

Asymmetrical Bridge Super Junction MOSFET Power Module

$V_{DSS} = 600V$
 $R_{DSon} = 24m\Omega \text{ max @ } T_j = 25^\circ C$
 $I_D = 95A \text{ @ } T_c = 25^\circ C$

Application

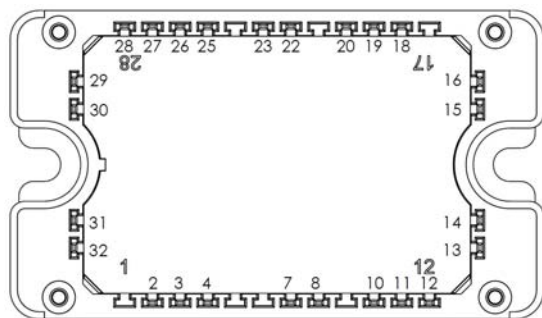
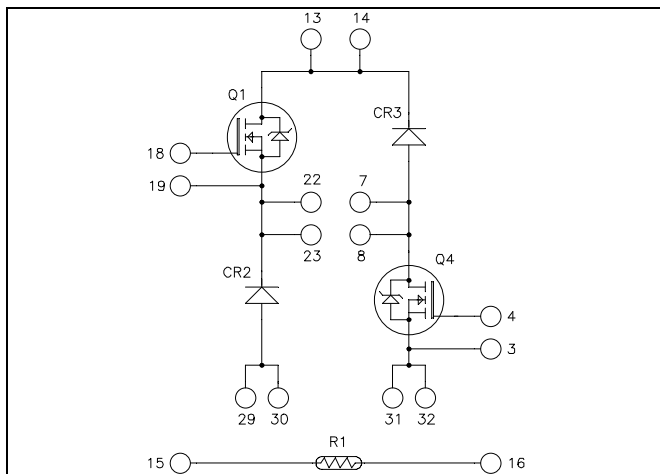
- Welding converters
- Switched Mode Power Supplies
- Switched Reluctance Motor Drives

Features

- **Super junction MOSFET**
 - Ultra low R_{DSon}
 - Low Miller capacitance
 - Ultra low gate charge
 - 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
- 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 super junction MOSFET)

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Voltage	600	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	A
		$T_c = 80^\circ C$	
I_{DM}	Pulsed Drain current	260	
V_{GS}	Gate - Source Voltage	± 20	V
R_{DSon}	Drain - Source ON Resistance	24	$m\Omega$
P_D	Power Dissipation	$T_c = 25^\circ C$	W
I_{AR}	Avalanche current (repetitive and non repetitive)	15	A
E_{AR}	Repetitive Avalanche Energy	3	mJ
E_{AS}	Single Pulse Avalanche Energy	1900	



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

Electrical Characteristics (per super junction MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 600V$			350	μA
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 47.5A$			24	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 5mA$	2.1	3	3.9	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 20V, V_{DS} = 0V$			200	nA

Dynamic Characteristics (per super junction MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V; V_{DS} = 25V$ $f = 1MHz$		14.4		nF
C_{oss}	Output Capacitance			17		
Q_g	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 300V$ $I_D = 95A$		300		nC
Q_{gs}	Gate – Source Charge			68		
Q_{gd}	Gate – Drain Charge			102		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GS} = 10V$ $V_{Bus} = 400V$ $I_D = 95A$ $R_G = 2.5\Omega$		21		ns
T_r	Rise Time			30		
$T_{d(off)}$	Turn-off Delay Time			100		
T_f	Fall Time			45		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 10V; V_{Bus} = 400V$ $I_D = 95A; R_G = 2.5\Omega$		1350		μJ
E_{off}	Turn-off Switching Energy			1040		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 10V; V_{Bus} = 400V$ $I_D = 95A; R_G = 2.5\Omega$		2200		μJ
E_{off}	Turn-off Switching Energy			1270		
R_{thJC}	Junction to Case Thermal Resistance				0.27	°C/W

Diode ratings and characteristics (per diode)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Peak Repetitive Reverse Voltage				600	V
I_{RM}	Reverse Leakage Current	$V_R = 600V$			25	μA
I_F	DC Forward Current	$T_c = 80^\circ C$		60		A
V_F	Diode Forward Voltage	$I_F = 60A$		1.7	2.3	V
		$I_F = 120A$		2		
		$I_F = 60A, T_j = 125^\circ C$		1.4		
t_{rr}	Reverse Recovery Time	$I_F = 60A$ $V_R = 400V$	$T_j = 25^\circ C$	70		ns
			$T_j = 125^\circ C$	140		
Q_{rr}	Reverse Recovery Charge	$di/dt = 200A/\mu s$	$T_j = 25^\circ C$	100		nC
			$T_j = 125^\circ C$	690		
R_{thJC}	Junction to Case Thermal Resistance				0.85	°C/W

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

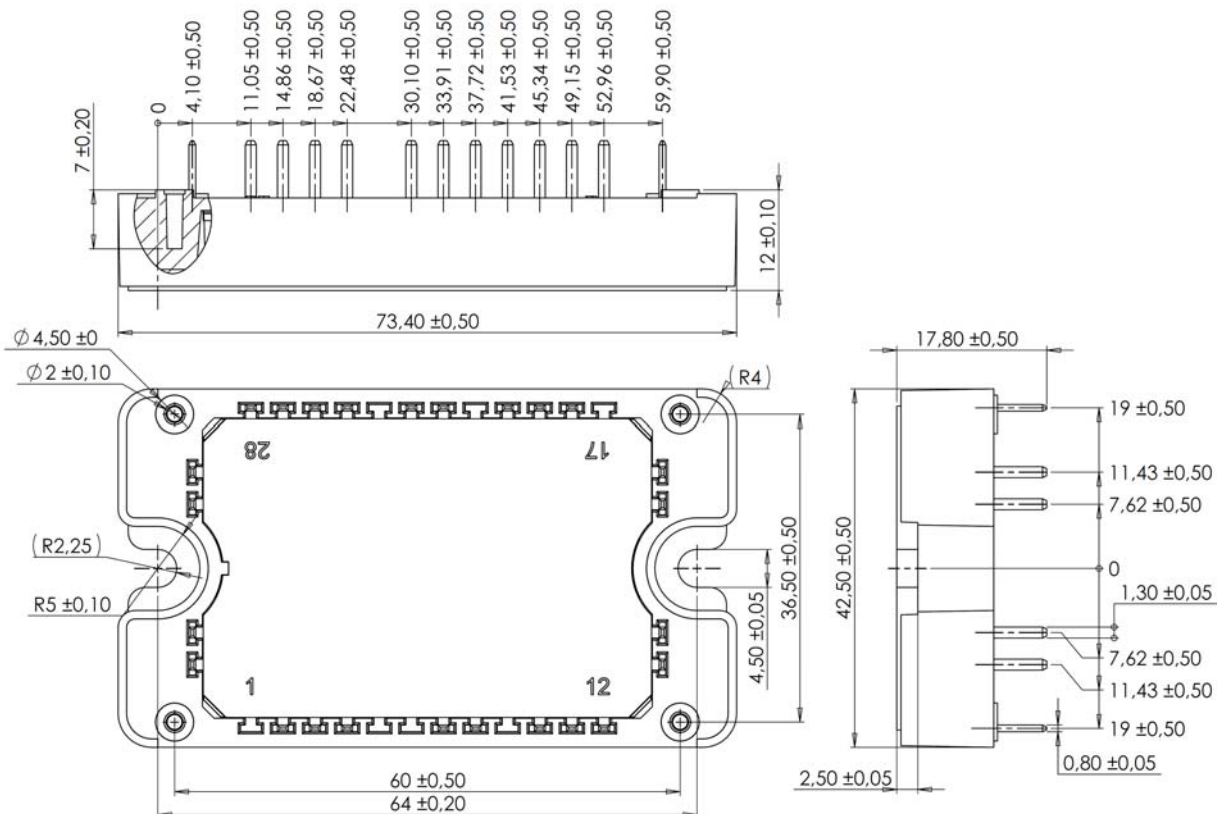
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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		%

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

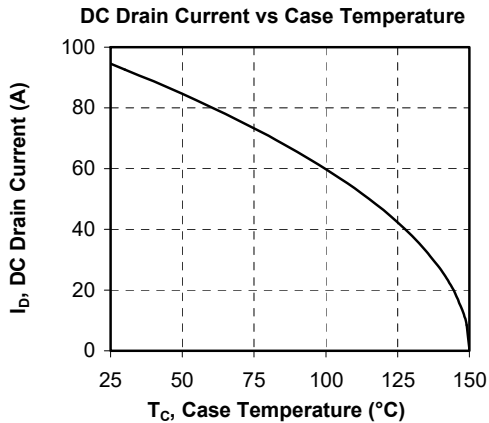
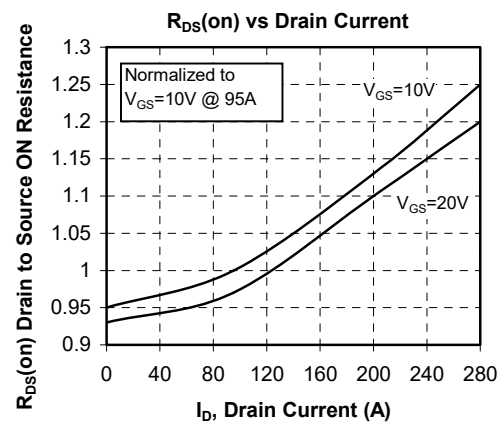
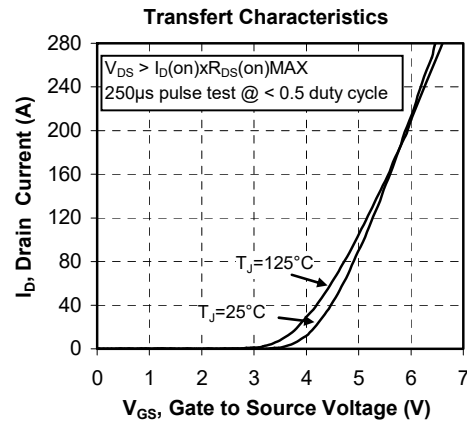
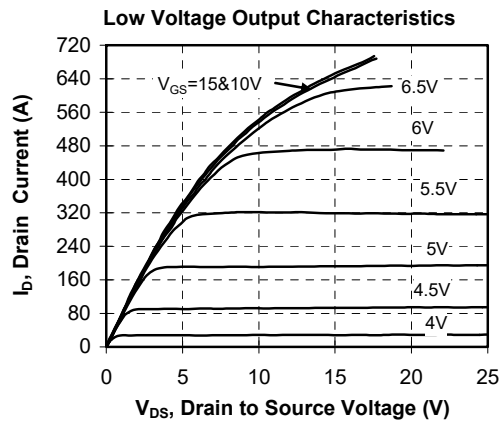
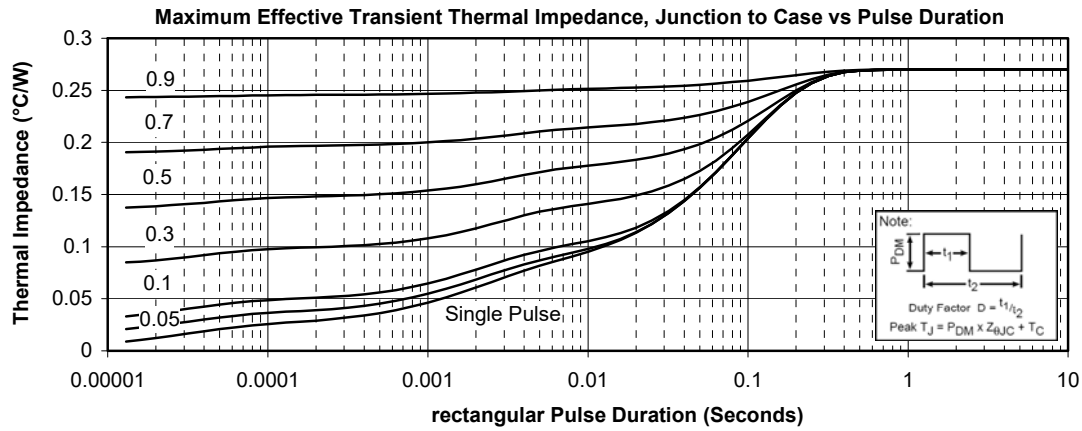
T: Thermistor temperature
R_T: Thermistor value at T

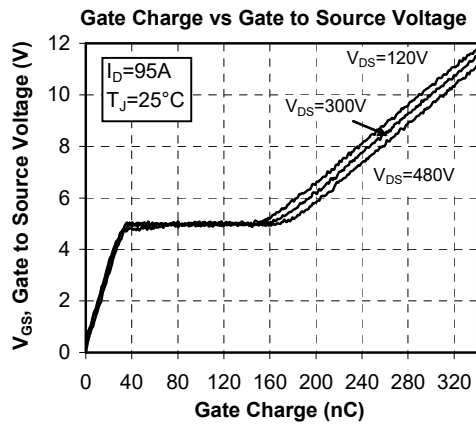
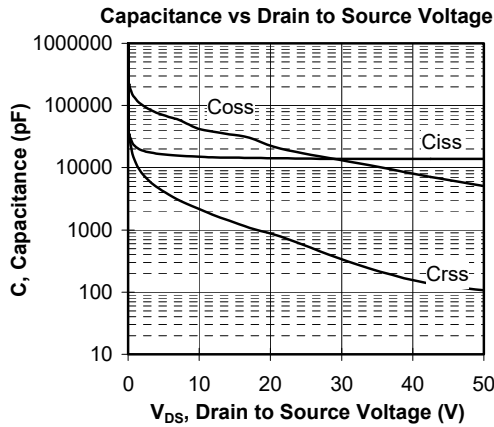
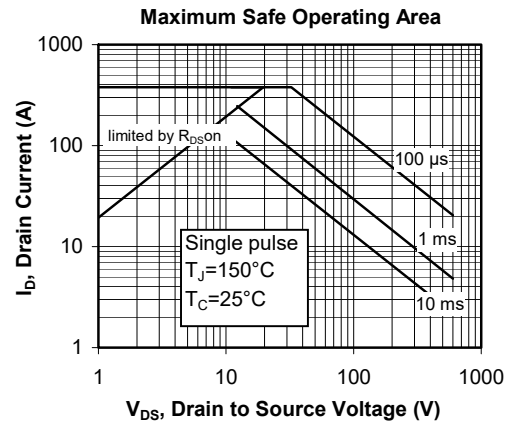
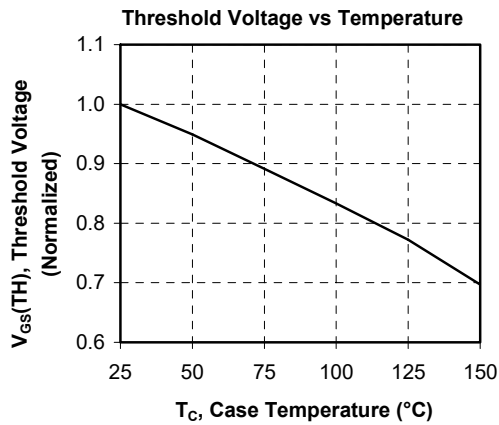
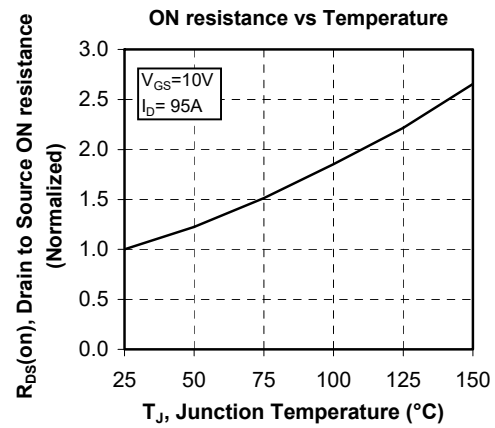
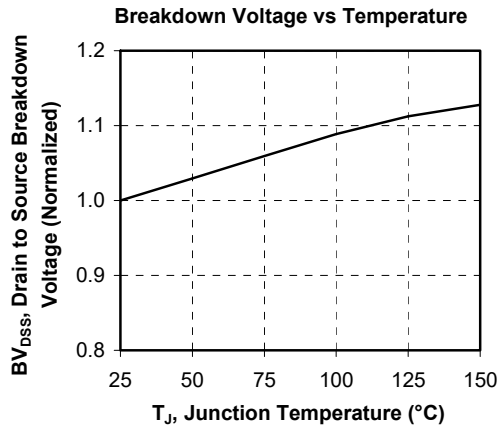
Package outline (dimensions in mm)

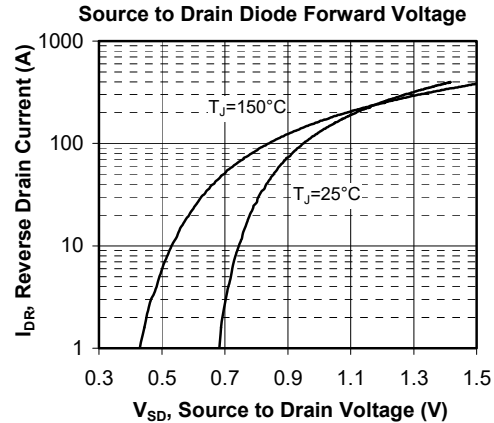
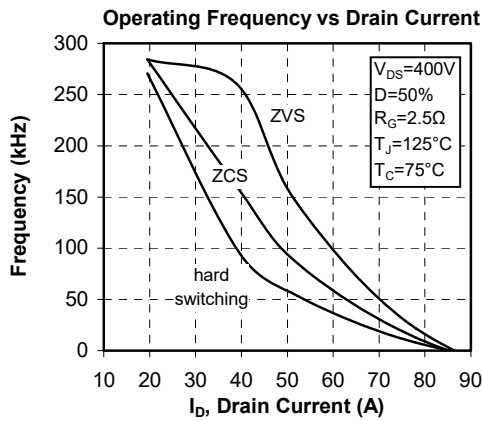
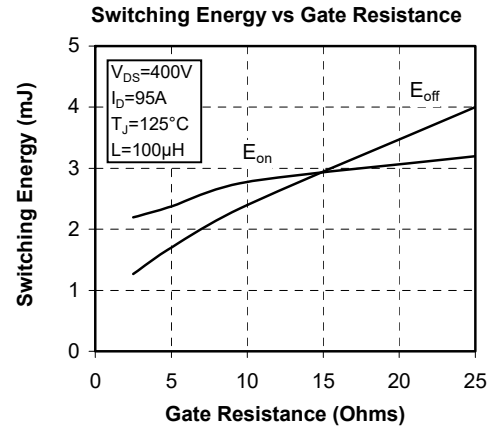
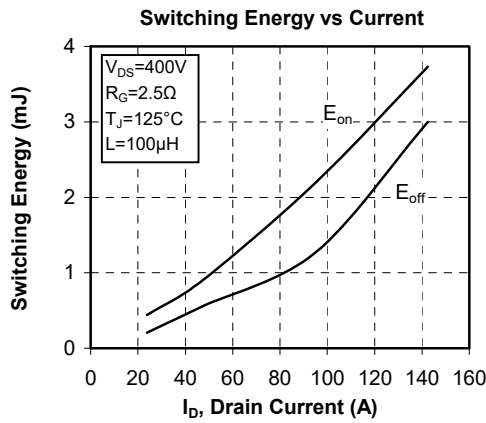
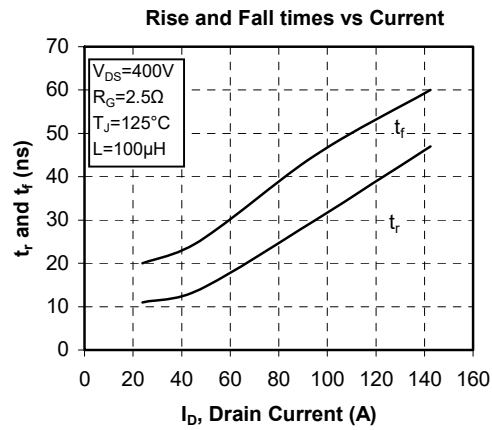
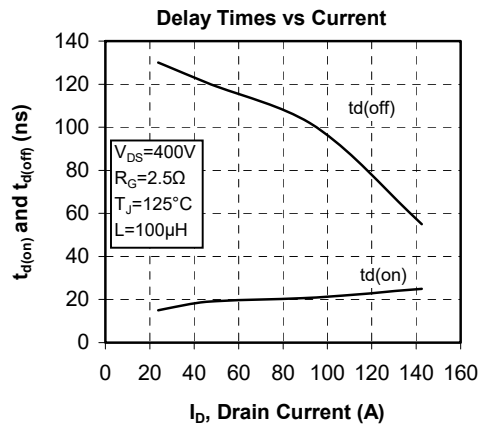


See application note 1906 - Mounting Instructions for SP3F Power Modules on www.microsemi.com

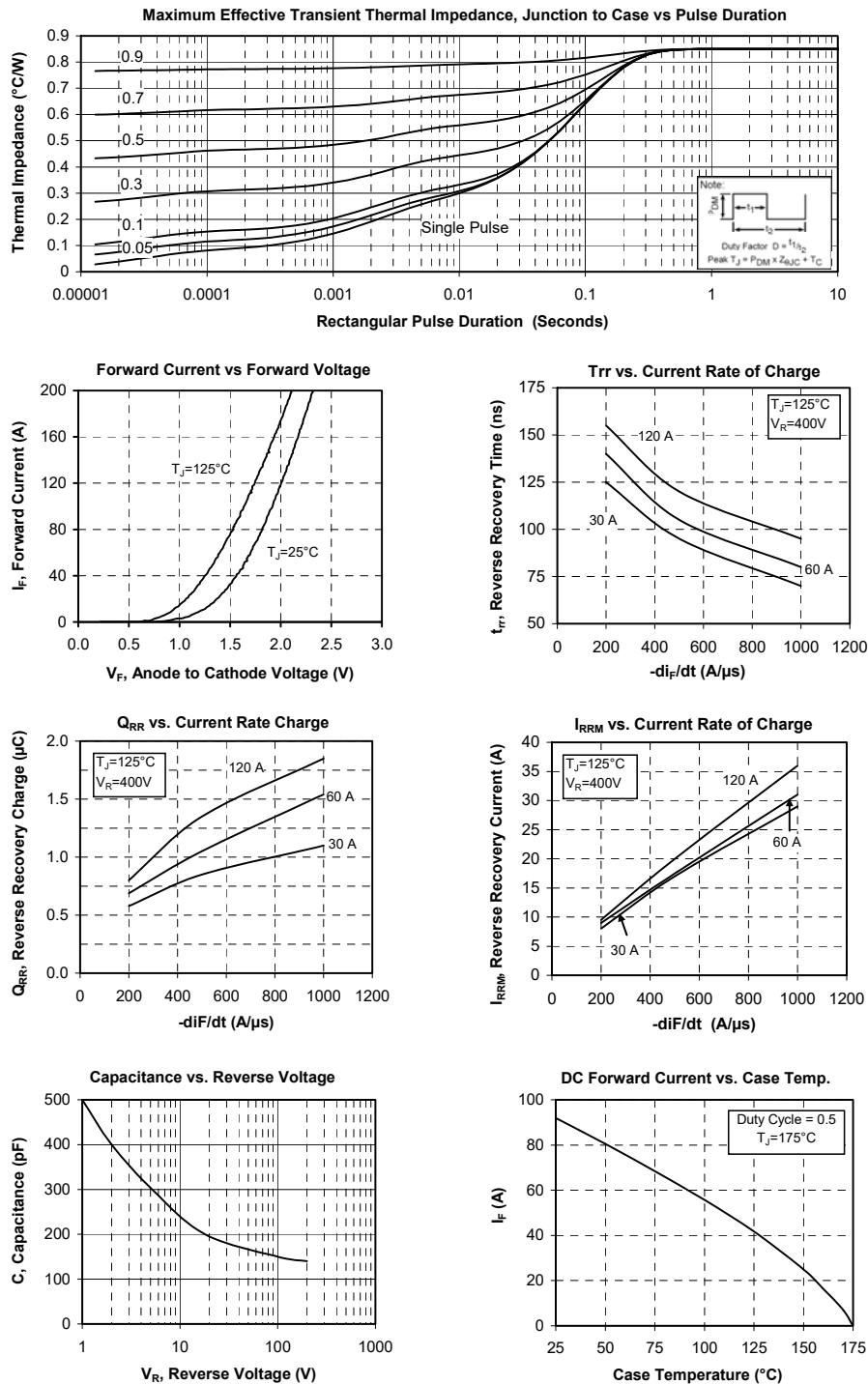
Typical Super junction MOSFET Performance Curve







Typical diode Performance Curve



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