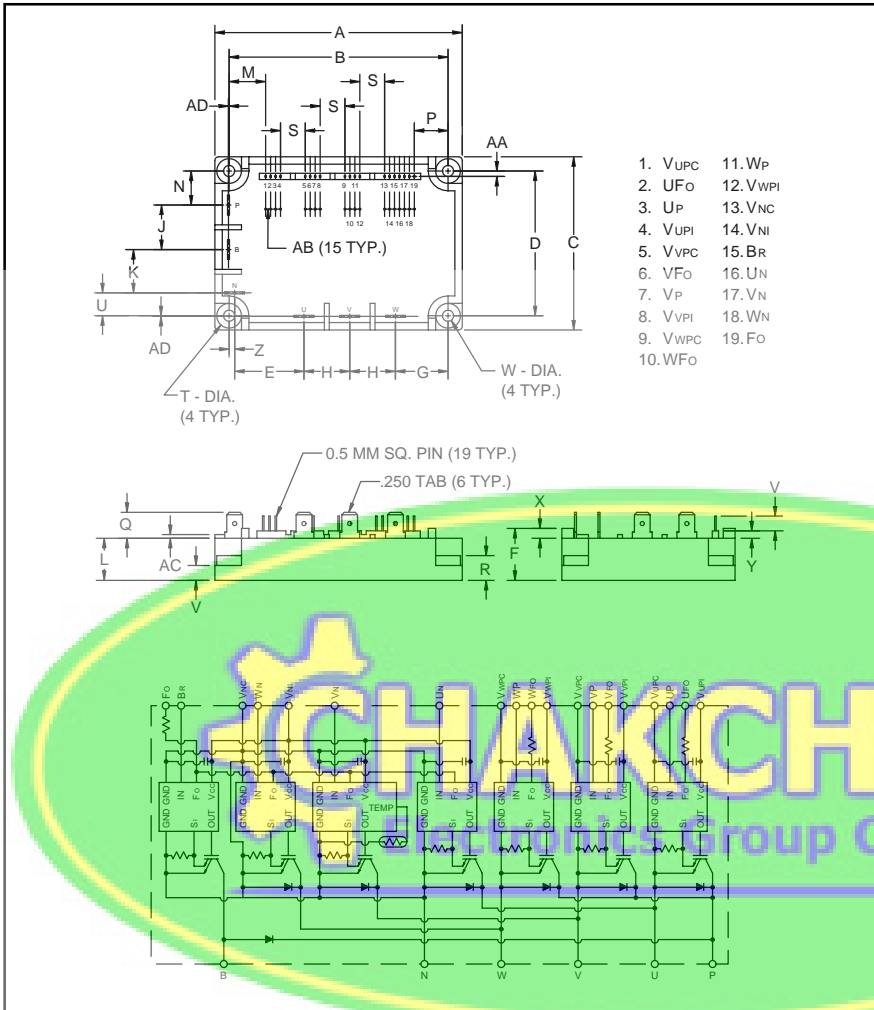
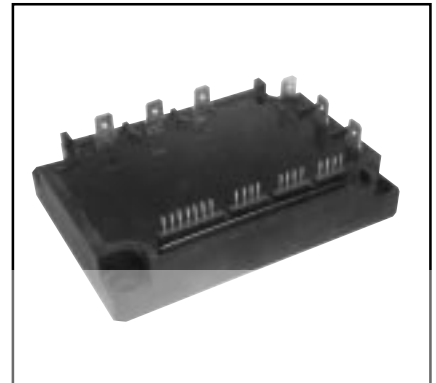


# PM25RSB120

FLAT-BASE TYPE  
INSULATED PACKAGE



- |                     |                      |
|---------------------|----------------------|
| 1. V <sub>UPC</sub> | 11. W <sub>P</sub>   |
| 2. U <sub>Fo</sub>  | 12. V <sub>WPI</sub> |
| 3. U <sub>P</sub>   | 13. V <sub>NC</sub>  |
| 4. V <sub>UPI</sub> | 14. V <sub>NI</sub>  |
| 5. V <sub>VPC</sub> | 15. B <sub>R</sub>   |
| 6. V <sub>Fo</sub>  | 16. U <sub>N</sub>   |
| 7. V <sub>P</sub>   | 17. V <sub>N</sub>   |
| 8. V <sub>VPI</sub> | 18. W <sub>N</sub>   |
| 9. V <sub>WPC</sub> | 19. F <sub>o</sub>   |
| 10. W <sub>Fo</sub> |                      |



**Description:**

Mitsubishi Intelligent Power Modules are isolated base modules designed for power switching applications operating at frequencies to 20 kHz. Built-in control circuits provide optimum gate drive and protection for the IGBT and free-wheel diode power devices.

**Features:**

- Complete Output Power Circuit
- Gate Drive Circuit
- Protection Logic
  - Short Circuit
  - Over Current
  - Over Temperature
  - Under Voltage

Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	3.96 ± 0.04	100.5 ± 1.0
B	3.48 ± 0.02	88.5 ± 0.5
C	2.76 ± 0.04	70.0 ± 1.0
D	2.30 ± 0.02	58.5 ± 0.5
E	1.191 ± 0.02	30.25 ± 0.5
F	0.83	21.0
G	0.75	19.0
H	0.73	18.5
J	0.71	18.0
K	0.69	17.5
L	0.67	17.0
M	0.581	14.76
N	0.541	13.75
P	0.541	13.74

Dimensions	Inches	Millimeters
Q	0.41	10.5
R	0.39	10.0
S	0.394 ± 0.010	10.00 ± 0.25
T	0.39 Dia.	Dia. 10.0
U	0.364	9.25
V	0.24	6.0
W	0.18 Dia.	Dia. 4.5
X	0.16	4.0
Y	0.12	3.0
Z	0.88 ± 0.02	2.25 ± 0.5
AA	0.086 ± 0.02	2.18 ± 0.5
AB	0.079 ± 0.010	2.00 ± 0.25
AC	0.06	1.5
AD	0.01 ± 0.02	0.25 ± 0.5

**Applications:**

- Inverters
- UPS
- Motion/Servo Control
- Power Supplies

**Ordering Information:**

Example: Select the complete part number from the table below -i.e. PM25RSB120 is a 1200V, 25 Ampere Intelligent Power Module.

Type	Current Rating Amperes	V <sub>CES</sub> Volts (x 10)
PM	25	120

**PM25RSB120**FLAT-BASE TYPE  
INSULATED PACKAGE**Absolute Maximum Ratings,  $T_j = 25^\circ\text{C}$  unless otherwise specified**

Ratings	Symbol	PM25RSB120	Units
Power Device Junction Temperature	$T_j$	-20 to 150	$^\circ\text{C}$
Storage Temperature	$T_{\text{stg}}$	-40 to 125	$^\circ\text{C}$
Case Operating Temperature	$T_C$	-20 to 100	$^\circ\text{C}$
Mounting Torque, M4 Mounting Screws	—	0.98 ~ 1.47	$\text{N} \cdot \text{m}$
Module Weight (Typical)	—	330	Grams
Supply Voltage Protected by OC and SC ( $V_D = 13.5 - 16.5\text{V}$ , Inverter Part, $T_j = 125^\circ\text{C}$ )	$V_{\text{CC(prot.)}}$	800	Volts
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	$V_{\text{iso}}$	2500	$V_{\text{rms}}$

**Control Sector**

Supply Voltage (Applied between $V_{\text{UP1}}-V_{\text{UPC}}$ , $V_{\text{VP1}}-V_{\text{VPC}}$ , $V_{\text{WP1}}-V_{\text{WPC}}$ , $V_{\text{N1}}-V_{\text{NC}}$ )	$V_D$	20	Volts
Input Voltage (Applied between $U_P-V_{\text{UPC}}$ , $V_P-V_{\text{VPC}}$ , $W_P-V_{\text{WPC}}$ , $U_N \cdot V_N \cdot W_N \cdot B_r-V_{\text{NC}}$ )	$V_{\text{CIN}}$	20	Volts
Fault Output Supply Voltage Applied between ( $U_{\text{FO}}-V_{\text{UPC}}$ , $V_{\text{FO}}-V_{\text{VPC}}$ , $W_{\text{FO}}-V_{\text{WPC}}$ , $F_{\text{O}}-V_{\text{NC}}$ )	$V_{\text{FO}}$	20	Volts
Fault Output Current (Sink Current at $U_{\text{FO}}$ , $V_{\text{FO}}$ , $W_{\text{FO}}$ and $F_{\text{O}}$ Terminal)	$I_{\text{FO}}$	20	mA

**IGBT Inverter Sector**

Collector-Emitter Voltage ( $V_D = 15\text{V}$ , $V_{\text{CIN}} = 15\text{V}$ )	$V_{\text{CES}}$	1200	Volts
Collector Current, ( $T_C = 25^\circ\text{C}$ )	$I_C$	25	Amperes
Peak Collector Current, ( $T_C = 25^\circ\text{C}$ )	$I_{\text{CP}}$	50	Amperes
Supply Voltage (Applied between P - N)	$V_{\text{CC}}$	900	Volts
Supply Voltage, Surge (Applied between P - N)	$V_{\text{CC(surge)}}$	1000	Volts
Collector Dissipation	$P_C$	132	Watts

**Brake Sector**

Collector-Emitter Voltage	$V_{\text{CES}}$	1200	Volts
Collector Current, ( $T_C = 25^\circ\text{C}$ )	$I_C$	10	Amperes
Peak Collector Current, ( $T_C = 25^\circ\text{C}$ )	$I_{\text{CP}}$	20	Amperes
Supply Voltage (Applied between P - N)	$V_{\text{CC}}$	900	Volts
Supply Voltage, Surge (Applied between P - N)	$V_{\text{CC(surge)}}$	1000	Volts
Collector Dissipation	$P_C$	62	Watts
Diode Forward Current	$I_F$	10	Amperes
Diode DC Reverse Voltage	$V_{\text{R(DC)}}$	1200	Volts

**PM25RSB120**

FLAT-BASE TYPE  
INSULATED PACKAGE

**Electrical and Mechanical Characteristics, T<sub>j</sub> = 25°C unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
<b>Control Sector</b>						
Over Current Trip Level Inverter Part	OC	-20°C ≤ T ≤ 125°C, V <sub>D</sub> = 15V	32	62	—	Amperes
Over Current Trip Level Brake Part			15	30	—	Amperes
Short Circuit Trip Level Inverter Part	SC	-20°C ≤ T ≤ 125°C, V <sub>D</sub> = 15V	—	101	—	Amperes
Short Circuit Trip Level Brake Part			—	41	—	Amperes
Over Current Delay Time	t <sub>off(OC)</sub>	V <sub>D</sub> = 15V	—	10	—	μs
Over Temperature Protection	OT	Trip Level	111	118	125	°C
	OT <sub>r</sub>	Reset Level	—	100	—	°C
Supply Circuit Under Voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
	UV <sub>r</sub>	Reset Level	—	12.5	—	Volts
Supply Voltage	V <sub>D</sub>	Applied between V <sub>UP1</sub> -V <sub>UPC</sub> , V <sub>VP1</sub> -V <sub>VPC</sub> , V <sub>WP1</sub> -V <sub>WPC</sub> , V <sub>N1</sub> -V <sub>N3</sub>	13.5	15	16.5	Volts
Circuit Current	I <sub>D</sub>	V <sub>D</sub> = 15V, V <sub>CIN</sub> = 15V, V <sub>N1</sub> -V <sub>N3</sub>	—	44	60	mA
		V <sub>D</sub> = 15V, V <sub>CIN</sub> = 15V, V <sub>XP1</sub> -V <sub>XPC</sub>	—	13	18	mA
Input ON Threshold Voltage	V <sub>th(on)</sub>	Applied between	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	V <sub>th(off)</sub>	U <sub>P</sub> -V <sub>UPC</sub> , V <sub>P</sub> -V <sub>VPC</sub> , W <sub>P</sub> -V <sub>WPC</sub> , U <sub>N</sub> · V <sub>N</sub> · W <sub>N</sub> · B <sub>r</sub> -V <sub>N3</sub>	1.7	2.0	2.3	Volts
PWM Input Frequency	f <sub>PWM</sub>	3-φ Sinusoidal	—	15	20	kHz
Fault Output Current	I <sub>FO(H)</sub>	V <sub>D</sub> = 15V, V <sub>FO</sub> = 15V	—	—	0.01	mA
	I <sub>FO(L)</sub>	V <sub>D</sub> = 15V, V <sub>FO</sub> = 15V	—	10	15	mA
Minimum Fault Output Pulse Width	t <sub>FO</sub>	V <sub>D</sub> = 15V	1.0	1.8	—	ms

**PM25RSB120**FLAT-BASE TYPE  
INSULATED PACKAGE**Electrical and Mechanical Characteristics,  $T_j = 25^\circ\text{C}$  unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
<b>IGBT Inverter Sector</b>						
Collector Cutoff Current	$I_{CES}$	$V_{CE} = V_{CES}, T_j = 25^\circ\text{C}$	—	—	1.0	mA
		$V_{CE} = V_{CES}, T_j = 125^\circ\text{C}$	—	—	10	mA
Emitter-Collector Voltage	$V_{EC}$	$-I_C = 25\text{A}, V_D = 15\text{V}, V_{CIN} = 5\text{V}$	—	2.5	3.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 25\text{A}$	—	2.5	3.5	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 25\text{A}, T_j = 125^\circ\text{C}$	—	2.2	3.2	Volts
Inductive Load Switching Times	$t_{on}$		0.5	1.0	2.5	$\mu\text{s}$
	$t_{rr}$	$V_D = 15\text{V}, V_{CIN} = 0 \leftrightarrow 15\text{V}$	—	0.15	0.3	$\mu\text{s}$
	$t_{C(on)}$	$V_{CC} = 600\text{V}, I_C = 25\text{A}$	—	0.4	1.0	$\mu\text{s}$
	$t_{off}$	$T_j = 125^\circ\text{C}$	—	2.0	3.0	$\mu\text{s}$
	$t_{C(off)}$		—	0.7	1.2	$\mu\text{s}$
<b>Brake Sector</b>						
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 10\text{A}, T_j = 25^\circ\text{C}$	—	2.8	3.8	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 10\text{A}, T_j = 125^\circ\text{C}$	—	2.5	3.5	Volts
Diode Forward Voltage	$V_{FM}$	$-I_C = 10\text{A}, V_D = 15\text{V}, V_{CIN} = 5\text{V}$	—	2.5	3.5	Volts
Collector Cutoff Current	$I_{CES}$	$V_{CE} = V_{CES}, T_j = 25^\circ\text{C}$	—	—	1	mA
		$V_{CE} = V_{CES}, T_j = 125^\circ\text{C}$	—	—	10	mA

# PM25RSB120

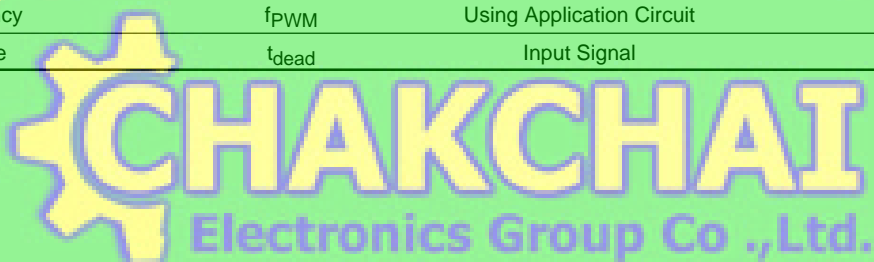
FLAT-BASE TYPE  
INSULATED PACKAGE

## Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each Inverter IGBT	—	—	0.95	°C/Watt
	$R_{th(j-c)F}$	Each Inverter FWDi	—	—	2.5	°C/Watt
	$R_{th(c-f)Q}$	Each Brake IGBT	—	—	2.0	°C/Watt
	$R_{th(c-f)F}$	Each Brake FWDi	—	—	2.5	°C/Watt
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.036	°C/Watt

## Recommended Conditions for Use

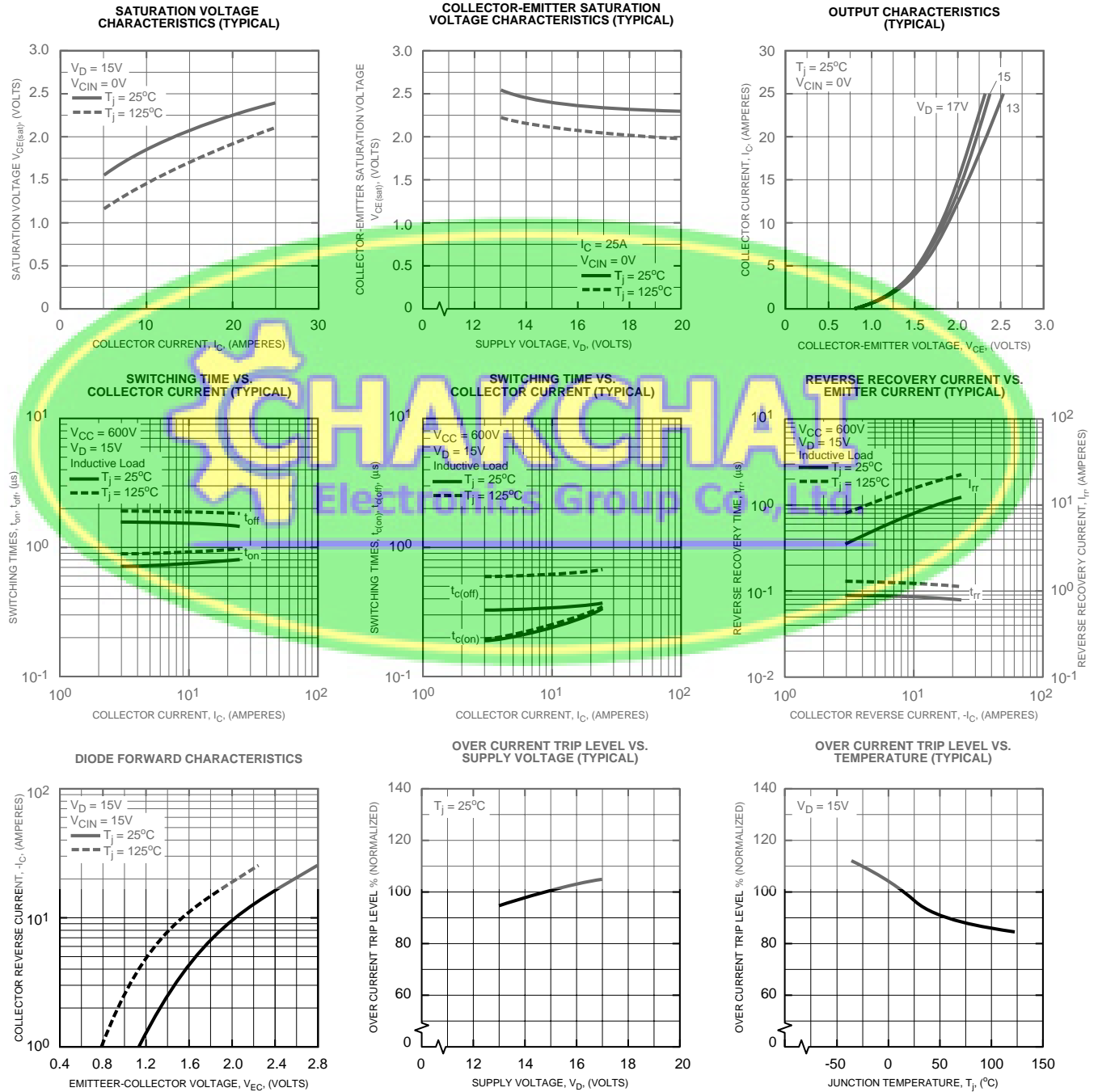
Characteristic	Symbol	Condition	Value	Units
Supply Voltage	$V_{CC}$	Applied across P-N Terminals	0 ~ 800	Volts
	$V_D$	Applied between $V_{UP1}$ - $V_{UPC}$ , $V_{N1}$ - $V_{NC}$ , $V_{VP1}$ - $V_{VPC}$ , $V_{WP1}$ - $V_{WPC}$	$15 \pm 1.5$	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied between	0 ~ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	$U_P, V_P, W_P, U_N, V_N, W_N, B_r$	$4.0 \sim V_D$	Volts
PWM Input Frequency	$f_{PWM}$	Using Application Circuit	5 ~ 20	kHz
Minimum Dead Time	$t_{dead}$	Input Signal	$\geq 2.5$	$\mu s$



# PM25RSB120

FLAT-BASE TYPE  
INSULATED PACKAGE

## Inverter Part

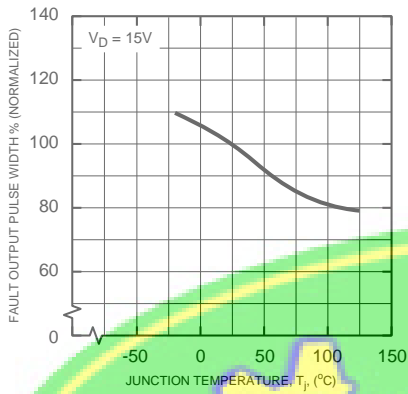


# PM25RSB120

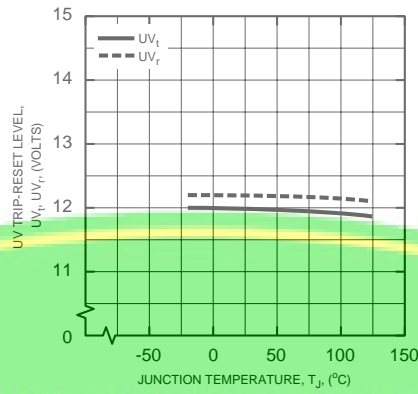
FLAT-BASE TYPE  
INSULATED PACKAGE

## Inverter Part

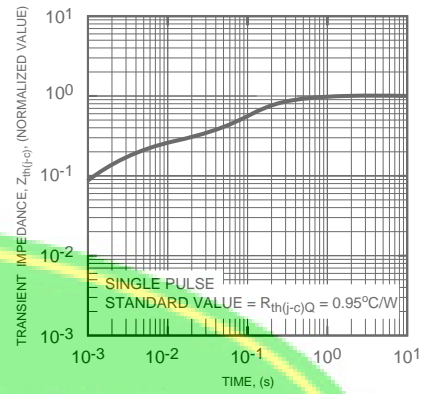
FAULT OUTPUT PULSE WIDTH VS. TEMPERATURE (TYPICAL)



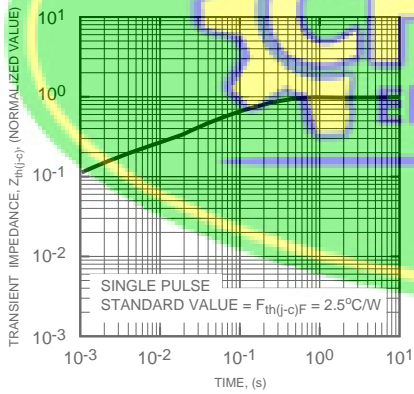
CONTROL SUPPLY VOLTAGE TRIP-RESET LEVEL TEMPERATURE DEPENDENCY (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (Each IGBT)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (Each FWD)



# PM25RSB120

FLAT-BASE TYPE  
INSULATED PACKAGE

## Brake Part

