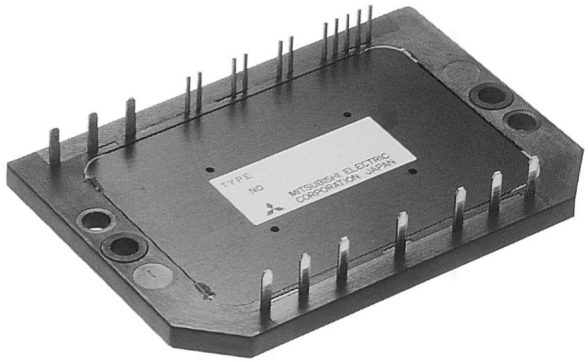
CM15MD3-12H

MEDIUM POWER SWITCHING USE
FLAT-BASE TYPE, INSULATED TYPE

CM15MD3-12H



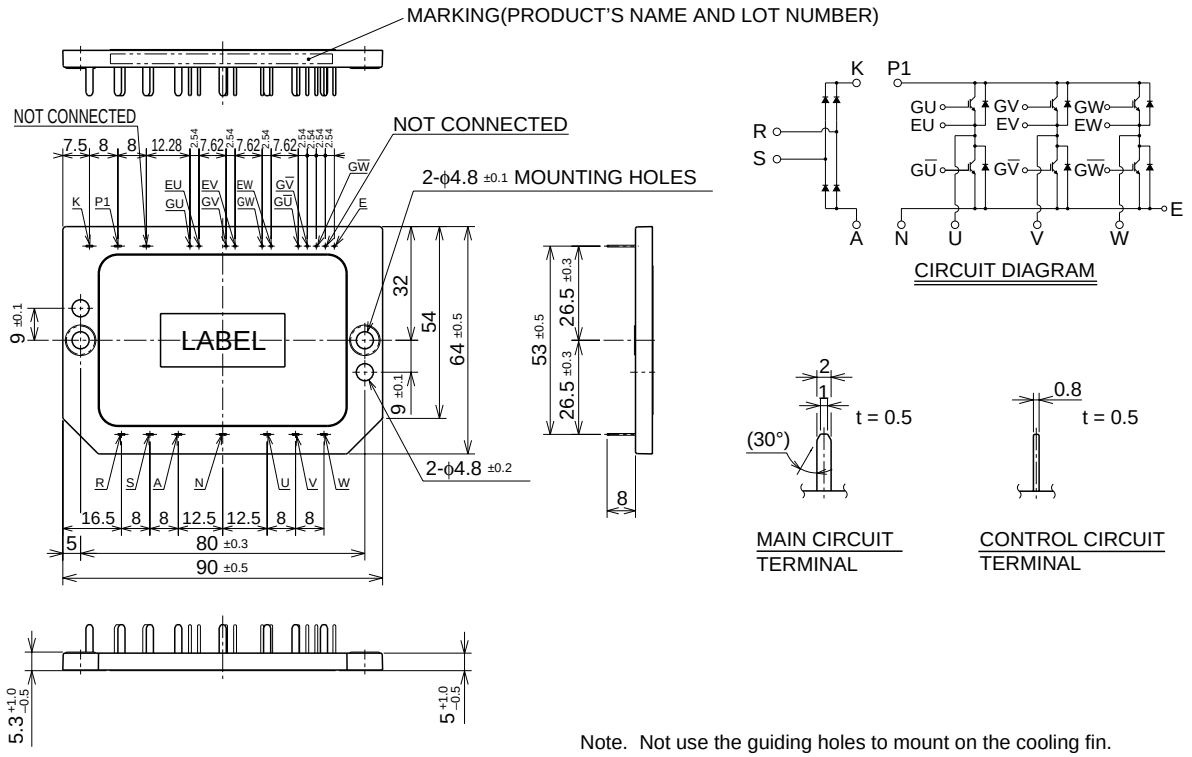
- I_C 15A
- V_{CES} 600V
- Insulated Type
- CIB Module
  3ϕ Inverter+1ϕ Converter
- UL Recognized
  Yellow Card No. E80276 (N)
  File No. E80271

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.

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	15	A
I_{CM}		PULSE (Note. 2)	30	A
I_E (Note. 1)	Emitter Current	T_C = 25°C	15	A
I_{EM} (Note. 1)		PULSE (Note. 2)	30	A
P_C (Note. 3)	Maximum collector dissipation	T_f = 25°C	45	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 = 100°C	15	A
I_{FSM}	Surge (non-repetitive) forward current	1 cycle at 60Hz, peak value Non-repetitive	300	A
I^2t	I^2t for fusing	Value for one cycle of surge current	375	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 Min.	Limits Typ.	Limits Max.	Unit
I_{CES}	Collector cutoff current	$V_{CE} = V_{CES}$, V_{GE} = 0V		—	—	1	mA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C = 1.5mA, V_{CE} = 10V		4.5	6	7.5	V
I_{GES}	Gate-emitter cutoff current	$V_{GE} = V_{GES}$, V_{CE} = 0V		—	—	0.5	μ A
$V_{CE(sat)}$	Collector-emitter saturation voltage	T_j = 25°C	I_C = 15A, 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		—	—	1.5	nF
C_{oes}	Output capacitance			—	—	1.2	nF
C_{res}	Reverse transfer capacitance			—	—	0.3	nF
Q_G	Total gate charge	V_{CC} = 300V, I_C = 15A, V_{GE} = 15V		—	45	—	nC
$t_{d(on)}$	Turn-on delay time	V_{CC} = 300V, I_C = 15A, $V_{GE1} = V_{GE2}$ = 15V, R_G = 42Ω, 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 = 15A, V_{GE} = 0V		—	—	2.8	V
t_{rr} (Note. 1)	Reverse recovery time	I_E = 15A, V_{GE} = 0V		—	—	110	ns
Q_{rr} (Note. 1)	Reverse recovery charge	di_e / dt = – 30A / μs		—	0.04	—	μ C
$R_{th(j-f)Q}$ (Note. 5)	Thermal resistance	IGBT part, Per 1/6 module		—	—	2.8	°C/W
$R_{th(j-f)R}$ (Note. 5)		FWDi part, Per 1/6 module		—	—	3.5	°C/W

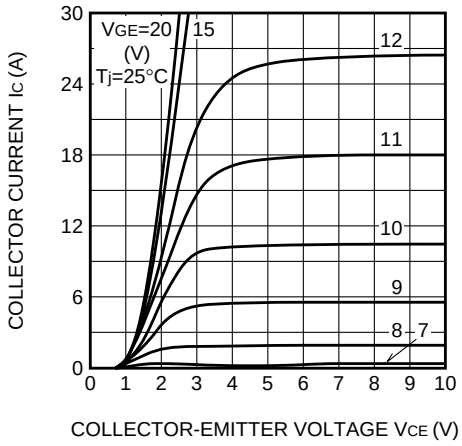
CONVERTER PART

Symbol	Parameter	Condition	Limits Min.	Limits Typ.	Limits Max.	Unit
I_{RRM}	Repetitive reverse current	$V_R = V_{RRM}$, T_j = 150°C	—	—	8	mA
V_{FM}	Forward voltage drop	I_F = 25A	—	—	1.6	V
$R_{th(j-f)}$ (Note. 5)	Thermal resistance	Per 1/4 module	—	—	3.6	°C/W

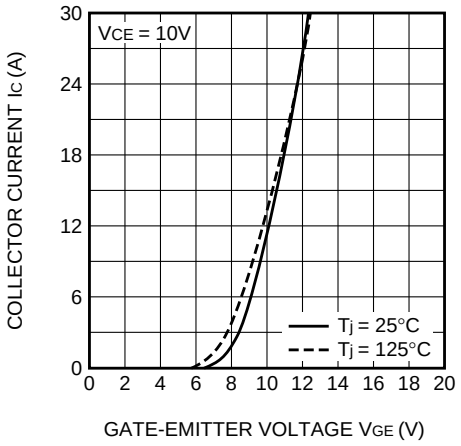
Note 1. I_E, V_{EC}, t_{rr}, Q_{rr} & die/dt represent characteristics of the anti-parallel, emitter to collector free-wheel diode.
2. Pulse width and repetition rate should be such that the device junction temp. (T_j) does not exceed T_{jmax} rating.
3. Junction temperature (T_j) should not increase 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.

PERFORMANCE CURVES

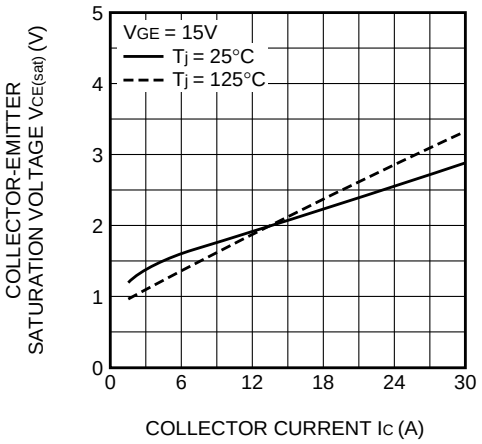
OUTPUT CHARACTERISTICS (TYPICAL)



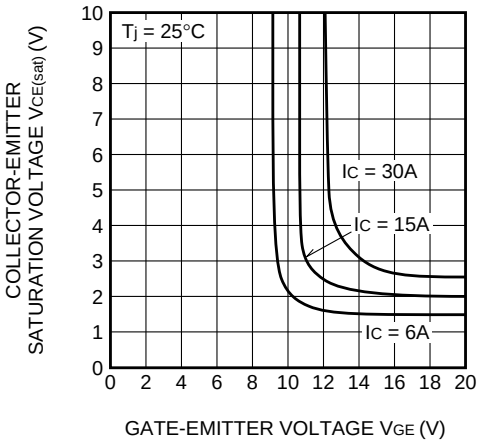
TRANSFER CHARACTERISTICS (TYPICAL)



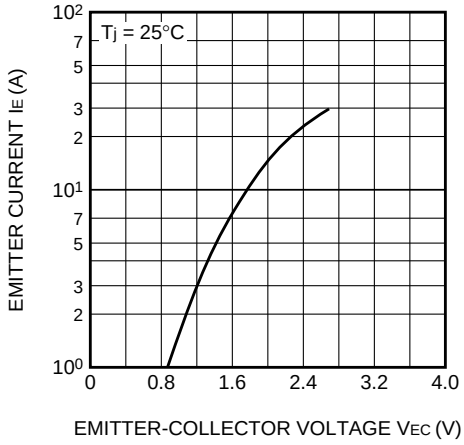
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



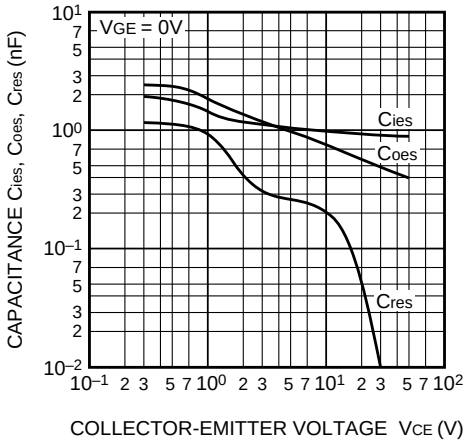
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



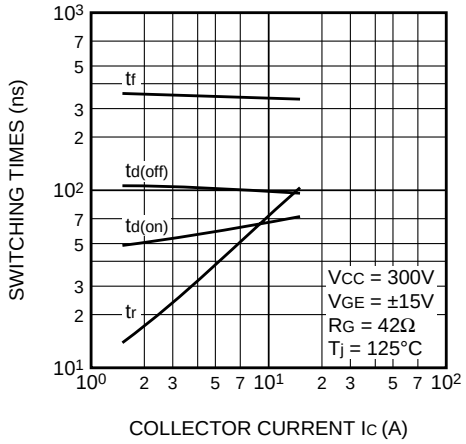
FREE-WHEEL DIODE FORWARD CHARACTERISITICS (TYPICAL)



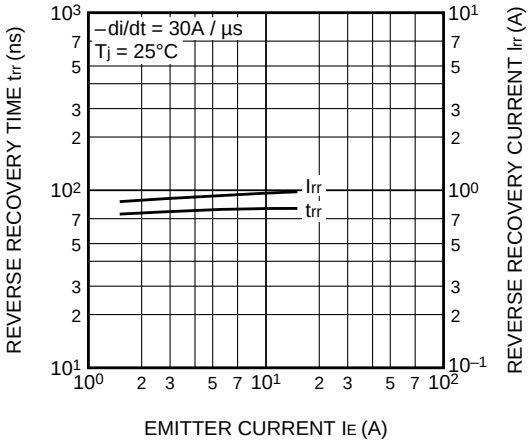
CAPACITANCE VS. VCE (TYPICAL)



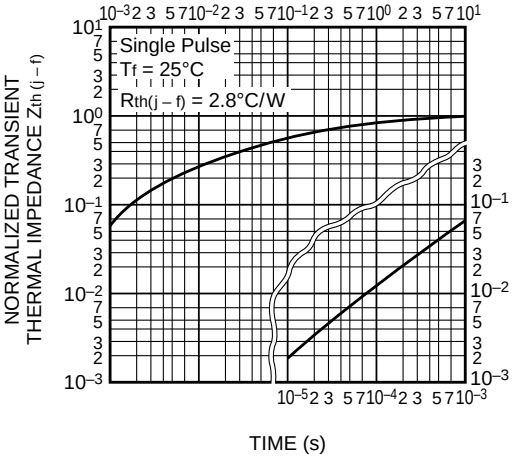
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



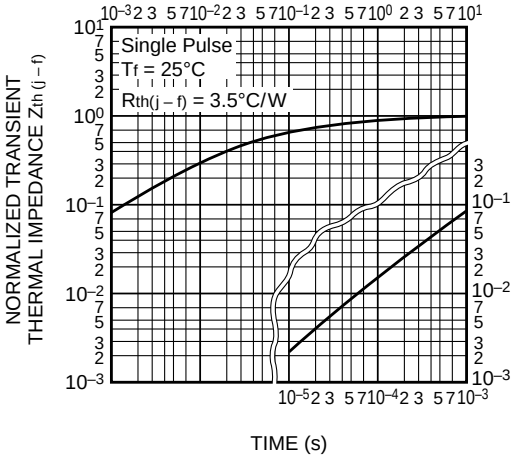
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



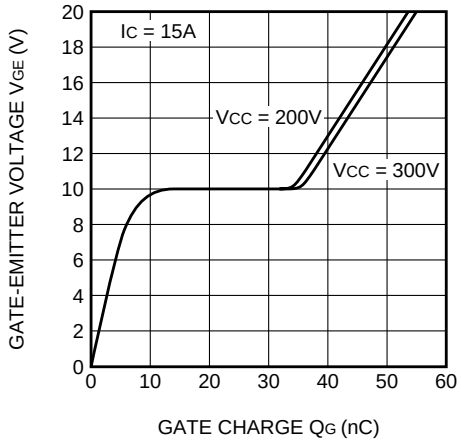
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi part)



VGE – GATE CHARGE (TYPICAL)



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