AX5326/5327/5328 3-STATE ENCODER/DECODER

The AX5326/5327/5328 is a series of encoder/decoder (transmitter/receiver) ICs, all fabricated in low-power CMOS technology. The AX5326 is an encoder and, the AX5327 and the AX5328 are decoders. The AX5326 can be coupled with either AX5327 or AX5328 to form an encoder/decoder (transmitter/receiver) system. The difference between the AX5327 and the AX5328 is that, if the AX5326 is coupled with the AX5327, four bits of data can be sent from the AX5326 to the AX5327, while the AX5328 does not have this function.

The AX5326 can accept 12 bits of input data, and serially transmits these 12 bits of data out in encoded format. The logic state of the input data can be either 0, 1, or open. The circuitry of the AX5326 is designed to have the capability to detect 0, 1, or open.

The AX5327 receives both code and data (to be explained later). Upon reception of valid code, the AX5327 issues a VT (valid transmission) signal and sends out 4 bits of received data.

The AX5328 receives codes only. If a valid code is received, the AX5328 issues a VT (valid transmission) signal.

A wide variety of medium, such as infrared, radio frequency, or ultrasonic wave, can be used as transmission medium.

FEATURES:

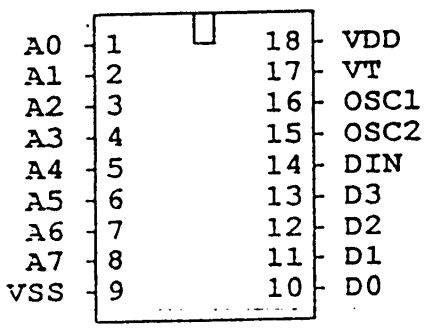
* Wide operating voltage range, 3.5 -- 13 volts.
* Low standby current and low-power consumption.
* On-chip RC-oscillator.
* Highly reliable transmission/reception protocol.
* Auto-power-off function.
* Easy interface with transmission media.
* Few external components needed for a complete encoder/decoder (transmitter/receiver) system.
* A maximum of 531441 codes available.
* wide application in home security system, alarm system, garage/car door control, remote control,etc.

ELECTRICAL CHARACTERISTIC

@ VDD=12 VOLTS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
OPERATING VOLTAGE	VDD	3.5	5	13	VOLT
STANDBY CURRENT	ISTD		1.0	3.0	UA
SOURCE CURRENT (VT PIN)	IOH	-2.0			MA
SINK CURRENT (VT PIN)	IOL	2.0			MA
SOURCE/SINK CURRENT (AC -- All PINS)	IIN			1	MA
OPERATING TEMP.	TOP	-20		70	C
STORAGE TEMP.	TSTR	-40		100	C

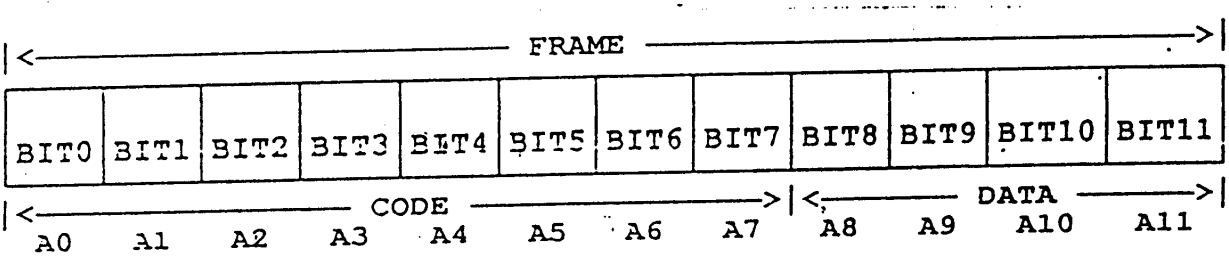
AX5327



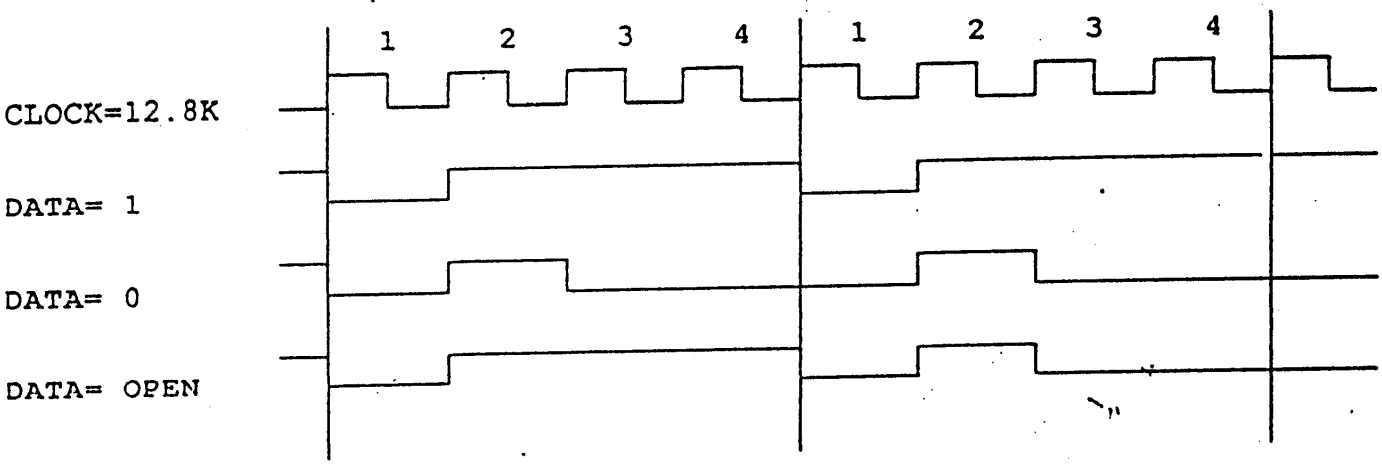
pin no.	pin name	description
1 -- 8	A0 -- A7	code inputs.
9	VSS	ground.
10	D0	frame bit-8 data output.
11	D1	frame bit-9 data output.
12	D2	frame bit-10 data output.
13	D3	frame bit-11 data output.
14	DIN	serial data input.
15	OSC2	oscillator connection.
16	OSC1	oscillator connection.
17	VT	valid transmission
18	VDD	positive power supply

TRANSMISSION DATA FRAME

The AX5326 is capable of encoding 12 bits of input data. The interpretation of these 12 bits of data, called a FRAME, depends on the application. If the AX5326 is used together with the AX5327 to form an encoder/decoder (transmitter/ receiver) pair, the first 8 bits (bit0 -- bit7) of the frame is interpreted by the AX5327 as CODE and the last 4 bits (bit8 -- bit11) of the frame is interpreted as DATA. On the other hand, if the AX5326 is used together with the AX5328, the whole 12 bits of data is interpreted by the AX5328 as CODE.



The input data is encoded by the AX5326 and sent out serially four times through the DOUT pin for each low pulse on the TE pin. The data encoding format is as follows:

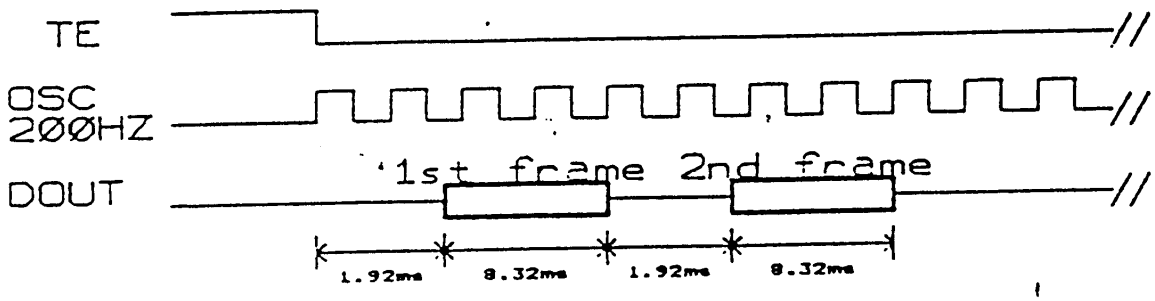


Note: the 12.8 KHz CLOCK is the internal operating clock.

PACKAGE

The AK5326/5327/5329 are available in 18-pin DIL package.

AK5326 TRANSMITTER TIMING DIAGRAM



NOTE: 1) A frame needs a total of (1.92+8.32) ms to transmit.
So, each transmission needs:
(1.92 + 8.32) X 4 = 40.96 ms .

2) The above timing diagram is not proportional in time-scale.

B) AX5326 ENCODER AND AX5328 DECODER

The following description is for the case when the AX5326 is used as the encoder and the AX5328 is used as the decoder. In this application, no data can be sent, but more codes are available. Please refer to the application diagram.

1) The A0 -- A11 inputs of the AX5326 is set to the desired code. The logic state of these input pins can be either 1, 0, or open. So, totally 3**12 = 531441 codes are available. The encoding format is the same as that described in setion A.

2) The A0 -- A11 inputs of the AX5327 is also set to the desired code.

3) Force a LOW pulse to the TE (transmission enable) pin of the AX5326. This low pulse triggers the oscillator to oscillate, and then the code is sent out serially FOUR times. A0 is the first bit sent out. Please refer to the AX5326 transmitter timing diagram.

4) Upon reception of TWO continuous valid codes, that is, the received A0 -- A11 matches with AX5328's A0--A11, the VT (valid transmission) pin of the AX5328 is raised to high. The VT pin will stay high until the data stop coming in.

RC-OSCILLATOR

Only an external resistor with 5% tolerance is needed for the RC-oscillator of the AX5326/5327/5328. The value of the oscillator decides the oscillating frequency. For example, if the value of the resistor is 80 Kohm, the oscillator will oscillate at 200 KHz.

A user can choose proper value of resistor for his specific application, but the resistor value of the encoder and the decoder must be the same. For frequency vs. resistor relation, please refer to the OSC ANALYSIS DIAGRAM.

POWER-ON-RESET

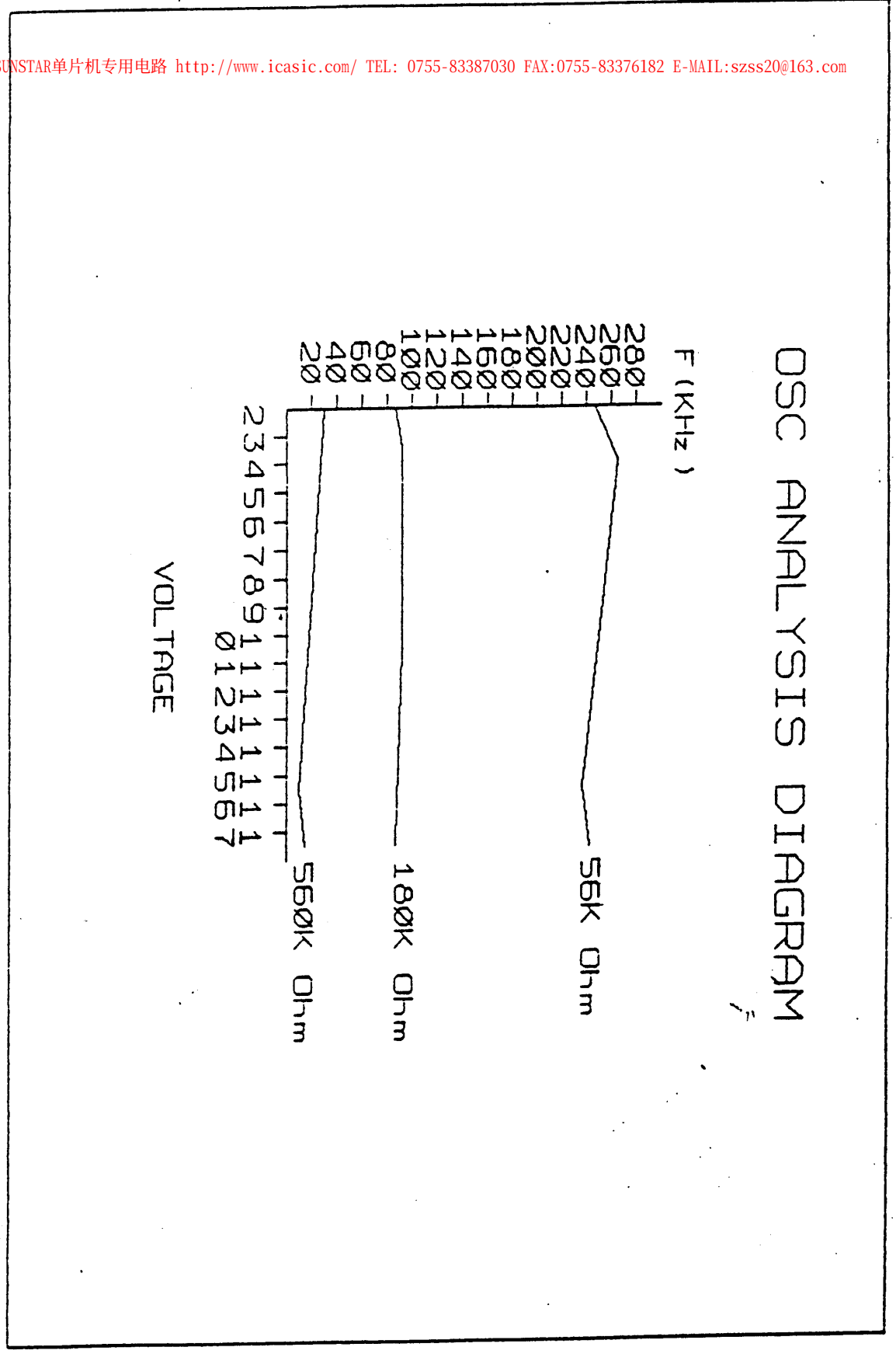
On power-on, the internal power-on-reset circuits of the AX5326/5327/5328 set their output pins to the following logic states.

A) AX5326
DOUT pin is at logic low state.

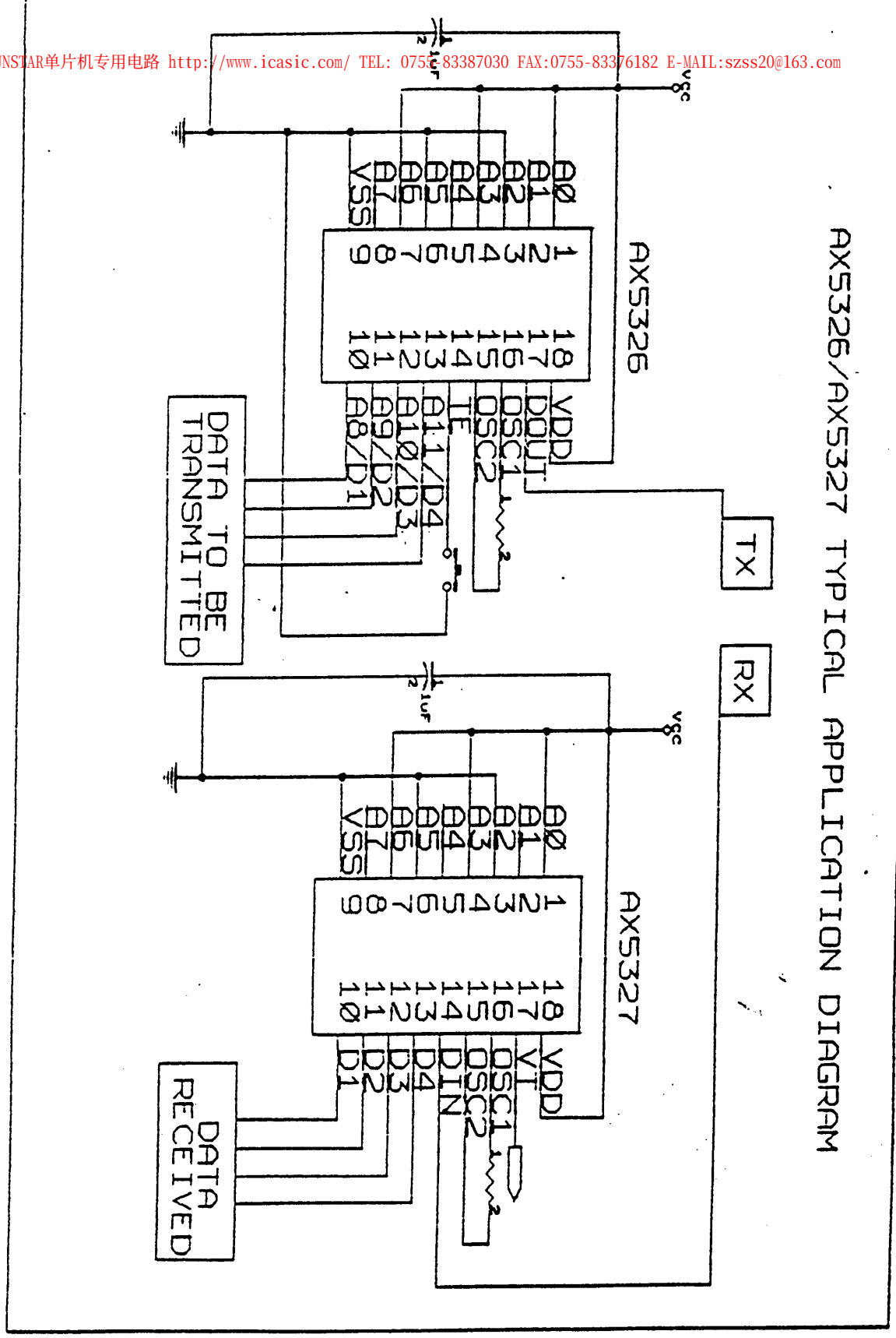
B) AX5327
VT pin and D0 -- D3 pins are at logic low state.

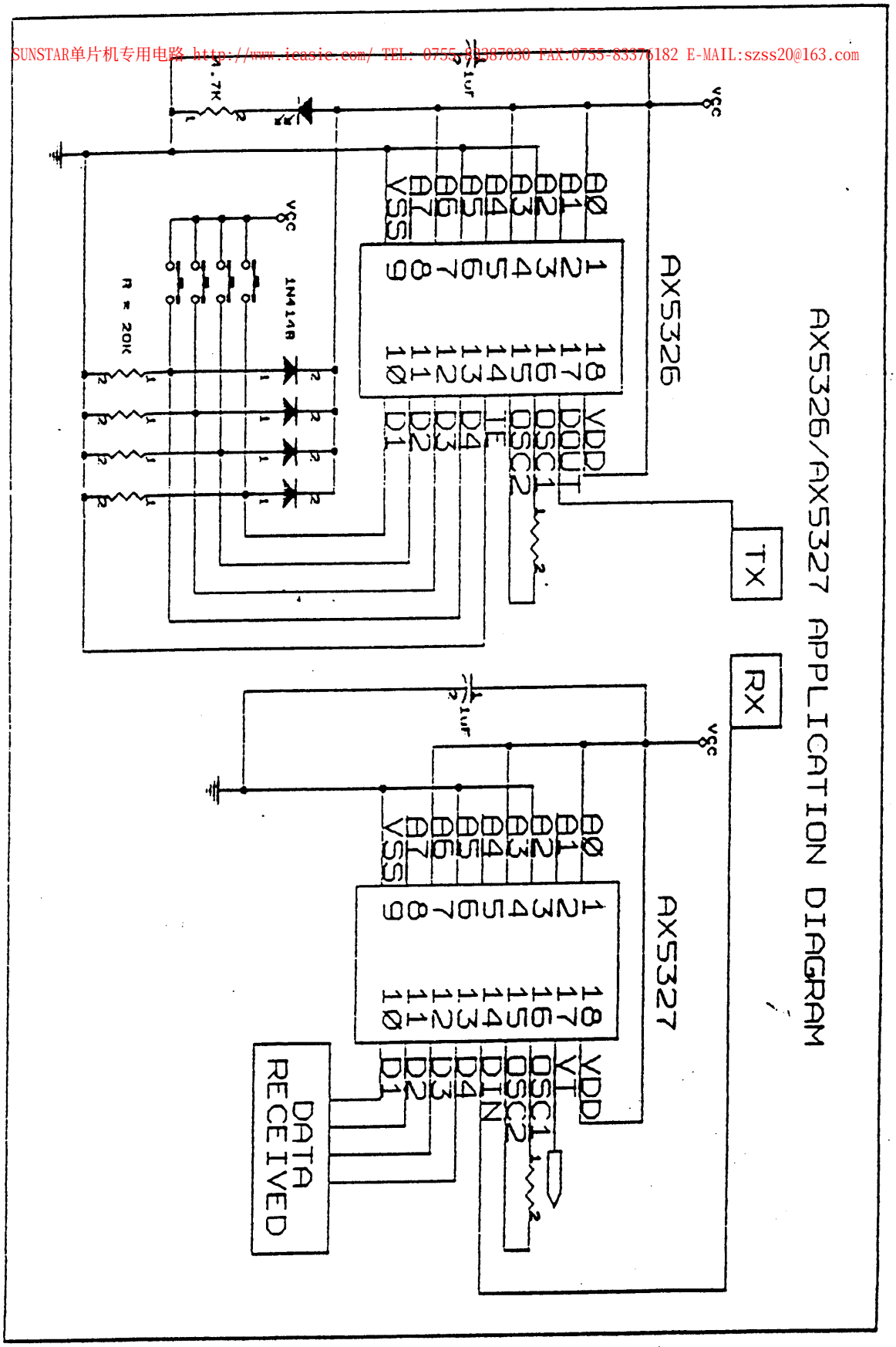
C) AX5328
VT pin is at logic low state.

OSC ANALYSIS DIAGRAM



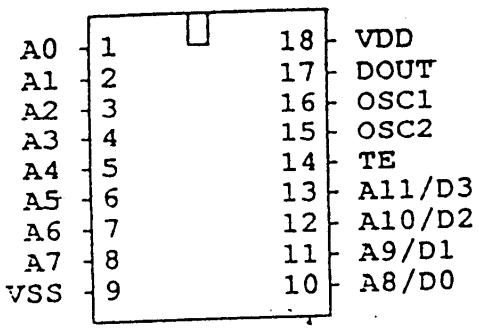
AX5326/AX5327 TYPICAL APPLICATION DIAGRAM



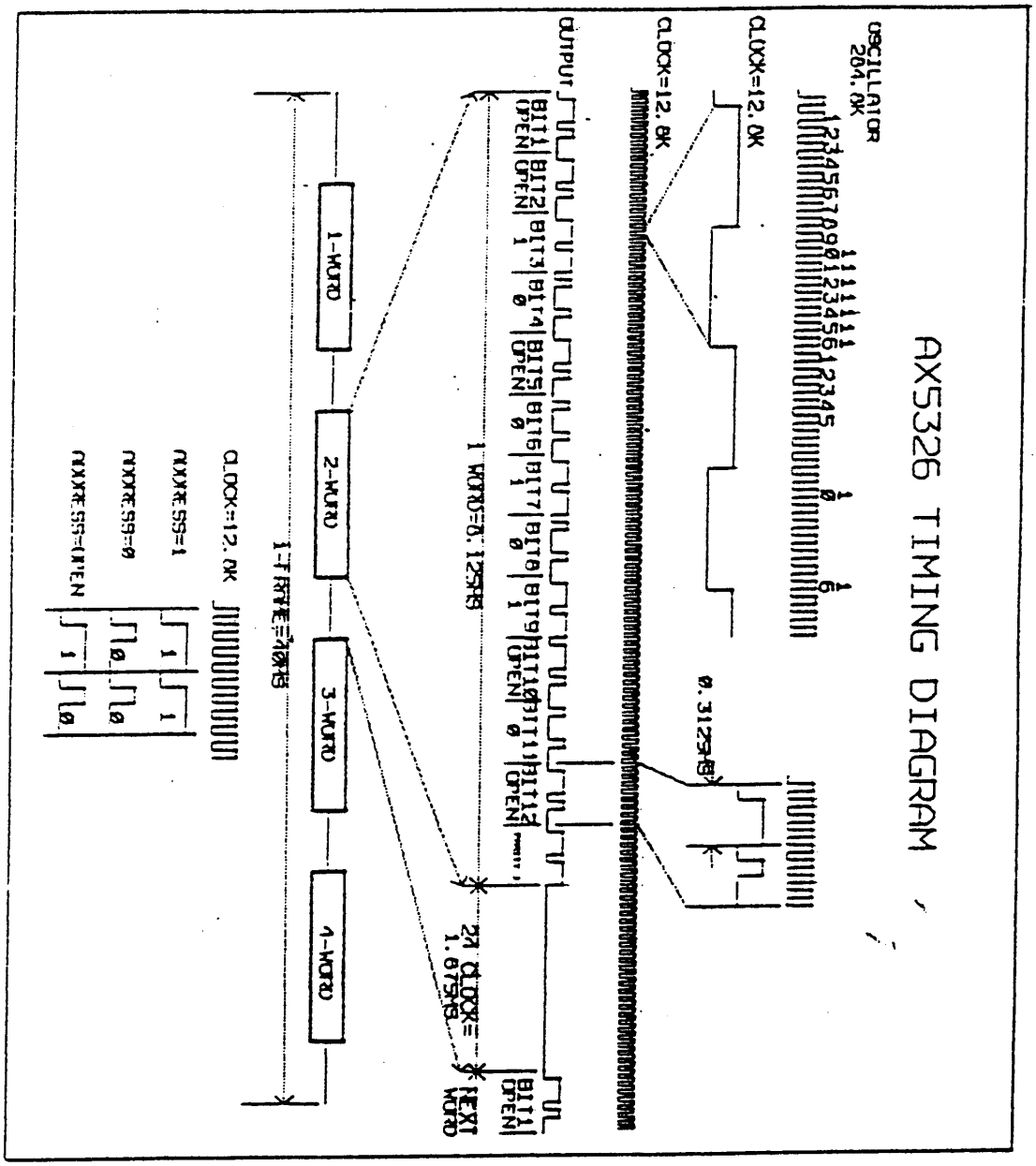


PIN ASSIGNMENT & DESCRIPTION

AX5326



pin no.	pin name	description
1 -- 8	A0 -- A7	code input.
9	VSS	ground.
10	A8/D0	code/data input.
11	A9/D1	code/data input.
12	A10/D2	code/data input.
13	A11/D3	code/data input.
14	TE	transmission enable input with internal pull-up resistor.
15	OSC2	oscillator connection.
16	OSC1	oscillator connection.
17	DOUT	encoded serial data output.
18	VDD	positive power supply.



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