# MSO100N019

## N -Channel 100-V (D-S) MOSFET

### Description

The device is the highest performance trench N-ch MOSFET with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The device meets the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

### Features

- Max Ron@$V_{GS}$ 10V=1.9mΩ
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

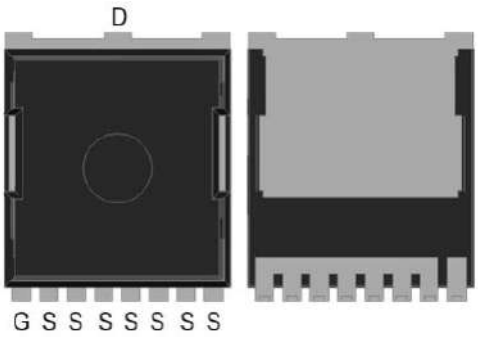
### Typical Applications

- Power Tools
- Motor Control Applications
- UPS
- Synchronous Rectification in SMPS

**Package type**：TOLL

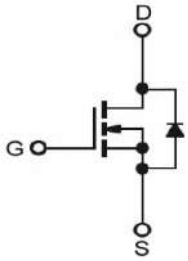
### Packing & Order Information

2,000/Reel

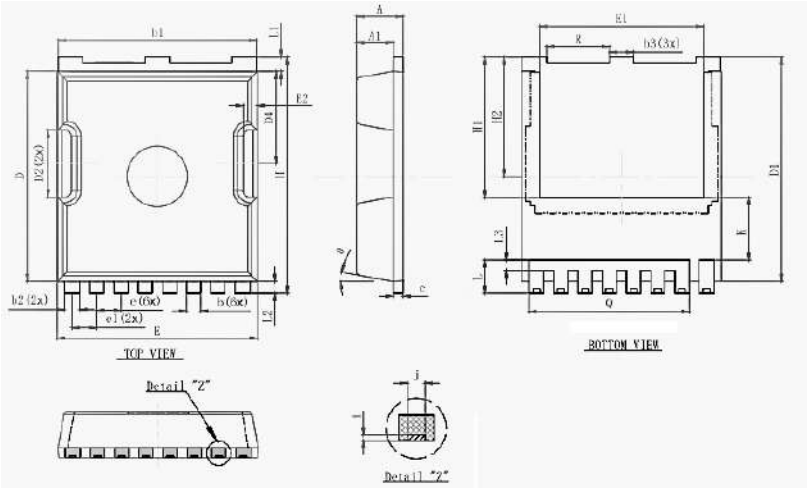



RoHS Compliant

### Graphic Symbol

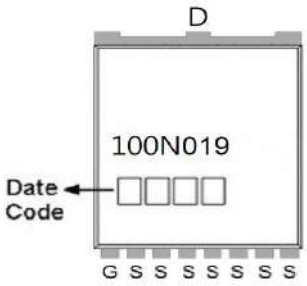



### Package Dimension




| SYMBOL | MILLIMETER | | | SYMBOL | MILLIMETER | | |
|---|---|---|---|---|---|---|---|
| | MIN. | NOM. | MAX. | | MIN. | NOM. | MAX. |
| A | 2.200 | 2.300 | 2.400 | e1 | | 1.225 BSC | |
| A1 | 1.700 | 1.800 | 1.900 | H | 11.600 | 11.700 | 11.800 |
| b | 0.600 | 0.700 | 0.800 | H1 | | 6.950 BSC | |
| b1 | 9.700 | 9.800 | 9.900 | H2 | | 5.900 BSC | |
| b2 | 0.650 | 0.750 | 0.850 | i | | 0.100 REF. | |
| b3 | 1.100 | 1.200 | 1.300 | j | | 0.350 REF. | |
| c | 0.400 | 0.500 | 0.600 | K | | 3.100 REF. | |
| D | 10.300 | 10.400 | 10.500 | L | 1.550 | 1.650 | 1.750 |
| D1 | 11.000 | 11.100 | 11.200 | L1 | 0.600 | 0.700 | 0.800 |
| D2 | 3.200 | 3.300 | 3.400 | L2 | 0.500 | 0.600 | 0.700 |
| D4 | 4.470 | 4.570 | 4.670 | L3 | 0.400 | 0.500 | 0.600 |
| E | 9.800 | 9.900 | 10.000 | Q | | 7.950 REF. | |
| E1 | 8.000 | 8.100 | 8.200 | R | 3.000 | 3.100 | 3.200 |
| E2 | 0.500 | 0.600 | 0.700 | θ | | 10° REF. | |
| e | | 1.200 BSC | | | | | |

### Marking



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## N-Channel 100-V (D-S) MOSFET

**MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS**

| Absolute Maximum Ratings | | | |
|---|---|---|---|
| **Symbol** | **Parameter** | **Value** | **Units** |
| $V_{DS}$ | Drain-Source Voltage | 100 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$ | Continuous Drain Current[1] ($T_C$ =25°C) | 330 | A |
| | Continuous Drain Current[1] ($T_C$ =100°C) | 225 | A |
| $I_{DM}$ | Pulsed Drain Current[1,2] | 1000 | A |
| $I_{AS}$ | Single Pulse Avalanche Current, L =1.0mH[3] | 40 | A |
| $E_{AS}$ | Single Pulse Avalanche Energy, L =1.0mH[3] | 800 | mJ |
| $P_D$ | Power Dissipation[4] ($T_C$ =25°C) | 333 | W |
| $T_J/T_{STG}$ | Operating Junction and Storage Temperature | -55 to +175 | °C |

| Thermal Resistance Ratings | | | |
|---|---|---|---|
| **Symbol** | **Parameter** | **Maximum** | **Units** |
| $R_{\theta JA}$ | Maximum Junction-to-Ambient[1] | 40 | °C/W |
| $R_{\theta JC}$ | Maximum Junction-to-Case[1] | 0.45 | °C/W |

| Electrical Characteristics ($T_J$=25°C unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Parameter** | **Test Conditions** | **Min.** | **Typ.** | **Max.** | **Units** |
| $V_{GS\ (th)}$ | Gate Threshold Voltage | $V_{DS}$ =$V_{GS}$, $I_D$ =250μA | 2.0 | - | 4.0 | V |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$ =0V, $I_D$ =250μA | 100 | - | - | V |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$ =5V, $I_D$ =20A | - | 75 | - | S |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{DS}$ =0V, $V_{GS}$ =±20V | - | - | ±100 | nA |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$ =80V, $V_{GS}$ =0V, $T_J$ =25°C<br>$V_{DS}$ =80V, $V_{GS}$ =0V, $T_J$ =100°C | - | - | 1<br>100 | μA |
| $R_{DS\ (on)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$ =10V, $I_D$ =90A | - | 1.6 | 1.9 | mΩ |
| EAS | Single Pulse Avalanche Energy[5] | $V_{DD}$ =50V, L =1mH, $I_{AS}$ =30A | 450 | - | - | mJ |
| $V_{SD}$ | Diode Forward Voltage[2] | $I_S$ =1A, $V_{GS}$ =0V, $T_J$ =25°C | - | - | 1.2 | V |
| $I_S$ | Continuous Source Current[1,6] | $V_G$ =$V_D$ =0V, Force Current | - | - | 100 | A |

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| Dynamic | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Parameter** | **Test Conditions** | **Min.** | **Typ.** | **Max.** | **Units** |
| $Q_g$ | Total Gate Charge[2] | $V_{DS}$ =50V<br>$I_D$ =90A<br>$V_{GS}$ =10V | -- | 212 | -- | nC |
| $Q_{gs}$ | Gate-Source Charge | | -- | 59 | -- | |
| $Q_{gd}$ | Gate-Drain (“Miller”) Charge | | -- | 53 | -- | |
| $t_{d(on)}$ | Turn-On Delay Time[2] | $V_{DS}$ =50V<br>$I_D$ =20A<br>$V_{GS}$ =10V<br>$R_G$ =3Ω | -- | 47 | -- | ns |
| $t_r$ | Rise Time | | -- | 28 | -- | |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 79 | -- | |
| $t_f$ | Fall Time | | -- | 18 | -- | |
| $C_{ISS}$ | Input Capacitance | $V_{DS}$ =50V<br>$V_{GS}$ =0V<br>f =1.0MHz | -- | 13362 | -- | pF |
| $C_{OSS}$ | Output Capacitance | | -- | 1917 | -- | |
| $C_{RSS}$ | Reverse Transfer Capacitance | | -- | 386 | -- | |
| Rg | Gate Resistance | $V_{GS}$ =$V_{DS}$ =0V, f =1.0MHz | -- | 1.0 | -- | Ω |

**Notes**

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. The EAS data shows maximum rating. The test condition is $V_{DD}$=50V, $V_{GS}$=10V, L=1.0mH, $I_{AS}$=40A.
4. The power dissipation is limited by 175℃ junction temperature.
5. The Min. value is 100% EAS tested guarantee.
6. The data is theoretically the same as $I_D$ and $I_{DM}$, in real applications, should be limited by total power dissipation.

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- **Typical Electrical Characteristics**

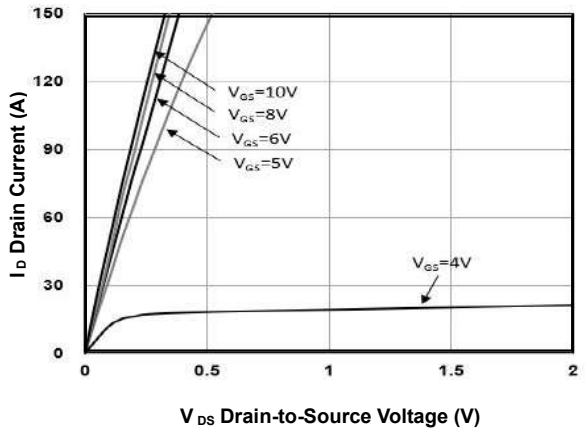


**FIG.1-Typical Output Characteristics**

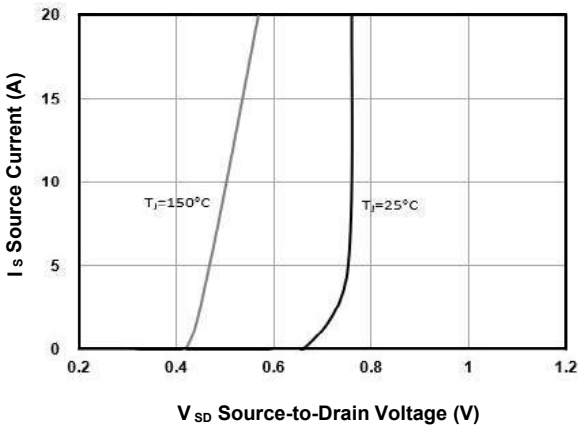


**Fig.2 Source-Drain Forward Characteristics**

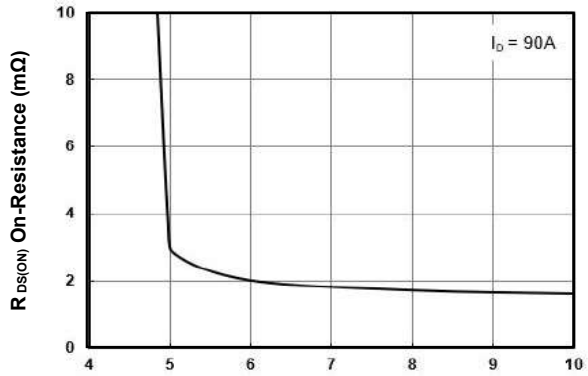


**FIG.3-On-Resistance vs. $V_{GS}$ Voltage**

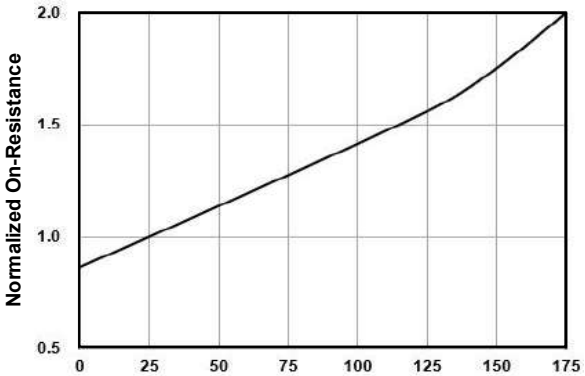


**FIG.4-Normalized $R_{DSON}$ vs. $T_J$**

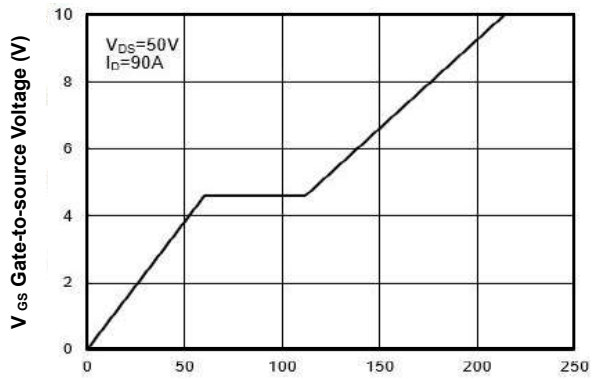


**FIG.5-Gate Charge Characteristics**

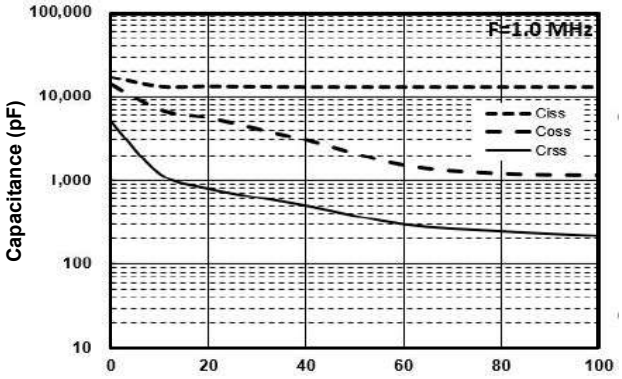


**FIG.6-Capacitance Characteristics**

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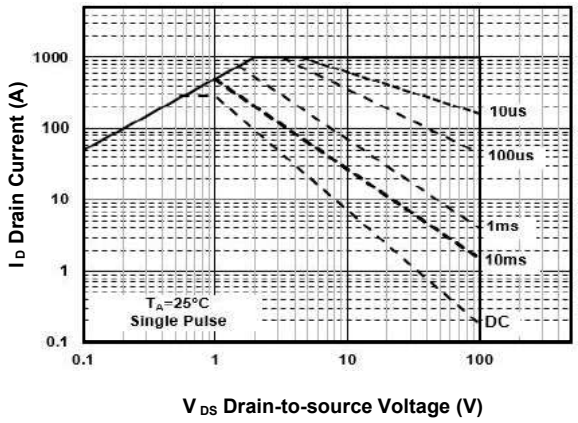


**FIG.7-Safe Operating Area**

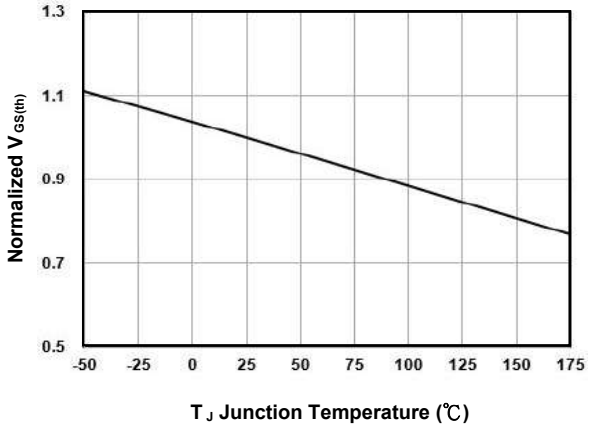


**FIG.8-Normalized $V_{GS(th)}$ vs. $T_J$**

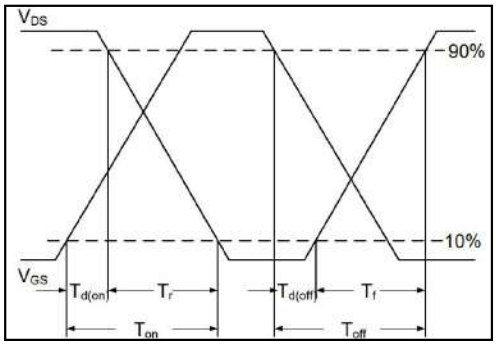


**FIG.9-Switching Time Waveform**

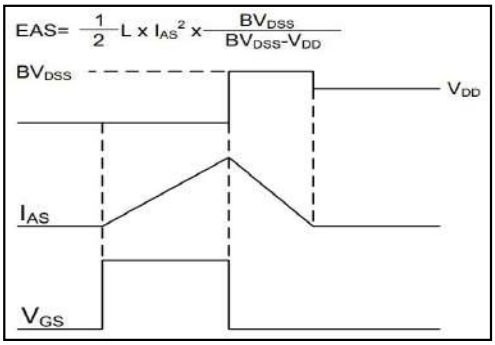


**FIG.10-Unclamped Inductive Switching Waveform**

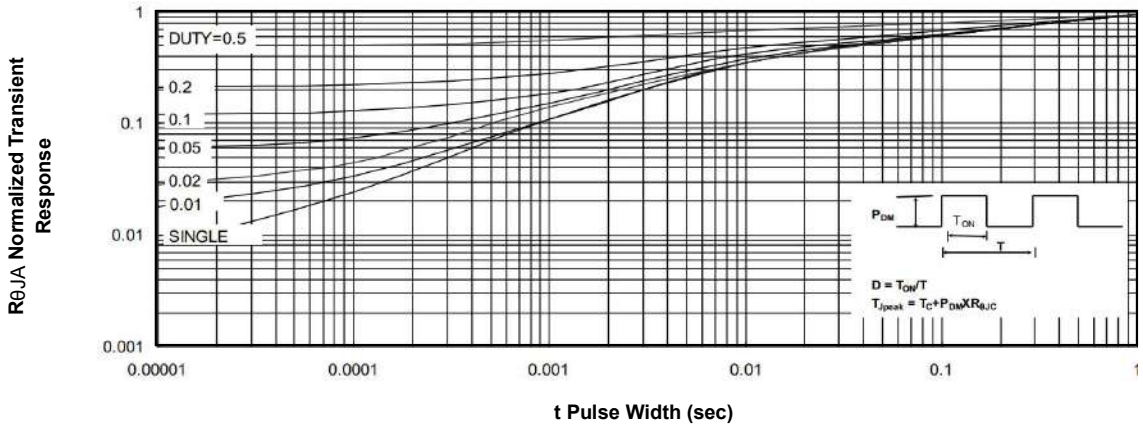


**FIG.11-Normalized Maximum Transient Thermal Impedance**

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