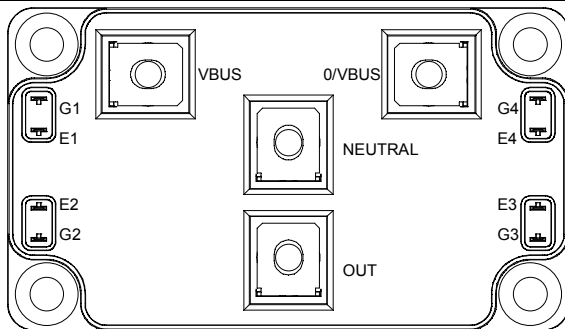
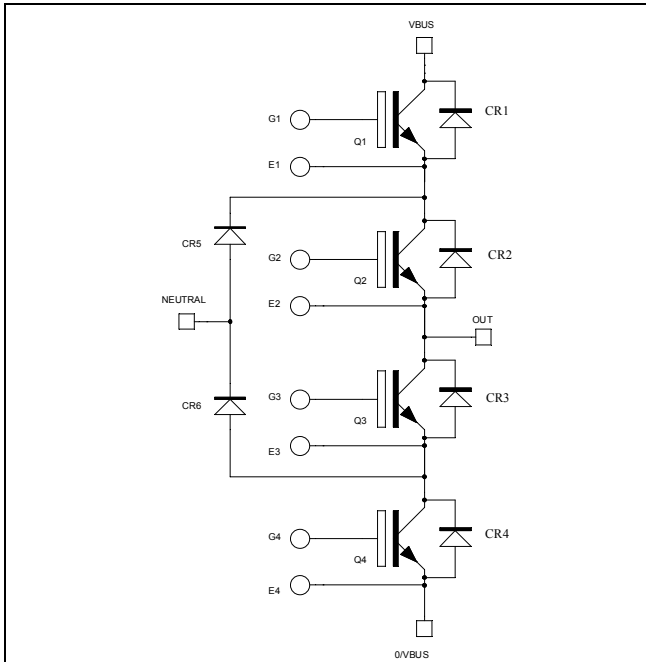


**Three level inverter
Trench + Field Stop IGBT3
Power Module**

**$V_{CES} = 600V$
 $I_C = 150A @ T_c = 80^\circ C$**



Application

- Solar converter
- Uninterruptible Power Supplies

Features

- Trench + Field Stop IGBT3 Technology
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 20 kHz
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- Very low stray inductance
 - Symmetrical design
 - M5 power connectors
- High level of integration

Benefits

- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of VCEsat
- Low profile
- RoHS Compliant

Q1 to Q4 Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	600	V
I_C	Continuous Collector Current	$T_C = 25^\circ C$	200
		$T_C = 80^\circ C$	150
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ C$	300
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_C = 25^\circ C$	480
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	300A @ 550V

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

All ratings @ $T_j = 25^\circ\text{C}$ unless otherwise specified

Q1 to Q4 Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$, $V_{CE} = 600\text{V}$			250	μA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 150\text{A}$		1.5 1.7	1.9	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$, $I_C = 2.5\text{ mA}$	5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}$, $V_{CE} = 0\text{V}$			400	nA

Q1 to Q4 Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$		9200		pF
C_{oes}	Output Capacitance	$V_{CE} = 25\text{V}$		580		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		270		
Q_G	Gate charge	$V_{GE} = \pm 15\text{V}$, $I_C = 150\text{A}$ $V_{CE} = 300\text{V}$		1.6		μC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 150\text{A}$ $R_G = 3.3\Omega$		115		ns
T_r	Rise Time			45		
$T_{d(off)}$	Turn-off Delay Time			225		
T_f	Fall Time			55		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 150\text{A}$ $R_G = 3.3\Omega$		130		ns
T_r	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			300		
T_f	Fall Time			70		
E_{on}	Turn on Energy	$V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 150\text{A}$		0.85 1.5		mJ
E_{off}	Turn off Energy	$R_G = 3.3\Omega$		4.1 5.3		
I_{sc}	Short Circuit data	$V_{GE} \leq 15\text{V}$; $V_{Bus} = 360\text{V}$ $t_p \leq 6\mu\text{s}$; $T_j = 150^\circ\text{C}$		750		A
R_{thJC}	Junction to Case Thermal Resistance				0.31	$^\circ\text{C}/\text{W}$

CR1 to CR4 diode ratings and characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V _{RRM}	Maximum Peak Repetitive Reverse Voltage			600			V
I _{RM}	Maximum Reverse Leakage Current	V _R =600V	T _j = 25°C			150	μA
			T _j = 150°C			350	
I _F	DC Forward Current		T _c = 80°C		100		A
V _F	Diode Forward Voltage	I _F = 100A V _{GE} = 0V	T _j = 25°C		1.6	2	V
			T _j = 150°C		1.5		
t _{rr}	Reverse Recovery Time	I _F = 100A V _R = 300V di/dt = 2000A/μs	T _j = 25°C		125		ns
			T _j = 150°C		220		
Q _{rr}	Reverse Recovery Charge	I _F = 100A V _R = 300V di/dt = 2000A/μs	T _j = 25°C		4.7		μC
			T _j = 150°C		9.9		
E _{rr}	Reverse Recovery Energy	I _F = 100A V _R = 300V di/dt = 2000A/μs	T _j = 25°C		1.1		mJ
			T _j = 150°C		2.4		
R _{thJC}	Junction to Case Thermal Resistance					0.77	°C/W

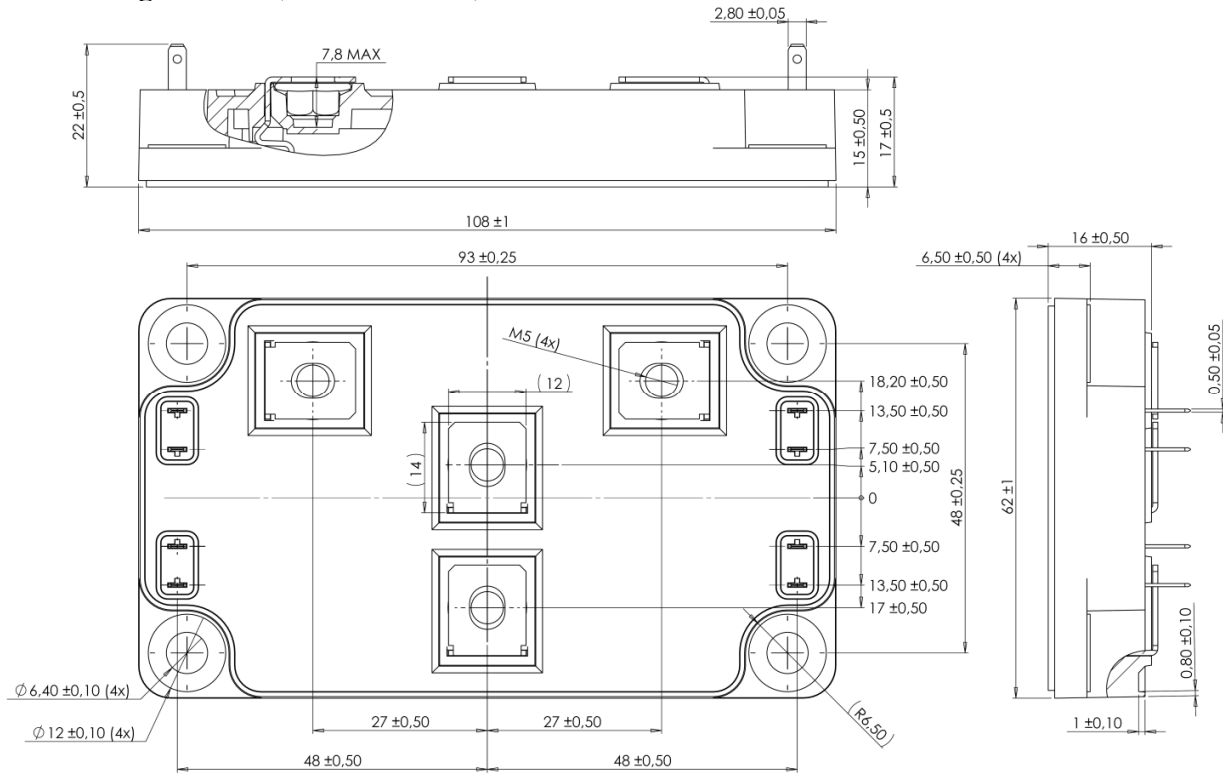
CR5 & CR6 diode ratings and characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V _{RRM}	Maximum Peak Repetitive Reverse Voltage			600			V
I _{RM}	Maximum Reverse Leakage Current	V _R =600V	T _j = 25°C			150	μA
			T _j = 150°C			350	
I _F	DC Forward Current		T _c = 80°C		150		A
V _F	Diode Forward Voltage	I _F = 150A V _{GE} = 0V	T _j = 25°C		1.6	2	V
			T _j = 150°C		1.5		
t _{rr}	Reverse Recovery Time	I _F = 150A V _R = 300V di/dt = 3000A/μs	T _j = 25°C		130		ns
			T _j = 150°C		225		
Q _{rr}	Reverse Recovery Charge	I _F = 150A V _R = 300V di/dt = 3000A/μs	T _j = 25°C		6.9		μC
			T _j = 150°C		14.5		
E _{rr}	Reverse Recovery Energy	I _F = 150A V _R = 300V di/dt = 3000A/μs	T _j = 25°C		1.6		mJ
			T _j = 150°C		3.5		
R _{thJC}	Junction to Case Thermal Resistance					0.52	°C/W

Thermal and package characteristics

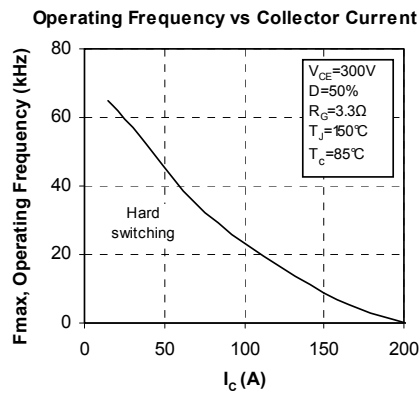
<i>Symbol</i>	<i>Characteristic</i>			<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz			4000			V
T _J	Operating junction temperature range			-40		175	°C
T _{STG}	Storage Temperature Range			-40		125	
T _C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M6	3		5	N.m
		For terminals	M5	2		3.5	
Wt	Package Weight					300	g

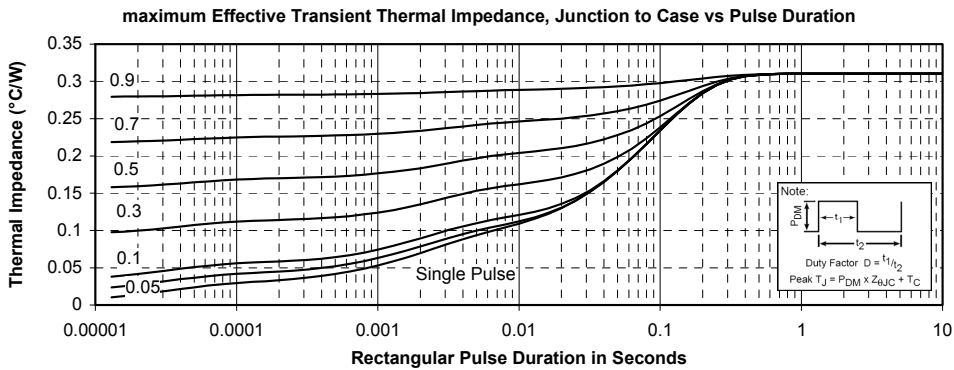
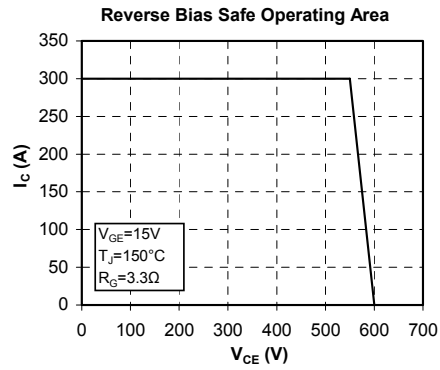
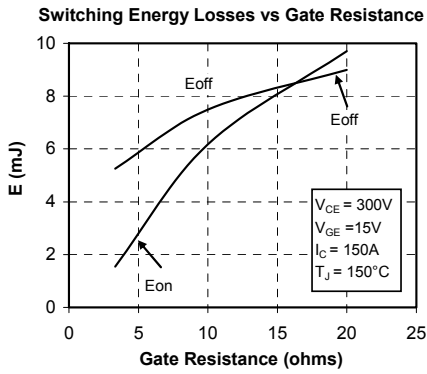
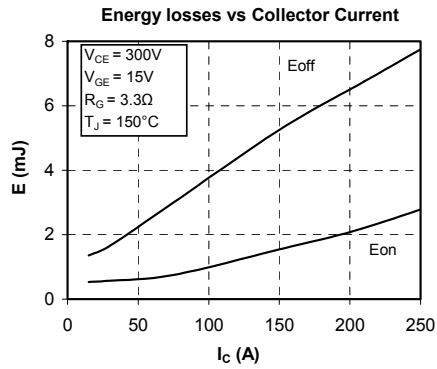
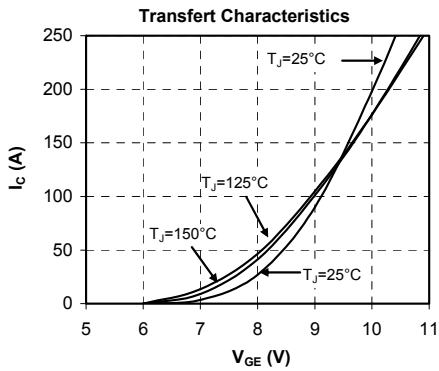
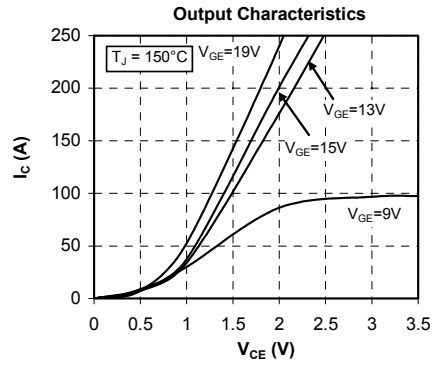
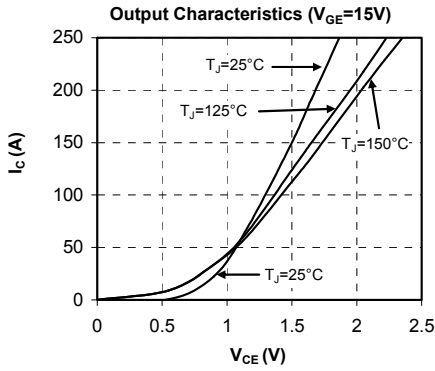
SP6 Package outline (dimensions in mm)

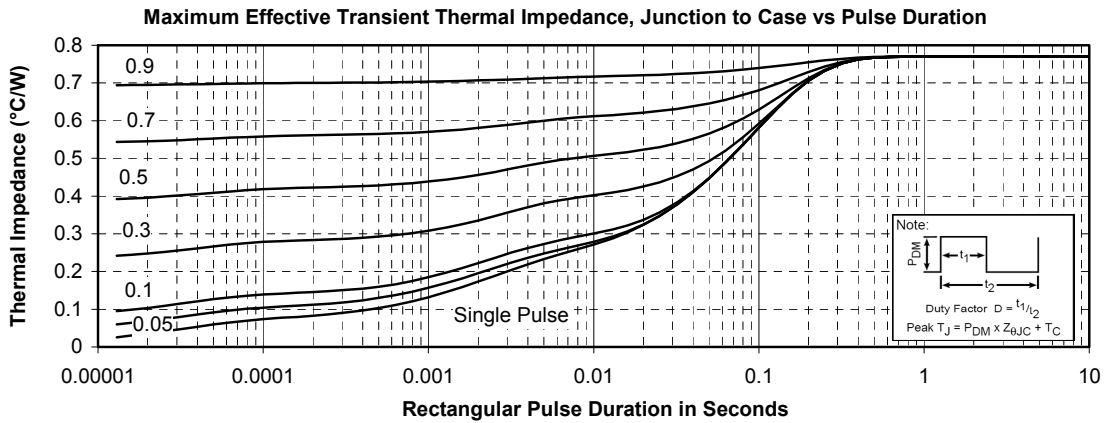
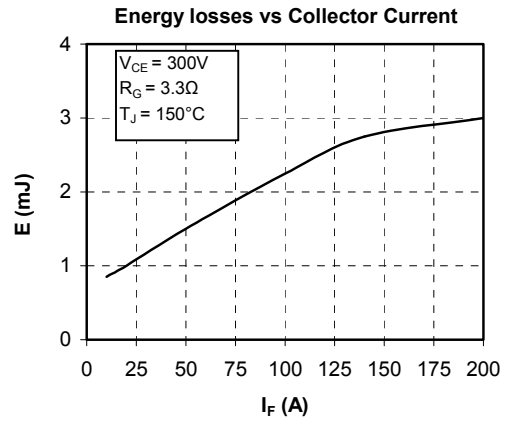
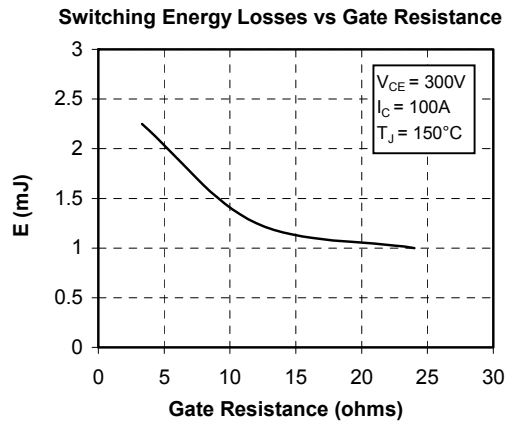
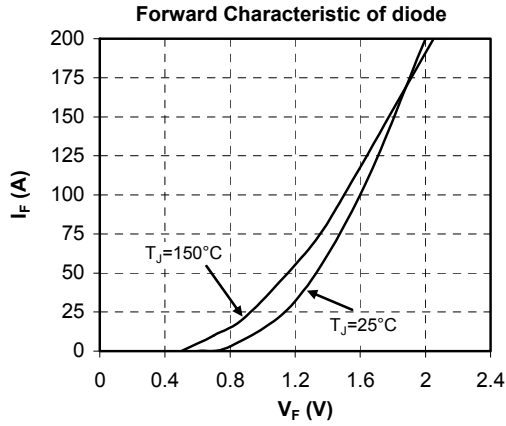


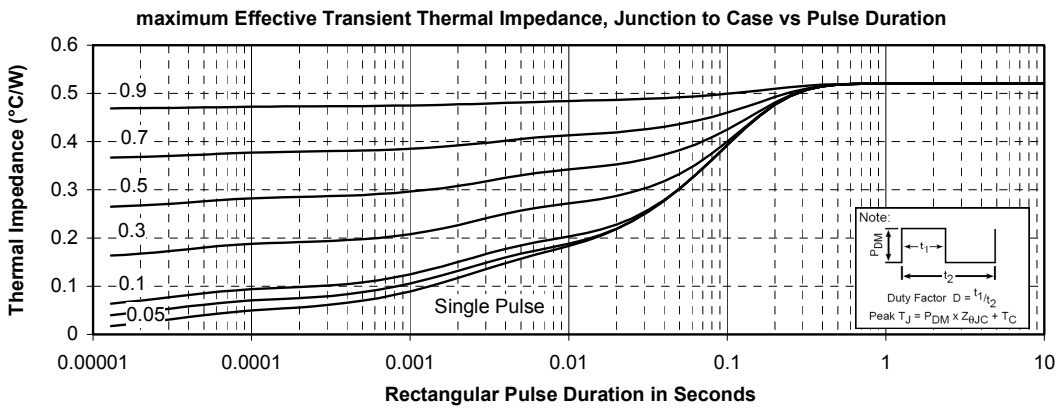
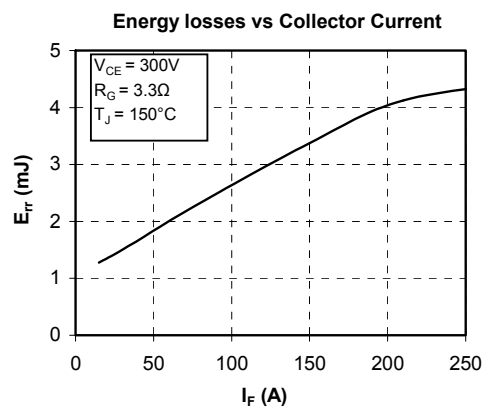
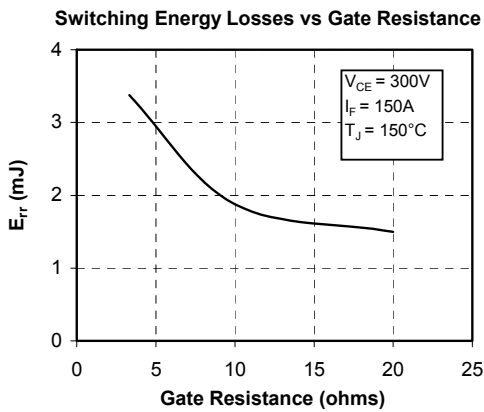
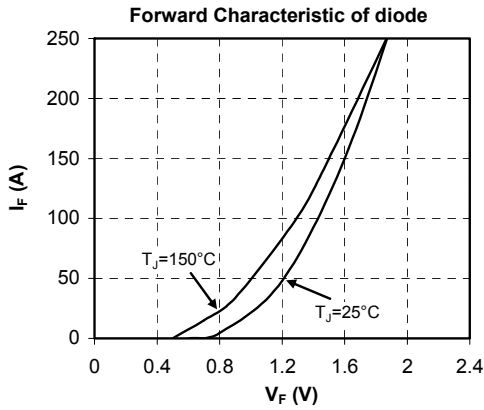
See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Q1 to Q4 Typical performance curve





CR1 to CR4 Typical performance curve


CR5 & CR6 Typical performance curve


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