Application Note

Converting a Rockwell v.22bis Modem to a ZiLOG Solution

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CONVERTING A ROCKWELL V.22BIS MODEM TO A ZiLOG SOLUTION

INTRODUCTION

This application note demonstrates how to replace a Rockwell modem device in an existing embedded modem application using a cost-effective, well-supported, advanced ZiLOG modem solution.

ZILOG V.22BIS MODEM SOLUTIONS

ZiLOG provides a V.22bis 2400bps modem solution that consists of both the Z02201 Modem Data Pump and integrated Analog Front End (AFE), and the Z02205 Embedded Modem Controller. Each product includes firmware in the on-chip ROM, eliminating the need for external memory. Additionally, the chips are connected using zero glue logic.

The Z02201 Data Pump and AFE is a DSP-based modem that performs filtering, tone generation and detection, DTMF dialing, pulse dialing, and other functions that are required in a modem application. This modem includes a set of simple registers that control a variety of settings. This flexibility is crucial for performing modem certifications.

The Z02205 Modem Controller includes a basic AT command set and the necessary data pump drivers that control the actions of the Z02201 data pump. The modem is supported by the Diplomat™ controller code utility that makes changes to controller code as simple as changing values in a text file.

For more detailed product specifications on any of ZiLOG's Embedded Modem products, visit ZiLOG's web site at www.zilog.com.

Note: These products are not pin-compatible with Rockwell's modems. Expect to make both board and software changes to your design. Re-qualification is necessary for the new revision of your application.

ZILOG Z02201 VS. ROCKWELL RC224AT

The Rockwell RC224AT modem has a built-in controller with an AT command set that controls the modem. This section describes the hardware and software differences between the Rockwell modem and the ZiLOG Z02201/Z02205 combination.

Major Hardware Differences

The following summarizes the major hardware differences:

- The RC224AT Supports Both a Serial and Parallel Host Interface; the Z02201/Z02205 Only Supports a Serial Interface.
- The RC224AT Uses a 16.00312 MHz Crystal. The Z02201 Uses a 24.576 MHz Crystal and the Z02205 Uses a 14.7456 MHz Crystal.
- The RC224AT Has a Differential Analog Transmitter and a Single-Ended Receiver; the Z02201 Has Differential Transmitters and Receivers.
- The RC224AT is Packaged in a Single 100-Pin QFP Package; the Z02205 is Available as a 28-Pin SOIC and the Z02201 is Housed in a 44-Pin PLCC Package.

Figure 1, included at the end of this application note, is a schematic that illustrates the equivalent of the Rockwell single-chip modem, using the ZiLOG Z02201 and Z02205.

This schematic demonstrates modifying a typical design to incorporate the ZiLOG's Embedded Modem products.

Major Software Differences

Table 1 compares the functions of the Z02201 with those of the Rockwell RC224AT. Both ZiLOG and Rockwell solutions include AT command sets that are fairly similar. Table 2 describes how the differences in the two command sets are related to features that are supported in one chipset but not the other.

Generally, where Rockwell has chosen not to support a particular command, the software still accepts the default form of the command. For example, Rockwell does not support leased line modes but their software does accept the AT&L command. With onlly a dial-up mode option available, only the AT&L0 command is accepted.

In cases where the ZiLOG controller does not support a certain mode, the command is omitted completely (such as AT&L).

Table 1. Comparison Between Rockwell RC224AT and ZiLOG Z02201

Function	Rockwell RC224AT	ZiLOG Z02201
AT Command Set	Expanded - some not needed (see detailed comparison in Table A)	Basic
AT Command set easily modified?	No. Rockwell's ConfigurAce™ utility is only used with 14.4K and 28.8K modems	Yes - allows simple changes to comply with international regulatory Post, Telephone and Telegraph (PTT) requirements.
International Support	RC224AT is not designed for worldwide use.	This device can be tailored for different countries by changing the homologation table and using the Diplomat™ code utility option.
Current consumption	Rockwell has a sleep mode that is activated by some wakeup pins (hardware). This mode is not an automatic wakeup.	The Z02205 (code version 3.2 and later) has an automatic sleep mode that reduces operating current of the chip set to approximately 8 mA when the modem is not in use. The device wakes up on every AT command received or ring detect signal. The DSP is automatically awakened and put to sleep by the Z02205 depending on its operating state.
V.23 Support	No, does not include V.23.	Yes, V.23 is included.
EEPROM (NVROM) support	Yes	No
Sync modes	No	Yes
V.22bis autoretrain	No	Yes
Caller ID support	No	Yes
Loopback test	Yes	No
Speaker support	On/off and speaker volume supported	Only on/off supported (no speaker volume support)
Fax support	Yes, on RC224ATF	No
Support for Auxiliary relay	Yes	No

Table 2. AT Command Set Comparison

Rockwell RC224AT	ZiLOG Z02201/Z02205	Function
Basic Commands		
AT	AT	Attention Code
A/	A/	Repeat Last Command
Bn	Bn	Communications Standard Option
C1	-	Carrier Control Option
D	D	Dial Command
En	En	Off-line Character Echo Command
F1	-	On-line Character Echo Command
Hn	Hn	Hook Switch Control Option
In	In	Identification/Checksum Option
Ln	-	Speaker Volume Option
Mn	Mn	Speaker Control Option
On	On	On-line Command
P	P	Pulse Dial
Qn	Qn	Result Code Display Option
Sn	Sn	Select and S Register
Sn=	Sn=	Write to an S Register
Sn?	Sn?	Query and S Register
T	T	Tone Dial
Vn	Vn	Result Code Form Option
Xn	Xn	Result Code Set/Call Progress Option
Yn	-	Long Space Disconnect Option
Zn	-	Recall Stored Profile
+++	+++	Escape Code Sequence
?	?	Queries Last Selected S Register
=	=	Writes Last Selected S Register
& Commands		
&Cn	&Cn	Data Carrier Detect Option
&Dn	&Dn	Data Terminal Ready Option
&F	&F	Load Factory Defaults
&Gn	&Gn	Guard Tone Option
-	&HTn	PTT Test Command
&Jn	-	Auxiliary Relay Control
&L0	-	Leased Line Option
&M0	-	Sync Mode Option

Table 2. AT Command Set Comparison (Continued)

Rockwell RC224AT	ZiLOG Z02201/Z02205	Function
&Pn	&Pn	Pulse Dial Make/Break Select Option
&Q0	&Q0	Sync Mode Option
&Sn	-	Data Set Ready Option
&Tn	-	Loop Back Test Command
&V	-	View Active Profile and Stored Profiles
&Wn	-	Store Active Profile
&X0	-	Sync Clock Select
&Yn	-	Select Stored Profile on Reset
&Zn=x	-	Store Telephone Number
% Commands		
%Dn	-	DTMF Level Attenuation
-	%E	Retrain Options
%Ln	S17	Transmit Level Attenuation
%J	-	Load Secondary Defaults
# Commands		
-	#CID=n	Caller ID Options
Dial Modifiers		
P	P	Pulse Dial
R	R	Originate Call in Answer Mode
S=n	-	Dial Stored Number
T	T	Tone Dial
W	W	Wait for Dial Tone
;	;	Return To Command State
@	@	Wait for Quiet Answer
!	!	Hook Flash
,	,	Pause
0-9, A, B,	0-9, A, B,	Dial Digits
C, D, #, *	C, D, #, *	

Table 2. AT Command Set Comparison (Continued)

Rockwell RC224AT	ZiLOG Z02201/Z02205	Function
S Registers		
S0	S0	Ring to Answer On
S1	S1	Ring Count
S2	S2	Escape Code Character
S3	S3	Carriage Return Character
S4	S4	Line Feed Character
S5	S5	Back Space Character
S6	S6	Wait for Dial Tone
S7	S7	Wait Time for Data Carrier
S8	S8	Pause Time for Comma
S9	S9	Carrier Detect Response Time
S10	S10	Last Carrier to Hang-up Delay Time
S11	S11	DTMF Dialing Speed
S12	S12	Escape Prompt Delay Time
S13	S13	Reserved
S14	S14	Bit Mapped Options
S15	S15	Reserved
S16	S16	Reserved
-	S17	Set Transmit Level
S18	S18	Reserved
S19	S19	Reserved
S20	S20	Reserved
S21	S21	Bit Mapped Options
S22	S22	Bit Mapped Options
S23	S23	Bit Mapped Options
S24	S24	Bit Mapped Options
S25	S25	Delay to DTR
S26	S26	Reserved
S27	S27	Bit Mapped Register
-	S28	Terminal Inactivity Time-out
-	S29	Hook Flash Time
-	S37	Communications Speed Limit

COLLATERAL AND SUPPORT MATERIALS

ZiLOG provides a number of support products and services to help any designer with modem designs. The ZiLOG solution is software-based, allowing rapid development of new applications. Country approval tables are available for the DSP parameter settings that serve as a starting point to assist homologation in various countries.

For additional information and assistanc, visit ZiLOG's web site at www.zilog.com. Obtain the latest support materials, including:

- Product Specs
- Product Presentations
- Evaluation Board Schematics, Gerber, and User Manual
- Example Controller Codes
- Links to Modem-Related Sites such as Standards Bodies, Henderson Labs, CP Clare, and so on.

To order an Evaluation Kit for the Z02201/Z02205, contact the nearest ZiLOG Sales representative in your area. The ordering number is: Z0220100ZCO.

TECHNICAL AND BUSINESS SUPPORT OPTIONS

Technical support for the ZiLOG modem products is available through your local field sales office, applications office, or the ZiLOG Customer Service Center (toll-free at 877-945-6427).They are dedicated to support your needs for design and application information, backed up by ZiLOG's modem hardware, software, and system experts.

CONCLUSION

ZiLOG's Z02201 data pump/analog front end and Z02205 modem controller are a worthy alternative to Rockwell's V.22bis modem. By making some minor board and software changes, any designer can easily fit ZiLOG's cost-effective modem design solutions into their end-user applications.

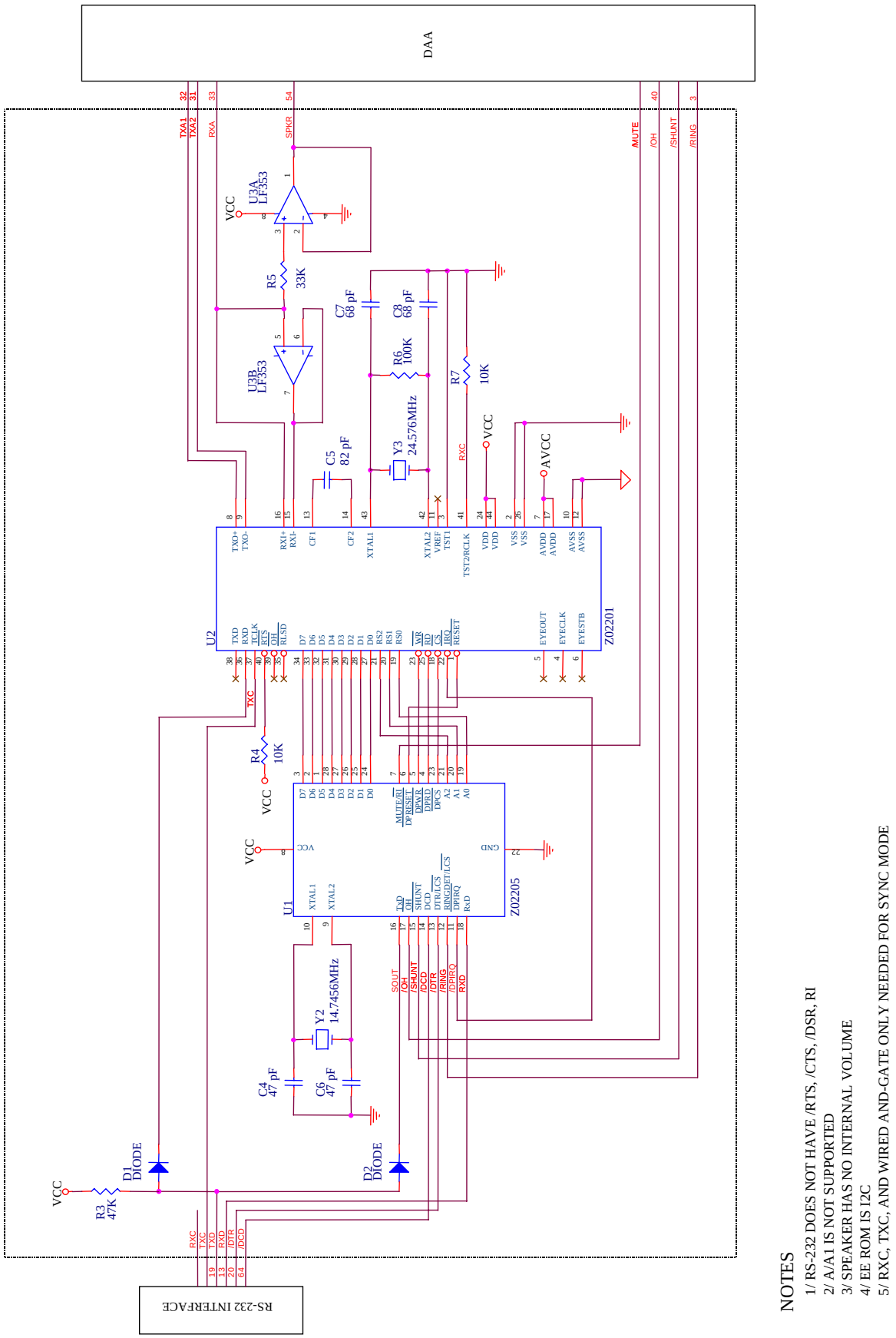

Figure 1. Schematic Illustrating ZiLOG Equivalent of Rockwell RC224AT