



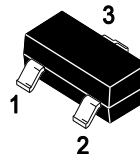
# PJM2302NSA

## N- Enhancement Mode Field Effect Transistor

### DESCRIPTION

The PJM2302NSA uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

SOT-23



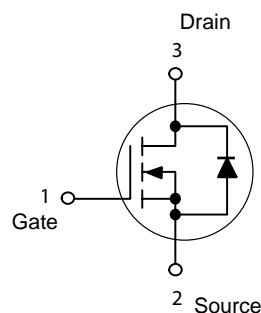
### FEATURES

- ◆  $V_{DS} = 20V, I_D = 3.3A$   
 $R_{DS(ON)} < 60m\Omega @ V_{GS}=2.5V$   
 $R_{DS(ON)} < 45m\Omega @ V_{GS}=4.5V$
- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

### APPLICATIONS

- ◆ Battery protection
- ◆ Load switch
- ◆ Power management

### Schematic diagram



### ABSOLUTE MAXIMUM RATINGS

$T_A=25^\circ C$  unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Drain Current-Continuous	$I_D$	3.3	A
Drain Current-Pulsed (Note 1)	$I_{DM}$	16	A
Maximum Power Dissipation	$P_D$	0.9	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

### THERMAL CHARACTERISTIC

Parameter	Symbol	Limit	Unit
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	139	$^\circ C/W$



**ELECTRICAL CHARACTERISTICS**

T<sub>A</sub>=25°C unless otherwise noted

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	20	22	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.5	0.75	1.2	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =2.5V, I <sub>D</sub> =2.8A	-	35	60	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =3A	-	29	45	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =3A	-	8	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, F=1.0MHz	-	260	-	PF
Output Capacitance	C <sub>OSS</sub>		-	48	-	PF
Reverse Transfer Capacitance	C <sub>RSS</sub>		-	27	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =10V, R <sub>L</sub> =3.3Ω V <sub>GS</sub> =4.5V, R <sub>GEN</sub> =6Ω	-	2.5	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	3.2	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	21	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	3	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =3A, V <sub>GS</sub> =4.5V	-	2.9	5	nC
Gate-Source Charge	Q <sub>gs</sub>		-	0.4	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	0.6	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =3.3A	-	0.75	1.2	V
Diode Forward Current (Note 2)	I <sub>S</sub>		-	-	3.3	A

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production



TYPICAL CHARACTERISTICS CURVES

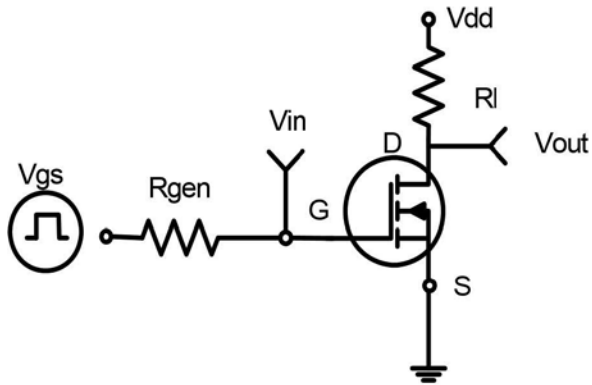


Figure 1: Switching Test Circuit

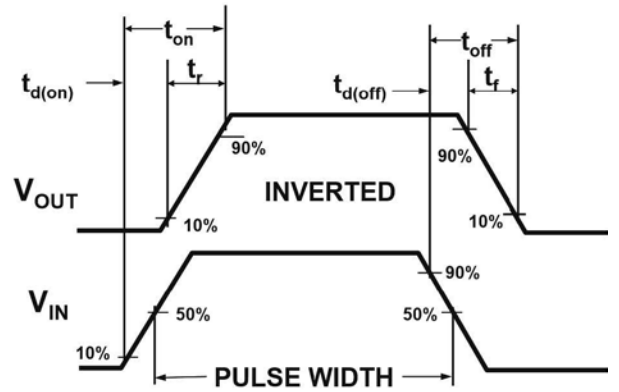


Figure 2: Switching Waveforms

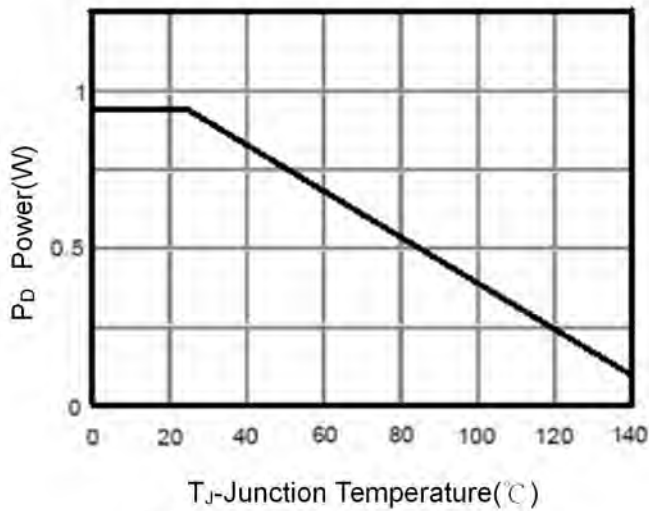


Figure 3 Power Dissipation

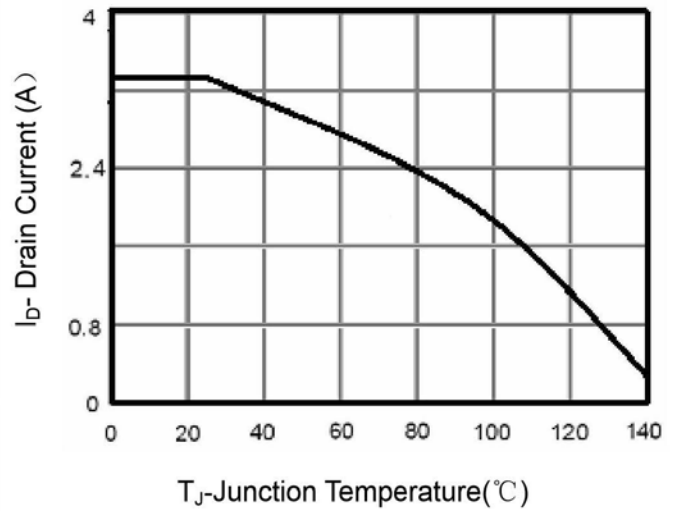


Figure 4 Drain Current

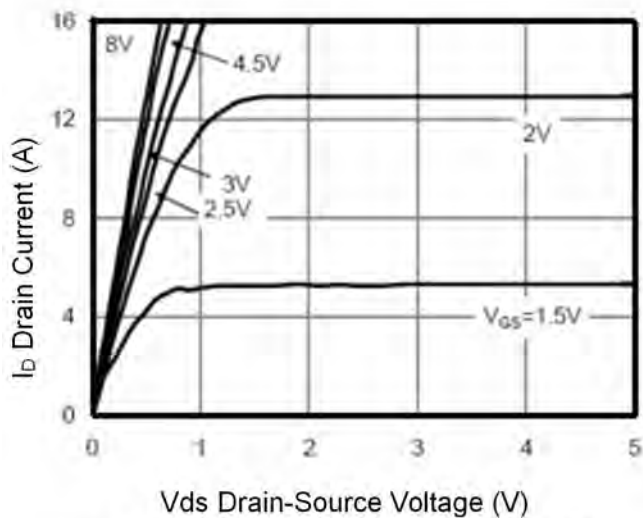


Figure 5 Output Characteristics

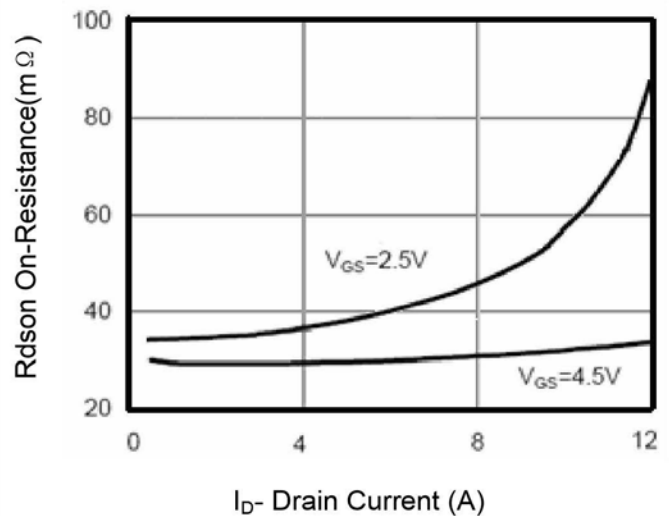


Figure 6 Drain-Source On-Resistance

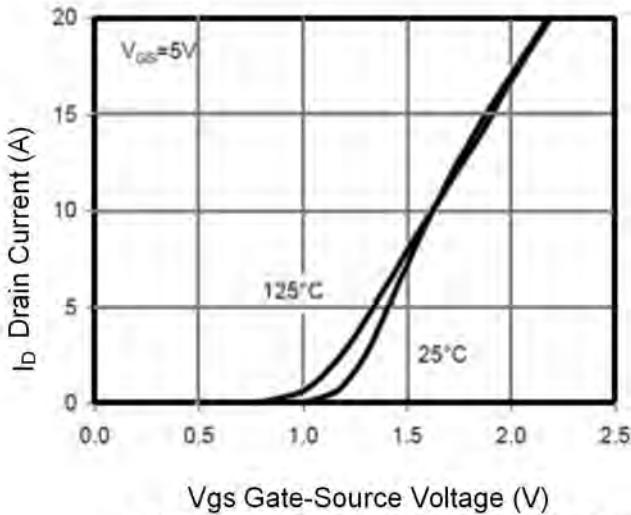


Figure 7 Transfer Characteristics

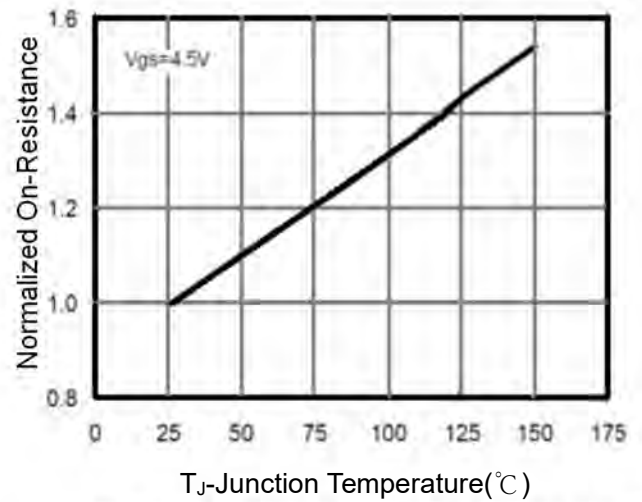


Figure 8 Drain-Source On-Resistance

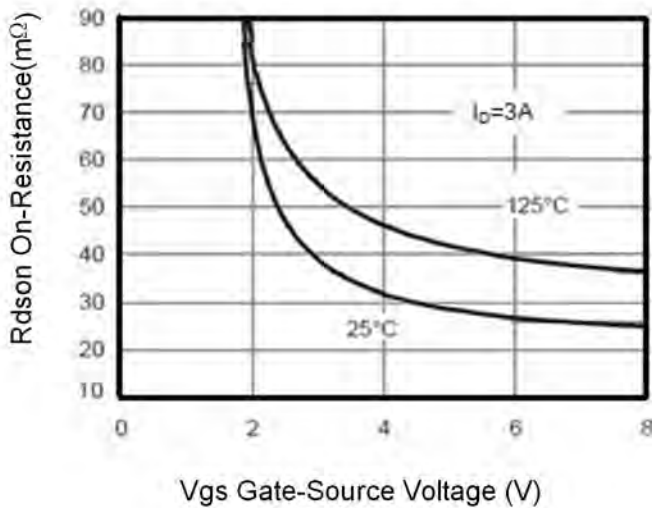


Figure 9  $R_{DS(on)}$  vs  $V_{GS}$

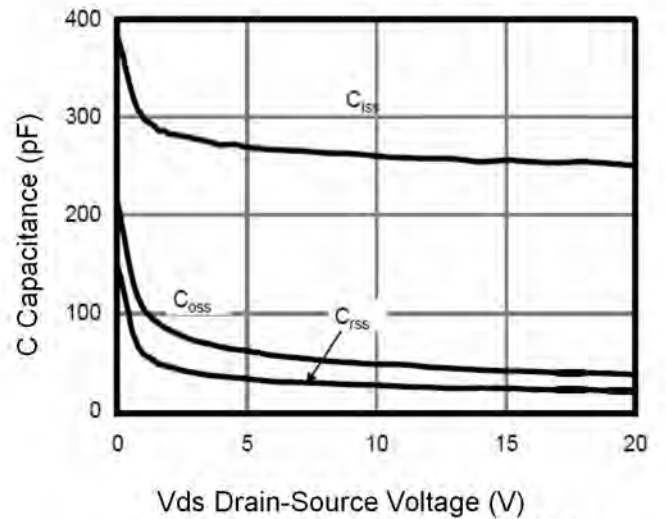


Figure 10 Capacitance vs  $V_{DS}$

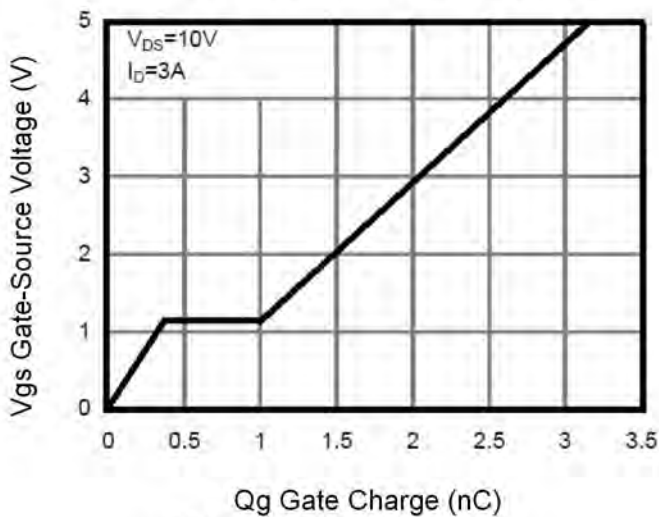


Figure 11 Gate Charge

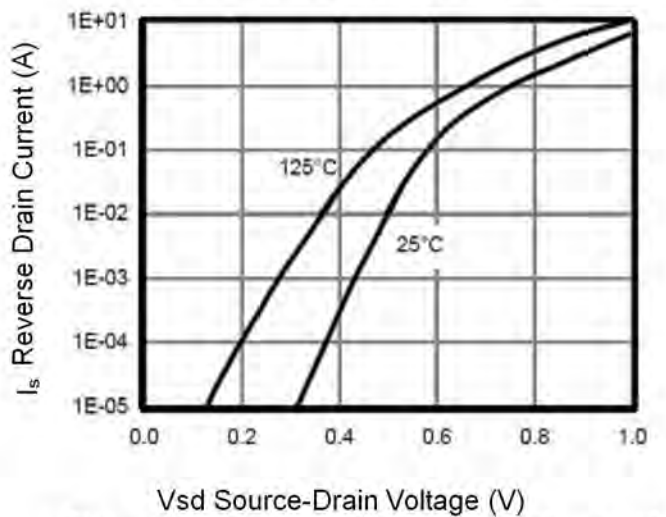


Figure 12 Source- Drain Diode Forward

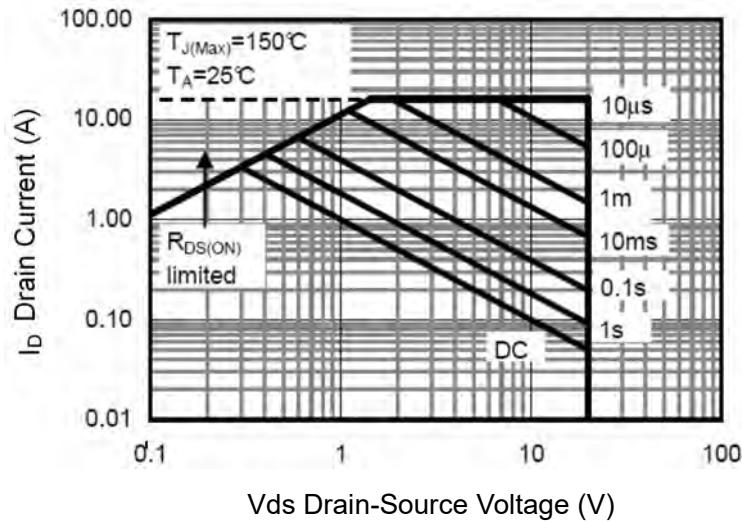


Figure 13 Safe Operation Area

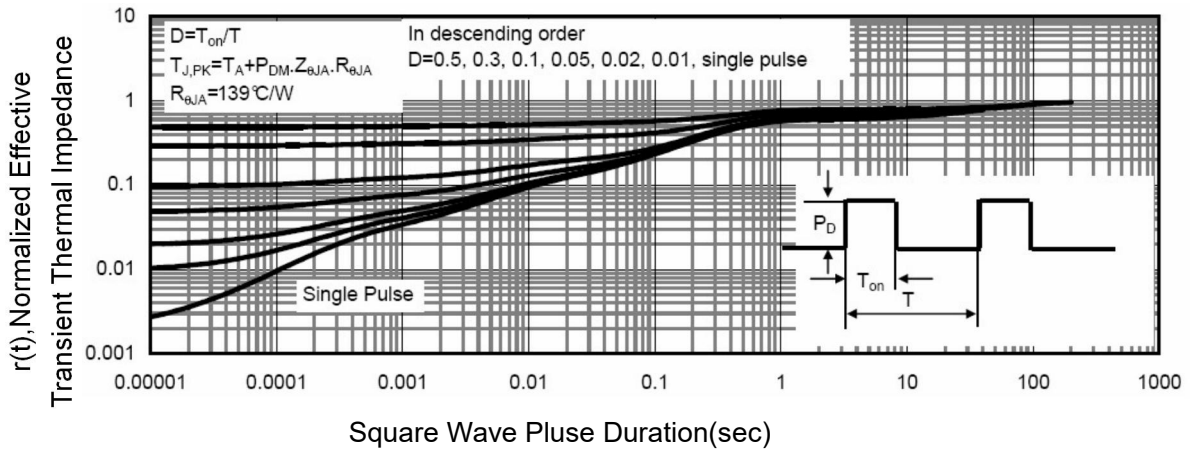
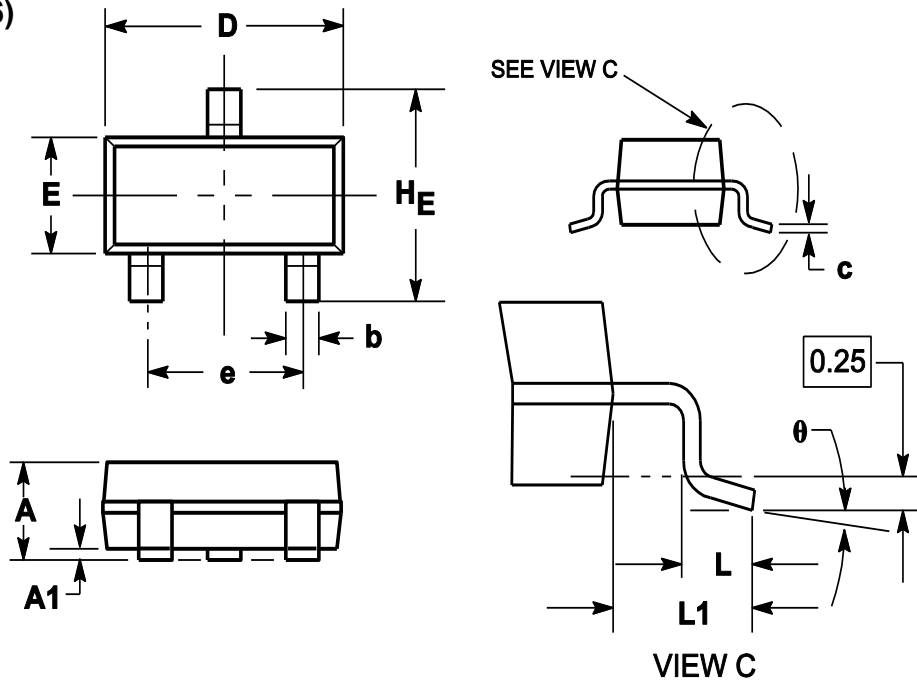


Figure 14 Normalized Maximum Transient Thermal Impedance

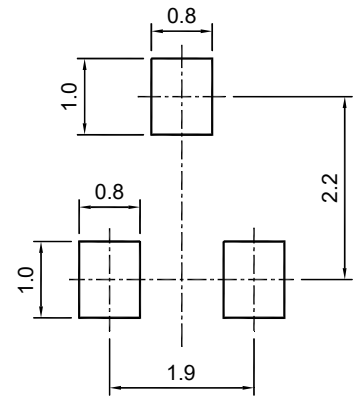


**PACKAGE OUTLINE**

**SOT-23 (TO-236)**



Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	0.900	1.025	1.150
A1	0.000	0.050	0.100
b	0.300	0.400	0.500
c	0.080	0.115	0.150
D	2.800	2.900	3.000
E	1.200	1.300	1.400
HE	2.250	2.400	2.550
e	1.800	1.900	2.000
L1	0.550REF		
L	0.300		0.500
θ	0°		8°

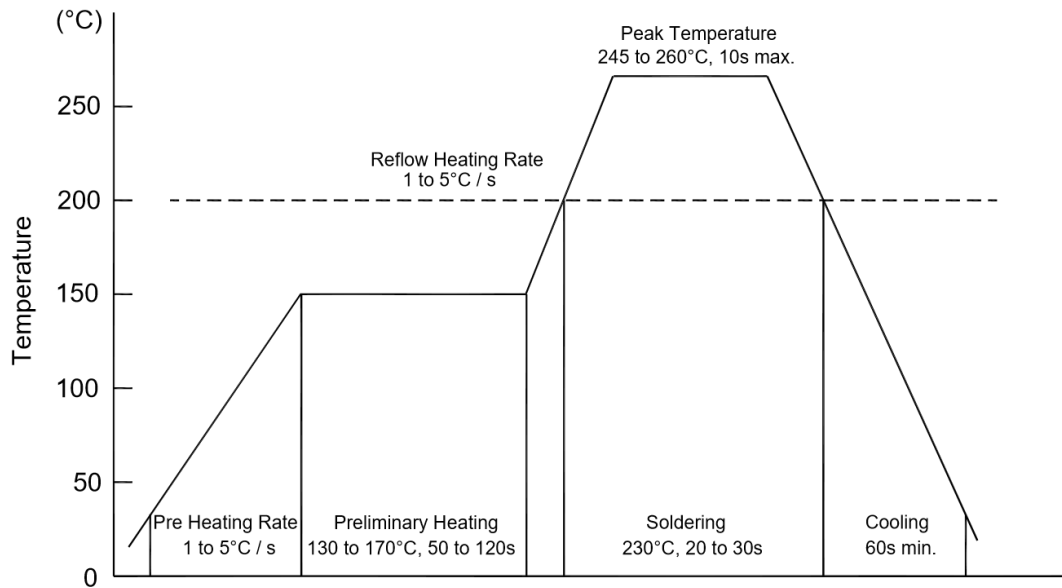


SOT-23 (TO-236)

**Recommended soldering pad**

**ORDERING INFORMATION**

Device	Package	Shipping
PJM2302NSA	SOT-23	3000/Reel&Tape(7inch)

**CONDITIONS OF SOLDERING AND STORAGE****◆ Recommended condition of reflow soldering**

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)

**◆ Conditions of hand soldering**

- Temperature: 370 °C
- Time: 3s max.
- Times: one time

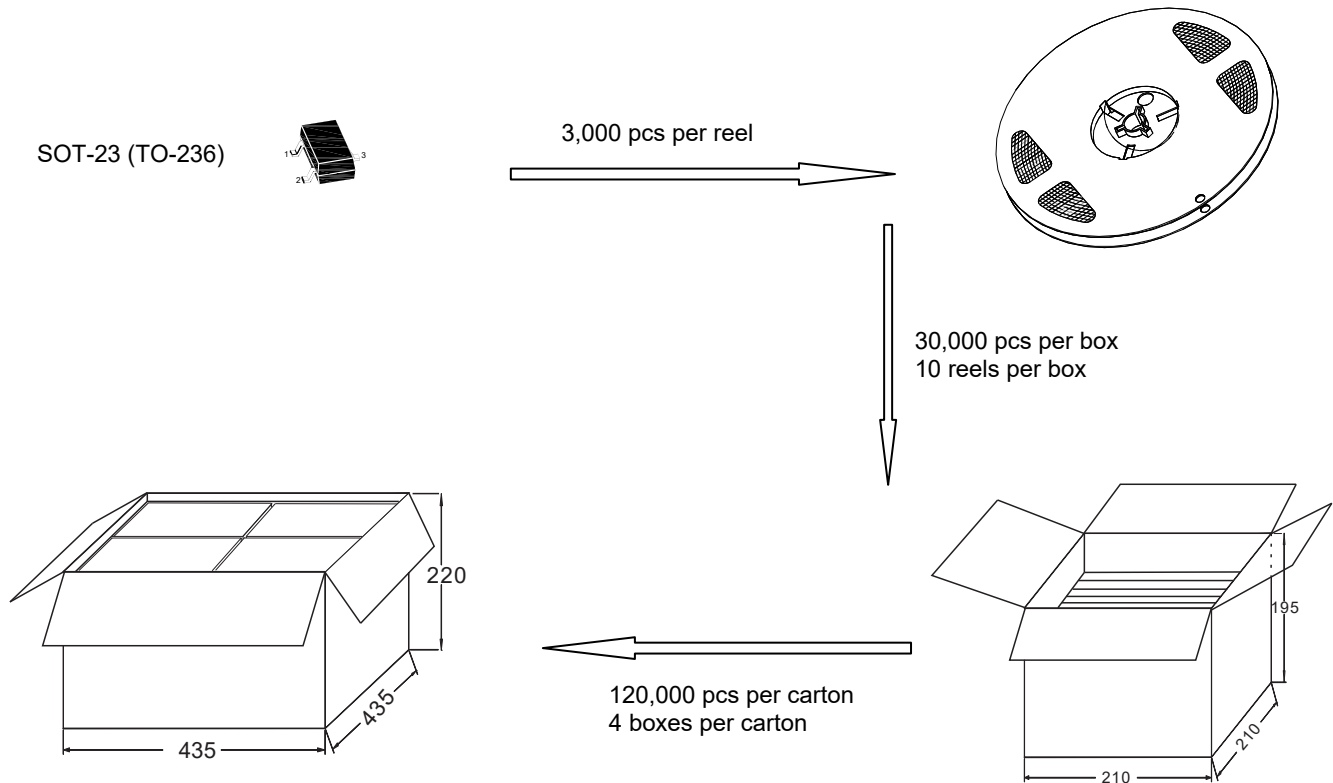
**◆ Storage conditions**

- **Temperature**  
5 to 40 °C
- **Humidity**  
30 to 80% RH
- **Recommended period**  
One year after manufacturing

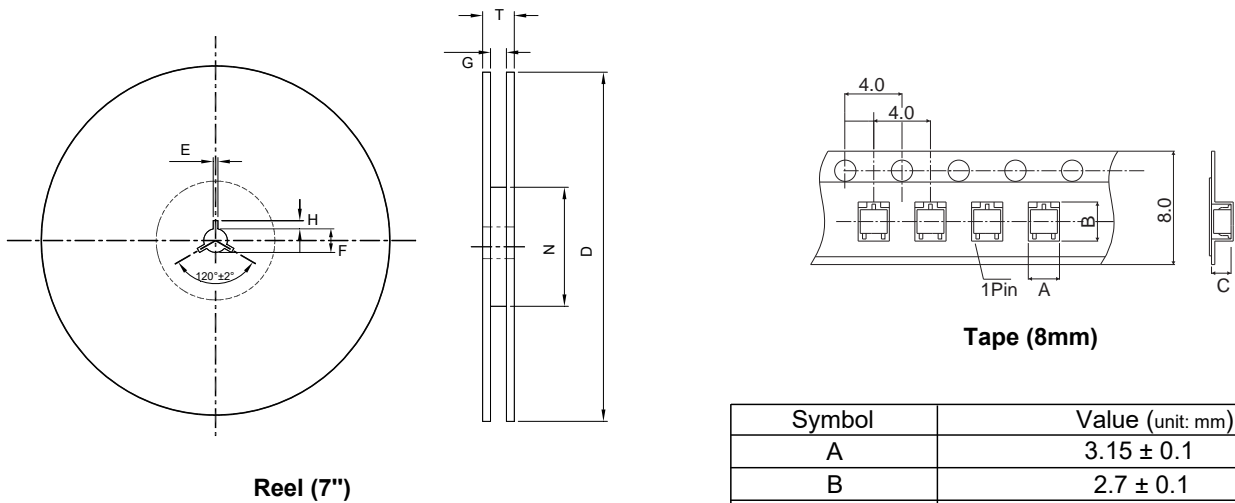


**PACKAGE SPECIFICATIONS**

◆ **The method of packaging**



◆ **Embossed tape and reel data**



Symbol	Value (unit: mm)
A	3.15 ± 0.1
B	2.7 ± 0.1
C	1.25 ± 0.1
E	2 ± 0.5
F	13 ± 0.5
D	178 ± 2.0
G	8.4 ± 1.5
H	4 ± 0.5
N	60
T	< 14.9