



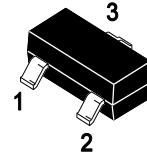
# PJM2301PSA

## P- Enhancement Mode Field Effect Transistor

### FEATURES

- ◆  $V_{DS} = -20V, I_D = -2.8A$   
 $R_{DS(ON)} = 110m\Omega$  (typ) @  $V_{GS} = -2.5V$   
 $R_{DS(ON)} = 90m\Omega$  (typ) @  $V_{GS} = -4.5V$
- ◆ High power and current handing capability
- ◆ Halogen free product is acquired
- ◆ Surface mount package

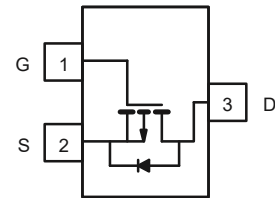
SOT-23 (TO-236)  
Top view



### 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	$V_{GS}$	$\pm 12$	
Continuous Drain Current ( $T_J = 150^\circ C$ )	$I_D$	$T_A = 25^\circ C$	- 2.8
		$T_A = 70^\circ C$	- 1.8
Pulsed Drain Current	$I_{DM}$	- 10	A
Continuous Source-Drain Diode Current <sup>(1,2)</sup>	$I_S$	- 0.72	
Maximum Power Dissipation <sup>(1,2)</sup>	$P_D$	$T_A = 25^\circ C$	0.86
		$T_A = 70^\circ C$	0.55
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	- 55 to 150	$^\circ C$

### THERMAL CHARACTERISTIC

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>(1,3)</sup>	$R_{\theta JA}$	120	145	$^\circ C/W$
Maximum Junction-to-Foot (Drain)	$R_{\theta JC}$	62	78	

Notes: 1.Surface Mounted on 1" x 1" FR4 board.

2.t = 5 s.

3.Maximum under Steady State conditions is 175  $^\circ C/W$ .



**ELECTRICAL CHARACTERISTICS**

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

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = - 250 μA	- 20			V
V <sub>DS</sub> Temperature Coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	I <sub>D</sub> = - 250 μA		- 18		mV/°C
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub> /T <sub>J</sub>			2.2		
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = - 250 μA	- 0.45		- 1	V
Gate-Source Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = - 20 V, V <sub>GS</sub> = 0 V			- 1	μA
		V <sub>DS</sub> = - 20 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C			- 10	
On-State Drain Current <sup>1)</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≤ - 5 V, V <sub>GS</sub> = - 4.5 V	- 6			A
Drain-Source On-State Resistance <sup>1)</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 2.8 A	0.070	0.090	0.110	Ω
		V <sub>GS</sub> = - 2.5 V, I <sub>D</sub> = - 2.0 A	0.080	0.110	0.140	
Forward Transconductance <sup>1)</sup>	g <sub>fs</sub>	V <sub>DS</sub> = - 5 V, I <sub>D</sub> = - 2.8 A		2.0		S
<b>Dynamic<sup>2)</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = - 10 V, V <sub>GS</sub> = 0 V, f = 1 MHz		405		pF
Output Capacitance	C <sub>oss</sub>			75		
Reverse Transfer Capacitance	C <sub>rss</sub>			55		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = - 10 V, V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 2.8 A		5.5	10	nC
				3.3	6	
Gate-Source Charge	Q <sub>gs</sub>	V <sub>DS</sub> = - 10 V, V <sub>GS</sub> = - 2.5 V, I <sub>D</sub> = - 2.8 A		0.7		
Gate-Drain Charge	Q <sub>gd</sub>			1.3		
Gate Resistance	R <sub>g</sub>	f = 1 MHz		6.0		Ω



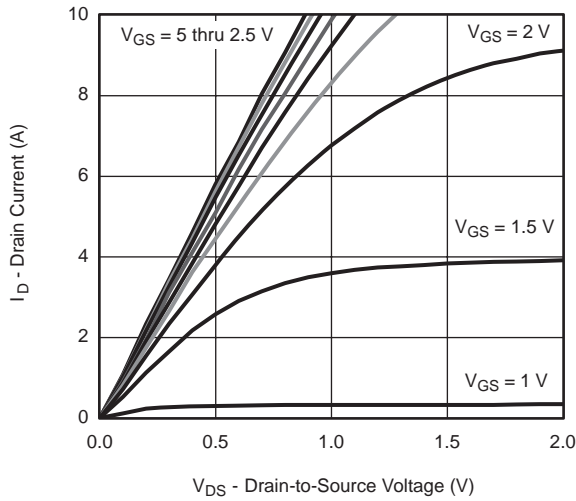
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 10\ \Omega, I_D = -1\text{ A},$ $V_{GEN} = -4.5\text{ V}, R_G = 1\ \Omega$		11	20	ns
Rise Time	$t_r$			35	60	
Turn-Off Delay Time	$t_{d(off)}$			30	50	
Fall Time	$t_f$			10	20	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$			- 1.3	A
Pulse Diode Forward Current <sup>1)</sup>	$I_{SM}$				- 10	
Body Diode Voltage	$V_{SD}$	$I_S = -1.0\text{ A}$	- 0.5		- 1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = -3.0\text{ A}, dI/dt = 100\text{ A}/\mu\text{s},$ $T_J = 25\text{ }^\circ\text{C}$		30	50	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			25	50	nC
Reverse Recovery Fall Time	$t_a$			15		ns
Reverse Recovery Rise Time	$t_b$			15		

Notes: 1.Pulse test; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .

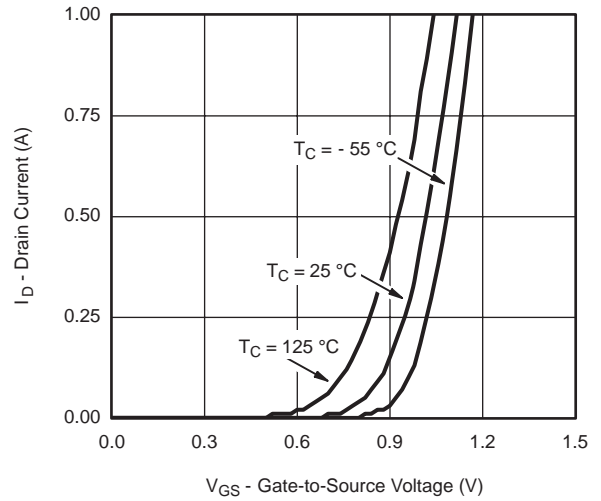
2.Guaranteed by design, not subject to production testing.



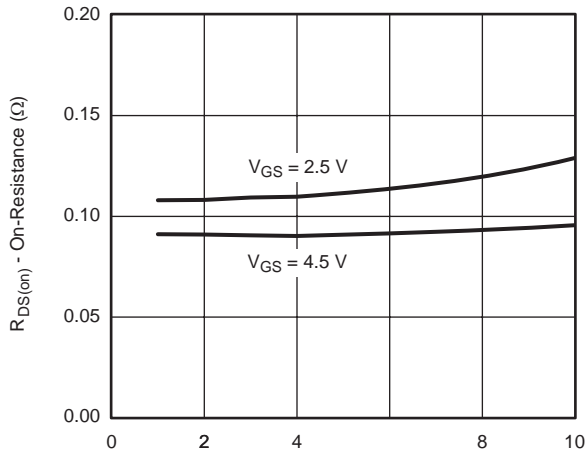
### TYPICAL CHARACTERISTICS CURVES



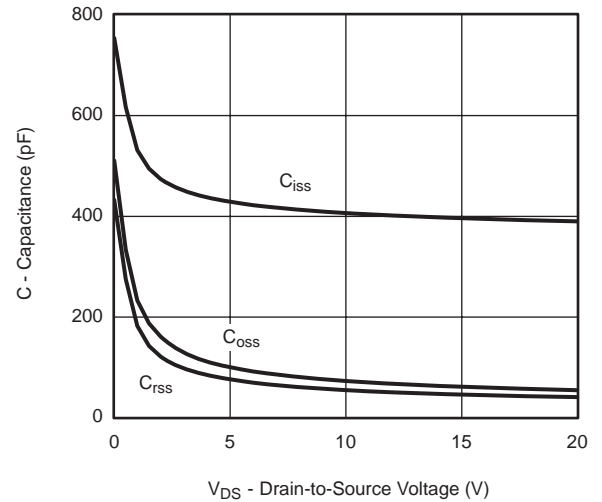
**Output Characteristics**



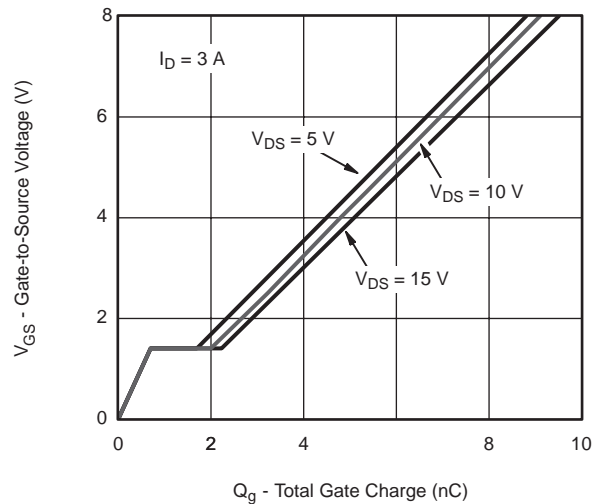
**Transfer Characteristics**



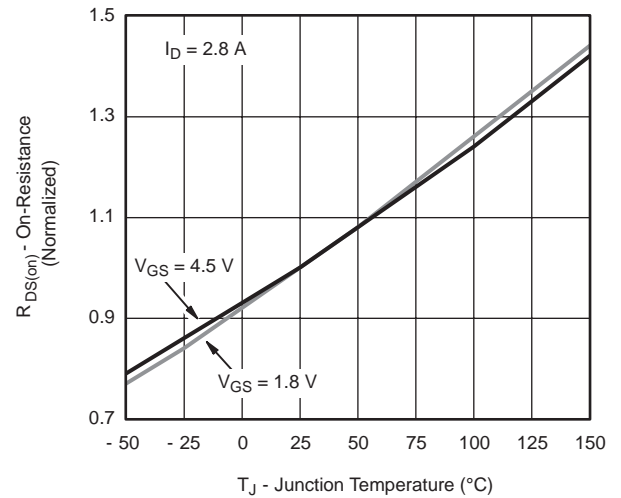
**On-Resistance vs. Drain Current and Gate Voltage**



**Capacitance**



**Gate Charge**

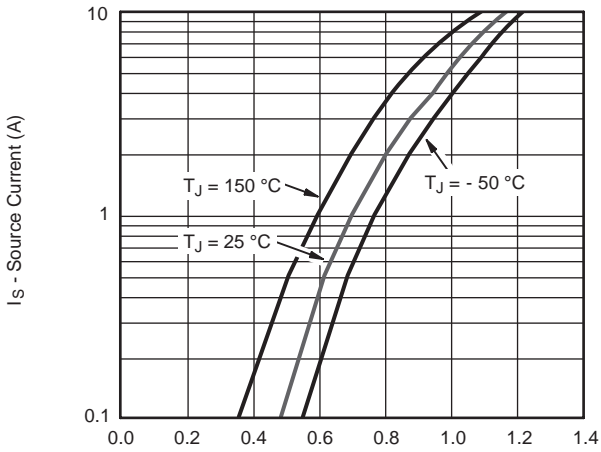


**On-Resistance vs. Junction Temperature**

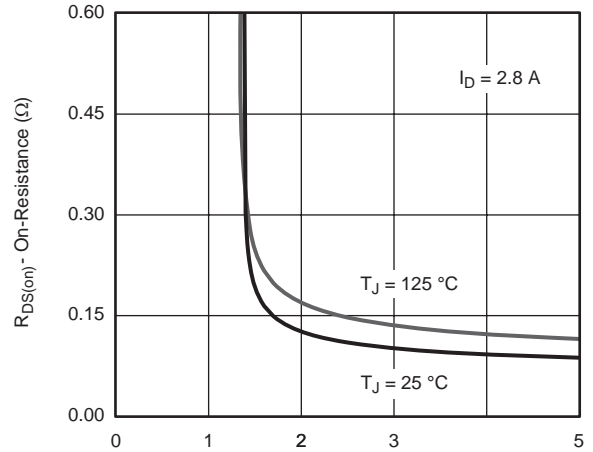


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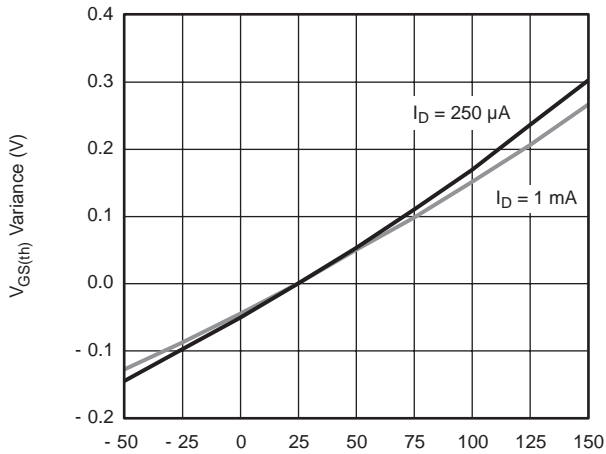
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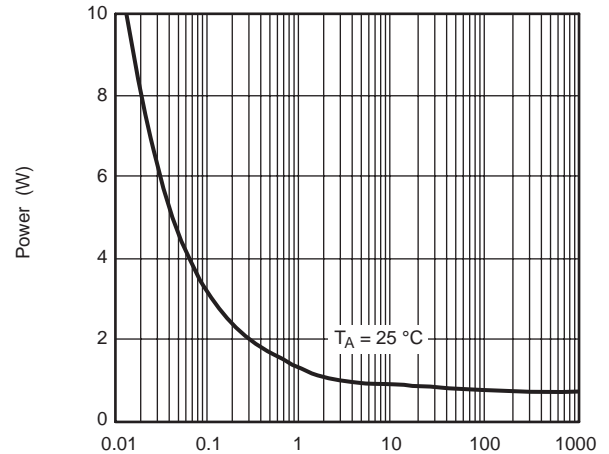
Source-Drain Diode Forward Voltage



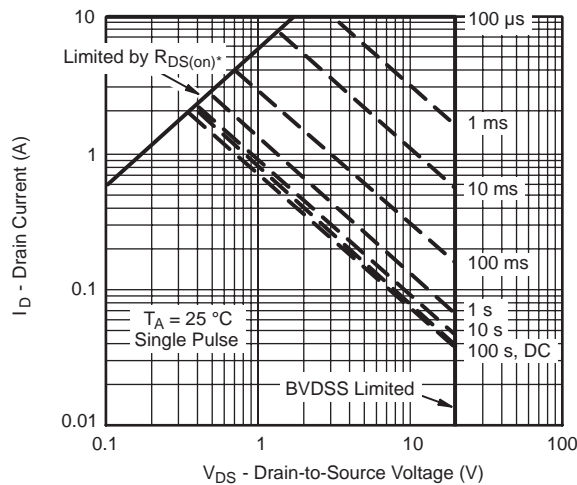
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power

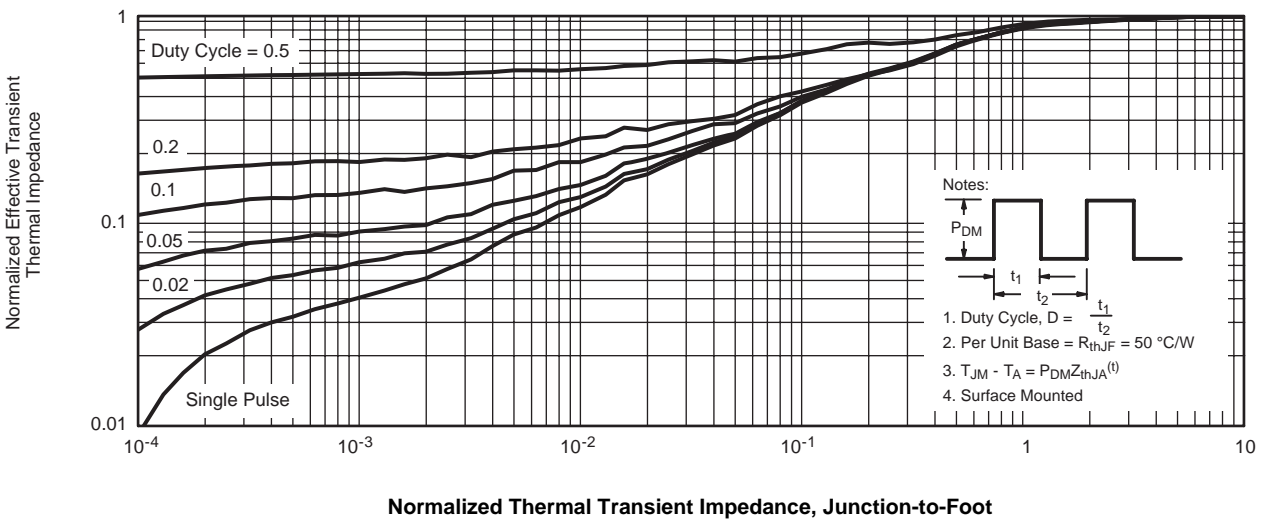
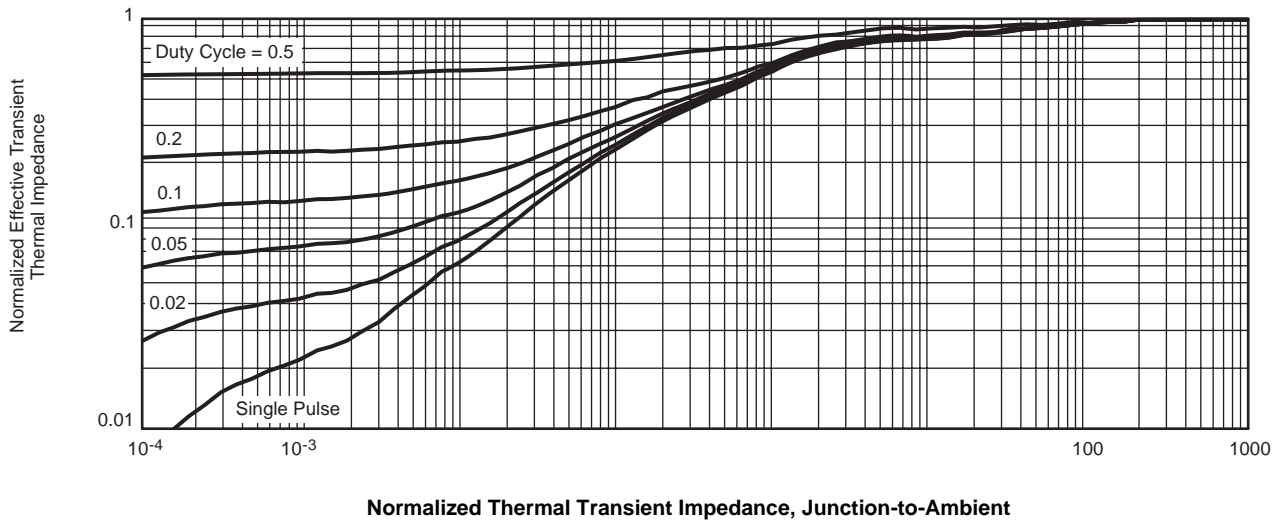


Safe Operating Area



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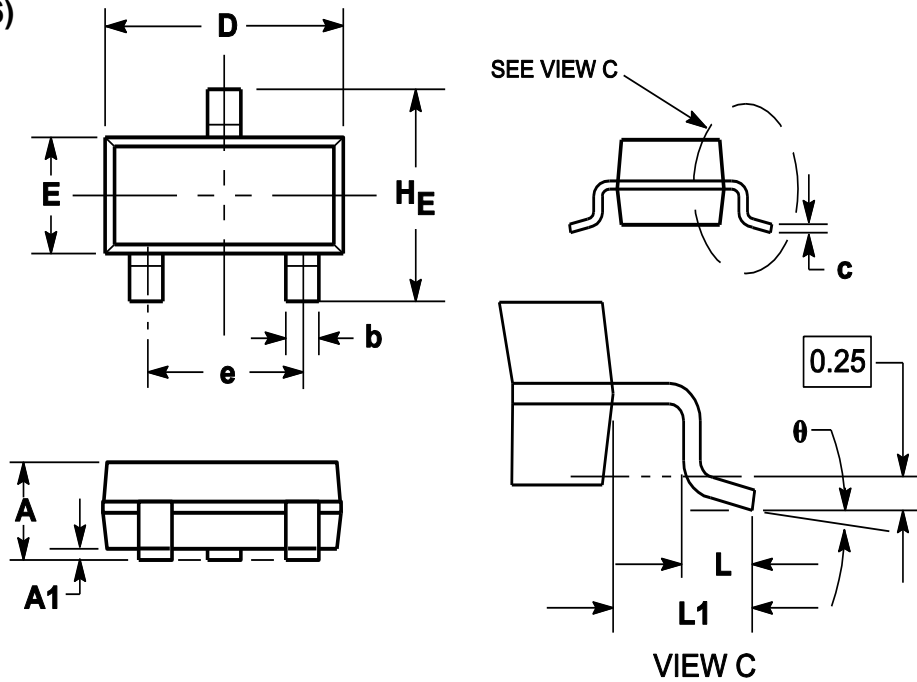
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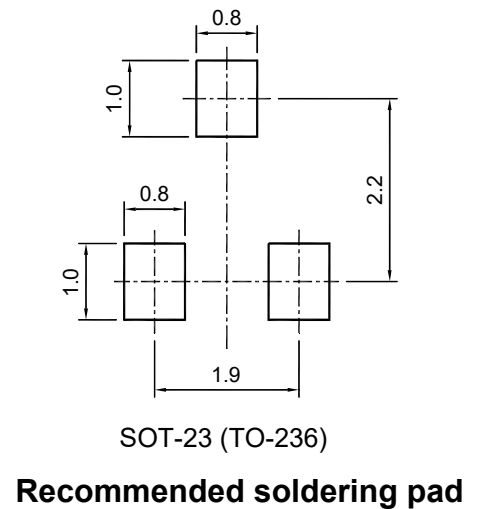


**PACKAGE OUTLINE**

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

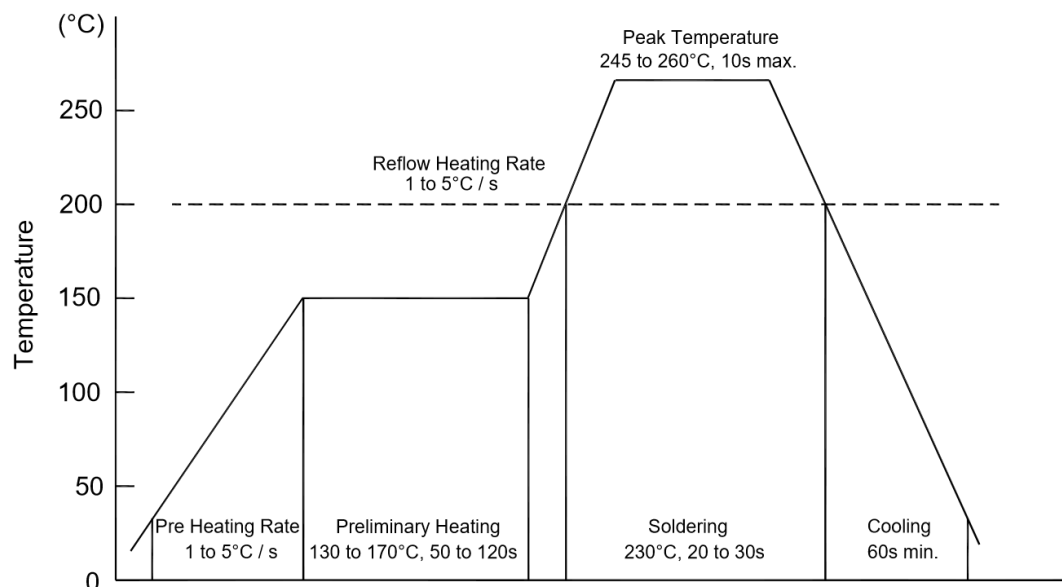


Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	0.900	1.025	1.150
A1	0.000	0.050	0.100
b	0.300	0.400	0.500
c	0.080	0.115	0.150
D	2.800	2.900	3.000
E	1.200	1.300	1.400
HE	2.250	2.400	2.550
e	1.800	1.900	2.000
L1	0.550REF		
L	0.300		0.500
θ	0°		8°



**ORDERING INFORMATION**

Device	Package	Shipping
PJM2301PSA	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**

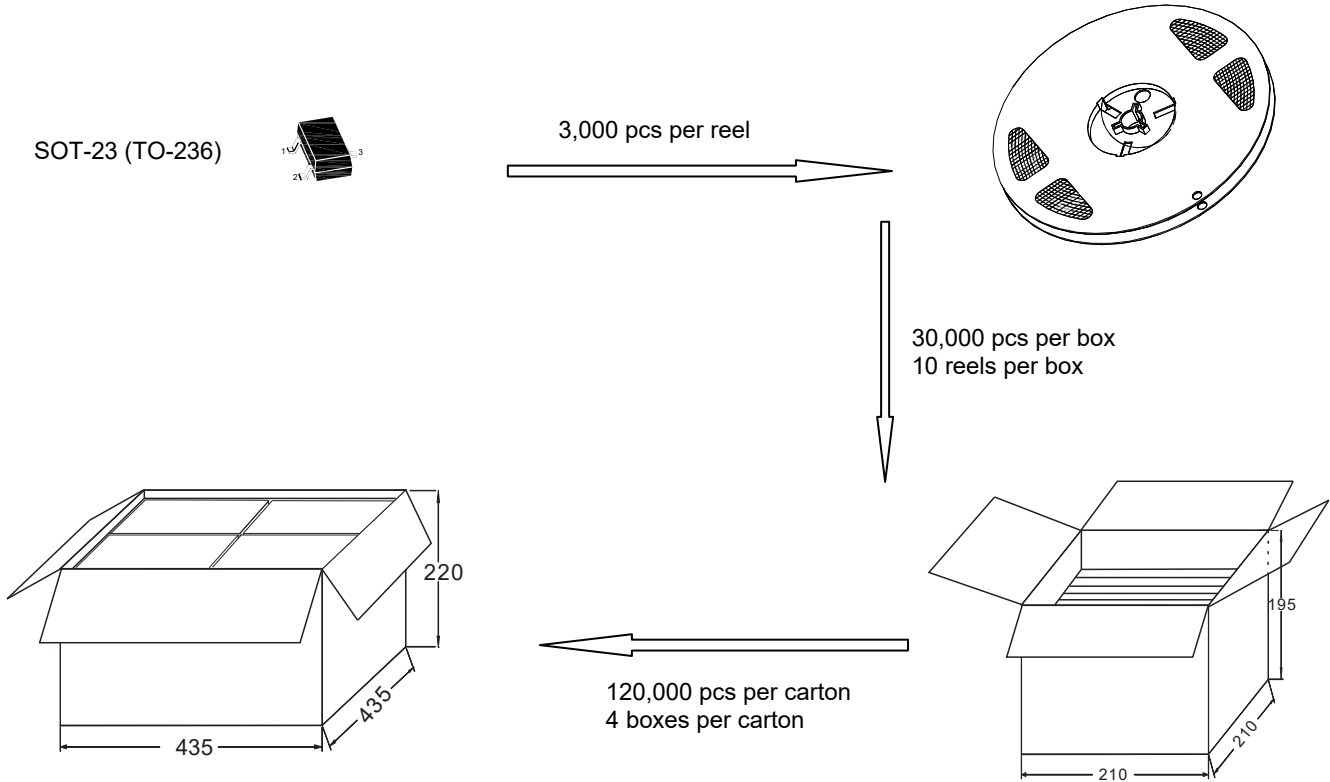
- **Temperature**  
5 to 40 °C
- **Humidity**  
30 to 80% RH
- **Recommended period**  
One year after manufacturing



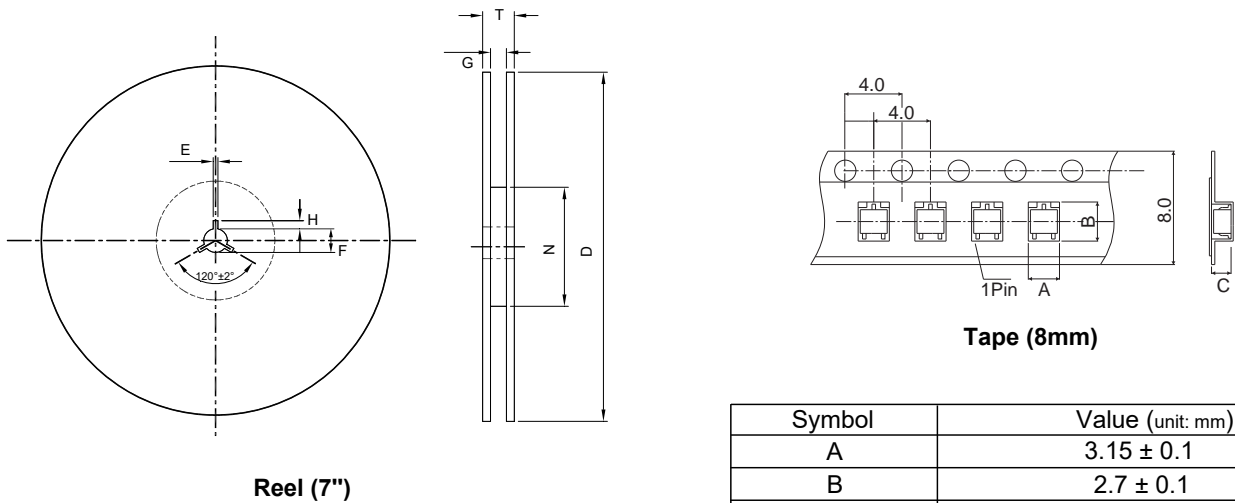


**PACKAGE SPECIFICATIONS**

◆ **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