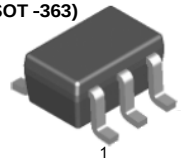
January 2015

# 2N7002DW
# N-Channel Enhancement Mode Field Effect Transistor

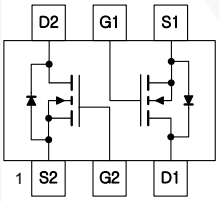
## Features

- Dual N-Channel MOSFET
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra-Small Surface Mount Package
- Lead Free/RoHS Compliant

SC70-6 (SOT -363)




Marking : 2N




## Ordering Information

| Part Number | Top Mark | Package | Packing Method |
|---|---|---|---|
| 2N7002DW | 2N | SC70 6L | Tape and Reel |

## Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at $T_A$ = 25°C unless otherwise noted.

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | | 60 | V |
| $V_{DGR}$ | Drain-Gate Voltage ($R_{GS}$ ≤ 1.0 MΩ) | | 60 | V |
| $V_{GSS}$ | Gate-Source Voltage | Continuous | ±20 | V |
| | | Pulsed | ±40 | |
| $I_D$ | Drain Current | Continuous | 115 | mA |
| | | Continuous at 100°C | 73 | |
| | | Pulsed | 800 | |
| $T_J$, $T_{STG}$ | Junction and Storage Temperature Range | | -55 to +150 | °C |

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## Thermal Characteristics

Values are at $T_A$ = 25°C unless otherwise noted.

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $P_D$ | Total Device Dissipation | 200 | mW |
| | Derate Above $T_A$ = 25°C | 1.6 | mW/°C |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient(1) | 625 | °C/W |

**Note:**

1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch. Minimum land pad size.

## Electrical Characteristics

Values are at $T_A$ = 25°C unless otherwise noted.

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics**(2) | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = 10 μA | 60 | 78 | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 60 V, $V_{GS}$ = 0 V | | 0.001 | 1.0 | μA |
| | | $V_{DS}$ = 60 V, $V_{GS}$ = 0 V, $T_J$ = 125°C | | 7 | 500 | |
| $I_{GSS}$ | Gate-Body Leakage | $V_{GS}$ = ±20 V, $V_{DS}$ = 0 V | | 0.2 | ±10 | nA |
| **On Characteristics**(2) | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 μA | 1.00 | 1.76 | 2.00 | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$ = 5 V, $I_D$ = 0.05 A | | 1.6 | 7.5 | Ω |
| | | $V_{GS}$ = 10 V, $I_D$ = 0.5 A | | | 2.0 | |
| | | $V_{GS}$ = 10 V, $I_D$ = 0.5 A, $T_J$ = 125°C | | 2.53 | 13.5 | |
| $I_{D(ON)}$ | On-State Drain Current | $V_{GS}$ = 10 V, $V_{DS}$ = 7.5 V | 0.50 | 1.43 | | A |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = 10 V, $I_D$ = 0.2 A | 80.0 | 356.5 | | mS |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 25 V, $V_{GS}$= 0 V, f = 1.0 MHz | | 37.8 | 50 | pF |
| $C_{oss}$ | Output Capacitance | | | 12.4 | 25 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 6.5 | 7 | pF |
| **Switching Characteristics** | | | | | | |
| $t_{D(ON)}$ | Turn-On Delay Time | $V_{DD}$ = 30 V, $I_D$ = 0.2 A, $V_{GEN}$ = 10 V, $R_L$ = 150 Ω, $R_{GEN}$ = 25 Ω | | 5.85 | 20 | ns |
| $t_{D(OFF)}$ | Turn-Off Delay Time | | | 12.5 | 20 | ns |

**Note:**

2. Short duration test pulse used to minimize self-heating effect.

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## Typical Performance Characteristics

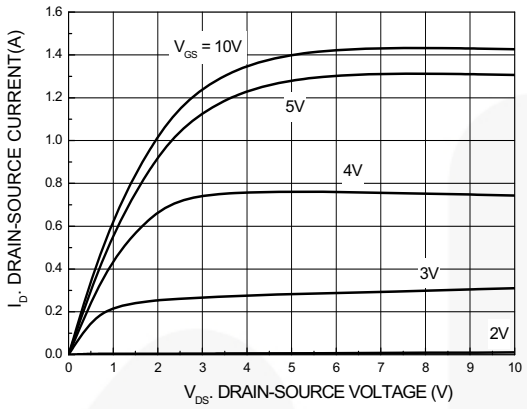



**Figure 1. On-Region Characteristics**

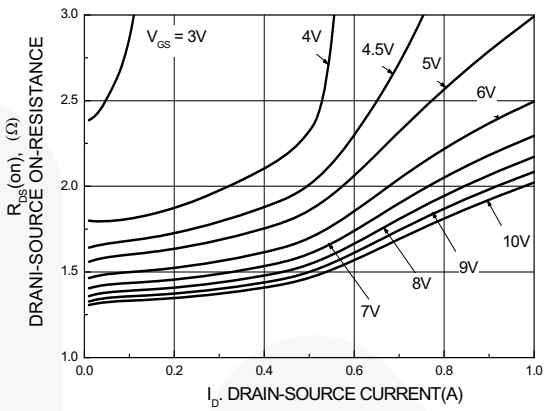



**Figure 2. On-Resistance Variation with Gate Voltage and Drain Current**

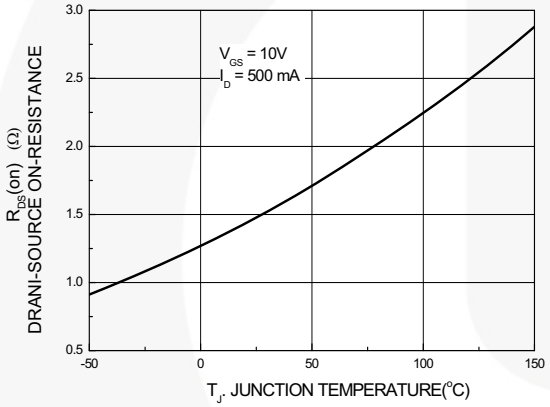



**Figure 3. On-Resistance Variation with Temperature**

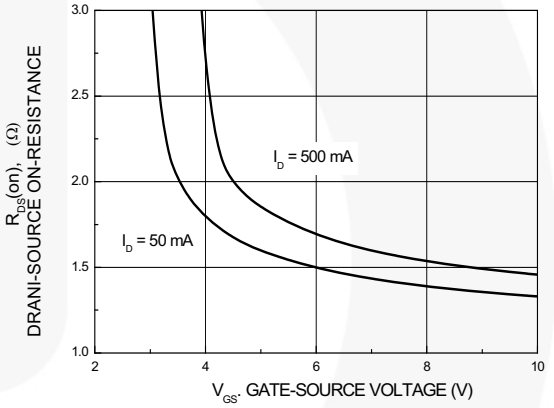



**Figure 4. On-Resistance Variation with Gate-Source Voltage**

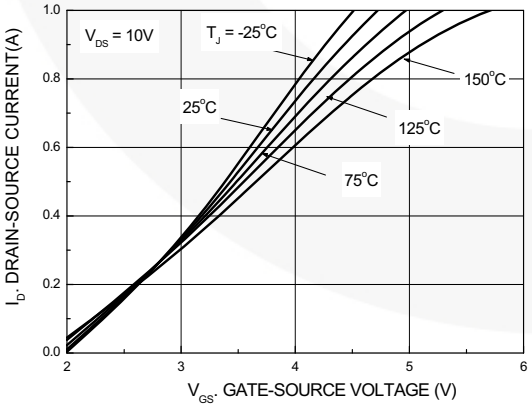



**Figure 5. Transfer Characteristics**

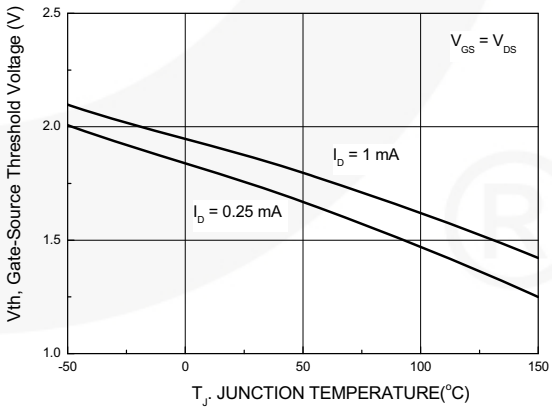



**Figure 6. Gate Threshold Variation with Temperature**

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## Typical Performance Characteristics (Continued)

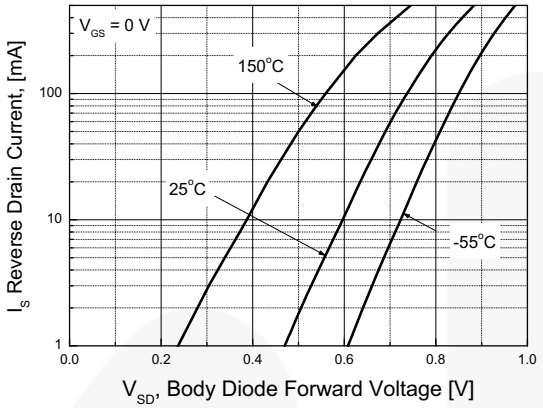



**Figure 7. Reverse Drain Current Variation with Diode Forward Voltage and Temperature**

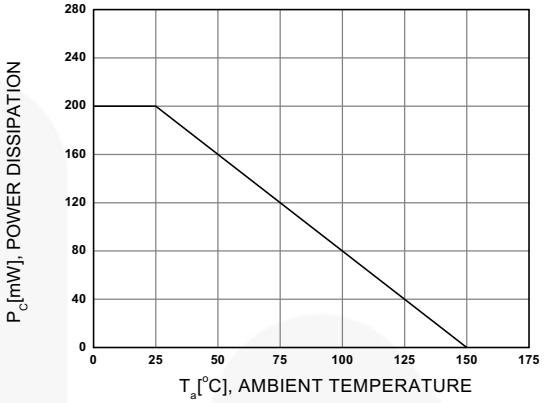



**Figure 8. Power Derating**

## Physical Dimensions

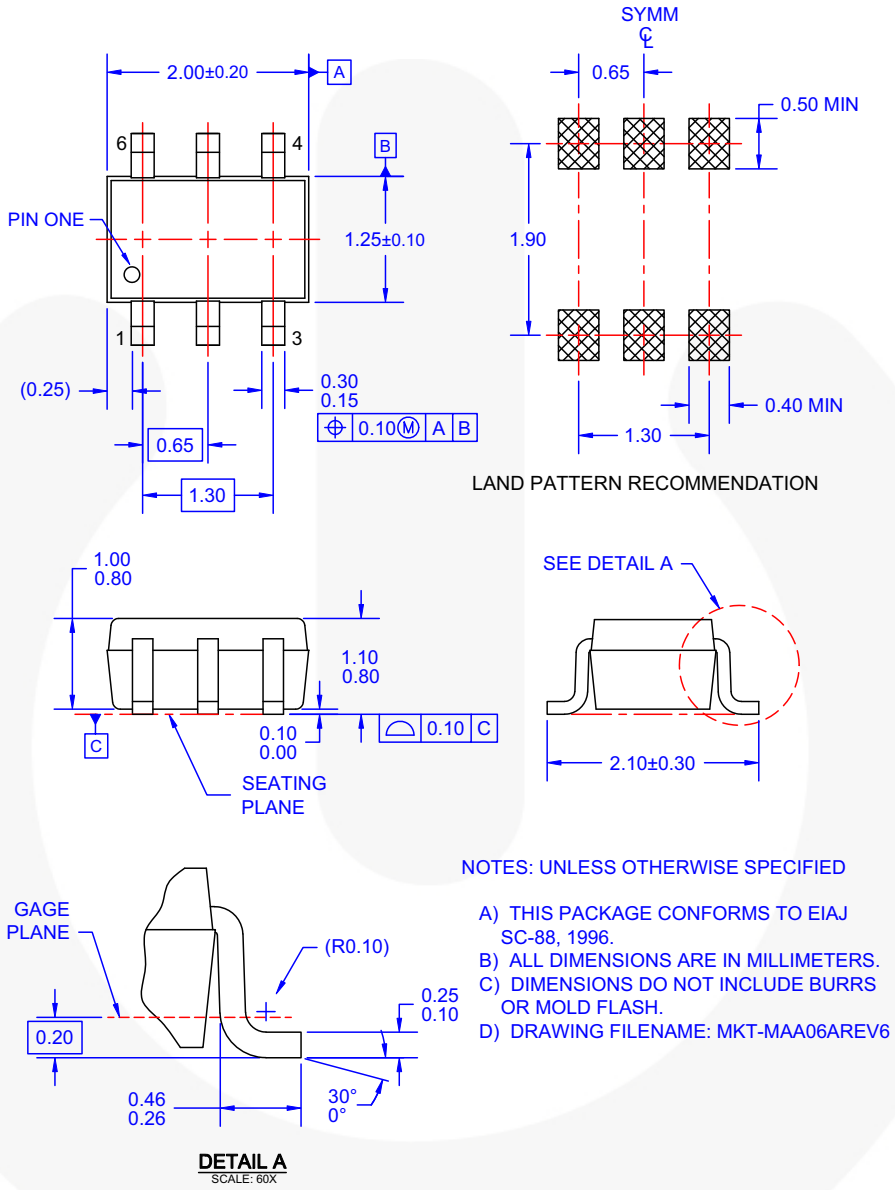



**Figure 9. 6-LEAD, SC70, EIAJ SC-88, 1.25MM WIDE**

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