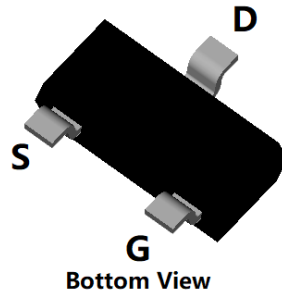
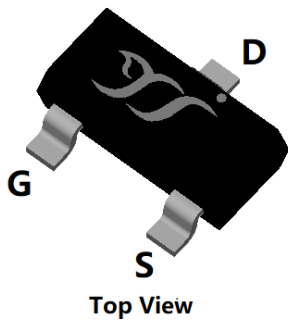
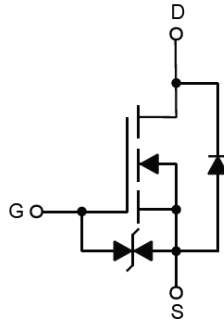


N-Channel Enhancement Mode Field Effect Transistor



SOT-23



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
- Part no. with suffix "Q" means AEC-Q101 qualified

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} | ± 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 ^A | 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 ^B | $R_{\theta JA}$ | 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 |
|---------------|--------------|---------|----------------------|-------------------------|----------------------------|---------------|
| 2N7002KCQ | F2 | 72KC. | 3000 | 30000 | 120000 | 7" reel |



2N7002KCQ

■ Electrical Characteristics (T_J=25°C 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, T _J =25°C | | | 1 | μA |
| | | V _{DS} =60V, V _{GS} =0V, T _J =125°C | | | 10 | μA |
| | | V _{DS} =50V, V _{GS} =0V, T _J =25°C | | | 100 | nA |
| 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

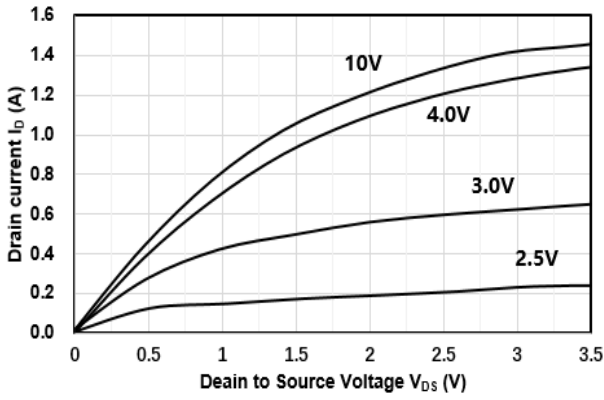


Figure1. Output Characteristics

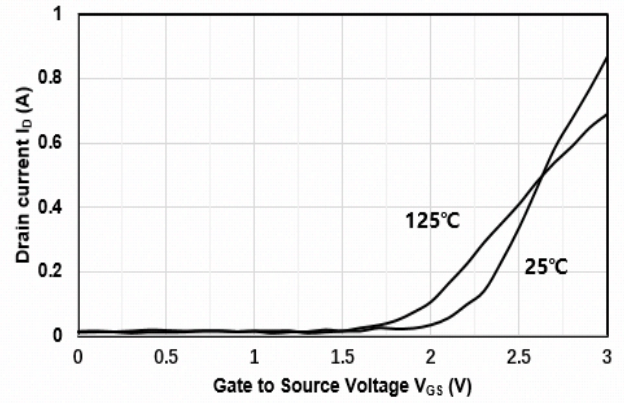


Figure2. Transfer Characteristics

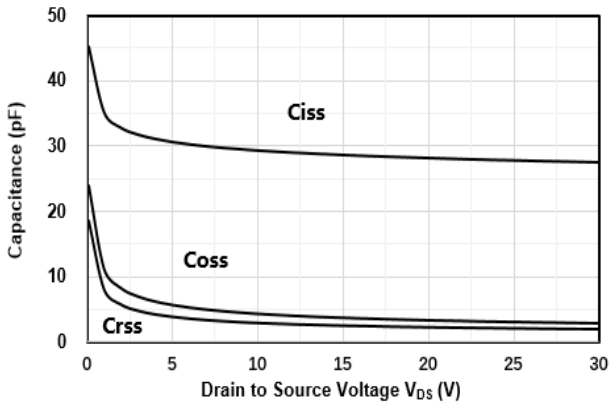


Figure3. Capacitance Characteristics

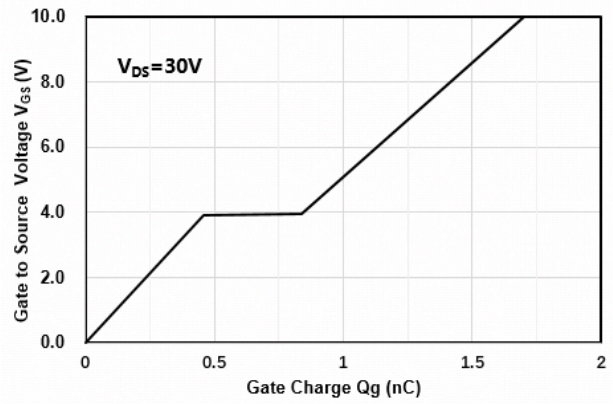


Figure4. Gate Charge

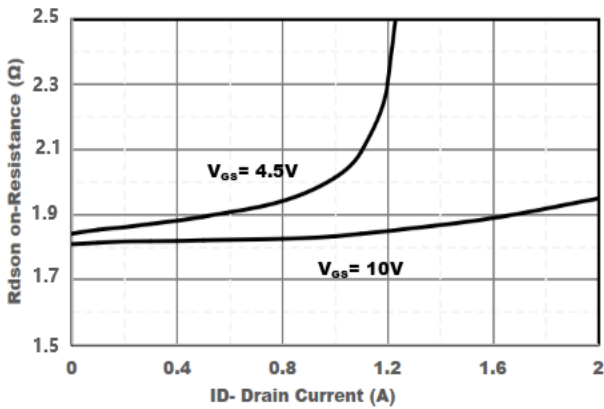


Figure5. Drain-Source on Resistance

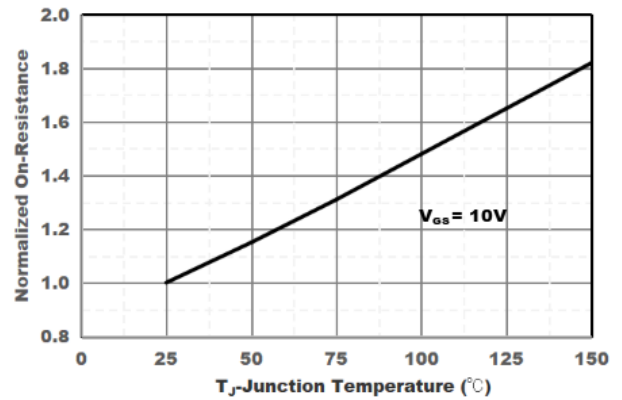


Figure6. Drain-Source on Resistance



2N7002KCQ

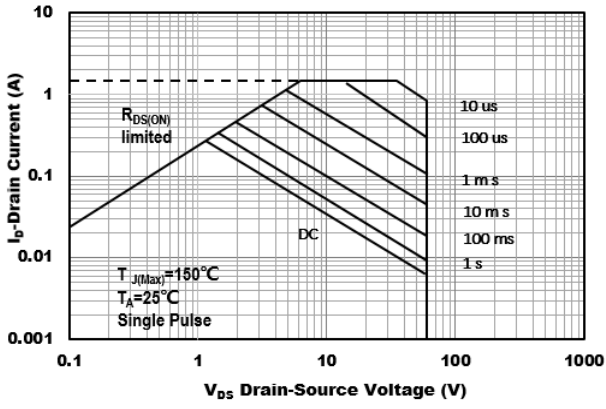


Figure7. Safe Operation Area

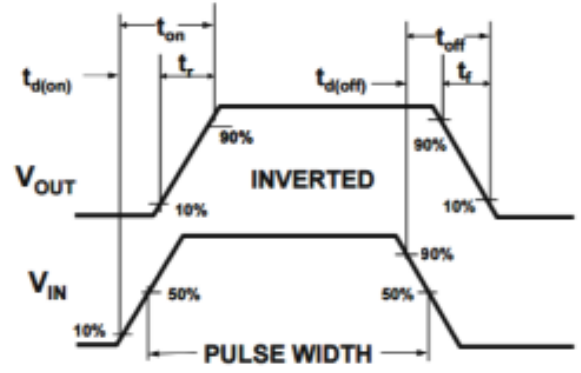
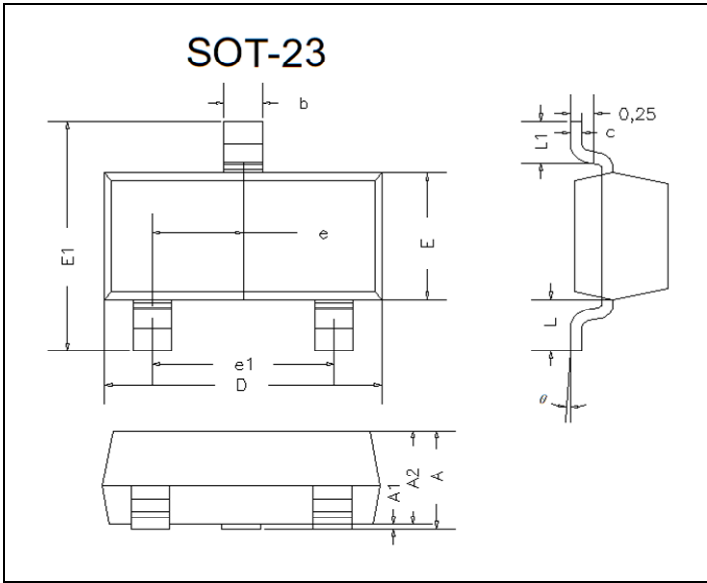


Figure8. Switching wave



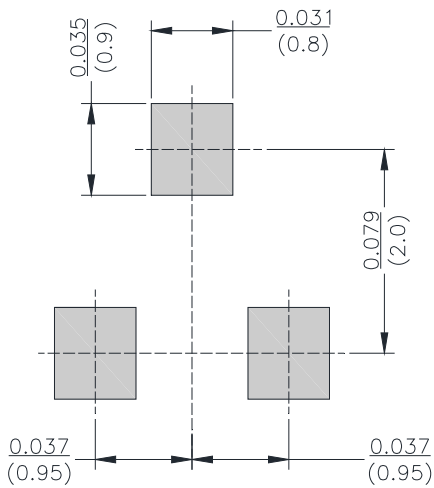
2N7002KCQ

■ SOT-23 Package information



| DIM | INCHES | | MM | | NOTE |
|-----|----------|-------|---------|------|------|
| | MIN | MAX | MIN | MAX | |
| A | 0.035 | 0.045 | 0.90 | 1.15 | |
| A1 | 0.000 | 0.004 | 0.00 | 0.10 | |
| A2 | 0.035 | 0.041 | 0.90 | 1.05 | |
| b | 0.012 | 0.020 | 0.30 | 0.50 | |
| c | 0.004 | 0.008 | 0.10 | 0.20 | |
| D | 0.110 | 0.118 | 2.80 | 3.00 | |
| E | 0.047 | 0.055 | 1.20 | 1.40 | |
| E1 | 0.089 | 0.100 | 2.25 | 2.55 | |
| e | 0.370TYP | | 0.95TYP | | |
| e1 | 0.071 | 0.079 | 1.80 | 2.00 | |
| L | 0.220REF | | 0.55REF | | |
| L1 | 0.012 | 0.020 | 0.30 | 0.50 | |
| θ | 0° | 8° | 0° | 8° | |

■ SOT-23 Suggested Pad Layout





2N7002KCQ

Disclaimer

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