

MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

2N7002DW-7-F-MS

Product specification

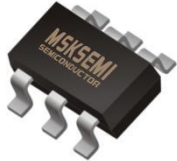
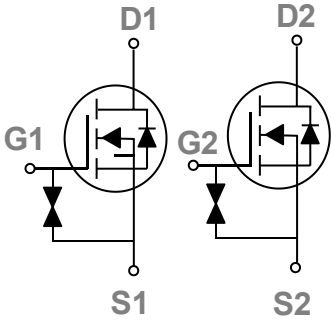
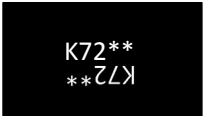
General Features

- 60V,0.3A,RDS(ON)=1.8Ω@VGS=10V
Improved dv/dt capability
- Fast switching
- Green Device Available
- G-S ESD Protection Diode Embedded

Application

- Motor Drive
- Power Tools
- LED Lighting

Reference News

| PACKAGE OUTLINE | Pin Configuration | Marking |
|--|--|--|
|  |  |  |
| <p>SOT-363</p> | | |

Absolute Maximum Ratings (TA=25°C unless otherwise)

| Symbol | Parameter | Rating | Units |
|------------------|---------------------------------------|------------|-------|
| V _{DS} | Drain- Source Voltage | 60 | V |
| V _{GS} | Gate- Source Voltage | ±20 | V |
| I _D | Drain Current – Continuous (TA=25°C) | 0.3 | A |
| | Drain Current – Continuous (TA=70°C) | 0.24 | A |
| I _{DM} | Drain Current – Pulsed ¹ | 1.2 | A |
| P _D | Power Dissipation (TA=25°C) | 0.28 | W |
| | Power Dissipation – Derate above 25°C | 0.002 | W/°C |
| T _{STG} | Storage Temperature Range | -50 to 150 | °C |
| T _J | Operating Junction Temperature Range | -50 to 150 | °C |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|------------------|--|------|------|------|
| R _{θJA} | Thermal Resistance Junction to ambient | --- | 450 | °C/W |

Electrical Characteristics (T_J=25 °C , unless otherwise noted) Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------------------------|---------------------------------|---|------|------|------|------|
| BVDSS | Drain- Source Breakdown Voltage | V _{GS} =0V , I _D =250uA | 60 | --- | --- | V |
| ΔBVDSS/ ΔT _J | BVDSS Temperature Coefficient | Reference to 25°C , I _D =1mA | --- | 0.04 | --- | V/°C |
| I _{DSS} | Drain- Source Leakage Current | V _{DS} =60V , V _{GS} =0V , T _J =25°C | --- | --- | 1 | A |
| | | V _{DS} =48V , V _{GS} =0V , T _J =125°C | --- | --- | 100 | A |
| I _{GSS} | Gate- Source Leakage Current | V _{GS} = ±20V , V _{DS} =0V | --- | --- | ±10 | A |

On Characteristics

| | | | | | | |
|---------------------------|---|--|-----|------|-----|-------|
| R _{DS(ON)} | Static Drain- Source On-Resistance | V _{GS} =10V , I _D =0.3A | --- | 1.8 | 2.8 | Ω |
| | | V _{GS} =4.5V , I _D =0.2A | --- | 2.2 | 3 | Ω |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1 | 1.6 | 2.5 | V |
| ΔV _{GS(th)}) | V _{GS(th)} Temperature Coefficient | | --- | -4 | --- | MV/°C |
| g _{fs} | Forward Transconductance | V _{DS} =10V , I _D =0.1A | --- | 0.24 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|---------|-------------------------------------|--------------------------------------|-----|------|--|----|
| Qg | Total Gate Charge ^{2, 3} | VDS=30V , VGS=10V , ID=0.2A | --- | 1.1 | | nC |
| Qgs | Gate-Source Charge ^{2, 3} | | --- | 0.1 | | |
| Qgd | Gate-Drain Charge ^{2, 3} | | --- | 0.23 | | |
| Td(on) | Turn-On Delay Time ^{2, 3} | VDD=30V , VGS=10V , RG=6Ω ID=0.2A | --- | 3 | | nS |
| Tr | Rise Time ^{2, 3} | | --- | 5 | | |
| Td(off) | Turn-Off Delay Time ^{2, 3} | | --- | 14 | | |
| Tf | Fall Time ^{2, 3} | | --- | 9 | | |
| Ciss | Input Capacitance | VDS=10V , VGS=0V , F=1MHz | --- | 30.6 | | pF |
| Coss | Output Capacitance | | --- | 5.5 | | |
| Crss | Reverse Transfer Capacitance | | --- | 4 | | |

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|--------|---------------------------|--------------------------|------|------|------|------|
| IS | Continuous Source Current | VG=VD=0V , Force Current | --- | --- | 0.3 | A |
| ISM | Pulsed Source Current | | --- | --- | 0.6 | A |
| VSD | Diode Forward Voltage | VGS=0V , IS=1A , TJ=25C | --- | --- | 1.2 | V |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width \cong 300us , duty cycle \cong 2%.
3. Essentially independent of operating temperature.

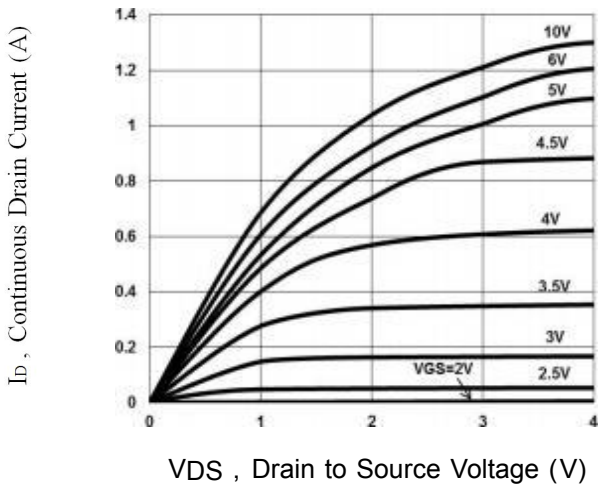


Fig. 1 Output Characteristics

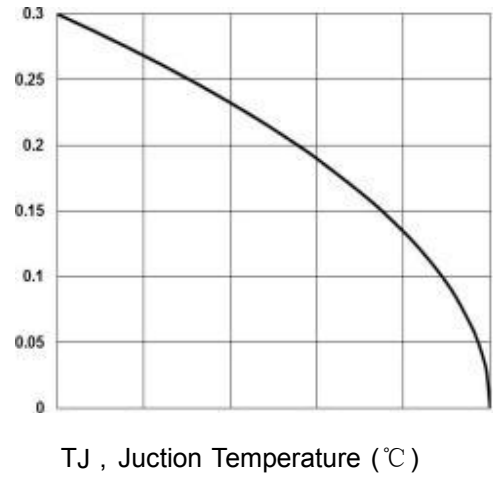


Fig. 2 Continuous Drain Current vs. T_J

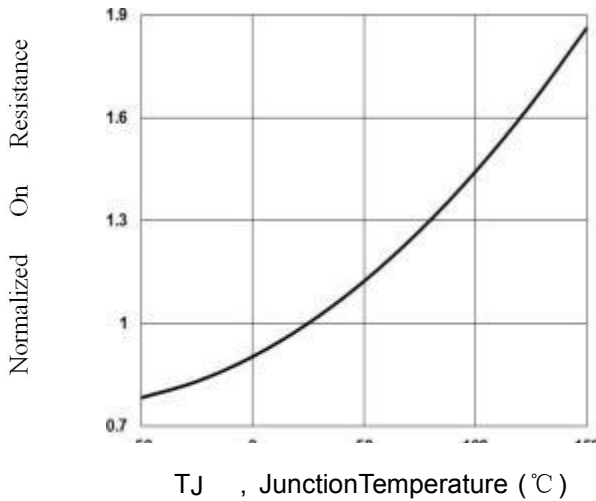


Fig. 3 Normalized $R_{DS(ON)}$ vs. T_J

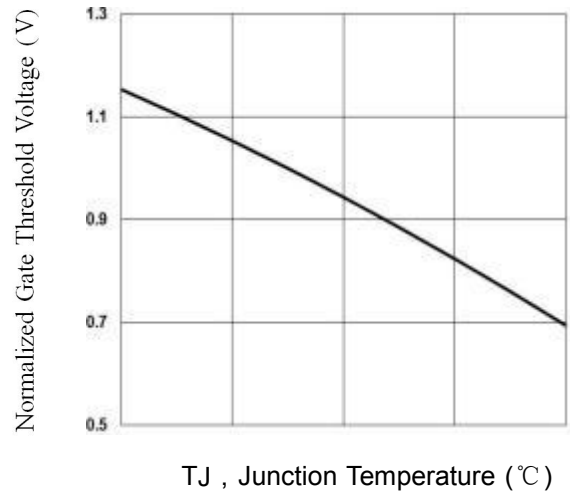


Fig. 4 Normalized V_{th} vs. T_J

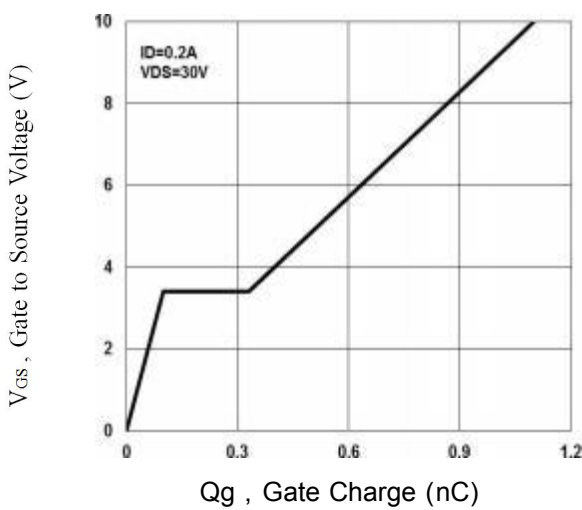


Fig. 5 Gate Charge Waveform

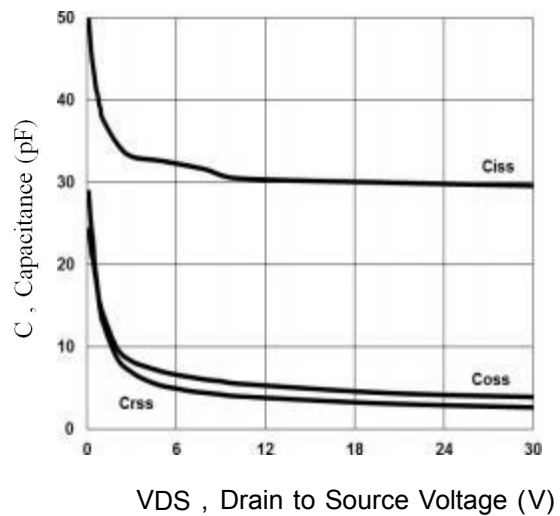
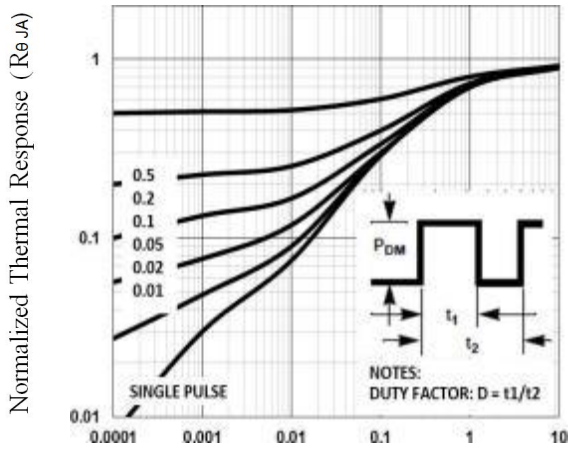
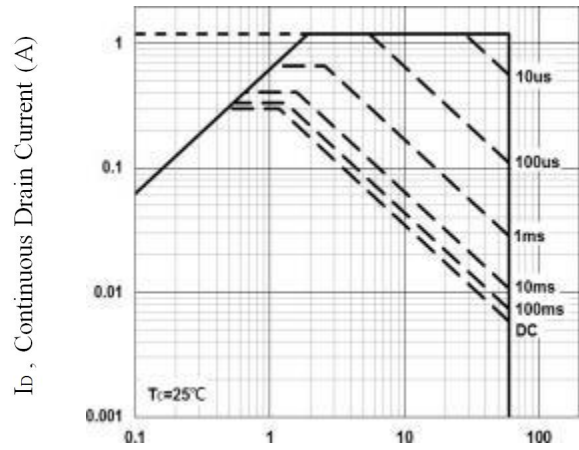


Fig. 6 Capacitance Characteristics



Square Wave Pulse Duration (s)

Fig. 7 Normalized Transient Impedance



VDS , Drain to Source Voltage(V)

Fig. 8 Maximum Safe Operation Area

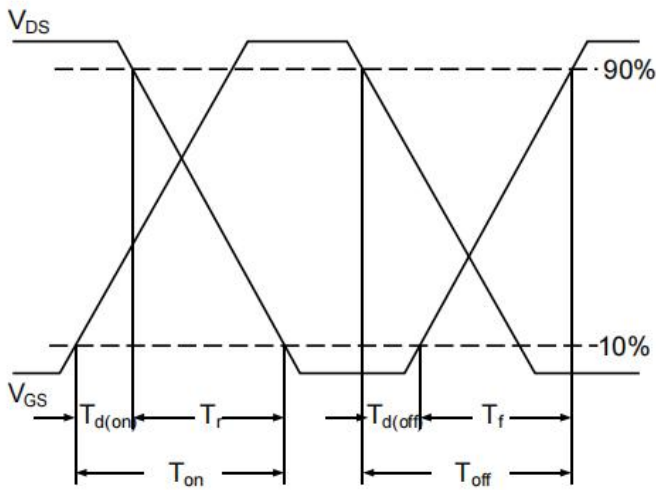
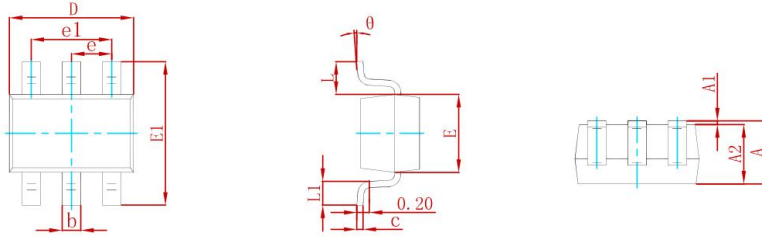


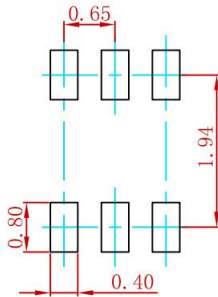
Fig.9 Switching Time Waveform

PACKAGE MECHANICAL DATA



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 0.900 | 1.100 | 0.035 | 0.043 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.000 | 0.035 | 0.039 |
| b | 0.150 | 0.350 | 0.006 | 0.014 |
| c | 0.100 | 0.150 | 0.004 | 0.006 |
| D | 2.000 | 2.200 | 0.079 | 0.087 |
| E | 1.150 | 1.350 | 0.045 | 0.053 |
| E1 | 2.150 | 2.400 | 0.085 | 0.094 |
| e | 0.650 TYP | | 0.026 TYP | |
| e1 | 1.200 | 1.400 | 0.047 | 0.055 |
| L | 0.525 REF | | 0.021 REF | |
| L1 | 0.260 | 0.460 | 0.010 | 0.018 |
| θ | 0° | 8° | 0° | 8° |

Suggested Pad Layout



Note:

1. Controlling dimension: In millimeters.
2. General tolerance: ± 0.05mm.
3. The pad layout is for reference purposes only.

REEL

| P/N | PKG | QTY |
|-----------------|---------|------|
| 2N7002DW-7-F-MS | SOT-363 | 3000 |

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