INNOMEDIA
ECMM9500-BI
EMBEDDED CABLE MODEM MODULE

OVERVIEW

The InnoMedia Embedded Cable Modem Module, ECMM9500-BI, is a state-of-the-art DOCSIS 3.0 cable modem with full 8x4 channel bonding support. Up to eight 6/8MHz downstream channels can be bonded with the supported frequency range of 88MHz – 1002MHz. In addition, four parallel upstream channels can transmit simultaneously meeting the requirements of the DOCSIS 3.0 specification through the use of a wideband DAC, IR filter, and high linearity PGA. By incorporating the latest DOCSIS 3.0 Advanced Time Division Multiple Access (ATDMA) and Synchronous Code Division Multiple Access (SCDMA) technologies, the ECMM9500-BI provides up to twice as much upstream bandwidth capability than DOCSIS 2.0 systems. The InnoMedia ECMM9500-BI presents an ideal choice as a DOCSIS 3.0 embedded solution for quick time-to-market applications with the perfect blend of flexibility and high performance.

APPLICATIONS

1. Embedded Multimedia Terminal Adapter.
2. Video Set-top Box.
3. Cable Equipment.
4. Medical Equipment.
5. Cable-based Transponder.
6. Industrial-grade Applications

FEATURES

1. DOCSIS 1.1, 2.0 and 3.0 compliant.
2. Q PSK, 8/16/32/64/128/256 QAM auto detection
3. SNMP and IETF cable MIB remote management.
4. Integrated ATDMA and SCDMA technology – capable of providing up to 120 Mbps upstream data rate and 320 Mbps downstream data rate using 8x4 channel bonding
5. Supports up to 32 SIDs (24 UGS)
6. Fast installation and easy operation.
7. Software upgradeable.
8. Self diagnostics.
9. Low symmetrical IF output for a direct connection to the channel decoder. RSSI (received strength signal indicator) information through I2C.
10. RF splitter for Loop-Through (Optional).

11. ROHS product.
12. Operational temperature range: -40°C~+85°C.

SPECIFICATIONS

1. Interface

Item	Specifications
Reset port (See 6.2.1)	Reset to restart/reboot the system when holding the reset longer than 1 second.
Console port (See 6.2.1)	Internal Console port.
JTAG port (See 6.2.1)	Internal JTAG port.
GMII for LAN Ethernet port (See 6.2.2)	GMII for 10/100/1000Base-Tx Ethernet port. N-way, Automatic speed negotiation supported. Auto-sensing, auto-detection MDI/MDI-X.
Cable connector (See 6.2.3)	RF F-type, female, 75 ohm.

2. Cable Specification

Compliant with DOCSIS 3.0/ 2.0/ 1.1 standards.

3. Downstream (Receiver) and Upstream (Transmitter) Characteristics

Item	Downstream	Upstream
Frequency Range	North America: 88MHz~1002MHz Europe: 108MHz~1002MHz Japan: 91MHz~1002MHz	North America: 5MHz~42MHz Europe: 5MHz~65MHz Japan: 5MHz~65MHz
Channel bandwidth	DOCSIS: 6 MHz EuroDocsis: 8 MHz	TDMA: 200, 400, 800, 1600, 3200 and 6400 kHz S-CDMA: 1600, 3200 and 6400 kHz
Impedance	75 ohm (nominal)	75 ohm (nominal)
Modulation	QPSK,64/256QAM	QPSK, 8/16/32/64/128 QAM
Maximum Data Rate	320Mbps, 8 channel bonding	120 Mbps, 4 channel bonding
Symbol Rates	64QAM: 5.057Msym/s 256QAM: 5.361 Msym/s	160, 320, 640, 1280, 2560 and 5120 ksym/s
FEC	RS (128,122) GF128 with Trellis coding	Reed Solomon
Signal Level	Receive Power Level: –15 dBmV ~ +15dBmV	Transmit Power Level: TDMA: +17 ~ +57dBmV(32QAM, 64QAM) +17 ~ +55dBmV(8QAM, 16QAM) +17 ~ +61dBmV(QPSK) SCDMA: +17~+56dBmV(all modulation)
Signal-to-Noise Ratio(SNR)	BER < 10^-8 64QAM: > 23.5dB 256QM: > 30dB	

4. Software Specifications

|	
Security	DOCSIS Baseline Privacy Plus: 1024-bit RSA and 128-bit Triple-DES for BPKM protocol 56 -bit DES for data encryption X.509 v3 certificates
DOCSIS	Compliant to DOCSIS 3.0
Protocol	TCP/IP, UDP, ARP, ICMP, DHCP, SNMP, TFTP, TOD, BOOTP, SYSLOG
Configuration	Ease of configuration and privacy control provided by resident or downloaded code from a Cable Modem Termination System (CMTS)
Bridging	Support for unicast, broadcast, and multicast IP packets

	Variable-length packet cable Media Access Control (MAC) transport layer Mix of contention and reservation-based upstream transmission
Quality of Service	Quality of service of MAC layer
Management Operations (SNMPv1/v2c/v3)	RFC1157: A simple Network Management Protocol RFC1901: Introduction to Community-based SNMPv2 RFC3416: Version 2 of the Protocol Operation for the SNMP RFC3417: Transport Mapping for the SNMP RFC2578: Structure of Management Information Version 2 RFC2570: Introduction to Version 3 of the internet-standard Network Management RFC3411:An Architecture for Describing SNMP management Frameworks RFC3412: Message Processing and Dispatching for the SNMP RFC3413:SNMP Applications RFC3414: User-based Security Model (USM) for SNMPv3 RFC3415: View-based Access Control Model (VACM) for SNMP RFC2576: Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard. Network Management Framework
MIBs support	RFC1493: BRIDGE-MIB RFC3418: SNMPv2-MIB RFC2011: IP-MIB RFC2013: UDP-MIB RFC2233: IF-MIB RFC3411: SNMP-FRAMEWORK-MIB RFC3412: SNMP-MPD-MIB RFC3413: SNMP-TARGET-MIB SNMP-NOTIFICATION-MIB RFC3414: SNMP-USER-BASED-SM-MIB RFC3415: SNMP-VIEW-BASED-ACM-MIB RFC2576: SNMP-COMMUNITY-MIB RFC2665: EtherLike-MIB RFC2669: DOCS-CABLE-DEVICE-MIB RFC2786: SNMP-USM-DH-OBJECTS-MIB RFC2851: INET-ADDRESS-MIB RFC2933: IGMP-STD-MIB RFC3083: DOCS-BPI-MIB DRAFT: DOCS-IF-MIB DRAFT: USB-MIB DRAFT: DOCS-BPI2-MIB DRAFT: DOCS-QOS-MIB Append L/Annex H: DOCS-IF-EXT-MIB Append L/Annex H: DOCS-CABLE-DEVICE-TRAP-MIB

5. Power Consumption and Physical Dimensions

| Item	Specifications
Power Consumption	Maximum: 5.64W at upstream power level of 51dBmv, 8x4 channel bonding, gigabit LAN port, and maximum upstream and downstream throughputs. Standby: 5.16W at 8x4 channel bonding, gigabit LAN port (Shall comply with EU CoC spec Tier 2) Comply with Energy Star 2.0)
PCB Dimension	• Excluding the RF connector - 100mm x 62.9mm x 20.1mm (3.94inch x 2.48 inch x 0.8inch) • Including the RF F connector - 119.9mm x 62.9mm x 20.1mm (4.72inch x 2.48 inch x 0.8inch)
Weight	200grams

6. Physical Specifications

6.1 Dimensions

Units: mm
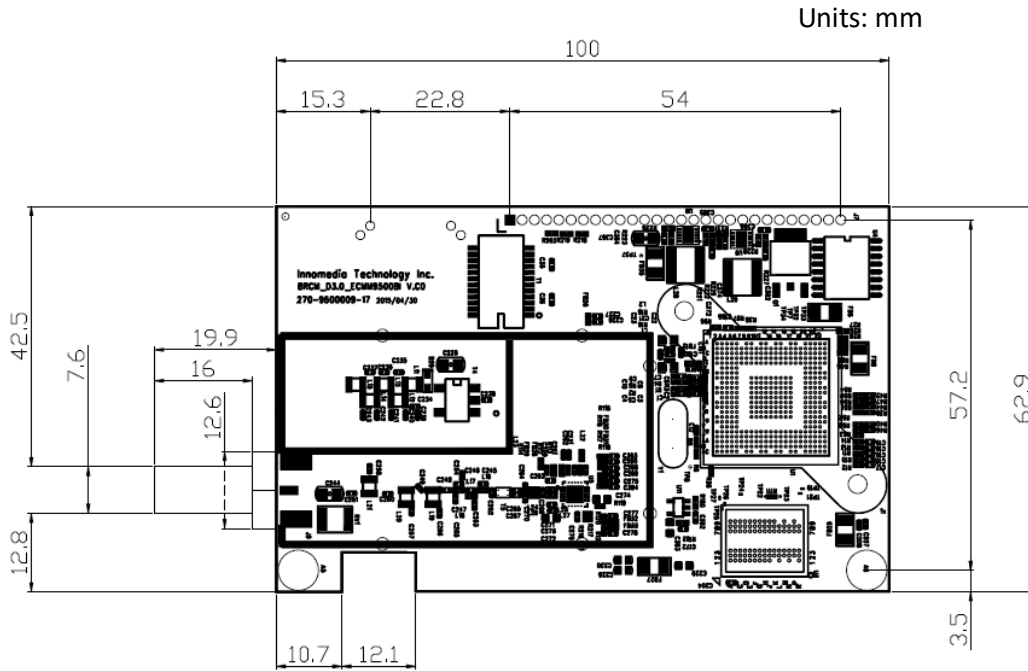
Top view of PCBA

Bottom view of PCBA
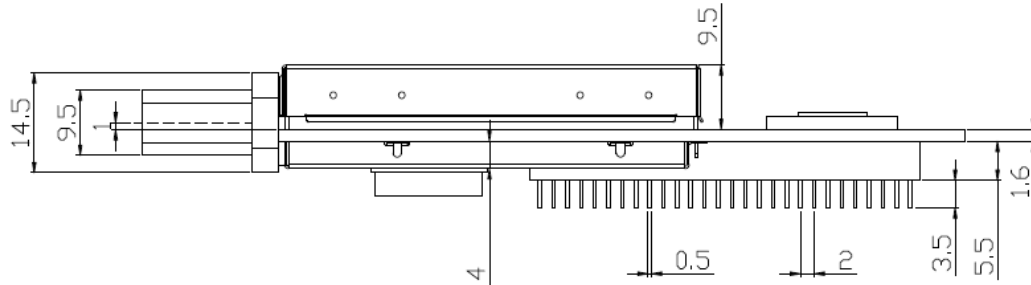
Side view of PCBA

6.2. Pin definition

6.2.1 Main connector: Power and I/O_J7

Pin	Function	I/O	Pin	Function	I/O
1	+3.3Vdc Input	I	2	+3.3Vdc Input	I
3	CM Reset	I	4	Ground	
5	EJTAG_TCK	I	6	EJTAG_TMS	I
7	EJTAG_TDO	O	8	EJTAG_TDI	I
9	EJTAG_RTCK	O	10	Reserved	X
11	Reserved	X	12	JTAG_TRSTN	I
13	Ground		14	+3.3Vdc Input	I
15	+3.3Vdc Input	I	16	+3.3Vdc Input	I
17	Ground		18	UART_RD	I
19	UART_TD	O	20	Reserved	X
21	Reserved		22	LAN indicator (for ESBC only)	O
23	Upstream indicator (for LED)	O	24	LAN indicator (for LED)	O
25	On Line indicator (for LED)	O	26	Power indicator (for LED)	O
27	Downstream indicator (for LED)	O	28	Ground	

6.2.2 GMII Bus Connector_J8

Pin	Function	I/O	Pin	Function	I/O
1	Ground		2	Ground	
3	Ground		4	MDI_0+ for Giga PHY	I/O
5	Ground		6	MDI_0- for Giga PHY	I/O
7	Ground		8	Ground	
9	Ground		10	MDI_1+ for Giga PHY	I/O
11	Ground		12	MDI_1- for Giga PHY	I/O
13	Ground		14	Ground	
15	Ground		16	MDI_2+ for Giga PHY	I/O
17	Ground		18	MDI_2- for Giga PHY	I/O

19	Ground		20	Ground	
21	Ground		22	MDI_3+ for Giga PHY	I/O
23	Ground		24	MDI_3- for Giga PHY	I/O
25	Ground		26	Ground	

6.2.3 RF Connectors_J9

Pin	Function	I/O	Pin	Function	I/O
J9-1	RF F-Type 75ohm	I/O			

www.innomedia.com

InnoMedia Pte. Ltd.
10 Science Park Road #03-04
The Alpha, Singapore Science Park II, SINGAPORE 117684
Ph: (65) 6872 0828; Fax: (65) 6872 0900

InnoMedia Technology Inc.
3F, No. 3, Industrial East Road IX
Hsinchu Science-Based Industrial Park, Hsinchu TAIWAN 300
Ph: (886) 3 564 1299; Fax: (886) 3 564 1589

InnoMedia, Inc.
1901 McCarthy Blvd.,
Milpitas, CA 95035
Ph: (408) 432-5400; Fax: (408) 941-8152

InnoMedia Technology (China) Ltd
903 Colorful Plaza,
No.16, GuangShun North Street,
ChaoYang District, Beijing, 100102
P. R. China
Phone: (86) 10-59782890, (86) 10-59782891
Fax: (86) 10-59782890 ext 210, (86) 10-59782891 ext 210