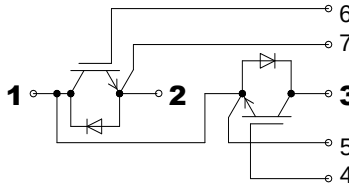


# SGG400T120UC2

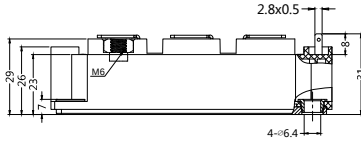
## IGBT Modules



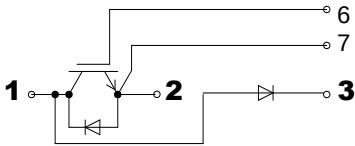
SGG400T120UC2



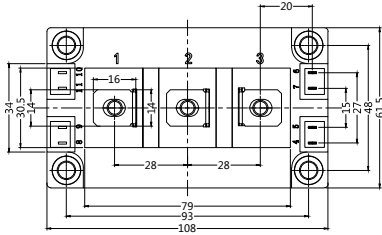
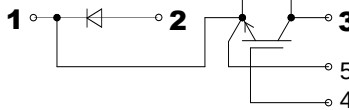
Dimensions in mm (1mm = 0.0394")



SGD400T120UC2



SDG400T120UC2



T<sub>C</sub> = 25°C, unless otherwise specified

| Symbol              | Conditions                                        | Values     | Units |
|---------------------|---------------------------------------------------|------------|-------|
| IGBT                |                                                   |            |       |
| V <sub>CES</sub>    |                                                   | 1200       | V     |
| I <sub>Cnom</sub>   | T <sub>C</sub> =25(100)°C                         | 800(400)   | A     |
| I <sub>CRM</sub>    | T=25°C, t <sub>P</sub> =1ms                       | 1200       | A     |
| V <sub>GES</sub>    |                                                   | ±20        | V     |
| T <sub>Vj</sub>     |                                                   | -40...+175 | °C    |
| Inverse Diode       |                                                   |            |       |
| I <sub>F</sub>      | T <sub>C</sub> = 25(100)°C                        | 800(400)   | A     |
| I <sub>FRM</sub>    | T <sub>C</sub> = 25°C, t <sub>P</sub> =1ms        | 1200       | A     |
| I <sub>FSM</sub>    | t <sub>P</sub> =10ms; sin.; T <sub>J</sub> =150°C | 1980       | A     |
| Module              |                                                   |            |       |
| I <sub>t(RMS)</sub> | T <sub>terminal</sub> = 80°C                      | 500        | A     |
| T <sub>stg</sub>    |                                                   | -40~125    | °C    |
| V <sub>Isol</sub>   | AC, 1min                                          | 4000       | V     |

### Features

- Trench Field Stop IGBT technology
- Low switching losses
- Switching frequency up to 20kHz
- Square RBSOA, no latch up
- High short circuit capability
- Positive temperature coefficient for easy parallelling
- MOS input, voltage controlled
- Soft switching FRD 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

**Sirectifier®**

# SGG400T120UC2

## IGBT Modules

### Characteristics

$T_C = 25^{\circ}\text{C}$ , unless otherwise specified

| Symbol                                           | Conditions                                                                                                                                             | min. | typ.       | max.       | Units         |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------|------------|---------------|
| <b>IGBT</b>                                      |                                                                                                                                                        |      |            |            |               |
| $V_{GE(th)}$                                     | $V_{GE}=V_{CE}, I_C=15.2\text{mA}$                                                                                                                     | 5.3  | 5.8        | 6.3        | V             |
| $I_{CES}$                                        | $V_{GE}=0; V_{CE}=V_{CES}; T_j=25^{\circ}\text{C}$                                                                                                     |      |            | 5.0        | mA            |
| $V_{CE(TO)}$                                     | $T_j=25^{\circ}\text{C}$                                                                                                                               |      | 0.8        | 0.9        | V             |
| $r_{CE}$                                         | $V_{GE}=15\text{V}, T_j=25(150)^{\circ}\text{C}$                                                                                                       |      | 2.50(3.75) | 2.88(4.00) | m $\Omega$    |
| $V_{CE(sat)}$                                    | $I_C=400\text{A}; V_{GE}=15\text{V}; \text{chip level}$                                                                                                |      | 1.80       | 2.05       | V             |
| $C_{ies}$                                        | under following conditions<br>$V_{GE}=0, V_{CE}=25\text{V}, f=1\text{MHz}$                                                                             |      | 24.6       |            | nF            |
| $C_{oes}$                                        |                                                                                                                                                        |      | 1.62       |            |               |
| $C_{res}$                                        |                                                                                                                                                        |      | 1.38       |            |               |
| $L_{CE}$                                         |                                                                                                                                                        |      | 15         |            | nH            |
| $R_{CC'+EE'}$                                    | res., terminal-chip $T_C=25(125)^{\circ}\text{C}$                                                                                                      |      | 0.25(0.55) |            | m $\Omega$    |
| $t_{d(on)}$                                      | under following conditions:<br>$V_{CC}=600\text{V}, I_C=400\text{A}$<br>$R_{Gon}=R_{Goff}=1\Omega, T_j=150^{\circ}\text{C}$<br>$V_{GE}=\pm 15\text{V}$ |      | 220        |            | ns            |
| $t_r$                                            |                                                                                                                                                        |      | 49         |            | ns            |
| $t_{d(off)}$                                     |                                                                                                                                                        |      | 505        |            | ns            |
| $t_f$                                            |                                                                                                                                                        |      | 78         |            | ns            |
| $E_{on}(E_{off})$                                |                                                                                                                                                        |      | 33(42)     |            | mJ            |
| <b>Inverse Diode</b> under following conditions: |                                                                                                                                                        |      |            |            |               |
| $V_F = V_{EC}$                                   | $I_F=400\text{A}; V_{GE}=0\text{V}; T_j=25^{\circ}\text{C}$                                                                                            |      | 2.20       | 2.52       | V             |
| $V_{(FO)}$                                       | $T_j=25(150)^{\circ}\text{C}$                                                                                                                          |      | 1.3(0.9)   | 1.5(1.1)   | V             |
| $r_F$                                            | $T_j=25(150)^{\circ}\text{C}$                                                                                                                          |      | 2.3(3.1)   | 2.5(3.4)   | m $\Omega$    |
| $I_{RRM}$                                        | $I_F=400\text{A}; T_j=150^{\circ}\text{C}$                                                                                                             |      | 450        |            | A             |
| $Q_{rr}$                                         | $di/dt=8800\text{A/us}$                                                                                                                                |      | 68         |            | $\mu\text{C}$ |
| $E_{rr}$                                         | $V_{GE}=15\text{V}$                                                                                                                                    |      | 30         |            | mJ            |
| <b>Thermal Characteristics</b>                   |                                                                                                                                                        |      |            |            |               |
| $R_{th(j-c)}$                                    | per IGBT                                                                                                                                               |      |            | 0.072      | K/W           |
| $R_{th(j-c)D}$                                   | per Inverse Diode                                                                                                                                      |      |            | 0.14       | K/W           |
| $R_{th(c-s)}$                                    | per module                                                                                                                                             |      |            | 0.038      | K/W           |
| <b>Mechanical Data</b>                           |                                                                                                                                                        |      |            |            |               |
| $M_s$                                            | to heatsink M6                                                                                                                                         | 3    |            | 5          | Nm            |
| $M_t$                                            | to terminals M6                                                                                                                                        | 2.5  |            | 5          | Nm            |
| Weight                                           | typical                                                                                                                                                |      |            | 325        | g             |

# SGG400T120UC2

## IGBT Modules

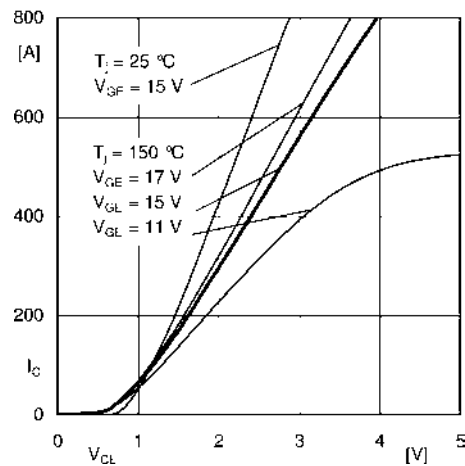


Fig. 1:Typ. output characteristic, inclusive  $R_{CC'+EE'}$

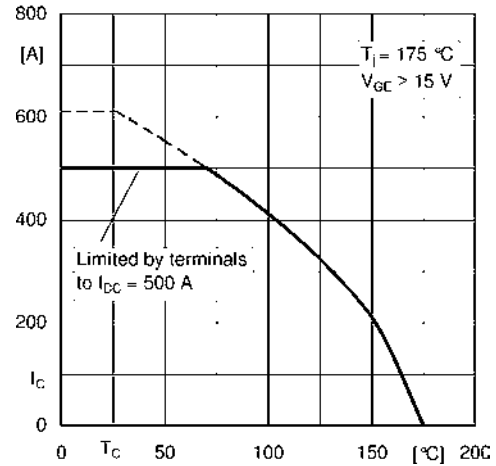


Fig. 2:Rated current vs. temperature  $I_C=f(T_C)$

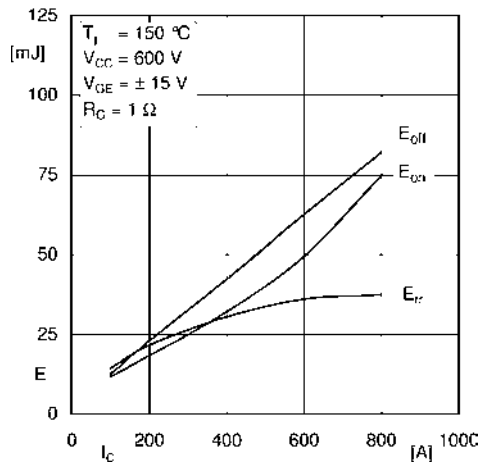


Fig. 3:Typ. turn-on /-off energy= $f(I_C)$

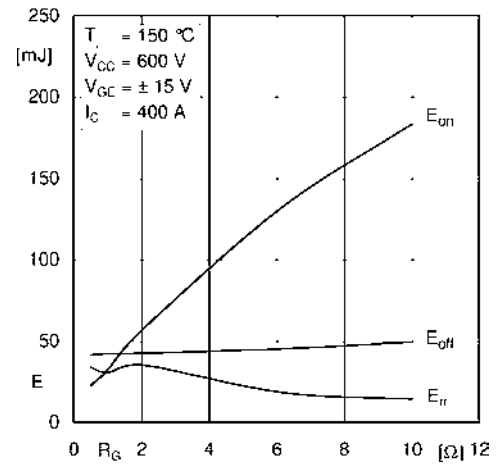


Fig. 4:Typ. turn-on /-off energy= $f(R_G)$

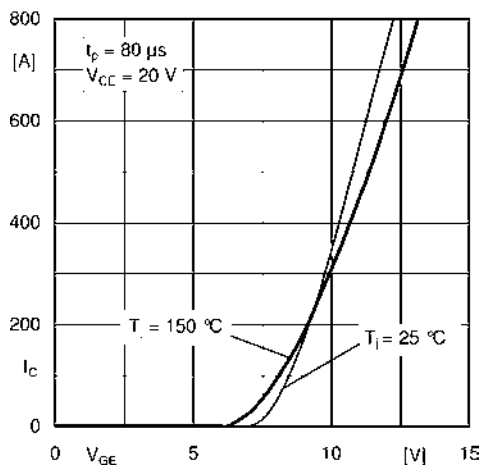


Fig. 5:Typ. transfer characteristic

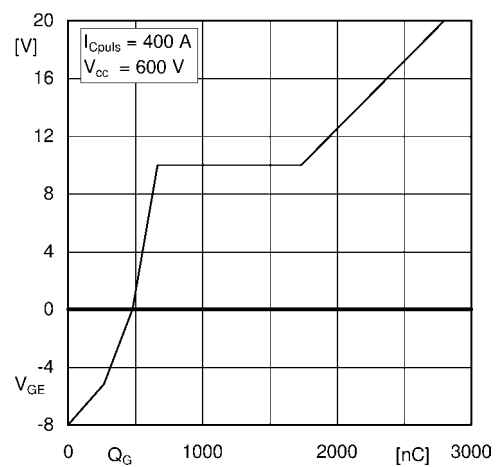


Fig. 6:Typ. gate charge characteristic

# SGG400T120UC2

## IGBT Modules

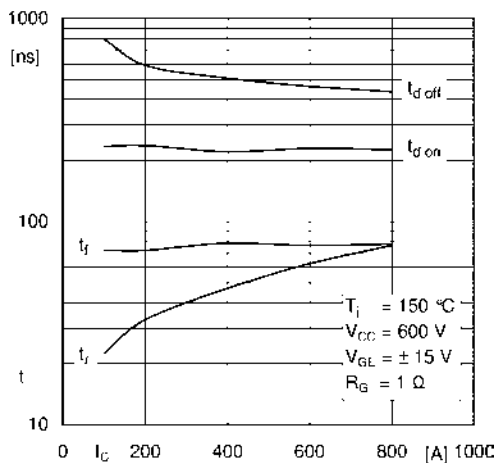


Fig.7:Typ. switching times vs.  $I_C$

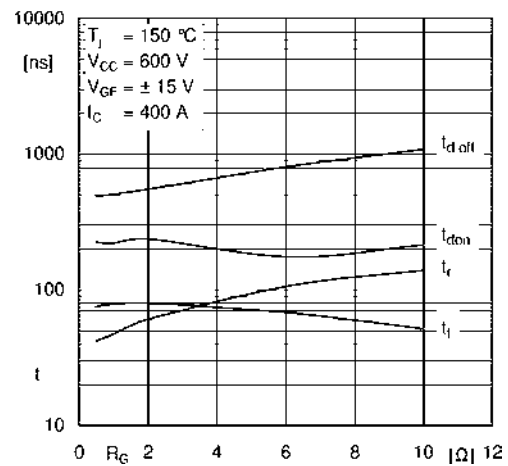


Fig.8:Typ. switching times vs. gate resistor  $R_G$

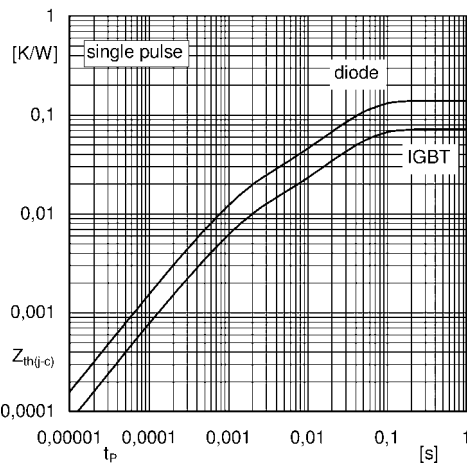


Fig.9:Transient thermal impedance

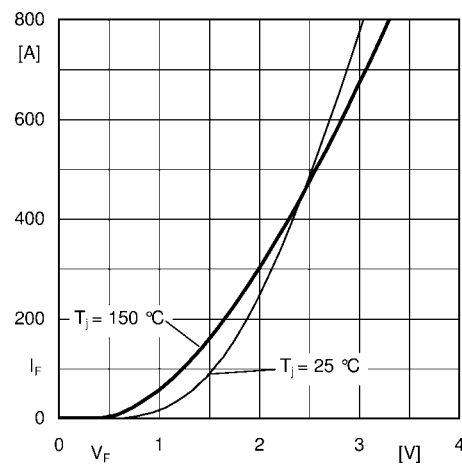


Fig.10:Typ. FRD diode forward charact., incl.  $R_{CC}+EE'$

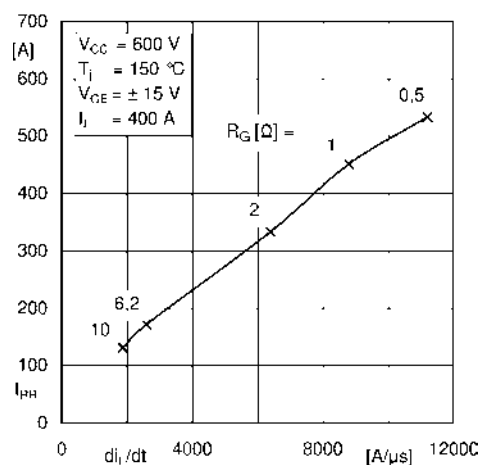


Fig.11:FRD diode peak reverse recovery current

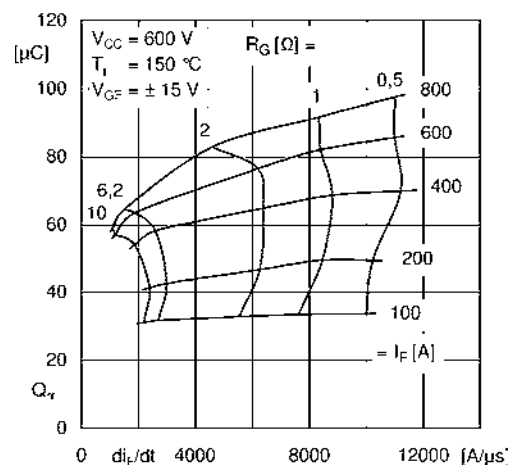


Fig.12:Typ. FRD diode peak reverse recovery charge