

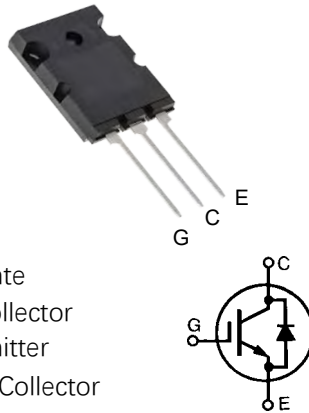
# SG60T120UDB3

## Discrete IGBTs

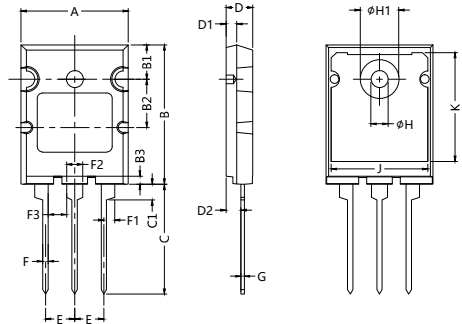
$V_{CES} = 1200V$   
 $I_{C90} = 60A$   
 $V_{CEsat(typ)} = 2.10V$   
 $E_{off(typ)} = 2.4mJ$



G=Gate  
C=Collector  
E=Emitter  
TAB=Collector



TO-264



### IGBT

| Symbol                             | Test Conditions                                                                                                                             | Maximum Ratings                 | Unit                       |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|----------------------------|
| $V_{CES}$<br>$V_{CGR}$             | $T_J=25^{\circ}C$ to $150^{\circ}C$<br>$T_J=25^{\circ}C$ to $150^{\circ}C$ ; $R_{GE}=1\ \Omega$ ;                                           | 1200<br>1200                    | V                          |
| $V_{GES}$<br>$V_{GEM}$             | Continuous<br>Transient                                                                                                                     | $\pm 20$<br>$\pm 30$            | V                          |
| $I_{C25}$<br>$I_{C90}$<br>$I_{CM}$ | $T_C=25^{\circ}C$ ; limited by leads<br>$T_C=90^{\circ}C$<br>$T_C=25^{\circ}C$ , 1 ms                                                       | 100<br>60<br>200                | A                          |
| <b>SSOA</b><br><b>(RBSOA)</b>      | $V_{GE}=15V$ ; $T_{VJ}=125^{\circ}C$ ; $R_G=5\ \Omega$<br>Clamped inductive load                                                            | $I_{CM}=150$<br>@ 0.8 $V_{CES}$ | A                          |
| $P_c$                              | $T_C=25^{\circ}C$                                                                                                                           | 350                             | W                          |
| $T_J$<br>$T_{JM}$<br>$T_{stg}$     |                                                                                                                                             | -55...+175<br>175<br>-55...+150 | $^{\circ}C$                |
|                                    | Maximum lead temperature for soldering<br>1.6 mm (0.062 in.) from case for 10s<br>Maximum Tab temperature for soldering SMD devices for 10s | 300<br>260                      | $^{\circ}C$<br>$^{\circ}C$ |
| $M_d$                              | Mounting torque (M3)                                                                                                                        | 1.13/10                         | Nm/lb.in.                  |
| <b>Weight</b>                      | TO-264                                                                                                                                      | 8                               | g                          |

( $T_J=25^{\circ}C$ , unless otherwise specified)

| Symbol        | Test Conditions                      | Characteristic Values |      |           | Unit    |
|---------------|--------------------------------------|-----------------------|------|-----------|---------|
|               |                                      | min.                  | typ. | max.      |         |
| $BV_{CES}$    | $I_C=1mA$ ; $V_{GE}=0V$              | 1200                  |      |           | V       |
| $V_{GE(th)}$  | $I_C=250\mu A$ ; $V_{CE}=V_{GE}$     | 4.5                   | 5.8  | 7.0       | V       |
| $I_{CES}$     | $V_{CE}=V_{CES}$ ; $T_J=25^{\circ}C$ |                       |      | 260       | $\mu A$ |
|               | $V_{GE}=0V$ ; $T_J=125^{\circ}C$     |                       |      | 4         | mA      |
| $I_{GES}$     | $V_{CE}=0V$ ; $V_{GE}=\pm 20V$       |                       |      | $\pm 250$ | nA      |
| $V_{CE(sat)}$ | $I_C=I_{C90}$ ; $V_{GE}=15V$         |                       | 2.10 | 2.40      | V       |

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

| Symbol                                                                                                                 | Test Conditions                                                                                                                                                                                                                                                                                                                   | Characteristic Values |                                      |      | Unit                             |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------------------------------------|------|----------------------------------|
|                                                                                                                        |                                                                                                                                                                                                                                                                                                                                   | min.                  | typ.                                 | max. |                                  |
| g <sub>ts</sub>                                                                                                        | I <sub>C</sub> =I <sub>C90</sub> ; V <sub>CE</sub> =10V<br>Pulse test, t <sub>s</sub> ≤300us, duty cycle≤2%                                                                                                                                                                                                                       |                       | 33                                   |      | S                                |
| I <sub>C(ON)</sub>                                                                                                     | V <sub>GE</sub> =10V; V <sub>CE</sub> =10V                                                                                                                                                                                                                                                                                        |                       | 175                                  |      | A                                |
| C <sub>ies</sub><br>C <sub>oes</sub><br>C <sub>res</sub>                                                               | V <sub>CE</sub> =25V; V <sub>GE</sub> =0V; f=1MHz                                                                                                                                                                                                                                                                                 |                       | 4800<br>270<br>140                   |      | pF                               |
| Q <sub>g</sub><br>Q <sub>ge</sub><br>Q <sub>gc</sub>                                                                   | I <sub>C</sub> =I <sub>C90</sub> ; V <sub>GE</sub> =15V; V <sub>CE</sub> =0.5V <sub>CES</sub>                                                                                                                                                                                                                                     |                       | 250<br>32<br>157                     |      | nC                               |
| t <sub>d(on)</sub><br>t <sub>ri</sub><br>t <sub>d(off)</sub><br>t <sub>fi</sub><br>E <sub>off</sub>                    | Inductive load, T <sub>J</sub> =25°C<br>I <sub>C</sub> =I <sub>C90</sub> ; V <sub>GE</sub> =15V;<br>V <sub>CE</sub> =0.5V <sub>CES</sub> ; R <sub>G</sub> =R <sub>off</sub> =5 Ω<br>Remarks:Switching times may increase<br>for V <sub>CE</sub> (Clamp)>0.8V <sub>CES</sub> higher T <sub>J</sub> or<br>increased R <sub>G</sub>  |                       | 60<br>56<br>265<br>33<br>2.4         |      | ns<br>ns<br>ns<br>ns<br>mJ       |
| t <sub>d(on)</sub><br>t <sub>ri</sub><br>E <sub>on</sub><br>t <sub>d(off)</sub><br>t <sub>fi</sub><br>E <sub>off</sub> | Inductive load, T <sub>J</sub> =150°C<br>I <sub>C</sub> =I <sub>C90</sub> ; V <sub>GE</sub> =15V;<br>V <sub>CE</sub> =0.5V <sub>CES</sub> ; R <sub>G</sub> =R <sub>off</sub> =5 Ω<br>Remarks:Switching times may<br>increase for V <sub>CE</sub> (Clamp)>0.8V <sub>CES</sub><br>higher T <sub>J</sub> or increased R <sub>G</sub> |                       | 55<br>54<br>3.5<br>300<br>38<br>2.85 |      | ns<br>ns<br>mJ<br>ns<br>ns<br>mJ |
| R <sub>thJC</sub> (IGBT)                                                                                               | TO-264                                                                                                                                                                                                                                                                                                                            |                       |                                      | 0.35 | °C/W                             |
| R <sub>thJA</sub> (IGBT)                                                                                               |                                                                                                                                                                                                                                                                                                                                   |                       |                                      | 40   | °C/W                             |

### Reverse Diode (FRED)

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

| Symbol            | Test Conditions                                                                                             | Characteristic Values |            |            | Unit |
|-------------------|-------------------------------------------------------------------------------------------------------------|-----------------------|------------|------------|------|
|                   |                                                                                                             | min.                  | typ.       | max.       |      |
| V <sub>F</sub>    | I <sub>F</sub> =60A; T <sub>VJ</sub> =125°C<br>T <sub>VJ</sub> =25°C                                        |                       | 1.7<br>2.0 | 2.2<br>2.4 | V    |
| I <sub>RM</sub>   | V <sub>R</sub> =100V; I <sub>F</sub> =60A; -di <sub>F</sub> /dt=100A/us<br>L≤0.05uH; T <sub>VJ</sub> =100°C |                       | 5.4        |            | A    |
| t <sub>rr</sub>   | I <sub>F</sub> =1A; -di <sub>F</sub> /dt=50A/us; V <sub>R</sub> =30V; T <sub>J</sub> =25°C                  |                       | 45         |            | ns   |
| R <sub>thJC</sub> | TO-264                                                                                                      |                       | 0.28       |            | K/W  |

**Sirectifier®**

# SG60T120UDB3

## Discrete IGBTs

### Features

- Trench Field Stop IGBT technology
- Low switching losses
- Switching frequency up to 30KHz
- High short circuit capability
- Positive temperature coefficient for easy paralleling
- MOS input, voltage controlled
- Ultra fast free wheeling diodes

### Application

- AC and DC motor control
- AC servo and robot drives
- Power supplies
- Welding inverters
- Solar inverters
- Chargers

### Advantages

- Space and weight savings
- Reduced protection circuits

### Standard applicable to Power Semiconductors

- IEC191-1/4
- IEC747-1
- IEC747-6
- IEC68-2-...
- UL94-V0

### Product Reliability

- IEC147-4
- IEC68-2-14
- IEC68-2-20
- IEC68-2-27
- CECC50000-4.4.3

### Package: TO-264

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

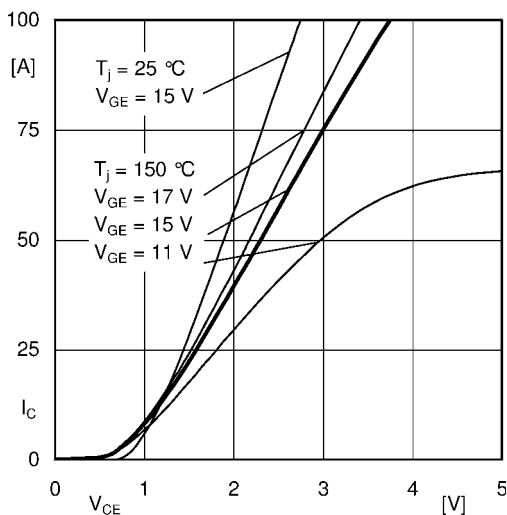


Fig. 1: Typ. output characteristic, inclusive  $R_{CC'+EE'}$

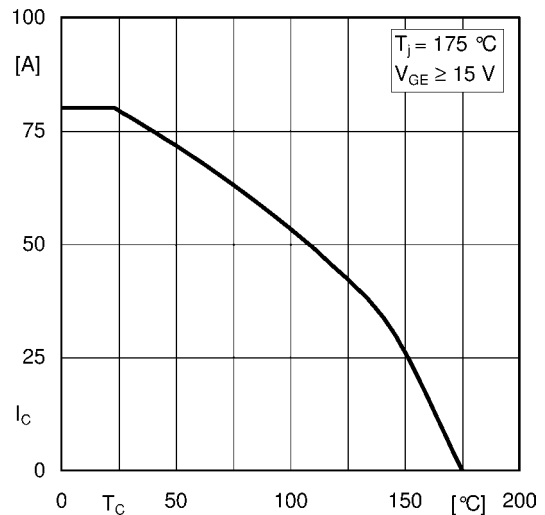


Fig. 2: Rated current vs. temperature  $I_C = f(T_C)$

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## Discrete IGBTs

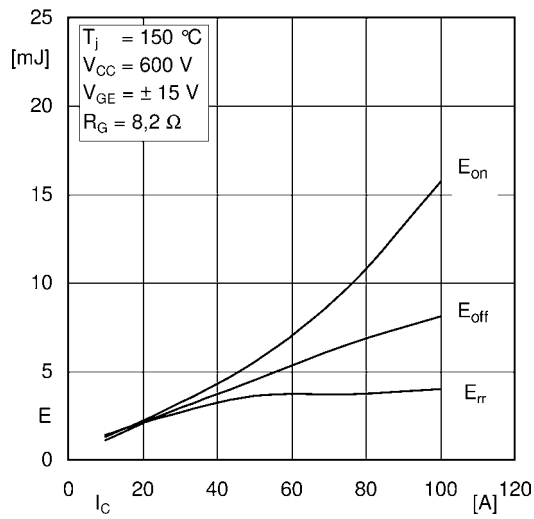


Fig. 3: Typ. turn-on /-off energy =  $f(I_C)$

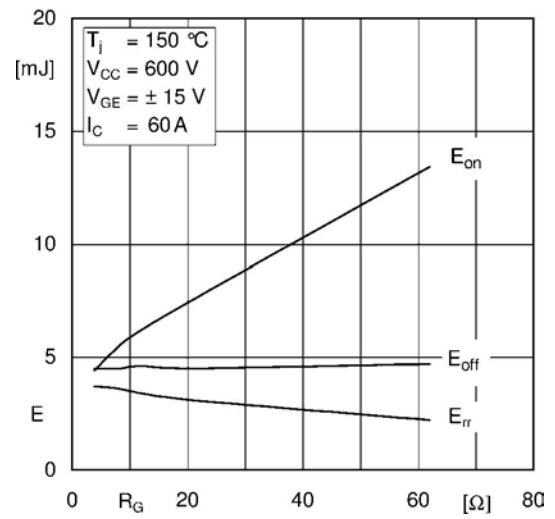


Fig. 4: Typ. turn-on /-off energy =  $f(R_G)$

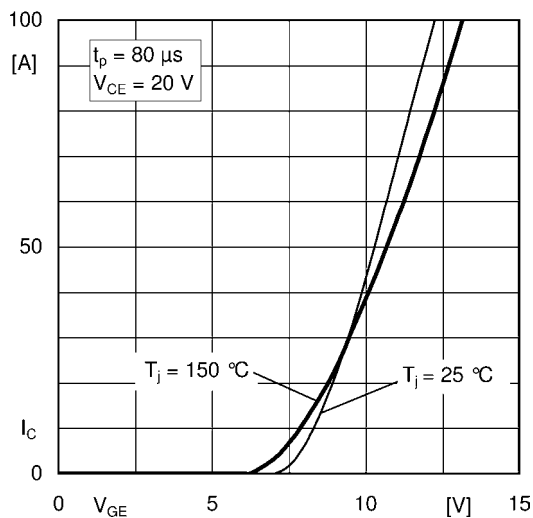


Fig. 5: Typ. transfer characteristic

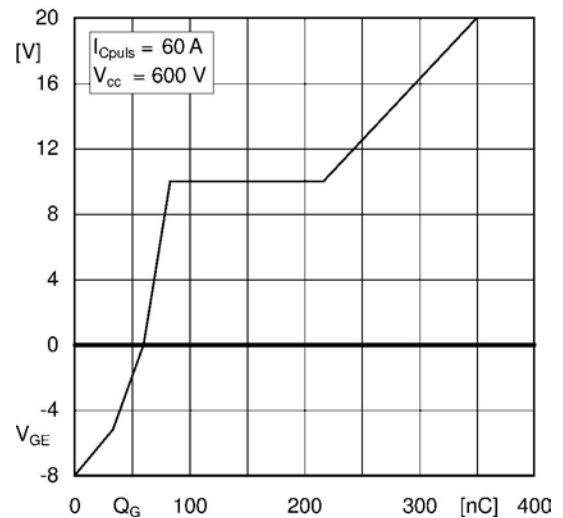
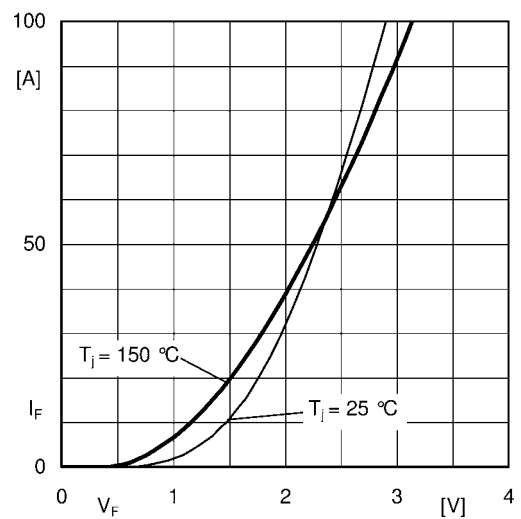
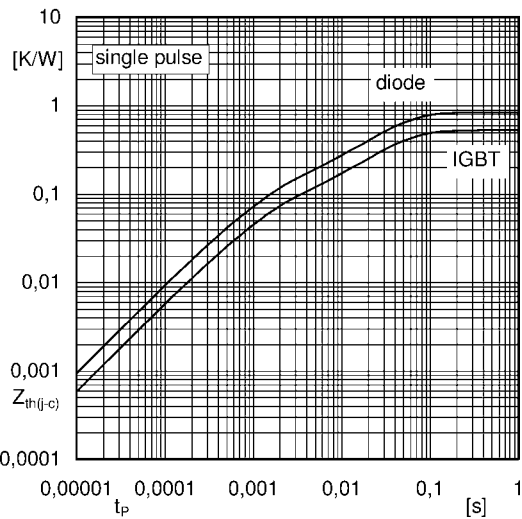
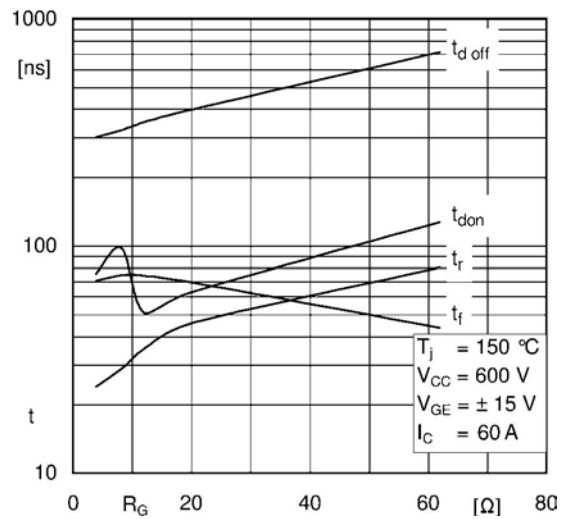
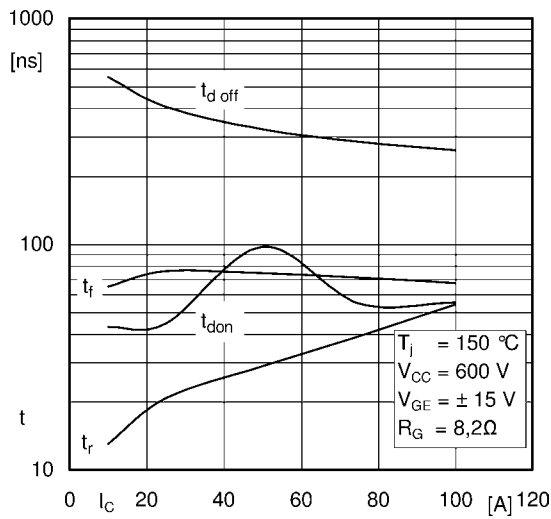


Fig. 6: Typ. gate charge characteristic

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## Discrete IGBTs



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## Discrete IGBTs

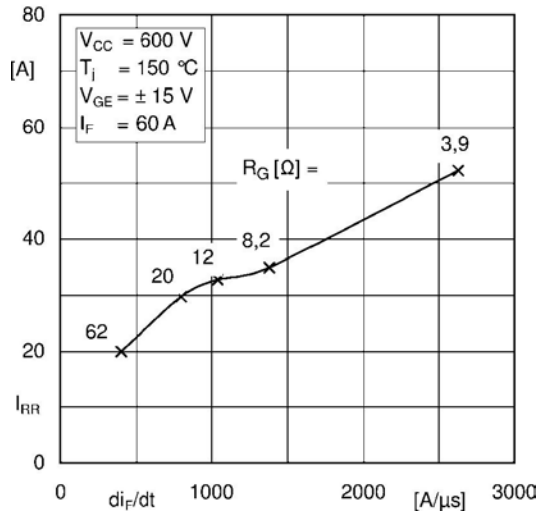


Fig. 11: FRD diode peak reverse recovery current

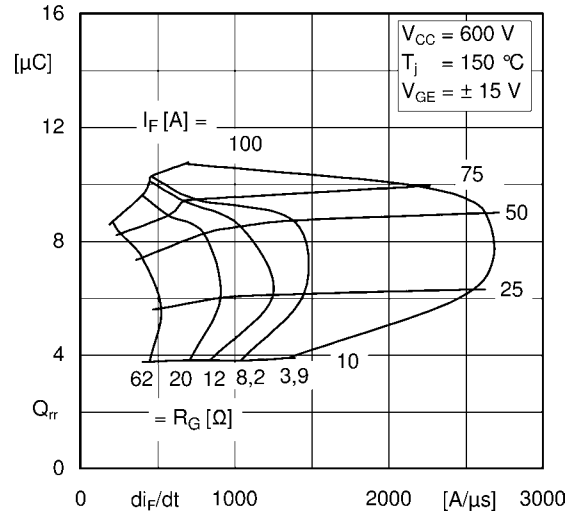
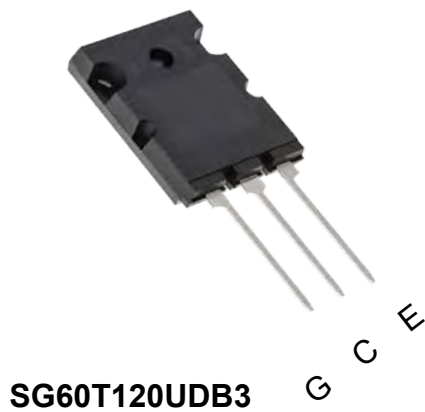
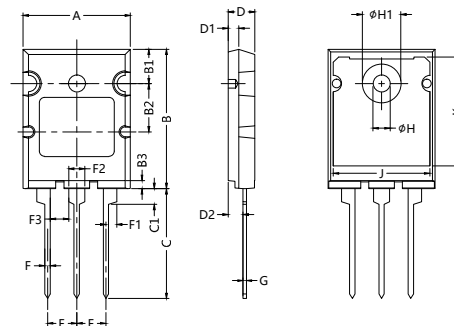


Fig. 12: Typ. FRD diode peak reverse recovery charge

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| Dim. | Millimeter |       | Dim. | Millimeter |      |
|------|------------|-------|------|------------|------|
|      | Min.       | Max.  |      | Min.       | Max. |
| A    | 19.50      | 20.50 | E    | 5.45TYP    |      |
| B    | 25.70      | 26.30 | F    | 0.90       | 1.25 |
| B1   | 5.80       | 6.20  | F1   | 2.30       | 2.75 |
| B2   | 8.80       | 9.20  | F2   | 2.80       | 3.20 |
| B3   | 1.35REF    |       | F3   | 2.40       | /    |
| C    | 19.50      | 20.50 | G    | 0.50       | 0.85 |
| C1   | 2.20       | 2.70  | H    | 3.20       | 3.60 |
| D    | 4.80       | 5.20  | H1   | 6.50       | 7.50 |
| D1   | 2.00REF    |       | J    | 16.00      | /    |
| D2   | 2.50       | 3.10  | K    | 19.00      | /    |