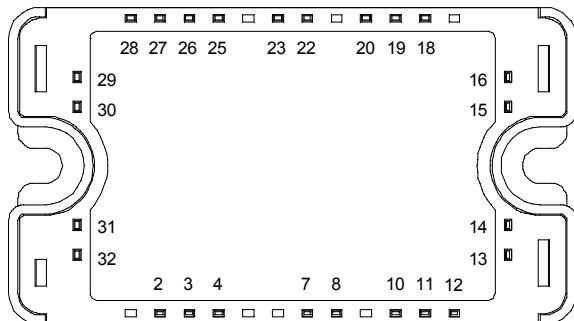
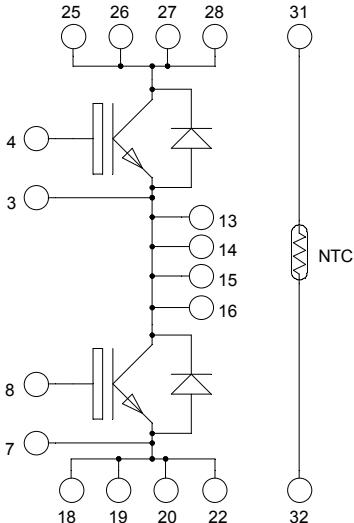


Phase leg
NPT IGBT Power Module

$V_{CES} = 1200V$
 $I_C = 100A @ T_c = 80^\circ C$



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

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	1200	V
I_C	Continuous Collector Current	$T_c = 25^\circ C$	A
		$T_c = 80^\circ C$	
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	200
V_{GE}	Gate – Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	657
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	200A @ 1150V

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

Application

- Welding converters

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
- 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 T_c of V_{CESat}
- RoHS compliant

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	$V_{GE} = 0\text{V}$, $V_{CE} = 1200\text{V}$	$T_j = 25^\circ\text{C}$	3.2	3.7	6.5	μA
$V_{CE(\text{sat})}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$	$T_j = 125^\circ\text{C}$	3.9			
$V_{GE(\text{th})}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$	$I_C = 4\text{mA}$	4.5	5.5	6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}$	$V_{CE} = 0\text{V}$			600	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$		6.5	1	0.5	nF
C_{oes}	Output Capacitance						
C_{res}	Reverse Transfer Capacitance						
Q_G	Gate charge	$V_{GE} = \pm 15\text{V}$; $V_{CE} = 600\text{V}$	$I_C = 100\text{A}$		1.1		μC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 100\text{A}$ $R_G = 5.6\Omega$		120	50	310	ns
T_r	Rise Time						
$T_{d(off)}$	Turn-off Delay Time						
T_f	Fall Time						
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 100\text{A}$ $R_G = 5.6\Omega$		130	60	360	ns
T_r	Rise Time						
$T_{d(off)}$	Turn-off Delay Time						
T_f	Fall Time						
E_{on}	Turn-on Switching Energy	$V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$	$T_j = 125^\circ\text{C}$	12	5		mJ
E_{off}	Turn-off Switching Energy		$T_j = 125^\circ\text{C}$				
I_{sc}	Short Circuit data	$V_{GE} \leq 15\text{V}$; $V_{Bus} = 900\text{V}$ $t_p \leq 10\mu\text{s}$; $T_j = 125^\circ\text{C}$			650		A

Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit	
V_{RRM}	Maximum Peak Repetitive Reverse Voltage			1200			V	
I_{RM}	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$			100	μA	
			$T_j = 125^\circ\text{C}$			500		
I_F	DC Forward Current		$T_c = 80^\circ\text{C}$		60		A	
V_F	Diode Forward Voltage	$I_F = 60\text{A}$			2.5	3	V	
		$I_F = 120\text{A}$			3			
		$I_F = 60\text{A}$	$T_j = 125^\circ\text{C}$		1.8			
t_{rr}	Reverse Recovery Time	$I_F = 60\text{A}$ $V_R = 800\text{V}$ $di/dt = 200\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		265		ns	
			$T_j = 125^\circ\text{C}$		350			
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$		560		nC	
			$T_j = 125^\circ\text{C}$		2890			

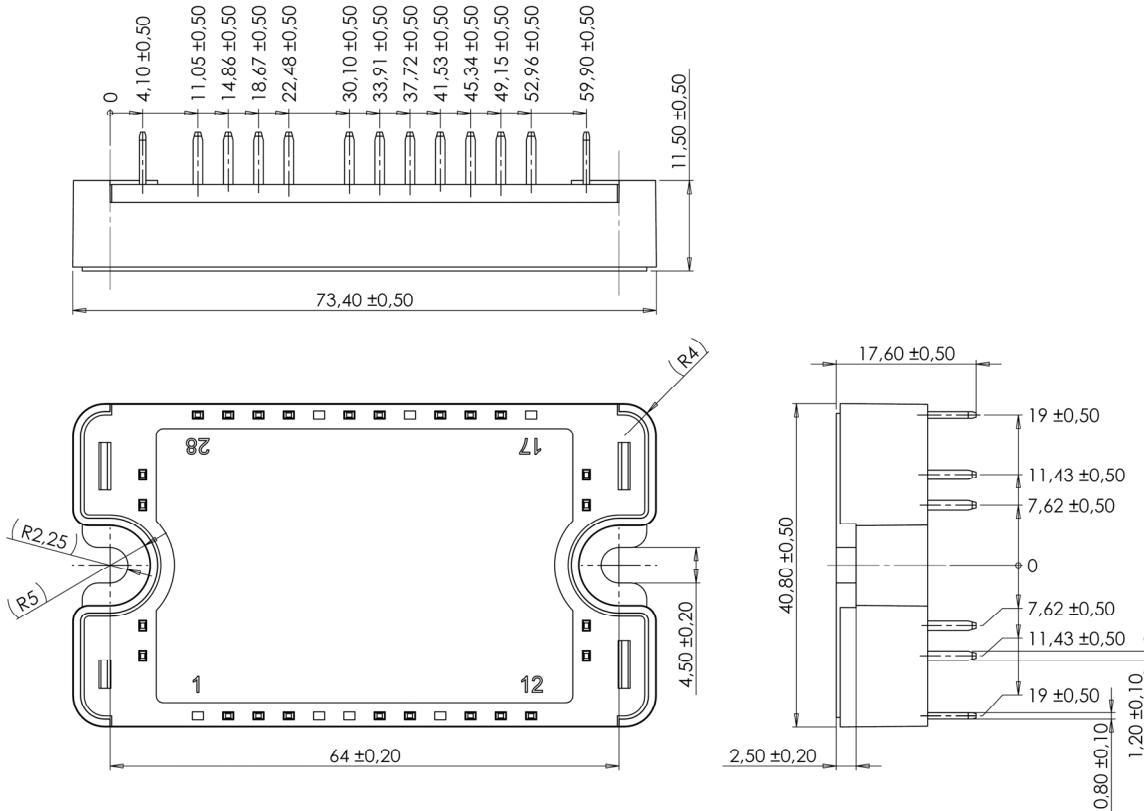
Thermal and package characteristics

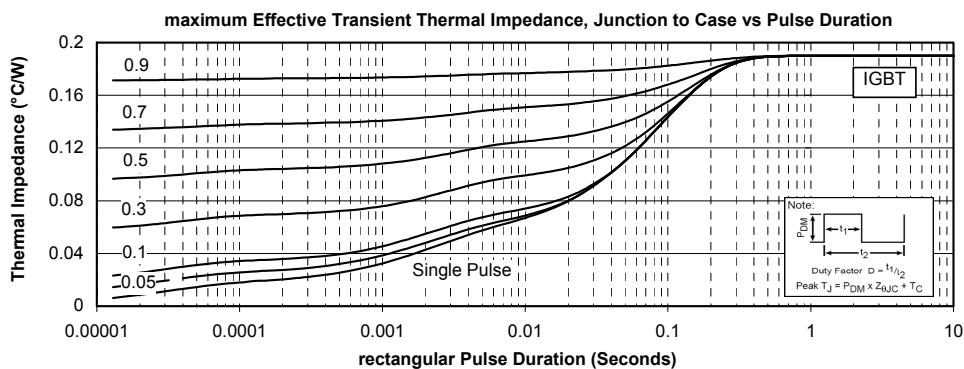
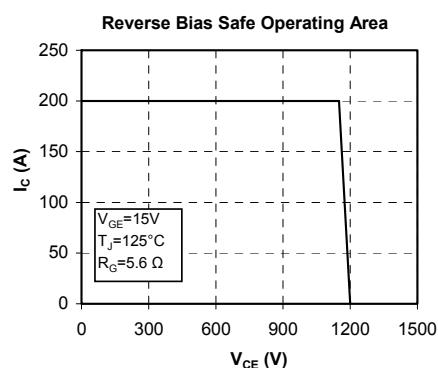
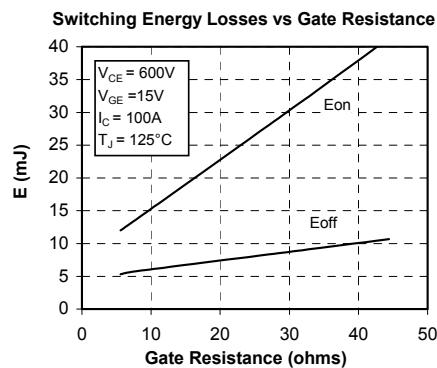
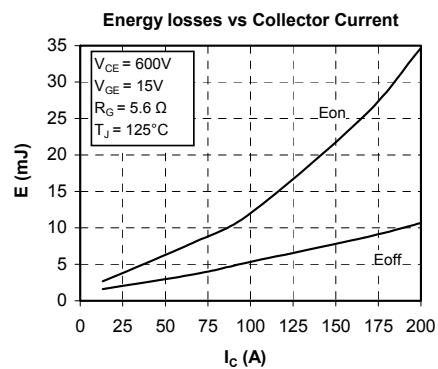
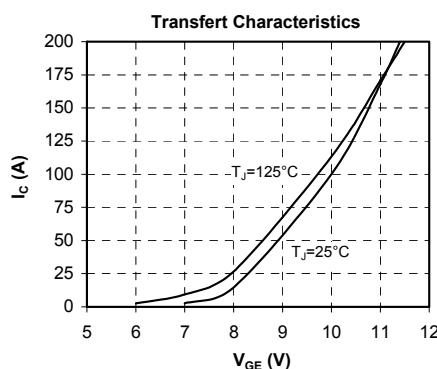
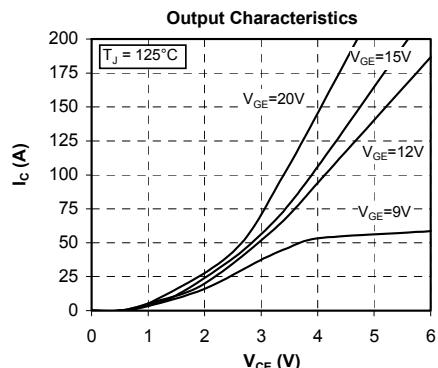
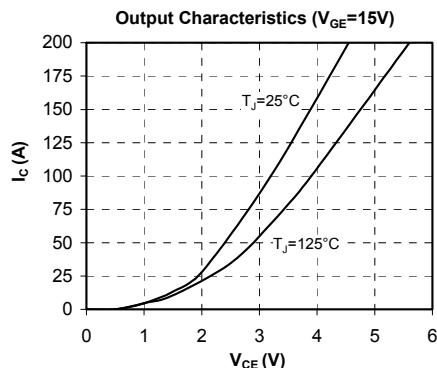
Symbol	Characteristic		Min	Typ	Max	Unit
R_{thJC}	Junction to Case Thermal Resistance	IGBT			0.19	$^{\circ}\text{C}/\text{W}$
		Diode			0.90	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz		4000			V
T_J	Operating junction temperature range		-40		150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range		-40		125	
T_C	Operating Case Temperature		-40		100	
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				110	g

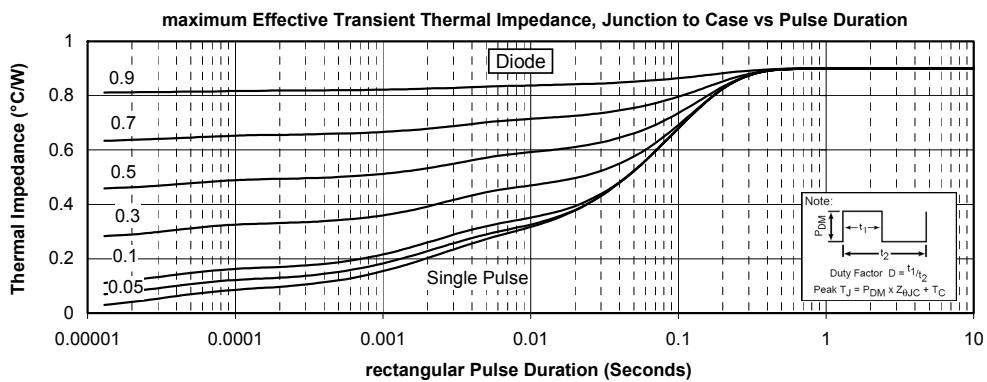
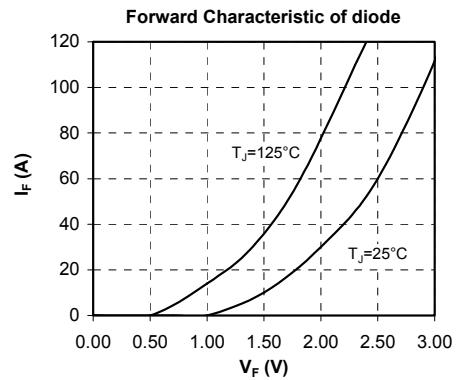
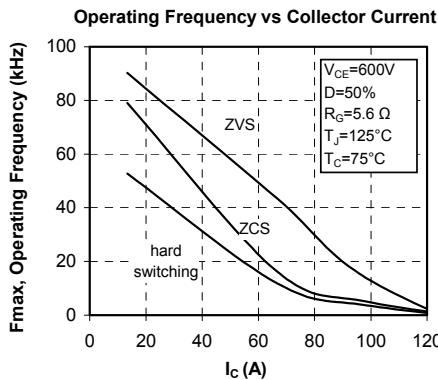
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic		Min	Typ	Max	Unit
R_{25}	Resistance @ 25°C			50		k Ω
$\Delta R_{25}/R_{25}$				5		%
$B_{25/85}$	$T_{25} = 298.15 \text{ K}$			3952		K
$\Delta B/B$		$T_C=100^{\circ}\text{C}$		4		%

$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]} \quad \begin{array}{l} \text{T: Thermistor temperature} \\ \text{R}_T: \text{Thermistor value at T} \end{array}$$

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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