

**FEATURES**

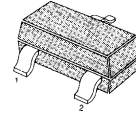
- ❑ Lower  $R_{DS(on)}$
- ❑ Improved Inductive Ruggedness
- ❑ Fast Switching Times
- ❑ Lower Input Capacitance
- ❑ Extended Safe Operating Area
- ❑ Improved High Temperature Reliability

$$BV_{DSS} = 60\text{ V}$$

$$R_{DS(on)} = 5.0\ \Omega$$

$$I_D = 200\text{ mA}$$

**SOT-23**



1.Gate 2. Source 3. Drain

**Product Summary**

Part Number	$BV_{DSS}$	$R_{DS(on)}$	$I_D$
2N7002	60V	5.0 $\Omega$	115mA

**Absolute Maximum Ratings**

Symbol	Characteristic	Value	Units
$V_{DSS}$	Drain-to-Source Voltage	60	V
$I_D$	Continuous Drain Current ( $T_C=25^\circ\text{C}$ )	115	mA
	Continuous Drain Current ( $T_C=100^\circ\text{C}$ )	73	
$I_{DM}$	Drain Current-Pulsed <sup>①</sup>	800	mA
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$P_D$	Total Power Dissipation ( $T_C=25^\circ\text{C}$ )	0.2	W
	Linear Derating Factor	0.16	W/ $^\circ\text{C}$
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	- 55 to +150	$^\circ\text{C}$

**Thermal Resistance**

Symbol	Characteristic	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient	--	62.5	$^\circ\text{C}/\text{W}$

### Electrical Characteristics (T<sub>C</sub>=25°C unless otherwise specified)

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	60	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	1.0	-	2.5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
I <sub>GSS</sub>	Gate-Source Leakage, Forward	-	-	100	nA	V <sub>GS</sub> = 20V
	Gate-Source Leakage, Reverse	-	-	-100		V <sub>GS</sub> = -20V
I <sub>DSS</sub>	Drain-to-Source Leakage Current	-	-	1.0	μA	V <sub>GS</sub> = 40V
		-	-	500		V <sub>GS</sub> = 40V, T <sub>C</sub> = 125°C
I <sub>D(ON)</sub>	On-State Drain-Source Current	0.5	-	-	A	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 10V
R <sub>DS(on)</sub>	Static Drain-Source On-State Resistance ②	-	-	5.0	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 0.5A
g <sub>fs</sub>	Forward Transconductance ②	0.08	-	-	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 0.2A
C <sub>iss</sub>	Input Capacitance	-	-	50	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz
C <sub>oss</sub>	Output Capacitance	-	-	25		
C <sub>rss</sub>	Reverse Transfer Capacitance	-	-	5		
t <sub>d(on)</sub>	Turn-On Delay Time	-	-	20	ns	V <sub>DD</sub> = 30V, I <sub>D</sub> = 0.2A R <sub>G</sub> = 25Ω ②③
t <sub>r</sub>	Rise Time	-	-	-		
t <sub>d(off)</sub>	Turn-Off Delay Time	-	-	20		
t <sub>f</sub>	Fall Time	-	-	-		

### Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
I <sub>S</sub>	Continuous Source Current	-	-	115	mA	Integral reverse pn-diode in the MOSFET
I <sub>SD</sub>	Pulse Source Current ①	-	-	800	mA	
V <sub>SD</sub>	Diode Forward Voltage ②	-	-	1.5	V	T <sub>A</sub> = 25 °C, I <sub>S</sub> = 115mA V <sub>GS</sub> = 0V

#### Notes ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② Pulse Test : Pulse Width = 250μs, Duty Cycle ≤ 2%
- ③ Essentially Independent of Operating Temperature

Fig 1. Output Characteristics

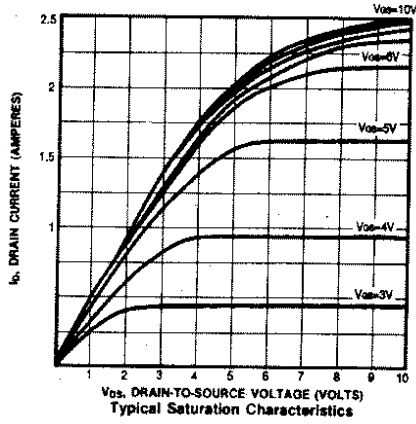


Fig 2. Transfer Characteristics

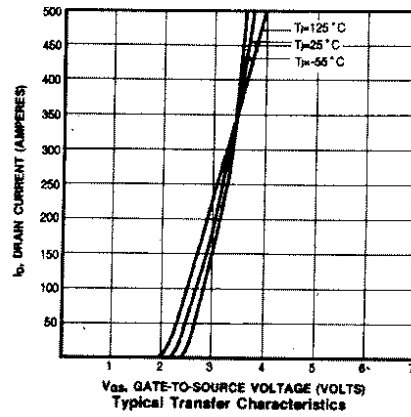


Fig 3. On-Resistance vs. Drain Current

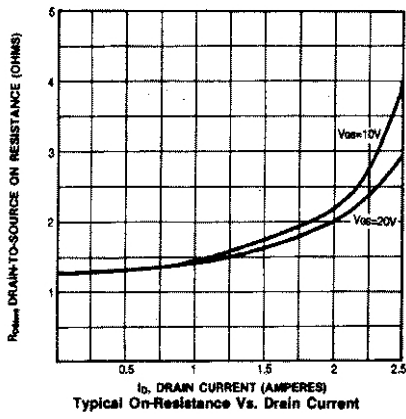


Fig 4. Source-Drain Diode Forward Voltage

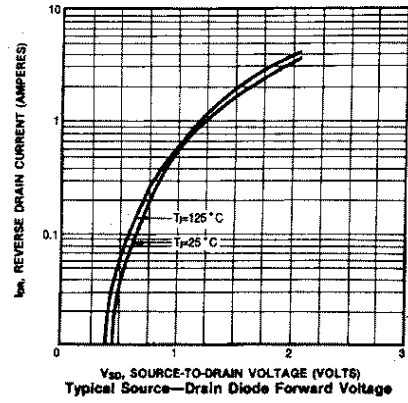


Fig 5. Capacitance vs. Drain-Source Voltage

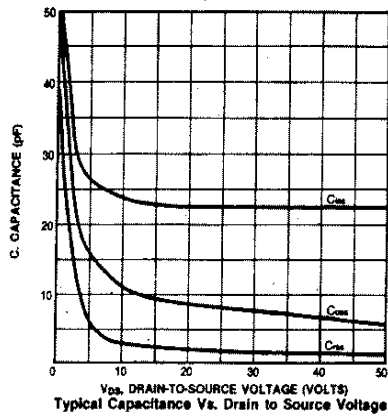


Fig 6. Breakdown Voltage vs. Temperature

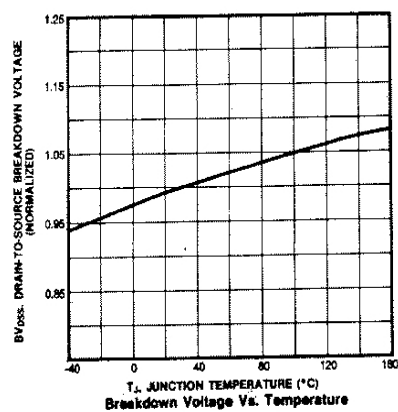


Fig 7. On-Resistance vs. Temperature

