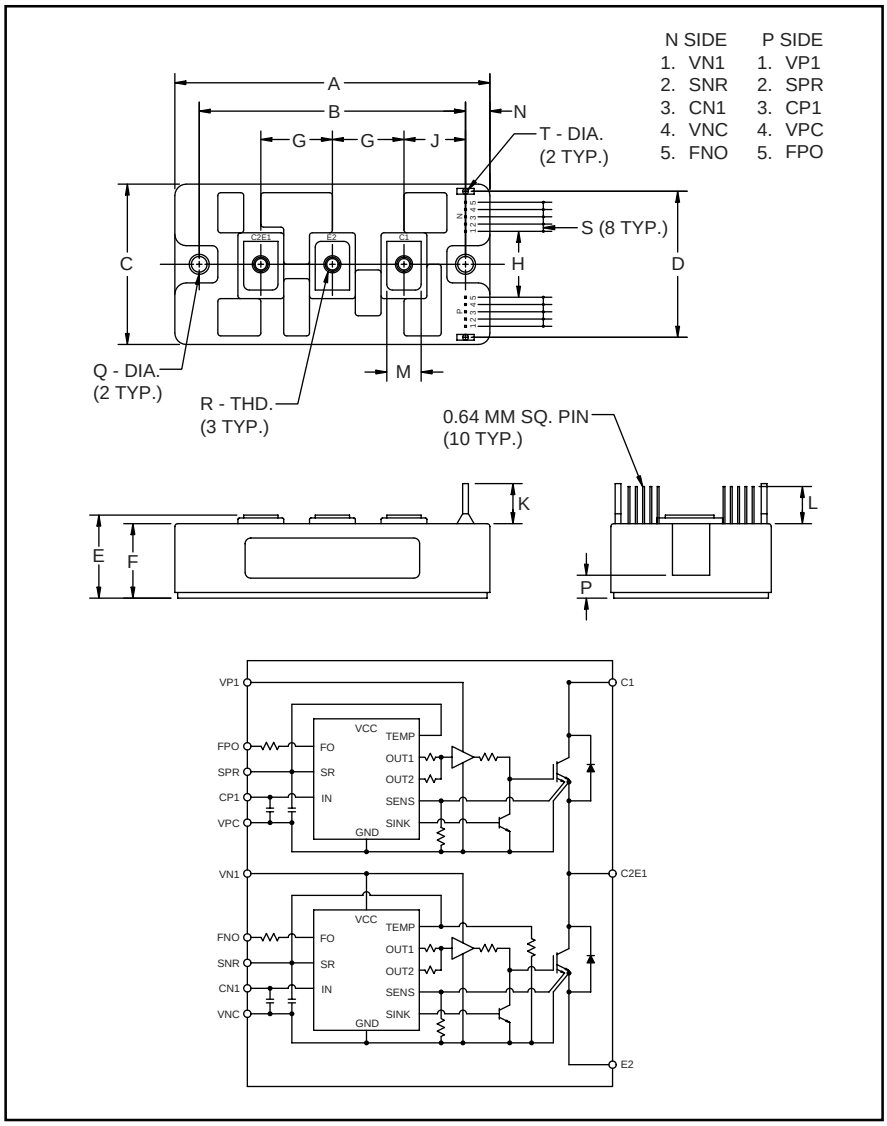
MITSUBISHI INTELLIGENT POWER MODULES

PM300DSA060

FLAT-BASE TYPE
INSULATED PACKAGE



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.33	110.0
B	3.66±0.010	93.0±0.25
C	2.20	56.0
D	2.01	51.0
E	1.14 +0.04/-0.02	29.0 +1/-0.5
F	1.02	26.0
G	0.98	25.0
H	0.90	23.0
J	0.85	21.5

Dimensions	Inches	Millimeters
K	0.55	14.0
L	0.51	13.0
M	0.47	12.0
N	0.33	8.5
P	0.28	7.0
Q	0.22 Dia.	Dia. 5.5
R	M5 Metric	M5
S	0.100	2.54
T	0.08 Dia.	Dia. 2.0

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. PM300DSA060 is a 600V, 300 Ampere Intelligent Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 10)
PM	300	60

MITSUBISHI ELECTRIC

Absolute Maximum Ratings, T_j = 25°C unless otherwise specified

Ratings	Symbol	PM300DSA060	Units
Power Device Junction Temperature	T_j	-20 to 150	°C
Storage Temperature	T_{stg}	-40 to 125	°C
Case Operating Temperature	T_C	-20 to 100	°C
Mounting Torque, M5 Mounting Screws	—	1.47 ~ 1.96	N · m
Mounting Torque, M5 Main Terminal Screws	—	1.47 ~ 1.96	N · m
Module Weight (Typical)	—	430	Grams
Supply Voltage Protected by OC and SC (V_D = 13.5 - 16.5V, Inverter Part)	$V_{CC(prot.)}$	400	Volts
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{iso}	2500	Vrms

Control Sector

Supply Voltage (Applied between V_{P1}-V_{PC}, V_{N1}-V_{NC})	V_D	20	Volts
Input Voltage (Applied between C_{P1}-V_{PC}, C_{N1}-V_{NC})	V_{CIN}	10	Volts
Fault Output Supply Voltage (Applied between F_{po}-V_{pc} and F_{no}-V_{nc})	V_{FO}	20	Volts
Fault Output Current (Sink Current at F_{PO}, F_{NO} Terminal)	I_{FO}	20	mA

IGBT Inverter Sector

Collector-Emitter Voltage (V_D = 15V, V_{CIN} = 5V)	V_{CES}	600	Volts
Collector Current, (T_C = 25°C)	I_C	300	Amperes
Peak Collector Current, (T_C = 25°C)	I_{CP}	600	Amperes
Supply Voltage (Applied between C1 - E2)	V_{CC}	450	Volts
Supply Voltage, Surge (Applied between C1 - E2)	$V_{CC(surge)}$	500	Volts
Collector Dissipation	P_C	960	Watts

Electrical and Mechanical Characteristics, T_j = 25°C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Control Sector						
Over Current Trip Level Inverter Part	OC	-20°C ≤ T ≤ 125°C, V_D = 15V	390	540	—	Amperes
Short Circuit Trip Level Inverter Part	SC	-20°C ≤ T ≤ 125°C, V_D = 15V	540	760	—	Amperes
Over Current Delay Time	$t_{off(OC)}$	V_D = 15V	—	5	—	µs
Over Temperature Protection	OT	Trip Level	100	110	120	°C
	OT_r	Reset Level	85	95	105	°C
Supply Circuit Under Voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
	UVr	Reset Level	—	12.5	—	Volts
Supply Voltage	V_D	Applied between V_{P1}-V_{PC}, V_{N1}-V_{NC}	13.5	15	16.5	Volts
Circuit Current	I_D	V_D = 15V, V_{CIN} = 5V, V_{N1}-V_{NC}	—	19	26	mA
		V_D = 15V, V_{CIN} = 5V, V_{XP1}-V_{XPC}	—	19	26	mA
Input ON Threshold Voltage	$V_{th(on)}$	Applied between	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{th(off)}$	C_{P1}-V_{PC}, C_{N1}-V_{NC}	1.7	2.0	2.3	Volts
PWM Input Frequency	f_{PWM}	3-ϕ Sinusoidal	—	15	20	kHz
Fault Output Current	$I_{FO(H)}$	V_D = 15V, V_{FO} = 15V	—	—	0.01	mA
	$I_{FO(L)}$	V_D = 15V, V_{FO} = 15V	—	10	15	mA
Minimum Fault Output Pulse Width	t_{FO}	V_D = 15V	1.0	1.8	—	ms
SXR Terminal Output Voltage	V_{SXR}	-20°C≤T_j ≤125°C, Rin = 6.8 kΩ (S_{PR}, S_{NR})	4.5	5.1	5.6	Volts

Electrical and Mechanical Characteristics, T_j = 25°C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
IGBT Inverter Sector						
Collector Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, T_j = 25°C	—	—	1	mA
		$V_{CE} = V_{CES}$, T_j = 125°C	—	—	10	mA
Emitter-Collector Voltage	V_{EC}	$-I_C$ = 300A, V_D = 15V, V_{CIN} = 5V	—	1.9	2.8	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_D = 15V, V_{CIN} = 0V, I_C = 300A	—	1.8	2.6	Volts
		V_D = 15V, V_{CIN} = 0V, I_C = 300A, T_j = 125°C	—	1.9	2.7	Volts
Inductive Load Switching Times	t_{on}	V_D = 15V, V_{CIN} = 0 ↔ 5V V_{CC} = 300V, I_C = 300A T_j = 125°C	0.5	1.4	2.5	µs
	t_{rr}		—	0.15	0.3	µs
	$t_{C(on)}$		—	0.4	1.0	µs
	t_{off}		—	2.0	3.0	µs
	$t_{C(off)}$		—	0.5	1.0	µs

Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each IGBT	—	—	0.13	°C/Watt
	$R_{th(j-c)F}$	Each FWDi	—	—	0.25	°C/Watt
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module Thermal Grease Applied	—	—	0.048	°C/Watt

Recommended Conditions for Use

Characteristic	Symbol	Condition	Value	Units
Supply Voltage	V_{CC}	Applied across C1-E2 Terminals	0 ~ 400	Volts
	V_D	Applied between V_{P1}-V_{PC}, V_{N1}-V_{NC}	15 ± 1.5	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied between	0 ~ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	C_{P1}-V_{PC}, C_{N1}-V_{NC}	4.0 ~ V_{SXR}	Volts
PWM nput Frequency	f_{PWM}	Using Application Circuit	5 ~ 20	kHz
Minimum Dead Time	t_{dead}	Input Signal	≥ 3.5	µs