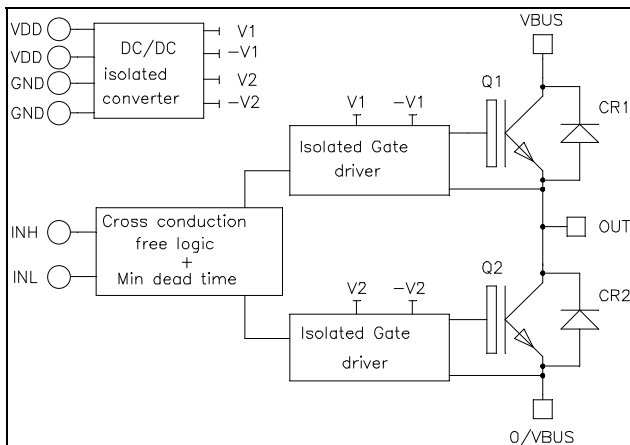


*Phase leg  
Intelligent Power Module*

$V_{CES} = 1200V$   
 $I_C = 325A @ T_c = 80^\circ C$

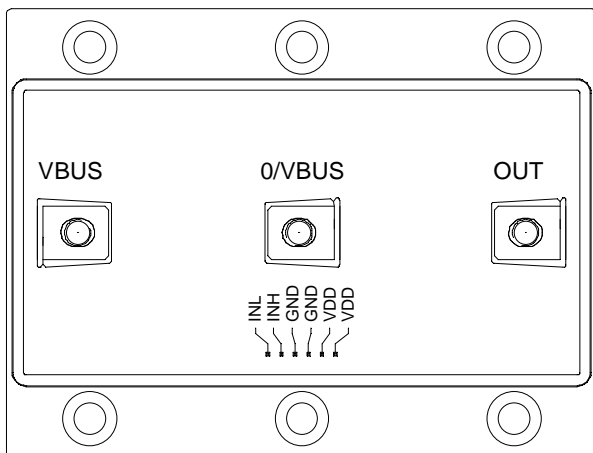


**Application**

- 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](http://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	$T_C = 25^\circ\text{C}$	420
		$T_C = 80^\circ\text{C}$	325
$I_{CM}$	Pulsed Collector Current	$T_C = 25^\circ\text{C}$	600
$P_D$	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	1500
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ\text{C}$	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	$\mu\text{A}$
			$T_j = 150^\circ\text{C}$		750	
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{DD} = V_{IN} = 5\text{V}$ $I_C = 300\text{A}$	$T_j = 25^\circ\text{C}$	1.85	2.2	V
			$T_j = 150^\circ\text{C}$	2.2		

#### Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$		17.6		nF
$C_{oes}$	Output Capacitance			1.16		
$C_{res}$	Reverse Transfer Capacitance			0.94		
$T_r$	Rise Time	Inductive Switching ( $25^\circ\text{C}$ ) $V_{DD} = V_{IN} = 5\text{V}$ $V_{Bus} = 600\text{V}; I_C = 300\text{A}$		30		ns
$T_f$	Fall Time			70		
$T_r$	Rise Time	Inductive Switching ( $150^\circ\text{C}$ ) $V_{DD} = V_{IN} = 5\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 300\text{A}$		40		ns
$T_f$	Fall Time			80		
$E_{on}$	Turn-on Switching Energy	$V_{DD} = V_{IN} = 5\text{V}; V_{Bus} = 900\text{V}$ $t_p \leq 10\mu\text{s}; T_j = 150^\circ\text{C}$		34		mJ
$E_{off}$	Turn-off Switching Energy			29		
$I_{sc}$	Short Circuit data			1100		A
$R_{thJC}$	Junction to Case thermal resistance				0.1	$^\circ\text{C}/\text{W}$

**Reverse diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V <sub>RRM</sub>	Maximum Peak Repetitive Reverse Voltage		1200			V
I <sub>RM</sub>	Maximum Reverse Leakage Current	V <sub>R</sub> =1200V			250	μA
					750	
I <sub>F</sub>	DC Forward Current			360		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 300A		1.7	2.2	V
				1.65		
t <sub>rr</sub>	Reverse Recovery Time			155		ns
				300		
Q <sub>rr</sub>	Reverse Recovery Charge	I <sub>F</sub> = 300A V <sub>R</sub> = 600V di/dt = 7000A/μs		29		μC
				61		
E <sub>rr</sub>	Reverse Recovery Energy			10.4		mJ
				22		
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.17	°C/W

**2. Driver**
**Absolute maximum ratings**

Symbol	Parameter	Max ratings	Unit
V <sub>DD</sub>	Supply Voltage	5.5	V
V <sub>INi</sub>	Input signal voltage i=L, H	5.5	V
I <sub>VDDmax</sub>	Maximum Supply current	0.35	A
	V <sub>INi</sub> = 0V, i = L & H		
	V <sub>DD</sub> =5V, V <sub>INH</sub> = /V <sub>INL</sub> ; F <sub>out</sub> = 55kHz	2	
f <sub>max</sub>	Maximum Switching Frequency	55	kHz

**Driver Electrical Characteristics**

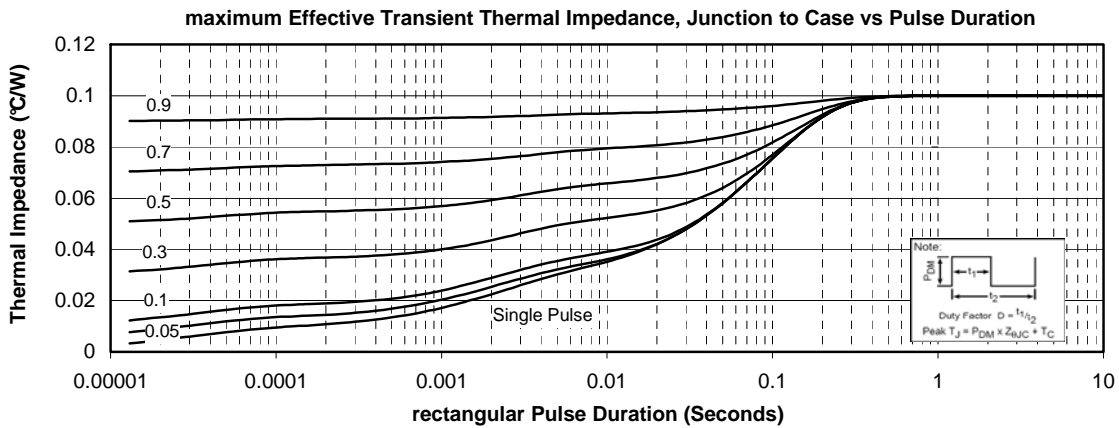
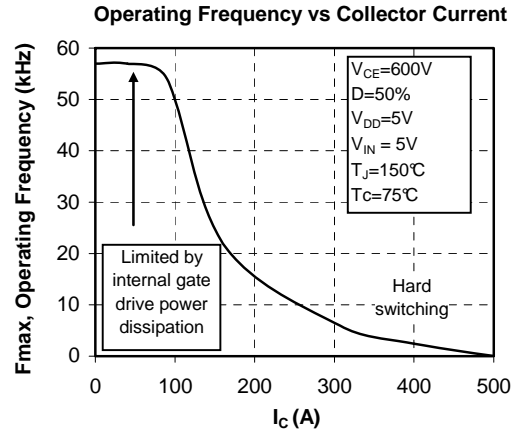
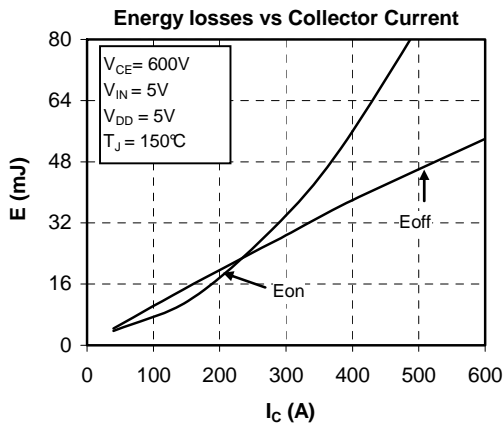
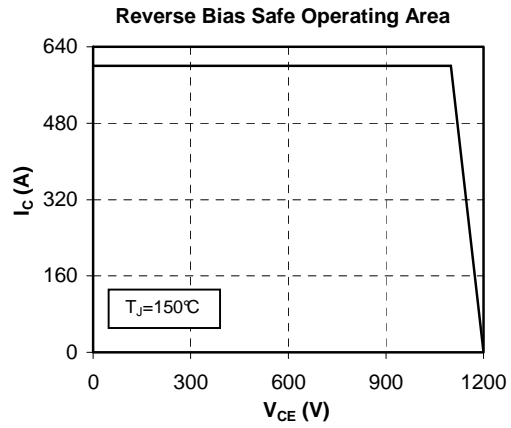
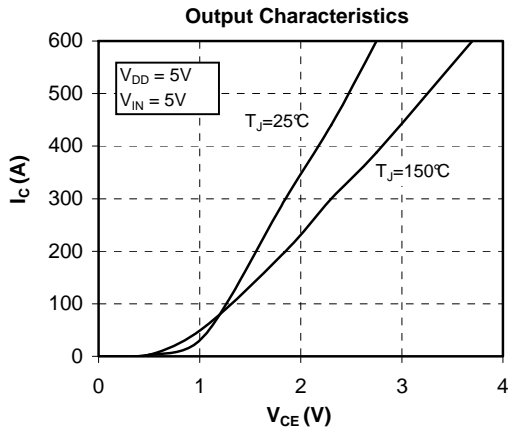
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V <sub>DD</sub>	Operating Supply Voltage		4.5	5	5.5	V
V <sub>INi(max)</sub>	Maximum Input Voltage		-0.5	5	5.5	V
V <sub>INi(th+)</sub>	Positive Going Threshold Voltage	i = L, H		3.2		V
V <sub>INi(th-)</sub>	Negative Going Threshold Voltage			1		V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

\* Low impedance guarantees good noise immunity.

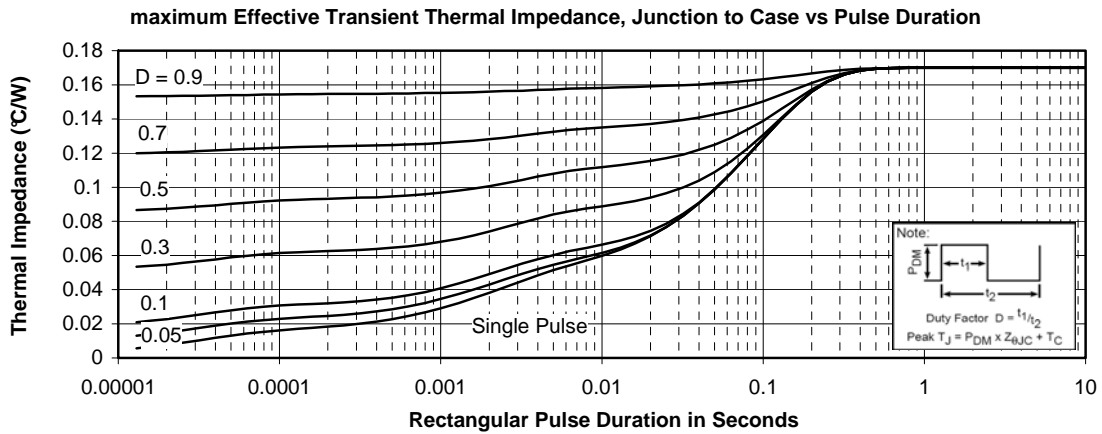
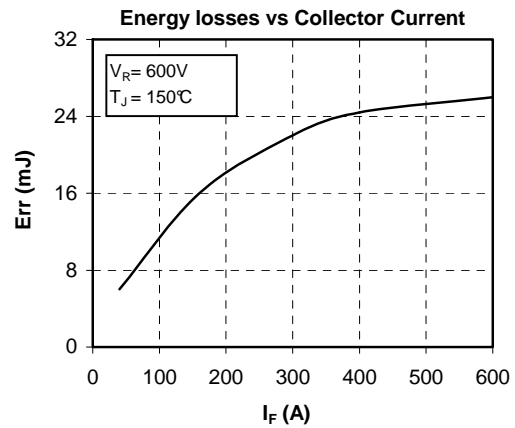
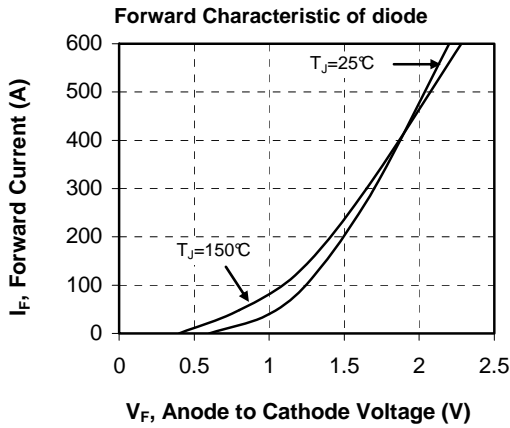
① Including built in dead time.



## Typical IGBT Performance Curve



## Typical diode Performance Curve



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