Enhancement Mode MOSFET (N-Channel)

SOT-23

HALOGEN FREE

RoHS Compliant

Features

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

Mechanical Data

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

Maximum Ratings @ T_A=25°C unless noted otherwise

Symbol	Description	2N7002Z	Unit
V_{DSS}	Drain-Source Voltage	60	V
V_{DGR}	Drain-Gate Voltage (RGS ≤1MΩ)	60	V
V_{GSS}	Gate-Source Voltage Continuous	±20	V
	Gate-Source Voltage Non Repetitive (tp <50μs)	±40	V
I_D	Drain Current Continuous	300	mA
I_{DP}	Drain Current Pulsed	800	mA
P_D	Total Power Dissipation	200	mW
		1.6	mW/°C
T_J	Junction Temperature	150	°C
T_{STG}	Storage Temperature	-55 ~ +150	°C
$R_{\theta JA}$	Junction to Ambient	625	°C/W

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Electrical Characteristics @ T_A=25°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=10μA
I_{DSS}	Drain-Source Leakage Current	-	-	1	μA	V_{DS}=60V, V_{GS}=0V
I_{GSS}	Gate-Source Leakage Current	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V

On Characteristics (Note)

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
$V_{GS(th)}$	Gate Threshold Voltage	1.0	2.1	2.5	V	V_{GS}=V_{DS}, I_D=250uA
$V_{DS(ON)}$	Drain-Source On-Voltage	-	0.6	3.75	V	V_{GS}=10V, I_D=0.5A
		-	0.09	1.5	V	V_{GS}=5V, I_D=0.05A
$I_{D(ON)}$	On-State Drain Current	0.5	2.7	-	A	V_{GS}=10V, V_{DS}≥2$V_{DS(ON)}$
$R_{DS(ON)}$	Static Drain-Source On Resistance	-	1.2	3.5	Ω	V_{GS}=10V, I_D=0.5A
		-	1.7	7.5		V_{GS}=5V, I_D=0.05A

Dynamic Characteristics

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
C_{iss}	Input Capacitance	-	25	50	pF	V_{DS}=25V, V_{GS}=0V, f=1MHz
C_{oss}	Output Capacitance	-	11	25		
C_{rss}	Reverse Transfer Capacitance	-	4.0	5.0		

Switching Characteristics (Note)

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
t_{on}	Turn-On Time	-	-	20	nS	I_D=200mA, V_{DD}=30V, V_{GS}=10V, R_L=150Ω, R_{GEN}=25Ω
t_{off}	Turn-Off Time	-	-	20		I_D=200mA, V_{DD}=30V, VGS=10V, RL=25Ω, R_{GEN}=25Ω

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
V_{SD}	Drain-Source Diode Forward Voltage (Note)	-	0.88	1.5	V	V_{GS}=0V, I_S=115mA
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	-	-	0.8	A	-
I_S	Maximum Continuous Drain-Source Diode Forward Current	-	-	115	mA	-

Note: Pulse Width≦300 μs, Duty cycle ≦2.0 %.

Typical Characteristics Curves

Fig.1- Typical Output Characteristics

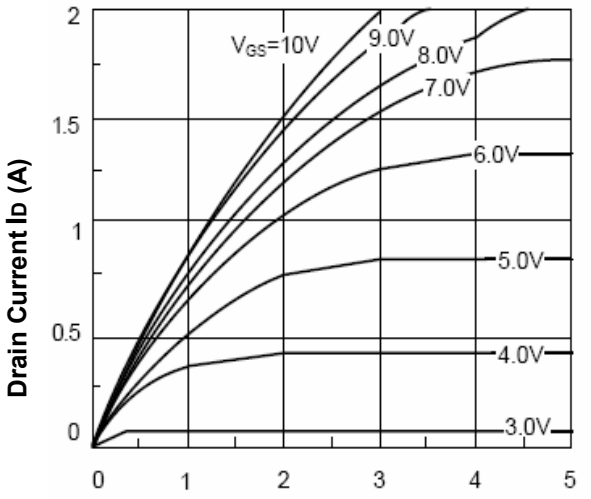


Fig.2- Typical Transfer Characteristics

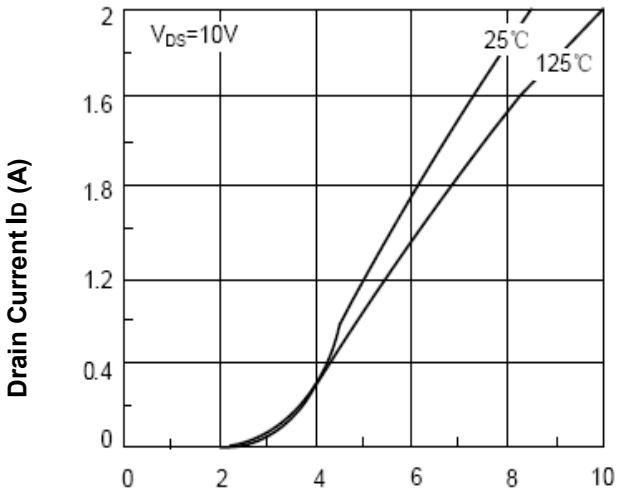


Fig.3- Gate Threshold Voltage vs. Junction Temperature

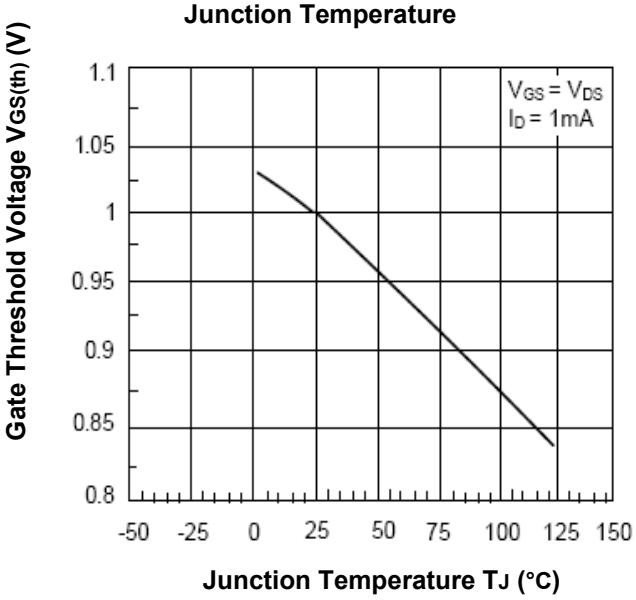


Fig.4- Static Drain-Source On-state Resistance vs. Drain Current

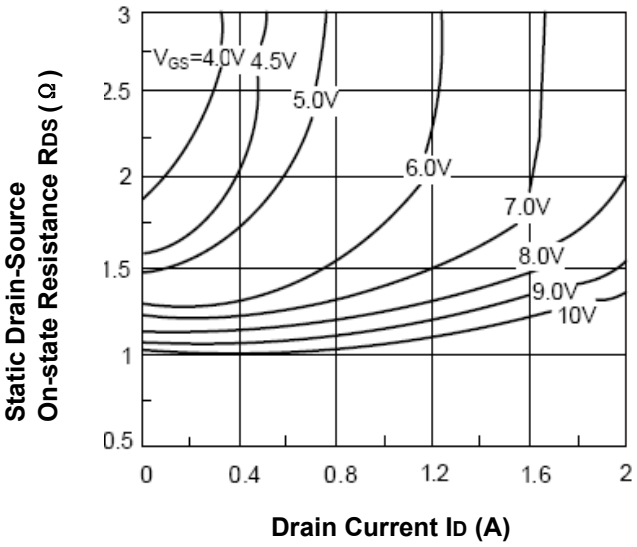


Fig.5- Static Drain-Source On-state Resistance vs. Drain Current and Temperature

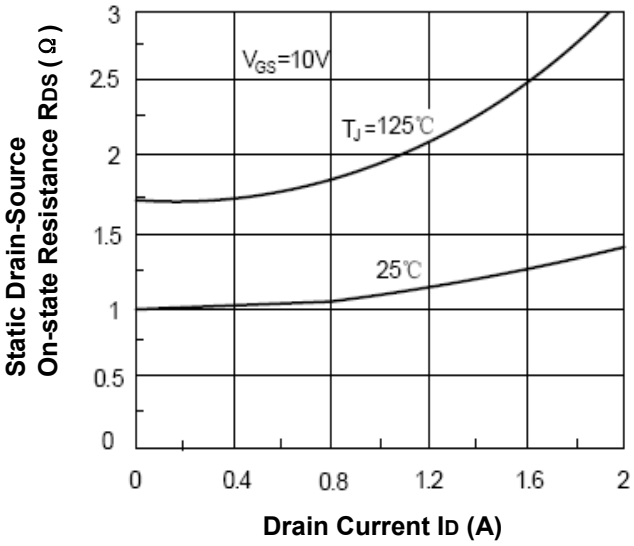
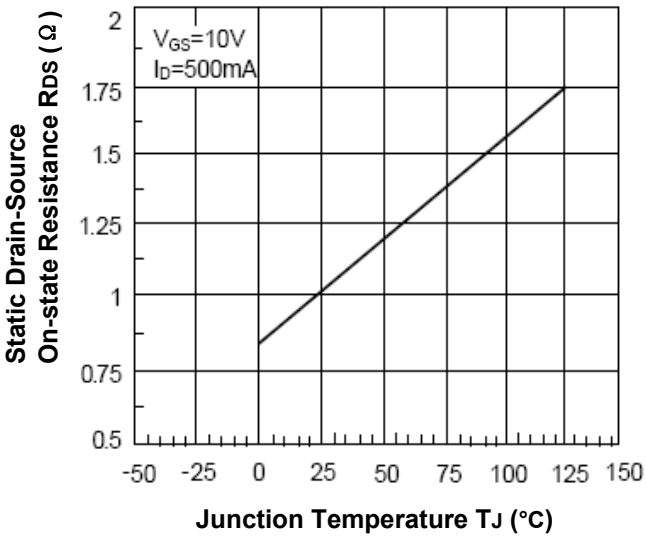


Fig.6- Static Drain-Source On-state Resistance vs. Junction Temperature



Typical Characteristics Curves (Cont.)

Fig.7- Breakdown Voltage vs. Junction Temperature

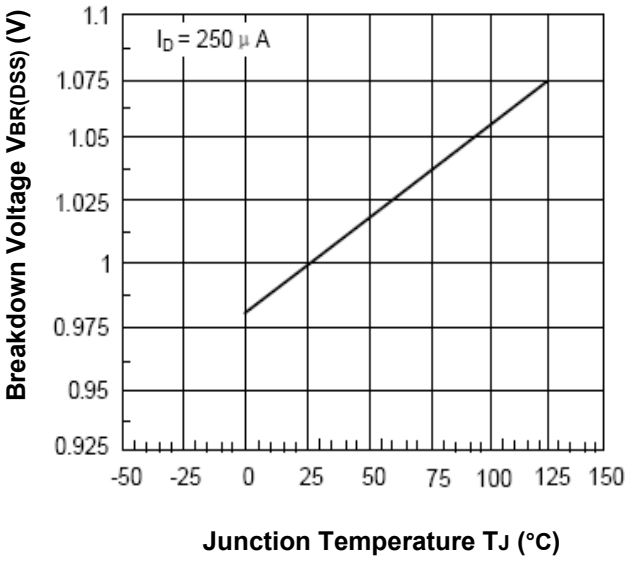


Fig.8- Drain-Source Diode Forward Voltage vs. Drain-Source Diode Forward Current

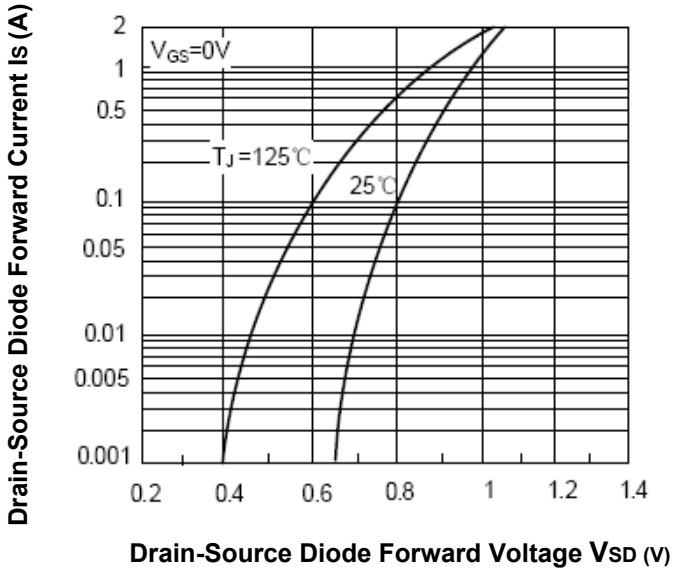


Fig.9- Capacitance vs Drain-Source Voltage

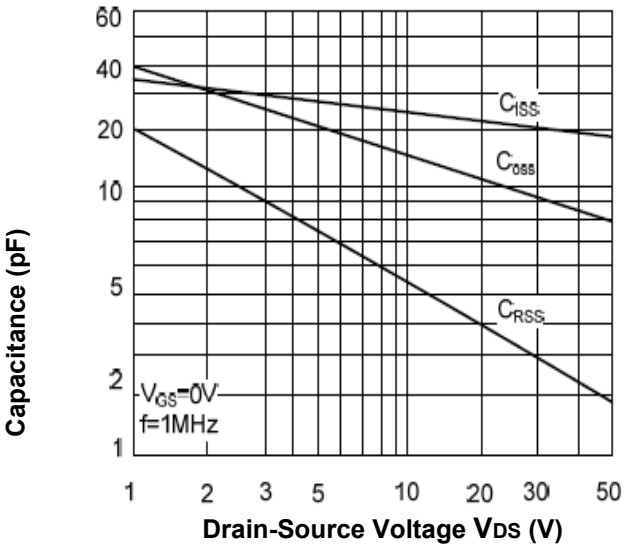


Fig.10- Gate Charge vs Gate-Source Voltage

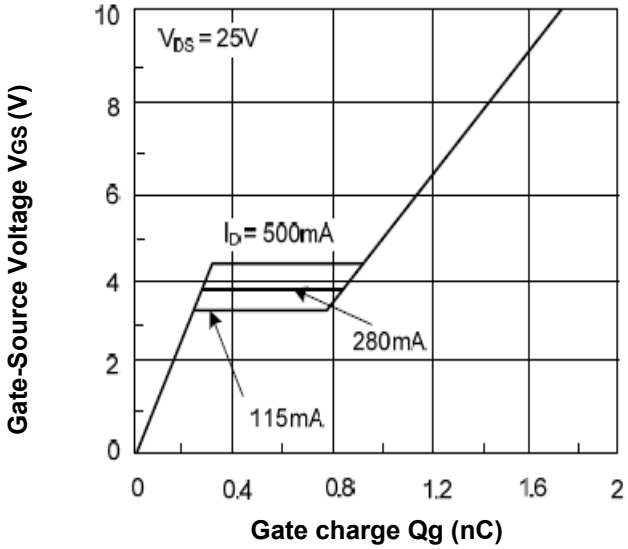


Fig.11- Drain-Source Voltage vs Drain Current

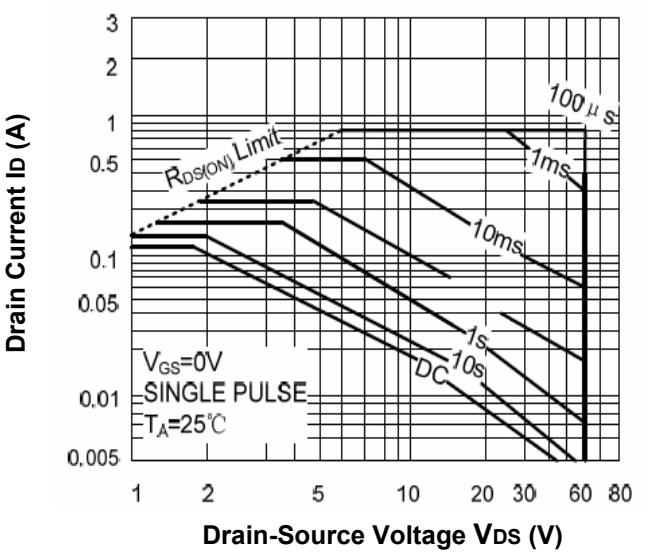
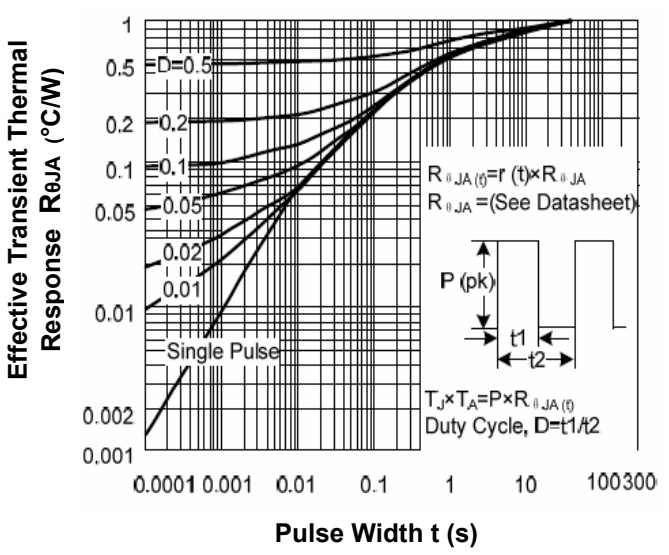


Fig.12- Effective Transient Thermal Response



Switching Characteristics Measurement Circuit

Fig.13- Switching Time Measurement Circuit

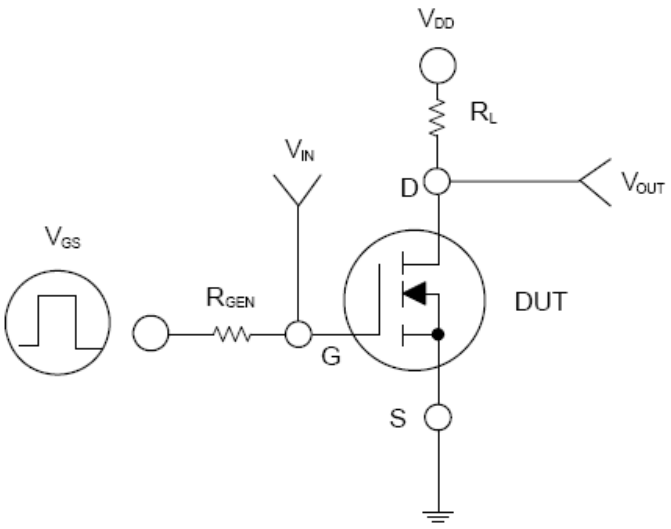
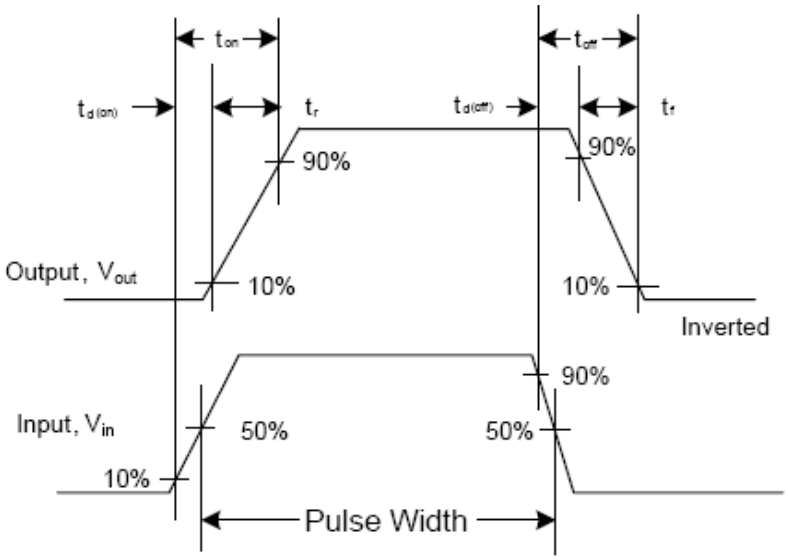
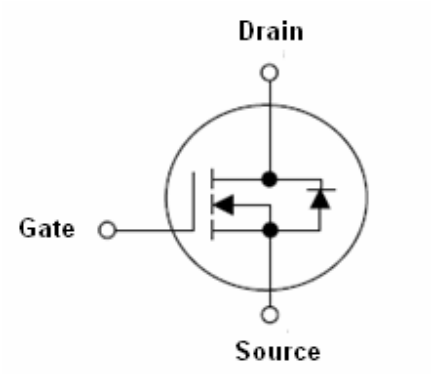


Fig.14- Switching Time Waveforms

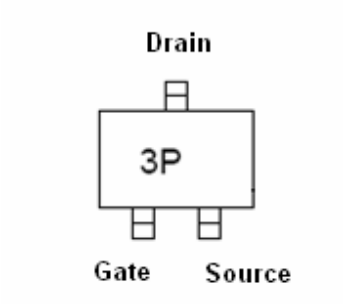


2N7002E

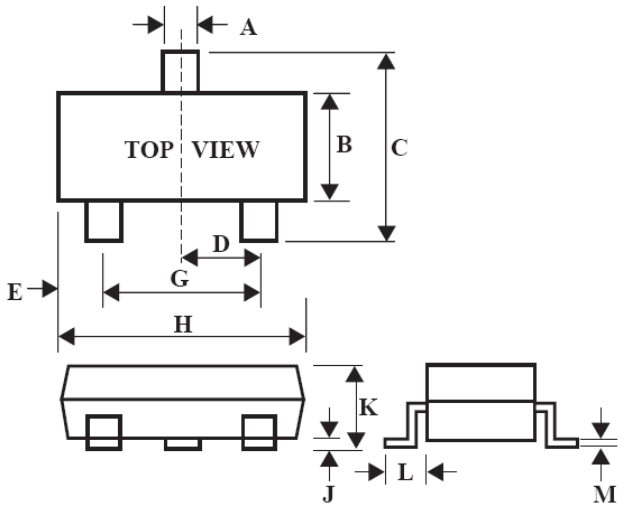
Equivalent Circuit:



Marking Information:



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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