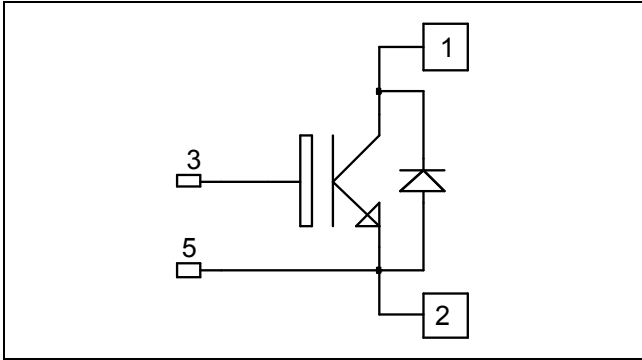


Single switch NPT IGBT Power Module

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



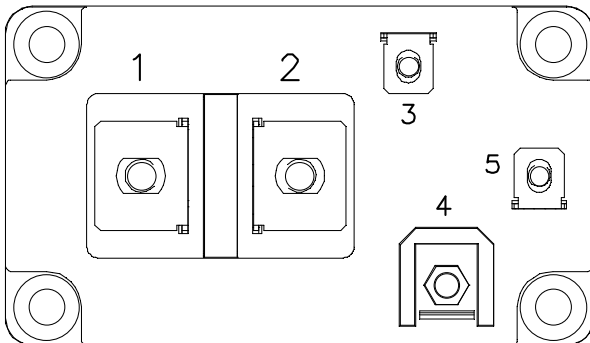
Application

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

Features

- Non Punch Through (NPT) FAST IGBT
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 50 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

- Outstanding performance at high frequency operation
- 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	$T_c = 25^\circ C$	510
		$T_c = 80^\circ C$	400
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	800
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	2500
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	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	$V_{GE} = 0\text{V}$; $V_{CE} = 1200\text{V}$			5	mA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 400\text{A}$	$T_j = 25^\circ\text{C}$	3.2	3.7	V
			$T_j = 125^\circ\text{C}$	3.9		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$, $I_C = 16\text{mA}$	4.5	5.5	6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}$, $V_{CE} = 0\text{V}$			400	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$		26		nF
C_{oes}	Output Capacitance	$V_{CE} = 25\text{V}$		4		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		2		
Q_G	Gate charge	$V_{GE} = \pm 15\text{V}$, $I_C = 400\text{A}$ $V_{CE} = 600\text{V}$		4.2		μC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C)		100		ns
T_r	Rise Time	$V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$		60		
$T_{d(off)}$	Turn-off Delay Time	$I_C = 400\text{A}$		530		
T_f	Fall Time	$R_G = 2.2\Omega$		40		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C)		110		ns
T_r	Rise Time	$V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$		70		
$T_{d(off)}$	Turn-off Delay Time	$I_C = 400\text{A}$		550		
T_f	Fall Time	$R_G = 2.2\Omega$		50		
E_{on}	Turn-on Switching Energy	$V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$	$T_j = 125^\circ\text{C}$	22		mJ
E_{off}	Turn-off Switching Energy	$I_C = 400\text{A}$ $R_G = 2.2\Omega$	$T_j = 125^\circ\text{C}$	29		
I_{sc}	Short Circuit data	$V_{GE} \leq 15\text{V}$; $V_{Bus} = 900\text{V}$ $t_p \leq 10\mu\text{s}$; $T_j = 125^\circ\text{C}$		2600		A

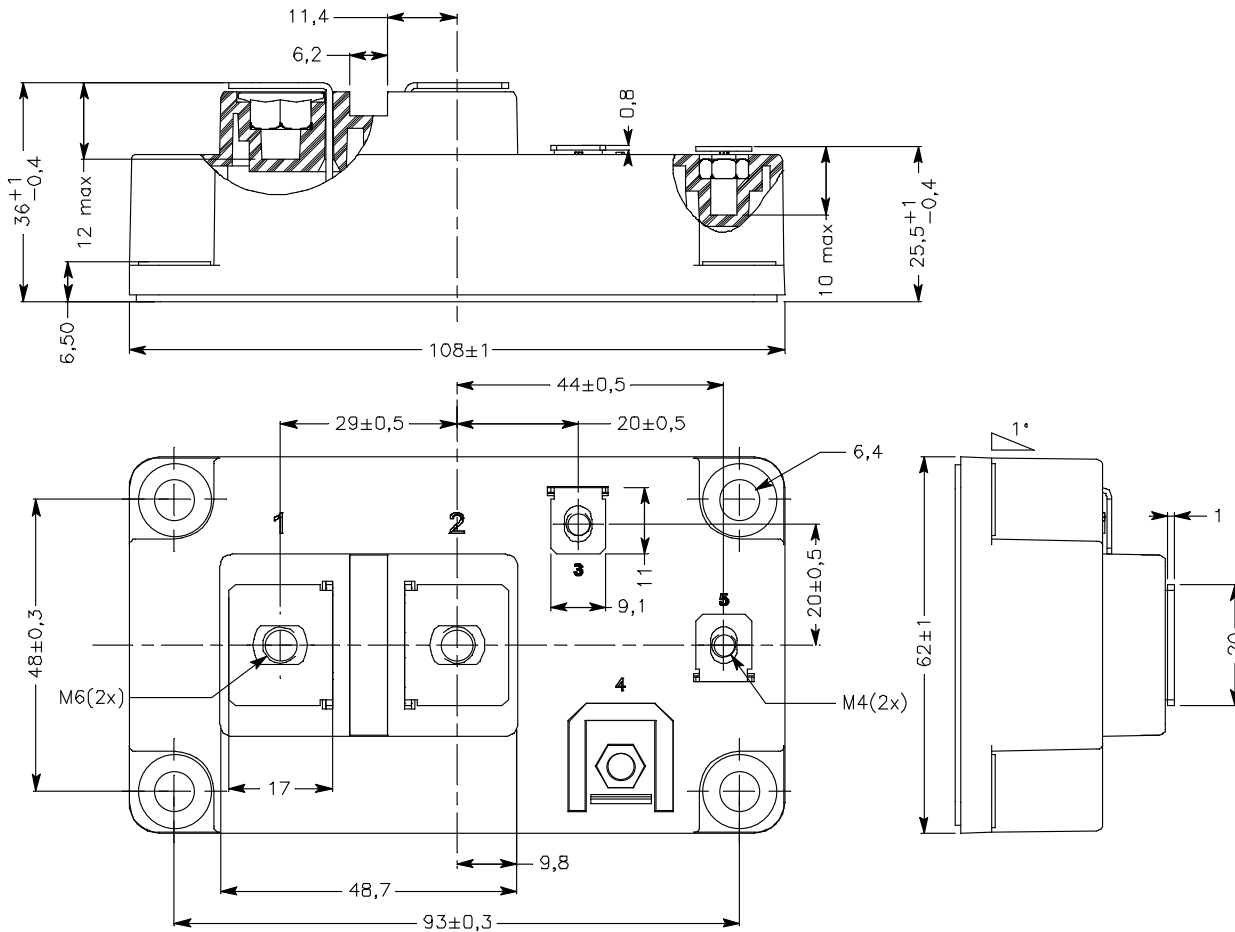
Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		1200			V
I_{RRM}	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$		750	μA
			$T_j = 125^\circ\text{C}$		1000	
I_F	DC Forward Current		$T_c = 80^\circ\text{C}$	400		A
V_F	Diode Forward Voltage	$I_F = 400\text{A}$	$T_j = 25^\circ\text{C}$	2.1		V
			$T_j = 125^\circ\text{C}$	1.9		
t_{rr}	Reverse Recovery Time	$I_F = 400\text{A}$ $V_R = 600\text{V}$ $di/dt = 4000\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	120		ns
			$T_j = 125^\circ\text{C}$	210		
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$	26		μC
			$T_j = 125^\circ\text{C}$	64		
E_{rr}	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$	16		mJ
			$T_j = 125^\circ\text{C}$	32		

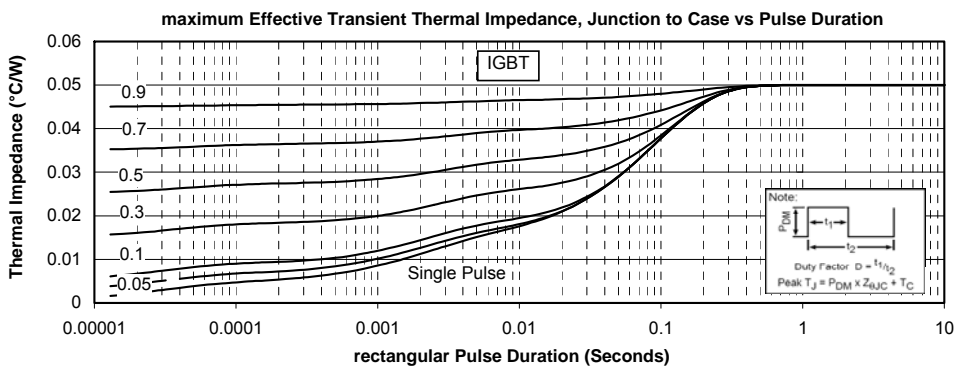
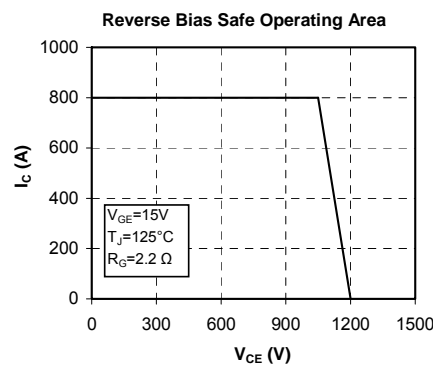
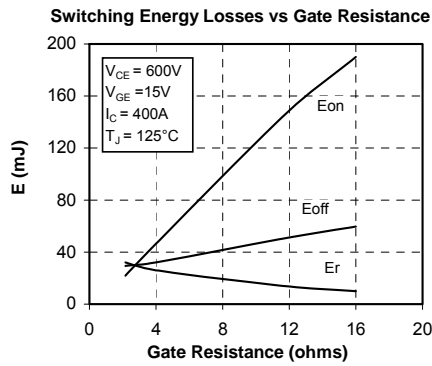
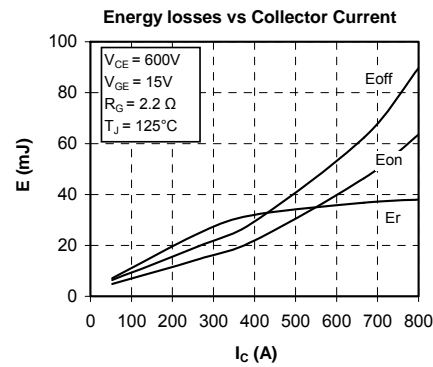
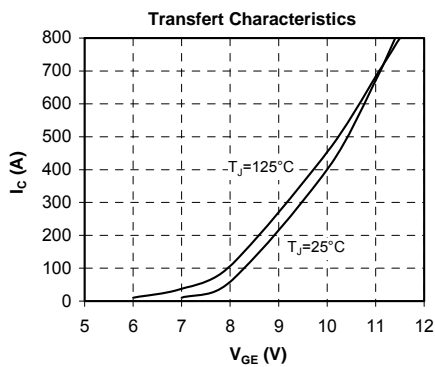
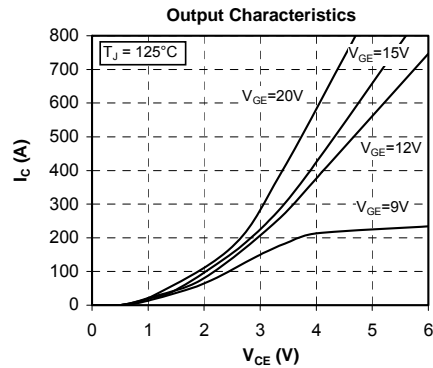
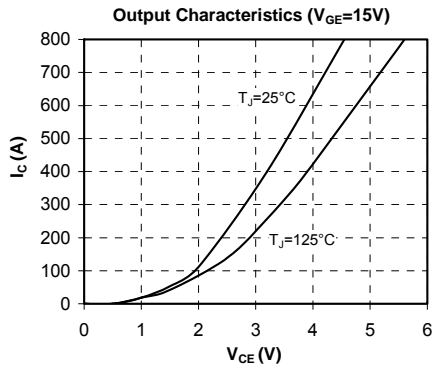
Thermal and package characteristics

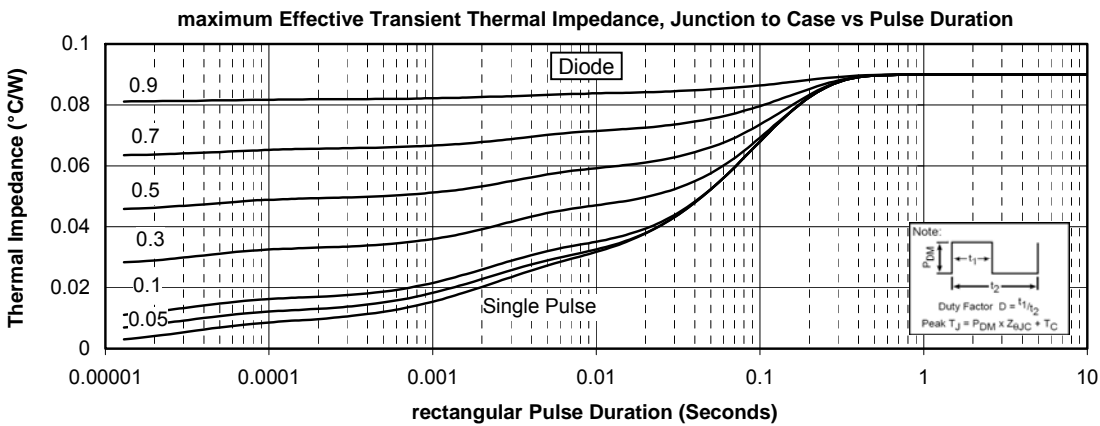
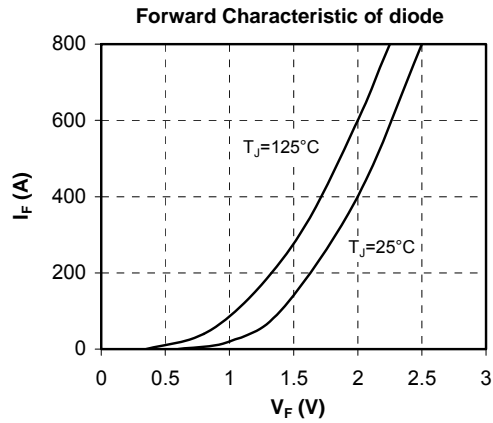
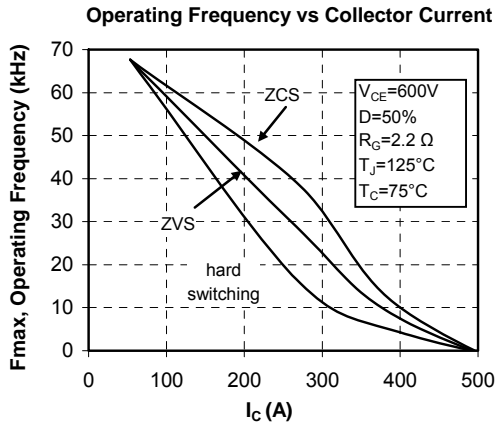
Symbol	Characteristic		Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance	IGBT			0.05	°C/W
		Diode			0.09	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, I _{isol} < 1mA, 50/60Hz		2500			V
T _J	Operating junction temperature range		-40		150	°C
T _{STG}	Storage Temperature Range		-40		125	
T _C	Operating Case Temperature		-40		125	
Torque	Mounting torque	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.