

100V 1.25mohm N-channel SGT MOSFET
AKG10N012TM-A

Description:

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

Features:

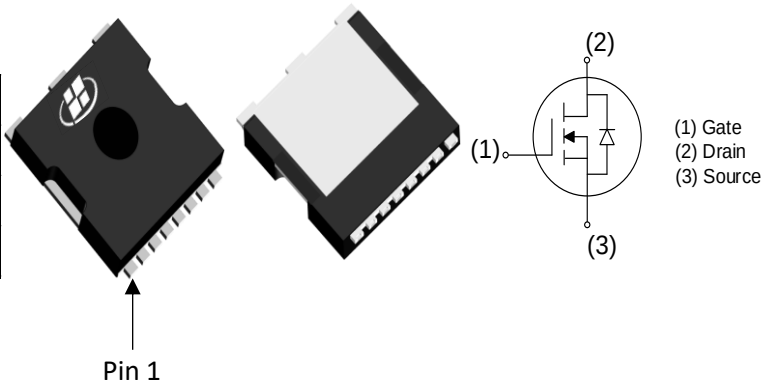
- Ultra-low on-resistance
- RoHS compliant (Note 1)
- Halogen-free (Note 1)
- 100% UIS tested
- AEC-Q101 qualified and PPAP capable
- Wettable Flank for Improved Optical Inspection

Applications:

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

Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	100	V
$R_{DS(on)}$, max @ $V_{GS} = 10\text{ V}$	1.25	mΩ
I_D	300	A



Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
AKG10N012TM-A	TOLL	G10N012TM	Tape 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	100	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) ^(Note 1)	367	A
	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) ^(Note 2)	300	A
	Drain Current - Continuous ($T_C = 100^\circ\text{C}$)	260	A
I_{DM}	Drain Current - Pulsed ^(Note 3)	1200	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy ^(Note 4)	1600	mJ
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	300	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	0.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State ^(Note 5)	50	$^\circ\text{C/W}$

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. $L = 0.5\text{ mH}$, $V_{DD} = 50\text{ V}$, $I_{AS} = 80\text{ A}$, $R_G = 25\ \Omega$, 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
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	100			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 80 V, V _{GS} = 0 V			1	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	2.8	4	V
R _{DS(ON)}	Drain-Source on-state resistance	V _{GS} = 10 V, I _D = 20 A		0.98	1.25	mΩ
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{DS} = 50 V, V _{GS} = 0 V, F = 1 MHz		20760		pF
C _{OSS}	Output Capacitance			4310		pF
C _{RSS}	Reverse Transfer Capacitance			117		pF
R _G	Gate Resistance	F = 1 MHz		2.3		Ω
Switching Characteristics						
T _{D(ON)}	Turn On Delay Time	V _{DD} = 50 V , R _L = 2.5 Ω, V _{GS} = 10 V, R _G = 1.6 Ω		49		nS
T _R	Rise Time			48.0		nS
T _{D(OFF)}	Turn Off Delay Time			143		nS
T _F	Fall Time			63		nS
Q _G	Total Gate Charge	V _{DD} = 50 V , I _D = 20 A, V _{GS} = 10 V		291		nC
Q _{GS}	Gate-Source Charge			71		nC
Q _{GD}	Gate-Drain Charge			49		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Body-Diode Forward Current				300	A
I _{SM}	Maximum Pulsed Body-Diode Forward Current				1200	A
V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _S = 20 A		0.85		V
T _{RR}	Reverse recovery time	V _{DD} = 50 V, I _D = 20 A, di/dt = 100 A/μS		133		nS
Q _{RR}	Reverse recovery charge			374		nC
I _{RRM}	Peak Reverse Recovery Current			5		A

Electrical Characteristics Diagrams

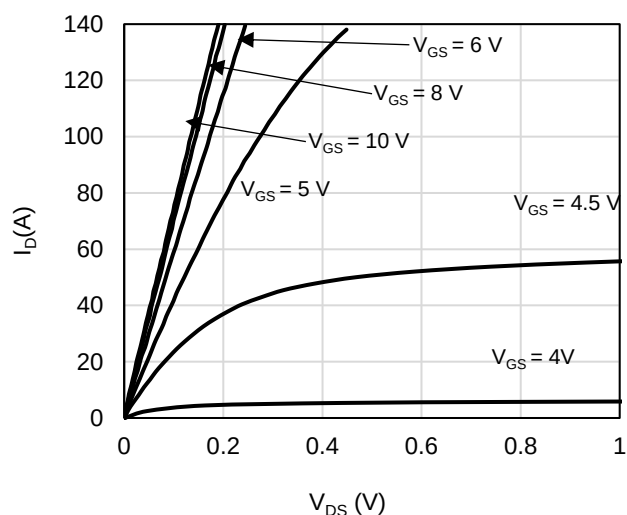


Figure 1: On-Region Characteristics

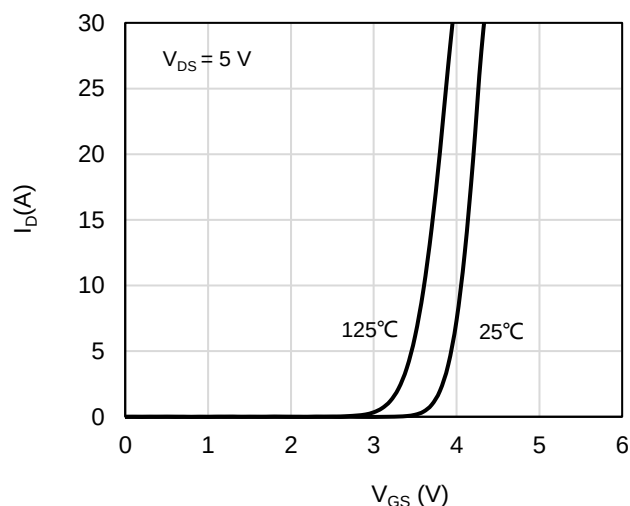


Figure 2: Transfer Characteristics

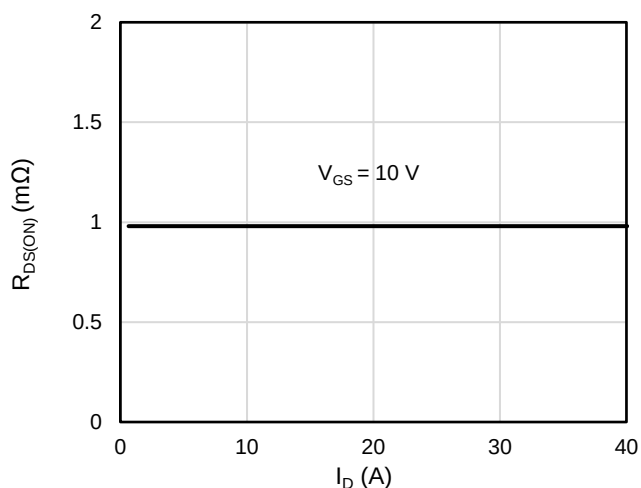


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

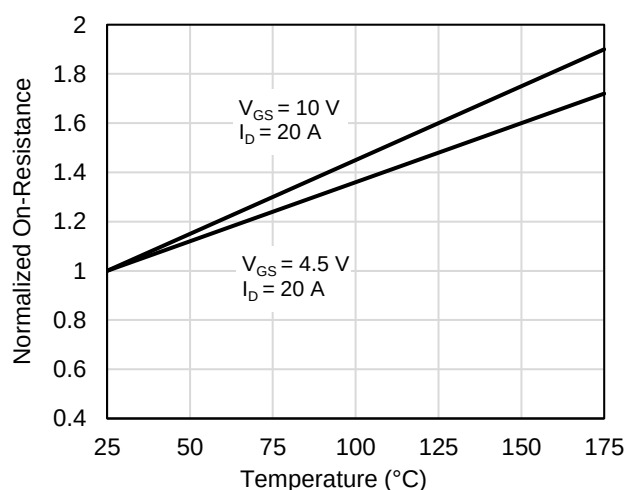


Figure 4: On-Resistance vs. Junction Temperature

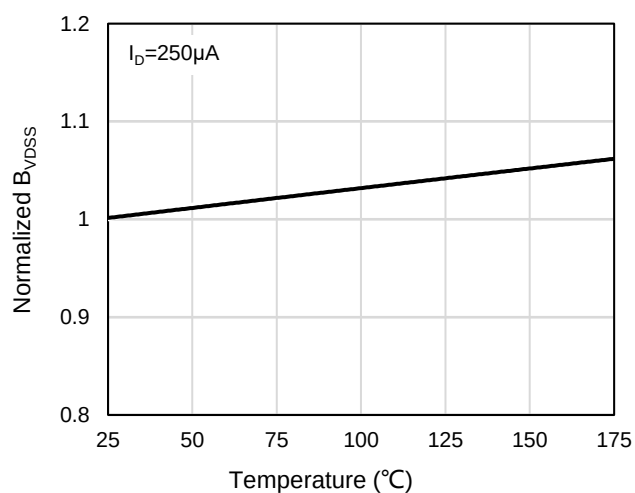


Figure 5: Breakdown Voltage vs. Junction Temperature

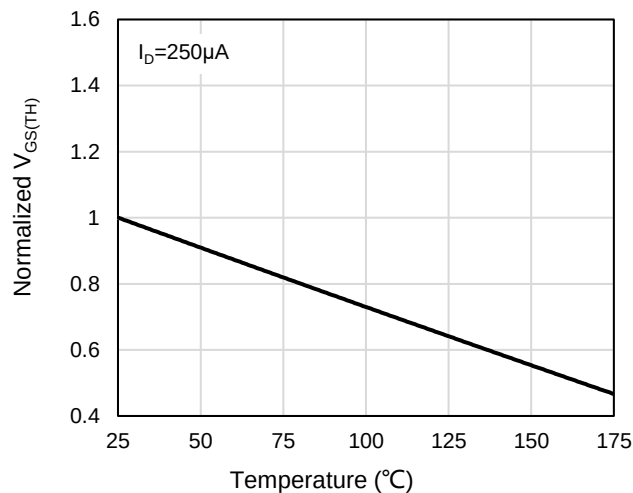


Figure 6: Threshold Voltage vs. Junction Temperature

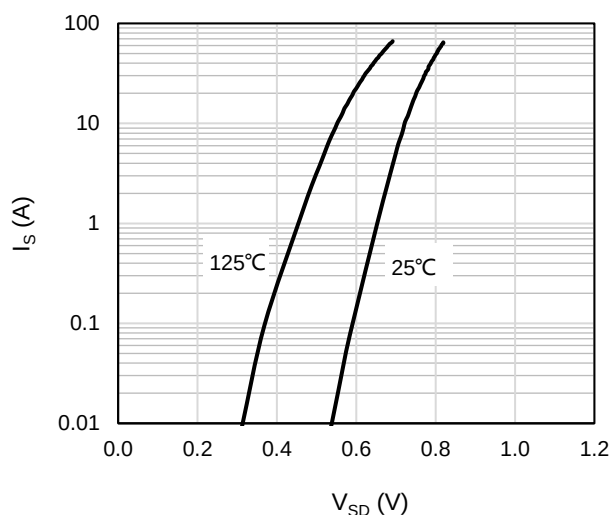


Figure 7: Body-Diode Characteristics

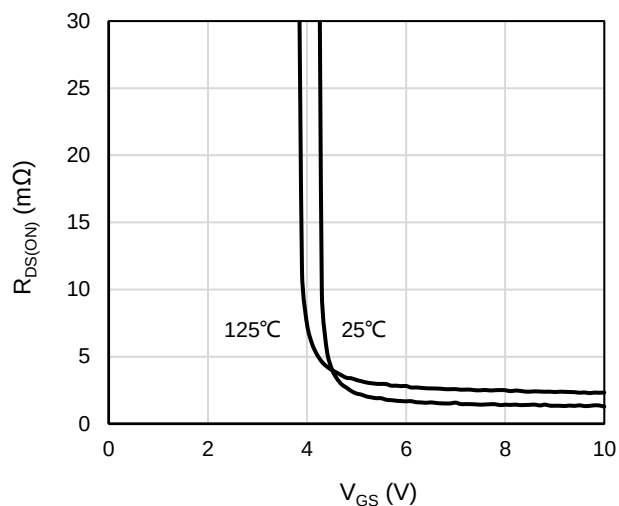


Figure 8: On-Resistance vs. Gate-Source Voltage

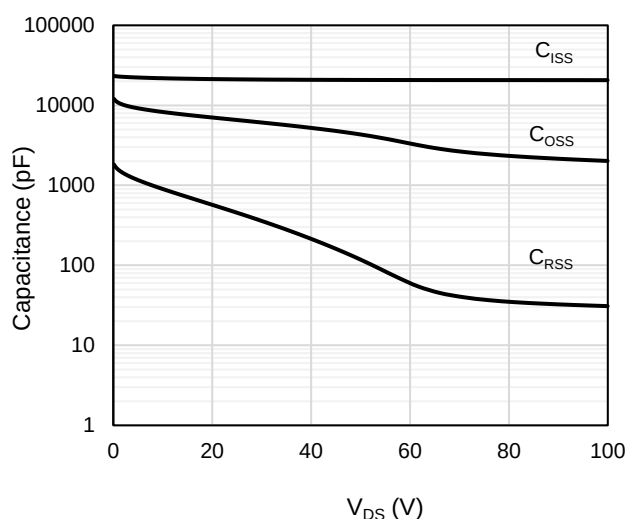


Figure 9: Capacitance Characteristics

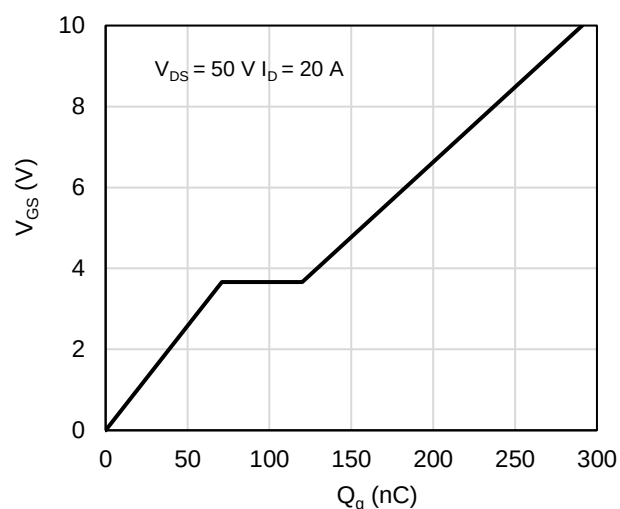


Figure 10: Gate-Charge Characteristics

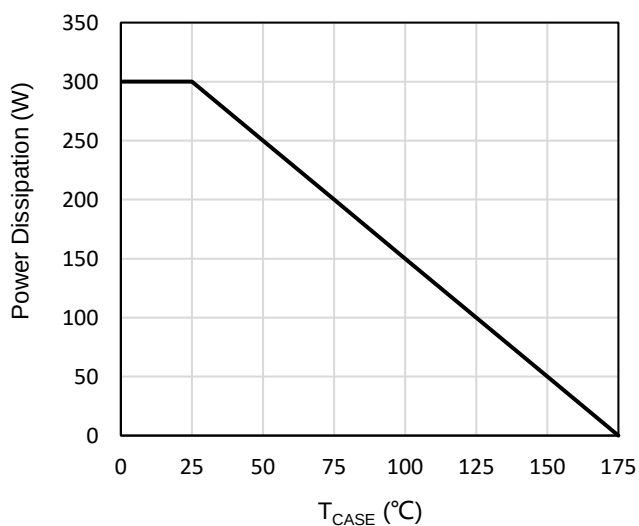


Figure 11: Power De-rating

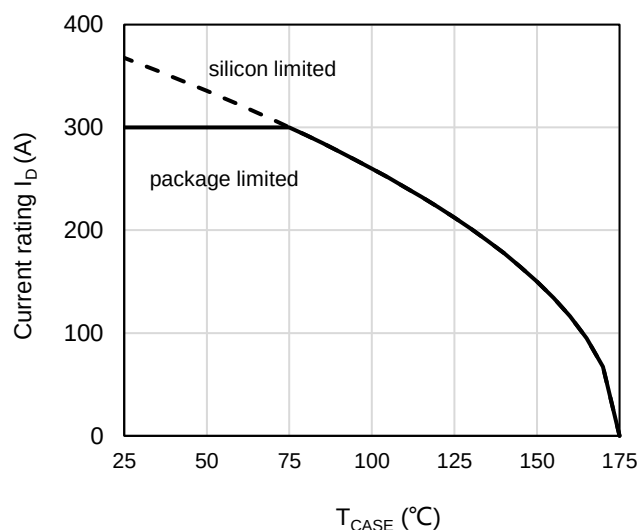
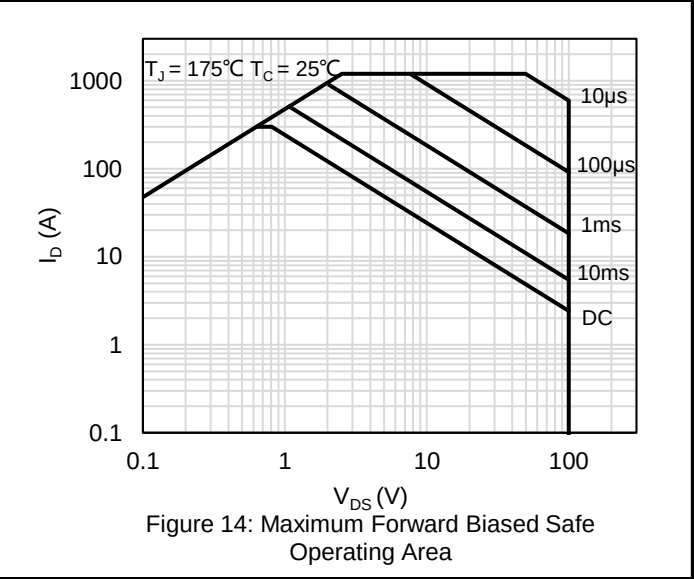
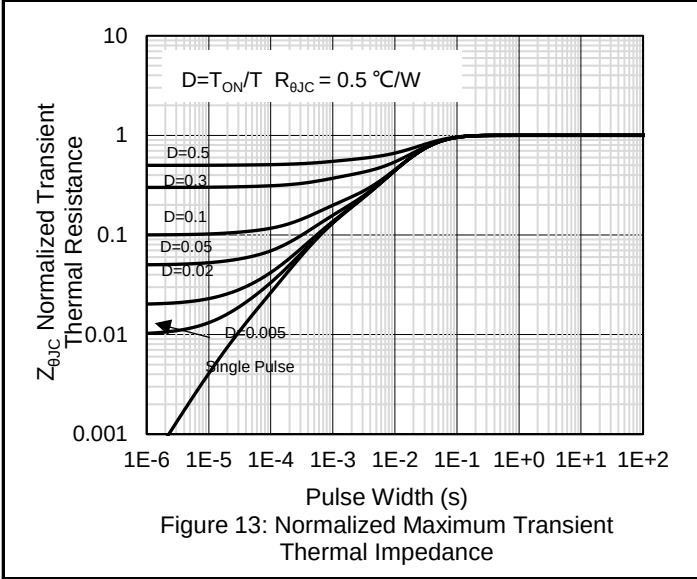
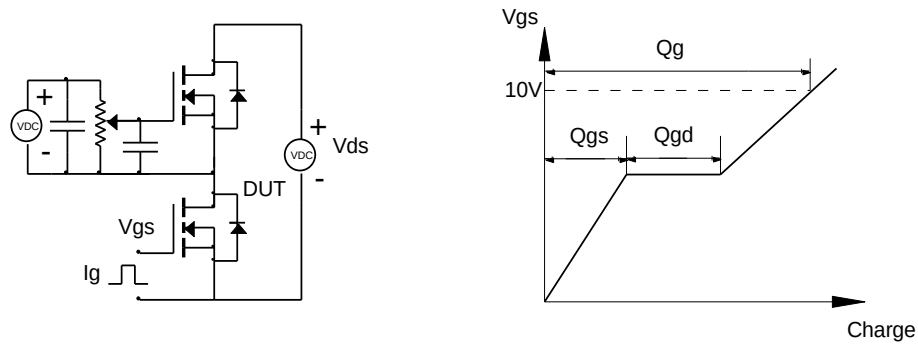


Figure 12: Current De-rating

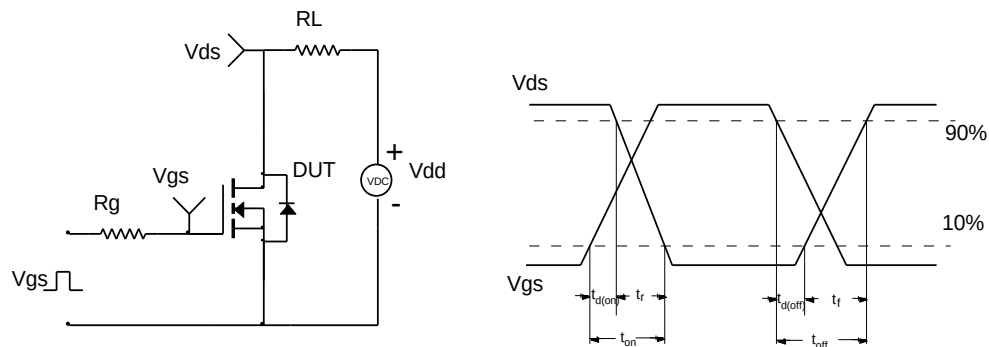


Test Circuit and Waveform

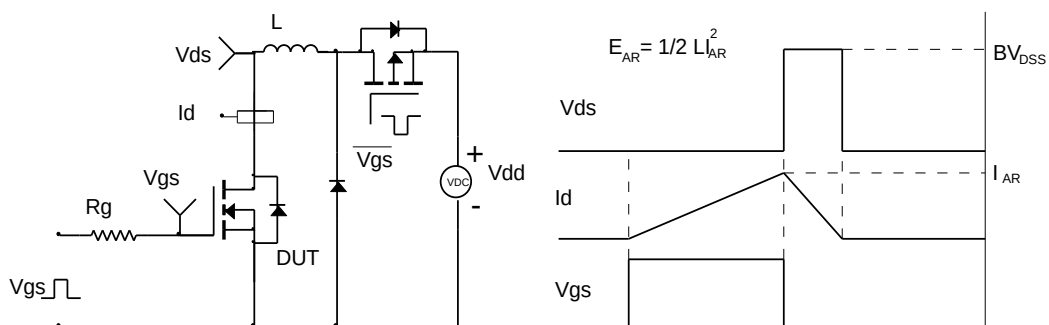
Gate Charge Test Circuit & Waveform



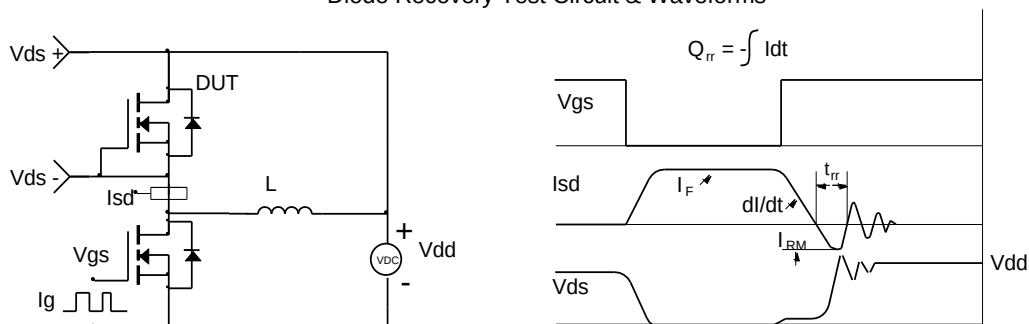
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Revision History

Revision	Release Date	Remark
Rev.1.1	2023/3/1	

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.