

40V 3.5mohm SGT Power MOSFET
AKG4N035QL

Description:

This N channel SGT MOSFET has been designed to very low on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, especially for high efficiency power management applications

Features:

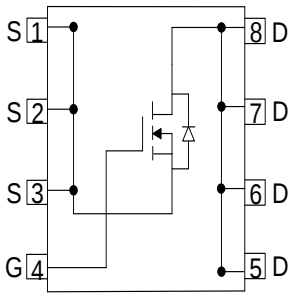
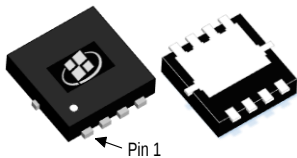
- N-channel, optimized for high-speed smooth switching
- Excellent Gate Charge $\times R_{DS(on)}$ (FOM)
- Very low on-resistance
- RoHS compliant (Note 1)
- Halogen-free (Note 1)

Applications:

- DC-DC Converter
- Power Tools
- Load Switching

Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	40	V
$R_{DS(on), max} @V_{GS} = 10V$	3.5	mΩ
I_D	70	A



Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKG4N035QL	PDFN3.3X3.3	G4N035QL	13 Inches Reel	See the detail package information

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)	70	A
	Drain Current - Continuous ($T_C = 100^\circ\text{C}$)	51	A
I_{DM}	Drain Current - Pulsed ^(Note 2)	280	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy ^(Note 3)	76	mJ
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	40	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	3.1	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient Steady-State ^(Note 4)	58	$^\circ\text{C/W}$

Notes:

1. The max drain current rating is package limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. $L = 0.5 \text{ mH}$, $V_{DD} = 20\text{V}$, $I_{AS} = 17.5 \text{ A}$, $R_G = 50 \Omega$, Starting $T_J = 25^\circ\text{C}$
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
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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
		$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V},$ $T_J = 150^\circ\text{C}$			100	
I_{GSS}	Gate Leakage Current	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$			± 100	nA
$V_{GS(TH)}$	Gate Threshold voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1	1.7	2.5	V
$R_{DS(ON)}$	Drain-Source on-state resistance	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		2.8	3.5	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$		4.4	6.2	

Dynamic Characteristics

C_{ISS}	Input Capacitance	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V},$ $F = 1\text{ MHz}$		1193		pF
C_{OSS}	Output Capacitance			426		pF
C_{RSS}	Reverse Transfer Capacitance			30		pF
R_G	Gate Resistance	$F = 1\text{ MHz}$		8.4		Ω

Switching Characteristics

$T_{D(ON)}$	Turn On Delay Time	$V_{DD} = 20\text{ V}, I_D = 20\text{ A},$ $V_{GS} = 10\text{ V}, R_G = 6\text{ }\Omega$		7		ns
T_R	Rise Time			6.5		ns
$T_{D(OFF)}$	Turn Off Delay Time			29		ns
T_F	Fall Time			13		ns
Q_G	Total Gate Charge	$V_{DD} = 20\text{ V}, I_D = 20\text{ A},$ $V_{GS} = 10\text{ V}$		20.3		nC
Q_{GS}	Gate-Source Charge			3.9		nC
Q_{GD}	Gate-Drain Charge			4.2		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 2)				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} = 20 V, I _D = 15 A, di/dt = 100 A/μs		30		ns
Q _{RR}	Reverse recovery charge			17		nC

Electrical Characteristics Diagrams

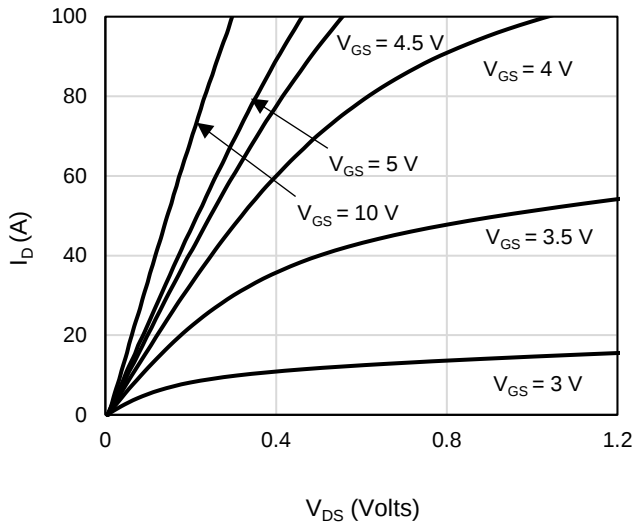


Figure 1: On-Region Characteristics

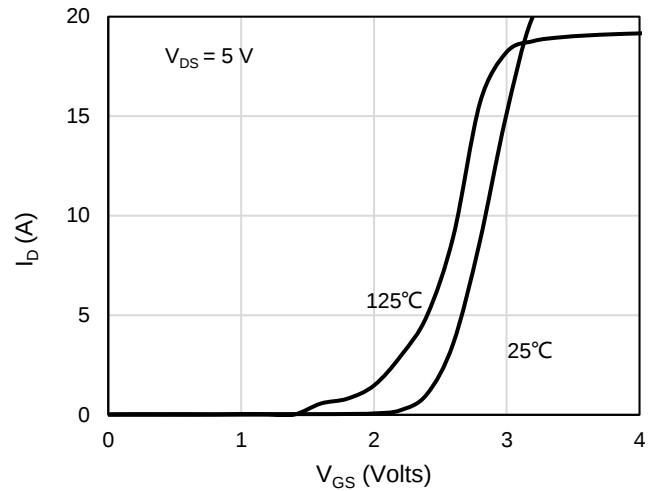


Figure 2: Transfer Characteristics

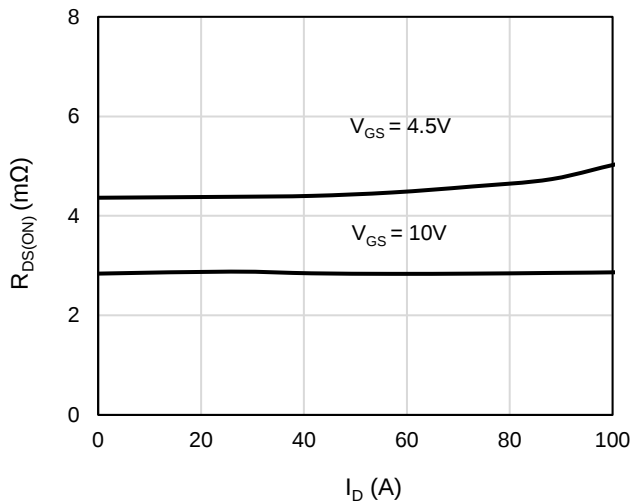


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

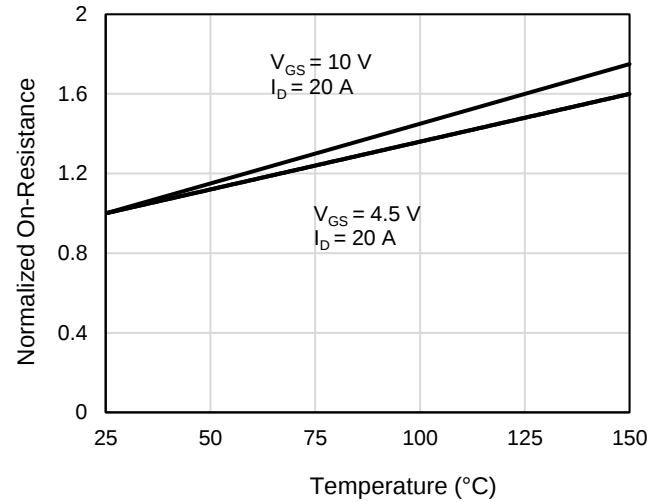


Figure 4: On-Resistance vs. Junction Temperature

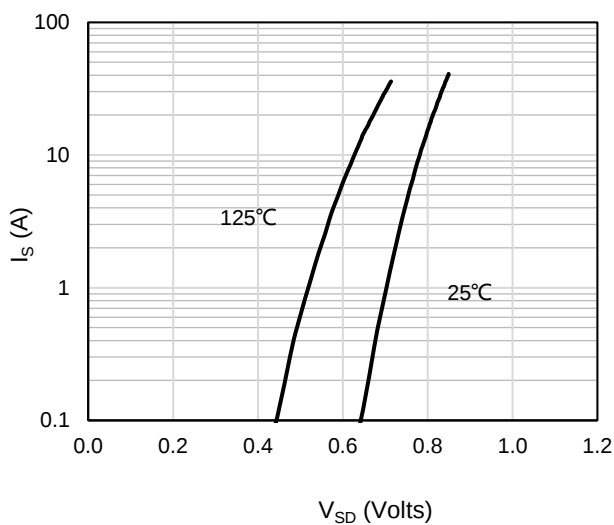


Figure 5: Body-Diode Characteristics

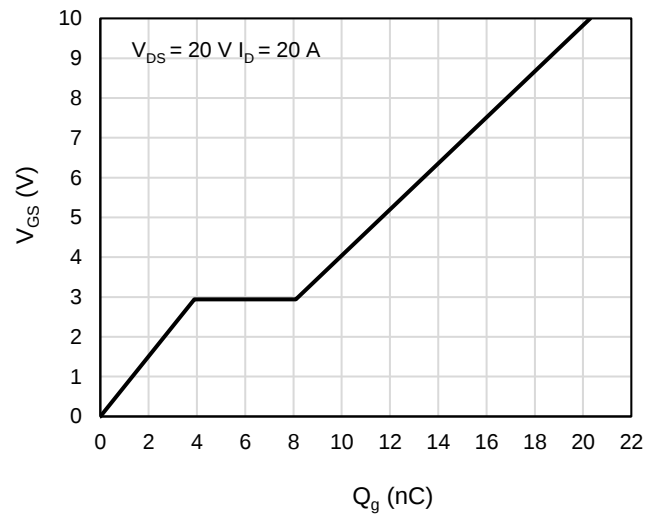


Figure 6: Gate-Charge Characteristics

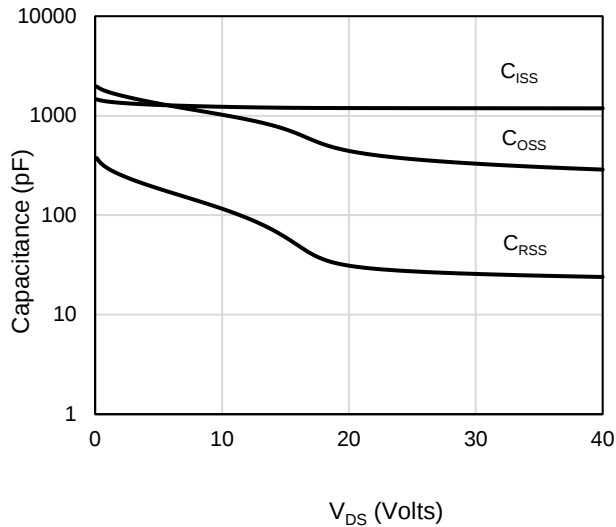


Figure 7: Capacitance Characteristics

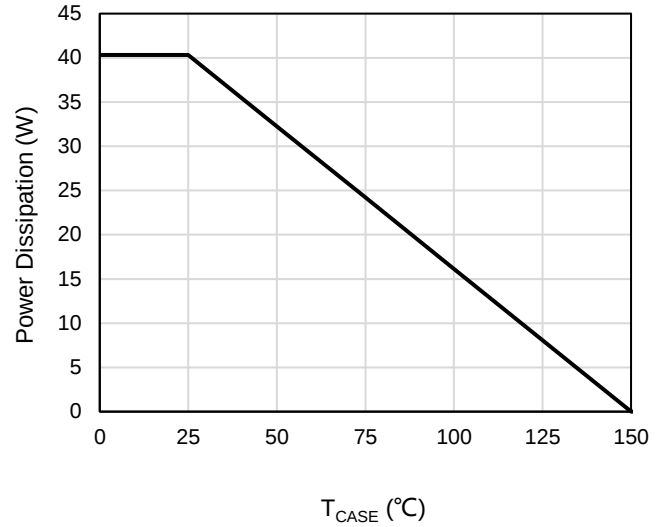


Figure 8: Power De-rating

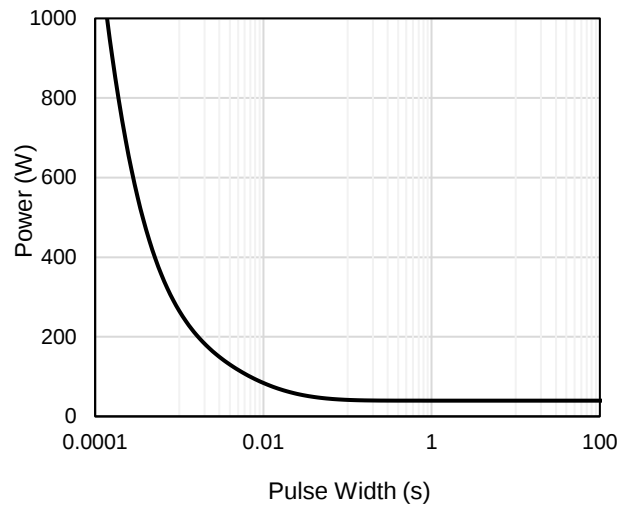


Figure 9: Single Pulse Power Rating Junction-to-Case

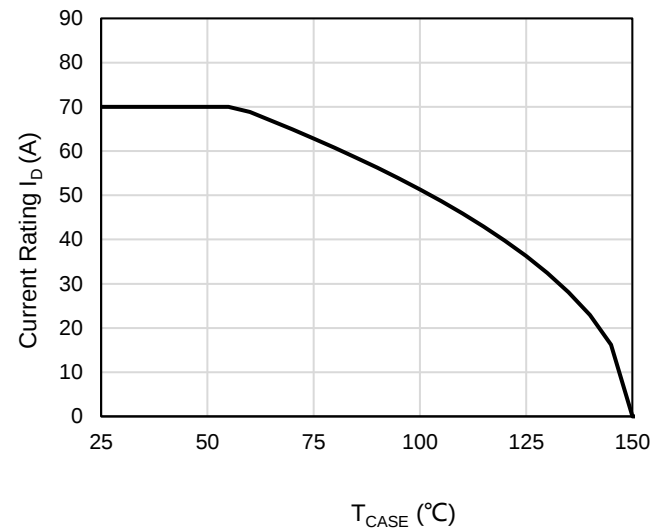


Figure 10: Current De-rating

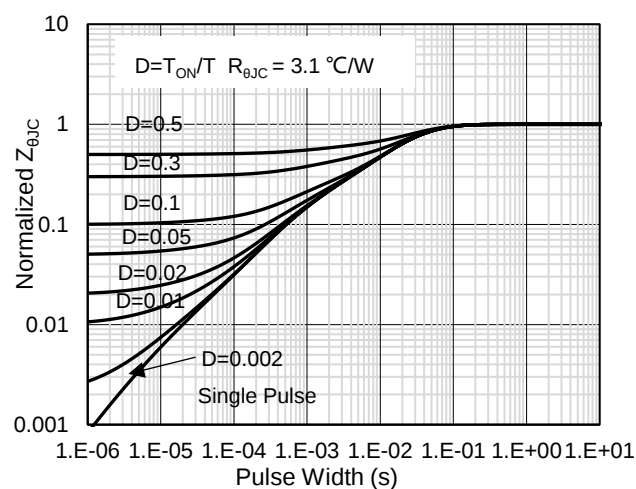


Figure 11: Normalized Maximum Transient Thermal Impedance

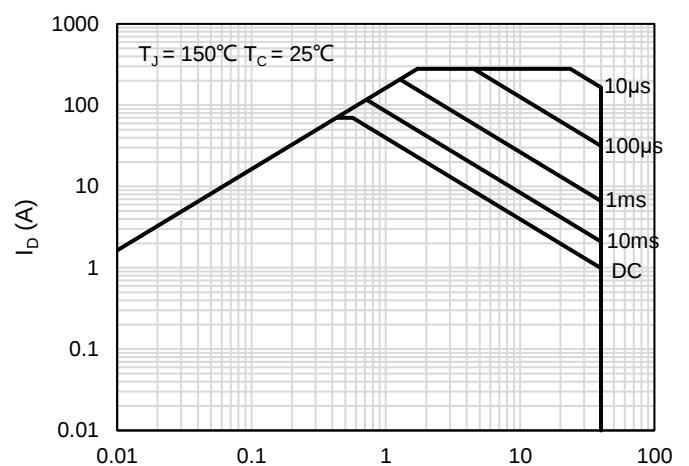
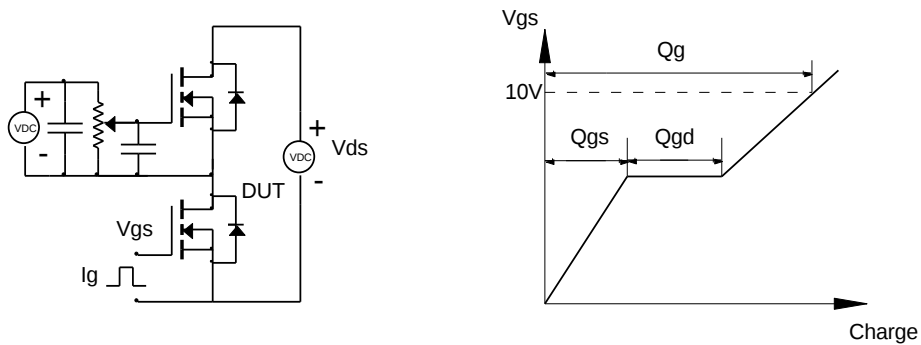


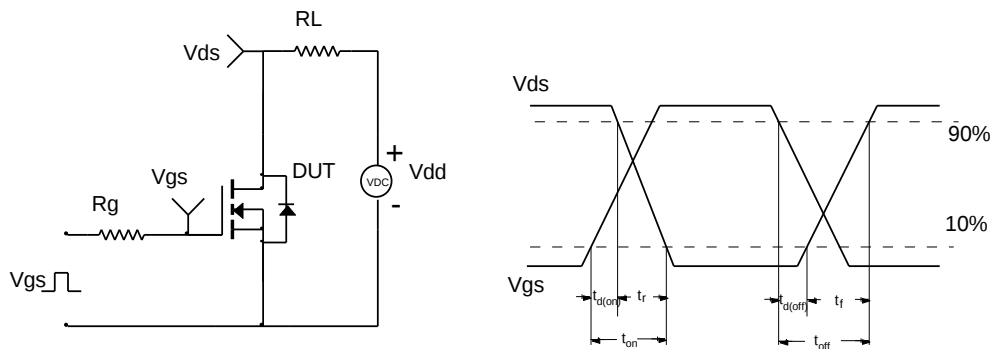
Figure 12: Maximum Forward Biased Safe Operating Area

Test Circuit and Waveform

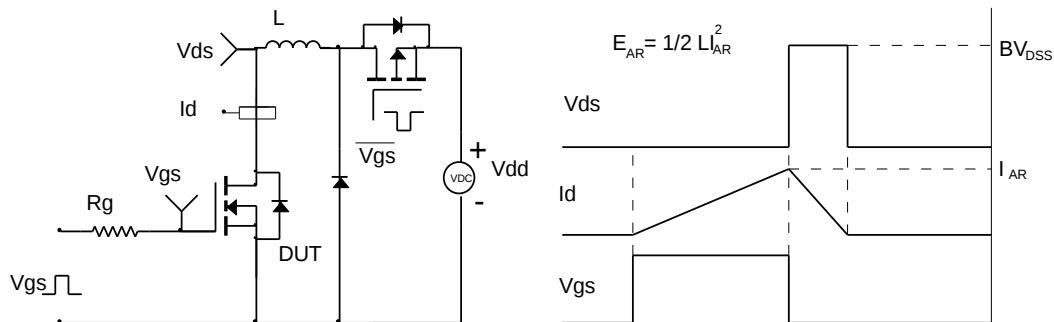
Gate Charge Test Circuit & Waveform



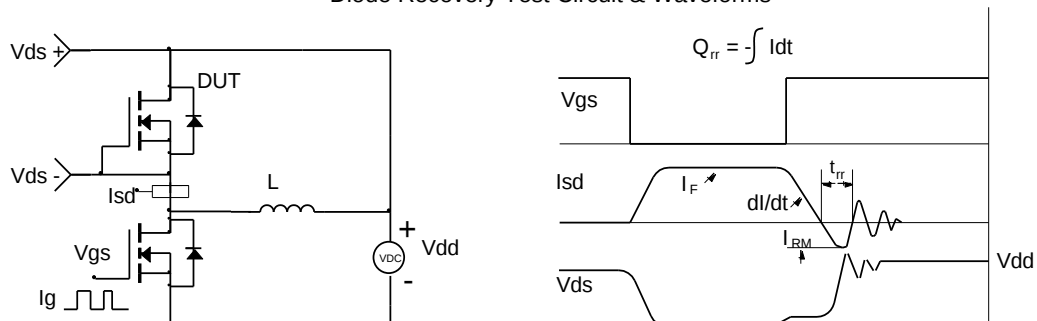
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Revision History

Revision	Release Date	Remark
Rev.1.0	2021/12/24	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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