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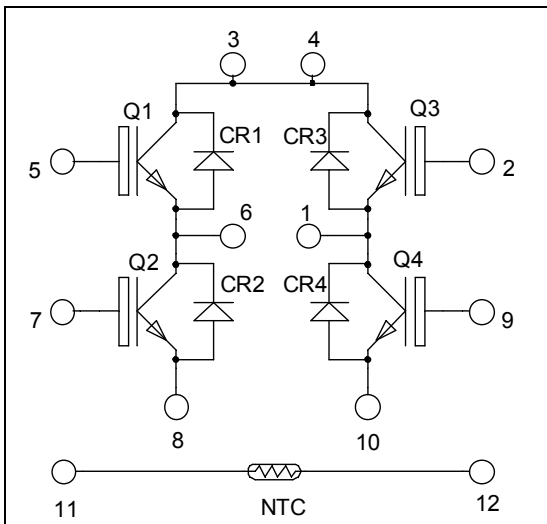
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**Full bridge
High speed Trench + Field Stop IGBT4
Power Module**

**$V_{CES} = 650V$
 $I_C = 75A @ T_c = 60^\circ C$**


Application

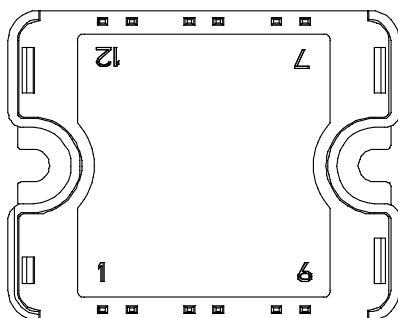
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- **High speed Trench + Field Stop IGBT 4 Technology**
 - Low voltage drop
 - Low leakage current
 - Low switching losses
 - RBSOA and SCSOA rated
- Very low stray inductance
- High level of integration
- 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 3/4 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	$T_c = 25^\circ C$	100
		$T_c = 60^\circ C$	75
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	200
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	250	W
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	150A @ 600V

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

Electrical Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} = 650V$			100	μA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15V$ $I_C = 75A$		1.85 2.2	2.3	V
		$T_j = 25^\circ C$ $T_j = 150^\circ C$				
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1.2 mA$	4.2	5.1	5.6	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			200	nA

Dynamic Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0V$		4620		pF
C_{oes}	Output Capacitance	$V_{CE} = 25V$		160		
C_{res}	Reverse Transfer Capacitance	$f = 1MHz$		137		
Q_G	Gate charge	$V_{GE} = 15V, I_C = 75A$ $V_{CE} = 480V$		440		nC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15V$ $V_{Bus} = 400V$ $I_C = 75A$ $R_G = 5\Omega$		19		ns
T_r	Rise Time			33		
$T_{d(off)}$	Turn-off Delay Time			197		
T_f	Fall Time			21		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) $V_{GE} = \pm 15V$ $V_{Bus} = 400V$ $I_C = 75A$ $R_G = 5\Omega$		19		ns
T_r	Rise Time			29		
$T_{d(off)}$	Turn-off Delay Time			227		
T_f	Fall Time			22		
E_{on}	Turn on Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 400V$ $I_C = 75A$ $R_G = 5\Omega$	$T_j = 25^\circ C$	1.5		mJ
			$T_j = 150^\circ C$	1.8		
E_{off}	Turn off Energy	$I_C = 75A$ $R_G = 5\Omega$	$T_j = 25^\circ C$	1.25		
			$T_j = 150^\circ C$	1.4		
I_{sc}	Short Circuit data	$V_{GE} \leq 15V; V_{Bus} = 400V$ $t_p \leq 5\mu s; T_j = 150^\circ C$		500		A
R_{thJC}	Junction to Case Thermal Resistance				0.6	$^\circ C/W$

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	$V_R = 650V$			100	μA
I_F	DC Forward Current	$T_c = 25^\circ C$		75		A
V_F	Diode Forward Voltage	$I_F = 75A$ $V_{GE} = 0V$	$T_j = 25^\circ C$	1.6	2	V
			$T_j = 150^\circ C$	1.5		
t_{rr}	Reverse Recovery Time	$I_F = 75A$ $V_R = 400V$ $di/dt = 2000A/\mu s$	$T_j = 25^\circ C$	100		ns
			$T_j = 150^\circ C$	150		
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ C$	3.6		μC
			$T_j = 150^\circ C$	7.6		
E_{rr}	Reverse Recovery Energy	$T_j = 25^\circ C$	0.85		mJ	
		$T_j = 150^\circ C$	1.8			
R_{thJC}	Junction to Case Thermal Resistance				0.98	$^\circ C/W$

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

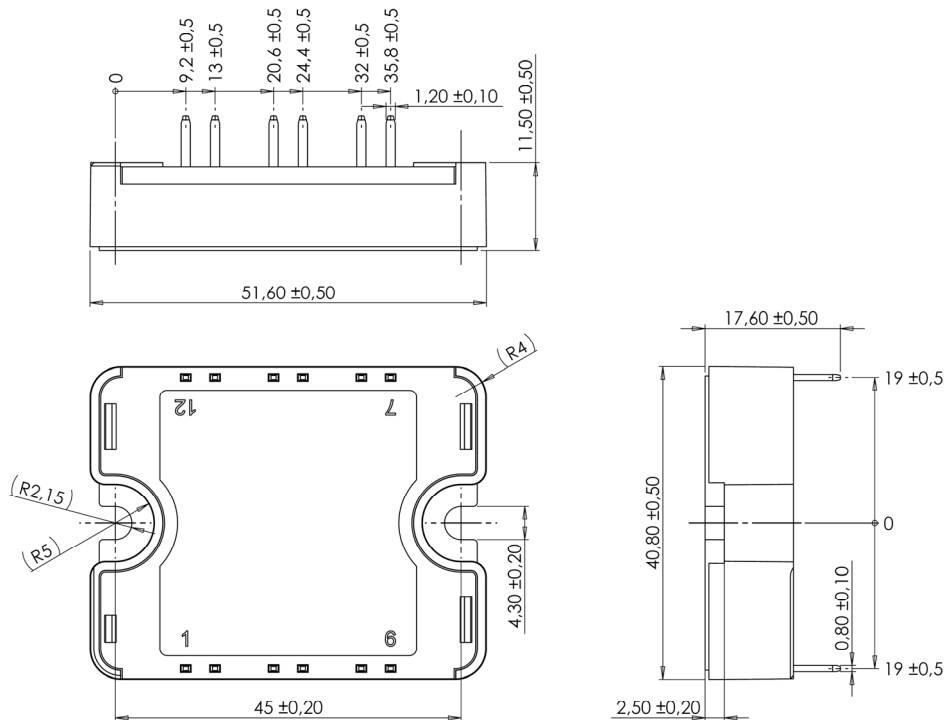
Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B	T _C = 100°C		4		%

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

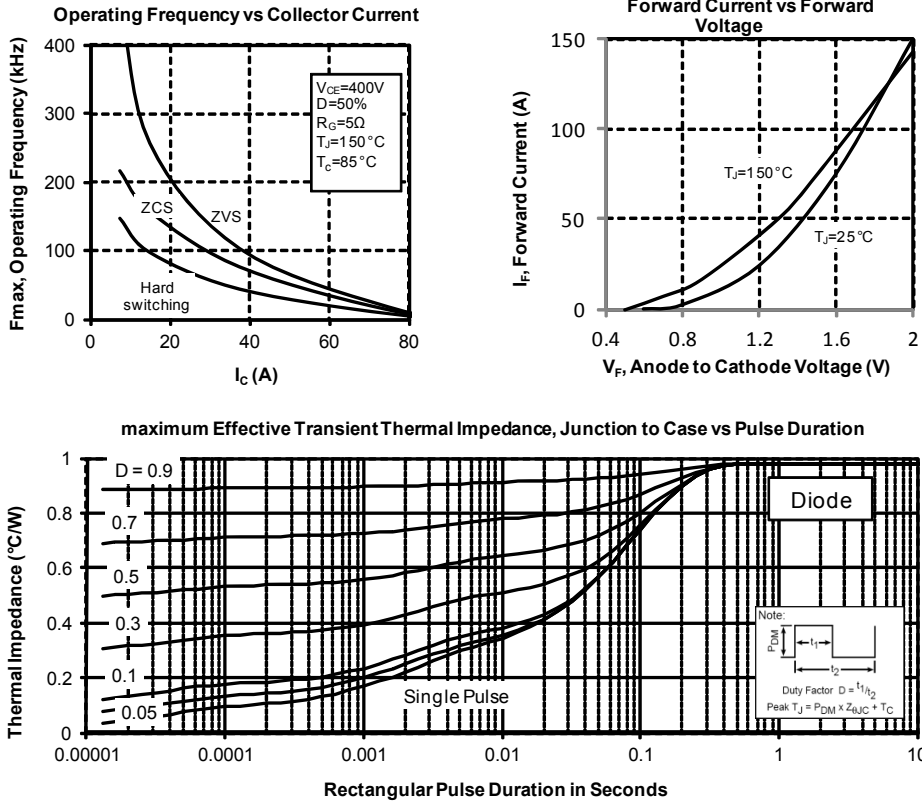
T: Thermistor temperature
 R_T: Thermistor value at T

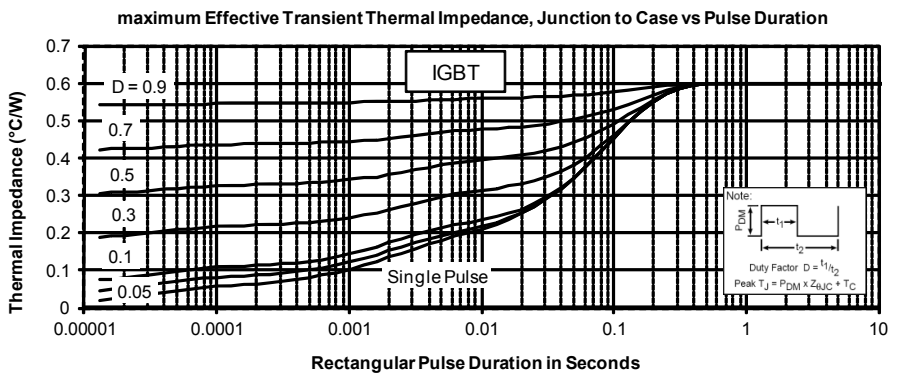
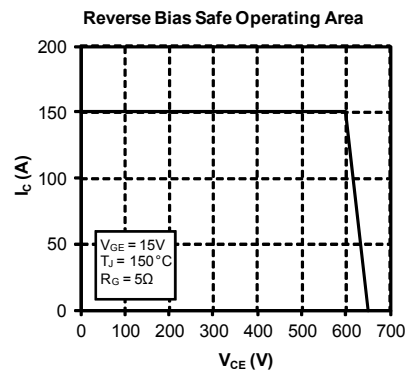
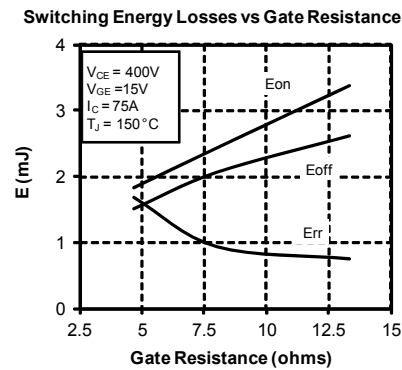
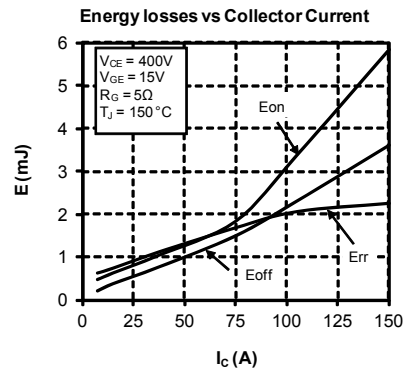
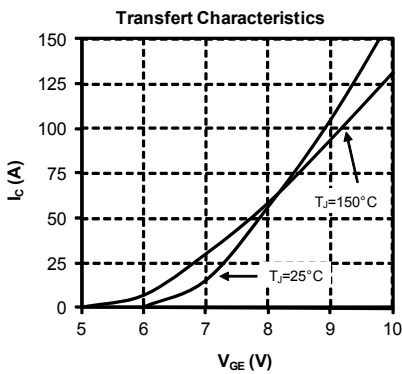
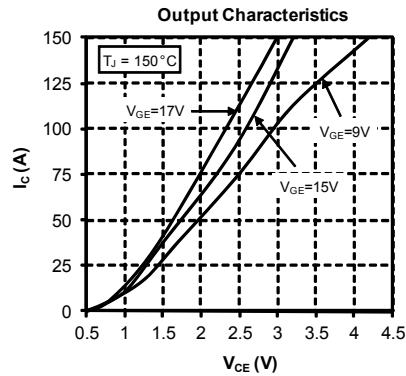
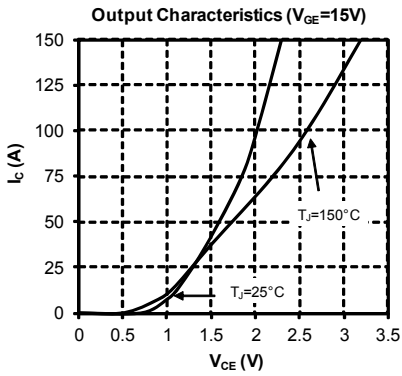
Thermal and package characteristics

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	100			
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				80	g

Package outline (dimensions in mm)

 See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

Typical performance curve





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