

40V 2.4mohm N-channel SGT MOSFET AKG4N024KM

Description:

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

Features:

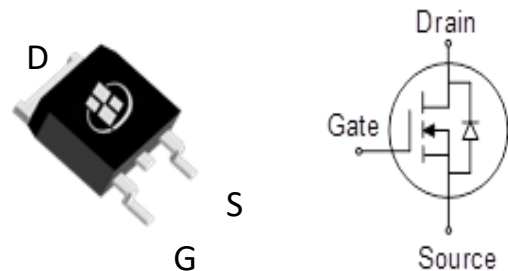
- Low $R_{DS(ON)}$
- RoHS compliant ^(Note 1)
- Halogen-free ^(Note 1)
- 100% UIS Tested

Applications:

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

Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	40	V
$R_{DS(ON), max} @ V_{GS} = 10V$	2.4	m Ω
I_D	70	A



Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKG4N024KM	TO252	G4N024KM	Tape Reel	2500PCS

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)	190	A
	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) ^(Note 2)	70	A
	Drain Current - Continuous ($T_C = 100^\circ\text{C}$)	70	A
I_{DM}	Drain Current - Pulsed ^(Note 3)	280	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy ^(Note 4)	552	mJ
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	139	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	0.9	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State ^(Note 5)	55	$^\circ\text{C/W}$

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. $L = 0.5\text{ mH}$, $V_{DD} = 30\text{ V}$, $I_{AS} = 47\text{ A}$, $R_G = 25\ \Omega$, 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
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Static Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	40			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V},$			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	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2	3	4	V
$R_{DS(ON)}$	Drain-Source on-state resistance	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$		2	2.4	$\text{m}\Omega$
		$V_{GS} = 6\text{ V}, I_D = 30\text{ A}$		3	5	$\text{m}\Omega$

Dynamic Characteristics

C_{ISS}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $F = 1\text{ MHz}$		6240		pF
C_{OSS}	Output Capacitance			1520		pF
C_{RSS}	Reverse Transfer Capacitance			24		pF
R_G	Gate Resistance	$F = 1\text{ MHz}$		6		Ω

Switching Characteristics

$T_{D(ON)}$	Turn On Delay Time	$V_{DD} = 20\text{ V}, R_L = 0.65\text{ }\Omega,$ $V_{GS} = 10\text{ V}, R_G = 2.7\text{ }\Omega$		23		nS
T_R	Rise Time			108		nS
$T_{D(OFF)}$	Turn Off Delay Time			70		nS
T_F	Fall Time			106		nS
Q_G	Total Gate Charge	$V_{DD} = 0\text{ V}, I_D = 35\text{ A},$ $V_{GS} = 10\text{ V}$		73		nC
Q_{GS}	Gate-Source Charge			28		nC
Q_{GD}	Gate-Drain Charge			11		nC

Drain-Source Diode Characteristics and Maximum Ratings

I _S	Maximum Continuous Body-Diode Forward Current			70		A
I _{SM}	Maximum Pulsed Body-Diode Forward Current ^(NOTE 1)			280		A
V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _S = 1 A		0.7	1	V
T _{RR}	Reverse recovery time	V _{DD} = 32 V, I _D = 35 A, di/dt = 100 A/μS		187		nS
Q _{RR}	Reverse recovery charge			570		nC
I _{RRM}	Peak Reverse Recovery Current			5.2		A

Electrical Characteristics Diagrams

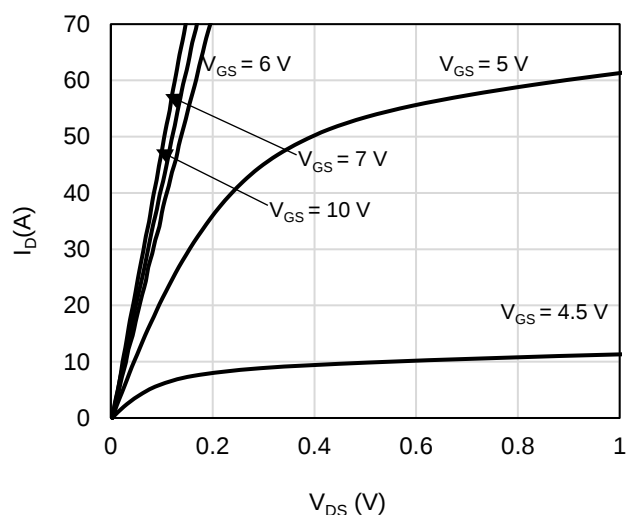


Figure 1: On-Region Characteristics

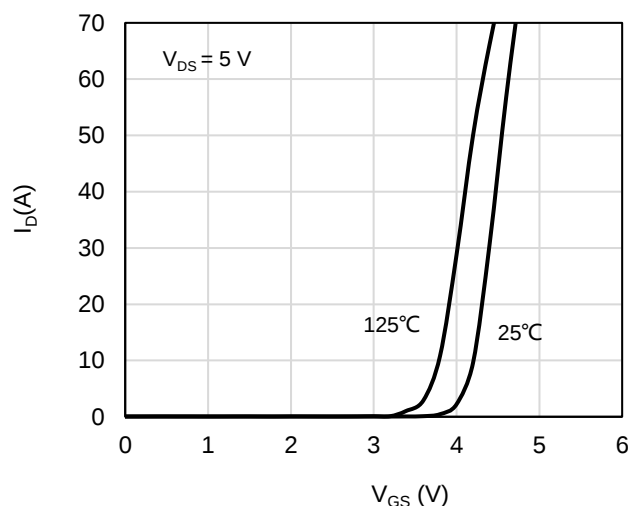


Figure 2: Transfer Characteristics

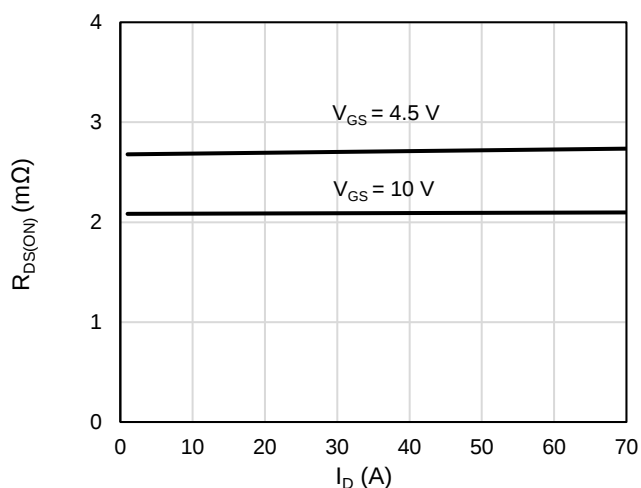


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

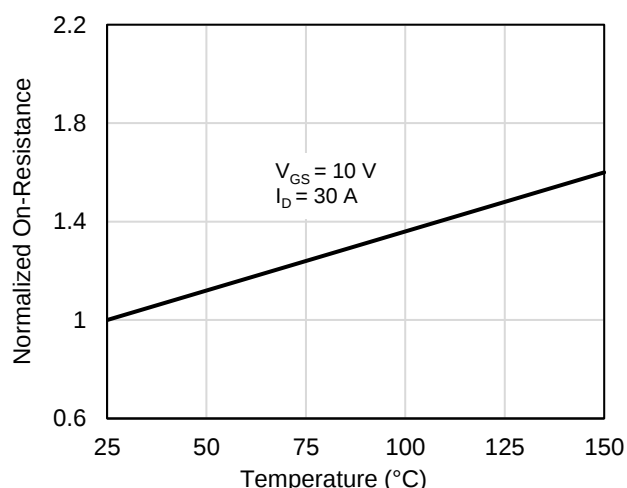


Figure 4: On-Resistance vs. Junction Temperature

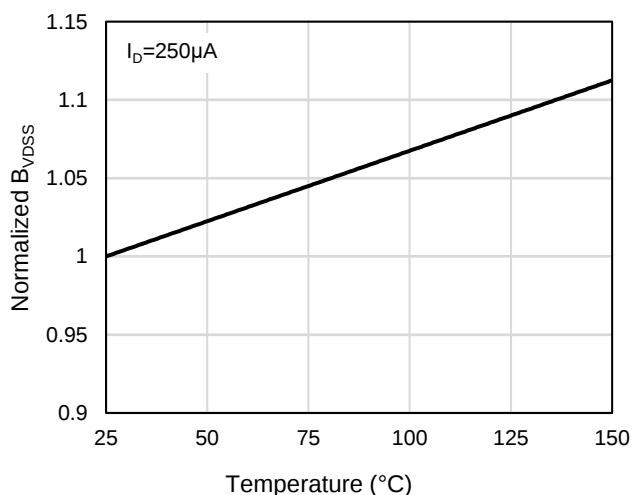


Figure 5: Breakdown Voltage vs. Junction Temperature

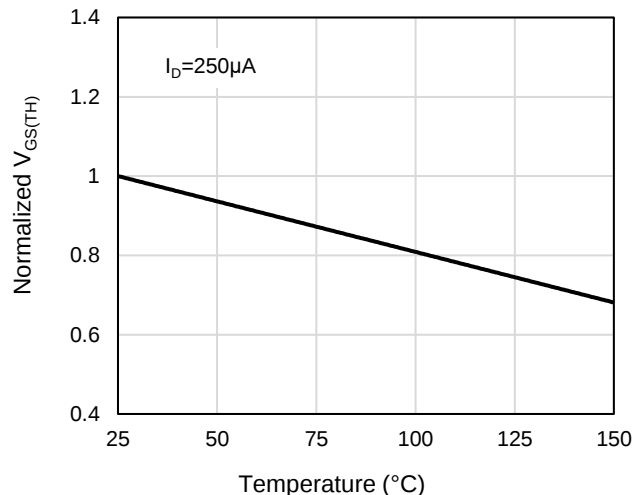


Figure 6: Threshold Voltage vs. Junction Temperature

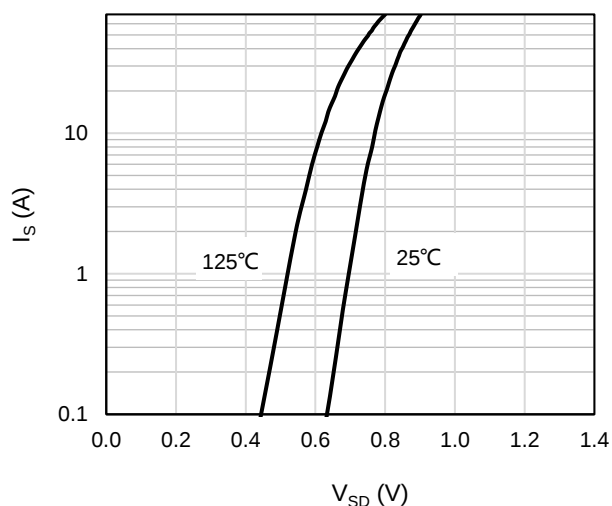


Figure 7: Body-Diode Characteristics

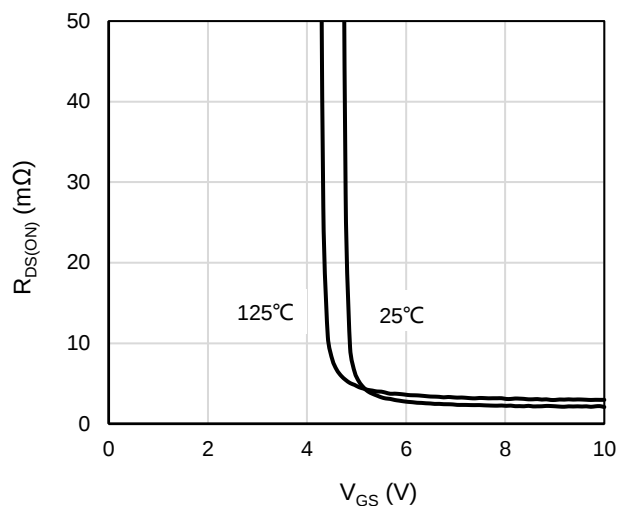


Figure 8: On-Resistance vs. Gate-Source Voltage

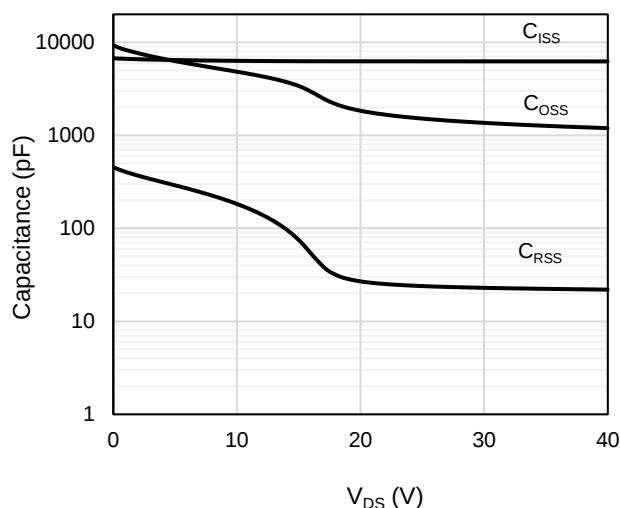


Figure 9: Capacitance Characteristics

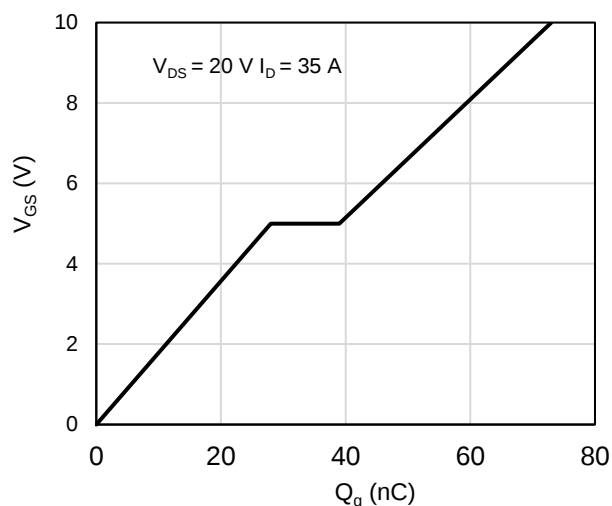


Figure 10: Gate-Charge Characteristics

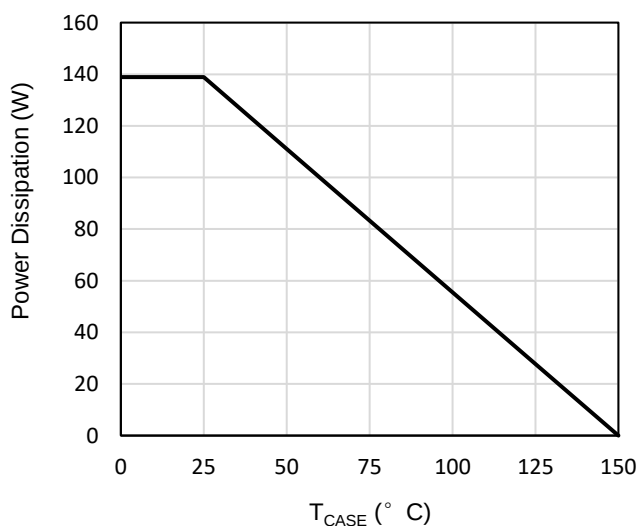


Figure 11: Power De-rating

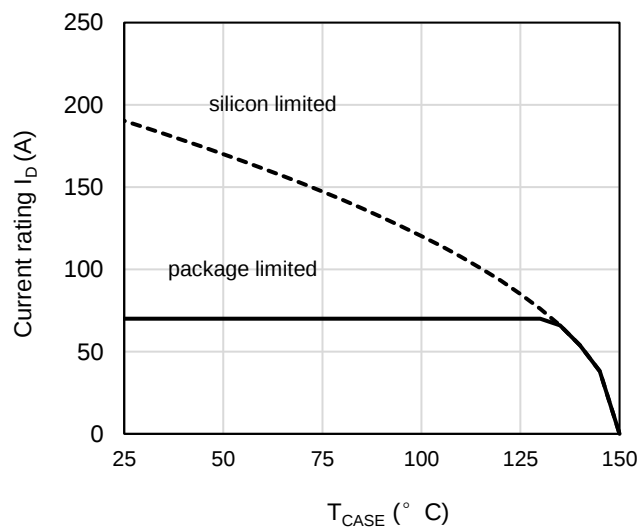
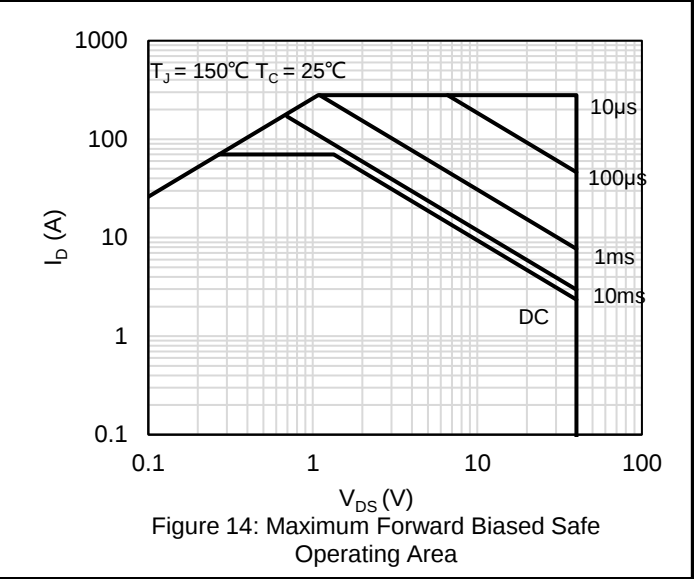
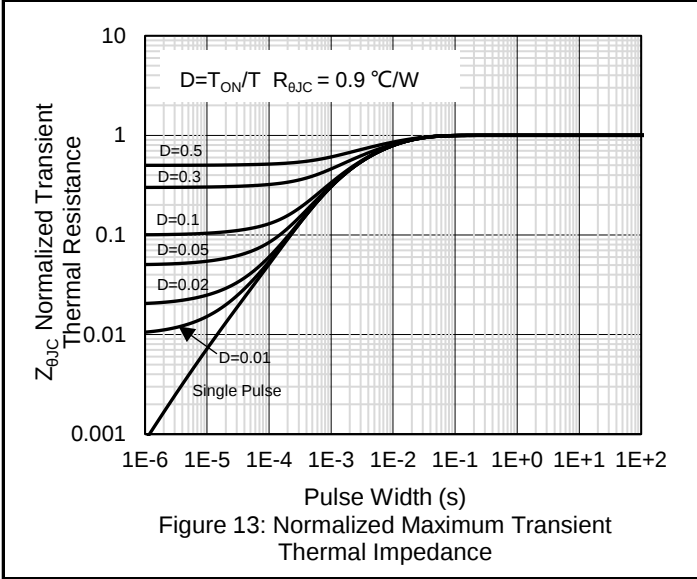
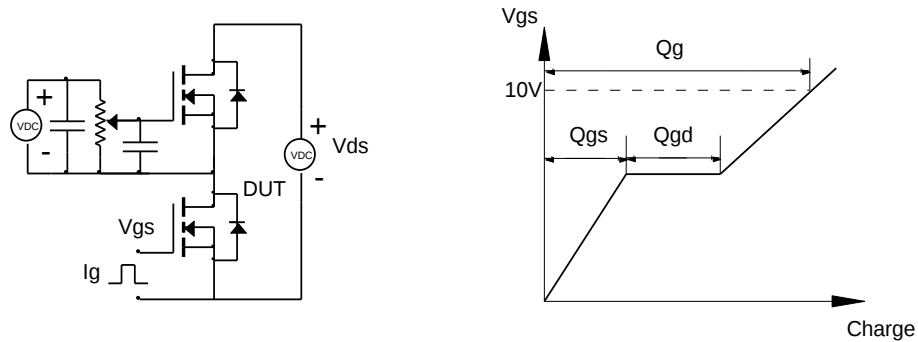


Figure 12: Current De-rating

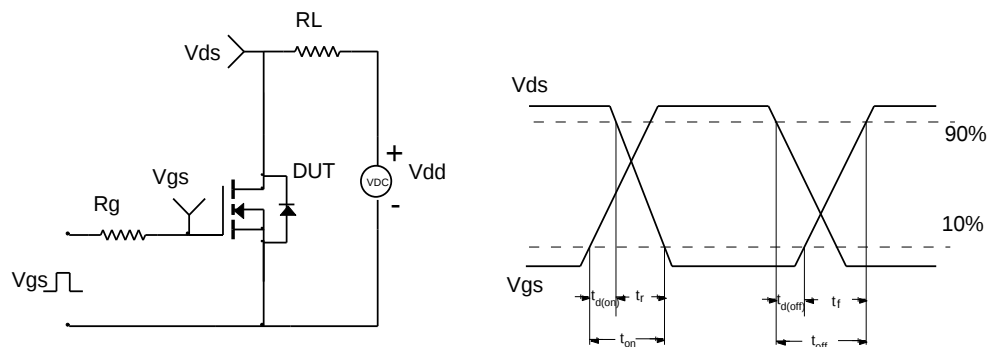


Test Circuit and Waveform

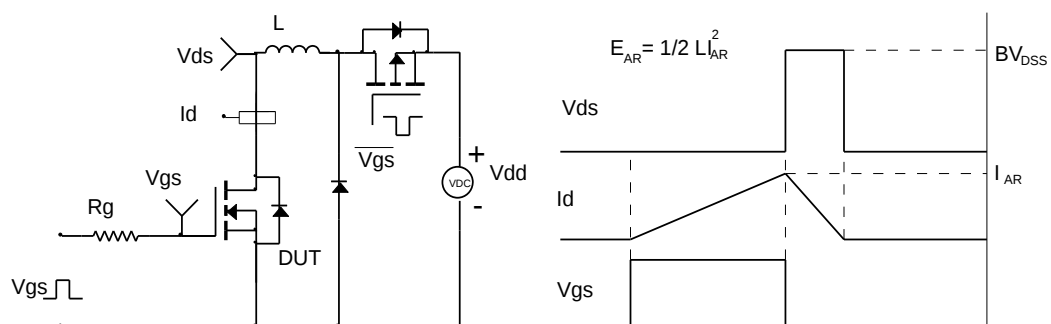
Gate Charge Test Circuit & Waveform



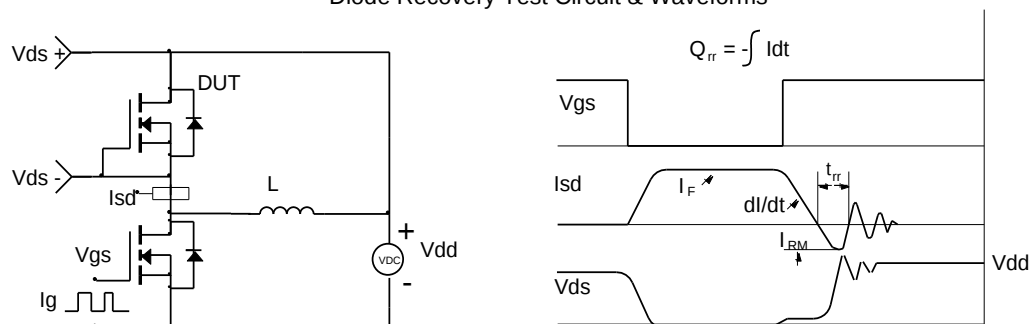
Resistive Switching Test Circuit & Waveforms



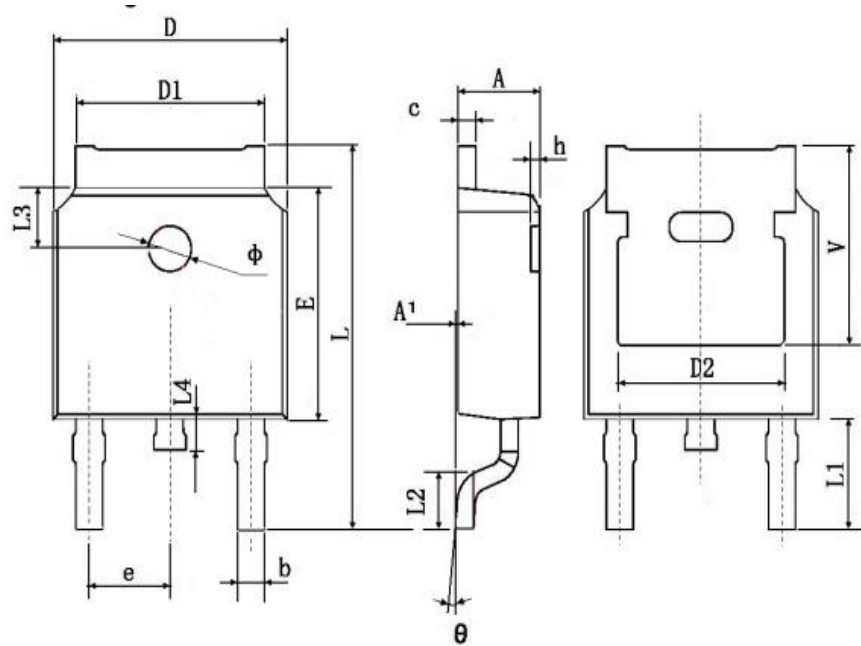
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outlines



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.250	2.350	0.089	0.093
A1	0.050	0.150	0.002	0.006
b	0.660	0.860	0.026	0.034
c	0.458	0.558	0.018	0.022
D	6.550	6.650	0.259	0.263
D1	5.234	5.434	0.207	0.215
D2	4.826 TYP.		0.191 TYP.	
E	6.050	6.150	0.239	0.243
e	2.236	2.336	0.088	0.092
L	9.820	10.220	0.388	0.404
L1	3.000 TYP.		0.119 TYP.	
L2	1.400	1.600	0.055	0.063
L3	1.800 TYP.		0.071 TYP.	
L4	0.700	0.900	0.028	0.036
Φ	1.150	1.250	0.045	0.049
θ	0°	3°	0°	3°
h	0.000	0.300	0.000	0.012
V	5.399 TYP		0.213 TYP	

Marking Information



G4N024KM
XXXXXXX

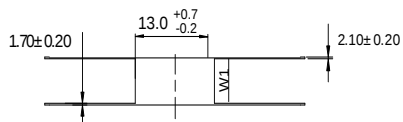
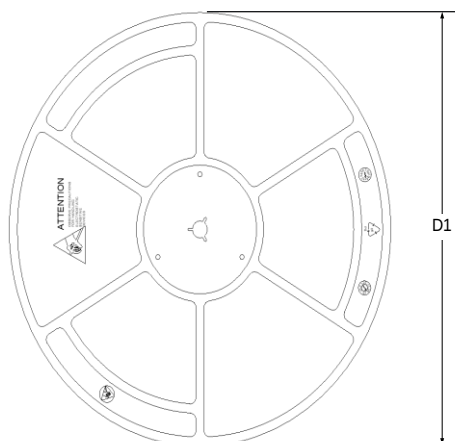
Note:

G4N024KM = Product Name Code

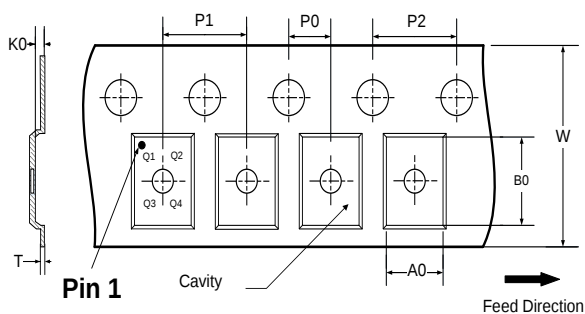
XXXXXXX = Date code

Contact ALKAIDSEMI sales for detail 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	Release Date	Remark
Rev.1.0	2022/7/13	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.