

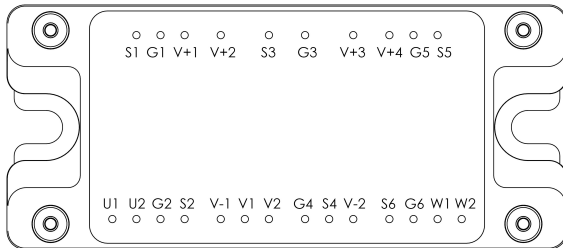
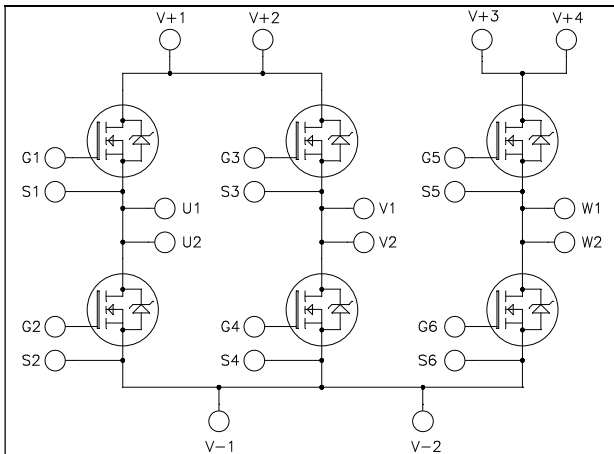
MSCM20XM16F4G

3 phase bridge MOSFET Power Module

$$V_{DSS} = 200V$$

$$R_{DSon} = 16m\Omega \text{ typ @ } T_j = 25^\circ C$$

$$I_D = 104A^* \text{ @ } T_c = 25^\circ C$$



Application

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

Features

- Power MOS 7[®] FREDFETs
 - Low R_{DSon}
 - Low input and Miller capacitance
 - Low gate charge
 - Fast intrinsic reverse diode
 - Avalanche energy rated
 - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
- High level of integration

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

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Breakdown Voltage	200	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	104*
		$T_c = 80^\circ C$	77*
I_{DM}	Pulsed Drain current	416	A
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	19	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	390
I_{AR}	Avalanche current (repetitive and non repetitive)	104	A
E_{AR}	Repetitive Avalanche Energy	50	mJ
E_{AS}	Single Pulse Avalanche Energy	3000	

* Specification of device but output current must be limited due to connectors' temperature.

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

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
IDSS	Zero Gate Voltage Drain Current	V _{GS} = 0V, V _{DS} = 200V, T _j = 25°C			250	μA
		V _{GS} = 0V, V _{DS} = 160V, T _j = 125°C			1000	
R _{DS(on)}	Drain – Source on Resistance	V _{GS} = 10V, I _D = 52A		16	19	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 2.5mA	3		5	V
I _{GSS}	Gate – Source Leakage Current	V _{GS} = ±30 V, V _{DS} = 0V			±140	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C _{iss}	Input Capacitance	V _{GS} = 0V V _{DS} = 25V f = 1MHz		7220		pF
C _{oss}	Output Capacitance			2330		
C _{rss}	Reverse Transfer Capacitance			146		
Q _g	Total gate Charge	V _{GS} = 10V V _{Bus} = 100V I _D = 104A		140		nC
Q _{gs}	Gate – Source Charge			53		
Q _{gd}	Gate – Drain Charge			67		
T _{d(on)}	Turn-on Delay Time	Inductive switching @ 125°C V _{GS} = 15V V _{Bus} = 133V I _D = 104A R _G = 5Ω		32		ns
T _r	Rise Time			64		
T _{d(off)}	Turn-off Delay Time			88		
T _f	Fall Time			116		
E _{on}	Turn-on Switching Energy	Inductive switching @ 125°C V _{GS} = 15V, V _{Bus} = 133V I _D = 104A, R _G = 5Ω		936		μJ
E _{off}	Turn-off Switching Energy			986		
R _{thJC}	Junction to Case Thermal Resistance				0.33	°C/W

Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I _S	Continuous Source current (Body diode)		T _C = 25°C			104	A
			T _C = 80°C			77	
V _{SD}	Diode Forward Voltage	V _{GS} = 0V, I _S = - 104A				1.3	V
dv/dt	Peak Diode Recovery ❶					5	V/ns
t _{rr}	Reverse Recovery Time	I _S = - 104A V _R = 133V di _S /dt = 100A/μs	T _j = 25°C			230	ns
			T _j = 125°C			450	
Q _{rr}	Reverse Recovery Charge		T _j = 25°C		0.9		μC
			T _j = 125°C		3.4		

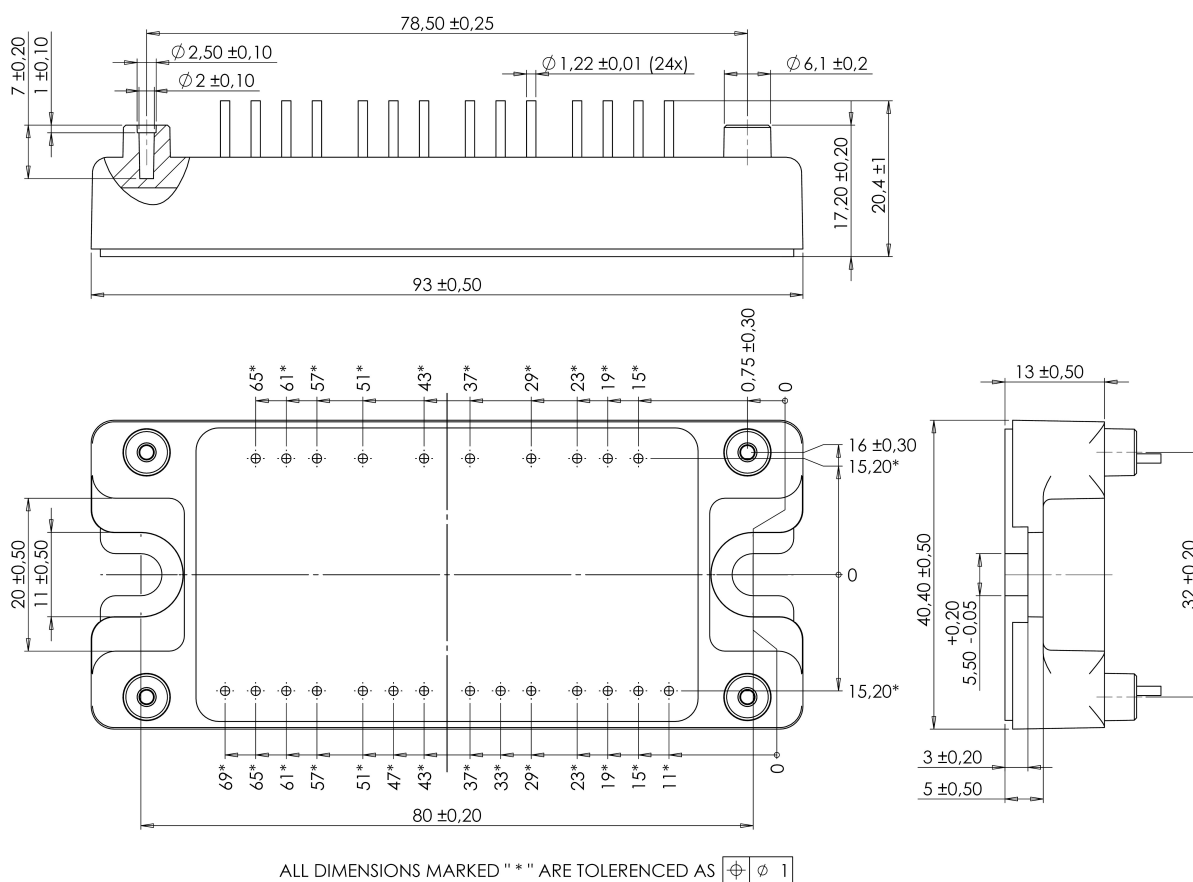
❶ dv/dt numbers reflect the limitations of the circuit rather than the device itself.

$$I_S \leq -104A \quad di/dt \leq 700A/\mu s \quad V_R \leq V_{DSS} \quad T_j \leq 150^\circ C$$

Thermal and package characteristics

Symbol	Characteristic			Min	Max	Unit
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000		V
T _J	Operating junction temperature range			-40	150	°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	M5	2.5	4.7	N.m
Wt	Package Weight				160	g

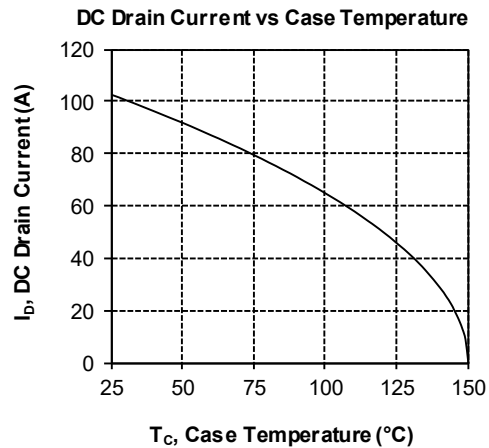
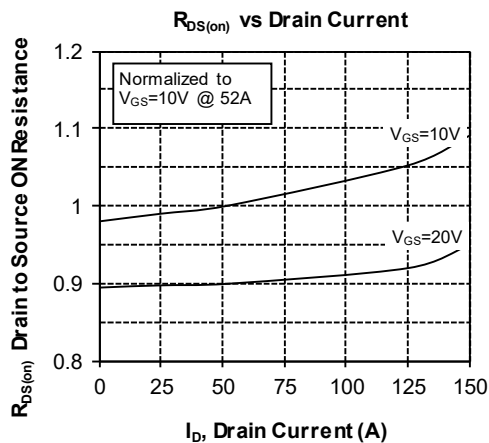
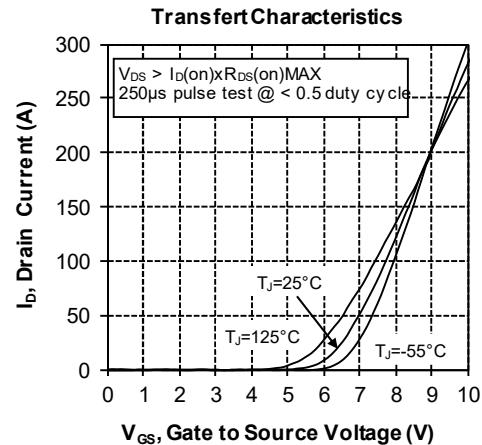
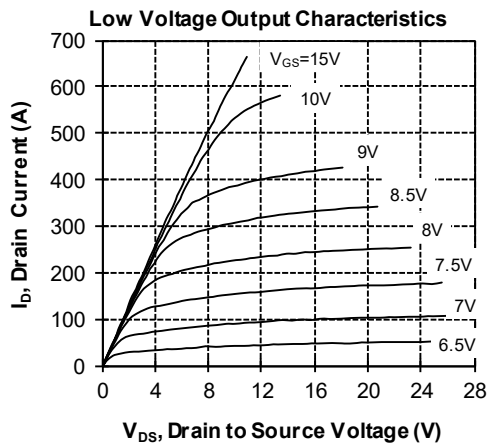
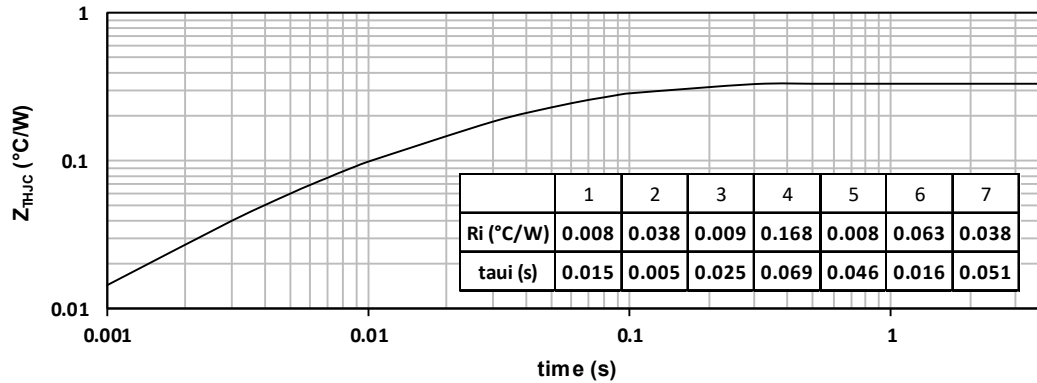
Package outline (dimensions in mm)



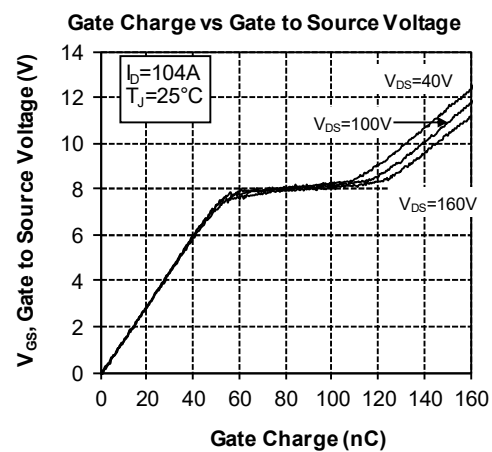
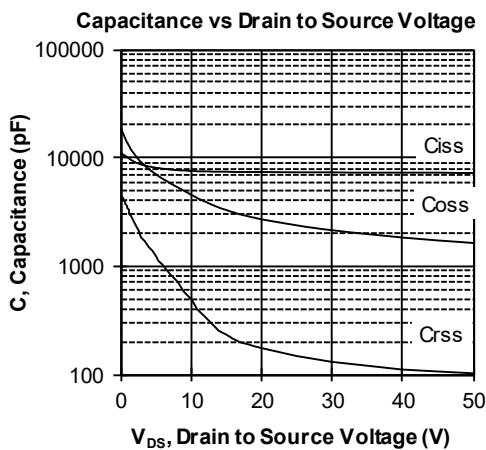
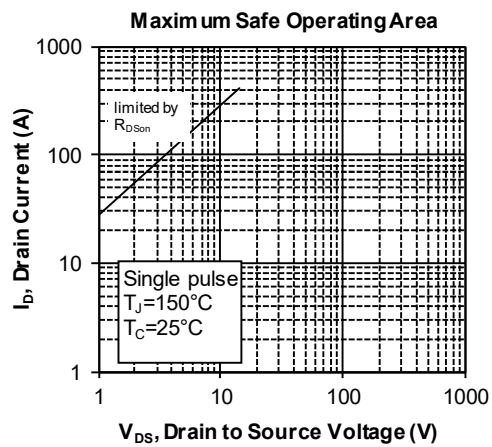
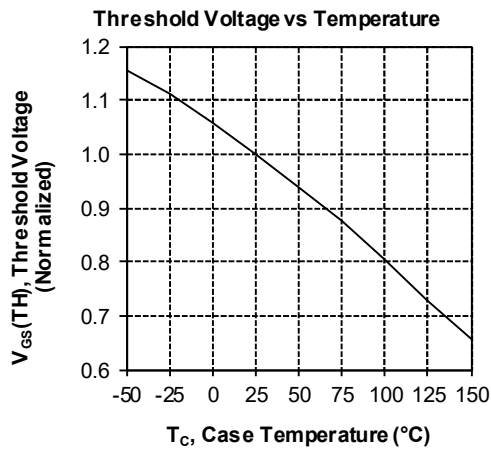
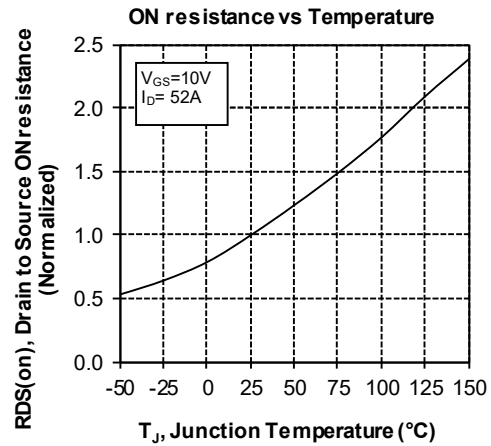
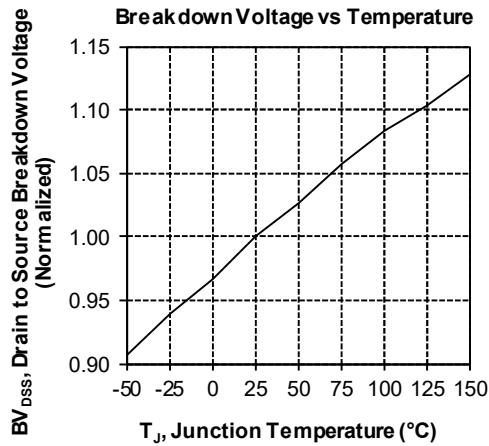
See application note APT0501 - Mounting Instructions for SP4 Power Modules on www.microsemi.com

Typical Performance Curve

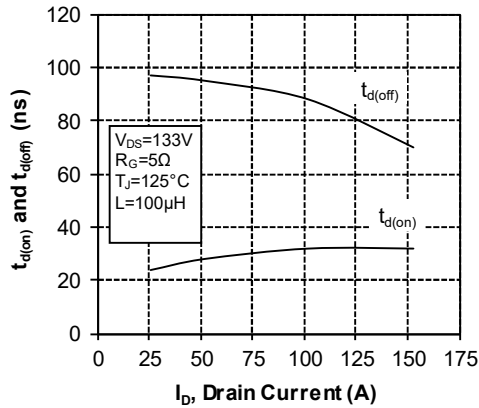
Maximum thermal impedance



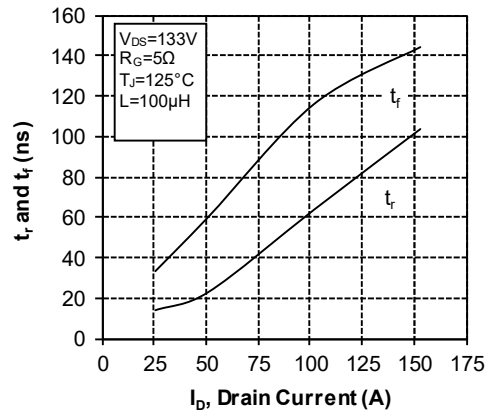
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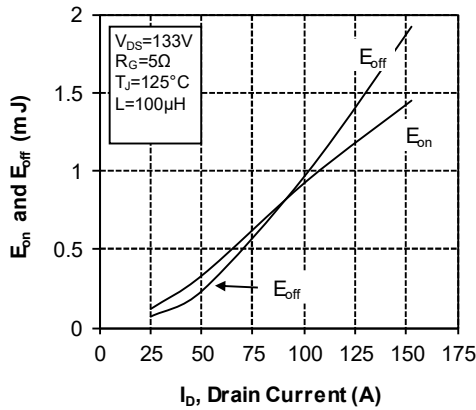
Delay Times vs Current



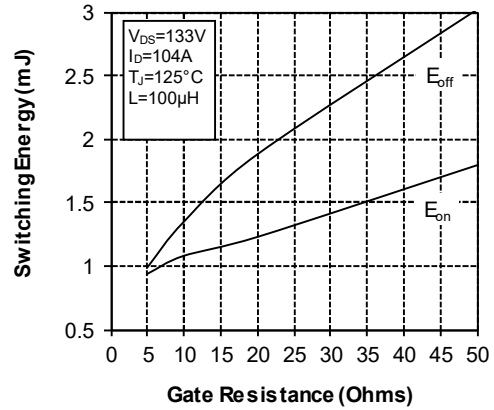
Rise and Fall times vs Current



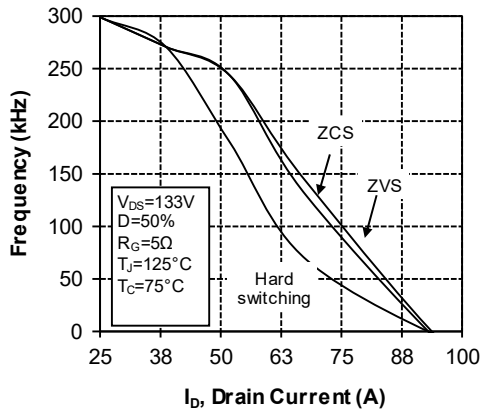
Switching Energys vs Current



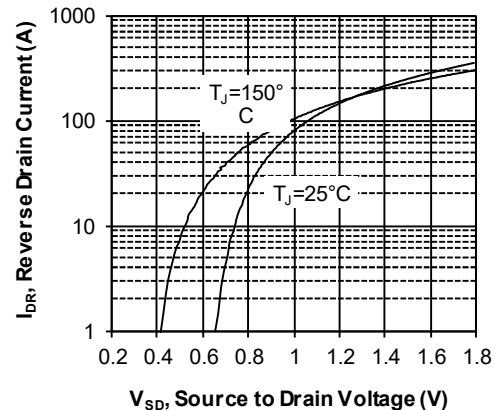
Switching Energys vs Gate Resistance



Operating Frequency vs Drain Current



Source to Drain Diode Forward Voltage



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