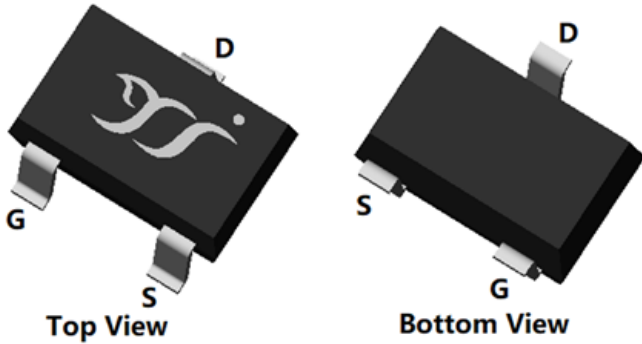
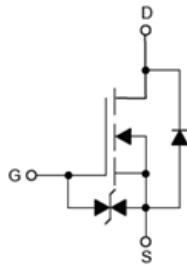


## N-Channel Enhancement Mode Field Effect Transistor



**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 ( $T_A=25^\circ\text{C}$ unless otherwise noted)

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

### ■ Ordering Information (Example)

| PREFERRED 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       |



# 2N7002KCW

## ■ Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

| Parameter                             | Symbol              | Conditions   | Min | Typ  | Max | Units |
|---------------------------------------|---------------------|--|-----|------|-----|-------|
| <b>Static Parameter</b>               |                     |  |     |      |     |       |
| Drain-Source Breakdown Voltage        | BV <sub>DSS</sub>   | V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA  | 60  |      |     | V     |
| Zero Gate Voltage Drain Current       | I <sub>DSS</sub>    | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V  |     |      | 1   | μA    |
| Gate-Body Leakage Current             | I <sub>GSS</sub>    | V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V  |     |      | ±10 | μA    |
| Gate Threshold Voltage                | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA                                  | 1   | 1.5  | 2.5 | V     |
| Static Drain-Source On-Resistance     | R <sub>DS(on)</sub> | V <sub>GS</sub> = 10V, I <sub>D</sub> =300mA   |     | 1.9  | 2.5 | Ω     |
|                                       |                     | V <sub>GS</sub> = 4.5V, I <sub>D</sub> =200mA  |     | 2.0  | 3.0 |       |
| Diode Forward Voltage                 | V <sub>SD</sub>     | I <sub>S</sub> =300mA, V <sub>GS</sub> =0V   |     |      | 1.2 | V     |
| Maximum Body-Diode Continuous Current | I <sub>S</sub>      |  |     |      | 300 | mA    |
| <b>Dynamic Parameters</b>             |                     |  |     |      |     |       |
| Input Capacitance                     | C <sub>iss</sub>    | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1MHZ  |     | 27   |     | pF    |
| Output Capacitance                    | C <sub>oss</sub>    |  |     | 3    |     |       |
| Reverse Transfer Capacitance          | C <sub>rss</sub>    |  |     | 2    |     |       |
| <b>Switching Parameters</b>           |                     |  |     |      |     |       |
| Total Gate Charge                     | Q <sub>g</sub>      | V <sub>GS</sub> =10V, V <sub>DS</sub> =30V, I <sub>D</sub> =0.3A                           |     | 1.65 | 2.4 | nC    |
| Turn-on Delay Time                    | t <sub>D(on)</sub>  | V <sub>GS</sub> =10V, V <sub>DD</sub> =30V, I <sub>D</sub> =300mA,<br>R <sub>GEN</sub> =6Ω |     | 6.5  |     | ns    |
| Turn-off Delay Time                   | t <sub>D(off)</sub> |  |     | 9.6  |     |       |
| Reverse recovery Time                 | t <sub>rr</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =300mA, V <sub>R</sub> =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

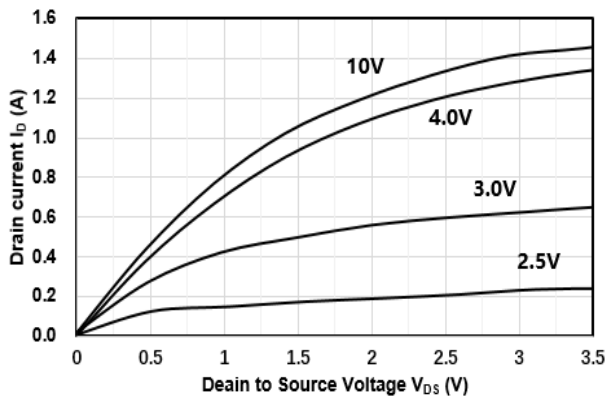


Figure1. Output Characteristics

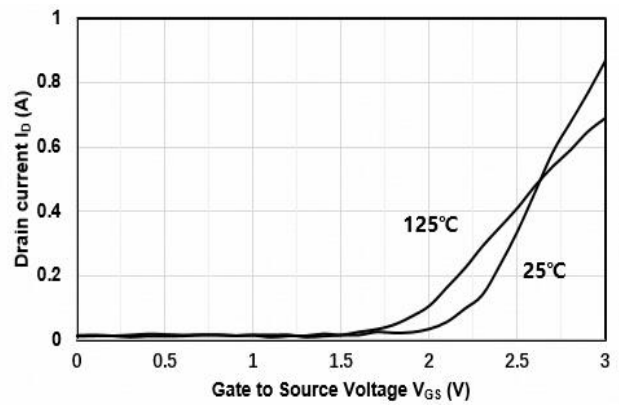


Figure2. Transfer Characteristics

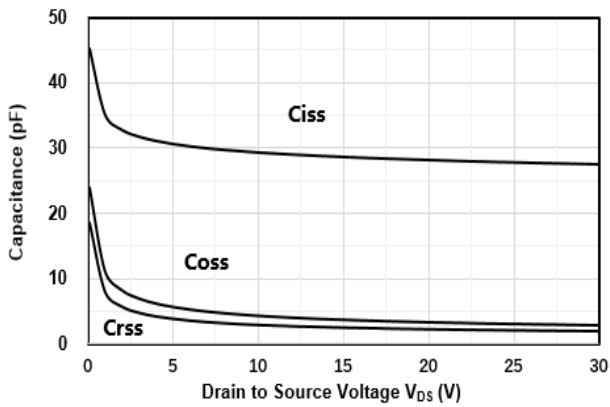


Figure3. Capacitance Characteristics

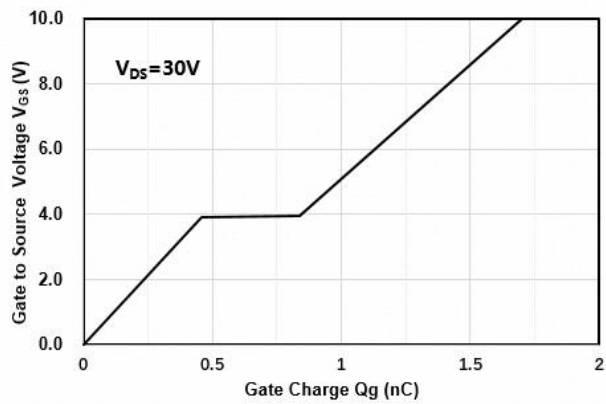


Figure4. Gate Charge

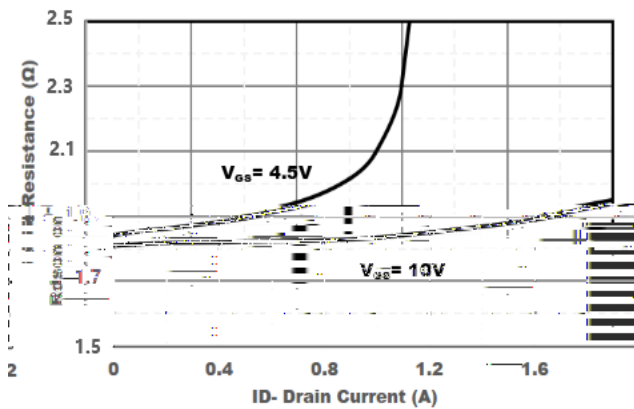


Figure5. Drain-Source on Resistance

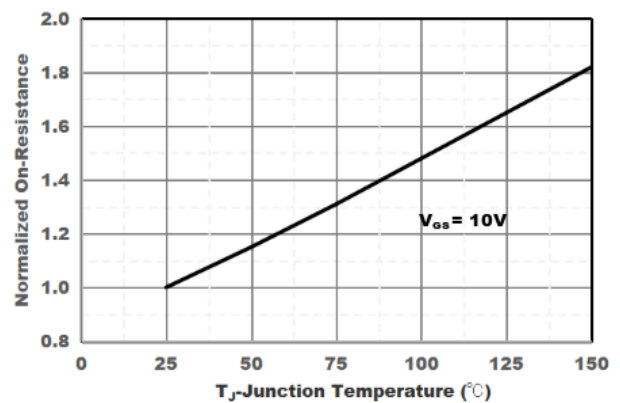


Figure6. Drain-Source on Resistance

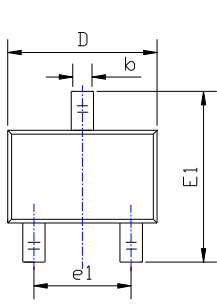
**2N7002KCW**

---

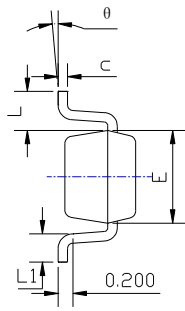


# 2N7002KCW

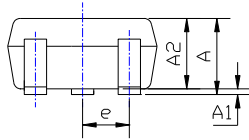
## ■ SOT-323 Package information



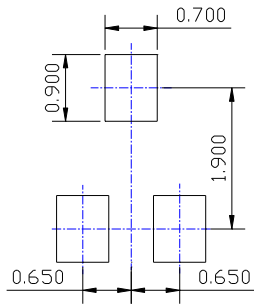
TOP VIEW



SIDE VIEW



SIDE VIEW



UNIT: mm

SUGGESTED SOLDER PAD LAYOUT

| SYMBOL | DIMENSIONS |       |            |       |
|--------|------------|-------|------------|-------|
|        | 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      | 0.026 TYP  |       | 0.650 TYP  |       |
| e1     | 0.047      | 0.055 | 1.200      | 1.400 |
| L      | 0.021 REF  |       | 0.525 REF  |       |
| 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.



## 2N7002KCW

---

### Disclaimer

The information presented in this document is for reference only. Yangzhou Yangjie Electronic Technology Co., Ltd. reserves the right to make changes without notice for the specification of the products displayed herein to improve reliability, function or design or otherwise.

The product listed herein is designed to be used with ordinary electronic equipment or devices, and not designed to be used with equipment or devices which require high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), Yangjie or anyone on its behalf, assumes no responsibility or liability for any damages resulting from such improper use of sale.

This publication supersedes & replaces all information previously supplied. For additional information, please visit our website [http:// www.21yangjie.com](http://www.21yangjie.com) , or consult your nearest Yangjie's sales office for further assistance.