

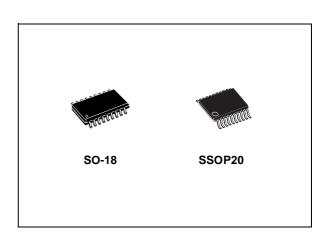


3 TO 3.6V, LOW POWER, UP TO 250KBPS, RS-232 DRIVERS AND RECEIVERS

- 300µA SUPPLY CURRENT
- 250Kbps MINIMUM GUARENTEED DATA RATE
- 6V/ms MINIMUM GUARANTEED SLEW RATE
- MEET EIA/TIA-232 SPECIFICATIONS DOWN TO 3V
- AVAILABLE IN SO-18 AND SSOP20

DESCRIPTION

The ST3384 is a 3V powered EIA/TIA-232 and V.28/V.24 communications interface with low power and requirements high data-rate capabilities. ST3384 has a proprietary low dropout transmitter output stage providing true RS-232 performance from 3 to 3.6V power supplies. The device requires only four small 0.1mF standard external capacitors for operating from 3V supply. The ST3384 has two receivers and two drivers. The ST3384 features a 1mA shutdown mode that reduces power consumption and extends battery life in portable systems. Its receivers can remain active in shutdown mode, allowing external



devices such as modems to be monitored using only 1mA supply current.

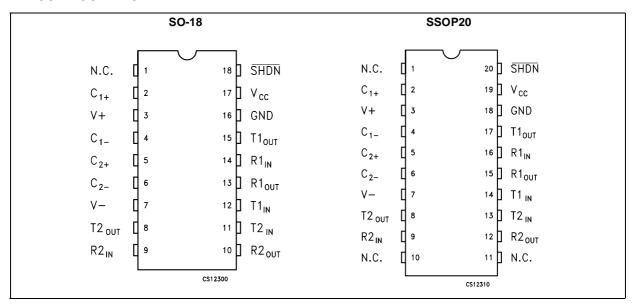
The device is guaranteed to run at data rates of 250Kbps while maintaining RS-232 output levels. Typical applications are Notebook, Sub-notebook and Palmtop Computers, Battery Powered Equipment, Hand-Held Equipment, Peripherals and Printers.

ORDERING CODES

Туре	Temperature Range	Package	Comments
ST3384CD	0 to 70 °C	SO-18 (Tube)	50 parts per tube / 20 tube per box
ST3384BD	-40 to 85 °C	SO-18 (Tube)	50 parts per tube / 20 tube per box
ST3384CDR	0 to 70 °C	SO-18 (Tape & Reel)	1000 parts per reel
ST3384BDR	-40 to 85 °C	SO-18 (Tape & Reel)	1000 parts per reel
ST3384CPR	0 to 70 °C	SSOP20 (Tape & Reel)	1350 parts per reel
ST3384BPR	-40 to 85 °C	SSOP20 (Tape & Reel)	1350 parts per reel

October 2003 1/11

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	SHDN	Active Low Shutdown Control Input. Drive Low To Shut-down Transmitters, receiver and Charge Pump

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
SHDN	Shutdown Input Voltage (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

SHDN	T-OUT	R-OUT
L	High Z	High Z
Н	Active	Active

ELECTRICAL CHARACTERISTICS

 $(C_1$ - C_4 = 0.1 μ F, V_{CC} = 3V to 5.5V, tested at 3.3V ±10% C_1 = 0.047 μ F, C_2 - C_4 = 0.33 μ F 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		Тур.	Max.	Unit
I _{CC}	V _{CC} Power Supply Current	SHDN = NO LOAD		0.3	1	mA
I _{SHDN}	SHUTDOWN Supply Current	SHDN = GND		1	10	μА
ESD	R-IN, T-OUT Electrostatic Discharge Immunity	Human Body Model		±15		kV

LOGIC INPUT ELECTRICAL CHARACTERISTICS

 $(C_1$ - C_4 = 0.1 μ F, V_{CC} = 3V to 5.5V, tested at 3.3V ±10% C_1 = 0.047 μ F, C_2 - C_4 = 0.33 μ F 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.	Тур.	Max.	Unit
V _{IL}	Input Logic Threshold Low	T-IN, SHDN			0.8	V
V _{IH}	Input Logic Threshold High	T-IN, SHDN V _{CC} = 3.3V	2			V
		T-IN, SHDN $V_{CC} = 5.0V$	2.4			
V _{HYS}	Transmitter Input Hysteresis			0.5		V
I _{IL}	Input Leakage Current	T-IN, SHDN		± 0.01	± 1	μΑ

TRANSMITTER ELECTRICAL CHARACTERISTICS

 $(C_1 - C_4 = 0.1 \mu F, \ V_{CC} = 3 \text{V to } 5.5 \text{V, tested at } 3.3 \text{V } \pm 10 \% \ C_1 = 0.047 \mu F, \ C_2 - C_4 = 0.33 \mu F \text{ tested at } 5 \text{V } \pm 10 \% -40 ^{\circ}\text{C} < T_A < 85 ^{\circ}\text{C} \text{ unless otherwise noted. Typical values are referred to } T_A = 25 ^{\circ}\text{C})$

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
V _{TOUT}	Output Voltage Swing	All Transmitter outputs loaded with 3 K $\!\Omega\!$ to GND	± 5	± 5.4		V
R _{TOUT}	Transmitter Output Resistance	$V_{CC} = V + = V - = 0V$ Transmitter output = $\pm 2V$	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	μΑ

RECEIVER DC TARGET ELECTRICAL CHARACTERISTICS

 $(C_1 - C_4 = 0.1 \mu F, V_{CC} = 3V \text{ to } 5.5V, \text{ tested at } 3.3V \pm 10\% C_1 = 0.047 \mu F, C_2 - C_4 = 0.33 \mu F \text{ tested at } 5V \pm 10\% -40^{\circ}C < T_A < 85^{\circ}C \text{ unless otherwise noted.}$ Typical values are referred to $T_A = 25^{\circ}C$)

		• •					
Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit	
I _{OL}	Output Leakage Current	R-OUT, Receiver Disabled		± 0.05	± 10	μΑ	
V_{RIN}	Input Voltage Operating Range		-25		± 25	V	
V _{RIL}	Input Threshold Low	$T_A = 25^{\circ}C$ $V_{CC} = 3.3V$	0.6	1.2		V	
		$T_A = 25^{\circ}C$ $V_{CC} = 5.5V$	0.8	1.5			
V _{RITH}	Input Threshold High	$T_A = 25^{\circ}C$ $V_{CC} = 3.3V$		1.5	2.4	V	
		$T_A = 25^{\circ}C$ $V_{CC} = 5.5V$		1.8	2.4		
V _{RIH}	Input Hysteresis			0.5		V	
R _{RIN}	Input Resistance	T _A = 25°C	3	5	7	ΚΩ	
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	

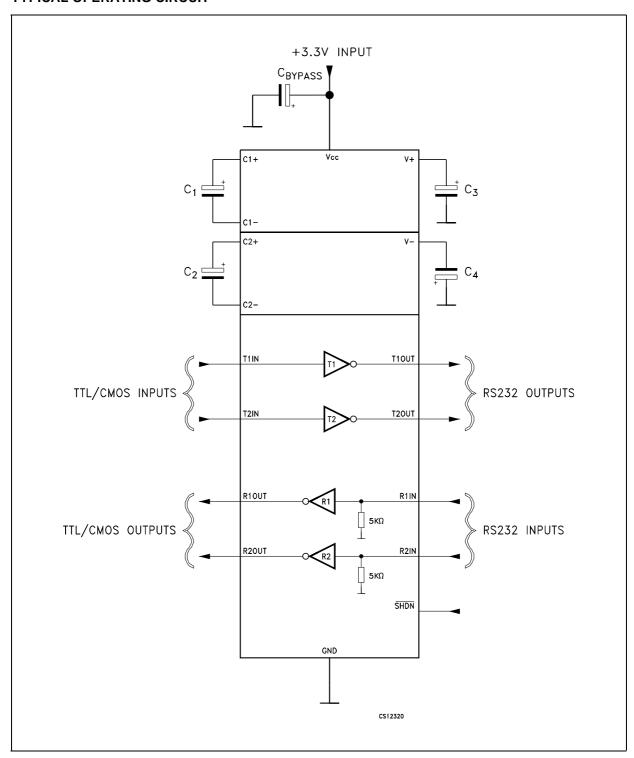
TIMING TARGET ELECTRICAL CHARACTERISTICS

 $(C_1$ - C_4 = 0.1 μ F, V_{CC} = 3V to 5.5V, tested at 3.3V ±10% C_1 = 0.047 μ F, C_2 - C_4 = 0.33 μ F 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.	Тур.	Max.	Unit
D _R	Maximum Data Rate	$R_L = 3 \text{ K}\Omega$ $C_{L2} = 1000 \text{pF}$ one transmitter switching	250			Kbps
t _{PHLR}	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	$V_{OUT} \ge 3V$, R_{LOAD} at $V + = 3 \text{ K}\Omega$		20		μs
S _{RT}	Transition Slew Rate	$T_A=25^{\circ}C$ $R_L=3K\Omega$ to $7K\Omega$ $V_{CC}=3.3V$ Measured from +3V to -3V or -3V to +3V $C_L=150$ pF to 1000 pF $C_L=150$ pF to 2500 pF	6 4	8 8	30 30	V/μs V/μs

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

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 $T_i = 25$ °C)

Figure 1: Loopback Test Result at 120 kbps

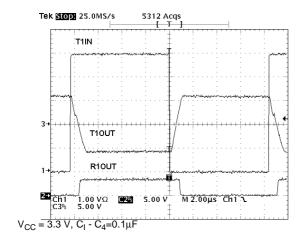


Figure 3 : Transmitter Outputs Exiting Shutdown or Powering Up

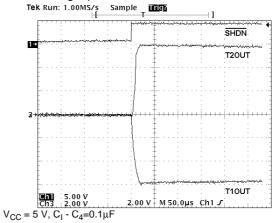
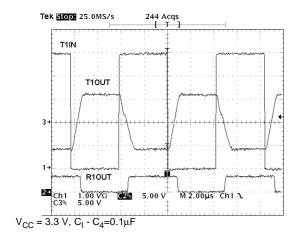
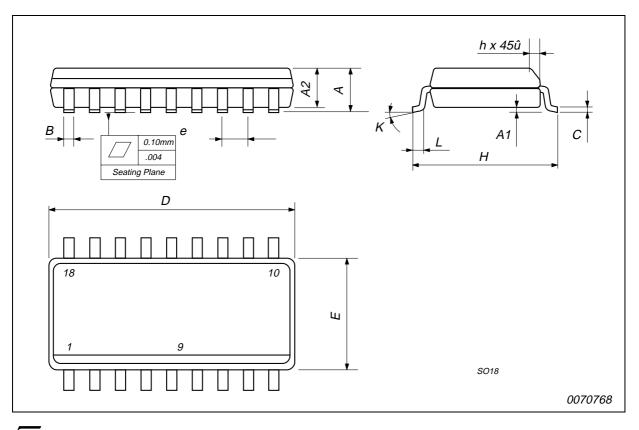


Figure 2: Loopback Test Result at 250 kbps



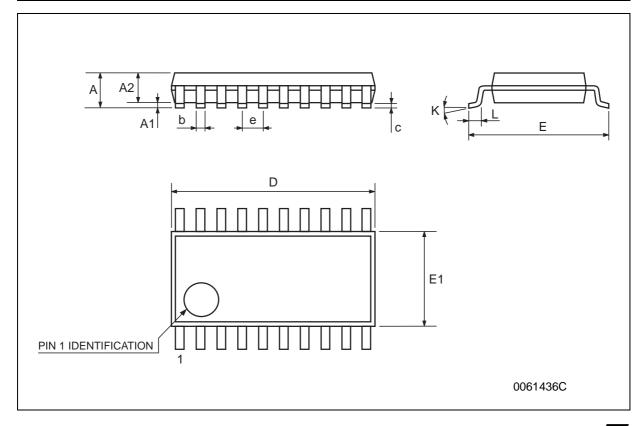
SO-18 MECHANICAL DATA

DIM	DIM.				inch	
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
Α	2.35		2.65	0.092		0.104
A1	0.1		0.3	0.004		0.012
A2			2.55			0.100
В	0.33		0.51	0.013		0.020
С	0.23		0.32	0.009		0.012
D	11.35		11.75	0.447		0.462
Ε	7.4		7.6	0.291		0.299
е		1.27			0.050	
Н	10.00		10.65	0.393		0.419
h	0.25		0.75	0.010		0.029
k	8		° (r	max.)		
L	0.4		1.27	0.016		0.050



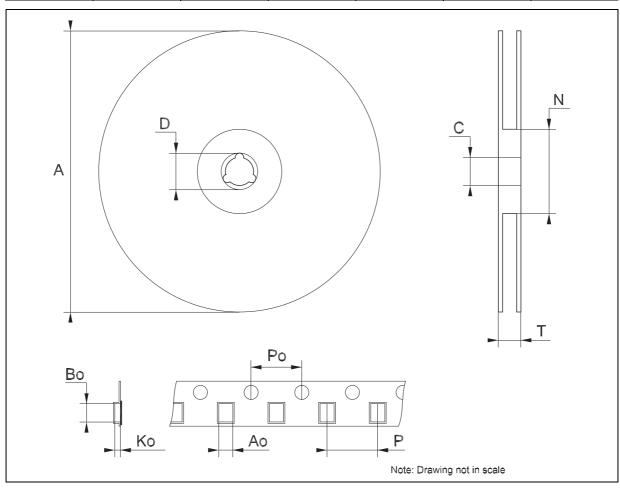
SSOP20 MECHANICAL DATA

DIM		mm.	mm.		inch			
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.		
А			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		
С	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		
е		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		

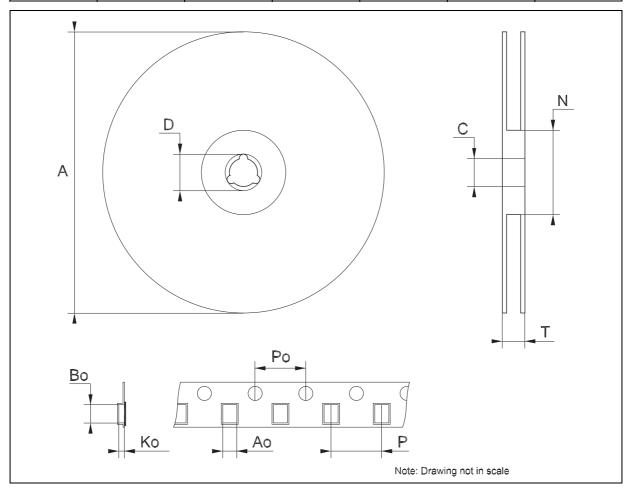


Tape & Reel SO-18 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
Α			330			12.992
С	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
Т			22.4			0.882
Ao	10.8		11.0	0.425		0.433
Во	11.9		12.1	0.468		0.476
Ko	2.9		3.1	0.114		0.122
Ро	3.9		4.1	0.153		0.161
Р	11.9		12.1	0.468		0.476



DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
А			330			12.992
С	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
Т			22.4			0.882
Ao	8.4		8.6	0.331		0.339
Во	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
Р	11.9		12.1	0.468		0.476



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