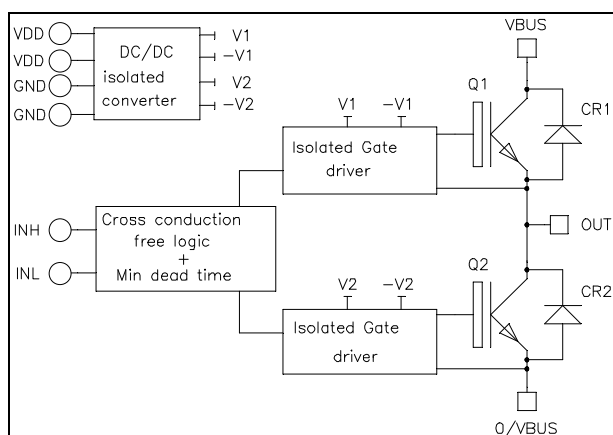


Phase leg Intelligent Power Module

$V_{CES} = 600V$
 $I_C = 350A @ T_c = 80^\circ C$

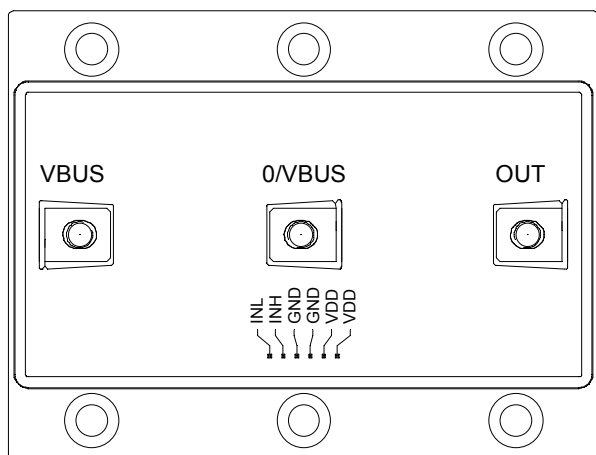


Application

- 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	600	V
I_C	Continuous Collector Current	$T_C = 25^\circ\text{C}$	430
		$T_C = 80^\circ\text{C}$	350
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ\text{C}$	700
P_D	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	1562
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ\text{C}$	800A@550V

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$ $V_{CE} = 600\text{V}$			0.5	mA
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$			1.5	
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{DD} = V_{IN} = 5\text{V}$ $I_C = 400\text{A}$		2	2.5	V
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		2.2		

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$		17.2		nF
C_{oes}	Output Capacitance			1.88		
C_{res}	Reverse Transfer Capacitance			1.6		
T_r	Rise Time	Inductive Switching (25°C) $V_{DD} = V_{IN} = 5\text{V}$ $V_{Bus} = 400\text{V}$; $I_C = 400\text{A}$		25		ns
T_f	Fall Time			30		
T_r	Rise Time	Inductive Switching (125°C) $V_{DD} = V_{IN} = 5\text{V}$ $V_{Bus} = 400\text{V}$ $I_C = 400\text{A}$		25		ns
T_f	Fall Time			45		
E_{on}	Turn-on Switching Energy	$V_{DD} = V_{IN} = 5\text{V}$; $V_{Bus} = 360\text{V}$ $t_p \leq 10\mu\text{s}$; $T_j = 125^\circ\text{C}$		17.2		mJ
E_{off}	Turn-off Switching Energy			14		
I_{sc}	Short Circuit data	$V_{DD} = V_{IN} = 5\text{V}$; $V_{Bus} = 360\text{V}$ $t_p \leq 10\mu\text{s}$; $T_j = 125^\circ\text{C}$		1800		A
R_{thJC}	Junction to Case thermal resistance				0.08	$^\circ\text{C/W}$

Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage			600			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 600V$	$T_i = 25^\circ C$ $T_i = 150^\circ C$			350 500	μA
I_F	DC Forward Current		$T_c = 80^\circ C$		400		A
V_F	Diode Forward Voltage	$I_F = 400A$	$T_i = 25^\circ C$ $T_i = 150^\circ C$		1.6 1.5	2	V
t_{rr}	Reverse Recovery Time	$I_F = 400A$ $V_R = 300V$ $di/dt = 4800A/\mu s$	$T_j = 25^\circ C$ $T_j = 150^\circ C$		125 220		ns
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ C$ $T_j = 150^\circ C$		19 40		μC
E_{rr}	Reverse Recovery Energy		$T_j = 25^\circ C$ $T_j = 150^\circ C$		4.4 9.6		mJ
R_{thJC}	Junction to Case thermal resistance					0.20	$^\circ C/W$

2. Driver
Absolute maximum ratings

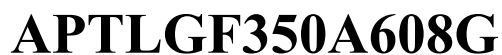
Symbol	Parameter		Max ratings	Unit
V _{DD}	Supply Voltage		5.5	V
V _{INi}	Input signal voltage i=L, H		5.5	
I _{VDDmax}	Maximum Supply current	V _{INi} = 0V, i = L & H	0.35	A
		V _{DD} =5V, V _{INH} = /V _{INL} ; F _{out} = 60kHz	2	
f _{max}	Maximum Switching Frequency		60	kHz

Driver Electrical Characteristics

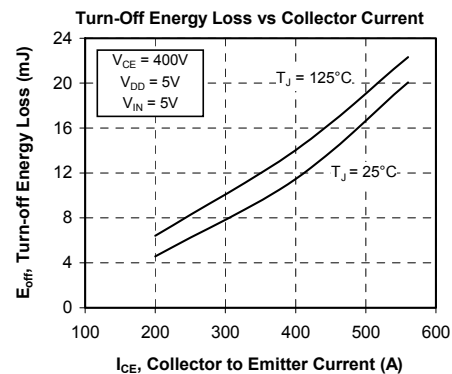
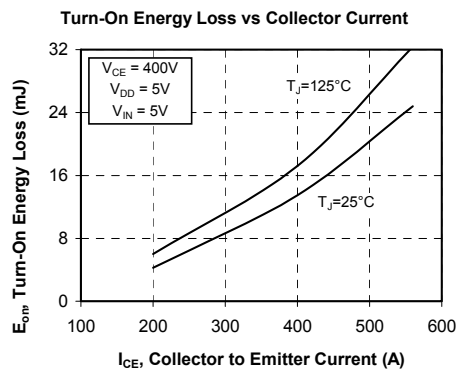
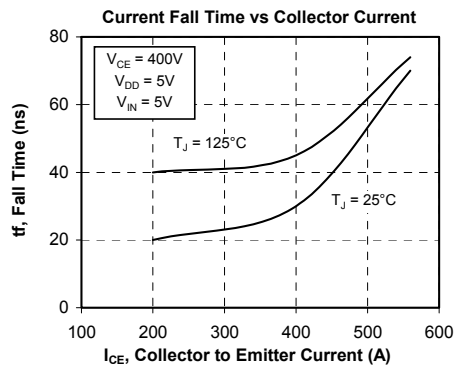
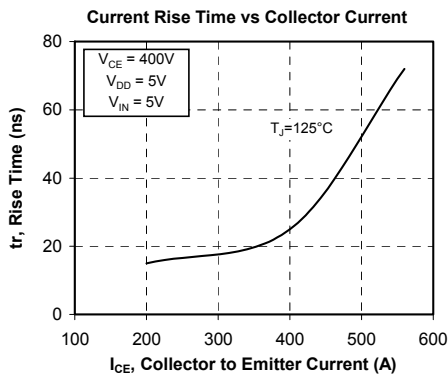
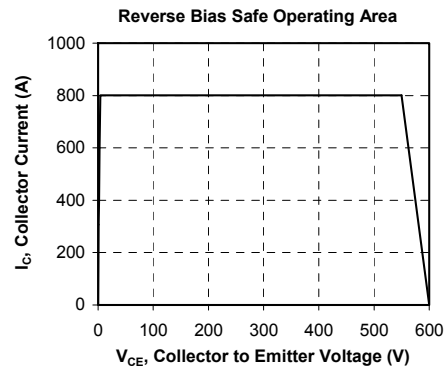
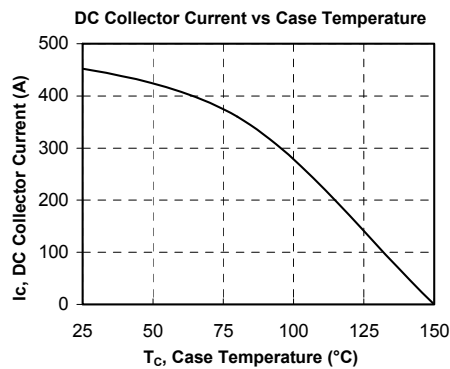
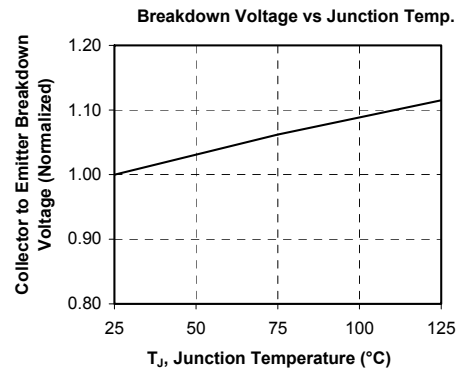
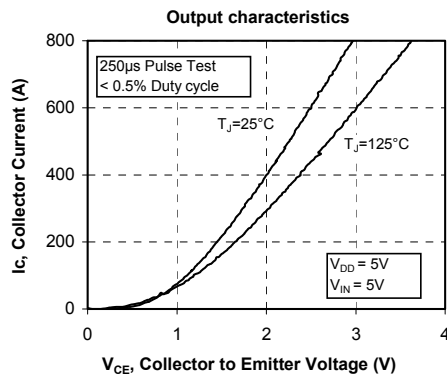
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{DD}	Operating Supply Voltage		4.5	5	5.5	V
$V_{INi(max)}$	Maximum Input Voltage	$i = L, H$	-0.5	5	5.5	V
$V_{INi(th+)}$	Positive Going Threshold Voltage			3.2		
$V_{INi(th-)}$	Negative Going Threshold Voltage			1		
R_{INi}	Input Resistance *			1		k Ω
$T_{d(on)}$	Turn On delay time	Driver + IGBT		1100 ^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}

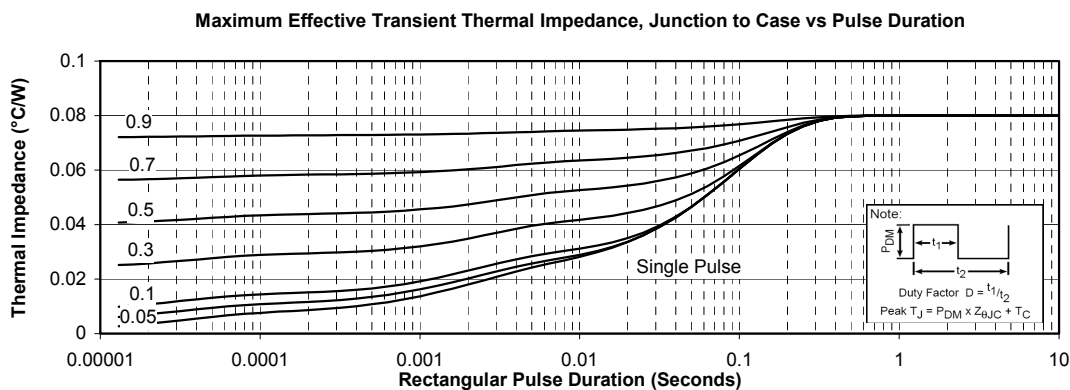
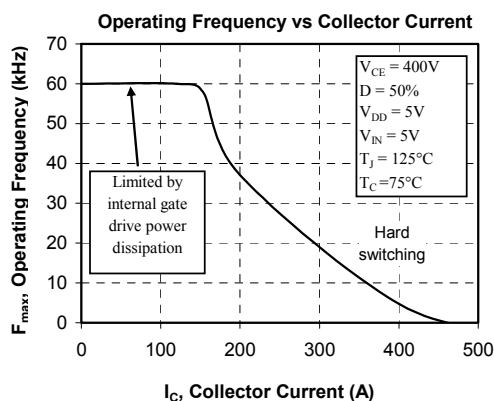
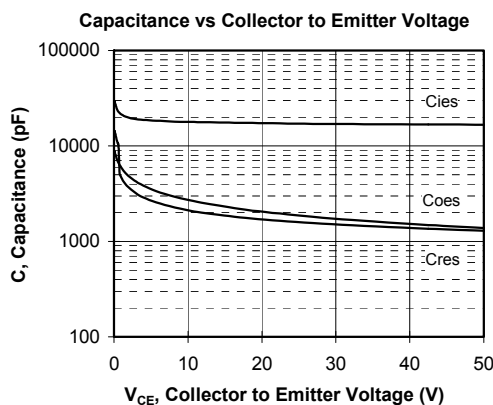
* Low impedance guarantees good noise immunity.

① Including built in dead time.

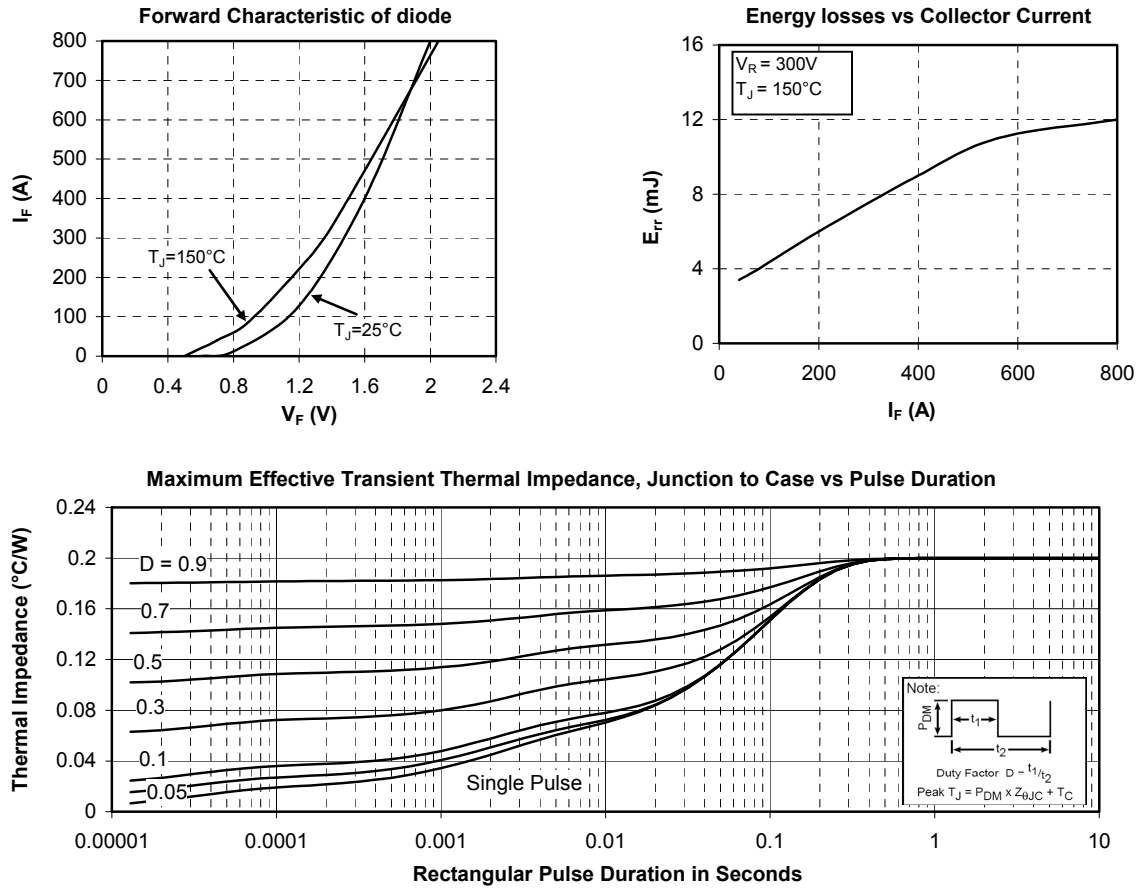


Typical IGBT Performance Curve





Typical diode Performance Curve



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