

40V 1.2mohm N-channel SGT MOSFET
AKG4N013GAM-A

Description:

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

Features:

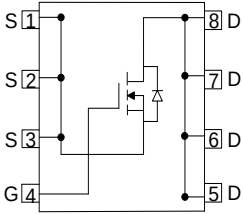
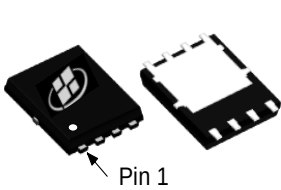
- Low RDS(ON)
- 100% UIS Tested
- RoHS compliant
- Halogen-free
- AEC-Q101 Qualified and PPAP capable

Applications:

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

Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	40	V
$R_{DS(ON), max} @ V_{GS} = 10\text{ V}$	1.2	mΩ
I_D	235	A



Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKG4N013GAM-A	DFN5X6	G4N013GAM	Tape Reel	See the detail package information

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

Symbol	Parameter	Value	Units
V _{DS}	Drain - Source Voltage	40	V
I _D	Drain Current - Continuous (T _C = 25°C) ^(Note 1)	235	A
	Drain Current - Continuous (T _C = 100°C)	165	A
I _{DM}	Drain Current - Pulsed ^(Note 2)	900	A
V _{GS}	Gate - Source Voltage	± 20	V
E _{AS}	Single Pulsed Avalanche Energy ^(Note 3)	625	mJ
P _D	Power Dissipation (T _C = 25°C)	125	W
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +175	°C

Thermal Characteristics

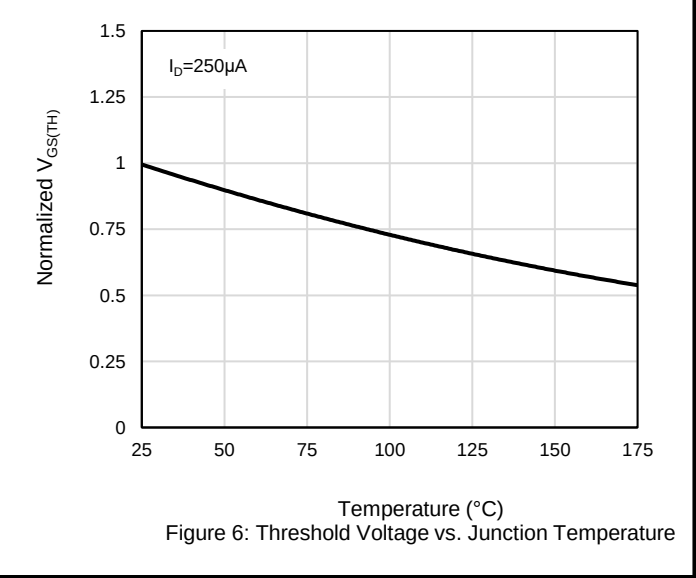
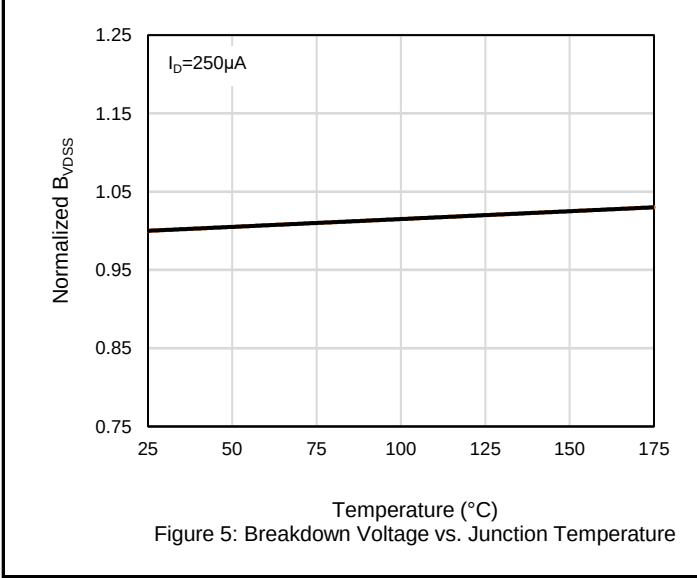
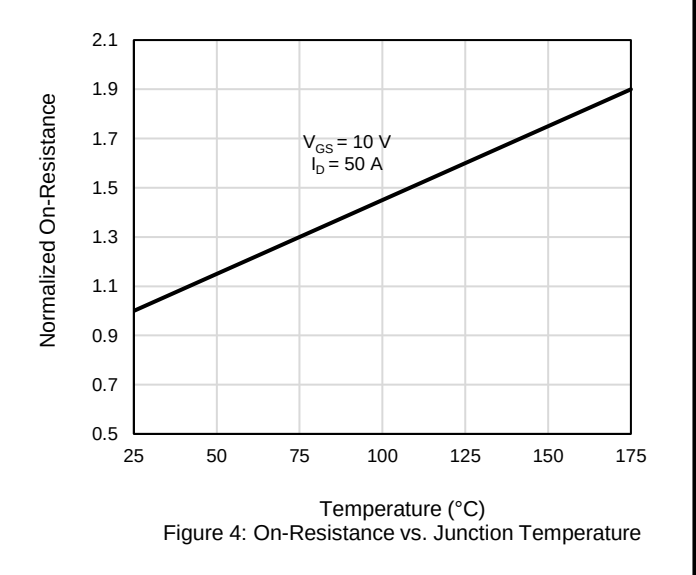
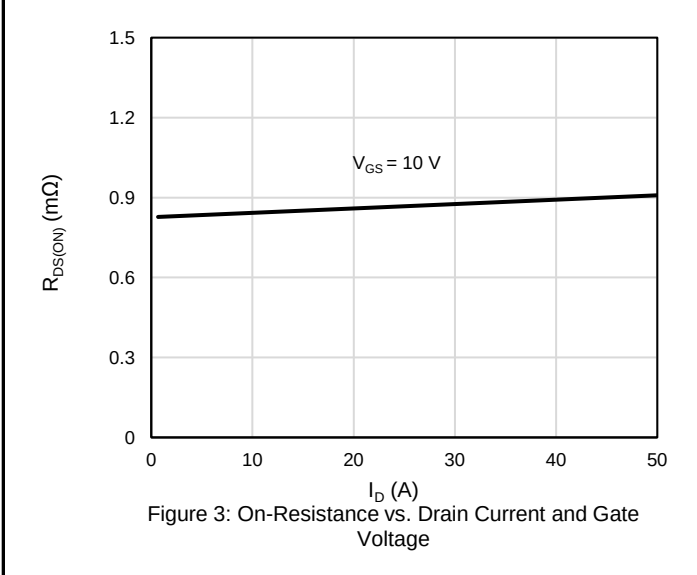
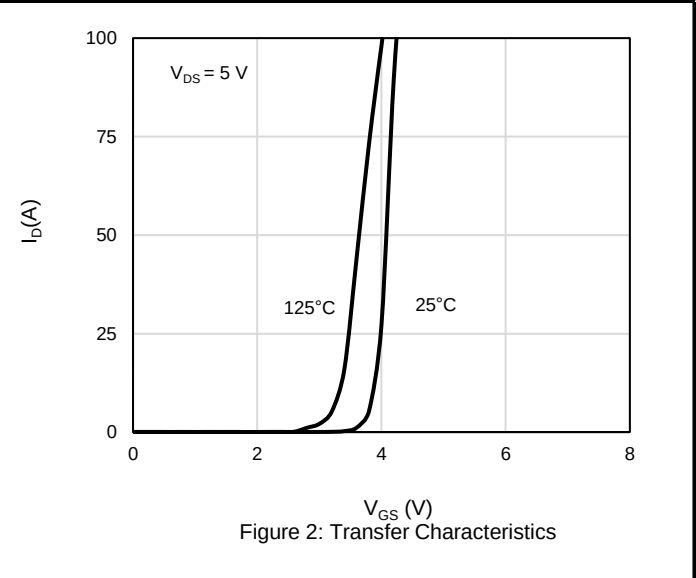
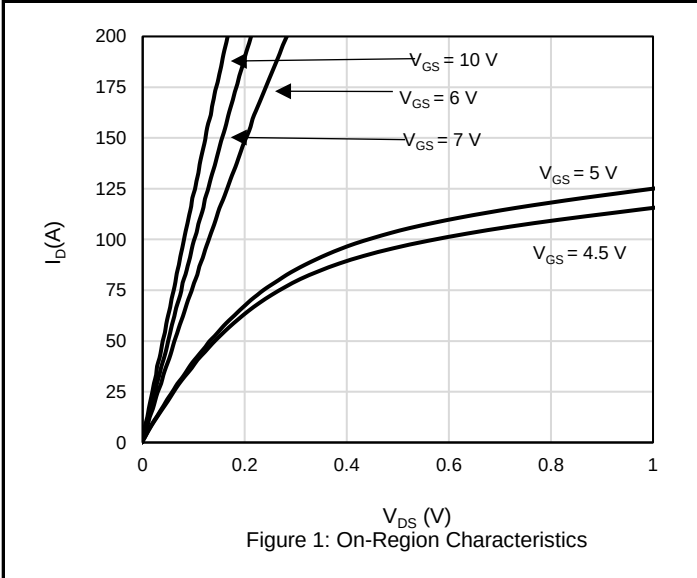
Symbol	Parameter	Value	Units
R _{θJC}	Thermal Resistance, Junction - to - Case, Steady State	1.2	°C/W
R _{θJA}	Thermal Resistance, Junction - to - Ambient, Steady State ^(Note 4)	45	°C/W

Notes:

- 1. The max drain current rating is silicon limited
- 2. Repetitive Rating: Pulse width limited by maximum junction temperature
- 3. L = 0.5 mH, V_{DD} = 40 V, I_{AS} = 50 A, R_g = 25 Ω, Starting T_J = 25 °C
- 4. Mount on minimum PCB layout

Electrical Characteristics (T _J = 25°C unless otherwise noted)						
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Static Characteristics						
V _{(BR)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			1	μA
		V _{DS} = 40 V, V _{GS} = 0 V, T _J = 125 °C			100	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	2.5	3	3.5	V
R _{DS(ON)}	Drain - Source on - state resistance	V _{GS} = 10 V, I _D = 50 A		0.9	1.2	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz		5810		pF
C _{oss}	Output Capacitance			1640		pF
C _{rss}	Reverse Transfer Capacitance			15		pF
Switching Characteristics						
t _{d(on)}	Turn On Delay Time	V _{DD} = 20 V , R _L = 0.4 Ω, V _{GS} = 10 V, R _G = 2.5 Ω		15		ns
t _r	Rise Time			50		ns
t _{d(off)}	Turn Off Delay Time			65		ns
t _f	Fall Time			45		ns
Q _g	Total Gate Charge	V _{DD} = 20 V , I _D = 50 A, V _{GS} = 10 V		72		nC
Q _{gs}	Gate - Source Charge			30		nC
Q _{gd}	Gate - Drain Charge			14		nC
Drain - Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Body - Diode Forward Current				235	A
I _{SM}	Maximum Pulsed Body - Diode Forward Current				900	A
V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _S = 50 A		0.8		V
t _{rr}	Reverse recovery time	V _{DD} = 20 V, I _D = 50 A, di/dt = 100 A/μs		75		ns
Q _{rr}	Reverse recovery charge			150		nC
I _{rrm}	Peak Reverse Recovery Current			3		A

Electrical Characteristics Diagrams



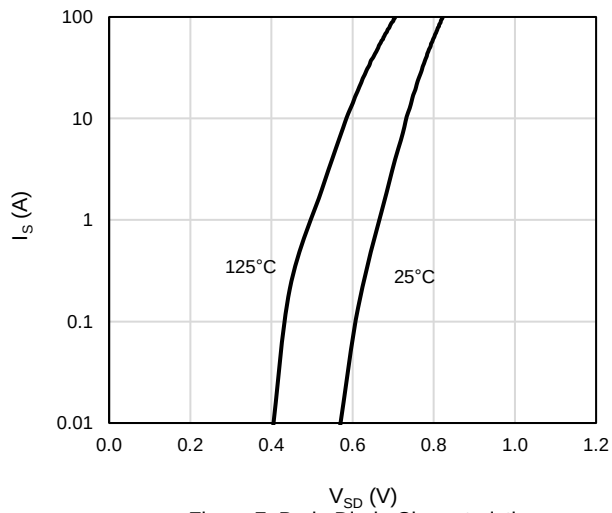


Figure 7: Body-Diode Characteristics

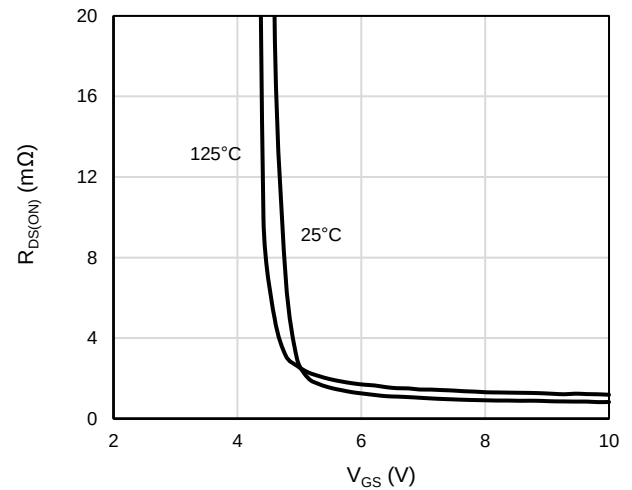


Figure 8: On-Resistance vs. Gate-Source Voltage

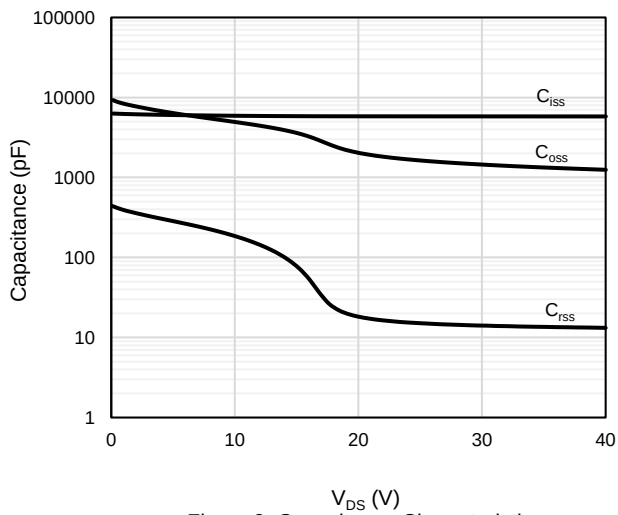


Figure 9: Capacitance Characteristics

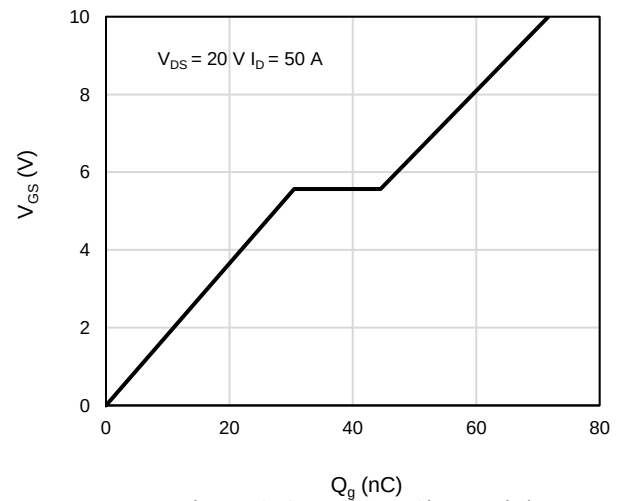


Figure 10: Gate-Charge Characteristics

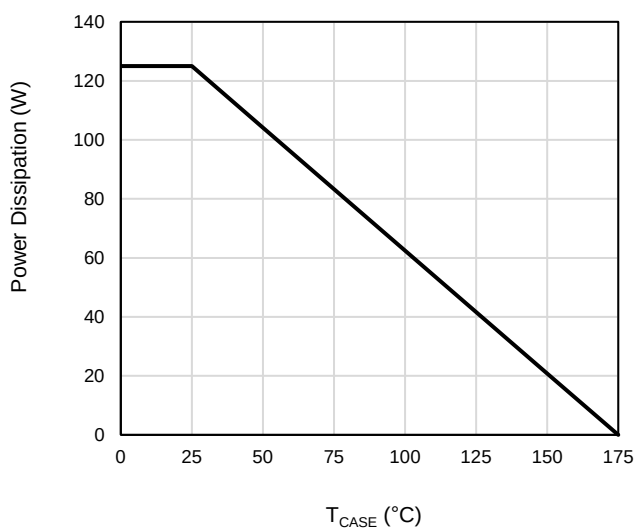


Figure 11: Power De-rating

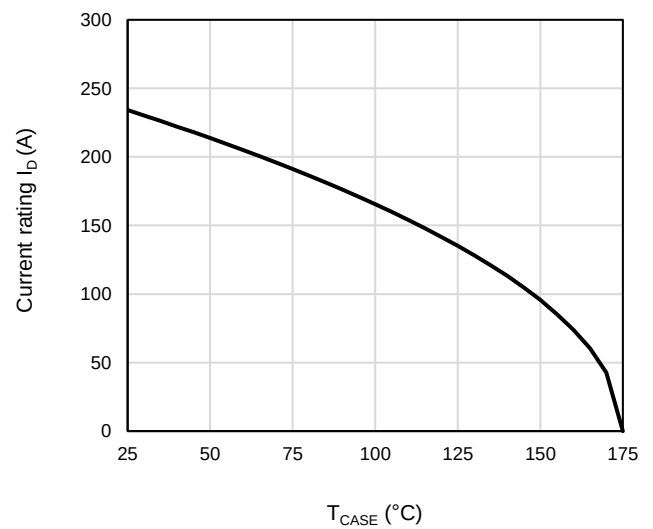
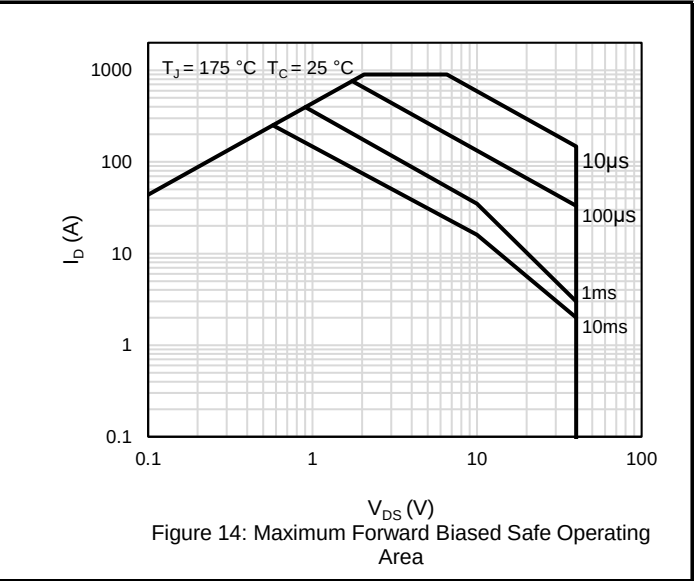
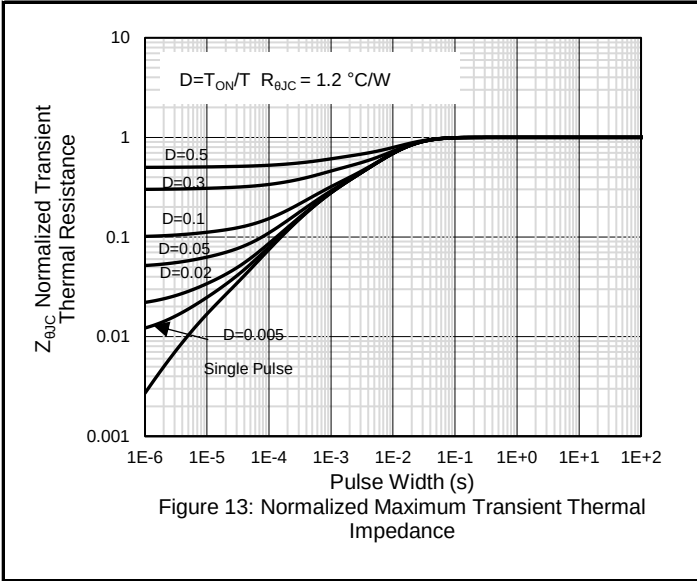
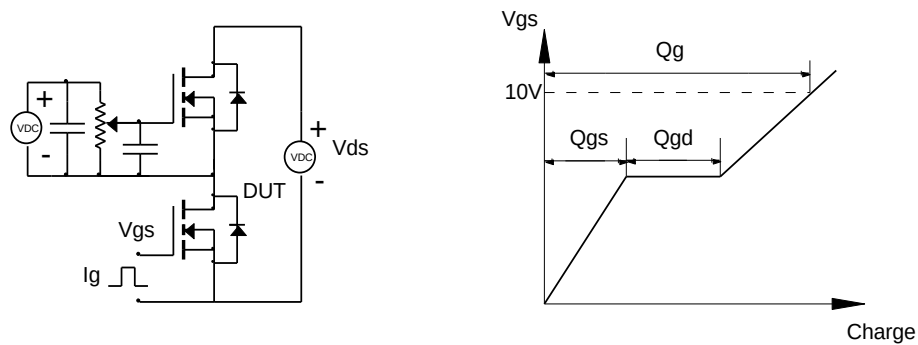


Figure 12: Current De-rating

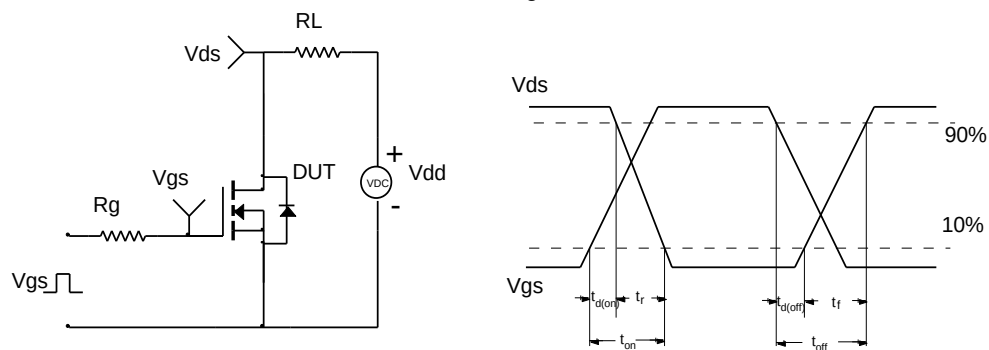


Test Circuit and Waveform

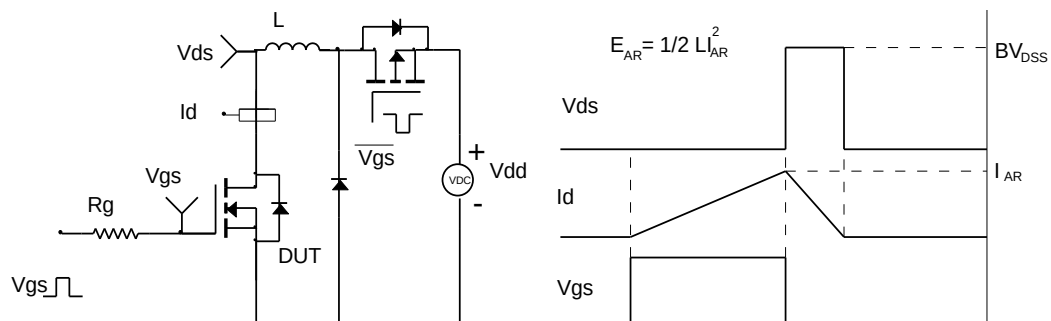
Gate Charge Test Circuit & Waveform



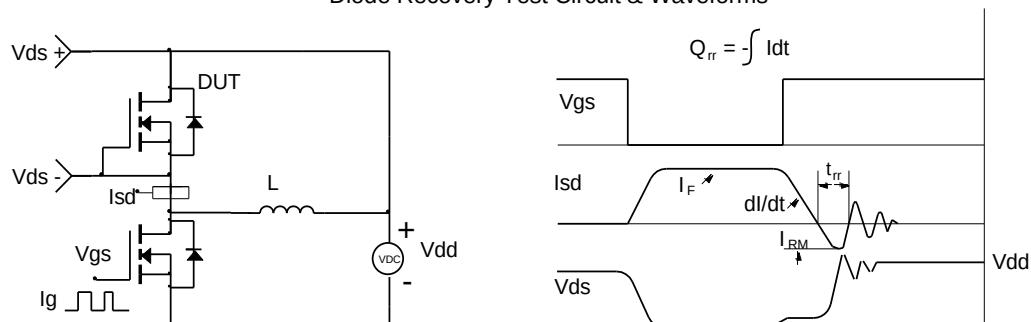
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Revision History

Revision	Released	Remark
Rev.1.0	2025	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.