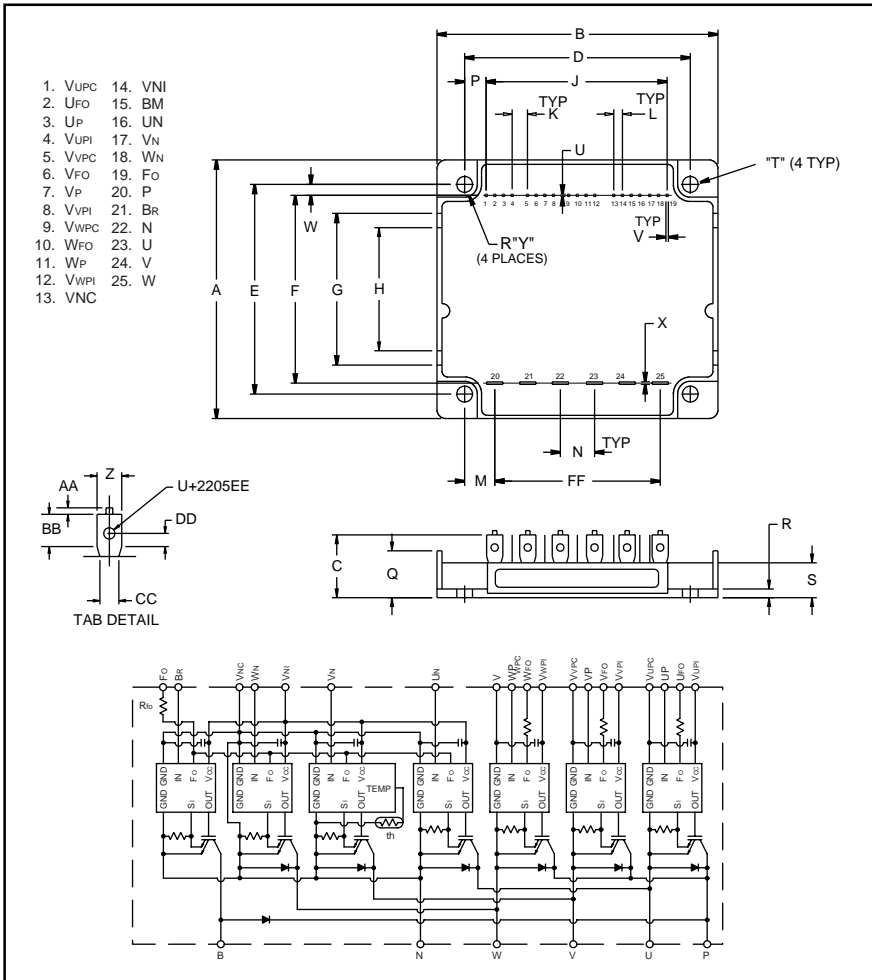


PM75RSK060

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. PM75RSK060 is a 600V, 75 Ampere Intelligent Power Module.

Type	Current Rating Amperes	V _{CES} Volts (x 10)
PM	75	60

Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	2.76±0.04	70.0±1.0
B	4.29±0.04	109.0±1.0
C	0.83±0.04	21.0±1.0
D	3.78±0.02	96.0±0.5
E	2.31±0.02	58.5±0.5
F	2.22±0.03	56.5±0.8
G	1.61	41.0
H	1.30	33.0
J	2.40±0.03	60.96±0.8
K	0.30	7.62
L	0.10±0.01	2.54±0.25
M	0.66	16.75
N	0.49±0.01	12.5±0.25
P	0.69	17.52
Q	0.53	13.5

Dimensions	Inches	Millimeters
R	0.21	5.4
S	0.39	10.0
T	0.18	4.5
U	0.02	0.6
V	0.02	0.4
W	0.03	0.75
X	0.03	0.8
Y	0.20	5.0
Z	0.25	6.35
AA	0.04	1.0
BB	0.39	9.95
CC	0.24	6.0
DD	0.21	5.4
EE	0.07	1.65
FF	2.46±0.03	62.5±0.8

PM75RSK060

 FLAT-BASE TYPE
 INSULATED PACKAGE

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

Ratings	Symbol	PM75RSK060	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 M4 Mounting Screws	-	0.98 ~ 1.47	N · m
Module Weight (Typical)	-	150	Grams
Supply Voltage Protected by OC and SC ($V_D = 13.5 \sim 16.5\text{V}$, Inverter Part)	$V_{\text{CC(prot)}}$	400	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} , $U_N \cdot V_N \cdot W_N \cdot B_r-V_{\text{NC}}$)	V_{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_O-V_{NC})	V_{FO}	20	Volts
Fault Output Current (Sink Current of U_{FO} , V_{FO} , W_{FO} and 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}	600	Volts
Collector Current, \pm	I_C	75	Amperes
Peak Collector Current, \pm	I_{CP}	150	Amperes
Supply Voltage (Applied between P-N)	V_{CC}	450	Volts
Supply Voltage, Surge (Applied between P-N, Surge Value)	$V_{\text{CC (surge)}}$	500	Volts
Collector Dissipation	P_C	125	Watts

Brake Sector

Collector-Emitter Voltage ($V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$)	V_{CES}	600	Volts
Collector Current, ($T_C = 25\text{ }^\circ\text{C}$)	I_C	30	Amperes
Peak Collector Current, ($T_C = 25\text{ }^\circ\text{C}$)	I_{CP}	60	Amperes
Supply Voltage (Applied between P-N)	V_{CC}	450	Volts
Supply Voltage, Surge (Applied between P-N, Surge Value)	$V_{\text{CC (surge)}}$	500	Volts
Collector Dissipation	P_C	75	Watts
Diode Forward Current	I_F	30	Amperes
Diode DC Reverse Voltage	$V_{\text{R(DC)}}$	600	Volts

PM75RSK060

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 Inverter Part	OC	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $V_D = 15\text{V}$	115	161	–	Amperes
Over Current Trip Level Brake Part			39	53	–	Amperes
Short Circuit Trip Level Inverter Part	SC	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $V_D = 15\text{V}$	–	241	–	Amperes
Short Circuit Trip Level Brake Part			–	79	–	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	$V_D = 15\text{V}$, $V_{CIN} = 15\text{V}$, $V_{N1}-V_{NC}$	–	44	60	mA
		$V_D = 15\text{V}$, $V_{CIN} = 15\text{V}$, $V_{XP1}-V_{XPC}$	–	13	18	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} , $U_N \cdot V_N \cdot W_N \cdot B_r-V_{NC}$	1.7	2.0	2.3	Volts
PWM Input Frequency	f_{PWM}	3- ϕ Sinusoidal	5	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_{FO}	$V_D = 15\text{V}$	1.0	1.8	–	ms

PM75RSK060

 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}	$-I_C = 75\text{A}, V_D = 15\text{V}, V_{CIN} = 15\text{V}$	–	2.2	3.3	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 75\text{A}, T_j = 25^\circ\text{C}$	–	1.8	2.7	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 75\text{A}, T_j = 125^\circ\text{C}$	–	1.85	2.78	Volts
Inductive Load Switching Times	t_{on}		0.4	0.8	2.0	μs
	t_{rr}	$V_D = 15\text{V}, V_{CIN} = 0 \leftrightarrow 15\text{V}$	–	0.15	0.3	μs
	$t_{C(on)}$	$V_{CC} = 300\text{V}, I_C = 75\text{A}$	–	0.4	1.0	μs
	t_{off}	$T_j = 125^\circ\text{C}$, Inductive Load	–	2.0	2.9	μs
	$t_{C(off)}$		–	0.5	1.0	μs

Brake Sector

Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 30\text{A}, T_j = 25^\circ\text{C}$	–	1.8	2.7	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 30\text{A}, T_j = 125^\circ\text{C}$	–	1.9	2.8	Volts
FWDi Forward Voltage	V_{FM}	$I_F = 30\text{A}, V_D = 15\text{V}, V_{CIN} = 15\text{V}$	–	1.7	2.7	Volts
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

Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each Inverter IGBT	–	–	1.0	$^\circ\text{C/Watt}$
	$R_{th(j-c)F}$	Each Inverter FWDi	–	–	0.95	$^\circ\text{C/Watt}$
	$R_{th(j-c)Q}$	Each Brake IGBT	–	–	1.66	$^\circ\text{C/Watt}$
	$R_{th(j-c)F}$	Each Brake FWDi	–	–	1.9	$^\circ\text{C/Watt}$
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module Thermal Grease Applied	–	–	0.036	$^\circ\text{C/Watt}$

Recommended Conditions for Use

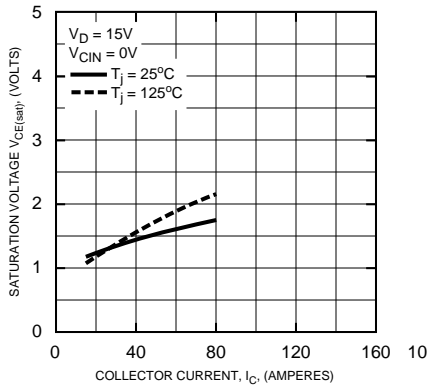
Characteristic	Symbol	Condition	Value	Units
Supply Voltage	V_{CC}	Applied across P-N Terminals	0 ~ 400	Volts
	V_D	Applied between $V_{UP1}-V_{UPC}$, $V_{N1}-V_{NC}$, $V_{VP1}-V_{VPC}$, $V_{WP1}-V_{WPC}$	15 ± 1.5	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied between	0 ~ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	U_P-V_{UPC} , V_P-V_{VPC} , W_P-V_{WPC} , $U_N \cdot V_N \cdot W_N \cdot B_r-V_{NC}$	$4.0 \sim V_D$	Volts
PWM Input Frequency	f_{PWM}	Using Application Circuit	5 ~ 20	kHz
Minimum Dead Time	t_{dead}	Input Signal	≥ 2.5	μs

PM75RSK060

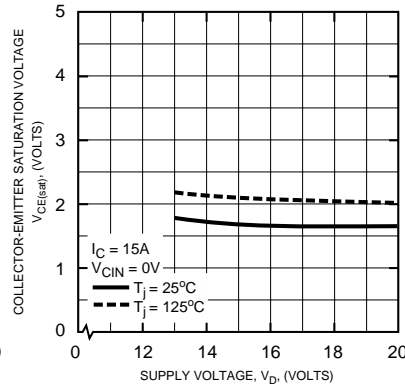
FLAT-BASE TYPE
INSULATED PACKAGE

Inverter Sector

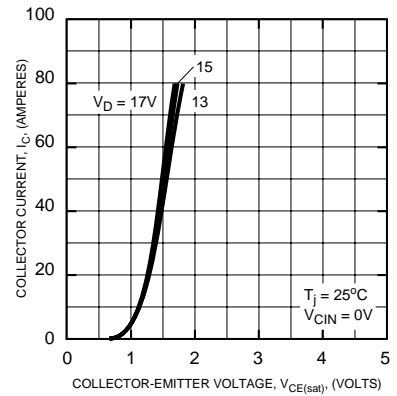
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



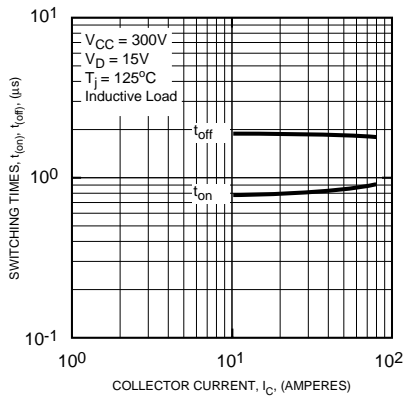
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



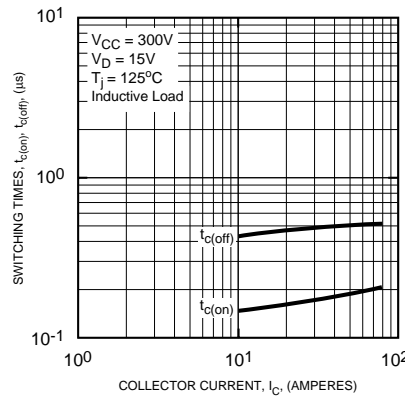
OUTPUT CHARACTERISTICS (TYPICAL)



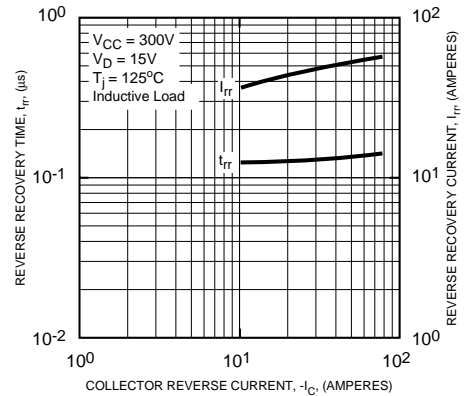
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



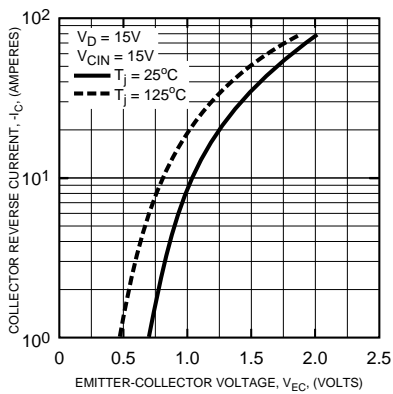
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



REVERSE RECOVERY CURRENT VS. COLLECTOR CURRENT (TYPICAL)



FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)

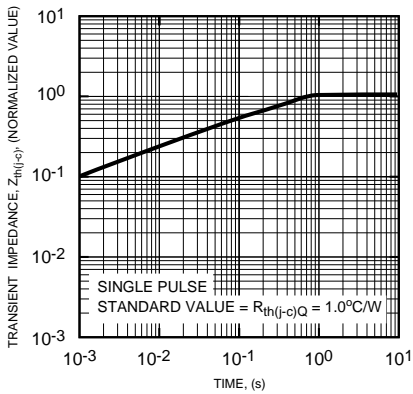


PM75RSK060

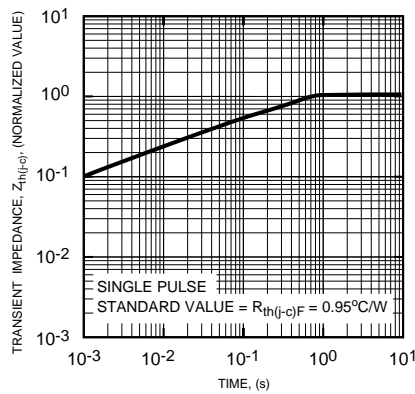
FLAT-BASE TYPE
INSULATED PACKAGE

Inverter Sector

TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (Each IGBT)

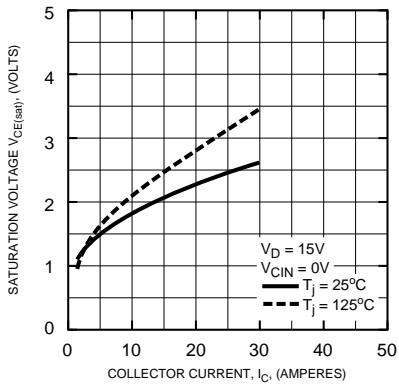


TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (Each FWD)

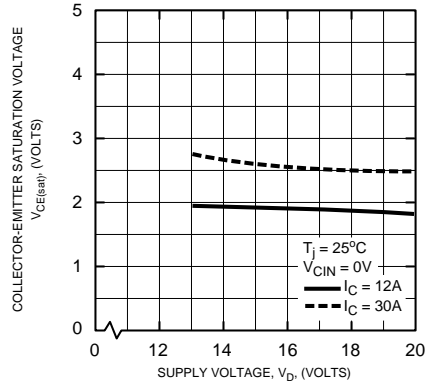


Brake Sector

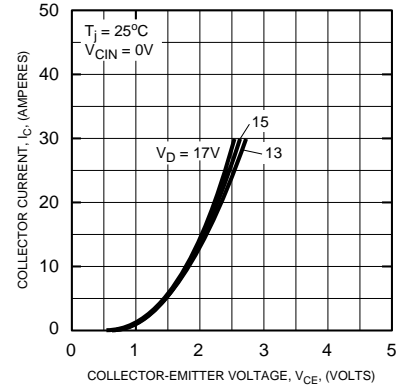
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



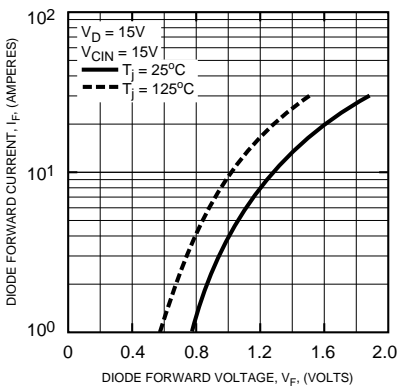
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



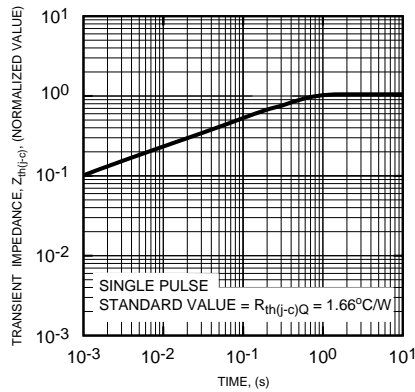
OUTPUT CHARACTERISTICS (TYPICAL)



DIODE FORWARD CHARACTERISTICS



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWD)

