

60V 4mohm N-channel SGT MOSFET
AKG6N040KL

Description:

This N channel SGT MOSFET has been designed to low on-state resistance and maintain superior switching performance, especial for high efficiency power management applications.

Features:

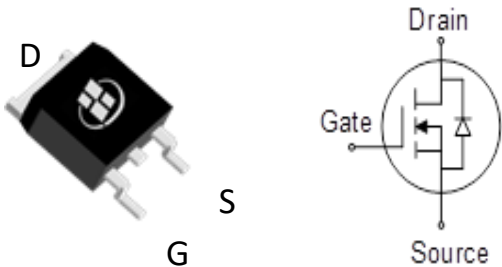
- Low $R_{DS(ON)}$
- RoHS compliant ^(Note 1)
- Halogen-free ^(Note 1)

Applications:

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

Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	60	V
$R_{DS(ON), max} @V_{GS} = 10V$	4	mΩ
I_D	70	A



Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKG6N040KL	TO252	G6N040KL	Tape Reel	2500PCS

Notes:

1. Contact ALKAIDSEMI sales for detail information

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 ($T_C = 25^\circ\text{C}$) ^(Note 1)	125	A
	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) ^(Note 2)	70	A
	Drain Current - Continuous ($T_C = 100^\circ\text{C}$)	47	A
I_{DM}	Drain Current - Pulsed ^(Note 3)	280	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy ^(Note 4)	225	mJ
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	113	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	1.1	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State ^(Note 5)	54	$^\circ\text{C/W}$

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. $L = 0.5 \text{ mH}$, $V_{DD} = 30 \text{ V}$, $I_{AS} = 30 \text{ A}$, $R_G = 25 \Omega$, Starting $T_J = 25^\circ\text{C}$
5. Mount on minimum PCB layout

Electrical Characteristics (T _J = 25°C unless otherwise noted)						
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Static Characteristics						
BV _{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	1	1.9	3	V
R _{DS(ON)}	Drain-Source on-state resistance	V _{GS} = 10 V, I _D = 60 A		3.5	4	mΩ
		V _{GS} = 4.5 V, I _D = 60 A		4.5	5.5	mΩ
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{DS} = 30 V, V _{GS} = 0 V, F = 1 MHz		3677		pF
C _{OSS}	Output Capacitance			773		pF
C _{RSS}	Reverse Transfer Capacitance			69		pF
R _G	Gate Resistance	F = 1 MHz		1.2		Ω
Switching Characteristics						
T _{D(ON)}	Turn On Delay Time	V _{DD} = 30 V , R _L = 0.5 Ω, V _{GS} = 10 V, R _G =4.7 Ω		16		nS
T _R	Rise Time			52		nS
T _{D(OFF)}	Turn Off Delay Time			54		nS
T _F	Fall Time			116.5		nS
Q _G	Total Gate Charge	V _{DD} = 30 V , I _D = 60 A, V _{GS} = 10 V		66.5		nC
Q _{GS}	Gate-Source Charge			12		nC
Q _{GD}	Gate-Drain Charge			17.5		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Body-Diode Forward Current				70	A
I _{SM}	Maximum Pulsed Body-Diode Forward Current ^(NOTE 1)				280	A
V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _S = 120 A		1.1		V
T _{RR}	Reverse recovery time	V _{DD} = 30 V, I _D = 60 A, di/dt = 100 A/μS		46.5		nS
Q _{RR}	Reverse recovery charge			27.5		nC
I _{RRM}	Peak Reverse Recovery Current			1		A

Electrical Characteristics Diagrams

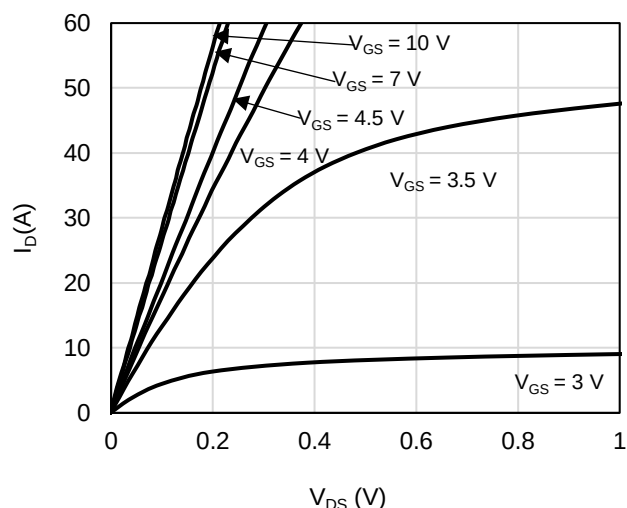


Figure 1: On-Region Characteristics

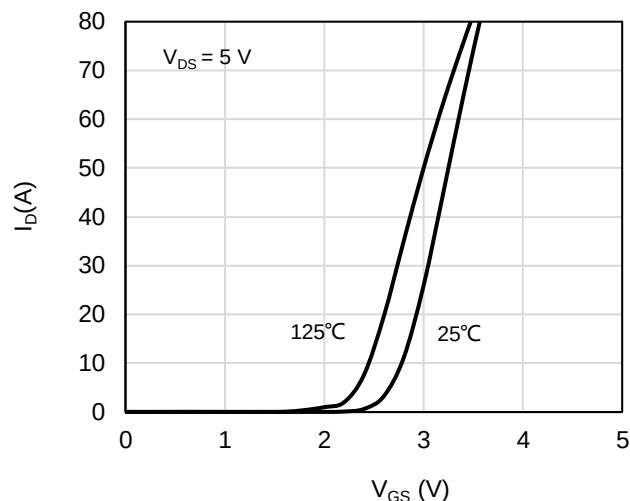


Figure 2: Transfer Characteristics

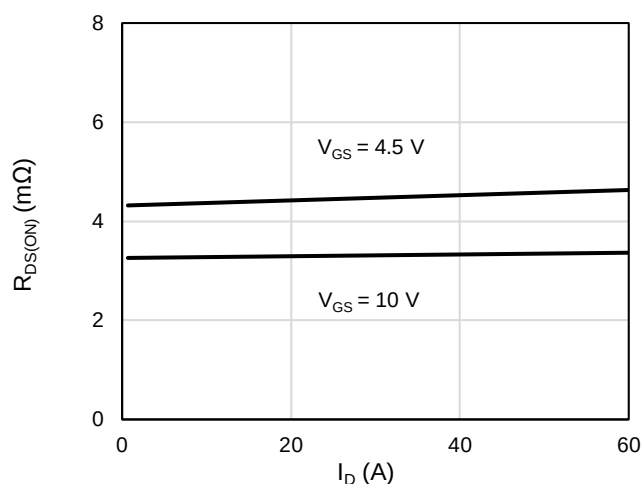


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

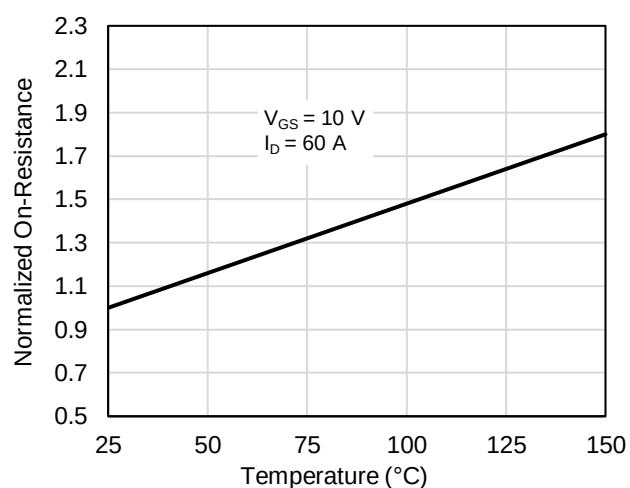


Figure 4: On-Resistance vs. Junction Temperature

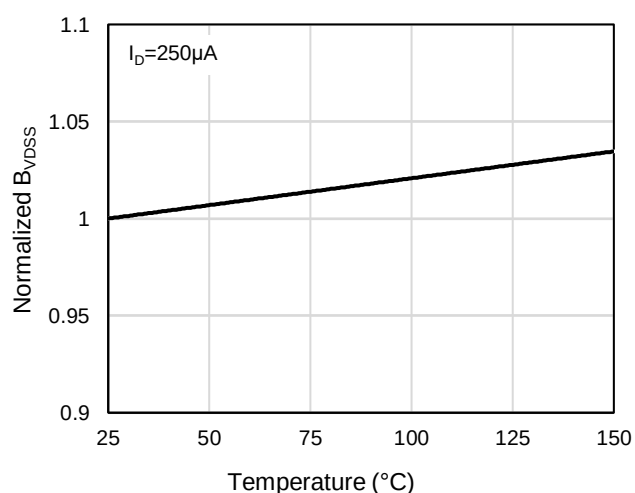


Figure 5: Breakdown Voltage vs. Junction Temperature

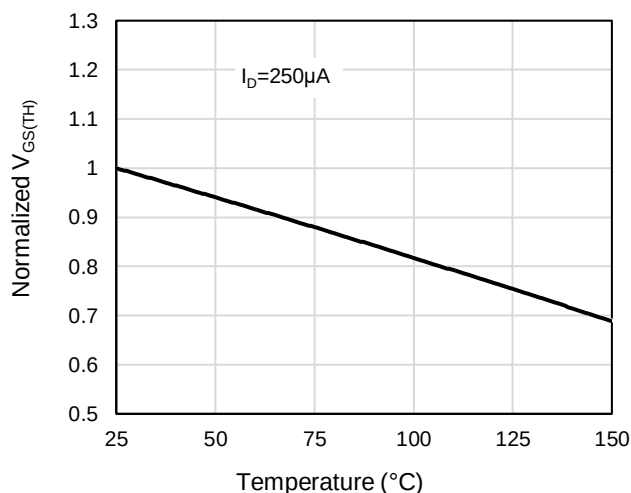


Figure 6: Threshold Voltage vs. Junction Temperature

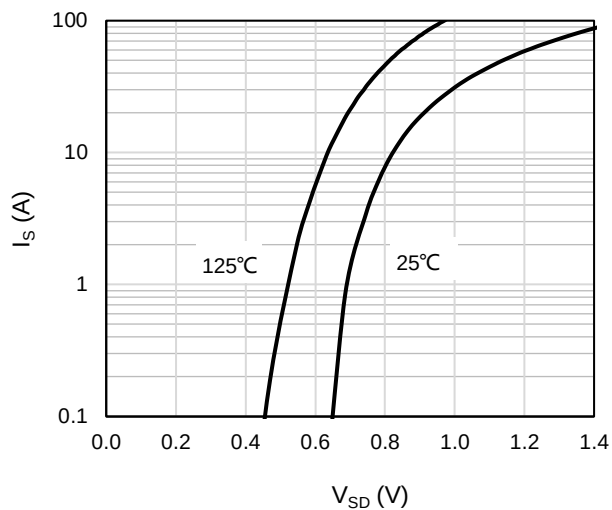


Figure 7: Body-Diode Characteristics

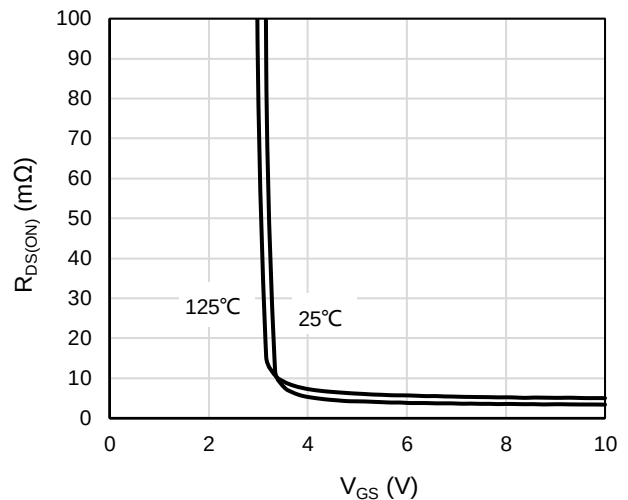


Figure 8: On-Resistance vs. Gate-Source Voltage

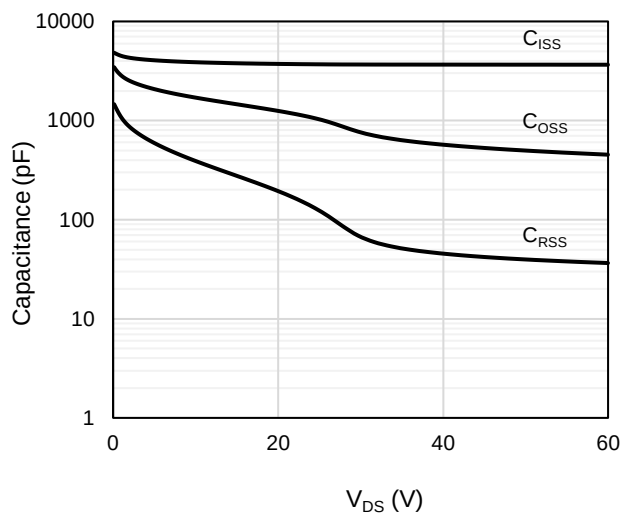


Figure 9: Capacitance Characteristics

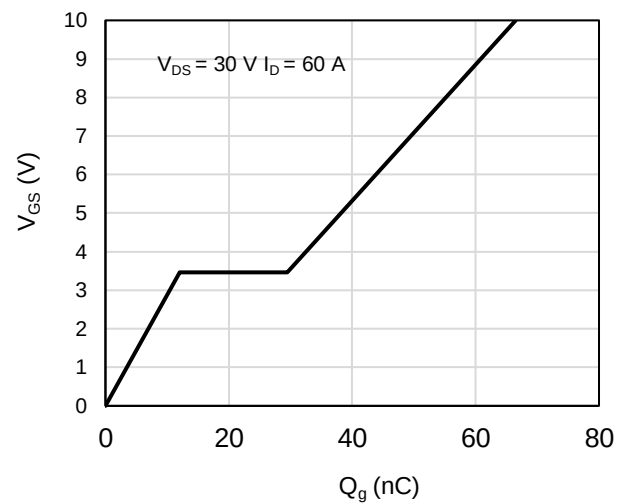


Figure 10: Gate-Charge Characteristics

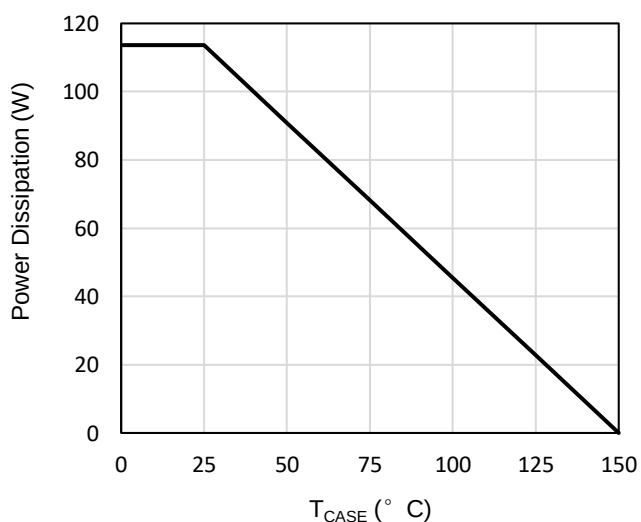


Figure 11: Power De-rating

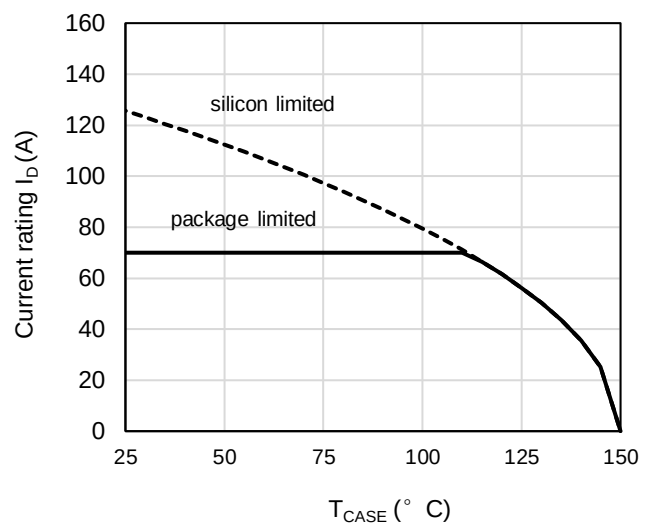
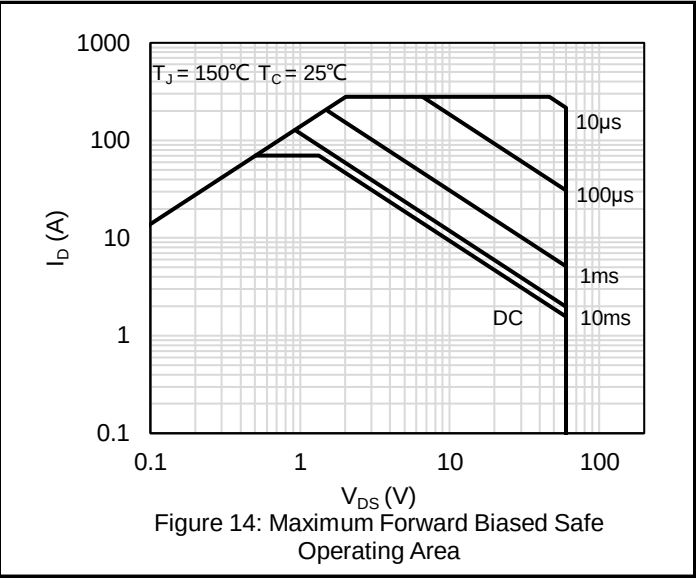
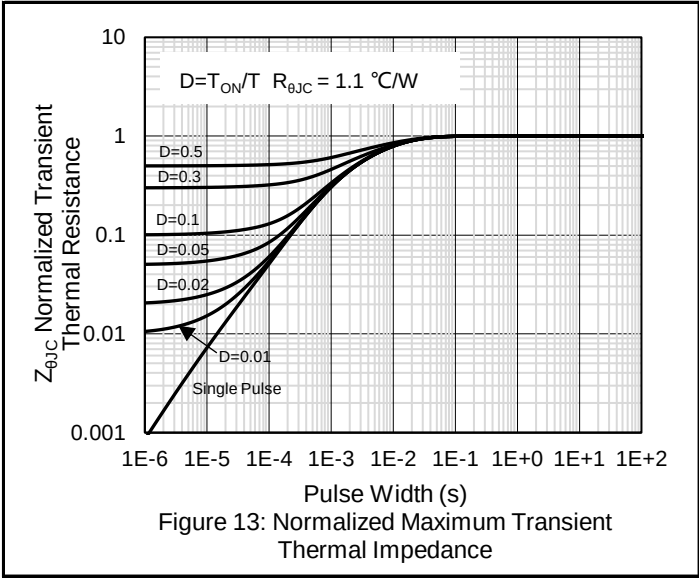
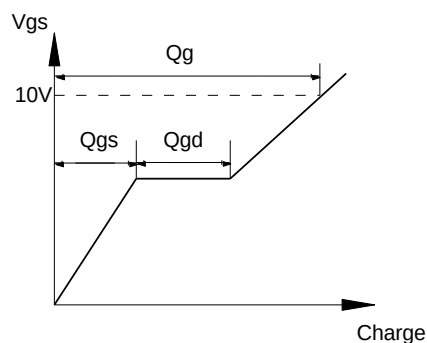
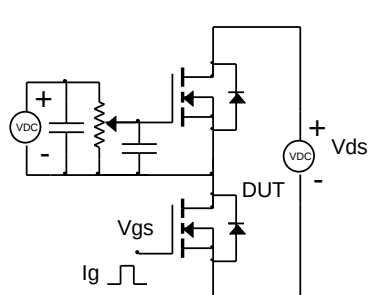


Figure 12: Current De-rating

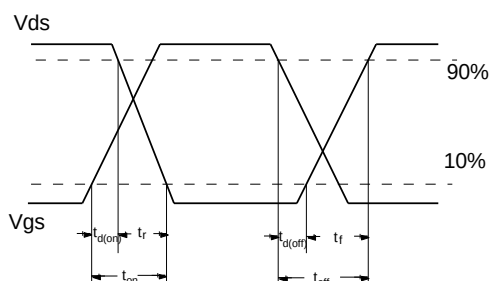
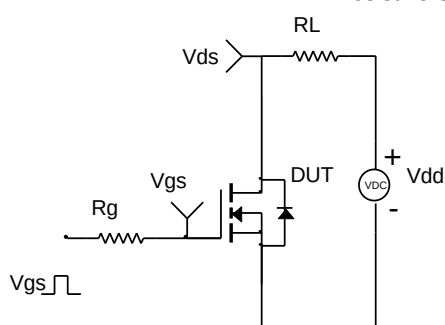


Test Circuit and Waveform

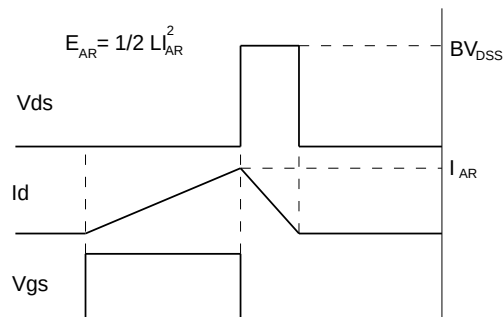
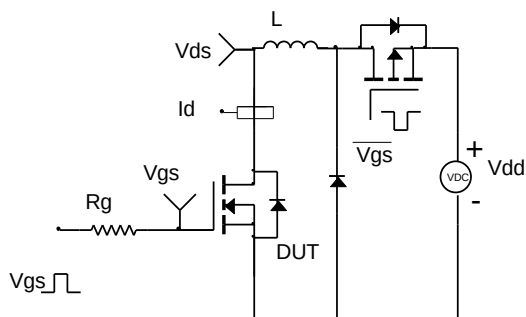
Gate Charge Test Circuit & Waveform



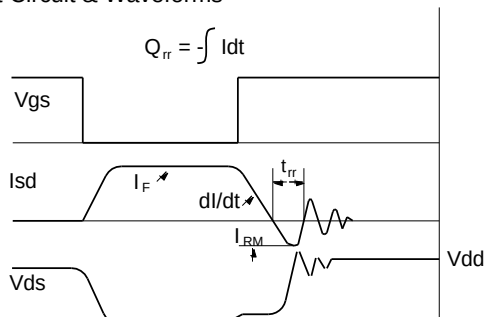
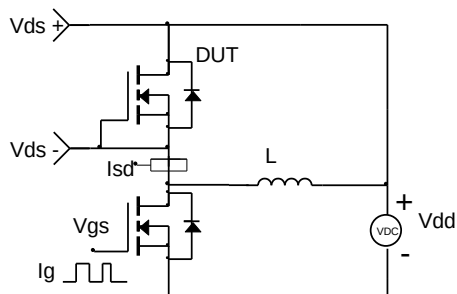
Resistive Switching Test Circuit & Waveforms



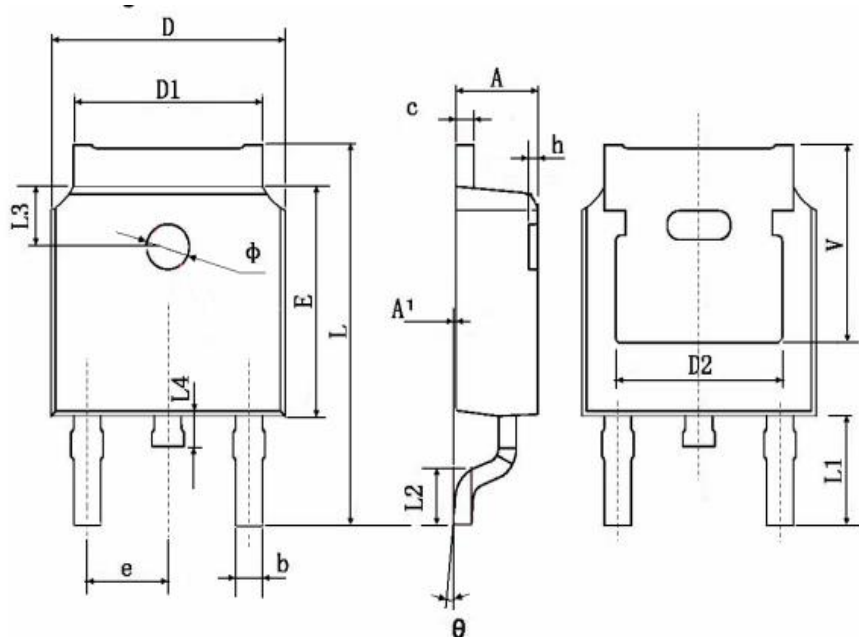
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outlines



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.250	2.350	0.089	0.093
A1	0.050	0.150	0.002	0.006
b	0.660	0.860	0.026	0.034
c	0.458	0.558	0.018	0.022
D	6.550	6.650	0.259	0.263
D1	5.234	5.434	0.207	0.215
D2	4.826 TYP.		0.191 TYP.	
E	6.050	6.150	0.239	0.243
e	2.236	2.336	0.088	0.092
L	9.820	10.220	0.388	0.404
L1	3.000 TYP.		0.119 TYP.	
L2	1.400	1.600	0.055	0.063
L3	1.800 TYP.		0.071 TYP.	
L4	0.700	0.900	0.028	0.036
Φ	1.150	1.250	0.045	0.049
θ	0°	3°	0°	3°
h	0.000	0.300	0.000	0.012
V	5.399 TYP		0.213 TYP	

Marking Information



G6N040KL
XXXXXXXX

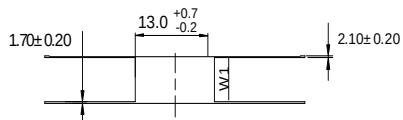
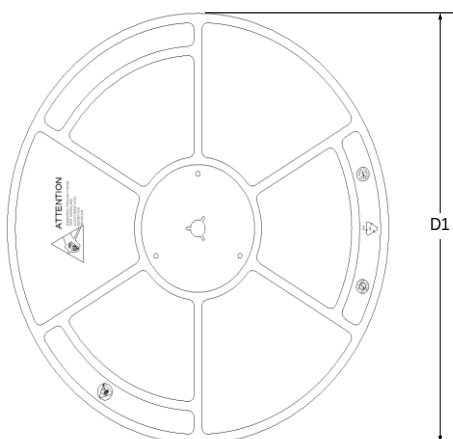
Note:

G6N040KL = Product Name Code

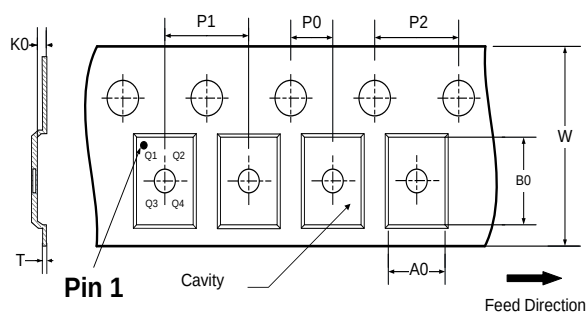
XXXXXXXX = Date code

Contact ALKAIDSEMI sales for detail information

REEL DIMENSIONS



TAPE 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	20.5								Hips
Tape	P0	P1	P2	W	A0	B0	K0	T	Pin 1 Quadrant	Material
	4	8	2	16	6.9	10.5	2.9	0.27	Q1	PC

All dimensions are nominal

Revision History

Revision	Release Date	Remark
Rev.1.0	2022/7/13	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.