

## Product Summary

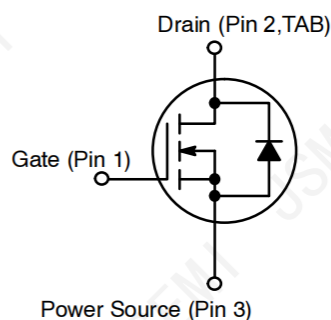
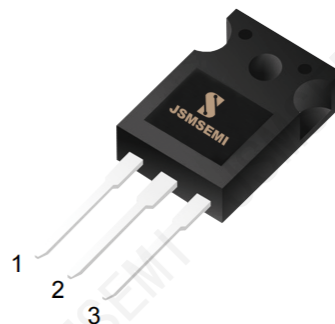
- $V_{DS}$  1500V
- $I_D$  4A
- $R_{DS(ON)}$  (at  $V_{GS}=10V$ )  $<4\Omega$
- 100% EAS Tested
- 100%  $\nabla V_{DS}$  Tested

## General Description

- Vertical Double-diffused MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

## Applications

- Power switching application
- Uninterruptible power supply
- DC-DC convertor
- Motor drivers



| Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ , unless otherwise noted |                |                 |                  |
|----------------------------------------------------------------------------|----------------|-----------------|------------------|
| Parameter                                                                  | Symbol         | Value           | Unit             |
|                                                                            |                | TO-247          |                  |
| Drain-Source Voltage ( $V_{GS} = 0V$ )                                     | $V_{DSS}$      | 1500            | V                |
| Continuous Drain Current $V_{GS} = 10V$ $T_C = 25^\circ\text{C}$           | $I_D$          | 4               | A                |
| Pulsed Drain Current (note1)                                               | $I_{DM}$       | 16              | A                |
| Gate-Source Voltage                                                        | $V_{GSS}$      | $\pm 30$        | V                |
| Single Pulse Avalanche Energy (note2)                                      | $E_{AS}$       | 230.2           | mJ               |
| Avalanche Current (note1)                                                  | $I_{AS}$       | 19.8            | A                |
| Repetitive Avalanche Energy (note1)                                        | $E_{AR}$       | 1176.1          | mJ               |
| Power Dissipation ( $T_C = 25^\circ\text{C}$ )                             | $P_D$          | 65              | W                |
| Peak Diode Recovery $dv/dt$ (note1)                                        | $dv/dt$        | 5.0             |                  |
| Operating Junction and Storage Temperature Range                           | $T_J, T_{stg}$ | $-55 \sim +150$ | $^\circ\text{C}$ |

| Thermal Resistance                      |            |       |                    |
|-----------------------------------------|------------|-------|--------------------|
| Parameter                               | Symbol     | Value | Unit               |
| Thermal Resistance, Junction-to-Case    | $R_{thJC}$ | 3.8   | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{thJA}$ | 67.3  |                    |

**Specifications**  $T_J = 25^{\circ}\text{C}$ , unless otherwise noted

| Parameter                               | Symbol        | Test Conditions                                         | Value |      |           | Unit     |
|-----------------------------------------|---------------|---------------------------------------------------------|-------|------|-----------|----------|
|                                         |               |                                                         | Min.  | Typ. | Max.      |          |
| Static                                  |               |                                                         |       |      |           |          |
| Drain-Source Breakdown Voltage          | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$                           | 1500  | --   | --        | V        |
| Zero Gate Voltage Drain Current         | $I_{DSS}$     | $V_{DS} = 1500V, V_{GS} = 0V, T_J = 25^{\circ}C$        | --    | --   | 1         | $\mu A$  |
|                                         |               | $V_{DS} = 1200V, V_{GS} = 0V, T_J = 125^{\circ}C$       | --    | --   | 100       |          |
| Gate-Source Leakage                     | $I_{GSS}$     | $V_{GS} = \pm 30V$                                      | --    | --   | $\pm 100$ | nA       |
| Gate-Source Threshold Voltage           | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu A$                       | 3.0   | --   | 4.5       | V        |
| Drain-Source On-Resistance (Note3)      | $R_{DS(on)}$  | $V_{GS} = 10V, I_D = 4A$                                | 3.6   | 3.8  | 4.0       | $\Omega$ |
| Dynamic                                 |               |                                                         |       |      |           |          |
| Input Capacitance                       | $C_{iss}$     | $V_{GS} = 0V, V_{DS} = 25V, f = 1.0MHz$                 | --    | 1884 | --        | pF       |
| Output Capacitance                      | $C_{oss}$     |                                                         | --    | 93   | --        |          |
| Reverse Transfer Capacitance            | $C_{rss}$     |                                                         | --    | 5.1  | --        |          |
| Total Gate Charge                       | $Q_g$         | $V_{DD} 750V, I_D = 4A, V_{GS} = 10V$                   | --    | 36   | --        | nC       |
| Gate-Source Charge                      | $Q_{gs}$      |                                                         | --    | 8    | --        |          |
| Gate-Drain Charge                       | $Q_{gd}$      |                                                         | --    | 17   | --        |          |
| Turn-on Delay Time                      | $t_{d(on)}$   | $V_{DD} = 750V, I_D = 4A, R_G = 10\Omega, V_{GS} = 10V$ | --    | 35   | --        | ns       |
| Turn-on Rise Time                       | $t_r$         |                                                         | --    | 16   | --        |          |
| Turn-off Delay Time                     | $t_{d(off)}$  |                                                         | --    | 56   | --        |          |
| Turn-off Fall Time                      | $t_f$         |                                                         | --    | 37   | --        |          |
| Drain-Source Body Diode Characteristics |               |                                                         |       |      |           |          |
| Continuous Body Diode Current           | $I_S$         | $T_C = 25^{\circ}C$                                     | --    | --   | 4         | A        |
| Pulsed Diode Forward Current            | $I_{SM}$      |                                                         | --    | --   | 16        |          |
| Body Diode Voltage                      | $V_{SD}$      | $T_J = 25^{\circ}C, I_{SD} = 4A, V_{GS} = 0V$           | --    | --   | 1.0       | V        |
| Reverse Recovery Time                   | $t_{rr}$      | $V_{GS} = 0V, I_S = 4A, di_F/dt = 100A/\mu s$           | --    | 560  | --        | ns       |
| Reverse Recovery Charge                 | $Q_{rr}$      |                                                         | --    | 5.61 | --        | $\mu C$  |

- Notes**
1. Repetitive Rating: Pulse width limited by maximum junction temperature
  2.  $L = 10mH, V_{DD} = 50V, R_G = 25\Omega$ , Starting  $T_J = 25^{\circ}\text{C}$
  3. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 1\%$

**Ordering Information**

| Order number  | Package | Marking   | Operation Temperature Range  | MSL Grade | Ship,Quantity | Green |
|---------------|---------|-----------|------------------------------|-----------|---------------|-------|
| IXTH4N150-JSM | TO-247S | JSM4N150P | -55 to $150^{\circ}\text{C}$ | 1         | TUBE,450      | Rohs  |

Typical Characteristics  $T_J = 25^\circ\text{C}$ , unless otherwise noted

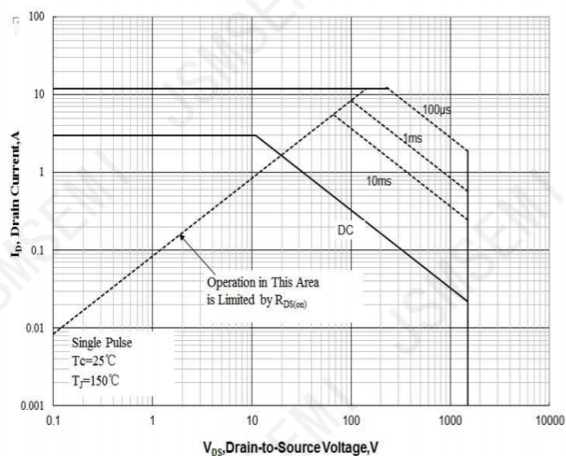


Figure 1 Maximum Forward Bias Safe Operating Area

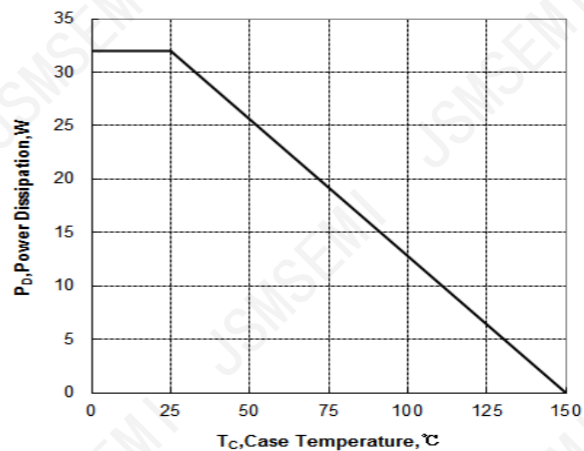


Figure 2 Maximum Power dissipation vs Case Temperature

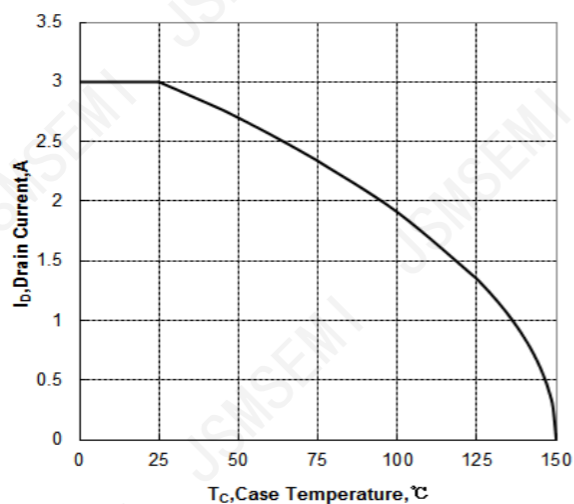


Figure 3 Maximum Continuous Drain Current vs Case Temperature

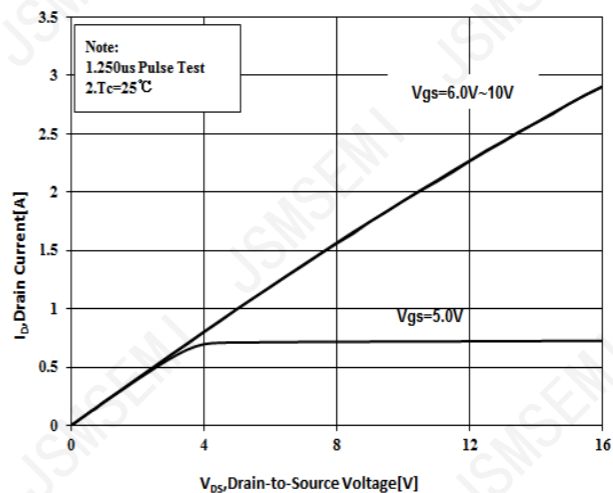


Figure 4 Typical Output Characteristics

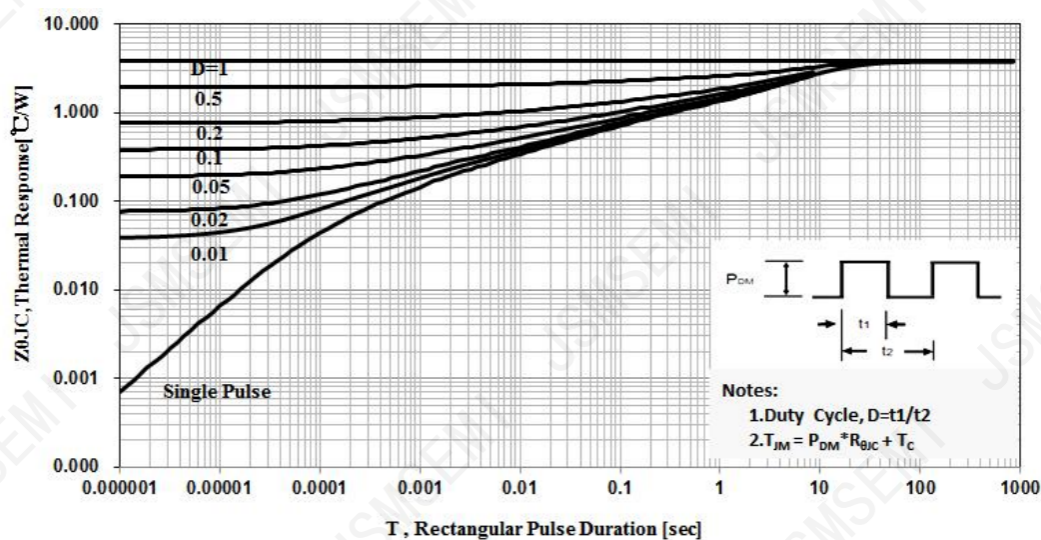


Figure 5 Maximum Effective Thermal Impedance , Junction to Case

**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

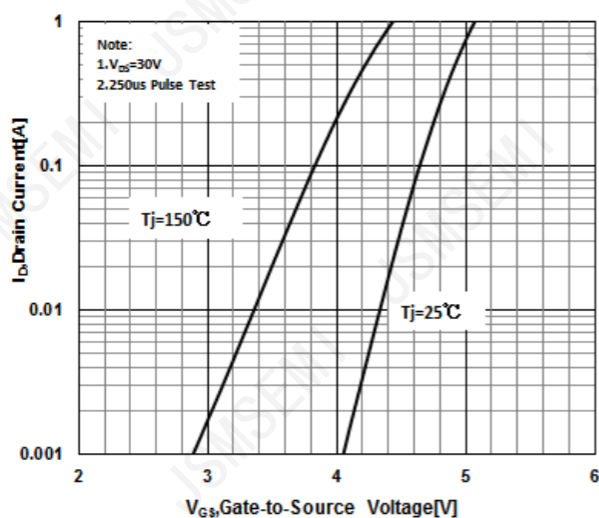


Figure 6 Typical Transfer Characteristics

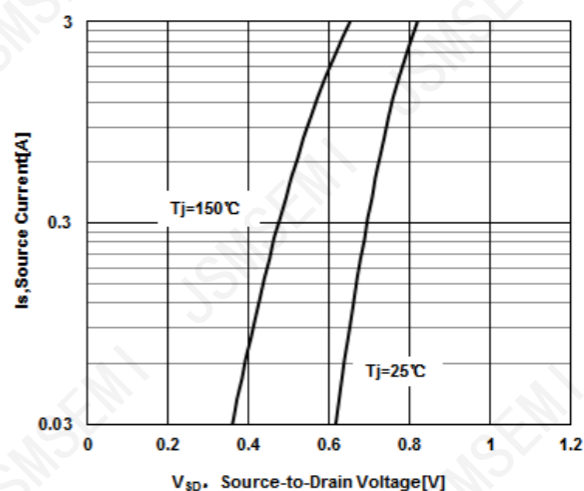


Figure 7 Typical Body Diode Transfer Characteristics

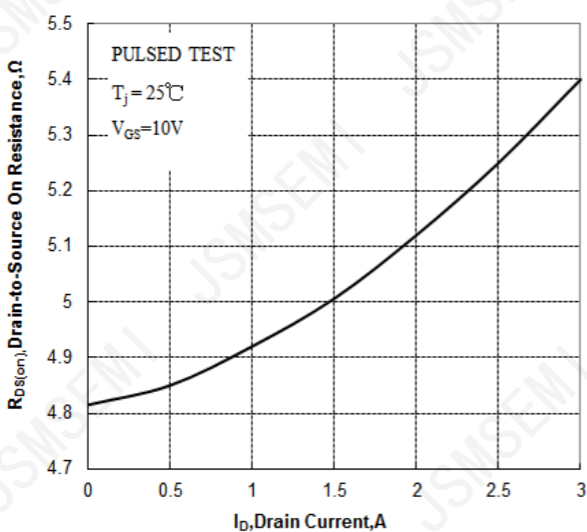


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

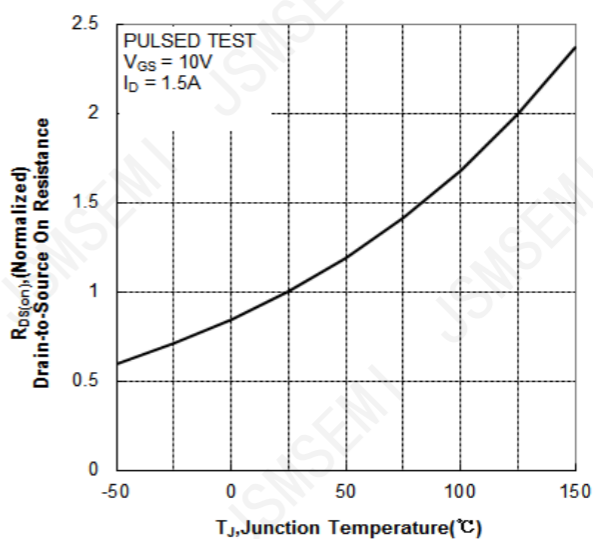


Figure 9 Typical Drain to Source on Resistance vs Junction Temperature

Figure A: Gate Charge Test Circuit and Waveform

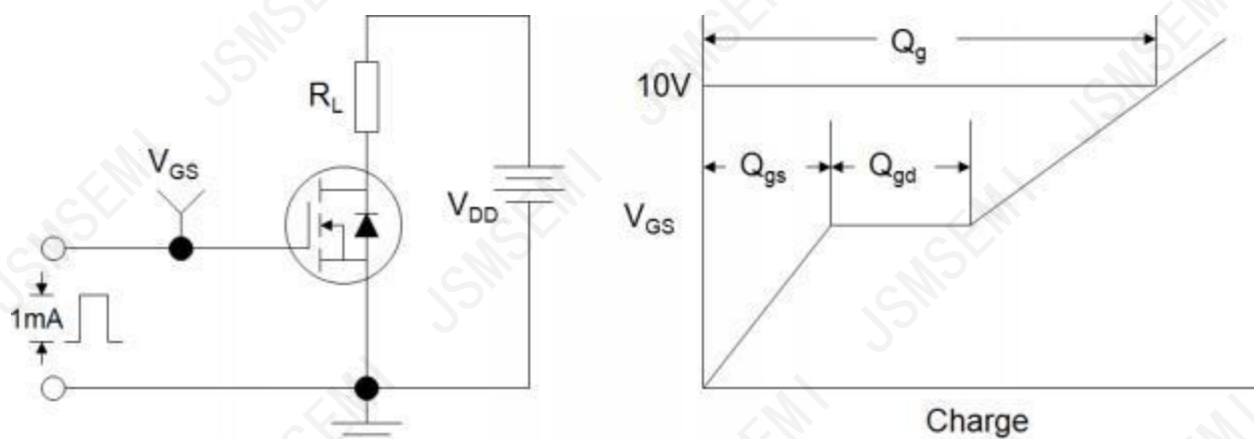


Figure B : Resistive Switching Test Circuit and Waveform

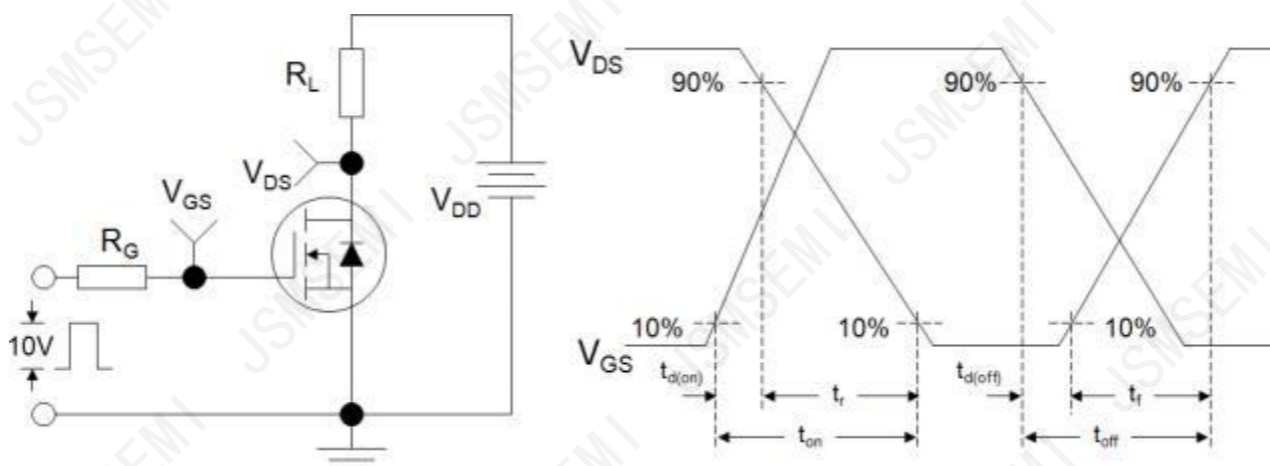
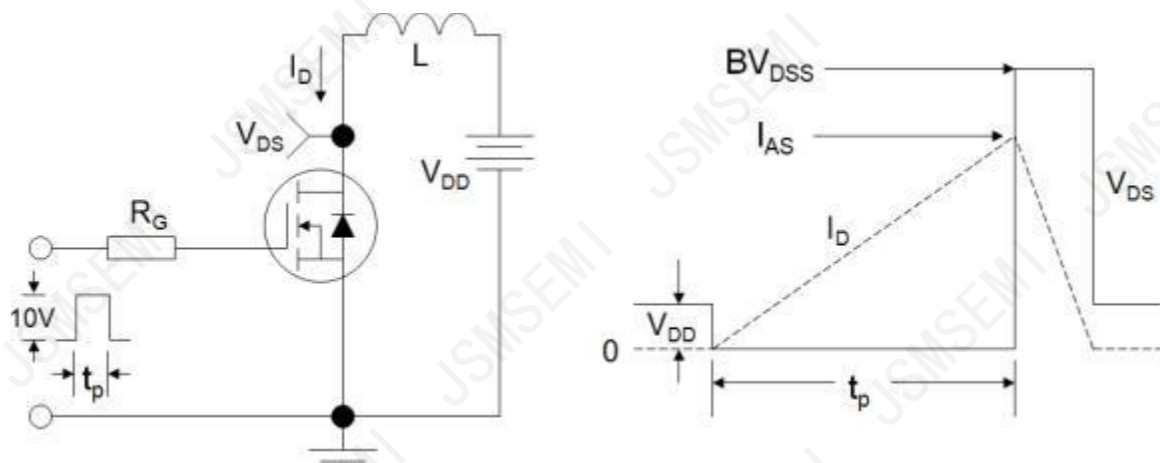


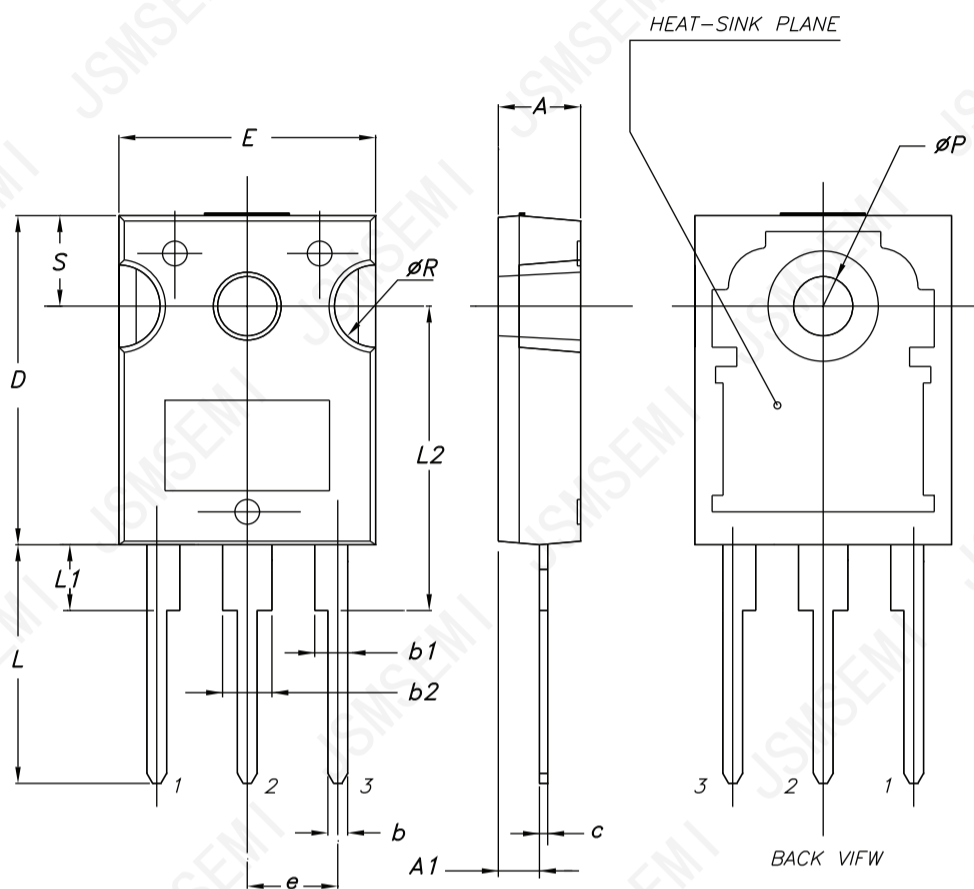
Figure C : Unclamped Inductive Switching Test Circuit and Waveform





Package Information

TO-247S



| Dim. | mm.   |       |       |
|------|-------|-------|-------|
|      | Min.  | Typ.  | Max.  |
| A    | 4.85  |       | 5.15  |
| A1   | 2.20  |       | 2.60  |
| b    | 1.0   |       | 1.40  |
| b1   | 2.0   |       | 2.40  |
| b2   | 3.0   |       | 3.40  |
| c    | 0.40  |       | 0.80  |
| D    | 19.85 |       | 20.15 |
| E    | 15.45 |       | 15.75 |
| e    | 5.30  | 5.45  | 5.60  |
| L    | 14.20 |       | 14.80 |
| L1   | 3.70  |       | 4.30  |
| L2   |       | 18.50 |       |
| ØP   | 3.55  |       | 3.65  |
| ØR   | 4.50  |       | 5.50  |
| S    | 5.30  | 5.50  | 5.70  |

## Revision History

| Rev. | Change          | Date      |
|------|-----------------|-----------|
| V1.0 | Initial version | 6/27/2020 |
|      |                 |           |

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