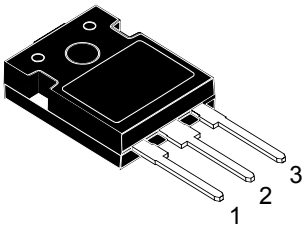
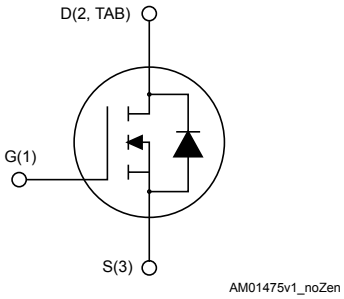
SCTW60N120G2AG

Datasheet

Automotive-grade silicon carbide Power MOSFET 1200 V, 52 A, 45 mΩ (typ., T_J = 25 °C) in an HiP247 package



HiP247



Features

Order code	V_{DS}	$R_{DS(on)}$ typ.	I_D
SCTW60N120G2AG	1200 V	45 mΩ	52 A

- AEC-Q101 qualified
- High speed switching performance
- Very fast and robust intrinsic body diode
- Low capacitances
- Very high operating junction temperature capability (T_J = 200 °C)

Applications

- DC-DC converters
- Solar Inverters and renewable energy
- SMPS
- OBC

Description

This silicon carbide Power MOSFET is produced exploiting the advanced, innovative properties of wide bandgap materials. This results in unsurpassed on-resistance per unit area and very good switching performance almost independent of temperature. The outstanding thermal properties of the SiC material allow designers to use an industry-standard outline with significantly improved thermal capability. These features render the device perfectly suitable for high-efficiency and high power density applications.

Product status link
SCTW60N120G2AG

Product summary	
Order code	SCTW60N120G2AG
Marking	SCT60N120G2AG
Package	HiP247
Packing	Tube

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	1200	V
V_{GS}	Gate-source voltage	-10 to 22	V
	Gate-source voltage (recommended operational values)	-5 to 18	
I_D	Drain current (continuous) at T_C = 25 °C	52	A
	Drain current (continuous) at T_C = 100 °C	39	
I_{DM}(1)	Drain current (pulsed)	156	A
P_{TOT}	Total power dissipation at T_C = 25 °C	388	W
T_{stg}	Storage temperature range	-55 to 200	°C
T_J	Operating junction temperature range		°C

1. *Pulse width is limited by safe operating area.*

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case	0.45	°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient	50	°C/W

2 Electrical characteristics

(T_C = 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	1200			V
I_{DSS}	Zero gate voltage drain current	V_{GS} = 0 V, V_{DS} = 1200 V		1	10	µA
		V_{GS} = 0 V, V_{DS} = 1200 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 = 1 mA	1.9	3.1	5	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS} = 18 V, I_D = 30 A		45	58	mΩ
		V_{GS} = 18 V, I_D = 30 A, T_J = 200 °C		113		

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{DS} = 800 V, f = 1 MHz, V_{GS} = 0 V	-	2086	-	pF
C_{oss}	Output capacitance		-	90	-	pF
C_{rss}	Reverse transfer capacitance		-	18	-	pF
R_g	Gate input resistance	f = 1 MHz, I_D = 0 A	-	1	-	Ω
Q_g	Total gate charge	V_{DS} = 800 V, V_{GS} = -5 to 18 V, I_D = 30 A	-	101	-	nC
Q_{gs}	Gate-source charge		-	36	-	nC
Q_{gd}	Gate-drain charge		-	23	-	nC

Table 5. Switching energy (inductive load)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
E_{on}	Turn-on switching energy	V_{DD} = 800 V, I_D = 30 A	-	431	-	µJ
E_{off}	Turn-off switching energy	R_G = 2.2 Ω, V_{GS} = -5 V to 18 V	-	68	-	µJ

Table 6. Reverse SiC diode characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode forward voltage	I_{SD} = 30 A, V_{GS} = 0 V	-	3.5	-	V
t_{rr}	Reverse recovery time	I_{SD} = 30 A, V_{GS} = 0 V, di/dt = 2000 A/µs, V_{DD} = 800 V	-	53	-	ns
Q_{rr}	Reverse recovery charge		-	192	-	nC
I_{RRM}	Reverse recovery current		-	11	-	A

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

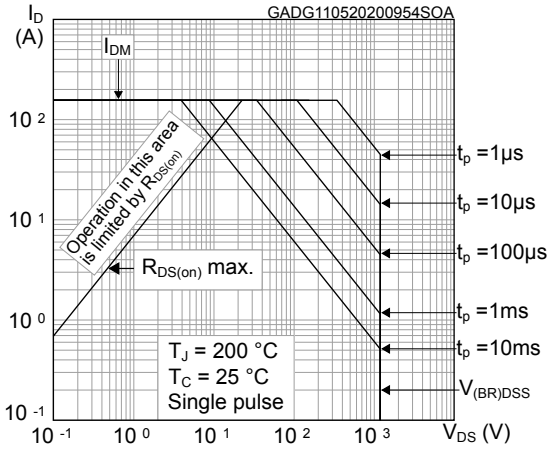


Figure 2. Thermal impedance

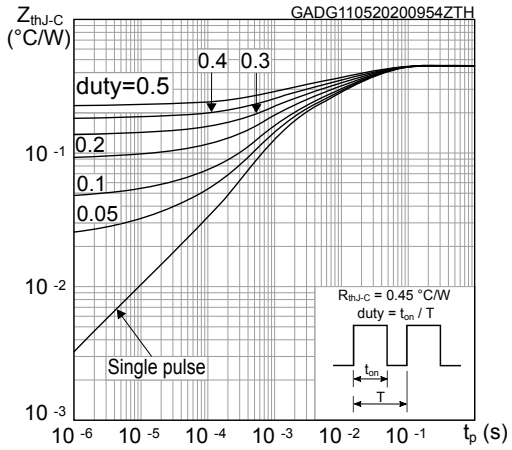


Figure 3. Output characteristics (T_J = 25 °C)

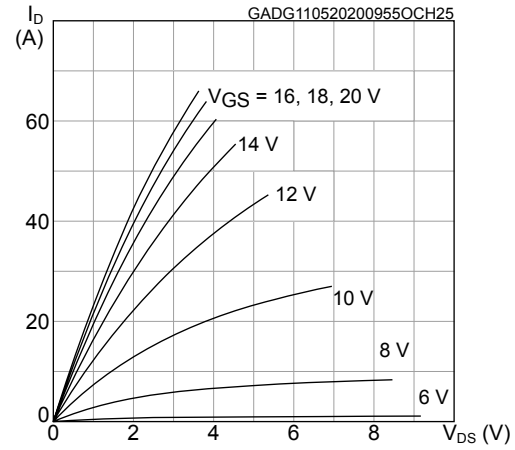


Figure 4. Output characteristics (T_J = 200 °C)

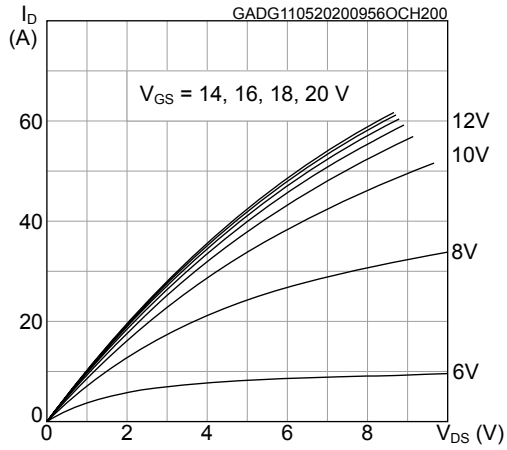


Figure 5. Transfer characteristics

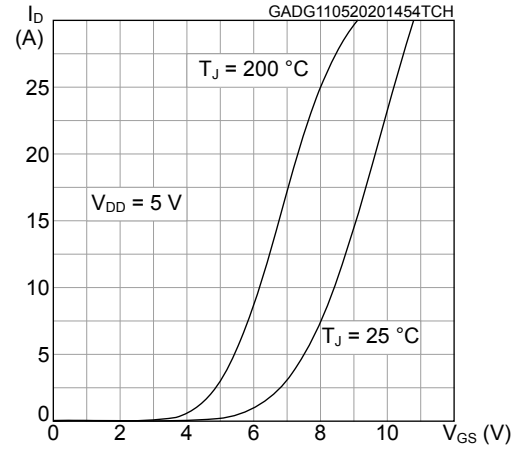


Figure 6. Total power dissipation

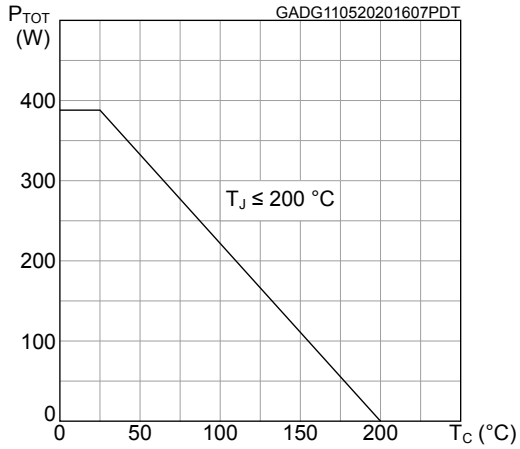


Figure 7. Gate charge vs gate-source voltage

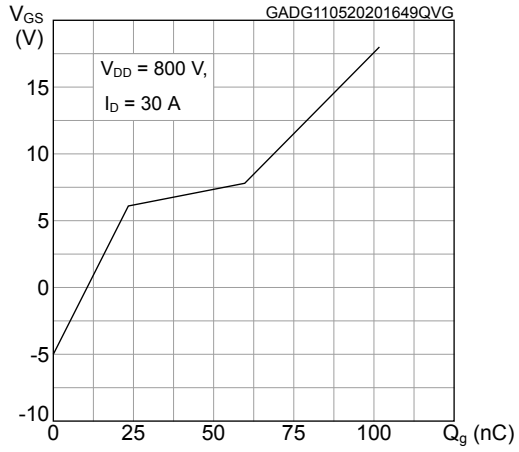


Figure 8. Capacitance variations

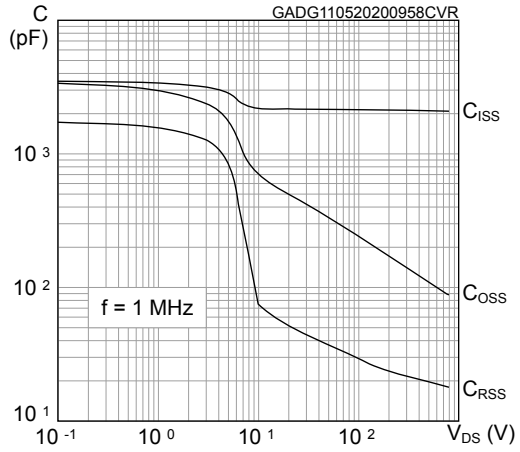


Figure 9. Switching energy vs drain current

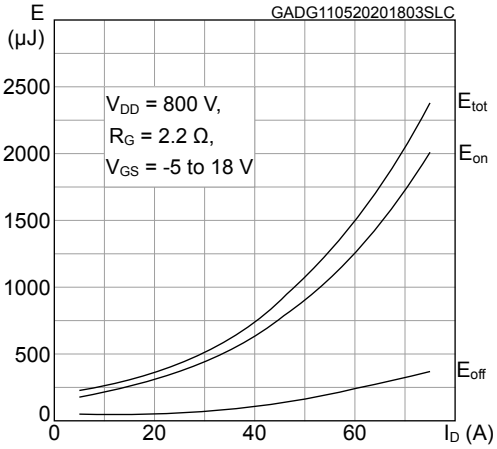


Figure 10. Switching energy vs temperature

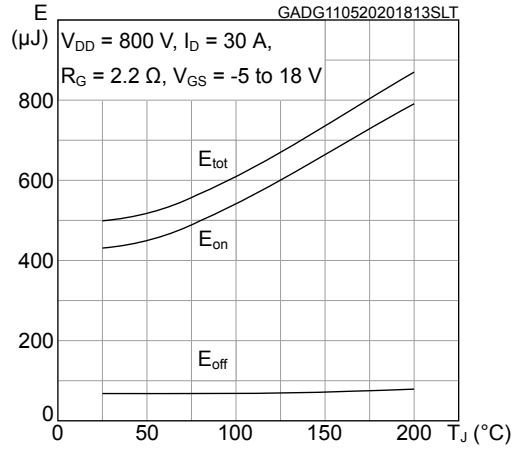


Figure 11. Normalized breakdown voltage vs temperature

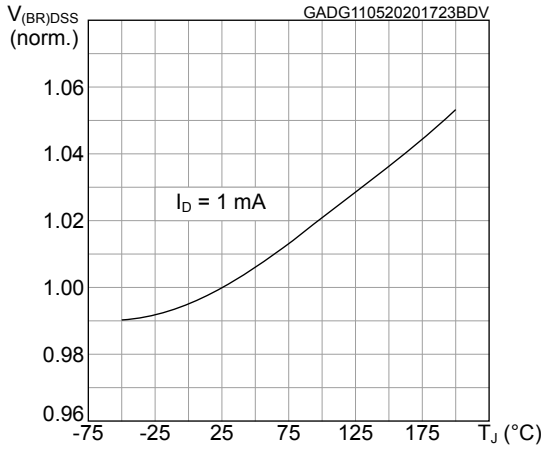


Figure 12. Normalized gate threshold vs temperature

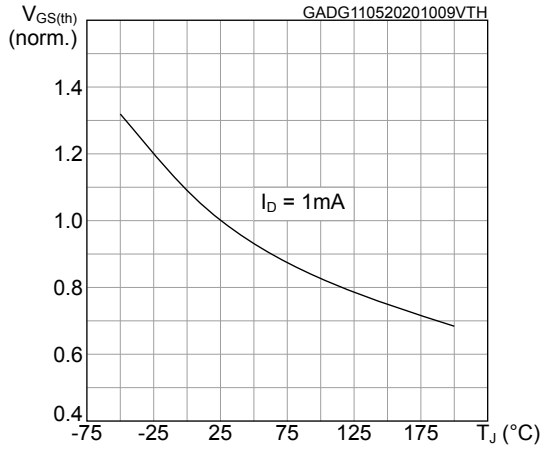


Figure 13. Normalized on-resistance vs temperature

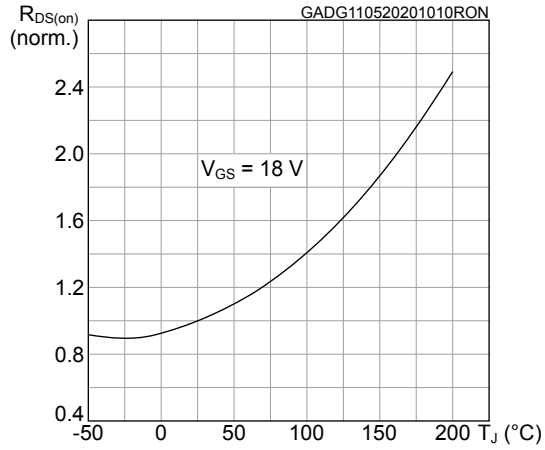


Figure 14. Reverse conduction characteristics (T_J = 25 °C)

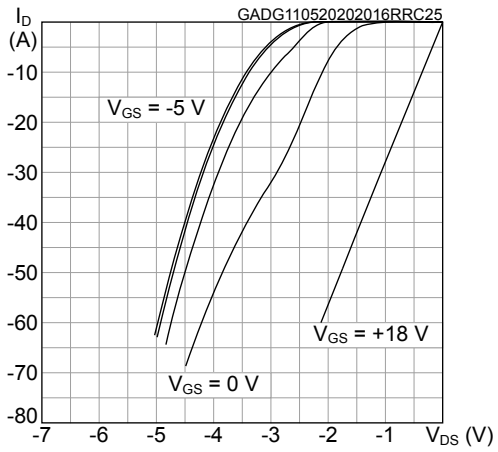
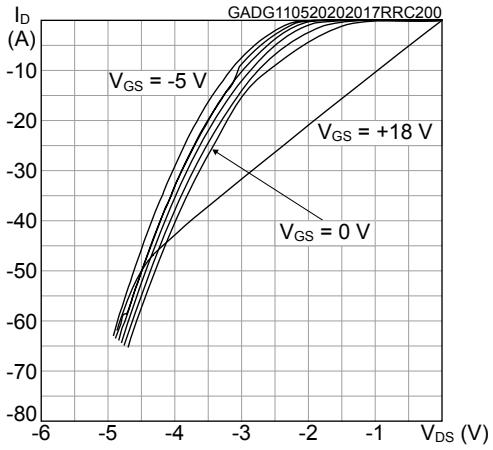


Figure 15. Reverse conduction characteristics (T_J = 200 °C)



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 16. HiP247 package outline

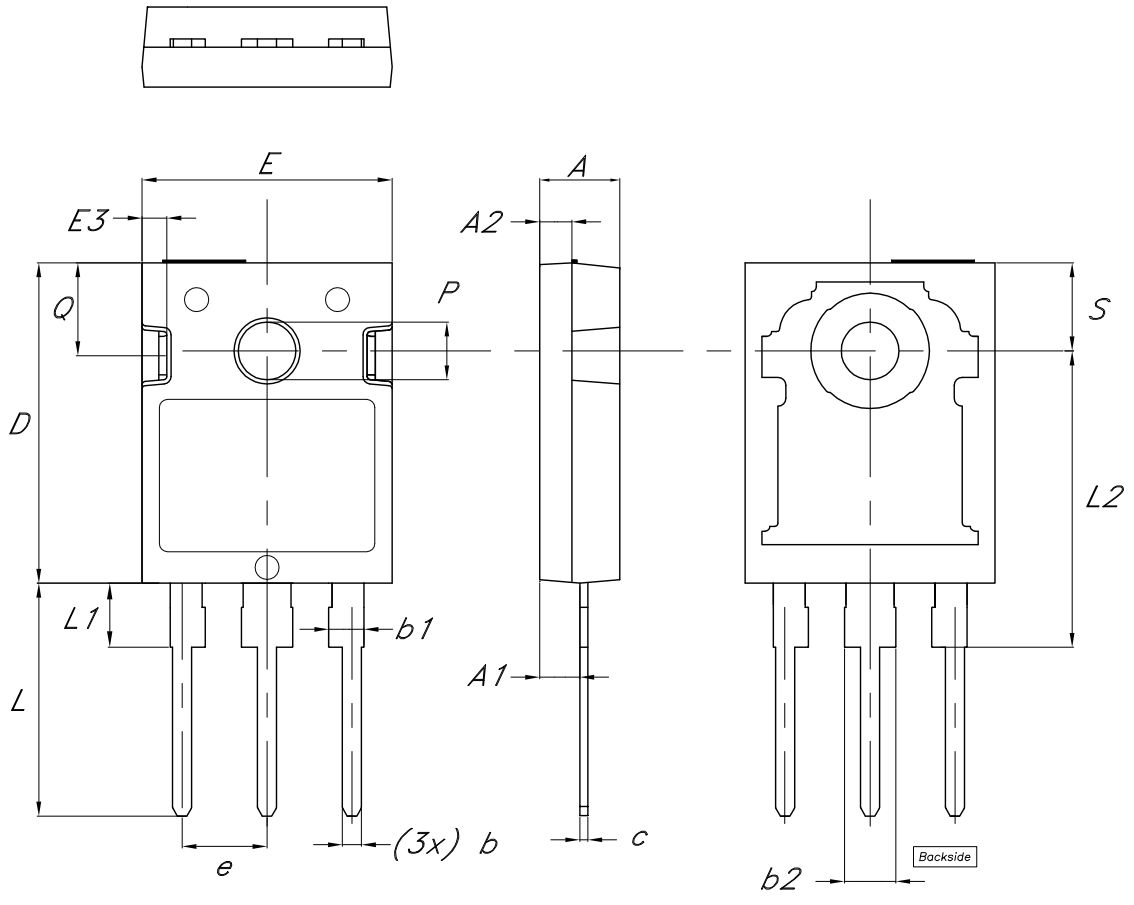


Table 7. **HiP247 package mechanical data**

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
18-May-2020	1	First release.

Contents