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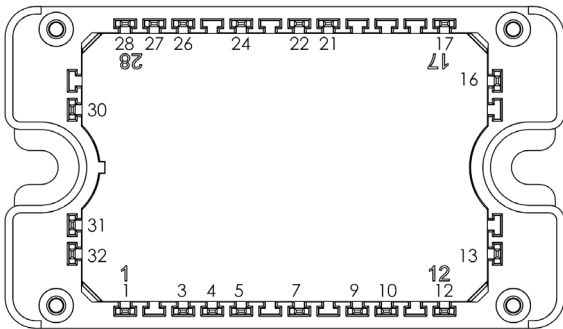
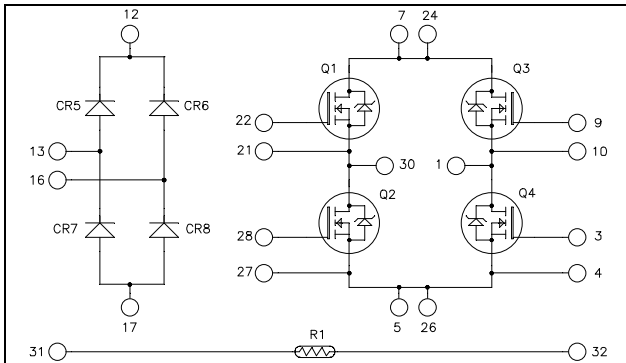


Full bridge + rectifier bridge CoolMOS Power module

CoolMOS™ :

$V_{DSS} = 600V$

$R_{DSon} = 70m\Omega \text{ max @ } T_j = 25^\circ C$



All multiple inputs and outputs must be shorted together
7/24 ; 5/26

Application

- Solar converter

Features

- **CoolMOS™**
 - Ultra low R_{DSon}
 - Low Miller capacitance
 - Ultra low gate charge
 - Avalanche energy rated

- Very low stray inductance
- Kelvin source for easy drive
- Internal thermistor for temperature monitoring
- High level of integration

Benefits

- Optimized conduction & switching losses
- 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
- Easy paralleling due to positive T_C of V_{CEsat}
- RoHS Compliant

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

1. Full bridge

Absolute maximum ratings (Per CoolMOS™)

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Breakdown Voltage	600	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	39
		$T_c = 80^\circ C$	29
I_{DM}	Pulsed Drain current	160	
V_{GS}	Gate - Source Voltage	± 20	V
R_{DSon}	Drain - Source ON Resistance	70	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	250
I_{AR}	Avalanche current (repetitive and non repetitive)	20	A
E_{AR}	Repetitive Avalanche Energy	1	mJ
E_{AS}	Single Pulse Avalanche Energy	1800	

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

Electrical Characteristics (Per CoolMOST™)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} = 0V, V _{DS} = 600V			25	μA
		T _j = 25°C				
		V _{GS} = 0V, V _{DS} = 600V			250	
R _{DS(on)}	Drain – Source on Resistance	V _{GS} = 10V, I _D = 39A			70	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 2.7mA	2.1	3	3.9	V
I _{GSS}	Gate – Source Leakage Current	V _{GS} = ±20 V, V _{DS} = 0V			±100	nA

Dynamic Characteristics (Per CoolMOST™)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C _{iss}	Input Capacitance	V _{GS} = 0V		7		nF
C _{oss}	Output Capacitance	V _{DS} = 25V		2.56		
C _{rss}	Reverse Transfer Capacitance	f = 1MHz		0.21		
Q _g	Total gate Charge	V _{GS} = 10V V _{Bus} = 300V I _D = 39A		259		nC
Q _{gs}	Gate – Source Charge			29		
Q _{gd}	Gate – Drain Charge			111		
T _{d(on)}	Turn-on Delay Time	Inductive Switching @ 125°C V _{GS} = 15V V _{Bus} = 400V I _D = 39A R _G = 5Ω		21		ns
T _r	Rise Time			30		
T _{d(off)}	Turn-off Delay Time			283		
T _f	Fall Time			84		
E _{off}	Turn-off Switching Energy	V _{GS} = 15V V _{Bus} = 400V I _D = 39A	T _j = 25°C		980	μJ
E _{off}	Turn-off Switching Energy	R _G = 5Ω	T _j = 125°C		1206	
R _{thJC}	Junction to Case Thermal resistance				0.5	°C/W

Source - Drain diode ratings and characteristics (Per CoolMOST™)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I _S	Continuous Source current (Body diode)		T _c = 25°C		39	A
			T _c = 80°C		29	
V _{SD}	Diode Forward Voltage	V _{GS} = 0V, I _S = - 39A			1.2	V
dv/dt	Peak Diode Recovery ❶				6	V/ns
t _{rr}	Reverse Recovery Time	I _S = - 39A V _R = 350V	T _j = 25°C		580	ns
Q _{rr}	Reverse Recovery Charge	di _S /dt = 100A/μs	T _j = 25°C		23	μC

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

$$I_S \leq -39A \quad di/dt \leq 100A/\mu s \quad V_R \leq V_{DSS} \quad T_j \leq 150^\circ C$$

2. Rectifier bridge

Absolute maximum ratings (per diode)

Symbol	Parameter	Max ratings	Unit
V_R	Maximum DC reverse Voltage	600	V
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		
$I_{F(AV)}$	Maximum Average Forward Current	40	A
I_{FSM}	Non-Repetitive Forward Surge Current		
		8.3ms	$T_C = 80^\circ\text{C}$
			$T_J = 45^\circ\text{C}$

Electrical Characteristics (per diode)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_F	Diode Forward Voltage	$I_F = 30\text{A}$		1.8	2.2	V
		$I_F = 60\text{A}$		2.2		
		$I_F = 30\text{A}$	$T_J = 125^\circ\text{C}$		1.5	
I_{RM}	Maximum Reverse Leakage Current	$V_R = 600\text{V}$	$T_J = 25^\circ\text{C}$		250	μA
			$T_J = 125^\circ\text{C}$		500	

Dynamic Characteristics (per diode)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse Recovery Time	$I_F = 1\text{A}, V_R = 30\text{V}$ $di/dt = 100\text{A}/\mu\text{s}$	$T_J = 25^\circ\text{C}$		22	ns
t_{rr}	Reverse Recovery Time		$T_J = 25^\circ\text{C}$		25	ns
			$T_J = 125^\circ\text{C}$		160	
Q_{rr}	Reverse Recovery Charge	$I_F = 30\text{A}$ $V_R = 400\text{V}$ $di/dt = 200\text{A}/\mu\text{s}$	$T_J = 25^\circ\text{C}$		35	nC
			$T_J = 125^\circ\text{C}$		480	
I_{RRM}	Reverse Recovery Current		$T_J = 25^\circ\text{C}$		3	A
			$T_J = 125^\circ\text{C}$		6	
t_{rr}	Reverse Recovery Time	$I_F = 30\text{A}$ $V_R = 400\text{V}$ $di/dt = 1000\text{A}/\mu\text{s}$	$T_J = 125^\circ\text{C}$		85	ns
Q_{rr}	Reverse Recovery Charge				920	μC
I_{RRM}	Reverse Recovery Current				20	A
R_{thJC}	Junction to Case Thermal Resistance				1.2	$^\circ\text{C}/\text{W}$

3. Thermal and package characteristics

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		k Ω
$\Delta R_{25}/R_{25}$			5		%
$B_{25/85}$	$T_{25} = 298.15\text{K}$		3952		K
$\Delta B/B$			4		%
					$T_C = 100^\circ\text{C}$

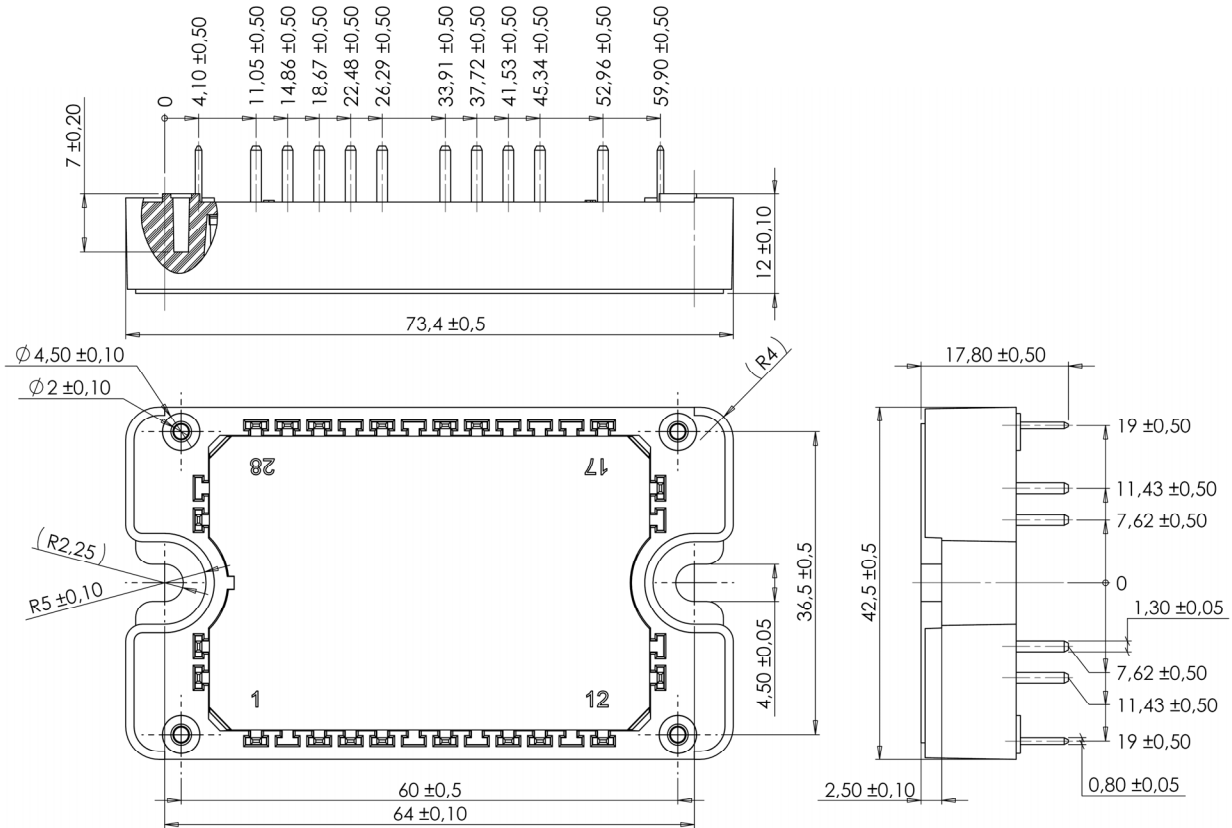
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

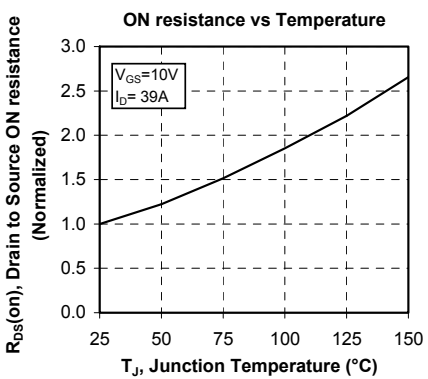
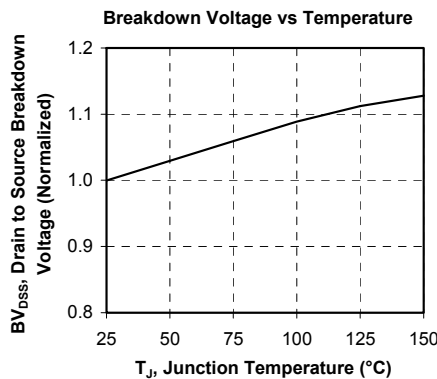
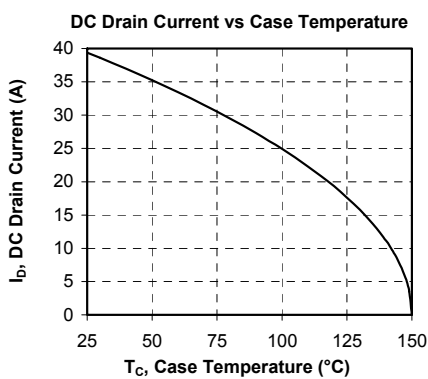
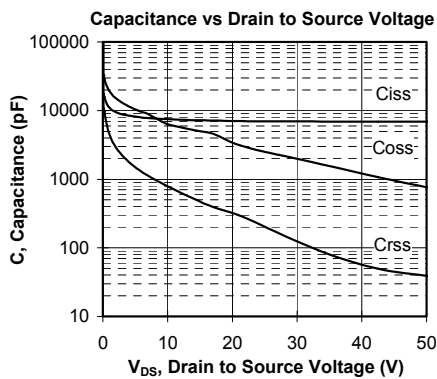
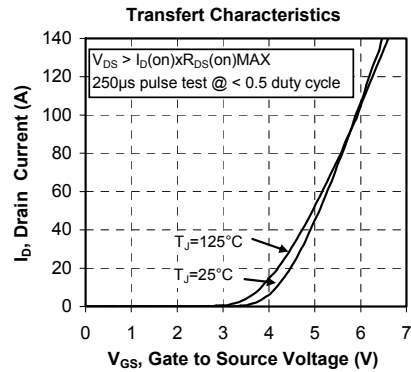
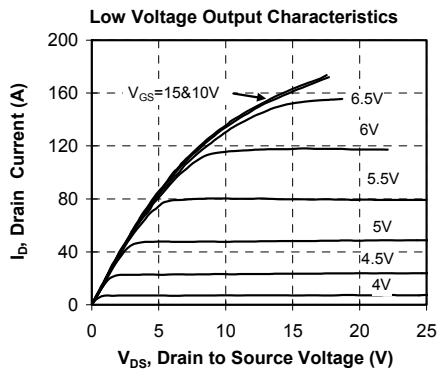
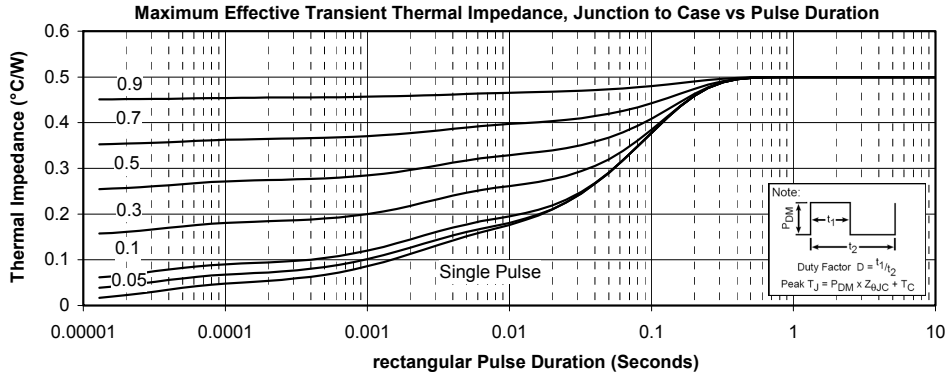
T: Thermistor temperature
 R_T : Thermistor value at T

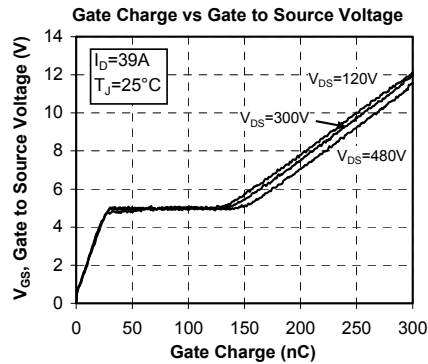
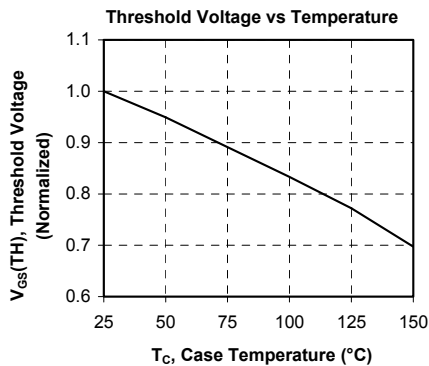
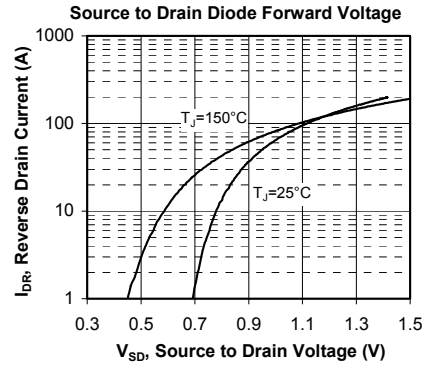
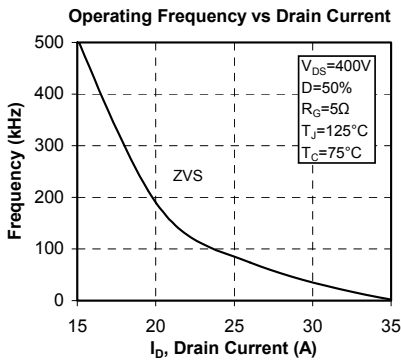
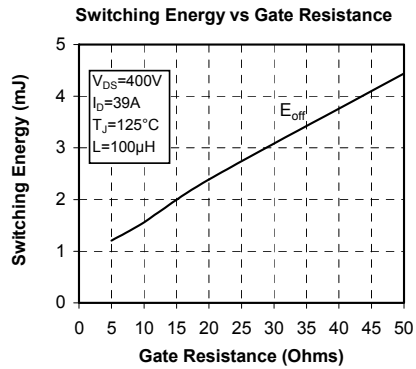
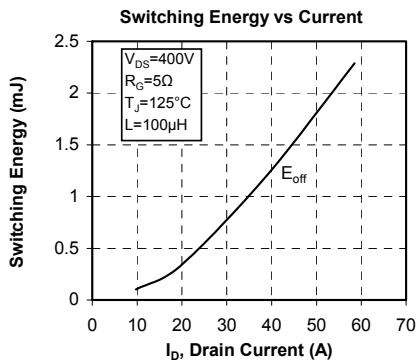
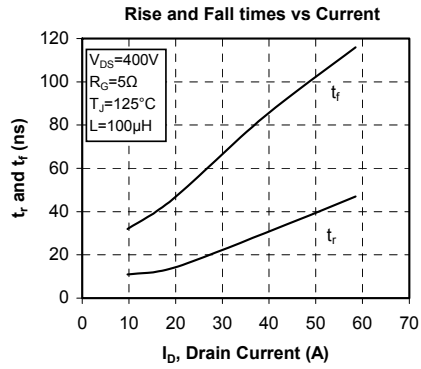
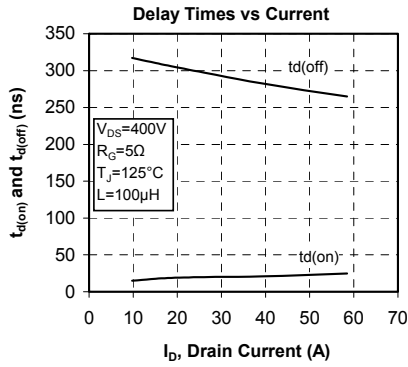
Package characteristics

Symbol	Characteristic	Min	Typ	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 _{STG}	Storage Temperature Range	-40		125		
T _C	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				110	g

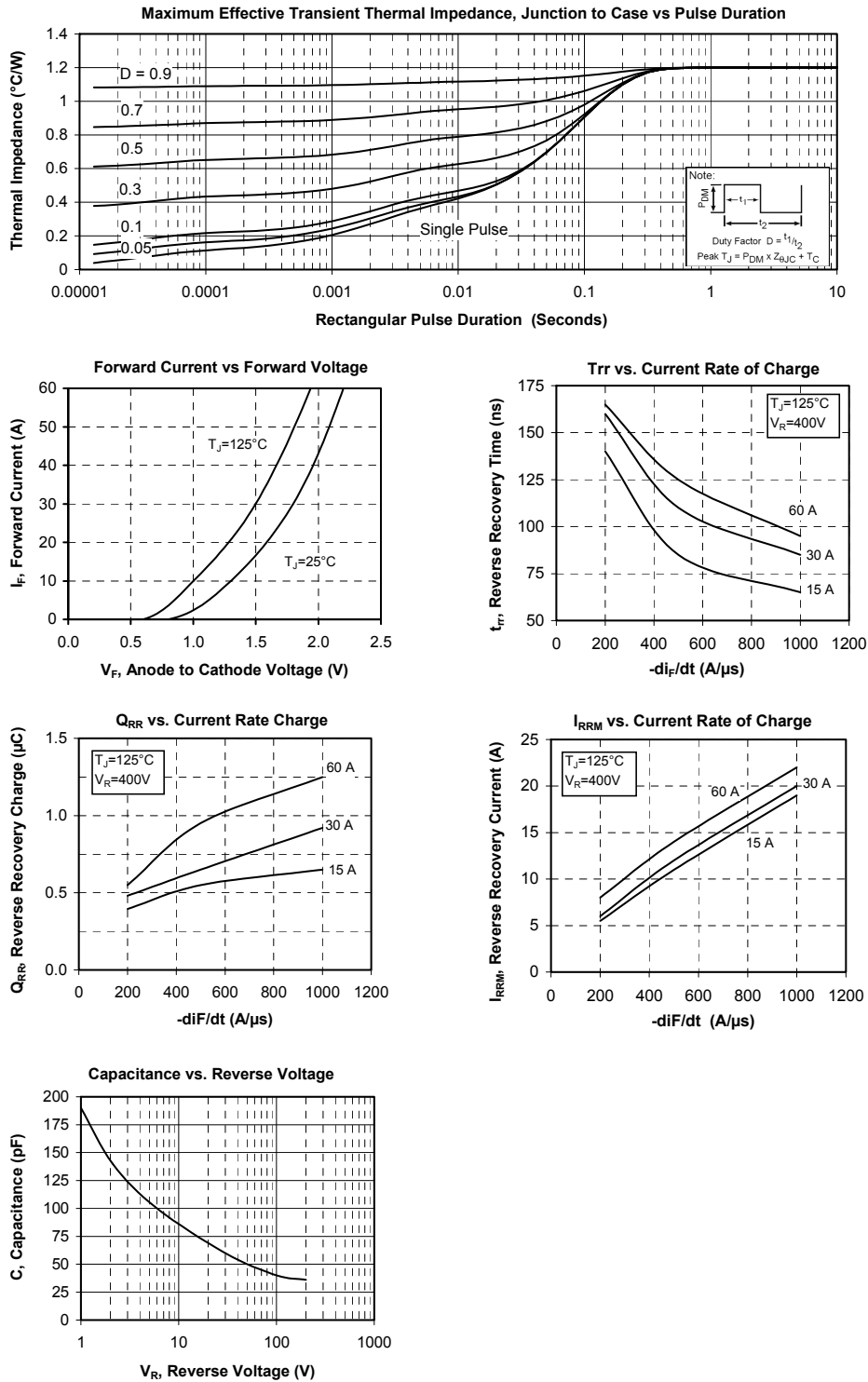
4. SP3F Package outline (dimensions in mm)



5. Full bridge switches curves (Per CoolMOS™)




6. Typical rectifier bridge Performance Curve (per diode)



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