

SLV2302A

20V N -Channel MOSFET

General Description

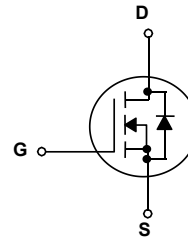
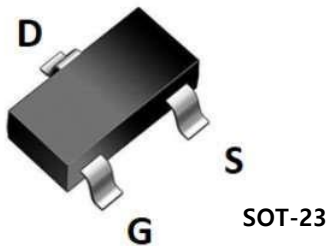
This Power MOSFET is produced using Msemitek's advanced TRENCH technology. This advanced technology has been especially tailored to minimize conduction loss, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

Application

- PWM Application
- Load Switch
- Power Management

Features

- N-Channel: 20V 4.3A
 $R_{DS(on)Typ} = 19m\Omega @ V_{GS} = 4.5V$
 $R_{DS(on)Typ} = 26m\Omega @ V_{GS} = 2.5V$
- Very Low On-resistance $R_{DS(ON)}$
- Low Crss
- Fast switching
- Improved dv/dt capability



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | SLV2302A | Units |
|-----------------|--|-------------|--------------------|
| V_{DSS} | Drain-Source Voltage | 20 | V |
| I_D | Drain Current - Continuous ($T_C = 25^\circ\text{C}$) - Continuous ($T_C = 70^\circ\text{C}$) | 4.3 | A |
| | | 3.4 | A |
| I_{DM} | Drain Current - Pulsed (Note 1) | 12.9 | A |
| V_{GSS} | Gate-Source Voltage | ± 10 | V |
| P_D | Power Dissipation ($T_C = 25^\circ\text{C}$) | 1.38 | W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 90.5 | $^\circ\text{C/W}$ |
| T_J, T_{STG} | Operating and Storage Temperature Range | -55 to +150 | $^\circ\text{C}$ |
| T_L | Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds | 300 | $^\circ\text{C}$ |

* Drain current limited by maximum junction temperature.

Package Marking

| Part Number | Top Marking | Package | Packing Method | MOQ | QTY |
|-------------|-------------|---------|----------------|------|--------|
| SLV2302A | 2302A | SOT-23 | Tape & Reel | 3000 | 180000 |

Electrical Characteristics

 $T_C = 25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|--------|-----------|-----------------|-----|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-----|-------|

Off Characteristics

| | | | | | | |
|------------|------------------------------------|---|----|----|------|---------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$ | 20 | -- | -- | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$ | -- | -- | 1 | μA |
| | | $V_{DS} = 16\text{ V}, T_C = 125^\circ\text{C}$ | -- | -- | 10 | μA |
| I_{GSSF} | Gate-Body Leakage Current, Forward | $V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V}$ | -- | -- | 100 | nA |
| I_{GSSR} | Gate-Body Leakage Current, Reverse | $V_{GS} = -10\text{ V}, V_{DS} = 0\text{ V}$ | -- | -- | -100 | nA |

On Characteristics

| | | | | | | |
|--------------|-----------------------------------|---|------|----|-----|------------|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$ | 0.45 | - | 1.1 | V |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | $V_{GS} = 4.5\text{ V}, I_D = 4.3\text{ A}$ | -- | 19 | 27 | m Ω |
| | | $V_{GS} = 2.5\text{ V}, I_D = 3.0\text{ A}$ | - | 26 | 38 | |

Dynamic Characteristics

| | | | | | | |
|-----------|------------------------------|--|----|-----|---|----|
| C_{iss} | Input Capacitance | $V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$ | -- | 354 | - | pF |
| C_{oss} | Output Capacitance | | -- | 71 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | | -- | 67 | - | pF |

Switching Characteristics

| | | | | | | |
|--------------|---------------------|--|----|-----|----|----|
| $t_{d(on)}$ | Turn-On Delay Time | $V_{GS} = 5\text{ V}, V_{DS} = 10\text{ V}, I_D = 4.3\text{ A},$ $R_G = 6\ \Omega, R_L = 2.7\ \Omega$ | -- | 5.2 | -- | ns |
| t_r | Turn-On Rise Time | | -- | 37 | -- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 15 | -- | ns |
| t_f | Turn-Off Fall Time | | -- | 5.7 | -- | ns |
| Q_g | Total Gate Charge | $V_{DS} = 10\text{ V}, I_D = 4.3\text{ A},$ $V_{GS} = 5\text{ V}$ | -- | 4.4 | -- | nC |
| Q_{gs} | Gate-Source Charge | | -- | 0.6 | -- | nC |
| Q_{gd} | Gate-Drain Charge | | -- | 1.9 | -- | nC |

Drain-Source Diode Characteristics and Maximum Ratings

| | | | | | |
|----------|---|----|----|------|---|
| I_S | Maximum Continuous Drain-Source Diode Forward Current | -- | -- | 4.3 | A |
| I_{SM} | Maximum Pulsed Drain-Source Diode Forward Current | -- | -- | 12.9 | A |
| V_{SD} | Drain to Source Diode Forward Voltage, $V_{GS} = 0\text{ V}, I_{SD} = 4.3\text{ A}, T_J = 25^\circ\text{C}$ | -- | -- | 1.2 | V |

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. Device mounted on FR-4 PCB, 1inch x 0.85inch x 0.062 inch
3. Pulse Test: Pulse Width \leq 300 μ s, Duty Cycle \leq 0.5%

N- Channel Typical Characteristics

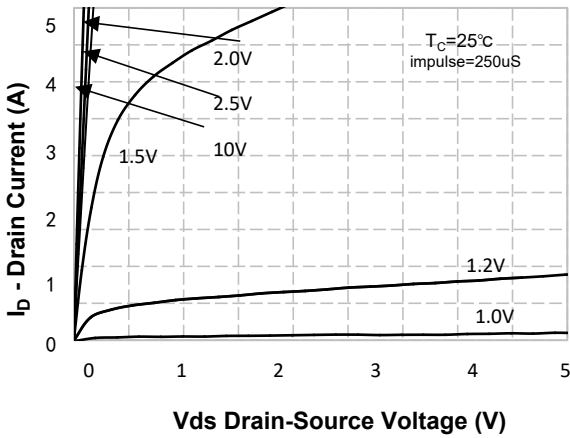


Figure 1. On-Region Characteristics

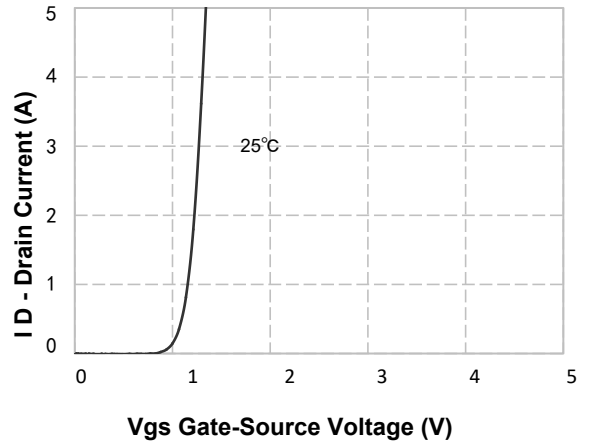


Figure 2. Transfer Characteristics

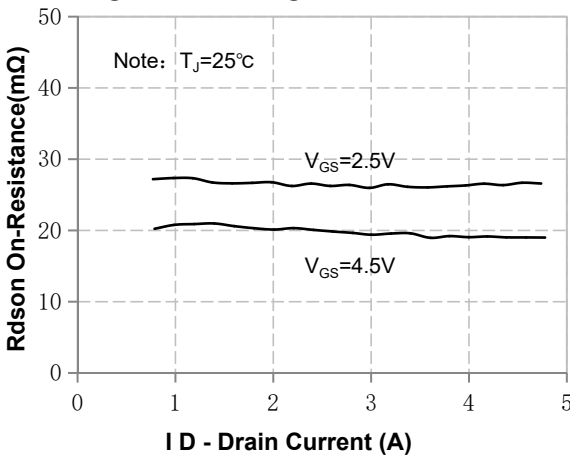


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

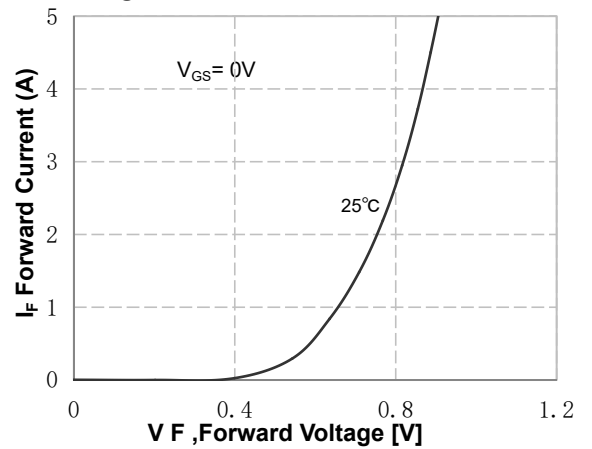


Figure 4. Body Diode Forward Voltage Variation with Source Current

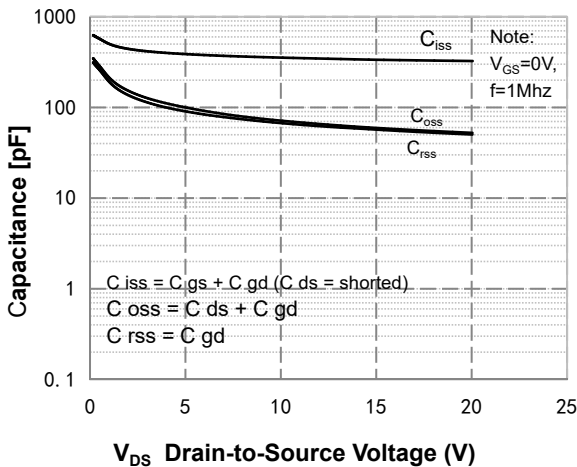


Figure 5. Capacitance Characteristics

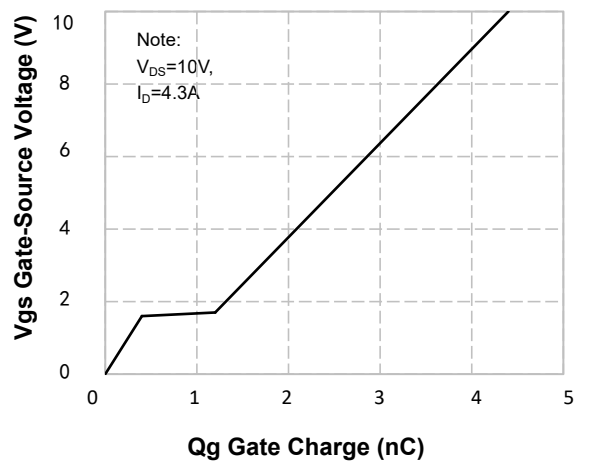


Figure 6. Gate Charge Characteristics

N- Channel Typical Characteristics (Continued)

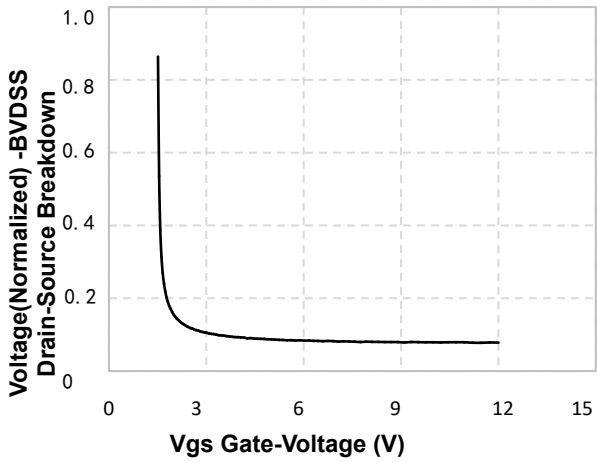


Figure 7. Breakdown Voltage Variation vs Gate-Voltage

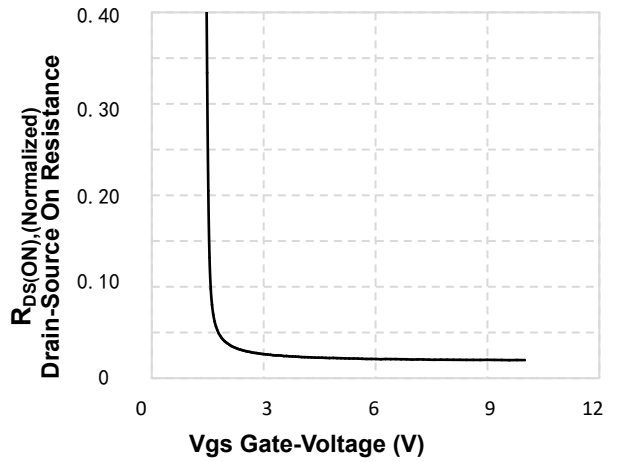


Figure 8. On-Resistance Variation vs Gate Voltage

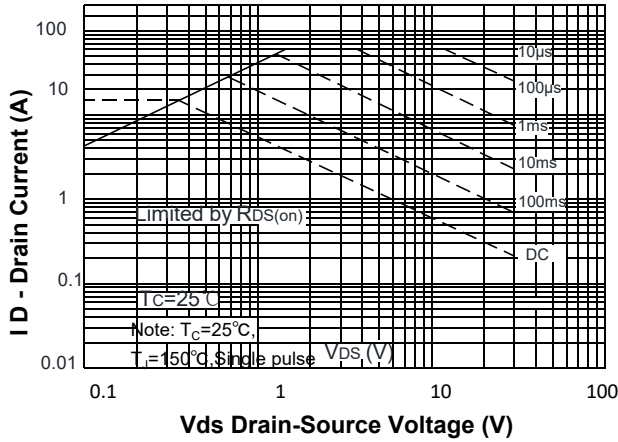


Figure 9. Maximum Safe Operating Area

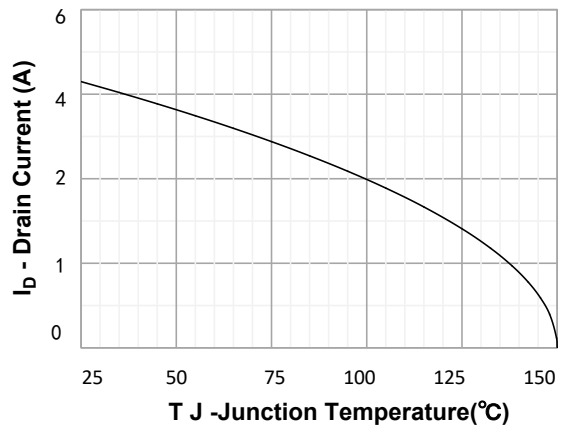


Figure 10. Maximum Continuous Drain Current vs Temperature

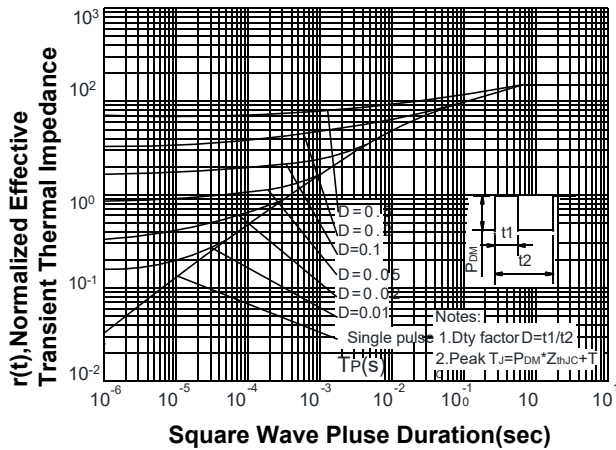
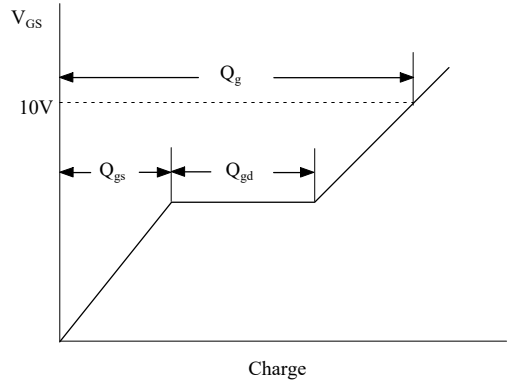
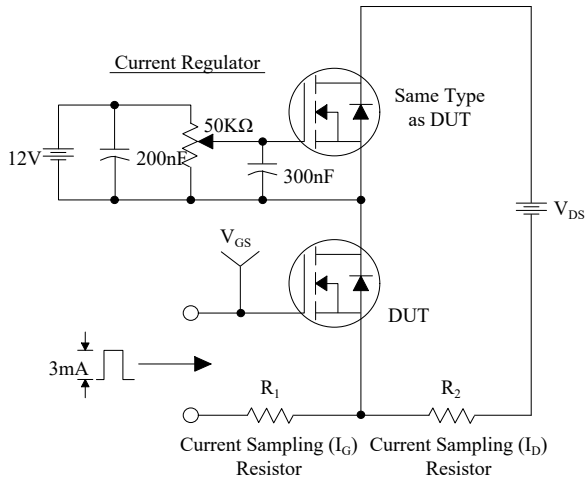
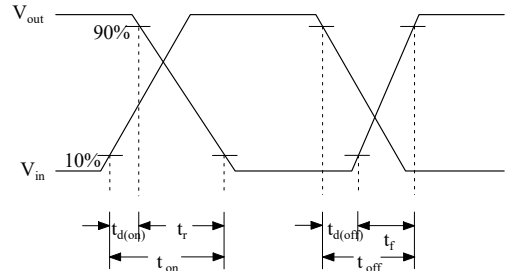
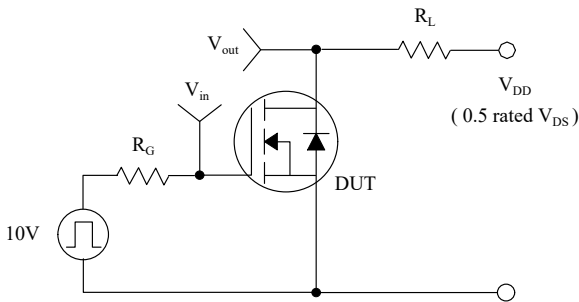


Figure 11. Transient Thermal Response Curve

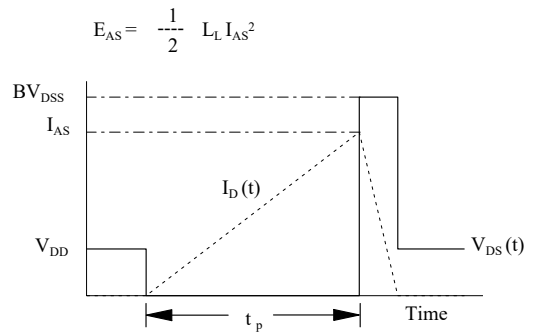
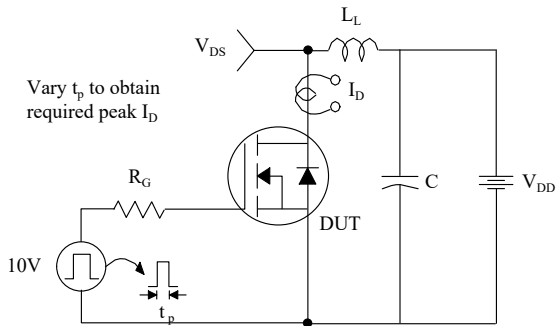
Gate Charge Test Circuit & Waveform



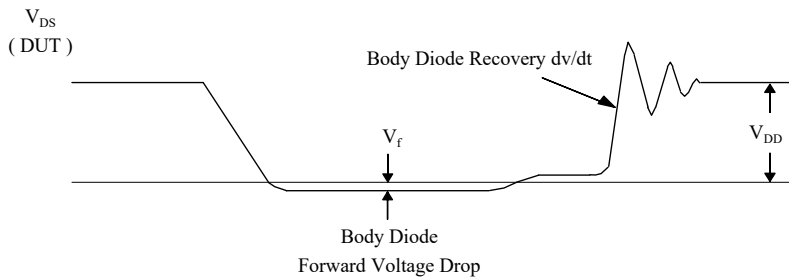
Resistive Switching Test Circuit & Waveforms



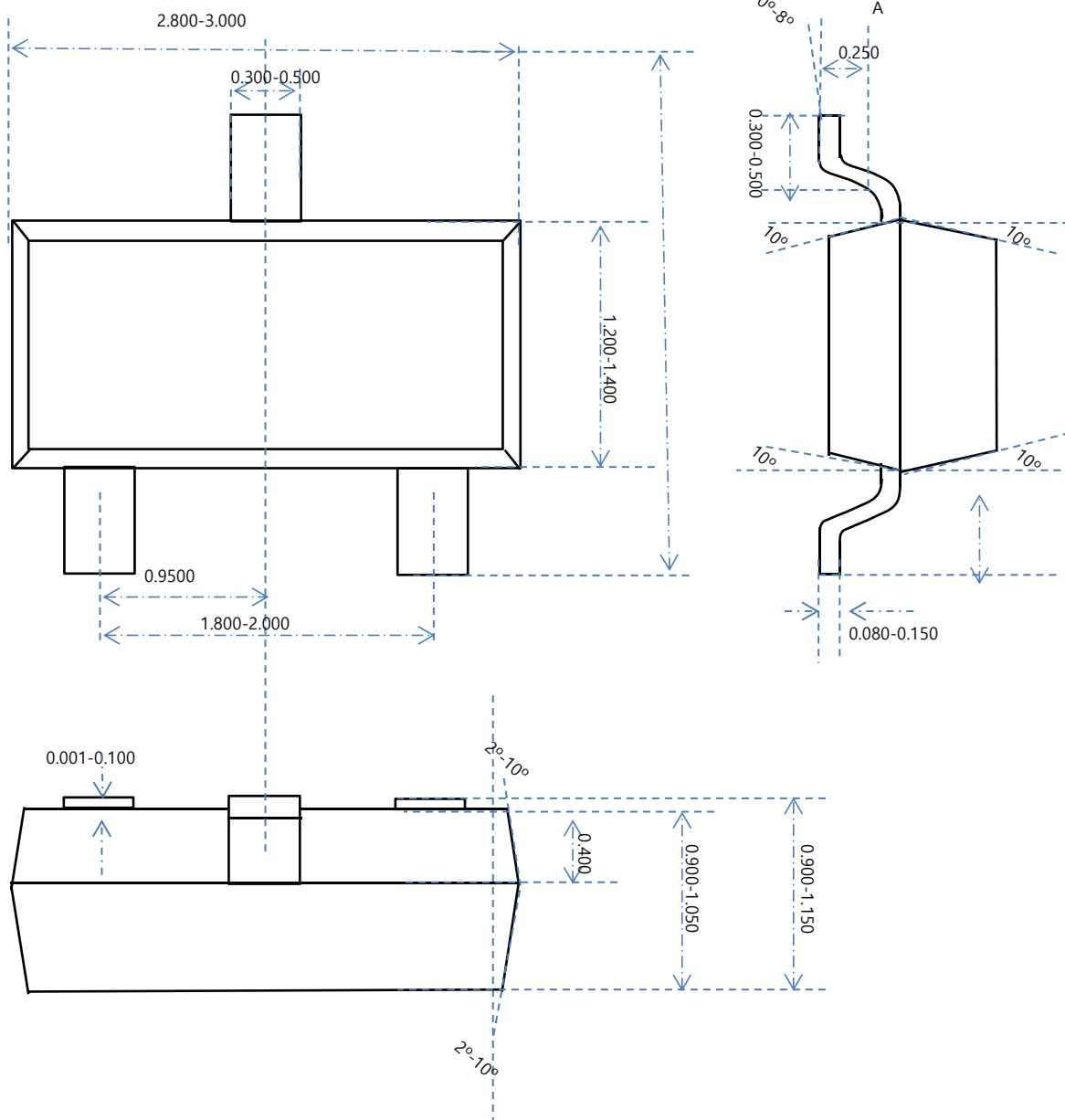
Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



SOT-23 OUTLINE



NOTE:

- 1.The plastic package is not marked as smooth surfaceRa=0.1; Subglossy surfaceRa=0.8
- 2.Undeclared tolerance±0.25,Unmarked filletRmax=0.25

| | | | | | | |
|---------|----------------|------------|--------|----------|-------|--------------------|
| NAME | SOT-23 OUTLINE | UNIT | mm | DESIGNED | Shawn | THIRD ANGLE SYSTEM |
| DWGNO | | PAGE | 1 OF 1 | CHECKED | | |
| VERSION | Ver1.0 | ISSUE DATE | | APPROVED | | |

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