100V 1.25mohm N-channel SGT MOSFET
AKG10N012TM-A

Description:

This device is designed for automotive applications and manufactured in IATF16949 certified facilities. Qualified AEC-Q101, PPAP capable.

Features:

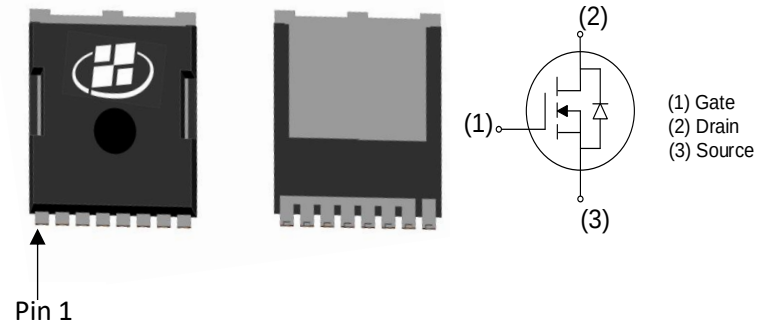
- Ultra-low on-resistance
- RoHS compliant (Note 1)
- Halogen-free (Note 1)
- 100% UIS tested
- AEC-Q101 qualified and PPAP capable
- Wettable Flank for Improved Optical Inspection

Applications:

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

Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	100	V
$R_{DSON,\ max}$ @V_{GS} = 10 V	1.25	mΩ
I_D	300	A



Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKG10N012TM-A	TOLL	G10N012TM	Tape Reel	2000PCS

Notes:

1. Contact ALKAIDSEMI sales for detail information

Maximum Ratings (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	100	V
I_D	Drain Current - Continuous (T_C = 25°C) (Note 1)	367	A
	Drain Current - Continuous (T_C = 25°C) (Note 2)	300	A
	Drain Current - Continuous (T_C = 100°C)	260	A
I_{DM}	Drain Current - Pulsed (Note 3)	1200	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 4)	1600	mJ
P_D	Power Dissipation (T_C = 25°C)	300	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	°C

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Steady-State	0.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State (Note 5)	50	°C/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 mH, V_{DD} = 50 V, I_{AS} = 80 A, R_G = 25 Ω, Starting T_J = 25 °C
5. 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	100			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80 V, V_{GS} = 0 V			1	μA
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	2	2.8	4	V
$R_{DS(ON)}$	Drain-Source on-state resistance	V_{GS} = 10 V, I_D = 20 A		0.98	1.25	mΩ
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V, F = 1 MHz		20760		pF
C_{OSS}	Output Capacitance			4310		pF
C_{RSS}	Reverse Transfer Capacitance			117		pF
R_G	Gate Resistance	F = 1 MHz		2.3		Ω
Switching Characteristics						
$T_{D(ON)}$	Turn On Delay Time	V_{DD} = 50 V , R_L = 2.5 Ω, V_{GS} = 10 V, R_G = 1.6 Ω		49		nS
T_R	Rise Time			48.0		nS
$T_{D(OFF)}$	Turn Off Delay Time			143		nS
T_F	Fall Time			63		nS
Q_G	Total Gate Charge	V_{DD} = 50 V , I_D = 20 A, V_{GS} = 10 V		291		nC
Q_{GS}	Gate-Source Charge			71		nC
Q_{GD}	Gate-Drain Charge			49		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Body-Diode Forward Current				300	A
I_{SM}	Maximum Pulsed Body-Diode Forward Current (NOTE 1)				1200	A
V_{SD}	Diode Forward Voltage	V_{GS} = 0 V, I_S = 20 A		0.85		V
T_{RR}	Reverse recovery time	V_{DD} = 50 V, I_D = 20 A, di/dt = 100 A/μS		133		nS
Q_{RR}	Reverse recovery charge			374		nC
I_{RRM}	Peak Reverse Recovery Current			5		A

Electrical Characteristics Diagrams

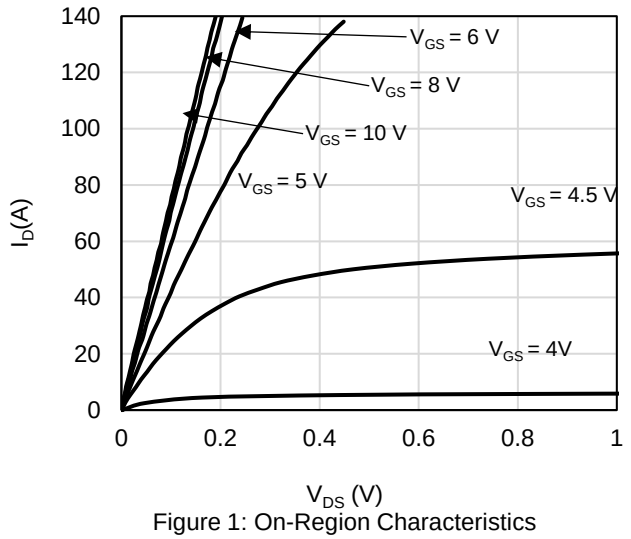


Figure 1: On-Region Characteristics

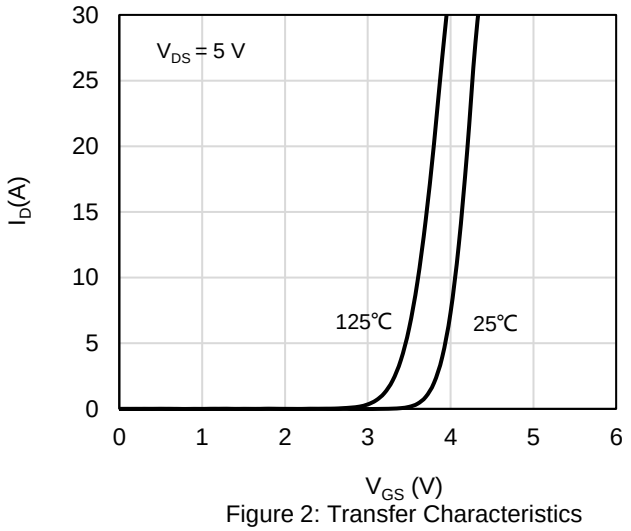


Figure 2: Transfer Characteristics

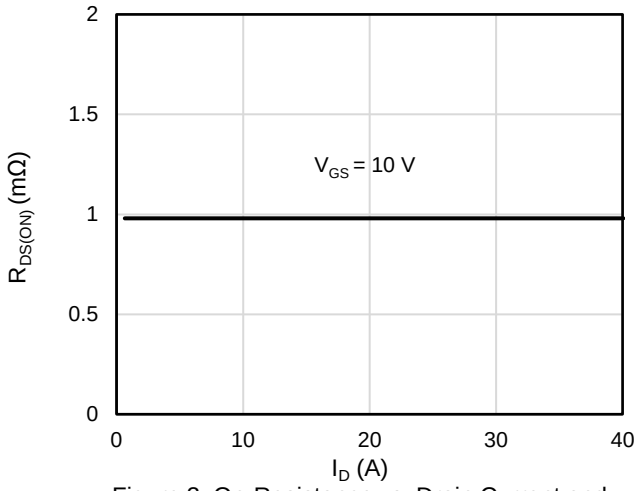


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

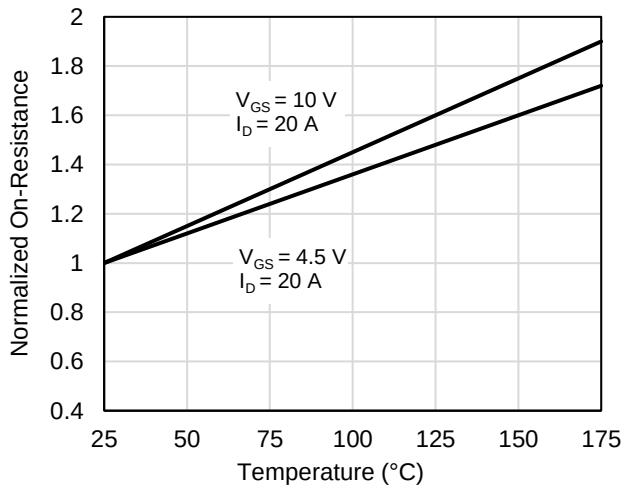


Figure 4: On-Resistance vs. Junction Temperature

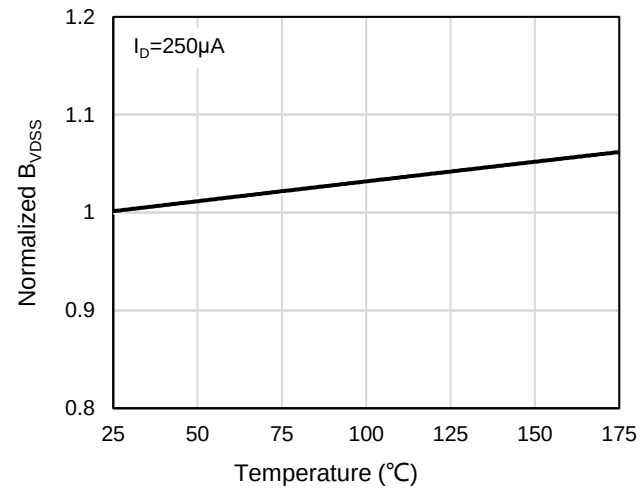


Figure 5: Breakdown Voltage vs. Junction Temperature

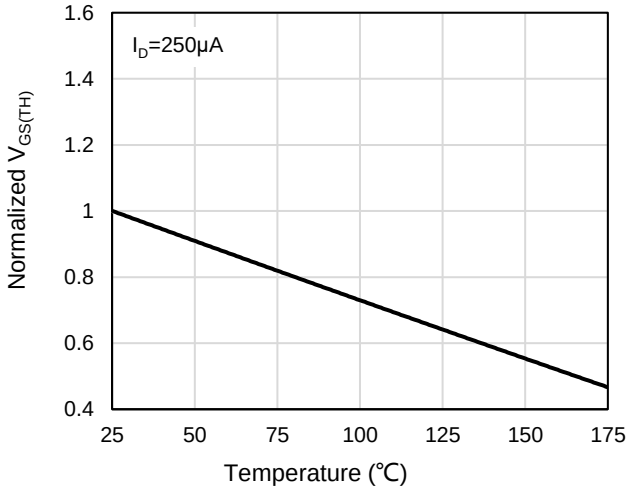


Figure 6: Threshold Voltage vs. Junction Temperature

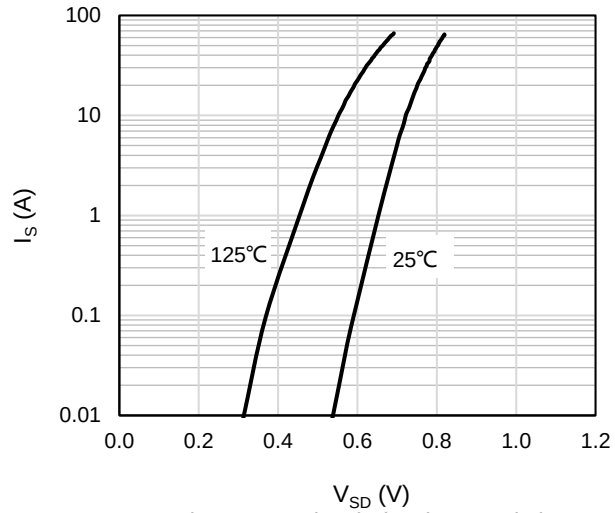


Figure 7: Body-Diode Characteristics

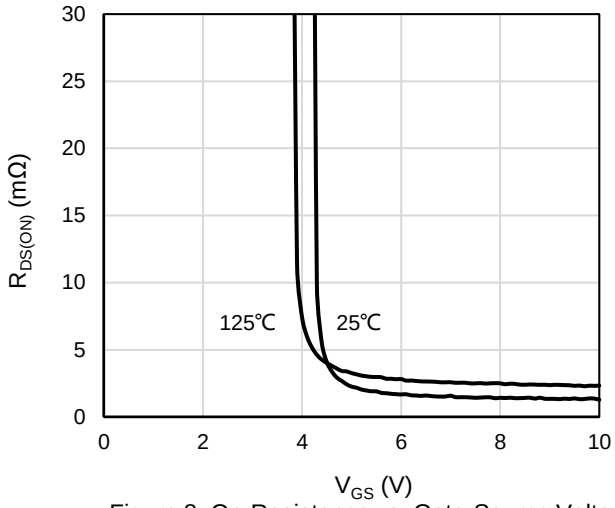


Figure 8: On-Resistance vs. Gate-Source Voltage

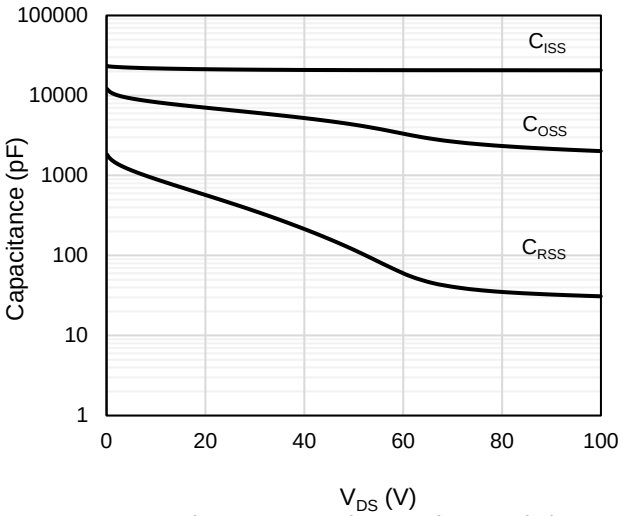


Figure 9: Capacitance Characteristics

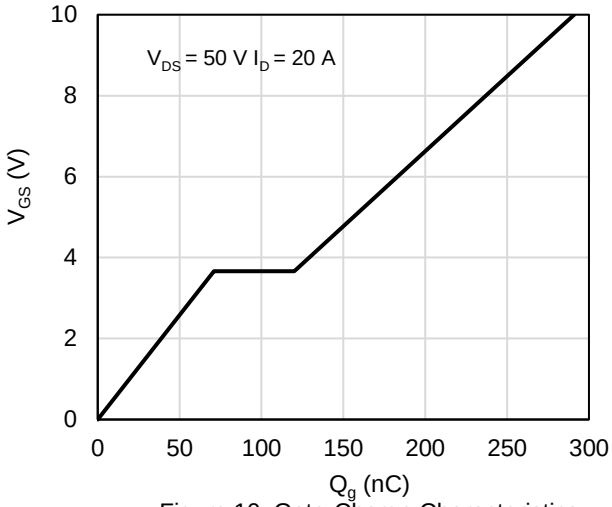


Figure 10: Gate-Charge Characteristics

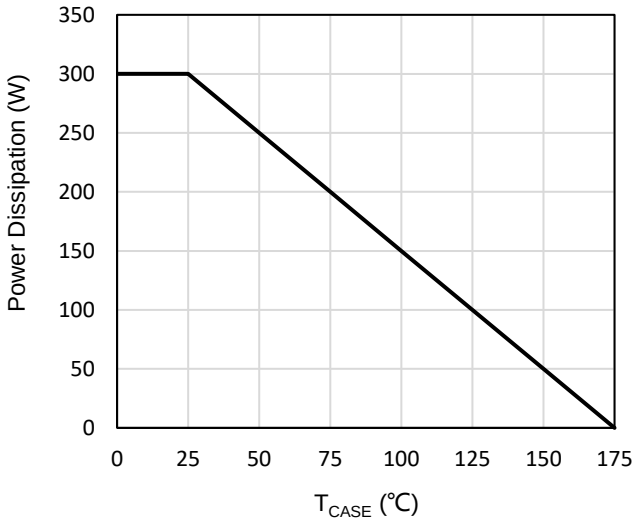


Figure 11: Power De-rating

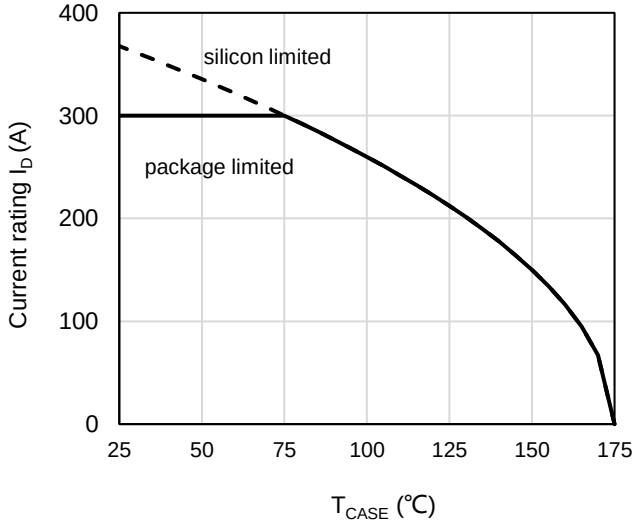


Figure 12: Current De-rating

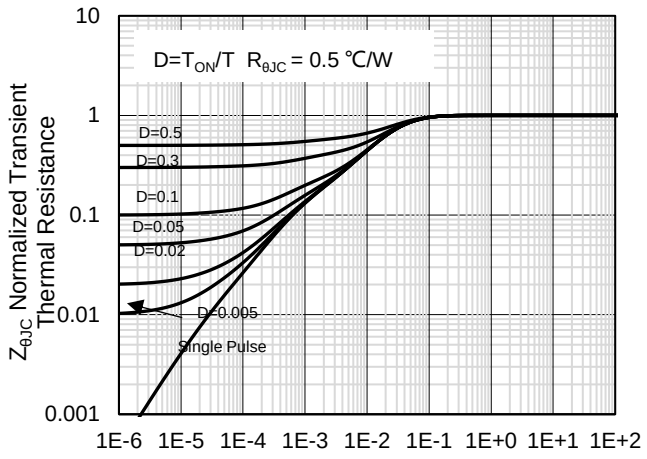


Figure 13: Normalized Maximum Transient Thermal Impedance

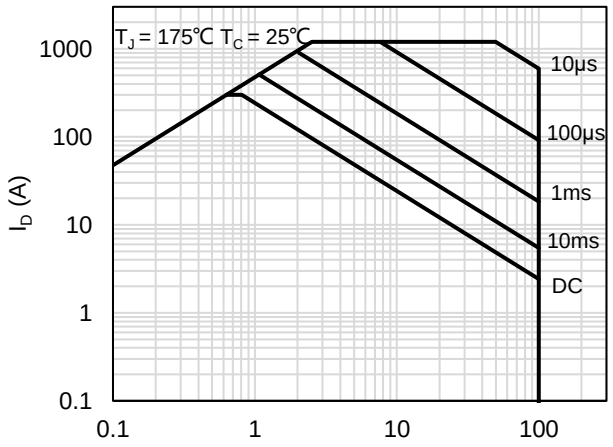
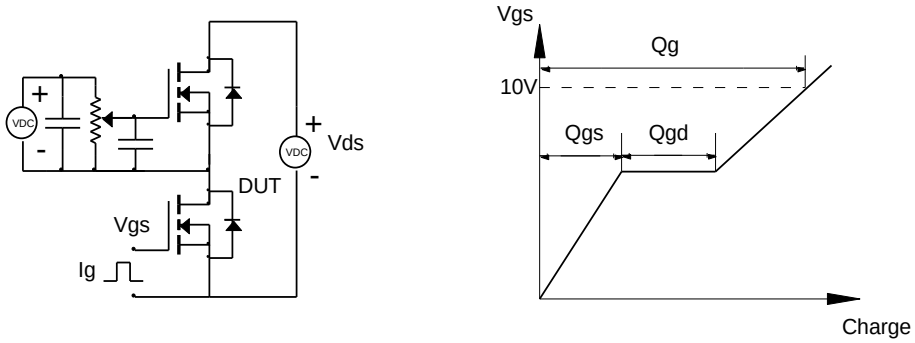


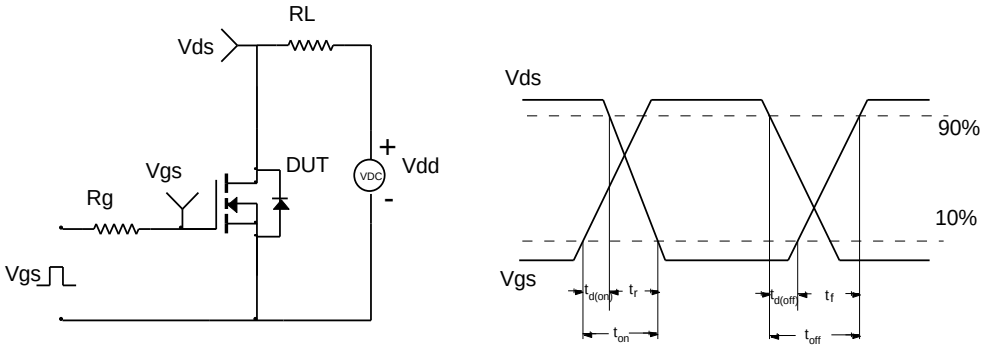
Figure 14: Maximum Forward Biased Safe Operating Area

Test Circuit and Waveform

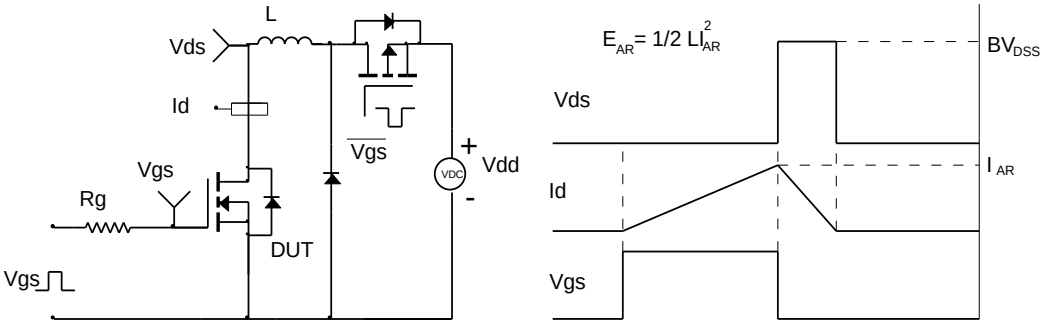
Gate Charge Test Circuit & Waveform



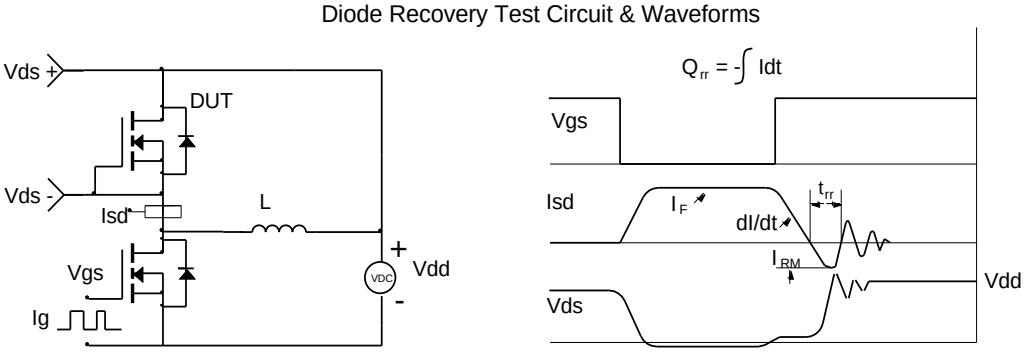
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

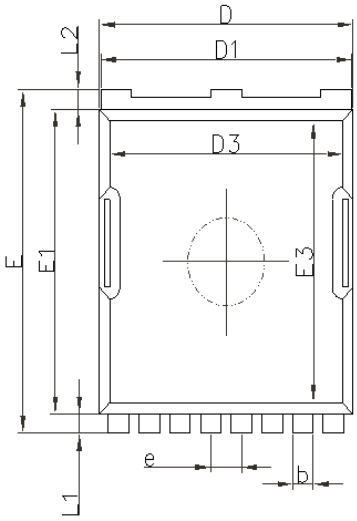


Diode Recovery Test Circuit & Waveforms

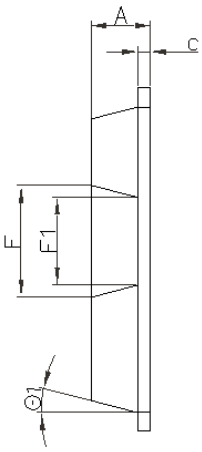


Package Outlines

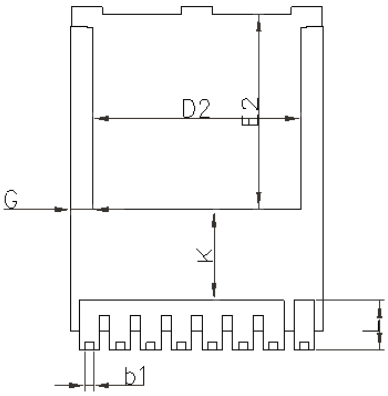
POD1



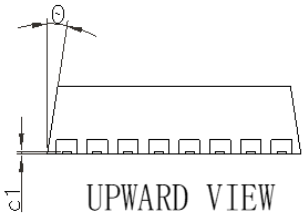
TOP VIEW



SIDE VIEW



BTM VIEW



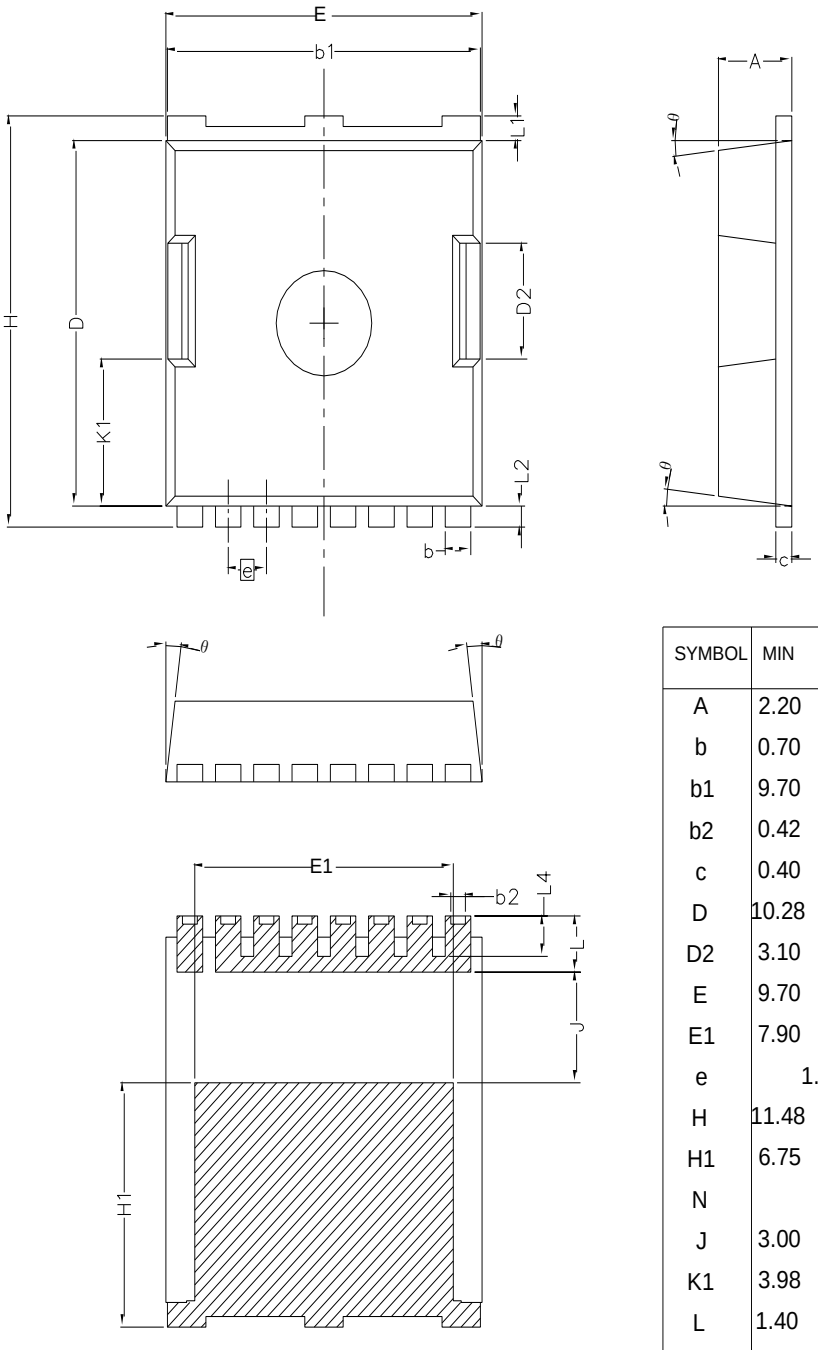
UPWARD VIEW

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.40
b	0.75	0.80	0.85
b1	0.30	0.35	0.40
c	0.45	0.50	0.55
c1	0.05	0.10	0.15
D	9.80	9.90	10.00
D1	9.70	9.80	9.90
D2	8.00	8.10	8.30
D3	9.10 TYP.		
e	1.20 BSC		
E	11.60	11.70	11.80
E1	10.30	10.40	10.50
E2	6.55	6.65	6.75
E3	9.60 TYP.		
F	3.80 TYP.		
F1	3.00 TYP.		
G	0.80	0.90	1.00
K	3.00	3.10	3.20
L	1.59	1.69	1.79
L1	0.54	0.64	0.74
L2	0.56	0.66	0.76
θ	8°	10°	12°
θ1	10°	12°	14°

(UNITS OF MEASURE = MILLIMETER)

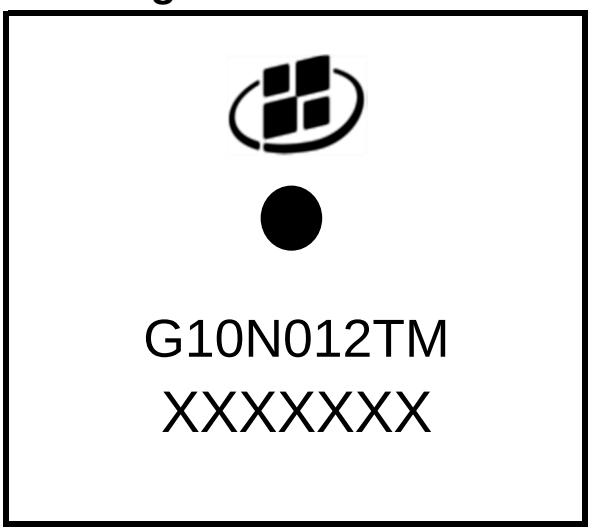
Package Outlines

POD2



SYMBOL	MIN		MAX
A	2.20		2.40
b	0.70		0.90
b1	9.70		9.90
b2	0.42		0.50
c	0.40		0.60
D	10.28		10.58
D2	3.10	3.30	3.50
E	9.70	9.90	10.10
E1	7.90	8.10	8.30
e	1.20 BSC		
H	11.48	11.68	11.88
H1	6.75	6.95	7.15
N		8	
J	3.00	3.15	3.30
K1	3.98	4.18	4.38
L	1.40	1.60	1.80
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L4	1.00	1.15	1.30
θ	4°	7°	10°

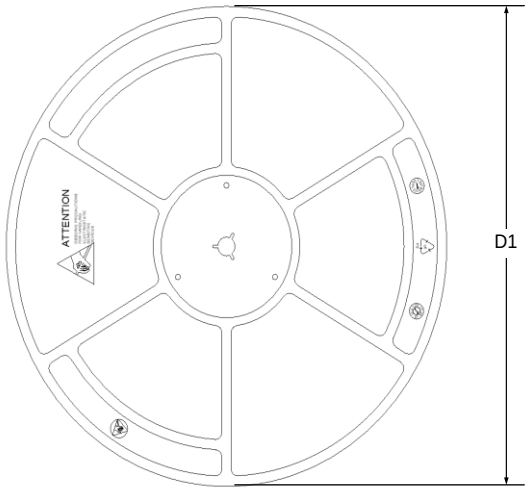
Marking Information

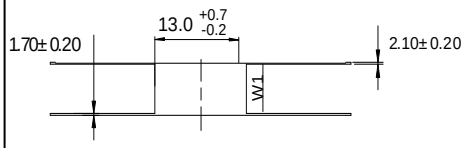


Note:
G10N012TM = Product Name Code
XXXXXXX = Date code
Contact ALKAIDSEMI sales for detail information

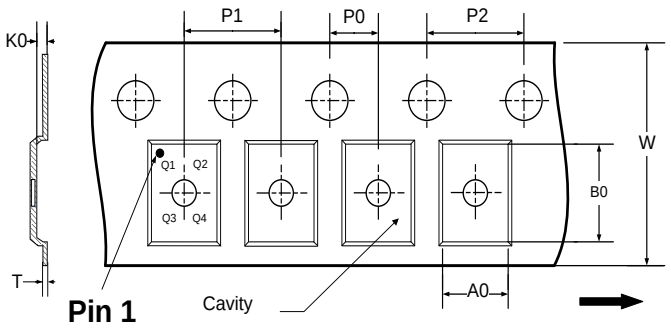
Reel Information

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)

	D1	W1								Material
Reel	330	24.4								Hips
	P0	P1	P2	W	A0	B0	K0	T	Pin 1 Quadrant	Material
Tape	2	4	12	24	10.5	12.28	2.55	0.28	Q1	PC
All dimensions are nominal										

Revision History

Revision	Release Date	Remark
Rev.1.1	2023/3/1	

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.