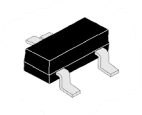
20V P-Channel Enhancement Mode MOSFET

CDM3457



SOT-23

SOT-23
Surface Mount
Plastic Package
RoHS compliant

FEATURE

1. RDS(ON) , V_{GS}@4.5V, I_D@4.0A<33mΩ
2. RDS(ON) , V_{GS}@2.5V, I_D@3.0A<40mΩ
3. RDS(ON) , V_{GS}@1.8V, I_D@2.0A<52mΩ
4. Advanced Trench Process Technology
5. Specially Designed for Switch Load, PWM Application, etc.
6. Lead free in compliance with EU RoHS2.0 (2011/65/EU & 2015/865/EU directive.
7. Green molding compound as per IEC61249 Std.. (Halogen Free)

ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

Parameter		SYMBOL	VALUE	UNIT
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±10	V
Continuous Drain Current		I_D	5.2	A
Pulsed Drain Current		I_{DM}	20.8	A
Power Dissipation	Ta=25°C	P_D	1.25	W
	Derate above 25°C		10	mW/°C
Operating Junction and Storage Temperature Range		T_J,T_{STG}	-55 to +150	°C

Thermal Resistance

Junction to Ambient [3]	$R_{\theta JA}$	100	°C/W

ELECTRICAL CHARACTERISTICS at T_a = 25 °C

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=-250uA	20	--	--	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250uA	0.3	0.5	1	V
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS}=4.5V, I_D=4.0A	--	27	33	mΩ
		V_{GS}=-2.5V, I_D=-3.0A	--	33	40	
		V_{GS}=1.8V, I_D=2.0A	--	41	52	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V, V_{GS}=0V	--	--	1	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=10V, V_{DS}=0V	--	--	100	nA

ELECTRICAL CHARACTERISTICS at T_a = 25 °C

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Dynamic Characteristics						
Total Gate Charge	Q_g	V_{DS}=10V, I_D=1.0A, V_{GS}=4.5V [1,2]	--	14	--	nC
Gate-Source Charge	Q_{gs}		--	1.5	--	
Gate-Drain Charge	Q_{gd}		--	2.9	--	
Input Capacitance	C_{iss}	V_{DS}=15V, V_{GS}=0V, f=1.0MHz	--	1237	--	pF
Output Capacitance	C_{oss}		--	155	--	
Reverse Transfer Capacitance	C_{rss}		--	133	--	
Turn-On Delay Time	$t_{d(on)}$	V_{DD}=10V, I_D=-1.0A, V_{GS}=4.5V R_G=25Ω [1,2]	--	8.1	--	ns
Turn-On Rise Time	t_r		--	32	--	
Turn-Off Delay Time	$t_{d(off)}$		--	207	--	
Turn-Off Fall Time	t_f		--	114	--	
Drain-Source Diode Characteristics						
Maximum Continuous Drain-Source Diode Forward Current	I_S		--	--	5.2	A
Diode Forward Voltage	V_{SD}	I_S=-1.0A, V_{GS}=0V	--	0.75	1.2	V

Note:

1. Pulse width<300us, Duty cycle<2%
2. Essentially independent of operating temperature typical characteristics.
3. $R_{\Theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins mounted on a 1 inch FR-4 with 2oz. square pad of copper
4. The maximum current rating is package limited
5. Guaranteed by design, not subject to production testing
6. For PNP device voltage and current values will be negative (-).

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.

Figure 1

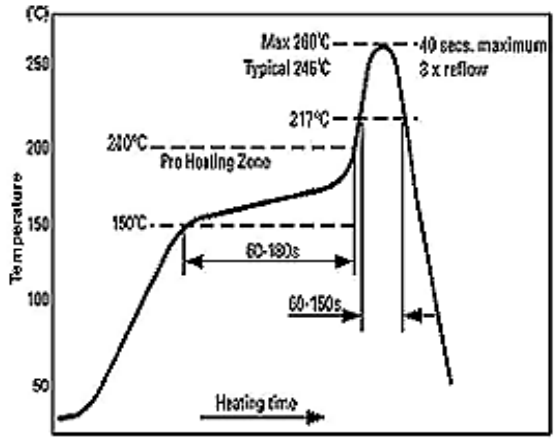
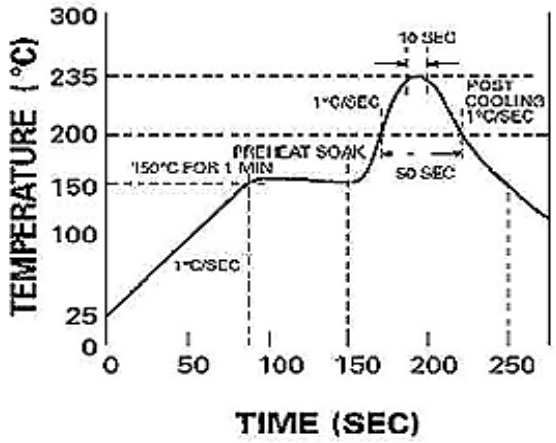


Figure 2

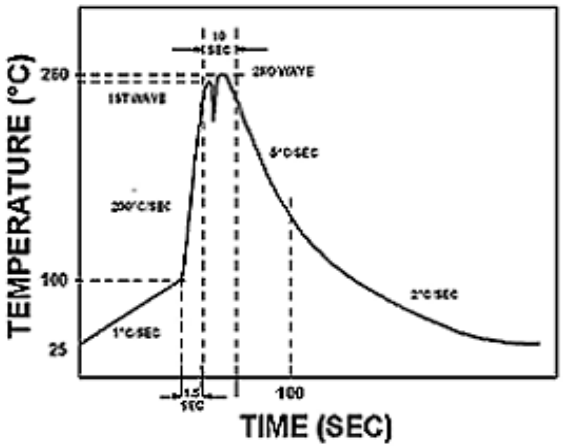


Reflow profiles in tabular form

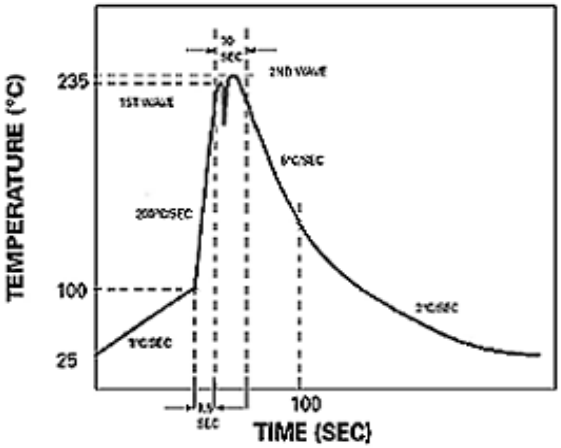
Profile Feature	Sn-Pb System	Pb-Free System
Average Ramp-Up Rate	~3°C/second	~3°C/second
Preheat – Temperature Range – Time	 150-170°C 60-180 seconds	 150-200°C 60-180 seconds
Time maintained above: – Temperature – Time	 200°C 30-50 seconds	 217°C 60-150 seconds
Peak Temperature	235°C	260°C max.
Time 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

Typical Characteristic Curves

Fig 1: On-Region Characteristics

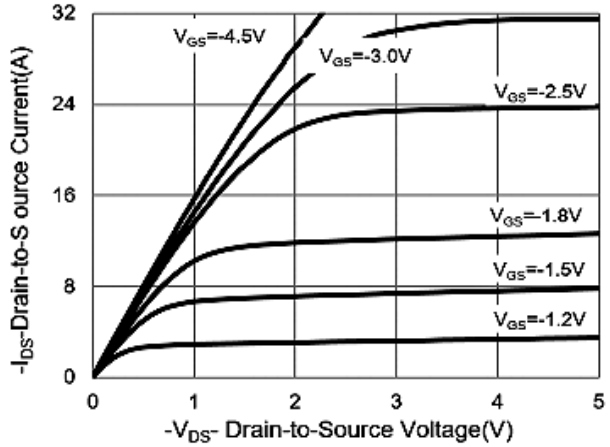


Fig 2: On-Resistance vs. Drain Current

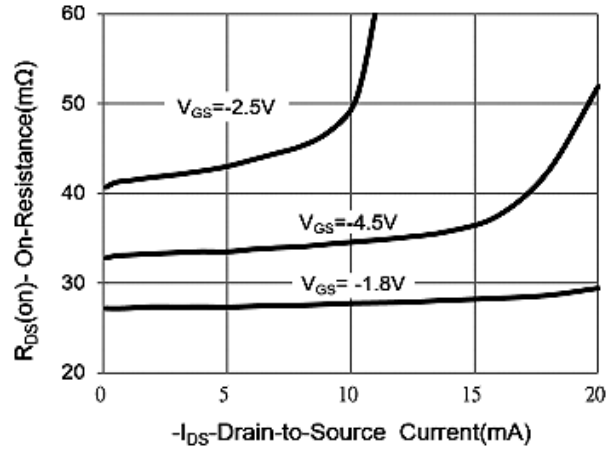


Fig 3: On-Resistance Variation with VGS.

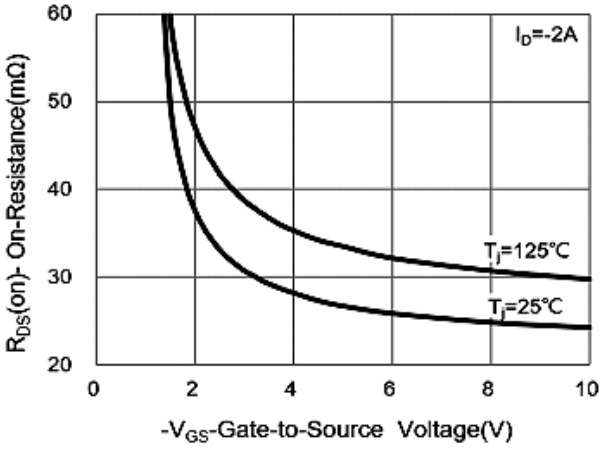


Fig 4: Transfer Characteristics

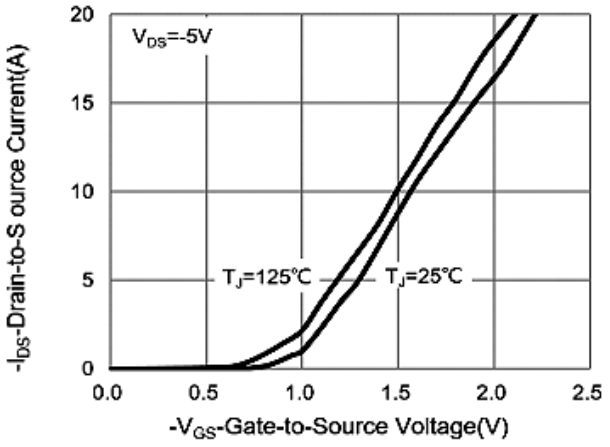


Fig 5: On-Resistance vs. Junction temperature

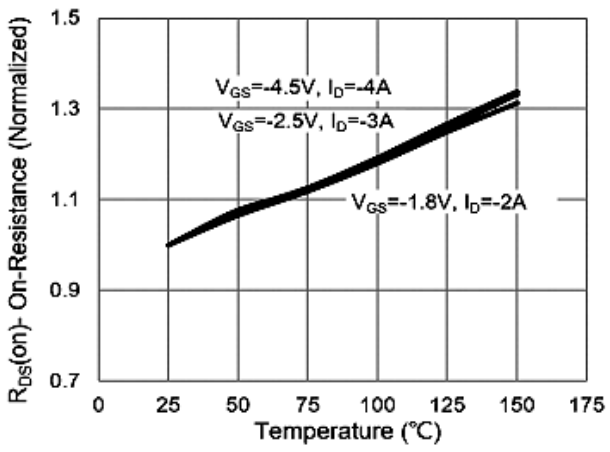
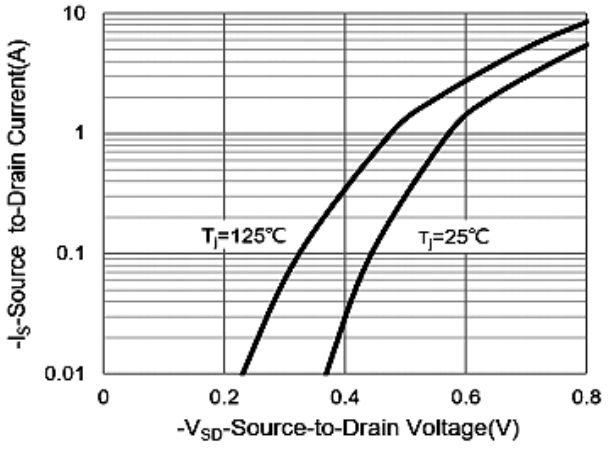


Fig 6: Body Diode Characteristics



Typical Characteristic Curves

Fig 7: Gate-Charge Characteristics

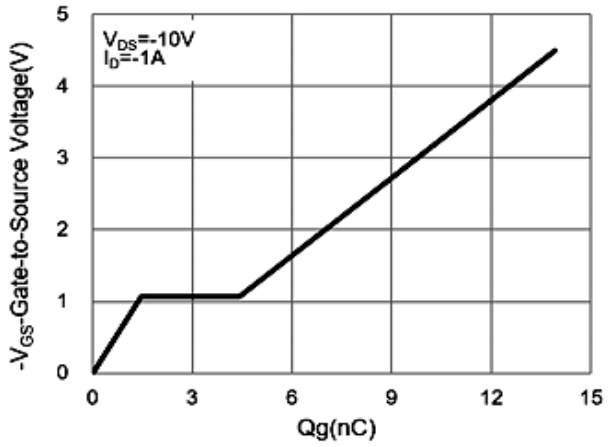


Fig 8: Capacitance vs. Drain-Source Voltage

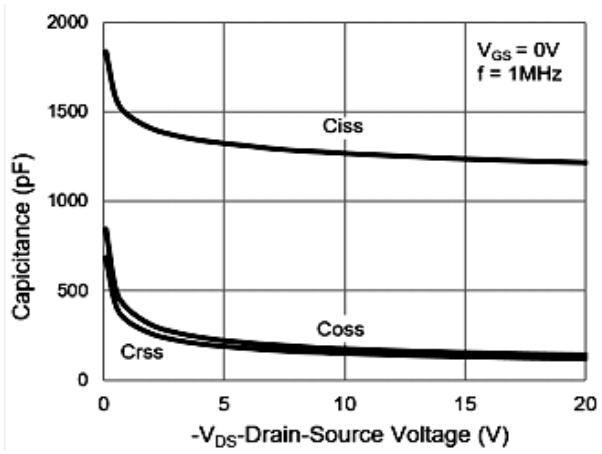
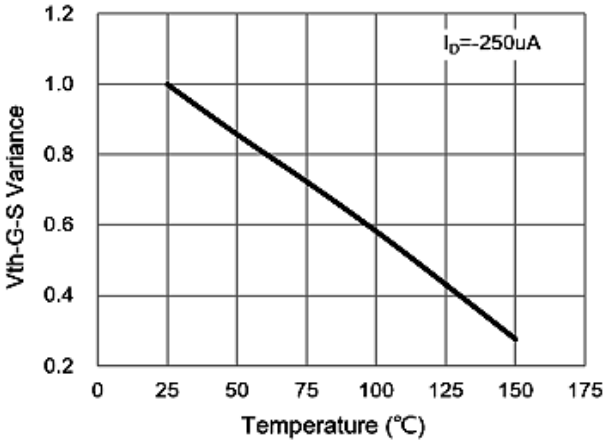
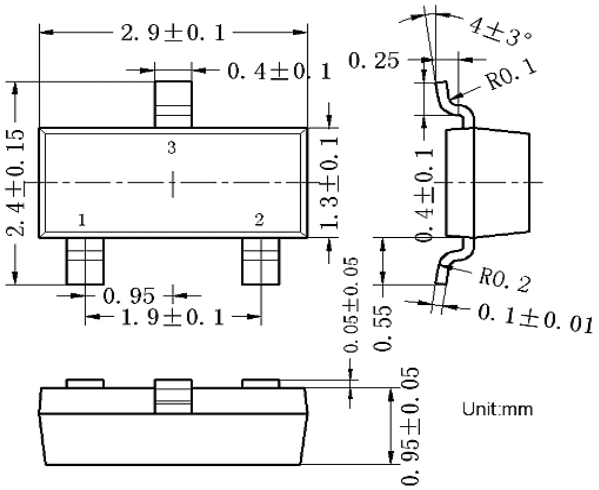


Fig 9: Threshold Voltage Variation with Temperature.



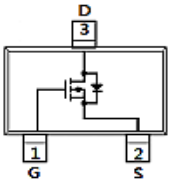
PACKAGE DETAILS

SOT-23 Formed SMD Package



Pin configuration

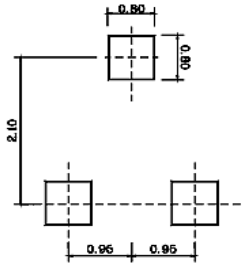
1. Gate
2. Source
3. Drain



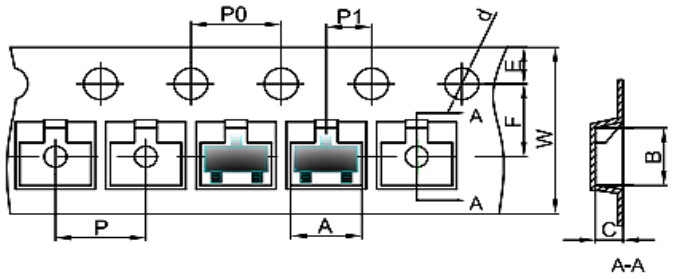
Mechanical Data

1. Case: SOT-23 Package
2. Terminals: Solderable per MIL-STD-750, Method 2026

Recommend PCB solder land [Unit: mm]



SOT-23 Embossed Carrier Tape

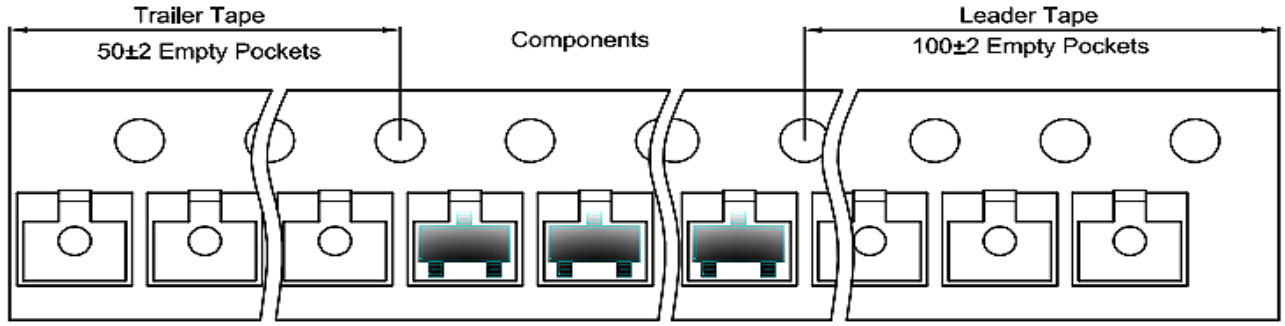


Packaging Description:

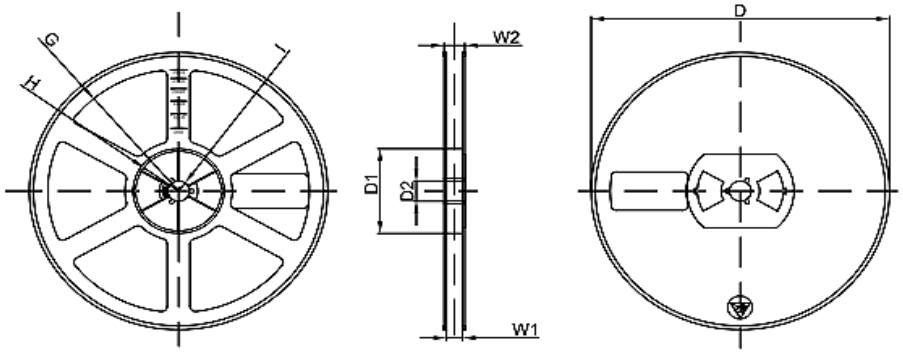
SOT-23 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 17.8cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00

SOT-23 TAPE LEADER & TRAILAR



SOT-23 REEL



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7"Dia	Ø178.00	54.40	13.00	R78.00	R25.60	R6.50	9.50	12.30

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
3000 pcs	7 Inch	45,000 pcs	203×203×195	180,000 pcs	438×438×220	

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 Akyga Semi.

- 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 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 Akyga Semi quality procedure.
The products are further warranted for another one year after the date of shipment subject to the above conditions in Akyga Semi original packing.

Floor Life of 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

Customer Notes

Component Disposal Instructions

1. Akyga 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 Akyga'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 Akyga Web Site/CD are believed to be accurate and reliable. Akyga however, does not assume responsibility for inaccuracies or incomplete information. Furthermore, Akyga does not assume liability whatsoever, arising out of the application or use of any Akyg 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. Akyga 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 Akyga will not be responsible for any damages resulting from such sale(s).

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