

# Technische Information / Technical Information

IGBT-Module  
IGBT-Modules

## BSM15GP60

eupec



### Elektrische Eigenschaften / Electrical properties

#### Höchstzulässige Werte / Maximum rated values

##### Diode Gleichrichter/ Diode Rectifier

|  |  |             |      |                      |
|--|--|-------------|------|----------------------|
| Periodische Rückw. Spitzensperrspannung<br>repetitive peak reverse voltage |  | $V_{RRM}$   | 1600 | V                    |
| Durchlaßstrom Grenzeffektivwert<br>RMS forward current per chip            |  | $I_{FRMSM}$ | 40   | A                    |
| Dauergleichstrom<br>DC forward current                                     | $T_C = 80^\circ\text{C}$                         | $I_d$       | 15   | A                    |
| Stoßstrom Grenzwert<br>surge forward current                               | $t_p = 10\text{ ms}, T_{vj} = 25^\circ\text{C}$  | $I_{FSM}$   | 300  | A                    |
|  | $t_p = 10\text{ ms}, T_{vj} = 150^\circ\text{C}$ |             | 230  | A                    |
| Grenzlastintegral<br>$I^2t$ - value  | $t_p = 10\text{ ms}, T_{vj} = 25^\circ\text{C}$  | $I^2t$      | 450  | $\text{A}^2\text{s}$ |
|  | $t_p = 10\text{ ms}, T_{vj} = 150^\circ\text{C}$ |             | 260  | $\text{A}^2\text{s}$ |

##### Transistor Wechselrichter/ Transistor Inverter

|  |   |              |         |   |
|--|---|--------------|---------|---|
| Kollektor-Emitter-Sperrspannung<br>collector-emitter voltage             |   | $V_{CES}$    | 600     | V |
| Kollektor-Dauergleichstrom<br>DC-collector current                       | $T_C = 80^\circ\text{C}$                    | $I_{C,nom.}$ | 15      | A |
|  | $T_C = 25^\circ\text{C}$                    | $I_C$        | 25      | A |
| Periodischer Kollektor Spitzenstrom<br>repetitive peak collector current | $t_p = 1\text{ ms}, T_C = 80^\circ\text{C}$ | $I_{CRM}$    | 30      | A |
| Gesamt-Verlustleistung<br>total power dissipation                        | $T_C = 25^\circ\text{C}$                    | $P_{tot}$    | 100     | W |
| Gate-Emitter-Spitzenspannung<br>gate-emitter peak voltage                |   | $V_{GES}$    | +/- 20V | V |

##### Diode Wechselrichter/ Diode Inverter

|  |  |           |    |                      |
|--|--|-----------|----|----------------------|
| Dauergleichstrom<br>DC forward current                     | $T_C = 80^\circ\text{C}$   | $I_F$     | 15 | A                    |
| Periodischer Spitzenstrom<br>repetitive peak forw. current | $t_p = 1\text{ ms}$  | $I_{FRM}$ | 30 | A                    |
| Grenzlastintegral<br>$I^2t$ - value                        | $V_R = 0\text{V}, t_p = 10\text{ms}, T_{vj} = 125^\circ\text{C}$ | $I^2t$    | 70 | $\text{A}^2\text{s}$ |

##### Transistor Brems-Chopper/ Transistor Brake-Chopper

|  |   |              |         |   |
|--|---|--------------|---------|---|
| Kollektor-Emitter-Sperrspannung<br>collector-emitter voltage             |   | $V_{CES}$    | 600     | V |
| Kollektor-Dauergleichstrom<br>DC-collector current                       | $T_C = 80^\circ\text{C}$                    | $I_{C,nom.}$ | 10      | A |
|  | $T_C = 25^\circ\text{C}$                    | $I_C$        | 20      | A |
| Periodischer Kollektor Spitzenstrom<br>repetitive peak collector current | $t_p = 1\text{ ms}, T_C = 80^\circ\text{C}$ | $I_{CRM}$    | 20      | A |
| Gesamt-Verlustleistung<br>total power dissipation                        | $T_C = 25^\circ\text{C}$                    | $P_{tot}$    | 80      | W |
| Gate-Emitter-Spitzenspannung<br>gate-emitter peak voltage                |   | $V_{GES}$    | +/- 20V | V |

##### Diode Brems-Chopper/ Diode Brake-Chopper

|  |                          |           |    |   |
|--|--------------------------|-----------|----|---|
| Dauergleichstrom<br>DC forward current                     | $T_C = 80^\circ\text{C}$ | $I_F$     | 10 | A |
| Periodischer Spitzenstrom<br>repetitive peak forw. current | $t_p = 1\text{ ms}$      | $I_{FRM}$ | 20 | A |

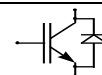
|                             |                                 |
|-----------------------------|---------------------------------|
| prepared by: Andreas Schulz | date of publication: 17.09.1999 |
| approved by: M.Hierholzer   | revision: 3                     |

# Technische Information / Technical Information

IGBT-Module  
IGBT-Modules

## BSM15GP60

eupec



### Modul Isolation/ Module Isolation

|  |  |                   |     |    |
|--|--|-------------------|-----|----|
| Isolations-Prüfspannung<br>insulation test voltage | RMS, f = 50 Hz, t = 1 min.<br>NTC connected to Baseplate | V <sub>ISOL</sub> | 2,5 | kV |
|--|--|-------------------|-----|----|

## Elektrische Eigenschaften / Electrical properties

### Charakteristische Werte / Characteristic values

| Diode Gleichrichter/ Diode Rectifier   |  | min.                 | typ. | max. |         |
|--|--|----------------------|------|------|---------|
| Durchlaßspannung<br>forward voltage  | T <sub>vj</sub> = 150°C, I <sub>F</sub> = 15 A   | V <sub>F</sub>       | -    | 0,95 | 1 V     |
| Schleusenspannung<br>threshold voltage                                       | T <sub>vj</sub> = 150°C                          | V <sub>(TO)</sub>    | -    | -    | 0,8 V   |
| Ersatzwiderstand<br>slope resistance   | T <sub>vj</sub> = 150°C                          | r <sub>T</sub>       | -    | -    | 10,5 mΩ |
| Sperrstrom<br>reverse current  | T <sub>vj</sub> = 150°C, V <sub>R</sub> = 1600 V | I <sub>R</sub>       | -    | 2    | - mA    |
| Modul Leitungswiderstand, Anschlüsse-Chip<br>lead resistance, terminals-chip | T <sub>C</sub> = 25°C                            | R <sub>AA'+CC'</sub> | -    | 8    | - mΩ    |

| Transistor Wechselrichter/ Transistor Inverter                               |  | min.                | typ. | max. |        |
|--|--|---------------------|------|------|--------|
| Kollektor-Emitter Sättigungsspannung<br>collector-emitter saturation voltage | V <sub>GE</sub> = 15V, T <sub>vj</sub> = 25°C, I <sub>C</sub> = 15 A   | V <sub>CE sat</sub> | -    | 1,95 | 2,45 V |
|  | V <sub>GE</sub> = 15V, T <sub>vj</sub> = 125°C, I <sub>C</sub> = 15 A  |                     | -    | 2,2  | - V    |
| Gate-Schwellenspannung<br>gate threshold voltage                             | V <sub>CE</sub> = V <sub>GE</sub> , T <sub>vj</sub> = 25°C, I <sub>C</sub> = 0,4 mA  | V <sub>GE(TO)</sub> | 4,5  | 5,5  | 6,5 V  |
| Eingangskapazität<br>input capacitance                                       | f = 1MHz, T <sub>vj</sub> = 25°C<br>V <sub>CE</sub> = 25 V, V <sub>GE</sub> = 0 V  | C <sub>ies</sub>    | -    | 0,8  | - nF   |
| Kollektor-Emitter Reststrom<br>collector-emitter cut-off current             | V <sub>GE</sub> = 0V, T <sub>vj</sub> = 25°C, V <sub>CE</sub> = 600 V  | I <sub>CES</sub>    | -    | 0,5  | 500 μA |
|  | V <sub>GE</sub> = 0V, T <sub>vj</sub> = 125°C, V <sub>CE</sub> = 600 V   |                     | -    | 0,8  | - mA   |
| Gate-Emitter Reststrom<br>gate-emitter leakage current                       | V <sub>CE</sub> = 0V, V <sub>GE</sub> = 20V, T <sub>vj</sub> = 25°C  | I <sub>GES</sub>    | -    | -    | 300 nA |
| Einschaltverzögerungszeit (ind. Last)<br>turn on delay time (inductive load) | I <sub>C</sub> = I <sub>Nenn</sub> , V <sub>CC</sub> = 300 V   | t <sub>d,on</sub>   | -    | 50   | - ns   |
|  | V <sub>GE</sub> = ±15V, T <sub>vj</sub> = 25°C, R <sub>G</sub> = 67 Ohm  |                     |      |      |        |
|  | V <sub>GE</sub> = ±15V, T <sub>vj</sub> = 125°C, R <sub>G</sub> = 67 Ohm   |                     |      |      |        |
| Anstiegszeit (induktive Last)<br>rise time (inductive load)                  | I <sub>C</sub> = I <sub>Nenn</sub> , V <sub>CC</sub> = 300 V   | t <sub>r</sub>      | -    | 50   | - ns   |
|  | V <sub>GE</sub> = ±15V, T <sub>vj</sub> = 25°C, R <sub>G</sub> = 67 Ohm  |                     |      |      |        |
|  | V <sub>GE</sub> = ±15V, T <sub>vj</sub> = 125°C, R <sub>G</sub> = 67 Ohm   |                     |      |      |        |
| Abschaltverzögerungszeit (ind. Last)<br>turn off delay time (inductive load) | I <sub>C</sub> = I <sub>Nenn</sub> , V <sub>CC</sub> = 300 V   | t <sub>d,off</sub>  | -    | 250  | - ns   |
|  | V <sub>GE</sub> = ±15V, T <sub>vj</sub> = 25°C, R <sub>G</sub> = 67 Ohm  |                     |      |      |        |
|  | V <sub>GE</sub> = ±15V, T <sub>vj</sub> = 125°C, R <sub>G</sub> = 67 Ohm   |                     |      |      |        |
| Fallzeit (induktive Last)<br>fall time (inductive load)                      | I <sub>C</sub> = I <sub>Nenn</sub> , V <sub>CC</sub> = 300 V   | t <sub>f</sub>      | -    | 30   | - ns   |
|  | V <sub>GE</sub> = ±15V, T <sub>vj</sub> = 25°C, R <sub>G</sub> = 67 Ohm  |                     |      |      |        |
|  | V <sub>GE</sub> = ±15V, T <sub>vj</sub> = 125°C, R <sub>G</sub> = 67 Ohm   |                     |      |      |        |
| Einschaltverlustenergie pro Puls<br>turn-on energy loss per pulse            | I <sub>C</sub> = I <sub>Nenn</sub> , V <sub>CC</sub> = 300 V<br>V <sub>GE</sub> = ±15V, T <sub>vj</sub> = 125°C, R <sub>G</sub> = 67 Ohm<br>L <sub>S</sub> = 75 nH | E <sub>on</sub>     | -    | 0,7  | - mWs  |
| Abschaltverlustenergie pro Puls<br>turn-off energy loss per pulse            | I <sub>C</sub> = I <sub>Nenn</sub> , V <sub>CC</sub> = 300 V<br>V <sub>GE</sub> = ±15V, T <sub>vj</sub> = 125°C, R <sub>G</sub> = 67 Ohm<br>L <sub>S</sub> = 75 nH | E <sub>off</sub>    | -    | 0,5  | - mWs  |
| Kurzschlußverhalten<br>SC Data   | t <sub>p</sub> ≤ 10μs, V <sub>GE</sub> ≤ 15V, R <sub>G</sub> = 67 Ohm<br>T <sub>vj</sub> ≤ 125°C, V <sub>CC</sub> = 360 V<br>di/dt = 900 A/μs                      | I <sub>SC</sub>     | -    | 65   | - A    |