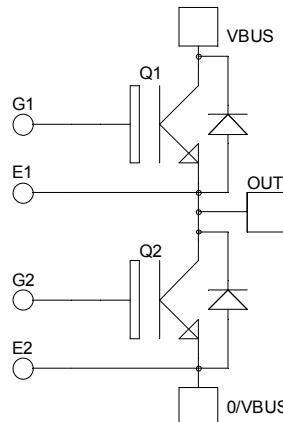


**Phase leg**  
**Fast Trench + Field Stop IGBT3**  
**Power Module**

**V<sub>CES</sub> = 1200V**  
**I<sub>C</sub> = 300A @ T<sub>c</sub> = 80°C**



**Application**

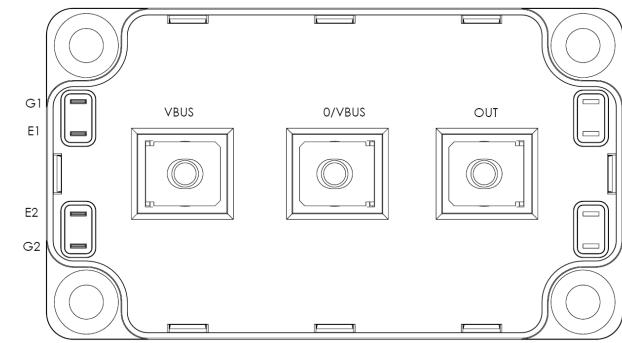
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

**Features**

- Fast 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
- Very low stray inductance
  - Symmetrical design
  - M5 power connectors
- 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 TC of VCEsat
- Low profile
- RoHS Compliant



**Absolute maximum ratings**

Symbol	Parameter	Max ratings	Unit
V <sub>CES</sub>	Collector - Emitter Breakdown Voltage	1200	V
I <sub>C</sub>	Continuous Collector Current	T <sub>c</sub> = 25°C	A
		T <sub>c</sub> = 80°C	
I <sub>CM</sub>	Pulsed Collector Current	T <sub>c</sub> = 25°C	600
V <sub>GE</sub>	Gate – Emitter Voltage	±20	V
P <sub>D</sub>	Maximum Power Dissipation	T <sub>c</sub> = 25°C	1380
RBSOA	Reverse Bias Safe Operating Area	T <sub>j</sub> = 125°C	600A @ 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	$V_{GE} = 0\text{V}$ , $V_{CE} = 1200\text{V}$				500	$\mu\text{A}$
$V_{CE(\text{sat})}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$	$T_j = 25^\circ\text{C}$	1.4	1.7	2.1	$\text{V}$
		$I_C = 300\text{A}$	$T_j = 125^\circ\text{C}$		2.0		
$V_{GE(\text{th})}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$ , $I_C = 4\text{ mA}$		5.0	5.8	6.5	$\text{V}$
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}$ , $V_{CE} = 0\text{V}$				600	$\text{nA}$

**Dynamic Characteristics**

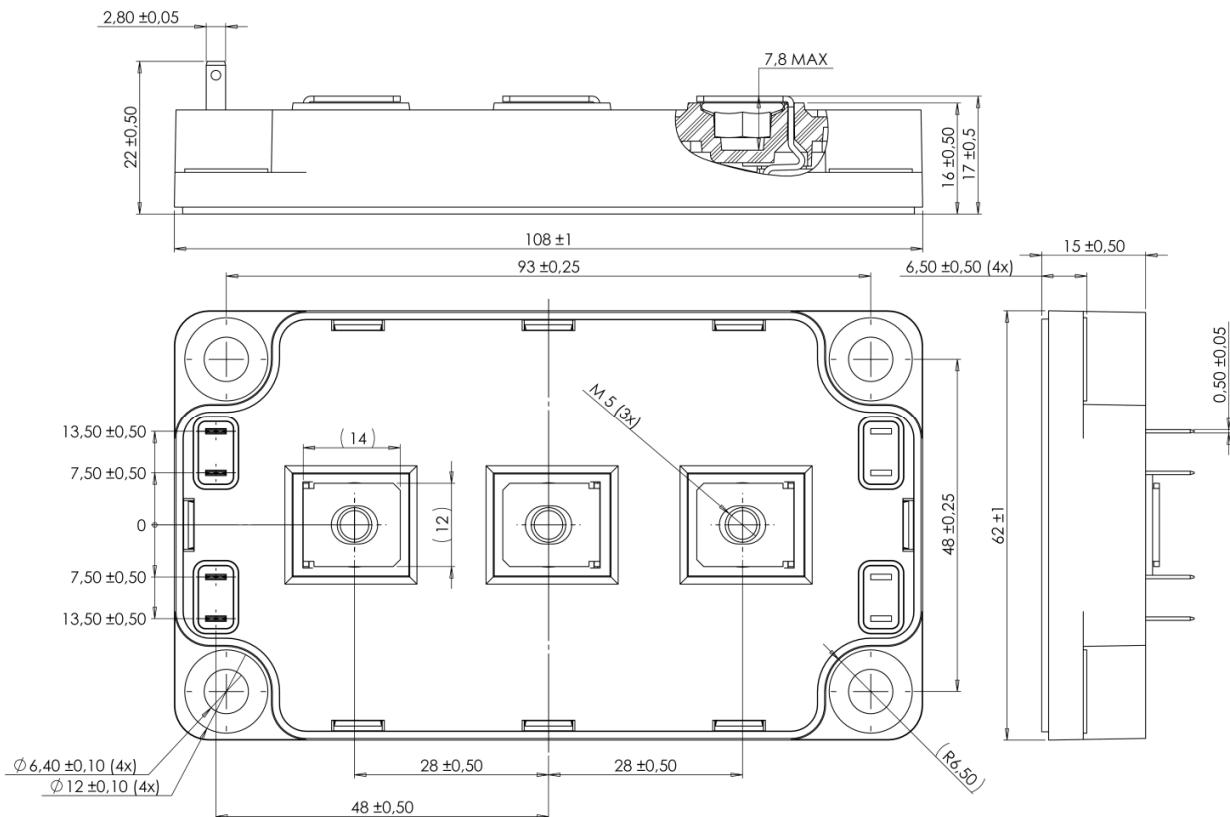
Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$		21			$\text{nF}$
$C_{oes}$	Output Capacitance			1.2			
$C_{res}$	Reverse Transfer Capacitance			0.9			
$T_{d(on)}$	Turn-on Delay Time	$\text{Inductive Switching}$ ( $25^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 300\text{A}$ $R_G = 1.8\Omega$		260			$\text{ns}$
	Rise Time			30			
	Turn-off Delay Time			420			
	Fall Time			70			
$T_{d(off)}$	Turn-on Delay Time	$\text{Inductive Switching}$ ( $125^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 300\text{A}$ $R_G = 1.8\Omega$		290			$\text{ns}$
	Rise Time			50			
	Turn-off Delay Time			520			
	Fall Time			90			
$E_{on}$	Turn on Energy	$V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 300\text{A}$ $R_G = 1.8\Omega$	$T_j = 125^\circ\text{C}$		30		$\text{mJ}$
	Turn off Energy		$T_j = 125^\circ\text{C}$		30		

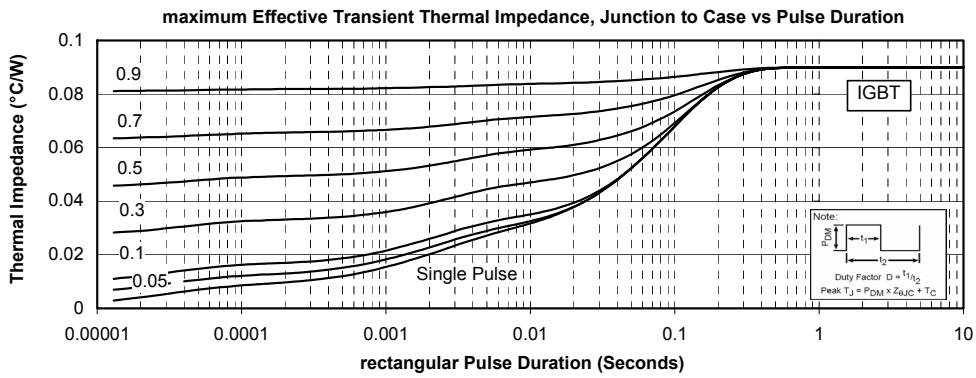
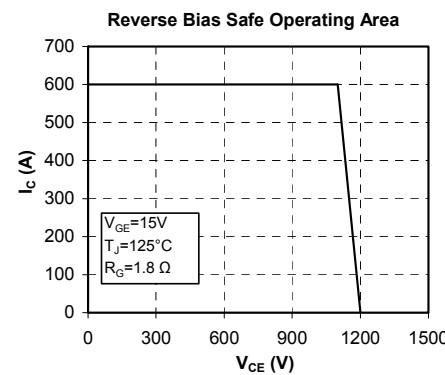
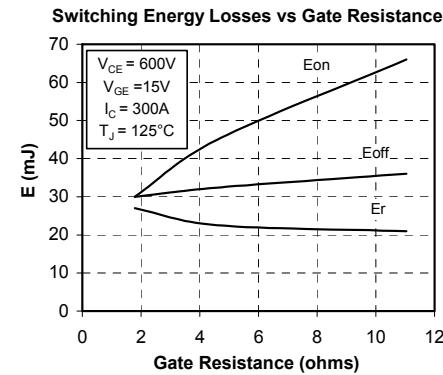
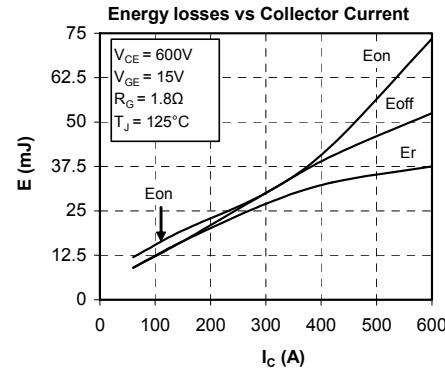
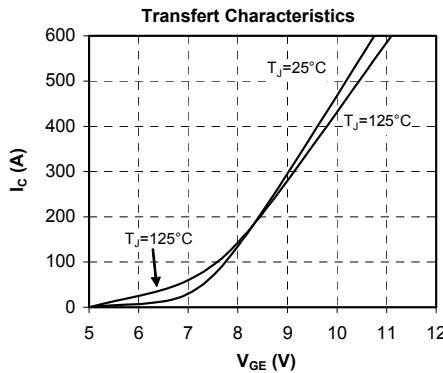
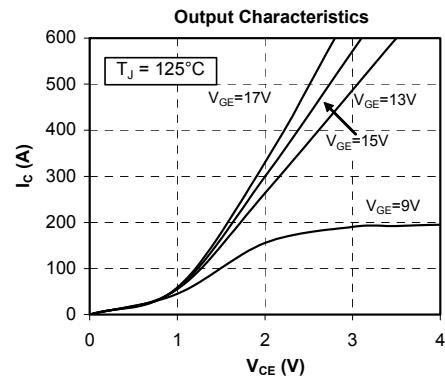
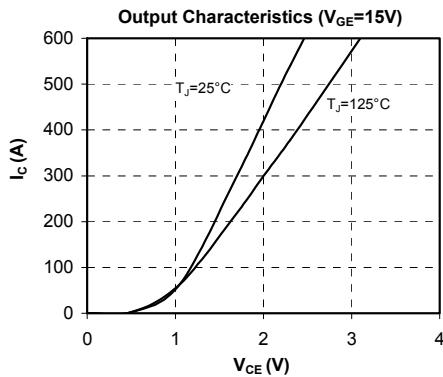
**Reverse diode ratings and characteristics**

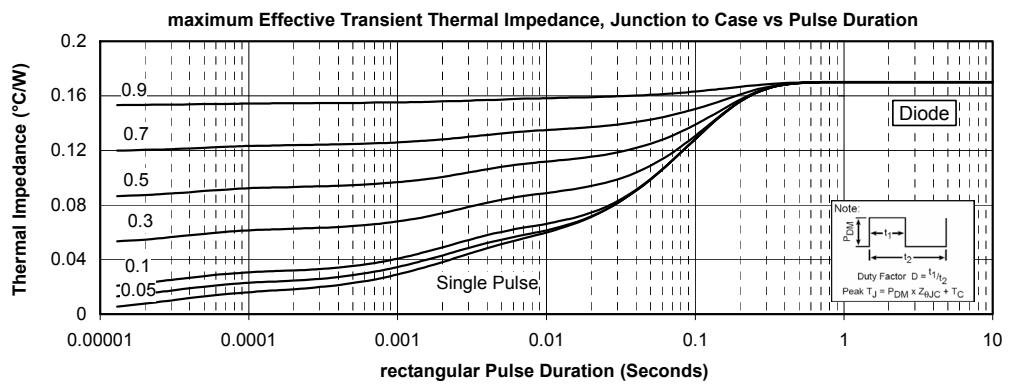
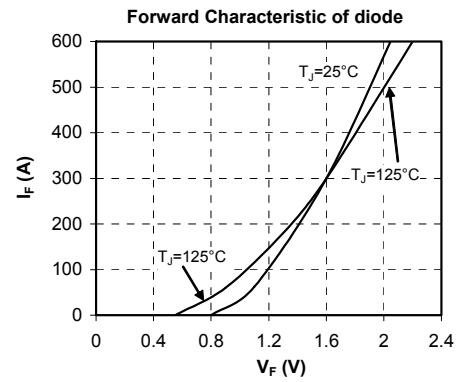
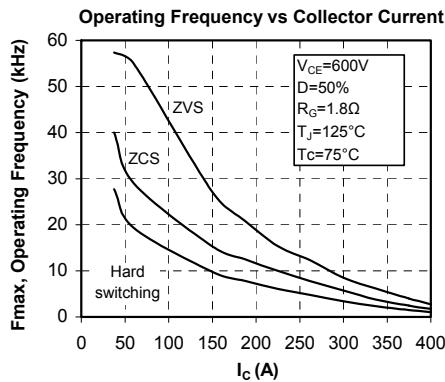
Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit	
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage			1200			$\text{V}$	
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$			500	$\mu\text{A}$	
			$T_j = 125^\circ\text{C}$			700		
$I_F$	DC Forward Current		$T_C = 80^\circ\text{C}$		300		$\text{A}$	
$V_F$	Diode Forward Voltage	$I_F = 300\text{A}$ $V_{GE} = 0\text{V}$	$T_j = 25^\circ\text{C}$		1.6	2.1	$\text{V}$	
			$T_j = 125^\circ\text{C}$		1.6			
$t_{rr}$	Reverse Recovery Time	$I_F = 300\text{A}$ $V_R = 600\text{V}$ $di/dt = 3000\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		170		$\text{ns}$	
			$T_j = 125^\circ\text{C}$		280			
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$		27		$\mu\text{C}$	
			$T_j = 125^\circ\text{C}$		54			
$E_r$	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$		15		$\text{mJ}$	
			$T_j = 125^\circ\text{C}$		27			

**Thermal and package characteristics**
**Symbol** **Characteristic**

			Min	Typ	Max	Unit
$R_{thJC}$	Junction to Case Thermal Resistance	IGBT			0.09	$^{\circ}\text{C}/\text{W}$
		Diode			0.17	
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case $t = 1$ min, 50/60Hz		4000			V
$T_J$	Operating junction temperature range		-40		150	$^{\circ}\text{C}$
$T_{STG}$	Storage Temperature Range		-40		125	
$T_C$	Operating Case Temperature		-40		100	
Torque	Mounting torque	To heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	
Wt	Package Weight				300	g

**SP6 Package outline** (dimensions in mm)

 See application note APT0601 - Mounting Instructions for SP6 Power Modules on [www.microsemi.com](http://www.microsemi.com)

**Typical Performance Curve**




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