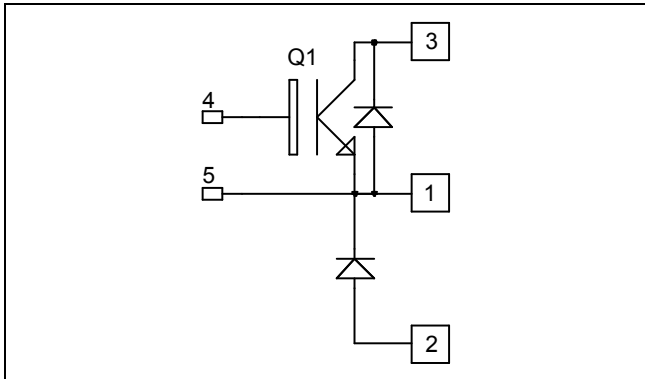


**Buck chopper  
Trench + Field Stop IGBT4  
Power Module**

**$V_{CES} = 1200V$   
 $I_C = 700A @ T_c = 80^\circ C$**



### Application

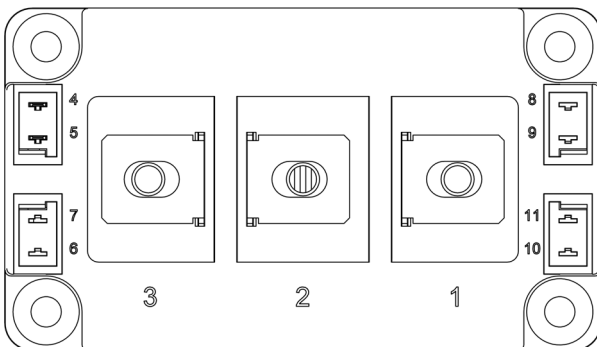
- AC and DC motor control
- Switched Mode Power Supplies

### 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	$T_C = 25^\circ C$	840
		$T_C = 80^\circ C$	700
$I_{CM}$	Pulsed Collector Current	$T_C = 25^\circ C$	1800
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_C = 25^\circ C$	3000
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	1200A @ 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	$V_{GE} = 0V, V_{CE} = 1200V$			5	mA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 600A$		1.8 2.2	2.2	V
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$				
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 11mA$	5.0	5.8	6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			800	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0V$		37.2		nF
$C_{oes}$	Output Capacitance	$V_{CE} = 25V$		2.3		
$C_{res}$	Reverse Transfer Capacitance	$f = 1MHz$		2		
$Q_G$	Gate charge	$V_{GE} = -8V / 15V ; V_{CE} = 600V$ $I_C = 600A$		3.4		$\mu\text{C}$
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ ) $V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 600A$ $R_G = 0.8\Omega$		200		ns
$T_r$	Rise Time			40		
$T_{d(off)}$	Turn-off Delay Time			380		
$T_f$	Fall Time			70		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $150^\circ\text{C}$ ) $V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 600A$ $R_G = 0.8\Omega$		220		ns
$T_r$	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			450		
$T_f$	Fall Time			80		
$E_{on}$	Turn-on Switching Energy	$V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 600A$	$T_j = 150^\circ\text{C}$	54		mJ
$E_{off}$	Turn-off Switching Energy	$R_G = 0.8\Omega$	$T_j = 150^\circ\text{C}$	58		mJ
$I_{sc}$	Short Circuit data	$V_{GE} \leq 15V ; V_{Bus} = 900V$ $t_p \leq 10\mu\text{s} ; T_j = 150^\circ\text{C}$		2400		A

**Chopper 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	$V_R = 1200V$			250 2000	$\mu\text{A}$
		$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$				
$I_F$	DC Forward Current			600		A
		$T_C = 80^\circ\text{C}$				
$V_F$	Diode Forward Voltage	$I_F = 600A$ $V_{GE} = 0V$	$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	1.7 1.65	2.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = 600A$ $V_R = 600V$ $di/dt = 7000A/\mu\text{s}$	$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	155 300		ns
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	53 110		$\mu\text{C}$
$E_{rr}$	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	23 46		mJ

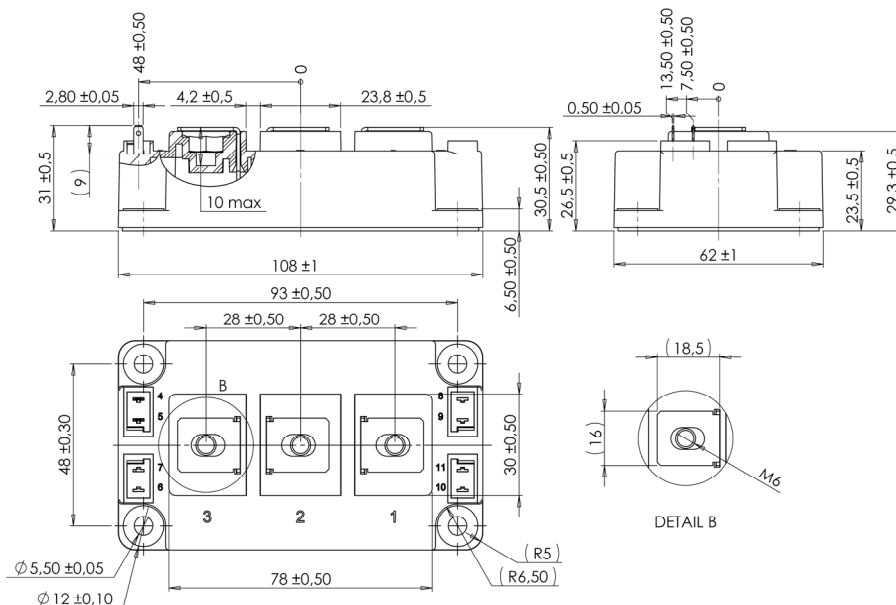
## IGBT Parallel protection diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Repetitive Reverse Voltage		1200			V
$I_{RRM}$	Maximum Reverse Leakage Current	$V_R = 1200V$	$T_j = 25^\circ C$		100	$\mu A$
			$T_j = 150^\circ C$		500	
$I_F$	DC Forward Current			75		A
$V_F$	Diode Forward Voltage	$I_F = 75A$ $V_{GE} = 0V$	$T_j = 25^\circ C$	1.7	2.2	V
			$T_j = 150^\circ C$	1.65		
$t_{rr}$	Reverse Recovery Time	$I_F = 75A$ $V_R = 600V$ $di/dt = 1900A/\mu s$	$T_j = 25^\circ C$	155		ns
			$T_j = 150^\circ C$	300		
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ C$	7.3		$\mu C$
			$T_j = 150^\circ C$	15.2		
$E_{rr}$	Reverse Recovery Energy	$T_j = 25^\circ C$	2.6		mJ	
		$T_j = 150^\circ C$	5.5			

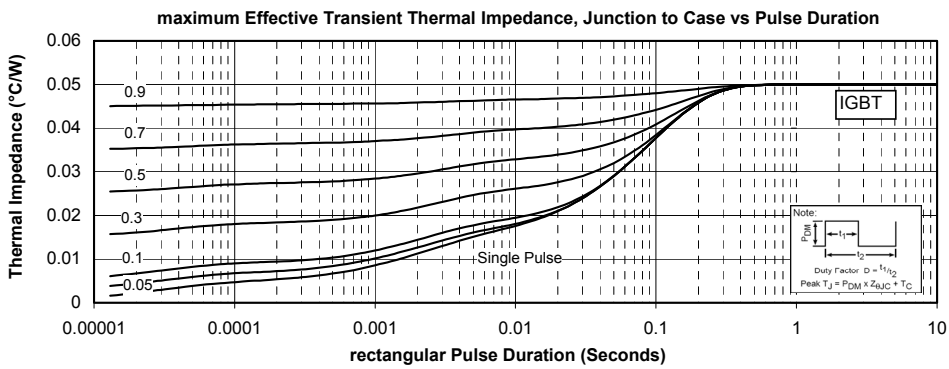
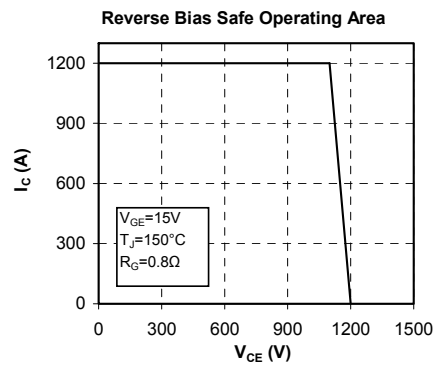
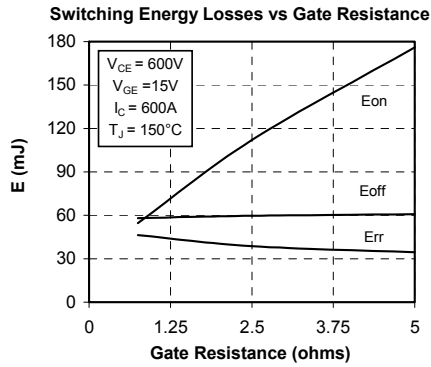
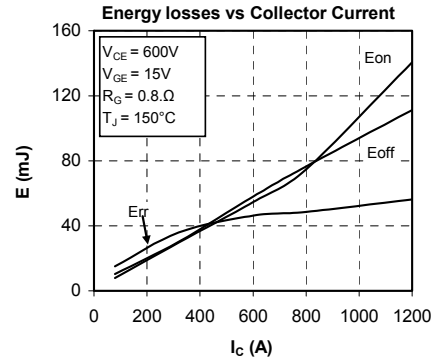
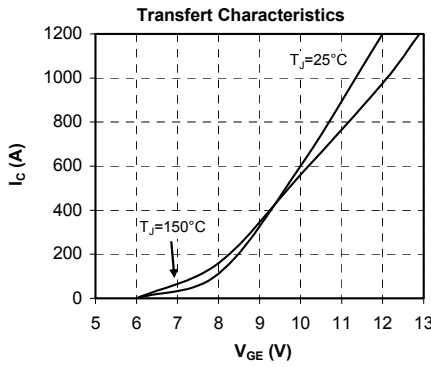
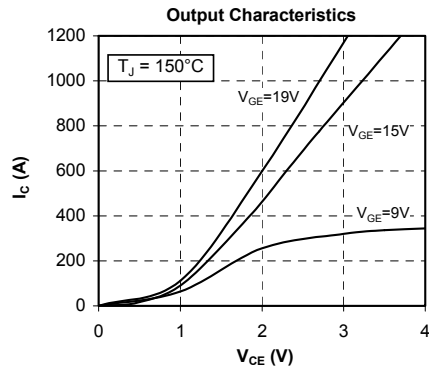
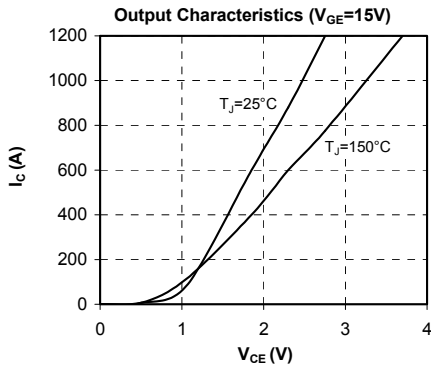
## Thermal and package characteristics

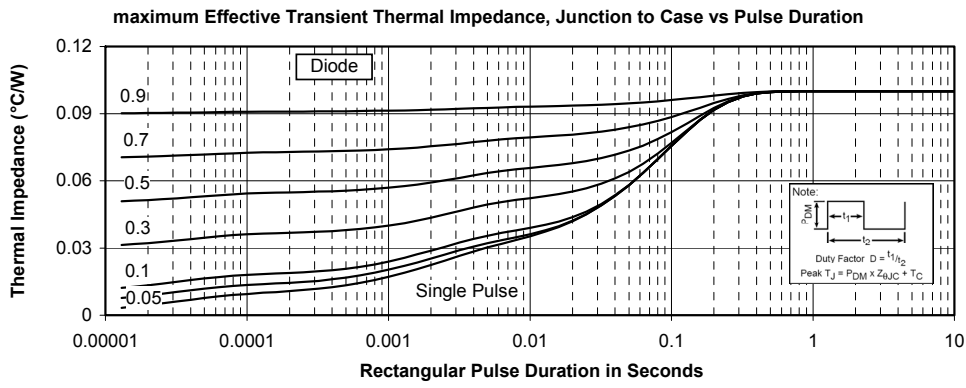
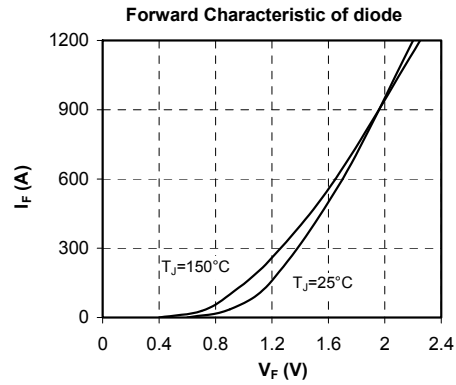
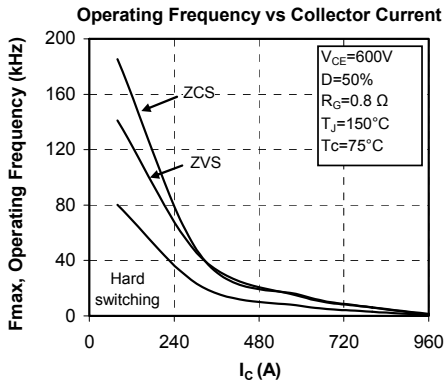
Symbol	Characteristic	Min	Typ	Max	Unit	
$R_{thJC}$	Junction to Case Thermal Resistance	IGBT		0.05	$^\circ C/W$	
		Chopper diode		0.10		
		IGBT parallel diode		0.62		
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case $t = 1$ min, 50/60Hz	4000			V	
$T_J$	Operating junction temperature range	-40		175	$^\circ C$	
$T_{STG}$	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





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