

100V 3.8mohm N-channel SGT MOSFET

AKG10N038DM

Description:

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

Features:

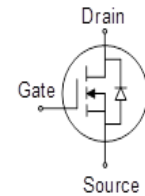
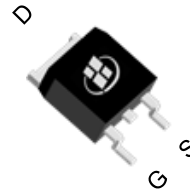
- Low $R_{DS(ON)}$
- RoHS compliant
- Halogen-free
- 100% UIS tested

Applications:

- Power Management Switches
- DC-DC Converter
- Battery Management System

Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	100	V
$R_{DS(ON), max} @V_{GS} = 10 V$	3.8	m Ω
I_D	185	A



Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKG10N038DM	TO-263	G10N038DM	Tape Reel	1000 per reel

Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	100	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) ^(Note 1)	185	A
	Drain Current - Continuous ($T_C = 100^\circ\text{C}$)	117	A
I_{DM}	Drain Current - Pulsed ^(Note 2)	740	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy ^(Note 3)	441	mJ
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	208	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	0.6	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State ^(Note 4)	50	$^\circ\text{C}/\text{W}$

Notes:

1. The max drain current rating is silicon limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. $L = 0.5 \text{ mH}$, $V_{DD} = 50 \text{ V}$, $I_{AS} = 42 \text{ A}$, $R_g = 50 \Omega$, Starting $T_J = 25 \text{ }^\circ\text{C}$
4. 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						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	100			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V},$			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	2.7	4	V
$R_{DS(ON)}$	Drain-Source on-state resistance	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		3.3	3.8	m Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$		8845		pF
C_{oss}	Output Capacitance			1680		pF
C_{rss}	Reverse Transfer Capacitance			57		pF
R_g	Gate Resistance	$f = 1\text{ MHz}$		1.9		Ω
Switching Characteristics						
$t_{d(on)}$	Turn On Delay Time	$V_{DD} = 50\text{ V}, R_L = 2.5\ \Omega,$ $V_{GS} = 10\text{ V}, R_G = 6\ \Omega$		37		ns
t_r	Rise Time			53		ns
$t_{d(off)}$	Turn Off Delay Time			127		ns
t_f	Fall Time			74		ns
Q_g	Total Gate Charge	$V_{DD} = 50\text{ V}, I_D = 20\text{ A},$ $V_{GS} = 10\text{ V}$		128		nC
Q_{gs}	Gate-Source Charge			32		nC
Q_{gd}	Gate-Drain Charge			25		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Body-Diode Forward Current				185	A
I_{SM}	Maximum Pulsed Body-Diode Forward Current				740	A
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 1\text{ A}$		0.62		V
t_{rr}	Reverse recovery time	$V_{DD} = 50\text{ V}, I_D = 20\text{ A},$ $di/dt = 100\text{ A}/\mu\text{S}$		82		ns
Q_{rr}	Reverse recovery charge			202		nC
I_{rrm}	Peak Reverse Recovery Current			4		A

Electrical Characteristics Diagrams

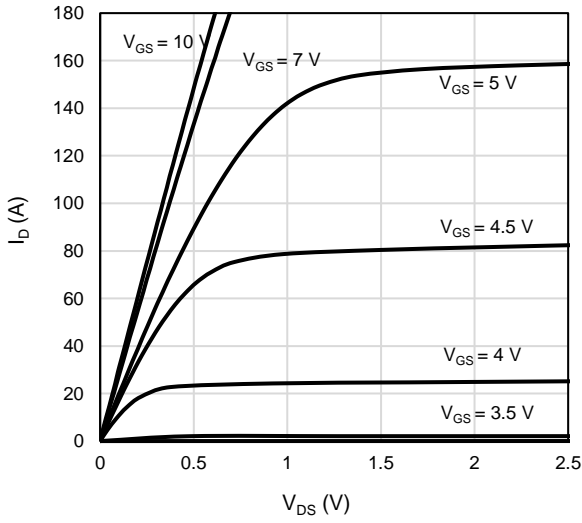


Figure 1: On-Region Characteristics

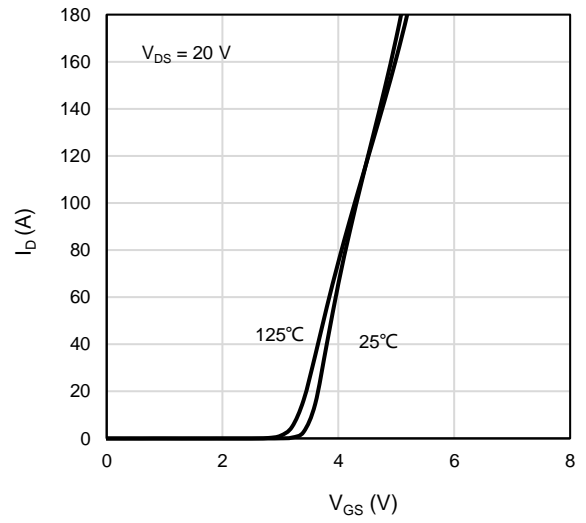


Figure 2: Transfer Characteristics

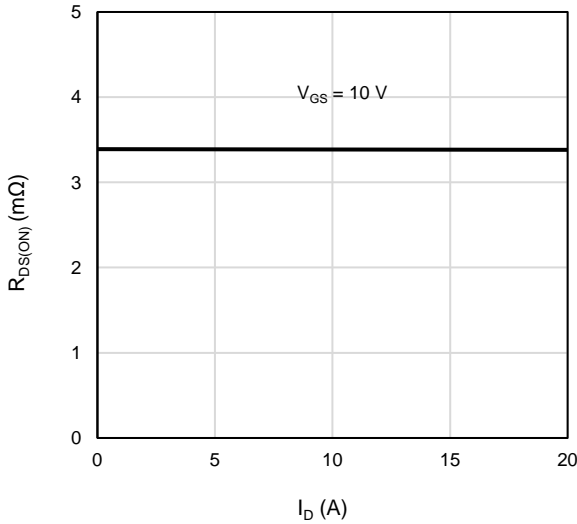


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

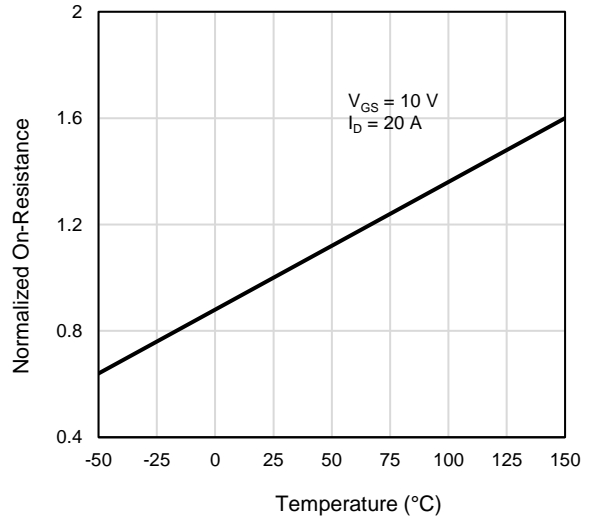


Figure 4: On-Resistance vs. Junction Temperature

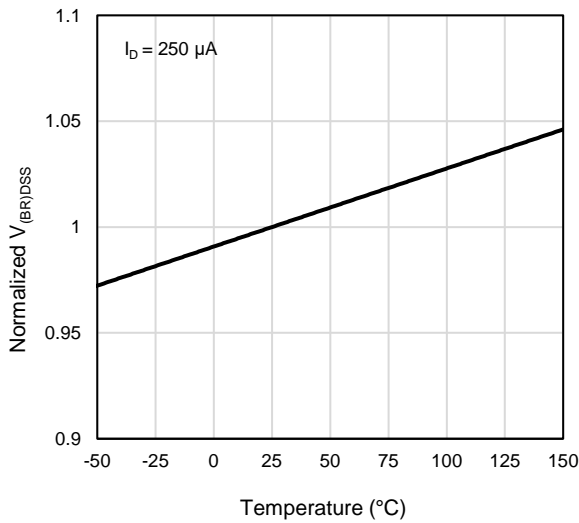


Figure 5: Breakdown Voltage vs. Junction Temperature

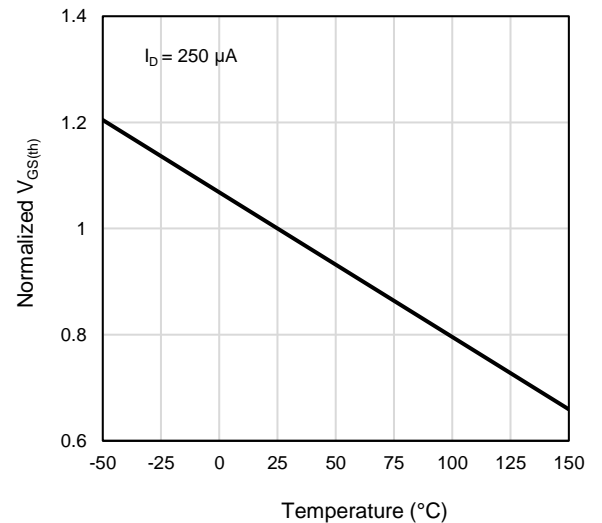


Figure 6: Threshold Voltage vs. Junction Temperature

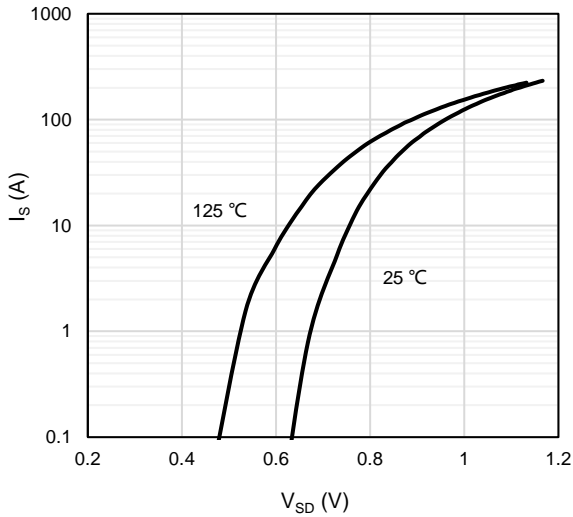


Figure 7: Body-Diode Characteristics

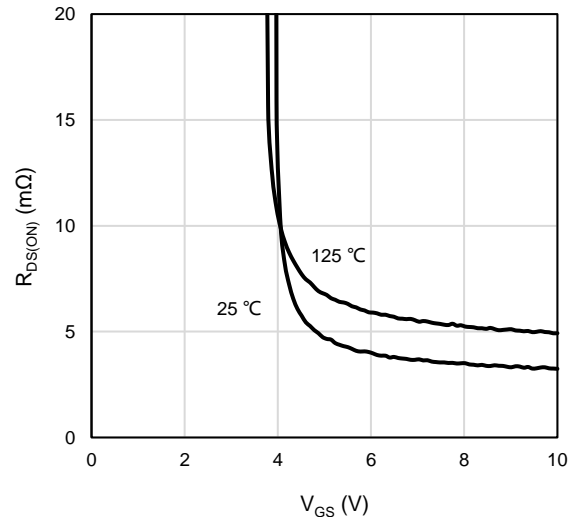


Figure 8: On-Resistance vs. Gate-Source Voltage

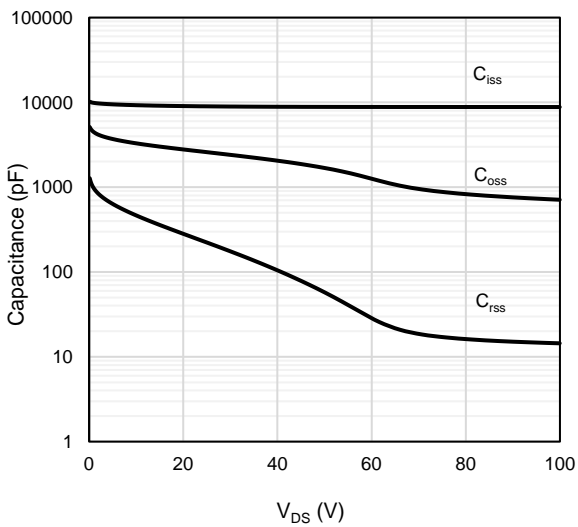


Figure 9: Capacitance Characteristics

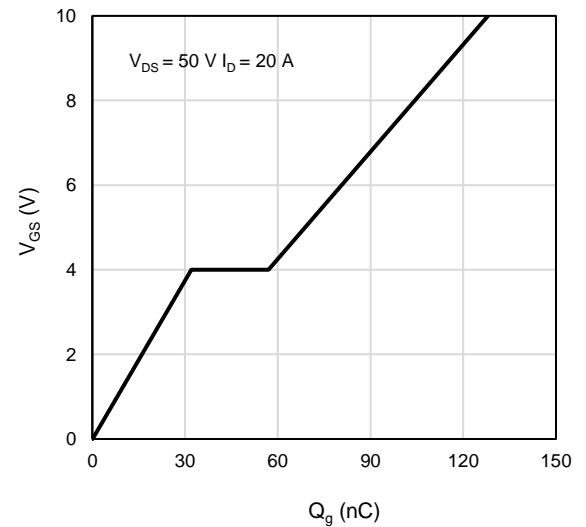


Figure 10: Gate-Charge Characteristics

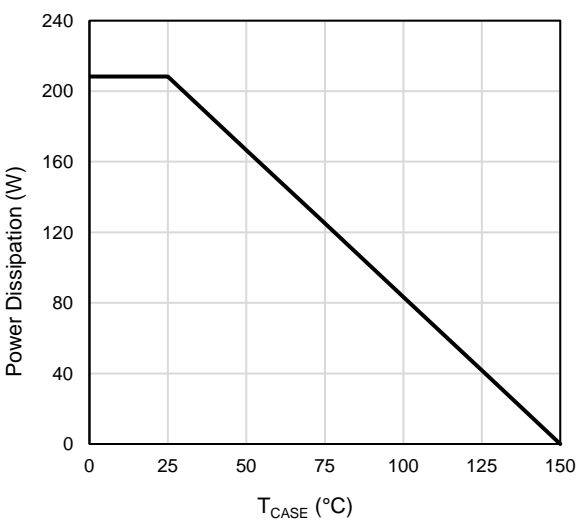


Figure 11: Power De-rating

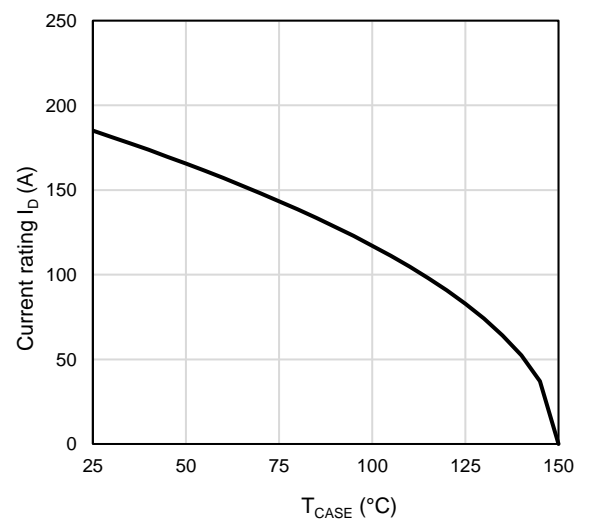


Figure 12: Current De-rating

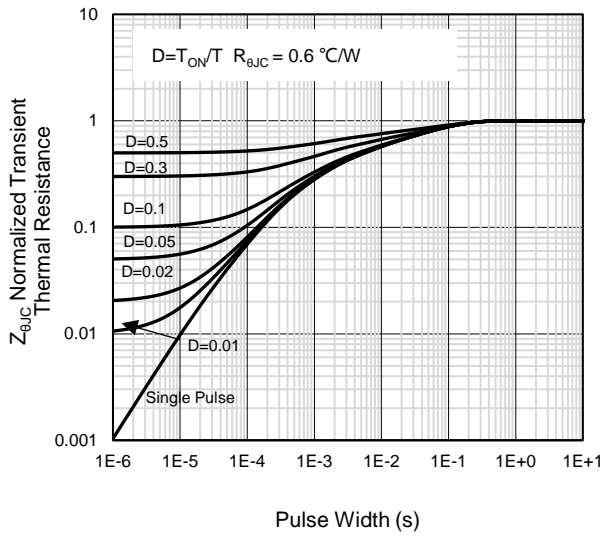


Figure 13: Normalized Maximum Transient Thermal Impedance

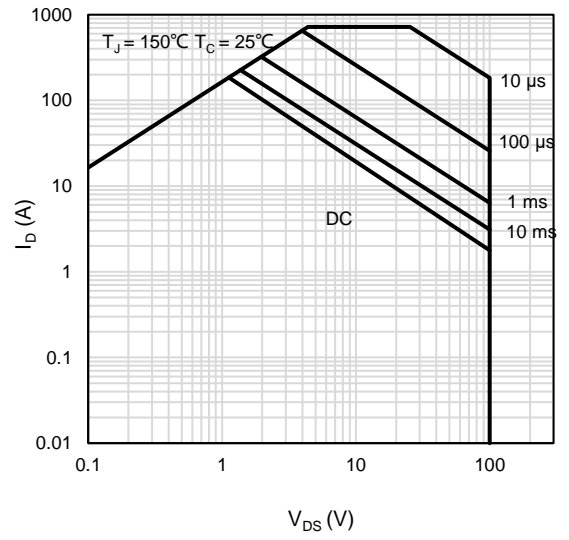
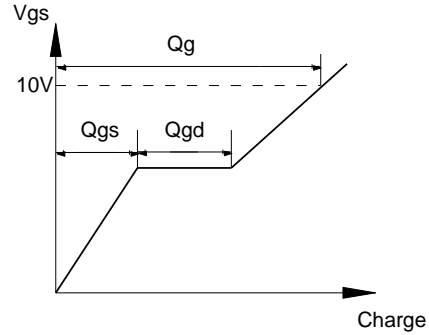
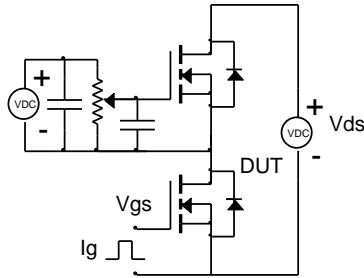


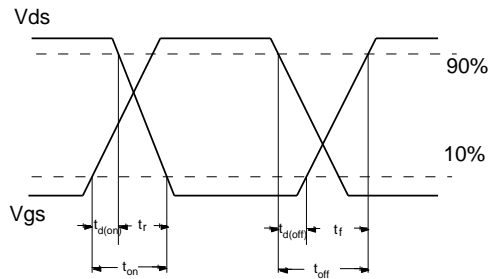
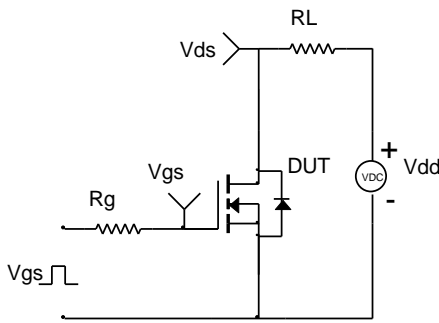
Figure 14: Maximum Forward Biased Safe Operating Area

Test Circuit and Waveform

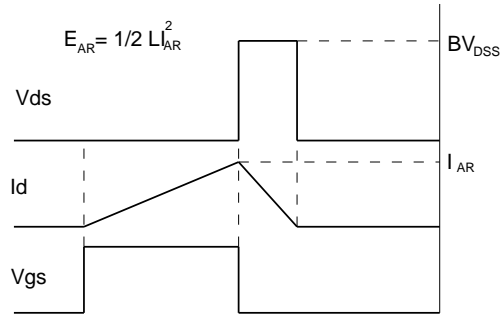
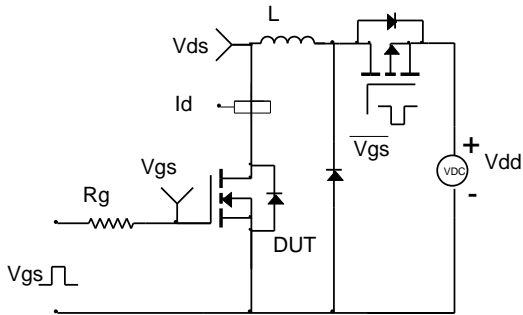
Gate Charge Test Circuit & Waveform



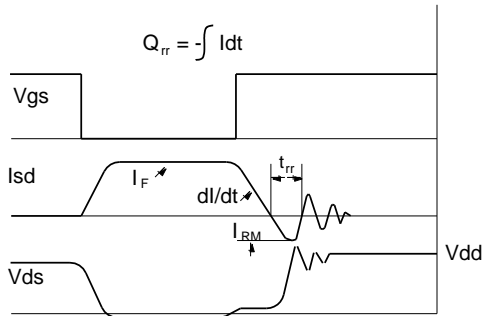
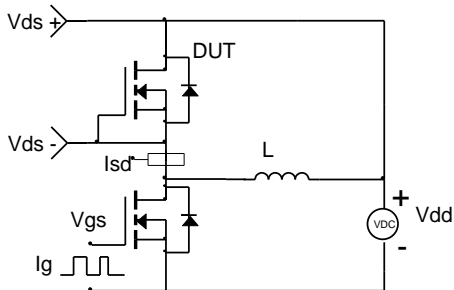
Resistive Switching Test Circuit & Waveforms



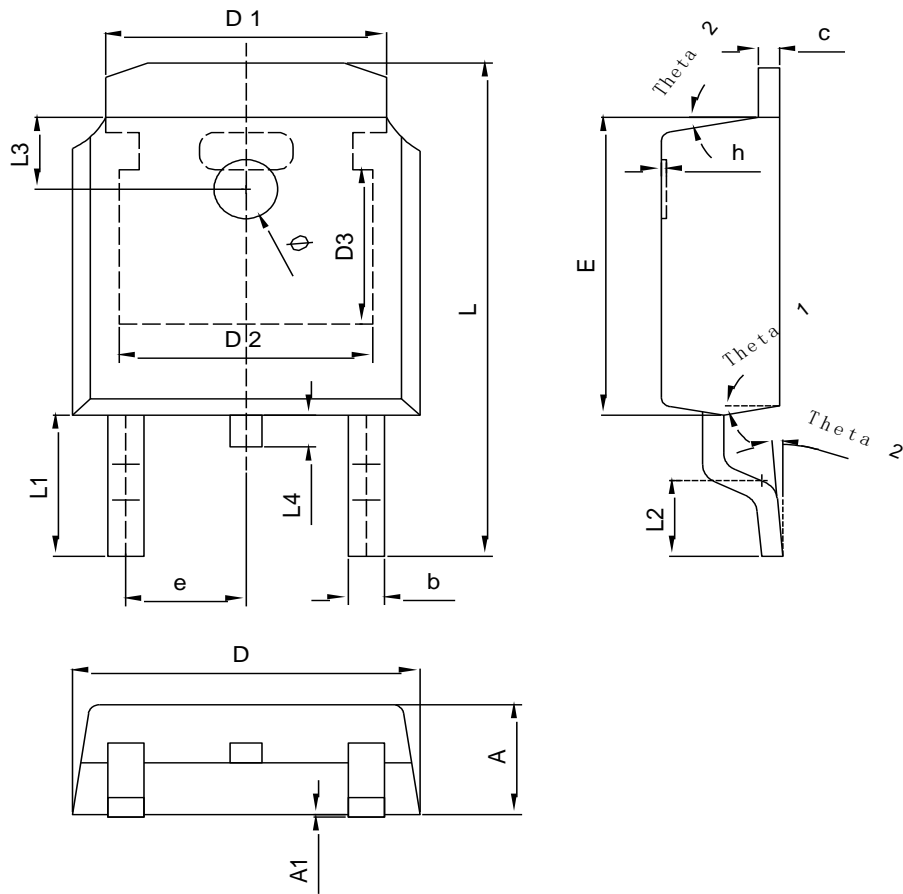
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outlines



SYMBOL	MILLIMETER		SYMBOL	MILLIMETER	
	MIN	MAX		MIN	MAX
A	2.200	2.400	h	0.000	0.200
A1	0.000	0.127	L	9.900	10.30
b	0.640	0.740	L1	2.888 REF	
c	0.460	0.580	L2	1.400	1.700
D	6.500	6.700	L3	1.600 REF	
D1	5.334 REF		L4	0.600	1.000
D2	4.826 REF		ϕ	1.100	1.300
D3	3.166 REF		Theta	0°	8°
E	6.000	6.200	Theta 1	9° TYP	
e	2.286 TYP		Theta 2	9° TYP	

Marking Information



Note:

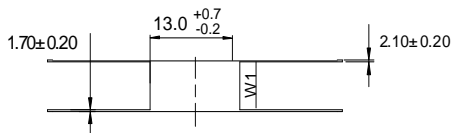
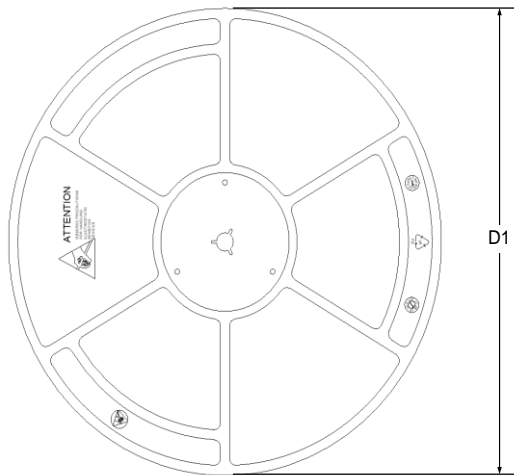
G10N038DM = Product Name Code

XXXXXXX = Date code

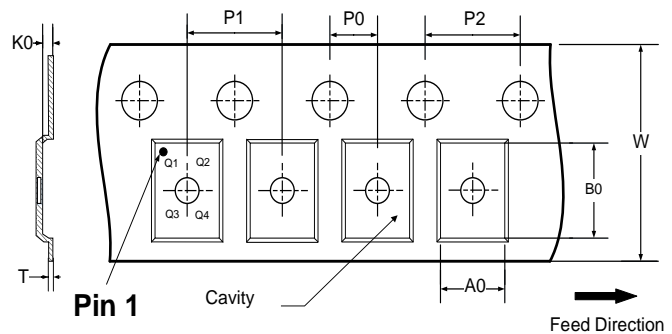
Contact ALKAIDSEMI sales for detail information

Tape & Reel 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	Released	Remark
Rev.1.0	2023	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.