

## Intelligent Power Module ( R-Series )

### Maximum Ratings and Characteristics

#### Absolute Maximum Ratings ( T<sub>c</sub>=25°C )

Items	Symbols	Ratings		Units	
		Min.	Max.		
DC Bus Voltage	V <sub>DC</sub>	0	450	V	
DC Bus Voltage (surge)	V <sub>DC(Surge)</sub>	0	500		
DC Bus Voltage (short operating)	V <sub>SC</sub>	200	400		
Collector-Emitter Voltage	V <sub>CES</sub>	0	600		
Inverter Collector Current	Continuous	I <sub>C</sub>	50	A	
	1ms	I <sub>CP</sub>	100		
Current	Duty=62.6%	-I <sub>C</sub>	50		
Collector Power Dissipation	One Transistor	P <sub>C</sub>	198	W	
Dynamic Brake Collector Current	Continuous	I <sub>C</sub>	30	A	
	1ms	I <sub>CP</sub>	60		
Forward Current of Diode	I <sub>F</sub>		30		
Collector Power Dissi. DB	One Transistor	P <sub>C</sub>	120	W	
Voltage of Power Supply for Driver	V <sub>CC</sub> *1	0	20	V	
Input Signal Voltage	V <sub>IN</sub> *2	0	V <sub>Z</sub>		
Input Signal Current	I <sub>IN</sub>		1	mA	
Alarm Signal Voltage	V <sub>ALM</sub> *3	0	V <sub>CC</sub>	V	
Alarm Signal Current	I <sub>ALM</sub> *4		15	mA	
Junction Temperature	T <sub>J</sub>		150	°C	
Operating Temperature	T <sub>OP</sub>	-20	100		
Storage Temperature	T <sub>stg</sub>	-40	125		
Isolation Voltage	A.C. 1min.	V <sub>ISO</sub>		2500	V
Screw Torque	Mounting *1		3.5	Nm	
	Terminals *1		3.5		

Note: \*1: Recommendable Value; 2.5 - 3.0 Nm (M5)

### Outline Drawing

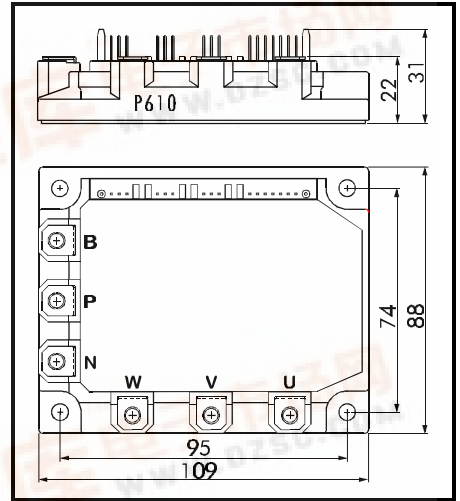


Fig. 1

#### Electrical Characteristics of Power Circuit ( at T<sub>J</sub>=25°C, V<sub>CC</sub>=15V )

Items	Symbols	Conditions	Min.	Typ.	Max.	Units	
INV	Collector Current At Off Signal Input	I <sub>CES</sub>	V <sub>CE</sub> =600V, Input Terminal Open			1.0	mA
	Collector-Emitter Saturation Voltage	V <sub>CE(Sat)</sub>	I <sub>C</sub> =50A			2.8	V
	Forward Voltage of FWD	V <sub>F</sub>	-I <sub>C</sub> =50A			3.0	V
DB	Collector Current At Off Signal Input	I <sub>CES</sub>	V <sub>CE</sub> =600V, Input Terminal Open			1.0	mA
	Collector-Emitter Saturation Voltage	V <sub>CE(Sat)</sub>	I <sub>C</sub> =30A			2.8	V
	Forward Voltage of FWD	V <sub>F</sub>	-I <sub>C</sub> =30A			3.3	V

#### Electrical Characteristics of Control Circuit ( at T<sub>J</sub>=25°C, V<sub>CC</sub>=15V )

Items	Symbols	Conditions	Min.	Typ.	Max.	Units
Current of P-Line Side Driver (One Unit)	I <sub>CCP</sub>	f <sub>SW</sub> =0~15kHz, T <sub>C</sub> =-20~100°C	3		18	mA
Current of N-Line Side Driver (Three Units)	I <sub>CCN</sub>	f <sub>SW</sub> =0~15kHz, T <sub>C</sub> =-20~100°C	10		65	
Input Signal Threshold Voltage	V <sub>IN(th)</sub>	On	1.00	1.35	1.70	V
		Off	1.25	1.60	1.95	
Input Zener Voltage	V <sub>Z</sub>	R <sub>IN</sub> =20kΩ		8.0		
Over Heating Protection Temperature Level	T <sub>COH</sub>	V <sub>DC</sub> =0V, I <sub>C</sub> =0A, Case Temp.	110		125	°C
Hysteresis	T <sub>CH</sub>			20		
IGBT Chips Over Heating Protec. Temp. Level	T <sub>JOH</sub>	Surface Of IGBT Chip	150			
Hysteresis	T <sub>JH</sub>			20		
Inverter Collector Current Protection Level	I <sub>OC</sub>	T <sub>J</sub> =125°C	75			A
DB Collector Current Protection Level	I <sub>OC</sub>	T <sub>J</sub> =125°C	45			
Over Current Detecting Time	t <sub>DOC</sub>	T <sub>J</sub> =25°C		10		μs
Alarm Signal Hold Time	t <sub>ALM</sub>		1.5	2		ms
Limiting Resistor for Alarm	R <sub>ALM</sub>		1425	1500	1575	Ω
Under Voltage Protection Level	V <sub>UV</sub>		11.0		12.5	V
Hysteresis	V <sub>H</sub>		0.2			

#### Dynamic Characteristics ( at T<sub>C</sub>=T<sub>J</sub>=125°C, V<sub>CC</sub>=15V )

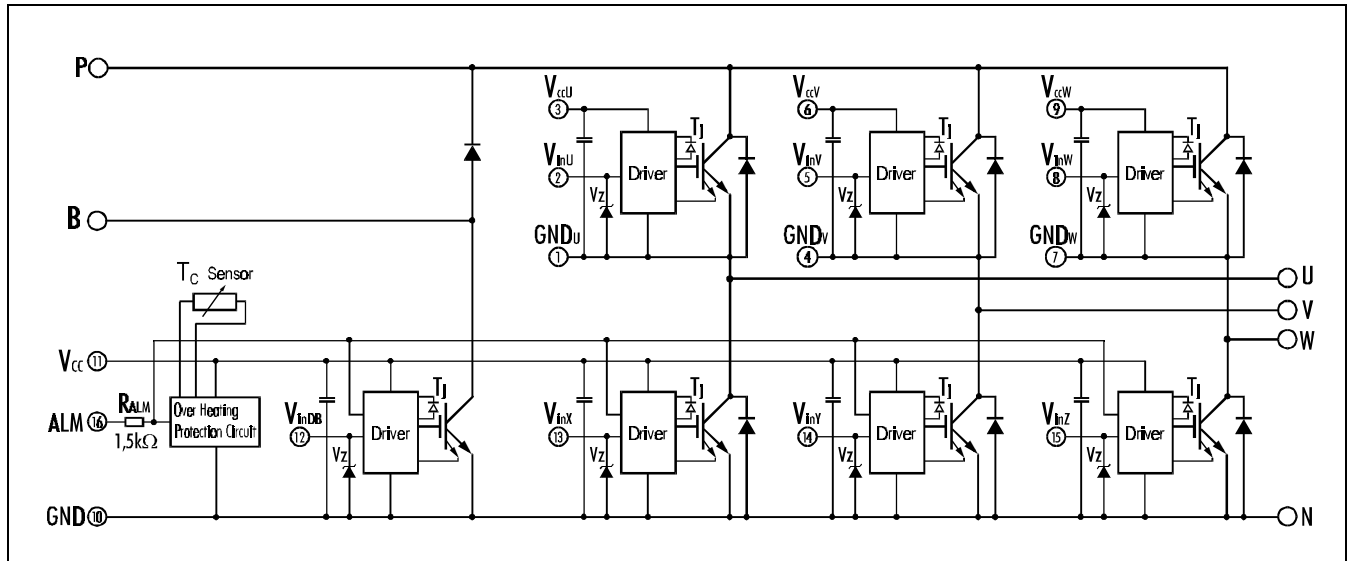
Items	Symbols	Conditions	Min.	Typ.	Max.	Units
Switching Time	t <sub>ON</sub>	I <sub>C</sub> =50A, V <sub>DC</sub> =300V	0.3			μs
	t <sub>OFF</sub>				3.6	
	t <sub>RR</sub>	I <sub>F</sub> =50A, V <sub>DC</sub> =300V			0.4	



• Thermal Characteristics

Items	Symbols	Conditions	Min.	Typ.	Max.	Units
Thermal Resistance	$R_{th(i-c)}$	Inverter IGBT			0.63	°C/W
	$R_{th(i-c)}$	Diode			1.33	
	$R_{th(i-c)}$	DB IGBT			1.04	
	$R_{th(c-f)}$	With Thermal Compound		0.05		

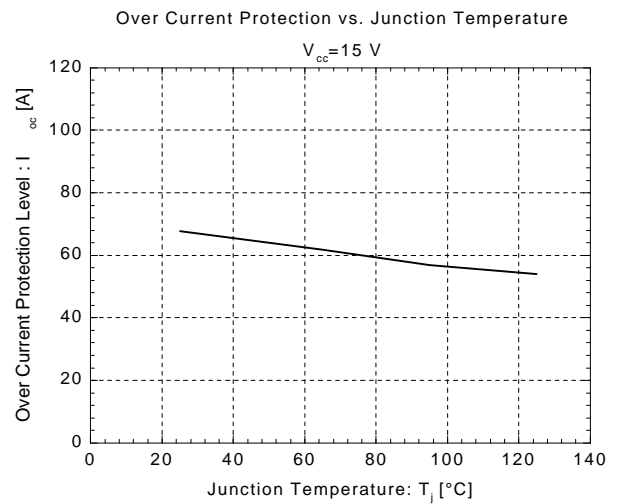
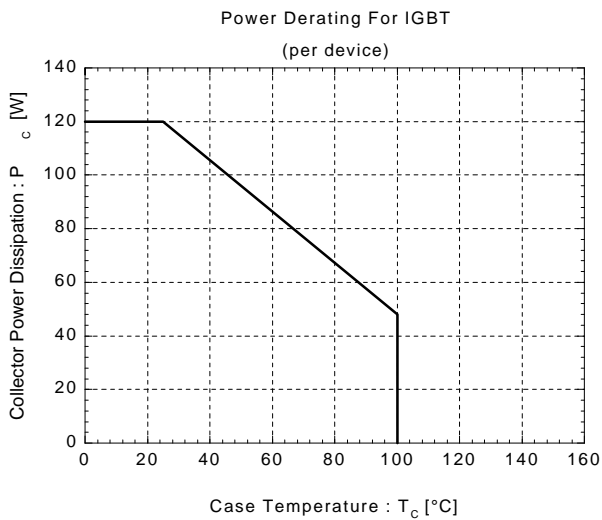
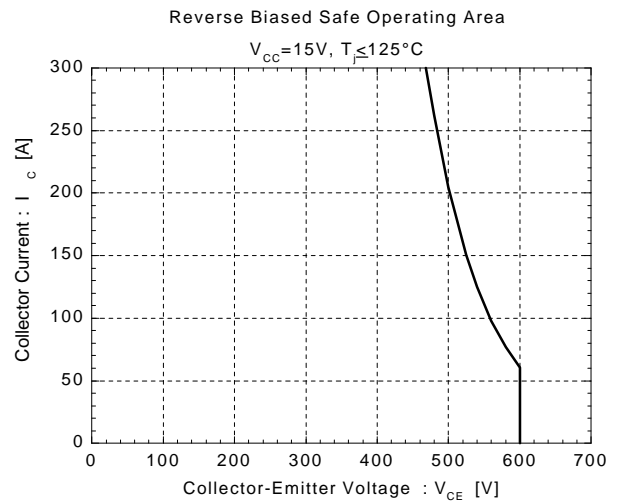
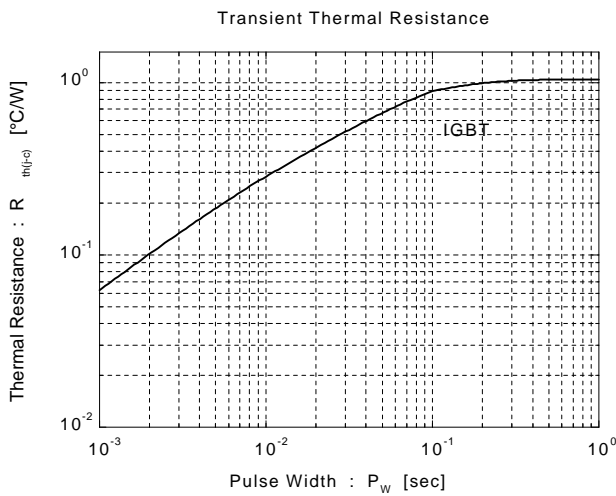
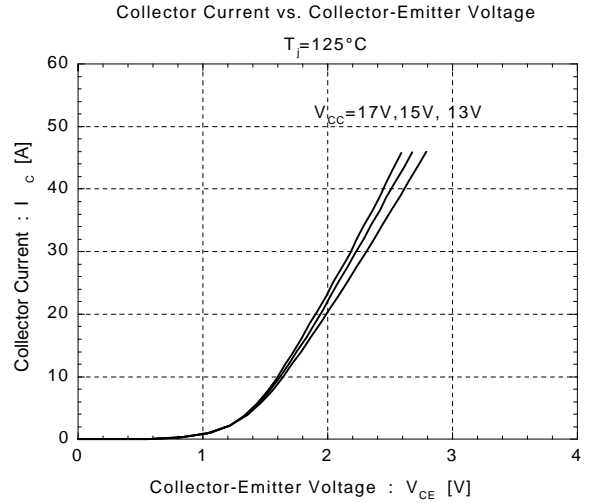
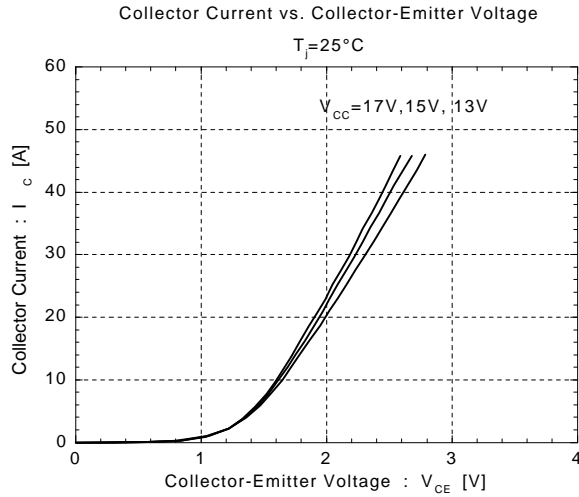
■ Equivalent Circuit



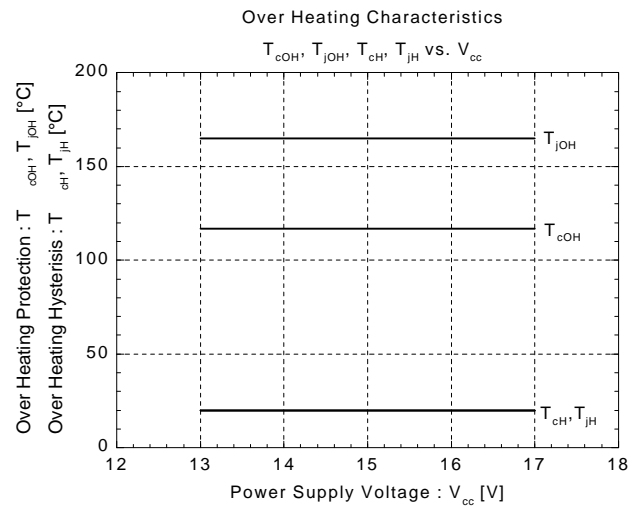
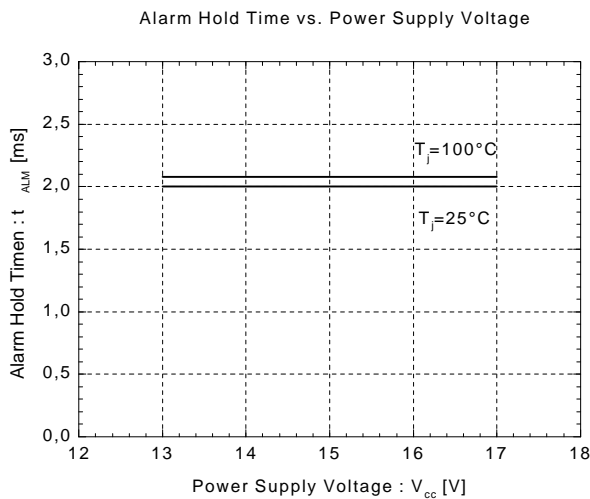
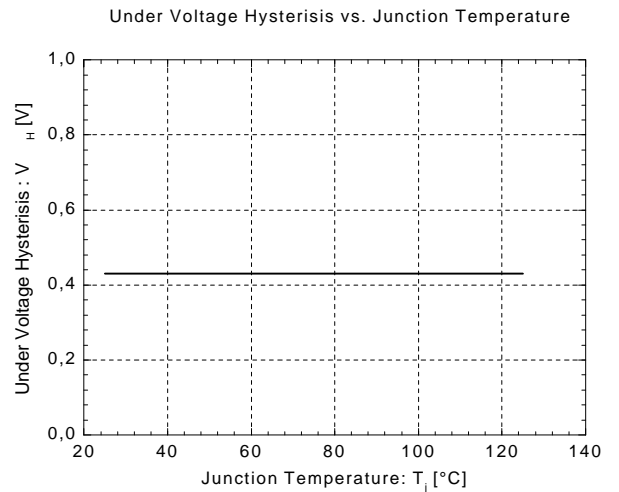
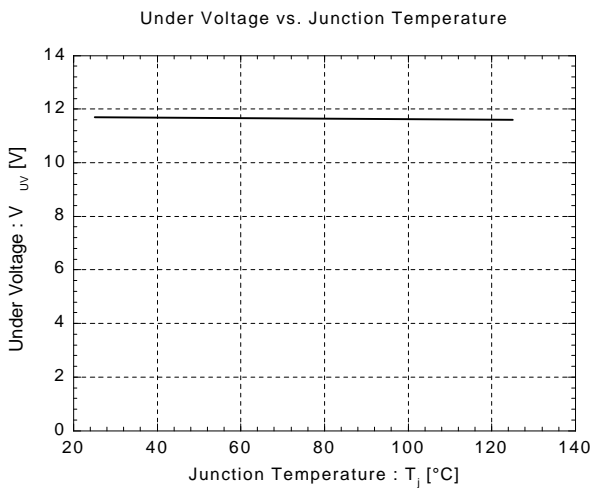
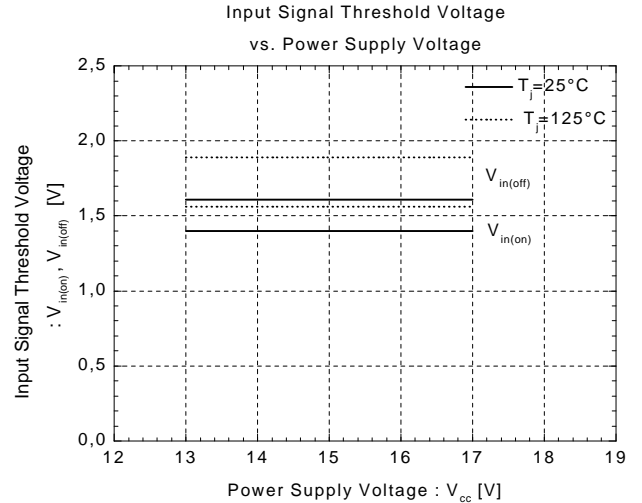
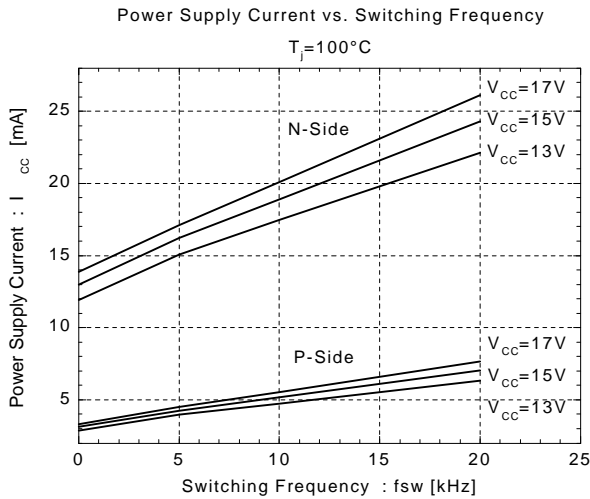
Drivers include following functions

- Short circuit protection circuit
- Amplifier for driver
- Undervoltage protection circuit
- Overcurrent protection circuit
- IGBT Chip overheating protection

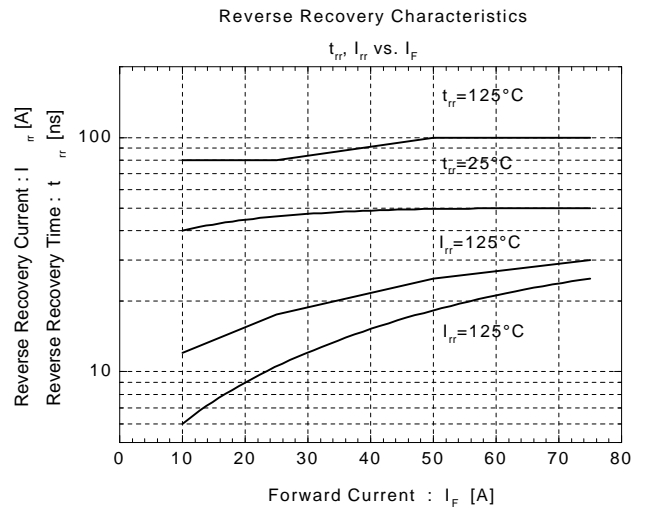
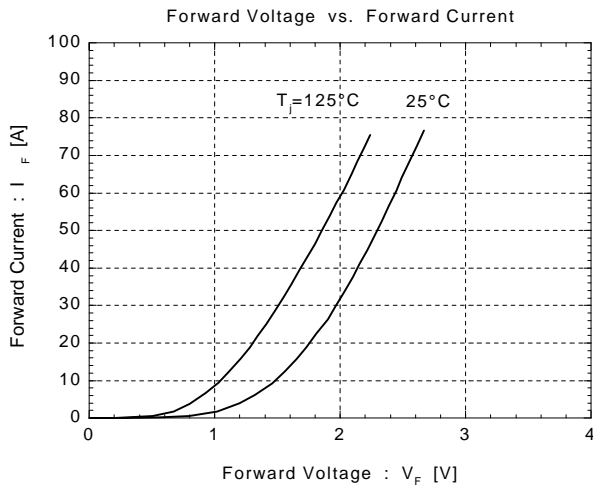
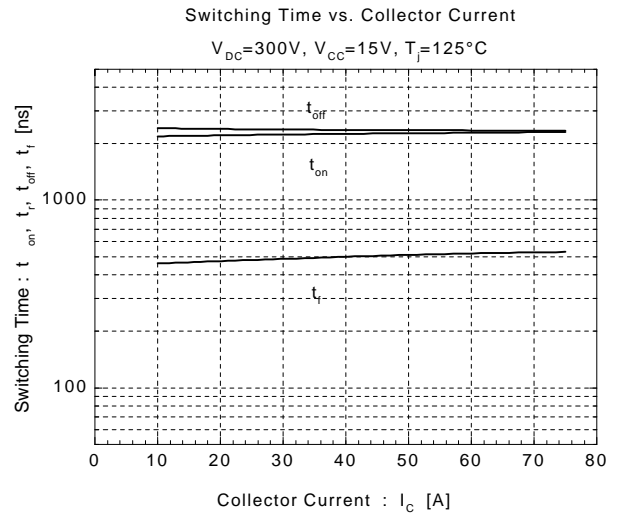
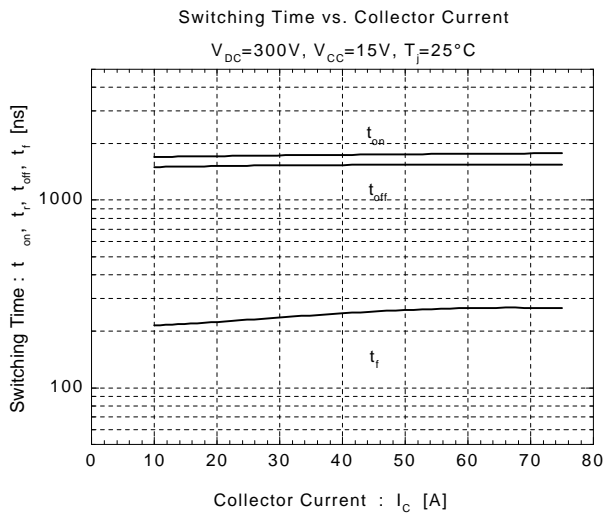
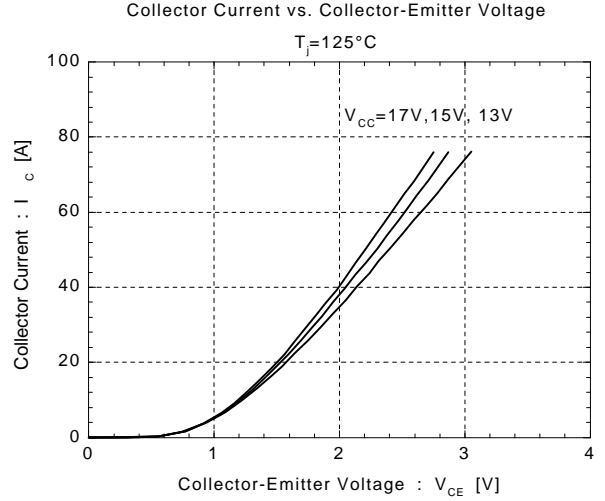
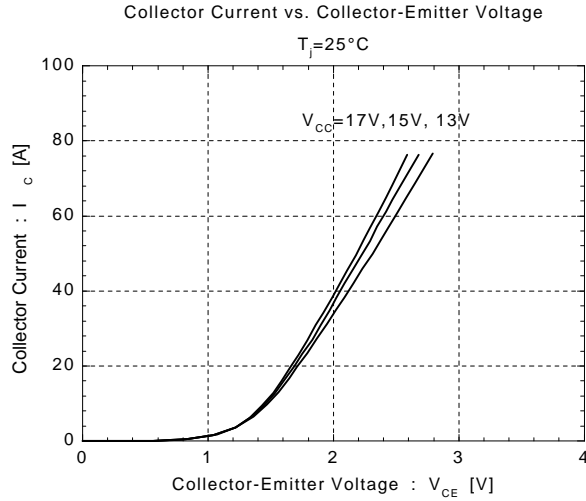
## Dynamic Brake



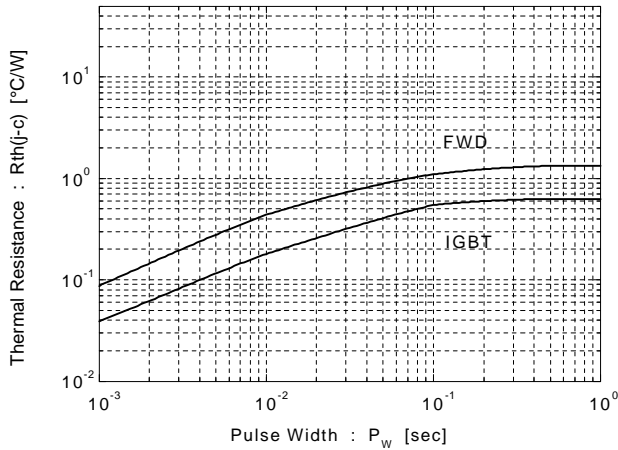
## Control Circuit



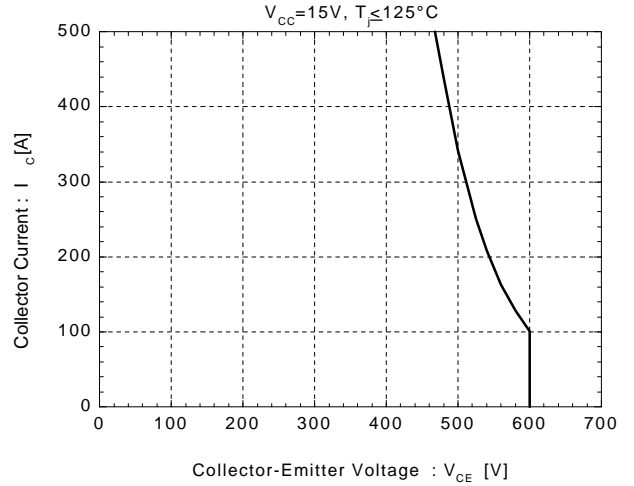
## ■ Inverter



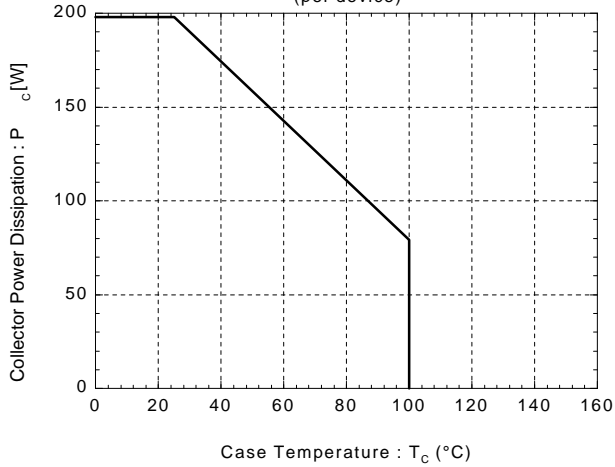
Transient Thermal Resistance



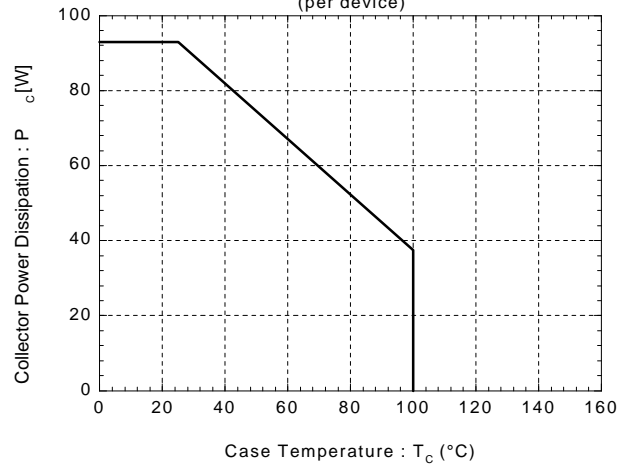
Reverse Biased Safe Operating Area



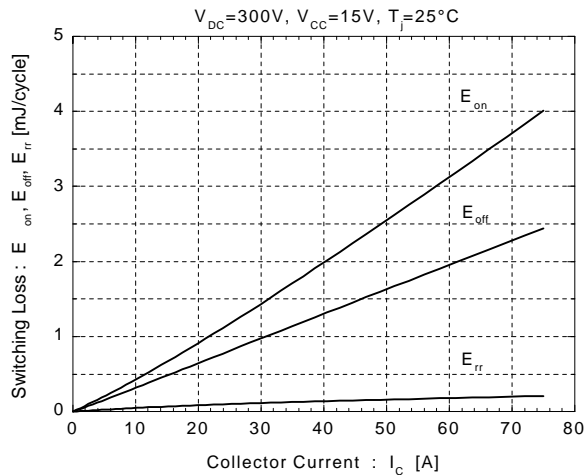
Power Derating For IGBT  
(per device)



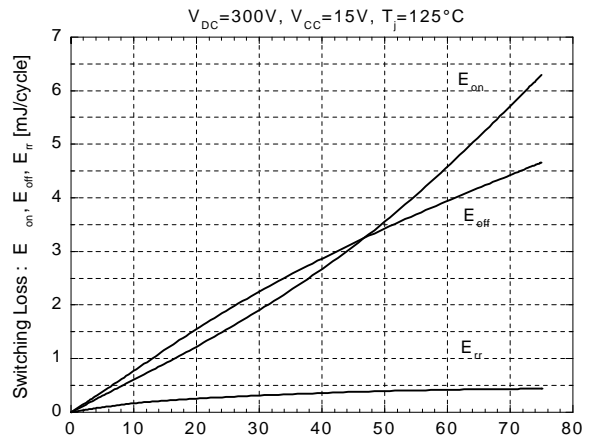
Power Derating For FWD  
(per device)

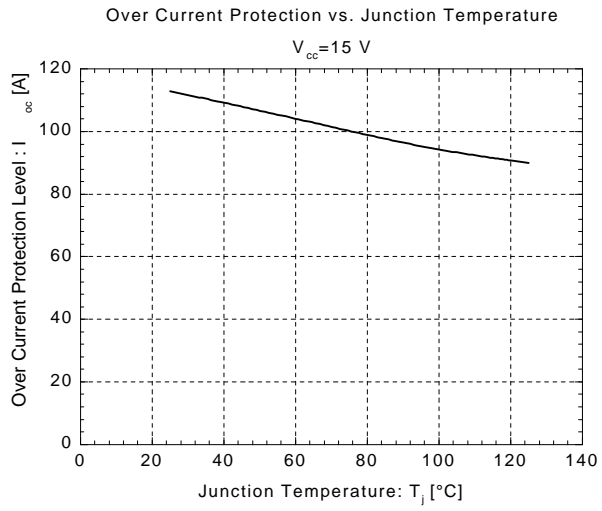


Switching Loss vs. Collector Current

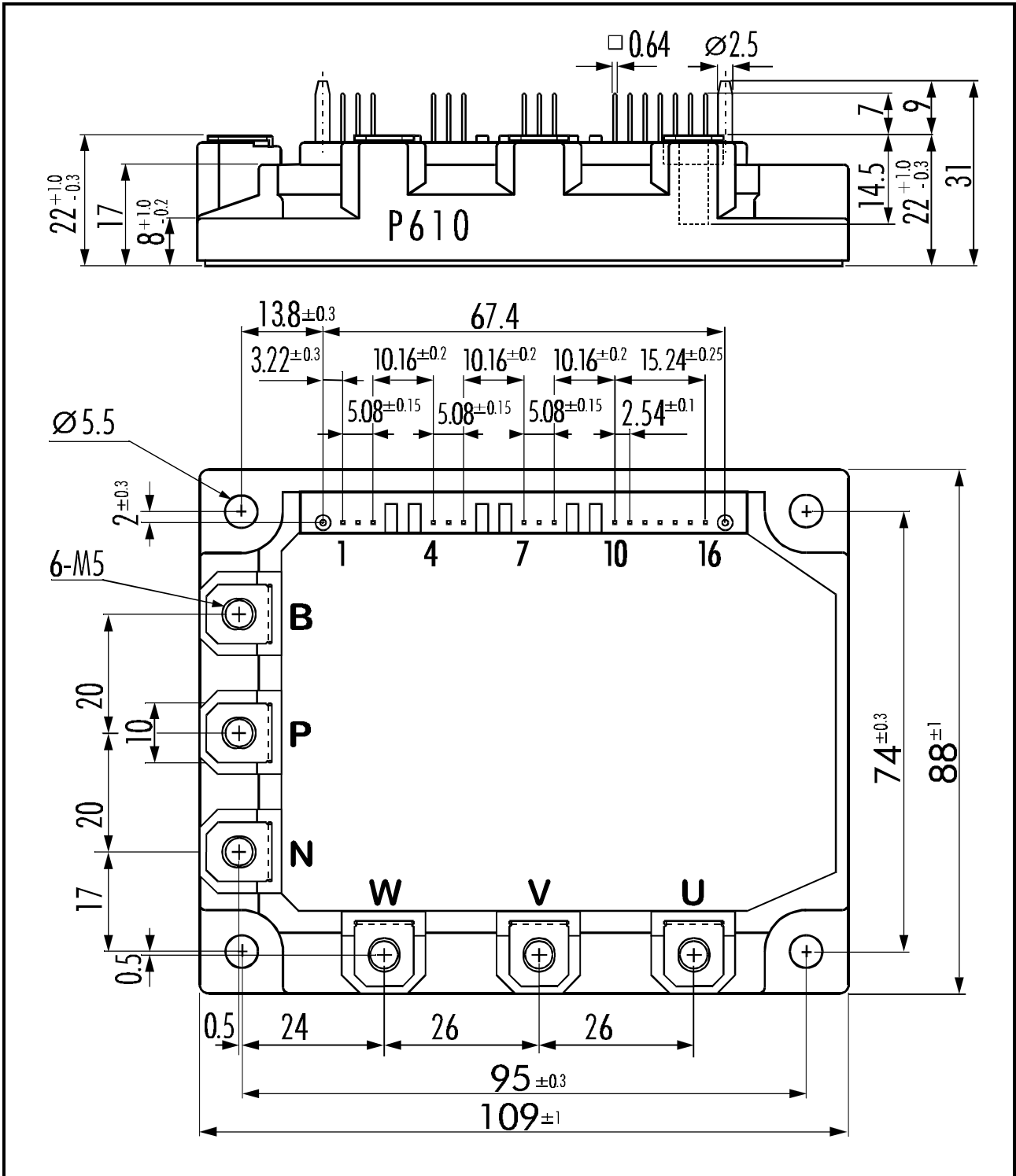


Switching Loss vs. Collector Current





■ Outline Drawing



**Weight: 440g**



For more information, contact:

**Collmer Semiconductor, Inc.**

P.O. Box 702708

Dallas, TX 75370

972-233-1589

972-233-0481 Fax

<http://www.collmer.com>