

RCV56HCF Host-Controlled K56flex™ Data/Fax Modem Device Family for ISA Bus Applications

Introduction

The Rockwell RCV56HCF Host-Controlled Modem Device Family supports high speed analog data, high speed fax, ISDN, DSVD, AudioSpan, speakerphone, audio/voice, and VoiceView operation. It operates with PSTN or ISDN telephone lines in the U.S. and world-wide and is offered in eight device models (see Table 1).

The modem device set consists of PC ISA bus interface (BIF) and modem data pump (MDP) hardware available in two thin quad flat packs (TQFPs). Host-controlled modem software is also provided. The RCV56HCF employs a downloadable architecture so that the user can upgrade MDP executable code. Figure 1 illustrates the major interfaces supported by each model.

Using K56flex™ technology, the RCV56HCF can receive data at speeds up to 56 kbps from a digitally connected central site modem, also K56flex enabled, e.g., with a Rockwell RC56CSM modem. This modem takes advantage of the PSTN which is primarily digital except for the client modem to central office local loop and is ideal for applications such as remote access to an Internet service provider (ISP), on-line service, or corporate site. The RCV56HCF can send data at speeds up to V.34 rates.

In V.34 data mode, the modem operates at line speeds up 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. Non-error-correcting mode is also supported.

AudioSpan (analog simultaneous audio/voice and data) operation supports a data rate with audio of 4.8 kbps.

SP models support position independent, full-duplex speakerphone (FDSP), as well as digital simultaneous voice and data (DSVD) with speech coding per ITU-T G.729 Annex A with interoperable G.729 Annex B, and SIG DigiTalk™ DSVD.

The modem supports fax Group 3 send and receive rates up to 28800 bps and T.30 protocol.

V.80 and Rockwell Video Ready compatible synchronous access modes support host-controlled communication protocols, e. g., H.324 video conferencing.

In voice/audio mode, enhanced 4-bit per sample ADPCM coding and decoding at 8000 Hz sample rate allows efficient digital storage of voice/audio. This mode supports digital telephone answering machine, voice annotation, and audio recording/playback applications.

AccelerATor kits and reference designs are available to minimize application design time and costs.

Features

- Data modem
 - K56flex, upgradable to ITU-T 56 kbps
 - 33.6 kbps, 31.2 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 and MNP 2-4 error correction
 - V.42 bis and MNP 5 data compression
 - V.25 ter, V.25 ter Annex A, and EIA 602 command sets
- Fax modem send and receive rates up to 28800 bps
 - ITU-T V.34 fax, V.17, V.29, V.27 ter, and V.21 ch 2
 - EIA/TIA 578 Class 1, Class 1.0 (T.31) fax
- ISDN BRI support (option)
 - PC Bus support 2B+D channels
 - IOM-2 interface to external U or S/T transceiver
 - Simultaneous transfer of B1, B2, D channels (144 kbps; 64 kbps x 2, 16 kbps)
 - V.34, DSVD, FDSP, audio functions over B channel
- AudioSpan (simultaneous audio/voice and data)
 - ITU-T V.61 modulation (4.8 kbps data plus audio)
 - Handset, headset, or half-duplex speakerphone
- ITU-T V.70 DSVD (option)
 - ITU-T G.729 Annex A with interoperable G.729 Annex B
 - SIG (special interest group) DigiTalk DSVD
 - Voice/silence detection and handset echo cancellation
 - Handset, headset, or half-duplex speakerphone
- Full-duplex speakerphone (FDSP) mode
 - Over PSTN or ISDN B channel (option)
 - Switching to/from data, fax, DSVD and VoiceView
 - Microphone gain and muting
 - Speaker volume control and muting
 - Adaptive line and acoustic echo cancellation
 - Loop gain control, transmit and receive path AGC
 - Acoustic echo cancellation concurrent with DSVD
 - Noise suppression
 - Room monitor
- V.80 and Rockwell Video Ready synchronous access modes support host-controlled communication protocols
 - H.324 interface support
- V.8/V.8bis and supporting commands (V.25 ter Annex A)
- Data/Fax/VoiceView/Voice call discrimination
- Voice, telephony, audio, VoiceView
 - Voice (4-bit ADPCM compression/decompression)
 - TIA-695 command set
 - VoiceView alternating voice and data (option)
 - 8-bit linear and 8-bit μ -Law record/playback
 - 8.0 kHz, 11.025 kHz, 22.050 kHz and 44.1 kHz (down sampled to 11.025)
 - Handset, acoustic, line echo cancellation
 - Music on hold from host or analog hardware input
 - TAM support with concurrent DTMF detect, ring detect and caller ID

Features (Continued)

- World-class operation (option)
 - Call progress, blacklisting, multiple country support
- Integrated internal hybrid
- Caller ID and distinctive ring detect
- Modem and audio paths concurrent across PC bus
- Single profile stored in host
- Plug and Play compliant
- ISA Bus Interface
 - Only one IRQ required (IRQ3-5, 7, 9-12, or 15)
 - No DMA required
 - Independently mapped 16-byte I/O blocks
- System compatibilities
 - Windows 95 and Windows NT operating systems
 - Microsoft's PC 97 Design Initiative compliant
- Device packages:
 - Bus Interface: 144-pin TQFP
 - Modem Data Pump: 144-pin TQFP
- +5V operation

Table 1. Modem Models and Functions

Marketing Model Number ¹	Supported Functions				
	K56flex, V.34 Fax/	Voice/Audio/ VoiceView/ AudioSpan	ISDN (Note 5)	Full-duplex Speakerphone (FDSP) and DSVD	W-Class
RCV56HCF/SDN	Y	Y	Y	Y	–
RCV56HCFW/SDN	Y	Y	Y	Y	Y
RCV56HCF/SP	Y	Y	–	Y	–
RCV56HCFW/SP	Y	Y	–	Y	Y
RCV56HCF	Y	Y	–	–	–
RCV56HCFW	Y	Y	–	–	Y
RC56HCF	Y	–	–	–	–
RC56HCFW	Y	–	–	–	Y

Notes:

- The two-device set manufacturing part numbers are:
ISA Bus Interface in 144-pin TQFP: 11218-XX.
MDP in 144-pin TQFP: R6775-XX.
- Legend:**
Y = Function supported.
– = Function not supported.
- Model options:**
SP Speakerphone and DSVD.
V Voice, audio, and VoiceView.
W World-class (W-class).
- Supported functions (Y = Supported; – = Not supported):**
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.
- Provides ISDN functionality with the addition of a U or S/T transceiver device.

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VoiceView is a registered trademark of Radish Communications, Inc.

Hayes is a trademark of Hayes Microcomputer Products, Inc.



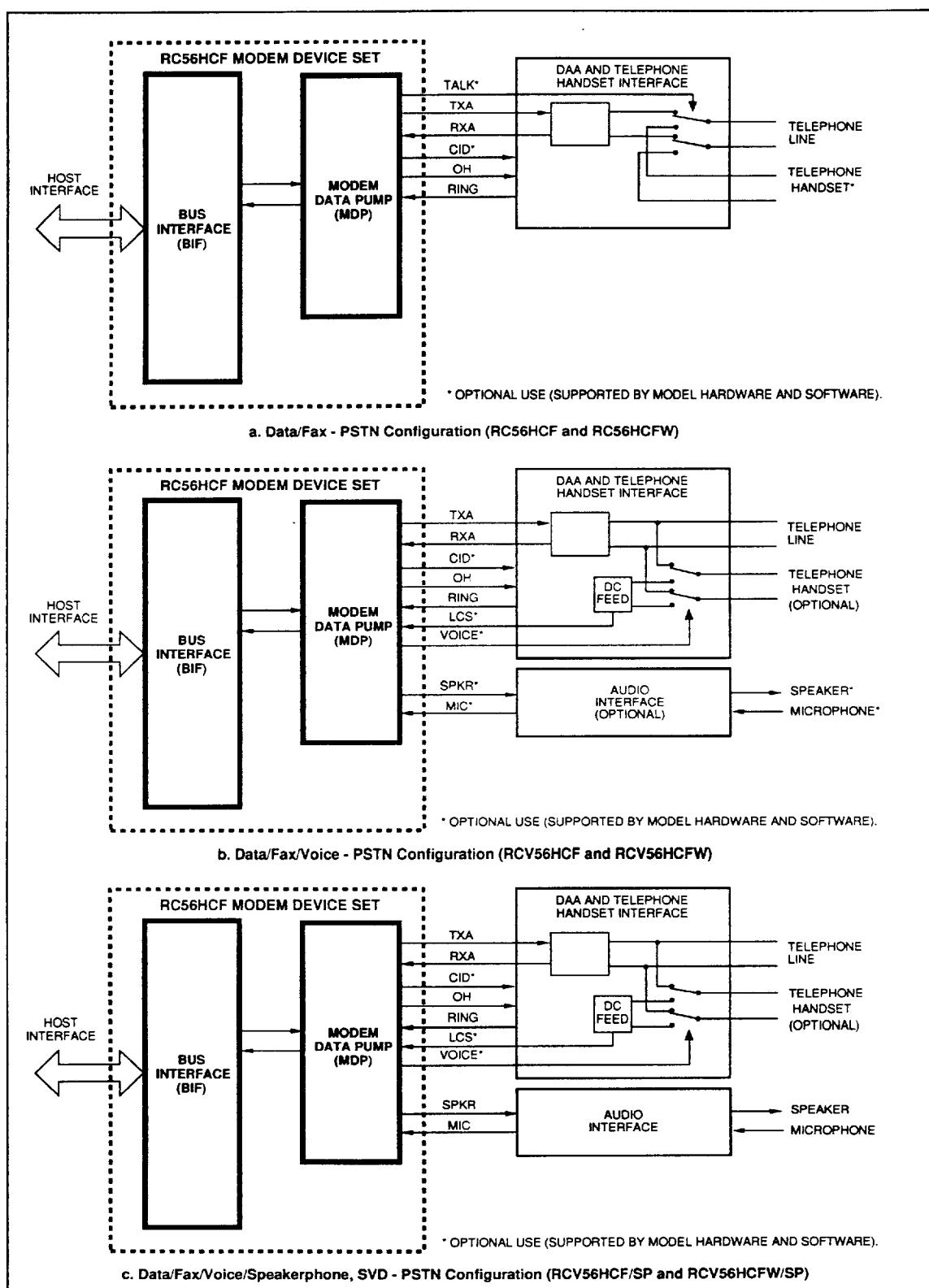


Figure 1. RCV56HCF Configuration Block Diagram

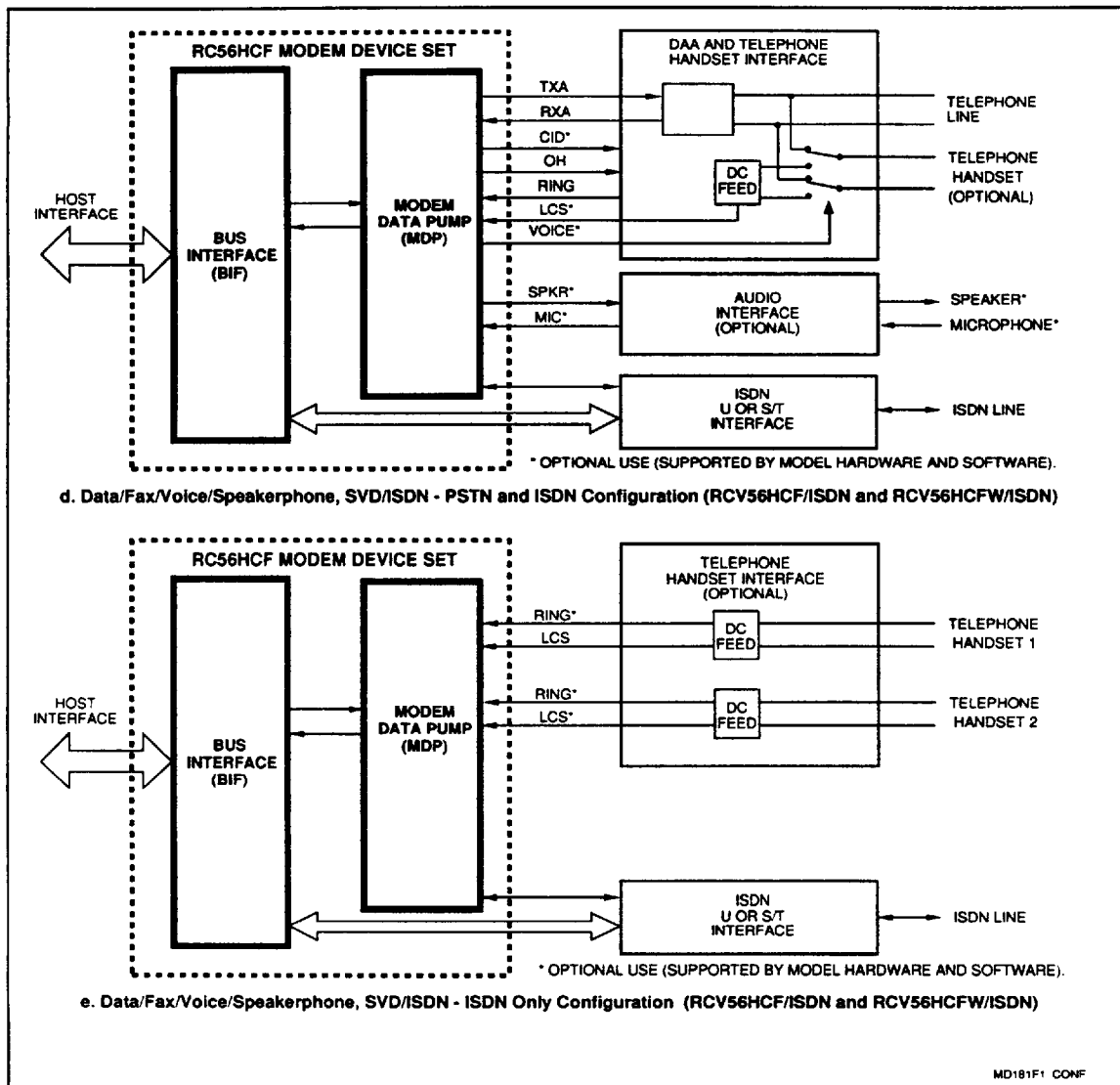


Figure 1. RCV56HCF Configuration Block Diagram (Continued)

Description

General

The RCV56HCF Device Set provides the processing core for a complete system design featuring data/fax modem, DSVD, AudioSpan, speakerphone, voice/audio, and VoiceView depending on specific model (Table 1). Note: RCV56HCF Device Set refers to the family of single device modem models listed in Table 1.

The modem is the full-featured, self-contained data modem/fax modem/DSVD/voice/audio/speakerphone solution. Dialing, call progress, telephone line interface, AudioSpan, DSVD, speakerphone, voice/audio, and VoiceView functions are supported and controlled through the AT command set.

The modem hardware connects to the host PC via an ISA bus interface. The OEM adds a crystal circuit, telephone line interface, telephone interface (optional), audio interface (optional), and ISDN interface (optional) to complete the system.

Data/Fax Modes

In K56flex™ mode, the modem can receive data from a digital source using a K56flex™-compatible central site modem (e. g., Rockwell RC56CSM) over the digital telephone network portion of the PSTN at line speeds up to 56 kbps. Asymmetrical data transmission supports sending data at V.34 rates. This mode can fall back to full-duplex V.34 mode, and to slower rates as supported by line conditions.

In V.34 data modem mode, the modem can also 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 2400 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 28800, 14400, 12000, 9600, 7200, 4800, or 2400 bps. Fax modes support Group 3 fax requirements. Fax data transmission and reception performed by the modem are controlled and monitored through the fax EIA-578 Class 1 command interface. Full HDLC formatting, zero insertion/deletion, and CRC generation/checking are 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 at a data rate with audio of 4800 bps using V.61 modulation. 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 microphone and speaker (half-duplex speakerphone). Handset echo cancellation is provided.

Host-Controlled DSVD Mode (SVD and SP Models)

SVD and SP models support host-controlled DSVD. A microphone and a speaker are required.

ITU-T Interoperable G.729 and G.729 Annex A with Interoperable G.729 Annex B Operation. Voice activity detection supports speech coding at an average bit rate significantly lower than 8.0 kbps.

SIG DigiTalk. Speech coding is performed at 8.5 kbps.

Voice/Audio Mode (V Models)

Voice/Audio Mode features include enhanced ADPCM compression/decompression, tone detection/generation and call discrimination, concurrent DTMF detection, and 8-bit monophonic audio data encoding at 11.025 kHz or 8000 Hz.

Voice/Audio Mode is supported by three submodes:

1. Online Voice Command Mode supports connection to the telephone line or a voice/audio I/O device (e.g., microphone, speaker, or handset).
2. Voice Receive Mode supports recording voice or audio data input at the MIC_M pin, typically from a microphone/handset or the telephone line.
3. Voice Transmit Mode supports playback of voice or audio data to the TXA1/TXA2 output, typically to a speaker/handset or to the telephone line.

Speakerphone Mode (SVD and SP Models)

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.

Synchronous Access Mode (SAM)

V.80 and Rockwell Video Ready synchronous access modes between the modem and the host/DTE are provided for host-controlled communication protocols, e.g., H.324 video conferencing applications.

Voice-call-first (VCF) before switching to a videophone call is also supported.

Host-Controlled Modem Software

Host-controlled modem software performs processing of general modem control, command sets, fax Class 1, AudioSpan, DSVD, speakerphone, voice/audio/TAM, error correction, data compression, and operating system interface functions. Configurations of the modem software are provided to support modem models listed in Table 1.

Binary executable modem software is provided for the OEM.

Downloadable Modem Data Pump Firmware

Binary executable code controlling MDP operation is downloaded as required during operation.

Hardware Interface Signals

The RCV56HCF functional interface signals are shown in Figure 2.

The Bus Interface (11218) hardware interface signals are shown in Figure 3.

The Bus Interface (11218) 144-pin TQFP pin assignments are shown in Figure 4.

The MDP (R6775) hardware interface signals are shown in Figure 5.

The MDP (R6775) 144-pin TQFP pin assignments are shown in Figure 6.

Package Dimensions

The 144-pin TQFP package dimensions are shown in Figure 7.

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 RCV56HCF Designer's Guide (Order No. 1123) and in the RCV56HCF Command Reference Manual (Order No. 1118).

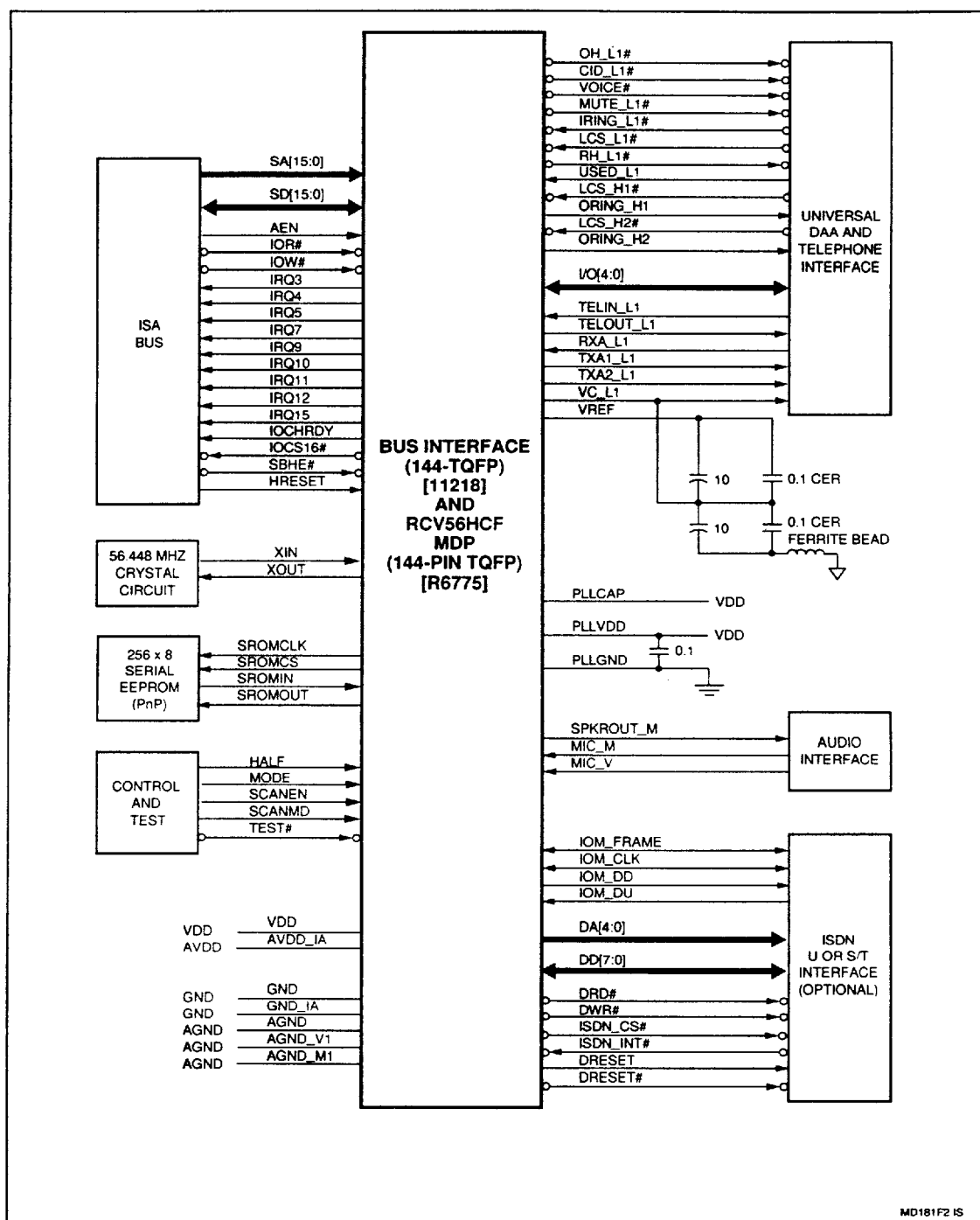


Figure 2. RCV56HCF Interface Signals

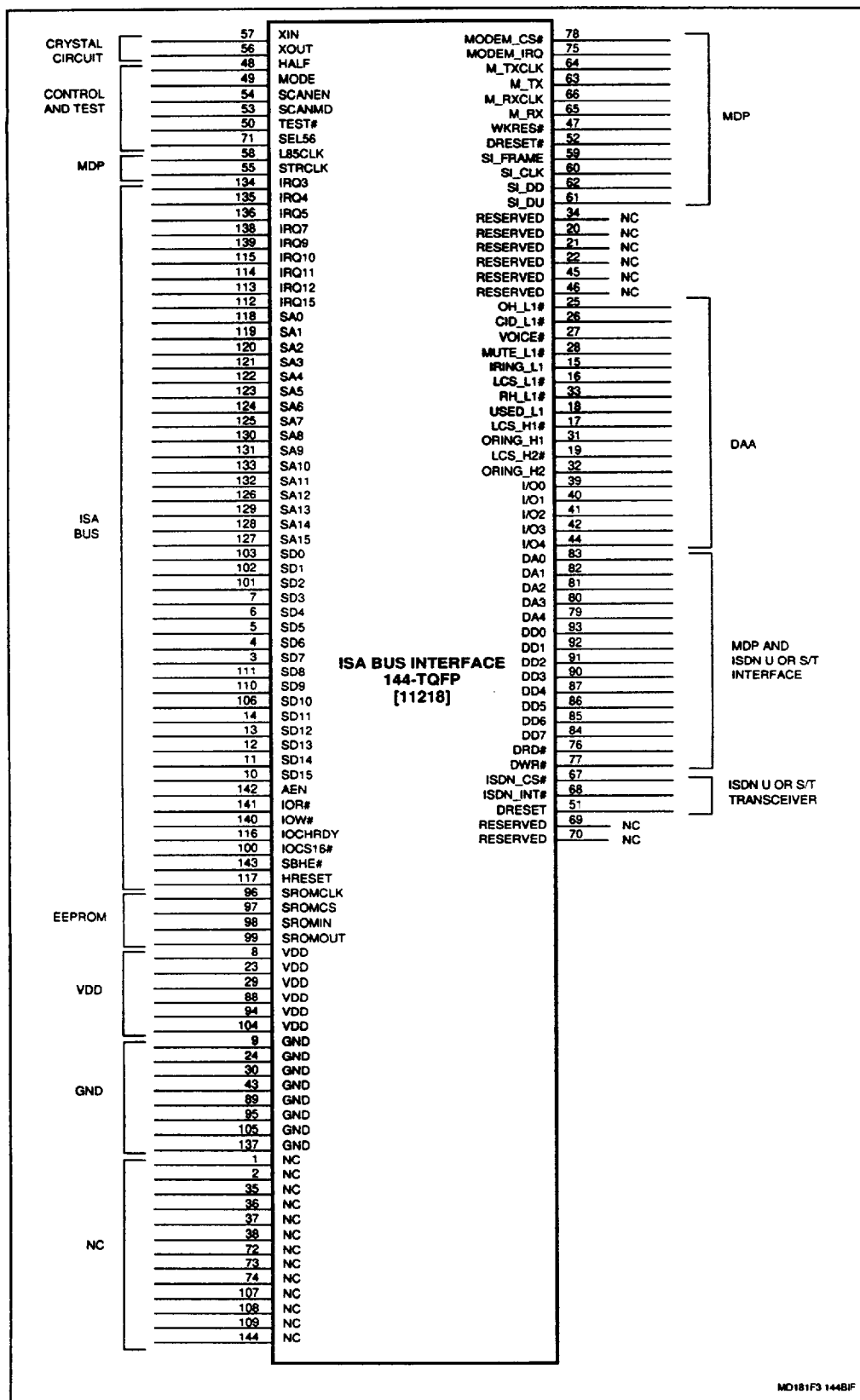
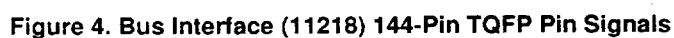


Figure 3. Bus Interface (11218) 144-Pin TQFP Hardware Interface Signals





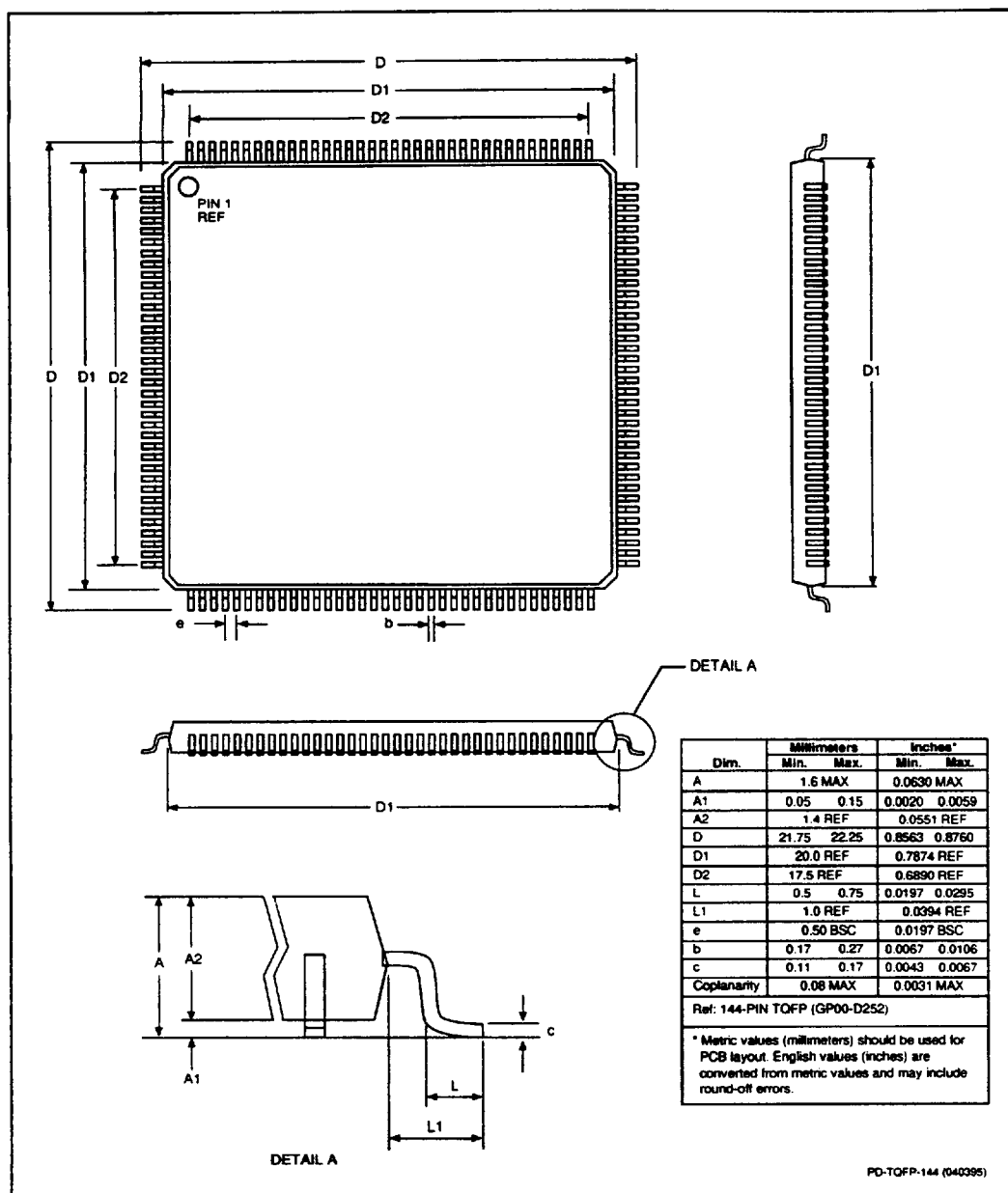


Figure 7. Package Dimensions - 144-Pin TQFP

Table 2. Current and Power Requirements

Mode	Current		Power		Notes
	Typical Current (mA)	Maximum Current (mA)	Typical Power (mW)	Maximum Power (mW)	
Bus Interface (11218)					$f_{IN} = 56.448 \text{ MHz}$
Operating	TBD	TBD	TBD	TBD	
Sleep	TBD	TBD	TBD	TBD	
Modem Data Pump (R6775)					$f_{IN} = 56.448 \text{ MHz}$
Operating	150	TBD	750	TBD	
Sleep	TBD	—	TBD	—	
Total					
Operating	TBD	TBD	TBD	TBD	
Sleep	TBD	TBD	TBD	TBD	

Notes:
 Operating voltage: VDD = 5.0V $\pm$ 5%.
 Test conditions: VDD = 5.0 VDC for typical values; VDD = 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

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