

Boost chopper MOSFET Power Module

CR1

Q2

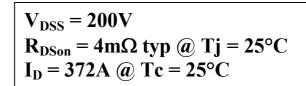
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Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

Features

- Power MOS 7[®] MOSFETs
 - Low R_{DSon}
 - Low input and Miller capacitance
 - Low gate charge
 - Avalanche energy rated
 - Very rugged
- Kelvin source for easy drive
 - Very low stray inductance
 - Symmetrical design
 - M5 power connectors
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Low profile
- **RoHS** Compliant

Symbol	Parameter		Max ratings	Unit
V _{DSS}	Drain - Source Breakdown Voltage		200	V
T	Continuous Drain Current	$T_c = 25^{\circ}C$	372	
I _D	Continuous Drain Current	$T_c = 80^{\circ}C$	278	А
I _{DM}	Pulsed Drain current		1488	
V _{GS}	Gate - Source Voltage		±30	V
R _{DSon}	Drain - Source ON Resistance		5	mΩ
P _D	Maximum Power Dissipation	$T_c = 25^{\circ}C$	1250	W
I _{AR}	Avalanche current (repetitive and non repetitive)		100	А
E _{AR}	Repetitive Avalanche Energy		50	I and
E _{AS}	Single Pulse Avalanche Energy		3000	mJ

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

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www.microsemi.com

Absolute maximum ratings

G2

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S2

VBU:

S2

G2



All ratings (a) $T_j = 25^{\circ}C$ unless otherwise specified

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Тур	Max	Unit
I _{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 200V$ $T_j = 2$	25°C		500	μA
		$V_{GS} = 0V, V_{DS} = 160V$ $T_j = 1$	25°C		2000	
R _{DS(on)}	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 186A$		4	5	mΩ
V _{GS(th)}	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 10 \text{mA}$	3		5	V
I _{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{V}$			±200	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Тур	Max	Unit
C _{iss}	Input Capacitance	$V_{GS} = 0V$		28.9		
Coss	Output Capacitance	$V_{\rm DS} = 25 V$		9.32		nF
C _{rss}	Reverse Transfer Capacitance	f=1MHz		0.58		
Qg	Total gate Charge	$V_{GS} = 10V$		560		
Q_{gs}	Gate – Source Charge	$V_{Bus} = 100V$		212		nC
Q_{gd}	Gate – Drain Charge	$I_{\rm D} = 372 \rm A$		268		
T _{d(on)}	Turn-on Delay Time	Inductive switching @ 125°C		32		ns
Tr	Rise Time	$V_{GS} = 15V$ $V_{Bus} = 133V$ $I_D = 372A$ $R_G = 1.2\Omega$		64		
T _{d(off)}	Turn-off Delay Time			88		
$T_{\rm f}$	Fall Time			116		
Eon	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15V$, $V_{Bus} = 133V$ $I_D = 372A$, $R_G = 1.2\Omega$		3396		T
E_{off}	Turn-off Switching Energy			3716		μJ
Eon	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V$, $V_{Bus} = 133V$ $I_D = 372A$, $R_G = 1.2\Omega$		3744		т
E _{off}	Turn-off Switching Energy			3944		μJ

Chopper diode ratings and characteristics

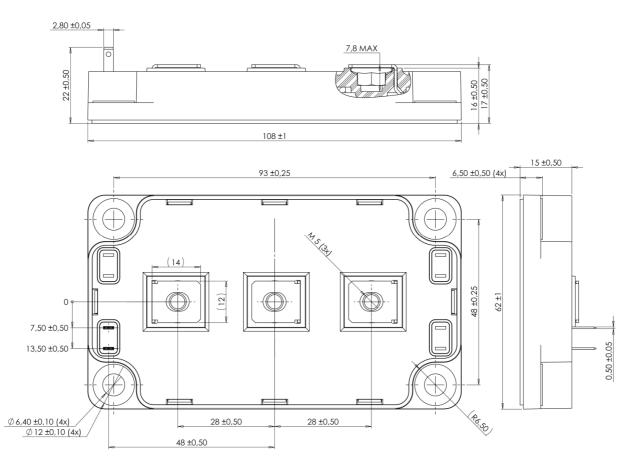
Symbol	Characteristic	Test Conditions		Min	Тур	Max	Unit
V _{RRM}	Maximum Peak Repetitive Reverse Voltage			200			V
I _{RM}	Maximum Reverse Leakage Current	V _R =200V	$T_j = 25^{\circ}C$			250	μA
			$T_{j} = 125^{\circ}C$			750	
I _F	DC Forward Current		$T_c = 80^{\circ}C$		300		A
	Diode Forward Voltage	$I_{\rm F} = 300 {\rm A}$			1	1.1	
$V_{\rm F}$		$I_{\rm F} = 600 {\rm A}$			1.4		V
		$I_{\rm F} = 300 {\rm A}$	$T_{j} = 125^{\circ}C$		0.9		
t _{rr}	Reverse Recovery Time		$T_j = 25^{\circ}C$		60		ns
۲r	$I_{\rm rr}$ Reverse Recovery Time $I_{\rm F} = 300 \text{ A}$ $V_{\rm R} = 133 \text{ V}$	$T_{j} = 125^{\circ}C$		110		115	
Qrr	Reverse Recovery Charge	$di/dt = 600 A/\mu s$	$T_j = 25^{\circ}C$		600		nC
Qrr	Reverse Receivery Charge		$T_{j} = 125^{\circ}C$		2520		пс



Thermal and package characteristics

Symbol	Characteristic			Min	Тур	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance Transistor Diode				0.1	°C/W	
R _{th} JC					0.2		
VISOL	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000			V
T _J	Operating junction temperature range			-40		150	
T _{STG}	Storage Temperature Range			-40		125	°C
T _C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M6	3		5	N.m
Torque		For terminals	M5	2		3.5	19.111
Wt	Package Weight					300	g

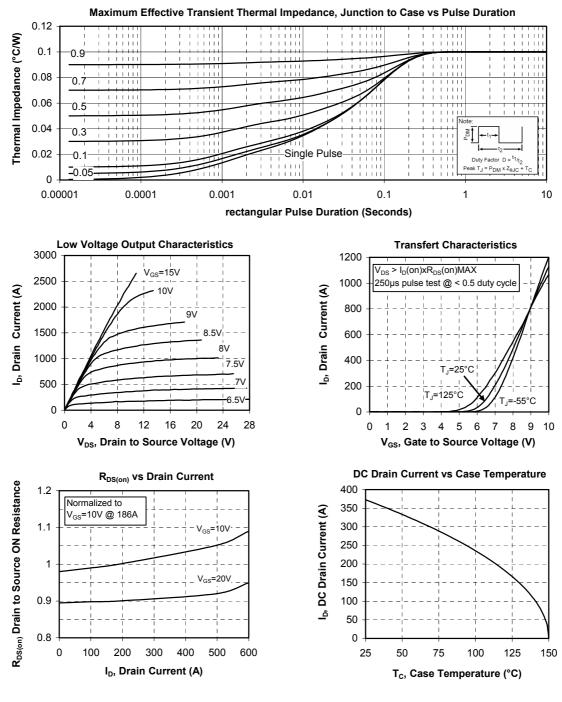
SP6 Package outline (dimensions in mm)



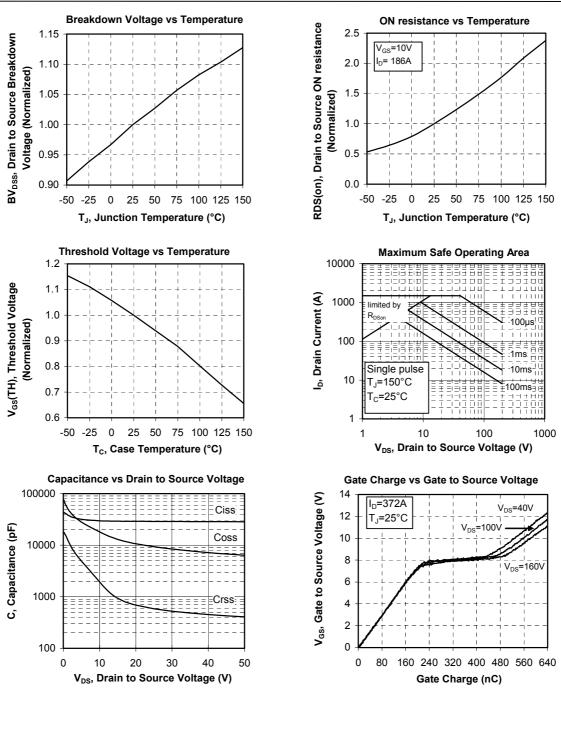
See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com



Typical Performance Curve



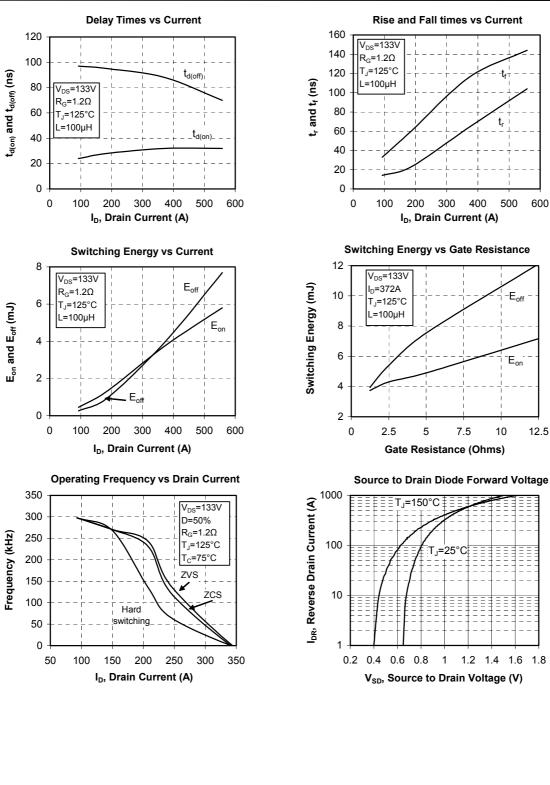






Frequency (kHz)

APTM20DAM04G





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