

Annual Report 2008-09



Astra Microwave Products Ltd

Astra Microwave designs, develops, and manufactures components and sub-systems for RF and microwave systems used in defense, space, meteorology, and telecommunication.

I N S I D E

Letter to shareholders	2
Astra overview	
Quick information	4
Board of directors	5
Products	6
Infrastructure	8
Revenue mix	10
Prominent customers	11
AGM notice	13
Directors' report	17
Accounts - Astra Microwave Products	39
Balance sheet	43
Profit and loss account	44
Schedules	45
Notes	54
Cash flow statement	64
Accounts - subsidiary	67
Accounts - consolidated	91

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Key financials

(standalone, INR million)

Year to 31 March	2008-09	2007-08
Revenue	1168.2	1238.9
Profit before interest, depreciation, tax	310.3	427.0
Less: Interest	30.6	42.4
Less: Depreciation	84.7	73.8
Less: Provision for tax	50.0	102.0
Profit after tax	145.0	208.8
Equity share capital	108.1	107.5
Reserves and surplus	1126.2	1029.7
Net worth	1234.3	1137.2
Gross fixed assets	1249.2	949.2
Net fixed assets	814.2	614.5



Dear shareholder

For the record, fiscal 2008-09 was only the second in Astra Microwave's 18 years that revenue and profit were lower than in the previous year.

The primary reason was, as I have explained on many occasions, the lumpy nature of our order flows. Given that most of our business comes from projects that are initiated, designed, developed and driven by our government and its policies and priorities, our revenues do not flow smoothly. The first two quarters in 2008-09 were good because many orders got lumped together; in contrast, some orders that were expected in the third and fourth quarters spilled into the current 2009-10 fiscal.

Our financials might have disappointed on paper; our order book—we believe it's the true indicator of business potential—remains strong.



Secondly, we spent considerable effort and resources to put firmly in place the many components that will drive Astra Microwave's future growth engine:

- new products;
- new opportunities;
- new segments.

Among the new products, we developed T/R (transmit/receive) modules that work in the L, S, C, X and Ku bands. These modules are critical for phased array radars of various applications. In 2008-09, we received an order of USD 11 million from Israel's ELTA for the manufacture of T/R modules. The order is special—the very first under the offset obligations clause of India's Defence Procurement Policy. The policy mandates that 30% of all defense contracts worth INR 3 billion and above must be invested in the Indian defense industry by way of sourcing components, sharing technology, setting up training facilities, or using IT services.

We have created an in-house capability—Astra Microwave's very own—for the design and development of Monolithic Microwave Integrated Circuits (MMICs), up to Ka band frequencies. MMICs are critical devices used in T/R modules; typical functions include microwave mixing, power amplification, low noise amplification, digital attenuation, digital phase shifting, and signal path switching.

Our T/R modules will now be powered by our own MMICs, which will provide us with an assured supply chain and better control over cost, performance, and quality. We expect that our MMIC facility will appeal to global defense electronics manufacturers seeking top capability and competitive costing.

Global OEMs in cellular telecom have recently begun manufacturing base stations and point-to-point microwave radios out of India. We have developed antennas for point-to-point microwave radios and are now developing base station filters, a significant addition to our current portfolio of repeaters, jammers, and interference-killing filters.

Meteorology was created as a separate marketing segment two year ago. We now have large orders from the Indian Meteorological Department and Antrix, the commercial arm of India's Department of Space, for unmanned automatic weather stations. Featuring sensors for multiple weather variables, the stations will bring bleeding-edge capability to India's short-term weather forecasting at the local, regional, and national level.

Our strategy of diversifying our market segments has worked: in 2007-08, 89% of our revenue came from the defense (61%) and space (28%) segments; in 2008-09, our revenue mix is a healthier balance—51% comes from defense; 23% from space; 20% from meteorology.

Right from its inception, Astra Microwave has stayed true to its unique mission of creating cutting-edge microwave technologies for critical applications. With a healthy order book, and active customers and partnerships with the most active players in defense, space, and telecom across India and globally, we believe we are on the sure road to larger successes ahead.

A handwritten signature in black ink, reading 'B Malla Reddy', is positioned above the printed name.

B Malla Reddy
Managing Director

Overview

Quick information

Primary business	Design, development, and manufacture of RF and microwave components and sub-systems for defense, space, meteorological and telecom applications
Incorporation	1991
Initial public offering	1994
Annual revenue (consolidated)	INR 1.18 billion
Net profit (consolidated)	157.11 million
Number of shares issued	54.04 million (of INR 2.00 face value each)
Listing	National Stock Exchange of India Ltd (ASTRAMICRO) Bombay Stock Exchange Ltd (532493)
Registered office and corporate office	Astra Towers Survey 12(P) Kothaguda Post Kondapur Hitech City Hyderabad 500084
Bankers	Canara Bank, Prime Corporate Branch, Secunderabad HDFC Bank, Lakdi-ka-pul, Hyderabad State Bank of India, Saifabad (SIB) Branch, Hyderabad
Auditors	M/s Amar & Raju Chartered Accountants Road 3 Banjara Hills Hyderabad 500032



Board

B Malla Reddy - Managing Director

In charge of overall business and strategy at Astra Microwave, B Malla Reddy is among Astra Microwave's core founders. Mr Malla Reddy worked for over two decades the Systems Division, Indian Space Research Organisation, Bangalore, and with Defence Research and Development Laboratory, Hyderabad, before taking charge of software development and R&D at OMC Computers Ltd, Hyderabad. Mr Malla Reddy holds a Master's in Engineering (Automation) from the Indian Institute of Science, Bangalore.

PA Chitrakar - Director and COO

Head of operations at Astra Microwave, PA Chitrakar had been with the Defence Electronics Laboratory, Hyderabad, as a scientist for over 20 years before co-founding Astra Microwave. An MSc (Physics) from Mysore University and an MTech (Advanced Electronics) from JNTU, Hyderabad, Mr Chitrakar is an expert in, among others, the design of microwave components.

C Prameelamma - Director (Technical)

Among Astra Microwave founders, C Prameelamma has had a distinguished career with the Electronics Research and Development Establishment, Bangalore, and the Defence Electronics Research Laboratory, Hyderabad. An expert in the manufacture and testing of microwave components and computer-aided design, Ms Prameelamma is a Master's in Engineering (Instrumentation & Control Systems) From SV University, Tirupati.

J Venkatadas - Independent Director

In his 35-plus years of corporate banking and venture capital investing, J Venkatadas worked 25 years at Canara Bank of which 6 years were as Managing Director of Canbank Venture Capital Fund Ltd, and 2 years as Senior Faculty in Management Development Institute, Gurgaon, on secondment by the bank in the area of development and commercial banking. Mr Venkatadas is a BE (Mechanical) from Mysore University and is a Certified Associate of the Indian Institution of Bankers.

Atim Kabra - Director

Founding Partner of Frontline Strategy Limited, among India's earliest independent private equity advisory firms, Atim Kabra has worked for over 17 years with global institutions such as ABN AMRO Bank and ANZ Grindlays Bank in portfolio management, equity sales, and equity research. A BA Hons (Economics) from Delhi University and an MBA (Finance) from Bombay University, Mr Kabra has lived and worked in India, USA, and Singapore, where he is currently based.

Shiban K Koul - Independent Director

An international authority on microwave technology, Shiban K Koul is Professor at the Centre for Applied Research in Electronics at the Indian Institute of Technology Delhi. Prof Koul is a BE (Electrical) from REC, Srinagar, and holds an MTech and PhD in microwave engineering from IIT Delhi; he has held visiting assignments with several universities across the world and has authored/co-authored several research papers and books.

Overview

Products

Microwave components and sub-systems

DEFENSE

RADAR

Transmit/receive (TR) modules in UHF, L, S, C, X and Ku band for active apertures
 Low power microwave sub-systems for central acquisition radar (CAR)
 Electronic beam former for 3-D radar
 Microwave receivers
 High power 4-port circulators for radar applications.
 High power limiters

TELEMETRY

Data and video telemetry transmitter systems for LCA and IJT
 Video telemetry receivers
 Telemetry tracking systems
 1 watt and 10 watt telemetry transmitters for missile applications

GROUND-BASED AND SURVEILLANCE

8-Ch and 16-Ch frequency synthesizer for army applications
 VHF/UHF and microwave range front-end LRUs for ground surveillance applications
 VHF/UHF and microwave range biconical, dual-polarised antennae for ground surveillance applications

SPACE

GROUND-BASED

Coherent frequency generators
 L-band modulators
 8x8 switchable routers for earth station
 V/UHF T/R modules for ST radar
 Ka-band indoor/outdoor units

S-LEVEL (ON-BOARD)

C-band T/R modules
 SSPA screening
 1:12-way power dividers
 2, 3, 4-way power dividers
 X-band phase shifter, power amplifier
 S-band transmitter
 Fabrication and assembly of RISAT antenna
 8X8 switch matrix for the communication payloads
 Ku-band receivers
 Ku-band beacon source
 C-band MMIC receivers
 4x4 switch matrix



ELECTRONIC COUNTERMEASURES

Broadband antenna head unit comprising homodyne receivers in 2-18 GHz and 0.5-2 GHz for better DF accuracy*

EDLVA super components in 1-18 GHz, 2-18 GHz, 0.5-2 GHz and 8-18 GHz for naval and air-borne applications*

BLI super components (2-8 GHz and 8-18 GHz) for naval and army applications*

Cavity backed spiral antennae (0.5-2 GHz, 2-18 GHz, 1-18 GHz, 0.5-18 GHz)*

DIFM receiver (2-18 GHz) for air-borne, naval and army applications

2 Ch, 4 Ch digital receivers

Switch filter assembly (2-18 GHz) for air-borne applications

Dual-switch amplifier (2-18 GHz) for air-borne applications

Limiting amplifier (2-18 GHz) for air-borne applications

Wideband (0.5-18 GHz) for RFPS applications

* Technology from DLRL Hyderabad

TELECOM

SATCOM

MSS terminals for disaster communications

CIVIL TELECOM

GSM/Ext GSM, CDMA repeaters

RF and optical mobile jammers

Tower mounted amplifiers

Tower mounted boosters

Band pass and CDMA rejection filters

SECURITY

Non-linear junction detector

RFID solutions

Industrial security system

METEOROLOGY

Automatic weather stations for remote data collection

Met towers

Mini boundary layer masts

50m tower masts

Agro met towers

Overview

Infrastructure

120,000 sft of research, design, development and manufacturing across 4 units

Equipment

Scalar and vector network analyzers

Noise figure meters

Microwave frequency counters

Power meters

Signal generators

Function and pulse generators

Open air antenna test range

High-precision bonding machines

Temperature controlled hot plate with nitrogen purging facility for eutectic attachment

Clean room compatible oven for curing epoxy
X10-X100 magnification microscopes

Thermosonic wire bonders for deep access ball and wedge bonding

Parallel gap welding

MMIC design and manufacture

32000 sft working floor with static dissipative epoxy coated flooring

12000 sft Class 10000 clean room

Class 100 laminar flow benches

Complete ESD care

Temperature/humidity-controlled dessicators with nitrogen purging for bare chips storage

Humidity/temperature-controlled bonded material store

Fume absorbers with soldering stations to avoid contamination

Dicing system for cutting alumina substrate, and GaAs/silicon wafer

Resistive welding system for package sealing