

# N-Channel MOSFET

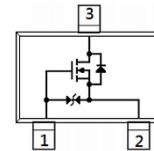
## 60V 0.5A 0.35W SOT-323 ESD

MFT6NA50S323E

MERITEK

### FEATURE

- $R_{DS(ON)} \leq 1.6\Omega$  at  $V_{GS}=10V$
- $R_{DS(ON)} \leq 2.0\Omega$  at  $V_{GS}=4.5V$
- Low Gate Charge
- Excellent Low  $R_{DS(ON)}$
- ESD Protected
- Application: Load Switch, Uninterruptible Power Supply



### MECHANICAL DATA

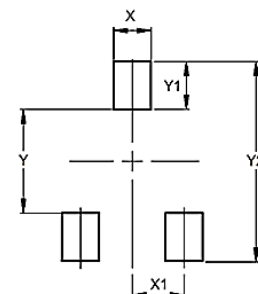
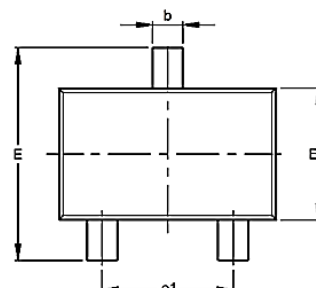
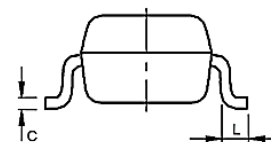
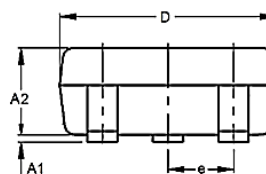
- Case: SOT-323 Package
- Terminals: Solderable per MIL-STD-750, Method 2026

### MAXIMUM RATINGS

| Parameter                                        |                               | Symbol          | Value      | Unit         |
|--------------------------------------------------|-------------------------------|-----------------|------------|--------------|
| Drain-Source Voltage                             |                               | $V_{DS}$        | 60         | V            |
| Gate-Source Voltage                              |                               | $V_{GS}$        | $\pm 20$   | V            |
| Drain Current – Continuous                       | $V_{GS}=10V, T_c=25^\circ C$  | $I_D$           | 500        | mA           |
|                                                  | $V_{GS}=10V, T_c=100^\circ C$ |                 | 130        |              |
| Drain Current – Pulsed                           |                               | $I_{DM}$        | 1.5        | A            |
| Power Dissipation                                |                               | $P_D$           | 350        | mW           |
| Thermal Resistance form Junction to Case         |                               | $R_{\theta JC}$ | 15         | $^\circ C/W$ |
| Operating Junction and Storage Temperature Range |                               | $T_J, T_{stg}$  | -55 to 150 | $^\circ C$   |

### DIMENSIONS

| Item | Min (mm) | Max (mm) |
|------|----------|----------|
| A1   | 0.00     | 0.10     |
| A2   | 0.90     | 1.00     |
| b    | 0.15     | 0.40     |
| c    | 0.10     | 0.25     |
| D    | 1.80     | 2.20     |
| e    | 0.65 TYP |          |
| e1   | 1.20     | 1.40     |
| E    | 2.15     | 2.45     |
| E1   | 1.15     | 1.35     |
| L    | 0.25     | 0.46     |
| X    | 0.80     |          |
| X1   | 0.65     |          |
| Y    | 0.80     |          |
| Y1   | 0.80     |          |
| Y2   | 2.40     |          |



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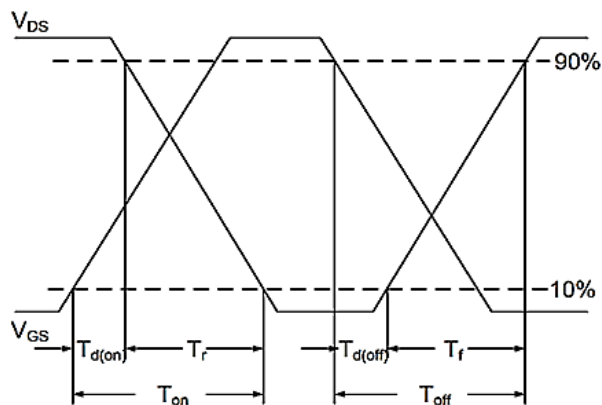
### ELECTRICAL CHARACTERISTICS

| Off Characteristics               | Conditions                                              | Symbol       | Min | Typ. | Max      | Unit     |
|-----------------------------------|---------------------------------------------------------|--------------|-----|------|----------|----------|
| Drain-Source Breakdown Voltage    | $V_{GS}=0V, I_D=250\mu A$                               | $BV_{DSS}$   | 60  | --   | --       | V        |
| Gate Threshold Voltage            | $V_{GS}=V_{DS}, I_D=250\mu A$                           | $V_{GS(th)}$ | 1.0 | 1.3  | 2.0      | V        |
| Gate Leakage Current              | $V_{DS}=0V, V_{GS}=\pm 20V$                             | $I_{GSS}$    | --  | --   | $\pm 10$ | $\mu A$  |
| Zero Gate Voltage Drain Current   | $V_{DS}=60V, V_{GS}=0V$                                 | $I_{DSS}$    | --  | --   | 1        | $\mu A$  |
| On Characteristics                | Conditions                                              | Symbol       | Min | Typ. | Max      | Unit     |
| Static Drain-Source On-Resistance | $V_{GS}=10V, I_D=300mA$                                 | $R_{DS(on)}$ | --  | 1.1  | 1.6      | $\Omega$ |
|                                   | $V_{GS}=4.5V, I_D=200mA$                                |              | --  | 1.3  | 2.0      |          |
| Dynamic Characteristics           | Conditions                                              | Symbol       | --  | Typ. | Max      | Unit     |
| Input Capacitance                 | $V_{DS}=30V, V_{GS}=0V, F=1MHz$                         | $C_{iss}$    | --  | 25   | --       | pF       |
| Output Capacitance                |                                                         | $C_{oss}$    | --  | 5.6  | --       |          |
| Reverse Transfer Capacitance      |                                                         | $C_{rss}$    | --  | 2.2  | --       |          |
| Turn-On Delay Time                | $V_{DD}=30V, I_D \equiv 300mA, V_{GS}=10V, R_G=3\Omega$ | $T_{d(on)}$  | --  | 4.3  | --       | nS       |
| Rise Time                         |                                                         | $T_r$        | --  | 2.4  | --       |          |
| Turn-Off Delay Time               |                                                         | $T_{d(off)}$ | --  | 21   | --       |          |
| Fall Time                         |                                                         | $T_f$        | --  | 14.5 | --       |          |
| Total Gate Charge                 | $V_{DS}=30V, V_{GS}=4.5V, I_D \equiv 300mA$             | $Q_g$        | --  | 0.61 | --       | nC       |
| Gate-Source Charge                |                                                         | $Q_{gs}$     | --  | 0.27 | --       |          |
| Gate-Drain Charge                 |                                                         | $Q_{gd}$     | --  | 0.23 | --       |          |
| Drain-Source Body Diode           | Conditions                                              | Symbol       | Min | Typ. | Max      | Unit     |
| Diode Forward Current             | --                                                      | $I_S$        | --  | --   | 0.5      | A        |
| Diode Forward Voltage             | $I_S=300mA, V_{GS}=0V$                                  | $V_{SD}$     | --  | --   | 1.5      | V        |

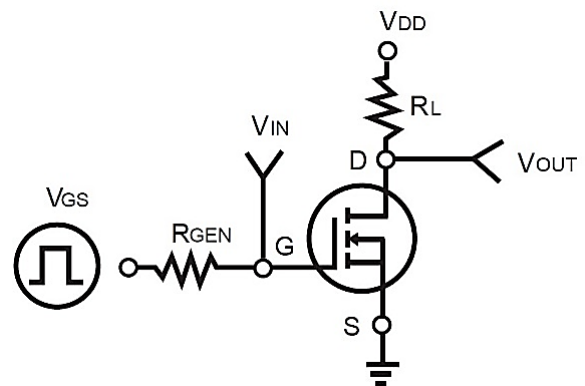
Note:

1.  $T_A=25^\circ C$ , unless otherwise noted
2. Pulse width  $< 300\mu s$ , Duty cycle  $< 2\%$
3. The power dissipation is limited by  $150^\circ C$  junction temperature.
4. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2oz copper
5. The data is theoretically the same as  $I_D$  and  $I_{DM}$ , in real applications, should be limited by total power dissipation

Switching Time Waveform

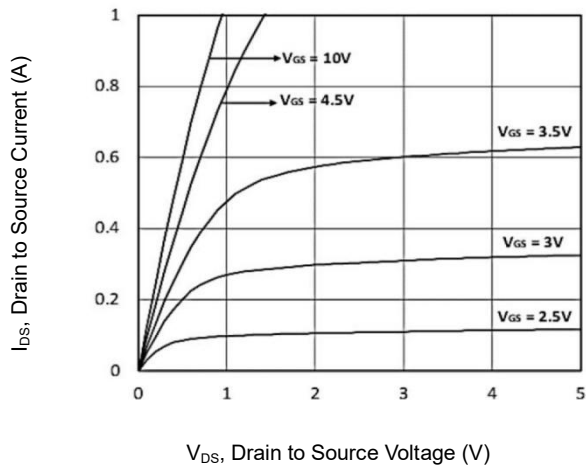


Switching Test Circuit

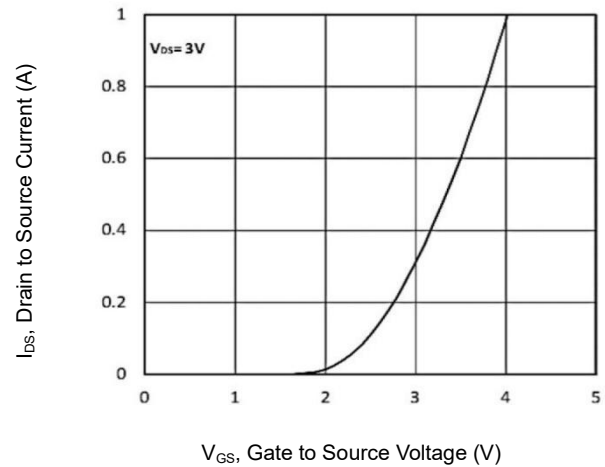


## CHARACTERISTIC CURVES

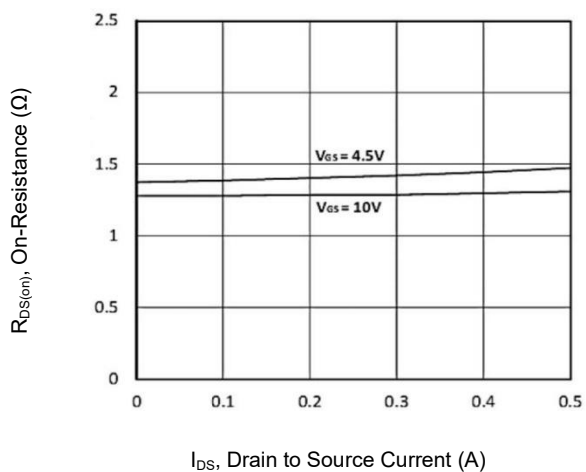
On-Region Characteristic



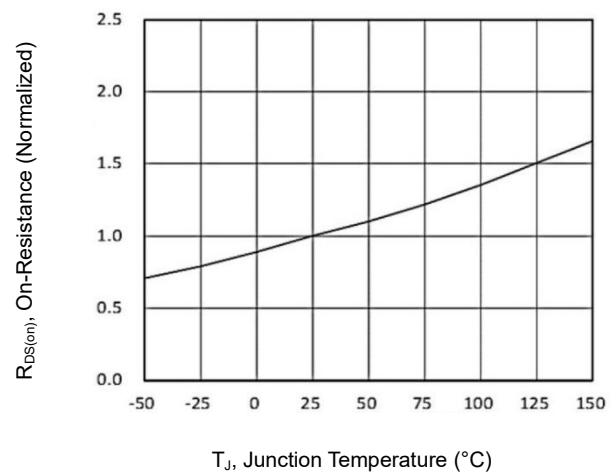
Transfer Characteristics



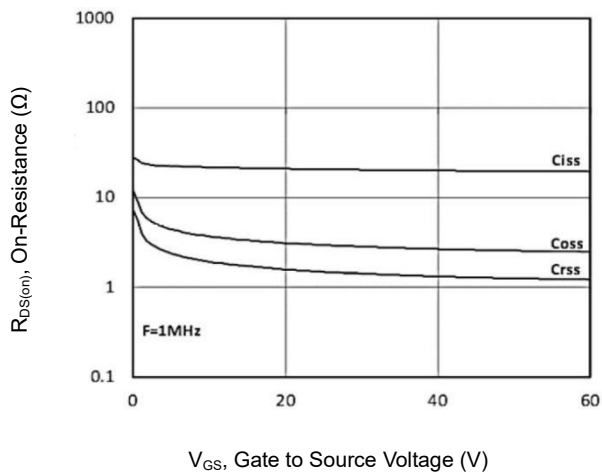
On-Resistance vs. Drain Current



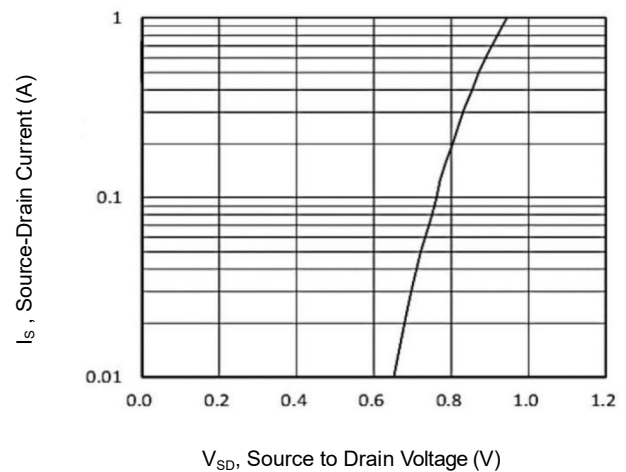
On-Resistance vs. Junction Temperature



On-Resistance vs. Gate -Source Voltage



Source-Drain Diode Forward Voltage



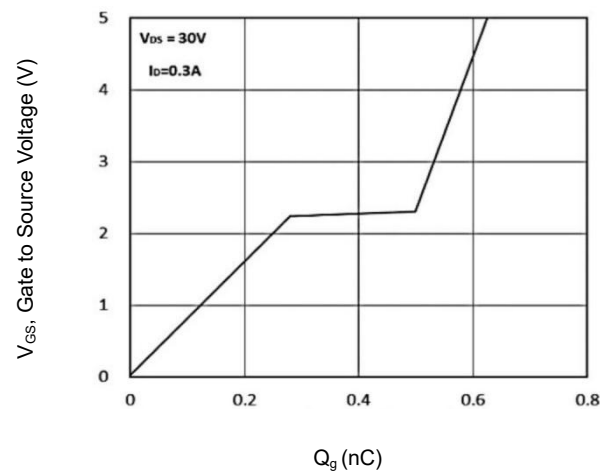
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**CHARACTERISTIC CURVES**

Gate-Charge Characteristics



Capacitance vs. Drain-Source Voltage

