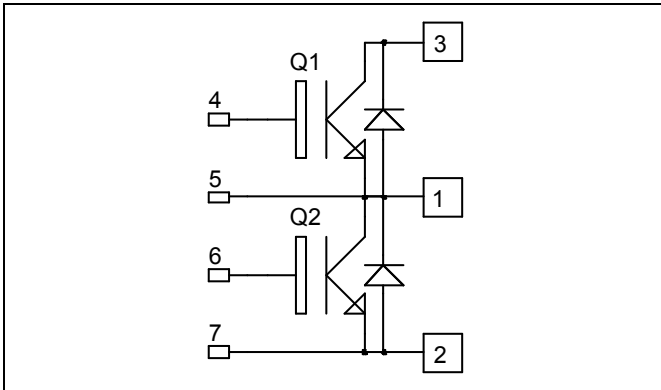


**Phase leg  
Trench + Field Stop IGBT4  
Power Module**

**$V_{CES} = 1200V$   
 $I_C = 475A @ T_c = 80^\circ C$**



### Application

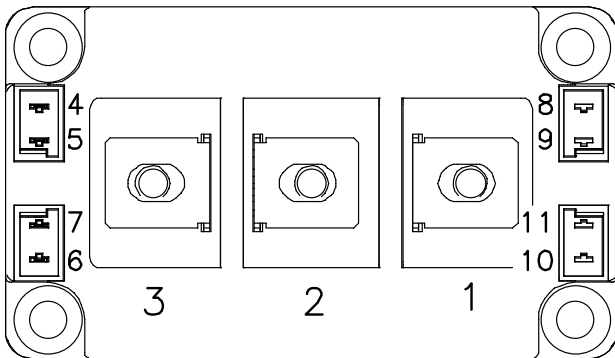
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

### Features

- Trench + Field Stop IGBT 4 Technology
  - Low voltage drop
  - Low leakage current
  - Low switching losses
  - Soft recovery parallel diodes
  - Low diode VF
  - 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	$T_C = 25^\circ C$	610
		$T_C = 80^\circ C$	475
$I_{CM}$	Pulsed Collector Current	$T_C = 25^\circ C$	900
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_C = 25^\circ C$	2080
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](http://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	$V_{GE} = 15\text{V}$ $I_C = 400\text{A}$	$T_j = 25^\circ\text{C}$	1.8	2.2	V
			$T_j = 125^\circ\text{C}$	2.2		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 15\text{mA}$	5.0	5.8	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	$V_{GE} = 0\text{V}$		24.6		nF
$C_{oes}$	Output Capacitance	$V_{CE} = 25\text{V}$		1.62		
$C_{res}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		1.38		
$Q_G$	Gate charge	$V_{GE} = -8\text{V} / 15\text{V}; V_{CE} = 600\text{V}$ $I_C = 400\text{A}$		2.3		$\mu\text{C}$
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 400\text{A}$ $R_G = 1\Omega$		200		ns
$T_r$	Rise Time			40		
$T_{d(off)}$	Turn-off Delay Time			400		
$T_f$	Fall Time			70		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $150^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 400\text{A}$ $R_G = 1\Omega$		220		ns
$T_r$	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			500		
$T_f$	Fall Time			80		
$E_{on}$	Turn-on Switching Energy	$V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 400\text{A}$	$T_j = 150^\circ\text{C}$	33		mJ
$E_{off}$	Turn-off Switching Energy	$R_G = 1\Omega$	$T_j = 150^\circ\text{C}$	42		mJ
$I_{sc}$	Short Circuit data	$V_{GE} \leq 15\text{V}; V_{Bus} = 900\text{V}$ $t_p \leq 10\mu\text{s}; T_j = 150^\circ\text{C}$		1600		A

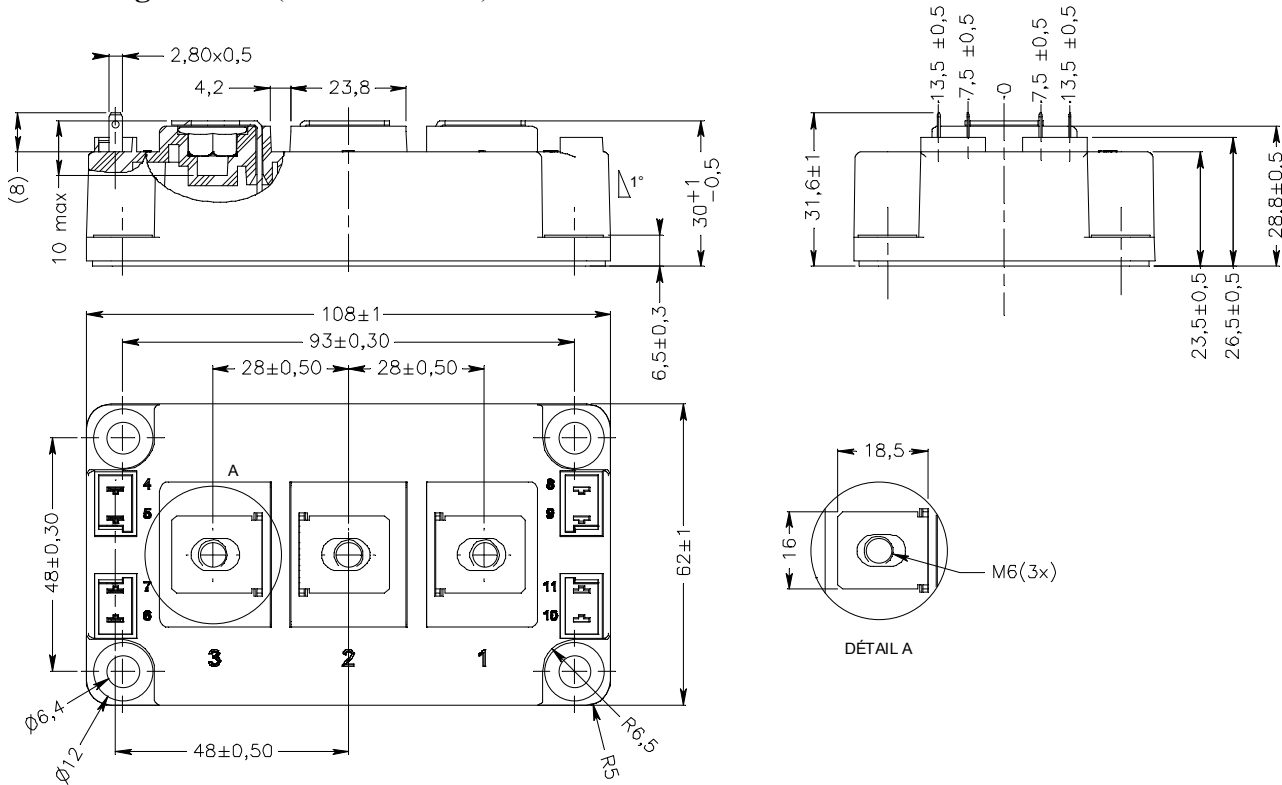
**Diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Repetitive Reverse Voltage		1200			V
$I_{RRM}$	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$		250	$\mu\text{A}$
			$T_j = 150^\circ\text{C}$		2000	
$I_F$	DC Forward Current		$T_C = 80^\circ\text{C}$	400		A
$V_F$	Diode Forward Voltage	$I_F = 400\text{A}$ $V_{GE} = 0\text{V}$	$T_j = 25^\circ\text{C}$	1.7	2.2	V
			$T_j = 150^\circ\text{C}$	1.65		
$t_{rr}$	Reverse Recovery Time	$I_F = 400\text{A}$ $V_R = 600\text{V}$ $di/dt = 7000\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	155		ns
			$T_j = 150^\circ\text{C}$	300		
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$	37.2		$\mu\text{C}$
			$T_j = 150^\circ\text{C}$	78		
$E_{rr}$	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$	16		mJ
			$T_j = 150^\circ\text{C}$	32		

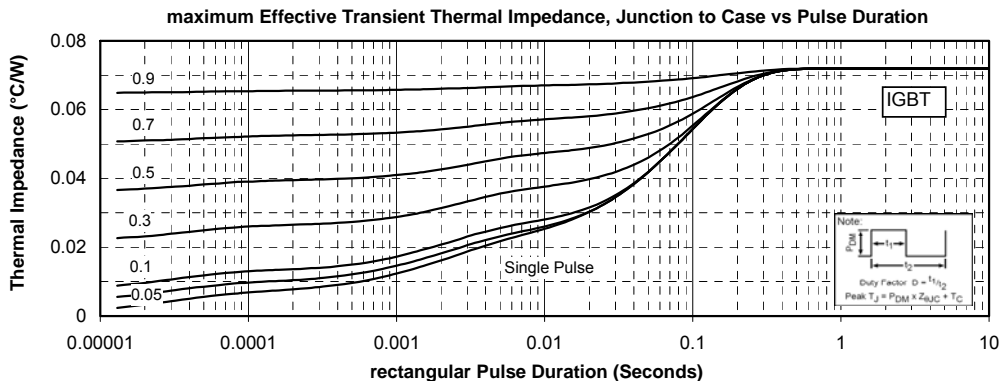
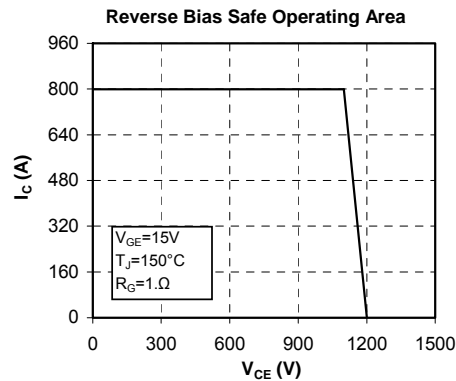
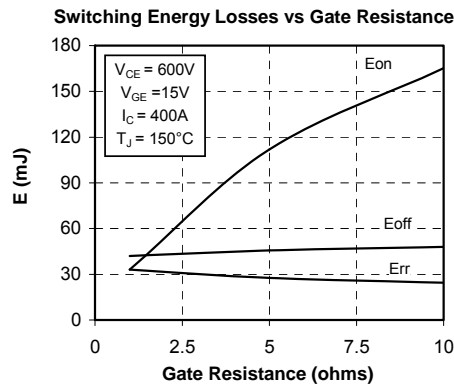
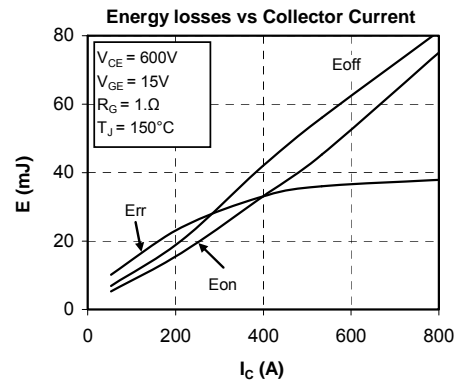
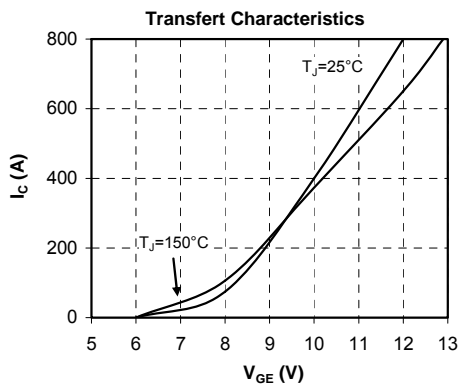
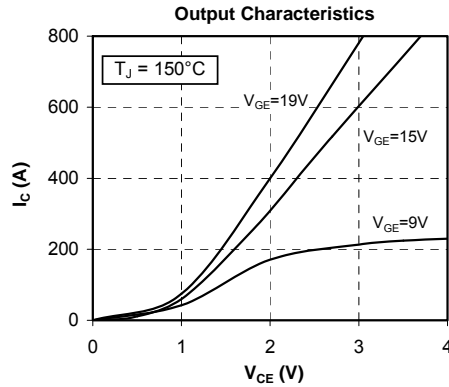
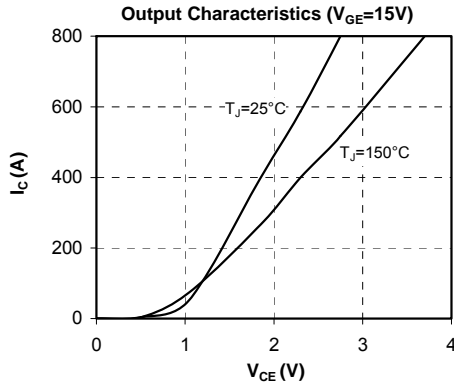
## Thermal and package characteristics

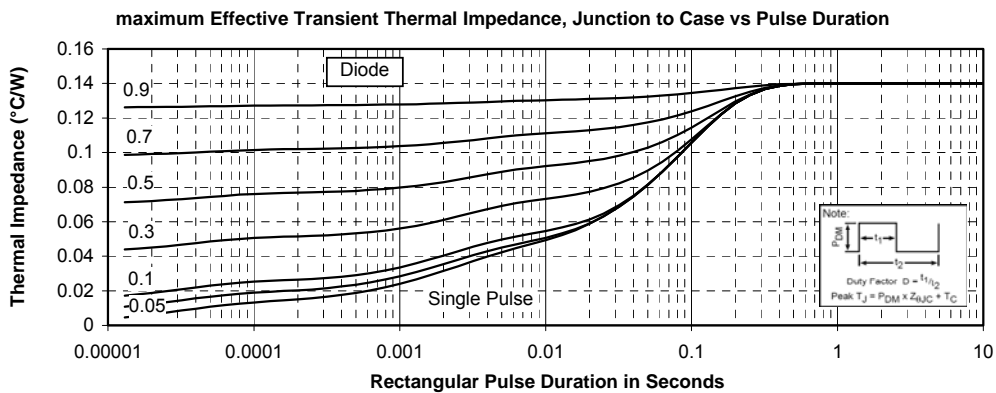
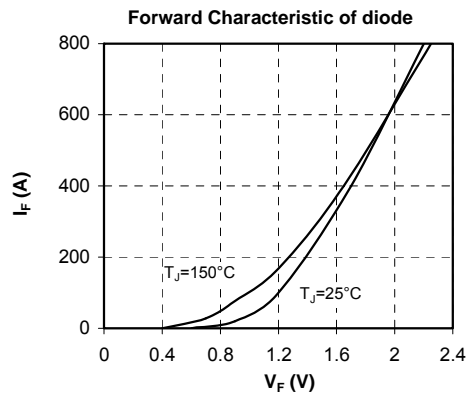
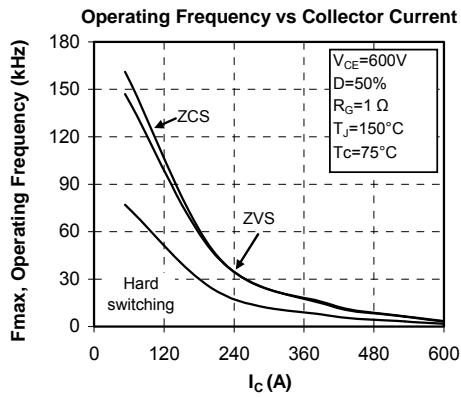
Symbol	Characteristic	Min	Typ	Max	Unit	
R <sub>thJC</sub>	Junction to Case Thermal Resistance	IGBT		0.072	°C/W	
		Diode		0.14		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, I <sub>isol</sub> <1mA, 50/60Hz	2500			V	
T <sub>J</sub>	Operating junction temperature range	-40		175	°C	
T <sub>STG</sub>	Storage Temperature Range	-40		125		
T <sub>C</sub>	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.