RCV288ACi
Integrated V.34 Data/V.17 Fax/Voice Modem Device Set Family for Desktop Applications

Introduction

The Rockwell RCV288ACi Modem Device Family supports high speed data, high speed fax, voice/audio, and VoiceView operation in the US or world-wide over a dial-up telephone line, depending upon the model (Table 1).

The modem device set consists of an L39 8-bit microcomputer (MCU), and an RCV288DPi V.34 modem data pump (MDP).

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.

Error correction and data compression (ECC) is performed in the modem using 32k bytes of external RAM to increase data throughput typically by a factor of four.

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

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

In voice/audio mode, enhanced 2-bit or 4-bit per sample ADPCM coding and decoding at 7200 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.

PC-based “ConfigurACE™ II for Windows” software allows MCU firmware to be customized to application and country requirements.

Features

- Data modem throughput up to 115.2 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, 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
  - ITU-T V.17, V.29, V.27 ter, and V.21 channel 2
- Rockwell Video Ready synchronous access mode supports host-based communication protocols
- Voice/audio mode
  - Enhanced ADPCM compression/decompression
  - Tone detection/generation and call discrimination
  - Concurrent DTMF detection
- VoiceView alternating voice and data
- 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 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 115.2 kbps
- Serial async data; parallel async data
- Auto dial and auto answer; tone and pulse dialing
- Caller ID and distinctive ring detect
- Device packages
  - MCU (L3903): 84-pin PLCC
  - MDP (R6682): 68-pin PLCC
- +5V operation
- Power use (typ.): Operating = 1.15 W; Sleep = 211 mW

Table 1. Modem Models and Functions

Model	Supported Functions			
	Data Modem, Fax Modem, MNP 10/ MNP 10EC, Voice/Audio, VoiceView	**AutoSync**	**W-Class**	**Country Support**
RCV288ACi	S	-	-	US/Canada
RCV288ACi/A	S	S	-	US/Canada
RCV288ACiW	S	S	S	Multiple

N**otes:**

1. . The manufacturing part numbers are:
   - L39 MCU: L3900-XX
   - P39 MCU: L1303-XX
   - RC288DPi MDP: R6682-XX
2. Model options:
   - (/A) Hayes AutoSync.
   - W World class support.
2. Supported functions (S = Supported; – = Not supported):
   - Fax Class Fax command functions (1 = Fax Class 1; 2 = Fax class 2).
   - MNP 10 MNP 10 data throughput enhancement.
   - MNP 10EC MNP 10EC enhanced cellular.
   - Voice/Audio Voice and business audio command functions.
   - VoiceView VoiceView alternating voice and data.
   - AutoSync Hayes AutoSync using Hayes Synchronous Interface (HSI).
   - W-Class World-class functions supporting multiple country requirements.

Technical Specifications

General Description

The RCV288ACi Device Set provides the processing core for a complete system design featuring data/fax modem, voice/audio, and VoiceView depending on specific model (see Table 1). Note: RCV288ACi Device Set refers to the family of modem models listed in Table 1.

The modem device set, consisting of separate microcontroller (MCU) and a modem data pump (MDP), provides the processing core for a complete modem design. The OEM adds two crystals, 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 solution shown in Figure 1 (serial DTE interface) and Figure 2 (parallel host interface). Dialing, call progress, telephone line interface, voice/audio, and VoiceView functions are supported and controlled through the AT command set.

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 Data Pump (MDP)

The MDP is a Rockwell RCV288DPi data/fax/voice modem data pump (R6682). The crystal frequency is 40.32 MHz.

As a data modem, the MDP can operate in full-duplex, synchronous/asynchronous modes at line rates up to 33600 bps. Using V.34 modulation to optimize modem configuration for line conditions, the MDP can connect at the highest data rate that the channel can support from 28800 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.

As a fax modem, the MDP fully supports Group 3 facsimile send and receive speeds of 14400, 12000, 9600, 7200, 4800, and 2400 bps.

ADPCM voice processing is performed in the MDP.

The RCV336DPi MDP is packaged in a 68-pin PLCC.

Microcontroller (MCU)

The MCU is a Rockwell L39 microcomputer (L3903).

The MCU performs the command processing and host interface functions. The crystal frequency is 14.7456 MHz.

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

The MCU connects to the MDP via dedicated lines and the external bus. The MCU external bus also connects to OEM-supplied ROM (128k bytes) and RAM (32k bytes).

For all models, a 256-byte NVRAM (serial EEPROM) can optionally be connected to the MCU over a dedicated serial interface.

The MCU is packaged in an 84-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.

Voice/Audio Mode

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 7200 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 RXA 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.

Synchronous Access Mode (SAM)

Rockwell Video Ready synchronous access mode between the modem and the host/DTE is provided for host-based communication protocols, e.g., H.324 video conferencing applications.

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

MCU Firmware

MCU firmware performs processing of general modem control, command sets, data modem, error correction and data compression (ECC), AutoSync, fax class 1, fax class 2, voice/audio, VoiceView, DSVD, W-class, and DTE/host interface functions according to modem models (see Table 1).

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

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

Hardware Interface Signals

The MCU pin assignments with serial DTE interface for the 84-pin PLCC are shown in Figure 3.

The MCU pin assignments with parallel host interface for the 84-pin PLCC are shown in Figure 4.

The MDP pin assignments for the 68-pin PLCC are shown in Figure 5.

Electrical and Environmental Specifications

The current and power requirements are listed Table 2.

The absolute maximum ratings are listed in Table 3.

Additional Information

Additional information is described in the RCV288ACi Designer's Guide (Order No. 1027) and in the AT Command Reference Manual (Order No. 1048).

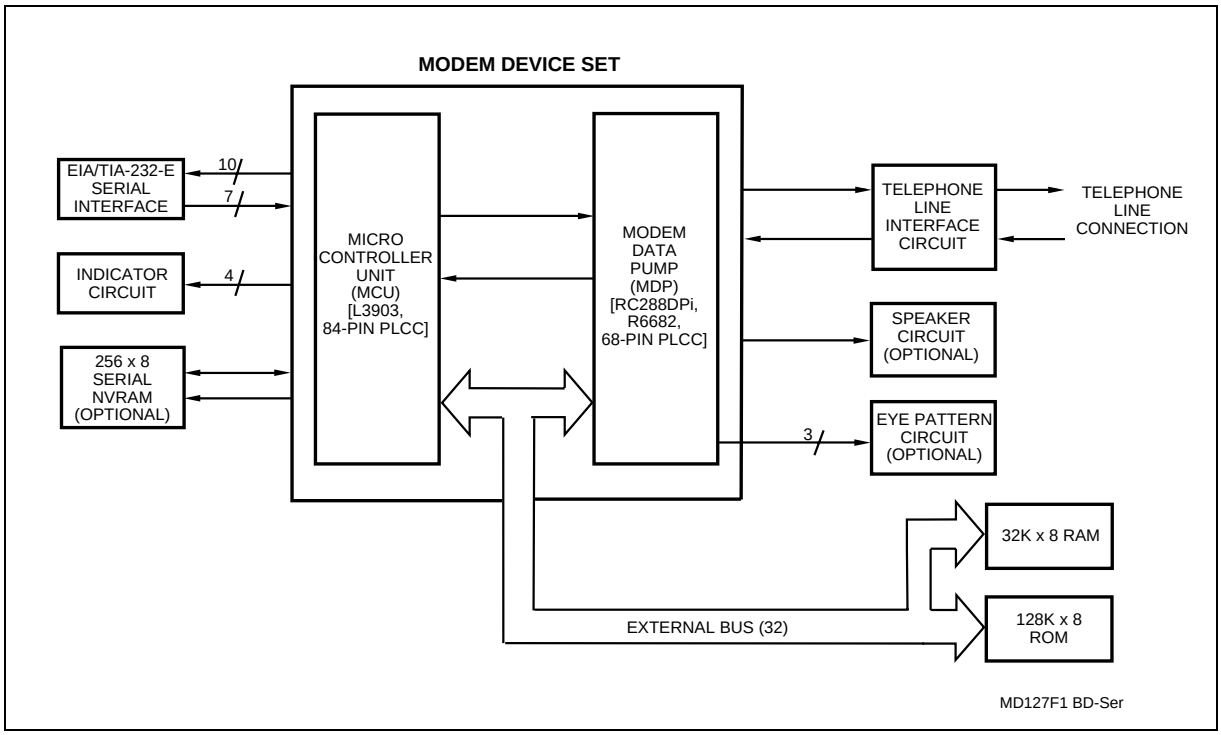

Figure 1. Block Diagram - Serial DTE Interface

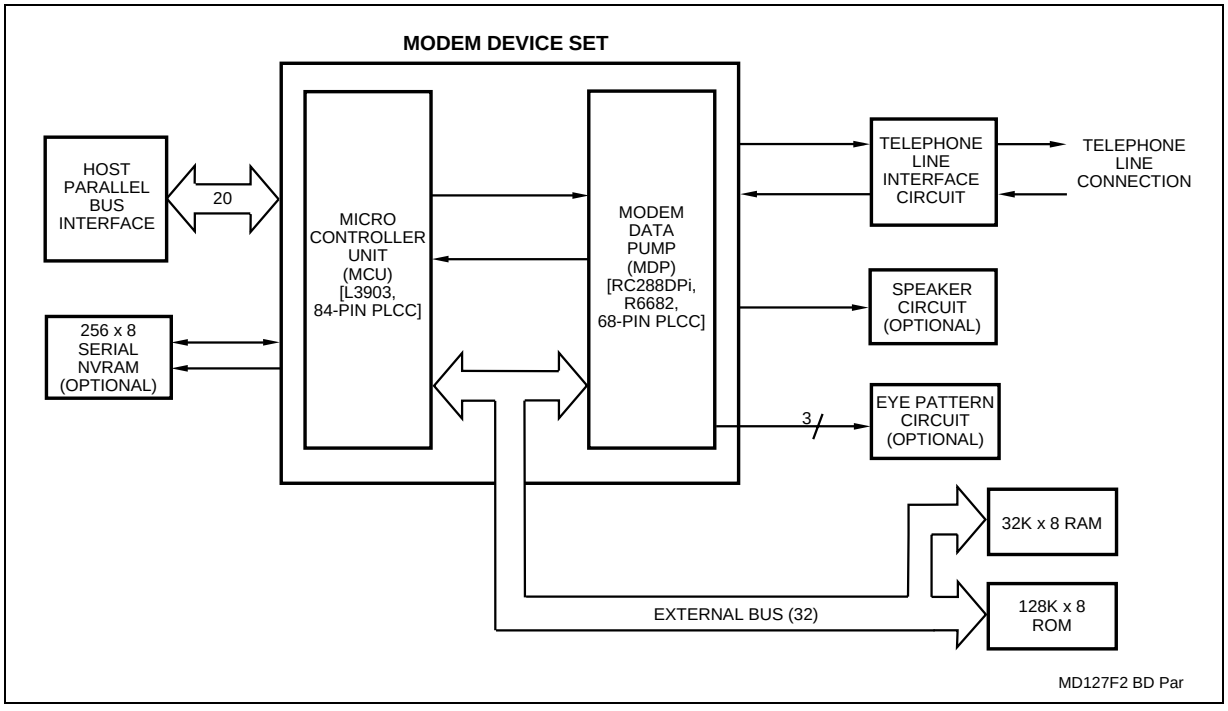

Figure 2. Block Diagram - Parallel Host Interface

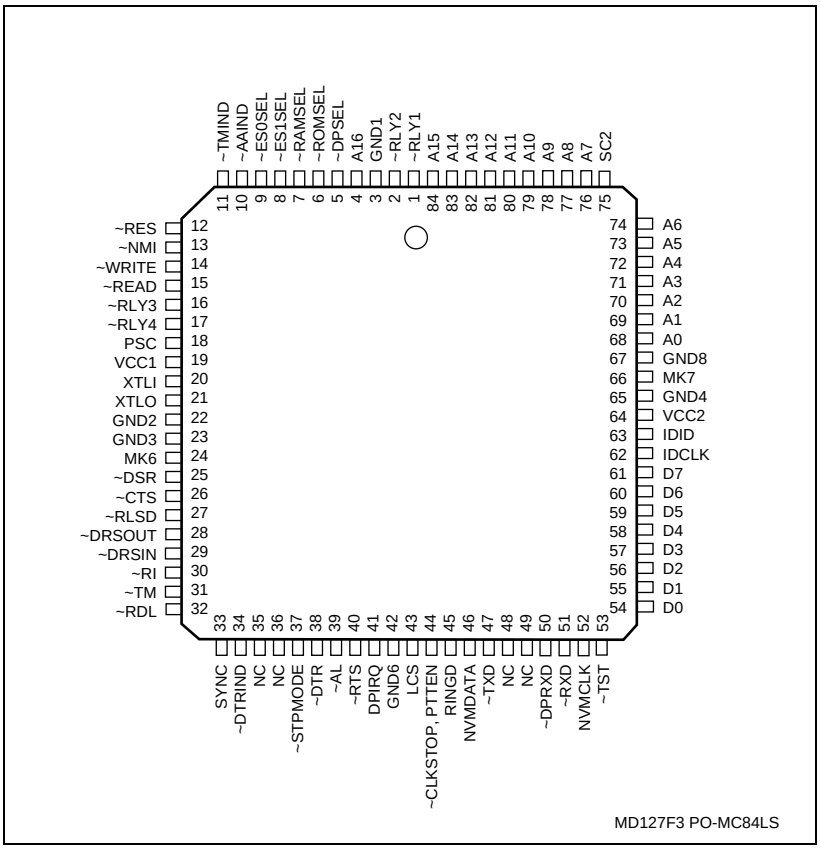

Figure 3. MCU Pin Signals - 84-Pin PLCC - Serial DTE Interface

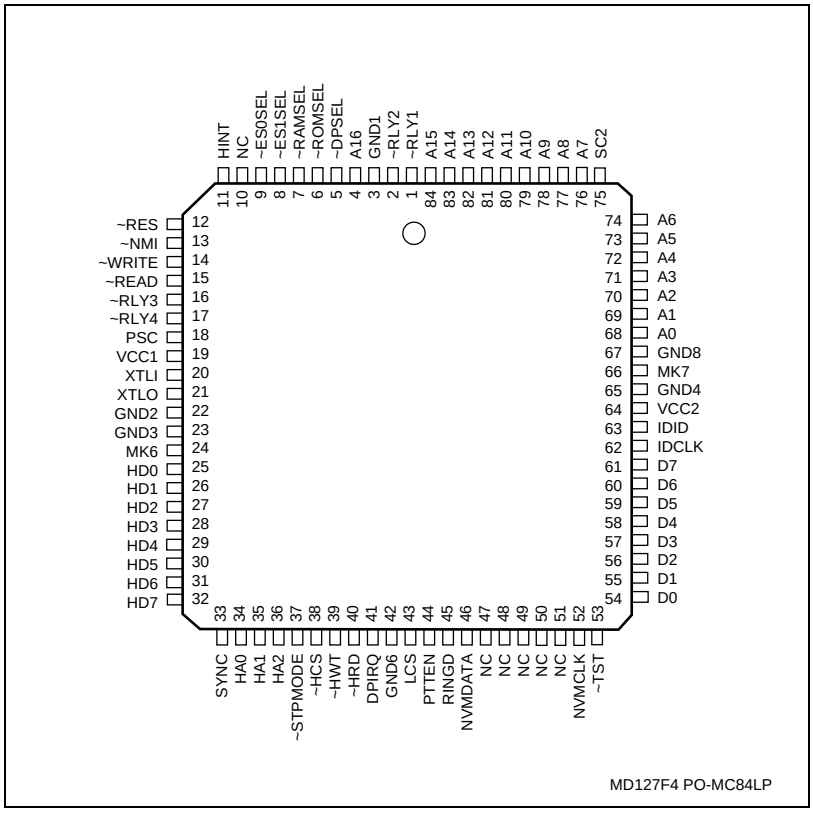

Figure 4. MCU Pin Signals - 84-Pin PLCC - Parallel Host Interface

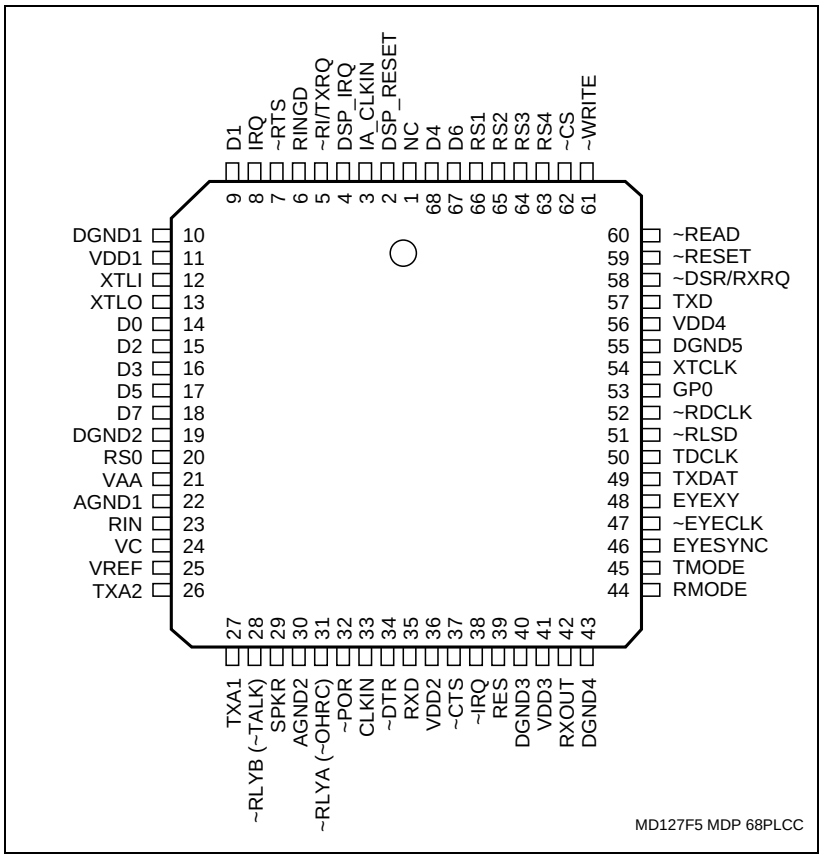

Figure 5. MDP Pin Signals - 68-Pin PLCC

Table 2. Current and Power Requirements

Mode	Current (ID)		Power (PD)		Notes
	Typical Current (mA)	Maximum Current (mA)	Typical Power (mW)	Maximum Power (mW)	
MCU (L39)					f_{IN} = 14.7456 MHz
Normal mode	34	41	170	214	
Sleep mode	2.2	2.7	11	14	
MDP (R6682)					f_{IN} = 40.32 MHz
Normal mode	196	255	980	1340	
Sleep mode	40	52	200	273	
Total					
Normal mode	230	296	1150	1554	
Sleep mode	42.2	54.7	211	287	

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

NOTES

Headquarters
Rockwell Semiconductor Systems
4311 Jamboree Road,
P.O. Box C
Newport Beach, CA 92658-8902
Phone: (714) 221-4600
Fax: (714) 221-6375

European Headquarters
Rockwell Semiconductor Systems
S.A.R.L.
Les Taissounieres B1
Route des Dolines
Sophia Antipolis Cedex
06905 Valbonne
France
Phone: (33) 93 00 33 35
Fax: (33) 93 00 33 03

For more information:
Call 1-800-854-8099
International information:
Call 1-714-833-6996

URL Address:
http://www.nb.rockwell.com
E-Mail Address:
literature@nb.rockwell.com

REGIONAL SALES OFFICES

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Rockwell Semiconductor Systems
5000 Birch Street
Suite 400
Newport Beach, CA 92660
Phone: (714) 222-9119
Fax: (714) 222-0620

US Southwest Satellite Office
Rockwell Semiconductor Systems
1000 Business Center Circle
Suite 215
Thousand Oaks, CA 91320
Phone: (805) 376-0559
Fax: (805) 376-8180

US South Central Office
Rockwell Semiconductor Systems
2001 North Collins Blvd
Suite 103
Richardson, TX 75080
Phone: (214) 379-9310
Fax: (214) 479-9317

US Southeast Office
Rockwell Semiconductor Systems
900 Ashwood Parkway
Suite 400
Atlanta, GA 30338
Phone: (770) 393-1830
Fax: (770) 395-1419

US Southeast Satellite Office
Rockwell Semiconductor Systems
Arbor Shoreline Office Park
19345 US 19 N.
Suite 108
Clearwater, FL 34624-3156
Phone: (813) 538-8837
Fax: (813) 531-3031

US Northwest Office
Rockwell Semiconductor Systems
US Northwest Office
3600 Pruneridge Avenue
Suite 100
Santa Clara, CA 95051
Phone: (408) 249-9696
Fax: (408) 249-7113

US North Central Office
Rockwell Semiconductor Systems
Two Pierce Place
Chancellory Park
Suite 810
Itasca, IL 60143
Phone: (708) 773-3454
Fax: (708) 773-3907

US Northeast Office
Rockwell Semiconductor Systems
239 Littleton Road
Suite 4A
Westford, MA 01886
Phone: (508) 692-7660
Fax: (508) 692-8185

Australia
Rockwell Semiconductor Systems
Rockwell Australia Limited
3 Thomas Holt Drive
P.O. Box 165
North Ryde, NSW 2113
Australia
Phone: (61-2) 805 5555
Fax: (61-2) 805 5599

Europe Mediterranean
Rockwell Semiconductor Systems
c/o Rockwell Automation S.r.l.
Via Di Vittorio, 1
20017 Mazzo Di Rho (MI)
Italy
Phone: (39 2) 93179911
Fax (39 2) 93179913

Europe North
Rockwell Semiconductor Systems, Ltd.
Berkshire Court
Western Road
Bracknell
Berkshire RG12 1RE
England
Phone: +44 1344 486 444
Fax: +44 1344 486 555

Europe South
Rockwell Semiconductor Systems
S.A.R.L.
Tour GAN
Cedex 13
92082 Paris La Defense 2
France
Phone: (33-1) 49-06-3980
Fax: (33-1) 49-06-3990

Germany
Rockwell Semiconductor Systems
Rockwell Int'l GmbH Germany
Paul-Gerhardt-Allee 50 a
81245 Munchen
Germany
Phone: (49-89) 829-1320
Fax: (49-89) 834-2734

Hong Kong
Rockwell Int'l (Asia Pacific) Ltd.
13th Floor, Suites 8-10,
Harbour Centre
25 Harbour Road
Wanchai,
Hong Kong
Phone: (852) 2 827-0181
Fax: (852) 2 827-6488

Japan
Rockwell Int'l Japan Co., Ltd.
Shimomoto Bldg
1-46-3 Hatsudai, Shibuya-ku
Tokyo, 151
Japan
Phone: (81-3) 5371 1520
Fax: (81-3) 5371 1501

Korea
Rockwell-Collins Int'l, Inc.
Room No. 1508
Korea Textile Centre Building
944-31, Daechi-3dong
Kangnam P.O. Box 2037
Kangnam-ku
Seoul
Korea
Phone: (82-2) 565-2880
Fax: (82-2) 565-1440

Singapore
Rockwell-Collins Int'l, Inc.
230 Orchard Road #10-230/232
Faber House
Singapore 0923
Phone: (65) 732-2292
Fax: (65) 733-0835

Taiwan
Rockwell Int'l Taiwan Company, Ltd.
Room 2808 International Trade Bldg.
333, Keelung Road, Section I
Taipei,
Taiwan
10548 ROC
Phone: (886-2) 720-0282
Fax: (886-2) 757-6760

Rockwell
Semiconductor Systems