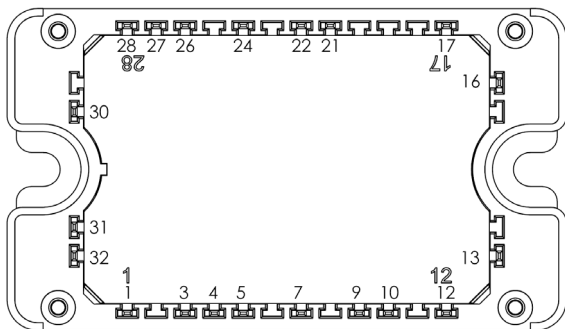
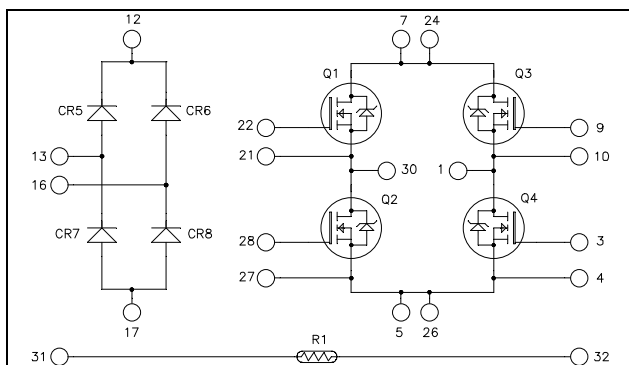


Full bridge + rectifier bridge CoolMOS Power module



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

CoolMOSTM :

$V_{DSS} = 600V$

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

Application

- Solar converter

Features

- **CoolMOSTM**
 - 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 CoolMOSTM)

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	A
I_{DM}	Pulsed Drain current	160	
V_{GS}	Gate - Source Voltage	± 20	V
R_{DSon}	Drain - Source ON Resistance	70	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$ 250	W
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, T _j = 25°C			25	μA
		V _{GS} = 0V, V _{DS} = 600V, T _j = 125°C			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		259		nC
Q _{gs}	Gate – Source Charge	V _{Bus} = 300V		29		
Q _{gd}	Gate – Drain Charge	I _D = 39A		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/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 ≤ - 39A di/dt ≤ 100A/μs V_R ≤ V_{DSS} T_j ≤ 150°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	320	

Electrical Characteristics (per diode)

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

Dynamic Characteristics (per diode)

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
t _{rr}	Reverse Recovery Time	I _F =1A, V _R =30V di/dt = 100A/μs	T _j = 25°C		22		ns
t _{rr}	Reverse Recovery Time	I _F = 30A V _R = 400V di/dt = 200A/μs	T _j = 25°C		25		ns
			T _j = 125°C		160		
Q _{rr}	Reverse Recovery Charge		T _j = 25°C		35		nC
			T _j = 125°C		480		
I _{RRM}	Reverse Recovery Current		T _j = 25°C		3		A
			T _j = 125°C		6		
t _{rr}	Reverse Recovery Time	I _F = 30A V _R = 400V di/dt = 1000A/μs	T _j = 125°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	°C/W

3. Thermal and package characteristics

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

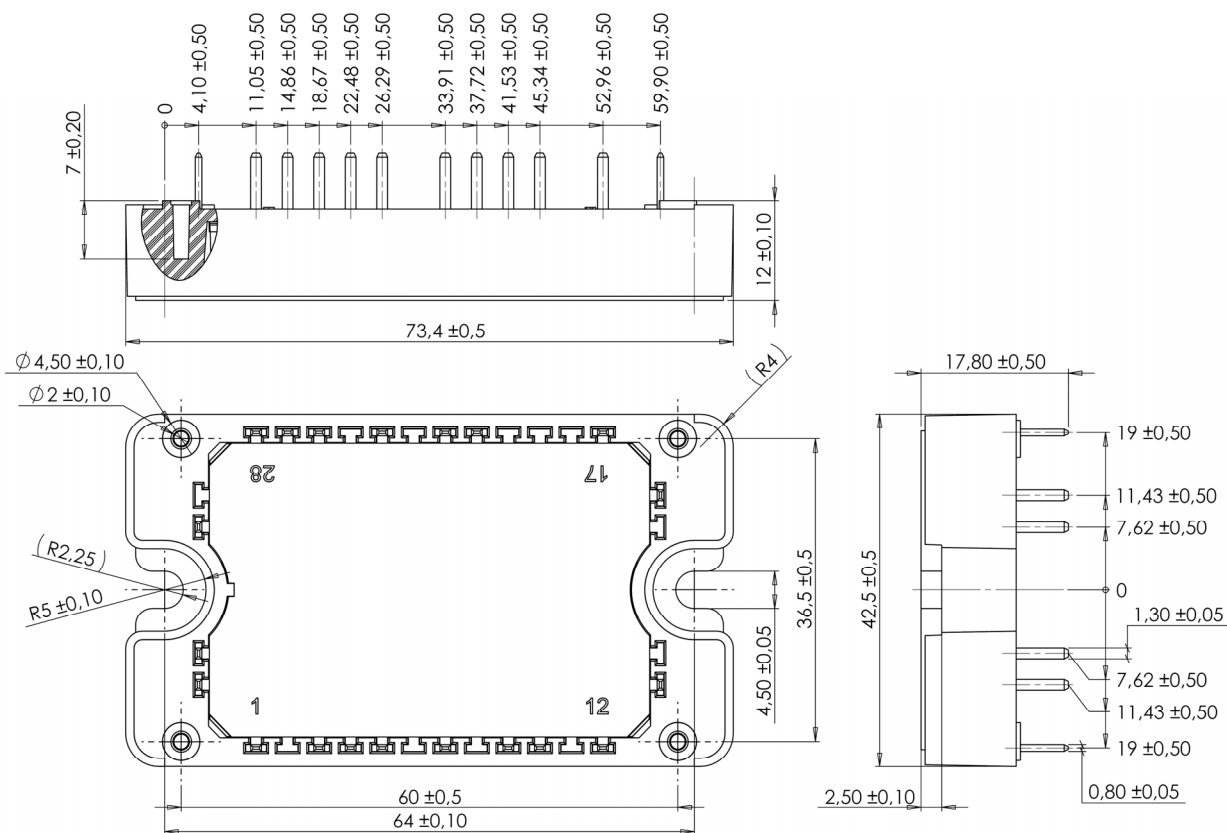
Symbol	Characteristic	Min	Typ	Max	Unit
R_{25}	Resistance @ 25°C		50		k Ω
$\Delta R_{25}/R_{25}$			5		%
$B_{25/85}$	$T_{25} = 298.15 K$		3952		K
$\Delta B/B$			4		%

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

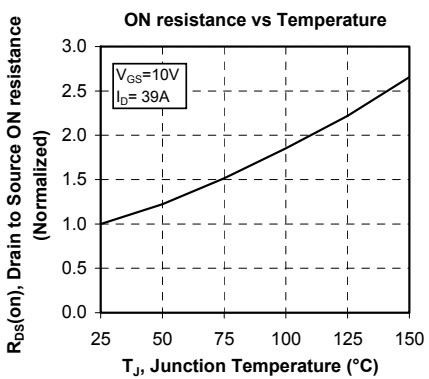
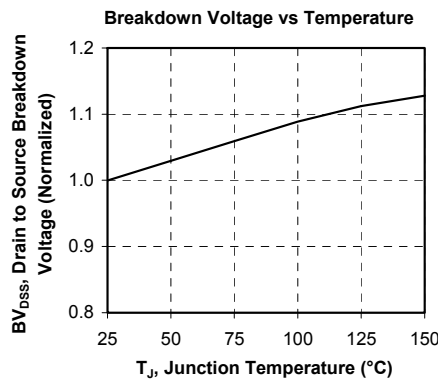
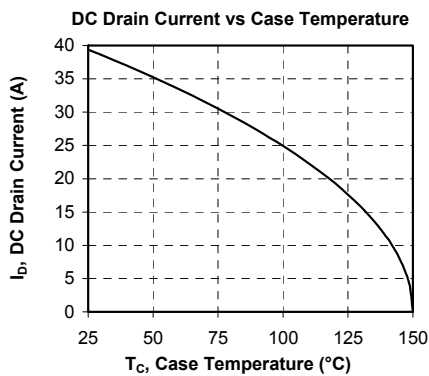
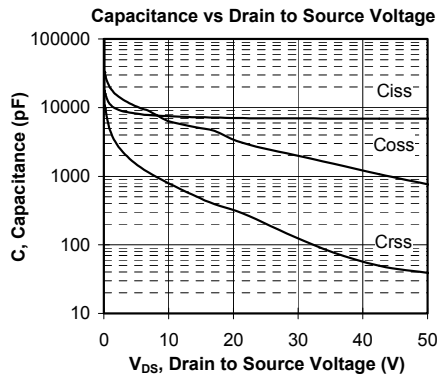
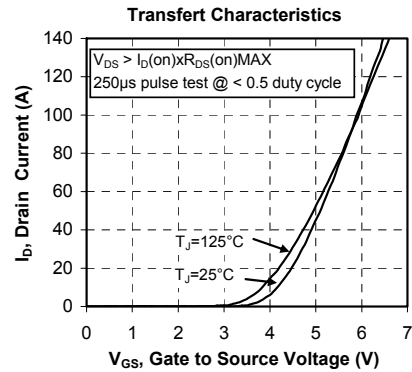
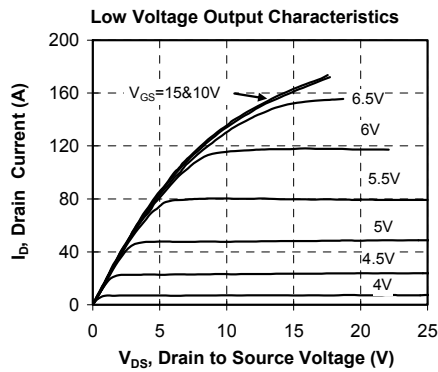
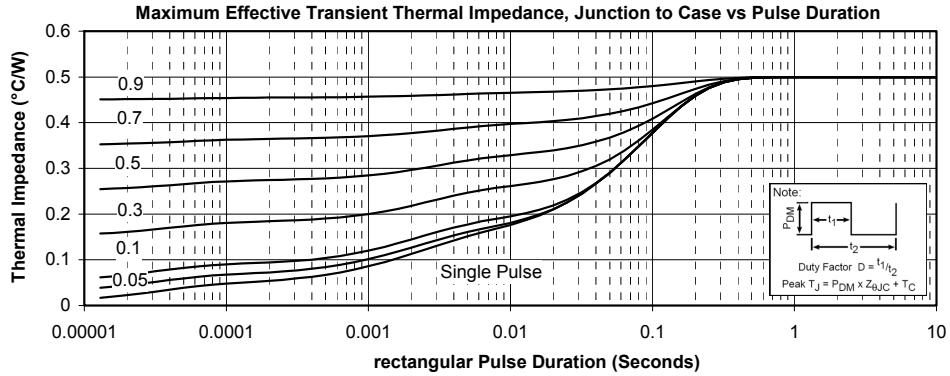
T: Thermistor temperature
 R_T : Thermistor value at T

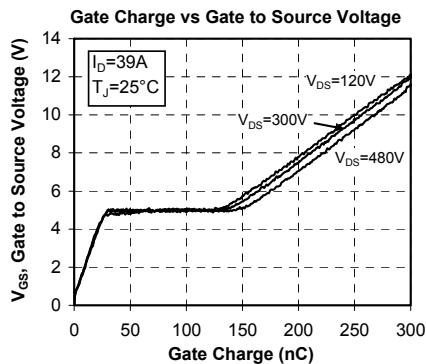
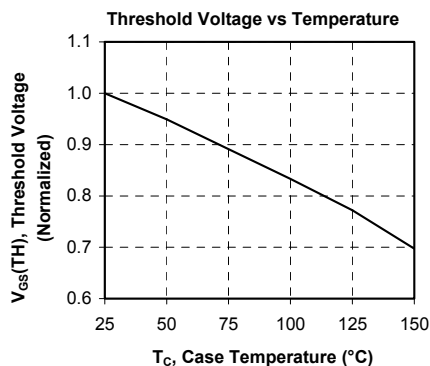
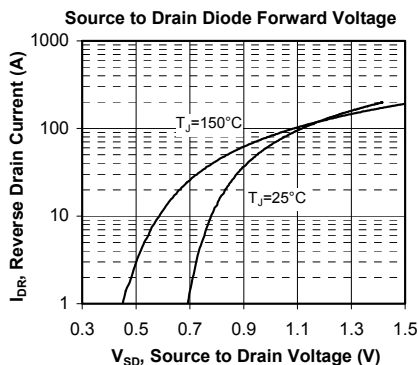
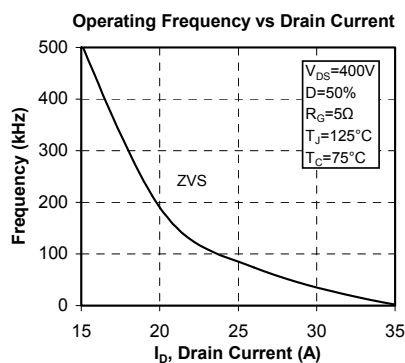
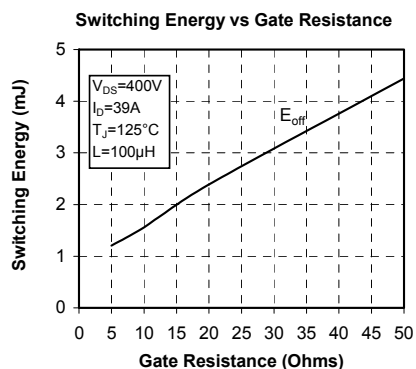
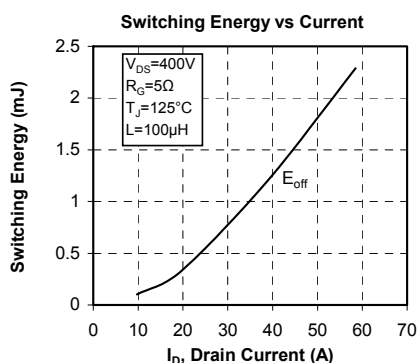
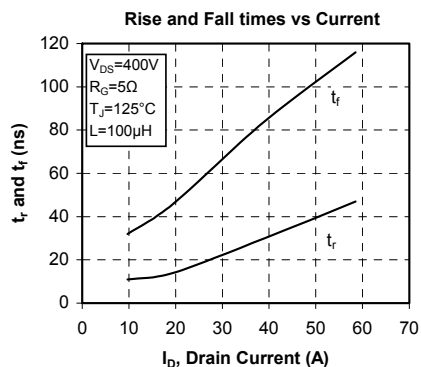
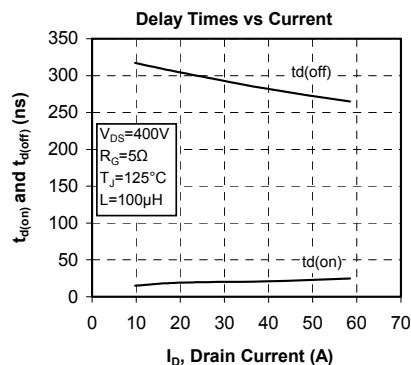
Package characteristics

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

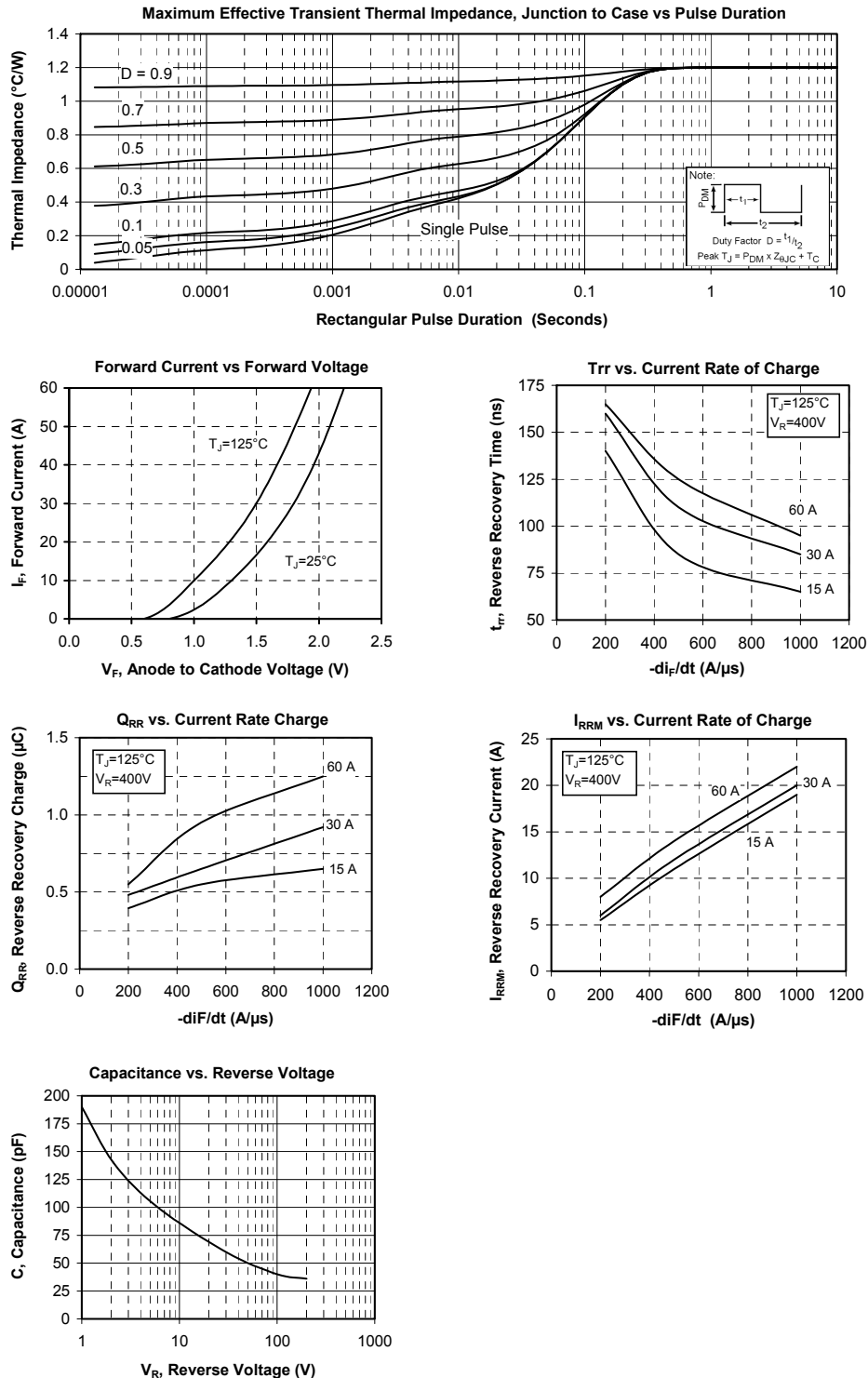
4. SP3F Package outline (dimensions in mm)


5. Full bridge switches curves (Per CoolMOST™)





6. Typical rectifier bridge Performance Curve (per diode)



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