PM30CTJ060

FLAT-BASE TYPE
INSULATED PACKAGE

PM30CTJ060



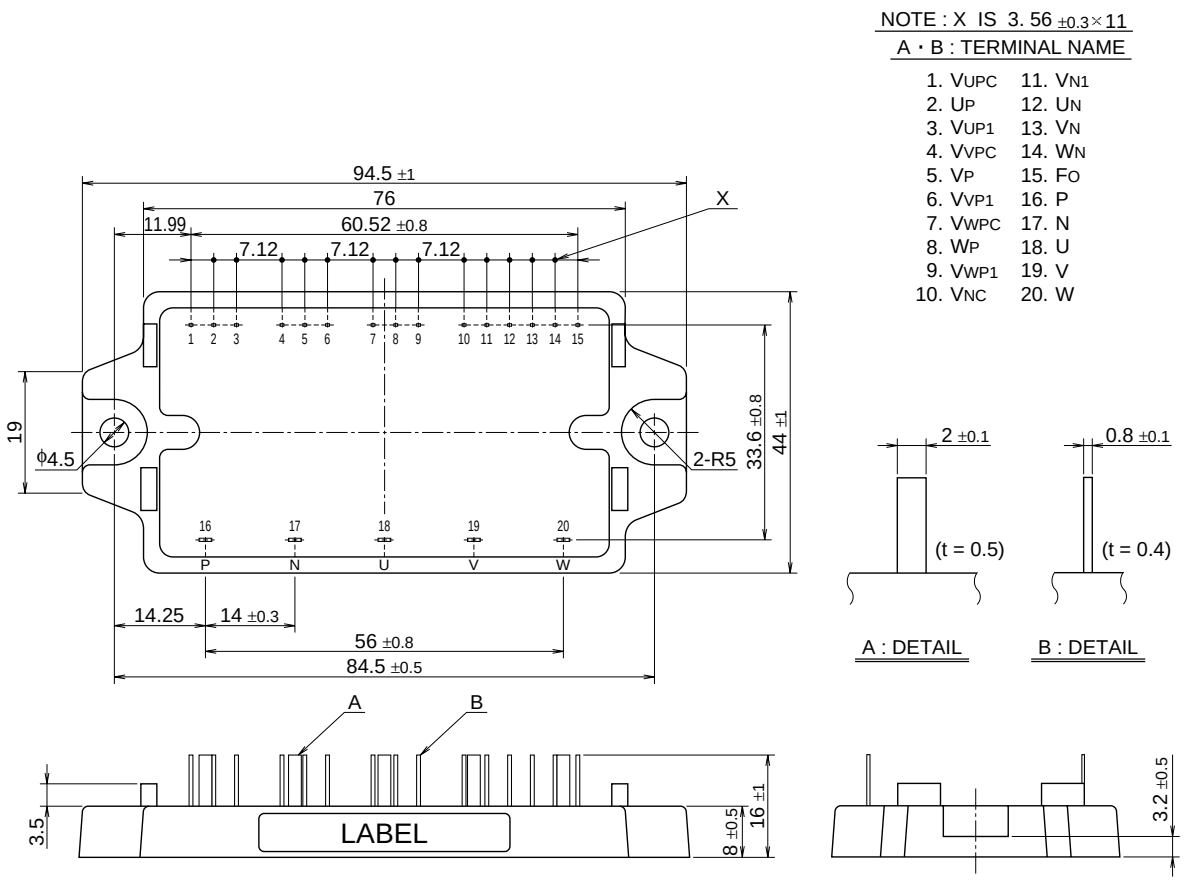
- 600V, 30A Current-sense 6kHz IGBT type inverter
- Built in IGBT gate drive circuit
- Built in Faule OC, SC, OT & UV protection Fault output
- 2.2kW class inverter application

APPLICATION

Air conditioner, mortor control

OUTLINE DRAWING

Dimensions in mm

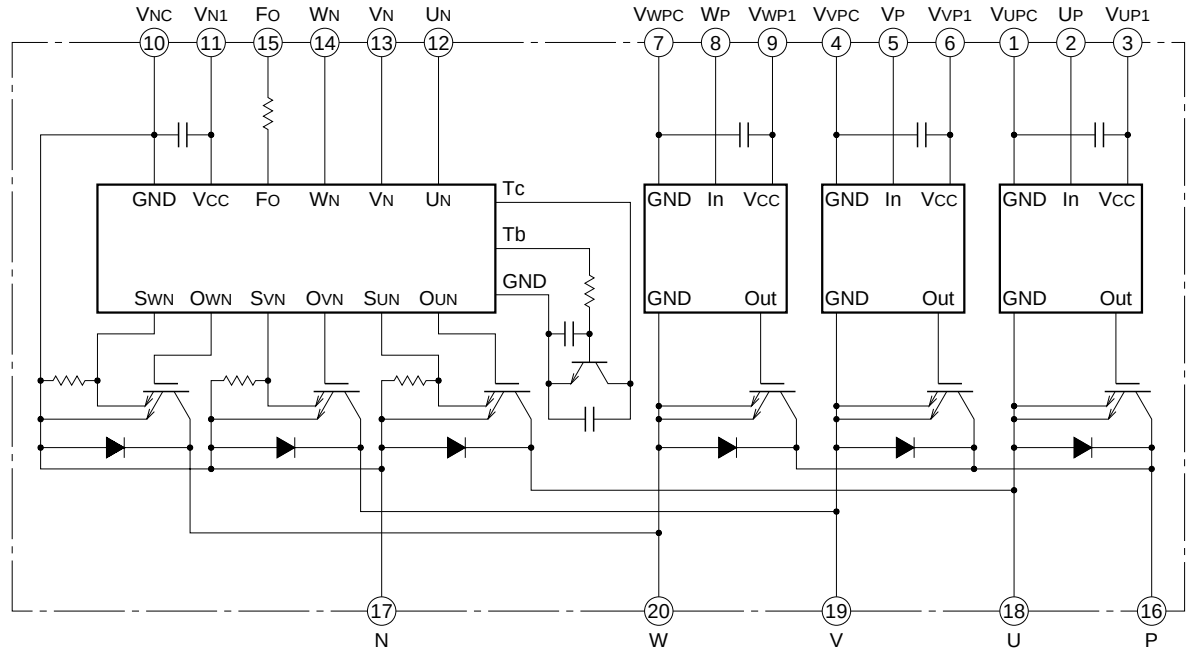


MITSUBISHI ELECTRIC

PM30CTJ060

FLAT-BASE TYPE
INSULATED PACKAGE

EQUIVALENT CIRCUIT DIAGRAM



MAXIMUM RATINGS (Tj = 25°C, unless otherwise noted)

INVERTER PART

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	V_D = 15V, I_{CIN} = 10mA	600	V
±I_C	Collector current	T_C = 25°C	30	A
±I_{CP}	Collector current (peak)	T_C = 25°C	60	A
P_C	Collector dissipation	T_C = 25°C	83	W
T_j	Junction temperature		–20 ~ +125*	°C

* maximum instantaneous $T_j \leq 150$°C

CONTROL PART

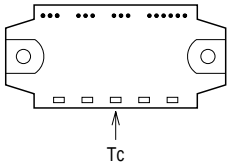
Symbol	Parameter	Conditions	Ratings	Unit
V_D	Supply voltage	Applied between : V_{UP1}-V_{UPC}, V_{VP1}-V_{VPC} V_{WP1}-V_{WPC}, V_{N1}-V_{NC}	20	V
I_{CIN}	Input current	Applied between : U_P-V_{UPC}, V_P-V_{VPC}, W_P-V_{WPC}, U_N · V_N · W_N-V_{NC}	20	mA
V_{FO}	Fault output supply voltage	Applied between : F_O-V_{NC}	20	V
I_{FO}	Fault output current	Sink current of F_O terminal	20	mA

MITSUBISHI ELECTRIC

TOTAL SYSTEM

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CC(PROT)}$	Supply voltage protected by OC & SC	V_D = 13.5 ~ 16.5V, Inverter part, T_j = 125°C start	400	V
V_{CC}	Supply voltage	Applied between : P-N, operating time	450	V
$V_{CC(surge)}$	Supply voltage (surge)	Applied between : P-N, surge and non-operating time	500	V
T_C	Module case operating temperature	(Note 1)	–20 ~ +100	°C
T_{stg}	Storage temperature		–40 ~ +125	°C
V_{iso}	Isolation voltage	60Hz, sinusoidal, AC · 1 min	2500	V_{rms}

Note 1 : T_C measuring point is as shown below.



ELECTRICAL CHARACTERISTICS (T_j = 25°C, unless otherwise noted)

INVERTER PART

Symbol	Parameter	Test conditions		Limits			Unit
				Min.	Typ.	Max.	
$V_{CE(sat)}$	Collector-emitter saturation voltage	V_D = 15V, I_{CIN} = 10mA	I_C = 30A, T_j = 25°C	—	1.8	2.6	V
			I_C = 30A, T_j = 125°C	—	2.0	3.0	
V_{EC}	FWDi forward voltage	–I_C = 30A, V_D = 15V, I_{CIN} = 0mA		—	2.5	3.5	V
t_{on}	Switching time	V_D = 15V, I_{CIN} = 0mA↔10mA V_{CC} = 300V, I_C = 30A T_j = 125°C (Per 1 arm) Inductive Load		0.5	1.0	2.0	µs
t_{rr}				—	0.1	—	µs
$t_{c(on)}$				—	0.3	0.9	µs
t_{off}				—	3.0	4.0	µs
$t_{c(off)}$				—	1.0	2.0	µs
I_{CES}	Collector-emitter cutoff current	V_{CE} = V_{CES}, I_{CIN} = 0mA	T_j = 25°C	—	—	1	mA
			T_j = 125°C	—	—	10	

CONTROL PART

Symbol	Parameter	Test conditions		Limits			Unit
				Min.	Typ.	Max.	
I_D	Circuit current	V_D = 15V, I_{CIN} = 0mA	V_{N1}-V_{NC}	—	25	35	mA
			V_{XP1}-V_{XPC}	—	5	10	
$I_{th(ON)}$	Input on threshold current	Applied between : U_P-V_{UPC}, V_P-V_{VPC}, W_P-V_{WPC}		1	3	5	mA
$I_{th(OFF)}$	Input off threshold current	U_N · V_N · W_N-V_{NC}		1	3	5	mA
OC	Over current trip level	–20°C ≤ T_j ≤ 125°C, V_D = 15V (only N side)		41	46	—	A
SC	Short circuit trip level	–20°C ≤ T_j ≤ 125°C, V_D = 15V (only N side)		—	69	—	A
$t_{off(OC)}$	Over current delay time	V_D = 15V		—	10	—	µs
OT	Over temperature protection	Base-plate Temperature detection, V_D = 15V	Trip level	100	110	120	°C
OT_r			Reset level	—	90	—	°C
UV	Supply circuit under voltage protection	–20°C ≤ T_j ≤ 125°C (only N side)	Trip level	11.5	12.0	12.5	V
UV_r			Reset level	—	12.5	—	V
$I_{FO(H)}$	Fault output current (Note 2)	V_D = 15V, V_{FO} = 15V		—	—	0.01	mA
$I_{FO(L)}$				—	10	15	mA
t_{FO}	Minimum fault output pulse width (Note 2)	V_D = 15V		1.0	1.8	—	ms

Note 2 : Fault output is given only when the internal OC, SC, OT & UV protection. (only N side)
Fault output of OC, SC protection given pulse.
Fault output of OT, UV protection given pulse while over level. (OT is only N side)

THERMAL RESISTANCES

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Tye.	Max.	
$R_{th(j-c)Q}$	Junction to case thermal resistances	Inverter IGBT part, per 1/6 module	—	—	1.5	°C / W
$R_{th(j-c)F}$		Inverter FWDi part, per 1/6 module	—	—	4.5	°C / W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, thermal grease applied, per 1/6 module	—	—	0.4	°C / W

MECHANICAL RATINGS AND CHARACTERISTICS

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Tye.	Max.	
—	Mounting torque	Mounting screw : M4	0.98	1.18	1.47	N·m
			10	12	15	kg·cm
—	Weight		—	80	—	g

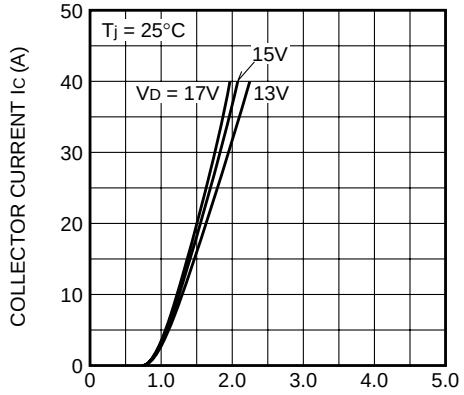
RECOMMENDED CONDITIONS FOR USE

Symbol	Parameter	Test conditions	Ratings	Unit
V_{CC}	Supply voltage	Applied between : P-N	≤ 400	V
V_D		Applied between : V_{UP1}-V_{UPC}, V_{VP1}-V_{VPC} V_{WP1}-V_{WPC}, V_{N1}-V_{NC} (Note 3)	15 ± 1.5	V
$I_{CIN(ON)}$	Input on current	Applied between : U_P, V_P, W_P, U_N, V_N, W_N	≥ 5	mA
$I_{CIN(OFF)}$	Input off current		≤ 1	mA
f_{PWM}	PWM input frequency	Using application circuit Opto-coupler's input signal	≤ 8	kHz
t_{dead}	Arm shoot-through blocking time	Using application circuit Opto-coupler's input signal	≥ 3.5	µs

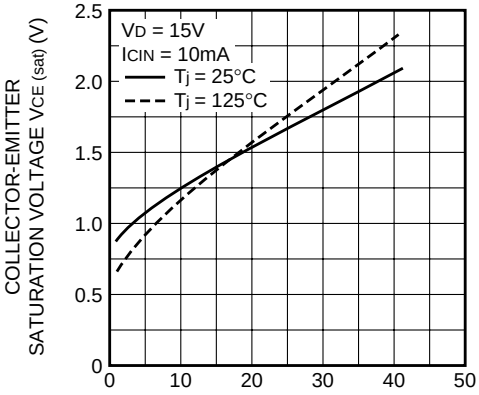
Note 3 : Permissible ripple value : dv/dt ≤ ±5V/µs, Vripple ≤ $2V_{P-P}$

PERFORMANCE CURVES

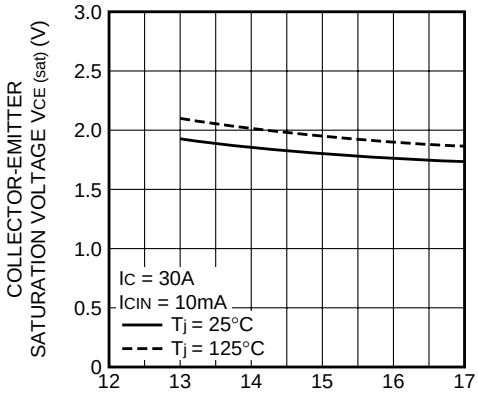
OUTPUT CHARACTERISTICS (TYPICAL)



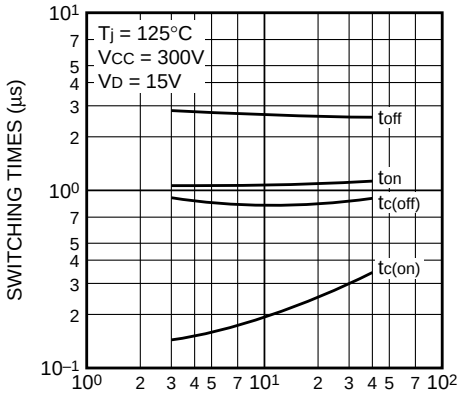
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



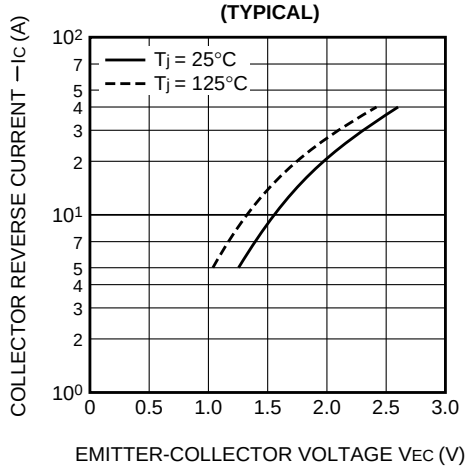
COLLECTOR-EMITTER SATURATION VOLTAGE VS. SUPPLY VOLTAGE (TYPICAL)



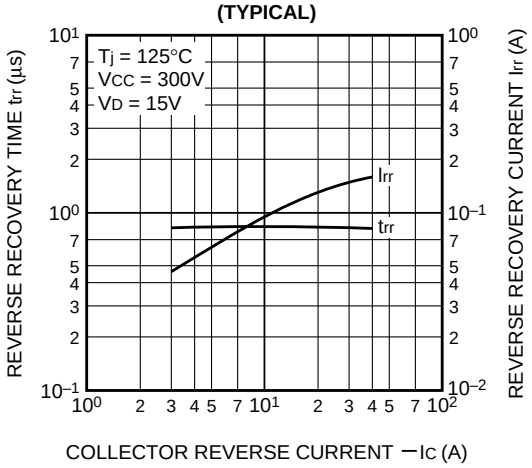
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



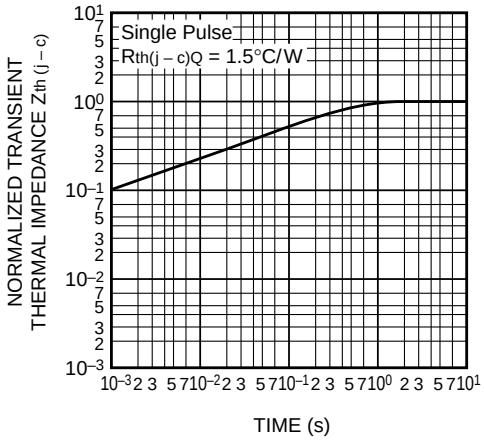
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT per 1 element)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi per 1 element)

