CIRRUS LOGIC®

CL-MD9624ECP

Advance Product Bulletin

FEATURES

- **Data modem modes**
  - CCITT: V.22 bis, V.22, and V.21
  - Bell®: 212A and 103
  - Speeds: 2400, 1200, and 300 bps
  - Industry-standard 'AT' command set
- **Fax modem send and receive modes**
  - CCITT: V.29, V.27 ter, and V.21 ch2
  - Speeds: 9600, 7200, 4800, 2400, and 300 bps
  - Supports Group 3 fax
  - Data/Fax EIA/TIA-578 Class 1 'AT' command set
- **Voice mode**
  - Embedded voice mode 'AT' command set
  - Auto-recognition (fax/voice) answer mode
  - ADPCM and A-law voice compression
- **V.42/MNP® protocols**
  - Error correction: V.42 and MNP® 2-4
  - Data compression: V.42 bis and MNP® 5
- **PCMCIA-compliant interface**
  - Direct connection to PCMCIA 2.0 bus
  - 16C550A/16C450 register-compatible UART
  - Integrated CIS ROM
- **Manufacturer-programmable CIS (optional ROM)**
- **Telephone emulation**
- **Microphone interface**
- **Low power requirement**
  - Automatic sleep (power-down) and wake-up
  - Operates from a single +5V power supply
  - Typical power requirements:
    - Operating power: 330 mW
    - Sleep mode: 15 mW

(cont.)

PCMCIA-Compatible Data/Fax/Voice Modem Device Set

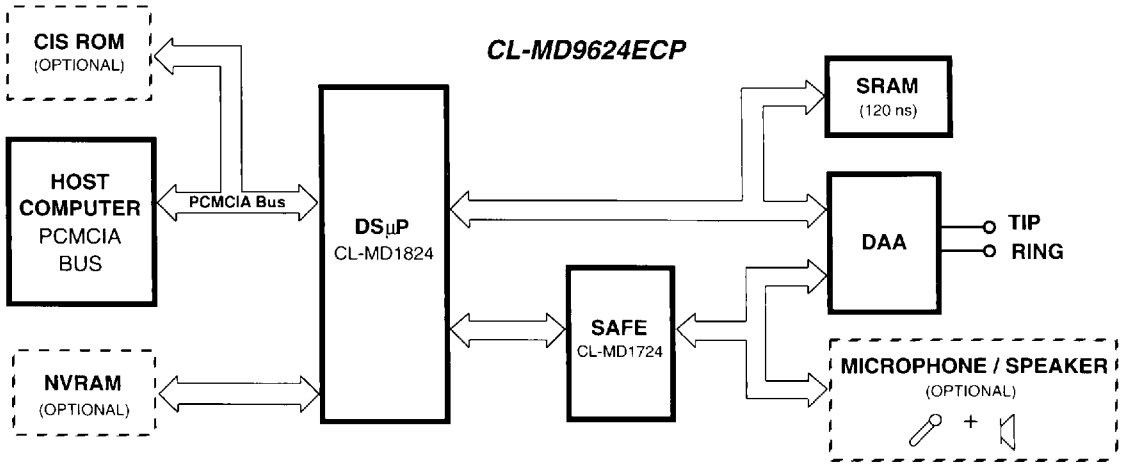
OVERVIEW

The Cirrus Logic CL-MD9624ECP is a complete, intelligent, multi-mode modem combining data, fax, and voice features with a built-in PCMCIA bus interface in only two devices, the CL-MD1824 and CL-MD1724.

The CL-MD9624ECP operates up to 9600 bps (transmit and receive) as a fax modem, and up to 2400 bps as a data modem. The device set provides a complete solution not requiring any additional firmware development. The CL-MD9624ECP is intended for all PCMCIA modem applications.

This device set provides all of the features of the CL-MD9624ECT, except the parallel and serial host interface. Instead, the CL-MD9624ECP integrates a PCMCIA host interface that enables modem-to-PCMCIA bus direct-connection without additional hardware. A built-in Card Information Structure (CIS) eliminates the need for an external CIS ROM.

(cont.)



CL-MD9624ECP Functional Block Diagram

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FEATURES (cont.)

- **No external microprocessor required**
- **Provides additional data buffering for fax and voice modes**
- **Data, fax, and voice application software available through third party software vendors**
- **DTMF and tone generation/detection**
- **Analog, local, and remote digital loopback tests**
- **Automatic adaptive and fixed compromise equalizers**
- **Non-volatile RAM (NVRAM) interface**
- **Eye pattern interface**
- **Direct connection to a speaker**
- **Expansion bus**
- **Small package dimensions (PCMCIA format)**
  - — DSμP (CL-MD1824): 100-pin VQFP
  - — SAFE (CL-MD1624): 44-pin VQFP

OVERVIEW (cont.)

To customize the modem design, the internal CIS may be overidden by using an optional external CIS ROM.

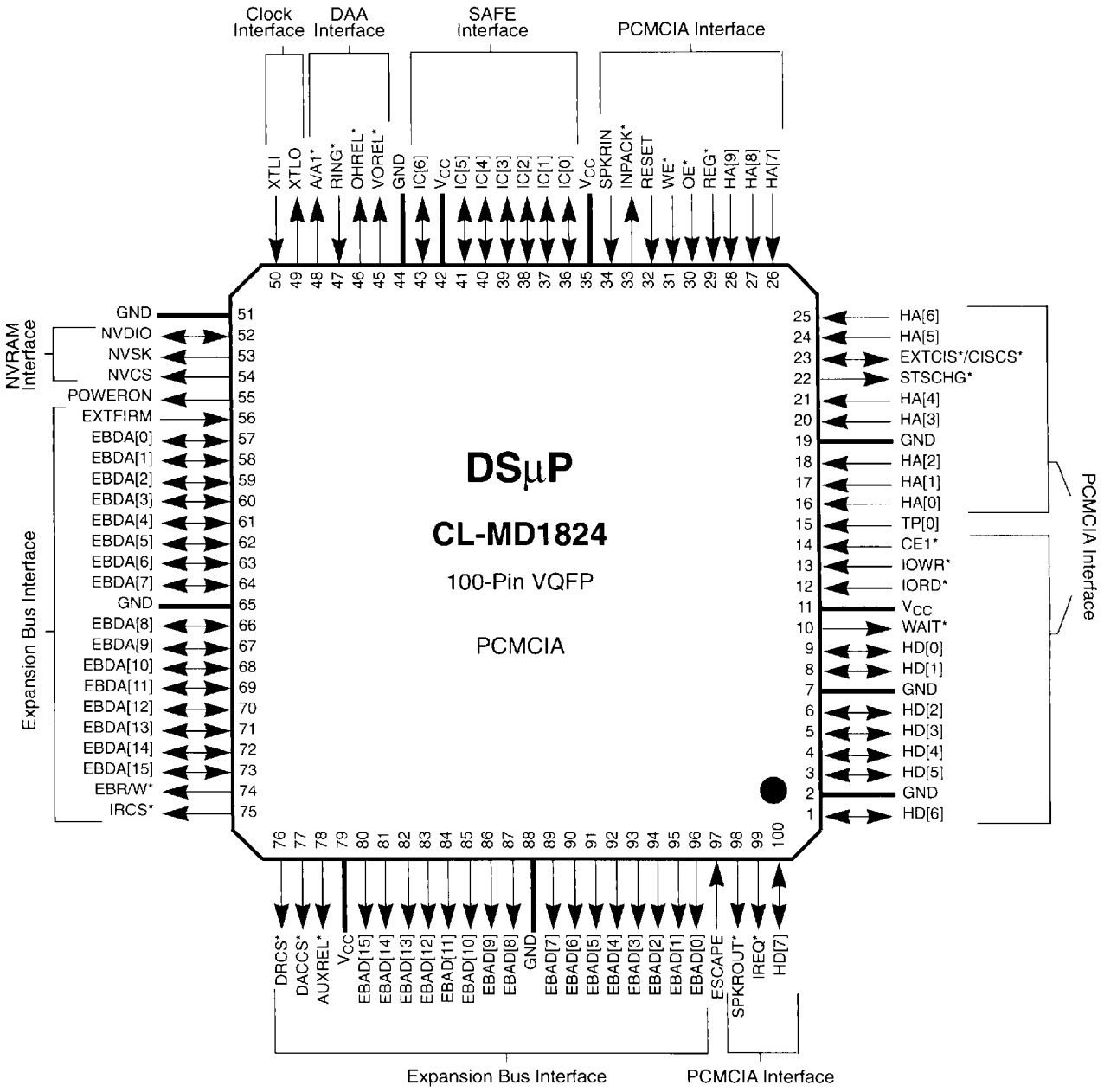
This device set also provides a complete set of voice/audio functions that allow the host and modem to playback/record voice messages and emulate an answering machine. With the integrated microphone interface and supporting firmware, dictaphone and telephone emulation are possible with a minimum of additional parts. Three voice-mode compression formats (A-Law, 3- and 4-bit ADPCM) provide flexibility for optimizing system quality and performance during playback and record modes.

An extended data, EIA/TIA-578 Class 1 Standard fax and voice 'AT' command set interpreter is embedded in the device sets, allowing system designers to develop a Hayes®-compatible modem with a minimum of effort. The device set provides V.42/MNP® 2-4 error correction, and V.42 bis/MNP® 5 data compression to ensure fast error-free data transfer during data modem connections.

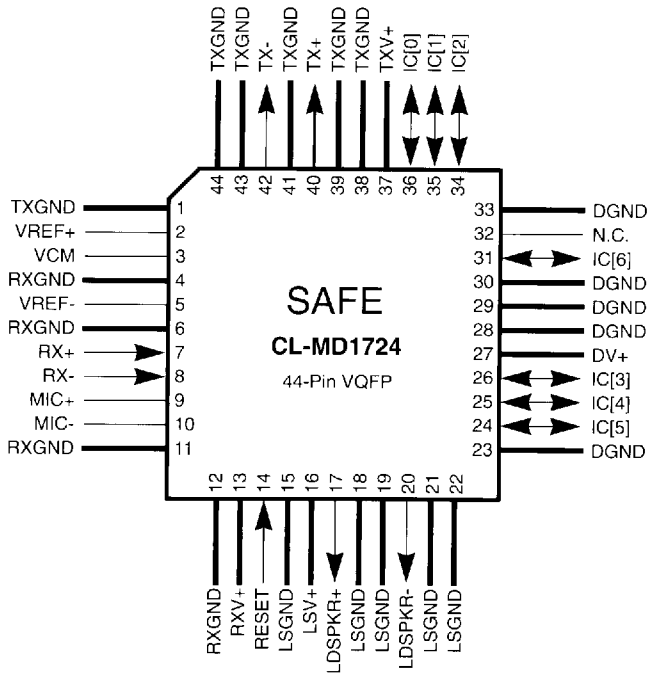
Low power requirements and small package dimensions make the CL-MD9624ECP ideal for PCMCIA modem applications.

ADVANTAGES

Unique Features	*Benefits*
• ***Direct connection to PCMCIA bus***	Eliminates the need for a PCMCIA interface chip and a CIS ROM.
• ***Lowest chip count to support data/fax/voice***	Reduces overall system chip count to support PCMCIA.
• ***Voice mode***	System can emulate an answering machine.
• ***Microphone interface***	Reduces hardware requirements for external an external microphone or handset.
• ***Telephone-emulation mode***	Allows system to be used as a telephone.
• ***16C550A register-compatible UART***	Supports enhanced communication software for improved data throughput.
• ***Small package sizes***	Minimizes board area (e.g., PCMCIA cards).
• ***Sleep mode***	Substantially reduces power consumption by over 95 percent.
• ***Requires a single +5V power supply***	Simplifies board design.



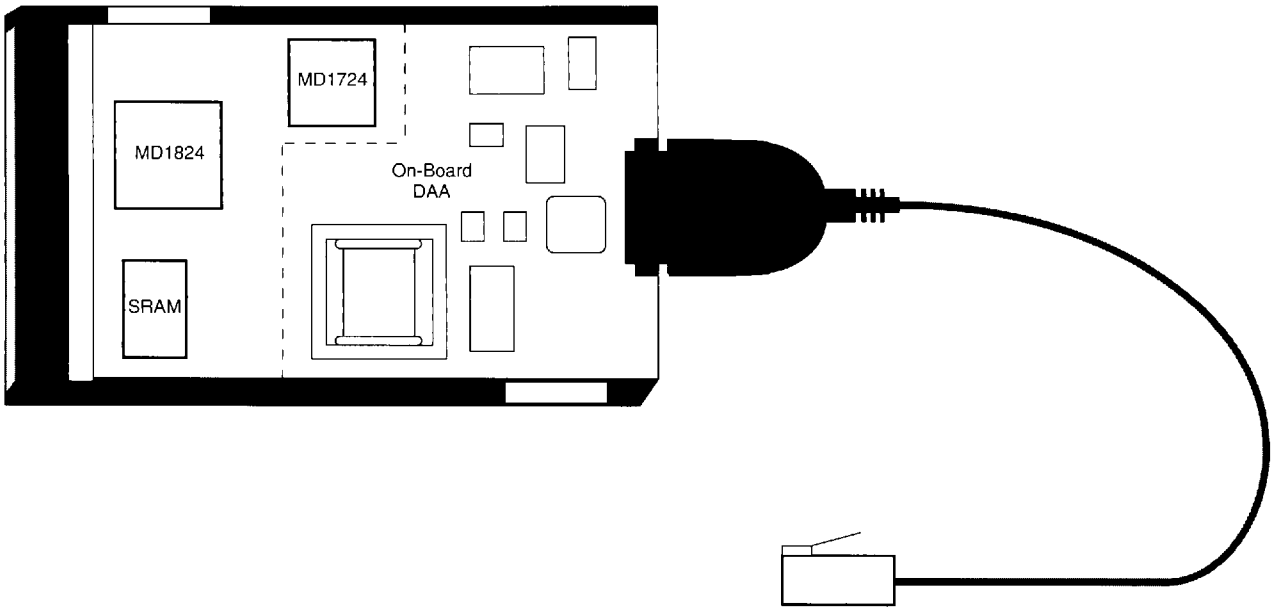
The CL-MD1824 100-Pin VQFP Pinout



The CL-MD1624 44-Pin VQFP Pinout

Cirrus Logic Modem Products

Device Set	Features
CL-MD9624AT	Basic modem that provides a 2400-bps data mode, and 9600-bps fax and voice modes (with two built-in DTE interfaces — serial RS232 and parallel 16C450/16C550-compatible interface registers that can be connected directly to an ISA bus).
CL-MD9624EC2	Same features as the CL-MD9624AT, plus error correction (V.42 and MNP 2-4) and data compression (V.42 bis and MNP 5).
CL-MD9624ECT	Same features as the CL-MD9624EC2, plus a microphone interface and phone-emulation mode.
CL-MD9624ECP	Same features as the CL-MD9624ECT, except built-in PCMCIA interface with 16C450/16C550-compatible registers, (i.e., does not support parallel ISA bus and serial RS232 host interfaces).



Typical PCMCIA 2.0 Modem Card with On-Board DAA (Actual Size)

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Table 1. Basic Data Modem 'AT' Commands

Command		Default	Function
A/	**	none	Repeat last command
A		none	Answer command
Bn	*	1	Select CCITT or Bell
Cn		1	Carrier control option
D		none	Dial command
En	*	1	Command mode echo
Fn		1	On-line echo
Hn		0	Switch hook control
In		0	Identification/checksum
Kn		none	Buffer control
Ln	*	2	Speaker volume control
Mn	*	1	Speaker control
Nn	*	1	Select data rate handshake
On		0	Go on line
P	*	none	Select pulse dialing
Qn	*	0	Result code display control
Sn		none	Select an S-Register
Sn=x		none	Write to an S-Register
Sn?		none	Read from an S-Register
?		none	Read last accessed S-Register
T	*	none	Select DTMF dialing
Vn	*	1	Result code form
Xn	*	4	Result code type/call progress
Yn	*	0	Long space disconnect
Zn		0	Reset modem/recall stored profile
&Cn	*	1	DCD option
&Dn	*	2	DTR option
&F		none	Load factory defaults
&Gn	*	0	Guard tone option
&Jn	*	0	Auxiliary relay control
&Mn	*	0	Communication mode option
&Pn	*	0	Dial pulse ratio
&Qn	*	0	Communication mode option
&Sn	*	0	DSR option
&Tn		0	Self-test commands
&Vn		0	View active configuration and stored profiles
&Wn		0	Store active profile
&Yn	*	0	Select stored profile on power up
&Zn=x		none	Store telephone number
%En	*	1	Auto-retrain control

Table 2. Fax Identity and Test 'AT' Commands

Command		Function
+FMFR?	none	Identify modem manufacturer
+FMDL?	none	Identify product model
+FREV?	none	Identify product revision
+FTTn	none	Fax transmit test command
+FRTn	none	Fax receive test command

Table 3. Data/Fax Class 1 'AT' Commands

Command	Function
+FCLASS?	Mode query
+FCLASS=n	Fax mode selection
+FCLASS=?	Supported modes
+FRH=<mod>	Receive HDLC data
+FRM=<mod>	Receive data
+FRS=<time>	Wait for silence
+FTH=<mod>	Transmit HDLC data
+FTM=<mod>	Transmit data
+FTS=<time>	Stop transmission and pause

Table 4. Voice Mode 'AT' Commands

Command	Default	Function
#VBP	none	Generate beep tone
#VCL=n	0	Voice mode selection
#VIP=n	0	Initialize parameter
#VLN=n	0	Relay/speaker control
#VPH	none	Phone-emulation mode
#VPL=n	127	Play level
#VPY	none	Play mode
#VRD	none	Record mode
#VRL=n	127	Recording level
#VSM=n	CL1	Sampling mode
#VSR=n	9600	Sampling rate

Table 5. V.42, MNP 'AT' Commands

Command		Default	Function
%An	*	13	Set auto-reliable fallback character
%Cn	*	1	MNP 5 data compression control
\An	*	3	MNP block size
\Bn		none	Transmit break
\Cn	*	0	Set auto-reliable buffer
\Gn	*	0	Set modem port flow control
\Jn	*	0	Bps rate adjust control
\Ln		0	Select MNP block/stream link
\Kn	*	5	Set break control
\Nn	*	3	Set operating mode
\O		none	Originate reliable link
\Qn	*	3	Set serial port flow control
\Tn	*	0	Set inactivity timer
\U		none	Accept reliable link
\Vn	*	2	Modify result code form
\Xn	*	0	Set XON/XOFF passthrough
\Y		none	Switch to reliable mode
\Z		none	Switch to normal mode
-Jn	*	1	Set V.42 detect phase
"Hn	*	3	V.42 bis compression control
"On		16	V.42 bis string length

* Value Saved in NVRAM
** Command not preceded by an 'AT'.

Table 6. Dial Modifiers

Command	Function
0 to 9	Dialing digits
A,B,C, D, *, #	Tone dial characters
P	Pulse dial
R	Reverse originate mode
S=n	Dial NVRAM telephone number
T	Tone dial
W	Wait for dial tone
,	Pause
!	Flash hook
@	Wait for quiet answer
;	Return to idle state
- ( )	Ignored by modem

Table 7. S-Registers Summary

Register		Default	Function
S0	*	0	No. of Rings to auto-answer on
S1		0	Ring count
S2	*	43	Escape character
S3		13	Carriage return character
S4		10	Line feed character
S5		8	Backspace character
S6	*	2	Wait before blind dialing
S7	*	30	Wait for carrier/dial tone
S8	*	2	Pause time for dial modifier
S9	*	6	Carrier detect recovery time
S10	*	14	Lost carrier hang up delay
S11	*	70	DTMF dialing speed
S12	*	50	Guard time
S13		none	Reserved
S14	*	none	Bit-mapped options
S15		none	Reserved
S16	*	none	Modem test options
S17		none	Reserved
S18	*	0	Modem test timer
S19		none	Reserved
S20		none	Reserved
S21	*	none	Bit-mapped options
S22	*	none	Bit-mapped options
S23	*	none	Bit-mapped options
S24		none	Reserved
S25	*	5	Detect DTR change
S26	*	1	RTS to CTS delay interval
S27	*	none	Bit-mapped options
S28	*	none	Reserved
S29	*	none	Reserved
S30	*	10	Sleep mode timer

* Value Saved in NVRAM

Table 8. Basic Response Codes (\V0)

Numeric Code	Verbose Code
0	OK
1	CONNECT
2	RING
3	NO CARRIER
4	ERROR
5	CONNECT 1200
6	NO DIAL TONE
7	BUSY
8	NO ANSWER
10	CONNECT 2400
+F4	+FCERROR

Table 9. Modified Response Codes (\V1)

Numeric Code	Verbose Code
22	CONNECT 300/REL
24	CONNECT 1200/REL
25	CONNECT 2400/REL

Table 10. V.42 Extended Response Codes (\V2)

Numeric Code	Verbose Code
32	CONNECT 300/REL-MNP
34	CONNECT 1200/REL-MNP
35	CONNECT 2400/REL-MNP
42	CONNECT 300/REL-MNP 5
44	CONNECT 1200/REL-MNP 5
45	CONNECT 2400/REL-MNP 5
52	CONNECT 300/REL-LAPM
54	CONNECT 1200/REL-LAPM
55	CONNECT 2400/REL-LAPM
62	CONNECT 300/REL-LAPM V.42 BIS
64	CONNECT 1200/REL-LAPM V.42 BIS
65	CONNECT 2400/REL-LAPM V.42 BIS