India Power Electronics Market Report - 2010

The unprecedented growth in the Indian electronics demand (estimated at $50B for 2009), has spawned a corresponding spurt in the domestic power electronics industry. While this growth has been acknowledged in industry circles, no specific data exist to understand this phenomenon – this report aims to fulfill this gap.

The report highlights the peculiarities of Indian industry by identifying unique areas of growth which require special attention from industry participants. It also highlights the gap between the domestic demand and supply which is currently fulfilled by imports. Conversely, areas where the Indian industry contributes to the global demand by exporting products/services are also highlighted. Coming from technology/strategic marketing background and with an unmatched access to the decision makers and trendsetters in Indian electronics industry, the authors are able to provide a highly credible and comprehensive account of the market that goes well beyond the surface data and helps identify actionable agenda for the reader.

Key Highlights

- **Complete picture of the value chain for power electronics subsystems in India**
- **Segment-wise identification of India power electronics subsystem demand and application drivers, growth rates, key participants in each segment**
- **Detailed data on Indian power electronics companies in all categories**
- **Analysis of the demand and supply trends with identification of unique opportunities and hurdles relevant to Indian power electronics industry**
- **Insights, success stories and cautionary tales shared from active participants**
- **Recommendations for participating in and benefiting from the Indian power electronics boom.**

Author Biographies

- **Dhaval Dalal:** Dhaval has been in the power electronics industry since his days as graduate student at Virginia Tech in mid 80's (after his B.Tech at IIT Bombay). During his career, he has worked as designer and researcher for OEMs (DEC from '87 to '92, Philips Laboratories from '92 to '94) and applications engineer for Unitrode ('94-'02). During his stint at Unitrode, Dhaval made transition to a strategic marketing role and continued that role at TI and later at ON Semiconductor ('02-'08). Dhaval has contributed his experience in data analysis and insights into the global power electronics market trends to this report.
- **Ram Kumar:** After completing his Bachelors program in Electronics at Bangalore University in 1984, and MSEE from Virginia Tech in 1987, Ram's career started as a Military power supply design engineer at Powercube (a subsidiary of Unitrode Corp.), in Boston. In 1990, Ram decided to move back to India and contributed to the nascent electronics industry by working at Hinditron-Tektronix and Electrohms in R&D management. Between 1996 and 2008, Ram played a leading role in establishing a strong presence for Power Integrations in India and SE Asia. He set up customer-centric Applications Engineering Centers which fueled revenue growth. Ram brings his unique knowledge of Indian power electronics value chain and its drivers to this report.

Report length: 100 pages approximately, secure pdf document type

Number of tables and figures: 45+ tables, 25+ figures/charts

Availability and Pricing

The report is available now (from May 1, 2010). **Pricing:** International, USD1495; India, INR65000; plus taxes as applicable. Early-bird discounts are available on request till 15 June 2010.

Following pages provide a glimpse into the organization, content and methodology of the report. Please contact ram.kumar@ispipl.com or dhaval@acptek.com if you are interested in learning more about this product.

Chapter Overviews:

1. Executive Summary

This section provides the highlights of the report on the Indian power electronics industry. It summarizes the overall demand and growth rates for various segments. It also provides a summary of domestic power electronics capabilities in terms of design, development, testing and manufacturing. Major insights gained during the study are also highlighted.

2. Scope and Methodology

This section identifies the scope and methodology. The scope of this report is to accurately and comprehensively quantify and analyze various facets of the power electronics value chain as it is developing in India. The methodology of data collection (primary and secondary research) is also described in this section.

3. India Power Electronics Value Chain

This section describes the complete value chain of the power electronics systems and subsystems in India. Starting with the end user who uses the power electronics product or the system of which the power electronic subsystem is a component, it traces and identifies roles and impacts of various stakeholders (such as buyers, manufacturers, distributors, government agencies, designers etc.) in shaping the overall growth of the power electronics industry. Each stakeholder's contributions, key concerns and constraints are identified as they pertain to different segments. This section also presents the segmentation of the market as it applies to the Indian industry.

4. India Power Electronics Demand

Complete segment-wise data for the power electronics are presented in this section. It identifies the current consumption rates and projected growth rates for each segment and also identifies the key drivers for these segments. Major OEMs and decision makers for each segment are identified. The geographic segmentation is also covered in this section.

5. India Power Electronics Capabilities

The recent growth in power electronics capabilities is captured in this section. It identifies major players (manufacturers, design houses and service providers) in this field by segment and by geography. It also highlights the role played by the other stakeholders in value chain in shaping these capabilities.

6. Observations and Analyses

This section contains major observations regarding the Indian power electronics industry. These observations are culled from the interviews with the stakeholders as well as from the authors' long association with the industry. The analyses of these observations tries to provide answers to the "why"s of these trends and characteristics of the Indian power electronics industry.

7. Recommendations for Success

Based on the data and the observations/analyses in this report, certain recommendations are made for achieving success in the growing Indian market. These recommendations are derived from the first-hand experience of the market and supported by the data collected.

8. Conclusions and Future Work

This report provides a comprehensive and accurate view of the Indian power electronics industry through the eyes of the authors who have been part of the industry for well over two decades. It gives the reader quantitative data for action coupled with valuable insights that provide the required nuances. As this is the first step ever in getting such a thorough understanding of the growing market, the authors foresee follow-on work focusing on a more specific areas as well as releasing periodic updates of this report.

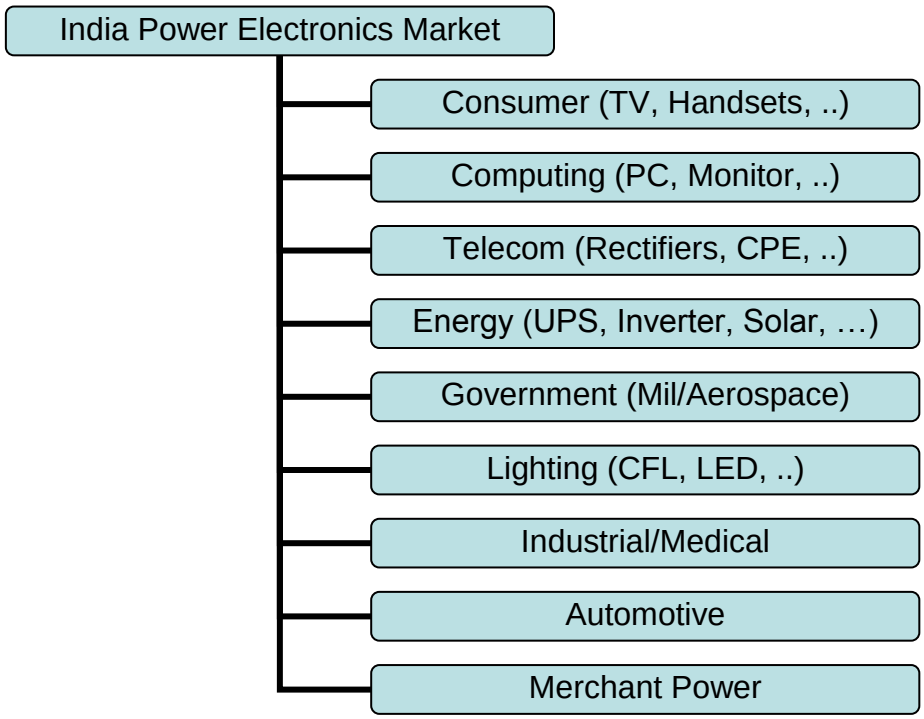
9. Appendix

Includes key references.

Exclusions:

The term Power Electronics involves any electronics-based power processing to convert power from one form to another. Admittedly, the term is very broad and encompasses several fields. This is both the challenge and opportunity presented in such a big geography as India. However, in this report, the focus is on **static** Power Electronics – i.e., the report specifically excludes the motion control electronics including motor drives. Even though the motion control market is very significant and huge in the Indian context, it has certain distinctions in terms of end applications, participants and market dynamics. It will require a separate endeavor to come up with a report on the motion control market. Another key exclusion is the utility-scale power conversion – distribution Power Electronics, HV-LV transformers, switchgear as well as servo-controlled and static voltage stabilizers. There are many interesting developments in this field, and growing use of electronics, but for now, it is not considered germane to the mainstream Power Electronics study. Hence, this study covers the Static Power Electronics as it applies to the Indian market.

Segmentation Overview:



(Excerpts from Chapter 4)

4.4 Energy Segment:

Power backup (including batteries) is a $1.1 Billion revenue industry in India. This industry has several facets uniquely shaped by Indian market realities of customer need and supply-demand dynamics. Two types of power backup devices commonly deployed in India are (a) the UPS and (b) the Inverter.

In the Indian context the UPS systems refers to a power backup source for limited times, up to one hour or less, and a true-sine wave output is generated. These are generally on-line systems where power is processed continuously and no 'transition' to backup mode is seen by the load. Desk-top Computers, Data-centers, Hospitals, Telecom exchanges, and mission critical applications use UPS systems. Battery ratings are consequently lower and form less than 30% of the system cost. One of the reasons for shorter back-up time is that there is an alternative power generation source (such as Diesel Generator), that comes on-line soon after utility power fails.

The Inverter system refers to a power backup source for extended time of power outages, typically from one hour to eight hours or more, and a pure sine-wave output (older products produce quasi-sine wave output) is produced by the system. Battery ratings (and the battery chargers also) are typically of high capacity, consequently the battery costs can form 60% or more of the system cost. These are popularly deployed in homes and offices to drive ceiling fans, TV sets, fluorescent and incandescent lights, or even elevators in housing complexes during power outages.

One salient characteristic of these applications is that they are essentially power electronics end equipment, and hence, Power Electronics is the driver and forms a large portion of the cost of the system. We estimate the Power Electronics content in the UPS and Inverter markets combined at $494 Million per year.

4.4.1 Demand and Growth rates for Power backup systems

The following figures provide unit volume and PE content for power backup segment in 2009.

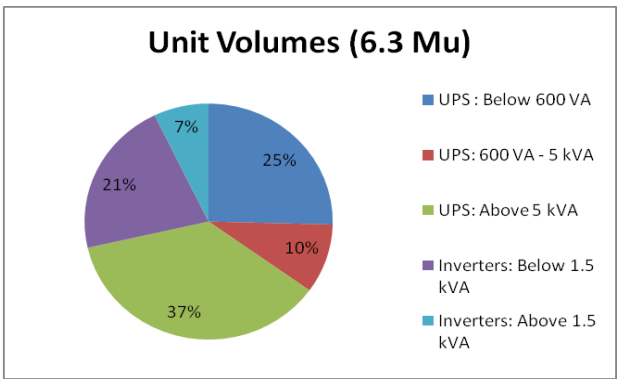


Figure 1: Market share by power rating and unit volumes

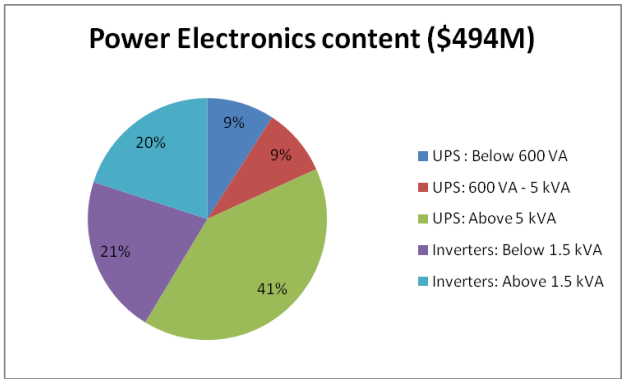


Figure 2: Value of Power Electronics content by product type

4.4.2 UPS systems

We estimate the UPS market in India has a Power Electronics content of $290 M. The industry has seen declining revenues the past two years of 8-9% but prior to 2008 the industry grew at a CAGR of 18%+ for 5-6 years.

The sub-5 kVA systems make up 35% (by unit volume) of the UPS and Inverters sold in India's market. Within this, more than 70% by unit volumes shipped are rated 600 VA and below which cater to the desk-top computer and linked to the growth of this market. Recent growth in the penetration of laptops and net books and the erosion in desktop PC sales are perceived as the reason for declining sales in 2009 in the 600 VA and below segment. The 10-100 kVA systems earn the highest revenues in the online and line-interactive UPS systems market.

The outlook for 2010 remains depressed to flat, and beyond that recovery to a CAGR of 18-20% is our forecast given the power shortage in the country. Several projects for generating power, largely coal-fired plants, are in the pipeline and a recent initiative to tap into solar power has begun, however, this power hungry nation will still see power outages due to the supply-demand gap in power generation for the near future.

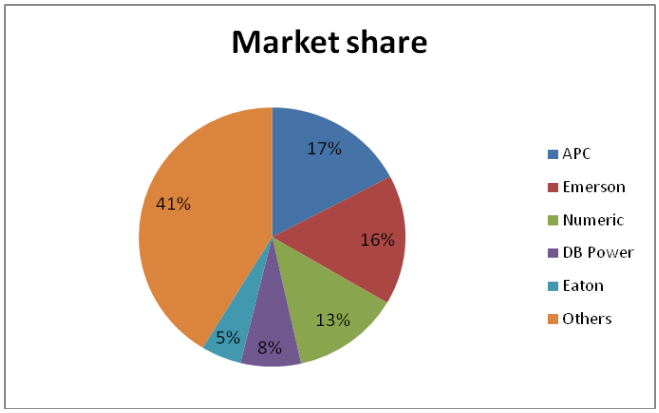


Figure 3: Key UPS players in India and their market share by revenue

4.4.3 Inverters

We estimate 1.8 Mu inverters are sold annually in India, with more than 60% rated below 1.5 kVA. We estimate the Power Electronics content at $204 Million. This market is expected to remain steady in 2010 and accelerate to a growth of 10-15% as the power shortage in the country is expected to ease only after 2012. This industry is currently much more fragmented than the UPS industry.

The unbranded Inverter industry in India is estimated to have a power electronics content of $60 Million, and more than 80% is sourced from China/Taiwan presently. Cost pressures are at the root of this trend and manufacturers tend to become traders in this high volume business segment. Unless significant policy changes happen to encourage access to low cost components for the local manufacturing industry, the trading opportunity will remain attractive.

4.4.4 Power Converters

4.4.5 Energy (Utility) Meters

4.4.6 Solar Inverters

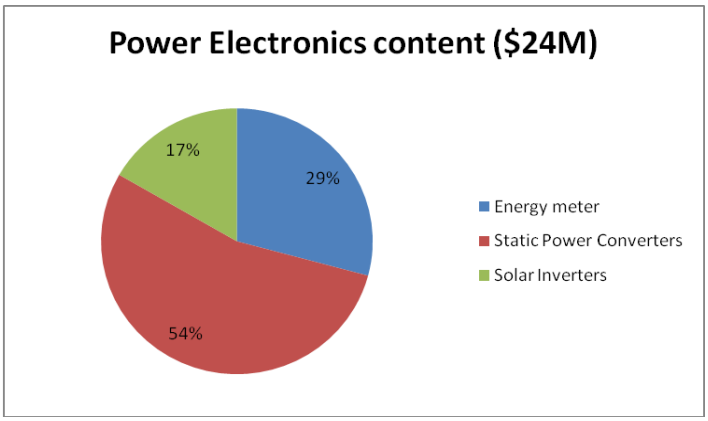


Figure 4: Other segments of the energy industry, total $24 M

4.10 Total Demand

Based on the segment-wise demand data presented above, the total Power Electronics demand in India is presented in the table below.

Table 4-25 Total power electronics demand - 2009

Segment	PE content ($M)	Semiconductor content ($M)	Magnetics content ($M)	Passives content ($M)	Mech. H/W content ($M)
Consumer					
Computing					
Telecom					
Energy	518	181	155	104	78
Government					
Lighting					
Industrial/Medical					
Automotive					
Total	2408				

From the above table, it can be seen that the $2.4 B demand for PE content in India is further broken down as - about xx% for semiconductors (including discretes, controllers and drivers), about yy% for magnetics, about zz% for passives and the rest for the mechanical hardware. With time, the semiconductor content is likely to increase at the expense of magnetics (mainly) and passives (secondarily) as more high frequency power solutions replace linears and line frequency magnetics. Clearly, this is a very attractive market for semiconductor manufacturers and it justifies their increasing focus and investments in the Indian market. For magnetics vendors, this is still a very attractive and dynamic market and with differentiated solutions in high frequency arena, companies providing magnetic material (such as bobbins, cores and wires) as well as wound magnetic components (inductors, filters and transformers) can grab a significant share of the market. For passives, lack of local capabilities makes it primarily an import market. On the mechanical hardware side ….

(Excerpts from Chapter 5)

5.1 Power Source Manufacturer types:

The power source design/manufacturing capability in India is diverse and ranges in scale from small-scale (less than $1M revenue) to large scale (>$100M revenue). Within this wide range, the players can be classified according to product capabilities as below.

Power Sources Manufacturer types:

1. **Low-power:** <1 kW – ac-dc, dc-dc, open-frame assemblies, modules, bricks, adaptors, custom and standard
2. **High-power:** >1 kW – ac-dc, dc-dc, dc-ac, custom and standard
3. **UPS, Renewables:** 0.5-1000+ kVA, dc-ac Inverters, ac-ac Power conditioners, ac-dc and dc-dc converters, custom and standard

Although not PSM manufacturers, two other types of organizations with PE capabilities comprise of:

1. **Design Houses** who influence power supply design choices while engaged in the business of product or sub-system design
2. **OEMs and ODMs** who make on-board and/or integral power supplies: ac-dc, dc-dc, open frame subassemblies, modules, bricks, co-located with system load on same PCB chassis or adjoining location, for internal requirements

The above classification was arrived upon in an effort to simplify and understand the complex factors at play in shaping India's PE industry today. PSM types 1, 2, and 3 are generally manufacturers for whom the end product is a Power Source. In the Indian context the UPS industry is a dominant PE business with strong local content and hence captured as a separate industry type. Types are not exclusive, they indicate the dominant activity a manufacturer is engaged in, multiple type numbers in the tables indicate multiple capabilities.

5.2 PSM Types 1, 2 and 3 capabilities:

Presented in Table 5-1 to Table 5-3 below is a Capabilities Matrix showing significant Type 1, 2 and 3 manufacturers by region and their play in the ecosystem (names in bold indicate Multinationals with non-India ownership/control). Key notes to the compilation below:

1. Most of the activity in PE occurs in the….

5.10 Energy Segment demand fulfillment

The Energy segment is characterized by heavy contribution of domestic content (>50%). Because of the size of the market and the domestic content domination, this segment is rightly seen as the engine of Indian Power Electronics industry, though some sources make the mistake of confining their assessment of the Indian Power Electronics market to this segment only. Another key facet of this segment is that there is virtually no local outsourcing of PE content in terms of design control. This is understandable as PE is the primary content of the end application and there is no point outsourcing it. However, some external design house or consultant involvement is present with some vendors as they seek to improve their performance metrics such as power density, efficiency and cost per watt.

ODM imports from China and Taiwan companies in the lower power (<600 VA) and high volume segment of UPS and Inverters has been a growing trend in the past few years. R&D efforts have focused on high power UPS systems and Inverters. Design firms (like abc) and newer entrants (like xyz) in the UPS and inverter segment have provided a competitive edge to the marketplace.

Given the vagaries of the Indian grid, there will be many local challenges that cannot be served directly by the solutions developed in other geographies, so the opportunity to develop local capabilities and benefit is great.

Table 5-16 Energy Segment demand fulfillment ($M)

Application	PE content	Import	Domestic	Import in-house	Import outsourced	Local in-house	Local outsourced
UPS : Below 600 VA							
UPS: 600 VA - 5 kVA							
UPS: Above 5 kVA							
Inverters: Below 1.5 kVA							
Inverters: Above 1.5 kVA							
Energy meter							
Static Power Converters							
Solar Inverters							
Total	518						