Rockwell

RCV144ACF/SP and RCV144ATF/SP Integrated High Speed Data/Fax/Voice Modem and Speakerphone Devices

INTRODUCTION

The Rockwell RCV144ACF/SP and RCV144ATF/SP integrated data/fax/voice/speakerphone modem device families support high speed data, high speed fax, voice/audio, and speakerphone operation in the US or world-wide over a dial-up telephone line. Models supporting error correction and data compression, fax class 1, MNP 10/MNP 10EC, AutoSync, voice/audio, VoiceView, and world class (W-class) are available (Table 1).

As a data modem, the modem operates at line speeds to 14400 bps. Error correction (V.42/MNP 2-4) and data compression (V.42 bis/MNP 5) maximize data transfer integrity and boost average data throughput up to 57.6 kbps. Non-error-correcting mode is also supported.

RCV144ACF/SP models perform error correction and data compression (ECC) in the modem using 32k bytes of external RAM. ECC increases data throughput typically by a factor of four.

RCV144ATF/SP models require no external RAM. These models support ECC performed by the host CPU and communications software for Windows using the enhanced Rockwell Windows Protocol Interface (RPI+™) and WinRPI host software module.

As a fax modem, the modem supports Group 3 send and receive rates up to 14400 bps and supports T.30 protocol.

In voice mode, enhanced ADPCM coding and decoding supports efficient digital storage of voice using 2-bit or 4-bit compression and decompression at 7200 bps.

Voice mode also supports business audio and the Integrated Communications System (ICS) program. These features support applications such as digital answering machine, voice annotation, and audio file play/record.

The position independent, full-duplex speakerphone function uses an advanced algorithm that includes both acoustic and line echo cancellation.

The modem device is available in a 68-pin PLCC package.

Reference hardware designs are available with and without interface to sound chips (audio codecs). These designs support functions such as music on hold, telephone/speakerphone conversation recording, and handset recording.

PC-based "ConfigurACE™" software allows MCU firmware to be customized to application and country requirements.

FEATURES

- Data modem throughput up to 57.6 kbps
  - V.32 bis, V.32, V.22 bis, V.22A/B, V.23, and V.21
  - Bell 212A and 103
- RCV144ACF/SP performs ECC in the modem
  - V.42 LAPM and MNP 2-4 error correction
  - V.42 bis and MNP 5 data compression
  - MNP 10 data throughput enhancement
  - MNP 10EC™ enhanced cellular performance
  - Hayes AutoSync (option)
- RCV144ATF/SP performs ECC performed in the host
  - V.42 LAPM and MNP 2-4 error correction
  - V.42 bis and MNP 5 data compression
- Enhanced Rockwell Protocol Interface (RPI+) supported by WinRPI host software module
- Fax modem send and receive rates up to 14400 bps
  - V.33, V.17, V.29, V.27 ter, and V.21 channel 2
- Voice mode
  - Enhanced ADPCM compression/decompression
  - Tone detection/generation and call discrimination
  - Concurrent DTMF detection
- Business audio mode using 8-bit monophonic audio data encoding at 11.025 kHz or 7200 Hz
- VoiceView alternating voice and data (AVD) (ACF only)
- World-class operation (option)
  - Call progress, blacklisting, multiple country support
- Full-duplex speakerphone
  - Acoustic and line echo cancellation
  - Programmable microphone AGC
  - Microphone volume selection and muting
  - Speaker volume control and muting
  - Room monitor
- Communication software compatible AT command sets
- NVRAM directory and stored profiles
- Built-in DTE interfaces with speed up to 57.6 kbps
  - Parallel 16550A UART-compatible interface
  - Serial CCITT V.24 (EIA/TIA-232-E)
- Supports Rockwell PnP ISA Bus Interface Device
- Supports Serial PnP interface per Plug and Play External COM Device Specification, Rev 1.00
- Flow control and speed buffering
- Automatic format/speed sensing to 57.6 kbps
- Serial async data; parallel async data
- Auto dial and auto answer; tone and pulse dialing
- Caller ID and distinctive ring detect
- Single package: 68-pin
- +5V operation
- Power use (typ.): Operating = 500 mW

Data Sheet
(Preliminary)

Order No. MD146
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Table 1. Modem Models and Functions

Model	ECC	Supported Functions							External
		Fax Class	MNP 10/ MNP 10EC	Voice	VoiceView	AutoSync	W-Class	Country Support	32k-Byte RAM Required
RCV144ACF/SP	Modem	1	S	S	S	-	-	US/Canada	Yes
RCV144ACF/A/SP	Modem	1	S	S	S	S	-	US/Canada	Yes
RCV144ACFW/SP	Modem	1	S	S	S	S	S	Multiple	Yes
RCV144ATF/SP	Host	1	-	S	-	-	-	US/Canada	No
RCV144ATFW/SP	Host	1	-	S	-	-	S	Multiple	No

Notes:

1. ECC:
   - Host — ECC performed by host CPU and commercially available windows software.
   - Modem — ECC performed by the modem hardware and firmware.
2. Model options:
   - /A — Optional Hayes AutoSync.
   - V — Voice (includes Business Audio) and, for ACF/SP and ACFW/SP, VoiceView
   - SP — Speakerphone.
   - W — World-class (W-class) support.
3. Supported functions (S = Supported; – = Not supported):
   - Fax Class — Fax command functions (1 = Fax Class 1).
   - MNP 10 — MNP 10 data throughput enhancement.
   - MNP 10EC — MNP 10EC enhanced cellular.
   - Voice — Voice and business audio command functions.
   - VoiceView — VoiceView alternating voice and data (AVD) (ACF/SP and ACFW/SP only).
   - AutoSync — Hayes AutoSync using Hayes Synchronous Interface (HSI).
   - W-Class — World-class functions supporting multiple country requirements.

TECHNICAL SPECIFICATIONS

GENERAL DESCRIPTION

The single device modem provides the processing core for a complete modem design. The OEM adds a crystal, discrete components, and a telephone line/telephone/audio interface circuit to complete the system.

The modem is the full-featured, self-contained data modem/fax modem/voice/audio/speakerphone solution shown in Figure 1 (serial DTE interface) and Figure 2 (parallel host interface). No external microcontroller for data or fax control functions is required. Dialing, call progress, telephone line interface, voice/audio, and VoiceView functions are supported and controlled through the AT command set. The audio signal interface is illustrated in Figure 3.

The modem connects to the DTE via a V.24 (EIA/TIA-232-E) serial interface or to a host via a parallel microcomputer bus depending on modem model.

Modem

In data modem modes, the modem can operate in 2-wire, full-duplex, asynchronous modes at line rates up to 14400 bps. Data modem modes perform complete handshake and data rate negotiations. All tone and pattern detection functions required by the applicable ITU or Bell standard are supported.

In fax modem mode, the modem fully supports Group 3 facsimile send and receive speeds of 14400, 12000, 9600, 7200, 4800, or 2400 bps. Fax modem modes support Group 3 fax requirements. Fax data transmission and reception performed by the modem is controlled and monitored through the fax EIA-578 Class 1 command interface. Full HDLC formatting, zero insertion/deletion, and CRC generation/checking is provided.

Both transmit and receive fax data are buffered within the modem. Data transfer to and from the DTE is flow controlled by XON/XOFF.

Speakerphone

The speakerphone features an advanced proprietary speakerphone algorithm which provides full-duplex, voice conversation with both acoustic and line echo cancellation. During real-time conditions, the speakerphone algorithm constantly adjusts its parameters to deliver the best performance, allowing automatic fallback from full-duplex to pseudo duplex. The speakerphone algorithm includes a superior automatic anti-howling scheme which allows extreme freedom in the placement of microphone and speaker.

The speakerphone mode provides hands-free full-duplex telephone operation under modem control. The host can separately control volume, muting, and AGC in microphone and speaker channels. The speakerphone automatically recalculates loop control parameters to maintain duplexity and stability.

Modem Firmware

Modem firmware performs processing of general modem control, command sets, fax class 1, voice/audio, and DTE/host interface functions. In addition, ACF/SP and ACFW/SP firmware perform Hayes Autosync, error correction, data compression, and VoiceView functions (see Table 1).

Configurations of the modem firmware are provided to support parallel host bus interface operation or serial DTE interface operation.

The modem firmware is provided in object code form for the OEM to program into external ROM. The modem firmware may also be provided in source code form under a source code addendum license agreement.

HARDWARE INTERFACE SIGNALS

The modem pin assignments for the 68-pin PLCC with serial interface are shown in Figure 4.

The modem pin assignments for the 68-pin PLCC with parallel interface are shown in Figure 5.

ELECTRICAL AND ENVIRONMENTAL SPECIFICATIONS

The current and power requirements are listed in Table 2.

The absolute maximum ratings are listed in Table 3.

ADDITIONAL INFORMATION

Additional information is described in the RCV144ACF/SP and RVV144ATF/SP Designer's Guide (Order No. 1046) and in the AT Command Reference Manual (Order No. 833).

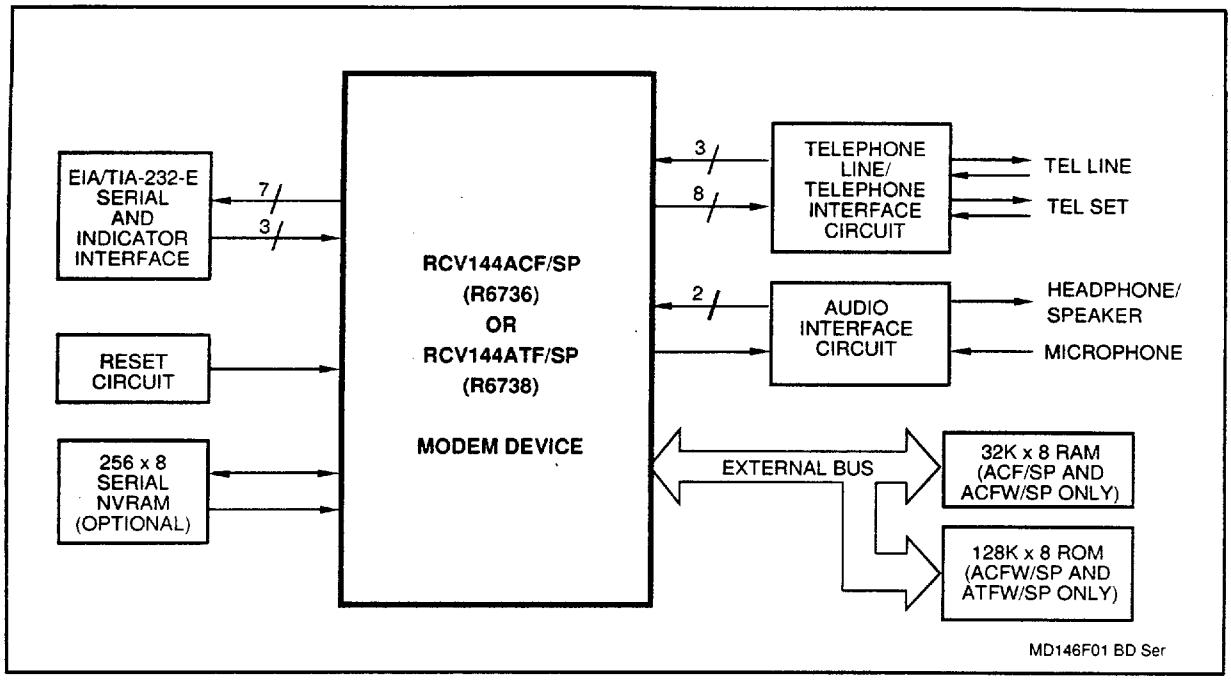

Figure 1. Block Diagram - Serial DTE Interface

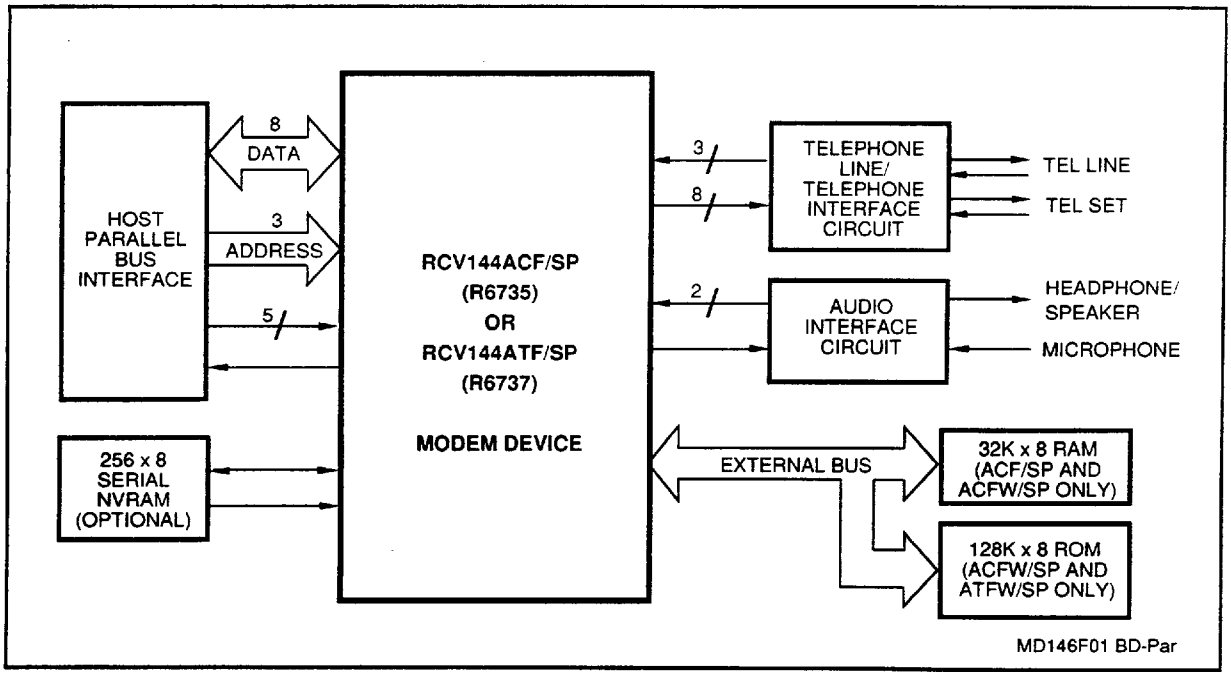

Figure 2. Block Diagram - Parallel Host Interface

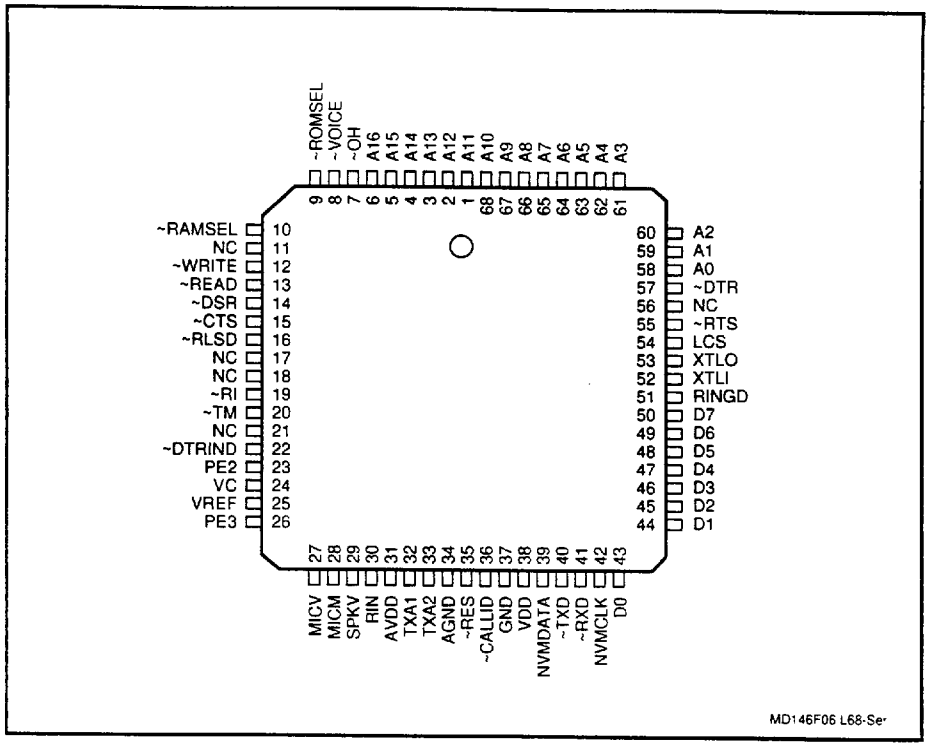

Figure 4. Modem Pin Signals - 68-Pin PLCC - Serial DTE Interface

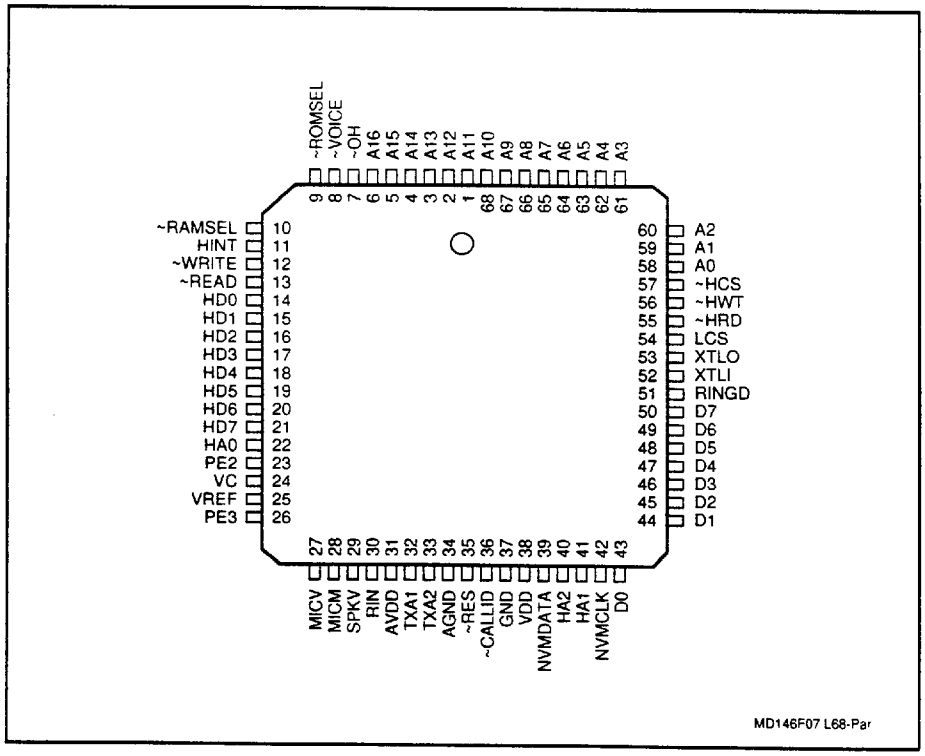

Figure 5. Modem Pin Signals- 68-Pin PLCC - Parallel Host Interface

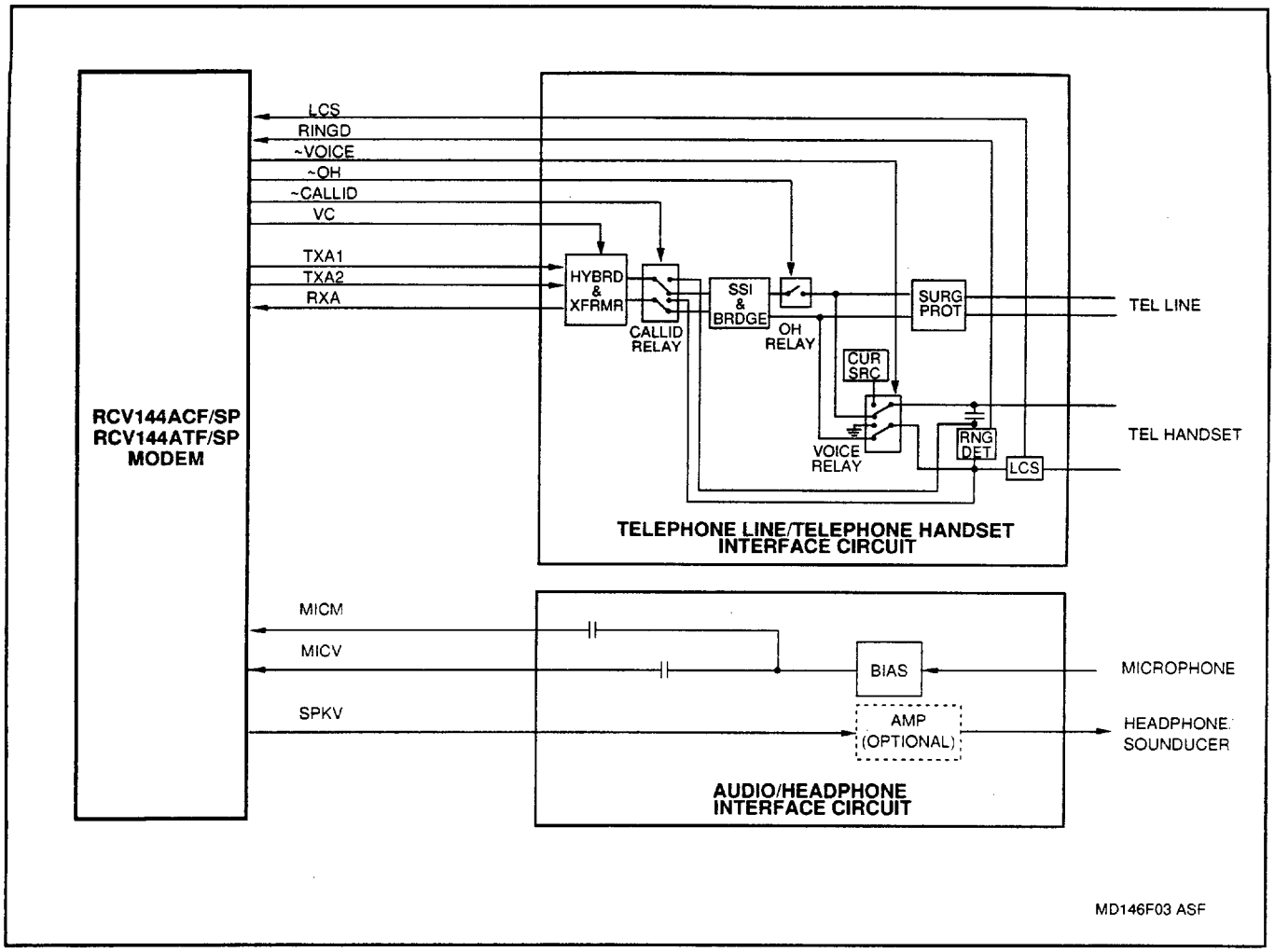

Figure 3. Audio Signal Interface

Table 2. Current and Power Requirements

Mode	Current (ID) Typical Current @ 25°C (mA)	Current (ID) Maximum Current @ 0°C (mA)	Power (PD) Typical Power @ 25°C (mW)	Power (PD) Maximum Power @ 0°C (mW)	Notes
Normal mode	100	120	500	630	

Notes:
1. Maximum power @ -40°C specified only for extended temperature range parts.
2. Test conditions: VCC = 5.0 VDC for typical values; VCC = 5.25 VDC for maximum values.

Table 3. Absolute Maximum Ratings

Parameter	Symbol	Limits	Units
Supply Voltage	V_{DD}	-0.5 to +7.0	V
Input Voltage	V_{IN}	-0.5 to (+5VD +0.5)	V
Operating Temperature Range	T_A	-0 to +70	°C
Storage Temperature Range	T_{STG}	-55 to +125	°C
Analog Inputs	V_{IN}	-0.3 to (+5VA + 0.3)	V
Voltage Applied to Outputs in High Impedance (Off) State	V_{HZ}	-0.5 to (+5VD + 0.5)	V
DC Input Clamp Current	I_{IK}	±20	mA
DC Output Clamp Current	I_{OK}	±20	mA
Static Discharge Voltage (25°C)	V_{ESD}	±2500	V
Latch-up Current (25°C)	I_{TRIG}	±200	