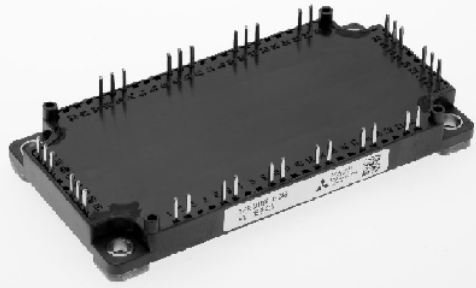


< IGBT MODULES >

CM75TX-24S

HIGH POWER SWITCHING USE
INSULATED TYPE



sixpack (3φ Inverter)

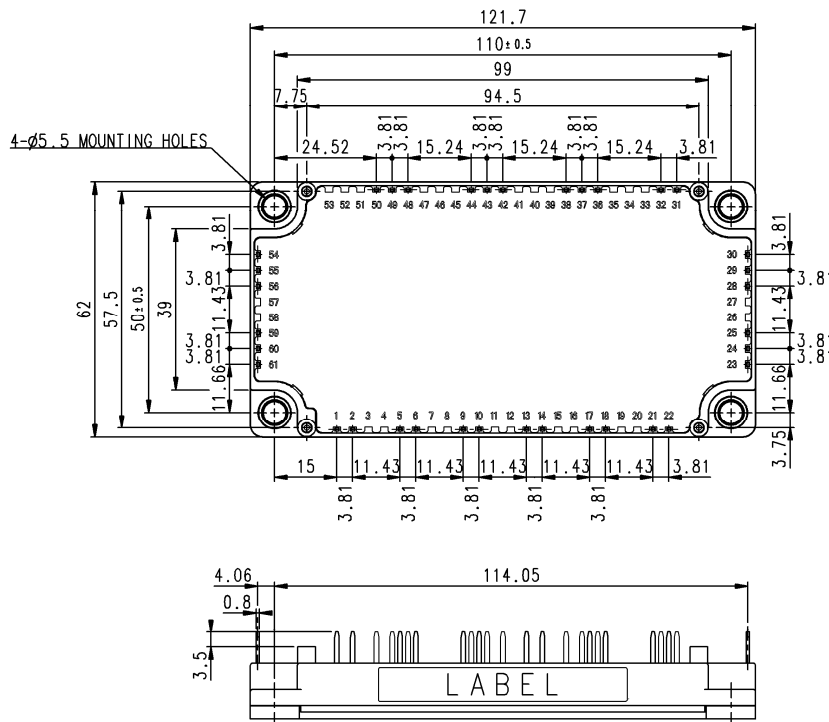
Collector current I_C **75 A**
 Collector-emitter voltage V_{CES} **1200 V**
 Maximum junction temperature T_{jmax} **175 °C**

- Flat base Type
- Copper base plate (non-plating)
- Tin plating pin terminals
- RoHS Directive compliant
- Recognized under UL1557, File E323585

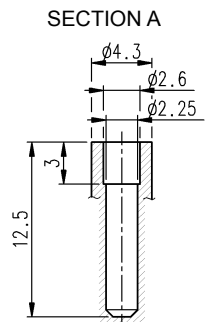
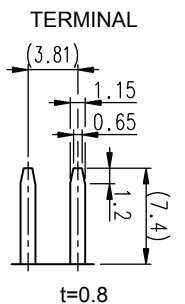
APPLICATION

AC Motor Control, Motion/Servo Control, Power supply, etc.

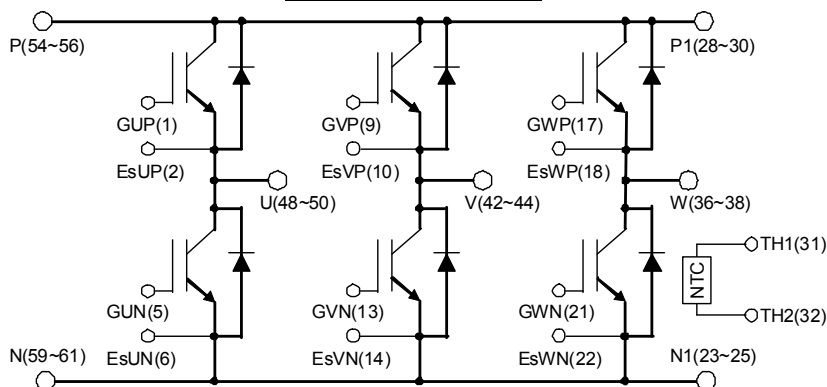
OUTLINE DRAWING & INTERNAL CONNECTION



Dimension in mm



INTERNAL CONNECTION



Caution: Each (three) pin terminal of P/N/P1/N1/U/V/W is connected in the module, but should use all each three pins for the external wiring.

Tolerance otherwise specified

Division of Dimension	Tolerance
0.5 to 3	± 0.2
over 3 to 6	± 0.3
over 6 to 30	± 0.5
over 30 to 120	± 0.8
over 120 to 400	± 1.2

The tolerance of size between terminals is assumed to be ± 0.4 .

< IGBT MODULES >

CM75TX-24S

HIGH POWER SWITCHING USE
INSULATED TYPEABSOLUTE MAXIMUM RATINGS ($T_J=25\text{ }^{\circ}\text{C}$, unless otherwise specified)

INVERTER PART IGBT/FWDI

Symbol	Item	Conditions	Rating	Unit
V_{CES}	Collector-emitter voltage	G-E short-circuited	1200	V
V_{GES}	Gate-emitter voltage	C-E short-circuited	± 20	V
I_C	Collector current	DC, $T_C=122\text{ }^{\circ}\text{C}$ (Note2, 4)	75	A
I_{CRM}		Pulse, Repetitive (Note3)	150	
P_{tot}	Total power dissipation	$T_C=25\text{ }^{\circ}\text{C}$ (Note2, 4)	600	W
I_E (Note1)	Emitter current	(Note2)	75	A
I_{ERM} (Note1)		Pulse, Repetitive (Note3)	150	

MODULE

Symbol	Item	Conditions	Rating	Unit
V_{isol}	Isolation voltage	Terminals to base plate, RMS, f=60 Hz, AC 1 min	2500	V
T_{jmax}	Maximum junction temperature	Instantaneous event (overload)	175	$^{\circ}\text{C}$
T_{Cmax}	Maximum case temperature	(Note4)	125	$^{\circ}\text{C}$
T_{jop}	Operating junction temperature	Continuous operation (under switching)	-40 ~ +150	$^{\circ}\text{C}$
T_{stg}	Storage temperature	-	-40 ~ +125	

ELECTRICAL CHARACTERISTICS ($T_J=25\text{ }^{\circ}\text{C}$, unless otherwise specified)

INVERTER PART IGBT/FWDI

Symbol	Item	Conditions		Limits			Unit
				Min.	Typ.	Max.	
I _{CES}	Collector-emitter cut-off current	V _{CE} =V _{CES} , G-E short-circuited		-	-	1.0	mA
I _{GES}	Gate-emitter leakage current	V _{GE} =V _{GES} , C-E short-circuited		-	-	0.5	μA
V _{GE(th)}	Gate-emitter threshold voltage	I _C =7.5 mA, V _{CE} =10 V		5.4	6.0	6.6	V
V _{CESat}	Collector-emitter saturation voltage	I _C =75 A ^(Note5) , V _{GE} =15 V, (Terminal)	T _J =25 °C	-	1.80	2.25	V
			T _J =125 °C	-	2.00	-	
			T _J =150 °C	-	2.05	-	
		I _C =75 A ^(Note5) , V _{GE} =15 V, (Chip)	T _J =25 °C	-	1.70	2.15	V
			T _J =125 °C	-	1.90	-	
			T _J =150 °C	-	1.95	-	
C _{ies}	Input capacitance	V _{CE} =10 V, G-E short-circuited		-	-	7.5	nF
C _{oes}	Output capacitance			-	-	1.5	
C _{res}	Reverse transfer capacitance			-	-	0.13	
Q _G	Gate charge	V _{CC} =600 V, I _C =75 A, V _{GE} =15 V		-	175	-	nC
t _{d(on)}	Turn-on delay time	V _{CC} =600 V, I _C =75 A, V _{GE} =±15 V, R _G =8.2 Ω, Inductive load		-	-	300	ns
t _r	Rise time			-	-	200	
t _{d(off)}	Turn-off delay time			-	-	600	
t _f	Fall time			-	-	300	
V _{EC} ^(Note1)	Emitter-collector voltage	I _E =75 A ^(Note5) , G-E short-circuited, (Terminal)	T _J =25 °C	-	1.80	2.25	V
			T _J =125 °C	-	1.80	-	
			T _J =150 °C	-	1.80	-	
		I _E =75 A ^(Note5) , G-E short-circuited, (Chip)	T _J =25 °C	-	1.70	2.15	V
			T _J =125 °C	-	1.70	-	
			T _J =150 °C	-	1.70	-	
t _{rr} ^(Note1)	Reverse recovery time	V _{CC} =600 V, I _E =75 A, V _{GE} =±15 V, R _G =8.2 Ω, Inductive load		-	-	300	ns
Q _{rr} ^(Note1)	Reverse recovery charge			-	4.0	-	
E _{on}	Turn-on switching energy per pulse	V _{CC} =600 V, I _C =I _E =75 A,		-	7.3	-	mJ
E _{off}	Turn-off switching energy per pulse	V _{GE} =±15 V, R _G =8.2 Ω, T _J =150 °C,		-	8.0	-	
E _{rr} ^(Note1)	Reverse recovery energy per pulse	Inductive load		-	6.9	-	mJ
R _{CC'+EE'}	Internal lead resistance	Main terminals-chip, per switch, T _C =25 °C ^(Note4)		-	-	2.4	mΩ
r _g	Internal gate resistance	Per switch		-	0	-	Ω

ELECTRICAL CHARACTERISTICS (cont; $T_j=25\text{ }^{\circ}\text{C}$, unless otherwise specified)

NTC THERMISTOR PART

Symbol	Item	Conditions	Limits			Unit
			Min.	Typ.	Max.	
R_{25}	Zero-power resistance	$T_c=25\text{ }^{\circ}\text{C}$ (Note4)	4.85	5.00	5.15	k Ω
$\Delta R/R$	Deviation of resistance	$R_{100}=493\text{ }\Omega$, $T_c=100\text{ }^{\circ}\text{C}$ (Note4)	-7.3	-	+7.8	%
$B_{(25/50)}$	B-constant	Approximate by equation (Note7)	-	3375	-	K
P_{25}	Power dissipation	$T_c=25\text{ }^{\circ}\text{C}$ (Note4)	-	-	10	mW

THERMAL RESISTANCE CHARACTERISTICS

Symbol	Item	Conditions	Limits			Unit
			Min.	Typ.	Max.	
$R_{th(j-c)Q}$	Thermal resistance (Note4)	Junction to case, per Inverter IGBT	-	-	0.25	K/W
$R_{th(j-c)D}$		Junction to case, per Inverter FWDi	-	-	0.40	
$R_{th(c-s)}$	Contact thermal resistance (Note4)	Case to heat sink, per 1 module, Thermal grease applied (Note7)	-	15	-	K/kW

MECHANICAL CHARACTERISTICS

Symbol	Item	Conditions	Limits			Unit
			Min.	Typ.	Max.	
M_s	Mounting torque	Mounting to heat sink M 5 screw	2.5	3.0	3.5	N·m
d_s	Creepage distance	Terminal to terminal	10.28	-	-	mm
		Terminal to base plate	14.27	-	-	
d_a	Clearance	Terminal to terminal	10.28	-	-	mm
		Terminal to base plate	12.33	-	-	
m	Weight	-	-	300	-	g
e_c	Flatness of base plate	On the centerline X, Y (Note8)	± 0	-	+100	μm

Note1. Represent ratings and characteristics of the anti-parallel, emitter-collector free wheeling diode (FWDi).

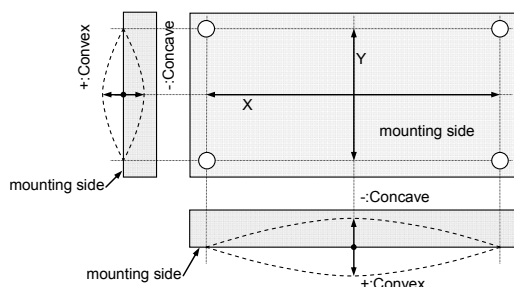
- Junction temperature (T_j) should not increase beyond T_{jmax} rating.
- Pulse width and repetition rate should be such that the device junction temperature (T_j) dose not exceed T_{jmax} rating.
- Case temperature (T_c) and heat sink temperature (T_s) are defined on the each surface (mounting side) of base plate and heat sink just under the chips. Refer to the figure of chip location.
- Pulse width and repetition rate should be such as to cause negligible temperature rise.
Refer to the figure of test circuit.

$$6. B_{(25/50)} = \ln\left(\frac{R_{25}}{R_{50}}\right) / \left(\frac{1}{T_{25}} - \frac{1}{T_{50}}\right),$$

R_{25} : resistance at absolute temperature T_{25} [K]; $T_{25}=25\text{ }^{\circ}\text{C}+273.15=298.15$ [K]

R_{50} : resistance at absolute temperature T_{50} [K]; $T_{50}=50\text{ }^{\circ}\text{C}+273.15=323.15$ [K]

- Typical value is measured by using thermally conductive grease of $\lambda=0.9\text{ W/(m}\cdot\text{K)}$.
- The base plate (mounting side) flatness measurement points (X, Y) are as follows of the following figure.

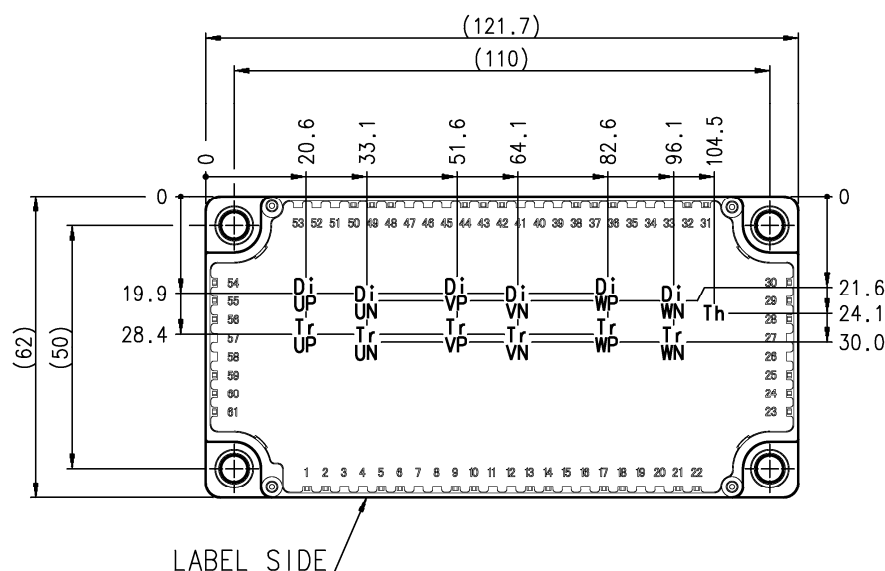


- Use the following screws when mounting the printed circuit board (PCB) on the stand offs.
"ST2.6×10 or ST2.6×12 self tapping screw"
The length of the screw depends on the thickness of the PCB.

RECOMMENDED OPERATING CONDITIONS

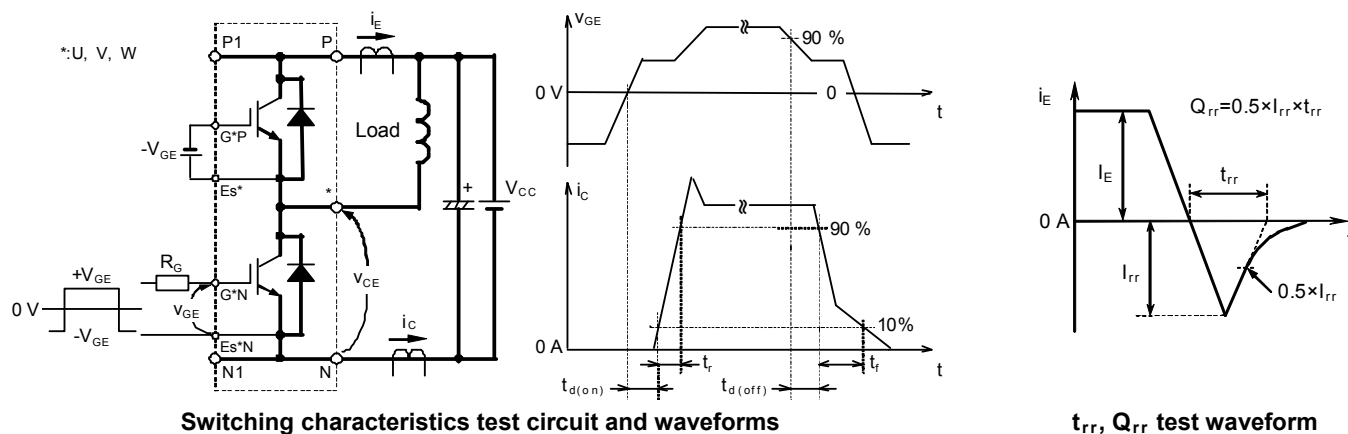
Symbol	Item	Conditions	Limits			Unit
			Min.	Typ.	Max.	
V_{CC}	(DC) Supply voltage	Applied across P-N terminals	-	600	850	V
V_{GEon}	Gate (-emitter drive) voltage	Applied across G*P-Es*P/G*N-Es*N (*=U, V, W) terminals	13.5	15.0	16.5	V
R_G	External gate resistance	Per switch	8.2	-	82	Ω

CHIP LOCATION (Top view)

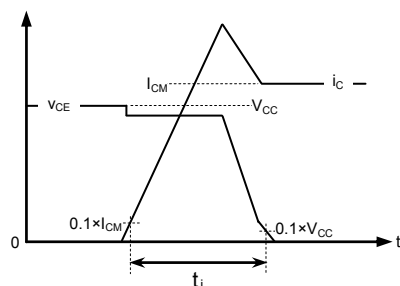
Dimension in mm, tolerance: ± 1 mm

Tr*P/Tr*N: IGBT, Di*P/Di*N: FWDi (*=U/V/W), Th: NTC thermistor

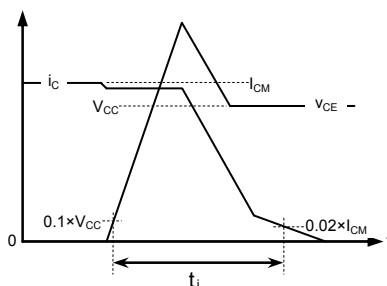
TEST CIRCUIT AND WAVEFORMS



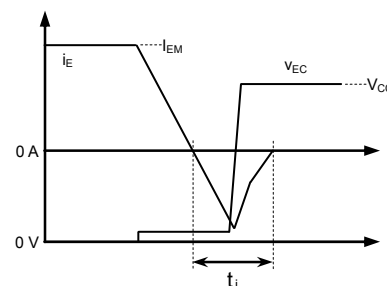
Switching characteristics test circuit and waveforms

 t_{rr} , Q_{rr} test waveform

IGBT Turn-on switching energy



IGBT Turn-off switching energy

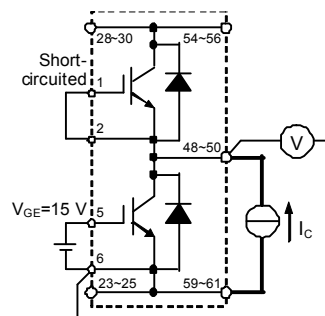
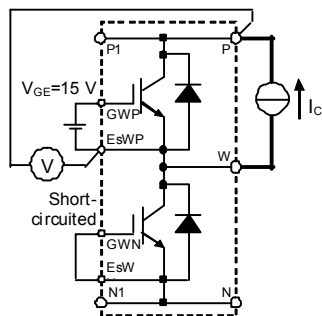
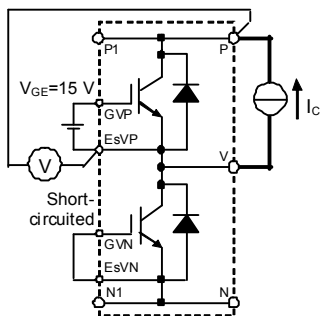
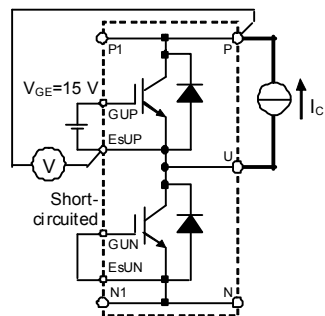


FWDi Reverse recovery energy

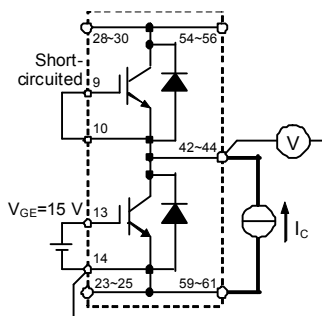
Turn-on / Turn-off switching energy and Reverse recovery energy test waveforms (Integral time instruction drawing)

< IGBT MODULES >
CM75TX-24S
HIGH POWER SWITCHING USE
INSULATED TYPE

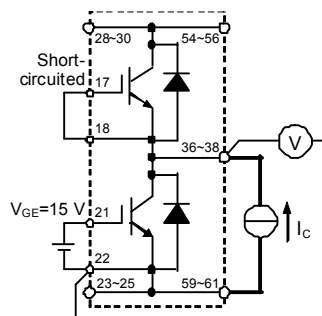
TEST CIRCUIT



Gate-emitter GVP-EsVP, GVN-EsVP,
short-circuited GWP-EsWN, GWN-EsWN
UP / UN IGBT

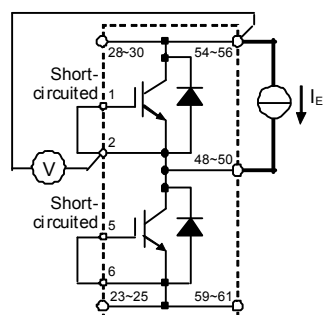


Gate-emitter GUP-EsUP, GUN-EsUN,
short-circuited GWP-EsWP, GWN-EsWN
VP / VN IGBT

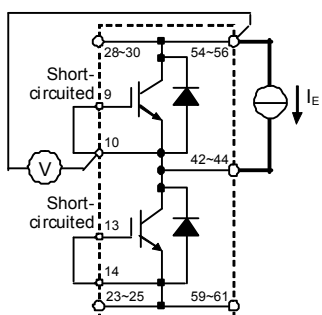


Gate-emitter GUP-EsUP, GUN-EsUN,
short-circuited GWP-EsWP, GVN-EsVN
WP / WN IGBT

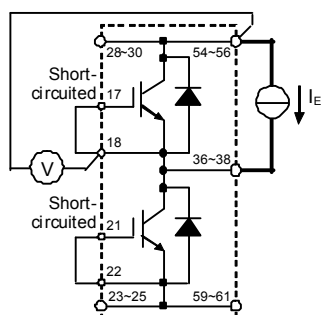
V_{CEsat} test circuit



Gate-emitter GVP-EsVP, GVN-EsVP,
short-circuited GWP-EsWN, GWN-EsWN
UP / UN FWDi



Gate-emitter GUP-EsUP, GUN-EsUN,
short-circuited GWP-EsWP, GWN-EsWN
VP / VN FWDi



Gate-emitter GUP-EsUP, GUN-EsUN,
short-circuited GWP-EsWP, GVN-EsVN
WP / WN FWDi

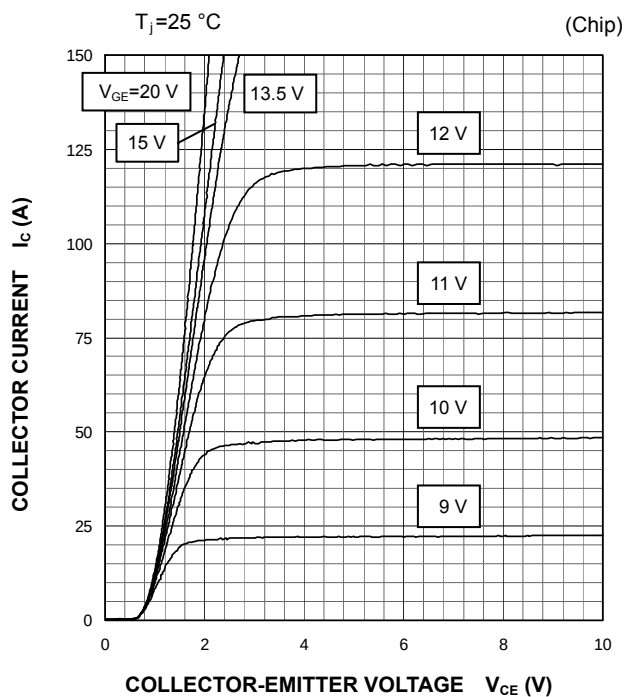
V_{EC} test circuit

< IGBT MODULES >
CM75TX-24S
HIGH POWER SWITCHING USE
INSULATED TYPE

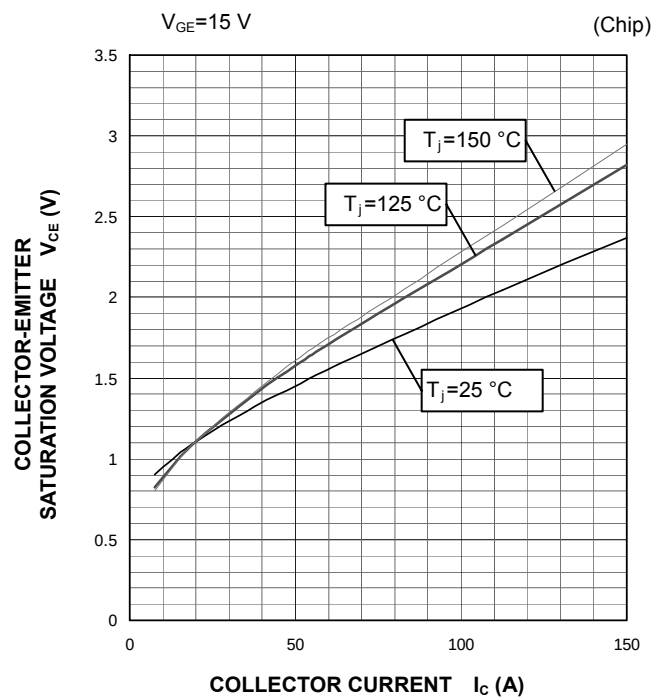
PERFORMANCE CURVES

INVERTER PART

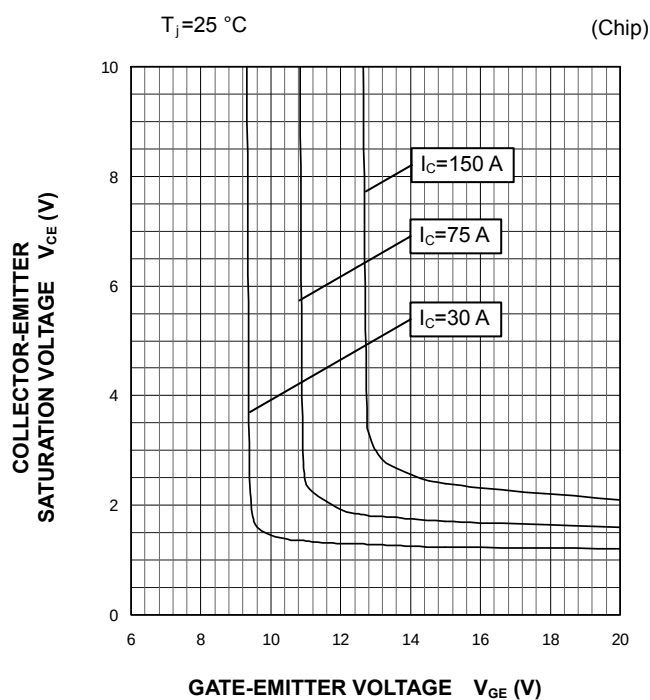
OUTPUT CHARACTERISTICS
(TYPICAL)



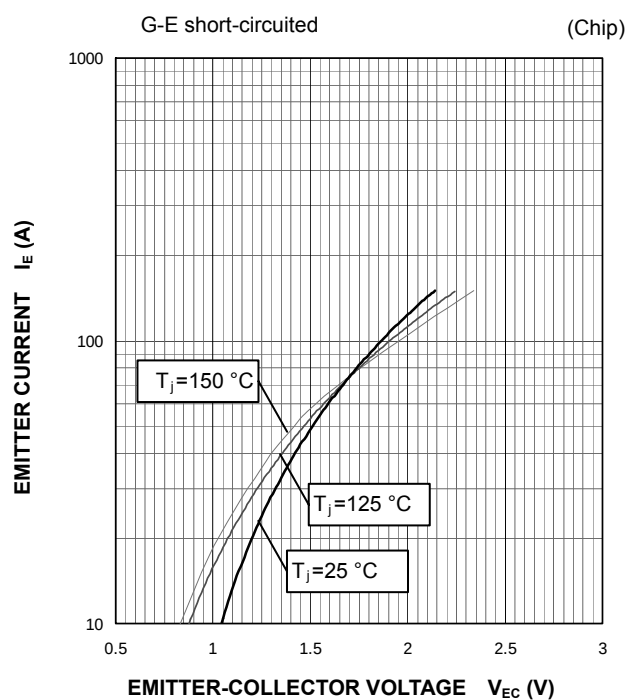
COLLECTOR-EMITTER SATURATION VOLTAGE
CHARACTERISTICS
(TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE
CHARACTERISTICS
(TYPICAL)



FREE WHEELING DIODE
FORWARD CHARACTERISTICS
(TYPICAL)

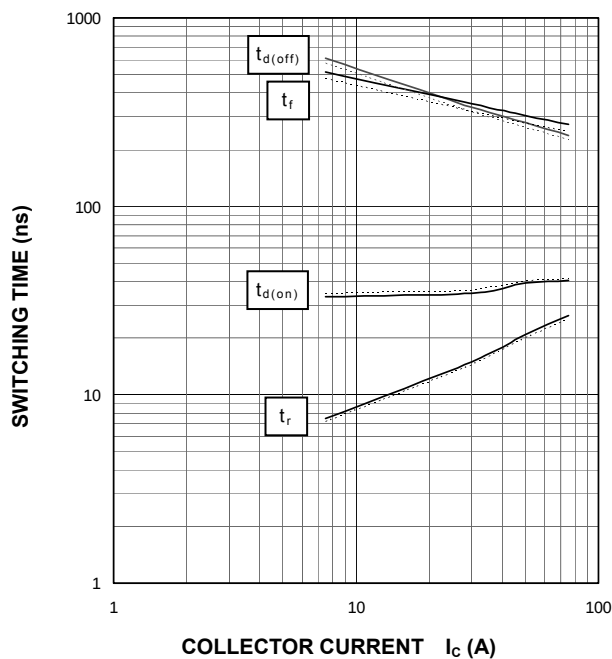


PERFORMANCE CURVES

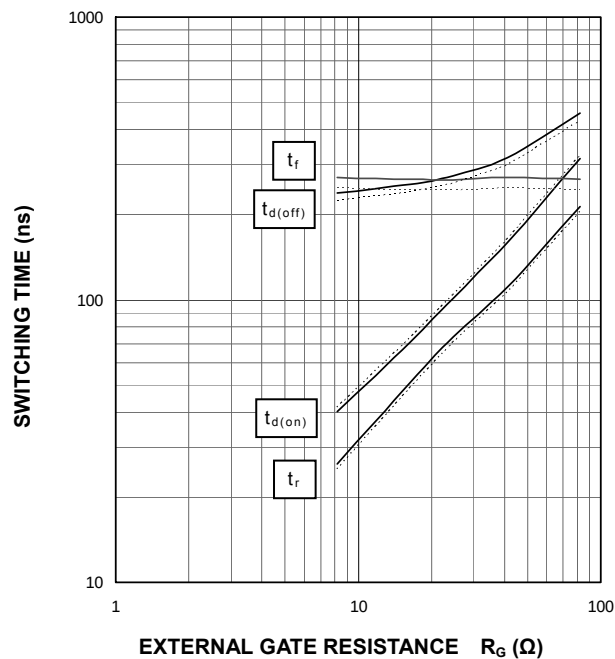
INVERTER PART

HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)

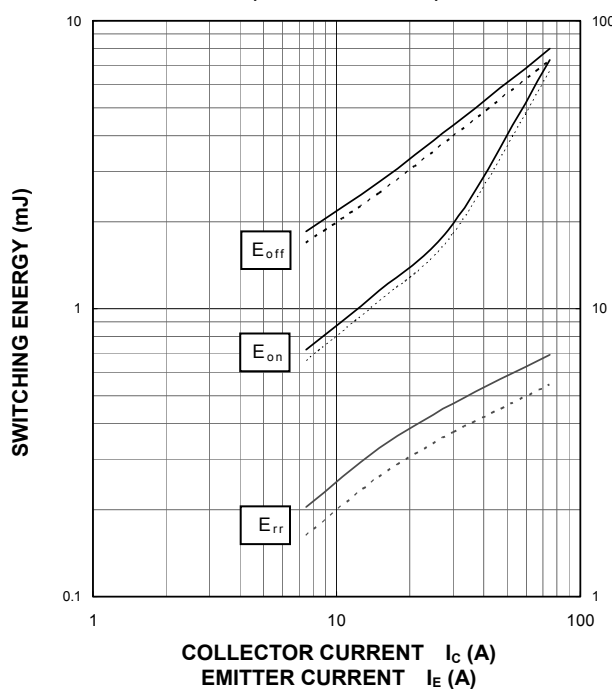
$V_{CC}=600\text{ V}$, $V_{GE}=\pm 15\text{ V}$, $R_G=8.2\ \Omega$, INDUCTIVE LOAD
 —: $T_J=150\text{ }^\circ\text{C}$, - - - - -: $T_J=125\text{ }^\circ\text{C}$

HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)

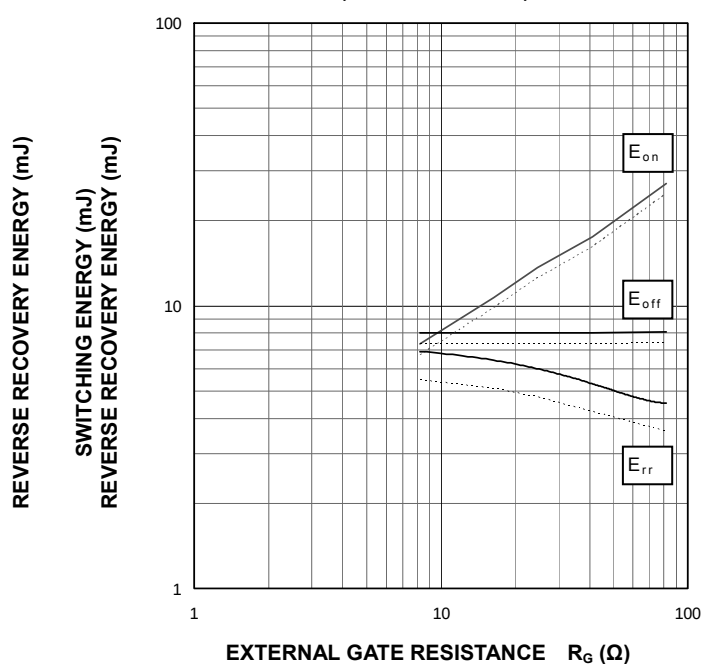
$V_{CC}=600\text{ V}$, $V_{GE}=\pm 15\text{ V}$, $I_C=75\text{ A}$, INDUCTIVE LOAD
 —: $T_J=150\text{ }^\circ\text{C}$, - - - - -: $T_J=125\text{ }^\circ\text{C}$

HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)

$V_{CC}=600\text{ V}$, $V_{GE}=\pm 15\text{ V}$, $R_G=8.2\ \Omega$,
INDUCTIVE LOAD, PER PULSE
 —: $T_J=150\text{ }^\circ\text{C}$, - - - - -: $T_J=125\text{ }^\circ\text{C}$

HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)

$V_{CC}=600\text{ V}$, $V_{GE}=\pm 15\text{ V}$, $I_C/I_E=75\text{ A}$,
INDUCTIVE LOAD, PER PULSE
 —: $T_J=150\text{ }^\circ\text{C}$, - - - - -: $T_J=125\text{ }^\circ\text{C}$

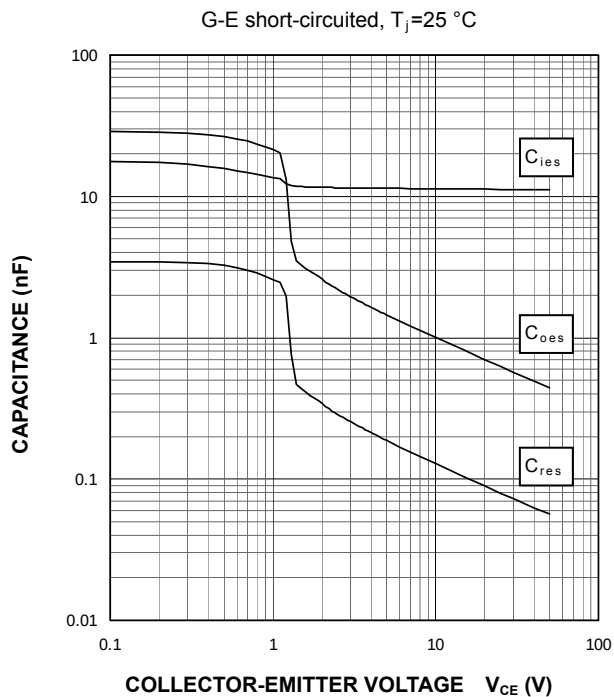


< IGBT MODULES >
CM75TX-24S
 HIGH POWER SWITCHING USE
 INSULATED TYPE

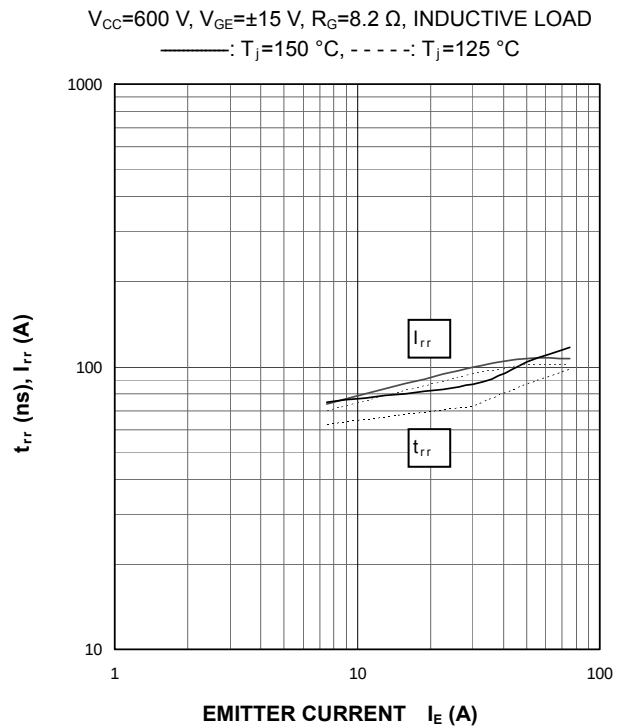
PERFORMANCE CURVES

INVERTER PART

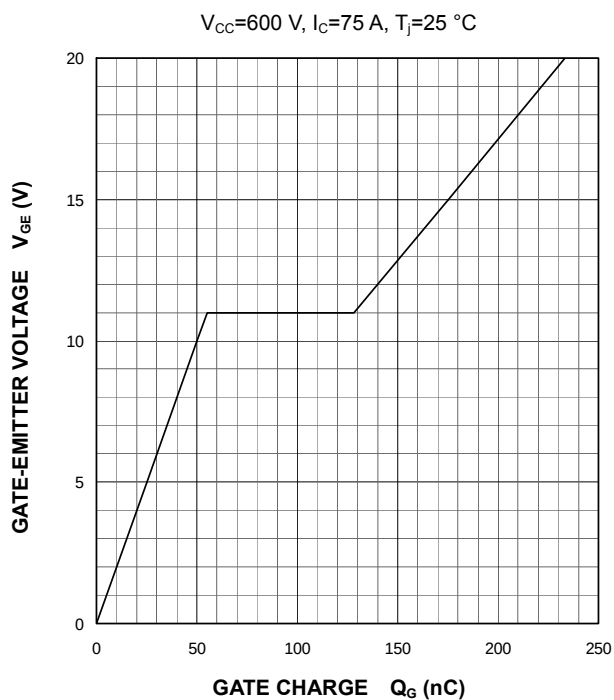
CAPACITANCE CHARACTERISTICS
 (TYPICAL)



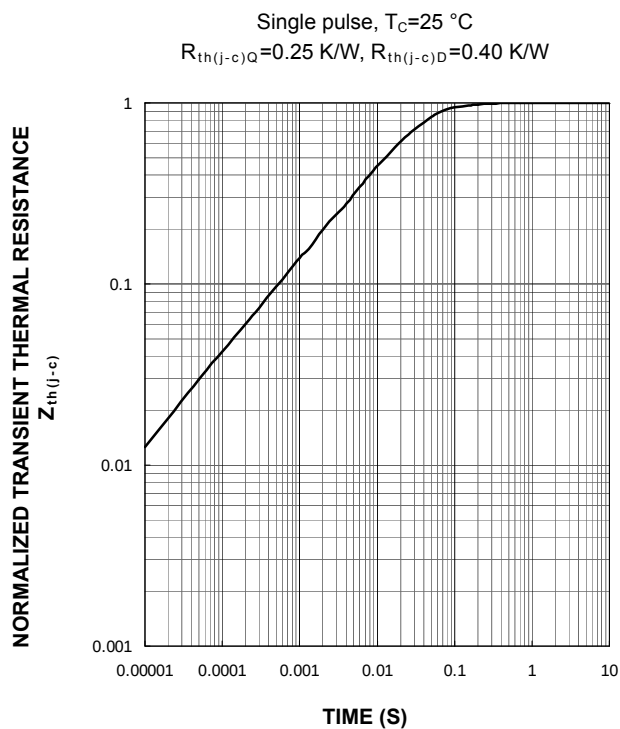
FREE WHEELING DIODE
 REVERSE RECOVERY CHARACTERISTICS
 (TYPICAL)



GATE CHARGE CHARACTERISTICS
 (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS
 (MAXIMUM)

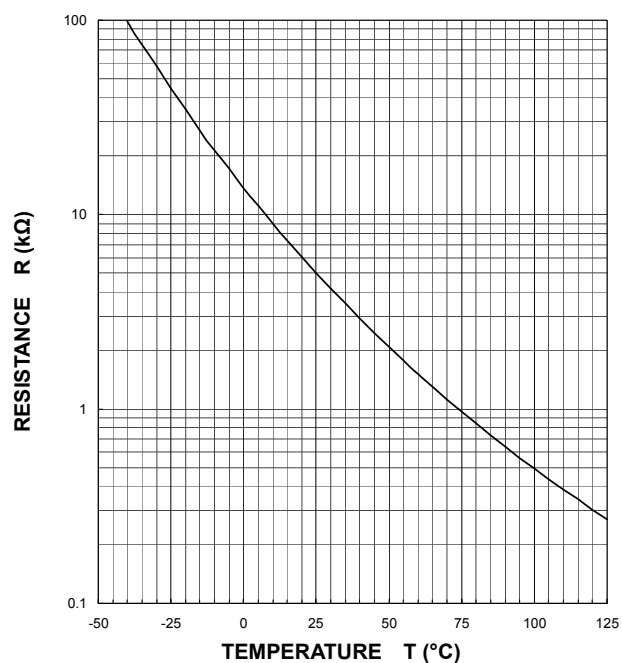


< IGBT MODULES >
CM75TX-24S
HIGH POWER SWITCHING USE
INSULATED TYPE

PERFORMANCE CURVES

NTC thermistor part

TEMPERATURE CHARACTERISTICS
(TYPICAL)



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