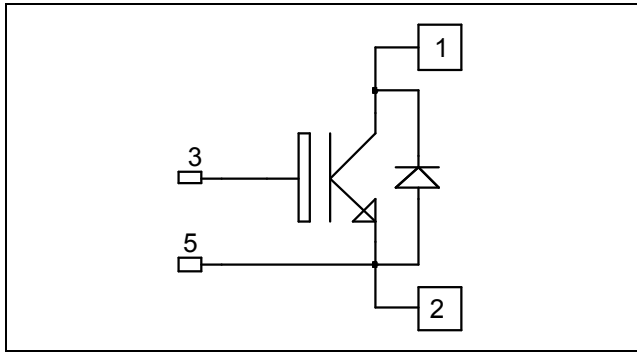


Single switch  
NPT IGBT Power Module

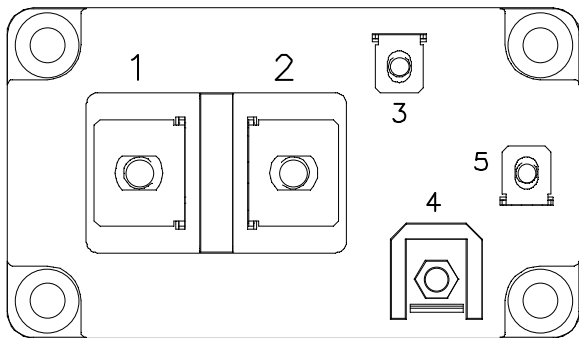
$V_{CES} = 600V$   
 $I_C = 660A @ T_c = 80^\circ C$


**Application**

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

**Features**

- Non Punch Through (NPT) IGBT
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 50 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**

- Outstanding performance at high frequency operation
- 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	600	V
$I_C$	Continuous Collector Current	$T_c = 25^\circ C$	860
		$T_c = 80^\circ C$	660
$I_{CM}$	Pulsed Collector Current	$T_c = 25^\circ C$	1320
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	2800
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	1600A@520V

**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	$V_{GE} = 0\text{V}$ $V_{CE} = 600\text{V}$	$T_j = 25^\circ\text{C}$		500	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		1	$\text{mA}$
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 800\text{A}$	$T_j = 25^\circ\text{C}$	1.95	2.45	V
			$T_j = 125^\circ\text{C}$	2.2		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 16\text{mA}$	4.5	5.5	6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$			2400	$\text{nA}$

**Dynamic Characteristics**

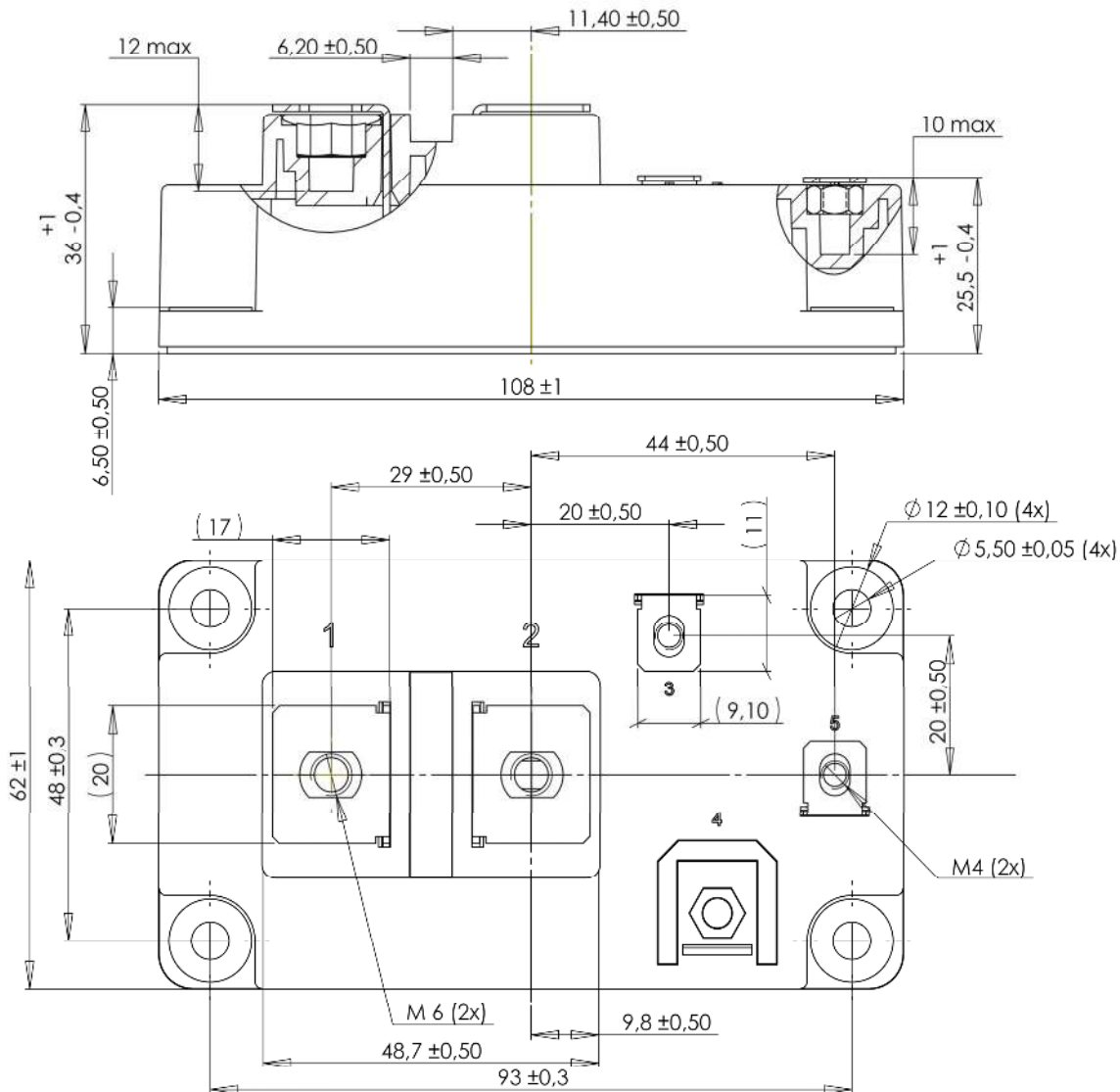
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}, V_{CE} = 25\text{V}$ $f = 1\text{MHz}$		36		$\text{nF}$
$C_{res}$	Reverse Transfer Capacitance			3.2		
$Q_G$	Gate charge	$V_{GE} = 15\text{V}, I_C = 800\text{A}$ $V_{CE} = 300\text{V}$		2		$\mu\text{C}$
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 800\text{A}$ $R_G = 16\Omega$		150		ns
$T_r$	Rise Time			72		
$T_{d(off)}$	Turn-off Delay Time			530		
$T_f$	Fall Time			40		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $125^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 800\text{A}$ $R_G = 16\Omega$		160		ns
$T_r$	Rise Time			75		
$T_{d(off)}$	Turn-off Delay Time			550		
$T_f$	Fall Time			50		
$E_{on}$	Turn on Energy	$V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$	$T_j = 125^\circ\text{C}$	36		$\text{mJ}$
$E_{off}$	Turn off Energy	$I_C = 800\text{A}$ $R_G = 16\Omega$	$T_j = 125^\circ\text{C}$	33		$\text{mJ}$
$I_{sc}$	Short Circuit data	$V_{GE} \leq 15\text{V}; V_{Bus} = 360\text{V}$ $t_p \leq 10\mu\text{s}; T_j = 125^\circ\text{C}$		3600		A

**Reverse diode ratings and characteristics**

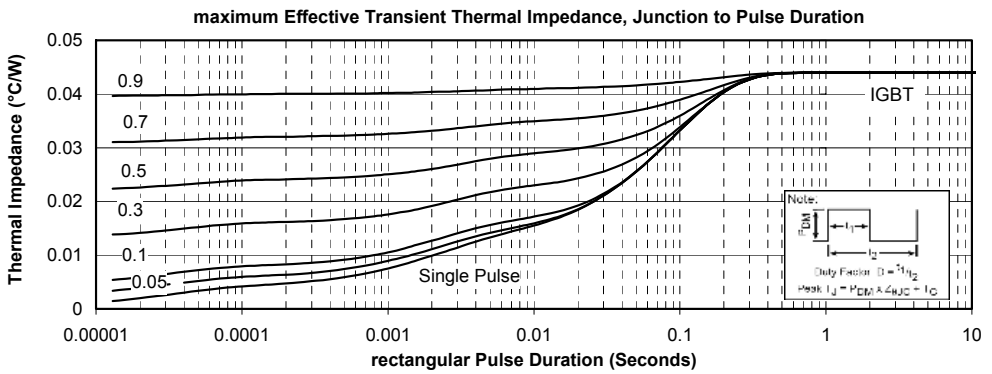
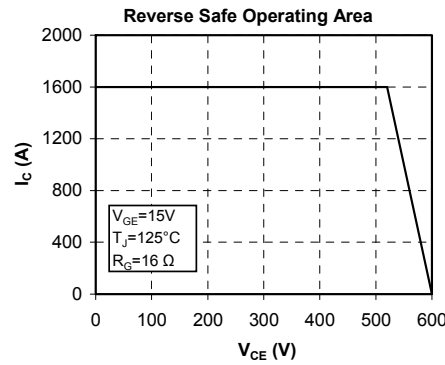
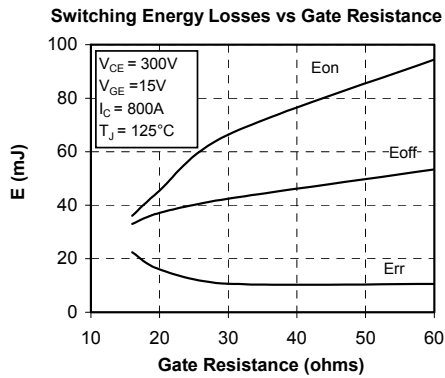
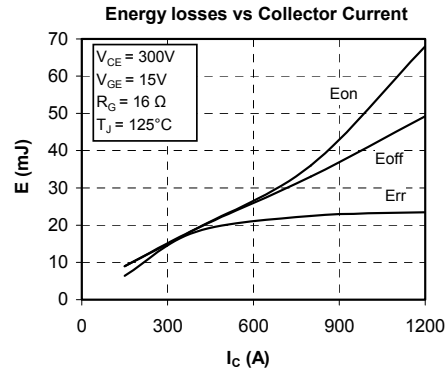
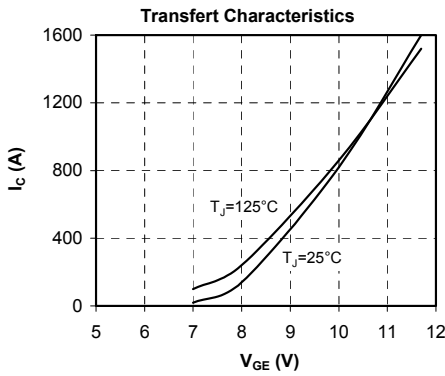
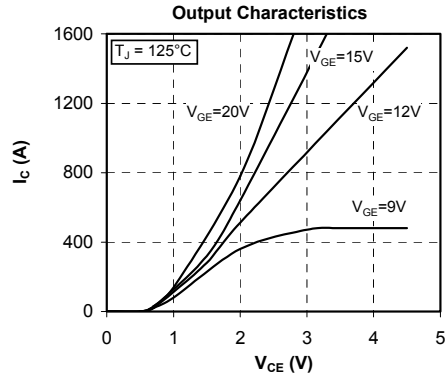
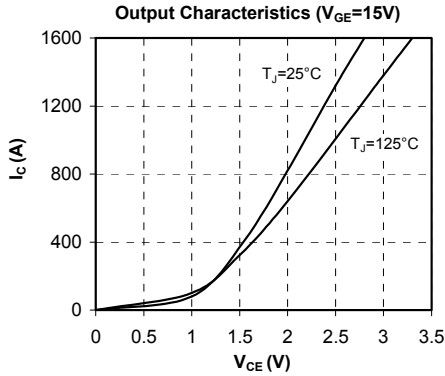
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		600			V
$I_{RRM}$	Maximum Reverse Leakage Current	$V_R = 600\text{V}$	$T_j = 25^\circ\text{C}$		750	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		1000	
$I_F$	DC Forward Current			800		A
$V_F$	Diode Forward Voltage	$I_F = 800\text{A}$ $V_{GE} = 0\text{V}$	$T_j = 25^\circ\text{C}$	1.25	1.6	V
			$T_j = 125^\circ\text{C}$	1.2		
$t_{rr}$	Reverse Recovery Time	$I_F = 800\text{A}$	$T_j = 25^\circ\text{C}$	150		ns
			$T_j = 125^\circ\text{C}$	250		
$Q_{rr}$	Reverse Recovery Charge	$V_R = 300\text{V}$ $di/dt = 7000\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	57		$\mu\text{C}$
			$T_j = 125^\circ\text{C}$	80		
$E_{rr}$	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$	11.6		$\text{mJ}$
			$T_j = 125^\circ\text{C}$	22.8		

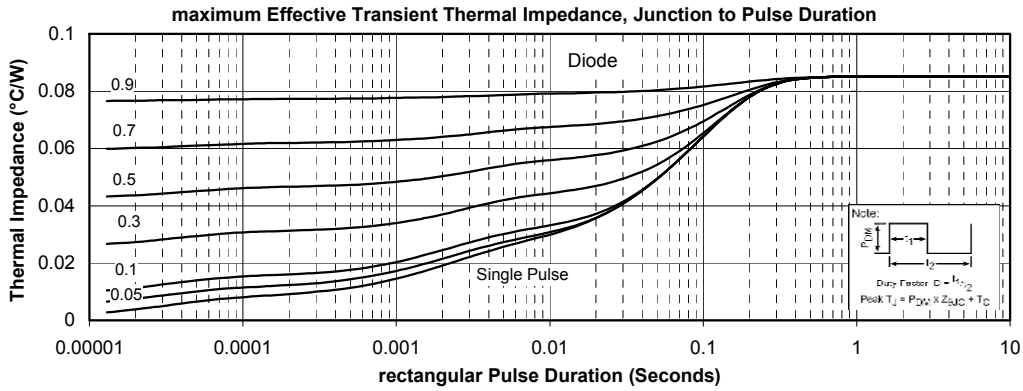
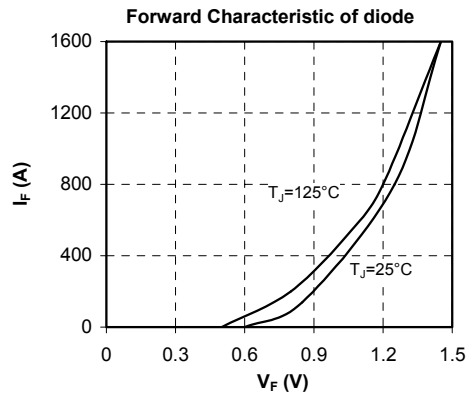
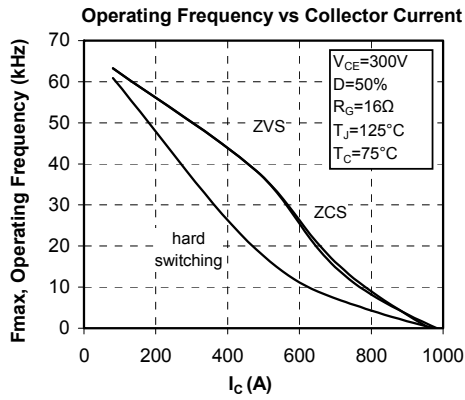
**Thermal and package characteristics**

Symbol	Characteristic		Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case Thermal Resistance	IGBT			0.044	°C/W
		Diode			0.085	
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		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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