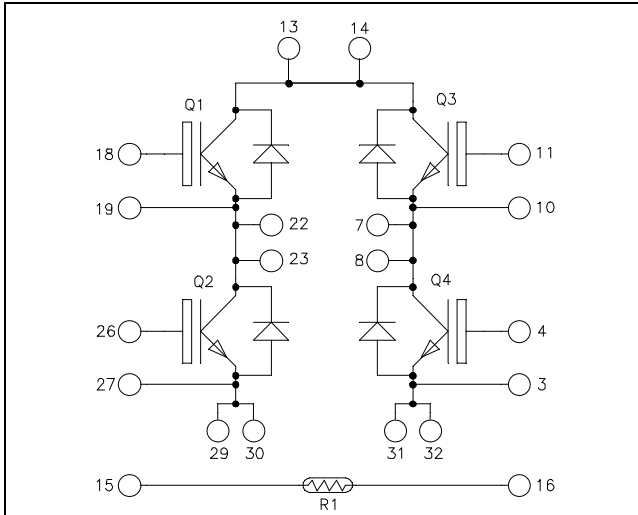


**Full bridge  
High speed Trench + Field Stop IGBT4  
Power Module**

**$V_{CES} = 1200V$   
 $I_C = 75A @ T_c = 80^\circ C$**

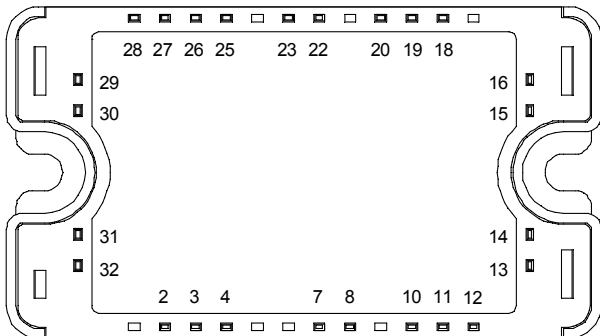


### Application

- 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
  - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- 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
- Easy paralleling due to positive TC of VCEsat
- Each leg can be easily paralleled to achieve a phase leg of twice the current capability
- RoHS compliant

All multiple inputs and outputs must be shorted together  
 Example: 13/14 ; 29/30 ; 22/23 ...

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

### Absolute maximum ratings (per IGBT)

Symbol	Parameter	Max ratings	Unit
$V_{CES}$	Collector - Emitter Breakdown Voltage	1200	V
$I_C$	Continuous Collector Current	$T_c = 25^\circ C$	130
		$T_c = 80^\circ C$	75
$I_{CM}$	Pulsed Collector Current	$T_c = 25^\circ C$	250
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	385	W
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	150A @ 1100V

**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.  
 See application note APT0502 on [www.microsemi.com](http://www.microsemi.com)

**Electrical Characteristics (per IGBT)**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_{CES}$	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} = 1200V$			50	$\mu A$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15V$ $I_C = 75A$	$T_j = 25^\circ C$ $T_j = 150^\circ C$	1.7 2.6	2.05 2.4	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 2.6 mA$	5.0	5.8	6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			150	nA

**Dynamic Characteristics (per IGBT)**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0V$		4400		pF
$C_{oes}$	Output Capacitance	$V_{CE} = 25V$		250		
$C_{res}$	Reverse Transfer Capacitance	$f = 1MHz$		235		
$Q_G$	Gate charge	$V_{GE} = 15V, I_C = 75A$ $V_{CE} = 960V$		325		nC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ C$ ) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 75A$ $R_G = 7\Omega$		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 ( $150^\circ C$ ) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 75A$ $R_G = 7\Omega$		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	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 75A$ $R_G = 7\Omega$	$T_j = 25^\circ C$	5.5		mJ
$E_{off}$	Turn off Energy		$T_j = 150^\circ C$	6.4		
			$T_j = 25^\circ C$	2.05		
			$T_j = 150^\circ C$	3.84		
$I_{sc}$	Short Circuit data	$V_{GE} \leq 15V; V_{Bus} = 900V$ $t_p \leq 10\mu s; T_j = 150^\circ C$		260		A
$R_{thJC}$	Junction to Case Thermal Resistance				0.39	$^\circ C/W$

**Diode ratings and characteristics (per diode)**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		1200			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200V$			150	$\mu A$
$I_F$	DC Forward Current	$T_c = 80^\circ C$		60		A
$V_F$	Diode Forward Voltage	$I_F = 60A$		2.6	3.1	V
		$I_F = 120A$		3.2		
		$I_F = 60A$	$T_j = 125^\circ C$	1.8		
$t_{rr}$	Reverse Recovery Time	$I_F = 60A$ $V_R = 800V$ $di/dt = 400A/\mu s$	$T_j = 25^\circ C$	300		ns
			$T_j = 125^\circ C$	380		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 60A$ $V_R = 800V$ $di/dt = 400A/\mu s$	$T_j = 25^\circ C$	720		nC
			$T_j = 125^\circ C$	3400		
$R_{thJC}$	Junction to Case Thermal Resistance				0.65	$^\circ C/W$

**Temperature sensor NTC** (see application note APT0406 on [www.microsemi.com](http://www.microsemi.com)).

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

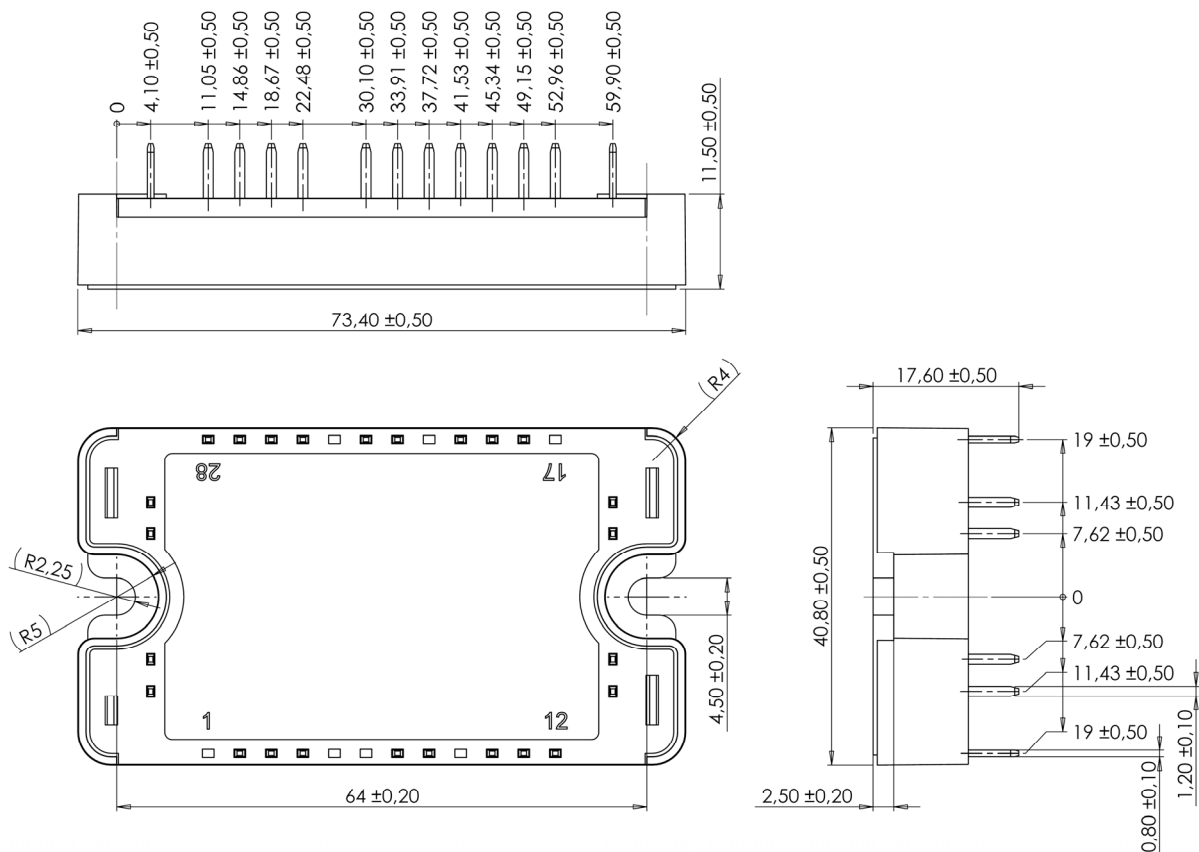
$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature  
 R<sub>T</sub>: Thermistor value at T

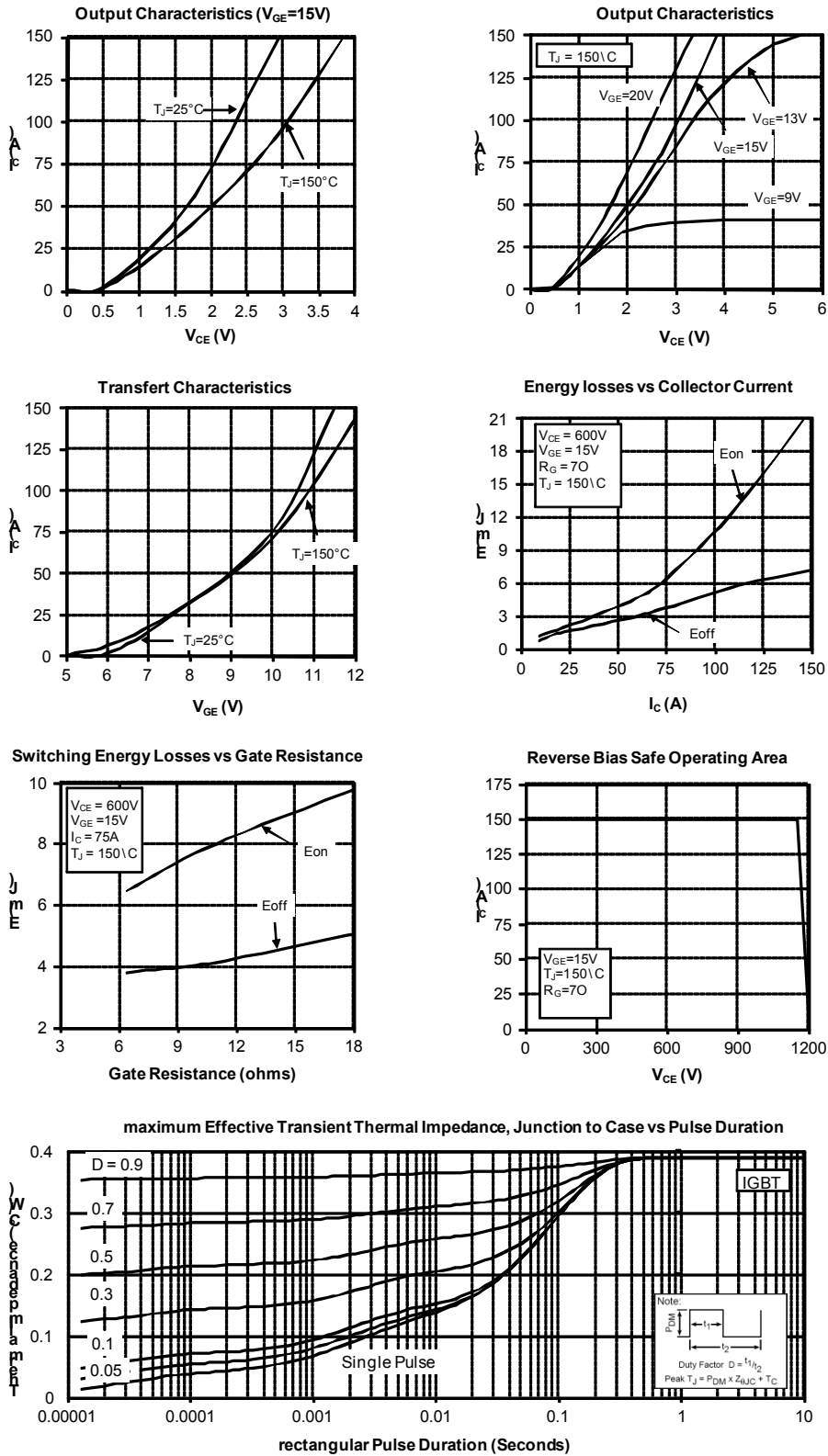
### Thermal and package characteristics

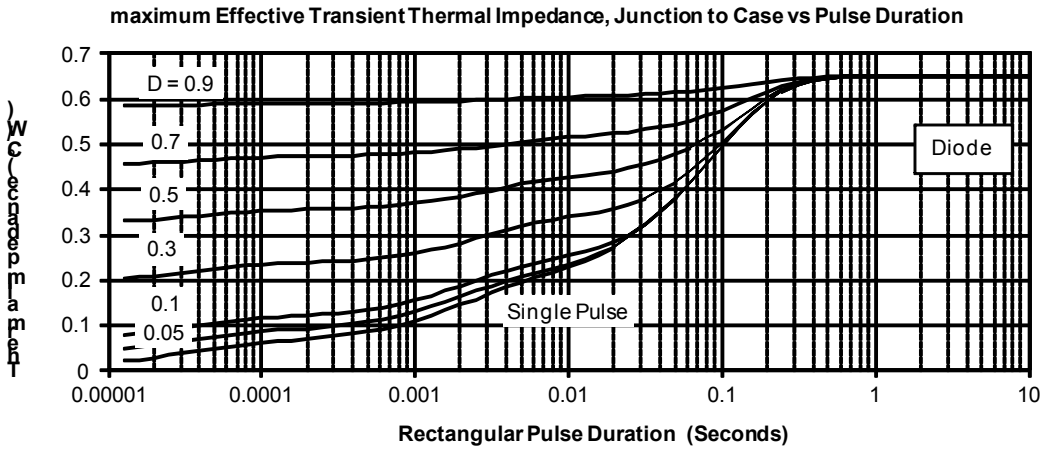
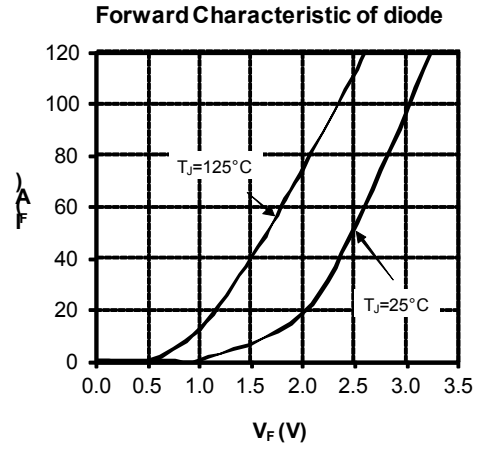
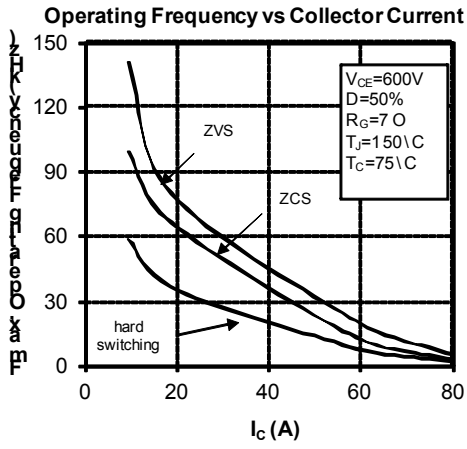
Symbol	Characteristic	Min	Typ	Max	Unit	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000			V	
T <sub>J</sub>	Operating junction temperature range	-40		175	°C	
T <sub>STG</sub>	Storage Temperature Range	-40		125		
T <sub>C</sub>	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				110	g

### SP1 Package outline (dimensions in mm)



See application note 1901 - Mounting Instructions for SP3 Power Modules on [www.microsemi.com](http://www.microsemi.com)

**Typical performance curve**




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