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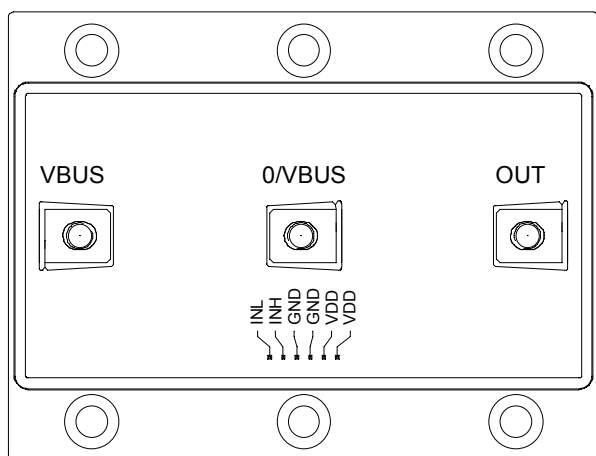
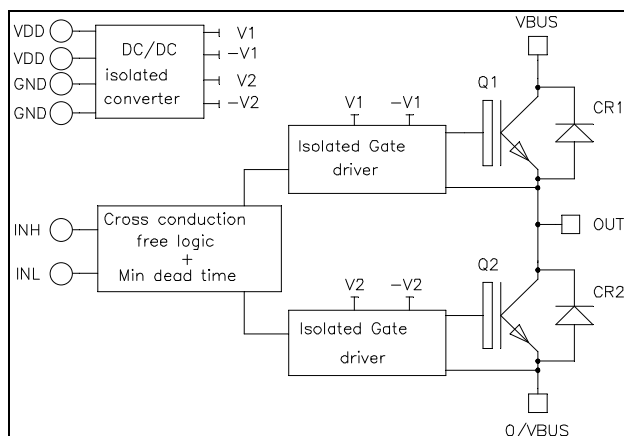
Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



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

- **Trench + Field Stop IGBT 3 Technology**
 - Low voltage drop
 - Low tail current
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - RBSOA and 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	$T_C = 25^\circ\text{C}$	440
		$T_C = 80^\circ\text{C}$	300
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ\text{C}$	600
P_D	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	1400
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ\text{C}$	600A @ 1150V

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$ $V_{CE} = 1200\text{V}$	$T_j = 25^\circ\text{C}$		500	μA
			$T_j = 125^\circ\text{C}$		750	
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{DD} = V_{IN} = 5\text{V}$ $I_C = 300\text{A}$	$T_j = 25^\circ\text{C}$	1.7	2.1	V
			$T_j = 125^\circ\text{C}$	2		

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			1.12		
C_{res}	Reverse Transfer Capacitance			0.96		
T_r	Rise Time	Inductive Switching (25°C) $V_{DD} = V_{IN} = 5\text{V}$ $V_{Bus} = 600\text{V}$; $I_C = 300\text{A}$		40		ns
T_f	Fall Time			70		
T_r	Rise Time	Inductive Switching (125°C) $V_{DD} = V_{IN} = 5\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 300\text{A}$		45		ns
T_f	Fall Time			90		
E_{on}	Turn-on Switching Energy	$V_{DD} = V_{IN} = 5\text{V}$; $V_{Bus} = 900\text{V}$ $t_p \leq 10\mu\text{s}$; $T_j = 125^\circ\text{C}$		28		mJ
E_{off}	Turn-off Switching Energy			32		
I_{sc}	Short Circuit data	$V_{DD} = V_{IN} = 5\text{V}$; $V_{Bus} = 900\text{V}$ $t_p \leq 10\mu\text{s}$; $T_j = 125^\circ\text{C}$		1200		A
R_{thJC}	Junction to Case thermal resistance				0.09	$^\circ\text{C/W}$

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	$V_R = 1200V$	$T_i = 25^\circ C$ $T_i = 125^\circ C$			250 500	μA
I_F	DC Forward Current		$T_c = 80^\circ C$		300		A
V_F	Diode Forward Voltage	$I_F = 300A$	$T_i = 25^\circ C$ $T_i = 125^\circ C$		1.6 1.6	2.1	V
t_{rr}	Reverse Recovery Time	$I_F = 300A$ $V_R = 600V$ $di/dt = 3500A/\mu s$	$T_j = 25^\circ C$ $T_j = 125^\circ C$		170 280		ns
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ C$ $T_j = 125^\circ C$		28 56		μC
E_{rr}	Reverse Recovery Energy		$T_j = 25^\circ C$ $T_j = 125^\circ C$		12 22		mJ
R_{thJC}	Junction to Case Thermal Resistance					0.16	$^\circ C/W$

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	V _{INi} = 0V, i = L & H	0.35	A
		V _{DD} =5V, V _{INH} = /V _{INL} ; F _{out} = 45kHz	2	
f _{max}	Maximum Switching Frequency		45	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		k Ω
$T_{d(on)}$	Turn On delay time	Driver + IGBT		1100 ^❶		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}

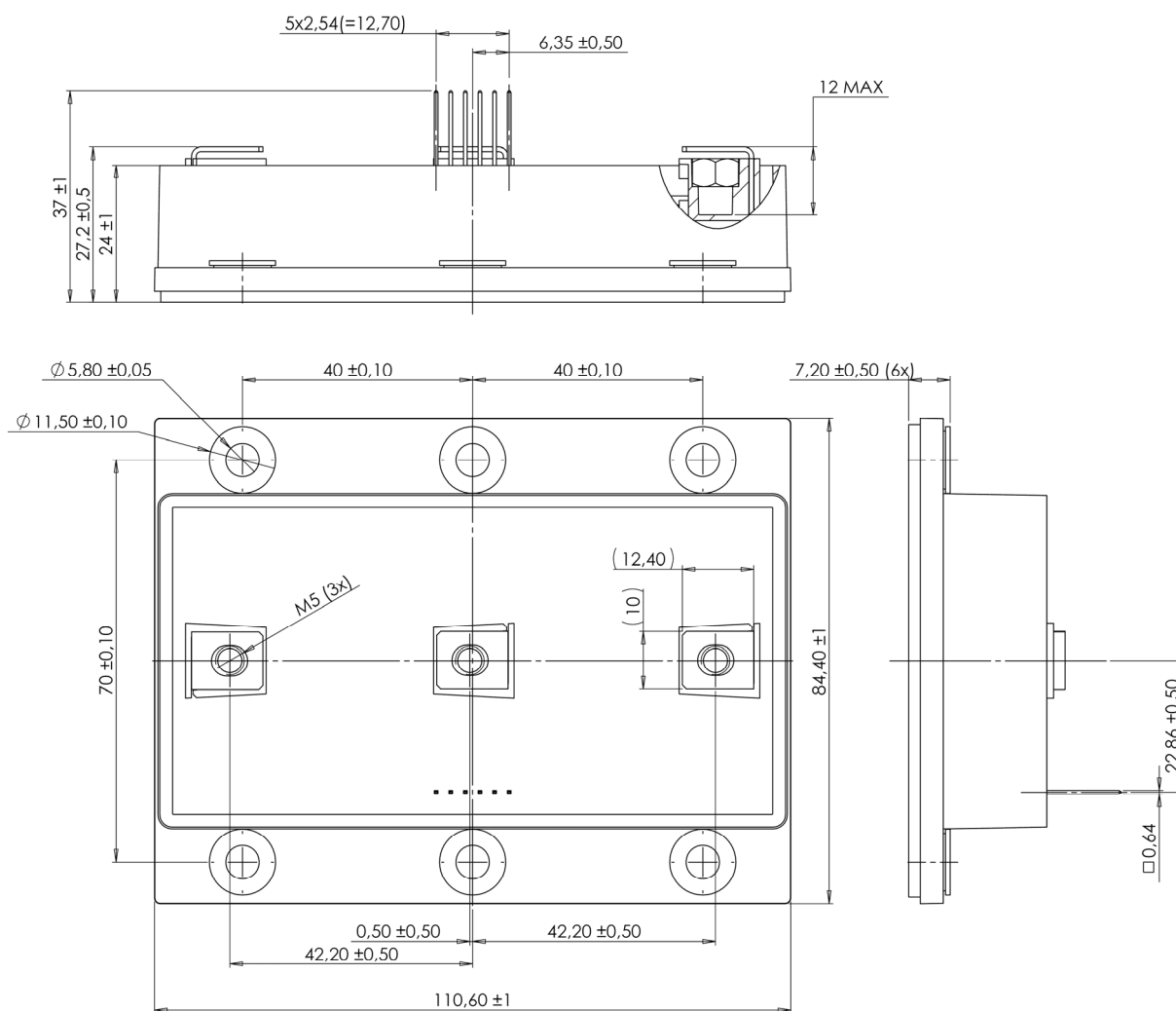
* Low impedance guarantees good noise immunity.

❶ Including built in dead time.

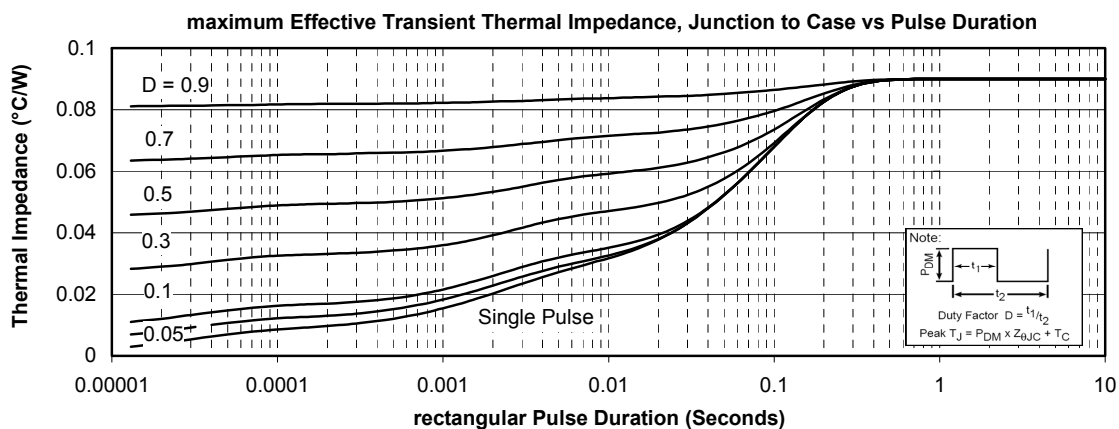
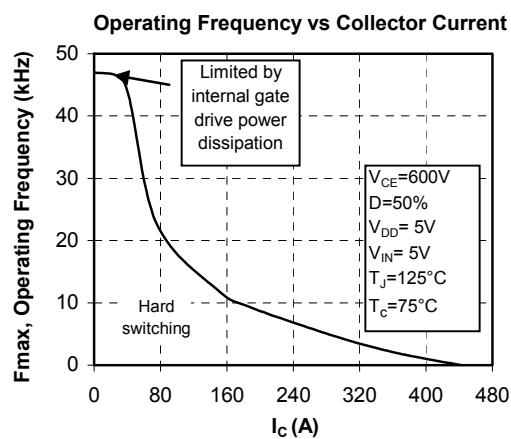
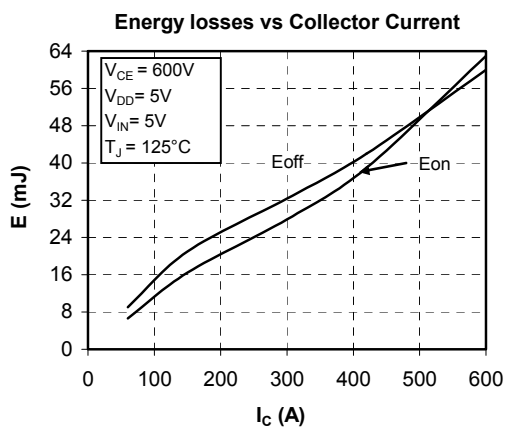
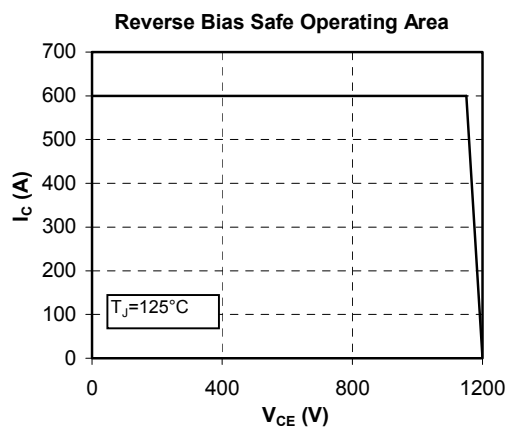
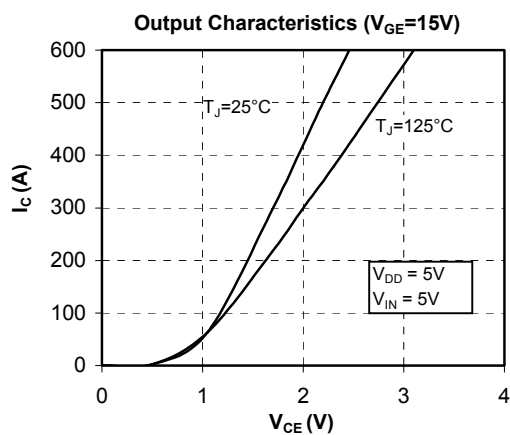
3. Package characteristics

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	°C
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	M5	2		4.7	N.m
		For terminals	M5	2		4	
Wt	Package Weight				550		g

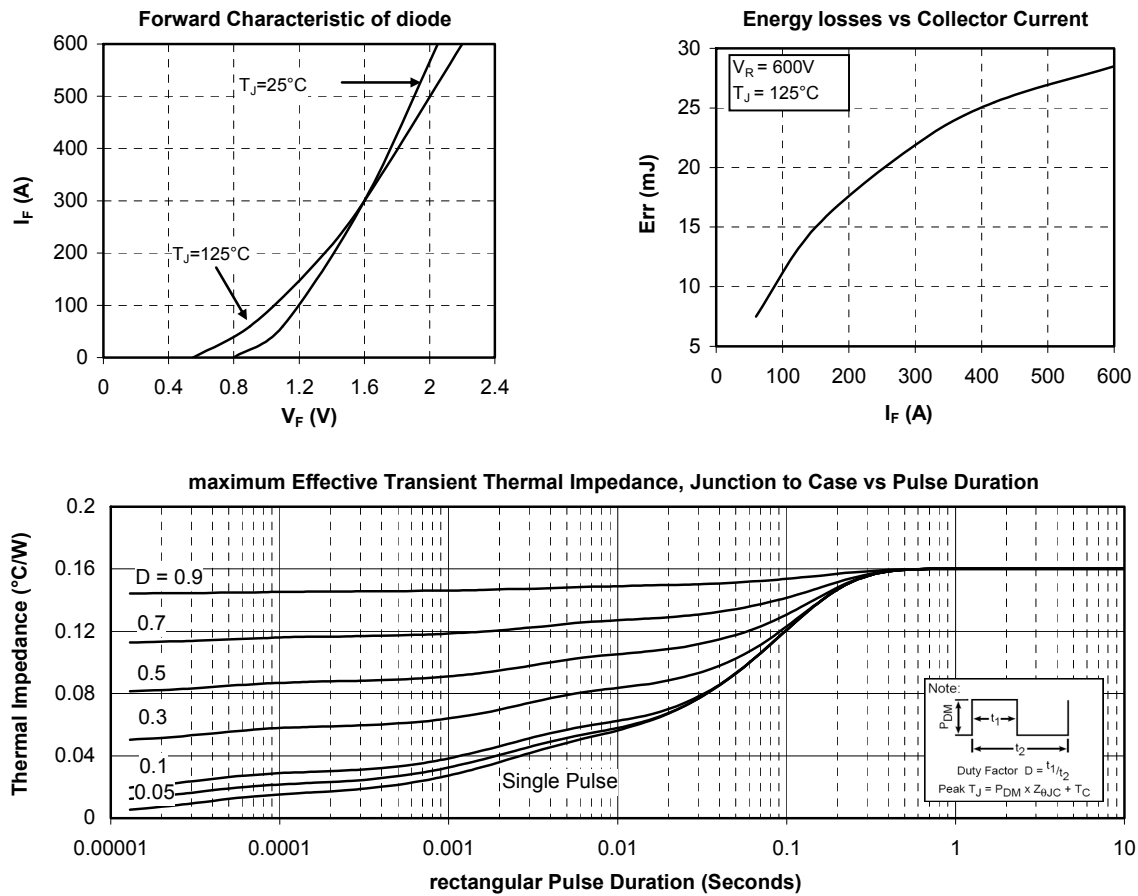
4. LP8 Package outline (dimensions in mm)



Typical IGBT Performance Curve



Typical diode Performance Curve



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