

Full - Bridge MOSFET Power Module

$V_{DSS} = 500V$

$R_{DSon} = 65m\Omega$ typ @ $T_j = 25^\circ C$

$I_D = 51A$ @ $T_c = 25^\circ C$

Application

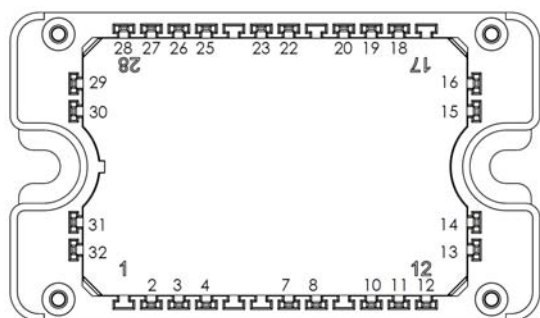
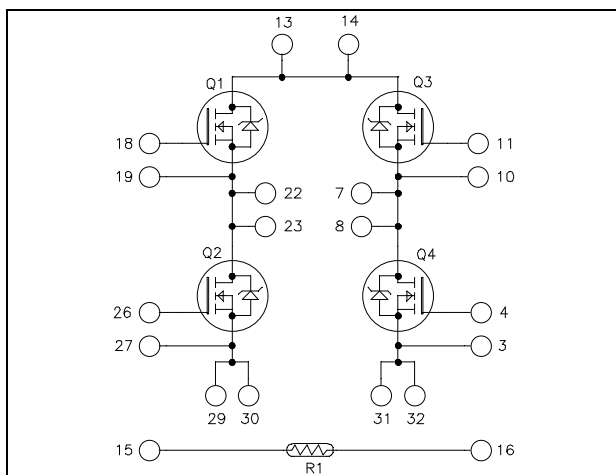
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

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
- Internal thermistor for temperature monitoring

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
- Each leg can be easily paralleled to achieve a phase leg of twice the current capability
- RoHS Compliant



All multiple inputs and outputs must be shorted together
 Example: 13/14 ; 29/30 ; 22/23 ...

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

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Voltage	500	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	51
		$T_c = 80^\circ C$	38
I_{DM}	Pulsed Drain current	204	A
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	78	$m\Omega$
P_D	Power Dissipation	$T_c = 25^\circ C$	390
I_{AR}	Avalanche current (repetitive and non repetitive)	51	A
E_{AR}	Repetitive Avalanche Energy	50	mJ
E_{AS}	Single Pulse Avalanche Energy	3000	

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

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 500V$			100	μA
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 25.5A$		65	78	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 2.5mA$	3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 150	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		7000		pF
C_{oss}	Output Capacitance	$V_{DS} = 25V$		1400		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		90		
Q_g	Total gate Charge	$V_{GS} = 10V$		140		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 250V$		40		
Q_{gd}	Gate – Drain Charge	$I_D = 51A$		70		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 333V$ $I_D = 51A$ $R_G = 3\Omega$		21		ns
T_r	Rise Time			38		
$T_{d(off)}$	Turn-off Delay Time			75		
T_f	Fall Time			93		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 51A, R_G = 3\Omega$		1035		μJ
E_{off}	Turn-off Switching Energy			845		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 51A, R_G = 3\Omega$		1556		μJ
E_{off}	Turn-off Switching Energy			1013		
R_{thJC}	Junction to Case Thermal Resistance				0.32	$^{\circ}C/W$

Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_S	Continuous Source current (Body diode)	$T_c = 25^{\circ}C$			51	A
		$T_c = 80^{\circ}C$			38	
V_{SD}	Diode Forward Voltage	$V_{GS} = 0V, I_S = -51A$			1.3	V
dv/dt	Peak Diode Recovery ❶				15	V/ns
t_{rr}	Reverse Recovery Time	$I_S = -51A$ $V_R = 333V$ $di/dt = 100A/\mu s$	$T_j = 25^{\circ}C$		270	ns
			$T_j = 125^{\circ}C$		540	
Q_{rr}	Reverse Recovery Charge	$I_S = -51A$ $V_R = 333V$ $di/dt = 100A/\mu s$	$T_j = 25^{\circ}C$	2.6		μC
			$T_j = 125^{\circ}C$	9.6		

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

$I_S \leq -51A$ $di/dt \leq 700A/\mu s$ $V_R \leq V_{DSS}$ $T_j \leq 150^{\circ}C$

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	M4	N.m
Wt	Package Weight		110	g

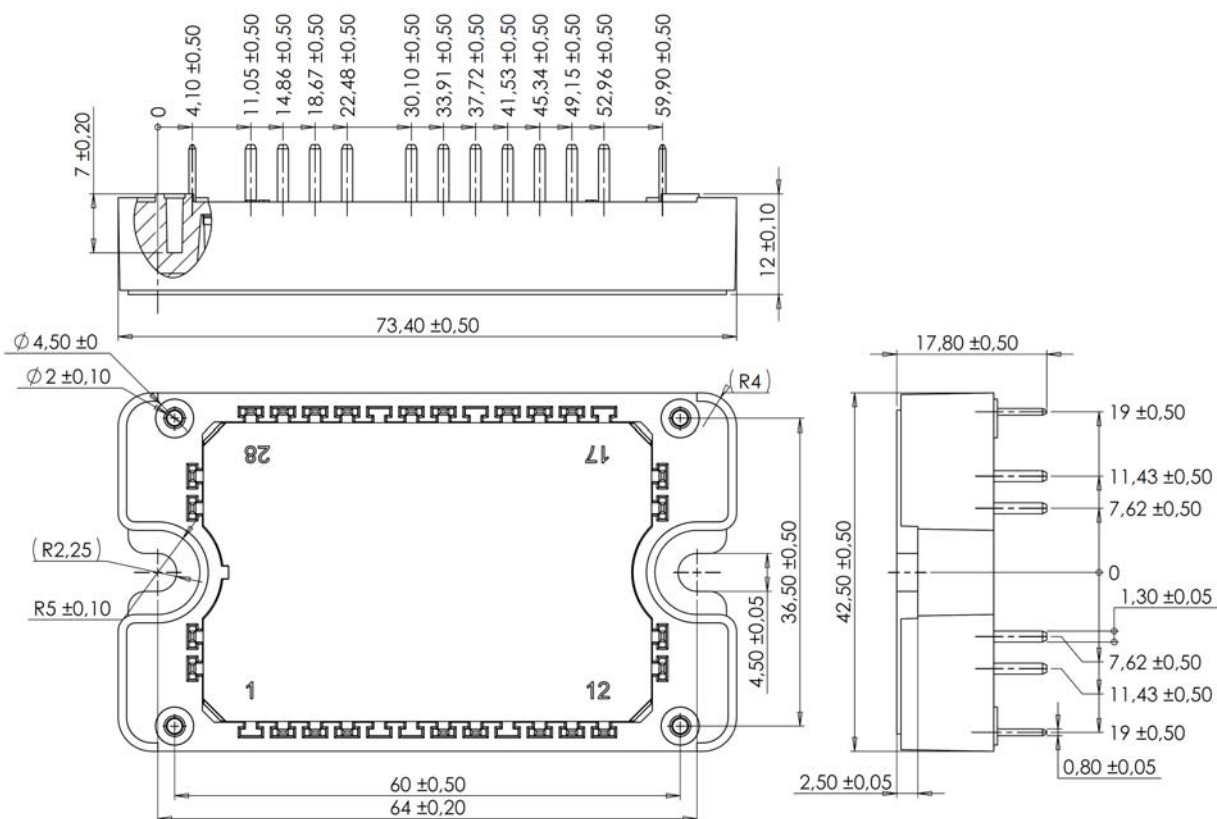
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B	T _C = 100°C		4		%

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

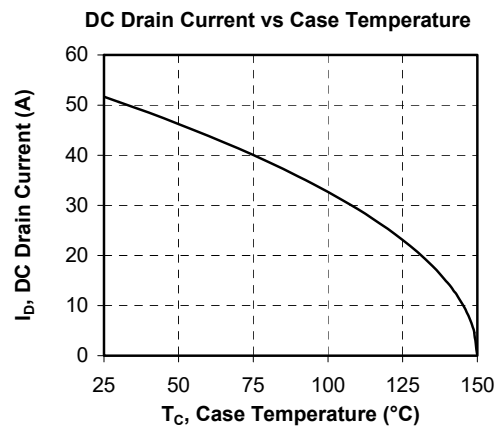
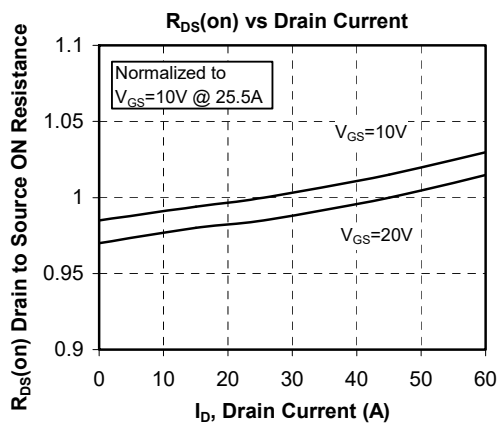
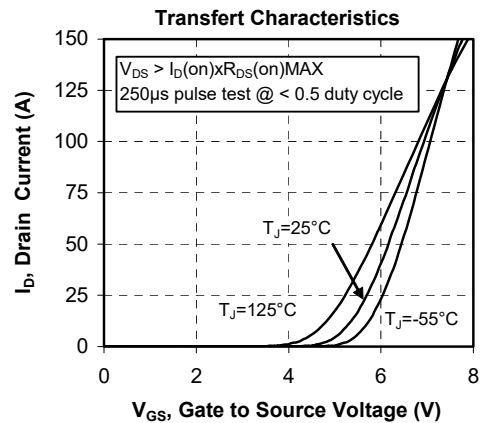
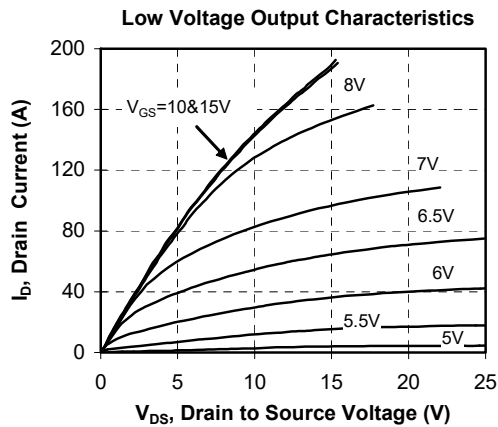
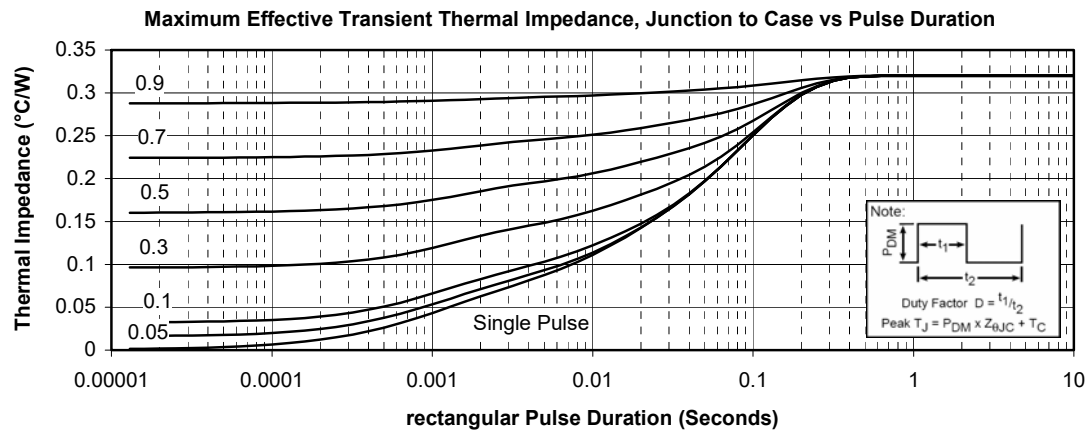
T: Thermistor temperature
R_T: Thermistor value at T

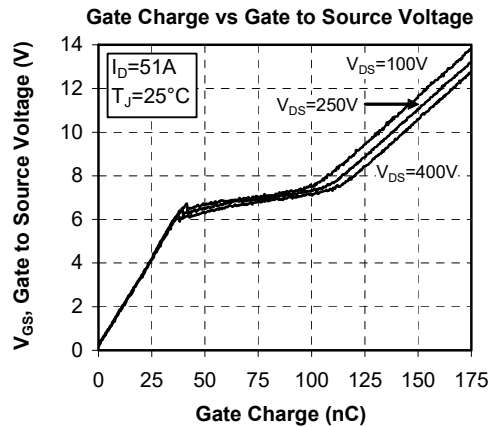
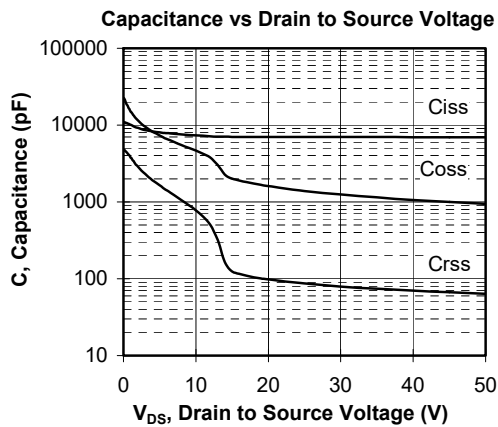
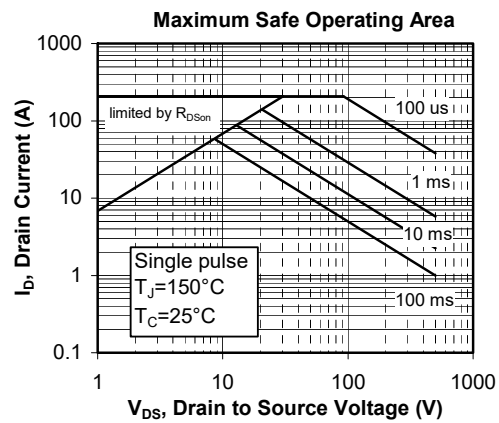
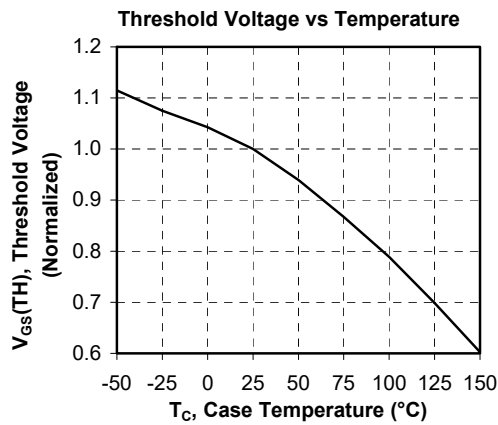
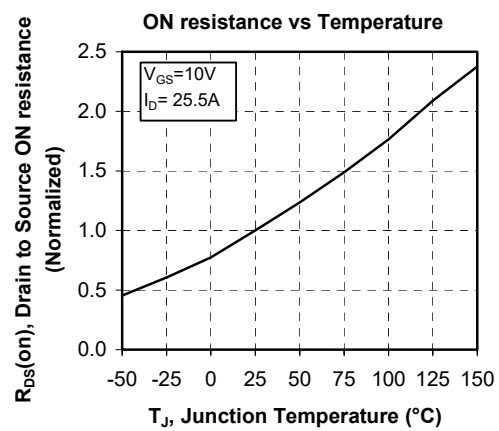
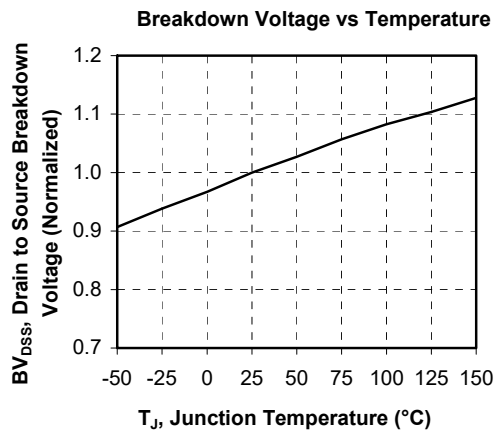
Package outline (dimensions in mm)

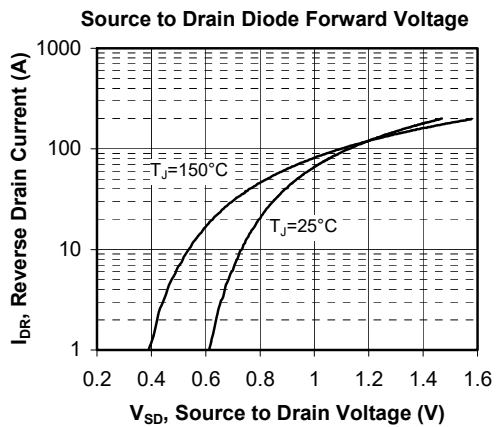
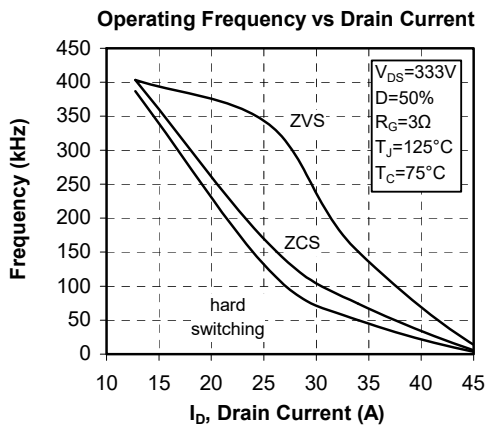
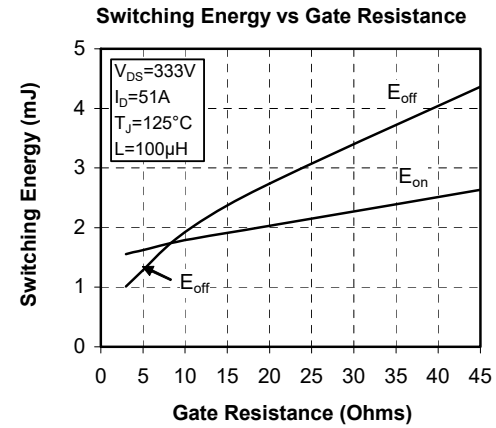
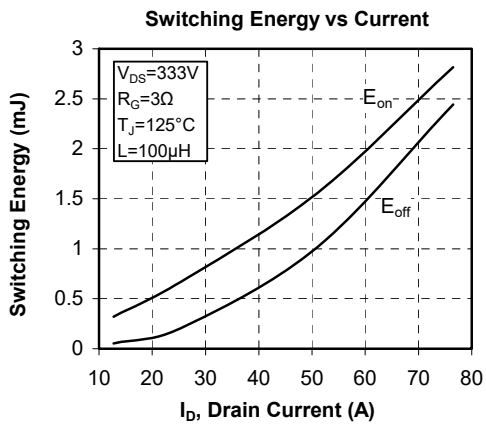
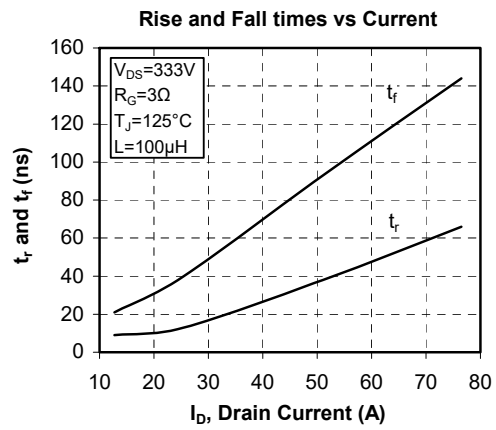
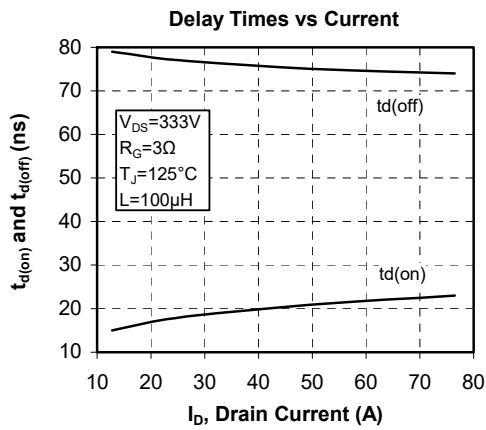


See application note 1906 - Mounting Instructions for SP3F Power Modules on www.microsemi.com

Typical Performance Curve







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