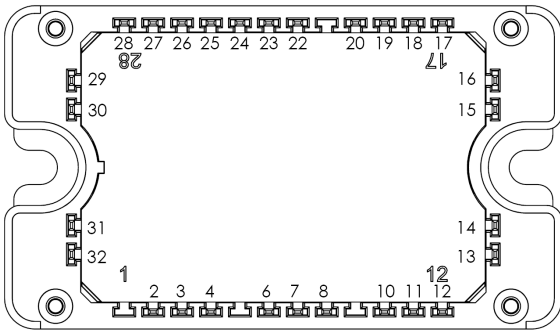
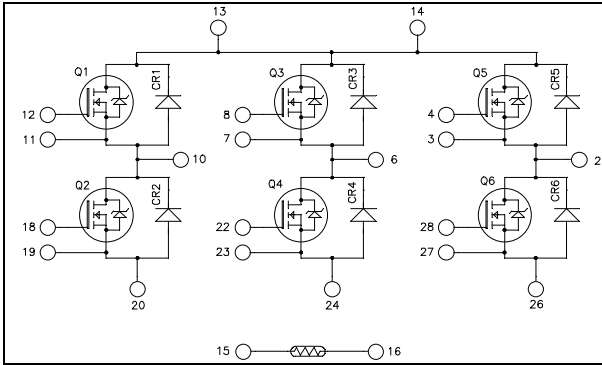


3 phase bridge SiC MOSFET Power Module

$V_{DSS} = 1200V$
 $R_{DS(on)} = 34m\Omega \text{ max @ } T_j = 25^\circ C$
 $I_D = 74A \text{ @ } T_c = 25^\circ C$



Pins 20, 24 & 26 must be shorted together to perform a 3 phase bridge.

Application

- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- **SiC Power MOSFET**
 - High speed switching
 - Low $R_{DS(on)}$
 - Ultra low loss
- **SiC Schottky Diode**
 - Zero reverse recovery
 - Zero forward recovery
 - Temperature Independent switching behavior
 - Positive temperature coefficient on VF
- Very low stray inductance
- Kelvin source for easy drive
- Internal thermistor for temperature monitoring
- AlN substrate for improved thermal performance

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile
- RoHS Compliant

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

Absolute maximum ratings (per SiC MOSFET)

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Voltage	1200	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	74
		$T_c = 80^\circ C$	58
I_{DM}	Pulsed Drain current	150	
V_{GS}	Gate - Source Voltage	-10/25V	V
$R_{DS(on)}$	Drain - Source ON Resistance	34	m Ω
P_D	Power Dissipation	$T_c = 25^\circ C$	375
			W

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.



APTMC120TAM34CT3AG

Power Matters.™

Electrical Characteristics (per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 1200V$		10	100	μA
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 20V$ $I_D = 50A$		25	34	m Ω
		$T_j = 25^\circ C$ $T_j = 175^\circ C$		52		
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}; I_D = 15mA$	2	2.6	4	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = 20V, V_{DS} = 0V$			600	nA

Dynamic Characteristics (per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		2788		pF
C_{oss}	Output Capacitance	$V_{DS} = 1000V$		220		
C_{riss}	Reverse Transfer Capacitance	$f = 1MHz$		15		
Q_g	Total gate Charge	$V_{GS} = -5/+20V$		161		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 800V$		46		
Q_{gd}	Gate – Drain Charge	$I_D = 50A$		50		
$T_{d(on)}$	Turn-on Delay Time	$V_{GS} = -5/+20V$		21		ns
T_r	Rise Time	$V_{Bus} = 800V$		19		
$T_{d(off)}$	Turn-off Delay Time	$I_D = 50A$		50		
T_f	Fall Time	$R_L = 16\Omega; R_{Gext} = 20\Omega$		30		
E_{on}	Turn on Energy	Inductive Switching $V_{GS} = -5/+20V$ $V_{Bus} = 600V$		1.1		mJ
E_{off}	Turn off Energy	$I_D = 50A$ $R_{Gext} = 20\Omega$		0.6		
R_{Gint}	Internal gate resistance			1.1		Ω
R_{thJC}	Junction to Case Thermal Resistance				0.4	$^\circ C/W$

Body diode ratings and characteristics (per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{SD}	Diode Forward Voltage	$V_{GS} = -5V$ $I_{SD} = 25A$		4		V
		$T_j = 25^\circ C$ $T_j = 175^\circ C$		3.5		
t_{rr}	Reverse Recovery Time			45		ns
Q_{rr}	Reverse Recovery Charge	$I_{SD} = 50A; V_{GS} = -5V$ $V_R = 800V; di_F/dt = 1000A/\mu s$		406		nC
I_{rr}	Reverse Recovery Current			13.5		A

SiC schottky diode ratings and characteristics (per SiC diode)

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V _{RRM}	Peak Repetitive Reverse Voltage					1200	V
I _{RRM}	Reverse Leakage Current	V _R =1200V	T _j = 25°C		35	200	μA
			T _j = 175°C		65	400	
I _F	DC Forward Current		T _c = 100°C		20		A
V _F	Diode Forward Voltage	I _F = 20A	T _j = 25°C		1.5	1.8	V
			T _j = 175°C		2.2	3	
Q _C	Total Capacitive Charge	I _F = 20A, V _R = 1200V di/dt = 500A/μs			99		nC
C	Total Capacitance	f = 1MHz, V _R = 400V			93		pF
		f = 1MHz, V _R = 800V			67		
R _{thJC}	Junction to Case Thermal Resistance					1.1	°C/W

Temperature sensor NTC (see application note APT0406 on www.microsemi.com).

<i>Symbol</i>	<i>Characteristic</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B			4		%

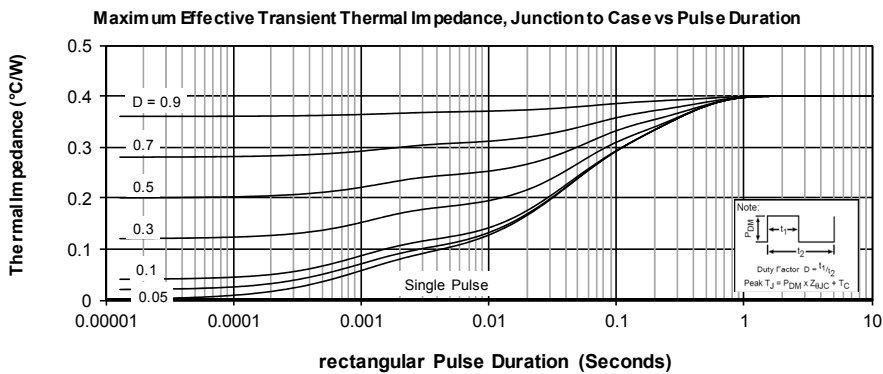
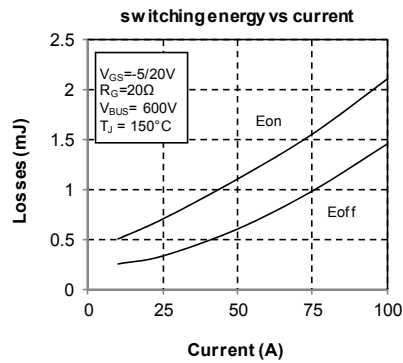
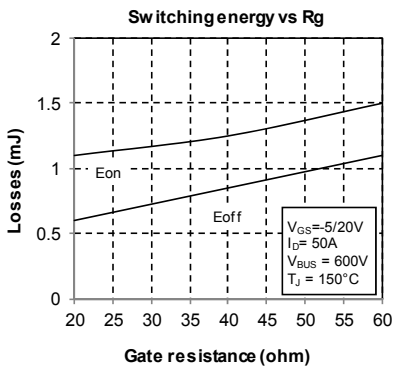
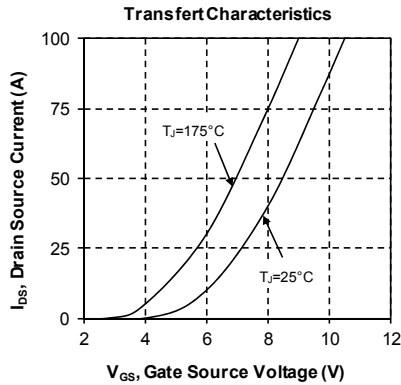
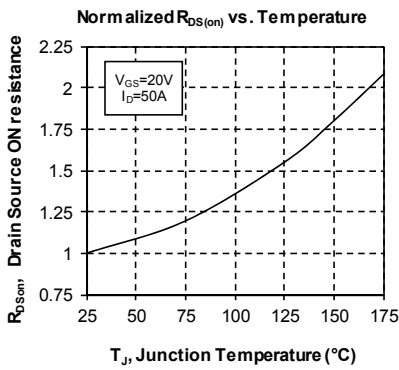
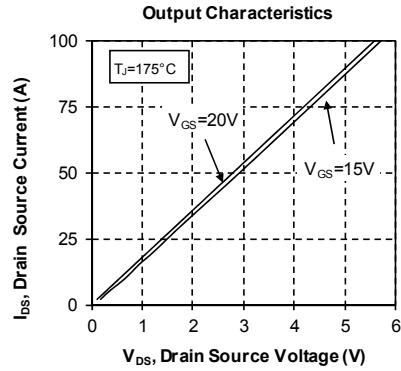
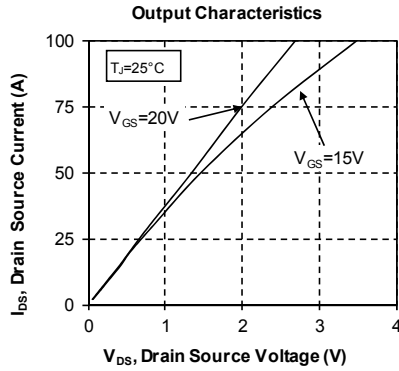
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

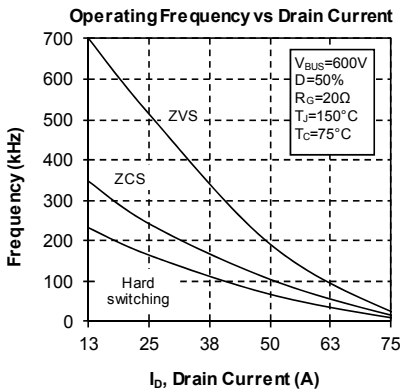
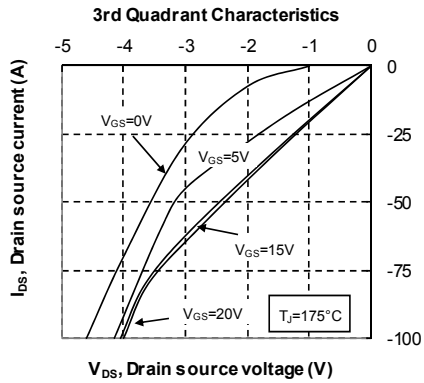
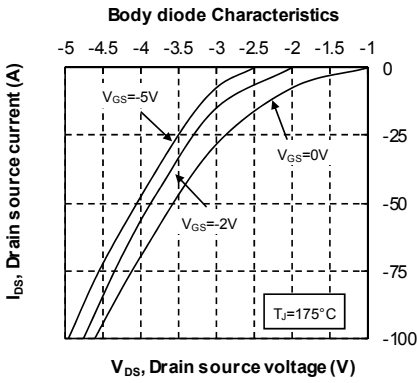
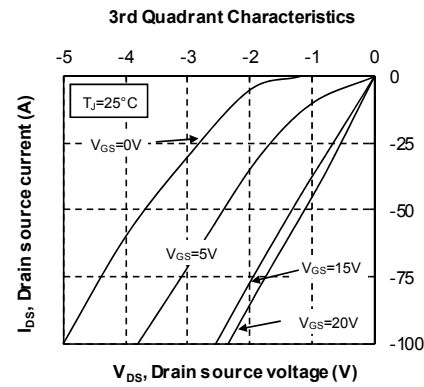
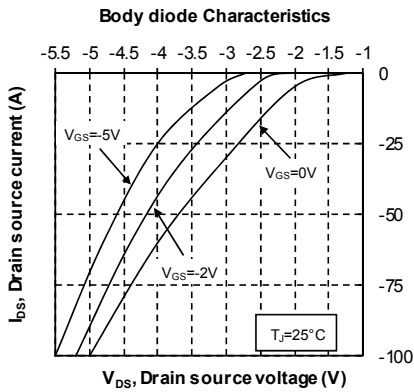
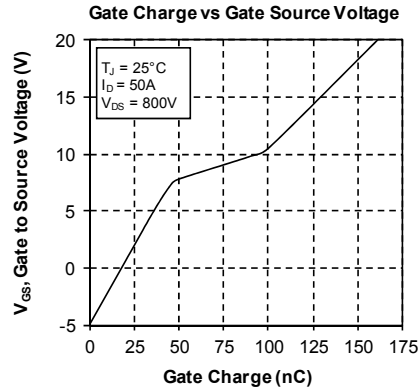
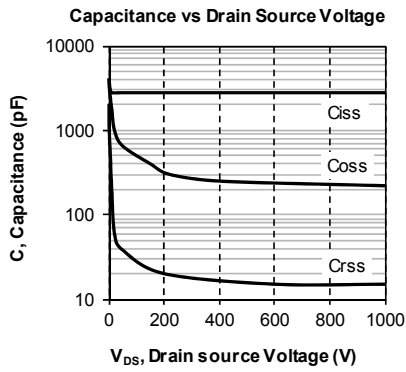
T: Thermistor temperature
R_T: Thermistor value at T

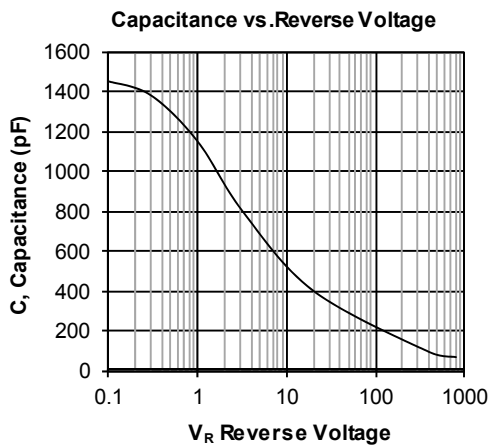
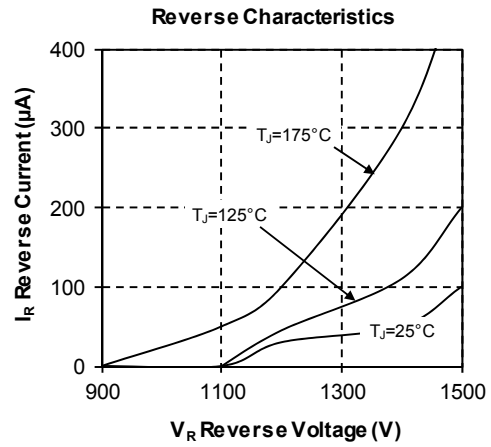
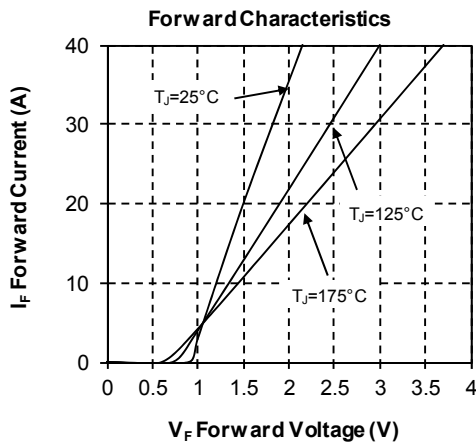
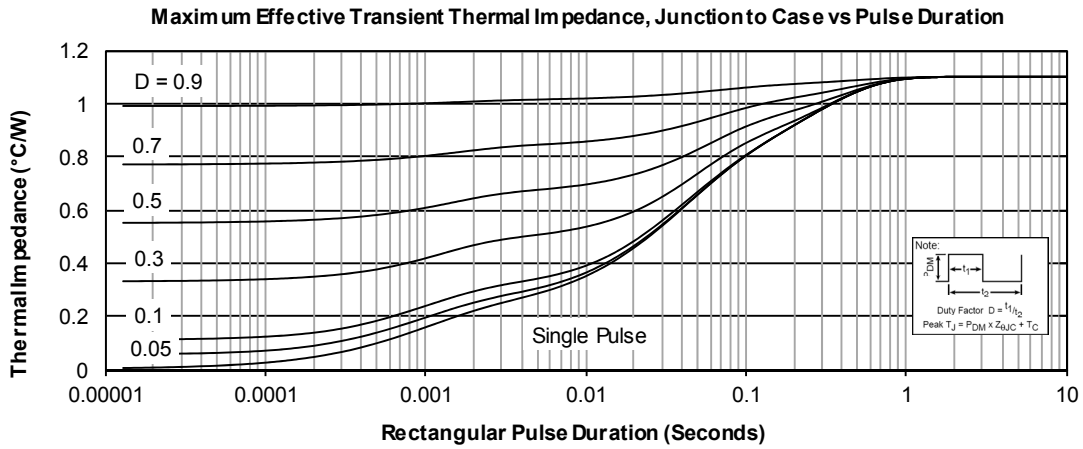
Thermal and package characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Min</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 _{JOP}	Recommended junction temperature under switching conditions	-40	T _{Jmax} -25			
T _{STG}	Storage Temperature Range	-40	125			
T _C	Operating Case Temperature	-40	125			
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				110	g

Typical SiC MOSFET Performance Curve





Typical SiC diode Performance Curve


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