

IGBT MODULE (N series)

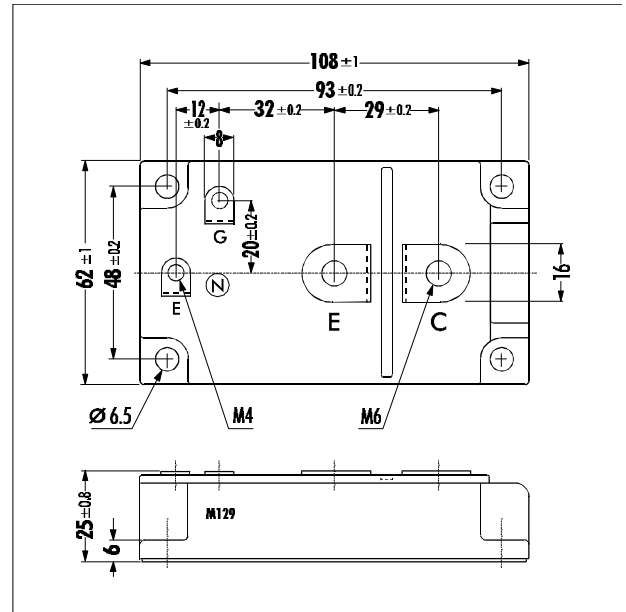
■ Features

- Square RBSOA
- Low Saturation Voltage
- Less Total Power Dissipation
- Improved FWD Characteristic
- Minimized Internal Stray Inductance
- Overcurrent Limiting Function (4~5 Times Rated Current)

■ Applications

- High Power Switching
- A.C. Motor Controls
- D.C. Motor Controls
- Uninterruptible Power Supply

■ Outline Drawing



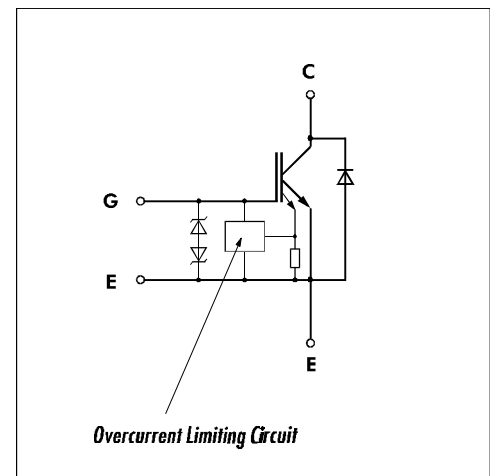
■ Maximum Ratings and Characteristics

• Absolute Maximum Ratings (T_c=25°C)

| Items | Symbols | Ratings | Units |
|---------------------------|------------------|------------|-----------------------|
| Collector-Emitter Voltage | V _{CEs} | 1200 | V |
| Gate -Emitter Voltage | V _{GES} | ± 20 | V |
| Collector Current | I _C | Continuous | 300 |
| | | 1ms | I _{C PULSE} |
| Current | -I _C | Continuous | 300 |
| | | 1ms | -I _{C PULSE} |
| Max. Power Dissipation | P _C | 2100 | W |
| Operating Temperature | T _i | +150 | °C |
| Storage Temperature | T _{stg} | -40 ~ +125 | °C |
| Isolation Voltage | V _{is} | 2500 | V |
| Screw Torque | Mounting *1 | 3.5 | |
| | Terminals *2 | 4.5 | Nm |
| | Terminals *3 | 1.7 | |

Note: *1:Recommendable Value; 2.5 ~ 3.5 Nm (M5) or (M6)
*2:Recommendable Value; 3.5 ~ 4.5 Nm (M6)
*3:Recommendable Value; 1.3 ~ 1.7 Nm (M4)

■ Equivalent Circuit



• Electrical Characteristics (at T_J=25°C)

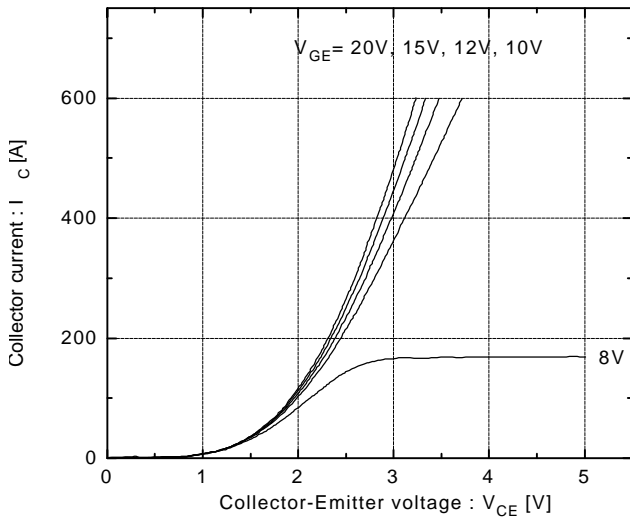
| Items | Symbols | Test Conditions | Min. | Typ. | Max. | Units |
|--------------------------------------|----------------------|--|----------------------|-------|------|-------|
| Zero Gate Voltage Collector Current | I _{CEs} | V _{GE} =0V V _{CE} =1200V | | | 4.0 | mA |
| Gate-Emitter Leakage Current | I _{GES} | V _{CE} =0V V _{GE} =± 20V | | | 60 | μA |
| Gate-Emitter Threshold Voltage | V _{GE(th)} | V _{GE} =20V I _C =300mA | 4.5 | | 7.5 | V |
| Collector-Emitter Saturation Voltage | V _{CE(sat)} | V _{GE} =15V I _C =300A | | | 3.3 | V |
| Input capacitance | C _{ies} | V _{GE} =0V | | 48000 | | |
| Output capacitance | C _{oes} | V _{CE} =10V | | 17400 | | pF |
| Reverse Transfer capacitance | C _{res} | f=1MHz | | 15480 | | |
| Turn-on Time | t _{ON} | V _{CC} =600V | | 0.65 | 1.2 | |
| | | | I _C =300A | | 0.25 | 0.6 |
| Turn-off Time | t _{OFF} | V _{GE} =± 15V | | 0.95 | 1.5 | μs |
| | | | R _G =2.7Ω | | 0.35 | 0.5 |
| Diode Forward On-Voltage | V _F | I _F =300A V _{GE} =0V | | | 3.0 | V |
| Reverse Recovery Time | t _{rr} | I _F =300A | | | 350 | ns |

• Thermal Characteristics

| Items | Symbols | Test Conditions | Min. | Typ. | Max. | Units |
|--------------------|----------------------|-----------------------|------|--------|------|-------|
| Thermal Resistance | R _{th(j-c)} | IGBT | | | 0.06 | |
| | R _{th(j-e)} | Diode | | | 0.12 | °C/W |
| | R _{th(c-f)} | With Thermal Compound | | 0.0125 | | |

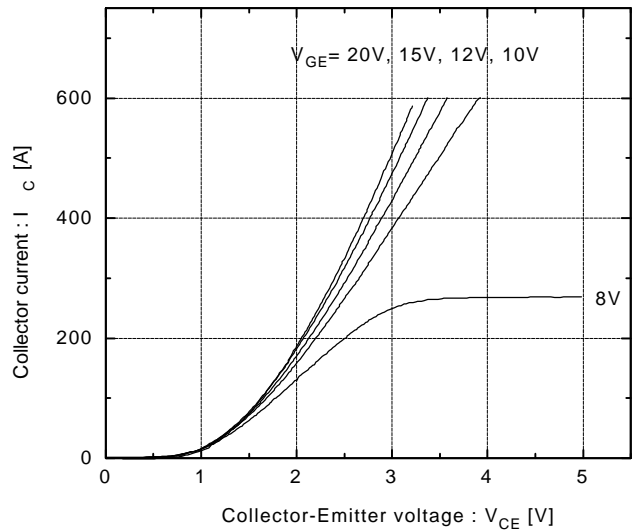
Collector current vs. Collector-Emitter voltage

$T_j=25^\circ\text{C}$



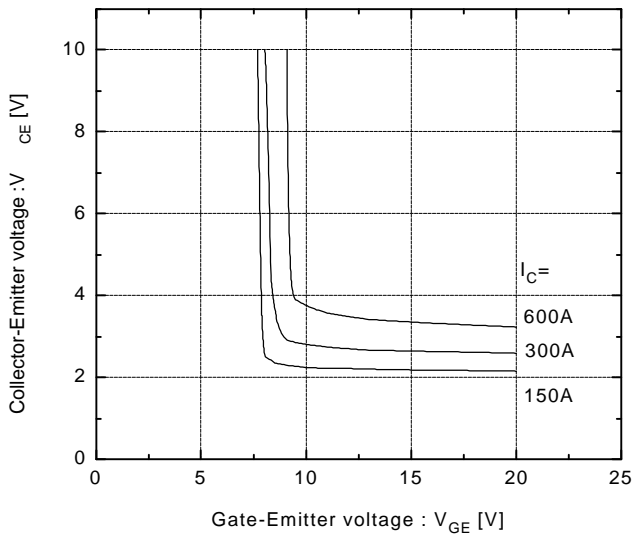
Collector current vs. Collector-Emitter voltage

$T_j=125^\circ\text{C}$



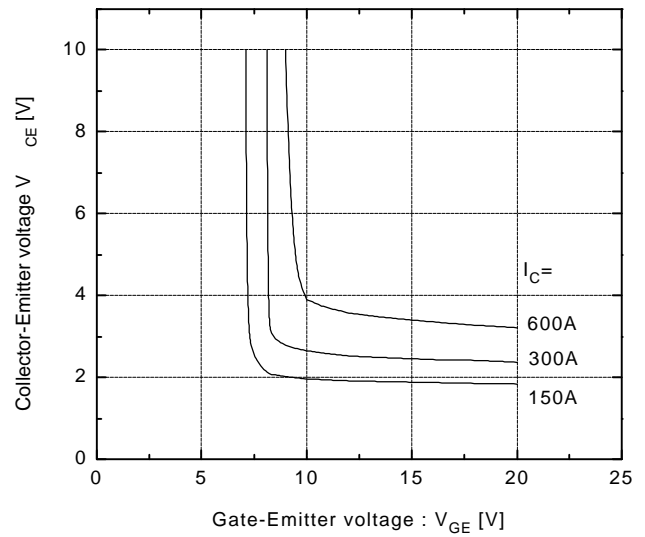
Collector-Emitter vs. Gate-Emitter voltage

$T_j=25^\circ\text{C}$



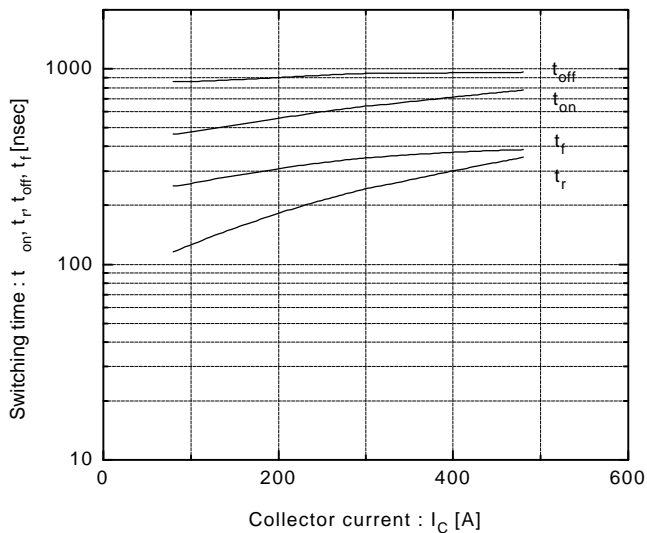
Collector-Emitter vs. Gate-Emitter voltage

$T_j=125^\circ\text{C}$



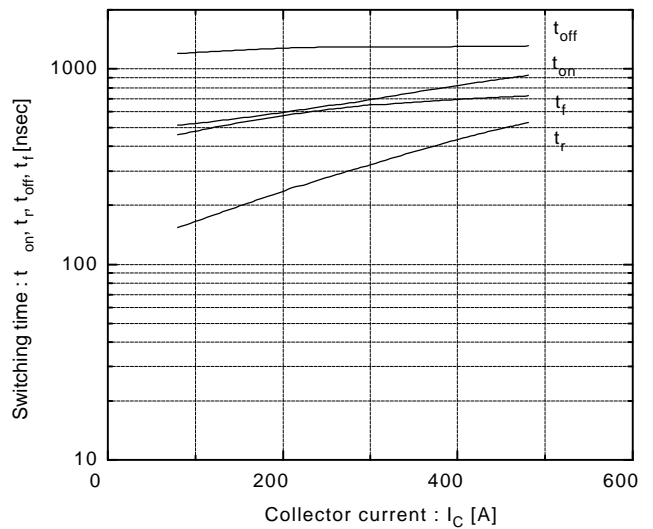
Switching time vs. Collector current

$V_{CC}=600\text{V}, R_G=2.7\Omega, V_{GE}=\pm 15\text{V}, T_j=25^\circ\text{C}$



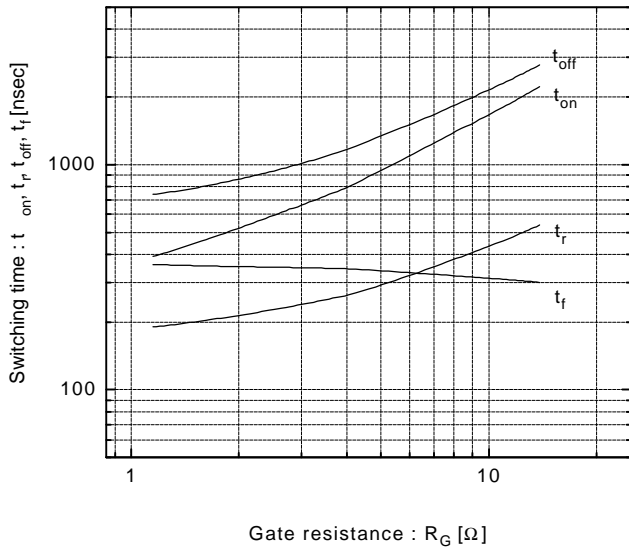
Switching time vs. Collector current

$V_{CC}=600\text{V}, R_G=2.7\Omega, V_{GE}=\pm 15\text{V}, T_j=125^\circ\text{C}$



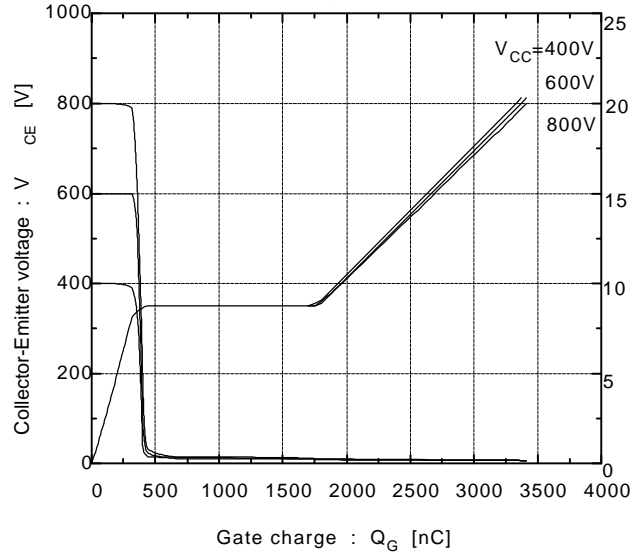
Switching time vs. R_G

$V_{CC}=600V, I_C=300A, V_{GE}=\pm 15V, T_j=25^\circ C$



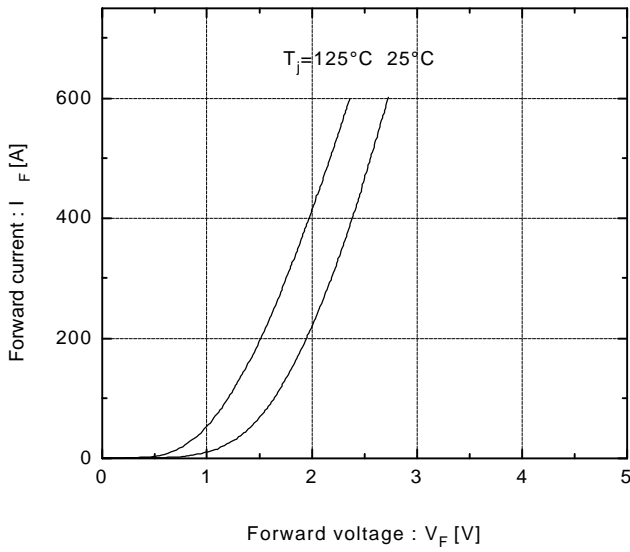
Dynamic input characteristics

$T_j=25^\circ C$



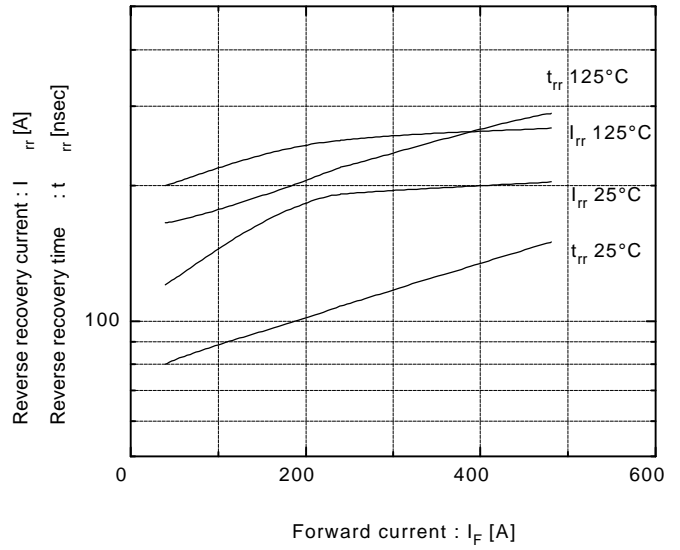
Forward current vs. Forward voltage

$V_{GE}=0V$

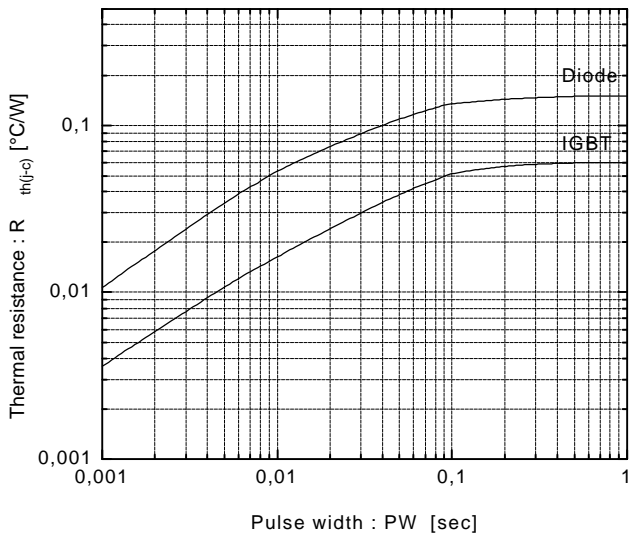


Reverse recovery characteristics

t_{rr}, I_{rr} vs. I_F

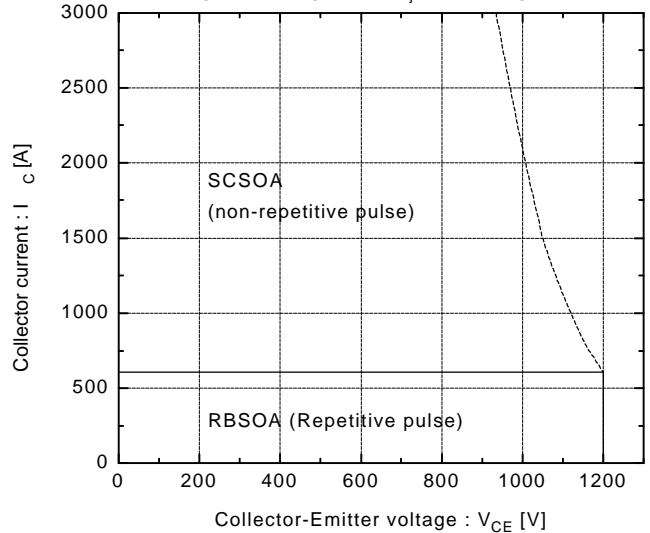


Transient thermal resistance



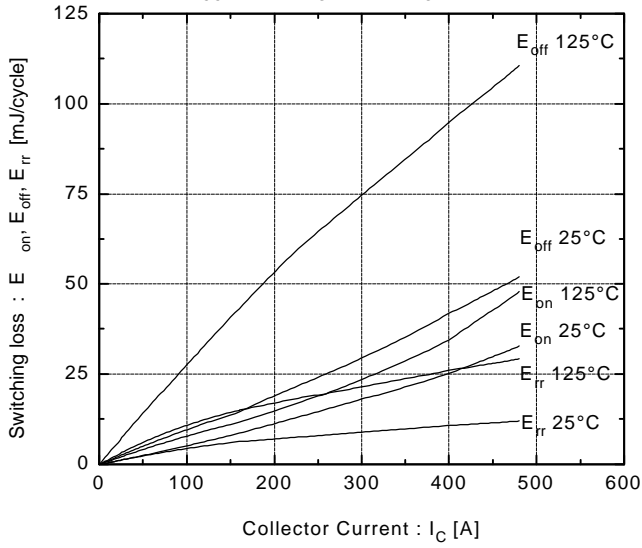
Reversed biased safe operating area

$+V_{GE}=15V, -V_{GE}\leq 15V, T_j\leq 125^\circ C, R_G\geq 2.7\Omega$



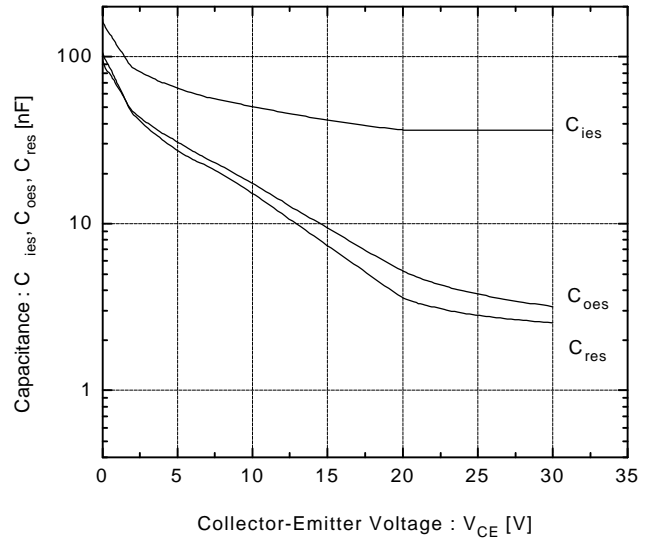
Switching loss vs. Collector current

$V_{CC}=600V, R_G=2.7\Omega, V_{GE}=\pm 15V$



Capacitance vs. Collector-Emitter voltage

$T_j=25^\circ C$



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