

# YIELD IMPROVEMENTS IN SEMICONDUCTOR MANUFACTURING USING TRIZ METHODOLOGY



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2018



## **YIELD IMPROVEMENTS IN SEMICONDUCTOR MANUFACTURING USING TRIZ METHODOLOGY**

This report is submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for Bachelor Degree of Manufacturing Engineering (Hons.)



**SEE LI XIN  
B051410123  
940512-01-6664**

FACULTY OF MANUFACTURING ENGINEERING  
2018

**BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA**

Tajuk: **YIELD IMPROVEMENTS IN SEMICONDUCTOR MANUFACTURING USING TRIZ METHODOLOGY**

Sesi Pengajian: **2017/2018 Semester 2**

Saya **SEE LI XIN (940512-01-6664)**

mengaku membenarkan Laporan Projek Sarjana Muda (PSM) ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan PSM ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. \*Sila tandakan (√)

- SULIT** (Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysiasebagaimana yang termaktub dalam AKTA RAHSIA RASMI 1972)
- TERHAD** (Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/ badan di mana penyelidikan dijalankan)
- TIDAK TERHAD**

Disahkan oleh:

Alamat Tetap:  
80, Jalan Mawar 5,  
Taman Mawar,  
84000 Muar,  
Johor.  
Tarikh: \_\_\_\_\_

Cop Rasmi:

Tarikh: \_\_\_\_\_

\*Jika Laporan PSM ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan PSM ini perlu dikelaskan sebagai SULIT atau TERHAD.



## FAKULTI KEJURUTERAAN PEMBUATAN

Tel: +606 – 331 6429 / Faks: +606 – 331 6431

Rujukan Kami (Our Ref) : UTeM.  
Rujukan Tuan (Your Ref) :

Ketua Pustakawan  
Perpustakaan UTeM Kampus Induk  
University Teknikal Malaysia Melaka  
Hang Tuah Jaya, 76100 Durian Tunggal  
Melaka.

6 June 2018

Tuan/Puan,

PENKELASAN LAPORAN PSM SEBAGAI SULIT/TERHAD LAPORAN PROJEK SARJANA MUDA KEJURUTERAAN PEMBUATAN.

NAMA: SEE LI XIN

Sukacita dimaklumkan bahawa Laporan PSM yang tersebut di atas bertajuk “YIELD IMPROVEMENTS IN SEMICONDUCTOR MANUFACTURING USING TRIZ METHODOLOGY” mohon dikelaskan sebagai \*SULIT / TERHAD untuk tempoh LIMA tahun dari tarikh surat ini.

2. Hal ini adalah kerana ianya merupakan projek yang ditaja sepenuhnya oleh syarikat luar dan hasil kajiannya adalah sulit.

Sekian dimaklumkan. Terima kasih.

Yang benar,

Tandatangan dan Cop Penyelia

NOTA: BORANG INI HANYA DIISI JIKA DIKLASIFIKASIKAN SEBAGAI SULIT DAN TERHAD. JIKA LAPORAN DIKELASKAN SEBAGAI TIDAK TERHAD, MAKA BORANG INI TIDAK PERLU DISERTAKAN DALAM LAPORAN PSM.

## DECLARATION

I hereby, declared this report entitled “Yield Improvements In Semiconductor Manufacturing Using TRIZ Methodology” is the result of my own research except as cited in references.

Signature

: .....

Author's Name

: SEE LI XIN

Date

:



## APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of Universiti Teknikal Malaysia Melaka as a partial fulfilment of the requirement for Degree of Manufacturing Engineering (Hons). The member of the supervisory committee are as follow:



## ABSTRAK

Dalam persekitaran yang kompetitif ini, setiap pengilang perlu meningkatkan prestasi. Banyak syarikat dikehendaki memohon banyak program mengenai peningkatan produktiviti supaya dapat bertahan di dunia nyata. Syarikat yang dapat memenuhi keperluan pelanggan dengan kualiti yang lebih baik dapat melebihi pesaingnya. Kajian ini adalah mengenai peningkatan hasil dalam pembuatan semikonduktor menggunakan metodologi TRIZ. Kajian ini dijalankan di sebuah syarikat semikonduktor yang terletak di Melaka. Syarikat sekarang sedang menghadapi masalah pengeluaran yang rendah. Syarikat kes telah mengenalpasti bahawa proses kesesakan itu berada dalam kawasan ujian. Mesin di kawasan ujian telah menyumbang Overall Equipment Effectiveness (OEE) yang rendah. Syarikat kes ini ingin meningkatkan OEE mesin dengan meningkatkan hasil kualiti. Oleh itu, syarikat itu merancang untuk meningkatkan parameter kualiti di jabatan ujian dan dengan itu dapat meningkatkan OEE mesin. Oleh itu, keluaran syarikat dapat ditingkatkan. Kajian ini akan memberi tumpuan kepada parameter kualiti di jabatan ujian. Tujuan projek ini adalah untuk meningkatkan OEE dengan meningkatkan kualiti mesin. Untuk memenuhi objektif, tiga jenis menolak yg tertinggi telah dikenal pasti menggunakan carta Pareto. Selepas itu, punca utama kritikal telah dikenal pasti untuk jenis menolak menggunakan Ishikwa rajah. Kaedah Theory of Inventive Problem Solving (TRIZ) digunakan untuk mencadangkan penyelesaian yang boleh dilaksanakan. Terdapat lima penyelesaian yang dicadangkan kepada syarikat kes dan tiga daripada penyelesaian telah dijalankan untuk diuji kerana kekangan masa. Hasilnya meningkat sekitar 0.5% berdasarkan data yang diperolehi. Peningkatan ini boleh memberikan keuntungan sebanyak RM 500,000. Oleh itu, peningkatan hasil boleh memberikan keuntungan kepada syarikat kes itu.

## ABSTRACT

In this full of competitive environment, every manufacturer has to increase the performance. Many companies are required to apply a lot of programs regarding the increasing of the productivity so can survive in the real world. A company which can fulfil the customer need with the better quality may exceed its competitors. This study is about yield improvement in semiconductor manufacturing using TRIZ methodology. This study is carried out at a semiconductor company which is located at the Melaka. The company is currently facing the low throughput. The case company had identified that the bottleneck process is in the testing area. The machine in the testing area had contributed the low Overall Equipment Effectiveness (OEE). The case company desire to improve the OEE of the machine by improving the quality yield. So, the company plans to improve the quality parameter in the testing department and therefore can increase the OEE of the machine. Therefore the throughput of the company can be improved. This study will focus on the quality parameter in the testing department. The aim of the project is to improve the OEE by improving the quality of the machine. To fulfil the objectives, the top three significant reject types were identified using the Pareto chart. After that, the critical root causes were identified for the significant reject types using Ishikawa diagram. Theory of Inventive Problem Solving (TRIZ) methodology was used to propose the feasible solution. There are five solution that proposed to the case company and three of the solutions were carried the pilot run due to time constraint. The yield was improved around 0.5% based on the data obtained. The increment can earn a profit of about RM 500,000. So, the yield improvement can give the profit to the case company.



## DEDICATION

I would like to dedicate my thesis to my beloved family members, supervisor and friends.

Thank you for the unconditional loves, understandings and supports.

Love you all forever.



## ACKNOWLEDGEMENT

Firstly, I would like to thank my beloved parents for their fully support and always be there for me in giving ideas. I would also like to thank all UTeM lecturers and staffs. A much thankful to my FYP supervisor, Professor Dr. Chong Kuan Eng. Professor Chong had giving me a lot of help and guidance on the project, without him I cannot complete my project.

In additional, I would like to state my extremely contribution to my industry supervisor, Mr Alan Ng Kam Choi, as a person who supervise me for my research and teaching me a lot of knowledge on my project. I would like to give a lot of thanks for their support, and assist in term of their knowledge and information that help me a lot during my research.

Last but not least, my special thanks to all my friends that always giving assist for me to finish this research. I would also like to specially thank to my coursemate, Mr Lee Cheang Fu that encourage me along the project. Without them, I would not be where I'm today. Thank you very much.

# TABLE OF CONTENT

Abstrak	i
Abstract	ii
Dedication	iii
Acknowledgement	iv
Table of Contents	v
List of Tables	ix
List of Figures	xi
List of Abbreviations	xiii

## CHAPTER 1: INTRODUCTION

1.1 Background of Study	1
1.2 Background of Case Company	3
1.3 Problem Statement	5
1.4 Objectives	5
1.5 Scopes	6
1.6 Significance of Study	6
1.7 Thesis Organization	6

## CHAPTER 2: LITERATURE REVIEW

2.1 Introduction	8
2.2 Productivity	8
2.3 Toyota Production System (TPS)	9
2.4 Total Productive Maintenance (TPM)	10
2.4.1 TPM pillars	11
2.5 Overview of Overall Equipment Effectiveness	12
2.5.1 Availability	13
2.5.2 Performance rate	14
2.5.3 Quality rate	14
2.6 Quality	15

2.7 Quality Tools	18
2.7.1 Statistical Process Control (SPC)	19
2.7.2 Six Sigma	20
2.7.3 TRIZ	21
2.7.4 Pareto diagram	27
2.7.5 Cause and effect diagram (C&E)	28
2.7.6 Failure mode and effect analysis (FMEA)	29
2.8 Summary	30

### **CHAPTER 3: METHODOLOGY**

3.1 General Flow of Methodology	32
3.2 Research Methodology for FYP 1	34
3.2.1 Conceptualization	34
3.2.2 Literature review	34
3.2.3 Methodology design	34
3.3 Research Methodology for FYP 2	36
3.3.1 Data collection and analysis	36
3.3.2 TRIZ solving	36
3.4 Documentation	37
3.5 Summary	38

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

### **CHAPTER 4: DATA COLLECTION AND ANALYSIS**

4.1 Overall Manufacturing Process Flow	39
4.2 Electrical Testing Process Flow	44
4.2.1 Load frame	45
4.2.2 Load frame from vision machine and test program	46
4.2.3 Testing process	46
4.2.4 Compile test data	46
4.3 Data Collection	47
4.4 Data Analysis for Quality Yield	48
4.4.1 To calculate the yield loss	49
4.4.2 To calculate the average yield loss of testing machine per week	51
4.4.3 To find the average of each testing machine in total 13 log week	51
4.4.4 To calculate the total average of the rejects type	52

4.4.5 To calculate the OEE	53
4.4.6 Pareto chart	54
<b>CHAPTER 5: TRIZ METHODOLOGY AND DISCUSSION</b>	
5.1 Machine Contact	56
5.1.1 Ishikawa diagram for machine contact	57
5.1.2 Root cause elimination list for machine contact	58
5.1.3 Cause and effect chain analysis for machine contact	59
5.1.4 Contradiction matrix	61
5.1.5 Inventive principle	64
5.1.6 Proposed solution	65
5.2 Vision Reject	68
5.2.1 Ishikawa diagram for vision reject	68
5.2.2 Root cause elimination list for vision reject	70
5.2.3 Cause and effect chain analysis for vision reject	70
5.2.4 Contradiction matrix	72
5.2.5 Inventive principle	75
5.2.6 Proposed solution	76
5.3 Contact	77
5.3.1 Ishikawa diagram for contact	77
5.3.2 Root cause elimination list for contact	78
5.3.3 Cause and effect chain analysis for contact	79
5.3.4 Contradiction matrix	79
5.3.5 Inventive principle	81
5.3.6 Proposed solution	81
5.4 Pilot Run	86
5.5 Summary	90
<b>CHAPTER 6: CONCLUSION AND RECOMMENDATIONS</b>	
6.1 Conclusion	92
6.2 Recommendations	93
<b>REFERENCES</b>	94

## APPENDICES

A Gantt Chart for FYP I and FYP II	101
B Yield Loss Data for 11 Units Testing Machine	103
C Yield Loss Data for Different Types Rejects	109
D Contradiction Matrix	116
E 39 System Parameters and Explanation	118
F 40 Inventive Principles	121



## LIST OF TABLES

2.1	Types of waste	9
2.2	Types of maintenance	11
2.3	Six major equipment losses	13
2.4	The dimensions of quality	16
3.1	Template on data collection of percentage of yield loss for 13 weeks	36
4.1	Yield loss for testing machine 1	50
4.2	Yield loss data for machine contact	52
4.3	Data of the overall reject type that causes yield loss for 11 units testing machine	53
4.4	Overall yield loss data for pareto chart	55
5.1	Root cause elimination list for machine contact	58
5.2	System parameter and the suggested inventive principle for machine contact	64
5.3	Suggested inventive principle and explanation for machine contact (1 <sup>st</sup> condition)	64
5.4	Suggested inventive principle and explanation for machine contact (2 <sup>nd</sup> condition)	65
5.5	Socket of old and new	66
5.6	Comparison between the materials	67
5.7	Comparison between two types of pogo pin	67
5.8	Root cause elimination list for vision reject	70
5.9	System parameter and the suggested inventive principle for vision reject	75
5.10	Suggested inventive principle and explanation for vision reject (1 <sup>st</sup> condition)	75

5.11	Suggested inventive principle and explanation for vision reject (2 <sup>nd</sup> condition)	76
5.12	Root cause elimination list for contact	78
5.13	System parameter and the suggested inventive principle for contact	80
5.14	Suggested inventive principle and explanation for contact	81
5.15	The summary of the improvement plans for each of the root causes	86
5.16	Yield loss data for testing machine 1 after improvement	87
5.17	Yield loss data for testing machine 2 after improvement	88
5.18	Yield loss data for testing machine 3 after improvement	88
5.19	The yield loss data before and after improvement for testing machine 1	89
5.20	The yield loss data before and after improvement for testing machine 2	90
5.21	The yield loss data before and after improvement for testing machine 3	90





## LIST OF FIGURES

2.1	Formula of OEE and six losses	13
2.2	The meaning of quality	17
2.3	Reconstruction from the text	18
2.4	Steps in SPC implementation	19
2.5	Example of contradiction matrix with improving and worsening parameter	22
2.6	Approach for the TRIZ Methodology	23
2.7	TRIZ process flow	23
2.8	Function analysis in the form of subject, function, object	24
2.9	Time distribution of the papers	25
2.10	Industrial sectors distribution in percentage	26
2.11	The reason companies require TRIZ	26
2.12	Example of pareto chart	28
2.13	Cause and effect diagram	29
3.1	Overall flow of methodology	33
3.2	Flow chart of methodology for FYP 1	35
3.3	Flow of TRIZ methodology	37
3.4	Flow chart of methodology for FYP 2	38
4.1	Wafer	40
4.2	Wafer case	40
4.3	Wafer sawing process	40
4.4	Wafer e-map	41
4.5	Wire bonding process	42
4.6	Trimming and forming process	42
4.7	Visual inspection process	43
4.8	Taper machine	43
4.9	Overall manufacturing process flow	44
4.10	Electrical testing machine	44

4.11	The electrical testing process flow	45
4.12	The frame is loaded onto the chuck table	45
4.13	The electrical testing process	46
4.14	Frame processing completed indicator	47
4.15	Data collection from DS SkyNet 4.x Database	48
4.16	Graph of yield loss data for testing machine 1	50
4.17	Quality yield for the average 13 log week	54
4.18	Pareto chart of yield loss causes	55
5.1	Ishikawa diagram for machine contact	57
5.2	Cause and effect chain analysis for machine contact (1 <sup>st</sup> condition)	59
5.3	Test head in the electrical testing machine	60
5.4	Side view of test head	60
5.5	Front view of test head	60
5.6	Cause and effect chain analysis for machine contact (2 <sup>nd</sup> condition)	61
5.7	Suggested inventive principle for the hardness of the pogo pin and socket	62
5.8	Suggested inventive principle for the pogo pin and socket are not ready	63
5.9	Ishikawa diagram for vision reject	68
5.10	Incoming material ink die	69
5.11	Cause and effect chain analysis for vision reject (1 <sup>st</sup> condition)	71
5.12	Cause and effect chain analysis for vision reject (2 <sup>nd</sup> condition)	71
5.13	Missing cross mark	72
5.14	Suggested inventive principle for adhesive of D820 foil is not strong	73
5.15	Suggested inventive principle for dicing cutter flowrate	74
5.16	Ishikawa diagram for contact	77
5.17	Cause and effect chain analysis for contact	79
5.18	Suggested inventive principle for lack of training	80
5.19	Graph of testing machine 1 after improvement	87
5.20	Graph of testing machine 2 after improvement	88
5.21	Graph of testing machine 3 after improvement	89
5.22	Graph of quality yield after improvement	89

## LIST OF ABBREVIATIONS

A	-	Availability
ABS	-	Antilock Braking System
ATV	-	Anti-Theft Vehicle
C&E	-	Cause & Effect Diagram
CCS	-	Chip Card & Security
CECA	-	Cause and Effect Chain Analysis
CM	-	Corrective Maintenance
CTE	-	Cycle Time Effectiveness
DMAIC	-	Define, Measure, Analyse, Improve, Control
E	-	Expectation
FMEA	-	Failure Mode and Effect Analysis
FYP 1	-	Final Year Project 1
FYP 2	-	Final Year Project 2
ICs	-	Integrated Circuits
IPC	-	Industrial Power Control
JIPM	-	Japan Institute of Plant Maintenance
LED	-	Light Emitting Diode
MP	-	Maintenance Prevention
OEE	-	Overall Equipment Effectiveness
OTE	-	Overall Throughput Effectiveness
P	-	Performance
PC	-	Personal Computer
PE	-	Performance Efficiency
PM	-	Preventive Maintenance
PMM	-	Power Management & Multimarket
Q	-	Quality
QIs	-	Quality Improvements
RQ	-	Rate of Quality
SEMI	-	Semiconductor Equipment Materials International

SIM	-	Subscriber Identification Module
SOP	-	Standard Operating Procedure
SPC	-	Statistical Process Control
TFM	-	Total Fabrication Maintenance
TPM	-	Total Productive Maintenance
TPS	-	Toyota Production System
TRIZ	-	Theory of Inventive Problem Solving
UK	-	United Kingdom
USA	-	United States of America
UTeM	-	Universiti Teknikal Malaysia Melaka



# CHAPTER 1

## INTRODUCTION

The background of study and information about the case company are introduced in this chapter. The problem statement and the purpose of increasing quality in the industry is shown. The objectives are well-defined followed by the scope which set the boundaries of this study. Lastly, the significance of the study and organization of the report is delivered in this chapter.

### 1.1 Background of Study

Nowadays, every manufacturer has to increase the performance when the economy nowadays are becoming more competitive. Many companies are required to apply a lot of programs regarding the increasing of the productivity so can survive in the real world (Ng *et al.*, 2014). A company which can fulfil the customer need with the better quality may exceed its competitors (Kurniati *et al.*, 2015).

The fundamental for being in the world is to fulfil the customer requirement and satisfaction. Customer need a product with a high quality, but low cost, and the product can get on time (Madanhire and Mbohwa, 2016). Semiconductor manufacturer have the big hope on the quality and the competitor is so powerful, so they have to overcome the challenge (Chandurkar *et al.*, 2015). The semiconductor manufacturer keep finding the way for the yield improvement so that can chase the technology recently. It is a major problem that company want to decrease the rework and the defects when the assembly process. There are a lot of reason that can cause the yield losses and therefore can increase the costs. So it is important to inspect the manufacturing process of the products. Based on the research done, identified the root cause is a very hard problem of engineering. There are many factors that

can contribute the yield losses (Rokach and Hutter, 2012). Hence, quality tool need to integrate to improve the yield.

A completed product can have a few behaviour of quality. A product is identified fail or fulfil requirement by comparing with the standard products. Continuous monitor the products can make sure the products meet the specification. The machine play an important role as the reason for the product to be fail maybe come from the previous process. The performance of the machine will give an effect on the quality of the product. (Chen *et al.*, 1997)

There are several techniques have been established to backing the enhancement of production processes, exclusively in Japan during its industrial development quest. A familiar method which is total productive maintenance (TPM) that technologically advanced by S. Nakajima in 1971 (Becker *et al.*, 2015). Company need to increase their production system to adjust and decrease the overall production cost in line for to the above industrial challenges. This is generally driven by customers' requirement for product price reduction. The quality, delivery, cost and flexibility have to satisfy the customer requirements. (Eng and Choi, 2016)

In this day and age, customer wants the thing that buy to have the amazing quality, trustworthy transport and reasonable valuing. This requests that the producer's machines and progressions are highly reliable (Bon and Ping, 2011). TPM has the aim of aggregate the production equipment effectiveness. There are six types of losses that can be recognised and reduced. The losses are failure of equipment, set-up and adjustment times, idling and minor stoppages, reduced speed of equipment, defects in process, and reduced yield. Overall equipment effectiveness (OEE) is introduced by TPM to measure equipment effectiveness as backbone for eliminating these losses. By constantly evaluating the effectiveness of tools, production managers and workers can react quickly to eventual production troubles and that aids them to circumstance standard and lasting continuous improvement programmes (Becker *et al.*, 2015).

Recently, in the semiconductor company OEE has generally accepted. Executives gain such grouped metric rather than many detailed metrics because OEE is an easy and flawless overall metric. In semiconductor manufacture company, there is quantitative tool

that is crucial to the yield measurement which is OEE. OEE has been broadly used as its risky capacity controlled facility investment. The traditional ways for determining yield, throughput, and application are lacking in problems findings and core enhancements required to growth production (Ron and Rooda, 2005).

OEE has three general parameters which is availability, performance efficiency, and rate of quality. Availability is to measure the effectiveness of remain the tools in a capable condition. SEMI E10-96 creates metrics for computing tools reliability, availability, and maintainability. Performance Efficiency can look on the effectiveness on the way equipment been used in production. Next, Rate of Quality is to evaluate the effectiveness of the industrial process to reduce scrap, rework and yield loss(Pomorski, n.d.).

Effectiveness is presented below in Equation 1.1 where A=Availability, PE=Performance Efficiency and RQ=Rate of Quality

$$OEE=A \times PE \times RQ \quad \text{Equation 1.1}$$

On the other hand, the equation of these parameters is established on the common definition and approaches. There are several techniques to calculate the parameter of OEE. Some company will modified the equation. This will not provide an accurate value for the OEE metric. The set point of standard value maybe incorrect when the performance measures of the tool is not appropriate. Thus, the control or enlargement will not achieve satisfactorily.

## 1.2 Background of Case Company

This project is conducted in a global semiconductor maker company located in Melaka. The company is a German based company. The company has been continuously developing its operation by expanding the manufacturing facilities, test equipment and adding new product.

The company is a world forerunner in the semiconductor arrangements that intended to make the life easier, more secure and greener. The company involves in assembling in

addition testing of discrete semiconductors, power semiconductors, logic ICs and sensor products. As of 30 September 2017, the company had about 37,500 workers universal. In the economic year of 2017, the business reached sales of €7.1 billion. Frankfurt Stock Exchange and the USA on the over-the-counter market International Premier had recorded this company.

The corporation consist of four business segments. One of it is automotive (ATV). The company provides semiconductor products for use in powertrains, comfort electronics such as steering and also safety systems such as airbags and ABS. The manufactured goods collection includes microcontrollers, power semiconductors and sensors.

Industrial Power Control (IPC) also one of the business segments. The industrial separation of the organization contains regulator semiconductors and modules that utilized for age, transmission and utilization of electrical energy. Its tender ranges cover mechanism of electric energies for modern tools and family unit machines, modules for sustainable power source creation, conversion and transmission.

Another business segment is Chip Card & Security (CCS). CCS are useful for the cell phone SIM cards, safety chip. Furthermore, chip-based are used for travel papers, personality cards and also the authority records. The company passes on countless for the new German character card. CCS gives ways for applications with high security necessities.

On the other hands, Power Management & Multimarket (PMM) also another segments. The separation Power Management & Control aggregates up the business with semiconductor parts for effective power administration or high-recurrence applications. The discover application in lighting administration frameworks and LED lighting, control supplies for servers, PCs, laptop and purchaser devices, consumer gadgets for fringe devices, game consoles, applications in therapeutic innovation, high-recurrence segments having a defensive capacity for correspondence and tuner frameworks and silicon MEMS receivers.

The world's growth populace, the big city and the increasing demand for vitality is encouraging the company to reconsideration numerous parts of present days of life. Semiconductor and framework arrangements from the organization add to a superior future which is making the world easier, more secure and environmental friendly. These minor,