

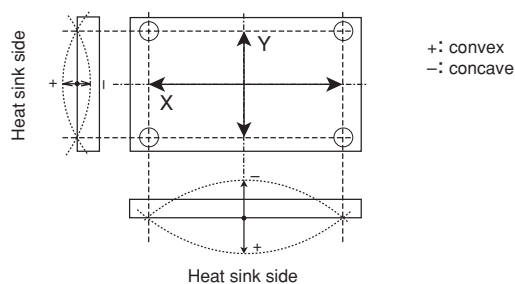
HIGH POWER SWITCHING USE

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	1200	V
V_{GES}	Gate-emitter voltage	C-E Short	± 20	
I_C	Collector current	DC, $T_c = 90^\circ\text{C}$ (Note. 1)	600	A
I_{CRM}		Pulse (Note. 4)	1200	
P_C	Maximum collector dissipation	$T_c = 25^\circ\text{C}$ (Note. 1, 5)	3785	W
I_E (Note.3)	Emitter current	$T_c = 25^\circ\text{C}$ (Note. 1)	600	A
I_{ERM} (Note.3)	(Free wheeling diode forward current)	Pulse (Note. 4)	1200	
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	Main terminals M6 screw	3.5 ~ 4.5	N·m
—	Torque strength	Mounting M5 screw	2.5 ~ 3.5	
—	Weight	(Typical)	330	g

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



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 = 60mA, VCE = 10V	6	7	8	V
IGES	Gate leakage current	±VGE = VGES, VCE = 0V	—	—	0.5	μA
VCE(sat)	Collector-emitter saturation voltage	IC = 600A, VGE = 15V (Note. 6) T _j = 25°C	—	2.0	2.6	V
		T _j = 125°C	—	2.2	—	
		Chip	—	1.9	—	
Cies	Input capacitance	VCE = 10V VGE = 0V (Note. 6)	—	—	100	nF
Coes	Output capacitance		—	—	9	
Cres	Reverse transfer capacitance		—	—	2	
QG	Total gate charge	VCC = 600V, IC = 600A, VGE = 15V	—	3000	—	nC
td(on)	Turn-on delay time	VCC = 600V, IC = 600A	—	—	660	ns
tr	Turn-on rise time	VGE = ±15V, RG = 1.0Ω	—	—	190	
td(off)	Turn-off delay time	Inductive load (IE = 600A)	—	—	700	
tf	Turn-off fall time		—	—	600	
t _{rr} (Note.3)	Reverse recovery time		—	—	250	
Q _{rr} (Note.3)	Reverse recovery charge		—	19	—	μC
VEC(Note.3)	Emitter-collector voltage	IE = 600A, VGE = 0V (Note. 6) T _j = 25°C	—	2.6	3.4	V
		T _j = 125°C	—	2.16	—	
		Chip	—	2.5	—	
Rlead	Module lead resistance	Main terminals-chip	—	0.6	—	mΩ
Rth(j-c)Q	Thermal resistance	per IGBT	—	—	0.033	K/W
Rth(j-c)R	(Junction to case) (Note. 1)	per free wheeling diode	—	—	0.048	
Rth(c-f)	Contact thermal resistance (Case to heat sink) (Note. 1)	Thermal grease applied (Note. 2)	—	0.015	—	
RGint	Internal gate resistance	TC = 25°C	0.7	1	1.3	Ω
		TC = 125°C	1.4	2	2.6	
RG	External gate resistance		1	—	10	

NTC THERMISTOR PART

Symbol	Parameter	Conditions	Limits			Unit
			Min.	Typ.	Max.	
R	Zero power resistance	TC = 25°C	4.85	5.00	5.15	kΩ
ΔR/R	Deviation of resistance	TC = 100°C, R ₁₀₀ = 493Ω	-7.3	—	+7.8	%
B(25/50)	B constant	Approximate by equation (Note. 7)	—	3375	—	K
P25	Power dissipation	TC = 25°C	—	—	10	mW

Note.1: Case temperature (TC), heat sink temperature (T_h) 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 λ = 0.9W/(m·K).

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

4: Pulse width and repetition rate should be such that the device junction temperature (T_j) dose not exceed T_{jmax} 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 VCE(sat) and VEC)

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

R₂₅: resistance at absolute temperature T₂₅ [K]; T₂₅ = 25 [°C]+273.15 = 298.15 [K]

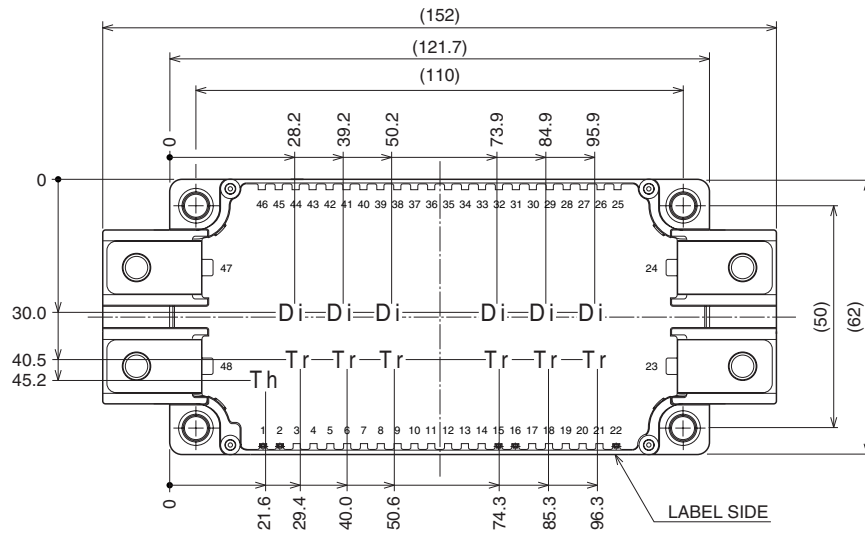
R₅₀: resistance at absolute temperature T₅₀ [K]; T₅₀ = 50 [°C]+273.15 = 323.15 [K]

CM600HX-24A

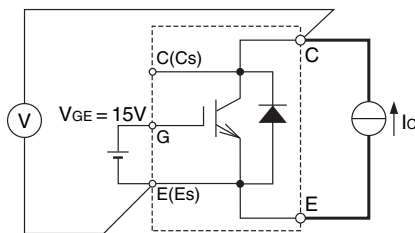
HIGH POWER SWITCHING USE

Chip Location (Top view)

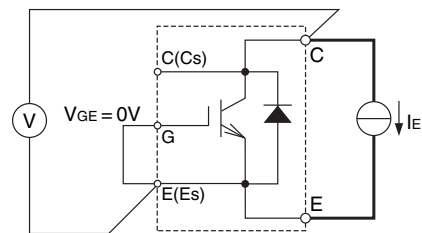
Dimensions in mm (tolerance: ± 1 mm)



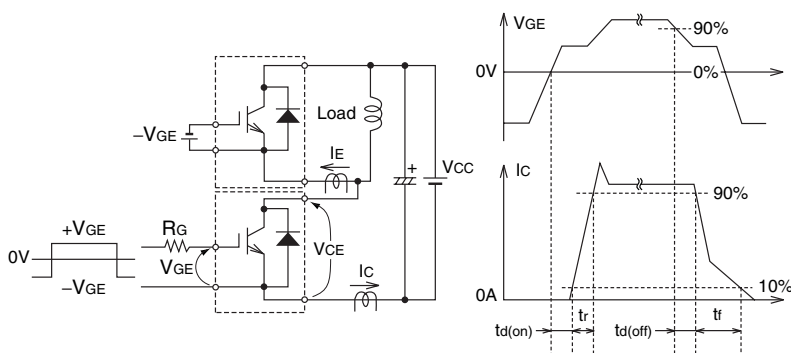
Each mark points the center position of each chip. Tr: IGBT, Di: FWDi, Th: NTC thermistor



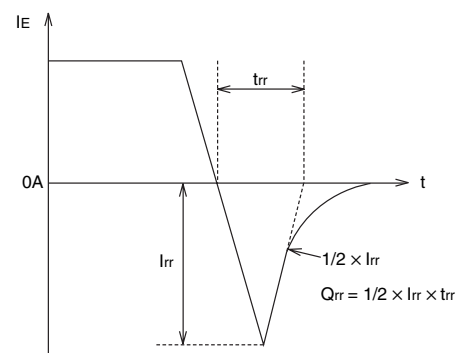
VCE(sat) test circuit



VEC test circuit



Switching time test circuit and waveforms

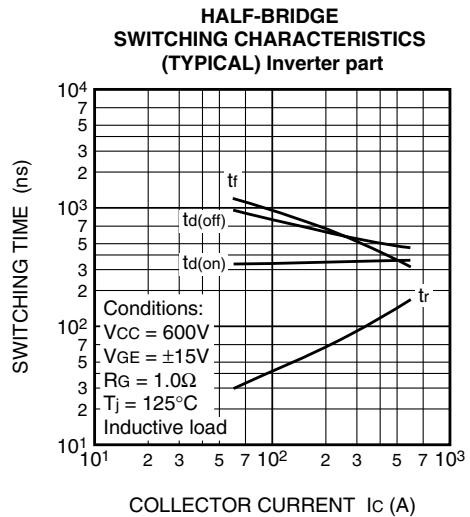
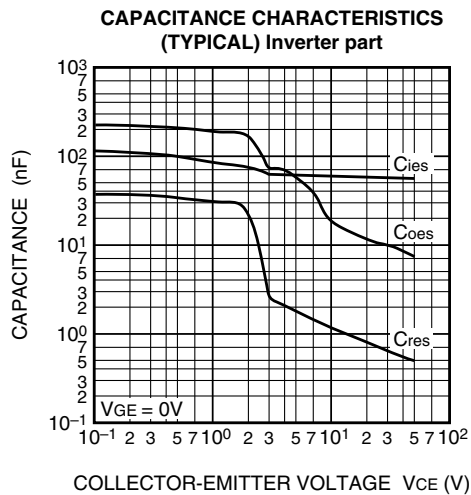
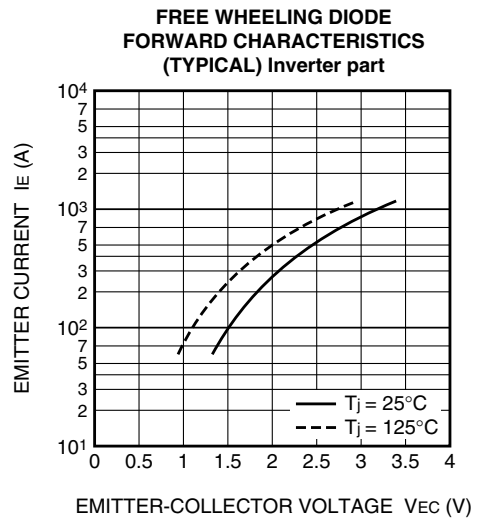
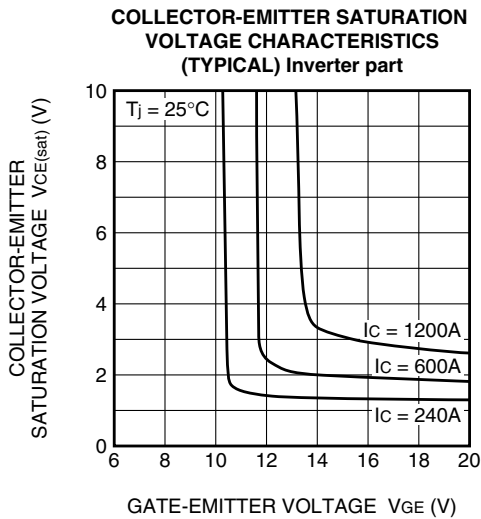
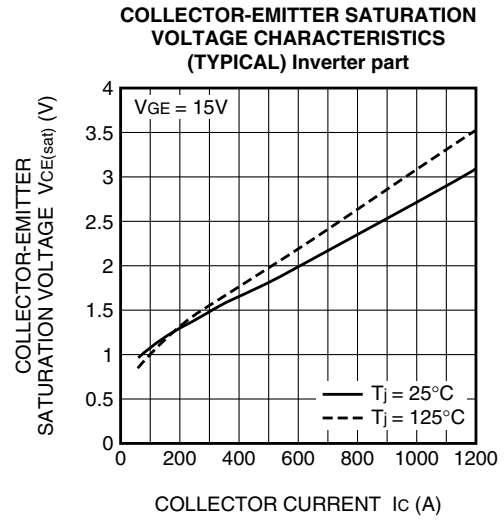
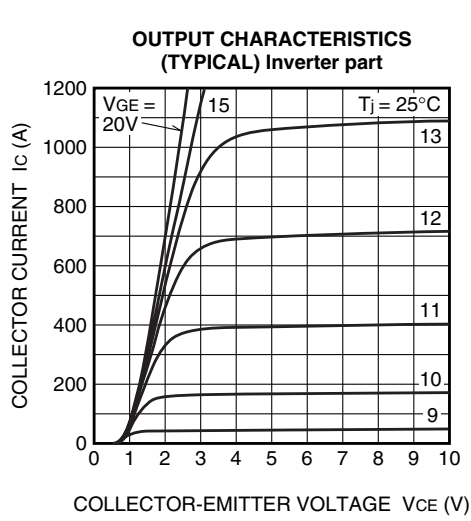


trr, Qrr test waveform

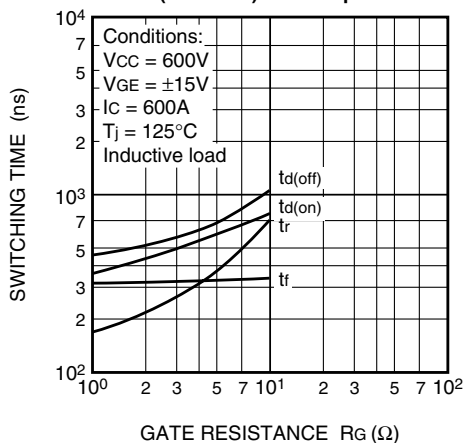
CM600HX-24A

HIGH POWER SWITCHING USE

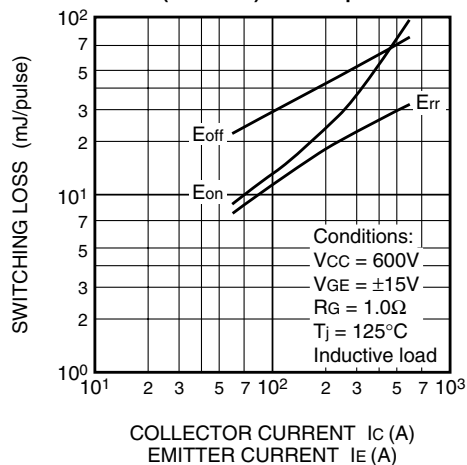
PERFORMANCE CURVES



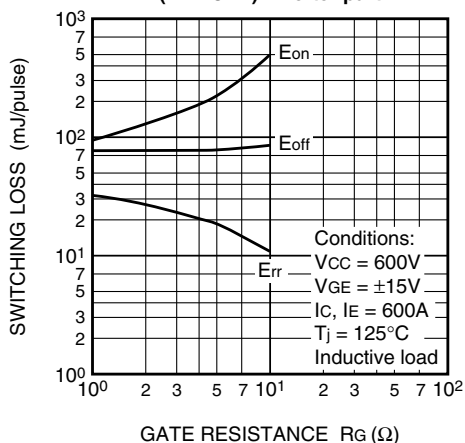
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL) Inverter part



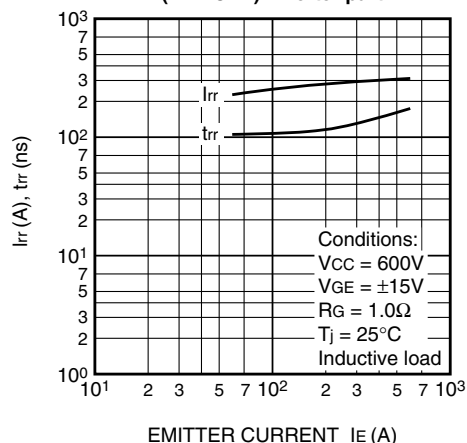
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL) Inverter part



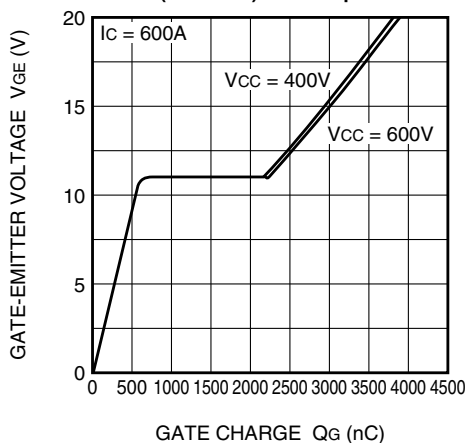
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL) Inverter part



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



GATE CHARGE CHARACTERISTICS
(TYPICAL) Inverter part



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS

