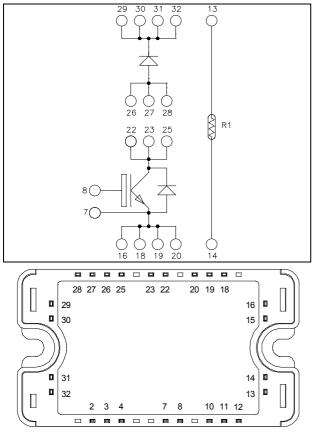


Boost chopper Trench + Field Stop IGBT3 Power Module



Pins 29/30/31/32 must be shorted together Pins 26/27/28/22/23/25 must be shorted together to achieve a phase leg Pins 16/18/19/20 must be shorted together

Absolute maximum ratings

$V_{CES} = 600V$ $I_{C} = 200A$ @ Tc = 100°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
- Very low stray inductance
- Kelvin emitter for easy drive
- Internal thermistor for temperature monitoring
- High level of integration
- AlN substrate for improved thermal performance

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

Symbol	Parameter		Max ratings	Unit
V _{CES}	Collector - Emitter Breakdown Voltage		600	V
т	Continuous Collector Current	$T_C = 25^{\circ}C$	290	
I _C	Continuous Conector Current	$T_{\rm C} = 100^{\circ}{\rm C}$	200	Α
I _{CM}	Pulsed Collector Current	$T_C = 25^{\circ}C$	400	
V _{GE}	Gate – Emitter Voltage		±20	V
P _D	Maximum Power Dissipation	$T_C = 25^{\circ}C$	750	W
RBSOA	Reverse Bias Safe Operating Area	$T_{j} = 150^{\circ}C$	400A @ 550V	

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

Electrical Characteristics								
Symbol	Characteristic	Test Conditions		Min	Тур	Max	Unit	
I _{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} =$	= 600V			250	μA	
V	Collector Emitter Saturation Voltage	$V_{GE} = 15V$	$T_j = 25^{\circ}C$		1.5	1.9	V	
V _{CE(sat)}	Conector Emitter Saturation Voltage	$I_{\rm C} = 200 {\rm A}$	$T_{j} = 150^{\circ}C$		1.7		v	
V _{GE(th)}	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 2 \text{ mA}$		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	Тур	Max	Unit
Cies	Input Capacitance	$V_{GE} = 0V$			12.3		
C _{oes}	Output Capacitance	$V_{CE} = 25V$	$V_{CE} = 25V$ f = 1MHz		0.8		nF
Cres	Reverse Transfer Capacitance	f = 1 MHz			0.4		
Q _G	Gate charge	$V_{GE} = \pm 15V$; V_{C} $I_{C} = 200A$	_{CE} =300V		2.2		μC
T _{d(on)}	Turn-on Delay Time	Inductive Switch	hing (25°C)		115		
Tr	Rise Time	$V_{GE} = \pm 15V$			45		ns
T _{d(off)}	Turn-off Delay Time	$V_{Bus} = 300V$ $I_{C} = 200A$			225		
$T_{\rm f}$	Fall Time	$R_G = 2\Omega$			55		
T _{d(on)}	Turn-on Delay Time	Inductive Switch	hing (150°C)		130		
Tr	Rise Time		$V_{GE} = \pm 15V$		50		ma
T _{d(off)}	Turn-off Delay Time	$V_{Bus} = 300V$ $I_{C} = 200A$			300		ns
T _f	Fall Time	$R_G = 2\Omega$			70		
Б	Turn on Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 300V$	$T_j = 25^{\circ}C$		1		mJ
Eon	Turn on Energy			$T_{j} = 150^{\circ}C$		1.8	
Б	Turn off Energy	D 10	$T_j = 25^{\circ}C$		5.7		mJ
E _{off}	Turn off Energy		$R_G = 2\Omega$	$T_{j} = 150^{\circ}C$		7	
I _{sc}	Short Circuit data	$V_{GE} \leq 15V ; V_{Bus}$ $t_p \leq 6\mu s ; T_1 = 15$			1000		А

Chopper diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Тур	Max	Unit	
V _{RRM}	Maximum Peak Repetitive Reverse Voltage			600			V	
I _{RM}	Maximum Reverse Leakage Current	V _R =600V	$T_i = 25^{\circ}C$ $T_i = 150^{\circ}C$			250 500	μΑ	
I _F	DC Forward Current		$Tc = 80^{\circ}C$		200		А	
V _F	Diode Forward Voltage	$I_{\rm F} = 200 {\rm A}$	$T_i = 25^{\circ}C$		1.6	2	V	
v _F	Didde Forward Voltage	$V_{GE} = 0V$	$T_{i} = 150^{\circ}C$		1.5		v	
t	Reverse Recovery Time	$I_F = 200A$ $V_R = 300V$	$T_j = 25^{\circ}C$		125		ns	
t _{rr}	Reverse Recovery Time		$T_{j} = 150^{\circ}C$		220		115	
0	Reverse Recovery Charge		$T_j = 25^{\circ}C$		9		uС	
Q _{rr}	Reverse Recovery Charge				$T_{i} = 150^{\circ}C$		20	
Er	Reverse Recovery Energy	$T_j =$	$T_j = 25^{\circ}C$		2.2		mI	
			$T_j = 150^{\circ}C$		4.8		mJ	



Thermal and package characteristics

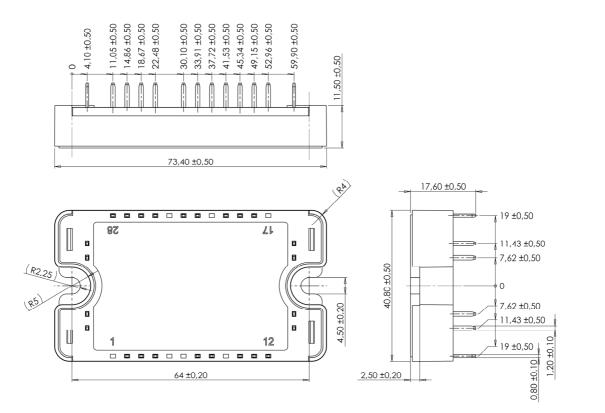
Symbol	Characteristic			Min	Тур	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance	IGBT			0.20	°C/W	
K _{thJC}			Diode			0.31	C/ W
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000			V
TJ	Operating junction temperature range			-40		175	
T _{STG}	Storage Temperature Range		-40		125	°C	
T _C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M4	2		3	N.m
Wt	Package Weight				110	g	

Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic			Тур	Max	Unit
R ₂₅	Resistance @ 25°C			50		kΩ
$\Delta R_{25}/R_{25}$				5		%
B _{25/85}	$T_{25} = 298.15 \text{ K}$			3952		K
$\Delta B/B$		$T_C = 100^{\circ}C$		4		%

$$R_{T} = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$
 T: Thermistor temperature
R_T: Thermistor value at T

SP3 Package outline (dimensions in mm)



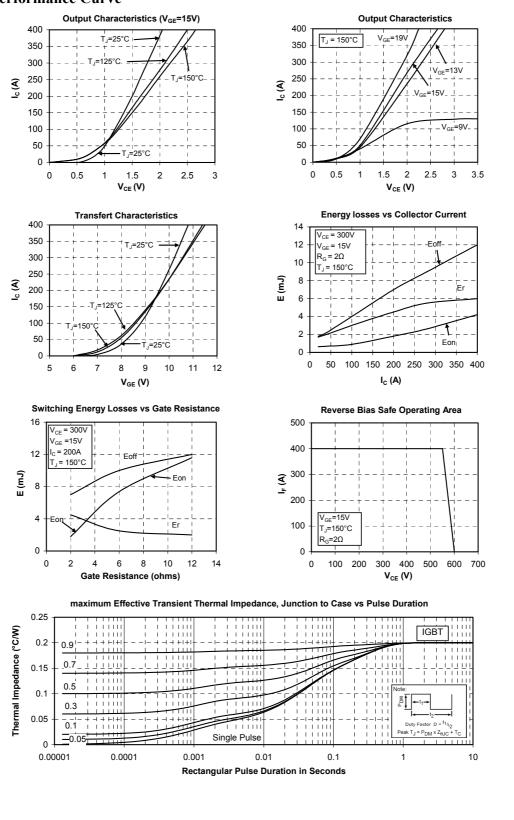
See application note 1901 - Mounting Instructions for SP3 Power Modules on www.microsemi.com

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Typical Performance Curve



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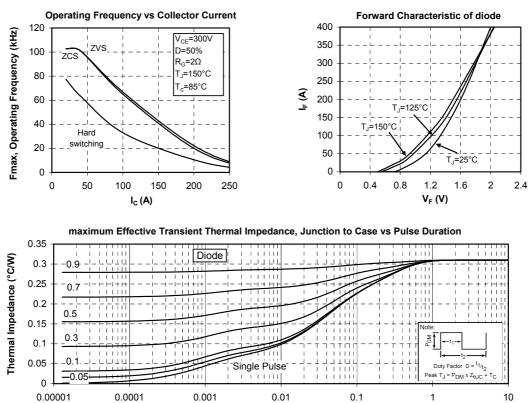
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0.00001

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0.01 **Rectangular Pulse Duration in Seconds**

0.1

1

0.001

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