RCV336ACF/SVD Integrated DSVD, AudioSpan Speakerphone, Data/Fax Modem Device Set for Desktop Applications

Introduction

The Rockwell RCV336ACF/SVD Modem Device Set supports high speed data high speed fax, DSVD, AudioSpan, speakerphone, audio/voice, and VoiceView operation. It is intended for use with dial-up telephone lines in the U.S. or world-wide and is offered in eight device models (Table 1).

The RCV336ACF/SVD modem and an optional DSVD Coprocessor device set allows design of a common PC board providing data and fax modem, DSVD, AudioSpan, speakerphone, and audio/voice operation with handset, headset, or speakerphone (microphone and speaker). DSVD operation can be defeatured by not installing the DSVD Coprocessor device.

AudioSpan (analog simultaneous audio/voice and data) operation supports data rates with audio of 4.8 kbps in V.61 modulation, 4.8 to 9.6 kbps in ML144 modulation, or 4.8 to 14.4 kbps in ML288 modulation.

DSVD (digital simultaneous voice and data) operation using the optional DSVD Coprocessor supports speech coding plus data rate of 8.0 kbps in G.729A mode per ITU-T V.70 or 8.5 kbps in DigiTalk™ mode per DSVD Special Interest Group (SIG).

SVD models support position independent, full-duplex speakerphone (FDSP).

As a data modem, the modem operates at line speeds to 33600 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 115.2 kbps. Non-error-correcting mode is also supported.

The modem supports fax Group 3 send and receive rates up to 14400 bps and supports T.30 protocol.

In voice/audio mode, enhanced ADPCM coding and decoding supports efficient digital storage of voice/audio using 2-bit or 4-bit per sample compression and decompression with a 7200 Hz sample rate. This mode supports digital telephone answering machine (DTAM), voice annotation, and audio recording and playback applications.

AccelerATor kits and reference designs are available to minimize application design time and costs. PC-based "ConfigurACE™ II for Windows" software allows MCU firmware to be customized to application and country requirements.

Features

- AudioSpan (simultaneous audio/voice and data)
  - ITU-T V.61 modulation (4.8 kbps data plus audio)
  - ML144 modulation (4.8 to 9.6 kbps data plus audio)
  - ML288 modulation (4.8 to 14.4 kbps data plus audio)
  - Audio/silence detection (ML144) and handset echo cancellation
  - Handset, headset, or half-duplex speakerphone
- DSVD (digital simultaneous voice and data) (option)
  - ITU V.70 (8.0 kbps speech coding plus data in G.729A mode)
  - DigiTalk (8.5 kbps speech coding plus data)
  - Voice/silence detection and handset echo cancellation
  - Robust DSVD timing recovery
  - Handset, headset, or half-duplex speakerphone
- Full-duplex speakerphone (FDSP) mode (option)
  - Acoustic and line echo cancellation
  - Microphone gain and muting
  - Speaker volume control and muting
  - Room monitor
- Data modem throughput up to 115.2 kbps
  - 33.6 kbps, V.34, V.32 bis, V.32, V.22 bis, V.22A/B, V.23, and V.21; Bell 212A and 103
  - V.42 LAPM, MNP 2-4, and MNP 10 error correction
  - V.42 bis and MNP 5 data compression
  - MNP 10EC™ enhanced cellular performance
  - Hayes AutoSync (option)
- 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/audio mode (option)
  - Enhanced ADPCM compression/decompression
  - Tone detection/generation and call discrimination
  - Concurrent DTMF detection
  - 8-bit monophonic audio data encoding at 11.025 kHz or 7200 Hz
- VoiceView alternating voice and data (option)
- World-class operation (option)
  - Call progress, blacklisting, multiple country support
- Communication software compatible AT command sets
- NVRAM directory and stored profiles
- Built-in DTE interfaces with speed up to 115.2 kbps
  - Parallel 16550A UART-compatible interface
  - Serial ITU-T 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
- Serial async data; parallel async data
- Caller ID and distinctive ring detect
- Packages:
  - RCV336ACF/SVD Modem: 68-pin PLCC
  - DSVD Coprocessor: 68-pin PLCC
- +5V operation

Table 1. Modem Models and Functions

Model	Devices Used		Supported Functions				
	Modem (R6759/R6760)	DSVD Coprocessor (R6715)	V.34 Data/ V.17 Fax/ AudioSpan	FDSP	DSVD	Voice/Audio/ VoiceView	W-Class
RCV336ACF/SVD	Y	Y	S	S	S	S	--
RCV336ACF/SVD	Y	N	S	S	--	S	--
RCV336ACFW/SVD	Y	Y	S	S	S	S	S
RCV336ACFW/SVD	Y	N	S	S	--	S	S
RCV336ACF	Y	N	S	--	--	S	--
RCV336ACFW	Y	N	S	--	--	S	S
RC336ACF	Y	N	S	--	--	--	--
RC336ACFW	Y	N	S	--	--	--	S

Notes:

1. Legend:

   Y = Device required.

   N = Device not required.

   S = Function supported.

   O = Function supported with optional device (e.g., DSVD function requires optional DSVD Coprocessor).

   -- = Function not supported.

2. Model options:

   SVD   Speakerphone and, with DSVD Coprocessor, DSVD.

   V   Voice, audio, and VoiceView.

   W   World-class (W-class).

3. Supported functions (S = Supported; — = Not supported):

   AudioSpan   Analog simultaneous audio/voice and data.

   FDSP   Full-duplex speakerphone.

   DSVD   Digital simultaneous voice and data.

   Voice/Audio   Voice and audio functions.

   VoiceView   VoiceView alternating voice and data.

   W-Class   World-class functions supporting multiple country requirements.

Description

General

The RCV336ACF/SVD device set provides the processing core for a complete system design featuring data/fax modem, DSVD, AudioSpan, speakerphone, voice/audio, and VoiceView support depending on model (Table 1).

For modem/AudioSpan/speakerphone/voice/audio operation, only the RCV336ACF/SVD modem device is needed. The OEM adds a crystal, discrete components, and a telephone line/telephone/audio interface circuit to complete the system. The standard crystal frequency is 52.416 MHz (alternatively, a modem model may be ordered for use with a 56.448 MHz crystal).

The modem is packaged in a 68-pin PLCC.

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). Dialing, call progress, telephone line interface, AudioSpan, DSVD (with the DSVD Coprocessor), speakerphone, 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.

The DSVD Coprocessor is required for DSVD operation. The OEM adds a 50.688 MHz crystal and a few discrete components.

The DSVD Coprocessor is packaged in a 68-pin PLCC.

Data/Fax Modes

In data modem modes, the modem can operate in 2-wire, full-duplex, asynchronous modes at line rates up to 33600 bps. Data modem modes perform complete handshake and data rate negotiations. Using V.34 modulation to optimize modem configuration for line conditions, the modem can connect at the highest data rate that the channel can support from 33600 bps to 300 bps with automatic fallback. Automode operation in V.34 is provided in accordance with PN3320 and in V.32 bis in accordance with PN2330. All tone and pattern detection functions required by the applicable ITU or Bell standard are supported.

In fax modem modes, 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 and RTS/CTS.

AudioSpan Modes

AudioSpan provides full-duplex analog simultaneous audio/voice and data over a single telephone line. AudioSpan can send any type of audio waveform, including music. Data can be sent with or without error correction. The audio/voice interface can be in the form of a headset, handset, or a microphone and speaker (half-duplex speakerphone).

V.61 Modulation. AudioSpan can operate in V.61 modulation at a data rate with audio of 4800 bps.

ML144 Modulation. AudioSpan can operate in ML144 (V.32) modulation at a 4.8 to 9.6 kbps data rate with audio where lower data rates provide higher audio quality.

ML288 Modulation. AudioSpan can operate in ML288 (V.34 type) modulation at a 4.8 to 14.4 kbps data rate with audio where lower data rates provide higher audio quality.

DSVD Mode (SVD Models Only)

DSVD provides full-duplex digital simultaneous voice and data over a single telephone line. DSVD uses a ITU-T V.70 G.729A or DigiTalk voice codec to code (compress) and decode (decompress) speech in the DSVD Coprocessor. The voice interface can be in the form of a headset, handset or a microphone and speaker (half-duplex speakerphone).

DSVD modes include voice activated coding. The decoder timing recovery algorithm compensates for clock skew, asynchronous host-to-decoder data transfer delay, intervening variable length data block transmission delay, and loss of encoded speech data.

Handset echo cancellation supports handset use through a hybrid.

G.729A Mode. DSVD can operate in G.729A mode at a voice codec rate of 8.0 kbps.

DigiTalk Mode. DSVD can operate in DigiTalk mode at a voice codec rate of 8.5 kbps.

Speakerphone Mode (SVD Models Only)

The speakerphone mode features an advanced proprietary speakerphone algorithm which supports full-duplex voice conversation with both acoustic and line echo cancellation. Parameters are constantly adjusted to maintain stability with automatic fallback from full-duplex to pseudo-duplex operation. The speakerphone algorithm allows position independent placement of microphone and speaker.

The speakerphone mode provides hands-free full-duplex telephone operation under host control. The host can separately control volume, muting, and AGC in microphone and speaker channels.

Modem Firmware

Modem firmware performs processing of general modem control, command sets, fax Class 1, AudioSpan, DSVD, speakerphone, voice/audio/TAM, error correction, data compression, and DTE/host interface 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 (R6759) pin assignments for the 68-pin PLCC with serial interface are shown in Figure 4.

The modem (R6760) pin assignments for the 68-pin PLCC with parallel interface are shown in Figure 5.

The DSVD Coprocessor (R6715) pin assignments for the 68-pin PLCC are shown in Figure 6.

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 RCV336ACF/SVD Designer's Guide (Order No. 1105) and in the AT Command Reference Manual (Order No. 1048).
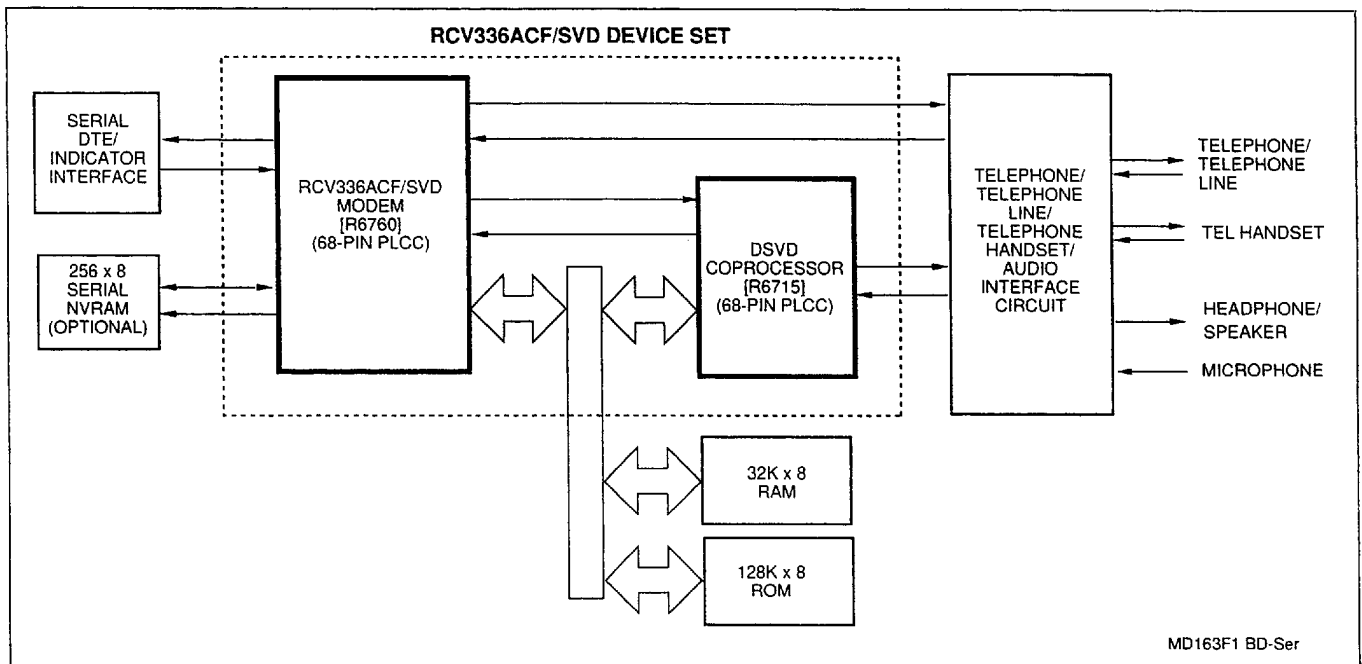
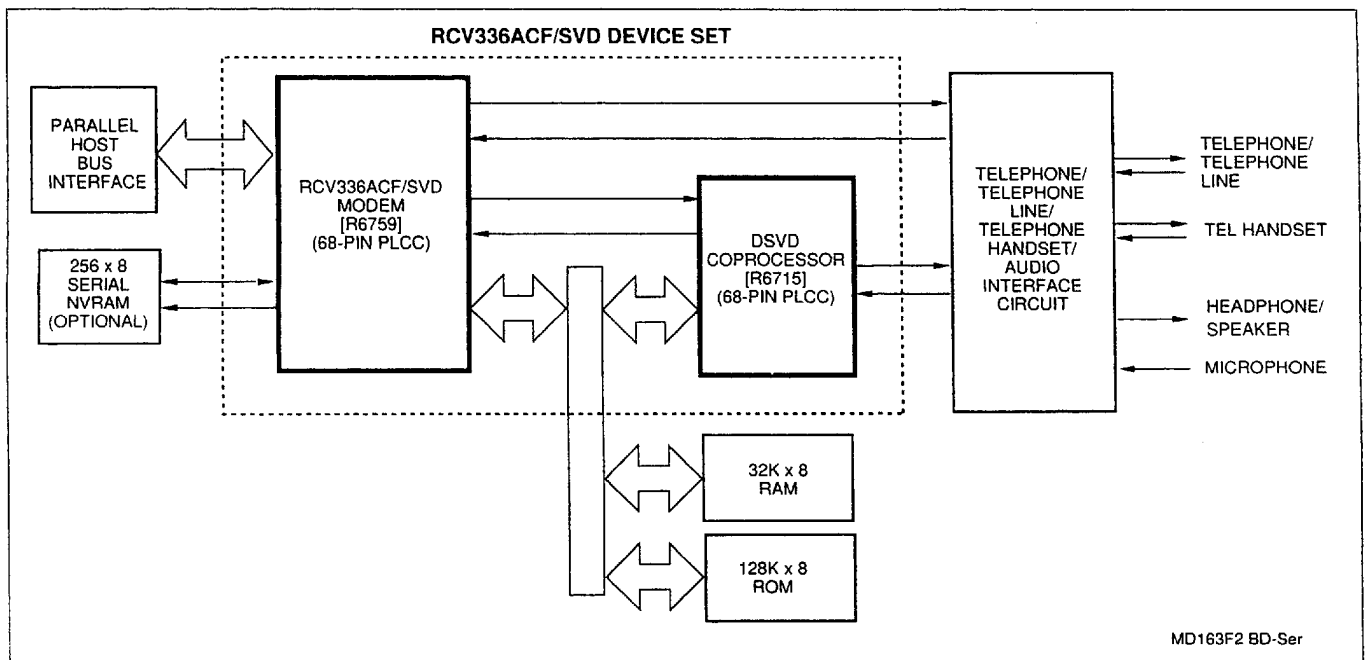**Figure 1. Block Diagram - Serial DTE Interface**

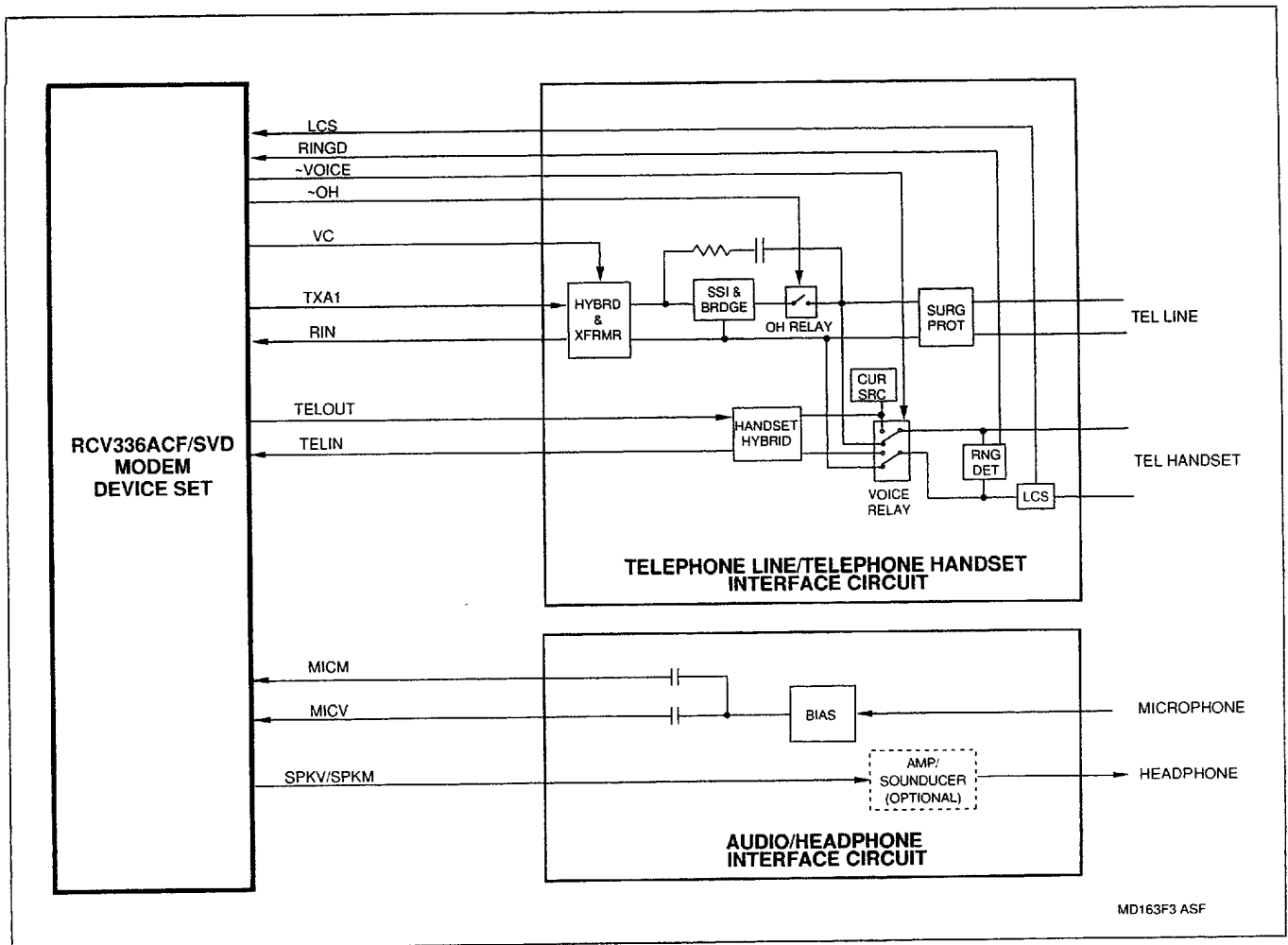**Figure 2. Block Diagram - Parallel Host Interface**
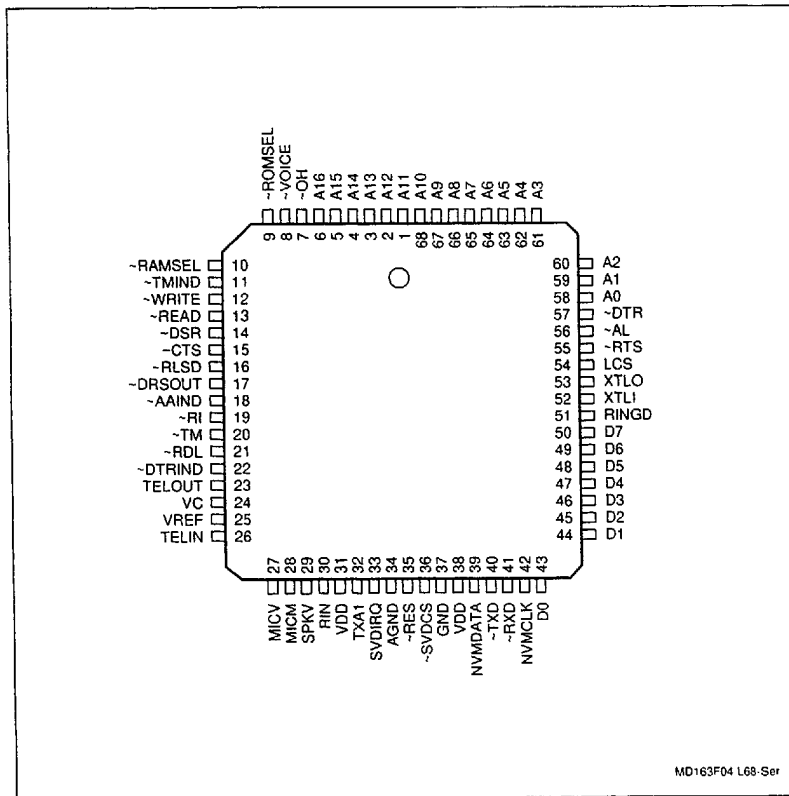
Figure 3. Typical Audio Signal Interface

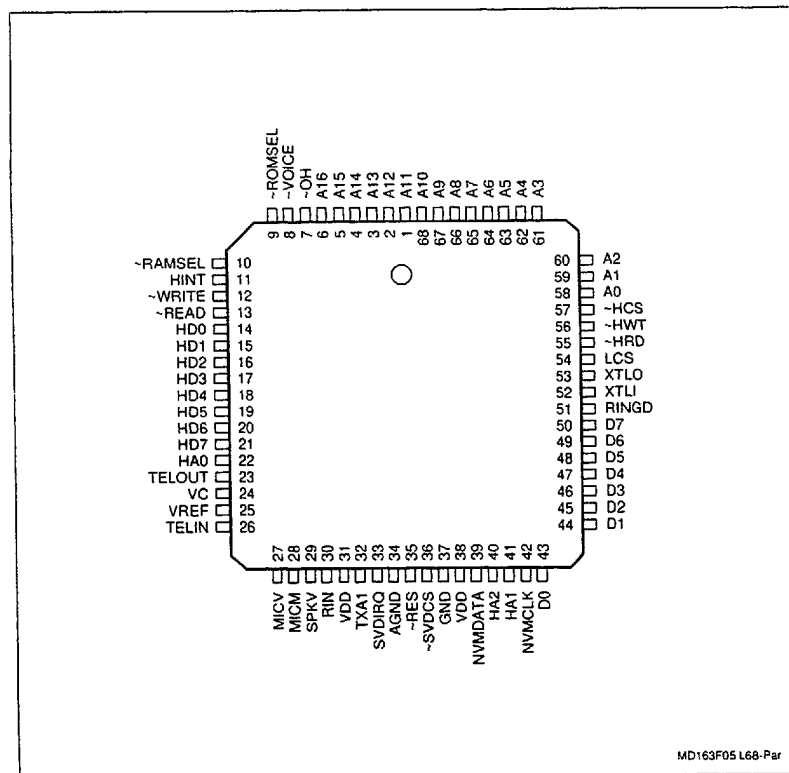Figure 4. Modem Pin Signals - 68-Pin PLCC - Serial DTE Interface

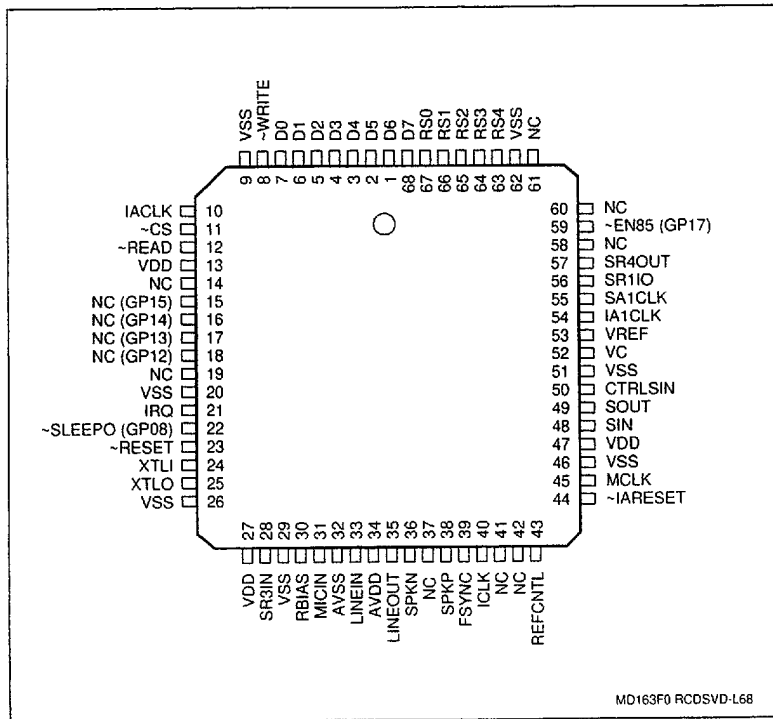Figure 5. Modem Pin Signals- 68-Pin PLCC - Parallel Host Interface

Figure 6. DSVD Coprocessor Pin Signals- 68-Pin PLCC

Table 2. Current and Power Requirements

Mode	Current		Power		Notes
	Typical Current (mA)	Maximum Current (mA)	Typical Power (mW)	Maximum Power (mW)	
Normal Mode					
Modem Device	170	205	850	1075	
DSVD Coprocessor	110	124	550	650	
Notes:					
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	mA