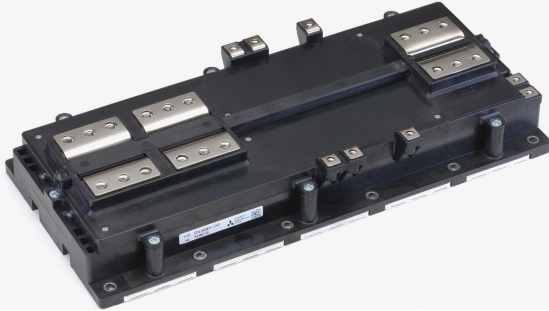


< IGBT MODULES >

CM1800DY-34S

HIGH POWER SWITCHING USE
INSULATED TYPE



Dual switch (Half-Bridge)

Collector current I_C **1 8 0 0 A**
 Collector-emitter voltage V_{CES} **1 7 0 0 V**
 Maximum junction temperature T_{jmax} **1 7 5 °C**

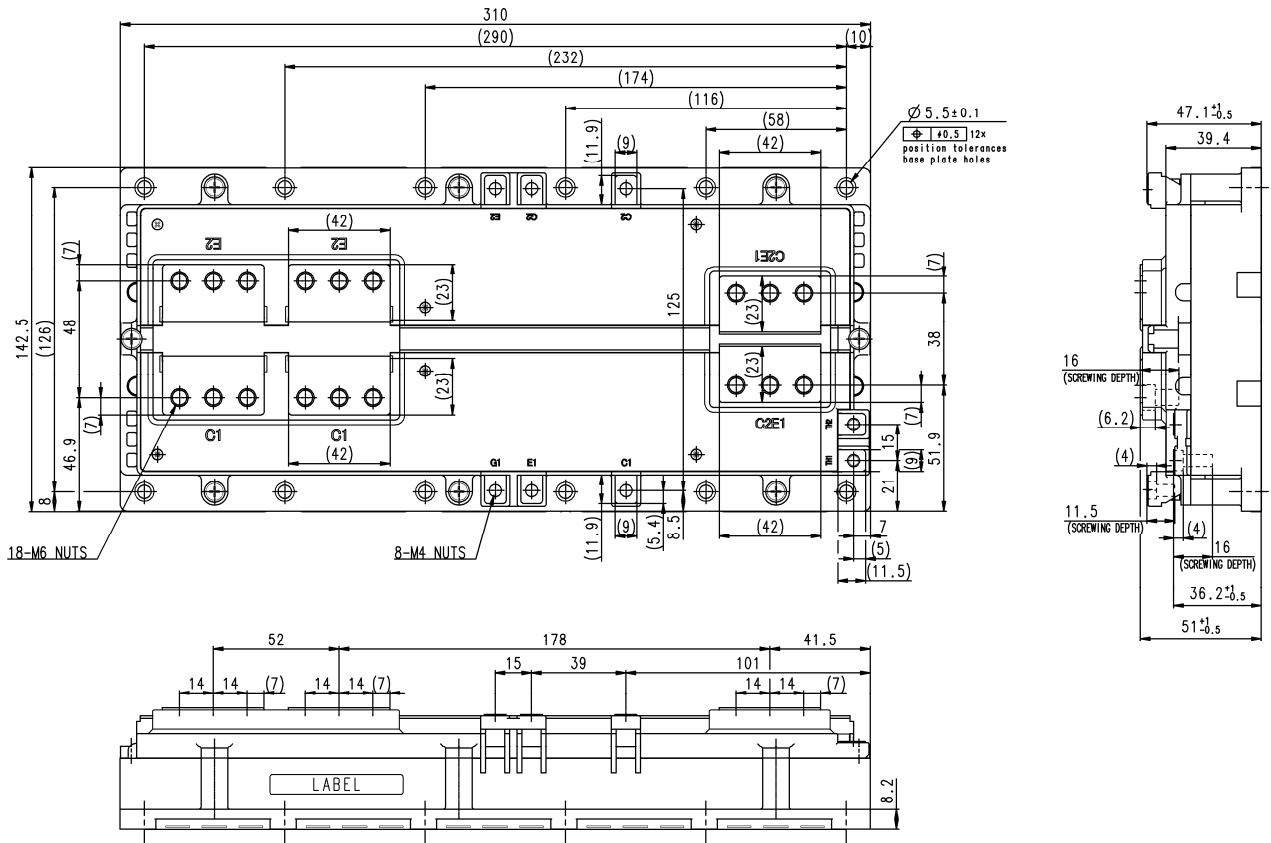
- Flat base Type
- Aluminum base plate
- RoHS Directive compliance
- Recognized under UL1557, File E323585

APPLICATION

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

OUTLINE DRAWING & INTERNAL CONNECTION

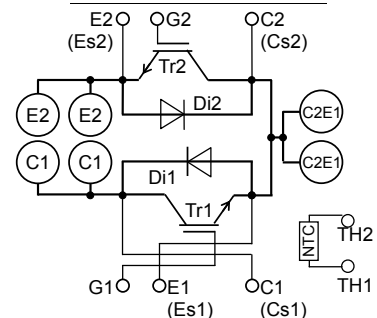
Dimension in mm



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 >

CM1800DY-34S

HIGH POWER SWITCHING USE
INSULATED TYPE

MAXIMUM RATINGS (T_j=25 °C, unless otherwise specified)

INVERTER PART IGBT/DIODE

| Symbol | Item | Conditions | Rating | Unit |
|---------------------------|---------------------------|---------------------------------------|--------|------|
| V _{CES} | Collector-emitter voltage | G-E short-circuited | 1700 | V |
| V _{GES} | Gate-emitter voltage | C-E short-circuited | ± 20 | V |
| I _C | Collector current | DC, T _C =105 °C (Note2, 4) | 1800 | A |
| I _{CRM} | | Pulse, Repetitive (Note3) | 3600 | |
| P _{tot} | Total power dissipation | T _C =25 °C (Note2, 4) | 11535 | W |
| I _E (Note.1) | Emitter current | DC (Note2) | 1800 | A |
| I _{ERM} (Note.1) | | Pulse, Repetitive (Note3) | 3600 | |

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 | °C |
| T _{cmax} | Maximum case temperature | (Note4) | 125 | |
| T _{joپر} | Operating junction temperature | Continuous operation (under switching) | -40 ~ +150 | °C |
| T _{stg} | Storage temperature | - | -40 ~ +125 | |

ELECTRICAL CHARACTERISTICS (T_j=25 °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 =180 mA, V _{CE} =10 V | 5.4 | 6.0 | 6.6 | V | |
| V _{CEsat} (Terminal) | Collector-emitter saturation voltage | I _C =1800 A, V _{GE} =15 V, Refer to the figure of test circuit (Note5) | T _j =25 °C | - | 2.20 | 2.70 | V |
| | | | T _j =125 °C | - | 2.40 | - | |
| | | | T _j =150 °C | - | 2.45 | - | |
| V _{CEsat} (Chip) | | I _C =1800 A, V _{GE} =15 V, (Note5) | T _j =25 °C | - | 2.10 | 2.60 | V |
| | | | T _j =125 °C | - | 2.30 | - | |
| | | | T _j =150 °C | - | 2.35 | - | |
| C _{ies} | Input capacitance | V _{CE} =10 V, G-E short-circuited | - | - | 460 | nF | |
| C _{oes} | Output capacitance | | - | - | 48 | | |
| C _{res} | Reverse transfer capacitance | | - | - | 8.0 | | |
| Q _G | Gate charge | V _{CC} =1000 V, I _C =1800 A, V _{GE} =15 V | - | 8400 | - | nC | |
| t _{d(on)} | Turn-on delay time | V _{CC} =1000 V, I _C =1800 A, V _{GE} =±15 V, R _G =0 Ω, Inductive load | - | - | 1100 | ns | |
| t _r | Rise time | | - | - | 200 | | |
| t _{d(off)} | Turn-off delay time | | - | - | 950 | | |
| t _f | Fall time | | - | - | 500 | | |
| V _{EC} (Note1) (Terminal) | Emitter-collector voltage | I _E =1800 A, G-E short-circuited, Refer to the figure of test circuit (Note5) | T _j =25 °C | - | 2.00 | 2.50 | V |
| | | | T _j =125 °C | - | 2.10 | - | |
| | | | T _j =150 °C | - | 2.05 | - | |
| V _{EC} (Note1) (Chip) | | I _E =1800 A, G-E short-circuited, (Note5) | T _j =25 °C | - | 1.90 | 2.40 | V |
| | | | T _j =125 °C | - | 2.00 | - | |
| | | | T _j =150 °C | - | 1.95 | - | |
| t _{rr} (Note1) | Reverse recovery time | V _{CC} =1000 V, I _E =1800 A, V _{GE} =±15 V, | - | - | 350 | ns | |
| Q _{rr} (Note1) | Reverse recovery charge | R _G =0 Ω, Inductive load | - | 80 | - | µC | |
| E _{on} | Turn-on switching energy per pulse | V _{CC} =1000 V, I _C =I _E =1800 A, | - | 722.8 | - | mJ | |
| E _{off} | Turn-off switching energy per pulse | V _{GE} =±15 V, R _G =0 Ω, | - | 509.5 | - | | |
| E _{rr} (Note1) | Reverse recovery energy per pulse | T _j =150 °C, Inductive load | - | 509.2 | - | mJ | |
| R _{CC'+EE'} | Internal lead resistance | Main terminals -chip, per switch, T _C =25 °C (Note4) | - | 0.11 | - | mΩ | |
| r _g | Internal gate resistance | Per switch | - | 1.1 | - | Ω | |

< IGBT MODULES >

CM1800DY-34S

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.

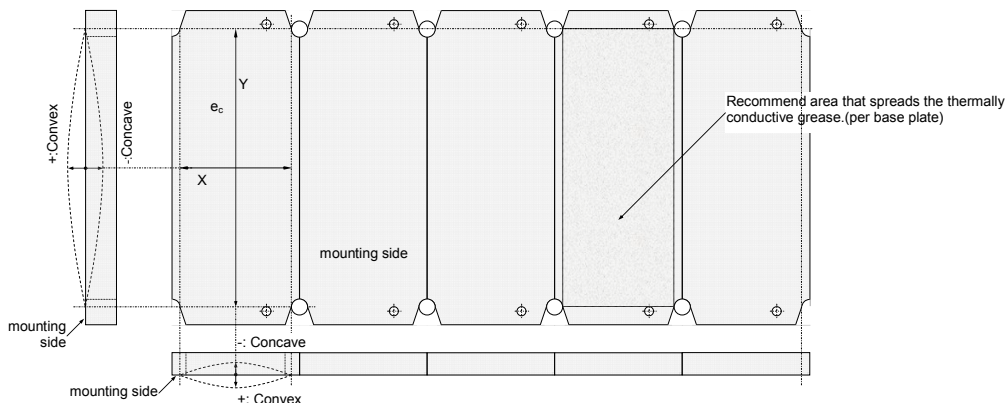
$$6. B_{(25/50)} = \ln\left(\frac{R_{25}}{R_{50}}\right) / \left(\frac{1}{T_{25}} - \frac{1}{T_{50}}\right)$$

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 >

CM1800DY-34S

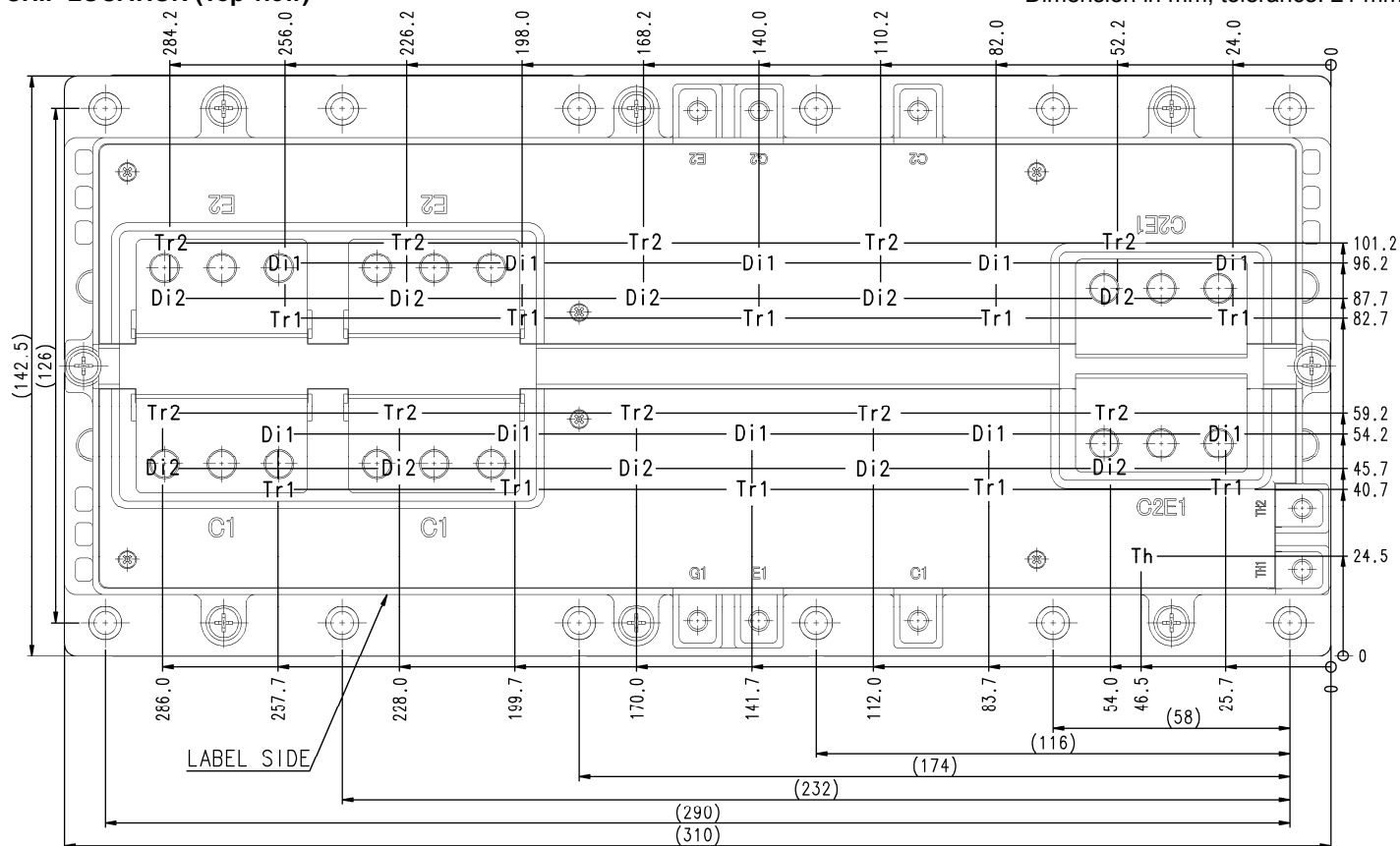
HIGH POWER SWITCHING USE
INSULATED TYPE

RECOMMENDED OPERATING CONDITIONS

| Symbol | Item | Conditions | Limits | | | Unit |
|-------------------|-------------------------------|------------------------------|--------|------|------|------|
| | | | Min. | Typ. | Max. | |
| V _{CC} | (DC) Supply voltage | Applied across C1-E2 | - | 1000 | 1200 | 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)

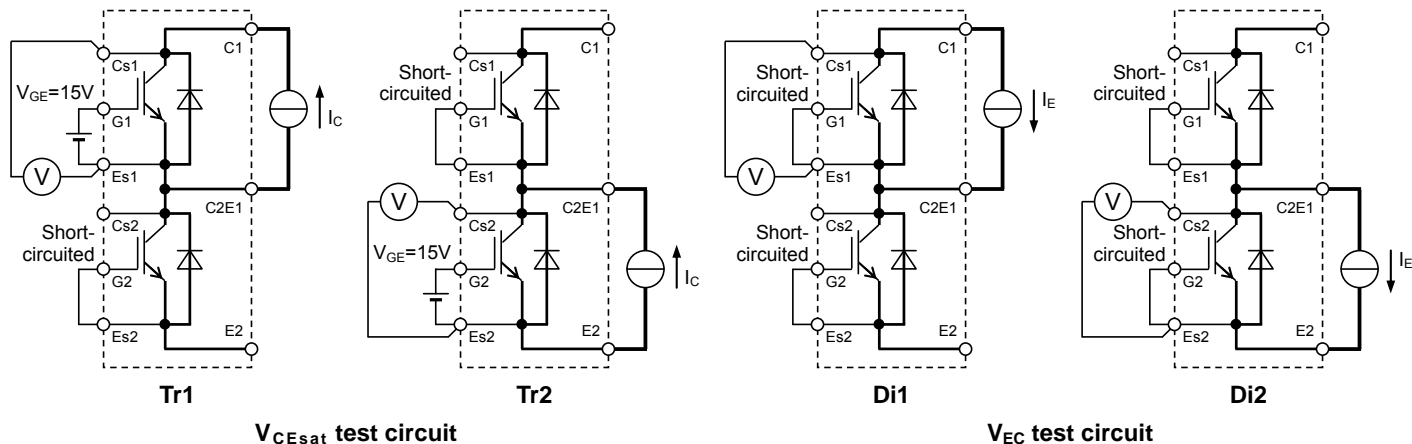
Dimension in mm, tolerance: ±1 mm



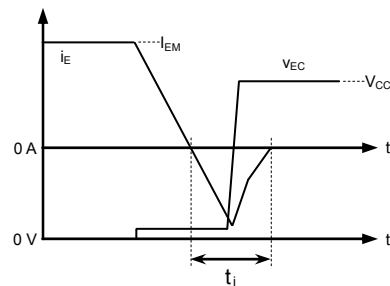
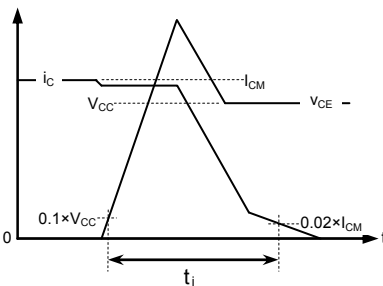
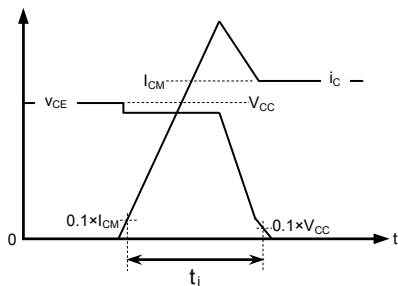
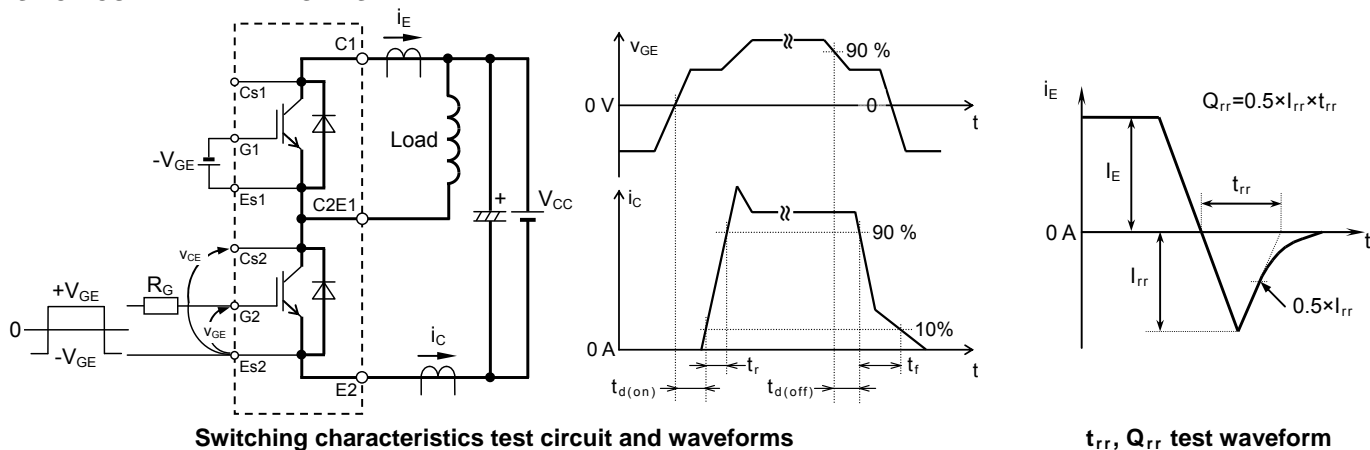
Tr1/Tr2: IGBT, Di1/Di2: DIODE, Th: NTC thermistor

< IGBT MODULES >
CM1800DY-34S
 HIGH POWER SWITCHING USE
 INSULATED TYPE

TEST CIRCUIT



TEST CIRCUIT AND WAVEFORMS



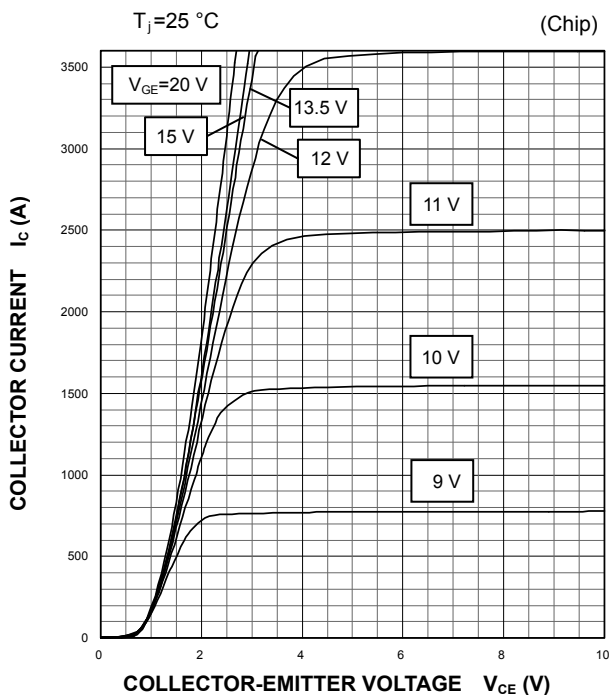
Turn-on / Turn-off switching energy and Reverse recovery energy test waveforms (Integral time t_i instruction drawing)

< IGBT MODULES >
CM1800DY-34S
 HIGH POWER SWITCHING USE
 INSULATED TYPE

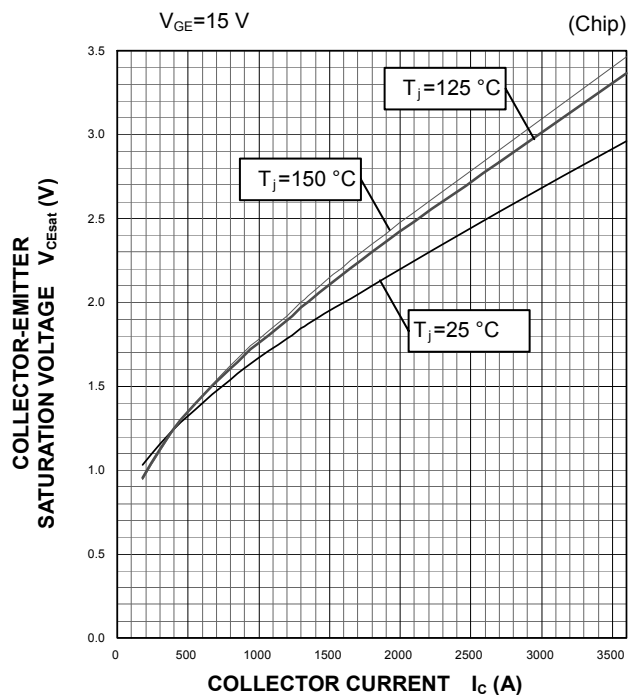
PERFORMANCE CURVES

Inverter part

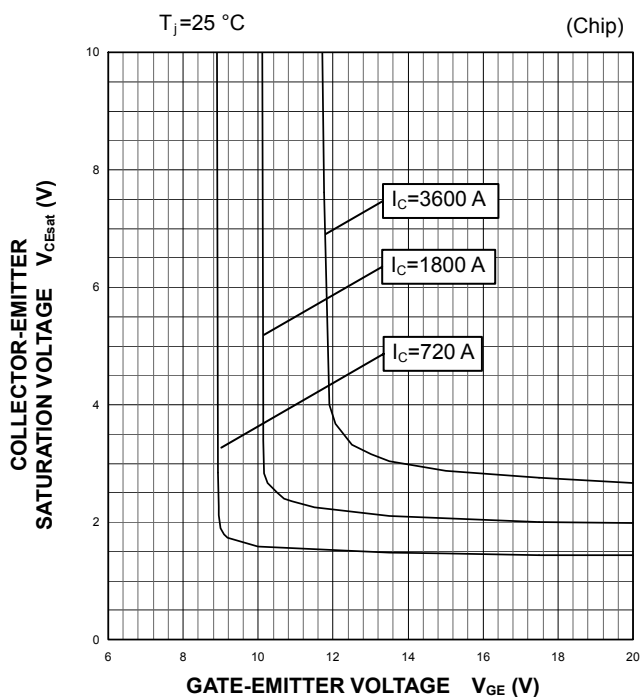
OUTPUT CHARACTERISTICS
 (TYPICAL)



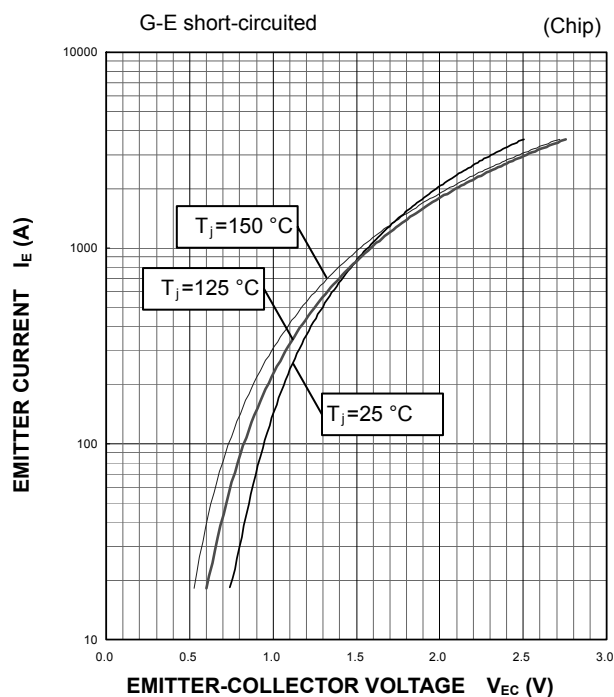
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS
 (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS
 (TYPICAL)



FREE WHEELING DIODE FORWARD CHARACTERISTICS
 (TYPICAL)



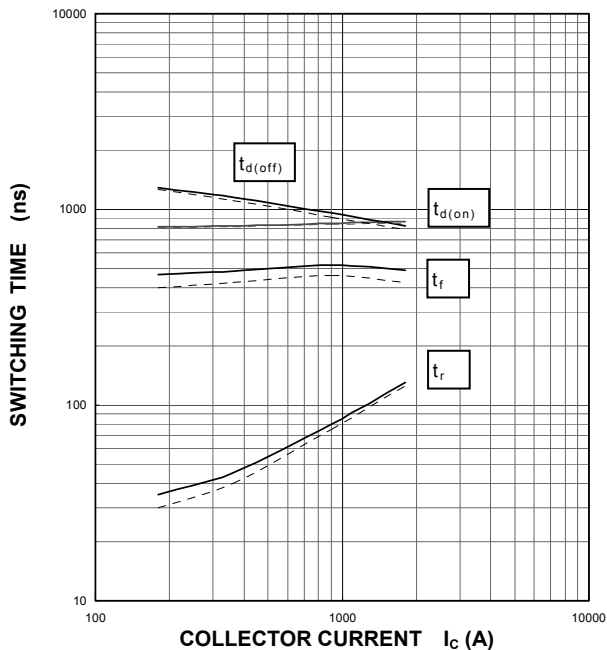
< IGBT MODULES >
CM1800DY-34S
 HIGH POWER SWITCHING USE
 INSULATED TYPE

PERFORMANCE CURVES

Inverter part

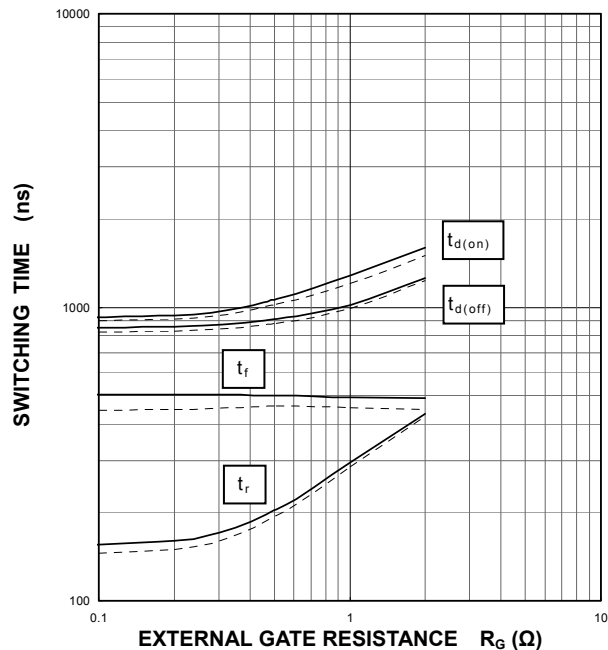
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)

$V_{CC}=1000\text{ V}$, $V_{GE}=\pm 15\text{ V}$, $R_G=0\ \Omega$, INDUCTIVE LOAD
 —: $T_j=150\text{ }^\circ\text{C}$, - - - -: $T_j=125\text{ }^\circ\text{C}$



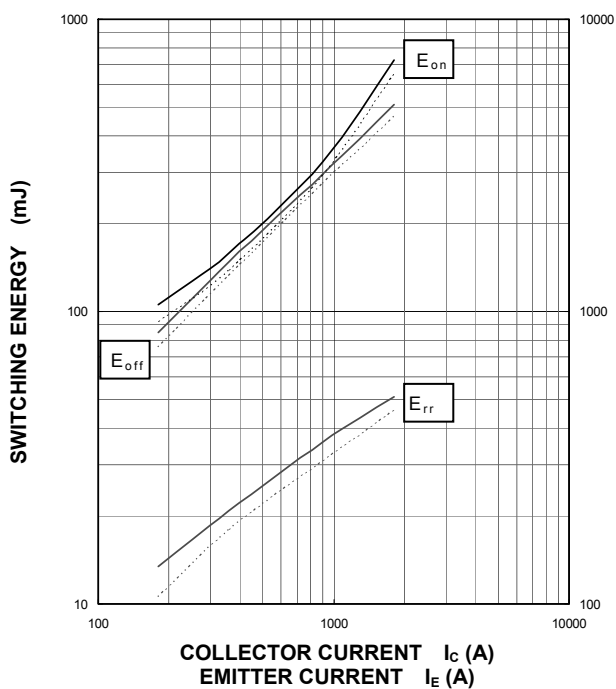
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)

$V_{CC}=1000\text{ V}$, $I_C=1800\text{ A}$, $V_{GE}=\pm 15\text{ V}$, INDUCTIVE LOAD
 —: $T_j=150\text{ }^\circ\text{C}$, - - - -: $T_j=125\text{ }^\circ\text{C}$



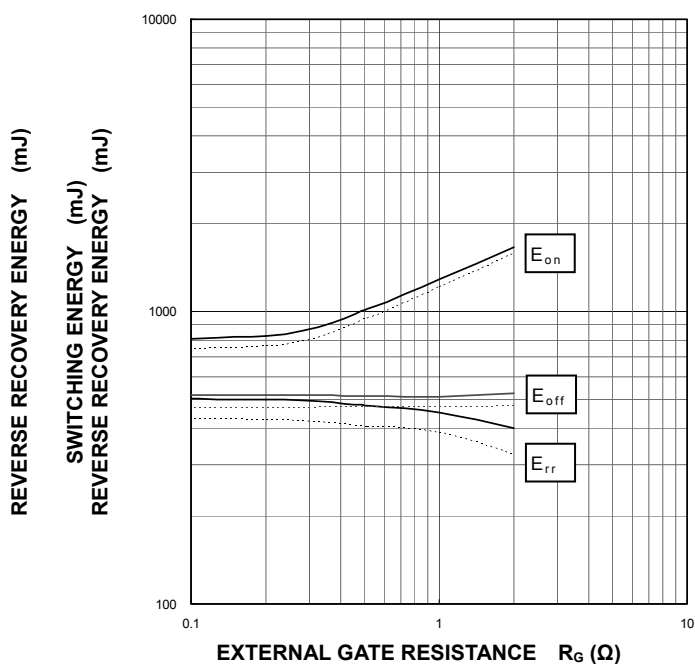
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)

$V_{CC}=1000\text{ V}$, $V_{GE}=\pm 15\text{ V}$, $R_G=0\ \Omega$, INDUCTIVE LOAD, PER PULSE
 —: $T_j=150\text{ }^\circ\text{C}$, - - - -: $T_j=125\text{ }^\circ\text{C}$



HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)

$V_{CC}=1000\text{ V}$, $I_C/I_E=1800\text{ A}$, $V_{GE}=\pm 15\text{ V}$, INDUCTIVE LOAD, PER PULSE
 —: $T_j=150\text{ }^\circ\text{C}$, - - - -: $T_j=125\text{ }^\circ\text{C}$



< IGBT MODULES >
CM1800DY-34S
 HIGH POWER SWITCHING USE
 INSULATED TYPE

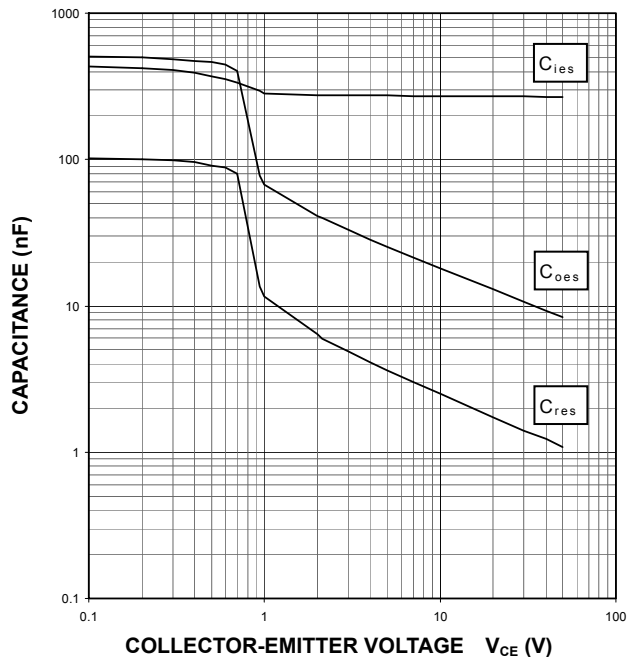
PERFORMANCE CURVES

Inverter part

CAPACITANCE CHARACTERISTICS

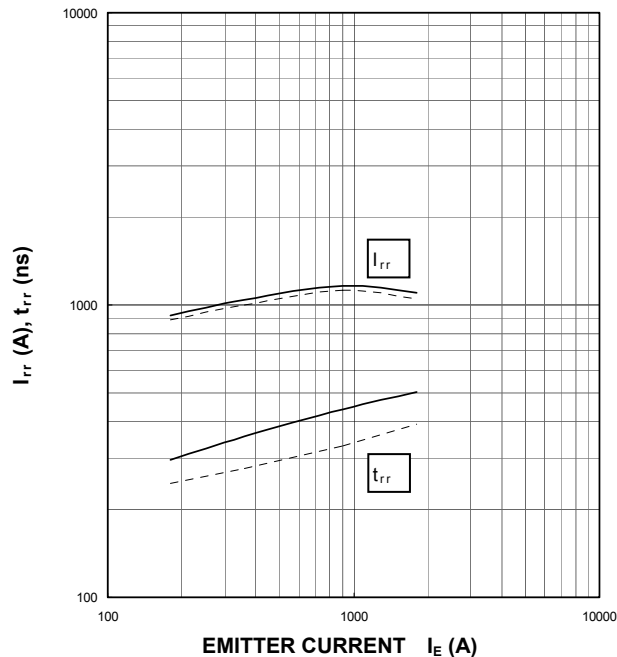
(TYPICAL)

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



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

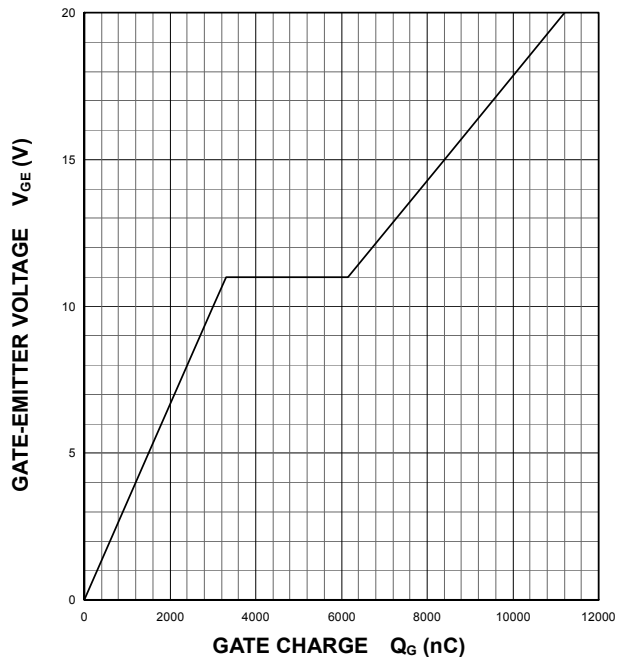
$V_{CC}=1000\text{ V}$, $V_{GE}=\pm 15\text{ V}$, $R_G=0\ \Omega$, INDUCTIVE LOAD
 —: $T_j=150\text{ }^\circ\text{C}$, - - - -: $T_j=125\text{ }^\circ\text{C}$



GATE CHARGE CHARACTERISTICS

(TYPICAL)

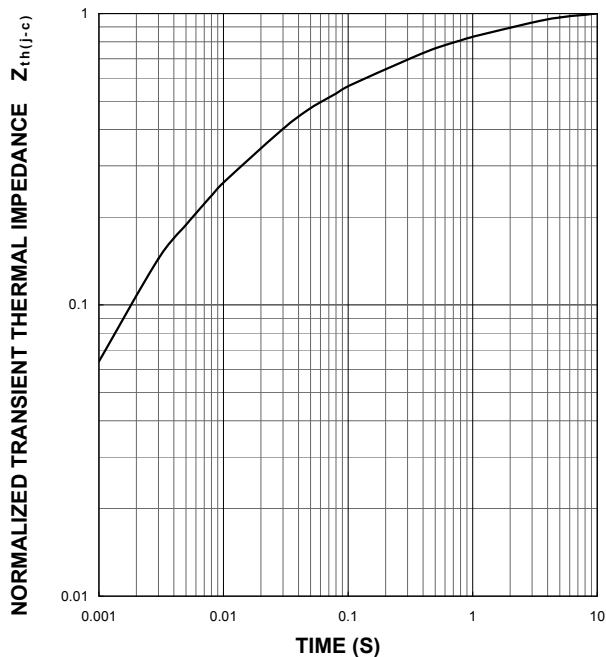
$V_{CC}=1000\text{ V}$, $I_C=1800\text{ A}$, $T_j=25\text{ }^\circ\text{C}$



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS

(MAXIMUM)

Single pulse, $T_C=25\text{ }^\circ\text{C}$
 $R_{th(j-c)Q}=13\text{ K/kW}$, $R_{th(j-c)D}=22\text{ K/kW}$



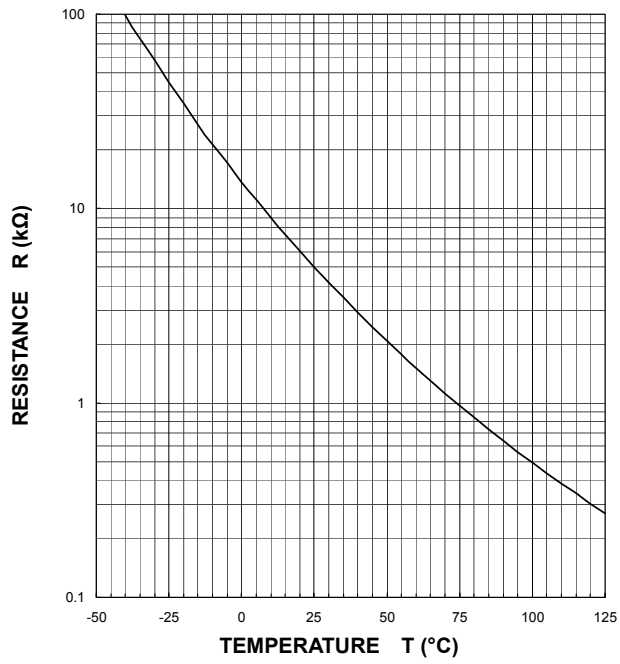
< IGBT MODULES >
CM1800DY-34S
HIGH POWER SWITCHING USE
INSULATED TYPE

PERFORMANCE CURVES

NTC thermistor part

TEMPERATURE CHARACTERISTICS

(TYPICAL)



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