

SILICON CARBIDE SCHOTTKY DIODE

DESCRIPTION:



The ALPS06504A is Silicon Carbide Schottky Diode with Zero Reverse Recovery Current, Zero Forward Recovery Voltage and High-Frequency Operation in Applications like Switching Mode Power Supply.



FEATURES:

- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- High-Frequency Operation
- Temperature Independent Switching Behavior
- Extremely Fast Switching
- Positive Temperature Coefficient on VF
- Replace Bipolar with Unipolar Rectifiers
- Essentially No Switching Losses
- High Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway
- Lead-free parts meet RoHS requirements

APPLICATIONS:

- Switching Mode Power Supply
- Power Factor Correction

MECHANICAL CHARACTERISTICS

- Epoxy: Molding compound meets UL 94 V-0 flammability rating.
- Case: Molded TO-220AC.

TYPICAL DEVICE CHARACTERISTICS

MAXIMUM RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)				
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNITS
Repetitive Peak Reverse Voltage		V_{RRM}	650	Volts
Surge Peak Reverse Voltage		V_{RSM}	650	Volts
DC Blocking Voltage		V_{DC}	650	Volts
Continuous Forward Current	$T_C = 25^{\circ}\text{C}$	I_F	11	Amps
	$T_C = 125^{\circ}\text{C}$		7	
	$T_C = 150^{\circ}\text{C}$		4	
Repetitive Peak Forward Surge Current	$T_C = 25^{\circ}\text{C}$, $t_p = 10\text{ ms}$, Half Sine Wave	I_{FRM}	20	Amps
Non-Repetitive Peak Forward Surge Current	$T_C = 25^{\circ}\text{C}$, $t_p = 10\text{ ms}$, Half Sine Wave	I_{FSM}	25	Amps
Power Dissipation	$T_C = 25^{\circ}\text{C}$	P_{tot}	48	Watts
	$T_C = 110^{\circ}\text{C}$		22	
Operating Junction temperature range		T_J	-55 to +150	$^{\circ}\text{C}$
Storage temperature range		T_{STG}	-55 to +150	$^{\circ}\text{C}$

THERMAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)			
PARAMETER	SYMBOL	TYP.	UNIT
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.16	$^{\circ}\text{C/W}$

ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)					
PARAMETER	TEST CONDITIONS	SYMBOL	TYP.	MAX	UNIT
Forward Voltage	$I_F = 4\text{ A}$, $T_J = 25^{\circ}\text{C}$	V_F	1.45	1.6	Volts
	$I_F = 4\text{ A}$, $T_J = 175^{\circ}\text{C}$		1.63	1.8	
Reverse current	$V_R = 650\text{ V}$, $T_J = 25^{\circ}\text{C}$	I_R	0.1	25	μA
	$V_R = 650\text{ V}$, $T_J = 175^{\circ}\text{C}$		0.8	100	
Total Capacitive Charge	$V_R = 400\text{ V}$, $I_F = 4\text{ A}$ $di/dt = 500\text{ A}/\mu\text{S}$ $T_J = 25^{\circ}\text{C}$	Q_C	15.4		nC
Total Capacitance	$V_R = 0\text{ V}$, $T_J = 25^{\circ}\text{C}$, $f = 1\text{ MHz}$	C	289		pF
	$V_R = 200\text{ V}$, $T_J = 25^{\circ}\text{C}$, $f = 1\text{ MHz}$		30		
	$V_R = 400\text{ V}$, $T_J = 25^{\circ}\text{C}$, $f = 1\text{ MHz}$		22		

TYPICAL DEVICE CHARACTERISTICS CURVES

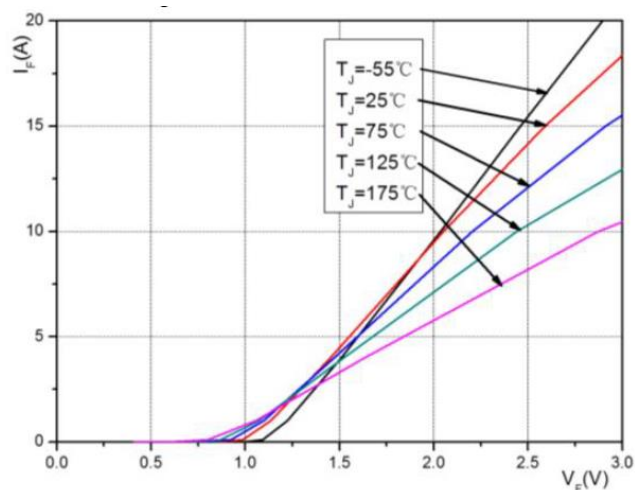


Fig1. FORWARD CHARACTERISTICS

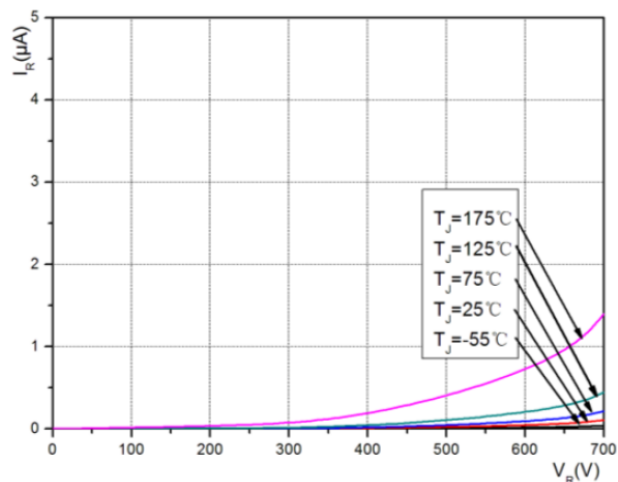


Fig2. REVERSE CHARACTERISTICS

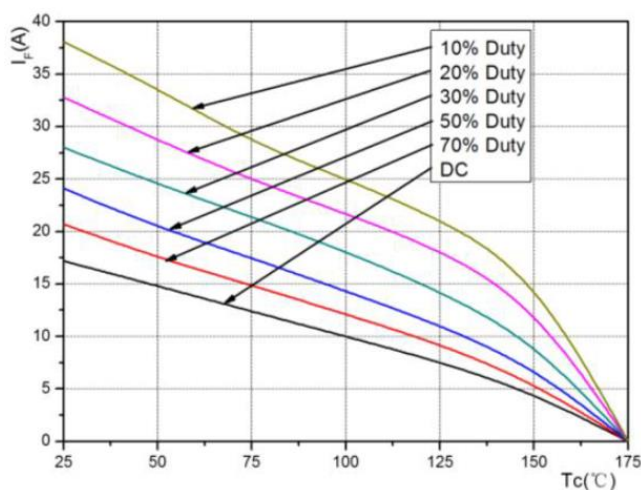


Fig3. CURRENT DERATING

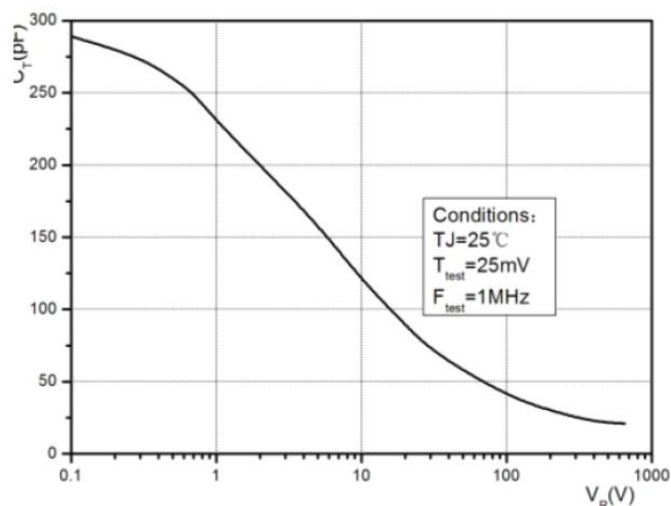


Fig4. CAPACITANCE VS. REVERSE VOLTAGE

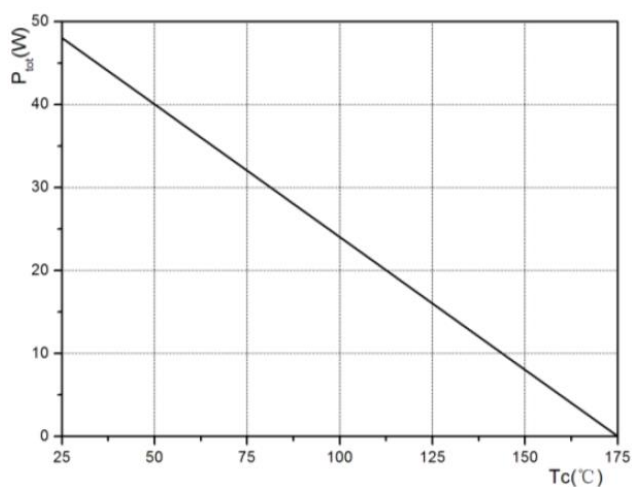


Fig5. POWER DISSIPATION DERATING

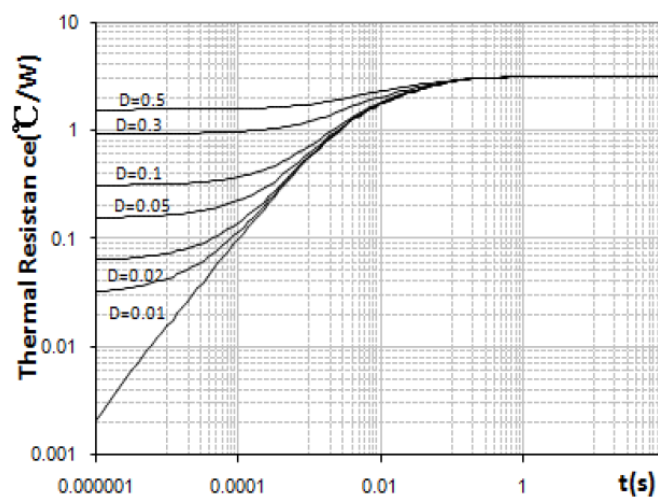
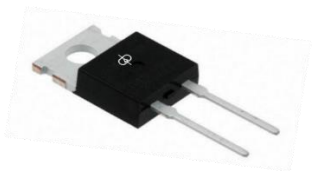


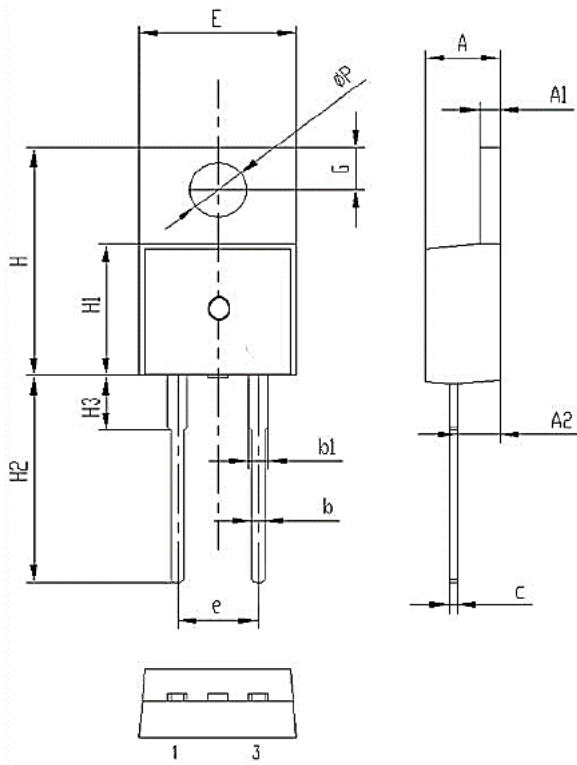
Fig6. TRANSIENT THERMAL IMPEDANCE

PINNING INFORMATION

SIMPLIFIED OUTLINE	SYMBOL
	

PACKAGE INFORMATION

TO-220AC

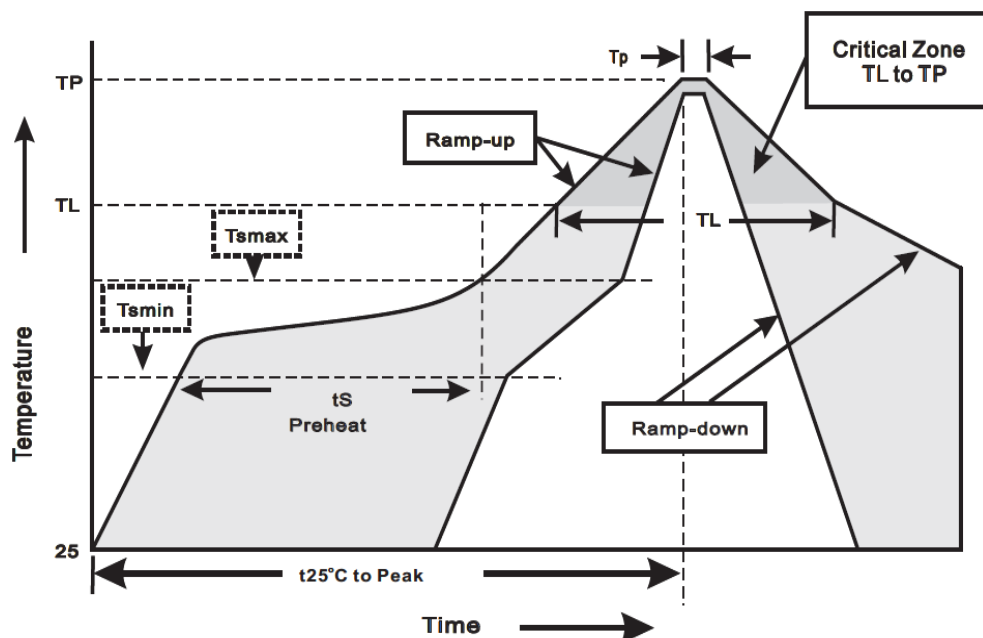


OUTLINE DIMENSIONS						
DIM	MILLIMETERS			INCHES		
	MIN	TYP	MAX	MIN	TYP	MAX
A	4.30	4.50	4.70	0.169	0.177	0.185
A1	1.20	1.30	1.40	0.047	0.051	0.055
A2	2.30	2.40	2.50	0.091	0.094	0.098
b	0.60	0.80	1.00	0.024	0.031	0.039
b1	1.10	1.30	1.50	0.043	0.051	0.059
c	0.40	0.50	0.60	0.016	0.020	0.024
e	4.88	5.08	5.28	0.192	0.200	0.208
E	9.80	10.00	10.20	0.386	0.394	0.402
H	15.50	15.70	15.90	0.610	0.618	0.626
H1	9.00	9.20	9.40	0.354	0.362	0.370
H2	12.50	13.00	13.50	0.492	0.512	0.531
H3	2.80	3.00	3.20	0.110	0.118	0.126
G	2.60	2.80	3.00	0.102	0.110	0.118
ϕP	3.40	3.60	3.80	0.134	0.142	0.150
NOTES 1. Dimensions are exclusive of mold flash and metal burrs.						

SOLDERING PARAMETERS

SUGGESTED THERMAL PROFILES FOR SOLDERING PROCESSES

1. Storage environment: Temperature=5 °C~40 °C Humidity=55% ±25%
2. Reflow soldering of surface-mount devices



3. Reflow soldering

PROFILE FEATURE	SOLDERING CONDITION
Average ramp-up rate (T_L to T_P)	<3 °C/sec
Preheat - Temperature Min (T_{smin}) - Temperature Max (T_{smax}) - Time (min to max) (t_s)	150 °C 200 °C 60 ~ 120 sec
T_{smax} to T_L - Ramp-upRate	<3 °C/sec
Time maintained above: - Temperature (T_L) - Time(t_L)	217 °C 60 ~ 260 sec
Peak Temperature (T_P)	255 °C-0/+5 °C
Time within 5 °C of actual Peak Temperature(t_P)	10 ~ 30 sec
Ramp-down Rate	<6 °C/sec
Time 25 °C to Peak Temperature	<6 minutes

PRODUCT HIGH RELIABILITY TEST CAPABILITIES

ITEM	TEST CONDITIONS	STANDARD
Solder Resistance	At 260±5°C for 10±2Sec.	MIL-STD-750D METHOD-2031
Solderability	At 245±5°C for 5 sec.	MIL-STD-202F METHOD-208
High Temperature Reverse Bias	$V_R = 80\%$ rate at $T_J = 150^\circ$ for 168 hrs.	MIL-STD-750D METHOD-1038
Forward Operation Life	Rated average rectifier current at $T_A = 25^\circ\text{C}$ for 500hrs	MIL-STD-750D METHOD-1027
Intermittent Operation Life	$T_A = 25^\circ\text{C}$, $I_F = I_O$ On state: power on for 5 min. off state: power off for 5 min. on and off for 500 cycles.	MIL-STD-750D METHOD-1036
Pressure Cooker	15P _{SIG} at $T_A = 121^\circ\text{C}$ for 4Hrs	JESD22-A102
Temperature Cycling	-55°C to +125°C dwelled for 30min and transferred for 5min. total 10 cycles.	MIL-STD-750D METHOD-1051
Forward Surge	1.0ms square-wave, one surge.	MIL-STD-750D METHOD-4066-2
Humidity	At $T_A = 85^\circ\text{C}$, RH=85% for 1000hrs.	MIL-STD-750D METHOD-1021
High Temperature Storage Life	At 175°C for 1000hrs.	MIL-STD-750D METHOD-1031



beyond boundaries...

ALPS06504A

TO-220AC

CUSTOMER NOTE:

DISCLAIMER

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1. ALPINESEMI™ Semiconductor Devices are RoHS compliant and hence customers are requested to dispose as per the prevailing Environmental Legislation put forth in their specific country.
2. In Europe, please dispose as per EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).



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