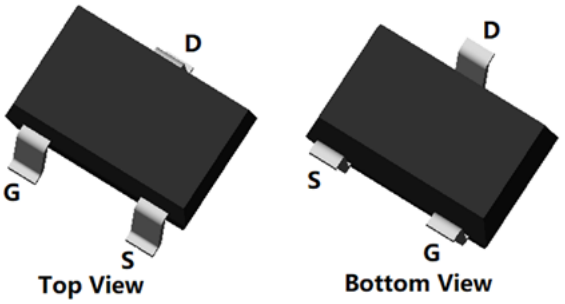
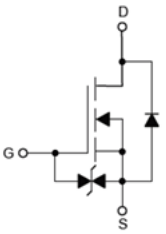
# N-Channel Enhancement Mode Field Effect Transistor




SOT-323




## Product Summary

- $V_{DS}$ 60V
- $I_D$ 300mA
- $R_{DS(ON)}$( at $V_{GS}$=10V) ＜2.5ohm
- $R_{DS(ON)}$( at $V_{GS}$=4.5V) ＜3.0ohm
- Gate-Source ESD Rating Up to 2KV (HBM)

## General Description

- Trench Power MV MOSFET technology
- Voltage controlled small signal switch
- Low input Capacitance
- Fast Switching Speed
- Low Input / Output Leakage
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

## Applications

- Battery operated systems
- Solid-state relays
- Direct logic-level interface：TTL/CMOS

## ■ Absolute Maximum Ratings ($T_A$=25℃unless otherwise noted)

| Parameter | | Symbol | Limit | Unit |
|---|---|---|---|---|
| Drain-source Voltage | | $V_{DS}$ | 60 | V |
| Gate-source Voltage | | $V_{GS}$ | ±20 | V |
| Drain Current | $T_A$=25℃ @ Steady State | $I_D$ | 300 | mA |
| | $T_A$=70℃ @ Steady State | | 240 | |
| Pulsed Drain Current [A] | | $I_{DM}$ | 1.5 | A |
| Total Power Dissipation @ $T_A$=25℃ | | $P_D$ | 300 | mW |
| Thermal Resistance Junction-to-Ambient @ Steady State [B] | | $R_{\theta JA}$ | 416 | ℃/ W |
| Junction and Storage Temperature Range | | $T_J$ ,$T_{STG}$ | -55～+150 | ℃ |

## ■ Ordering Information (Example)

| PREFERED P/N | PACKING CODE | Marking | MINIMUM PACKAGE(pcs) | INNER BOX QUANTITY(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|---|---|---|---|---|---|---|
| 2N7002KCW | F2 | 72KC. | 3000 | 30000 | 120000 | 7“ reel |

## ■ Electrical Characteristics ($T_J$=25℃ unless otherwise noted)

| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Static Parameter** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$= 0V, $I_D$=250μA | 60 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=60V,$V_{GS}$=0V | | | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$= ±20V, $V_{DS}$=0V | | | ±10 | μA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$= $V_{GS}$, $I_D$=250μA | 1 | 1.5 | 2.5 | V |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$= 10V, $I_D$=300mA | | 1.9 | 2.5 | Ω |
| | | $V_{GS}$= 4.5V, $I_D$=200mA | | 2.0 | 3.0 | |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=300mA,$V_{GS}$=0V | | | 1.2 | V |
| Maximum Body-Diode Continuous Current | $I_S$ | | | | 300 | mA |
| **Dynamic Parameters** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=30V,$V_{GS}$=0V,f=1MHZ | | 27 | | pF |
| Output Capacitance | $C_{oss}$ | | | 3 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 2 | | |
| **Switching Parameters** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{GS}$=10V,$V_{DS}$=30V,$I_D$=0.3A | | 1.65 | 2.4 | nC |
| Turn-on Delay Time | $t_{D(on)}$ | $V_{GS}$=10V,$V_{DD}$=30V, $I_D$=300mA, $R_{GEN}$=6Ω | | 6.5 | | ns |
| Turn-off Delay Time | $t_{D(off)}$ | | | 9.6 | | |
| Reverse recovery Time | $t_{rr}$ | $V_{GS}$=0V,$I_S$=300mA,$V_R$=25V, di/dt=-100A/μs | | 24 | | ns |

A. Pulse Test: Pulse Width≤300us,Duty cycle ≤2%.
B. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch.

## ■ Typical Performance Characteristics

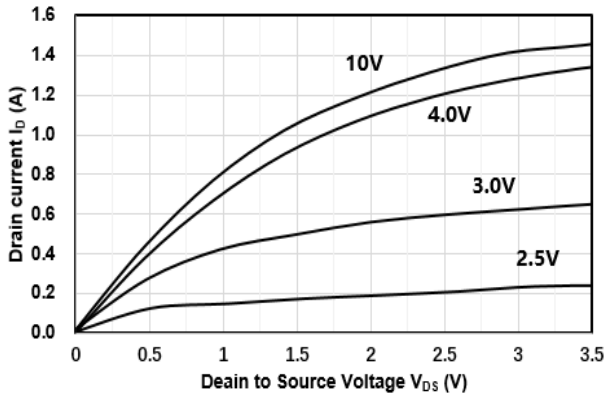



Figure1. Output Characteristics

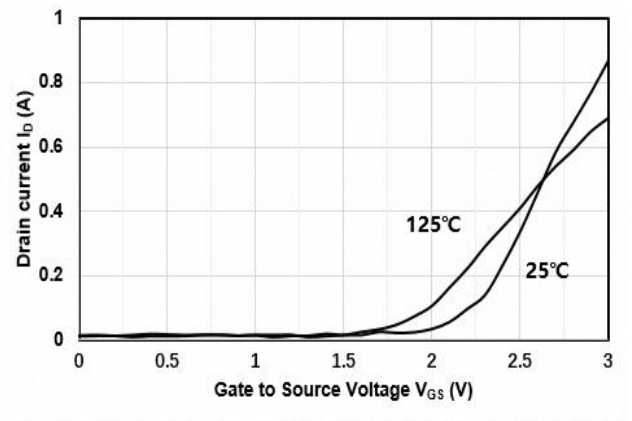



Figure2. Transfer Characteristics

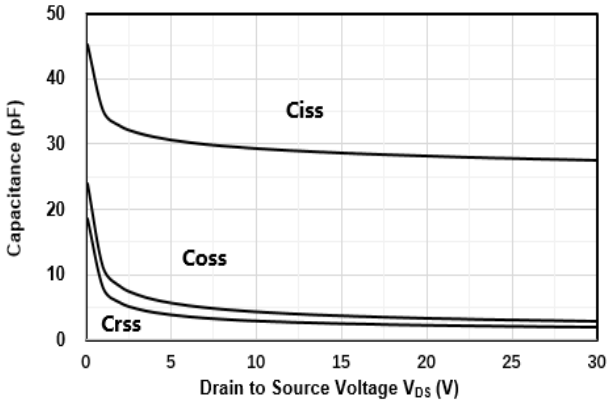



Figure3. Capacitance Characteristics

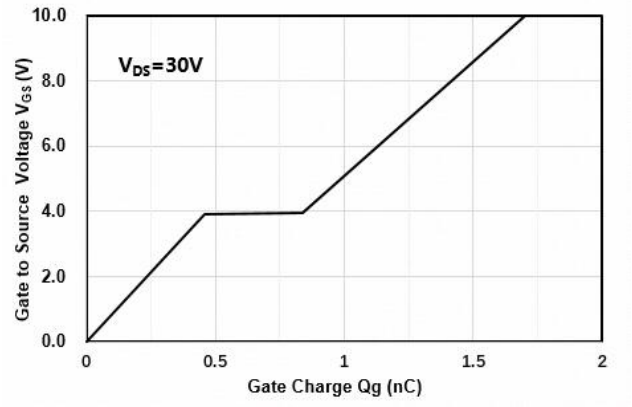



Figure4. Gate Charge

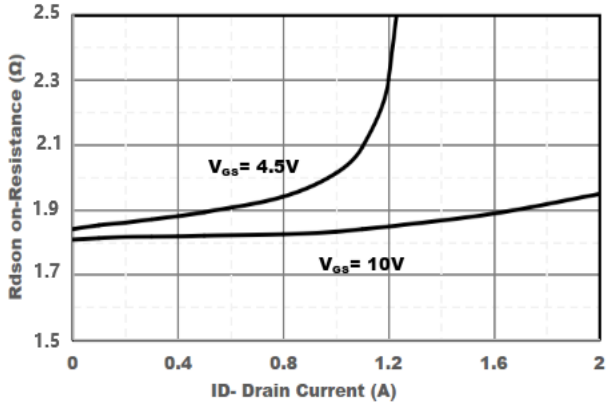



Figure5. Drain-Source on Resistance

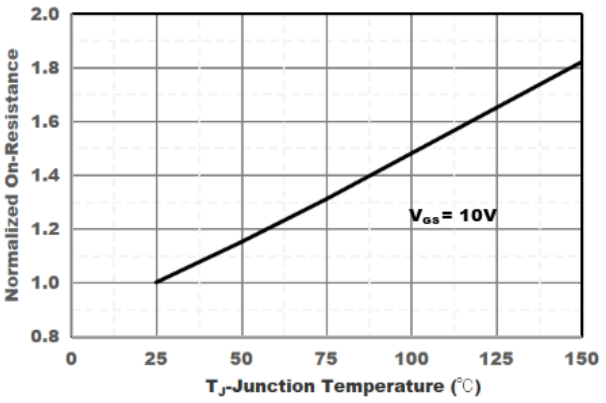



Figure6. Drain-Source on Resistance

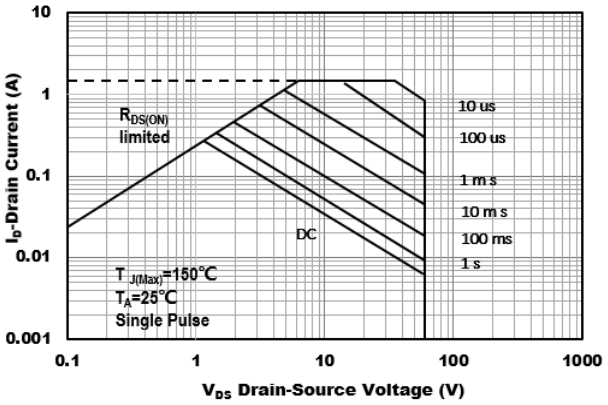



Figure7. Safe Operation Area

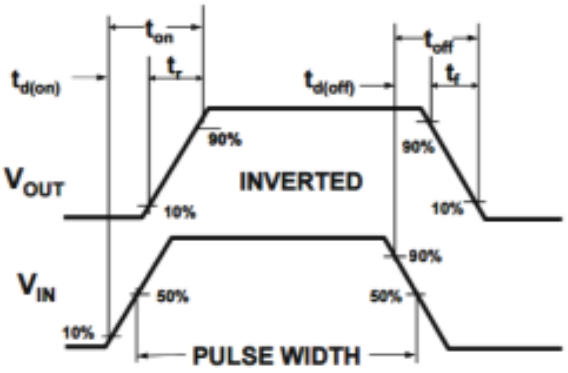
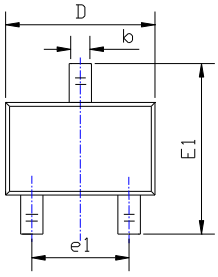
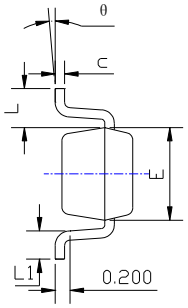



Figure8. Switching wave

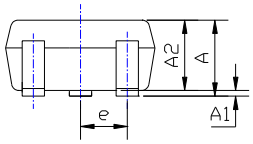
## ■ SOT-323 Package information



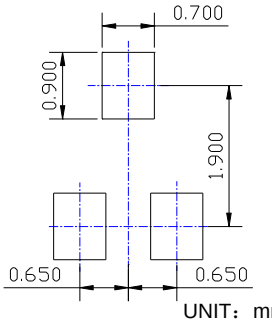

TOP VIEW




SIDE VIEW




SIDE VIEW




UNIT：mm

SUGGESTED SOLDER PAD LAYOUT

| DIMENSIONS | | | | |
|---|---|---|---|---|
| SYMBOL | INCHES | | Millimeter | |
| | MIN. | MAX. | MIN. | MAX. |
| A | 0.035 | 0.043 | 0.900 | 1.100 |
| A1 | 0.000 | 0.004 | 0.000 | 0.100 |
| A2 | 0.035 | 0.039 | 0.900 | 1.000 |
| b | 0.006 | 0.016 | 0.150 | 0.400 |
| c | 0.004 | 0.010 | 0.100 | 0.250 |
| D | 0.071 | 0.087 | 1.800 | 2.200 |
| E | 0.045 | 0.053 | 1.150 | 1.350 |
| E1 | 0.085 | 0.096 | 2.150 | 2.450 |
| e | 0.026TYP | | 0.650TYP | |
| e1 | 0.047 | 0.055 | 1.200 | 1.400 |
| L | 0.021REF | | 0.525REF | |
| L1 | 0.010 | 0.018 | 0.260 | 0.460 |
| θ | 0° | 8° | 0° | 8° |

NOTE:
1.PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
2.TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.
3.THE PAD LAYOUT IS FOR REFERENCE PURPOSES ONLY.

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