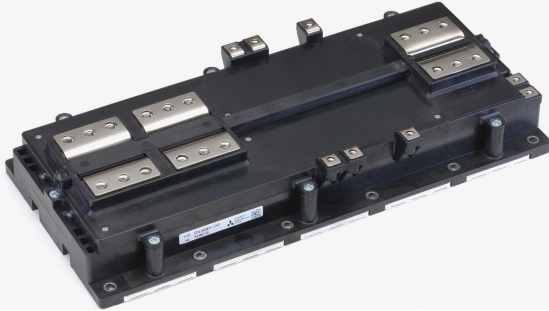


< IGBT MODULES >

CM2500DY-24S

HIGH POWER SWITCHING USE
INSULATED TYPE



Dual switch (Half-Bridge)

Collector current I_C **2 5 0 0 A**
 Collector-emitter voltage V_{CES} **1 2 0 0 V**
 Maximum junction temperature T_{jmax} **1 7 5 °C**

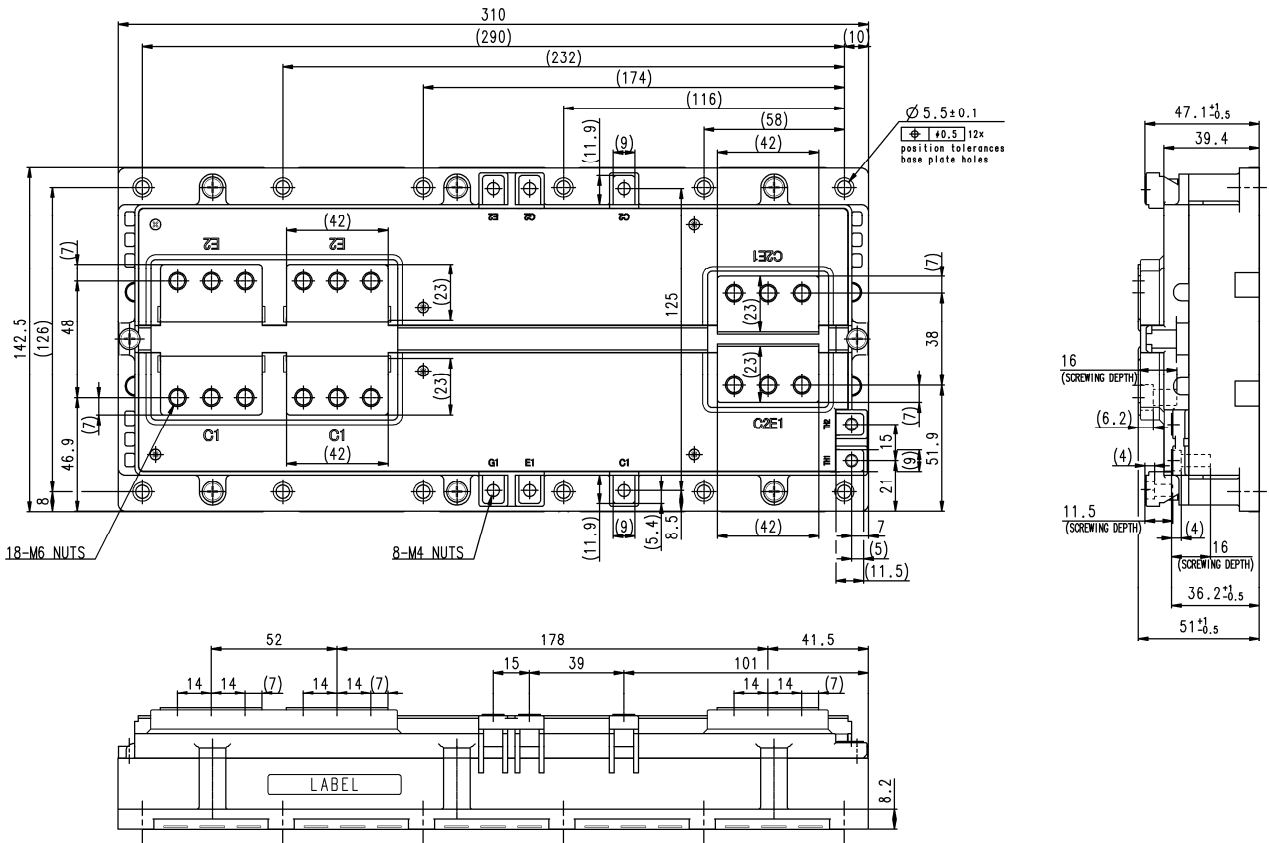
- Flat base Type
- Aluminum base plate
- RoHS Directive compliance
- Recognized under UL1557, File E323585

APPLICATION

Wind power, Photovoltaic (Solar) power, AC Motor Control, Motion/Servo Control, Power supply, etc.

OUTLINE DRAWING & INTERNAL CONNECTION

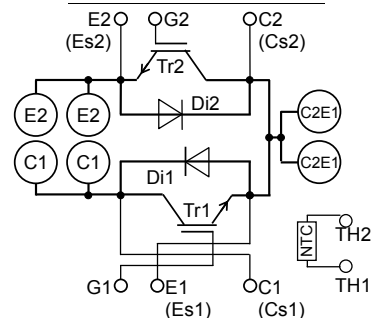
Dimension in mm



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

INTERNAL CONNECTION



< IGBT MODULES >

CM2500DY-24S

HIGH POWER SWITCHING USE
INSULATED TYPE

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

INVERTER PART IGBT/DIODE

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, $T_C=84\text{ }^\circ\text{C}$ (Note2, 4)	2500	A
I_{CRM}		Pulse, Repetitive (Note3)	5000	
P_{tot}	Total power dissipation	$T_C=25\text{ }^\circ\text{C}$ (Note2, 4)	11535	W
I_E (Note1)	Emitter current	DC (Note2)	2500	A
I_{ERM} (Note1)		Pulse, Repetitive (Note3)	5000	

MODULE

Symbol	Item	Conditions	Rating	Unit
V_{isol}	Isolation voltage	Terminals to base plate, RMS, f=60 Hz, AC 1 min	4000	V
T_{jmax}	Maximum junction temperature	Instantaneous event (overload)	175	$^\circ\text{C}$
T_{cmax}	Maximum case temperature	(Note4)	125	
T_{jopr}	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/DIODE

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	-	-	5.0	μA	
$V_{GE(th)}$	Gate-emitter threshold voltage	$I_C=250\text{ mA}$, $V_{CE}=10\text{ V}$	5.4	6.0	6.6	V	
V_{CESat} (Terminal)	Collector-emitter saturation voltage	$I_C=2500\text{ A}$, $V_{GE}=15\text{ V}$, Refer to the figure of test circuit (Note5)	$T_j=25\text{ }^\circ\text{C}$	-	1.80	2.25	V
			$T_j=125\text{ }^\circ\text{C}$	-	2.00	-	
			$T_j=150\text{ }^\circ\text{C}$	-	2.05	-	
V_{CESat} (Chip)		$I_C=2500\text{ A}$, $V_{GE}=15\text{ V}$, (Note5)	$T_j=25\text{ }^\circ\text{C}$	-	1.70	2.15	V
			$T_j=125\text{ }^\circ\text{C}$	-	1.90	-	
			$T_j=150\text{ }^\circ\text{C}$	-	1.95	-	
C_{ies}	Input capacitance	$V_{CE}=10\text{ V}$, G-E short-circuited	-	-	250	nF	
C_{oes}	Output capacitance		-	-	50		
C_{res}	Reverse transfer capacitance		-	-	4.2		
Q_G	Gate charge	$V_{CC}=600\text{ V}$, $I_C=2500\text{ A}$, $V_{GE}=15\text{ V}$	-	5800	-	nC	
$t_{d(on)}$	Turn-on delay time	$V_{CC}=600\text{ V}$, $I_C=2500\text{ A}$, $V_{GE}=\pm 15\text{ V}$, $R_G=0\text{ }\Omega$, Inductive load	-	-	800	ns	
t_r	Rise time		-	-	200		
$t_{d(off)}$	Turn-off delay time		-	-	700		
t_f	Fall time		-	-	300		
V_{EC} (Note1) (Terminal)	Emitter-collector voltage	$I_E=2500\text{ A}$, G-E short-circuited, Refer to the figure of test circuit (Note5)	$T_j=25\text{ }^\circ\text{C}$	-	1.80	2.25	V
			$T_j=125\text{ }^\circ\text{C}$	-	1.80	-	
			$T_j=150\text{ }^\circ\text{C}$	-	1.80	-	
V_{EC} (Note1) (Chip)		$I_E=2500\text{ A}$, G-E short-circuited, (Note5)	$T_j=25\text{ }^\circ\text{C}$	-	1.70	2.15	V
			$T_j=125\text{ }^\circ\text{C}$	-	1.70	-	
			$T_j=150\text{ }^\circ\text{C}$	-	1.70	-	
t_{rr} (Note1)	Reverse recovery time	$V_{CC}=600\text{ V}$, $I_E=2500\text{ A}$, $V_{GE}=\pm 15\text{ V}$,	-	-	300	ns	
Q_{rr} (Note1)	Reverse recovery charge	$R_G=0\text{ }\Omega$, Inductive load	-	70	-	μC	
E_{on}	Turn-on switching energy per pulse	$V_{CC}=600\text{ V}$, $I_C=I_E=2500\text{ A}$,	-	174	-	mJ	
E_{off}	Turn-off switching energy per pulse	$V_{GE}=\pm 15\text{ V}$, $R_G=0\text{ }\Omega$,	-	259	-		
E_{rr} (Note1)	Reverse recovery energy per pulse	$T_j=150\text{ }^\circ\text{C}$, Inductive load	-	195	-	mJ	
$R_{CC'+EE'}$	Internal lead resistance	Main terminals -chip, per switch, $T_C=25\text{ }^\circ\text{C}$ (Note4)	-	0.11	-	m Ω	
r_g	Internal gate resistance	Per switch	-	1.1	-	Ω	

< IGBT MODULES >
CM2500DY-24S
HIGH POWER SWITCHING USE
INSULATED TYPE

ELECTRICAL CHARACTERISTICS (cont.; T_J=25 °C, unless otherwise specified)
NTC THERMISTOR PART

Symbol	Item	Conditions	Limits			Unit
			Min.	Typ.	Max.	
R ₂₅	Zero-power resistance	T _C =25 °C (Note4)	4.85	5.00	5.15	kΩ
ΔR/R	Deviation of resistance	R ₁₀₀ =493 Ω, T _C =100 °C (Note4)	-7.3	-	+7.8	%
B _(25/50)	B-constant	Approximate by equation (Note6)	-	3375	-	K
P ₂₅	Power dissipation	T _C =25 °C (Note4)	-	-	10	mW

THERMAL RESISTANCE CHARACTERISTICS

Symbol	Item	Conditions	Limits			Unit
			Min.	Typ.	Max.	
R _{th(j-c)Q}	Thermal resistance	Junction to case, per IGBT (Note4)	-	-	13	K/kW
R _{th(j-c)D}		Junction to case, per DIODE (Note4)	-	-	22	K/kW
R _{th(c-s)}	Contact thermal resistance	Case to heat sink, per 1 module, Thermal grease applied (Note4, 7)	-	3.1	-	K/kW

MECHANICAL CHARACTERISTICS

Symbol	Item	Conditions	Limits			Unit
			Min.	Typ.	Max.	
M _t	Mounting torque	Main terminals M 6 screw	3.5	4.0	4.5	N·m
M _t		Auxiliary terminals M 4 screw	1.3	1.5	1.7	
M _s		Mounting to heat sink M 5 screw	2.5	3.0	3.5	
d _s	Creepage distance	Terminal to terminal	16	-	-	mm
		Terminal to base plate	25	-	-	
d _a	Clearance	Terminal to terminal	16	-	-	mm
		Terminal to base plate	24	-	-	
m	mass	-	-	2	kg	
e _c	Flatness of base plate	On the centerline X, Y (Note8)	-50	-	+100	μm

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

2. Junction temperature (T_J) should not increase beyond T_{Jmax} rating.

3. Pulse width and repetition rate should be such that the device junction temperature (T_J) dose not exceed T_{Jmax} rating.

4. 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.

The heat sink thermal resistance should measure just under the chips.

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

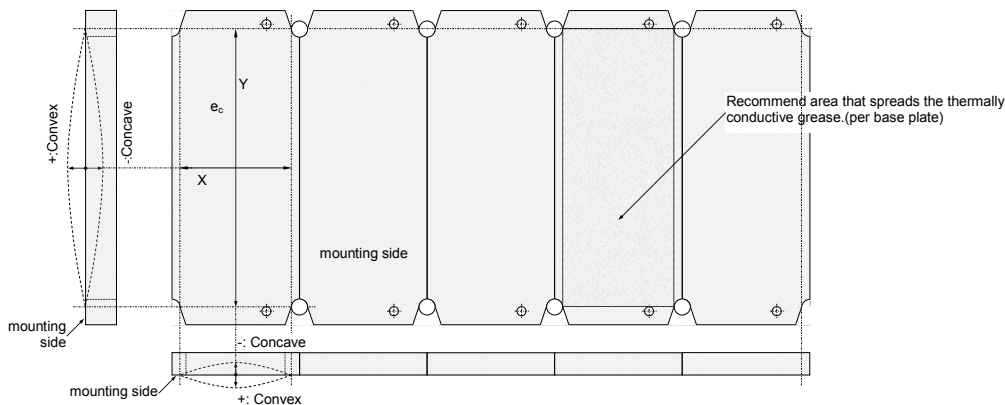
$$6. B_{(25/50)} = \ln\left(\frac{R_{25}}{R_{50}}\right) / \left(\frac{1}{T_{25}} - \frac{1}{T_{50}}\right)$$

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]

7. Typical value is measured by using thermally conductive grease of λ=0.9 W/(m·K).

8. Base plate (mounting side) flatness measurement points (X, Y) are as follows of the following figure.



9. Main terminal pair should be connected together in case of the current through it.

< IGBT MODULES >

CM2500DY-24S

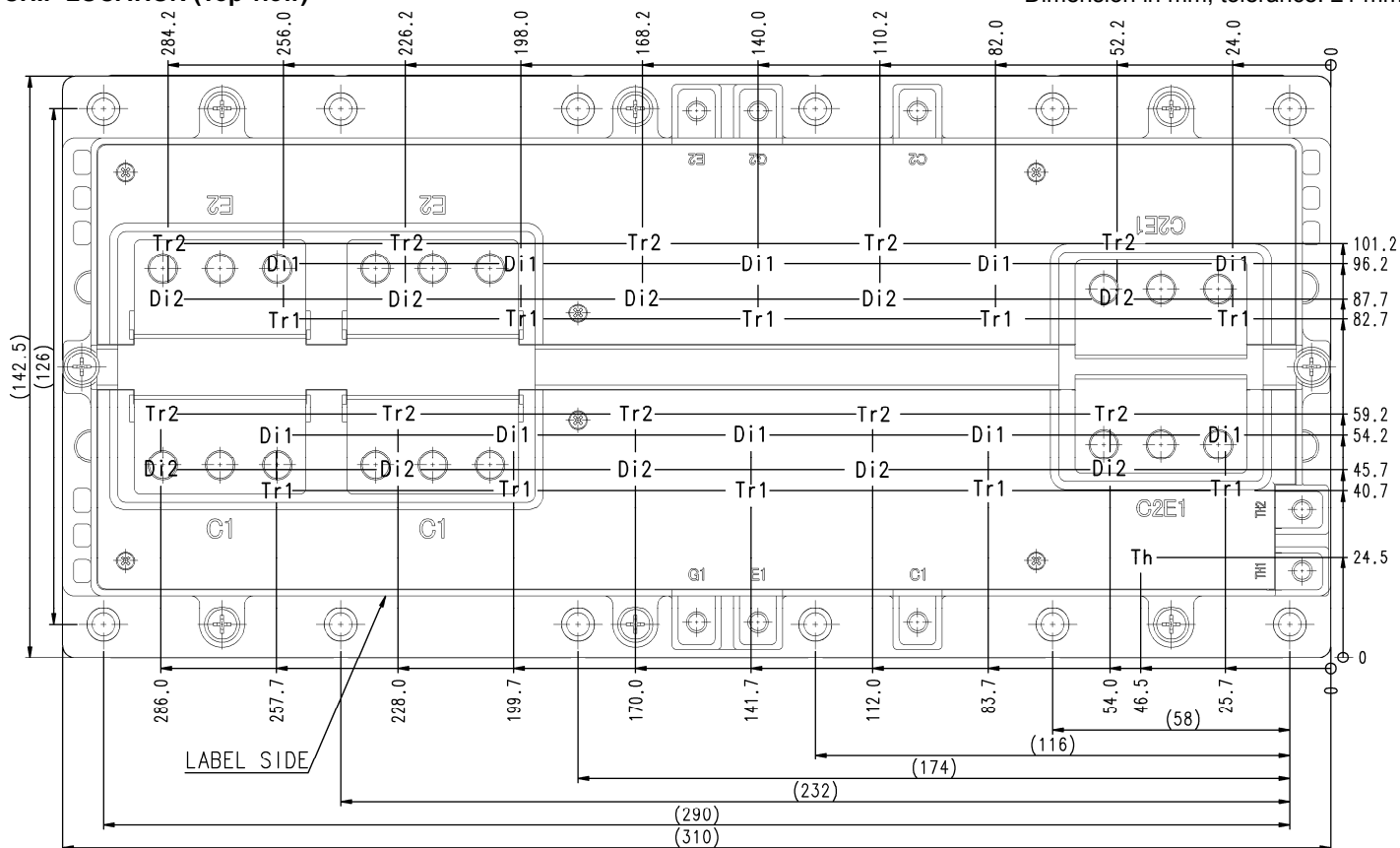
HIGH POWER SWITCHING USE
INSULATED TYPE

RECOMMENDED OPERATING CONDITIONS

Symbol	Item	Conditions	Limits			Unit
			Min.	Typ.	Max.	
V _{CC}	(DC) Supply voltage	Applied across C1-E2	-	600	850	V
V _{GEon}	Gate (-emitter drive) voltage	Applied across G1-Es1/G2-Es2	13.5	15.0	16.5	V
R _G	External gate resistance	Per switch	0	-	2	Ω

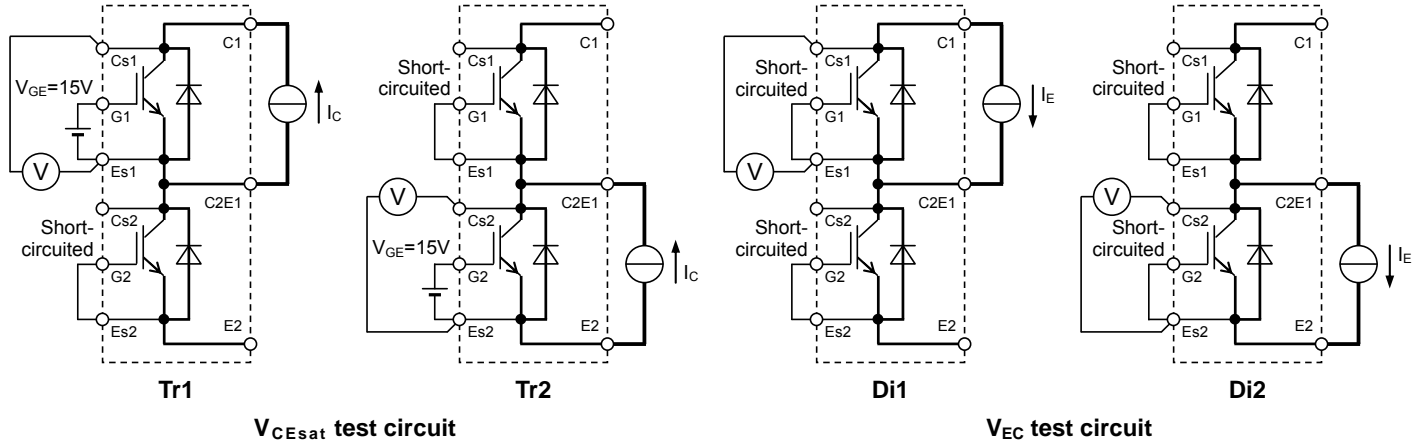
CHIP LOCATION (Top view)

Dimension in mm, tolerance: ±1 mm

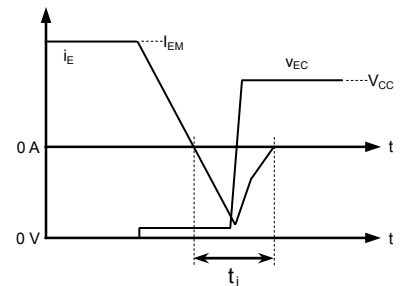
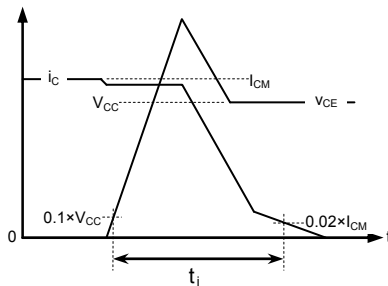
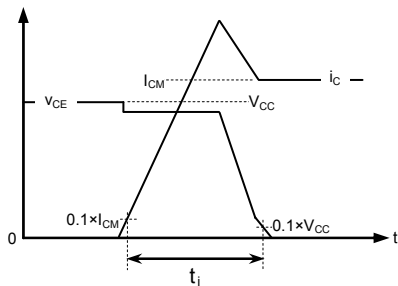
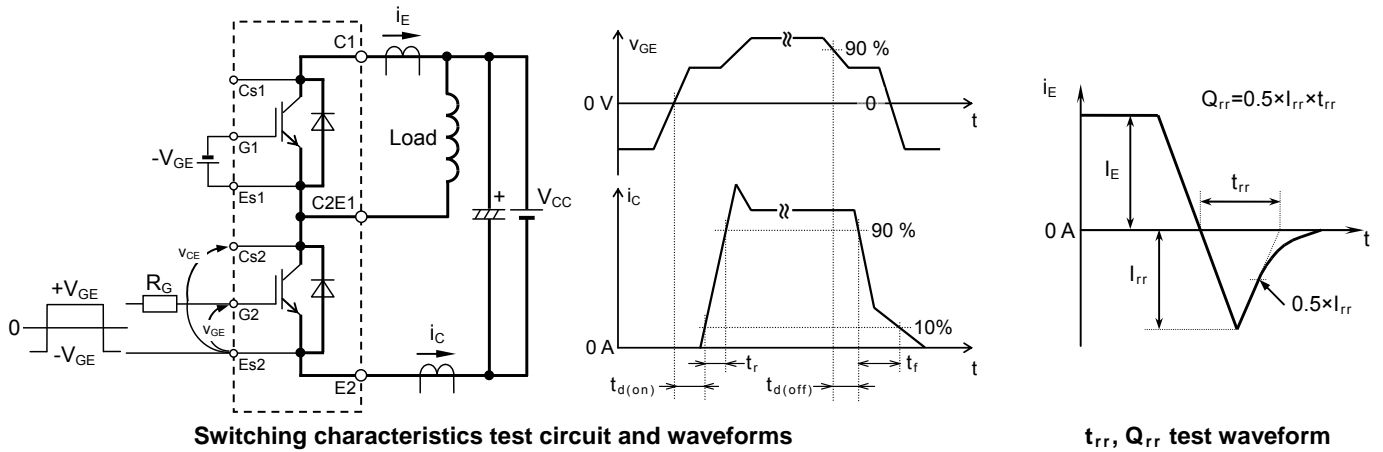


Tr1/Tr2: IGBT, Di1/Di2: DIODE, Th: NTC thermistor

TEST CIRCUIT



TEST CIRCUIT AND WAVEFORMS

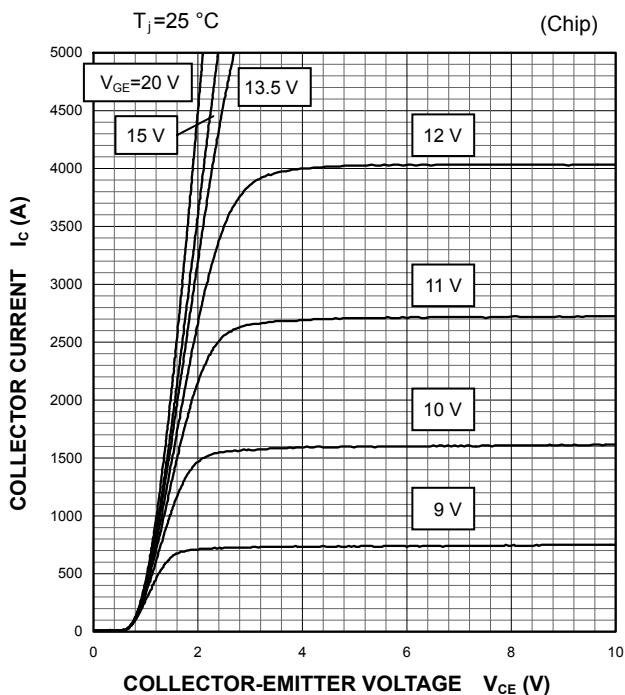


IGBT Turn-on switching energy IGBT Turn-off switching energy DIODE Reverse recovery energy
 Turn-on / Turn-off switching energy and Reverse recovery energy test waveforms (Integral time instruction drawing)

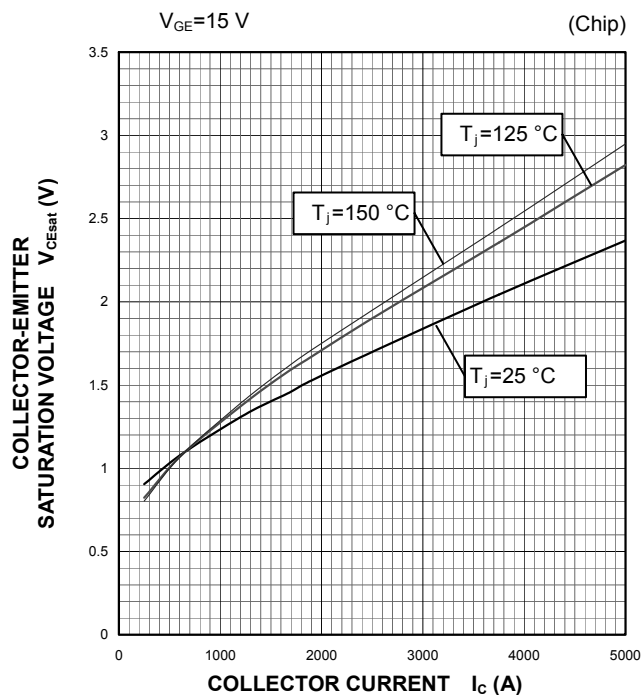
< IGBT MODULES >
CM2500DY-24S
 HIGH POWER SWITCHING USE
 INSULATED TYPE

PERFORMANCE CURVES

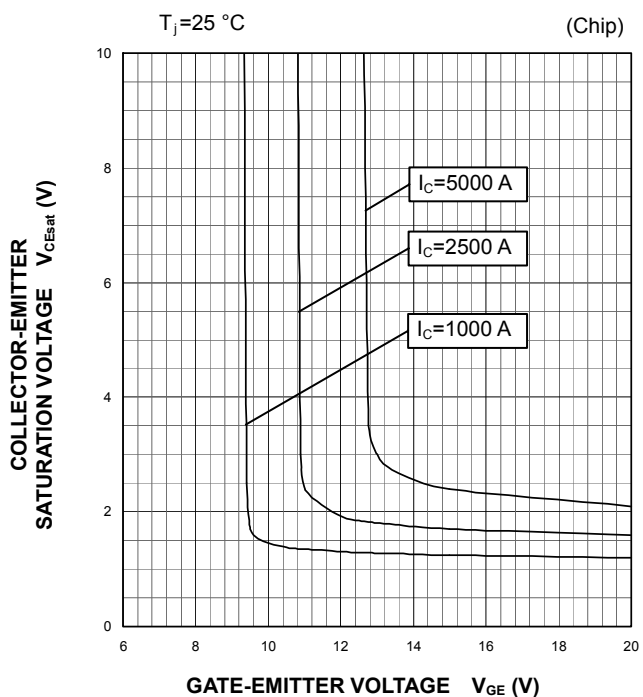
OUTPUT CHARACTERISTICS
(TYPICAL)



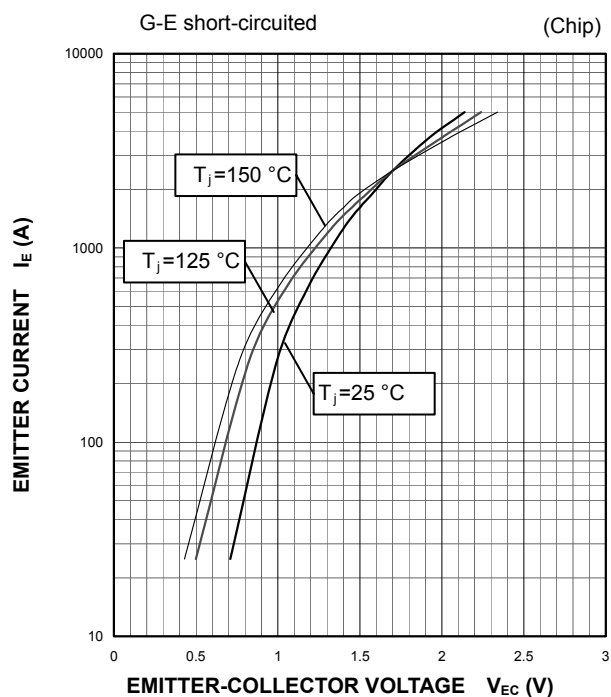
COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL)



COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL)



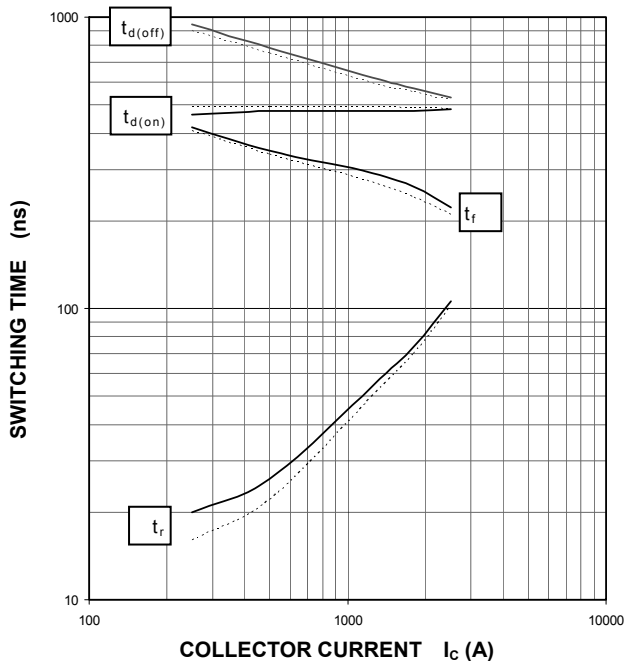
FREE WHEELING DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



PERFORMANCE CURVES

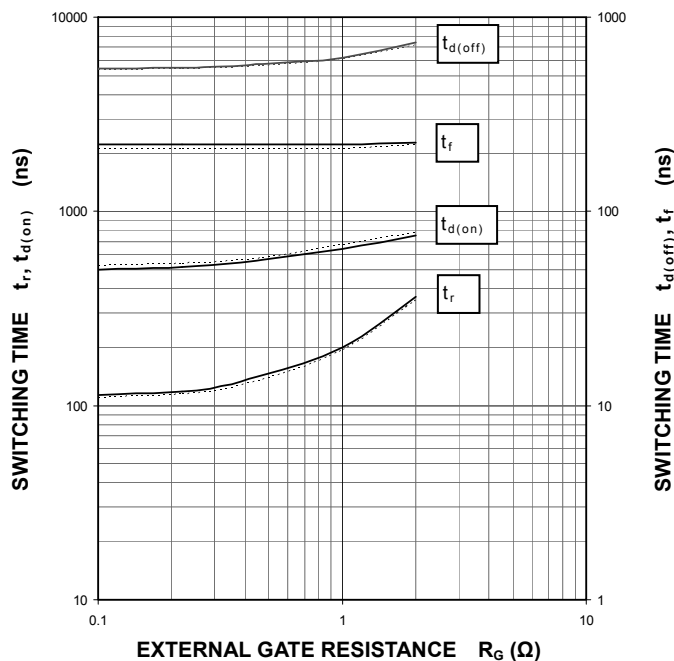
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)

$V_{CC}=600\text{ V}$, $V_{GE}=\pm 15\text{ V}$, $R_G=0\ \Omega$, INDUCTIVE LOAD
——: $T_J=150\text{ }^\circ\text{C}$, - - - -: $T_J=125\text{ }^\circ\text{C}$



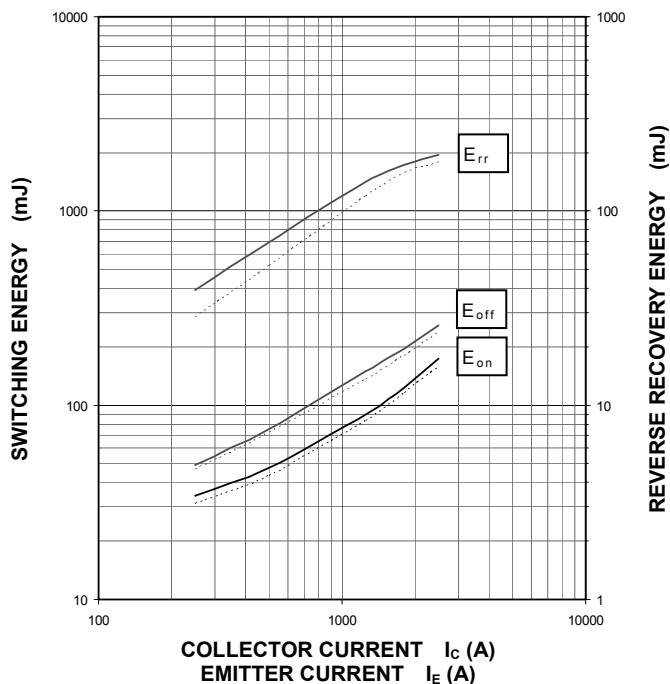
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)

$V_{CC}=600\text{ V}$, $I_C=2500\text{ A}$, $V_{GE}=\pm 15\text{ V}$, INDUCTIVE LOAD
——: $T_J=150\text{ }^\circ\text{C}$, - - - -: $T_J=125\text{ }^\circ\text{C}$



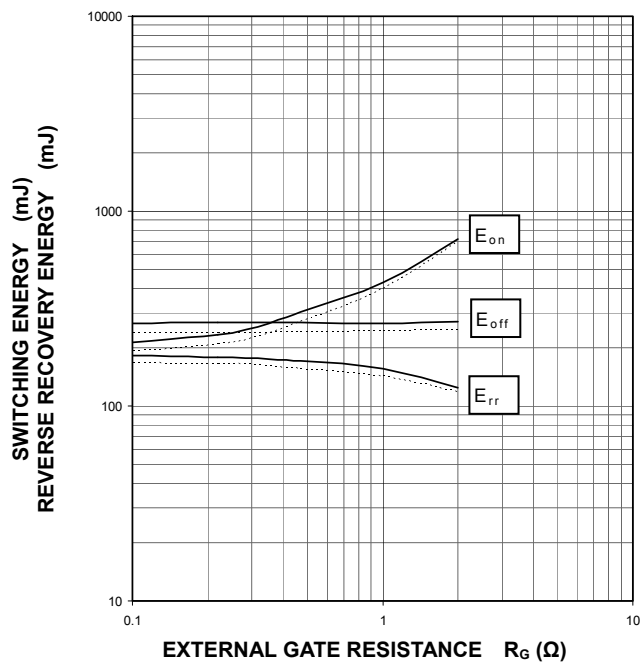
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)

$V_{CC}=600\text{ V}$, $V_{GE}=\pm 15\text{ V}$, $R_G=0\ \Omega$,
INDUCTIVE LOAD, PER PULSE
——: $T_J=150\text{ }^\circ\text{C}$, - - - -: $T_J=125\text{ }^\circ\text{C}$



HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)

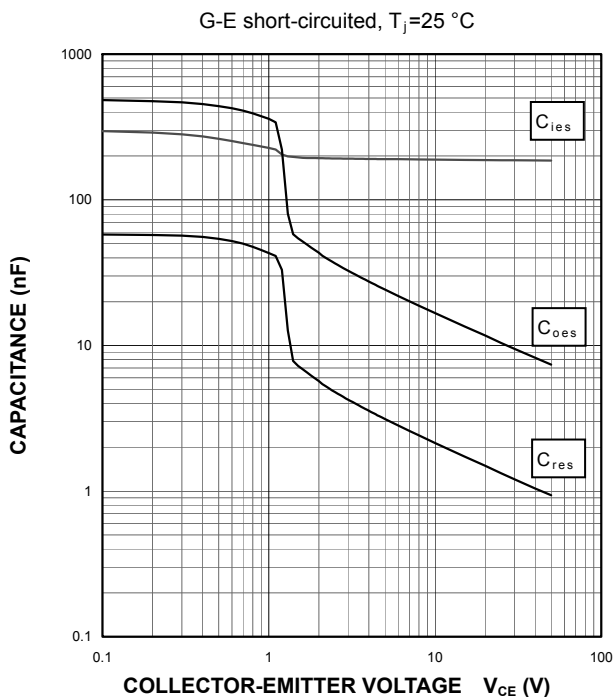
$V_{CC}=600\text{ V}$, $I_C/I_E=2500\text{ A}$, $V_{GE}=\pm 15\text{ V}$,
INDUCTIVE LOAD, PER PULSE
——: $T_J=150\text{ }^\circ\text{C}$, - - - -: $T_J=125\text{ }^\circ\text{C}$



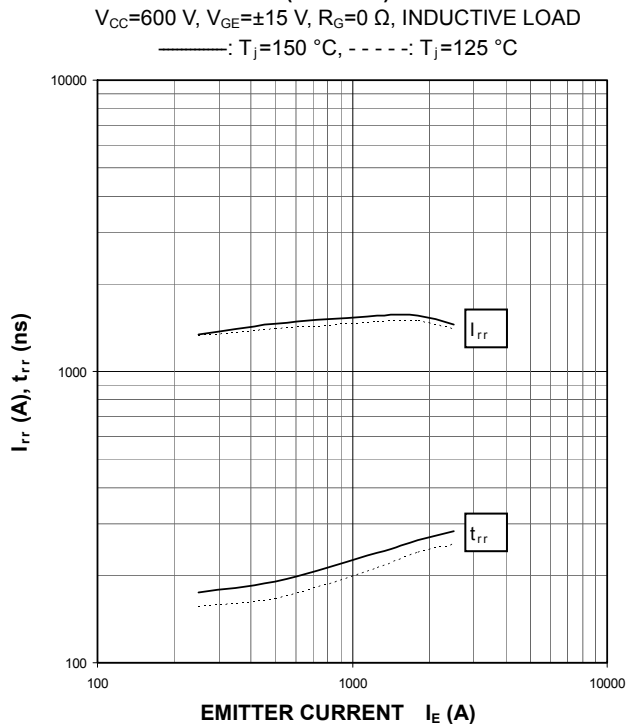
< IGBT MODULES >
CM2500DY-24S
 HIGH POWER SWITCHING USE
 INSULATED TYPE

PERFORMANCE CURVES

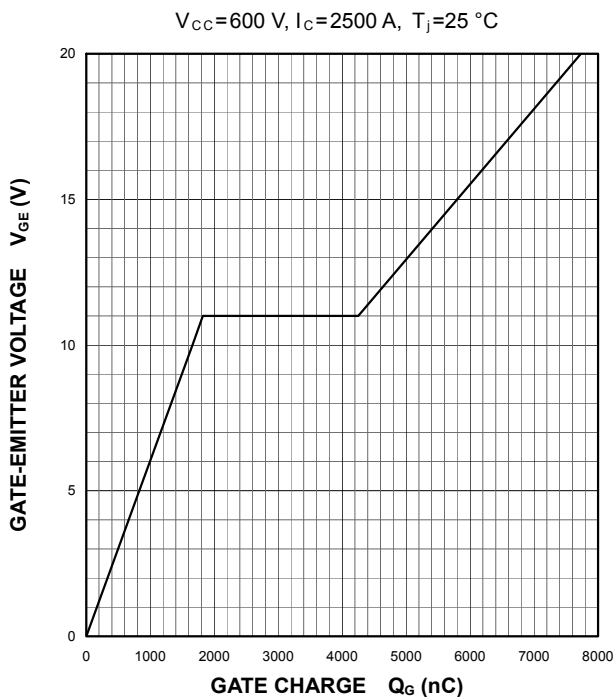
CAPACITANCE CHARACTERISTICS (TYPICAL)



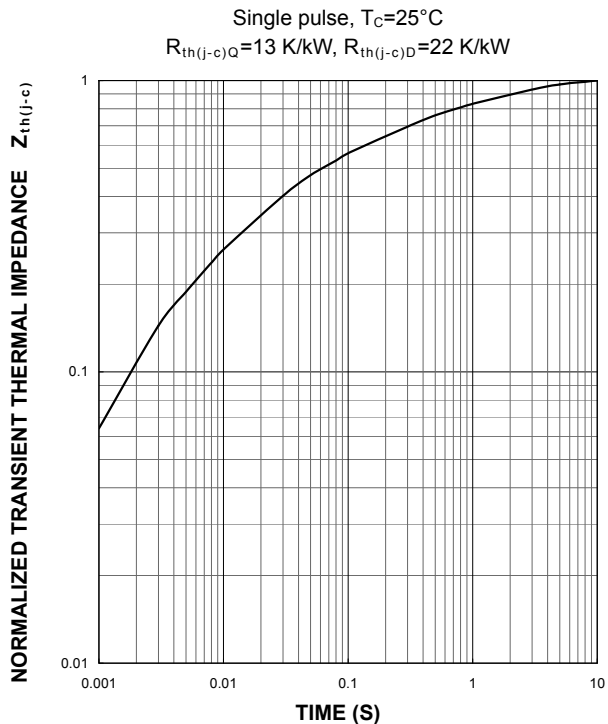
FREE WHEELING DIODE REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



GATE CHARGE CHARACTERISTICS (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (MAXIMUM)



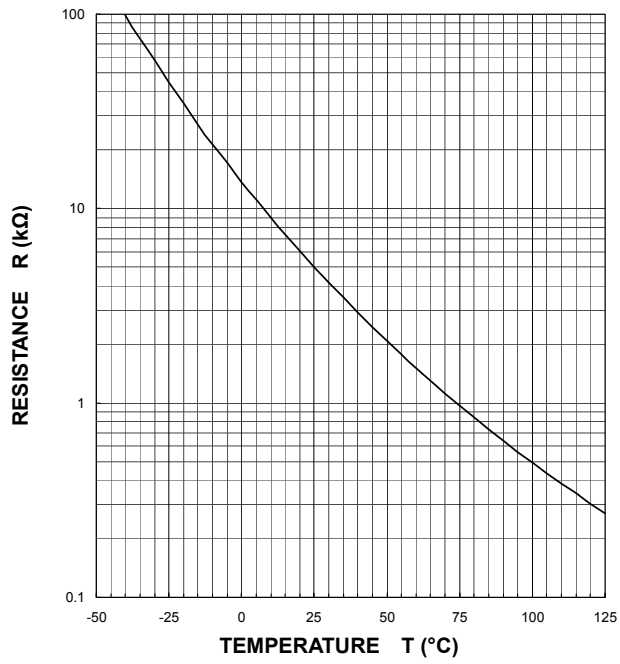
< IGBT MODULES >
CM2500DY-24S
HIGH POWER SWITCHING USE
INSULATED TYPE

PERFORMANCE CURVES

NTC thermistor part

TEMPERATURE CHARACTERISTICS

(TYPICAL)



Keep safety first in your circuit designs!

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