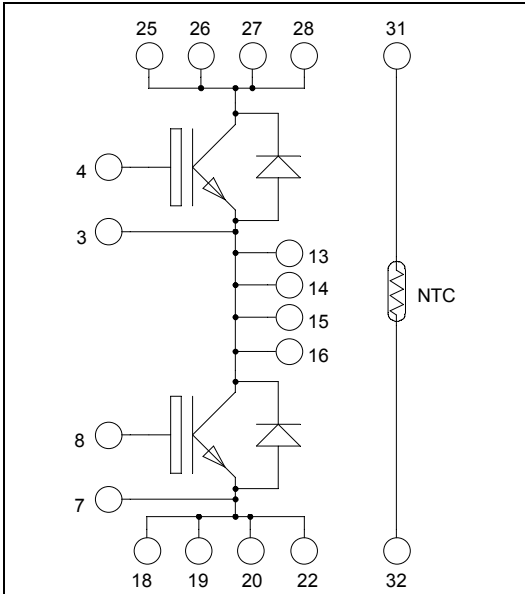


Phase leg
High speed IGBT 5 Power Module

$V_{CES} = 650V$
 $I_C = 200A @ T_c = 25^\circ C$


Application

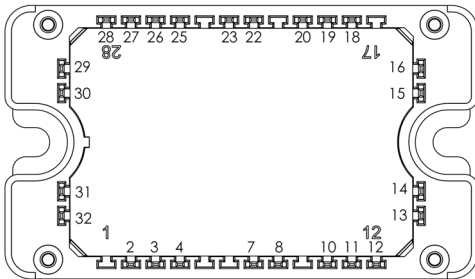
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- High speed IGBT 5
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 100 kHz
 - Low leakage current
- Very low stray inductance
- Internal thermistor for temperature monitoring

Benefits

- Outstanding performance at high frequency operation
- 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



Pins 25/26/27/28 ; 13/14/15/16 ; 18/19/20/22
 must be shorted together

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

Absolute maximum ratings (Per IGBT)

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Voltage	650	V
I_C	Continuous Collector Current	$T_C = 25^\circ C$	200
		$T_C = 80^\circ C$	120
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ C$	400
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Power Dissipation	483	W

 **CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

Electrical Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} = 650V$			200	μA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15V$ $I_C = 200A$		1.65 1.9	2.2	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 2mA$	3.3	4.0	4.7	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			480	nA

Dynamic Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0V$		12		nF
C_{oes}	Output Capacitance	$V_{CE} = 25V$		0.2		
C_{res}	Reverse Transfer Capacitance	$f = 1MHz$		0.044		
Q_G	Gate charge	$V_{GE} = 15V, I_C = 200A$ $V_{CE} = 520V$		480		nC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = 15V$ $V_{Bus} = 400V$ $I_C = 100A$ $R_G = 1\Omega$		21		ns
T_r	Rise Time			15		
$T_{d(off)}$	Turn-off Delay Time			180		
T_f	Fall Time			18		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) $V_{GE} = 15V$ $V_{Bus} = 400V$ $I_C = 100A$ $R_G = 1\Omega$		20		ns
T_r	Rise Time			15		
$T_{d(off)}$	Turn-off Delay Time			205		
T_f	Fall Time			26		
E_{on}	Turn on Energy	$V_{GE} = 15V$ $V_{Bus} = 400V$	$T_j = 150^\circ C$	3		mJ
E_{off}	Turn off Energy	$I_C = 100A$ $R_G = 1\Omega$	$T_j = 150^\circ C$	1.2		
R_{Gint}	Integrated gate resistor			1.25		Ω
R_{thJC}	Junction to Case Thermal Resistance				0.31	$^\circ C/W$

Diode ratings and characteristics (per diode)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Peak Repetitive Reverse Voltage				650	V
I_{RM}	Reverse Leakage Current	$V_R = 650V$			200	μA
I_F	DC Forward Current			200		A
V_F	Diode Forward Voltage	$I_F = 200A$ $V_{GE} = 0V$	$T_j = 25^\circ C$ $T_j = 150^\circ C$	1.6 1.65	2.2	V
t_{rr}	Reverse Recovery Time	$I_F = 100A$ $V_R = 400V$ $di/dt = 6000A/\mu s$	$T_j = 25^\circ C$ $T_j = 150^\circ C$	46 62		ns
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ C$ $T_j = 150^\circ C$	2 4		μC
R_{thJC}	Junction to Case Thermal Resistance				0.35	$^\circ C/W$

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

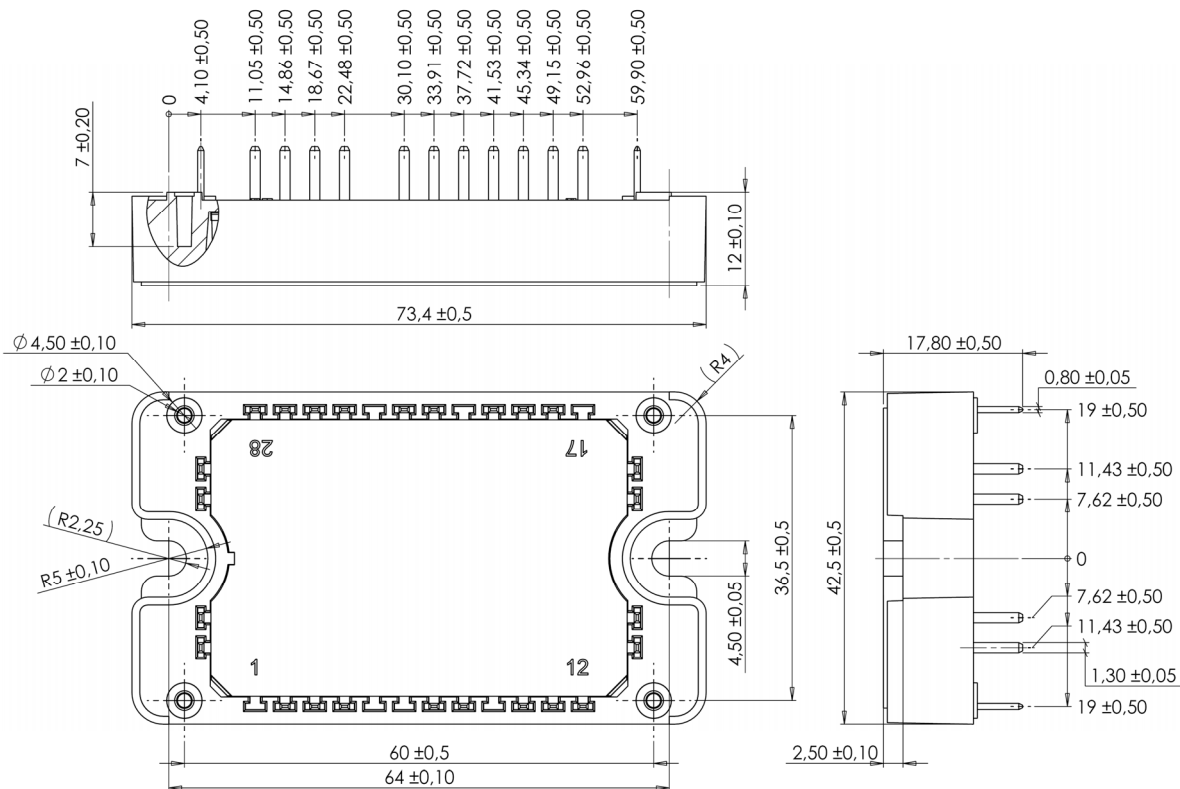
Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B	T _C = 100°C		4		%

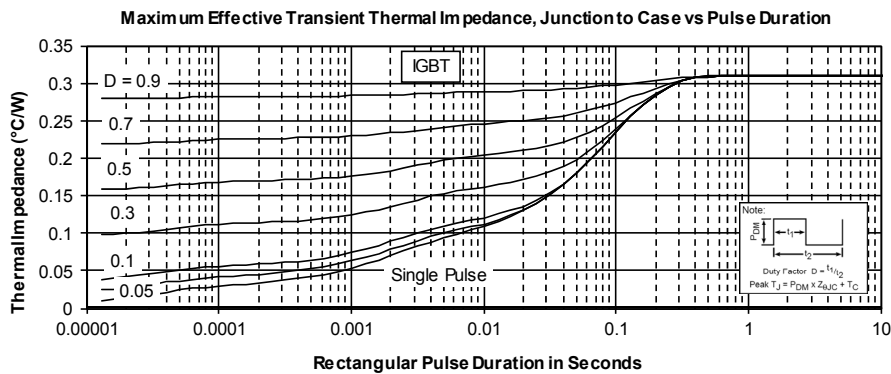
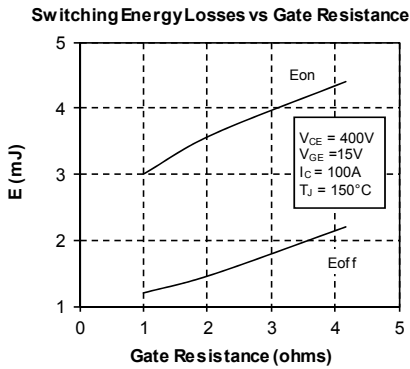
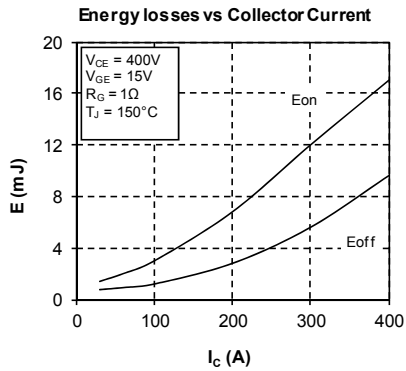
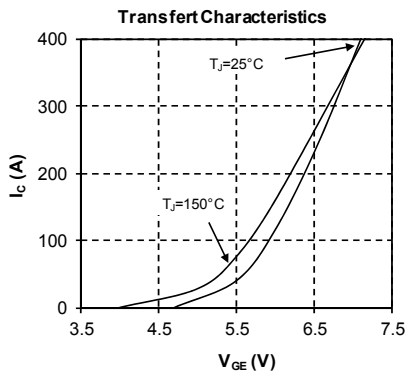
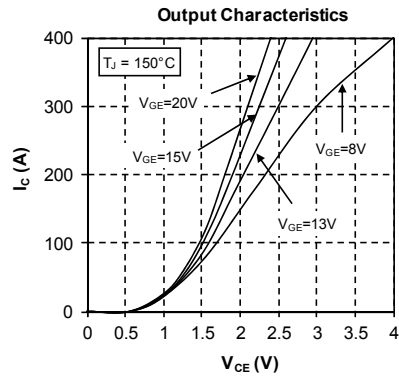
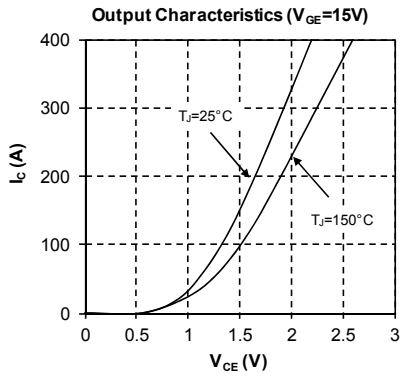
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

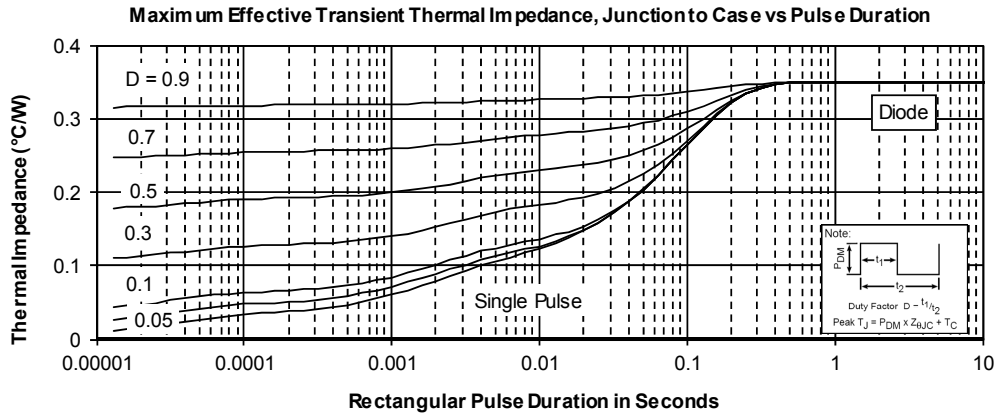
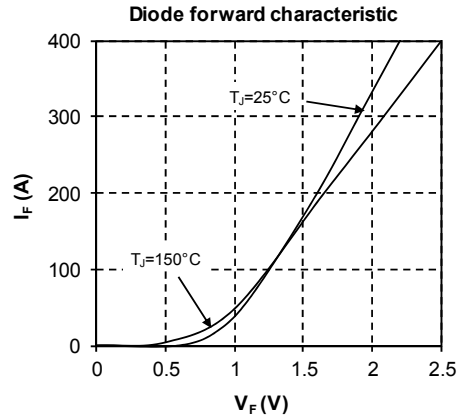
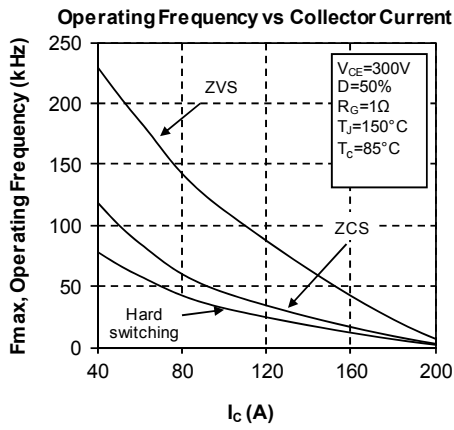
T: Thermistor temperature
 R_T: Thermistor value at T

Thermal and package characteristics

Symbol	Characteristic	Min	Max	Unit		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000		V		
T _J	Operating junction temperature range	-40	175	°C		
T _{JOP}	Recommended junction temperature under switching conditions	-40	T _{Jmax} - 25			
T _{STG}	Storage Temperature Range	-40	125			
T _C	Operating Case Temperature	-40	125			
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				110	g

Package outline (dimensions in mm)

 See application note 1906 - Mounting Instructions for SP3F Power Modules on www.microsemi.com

Typical performance curve




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