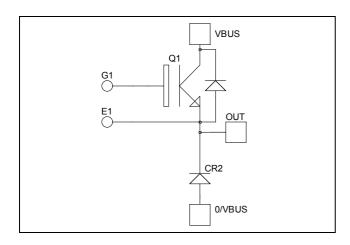


# Buck chopper NPT IGBT Power Module

$$V_{CES} = 1200V$$
  
 $I_C = 300A$  @  $Tc = 80$ °C

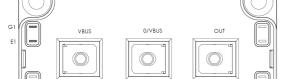


### Application

- AC and DC motor control
- Switched Mode Power Supplies

#### **Features**

- Non Punch Through (NPT) FAST 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
- Very low stray inductance
  - Symmetrical design
  - M5 power connectors
- 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<sub>C</sub> of V<sub>CEsat</sub>
- Low profile
- · RoHS compliant

#### Absolute maximum ratings

Symbol	Parameter		Max ratings	Unit
$V_{CES}$	Collector - Emitter Breakdown Voltage		1200	V
Ţ	Continuous Collector Current	$T_c = 25^{\circ}C$	400	
$I_{\rm C}$	Continuous Conector Current	$T_c = 80$ °C	300	A
$I_{CM}$	Pulsed Collector Current	$T_c = 25^{\circ}C$	600	
$V_{GE}$	Gate – Emitter Voltage		±20	V
$P_D$	Maximum Power Dissipation	$T_c = 25^{\circ}C$	1780	W
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^{\circ}C$	600A @ 1200V	

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com



# All ratings @ $T_j = 25$ °C unless otherwise specified

### **Electrical Characteristics**

Symbol	Characteristic	Test Conditions		Min	Тур	Max	Unit
T	Zero Gate Voltage Collector Current	$V_{GE} = 0V$	$T_j = 25$ °C			500	4
$I_{CES}$	Zero Gate Voltage Collector Current	$V_{CE} = 1200V$ T	$T_j = 125$ °C			750 P	μΑ
V	Collector Emitter saturation Voltage	$V_{GE} = 15V$	$T_j = 25$ °C		3.3	3.9	V
$V_{CE(sat)}$	Confector Emitter Saturation Voltage	$I_C = 300A$ $T_j = 12$	$T_j = 125$ °C		4		v
V <sub>GE(th)</sub>	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 12mA$		4.5		6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = \pm 20V, V_{CE} = 0V$				±1	μΑ

**Dynamic Characteristics** 

Symbol	Characteristic	Test Conditions		Min	Тур	Max	Unit
Cies	Input Capacitance	$\begin{aligned} V_{GE} &= 0V \\ V_{CE} &= 25V \\ f &= 1MHz \end{aligned}$			21		nF
$C_{oes}$	Output Capacitance				2.9		
$C_{res}$	Reverse Transfer Capacitance				1.52		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switch	ning (25°C)		120		
$T_{r}$	Rise Time	$V_{GE} = 15V$			50		
$T_{d(off)}$	Turn-off Delay Time	$V_{\text{Bus}} = 600V$ $I_{\text{C}} = 300A$			310		ns
$T_{\mathrm{f}}$	Fall Time	$R_G = 3\Omega$		30			
$T_{d(on)}$	Turn-on Delay Time	Inductive Switch		130		ns	
$T_{r}$	Rise Time	$V_{GE} = 15V$ $V_{Bus} = 600V$ $I_{C} = 300A$ $R_{G} = 3\Omega$			60		
$T_{d(off)}$	Turn-off Delay Time				360		
$T_{\rm f}$	Fall Time				40		
Eon	Turn-on Switching Energy	$V_{GE} = 15V$ $V_{Bus} = 600V$	$T_j = 125$ °C		25		T
E <sub>off</sub>	Turn-off Switching Energy	$I_C = 300A$ $R_G = 3\Omega$	$T_j = 125^{\circ}C$		15		mJ

Chopper diode ratings and characteristics

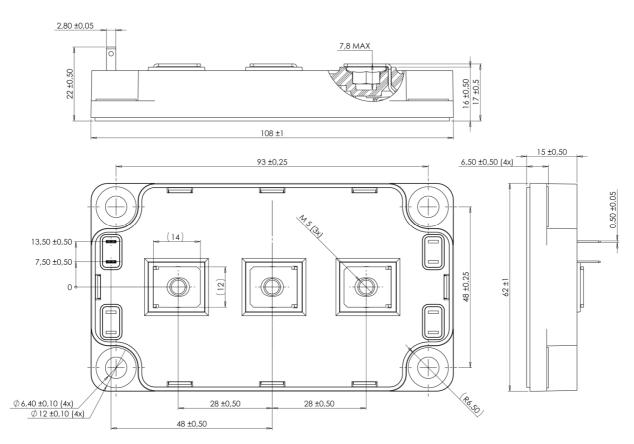
Symbol	Characteristic	Test Conditions		Min	Тур	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage			1200			V
ī	Maximum Reverse Leakage Current	$1 V_{p} = 1200V -$	$T_j = 25^{\circ}C$			750	1
$I_{RM}$			$T_j = 125$ °C			1000	μA
$I_F$	DC Forward Current		$Tc = 70^{\circ}C$		400		A
	Diode Forward Voltage	$I_F = 400A$			2.0	2.5	
$V_{\mathrm{F}}$		$I_F = 800A$			2.5		V
		$I_F = 400A$	$T_j = 125$ °C		1.8		
t <sub>rr</sub>	Reverse Recovery Time	$I_F = 400A$ $V_R = 800V$	$T_j = 25$ °C		420		ns
			$T_j = 125$ °C		580		115
Q <sub>rr</sub>	Reverse Recovery Charge	$\begin{array}{c c} di/dt = 800 A/\mu s & T_j = 25^{\circ}C \\ \hline T_j = 125^{\circ}C \end{array}$	$T_j = 25$ °C		5		μС
				21.4		μС	



## Thermal and package characteristics

Symbol	Characteristic			Min	Тур	Max	Unit
$R_{thJC}$	Junction to Case Thermal Resistance		IGBT			0.07	°C/W
T <sub>th</sub> JC			Diode			0.16	C/ <b>VV</b>
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000			V
$T_{J}$	Operating junction temperature range Storage Temperature Range Operating Case Temperature			-40		150	°C
$T_{STG}$				-40		125	
$T_{C}$				-40		100	
Torque	Mounting torque	To heatsink	M6	3		5	N.m
Torque		For terminals	M5	2		3.5	11.111
Wt	Package Weight					300	g

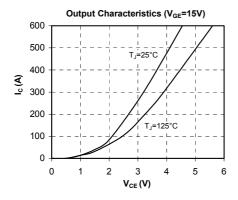
## SP6 Package outline (dimensions in mm)

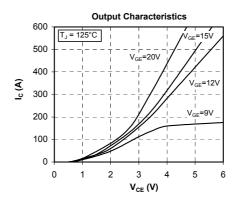


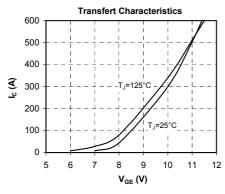
See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

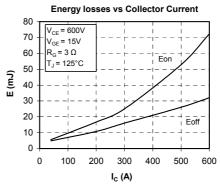


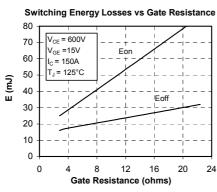
### **Typical Performance Curve**

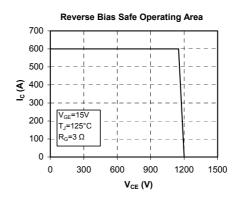


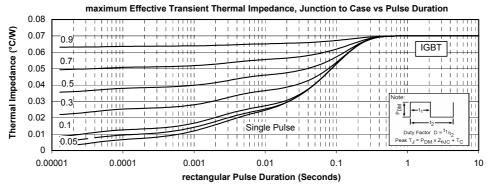




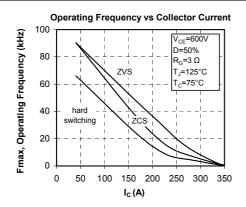


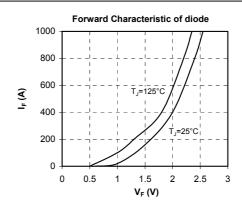


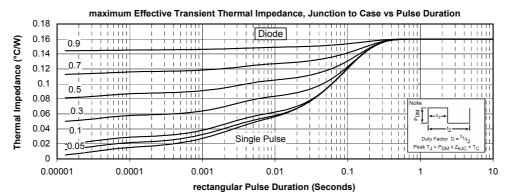














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