



CONVERTING A ROCKWELL RC224ATL MODEM TO A ZILOG Z02215 MODEM

INTRODUCTION

This application note demonstrates how to replace a Rockwell modem device in your existing embedded modem

application with a cost effective, well-supported, advanced ZiLOG Z02215 single-chip modem.

ZILOG Z02215 EMBEDDED MODEM

The ZiLOG Z02215 V.22bis 2400bps modem is a single chip modem that is well suited to many embedded modem applications. The Z02215 includes a modem DSP, a modem controller, and an integrated analog front end (AFE) with active hybrid circuits. It also includes DSP and controller firmware in on-chip ROM, which eliminates the need for external memory. An EEPROM interface is provided to allow customer modifications to the Z02215 controller code, which facilitates country certifications.

The Z02215 performs all filtering, tone generation/detection, DTMF dialing or pulse dialing that is required of modem applications. Operation utilizes simple registers to control a variety of settings. This flexibility is very important during modem certification.

The Z02215 Modem Controller includes a basic AT command set and data pump drivers that control the integrated data pump. The Diplomat™ controller code utility makes changing controller code as simple as typing values into a text file.

More information on this and other ZiLOG products is available in the product specifications section on the ZiLOG website at www.zilog.com.

Note: The Z02215 is not pin compatible with Rockwell modems. Expect to make board and software changes to your design. Requalification must to be performed on your revised application.

ROCKWELL RC224ATL VS. ZILOG Z02215

This section describes the differences between the ZiLOG Z02215 and the Rockwell RC224ATL.

Major Hardware Differences

The following items summarize the major hardware differences:

- The Z02215 supports a serial interface. The RC224ATL supports both a serial and parallel host interface.
- The Z02215 uses a 24.576-MHz crystal. The RC224ATL uses a 16.00312-MHz crystal.
- The Z02215 has differential transmitters and receivers. The RC224ATL has a differential analog transmitter and a single-ended receiver.
- The Z02215 is housed in a smaller 44-pin PLCC package, or 44-pin VQFP package. The RC224ATL is packaged in a single 100-pin QFP package.

Figure 1 shows the equivalent of a Rockwell single-chip modem using the ZiLOG Z02215. This schematic demonstrates how to modify a typical design by using ZiLOG products.

Major Software Differences

Both ZiLOG and Rockwell solutions include AT command sets that are fairly similar. The differences in the two command sets are related to features that are supported in one but not the other chip-set.

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. Because the only option is to use dial-up mode, only the AT&L0 command is accepted.

Where the ZiLOG controller does not support a certain mode, the command is omitted completely, for example, AT&L. The differences in the supported functionality are summarized in Table 1:

Table 1. Comparison Between Rockwell RC224ATL and ZiLOG

Function	Rockwell RC224ATL	ZiLOG Z02215
AT Command Set	Expanded. Some are not needed (see the detailed comparison in Table 2).	Basic
Ease of AT Command Set Modification	No. The Rockwell ConfigurAce™ utility is only used with 14.4K and 28.8K modems.	Yes. Allows simple changes to comply with international regulatory (PTT) requirements.
International Support	RC224ATL is not designed for worldwide use.	Can be tailored for different countries by changing the homologation table through the use of the Diplomat utility program. Diplomat modifies parameters in the EEPROM or in the executable software.
Current Consumption	Rockwell has a SLEEP mode that is activated by hardware wake-up pins (no automatic wake-up).	The Z02215 has an automatic SLEEP mode that reduces the chip-set operating current to approximately 8 mA when the modem is not in use. The DSP processor automatically enters the appropriate mode (SLEEP or ACTIVE) depending on the operating state. Wake-up automatically occurs when an AT command or rising signal is received.
V.23 Support	No. Does not include V.23.	Yes. V.23 is included.
Minitel Turnaround Option	No	Yes
Bell 202 and Bell 202T Support	No. Does not include Bell 202(T).	Yes. Bell 202 and Bell 202T are included.
EEPROM (NVRAM) Support	Yes	Yes
Software Selectable Active Hybrid	No	Yes
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 control are supported.	ON/OFF is supported. Speaker volume is not supported.
Fax Support	Yes, on the RC224ATLF	No
Support for Auxiliary Relay	Yes	No

Table 2. AT Command Set Comparison

ZiLOG Z02215	Rockwell RC224ATL	Function
	Basic Commands	
AT	AT	Attention Code
A	A	Answer Command
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
R	-	Minitel Turnaround Command
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
&K	-	Terminal Flow Control Options
-	&L0	Leased Line Option
-	&M0	Sync Mode Option

Table 2. AT Command Set Comparison

ZiLOG Z02215	Rockwell RC224ATL	Function
&Pn	&Pn	Pulse Dial Make/Break Select Option
&Q0	&Q0	Sync Mode Option
&Sn	&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
&Z0=x	&Zn=x	Store Telephone Number
	% Commands	
-	%Dn	DTMF Level Attenuation
%E	-	Retrain Options
S17	%Ln	Transmit Level Attenuation
-	%J	Load Secondary Defaults
	\ Commands	
\N	-	Asynchronous Terminal Data Options
\Q	-	Terminal Flow Control Options
\R	-	Minitel Turnaround Using RTS Options
	# 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

ZiLOG Z02215	Rockwell RC224ATL	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 that help you with your modem design. The ZiLOG solution is software based, which speeds development of new applications. Country tables, which are available for the DSP parameter settings, serve as a starting point to assist homologation in various countries. Customers should ask for the Diplomat code utility.

The following resources are available on the ZiLOG website at www.zilog.com:

- Product Specifications
- Product Presentations
- Evaluation Board Schematics, Gerber, and User Manuals
- Example Controller Code
- Links to Modem-Related Sites such as Standards Bodies, Henderson Labs, and CP Clare.

TECHNICAL AND BUSINESS SUPPORT OPTIONS

Technical support for the ZiLOG modem products is available through your local field sales or applications office. ZiLOG is dedicated to support your need for design and

application information, and is backed by modem hardware, software, and system experts.

CONCLUSION

The ZiLOG Z02215 single-chip modem is a superior alternative to the Rockwell V.22bis modem.

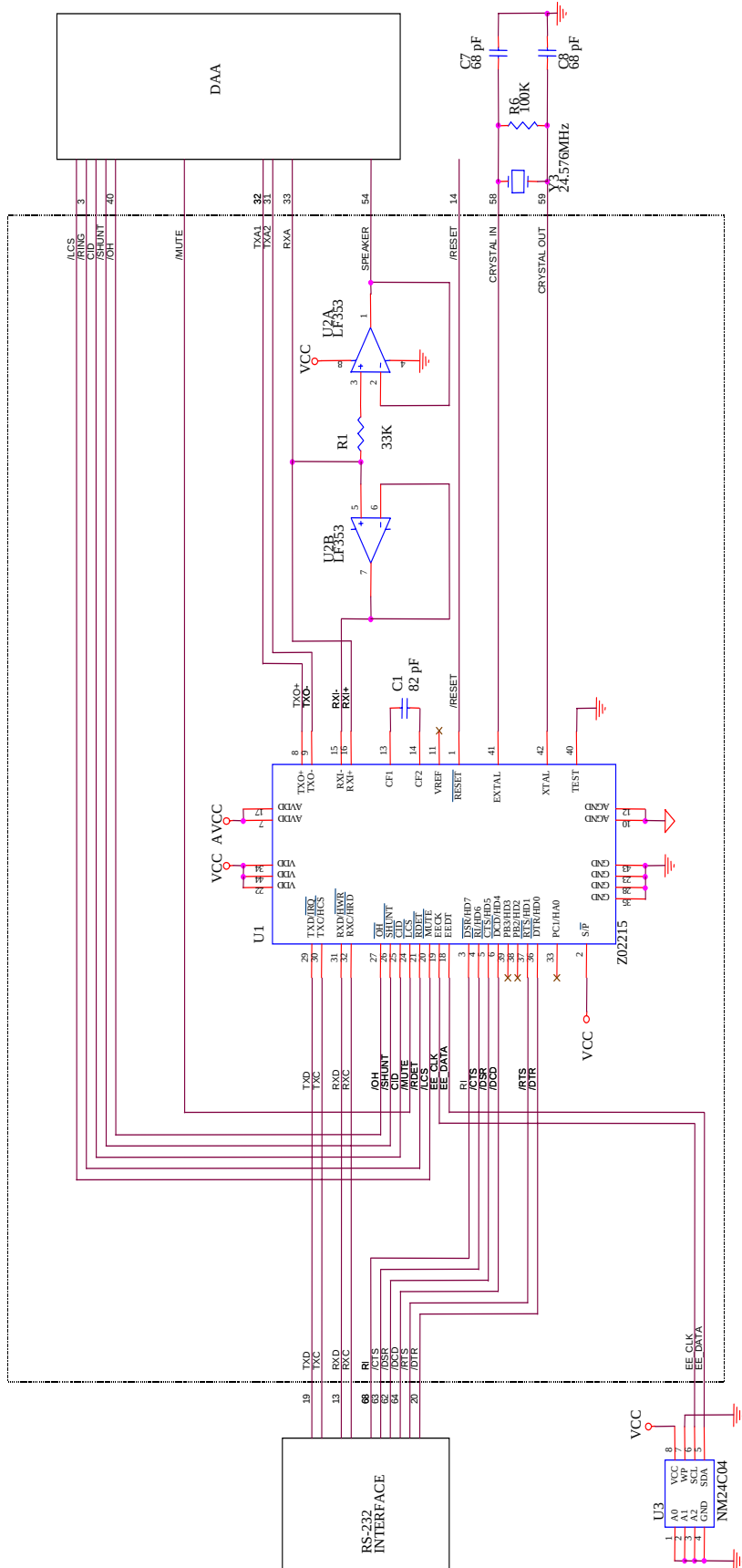


Figure 1. Schematic - ZiLOG Equivalent of Rockwell RC24ATL

NOTES

- NOTES
- 1/ A/A1 IS NOT SUPPORTED
 - 2/ SPEAKER CIRCUIT HAS NO INTERNAL VOLUME
 - 3/ EEPROM IS I2C
 - 4/ EEPROM AND SPEAKER CIRCUIT ARE OPTIONAL
 - 5/ U2 IS REQUIRED ONLY FOR ROCKWELL PIN COMPATIBILITY

INFORMATION INTEGRITY

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