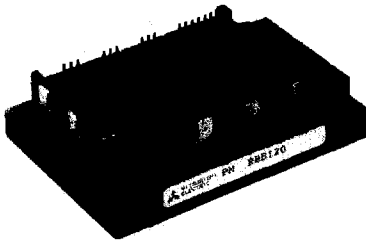


PM25RHB120

FLAT-BASE TYPE
INSULATED PACKAGE

PM25RHB120



- 3 ϕ 25A, 1200V Current-sense IGBT type inverter
- Monolithic gate drive & protection logic
- Detection, protection & status indication circuits for over-current, short-circuit, over-temperature & under-voltage
- Acoustic noise-less 3.7kW class inverter application
- UL Recognized

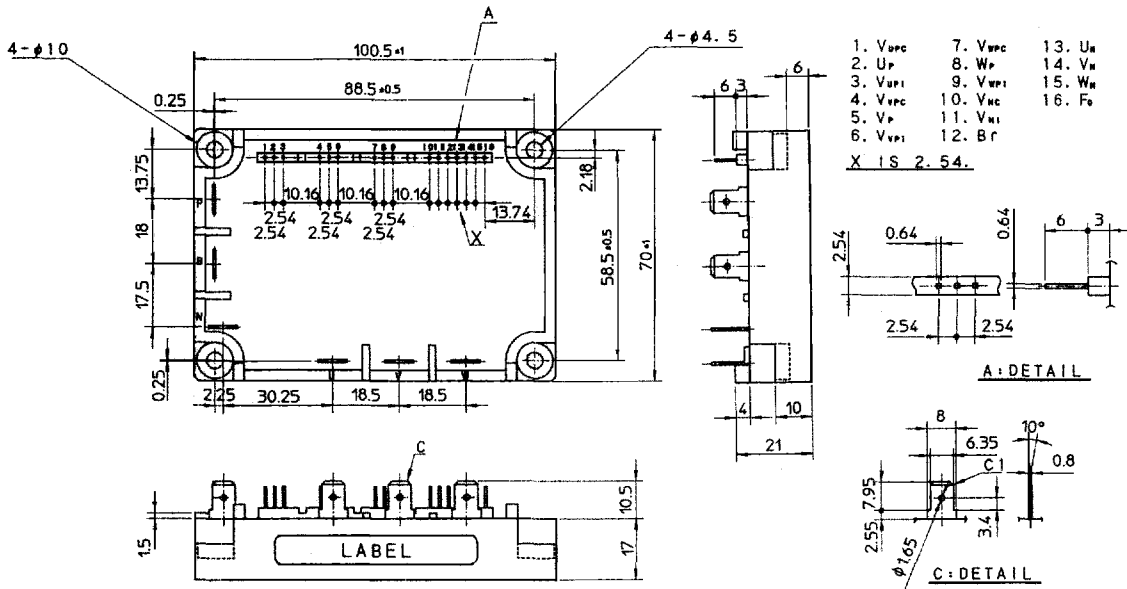
Yellow Card No. E80276 (N)
File No. E80271

APPLICATION

General purpose inverter, servo drives and other motor controls

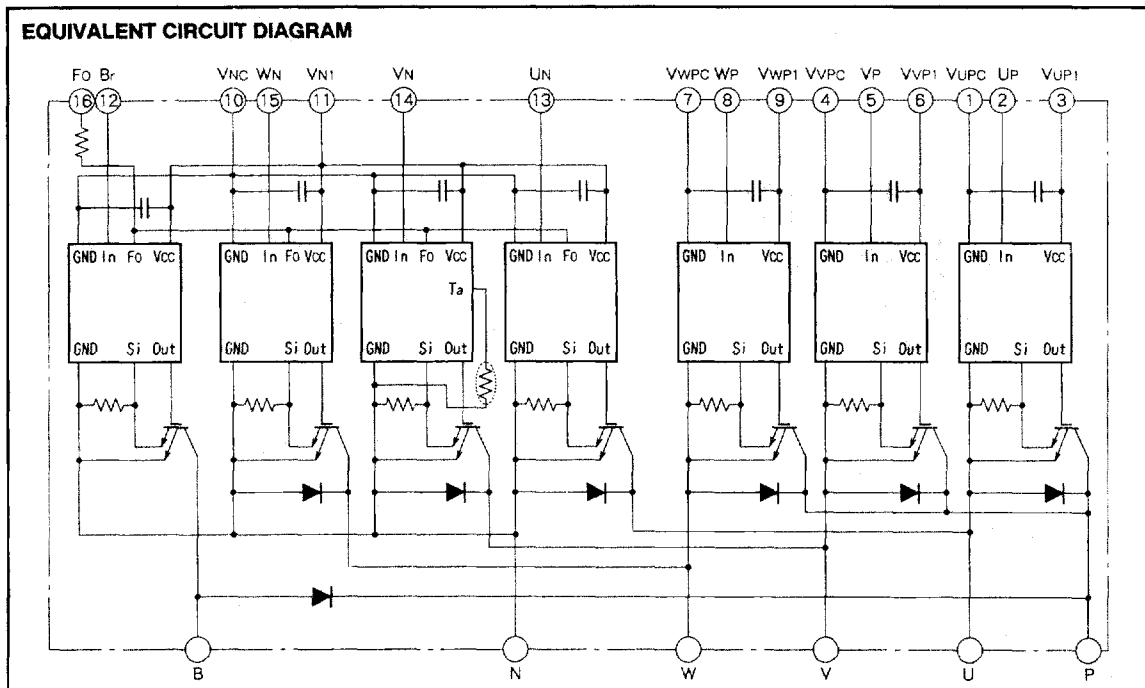
OUTLINE DRAWING

Dimensions in mm



PM25RHB120

FLAT-BASE TYPE
INSULATED PACKAGE



MAXIMUM RATINGS (T_j = 25 °C, unless otherwise noted)

INVERTER PART

Symbol	Parameter	Conditions	Ratings	Unit
V _{cc}	Supply voltage	Applied between : P-N	900	V
V _{cc(surge)}	Supply voltage (surge)	Applied between : P-N, surge value	1000	V
V _{CES}	Collector-emitter voltage		1200	V
± I _c	Collector current	T _c = 25 °C	25	A
± I _{cP}	Collector current (peak)	T _c = 25 °C	50	A
P _c	Collector dissipation	T _c = 25 °C	139	W
T _j	Junction temperature		- 20 ~ + 150	°C

BRAKE PART

Symbol	Parameter	Conditions	Ratings	Unit
V _{cc}	Supply voltage	Applied between : P-N	900	V
V _{cc(surge)}	Supply voltage (surge)	Applied between : P-N, surge value	1000	V
V _{CES}	Collector-emitter voltage		1200	V
I _c	Collector current	T _c = 25 °C	10	A
I _{cP}	Collector current (peak)	T _c = 25 °C	20	A
P _c	Collector dissipation	T _c = 25 °C	63	W
V _{R(DC)}	FWDi rating DC reverse voltage	T _c = 25 °C	1200	V
I _F	FWDi forward current	T _c = 25 °C	10	A
T _j	Junction temperature		- 20 ~ + 150	°C

CONTROL PART

Symbol	Parameter	Conditions	Ratings	Unit
V ₀	Supply voltage	Applied between : V _{UP1} -V _{UPC} , V _{VWP1} -V _{VPC} , V _{WN1} -V _{VNC}	20	V
V _{CIN}	Input voltage	Applied between : U _P -U _{PC} , V _P -V _{PC} , W _P -W _{PC} , U _N · V _N · W _N · B _r -V _{VNC}	20	V
V _{Fo}	Fault output supply voltage	Applied between, F ₀ -V _{VNC}	20	V
I _{Fo}	Fault output current	Sink current of F ₀ terminal	20	mA

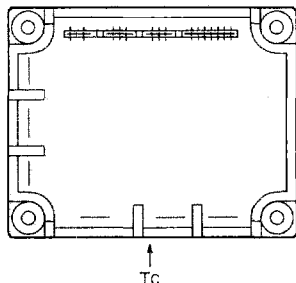
PM25RHB120

**FLAT-BASE TYPE
INSULATED PACKAGE**

TOTAL SYSTEM

Symbol	Parameter	Conditions	Ratings	Unit
V _{CC(PROT)}	Supply voltage protected by OC & SC	V _D = 13.5~16.5V Inverter part, T _j = 125 °C start	800	V
T _C	Module case operating temperature	(Note 1)	- 20 ~ + 100	°C
T _{stg}	Storage temperature	-	- 40 ~ + 125	°C
V _{iso}	Isolation voltage	60Hz, Sinusoidal, AC, 1min	2500	Vrms

Note 1. T_C measuring point is as shown below



ELECTRICAL CHARACTERISTICS (T_j = 25 °C, unless otherwise noted)
INVERTER PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V _{CE(sat)}	Collector-emitter saturation voltage	V _D = 15V, V _{CIN} = 0V Pulsed				V
			I _c = 25A, T _j = 25 °C	2.8	3.8	
			I _c = 25A, T _j = 125 °C	2.5	3.5	
V _{EC}	FWDi forward voltage	- I _c = 25A, V _D = 15V, V _{CIN} = 15V	-	1.9	3.0	V
t _{on}	Switching time	V _D = 15V, V _{CIN} = 0V ↔ 15V V _{CC} = 600V, I _c = 25A T _j = 125 °C (Per 1 arm) Inductive load	0.5	1.0	2.5	μs
t _{rr}			-	0.3	0.6	μs
t _{c(on)}			-	0.4	1.5	μs
t _{off}			-	2.3	3.5	μs
t _{c(off)}			-	0.7	1.2	μs
I _{CES}	Collector-emitter cutoff current	V _{CE} = V _{CES}				mA
			T _j = 25 °C	-	1	
			T _j = 125 °C	-	10	

BRAKE PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V _{CE(sat)}	Collector-emitter saturation voltage	V _D = 15V, V _{CIN} = 0V Pulsed				V
			I _c = 10A, T _j = 25 °C	2.8	3.8	
			I _c = 10A, T _j = 125 °C	2.5	3.5	
V _{EC}	FWDi forward voltage	- I _c = 10A, V _D = 15V, V _{CIN} = 15V	-	1.9	3.0	V
I _{CES}	Collector-emitter cutoff current	V _{CE} = V _{CES}				mA
			T _j = 25 °C	-	1	
			T _j = 125 °C	-	10	

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**FLAT-BASE TYPE
INSULATED PACKAGE**

CONTROL PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V _D	Supply voltage	Applied between : V _{UP1} -V _{UPC} , V _{VP1} -V _{VPc} , V _{WP1} -V _{WPC} , V _{N1} -V _{Nc}	13.5	15	16.5	V
I _D	Circuit current	V _D = 15V, V _{CIN} = 15V V _{N1} -V _{Nc} V _{XP1} -V _{XPc}	-	80	120	mA
			-	25	35	
V _{CIN(ON)}	Input on threshold voltage	Applied between :	1.2	1.5	1.8	V
V _{CIN(OFF)}	Input off threshold voltage	U _P -V _{UPC} , V _P -V _{VPc} , W _P -V _{WPC} , U _N · V _N · W _N · B _r -V _{Nc}	1.7	2.0	2.3	V
f _{PWM}	PWM input frequency	3φ sinusoidal	-	15	20	kHz
t _{dead}	Arm shoot-through blocking time	For each pulse input U _P -U _N , V _P -V _N , W _P -W _N	3.0	-	-	μs
		Using application circuit opto-coupler's input signal I _F = 12mA	5.0	-	-	
OC	Over current trip level	- 20°C ≤ T _J ≤ 125°C	32	62	-	A
		V _D = 15V	15	30	-	
SC	Short circuit trip level	- 20°C ≤ T _J ≤ 125°C	52	101	-	A
		V _D = 15V	-	70	-	
t _{off(oc)}	Over current delay time	V _D = 15V	-	10	-	μs
OT	Over temperature protection	Trip level	111	118	125	°C
		Reset level	-	100	-	°C
UV	Supply circuit under voltage protection	Trip level	11.5	12.0	12.5	V
		Reset level	-	12.5	-	V
I _{FO(H)}	Fault output current (Note 2)	V _D = 15V, V _{Fo} = 15V	-	-	0.01	mA
I _{FO(L)}			-	10	15	mA
t _{FO}	Minimum fault output pulse width (Note 2)	V _D = 15V	1.0	2.0	-	ms

Note 2. Fault output is given only when the internal OC, SC, OT & UV protections schemes of any lower arm device operate to protect the device. For each upper arm device, the internal OC, SC & UV protection schemes are provided to protect the device but, no fault output is given.

THERMAL RESISTANCES

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
R _{th(j-c)Q}	Junction-to-case thermal resistances	Inverter IGBT part, per 1/6 module	-	-	0.9	°C/W
R _{th(j-c)F}		Inverter FWDi part, per 1/6 module	-	-	2.5	°C/W
R _{th(j-c)Q}		Brake IGBT	-	-	2.0	°C/W
R _{th(j-c)F}		Brake FWDi	-	-	2.5	°C/W
R _{th(c-f)}	Contact thermal resistance	Thermal grease applied, per 1/6 module	-	-	0.25	°C/W

MECHANICAL RATINGS AND CHARACTERISTICS

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
-	Mounting torque	Mounting part screw : M4	0.98	1.18	1.47	N · m
-	Weight	-	10	12	15	kg · cm
-			-	330	-	g

RECOMMENDED CONDITIONS FOR USE

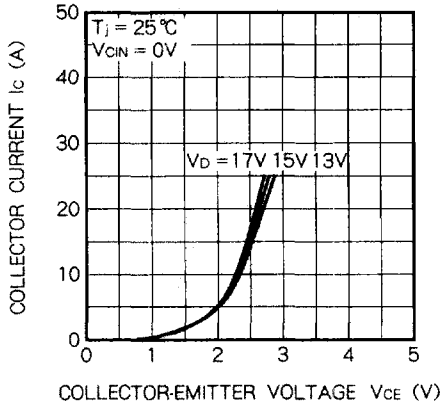
Symbol	Parameter	Test conditions	Value			Unit
			Min	Typ	Max	
V _{CC}	Supply voltage	Applied across P-N terminals	0	600	800	V
V _D		Applied between : V _{UP1} -V _{UPC} , V _{VP1} -V _{VPc} , V _{WP1} -V _{WPC} , V _{N1} -V _{Nc}	13.5	15	16.5	V
V _{CIN(ON)}	Input ON voltage	Applied between :	0	-	0.8	V
V _{CIN(OFF)}	Input OFF voltage	U _P -U _{PC} , V _P -V _{PC} , W _P -W _{PC} , U _N · V _N · W _N · B _r -V _{Nc}	12	-	V _D	V
f _{PWM}	PWM Input frequency	Using application circuit	5	15	20	kHz
t _{dead}	Arm shoot-through blocking time	Using application circuit opto-coupler's input signal	5	-	-	μs

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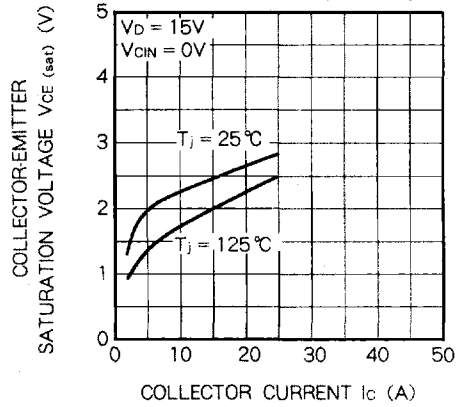
**FLAT-BASE TYPE
INSULATED PACKAGE**

PERFORMANCE CURVES (INVERTER PART)

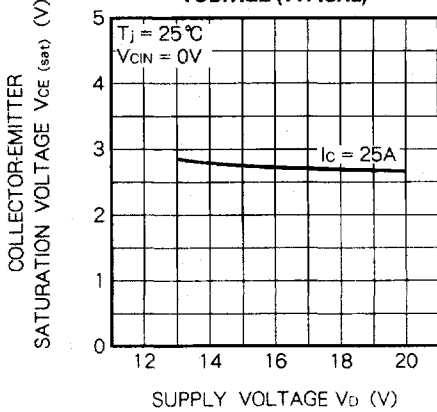
**OUTPUT CHARACTERISTICS
(TYPICAL)**



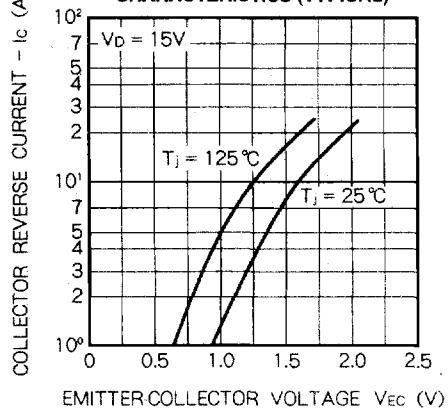
**SATURATION VOLTAGE
CHARACTERISTICS (TYPICAL)**



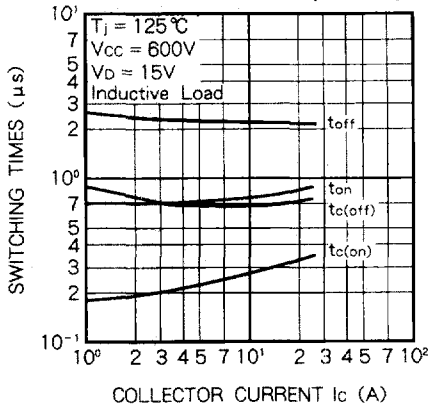
**COLLECTOR-EMITTER SATURATION
VOLTAGE (TYPICAL)**



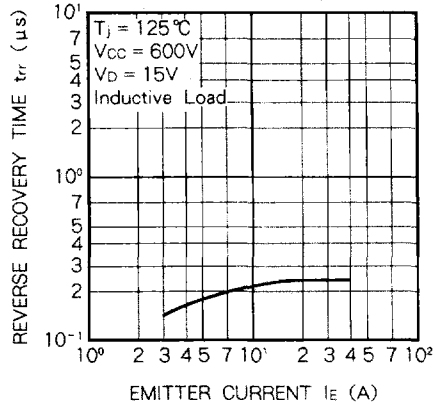
**FREE-WHEEL DIODE FORWARD
CHARACTERISTICS (TYPICAL)**



**SWITCHING TIME VS.
COLLECTOR CURRENT (TYPICAL)**



**REVERSE RECOVERY CHARACTERISTICS
OF FREE-WHEEL DIODE (TYPICAL)**

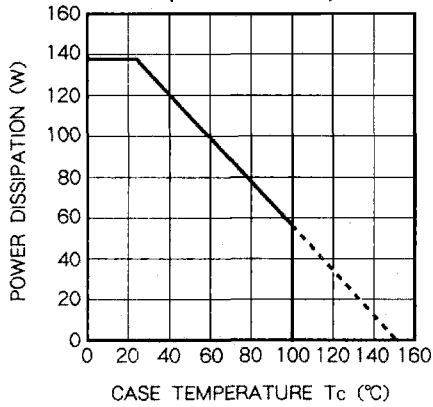


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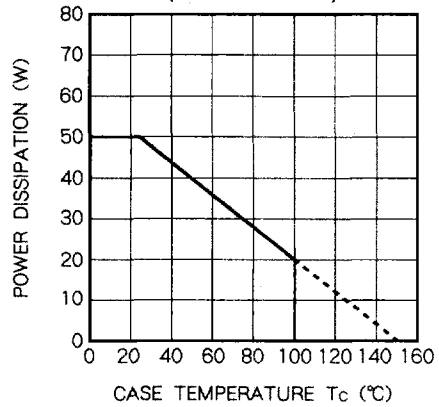
**FLAT-BASE TYPE
INSULATED PACKAGE**

(INVERTER PART)

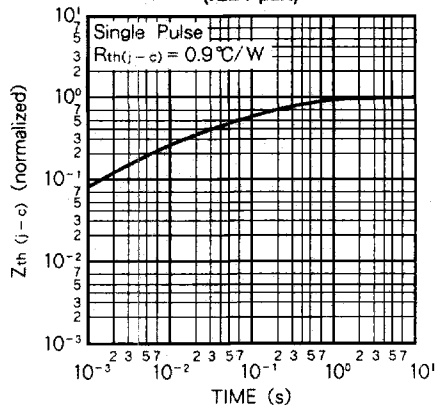
**POWER DISSIPATION DERATING CURVE
(Per IGBT element)**



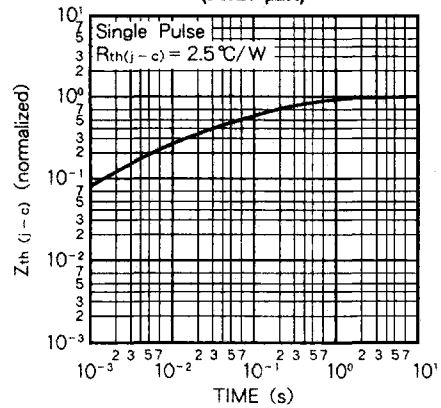
**POWER DISSIPATION DERATING CURVE
(Per FWDi element)**



**TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT part)**



**TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(FWDi part)**

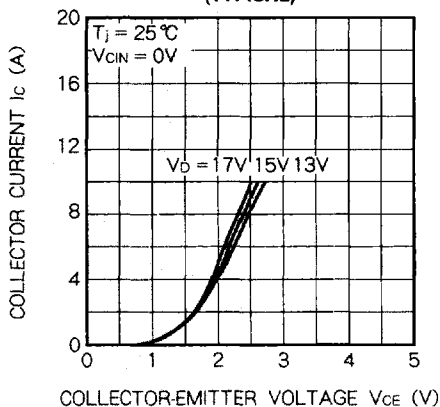


PM25RHB120

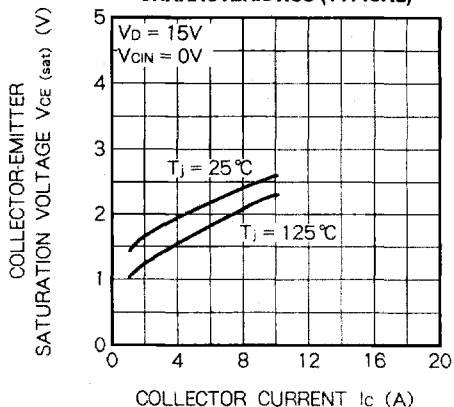
FLAT-BASE TYPE
INSULATED PACKAGE

PERFORMANCE CURVES (BRAKE PART)

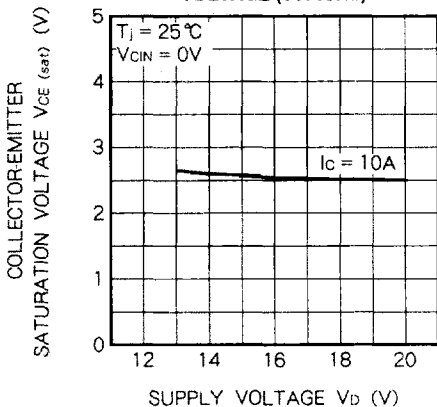
OUTPUT CHARACTERISTICS (TYPICAL)



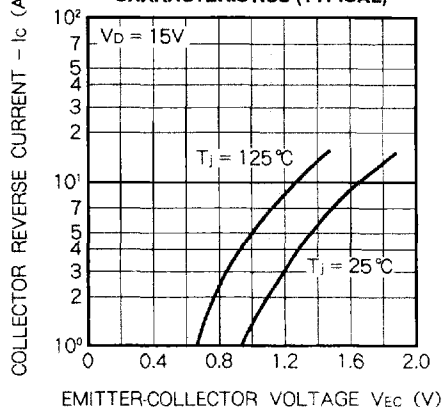
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



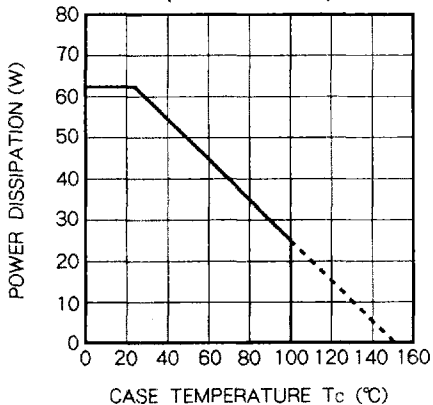
COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



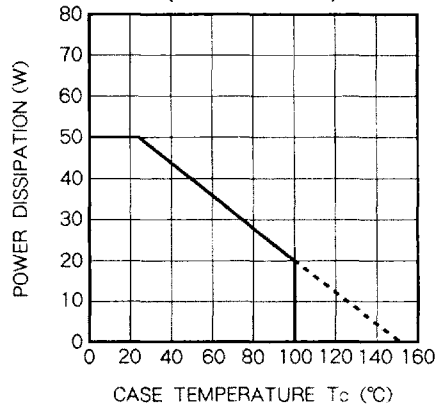
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



POWER DISSIPATION DERATING CURVE (Per IGBT element)



POWER DISSIPATION DERATING CURVE (Per FWDi element)

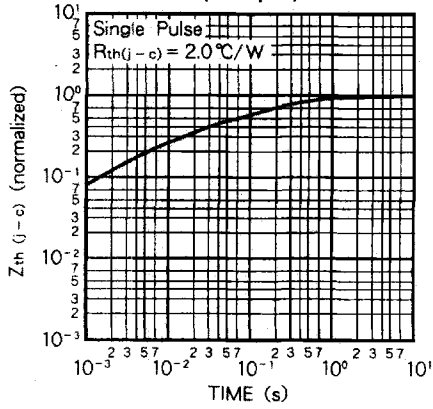


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FLAT-BASE TYPE
INSULATED PACKAGE

(BRAKE PART)

TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT part)



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(FWDI part)

