

70V 5.9mohm N-channel SGT MOSFET

AKG70N059D

Description:

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

Features:

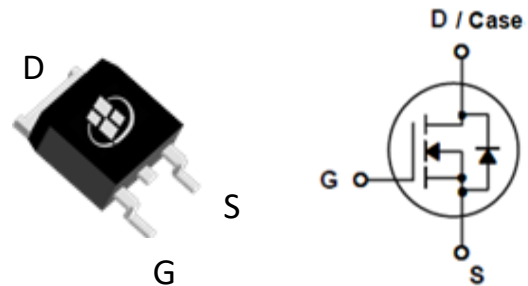
- Low $R_{DS(ON)}$
- RoHS compliant ^(Note 1)
- Halogen-free ^(Note 1)

Applications:

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

Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	70	V
$R_{DS(ON), max} @ V_{GS} = 10V$	5.9	m Ω
I_D	120	A



Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKG70N059D	TO-263	G70N059D	Tape Reel	1000PCS

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	70	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) ^(Note 1)	135	A
	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) ^(Note 2)	120	A
	Drain Current - Continuous ($T_C = 100^\circ\text{C}$)	86	A
I_{DM}	Drain Current - Pulsed ^(Note 3)	460	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy ^(Note 4)	168	mJ
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	178	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

Thermal Characteristics

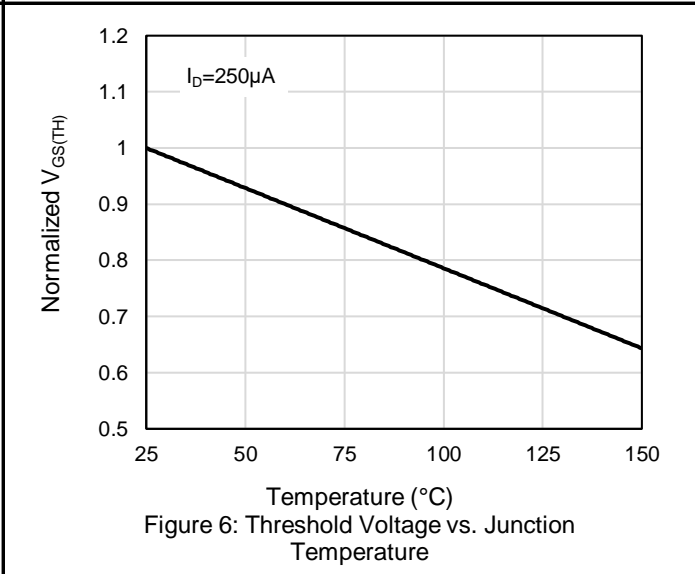
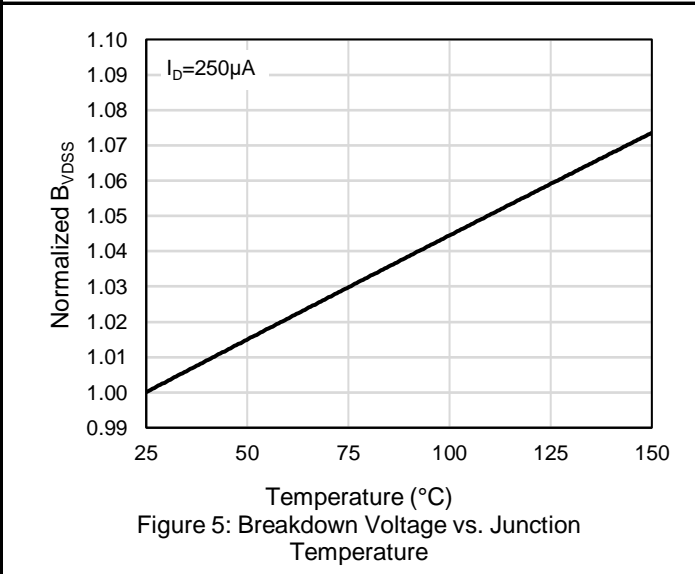
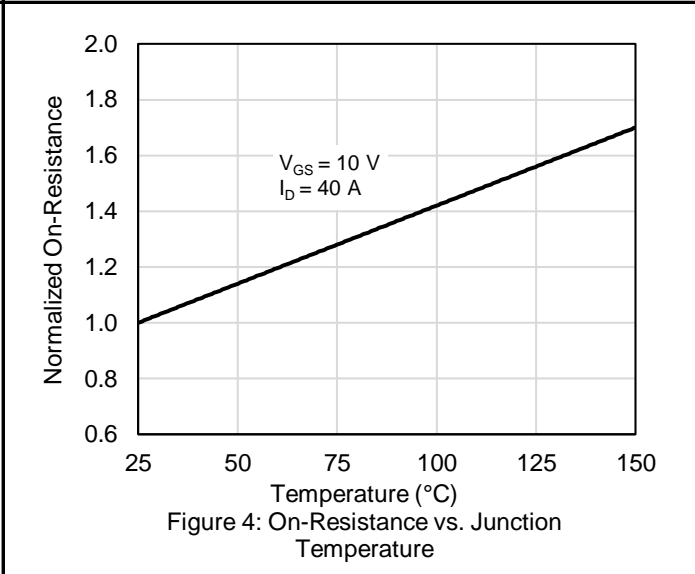
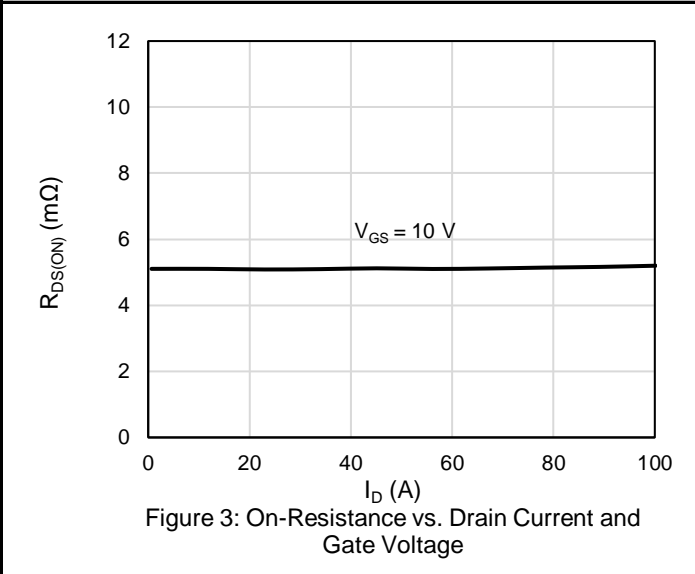
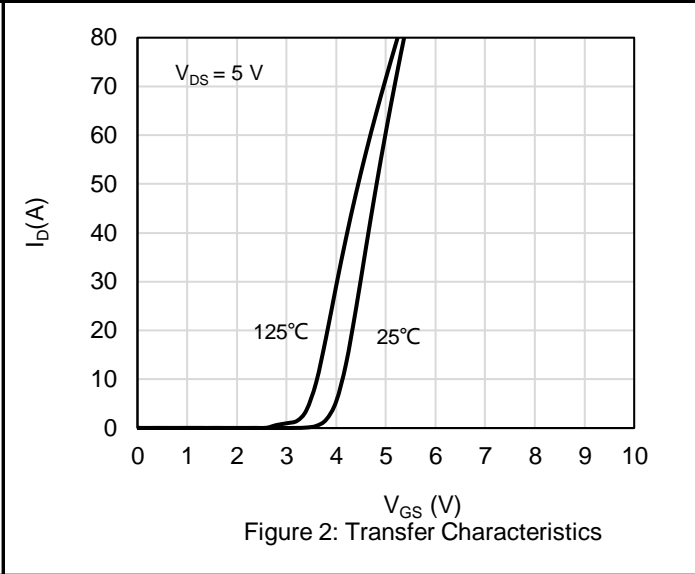
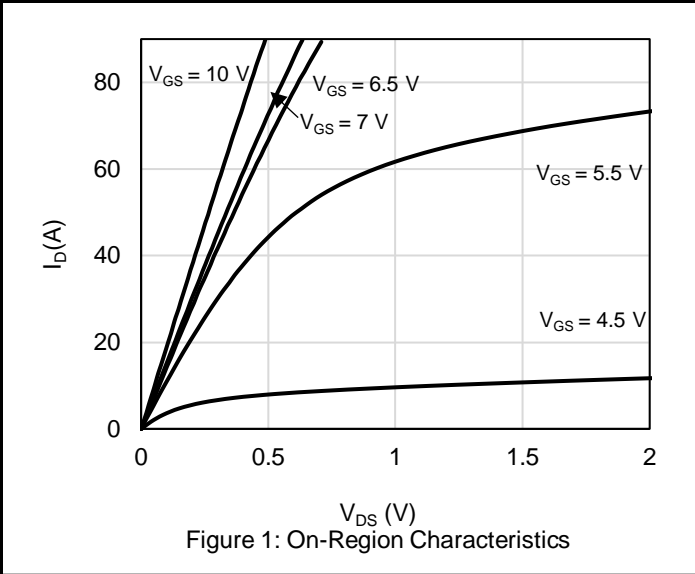
Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Steady-State	0.7	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State ^(Note 4)	55	$^\circ\text{C}/\text{W}$

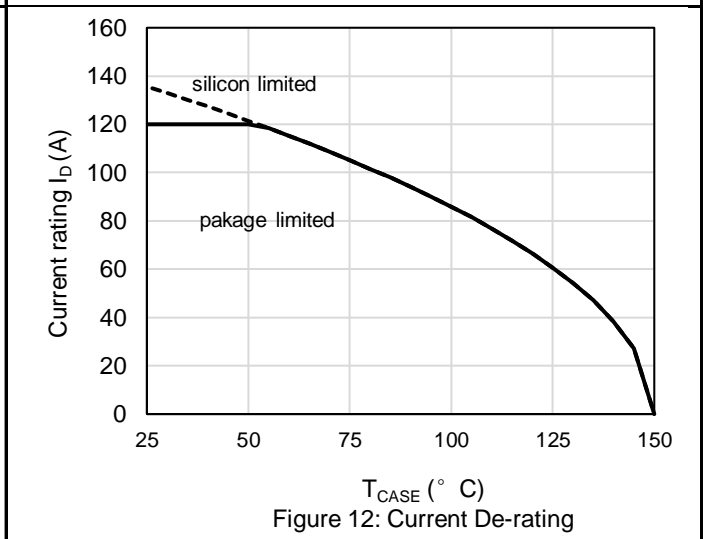
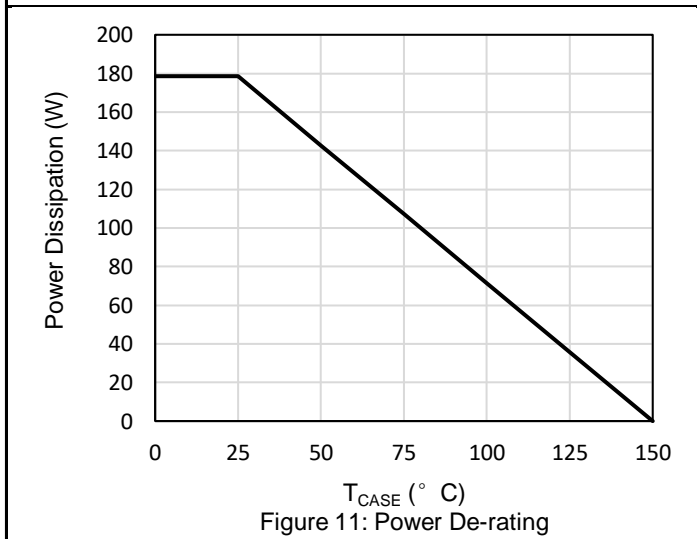
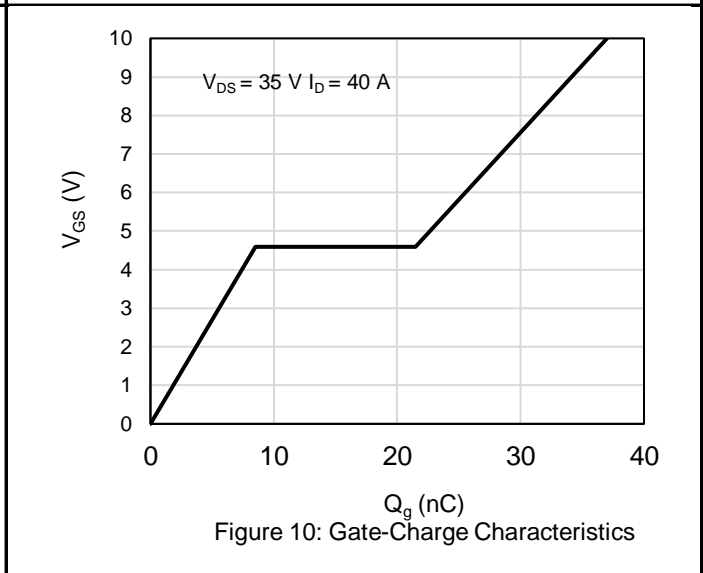
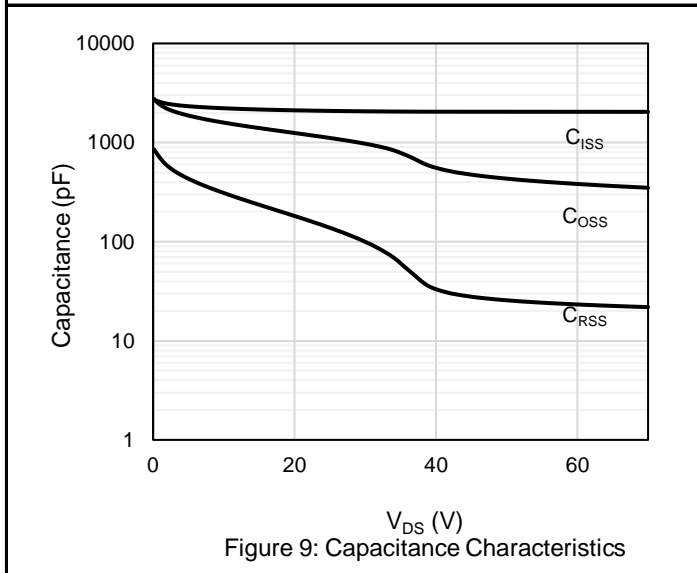
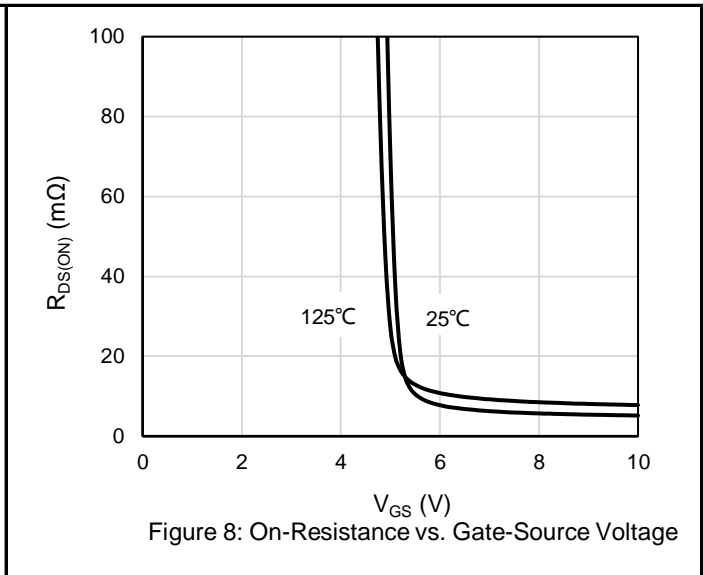
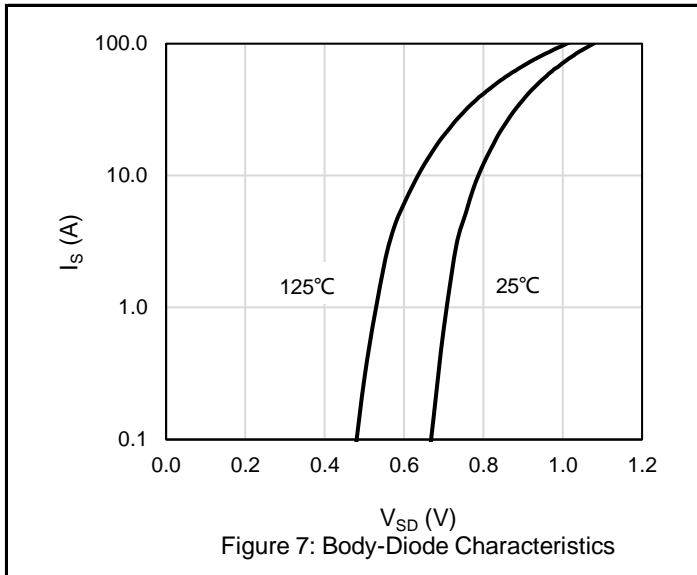
Notes:

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. $L = 0.5 \text{ mH}$, $V_{DD} = 35 \text{ V}$, $I_{AS} = 25.5 \text{ A}$, $R_G = 50 \Omega$, 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
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	70			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 70\text{ V}, V_{GS} = 0\text{ V},$			1	μA
I_{GSS}	Gate Leakage Current	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$			± 100	nA
$V_{GS(TH)}$	Gate Threshold voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2	3	4	V
$R_{DS(ON)}$	Drain-Source on-state resistance	$V_{GS} = 10\text{ V}, I_D = 40\text{ A}$		5.1	5.9	m Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	$V_{DS} = 35\text{ V}, V_{GS} = 0\text{ V},$ $F = 1\text{ MHz}$		2056		pF
C_{OSS}	Output Capacitance			716		pF
C_{RSS}	Reverse Transfer Capacitance			49.5		pF
R_G	Gate Resistance	$F = 1\text{ MHz}$		1.7		Ω
Switching Characteristics						
$T_{D(ON)}$	Turn On Delay Time	$V_{DD} = 35\text{ V}, R_L = 0.9\ \Omega,$ $V_{GS} = 10\text{ V}, R_G = 2.7\ \Omega$		14		nS
T_R	Rise Time			48		nS
$T_{D(OFF)}$	Turn Off Delay Time			28.5		nS
T_F	Fall Time			12		nS
Q_G	Total Gate Charge	$V_{DD} = 35\text{ V}, I_D = 40\text{ A},$ $V_{GS} = 10\text{ V}$		37		nC
Q_{GS}	Gate-Source Charge			8.5		nC
Q_{GD}	Gate-Drain Charge			13		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Body-Diode Forward Current				120	A
I_{SM}	Maximum Pulsed Body-Diode Forward Current ^(NOTE 1)				460	A
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 40\text{ A}$		0.9	1.3	V
T_{RR}	Reverse recovery time	$V_{DD} = 35\text{ V}, I_D = 40\text{ A},$ $di/dt = 100\text{ A}/\mu\text{S}$		40		nS
Q_{RR}	Reverse recovery charge			28		nC
I_{RRM}	Peak Reverse Recovery Current			1.4		A

Electrical Characteristics Diagrams





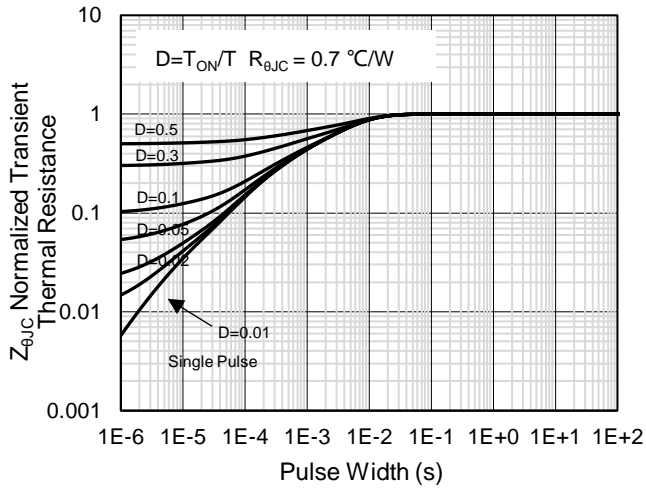


Figure 13: Normalized Maximum Transient Thermal Impedance

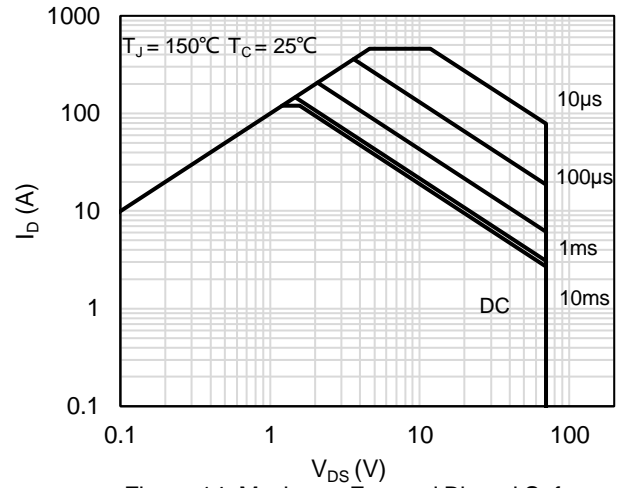
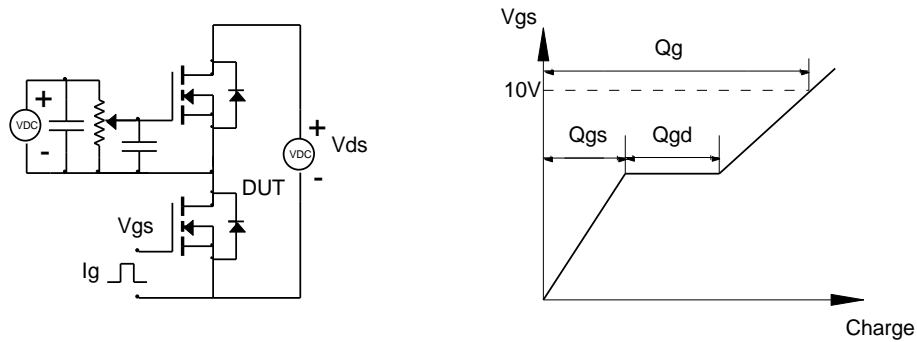


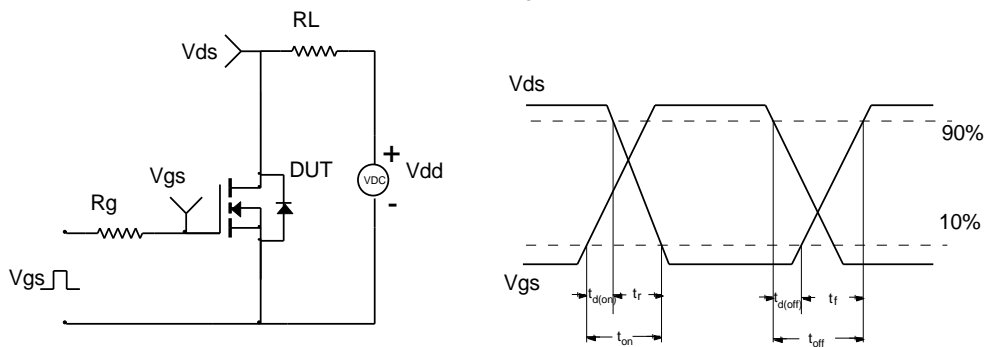
Figure 14: Maximum Forward Biased Safe Operating Area

Test Circuit and Waveform

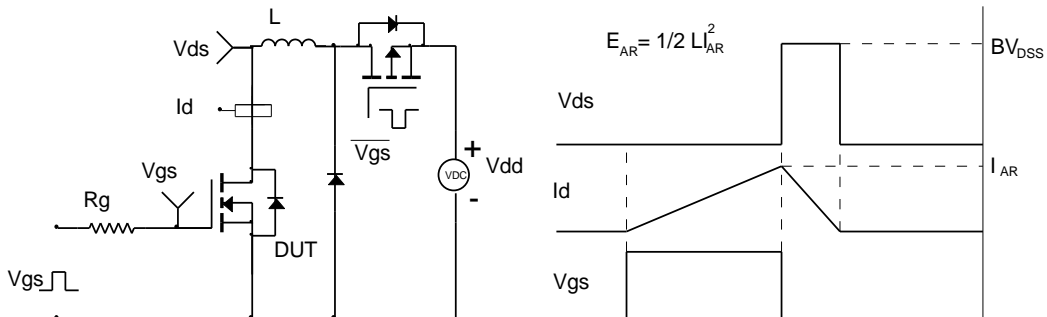
Gate Charge Test Circuit & Waveform



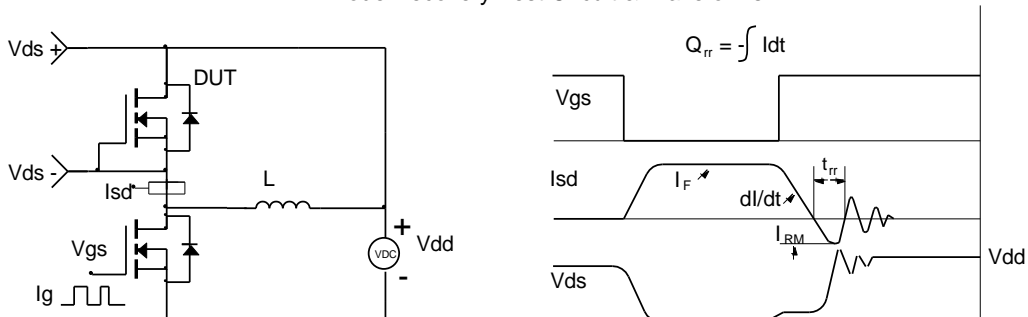
Resistive Switching Test Circuit & Waveforms



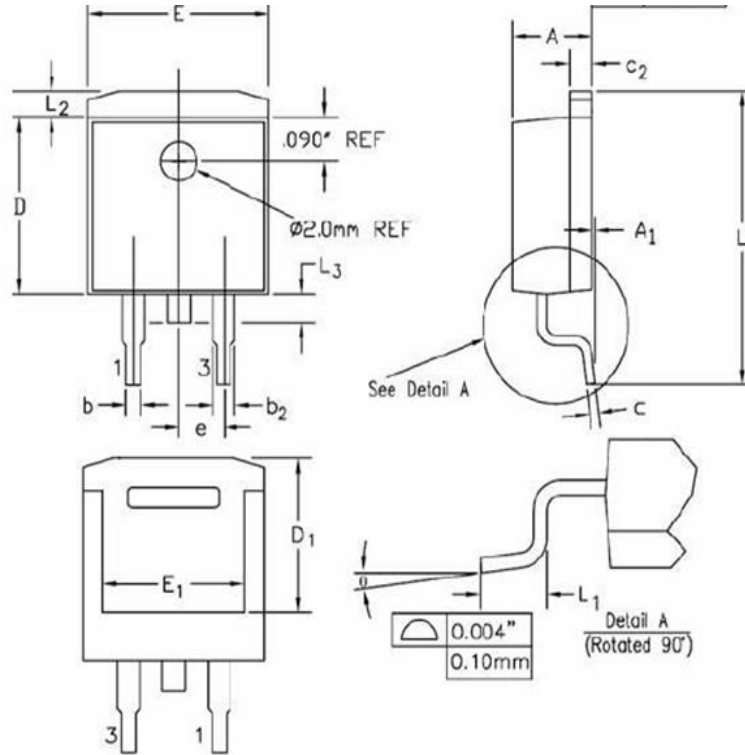
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outlines



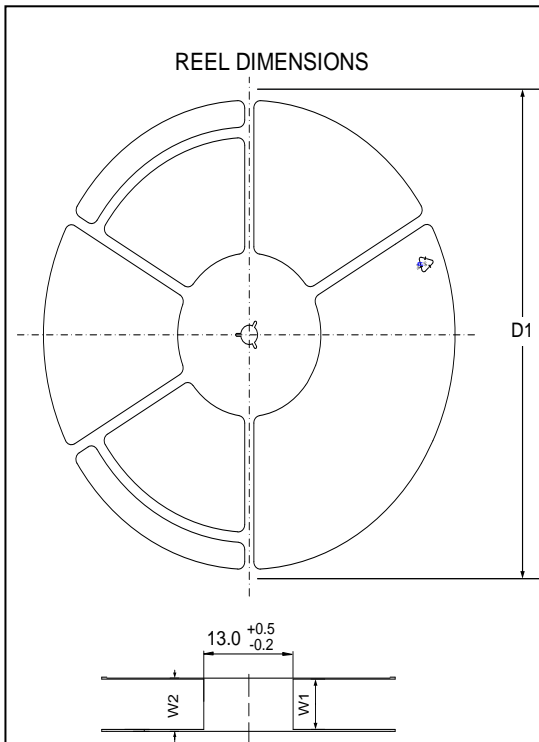
SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.170	0.180	4.32	4.57	
A1	-	0.010	-	0.25	
b	0.028	0.037	0.71	0.94	
b2	0.045	0.055	1.15	1.40	
c	0.018	0.024	0.46	0.61	
c2	0.048	0.055	1.22	1.40	
D	0.350	0.370	8.89	9.40	
D1	0.315	0.324	8.01	8.23	
E	0.395	0.405	10.04	10.28	
E1	0.310	0.318	7.88	8.08	
e	0.100 BSC.		2.54 BSC.		
L	0.580	0.620	14.73	15.75	
L1	0.090	0.110	2.29	2.79	
L2	0.045	0.055	1.15	1.39	
L3	0.050	0.070	1.27	1.77	
θ	0°	8°	0°	8°	

Marking Information



Note:
 G70N059D = Product Name Code
 XXXXXXXX = Date code
 Contact ALKAIDSEMI sales for detail information

Tape & Reel Information



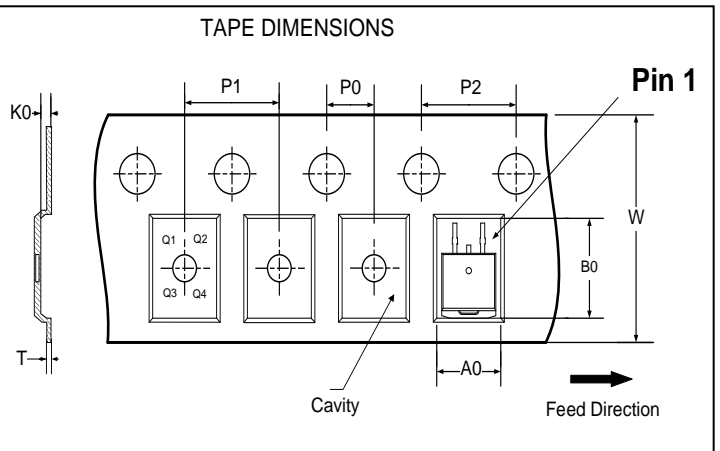
REEL DIMENSIONS

D1: Reel Diameter

W1: Reel Width

W2: Reel Width

13.0^{+0.5}/_{-0.2}



TAPE DIMENSIONS

Pin 1

W: Overall width of the carrier tape

B0: Dimension designed to accommodate the component length

A0: Dimension designed to accommodate the component width

K0: Dimension designed to accommodate the component thickness

T: Tape material thickness

P0: Pitch between sprocket hole

P1: Pitch between successive cavity centers

P2: Pitch between successive cavity centers and sprocket hole

Cavity

Feed Direction

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 sprocket hole
 P1: Pitch between successive cavity centers
 P2: Pitch between successive cavity centers and sprocket hole
 T: Tape material thickness
 D1: Reel Diameter
 W1: Reel Width

DIMENSIONS										(Unit: mm)	
Reel	D1	W1	W2								Material
	330	25.65	31								Hips
Tape	P0	P1	P2	W	A0	B0	K0	T	Pin 1 Quadrant	Material	
	4	12	2	24	10.5	16.1	5.1	0.4	Q2	PC	
All dimensions are nominal											

Revision History

Revision	Release Date	Remark
Rev.1.0	2022/8/2	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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