

40V 0.95mohm N-channel SGT MOSFET

AKG4N009DAM-A

Description:

This device is designed for automotive applications and manufactured in IATF16949 certified facilities. Qualified AEC-Q101, PPAP capable. Perform ultra-low on-state resistance ($R_{DS(on)}$) and excellent $Q_G \times R_{DS(on)}$ (FOM).

Features:

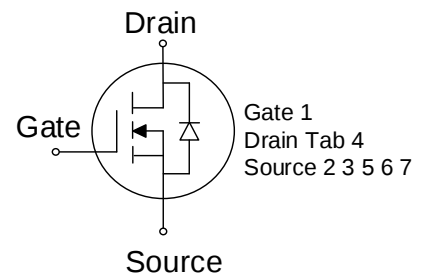
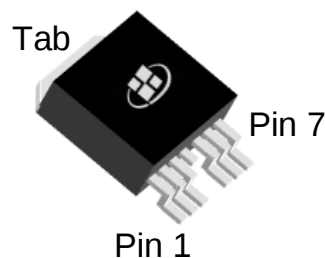
- Excellent Gate Charge $\times R_{DS(on)}$ (FOM)
- Very low on-resistance
- RoHS compliant (Note 1)
- Halogen-free (Note 1)
- AEC-Q101 qualified and PPAP capable

Applications:

- Battery Management System
- Electric Power Steering

Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	40	V
$R_{DS(on), max} @V_{GS}=10V$	0.95	m Ω
I_D	240	A



Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKG4N009DAM-A	TO-263-7L	G4N009DAM	13 inches 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	40	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) (Note 1)	240	A
	Drain Current - Continuous ($T_C = 100^\circ\text{C}$) (Note 1)	240	A
I_{DM}	Drain Current - Pulsed (Note 2)	960	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 3)	1.4	J
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	375	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Steady-State	0.4	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient Steady State (Note 4)	40	$^\circ\text{C/W}$

Notes:

1. The max drain current rating is package limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. $L = 0.5\text{ mH}$, $V_{DD} = 20\text{V}$, $I_{AS} = 75\text{A}$, $R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$, guaranteed by design
4. Mount on 1 - inch² FR - 4, 2oz copper PCB board

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 V, I _D = 250 μA	40			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 40 V, V _{GS} = 0 V, T _J = 25°C			1	μA
		V _{DS} = 40 V, V _{GS} = 0 V, T _J = 125°C			100	
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	2.7	3.2	4	V
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} = 10 V, I _D = 100A		0.62	0.95	mΩ
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, F = 1 MHz		13080		pF
C _{OSS}	Output Capacitance			3370		pF
C _{RSS}	Reverse Transfer Capacitance			52		pF
Switching Characteristics						
T _{D(ON)}	Turn On Delay Time	V _{DD} = 20 V, I _D = 90 A, V _{GS} = 10 V, R _G = 4.7 Ω		51		ns
T _R	Rise Time			125		ns
T _{D(OFF)}	Turn Off Delay Time			121		ns
T _F	Fall Time			50		ns
Q _G	Total Gate Charge	V _{DD} = 20 V, I _D = 180 A, V _{GS} = 10 V		132		nC
Q _{GS}	Gate-Source Charge			51		nC
Q _{GD}	Gate-Drain Charge			6		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Body-Diode Forward Current (NOTE 1)				240	A
I _{SM}	Maximum Pulsed Body-Diode Forward Current (NOTE 2)				960	A
V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _S = 1 A		0.65	1	V
T _{RR}	Reverse recovery time	I _{DS} = 180A, V _{DD} = 32V di/dt = 100A/μs		64		ns
Q _{RR}	Reverse recovery charge			117		nC
I _{RRM}	Reverse recovery current			3.5		A

Electrical Characteristics Diagrams

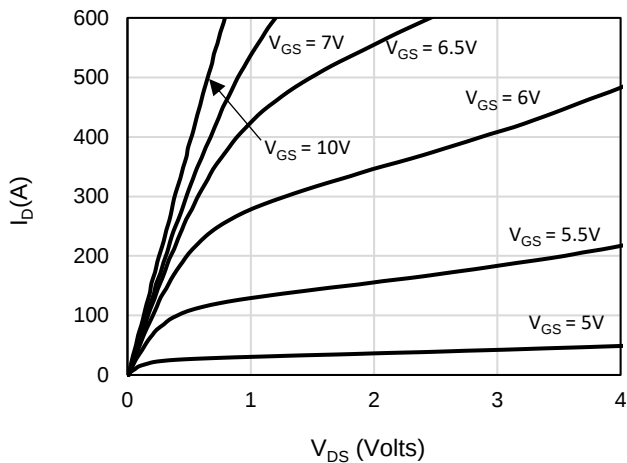


Figure 1: On-Region Characteristics

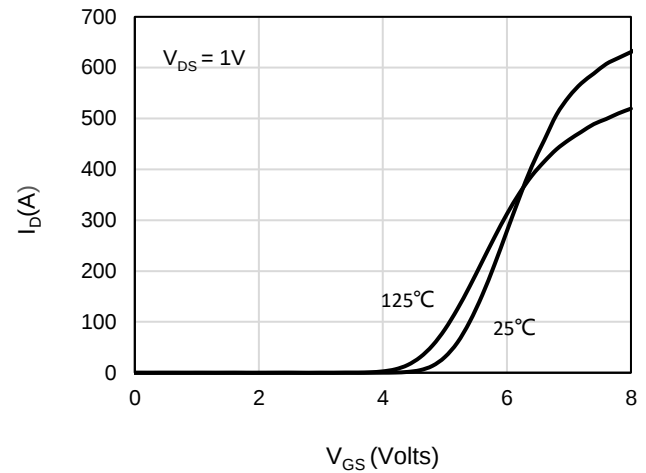


Figure 2: Transfer Characteristics

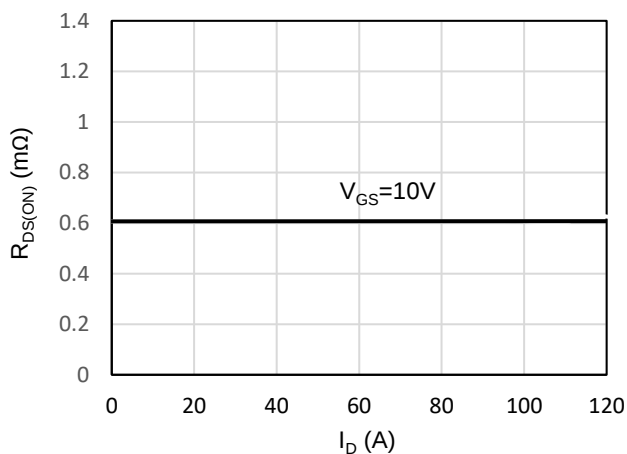


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

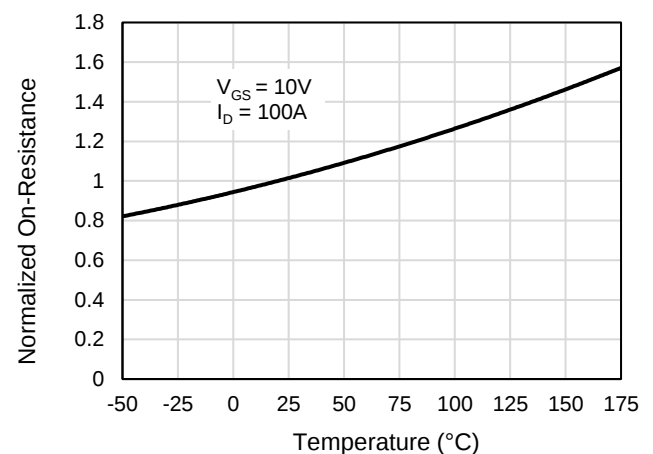


Figure 4: On-Resistance vs. Junction Temperature

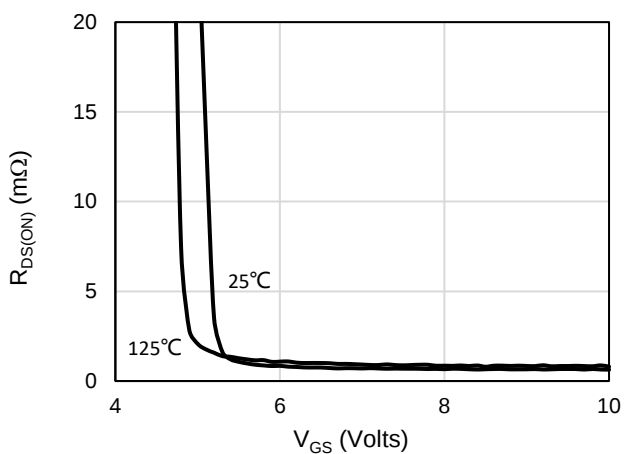


Figure 5: On-Resistance vs. Gate-Source Voltage

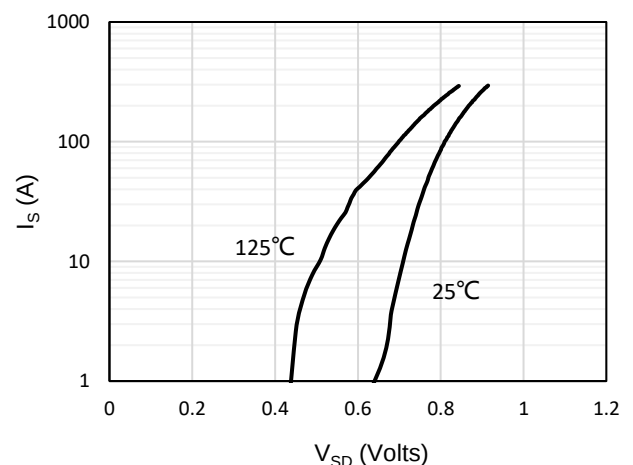


Figure 6: Body-Diode Characteristics

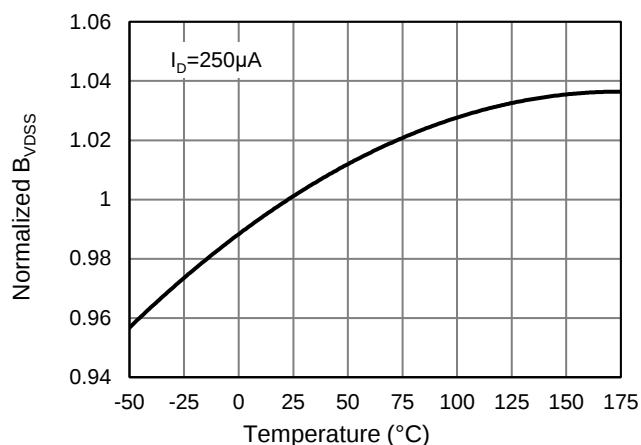


Figure 7: Breakdown Voltage vs. Junction Temperature

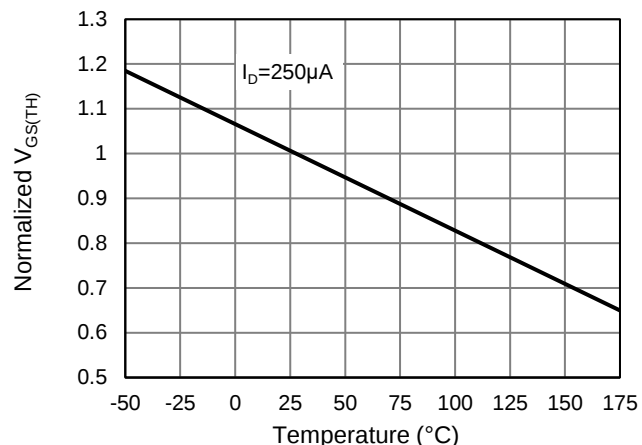


Figure 8: Threshold Voltage vs. Junction Temperature

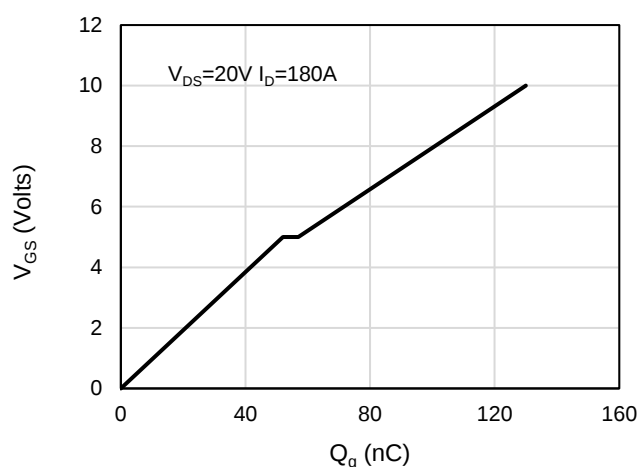


Figure 9: Gate-Charge Characteristics

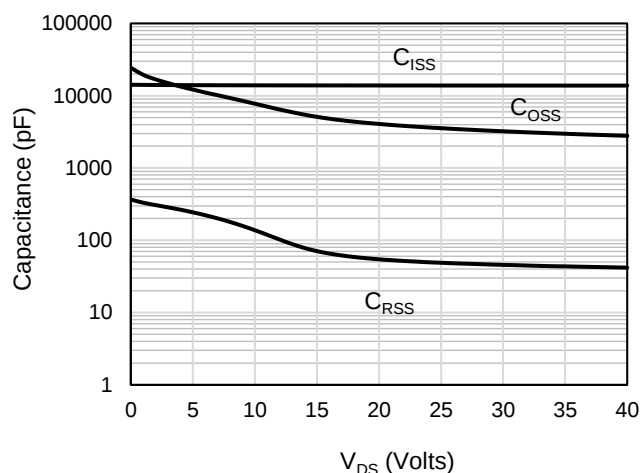


Figure 10: Capacitance Characteristics

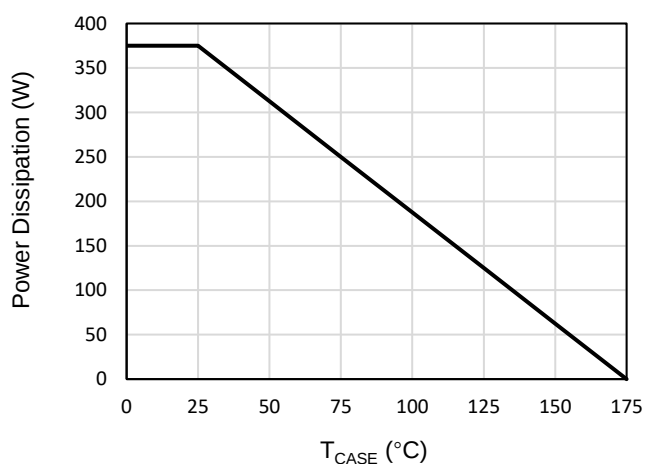


Figure 11: Power De-rating

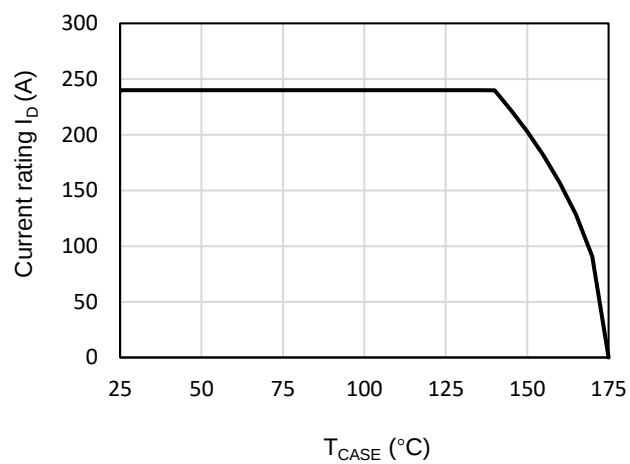


Figure 12: Current De-rating

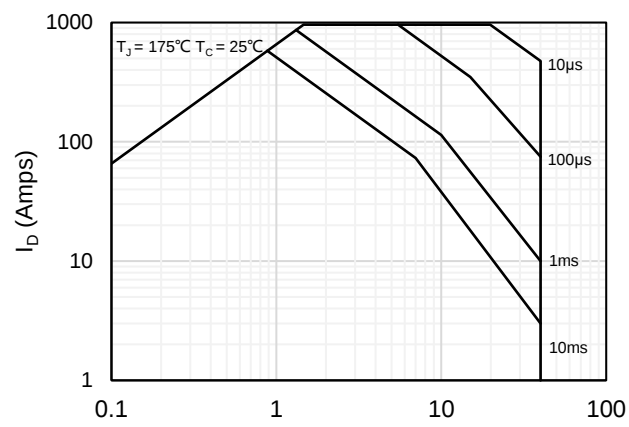


Figure 13: Maximum Forward Biased Safe Operating Area

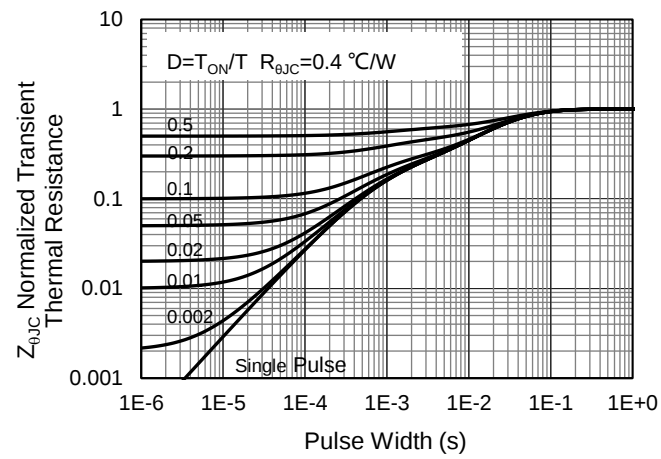
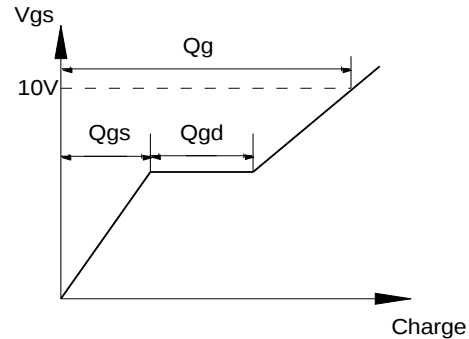
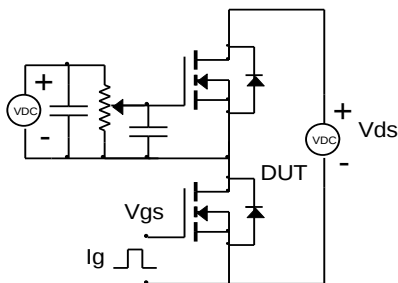


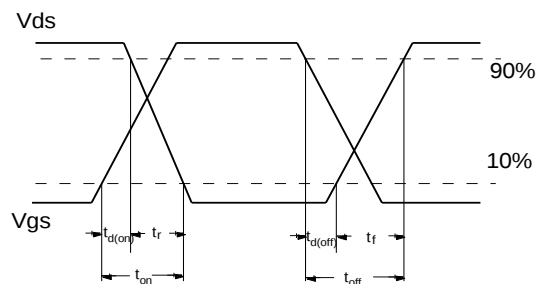
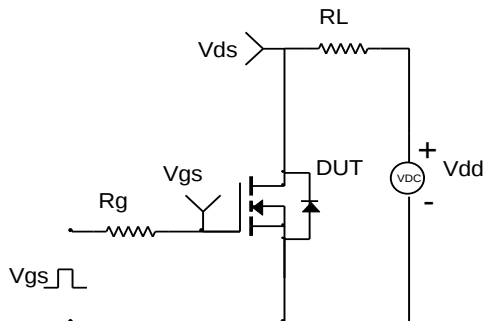
Figure 14: Normalized Maximum Transient Thermal Impedance

Test Circuit and Waveform

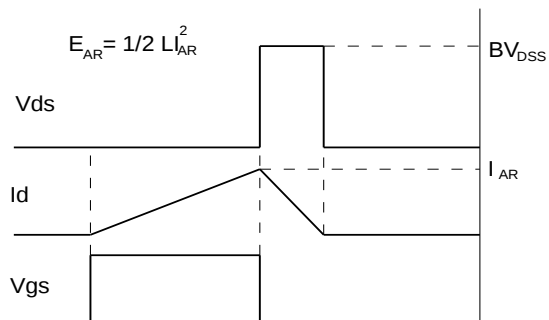
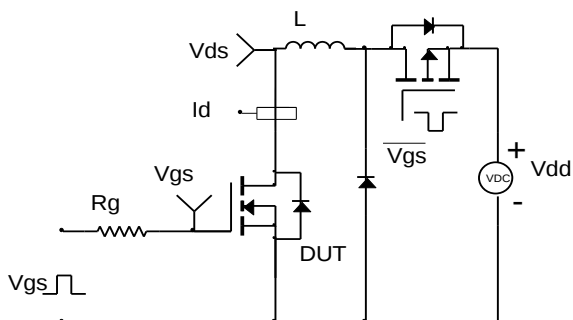
Gate Charge Test Circuit & Waveform



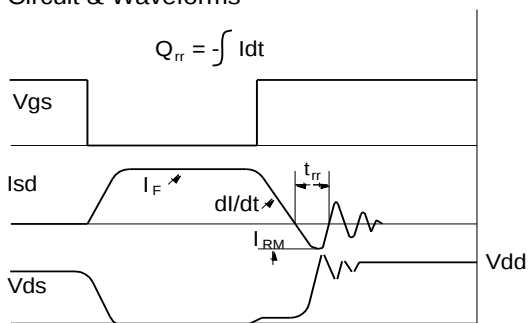
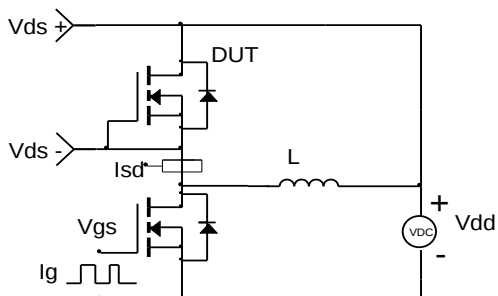
Resistive Switching Test Circuit & Waveforms



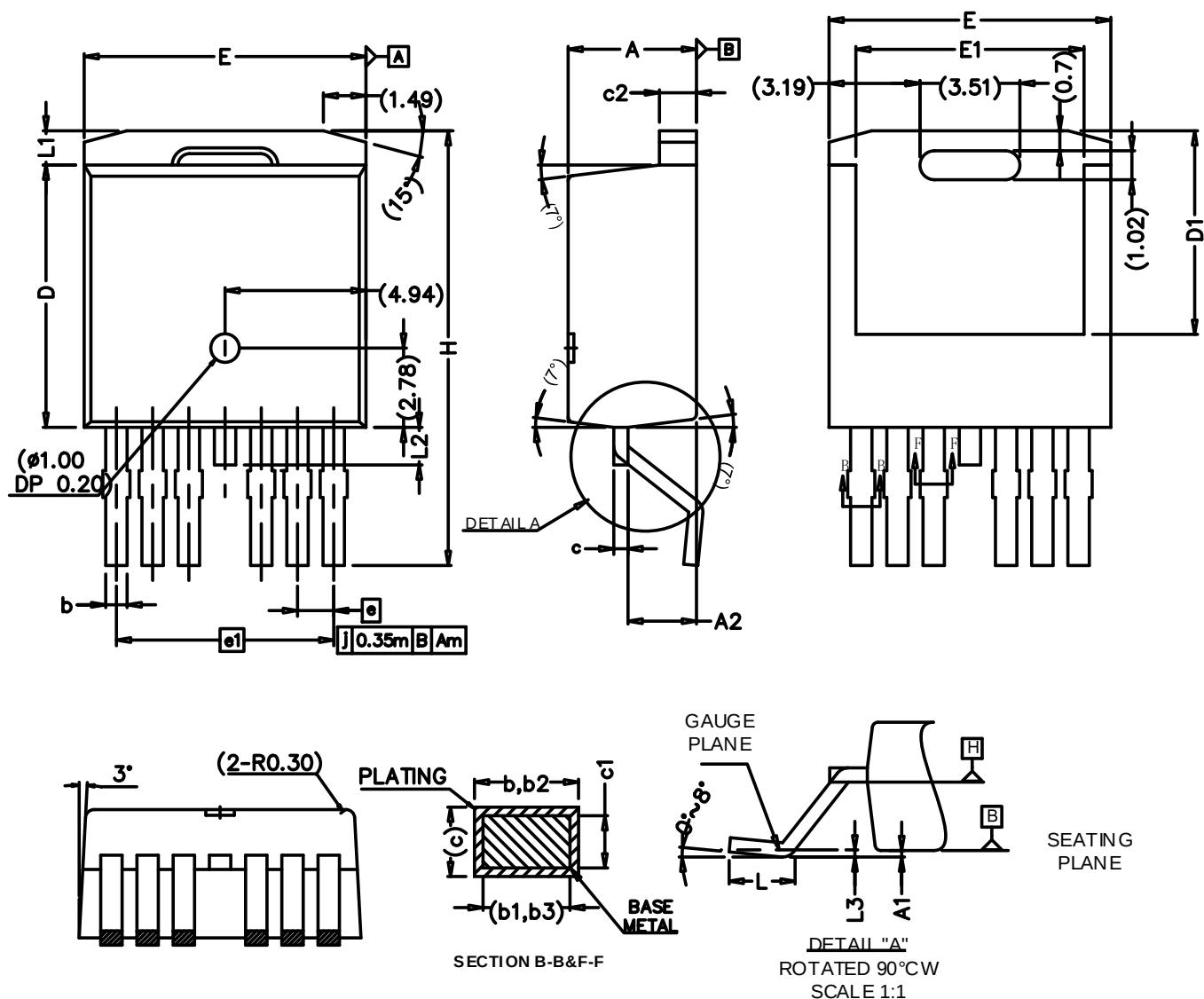
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outlines



SYMBOL	MIN	MAX
A	4.30	4.70
A1	-	0.25
A2	2.20	2.60
b	0.65	0.85
b1	0.65	0.80
b2	0.80	1.00
b3	0.80	0.95
c	0.45	0.60
c1	0.45	0.55
c2	1.25	1.40
D	9.00	9.40
D1	6.86	7.42
E	9.68	10.08
E1	7.70	8.30
e	1.27 BSC	
e1	7.62 BSC	
L	1.78	2.79
L1	-	1.60
L2	-	1.78
L3	0.25BSC	
H	14.61	15.88

Marking Information



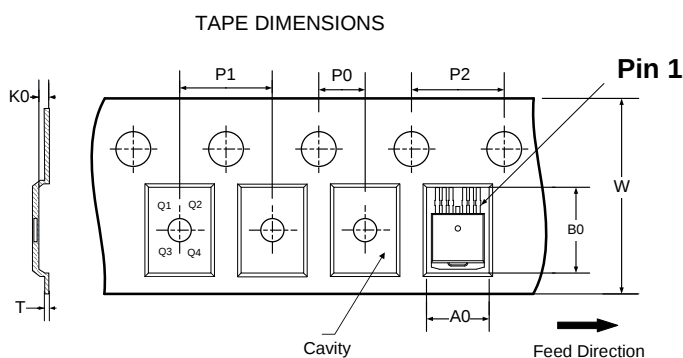
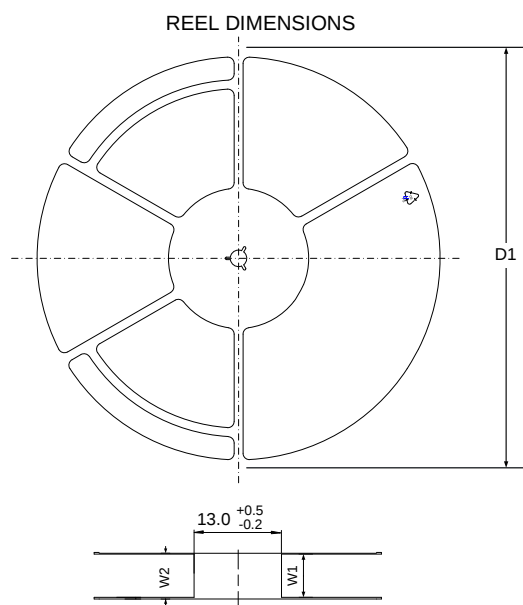
Note:

G4N009DAM = Product Name Code

XXXXXXX = Date code

Contact ALKAIDSEMI sales for detail information

Reel and Tube Information



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	W2							Material
	330	25.65	31							Hips
Tape	P0	P1	P2	W	A0	B0	K0	T	Pin 1 Quadrant	Material
	2	12	4	24	10.8	15.7	4.9	0.4	Q2	PC

All dimensions are nominal

Revision History

Revision	Release Date	Remark
Rev.1.2	2022-12-27	

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.