

■ General Description

The AO3401A uses advanced trench technology to provide excellent RDS(ON) , low gate charge and operation gate voltages as low as 2.5V. This device is suitable for use as a load switch or other general applications.

■ Features

- Package : SOT-23L(2913)
- Package Material: Molded Plastic. UL flammability
- Weight: 0.008 grams (approximate)

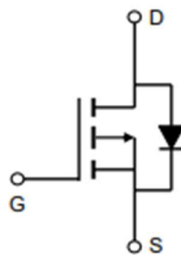
■ Applications

- load switch or other general applications.

■ Pin Assignment



■ Block Diagram



## ■ Absolute Maximum Ratings

Maximum Ratings (Ta = 25°C unless otherwise noted)

Parameter	Symbol	Value	Unit	
Drain-source voltage	V <sub>DS</sub>	-30	V	
Gate-source voltage	V <sub>GS</sub>	±12	V	
Continuous drain current	TA=25°C	I <sub>D</sub>	-4.4	A
	TA=70°C	I <sub>D</sub>	-3.5	A
Pulsed drain current <sup>A</sup>	I <sub>DM</sub> *	-27	A	
Power dissipation <sup>B</sup>	TA=25°C	P <sub>D</sub>	1.40	W
	TA=70°C	P <sub>D</sub>	0.9	W
Thermal resistance from Junction to ambient	R <sub>θJA</sub>	125	°C/W	
Junction temperature	T <sub>J</sub>	150	°C	
Storage temperature	T <sub>STG</sub>	-55 ~+150	°C	

## ■ Thermal Characteristics

Parameter	Symbol	Type	Max	Unit	
Maximum Junction-to-Lead <sup>C</sup>	t ≤ 10s	R <sub>θJA</sub>	70	90	°C/W
Maximum Junction-to-Ambient <sup>A&amp;D</sup>	Steady-State	R <sub>θJA</sub>	100	125	°C/W
Maximum Junction-to-Lead	Steady-State	R <sub>θJL</sub>	63	80	°C/W

### Note:

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with Ta =25°C. The value in any given application depends on the user's specific board design.

B: The power dissipation P<sub>D</sub> is based on T<sub>J</sub>(Max)=150°C, using ≤ 10s junction-to-ambient thermal resistance.

C: Repetitive rating, pulse width limited by junction temperature T<sub>J</sub>(Max)=150°C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25°C.

D: The R<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> and lead to ambient

E: The static characteristics in Figures 1 to 6 are obtained using.

F: These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T<sub>J</sub>(MAX)=150°C. The SOA curve provides a single pulse rating.

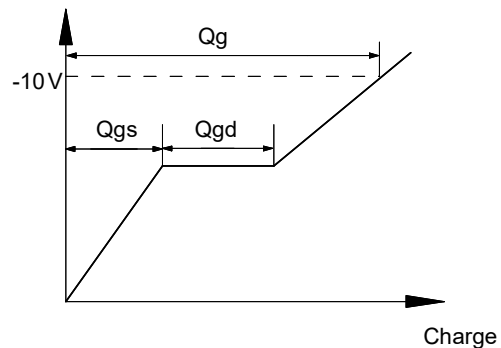
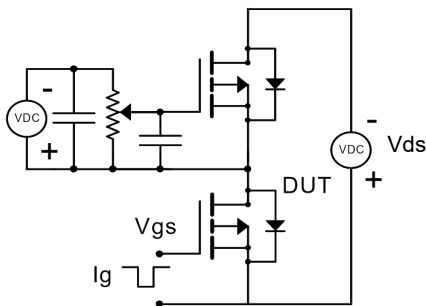
■ Electrical Characteristics

(Tj=25°C unless otherwise specified)

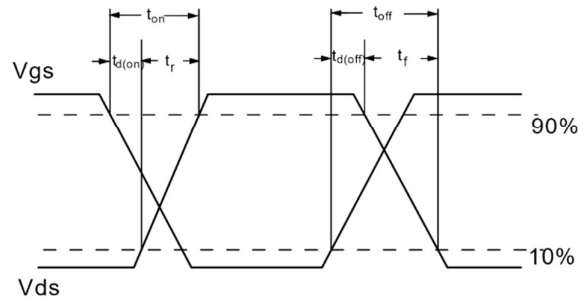
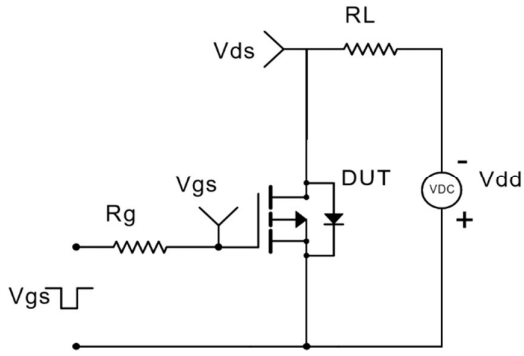
Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Drain-Source breakdown voltage	V(BR)DSS*	-30			V	VGS=0V, ID=-250μA
Zero gate voltage drain current	IDSS*			-1	uA	VDS=-30V, VGS=0V
Gate-body leakage current	IGSS*			±100	nA	VDS=0V, VGS=±12V
Gate-threshold voltage	VGS(th)*	-0.5	-0.9	-1.3	V	VDS=VGS, ID=-250μA
On state drain current	ID(ON)*	-27			A	VGS=-10V, VDS=-5V
Drain-source on-resistance	RDS(ON)*		50	60	mΩ	VGS=-10V, ID=-4.2A
			55	65	mΩ	VGS=-4.5V, ID=-3.7A
			60	85	mΩ	VGS=-2.5V, ID=-2A
Forward transconductance	gFS		17		S	VDS=-5V, ID=-4.0A
Gate resistance	Rg	4	7.8	12	Ω	VDS=-0V, VGS=0V, f=1MHz
Input capacitance	Ciss		645		pF	VDS=-15V, VGS=0V, f=1MHz
Output capacitance	Coss		80		pF	
Reverse transfer capacitance	Crss		55		pF	
Turn-on delay time	td(on)		6.5		nS	VGS=-10V, VDS=-15V, RGEN=3Ω, RL=3.75Ω
Turn-on rise time	tr		3.5		nS	
Turn-off delay time	td(off)		41		nS	
Turn-off fall time	tf		9		nS	
Total gate charge	Qg		7		nC	VDS=-15V, VGS=-4.5V, ID=-4A
			14		nC	
Gate-source charge	Qgs		1.5		nC	VDS=-15V, VGS=-10V, ID=-4A
Gate-drain charge	Qgd		2.5		nC	
Diode forward voltage	VSD		-0.7	-1	V	IS=-1A, VGS=0V
Diode forward current	IS			-2	A	Tc = 25°C
Body Diode Reverse Recovery Time	trr		11		nS	IF=-4A, di/dt=100A/μs
Body Diode Reverse Recovery Charge	Qrr		3.5		nC	

\* Pulse test ; Pulse width ≤300μs, Duty cycle ≤ 0.5% .

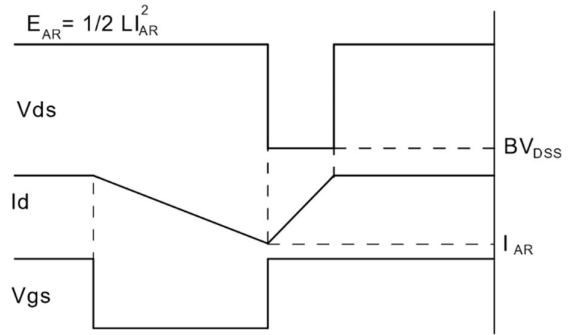
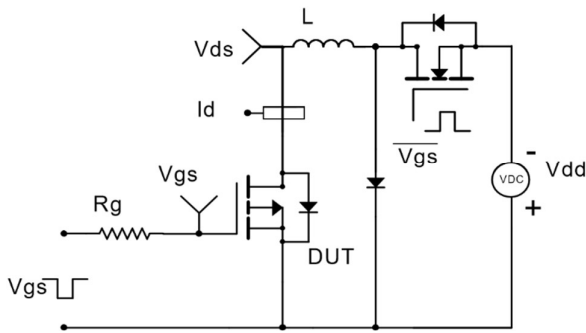
■ Test Circuit



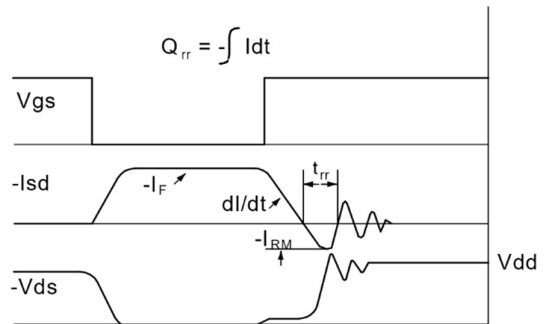
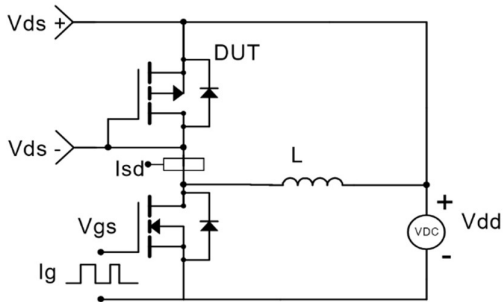
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

Reference Data

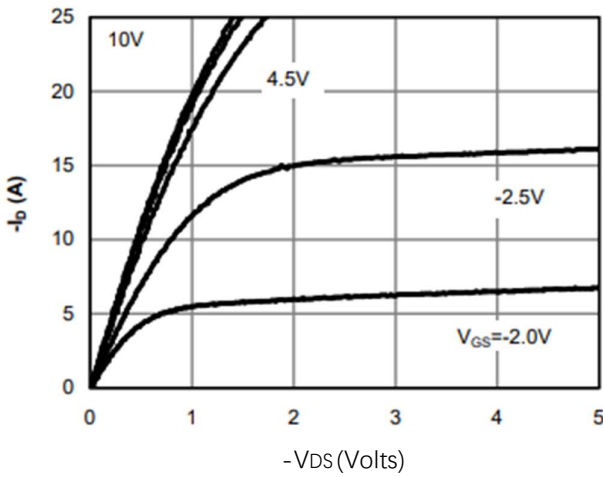


Fig 1: On-Region Characteristics (Note E)

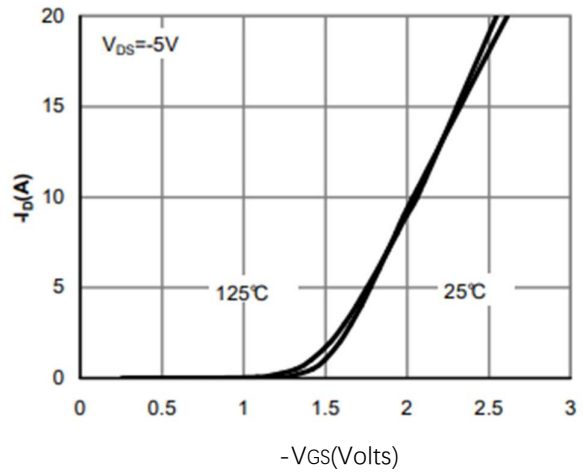


Figure 2: Transfer Characteristics (Note E)

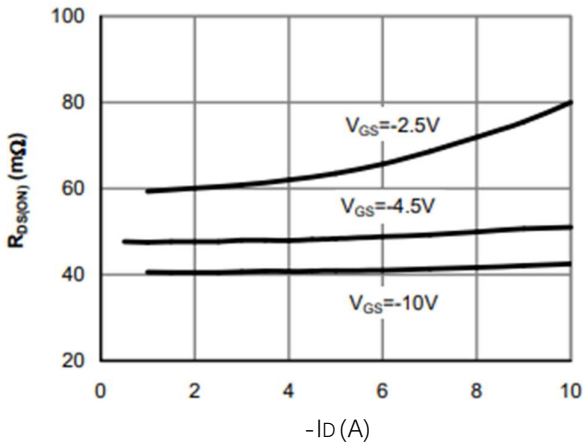


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

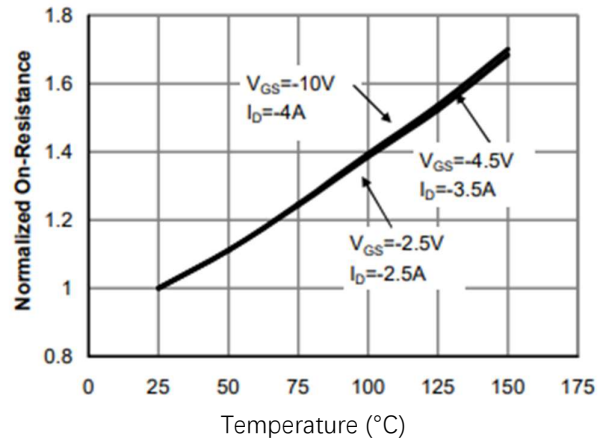


Figure 4: On-Resistance vs. Junction Temperature (Note E)

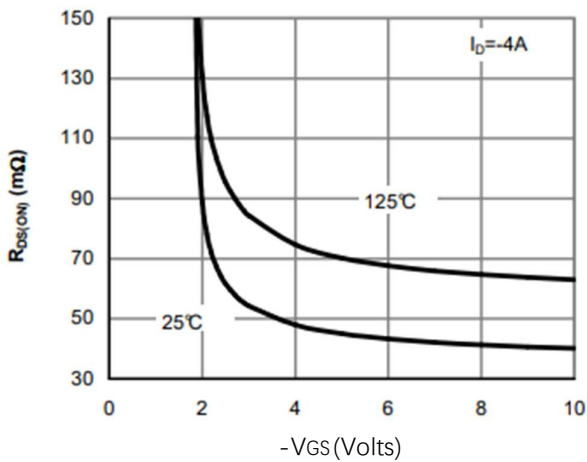


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

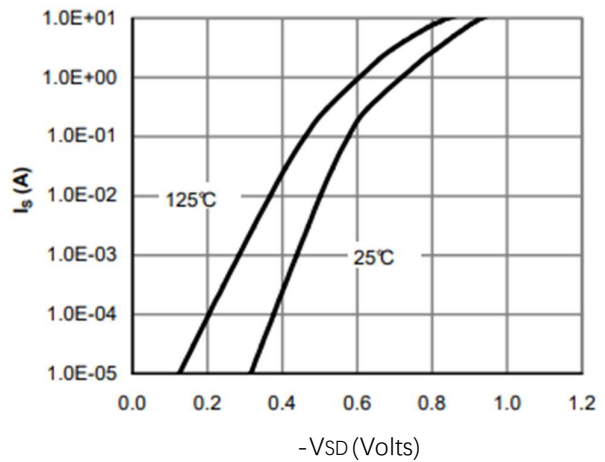


Figure 6: Body-Diode Characteristics (Note E)

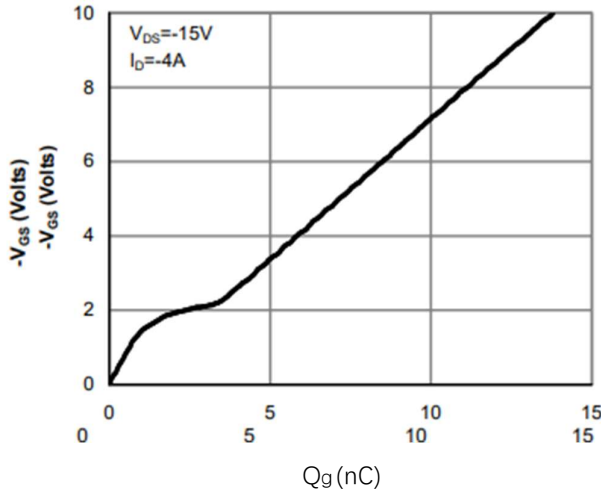


Figure 7: Gate-Charge Characteristics

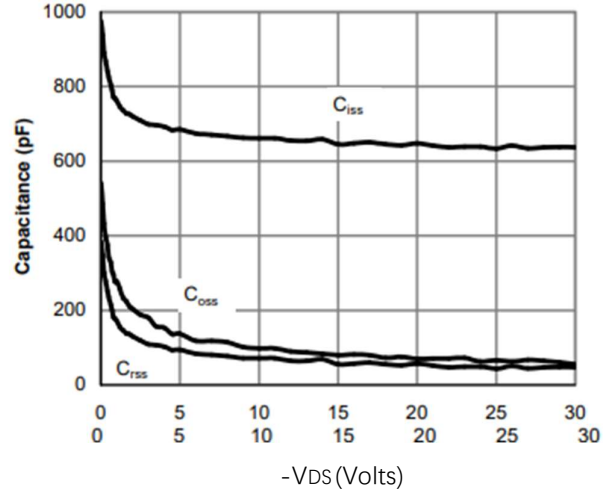


Figure 8: Capacitance Characteristics

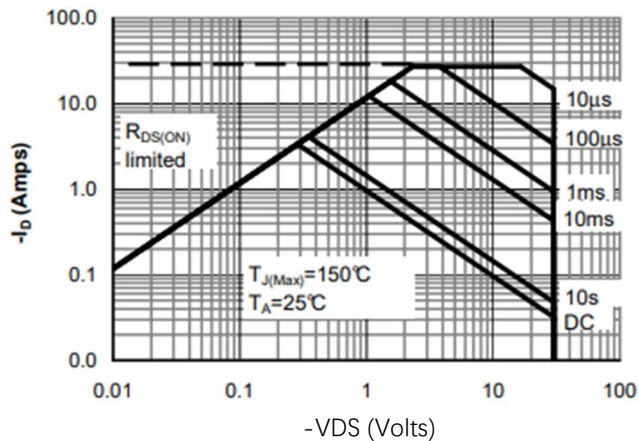


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

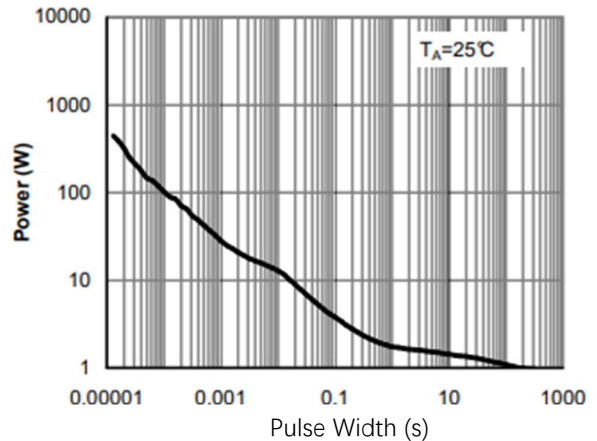


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

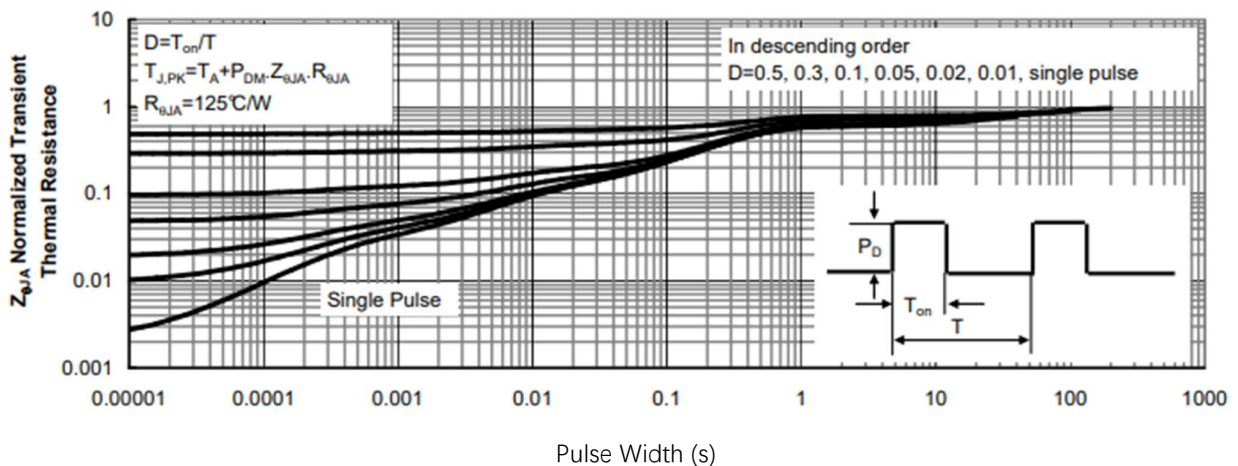
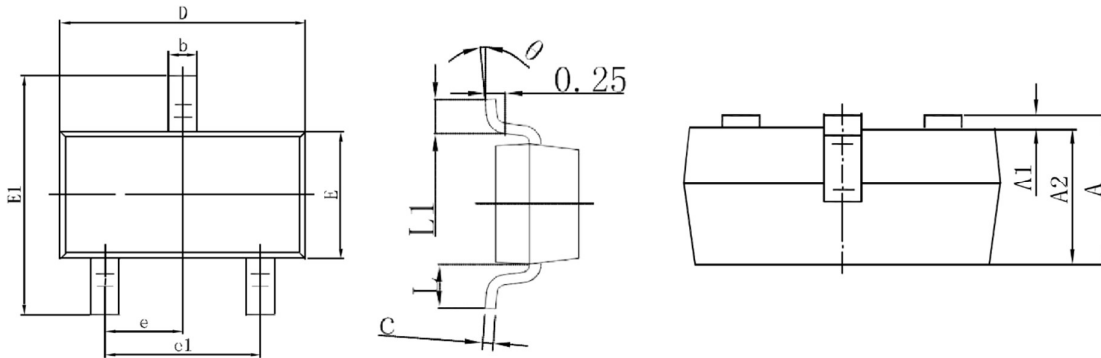


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

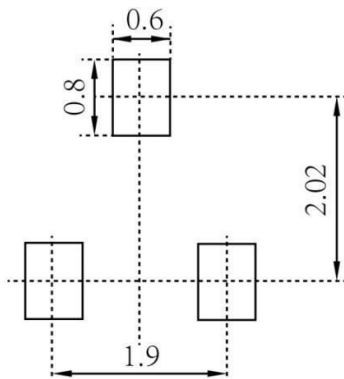
■ Package Information

SOT23-3L(2913)



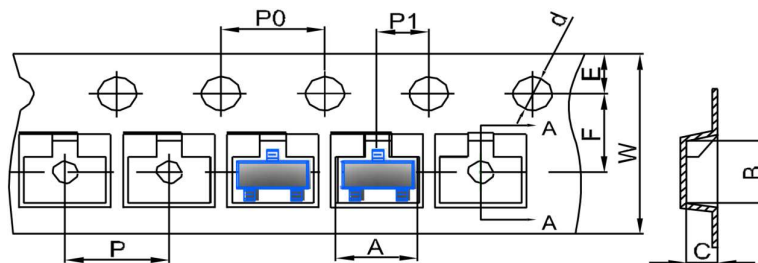
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

SOT-23 Suggested Pad Layout



- Note:
- 1,Controlling dimension: in millimeters.
  - 2, General tolerance:  $\pm 0.05\text{mm}$ .
  - 3, The pad layout is for reference purposes only.

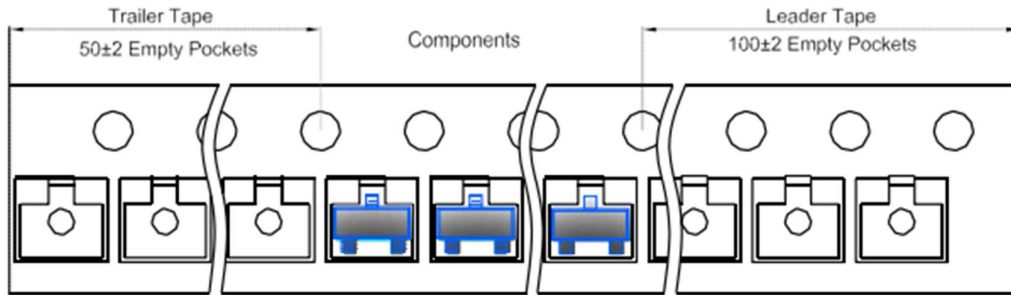
SOT-23 Embossed Carrier Tape



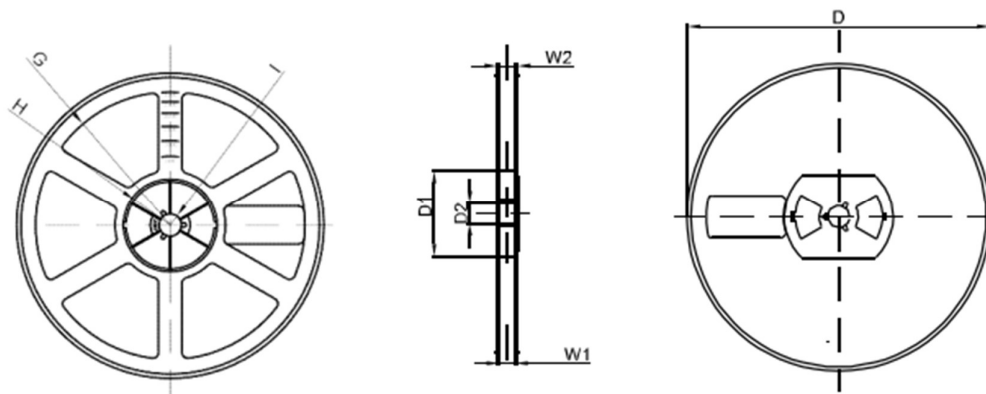
DIMENSIONS(mm)										
TYPE	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00
TOLERANCE	$\pm 0.1$	$\pm 0.1$	$\pm 0.1$	$\pm 0.1$	$\pm 0.1$	$\pm 0.1$	$\pm 0.1$	$\pm 0.1$	$\pm 0.1$	$\pm 0.1$



SOT-23 Tape Leader and Trailer



SOT-23 Reel



	DIMENSIONS(mm)							
REEL OPTION	D	D1	D2	G	H	I	W1	W2
7" DIA	Ø178	54.40	13.00	R78	R25.60	R6.50	9.50	12.30
TOLERANCE	±2	±1	±1	±1	±1	±1	±1	±1