

# 60V 10mohm Dual N-channel SGT MOSFET

## AKG6A100GL

### Description:

This Dual N Channel SGT MOSFET has been designed to low on-state resistance ( $R_{DS(ON)}$ ), suggested use for battery protection, special for high efficiency power management applications.

### Features:

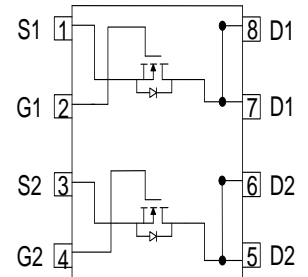
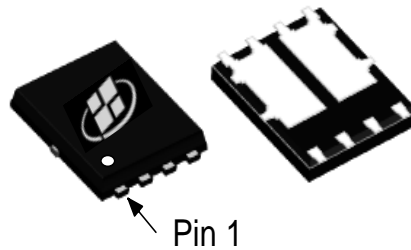
- Low  $R_{DS(ON)}$
- 100% UIS Tested
- RoHS compliant
- Halogen-free

### Applications:

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

### Key Performance Parameters:

Parameter	Value	Unit
$V_{DS}$	60	V
$R_{DS(ON), max} @ V_{GS} = 10 V$	10	m $\Omega$
$I_D$	50	A



### Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKG6A100GL	PDFN5X6_Dual	G6A100GL	Tape Reel	5000PCS

## Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Units
$V_{DS}$	Drain-Source Voltage	60	V
$I_D$	Drain Current - Continuous ( $T_C = 25^\circ\text{C}$ ) <sup>(Note 1)</sup>	57	A
	Drain Current - Continuous ( $T_C = 25^\circ\text{C}$ ) <sup>(Note 2)</sup>	50	A
	Drain Current - Continuous ( $T_C = 100^\circ\text{C}$ )	36	A
$I_{DM}$	Drain Current - Pulsed <sup>(Note 3)</sup>	200	A
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulsed Avalanche Energy <sup>(Note 4)</sup>	85	mJ
$P_D$	Power Dissipation ( $T_C = 25^\circ\text{C}$ )	52	W
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

## Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Steady-State	2.4	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State <sup>(Note 5)</sup>	50	$^\circ\text{C}/\text{W}$

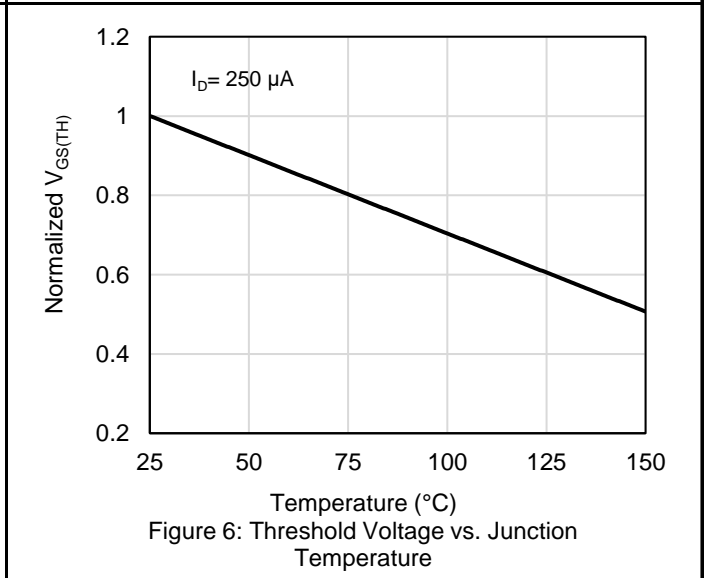
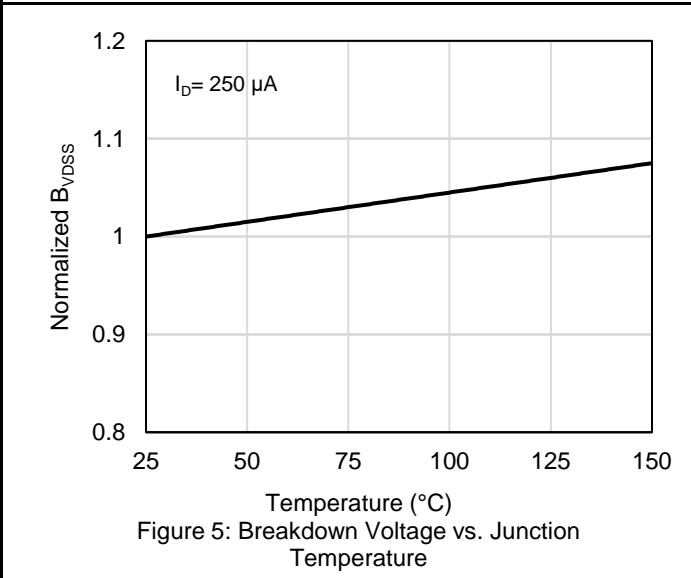
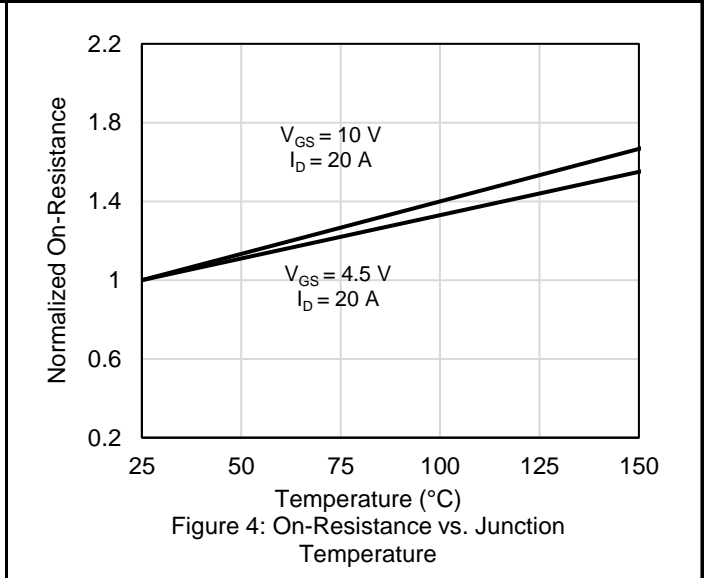
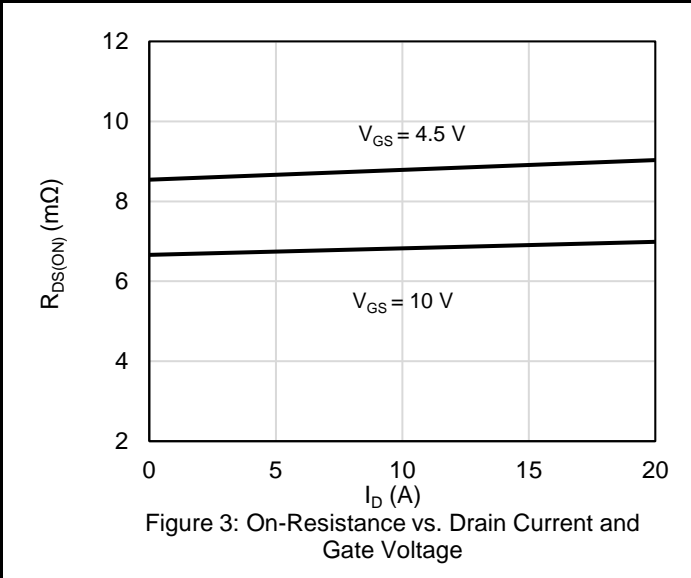
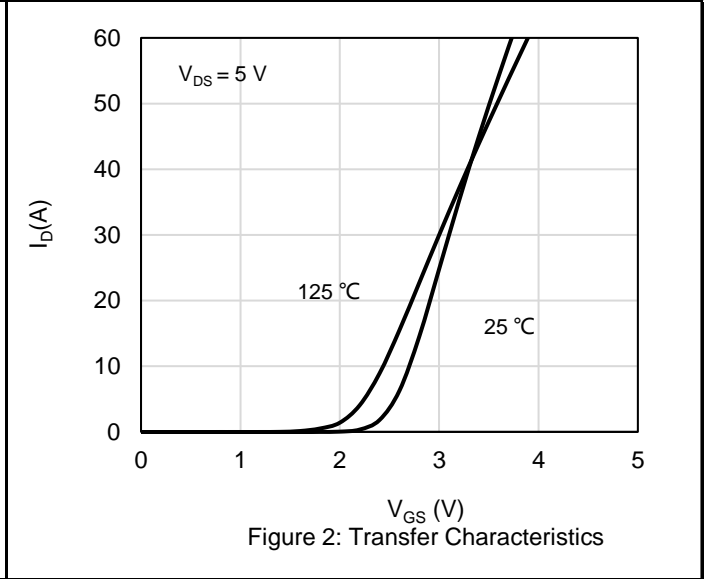
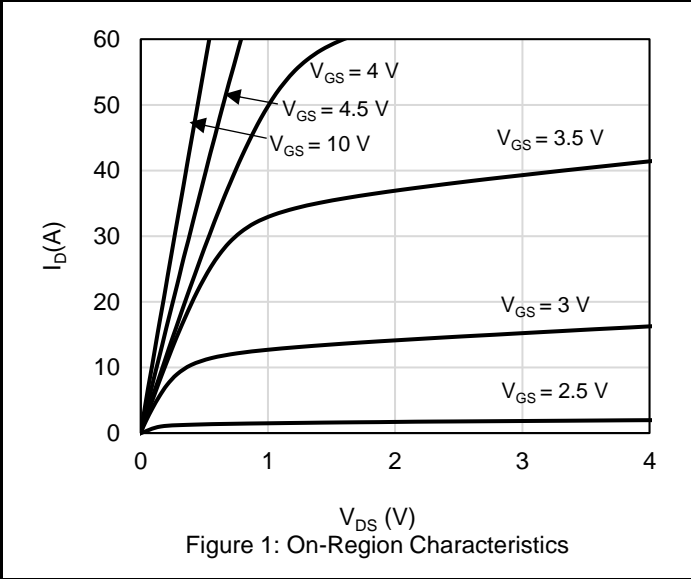
### Notes:

1. The max drain current rating is silicon limited
2. The max drain current rating is package limited
3. Repetitive Rating: Pulse width limited by maximum junction temperature
4.  $L = 0.5 \text{ mH}$ ,  $V_{DD} = 30 \text{ V}$ ,  $I_{AS} = 18.5 \text{ A}$ ,  $R_G = 25 \Omega$ , Starting  $T_J = 25^\circ\text{C}$
5. Mount on minimum PCB layout

**Electrical Characteristics** ( $T_J = 25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	60			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$			100	$\mu\text{A}$
$I_{GSS}$	Gate Leakage Current	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$			$\pm 100$	nA
$V_{GS(TH)}$	Gate Threshold voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	1	1.7	2.5	V
$R_{DS(ON)}$	Drain-Source on-state resistance	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		7	10	m $\Omega$
$R_{DS(ON)}$	Drain-Source on-state resistance	$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$		9	15	m $\Omega$
<b>Dynamic Characteristics</b>						
$C_{ISS}$	Input Capacitance	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V},$ $F = 1\text{ MHz}$		1890		pF
$C_{OSS}$	Output Capacitance			460		pF
$C_{RSS}$	Reverse Transfer Capacitance			46		pF
$R_G$	Gate Resistance	$F = 1\text{ MHz}$		1.1		$\Omega$
<b>Switching Characteristics</b>						
$T_{D(ON)}$	Turn On Delay Time	$V_{DD} = 30\text{ V}, R_L = 1.5\ \Omega,$ $V_{GS} = 10\text{ V}, R_G = 6\ \Omega$		11		nS
$T_R$	Rise Time			44		nS
$T_{D(OFF)}$	Turn Off Delay Time			42		nS
$T_F$	Fall Time			54		nS
$Q_G$	Total Gate Charge	$V_{DD} = 30\text{ V}, I_D = 20\text{ A},$ $V_{GS} = 10\text{ V}$		36		nC
$Q_{GS}$	Gate-Source Charge			5		nC
$Q_{GD}$	Gate-Drain Charge			10		nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Body-Diode Forward Current				50	A
$I_{SM}$	Maximum Pulsed Body-Diode Forward Current				200	A
$V_{SD}$	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 20\text{ A}$		1		V
$T_{RR}$	Reverse recovery time	$V_{DD} = 30\text{ V}, I_D = 20\text{ A},$ $di/dt = 100\text{ A}/\mu\text{S}$		34		nS
$Q_{RR}$	Reverse recovery charge			34		nC
$I_{RRM}$	Peak Reverse Recovery Current			1.8		A

# Electrical Characteristics Diagrams



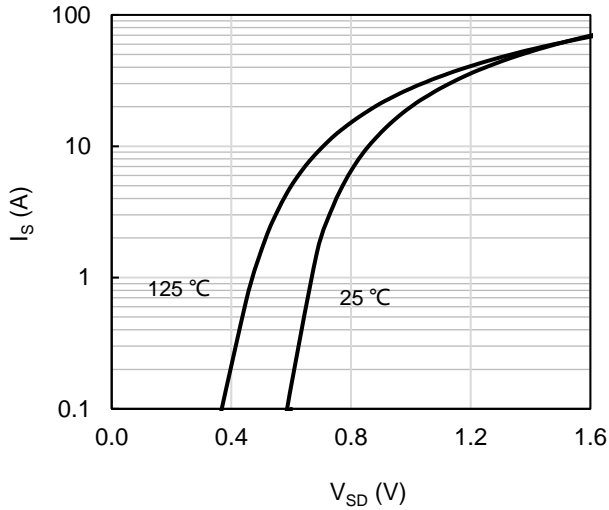


Figure 7: Body-Diode Characteristics

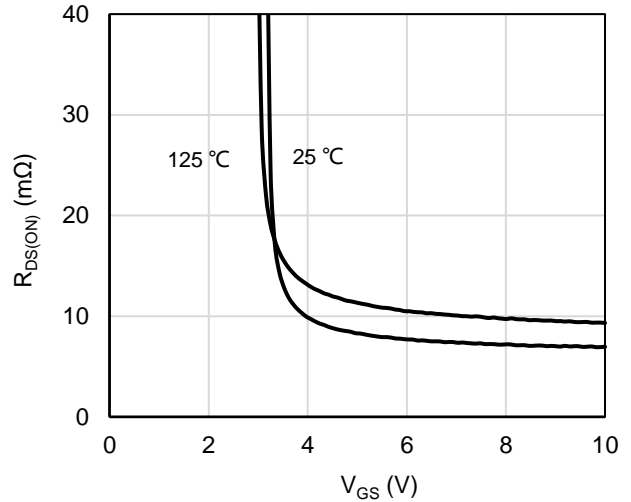


Figure 8: On-Resistance vs. Gate-Source Voltage

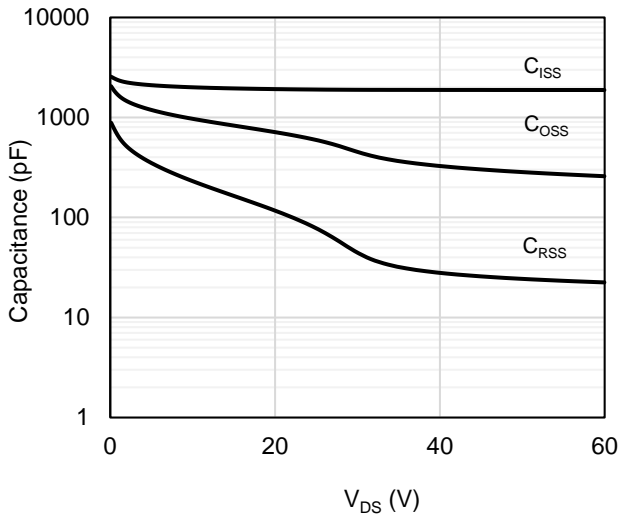


Figure 9: Capacitance Characteristics

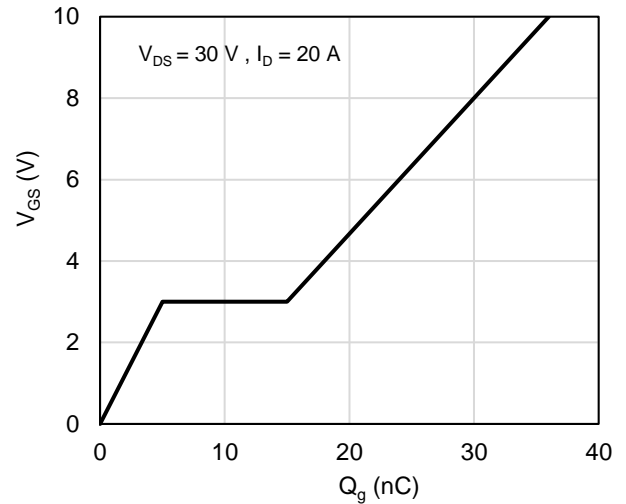


Figure 10: Gate-Charge Characteristics

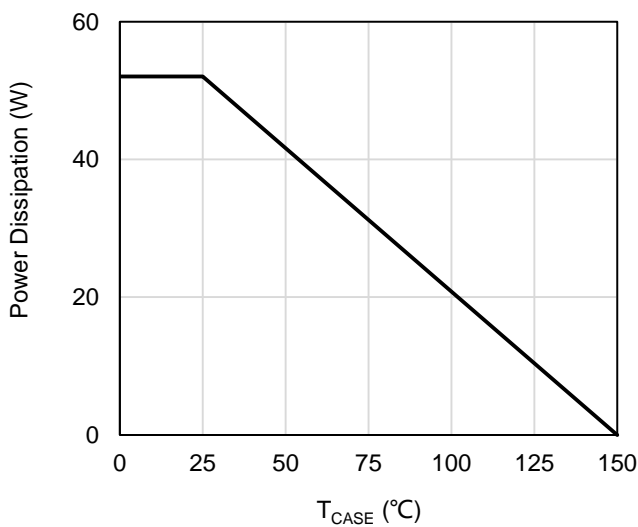


Figure 11: Power De-rating

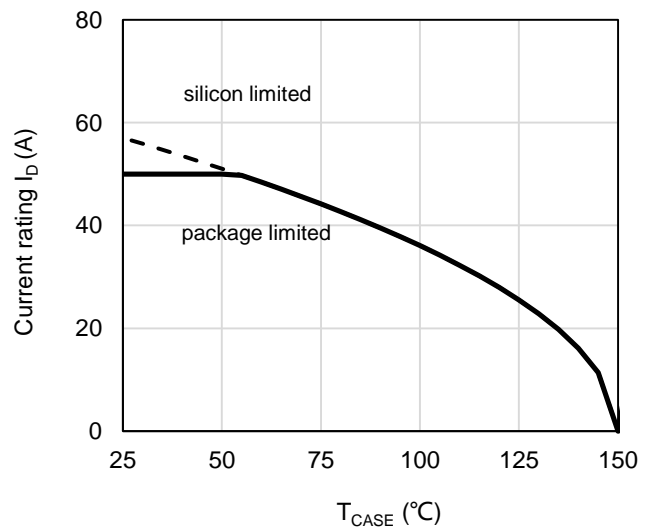


Figure 12: Current De-rating

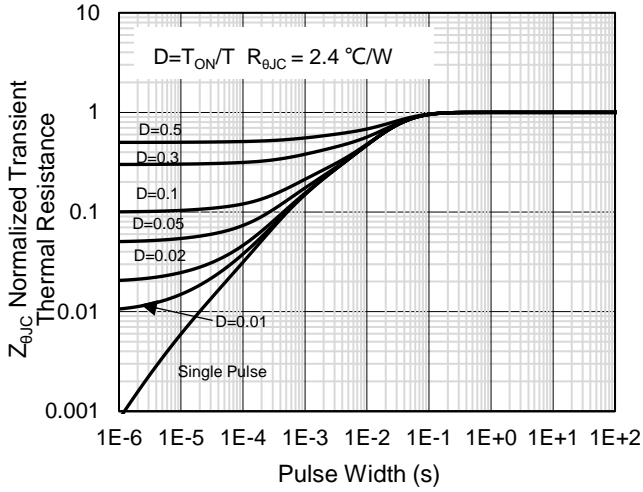


Figure 13: Normalized Maximum Transient Thermal Impedance

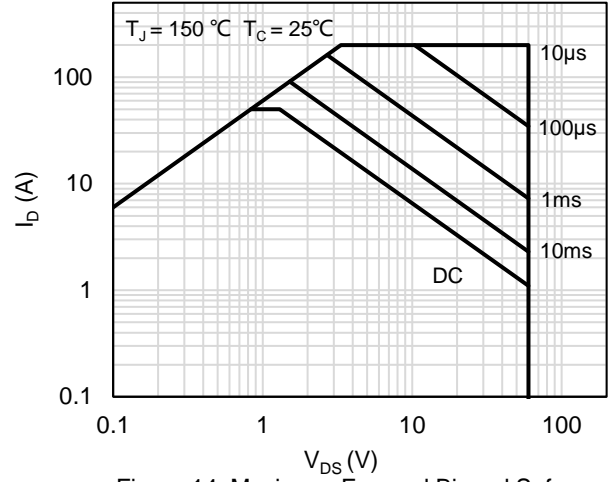
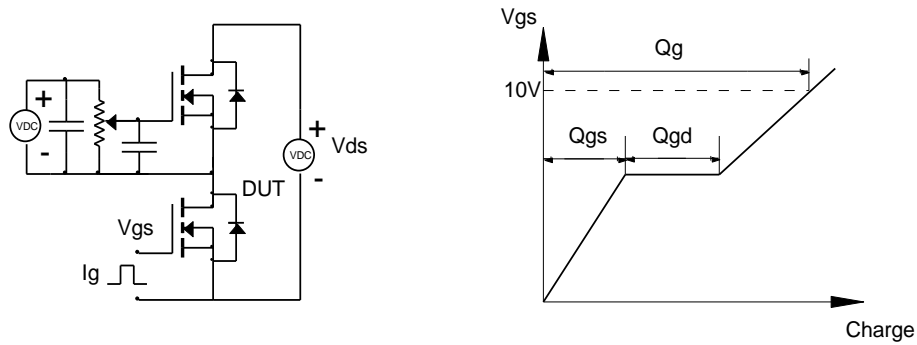


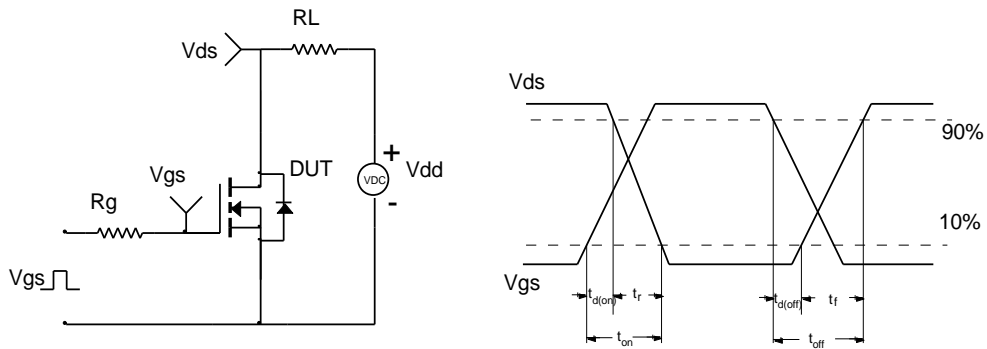
Figure 14: Maximum Forward Biased Safe Operating Area

# Test Circuit and Waveform

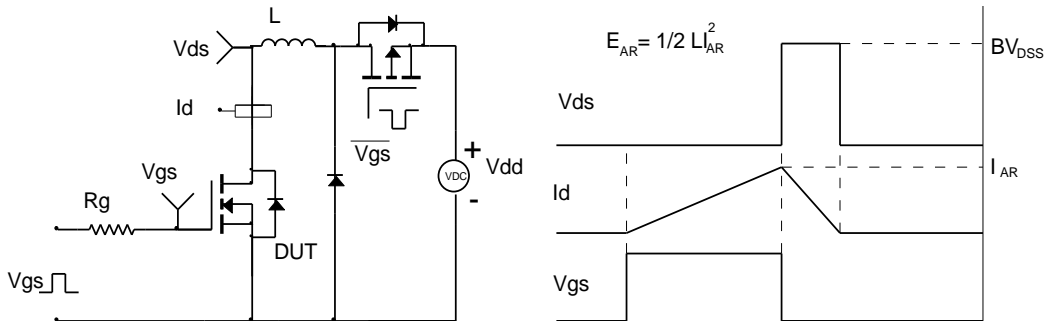
Gate Charge Test Circuit & Waveform



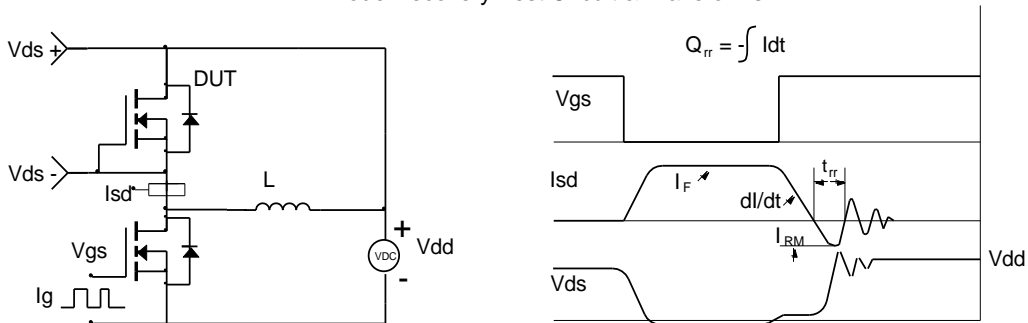
Resistive Switching Test Circuit & Waveforms



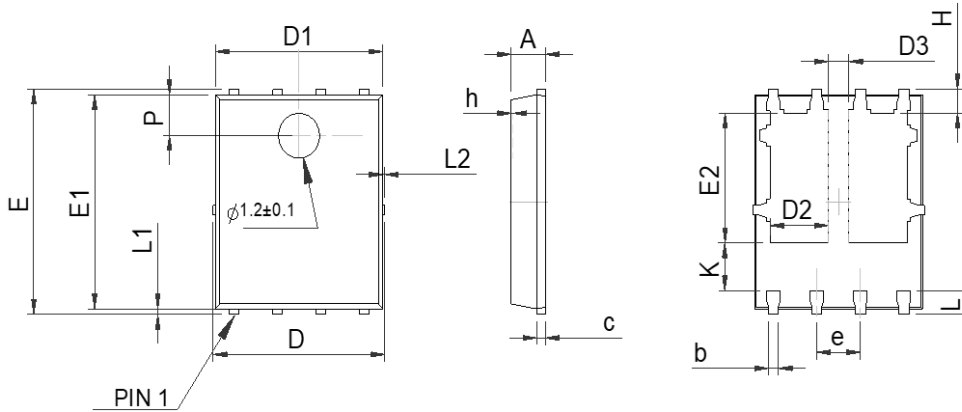
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



# Package Outlines

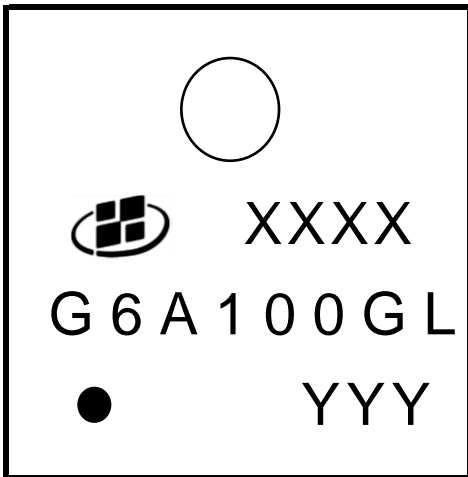


SYMBOL	MIN	NOM	MAX
A	0.90	1.00	1.10
b	0.20	0.30	0.40
c	0.21	0.25	0.34
D	–	–	5.10
D1	4.80	4.90	5.00
D2	1.605	1.705	1.805
D3	0.55	0.60	0.65
e	1.27 BSC		
E	5.90	6.00	6.10
E1	5.65	5.75	5.85
E2	3.375	3.475	3.575
H	0.55	0.65	0.75
h	–	–	0.10
K	1.20	–	–
L	0.535	0.635	0.735
L1	0.05	0.15	0.25
L2	–	–	0.12
$\Theta$	8°	10°	12°
P	1.00	1.10	1.20

Unit in mm



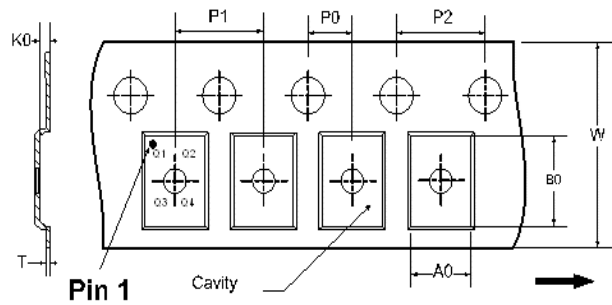
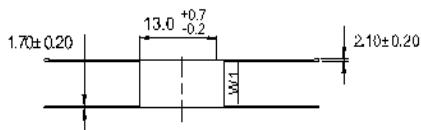
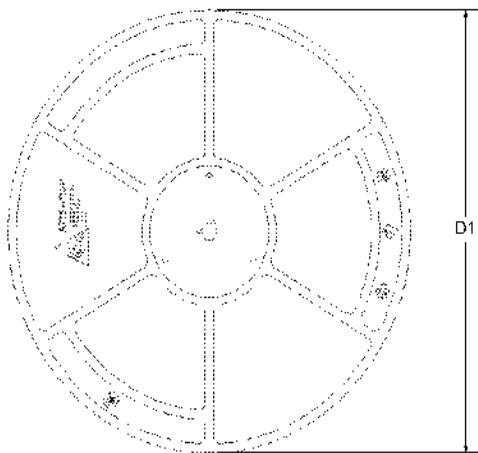
### Marking Information



Note:  
 G6A100GL = Product Name Code  
 XXXX = Date code  
 YYY  
 Contact ALKAIDSEMI sales for detail information

### Tape & Reel Information

REEL DIMENSIONS



A0: Dimension designed to accommodate the component width  
 B0: Dimension designed to accommodate the component length  
 K0: Dimension designed to accommodate the component thickness  
 W: Overall width of the carrier tape  
 P0: Pitch between successive cavity centers and sprocket hole  
 P1: Pitch between successive cavity centers  
 P2: Pitch between sprocket hole  
 T: Tape material thickness  
 D1: Reel Diameter  
 W1: Reel Width

DIMENSIONS(Unit:mm)										
Reel	D1	W1								Material
	330	12.4								Hips
Tape	P0	P1	P2	W	A0	B0	K0	T	Pin 1 Quadrant	Material
	2	8	4	12	6.3	5.3	1.2	0.25	Q1	PC

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## Revision History

Revision	Release Date	Remark
Rev.1.0	2023/7/26	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.

Due to product or technical improvements, the information described or contained herein may be changed without prior notice.