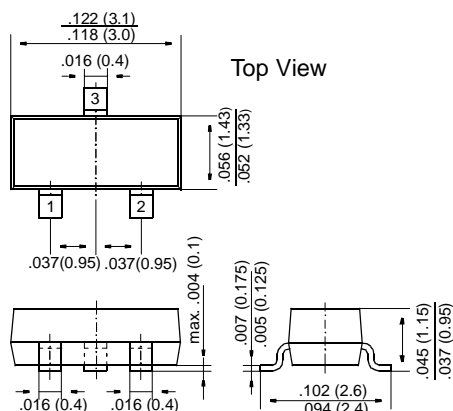


# 2N7002

## DMOS Transistors (N-Channel)

### SOT-23



Dimensions in inches and (millimeters)

Pin configuration

1 = Gate, 2 = Source, 3 = Drain

### FEATURES

- ◆ High input impedance
- ◆ High-speed switching
- ◆ No minority carrier storage time
- ◆ CMOS logic compatible input
- ◆ No minority carrier storage time
- ◆ CMOS logic compatible input
- ◆ No thermal runaway
- ◆ No secondary breakdown



### MECHANICAL DATA

**Case:** SOT-23 Plastic Package

**Weight:** approx. 0.008 g

**Marking**

S72

## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Ratings at 25 °C ambient temperature unless otherwise specified

	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	60	V
Drain-Gate Voltage	$V_{DGS}$	60	V
Gate-Source-Voltage (pulsed)	$V_{GS}$	$\pm 20$	V
Drain Current (continuous)	$I_D$	250	mA
Power Dissipation at $T_C = 50\text{ }^\circ\text{C}$	$P_{tot}$	0.310 <sup>1)</sup>	W
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature Range	$T_S$	-55 to +150	$^\circ\text{C}$

<sup>1)</sup> Ceramic Substrate 0.7mm; 2.5 cm<sup>2</sup> area.

### Inverse Diode

	Symbol	Value	Unit
Max. Forward Current (continuous) at $T_{amb} = 25\text{ }^\circ\text{C}$	$I_F$	0.3	A
Forward Voltage Drop (typ.) at $V_{GS} = 0$ , $I_F = 0.3\text{ A}$ , $T_j = 25\text{ }^\circ\text{C}$	$V_F$	0.85	V

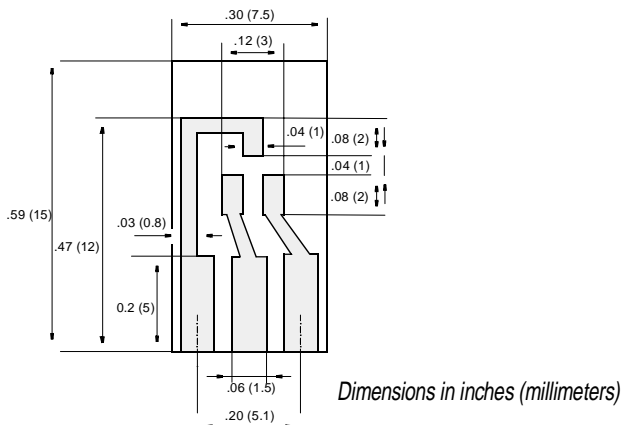
# 2N7002

## ELECTRICAL CHARACTERISTICS

Ratings at 25 °C ambient temperature unless otherwise specified

	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage at $I_D = 100 \mu\text{A}$ , $V_{GS} = 0$	$V_{(BR)DSS}$	60	90	–	V
Gate Threshold Voltage at $V_{GS} = V_{DS}$ , $I_D = 1 \text{ mA}$	$V_{GS(th)}$	–	2	2.5	V
Gate-Body Leakage Current at $V_{GS} = 15 \text{ V}$ , $V_{DS} = 0$	$I_{GSS}$	–	–	10	nA
Drain Cutoff Current at $V_{DS} = 25 \text{ V}$ , $V_{GS} = 0$	$I_{DSS}$	–	–	0.5	$\mu\text{A}$
Drain-Source ON Resistance at $V_{GS} = 10 \text{ V}$ , $I_D = 500 \text{ mA}$	$r_{DS(ON)}$	–	5	7.5	$\Omega$
Thermal Resistance Junction to Substrate Backside	$R_{thSB}$	–	–	320 <sup>1)</sup>	K/W
Thermal Resistance Junction to Ambient Air	$R_{thJA}$	–	–	450 <sup>1)</sup>	K/W
Forward Transconductance at $V_{DS} = 10 \text{ V}$ , $I_D = 200 \text{ mA}$ , $f = 1 \text{ MHz}$	$g_m$	–	200	–	mS
Input Capacitance at $V_{DS} = 10 \text{ V}$ , $V_{GS} = 0$ , $f = 1 \text{ MHz}$	$C_{iss}$	–	60	–	pF
Switching Times at $V_{GS} = 10 \text{ V}$ , $V_{DS} = 10 \text{ V}$ , $R_D = 100 \Omega$					
Turn-On Time	$t_{on}$	–	5	–	ns
Turn-Off Time	$t_{off}$	–	25	–	ns

<sup>1)</sup> Device on fiberglass substrate, see layout



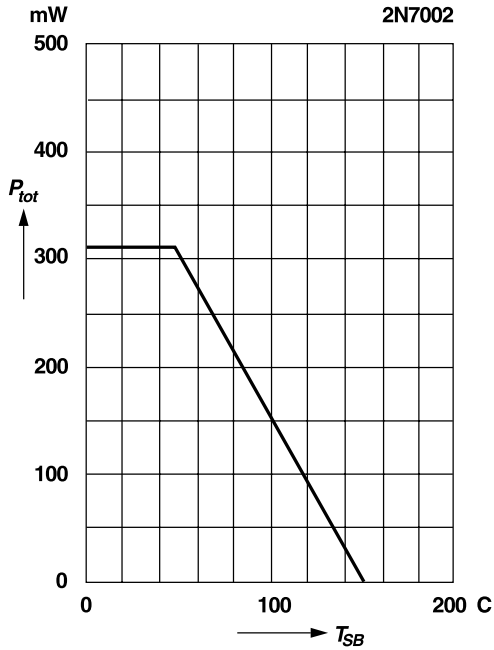
### Layout for $R_{thJA}$ test

Thickness: Fiberglass 0.059 in (1.5 mm)  
Copper leads 0.012 in (0.3 mm)

# RATINGS AND CHARACTERISTIC CURVES 2N7002

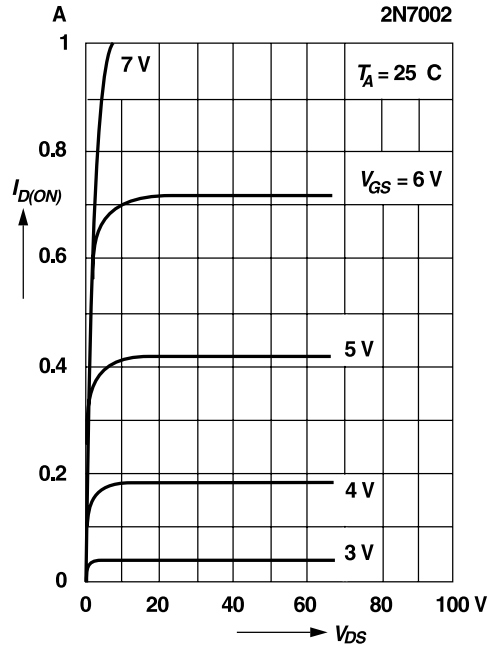
## Admissible power dissipation versus temperature of substrate backside

Device on fiberglass substrate, see layout



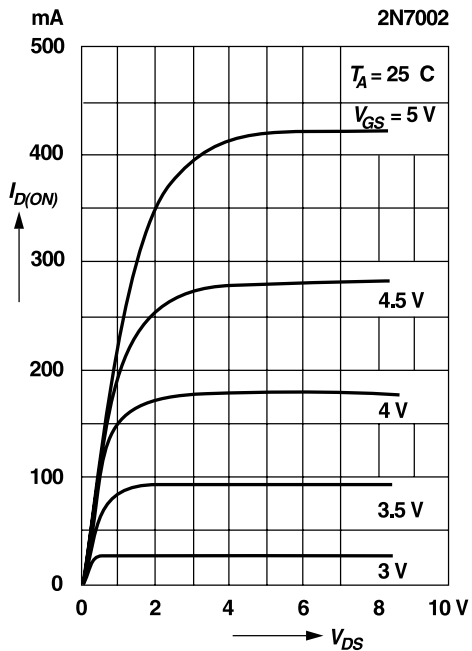
## Output characteristics

Pulse test width 80 ms; pulse duty factor 1%.

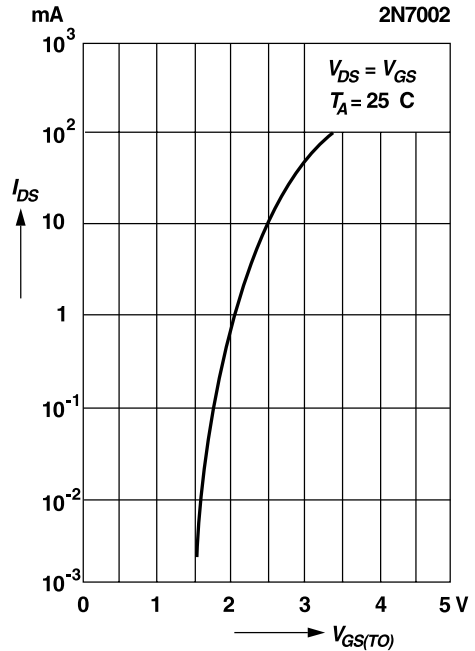


## Saturation characteristics

Pulse test width 80 ms; pulse duty factor 1%.



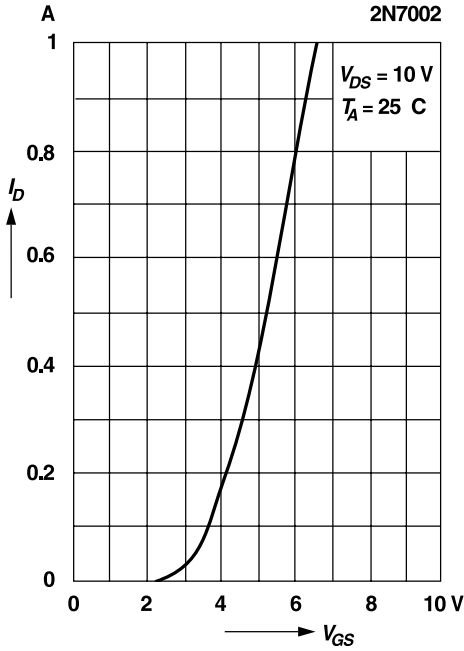
## Drain-source current versus gate threshold voltage



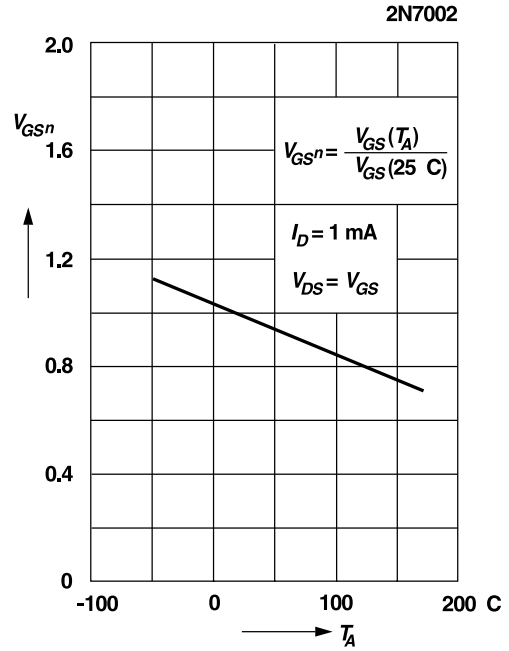
# RATINGS AND CHARACTERISTIC CURVES 2N7002

**Drain current versus gate-source voltage**

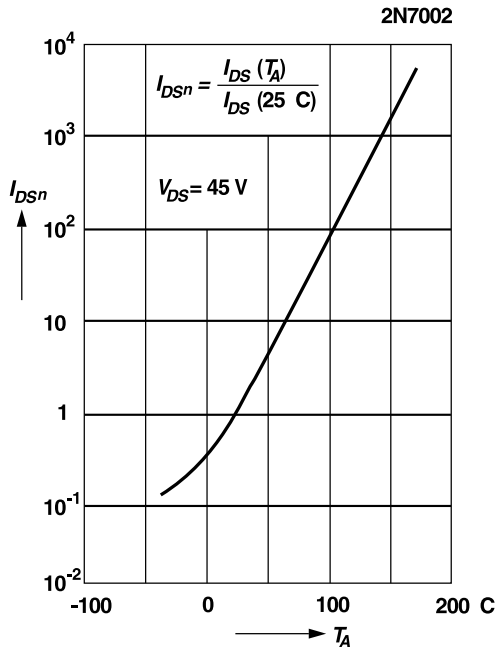
Pulse test width 80 ms; pulse duty factor 1%.



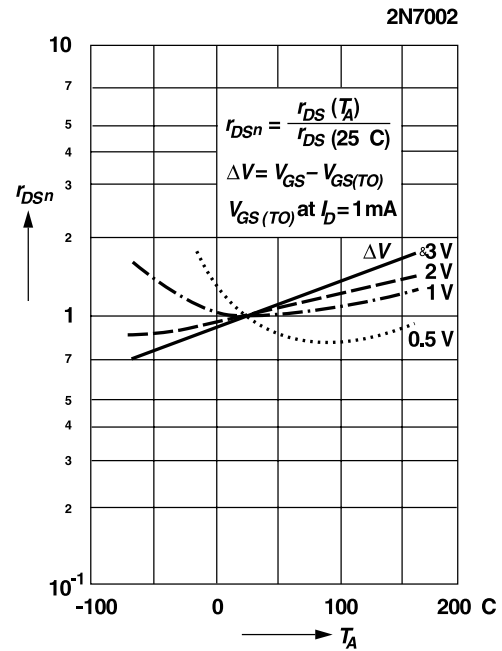
**Normalized gate-source voltage versus temperature**



**Normalized drain-source current versus temperature**

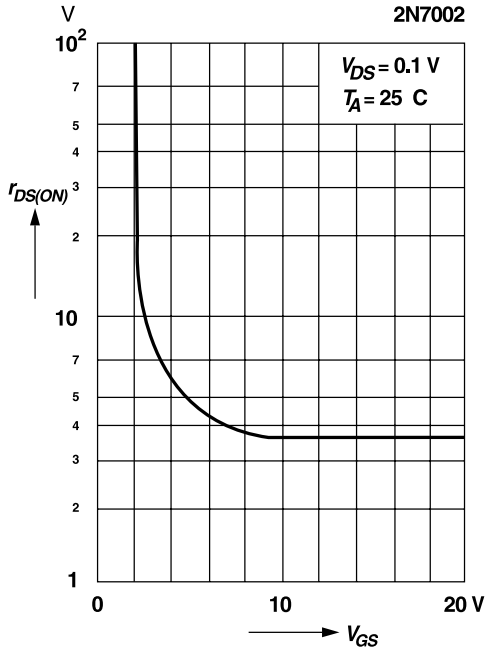


**Normalized drain-source resistance versus temperature**



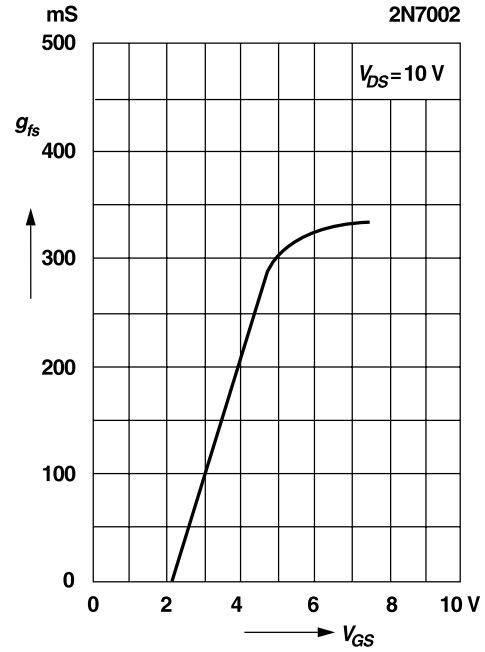
# RATINGS AND CHARACTERISTIC CURVES 2N7002

**Drain-source resistance versus gate-source voltage**



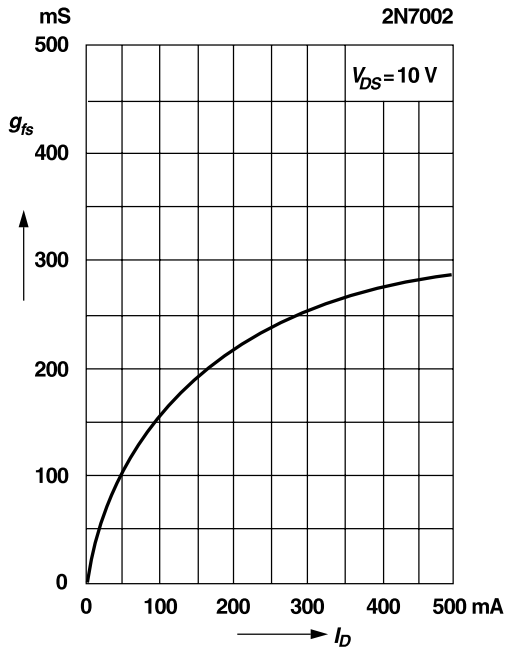
**Transconductance versus gate-source voltage**

Pulse test width 80 ms; pulse duty factor 1%



**Transconductance versus drain current**

Pulse test width 80 ms; pulse duty factor 1%



**Capacitance versus drain-source voltage**

