Semi
Advanced Power Semiconductor

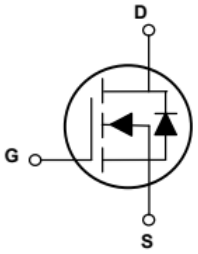
# AM90N10MD

## N-Channel Power MOSFET

### Characteristics Summary

| Characteristics | Values | Units |
|---|---|---|
| $BV_{DSS}$ | 100 | V |
| $R_{DS(ON)TYP}$@$V_{GS}$=10V | 6.2 | mΩ |
| $R_{DS(ON)TYP}$@$V_{GS}$=4.5V | 8.6 | |
| $I_D$ | 90 | A |

TO-252(D-PAK)


### FEATURES

- Very low On-resistance $R_{DS(ON)}$
- Low $C_{rss}$
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

### Maximum Ratings (TC=25°C, unless otherwise noted)

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 100 | V |
| Continuous Drain Current | $T_C$=25℃ | $I_D$ | 90 | A |
| | $T_C$=100℃ | | 56 | |
| Drain-Current Pulsed[1] | | $I_{DM}$ | 270 | A |
| Gate-Source Voltage | | $V_{GSS}$ | ±20 | V |
| Single Pulsed Avalanche Energy[2] | | $E_{AS}$ | 80 | mJ |
| Power Dissipation | $T_C$=25℃ | $P_D$ | 250 | W |
| Thermal Resistance from Junction to Case | | $R_{\theta JC}$ | 0.5 | ℃/W |
| Junction Temperature | | $T_J$ | -55~150 | ℃ |
| Storage Temperature | | $T_{STG}$ | -55~150 | ℃ |
| Maximum Lead Temperature for soldering purposes, 1/8"(3.17mm) from Case for 5seconds | | $T_L$ | 300 | ℃ |

**NOTE**

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: $T_J$ =25℃, $V_{DD}$ =20V, $V_G$ =10V, L=0.5mH

## Electrical Characteristics (TC=25°C, unless otherwise noted)

| Characteristic | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=250uA | 100 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=100V, $V_{GS}$=0V | | | 1 | uA |
| Gate-Body Leakage Current, Forward | $I_{GSSF}$ | $V_{GS}$=20V, $V_{DS}$=0V | | | 100 | nA |
| Gate-Body Leakage Current, Reverse | $I_{GSSR}$ | $V_{GS}$=-20V, $V_{DS}$=0V | | | -100 | nA |
| **On Characteristics** | | | | | | |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250uA | 1.5 | 2.0 | 2.5 | V |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=20A | | 6.2 | 7.7 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=20A | | 8.6 | 10 | |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=50V, $V_{GS}$=0V, F=500KHz | | 2600 | | pF |
| Output Capacitance | $C_{oss}$ | | | 641 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 22 | | |
| **Switching Characteristics[3]** | | | | | | |
| Turn-On Delay Time | $T_{d(on)}$ | $V_{GS}$=10V, $V_{DS}$=50V, $R_G$=1Ω $I_D$=45A, $T_J$=25℃ | | 20 | | nS |
| Turn-On Rise Time | $T_r$ | | | 16 | | |
| Turn-Off Delay Time | $T_{d(off)}$ | | | 32 | | |
| Turn-Off Fall Time | $T_f$ | | | 8 | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=50V, $V_{GS}$=10V, $I_D$=45A | | 44.4 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 9.1 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 9.4 | | |
| **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$ | | | | 90 | A |
| Maximum Pulsed Drain-Source Diode Forward Current | $I_{SM}$ | | | | 270 | A |
| Drain to Source Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_{SD}$=45A, $T_J$=25℃ | | | 1.2 | V |

**NOTE**

3. Pulse Test Condition: Pulse Width≤300μs, Duty Cycle≤0.5%

## Electrical Characteristic Curves

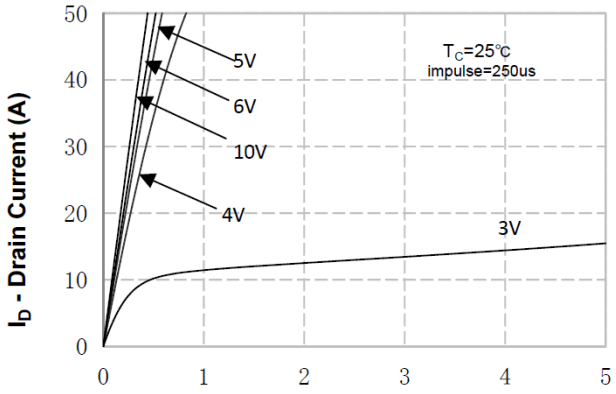



Figure 1. On-Region Characteristics

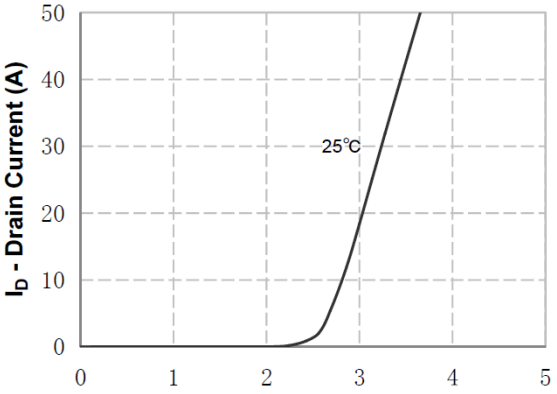



Figure 2. Transfer Characteristics

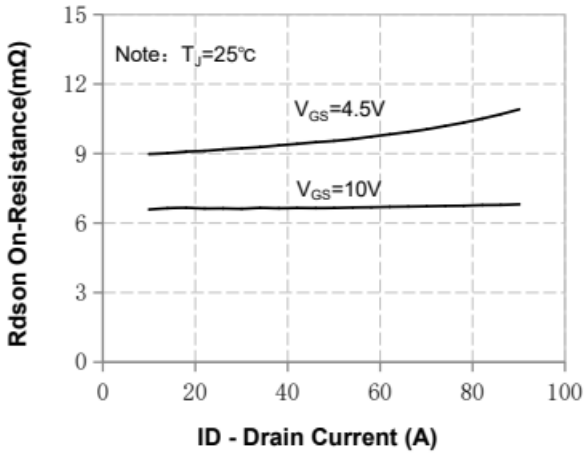



Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

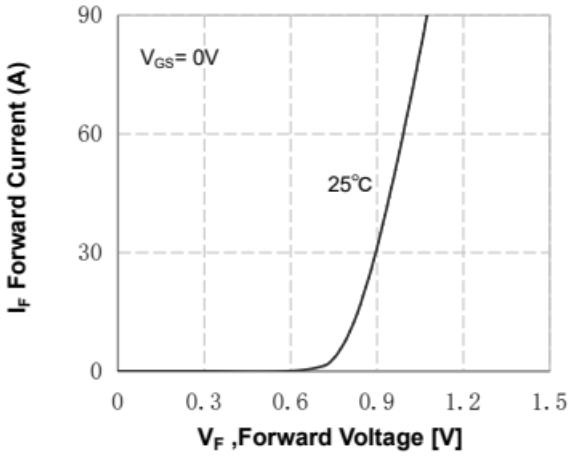



Figure 4. Body Diode Forward Voltage Variation vs Source Current

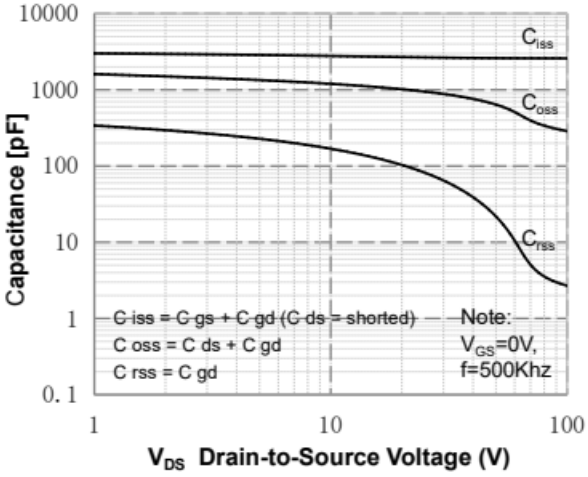



Figure 5. Capacitance Characteristics

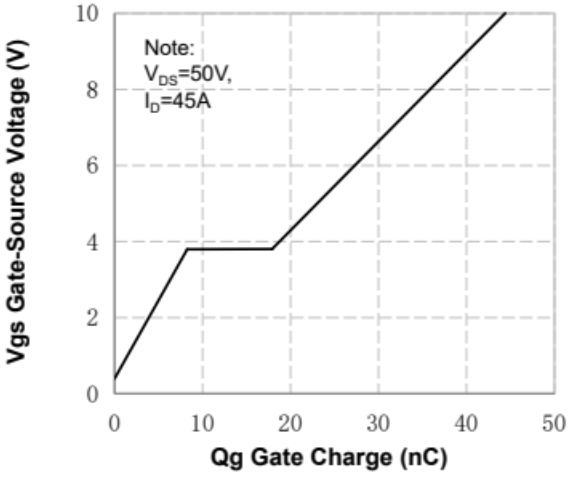



Figure 6. Gate Charge Characteristics

## Electrical Characteristic Curves

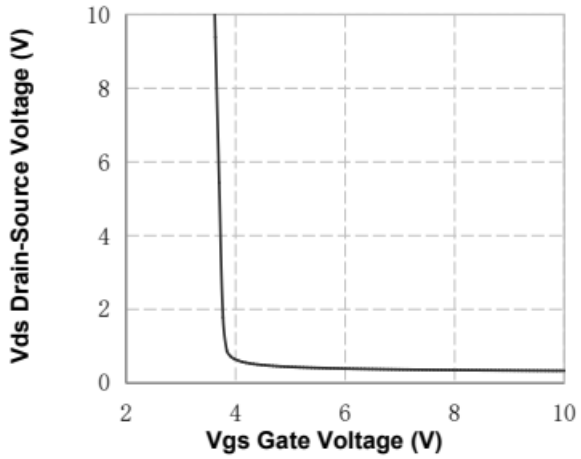



Figure 7. Vds Drain-Source Voltage vs Gate Voltage

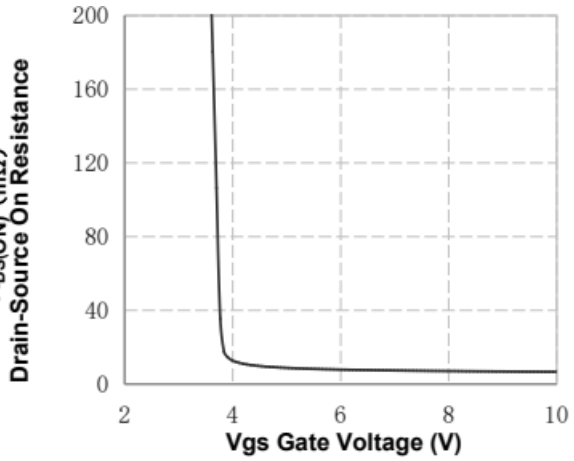



Figure 8. On-Resistance vs Gate Voltage

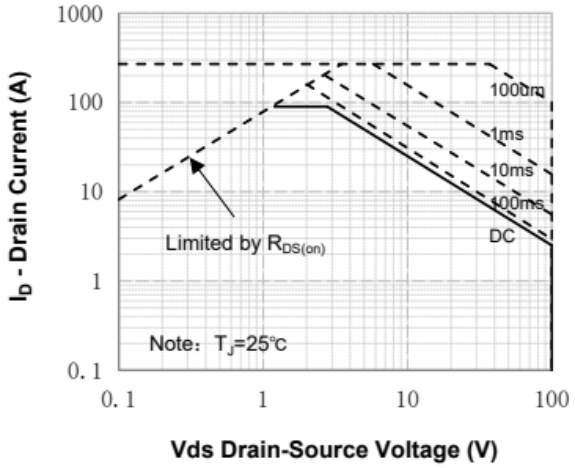



Figure 9. Maximum Safe Operating Area

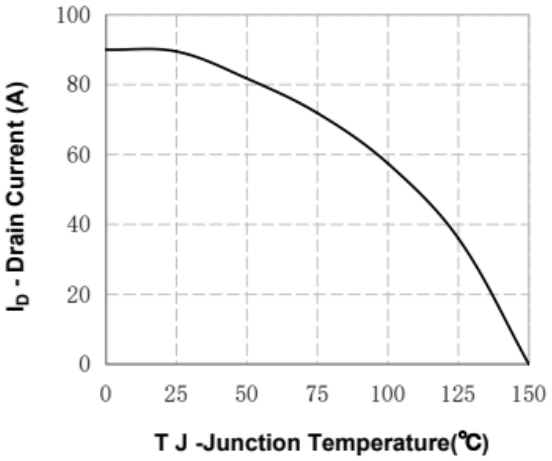



Figure 10. Maximum Continuous Drain Current vs Temperature

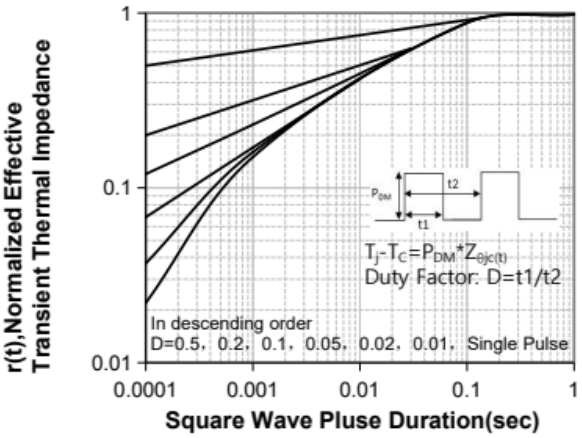
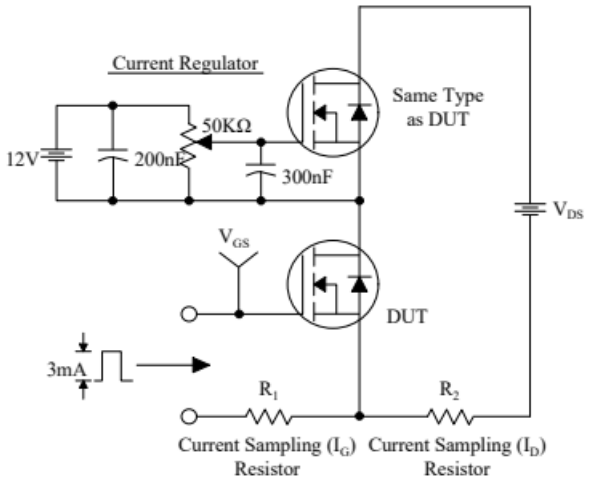
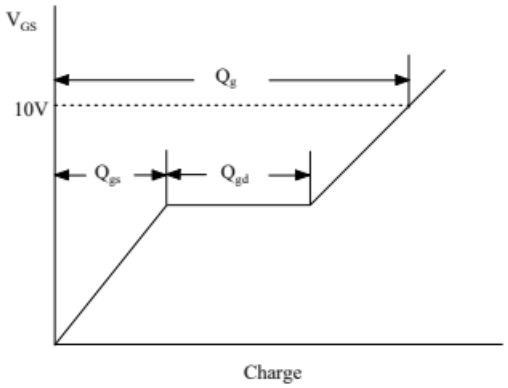



Figure 11. Transient Thermal Response Curve

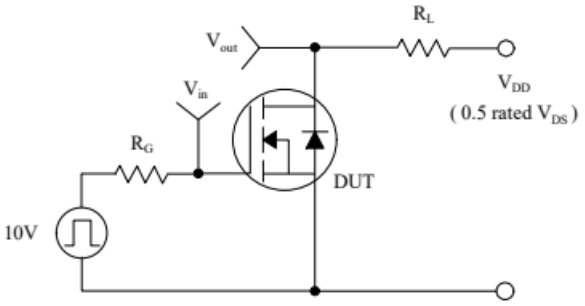
## Test Circuit & Waveform

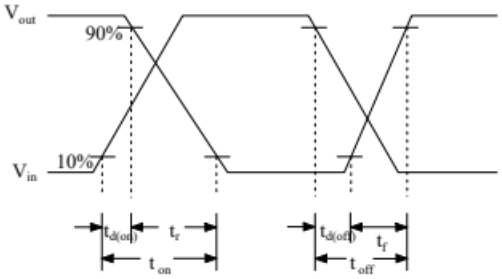
### Gate Charge Test Circuit & Waveform



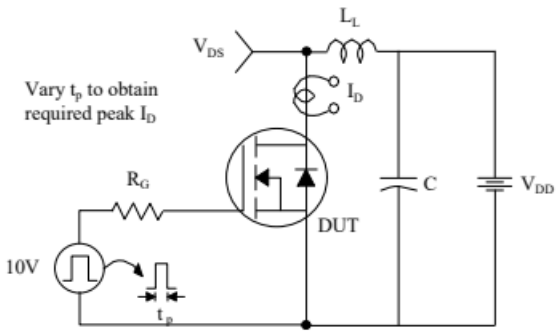



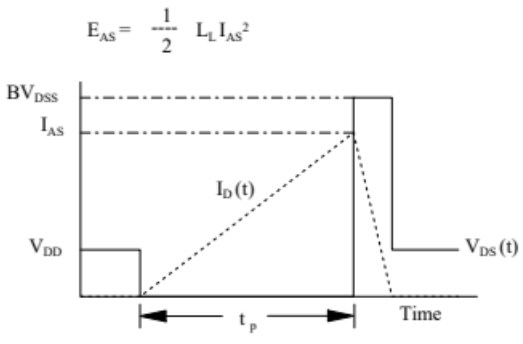

### Resistive Switching Test Circuit & Waveforms




### Unclamped Inductive Switching Test Circuit & Waveforms

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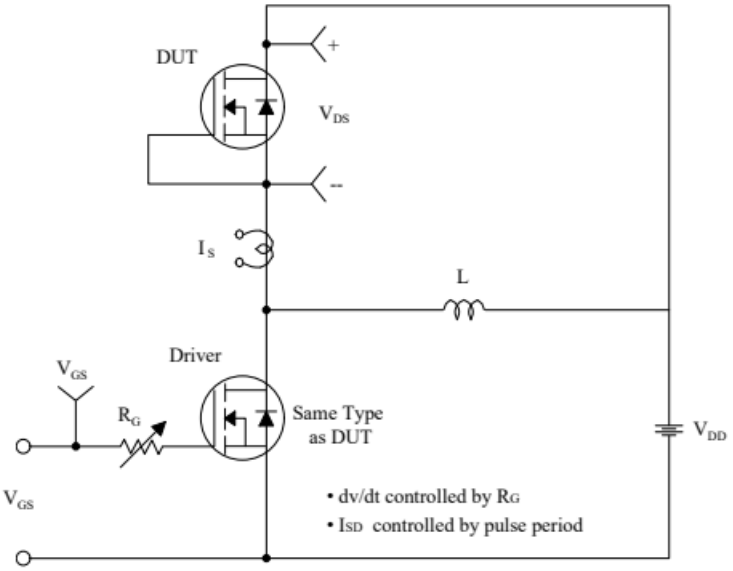
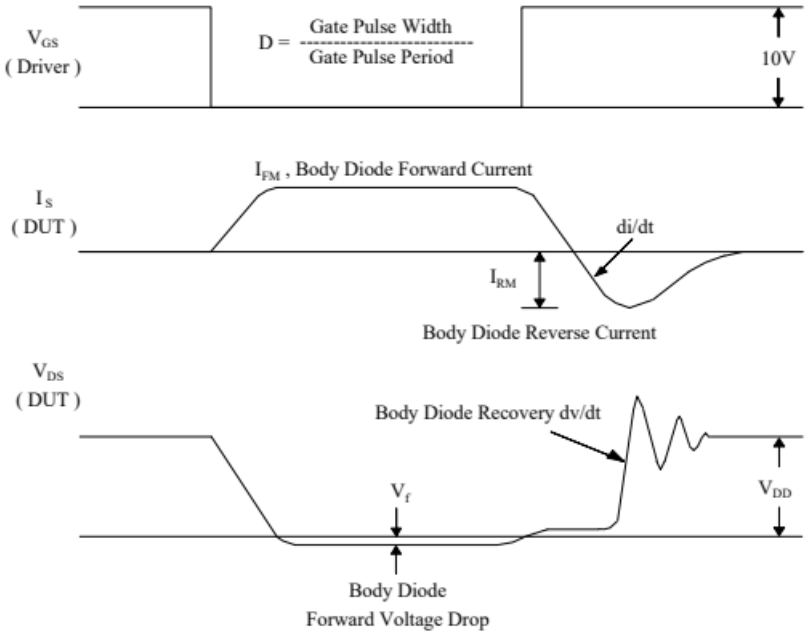
## Test Circuit & Waveform

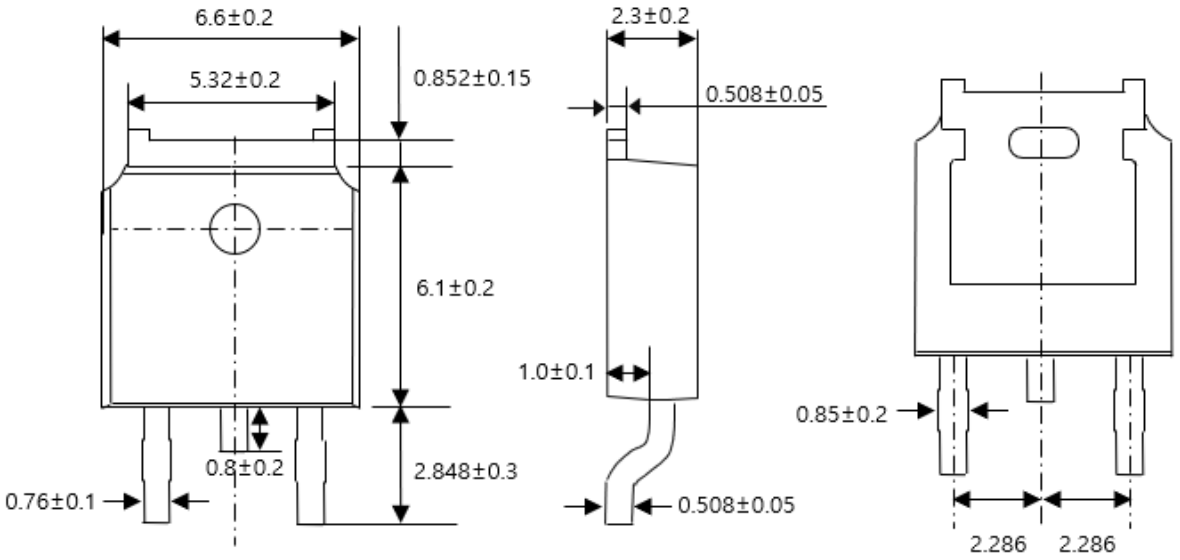
### Peak Diode Recovery dv/dt Test Circuit & Waveforms



## Package Dimensions

**TO-252**




## Ordering Information

| Part No | Package | Packing | Finish | Halogen | Packing Unit |
|---|---|---|---|---|---|
| AM90N10MD | TO-252 | REEL (2,500PCS/REEL) | Sn | Free | 5KPCS/Reel BOX 25KPCS/Outer Box |

## Revision History

| No | Date | Contents |
|---|---|---|
| 0 | 2024-12-12 | Initial Brief Datasheet Release |
| | | |
| | | |

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## IMPORTANT NOTICE

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