

Small Signal MOSFET 115mAmps, 60 Volts N–Channel

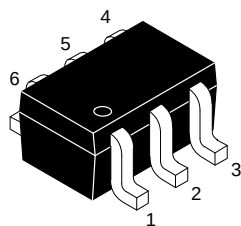
FEATURES:

- ESD Protected : 1000V
- We declare that the material of product complies with RoHS requirements and Halogen Free.

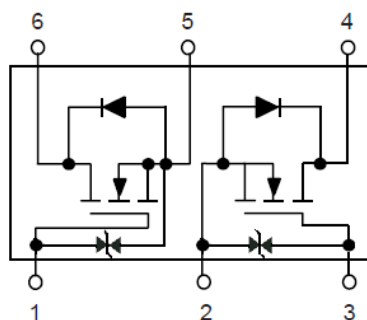
APPLICATIONS:

- Low Side Load Switch
- Level Shift Circuits
- DC–DC Converter

Circuit Diagram & Pin Configuration:



SOT23-6/SC-74



DEVICE MARKING AND ORDERING INFORMATION

Device	Marking	Shipping
2N7002DM-S03T	72D	3000/Tape&Reel

MAXIMUM RATINGS

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

THERMAL CHARACTERISTICS

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

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

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain–Source Breakdown Voltage ($V_{GS} = 0$, $I_D = 250\mu\text{Adc}$)	$V_{(BR)DSS}$	60	–	–	Vdc
Zero Gate Voltage Drain Current ($V_{GS} = 0$, $V_{DS} = 60\text{ Vdc}$)	I_{DSS}	$T_J = 25^\circ\text{C}$	–	1.0	μAdc
		$T_J = 125^\circ\text{C}$	–	500	
Gate–Body Leakage Current, Forward ($V_{GS} = 20\text{ Vdc}$)	I_{GSSF}	–	–	1.0	μAdc
Gate–Body Leakage Current, Reverse ($V_{GS} = -20\text{ Vdc}$)	I_{GSSR}	–	–	-1.0	μAdc

ON CHARACTERISTICS (Note 2.)

Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 250\mu\text{Adc}$)	$V_{GS(th)}$	1.0	1.6	2	Vdc
On–State Drain Current ($V_{DS} \geq 2.0\text{ V}_{DS(on)}$, $V_{GS} = 10\text{ Vdc}$)	$I_{D(on)}$	500	–	–	mA
Static Drain–Source On–State Voltage ($V_{GS} = 10\text{ Vdc}$, $I_D = 500\text{ mAdc}$) ($V_{GS} = 5.0\text{ Vdc}$, $I_D = 50\text{ mAdc}$)	$V_{DS(on)}$	–	–	3.75	Vdc
		–	–	0.375	
Static Drain–Source On–State Resistance ($V_{GS} = 10\text{ V}$, $I_D = 500\text{ mAdc}$) $T_C = 25^\circ\text{C}$ ($V_{GS} = 10\text{ V}$, $I_D = 500\text{ mAdc}$) $T_C = 125^\circ\text{C}$ ($V_{GS} = 5.0\text{ Vdc}$, $I_D = 50\text{ mAdc}$) $T_C = 25^\circ\text{C}$ ($V_{GS} = 5.0\text{ Vdc}$, $I_D = 50\text{ mAdc}$) $T_C = 125^\circ\text{C}$	$r_{DS(on)}$	–	1.4	7.5	Ohms
		–	–	13.5	
		–	1.8	7.5	
		–	–	13.5	
Forward Transconductance ($V_{DS} \geq 2.0\text{ V}_{DS(on)}$, $I_D = 200\text{ mAdc}$)	g_{FS}	80	–	–	mmhos

DYNAMIC CHARACTERISTICS

Input Capacitance ($V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0$, $f = 1.0\text{ MHz}$)	C_{iss}	–	17	50	pF
Output Capacitance ($V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0$, $f = 1.0\text{ MHz}$)	C_{oss}	–	10	25	pF
Reverse Transfer Capacitance ($V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0$, $f = 1.0\text{ MHz}$)	C_{rss}	–	2.5	5.0	pF

SWITCHING CHARACTERISTICS (Note 2.)

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

BODY–DRAIN DIODE RATINGS

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

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

TYPICAL ELECTRICAL CHARACTERISTICS

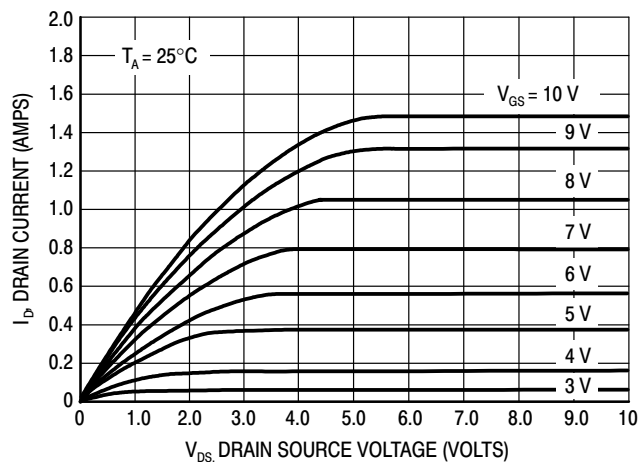


Figure 1. Ohmic Region

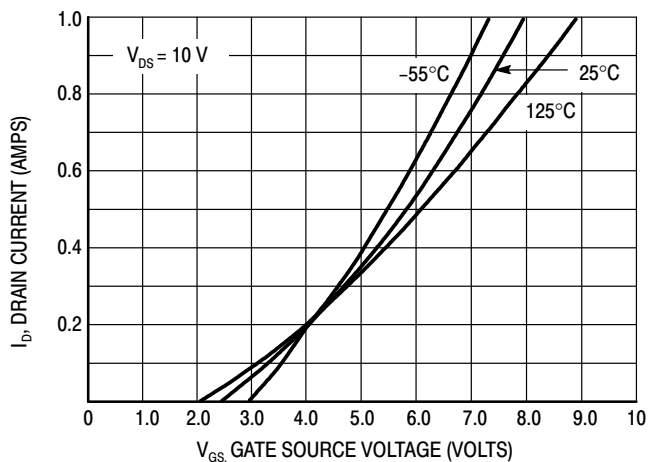


Figure 2. Transfer Characteristics

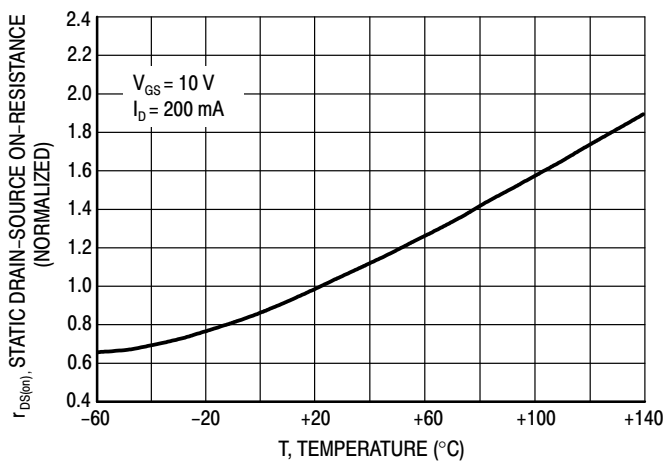


Figure 3. Temperature versus Static Drain-Source On-Resistance

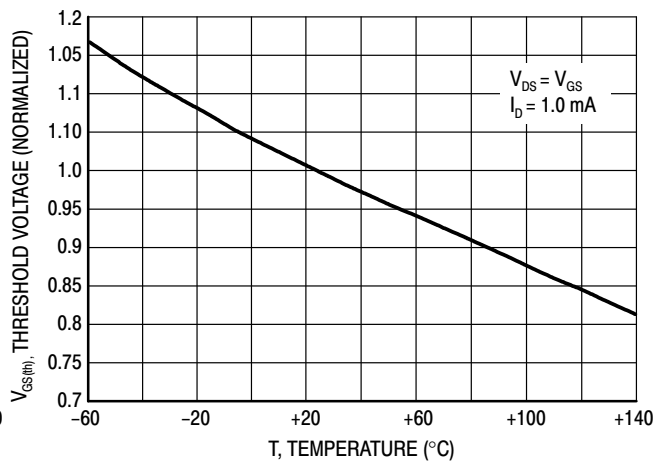
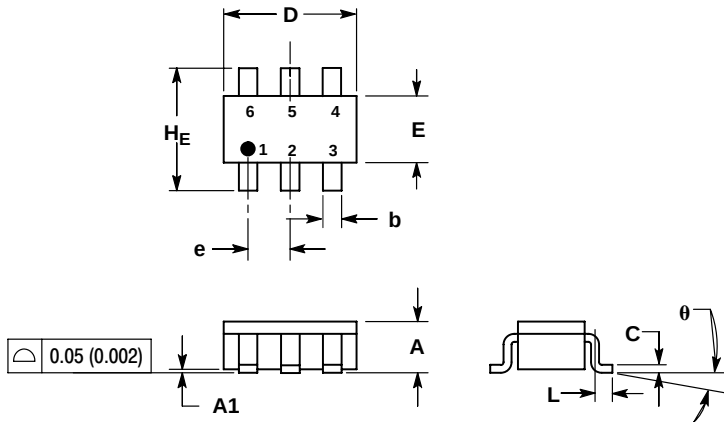


Figure 4. Temperature versus Gate Threshold Voltage

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DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	1.00	1.10	0.035	0.039	0.043
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.25	0.37	0.50	0.010	0.015	0.020
c	0.10	0.18	0.26	0.004	0.007	0.010
D	2.90	3.00	3.10	0.114	0.118	0.122
E	1.30	1.50	1.70	0.051	0.059	0.067
e	0.85	0.95	1.05	0.034	0.037	0.041
L	0.20	0.40	0.60	0.008	0.016	0.024
H _E	2.50	2.75	3.00	0.099	0.108	0.118
θ	0°	—	10°	0°	—	10°

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