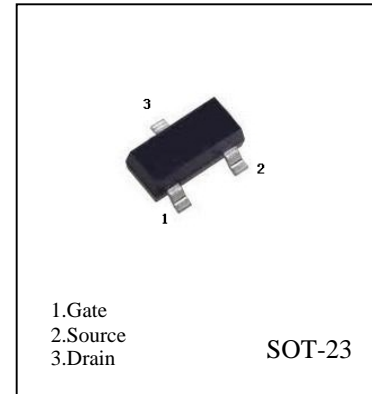


**FEATURES**

- High density cell design for low RDS(ON)
- Voltage controlled small signal switch.
- Rugged and reliable.
- High saturation current capability.

**2N7002**
**N-Channel MOSFET**

**MAXIMUM RATINGS (TA=25°C unless otherwise noted)**

Symbol	Parameter	Ratings	Unit
V <sub>DS</sub>	Drain-source voltage (V <sub>GS</sub> = 0)	60	V
V <sub>DGR</sub>	Drain-gate voltage (R <sub>GS</sub> = 20 k )	60	V
V <sub>GS</sub>	Gate- source voltage	±20	V
I <sub>D</sub>	Drain current (continuous) at T <sub>C</sub> = 25°C	0.20	A
I <sub>DM</sub> <sup>(1)</sup>	Drain current (pulsed)	800	mA
P <sub>TOT</sub>	Total dissipation at T <sub>C</sub> = 25°C	0.35	W
R <sub>thj- amb</sub>	Thermal resistance junction-ambient max	357.1 <sup>(2)</sup>	°C/W
T <sub>J</sub> , T <sub>stg</sub>	Operating junction temperature, Storage temperature	- 55 to 150 °C	

**ELECTRICAL CHARACTERISTICS (Tamb=25°C unless otherwise specified)**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-source breakdown voltage	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0	60			V
I <sub>DSS</sub>	Zero gate voltage drain current (V <sub>DS</sub> = 0)	V <sub>DS</sub> = max rating V <sub>DS</sub> = max rating, T <sub>C</sub> =125°C			1 10	μA μA
I <sub>GSS</sub>	Gate-body leakage current (V <sub>DS</sub> = 0)	V <sub>GS</sub> = ± 18V			±100	nA
V <sub>GS(th)</sub>	Gate threshold voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	1	2.1	2.5	V
R <sub>DS(on)</sub>	Static drain-source on resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 0.5A V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 0.5A		1.8 2	5 5.3	
g <sub>fs</sub> <sup>(3)</sup>	Forward transconductance	V <sub>DS</sub> = 10V, I <sub>D</sub> = 0.5A		0.6		S
C <sub>iss</sub> C <sub>oss</sub> C <sub>rss</sub>	Input capacitance Output capacitance Reverse transfer capacitance	V <sub>DS</sub> = 25V, f = 1MHz, V <sub>GS</sub> = 0		43 20 6		pF pF pF

## 2N7002

ELECTRICAL CHARACTERISTICS (Tamb=25°C unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V = 30V, I = 0.5A$ $R_G = 4.7 \quad V_{GS} = 4.5V$		5		ns
$t_r$	Rise time			15		ns
$t_{d(off)}$	Turn-off delay time			7		ns
$t_f$	Fall time			8		ns
$Q_g$	Total gate charge	$V_{DD} = 30V, I_D = 1A,$ $V_{GS} = 5V$		1.4		nC
$Q_{gs}$	Gate-source charge			0.8	2	nC
$Q_{gd}$	Gate-drain charge			0.5		nC
$I_{SD}$	Source-drain current				0.35	A
$I_{SDM}^{(4)}$	Source-drain current (pulsed)				1.40	A
$V_{SD}^{(5)}$	Forward on voltage	$I_{SD} = 1A, V_{GS} = 0$			1.2	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 1A, di/dt = 100A/\mu s,$ $V_{DD} = 20V, T_j = 150^\circ C$		32		ns
$Q_{rr}$	Reverse recovery charge			25		nC
$I_{RRM}$	Reverse recovery current			1.6		A

NOTE: 1. Pulse width limited by safe operating area  
3.Pulsed: Pulse duration = 300  $\mu s$ , duty cycle 1.5 %.  
5.Pulsed: Pulse duration = 300  $\mu s$ , duty cycle 1.5 %

2. When mounted on 1inch2 FR-4, 2 Oz copper board.  
4.Pulse width limited by safe operating area.

2N7002 Typical Characteristics

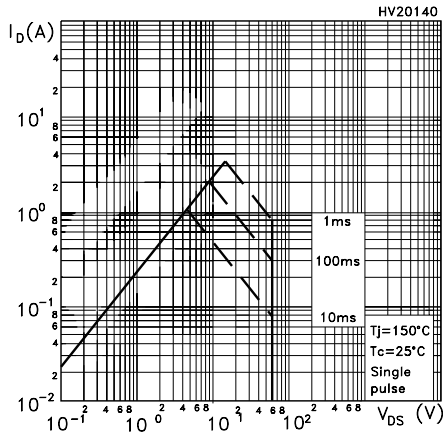


Figure 1. Safe operating area

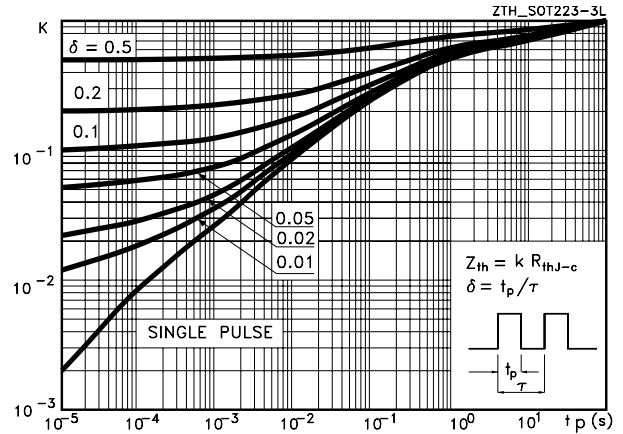


Figure 2. Thermal impedance

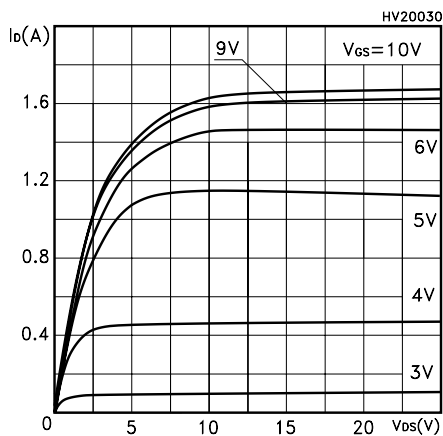


Figure 3. Output characteristics

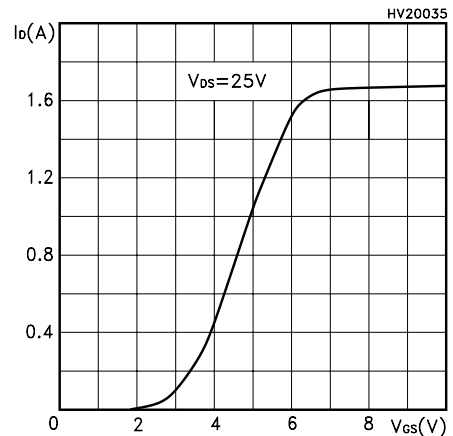


Figure 4. Transfer characteristics

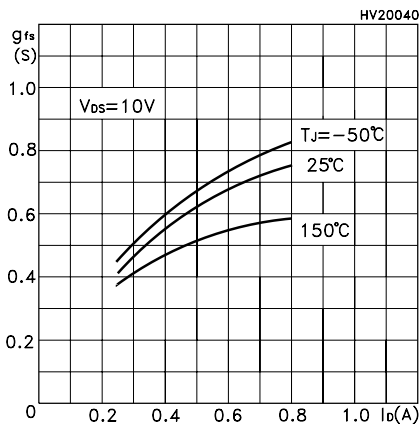


Figure 5. Transconductance

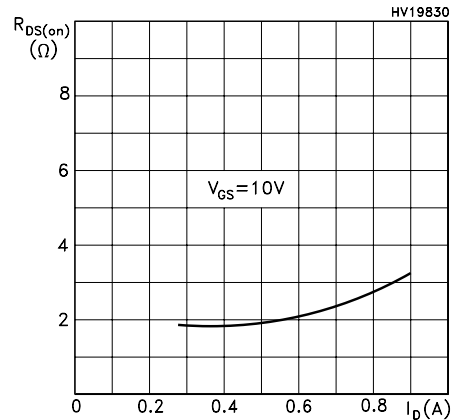
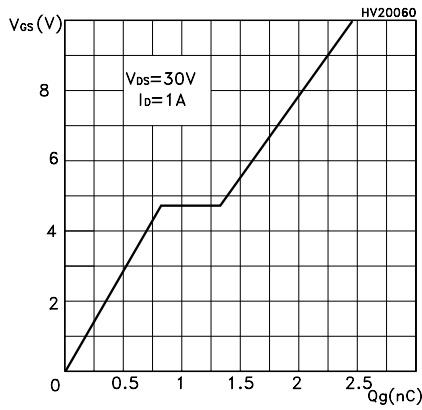
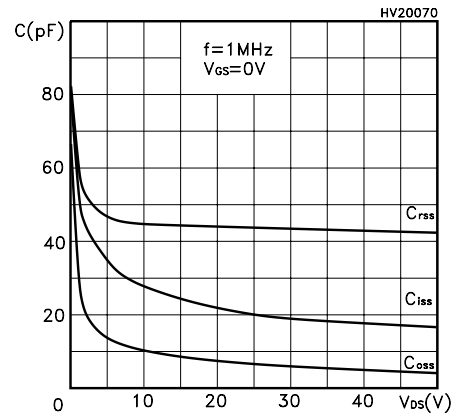


Figure 6. Static drain-source on resistance

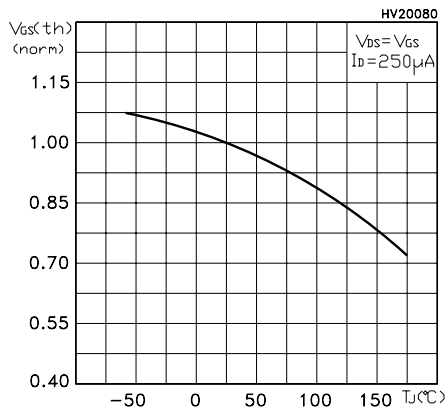
**2N7002** Typical Characteristics



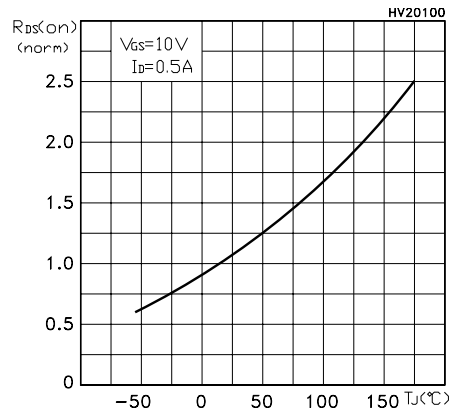
**Figure 7. Gate charge vs gate-source voltage**



**Figure 8. Capacitance variations**



**Figure 9. Normalized gate threshold voltage vs temperature**



**Figure 10. Normalized on resistance vs temperature**