

Intelligent Power Module (R-Series)

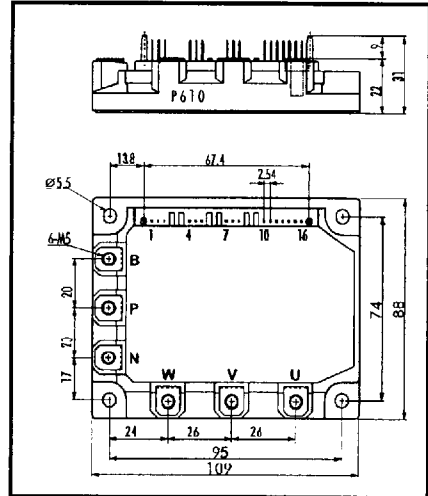
n Maximum Ratings and Characteristics

• Absolute Maximum Ratings (T_c=25°C)

Items	Symbols	Ratings		Units
		Min.	Max.	
DC Bus Voltage	V _{DC}	0	900	V
DC Bus Voltage (surge)	V _{DC(SURGE)}	0	1000	
DC Bus Voltage (short operating)	V _{SC}	200	800	
Collector-Emitter Voltage	V _{CES}	0	1200	A
Inverter	I _C		25	
Collector	I _{CP}		50	
Current	-I _C		25	W
Collector Power Dissipation (One Transistor)	P _C		198	
Voltage of Power Supply for Driver	V _{CC} *1	0	20	V
Input Signal Voltage	V _{IN} *2	0	V _Z	
Input Signal Current	I _{IN}		1	mA
Alarm Signal Voltage	V _{ALM} *3	0	V _{CC}	
Alarm Signal Current	I _{ALM} *4		15	°C
Junction Temperature	T _J		150	
Operating Temperature	T _{OP}	-20	100	°C
Storage Temperature	T _{STG}	-40	125	
Isolation Voltage	V _{ISO}		2500	V
Screw Torque	Mounting *1		3.5	
	Terminals *1		3.5	

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

n Outline Drawing



• Electrical Characteristics of Power Circuit (at T_J=25°C, V_{CC}=15V)

Items	Symbols	Conditions	Min.	Typ.	Max.	Units
INV	Collector Current At Off Signal Input	I _{CES}	V _{CE} =1200V, Input Terminal Open		1.0	mA
	Collector-Emitter Saturation Voltage	V _{CE(Sat)}	I _C =25A		2.6	V
	Forward Voltage of FWD	V _F	-I _C =25A		3.0	V

• Electrical Characteristics of Control Circuit (at T_J=25°C, V_{CC}=15V)

Items	Symbols	Conditions	Min.	Typ.	Max.	Units
Current of P-Line Side Driver (One Unit)	I _{CCP}	f _{SW} =0~15kHz, T _c =-20~100°C	3		18	mA
Current of N-Line Side Driver (Three Units)	I _{CCN}	f _{SW} =0~15kHz, T _c =-20~100°C	10		65	
Input Signal Threshold Voltage	V _{IN(IN)}	On	1.00	1.35	1.70	V
		Off	1.25	1.60	1.95	
Input Zener Voltage	V _Z	R _{IN} =20kΩ		8.0		°C
Over Heating Protection Temperature Level	T _{COH}	V _{DC} =0V, I _C =0A, Case Temp.	110		125	
Hysteresis	T _{CH}			20		°C
IGBT Chips Over Heating Protec. Temp. Level	T _{ICH}	Surface Of IGBT Chip	150			
Hysteresis	T _{IF}			20		A
Inverter Collector Current Protection Level	I _{OC}	T _J =125°C	38			
Over Current Detecting Time	t _{DOC}	T _J =25°C		10		μs
Alarm Signal Hold Time	t _{ALM}		1.5	2		ms
Limiting Resistor for Alarm	R _{ALM}		1425	1500	1575	Ω
Under Voltage Protection Level	V _{UV}		11.0		12.5	V
Hysteresis	V _H		0.2			

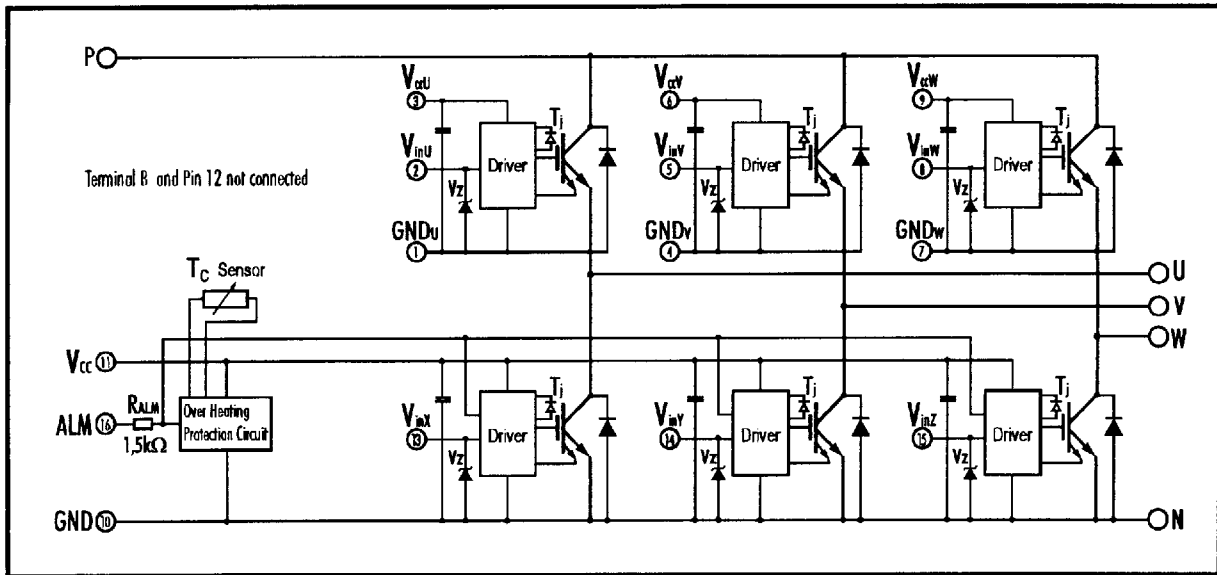
• Dynamic Characteristics (at T_c=T_J=125°C, V_{CC}=15V)

Items	Symbols	Conditions	Min.	Typ.	Max.	Units
Switching Time	t _{ON}	I _C =25A, V _{DC} =600V	0.3			μs
	t _{OFF}				3.6	
	t _{FR}	I _F =25A, V _{DC} =600V			0.4	

• Thermal Characteristics

Items	Symbols	Conditions	Min.	Typ.	Max.	Units
Thermal Resistance	R _{th(j-c)}	Inverter IGBT			0.63	°C/W
	R _{th(j-d)}	Diode			1.33	
	R _{th(c-d)}	With Thermal Compound		0.05		

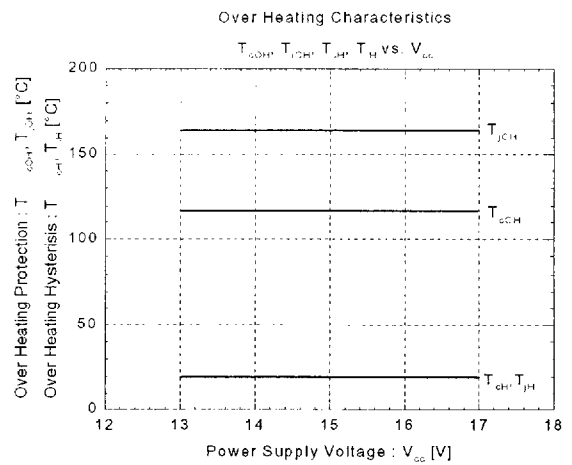
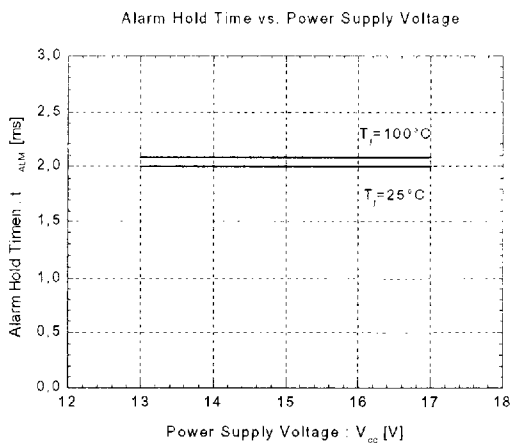
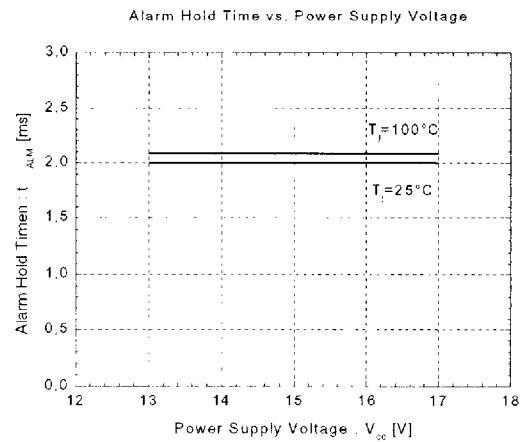
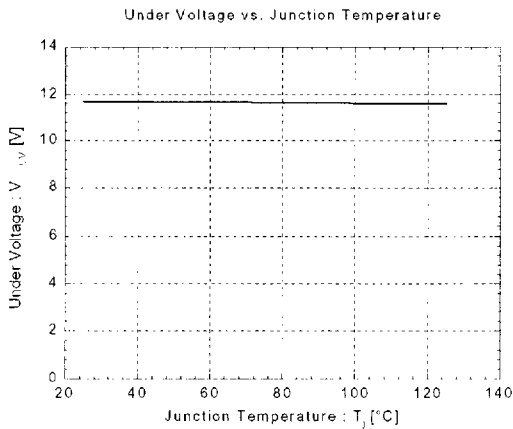
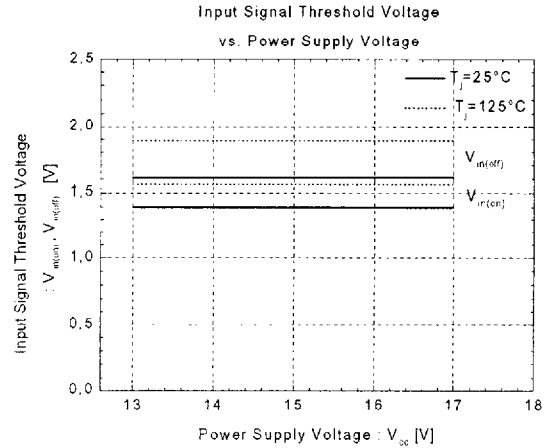
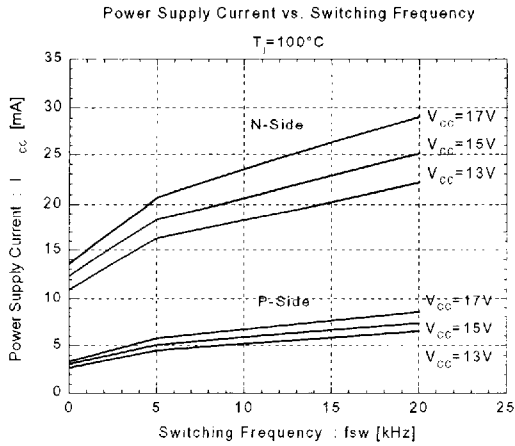
n Equivalent Circuit



Drivers include following functions

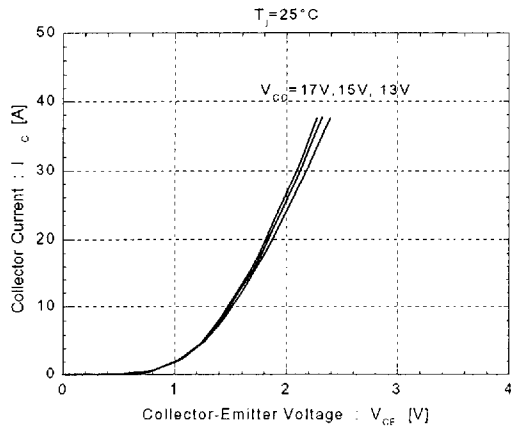
- Short circuit protection circuit
- \ Amplifier for driver
- ^ Undervoltage protection circuit
- ^ Overcurrent protection circuit
- ~ IGBT Chip overheating protection

n Control Circuit

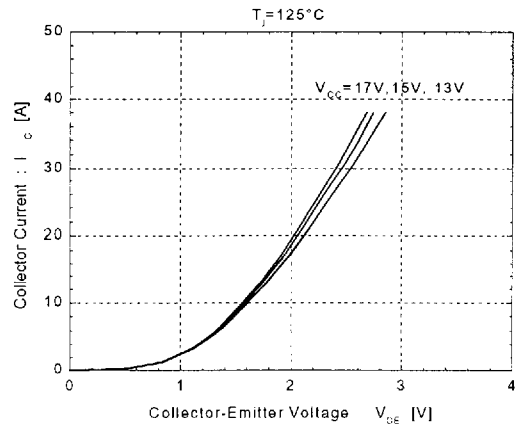


n Inverter

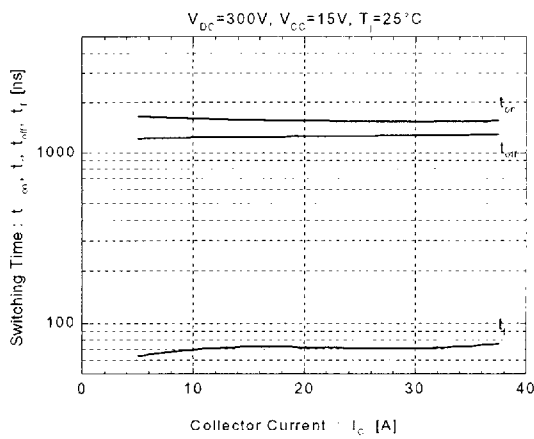
Collector Current vs. Collector-Emittor Voltage



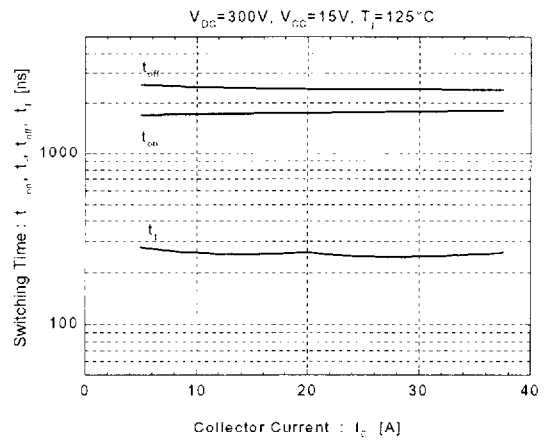
Collector Current vs. Collector-Emittor Voltage



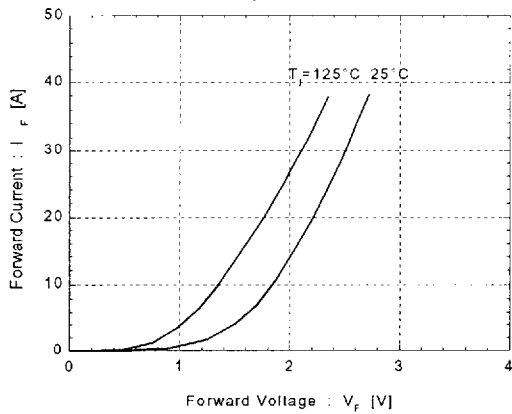
Switching Time vs. Collector Current



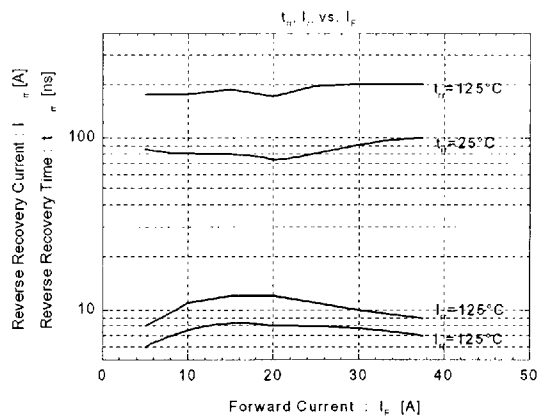
Switching Time vs. Collector Current

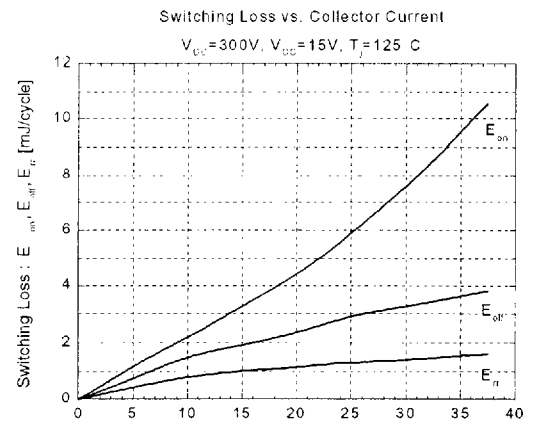
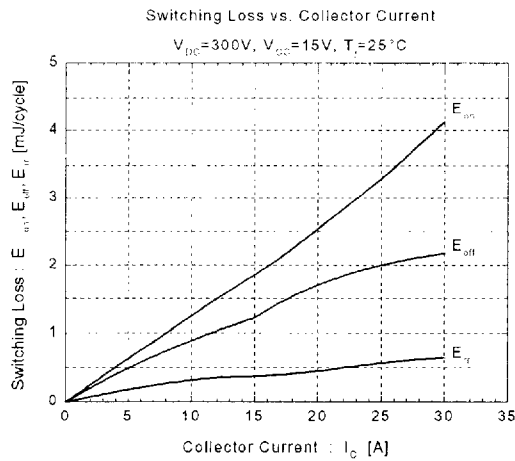
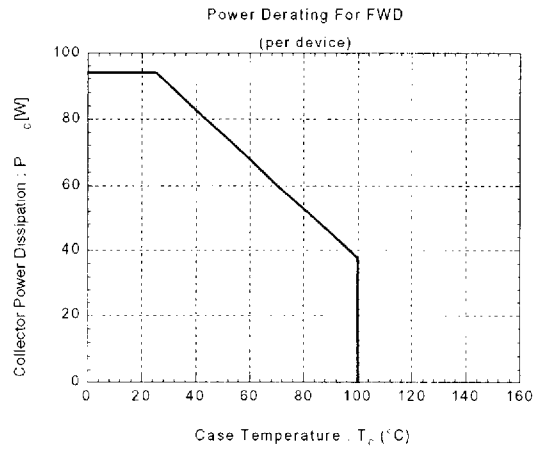
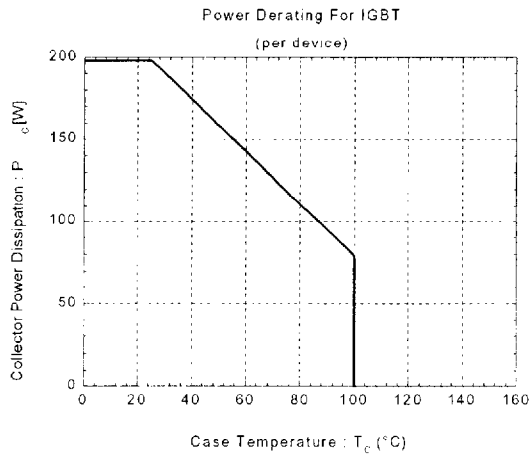
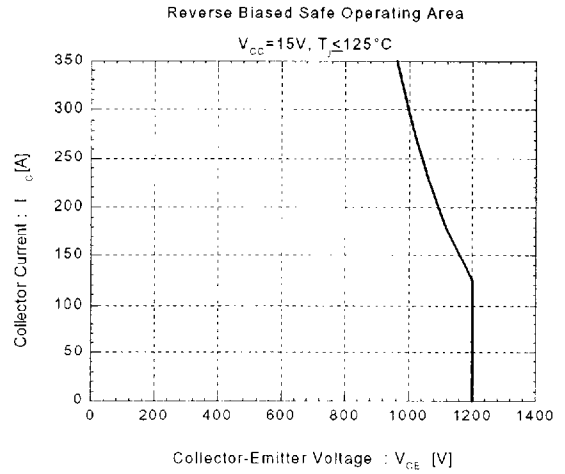
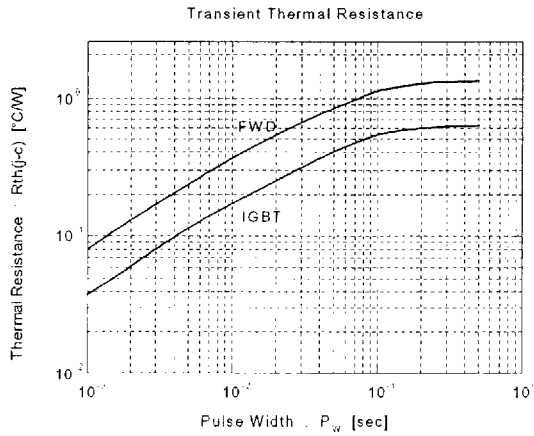


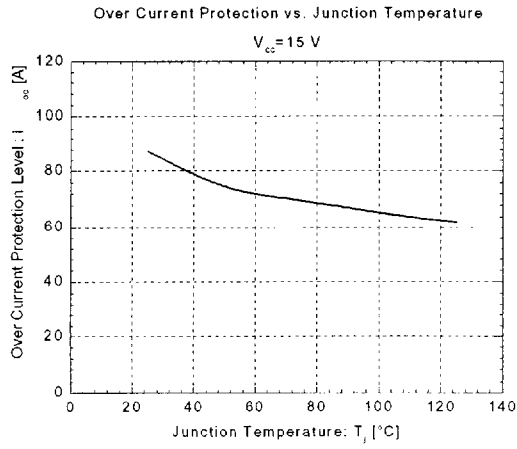
Forward Voltage vs. Forward Current



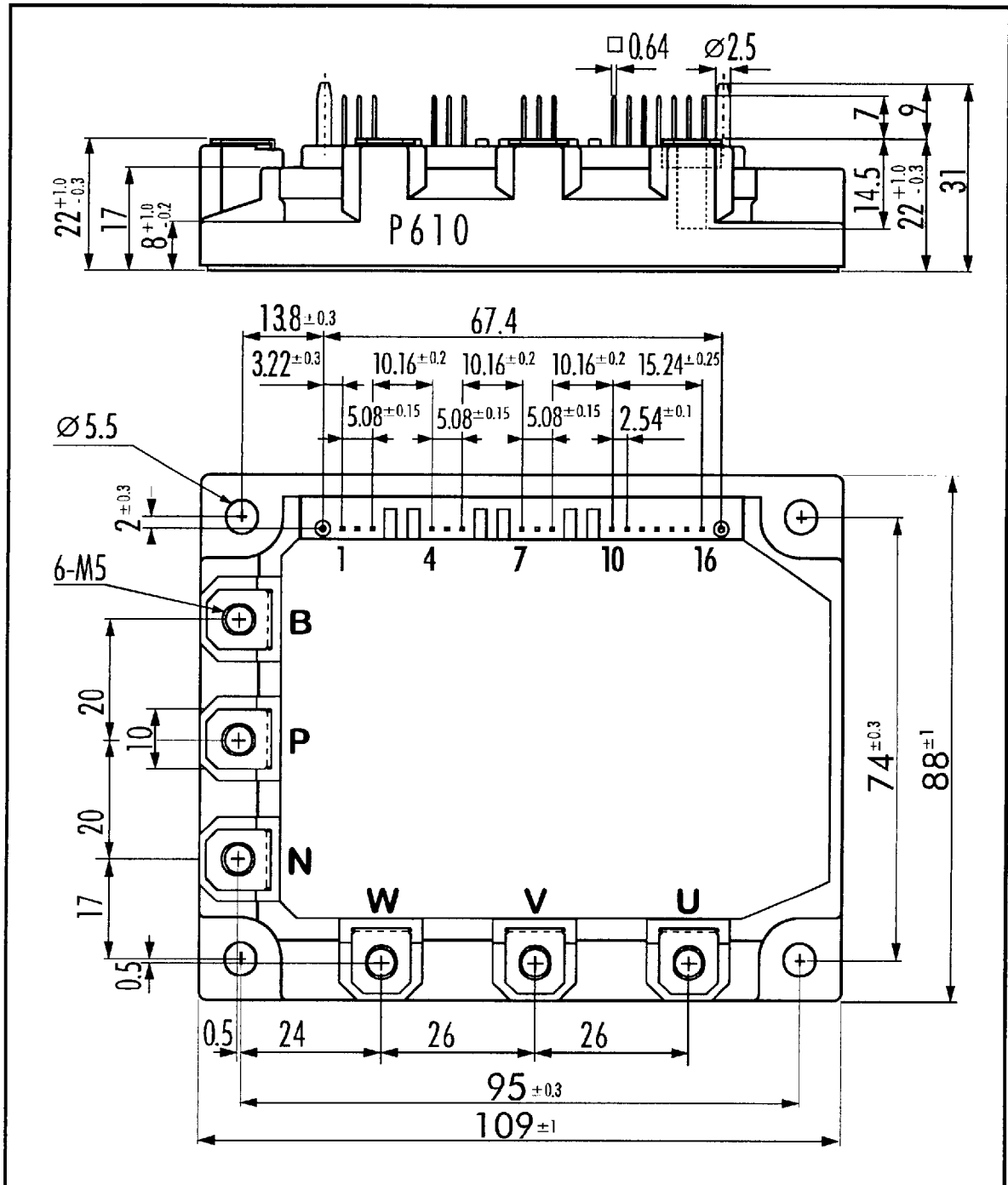
Reverse Recovery Characteristics







n Outline Drawing



Weight: 440g