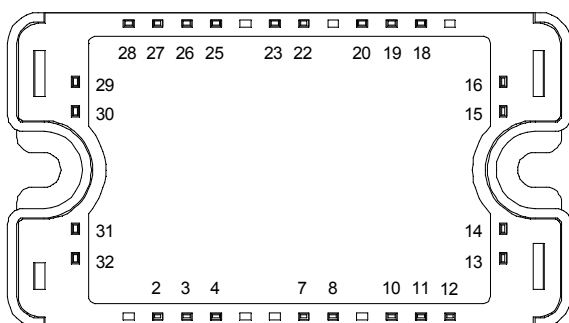
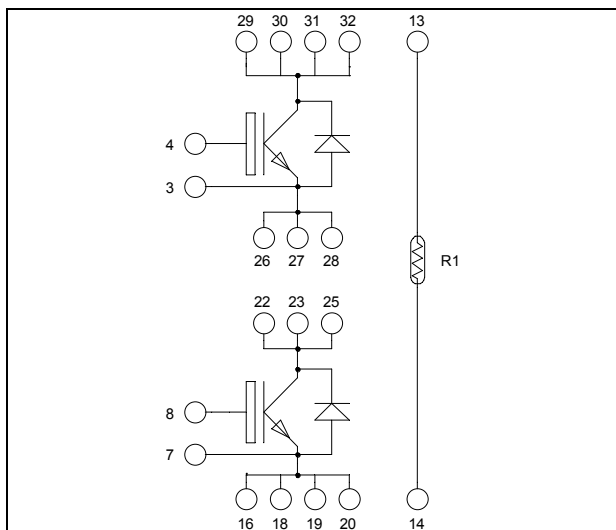


Phase leg NPT IGBT Power Module Power Module

$$V_{CES} = 600V$$

$$I_C = 150A @ T_c = 100^{\circ}C$$



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

Application

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

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
- 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

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	600	V
I_C	Continuous Collector Current	$T_C = 25^{\circ}C$	A
		$T_C = 100^{\circ}C$	
I_{CM}	Pulsed Collector Current	$T_C = 25^{\circ}C$	400
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_C = 25^{\circ}C$	833
RBSOA	Reverse Bias Safe Operating Area	$T_J = 150^{\circ}C$	400A @ 480V

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

All ratings @ $T_j = 25^\circ\text{C}$ unless otherwise specified

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} = 600V$			250	μA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15V$ $I_C = 200A$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	2 2.2	2.5	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1.5mA$	4.5	5.5	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	$V_{GE} = 0V ; V_{CE} = 25V$		9		nF
C_{res}	Reverse Transfer Capacitance	$f = 1MHz$		0.8		
Q_G	Gate charge	$V_{GE} = 15V ; V_{CE} = 300V$ $I_C = 200A$		480		nC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 200A$ $R_G = 1.5\Omega$		25		ns
T_r	Rise Time			10		
$T_{d(off)}$	Turn-off Delay Time			130		
T_f	Fall Time			20		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 200A$ $R_G = 1.5\Omega$		25		ns
T_r	Rise Time			11		
$T_{d(off)}$	Turn-off Delay Time			150		
T_f	Fall Time			30		
E_{on}	Turn-on Switching Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 200A$ $R_G = 1.5\Omega$	$T_j = 125^\circ\text{C}$	2		mJ
E_{off}	Turn-off Switching Energy		$T_j = 125^\circ\text{C}$	6		
I_{sc}	Short Circuit data	$V_{GE} \leq 15V ; V_{Bus} = 360V$ $t_p \leq 10\mu s ; T_j = 125^\circ\text{C}$		900		A

Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		600			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 600V$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		35 600	μA
I_F	DC Forward Current		$T_c = 100^\circ\text{C}$	120		A
V_F	Diode Forward Voltage	$I_F = 120A$ $I_F = 240A$ $I_F = 120A$	$T_j = 125^\circ\text{C}$	1.7 2 1.4	2.3	V
t_{rr}	Reverse Recovery Time	$I_F = 120A$ $V_R = 400V$ $di/dt = 200A/\mu s$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	70 140		ns
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	200 1380		nC

Thermal and package characteristics

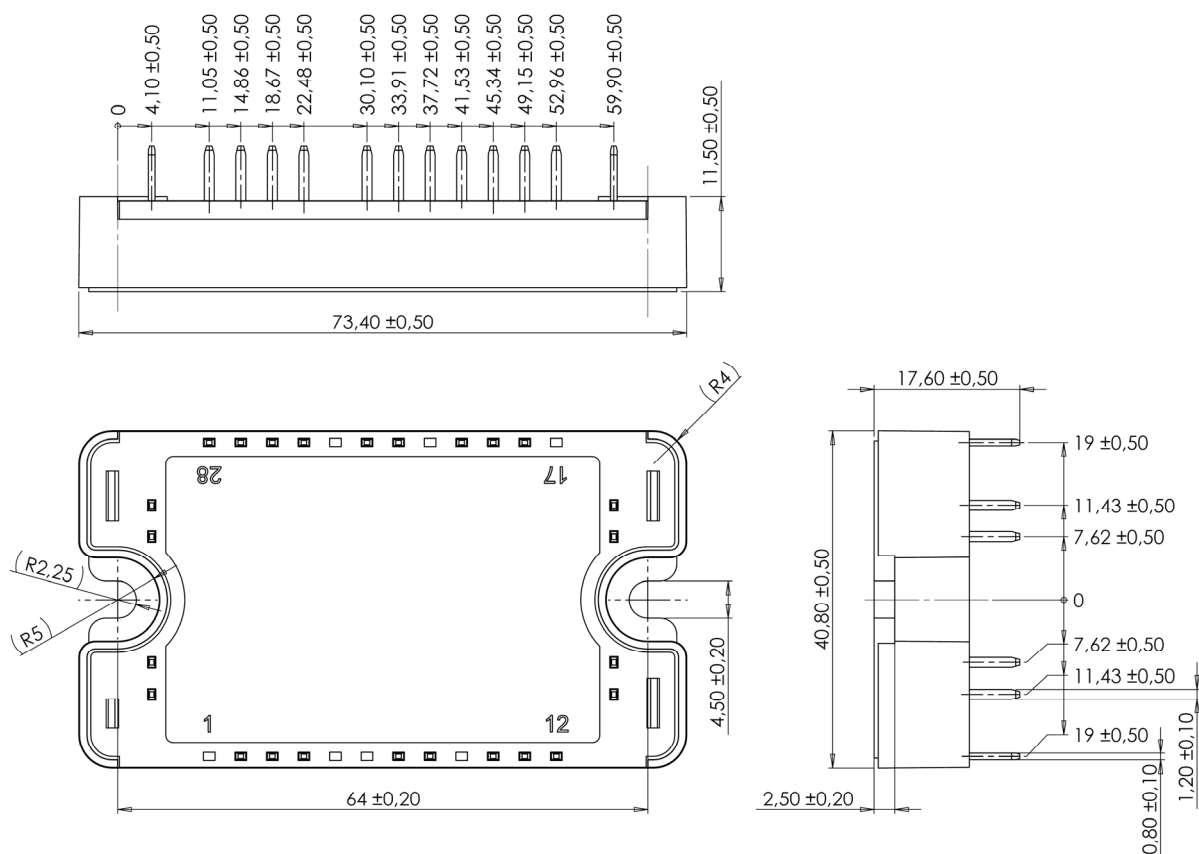
Symbol	Characteristic	Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance	IGBT		0.15	°C/W
		Diode		0.36	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000			V
T _J	Operating junction temperature range	-40		150	°C
T _{STG}	Storage Temperature Range	-40		125	
T _C	Operating Case Temperature	-40		100	
Torque	Mounting torque	To heatsink	M4	2	N.m
Wt	Package Weight			110	g

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

Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
B _{25/85}	T ₂₅ = 298.15 K		3952		K

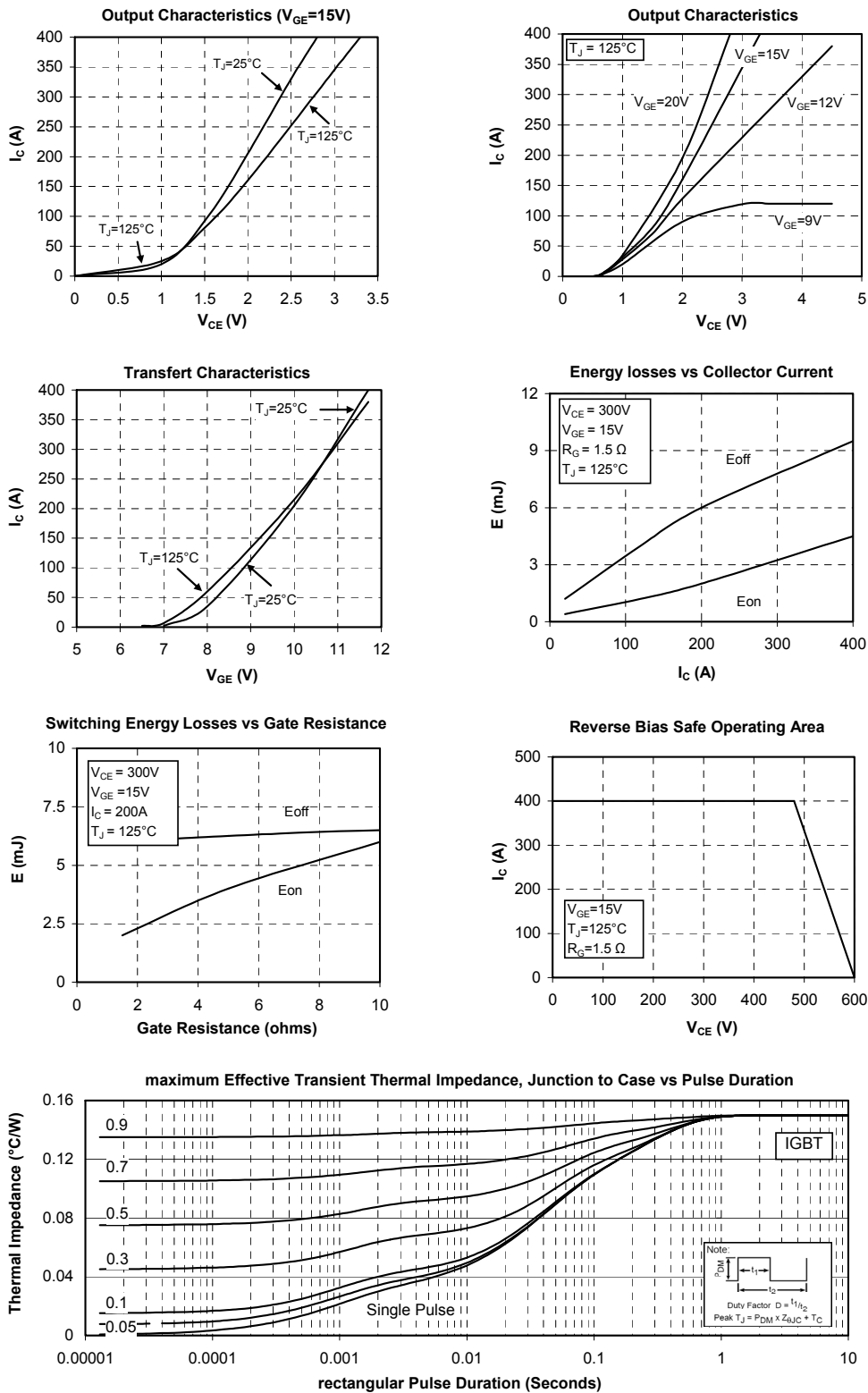
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

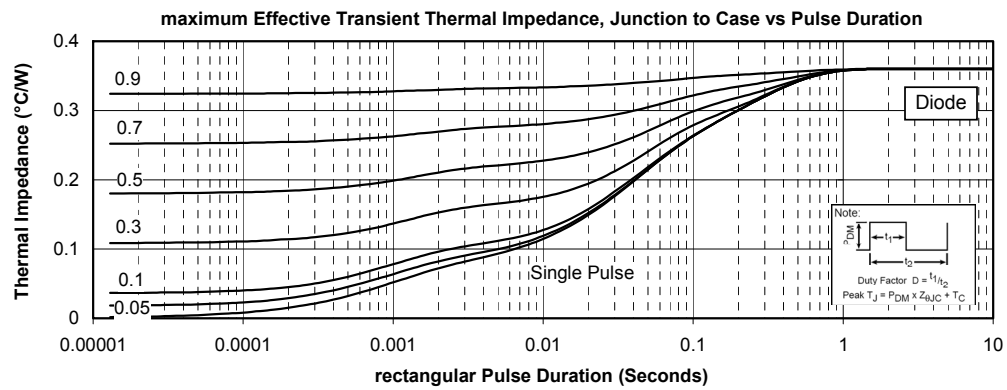
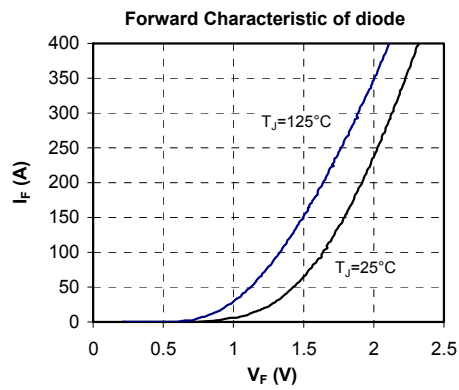
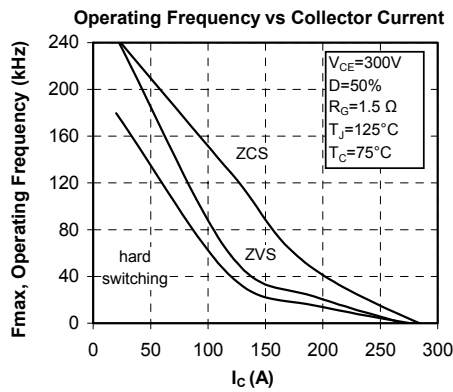
T: Thermistor temperature
 R_T: Thermistor value at T

SP3 Package outline (dimensions in mm)


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

Typical Performance Curve





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