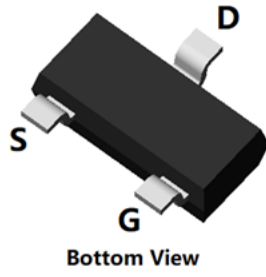
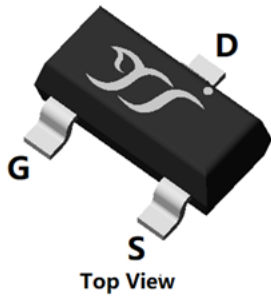
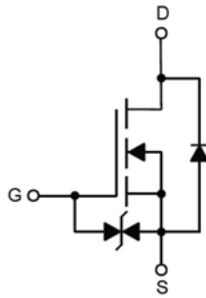


N-Channel Enhancement Mode Field Effect Transistor



SOT-23



Product Summary

- V_{DS} 100V
- I_D 0.28A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) $<4.6\Omega$
- $R_{DS(ON)}$ (at $V_{GS}=4.5V$) $<6\Omega$
- ESD protected up to 2.0KV (HBM)

General Description

- Voltage controlled small signal switch
- Low input Capacitance
- Fast Switching Speed
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free
- Part no. with suffix "Q" means AEC-Q101 qualified

Applications

- Battery operated systems
- Solid-state relays
- Direct logic-level interface: TTL/CMOS

Limiting Values

| Parameter | Conditions | | Symbol | Min | Max | Unit |
|--|--|-------------------------------------|----------------|-----|------|------------------|
| Drain-source Voltage | | | V_{DS} | - | 100 | V |
| Gate-source Voltage | | | V_{GS} | -20 | 20 | |
| Continuous Drain Current (Note 1,2) | Steady-State | $T_A=25^\circ\text{C}, V_{GS}=10V$ | I_D | - | 0.28 | A |
| | | $T_A=100^\circ\text{C}, V_{GS}=10V$ | | - | 0.17 | |
| Pulsed Drain Current | $T_A=25^\circ\text{C}, t_p \leq 10\mu\text{s}$ | | I_{DM} | - | 1.12 | |
| Maximum Body-Diode Continuous Current | $T_A=25^\circ\text{C}$ | | I_S | | 0.28 | |
| Total Power Dissipation (Note 1,2) | Steady-State | $T_A=25^\circ\text{C}$ | P_D | - | 0.78 | W |
| | | $T_A=100^\circ\text{C}$ | | - | 0.31 | |
| Junction and Storage Temperature Range | | | T_J, T_{STG} | -55 | 150 | $^\circ\text{C}$ |

Thermal Resistance

| Parameter | | Symbol | Typ | Max | Units |
|---|--------------|-----------------|-----|-----|---------------------------|
| Thermal Resistance Junction-to-Ambient (Note 2) | Steady-State | $R_{\theta JA}$ | - | 160 | $^\circ\text{C}/\text{W}$ |

Ordering Information (Example)

| PREFERRED P/N | PACKING CODE | Marking | MINIMUM PACKAGE(pcs) | INNER BOX QUANTITY(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|---------------|--------------|---------|----------------------|-------------------------|----------------------------|---------------|
| BSS123AJKQ | F2 | 123K. | 3000 | 30000 | 120000 | 7" reel |



BSS123AJKQ

■ Electrical Characteristics

| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|-----------------------------------|--------------|---|-----|------|----------|----------|
| Static Parameter | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A, T_j=25^\circ C$ | 100 | - | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=100V, V_{GS}=0V, T_j=25^\circ C$ | - | - | 1 | μA |
| | | $V_{DS}=100V, V_{GS}=0V, T_j=125^\circ C$ | - | - | 100 | |
| Gate-Source Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V, T_j=25^\circ C$ | - | - | ± 10 | μA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A, T_j=25^\circ C$ | 1.5 | 2 | 2.5 | V |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}=10V, I_D=0.25A, T_j=25^\circ C$ | - | 3.5 | 4.6 | Ω |
| | | $V_{GS}=4.5V, I_D=0.2A, T_j=25^\circ C$ | - | 4.1 | 6 | Ω |
| Diode Forward Voltage | V_{SD} | $I_S=0.25A, V_{GS}=0V, T_j=25^\circ C$ | - | 0.86 | 1.3 | V |
| Gate Resistance | R_G | $f=1MHz, T_j=25^\circ C$ | - | 81 | - | Ω |
| Dynamic Parameters | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=50V, V_{GS}=0V, f=1MHz, T_j=25^\circ C$ | - | 32 | - | μF |
| Output Capacitance | C_{oss} | | - | 3 | - | |
| Reverse Transfer Capacitance | C_{rss} | | - | 2 | - | |
| Switching Parameters | | | | | | |
| Total Gate Charge | Q_g | $V_{GS}=10V, V_{DS}=50V, I_D=0.1A, T_j=25^\circ C$ | - | 1.3 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 0.2 | - | |
| Gate-Drain Charge | Q_{gd} | | - | 0.4 | - | |
| Reverse Recovery Charge | Q_{rr} | $I_F=0.1A, di/dt=100A/\mu s, V_{GS}=0V, V_R=50V, T_j=25^\circ C$ | - | 4 | - | nC |
| Reverse Recovery Time | t_{rr} | | - | 13 | - | ns |
| Turn-on Delay Time | $t_{D(on)}$ | $V_{GS}=10V, V_{DS}=50V, I_D=0.1A, R_{GEN}=6\Omega, T_j=25^\circ C$ | - | 3 | - | ns |
| Turn-on Rise Time | t_r | | - | 3 | - | |
| Turn-off Delay Time | $t_{D(off)}$ | | - | 9 | - | |
| Turn-off Fall Time | t_f | | - | 51 | - | |

Note:

- The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- The value of $R_{\theta JA}$ is measured with the device mounted on the 40mm*40mm*1.1mm single layer FR-4 PCB board with 1 in² pad of 2oz. Copper, in the still air environment with $T_A=25^\circ C$. The maximum allowed junction temperature of 150 $^\circ C$. The value in any given application depends on the user's specific board design.



BSS123AJKQ

Typical Electrical and Thermal Characteristics Diagrams

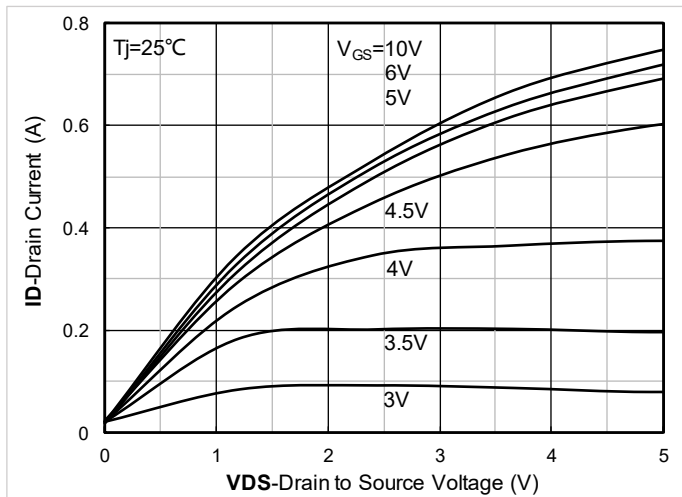


Figure 1. Output Characteristics; typical values

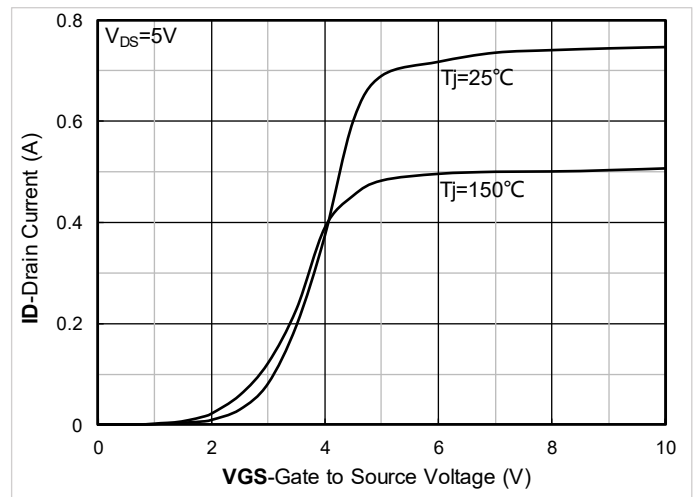


Figure 2. Transfer Characteristics; typical values

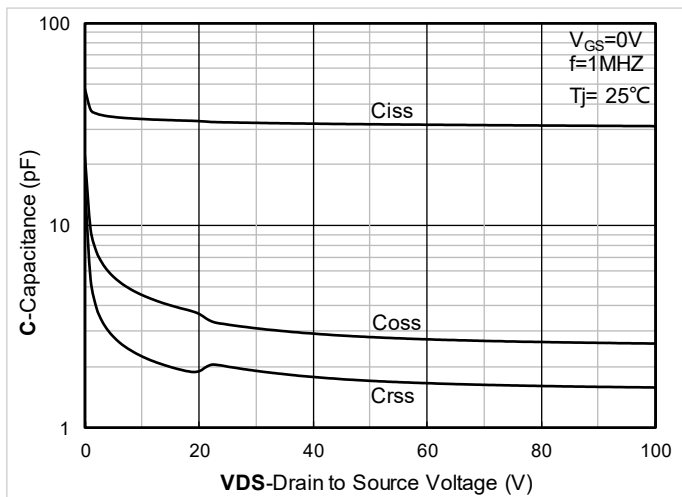


Figure 3. Capacitance Characteristics; typical values

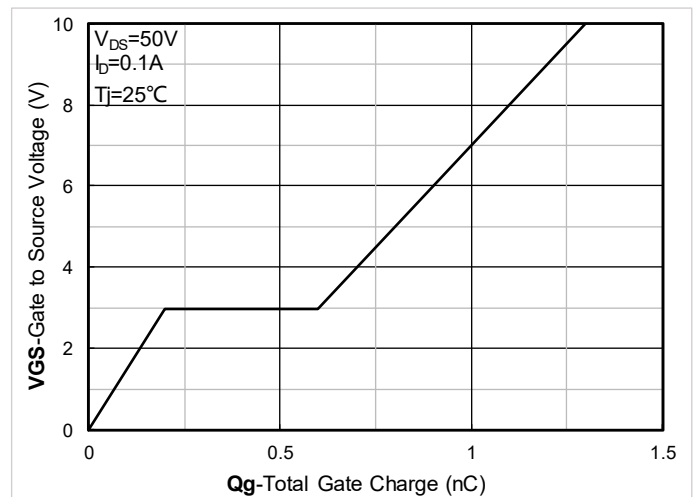


Figure 4. Gate Charge; typical values

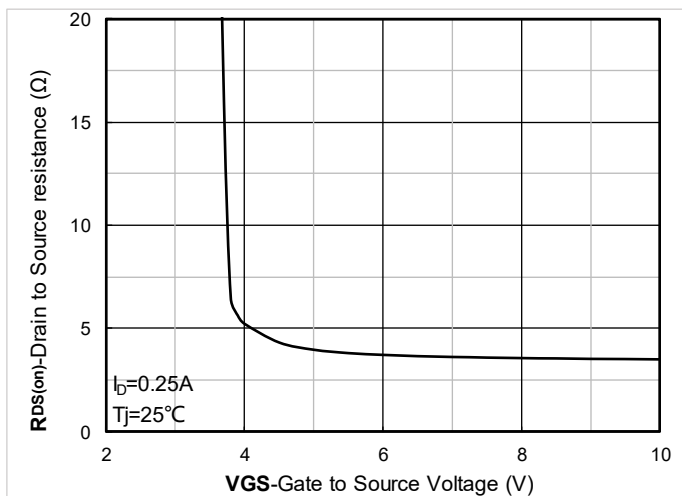


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

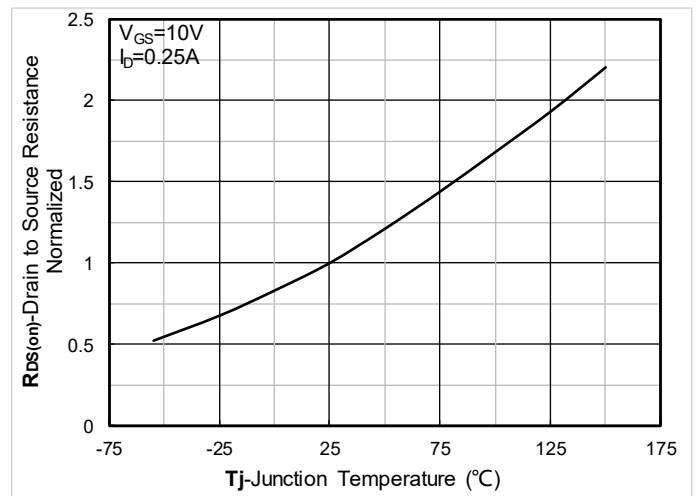


Figure 6. Normalized On-Resistance



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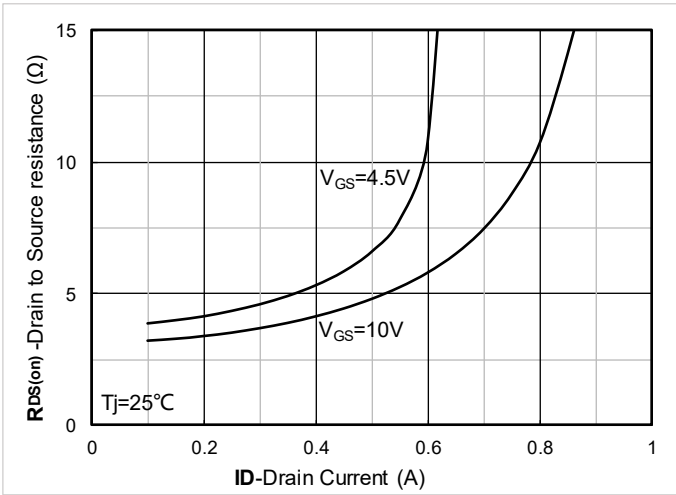


Figure 7. RDS(on) vs. Drain Current; typical values

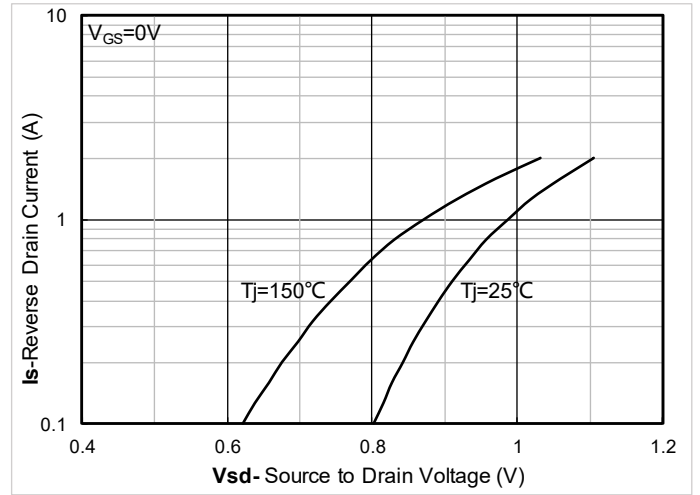


Figure 8. Forward characteristics of reverse diode; typical values

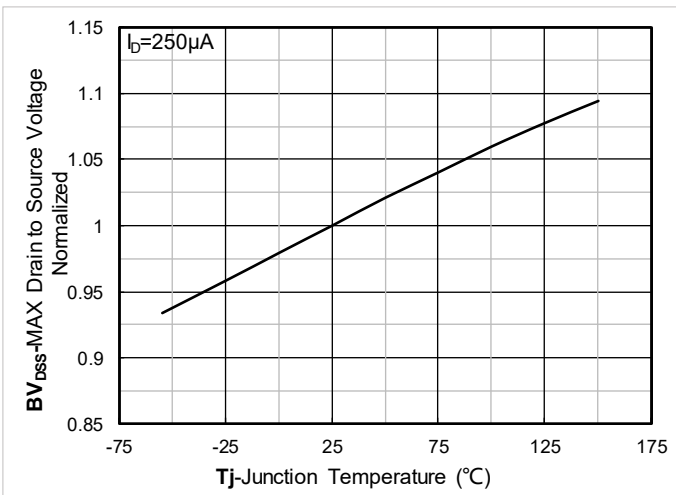


Figure 9. Normalized breakdown voltage

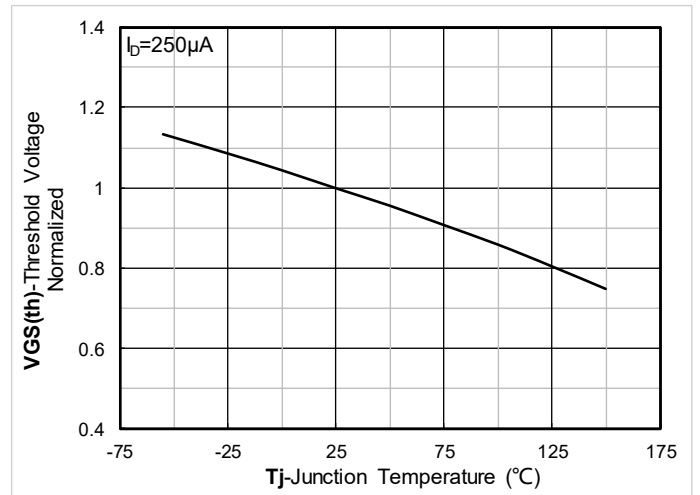


Figure 10. Normalized Threshold voltage

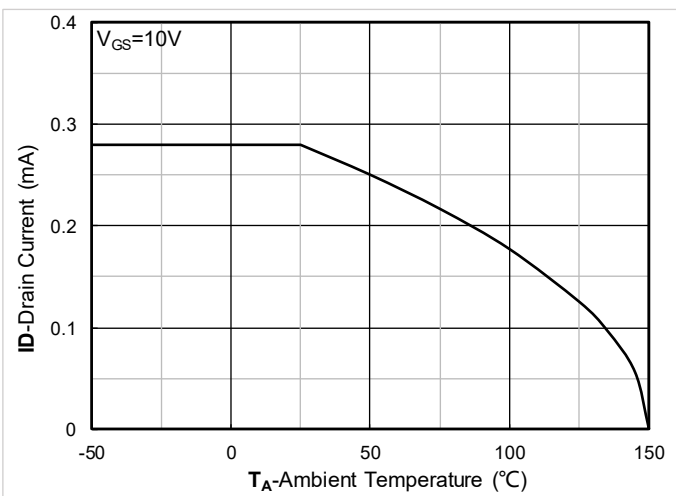


Figure 11. Current dissipation

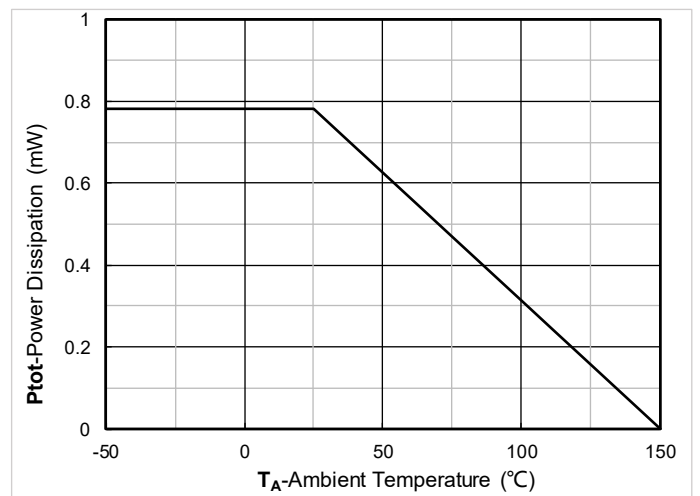


Figure 12. Power dissipation



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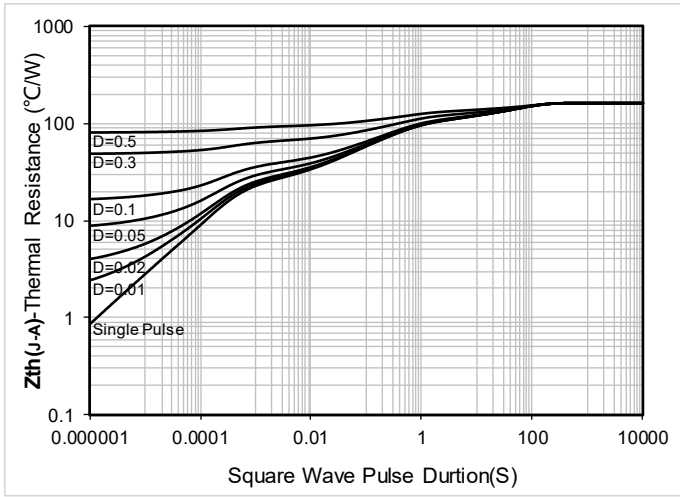


Figure 13. Maximum Transient Thermal Impedance

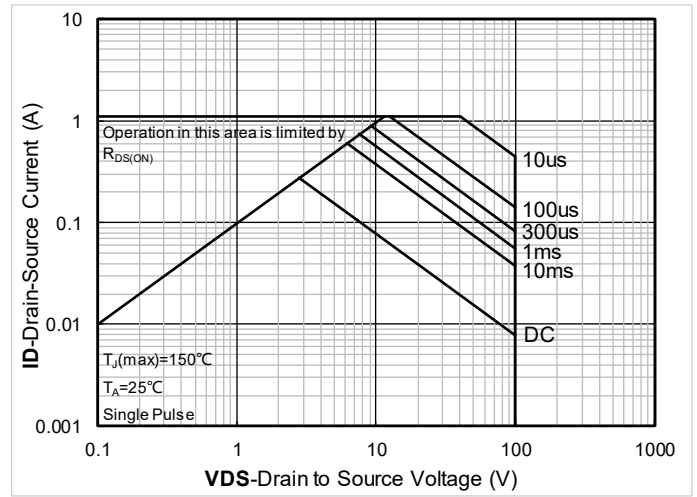


Figure 14. Safe Operation Area

■ Test Circuits & Waveforms

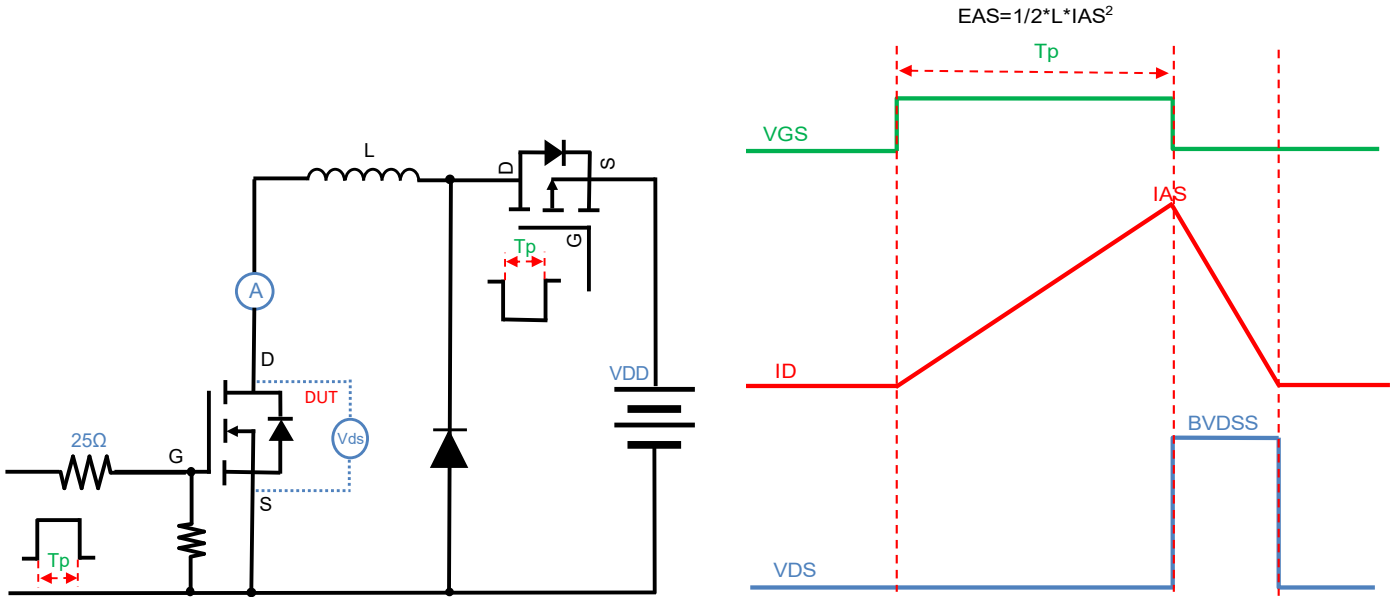


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

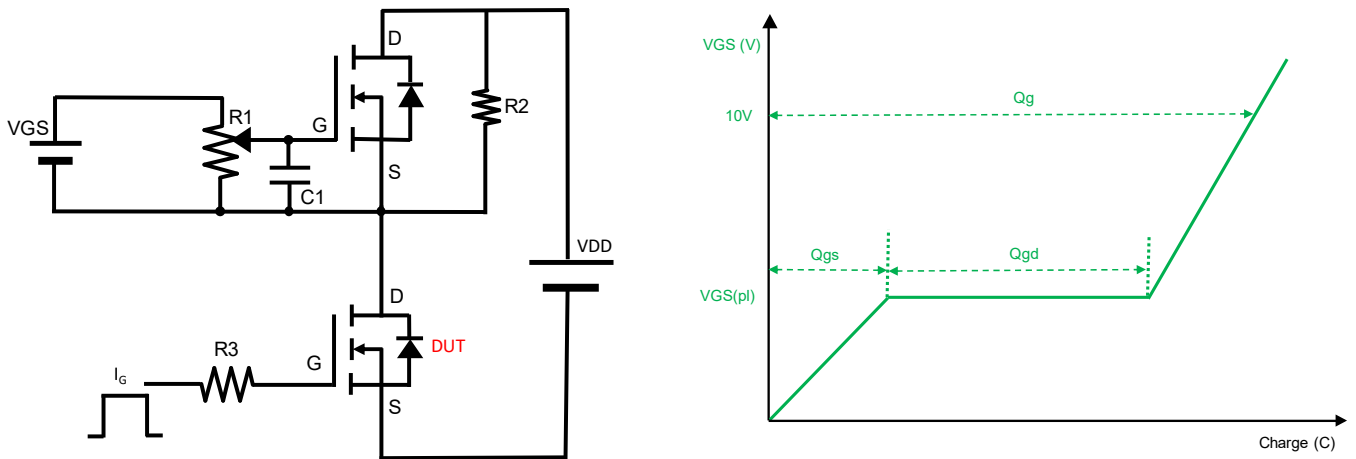


Figure B. Gate Charge Test Circuit & Waveform

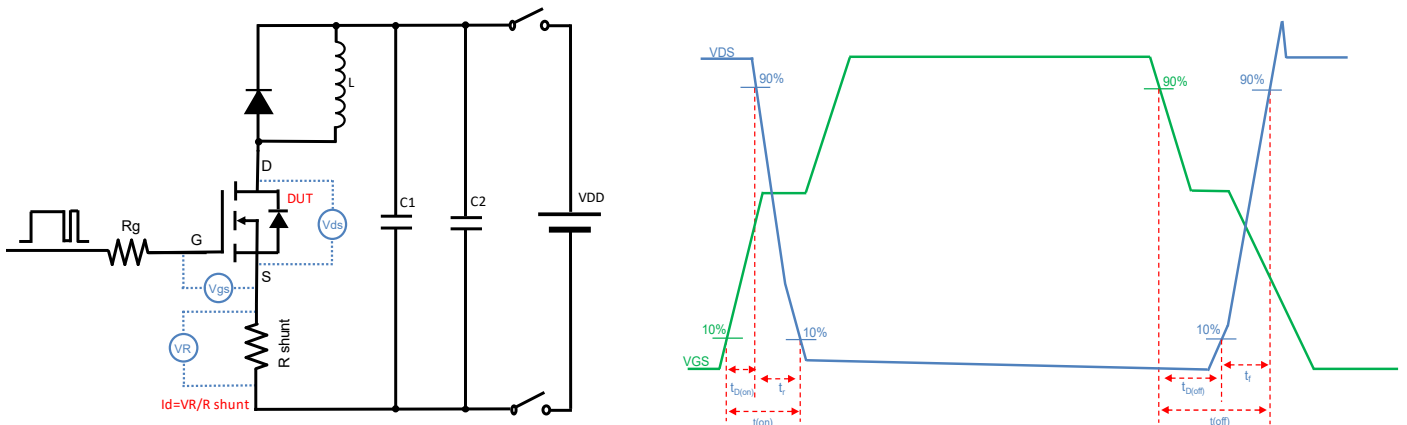


Figure C. Resistive Switching Test Circuit & Waveform

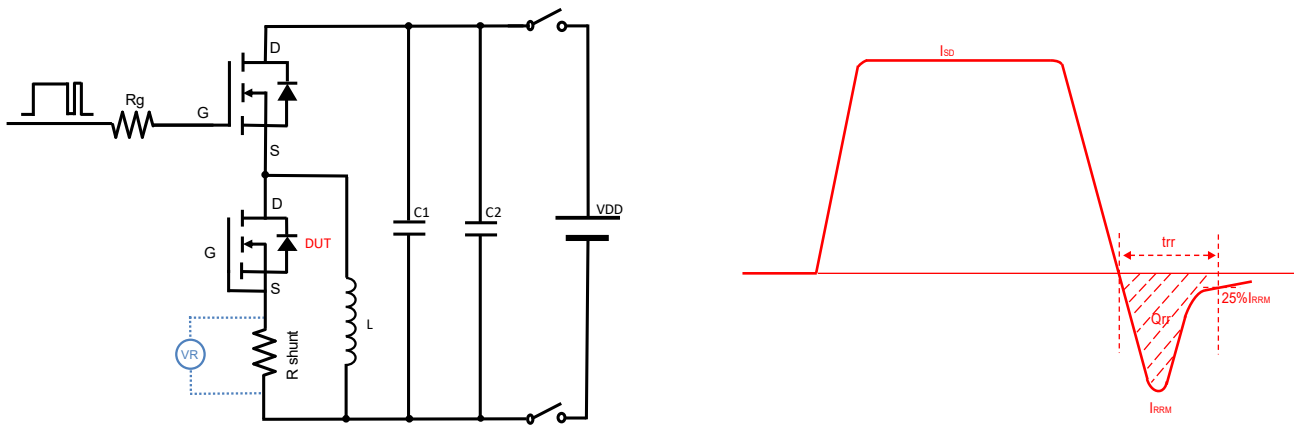
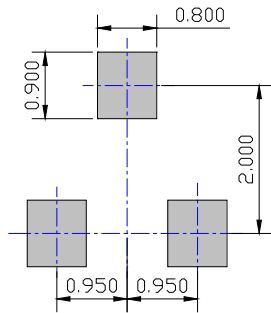
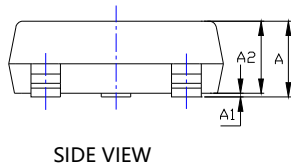
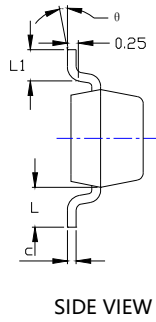
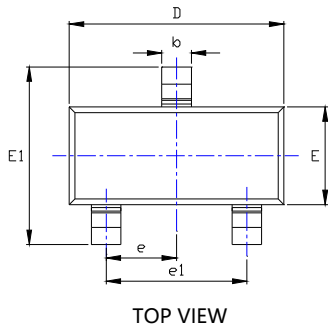


Figure D. Diode Recovery Test Circuit & Waveform



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■ SOT-23 Package Information



UNIT: mm

| SYMBOL | DIMENSIONS | | | |
|--------|------------|-------|------------|-------|
| | INCHES | | Millimeter | |
| | MIN. | MAX. | MIN. | MAX. |
| A | 0.035 | 0.045 | 0.900 | 1.150 |
| A1 | 0.000 | 0.004 | 0.000 | 0.100 |
| A2 | 0.035 | 0.041 | 0.900 | 1.050 |
| b | 0.012 | 0.020 | 0.300 | 0.500 |
| c | 0.004 | 0.008 | 0.100 | 0.200 |
| D | 0.110 | 0.118 | 2.800 | 3.000 |
| E | 0.047 | 0.055 | 1.200 | 1.400 |
| E1 | 0.089 | 0.100 | 2.250 | 2.550 |
| e | 0.037TYP | | 0.950TYP | |
| e1 | 0.071 | 0.079 | 1.800 | 2.000 |
| L | 0.022REF | | 0.550REF | |
| L1 | 0.012 | 0.020 | 0.300 | 0.500 |
| θ | 0° | 8° | 0° | 8° |

NOTE:
 1.PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
 2.TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.
 3.THE PAD LAYOUT IS FOR REFERENCE PURPOSES ONLY.



BSS123AJKQ

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