

MFC1000

Features and Capabilities Specification Guide

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Introduction

The MFC features and capabilities are described in detail within this specification guide. Questions or comments concerning any MFC1000 functionality should be discussed with your Sales Representative. Offices and locations are listed at the back of this document.

The features presented are as follows:

- Copy Function
- Host Scanning
- MFC Printing Capabilities
- Stand Alone Fax
- PC Fax (AT Class 1)
- Telephone Features
- Remote Control Panel
- Telephone Answering Machine (TAM)

Copy Function

The MFC1000 has the capability to produce black-and-white copies of sheet fed originals in a standalone environment without the need to be connected to a PC.

Note: Color output copies are not supported in the MFC1000. However, there are no restrictions on the original copies—they can be either black and white or color.

When copying, the user has several options from to choose from which includes: number of copies to be made, copy size enlargement or reduction, collated or non-collated copies, and copy quality. These options are discussed in detail in the sections that follow. The MFC1000 can not make copies of originals wider than that allowed by the sheet feeder nor can it accept anything other than sheet fed pages (e.g. book bound pages). The black ink cartridge is required to be installed for copying. The control panel prompts the user to replace the photo cartridge if it is installed.

Single or Multiple Copies

The MFC1000 can make one or more copies of single or multiple originals.

- The Automatic Document Feeder (ADF) can accept up to 20 originals placed face down, top edge first in the feeder.
- Up to 99 copies of an original can be specified, the machine has a default setting of one copy.
- Originals must be between 2.75” and 8.5” wide, and 5” and 14” long.
- Available paper size: letter, legal, or A4 sized paper.
- Copy quality is best when making a single copy versus multiple copies

Enlargement or Reduction

The MFC1000 can enlarge or reduce the size of an original onto a letter, legal, or A4 sized paper using a selection of fixed ratios. Enlargement and reduction features are described as follows:

- Enlargement ratio selections are: 100%, 120%, 125%, 150%, and 200%.
- Reduction ratio selections are: 50%, 75%, 87%, 93%, and 100%.
- Scanning and printing is centered on the output copy and is not alterable.
- Any portion of the original that can not be reproduced to fit within the 8" printable width of the copy is truncated on both sides so that the copy remains centered.
- Default setting is 100%;
- Enlargement or reduction settings are only valid during the current copy operation and automatically revert to the default setting once the copy operation is complete.

Collated or Non-Collated Multiple Copies

When specifying more than one copy, the MFC1000 can make *stack* (non-collated) copies or *sort* (collated) copies.

- *Stack* copy - the specified number of copies are made after each original is scanned into memory and is repeated with each original resulting in alternating scanning and printing cycles.
- *Sort* copy - every original is scanned into memory prior to any printing.
- The number of originals that can be scanned into memory during collated copying is limited by the amount of available memory and is affected by the complexity of the originals, copy quality selected, and the number of faxes and phone message stored in memory.
- When choosing more than one copy, the default is *stack* copy.

Copy Quality

When specifying the quality during copying, there are four selections that the user may choose from: *auto*, *fine*, *superfine*, and *photo*.

For best results, it is recommended that *fine* or *superfine* selection be used for copying text and *photo* for copying images. Ideally, the best quality is obtained while making only one copy at a time (i.e. single copy vs. multiple copy).

- *Auto* quality - scanning resolution is 300x600 dpi (200x400 dpi for multiple copy), printing resolution is 300x600 dpi.
- *Fine* quality - scanning resolution is 300x600 dpi (200x200 dpi for multiple copy), printing resolution is 300x600 dpi.
- *Superfine* quality - scanning resolution is 300x600 dpi (200x400 dpi for multiple copy), printing resolution is 300x600 dpi.
- *Photo* quality - scanning resolution is 600x600 dpi (200x400 dpi for multiple copy), printing resolution is 600x600 dpi (300x600 dpi for multiple copy).
- The image processing technique used in *auto* and *photo* mode is called *error diffusion*.
- Quality settings are only valid during the current copy operation and automatically revert to the default setting (*auto*) once the copy operation is complete.

Host Scanning

The Host Scan feature allows black and white images to be scanned on the MFP. The scanned image is then sent to the PC. The host PC uses a standard Twain interface to send the image to a default Microsoft Window image viewing application. The scan data is sent to the PC via a parallel IEEE 1284 printer cable. Multiple resolutions, multiple scan modes, and multi-sheet scanning are supported.

TWAIN Interface

The TWAIN interface in the Host PC allows any TWAIN compliant software application to access the scan features of the MFC1000. The driver in the Host PC implements Twain v1.6.

From within a TWAIN compliant application, the user selects the appropriate source. After the MFC1000 has been selected, the user selects either the **acquire** or **scan** command. This displays the dialog box for the scan operation. Resolution, paper size, modes, and contrast may be selected in this dialog box.

More information on TWAIN can be found on the Internet at the following URL:
<http://www.twain.org> .

Resolution

The MFC1000 supports four resolutions. The optical resolution of the scanner device is 200dpi. Resolutions supported are (in DPI) 100x100, 200x200, 400x400 and 600x600.

Mode

The MFC1000 supports three operational modes. Text/Line Art is for high contrast scanning (blacks and whites). Photographic (B/W) is for halftone photo images and 256 shade grayscale.

Image Processing

The MFC1000 supports image processing for Text mode and Photographic mode with the contrast setting. Supported options are Light/Medium/Dark.

Paper Size

The MFC1000 supports Letter (8.5" x 11"), Legal (8.5"x14"), and A4 (210mm x 297mm). Originals longer than the selected paper size are truncated while originals shorter than the original will be filled.

Printing Capabilities

The MFC1000 provides robust printer driver functionality that executes on the Windows 3.x, Windows 95, Windows 98 and Windows NT Operating Systems. In addition, the MFC1000 supports print functionality for standalone operations associated with FAX receiving and copy operations (black and white printing only). Host-based print operations can be performed in black and white, 4 color or 6 color (photo) modes at either 300x300, 600x600 and 1200x1200 dpi resolutions. The following options describe the capabilities provided by the MFC1000 host printer driver:

Paper Settings Options

Number of Copies – Provides the user with the ability to select the number of copies to print. The default is one copy. This setting may be overridden by the user's software program.

Reverse order - Use this option to print the document, last page first. This is a setting prevents re-shuffle multi-page documents when they are printed in reverse order. The documents appear face up, last page first.

Paper source – Selects the paper from either the automatic feeder mode or manual tray. In manual-feed mode, the printer will pause and allow the user to insert the paper in the tray before printing.

Orientation – *Portrait* (the standard vertical business letter style) or *Landscape* (wide).

Paper size – The supported paper sizes are: Letter, Legal, Executive, A4, A5, A6, JIS B5, Index card, J-Post, Envelope (#10, DL, C5, C6, B5 sizes) and custom.

Paper types – Plain paper, coated paper, glossy (photo quality) and transparency printing media are supported by the MFC1000.

Color/Quality Setting

Default – The default print settings provide the highest quality results for most print applications.

Color Control – Color, Black, White and Grayscale options are available. Color printing can be performed in either 4 color or 6 color modes.

Manual settings – The user can apply color control for photographs, graphics or text by selecting the *photograph*, *presentations* or *8 primary color* modes and adjusting the lightness, saturation and contrast appropriately. The halftone type options defines how photographic-type content is represented. Select from Pattern or Diffuse halftone "screen" types.

Photographs, presentation, and 8-color modes are described below:

- Photographs - preserves the balance and relative color values from the screen to the printed page. This setting gives the highest quality output for photographs.
- Presentations - prints with pure bright colors. This option is desirable when printing text or printing graphics to be used for presentations.
- 8 Primary Colors - prints every color on the page in the closest primary: white, black, red, green, blue, cyan, yellow, or magenta.

Special Options

Layout - this option determines the number of pages printed per sheet of paper. The user can print more than one "page" per sheet (available selections are 1, 2, 4, 6, 9, 12, 16 or 25).

Scaling – This option permits a user to shrink or expand a document image.

TrueType Options - these options control how the printer handles TrueType fonts.

- Automatic - The printer driver will attempt to adjust to the font and provide the best output.
- Rasterize in Driver - this is the preferred method to handle TrueType fonts.
- Rasterize in Windows - in some unusual cases, a TrueType font may not print on the printer exactly the way it appears on the screen. If this happens, the user can select this mode.

Print to File - Prints the document to a binary file stored on the hard disk. This file is created in the exact binary file format used by the printer's engine.

Maintenance - This option loads a dialog box that shows the status of the printer cartridges and allows the user to specify which cartridges are loaded into the printer. Also from this dialog box a user can generate an alignment page, reset the vertical and horizontal print head alignment values, clean the ink heads, and direct the installation or removal of the ink cartridges.

Watermarks

The MFC1000 driver software can place a special "watermark" graphic on a printed page. This effect can be precisely controlled. The printer driver contains a set of default watermarks that are setup during driver installation. The defaults can be modified and customized using the watermark controls option.

Watermark Text - the predefined watermark text examples and any user created ones are available for use in a drop-down list window. The predefined watermarks are CONFIDENTIAL, COPY, DRAFT, FILE COPY, FINAL, PROOF, and TOP SECRET. The user can choose how many copies of the watermark to be printed on each page.

Position Type (top or bottom) - The watermark text can be printed either on the bottom (first printed on each page), or top, which causes the printer to "over paint" the watermark after printing the remaining page's content.

Page Selector - determines which pages the watermark will appear (first, all, etc.)

Separation - This option defines how far apart multiple watermarks will be on the page.

Font Control - This option allows the user to describe the font name (e.g., Arial), color, darkness settings, font size and attributes (bold or italics).

Position Control - the user can control the position of the watermark on the page manually or leave as automatic setting. In automatic mode, the watermark is centered on the page. The "User Defined" mode permits accurate placement of the watermark on the page. These controls include the X/Y position and Angle.

- X axis position –this option controls the X axis (left and right) placement of the watermark on the page.
- Y axis position - this option controls the Y axis (up and down) placement of the watermark on the page.
- Angle – this option controls the "lean" angle of the watermark. The lean angle can be between 0 to 360 degrees.

Adjustment Type – The user manually positions the watermark by clicking on the page sample and "dragging" the mark.

Fax

The MFC1000 fax capabilities support all of the basic G3 fax functionality in addition to several extended capabilities. Many of the features are configurable at runtime with other features configurable while compiling the source code. Some of the features supported

- Modem speeds up to 14.4 kbps using the Conexant FM209/214 modem chip sets. The start speed is configurable when choosing the modem. Limited support is offered for older Conexant modem chipsets.
- MH/MR/MMR compression is supported with ECM support that can be turned off.
- Standard (200x100), fine (200x200), superfine (200x400), and ultrafine (300x300) resolutions are supported as well as error diffusion and contrasts (light, normal, dark). Photo resolution can be selected by using fine mode with error diffusion enabled. Multi-resolution transmission is supported.
- 300x600 printing resolution.
- Letter/legal/A4 and limited B4 paper support.
- Auto and manual transmissions as well as transmission through memory or directly from scanner.
- Fax broadcasts, delayed transmission, and fax forwarding.
- Sequential polling reception and polled transmission from either memory or document feeder.
- Error retransmission with configurable interval and maximum number of re-tries.
- Many configurable minimum line speeds defaulting to 20/10/10 ms.
- Auto reduction and fixed reductions.
- Storage of received faxes (85 pages) with capability to print all stored faxes.
- Out of paper and printer error receptions.
- Fax retrieval support - transmission of all stored faxes and transmission of generated reports.
- Fax activity logging with a configurable maximum number of logs (< 0xFFFF, default 175) and timed activity report printing.
- Configurable generation of transmit verification reports, broadcast/pollled reports, error reports, and various other reports. A sample rasterization module with a fixed-size font is available.
- Configurable header, footer, and cover page generation. 20-digit fax number and name are also supported.
- Various configurable fax timeouts and configurable speed fallback selections.
- Fax receive while various other operations are in progress.
- Dual access (scan into memory while receiving or while transmitting another fax from memory).
- Call progress.
- Overseas mode with separate support for V29 echo protection, ignore FCF echo, ignore first DIS, and changed CED frequency (2100 Hz vs. 1100 Hz).
- Line monitor support.
- Limited voice request support.
- Limited non-standard features (NSF, NSS, NSC) support.
- Limited support for paging after receiving a fax.

PC Fax (AT Class 1)

The PC Fax application is based on the AT Class 1 emulation using an IEEE 1284 interface from a serial communications port redirector on the PC. It will run any Class 1 compliant fax application software including, but not limited to, WinFax Pro and SMSI HotFax.

Functional Description

PC Fax/AT operates on a session-by-session basis. A session is all activity required to either transmit or receive a document (in the case of fax) or to complete a voice call. The PC fax firmware supports all Class 1 commands as well as AT commands required to support both fax and voice. The modem supported is the Conexant FM214 which is a 14400 bps MONOFAX modem. The PC Fax firmware utilizes a standard modem driver interface which supports this modem's feature set. This is the same interface used by the standalone fax firmware.

The AT commands used to control modem operation are defined in the AT Command Reference Manual. The PC Fax firmware supports a subset of the AT command library for the purposes of running a Class 1 emulation using the Conexant FM214 modem. The command set supported is as follows:

Command	Description
ATD	Dial (Both fax and voice dialing - tone or pulse mode)
ATA	Answer
ATH	Hangup
ATZ	Reset
ATP	Set Pulse Dial Default
ATT	Set Tone Dial Default
ATQ	Quiet Results Codes Control
ATC	Carrier Control
ATL	Speaker Volume
ATM	Speaker Control
ATI	Identification
ATE	Command Echo
ATV	Result Code Form (Verbose or Non-Verbose)
ATS	Read/Write S Register
AT=	Write to Selected S Register
AT?	Read Selected S Register
AT&Cn	DCD Option
AT&Dn	DTR Option
AT&Kn	Flow Control
AT+FCLASS=?	Service Class Inquiry
AT+FCLASS=	Select Service Class
AT+FCLASS?	Read Service Class
AT+FRH=?	FRH Inquiry
AT+FRH=	Receive HDLC Data
AT+FRM=?	FRM Inquiry
AT+FRM=	Receive Non-HDLC Data
AT+FRS=	Receive Silence
AT+FTH=?	FTH Inquiry
AT+FTH="	Transmit HDLC Data
AT+FTM=?	FTM Inquiry
AT+FTM=	Transmit Non-HDLC Data
AT+FTS=	Stop Transmission and Wait
AT+FAE=	Data/Fax Auto Answer
AT+FAA=	Data/Fax Auto Answer

Since the PC Fax application uses a IEEE 1284 interface rather than the traditional serial interface, autobaud and flow control support are not required. Ring detection is provided outside of the PC Fax firmware and is routed directly to the PC for the purposes of answering the phone and beginning a Class 1 session.

Telephone Features

The MFC1000 Phone Module supports advanced telephone features, including Caller ID detection, Distinctive Ringing, One Touch Dialing, Speed Dialing, etc. The telephone features design is separated in four layers for easy porting to a customized design.

- **DAA Drivers** - support for customized hardware and different modem interfaces.
- **Phone Drivers** - provides generic phone functions to support other applications (e.g. fax or Class1) to implement phone features.
- **Phone Control Program** (PhoneCP) - provides customer specific features in addition to basic phone functions. It also provides coordination among applications (e.g. DTAM, fax, or Class1) to use Phone Drivers.
- **User Interface** - provides user-friendly look and feel for each customized design. This layer is part of Local Control Panel (LCP).

Hardware Supported by Firmware

- Handset is included with product.
- External TEL/TAD connection is included.
- Speaker is supported to be used as ringer, beeper, and call monitoring.
- Special Function Keys supported:
 - FLASH
 - HOLD
 - PAUSE
 - REDIAL
 - HOOK/SPEAKER/MONITOR
 - MUTE
- Speakerphone is not supported.
- PBX interface is not supported.

Firmware Features

- Dialing Method: TONE/PULSE
- Tone Dialing: Supported continuous tone DTMF dialing with guaranteed minimum On/Off Time of 100 ms each.
- Pulse Dialing: Supported 10 PPS pulse dialing with 40% make ratio.
- Tone key: If the system is programmed to use pulse dialing, a user may press # anytime to switch from pulse to tone for the rest of the same phone call. Pulse dialing will be used for the next new phone call.
- Dial Tone detection and Blind Dial are supported.
- **Answer Mode:**
- MANUAL - Manual answer all calls.
- FAX - Fax answer all calls with user-defined Ring Delay. Refer to the Standalone Fax section for more information.
- FAX/TEL - MFC answer all calls with user-defined Ring Delay and identifies each call as fax or manual call. Start fax automatically for fax call. Start double-ring to prompt the user to answer the phone for a manual call. It disconnects the phone if there is no answer before the maximum FAX/TEL ring time. The maximum FAX/TEL ring time is user programmable.
- MSG_CTR - Provides built-in Telephone Answering Machine (TAM). It also works with external Telephone Answering Device (TAD). The user may enable or disable Toll Saver Mode. This feature can automatically detect fax calls. Dial Tone, Busy Tone, CNG Tone, DTMF Tone, and Silence Detection are supported. Refer to the Remote Control Panel section for additional information.
- The user can activate or deactivate the fax remotely by using a phone connected to the same line.
- **Ring Delay** for auto answer: 0, 1, 2, 3, 4 rings. Phone driver support up to 255 rings. It can be programmed to suppress up to 255 rings for silence ring detection. It can also be programmed to report ring detection at either the beginning the first ring burst or at the end of last ring burst of each ring cycle.
- **Distinctive Ringing** detection: Support ANSI T1.401.02 and some PBX ring patterns. The adaptive detection algorithm maps non-standard ring pattern to the closest ANSI pattern. It also reports a bad ring pattern if it does not satisfy a basic timing requirement.
- **Caller ID** detection: Type 1 (ringing) is supported, Type 2 (call waiting) is not supported. Support both SDMF (old) and MDMF (new) format. This information is available for application to retrieve.
- **Sound Control:**
- Real Time Ring to follow actual ring signal detected. It can be programmed to suppress up to 255 rings for silence ring detection.
- Pseudo Ring patterns (ANSI T1.401.02, and FAX/TEL double-ring) to support user interface design. New ring patterns can be added easily.
- Beeper patterns: support various beeps to support user interface design. New patterns can be added.
- Independent volume control for Speaker, Handset, Ringer, and Beeper. The PWM (Pulse Width Modulation) volume control provided by the MFP requires simple external circuits. The Speaker and Handset may use a built-in IA gain control to provide simple 4 level volume control.
- In addition to local sound patterns. Special sound patterns may also be placed on phone line to provide remote user interface.
- **Memory Dialing**
- One Touch Dialing: 24 one-touch keys
- Speed Dialing: 100 numbers.

-
- Telephone Index: Uniform database design to display programmed One Touch Dial and Speed Dial information.
 - Grouping: Up to six groups may be programmed by the user for fax broadcasting.
 - Memory Dialing utilizes uniform database design for both One Touch Dialing and Speed Dialing. The differences are only in the user interface design. The database currently contains 124 entries. It can be expanded at the driver layer. Each entry contains:
 - Dial length is up to 20 digits
 - Name length is up to 15 characters
 - Data Type supported FAX, TEL, FAX/TEL
 - **Redial:** Phone driver retains up to the first 64 digits dialed in the previous phone call.
 - **Multiple Dial**
 - Auto Dial: Redial, One Touch Dial, Speed Dial can be queued up to 64 digits, if several are touched in sequence, when phone is On-hook.
 - Manual Dial: Redial, One Touch Dial, Speed Dial, Number Keys can be queued up to 64 digits, if several are touched in sequence, when phone is Off-hook.
 - Tone key: If the system is programmed to use pulse dialing, a user may press # anytime to switch from pulse to tone for the rest of the same phone call. Pulse dialing will be used for the next new phone call.
 - Once the Multiple Auto Dial or Multiple Manual Dial is completed, a user can continue dialing use Number Keys with no limitation.

Remote Control Panel Features

The Remote Control Panel (RCP) allows for control of the standalone features of the MFC1000 from the PC via the RCP software application. The RCP has several main control sections that include General Settings, Fax Settings, and Ink Cartridge Maintenance.

General Settings

- Time/Date of MFC1000 can be set from the PC Clock or to any time the user desires.
- Dial Mode can be set to Tone or Pulse.
- Answering modes for incoming calls between manual, fax, telephone.
- Activity report print selection and frequency.

Fax Settings

- A fax number, telephone number and station ID can be specified.
- Speaker volume during fax send / receive can be set.
- A dialing list can be entered with each number having a name, number and number type (i.e. fax, tel or fax/tel). The numbers can be specified as Speed Dial, One Touch Dial or part of a Group Dial.

Ink Cartridge Maintenance

- The installed cartridge types are displayed in a user dialog box (i.e. Color, Black or Photo).
- Alignment page can be printed.
- The current alignment values are shown and can be changed.
- The ink head cleaning page can be printed.
- Ink cartridges can be replaced.

The following optional features may be added to the RCP if the customer desires.

Note: Any changes would impact the RCP PC application as well as the firmware to implement the functionality.

- Standalone Fax TX initiation.
- Standalone Copy options and initiation.
- Document management – Shows which faxes have been received but not printed, which faxes are waiting to be sent at a later time, any documents available for remote polling, etc. This would also provide memory use status for stored documents.
- Telephone functions such as dialing and controlling mute, hold, and flash hook.

MFP Status System

The MFP Status System is related to the RCP but is used only for reporting the current status and is a separate application. The status system has three display windows. The first mirrors the LCD of the MFC1000. The second describes the current status by use of a text message. The third describes the current status by use of bitmap graphics.

Telephone Answering Machine (TAM)

The following provides a high-level description of the Telephone Answering Machine (TAM) features.

The TAM in MFC1000 provides local and remote operation of the digital answering machine. It requires the Conexant FM214 MONOFAX modem with the (-V) option, or equivalent modem to carry out its functions. These functions are:

- TAM allows recording of an OutGoing Message (OGM) using a built-in handset. During recording of the OGM, elapsed time in seconds will be displayed on the LCD display. The maximum duration of OGM is 20 seconds.
- OGM can be played back or erased using a function menu on the control panel.
- TAM allows recording of InComing Messages (ICMs). All ICMs are date and time stamped. The maximum time for ICMs is programmable from 20 seconds to 60 seconds, in 5-second increments.
- ICMs are played back on the speaker only. When requested to play, all new ICMs are played back in the order they were recorded followed by any saved messages.
- During playback, an ICM can be skipped forward or reversed. Skip Forward skips the current ICM and starts playing the next ICM. Skip Reverse skips to the beginning of the ICM. To skip to the previous ICM, press Skip Reverse within 1 second. If Skip Forward is pressed while playing the last ICM, it starts playing the first ICM. Likewise, if Skip Reverse is pressed while playing the first ICM, it starts playing the last ICM.
- ICMs can be erased all at once or individually. Pressing the ERASE key while the message is playing can erase a specific ICM. Pressing the ERASE key when TAM is not running will erase all ICMs. Both Erase operations require a confirmation before the actual Erase takes place.
- In support of Caller ID service, a caller's name or phone #, with date/time stamp is recorded with the ICM.
- Remote access of TAM is allowed with a valid 3-digit security code. The following functions are permitted during remote access:
 - Play ICMs
 - Skip ICM forward or reverse
 - Erase all saved ICMs. New ICMs cannot be erased using remote access.
 - Play OGM
 - Record OGM

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Further Information

literature@conexant.com
1-800-854-8099 (North America)
33-14-906-3980 (International)

Web Site

www.conexant.com

World Headquarters

Conexant Systems, Inc.
4311 Jamboree Road
P. O. Box C
Newport Beach, CA
92658-8902
Phone: (949) 483-4600
Fax: (949) 483-6375

U.S. Florida/South America

Phone: (727) 799-8406
Fax: (727) 799-8306

U.S. Los Angeles

Phone: (805) 376-0559
Fax: (805) 376-8180

U.S. Mid-Atlantic

Phone: (215) 244-6784
Fax: (215) 244-9292

U.S. North Central

Phone: (630) 773-3454
Fax: (630) 773-3907

U.S. Northeast

Phone: (978) 692-7660
Fax: (978) 692-8185

U.S. Northwest/Pacific West

Phone: (408) 249-9696
Fax: (408) 249-7113

U.S. South Central

Phone: (972) 733-0723
Fax: (972) 407-0639

U.S. Southeast

Phone: (919) -858-9110
Fax: (919) 858-8669

U.S. Southwest

Phone: (949) 483-9119
Fax: (949) 483-0620

APAC Headquarters

Conexant Systems Singapore,
Pte. Ltd.
1 Kim Seng Promenade
Great World City
#09-01 East Tower
Singapore 237994
Phone: (65) 737 7355
Fax: (65) 737 9077

Australia

Phone: (61 2) 9869 4088
Fax: (61 2) 9869 4077

China

Phone: (86 21) 6361 2515
Fax: (86 21) 6361 2516

Hong Kong

Phone: (852) 2827 0181
Fax: (852) 2827 6488

India

Phone: (91 11) 692 4780
Fax: (91 11) 692 4712

Korea - Seoul Office

Phone: (82 2) 565 2880
Fax: (82 2) 565 1440

Korea - Taegu Office

Phone: (82 53) 745-2880
Fax: (82 53) 745-1440

Europe Headquarters

Conexant Systems France
Les Taissounieres B1
1680 Route des Dolines
BP 283
06905 Sophia Antipolis Cedex
France

Phone: (33 1) 41 44 36 50
Fax: (33 4) 93 00 33 03

Europe Central

Phone: (49 89) 829 1320
Fax: (49 89) 834 2734

Europe Mediterranean

Phone: (39 02) 9317 9911
Fax: (39 02) 9317 9913

Europe North

Phone: (44 1344) 486 444
Fax: (44 1344) 486 555

Europe South

Phone: (33 1) 41 44 36 50
Fax: (33 1) 41 44 36 90

Middle East Headquarters

Conexant Systems Commercial
(Israel) Ltd.
P. O. Box 12660
Herzlia 46733, Israel
Phone: (972 9) 952 4064
Fax: (972 9) 951 3924

Japan Headquarters

Conexant Systems Japan Co., Ltd.
Shimomoto Building
1-46-3 Hatsudai,
Shibuya-ku, Tokyo
151-0061 Japan
Phone: (81 3) 5371 1567
Fax: (81 3) 5371-1501

Taiwan Headquarters

Conexant Systems, Taiwan Co.,
Ltd.
Room 2808, 333
International Trade Building
Keelung Road, Section 1
Taipei 110, Taiwan, ROC
Phone: (886 2) 2720 0282
Fax: (886 2) 2757 6760