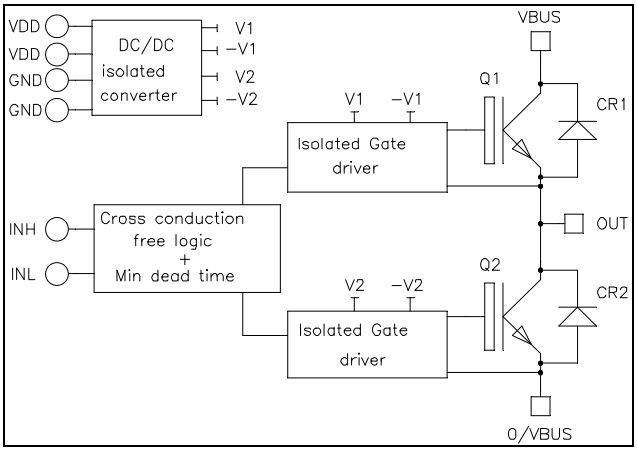
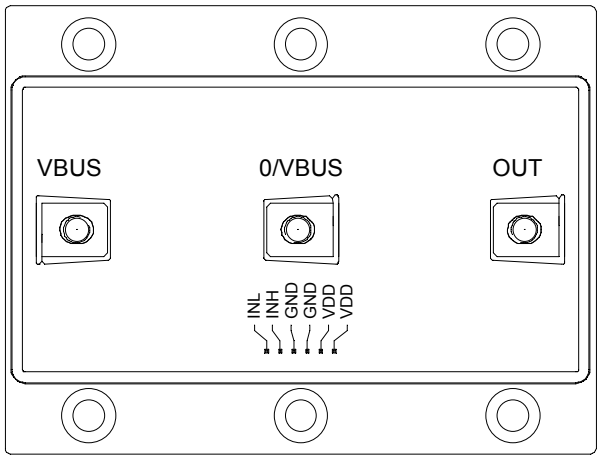
APTLGL325A1208G

Phase leg Intelligent Power Module

V_{CES} = 1200V
I_C = 325A @ Tc = 80°C





Application

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

Features

- ***Trench + Field Stop IGBT 4 Technology***
  - Low voltage drop
  - Low leakage current
  - Low switching losses
  - Soft recovery parallel diodes
  - Low diode VF
  - 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°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°C	420	A
		T_C = 80°C	325	
I_{CM}	Pulsed Collector Current	T_C = 25°C	600	
P_D	Maximum Power Dissipation	T_C = 25°C	1500	W
RBSOA	Reverse Bias Safe Operating Area	T_j = 150°C	600A @ 1150V	

Electrical Characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
I_{CES}	Zero Gate Voltage Collector Current	V_{GE} = 0V V_{CE} = 1200V	T_j = 25°C			500	µA
			T_j = 150°C			750	
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	V_{DD} = V_{IN} = 5V I_C = 300A	T_j = 25°C		1.85	2.2	V
			T_j = 150°C		2.2		

Dynamic Characteristics

Symbol	*Characteristic*	*Test Conditions*	*Min*	*Typ*	*Max*	*Unit*
C_{ies}	Input Capacitance	V_{GE} = 0V V_{CE} = 25V f = 1MHz		17.6		nF
C_{oes}	Output Capacitance			1.16		
C_{res}	Reverse Transfer Capacitance			0.94		
T_r	Rise Time	Inductive Switching (25°C) V_{DD} = V_{IN} = 5V V_{Bus} = 600V ; I_C = 300A		30		ns
T_f	Fall Time			70		
T_r	Rise Time	Inductive Switching (150°C) V_{DD} = V_{IN} = 5V V_{Bus} = 600V I_C = 300A		40		ns
T_f	Fall Time			80		
E_{on}	Turn-on Switching Energy			34		mJ
E_{off}	Turn-off Switching Energy			29		
I_{sc}	Short Circuit data	V_{DD} = V_{IN} = 5V; V_{Bus} =900V $t_p \leq$ 10µs ; T_j = 150°C		1100		A
R_{thJC}	Junction to Case thermal resistance				0.1	°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 = 150°C			750	
I_F	DC Forward Current		Tc = 80°C		360		A
V_F	Diode Forward Voltage	I_F = 300A	T_j = 25°C		1.7	2.2	V
			T_j = 150°C		1.65		
t_{rr}	Reverse Recovery Time	I_F = 300A V_R = 600V di/dt =7000A/µs	T_j = 25°C		155		ns
			T_j = 150°C		300		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		29		µC
			T_j = 150°C		61		
E_{rr}	Reverse Recovery Energy		T_j = 25°C		10.4		mJ
			T_j = 150°C		22		
R_{thJC}	Junction to Case Thermal Resistance					0.17	°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} = 55kHz	2	
f_{max}	Maximum Switching Frequency		55	kHz

Driver Electrical Characteristics

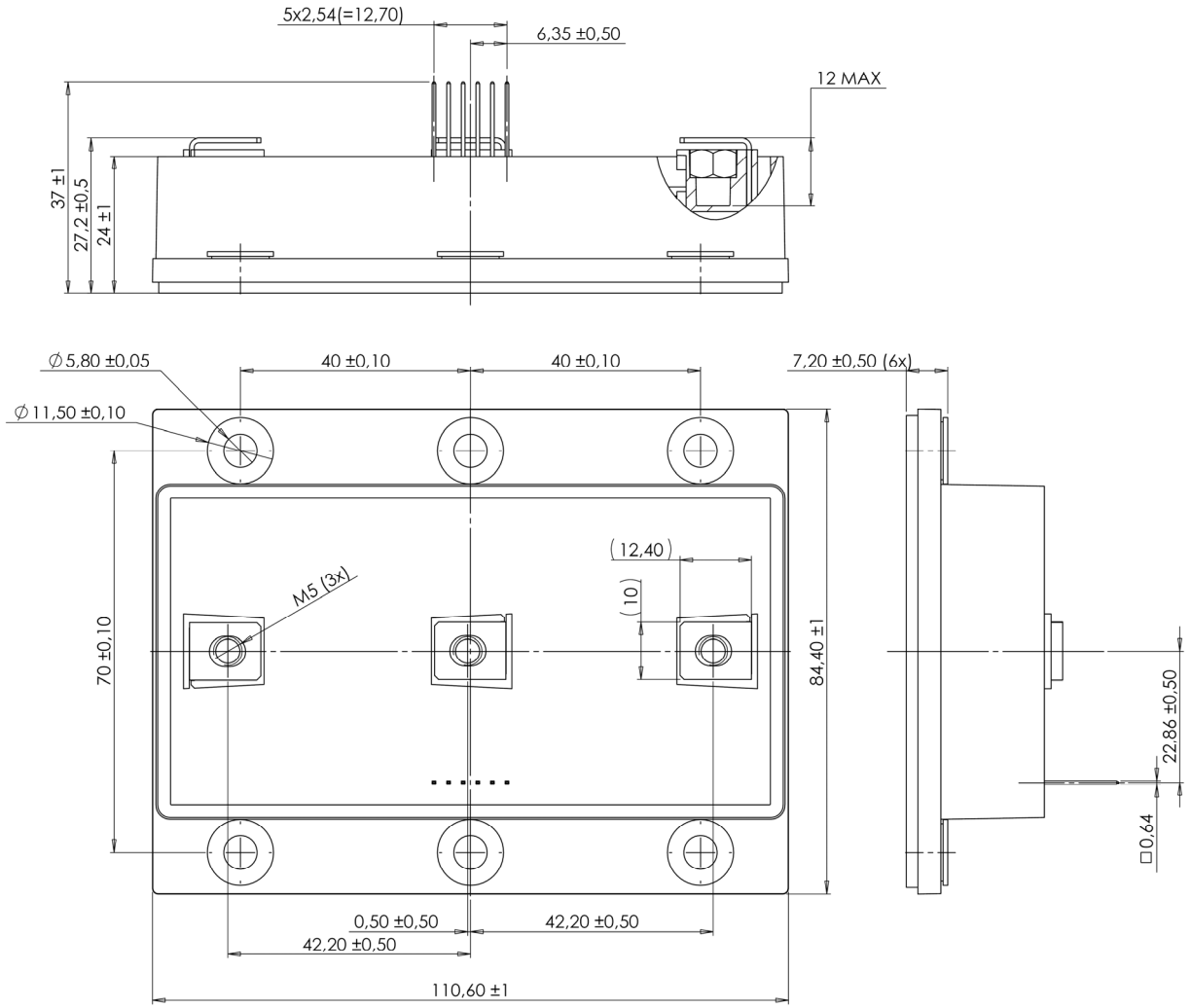
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{DD}	Operating Supply Voltage		4.5	5	5.5	V
$V_{INi(max)}$	Maximum Input Voltage	i = L, H	-0.5	5	5.5	V
$V_{INi\ (th+)}$	Positive Going Threshold Voltage			3.2		
$V_{INi(th-)}$	Negative Going Threshold Voltage			1		
R_{INi}	Input Resistance *			1		kΩ
$T_{d(on)}$	Turn On delay time	Driver + IGBT		1100❶		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

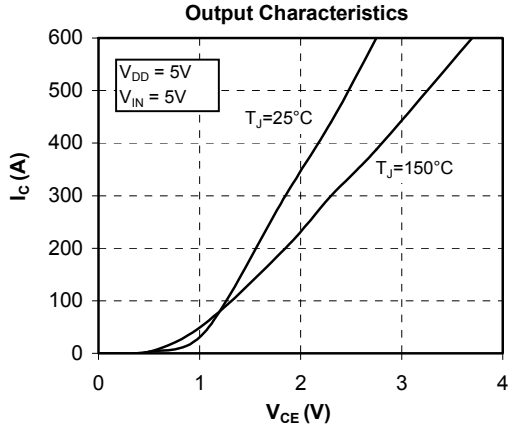
Symbol	*Characteristic*			*Min*	*Typ*	*Max*	*Unit*
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000			V
T_J	Operating junction temperature range			-40		150	°C
T_{OP}	Operating Ambient Temperature			-40		85	
T_{STG}	Storage Temperature Range			-40		100	
T_C	Operating Case 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)

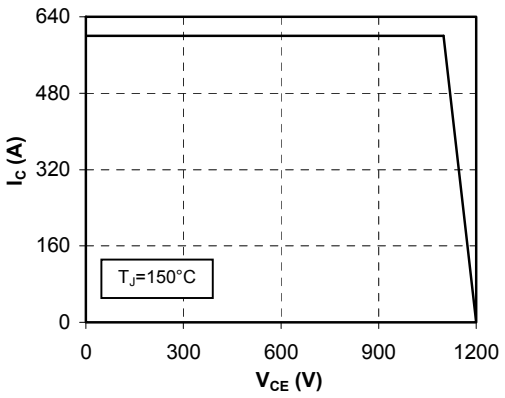


Typical IGBT Performance Curve

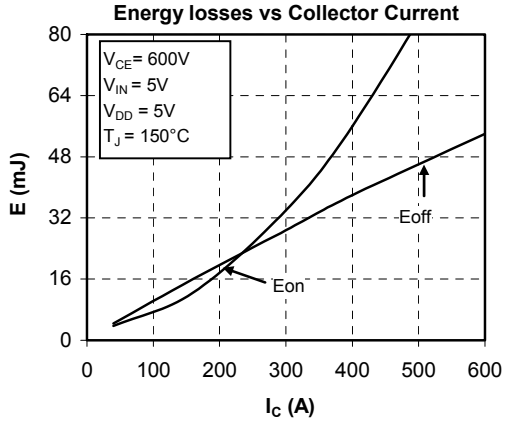
Output Characteristics



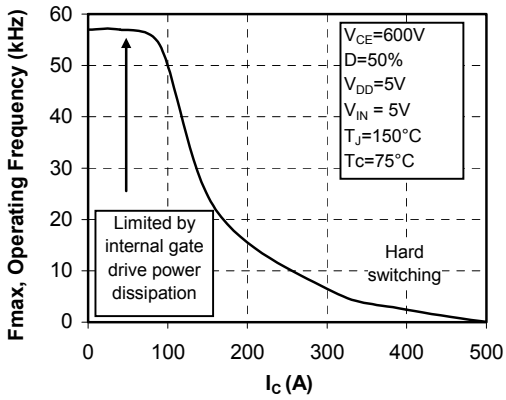
Reverse Bias Safe Operating Area



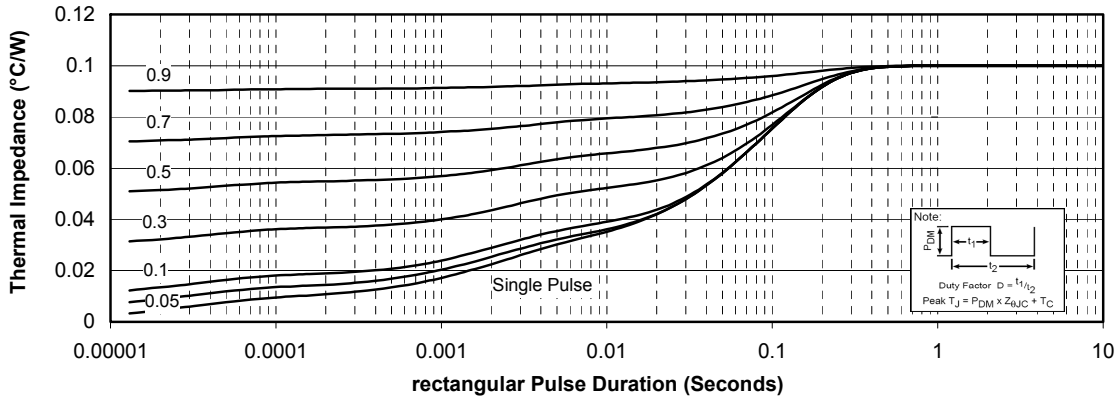
Energy losses vs Collector Current



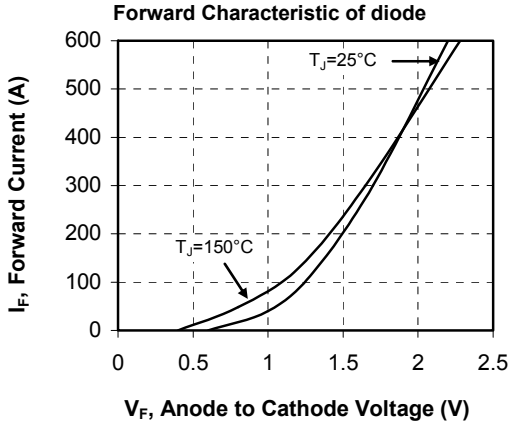
Operating Frequency vs Collector Current

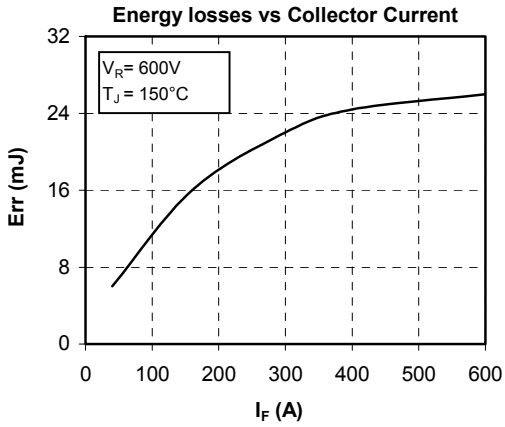


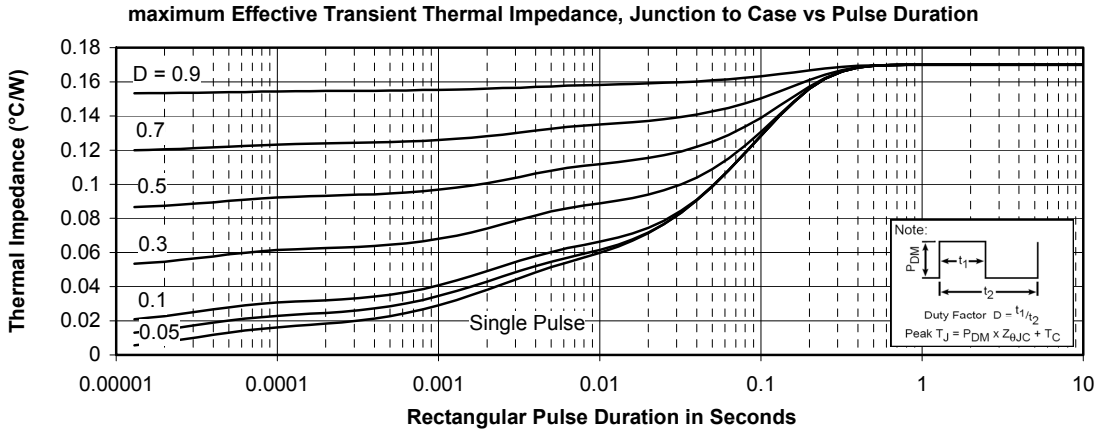
maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



Typical diode Performance Curve







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