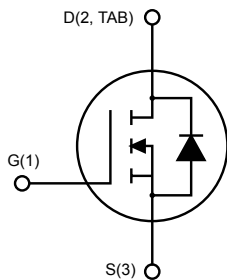
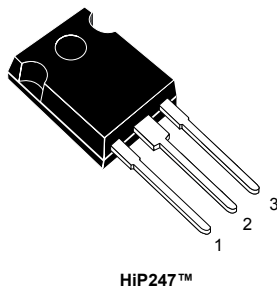


Automotive-grade silicon carbide Power MOSFET 650 V, 100 A, 20 mΩ (typ., T_J=25 °C), in an HiP247™ package




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 °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.

Maturity 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	
$I_D^{(1)}$	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

($T_{CASE} = 25\text{ °C}$ 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	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}$		1	10	μA
		$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}, T_J = 200\text{ °C}$		25		
I_{GSS}	Gate-body leakage current	$V_{DS} = 0\text{ V}, V_{GS} = 22\text{ V}, T_J = 200\text{ °C}$		20		nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 5\text{ mA}$	1.9	3.1	5	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	$I_F = 30\text{ A}, V_{GS} = 0\text{ V}$	-	3.5	-	V
t_{rr}	Reverse recovery time	$I_{SD} = 50\text{ A}, di/dt = 2140\text{ A}/\mu\text{s}, V_{DD} = 520\text{ V}, R_G = 10\text{ }\Omega, V_{GS} = -5\text{ V}$	-	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

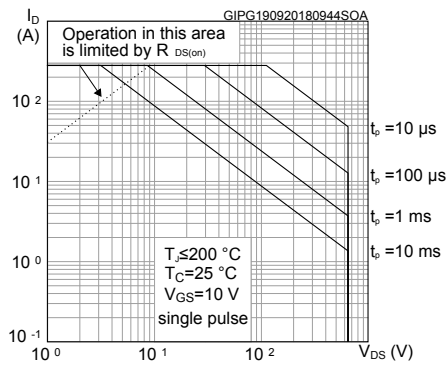


Figure 2. Thermal impedance

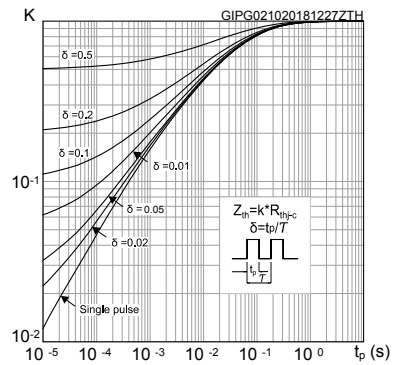


Figure 3. Output characteristics ($T_J = 25^\circ C$)

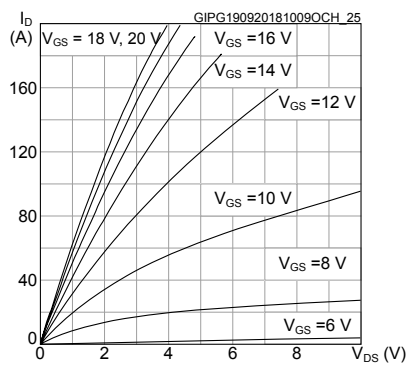


Figure 4. Output characteristics ($T_J = 200^\circ C$)

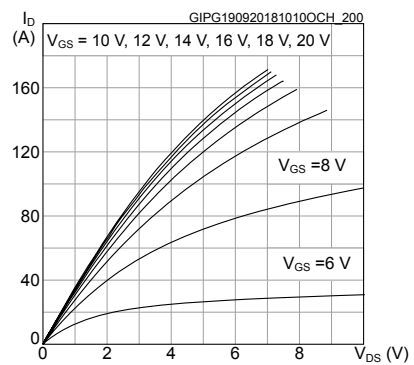


Figure 5. Transfer characteristics

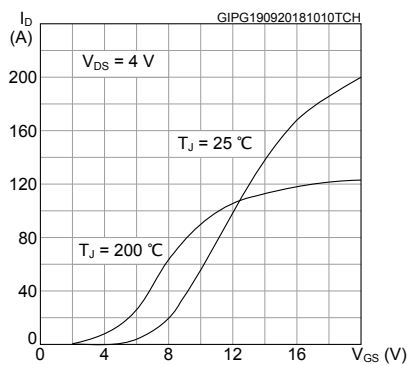


Figure 6. Power dissipation

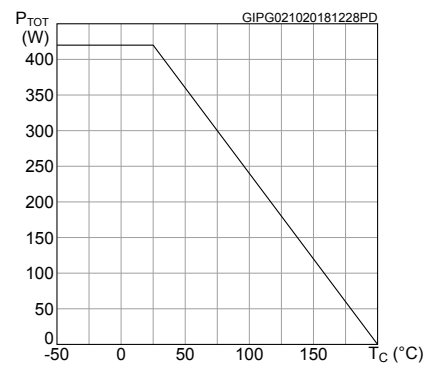


Figure 7. Gate charge vs gate-source voltage

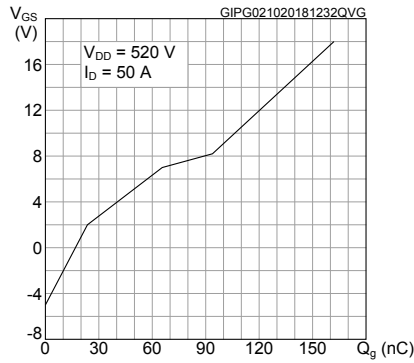


Figure 8. Capacitance variations

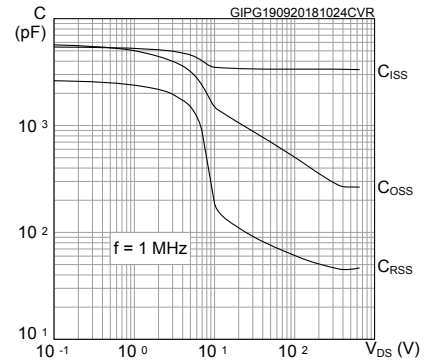


Figure 9. Normalized $V_{(BR)DSS}$ vs. temperature

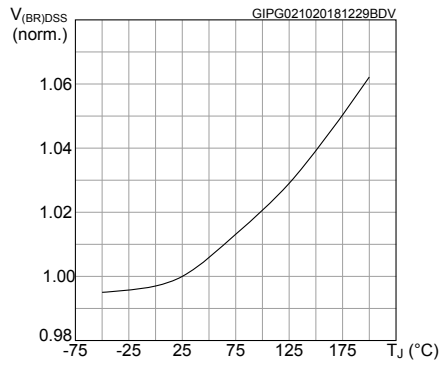


Figure 10. Normalized gate threshold voltage vs. temperature

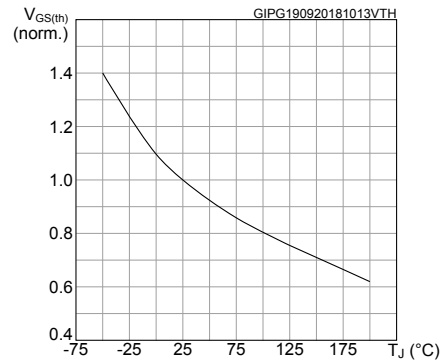


Figure 11. Normalized on-resistance vs. temperature

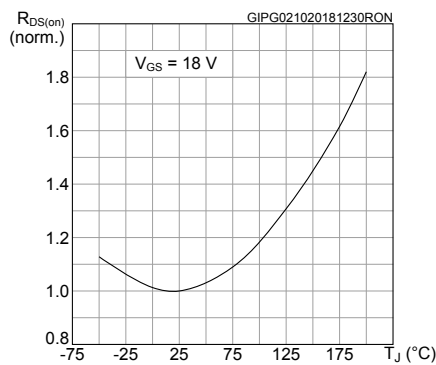


Figure 12. Switching energy vs drain current

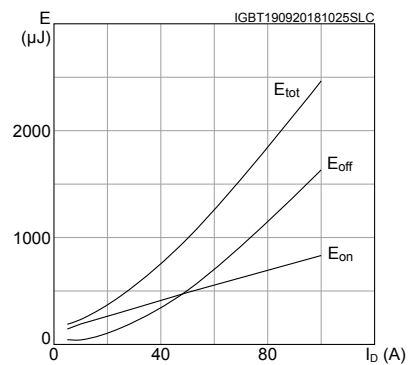


Figure 13. Switching energy vs junction temperature

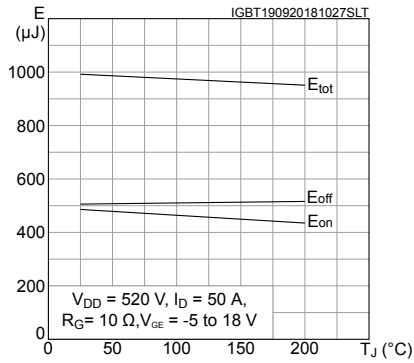


Figure 14. Switching energy vs gate resistance

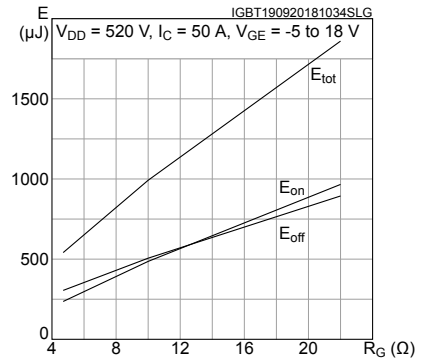


Figure 15. Body diode characteristics (T_J = 25 °C)

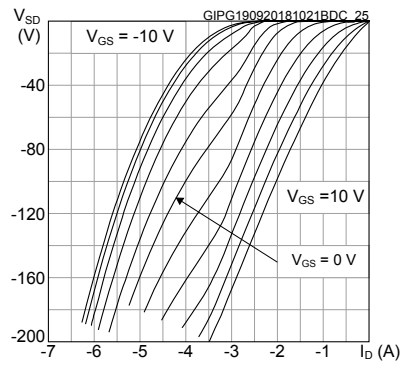
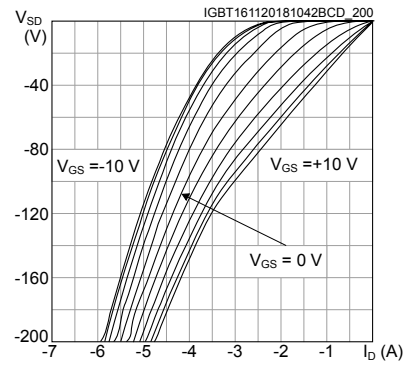


Figure 16. Body diode characteristics (T_J = 200 °C)

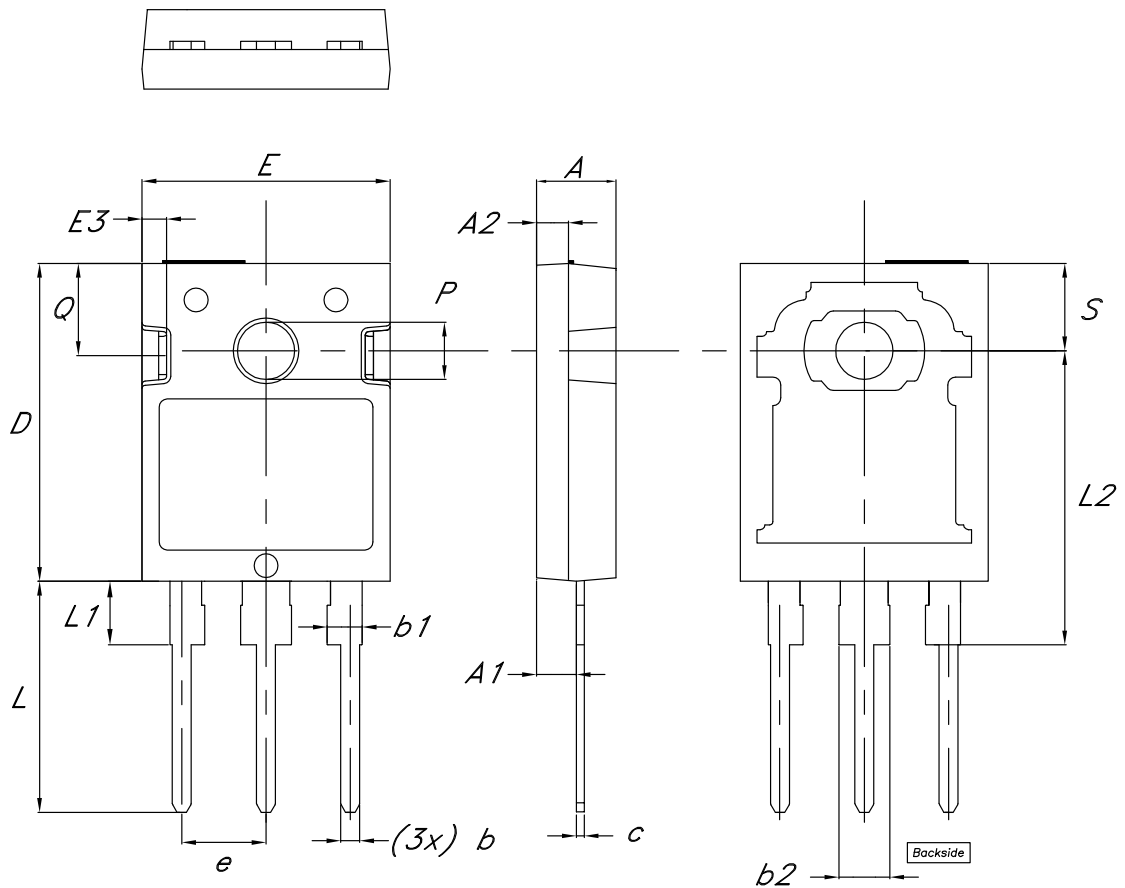


3 Package information

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



8581091_2

Table 7. HiP247™ package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.85	5.00	5.15
A1	2.20		2.60
A2	1.90	2.00	2.10
b	1.00		1.40
b1	2.00		2.40
b2	3.00		3.40
c	0.40		0.80
D	19.85	20.00	20.15
E	15.45	15.60	15.75
E3	1.45		1.65
e	5.30	5.45	5.60
L	14.20		14.80
L1	3.70		4.30
L2	18.30	18.50	18.70
P	3.55		3.65
Q	5.65		5.95
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	<p>Modified features and applications on cover page.</p> <p>Modified Table 1. Absolute maximum ratings, Table 2. Thermal data, Table 3. On/off states, Table 4. Dynamic, Table 5. Switching energy and Table 6. Reverse SiC diode characteristics.</p> <p>Added Section 2.1 Electrical characteristics (curves).</p> <p>Updated Section 3.1 HiP247 package information.</p> <p>Minor text changes.</p>

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