40V 2.5mohm N-channel SGT MOSFET

AKG40N025G

Description:

This N channel SGT MOSFET has been designed to very low on-state resistance (R_{DSON}) and yet maintain superior switching performance, especial for high efficiency power management applications.

Features:

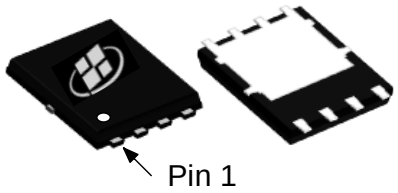
- N-channel, optimized for high-speed smooth switching
- Excellent Gate Charge × R_{DSON} (FOM)
- Very low on-resistance
- RoHS compliant (Note 1)
- Halogen-free (Note 1)

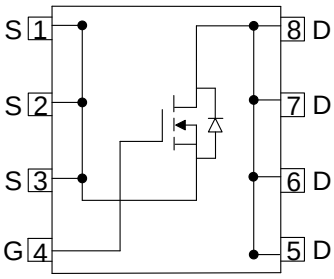
Applications:

- DC-DC Conversion
- Power Tools
- Motor Driving
- Power Management

Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	40	V
$R_{DSON,\ max}$ @V_{GS} = 10V	2.5	mΩ
I_D	115	A





Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKG40N025G	PDFN5X6-8L	G40N025G	13 inches Reel	5000

Notes:

1. Contact ALKAIDSEMI sales for detail information

Maximum Ratings(T_A = 25℃ unless otherwise noted)

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	40	V
I_D	Drain Current - Continuous (T_C = 25°C) (Note 1)	115	A
	Drain Current -Continuous (T_C = 100°C)	74	A
I_{DM}	Drain Current - Pulsed (Note 2)	460	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 3)	144	mJ
P_D	Power Dissipation (T_C = 25°C)	62.5	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	ºC

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case， Steady-State	2	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient Steady State (Note 4)	65	°C/W

Notes:

1. The max drain current rating is limited by T_{JMAX}
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. L = 0.5 mH, V_{DD} = 20V, I_{AS} = 24A, 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						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 40 V, V_{GS} = 0 V, T_J = 25℃			1	μA
		V_{DS} = 40 V, V_{GS} = 0 V, T_J = 150℃			250	
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	1.2	1.7	2.2	V
$R_{DS(ON)}$	Drain-Source on-state resistance	V_{GS} = 10 V, I_D = 30 A		2	2.5	mΩ
		V_{GS} = 4.5 V, I_D = 30 A		3	3.75	
Dynamic Characteristics						
C_{ISS}	Input capacitance	V_{DS} = 20 V, V_{GS} = 0 V, F = 1 MHz		1827		pF
C_{OSS}	Output capacitance			623		pF
C_{RSS}	Reverse transfer capacitance			22		pF
R_G	Gate resistance	F = 1 MHz		3.8		Ω
Switching Characteristics						
$T_{D(ON)}$	Turn On Delay Time	V_{DD} = 20 V, I_D = 20 A, V_{GS} = 10 V, R_G = 6 Ω		6.2		ns
T_R	RiseTime			27.4		ns
$T_{D(OFF)}$	Turn Off Delay Time			39.8		ns
T_F	Fall Time			16.6		ns
Q_G	Total Gate Charge	V_{DD} = 20 V, I_D = 20 A, V_{GS} = 10 V		28.3		nC
Q_{GS}	Gate-Source Charge			6.2		nC
Q_{GD}	Gate-Drain Charge			4.6		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Body-Diode Forward Current				80	A
I_{SM}	Maximum Pulsed Body-Diode Forward Current (NOTE 1)				240	A
V_{SD}	Diode Forward Voltage	V_{GS} = 0 V, I_S = 20 A		0.79	1.2	V
T_{RR}	Reverse recovery time	I_F = 20 A di/dt = 100 A/μS		36		ns
Q_{RR}	Reverse recovery charge			20		nC

Electrical Characteristics Diagrams

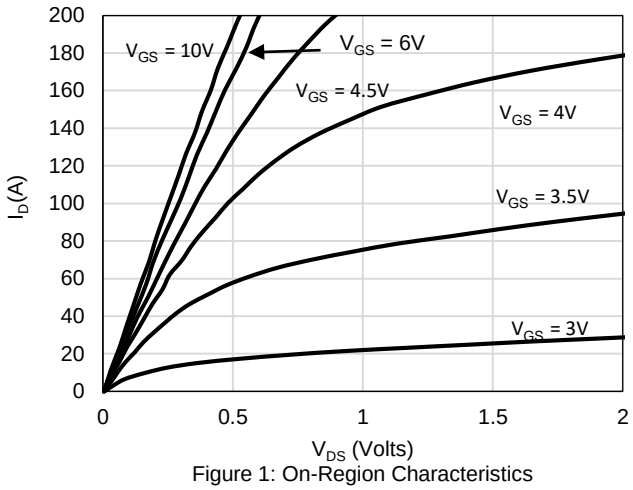


Figure 1: On-Region Characteristics

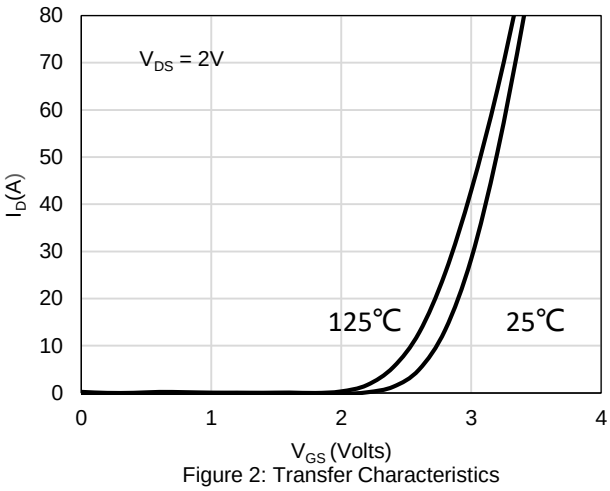


Figure 2: Transfer Characteristics

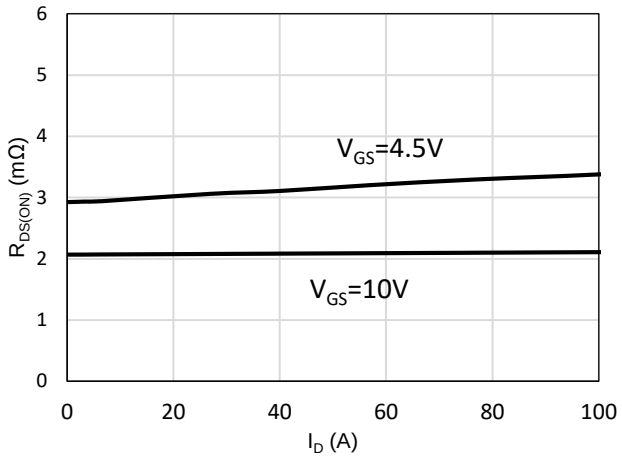


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

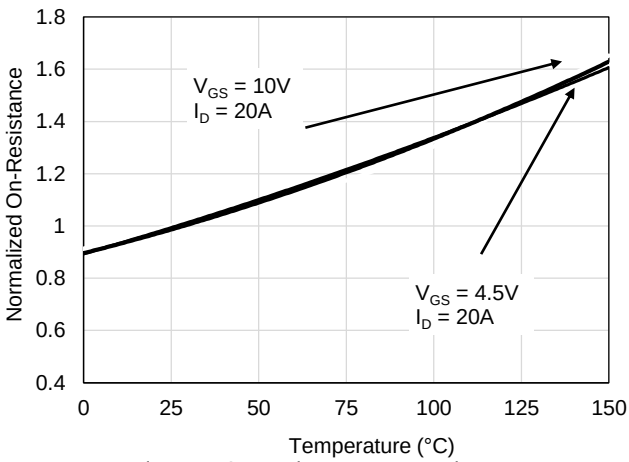


Figure 4: On-Resistance vs. Junction Temperature

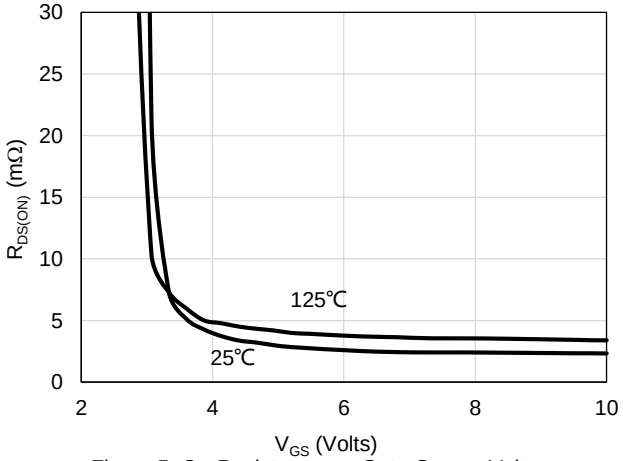


Figure 5: On-Resistance vs. Gate-Source Voltage

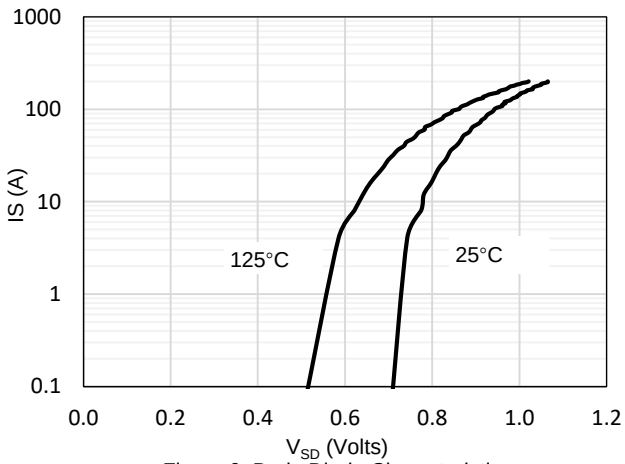


Figure 6: Body-Diode Characteristics

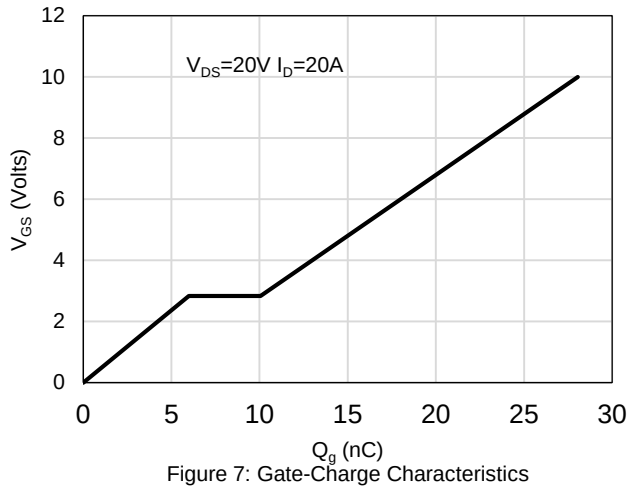


Figure 7: Gate-Charge Characteristics

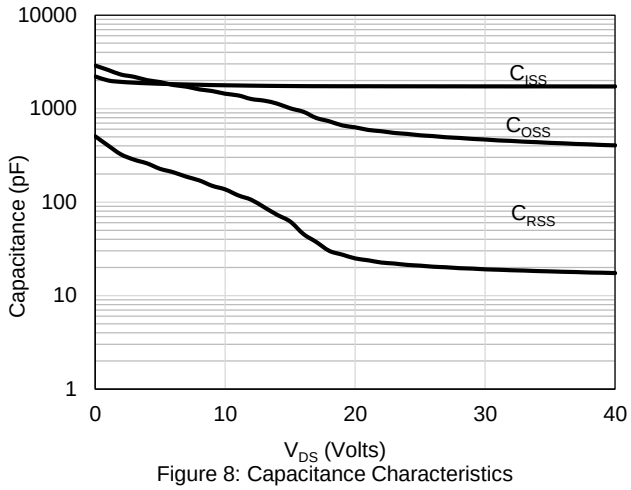


Figure 8: Capacitance Characteristics

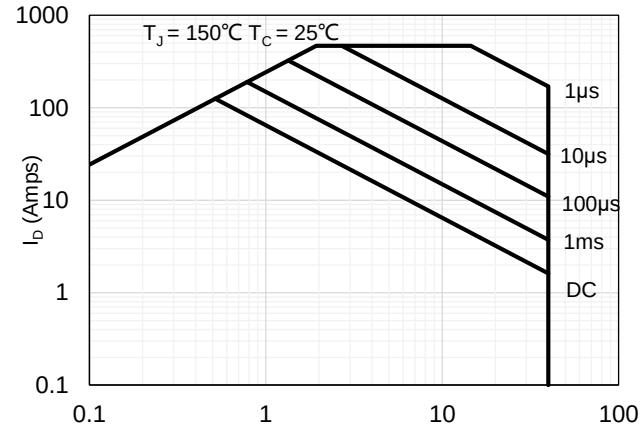


Figure 9: Maximum Forward Biased Safe Operating Area

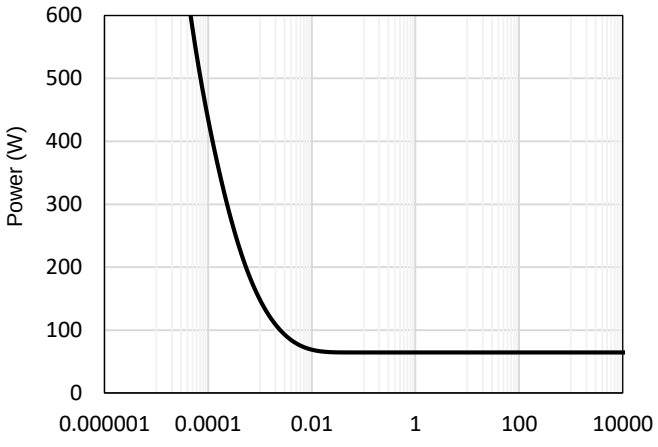


Figure 10: Single Pulse Power Rating Junction-to-Case

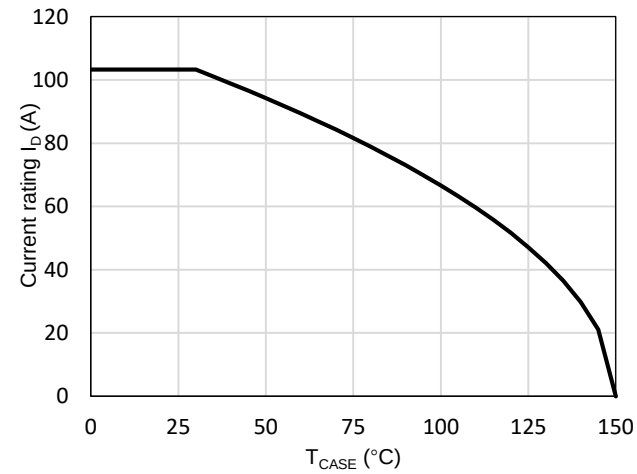


Figure 11: Current De-rating

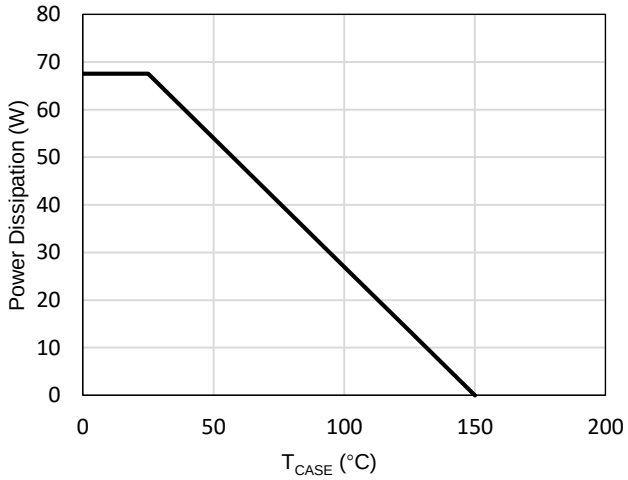


Figure 12: Power De-rating

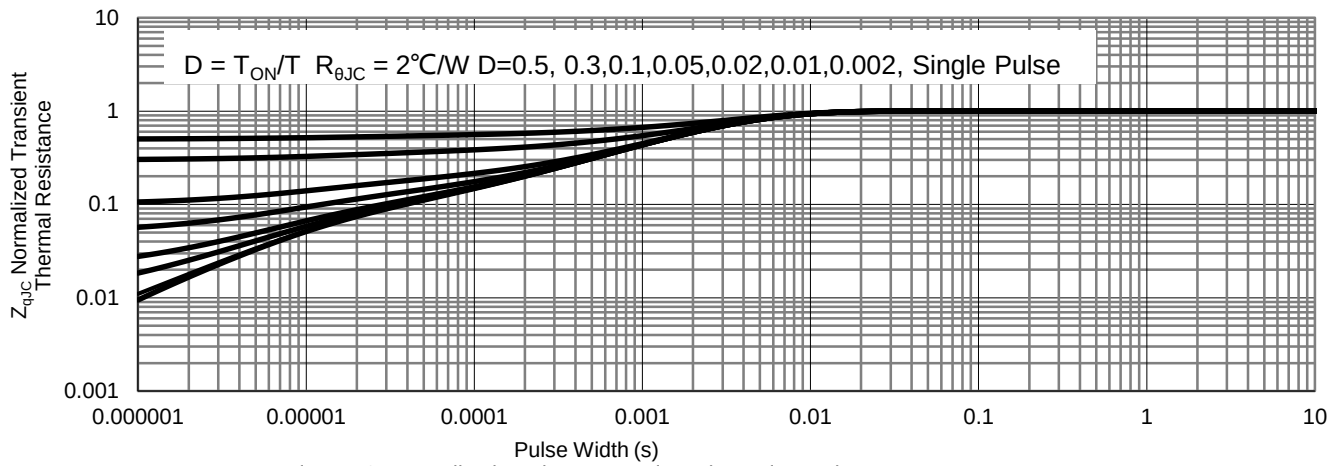
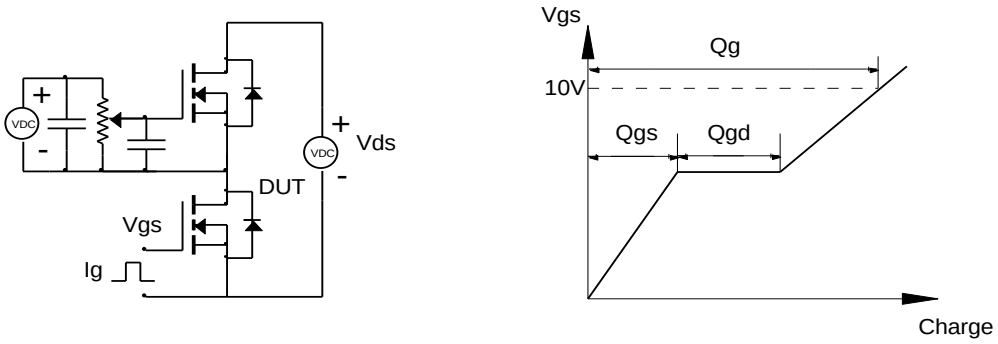


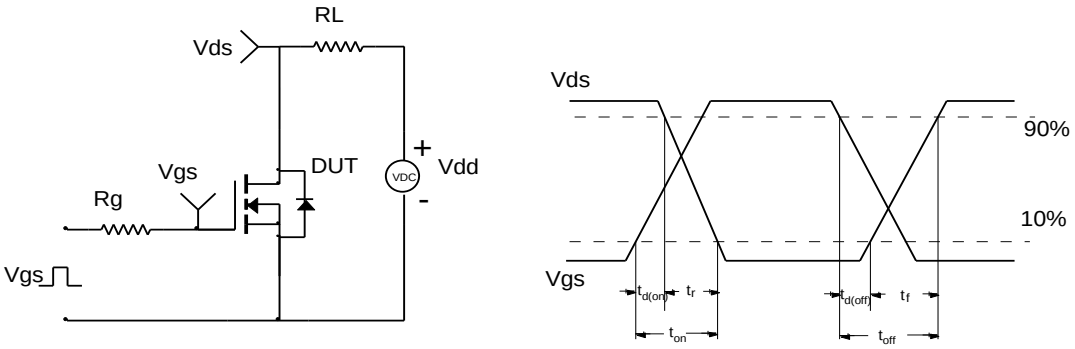
Figure 13: Normalized Maximum Transient Thermal Impedance

Test Circuit and Waveform

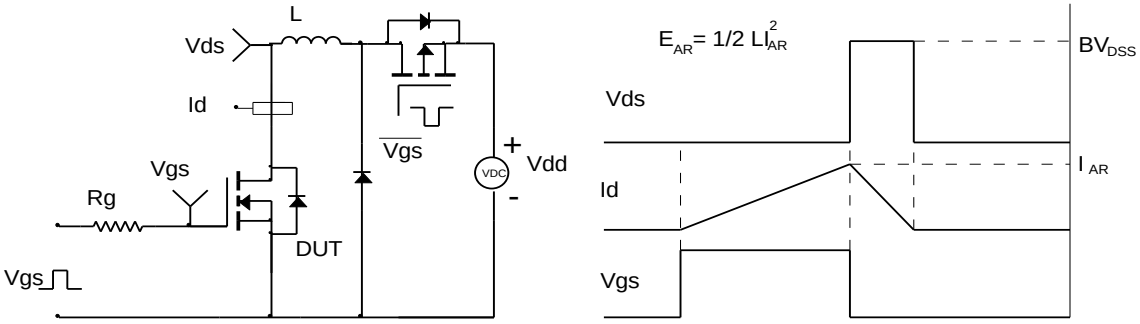
Gate Charge Test Circuit & Waveform



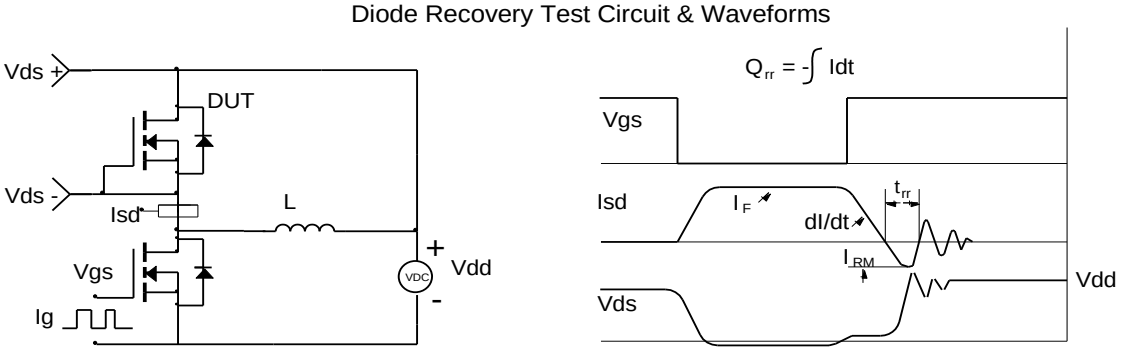
Resistive Switching Test Circuit & Waveforms



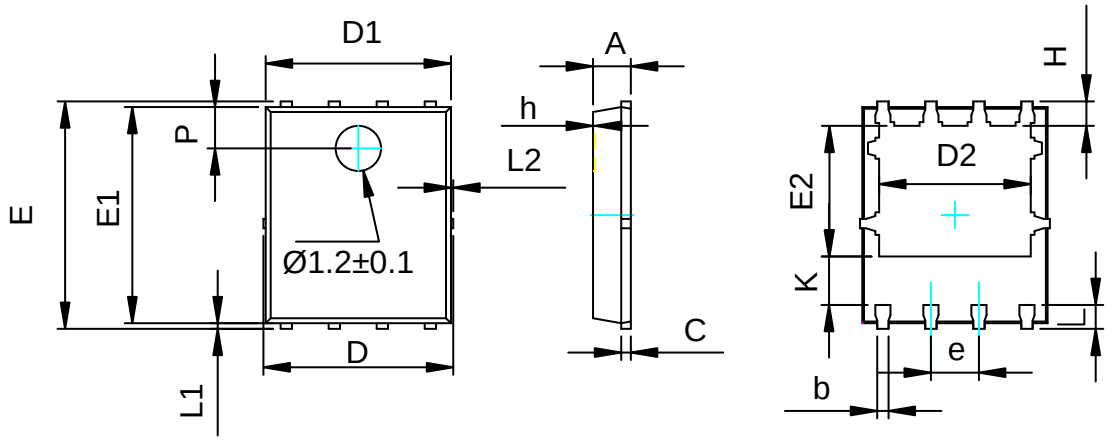
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



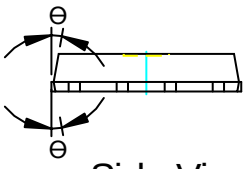
Diode Recovery Test Circuit & Waveforms



Package Outlines



Top View Side View Bottom View

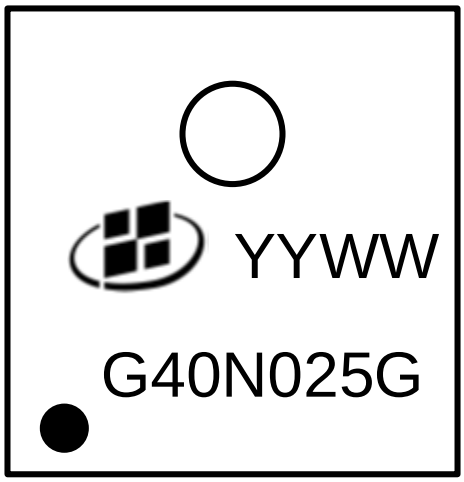


Side View

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	3.91	4.01	4.11
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	–	–	0.05
K	1.20	–	–
L	0.55	0.65	0.75
L1	0.05	0.15	0.25
L2	–	–	0.12
θ	8°	10°	12°
P	1.00	1.10	1.20

COMMON DIMENSIONS: (UNITS OF MEASURE = MILLIMETER)

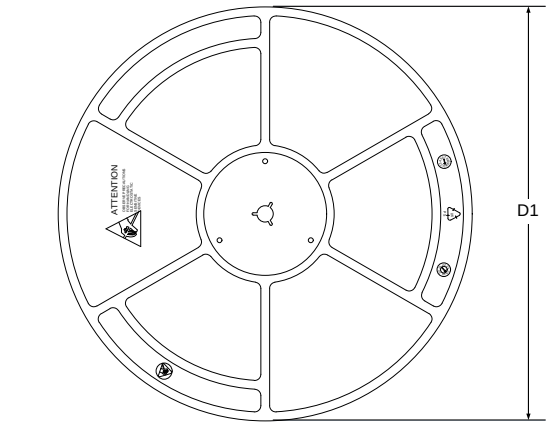
Marking Information

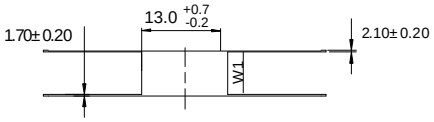


Note:
YYWW = Date code
G40N025G = Product Name Code
Contact ALKAIDSEMI sales for detail information

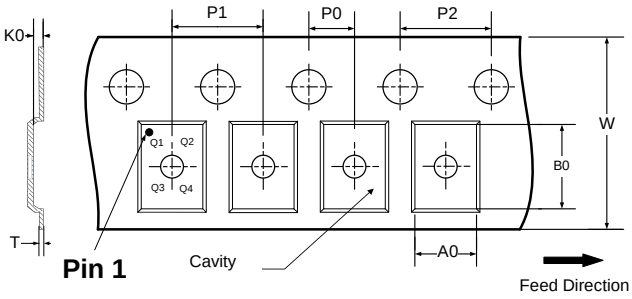
Reel and Tube Information

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)
	D1	W1								Material
Reel	330	12.5								Hips
	P0	P1	P2	W	A0	B0	K0	T	Pin 1 Quadrant	Material
Tape	4	8	2	12	6.3	5.3	1.2	0.25	Q1	PC
All dimensions are nominal										

Revision History

Revision	Release Date	Remark
Rev.1.0	2022-01-17	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.