

Full - Bridge MOSFET Power Module

$V_{DSS} = 500V$

$R_{DSon} = 100m\Omega$ typ @ $T_j = 25^\circ C$

$I_D = 37A$ @ $T_c = 25^\circ C$

Application

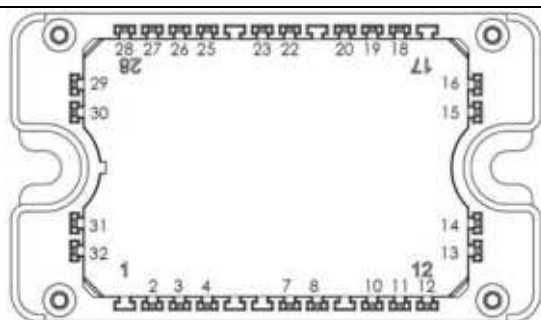
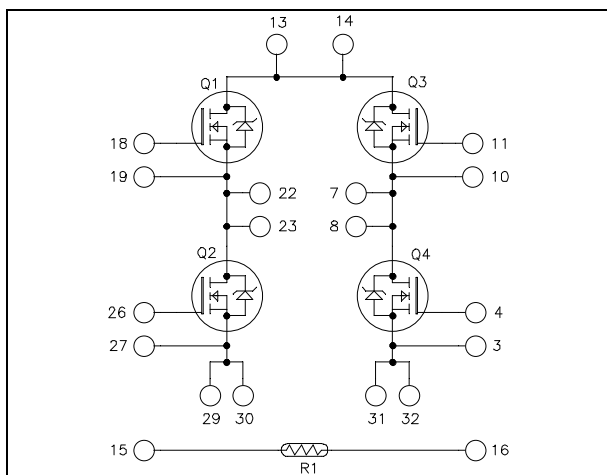
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

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 (Per MOSFET)

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Voltage	500	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	37
		$T_c = 80^\circ C$	28
I_{DM}	Pulsed Drain current	140	A
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	120	$m\Omega$
P_D	Power Dissipation	$T_c = 25^\circ C$	312
I_{AR}	Avalanche current (repetitive and non repetitive)	37	A
E_{AR}	Repetitive Avalanche Energy	50	mJ
E_{AS}	Single Pulse Avalanche Energy	1600	

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

Electrical Characteristics (Per MOSFET)

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	$V_{GS} = 10V, I_D = 18.5A$		100	120	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 1mA$	3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 150	nA

Dynamic Characteristics (Per MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1MHz$		4367		pF
C_{oss}	Output Capacitance			894		
C_{rss}	Reverse Transfer Capacitance			61		
Q_g	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 250V$ $I_D = 37A$		96		nC
Q_{gs}	Gate – Source Charge			24		
Q_{gd}	Gate – Drain Charge			49		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 333V$ $I_D = 37A$ $R_G = 5\Omega$		15		ns
T_r	Rise Time			21		
$T_{d(off)}$	Turn-off Delay Time			73		
T_f	Fall Time			52		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 37A, R_G = 5\Omega$		566		μJ
E_{off}	Turn-off Switching Energy			545		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 37A, R_G = 5\Omega$		931		μJ
E_{off}	Turn-off Switching Energy			635		
R_{thJC}	Junction to Case Thermal Resistance				0.40	$^{\circ}C/W$

Source - Drain diode ratings and characteristics (Per MOSFET)

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I _S	Continuous Source current (Body diode)		T _C = 25°C		37		A
			T _C = 80°C		28		
V _{SD}	Diode Forward Voltage	V _{GS} = 0V, I _S = - 37A				1.3	V
dv/dt	Peak Diode Recovery ❶					15	V/ns
t _{rr}	Reverse Recovery Time	I _S = - 37A V _R = 333V di _S /dt = 100A/μs	T _j = 25°C			280	ns
			T _j = 125°C			600	
Q _{rr}	Reverse Recovery Charge		T _j = 25°C		2.3		μC
			T _j = 125°C		6.4		

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

$I_S \leq -37A$ $di/dt \leq 100A/\mu s$ $V_R \leq V_{DSS}$ $T_j \leq 150^{\circ}C$

Thermal and package characteristics

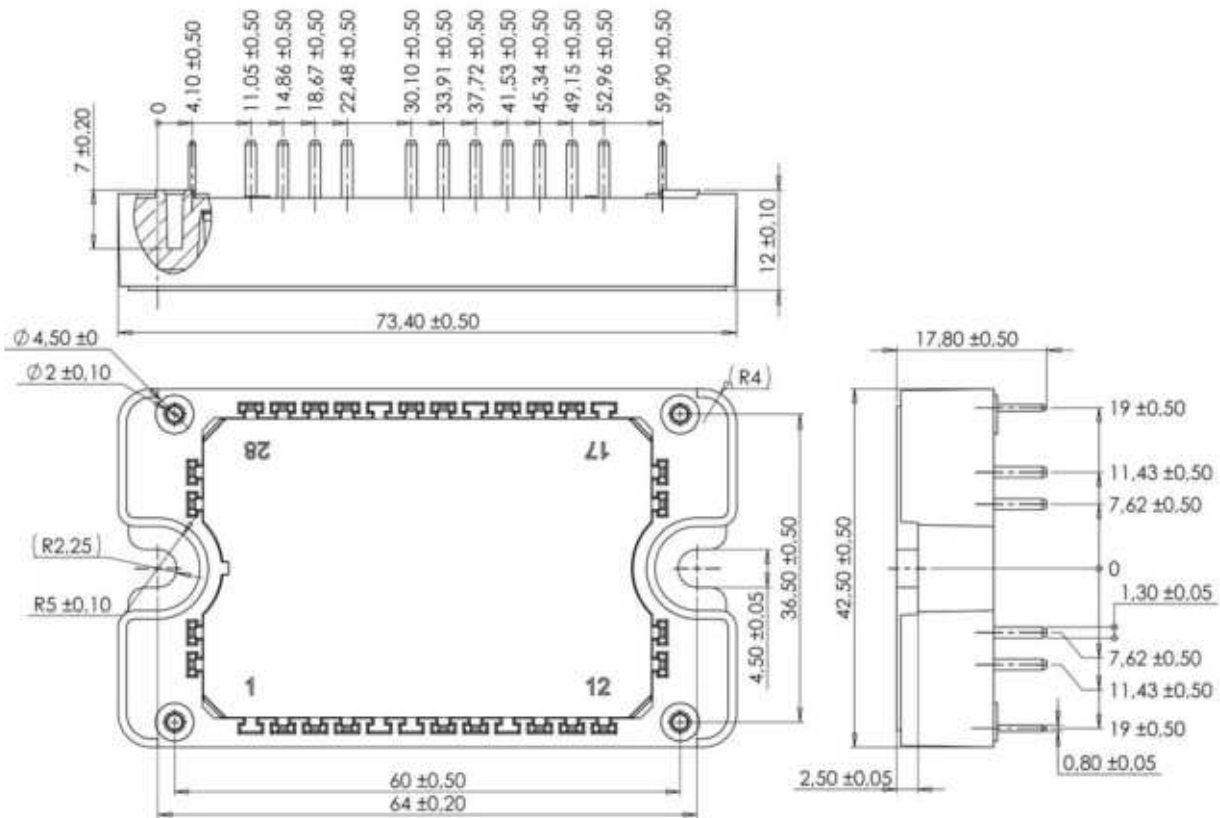
Symbol	Characteristic	Min	Max	Unit
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000		V
T _J	Operating junction temperature range	-40	150	°C
T _{JOP}	Recommended junction temperature under switching conditions	-40	T _{Jmax} - 25	
T _{STG}	Storage Temperature Range	-40	125	
T _C	Operating Case Temperature	-40	125	
Torque	Mounting torque	To heatsink	M4	
Wt	Package Weight		110	g

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

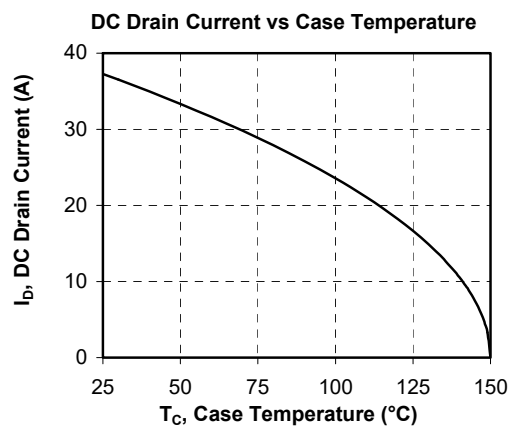
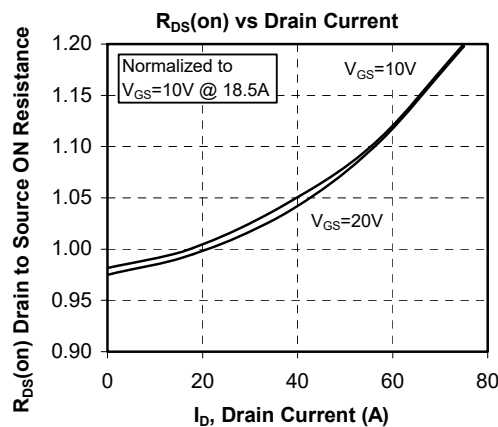
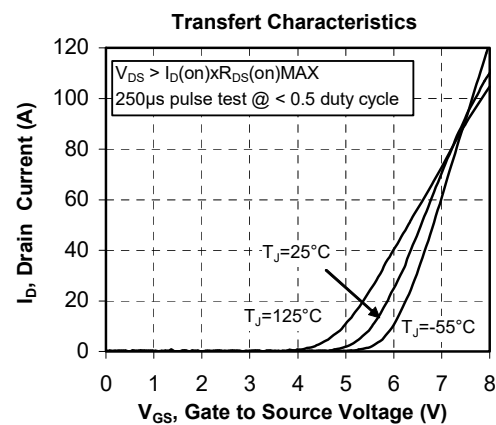
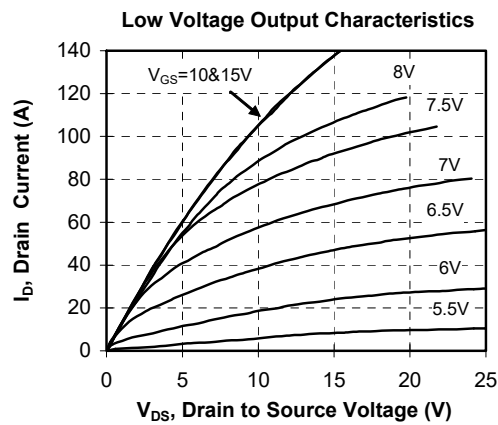
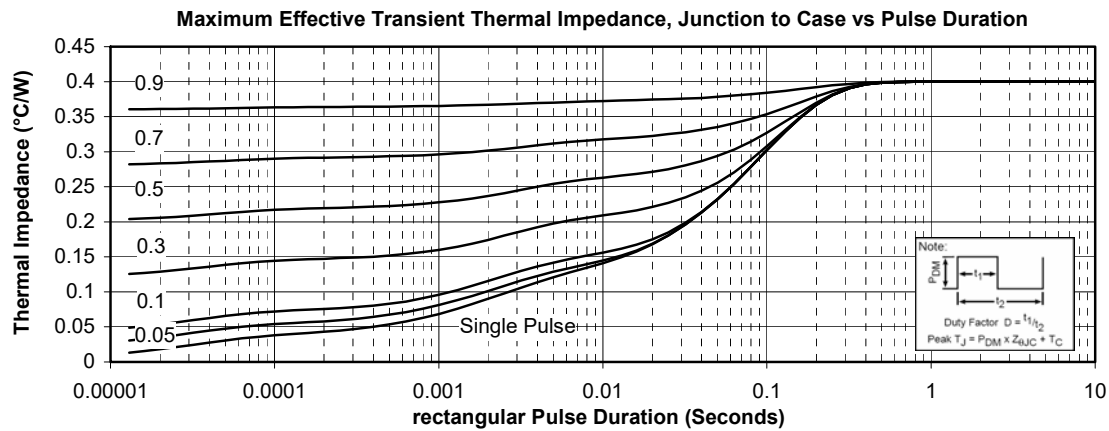
Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B		T _C =100°C	4		%

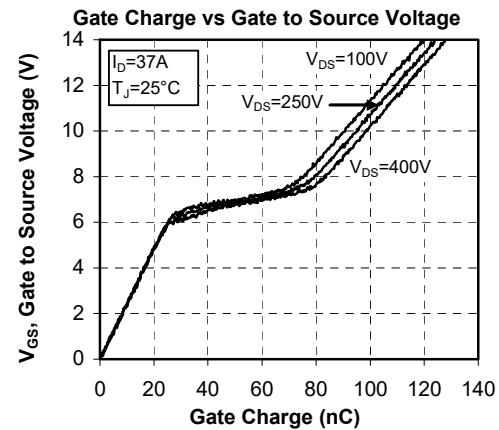
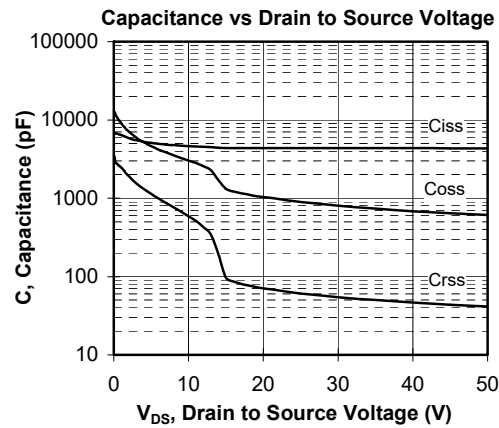
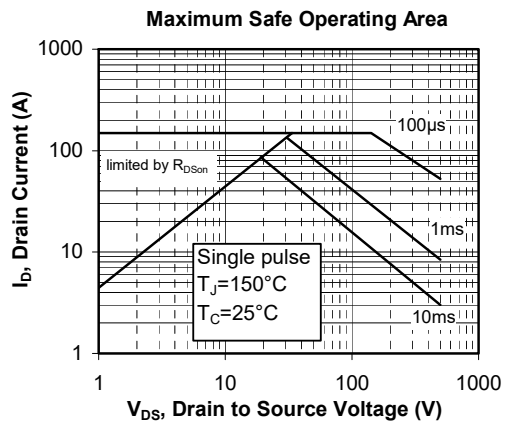
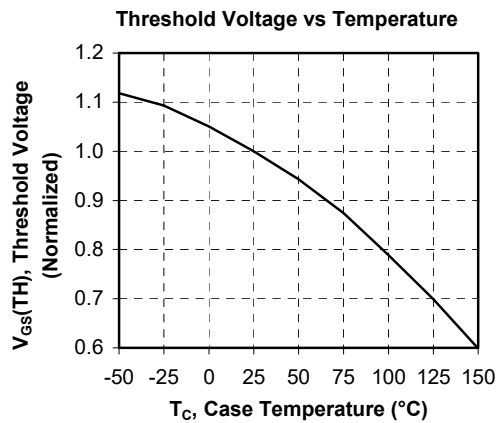
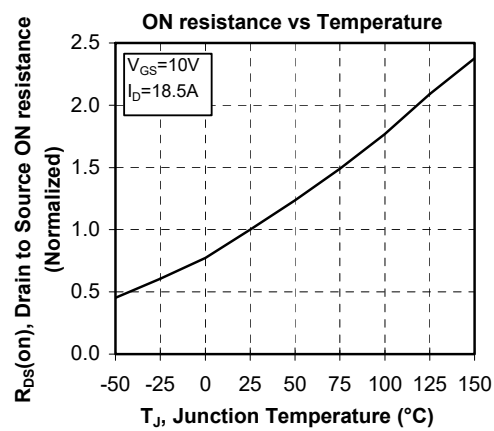
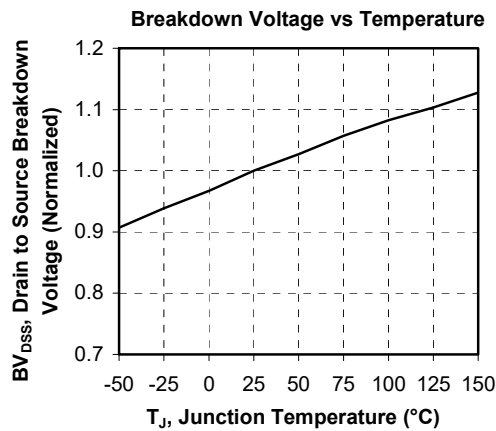
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

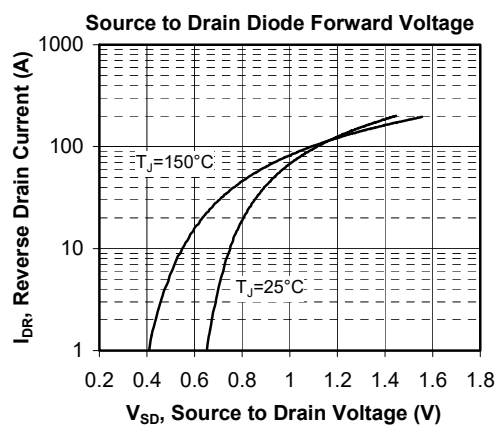
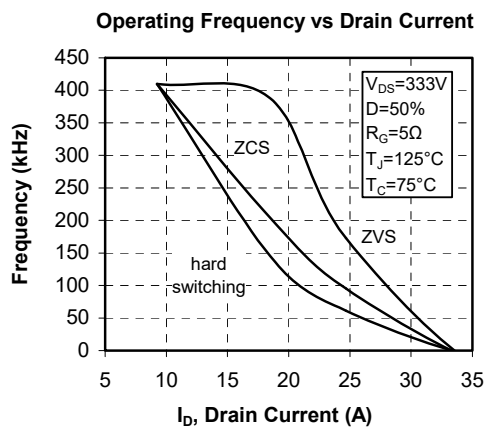
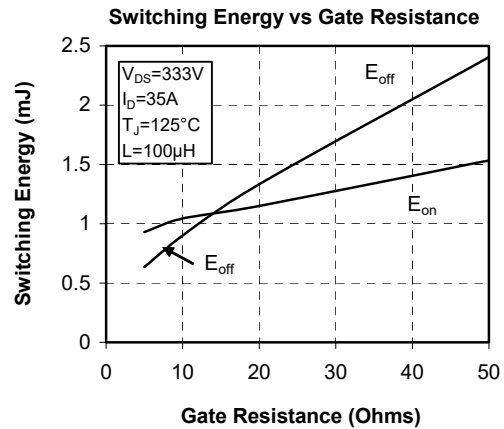
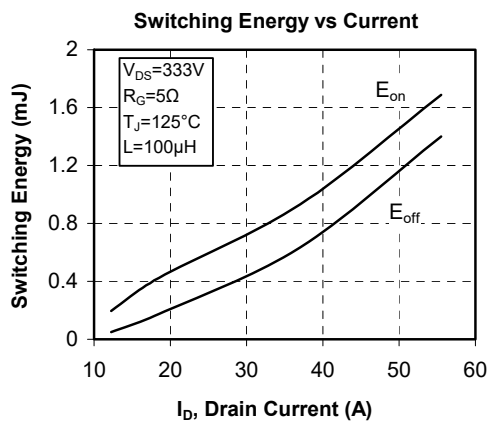
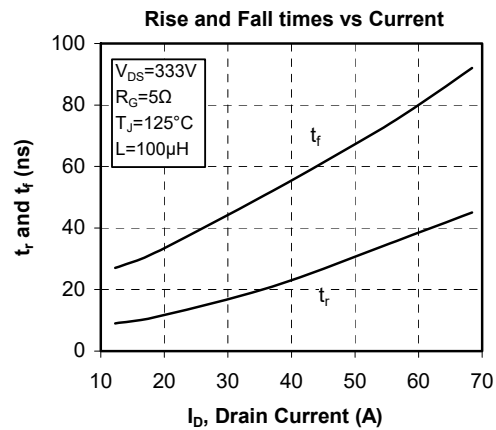
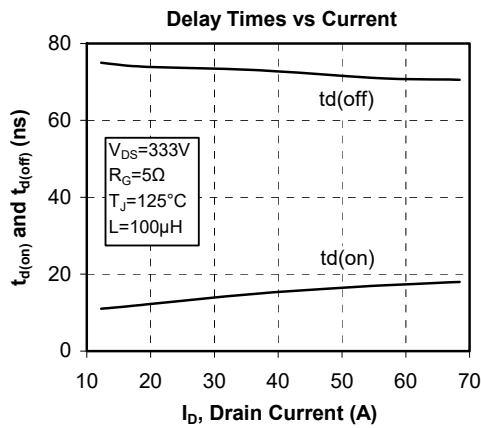
T: Thermistor temperature
 R_T: Thermistor value at T

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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