DALLAS SEMICONDUCTOR

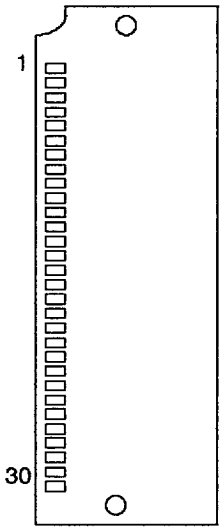
DS2249
Data Access Arrangement (DAA) Stik

T-51-07-01

FEATURES

- Direct connection to the public switched telephone network
- FCC Part-68 compatible with 1000 volts isolation
- User-transferable FCC registration when used with DS2245 Soft Modem Stik
- Single +5 volt supply
- Ring detection
- 2- to 4-wire converter
- Audio monitor output
- 30-pin SIMM connection scheme

PACKAGE OUTLINE



30-PIN SIMM

DESCRIPTION

The DS2249 Data Access Arrangement (DAA) Stik is designed to provide direct connection to the public switched telephone network through an appropriate connector such as an RJ-11. The DS2249 DAA carries a user-transferable, FCC Part-68 registration when used with the DS2245 modem. It is easily registrable with any other data/voice communication circuitry, provided that this circuitry performs output power limiting and billing delay. Included in the DS2249 is a ring detection output, a 2- to 4-wire converter for use with modems such as the DS2245, and an audio output for connection to speaker circuitry. It operates from a single +5 volt source.

Applications include laptop computers, remote data collection, or any application which can benefit from data or voice communication by telephone.

PIN NAMES

PIN #	PIN NAME
1	$\overline{OH}$
2	AUDIO
3	TXA
4	RXA
5-9	NC
10	VCC
11	GND
12	$\overline{RI}$
13-26	NC
27	RINGO
28	TIPO
29	RING
30	TIP

PIN DESCRIPTION Table 1

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PIN	SYMBOL	TYPE	DESCRIPTION
1	$\overline{OH}$	I	**Off-hook control.** A logic low on this pin causes the DAA to go off-hook and seize the phone line. If this pin is high or left floating, the DAA will remain in an on-hook state, which is disconnected from the phone line.
2	AUDIO	O	**Audio output.** This buffered output can be used for audio monitoring of the call connection. Can be connected to an amplifier for driving a speaker.
3	TXA	I	**Transmit analog data input.** Connected to the analog output of a modem or other communication device. This input will be transmitted onto the phone line, but is electrically isolated from the line.
4	RXA	O	**Receive analog data output.** This is the output of the 2- to 4- wire converter and should be connected to the modem's receive input. This output is AC coupled so that no DC voltage is present.
5-9	NC		**No connect.** Leave these pins unconnected.
10	VCC	I	+5 volt supply.
11	GND	I	Ground.
12	RI	O	**Ring indicate.** A logic 0 indicates the presence of a valid ring signal on TIP and RING.
13-26	NC		**No connect.** Leave these pins unconnected.
27 28	RINGO TIPO	I/O	**RING and TIP connections out.** When the DS2249 is on-hook, these are connected to TIP and RING line inputs. When the DS2249 is off-hook, these are disconnected from any circuitry.
29 30	RING TIP	I/O	**RING and TIP phone line connections.** These pins are connected directly to the telephone line through an RJ-11 jack.

RING DETECTION

A ring is detected by the presence of a particular signal between TIP and RING. This signal must conform to frequencies and amplitudes specified by the FCC. When a valid ring signal is present, the DS2249 will indicate this condition by asserting a logic low on $\overline{RI}$. This signal is low during the on interval and high during the off interval. A typical RING signal will be on for two seconds and off for four seconds. RING detection circuitry on the DS2249 is protected from pulse dialing transients which might otherwise cause false RING indications.

2- TO 4-WIRE CONVERTER

The 2- to 4-wire converter provides an interface between separate transmit and receive signals and the 2-wire telephone line. An ideal converter would completely remove the transmit signal from the receive signal. However, the wide range of telephone line impedance limits the performance of any 2- to 4-wire converter (hybrid). Because of this variance, the typical transhybrid loss will be -10 to -15 dB. Transhybrid loss is defined as the attenuation from the TXA input to the RXA output specified at a particular frequency.

SWITCH-HOOK CONTROL

The telephone line is seized (taken off-hook) by applying a logic 0 to the $\overline{OH}$ pin. This action disconnects TIPO and RINGO from the line and connects TIP and RING to the 2- to 4-wire converter (via a transformer). When $\overline{OH}$ is in a logic 1 state, the TIPO and RINGO are connected to the line and the DS2249 draws no DC current from the line. In addition, pulse dialing can be performed by pulsing the $\overline{OH}$ pin once the line has been initially seized.

USE WITH TELEPHONE SETS

As mentioned above, the TIPO and RINGO pins can be connected to an extension telephone. When the DAA is on-hook, the extension will be disconnected. At other times, the extension phone will have access to the line.

Note that incoming ring signals will be received by both the DS2249 ring detection circuitry and the telephone set.

INTERFACE

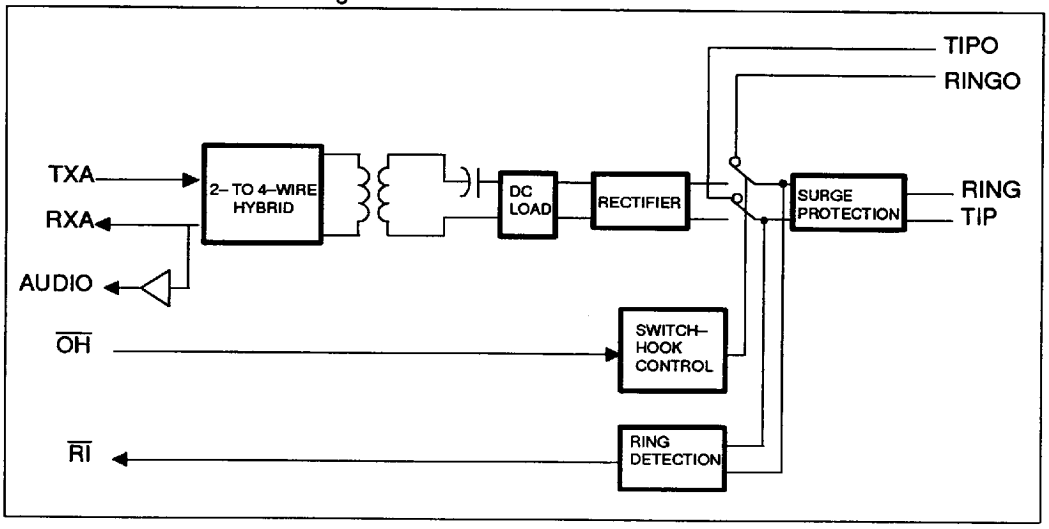
The DS2249 requires a minimal interface of four signals, excluding the telephone line connections. These signals are TXA and RXA for data and $\overline{OH}$ and $\overline{RI}$ for control. In a system such as a laptop computer, which can be monitored by a user, the audio pin may be gain-adjusted and connected to a speaker. Figure 2 shows a typical application of the DS2249 when used with the DS2245 Soft Modem Stik.

TELEPHONE LINE CONNECTION

Hardware which is designed for data communication by telephone must use a DAA which is approved by the appropriate government agency. In the U.S., this agency is the Federal Communications Commission (FCC), while in Canada, it is the Department of Communications (DOC). These agencies test and approve the product to ensure that it meets their specifications, thereby protecting the telephone system from damage and protecting the user from high voltage transients which may strike the phone line.

The DS2249 has been designed to meet all FCC Part-68 requirements for hazardous voltage, surge protection, and leakage current. It has been tested at an independent, FCC approved testing laboratory. If the end system transmits data or DTMF tones on the telephone line, the user must certify that the circuitry which drives the DS2249 meets basic FCC requirements for maximum transmission levels, out-of-band energy, and billing delay. The DS2245 modem provides these functions. Full details of these regulations can be obtained from the FCC under Part-68 of the FCC Rules and Regulations, or in Title 47 of the Code of Federal Regulations.

DS2249 BLOCK DIAGRAM Figure 1



OUTPUT LEVEL REQUIREMENTS OF PART-68

FCC Part-68 requires that any equipment which transmits data must limit its power level to -9 dBm. If the system is capable of DTMF dialing, the maximum DTMF level must be limited to 0 dBm averaged over a 3 second interval.

Part-68 also places limits on out-of-band energy. This limit is normally satisfied by the transmit filter which is part of the modem circuitry. Other data transmission equipment must be limited to the levels shown in the following table. Part-68 regulations should be consulted for more detail.

FREQ. RANGE	MAXIMUM PWR.
200 Hz to 3990 Hz	-9 dBm
3990 Hz to 4005 Hz	-27 dBm
4005 Hz to 16 KHz	-16 dBm
8 KHz to 94 KHz	-47 dBm
86 KHz to 270 KHz	-46 dBm
270 KHz to 6 MHz	-6 dBm

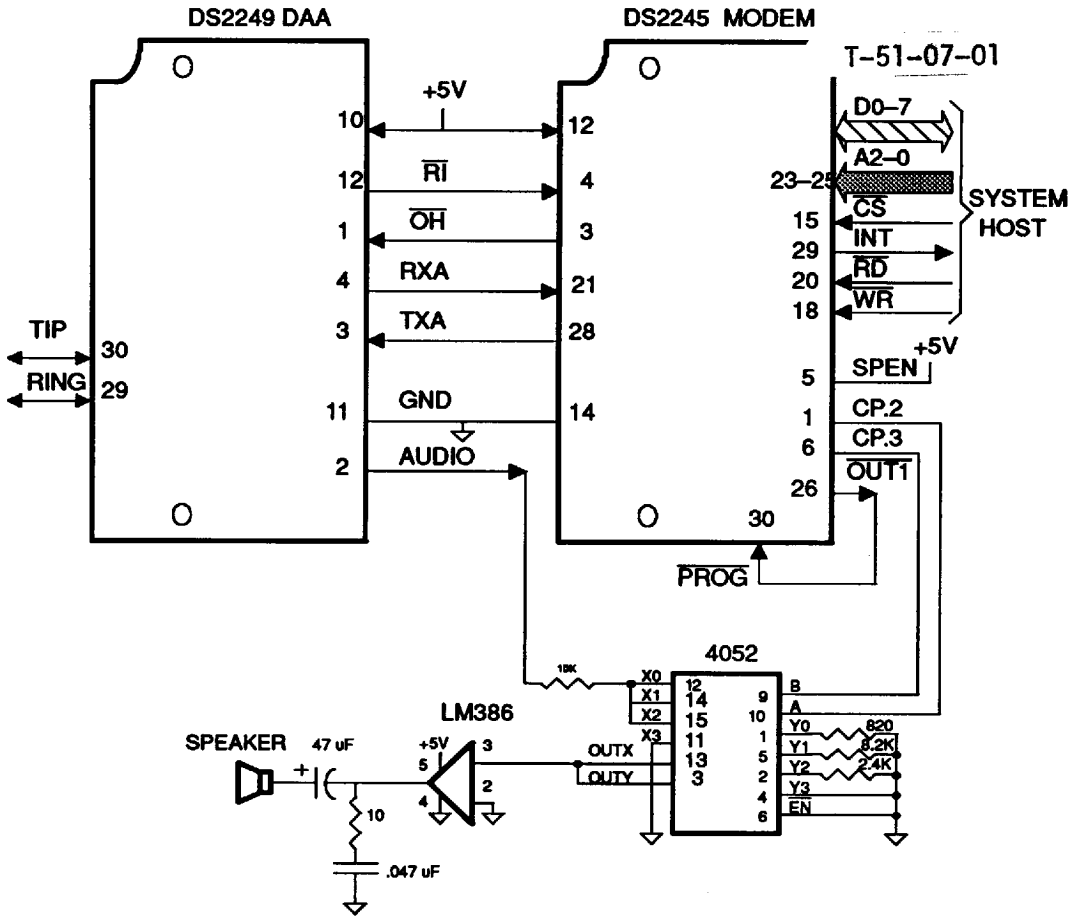
BILLING DELAY

A minimum of two seconds of silent time is required after the DS2249 is taken off-hook until the transmission of data. This delay is required to provide the telephone company central office with time to complete billing information about the call prior to transmission of data. Billing delay is commonly implemented in modem control software, as in the DS2245.

FCC APPROVAL

The manufacturer of any system which incorporates the DS2249 must receive certification from the FCC that the final system meets the requirements of Part-68. This is generally accomplished by an independent testing lab which will test the system and submit the correct paperwork for approval. However, when the DS2249 is used in conjunction with the DS2245 Soft Modem Stik, the resulting modem system is pre-registered with the FCC and can be used without further approval. A registration sticker is available which provides the FCC registration number and ringer equivalence.

DS2249 TYPICAL APPLICATION Figure 2



ELECTRICAL SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS*

Voltage on Any Pin Relative to Ground	-0.3 to +7.0V V_{CC} +0.3V
Operating Temperature	0°C to +70°C
Storage Temperature	-65°C to 150°C
Soldering Temperature	+260°C for 10 seconds

* This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

DC CHARACTERISTICS

(0° to 70° C; V_{CC} = 4.5 to 5.5V)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTE
Supply Voltage	V_{CC}	4.5	5.0	5.5	V	1
Supply Current $\overline{OH}$=0 $\overline{OH}$=1	I_{CC}		25 4	40 10	mA mA	
Input Low Voltage	V_{IL}			0.8	V	1,2
Input Low Current @V_{IL} max	I_{IL}	-800			uA	2
Input High Voltage	V_{IH}	V_{CC}-0.2	V_{CC}-0.5		V	1,2
Output High Voltage I_{OH}=-1 mA	V_{OH}	2.4			V	1,3
Output Low Voltage I_{OL}=1 mA	V_{OL}			0.4	V	1,3

AC CHARACTERISTICS

(0° to 70° C, V_{CC} = 4.5 to 5.5V)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS	NOTE
Transmit Gain	@ 300 Hz @ 1800 Hz @ 3400 Hz		-1.5 -1.0 -1.0		dB dB dB	
Receive Gain	@ 300 Hz @ 1800 Hz @ 3400 hz		+3.5 +2.3 +2.1		dB dB dB	
Telephone Line Input Impedance	@ 1800 Hz	540	600	660	ohms	
Transhybrid Loss	Attenuation from TXA to RXA @ 1 KHz, 600 ohm termination. 1KHz.		18		dB	
Transmit Input Impedance	@1800 Hz	20	21	22	Kohms	
Receive Output Impedance	@1800 Hz Audio RXA		 50 1K		ohms	
Min. Ring Detect	AC voltage TIP to RING			38	Vrms	
Ringer Equivalence	Type B ringer			0.8	B	4

NOTES:

1. All voltages referenced to ground.
2. Refers to $\overline{OH}$ input.
3. Refers to $\overline{RI}$ output.
4. Type B ring signal is the most demanding specification within the U.S. The FCC requires that the total ringer equivalence number (REN) on one telephone line be limited to 5.0. Thus, up to six DS2249s can be connected to one telephone line.

DS2249
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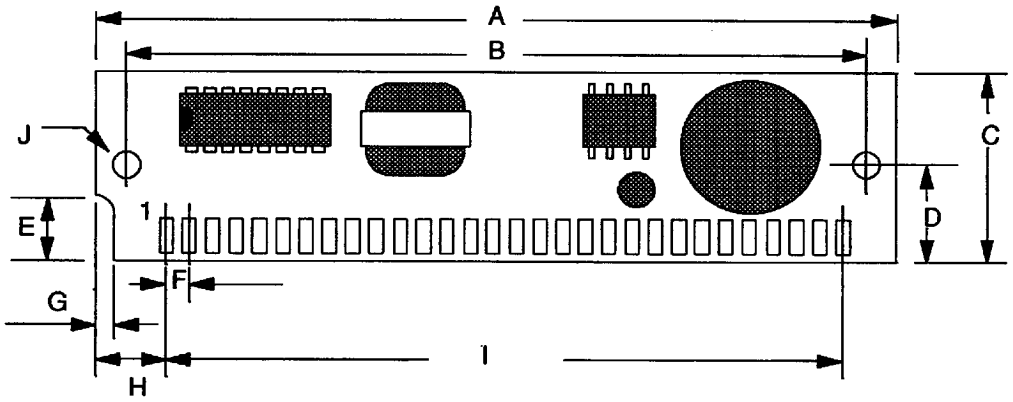

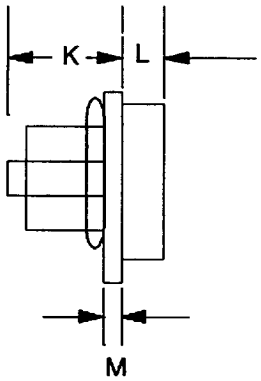

DIM	INCHES
A	3.500
B	3.234
C	0.840
D	0.400
E	0.250
F	0.100
G	0.080
H	0.300
I	2.900
J	0.125 DIA
K	0.450
L	0.125
M	0.062