

PM400DVA060**FLAT-BASE TYPE
INSULATED PACKAGE****TOTAL SYSTEM**

Symbol	Parameter	Condition	Ratings	Unit
V _{CC(Prot)}	Supply Voltage Protected by SC	V _D = 13.5 ~ 16.5V, Inverter Part, T _j = 125°C Start	400	V
V _{CC(surge)}	Supply Voltage (Surge)	Applied between : C1-E2, Surge value or without switching	500	V
T _C	Module Case Operating Temperature		-20 ~ +100	°C
T _{stg}	Storage Temperature		-40 ~ +125	°C
V _{iso}	Isolation Voltage	60Hz, Sinusoidal, Charged part to Base, AC 1 min.	2500	V _{rms}

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

Symbol	Parameter	Test Condition	Limits			Unit
			Min.	Typ.	Max.	
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _D = 15V, I _C = 400A V _{CIN} = 0V	—	2.35	2.80	V
		T _j = 25°C T _j = 125°C		2.55	3.05	
V _{EC}	FWDi Forward Voltage	-I _C = 400A, V _D = 15V, V _{CIN} = 5V	—	2.20	3.30	V
t _{on}	Switching Time	V _D = 15V, I _{CIN} = 0V↔5V V _{CC} = 300V, I _C = 400A T _j = 125°C Inductive Load (upper and lower arm)	0.4	0.8	2.1	μs
t _{rr}			—	0.2	0.3	
t _{c(on)}			—	0.3	1.1	
t _{off}			—	1.8	2.9	
t _{c(off)}			—	0.6	1.2	
I _{CES}	Collector-Emitter Cutoff Current	V _{CE} = V _{CES} , V _D = 5V	—	—	1	mA
		T _j = 25°C T _j = 125°C			10	

CONTROL PART

Symbol	Parameter	Test Condition	Limits			Unit
			Min.	Typ.	Max.	
I _D	Circuit Current	V _D = 15V, V _{CIN} = 5V	—	27	38	mA
		V _{N1} -V _{NC} V _{P1} -V _{PC}		27	38	
V _{th(ON)}	Input ON Threshold Voltage	Applied between : C _{P1} -V _{PC} , C _{N1} -V _{NC}	1.2	1.5	1.8	V
V _{th(OFF)}	Input OFF Threshold Voltage		1.7	2.0	2.3	
SC	Short Circuit Trip Level	-20 ≤ T _j ≤ 125°C, V _D = 15V	500	—	—	A
t _{off(SC)}	Short Circuit Current Delay Time	V _D = 15V	—	10	—	μs
OT	Over Temperature Protection	Base-plate Temperature detection, V _D = 15V	Trip level	111	118	°C
OT _r	(Lower-arms only)		Reset level	—	100	
UV	Supply Circuit Under-Voltage Protection	-20 ≤ T _j ≤ 125°C	Trip level	11.5	12.0	V
UV _r			Reset level	—	12.5	
I _{FO(H)}	Fault Output Current (Note-1)	V _D = 15V, V _{FO} = 15V	—	—	0.01	mA
I _{FO(L)}			—	10	15	
t _{FO}	Minimum Fault Output Pulse Width (Note-1)	V _D = 15V	1.0	1.8	—	ms
V _{SXR}	SXR Terminal Output Voltage	-20 ≤ T _j ≤ 125°C, R _{in} =6.8kΩ	4.5	5.1	5.6	V

(Note-1) Fault output is given only when the internal SC, OT & UV protection.

Fault output of OT protection operate by lower arm

Fault output of OT, UV protection given pulse while over level.

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Symbol	Parameter	Test Condition	Limits			Unit
			Min.	Typ.	Max.	
R _{th(j-c)Q}	Junction to case Thermal	Inverter IGBT part (per 1/2 module)	—	—	0.121	°C/W
R _{th(j-c)F}	Resistances	Inverter FWDi part (per 1/2 module)	—	—	0.18	
R _{th(c-f)}	Contact Thermal Resistance	Case to fin, Thermal grease applied (per 1/2 module)	—	—	0.075	

MECHANICAL RATINGS AND CHARACTERISTICS

Symbol	Parameter	Test Condition	Limits			Unit
			Min.	Typ.	Max.	
—	Mounting torque	Mounting part screw : M6	3.92	4.90	5.88	N • m
—	Mounting torque	Main terminal screw : M6	3.92	4.90	5.88	N • m
—	Weight		—	510	—	g

RECOMMENDED CONDITIONS FOR USE

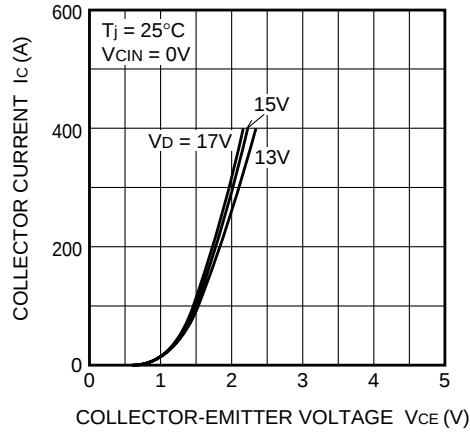
Symbol	Parameter	Test Condition	Recommended value	Unit
V _{CC}	Supply Voltage	Applied across C1-E2 terminals	≤ 400	V
V _D	Control Supply Voltage	Applied between : V _{P1} -V _{PC} , V _{N1} -V _{NC}	15 ± 1.5	V
V _{CIN(ON)}	Input ON Voltage	Applied between : C _{P1} -V _{PC} , C _{N1} -V _{NC}	≤ 0.8	V
V _{CIN(OFF)}	Input OFF Voltage		≥ 4.0	
t _{dead}	Arm Shoot-through Blocking Time	For IPM's each input signals	≥ 3.0	μs
f _{PWM}	PWM Input Frequency	Using Application Circuit input signal of IPM, 3φ Sinusoidal PWM VVVF inverter	≤ 20	kHz

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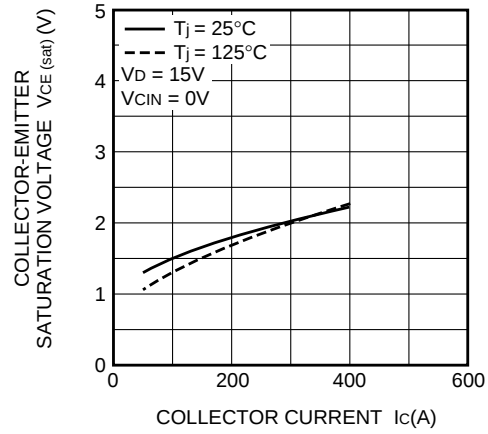
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PERFORMANCE CURVES

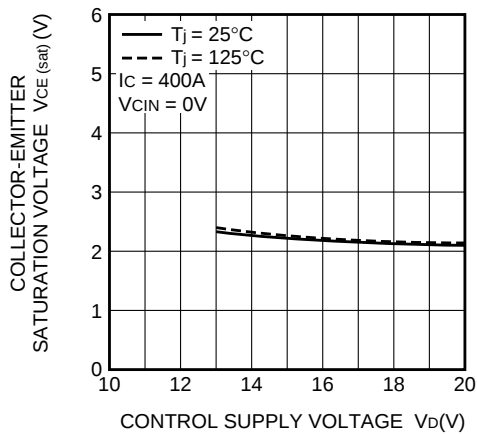
OUTPUT CHARACTERISTICS
(TYPICAL)



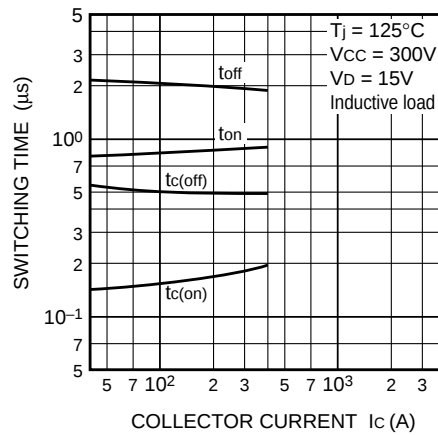
COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL)



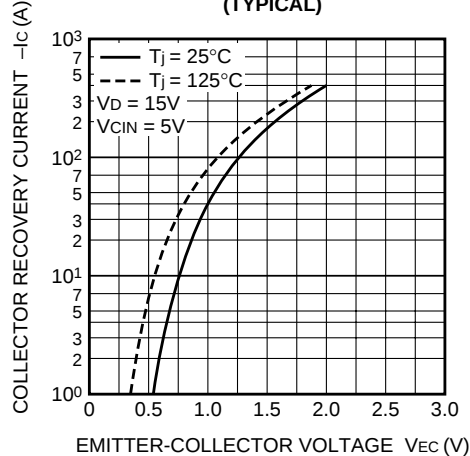
COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL)



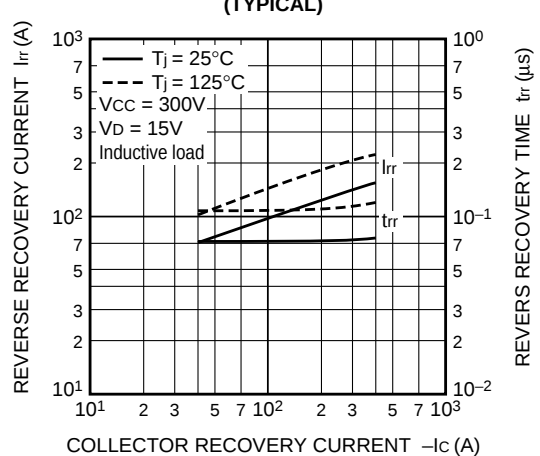
SWITCHING CHARACTERISTICS
(TYPICAL)



DIODE FORWARD CHARACTERISTICS
(TYPICAL)



DIODE REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)



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