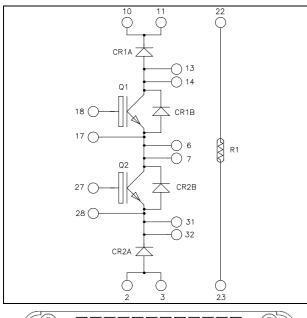
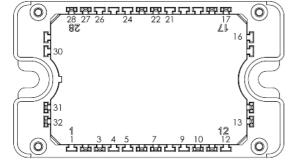


# Boost buck chopper Trench + Field Stop IGBT3 Power Module





All multiple inputs and outputs must be shorted together Example: 10/11 ; 13/14 ; 6/7 ...

# APTGT100BB60T3G

# $V_{CES} = 600V$ $I_{C} = 100A^{*}$ @ Tc = 80°C

#### Application

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

#### 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
- Very low stray inductance
- Kelvin emitter for easy drive
- Internal thermistor for temperature monitoring
- High level of integration

#### Benefits

- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile
- RoHS Compliant

### All ratings (a) $T_i = 25^{\circ}C$ unless otherwise specified

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

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### Absolute maximum ratings (Per IGBT)

Symbol	Parameter		Max ratings	Unit
V <sub>CES</sub>	Collector - Emitter Breakdown Voltage		600	V
т	Continuous Collector Current	$T_C = 25^{\circ}C$	150*	
I <sub>C</sub>		$T_C = 80^{\circ}C$	100*	Α
I <sub>CM</sub>	Pulsed Collector Current	$T_C = 25^{\circ}C$	200	
V <sub>GE</sub>	Gate – Emitter Voltage		±20	V
PD	Maximum Power Dissipation	$T_C = 25^{\circ}C$	340	W
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^{\circ}C$	200A @ 550V	

\* Specification of device but output current must be limited due to size of output pins.

## Electrical Characteristics (Per IGBT)

Symbol	Characteristic	Test Conditions		Min	Тур	Max	Unit
I <sub>CES</sub>	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} = 600V$				250	μA
V <sub>CE(sat)</sub>	Collector Emitter Saturation Voltage	$V_{GE} = 15V$	$T_j = 25^{\circ}C$		1.5	1.9	V
V CE(sat)		$I_{\rm C} = 100 {\rm A}$ $T_{\rm j} = 15$	$T_{j} = 150^{\circ}C$		1.7		v
V <sub>GE(th)</sub>	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1.5 \text{ mA}$		5.0	5.8	6.5	V
I <sub>GES</sub>	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$				400	nA

### Dynamic Characteristics (Per IGBT)

Symbol	Characteristic	Test Conditions	Min	Тур	Max	Unit
Cies	Input Capacitance	$V_{GE} = 0V$		6100		
C <sub>oes</sub>	Output Capacitance	$V_{CE} = 25V$		390		pF
Cres	Reverse Transfer Capacitance	f = 1 MHz		190		
Q <sub>G</sub>	Gate charge	$V_{GE} = \pm 15V$ ; $V_{CE} = 300V$ $I_C = 100A$		1.1		μC
T <sub>d(on)</sub>	Turn-on Delay Time	Inductive Switching (25°C)		115		
Tr	Rise Time	$V_{GE} = \pm 15V$		45		ns
T <sub>d(off)</sub>	Turn-off Delay Time	$V_{Bus} = 300V$ $I_{C} = 100A$		225		
$T_{\rm f}$	Fall Time	$R_G = 3.3\Omega$		55		
T <sub>d(on)</sub>	Turn-on Delay Time	Inductive Switching (150°C)		130		
Tr	Rise Time	$V_{GE} = \pm 15V$ $V_{GE} = 200V$		50		
T <sub>d(off)</sub>	Turn-off Delay Time	$V_{Bus} = 300V$ $I_{C} = 100A$		300		ns
T <sub>f</sub>	Fall Time	$R_G = 3.3\Omega$		70		
Eon	Turn on Energy	$V_{GE} = \pm 15V$ $T_j = 25^{\circ}C$		0.4		mJ
E <sub>on</sub>	rum on Energy	$V_{Bus} = 300V$ $T_j = 150^{\circ}C$		0.875		IIIJ
F	Turn off Energy	$I_{\rm C} = 100 {\rm A}$ $T_{\rm j} = 25^{\circ} {\rm C}$		2.5		mJ
E <sub>off</sub>	Turn off Energy	$R_G = 3.3\Omega \qquad T_j = 150^{\circ}C$		3.5		IIIJ
I <sub>sc</sub>	Short Circuit data	$V_{GE} \le 15V$ ; $V_{Bus} = 360V$ $t_p \le 6\mu s$ ; $T_i = 150^{\circ}C$		500		А



#### **Reverse diode ratings and characteristics** (Per diode)

Symbol	Characteristic	· /	Test Conditions		Тур	Max	Unit
V <sub>RRM</sub>	Maximum Peak Repetitive Reverse Voltage			600			V
I <sub>RM</sub>	Maximum Reverse Leakage Current	V <sub>R</sub> =600V	$T_i = 25^{\circ}C$ $T_i = 150^{\circ}C$			150 400	μΑ
I <sub>F</sub>	DC Forward Current		$Tc = 80^{\circ}C$		100		А
V	$V_F$ Diode Forward Voltage $I_F = 100A$ $V_{GE} = 0V$	$I_{\rm F} = 100 {\rm A}$	$T_i = 25^{\circ}C$		1.6	2	V
v <sub>F</sub>		$T_{i} = 150^{\circ}C$		1.5		v	
t	Reverse Recovery Time	$T_i =$	$T_j = 25^{\circ}C$		100		ns
t <sub>rr</sub>			$T_{j} = 150^{\circ}C$		150		115
0	Deverse Deservery Charge	$I_F = 100A$ $V_R = 300V$ $di/dt = 2500A/\mu s$	$T_j = 25^{\circ}C$		5.1		чС
Q <sub>rr</sub>	Reverse Recovery Charge		$T_{i} = 150^{\circ}C$		10.7		μC
Б	D. D. F.		$T_j = 25^{\circ}C$		1.2		In I
Er	Reverse Recovery Energy		$T_{j} = 150^{\circ}C$		2.4		mJ

## Thermal and package characteristics

Symbol	Characteristic			Min	Тур	Max	Unit
$R_{thJC}$	Unction to Case Thermal Resistance	Per IGBT			0.44	°C/W	
		Per Diode			0.77	C/ W	
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	
T <sub>STG</sub>	Storage Temperature Range			-40		125	°C
T <sub>C</sub>	Operating Case Temperature					100	
Torque	Mounting torque	To heatsink	M4	2		3	N.m
Wt	Package Weight					110	g

# **Temperature sensor NTC**

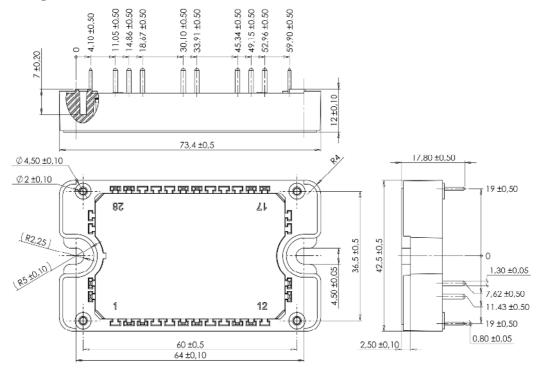
Symbol	Characteristic	Min	Тур	Max	Unit
R <sub>25</sub>	Resistance @ 25°C		22		kΩ
$\Delta R_{25}/R_{25}$	Resistance tolerance			5	%
$\Delta B/B$	Beta tolerance			3	70
B 25/100	$T_{25} = 298.16 \text{ K}$		3980		K

$$R_{T} = \frac{R_{25}}{\exp\left[B_{25/100}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

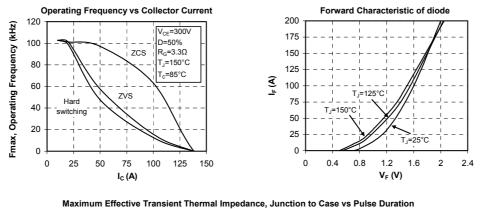
T: Thermistor temperature  $R_T$ : Thermistor value at T



### SP3F Package outline (dimensions in mm)



### **Typical Performance Curve**

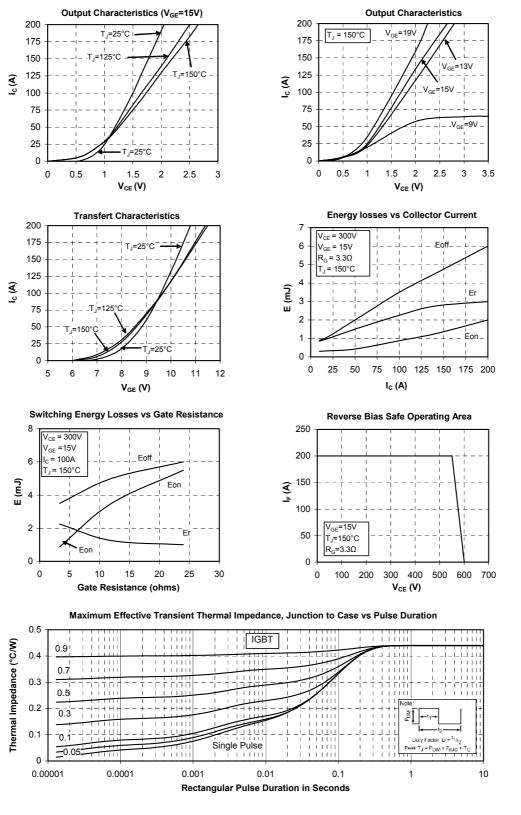


0.8 0.9 1111 Thermal Impedance (°C/W) 0.7 Diode 1111 T m f 0.6 -0.7 0.5 +++++ 0.5 0.4 + H + ++||+ | | | | | | + + ||+ + 0.3 -0.3 2 ++H т I I I I + H H 0.2 0.1 TIT. 0.1 + Duty Factor: D =  $I_{1/2}$ Single Pulse -0.05 1.1.1.1.1 111 Peak T<sub>J</sub> = P<sub>DM</sub> × Z<sub>BJ</sub> 0 0.00001 0.0001 0.001 0.01 0.1 1 10 Rectangular Pulse Duration in Seconds

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