



**PETROLEUM TRAINING INSTITUTE,
EFFURUN.**

**ELECTRICAL AND ELECTRONIC ENGINEERING
DEPARTMENT**

**FINAL YEAR PROJECT REPORT GUIDELINES FOR
HIGHER NATIONAL DIPLOMA (HND) AND
NATIONAL DIPLOMA (ND)**

APRIL 2022

1. COVER PAGE: COVER PAGE INFORMATION WITH FONT SIZE, STYLE AND SPACING

The information on this page should contain the following:

- Project Title.
- Name of Student(s) and their Mat. Number(s).
- A Project Submitted to the Electrical and Electronic Engineering . . .
- Month, Year

The report format should be as follows:

1. Project report cover colours: ND (GREEN), HND (RED)
2. Margin

Top:	2.54cm
Left:	2.54cm
Right:	2.54cm
Bottom:	2.54cm
3. Font size: 18
4. Font Style: Verdana Bold
5. Cover page spacing: single spacing (1.0)
6. Date on cover page: Month and year of defence
7. Page number: Blank

NB: All the information on the cover page is centralized and bold. A typical cover page format for both ND and HND is provided in the next page.

PROJECT TOPIC

BY

**NAME
MATRIC. No.**

**A PROJECT REPORT SUBMITTED TO THE
ELECTRICAL AND ELECTRONIC
ENGINEERING DEPARTMENT, PETROLEUM
TRAINING INSTITUTE, EFFURUN, DELTA
STATE**

MONTH, YEAR

(NB: This is a cover page for both ND and HND)

2. TITLE PAGE: TITLE PAGE INFORMATION WITH REQUIRED FONT SIZE, STYLE AND SPACING

The information on this page should contain the following:

- Project Title
- Name of Student(s) and their Mat. Number(s)
- A Project Report Submitted In Partial Fulfilment
- Month, Year

The report format should be as follows:

Left Margin:	3cm
Top Margin:	2.5cm
Right Margin:	2.5cm
Bottom Margin:	2.5cm
Font size:	12
Font style:	Verdana
Heading:	Bold and centralized
Line Spacing:	1.0 (single spacing)

NB: No Page numbering, and a format of the title page is given in the next page.

PROJECT TOPIC

BY

**NAME
MATRIC. No.**

**A PROJECT REPORT SUBMITTED TO THE
ELECTRICAL AND ELECTRONIC ENGINEERING
DEPARTMENT, PETROLEUM TRAINING
INSTITUTE, EFFURUN, DELTA STATE**

**IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF HIGHER NATIONAL
DIPLOMA(HND) ELECTRICAL AND ELECTRONIC
ENGINEERING TECHNOLOGY
(INSTRUMENTATION AND CONTROL)**

(NB: This is a title page sample for HND using I & C option as
an example.)

MONTH, YEAR

PROJECT TOPIC

BY

**NAME
MATRIC. No.**

**A PROJECT REPORT SUBMITTED TO THE
ELECTRICAL AND ELECTRONIC ENGINEERING
DEPARTMENT, PETROLEUM TRAINING
INSTITUTE, EFFURUN, DELTA STATE**

**IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF NATIONAL DIPLOMA (ND)
ELECTRICAL AND ELECTRONIC ENGINEERING
TECHNOLOGY**

MONTH, YEAR

(NB: This is a title page sample for ND)

3. DECLARATION PAGE

This is the page where the student(s) make statement to declare ownership of the project work and signed.

The report format is as follow:

Left Margin:	3cm
Top Margin:	2.5cm
Right Margin:	2.5cm
Bottom Margin:	2.5cm
Font size:	12
Font style:	Verdana
Heading:	Bold and Centralized
Line Spacing:	1.0 (single spacing)

NB: A declaration page format is given in the next page.

DECLARATION

I /We hereby declare that the project work on "Title of the Project" is carried out by me/us in the Department of Electrical and Electronic Engineering, Petroleum Training Institute, Effurun, Delta State, under the supervision of (name of the supervisor).

All sources have been duly distinguished and appropriately acknowledged.

.....
Name of student

.....
Date

NB: For a project done by more than one student, then provision for every student to sign must be created.

4. CERTIFICATION PAGE

This is the page where the project supervisor, coordinator, and head of department certifies the student(s) ownership of the project by endorsing their signatures.

The report format is as follow:

Left Margin:	3cm
Top Margin:	2.5cm
Right Margin:	2.5cm
Bottom Margin:	2.5cm
Font size:	12
Font style:	Verdana
Heading:	Bold and Centralized
Line Spacing:	1.0 (single spacing)

. **NB:** A certification page format page is given in the next page.

CERTIFICATION

We hereby certify that the project work titled "Name of the Project" carried out by Phillip Wellington with Mat. No. satisfied the standard in partial fulfilment of the requirements for the award of the degree of Higher National Diploma (HND) in the Department of Electrical and Electronic Engineering.

.....
ENGR. Ms FRANCES N. NWUKOR

Project Supervisor

.....
DATE

.....
ENGR. DR. TAOFECK O. AYINDE

Project Coordinator

.....
DATE

.....
ENGR. (DR.) ADULHAMID MUSA

Head of Department

.....
DATE

NB: Names should be in this format: First name Initial of middle name and the last name e.g., Engr. Dr. Taofeek O. Ayinde. The pagination is Roman figure and should be centre bottom.

5. DEDICATION PAGE

This is the section where the student(s) expresses gratitude or acknowledges to others, normally those who have inspired or assisted them during the project work.

The report format are as follows:

Spacing:	Single Space (1.0)
Font Size:	12
Font Style:	Verdana
Heading:	Centralized
Margin:	Same as title page

NB: Dedication page starts on a new page

6. ACKNOWLEDGMENT PAGE

This section acknowledges and shows appreciation to everyone who has helped in the project work.

The report format are as follows:

Spacing:	Single Space (1.0)
Font Size:	12
Font Style:	Verdana
Heading:	Centralized
Margin:	Same as title page

NB: Acknowledgement page starts on a new page.

7. ABSTRACT PAGE

This is concise summary of the entire project report. It is best written after the completion of the project and normally not more than 350 words in a single paragraph.

The report format is as follows:

Heading:	Centralized
Paragraph:	Single Paragraph
Words:	350 maximum
Spacing:	Single
Font size:	12
Font Style:	Verdana

8. TABLE OF CONTENTS (centralized)

Cover page	i
Title Page	ii
Certification	iii
Dedication	iv
Acknowledgment	v
Abstract	vi
Table of contents	vii
List of tables	viii
List of figures	ix
List of symbols	x
List of abbreviation	xi

NB: Abstract page starts on a new page

9. LIST OF TABLES

This section contains all the list of Tables and their captions in the project report. The format:

Table no.	Caption	Page no.
-----------	---------	----------

An example:

Table 3.1	Analysis of energy consumed per transmission	47
-----------	--	----

NB: This is to begin in a new page

10. LIST OF FIGURES

This section is a comprehensive list of all the figures and their captions in the project report. The format:

S/No.	Caption	Page no.
-------	---------	----------

An example:

Figure 1	Block diagram of a synchronous counter	15
----------	--	----

Figure 2.3	Random sensor wireless network coded in MATLAB	23
------------	--	----

NB: This is to begin in a new page.

NB: The arrangement of the list of figures should be in an ascending order. Also, the list of figures is to begin from a new page

11. LIST OF ABBREVIATIONS

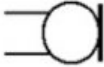
Abbreviations specially those uncommon ones are listed here for comprehension. The format:

S/No.	Abbreviation	Full meaning
An example:		
1.	SNR	Signal-to-Noise Ratio

NB: This item starts in a new page

12. LIST OF SYMBOLS

This section contains symbols especially uncommon ones and their meanings. The format:

S/No.	Symbol	meaning
An example:		
1.		Microphone

NB: This item starts in a new page

CHAPTER ONE (Centralized)

INTRODUCTION (Centralized)

1.1 Background of study

Briefly outline to your reader what you intend to do. Why are you doing it? What exactly is the research question? What is the possible importance of the research?

1.2 Aim and objectives

1.2.1 Specific objectives (itemize in roman figures)

1.3 Scope and limitations

1.4 Contributions to knowledge

1.5 Areas of applications (itemise in roman figures)

Left Margin: 3cm

Top Margin: 2.5cm

Right Margin: 2.5cm

Bottom Margin: 2.5cm

Font size: 12

Font style: Verdana

Heading: Bold and Centralized

Line Spacing: 1.5 (throughout the body of the project write-up)

in-text citation:

CHAPTER TWO (Centralized)

LITERATURE REVIEW

2.1. Review of past related work.

- Each author's work should be reviewed in a paragraph, highlighting Name of author, year, and title of research, methodology, solutions, and limitations. Not less than 5 (five) journals for HND, 2 (two) local and 3 (three) international. Not less than 3 (three) journals for ND, 1(one) local 2 (two) international.

2.2. Representation of the project with block diagram and brief explanation of each component block.

2.3. Component review. This encompasses the following:

- Review relevant components used in the project.
- Development of all the equations and mathematical expressions relating to the components being reviewed.
- Same format and spacing as chapter one.

NB: This chapter of a project report is heavily referenced. it contains other people's works that must be referenced. In-text citation and referencing format are presented in Appendix I.

Also, is significant to know that figures are labelled under the diagram while tables are labelled on top of it. All figures in a form circuit diagrams, pictures, screenshots must be plain and transparent.

Figures are labelled in the following order: Figure 2.1, Figure 2.2 ... or Figure 3.1, Figure 3.2 Etc. Typical example is shown in Figure 2.1.

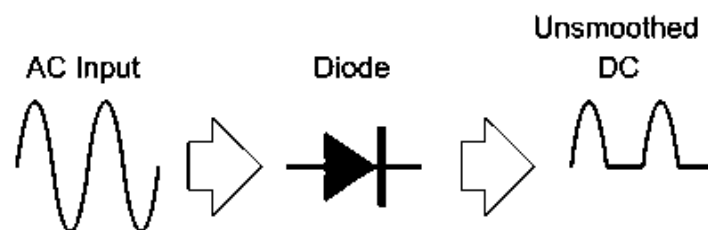


Fig 2.1. Diode rectifying circuit

Tables are labelled at the top as Table 1.1, Table 2.2 ... etc. Typical example is shown in Table 3.3.

Table 3.3 Total energy consumption in MW.

Energy Consumption (MW)				
Year	Industrial	Commercial	Residential	Total
2000	1011.60	2346.00	4608.40	8688.90
2001	1987.20	2439.00	7714.80	9034.40
2002	1830.00	3297.60	7668.50	12842.40
2003	1659.80	3583.00	7668.50	12866.60
2004	1605.00	3830.30	7725.30	13160.60
2005	1615.50	3851.00	7760.00	13226.60
2006	1575.00	3900.80	7650.00	13125.80
2007	1530.50	3915.00	7860.30	13305.80
2008	1502.50	3852.00	7910.05	13264.55
2009	1585.00	3865.50	8075.00	13525.50
2010	1589.40	3925.80	8205.20	13720.40
2011	1615.50	4004.70	8285.60	13905.80
2012	1648.00	4025.40	8350.00	14023.40

Source: S. L. Braide¹, E. J. Diema (2018).

Also, it is to be noted that headings like “Block diagram” should be avoided.

Students are to confirm that all diagrams and tables are introduced, explained, and referred to before their presentation in the writeup.

CHAPTER THREE “bold & centralised” (for HND)

DESIGN AND ANALYSIS – “bold & Centralised”

3.1. Design of each stage of the block diagram and in the main circuit diagram. This involves calculations, use of data sheets and charts and writing programs where applicable. The source code of the program should be moved to the appendix, only the flow chart and program structure is expected to appear on the body of the report.

3.2. Principle of operation of the circuit.

NB.: Programme coding and datasheet should be presented at Appendix. Typical examples are given in between Appendices II to VI.

CHAPTER THREE - bold & centralised (for ND)

CONSTRUCTION AND PRINCIPLE OF OPERATION (Centralized)

3.1. Construction.

3.1.1. Components and their specifications (tabulated)

3.1.2. Tools and materials used.

3.1.3. Methods of construction containing both circuit diagram and circuit layout.

- Testing of individual components.
- Building of circuit on breadboard and testing.
- Building on Veroboard
- Mounting
- Soldering
- Continuity test

3.1.4. Construction of Casing

The finished product should have the following characteristic:

- All switches, indicators and terminals should be well labelled
- Good Finishing/Package.
- Laminated labelling of:
 - Title of project
 - Project participant(s): Names and Mat No.
 - Project supervisor(s)' name(s)

3.2. Principle of circuit operation.

3.3. Bill of Engineering Measurement and Evaluation (BEME): This should be in tabular form consisting of Item Name, Quantity, Unit Price and Total Price.

CHAPTER FOUR (for HND)

CONSTRUCTION, TESTING, RESULTS AND DISCUSSION (Centralized)

4.1. Construction.

4.1.1. Components and their specifications (tabulated)

4.1.2. Tools and materials used.

4.1.3. Methods of construction containing both circuit diagram and circuit layout.

- Testing of individual components.
- Building of circuit on breadboard and testing.
- Building on Veroboard
- Mounting
- Soldering
- Continuity test

4.1.4. Construction of Casing

4.2. Testing

4.2.1. Operational Test.

4.2.2. Test Result...

The finished product should have the following characteristic:

- All switches, indicators and terminals should be well labelled
- Good Finishing/Package.
- Laminated labelling of:
 - Title of project
 - Project participant(s): Names and Mat No.
 - Project supervisor(s) name(s)

4.3. Bill of Engineering Measurement and Evaluation (BEME): This should be in tabular form consisting of Item Name, Quantity, Unit Price, and Total Price.

CHAPTER FOUR – bold and centralised (for ND)

TESTING, RESULTS AND DISCUSSIONS.

- 4.1. Testing procedures.
- 4.1.1. Operational Test.
- 4.1.2. Test Result.

CHAPTER FIVE– bold and centralized (for ND and HND)

CONCLUSION AND RECOMMENDATION

5.1 Conclusion: The conclusion is a summary that covers the highlights of the project work.

5.2 Recommendation: Recommendation for future improvement on the project work

REFERENCES (Reference page presentation format)

All the in-text citations in the main text should be listed in an alphabetical order in the 'REFERENCE' page at the end of the project report. To cite a source in the reference page, you will need to cite it with its complete details, e.g., author, year of publication, book title, place of publication, name of publisher.

NB: The EEED reference format is the Harvard American Psychological Association (APA) format.

The reference format in the reference list:

Last name of author, first name of author. Book title in Italics. Place of publication, Publishers, Year of publication.

Examples of various sources are given in the reference page are presented here.

Typical examples include:

S. L. Braide¹, E. J. Diema (2018). Analysis of Least Square and Exponential Regression Techniques for Energy Demand Requirement (2013-2032). American Journal of Electrical and Electronic Engineering, Vol. 6, No. 2, 38-59.
doi:10.12691/aje-6-2-1.

Book – editor

Aspinall, V. (Ed.). (2014). Clinical procedures in veterinary nursing (3rd ed.). Edinburgh, Scotland: Elsevier.

Conference paper (online)

Cannan, J. (2008). Using practice-based learning at a dual-sector tertiary institution: A discussion of current practice. In R. K. Coll, & K. Hoskyn (Eds.), Working together: Putting the cooperative into cooperative education. Conference proceedings of the New Zealand Association for Cooperative Education, New Plymouth, New Zealand. Retrieved from http://www.nzace.ac.nz/conferences/papers/Proceedings_2008.pdf

Serial / journal article – more than one author (print)

Gabbett, T., Jenkins, D., & Abernethy, B. (2010). Physical collisions and injury during professional rugby league skills training. Journal of Science and Medicine in Sport, 13(6), 578-583.

Issi, F., & Kaplan, O. (2018). The Determination of Load Profiles and Power Consumptions of Home Appliances. Energies, 11(3), 607.
doi:10.3390/en11030607

Serial / journal article – with DOI (print)

Gabbett, T., Jenkins, D., & Abernethy, B. (2010). Physical collisions and injury during professional rugby league skills training. *Journal of Science and Medicine in Sport*, 13(6), 578-583. doi:10.1016/j.jsams.2010.03.007

Book – one author

Mullane, A. (2008). *The world of tourism and travel*. Rosedale, New Zealand: Pearson Education New Zealand.

Chapter in an edited book

Palmer, F. (2007). Treaty principles and Maori sport: Contemporary issues. In C. Collins & S. Jackson (Eds.), *Sport in Aotearoa/New Zealand society* (2nd ed., pp. 307-334). South Melbourne, Australia: Thomson.

Internet Reference list

Pet therapy. (n.d.). Retrieved from
http://www.holisticonline.com/stress/stress_pet-therapy.htm

Serial / journal article (print)

Wilson, C. (2015). Facebook: Cautionary tales for nurses. *Kai Tiaki: Nursing New Zealand*, 16(7), 26.

Internet – Organization / Corporate author

Ministry of Health. (2014). Ebola: Information for the public. Retrieved from
<http://www.health.govt.nz/your-health/conditions-and-treatments/diseases-and-illnesses/ebolainformation-public>

APPENDIX I: REFERENCE FORMAT FOR CITING SOURCES

INTRODUCTION: A project work involves studying external sources for understanding various aspects of the project work areas and writing report. The project student(s) should give a proper citation for each external source (e.g., research journals, textbooks, reports, on-line materials, magazine, etc) which is used for preparing the project report. The citation for the external sources is necessary for the following reasons:

- To prove authenticity of facts and figures.
- To make the information more reliable.
- To give a credit to the original author.
- To lay solid foundation for the research work.
- To avoid plagiarism.

CITING THE EXTERNAL SOURCES

An external source is cited within the content where a part of the external source is presented as well as in the list of references given at the end of the project work. For proper citation, reference for each source should be given at these two places:

- Within the content of the main text. This is called in-text citation.
- As well as in the list of reference at the end of the document.

In-text Citation

In-text citation means to cite an information or statement taken from other source within the content of your project work report. It is simply done by writing the last name of the author and year of the publication within the same sentence.

Typical example - A project student must include a statement (or fact) from a book in his own project report to support his stance. The statement is "MC899SC01C microcontrollers are the most reliable and versatile for microelectromechanical (MEM) systems applications". And the details of the book from which this statement is taken are as follows:

Author: Andre Butworth

Year of Publication: 2015.

The two common ways of in-text citation for the above statement are:

1. By starting sentence with the last name of the author and mentioning year of publication of book in parenthesis:

Butworth (2015) stated that MC899SC01C microcontrollers are the most reliable and versatile for microelectromechanical (MEM) systems applications. This is an example of narrative in-text citation where the author's name is use in the writing.

2. By writing the last name of the author and year of publication of the book in parenthesis, within the same sentence:

MC899SC01C microcontrollers are the most reliable and versatile for microelectromechanical (MEM) systems applications (Butworth, 2015).

or

A recent study (Wilson, 2019) shows that MC899SC01C microcontrollers are the most reliable and versatile for microelectromechanical (MEM) systems applications. This is an example of parenthetical in-text citation where a work is referred to in the project report text.

NB: In the in-text citation where there are more than three authors, cite only the first author as usual and follow by "et al", which is italicised e.g., (Brute *et al.*, 2018).

APPENDIX II (Next is APPENDIX III etc or APPENDIX A, B, C, . . .)

An appendix presents information that supplements the reader's understanding of your project work/research but is not essential to the argument of your work/research. As a result, you don't always need to include any appendices. For example, you might include some of the following in an appendix:

- Full records of interviews you conducted which you can quote in the main text.
- Documents used in your project work/research, such as questionnaires, programme codes/instructions, tests, or scales.
- Detailed statistical data (often presented in tables or figures).
- Detailed descriptions of equipment used e.g., data sheets.

Note the following:

1. You should refer to each appendix at least once in the main text. If you don't refer to any information from an appendix, it should not be included.

2. When you discuss information that can be found in an appendix, state this the first time you refer to it using in-text (as an example) as given below:

The function(s) of each pin of the microcontroller were determined as stated on its data sheet (see Appendix B for full interview transcripts).

3. Note that, if you refer to the same function(s) of each of the microcontroller again, it's not necessary to mention the appendix each time.

NB: The appendix label appears at the top of the page, bold and centred. Under it is a descriptive title, also bold and centralized.

Start a new page for each new appendix and the caption should be APPENDIX A, B, C, etc. Numbers can also be used instead of letters i.e., APPENDIX 1,2,3, etc. Appendix with the same subject matters is caption as APPENDIX A1, A2, A3, etc or APPENDIX 1A, 1B, 1C, etc.

Examples of appendices are given in the next pages.

APPENDIX III

MATLAB Code of Network Topology

```
%% Network Initialization

% Number of Nodes in Network
n= 100;

% Boundaries of Network

% Sensor Field is 0-xmax by 0-ymax (square/ rectangle)xmax=100;

ymax=100;

x=0; % added for better display results of the plot
y=0; % added for better display results of the plot
dead_nodes=0;

% N is data structure for each Node in Field

% a serves as an index
for a = 1:n

N(a).xd= rand(1,1)*xmax;

N(a).yd= rand(1,1)*ymax;
end

%Designate the sink node location, this assumes your sink node location is

%deliberateN(1).xd=
25;

N(1).yd=75;

% Plot network Topology
Network_Topology= figure;
hold on

for a=1:n
```

APPENDIX IV

MC9S08SC4 8-Bit Microcontroller Data Sheet

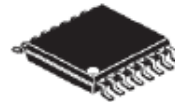
Freescale Semiconductor
Data Sheet: Technical Data

Document Number: MC9S08SC4
Rev. 4, 6/2010



MC9S08SC4 8-Bit Microcontroller Data Sheet

MC9S08SC4



948F-01

8-Bit HCS08 Central Processor Unit (CPU)

- Up to 40 MHz HCS08 CPU (central processor unit); up to 20 MHz bus frequency
- HCS08 instruction set with added BGND instruction

On-Chip Memory

- 4 KB of FLASH with read/program/erase over full operating voltage and temperature
- 256 bytes of Random-access memory (RAM)

Power-Saving Modes

- Two very low power stop modes
- Reduced power wait mode

Clock Source Options

- Oscillator (XOSC) — Loop-control Pierce oscillator; Crystal or ceramic resonator range of 32 kHz to 38.4 kHz or 1 MHz to 16 MHz
- Internal Clock Source (ICS) — Internal clock source module containing a frequency-locked loop (FLL) controlled by internal or external reference; precision trimming of internal reference allows 0.2 % resolution and 2.0 % deviation over temperature and voltage; supports bus frequencies from 2 MHz to 20 MHz.

System Protection

- Watchdog computer operating properly (COP) reset with option to run from dedicated 1 kHz internal clock source or bus clock
- Low-voltage detection with reset or interrupt; selectable trip points
- Illegal opcode detection with reset
- Illegal address detection with reset
- FLASH block protect
- Reset on loss of clock

Development Support

- Single-wire background debug interface

- Breakpoint capability to allow single breakpoint setting during in-circuit debugging

Peripherals

- **SCI** — Serial Communication Interface
 - Full-duplex non-return to zero (NRZ)
 - LIN master extended break generation
 - LIN slave extended break detection
 - Wake-up on active edge
- **TPMx** — Two 2-channel Timer/PWM modules (TPM1 and TPM2)
 - 16-bit modulus or up/down counters
 - Input capture, output compare, buffered edge-aligned or center-aligned PWM
- **ADC** — Analog to Digital Converter
 - 8-channel, 10-bit resolution
 - 2.5 μ s conversion time
 - Automatic compare function
 - Temperature sensor
 - Internal bandgap reference channel

Input/Output

- 12 general purpose I/O pins (GPIOs)
- 8 interrupt pins with selectable polarity
- Hysteresis and configurable pull-up device on all input pins; Configurable slew rate and drive strength on all output pins.

Package Options

- 16-TSSOP

Operating Parameters

- 4.5-5.5 V operation
- C, V, M temperature ranges available, covering -40 - 125 °C operation

Freescale reserves the right to change the detail specifications as may be required to permit improvements in the design of its products.

© Freescale Semiconductor, Inc., 2009-2010. All rights reserved.

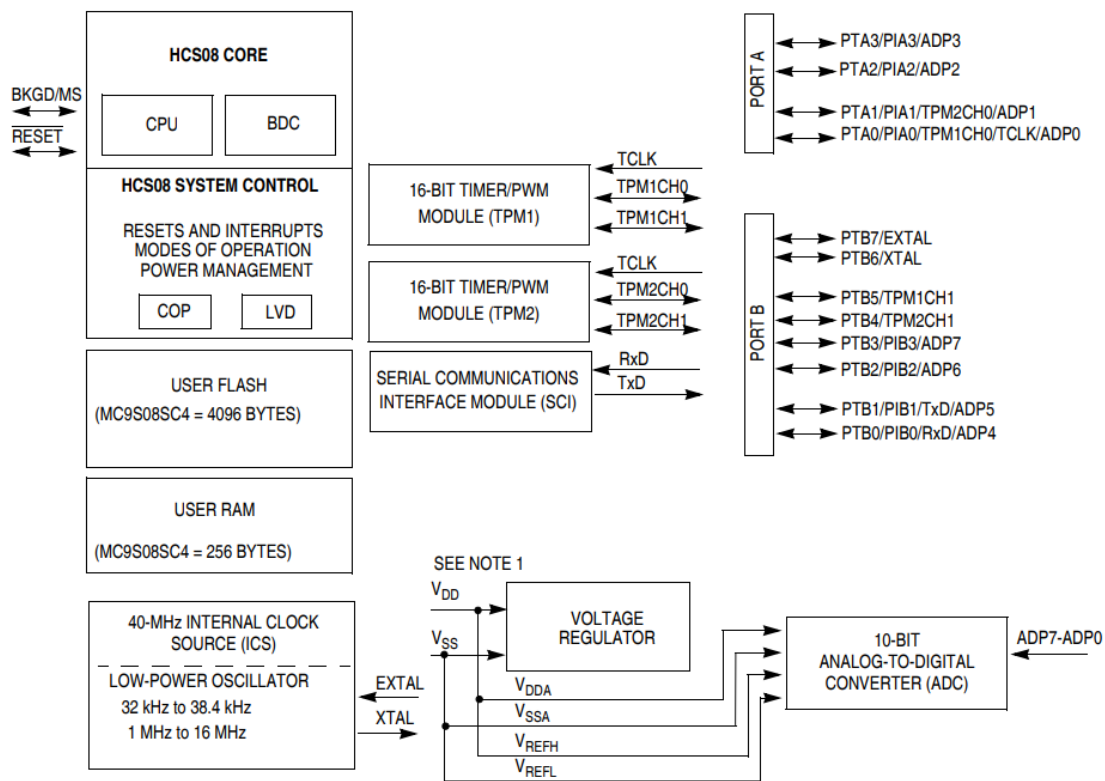


www.DataSheet4U.com

APPENDIX V

MC9S08SC4 8-Bit MCU BLOCK DIAGRAM

The block diagram in Figure 1-1 shows the structure of the MC9S08SC4 MCU.



NOTES

- 1: V_{DDA}/V_{REFH} and V_{SSA}/V_{REFL} are derived from V_{DD} and V_{SS} respectively.

APPENDIX VI DEVICE PIN ARRANGEMENT

The following figure shows the pin assignments for the MC9S08SC4 device.

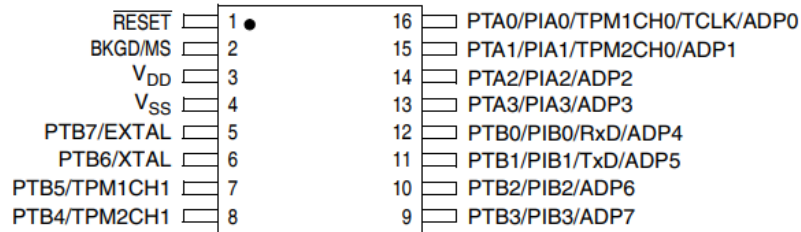


Table 2-1. Pin Function Priority

Pin Number	Priority				
	← Lowest Highest →				
16-pin	Port Pin	Alt 1	Alt 2	Alt 3	Alt 4
1					RESET
2				BKGD	MS
3					V _{DD}
4					V _{SS}
5	PTB7		EXTAL		
6	PTB6		XTAL		
7	PTB5	TPM1CH1			
8	PTB4	TPM2CH1			
9	PTB3	PIB3			ADP7
10	PTB2	PIB2			ADP6
11	PTB1	PIB1	TxD		ADP5

Table 2-1. Pin Function Priority (continued)

Pin Number	Priority				
	← Lowest Highest →				
16-pin	Port Pin	Alt 1	Alt 2	Alt 3	Alt 4
12	PTB0	PIB0	RxD		ADP4
13	PTA3	PIA3			ADP3
14	PTA2	PIA2			ADP2
15	PTA1	PIA1	TPM2CH0		ADP1
16	PTA0	PIA0	TPM1CH0	TCLK	ADP0