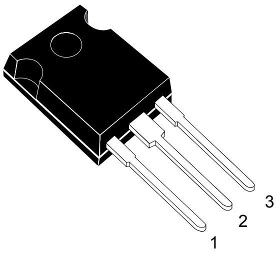
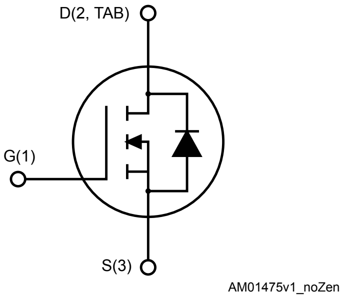
SCTW100N65G2AG

Datasheet

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



HiP247™



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 °C	100	A
	Drain current (continuous) at T_C = 100 °C	70	
I_D (1)	Drain current (pulsed)	280	A
P_{TOT}	Total power dissipation at T_C = 25 °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
$R_{thj\text{-}case}$	Thermal resistance junction-case	0.42	°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient	50	°C/W

2 Electrical characteristics

(T_{CASE} = 25 °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 V, I_D = 1 mA	650			V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 650 V, V_{GS} = 0 V		1	10	µA
		V_{DS} = 650 V, V_{GS} = 0 V, T_J = 200 °C		25		
I_{GSS}	Gate-body leakage current	V_{DS} = 0 V, V_{GS} = 22 V, T_J = 200 °C		20		nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 5 mA	1.9	3.1	5	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS} = 18 V, I_D = 50 A		20	26	mΩ
		V_{GS} = 18 V, I_D = 50 A, T_J = 200 °C		36		

Table 4. **Dynamic**

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

Table 5. **Switching energy**

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

Table 6. **Reverse SiC diode characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode forward voltage	I_F = 30 A, V_{GS} = 0 V	-	3.5	-	V
t_{rr}	Reverse recovery time	I_{SD} = 50 A, di/dt = 2140 A/µs V_{DD} = 520 V, R_G= 10 Ω, V_{GS}= -5 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

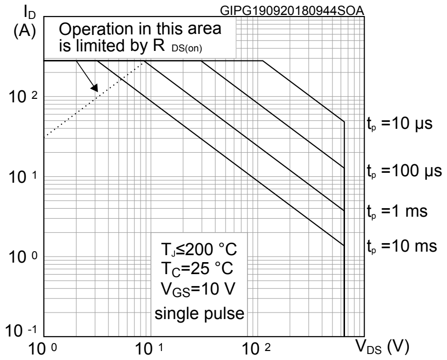


Figure 2. Thermal impedance

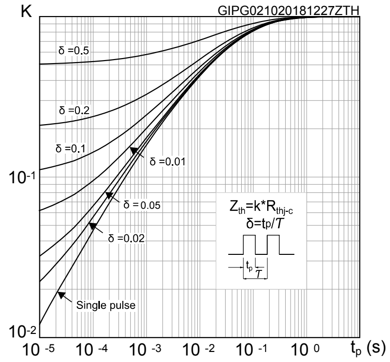


Figure 3. Output characteristics (T_J = 25 °C)

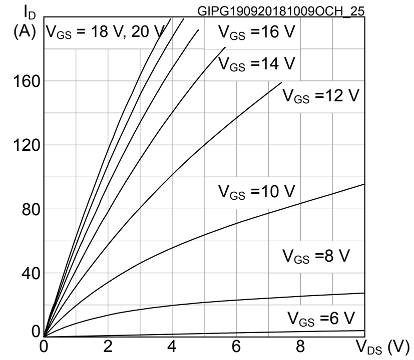


Figure 4. Output characteristics (T_J = 200 °C)

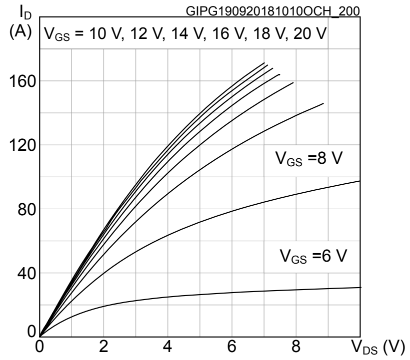


Figure 5. Transfer characteristics

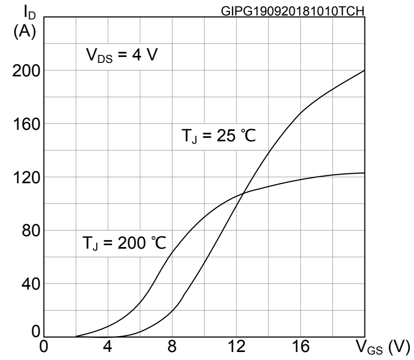


Figure 6. Power dissipation

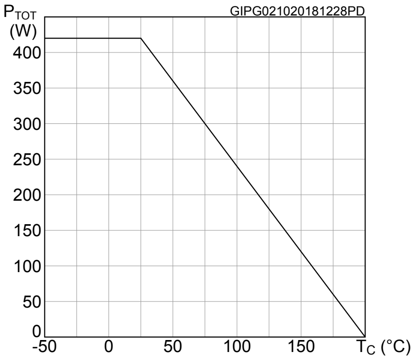


Figure 7. **Gate charge vs gate-source voltage**

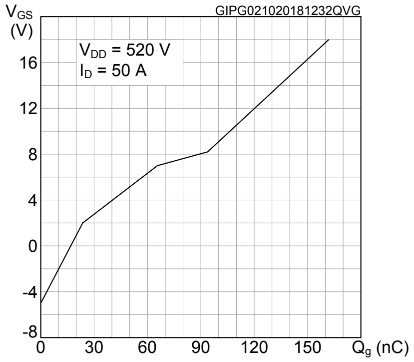


Figure 8. **Capacitance variations**

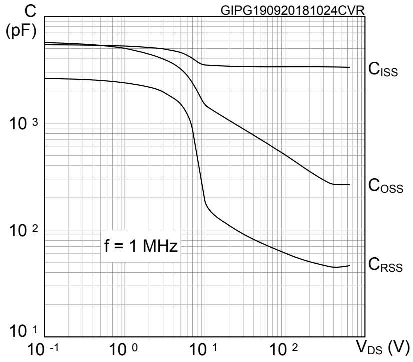


Figure 9. **Normalized $V_{(BR)DSS}$ vs. temperature**

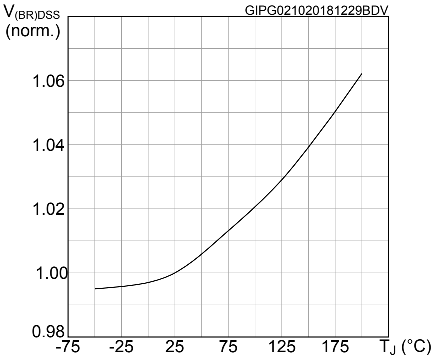


Figure 10. **Normalized gate threshold voltage vs. temperature**

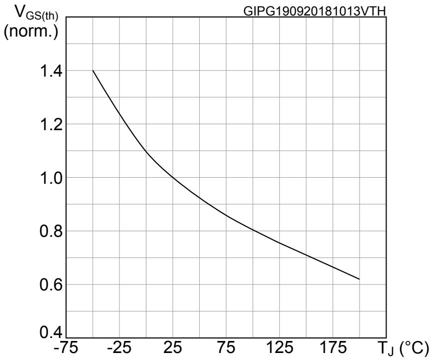


Figure 11. **Normalized on-resistance vs. temperature**

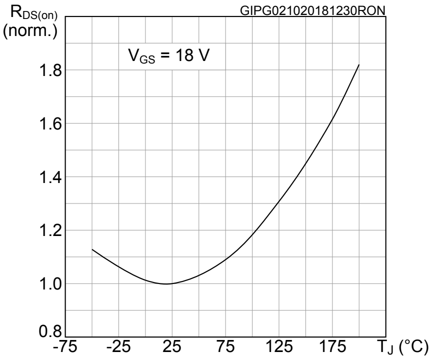
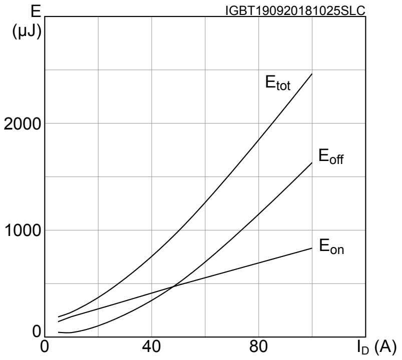


Figure 12. **Switching energy vs drain current**



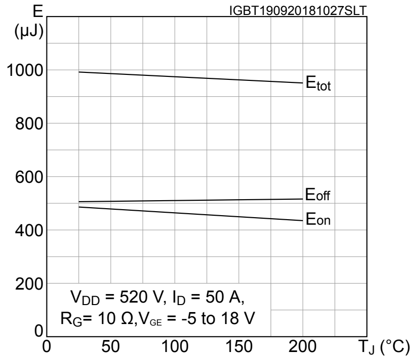


Figure 13. **Switching energy vs junction temperature**

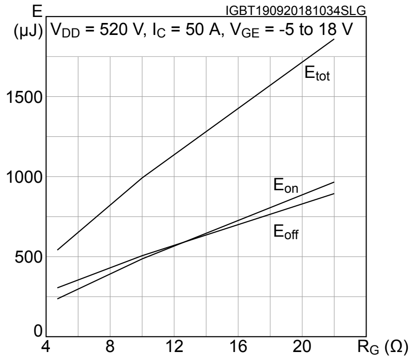


Figure 14. **Switching energy vs gate resistance**

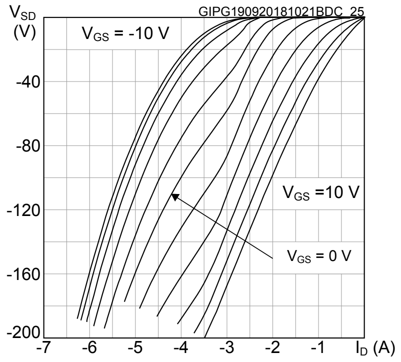


Figure 15. **Body diode characteristics (T_J= 25 °C)**

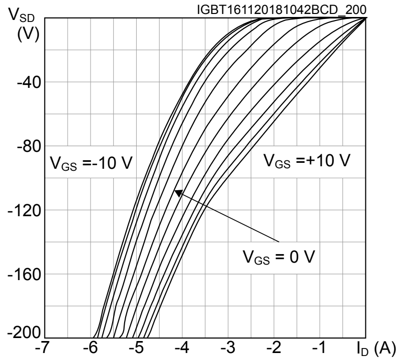


Figure 16. **Body diode characteristics (T_J= 200 °C)**

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**

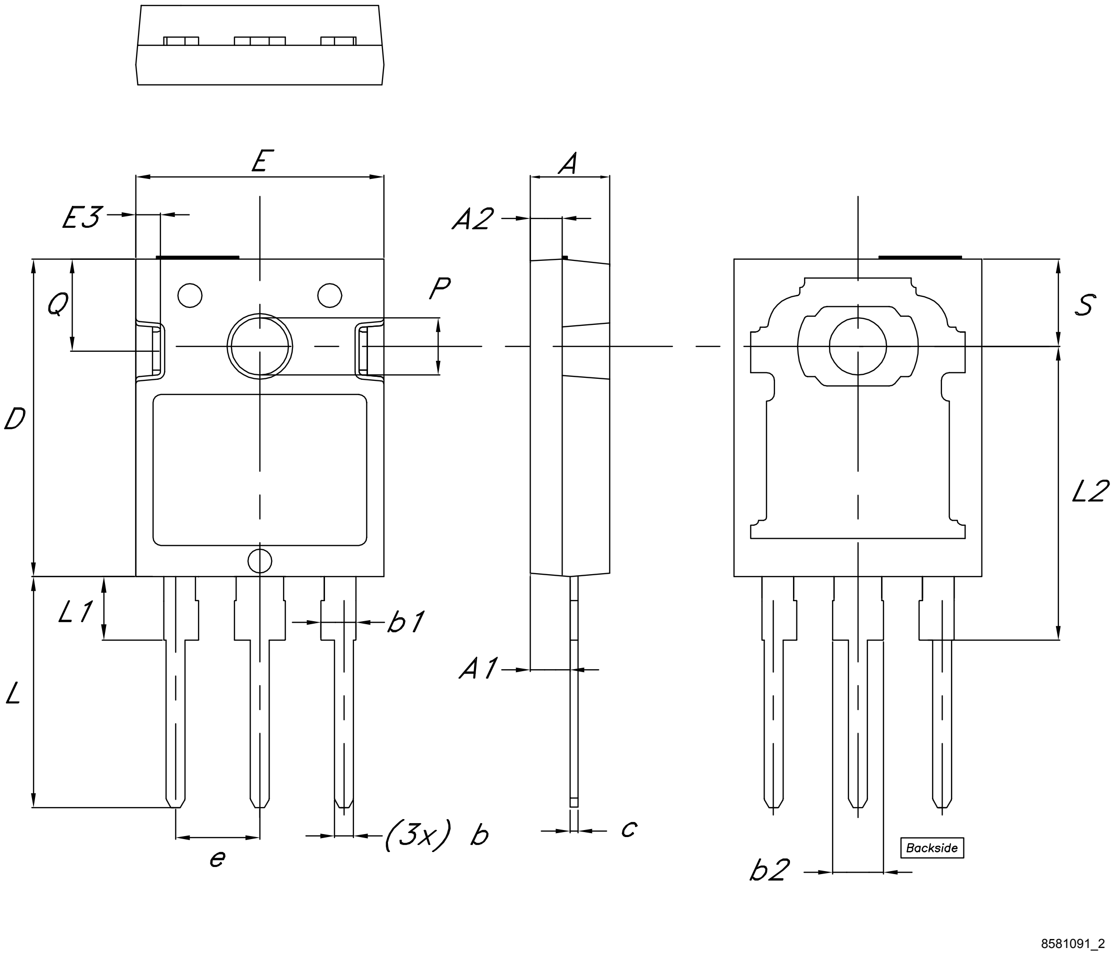


Table 7. **HiP247™ package mechanical data**

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	Modified features and applications on cover page. 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. Added Section 2.1 Electrical characteristics (curves). Updated Section 3.1 HiP247 package information. Minor text changes.

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