74V1T79

SINGLE POSITIVE EDGE TRIGGERED D-TYPE FLIP-FLOP

- HIGH SPEED:
  f_{MAX} = 180MHz (TYP.) at V_{CC} = 5V
  t_{CK-Q} = 3.9ns (TYP.) at V_{CC} = 5V
- LOW POWER DISSIPATION:
  I_{CC} = 1µA(MAX.) at T_A=25°C
- COMPATIBLE WITH TTL OUTPUTS:
  V_{IH} = 2V (MIN), V_{IL} = 0.8V (MAX)
- POWER DOWN PROTECTION ON INPUTS
- SYMMETRICAL OUTPUT IMPEDANCE:
  $|I_{OH}| = I_{OL}$ = 8mA (MIN) at V_{CC} = 4.5V
- BALANCED PROPAGATION DELAYS:
  $t_{PLH} \cong t_{PHL}$
- OPERATING VOLTAGE RANGE:
  V_{CC}(OPR) = 4.5V to 5.5V
- IMPROVED LATCH-UP IMMUNITY

SOT23-5L

SOT323-5L

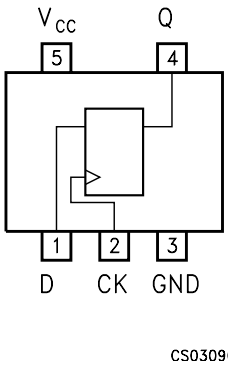
ORDER CODES

PACKAGE	T & R
SOT23-5L	74V1T79STR
SOT323-5L	74V1T79CTR

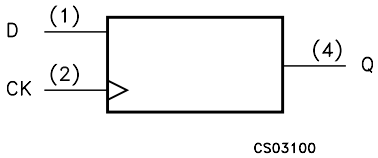
DESCRIPTION

The 74V1T79 is an advanced high-speed CMOS SINGLE POSITIVE EDGE TRIGGERED D-TYPE FLIP-FLOP fabricated with sub-micron silicon gate and double-layer metal wiring C^2MOS technology. It is designed to operate from 4.5V to 5.5V, making this device ideal for portable applications.
This D-Type flip-flop is controlled by a clock input (CK). On the positive transition of the clock, the Q output will be set to the logic state that was setup at the D input.
Following the hold time interval, data at the D input can be changed without affecting the level at the output. Power down protection is provided on inputs and 0 to 7V can be accepted on inputs with no regard to the supply voltage. This device can be used to interface 5V to 3V systems.
It's available in the commercial and extended temperature range.
All inputs and output are equipped with protection circuits against static discharge, giving them ESD immunity and transient excess voltage.

PIN CONNECTION AND IEC LOGIC SYMBOLS

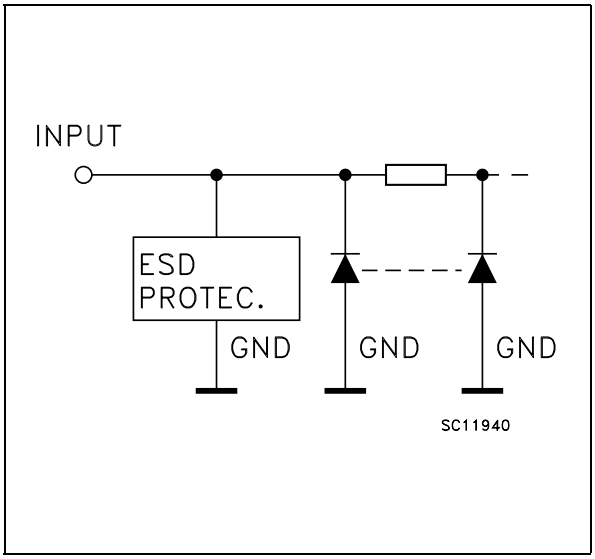


CS03090



CS03100

INPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

PIN N°	SYMBOL	NAME AND FUNCTION
1	D	Data Input
2	CK	Clock Input (Positive Edge)
4	Q	Flip-Flop Output
3	GND	Ground (0V)
5	V_{CC}	Positive Supply Voltage

TRUTH TABLE

D	CK	Q
L	⌐¬	L
H	⌐¬	H
L	¬⌐	Qn
H	¬⌐	Qn

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	-0.5 to +7.0	V
V_I	DC Input Voltage	-0.5 to +7.0	V
V_O	DC Output Voltage	-0.5 to V_{CC} + 0.5	V
I_{IK}	DC Input Diode Current	- 20	mA
I_{OK}	DC Output Diode Current	± 20	mA
I_O	DC Output Current	± 25	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	± 50	mA
T_{stg}	Storage Temperature	-65 to +150	°C
T_L	Lead Temperature (10 sec)	300	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	4.5 to 5.5	V
V_I	Input Voltage	0 to 5.5	V
V_O	Output Voltage	0 to V_{CC}	V
T_{op}	Operating Temperature	-55 to 125	°C
dt/dv	Input Rise and Fall Time (note 1) (V_{CC} = 5.0 ± 0.5V)	0 to 20	ns/V

1) V_{IN} from 0.8V to 2V

DC SPECIFICATIONS

Symbol	Parameter	Test Condition		Value							Unit
		V_{CC} (V)		T_A = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
V_{IH}	High Level Input Voltage	4.5 to 5.5		2			2		2		V
V_{IL}	Low Level Input Voltage	4.5 to 5.5				0.8		0.8		0.8	V
V_{OH}	High Level Output Voltage	4.5	I_O=-50 µA	4.4	4.5		4.4		4.4		V
		4.5	I_O=-8 mA	3.94			3.8		3.7		
V_{OL}	Low Level Output Voltage	4.5	I_O=50 µA		0.0	0.1		0.1		0.1	V
		4.5	I_O=8 mA			0.36		0.44		0.55	
I_I	Input Leakage Current	0 to 5.5	V_I = 5.5V or GND			± 0.1		± 1.0		± 1.0	µA
I_{CC}	Quiescent Supply Current	5.5	V_I = V_{CC} or GND			1		10		20	µA
$^+I_{CC}$	Additional Worst Case Supply Current	5.5	One Input at 3.4V, other input at V_{CC} or GND			1.35		1.5		1.5	mA

AC ELECTRICAL CHARACTERISTICS (Input t_r = t_f = 3ns)

Symbol	Parameter	Test Condition			Value							Unit
		V_{CC} (V)	C_L (pF)		T_A = 25°C			-40 to 85°C		-55 to 125°C		
					Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
t_{PLH} t_{PHL}	Propagation Delay Time CK to Q	5.0 (*)	15			3.9	5.5	1.0	6.5	1.0	7.5	ns
		5.0 (*)	50			4.5	6.5	1.0	7.5	1.0	8.5	
t_W	CK Pulse Width, HIGH or LOW	5.0 (*)			3.0			3.0		3.0		ns
t_s	Setup Time D to CK, HIGH or LOW	5.0 (*)			2.0			2.0		2.0		ns
t_h	Hold Time D to CK, HIGH or LOW	5.0 (*)			1.0			1.0		1.0		ns
f_{MAX}	Maximum Clock Frequency	5.0 (*)	50		120	180		120		120		MHz

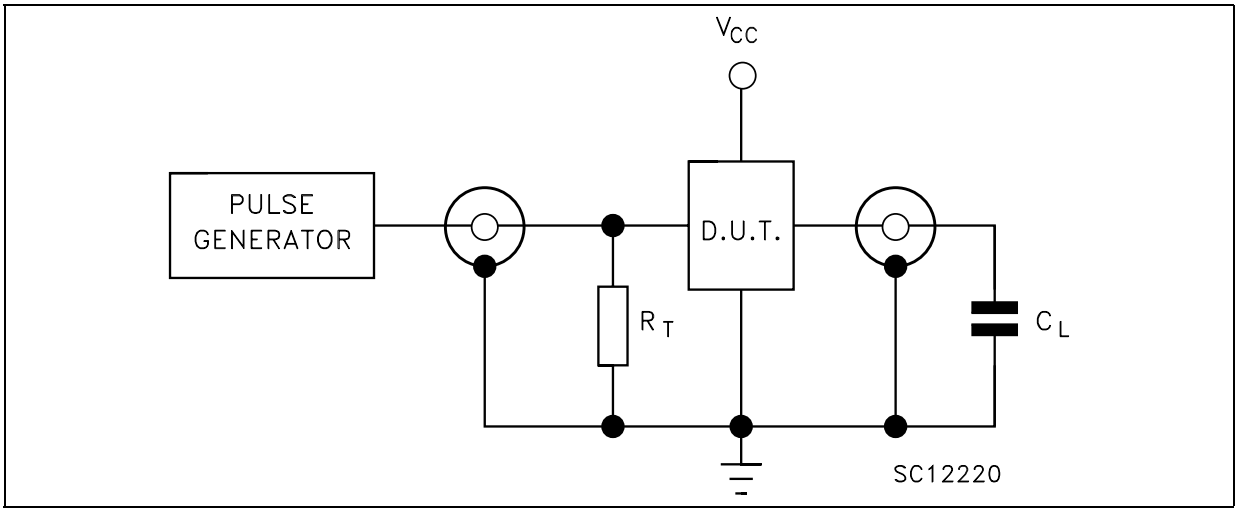
(*) Voltage range is 5.0V ± 0.5V

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Condition	Value							Unit
			T_A = 25°C			-40 to 85°C		-55 to 125°C		
			Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
C_{IN}	Input Capacitance			4	10		10		10	pF
C_{PD}	Power Dissipation Capacitance (note 1)			8						pF

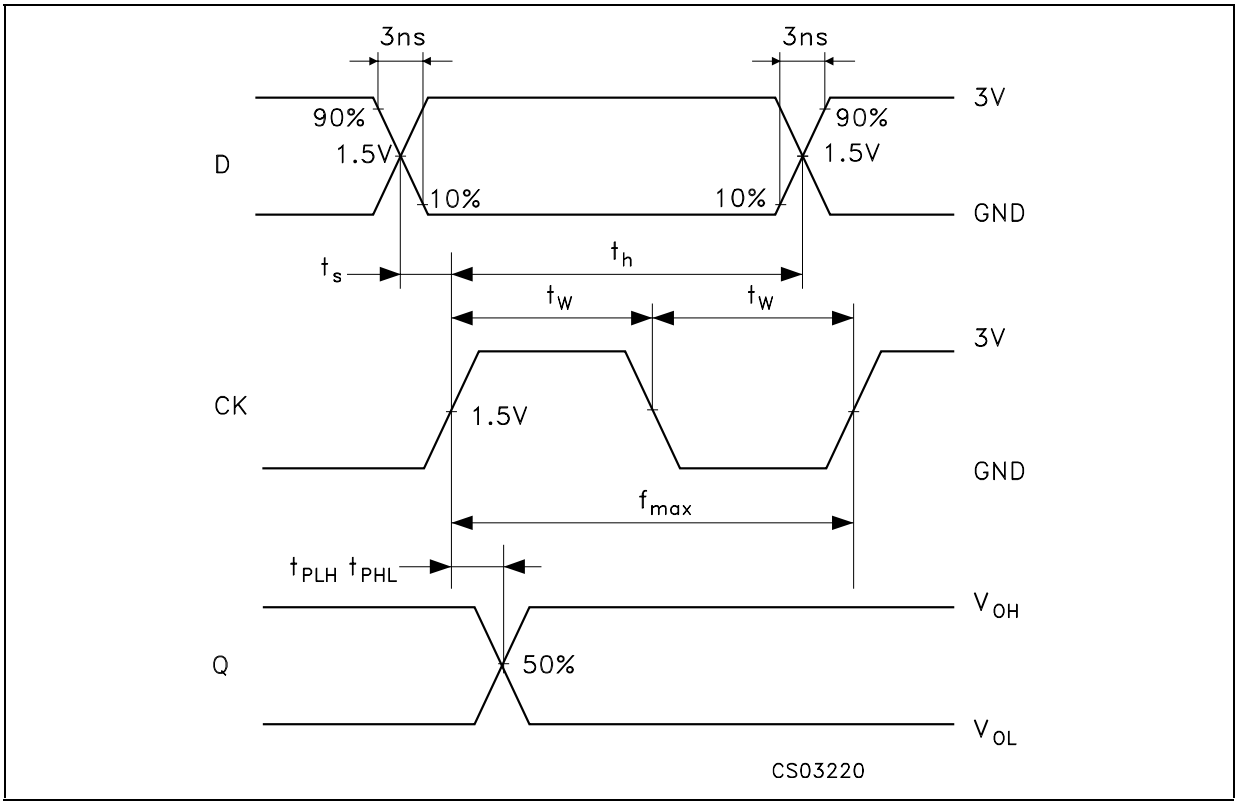
1) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}$

TEST CIRCUIT



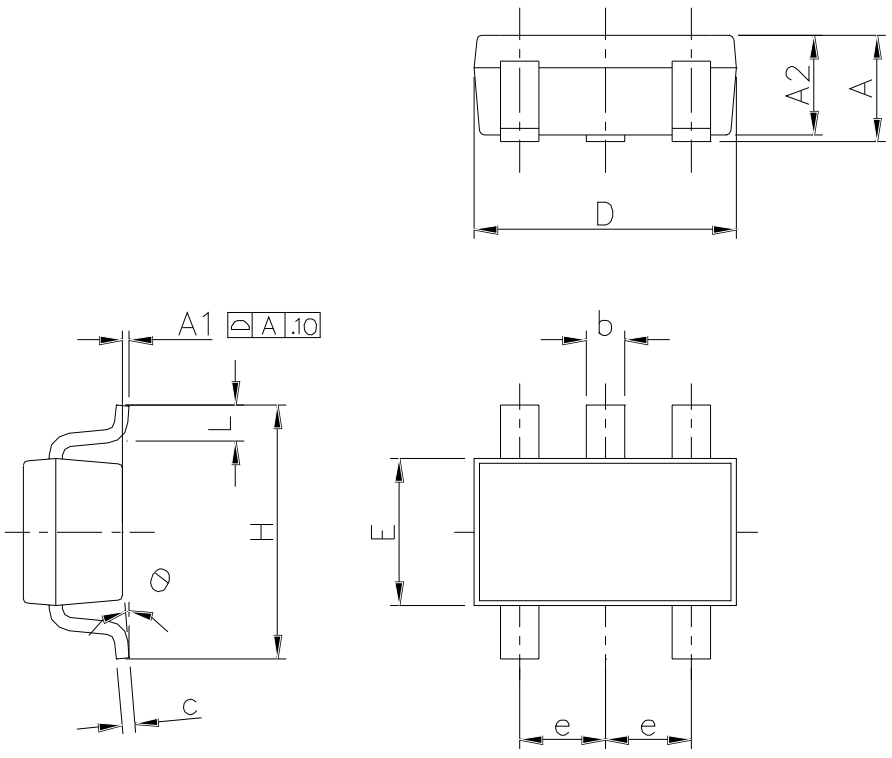
C_L = 15/50pF or equivalent (includes jig and probe capacitance)
R_T = Z_{OUT} of pulse generator (typically 50Ω)

WAVEFORM: PROPAGATION DELAY, SETUP AND HOLD TIMES (f=1MHz; 50% duty cycle)



SOT23-5L MECHANICAL DATA

DIM.	mm.			mils		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	0.90		1.45	35.4		57.1
A1	0.00		0.10	0.0		3.9
A2	0.90		1.30	35.4		51.2
b	0.35		0.50	13.7		19.7
C	0.09		0.20	3.5		7.8
D	2.80		3.00	110.2		118.1
E	1.50		1.75	59.0		68.8
e		0.95			37.4	
H	2.60		3.00	102.3		118.1
L	0.10		0.60	3.9		23.6



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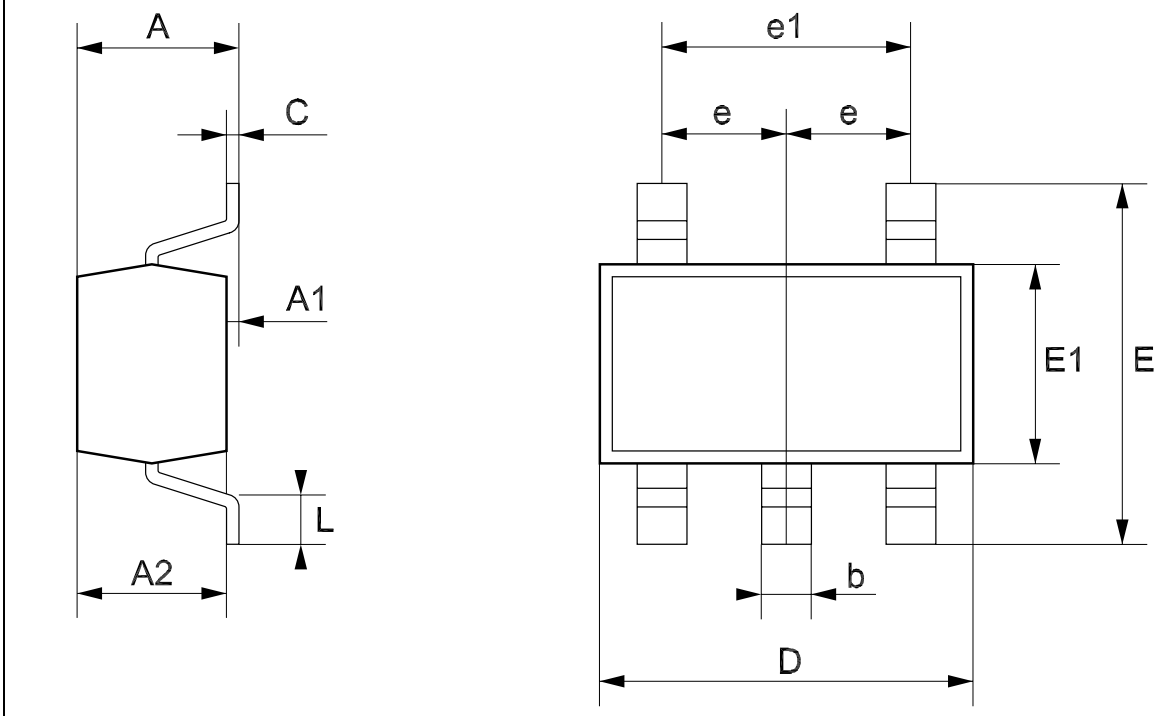
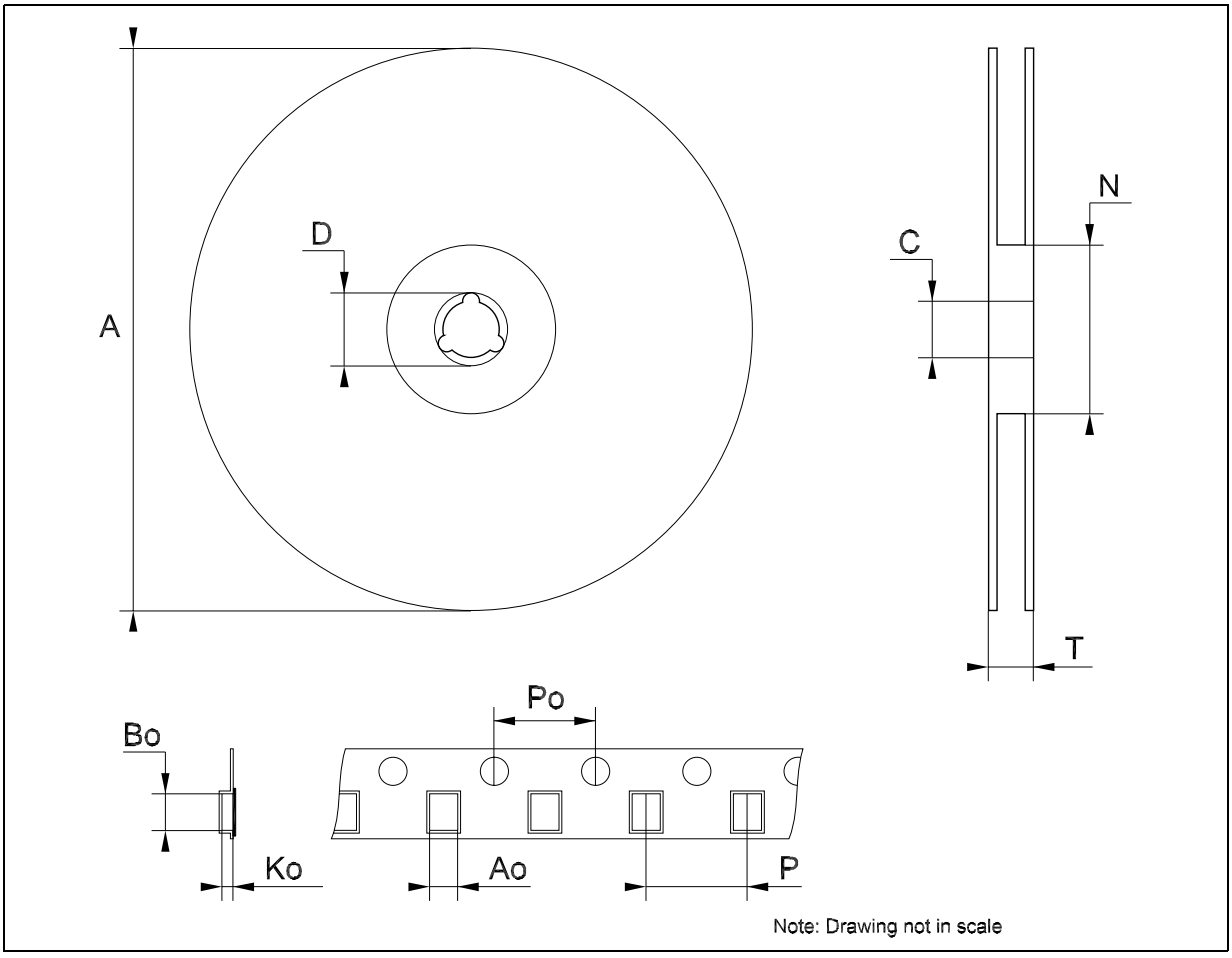
SOT323-5L MECHANICAL DATA

DIM.	mm.			mils		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	0.80		1.10	31.5		43.3
A1	0.00		0.10	0.0		3.9
A2	0.80		1.00	31.5		39.4
b	0.15		0.30	5.9		11.8
C	0.10		0.18	3.9		7.1
D	1.80		2.20	70.9		86.6
E	1.80		2.40	70.9		94.5
E1	1.15		1.35	45.3		53.1
e		0 .65			25.6	
e1		1.3			51.2	
L	0.10		0.30	3.9		11.8



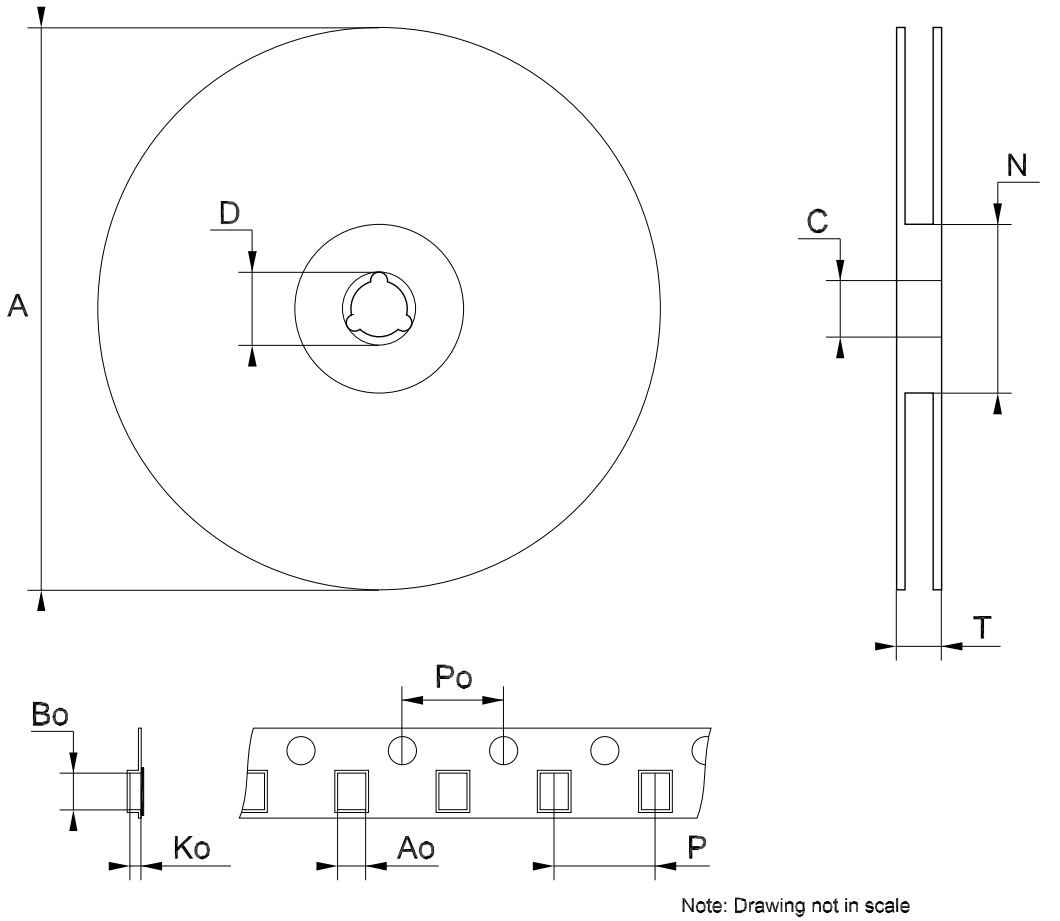
Tape & Reel SOT23-xL MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			180			7.086
C	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
T			14.4			0.567
Ao	3.13	3.23	3.33	0.123	0.127	0.131
Bo	3.07	3.17	3.27	0.120	0.124	0.128
Ko	1.27	1.37	1.47	0.050	0.054	0.0.58
Po	3.9	4.0	4.1	0.153	0.157	0.161
P	3.9	4.0	4.1	0.153	0.157	0.161



Tape & Reel SOT323-xL MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	175	180	185	6.889	7.086	7.283
C	12.8	13	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	59.5	60	60.5		2.362	
T			14.4			0.567
Ao		2.25			0.088	
Bo		2.7			0.106	
Ko		1.2			0.047	
Po	3.9	4	4.1	0.153	0.157	0.161
P	3.8	4	4.2	0.149	0.157	0.165



Note: Drawing not in scale