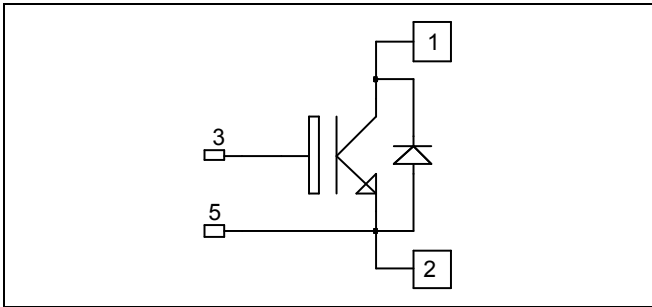


**Single switch  
Trench + Field Stop IGBT3  
Power Module**

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



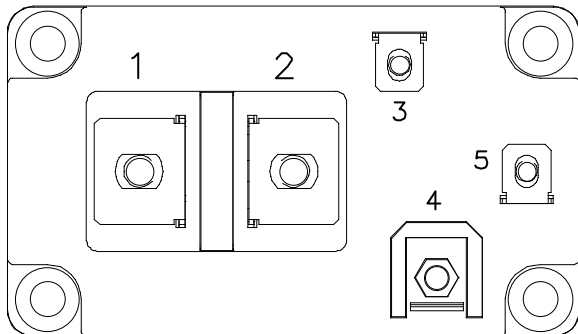
**Application**

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

**Features**

- Trench + Field Stop IGBT3 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	1200	V
$I_C$	Continuous Collector Current	$T_C = 25^\circ C$	650
		$T_C = 80^\circ C$	400
$I_{CM}$	Pulsed Collector Current	$T_C = 25^\circ C$	800
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_C = 25^\circ C$	1785
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	800A@1050V

**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	$V_{GE} = 0V, V_{CE} = 1200V$			750	$\mu\text{A}$
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 400A$	1.4	1.7	2.1	V
		$T_j = 125^\circ\text{C}$		2.0		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 12mA$	5.0	5.8	6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			600	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0V$		28		nF
$C_{oes}$	Output Capacitance	$V_{CE} = 25V$		1.6		
$C_{res}$	Reverse Transfer Capacitance	$f = 1MHz$		1.2		
$Q_G$	Gate charge	$V_{GE} = \pm 15V, I_C = 400A$ $V_{CE} = 600V$		3.7		$\mu\text{C}$
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ ) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 400A$ $R_G = 1.8\Omega$		280		ns
$T_r$	Rise Time		90			
$T_{d(off)}$	Turn-off Delay Time		550			
$T_f$	Fall Time		130			
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $125^\circ\text{C}$ ) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 400A$ $R_G = 1.8\Omega$		300		ns
$T_r$	Rise Time		100			
$T_{d(off)}$	Turn-off Delay Time		650			
$T_f$	Fall Time		180			
$E_{on}$	Turn on Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$	$T_j = 125^\circ\text{C}$	33		mJ
$E_{off}$	Turn off Energy	$I_C = 400A$ $R_G = 1.8\Omega$		$T_j = 125^\circ\text{C}$	59	
$I_{sc}$	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

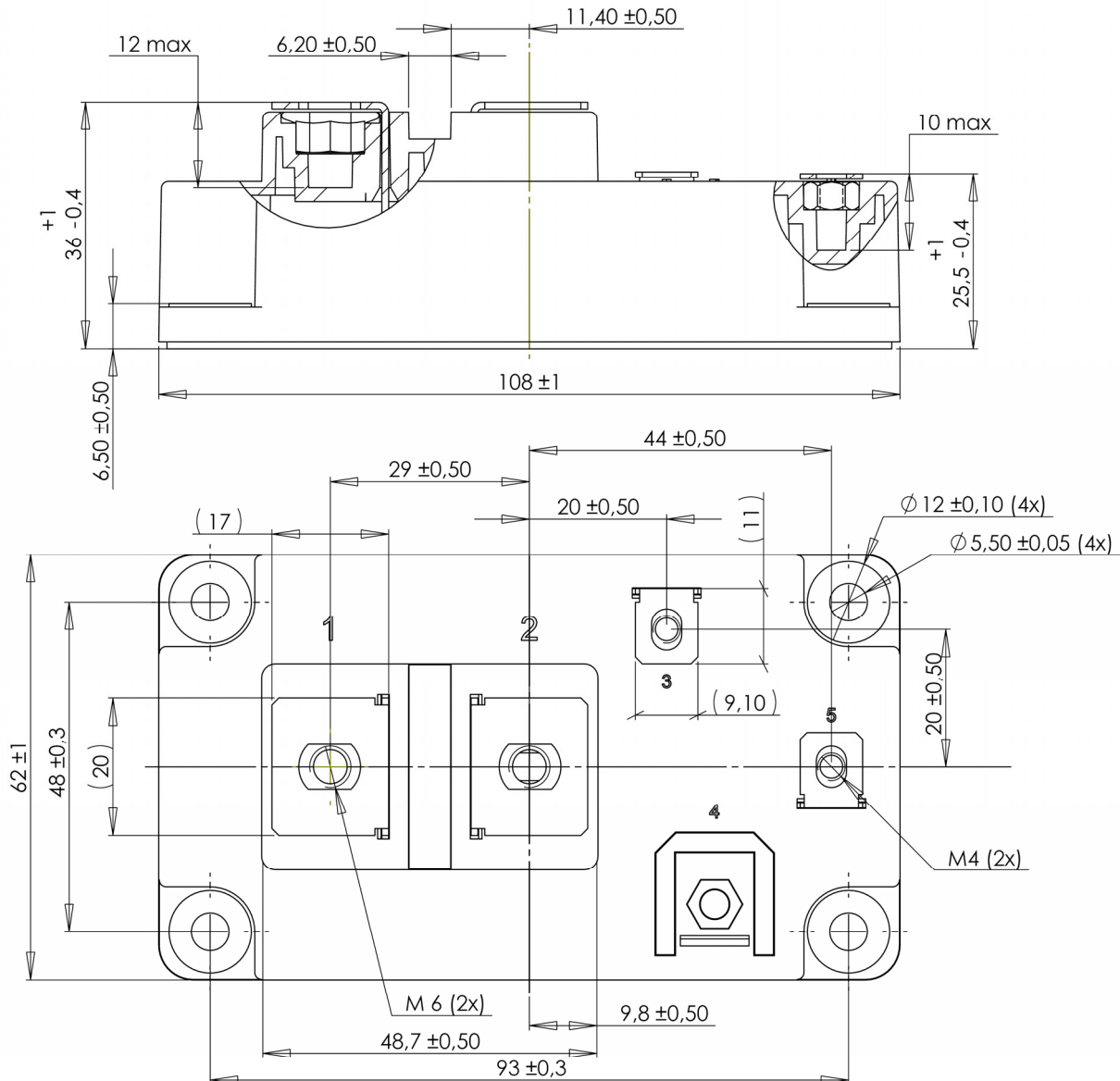
**Reverse diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		1200			V	
$I_{RRM}$	Maximum Reverse Leakage Current	$V_R = 1200V$			750	$\mu\text{A}$	
		$T_j = 125^\circ\text{C}$			1000		
$I_F$	DC Forward Current			400		A	
$V_F$	Diode Forward Voltage	$I_F = 400A$ $V_{GE} = 0V$		$T_j = 25^\circ\text{C}$	1.6	2.1	V
		$T_j = 125^\circ\text{C}$		1.6			
$t_{rr}$	Reverse Recovery Time	$I_F = 400A$ $V_R = 600V$ $di/dt = 4000A/\mu\text{s}$		$T_j = 25^\circ\text{C}$	250		ns
				$T_j = 125^\circ\text{C}$	350		
$Q_{rr}$	Reverse Recovery Charge			$T_j = 25^\circ\text{C}$	40		$\mu\text{C}$
				$T_j = 125^\circ\text{C}$	75		
$E_{rr}$	Reverse Recovery Energy			$T_j = 25^\circ\text{C}$	18	mJ	
				$T_j = 125^\circ\text{C}$	34		

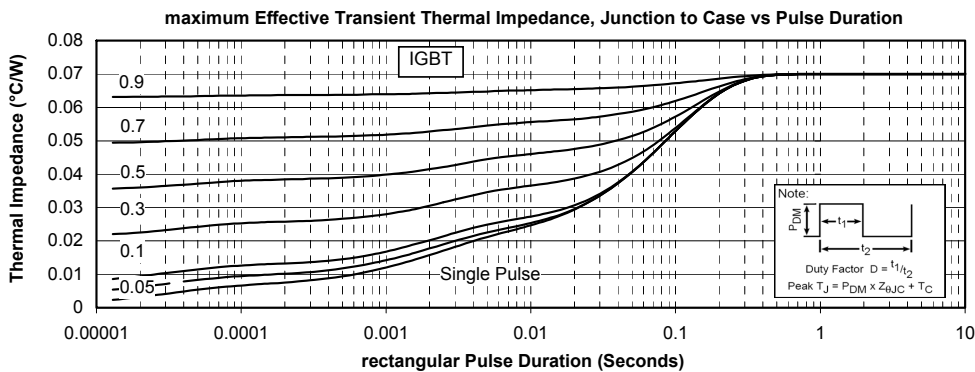
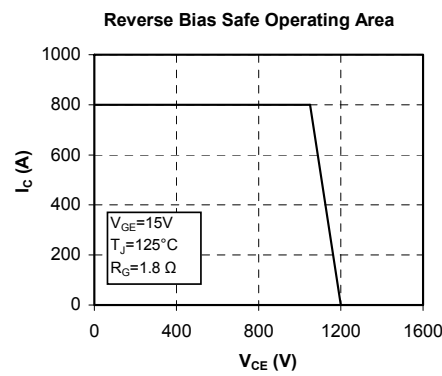
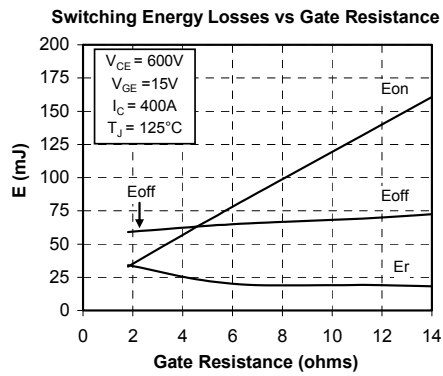
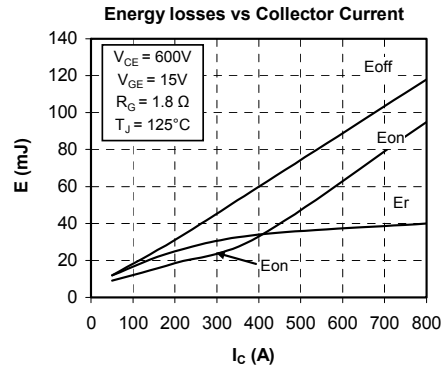
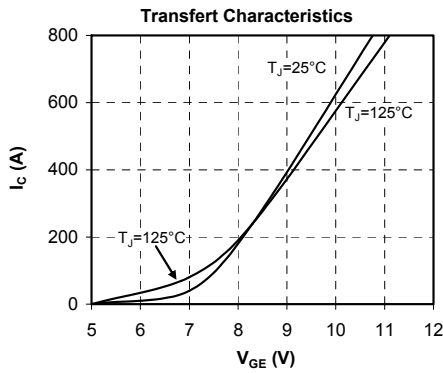
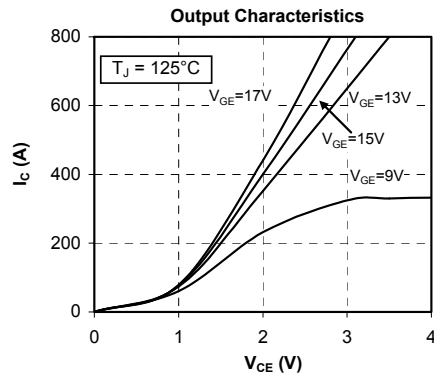
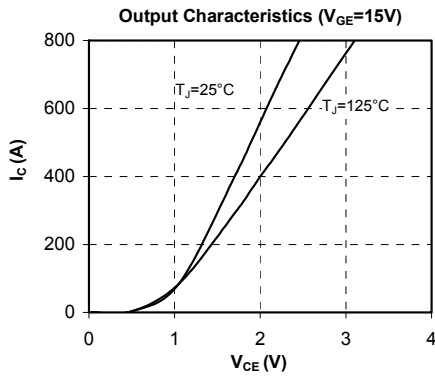
## Thermal and package characteristics

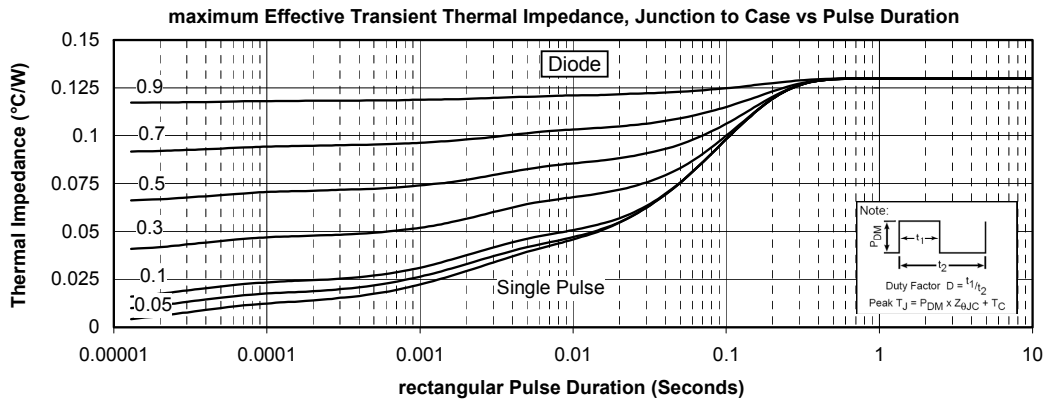
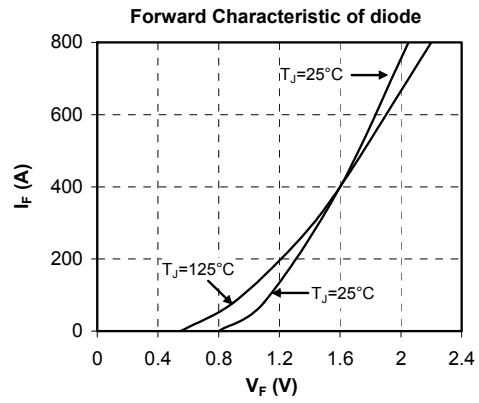
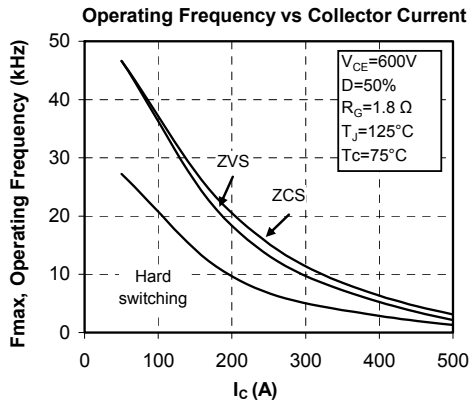
Symbol	Characteristic		Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case Thermal Resistance	IGBT			0.07	°C/W
		Diode			0.13	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz		4000			V
T <sub>J</sub>	Operating junction temperature range		-40		150	°C
T <sub>STG</sub>	Storage Temperature Range		-40		125	
T <sub>C</sub>	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





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