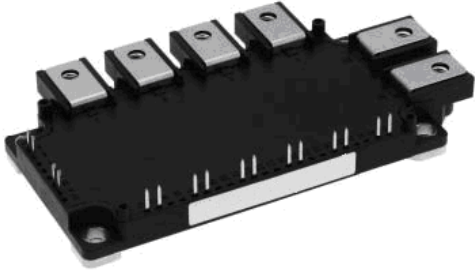


< IGBT MODULES >

# CM150RX-24S

HIGH POWER SWITCHING USE  
INSULATED TYPE



sevenpack (3φ Inverter+Chopper Brake)

Collector current  $I_C$  ..... **150 A**  
 Collector-emitter voltage  $V_{CES}$  ..... **1200 V**  
 Maximum junction temperature  $T_{jmax}$  ..... **175 °C**

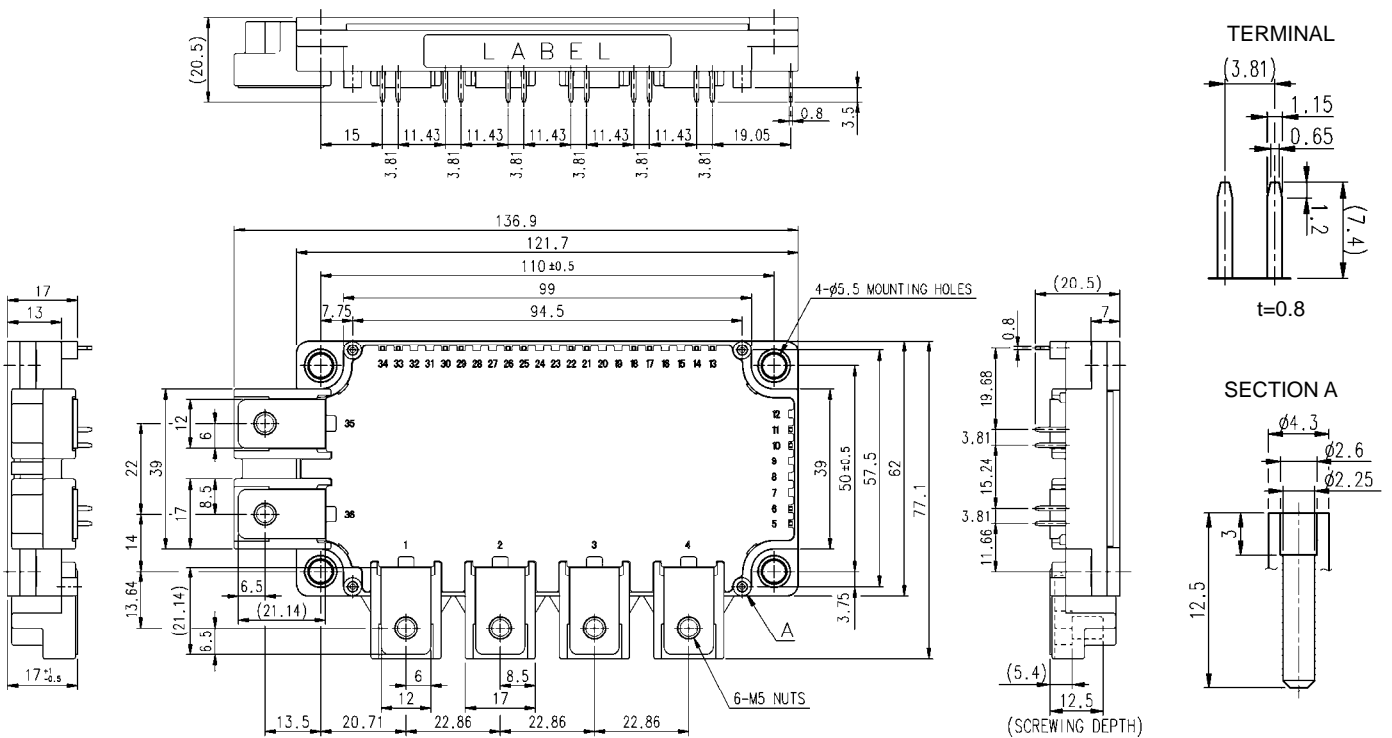
- Flat base Type
- Copper base plate (non-plating)
- Tin plating pin terminals
- RoHS Directive compliant
- Recognized under UL1557, File E323585

## APPLICATION

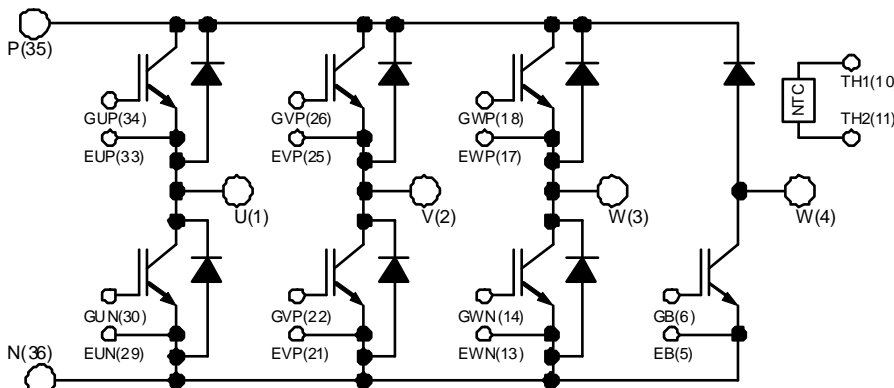
AC Motor Control, Motion/Servo Control, Power supply, etc.

## OUTLINE DRAWING & INTERNAL CONNECTION

Dimension in mm



### INTERNAL CONNECTION



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 >

CM150RX-24S

HIGH POWER SWITCHING USE  
INSULATED TYPE

ABSOLUTE 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                            | $\pm 20$ | V    |
| $I_C$             | Collector current         | DC, $T_C=120\text{ }^\circ\text{C}$ (Note2, 4) | 150      | A    |
| $I_{CRM}$         |                           | Pulse, Repetitive (Note3)                      | 300      |      |
| $P_{tot}$         | Total power dissipation   | $T_C=25\text{ }^\circ\text{C}$ (Note2, 4)      | 1150     | W    |
| $I_E$ (Note1)     | Emitter current           | (Note2)  | 150      | A    |
| $I_{ERM}$ (Note1) |                           | Pulse, Repetitive (Note3)                      | 300      |      |

BRAKE 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                            | $\pm 20$ | 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    |
| $V_{RRM}$ | Repetitive peak reverse voltage | G-E short-circuited                            | 1200     | V    |
| $I_F$     | Forward current                 | (Note2)  | 75       | A    |
| $I_{FRM}$ |                                 | Pulse, Repetitive (Note3)                      | 150      |      |

MODULE

| Symbol     | Item                           | Conditions  | Rating     | Unit             |
|------------|--------------------------------|---|------------|------------------|
| $V_{isol}$ | Isolation voltage              | Terminals to base plate, RMS, $f=60\text{ Hz}$ , 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/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  | -                               | -    | 0.5  | $\mu\text{A}$ |   |
| $V_{GE(th)}$                    | Gate-emitter threshold voltage       | $I_C=15\text{ mA}$ , $V_{CE}=10\text{ V}$   | 5.4                             | 6.0  | 6.6  | V             |   |
| $V_{CEsat}$                     | Collector-emitter saturation voltage | $I_C=150\text{ A}$ (Note5),<br>$V_{GE}=15\text{ V}$ ,<br>(Terminal)   | $T_j=25\text{ }^\circ\text{C}$  | -    | 1.80 | 2.25          | V |
|                                 |                                      |   | $T_j=125\text{ }^\circ\text{C}$ | -    | 2.00 | -             |   |
|                                 |                                      | $I_C=150\text{ A}$ (Note5),<br>$V_{GE}=15\text{ V}$ ,<br>(Chip)   | $T_j=25\text{ }^\circ\text{C}$  | -    | 1.70 | 2.15          | V |
| $T_j=125\text{ }^\circ\text{C}$ | -                                    |   | 1.90                            | -    |      |               |   |
| $C_{ies}$                       | Input capacitance                    | $V_{CE}=10\text{ V}$ , G-E short-circuited  | -                               | -    | 15   | nF            |   |
| $C_{oes}$                       | Output capacitance                   |   | -                               | -    | 3.0  |               |   |
| $C_{res}$                       | Reverse transfer capacitance         |   | -                               | -    | 0.25 |               |   |
| $Q_G$                           | Gate charge                          | $V_{CC}=600\text{ V}$ , $I_C=150\text{ A}$ , $V_{GE}=15\text{ V}$   | -                               | 350  | -    | nC            |   |
| $t_{d(on)}$                     | Turn-on delay time                   | $V_{CC}=600\text{ V}$ , $I_C=150\text{ A}$ , $V_{GE}=\pm 15\text{ V}$ ,<br>$R_G=0\text{ }\Omega$ , Inductive load | -                               | -    | 800  | ns            |   |
| $t_r$                           | Rise time                            |   | -                               | -    | 200  |               |   |
| $t_{d(off)}$                    | Turn-off delay time                  |   | -                               | -    | 600  |               |   |
| $t_f$                           | Fall time                            |   | -                               | -    | 300  |               |   |

< IGBT MODULES >

CM150RX-24S

HIGH POWER SWITCHING USE  
INSULATED TYPE

ELECTRICAL CHARACTERISTICS (cont; T<sub>j</sub>=25 °C, unless otherwise specified)

INVERTER PART IGBT/DIODE

| Symbol                  | Item                                | Conditions   | Limits                 |      |      | Unit |   |
|-------------------------|-------------------------------------|--|------------------------|------|------|------|---|
|                         |                                     |  | Min.                   | Typ. | Max. |      |   |
| V <sub>EC</sub> (Note1) | Emitter-collector voltage           | I <sub>E</sub> =150 A (Note5),<br>G-E short-circuited,<br>(Terminal)   | T <sub>j</sub> =25 °C  | -    | 1.80 | 2.25 | V |
|                         |                                     |  | T <sub>j</sub> =125 °C | -    | 1.80 | -    |   |
|                         |                                     |  | T <sub>j</sub> =150 °C | -    | 1.80 | -    |   |
|                         |                                     | I <sub>E</sub> =150 A (Note5),<br>G-E short-circuited,<br>(Chip)       | T <sub>j</sub> =25 °C  | -    | 1.70 | 2.15 | V |
|                         |                                     |  | T <sub>j</sub> =125 °C | -    | 1.70 | -    |   |
|                         |                                     |  | T <sub>j</sub> =150 °C | -    | 1.70 | -    |   |
| t <sub>rr</sub> (Note1) | Reverse recovery time               | V <sub>CC</sub> =600 V, I <sub>E</sub> =150 A, V <sub>GE</sub> =±15 V, | -                      | -    | 300  | ns   |   |
| Q <sub>rr</sub> (Note1) | Reverse recovery charge             | R <sub>G</sub> =0 Ω, Inductive load                                    | -                      | 8.0  | -    | μC   |   |
| E <sub>on</sub>         | Turn-on switching energy per pulse  | V <sub>CC</sub> =600 V, I <sub>C</sub> =I <sub>E</sub> =150 A,         | -                      | 24.2 | -    | mJ   |   |
| E <sub>off</sub>        | Turn-off switching energy per pulse | V <sub>GE</sub> =±15 V, R <sub>G</sub> =0 Ω, T <sub>j</sub> =150 °C,   | -                      | 16   | -    |      |   |
| E <sub>rr</sub> (Note1) | Reverse recovery energy per pulse   | Inductive load   | -                      | 12.2 | -    |      |   |
| R <sub>CC+EE'</sub>     | Internal lead resistance            | Main terminals-chip, per switch,<br>T <sub>C</sub> =25 °C (Note4)      | -                      | -    | 1.8  | mΩ   |   |
| r <sub>g</sub>          | Internal gate resistance            | Per switch   | -                      | 13   | -    | Ω    |   |

BRAKE PART IGBT/DIODE

| Symbol              | Item                                 | Conditions   | Limits                 |      |      | Unit |   |
|---------------------|--------------------------------------|--|------------------------|------|------|------|---|
|                     |                                      |  | Min.                   | Typ. | Max. |      |   |
| I <sub>CES</sub>    | Collector-emitter cut-off current    | V <sub>CE</sub> =V <sub>CES</sub> , G-E short-circuited  | -                      | -    | 1.0  | mA   |   |
| I <sub>GES</sub>    | Gate-emitter leakage current         | V <sub>GE</sub> =V <sub>GES</sub> , C-E short-circuited  | -                      | -    | 0.5  | μA   |   |
| V <sub>GE(th)</sub> | Gate-emitter threshold voltage       | I <sub>C</sub> =7.5 mA, V <sub>CE</sub> =10 V  | 5.4                    | 6.0  | 6.6  | V    |   |
| V <sub>CEsat</sub>  | Collector-emitter saturation voltage | I <sub>C</sub> =75 A (Note5),<br>V <sub>GE</sub> =15 V,<br>(Terminal)  | T <sub>j</sub> =25 °C  | -    | 1.80 | 2.25 | V |
|                     |                                      |  | T <sub>j</sub> =125 °C | -    | 2.00 | -    |   |
|                     |                                      |  | T <sub>j</sub> =150 °C | -    | 2.05 | -    |   |
|                     |                                      | I <sub>C</sub> =75 A (Note5),<br>V <sub>GE</sub> =15 V,<br>(Chip)  | T <sub>j</sub> =25 °C  | -    | 1.70 | 2.15 | V |
|                     |                                      |  | T <sub>j</sub> =125 °C | -    | 1.90 | -    |   |
|                     |                                      |  | T <sub>j</sub> =150 °C | -    | 1.95 | -    |   |
| C <sub>ies</sub>    | Input capacitance                    | V <sub>CE</sub> =10 V, G-E short-circuited   | -                      | -    | 7.5  | nF   |   |
| C <sub>oes</sub>    | Output capacitance                   |  | -                      | -    | 1.5  |      |   |
| C <sub>res</sub>    | Reverse transfer capacitance         |  | -                      | -    | 0.13 |      |   |
| Q <sub>G</sub>      | Gate charge                          | V <sub>CC</sub> =600 V, I <sub>C</sub> =75 A, V <sub>GE</sub> =15 V  | -                      | 175  | -    | nC   |   |
| t <sub>d(on)</sub>  | Turn-on delay time                   | V <sub>CC</sub> =600 V, I <sub>C</sub> =75 A, V <sub>GE</sub> =±15 V,<br>R <sub>G</sub> =8.2 Ω, Inductive load | -                      | -    | 300  | ns   |   |
| t <sub>r</sub>      | Rise time                            |  | -                      | -    | 200  |      |   |
| t <sub>d(off)</sub> | Turn-off delay time                  |  | -                      | -    | 600  |      |   |
| t <sub>f</sub>      | Fall time                            |  | -                      | -    | 300  |      |   |
| I <sub>RRM</sub>    | Reverse current                      | V <sub>R</sub> =V <sub>RRM</sub> , G-E short-circuited   | -                      | -    | 1.0  | mA   |   |
| V <sub>F</sub>      | Forward voltage                      | I <sub>E</sub> =75 A (Note5),<br>G-E short-circuited,<br>(Terminal)  | T <sub>j</sub> =25 °C  | -    | 1.80 | 2.25 | V |
|                     |                                      |  | T <sub>j</sub> =125 °C | -    | 1.80 | -    |   |
|                     |                                      |  | T <sub>j</sub> =150 °C | -    | 1.80 | -    |   |
|                     |                                      | I <sub>E</sub> =75 A (Note5),<br>G-E short-circuited,<br>(Chip)  | T <sub>j</sub> =25 °C  | -    | 1.70 | 2.15 | V |
|                     |                                      |  | T <sub>j</sub> =125 °C | -    | 1.70 | -    |   |
|                     |                                      |  | T <sub>j</sub> =150 °C | -    | 1.70 | -    |   |
| t <sub>rr</sub>     | Reverse recovery time                | V <sub>CC</sub> =600 V, I <sub>E</sub> =75 A, V <sub>GE</sub> =±15 V,  | -                      | -    | 300  | ns   |   |
| Q <sub>rr</sub>     | Reverse recovery charge              | R <sub>G</sub> =8.2 Ω, Inductive load  | -                      | 4.0  | -    | μC   |   |
| E <sub>on</sub>     | Turn-on switching energy per pulse   | V <sub>CC</sub> =600 V, I <sub>C</sub> =I <sub>E</sub> =75 A,  | -                      | 7.3  | -    | mJ   |   |
| E <sub>off</sub>    | Turn-off switching energy per pulse  | V <sub>GE</sub> =±15 V, R <sub>G</sub> =8.2 Ω, T <sub>j</sub> =150 °C,   | -                      | 8.0  | -    |      |   |
| E <sub>rr</sub>     | Reverse recovery energy per pulse    | Inductive load   | -                      | 6.9  | -    |      |   |
| r <sub>g</sub>      | Internal gate resistance             | -  | -                      | 0    | -    | Ω    |   |

# < IGBT MODULES > CM150RX-24S

HIGH POWER SWITCHING USE  
INSULATED TYPE

## ELECTRICAL CHARACTERISTICS (cont; T<sub>j</sub>=25 °C, unless otherwise specified)

### NTC THERMISTOR PART

| Symbol               | Item                    | Conditions  | Limits |      |      | Unit |
|----------------------|-------------------------|---|--------|------|------|------|
|                      |                         |   | Min.   | Typ. | Max. |      |
| R <sub>25</sub>      | Zero-power resistance   | T <sub>C</sub> =25 °C (Note4)                           | 4.85   | 5.00 | 5.15 | kΩ   |
| ΔR/R                 | Deviation of resistance | R <sub>100</sub> =493 Ω, T <sub>C</sub> =100 °C (Note4) | -7.3   | -    | +7.8 | %    |
| B <sub>(25/50)</sub> | B-constant              | Approximate by equation (Note7)                         | -      | 3375 | -    | K    |
| P <sub>25</sub>      | Power dissipation       | T <sub>C</sub> =25 °C (Note4)                           | -      | -    | 10   | mW   |

### THERMAL RESISTANCE CHARACTERISTICS

| Symbol                | Item                               | Conditions   | Limits |      |      | Unit |
|-----------------------|------------------------------------|--|--------|------|------|------|
|                       |                                    |  | Min.   | Typ. | Max. |      |
| R <sub>th(j-c)Q</sub> | Thermal resistance (Note4)         | Junction to case, per Inverter IGBT                                | -      | -    | 0.13 | K/W  |
| R <sub>th(j-c)D</sub> |                                    | Junction to case, per Inverter DIODE                               | -      | -    | 0.23 |      |
| R <sub>th(j-c)Q</sub> |                                    | Junction to case, per Brake IGBT                                   | -      | -    | 0.25 | K/W  |
| R <sub>th(j-c)D</sub> |                                    | Junction to case, per Brake DIODE                                  | -      | -    | 0.40 |      |
| R <sub>th(c-s)</sub>  | Contact thermal resistance (Note4) | Case to heat sink, per 1 module,<br>Thermal grease applied (Note7) | -      | 15   | -    | K/kW |

### MECHANICAL CHARACTERISTICS

| Symbol         | Item                   | Conditions                      | Limits |      |      | Unit |
|----------------|------------------------|---------------------------------|--------|------|------|------|
|                |                        |                                 | Min.   | Typ. | Max. |      |
| M <sub>t</sub> | Mounting torque        | Main terminals M 5 screw        | 2.5    | 3.0  | 3.5  | N·m  |
| M <sub>s</sub> | Mounting torque        | Mounting to heat sink M 5 screw | 2.5    | 3.0  | 3.5  | N·m  |
| d <sub>s</sub> | Creepage distance      | Terminal to terminal            | 10.25  | -    | -    | mm   |
|                |                        | Terminal to base plate          | 12.32  | -    | -    |      |
| d <sub>a</sub> | Clearance              | Terminal to terminal            | 10.28  | -    | -    | mm   |
|                |                        | Terminal to base plate          | 10.85  | -    | -    |      |
| m              | mass                   | -                               | -      | 370  | -    | g    |
| e <sub>c</sub> | 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 (DIODE).

- Junction temperature (T<sub>j</sub>) should not increase beyond T<sub>jmax</sub> rating.
- Pulse width and repetition rate should be such that the device junction temperature (T<sub>j</sub>) dose not exceed T<sub>jmax</sub> rating.
- Case temperature (T<sub>C</sub>) and heat sink temperature (T<sub>s</sub>) 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.

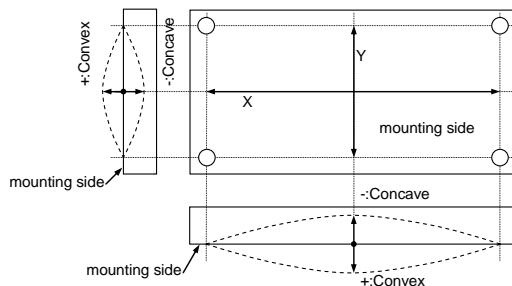
$$6. B_{(25/50)} = \ln\left(\frac{R_{25}}{R_{50}}\right) / \left(\frac{1}{T_{25}} - \frac{1}{T_{50}}\right),$$

R<sub>25</sub>: resistance at absolute temperature T<sub>25</sub> [K]; T<sub>25</sub>=25 [°C]+273.15=298.15 [K]

R<sub>50</sub>: resistance at absolute temperature T<sub>50</sub> [K]; T<sub>50</sub>=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. The base plate (mounting side) flatness measurement points (X, Y) are as follows of the following figure.



9. Use the following screws when mounting the printed circuit board (PCB) on the stand offs.

"φ2.6×10 or φ2.6×12 self tapping screw"

The length of the screw depends on the thickness (t1.6~t2.0) of the PCB.

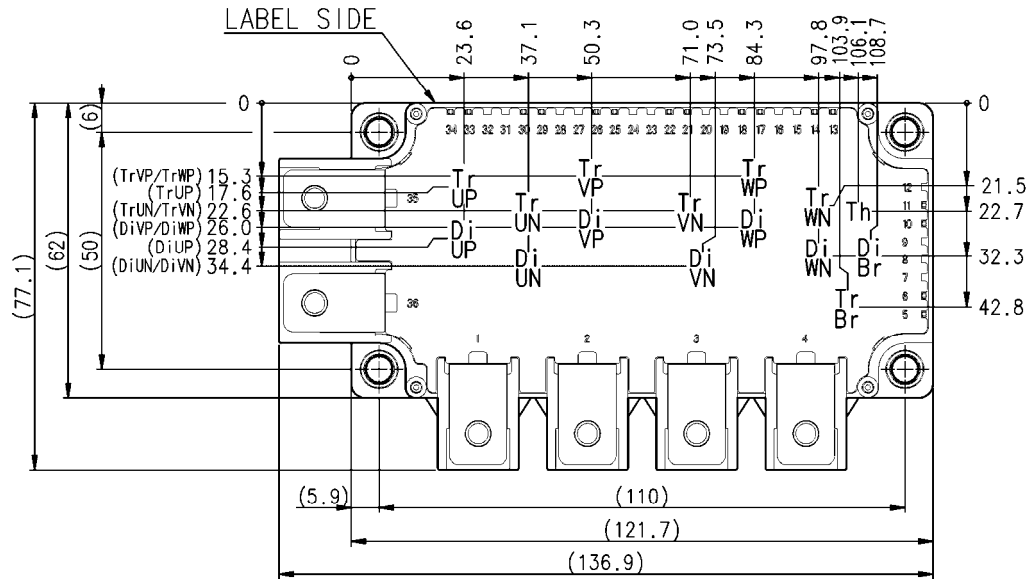
< IGBT MODULES >  
**CM150RX-24S**  
 HIGH POWER SWITCHING USE  
 INSULATED TYPE

**RECOMMENDED OPERATING CONDITIONS**

| Symbol     | Item                          | Conditions   | Limits        |      |      | Unit |          |
|------------|-------------------------------|--|---------------|------|------|------|----------|
|            |                               |  | Min.          | Typ. | Max. |      |          |
| $V_{CC}$   | (DC) Supply voltage           | Applied across P-N terminals                                   | -             | 600  | 850  | V    |          |
| $V_{GEon}$ | Gate (-emitter drive) voltage | Applied across GB-EB/<br>G*P-E*P/G*N-E*N (*=U, V, W) terminals | 13.5          | 15.0 | 16.5 | V    |          |
| $R_G$      | External gate resistance      | Per switch   | Inverter IGBT | 0    | -    | 30   | $\Omega$ |
|            |                               |  | Brake IGBT    | 8.2  | -    | 82   |          |

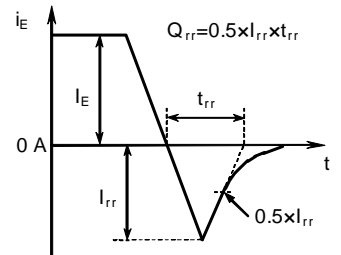
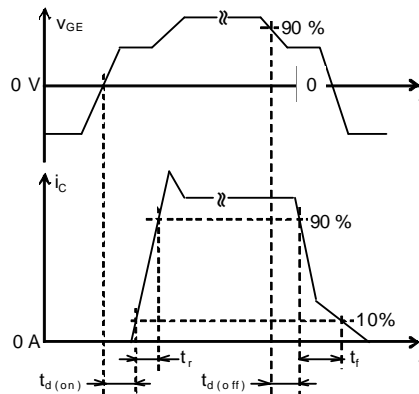
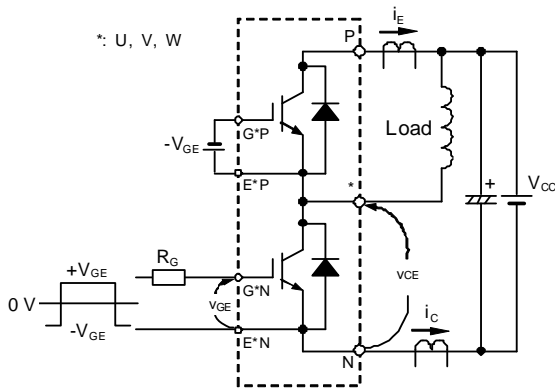
**CHIP LOCATION (Top view)**

Dimension in mm, tolerance:  $\pm 1$  mm



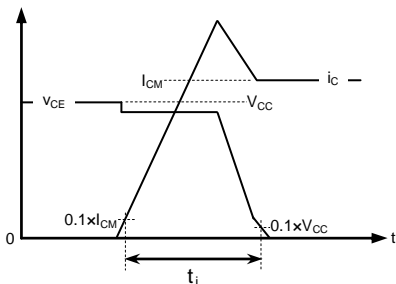
Tr\*P/Tr\*N/Tr\*Br: IGBT, Di\*P/Di\*N: DIODE (\*=U/V/W), Di\*Br: BRAKE DIODE, Th: NTC thermistor

**TEST CIRCUIT AND WAVEFORMS**

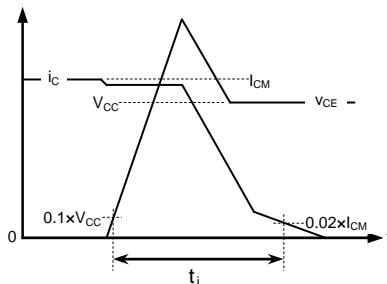


**Switching characteristics test circuit and waveforms**

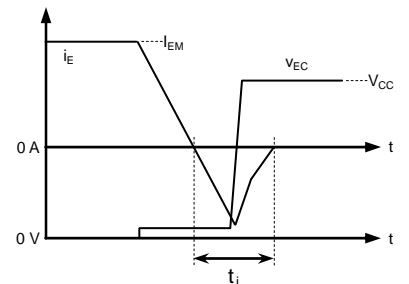
**$t_{rr}$ ,  $Q_{rr}$  test waveform**



**IGBT Turn-on switching energy**



**IGBT Turn-off switching energy**



**DIODE Reverse recovery energy**

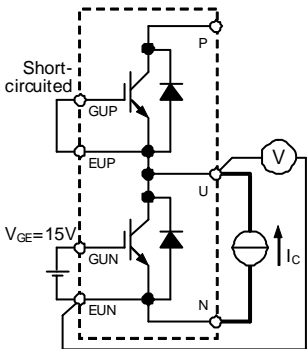
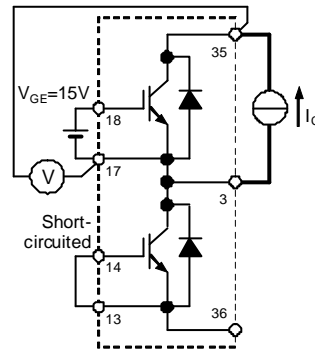
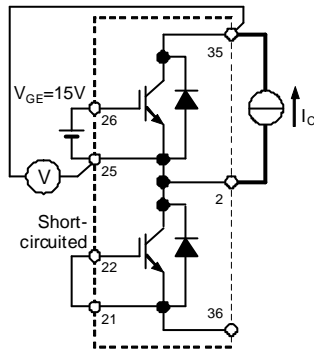
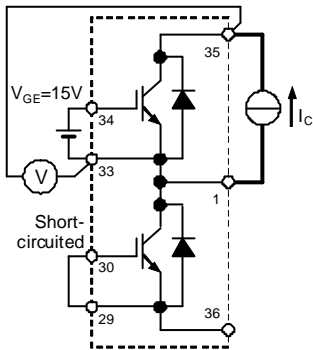
Turn-on / Turn-off switching energy and Reverse recovery energy test waveforms (Integral time instruction drawing)

< IGBT MODULES >

CM150RX-24S

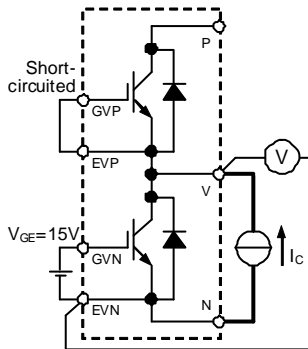
HIGH POWER SWITCHING USE  
INSULATED TYPE

TEST CIRCUIT



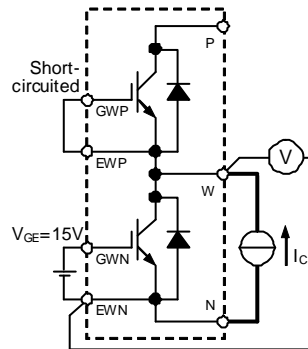
Gate-emitter GVP-EVP GVN-EVN,  
short-circuited GWP-EWP, GWN-EWN,  
GB-EB

UP / UN IGBT



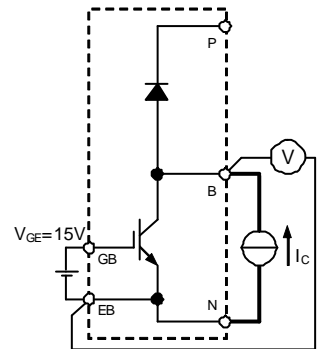
Gate-emitter GUP-EUP, GUN-EUN,  
short-circuited GWP-EWP, GWN-EWN,  
GB-EB

VP / VN IGBT



Gate-emitter GUP-EUP, GUN-EUN,  
short-circuited GVP-EVP, GVN-EVN,  
GB-EB

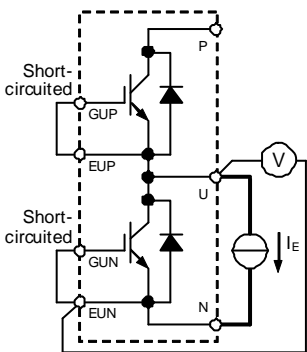
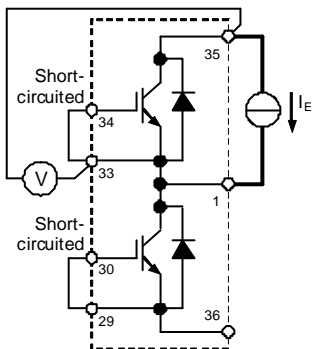
WP / WN IGBT



Gate-emitter GUP-EUP, GUN-EUN,  
short-circuited GVP-EVP, GVN-EVN,  
GWP-EWP, GWN-EWN

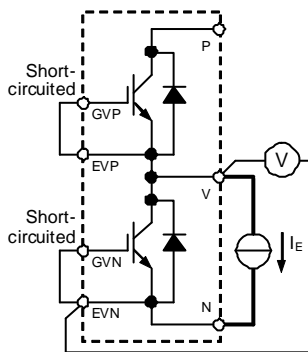
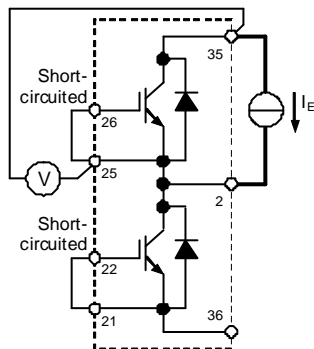
Brake IGBT

$V_{CEsat}$  test circuit



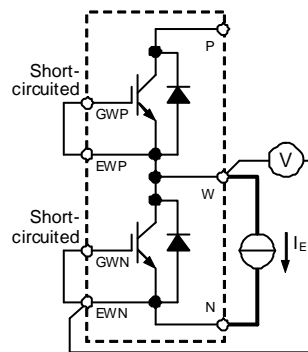
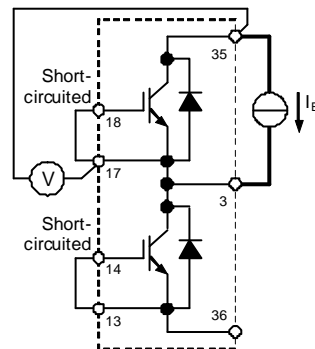
Gate-emitter GVP-EVP GVN-EVN,  
short-circuited GWP-EWP, GWN-EWN,  
GB-EB

UP / UN DIODE



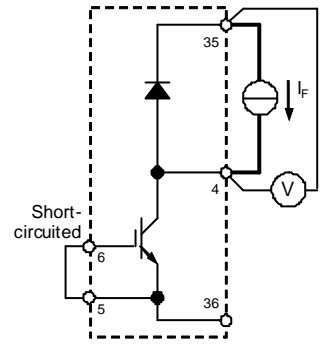
Gate-emitter GUP-EUP, GUN-EUN,  
short-circuited GWP-EWP, GWN-EWN,  
GB-EB

VP / VN DIODE



Gate-emitter GUP-EUP, GUN-EUN,  
short-circuited GVP-EVP, GVN-EVN,  
GB-EB

WP / WN DIODE



Gate-emitter GUP-EUP, GUN-EUN,  
short-circuited GVP-EVP, GVN-EVN,  
GWP-EWP, GWN-EWN

Brake DIODE

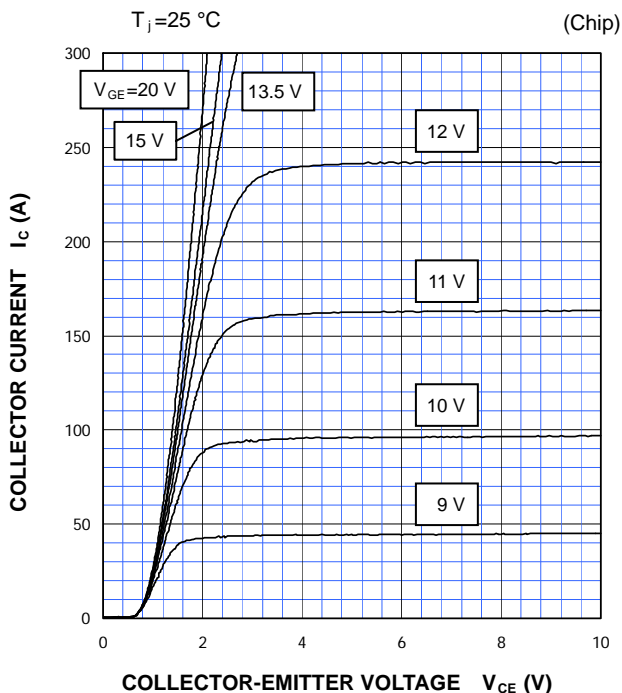
$V_{EC} / V_F$  test circuit

< IGBT MODULES >  
**CM150RX-24S**  
 HIGH POWER SWITCHING USE  
 INSULATED TYPE

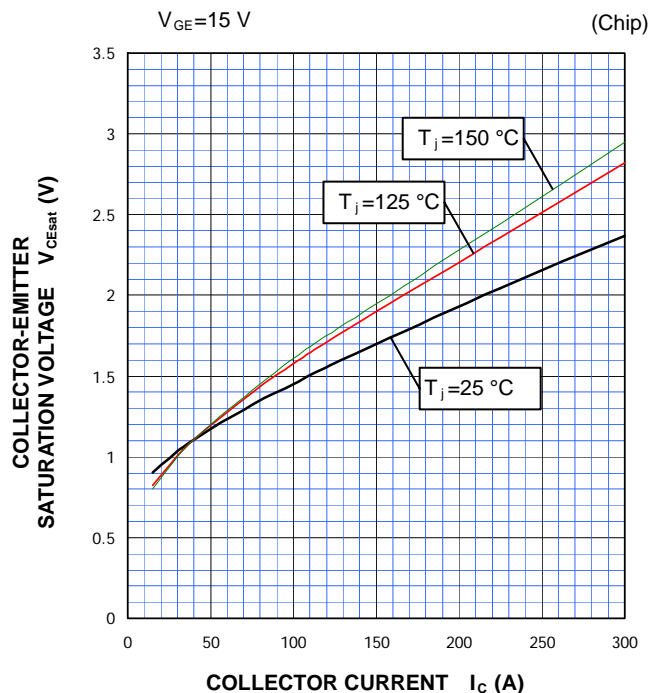
PERFORMANCE CURVES

INVERTER PART

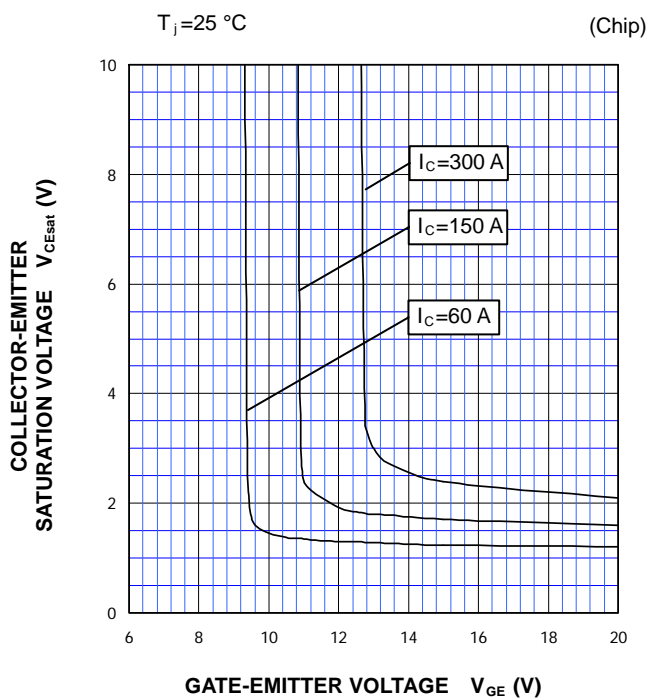
OUTPUT CHARACTERISTICS  
 (TYPICAL)



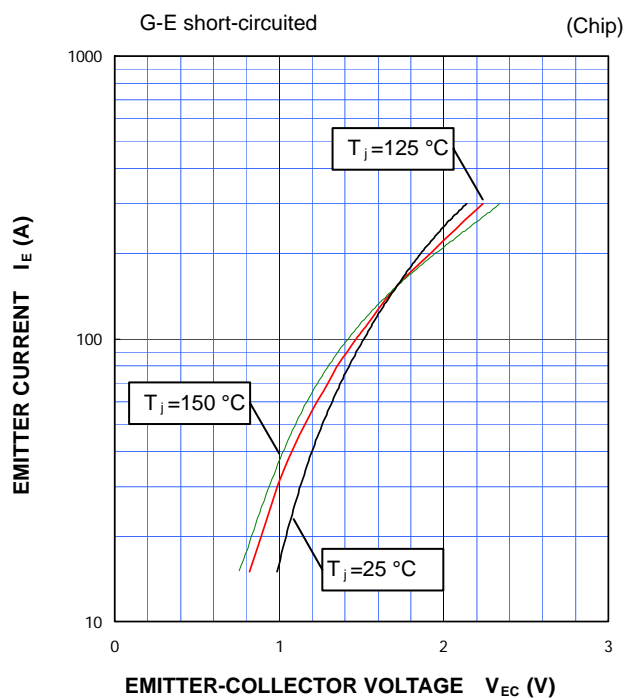
COLLECTOR-EMITTER SATURATION VOLTAGE  
 CHARACTERISTICS  
 (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE  
 CHARACTERISTICS  
 (TYPICAL)



FREE WHEELING DIODE  
 FORWARD CHARACTERISTICS  
 (TYPICAL)



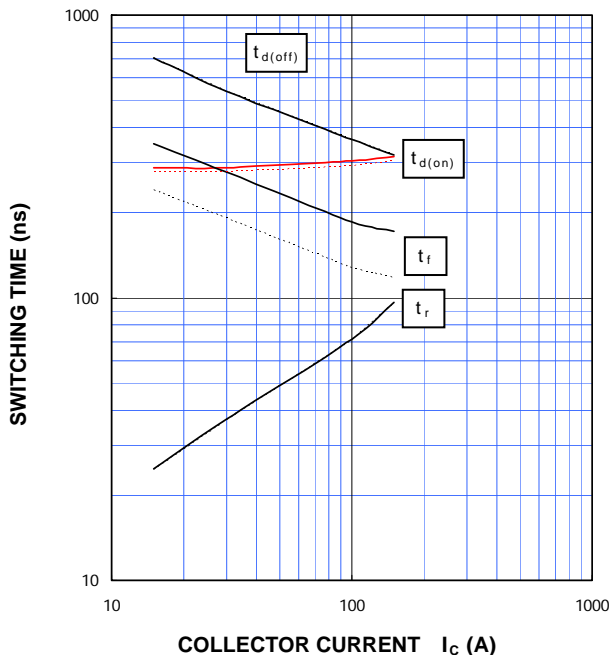
< IGBT MODULES >  
**CM150RX-24S**  
 HIGH POWER SWITCHING USE  
 INSULATED TYPE

PERFORMANCE CURVES

INVERTER PART

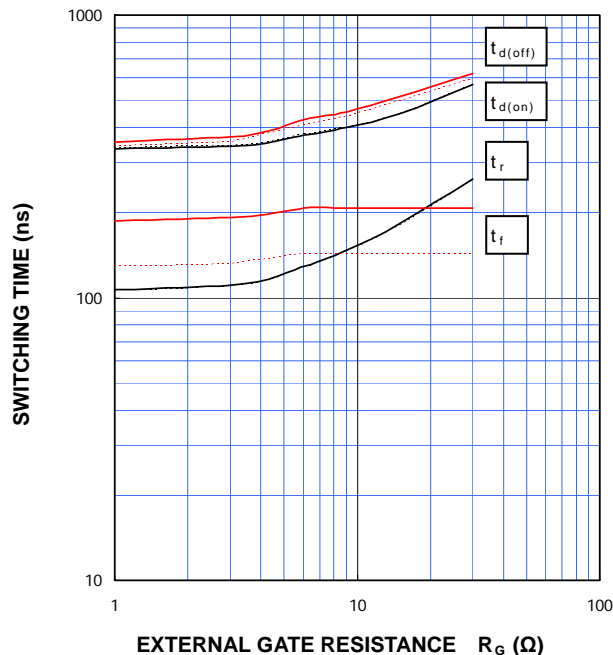
HALF-BRIDGE  
 SWITCHING CHARACTERISTICS  
 (TYPICAL)

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



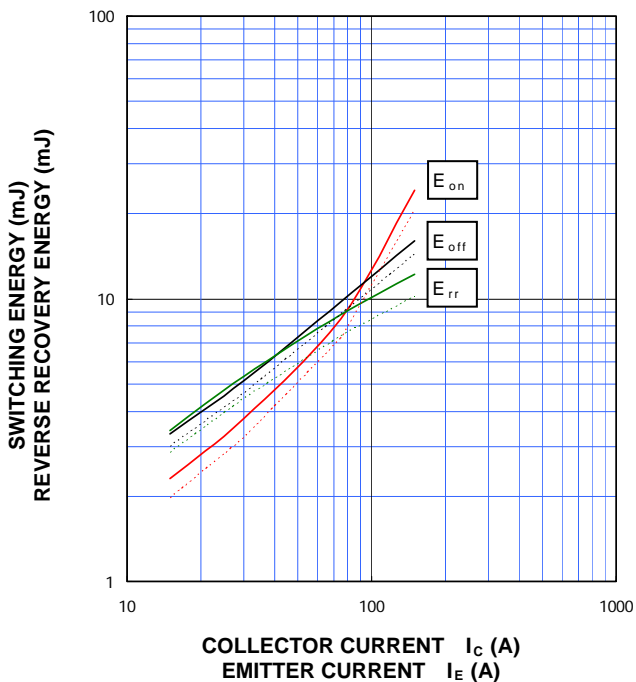
HALF-BRIDGE  
 SWITCHING CHARACTERISTICS  
 (TYPICAL)

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



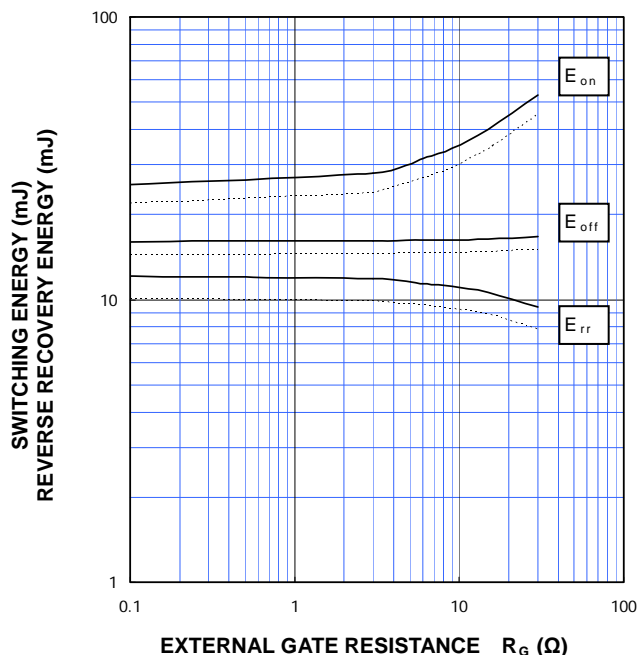
HALF-BRIDGE  
 SWITCHING CHARACTERISTICS  
 (TYPICAL)

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



HALF-BRIDGE  
 SWITCHING CHARACTERISTICS  
 (TYPICAL)

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





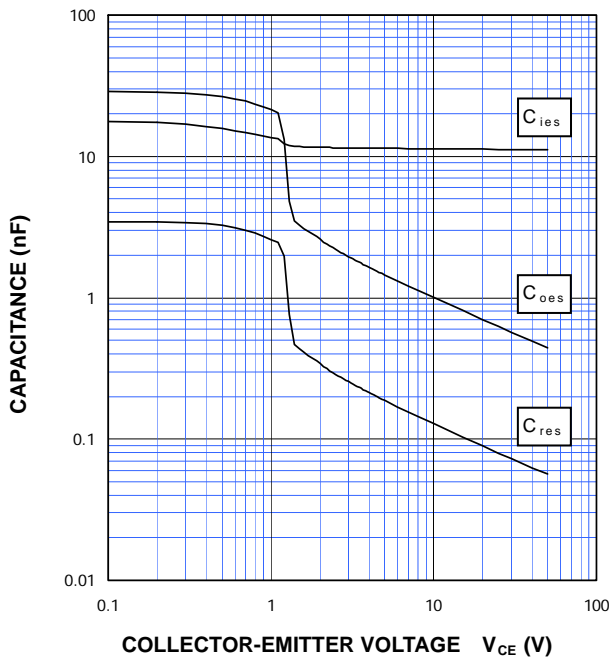
< IGBT MODULES >  
**CM150RX-24S**  
 HIGH POWER SWITCHING USE  
 INSULATED TYPE

**PERFORMANCE CURVES**

**INVERTER PART**

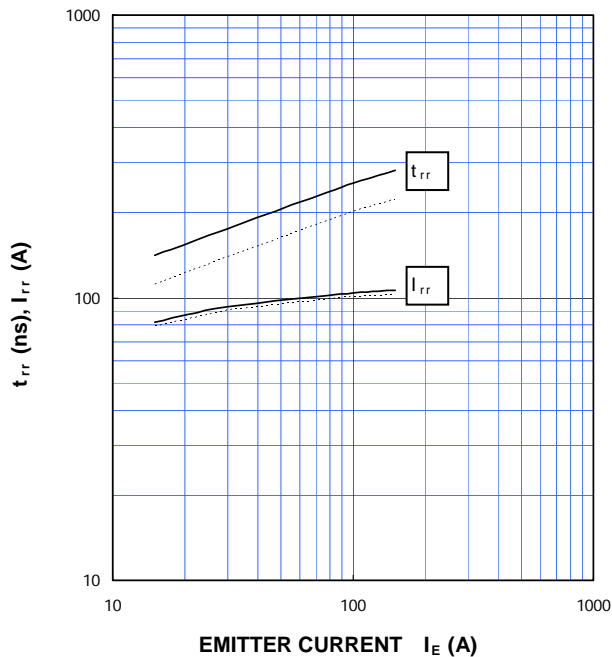
**CAPACITANCE CHARACTERISTICS (TYPICAL)**

G-E short-circuited,  $T_j=25\text{ }^\circ\text{C}$



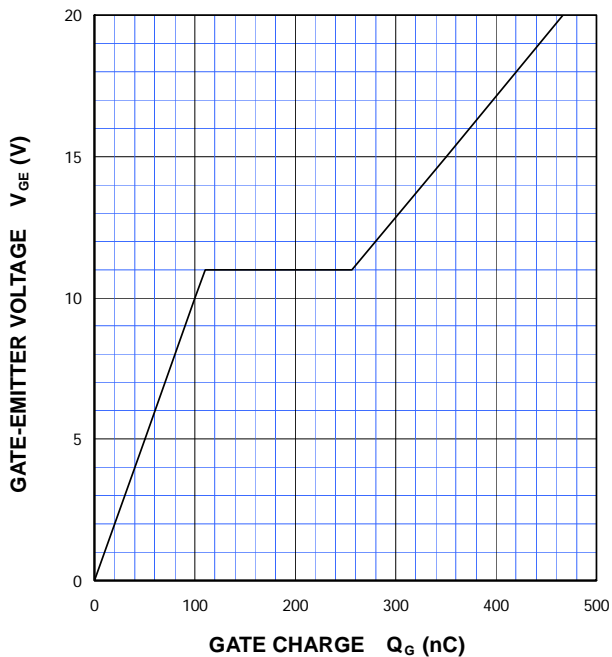
**FREE WHEELING DIODE REVERSE RECOVERY CHARACTERISTICS (TYPICAL)**

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



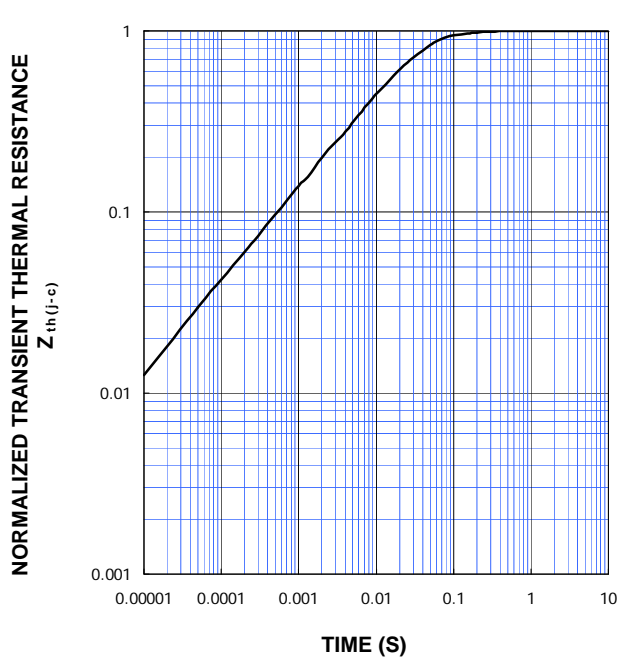
**GATE CHARGE CHARACTERISTICS (TYPICAL)**

$V_{CC}=600\text{ V}$ ,  $I_C=150\text{ A}$ ,  $T_j=25\text{ }^\circ\text{C}$



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (MAXIMUM)**

Single pulse,  $T_C=25\text{ }^\circ\text{C}$   
 $R_{th(j-c)Q}=0.13\text{ K/W}$ ,  $R_{th(j-c)D}=0.23\text{ K/W}$

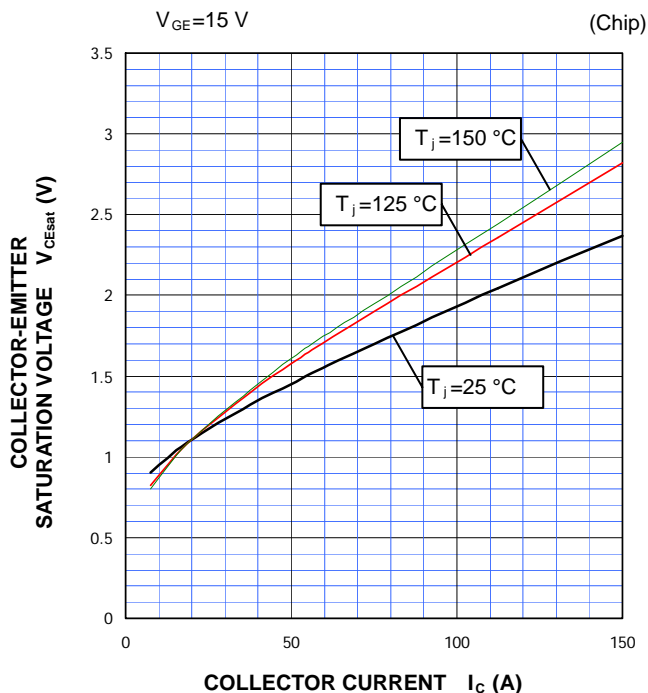


< IGBT MODULES >  
**CM150RX-24S**  
 HIGH POWER SWITCHING USE  
 INSULATED TYPE

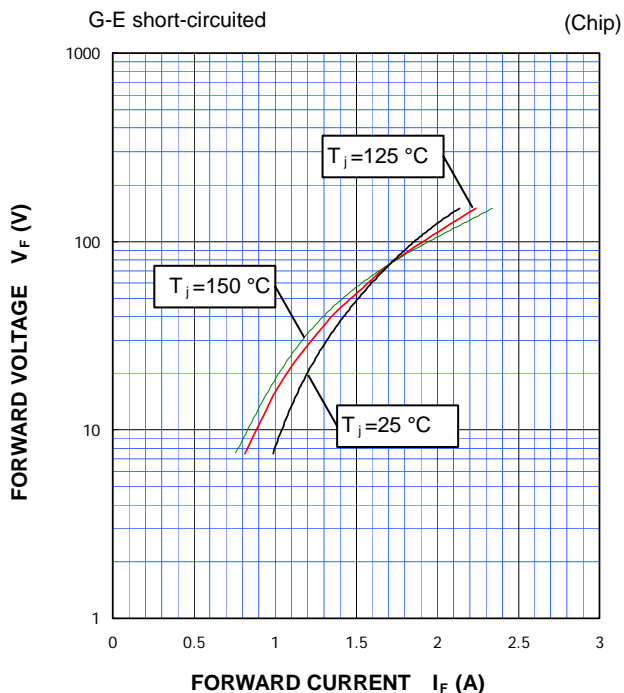
PERFORMANCE CURVES

BRAKE PART

COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)

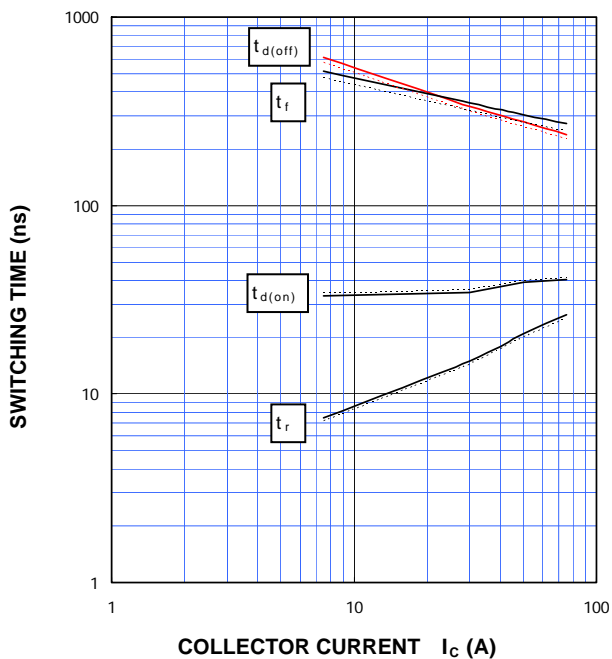


CLAMP DIODE FORWARD CHARACTERISTICS (TYPICAL)



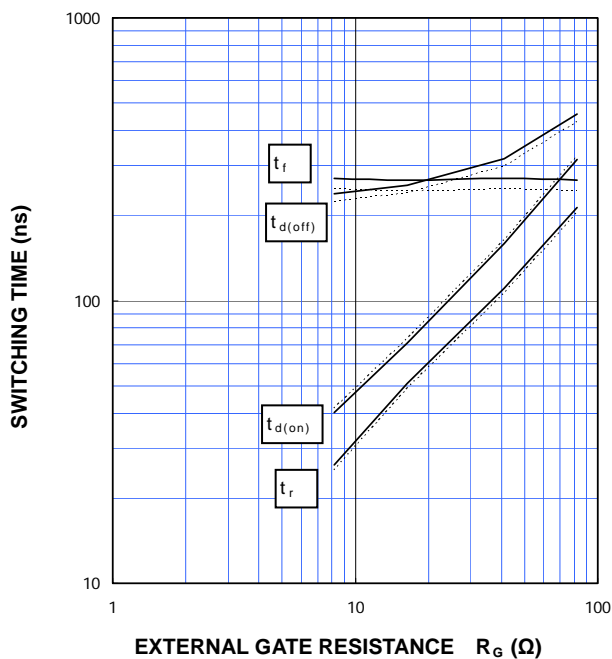
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)

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



HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)

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

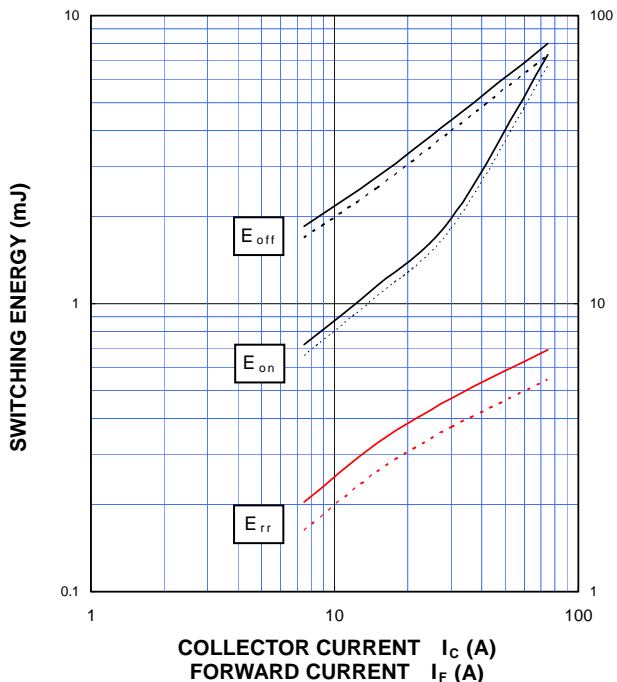


< IGBT MODULES >  
**CM150RX-24S**  
 HIGH POWER SWITCHING USE  
 INSULATED TYPE

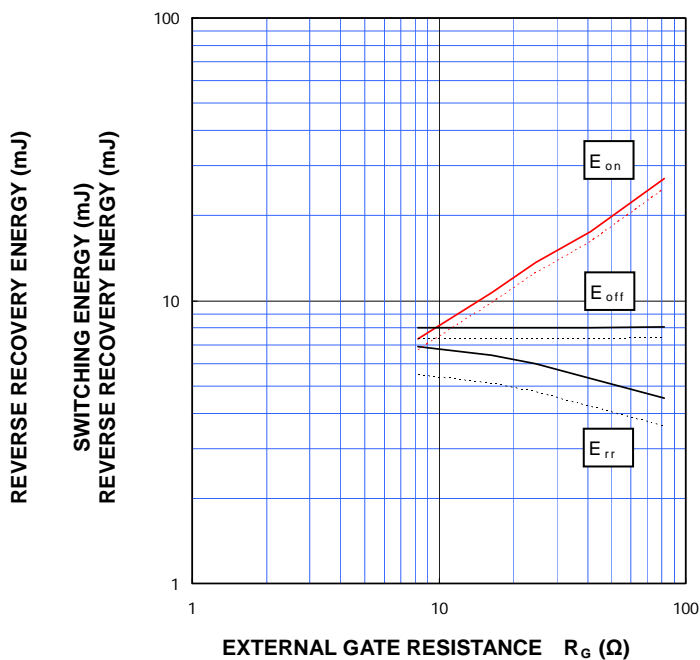
PERFORMANCE CURVES

BRAKE PART

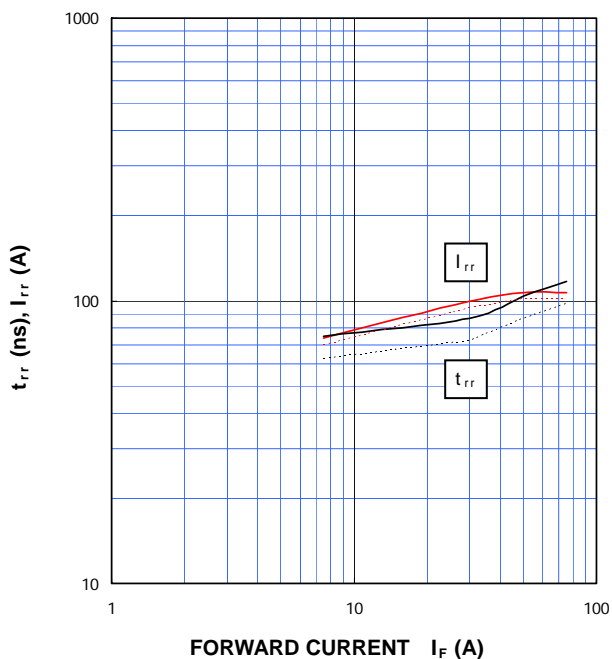
**HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)**  
 $V_{CC}=600\text{ V}$ ,  $V_{GE}=\pm 15\text{ V}$ ,  $R_G=8.2\ \Omega$ ,  
 INDUCTIVE LOAD, PER PULSE  
 —:  $T_j=150\text{ }^\circ\text{C}$ , - - - -:  $T_j=125\text{ }^\circ\text{C}$



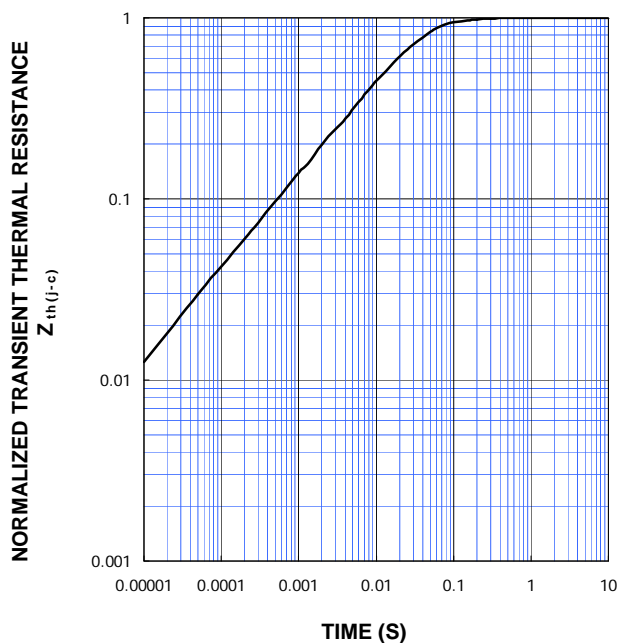
**HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)**  
 $V_{CC}=600\text{ V}$ ,  $I_C/I_F=75\text{ A}$ ,  $V_{GE}=\pm 15\text{ V}$ ,  
 INDUCTIVE LOAD, PER PULSE  
 —:  $T_j=150\text{ }^\circ\text{C}$ , - - - -:  $T_j=125\text{ }^\circ\text{C}$



**CLAMP DIODE REVERSE RECOVERY CHARACTERISTICS (TYPICAL)**  
 $V_{CC}=600\text{ V}$ ,  $V_{GE}=\pm 15\text{ V}$ ,  $R_G=8.2\ \Omega$ , INDUCTIVE LOAD  
 —:  $T_j=150\text{ }^\circ\text{C}$ , - - - -:  $T_j=125\text{ }^\circ\text{C}$



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (MAXIMUM)**  
 Single pulse,  $T_C=25\text{ }^\circ\text{C}$   
 $R_{th(j-c)Q}=0.25\text{ K/W}$ ,  $R_{th(j-c)D}=0.40\text{ K/W}$



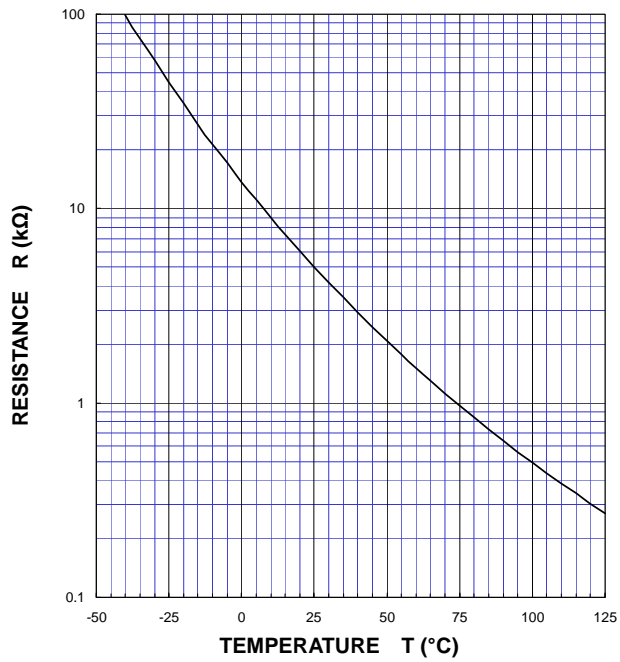
< IGBT MODULES >  
CM150RX-24S  
HIGH POWER SWITCHING USE  
INSULATED TYPE

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PERFORMANCE CURVES

NTC thermistor part

TEMPERATURE CHARACTERISTICS  
(TYPICAL)



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