

EE100

EEPROM On Board and Off line Programmer Specification

V0.3

The Innovative solution to update the EEPROM on board and Offline

- **EEPROM supported: SPI, I2C and Microwire EEPROM**
- **Voltages supported: 5V / 3V / 1.8V**
- **ICP connector to work with EEPROM soldered on board**
- **Socket adaptor for any EEPROM packages**
- **Stand Alone mode (no computer needed to update EEPROM)**
- **High performances for low price**
- **USB full speed support**
- **Friendly and powerful software with free life update via our Website:
Engineering GUI + Production GUI + Command line interface**
- **Support multiple programmers via USB Hub**
- **Protection: inrush current, over and under voltage, current limitation,
ESD, polarities..**
- **Advanced I/O control**
- **Manual Start button**
- **Portable programmer : 10cm X 5cm X 2 cm**

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I. Product Description

A. Introduction

The Universal Programmers available on the market are not optimised for the EEPROM offering low performances for high price. Our DediProg team has then developed for you, a complete portfolio of EEPROM solutions to cover all your needs and for your entire satisfaction.

- **In Circuit Programming solution to program the EEPROM soldered on application board**
- **Engineering solution to program the EEPROM on the socket**
- **USB or Stand Alone mode**

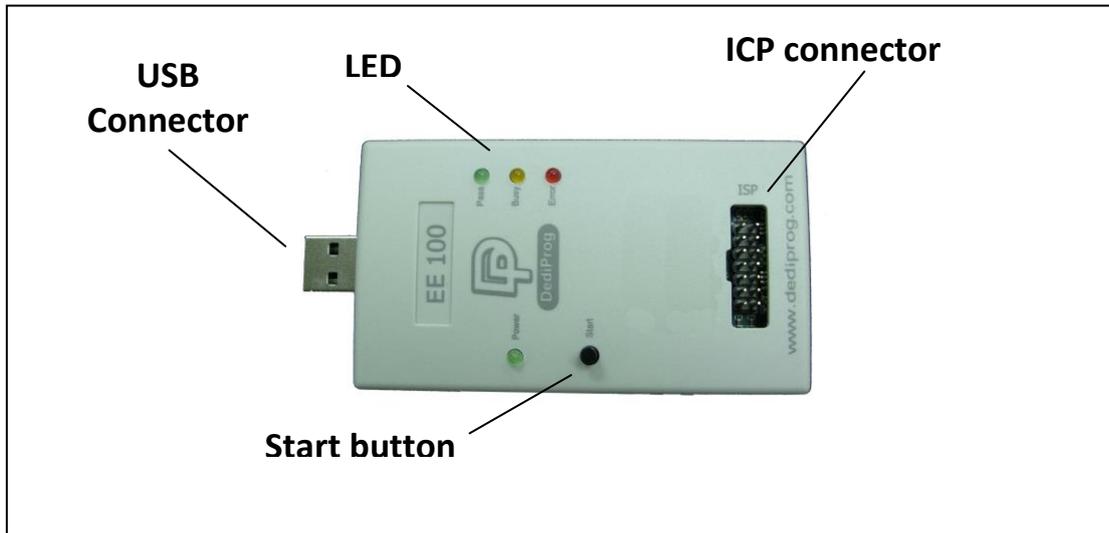
B. Interface description

The EE100 is composed of the main following parts:

- **USB male Connector:** To connect the programmer to the computer.
A USB cable extension is provided for more flexibility and convenience.
- **An ICP Connector:** to connect the Bus signals and power supply to the application EEPROM via a flat cable. The flat cable is flexible and convenient to manipulate, and can be changed easily before connection. For customization of the ICP-cable (number of signals, pin out assignment or connector size), please contact DediProg.
- **The ICP connector** can also be used to connect our socket adaptor extension for off line programming according to the EEPROM package.
- **LED:** to indicate the status of the operation in progress.
- **Start button:** to start the batch operation manually



Fig 1: EE100 Programmer



C. In Circuit Programming with EE100

The EE100 programmers are used to read, program or update the EEPROM soldered on board by using the computer software through USB communication or in Stand Alone mode.

The EE100 programmer has been designed to meet the strong and growing demand of EEPROM users to program and update the memories soldered on board during development, production, field manipulation or repairing with high performance and low cost. Before trying to update the EEPROM on Board, be sure that the controller and the application are compatible with the In Circuit Programming method to avoid any conflict with the programmer.

DediProg has published Application Note to help designers to implement the ICP method and will be pleased to answer to any of your questions on this subject.

Fig 2: EE100 connected to the application pin header



The software provided with the **EE100** has been developed to offer a complete portfolio of features with a friendly and simple interface to not require any technical expertise.

EE100 can also be used together with DediProg SPI backup EEPROM modules so that it forces the application controller to work from the backup EEPROM located in the backup EEPROM module instead of the soldered EEPROM on the application. The on board SPI EEPROM will be automatically disabled by driving the Hold pin low (pull-up resistor in the application is required).

The backup EEPROM can then be accessed at any time with the EE100 without any possible conflict with the application controller as our tool embeds the needed circuit for isolation.

Fig 3: Backup EEPROM connected to EE100



D. OFF line programming with EE100

EE100 Engineering programmer can also be used to program the EEPROM in the socket adaptors through the ICP pin header. DediProg provides all the sockets for the market standard packages and more under demand. User has to visit our DediProg web site to find the up to date list of the sockets available.



E. EE100 Stand Alone mode

EE100 has been designed with an internal buffer to support Stand Alone mode. In Stand Alone mode the EEPROM programming or verify can be performed without computer:

- 1) User has to define in the Stand Alone GUI the project with:
 - Operation to be performed
 - Data to be programmed

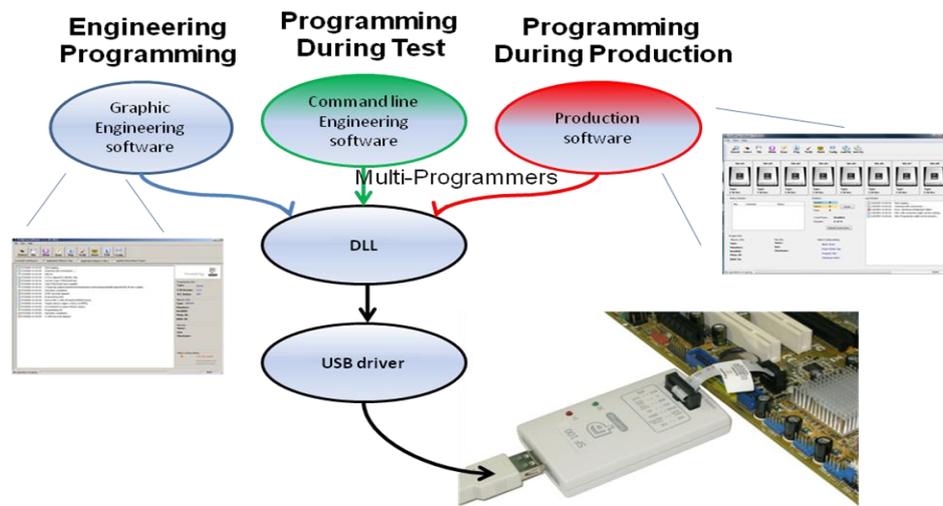


- 2) User has to download the project to the EE100 non-volatile buffer through USB
- 3) User can then perform EEPROM programming with the buffer content just by clicking the EE100 button (no computer needed).

II. Software versions

EE100 software can be update for Free on www.DediProg.com for life time.
DediProg offers three different versions of user interface to fit the user needs:

Fig 4: USB Window interface



A. Engineering GUI:

The engineering GUI offers expert features and lot of flexibilities optimized for expert user (R&D, development..).

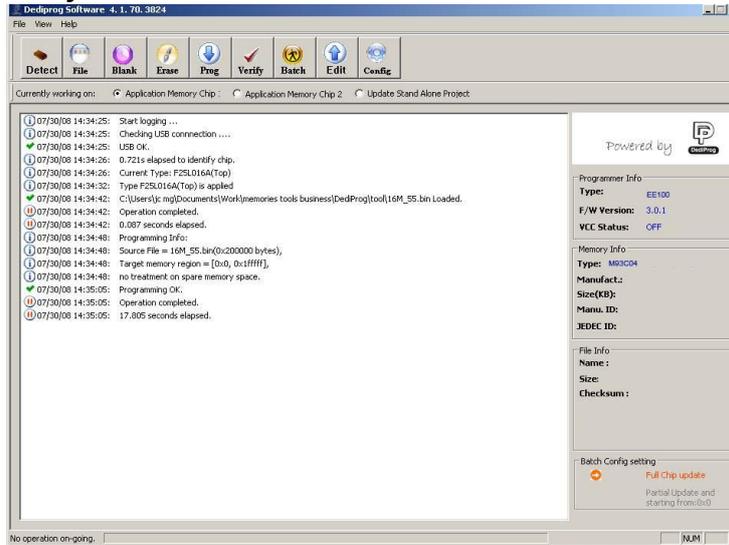
In USB mode, user can control the programmer operations via a friendly interface.

He can load a file, blank check, program and verify the target EEPROM. Batch button provides an easy way to perform more than one operations in one click.

User can also edit the buffer or load the EEPROM content and compare with a file.



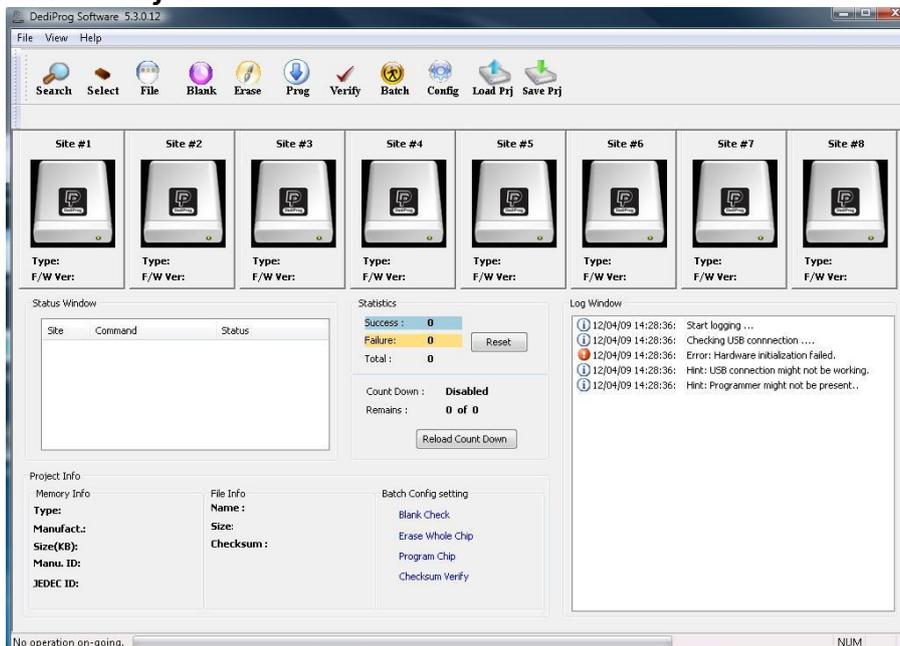
Fig 5: USB Window interface



B. Production GUI

This interface has been optimized for operator using multiple EE100 to program EEPROM in high volume. User can visualize all the programmers status.

Fig 6: USB Window interface



C. Command line

The Command line interface is a DOS window where user can call the commands by using the keyboard only. The command line can also be used by other software to control the programmer automatically (compiler, tester for programming the EEPROM during ICT...).

Fig 7: Window DOS interface

```
C:\>
C:\>set path=%path%;"c:\program files\dedipro\inc\dedipro programmer"

C:\>dpCmd -uc:\M_55.bin
DpCmd 1.1.0, Engine Version: 2.0.33.
Last Built on Nov 22 2006
Copyright (C) 2006 DediProg. All rights reserved.

M25PE80 detected.

Auto sequences Operating, please wait ...
Time elapsed: 26.608s
Automatic program OK
Checksum(file): 0000
C:\>dpCmd -pc:\M.bin -a0x010
DpCmd 1.1.0, Engine Version: 2.0.33.
Last Built on Nov 22 2006
Copyright (C) 2006 DediProg. All rights reserved.

M25PE80 detected.

Reading, please wait ...
Time elapsed: 4.596s
Read OK
Erasing, please wait ...
Time elapsed: 15.422s
Erase OK
Programming, please wait ...
Time elapsed: 8.573s
Program OK
Checksum(file): 00aa
C:\>
```

More detailed information on how to use the software can be found in our EE100 User manual.

III. Specification

A. USB Connector

The USB connector type A is available to communicate with the computer tool and to supply the programmer (no need of an external power supply).

USB Power supply specification:

- Vdd = 5V \pm 5%
- Idd min = 500mA

B. Power and signals characteristics

1. EEPROM power supply

EEPROM on the socket or on the board can be supplied with:

- 5V
- 3V
- 1.8V

User can select the Vcc on the software interface.

The SPI, Microwire and I2C signals level are generated according to the Vcc selected.

The EEPROM soldered in the application board can be supplied by two different sources:

1) by the programmer via Vcc ICP pin at 5V, 3.3V or 1.8V

2) by the application according to the EEPROM specification

EE100 is designed with internal protection to avoid supply conflict with application board.



2. EE100 ICP Header pin out

The ICP connector is a 7x2 pin header straight type with 2.54mm pitch. It is used to control the application EEPROM and if necessary supply the EEPROM or reset the application chipset, etc.

Table1: Top View

Header pins	
1	8
2	7
3	6
4	5
x	GPIO
x	x
x	x

Table 2: Pins description according to the EEPROM selected

Pin Out	SPI	I2C	UW 93C	UW 93S
1	CS	E0	CS	CS
2	Q (SO)	E1	CLK	CLK
3	Wp	E2	D (SI)	D (SI)
4	Vss	Vss	Q (SO)	Q (SO)
5	D (SI)	SDA	Vss	Vss
6	CLK	SCK	ORG	W
7	Hold	Wc	DU	PRE
8	Vcc	Vcc	Vcc	Vcc
GPIO	GPIO	GPIO	GPIO	GPIO
x	NC	NC	NC	NC

The application connector pin count can be optimized to the application needs and reduced down to a minimum of 5 pins. For explanation on how to design your application and use the programmer in the different scenario, please review the document available on DediProg website.

3. Bus signals characteristics

The signals are used to communicate with the socket or application EEPROM with the highest allowed frequency. They are CMOS compatible and are switch in High Impedance when not used.

**Table 3: DC specification for signals and IO**

Symbol	Parameter	Test condition		Value	Unit
		Vcc(V)	Io(mA)		
Vih	High Level Input Voltage	4.5V to 5.5V		Vcc*0.7	V min
		2.7V to 3.6V		2V	
		2.3V to 2.7V		1.7V	
		1.65V to 1.95V		0.65*Vcc	
Vil	Low Level Input Voltage	4.5V to 5.5V		Vcc*0.3	V max
		2.7V to 3.6V		0.8V	
		2.3V to 2.7V		0.7V	
		1.65V to 1.95V		0.35*Vcc	
Ioh	High Level Output current	4.5V to 5.5V	-32mA		mA
		2.7V to 3.6V	-24mA		
		2.3V to 2.7V	-8mA		
		1.65V to 1.95V	-4mA		
Iol	Low Level Output current	4.5V to 5.5V	32mA		mA
		2.7V to 3.6V	24mA		
		2.3V to 2.7V	8mA		
		1.65V to 1.95V	4mA		
Voh	High level output voltage	1.65V to 4.5V	-100uA	Vcc-0.1	V
		1.65V	-4mA	1.2V	
		2.3V	-8mA	1.9V	
		3V	-24mA	2.4V	
		4.5V	-32mA	3.8V	
Vol	Low level output voltage	1.65V to 4.5V	100uA	0.1V	V
		1.65V	4mA	0.45V	
		2.3V	8mA	0.3V	
		3V	24mA	0.55V	
		4.5V	32mA	0.55V	
Cap	Capacitance			10nF	nF typ

This specification is relative to individual capability of one signal.

ESD high performance protection compliant with IEC61000-4-2 level 4:

15kV (air discharge)

8kV (contact discharge)

4. Performances

The EE100 performances will depend of the frequency used and memory.

User can adjust the bus frequency from DediProg GUI in order select the optimum one according to the memory specification but also the application characteristics.

Actually, the frequency has to be adjusted according to:

- 1) The bus capacitance
- 2) Memory performances

- 1) The total capacitance of the bus will be the sum of the application capacitance and the ICP cable length. The ICP cable length must be reduced at the minimum to optimize the performance and ensure the good signals quality.
- 2) - The EEPROM specification has to be checked to select a frequency which is lower or equal to the maximum frequency supported by the memory. The maximum frequency guaranteed by the suppliers is under capacitance condition (usually lower than 100pF). When performing In circuit Programming the total capacitance is often higher than the EEPROM specification so the frequency need to be safely adjusted to a lower value.
- Furthermore, the EEPROM output buffer capability is limited compared to the programmer performances. So even if the programmer is able to drive high capacitance, the EEPROM soldered on the application will probably not (information read from EEPROM will be wrong). User can use a buffer board at the end of the cable to help the EEPROM to drive the cable capacitance.

5. Smart management of the EEPROM Vcc and signals

In order to minimize the impact of the ICP method on the chipset and application board, the programmer supplies the application EEPROM with Vcc and signals only during the programmer and EEPROM operations.

Advantages:

- The programmer is plugged on the application board with Vcc OFF and signals in High Impedance to avoid inrush current.
- All the ICP pins are protected with ESD high performance protections to discharge the Electronics charge before the connection and protect the application.
- The EEPROM Vcc and signals are provided only when the user send the command and are switched OFF automatically when the operation is completed.

Therefore, the programmer is transparent for the application and can be kept connected during application trials.



6. I/O management: GPIO

One general output/Input signal is provided on the ICP connector for custom needs. The IO is in High Impedance state if there is no software operation ongoing even if the power is connected. The IO is driven low when the software is running command.

This output can be useful to drive reset the application chipset, or switch Off the MOSFET transistors in the application board. They are CMOS compatible and are switched in High Impedance when the software is not executing commands.

C. Host PC requirements

The EE100 interfaces with IBM compatible PC's through the USB 2.0/1.1 port. This gives full compatibility with the latest PC's, notebooks and portables.

System Requirements:

- PC with Windows XP / Vista / Window 7
- Hard disk with at least 64 MB free space.

System Interface:

- PC connectionUSB 2.0/1.1 port

IV. Revision history

Date	Version	Changes
2009/12/14	V0.1	Pin out numbering, Errata added for engineering samples
2010/01/11	V0.1	Fig 3 added
2012/05/02	V0.2	Add SI and SO to Table 2.
2017/07/26	V0.3	Modified Point 6 I/O Management: GPIO and adjust the document format.

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