

Digital IC Test for Individual Gates on DIP Package Using ATmega328p Microcontroller

Mrs.Selvarani. A
Department of Electronics and
Communication Engineering
Panimalar Institute of
Technology
Chennai, India

Manimegalai. K
Department of Electronics and
Communication Engineering
Panimalar Institute of
Technology
Chennai, India

Premalatha. G
Department of Electronics and
Communication Engineering
Panimalar Institute of
Technology
Chennai, India

Priyadharshini. P
Department of Electronics and
Communication Engineering
Panimalar Institute of
Technology
Chennai, India

Abstract—An IC is an important domain in microelectronics where many electronic components are combined to form various components of high density modules, each with an individual function. IC's are the main component of each and every electronic circuit. IC consists of passive operators like resistors, capacitor, transistors present on one chip and thus reduces the size of the system, consumed and overall cost of the system. But sometimes malfunctioning IC's can lead to improper functioning of the circuit. A lot of work is involved to work the bugs out of the IC individually and check both the circuit as well as the IC. Thus our proposed project is designed to confirm if the IC considered is operating efficiently or not with low kit heating and increased efficiency.

I. INTRODUCTION

There's an increasing demand for the IC's in the electronics field and proper functioning of each IC should be ensured before installing it into the kit. The task of IC analyser is to check the advanced Integrated Circuit for right coherent working, for example it can accustomed to test the assortment of IC's which comprises of logics, sequence circuits and combination circuits. The input signal is supplied to the input pin of the inserted chip. In different frameworks different IC's and segments are associated with one another. During the framework failure it is beyond the realm of ability to examine the entire circuit as it requires a lot of time, and significantly expensive. Accordingly by examining just the IC's and segments on the chip, the deterioration rate can be minimized by utilizing this structured task and exhaustion of silicon components can be reduced by utilizing the existing IC's for alternate purposes. In contrast to the IC analysers accessible in the market, this IC analyser is reasonable and easy to understand. The ATmega328p microcontroller uses current consoles and LCD display unit. It examines the inputs of IC which is pinned in ZIF attachment and gives the outcome. Testing of IC depends on the sources of input information that provided the gates of IC through programming. Thus, this IC tester is designed with substrates like ATmega microcontroller (328p). The software is simulated in Proteus Simulation and code is written in Embedded C and fed to

the kit. The LCD display is integrated to the kit to enable the client to view the result. ZIF (Zero Insertion Force) is used in the kit to ease the replacement of the detected faulty IC's.

II. BLOCK DIAGRAM

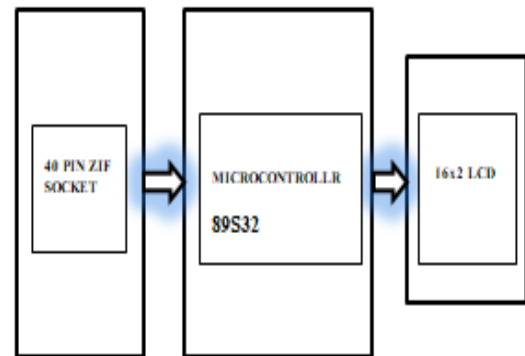


Fig.1 Block diagram representing the circuit design.

The structure consists of a 40 Pin ZIF socket which feeds the input to the ATmega328p microcontroller and the output is displayed on the 16*2 LCD display.

III. LITERATURE SURVEY

Manufacturing companies have been trying to produce outcomes with reduced cost increased efficiency, expertise quality to stay stable in the market. As the complexity of the circuit increases, the reliability comes under test. It is important that every product is tested in manufacturing and also essential for future fault detection. The IC testers that are commercially available are used to test linear components or digital or analog IC's but to ensure proper

functioning of individual components different types of testers are required.

2 broad categories are:

1. Controller based
2. Operating system based

The proposed project has the capacity to check multiple types of microcontroller based IC's except the 7404 type IC because it can cause an overload to the system.

Several microcontroller types are used for checking the proper functioning of components and IC's such as

- 8051
- 89c2051
- ATmega328p

A. Disadvantage of 8051

- IC's of type 8051 comparatively consume excessive power and thus temperature increases rapidly.
- It is compatible with TTL but it does not support CMOS.

B. Disadvantage of 89c2051

- It is a 20 pin IC.
- It is impossible to interface keyboard and display, in case of a different structural build.

C. Advantages of ATMEGA328P

This microcontroller is suitable for enormous number of embedded control applications.

- These processors are more easy to use because they function on 8/16 bit when compared to the complexity of 32/64 bit processors.
- They do not require additional computing structures because of the 32k bytes of inbuilt self-programmable flash program memory and also includes usable 23 I/O lines for programming.
- There are 31 registers that are directly connected to the ALU (Arithmetic Logic Unit), thus it is 10 times faster than the CISC programmable micro-controllers.

- The ATmega328p are optimized to operate on AVR enhanced RISC instruction set.

TABLE I. OPERATING CAPACITY AND NATURE OF CONTROLLER 328P

S.no	Specification	Capacity
1	Memory Type	Flash
2	Memory Size	32Kilobytes(KB)
3	CPU operation (MIPS)	20Instructions Per second(IPS)
4	SRAM	2Kilobytes(KB)
5	EEPROM	1Kilobyte(KB)
6	Comparators	1 (quantity)
7	Total Pins	32
8	Power consumption	Low
9	Voltage for Operation	1.8Volts(V)-5.5Volts(V)
10	Timer and Counter Circuits	2x8bit, 1x16bit
11	Operating Temperature	-40 to 85Temperature(deg)
12	Digital Communication Peripheral	1-UART, 2-SPI, 1-I2C

IV. WORKING

1) *Power supply*: For any circuit to operate power supply is the first necessity.

The kit is supplied with power from the DC jack of voltage capacity of 7-12V or from the USB connector for 5V supply or the V_{in} pin can also be used to give supply of 7-12V. Any other voltage supply through the 5V or 3.3V pins can damage the kit by bypassing the regulator.

2) *LCD Display*: A 16*2 LCD display is used here. It has 3 control lines and 8 data lines.

3) *Working of gate level functioning of IC's*: The Proteus software is utilized to key in the program to the

controller. The venture is contrived to use by interfacing the kit and LCD. The IC is attached to the ZIF socket. The configuration of the IC is automatically detected and displayed on the LCD.

All the gates present in an IC are individually tested for proper operation through code modules imparted into the controller. The results are displayed on the screen of display. If the component under test has any malfunctioning gate present inside the IC the result is displayed on the LCD as “-”, indicating the malfunction of the corresponding gate. If the gates are functioning effectively then it is represented by a “*”, on the LCD, corresponding to the operating gate. Otherwise "IC Test FAILED" is portrayed on the LCD.



FIG 2. FUNCTIONING OF 16*2 DISPLAY IN THE CIRCUIT



FIG3. 16*2 LCD PIN DIAGRAM

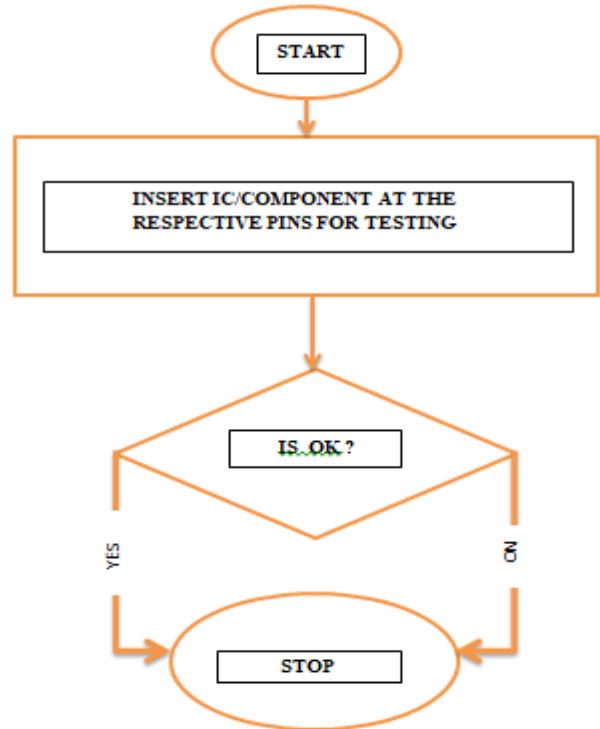


FIG 4. FLOWCHART REPRESENTING THE FLOW OF INFORMATION IN THE CIRCUIT.

V. CONCLUSION

This paper proposes a modest and reduced alternative of advanced incorporated analyser utilizing ATmega328p. Different computerized IC's can be examined by simply composing the particular program with no adjustment in equipment. Contingency of pre-decided information the signals from the controller are moulded furthermore, related output pins are probed for accuracy. The framework that has been executed has demonstrated significant output that is coordinated with our requirement by using ATmega328p microcontroller. By utilizing this proposed venture we can check various IC's of the 74' configurational series. In addition, this venture checks the operation of diodes and transistors over any type of connection even shorted or open circuited.

VI. REFERENCES

- [1] Abhishek Jain, Anshul Goyal, Siddharthgarg, "Digital IC tester" Electronic club, Indian Institute of Technology Kanpur
- [2] Fang pang, "A reconfigurable digital Chip tester implemented ARM".
- [3] www.scribcom "Integrated chip Tester".

- [4] RshanBorkar,AshvinAakman,"DigitalIntegrated Circuit Tester",DBIT.
- [5] Labon embedded systems,"Microcontrollerbased diode and BJT tester".
- [6] Dhananjayv.Garde"Programmingand customizing the AvRmicrocontroller",.
- [7] Labon embedded systems,"Microcontroller based diode and BipolarJT tester".2009
- [8] Miss. M. A. Tarkunde, Prof.A.A.Shinde, "Component And IC Tester Using 89S52 Miiicrocontroller"Bharatvidyapeeth College of Engineering.
- [9] KRBottkar,BZwiehoff, GMuchha, Journalvolumeisue: 15,3 (*IEEE*)
- [10] <http://extremeelectronics.co.in/avrtutorials>



FIG6. LCD DISPLAY DISPLAYING THE GATE LEVEL OPERATION OF IC 7409

VII. RESULT

A gist of the output obtained through this experiment is presented as images below.

The gates that are malfunctioning are represented by a “-” and the gates that are functioning efficiently are represented by a “*”.



FIG5. LCD DISPLAY DISPLAYING THE OUTPUT FOR A FAULTY 7432 IC.