

## 40V 7mohm N-channel SGT MOSFET AKG4N070GL

### Description:

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

### Features:

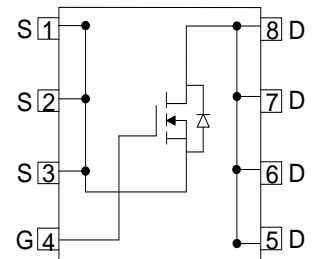
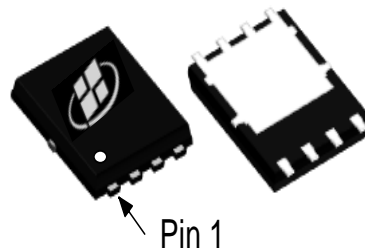
- Low FOM  $R_{DS(ON)} \times Q_G$
- Ultra-low on-resistance
- RoHS compliant <sup>(Note 1)</sup>
- Halogen-free <sup>(Note 1)</sup>

### Applications:

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

### Key Performance Parameters:

Parameter	Value	Unit
$V_{DS}$	40	V
$R_{DS(ON), max} @ V_{GS} = 10V$	7	m $\Omega$
$I_D$	50	A



### Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKG4N070GL	DFN5X6	G4N070GL	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>	50	A
	Drain Current - Continuous ( $T_C = 100^\circ\text{C}$ )	32	A
$I_{DM}$	Drain Current - Pulsed <sup>(Note 2)</sup>	200	A
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulsed Avalanche Energy <sup>(Note 3)</sup>	45.5	mJ
$P_D$	Power Dissipation ( $T_C = 25^\circ\text{C}$ )	34	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	3.7	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State <sup>(Note 4)</sup>	49.8	$^\circ\text{C}/\text{W}$

### Notes:

1. The max drain current rating is package limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3.  $L = 0.5 \text{ mH}$ ,  $V_{DD} = 20\text{V}$ ,  $I_{AS} = 13.5 \text{ A}$ ,  $R_G = 25 \Omega$ , Starting  $T_J = 25^\circ\text{C}$
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	1.6	2.1	V
$R_{DS(ON)}$	Drain-Source on-state resistance	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		5.5	7	$\text{m}\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$		7.5	10	$\text{m}\Omega$
<b>Dynamic Characteristics</b>						
$C_{ISS}$	Input Capacitance	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V},$ $F = 1\text{ MHz}$		842		pF
$C_{OSS}$	Output Capacitance			321		pF
$C_{RSS}$	Reverse Transfer Capacitance			13		pF
$R_G$	Gate Resistance	$F = 1\text{ MHz}$		3.7		$\Omega$
<b>Switching Characteristics</b>						
$T_{D(ON)}$	Turn On Delay Time	$V_{DD} = 20\text{ V}, R_L = 1\ \Omega,$ $V_{GS} = 10\text{ V}, R_G = 1.6\ \Omega$		5.5		nS
$T_R$	Rise Time			49.5		nS
$T_{D(OFF)}$	Turn Off Delay Time			18.0		nS
$T_F$	Fall Time			5.5		nS
$Q_G$	Total Gate Charge	$V_{DD} = 20\text{ V}, I_D = 20\text{ A},$ $V_{GS} = 10\text{ V}$		13.5		nC
$Q_{GS}$	Gate-Source Charge			2.4		nC
$Q_{GD}$	Gate-Drain Charge			2.6		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 <sup>(NOTE 1)</sup>			200		A
$V_{SD}$	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 20\text{ A}$			1.2	V
$T_{RR}$	Reverse recovery time	$V_{DD} = 20\text{ V}, I_D = 20\text{ A},$ $di/dt = 100\text{ A}/\mu\text{S}$		28.6		nS
$Q_{RR}$	Reverse recovery charge			15.0		nC
$I_{RRM}$	Peak Reverse Recovery Current			0.9		A

# Electrical Characteristics Diagrams

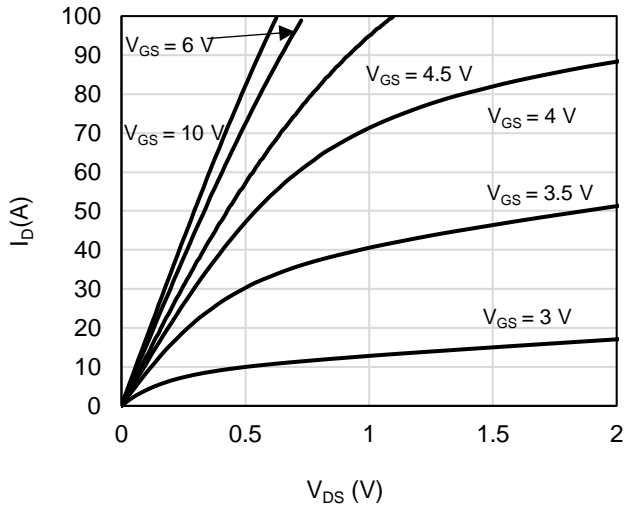


Figure 1: On-Region Characteristics

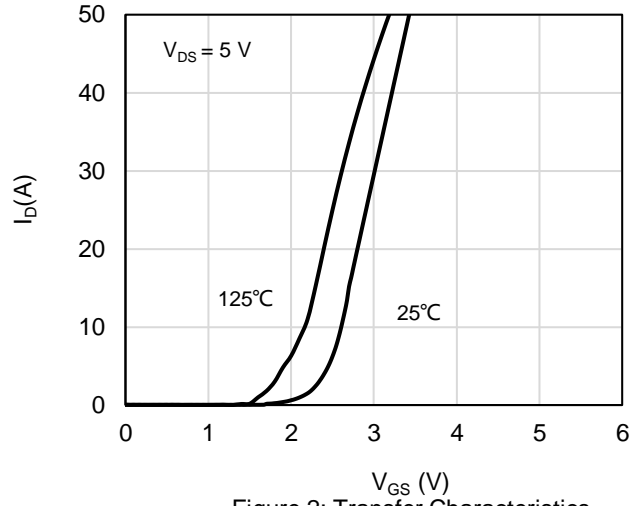


Figure 2: Transfer Characteristics

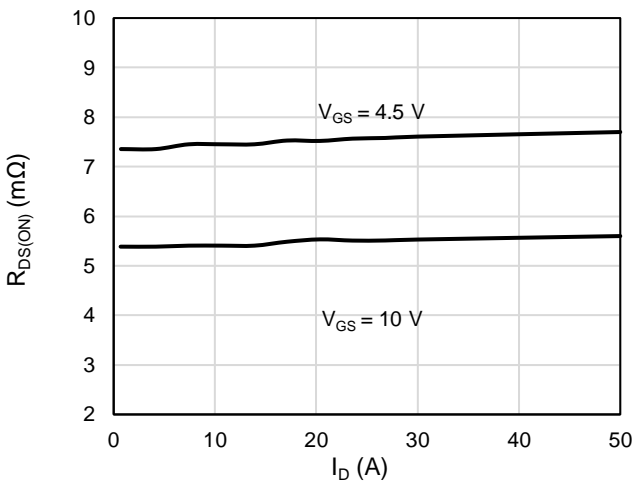


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

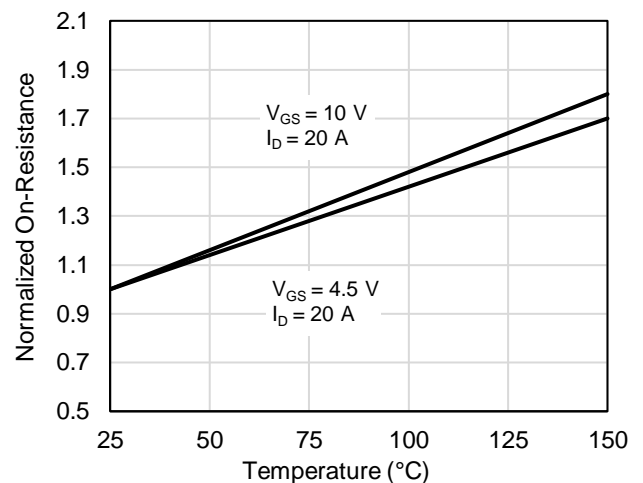


Figure 4: On-Resistance vs. Junction Temperature

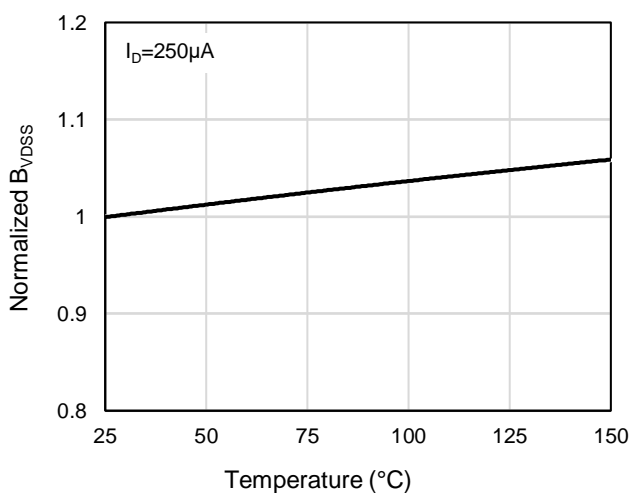


Figure 5: Breakdown Voltage vs. Junction Temperature

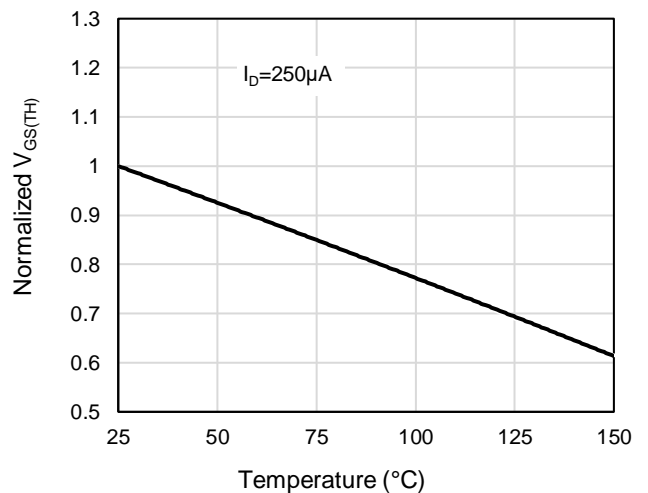
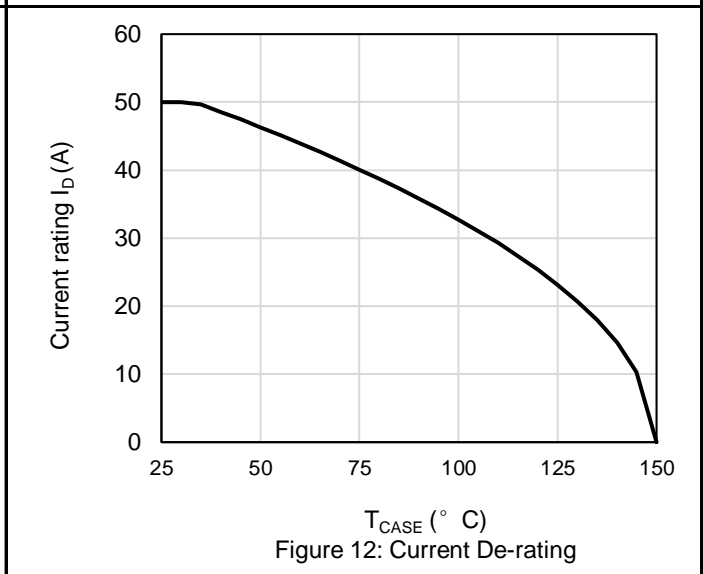
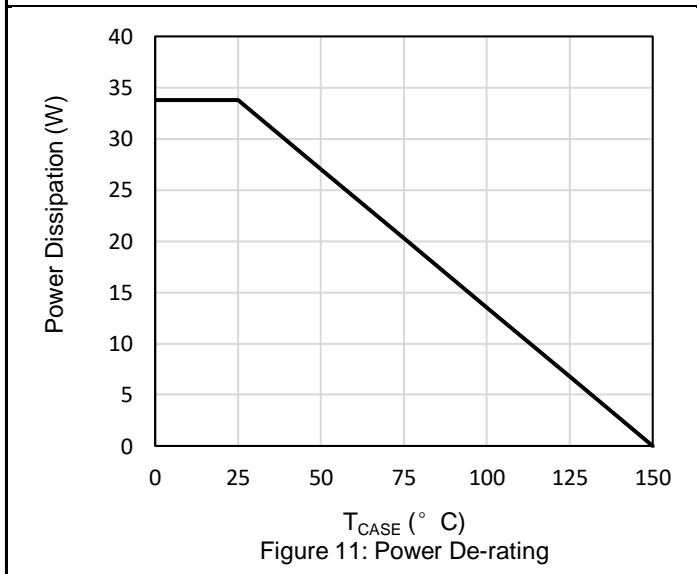
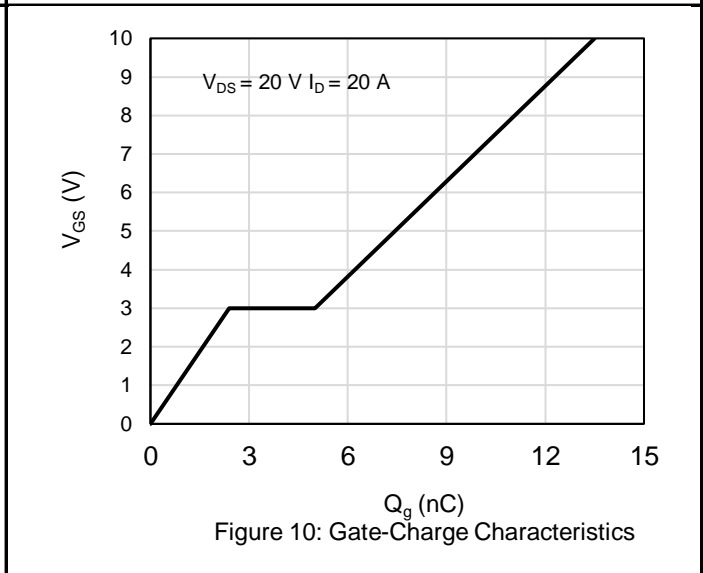
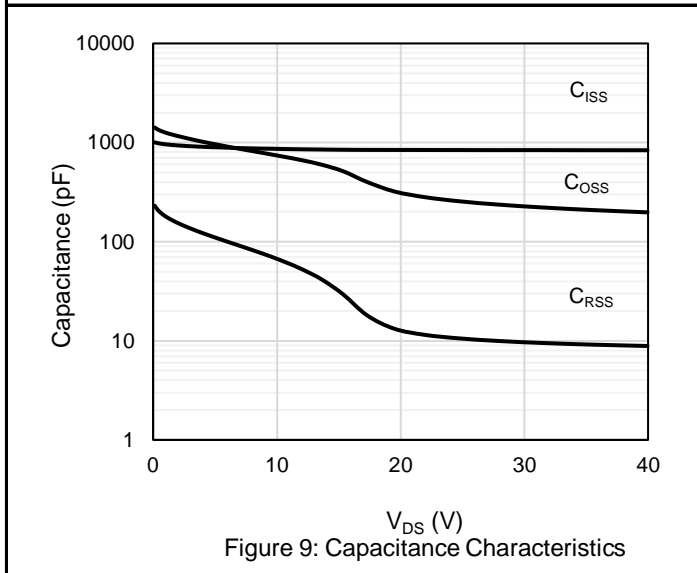
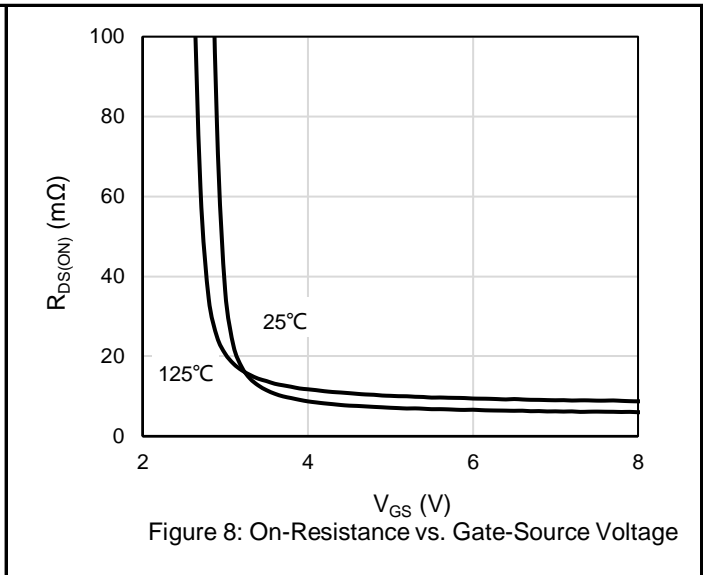
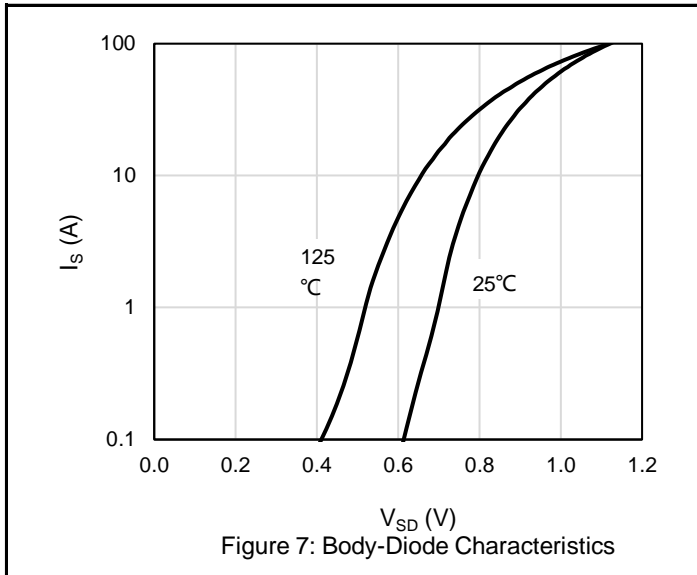
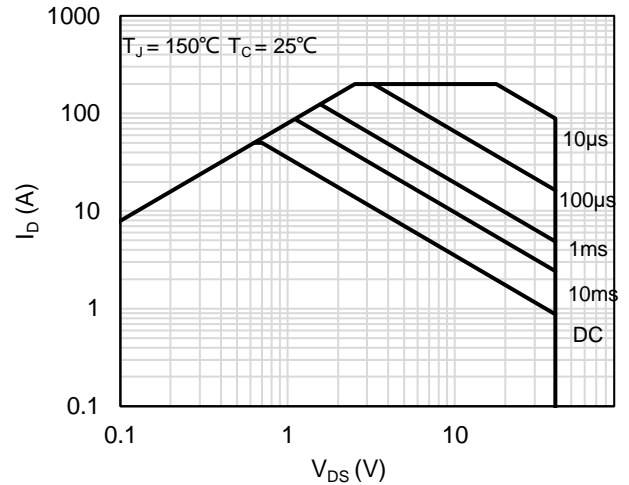
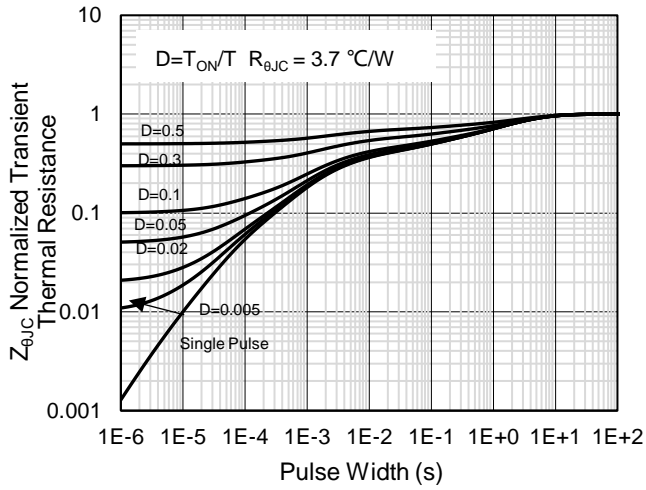


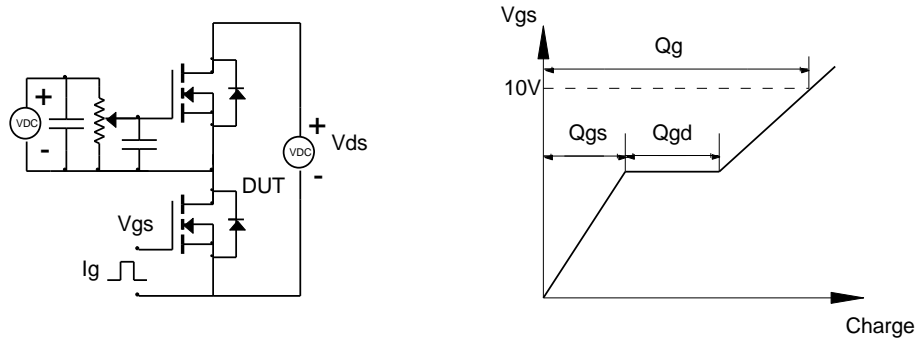
Figure 6: Threshold Voltage vs. Junction Temperature



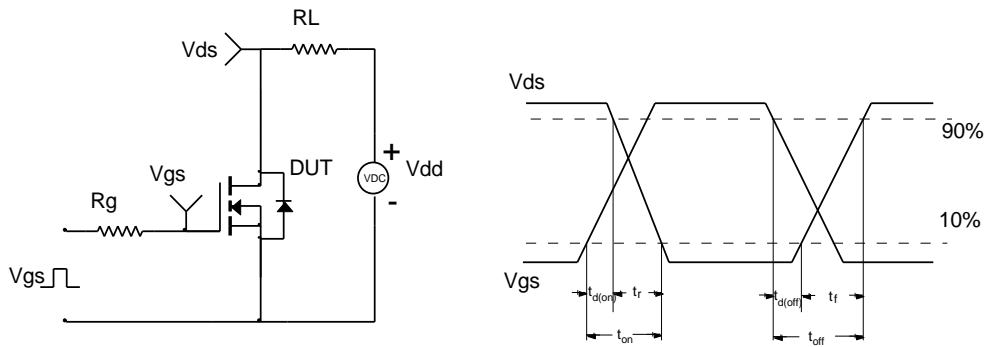


# Test Circuit and Waveform

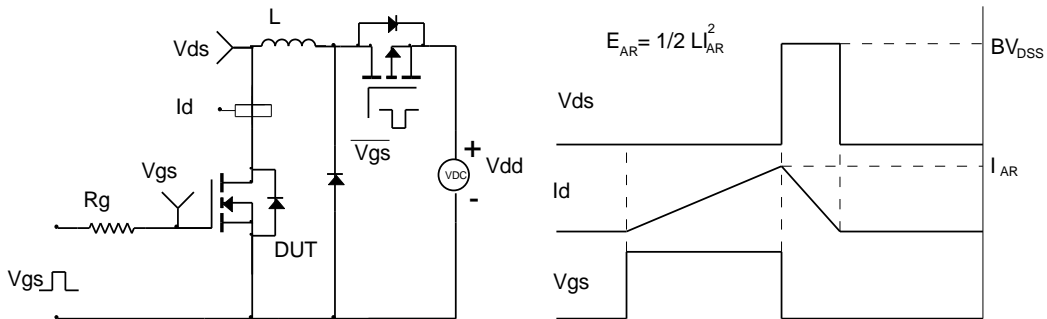
Gate Charge Test Circuit & Waveform



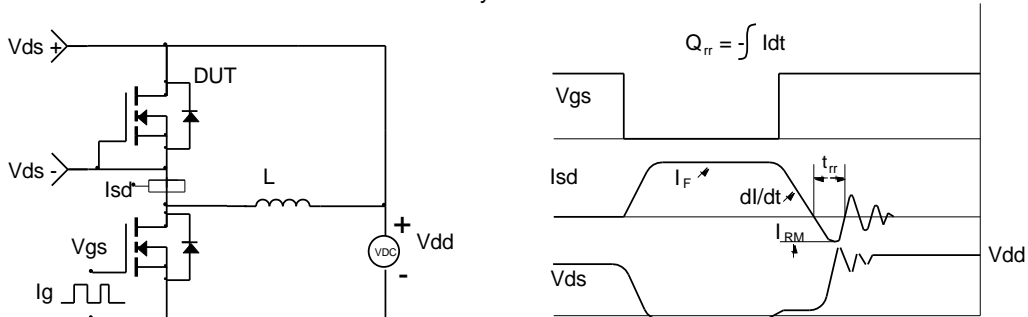
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



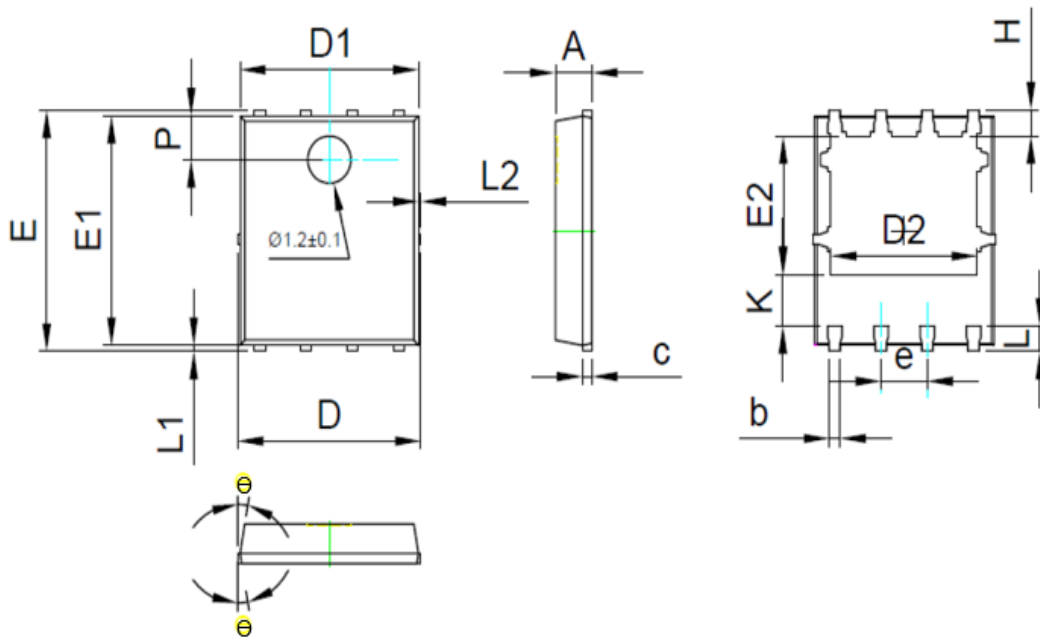
Diode Recovery Test Circuit & Waveforms



## Package Outlines

Package Dimensions : PDFN 5\*6 PACKAG

E



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
θ	8°	10°	12°
P	1.05	1.10	1.15



# Marking Information



Note:  
 G4N070GL = Product Name Code  
 XXXXXXXX = Date code  
 Contact ALKAIDSEMI sales for detail information

### REEL DIMENSIONS

Detailed description: A circular reel with a central hub and several spokes. Dimension D1 is the outer diameter, and W1 is the width of the reel.

### TAPE DIMENSIONS

Detailed description: A side view of a carrier tape with five cavities. Dimensions include K0 (thickness), W (width), P0 (pitch between cavity centers), P1 (pitch between successive cavity centers), P2 (pitch between sprocket holes), A0 (cavity width), B0 (cavity length), and T (tape thickness). A Pin 1 location is marked with a dot and 'Q1' through 'Q4' quadrants. An arrow indicates the direction of travel.

Detailed description: A cross-sectional view of the tape showing three distinct layers with the following dimensions: 1.70±0.20, 13.0 (+0.7/-0.2), and 2.10±0.20.

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	12.5								Hips
Tape	P0	P1	P2	W	A0	B0	K0	T	Pin 1 Quadrant	Material
	4	8	2	12	6.3	5.3	1.2	0.25	Q1	PC

All dimensions are nominal

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## Revision History

Revision	Release Date	Remark
Rev.1.0	2022/4/17	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.