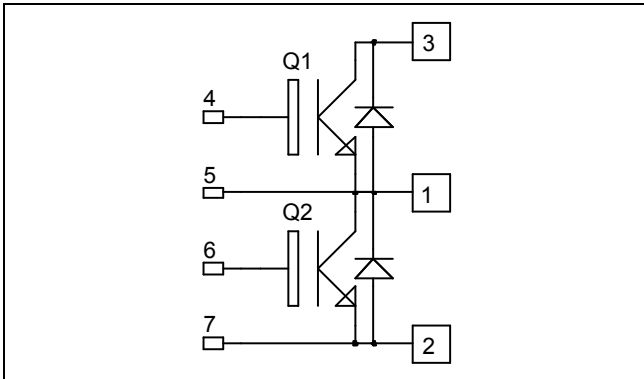


*Phase leg  
Trench + Field Stop IGBT4  
Power Module*

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


**Application**

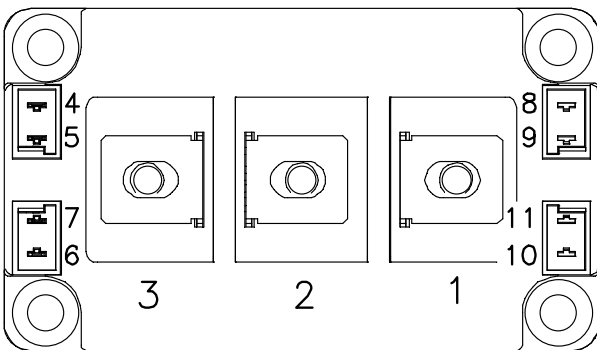
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

**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	$V_{GE} = 0V, V_{CE} = 1200V$			5	mA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 400A$		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	$V_{GE} = V_{CE}, I_C = 15mA$	5.0	5.8	6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			400	nA

**Dynamic Characteristics**

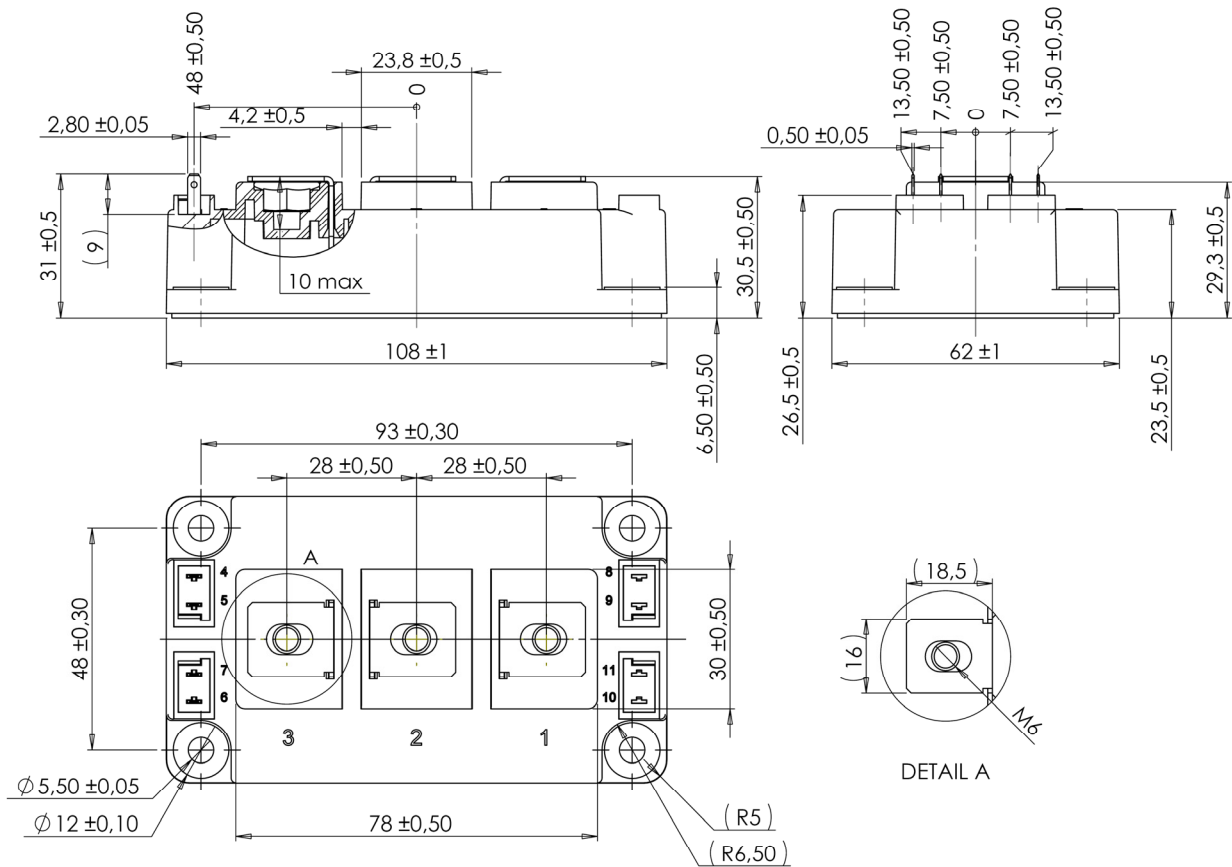
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0V$		24.6		nF
$C_{oes}$	Output Capacitance	$V_{CE} = 25V$		1.62		
$C_{res}$	Reverse Transfer Capacitance	$f = 1MHz$		1.38		
$Q_G$	Gate charge	$V_{GE} = -8V / 15V ; V_{CE} = 600V$ $I_C = 400A$		2.3		$\mu\text{C}$
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ ) $V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 400A$ $R_G = 1\Omega$		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 ( $150^\circ\text{C}$ ) $V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 400A$ $R_G = 1\Omega$		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	$V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 400A$	$T_j = 150^\circ\text{C}$	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	$V_{GE} \leq 15V ; V_{Bus} = 900V$ $t_p \leq 10\mu\text{s} ; T_j = 150^\circ\text{C}$		1600		A

**Diode ratings and characteristics**

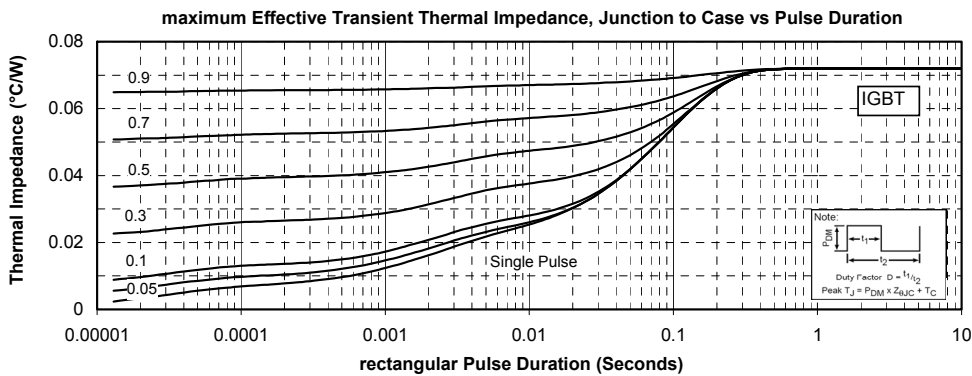
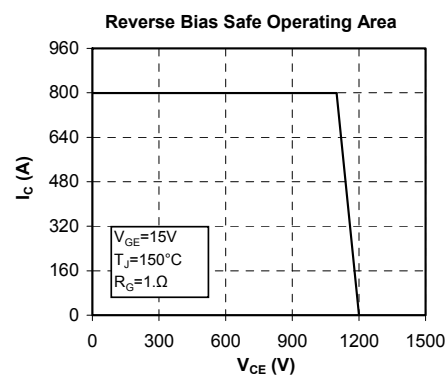
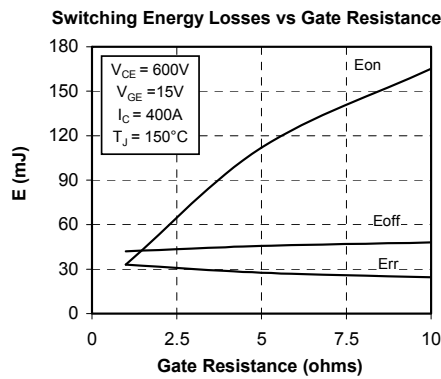
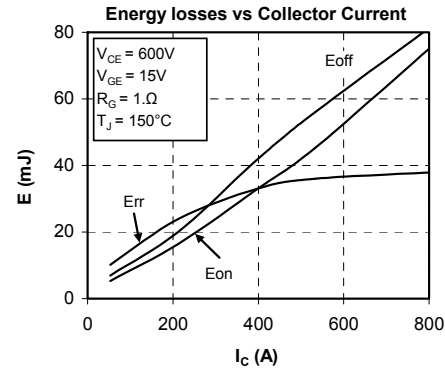
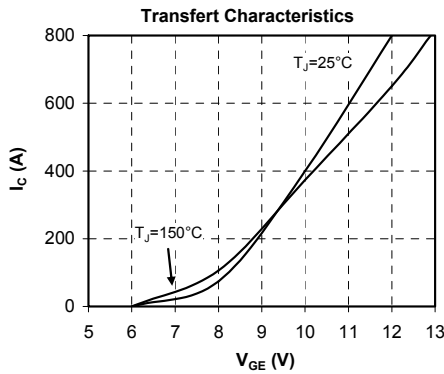
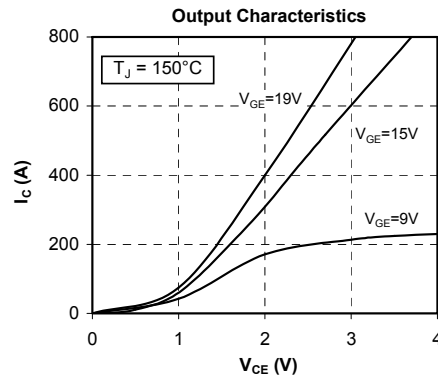
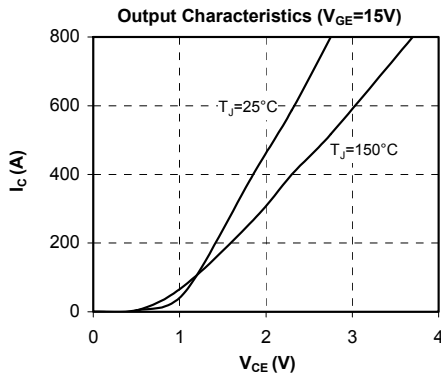
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
$V_{RRM}$	Maximum Repetitive Reverse Voltage		1200			V	
$I_{RRM}$	Maximum Reverse Leakage Current	$V_R = 1200V$			250 2000	$\mu\text{A}$	
		$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$					
$I_F$	DC Forward Current			400		A	
		$T_C = 80^\circ\text{C}$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

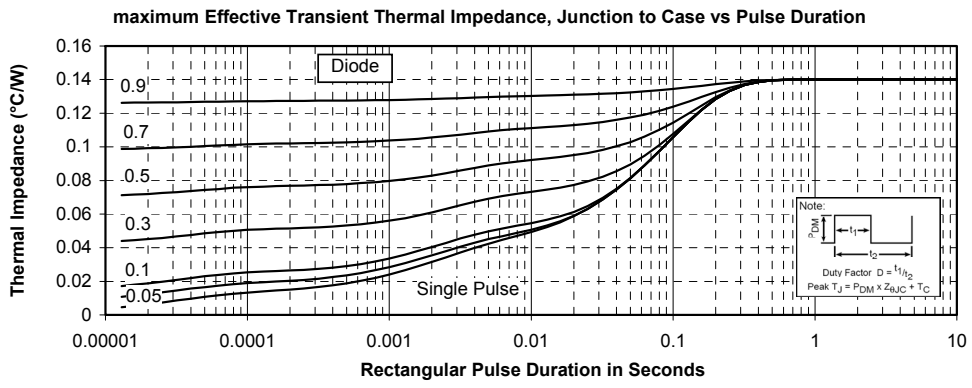
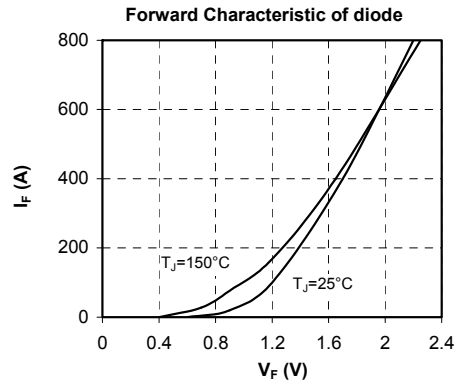
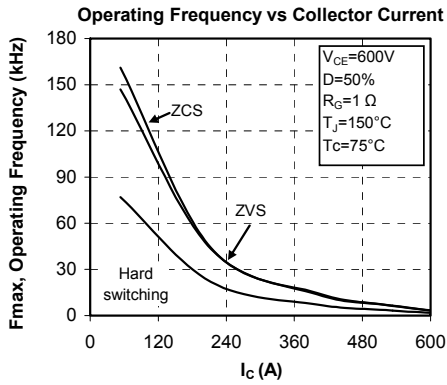
**Thermal and package characteristics**

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, 50/60Hz	4000			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





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