

SPECIFICATION SHEET

SPECIFICATION SHEET NO.	N0909- SOT232N70S702K
DATE	Sept. 09, 2021
REVISION	A1
DESCRIPTION	<p>SMD Plastic-Encapsulate MOSFETS, SOT-23 series, 3 pads 2N7002K Type, 60V N-Channel Enhancement Mode MOSFET Reverse Working Voltage : 12V, Peak Pulse Power per (8/20μs): 350 Watts Operating Temp. Range -55°C ~+150°C, Package in Tape/Reel, 3000pcs/Reel RoHS/RoHS III compliant</p>
CUSTOMER	
CUSTOMER PART NUMBER	
CROSS REF. PART NUMBER	
ORIGINAL PART NUMBER	MDD 2N7002K
PART CODE	SOT232N70S702K

VENDOR APPROVE	
Issued/Checked/Approved	  
DATE: Sept. 09, 2021	

CUSTOMER APPROVE	
DATE:	

SMD PLASTIC-ENCAPSULATE MOSFETS SOT-23 SERIES

MAIN FEATURE

- High density cell design for low RDS(ON)
- Voltage controlled small signal switch
- Rugged and reliable
- High saturation current capability
- HBM ESD protected (2000V)



APPLICATION

- Load Switch for Portable Devices
- DC/DC Converter

RFQ

[Request For Quotation](#)

PART CODE GUIDE

SOT23	2N70	S	702K
1	2	3	4

1) **SOT23:** SMD Plastic-Encapsulate MOSFETS, SOT-23 series, 3 pads

2) **2N70:** Type code for Original part number 2N7002K

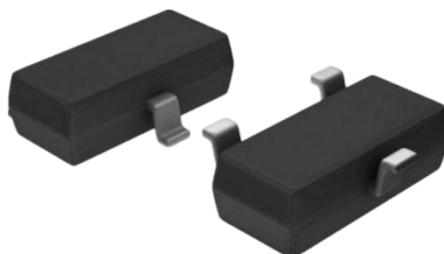
3) **S:** Package code, Package in Tape/Reel, 3000pcs/Reel

4) **702K:** Marking code for “702K” on the case surface, Different Marking for different specification.

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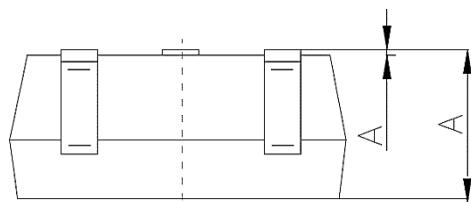
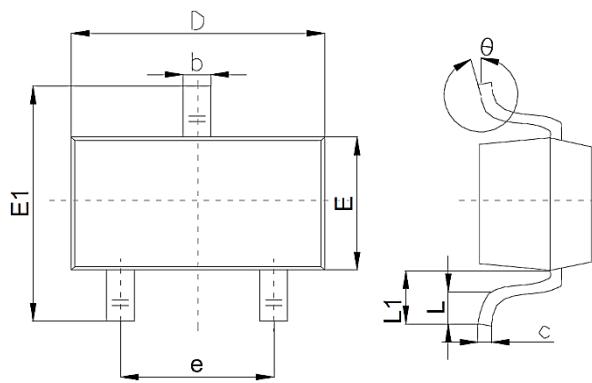
DIMENSION (Unit: Inch/mm)

Image for reference



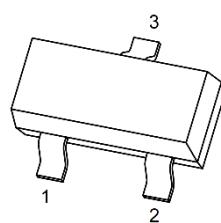
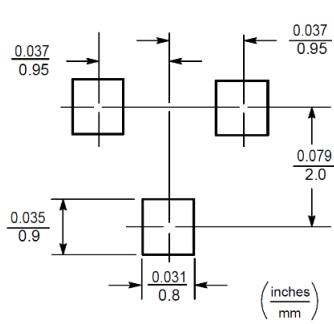
Marking: 702K

SOT-23



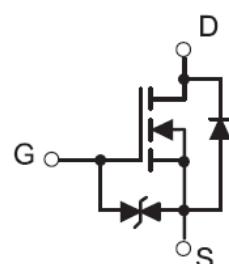
Symbol	Value (mm)		
	Min.	Typ.	Max.
A	1.0		1.4
A1			0.10
b	0.35		0.50
c	0.10		0.20
D	2.70	2.90	3.10
E	1.40		1.60
E1	2.40		2.80
e		1.9	
L	0.10		0.30
L1	0.40		
θ	0°		10°

Recommend Pad Layout
(Tol.: +/-0.05mm)



1. Gate
2. Source
3. Drain

Equivalent Circuit Diagram



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60V N-CHANNEL ENHANCEMENT MODE MOSFET

V (BR)DSS	R DS(on) Typical	I D MAX
60V	0.9Ω@10V	500mA
	1.1Ω@4.5V	500mA

MECHANICAL DATA

V(BR)DSS	Terminals	Polarity	Mounting Position	Weight per piece
JEDEC SOT-23 molded plastic body	Matte tin plated	Polarity symbol marking on case	Any	0.00019 Ounce, 0.00591 grams

MAX. RATINGS AT Ta=25 °C (unless otherwise specified)

Parameter	SYMBOL S	VALUE	UNITS
		LIMIT	
Drain-Source Voltage	V DS	60	V
Gate-Source Voltage	V GS	+/-20	V
Continuous Drain Current	I D	0.6	A
Power Dissipation	P D	0.3	W
Thermal Resistance from Junction to Ambient	R QJA	400	°C/W
Junction Temperature	T J	+ 150	°C
Storage Temperature Range	T STG	-50 ~ +150	°C

SMD PLASTIC-ENCAPSULATE MOSFETS SOT-23 SERIES

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

Parameter	SYMBOLS	VALUE			UNIT	Condition
		Min.	Typ.	Max.		
Drain-Source Breakdown Voltage	$V_{(BR) DSS}$	60			V	$V_{GS}=0V, I_D=250\mu\text{A}$
Zero Gate Voltage Drain Current($TA=25^{\circ}\text{C}$)	I_{DSS}			1	μA	$V_{DS}=60\text{V}, V_{GS}=0\text{V}$
Zero Gate Voltage Drain Current($TA=125^{\circ}\text{C}$)	I_{DSS}			100	μA	$V_{DS}=50\text{V}, V_{GS}=0\text{V}$
Gate-Body Leakage Current	I_{GSS}			+/-10	μA	$V_{GS}=\pm 20\text{V}, V_{DS}=0\text{V}$
Gate Threshold Voltage	$V_{GS(\text{TH})}$	1.0	1.6	2.5	V	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$
Drain-Source On-State Resistance ②	$R_{DS(\text{ON})}$		0.9	2	Ω	$V_{GS}=10\text{V}, I_D=0.5\text{A}$
			1.4	3	Ω	$V_{GS}=4.5\text{V}, I_D=0.3\text{A}$

DYNAMIC ELECTRICAL CHARACTERISTICS

Parameter	SYMBOLS	VALUE			UNIT	Condition
		Min.	Typ.	Max.		
Input Capacitance	C_{iss}		23.8		pF	$V_{DS}=30\text{V}$ $V_{GS}=0\text{V}$ $f=1\text{MHz}$
Output Capacitance	C_{oss}		3.9			
Reverse Transfer Capacitance	C_{rss}		1.5			
Total Gate Charge	Q_g		0.93			
Gate Source Charge	Q_{gs}		0.18		nC	$V_{DS}=30\text{V}$ $I_D=0.5\text{A}$ $V_{DS}=10\text{V}$
Gate Drain Charge	Q_{gd}		0.31			

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SWITCHING CHARACTERISTICS

Parameter	SYMBOLS	VALUE			UNIT	Condition
		Min.	Typ.	Max.		
Turn on Delay Time	$t_{d(on)}$		6		ns	$V_{DD}=30V$ $I_D=0.3A$ $R_G = 3.3\Omega$ $V_{GS} = 10 V$
Turn on Rise Time	t_r		3.5			
Turn Off Delay Time	$t_{d(off)}$		20			
Turn Off Fall Time	t_f		5.9			

SOURCE DRAIN DIODE CHARACTERISTIC

Parameter	SYMBOLS	VALUE			UNIT	Condition
		Min.	Typ.	Max.		
Source drain current(Body Diode)	I_{SD}			0.2	A	$V_{GS}=0V$ $I_D=250\mu A$
Forward on voltage②	V_{SD}		0.78	1.2	V	$V_{DS}=60V$, $V_{GS}=0V$

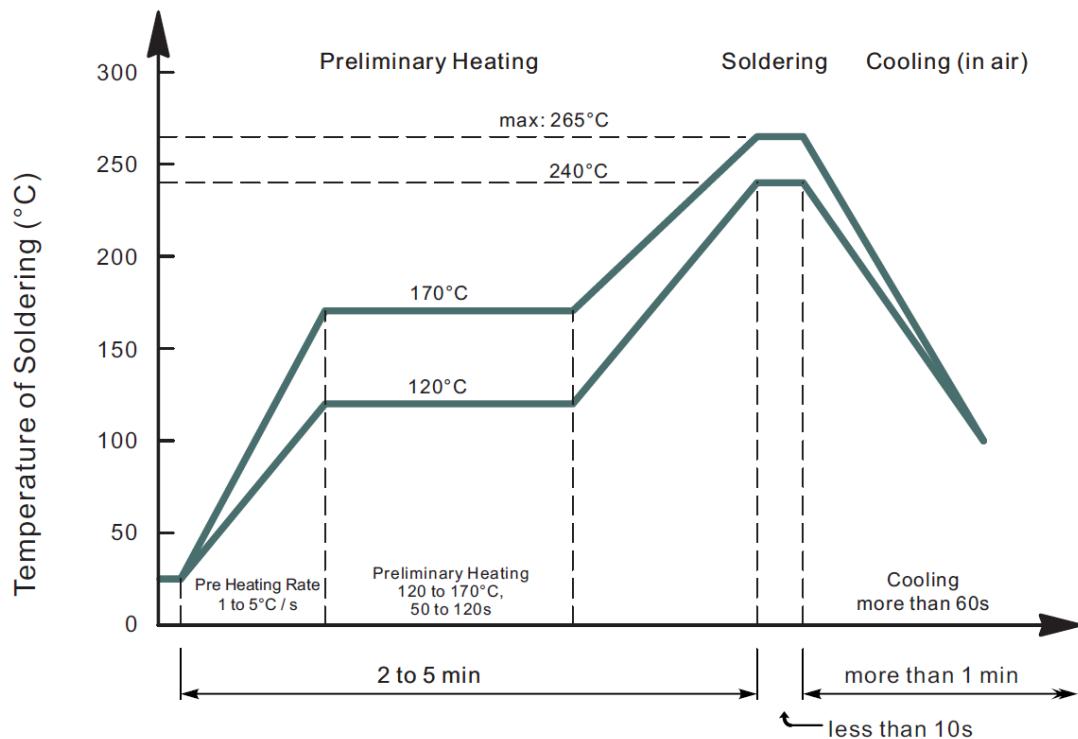
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RELIABILITY

Number	Experiment Items	Experiment Method And Conditions	Reference Documents
1	Solder Resistance Test	Test 260°C± 5°C for 10 ± 2 sec. Immerse body into solder 1/16" ± 1/32"	MIL-STD-750D METHOD-2031.2
2	Solderability Test	230°C ±5°C for 5 sec.	MIL-STD-750D METHOD-2026.1 0
3	Pull Test	1 kg in axial lead direction for 10 sec.	MIL-STD-750D METHOD-2036.4
4	Bend Test	0.5Kg Weight Applied To Each Lead, Bending Arcs 90 °C ± 5 °C For 3 Times	MIL-STD-750D METHOD-2036.4
5	High Temperature Reverse Bias Test	TA=100°C for 1000 Hours at VR=80% Rated VR	MIL-STD-750D METHOD-1038.4
6	Forward Operation Life Test	TA=25°C Rated Average Rectified Current	MIL-STD-750D METHOD-1027.3
7	Intermittent Operation Life Test	On state: 5 min with rated IRMS Power Off state: 5 min with Cool Forced Air. On and off for 1000 cycles.	MIL-STD-750D METHOD-1036.3
8	Pressure Cooker Test	15 PSIG, TA=121°C, 4 hours	MIL-S-19500 APPENDIX C
9	Temperature Cycling Test	-55°C~+125°C; 30 Minutes For Dwelled Time 5 minutes for transferred time. Total: 10 cycles.	MIL-STD-750D METHOD-1051.7
10	Thermal Shock Test	0°C for 5 minutes., 100°C for 5minutes, Total: 10 cycles	MIL-STD-750D METHOD-1056.7
11	Forward Surge Test	8.3ms Single Sale Sine-wave One Surge.	MIL-STD-750D METHOD-4066.4
12	Humidity Test	TA=65°C, RH=98% for 1000 hours.	MIL-STD-750D METHOD-1021.3
13	High Temperature Storage life Test	150°C for 1000 Hours	MIL-STD-750D METHOD-1031.5

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SUGGESTED REFLOW PROFILE (For Reference Only)



- Recommended peak temperature is over 245°C, If peak temperature is below 245 °C, you may adjust the following parameters; time length of peak temperature (longer), time length of soldering (longer), thickness of solder paste (thicker)
- Welding shall not exceed 2 times
- Remark: lead free solder paste (96.5 sn/3.0 Ag/0.5Cu)

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RATINGS AND CHARACTERISTIC CURVES (For Reference Only)

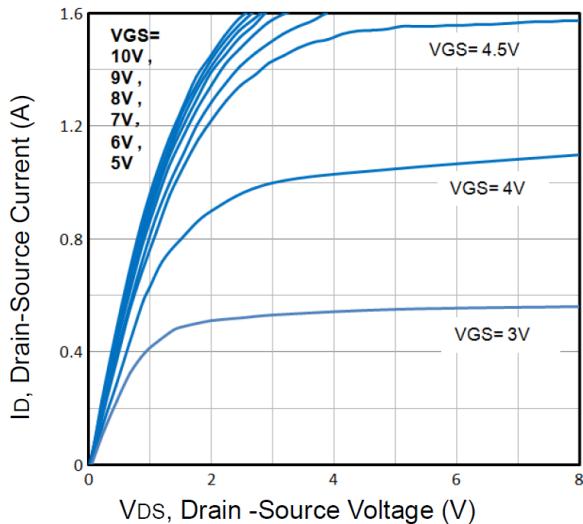


Fig1. Typical Output Characteristics

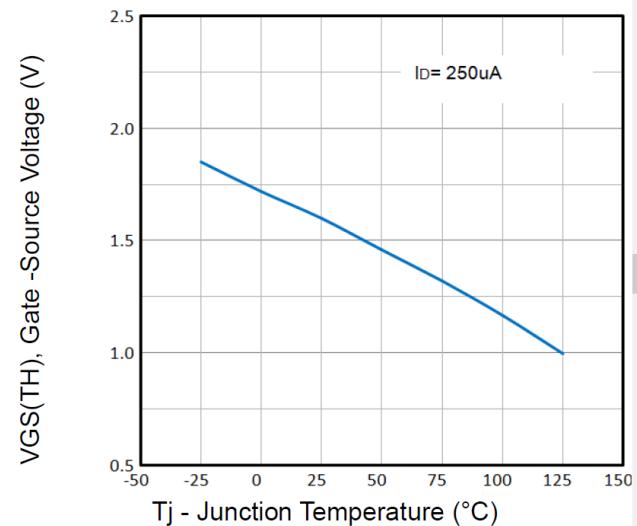


Fig2. Normalized Threshold Voltage Vs. Temperature

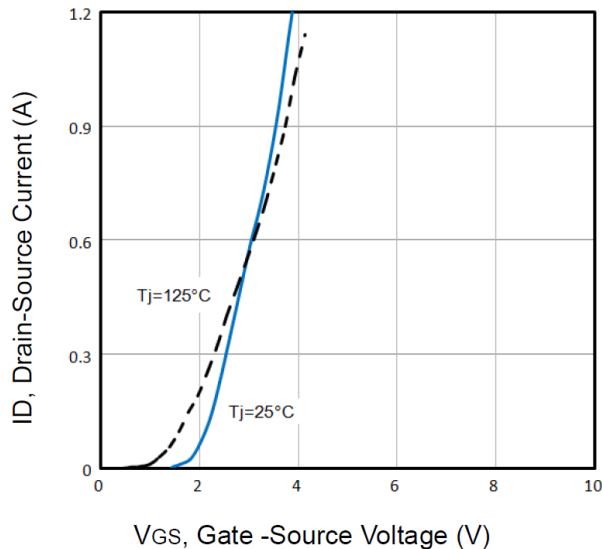


Fig3. Typical Transfer Characteristics

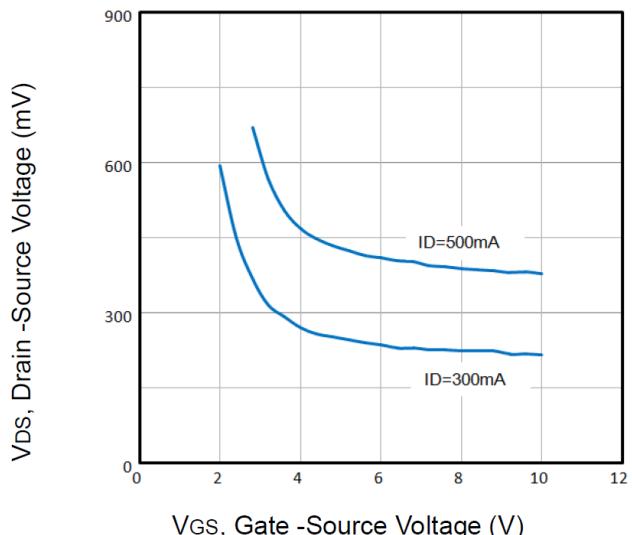


Fig4. Drain -Source Voltage vs Gate -Source Voltage

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RATINGS AND CHARACTERISTIC CURVES (For Reference Only)

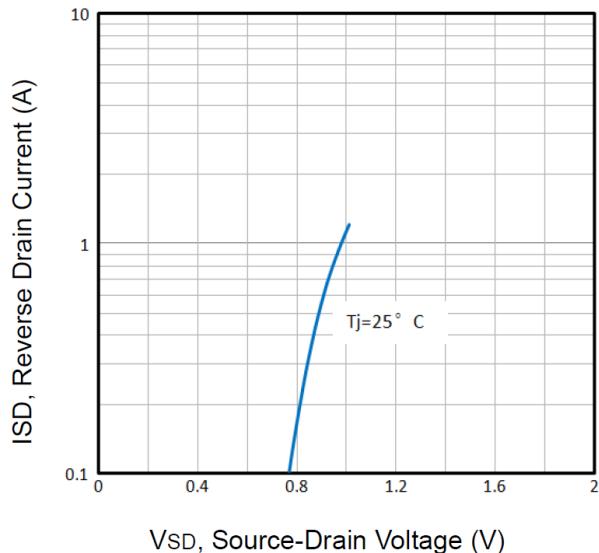


Fig5. Typical Source-Drain Diode Forward Voltage

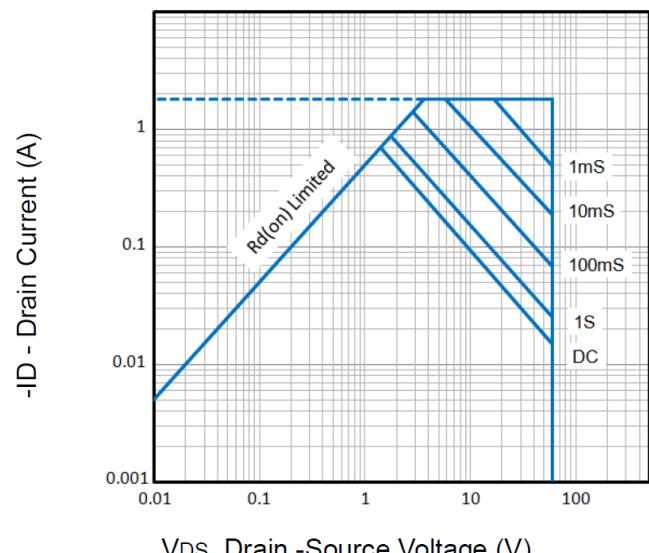


Fig6. Maximum Safe Operating Area

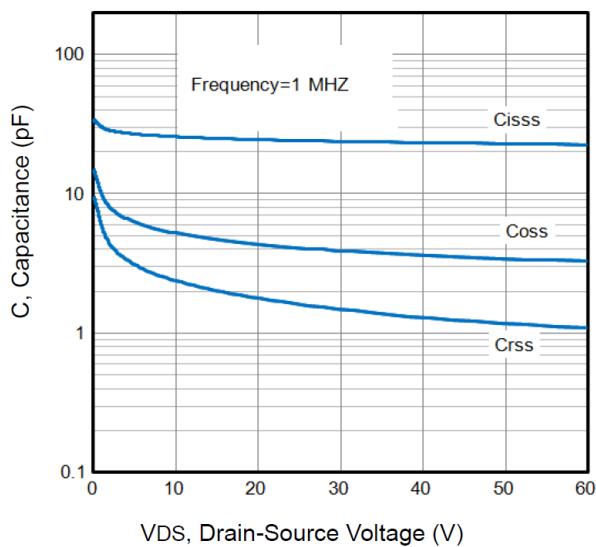


Fig7. Typical Capacitance Vs. Drain-Source Voltage

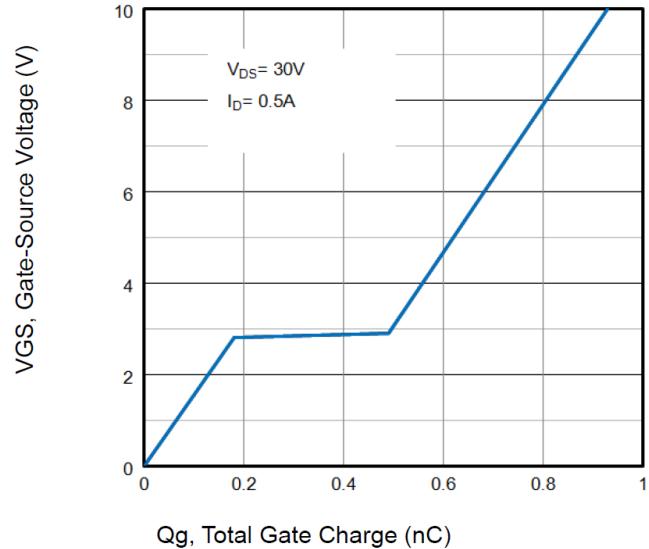


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

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RATINGS AND CHARACTERISTIC CURVES (For Reference Only)

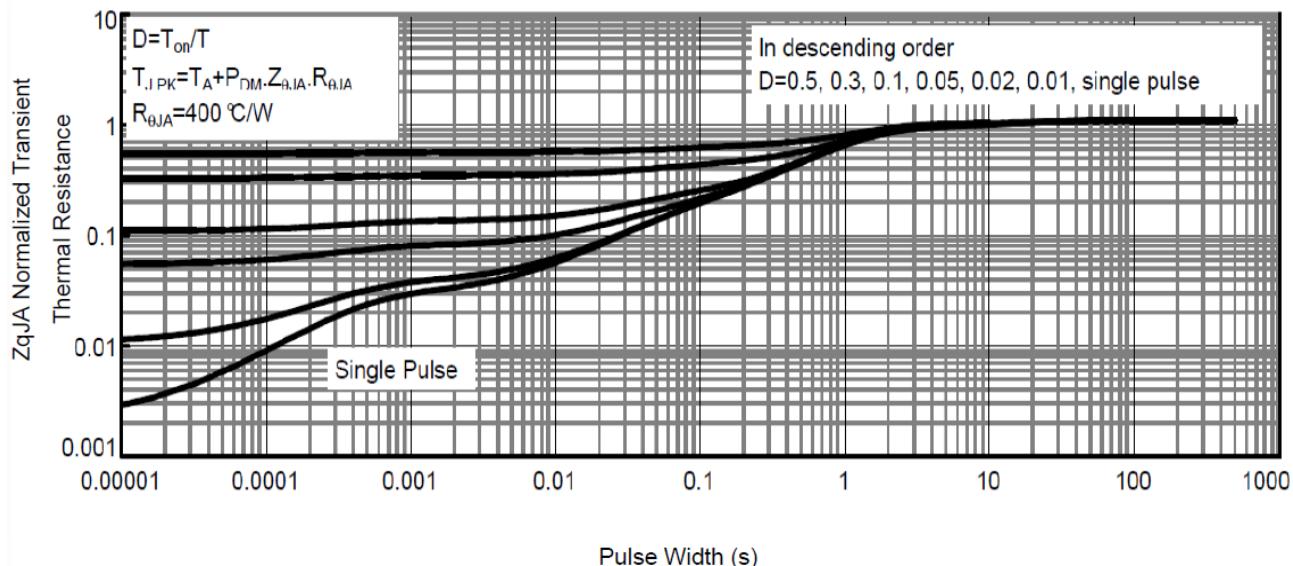


Fig9. Normalized Maximum Transient Thermal Impedance

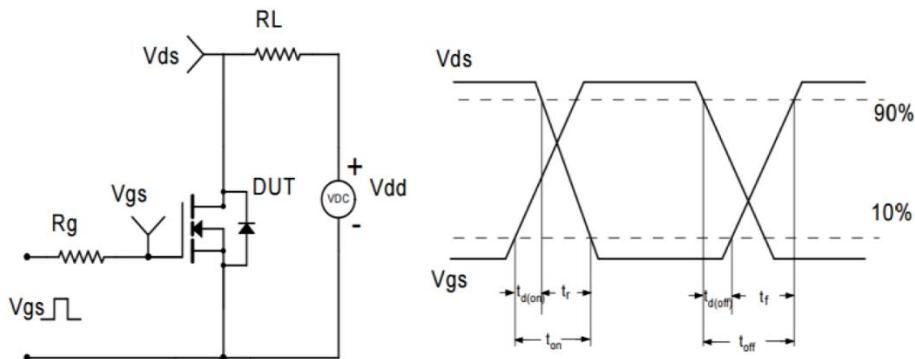
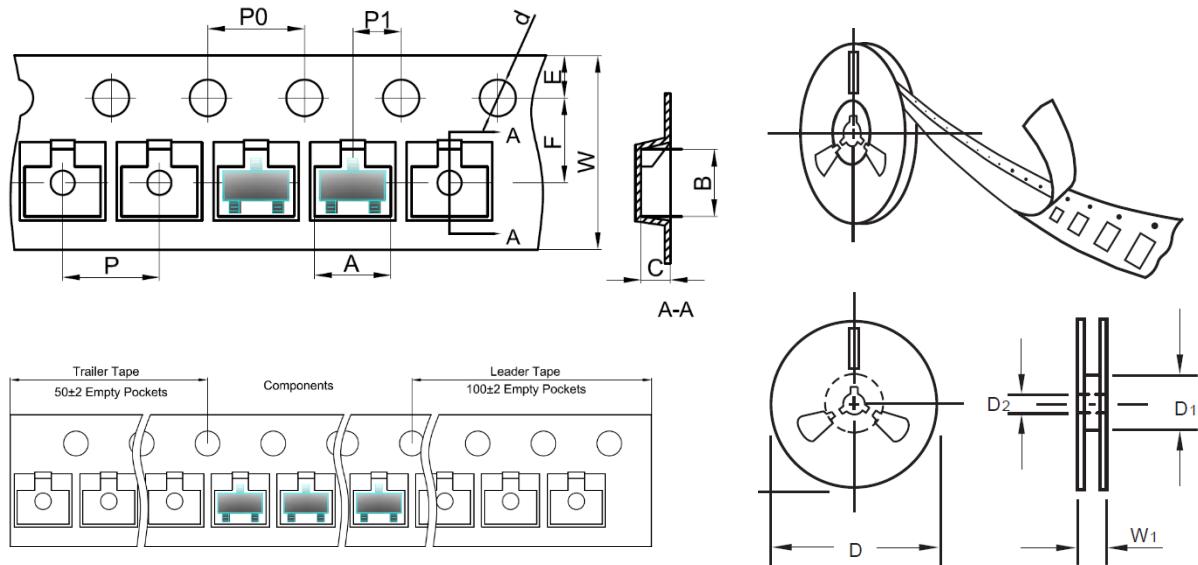


Fig10. Switching Time Test Circuit and waveforms

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TAPE/REEL (Unit: mm)

All Devices are packed in accordance with EIA standard RS-481-A and specifications.

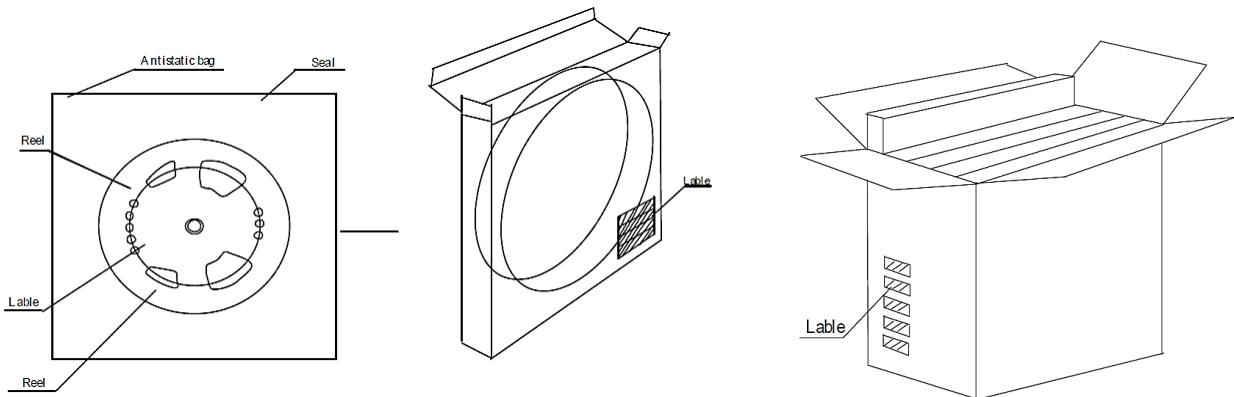


Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	3.15
Carrier Length	B	0.1	2.77
Carrier Depth	C	0.1	1.22
Sprocket hole	d	0.05	1.55
7"Reel outside diameter	D	2.0	178.00
7"Reel inner diameter	D1	Min.	54.4
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch 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	0.1	0.25
Tape width	W	0.3	8.00
Reel width	W1	1.0	19.50

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PACKAGE

Case Code	Reel Size	MPQ (pcs)	Component Spacing (mm)	Qty. Per Box (pcs)	Inner Box L*W*H (mm)	Reel Size (mm)	Carton size L*W*H (mm)	Qty. Per Carton (pcs)	G. W (kg)
SOT-23	7"	3,000		45,000	212*207*207	178	430*430*230	180,000	6.5



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