

# 40V 3.6mohm N-channel SGT MOSFET AKG4N036GL

## Description:

This N channel SGT MOSFET has been designed to low on-state resistance, low switching loss with good EAS performance, especially for DC-DC and Motor driving applications.

## Features:

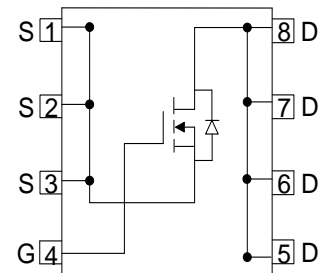
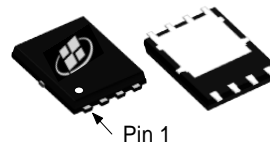
- Low FOM  $R_{DS(ON)} \times Q_G$
- Ultra-low on-resistance
- RoHS compliant <sup>(Note 1)</sup>
- Halogen-free <sup>(Note 1)</sup>

## Applications:

- Battery management
- Solenoid and Motor Drivers
- DC-DC Converter

## Key Performance Parameters:

Parameter	Value	Unit
$V_{DS}$	40	V
$R_{DS(ON), max} @ V_{GS} = 10V$	3.6	m $\Omega$
$I_D$	100	A



## Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKG4N036GL	DFN5X6	G4N036GL	Tape Reel	5000PCS

## 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	40	V
$I_D$	Drain Current - Continuous ( $T_C = 25^\circ\text{C}$ ) <sup>(Note 1)</sup>	100	A
	Drain Current - Continuous ( $T_C = 100^\circ\text{C}$ )	68	A
$I_{DM}$	Drain Current - Pulsed <sup>(Note 2)</sup>	400	A
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulsed Avalanche Energy <sup>(Note 3)</sup>	110	mJ
$P_D$	Power Dissipation ( $T_C = 25^\circ\text{C}$ )	67	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	1.85	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State <sup>(Note 4)</sup>	52	$^\circ\text{C}/\text{W}$

**Notes:**

1. The max drain current rating is package limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3.  $L = 0.5 \text{ mH}$ ,  $V_{DD} = 50\text{V}$ ,  $I_{AS} = 21 \text{ A}$ ,  $R_G = 25 \Omega$ , Starting  $T_J = 25 \text{ }^\circ\text{C}$
4. Mount on minimum PCB layout

<b>Electrical Characteristics</b> ( $T_J = 25^\circ\text{C}$ unless otherwise noted)						
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	40			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V},$			1	$\mu\text{A}$
$I_{GSS}$	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	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		3	3.6	m $\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$		3.5	5.5	m $\Omega$
<b>Dynamic Characteristics</b>						
$C_{ISS}$	Input Capacitance	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V},$ $F = 1\text{ MHz}$		1850		pF
$C_{OSS}$	Output Capacitance			608		pF
$C_{RSS}$	Reverse Transfer Capacitance			29		pF
$R_G$	Gate Resistance	$F = 1\text{ MHz}$		7.2		$\Omega$
<b>Switching Characteristics</b>						
$T_{D(ON)}$	Turn On Delay Time	$V_{DD} = 20\text{ V}, R_L = 1\ \Omega,$ $V_{GS} = 10\text{ V}, R_G = 6\ \Omega$		9		nS
$T_R$	Rise Time			51		nS
$T_{D(OFF)}$	Turn Off Delay Time			45.5		nS
$T_F$	Fall Time			78		nS
$Q_G$	Total Gate Charge	$V_{DD} = 20\text{ V}, I_D = 20\text{ A},$ $V_{GS} = 10\text{ V}$		28.2		nC
$Q_{GS}$	Gate-Source Charge			4.6		nC
$Q_{GD}$	Gate-Drain Charge			5.9		nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Body-Diode Forward Current				100	A
$I_{SM}$	Maximum Pulsed Body-Diode Forward Current <sup>(NOTE 1)</sup>				400	A
$V_{SD}$	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 1\text{ A}$		0.7	1	V
$T_{RR}$	Reverse recovery time	$V_{DD} = 20\text{ V}, I_D = 15\text{ A},$ $di/dt = 100\text{ A}/\mu\text{S}$		40		ns
$Q_{RR}$	Reverse recovery charge			27		nC
$I_{RRM}$	Peak Reverse Recovery Current			1.1		A

# Electrical Characteristics Diagrams

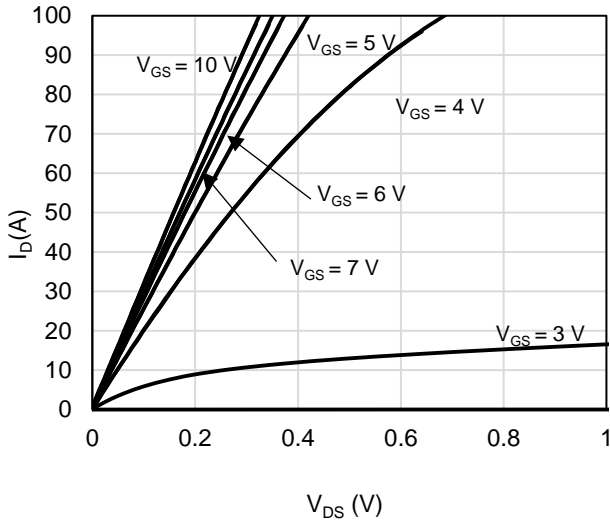


Figure 1: On-Region Characteristics

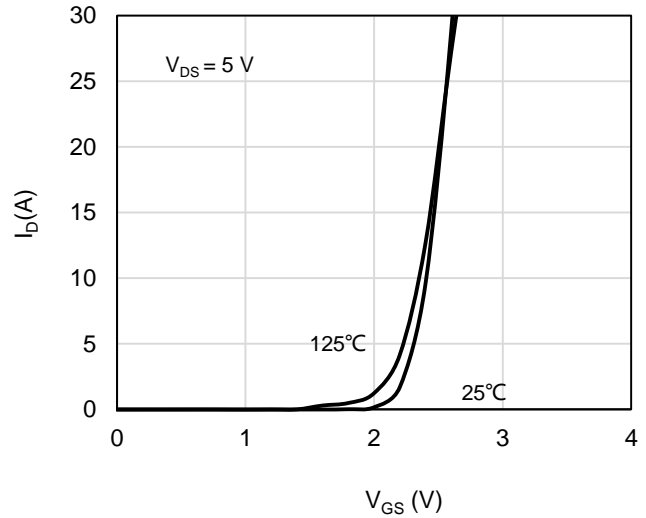


Figure 2: Transfer Characteristics

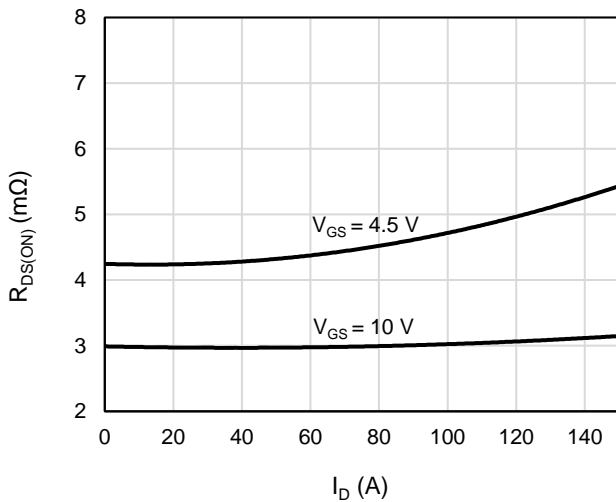


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

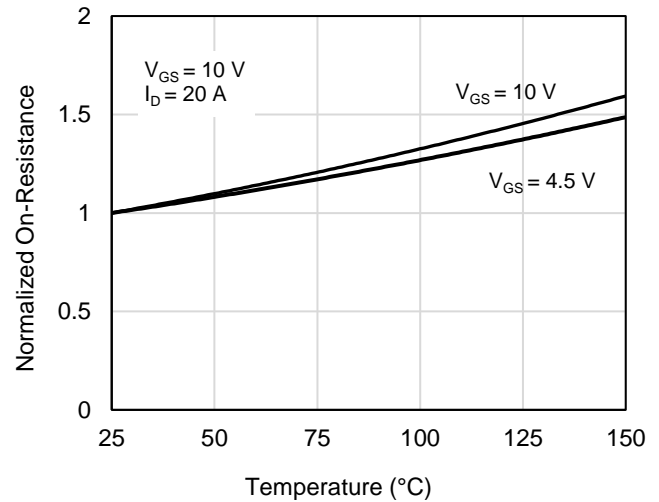


Figure 4: On-Resistance vs. Junction Temperature

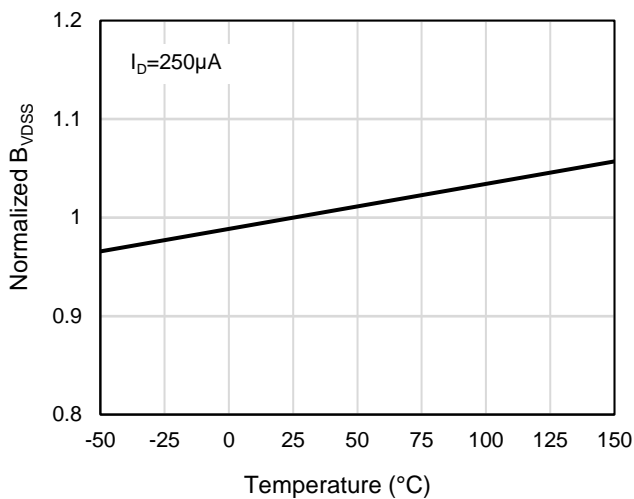


Figure 5: Breakdown Voltage vs. Junction Temperature

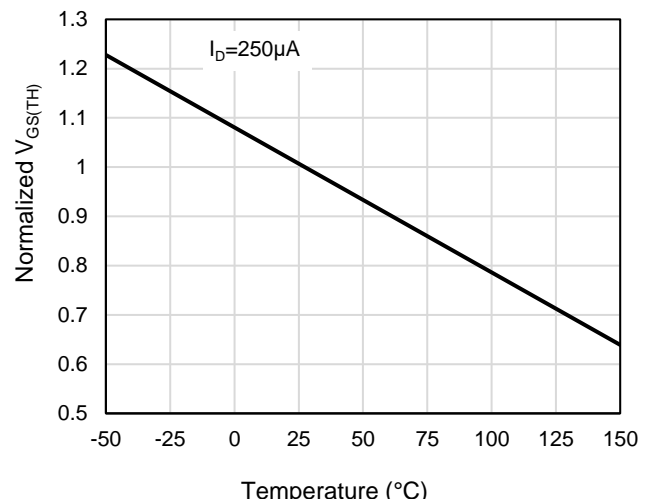


Figure 6: Threshold Voltage vs. Junction Temperature

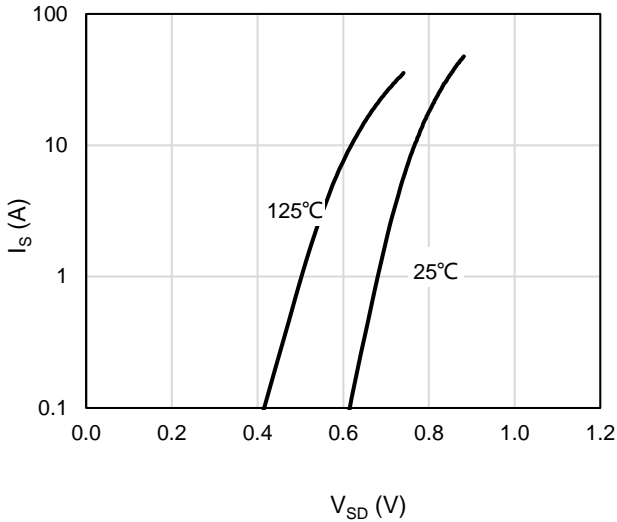


Figure 7: Body-Diode Characteristics

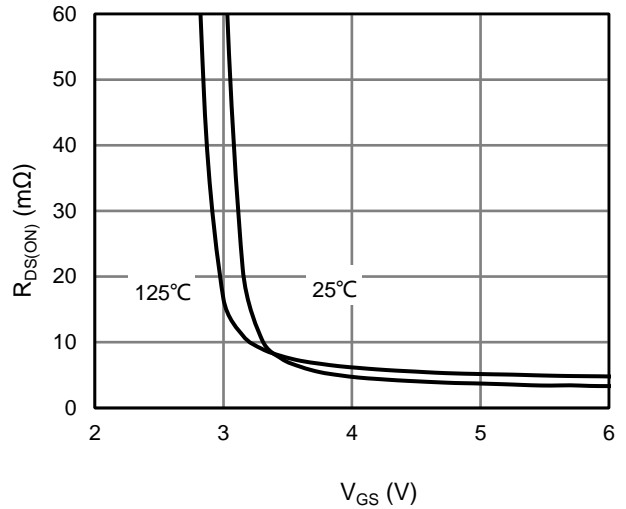


Figure 8: On-Resistance vs. Gate-Source Voltage

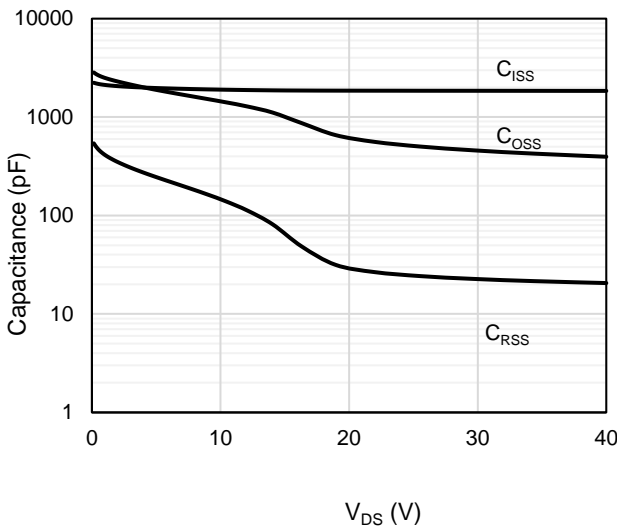


Figure 9: Capacitance Characteristics

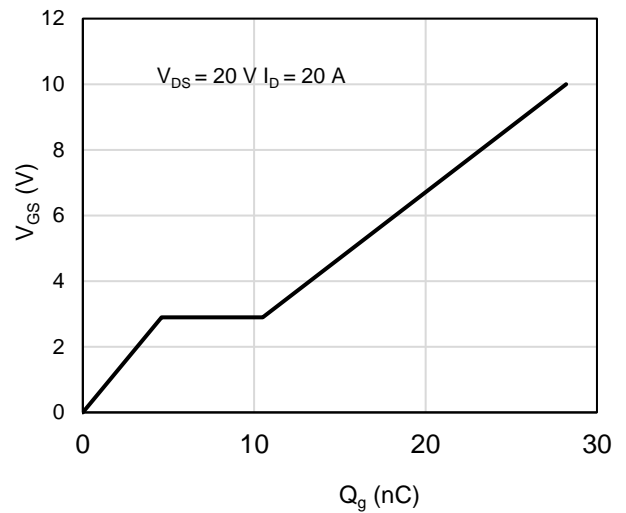


Figure 10: Gate-Charge Characteristics

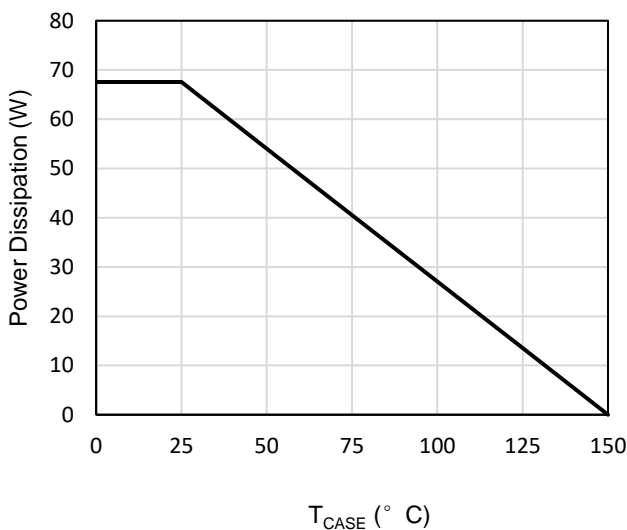


Figure 11: Power De-rating

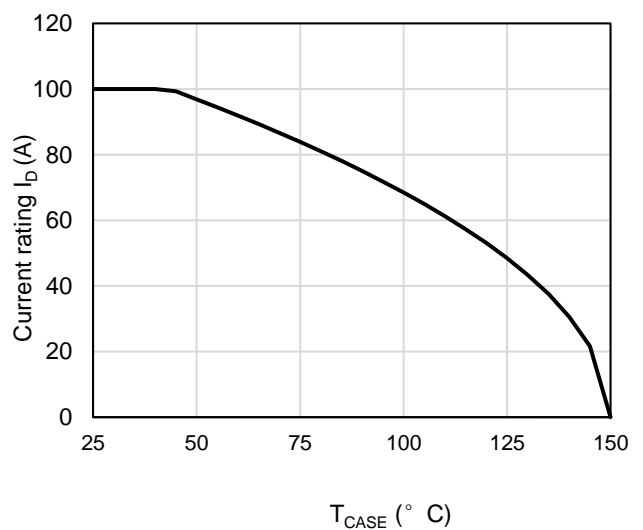
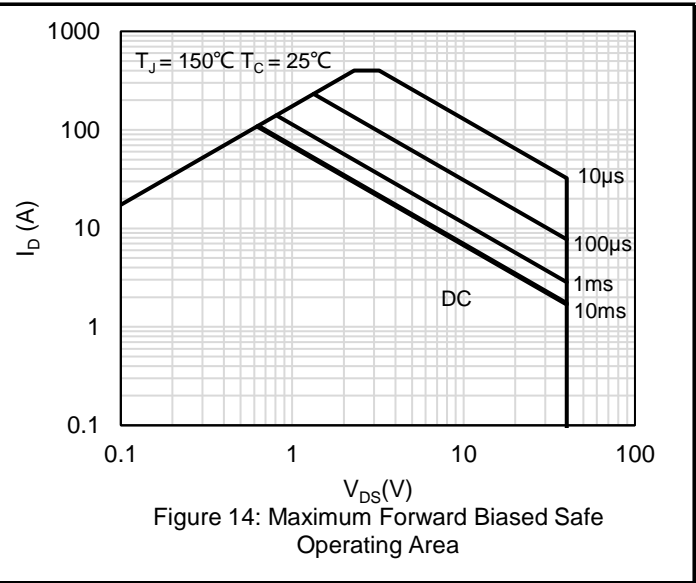
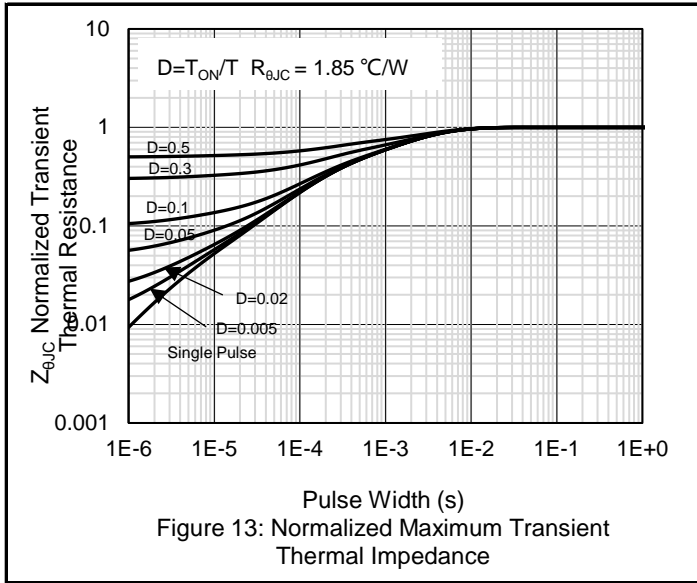
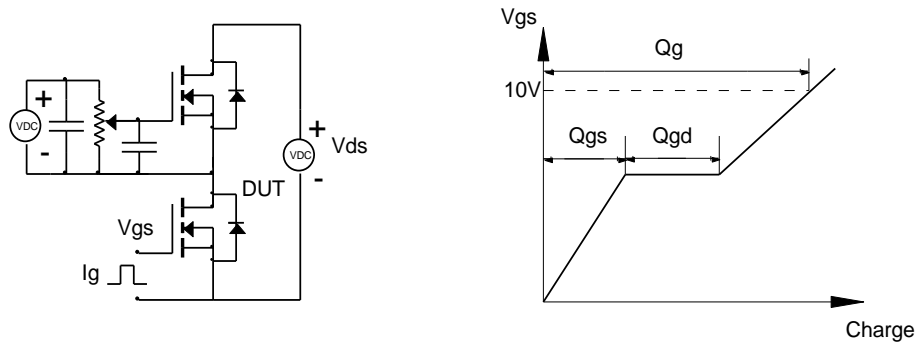


Figure 12: Current De-rating

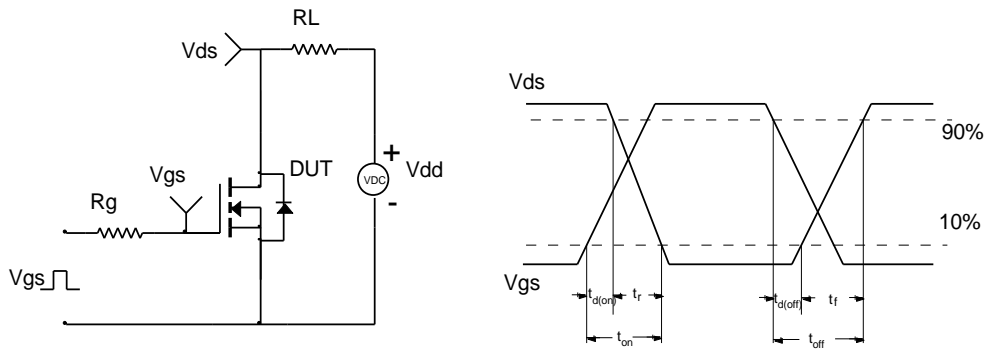


# Test Circuit and Waveform

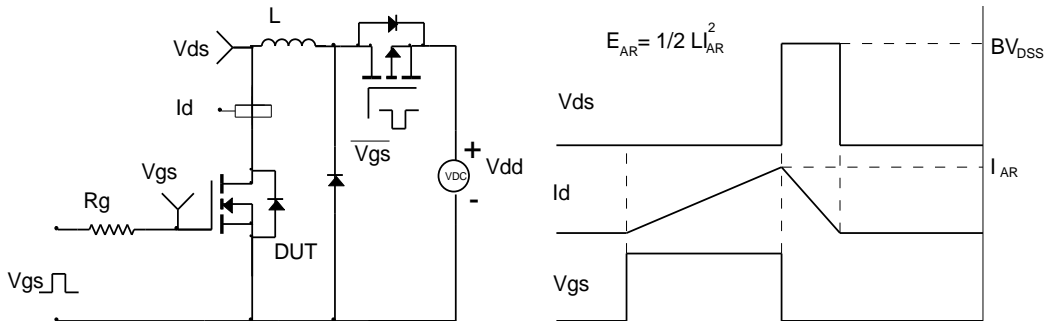
Gate Charge Test Circuit & Waveform



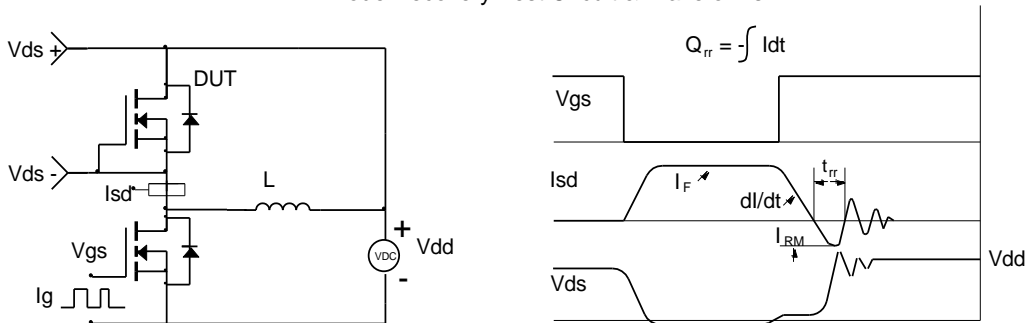
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

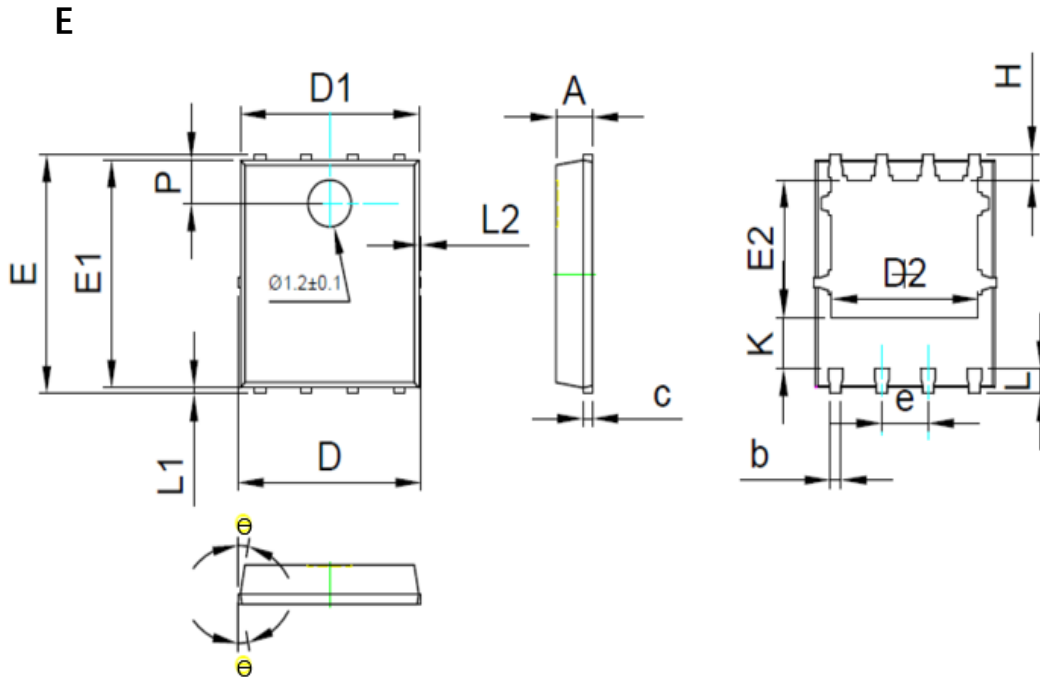


Diode Recovery Test Circuit & Waveforms



## Package Outlines

Package Dimensions : PDFN 5\*6 PACKAG



COMMON DIMENSIONS  
( UNITS OF MEASURE = MILLIMETER )

SYMBOL	MIN	NOM	MAX
A	0.90	1.00	1.10
b	0.35	0.40	0.45
c	0.21	0.25	0.34
D	-	-	5.1
D1	4.85	4.90	4.95
D2	3.96	4.01	4.06
e	1.27 BSC		
E	5.95	6.00	6.05
E1	5.70	5.75	5.80
E2	3.425	3.475	3.525
H	0.60	0.65	0.70
K	1.29	-	-
L	0.60	0.65	0.70
L1	0.05	0.15	0.25
L2	-	-	0.12
$\theta$	8°	10°	12°
P	1.05	1.10	1.15



## Marking Information



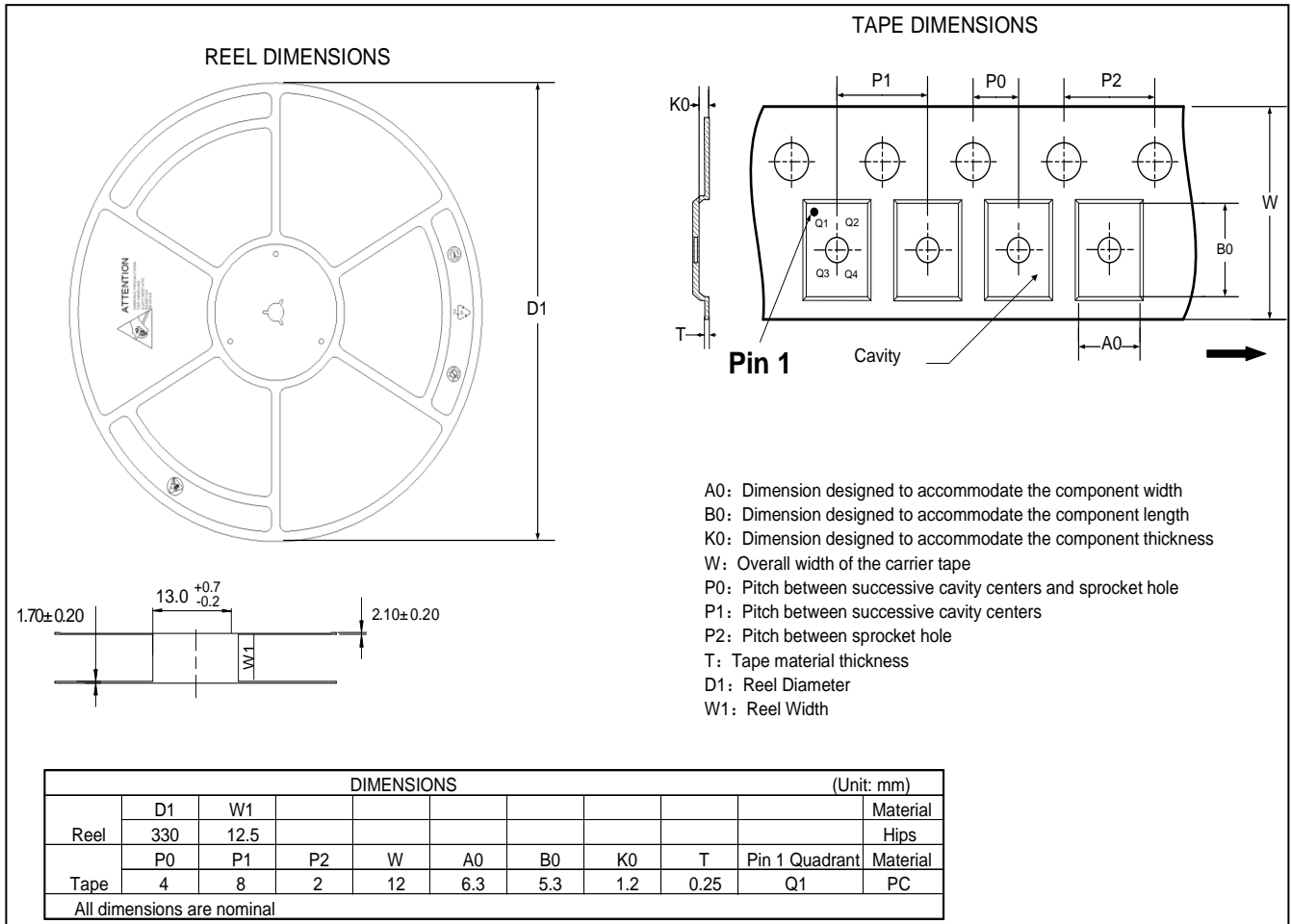
Note:

G4N036GL = Product Name Code

XXXXXXX = Date code

Contact ALKAIDSEMI sales for detail information

## Tape & Reel Information



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## Revision History

Revision	Release Date	Remark
Rev.1.0	2022/6/28	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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