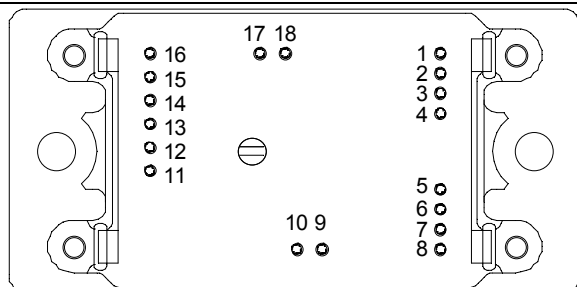
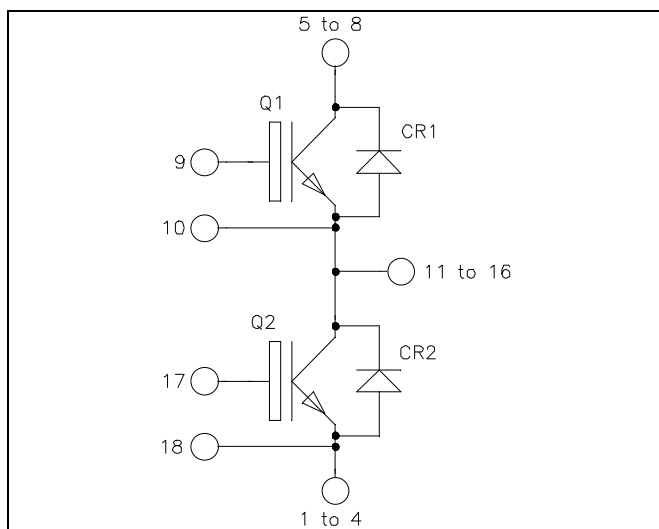


**Phase leg  
Fast Trench + Field Stop IGBT3  
Power Module**

**$V_{CES} = 1200V$   
 $I_C = 150A @ T_c = 80^\circ C$**



Pins 1/2/3/4 ; 5/6/7/8 ; 11/12/13/14/15/16  
must be shorted together

## 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
- 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

**All ratings @  $T_j = 25^\circ C$  unless otherwise specified**

## Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{CES}$	Collector - Emitter Breakdown Voltage	1200	V
$I_C$	Continuous Collector Current	$T_C = 25^\circ C$	220
		$T_C = 80^\circ C$	150
$I_{CM}$	Pulsed Collector Current	$T_C = 25^\circ C$	350
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_C = 25^\circ C$	690
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	300A @ 1150V

**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)

**Electrical Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_{CES}$	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} = 1200V$			50	$\mu A$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15V$ $I_C = 150A$		$T_j = 25^\circ C$ 1.7 $T_j = 125^\circ C$ 2.0	2.1	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 3 mA$	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	$V_{GE} = 0V$		10.7		nF
$C_{oes}$	Output Capacitance	$V_{CE} = 25V$		0.56		
$C_{res}$	Reverse Transfer Capacitance	$f = 1MHz$		0.48		
$Q_G$	Gate charge	$V_{GE} = \pm 15V, I_C = 150A$ $V_{CE} = 600V$		1.4		$\mu C$
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ C$ ) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 150A$ $R_G = 2.2\Omega$		280		ns
$T_r$	Rise Time			40		
$T_{d(off)}$	Turn-off Delay Time			420		
$T_f$	Fall Time			75		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $125^\circ C$ ) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 150A$ $R_G = 2.2\Omega$		290		ns
$T_r$	Rise Time			45		
$T_{d(off)}$	Turn-off Delay Time			520		
$T_f$	Fall Time			90		
$E_{on}$	Turn-on Switching Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 150A$ $R_G = 2.2\Omega$	$T_j = 125^\circ C$	14		mJ
$E_{off}$	Turn-off Switching Energy		$T_j = 125^\circ C$	16		
$I_{sc}$	Short Circuit data	$V_{GE} \leq 15V ; V_{Bus} = 900V$ $t_p \leq 10\mu s ; T_j = 125^\circ C$		600		A
$R_{thJC}$	Junction to Case Thermal Resistance				0.18	$^\circ C/W$

**Reverse diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		1200			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200V$			50	$\mu A$
$I_F$	DC Forward Current			$T_c = 80^\circ C$ 150		A
$V_F$	Diode Forward Voltage	$I_F = 150A$	$T_j = 25^\circ C$ $T_j = 125^\circ C$	1.6 1.6	2.1	V
$t_{rr}$	Reverse Recovery Time	$I_F = 150A$ $V_R = 600V$ $di/dt = 3000A/\mu s$	$T_j = 25^\circ C$	170		ns
			$T_j = 125^\circ C$	280		
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ C$	15		$\mu C$
			$T_j = 125^\circ C$	29		
$E_r$	Reverse Recovery Energy		$T_j = 25^\circ C$	7		mJ
			$T_j = 125^\circ C$	12		
$R_{thJC}$	Junction to Case Thermal Resistance				0.34	$^\circ C/W$



<i>Symbol</i>	<i>Characteristic</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>		
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		100			
Torque	Mounting torque						
		To heatsink	M4	2		3	N.m
Wt	Package Weight					75	g

**Operating Frequency vs Collector Current**

Y-axis:  $F_{max}$ , Operating Frequency (kHz)

X-axis:  $I_C$  (A)

Regions: ZCS, ZVS, Hard Switching

Parameters:

- $V_{CE}=600V$
- $D=50\%$
- $R_{\theta}=2.2\ \Omega$
- $T_j=125^\circ C$
- $T_C=75^\circ C$

**Forward Characteristic of diode**

Y-axis:  $I_F$  (A)

X-axis:  $V_F$  (V)

Curves for  $T_j=125^\circ C$  and  $T_j=25^\circ C$

**maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration**

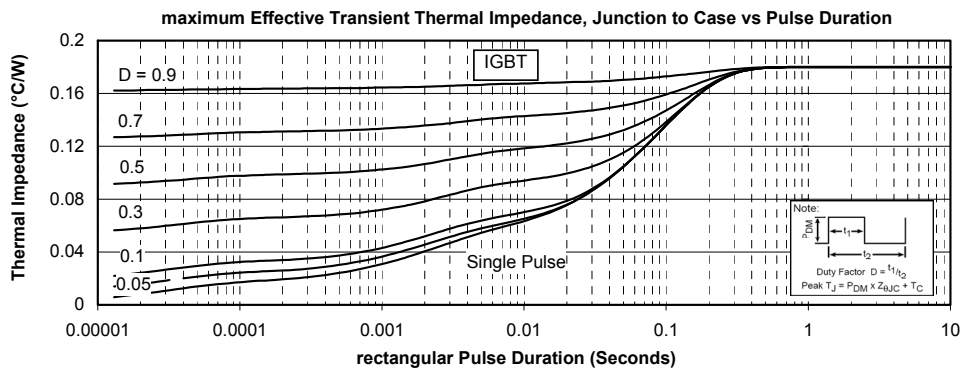
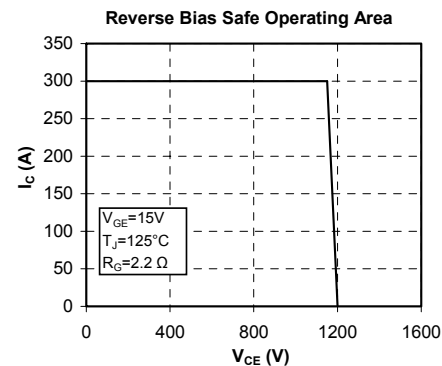
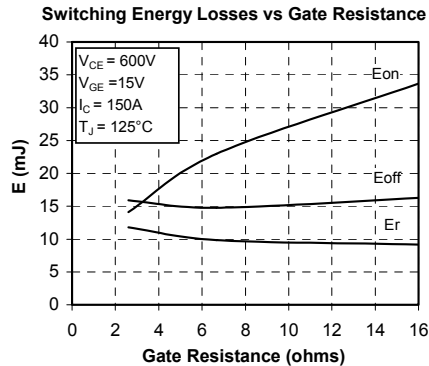
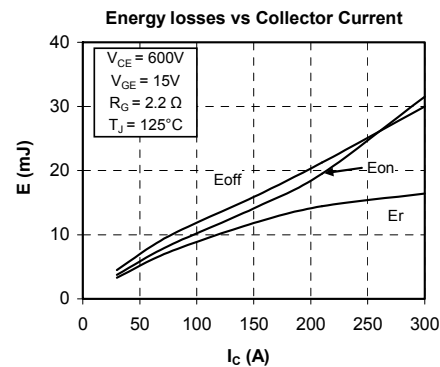
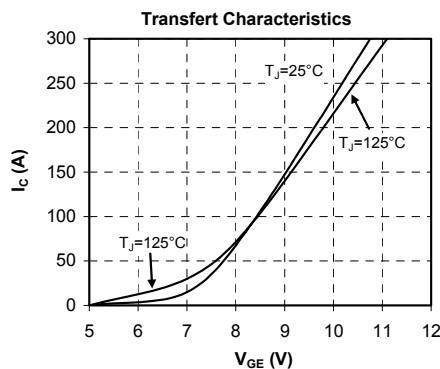
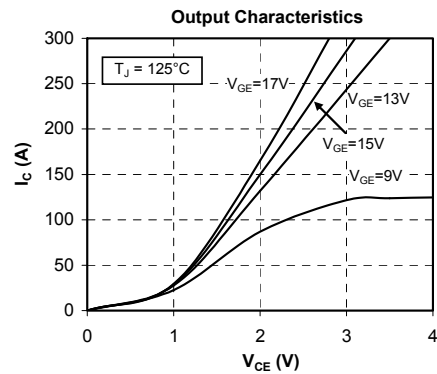
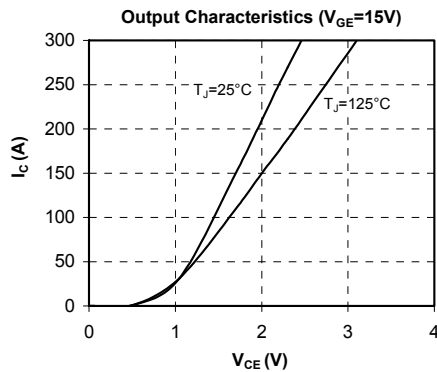
Y-axis: Thermal impedance ( $^\circ C/W$ )

X-axis: rectangular Pulse Duration (Seconds)

Curves for  $D = 0.9, 0.7, 0.5, 0.3, 0.1, 0.05$

Note:

- $P_{avg} = I_{avg}^2 R_{\theta}$
- Duty Factor:  $D = t_{on}/t_{off}$
- Peak  $T_j = P_{avg} \times Z_{\theta}(t_{on}) + T_C$



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