

2N7002T-Q1-H

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0.115A 60V N-Channel Enhancement Mode MOSFET

- $V_{DS}=60V, I_D=0.115A.$
- $R_{DS(on)} \leq 5.0 \Omega @ V_{GS}=10V, I_D=500mA.$
- $R_{DS(on)} \leq 7.0 \Omega @ V_{GS}=5V, I_D=50mA.$
- High density cell design for low on-resistance.
- Voltage controlled small signal switch.
- Rugged and reliable.
- High saturation current capability.
- Qualified to AEC-Q101 standards for high reliability.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

- Load switch for portable devices.
- DC/DC converter.

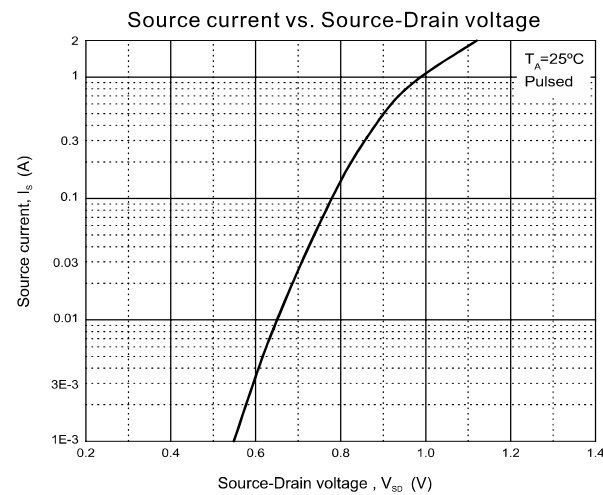
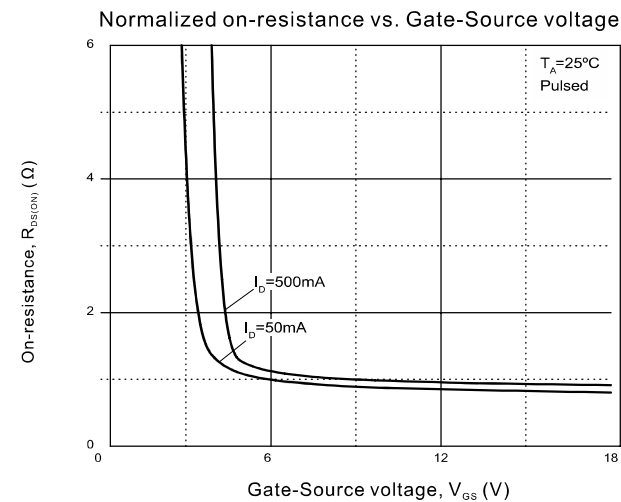
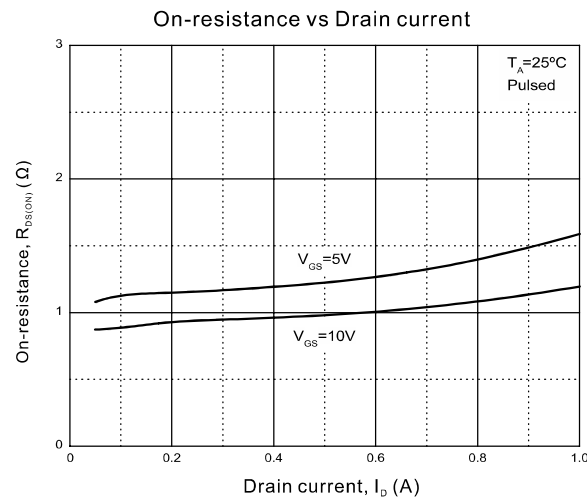
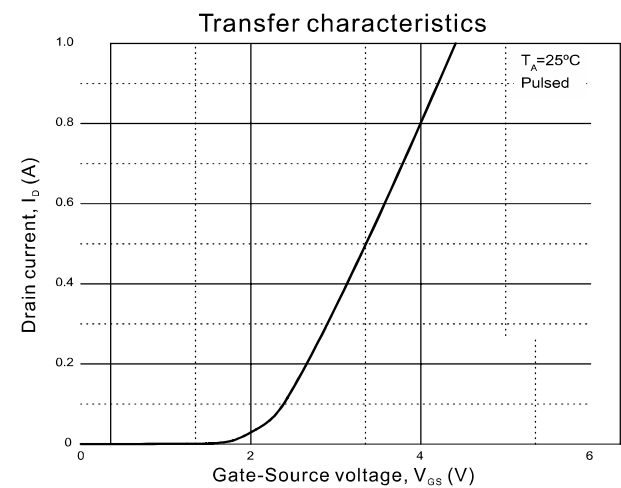
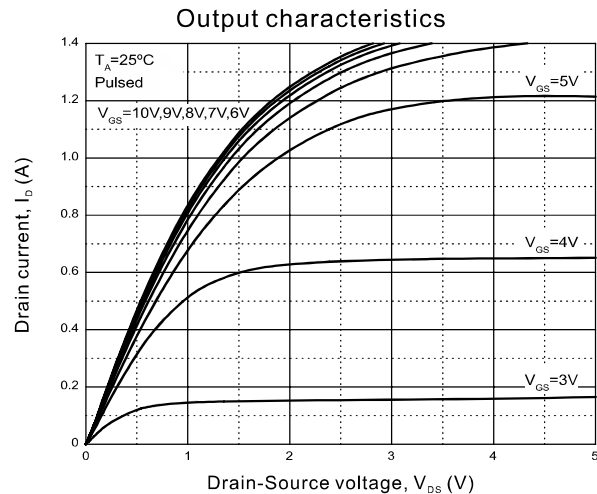
- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-523.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Weight : Approximated 2.0mg.

Parameter	Symbol	Ratings	Units
Drain-source voltage	V_{DS}	60	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current	I_D	0.115	A
Total power dissipation	P_D	0.20	W
Thermal resistance form junction to ambient	$R_{\theta JA}$	625	$^{\circ}\text{C/W}$
Junction temperature	T_J	+150	$^{\circ}\text{C}$
Storage temperature range	T_{STG}	-50 to +150	$^{\circ}\text{C}$

The drawing shows the mechanical specifications for a SOT-523 package. The top view includes dimensions for the overall width (0.067 (1.70)), body width (0.059 (1.50)), and various internal offsets and widths (0.044 (1.10), 0.035 (0.90), 0.035 (0.90), 0.028 (0.70), 0.069 (1.75), 0.057 (1.45)). The side view shows the package height (0.040 (1.00)), standoff height (0.028 (0.70)), and lead dimensions (0.008 (0.20), 0.004 (0.10)).

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Rating and characteristic curves



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Electrical characteristics (At $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Drain-source breakdown voltage	$V_{GS}=0V, I_D=250\mu A$	BV_{DSS}	60			V
Zero gate voltage drain current	$V_{DS}=60V, V_{GS}=0V$	I_{DSS}			80	nA
Gate-source leakage current	$V_{DS}=0V, V_{GS}=\pm 20V$	I_{GSS}			± 80	nA
On-state drain current	$V_{DS}=10V, V_{DS}=7V,$	$I_{D(ON)}$	500			mA
Gate threshold voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	$V_{GS(TH)}$	1.0	1.6	2.5	V
Static drain-source on-resistance	$V_{GS}=10V, I_D=500mA$	$R_{DS(ON)}$		0.9	5.0	Ω
	$V_{GS}=5V, I_D=50mA$			1.1	7.0	
Forward transconductance	$V_{DS}=10V, I_D=200mA$	g_{FS}	80			mS
Drain-source on-voltage	$V_{GS}=10V, I_D=500mA$	$V_{DS(ON)}$			3.75	V
	$V_{GS}=5V, I_D=50mA$				0.375	
Diode forward voltage	$I_S=115mA, V_{GS}=0V$	V_{SD}	0.55		1.2	V

Dynamic characteristics

Input capacitance (Note1)	$V_{GS}=0V, V_{DS}=25V, F_{req.}=1.0MHz$	C_{iss}			50	pF
Output capacitance (Note1)		C_{oss}			25	
Reverse transfer capacitance (Note1)		C_{rss}			5	

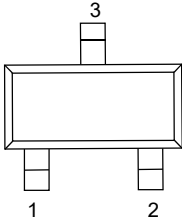
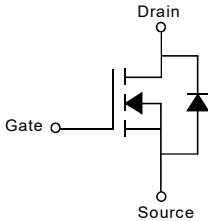
Switching parameters

Turn-on delay time (Note1)	$V_{DD}=25V, I_D=500mA, V_{GEN}=10V, R_{G.}=25\Omega, R_{L.}=50\Omega$				20	ns
Turn-off delay time (Note1)					40	

Note: 1. These parameters have no way to verify.

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Pinning information

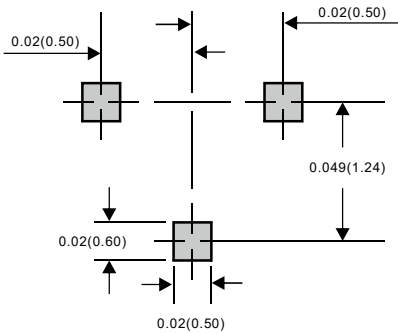
Pin	Simplified outline	Symbol
Pin 1 Gate Pin 2 Source Pin 3 Drain		

Marking

Type number	Marking code
2N7002T-Q1-H	K72

Suggested solder pad layout

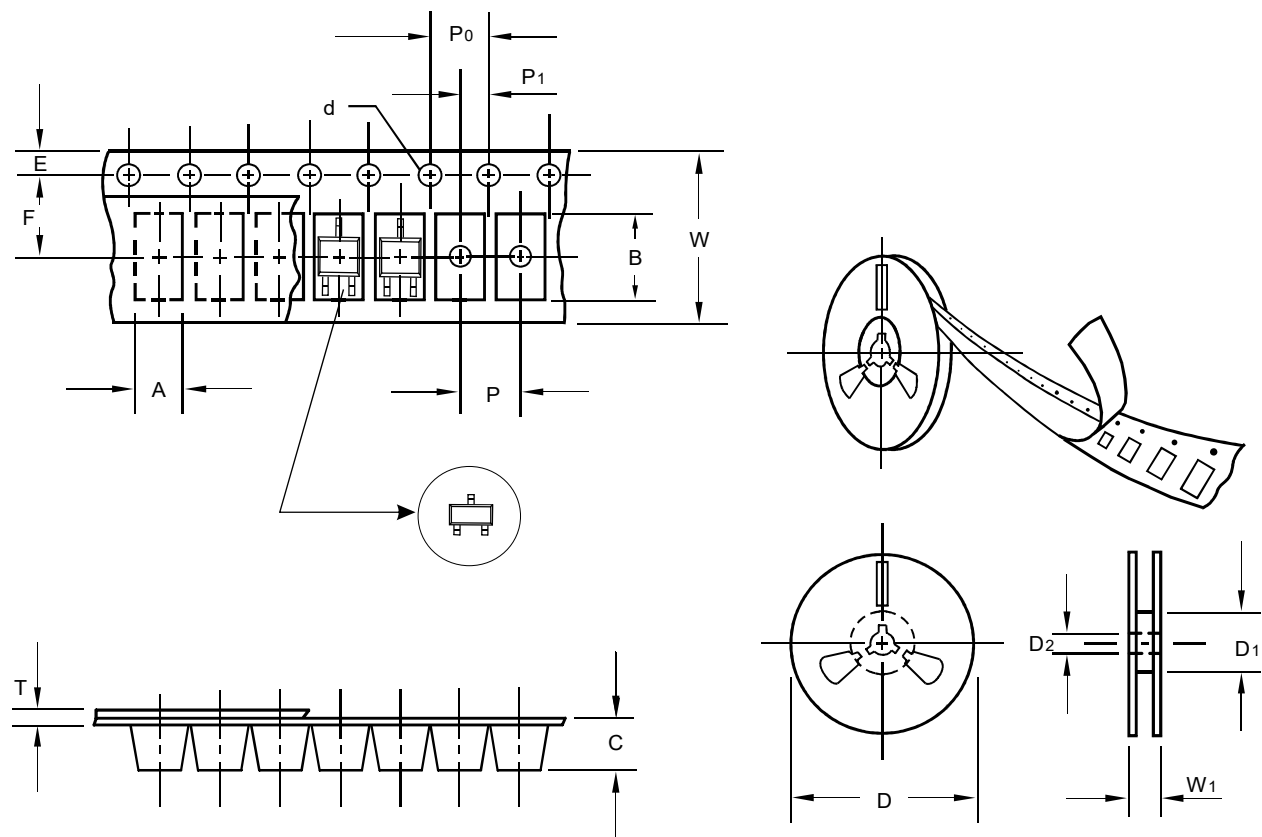
SOT-523



Dimensions in inches and (millimeters)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOT-523
Carrier width	A	0.5	1.85
Carrier length	B	0.5	1.85
Carrier depth	C	0.5	0.875
Sprocket hole	d	0.5	1.5
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	60.00
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.5	0.23
Tape width	W	0.5	8.00
Reel width	W1	5.0	11.40

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

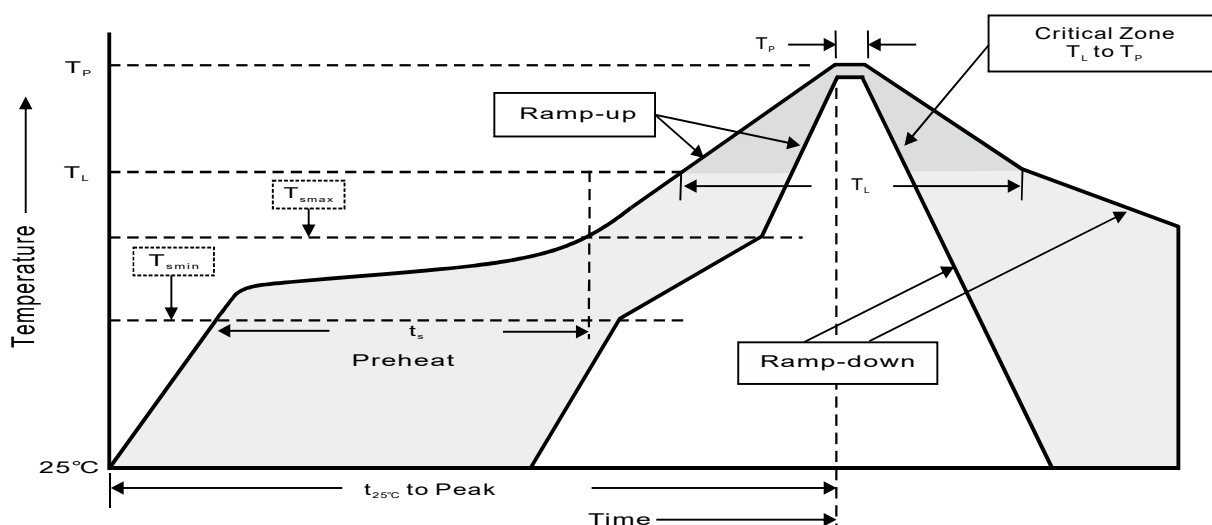
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Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)
SOT-523	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature = 5°C ~ 40°C Humidity = 55%, ±25%
- 2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile feature	Soldering condition
Average ramp-up rate (T_L to T_p)	< 3 °C/sec
Preheat - Temperature Min (T_{smin}) - Temperature Max (T_{smax}) - Time (Min to Max) (t_s)	150°C 200°C 60 ~ 120 sec
T_{smax} to T_L - Ramp-up rate	< 3 °C/sec
Time maintained above : - Temperature (T_L) - Time (T_L)	217°C 60 ~ 260 sec
Peak temperature (T_p)	255 °C -0/+5°C
Time with 5°C of actual peak temperature (T_p)	10 ~30 sec
Ramp-down rate	< 6 °C/sec
Time 25°C to peak temperature	< 6 minutes