

Silicon Carbide Merged PN-Schottky Diode

650V SiC MPS High Power Rectifier – Husky Series



Product Information:

Cathode  Anode

Features

- Ultra-Low Forward Voltage (V_F)
- Zero Forward Recovery
- Zero Reverse Recovery
- High Surge Current Capability
- Optimized for High Power Applications
- RoHS Compliant and Halogen Free

Benefits

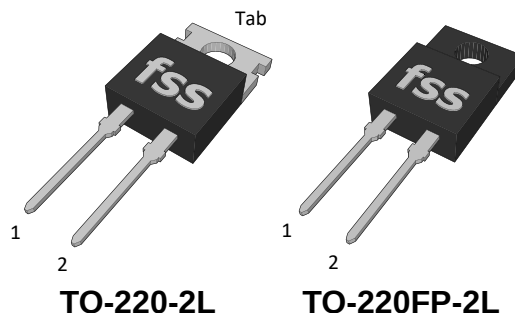
- Higher System Efficiency
- Increase Parallel Device Convenience
- Enable High Temperature Application
- Allow High Frequency Operation
- Realize Compact and Lightweight Systems
- High Reliability

Key Performance Parameters

Parameter	Symbol	Value	Unit
DC Blocking Voltage	V_R	650	V
Nominal Forward Current	$I_{F,NOM}$	4	A
Total Capacitive Charge	Q_C	10.6	nC
Capacitance Stored Energy	E_C	1.55	μ J
Junction & Storage Temperature	T_J, T_{stg}	-55 to 175	$^{\circ}$ C
TO-220-2L			
Continuous Forward Current	$I_{F,max(cont.)}$	16	A
I^2t Value	$\int i^2 dt$	2.6	A ² s
Power Dissipation	P_{tot}	68	W
TO-220FP-2L			
Continuous Forward Current	$I_{F,max(cont.)}$	12	A
I^2t Value	$\int i^2 dt$	2.1	A ² s
Power Dissipation	P_{tot}	38	W

Part Number	Package	Marking
FH06004C	TO-220-2L	FH06004
FH06004D	TO-220FP-2L	FH06004
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For further information about comparable products, please contact (www.fastsic.com).



Terminal	Packaging Type	
	TO-220-2L	TO-220FP-2L
Anode	2	2
Cathode	1, Tab	1
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Potential Applications

- Switching Mode Power Supply
- Power Factor Correction
- Portable Adaptor
- Renewable Energy

Maximum Ratings:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
TO-220-2L						
Continuous Forward Current	I_F	--	--	4 10.6 16	A	$T_c \leq 161^\circ\text{C}$, Duty=100% $T_c \leq 110^\circ\text{C}$, Duty=100% $T_c \leq 25^\circ\text{C}$, Duty=100%
Non-Repetitive Forward Surge Current, Sinusoidal Halfwave	$I_{F,SM}$	--	--	23		$T_c = 25^\circ\text{C}$, $t_p = 10\text{ms}$
Non-Repetitive Peak Forward Surge Current	$I_{F,max}$	--	--	251		$T_c = 25^\circ\text{C}$, $t_p = 10\mu\text{s}$
I^2t Value	$\int i^2 dt$	--	--	2.6	A ² s	$T_c = 25^\circ\text{C}$, $t_p = 10\text{ms}$
TO-220FP-2L						
Continuous Forward Current	I_F	--	--	4 7.6 12	A	$T_c \leq 151^\circ\text{C}$, Duty=100% $T_c \leq 110^\circ\text{C}$, Duty=100% $T_c \leq 25^\circ\text{C}$, Duty=100%
Non-Repetitive Forward Surge Current, Sinusoidal Halfwave	$I_{F,SM}$	--	--	21		$T_c = 25^\circ\text{C}$, $t_p = 10\text{ms}$
Non-Repetitive Peak Forward Surge Current	$I_{F,max}$	--	--	252		$T_c = 25^\circ\text{C}$, $t_p = 10\mu\text{s}$
I^2t Value	$\int i^2 dt$	--	--	2.1	A ² s	$T_c = 25^\circ\text{C}$, $t_p = 10\text{ms}$
Repetitive Peak Reverse Voltage	V_{RRM}	--	--	650	V	$T_c = 25^\circ\text{C}$
Power Dissipation	P_{tot}	--	--	68 38	W	$T_c = 25^\circ\text{C}$ (TO-220-2L) $T_c = 25^\circ\text{C}$ (TO-220FP-2L)
Junction Temperature	T_j	-55	--	175		°C
Storage Temperature	T_{stg}	-55	--	175		
Soldering Temperature	T_L	--	--	260		

Electrical Characteristics:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
DC Characteristics						
DC Blocking Voltage	V_{DC}	650	--	--	V	$T_J=25^{\circ}\text{C}$
Forward Voltage	V_F	--	1.29 1.5	1.55 --		$I_F=4\text{A}$, $T_J=25^{\circ}\text{C}$ $I_F=4\text{A}$, $T_J=175^{\circ}\text{C}$
Reverse Current	I_R	--	0.6 7	35 --	μA	$V_R=520\text{V}$, $T_J=25^{\circ}\text{C}$ $V_R=520\text{V}$, $T_J=175^{\circ}\text{C}$
AC Characteristics						
Total Capacitive Charge	Q_C	--	10.6	--	nC	$V_R=400\text{V}$, $T_J=25^{\circ}\text{C}$
Total Capacitance	C_j	--	181 20 16	--	pF	$V_R=1\text{V}$, $f=1\text{MHz}$, $T_J=25^{\circ}\text{C}$ $V_R=200\text{V}$, $f=1\text{MHz}$, $T_J=25^{\circ}\text{C}$ $V_R=400\text{V}$, $f=1\text{MHz}$, $T_J=25^{\circ}\text{C}$
Capacitance Stored Energy	E_C	--	1.55	--	μJ	$V_R=400\text{V}$, $T_J=25^{\circ}\text{C}$

Thermal Characteristics:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Thermal Impedance, junction – case (TO-220-2L)	R_{th-jc}	--	2.2	--	K/W	--
Thermal Impedance, junction – case (TO-220FP-2L)	R_{th-jc}	--	3.9	--		--
Thermal Impedance, junction – ambient	R_{th-ja}	--	--	--		Device on PCB, with 6 cm ² of cooling area

Electrical Characteristics Diagrams

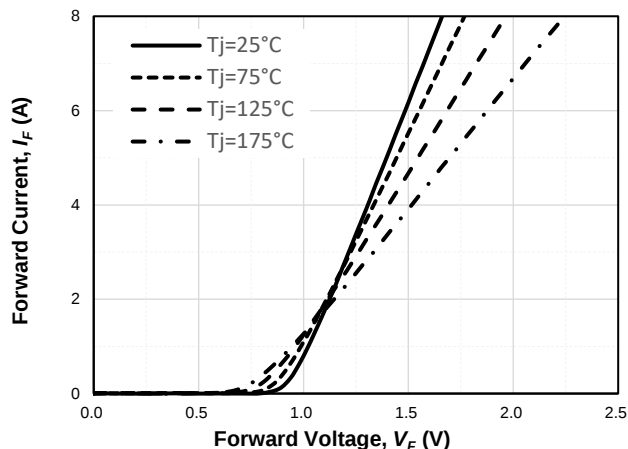


Fig. 1 Forward Characteristics

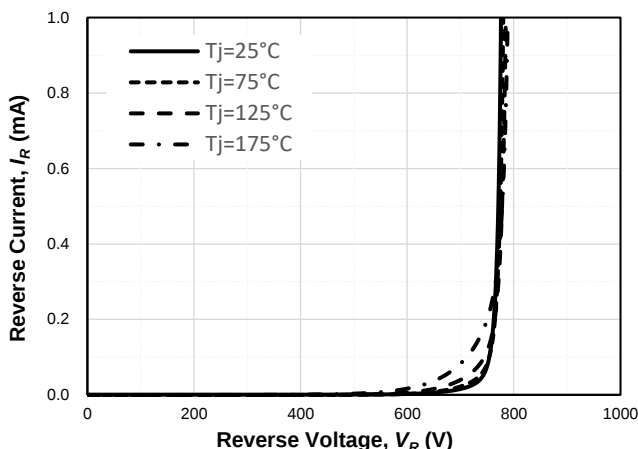


Fig. 2 Reverse Characteristics

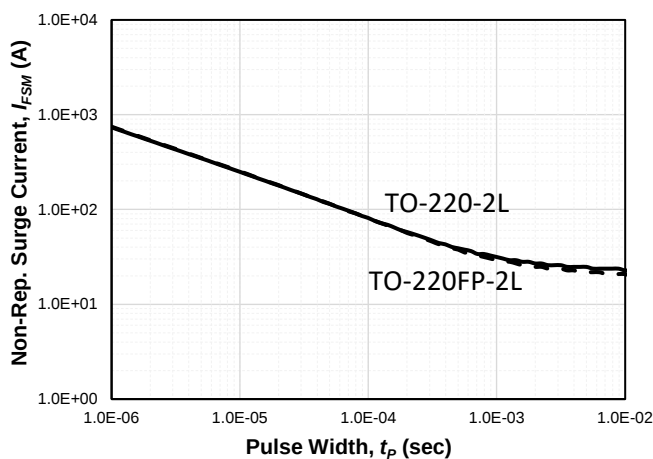


Fig. 3 Non-repetitive Peak Forward Surge Current vs. Pulse Width

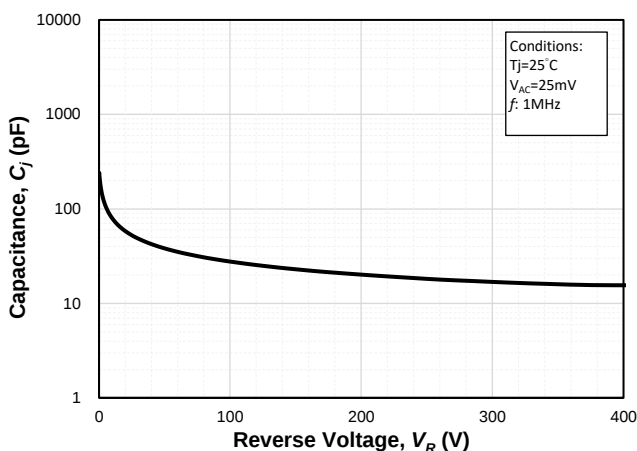


Fig. 4 Capacitance vs. Reverse Voltage

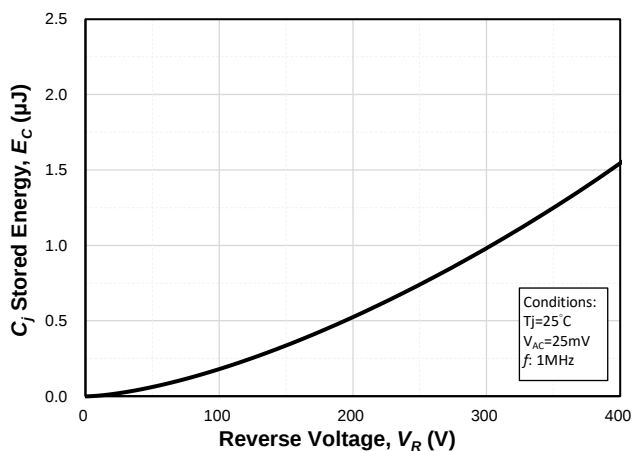


Fig. 5 Capacitance Stored Energy vs. Reverse Voltage

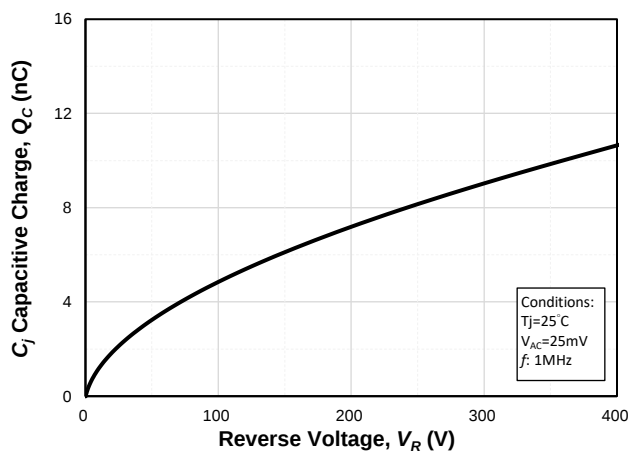


Fig. 6 Capacitive Charge vs. Reverse Voltage

Electrical Characteristics Diagrams

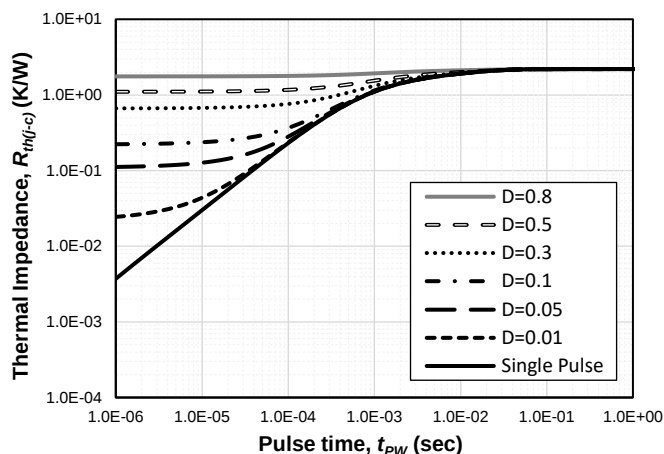


Fig. 7 Typ. Transient Thermal Impedance R_{th-jc} (TO-220-2L)

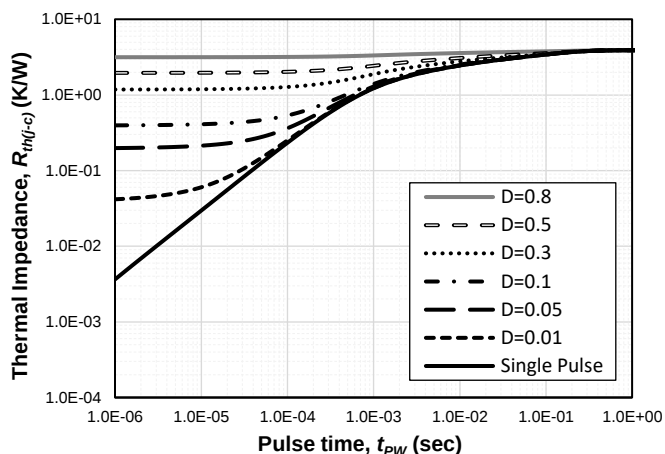


Fig. 8 Typ. Transient Thermal Impedance R_{th-jc} (TO-220FP-2L)

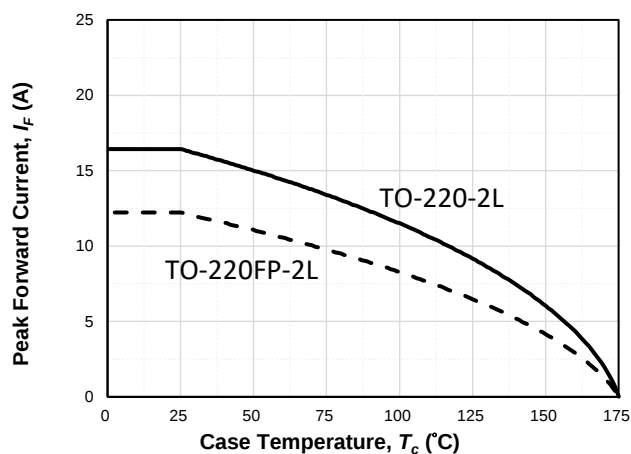


Fig. 9 Continuous I_F De-rating

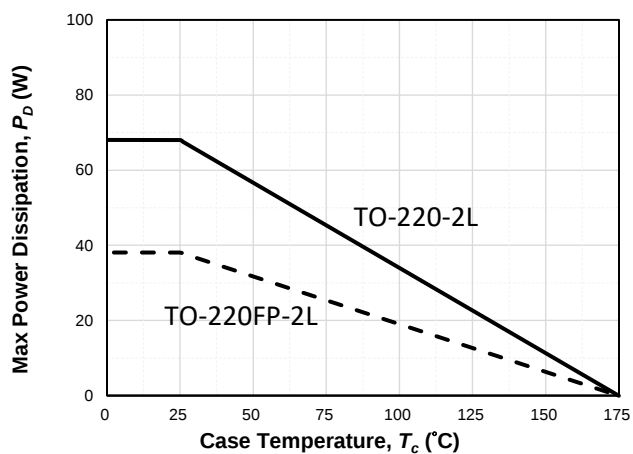
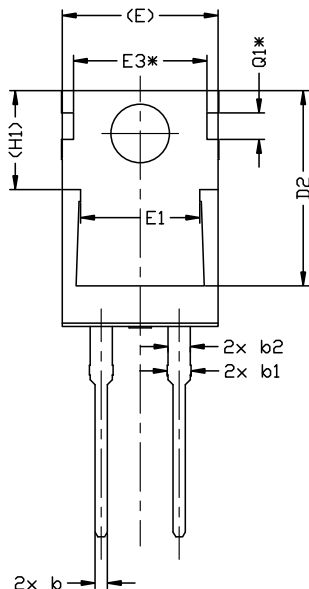
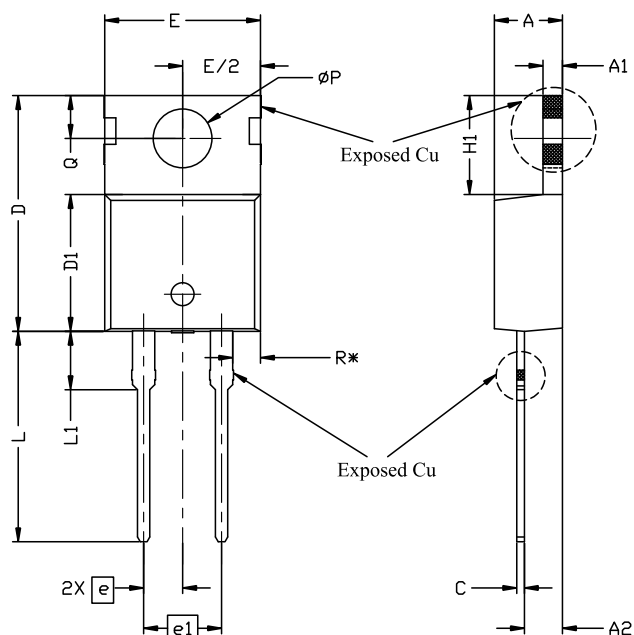


Fig. 10 Power Dissipation

Package Outline (TO-220-2L)

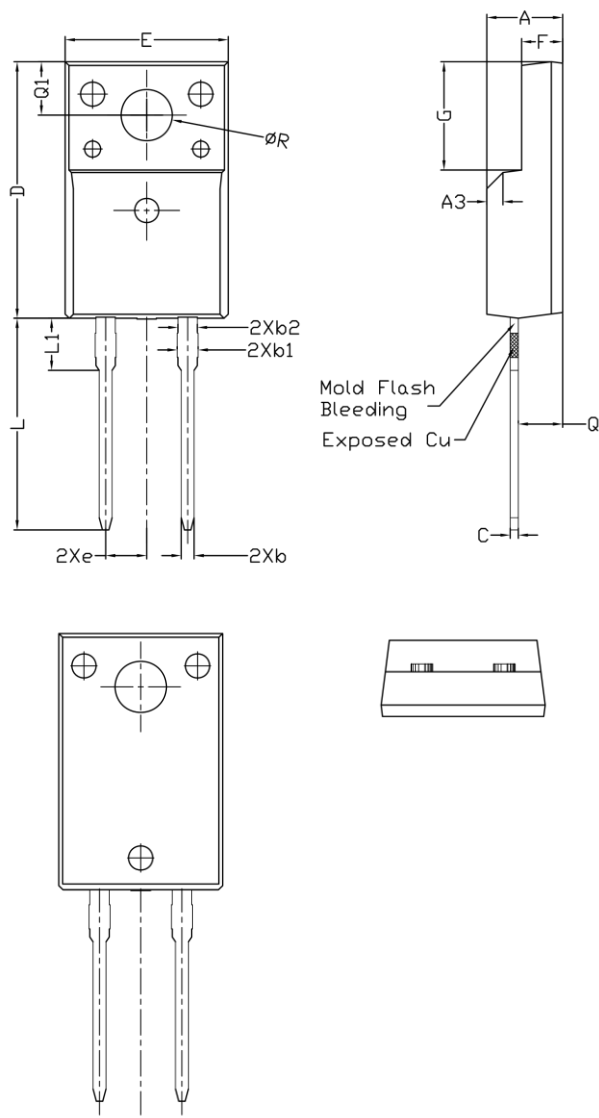


Symbol	Dimension (Millimeters)		
	Min.	Nom.	Max.
A	4.24	4.44	4.64
A1	1.15	1.27	1.40
A2	2.30	2.48	2.70
b	0.70	0.80	0.90
b1	1.20	1.55	1.75
b2	1.20	1.45	1.70
c	0.40	0.50	0.60
D ⁽³⁾	14.70	15.37	16.00
D1	8.82	8.92	9.02
D2 ⁽⁴⁾	12.63	12.73	12.83
E ^(3, 4)	9.96	10.16	10.36
E1 ⁽⁴⁾	6.86	7.77	8.89
E3*	8.70 REF.		
e	2.54 BSC.		
e1	5.08 BSC.		
H1 ^(4,5)	6.30	6.45	6.60
L	13.47	13.72	13.97
L1	3.60	3.80	4.00
øP	3.75	3.84	3.93
Q	2.60	2.80	3.00
Q1*	1.73 REF.		
R*	1.82 REF.		

Note:

1. Package reference: JEDEC TO220, variation AB.
2. Slot required, notch may be rounded.
3. Dimension D & E do not include mold flash. Mold flash shall not exceed 0.127mm per side. These dimensions are measured at the outermost extreme of the plastic body.
4. Thermal pad contour optional within dimension E, H1, D2 & E1.
5. Dimension E2 & H1 define a zone where stamping and singulation irregularities are allowed.
6. "*" is reference.

Package Outline (TO-220FP-2L)



Symbol	Dimension (Millimeters)		
	Min.	Nom.	Max.
A	4.60	4.70	4.80
B	0.70	0.80	0.91
b1	1.20	1.30	1.47
b2	1.10	1.20	1.30
C	0.45	0.50	0.63
D	15.80	15.87	15.97
e	2.54 BSC.		
E	10.00	10.10	10.30
F	2.44	2.54	2.64
G	6.50	6.70	6.90
L	12.90	13.10	13.30
L1	3.13	3.23	3.33
Q	2.65	2.75	2.85
Q1	3.20	3.30	3.40
ϕR	3.08	3.18	3.28

Note:

Package body sizes exclude mold flash and burrs mold flash should be less than 0.15mm

Revision History

Date	Revision	Changes
20.09.22	Pre. A	1 st issue
22.07	Revision 1.0	Revision to 1.0

Important Note (Disclaimer)

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