REASUNOS

# RS6N65D

**N Channel MOSFET**

Lead Free Package and Finish

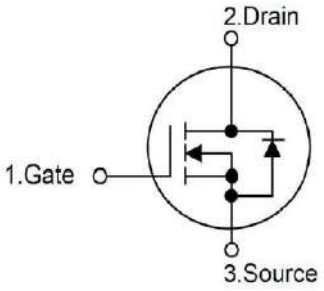
## Applications:

- •Adapter & Charger
- •AC-DC Switching Power Supply
- •LED driving power
- •PC Power Supply

| $I_D$ | $R_{DS(ON)}$(Typ.) | $V_{DSS}$ |
|---|---|---|
| 6A | 1.65Ω | 650V |

## Features:

- •100% avalanche tested
- •Low Gate Charge Minimize Switching Loss
- •$R_{DS(ON)}$,typ.=1.65 Ω@$V_{GS}$=10V
- •RoHS Compliant




Not to Scale

## Ordering Information

| Part Number | Package | Marking |
|---|---|---|
| RS6N65D | TO-252 | RS6N65D |

## Absolute Maximun Ratings Tc=25℃ unless otherwise specified

| Symbol | Parameter | RS6N65D | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain-to-Source Voltage | 650 | V |
| $I_D$ | Continuous Drain Current | 6 | A |
| $I_{DM}$ | Pulsed Drain Current (Note*1) | 24 | |
| $P_D$ | Power Dissipation | 83 | W |
| $V_{GS}$ | Gate-to-Source Voltage | ±30 | V |
| $E_{AS}$ | Single Pulse Avalanche Engergy (Note *2) | 61 | mJ |
| $I_{AR}$ | Avalanche Current (Note*1) | 3.5 | A |
| $E_{AR}$ | Repetitive Avalanche Energy (Note*1) | 39 | mJ |
| $T_L$ | Maximum Temperature for Soldering | 300 | ℃ |
| $T_{PKG}$ | Leads at 0.063in(1.6mm)from Case for 10 seconds<br>Package Body for 10 seconds | 260 | |
| $T_J$ and $T_{STG}$ | Operating Junction and Storage Temperature Range | -55 to 150 | |

*Drain Current Limited by Maximum Junction Temperature

Caution:Stresses greater than those listed in the“Absolute Maximum Ratings”Table may cause permanent damage to the device.

## Thermal Resistance

| Symbol | Parameter | RS6N65D | Units | Test Conditions |
|---|---|---|---|---|
| RθJC | Junction-to-Case | 1.5 | ℃/W | Drain lead soldered to water cooled heatsink,PD adjusted for a peak junction temperature of +150℃. |
| RθJA | Junction-to-Ambient | 60 | | 1 cubic foot chamber,free air. |

**OFF Characteristics** TJ=25℃ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| BVDSS | Drain-to-source Breakdown Voltage | 650 | -- | -- | V | VGS=0V,ID=250μA |
| IDSS | Drain-to-Source Leakage Current | -- | -- | 1 | μA | VDS=650V,VGS=0V |
| IGSS | Gate-to-Source Forward Leakage | -- | -- | 100 | nA | VGS=+30V VDS=0V |
| | Gate-to-Source Reverse Leakage | -- | -- | -100 | | VGS=-30V VDS=0V |

**ON Characteristics TJ=25℃ unless otherwise specified**

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| RDS(on) | Static Drain-to-Source On-Resistance (Note *3) | -- | 1.65 | 1.88 | Ω | VGS=10V,ID=3A |
| VGS(TH) | Gate Threshold Voltage | 3.0 | -- | 4.0 | V | VGS=VDS,ID=250μA |

**Resistive Switching Characteristics** Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| td(ON) | Turn-on Delay Time | -- | 37 | -- | nS | VDS=400V<br>ID=6A<br>VGS=10V<br>RG=25Ω |
| trise | Rise Time | -- | 16 | -- | | |
| td(OFF) | Turn-OFF Delay Time | -- | 98 | -- | | |
| tfall | Fall Time | -- | 28 | -- | | |

**Dynamic Characteristics** Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| Ciss | Input Capacitance | -- | 630 | -- | pF | VGS=0V<br>VDS=25V<br>f=1.0MHz |
| Coss | Output Capacitance | -- | 65 | -- | | |
| Crss | Reverse Transfer Capacitance | -- | 7 | -- | | |
| Qg | Total Gate Charge | -- | 20 | -- | nC | VDS=520V<br>ID=6A<br>VGS=0 to 10V |
| Qgs | Gate-to-Source Charge | -- | 3 | -- | | |
| Qgd | Gate-to-Drain("Miller"）Charge | -- | 10.5 | -- | | |

## Source-Drain Diode Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| IS | Continuous Source Current | -- | -- | 6 | A | Integral pn-diode in MOSFET |
| ISM | Maximum Pulsed Current | -- | -- | 24 | A | |
| VSD | Diode Forward Voltage | -- | -- | 1.4 | V | IS=6A,VGS=0V |
| trr | Reverse Recovery Time | -- | 630 | -- | nS | VGS=0V IF=Is,di/dt=100A/μs |
| Qrr | Reverse Recovery Charge | -- | 1.52 | -- | μC | |

## Notes:

*1.Repetitive rating;pulse width limited by maximum junction temperature.
*2.L = 10.0mH, VDD = 50V, RG = 25 Ω, Starting TJ = 25 ºC
*3.Pulse width≤300μs;duty cycle ≤1%.

## Typical Feature curve

**Figure 1. Output Characteristics ($T_J$ = 25ºC)**

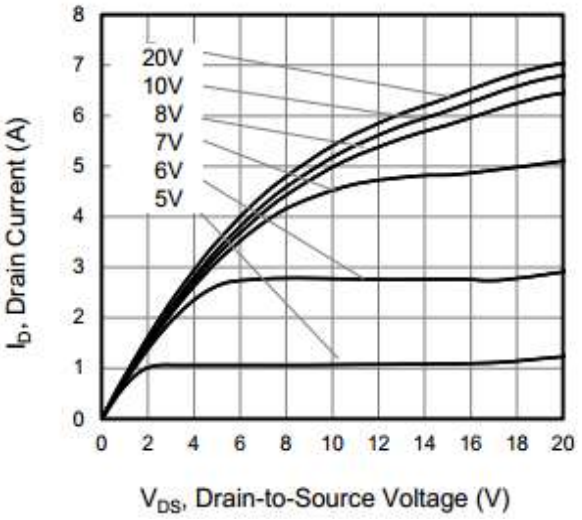



**Figure 2. Body Diode Forward Voltage**

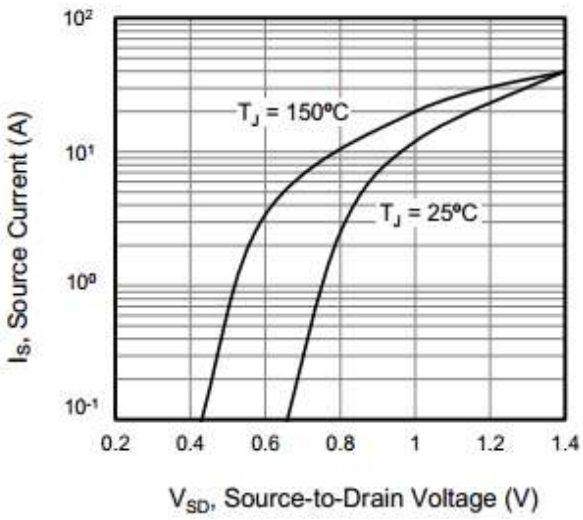


**Figure 3. Drain Current vs. Temperature**

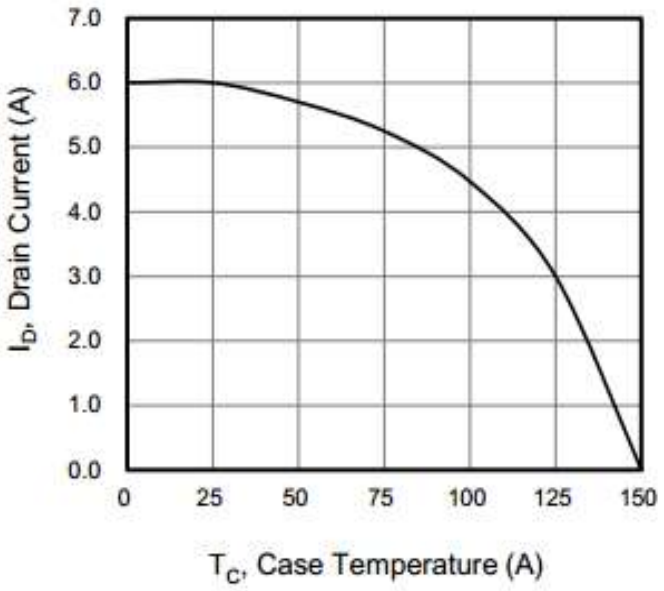



**Figure 4. $BV_{DSS}$ Variation vs. Temperature**

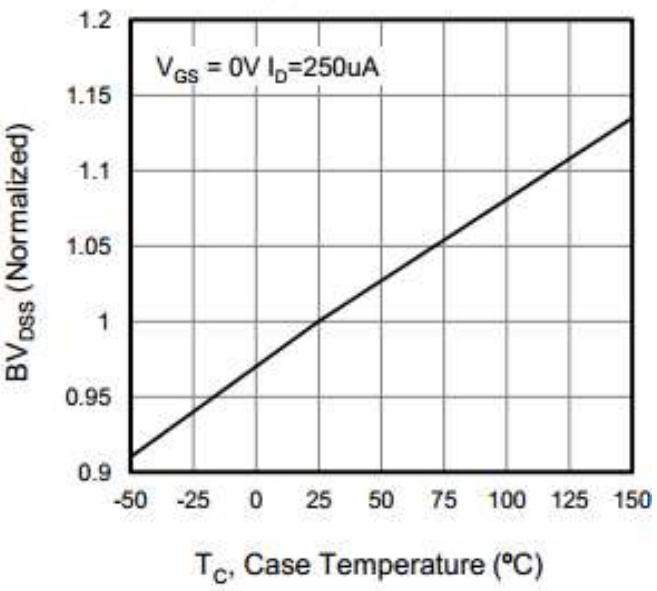



**Figure 5. Transfer Characteristics**

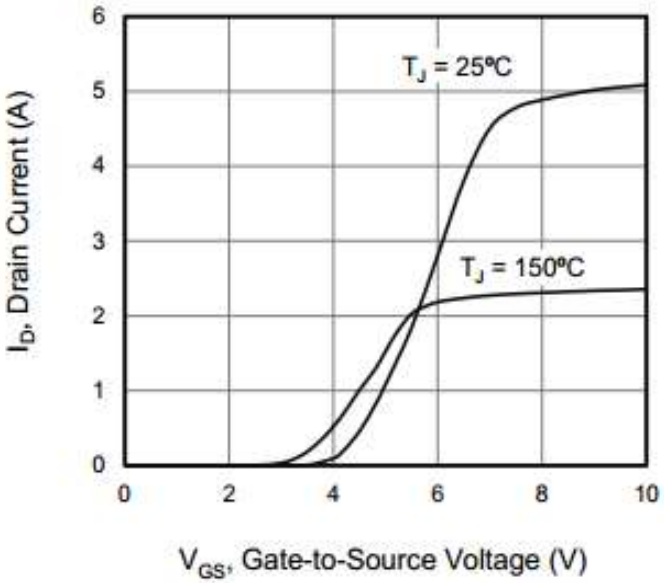



**Figure 6. On-Resistance vs. Temperature**

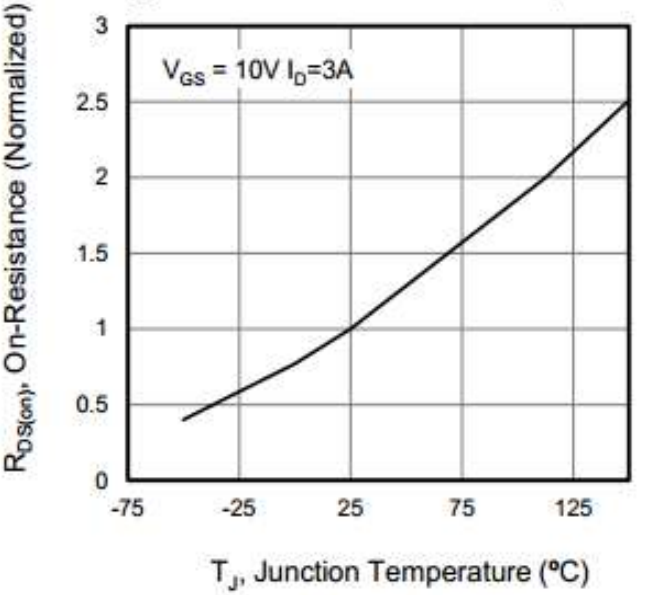


**Figure 7. Capacitance**

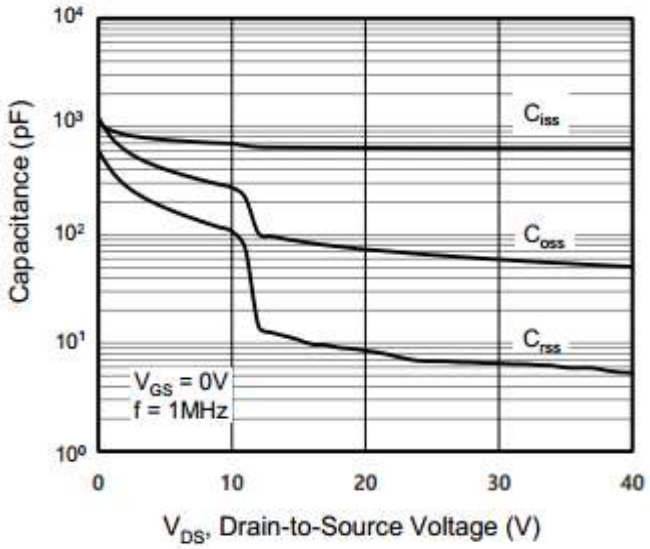



**Figure 8. Gate Charge**

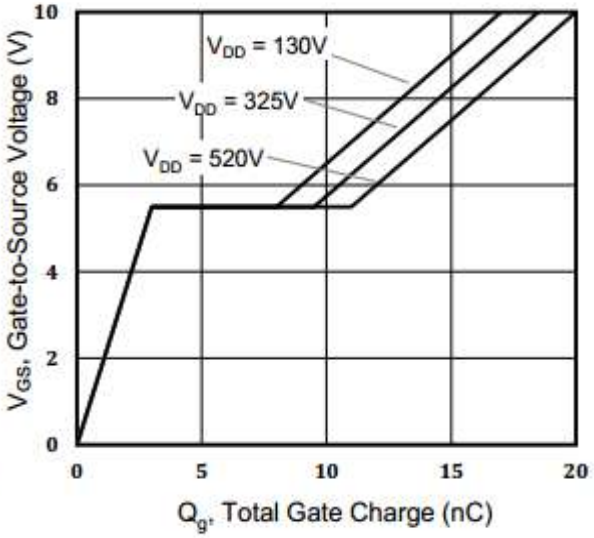
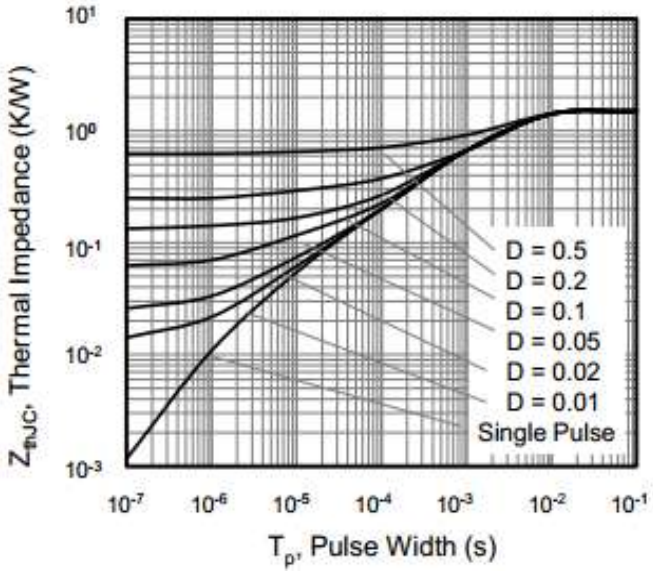



**Figure 9. Transient Thermal Impedance**

**TO-252**



## Test Circuits and Waveforms

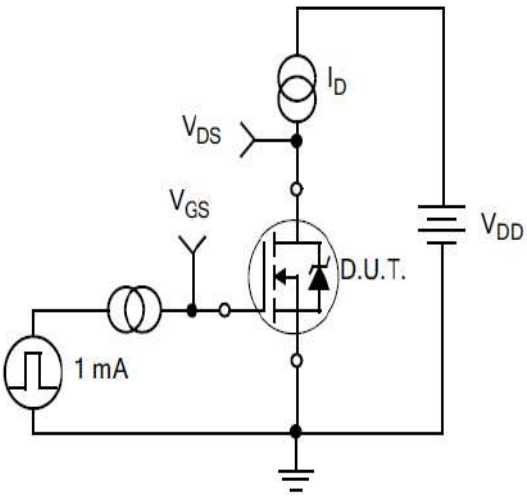



Figure A.
Gate Charge Test Circuit

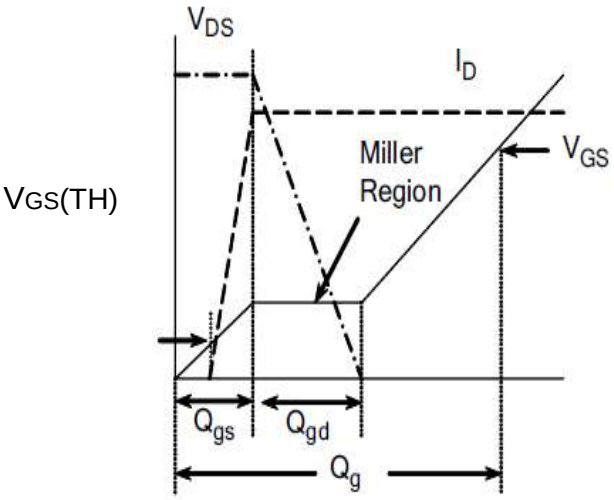



Figure B.
Gate Charge Waveform

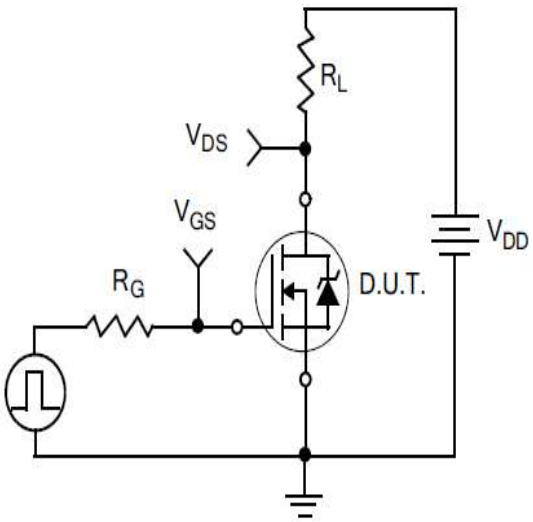



Figure C.
Resistive Switching Test Circuit

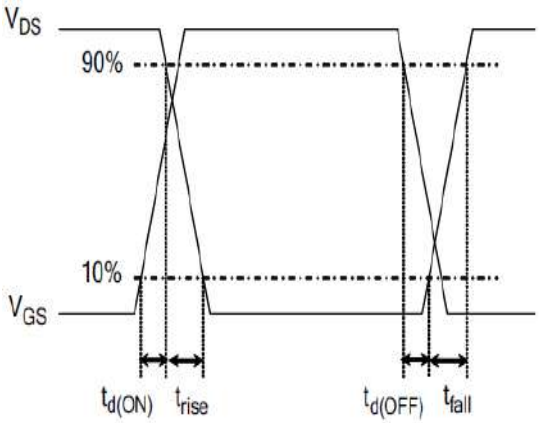



Figure D.
Resistive Switching Waveforms

## Test Circuits and Waveforms

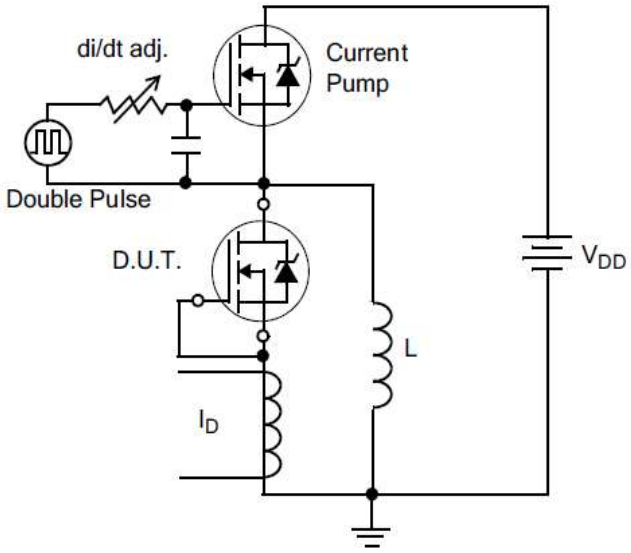



Figure E.Diode Reverse Recovery Test Circuit

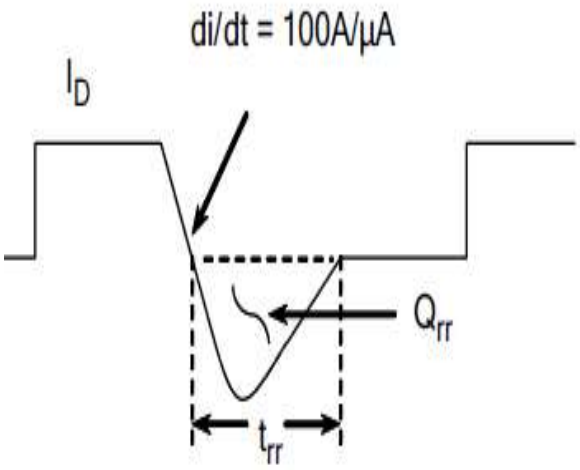



Figure F.Diode Reverse Recovery Waveform

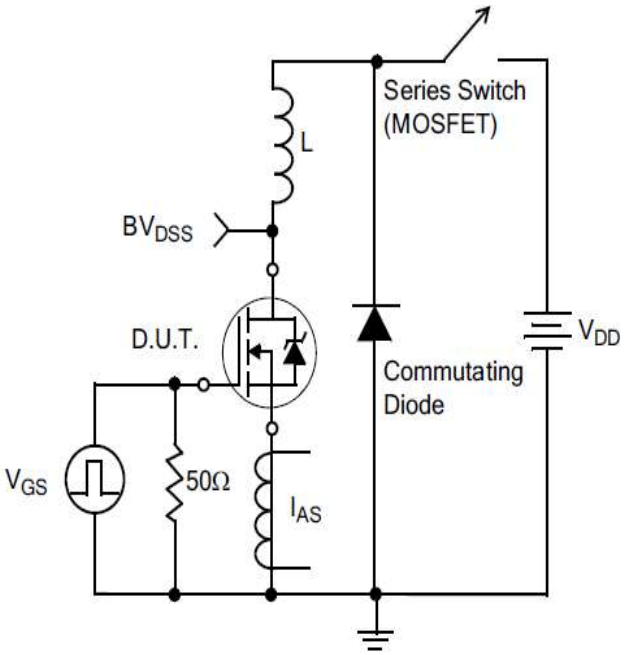
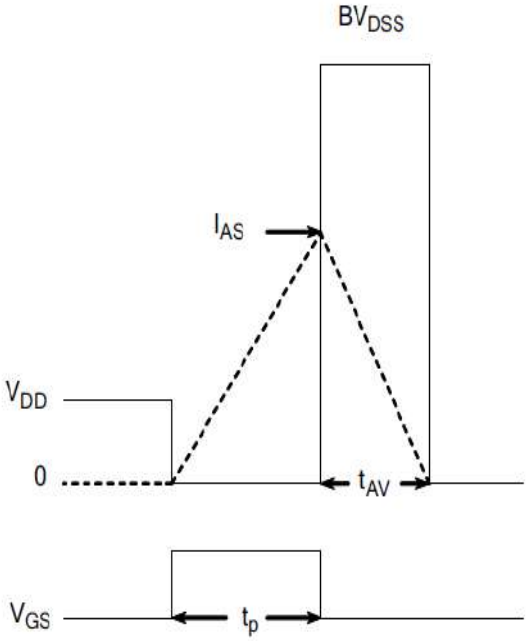



Figure G.Unclamped Inductive Switching Test Circuit



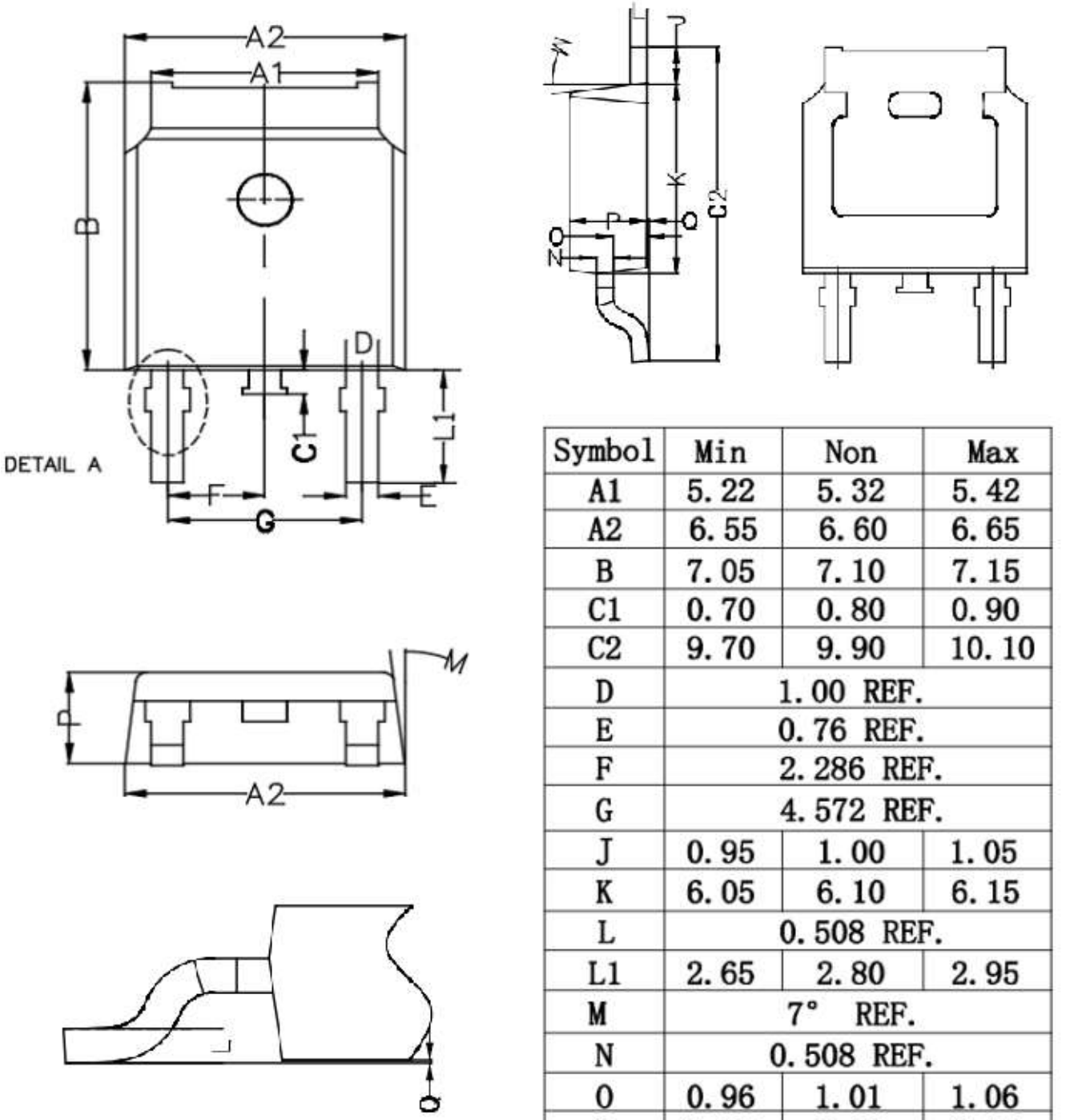

$$E_{AS}=\frac{I_{AS}^2 L}{2}$$

Figure H.Unclamped Inductive Switching Waveforms

## Package outline drawing

Unit:mm

# TO-252




| Symbol | Min | Non | Max |
|---|---|---|---|
| A1 | 5.22 | 5.32 | 5.42 |
| A2 | 6.55 | 6.60 | 6.65 |
| B | 7.05 | 7.10 | 7.15 |
| C1 | 0.70 | 0.80 | 0.90 |
| C2 | 9.70 | 9.90 | 10.10 |
| D | | 1.00 REF. | |
| E | | 0.76 REF. | |
| F | | 2.286 REF. | |
| G | | 4.572 REF. | |
| J | 0.95 | 1.00 | 1.05 |
| K | 6.05 | 6.10 | 6.15 |
| L | | 0.508 REF. | |
| L1 | 2.65 | 2.80 | 2.95 |
| M | | 7° REF. | |
| N | | 0.508 REF. | |
| O | 0.96 | 1.01 | 1.06 |
| P | 2.25 | 2.30 | 2.35 |
| Q | 0.00 | 0.05 | 0.10 |

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