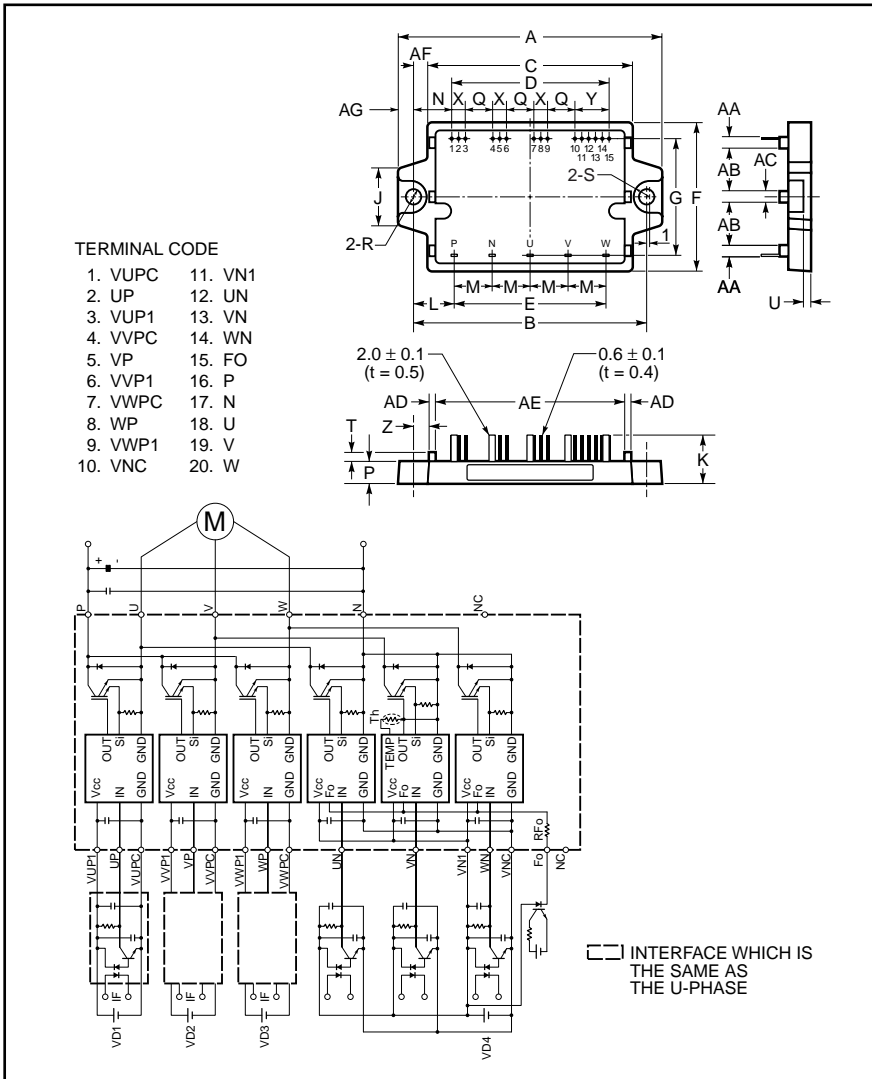


PM15CZF120

FLAT-BASE TYPE
INSULATED PACKAGE



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. PM15CZF120 is a 1200V, 15 Ampere Intelligent Power Module.

Type	Current Rating Amperes	V _{CEs} Volts (x 10)
PM	15	120

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

PM15CZF120

FLAT-BASE TYPE
INSULATED PACKAGE

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

	Symbol	Ratings	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	15	Amperes
Peak Collector Current, ($T_C = 25\text{ }^\circ\text{C}$)	I_{CP}	30	Amperes
Supply Voltage (Applied between P-N)	V_{CC}	900	Volts
Supply Voltage, Surge (Applied between P-N, Surge Value)	$V_{\text{CC (surge)}}$	1000	Volts
Collector Dissipation	P_C	83	Watts

PM15CZF120FLAT-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	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $V_D = 15\text{V}$	22	37	–	Amperes
Short Circuit Trip Level	SC	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $V_D = 15\text{V}$	–	56	–	Amperes
Over Current Delay Time	$t_{\text{off}}(\text{OC})$	$V_D = 15\text{V}$	–	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 $V_{\text{UP1}}-V_{\text{UPC}}$, $V_{\text{VP1}}-V_{\text{VPC}}$, $V_{\text{WP1}}-V_{\text{WPC}}$, $V_{\text{N1}}-V_{\text{NC}}$	13.5	15.0	16.5	Volts
Circuit Current	I_D	$V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$, $V_{\text{N1}}-V_{\text{NC}}$	–	18	25	mA
		$V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$, $V_{\text{XP1}}-V_{\text{XPC}}$	–	7	10	mA
Input ON Threshold Voltage	$V_{\text{th(on)}}$	Applied between	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{\text{th(off)}}$	$\text{Up}-V_{\text{UPC}}$, $\text{Vp}-V_{\text{VPC}}$, $\text{Wp}-V_{\text{WPC}}$, $\text{Un}-V_{\text{N}} \cdot \text{Wn}-V_{\text{NC}}$	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

PM15CZF120

**FLAT-BASE TYPE
INSULATED PACKAGE**

Electrical and Mechanical Characteristics, T_j = 25°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 = 15V, T _j = 25°C	–	–	1	mA
		V _{CE} = V _{CES} , V _D = 15V, T _j = 125°C	–	–	10	mA
FwDi Forward Voltage	V _{EC}	-I _C = 15A, V _D = 15V, V _{CIN} = 15V	–	2.5	3.5	Volts
Collector-Emitter Saturation Voltage	V _{CE(sat)}	V _D = 15V, V _{CIN} = 0V, I _C = 15A, T _j = 25°C	–	2.7	3.7	Volts
		V _D = 15V, V _{CIN} = 0V, I _C = 15A, T _j = 125°C	–	2.5	3.4	Volts
Inductive Load Switching Times	t _{on}		0.3	0.6	1.3	μs
	t _{rr}	V _D = 15V, V _{CIN} = 0 ↔ 15V,	–	0.15	–	μs
	t _{C(on)}	V _{CC} = 600V, I _C = 15A,	–	0.3	1.0	μs
	t _{off}	T _j = 125°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	–	–	1.5	°C/Watt
	R _{th(j-c)F}	Each FwDi	–	–	4.5	°C/Watt
Contact Thermal Resistance	R _{th(c-f)}	Case to Fin Per Module, Thermal Grease Applied	–	–	0.067	°C/Watt

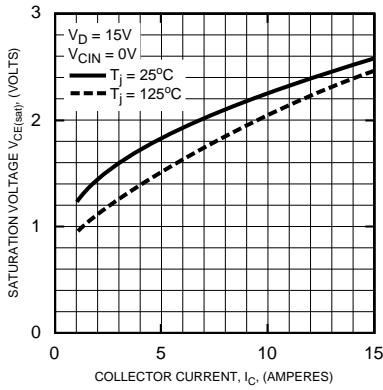
Recommended Conditions for Use

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 ~ V _D	Volts
PWM Input Frequency	f _{PWM}	Using Application Circuit	5 ~ 15	kHz
Minimum Dead Time	t _{dead}	Input Signal	≥3.0	μs

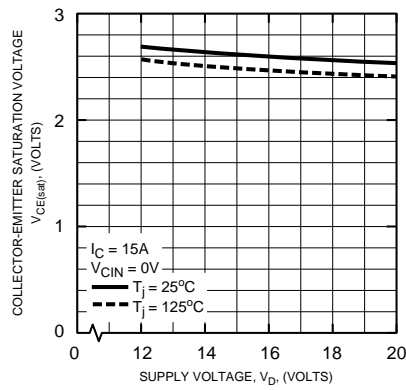
PM15CZF120

FLAT-BASE TYPE
INSULATED PACKAGE

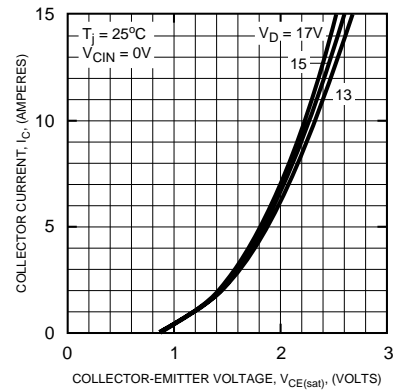
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



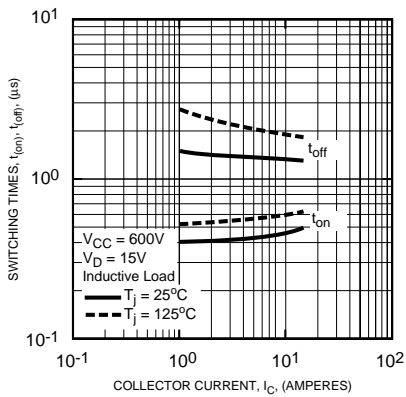
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



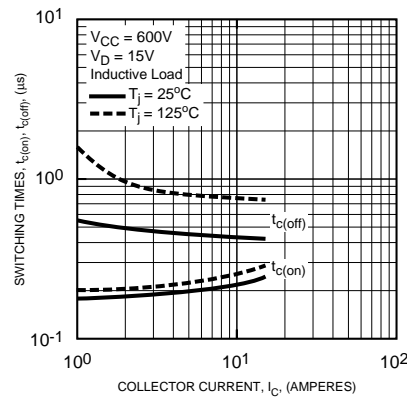
OUTPUT CHARACTERISTICS (TYPICAL)



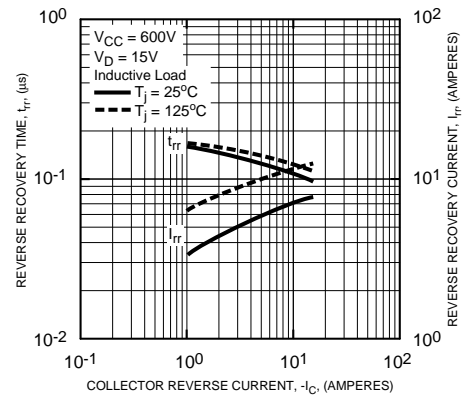
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



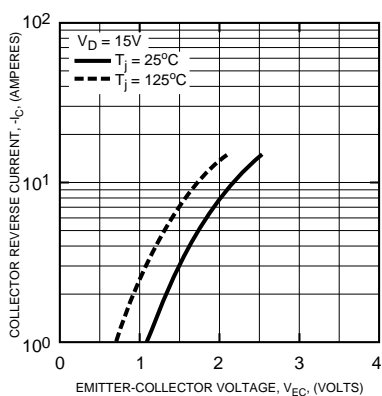
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



REVERSE RECOVERY CURRENT VS. COLLECTOR CURRENT (TYPICAL)



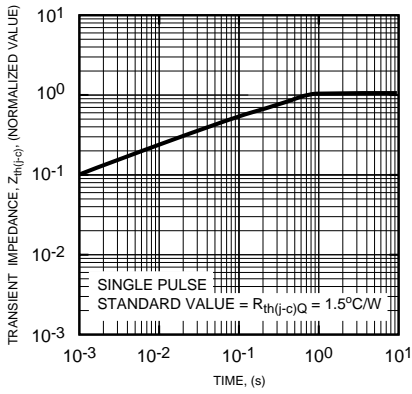
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



PM15CZF120

FLAT-BASE TYPE
INSULATED PACKAGE

TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(Each IGBT)



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(Each FWD)

