

Small Signal MOSFET

115 mAmps, 60 Volts N-Channel SOT-23

● FEATURES

- 1) We declare that the material of product compliant with RoHS requirements and Halogen Free.
- 2) ESD Protected: 1000V
- 3) S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

● DEVICE MARKING AND ORDERING INFORMATION

Device	Marking	Shipping
2N7002	702	3000/Tape&Reel
2N7002-13"	702	10000/Tape&Reel

● MAXIMUM RATINGS ($T_a = 25^\circ C$)

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	60	Vdc
Drain-Gate Voltage ($R_{GS} = 1.0 \text{ M}\Omega$)	V_{DGR}	60	Vdc
Drain Current			mAdc
– Continuous $T_c = 25^\circ C$ (Note 1.)	I_D	± 115	
$T_c = 100^\circ C$ (Note 1.)	I_D	± 75	
– Pulsed (Note 2.)	I_{DM}	± 800	
Gate-Source Voltage			
– Continuous	V_{GS}	± 20	Vdc
– Non-repetitive ($t_p \leq 50 \mu\text{s}$)	V_{GSM}	± 40	Vpk

● THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 (Note 3.) $T_A = 25^\circ C$	P_D	225 1.8	mW mW/ $^\circ C$
Derate above $25^\circ C$			
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556	$^\circ C/W$
Total Device Dissipation Alumina Substrate, (Note 4.) $T_A = 25^\circ C$	P_D	300 2.4	mW mW/ $^\circ C$
Derate above $25^\circ C$			
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	417	$^\circ C/W$
Junction and Storage Temperature	T_J, T_{stg}	-55 to +150	$^\circ C$

1. The Power Dissipation of the package may result in a lower continuous

2. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

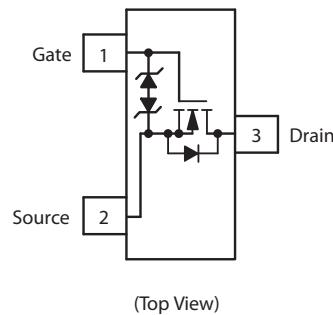
3. FR-5 = $1.0 \times 0.75 \times 0.062$ in.

4. Alumina = $0.4 \times 0.3 \times 0.025$ in 99.5% alumina.

2N7002
S-2N7002



Simplified Schematic



MEI**2N7002, S-2N7002****● ELECTRICAL CHARACTERISTICS (Ta= 25°C)**

Characteristic	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS					
Drain–Source Breakdown Voltage (V _{GS} = 0, I _D = 10 µAdc)	V _{(BR)DSS}	60	–	–	Vdc
Zero Gate Voltage Drain Current T _J = 25° C (V _{GS} = 0, V _{DS} = 60 Vdc) T _J = 125° C	I _{DSS}	–	–	1.0 500	µAdc
Gate–Body Leakage Current, Forward (V _{GS} = 20 Vdc)	I _{GSSF}	–	–	1	µAdc
Gate–Body Leakage Current, Reverse (V _{GS} = - 20 Vdc)	I _{GSSR}	–	–	-1	µAdc

ON CHARACTERISTICS (Note 2.)

Gate Threshold Voltage (V _{DS} = V _{GS} , I _D = 250 µAdc)	V _{GS(th)}	1	1.6	2	Vdc
On–State Drain Current (V _{DS} ≥ 2.0 V _{DS(on)} , V _{GS} = 10 Vdc)	I _{D(on)}	500	–	–	mA
Static Drain–Source On–State Voltage (V _{GS} = 10 Vdc, I _D = 500 mA)	V _{DS(on)}	–	–	3.75	Vdc
(V _{GS} = 5.0 Vdc, I _D = 50 mA)		–	–	0.375	
Static Drain–Source On–State Resistance (V _{GS} = 10 V, I _D = 500 mA) T _C = 25° C	r _{DS(on)}	–	1.4	7.5	Ohms
T _C = 125° C		–	–	13.5	
(V _{GS} = 5.0 Vdc, I _D = 50 mA) T _C = 25° C		–	1.8	7.5	
T _C = 125° C		–	–	13.5	
(V _{DS} ≥ 2.0 V _{DS(on)} , I _D = 200 mA)	g _{FS}	80	–	–	mmhos

DYNAMIC CHARACTERISTICS

Input Capacitance (V _{DS} = 25 Vdc, V _{GS} = 0, f = 1.0 MHz)	C _{iss}	–	17	50	pF
Output Capacitance (V _{DS} = 25 Vdc, V _{GS} = 0, f = 1.0 MHz)	C _{oss}	–	10	25	pF
Reverse Transfer Capacitance (V _{DS} = 25 Vdc, V _{GS} = 0, f = 1.0 MHz)	C _{rss}	–	2.5	5.0	pF

SWITCHING CHARACTERISTICS (Note 2.)

Turn-On Delay Time	(V _{DD} = 25 Vdc, I _D = 500 mA, R _G = 25 Ω, R _L = 50 Ω, V _{gen} = 10V)	td(on)	–	7	20	ns
Turn-Off Delay Time		td(off)	–	11	40	ns

BODY–DRAIN DIODE RATINGS

Diode Forward On–Voltage (I _S = 115 mA, V _{GS} = 0V)	V _{SD}	–	–	-1.5	Vdc
Source Current Continuous (Body Diode)	I _S	–	–	-115	mA
Source Current Pulsed	I _{SM}	–	–	-800	mA

2. Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2.0%.

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ELECTRICAL CHARACTERISTIC CURVES

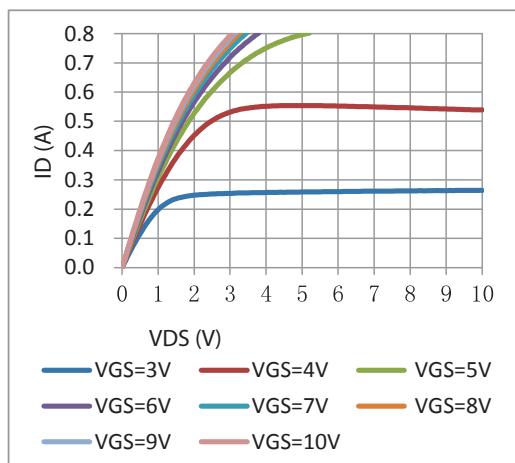


FIG1. On-Region Characteristics

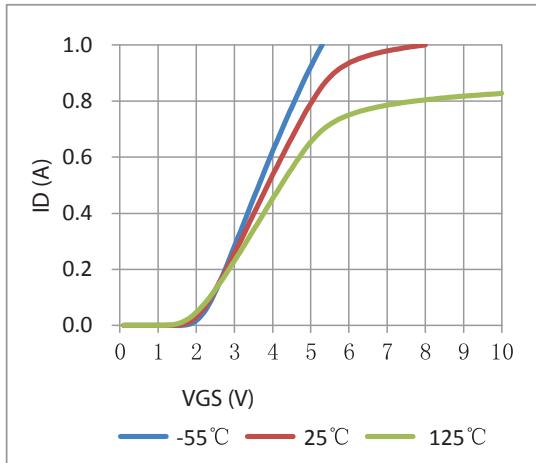


FIG2. Transfer Characteristics

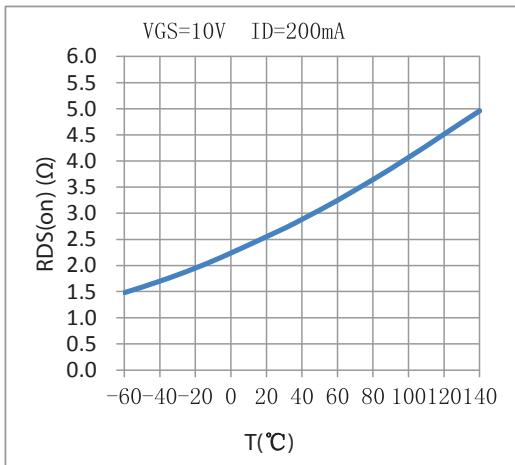


FIG. 3 Temperature vs Static Drain- Source On-Resistance

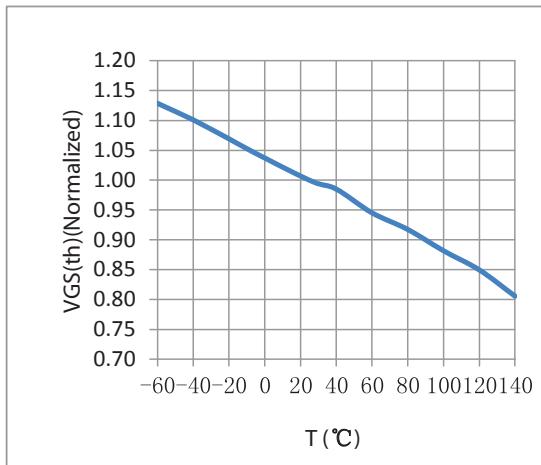
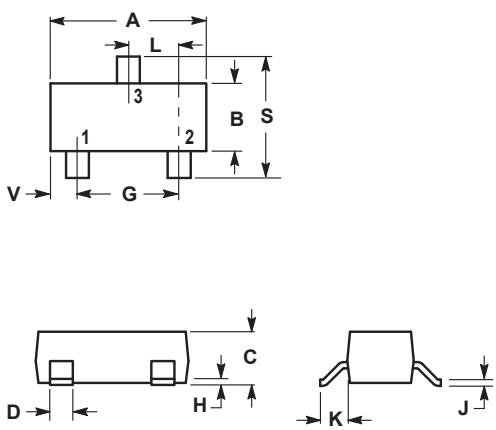


FIG. 4 Temperature vs Gate Threshold

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Dimension Outline:



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60

Soldering Footprint:

