

100V 5.4mohm N-channel SGT MOSFET

AKG10N054PM

Description:

This N channel SGT MOSFET has been designed to very low on-state resistance and superior E_{AS} performance, especially for BMS and Motor driving applications.

Features:

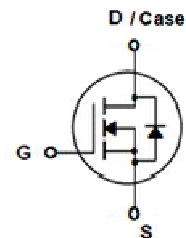
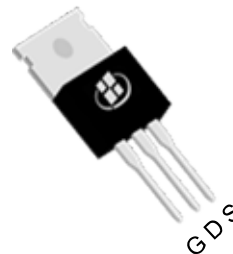
- Low FOM $R_{DS(ON)} \times Q_G$
- Ultra-low on-resistance
- RoHS compliant ^(Note 1)
- Halogen-free ^(Note 1)

Applications:

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

Key Performance Parameters:

| Parameter | Value | Unit |
|-----------------------------------|-------|------------|
| V_{DS} | 100 | V |
| $R_{DS(ON), max} @ V_{GS} = 10 V$ | 5.4 | m Ω |
| I_D | 120 | A |



Ordering Information:

| Ordering Code | Package Type | Marking Code | Form | Packing |
|---------------|--------------|--------------|------|---------|
| AKG10N054PM | TO-220 | G10N054PM | Tube | 1000PCS |

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) | 133 | A |
| | Drain Current - Continuous ($T_C = 25^\circ\text{C}$) ^(Note 2) | 120 | A |
| | Drain Current - Continuous ($T_C = 100^\circ\text{C}$) | 84 | A |
| I_{DM} | Drain Current - Pulsed ^(Note 3) | 480 | A |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| E_{AS} | Single Pulsed Avalanche Energy ^(Note 4) | 225 | mJ |
| P_D | Power Dissipation ($T_C = 25^\circ\text{C}$) | 192 | W |
| T_J, T_{STG} | Operating and Storage Temperature Range | -55 to +150 | $^\circ\text{C}$ |

Thermal Characteristics

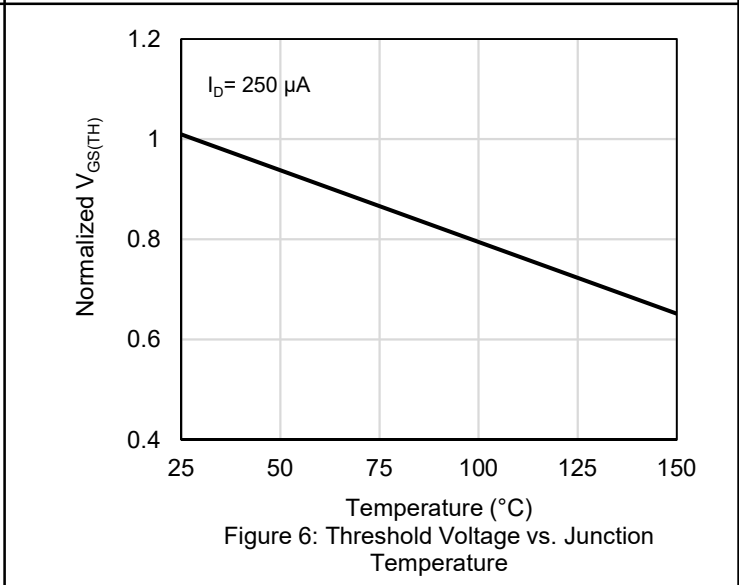
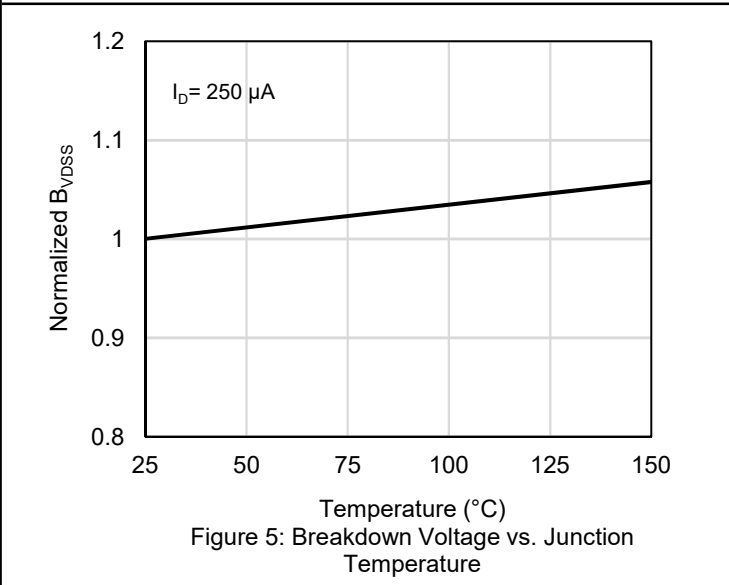
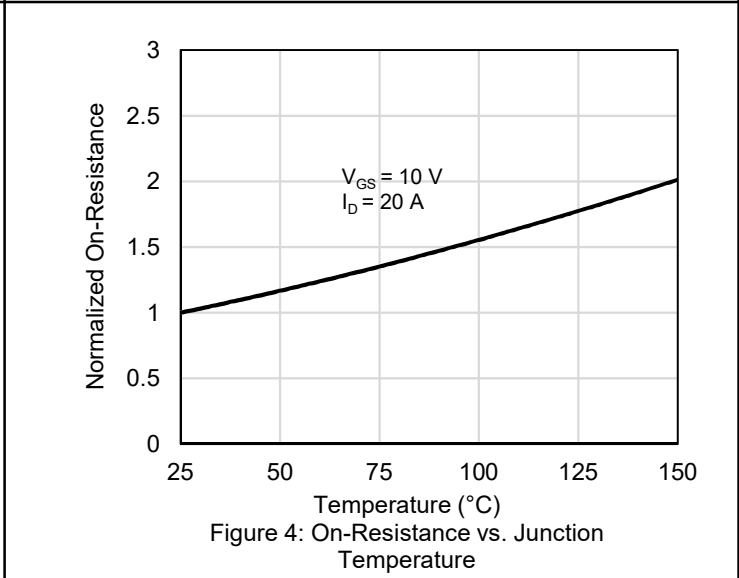
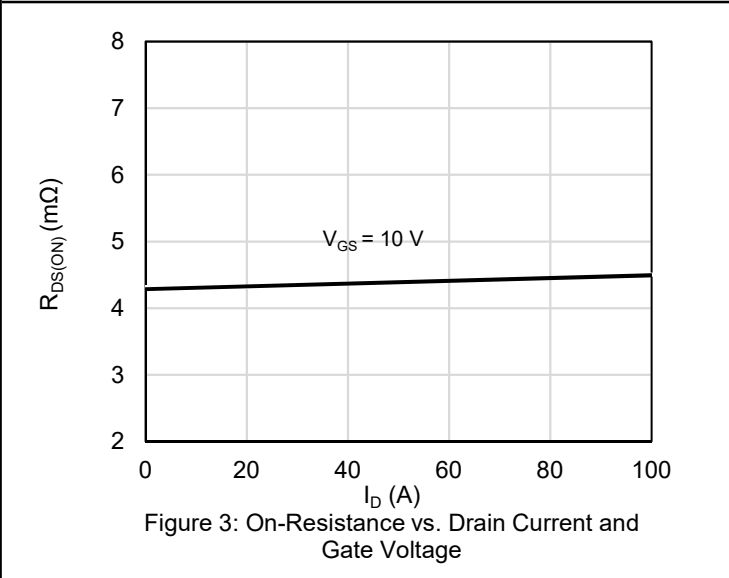
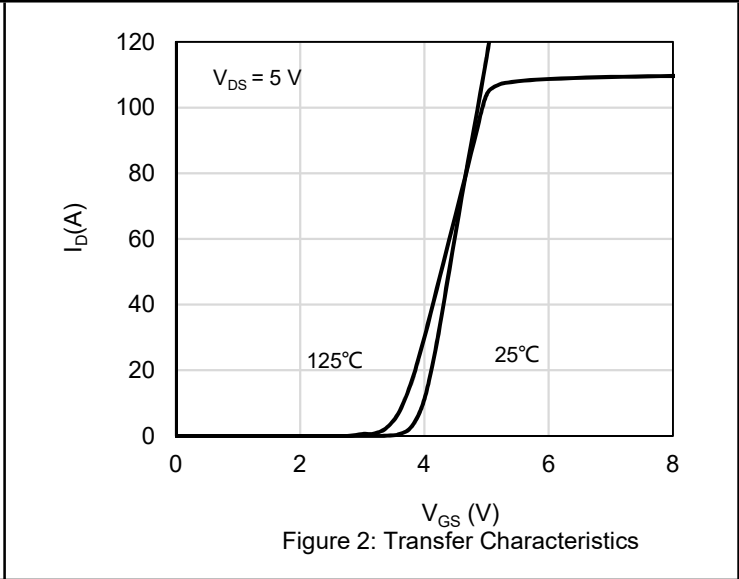
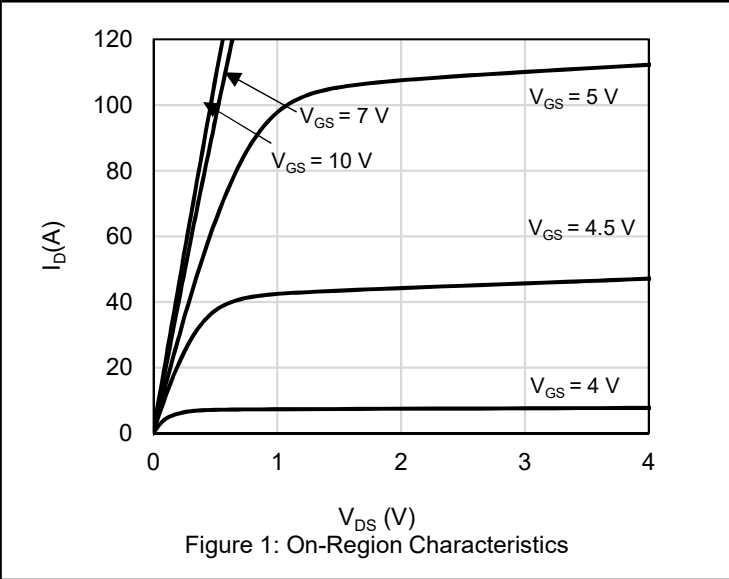
| Symbol | Parameter | Value | Units |
|-----------------|---|-------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case, Steady-State | 0.65 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient, Steady State ^(Note 5) | 55 | $^\circ\text{C}/\text{W}$ |

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. $L = 0.5 \text{ mH}$, $V_{DD} = 50 \text{ V}$, $I_{AS} = 30 \text{ A}$, $R_G = 25 \Omega$, 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 | $V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$ | 100 | | | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V},$ | | | 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 | $V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$ | 2 | 3 | 4 | V |
| $R_{DS(ON)}$ | Drain-Source on-state resistance | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}$ | | 4.5 | 5.4 | m Ω |
| Dynamic Characteristics | | | | | | |
| C_{ISS} | Input Capacitance | $V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V},$ $F = 1\text{ MHz}$ | | 4666 | | pF |
| C_{OSS} | Output Capacitance | | | 1038 | | pF |
| C_{RSS} | Reverse Transfer Capacitance | | | 45 | | pF |
| R_G | Gate Resistance | $F = 1\text{ MHz}$ | | 1.5 | | Ω |
| Switching Characteristics | | | | | | |
| $T_{D(ON)}$ | Turn On Delay Time | $V_{DD} = 50\text{ V}, R_L = 2.5\ \Omega,$ $V_{GS} = 10\text{ V}, R_G = 6.8\ \Omega$ | | 26.5 | | nS |
| T_R | Rise Time | | | 32 | | nS |
| $T_{D(OFF)}$ | Turn Off Delay Time | | | 65 | | nS |
| T_F | Fall Time | | | 32.5 | | nS |
| Q_G | Total Gate Charge | $V_{DD} = 50\text{ V}, I_D = 20\text{ A},$ $V_{GS} = 10\text{ V}$ | | 67 | | nC |
| Q_{GS} | Gate-Source Charge | | | 18 | | nC |
| Q_{GD} | Gate-Drain Charge | | | 12 | | nC |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| I_S | Maximum Continuous Body-Diode Forward Current | | | | 120 | A |
| I_{SM} | Maximum Pulsed Body-Diode Forward Current ^(NOTE 1) | | | | 480 | A |
| V_{SD} | Diode Forward Voltage | $V_{GS} = 0\text{ V}, I_S = 1\text{ A}$ | | 0.7 | 1 | V |
| T_{RR} | Reverse recovery time | $V_{DD} = 50\text{ V}, I_D = 15\text{ A},$ $di/dt = 100\text{ A}/\mu\text{S}$ | | 57 | | ns |
| Q_{RR} | Reverse recovery charge | | | 106 | | nC |
| I_{RRM} | Peak Reverse Recovery Current | | | 3 | | A |

Electrical Characteristics Diagrams



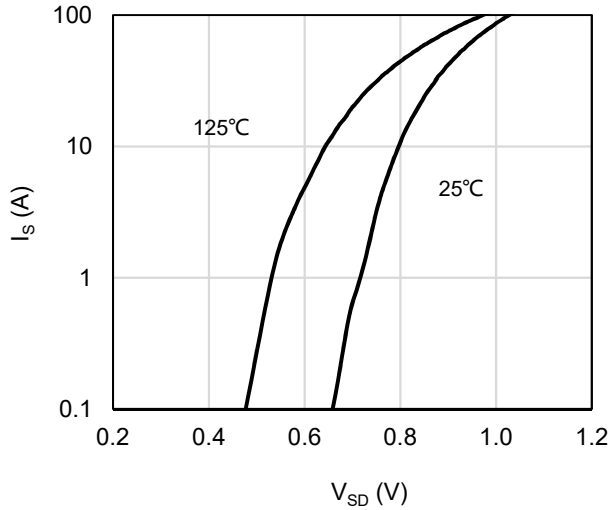


Figure 7: Body-Diode Characteristics

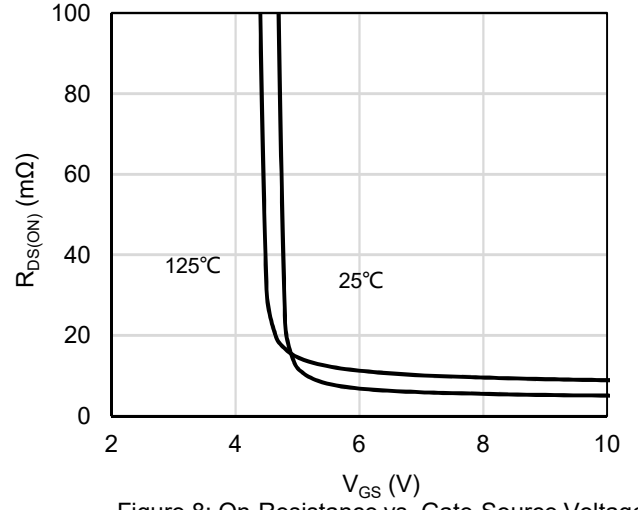


Figure 8: On-Resistance vs. Gate-Source Voltage

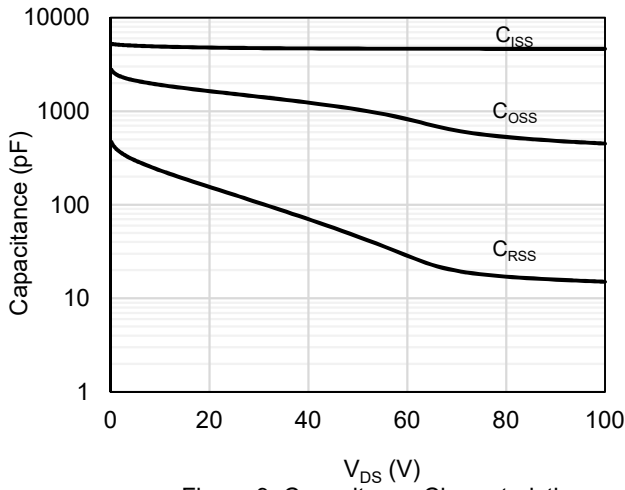


Figure 9: Capacitance Characteristics

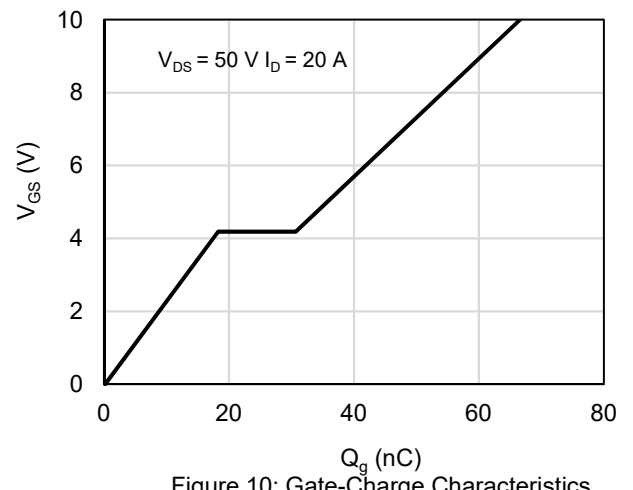


Figure 10: Gate-Charge Characteristics

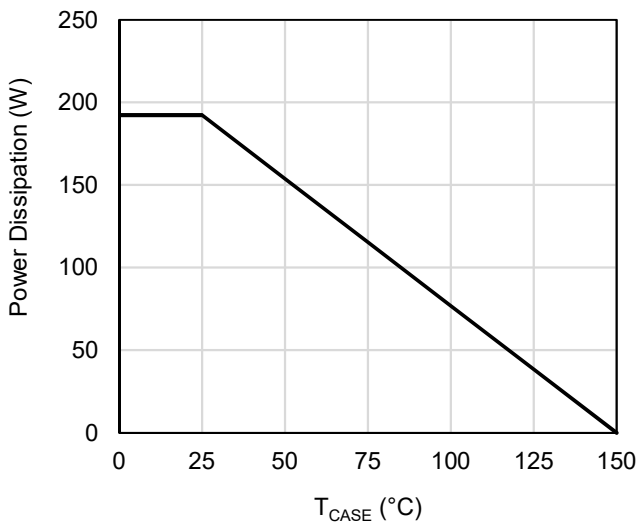


Figure 11: Power De-rating

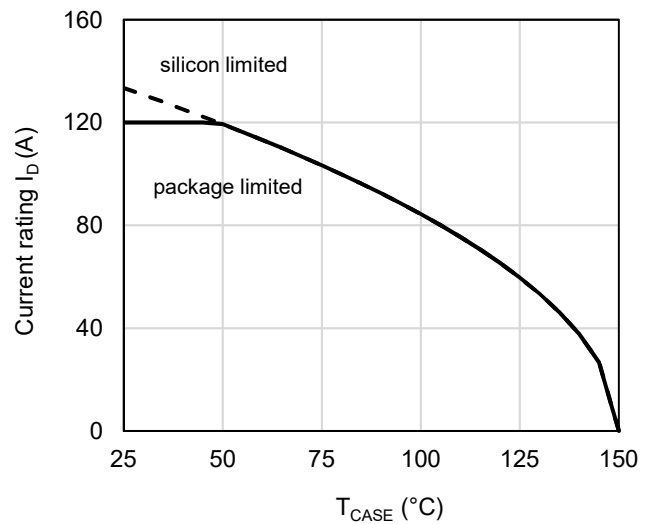


Figure 12: Current De-rating

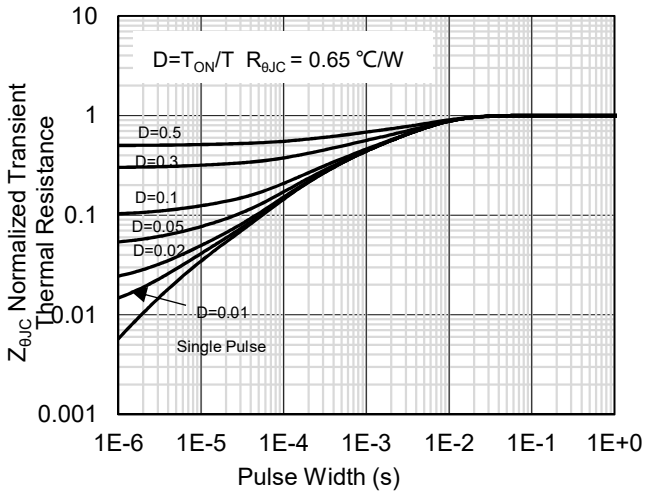


Figure 13: Normalized Maximum Transient Thermal Impedance

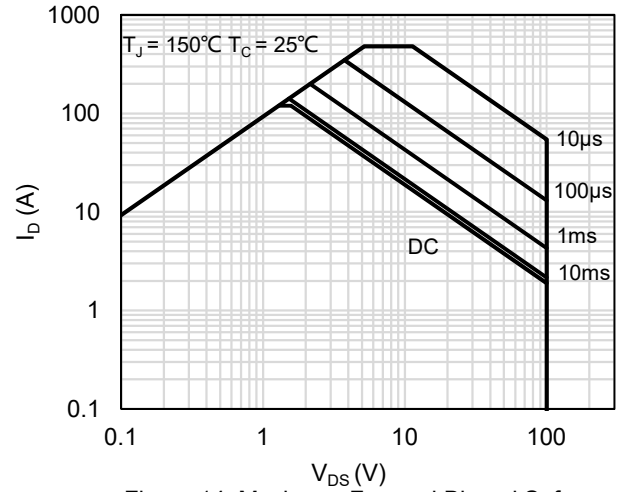
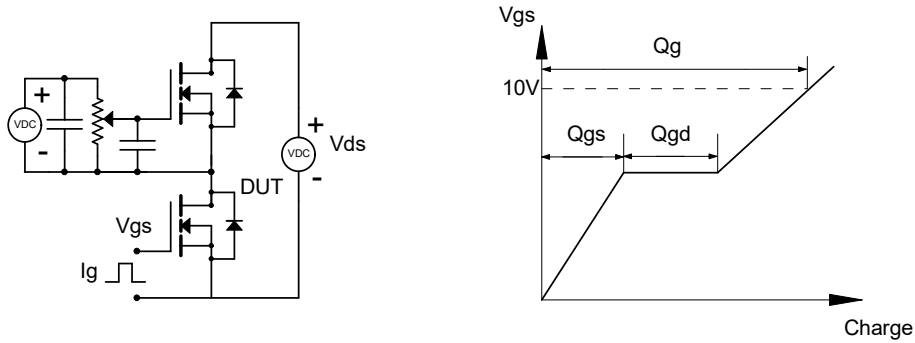


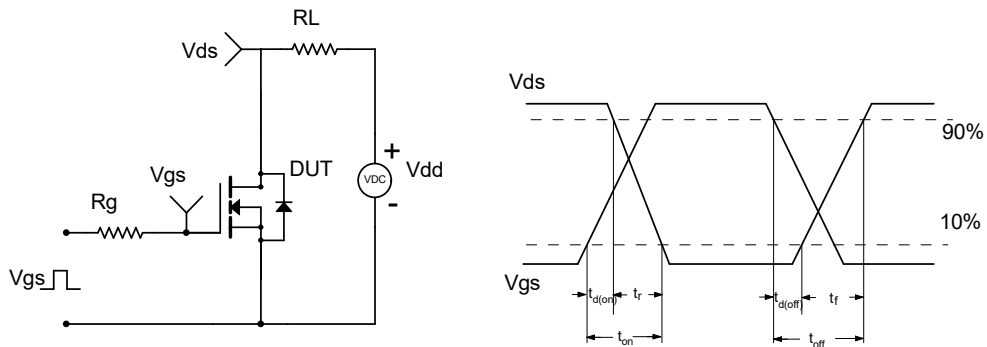
Figure 14: Maximum Forward Biased Safe Operating Area

Test Circuit and Waveform

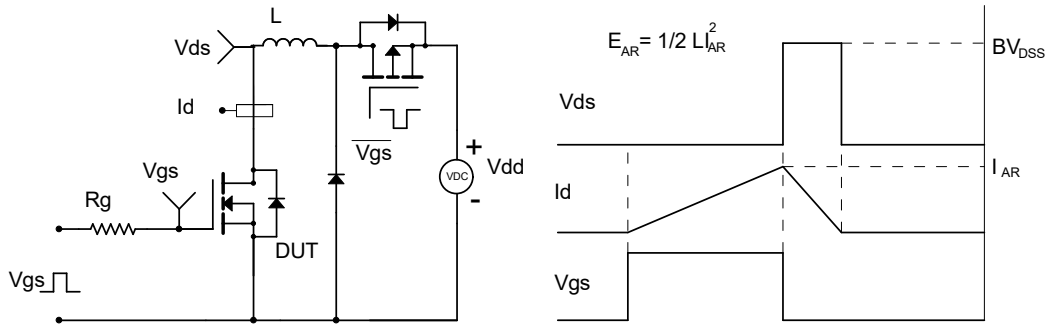
Gate Charge Test Circuit & Waveform



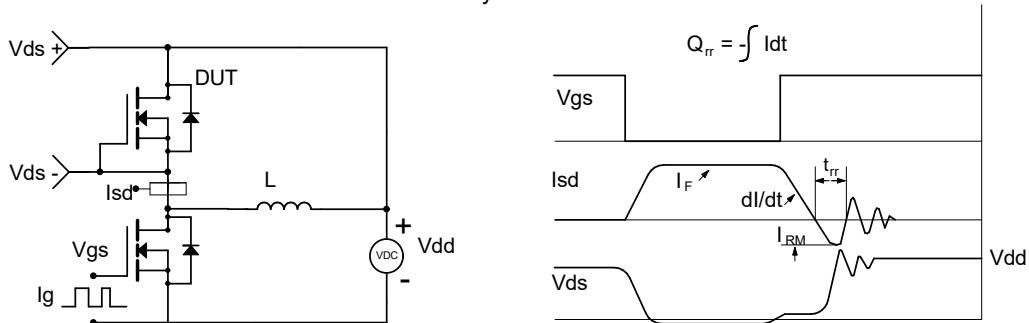
Resistive Switching Test Circuit & Waveforms



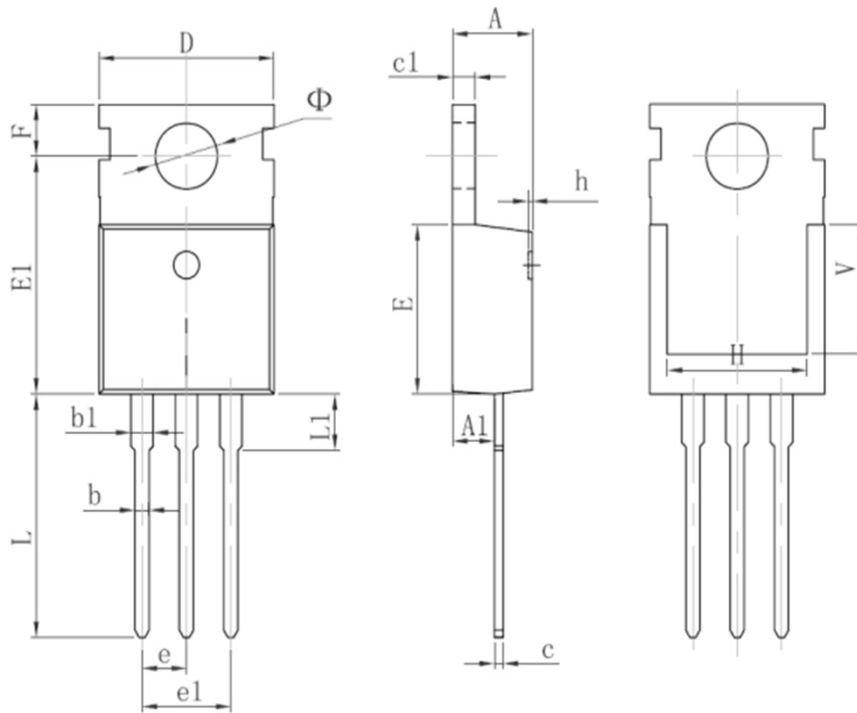
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outlines



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.400 | 4.600 | 0.173 | 0.181 |
| A1 | 2.250 | 2.550 | 0.089 | 0.100 |
| b | 0.710 | 0.910 | 0.028 | 0.036 |
| b1 | 1.170 | 1.370 | 0.046 | 0.054 |
| c | 0.330 | 0.650 | 0.013 | 0.026 |
| c1 | 1.200 | 1.400 | 0.047 | 0.055 |
| D | 9.910 | 10.250 | 0.390 | 0.404 |
| E | 8.950 | 9.750 | 0.352 | 0.384 |
| E1 | 12.650 | 13.050 | 0.498 | 0.514 |
| e | 2.540 TYP. | | 0.100 TYP. | |
| e1 | 4.980 | 5.180 | 0.196 | 0.204 |
| F | 2.650 | 2.950 | 0.104 | 0.116 |
| H | 7.900 | 8.100 | 0.311 | 0.319 |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| L | 12.900 | 13.400 | 0.508 | 0.528 |
| L1 | 2.850 | 3.250 | 0.112 | 0.128 |
| V | 6.900 REF. | | 0.276 REF. | |
| Φ | 3.400 | 3.800 | 0.134 | 0.150 |

Marking Information



G10N054PM
XXXXXXXX

Note:

G10N054PM = Product Name Code

XXXXXXXX = Date code

Contact ALKAIDSEMI sales for detail information

Revision History

| Revision | Release Date | Remark |
|----------|--------------|--------|
| Rev.1.1 | 2023/2/24 | |

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.

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