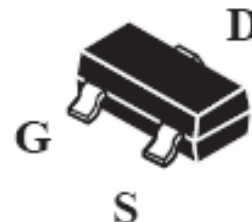


Enhancement Mode MOSFET (N-Channel)

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



SOT-23

HALOGEN
FREE



Mechanical Data

Case:	SOT-23, Plastic Package
Terminals:	Solderable per MIL-STD-202G, Method 208
Weight:	0.008 gram

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

Symbol	Description	2N7002K	Unit
V_{DSS}	Drain-Source Voltage	60	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Drain Current Continuous	300	mA
I_{DP}	Drain Current Pulsed (Note 1)	1200	mA
P_D	Drain Power Dissipation (Note 2)	300	mW
T_J	Junction Temperature	+150	$^{\circ}C$
T_{STG}	Storage Temperature Range	-55 to +150	$^{\circ}C$
ESD	Gate-Source ESD Rating	2000	V

Enhancement Mode MOSFET (N-Channel)

2N7002K

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

Off Characteristics

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
V(BR)DSS	Drain-Source Breakdown Voltage	60	-	-	V	$V_{GS}=0V, I_D=10\mu A$
I_{DSS}	Zero Gate Voltage Drain Current	-	-	1	μA	$V_{DS}=60V, V_{GS}=0V$
I_{GSS}	Gate-Source Leakage Current	-	-	± 10	μA	$V_{GS}=\pm 20V, V_{DS}=0V$

On Characteristics (Note3)

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
V_{GS(th)}	Gate Threshold Voltage	1.1	-	2.35	V	$V_{DS}=V_{GS}, I_D=250\mu A$
R_{DS(on)}	Drain-Source ON Resistance	-	1.2	1.8	Ω	$V_{GS}=10V, I_D=500mA$
		-	1.5	2.1		$V_{GS}=5V, I_D=50mA$
V_{DS(on)}	Drain-Source ON Voltage	-	0.6	0.9	V	$V_{GS}=10V, I_D=500mA$
		-	0.075	0.105		$V_{GS}=5V, I_D=50mA$
I_{D(on)}	ON State Drain Current	500	-	-	mA	$V_{GS}=10V, V_{DS}>2 V_{DS(on)}$
g_{FS}	Forward Transconductance	200	580	-	mS	$V_{DS}=10V, I_D=500mA$

Dynamic Characteristics

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
C_{iss}	Input Capacitance	-	52.1	-	pF	$V_{DS}=25V, V_{GS}=0V, f=1MHz$
C_{rss}	Reverse Transfer Capacitance	-	3.9	-		
C_{oss}	Output Capacitance	-	7.7	-		

Switching Characteristics

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
t_{on}	Turn-On Time	-	11.1	-	nS	$V_{DD}=30V, R_L=155\Omega, I_D=190mA, V_{GS}=10V$
t_{off}	Turn-Off Time	-	22.5	-		

Enhancement Mode MOSFET (N-Channel)

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Drain-Source Diode Ratings and Maximum Ratings

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
V _{SD}	Source-Drain Forward Voltage (Note 1)	-	760	1150	mV	V _{GS} =0V, I _S =200mA(Note1)

Note: 1. Pulse width $\leq 10\mu\text{S}$, duty cycle $\leq 1\%$
 2. Package mounted on a glass epoxy PCB(100mm²x1mm).
 3. Pulse width $\leq 80\mu\text{S}$, duty cycle $\leq 1\%$.

Typical Characteristics Curves

Fig.1- Typical Output Characteristics

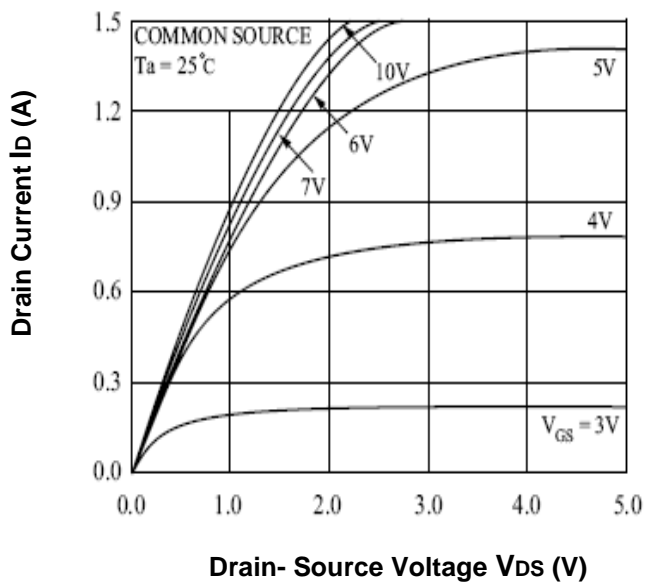
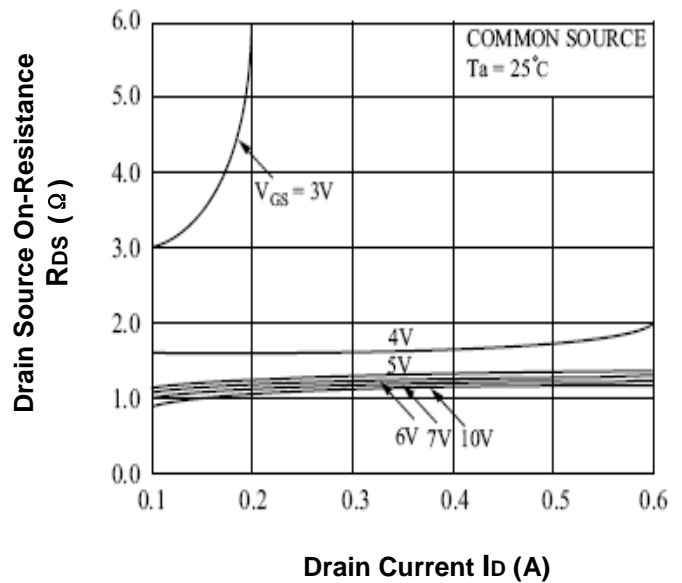


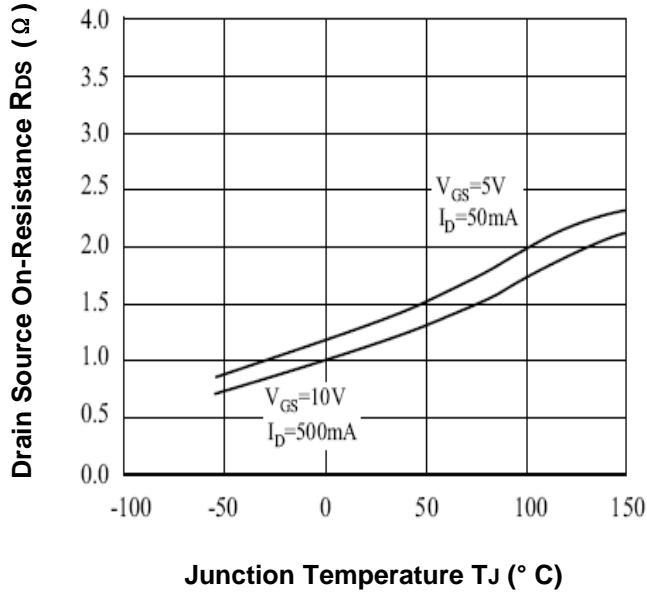
Fig.2- Drain-Source On-Resistance vs. Drain Current



Enhancement Mode MOSFET (N-Channel)

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Fig.3- On-Resistance vs. Junction Temperature



Gate-Source Threshold Voltage $V_{GS(th)}$ (V)

Fig.4- Gate Threshold Voltage vs. Junction Temperature

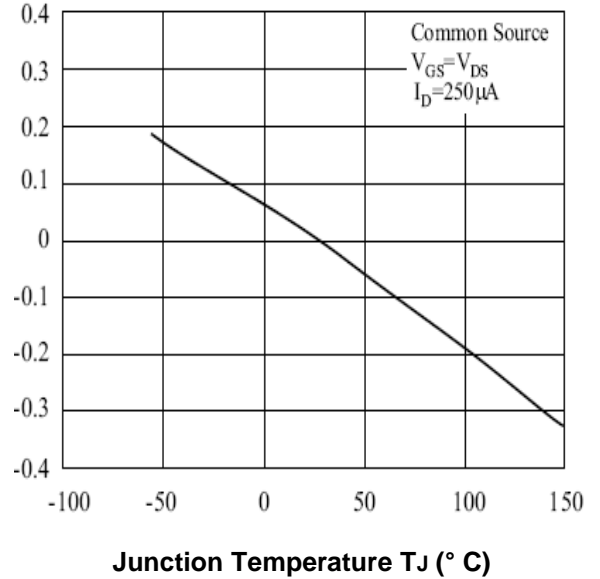


Fig.5- Drain Current vs. Gate-Source Voltage

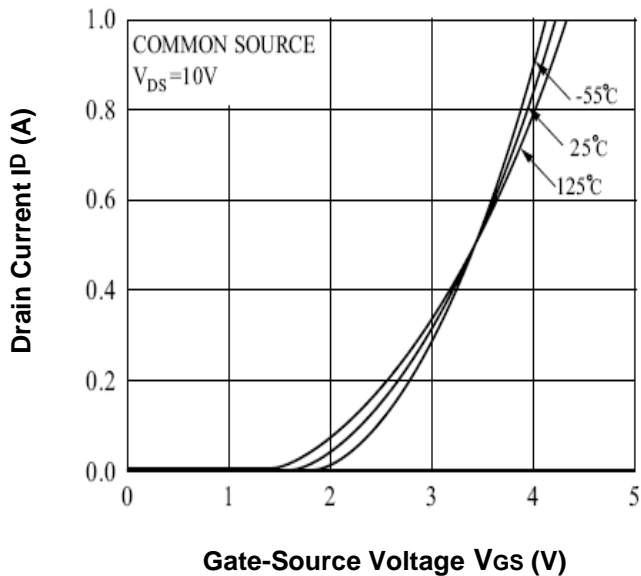
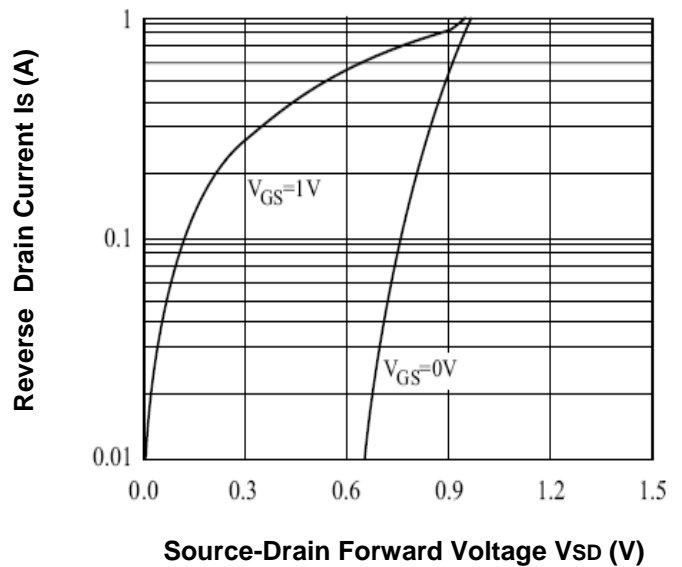


Fig.6- Reverse Drain Current vs. Body Diode Forward Voltage



Enhancement Mode MOSFET (N-Channel)

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Fig.7- Gate Charge Characteristics

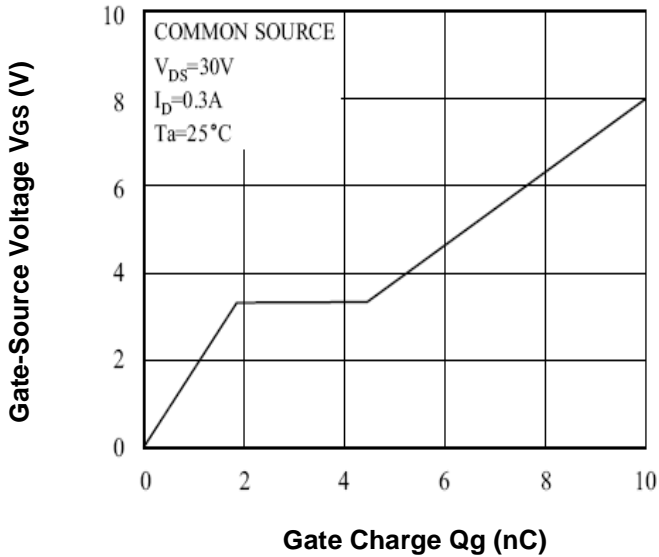


Fig.8- Typical Capacitance Characteristics

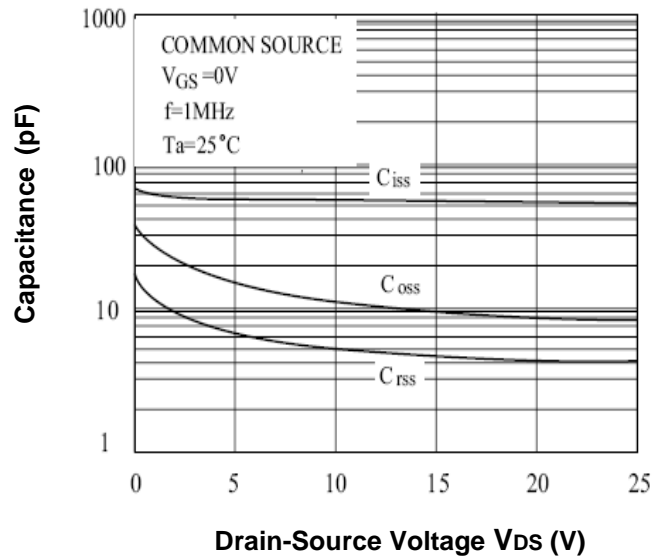


Fig.9- Drain-Source Voltage vs Drain Current

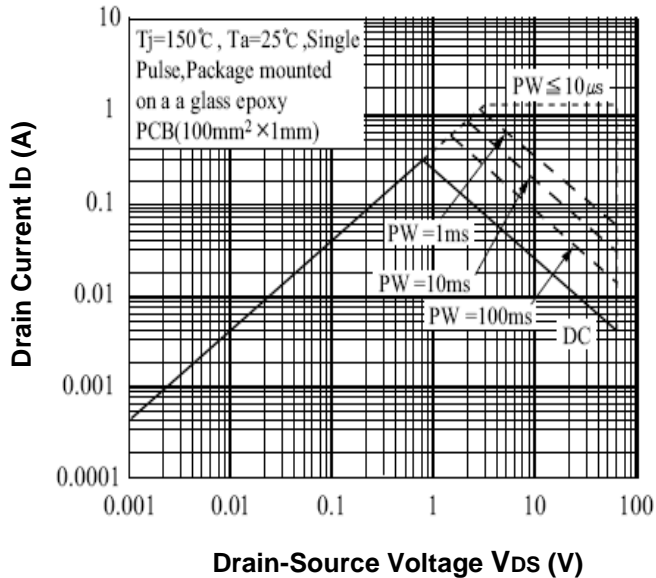
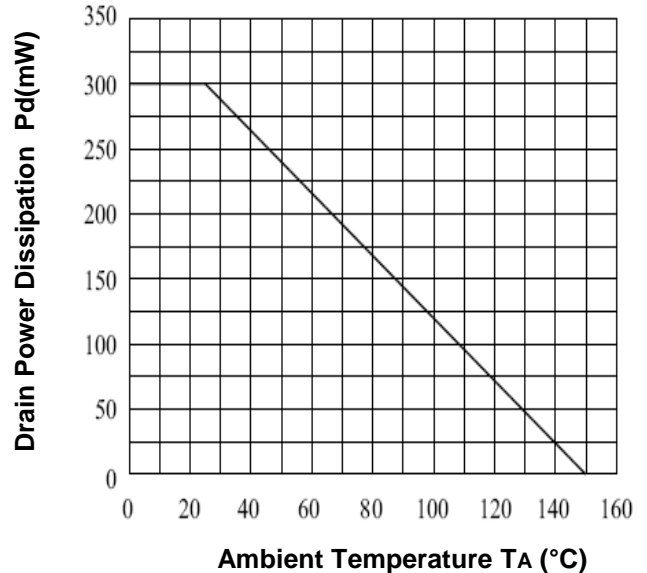


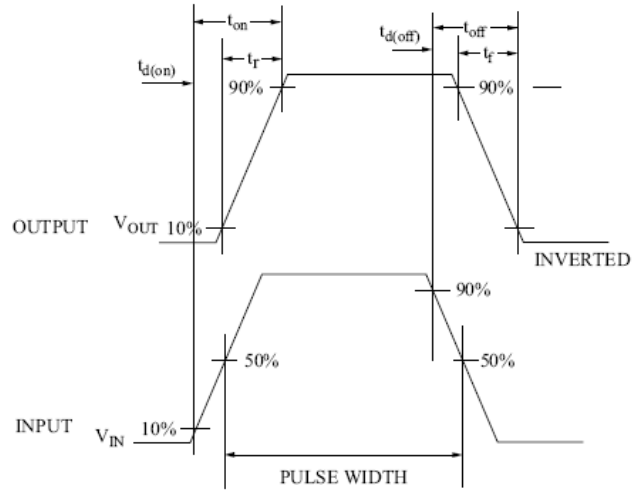
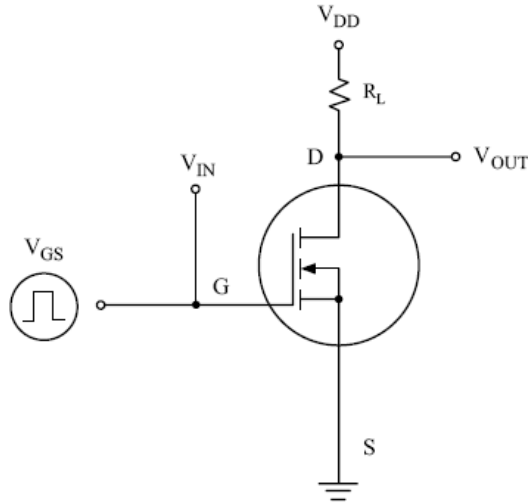
Fig.10- Power Dissipation Vs. Ambient Temperature



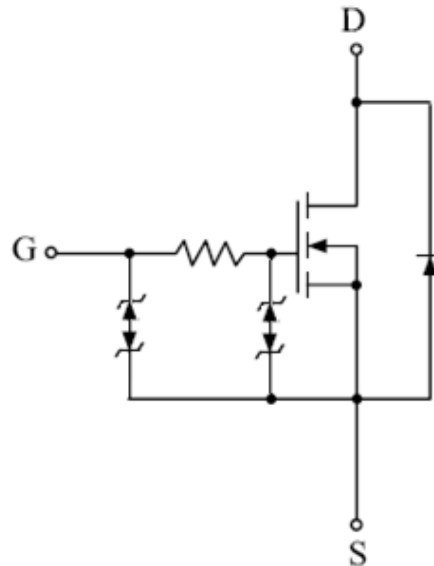
Enhancement Mode MOSFET (N-Channel)

2N7002K

Switching Time Test Circuit



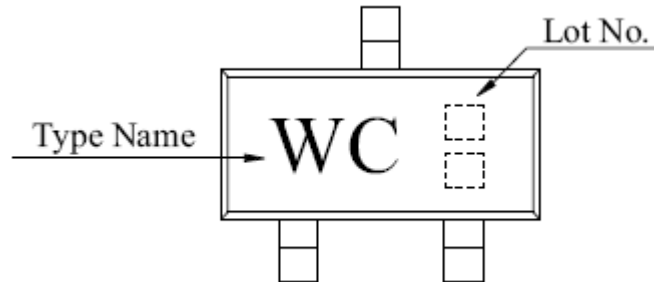
Equivalent Circuit



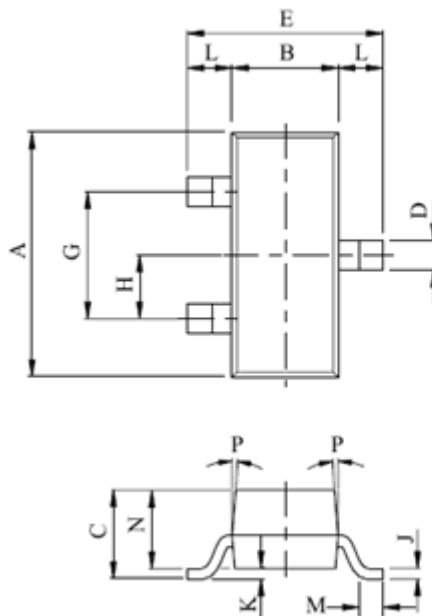
Enhancement Mode MOSFET (N-Channel)

2N7002K

Marking Information:



Dimensions in mm



DIM	MILLIMETERS
A	2.93±0.20
B	1.30+0.20/-0.15
C	1.30 MAX
D	0.45+0.15/-0.05
E	2.40+0.30/-0.20
G	1.90
H	0.95
J	0.13+0.10/-0.05
K	0.00 ~ 0.10
L	0.55
M	0.20 MIN
N	1.00+0.20/-0.10
P	7°

SOT-23

Enhancement Mode MOSFET (N-Channel)

2N7002K

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