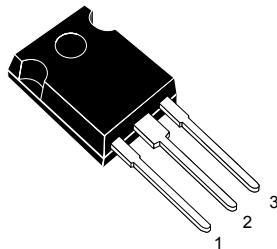
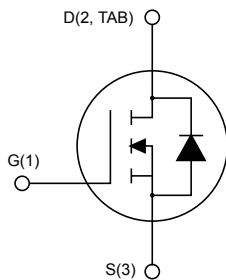


Automotive-grade silicon carbide Power MOSFET 650 V, 100 A, 20 mΩ (typ., $T_J = 25\text{ °C}$), in an HiP247 package



HiP247




AM01475v1_noZen



Features

| Order code | V_{DS} | $R_{DS(on)}$ typ. | I_D |
|----------------|----------|-------------------|-------|
| SCTW100N65G2AG | 650 V | 20 mΩ | 100 A |

- AEC-Q101 qualified 
- Very high operating temperature capability ($T_J = 200\text{ °C}$)
- Very fast and robust intrinsic body diode
- Low capacitance

Applications

- Traction for inverters
- DC-DC converters
- OBC

Description

This silicon carbide Power MOSFET device has been developed using ST's advanced and innovative 2nd generation SiC MOSFET technology. The device features remarkably low on-resistance per unit area and very good switching performance.

Product status link

[SCTW100N65G2AG](#)

Device summary

| | |
|------------|----------------|
| Order code | SCTW100N65G2AG |
| Marking | SCT100N65G2AG |
| Package | HiP247 |
| Packing | Tube |

1 Electrical ratings

Table 1. Absolute maximum ratings

| Symbol | Parameter | Value | Unit |
|----------------|--|------------|------|
| V_{DS} | Drain-source voltage | 650 | V |
| V_{GS} | Gate-source voltage | -10 to 22 | |
| | Gate-source voltage (recommended operational values) | -5 to 18 | |
| I_D | Drain current (continuous) at $T_C = 25\text{ °C}$ | 100 | A |
| | Drain current (continuous) at $T_C = 100\text{ °C}$ | 70 | |
| $I_{DM}^{(1)}$ | Drain current (pulsed) | 280 | A |
| P_{TOT} | Total power dissipation at $T_C = 25\text{ °C}$ | 420 | W |
| T_{stg} | Storage temperature range | -55 to 200 | °C |
| T_J | Operating junction temperature range | | °C |

1. Pulse width limited by safe operating area.

Table 2. Thermal data

| Symbol | Parameter | Value | Unit |
|----------------|-------------------------------------|-------|------|
| $R_{thj-case}$ | Thermal resistance junction-case | 0.42 | °C/W |
| $R_{thj-amb}$ | Thermal resistance junction-ambient | 50 | °C/W |

2 Electrical characteristics

($T_C = 25\text{ °C}$ unless otherwise specified).

Table 3. On/off states

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---------------|-----------------------------------|--|------|------|-----------|---------------|
| $V_{(BR)DSS}$ | Drain-source breakdown voltage | $V_{GS} = 0\text{ V}$, $I_D = 1\text{ mA}$ | 650 | | | V |
| I_{DSS} | Zero gate voltage drain current | $V_{DS} = 650\text{ V}$, $V_{GS} = 0\text{ V}$ | | | 10 | μA |
| I_{GSS} | Gate-body leakage current | $V_{DS} = 0\text{ V}$, $V_{GS} = -10\text{ to }22\text{ V}$ | | | ± 100 | nA |
| $V_{GS(th)}$ | Gate threshold voltage | $V_{DS} = V_{GS}$, $I_D = 5\text{ mA}$ | 1.9 | 3.1 | 5.0 | V |
| $R_{DS(on)}$ | Static drain-source on-resistance | $V_{GS} = 18\text{ V}$, $I_D = 50\text{ A}$ | | 20 | 26 | m Ω |
| | | $V_{GS} = 18\text{ V}$, $I_D = 50\text{ A}$, $T_J = 200\text{ °C}$ | | 36 | | |

Table 4. Dynamic

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|-----------|------------------------------|---|------|------|------|----------|
| C_{iss} | Input capacitance | $V_{DS} = 520\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0\text{ V}$ | - | 3315 | - | pF |
| C_{oss} | Output capacitance | | - | 267 | - | pF |
| C_{rSS} | Reverse transfer capacitance | | - | 46 | - | pF |
| Q_g | Total gate charge | $V_{DS} = 520\text{ V}$, $V_{GS} = -5\text{ to }18\text{ V}$, $I_D = 50\text{ A}$ | - | 162 | - | nC |
| Q_{gs} | Gate-source charge | | - | 45 | - | nC |
| Q_{gd} | Gate-drain charge | | - | 49 | - | nC |
| R_g | Gate input resistance | $f = 1\text{ MHz}$, $I_D = 0\text{ A}$ | - | 1 | - | Ω |

Table 5. Switching energy

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|-----------|---------------------------|--|------|------|------|---------------|
| E_{on} | Turn-on switching energy | $V_{DD} = 520\text{ V}$, $I_D = 50\text{ A}$, | - | 486 | - | μJ |
| E_{off} | Turn-off switching energy | $R_G = 10\text{ }\Omega$, $V_{GS} = -5\text{ to }18\text{ V}$ | - | 506 | - | μJ |

Table 6. Reverse SiC diode characteristics

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|-----------|--------------------------|---|------|------|------|------|
| V_{SD} | Diode forward voltage | $I_F = 50\text{ A}$, $V_{GS} = 0\text{ V}$ | - | 2.8 | - | V |
| t_{rr} | Reverse recovery time | $I_F = 50\text{ A}$, $di/dt = 2140\text{ A}/\mu\text{s}$, $V_{DD} = 520\text{ V}$, $R_G = 10\text{ }\Omega$, $V_{GS} = -5\text{ to }18\text{ V}$ | - | 26 | - | ns |
| Q_{rr} | Reverse recovery charge | | - | 370 | - | nC |
| I_{RRM} | Reverse recovery current | | - | 24 | - | A |

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

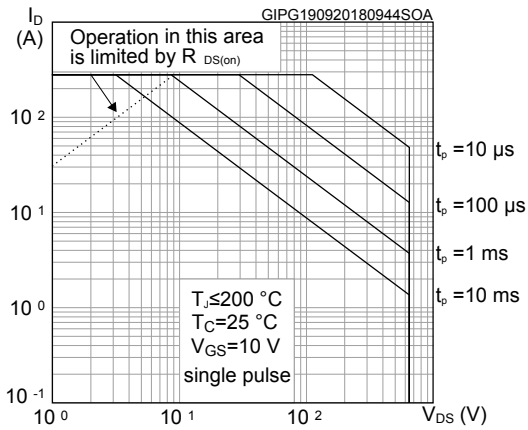


Figure 2. Thermal impedance

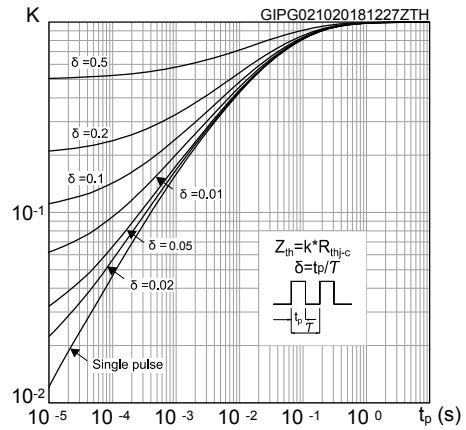


Figure 3. Output characteristics ($T_J = 25\ ^\circ\text{C}$)

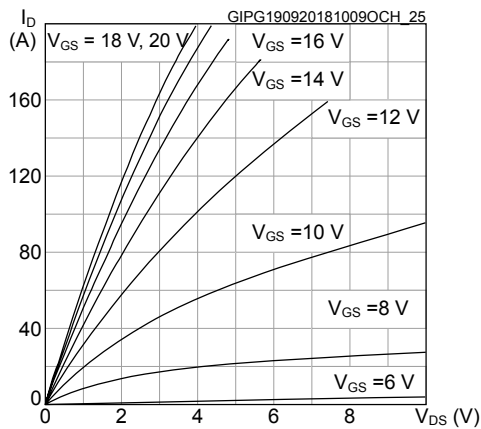


Figure 4. Output characteristics ($T_J = 200\ ^\circ\text{C}$)

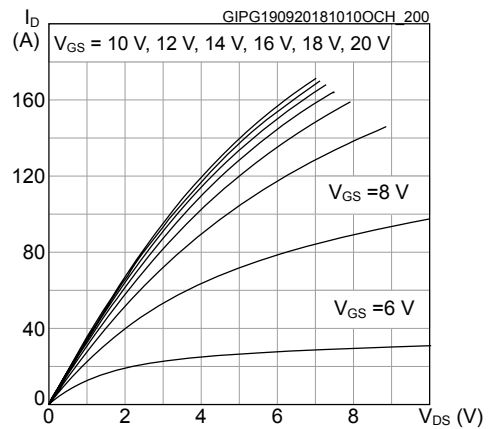


Figure 5. Transfer characteristics

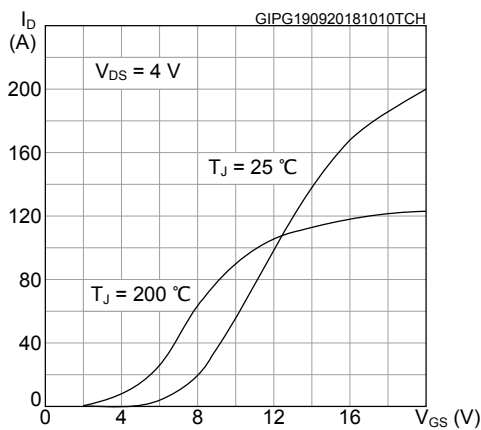


Figure 6. Power dissipation

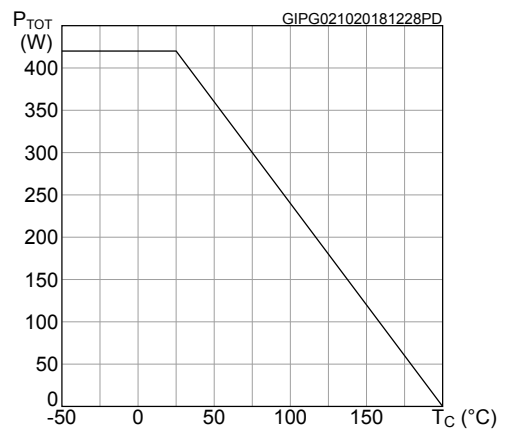


Figure 7. Gate charge vs gate-source voltage

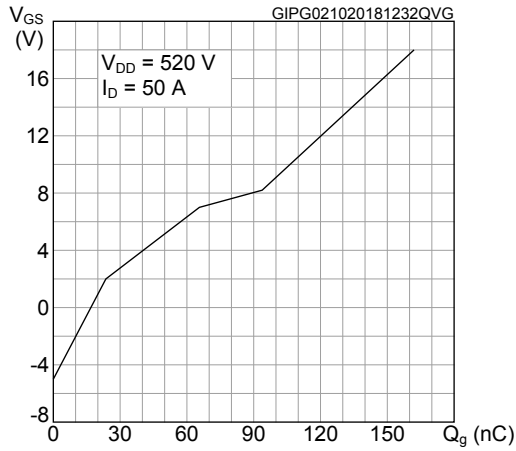


Figure 8. Capacitance variations

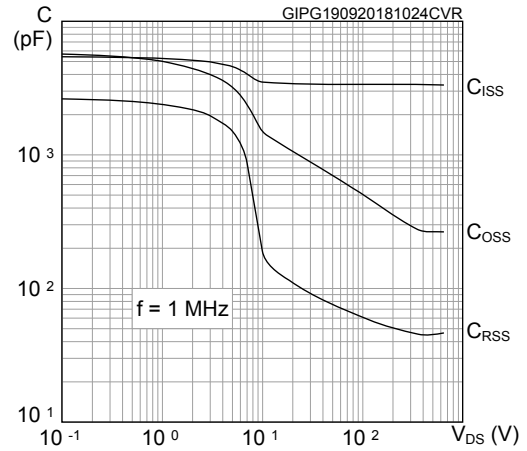


Figure 9. Normalized $V_{(BR)DSS}$ vs. temperature

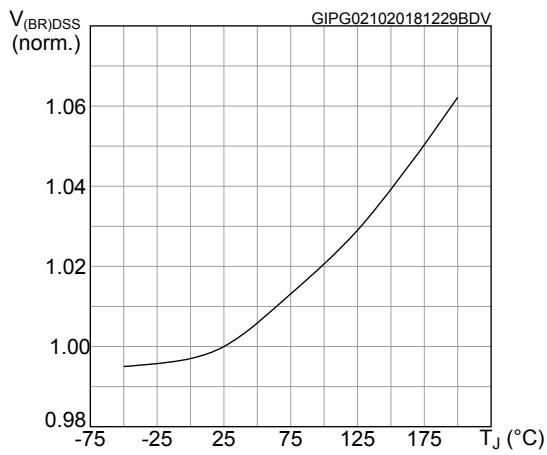


Figure 10. Normalized gate threshold voltage vs. temperature

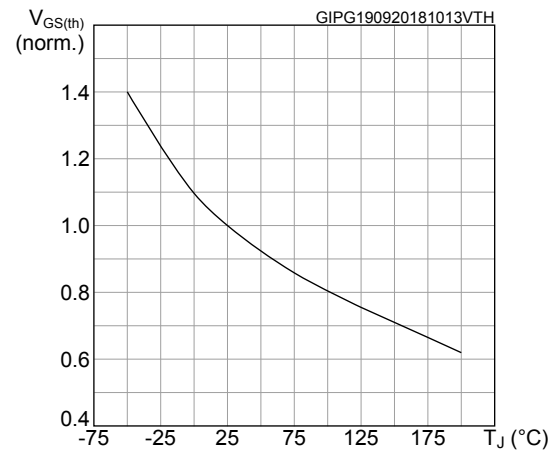


Figure 11. Normalized on-resistance vs. temperature

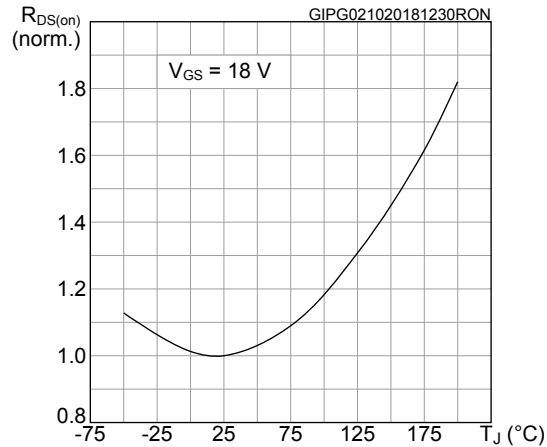


Figure 12. Switching energy vs drain current

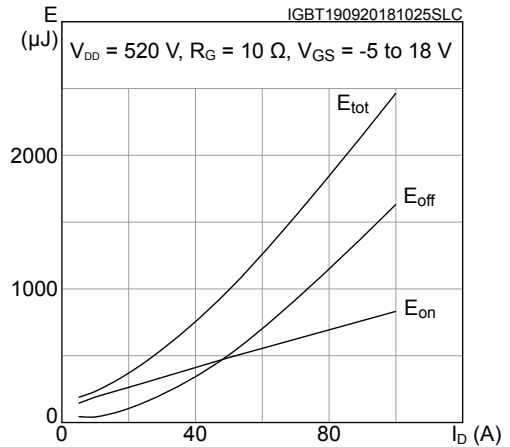


Figure 13. Switching energy vs junction temperature

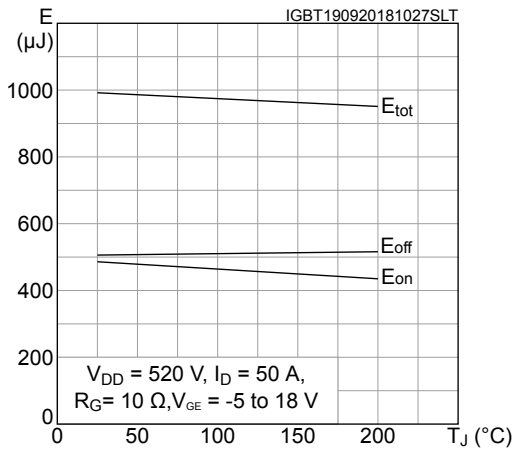


Figure 14. Switching energy vs gate resistance

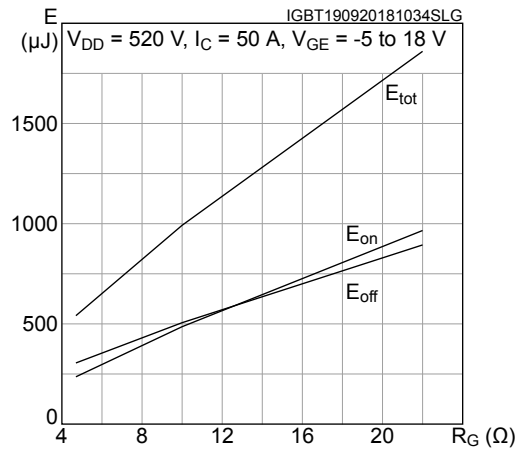


Figure 15. Body diode characteristics (T_J = 25 °C)

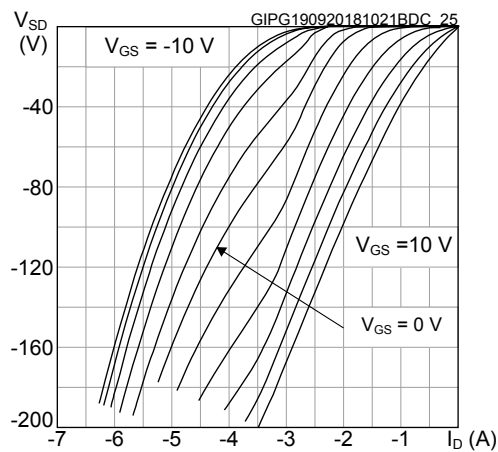
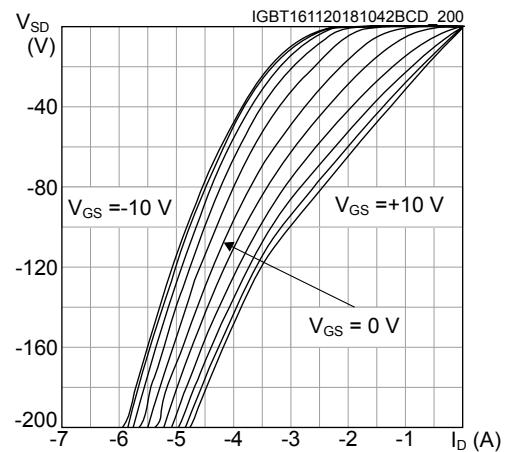


Figure 16. Body diode characteristics (T_J = 200 °C)

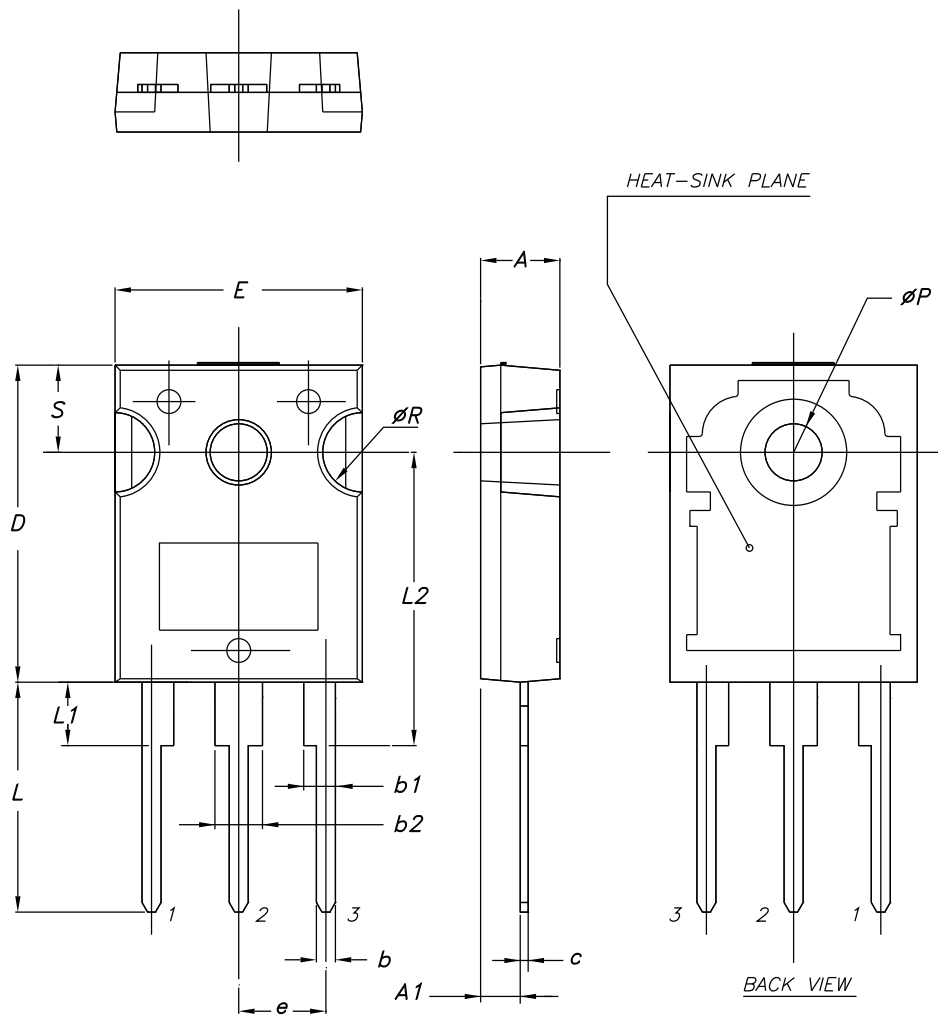


3 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

3.1 HiP247 package information

Figure 17. HiP247 package outline



8396756_2

Table 7. HiP247 package mechanical data

| Dim. | mm | | |
|------|-------|-------|-------|
| | Min. | Typ. | Max. |
| A | 4.85 | 5.00 | 5.15 |
| A1 | 2.20 | | 2.60 |
| b | 1.0 | | 1.40 |
| b1 | 2.0 | | 2.40 |
| b2 | 3.0 | | 3.40 |
| c | 0.40 | | 0.80 |
| D | 19.85 | | 20.15 |
| E | 15.45 | | 15.75 |
| e | 5.30 | 5.45 | 5.60 |
| L | 14.20 | | 14.80 |
| L1 | 3.70 | | 4.30 |
| L2 | | 18.50 | |
| ∅P | 3.55 | | 3.65 |
| ∅R | 4.50 | | 5.50 |
| S | 5.30 | 5.50 | 5.70 |

Revision history

Table 8. Document revision history

| Date | Revision | Changes |
|-------------|----------|---|
| 09-May-2016 | 1 | First release |
| 21-Nov-2018 | 2 | Modified features and applications on cover page. Modified <i>Table 1. Absolute maximum ratings</i> , <i>Table 2. Thermal data</i> , <i>Table 3. On/off states</i> , <i>Table 4. Dynamic</i> , <i>Table 5. Switching energy</i> and <i>Table 6. Reverse SiC diode characteristics</i> . Added <i>Section 2.1 Electrical characteristics (curves)</i> . Updated <i>Section 3.1 HIP247 package information</i> . Minor text changes. |
| 11-Sep-2020 | 3 | Updated <i>Section 2 Electrical characteristics</i> . |

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| | Revision history | 9 |

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