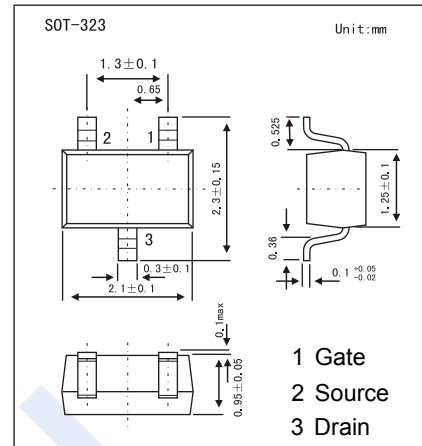


## N-Channel MOSFET

### 2N7002W

#### ■ Features

- $V_{DS}$  (V) = 60V
- $I_D$  = 0.34 A ( $V_{GS}$  = 10V)
- $R_{DS(ON)}$  < 1.6  $\Omega$  ( $V_{GS}$  = 10V)
- $R_{DS(ON)}$  < 2.5  $\Omega$  ( $V_{GS}$  = 4.5V)
- ESD Protected



#### ■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( Steady State)	$T_a=25^\circ\text{C}$	310	mA
	$T_a=85^\circ\text{C}$	220	
Continuous Drain Current ( $t < 5$ s)	$T_a=25^\circ\text{C}$	340	
	$T_a=85^\circ\text{C}$	240	
Pulsed Drain Current ( $t_p = 10$ us)	$I_{DM}$	1.4	A
Gate-Source ESD Rating	ESD	900	V
Power Dissipation	Steady State	280	mW
	$t < 5$ s	330	
Thermal Resistance.Junction- to-Ambient	Steady State	$R_{thJA}$	$^\circ\text{C}/\text{W}$
Thermal Resistance.Junction- to-Case	$t \leq 5$ s	$R_{thJC}$	
Lead Temperature for Soldering Purposes	$T_L$	260	$^\circ\text{C}$
Junction Temperature	$T_J$	150	
Storage Temperature Range	$T_{stg}$	-55 to 150	

## N-Channel MOSFET

### 2N7002W

#### ■ Electrical Characteristics Ta = 25°C

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V <sub>DSS</sub>	I <sub>D</sub> =250 μA, V <sub>GS</sub> =0V	60			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C			1	μA
		V <sub>DS</sub> =60V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C			500	
		V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C			0.1	
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			±10	μA
		V <sub>DS</sub> =0V, V <sub>GS</sub> =±10V			±450	nA
		V <sub>DS</sub> =0V, V <sub>GS</sub> =±5V			±150	
Gate Threshold Voltage (Note.1)	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250 μA	1		2.5	V
Static Drain-Source On-Resistance (Note.1)	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =500mA		1.19	1.6	Ω
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =200mA		1.33	2.5	
On State Drain Current	I <sub>D(on)</sub>	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =5V	30			A
Forward Transconductance (Note.1)	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =200mA		80		mS
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =20V, f=1MHz		24.5		pF
Output Capacitance	C <sub>oss</sub>			4.2		
Reverse Transfer Capacitance	C <sub>rss</sub>			2.2		
Total Gate Charge	Q <sub>g</sub>			0.7		
Threshold Gate Charge	Q <sub>gT</sub>	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =200mA		0.1		nC
Gate Source Charge	Q <sub>gs</sub>			0.3		
Gate Drain Charge	Q <sub>gd</sub>			0.1		
Turn-On DelayTime	t <sub>d(on)</sub>			12.2		
Turn-On Rise Time	t <sub>r</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =25V, I <sub>D</sub> =500mA, R <sub>G</sub> =25 Ω (Note.2)		9		ns
Turn-Off DelayTime	t <sub>d(off)</sub>			55.8		
Turn-Off Fall Time	t <sub>f</sub>			29		
Maximum Body-Diode Continuous Current	I <sub>S</sub>					
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =0.2 A, V <sub>GS</sub> =0V, T <sub>J</sub> = 25°C		0.8	1.2	V
		I <sub>S</sub> =0.2 A, V <sub>GS</sub> =0V, T <sub>J</sub> = 85°C		0.7		

Note.1:Pulse Test: pulse width ≤ 300us, duty cycle ≤ 2%

Note.2:Switching characteristics are independent of operating junction temperatures

#### ■ Marking

Marking	6C
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## N-Channel MOSFET 2N7002W

■ Typical Characteristics

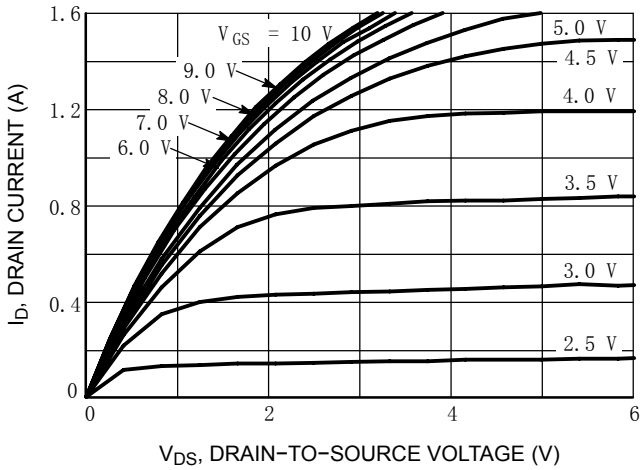


Figure 1. On -Region Characteristics

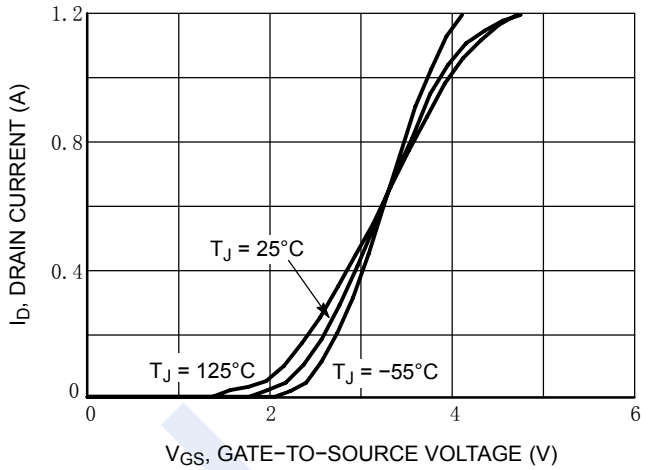


Figure 2. Transfer Characteristics

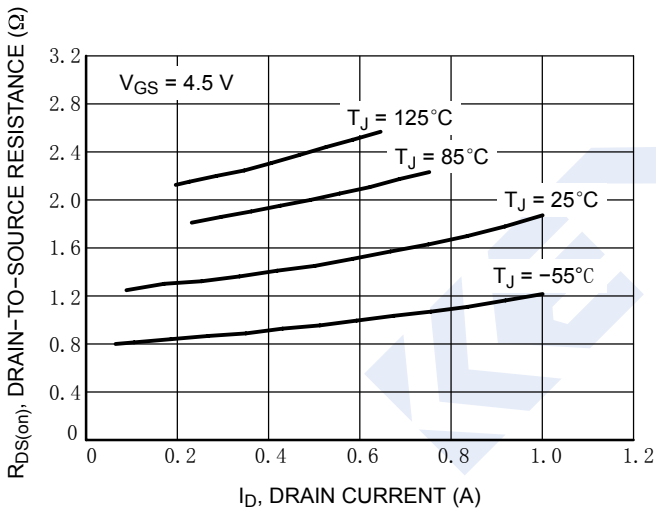


Figure 3. On -Resistance vs. Drain Current and Temperature

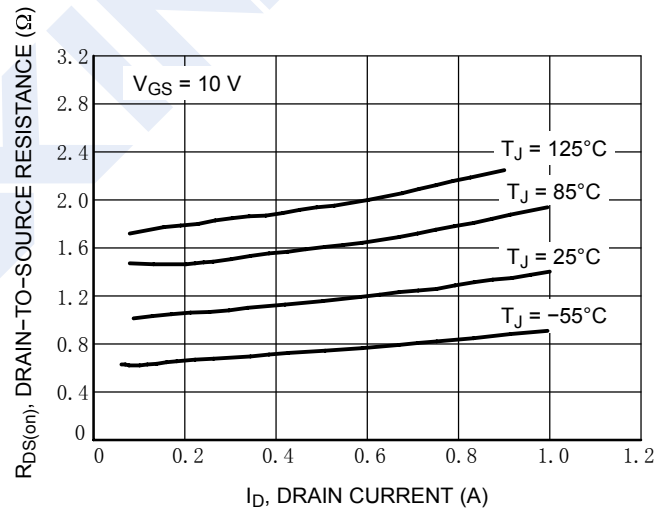


Figure 4. On -Resistance vs. Drain Current and Temperature

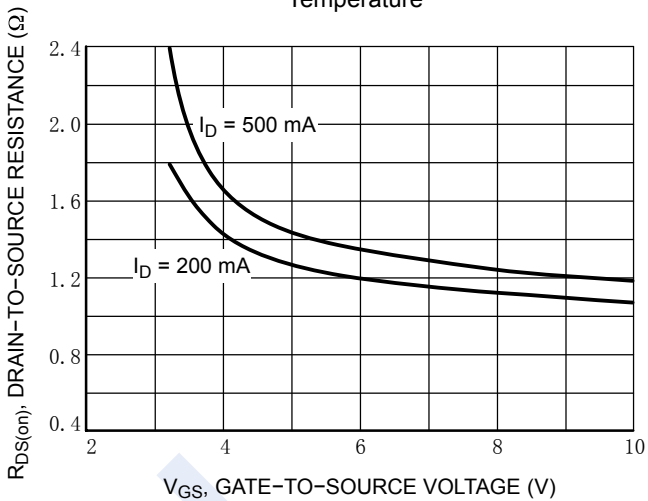


Figure 5. On -Resistance vs. Gate -to-Source Voltage

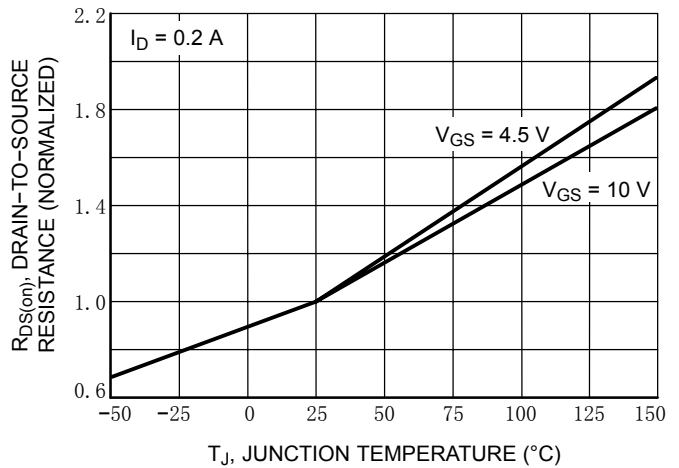


Figure 6. On -Resistance Variation with Temperature

## N-Channel MOSFET 2N7002W

■ Typical Characteristics

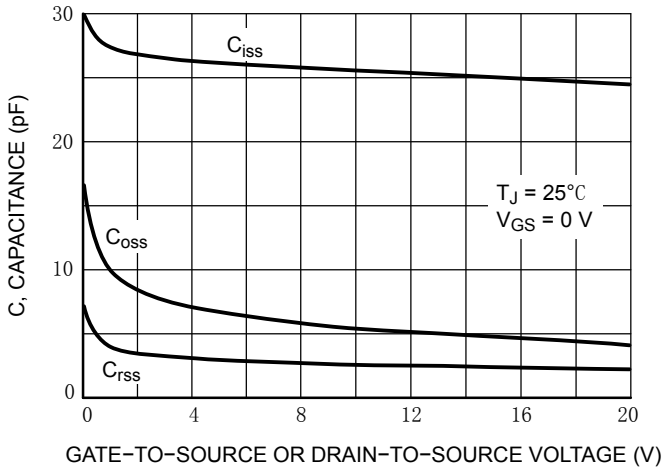


Figure 7. Capacitance Variation

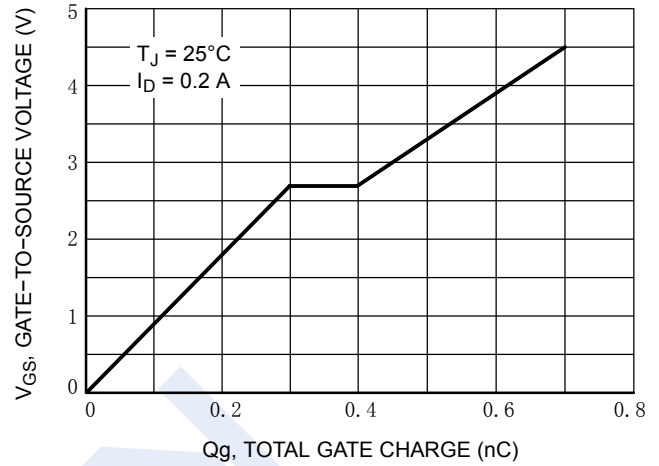


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

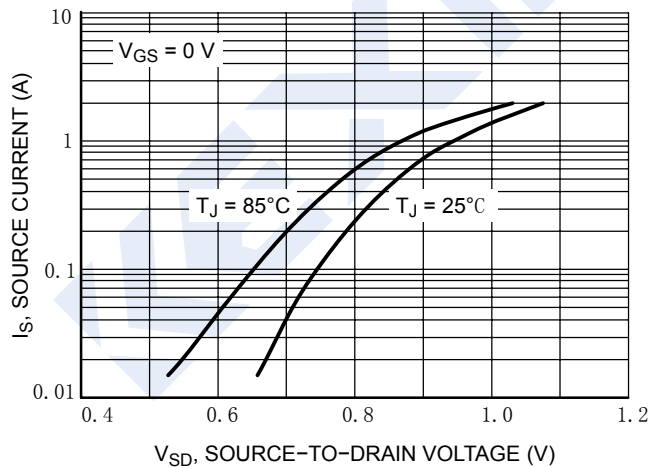


Figure 9. Diode Forward Voltage vs. Current