

40V 1.05mohm N-channel SGT MOSFET
AKG4N010GAM-A

Description:

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

Features:

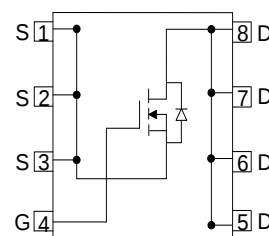
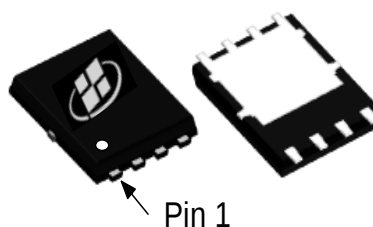
- Low $R_{DS(ON)}$
- 100% UIS Tested
- RoHS compliant
- Halogen-free
- AEC-Q101 Qualified and PPAP capable

Applications:

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

Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	40	V
$R_{DS(on), \max} @ V_{GS} = 10 \text{ V}$	1.05	m Ω
I_D	250	A



Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKG4N010GAM-A	PDFN5X6	G4N010GAM	Tape Reel	See the detail package 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)	250	A
	Drain Current - Continuous ($T_C = 100^\circ\text{C}$)	177	A
I_{DM}	Drain Current - Pulsed ^(Note 2)	1000	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy ^(Note 3)	625	mJ
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	125	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	1.2	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State ^(Note 4)	45	$^\circ\text{C/W}$

Notes:

1. The max drain current rating is silicon limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. $L = 0.5\text{ mH}$, $V_{DD} = 40\text{ V}$, $I_{AS} = 50\text{ A}$, $R_G = 25\ \Omega$, 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
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
		$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$			100	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	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.5	3	3.5	V
$R_{DS(ON)}$	Drain-Source on-state resistance	$V_{GS} = 10\text{ V}, I_D = 50\text{ A}$		0.8	1.05	m Ω

Dynamic Characteristics

C_{ISS}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, F = 1\text{ MHz}$		5810		pF
C_{OSS}	Output Capacitance			1640		pF
C_{RSS}	Reverse Transfer Capacitance			15		pF
R_g	Gate Resistance	$F = 1\text{ MHz}$		4.7		Ω

Switching Characteristics

$T_{D(ON)}$	Turn On Delay Time	$V_{DD} = 20\text{ V}, R_L = 0.4\text{ }\Omega, V_{GS} = 10\text{ V}, R_G = 2.5\text{ }\Omega$		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	$V_{DD} = 20\text{ V}, I_D = 50\text{ A}, V_{GS} = 10\text{ V}$		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			250		A
I_{SM}	Maximum Pulsed Body-Diode Forward Current			1000		A
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 50\text{ A}$		0.8	1.2	V
T_{RR}	Reverse recovery time	$V_{DD} = 20\text{ V}, I_D = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{S}$		75		nS
Q_{RR}	Reverse recovery charge			150		nC
I_{RRM}	Peak Reverse Recovery Current			3		A

Electrical Characteristics Diagrams

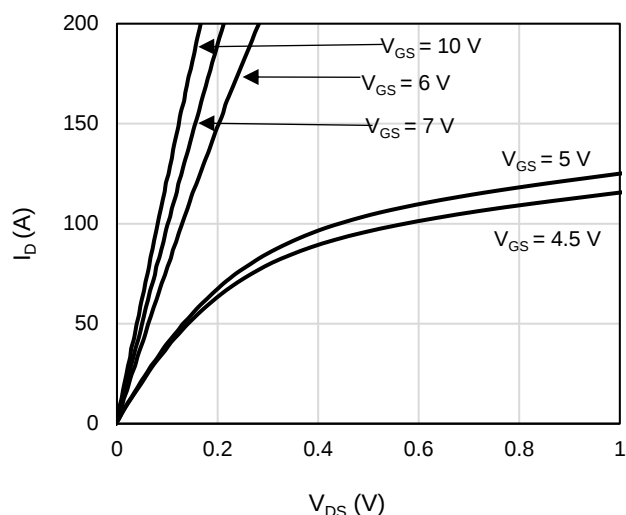


Figure 1: On-Region Characteristics

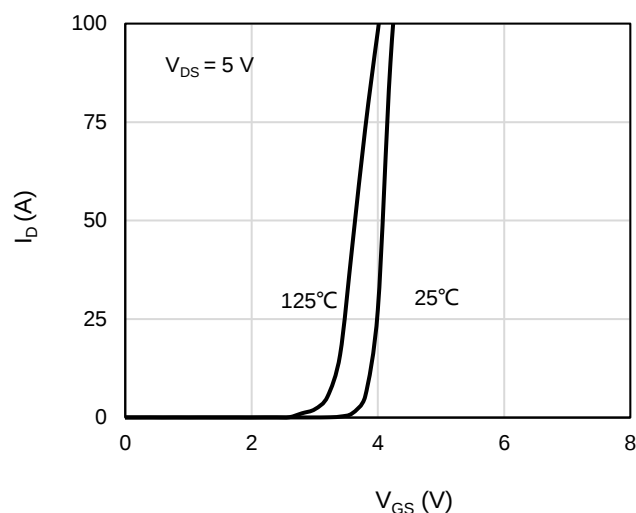


Figure 2: Transfer Characteristics

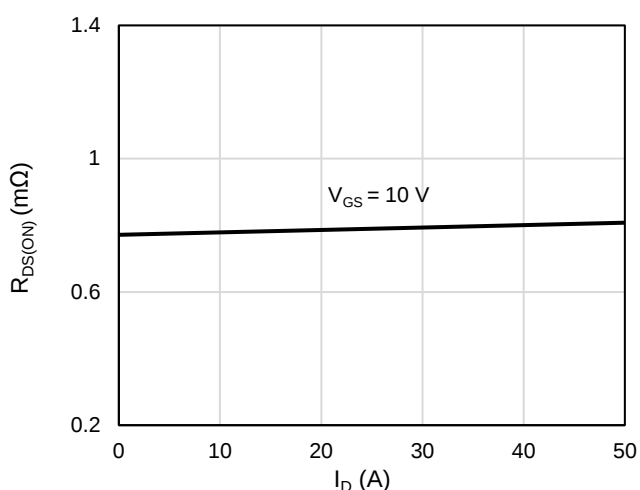


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

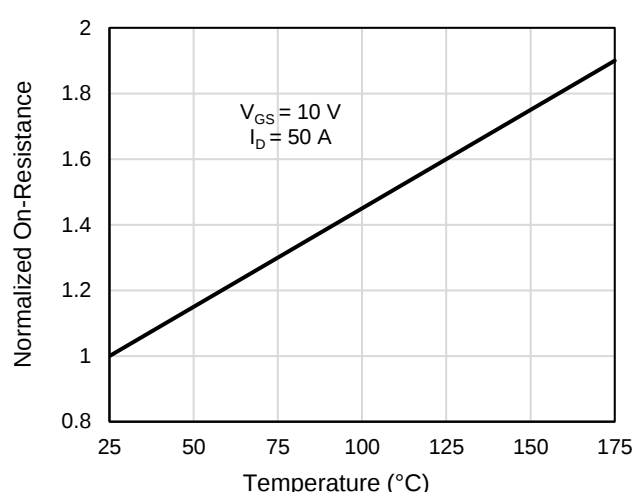


Figure 4: On-Resistance vs. Junction Temperature

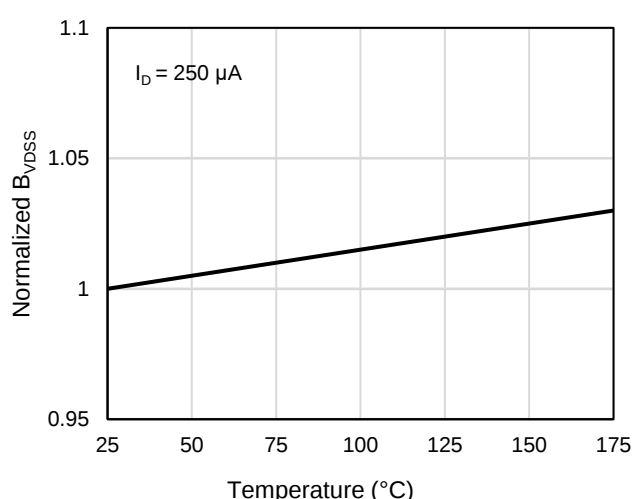


Figure 5: Breakdown Voltage vs. Junction Temperature

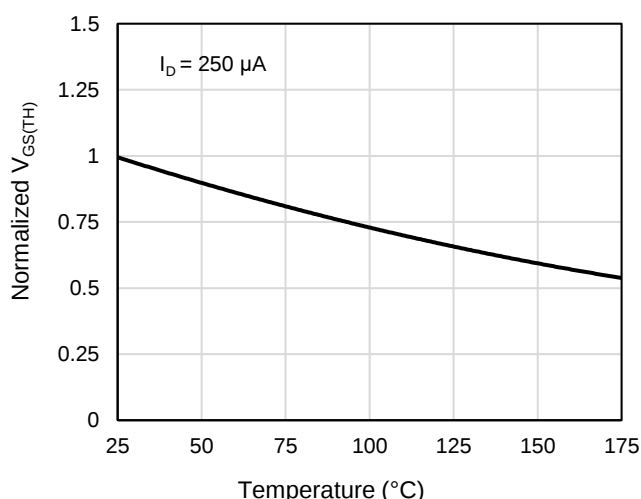


Figure 6: Threshold Voltage vs. Junction Temperature

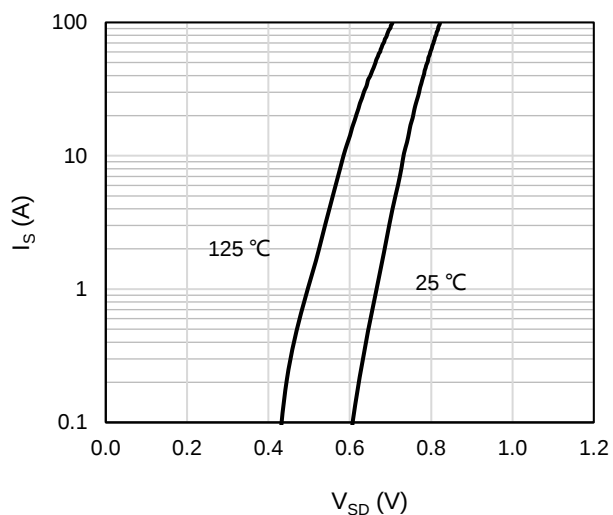


Figure 7: Body-Diode Characteristics

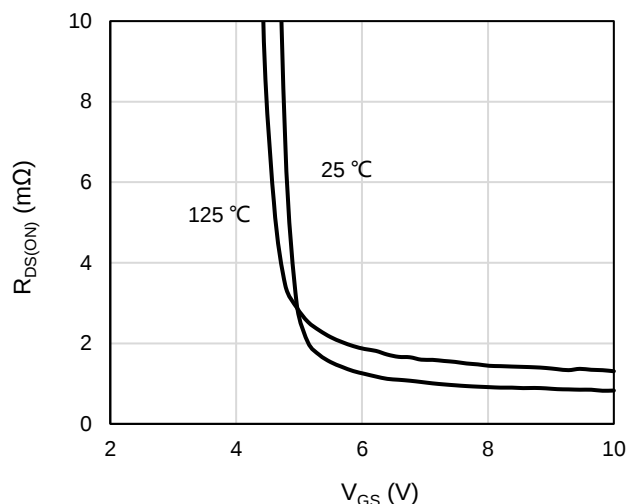


Figure 8: On-Resistance vs. Gate-Source Voltage

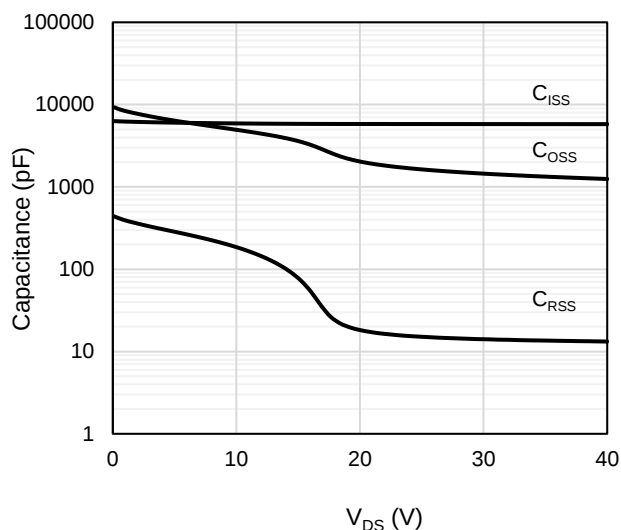


Figure 9: Capacitance Characteristics

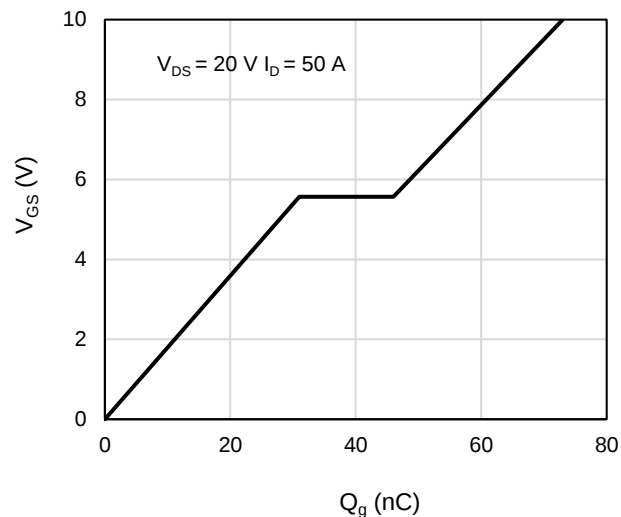


Figure 10: Gate-Charge Characteristics

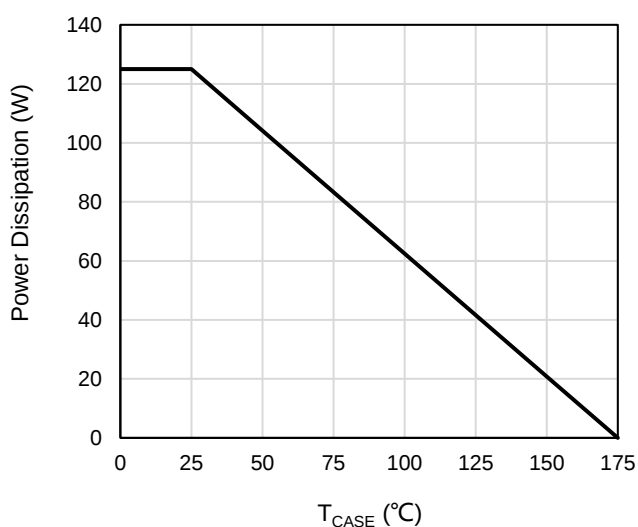


Figure 11: Power De-rating

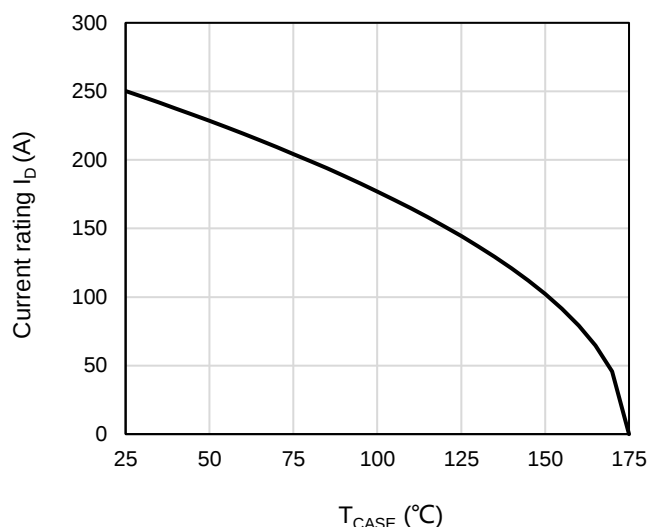
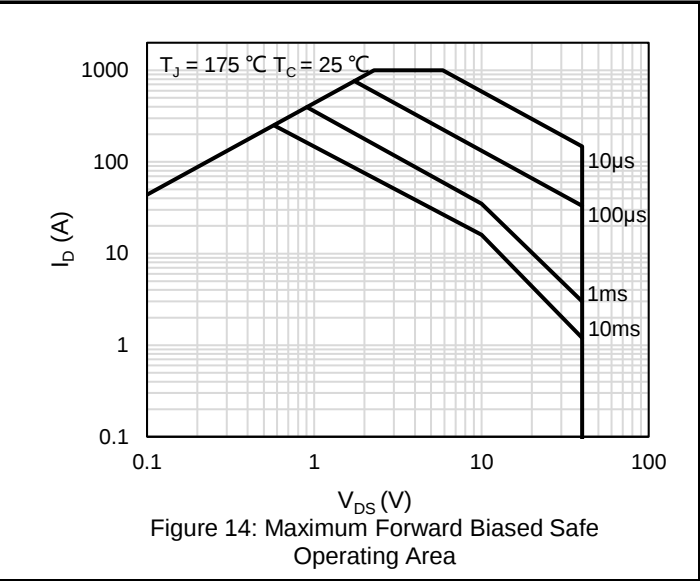
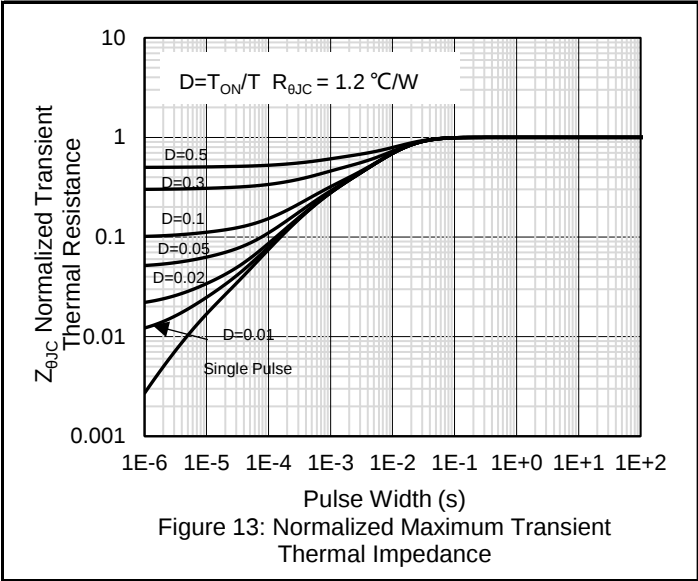
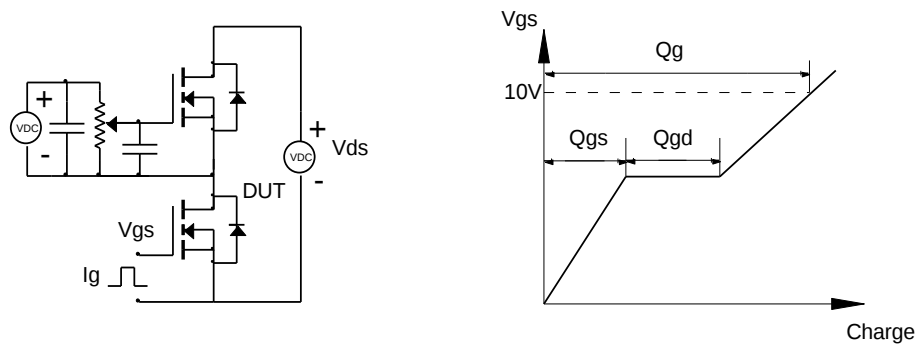


Figure 12: Current De-rating

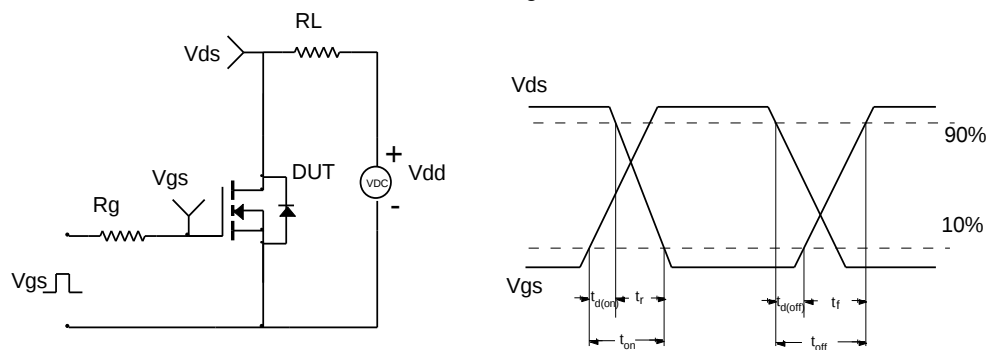


Test Circuit and Waveform

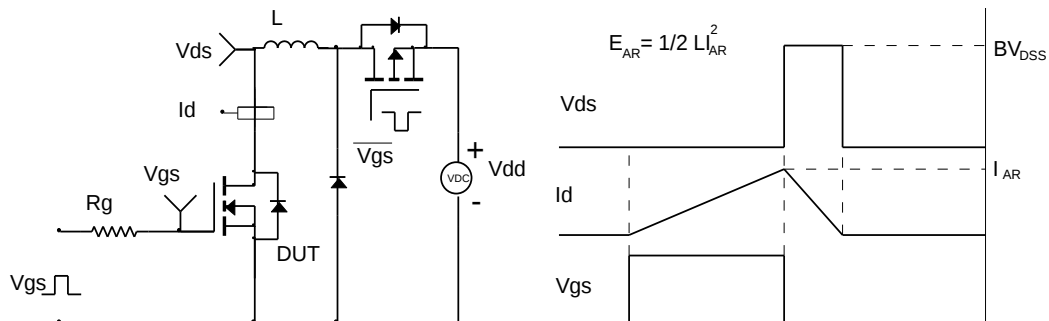
Gate Charge Test Circuit & Waveform



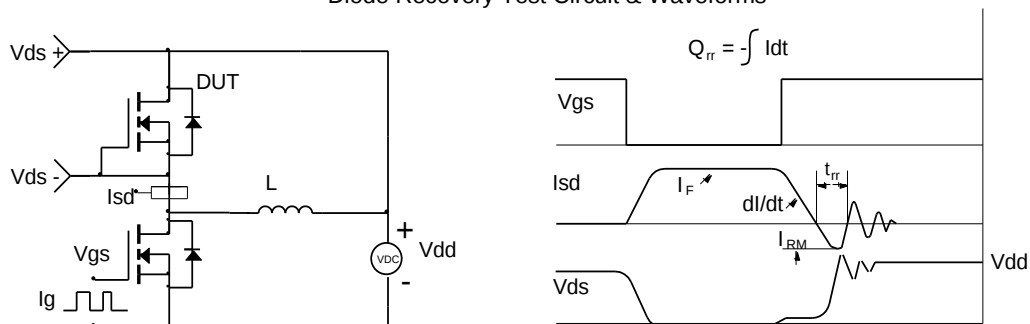
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Revision History

Revision	Release Date	Remark
Rev.1.0	2022	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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