

1MBK30D-060S

Molded IGBT

600V / 30A Molded Package

■ Features

- Small molded package
- Low power loss
- Soft switching with low switching surge and noise
- High reliability, high ruggedness (RBSOA, SCSOA etc.)
- Comprehensive line-up

■ Applications

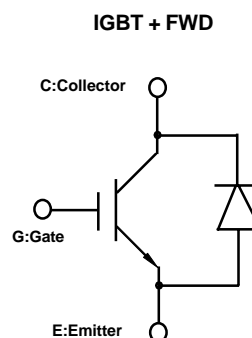
- Inverter for Motor drive
- AC and DC Servo drive amplifier
- Uninterruptible power supply

■ Maximum ratings and characteristics

● Absolute maximum ratings (Tc=25°C)

| Item | Symbol | Rating | Unit | | |
|-------------------------------|------------------|-----------------------|-------------------|----|---|
| Collector-Emitter voltage | V _{CES} | 600 | V | | |
| Gate-Emitter voltage | V _{GES} | ±20 | V | | |
| Collector current | DC | T _c =25°C | I _{C25} | 50 | A |
| | | T _c =100°C | I _{C100} | 30 | A |
| | 1ms | T _c =25°C | I _{CP} | 90 | A |
| Max. power dissipation (IGBT) | P _C | 150 | W | | |
| Max. power dissipation (FWD) | P _C | 80 | W | | |
| Operating temperature | T _j | +150 | °C | | |
| Storage temperature | T _{stg} | -40 to +150 | °C | | |
| Screw torque | - | 39.2 to 58.8 | N·cm | | |

■ Equivalent Circuit Schematic



● Electrical characteristics (at Tc=25°C unless otherwise specified)

| Item | Symbol | Characteristics | | | Conditions | Unit | |
|--------------------------------------|------------------------|-------------------|-------------------|------|---|--|----|
| | | Min. | Typ. | Max. | | | |
| Zero gate voltage collector current | I _{CES} | – | – | 1.0 | V _{GE} =0V, V _{CES} =600V | mA | |
| Gate-Emitter leakage current | I _{GES} | – | – | 10 | V _{CE} =0V, V _{GE} =±20V | μA | |
| Gate-Emitter threshold voltage | V _{GE(th)} | 4.0 | 5.0 | 6.0 | V _{CE} =20V, I _C =30mA | V | |
| Collector-Emitter saturation voltage | V _{CE(sat)} | – | 2.4 | 2.9 | V _{GE} =15V, I _C =30A | V | |
| Input capacitance | C _{ies} | – | 1960 | – | V _{GE} =0V | pF | |
| Output capacitance | C _{oes} | – | 222 | – | V _{CE} =25V | | |
| Reverse transfer capacitance | C _{res} | – | 101 | – | f=1MHz | | |
| Switching Time | Turn-on time | t _{on} * | – | 0.15 | – | V _{CC} =300V, I _C =30A | μs |
| | | t _r * | – | 0.09 | – | V _{GE} =±15V | |
| | | t _{rr2} | – | 0.03 | – | R _G =36 ohm | |
| | Turn-off time | t _{off} | – | 0.50 | 0.62 | (Half Bridge) | |
| | | t _f | – | 0.10 | 0.17 | Inductance Load | |
| | | Turn-on time | t _{on} * | – | 0.15 | – | |
| | t _r * | | – | 0.09 | – | V _{GE} =+15V | |
| | t _{rr2} | | – | 0.03 | – | R _G =10 ohm | |
| Turn-off time | t _{off} | – | 0.50 | 0.62 | (Half Bridge) | | |
| | t _f | – | 0.10 | 0.17 | Inductance Load | | |
| | FWD forward on voltage | V _F | – | 2.0 | 2.5 | I _F =30A, V _{GE} =0V | V |
| Reverse recovery time | t _{rr} | – | 0.06 | 0.10 | I _F =30A, V _{GE} =-10V, V _R =300V, di/dt=100A/μs | μs | |

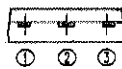
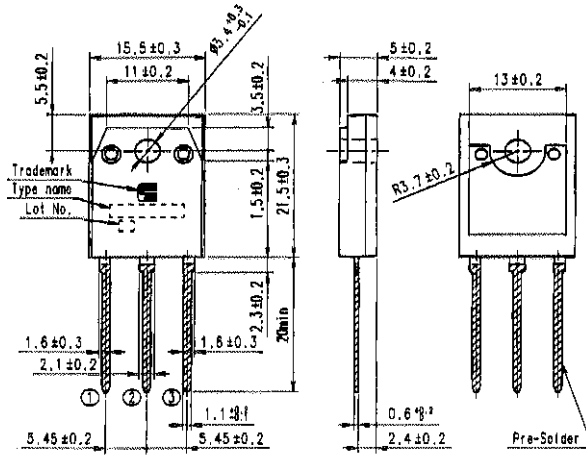
*Turn-on characteristics include t_{rr2}. See a figure in next page.

● Thermal resistance characteristics

| Item | Symbol | Characteristics | | | Conditions | Unit |
|--------------------|----------------------|-----------------|------|------|------------|------|
| | | Min. | Typ. | Max. | | |
| Thermal resistance | R _{th(j-c)} | – | – | 0.83 | IGBT | °C/W |
| | R _{th(j-c)} | – | – | 1.56 | FWD | °C/W |

Outline drawings, mm

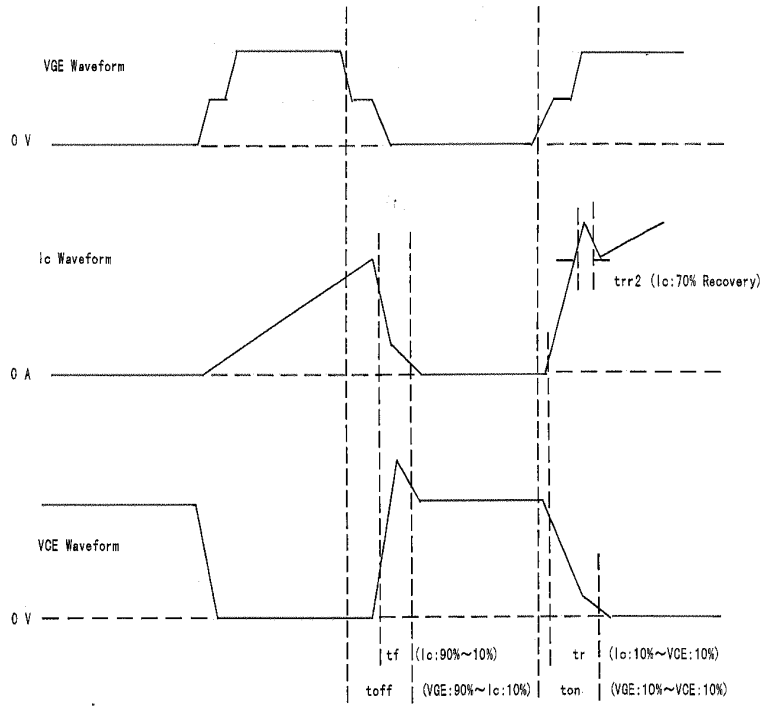
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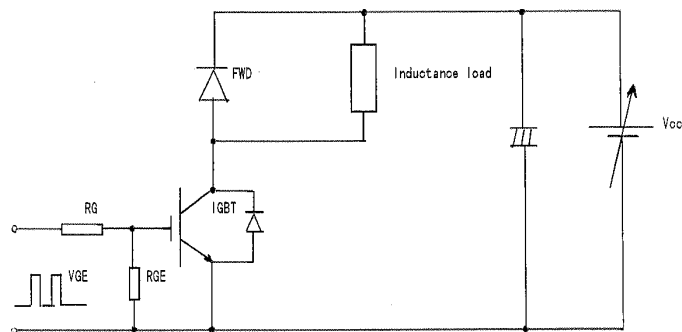
CONNECTION

- ① Gate
- ② Collector
- ③ Emitter

Switching waveform (Inductance load)

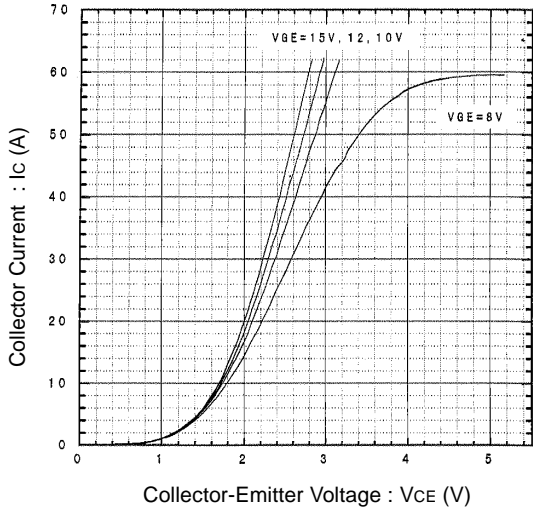


Mesurement circuit

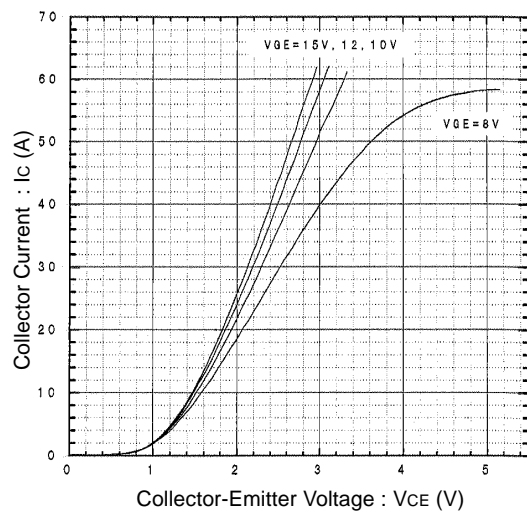


Characteristics

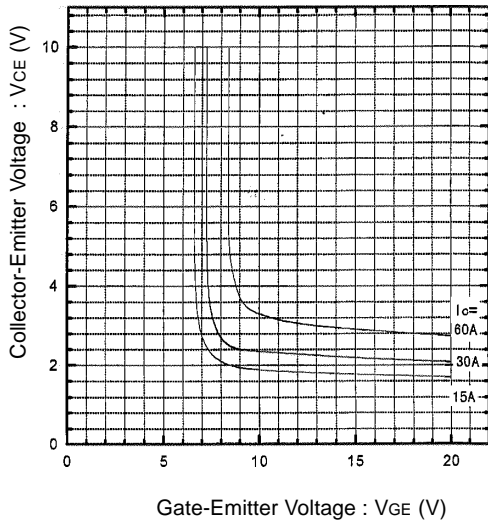
Collector current vs. Collector-Emitter voltage
T_j=25°C



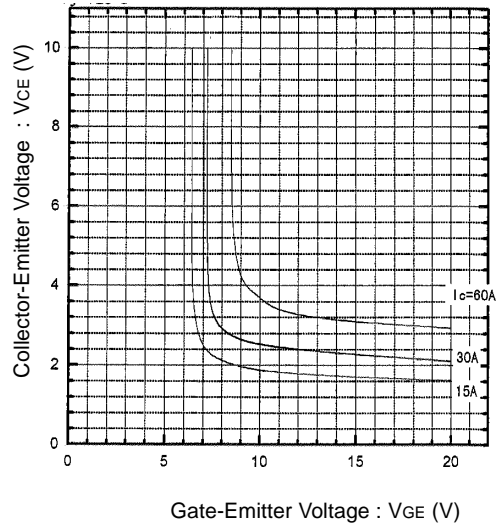
Collector current vs. Collector-Emitter voltage
T_j=125°C



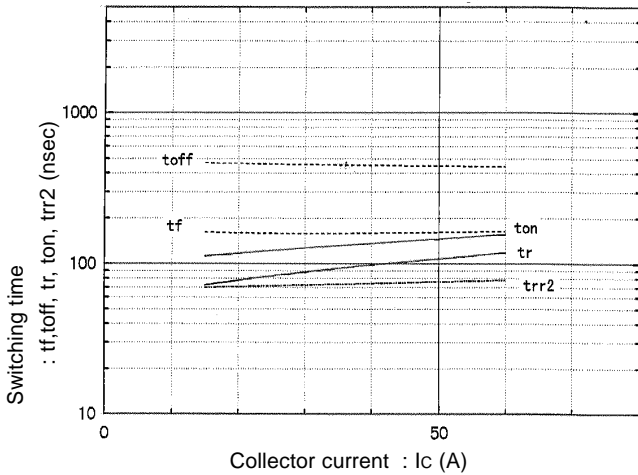
Collector-Emitter voltage vs. Gate-Emitter voltage
T_j=25°C



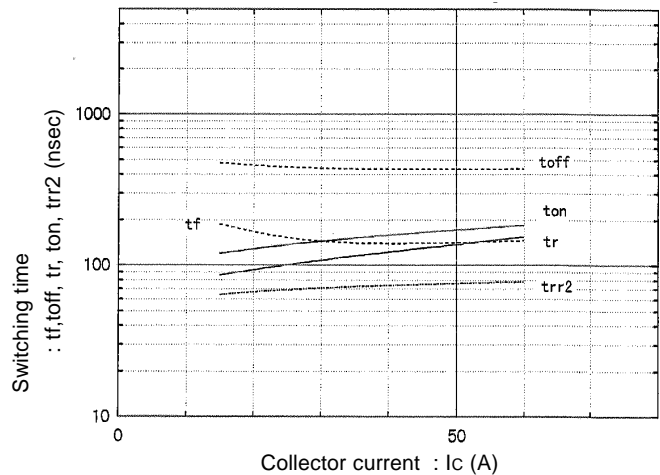
Collector-Emitter voltage vs. Gate-Emitter voltage
T_j=125°C



Switching time vs. Collector current
V_{CC}=300V, R_G=10Ω, V_{GE}=+15V, T_j=125°C



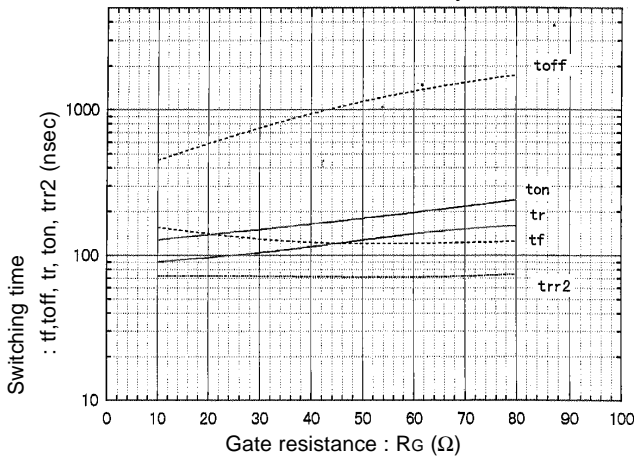
Switching time vs. Collector current
V_{CC}=300V, R_G=36Ω, V_{GE}=±15V, T_j=125°C



Characteristics

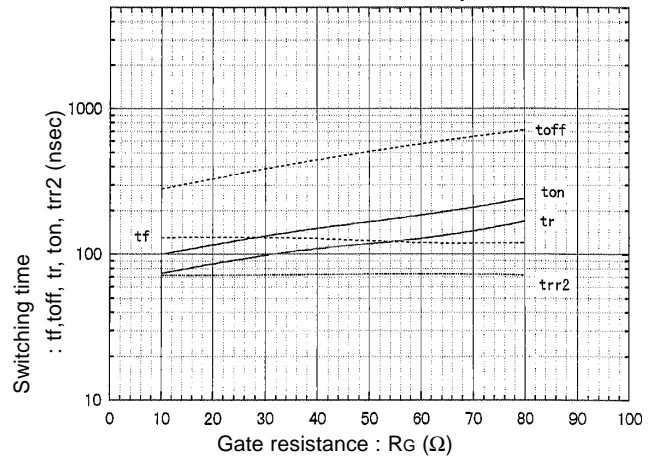
Switching time vs. R_G

V_{CC}=300V, I_C=30A, V_{GE}=+15V, T_J=125°C



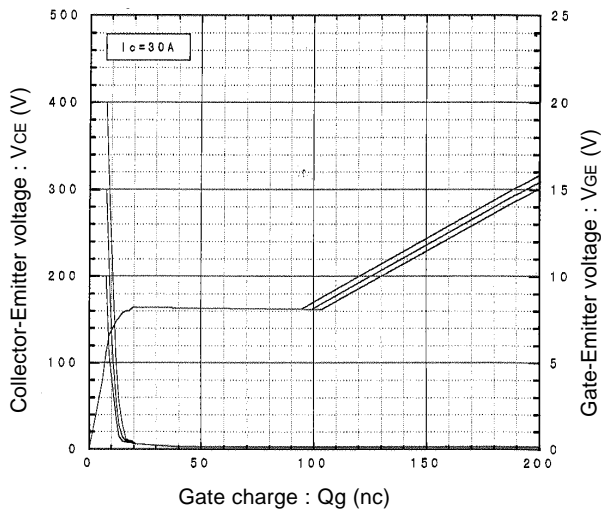
Switching time vs. R_G

V_{CC}=300V, I_C=30A, V_{GE}=±15V, T_J=125°C



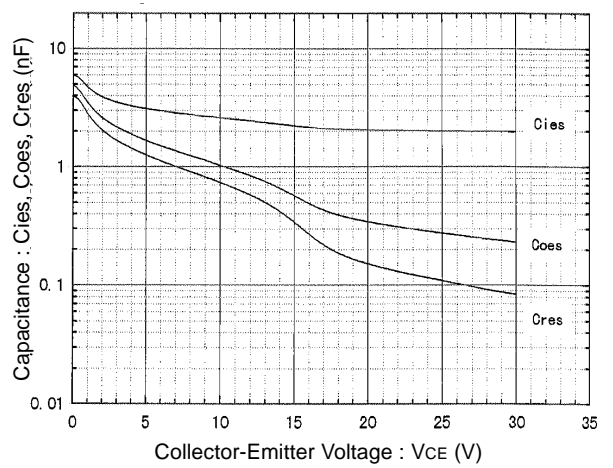
Dynamic input characteristics

T_J=25°C



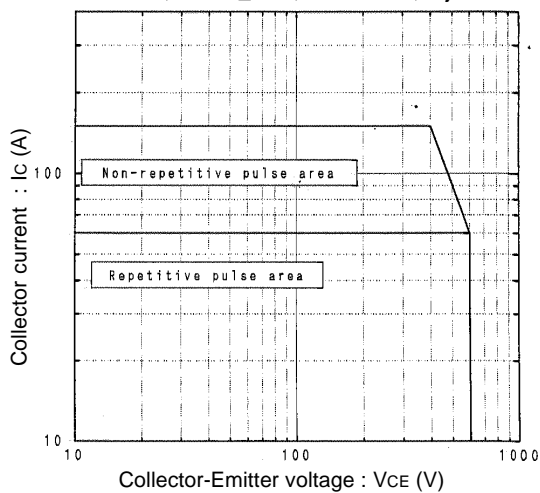
Capacitance vs. Collector-Emitter voltage

T_J=25°C

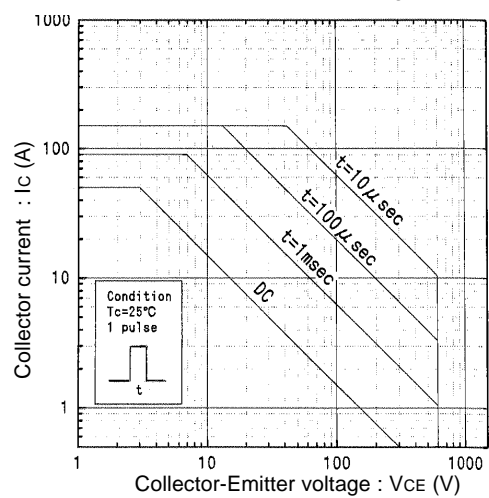


Reverse Biased Safe Operating Area

R_G=10Ω, +V_{GE}≤20V, -V_{GE}=15V, T_J≤125°C

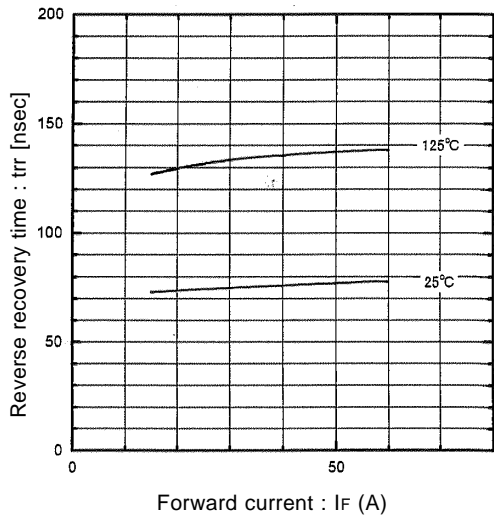


Forward Bias Safe Operating Area

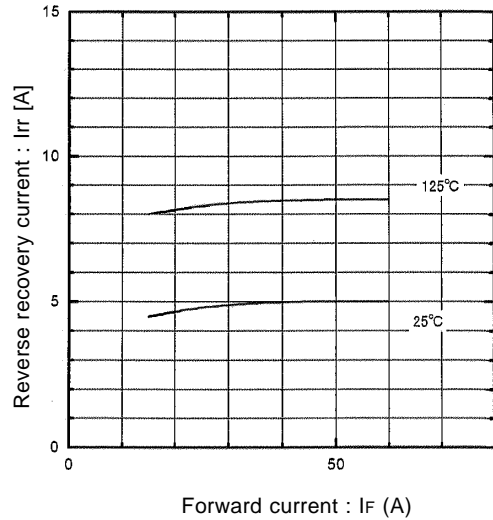


■ Characteristics

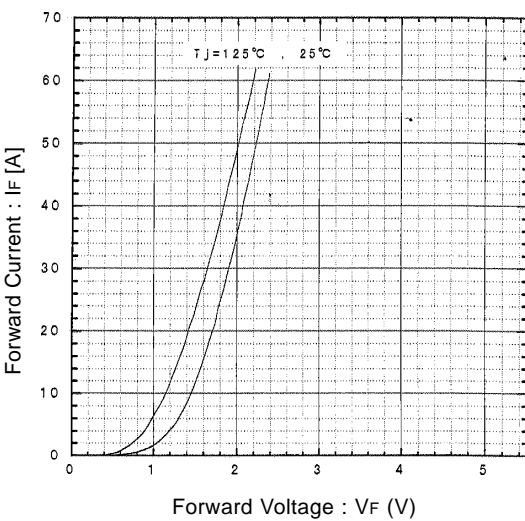
Reverse recovery time vs. Forward Current
 VR=300V, -di/dt=100A/μsec



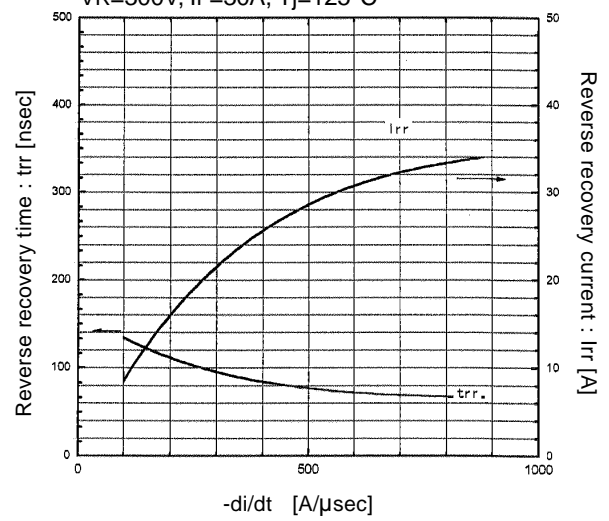
Reverse recovery current vs. Forward current
 VR=300V, -di/dt=100A/μsec



Forward Voltage vs. Forward current



Reverse recovery characteristics vs. -di/dt
 VR=300V, IF=30A, Tj=125°C



Transient thermal resistance

