

Small Signal MOSFET

380 mAmps, 60 Volts

N-Channel SOT-323

Features

- ESD Protected
- Low $R_{DS(on)}$
- Surface Mount Package
- This is a Pb-Free Device
- We declare that the material of product are Halogen Free and compliance with RoHS requirements.
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

Applications

- Low Side Load Switch
- Level Shift Circuits
- DC-DC Converter
- Portable Applications i.e. DSC, PDA, Cell Phone, etc.

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise stated)

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	60	V
Gate-to-Source Voltage	V_{GS}	± 20	V
Drain Current (Note 1) Steady State	I_D	$T_A = 25^\circ\text{C}$	320
		$T_A = 85^\circ\text{C}$	230
$t < 5\text{ s}$		$T_A = 25^\circ\text{C}$	380
		$T_A = 85^\circ\text{C}$	270
Power Dissipation (Note 1) Steady State	P_D		300
		$t < 5\text{ s}$	420
Pulsed Drain Current ($t_p = 10\ \mu\text{s}$)	I_{DM}	1.5	A
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$
Source Current (Body Diode)	I_S	300	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T_L	260	$^\circ\text{C}$
Gate-Source ESD Rating (HBM, Method 3015)	ESD	2000	V

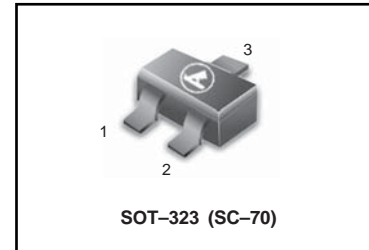
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Junction-to-Ambient - Steady State (Note 1)	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$
Junction-to-Ambient - $t \leq 5\text{ s}$ (Note 1)	$R_{\theta JA}$	300	

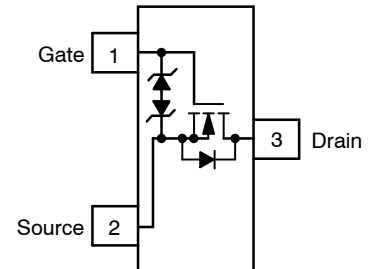
1. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces)

L2N7002KWT1G
S-L2N7002KWT1G



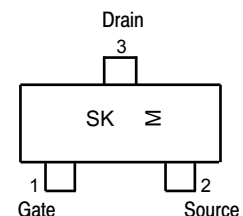
$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX (Note 1)
60 V	2.3 Ω @ 10 V	380 mA
	2.7 Ω @ 5.0 V	

Simplified Schematic



(Top View)

MARKING DIAGRAM & PIN ASSIGNMENT



SK = Device Code
M = Month Code

ORDERING INFORMATION

Device	Marking	Shipping
L2N7002KWT1G	SK	3000 Tape & Reel
S-L2N7002KWT1G		

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			71		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = 60\text{ V}$	$T_J = 25^\circ\text{C}$		1	μA
			$T_J = 125^\circ\text{C}$		500	
		$V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V}$	$T_J = 25^\circ\text{C}$			100
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 10	μA

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	1		2.5	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			4.0		mV/ $^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 500\text{ mA}$			2.3	Ω
		$V_{GS} = 5.0\text{ V}, I_D = 50\text{ mA}$			2.7	
Forward Transconductance	g_{FS}	$V_{DS} = 5\text{ V}, I_D = 200\text{ mA}$	80			mS

CHARGES AND CAPACITANCES

Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 25\text{ V}$		34		μF
Output Capacitance	C_{OSS}			3		
Reverse Transfer Capacitance	C_{RSS}			2.2		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V}; I_D = 500\text{ mA}$		0.71		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.1		
Gate-to-Source Charge	Q_{GS}			0.32		
Gate-to-Drain Charge	Q_{GD}			0.16		

SWITCHING CHARACTERISTICS, $V_{GS} = V$ (Note 3)

Turn-On Delay Time	$t_{d(ON)}$	$V_{DS} = 10\text{ V}, V_{GEN} = 10\text{ V}, I_D = 500\text{ mA}$		3.8		ns
Rise Time	t_r			3.4		
Turn-Off Delay Time	$t_{d(OFF)}$			19		
Fall Time	t_f			12		

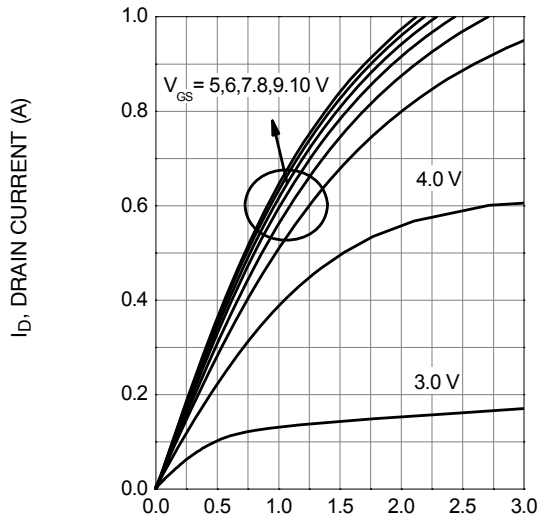
DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 115\text{ mA}$	$T_J = 25^\circ\text{C}$		1.2	V
			$T_J = 85^\circ\text{C}$		0.7	

2. Pulse Test: pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$
3. Switching characteristics are independent of operating junction temperatures

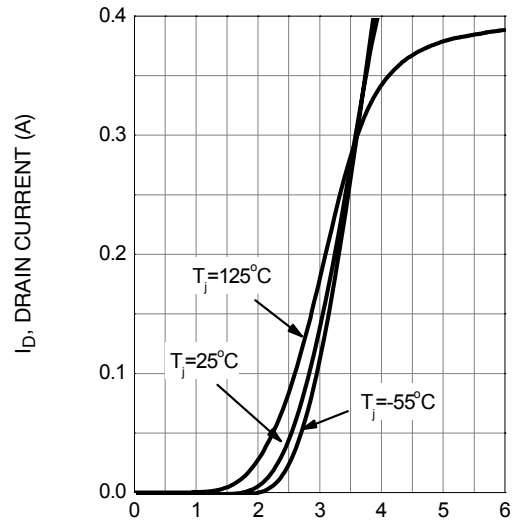
L2N7002KWT1G , S-L2N7002KWT1G

TYPICAL ELECTRICAL CHARACTERISTICS



V_{DS} , DRAIN-TO-SOURCE VOLTAGE (V)

Figure 1. On-Region Characteristics



V_{GS} , GATE-TO-SOURCE VOLTAGE (V)

Figure 2. Transfer Characteristics

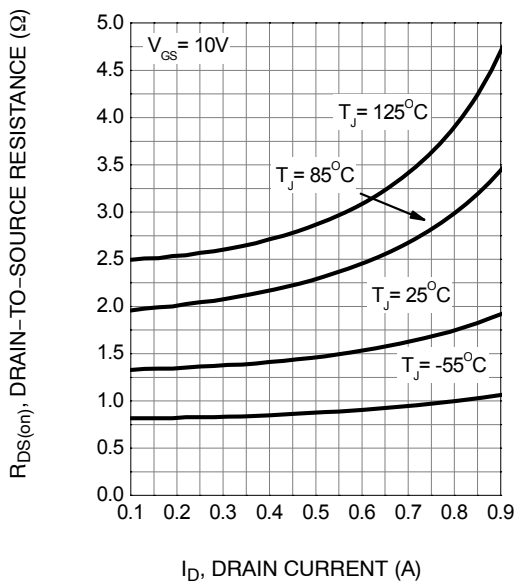


Figure 3. On-Resistance vs. Drain Current and Temperature

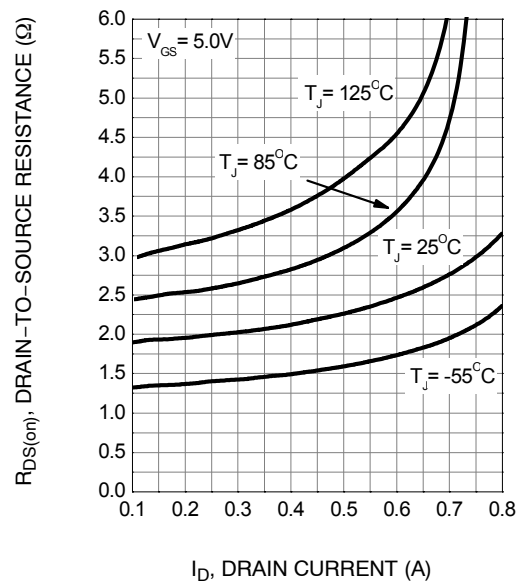


Figure 4. On-Resistance vs. Drain Current and Temperature

TYPICAL ELECTRICAL CHARACTERISTICS

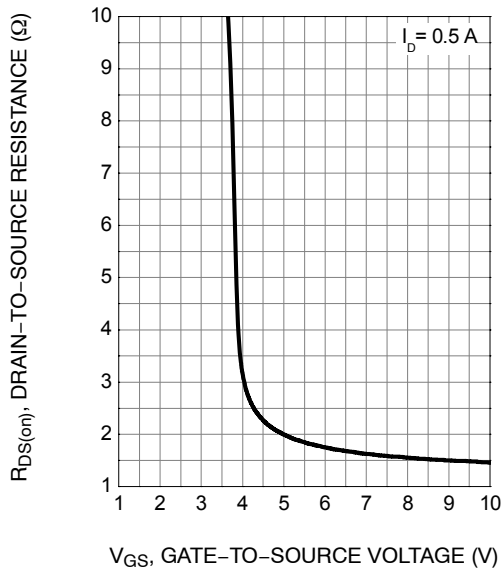


Figure 5. On-Resistance vs. Gate-to-Source Voltage

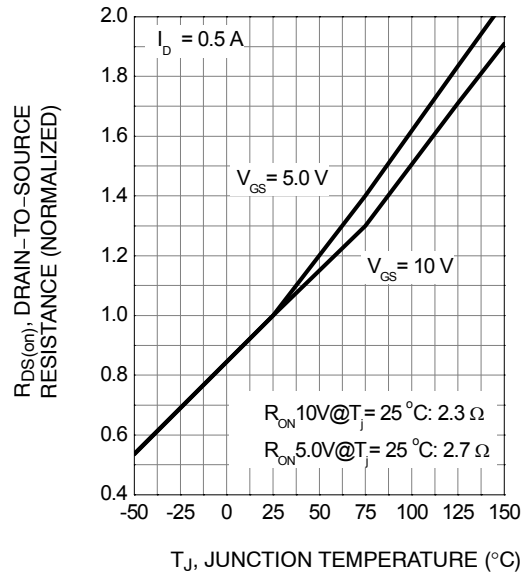


Figure 6. On-Resistance Variation with Temperature

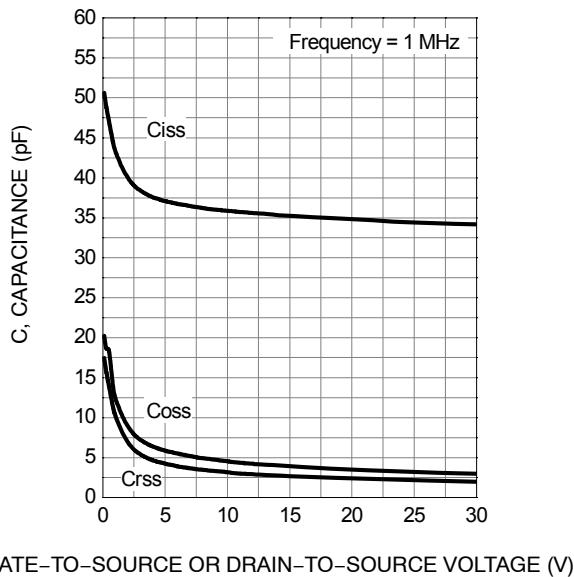


Figure 7. Capacitance Variation

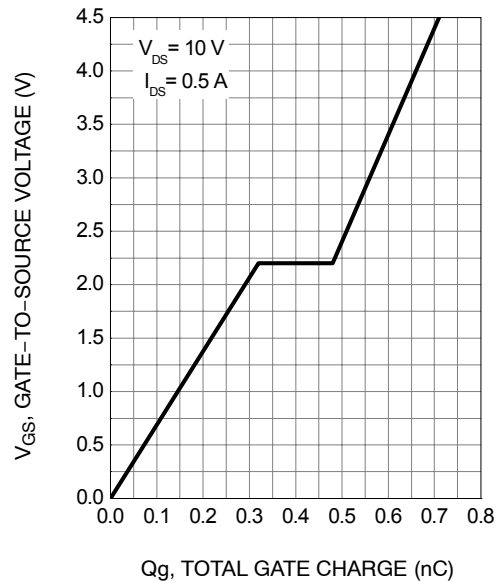
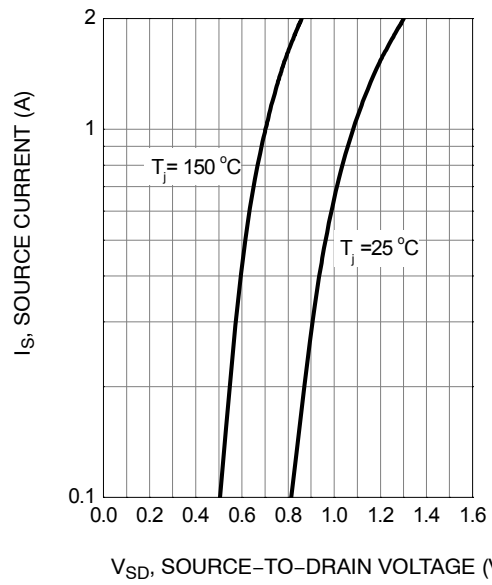
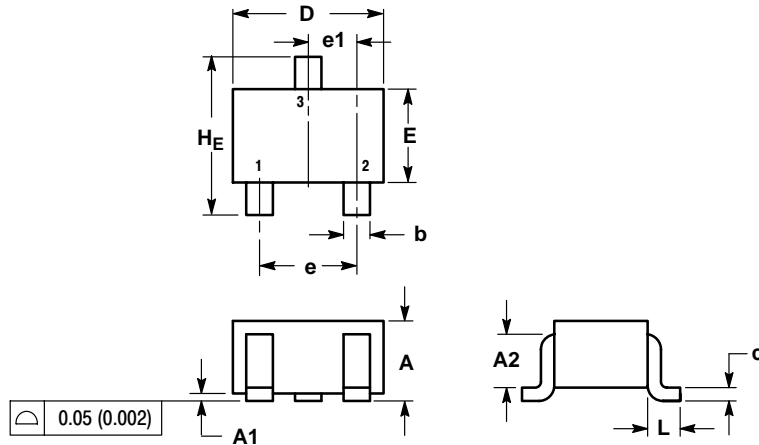


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

L2N7002KWT1G , S-L2N7002KWT1G**TYPICAL ELECTRICAL CHARACTERISTICS****Figure 9. Diode Forward Voltage vs. Current**

L2N7002KWT1G , S-L2N7002KWT1G

SC-70 (SOT-323)

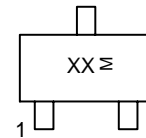


NOTES:

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

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.90	1.00	0.032	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.7 REF			0.028 REF		
b	0.30	0.35	0.40	0.012	0.014	0.016
c	0.10	0.18	0.25	0.004	0.007	0.010
D	1.80	2.10	2.20	0.071	0.083	0.087
E	1.15	1.24	1.35	0.045	0.049	0.053
e	1.20	1.30	1.40	0.047	0.051	0.055
e1	0.65 BSC			0.026 BSC		
L	0.425 REF			0.017 REF		
HE	2.00	2.10	2.40	0.079	0.083	0.095

GENERIC MARKING DIAGRAM



- XX = Specific Device Code
- ≅ = Date Code
- = Pb-Free Package

SOLDERING FOOTPRINT*

