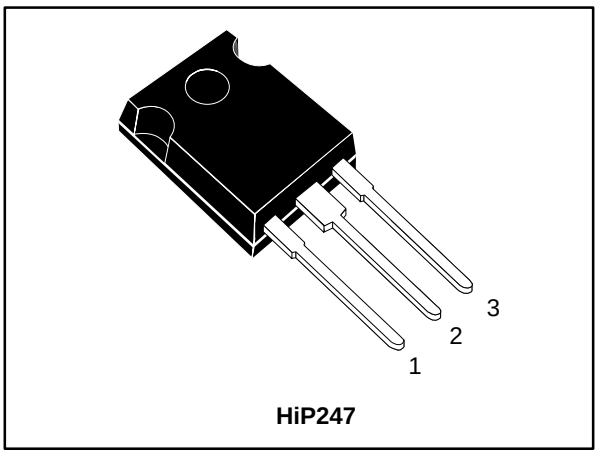
SCTW100N65G2AG

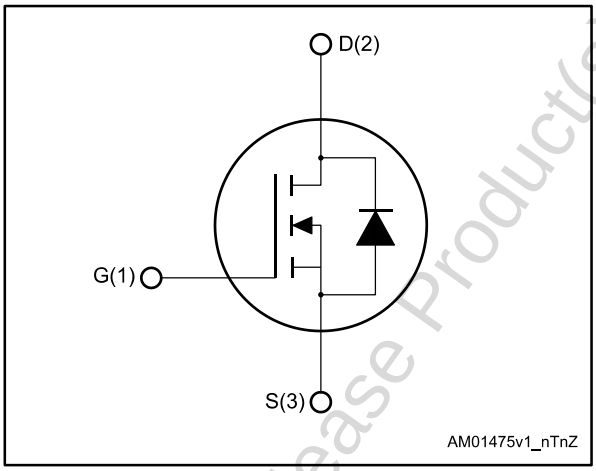
Automotive silicon carbide Power MOSFET 650 V, 100 A, 22 mΩ (typ., T_J=150 °C), in an HiP247™ package

Datasheet - preliminary data



HiP247

Figure 1: Internal schematic diagram



Features

- Designed for automotive applications
- Tight variation of on-resistance vs. temperature
- Very fast and robust intrinsic body diode
- Very high operating temperature capability (T_J = 200 °C)
- Low capacitance

Applications

- Traction for inverters
- DC-DC converters

Description

This silicon carbide Power MOSFET device has been developed using ST's advanced and innovative 2nd generation SiC MOSFET technology. The main features of this product include remarkably low on-resistance per unit area and very good switching performance. The variation of both $R_{DS(on)}$ and switching losses are almost independent from junction temperature.

Table 1: Device summary

Order code	Marking	Package	Packaging
SCTW100N65G2AG	SCT100N65G2AG	HiP247™	Tube

The device meets ECOPACK standards, an environmentally-friendly grade of products commonly referred to as "halogen-free". See *Section 5: "Package information"*.

Contents

1 Electrical ratings

Table 2: Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	650	V
V_{GS}	Gate-source voltage	-10 to 22	V
	Gate-source voltage (recommended operating values)	-5 to 20	
I_D	Drain current (continuous) at T_C = 25 °C	100	A
	Drain current (continuous) at T_C = 100 °C	85	
I_{DM}(1)	Drain current (pulsed)	200	A
P_{TOT}	Total dissipation at T_C = 25 °C	390	W
T_{stg}	Storage temperature range	-55 to 200	°C
T_j	Operating junction temperature range		°C

Notes:

(1)Pulse width limited by safe operating area.

Table 3: Thermal data

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

2 Electrical characteristics

(T_{CASE} = 25 °C unless otherwise specified).

Table 4: 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			50	µA
		V_{DS} = 650 V, V_{GS} = 0 V, T_J = 150 °C (1)			100	
I_{GSS}	Gate-body leakage current	V_{DS} = 0 V, V_{GS} = -10 to 22 V			500	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 1 mA	1.9	3.2		V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS} = 20 V, I_D = 50 A		20		mΩ
		V_{GS} = 20 V, I_D = 50 A, T_J = 150 °C		22		
		V_{GS} = 20 V, I_D = 50 A, T_J = 200 °C		23		

Notes:

(1)Defined by design, not subject to production test.

Table 5: Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{DS} = 400 V, f = 1 MHz, V_{GS} = 0 V	-	3600	-	pF
C_{oss}	Output capacitance		-	305	-	pF
C_{rss}	Reverse transfer capacitance		-	78	-	pF
Q_g	Total gate charge	V_{DD} = 400 V, I_D = 50 A, V_{GS} = 0 to 20 V	-	215	-	nC
Q_{gs}	Gate-source charge		-	32	-	nC
Q_{gd}	Gate-drain charge		-	60	-	nC
R_g	Gate input resistance	f=1 MHz, I_D = 0 A	-	1.5	-	Ω

Table 6: Switching energy (inductive load)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
E_{on}	Turn-on switching energy	V_{DD} = 400 V, I_D = 50 A	-	300	-	µJ
E_{off}	Turn-off switching energy	R_G= 2.2 Ω, V_{GS} = -5 to 20 V	-	250	-	µJ

Table 7: Reverse 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 = 4000 A/µs V_{DD} = 400 V, V_{GS} = -5 V	-	28		ns
Q_{rr}	Reverse recovery charge		-	795	-	nC
I_{RRM}	Reverse recovery current		-	44	-	A

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 2: HiP247™ package outline

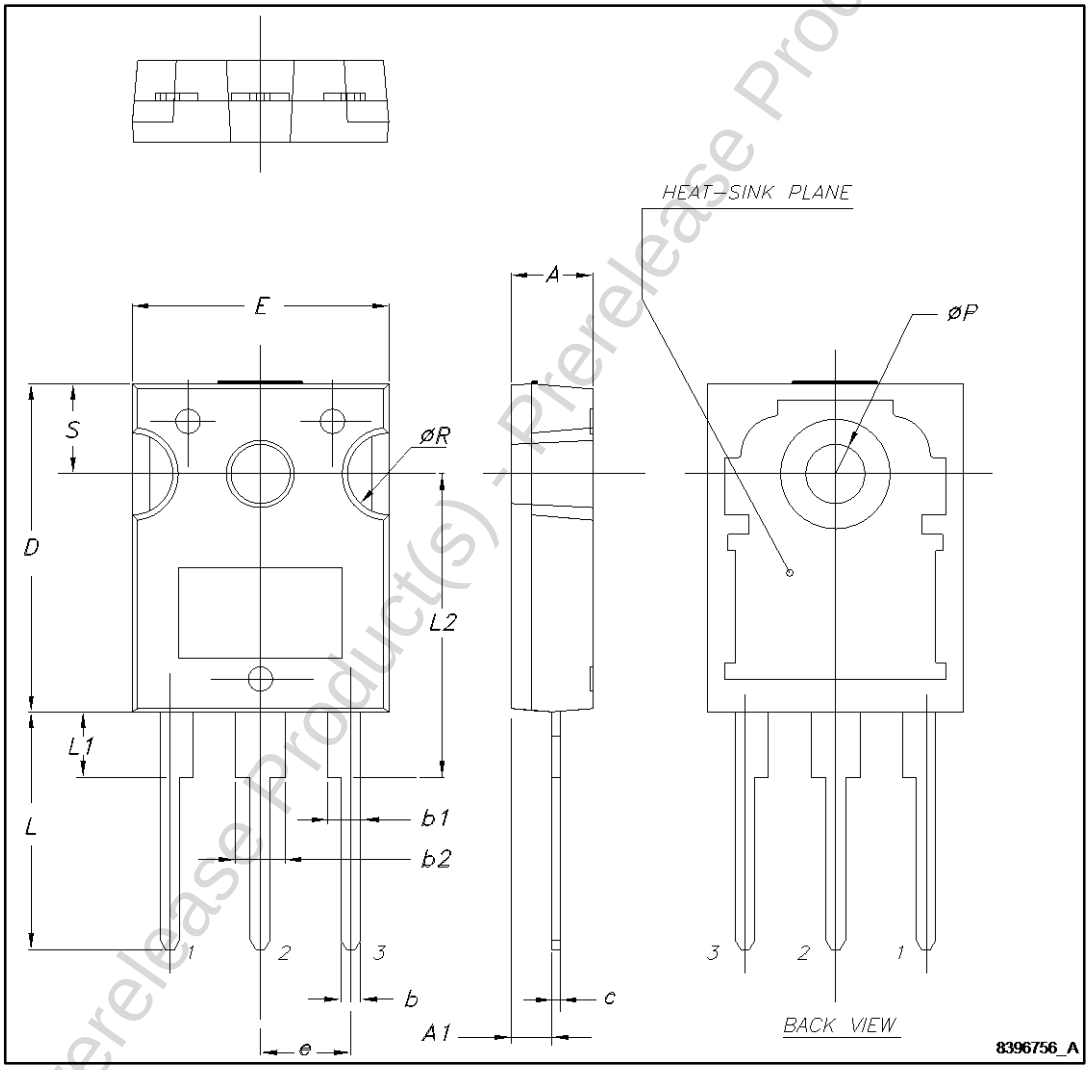


Table 8: HiP247™ package mechanical data

Dim.	mm.		
	Min.	Typ.	Max.
A	4.85		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	
ØP	3.55		3.65
ØR	4.50		5.50
S	5.30	5.50	5.70

4 Revision history

Table 9: Document revision history

Date	Revision	Changes
09-May-2016	1	First release

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