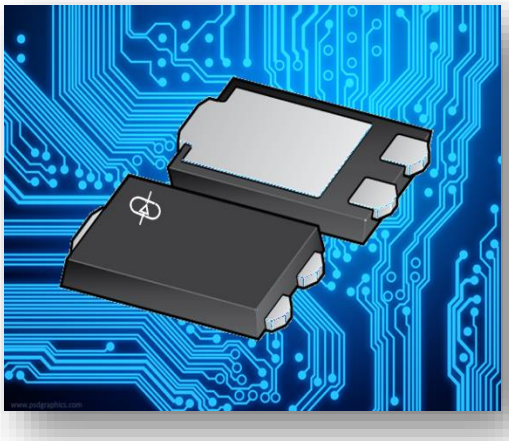
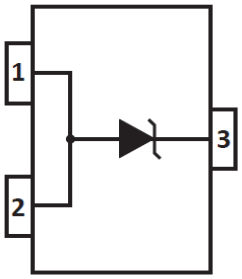
60 V, 5 A low VF MEGA Schottky Barrier Rectifier

DESCRIPTION:



The ALPAMST8960A is **AEC-Q101 approved** Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in a SOT1289 power and flat lead Surface-Mounted Device (SMD) plastic package.

The ALPAMST8960A has an Average forward current: IF(AV) ≤ 5 A, Reverse voltage: VR ≤ 60 V and Low forward Voltage. It has a high-power capability due to clip-bonding technology and heat sink. This device in accordance with the Absolute Maximum Rating System (IEC 60134) requirements.



UNIDIRECTIONAL

1 - Anode
2 - Anode
3 - Cathode

FEATURES:

- **AEC-Q101 Qualified.**
- Average forward current: IF(AV) ≤ 5 A
- Reverse voltage: VR ≤ 60 V
- Low forward voltage
- High power capability due to clip-bonding technology and heat sink
- Small and thin SMD power plastic package, typical height 0.78 mm
- RoHS Compliant
- REACH Compliant

APPLICATIONS:

- Automotive application

TYPICAL DEVICE CHARACTERISTICS

MAXIMUM RATINGS @ T_j = 25°C Unless Otherwise Specified				
PARAMETER	**SYMBOL**	**TYPICAL**	**MAX**	**UNITS**
Forward current @ T_{sp} = 160 °C; δ = 1	I_F	-	7	Amps
Average forward current @ δ = 0.5; f = 20 kHz; Tsp ≤ 165 °C; square wave	$I_{F(AV)}$	-	5	Amps
Reverse voltage	V_R	-	60	Volts
Forward voltage @ I_F = 5 A; t_p ≤ 300 µs; δ ≤ 0.02; Pulsed	V_F	480	560	mV
Reverse current @ V_R = 10 V; t_p ≤ 3 ms; δ ≤ 0.3; Pulsed	I_R	10	30	µA
Reverse current @ V_R = 60 V; t_p ≤ 3 ms; δ ≤ 0.3; Pulsed		100	400	µA
Non-repetitive peak forward current @ t_p = 8 ms; $T_{j(init)}$ = 25 °C; square wave	I_{FSM}	-	160	Amps
Total power dissipation @ T_{amb} ≤ 25 °C – Note 1	P_{tot}	-	1.66	Watts
Total power dissipation @ T_{amb} ≤ 25 °C – Note 2		-	2.15	Watts
Total power dissipation @ T_{amb} ≤ 25 °C – Note 3		-	3.75	Watts

Note:
1. Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
2. Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.
3. Device mounted on a ceramic Printed-Circuit Board (PCB), Al_2O_3, standard footprint.

THERMAL CHARACTERISTICS (T_{op} = 25 °C unless otherwise noted)				
PARAMETER	**SYMBOL**	**MIN**	**MAX**	**UNITS**
Junction Temperature	T_j	-	175	°C
Ambient Temperature	T_{amb}	-55	175	°C
Storage Temperature	T_{stg}	-65	175	°C
Thermal resistance from junction to ambient in free air - Note 1, 2 / Fig 1	$R_{th(j-a)}$	-	90	K/W
Thermal resistance from junction to ambient in free air - Note 1, 3 / Fig 2		-	70	K/W
Thermal resistance from junction to ambient in free air - Note 1, 4 / Fig 3		-	40	K/W
Thermal resistance from junction to solder point – Note 5	$R_{th(j-sp)}$	-	3	K/W

Note:
1. For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses.
2. Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
3. Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.
4. Device mounted on a ceramic Printed-Circuit Board (PCB), Al_2O_3, standard footprint.
5. Soldering point of cathode tab.

TYPICAL DEVICE CHARACTERISTICS

ELECTRICAL CHARACTERISTICS (T_{OP} = 25 °C unless otherwise noted)							
PART NUMBER	PARAMETER	TEST CONDITIONS	SYMBOL	TYP.	MIN.	MAX.	UNIT
ALPAMST8960A	Reverse breakdown voltage	I_R = 5 mA; T_j = 25 °C; $t_p \le$ 1.2 ms; $\delta \le$ 0.12; pulsed	$V_{(BR)R}$	-	60	-	Volts
	Forward voltage	I_F = 1 A; $t_p \le$ 300 µs; $\delta \le$ 0.02; T_j = 25 °C; pulsed	V_F	350	-	400	mV
		I_F = 2 A; $t_p \le$ 300 µs; $\delta \le$ 0.02; T_j = 25 °C; pulsed		390	-	-	mV
		I_F = 5 A; $t_p \le$ 300 µs; $\delta \le$ 0.02; T_j = 25 °C; pulsed		480	-	560	mV
		I_F = 5 A; $t_p \le$ 300 µs; $\delta \le$ 0.02; T_j = 125 °C; pulsed		435	-	-	mV
	Reverse current	V_R = 5 V; $t_p \le$ 3 ms; $\delta \le$ 0.3; T_j = 25 °C; pulsed	I_R	6	-	-	µA
		V_R = 10 V; $t_p \le$ 3 ms; $\delta \le$ 0.3; T_j = 25 °C; pulsed		10	-	-	µA
		V_R = 30 V; $t_p \le$ 3 ms; $\delta \le$ 0.3; T_j = 25 °C; pulsed		20	-	-	µA
		V_R = 60 V; $t_p \le$ 3 ms; $\delta \le$ 0.3; T_j = 25 °C; pulsed		100	-	400	µA
		V_R = 10 V; $t_p \le$ 3 ms; $\delta \le$ 0.3; T_j = 125 °C; pulsed		8	-	-	mA
	Diode capacitance	V_R = 1 V; f = 1 MHz; T_j = 25 °C	C_d	510	-	-	pF
		V_R = 10 V; f = 1 MHz; T_j = 25 °C		175	-	-	pF
	Reverse recovery time step recovery	I_F = 0.5 A; I_R = 0.5 A; $I_{R(meas)}$ = 0.1 A; T_j = 25 °C	t_{rr}	17	-	-	ns
	Reverse recovery time ramp recovery	dI_F/dt = 200 A/µs; T_j = 25 °C; I_F = 6 A; V_R = 26 V	t_{rr}	12	-	-	ns
	Peak forward recovery voltage	I_F = 0.5 A; dI_F/dt = 20 A/µs; T_j = 25 °C	V_{FRM}	335	-	-	mV

TYPICAL DEVICE CHARACTERISTICS CURVES

TRANSIENT THERMAL IMPEDANCE FROM JUNCTION TO AMBIENT AS A FUNCTION OF PULSE DURATION; TYPICAL VALUES

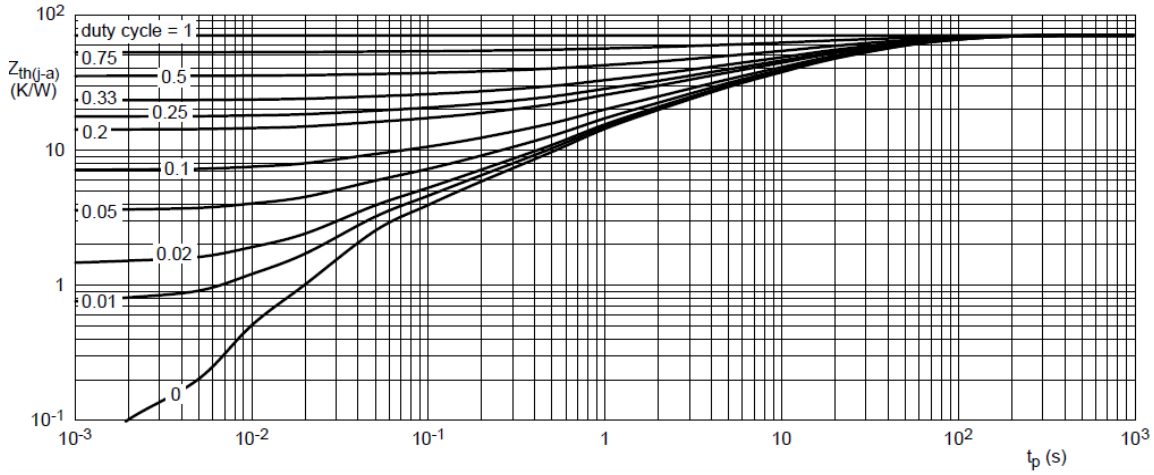


Fig1. FR4 PCB, STANDARD FOOTPRINT

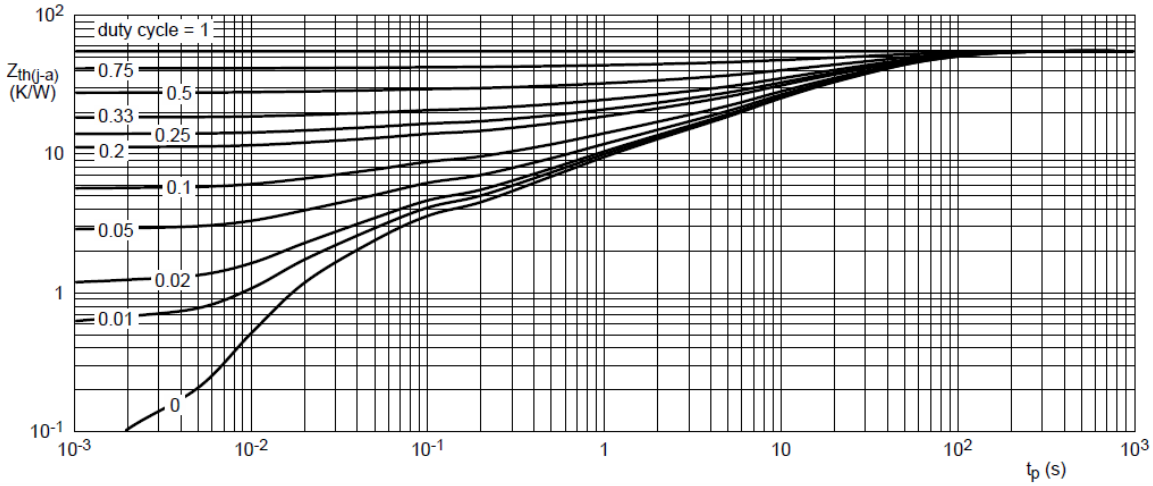


Fig2. FR4 PCB, MOUNTING PAD FOR CATHODE 1 cm²

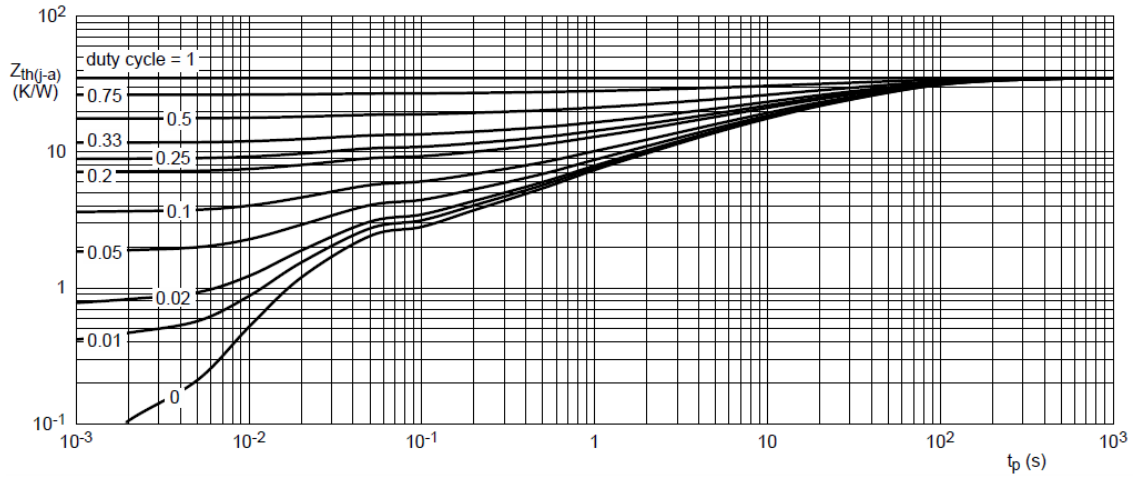
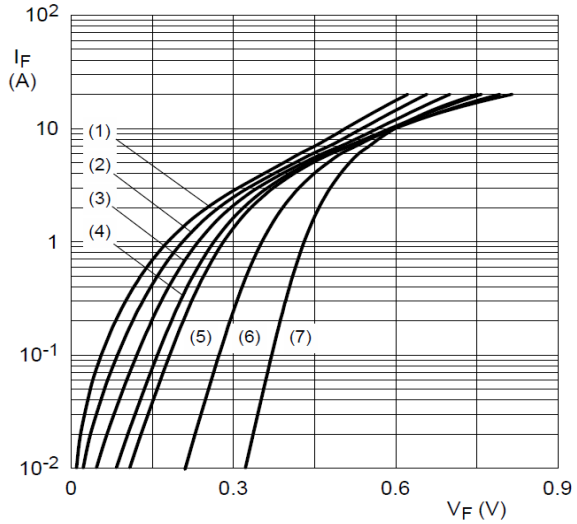


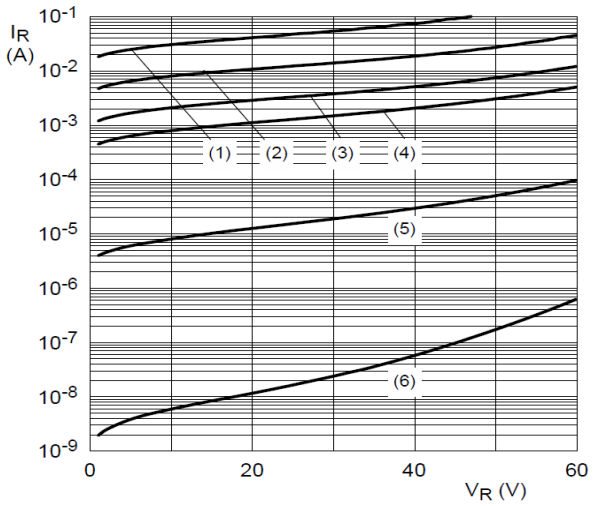
Fig3. CERAMIC PCB, AL_2O_3, STANDARD FOOTPRINT

TYPICAL DEVICE CHARACTERISTICS CURVES



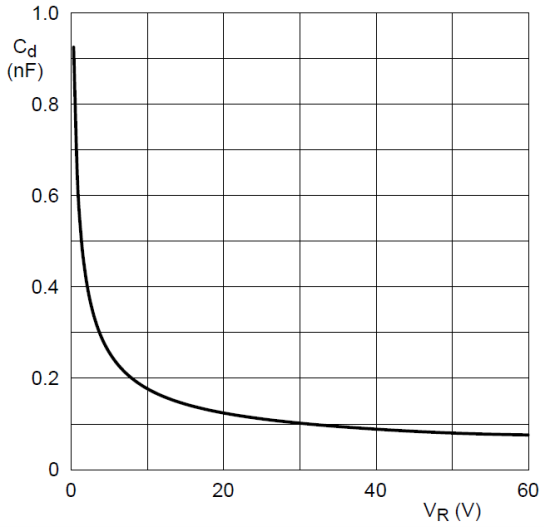
Pulsed condition:
(1) T_j = 175 °C, (2) T_j = 150 °C, (3) T_j = 125 °C, (4) T_j = 100 °C, (5) T_j = 85 °C, (6) T_j = 25 °C, (7) T_j = −40 °C

Fig4. FORWARD CURRENT AS A FUNCTION OF FORWARD VOLTAGE; TYPICAL VALUES



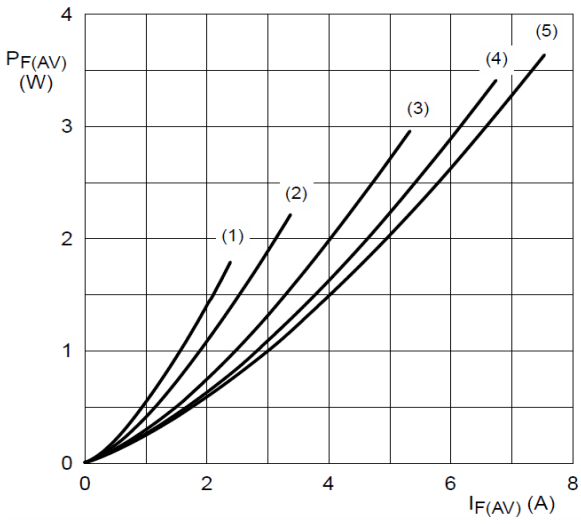
Pulsed condition:
(1) T_j = 150 °C, (2) T_j = 125 °C, (3) T_j = 100 °C, (4) T_j = 85 °C, (5) T_j = 25 °C, (6) T_j = −40 °C

Fig5. REVERSE CURRENT AS A FUNCTION OF REVERSE VOLTAGE; TYPICAL VALUES



f = 1 MHz; T_{amb} = 25 °C

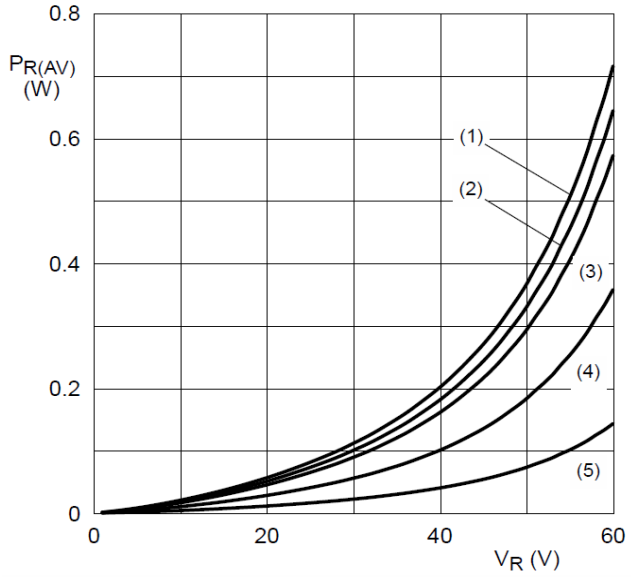
Fig6. Diode capacitance as a function of reverse voltage; typical values



T_j = 100 °C (1) δ = 0.1, (2) δ = 0.2, (3) δ = 0.5, (4) δ = 0.8, (5) δ = 1

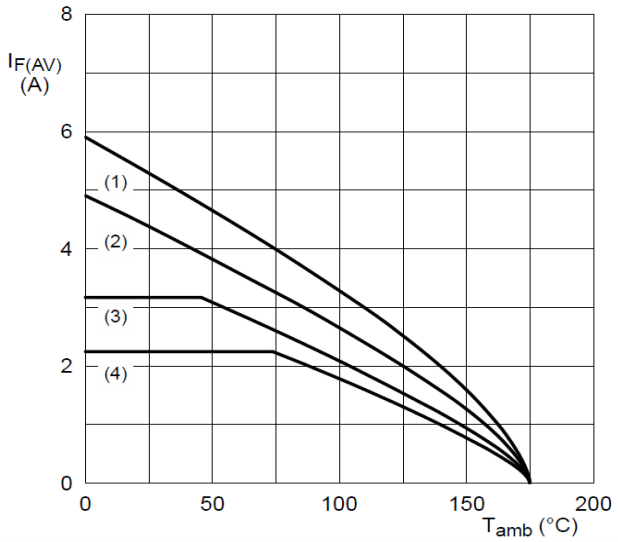
Fig7. Average forward power dissipation as a function of average forward current; typical values

TYPICAL DEVICE CHARACTERISTICS CURVES



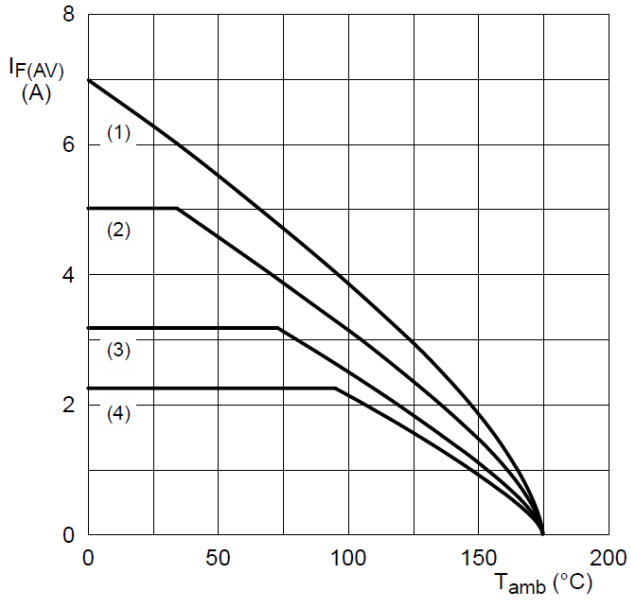
T_j = 100 °C, (1) δ = 1 (2) δ = 0.9 (3) δ = 0.8 (4) δ = 0.5 (5) δ = 0.2

Fig8. Average reverse power dissipation as a function of reverse voltage; typical values



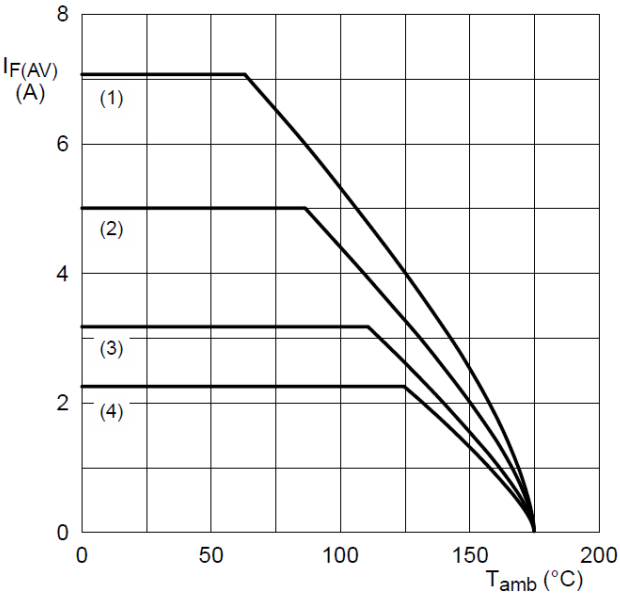
FR4 PCB, standard footprint T_j = 175 °C, (1) δ = 1; DC, (2) δ = 0.5; f = 20 kHz, (3) δ = 0.2; f = 20 kHz, (4) δ = 0.1; f = 20 kHz

Fig9. Average forward current as a function of ambient temperature; typical values



FR4 PCB, mounting pad for cathode 1 cm^2 T_j = 175 °C, (1) δ = 1; DC, (2) δ = 0.5; f = 20 kHz, (3) δ = 0.2; f = 20 kHz, (4) δ = 0.1; f = 20 kHz

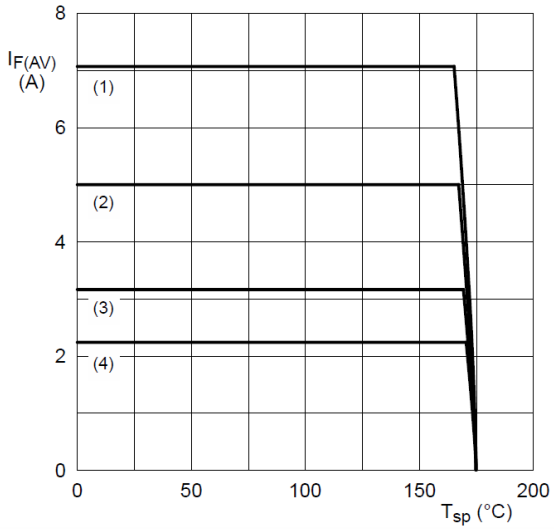
Fig10. Average forward current as a function of ambient temperature; typical values



Ceramic PCB, Al_2O_3, standard footprint T_j = 175 °C, (1) δ = 1; DC, (2) δ = 0.5; f = 20 kHz, (3) δ = 0.2; f = 20 kHz, (4) δ = 0.1; f = 20 kHz

Fig11. Average forward current as a function of ambient temperature; typical values

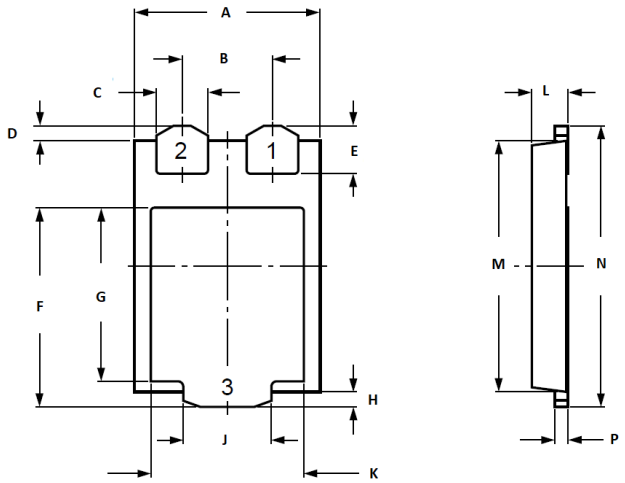
TYPICAL DEVICE CHARACTERISTICS CURVES



T_j = 175 °C, (1) δ = 1; DC, (2) δ = 0.5; f = 20 kHz, (3) δ = 0.2; f = 20 kHz, (4) δ = 0.1; f = 20 kHz

Fig. 12. Average forward current as a function of solder point temperature; typical values

PACKAGE INFORMATION



OUTLINE DIMENSIONS				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.2	4.4	0.615	0.173
B	-	2.13		0.083
C	1.1	1.3	0.043	0.051
D	0.25	0.45	0.009	0.018
E	0.9	1.3	0.035	0.051
F	4.4	4.8	0.173	0.189
G	3.8	4.2	0.149	0.165
H	0.25	0.45	0.009	0.018
J	1.95	2.15	0.076	0.084
K	3.1	3.5	0.122	0.138
L	0.74	0.82	0.029	0.032
N	5.7	5.9	0.224	0.232
M	6.4	6.6	0.251	0.259
P	0.16	0.24	0.006	0.009

NOTES
1. Controlling dimension: inches.
2. Dimensioning and tolerances per ANSI Y14.5M, 1985.
3. Pin 3 is the cathode (Unidirectional Only)
4. Dimensions are exclusive of mold flash and metal burrs.

CUSTOMER NOTE:

DISCLAIMER

The product information and the selection guide facilitates the selection of the ALPINESEMI™'s Semiconductor Device(s) best suited for application in your product(s) as per your requirement. It is recommended that you completely review the Data sheet(s) so as to confirm that the Device(s) meets functionality parameters for your application. The information furnished on the Data Sheet and the ALPINESEMI™'s Web Site is believed to be accurate and reliable at the time of preparation of this document. ALPINESEMI™ however, does not assume any inaccuracies that may arise when the components are mounted and removed. Furthermore, ALPINESEMI™ does not assume liability whatsoever, arising out of the application or the use of any of ALPINESEMI™'s product(s). Neither, does it convey any license under its patent rights nor the rights of others. These products are not guaranteed for use in life saving/support appliances or systems. ALPINESEMI™'s customers using 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 ALPINESEMI™ will not be responsible in any way(s) for any damage(s) resulting from such use.

Please check the website **www.alpinesemi.com** for continues updates and revision of datasheets.

DESIGN CHANGES: ALPINESEMI™ strives for continuous improvement and reserves the right to change the specifications of its products without prior notice. ALPINESEMI™ reserves the right to discontinue product lines without prior notice. Any product selection is a recommendation based on best understanding of such product(s) by our engineers. However, buyers are advised to rely on their own judgment for such selection of the products.

ALPINESEMI™ makes no warranty, representation or guarantee regarding the suitability of its products for any particular applications. Neither does ALPINESEMI™ assume any liability arising out of the applications nor the use of such products. ALPINESEMI™ specifically disclaims all liabilities either consequential or incidental.

All logos and information provided in the datasheets are for reference only. Any registered and/or trademark/logos belonging to respective companies be the property of those companies. ALPINESEMI™ extends the courtesy to them, if any of the information found in its datasheet.

Component Disposal Instructions

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).

ALPINESEMI

sales@alpinesemi.com
www.alpinesemi.com