CONEXANT™

Fax Modems

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Industry's Broadest Portfolio of Modems Enabling Integrated Communications for Fax Machines and MFPs

Conexant leads the industry by offering the broadest family of fax modem products available today. Offering high performance, fully featured fax and MFP solutions, Conexant allows OEMs to design products for the emerging integrated communications markets. Fax machines are undergoing a transformation to an integrated communication resource center — combining fax with the telephony features expected in consumer products. Conexant's fax modem solutions enable manufacturers to address the growing market for fax-ready devices, from high performance office products to low-cost consumer applications.

Conexant continues to advance fax technology with the latest levels of performance including integrated data modes now up to 33.6 Kbps and new features such as Automatic Speech Recognition. These innovations are driving new products both for traditional fax applications as well as completely new consumer functions such as Internet fax and color fax.

Today the fax market is evolving into two different classes of devices: PC–connected multifunction peripherals and telephony-centric resources. For decades Conexant has played an integral role in modern data communications, and the company's chipsets are found in the majority of the world's fax machines. This unmatched track record in fax innovation enables Conexant to lead collaborative efforts with manufacturers in developing new products for years to come.

Distinguishing Features

- Higher speed, lower cost fax modems to drive emerging applications like color fax and Internet fax
- Over 75 fax-ready solutions enable easy feature migration to the latest fax, data modes and voice applications
- Optimal connectivity with programmable features, enhanced probing and symbol rate selection along with Automatic Rate Adaptation
- Highly integrated single chip solutions

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FM336 V.34 High Performance Fax Modem

End users have come to expect higher performance, particularly higher data rates, with each new generation of fax-ready products. Conexant's new FM336 V.34 high performance fax modem amplifies this trend with transmit and receive times up to three and a half times faster than a 9,600 bps (V.29) fax machine.

The high performance of 33.6 Kbps has become the standard for office automation. Led by Conexant's design advances, the greater speed of V.34 is migrating downward and penetrating the low-cost fax-enabled machines that are ideal for small and home office (SOHO) and consumer markets.

The FM336 fax modem is the first in a family of high-speed devices that herald the next generation of image transmission applications such as color fax and Internet fax.

FM336 Distinguishing Features:

- Highly integrated, 100-pin TQFP single-chip solution
- V.34 half-duplex design specifically to provide high data rates on all types of local loops
- Automatic Rate Adaptation and symbol rate selection to optimize throughput speed
- PLL (Phased Lock Loop) technology uses a low crystal frequency (28.224 MHz) reducing system cost and EMI emissions
- Data mode support (V.34) for integrated Internet connectivity

FM209 and FM214 MONOFAX™ Modem

Conexant's MONOFAX modem family offers the greatest level of voice and speech features integrated into a single fax modem device available for OEMs today. This gives customers maximum flexibility in product differentiation while utilizing a single-platform design to reduce product development time and system cost, and increase manufacturing efficiency.

The single-package 128-pin TQFP, FM209 and FM214 devices, which support fax transmission and reception up to 14.4 Kbps, are pin-compatible within the product family. This single-platform design provides OEMs the flexibility to easily incorporate additional features including full duplex speakerphone and Digital Telephone Answering Machine, conversation recording and message playback capabilities during speakerphone operations as well as Type I and Type II Caller ID.

This fax modem family offers software compatibility across previous, popular generations of Conexant fax modems including EFXL, DFXL and RFX series.

FM209/FM214 Distinguishing Features:

- Choice of speeds (9.6 Kbps and 14.4 Kbps) along with voice and speech features
- First fax modem to offer Automatic Speech Recognition technology
- Single motherboard design by combining popular features of previous fax modems into one pin-to-pin compatible package

- Full duplex speakerphone and V24 digital telephone answering machine with 24 minutes voice recording capability
- Concurrent speakerphone and digital telephone answering machine operation

Automatic Speech Recognition

Conexant is the first to offer Automatic Speech Recognition (ASR) in the FM209/214 MONOFAX family for applications addressing a range of markets — from low-end stand-alone fax machines to high-end products. Fax machines and multifunction peripherals are integrating more features every year to add value for the end user. But these new functions make the keypad interface more complicated and difficult to use. For instance, the advent of Internet faxing will lead to larger alphanumeric keyboards and long URLs for Internet fax addresses. Automatic Speech Recognition can help the user operate the machine without the complicated keyboard functions, or even remotely from a common phoneline.

Conexant's ASR technology demonstrates high speech recognition accuracy, as well as a flexible vocabulary for menu functions. Possible implementations of ASR technology for fax and MFP devices include command and control of fax functions, managing voice calls and phoning directories, managing and reviewing voicemail. With its value-added potential, Automatic Speech Recognition can be used as a key differentiator for OEMs. Moreover, a simplified, intuitive interface increases end user satisfaction.

What is a Fax Modem?

Fax technology is diverging into two separate classes of devices: multifunction peripherals (MFPs) and fax phones. MFPs are fax-enabled products that are connected to a host PC, while fax phones are the traditional standalone fax machines. As fax technology improves, features and capabilities that were once found only on high-end and mid-volume machines are migrating downward. Multiple features including speakerphone, answering machine, Caller ID, cordless phones and Automatic Speech Recognition will become a part of every standalone fax machine — evolving into the fax-ready integrated communication resource.

Despite all the various new document-messaging methods — email, Internet, intranets — market research confirms that the fax-enabled products remain the key communications tool in Fortune 500 and mid-size companies. The standalone fax machine continues to be extremely popular because of reliability, familiarity and ease of use, universal compatibility and speed in delivering information and generating responses.

Within a standalone fax machine, Conexant offers a complete system solution referred to as the FaxEngine™ — including a fax controller and a fax modem. The fax controller acts as the "brain" managing and directing the appropriate processing for fax, copy, print and scan activities. Fax modems are similar to data modems in structure, but implement different algorithms to optimize performance, and are governed by different ITU standards.

Conventional fax modems support ITU V.27ter, V.29 and V.17, while higher performance fax modems support V.34fax. In addition, fax modems support ITU standard V.21 Ch2 for standard G3 fax handshaking (connections) as well as the tone generation required to complete the handshake.

FM336 Fax Modem Features

- **2-wire half-duplex fax modem modes with send and receive rates up to 33600 bps**
  - V.34 HDX, V.17, V.29, V.27ter, and V.21 channel 2
  - Short train option in V.17 and V.27ter
- **2-wire full-duplex data modem modes**
  - V.21, V.23 (75 bps TX/1200 bps RX or 1200 bps TX/ 75 bps RX)
- **PSTN session starting**
  - V.8 signaling
- **HDLC support at all speeds**
  - Flag generation, 0-bit stuffing, ITU CRC-16 or CRC-32 calculation and generation
  - Flag detection, 0 bit deletion, ITU CRC-16 or CRC-32 detection
  - FSK flag pattern detection during high speed receiving
- **Fax supporting features**
  - End of transmission indication
  - Automatic TCF Transmission
- **Tone modes and features**
  - Programmable single or dual tone generation
  - DTMF receive
  - Tone detection with three programmable tone detectors
- **Serial synchronous data**
- **Parallel synchronous data**
- **Automatic Rate Adaptation (ARA)**
  - Fixed ARA in ROM
  - Adjustable ARA in RAM
- **TTL and CMOS compatible DTE interface**
  - ITU-T V.24 (EIA/TIA-232-E) (data/control)
  - Microprocessor bus (data/configuration/control)
- **Receive dynamic range: 0 dBm to -43 dBm (V.17, V.29, V.27) and -9 dBm to -43 dBm (V.34)**
- **Programmable turn-on and turn-off thresholds**
- **Programmable transmit level: 0 to -15 dBm**
- **Switchable compromise equalizer in non-V.34 modes**
- **Adjustable speaker output to monitor received signal**
- **DMA support interrupt lines**
- **Two 16-byte FIFO data buffers for burst data transfer with programmable extension of up to 255 bytes**
- **NRZI encoding/decoding**
- **Diagnostic capability**
- **+5V/+3.3V operation**
- **Typical power consumption:**
  - Normal mode: 700 mW
  - Sleep mode: 65 mW
- **100-pin TQFP package**

FM209/214 MONOFAX™ Modems Features

- **Group 3 facsimile transmission/reception**
  - ITU-T V.17 and V.33 (FM214 models)
  - ITU-T V.29, V.27ter, T.30, V.21 Channel 2, T.4
  - ITU-T V.17 and V.27ter short train
  - HDLC framing at all speeds
  - Receive dynamic range: 0 dBm to -43 dBm
  - Automatic adaptive equalization
  - Fixed and programmable digital compromise equalization
  - DTMF transmission and detection
  - ITU-T V.21 Channel 2 FSK 7E Flag Detect
  - Ring detector
  - Programmable transmit level
  - Programmable single/dual tone transmission
- **Voice codec (-V Option)**
  - 24 minutes of voice storage per 4 Mbit memory
  - Near toll quality voice recording and playback
  - Programmable AGCs
  - Programmable line/microphone input and line/speaker output filters
  - Error correction coding allows ARAM usage
  - Pitch synchronized fast and slow playback
  - Near-end echo cancellation
- **ADPCM audio codec (-V Option)**
  - High fidelity recording and playback of audio signals
  - 32 Kbps and 24 Kbps
  - Programmable AGCs
  - Programmable line/microphone input and line/speaker output filters
  - Near-end echo cancellation
- **PCM audio codec**
  - 128 Kbps and 64 Kbps
  - DTMF detect and tone detect
  - Type II Caller ID CAS detection
  - Near end echo cancellation
- **Full duplex speakerphone (-S Option)**
  - Acoustic echo cancellation
  - Line echo cancellation or secondary acoustic echo cancellation
  - Programmable microphone and speaker AGCs
  - Programmable line and speaker output filters
  - Microphone and speaker volume control and muting
  - Auto fallback toward pseudo-duplex operation under poor operating conditions
  - Programmable handset echo simulation in handset operation
  - High gain half-duplex mode
  - Intercom support
  - Two dual tone transmitters
  - Conversation recording and message playback with Voice or ADPCM audio codec (-VS option)
- **Type II Caller ID CAS detection**
- **Automatic Speech Recognition (-R Option)**
  - Speaker Dependent (SD) and Speaker Independent (SI) isolated word recognition
  - SI Vocabulary (English) for hands-free voice control of dialing, telephone answering machine and fax functions
  - Active word list for recognition selected by host controller
  - Supports speech input from microphone, local handset, or telephone line
  - SI word models trained off-line and stored in DSP ROM
  - SD word models trained in real-time, stored in (off-chip) NVRAM and downloaded to DSP RAM
  - Supports up to 30 Active simultaneous SD words
  - SD training – single utterance or multiple utterances
  - 2.5 second maximum speech length for SD training
  - Rejection capability provided for SI mode
- **Room monitor**
  - Near end echo cancellation
  - Monitor recording and message playback with Voice or Audio codec (-V option)
- **V.23 and Type I Caller ID**
- **Interface Memory Interrupt**
- **Eight general purpose input (GPI) and eight general purpose output (GPO) pins for host assignment**
- **DTE Interface: two alternate ports**
  - Selectable microprocessor bus (6500 or 8085)
  - ITU-T V.24 (EIA/TIA-232-E compatible) interface
- **TTL and CMOS compatible**
- **3.3V/5V operation**
- **Packaging**
  - 128-pin TQFP (thin quad flat pack)

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