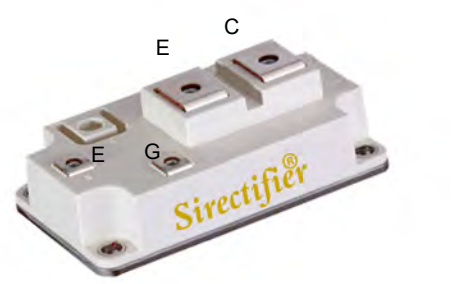
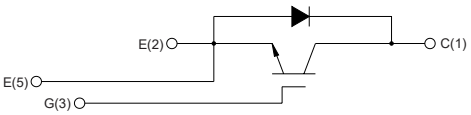
# SGO400NF120UC3

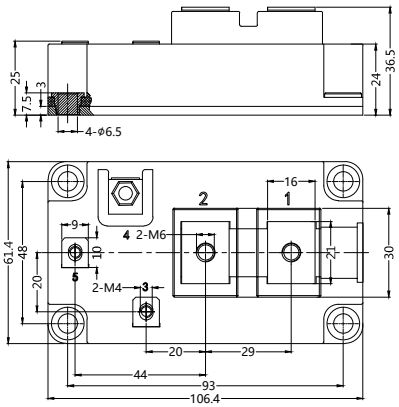
## IGBT Modules




**SGO400NF120UC3**




Dimensions in mm (1mm = 0.0394")




$T_C$ = 25°C, unless otherwise specified

| Symbol | Conditions | Values | Units |
|---|---|---|---|
| IGBT | | | |
| $V_{CES}$ | | 1200 | V |
| $I_{Cnom}$ | | 400 | A |
| $I_{CRM}$ | $T_C$= 25°C, $t_P$ =1ms | 1200 | A |
| $V_{GES}$ | | ±20 | V |
| $T_{Vj}$ | | -40...+175 | °C |
| Inverse Diode | | | |
| $I_F$ | $T_C$= 25(80)°C | 440(330) | A |
| $I_{FRM}$ | $T_C$= 25°C, $t_P$ =1ms | 1200 | A |
| $I_{FSM}$ | $t_P$ =10ms; sin.;$T_j$=150°C | 1980 | A |
| Module | | | |
| $I_{t(RMS)}$ | $T_{teminal}$ = 80°C | 500 | A |
| $T_{stg}$ | | -40~125 | °C |
| $V_{Isol}$ | AC, 1min | 4000 | V |

### *Features*

- Planar Gate Field Stop IGBT technology
- Low switching losses
- Switching frequency > 20kHz
- Square RBSOA, no latch up
- High short circuit capability
- Positive temperature coefficient for easy parallelling
- MOS input, voltage controlled
- Soft swithcing FWD Technology
- Package with copper base plate
- Isolation voltage 4000V

### *Application*

- AC and DC motor control
- AC servo and robot drives
- power supplies
- welding inverters

### *Advantages*

- space and weight savings
- reduced protection circuits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# SGO400NF120UC3

## IGBT Modules

**Characteristics** $T_C = 25^oC$, unless otherwise specified

| Symbol | Conditions | min. | typ. | max. | Units |
|---|---|---|---|---|---|
| IGBT | | | | | |
| $V_{GE(th)}$ | $V_{GE} = V_{CE}$, $I_C$ =15.2mA | 4.5 | 5.0 | 5.7 | V |
| $I_{CES}$ | $V_{GE}$ = 0; $V_{CE} = V_{CES}$; $T_j = 25^oC$ | | | 0.5 | mA |
| $V_{CE(TO)}$ | $T_j = 25^oC$ | | 1.4 | 1.6 | V |
| $r_{CE}$ | $V_{GE}$ = 15V, $T_j = 25(150)^oC$ | | 2.75（3.75) | 3.51(4.75) | mΩ |
| $V_{CE(sat)}$ | $I_C$ =400A; $V_{GE}$ = 15V; chip level | | 2.30 | 2.55 | V |
| $C_{ies}$<br>$C_{oes}$<br>$C_{res}$ | under following conditions<br>$V_{GE}$ = 0, $V_{CE}$ = 25V, f = 1MHz | | 28.8<br>4.40<br>2.52 | | nF |
| $L_{CE}$ | | | | 30 | nH |
| $R_{CC'+EE'}$ | res., terminal-chip $T_C = 25(125)^oC$ | | 0.35(0.55) | | mΩ |
| $t_{d(on)}$<br>$t_r$<br>$t_{d(off)}$<br>$t_f$ | under following conditions:<br>$V_{CC}$ = 600V, $I_C$ = 400A<br>$R_{Gon} = R_{Goff}$ = 10Ω, $T_j = 125^oC$<br>$V_{GE}$ = ± 15V | | 25<br>49<br>290<br>88 | | ns<br>ns<br>ns<br>ns |
| $E_{on}(E_{off})$ | $T_C = 25^oC$ | | 70(25) | | mJ |
| Inverse Diode under following conditions: | | | | | |
| $V_F = V_{EC}$ | $I_F$ =400A; $V_{GE}$ = 0V; $T_j = 25^oC$ | | 2.20 | 2.52 | V |
| $V_{(FO)}$ | $T_j = 25(150)^oC$ | | 1.3(0.9) | 1.5(1.1) | V |
| $r_F$ | $T_j = 25(150)^oC$ | | 2.3(3.1) | 2.5(3.4) | mΩ |
| $I_{RRM}$<br>$Q_{rr}$<br>$E_{rr}$ | $I_F$ = 400A; $T_j = 150^oC$<br>di/dt = 8800A/us<br>$V_{GE}$ = 15V | | 450<br>68<br>30 | | A<br>uC<br>mJ |
| Thermal Characteristics | | | | | |
| $R_{th(j-c)}$ | per IGBT | | | 0.072 | K/W |
| $R_{th(j-c)D}$ | per Inverse Diode | | | 0.140 | K/W |
| $R_{th(c-s)}$ | per module | | | 0.038 | K/W |
| Mechanical Data | | | | | |
| $M_s$ | to heatsink M6 | 3 | | 5 | Nm |
| $M_t$ | to terminals M6 | 2.5 | | 5 | Nm |
| Weight | typical | | | 340 | g |


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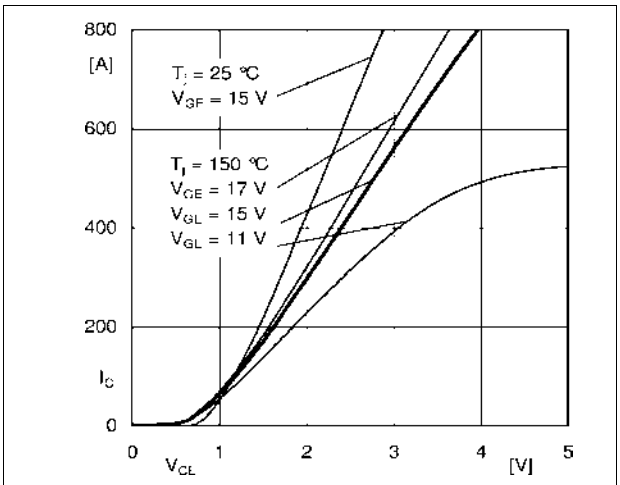


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

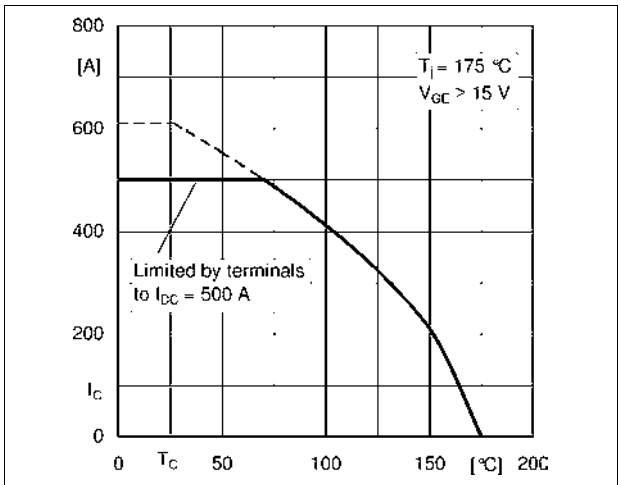


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

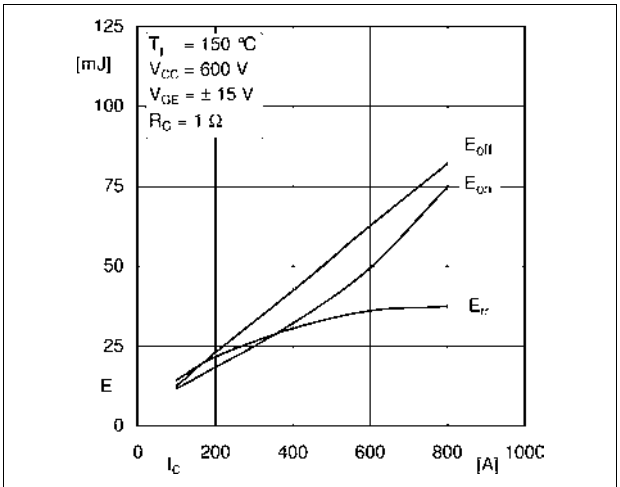


Fig. 3: Typ. turn-on /-off energy = f ($I_C$)

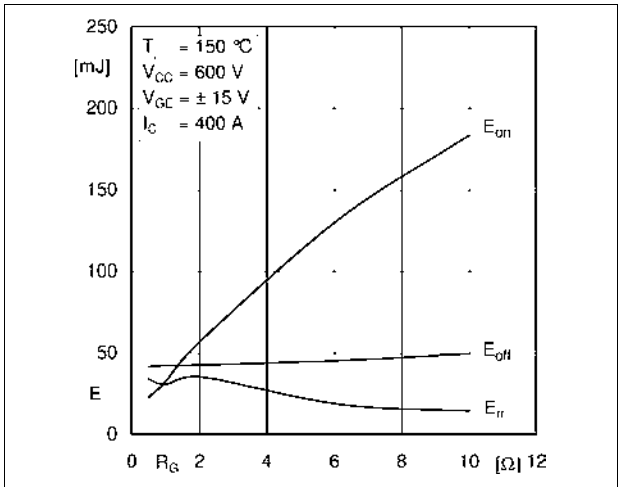


Fig. 4: Typ. turn-on /-off energy = f ($R_G$)

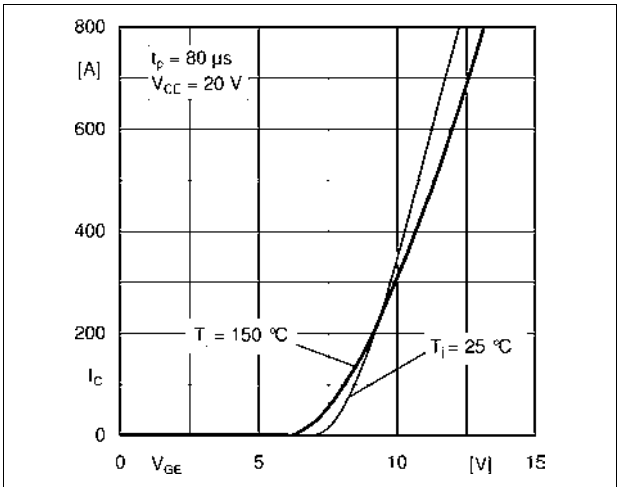


Fig. 5: Typ. transfer characteristic

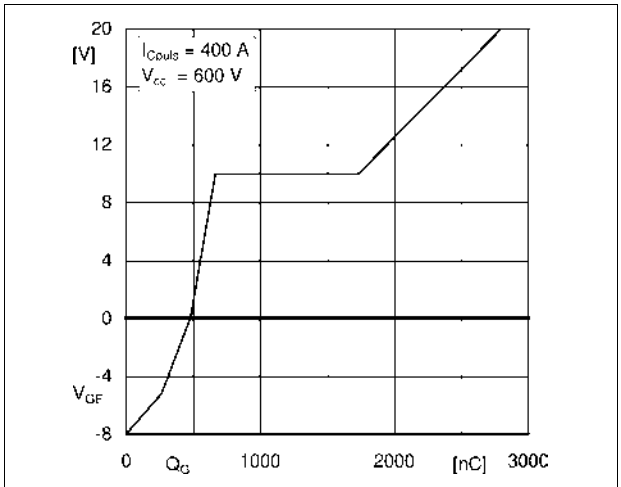


Fig. 6: Typ. gate charge characteristic



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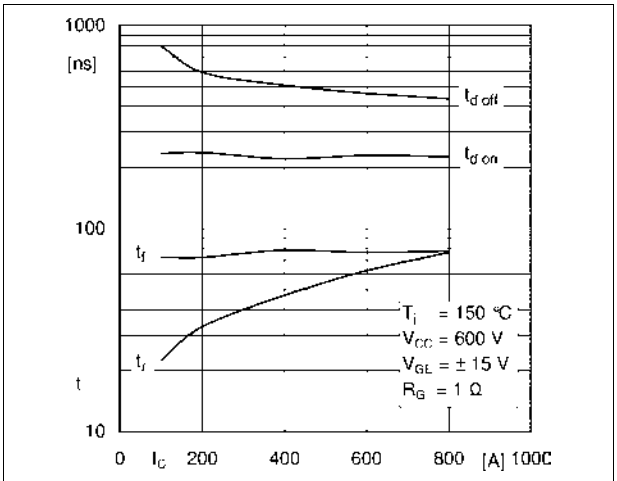


Fig. 7: Typ. switching times vs. $I_C$

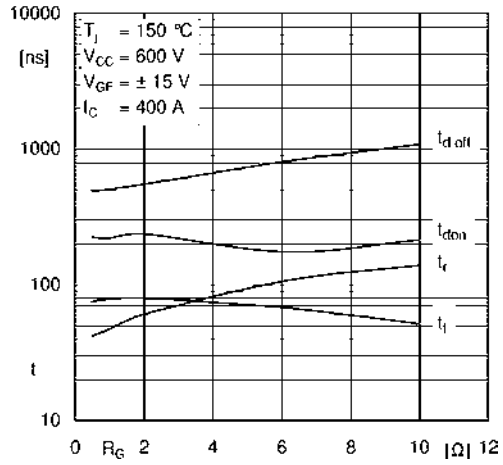


Fig. 8: Typ. switching times vs. gate resistor $R_G$

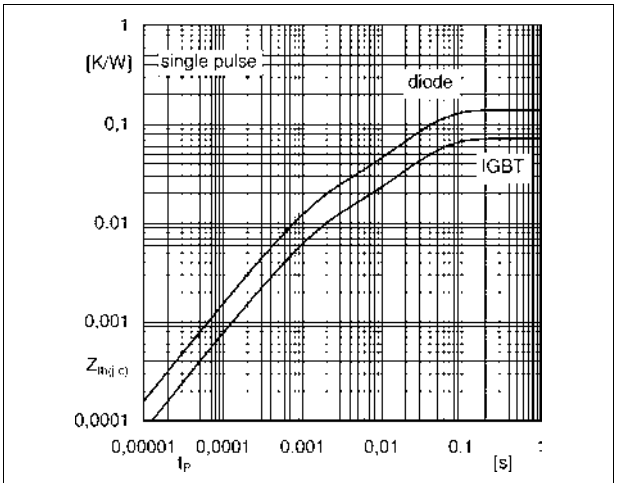


Fig. 9: Transient thermal impedance

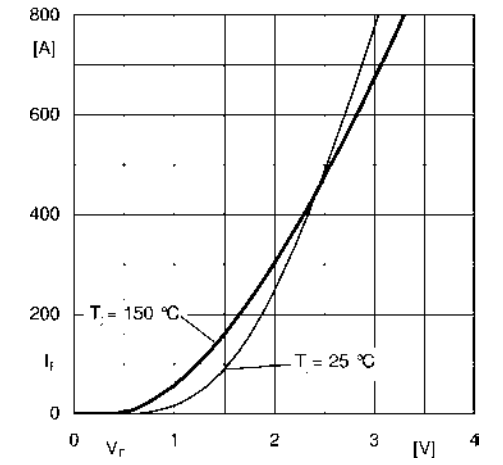


Fig. 10: Typ. FRD diode forward charact., incl. $R_{CC'+\,EE'}$

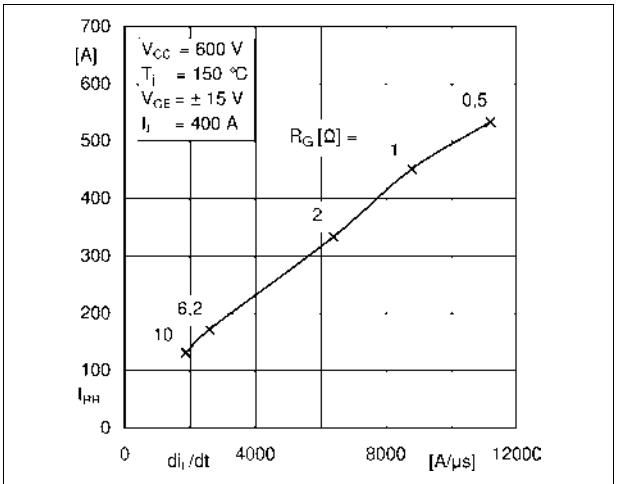


Fig. 11: FRD diode peak reverse recovery current

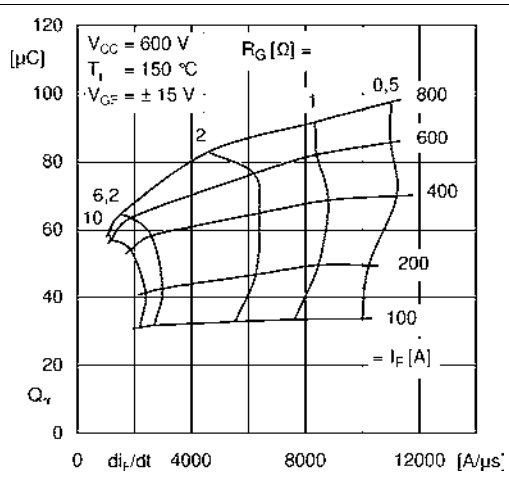


Fig. 12: Typ. FRD diode peak reverse recovery charge


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