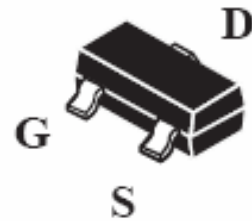


Enhancement Mode MOSFET (N-Channel)

Features

- 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°C unless noted otherwise)*

Symbol	Description	2N7002	Unit	Conditions
V_{DSS}	Drain-Source Voltage	60	V	
V_{DGR}	Drain-Gate Voltage ($R_{GS} \leq 1M\Omega$)	60	V	
V_{GSS}	Gate-Source Voltage Continuous	± 20	V	
V_{GSM}	Gate-Source Voltage Non-repetitive ($t_p \leq 50\mu S$)	± 40	V	
I_D	Drain Current Continuous (Note 1)	115	mA	T _C =25 °C
		75	mA	T _C =100 °C
I_{DM}	Drain Current Pulsed (Note 2)	800	mA	
P_D	Total Device Dissipation FR-5 Board (Note 3)	225	mW	T _A =25 °C
		1.8	mW/°C	Derate above 25 °C
R_{thJA}	Max. Thermal Resistance, Junction to Ambient	556	°C/W	
P_D	Total Device Dissipation Alumina Substrate (Note 4)	300	mW	T _A =25 °C
		2.4	mW/°C	Derate above 25 °C
R_{thJA}	Max. Thermal Resistance, Junction to Ambient	417	°C/W	
T_J	Junction Temperature	-55 to +150	°C	
T_{STG}	Storage Temperature Range	-55 to +150	°C	

Note: 1. The Power Dissipation of the package may result in a lower continuous drain current.

Enhancement Mode MOSFET (N-Channel)

2N7002

2. PulseTest: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$.
3. FR-5=1.0 x 0.75 x 0.062 in.
4. Alumina=0.4 x 0.3 x 0.025 in 99.5% alumina.

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

Off Characteristics

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
V(BR)DSS	Drain-Source Breakdown Voltage	60	-	-	V	$V_{\text{GS}}=0\text{V}$, $I_{\text{D}}=10\mu\text{A}$
IDSS	Zero Gate Voltage Drain Current	-	-	1	μA	$V_{\text{DS}}=60\text{V}$, $V_{\text{GS}}=0\text{V}$
		-	-	500		$V_{\text{DS}}=60\text{V}$, $V_{\text{GS}}=0\text{V}$, $T_{\text{J}}=125^{\circ}\text{C}$
IGSSF	Gate-Body Leakage, Forward	-	-	0.1		$V_{\text{DS}}=0\text{V}$, $V_{\text{GS}}=20\text{V}$
IGSSR	Gate-Body Leakage, Reverse	-	-	-0.1		$V_{\text{DS}}=0\text{V}$, $V_{\text{GS}}=-20\text{V}$

On Characteristics (Note 5)

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
VGS(th)	Gate Threshold Voltage	1.0	1.6	2.0	V	$V_{\text{DS}}=V_{\text{GS}}$, $I_{\text{D}}=250\mu\text{A}$
RDS(ON)	Drain-Source ON Resistance	-	1.4	7.5	Ω	$V_{\text{GS}}=10\text{V}$, $I_{\text{D}}=500\text{mA}$
		-	1.7	13.5		$V_{\text{GS}}=10\text{V}$, $I_{\text{D}}=500\text{mA}$, $T_{\text{J}}=125^{\circ}\text{C}$
		-	1.8	7.5		$V_{\text{GS}}=5\text{V}$, $I_{\text{D}}=50\text{mA}$
		-	2.4	13.5		$V_{\text{GS}}=5\text{V}$, $I_{\text{D}}=50\text{mA}$, $T_{\text{J}}=125^{\circ}\text{C}$
VDS(ON)	Drain-Source ON Voltage	-	0.6	3.75	V	$V_{\text{GS}}=10\text{V}$, $I_{\text{D}}=500\text{mA}$
		-	0.09	0.375		$V_{\text{GS}}=5\text{V}$, $I_{\text{D}}=50\text{mA}$
ID(ON)	On State Drain Current	500	2700	-	mA	$V_{\text{GS}}=10\text{V}$, $V_{\text{DS}} \geq 2V_{\text{DS(ON)}}$
gFS	Forward Transconductance	80	320	-	mS	$V_{\text{DS}} \geq 2V_{\text{DS(ON)}}$, $I_{\text{D}}=200\text{mA}$

Enhancement Mode MOSFET (N-Channel)

2N7002

Dynamic Characteristics *(T_{Ambient}=25°C unless noted otherwise)*

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
C_{iss}	Input Capacitance	-	17	50	pF	V _{DS} =25V, V _{GS} =0V, f=1MHz
C_{rss}	Reverse Transfer Capacitance	-	2.5	5.0		
C_{oss}	Output Capacitance	-	10	25		

Switching Characteristics *(T_{Ambient}=25°C unless noted otherwise)*

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
t_{on}	Turn-On Delay Time	-	7	20	nS	V _{DD} =25V, R _L =50Ω I _D =500mA, V _{GS} =10V, R _G =25Ω
t_{off}	Turn-Off Delay Time	-	11	40		

Drain-Source Diode Ratings and Maximum Ratings

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
I_D	Continuous Drain-Source Diode Forward Current	-	-	115	mA	
I_{DM}	Pulsed Drain-Source Diode Forward Current	-	-	800	mA	
V_{SD}	Source-Drain Forward Voltage	-	0.88	1.5	V	V _{GS} =0V, I _D =115mA

Note: 5. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

Enhancement Mode MOSFET (N-Channel)

2N7002

Typical Characteristics Curves

Fig.1- Ohmic Region

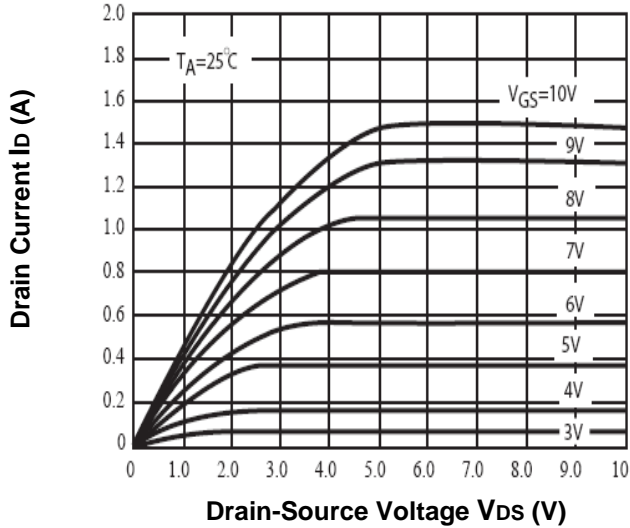


Fig.2- Transfer Characteristics

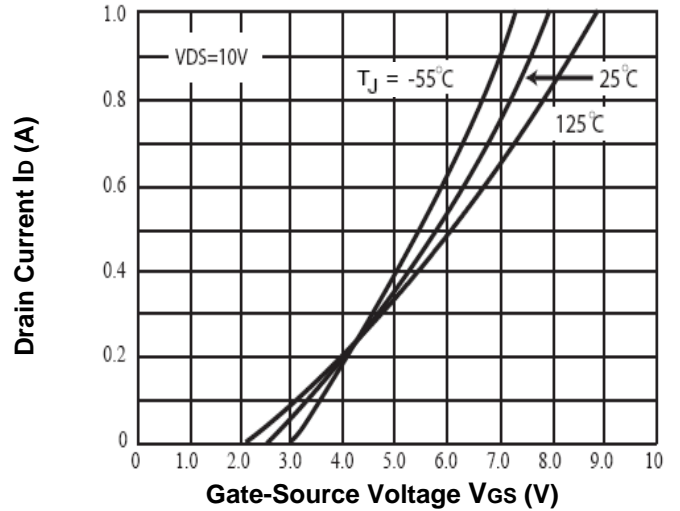


Fig.3- Temperature vs. Static Drain-Source On-Resistance

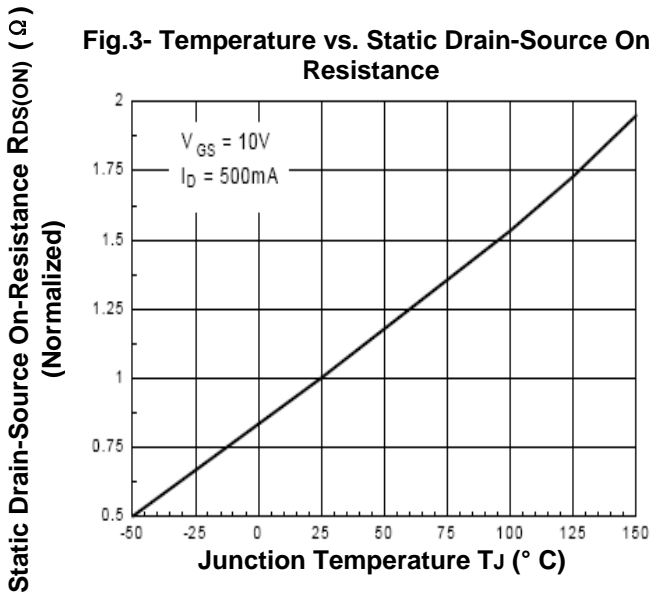
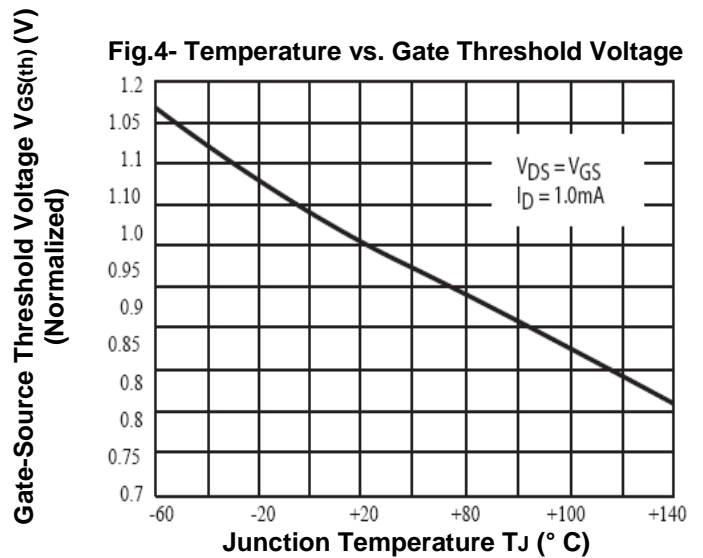


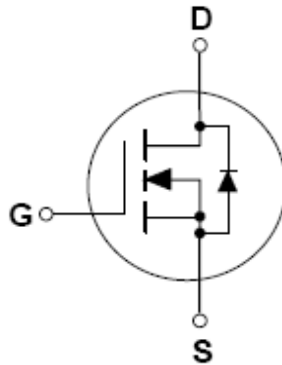
Fig.4- Temperature vs. Gate Threshold Voltage



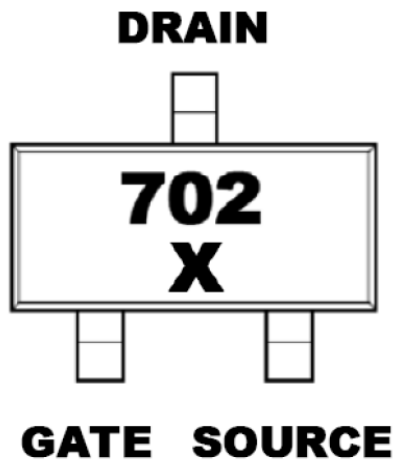
Enhancement Mode MOSFET (N-Channel)

2N7002

Equivalent Circuit



Marking Information:

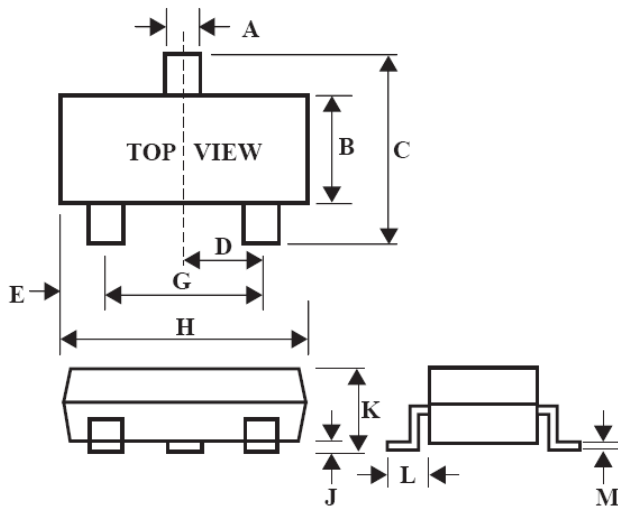


X: Date Code

Enhancement Mode MOSFET (N-Channel)

2N7002

Dimensions in mm



SOT-23		
Dim	Min	Max
A	0.35	0.51
B	1.19	1.40
C	2.10	3.00
D	0.85	1.05
E	0.46	1.00
G	1.70	2.10
H	2.70	3.10
J	0.01	0.13
K	0.89	1.10
L	0.30	0.61
M	0.076	0.25

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SOT-23

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