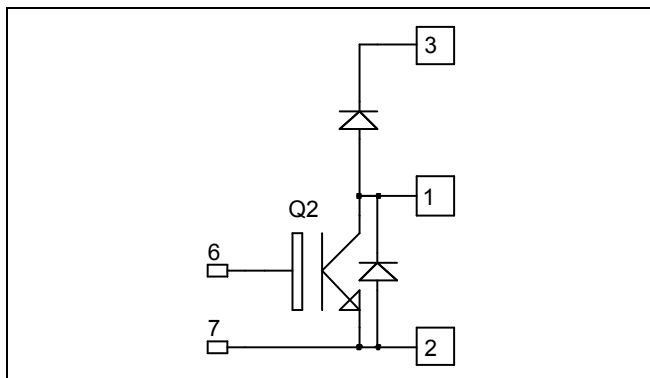


***Boost chopper  
Trench + Field Stop IGBT3  
Power Module***

**$V_{CES} = 600V$   
 $I_C = 400A @ T_c = 80^\circ C$**



## Application

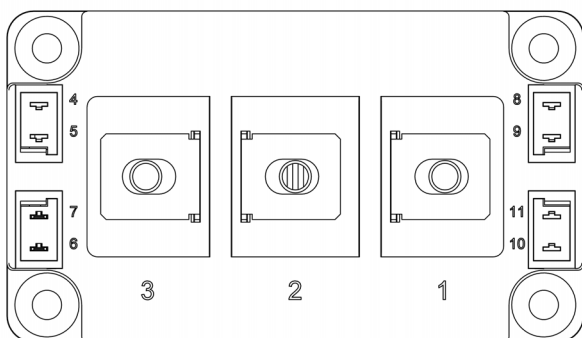
- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

## Features

- 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
- 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	600	V
$I_C$	Continuous Collector Current	$T_C = 25^\circ C$ 500 $T_C = 80^\circ C$ 400	A
$I_{CM}$	Pulsed Collector Current	$T_C = 25^\circ C$ 800	
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_C = 25^\circ C$ 1250	W
RBSOA	Reverse Bias Safe Operating Area	$T_J = 125^\circ C$ 800A @ 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	$V_{GE} = 0V, V_{CE} = 600V$			500	$\mu A$
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 400A$		$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	1.5 1.7	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 6.4\text{ mA}$	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	$V_{GE} = 0V$		24		nF
$C_{oes}$	Output Capacitance	$V_{CE} = 25V$		1.5		
$C_{res}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.75		
$Q_G$	Gate charge	$V_{GE} = \pm 15V, I_C = 400A$ $V_{CE} = 300V$		4.2		$\mu C$
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ ) $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 400A$ $R_G = 1.5\Omega$		110		ns
$T_r$	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			490		
$T_f$	Fall Time			50		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $150^\circ\text{C}$ ) $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 400A$ $R_G = 1.5\Omega$		130		ns
$T_r$	Rise Time			60		
$T_{d(off)}$	Turn-off Delay Time			530		
$T_f$	Fall Time			70		
$E_{on}$	Turn on Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 300V$	$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	3.2 3.4		mJ
$E_{off}$	Turn off Energy	$I_C = 400A$ $R_G = 1.5\Omega$	$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	15 15.5		
$I_{sc}$	Short Circuit data	$V_{GE} \leq 15V ; V_{Bus} = 360V$ $t_p \leq 6\mu s ; T_j = 150^\circ\text{C}$		2000		A

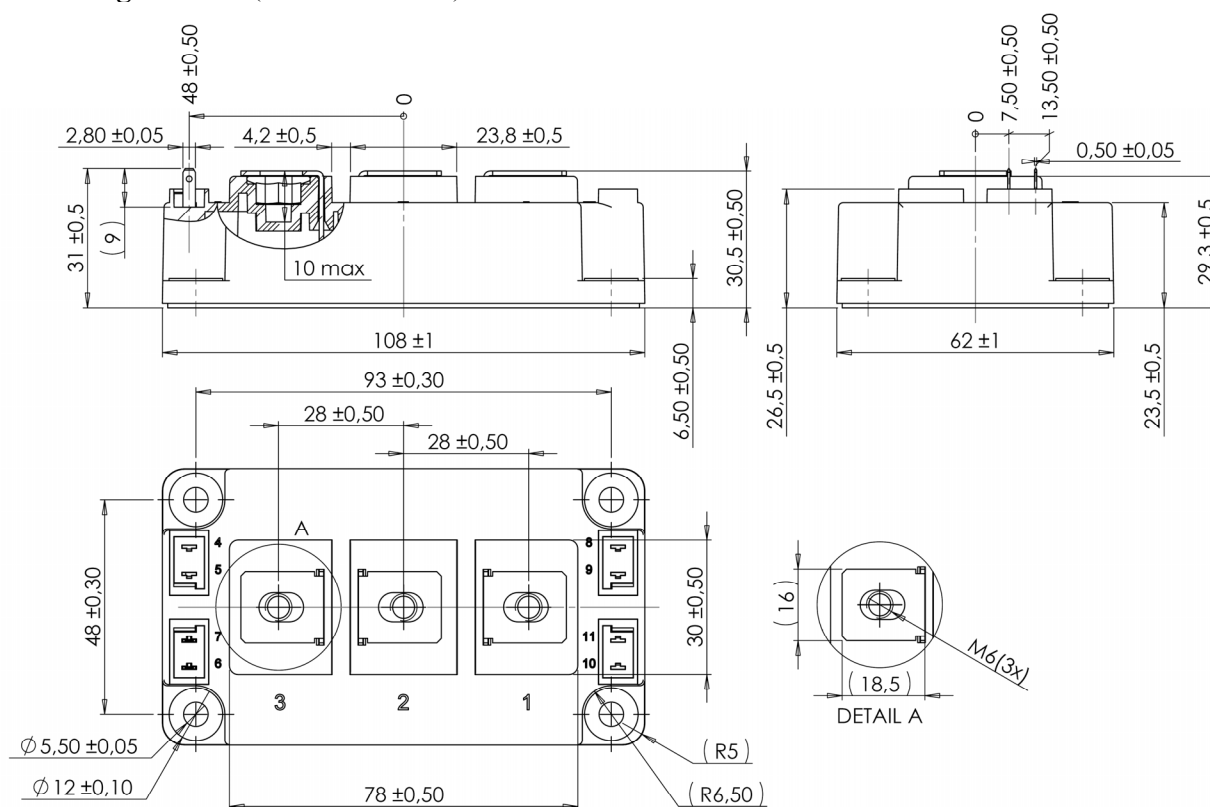
**Reverse diode ratings and characteristics**

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V <sub>RRM</sub>	Maximum Peak Repetitive Reverse Voltage			600			V
I <sub>RRM</sub>	Maximum Reverse Leakage Current	V <sub>R</sub> =600V	T <sub>j</sub> = 25°C			500	μA
			T <sub>j</sub> = 150°C			750	
I <sub>F</sub>	DC Forward Current		T <sub>c</sub> = 80°C		400		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 400A V <sub>GE</sub> = 0V	T <sub>j</sub> = 25°C		1.6	2	V
			T <sub>j</sub> = 150°C		1.5		
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 400A V <sub>R</sub> = 300V di/dt =4800A/μs	T <sub>j</sub> = 25°C		125		ns
			T <sub>j</sub> = 150°C		180		
Q <sub>rr</sub>	Reverse Recovery Charge		T <sub>j</sub> = 25°C		18.8		μC
			T <sub>j</sub> = 150°C		39.5		
E <sub>rr</sub>	Reverse Recovery Energy		T <sub>j</sub> = 25°C		4.4		mJ
		T <sub>j</sub> = 150°C		9.6			

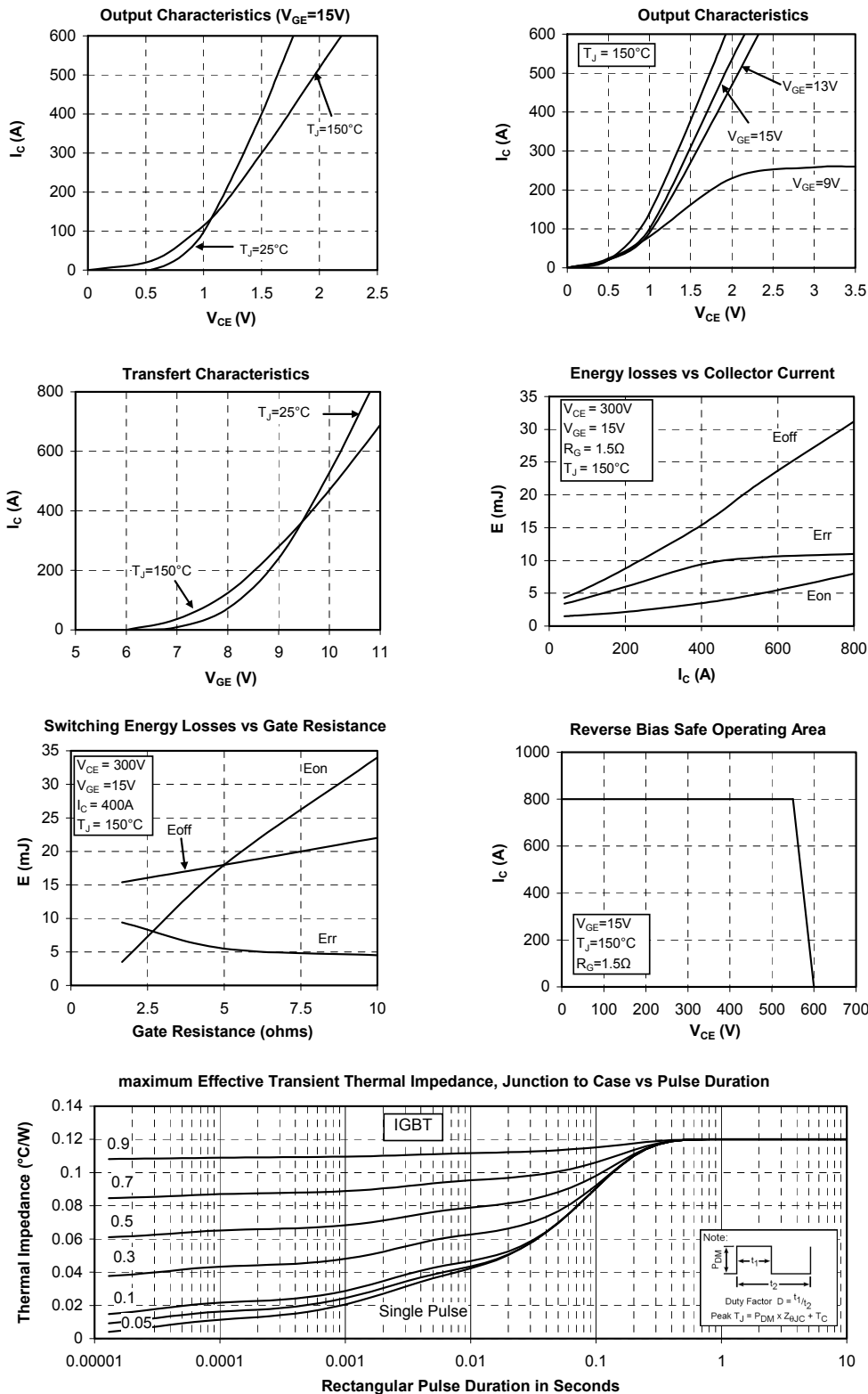
## Thermal and package characteristics

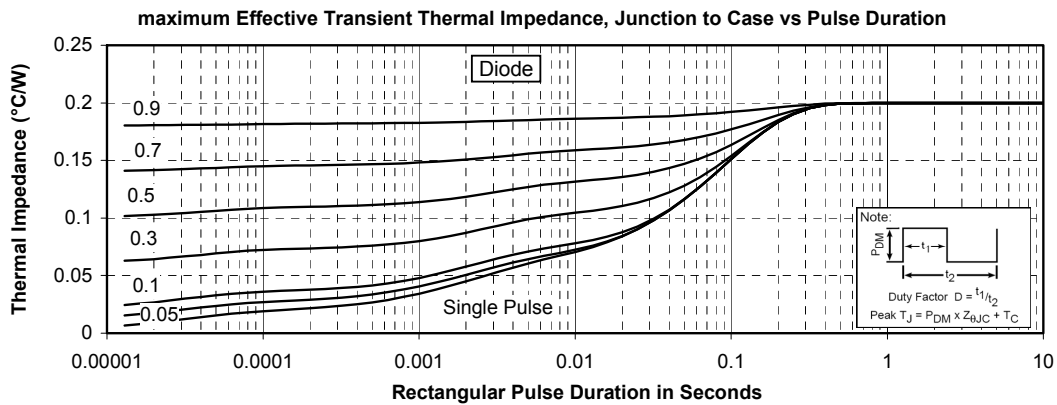
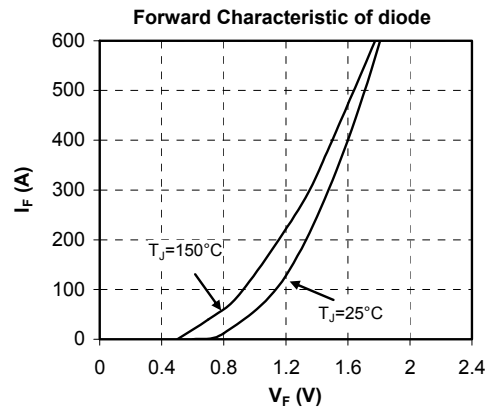
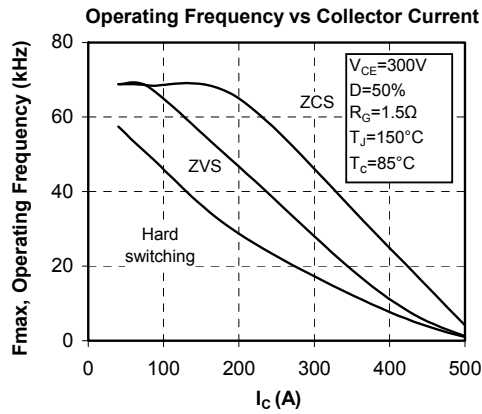
<i>Symbol</i>	<i>Characteristic</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
R <sub>thJC</sub>	Junction to Case Thermal Resistance	IGBT			0.12	°C/W
		Diode			0.20	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz		4000			V
T <sub>J</sub>	Operating junction temperature 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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