplete information. Furthermore, CDIL does not assume liability whatsoever, arising out of the application or use of any CDIL product; neither does it convey any license under its patent rights nor rights of others. These products are not designed for use in life saving/support appliances or systems. CDIL customers selling these products (either as individual Semiconductor Devices or incorporated in their end products), in any life saving/support appliances or systems or applications do so at their own risk and CDIL will not be responsible for any damages resulting from such sale(s). CDIL strives for continuous improvement and reserves the right to change the specifications of its products without prior notice.



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Rev04 07112023ESW