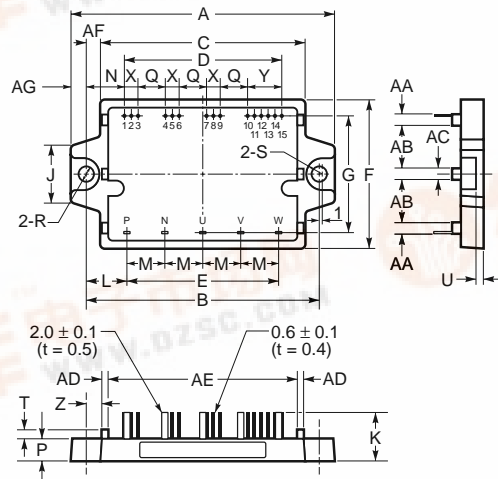


MITSUBISHI INTELLIGENT POWER MODULES

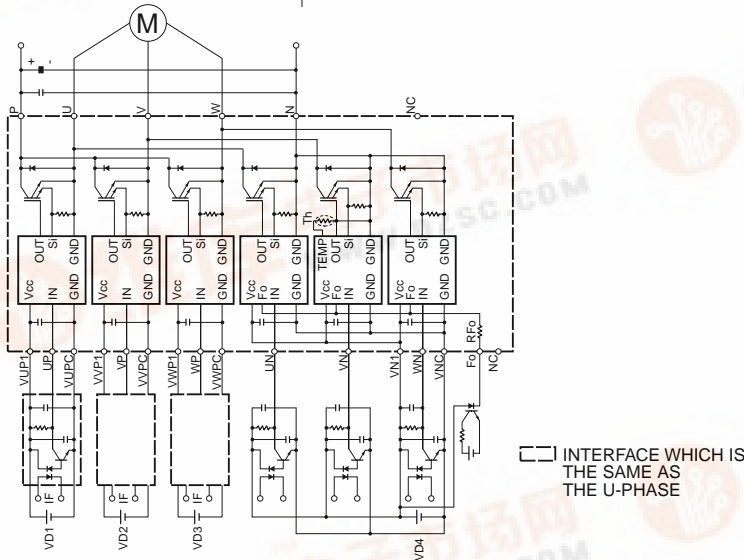
PM10CZF120

FLAT-BASE TYPE
INSULATED PACKAGE



TERMINAL CODE

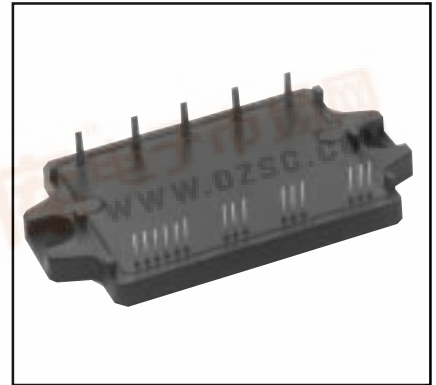
- | | |
|---------|---------|
| 1. VUPC | 11. VN1 |
| 2. UP | 12. UN |
| 3. VUP1 | 13. VN |
| 4. VVPC | 14. WN |
| 5. VP | 15. FO |
| 6. VVP1 | 16. P |
| 7. WVPC | 17. N |
| 8. WP | 18. U |
| 9. WVP1 | 19. V |
| 10. VNC | 20. W |



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	3.86±0.04	98.0±1.0
B	3.43±0.02	87.0±0.5
C	2.99	76.0
D	2.30	58.42
E	2.20±0.03	56.0±0.8
F	2.21±0.04	56.0±1.0
G	1.73±0.03	44.0±0.8
J	0.83	21.0
K	0.71±0.04	18.0±1.0
L	0.61	15.5
M	0.55±0.01	14.0±0.3
N	0.56	14.29
P	0.32±0.02	8.0±0.5
Q	0.40	10.16

Dimensions	Inches	Millimeters
R	0.22 Dia.	5.5 Dia.
S	0.24 Rad.	6.0 Rad.
T	0.14	3.5
U	0.12±0.02	3.0±0.5
X	0.1±0.01	2.54±0.3
Y	0.1±0.01	2.54±0.3
Z	0.24	6.0
AA	0.12	3.0
AB	0.69	17.5
AC	0.16	4.0
AD	0.10	2.5
AE	2.76	70.0
AF	0.22	5.5
AG	0.22	5.5



Description:

Mitsubishi Intelligent Power Modules are isolated base modules designed for power switching applications operating at frequencies to 20kHz. 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

Applications:

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

Ordering Information:

Example: Select the Complete part number from the table below -i.e. PM10CZF120 is a 1200V, 10 Ampere Intelligent Power Module.

Type	Current Rating Amperes	V _{CES} Volts (x 10)
PM	10	120



PM10CZF120

FLAT-BASE TYPE
INSULATED PACKAGE

Absolute Maximum Ratings, $T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified

Ratings	Symbol	PM10CZF120	Units
Junction Temperature	T_j	-20 to 150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 to 125	$^\circ\text{C}$
Case Operating Temperature	T_C	-20 to 100	$^\circ\text{C}$
Mounting Torque M5 Mounting Screws	-	1.47 ~ 1.96	N · m
Module Weight (Typical)	-	80	Grams
Supply Voltage Protected by OC and SC ($V_D = 13.5 \sim 16.5\text{V}$, Inverter Part)	$V_{\text{CC(prot)}}$	800	Volts
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{iso}	2500	Vrms

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_{UPC} , V_P-V_{VPC} , W_P-V_{WPC} , $U_N \cdot V_N \cdot W_N-V_{\text{NC}}$)	V_{CIN}	20	Volts
Fault Output Supply Voltage (Applied between F_O and V_{NC})	V_{FO}	20	Volts
Fault Output Current (Sink Current of F_O Terminal)	I_{FO}	20	mA

IGBT Inverter Sector

Collector-Emitter Voltage ($V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$)	V_{CES}	1200	Volts
Collector Current, ($T_C = 25\text{ }^\circ\text{C}$)	I_C	10	Amperes
Peak Collector Current, ($T_C = 25\text{ }^\circ\text{C}$)	I_{CP}	20	Amperes
Supply Voltage (Applied between P-N)	V_{CC}	900	Volts
Supply Voltage, Surge (Applied between P-N,)	$V_{\text{CC (surge)}}$	1000	Volts
Collector Dissipation	P_C	62	Watts

PM10CZF120

**FLAT-BASE TYPE
INSULATED PACKAGE**

Electrical and Mechanical Characteristics, $T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Control Sector						
Over Current Trip Level	OC	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $V_D = 15\text{V}$	15	27	–	Amperes
Short Circuit Trip Level	SC	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $V_D = 15\text{V}$	–	41	–	Amperes
Over Current Delay Time	$t_{\text{off(OC)}}$	$V_D = 15\text{V}$	–	10	–	μs
Over Temperature Protection	OT	Trip Level	100	110	120	$^\circ\text{C}$
	OT_r	Reset Level	–	90	–	$^\circ\text{C}$
Supply Circuit Under Voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
	UV_r	Reset Level	–	12.5	–	Volts
Supply Voltage	V_D	Applied between $V_{UP1}-V_{UPC}$, $V_{VP1}-V_{VPC}$, $V_{WP1}-V_{WPC}$, $V_{N1}-V_{NC}$	13.5	15.0	16.5	Volts
Circuit Current	I_D	$V_D = 15\text{V}$, $V_{CIN} = 15\text{V}$, $V_{N1}-V_{NC}$	–	18	25	mA
		$V_D = 15\text{V}$, $V_{CIN} = 15\text{V}$, $V_{XP1}-V_{XPC}$	–	7	10	mA
Input ON Threshold Voltage	$V_{\text{th(on)}}$	Applied between	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{\text{th(off)}}$	U_P-V_{UPC} , V_P-V_{VPC} , W_P-V_{WPC} , $U_N \cdot V_N \cdot W_N-V_{NC}$	1.7	2.0	2.3	Volts
PWM Input Frequency	f_{PWM}	3- ϕ Sinusoidal	–	–	15	kHz
Fault Output Current	$I_{\text{FO(H)}}$	$V_D = 15\text{V}$, $V_{\text{FO}} = 15\text{V}$	–	–	0.01	mA
	$I_{\text{FO(L)}}$	$V_D = 15\text{V}$, $V_{\text{FO}} = 15\text{V}$	–	10	15	mA
Minimum Fault Output Pulse Width	t_{FO}	$V_D = 15\text{V}$	1.0	1.8	–	ms

PM10CZF120
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
IGBT Inverter Sector						
Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}, V_D = 15\text{V}, T_j = 25^\circ\text{C}$	–	–	1	mA
		$V_{CE} = V_{CES}, V_D = 15\text{V}, T_j = 125^\circ\text{C}$	–	–	10	mA
FwDi Forward Voltage	V_{EC}	$-I_C = 10\text{A}, V_D = 15\text{V}, V_{CIN} = 15\text{V}$	–	2.5	3.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 10\text{A}, T_j = 25^\circ\text{C}$	–	2.7	3.7	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 10\text{A}, T_j = 125^\circ\text{C}$	–	2.5	3.4	Volts
Inductive Load Switching Times	t_{on}		0.3	0.6	1.3	μs
	t_{rr}	$V_D = 15\text{V}, V_{CIN} = 0 \leftrightarrow 15\text{V},$	–	0.15	–	μs
	$t_{C(on)}$	$V_{CC} = 600\text{V}, I_C = 10\text{A},$	–	0.3	1.0	μs
	t_{off}	$T_j = 125^\circ\text{C},$ Inductive Load	–	1.8	3.3	μs
	$t_{C(off)}$		–	0.8	1.5	μs

Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each IGBT	–	–	2.0	$^\circ\text{C/Watt}$
	$R_{th(j-c)F}$	Each FwDi	–	–	5.5	$^\circ\text{C/Watt}$
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	–	–	0.067	$^\circ\text{C/Watt}$

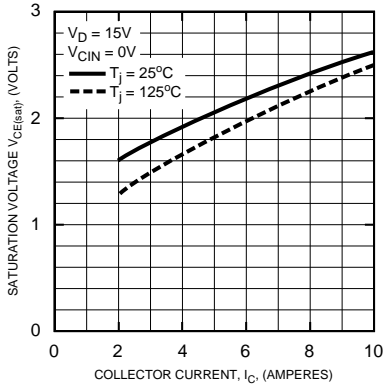
Recommended Conditions for Use

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 ± 1.5	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied between	0 ~ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	$U_P, V_P, W_P, U_N, V_N, W_N$	$4.0 \sim V_D$	Volts
PWM Input Frequency	f_{PWM}	Using Application Circuit	5 ~ 15	kHz
Minimum Dead Time	t_{dead}	Input Signal	≥ 3.0	μs

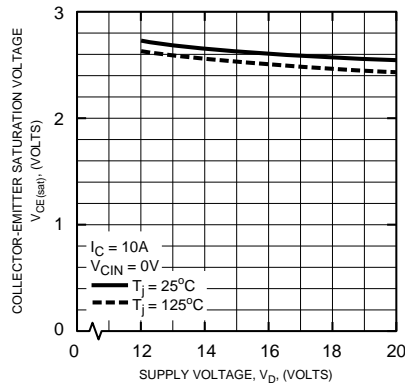
PM10CZF120

FLAT-BASE TYPE
INSULATED PACKAGE

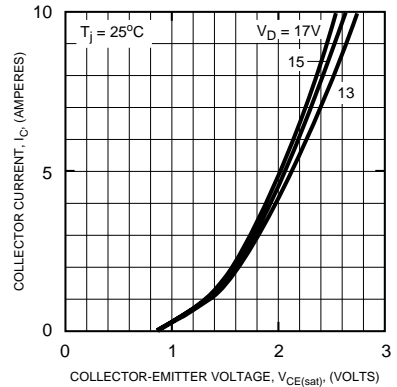
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



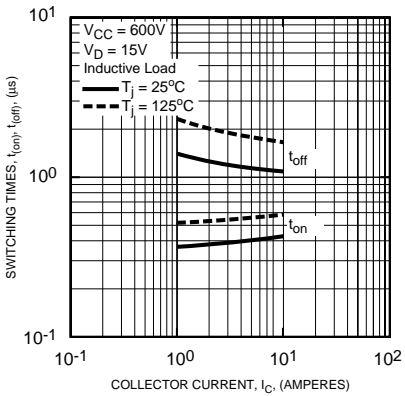
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



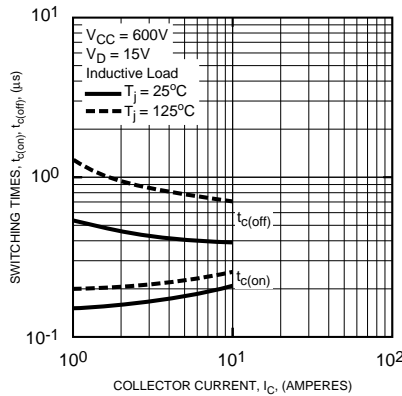
OUTPUT CHARACTERISTICS (TYPICAL)



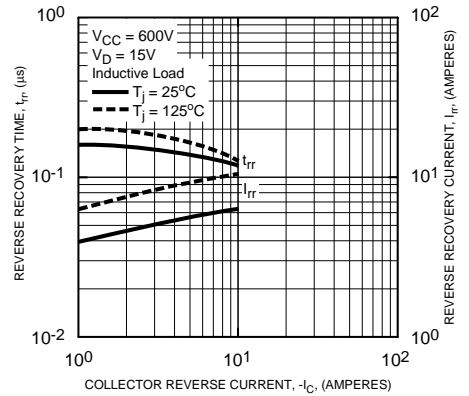
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



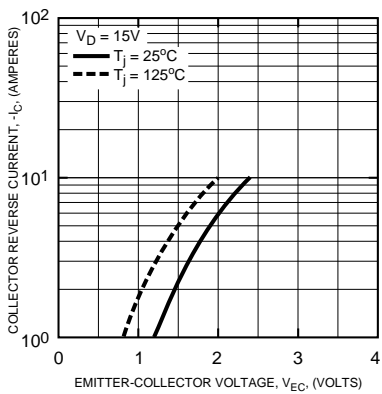
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



REVERSE RECOVERY CURRENT VS. COLLECTOR CURRENT (TYPICAL)

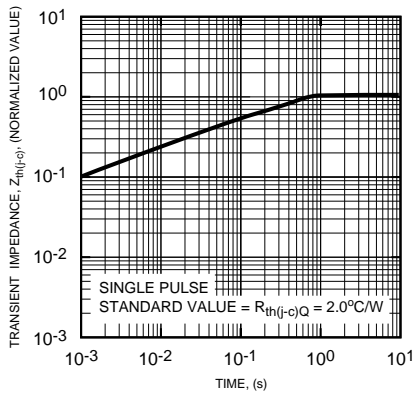


FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



PM10CZF120
FLAT-BASE TYPE
INSULATED PACKAGE

TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(Each IGBT)



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(Each FWD)

