

■ General Description

The AO3400A combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is suitable for use as a load switch or in PWM applications.

■ Features

- Ultra low on-resistance: $V_{DS}=30V$, $R_{DS(ON)} \leq 28m\Omega @ V_{GS}=10V, I_D=5.8A$
- Package : SOT-23L(2913)
- Package Material: Molded Plastic. UL flammability
- Classification Rating: 94V-0
- Weight: 0.008 grams (approximate)

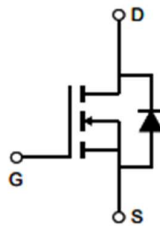
■ Applications

- For PWM application
- For Load switch application
- Surface Mount device

■ Pin Assignment



■ Block Diagram



■ Absolute Maximum Ratings

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

Parameter	Symbol	Value	Unit	
Drain-source voltage	V _{DS}	30	V	
Gate-source voltage	V _{GS}	±12	V	
Continuous drain current	TA=25°C	I _D	5.8	A
	TA=70°C	I _D	4.9	A
Pulsed drain current ^A	I _{DM} *	30	A	
Power dissipation ^B	TA=25°C	P _D	1.40	W
	TA=70°C	P _D	0.9	W
Thermal resistance from Junction to ambient	R _{θJA}	125	°C/W	
Junction temperature	T _J	150	°C	
Storage temperature	T _{STG}	-55 ~ +150	°C	

■ Thermal Characteristics

Parameter	Symbol	Type	Max	Unit
Maximum Junction-to-Lead ^C	R _{θJA}	70	90	°C/W
Maximum Junction-to-Ambient ^{A&D}	R _{θJA}	100	125	°C/W
Maximum Junction-to-Lead	R _{θJL}	63	80	°C/W

Note:

A: 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 Ta = 25°C. The value in any given application depends on the user's specific board design.

B: The power dissipation P_D is based on T_J(Max)=150°C, using ≤ 10s junction-to-ambient thermal resistance.

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

D: The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} 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_J(MAX)=150°C. The SOA curve provides a single pulse rating.

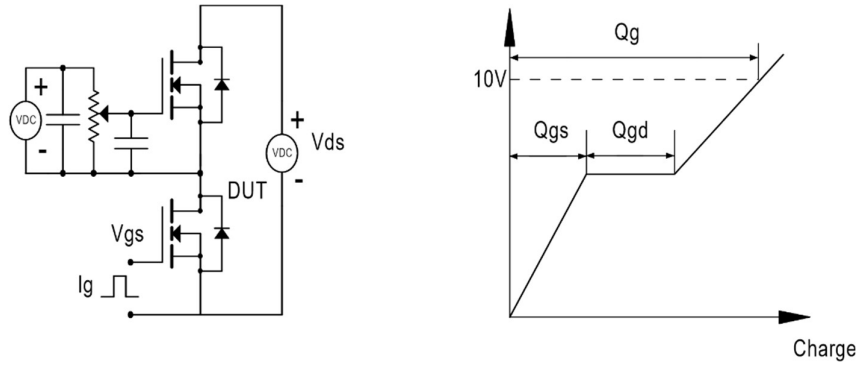
■ Electrical Characteristics

(T_j=25°C unless otherwise specified)

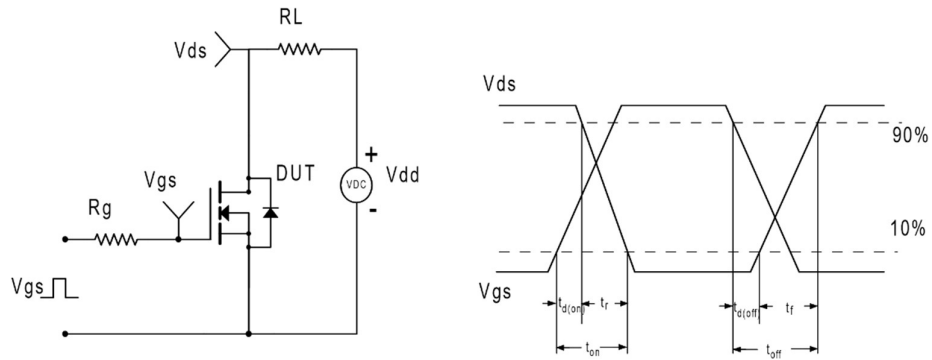
Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Drain-Source breakdown voltage	V _{(BR)DSS} *	30			V	V _{GS} =0V, I _D =250μA
Zero gate voltage drain current	I _{DSS} *			1	μA	V _{DS} =30V, V _{GS} =0V
Gate-body leakage current	I _{GSS} *			±100	nA	V _{DS} =0V, V _{GS} =±12V
Gate-threshold voltage	V _{GS(th)} *	0.65	1.05	1.45	V	V _{DS} =V _{GS} , I _D =250μA
Drain-source on-resistance	R _{DS(ON)} *		18	28	mΩ	V _{GS} =10V, I _D =5.8A
			19	33	mΩ	V _{GS} =4.5V, I _D =5A
			24	52	mΩ	V _{GS} =2.5V, I _D =4A
On-State Drain Current	I _{D(ON)}	30			A	V _{DS} =5V, V _{GS} =4.5V
Forward transconductance	g _{FS}		33		S	V _{DS} =5V, I _D =5.8A
Gate resistance	R _g	1.5	3	4.5	Ω	V _{GS} =0V, V _{DS} =0V, f=1MHz
Input capacitance	C _{iss}		630		pF	V _{DS} =15V, V _{GS} =0V, f=1MHz
Output capacitance	C _{oss}		75		pF	
Reverse transfer capacitance	C _{rss}		50		pF	
Turn-on delay time	t _{d(on)}		3		nS	V _{DS} =15V, V _{GS} =10V, R _{GEN} =3Ω, R _L =2.6Ω
Turn-on rise time	t _r		2.5		nS	
Turn-off delay time	t _{d(off)}		25		nS	
Turn-off fall time	t _f		4		nS	
Total gate charge	Q _g		6	7	nC	V _{DS} =15V, V _{GS} =4.5V, I _D =5.8A
Gate-source charge	Q _{gs}		1.3		nC	
Gate-drain charge	Q _{gd}		1.8		nC	
Diode forward voltage	V _{SD}		0.7	1	V	I _S =1A, V _{GS} =0V
Diode forward current	I _S			2	A	
Body Diode Reverse Recovery Time	t _{rr}		8.5		nS	I _F =5.8A, dI/dt=100A/ms
Body Diode Reverse Recovery Charge	Q _{rr}		2.6		nC	I _F =5.8A, dI/dt=100A/ms

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

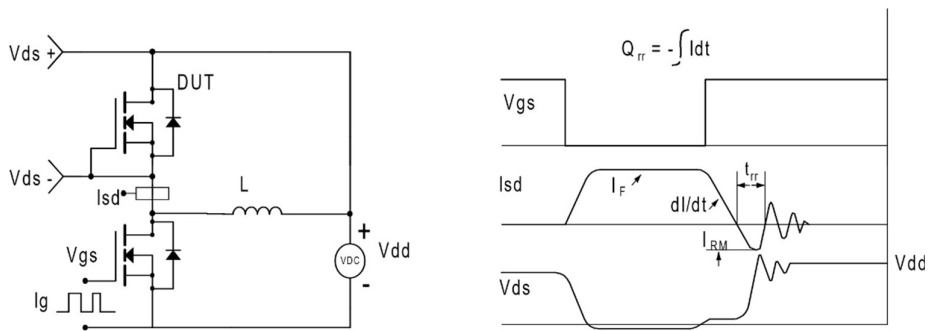
■ Test Circuit



Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

■ Reference Data

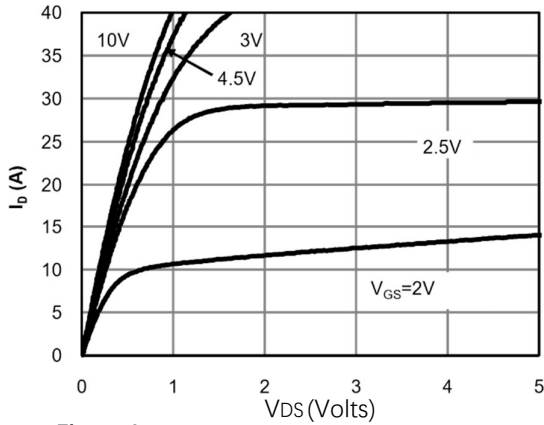


Figure 1: On-Region Characteristics (Note E)

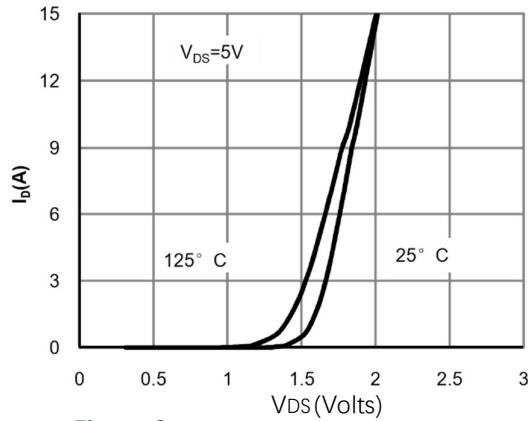


Figure 2: Transfer Characteristics (Note E)

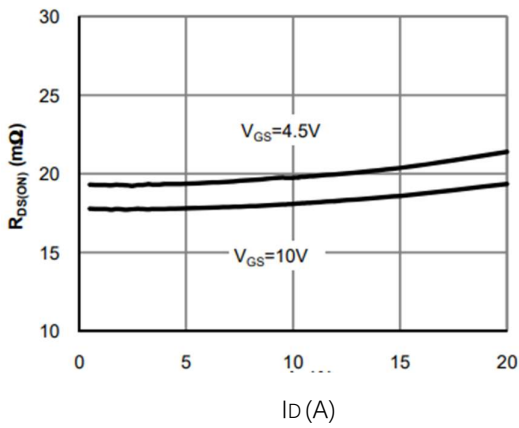


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

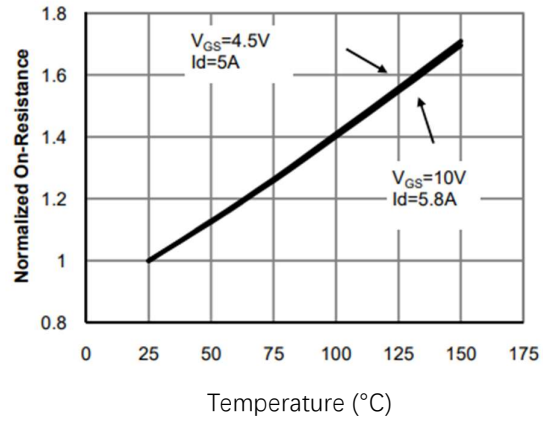


Figure 4: On-Resistance vs. Junction Temperature 18 (Note E)

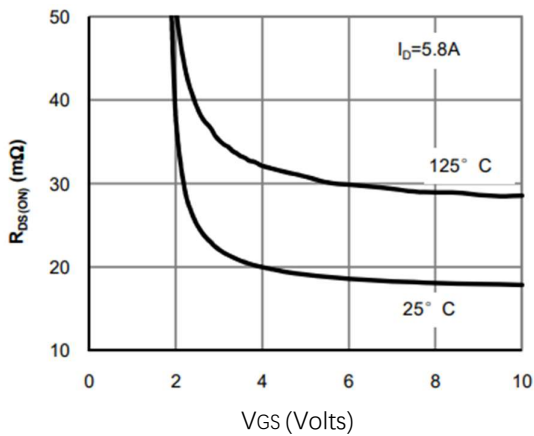


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

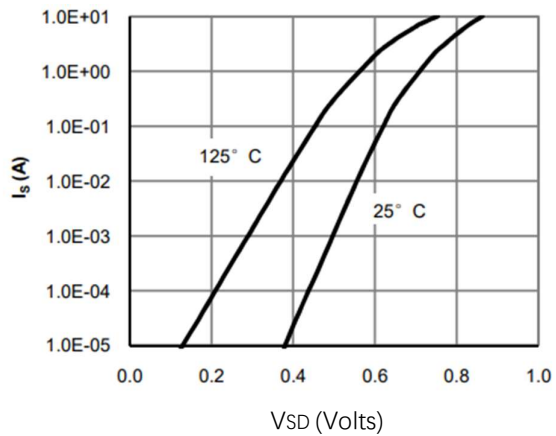


Figure 6: Body-Diode Characteristics (Note E)

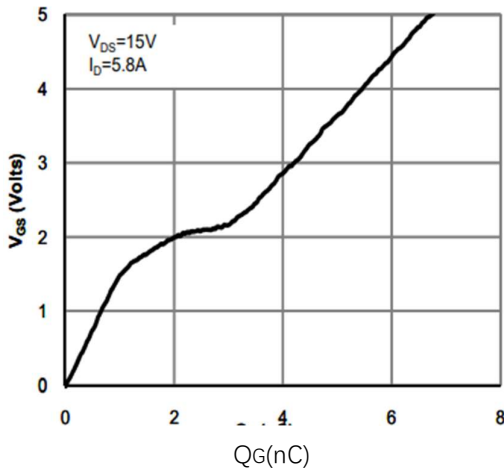


Figure 7: Gate-Charge Characteristics

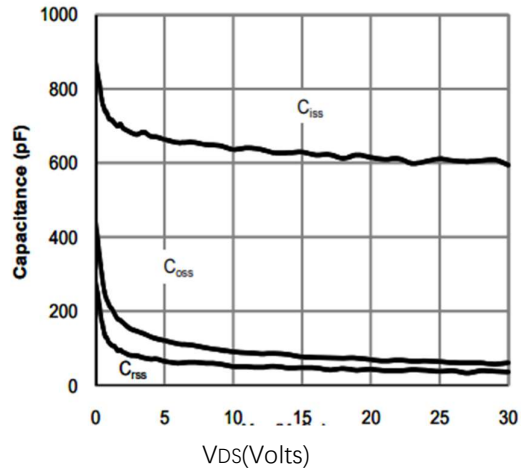


Figure 8: Capacitance Characteristics

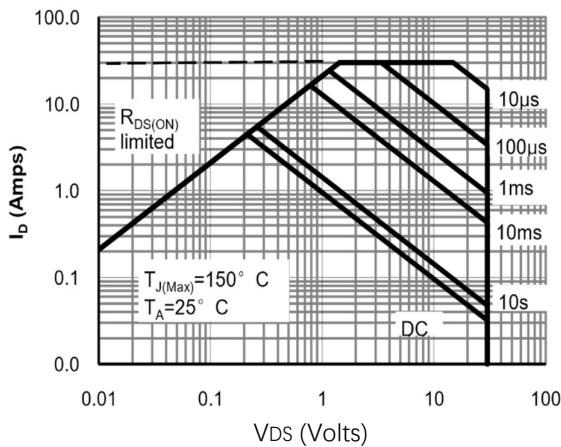


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

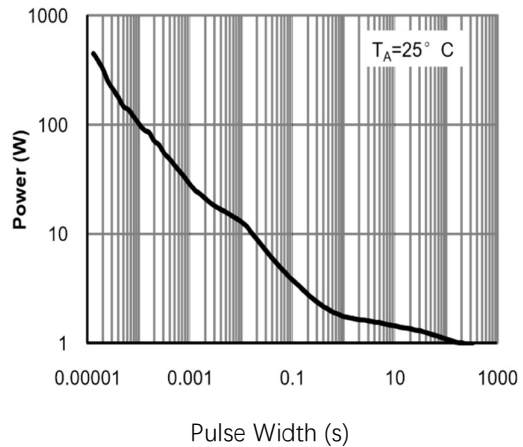


Figure 10: Single Pulse Power Rating Junction-to Ambient (Note F)

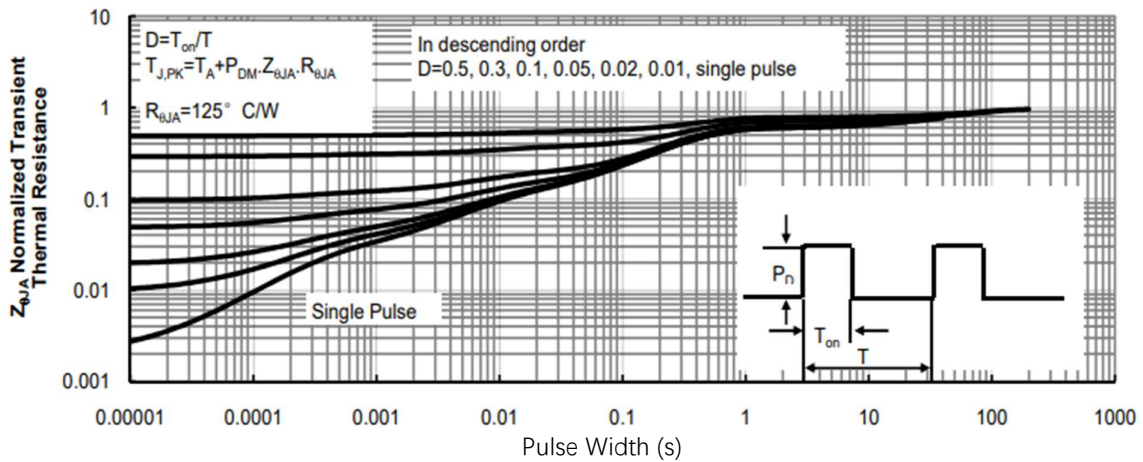
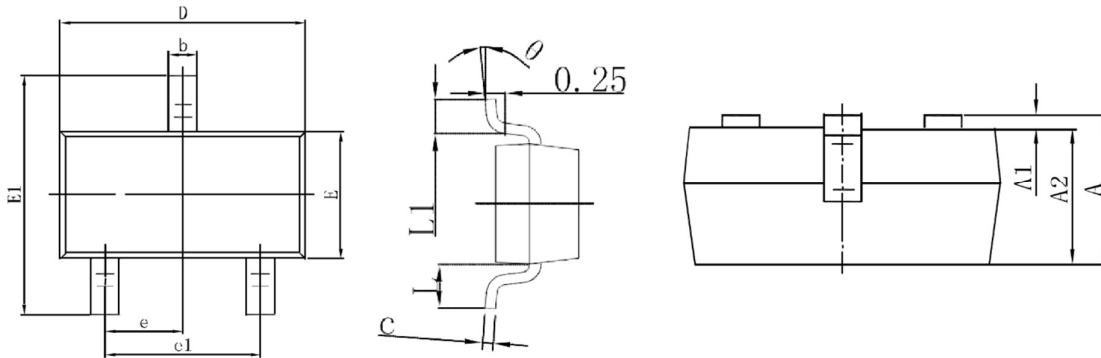


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

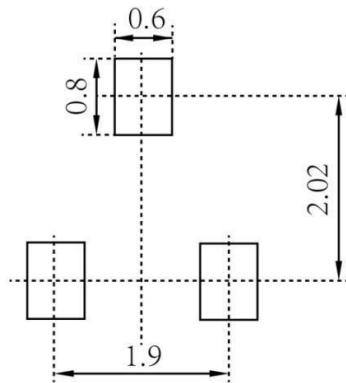
■ Package Information

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°

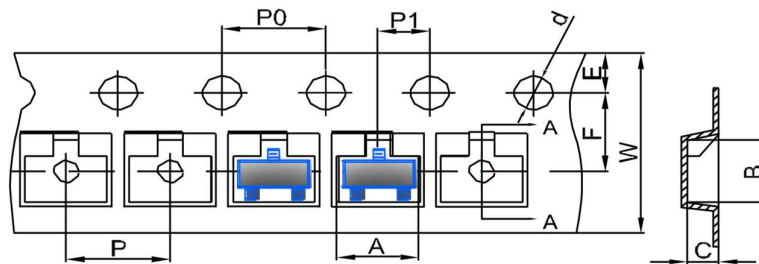
SOT-23 Suggested Pad Layout



Note:

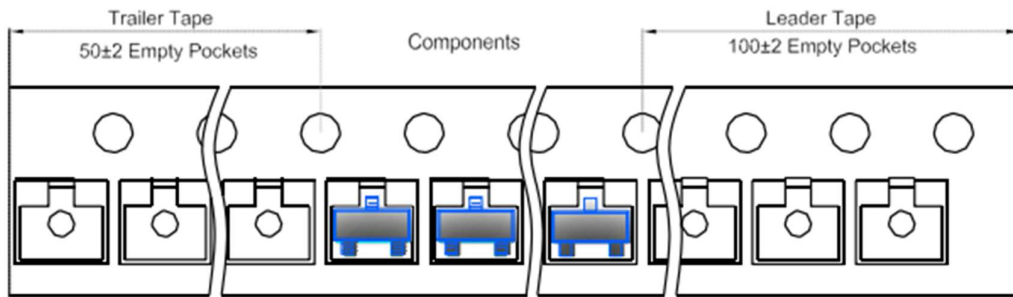
- 1, Controlling dimension: in millimeters.
- 2, General tolerance: $\pm 0.05\text{mm}$.
- 3, The pad layout is for reference purposes only.

SOT-23 Embossed Carrier Tape

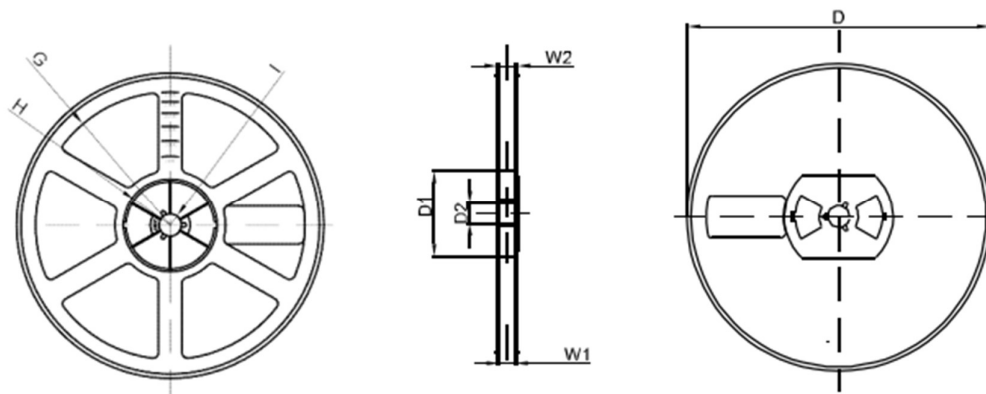


DIMENSIONS(mm)										
TYPE	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	$\text{Ø}1.50$	1.75	3.50	4.00	4.00	2.00	8.00
TOLERANCE	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1

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