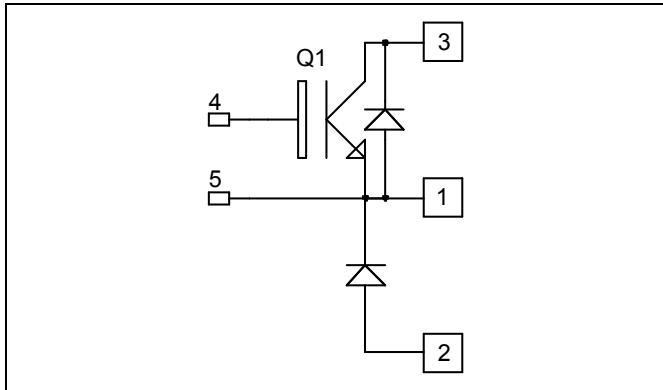


Buck Chopper Trench + Field Stop IGBT Power Module

$V_{CES} = 1200V$
 $I_C = 400A @ T_c = 80^\circ C$



Application

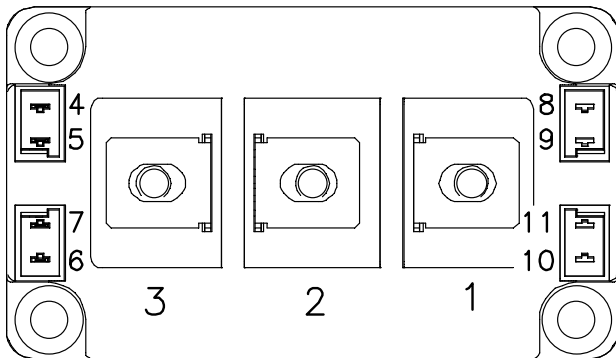
- AC and DC motor control
- Switched Mode Power Supplies

Features

- Trench + Field Stop IGBT Technology
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 20 kHz
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- High level of integration
- M6 power connectors

Benefits

- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_C of V_{CEsat}
- RoHS Compliant



Absolute maximum ratings

Symbol	Parameter		Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage		1200	V
I_C	Continuous Collector Current	$T_C = 25^\circ C$	580	A
		$T_C = 80^\circ C$	400	
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ C$	800	
V_{GE}	Gate - Emitter Voltage		± 20	V
P_D	Maximum Power Dissipation	$T_C = 25^\circ C$	2100	W
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	800A @ 1100V	

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

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

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} = 1200V$			750	μA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 400A$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	1.7 2.0	2.1	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 12mA$	5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			400	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0V; V_{CE} = 25V$		29		nF
C_{res}	Reverse Transfer Capacitance	$f = 1MHz$		1.3		
Q_G	Gate charge	$V_{GE} = \pm 15V, I_C = 400A$ $V_{CE} = 600V$		3.7		μC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C)		250		ns
T_r	Rise Time	$V_{GE} = \pm 15V$		90		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 600V$		550		
T_f	Fall Time	$I_C = 400A$ $R_G = 1.8\Omega$		130		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C)		300		ns
T_r	Rise Time	$V_{GE} = \pm 15V$		100		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 600V$		650		
T_f	Fall Time	$I_C = 400A$ $R_G = 1.8\Omega$		180		
E_{on}	Turn on Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$	$T_j = 125^\circ\text{C}$	36		mJ
E_{off}	Turn off Energy	$I_C = 400A$ $R_G = 1.8\Omega$	$T_j = 125^\circ\text{C}$	62		
I_{sc}	Short Circuit data	$V_{GE} \leq 15V; V_{Bus} = 900V$ $t_p \leq 10\mu\text{s}; T_j = 125^\circ\text{C}$		1600		A

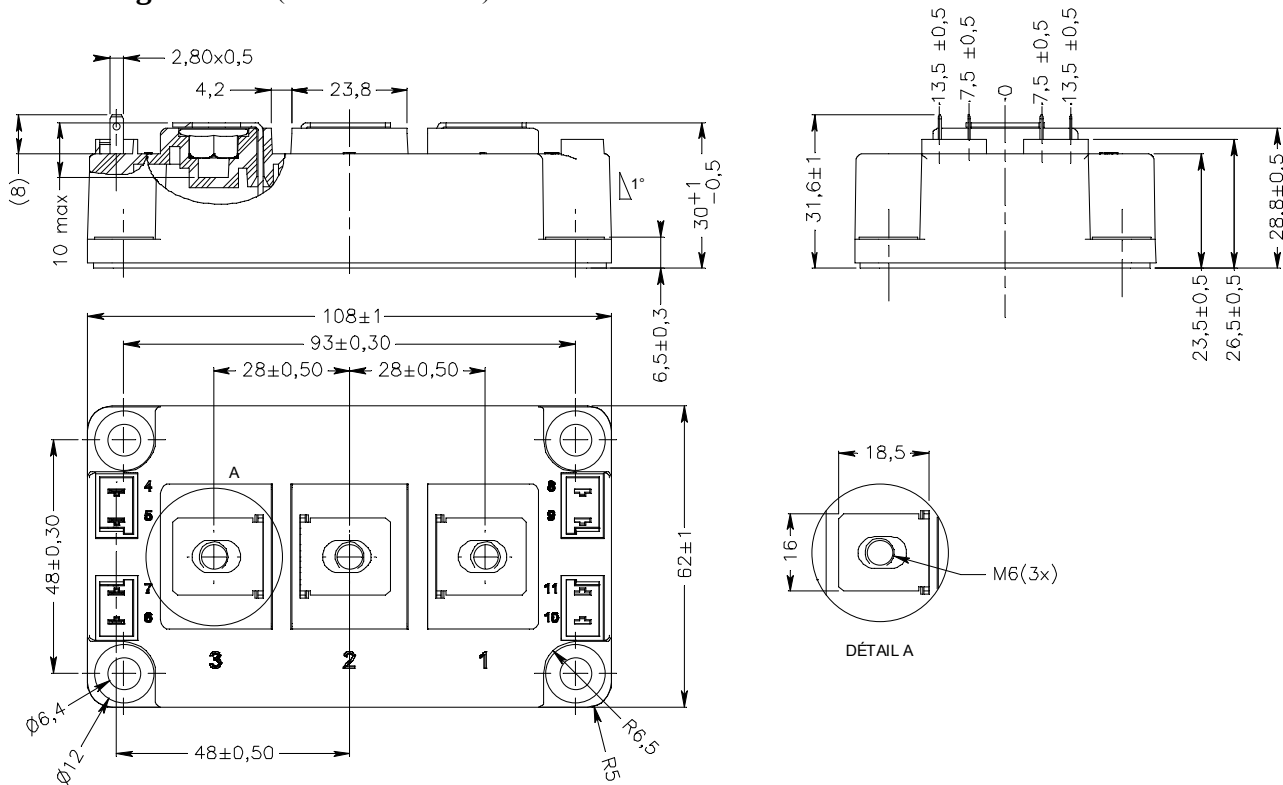
Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		1200			V
I_{RRM}	Maximum Reverse Leakage Current	$V_R = 1200V$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		750 1000	μA
I_F	DC Forward Current		$T_c = 80^\circ\text{C}$	400		A
V_F	Diode Forward Voltage	$I_F = 400A$ $V_{GE} = 0V$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	1.6 1.6	2.1	V
t_{rr}	Reverse Recovery Time	$I_F = 400A$ $V_R = 600V$ $di/dt = 4000A/\mu\text{s}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	170 280		ns
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	36 72		μC
E_{rr}	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	20 36		mJ

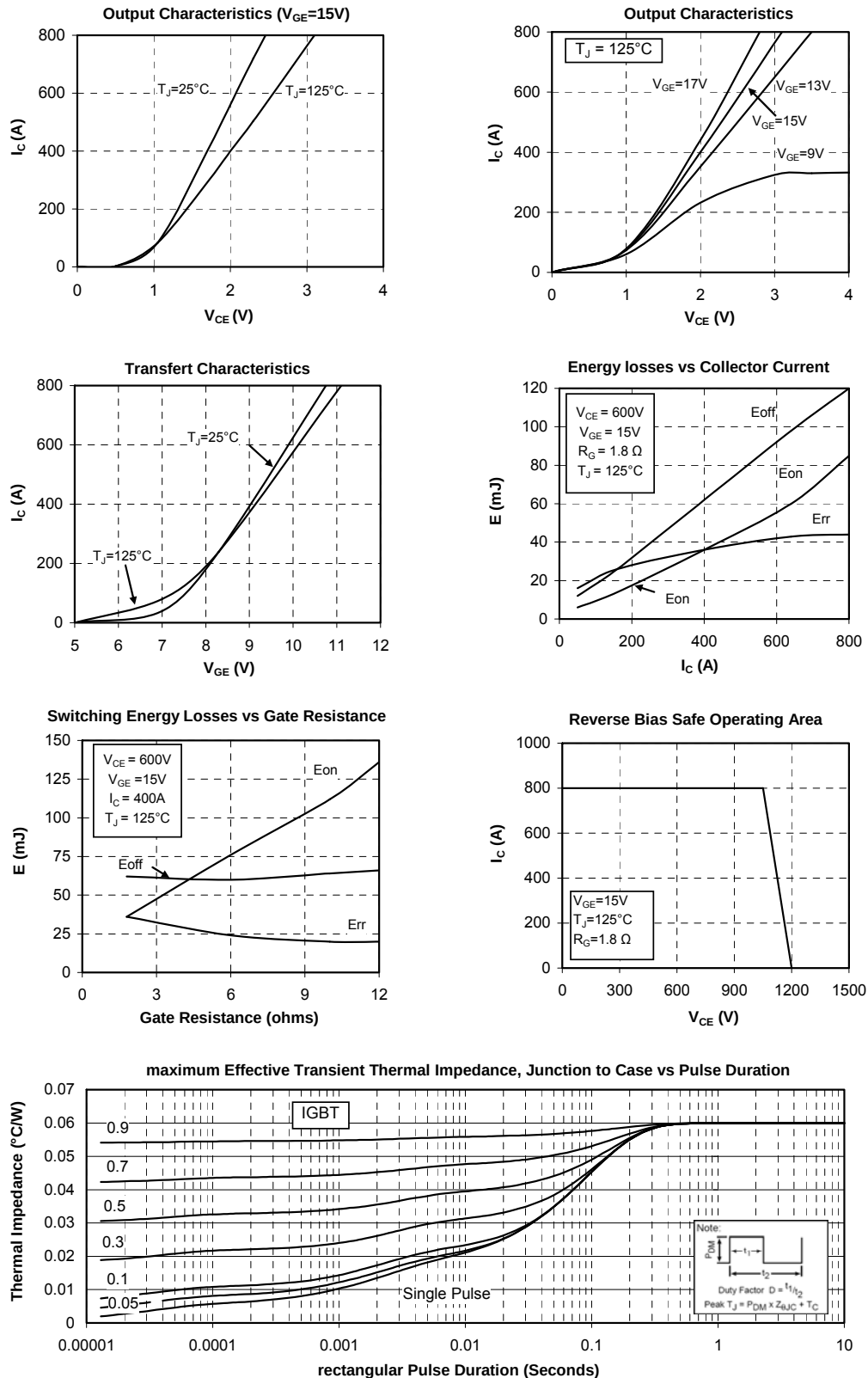
Thermal and package characteristics

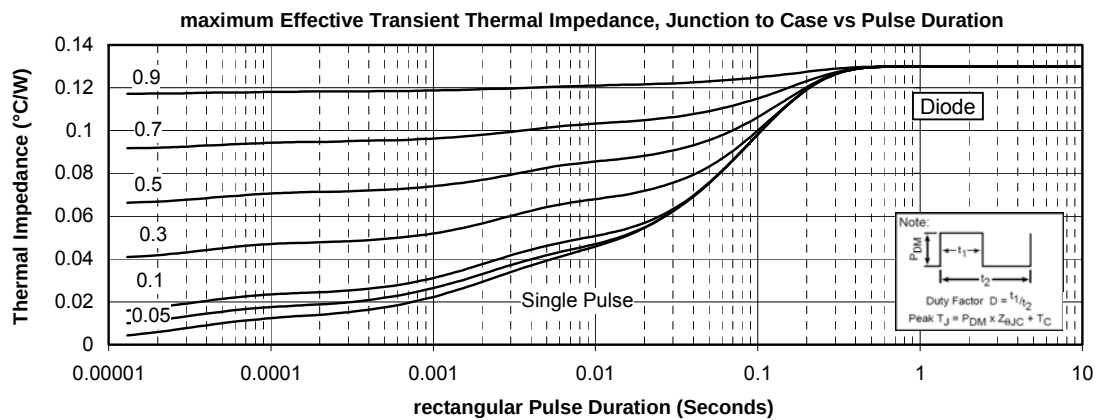
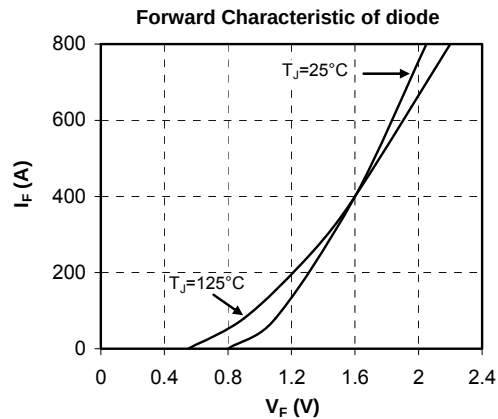
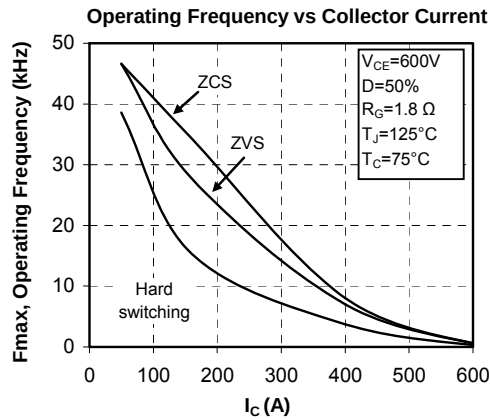
Symbol	Characteristic		Min	Typ	Max	Unit
R_{thJC}	Junction to Case Thermal Resistance	IGBT			0.06	°C/W
		Diode			0.13	
V_{ISOL}	RMS Isolation Voltage, any terminal to case $t = 1$ min, $I_{isol} < 1$ mA, 50/60Hz		2500			V
T_J	Operating junction temperature range		-40		150	°C
T_{STG}	Storage Temperature Range		-40		125	
T_C	Operating Case Temperature		-40		125	
Torque	Mounting torque	For terminals	M6	3	5	N.m
		To Heatsink	M6	3	5	
Wt	Package Weight				350	g

D3 Package outline (dimensions in mm)



Typical Performance Curve





Microsemi reserves the right to change, without notice, the specifications and information contained herein

Microsemi's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 6,939,743 7,352,045 5,283,201 5,801,417 5,648,283 7,196,634 6,664,594 7,157,886 6,939,743 7,342,262 and foreign patents. U.S. and Foreign patents pending. All Rights Reserved.