

**Single switch
Trench + Field Stop IGBT
Power Module**

**$V_{CES} = 1700V$
 $I_C = 400A @ T_c = 80^\circ C$**

Application

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

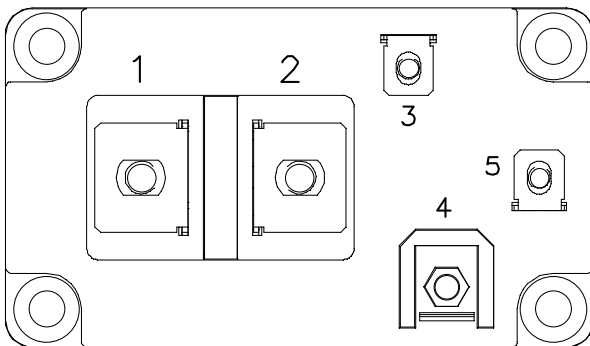
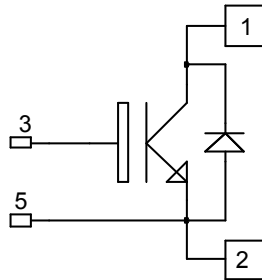
Features

- 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
- M6 connectors for power
- M4 connectors for signal
- High level of integration

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	1700	V
I_C	Continuous Collector Current	$T_C = 25^\circ C$ 800	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	$T_C = 25^\circ C$ 2080	W
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$ 800A@1650V	



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	$V_{GE} = 0V, V_{CE} = 1700V$			5	mA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 400A$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	2.0 2.4	2.4	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 16\text{ mA}$	5.2	5.8	6.4	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	$V_{GE} = 0V, V_{CE} = 25V$		33		nF
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		1.2		
Q_G	Gate charge	$V_{GE} = \pm 15V, I_C = 400A$ $V_{CE} = 900V$		4.6		μC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15V$ $V_{Bus} = 900V$ $I_C = 400A$ $R_G = 3.6\Omega$		250		ns
T_r	Rise Time			100		
$T_{d(off)}$	Turn-off Delay Time			850		
T_f	Fall Time			120		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GE} = \pm 15V$ $V_{Bus} = 900V$ $I_C = 400A$ $R_G = 3.6\Omega$		300		ns
T_r	Rise Time			100		
$T_{d(off)}$	Turn-off Delay Time			1000		
T_f	Fall Time			200		
E_{on}	Turn On Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 900V$ $I_C = 400A$ $R_G = 3.6\Omega$	$T_j = 125^\circ\text{C}$	135		mJ
E_{off}	Turn Off Energy		$T_j = 125^\circ\text{C}$	125		
I_{sc}	Short Circuit data	$V_{GE} \leq 15V ; V_{Bus} = 1000V$ $t_p \leq 10\mu\text{s} ; T_j = 125^\circ\text{C}$		1600		A

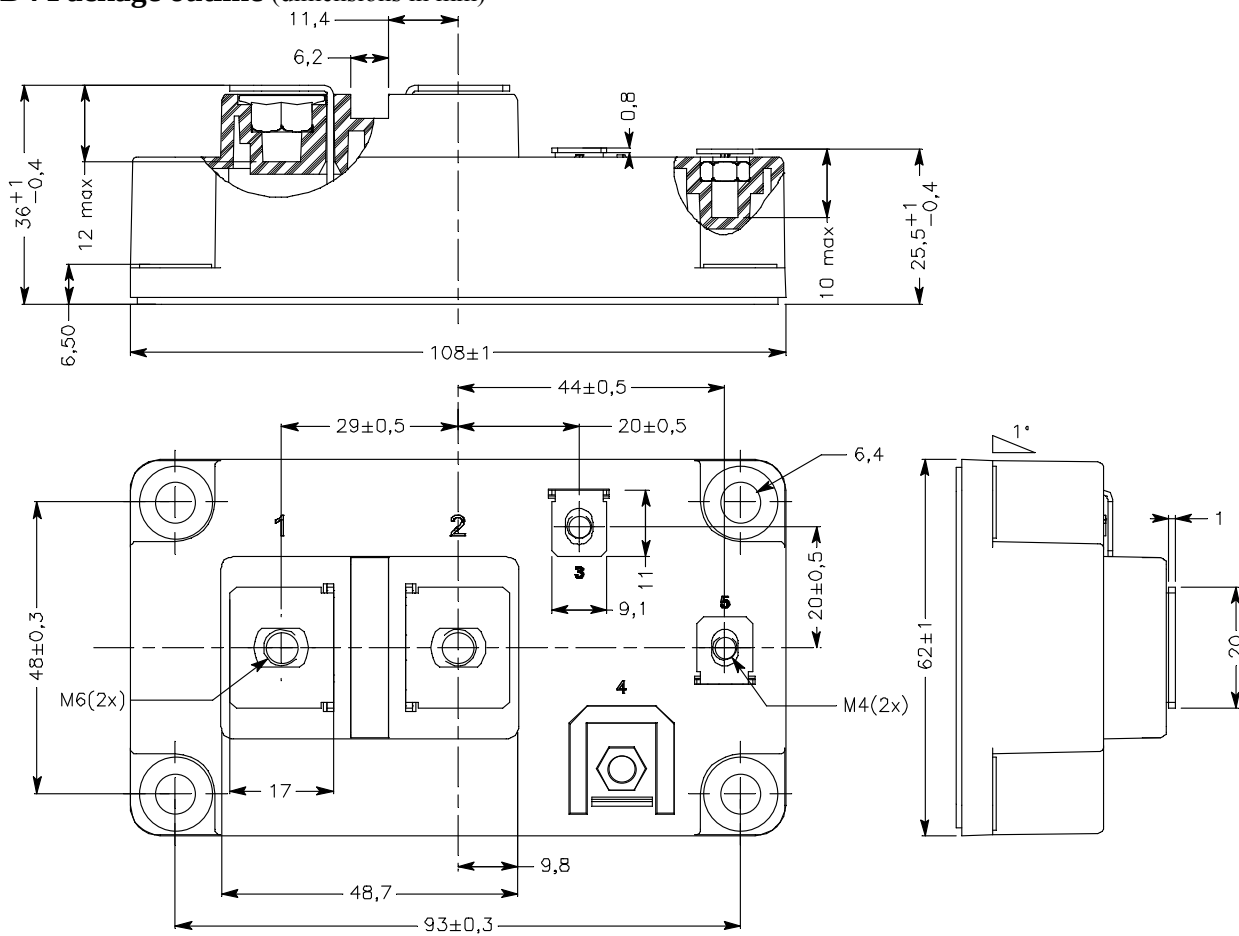
Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		1700			V
I_{RRM}	Maximum Reverse Leakage Current	$V_R = 1700V$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		750 1000	μA
I_F	DC forward current		$T_C = 80^\circ\text{C}$	400		A
V_F	Diode Forward Voltage	$I_F = 400A$ $V_{GE} = 0V$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	1.8 1.9	2.2	V
E_{rr}	Reverse Recovery Energy	$I_F = 400A$ $V_R = 900V$ $di/dt = 4200A/\mu\text{s}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	50 96		mJ
t_{rr}	Reverse Recovery Time		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	420 525		ns
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	100 170		μC

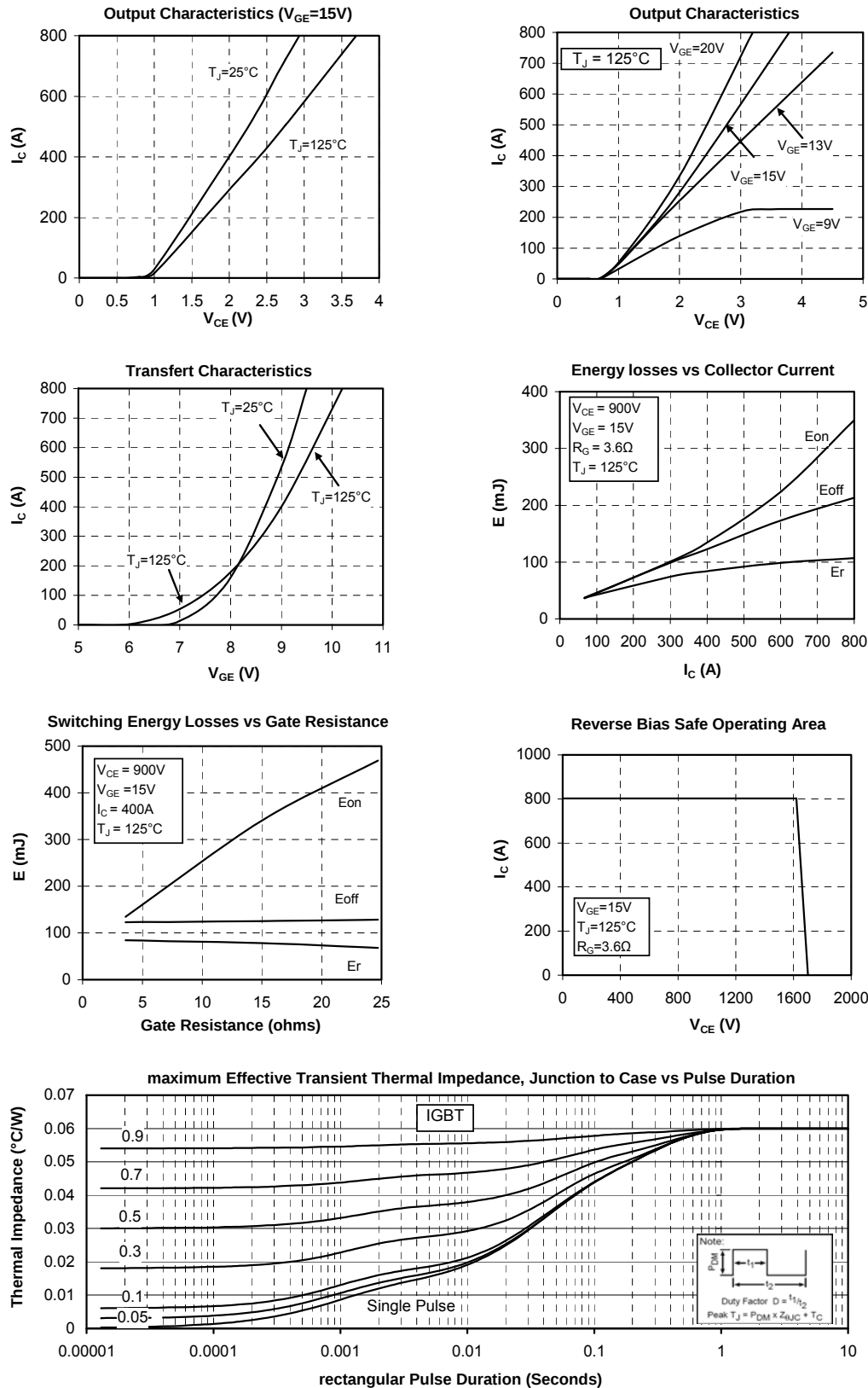
Thermal and package characteristics

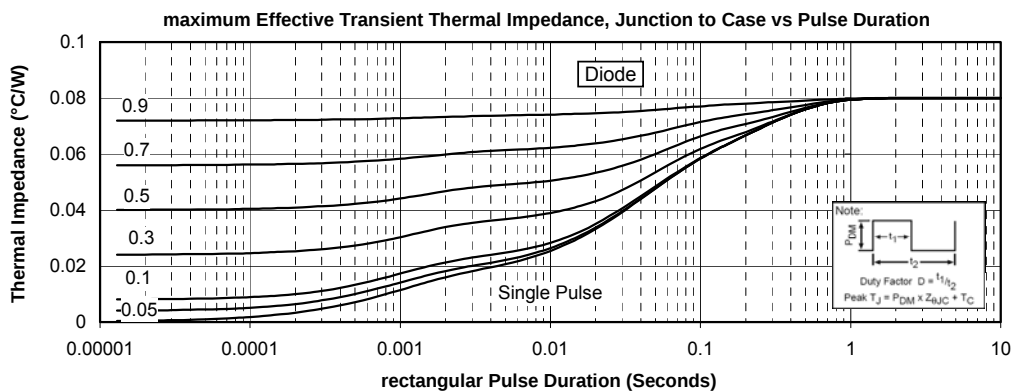
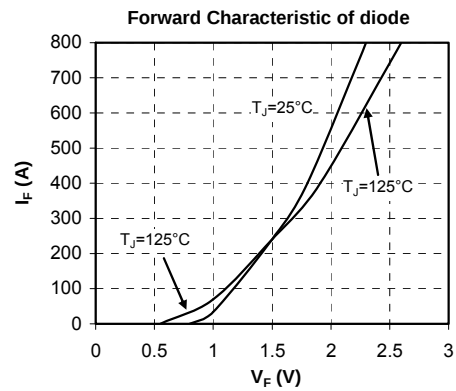
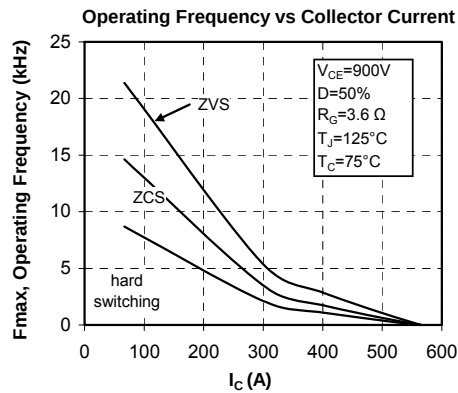
Symbol	Characteristic		Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance	IGBT			0.06	°C/W
		Diode			0.08	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, I isol < 1mA, 50/60Hz		3500			V
T _J	Operating junction temperature range		-40		150	°C
T _{STG}	Storage Temperature Range		-40		125	
T _C	Operating Case Temperature		-40		125	
Torque	Mounting torque	M6	3		5	N.m
		M4	1		2	
Wt	Package Weight				350	g

D4 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.