

ATM2601PSG

P-Channel Enhancement Mode Power MOSFET

Drain-Source Voltage -20V

Continuous Drain Current -2.8A

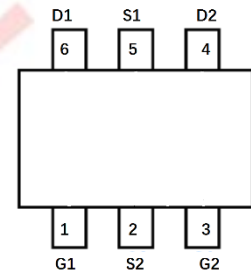
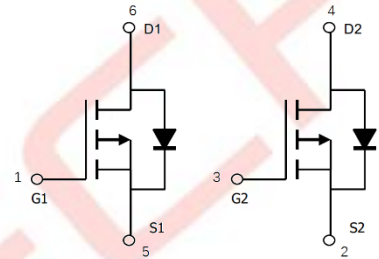
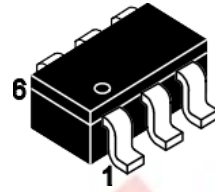
FEATURES

- ◆ $V_{DS} = -20V, I_D = -2.8A$
- ◆ $R_{DS(ON)} < 80m\Omega @ V_{GS} = -2.5V$
- ◆ $R_{DS(ON)} < 70m\Omega @ V_{GS} = -4.5V$
- ◆ High power and current handing capability
- ◆ Halogen free product is acquired
- ◆ Surface mount package

APPLICATIONS

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

SOT23-6



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}	± 12	
Continuous Drain Current ($T_J = 150^\circ C$)	$T_A = 25^\circ C$	-2.8	A
	$T_A = 70^\circ C$	- 1.8	
Pulsed Drain Current	I_{DM}	- 10	
Continuous Source-Drain Diode Current ^(1),2)	$T_A = 25^\circ C$	- 0.72	W
Maximum Power Dissipation ^(1),2)	$T_A = 25^\circ C$	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 ^(1),3)	$R_{\theta JA}$	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_A=25°C unless otherwise noted

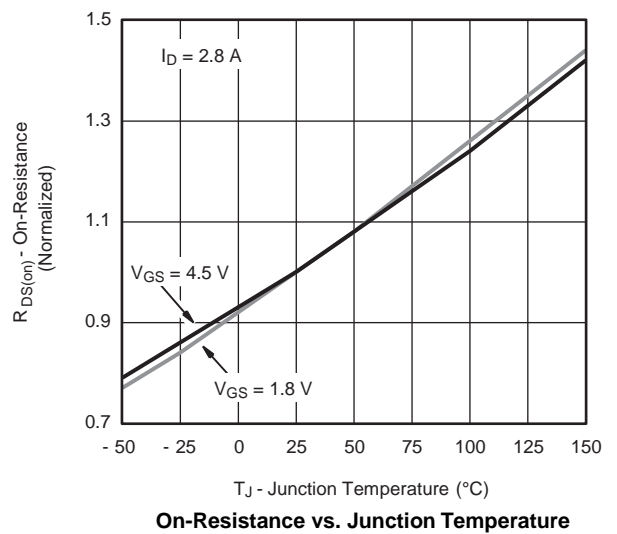
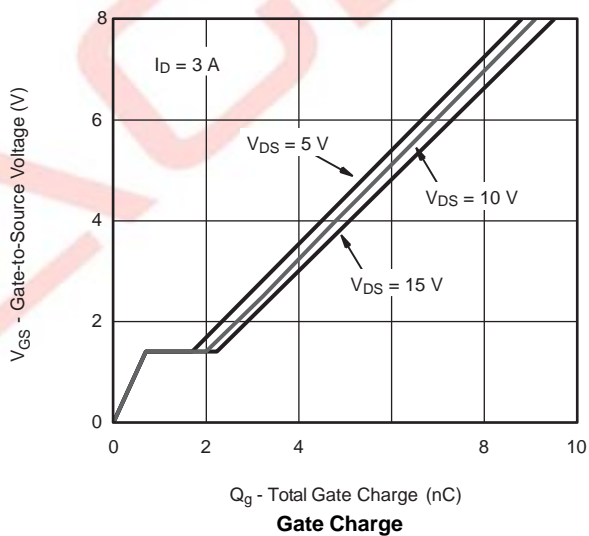
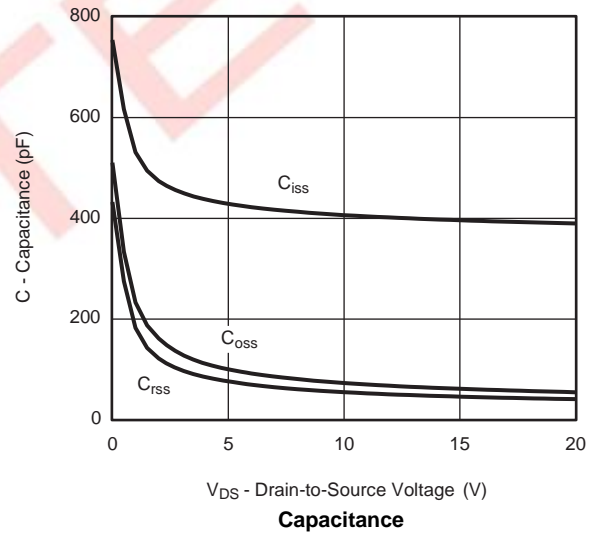
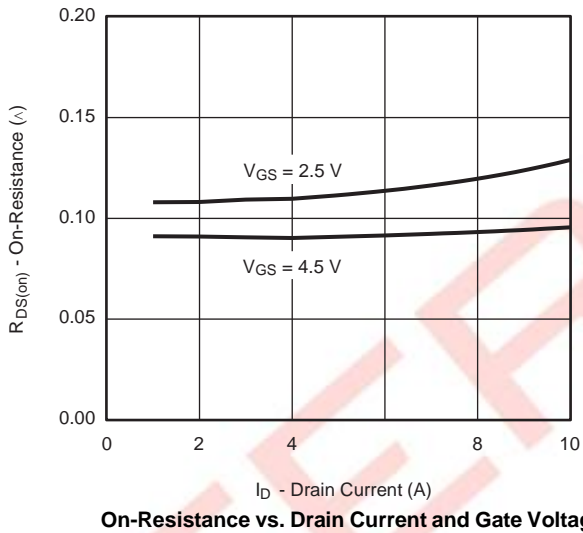
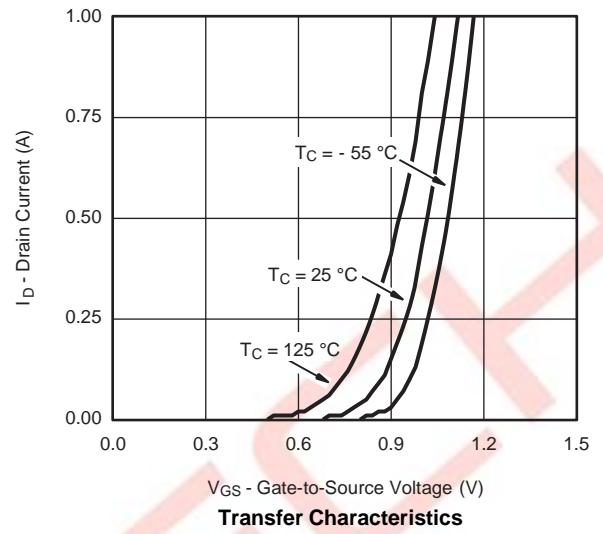
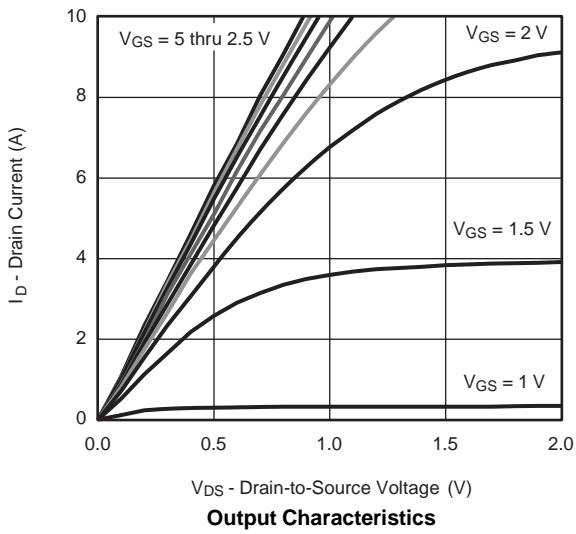
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 20			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 18		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			2.2		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 0.45		- 1	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 20 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 20 V, V _{GS} = 0 V, T _J = 55 °C			- 10	
On-State Drain Current ¹⁾	I _{D(on)}	V _{DS} ≤ - 5 V, V _{GS} = - 4.5 V	- 6			A
Drain-Source On-State Resistance ¹⁾	R _{DS(on)}	V _{GS} = - 4.5 V, I _D = - 2.8 A	0.070	0.090	0.110	Ω
		V _{GS} = - 2.5 V, I _D = - 2.0 A	0.080	0.110	0.140	
Forward Transconductance ¹⁾	g _{fs}	V _{DS} = - 5 V, I _D = - 2.8 A		2.0		S
Dynamic²⁾						
Input Capacitance	C _{iss}	V _{DS} = - 10 V, V _{GS} = 0 V, f = 1 MHz		405		pF
Output Capacitance	C _{oss}			75		
Reverse Transfer Capacitance	C _{rss}			55		
Total Gate Charge	Q _g	V _{DS} = - 10 V, V _{GS} = - 4.5 V, I _D = - 2.8 A		5.5	10	nC
				3.3	6	
Gate-Source Charge	Q _{gs}	V _{DS} = - 10 V, V _{GS} = - 2.5 V, I _D = - 2.8 A		0.7		
Gate-Drain Charge	Q _{gd}			1.3		
Gate Resistance	R _g	f = 1 MHz		6.0		Ω

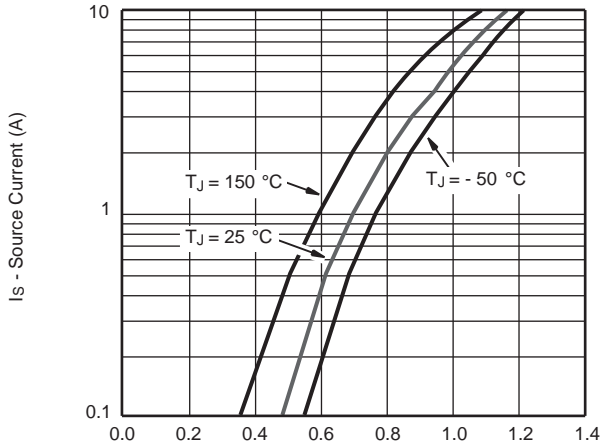
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Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 10\ \Omega, I_D = -1\text{ A},$ $V_{GEN} = -4.5\text{ V}, R_G = 1\ \Omega$		11	20	ns
Rise Time	t_r			35	60	
Turn-Off Delay Time	$t_{d(off)}$			30	50	
Fall Time	t_f			10	20	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			- 1.3	A
Pulse Diode Forward Current ¹⁾	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		

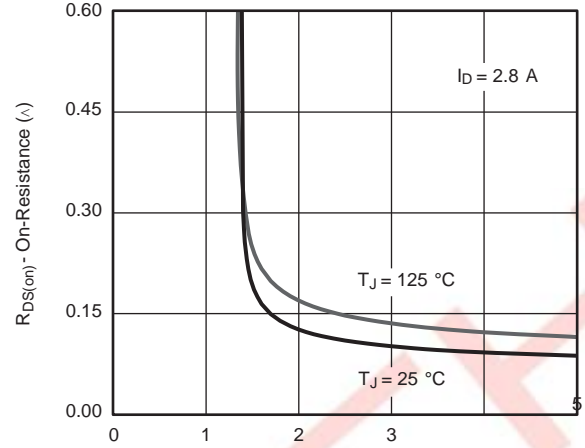
Notes: 1. Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.
2. Guaranteed by design, not subject to production testing.

TYPICAL CHARACTERISTICS CURVES

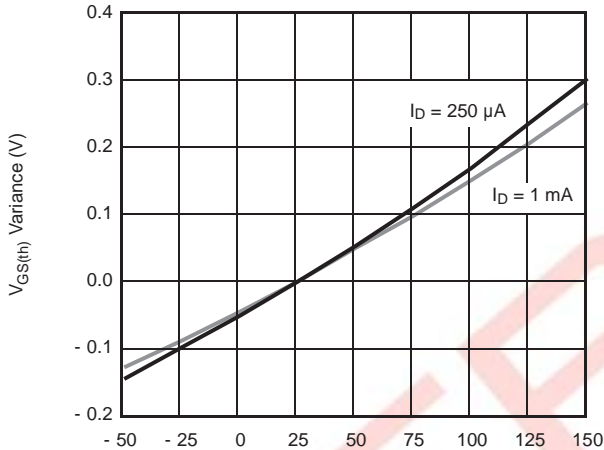




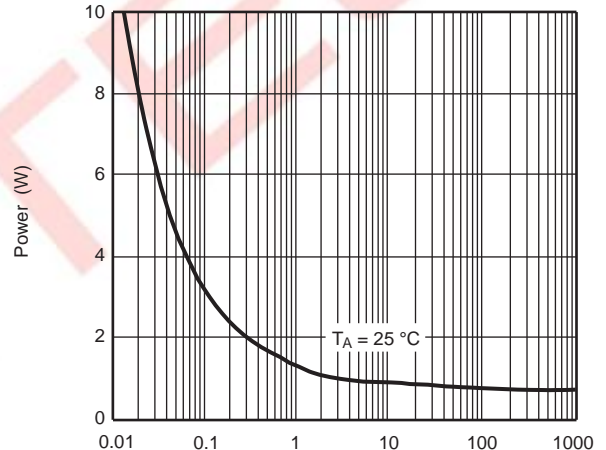
Source-Drain Diode Forward Voltage



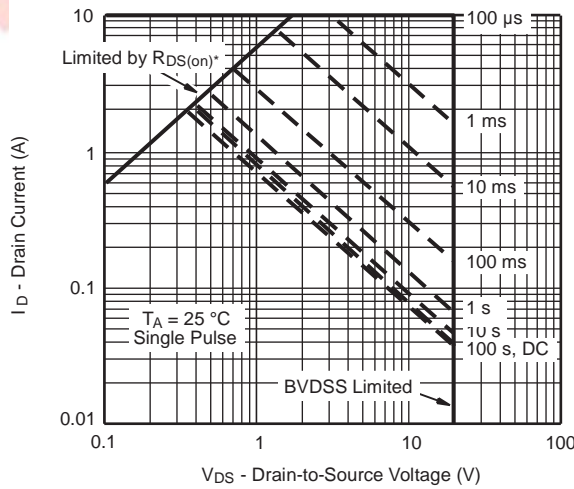
On-Resistance vs. Gate-to-Source Voltage



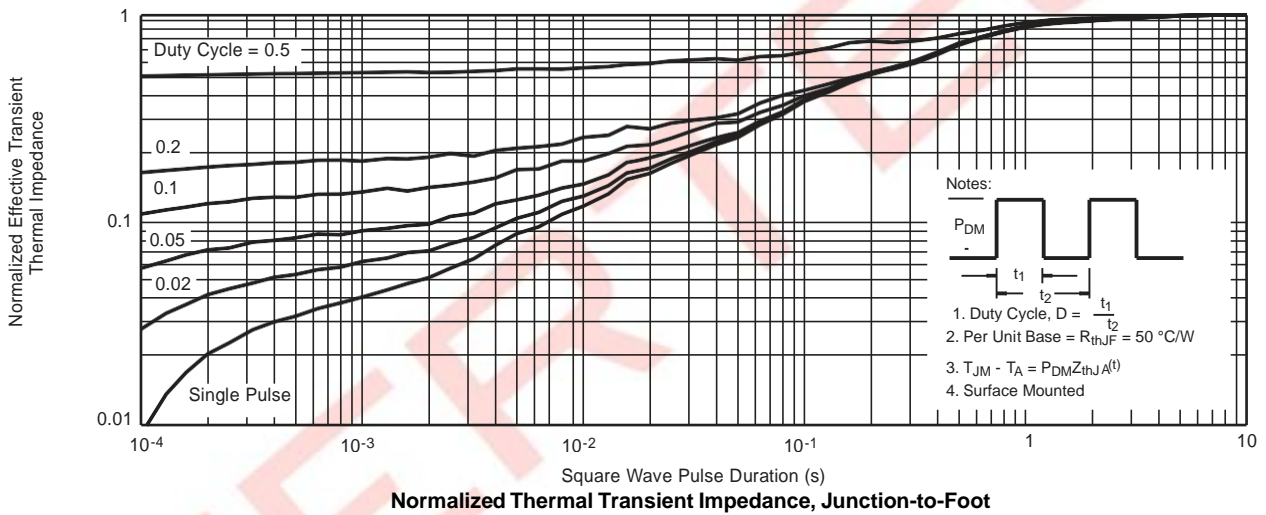
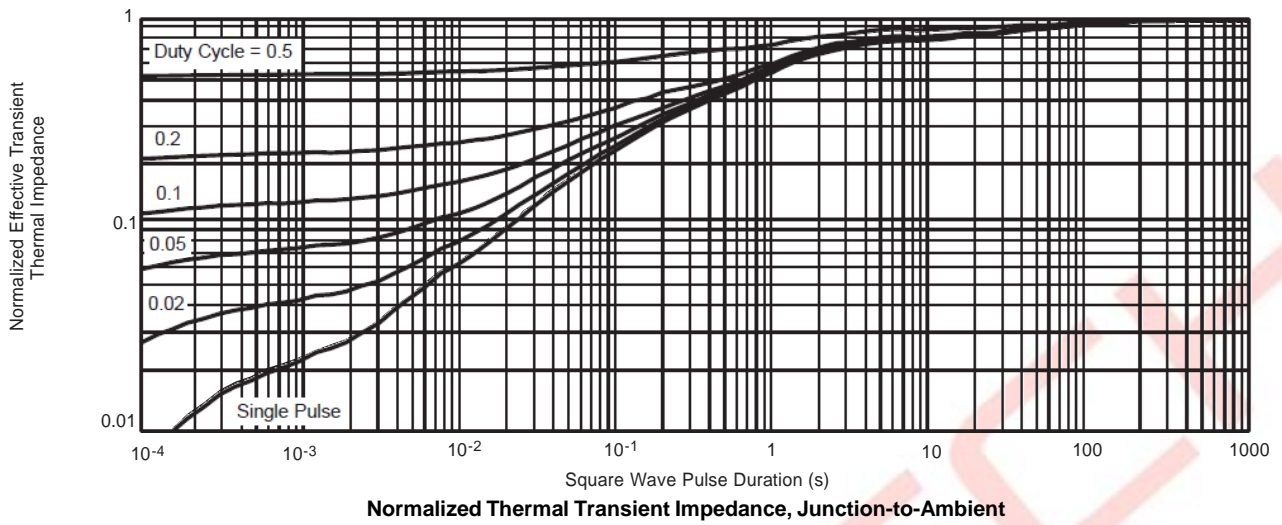
Threshold Voltage



Single Pulse Power

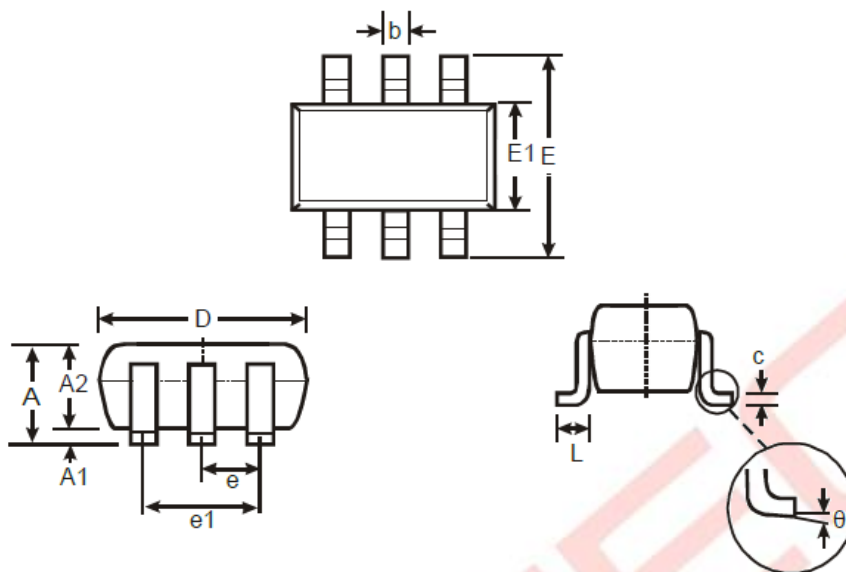


Safe Operating Area



PACKAGE OUTLINE

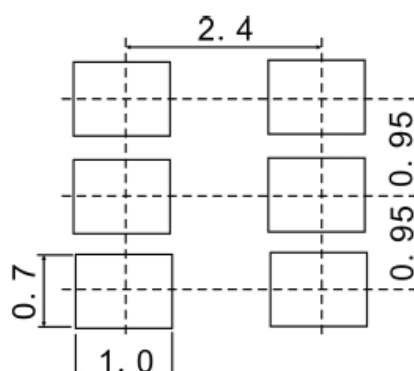
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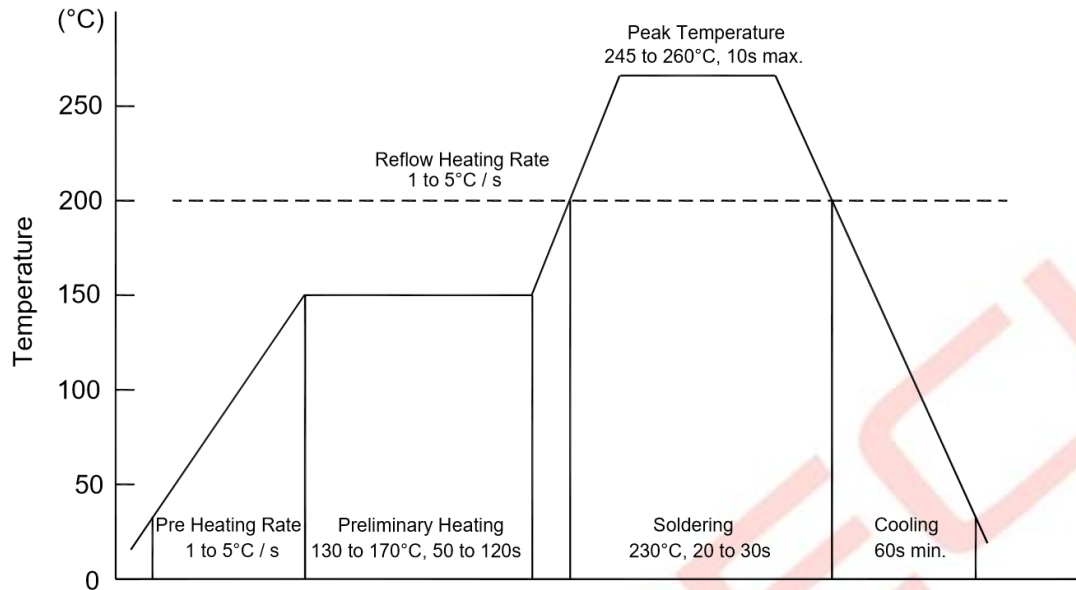
Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.05	1.25	0.041	0.049
A1	0.00	0.10	0.000	0.004
A2	1.05	1.15	0.041	0.045
b	0.30	0.50	0.012	0.020
c	0.10	0.20	0.004	0.008
D	2.82	3.02	0.111	0.119
E	2.65	2.95	0.104	0.116
E1	1.50	1.70	0.059	0.067
e	0.95 (BSC)		0.037 (BSC)	
L	0.30	0.60	0.012	0.024
e1	1.80	2.00	0.071	0.079
θ	0°	8°	0°	8°

RECOMMENDED SOLDERING PAD

Dimensions in Millimeters



◆ 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

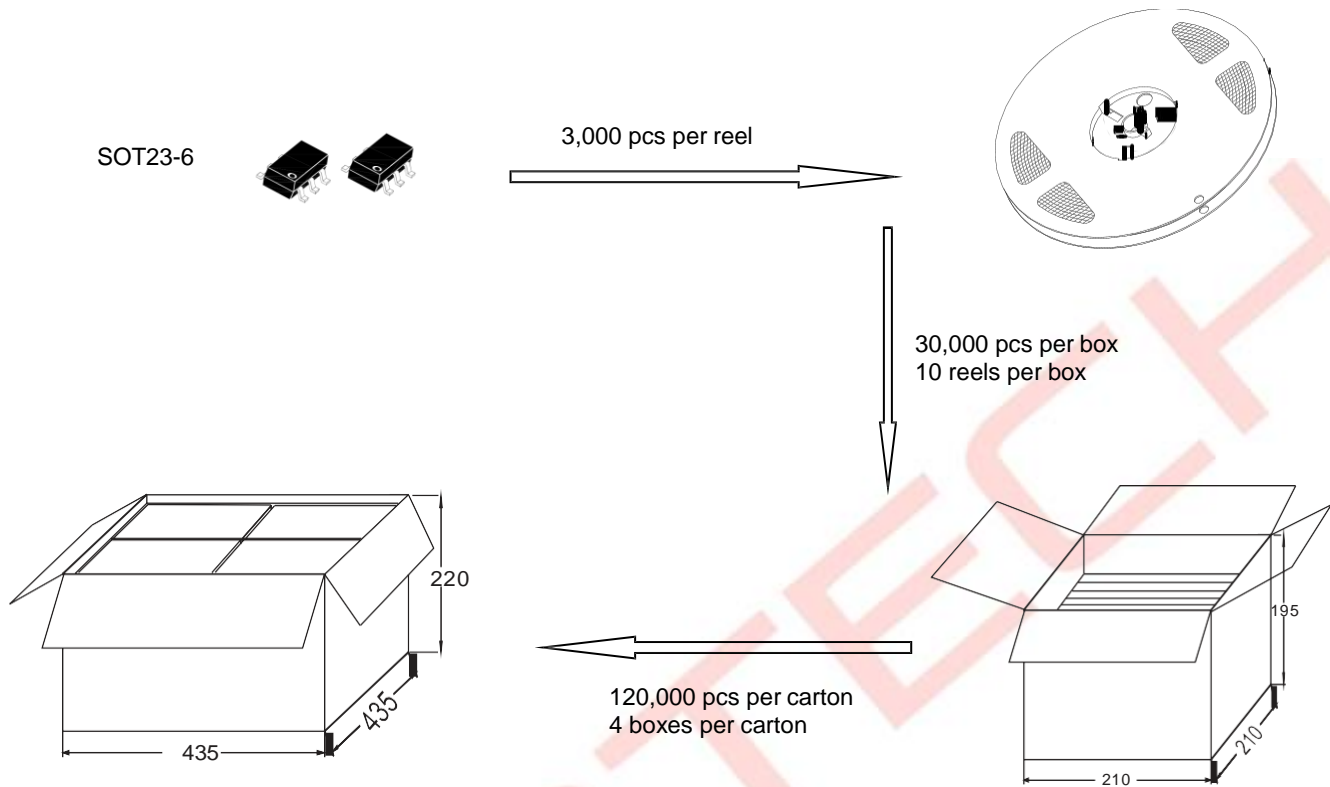
◆ Storage conditions

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

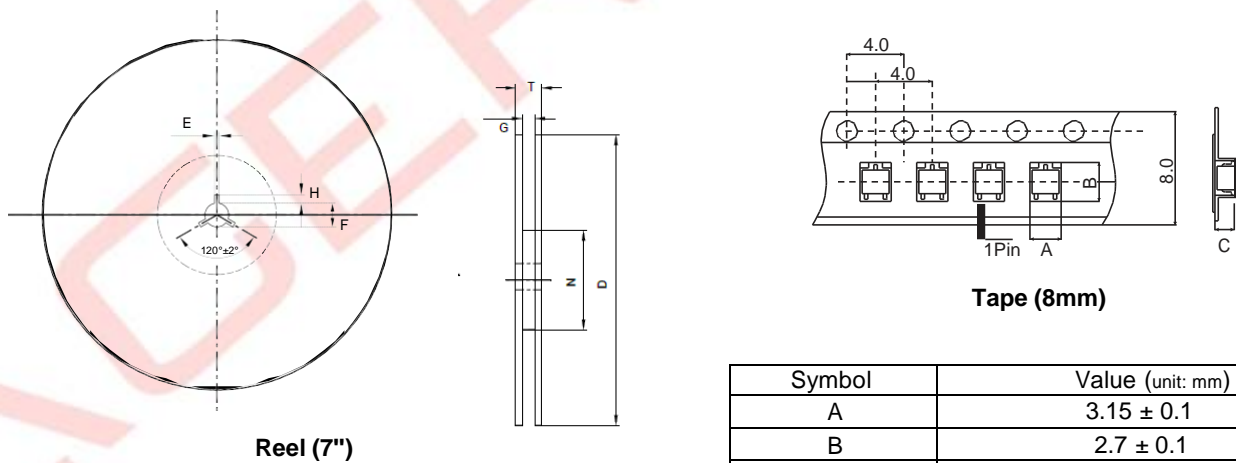
ATM2301PSA

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

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