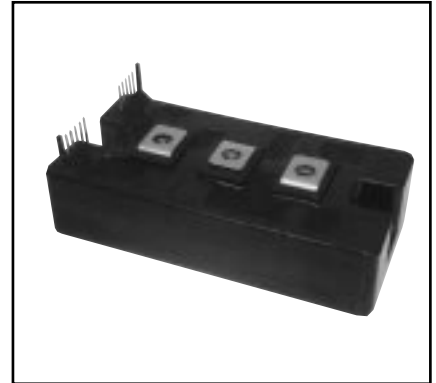
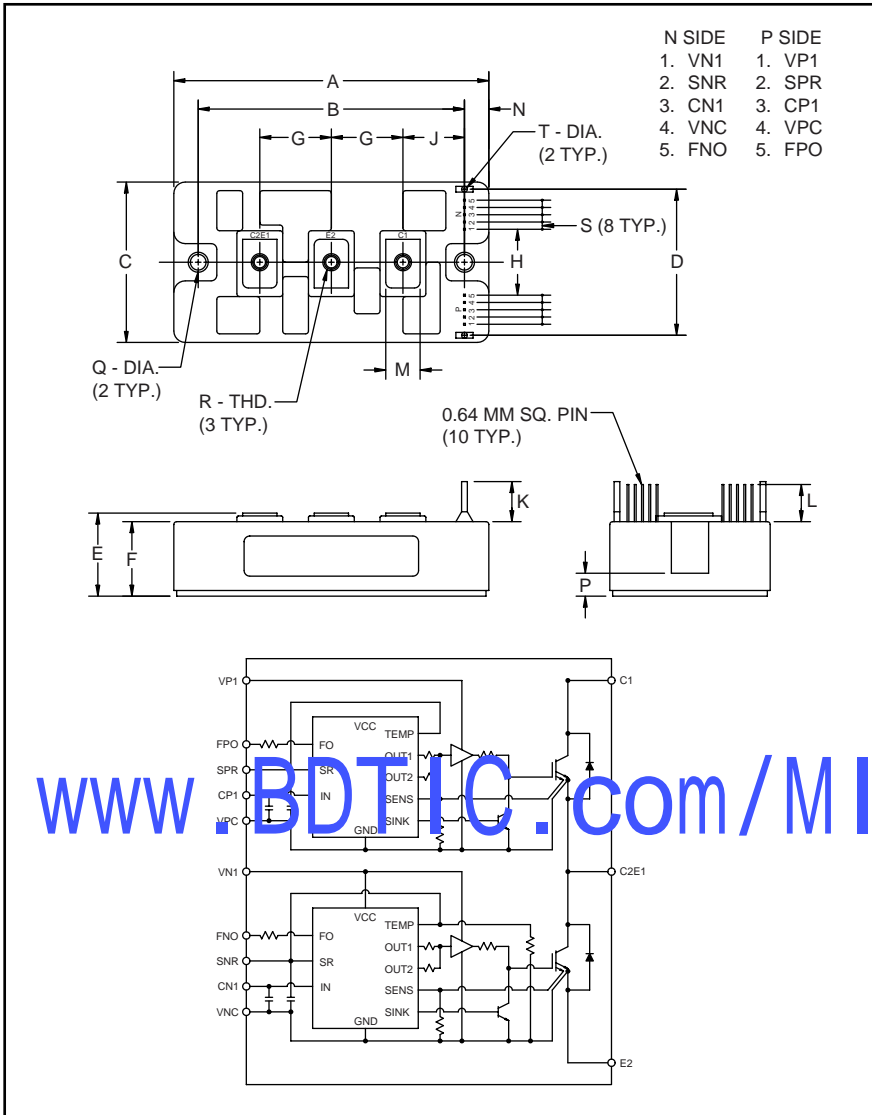


# PM300DSA060

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

Type	Current Rating Amperes	V <sub>CES</sub> Volts (x 10)
PM	300	60

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

# PM300DSA060

FLAT-BASE TYPE  
INSULATED PACKAGE

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

	Symbol	Ratings	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, 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 ( $V_D = 13.5 - 16.5\text{V}$ , Inverter Part)	$V_{\text{CC(prot.)}}$	400	Volts
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	$V_{\text{iso}}$	2500	$V_{\text{rms}}$

## Control Sector

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

## IGBT Inverter Sector

Collector-Emitter Voltage ( $V_D = 15\text{V}$ , $V_{\text{CIN}} = 5\text{V}$ )	$V_{\text{CES}}$	600	Volts
Collector Current, ( $T_C = 25^\circ\text{C}$ )	$I_C$	300	Amperes
Peak Collector Current, ( $T_C = 25^\circ\text{C}$ )	$I_{\text{CP}}$	300	Amperes
Supply Voltage (Applied between C1 - E2)	$V_{\text{CC}}$	430	Volts
Supply Voltage, Surge (Applied between C1 - E2)	$V_{\text{CC(surge)}}$	500	Volts
Collector Dissipation	$P_C$	960	Watts

## PM300DSA060

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
<b>Control Sector</b>						
Over Current Trip Level Inverter Part	OC	$-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$ , $V_D = 15\text{V}$	390	540	—	Amperes
Short Circuit Trip Level Inverter Part	SC	$-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$ , $V_D = 15\text{V}$	540	760	—	Amperes
Over Current Delay Time	$t_{\text{off(OC)}}$	$V_D = 15\text{V}$	—	5	—	$\mu\text{s}$
Over Temperature Protection	OT	Trip Level	100	110	120	$^\circ\text{C}$
	$OT_r$	Reset Level	85	95	105	$^\circ\text{C}$
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 $V_{P1}$ - $V_{PC}$ , $V_{N1}$ - $V_{NC}$	13.5	15	16.5	Volts
Circuit Current	$I_D$	$V_D = 15\text{V}$ , $V_{CIN} = 5\text{V}$ , $V_{N1}$ - $V_{NC}$	—	19	26	mA
		$V_D = 15\text{V}$ , $V_{CIN} = 5\text{V}$ , $V_{XP1}$ - $V_{XPC}$	—	19	26	mA
Input ON Threshold Voltage	$V_{\text{th(on)}}$	Applied between	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{\text{th(off)}}$	$C_{P1}$ - $V_{PC}$ , $C_{N1}$ - $V_{NC}$	1.7	2.0	2.3	Volts
PWM Input Frequency	$f_{\text{PWM}}$	3- $\phi$ Sinusoidal	—	15	20	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	$t_{\text{FO}}$	$V_D = 15\text{V}$	1.0	1.8	—	ms
SXR Terminal Output Voltage	$V_{\text{SXR}}$	$-20^\circ\text{C} \leq T_i \leq 125^\circ\text{C}$ , $R_{\text{th(j-c)}} = 6.8 \text{ k}\Omega$ (Spray on R)	4.5	5.1	5.6	Volts

[www.BDTIC.com/MITSUBISHI](http://www.BDTIC.com/MITSUBISHI)

# PM300DSA060

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	mA
		$V_{CE} = V_{CES}, T_j = 125^\circ\text{C}$	—	—	10	mA
Emitter-Collector Voltage	$V_{EC}$	$-I_C = 300\text{A}, V_D = 15\text{V}, V_{CIN} = 5\text{V}$	—	1.9	2.8	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 300\text{A}$	—	1.8	2.6	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 300\text{A}, T_j = 125^\circ\text{C}$	—	1.9	2.7	Volts
Inductive Load Switching Times	$t_{on}$		0.5	1.4	2.5	$\mu\text{s}$
	$t_{rr}$	$V_D = 15\text{V}, V_{CIN} = 0 \leftrightarrow 5\text{V}$	—	0.15	0.3	$\mu\text{s}$
	$t_{C(on)}$	$V_{CC} = 300\text{V}, I_C = 300\text{A}$	—	0.4	1.0	$\mu\text{s}$
	$t_{off}$	$T_j = 125^\circ\text{C}$	—	2.0	3.0	$\mu\text{s}$
	$t_{C(off)}$		—	0.5	1.0	$\mu\text{s}$

## Thermal Characteristics

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

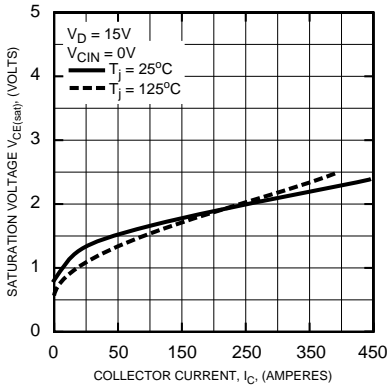
## Recommended Conditions for Use

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

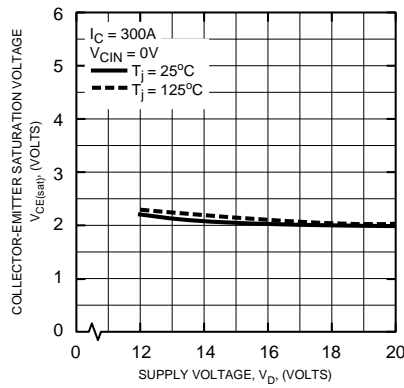
PM300DSA060

FLAT-BASE TYPE  
INSULATED PACKAGE

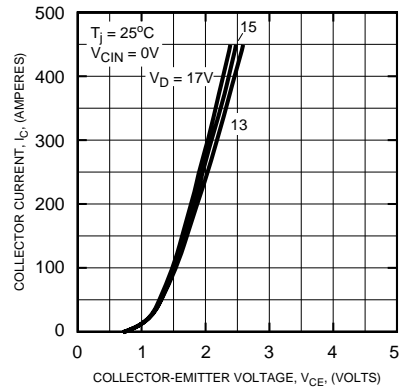
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



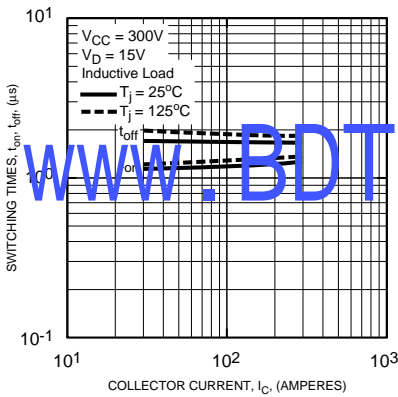
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



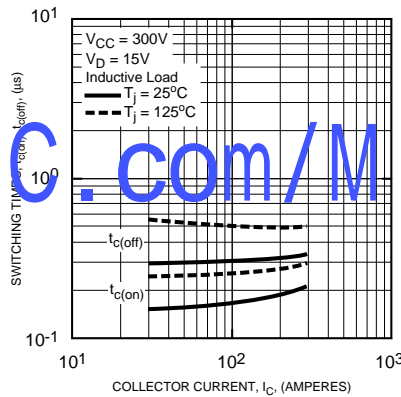
OUTPUT CHARACTERISTICS (TYPICAL)



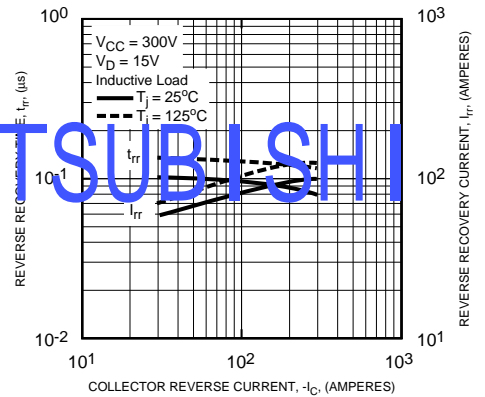
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



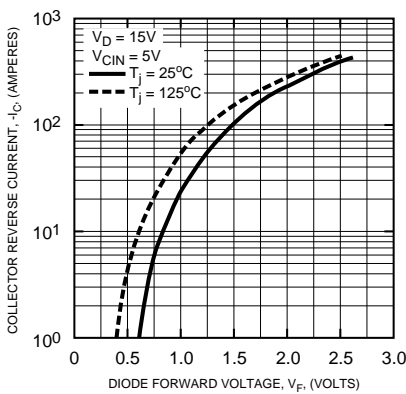
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



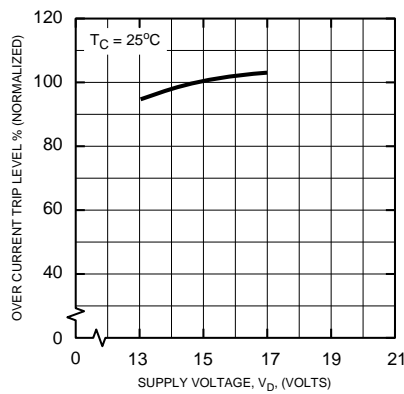
REVERSE RECOVERY CURRENT VS. COLLECTOR CURRENT (TYPICAL)



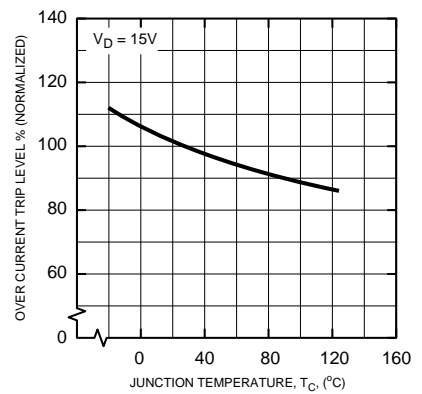
DIODE FORWARD CHARACTERISTICS



OVER CURRENT TRIP LEVEL VS. SUPPLY VOLTAGE (TYPICAL)



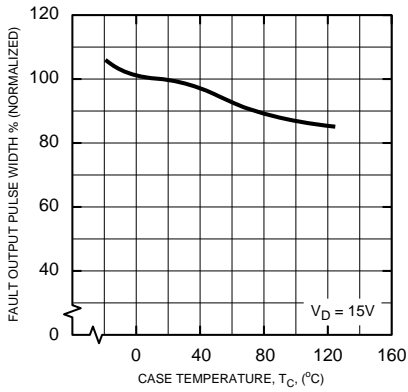
OVER CURRENT TRIP LEVEL VS. TEMPERATURE (TYPICAL)



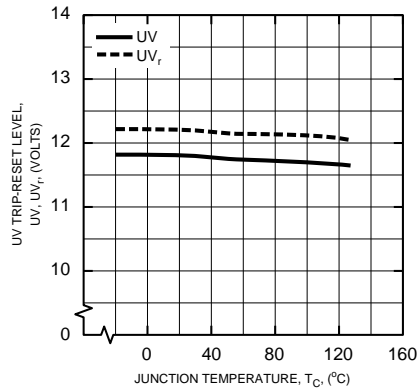
PM300DSA060

FLAT-BASE TYPE  
INSULATED PACKAGE

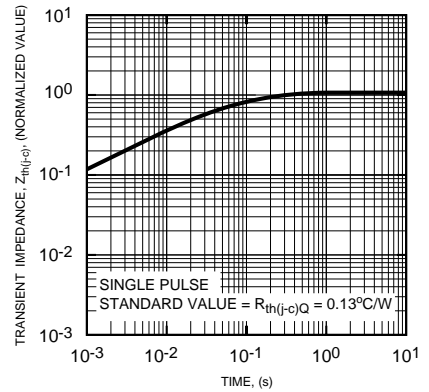
FAULT OUTPUT PULSE WIDTH VS. CASE TEMPERATURE (TYPICAL)



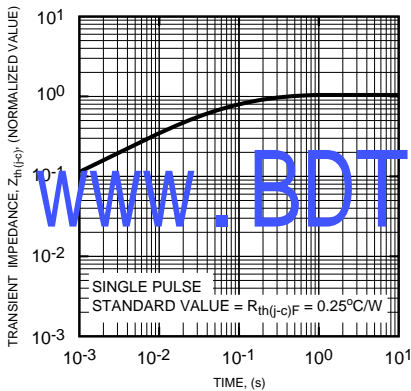
CONTROL SUPPLY VOLTAGE TRIP-RESET LEVEL TEMPERATURE DEPENDENCY (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (Each IGBT)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (Each FWDi)



[www.BDTIC.com/MITSUBISHI](http://www.BDTIC.com/MITSUBISHI)