

N-Channel Enhancement Mode Power MOSFET

■ Features

- Simple Gate Drive
- 2KV ESD Rating (Per MIL-STD-883D)
- Small Package Outline (SOT323)

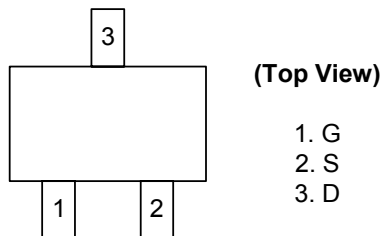
■ Description

The advanced power MOSFET provides the designer with the best combination of fast switching, low on-resistance and cost-effectiveness.

■ Product Summary

$BV_{DSS} = 20V$
 $R_{DS(on)} = 600m\Omega$
 $I_D = 600mA$

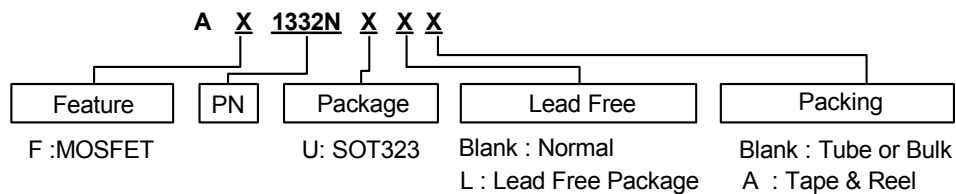
■ Pin Assignments



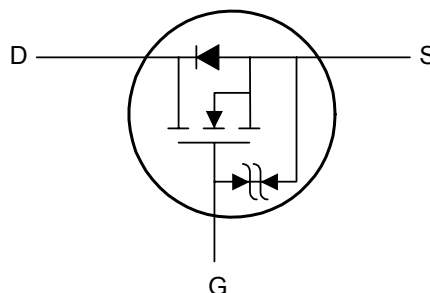
■ Pin Descriptions

| Pin No. | Pin Name | Description |
|---------|----------|-------------|
| 1 | G | Gate |
| 2 | S | Source |
| 3 | D | Drain |

■ Ordering information



■ Block Diagram





N-Channel Enhancement Mode Power MOSFET

■ Absolute Maximum Ratings

| Symbol | Parameter | Rating | Unit |
|-----------|--------------------------------------|------------------------|------------------|
| V_{DS} | Drain-Source Voltage | 20 | V |
| V_{GS} | Gate-Source Voltage | ± 6 | V |
| I_D | Continuous Drain Current (Note 1) | $T_A=25^\circ\text{C}$ | 600 |
| | | $T_A=70^\circ\text{C}$ | 470 |
| I_{DM} | Pulsed Drain Current (Note 2, 3) | 2.5 | A |
| P_D | Total Power Dissipation | $T_A=25^\circ\text{C}$ | 0.35 |
| | Linear Derating Factor | | 0.003 |
| T_{STG} | Storage Temperature Range | -55 to +150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to +150 | $^\circ\text{C}$ |

■ Thermal Data

| Symbol | Parameter | Value | Unit |
|--------|--|----------|--------------------|
| Rthj-a | Thermal Resistance Junction-Ambient (Note 1) | Max. 360 | $^\circ\text{C/W}$ |

■ Electrical Characteristics at $T_A=25^\circ\text{C}$ (unless otherwise specified)

| Symbol | Parameter | Test Conditions | Limits | | | Unit |
|--------------------------------|---|---|--------|------|----------|---------------------------|
| | | | Min. | Typ. | Max. | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0\text{V}, I_D=250\mu\text{A}$ | 20 | - | - | V |
| $\Delta BV_{DSS} / \Delta T_J$ | Breakdown Voltage Temperature Coefficient | Reference to 25°C , $I_D=1\text{mA}$ | - | 0.02 | - | $\text{V}/^\circ\text{C}$ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=4.5\text{V}, I_D=600\text{mA}$ | - | - | 600 | m Ω |
| | | $V_{GS}=2.5\text{V}, I_D=400\text{mA}$ | - | - | 850 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu\text{A}$ | 0.5 | - | 1.2 | V |
| g_{fs} | Forward Transconductance | $V_{DS}=5\text{V}, I_D=600\text{mA}$ | - | 1 | - | S |
| I_{DSS} | Drain-Source Leakage Current ($T_J=25^\circ\text{C}$) | $V_{DS}=20\text{V}, V_{GS}=0\text{V}$ | - | - | 1 | μA |
| | Drain-Source Leakage Current ($T_J=70^\circ\text{C}$) | $V_{DS}=16\text{V}, V_{GS}=0\text{V}$ | - | - | 10 | |
| I_{GSS} | Gate-Source Leakage | $V_{GS}=\pm 6\text{V}$ | - | - | ± 10 | μA |
| Q_g | Total Gate Charge (Note 3) | $I_D=600\text{mA}$, | - | 1.3 | 2 | nC |
| Q_{gs} | Gate-Source Charge | $V_{DS}=16\text{V}$, | - | 0.3 | - | |
| Q_{gd} | Gate-Drain ("Miller") Charge | $V_{GS}=4.5\text{V}$ | - | 0.5 | - | |
| $t_{d(on)}$ | Turn-On Delay Time (Note 3) | $V_{DS}=10\text{V}$, | - | 21 | - | ns |
| t_r | Rise Time | $I_D=600\text{mA}$, | - | 53 | - | |
| $t_{d(off)}$ | Turn-Off Delay Time | $R_G=3.3\Omega, V_{GS}=5\text{V}$ | - | 100 | - | |
| t_f | Fall-Time | $R_D=16.7\Omega$ | - | 125 | - | |
| C_{iss} | Input Capacitance | $V_{GS}=0\text{V}$, | - | 38 | 60 | pF |
| C_{oss} | Output Capacitance | $V_{DS}=10\text{V}$, | - | 17 | - | |
| C_{rss} | Reverse Transfer Capacitance | $f=1.0\text{MHz}$ | - | 12 | - | |

■ Source-Drain Diode

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|----------|-----------------------------|--------------------------------------|------|------|------|------|
| V_{DS} | Forward On Voltage (Note 3) | $I_S=300\text{mA}, V_{GS}=0\text{V}$ | - | - | 1.2 | V |

Note 1: Surface mounted on FR4 board, $t \leq 10$ sec.

Note 2: Pulse width limited by Max. junction temperature.

Note 3: Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

N-Channel Enhancement Mode Power MOSFET

■ Typical Performance Characteristics

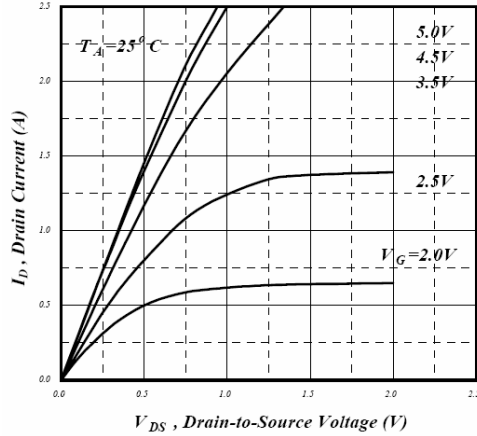


Fig 1. Typical Output Characteristics

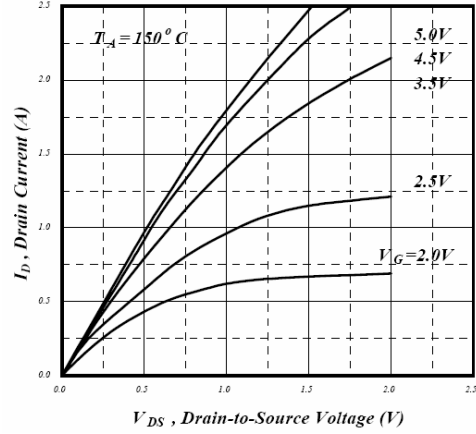


Fig 2. Typical Output Characteristics

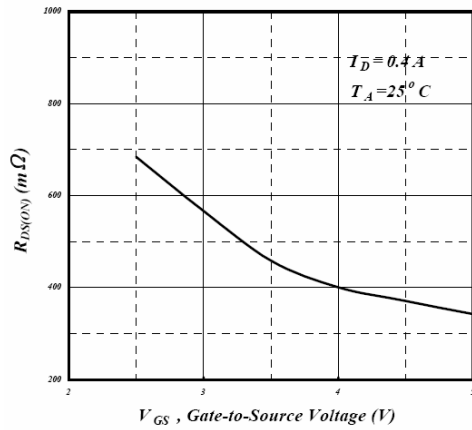


Fig 3. On-Resistance v.s. Gate Voltage

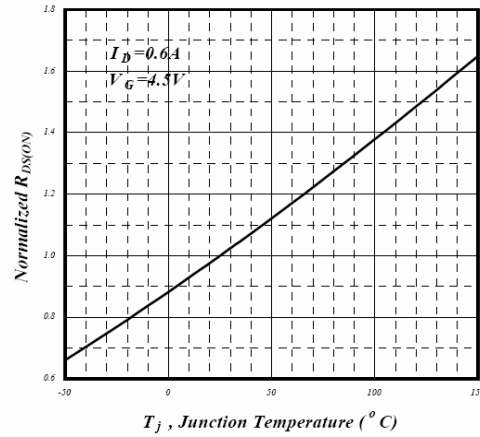


Fig 4. Normalized On-Resistance v.s. Junction Temperature

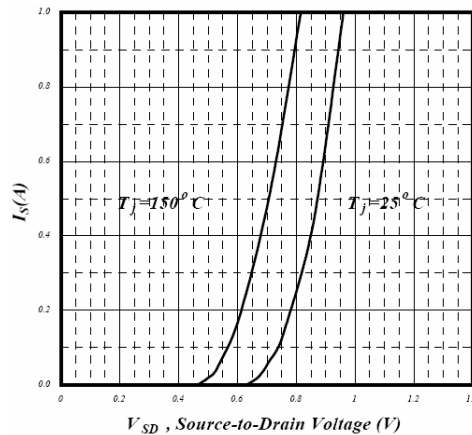


Fig 5. Forward Characteristic of Reverse Diode

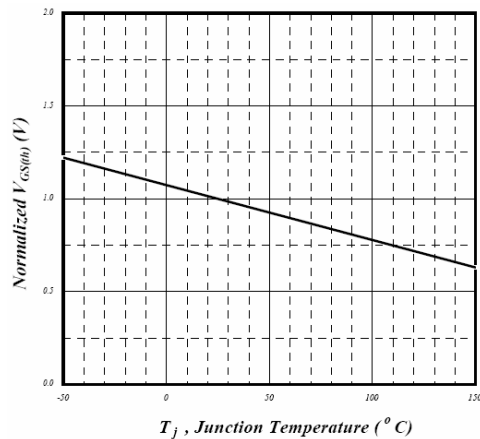


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

N-Channel Enhancement Mode Power MOSFET

■ Typical Performance Characteristics (Continued)

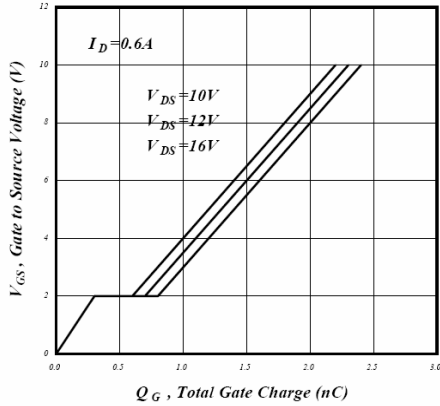


Fig 7. Gate Charge Characteristics

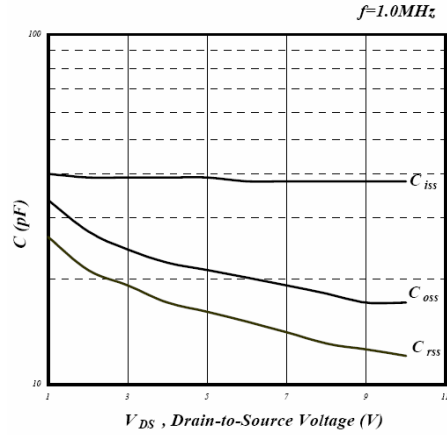


Fig 8. Typical capacitance Characteristics

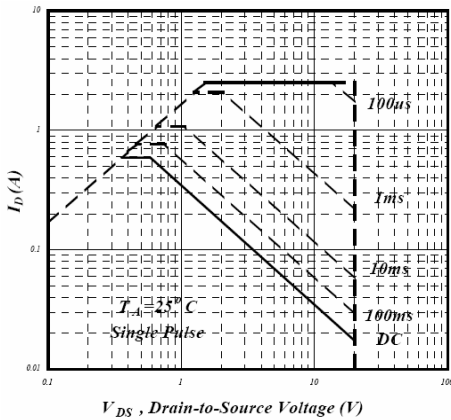


Fig 9. Maximum Safe Operating Area

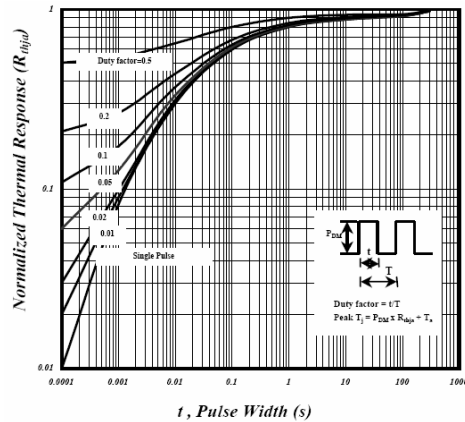


Fig 10. Effective Transient Thermal Impedance

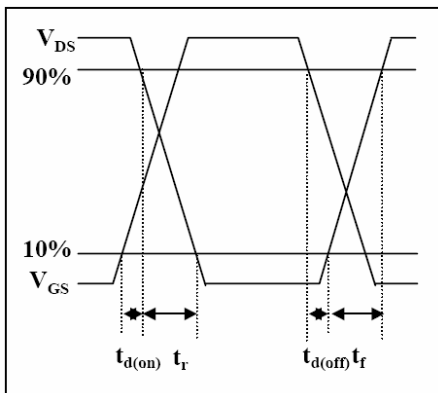


Fig 11. Switching Time Waveform

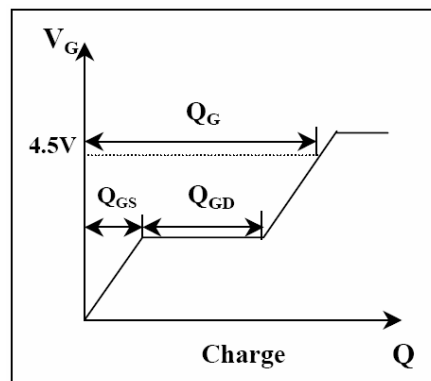
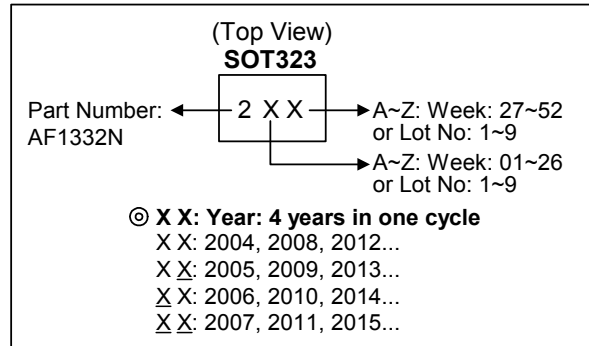


Fig 12. Gate Charge Waveform

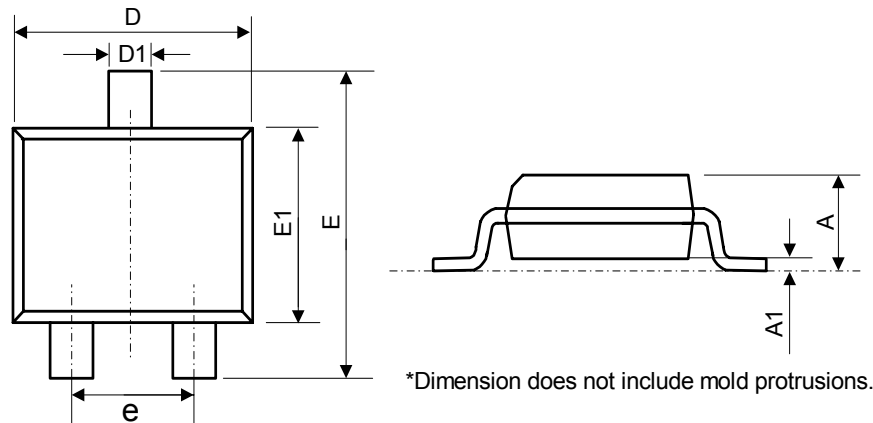
N-Channel Enhancement Mode Power MOSFET

■ Marking Information



■ Package Information

Package Type: SOT323



| Symbol | Dimensions In Millimeters | | | Dimensions In Inches | | |
|--------|---------------------------|------|------|----------------------|-------|-------|
| | Min. | Nom. | Max. | Min. | Nom. | Max. |
| A | 0.90 | 1.00 | 1.10 | 0.035 | 0.039 | 0.043 |
| A1 | 0.03 | 0.07 | 0.10 | 0.001 | 0.003 | 0.004 |
| D | 1.90 | 2.00 | 2.10 | 0.075 | 0.079 | 0.083 |
| D1 | 0.20 | 0.30 | 0.40 | 0.008 | 0.012 | 0.016 |
| E | 2.00 | 2.10 | 2.20 | 0.079 | 0.083 | 0.087 |
| E1 | 1.15 | 1.25 | 1.35 | 0.045 | 0.049 | 0.053 |
| e | 1.30 Bsc. | | | 0.051 Bsc. | | |

This datasheet has been download from:

www.datasheetcatalog.com

Datasheets for electronics components.