

SOT-23 Plastic-Encapsulate MOSFETS

AO3401

P-Channel Enhancement Mode Field Effect Transistor

Features

- V_{DS} (V) = -30V
- I_D = -4.2 A (V_{GS} = -10V)
- $R_{DS(ON)}$ < 50m Ω (V_{GS} = -10V)
- $R_{DS(ON)}$ < 65m Ω (V_{GS} = -4.5V)
- $R_{DS(ON)}$ < 120m Ω (V_{GS} = -2.5V)

General Description

The AO3401 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 load switch or in PWM applications. Standard product AO3401 is Pb-free (meets ROHS & Sony 259 specifications). AO3401L is a Green Product ordering option. AO3401 and AO3401L are electrically identical.

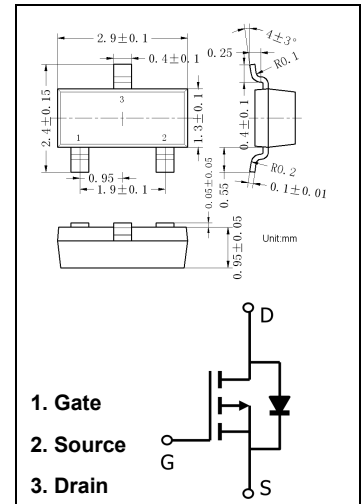
Marking: 3401

Maximum Ratings ($T_a=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{DS}	Drain-Source voltage		-30	V
V_{GS}	Gate-Source voltage		± 12	
I_D	Continuous Drain Current ¹⁾	$T_A = 25^\circ\text{C}$	-4.2	A
		$T_A = 70^\circ\text{C}$	-3.5	
I_{DM}	Pulsed Drain Current ²⁾		-30	
P_D	Maximum Power Dissipation ¹⁾	$T_A = 25^\circ\text{C}$	1.4	W
		$T_A = 70^\circ\text{C}$	1	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range		-55 to +150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Maximum Junction-to-Ambient ¹⁾ , $t \leq 10\text{s}$	65	90	$^\circ\text{C/W}$
	Maximum Junction-to-Ambient ¹⁾ , Steady-State	85	125	
$R_{\theta JL}$	Maximum Junction-to-Lead ³⁾ , Steady-State	43	60	



Electrical Characteristics (T_J=25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Static Parameters						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = -250μA	-30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -24V, V _{GS} = 0V			-1	μA
		V _{DS} = -24V, V _{GS} = 0V, T _J = 55°C			-5	
I _{GSS}	Gate-body Leakage current	V _{DS} = 0V, V _{GS} = ±12V			±100	nA
V _{GS(th)}	Gate-Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	-0.7	-1.0	-1.3	V
I _{D(ON)}	On state drain current	V _{GS} = -4.5V, V _{DS} = -5V	-25			A
R _{DS(on)}	Drain-Source On-Resistance	V _{GS} = -10V, I _D = -4.2A		42	50	mΩ
		V _{GS} = -10V, I _D = -4.2A, T _J = 125°C			75	
		V _{GS} = -4.5V, I _D = -4A		53	65	
		V _{GS} = -2.5V, I _D = -1A		80	120	
g _{fs}	Forward Trans conductance	V _{DS} = -5V, I _D = -5A	7	11		S
V _{SD}	Diode Forward Voltage	I _S = -1A, V _{GS} = 0V		-0.75	-1	V
I _S	Maximum Body-Diode Continuous Current				-2.2	A
Dynamic Parameters						
C _{iss}	Input Capacitance	V _{GS} = 0V V _{DS} = -15V f = 1.0MHz		945		pF
C _{oss}	Output Capacitance			115		
C _{rss}	Reverse Transfer Capacitance			77		
R _g	Gate resistance	V _{GS} = 0V, V _{DS} = 0V, f = 1MHz		6		Ω
Switching Parameters						
Q _g	Total Gate Charge	V _{GS} = -4.5V, V _{DS} = -15V, I _D = -4A		9.4		nC
Q _{gs}	Gate-Source Charge			2		
Q _{gd}	Gate-Drain Charge			3		
t _{d(on)}	Turn-On Delay Time	V _{GS} = -10V, V _{DS} = -15V, R _L = 3.6Ω, R _{GEN} = 6Ω		6.3		ns
t _r	Rise Time			3.2		
t _{d(off)}	Turn-Off Delay Time			38.2		
t _f	Fall Time			12		
t _{rr}	Body Diode Reverse Recovery Time	I _F = -4A, di/dt = 100A/μs		20.2		ns
Q _{rr}	Body Diode Reverse Recovery Charge			11.2		nC

Notes

- The value of R_{θJA} is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T_A = 25°C. The value in any given application depends on the user's specific board design. The current rating is based on the t_s ≤ 10s thermal resistance rating.
- Repetitive rating, pulse width limited by junction temperature.
- The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.
- The static characteristics in Figures 1 to 6, 12, 14 are obtained using 80μs pulses, duty cycle 0.5% max.
- These tests are performed with the device mounted on 1 in2 FR-4 board with 2oz. Copper, in a still air environment with T_A = 25°C. The SOA curve provides a single pulse rating.

Typical Characteristics

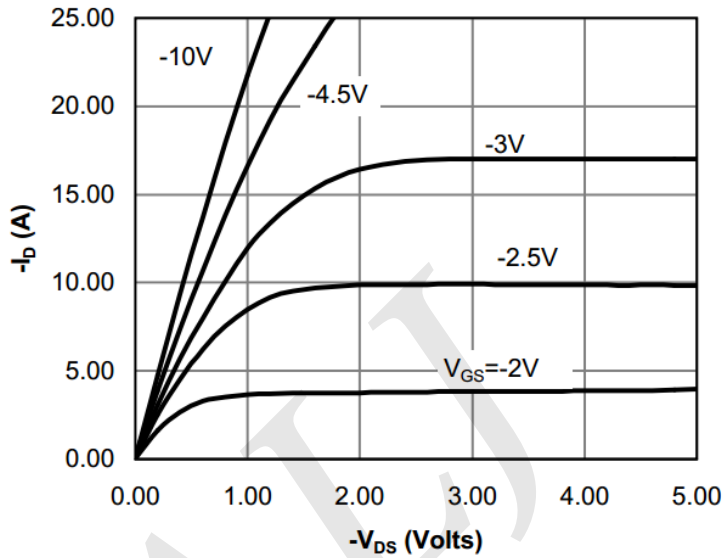


Fig 1: On-Region Characteristics

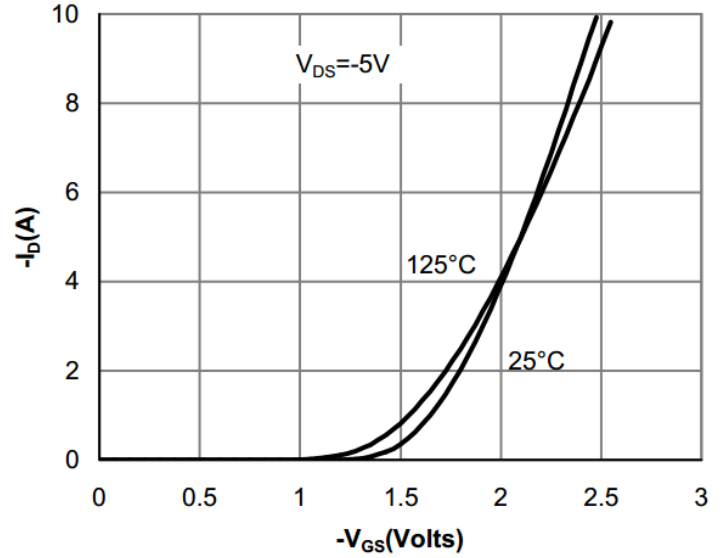


Figure 2: Transfer Characteristics

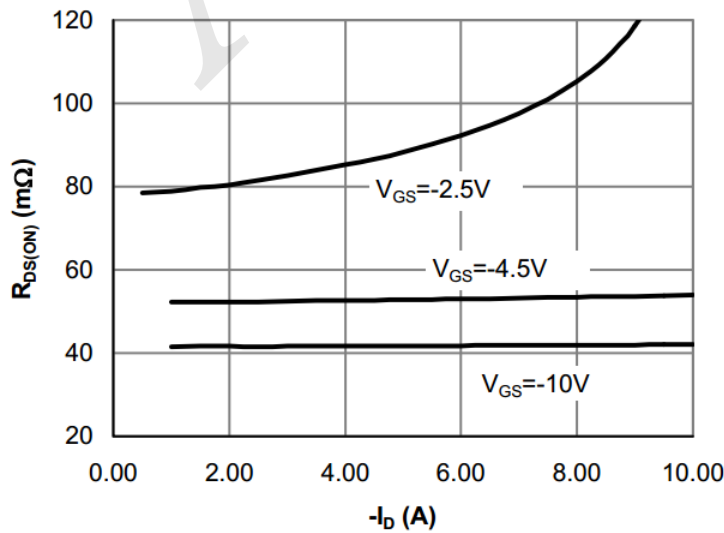


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

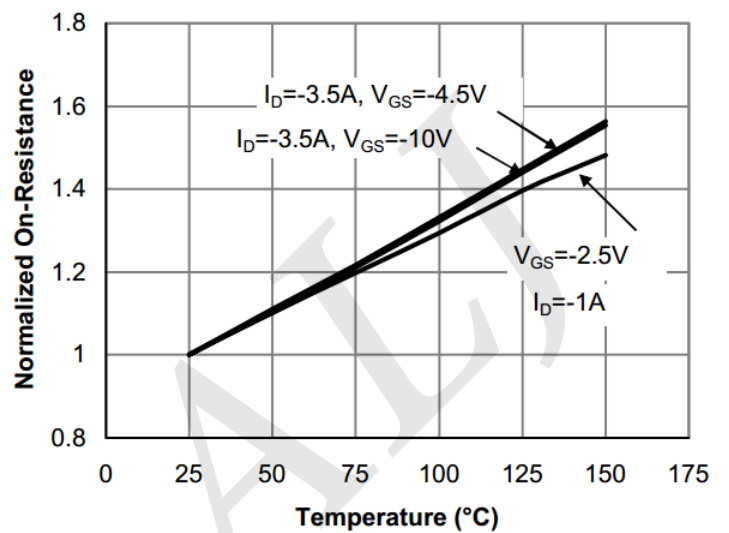


Figure 4: On-Resistance vs. Junction Temperature

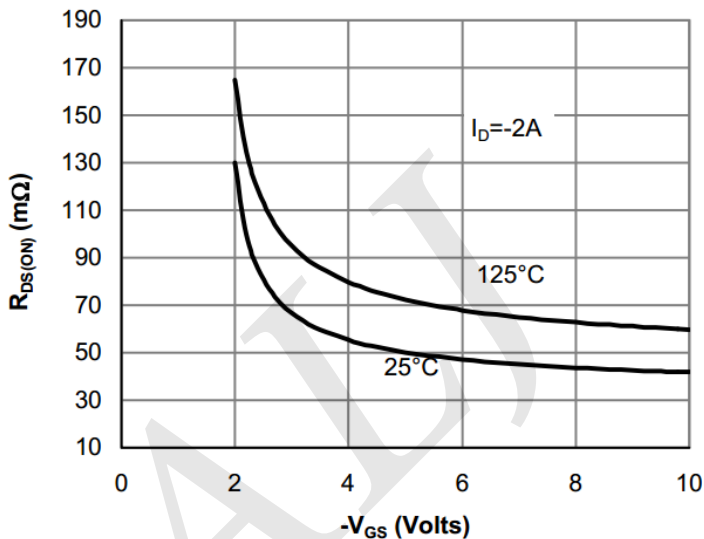


Figure 5: On-Resistance vs. Gate-Source Voltage

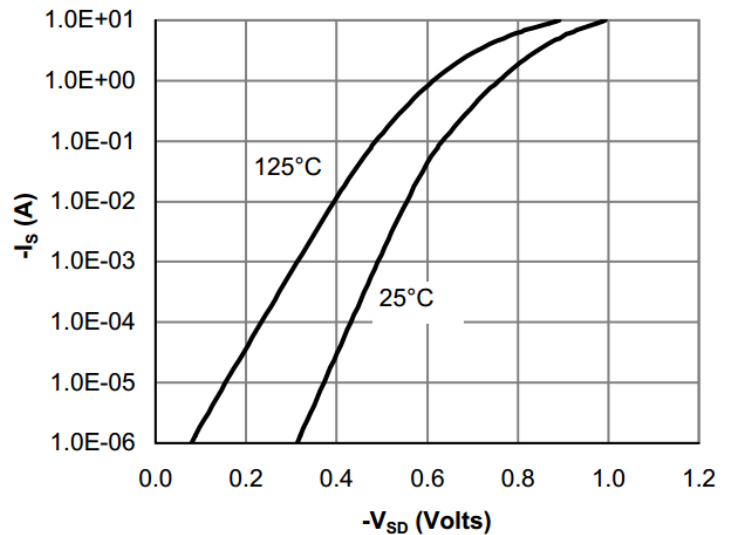


Figure 6: Body-Diode Characteristics

Typical Characteristics (Cont.)

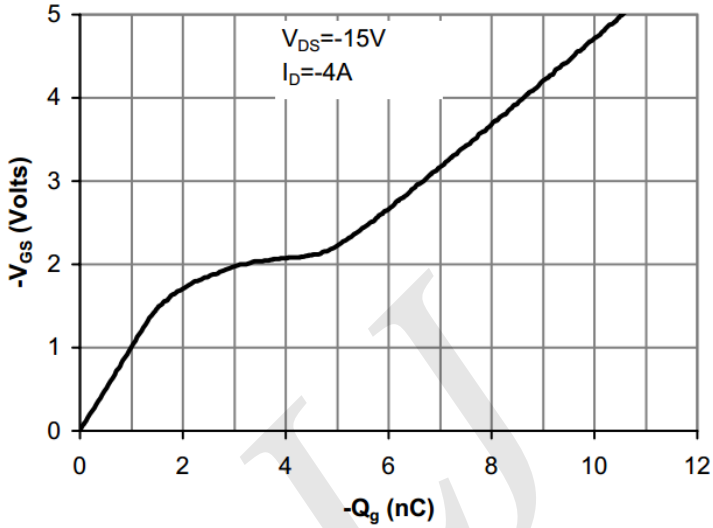


Figure 7: Gate-Charge Characteristics

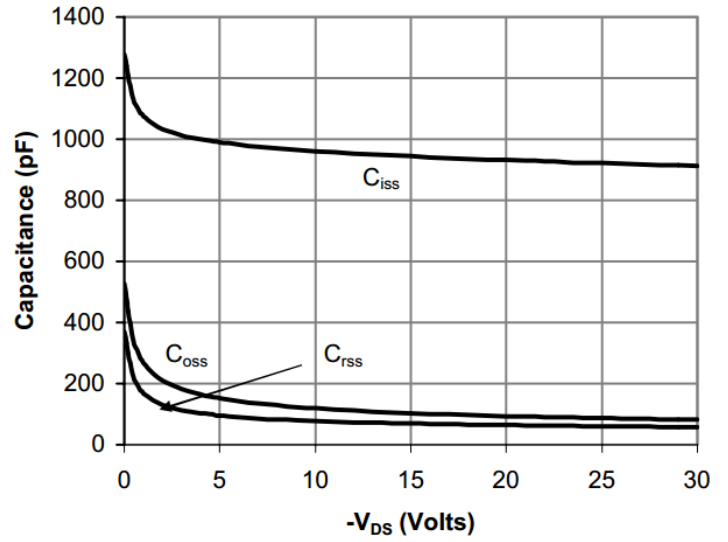


Figure 8: Capacitance Characteristics

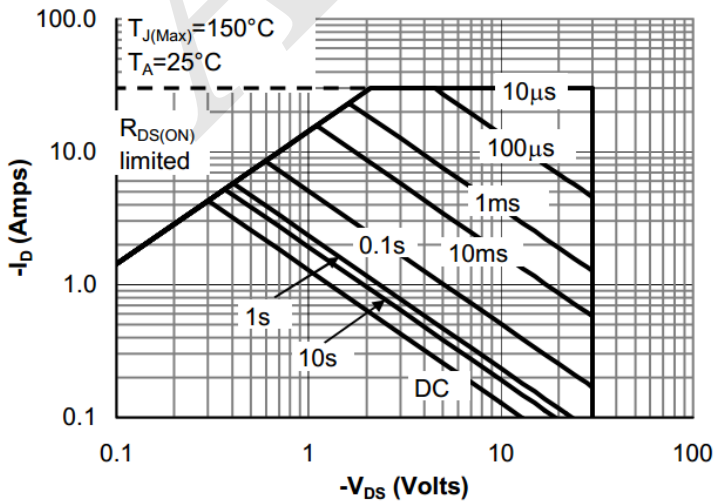


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

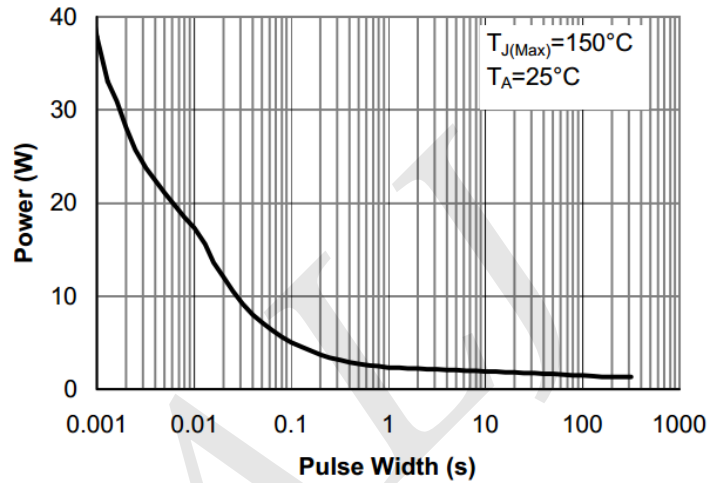


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

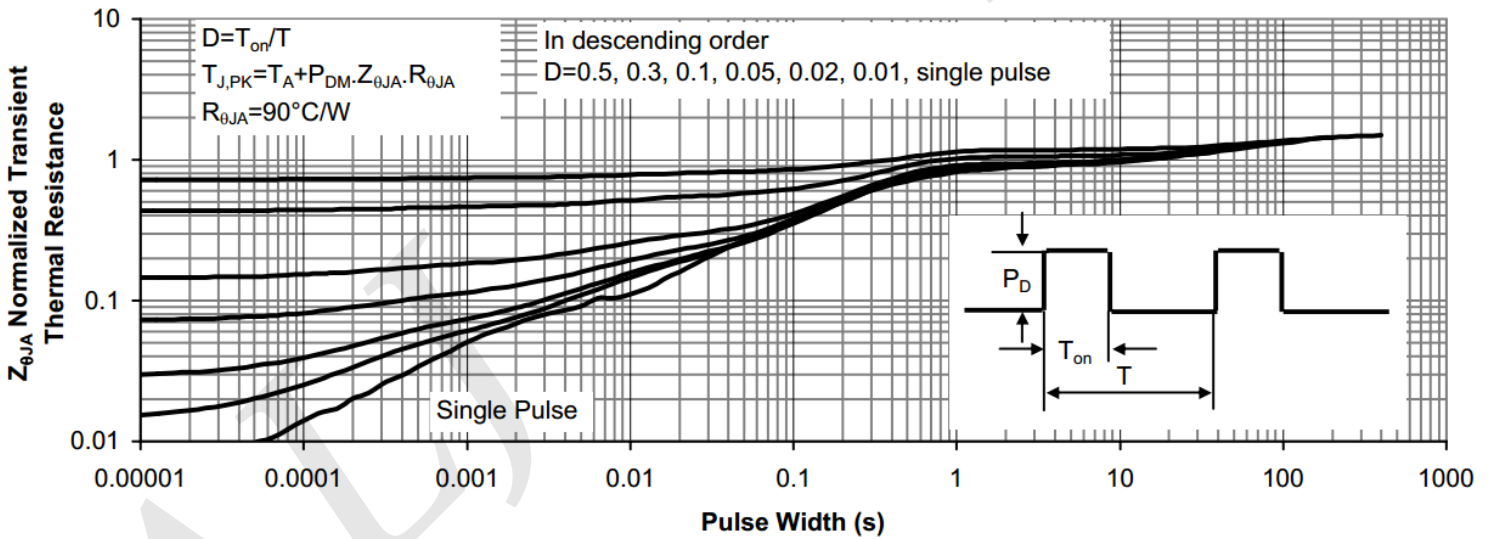
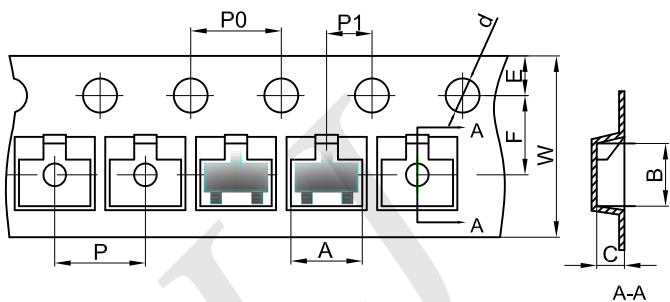


Figure 11: Normalized Maximum Transient Thermal Impedance

SOT-23 Embossed Carrier Tape

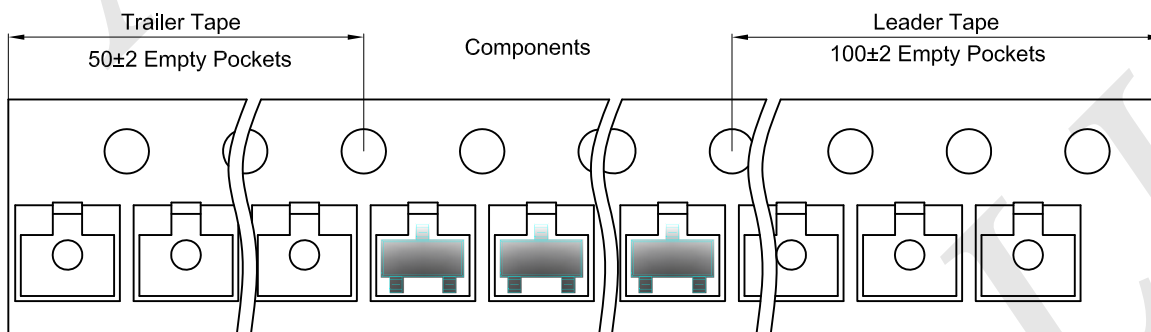


Packaging Description:

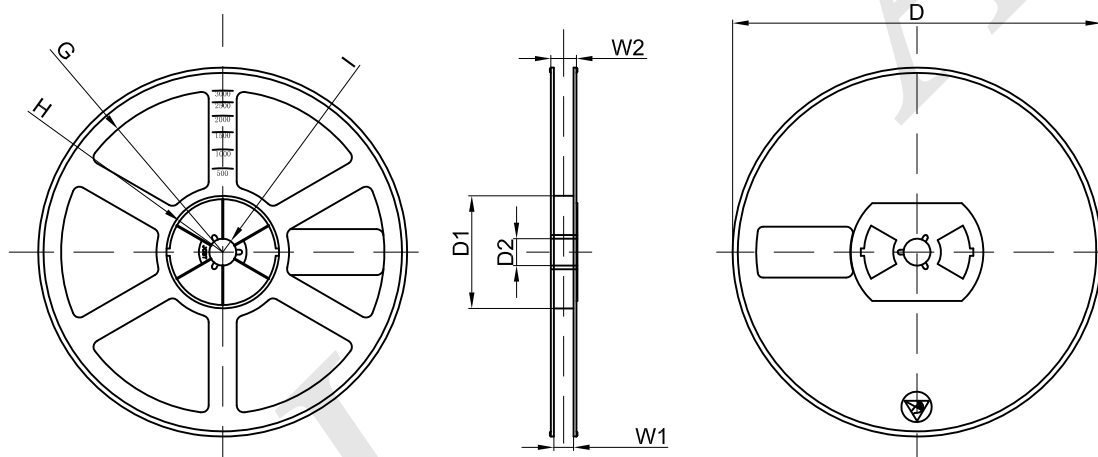
SOT-23 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 17.8cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00

SOT-23 Tape Leader and Trailer



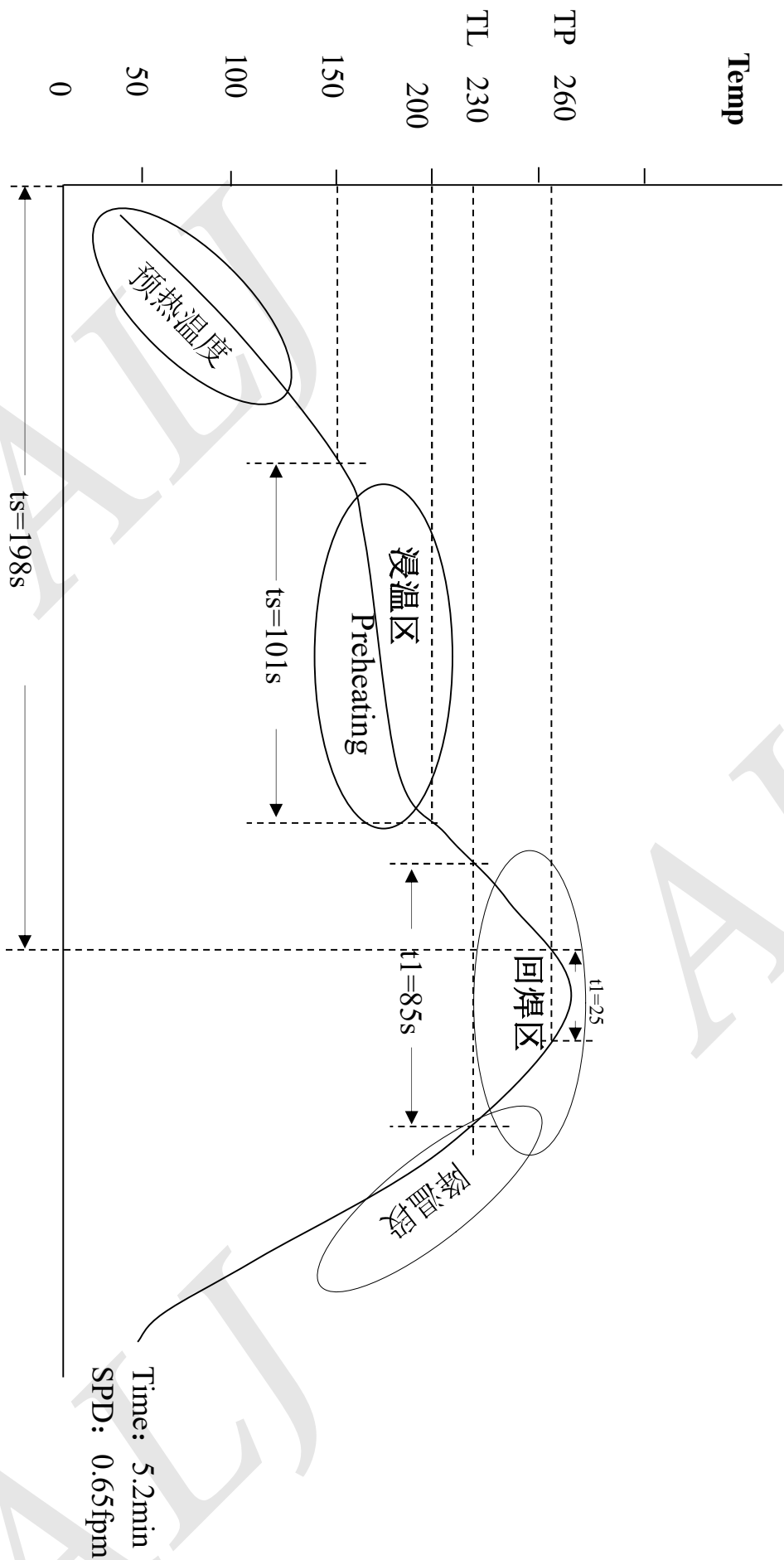
SOT-23 Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7" Dia	Ø178.00	54.40	13.00	R78.00	R25.60	R6.50	9.50	12.30

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
3000 pcs	7 inch	45,000 pcs	203×203×195	180,000 pcs	438×438×220	

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