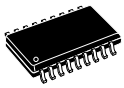
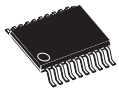
ST3384E

±15KV ESD-PROTECTED, 3 TO 5.5V, LOW POWER, UP TO 250KBPS, RS-232 TRANSCEIVER

- ESD PROTECTIO FOR RS-232 I/O PINS ±15KV (HUMAN BODY MODEL)
- LATCHUP FREE
- 1µA LOW POWER SHUTDOWN
- 300µA SUPPLY CURRENT
- 250Kbps GUARENTEED DATA RATE
- 20µs TYPICAL TIME TO EXIT SHUTDOWN
- 6V/µs GUARANTEED SLEW RATE
- MEET EIA/TIA-232 SPECIFICATIONS DOWN TO 3V
- PACKAGES: SO-18 AND SSOP-20



SO-18



SSOP20

DESCRIPTION

The ST3384E is a 3V powered EIA/TIA-232 and V.28/V.24 communications interface with low power requirements, high data-rate capabilities and enhanced electrostatic discharge (ESD) protection. All transmitter outputs and receiver inputs are protected to ±15kV using the Human Body Model. The ST3384E has a proprietary low dropout transmitter output stage enabling true RS-232 performance from 3 to 5.5V supplies with a dual charge pump. The charge pump require only four small 0.1µF external capacitors for operation from a 3.3V supply.

The device is guaranteed to run at data rates of 250Kbps while maintaining RS-232 output levels. The ST3384E has two receivers and two drivers. It features a 1µA shutdown mode that reduces power consumption and extends battery life in portable systems.

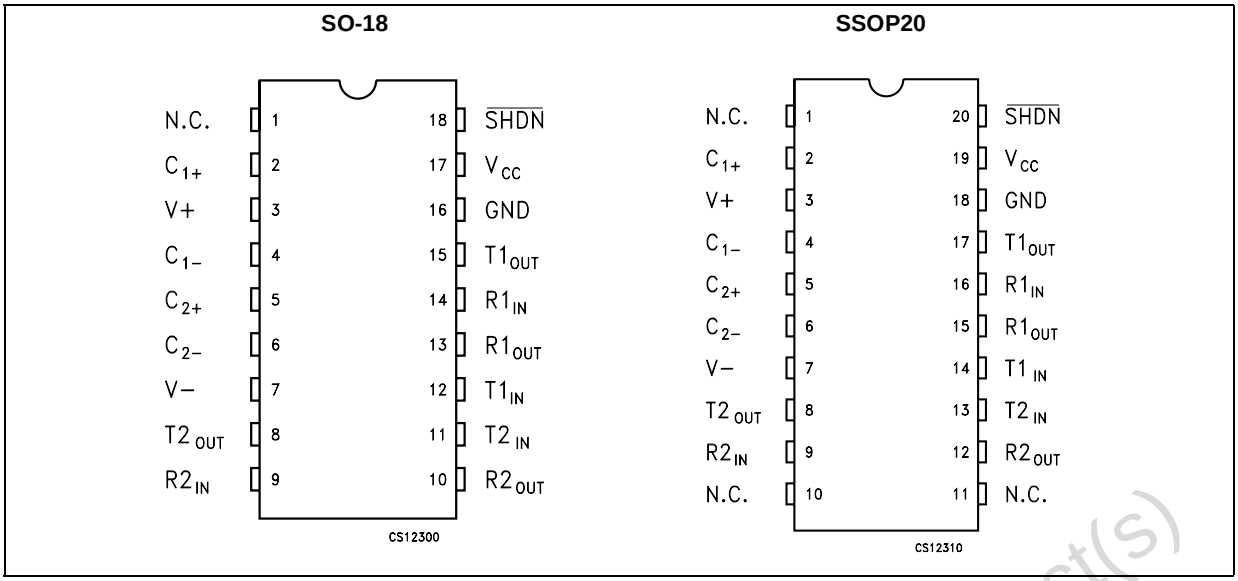
Typical applications are in Notebook, Sub-notebook, and Palmtop Computers, Battery Powered Equipment, Hand-Held Equipment, Peripherals, Printers.

ORDERING CODES

Type	Temperature Range	Package	Comments
ST3384ECD	0 to 70 °C	SO-18 (Tube)	50 parts per tube / 20 tube per box
ST3384EBD	-40 to 85 °C	SO-18 (Tube)	50 parts per tube / 20 tube per box
ST3384ECDR	0 to 70 °C	SO-18 (Tape & Reel)	1000 parts per reel
ST3384EBDR	-40 to 85 °C	SO-18 (Tape & Reel)	1000 parts per reel
ST3384ECPR	0 to 70 °C	SSOP20 (Tape & Reel)	1350 parts per reel
ST3384EBPR	-40 to 85 °C	SSOP20 (Tape & Reel)	1350 parts per reel

Obsolete Product(s) - Obsolete Product(s)

PIN CONFIGURATION



PIN DESCRIPTION

PIN N° (SO-18)	PIN N° (SSOP20)	SYMBOL	NAME AND FUNCTION
1	1, 10, 11	N.C.	Not Connected
2	2	C_1+	Positive Terminal for the first Charge Pump Capacitor
3	3	V+	5.5V Generated By The Charge Pump
4	4	C_1-	Negative Terminal for the first Charge Pump Capacitor
5	5	C_2+	Positive Terminal for the second Charge Pump Capacitor
6	6	C_2-	Negative Terminal for the second Charge Pump Capacitor
7	7	V-	-5.5V Generated By The Charge Pump
8	8	$T2_{OUT}$	Second Transmitter Output Voltage
9	9	$R2_{IN}$	Second Receiver Input Voltage
10	12	$R2_{OUT}$	Second Receiver Output Voltage
11	13	$T2_{IN}$	Second Transmitter Input Voltage
12	14	$T1_{IN}$	First Transmitter Input Voltage
13	15	$R1_{OUT}$	First Receiver Output Voltage
14	16	$R1_{IN}$	First Receiver Input Voltage
15	17	$T1_{OUT}$	First Transmitter Output Voltage
16	18	GND	Ground
17	19	V_{CC}	3V to 5.5V Supply Voltage. Connect a 0.1µF capacitor to GND
18	20	$\overline{SHDN}$	Active Low Shutdown Control Input. Drive Low To Shut-down Transmitters, receiver and Charge Pump

Obsolete Product(s) - Obsolete Product(s)

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage (V_{CC} to GND)	-0.3 to 6	V
V+	Doubled Voltage Terminal (V+ to GND) (Note 1)	(V_{CC} - 0.3) to 7	V
V-	Inverted Voltage Terminal (V- to GND) (Note 1)	0.3 to -7	V
V+ +|V-|	(Note 1)	13	V
T_{IN}	Transmitter Input Voltage	-0.3 to 6	V
$\overline{SHDN}$	Shutdown Input Voltage ($\overline{SHDN}$ to GND)	-0.3 to 6	V
R_{IN}	Receiver Input Voltage (R_{IN} to GND)	± 25	V
T_{OUT}	Transmitter Output Voltage (T_{OUT} to GND)	± 13.2	V
R_{OUT}	Receiver Output Voltage	-0.3 to (V_{CC} + 0.3)	V
t_{SHORT}	Transmitter Output Short to GND Time	Continuous	

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied. V+ and V- can have a maximum magnitude of +7V, but their absolute addition cannot exceed 13 V.
Note 1: V+ and V- can have maximum magnitude of 7V, but their absolute difference cannot exceed 13V.

SHUTDOWN TRUTH TABLE

$\overline{SHDN}$	T-OUT	R-OUT
L	High Z	High Z
H	Active	Active

ELECTRICAL CHARACTERISTICS

(C_1 - C_4 = 0.1µF, V_{CC} = 3V to 5.5V, tested at 3.3V ±10% C_1 = 0.047µF, C_2 - C_4 = 0.33µF tested at 5V ±10% -40°C < T_A < 85°C unless otherwise noted. Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CC}	V_{CC} Power Supply Current	$\overline{SHDN}$ = NO LOAD		0.3	1	mA
I_{SHDN}	SHUTDOWN Supply Current	$\overline{SHDN}$ = GND		1	10	µA
ESD	R-IN, T-OUT Electrostatic Discharge Immunity	Human Body Model		±15		kV

LOGIC INPUT ELECTRICAL CHARACTERISTICS

(C_1 - C_4 = 0.1µF, V_{CC} = 3V to 5.5V, tested at 3.3V ±10% C_1 = 0.047µF, C_2 - C_4 = 0.33µF tested at 5V ±10% -40°C < T_A < 85°C unless otherwise noted. Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
V_{IL}	Input Logic Threshold Low	T-IN, $\overline{SHDN}$				0.8	V
V_{IH}	Input Logic Threshold High	T-IN, $\overline{SHDN}$	V_{CC} = 3.3V	2			V
		T-IN, $\overline{SHDN}$	V_{CC} = 5.0V	2.4			
V_{HYS}	Transmitter Input Hysteresis				0.5		V
I_{IL}	Input Leakage Current	T-IN, $\overline{SHDN}$			± 0.01	± 1	µA

Obsolete Product(s) - Obsolete Product(s)

TRANSMITTER ELECTRICAL CHARACTERISTICS

(C_1 - C_4 = 0.1µF, V_{CC} = 3V to 5.5V, tested at 3.3V ±10% C_1 = 0.047µF, C_2 - C_4 = 0.33µF tested at 5V ±10% -40°C < T_A < 85°C unless otherwise noted. Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{TOUT}	Output Voltage Swing	All Transmitter outputs loaded with 3 KΩ to GND	± 5	± 5.4		V
R_{TOUT}	Transmitter Output Resistance	V_{CC} = V+ = V- = 0V Transmitter output = ± 2V	300	10M		Ω
I_{TSC}	Output Short Circuit Current			± 50		mA
I_{TOL}	Output Leakage Current	V_{CC} = 0V or 3V to 5.5V V_{OUT} = ± 12V Transmitters Disabled			± 25	µA

RECEIVER DC TARGET ELECTRICAL CHARACTERISTICS

(C_1 - C_4 = 0.1µF, V_{CC} = 3V to 5.5V, tested at 3.3V ±10% C_1 = 0.047µF, C_2 - C_4 = 0.33µF tested at 5V ±10% -40°C < T_A < 85°C unless otherwise noted. Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{OL}	Output Leakage Current	R-OUT, Receiver Disabled		± 0.05	± 10	µA
V_{RIN}	Input Voltage Operating Range		-25		± 25	V
V_{RIL}	Input Threshold Low	T_A = 25°C V_{CC} = 3.3V	0.6	1.2		V
		T_A = 25°C V_{CC} = 5.5V	0.8	1.5		
V_{RITH}	Input Threshold High	T_A = 25°C V_{CC} = 3.3V		1.5	2.4	V
		T_A = 25°C V_{CC} = 5.5V		1.8	2.4	
V_{RIH}	Input Hysteresis			0.5		V
R_{RIN}	Input Resistance	T_A = 25°C	3	5	7	KΩ
V_{ROL}	TTL/CMOS Output Voltage Low	I_{OUT} = 2 mA			0.4	V
V_{ROH}	TTL/CMOS Output Voltage High	I_{OUT} = -1 mA	V_{CC}-0.6	V_{CC}-0.1		V

TIMING TARGET ELECTRICAL CHARACTERISTICS

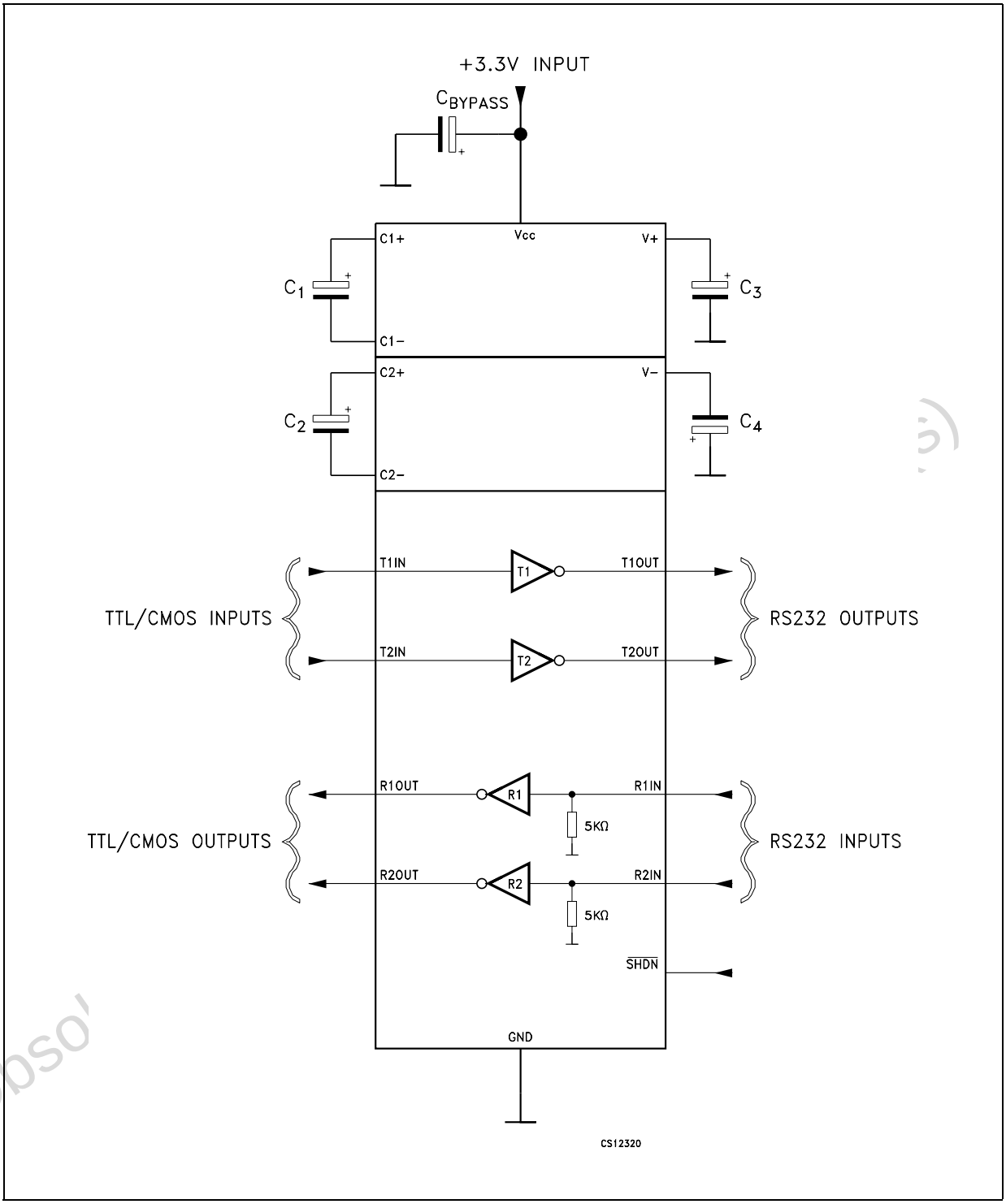
(C_1 - C_4 = 0.1µF, V_{CC} = 3V to 5.5V, tested at 3.3V ±10% C_1 = 0.047µF, C_2 - C_4 = 0.33µF tested at 5V ±10% -40°C < T_A < 85°C unless otherwise noted. Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
D_R	Maximum Data Rate	R_L = 3 KΩ C_{L2}= 1000pF one transmitter switching	250			Kbps
t_{PHLR} t_{PLHR}	Receiver Propagation Delay	R_{XIN} to R_{XOUT} C_L = 150pF		0.15		µs
$\|t_{PHLT} - t_{PLHT}\|$	Transmitter Propagation Delay Difference (Note 1)	(Note 1)		150		ns
$\|t_{PHLR} - t_{PLHR}\|$	Receiver Propagation Delay Difference			100		ns
t_{EX}	Time to Exit Shutdown	V_{OUT} ≥ 3V, R_{LOAD} at V+ = 3 KΩ		20		µs
S_{RT}	Transition Slew Rate	T_A = 25°C R_L = 3KΩ to 7KΩ V_{CC} = 3.3V Measured from +3V to -3V or -3V to +3V C_L = 150pF to 1000pF C_L = 150pF to 2500pF	 6 4	 8 8	 30 30	 V/µs V/µs

(Note 1) Transmitter Skew is measured at the transmitter zero cross points.

Obsolete product(s) - Obsolete Product(s)

TYPICAL OPERATING CIRCUIT

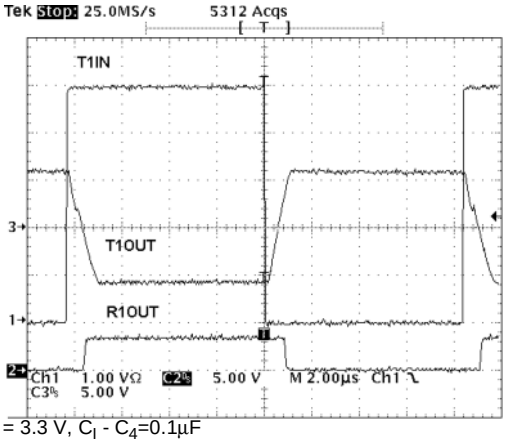


CAPACITANCE VALUE (µF)

C1	C2	C3	C4	Cbypass
0.1	0.1	0.1	0.1	0.1

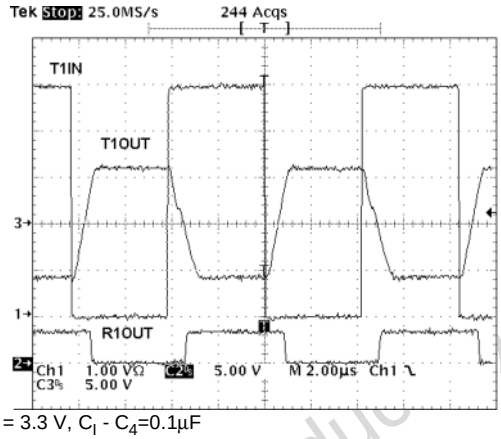
TYPICAL PERFORMANCE CHARACTERISTICS (unless otherwise specified T_j = 25°C)

Figure 1 : Loopback Test Result at 120 kbps



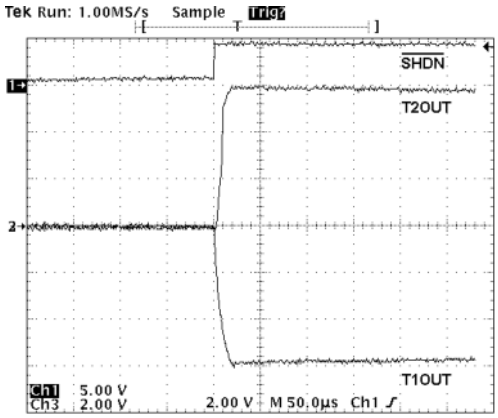
V_{CC} = 3.3 V, C_I - C_4=0.1µF

Figure 2 : Loopback Test Result at 250 kbps



V_{CC} = 3.3 V, C_I - C_4=0.1µF

Figure 3 : Transmitter Outputs Exiting Shutdown or Powering Up

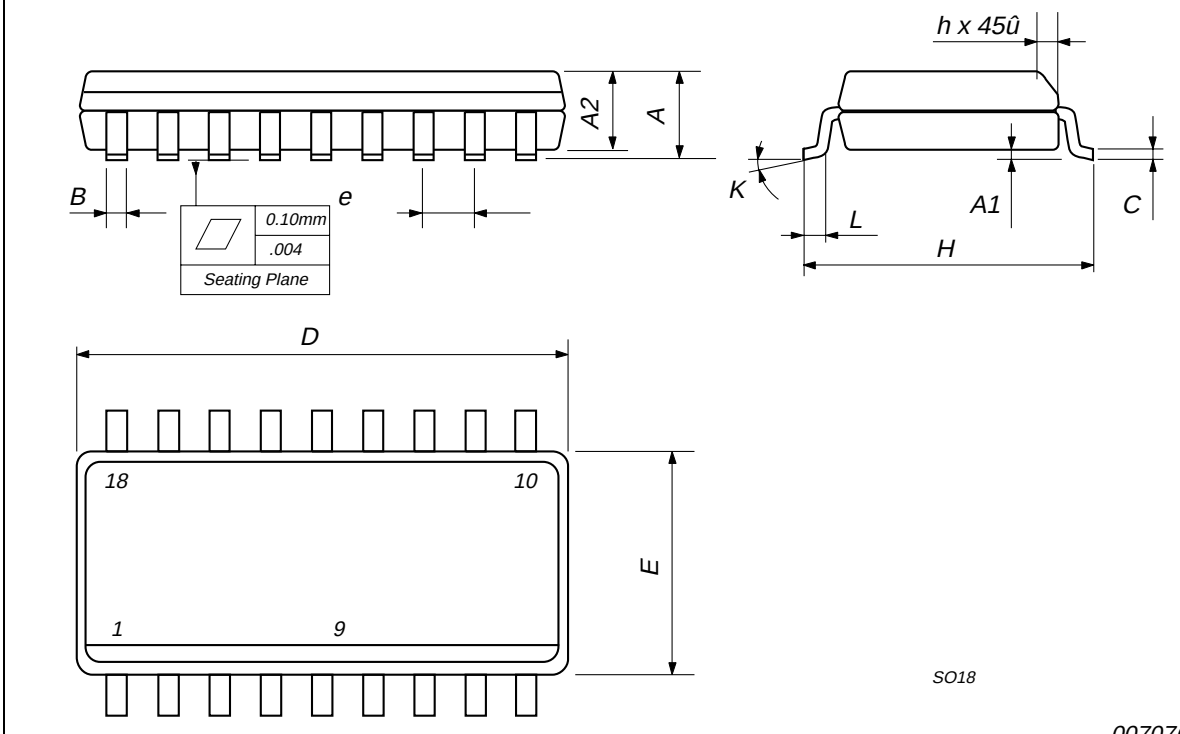


V_{CC} = 5 V, C_I - C_4=0.1µF

Obsolete Product(s) - Obsolete Product(s)

SO-18 MECHANICAL DATA

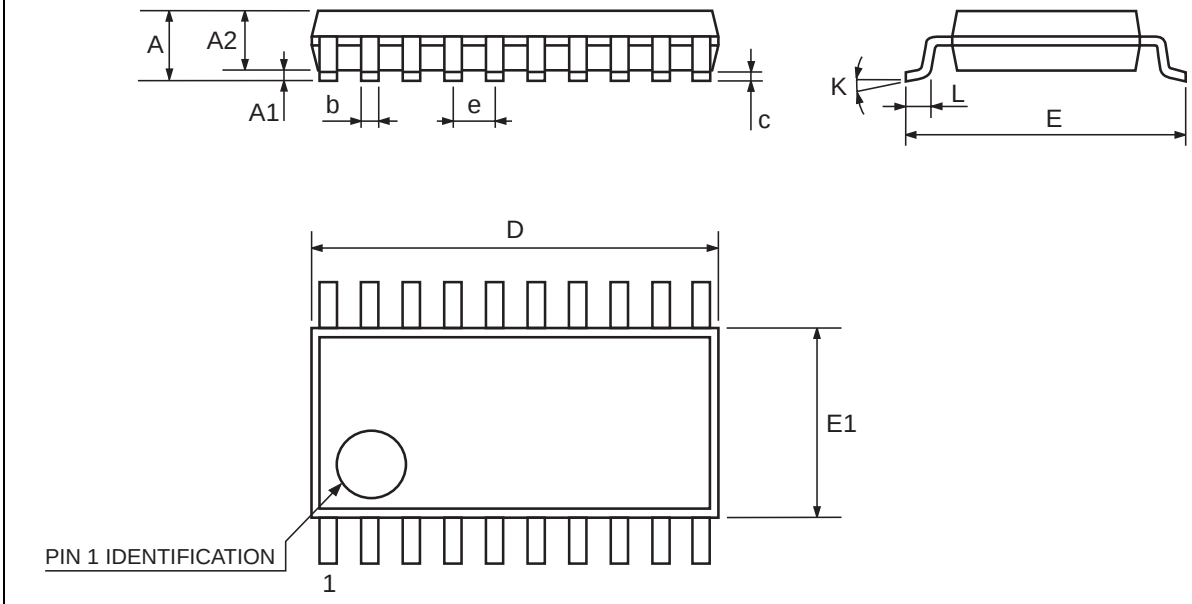
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	2.35		2.65	0.092		0.104
A1	0.1		0.3	0.004		0.012
A2			2.55			0.100
B	0.33		0.51	0.013		0.020
C	0.23		0.32	0.009		0.012
D	11.35		11.75	0.447		0.462
E	7.4		7.6	0.291		0.299
e		1.27			0.050	
H	10.00		10.65	0.393		0.419
h	0.25		0.75	0.010		0.029
k	8		˚ (max.)			
L	0.4		1.27	0.016		0.050



0070768

SSOP20 MECHANICAL DATA

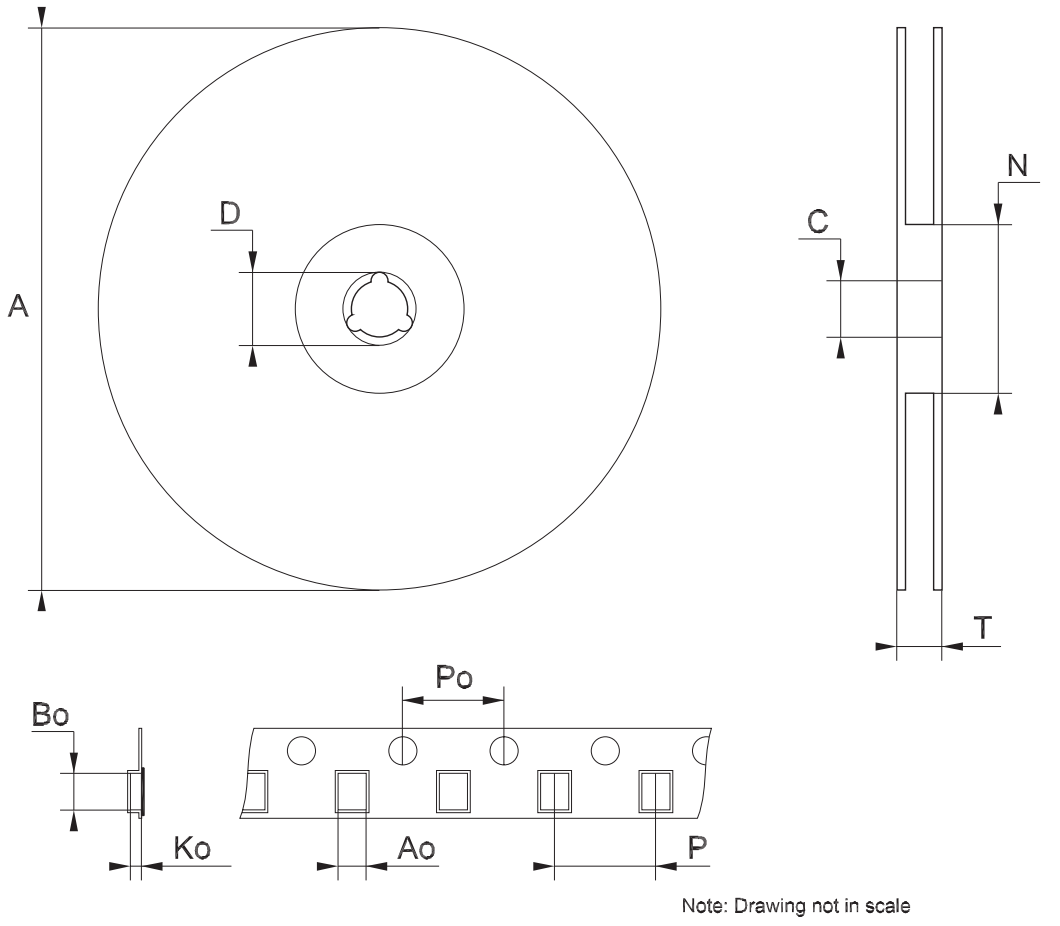
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			2			0.079
A1	0.05			0.002		
A2	1.65	1.75	1.85	0.065	0.069	0.073
b	0.22		0.38	0.009		0.015
c	0.09		0.25	0.004		0.010
D	6.9	7.2	7.5	0.272	0.283	0.295
E	7.4	7.8	8.2	0.291	0.307	0.323
E1	5	5.3	5.6	0.197	0.209	0.220
e		0.65 BSC			0.0256 BSC	
K	0˚	4˚	8˚	0˚	4˚	8˚
L	0.55	0.75	0.95	0.022	0.030	0.037



0061436C

Tape & Reel SO-18 MECHANICAL DATA

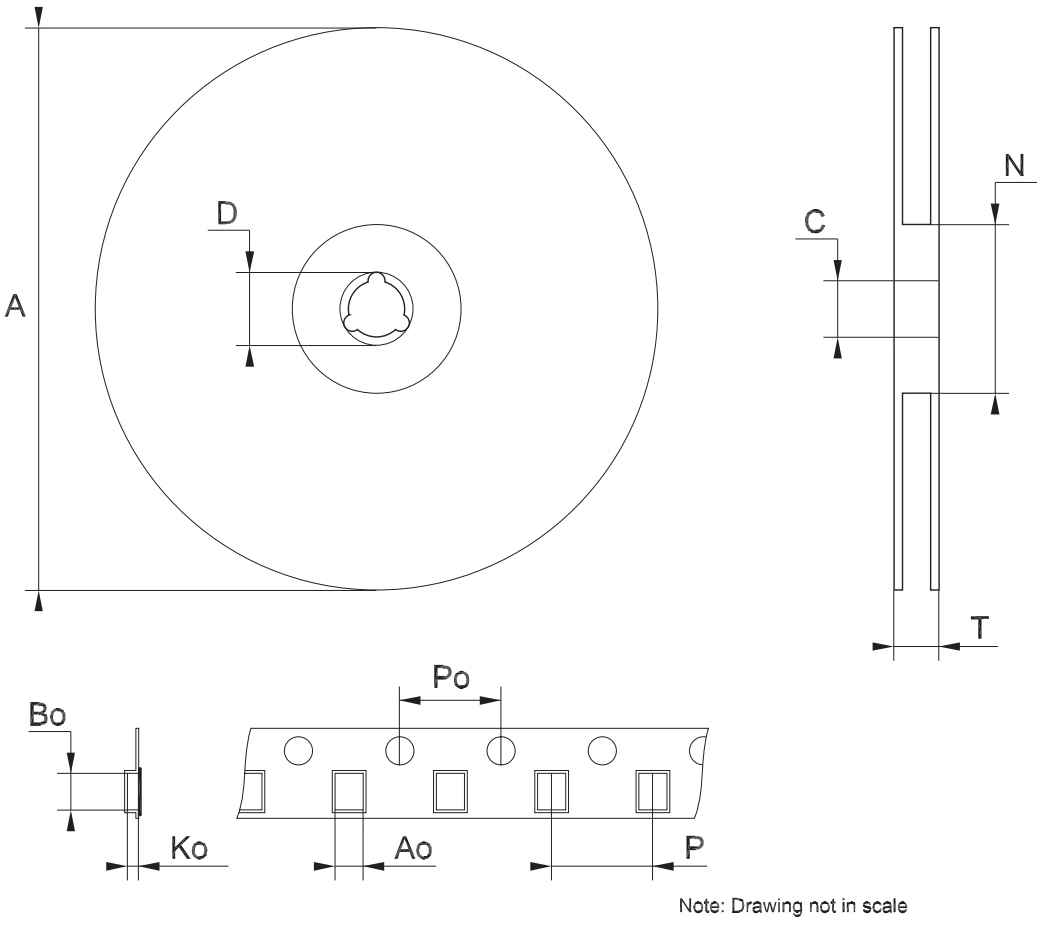
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	10.8		11.0	0.425		0.433
Bo	11.9		12.1	0.468		0.476
Ko	2.9		3.1	0.114		0.122
Po	3.9		4.1	0.153		0.161
P	11.9		12.1	0.468		0.476



Note: Drawing not in scale

Tape & Reel SSOP20 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	8.4		8.6	0.331		0.339
Bo	7.7		7.9	0.303		0.311
Ko	2.9		3.1	0.114		0.122
Po	3.9		4.1	0.153		0.161
P	11.9		12.1	0.468		0.476



Note: Drawing not in scale

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