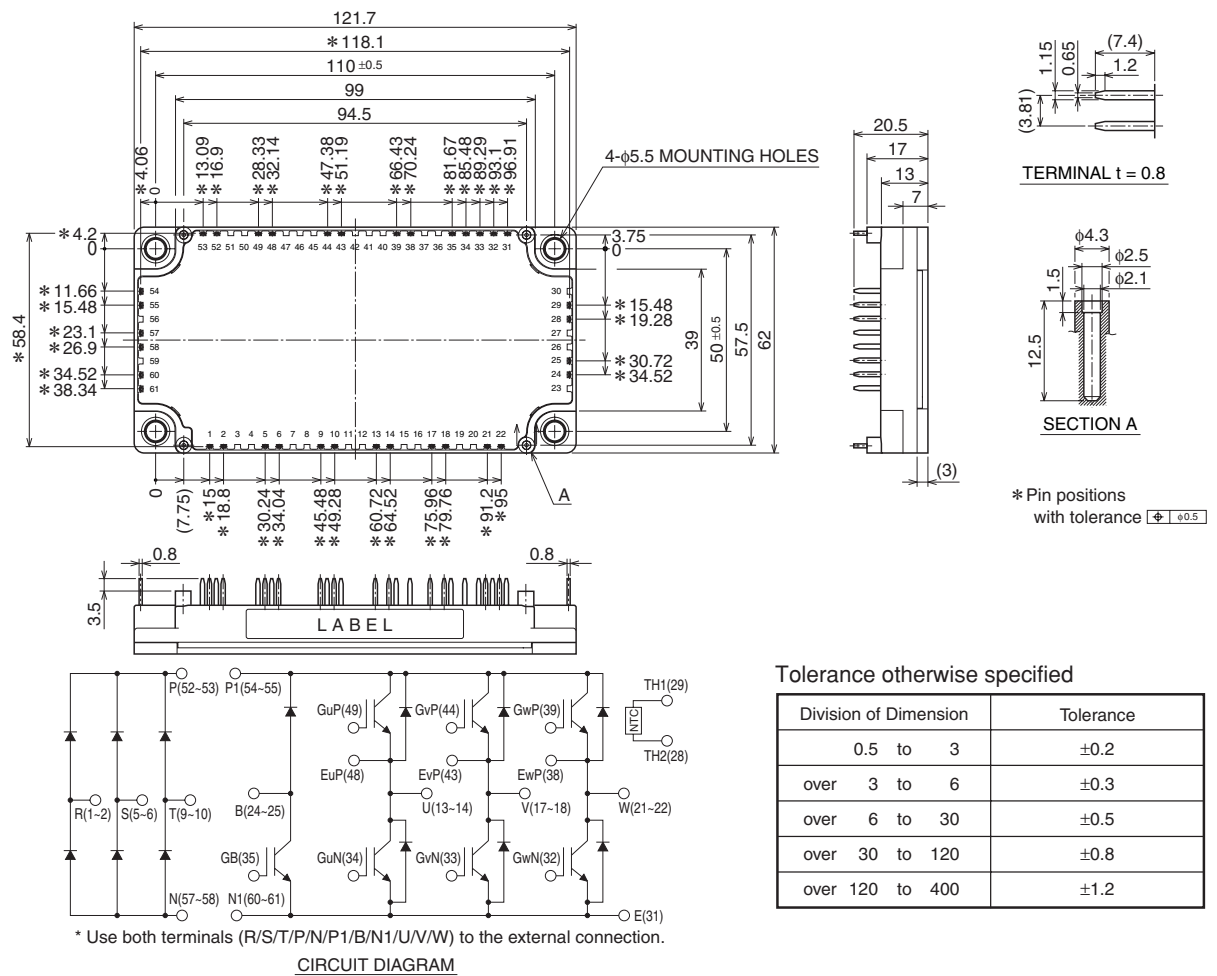


HIGH POWER SWITCHING USE

- ## General purpose Inverters, Servo Amplifiers

Dimensions in mm



ABSOLUTE MAXIMUM RATINGS ($T_j = 25^\circ\text{C}$, unless otherwise specified)**INVERTER PART**

Symbol	Parameter	Conditions	Rating	Unit
V_{CES}	Collector-emitter voltage	G-E Short	600	V
V_{GES}	Gate-emitter voltage	C-E Short	± 20	
I_C	Collector current	DC, $T_c = 70^\circ\text{C}$ (Note. 1)	75	A
I_{CRM}		Pulse (Note. 4)	150	
P_C	Maximum collector dissipation	$T_c = 25^\circ\text{C}$ (Note. 1, 5)	280	W
I_E (Note.3)	Emitter current	$T_c = 25^\circ\text{C}$ (Note. 1)	75	A
$I_{ERM}(\text{Note.3})$	(Free wheeling diode forward current)	Pulse (Note. 4)	150	

BRAKE PART

Symbol	Parameter	Conditions	Rating	Unit
V_{CES}	Collector-emitter voltage	G-E Short	600	V
V_{GES}	Gate-emitter voltage	C-E Short	± 20	
I_C	Collector current	DC, $T_c = 97^\circ\text{C}$ (Note. 1)	50	A
I_{CRM}		Pulse (Note. 4)	100	
P_C	Maximum collector dissipation	$T_c = 25^\circ\text{C}$ (Note. 1, 5)	280	W
$V_{RRM}(\text{Note.3})$	Repetitive peak reverse voltage		600	V
I_F (Note.3)	Forward current	$T_c = 25^\circ\text{C}$ (Note. 1)	50	A
$I_{FRM}(\text{Note.3})$		Pulse (Note. 4)	100	

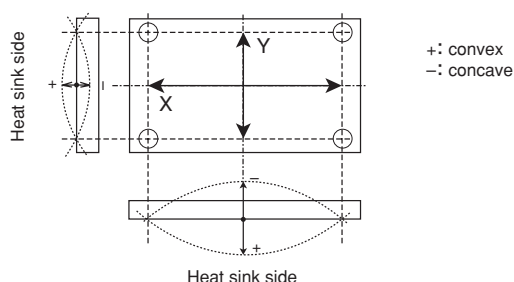
CONVERTER PART

Symbol	Parameter	Conditions	Rating	Unit
V_{RRM}	Repetitive peak reverse voltage		800	V
E_a	Recommended AC input voltage		220	Vrms
I_o	DC output current	3-phase full wave rectifying, $T_c = 140^\circ\text{C}$ (Note. 1)	75	A
I_{FSM}	Surge forward current	The sine half wave 1 cycle peak value, $f = 60\text{Hz}$, non-repetitive	750	
i^2t	Current square time	Value for one cycle of surge current	2340	A^2s

MODULE

Symbol	Parameter	Conditions	Rating	Unit
T_j	Junction temperature		$-40 \sim +150$	$^\circ\text{C}$
T_{stg}	Storage temperature		$-40 \sim +125$	
V_{iso}	Isolation voltage	Terminals to base plate, $f = 60\text{Hz}$, AC 1 minute	2500	Vrms
—	Base plate flatness	On the centerline X, Y (Note. 8)	$\pm 0 \sim +100$	μm
—	Torque strength	Mounting M5 screw	2.5 ~ 3.5	N·m
—	Weight	(Typical)	270	g

Note. 8: The base plate flatness measurement points are in the following figure.



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HIGH POWER SWITCHING USE

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

INVERTER PART

Symbol	Parameter	Conditions	Limits			Unit
			Min.	Typ.	Max.	
ICES	Collector cutoff current	VCE = VCES, VGE = 0V	—	—	1	mA
VGE(th)	Gate-emitter threshold voltage	IC = 7.5mA, VCE = 10V	5	6	7	V
IGES	Gate leakage current	±VGE = VGES, VCE = 0V	—	—	0.5	μA
VCE(sat)	Collector-emitter saturation voltage	IC = 75A, VGE = 15V (Note. 6) T _j = 25°C	—	1.7	2.1	V
		T _j = 125°C	—	1.9	—	
		Chip	—	1.6	—	
Cies	Input capacitance	VCE = 10V VGE = 0V (Note. 6)	—	—	9.3	nF
Coes	Output capacitance		—	—	1.0	
Cres	Reverse transfer capacitance		—	—	0.3	
QG	Total gate charge	VCC = 300V, IC = 75A, VGE = 15V	—	200	—	nC
td(on)	Turn-on delay time	VCC = 300V, IC = 75A	—	—	100	ns
tr	Turn-on rise time	VGE = ±15V, RG = 8.2Ω	—	—	100	
td(off)	Turn-off delay time	Inductive load	—	—	300	
tf	Turn-off fall time		—	—	600	
trr (Note.3)	Reverse recovery time		—	—	200	
Qrr (Note.3)	Reverse recovery charge	(IE = 75A)	—	1.8	—	μC
VEC(Note.3)	Emitter-collector voltage	IE = 75A, VGE = 0V (Note. 6) T _j = 25°C	—	2.0	2.8	V
		T _j = 125°C	—	1.95	—	
		Chip	—	1.9	—	
Rth(j-c)Q	Thermal resistance (Note. 1)	per IGBT	—	—	0.44	K/W
Rth(j-c)R		per free wheeling diode	—	—	0.85	
RGint	Internal gate resistance	Tc = 25°C, per switch	—	0	—	Ω
RG	External gate resistance		8.0	—	83	

BRAKE PART

Symbol	Parameter	Conditions	Limits			Unit
			Min.	Typ.	Max.	
ICES	Collector cutoff current	VCE = VCES, VGE = 0V	—	—	1	mA
VGE(th)	Gate-emitter threshold voltage	IC = 5mA, VCE = 10V	5	6	7	V
IGES	Gate leakage current	±VGE = VGES, VCE = 0V	—	—	0.5	μA
VCE(sat)	Collector-emitter saturation voltage	IC = 50A, VGE = 15V (Note. 6) T _j = 25°C	—	1.7	2.1	V
		T _j = 125°C	—	1.9	—	
		Chip	—	1.6	—	
Cies	Input capacitance	VCE = 10V VGE = 0V (Note. 6)	—	—	9.3	nF
Coes	Output capacitance		—	—	1.0	
Cres	Reverse transfer capacitance		—	—	0.3	
QG	Total gate charge	VCC = 300V, IC = 50A, VGE = 15V	—	200	—	nC
IRRM(Note.3)	Repetitive peak reverse current	VR = VRRM	—	—	1	mA
VFM(Note.3)	Forward voltage drop	IF = 50A (Note. 6) T _j = 25°C	—	2.0	2.8	V
		T _j = 125°C	—	1.95	—	
		Chip	—	1.9	—	
Rth(j-c)Q	Thermal resistance (Note. 1)	per IGBT	—	—	0.44	K/W
Rth(j-c)R		per Clamp diode	—	—	0.85	
RGint	Internal gate resistance	Tc = 25°C	—	0	—	Ω
RG	External gate resistance		13	—	125	

CONVERTER PART

Symbol	Parameter	Conditions	Limits			Unit
			Min.	Typ.	Max.	
IRRM	Repetitive peak reverse current	VR = VRRM, T _j = 150°C	—	—	20	mA
VF	Forward voltage drop	IF = 75A	—	1.2	1.6	V
Rth(j-c)	Thermal resistance (Note. 1)	per Diode	—	—	0.24	K/W

NTC THERMISTOR PART

MODULE

Note.1: Case temperature (T_c), heat sink temperature (T_f) measured point is just under the chips. (Refer to the figure of the chip location.)

2: Typical value is measured by using thermally conductive grease of $\lambda = 0.9 \text{ W}/(\text{m} \cdot \text{K})$.

3: IE, IERM, VEC, t_{rr} , Q_{rr} and E_{rr} represent ratings and characteristics of the anti-parallel, emitter-collector free wheeling diode (FWDi).

IE, IERM, VE, VBRM and IBBM represent ratings and characteristics of the Clamp diode of Brake part.

4: Pulse width and repetition rate should be such that the device junction temperature (T_j) dose not exceed T_{max} rating.

5: Junction temperature (T_j) should not increase beyond 150°C.

6: Pulse width and repetition rate should be such as to cause negligible temperature rise.

(Refer to the figure of the test circuit for $V_{CE(sat)}$ and V_{EC})

$$7: B_{(25/50)} = \ln\left(\frac{R_{25}}{B_{50}}\right) / \left(\frac{1}{T_{25}} - \frac{1}{T_{50}}\right)$$

R_{25} : resistance at absolute temperature T_{25} [K]: $T_{25} = 25$ [°C] + 273.15 = 298.15 [K]

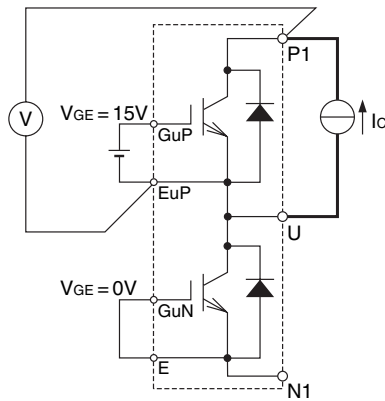
R₅₀: resistance at absolute temperature T₅₀ [K]; T₅₀ = 50 [°C] + 273.15 = 323.15 [K]

Dimensions in mm (tolerance: ± 1 mm)

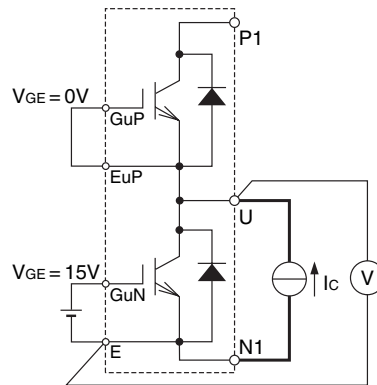


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HIGH POWER SWITCHING USE

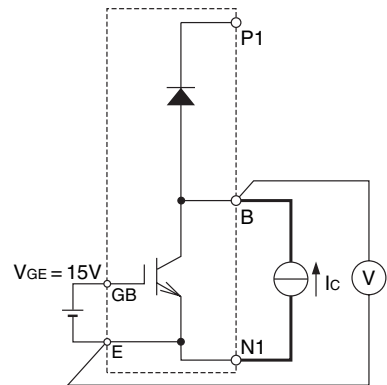


P side Inverter part Tr
(example of U arm)
 $V_{G^*E^*} = 0V$
(GvP-EvP, GwP-EwP, GvN-E, GwN-E, GB-E)

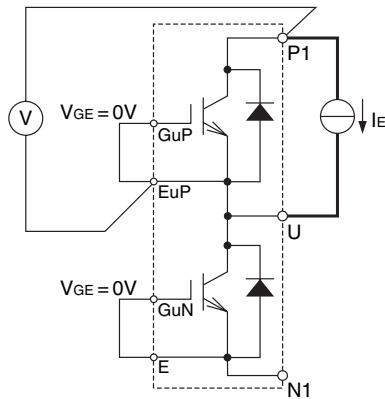


N side Inverter part Tr
(example of U arm)
 $V_{G^*E^*} = 0V$
(GvP-EvP, GwP-EwP, GvN-E, GwN-E, GB-E)

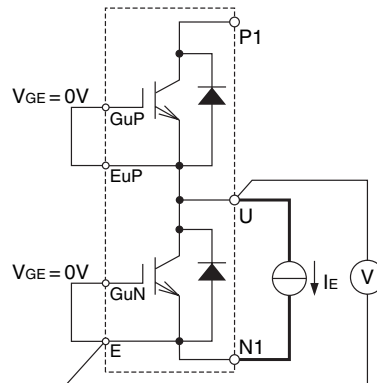
VCE(sat) test circuit



Br Tr
 $V_{G^*E^*} = 0V$
(GuP-EuP, GvP-EvP, GwP-EwP, GuN-E, GvN-E, GwN-E)

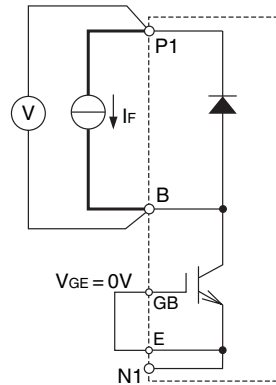


P side Inverter part Di
(example of U arm)
 $V_{G^*E^*} = 0V$
(GvP-EvP, GwP-EwP, GvN-E, GwN-E, GB-E)

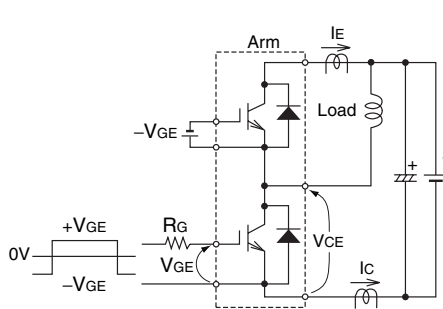


N side Inverter part Di
(example of U arm)
 $V_{G^*E^*} = 0V$
(GvP-EvP, GwP-EwP, GvN-E, GwN-E, GB-E)

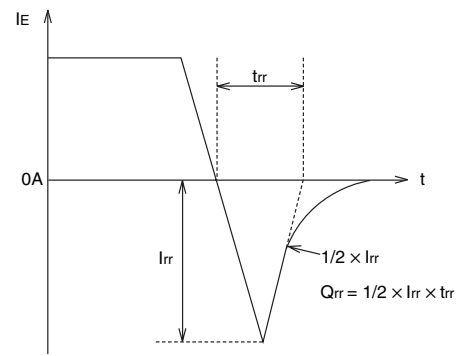
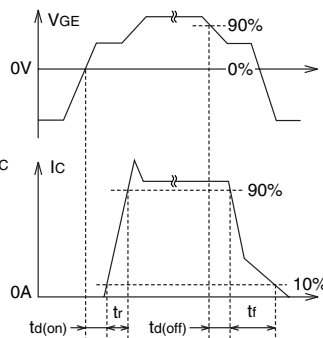
Vec/VFM test circuit



Br Di
 $V_{G^*E^*} = 0V$
(GuP-EuP, GvP-EvP, GwP-EwP, GuN-E, GvN-E, GwN-E)



Switching time test circuit and waveforms



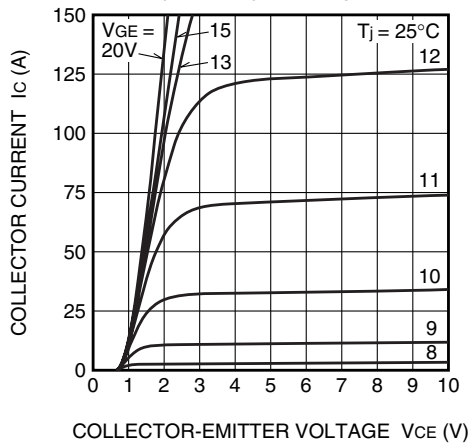
t_{rr} , Q_{rr} test waveform

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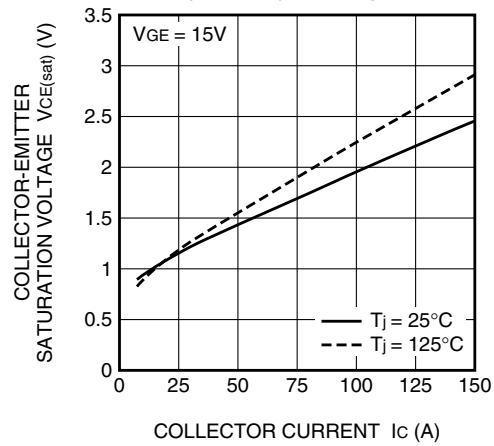
HIGH POWER SWITCHING USE

PERFORMANCE CURVES

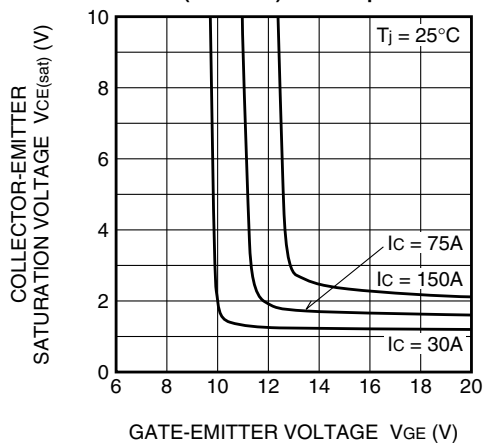
**OUTPUT CHARACTERISTICS
(TYPICAL) Inverter part**



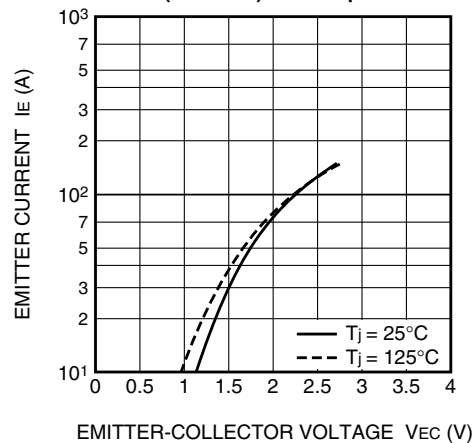
**COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL) Inverter part**



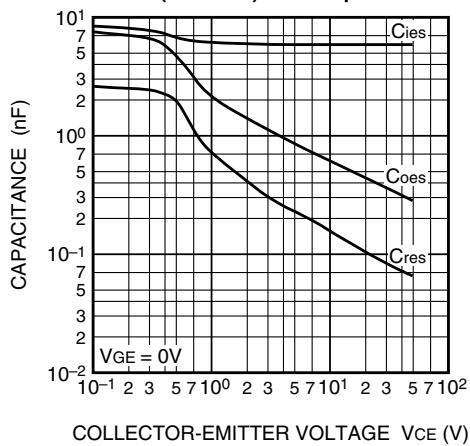
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VOLTAGE CHARACTERISTICS
(TYPICAL) Inverter part**



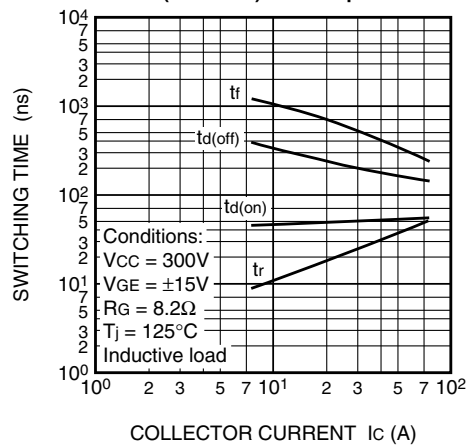
**FREE WHEELING DIODE
FORWARD CHARACTERISTICS
(TYPICAL) Inverter part**



**CAPACITANCE CHARACTERISTICS
(TYPICAL) Inverter part**



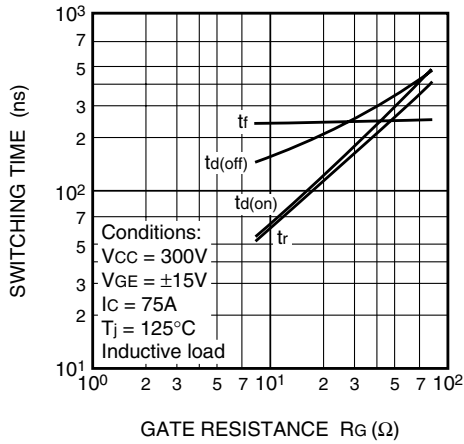
**HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL) Inverter part**



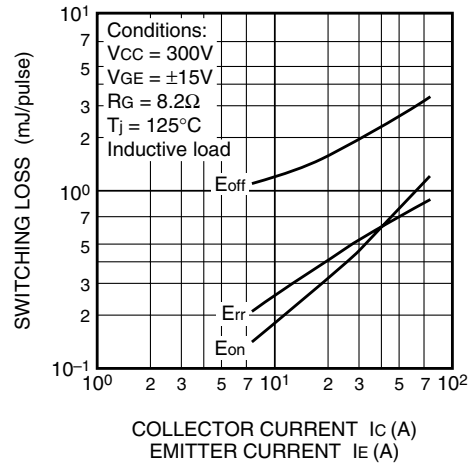
CM75MX-12A

HIGH POWER SWITCHING USE

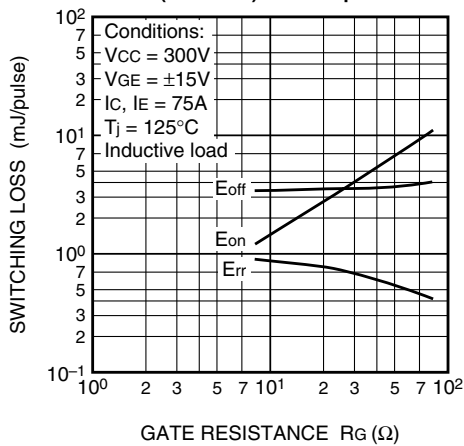
**HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL) Inverter part**



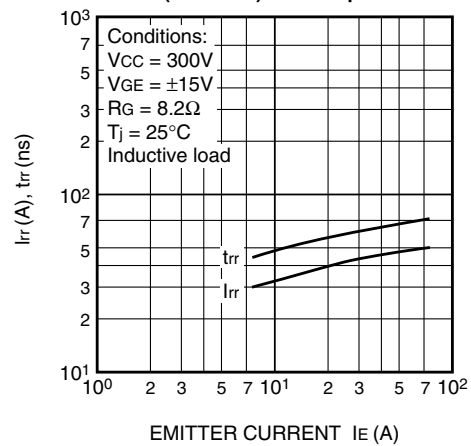
**HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL) Inverter part**



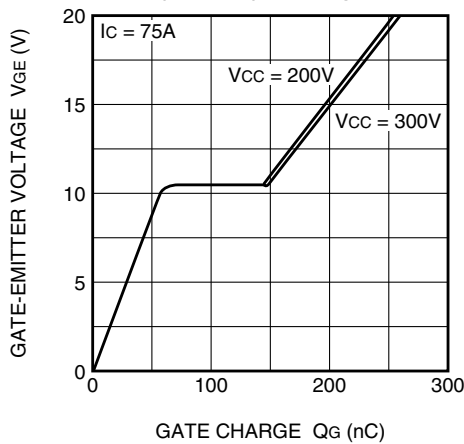
**HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL) Inverter part**



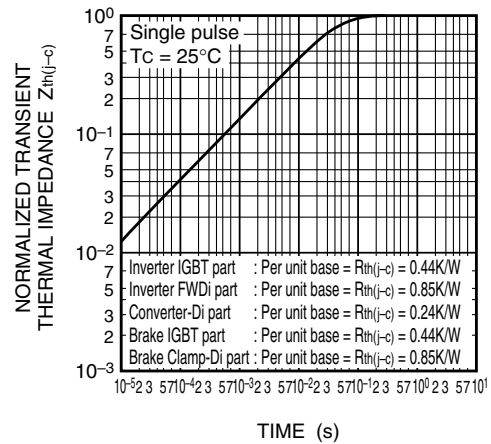
**REVERSE RECOVERY CHARACTERISTICS
OF FREE WHEELING DIODE
(TYPICAL) Inverter part**



**GATE CHARGE CHARACTERISTICS
(TYPICAL) Inverter part**



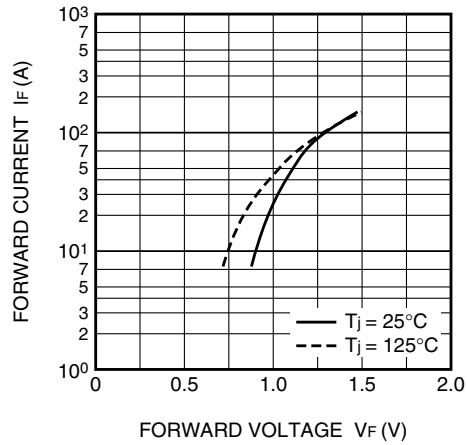
**TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS**



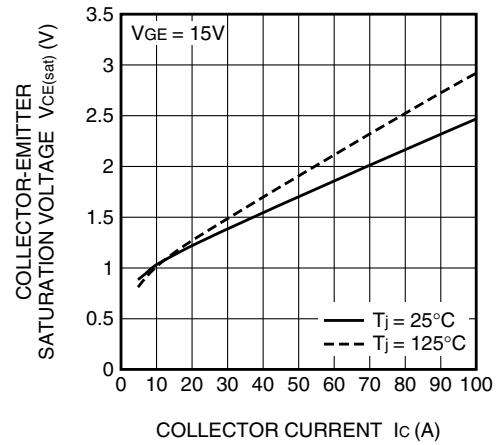
CM75MX-12A

HIGH POWER SWITCHING USE

**RECTIFIER DIODE
FORWARD CHARACTERISTICS
(TYPICAL) Converter part**



**COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL) Brake part**



**CLAMP DIODE
FORWARD CHARACTERISTICS
(TYPICAL) Brake part**

