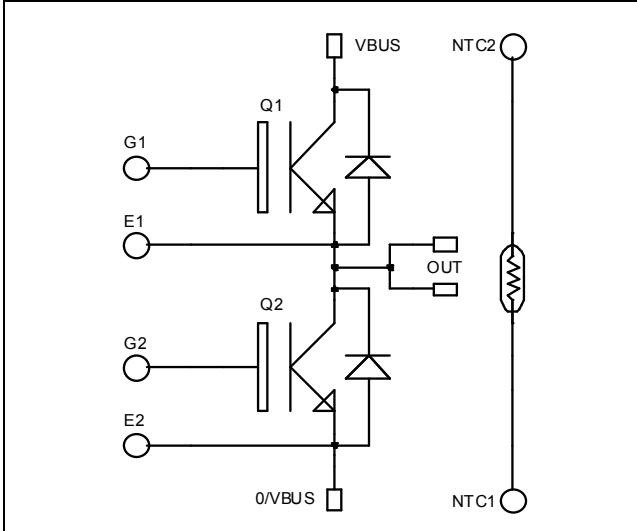


**Phase leg
High speed Trench + Field Stop IGBT4
Power Module**

**$V_{CES} = 1200V$
 $I_C = 150A @ T_c = 80^\circ C$**


Application

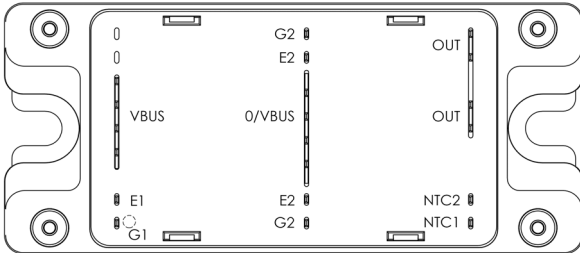
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- **High speed Trench + Field Stop IGBT 4 Technology**
 - Low voltage drop
 - Low leakage current
 - Low switching losses
- Kelvin emitter for easy drive
- Very low stray inductance
- Lead frames for power connections
- Internal thermistor for temperature monitoring

Benefits


- Stable temperature behavior
- Very rugged
- Solderable terminals for easy PCB mounting
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_C of V_{CESat}
- Low profile
- RoHS Compliant



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	1200	V
I_C	Continuous Collector Current	$T_C = 25^\circ C$	250
		$T_C = 80^\circ C$	150
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ C$	480
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Power Dissipation	750	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	$V_{GE} = 0V, V_{CE} = 1200V$			100	μA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15V$ $I_C = 150A$	1.78	$T_j = 25^\circ C$ 2.05	2.4	V
		$T_j = 150^\circ C$		2.6		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 5.2 mA$	5.3	5.8	6.3	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			240	nA

Dynamic Characteristics (Per IGBT)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0V$ $V_{CE} = 25V$ $f = 1MHz$		8.8		nF
C_{oes}	Output Capacitance			0.5		
C_{res}	Reverse Transfer Capacitance			0.45		
Q_G	Gate charge	$V_{GE} = 15V, I_C = 150A$ $V_{CE} = 960V$		645		nC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ($25^\circ C$) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 150A$ $R_G = 3.5\Omega$		30		ns
T_r	Rise Time			57		
$T_{d(off)}$	Turn-off Delay Time			290		
T_f	Fall Time			16		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ($150^\circ C$) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 150A$ $R_G = 3.5\Omega$		30		ns
T_r	Rise Time			49		
$T_{d(off)}$	Turn-off Delay Time			366		
T_f	Fall Time			48		
E_{on}	Turn on Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 150A$	$T_j = 150^\circ C$	13		mJ
E_{off}	Turn off Energy	$R_G = 3.5\Omega$		8		
R_G	Integrated gate resistor			5		Ω
I_{sc}	Short Circuit data	$V_{GE} \leq 15V; V_{Bus} = 600V$ $t_p \leq 10\mu s; T_j = 150^\circ C$		525		A
R_{thJC}	Junction to Case Thermal Resistance				0.20	$^\circ C/W$

Diode ratings and characteristics (per diode)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Peak Repetitive Reverse Voltage				1200	V
I_{RM}	Reverse Leakage Current	$V_R = 1200V$			400	μA
I_F	DC Forward Current	$T_c = 60^\circ C$		120		A
V_F	Diode Forward Voltage	$I_F = 120A$		2.6	3.5	V
		$I_F = 240A$		3.2		
		$I_F = 120A$	$T_j = 125^\circ C$	1.8		
t_{rr}	Reverse Recovery Time	$I_F = 120A$ $V_R = 800V$ $di/dt = 800A/\mu s$	$T_j = 25^\circ C$	300		ns
			$T_j = 125^\circ C$	380		
Q_{rr}	Reverse Recovery Charge	$I_F = 120A$ $V_R = 800V$ $di/dt = 800A/\mu s$	$T_j = 25^\circ C$	1.44		μC
			$T_j = 125^\circ C$	6.8		
R_{thJC}	Junction to Case Thermal Resistance				0.33	$^\circ C/W$

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

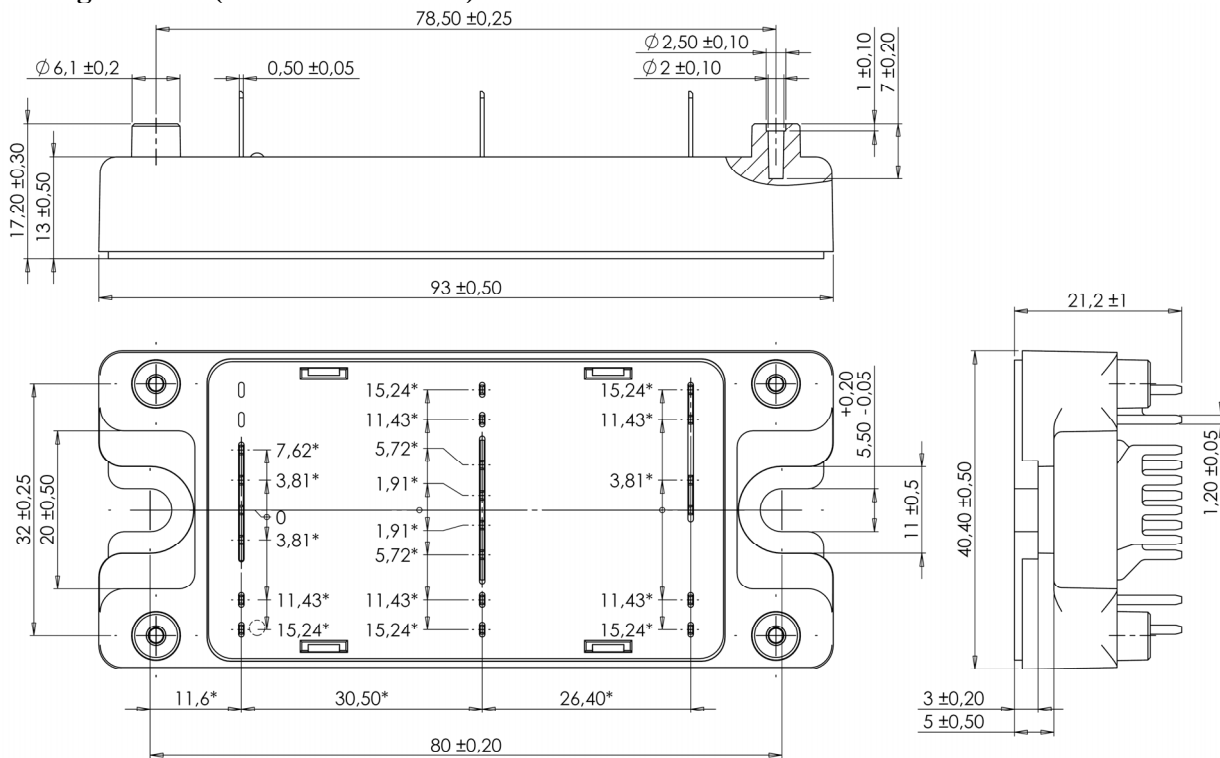
<i>Symbol</i>	<i>Characteristic</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B	T _C =100°C		4		%

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

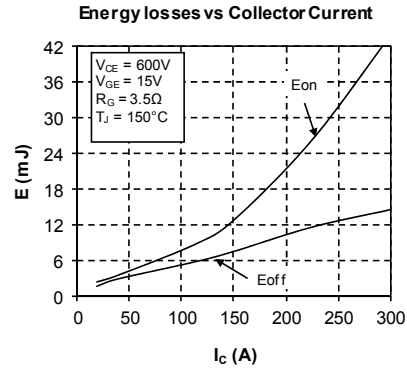
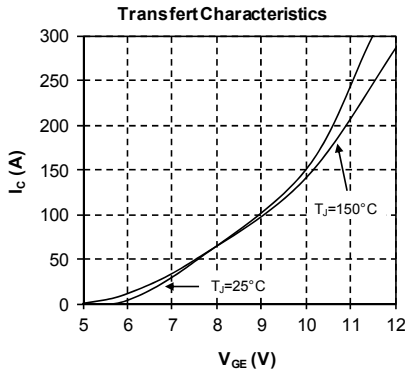
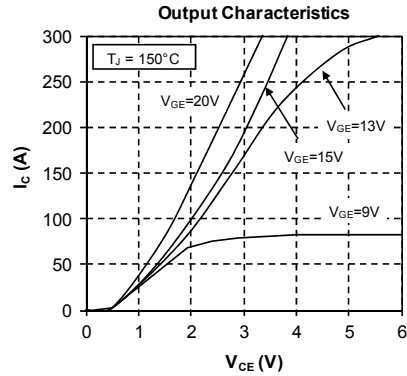
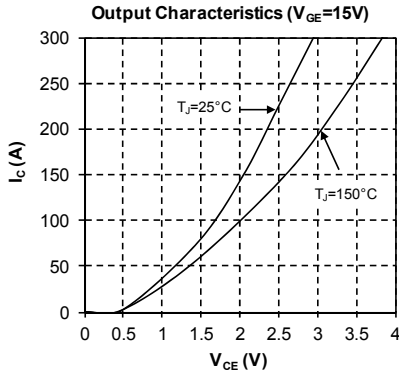
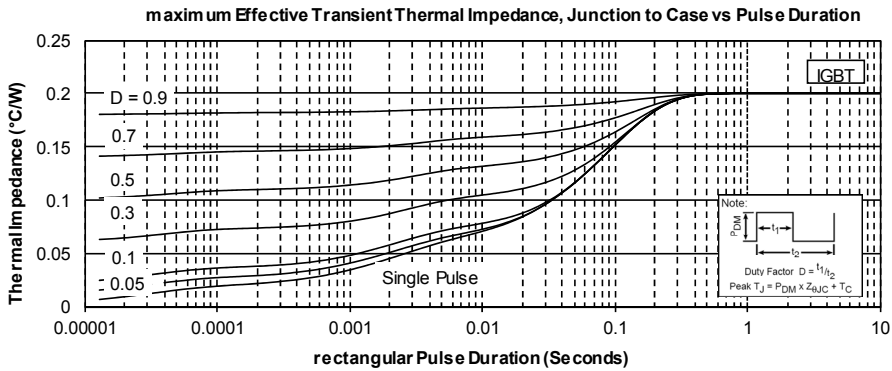
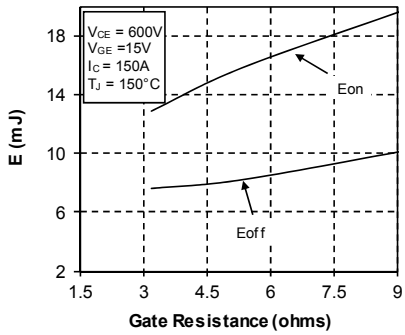
T: Thermistor temperature
 R_T: Thermistor value at T

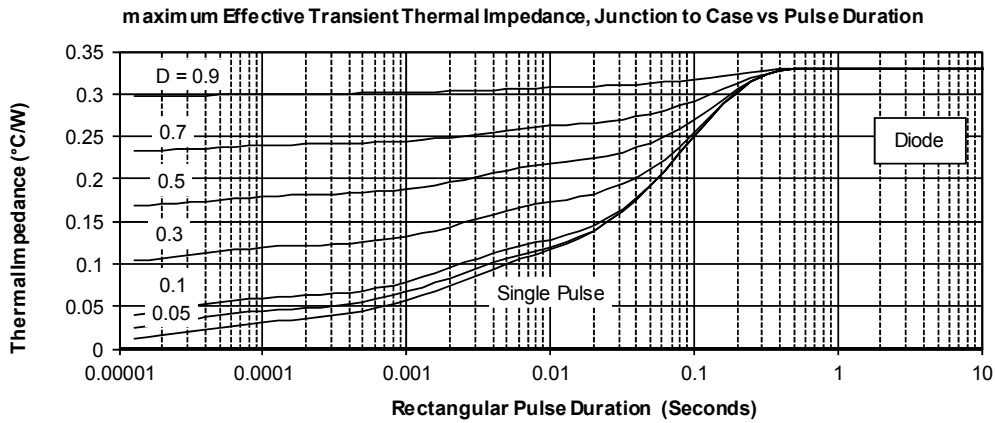
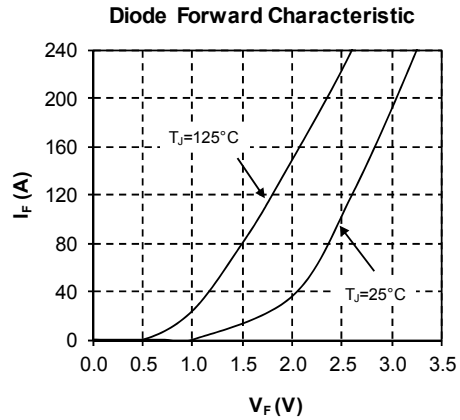
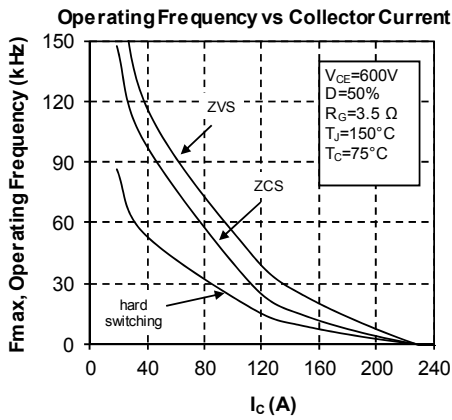
Thermal and package characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Min</i>	<i>Max</i>	<i>Unit</i>		
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	M5	2.5	4.7	N.m
Wt	Package Weight				160	g

Package outline (dimensions in mm)

 ALL DIMENSIONS MARKED "*" ARE TOLERANCED AS : $\pm \phi 1$

See application note APT0501 - Mounting Instructions for SP4 Power Modules on www.microsemi.com

Typical performance curve

Switching Energy Losses vs Gate Resistance




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