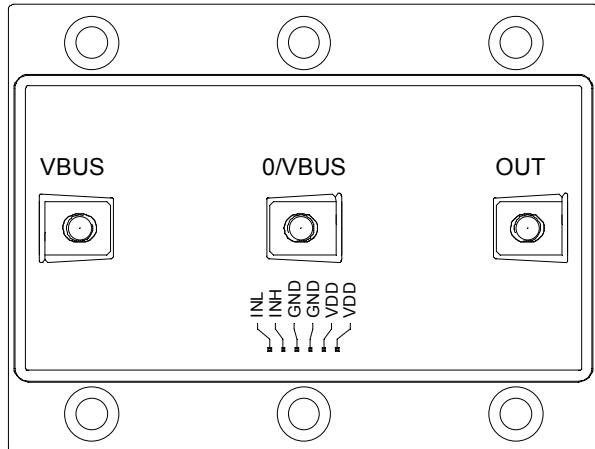
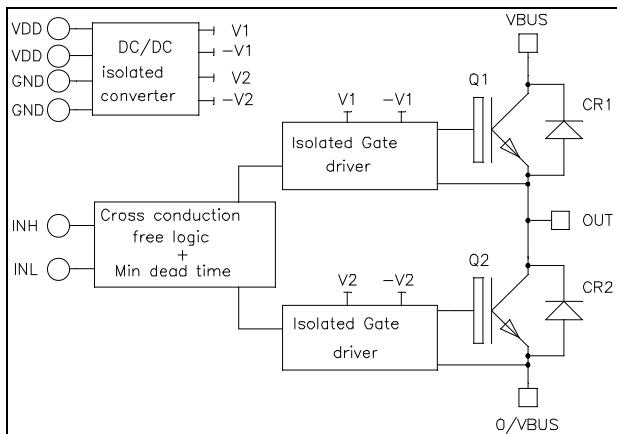


**Phase leg
Intelligent Power Module**
 $V_{CES} = 1200V$
 $I_C = 300A @ T_c = 80^\circ C$

Application

- Motor control
- Uninterruptible Power Supplies
- Switched Mode Power Supplies
- Amplifier

Features

- **Non Punch Through (NPT) FAST IGBT**
 - Low voltage drop
 - Low tail current
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - RBSOA & SCSOA rated
- **Integrated Fail Safe IGBT Protection (Driver)**
 - Top Bottom input signals Interlock
 - Isolated DC/DC Converter
- Low stray inductance
- M5 power connectors
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Very high noise immunity
(common mode rejection > 25kV/μs)
- Galvanic Isolation: 3750V for the optocoupler
2500V for the transformer
- 5V logic level with Schmitt-trigger Input
- Single $V_{DD}=5V$ supply required
- Secondary auxiliary power supplies internally generated
(15V, -6V)
- Optocoupler qualified to AEC-Q100 test guidelines
- RoHS compliant


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

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

1. Inverter Power Module

Absolute maximum ratings

Symbol	Parameter		Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage		1200	V
I_C	Continuous Collector Current	$T_C = 25^\circ\text{C}$	400	A
		$T_C = 80^\circ\text{C}$	300	
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ\text{C}$	600	
P_D	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	1780	W
$RBSOA$	Reverse Bias Safe Operating Area	$T_j = 125^\circ\text{C}$	600A @ 1200V	

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$	$T_j = 25^\circ\text{C}$		500	μA
		$V_{CE} = 1200\text{V}$	$T_j = 125^\circ\text{C}$		750	
$V_{CE(\text{sat})}$	Collector Emitter Saturation Voltage	$V_{DD} = V_{IN} = 5\text{V}$	$T_j = 25^\circ\text{C}$	3.2	3.9	V
		$I_C = 300\text{A}$	$T_j = 125^\circ\text{C}$	4		

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$		21		nF
C_{oes}	Output Capacitance			2.9		
C_{res}	Reverse Transfer Capacitance			1.52		
T_r	Rise Time	Inductive Switching (25°C) $V_{DD} = V_{IN} = 5\text{V}$ $V_{Bus} = 600\text{V} ; I_C = 300\text{A}$		50		ns
T_f	Fall Time			30		
T_r	Rise Time			60		ns
T_f	Fall Time	$V_{DD} = V_{IN} = 5\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 300\text{A}$		40		
E_{on}	Turn-on Switching Energy			25		mJ
E_{off}	Turn-off Switching Energy			15		
I_{sc}	Short Circuit data	$V_{DD} = V_{IN} = 5\text{V} ; V_{Bus} = 900\text{V}$ $t_p \leq 10\mu\text{s} ; T_j = 125^\circ\text{C}$		1800		A
R_{thJC}	Junction to Case thermal resistance				0.07	$^\circ\text{C/W}$

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 =1200V	T _j = 25°C			250	μA	
			T _j = 125°C			500		
I _F	DC Forward Current		T _c = 80°C		300		A	
V _F	Diode Forward Voltage	I _F = 300A	T _j = 25°C		2.1		V	
			T _j = 125°C		1.9			
t _{rr}	Reverse Recovery Time	I _F = 300A V _R = 600V di/dt = 6000A/μs	T _j = 25°C		120		ns	
			T _j = 125°C		210			
Q _{rr}	Reverse Recovery Charge		T _j = 25°C		22		μC	
			T _j = 125°C		56			
E _{rr}	Reverse Recovery Energy		T _j = 25°C		7.2		mJ	
			T _j = 125°C		18			
R _{thJC}	Junction to Case Thermal Resistance					0.12	°C/W	

2. Driver
Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V _{DD}	Supply Voltage	5.5	V
V _{INI}	Input signal voltage i=L, H	5.5	
I _{VDDmax}	Maximum Supply current	0.35	A
		2	
f _{max}	Maximum Switching Frequency	50	kHz

Driver Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V _{DD}	Operating Supply Voltage		4.5	5	5.5	V
V _{INI(max)}	Maximum Input Voltage	i = L, H	-0.5	5	5.5	V
V _{INI(th+)}	Positive Going Threshold Voltage			3.2		
V _{INI(th-)}	Negative Going Threshold Voltage			1		
R _{INI}	Input Resistance *			1		kΩ
T _{d(on)}	Turn On delay time	Driver + IGBT		1100 ^①		ns
D _T	Built in dead time			600		
T _{d(off)}	Turn Off delay time	Driver + IGBT		750		
PWD	Pulse Width Distortion				300	ns
PDD	Propagation Delay Difference between any two driver	T _{d(on)} - T _{d(off)}	-350		350	
V _{ISOL}	Primary to Secondary Isolation		2500			V _{RMS}

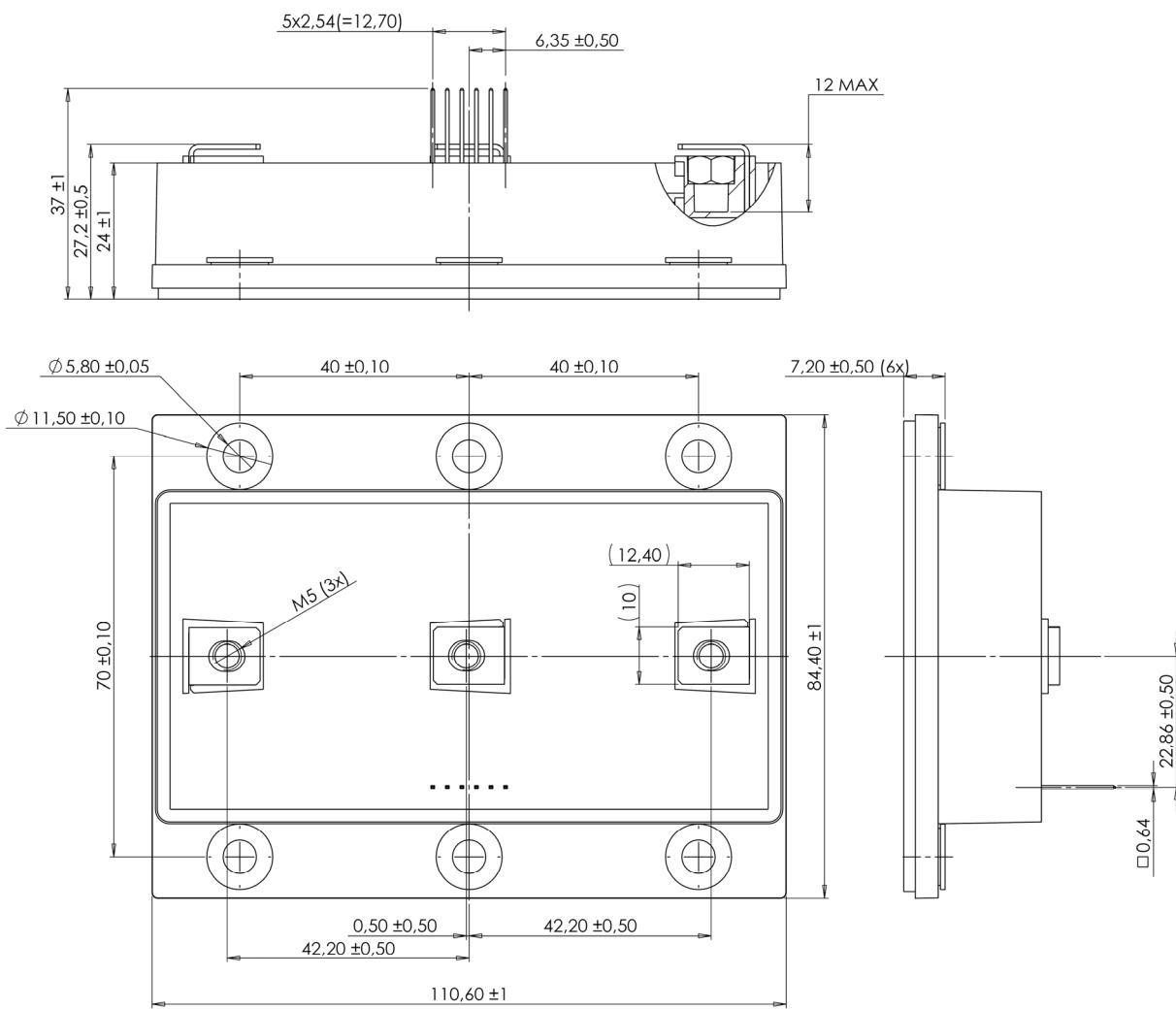
* Low impedance guarantees good noise immunity.

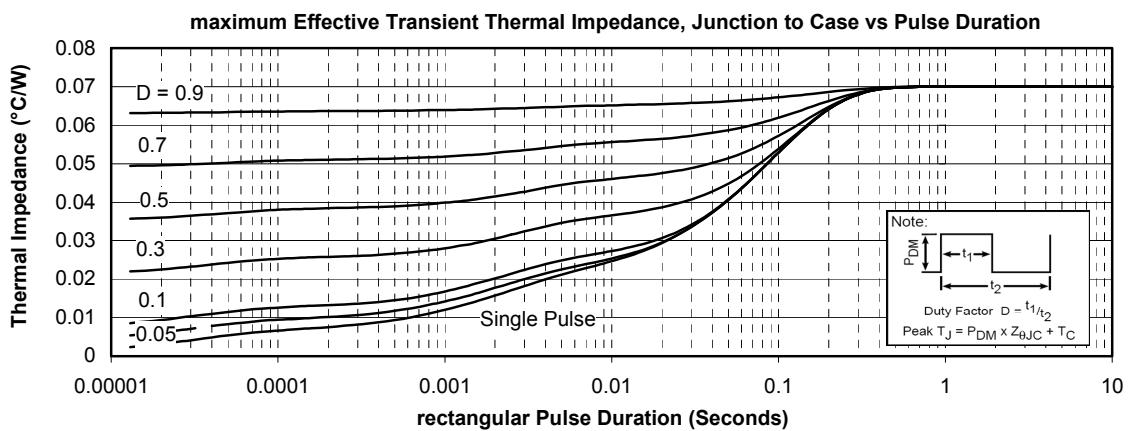
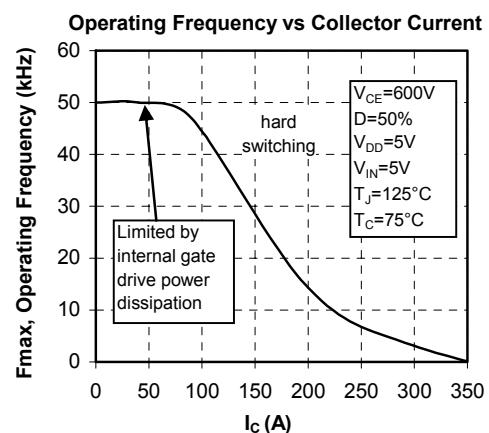
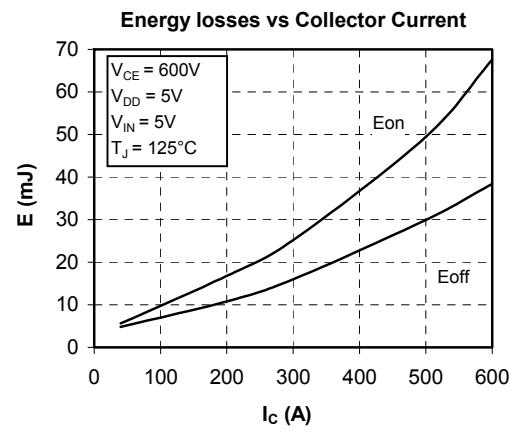
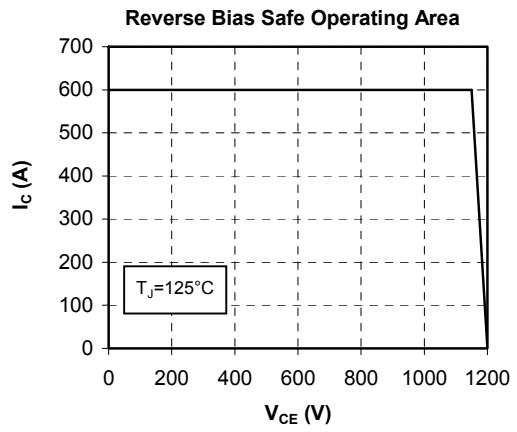
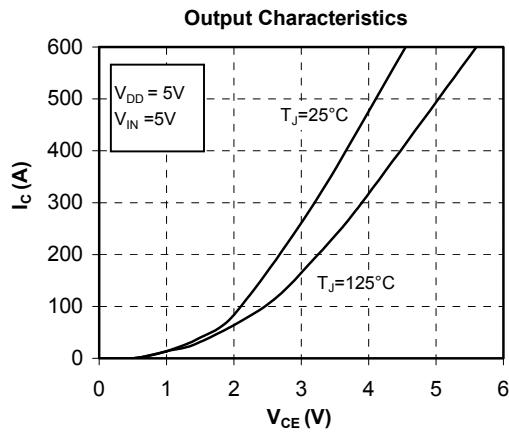
① Including built in dead time.

3. Package characteristics

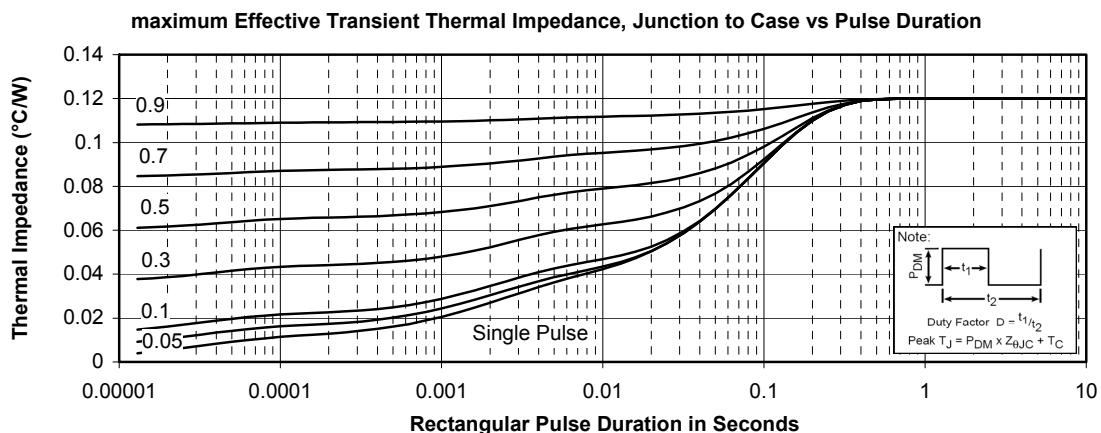
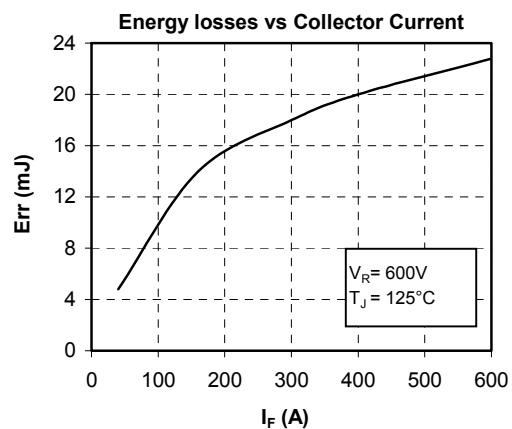
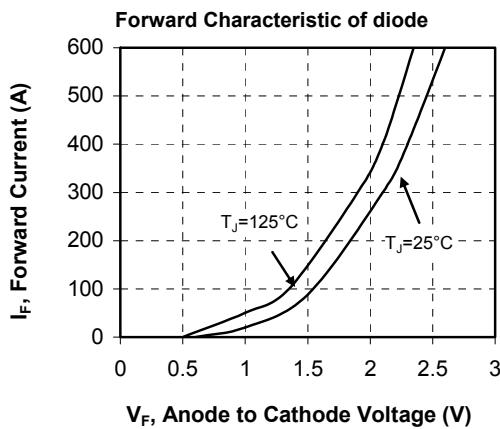
Symbol	Characteristic		Min	Typ	Max	Unit
V_{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz		4000			V
T_J	Operating junction temperature range		-40		150	
T_{OP}	Operating Ambient Temperature		-40		85	
T_{STG}	Storage Temperature Range		-40		100	
T_C	Operating Case Temperature		-40		100	
Torque	Mounting torque	To heatsink For terminals	M5 M5	2 2	4.7 4	N.m
Wt	Package Weight			550		g

4. LP8 Package outline (dimensions in mm)



Typical IGBT Performance Curve


Typical diode Performance Curve



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