

60V 1.4mohm N-channel SGT MOSFET

AKG6N014GAM-A

Description:

This N channel SGT MOSFET has been designed to very low on-state resistance and maintain superior switching performance, especially for high efficiency power management applications. Qualified AEC-Q101, PPAP capable.

Features:

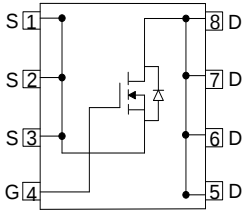
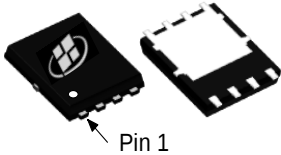
- Low $R_{DS(ON)}$
- RoHS compliant
- Halogen-free
- AEC-Q101 Qualified and PPAP capable

Applications:

- Battery Management System
- Motor Drivers
- DC-DC Converter

Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	60	V
$R_{DS(ON)}$, max @ $V_{GS} = 10\text{ V}$	1.4	m Ω
I_D	223	A



Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKG6N014GAM-A	PDFN5X6	G6N014GAM	Tape Reel	See the detail package information

Maximum Ratings (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Value	Units
V _{DS}	Drain-Source Voltage	60	V
I _D	Drain Current - Continuous (T _C = 25°C) ^(Note 1)	223	A
	Drain Current - Continuous (T _C = 100°C)	158	A
I _{DM}	Drain Current - Pulsed ^(Note 2)	892	A
V _{GS}	Gate-Source Voltage	± 20	V
E _{AS}	Single Pulsed Avalanche Energy ^(Note 3)	576	mJ
P _D	Power Dissipation (T _C = 25°C)	136	W
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +175	°C

Thermal Characteristics

Symbol	Parameter	Value	Units
R _{θJC}	Thermal Resistance, Junction-to-Case, Steady-State	1.1	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient, Steady State ^(Note 4)	45	°C/W

Notes:

1. The max drain current rating is silicon limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. L = 0.5 mH, V_{DD} = 35 V, I_{AS} = 48 A, R_g = 25 Ω, Starting T_J = 25 °C
4. Mount on minimum PCB layout

Electrical Characteristics (T _J = 25°C unless otherwise noted)						
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Static Characteristics						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	60			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 60 V, V _{GS} = 0 V,			1	μA
I _{GSS}	Gate Leakage Current	V _{GS} = ± 20 V, V _{DS} = 0 V			±100	nA
V _{GS(th)}	Gate Threshold voltage	V _{DS} = V _{GS} , I _D = 250 μA	2	2.9	4	V
R _{DS(ON)}	Drain-Source on-state resistance	V _{GS} = 10 V, I _D = 50 A		1.1	1.4	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 30 V, V _{GS} = 0 V, f = 1 MHz		8880		pF
C _{oss}	Output Capacitance			1970		pF
C _{rss}	Reverse Transfer Capacitance			178		pF
R _g	Gate Resistance	f = 1 MHz		1.4		Ω
Switching Characteristics						
t _{d(on)}	Turn On Delay Time	V _{DD} = 30 V , R _L = 0.6 Ω, V _{GS} = 10 V, R _G = 6.8 Ω		37		ns
t _r	Rise Time			93		ns
t _{d(off)}	Turn Off Delay Time			112		ns
t _f	Fall Time			72		ns
Q _g	Total Gate Charge	V _{DD} = 30 V , I _D = 50 A, V _{GS} = 10 V		147		nC
Q _{gs}	Gate-Source Charge			41		nC
Q _{gd}	Gate-Drain Charge			45		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Body-Diode Forward Current				223	A
I _{SM}	Maximum Pulsed Body-Diode Forward Current				892	A
V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _S = 50 A		0.82		V
t _{rr}	Reverse recovery time	V _{DD} = 30 V, I _D = 30 A, di/dt = 100 A/μS		80		ns
Q _{rr}	Reverse recovery charge			124		nC
I _{rrm}	Peak Reverse Recovery Current			2.7		A

Electrical Characteristics Diagrams

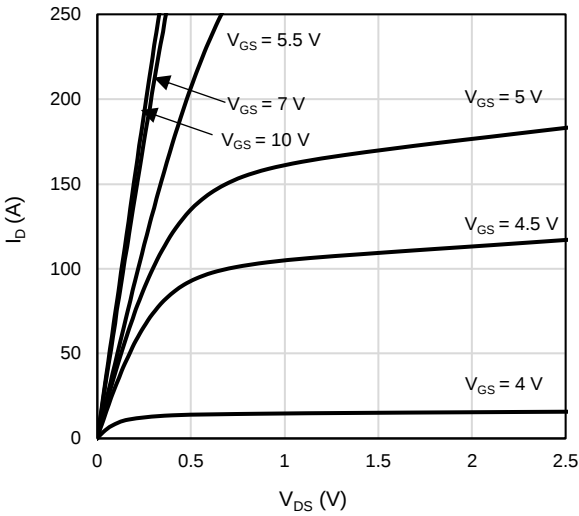


Figure 1: On-Region Characteristics

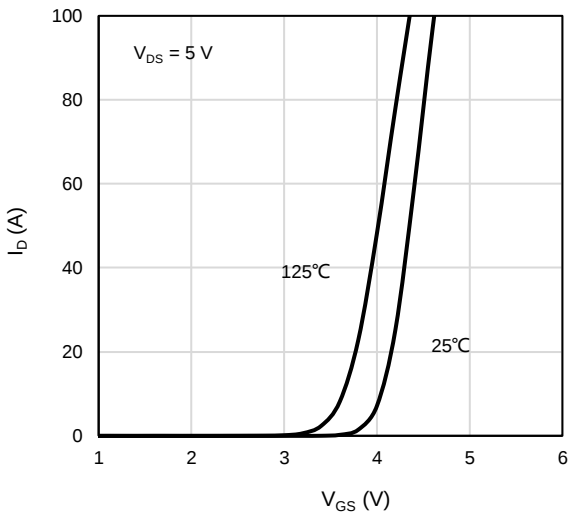


Figure 2: Transfer Characteristics

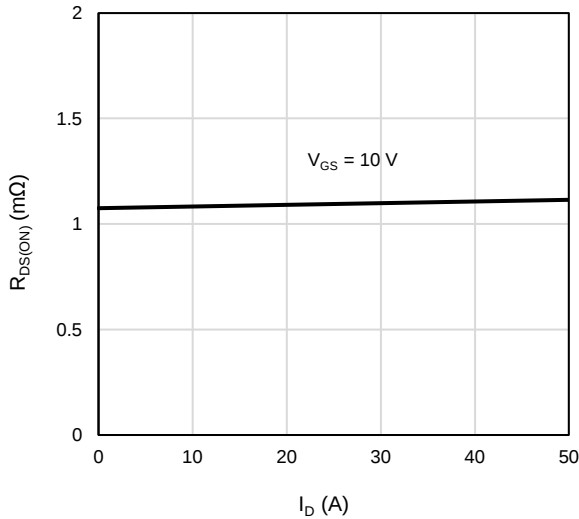


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

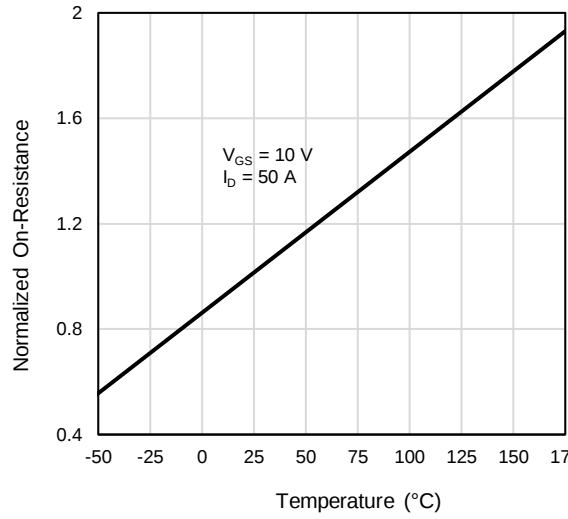


Figure 4: On-Resistance vs. Junction Temperature

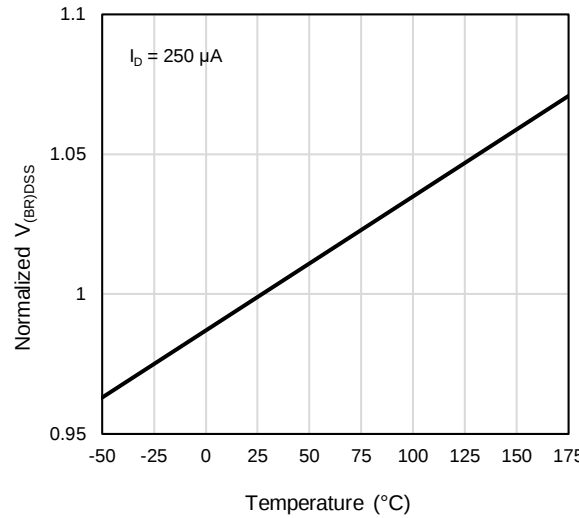


Figure 5: Breakdown Voltage vs. Junction Temperature

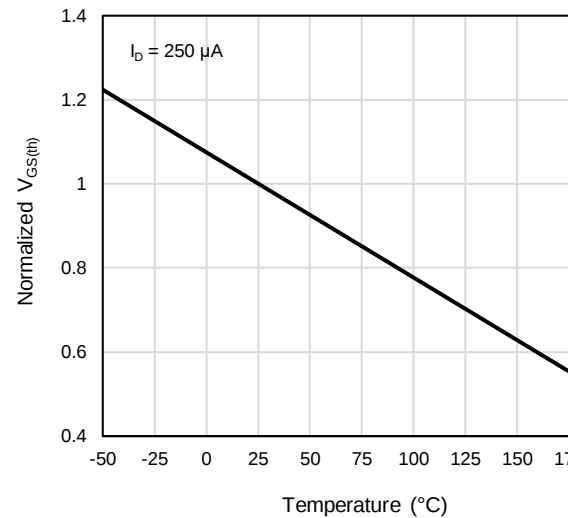
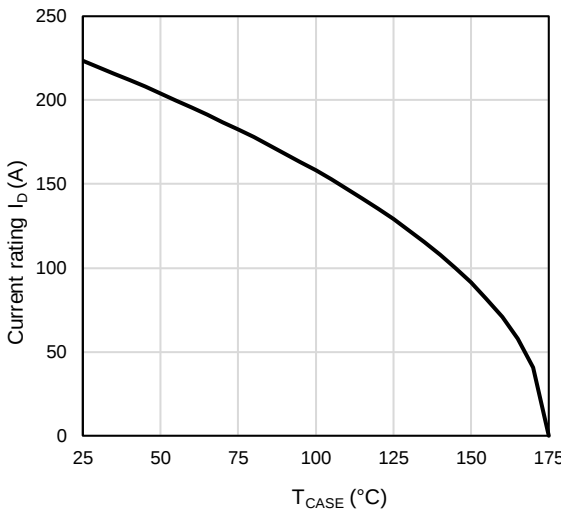
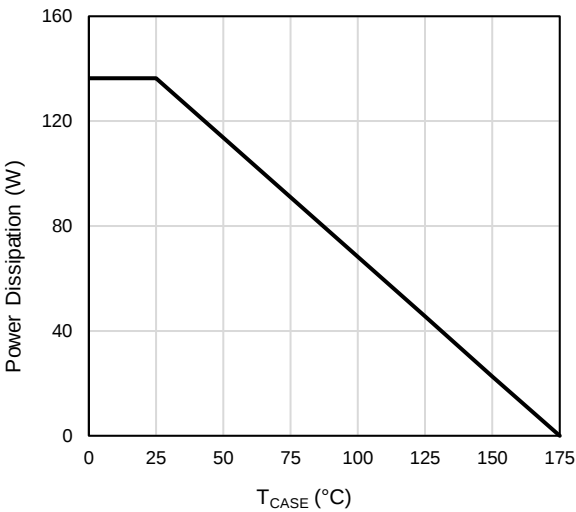
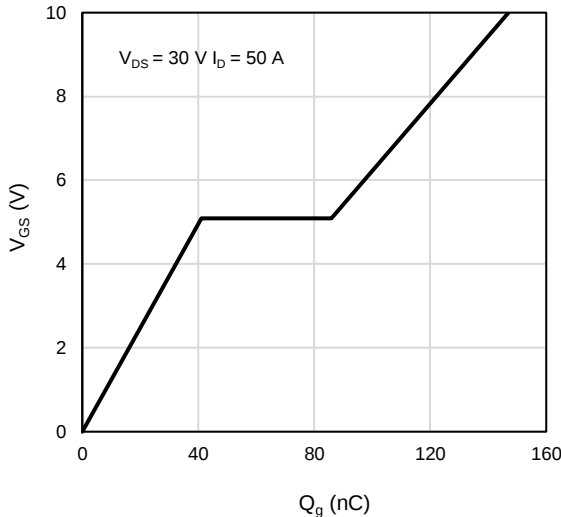
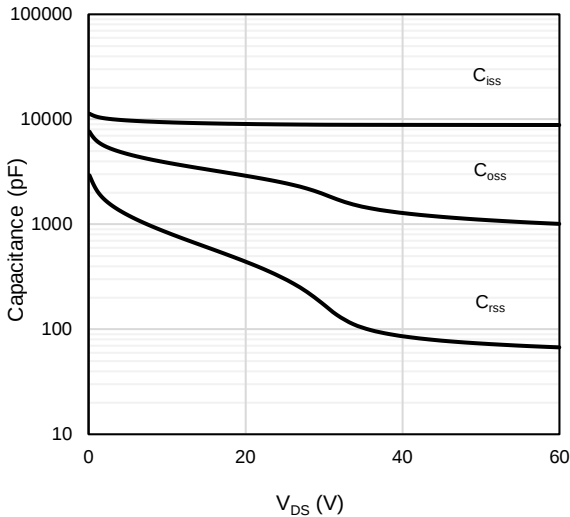
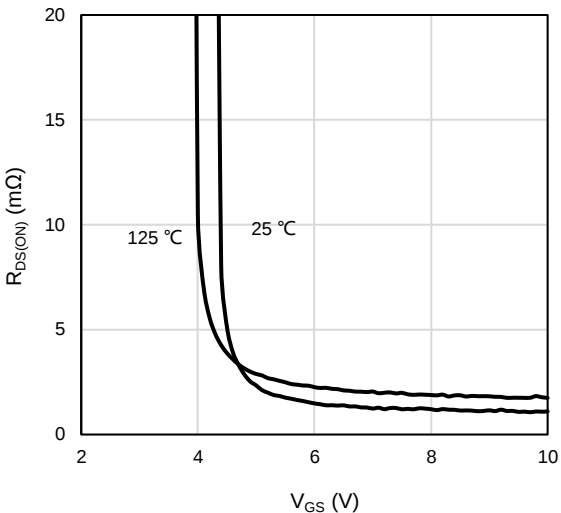
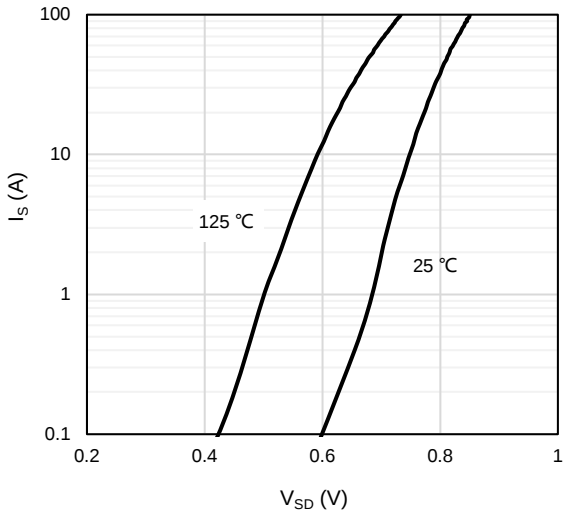


Figure 6: Threshold Voltage vs. Junction Temperature



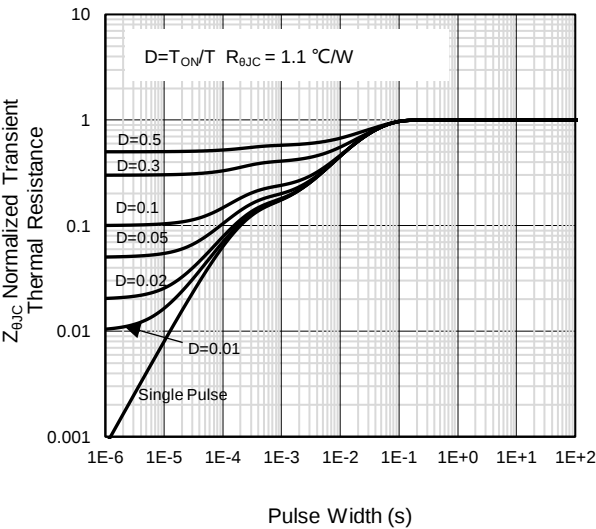


Figure 13: Normalized Maximum Transient Thermal Impedance

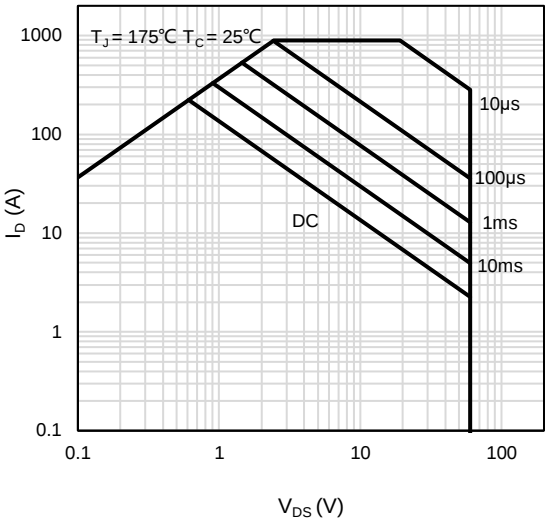
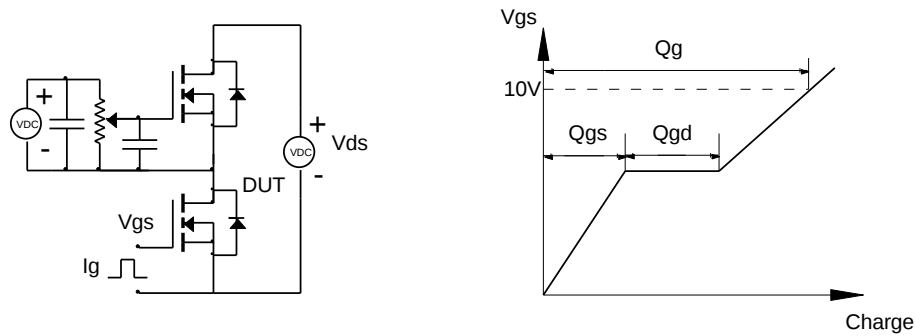


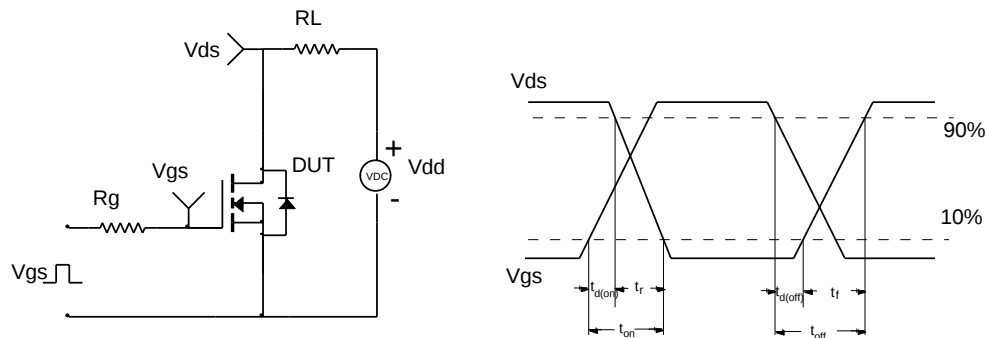
Figure 14: Maximum Forward Biased Safe Operating Area

Test Circuit and Waveform

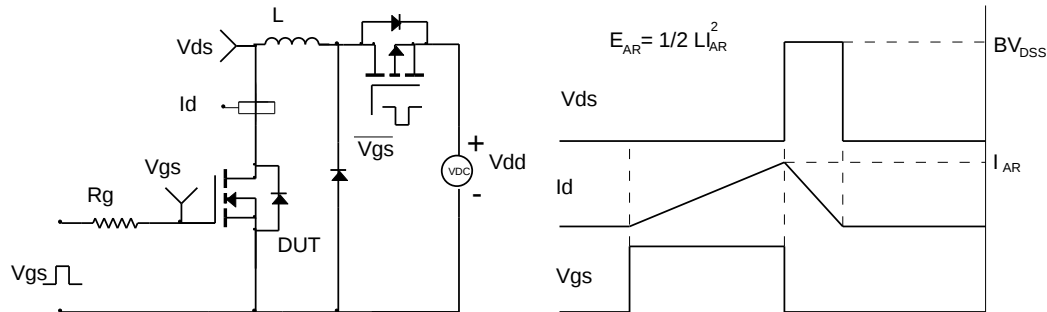
Gate Charge Test Circuit & Waveform



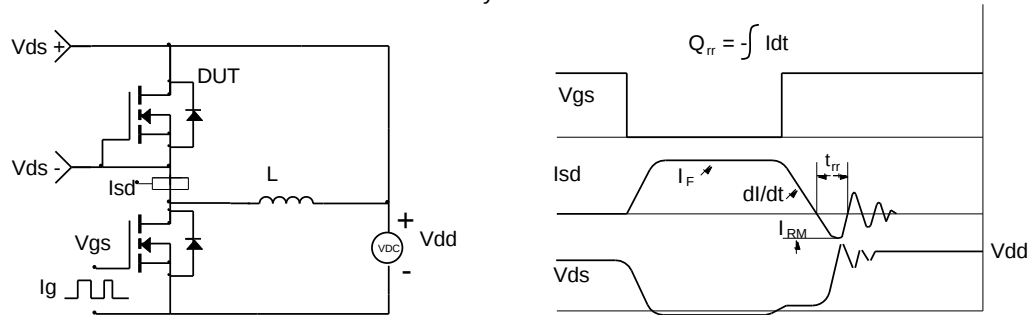
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Revision History

Revision	Released	Remark
Rev.1.0	2023	Initial Release

Disclaimer

The information given in this document describes the independent performance of the product, but similar performance is not guaranteed under other working conditions, and cannot be guaranteed when installed with other products or equipment. To achieve the required performance of the product in actual scenarios, the customer should conduct a complete application test to assess the functionality of the product.

Alkaidsemi assumes no responsibility for equipment failures result from using products at values that exceed the ratings, operating conditions, or other parameters listed in the product specifications.

The product described in this specification is not applicable for aerospace or other applications which requires high reliability. Customers using or selling these products for use in medical, life-saving, or life-sustaining applications do so at their own risk and agree to fully indemnify.

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