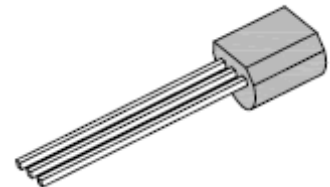


N-Channel MOSFET ESD Protected 2000V Transistor

Features

- ESD protected 2000V
- High density cell design for low $R_{DS(ON)}$
- Voltage controlled small signal switch
- Rugged and reliable
- High saturation current capability
- RoHS compliance



TO-92



Mechanical Data

Case:	TO-92, Plastic Package
Terminals:	Solderable per MIL-STD-202G, Method 208
Weight:	0.18 gram

Maximum Ratings ($T_{Ambient}=25^{\circ}C$ unless noted otherwise)

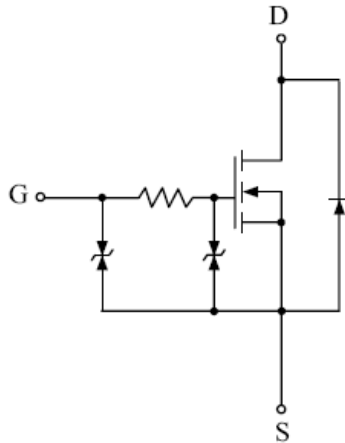
Symbol	Description		2N7000K	Unit
V_{DS}	Drain-Source Voltage		60	V
V_{GS}	Gate-Source Voltage		± 20	V
I_D	Drain Current	Continuous	500	mA
I_{DP}		Pulsed (Note 1)	2000	mA
P_D	Drain Power Dissipation		625	mW
T_J	Junction Temperature		150	$^{\circ}C$
T_{STG}	Storage Temperature Range		-55 to +150	$^{\circ}C$

Note 1: Pulse Width $\leq 10\mu s$, Duty Cycle $\leq 1\%$

N-Channel MOSFET ESD Protected 2000V Transistor

2N7000K

Equivalent Circuit



Electrical Characteristics ($T_{Ambient}=25^{\circ}C$ unless noted otherwise)

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	60	-	-	V	V _{GS} =0V, I _D =10μA
I_{DSS}	Zero Gate Voltage Drain Current	-	-	1	μA	V _{DS} =60V, V _{GS} =0V
I_{GSSF}	Gate- Body Leakage, Forward	-	-	10	μA	V _{GS} =20V, V _{DS} =0V
I_{GSSR}	Gate- Body Leakage, Reverse	-	-	-10	μA	V _{GS} =-20V, V _{DS} =0V

On Characteristics (Note 2)

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
V_{th}	Gate Threshold Voltage	1.1	-	2.35	V	V _{DS} =V _{GS} , I _D =250μA
R_{DS(ON)}	Drain-Source ON Resistance	-	1.2	1.8	Ω	V _{GS} =10V, I _D =500mA
		-	1.5	2.1	Ω	V _{GS} =5V, I _D =50mA
V_{DS(ON)}	Drain-Source ON Voltage	-	0.6	0.9	V	V _{GS} =10V, I _D =500mA
		-	0.075	0.105	V	V _{GS} =5V, I _D =50mA
I_{D(ON)}	On State Drain Current	500	-	-	mA	V _{GS} =10V, V _{DS} ≥2V _{DS(ON)}
g_{FS}	Forward Transconductance	200	580	-	mS	V _{DS} =10V, I _D =500mA
V_{SD}	Drain-Source Diode Forward Voltage	-	0.76	1.15	V	V _{GS} =0V, I _S =200mA(Note 1)

N-Channel MOSFET ESD Protected 2000V Transistor

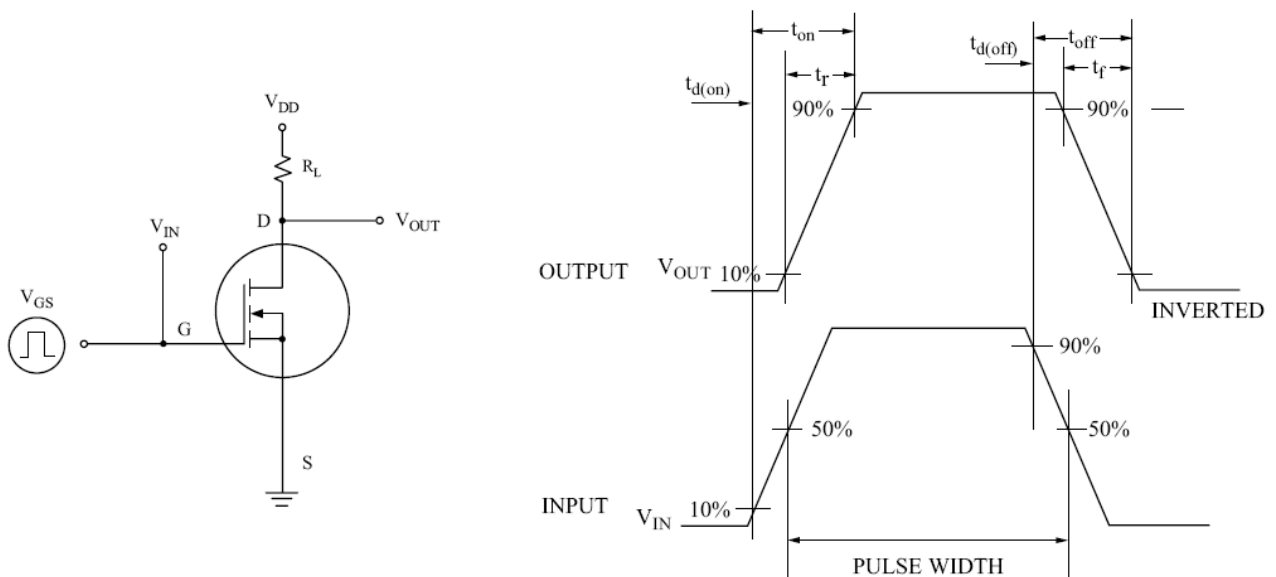
2N7000K

Note 2: Pulse Test: Pulse Width $\leq 80\mu\text{s}$, Duty Cycle $\leq 1\%$

Dynamic Characteristics

Symbol	Description		Min.	Typ.	Max.	Unit	Conditions
C_{iss}	Input Capacitance		-	52.1	-	pF	$V_{DS}=25V$, $V_{GS}=0V$, $f=1\text{MHz}$
C_{rss}	Reverse Transfer Capacitance		-	3.9	-	pF	
C_{oss}	Output Capacitance		-	7.7	-	pF	
t_{on}	Switching Time	Turn-on Time	-	11.1		nS	$V_{DD}=30V$, $R_L=155\Omega$, $I_D=190\text{mA}$, $V_{GS}=10V$
t_{off}		Turn-off Time	-	22.5		nS	

Switching Time Test Circuit



N-Channel MOSFET ESD Protected 2000V Transistor

2N7000K

Typical Characteristics Curves

Fig.1- I_D - V_{DS}

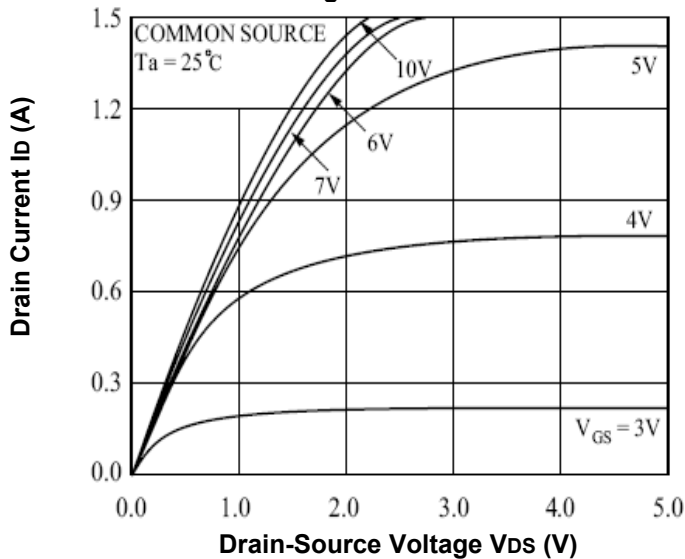


Fig.2- $R_{DS(ON)}$ - I_D

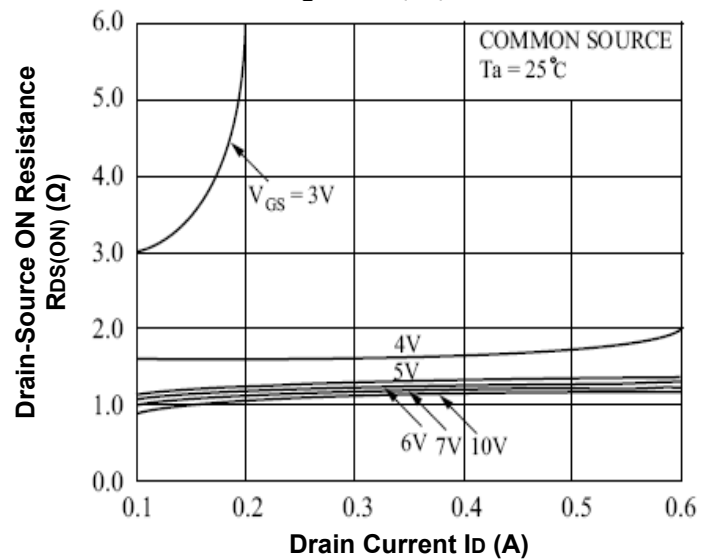


Fig.3- $R_{DS(ON)}$ - T_J

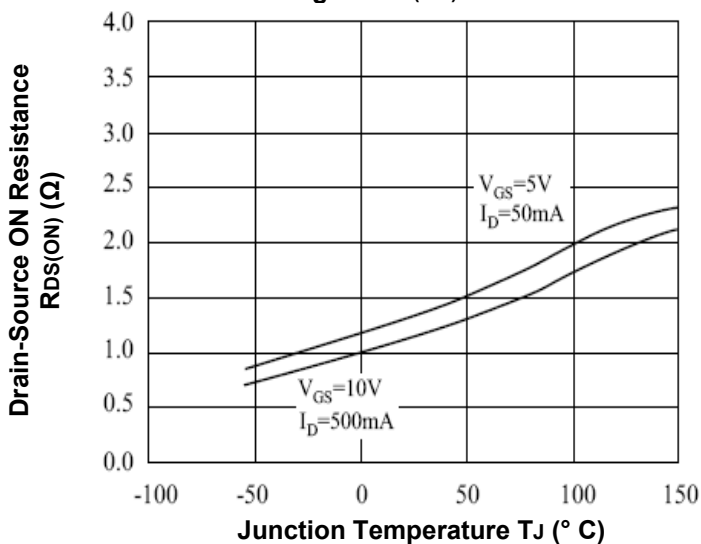
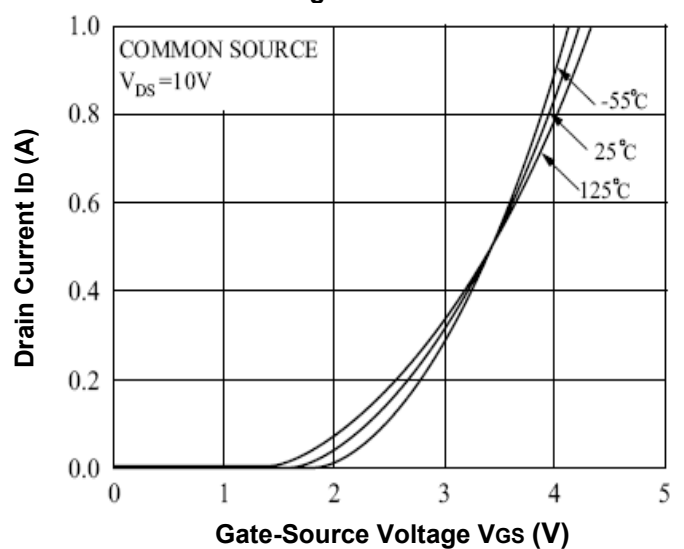


Fig.4- I_D - V_{GS}



N-Channel MOSFET ESD Protected 2000V Transistor

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Fig.5- V_{th} - T_J

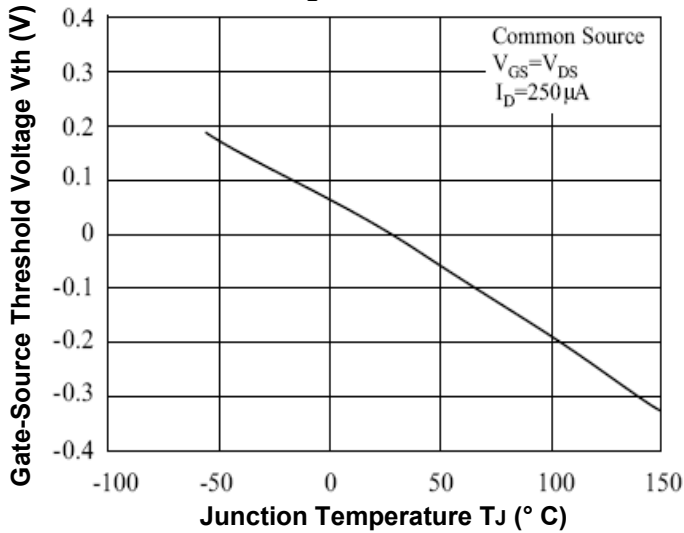


Fig.6- I_S - V_{SD}

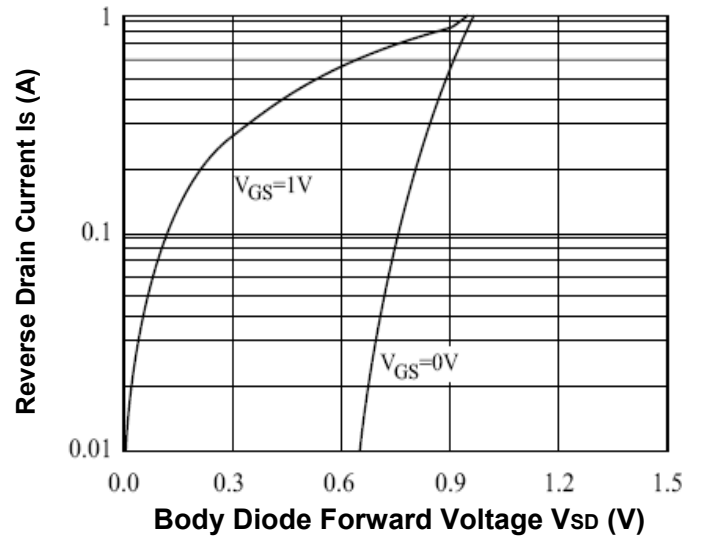


Fig.7- C - V_{DS}

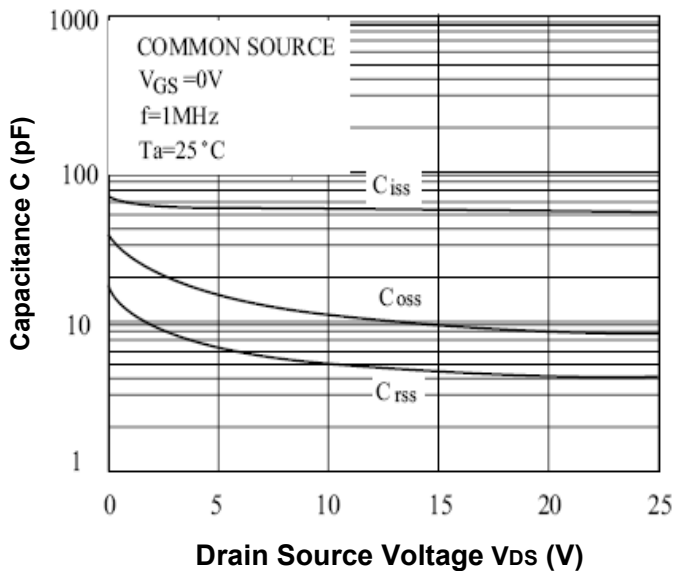
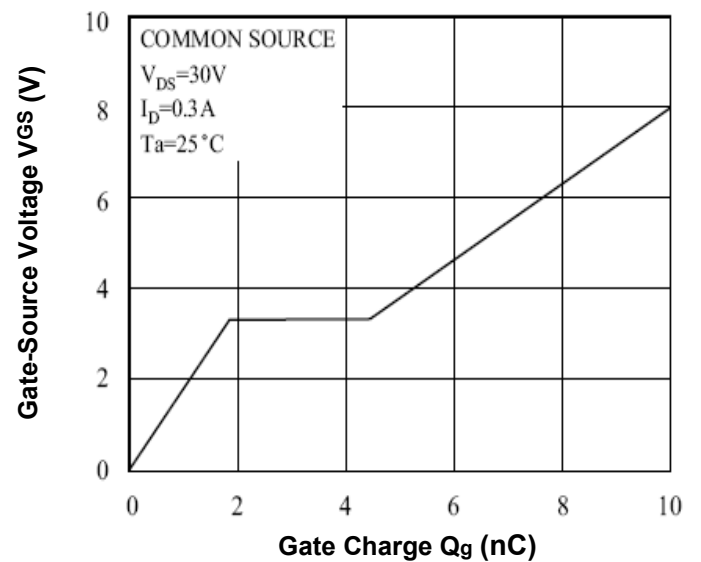


Fig.8- V_{GS} - Q_g



N-Channel MOSFET ESD Protected 2000V Transistor

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Fig.9- SOA

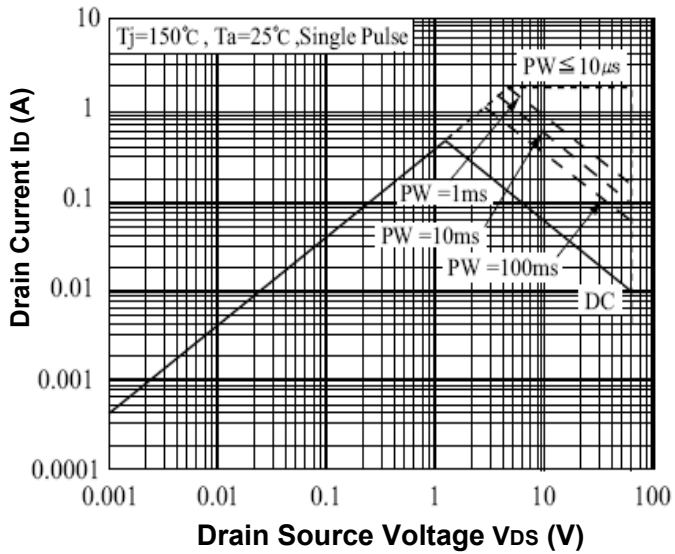
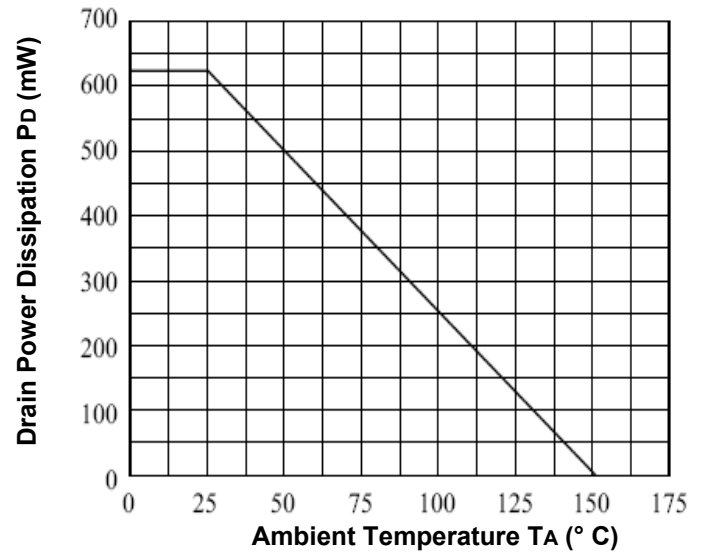


Fig.10- P_D - T_A

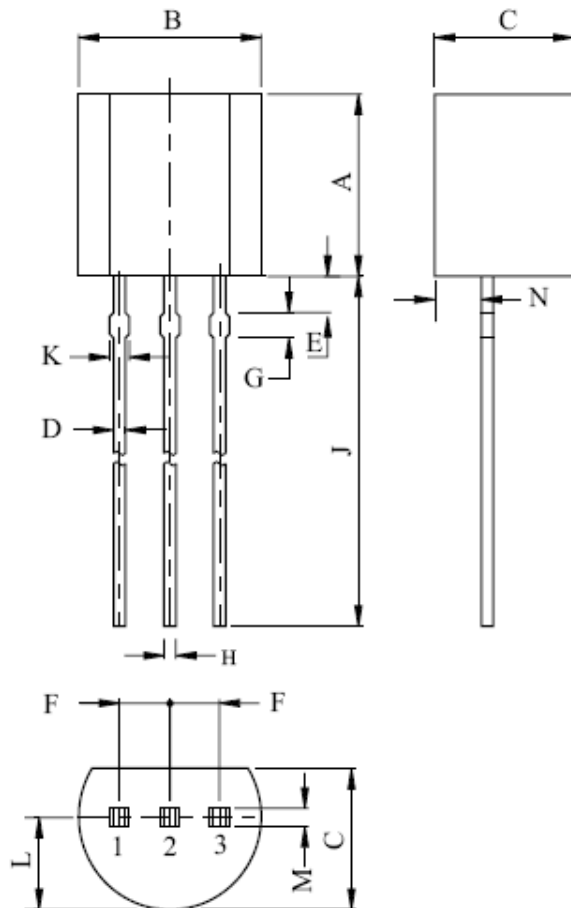


N-Channel MOSFET ESD Protected 2000V Transistor

2N7000K

Dimensions in mm

TO-92



DIM	MILLIMETERS
A	4.70 MAX
B	4.80 MAX
C	3.70 MAX
D	0.45
E	1.00
F	1.27
G	0.85
H	0.45
J	14.00±0.50
K	0.55 MAX
L	2.30
M	0.45 MAX
N	1.00

1. SOURCE
2. GATE
3. DRAIN

N-Channel MOSFET ESD Protected 2000V Transistor

2N7000K

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