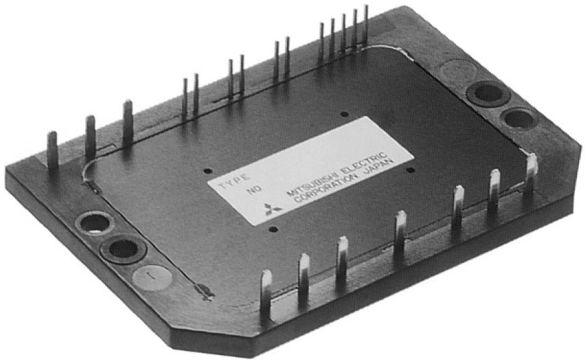
CM20MD3-12H

MEDIUM POWER SWITCHING USE
FLAT-BASE TYPE, INSULATED TYPE

CM20MD3-12H



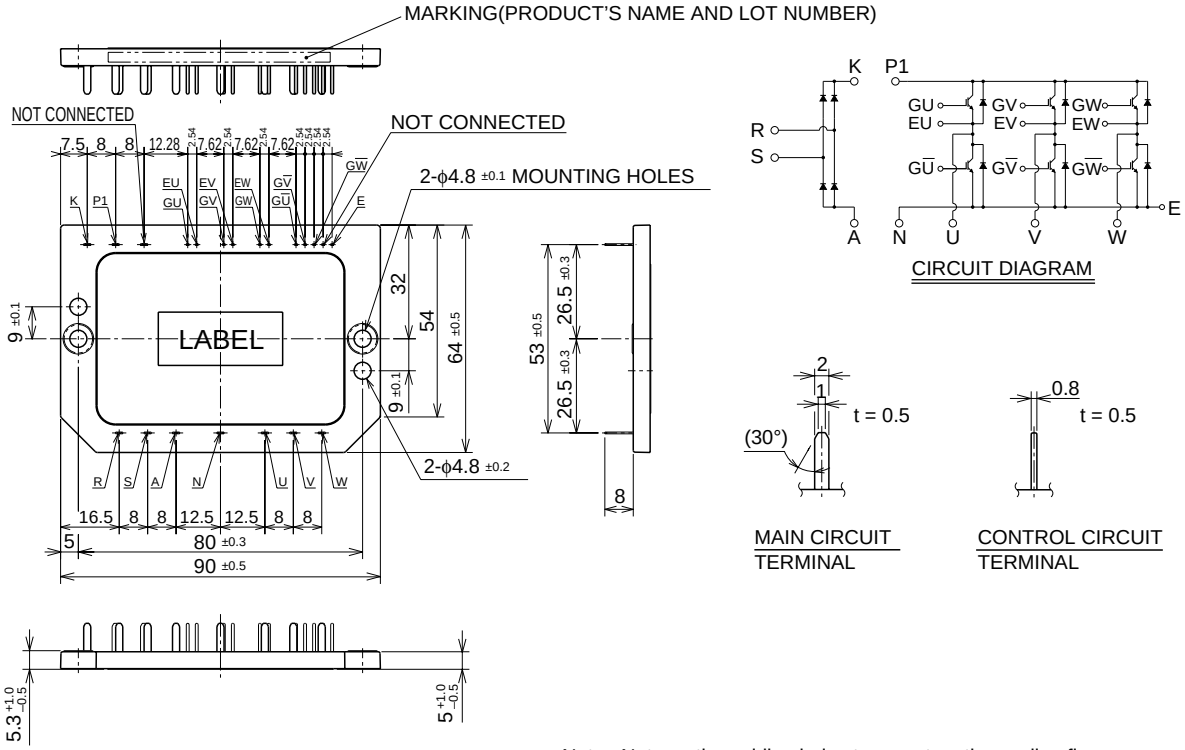
- I_C 20A
- V_{CES} 600V
- Insulated Type
- CIB Module
  3ϕ Inverter+1ϕ Converter
- UL Recognized
  Yellow Card No. E80276 (N)
  File No. E80271

APPLICATION

AC & DC motor controls, General purpose inverters, Servo controls, NC, Robotics, UPS

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



Note. Not use the guiding holes to mount on the cooling fin.

MITSUBISHI ELECTRIC

MAXIMUM RATINGS (T_j = 25°C)
INVERTER PART

Symbol	Parameter	Condition	Rating	Unit
V_{CES}	Collector-emitter voltage	G – E Short	600	V
V_{GES}	Gate-emitter voltage	C – E Short	±20	V
I_C	Collector Current	T_C = 25°C	20	A
I_{CM}		PULSE (Note. 2)	40	A
I_E (Note. 1)	Emitter Current	T_C = 25°C	20	A
I_{EM} (Note. 1)		PULSE (Note. 2)	40	A
P_C (Note. 3)	Maximum collector dissipation	T_f = 25°C	57	W

CONVERTER PART

Symbol	Parameter	Condition	Rating	Unit
V_{RRM}	Repetitive peak reverse voltage		800	V
E_a	Recommended AC input voltage		220	V
I_O	DC output current	1φ rectifying circuit T_f = 108°C	15	A
I_{FSM}	Surge (non-repetitive) forward current	1 cycle at 60Hz, peak value Non-repetitive	375	A
I^2t	I^2t for fusing	Value for one cycle of surge current	585	A^2s

COMMON RATING

Symbol	Parameter	Condition	Rating	Unit
T_j	Junction temperature		–40 ~ +150	°C
T_{stg}	Storage temperature		–40 ~ +125	°C
V_{iso}	Isolation voltage	AC 1 min.	2500	V
—	Mounting torque	Mounting M4 screw	1.47 ~1.96	N·m
—	Weight	Typical value	60	g

ELECTRICAL CHARACTERISTICS (T_j = 25°C)

INVERTER PART

Symbol	Parameter	Test conditions		Limits			Unit
				Min.	Typ.	Max.	
I_{CES}	Collector cutoff current	V_{CE} = V_{CES}, V_{GE} = 0V		—	—	1	mA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C = 2mA, V_{CE} = 10V		4.5	6	7.5	V
I_{GES}	Gate-emitter cutoff current	V_{GE} = V_{GES}, V_{CE} = 0V		—	—	0.5	μA
$V_{CE(sat)}$	Collector-emitter saturation voltage	T_j = 25°C	I_C = 20A, V_{GE} = 15V (Note. 4)	—	2.1	2.8	V
		T_j = 150°C		—	2.15	—	
C_{ies}	Input capacitance	V_{CE} = 10V, V_{GE} = 0V		—	—	2.0	nF
C_{oes}	Output capacitance			—	—	1.5	nF
C_{res}	Reverse transfer capacitance			—	—	0.4	nF
Q_G	Total gate charge	V_{CC} = 300V, I_C = 20A, V_{GE} = 15V		—	60	—	nC
$t_{d(on)}$	Turn-on delay time	V_{CC} = 300V, I_C = 20A, V_{GE1} = V_{GE2} = 15V, R_G = 31Ω, Resistive load		—	—	120	ns
t_r	Turn-on rise time			—	—	300	ns
$t_{d(off)}$	Turn-off delay time			—	—	200	ns
t_f	Turn-off fall time			—	—	300	ns
V_{EC} (Note. 1)	Emitter-collector voltage	I_E = 20A, V_{GE} = 0V		—	—	2.8	V
t_{rr} (Note. 1)	Reverse recovery time	I_E = 20A, V_{GE} = 0V		—	—	110	ns
Q_{rr} (Note. 1)	Reverse recovery charge	die / dt = – 40A / μs		—	0.05	—	μC
$R_{th(j-f)Q}$ (Note. 5)	Thermal resistance	IGBT part, Per 1/6 module		—	—	2.2	°C/W
$R_{th(j-f)R}$ (Note. 5)		FWDi part, Per 1/6 module		—	—	3.1	°C/W

CONVERTER PART

Symbol	Parameter	Condition	Limits			Unit
			Min.	Typ.	Max.	
I_{RRM}	Repetitive reverse current	V_R = V_{RRM}, T_j = 150°C	—	—	8	mA
V_{FM}	Forward voltage drop	I_F = 25A	—	—	1.5	V
$R_{th(j-f)}$ (Note. 5)	Thermal resistance	Per 1/4 module	—	—	3.3	°C/W

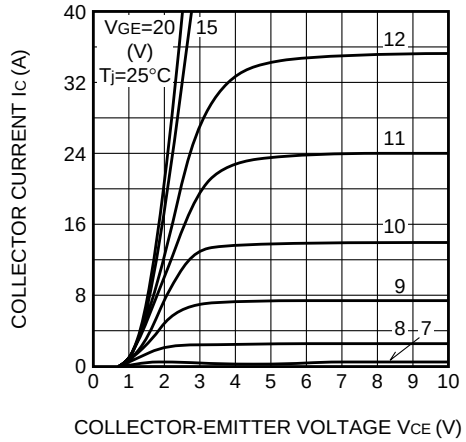
Note 1. I_E, V_{EC}, t_{rr}, Q_{rr} & die/dt represent characteristics of the anti-parallel, emitter to collector free-wheel diode.
2. Pulse width and repetition rate should be such that the device junction temp. (T_j) does not exceed T_{jmax} rating.
3. Junction temperature (T_j) should not increase beyond 150°C.
4. Pulse width and repetition rate should be such as to cause negligible temperature rise.
5. Thermal resistance is specified under following conditions.
   - The conductive greese applied, between module and fin.
   - Al plate is used as fin.

CM20MD3-12H

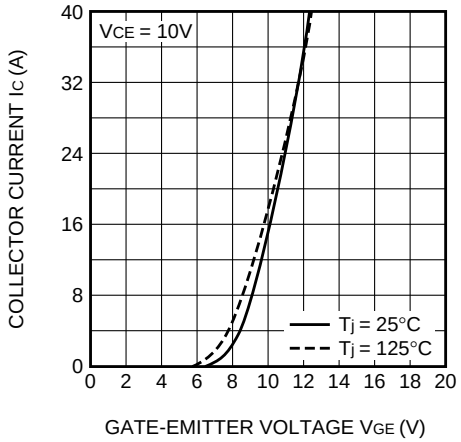
MEDIUM POWER SWITCHING USE
FLAT-BASE TYPE, INSULATED TYPE

PERFORMANCE CURVES

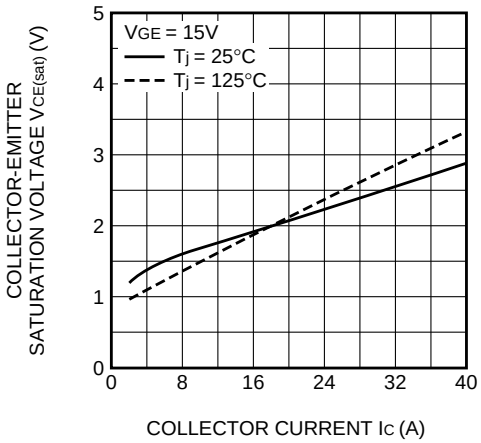
OUTPUT CHARACTERISTICS (TYPICAL)



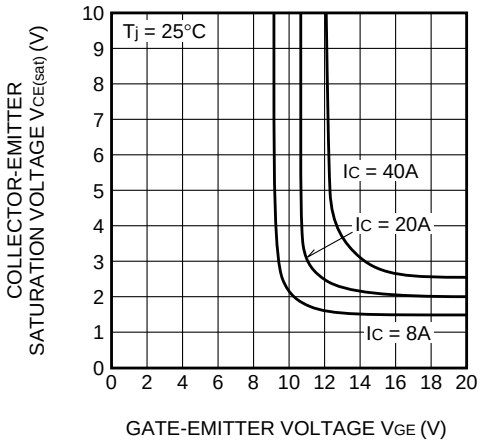
TRANSFER CHARACTERISTICS (TYPICAL)



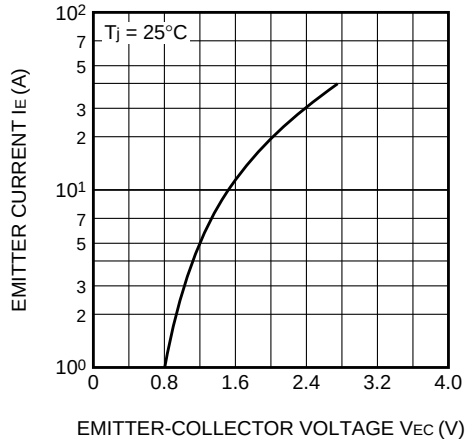
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



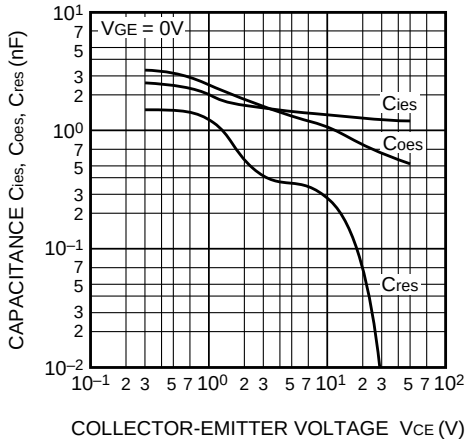
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



FREE-WHEEL DIODE FORWARD CHARACTERISITICS (TYPICAL)

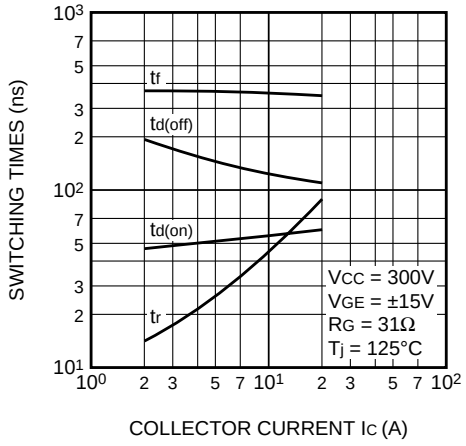


CAPACITANCE VS. VCE (TYPICAL)

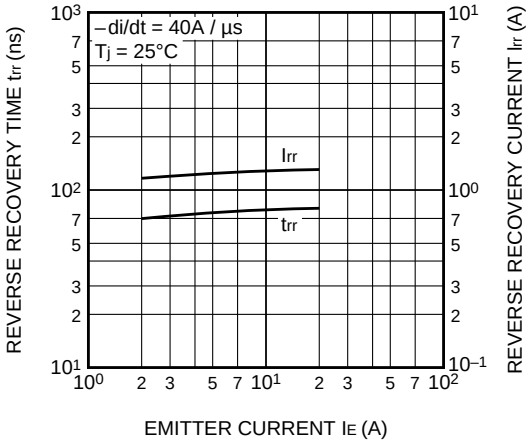


MITSUBISHI ELECTRIC

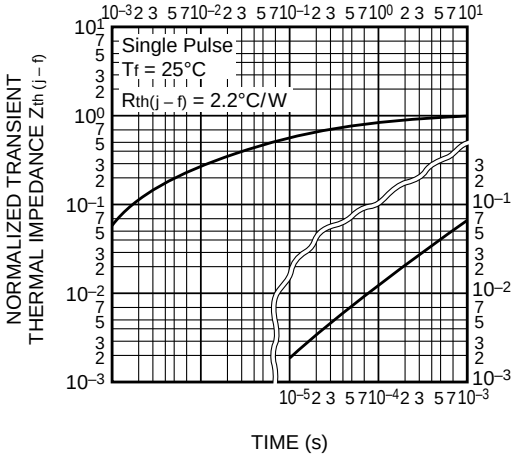
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



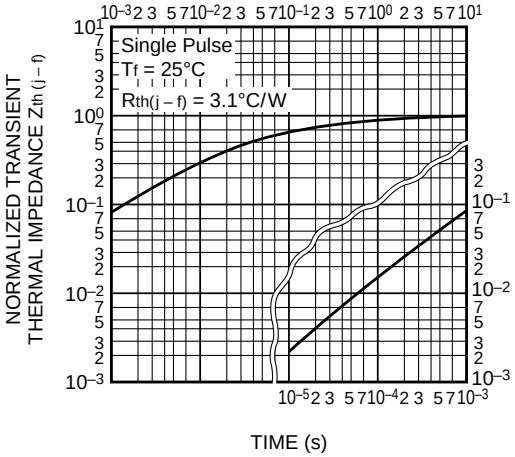
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi part)



VGE – GATE CHARGE (TYPICAL)

