# DSE108N20NA

200V/11mΩ/110A N-MOSFET

## Features

- **AEC-Q101 qualified**
- Low on resistance
- Low reverse transfer capacitances
- 100% single pulse avalanche energy test
- 100% ΔVDS test
- Pb-Free plating / Halogen-Free / RoHS compliant

## Applications

- Power switching applications
- DC-DC converters
- Full bridge control

## Key Parameters

| | |
|---|---|
| $V_{DS}$ | 200V |
| $R_{DS(on)typ.}$ | 11mΩ |
| $I_D$ | 110A |
| $Ciss_{@10V}$ | 4260pF |
| Qgd | 9nC |

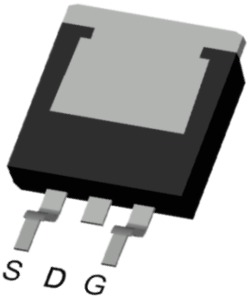
AEC Qualified

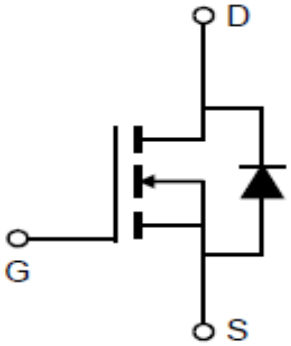
Pb LEAD FREE

Hal Halogen FREE

RoHS COMPLIANT

## TO-263


## Marking & Packing Information

| Part # | Package | Marking | Tube/Reel | Qty(pcs) |
|---|---|---|---|---|
| DSE108N20NA | TO-263 | DSE108N20NA | Reel | 800/box |

## Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-source voltage | $V_{DS}$ | 200 | V |
| Gate-Source voltage | $V_{GS}$ | ±20 | V |
| Continuous drain current<br>$T_C$ = 25°C<br>$T_C$ = 100°C | $I_D$ | <br>110<br>78 | A |
| Pulsed drain current ($T_C$ = 25°C, $t_p$ limited by $T_{jmax}$) | $I_{D\ pulse}$ | 440 | A |
| Avalanche energy, single pulse (L=0.5mH, Rg=25Ω)[1] | $E_{AS}$ | 1122 | mJ |
| Power dissipation $T_C$ = 25°C | $P_{tot}$ | 333 | W |
| Power dissipation $T_A$ = 25°C | $P_{tot}$ | 2.3 | W |
| Operating junction and storage temperature | $T_j$ , $T_{stg}$ | -55...+175 | °C |

Notes:1.EAS was tested at Tj = 25℃, L = 0.5mH, Id=47A.

## Thermal Resistance

| Parameter | Symbol | Max | Unit |
|---|---|---|---|
| Thermal resistance, junction – case. | $R_{thJC}$ | 0.45 | °C/W |
| Thermal resistance, junction – ambient(min. footprint) | $R_{thJA}$ | 65 | °C/W |

## Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

### Static Characteristic

| Parameter | Symbol | Value | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | min. | typ. | max. | | |
| Drain-source breakdown voltage | $BV_{DSS}$ | 200 | - | - | V | $V_{GS}$=0V, $I_D$=250uA |
| Gate threshold voltage | $V_{GS(th)}$ | 2.5 | - | 4.5 | V | $V_{DS}$=$V_{GS}$,$I_D$=250uA |
| Zero gate voltage drain current | $I_{DSS}$ | - | - | 1 | μA | $V_{DS}$=180V,$V_{GS}$=0V<br>$T_j$=25°C |
| Zero gate voltage drain current | $I_{DSS}$ | - | - | 100 | μA | $T_j$=125°C |
| Gate-source leakage current | $I_{GSS}$ | - | - | 100 | nA | $V_{GS}$=20V,$V_{DS}$=0V |
| Drain-source on-state resistance | $R_{DS(on)}$ | | 11 | 13 | mΩ | $V_{GS}$=10V, $I_D$=60A, Tj=25°C |
| Transconductance | $g_{fs}$ | - | 80 | - | S | $V_{DS}$=5V,$I_D$=60A |

## Dynamic Characteristic

| Parameter | Symbol | Value | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | min. | typ. | max. | | |
| Input Capacitance | $C_{iss}$ | - | 4260 | - | pF | $V_{GS}$=0V, $V_{DS}$=100V, f=1MHz |
| Output Capacitance | $C_{oss}$ | - | 367 | - | | |
| Reverse Transfer Capacitance | $C_{rss}$ | - | 18 | - | | |
| Gate Total Charge | $Q_G$ | - | 57 | - | nC | $V_{GS}$=10V, $V_{DS}$=100V, $I_D$=60A |
| Gate-Source charge | $Q_{gs}$ | - | 25 | - | | |
| Gate-Drain charge | $Q_{gd}$ | - | 9 | - | | |
| Gate plateau voltage | $V_{plateau}$ | - | 5.4 | - | V | |
| Turn-on delay time | $t_{d(on)}$ | - | 19 | - | ns | $V_{GS}$=10V, $V_{DD}$=100V, $I_D$=60A，$R_{G\_ext}$=3Ω |
| Rise time | $t_r$ | - | 72 | - | | |
| Turn-off delay time | $t_{d(off)}$ | - | 43 | - | | |
| Fall time | $t_f$ | - | 12 | - | | |
| Gate resistance | $R_G$ | - | 2.5 | - | Ω | $V_{GS}$=0V, $V_{DS}$=0V, f=1MHz |

## Body Diode Characteristic

| Parameter | Symbol | Value | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | min. | typ. | max. | | |
| Diode Max Current | $I_S$ | | - | 110 | A | - |
| Diode Forward Voltage | $V_{SD}$ | - | - | 1.2 | V | $V_{GS}$=0V,$I_{SD}$=60A |
| Diode Reverse Recovery Time | $t_{rr}$ | - | 123 | - | ns | $I_F$=60A, dI/dt=100A/μs |
| Diode Reverse Recovery Charge | $Q_{rr}$ | - | 485 | - | nC | |

## Typical Characteristics Diagram

Fig1. Output Characteristics

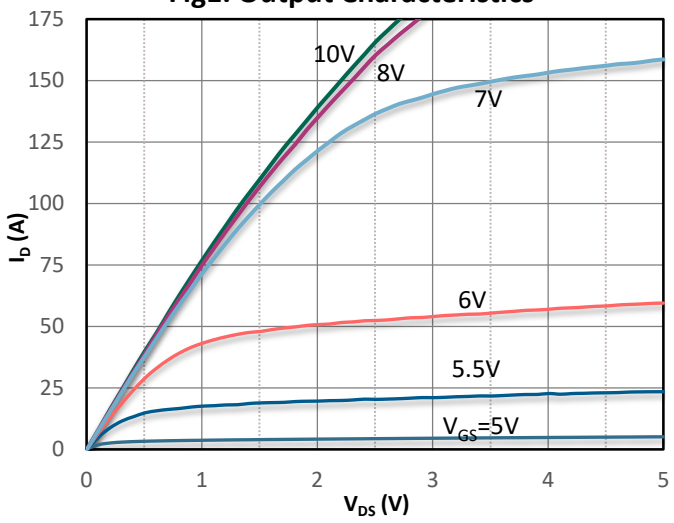



Fig2. Transfer Characteristics

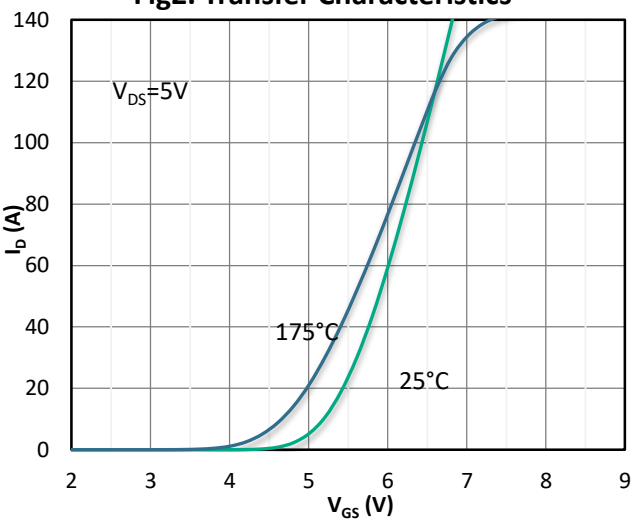



Fig3. Body-diode Forward Characteristics

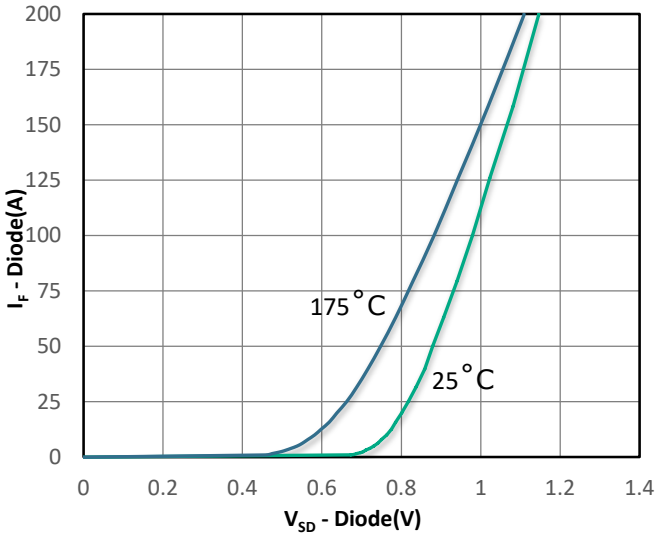



Fig 4. Rds(on) vs Gate Voltage

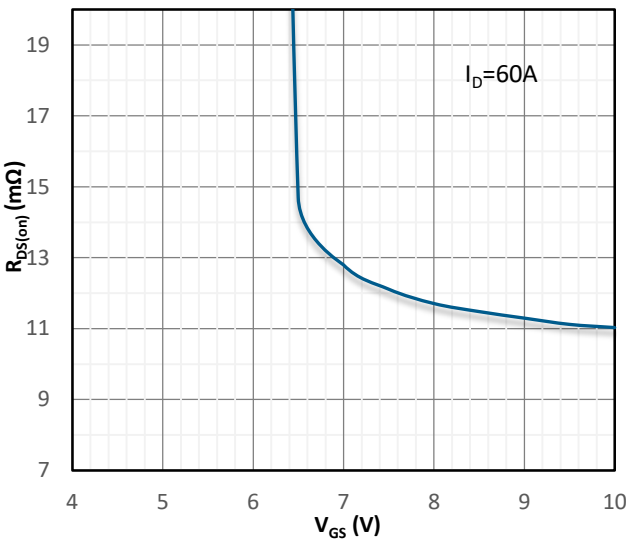



Fig5. Rds(on) vs. Temperature

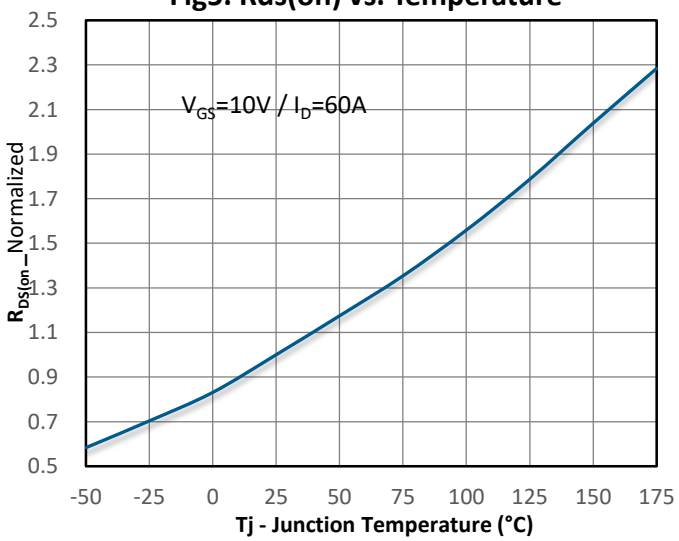
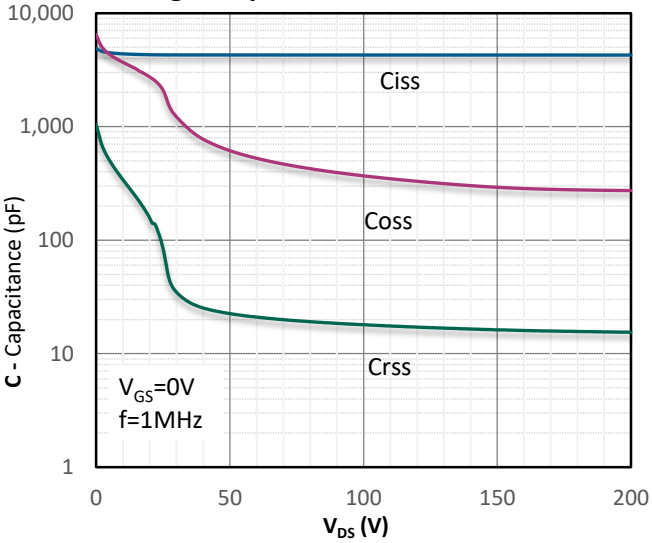



Fig6. Capacitance Characteristics



## Typical Characteristics Diagram

Fig7. Gate Charge Characteristics

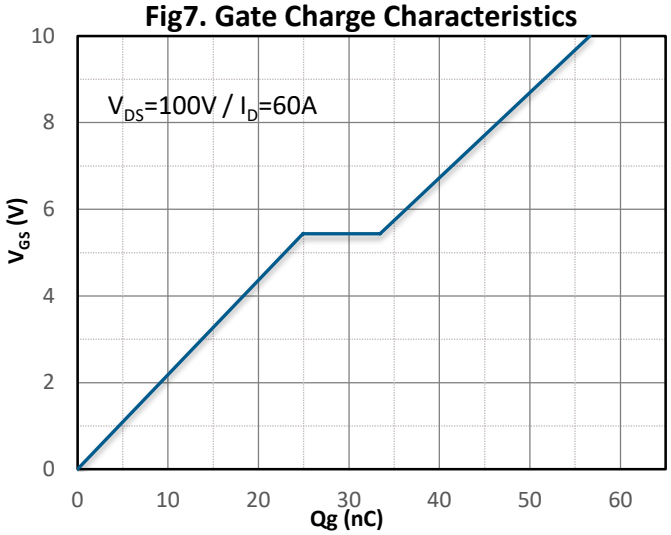



Fig8. Safe Operating Area

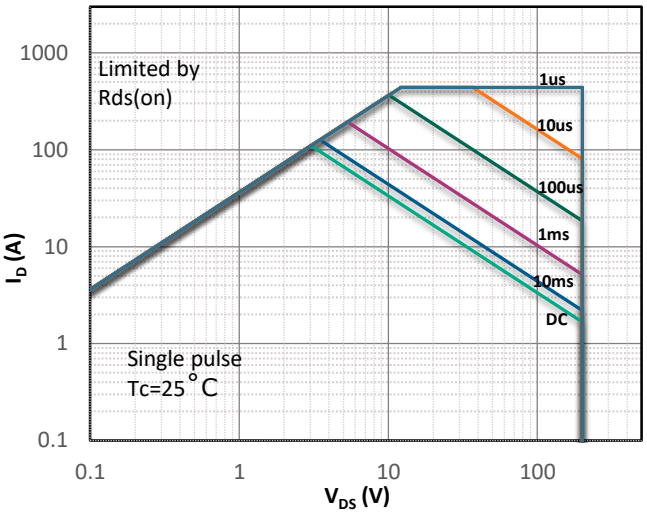



Fig9. Power De-rating

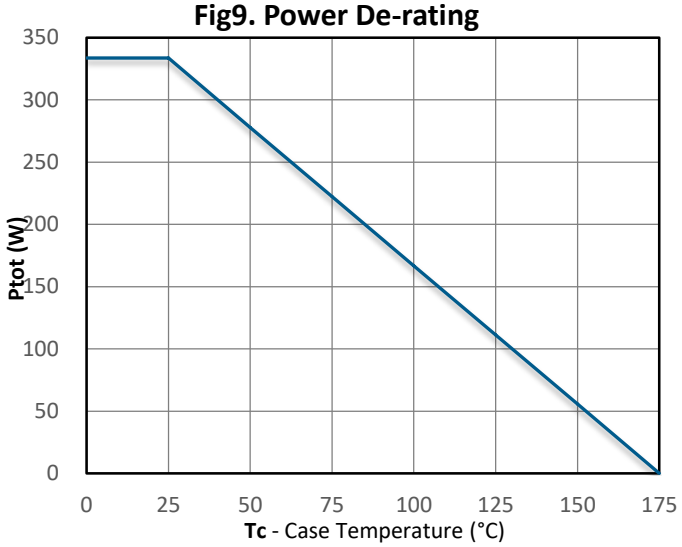



Fig10. Current De-rating

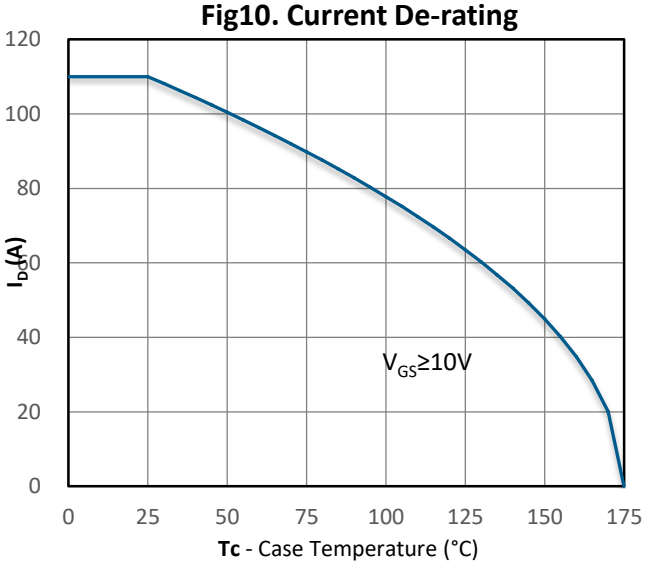
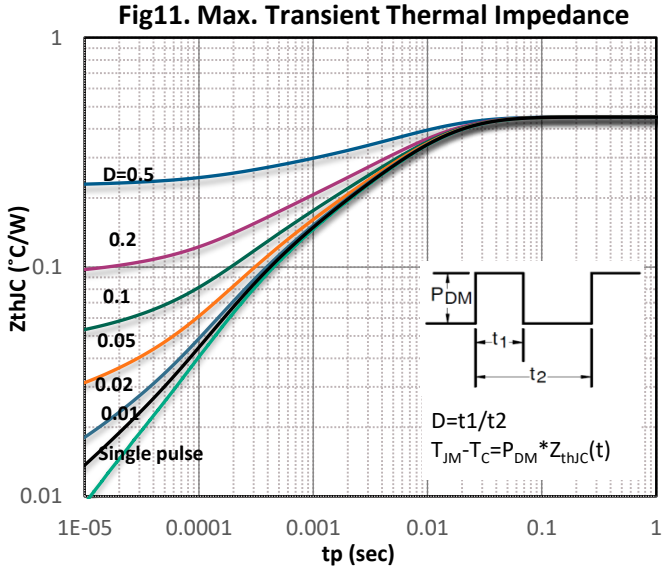
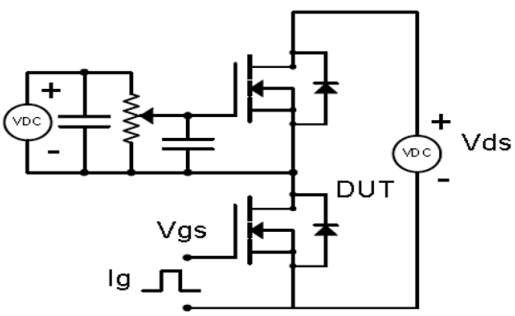


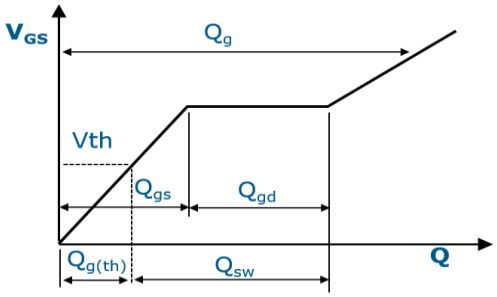

Fig11. Max. Transient Thermal Impedance



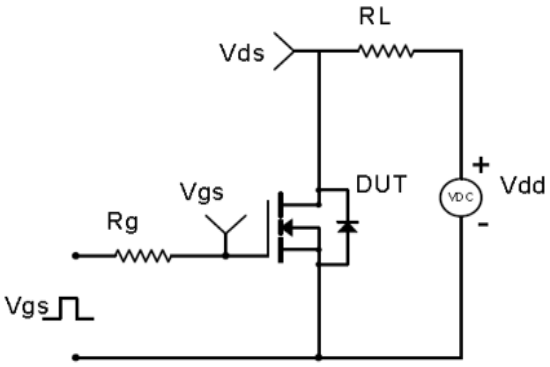
## Test Circuit & Waveform

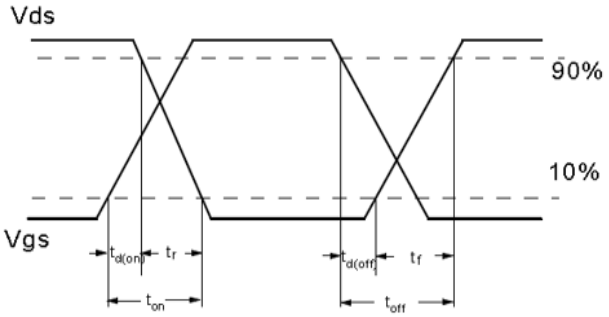
### Gate Charge Test Circuit & Waveform



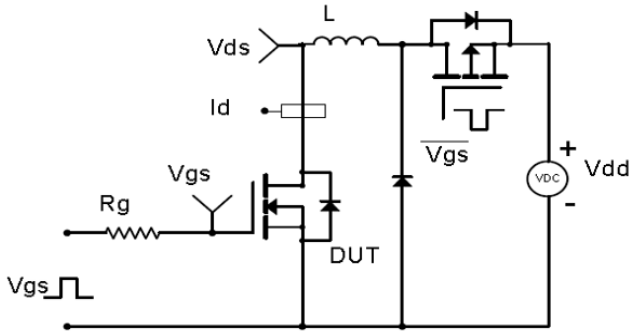



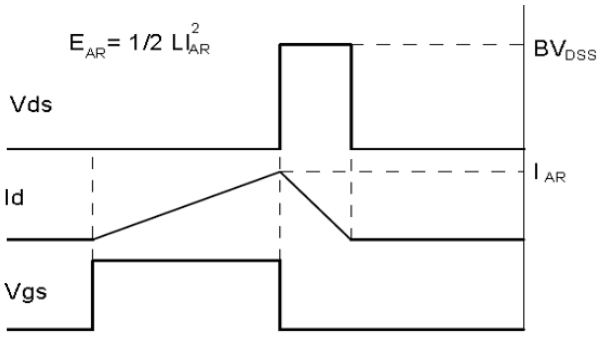

### MOSFET Switching Test Circuit & Waveform



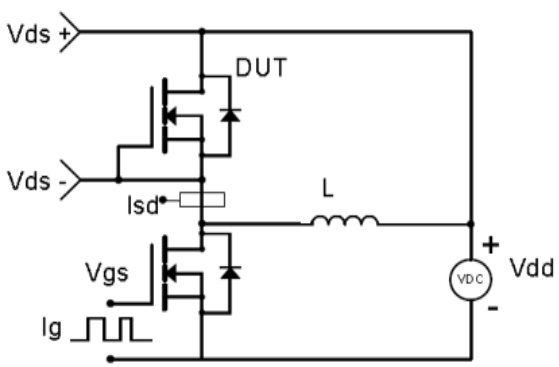



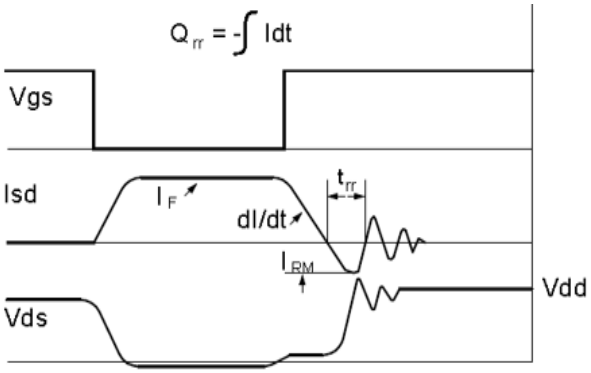

### $E_{AS}$ Test Circuit & Waveform



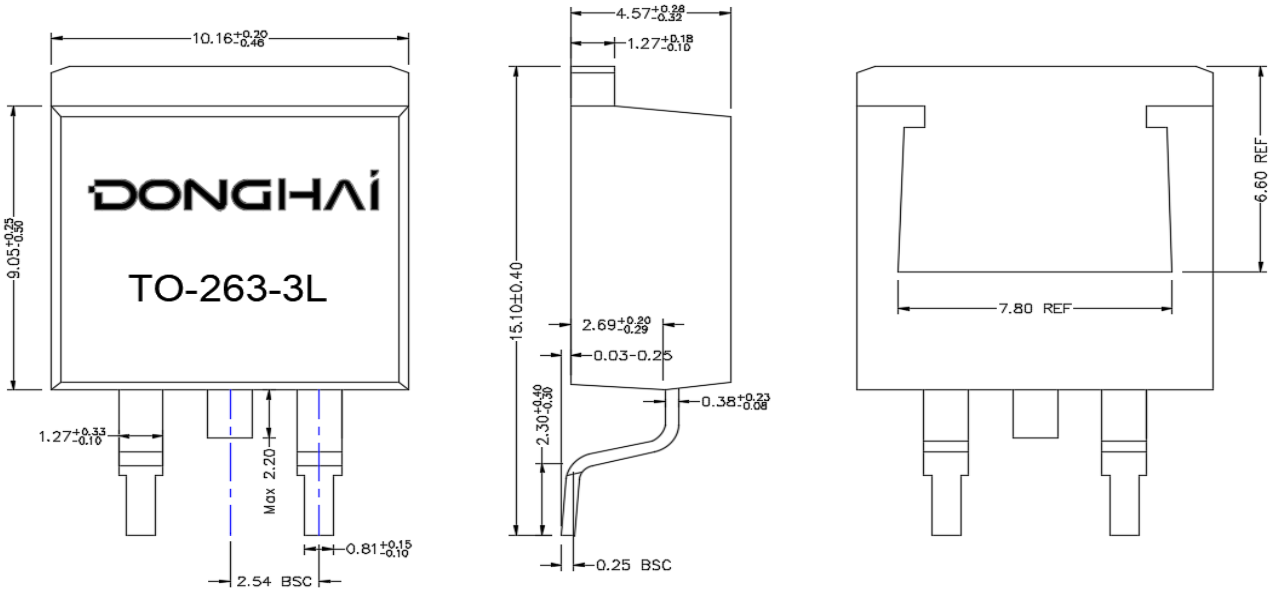

### Diode Recovery Test Circuit & Waveform



## Package Outline : TO-263

*Dimensions in mm




## Revision History

| Revison | Date | Major changes |
|---|---|---|
| 1.0 | 2023/7/10 | Release of formal version |

## Disclaimer

Unless otherwise specified in the datasheet, the product is designed and qulified as a standard commercial product and is not intended for use in applications that require extraordinary levels of quality and reliability, such as aviation, aerospace, life-support devices or systems.

Any and all semicondutor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are responsible for providing adequate safe measures when design their systems.