

**ON Semiconductor**

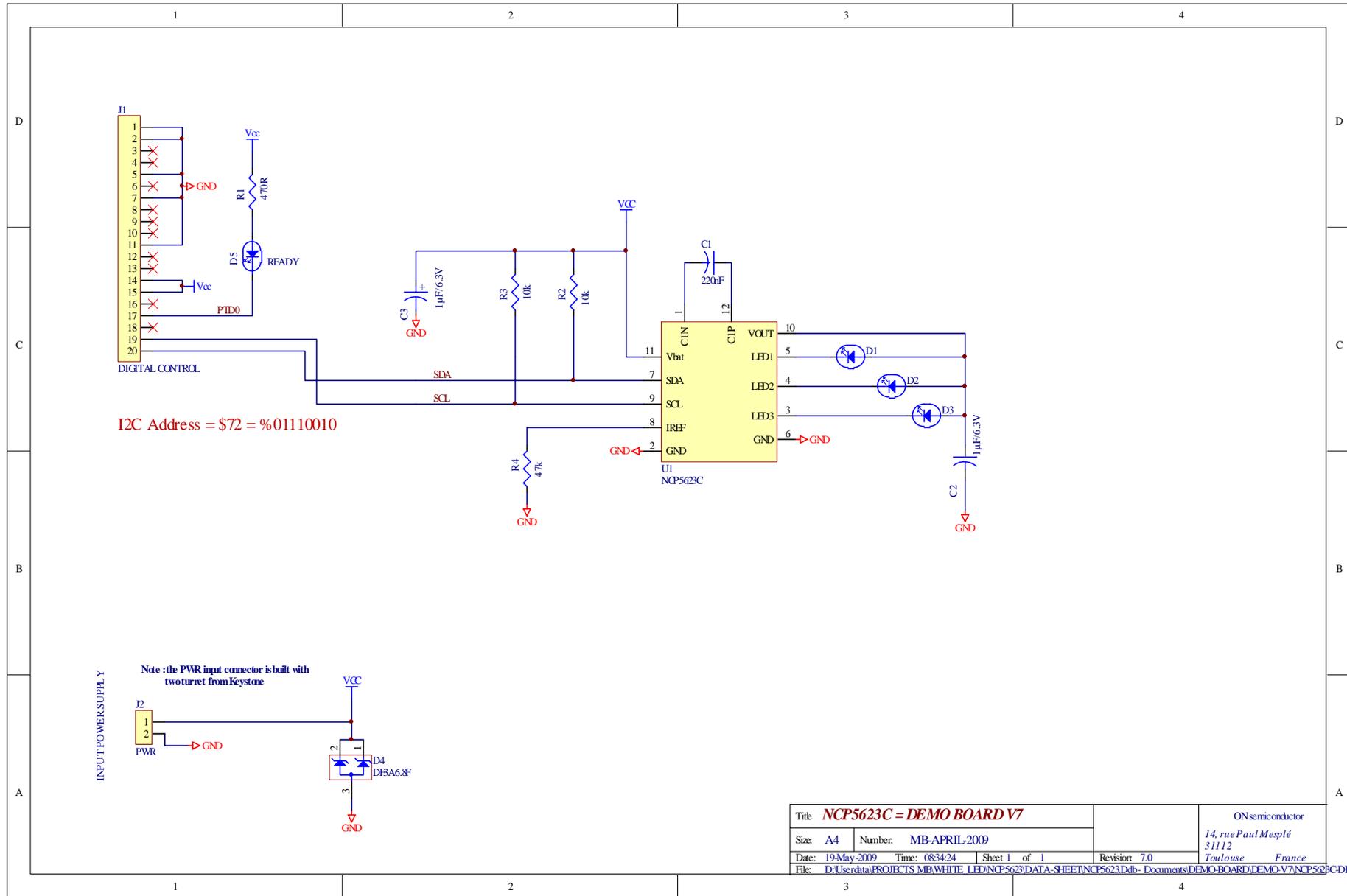
# **NCP5623C - DEMO BOARD VERSION 7.0**

# **BILL OF MATERIAL**

## **Documents Included:**

- **Bill Of Materials**
- **NCP5623C Demo Board V7.0 schematic diagram**
- **NCP5623C Demo Board V7.0 GERBER views**
- **Manufacturers web addresses**
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ON Semiconductor



**RESISTORS**

QTY	Designator	Description	Footprint	Manufacturer	PART NUMBER	COMMENTS	DIGI-KEY Part Number
1	R1	470Ω	0603	Vishay Draloric		Any other suppliers possible	P475HCT-ND
2	R2, R3	10kΩ	0603	Vishay Draloric		Any other suppliers possible	P10.0KHCT-ND
1	R4	47kΩ	0603	Vishay Draloric		Any other suppliers possible	P47.5KHCT-ND

**CAPACITOR**

QTY	Designator	Description	Footprint	Manufacturer	PART NUMBER	COMMENTS	DIGI-KEY Part Number
1	C1	220nF	0603	TDK	C1004X5R1C224MT		
2	C2, C3	1μF/6.3V	0603	TDK	C1005X5R1C105MT	Reference design	445-1604-1-ND (16V)

**INTEGRATED CIRCUITS**

QTY	Designator	Description	Footprint	Manufacturer	PART NUMBER	COMMENTS	DIGI-KEY Part Number
1	U1	NCP5623B	LLGA12	ON Semiconductor	NCP5623DBRG2	Reference design	-

**RECTIFIER & ZENER**

QTY	Designator	Description	Footprint	Manufacturer	PART NUMBER	COMMENTS	DIGI-KEY Part Number
1	D4	Transient Suppression	SOT_323	ON Semiconductor	DF3A6.8FUT1	Reference design	-

**LED**

QTY	Designator	Description	Footprint	Manufacturer	PART NUMBER	COMMENTS	DIGI-KEY Part Number
3	D1, D2, D3	LED	DIODE_1206	OSRAM	LWT67C	Reference design	475-1173-1-ND
1	D5	LED	DIODE_1206	OSRAM	LHN974	Any other suppliers possible	516-1440-1-ND

**MISCELLANEOUS**

QTY	Designator	Description	Footprint	Manufacturer	PART NUMBER	COMMENTS	DIGI-KEY Part Number
1	J1	Edge connector	FLEX-20-EDGE	-	-	Not a part : built in the PCB board	-
1	J2	Power connector	AXIAL-0.4			Use two turrets : see Figure 3	

**Note 1:** RS = Radio Spares

**Note 2:** any resistors with same footprint, tolerance up to  $\pm 5\%$  together with  $TC < 500\text{ppm}$  and  $+105^\circ\text{C}$  operating temperature range can fit the application.

**Note 3 :** using X5R type ceramic capacitor is preferred. Using X7R brings extended operating temperature range. Using Y5R material shall be avoided due to the wide tolerance spread over the temperature range. Using smaller foot print capacitor is discouraged to avoid audible noise issue with the ceramic.

### ASSEMBLY

Note : the here attached photos are used as a visual reference.

- 1- Assemble the NCP5623B (LLGA12 package ) , Hot Air Flow Process recommended
- 2- Assemble all the passive parts
- 3- Assemble all the White LED
- 4- Assemble the power supply pins.

At this point, the system is ready to operate.

**TEST CONDITIONS**

**Power Supply :** The system can be powered either by the USB port ( assuming the board is attached to the MCU board using the J1 connector )or by a standard DC power supply. In any case, one single source of power shall be connected : either the USB or the power supply, but not simultaneously. If a DC power supply is used, make sure it can supply 500mA continuous output current across the two pins built with connector J2. Make sure the polarity is properly respected : **although a built-in zener prevent for such failure, reverse polarity might destroy the board.**

Set up the power supply to any value between 3.2 V minimum to 5.0V maximum. Typically, the supply voltage shall be adjusted between 3.2V – 4.2V to emulate standard Li-Ion battery.

The NCP5623B being controlled through the I2C port only, an external controller must be provided to send the appropriate commands to the chip. One can select either of the possible digital sources:

- use an external I2C generator to send the command
- use the MCU board available from ON Semiconductor ( P/N = JB16)
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**Manufacturing Final Test :**

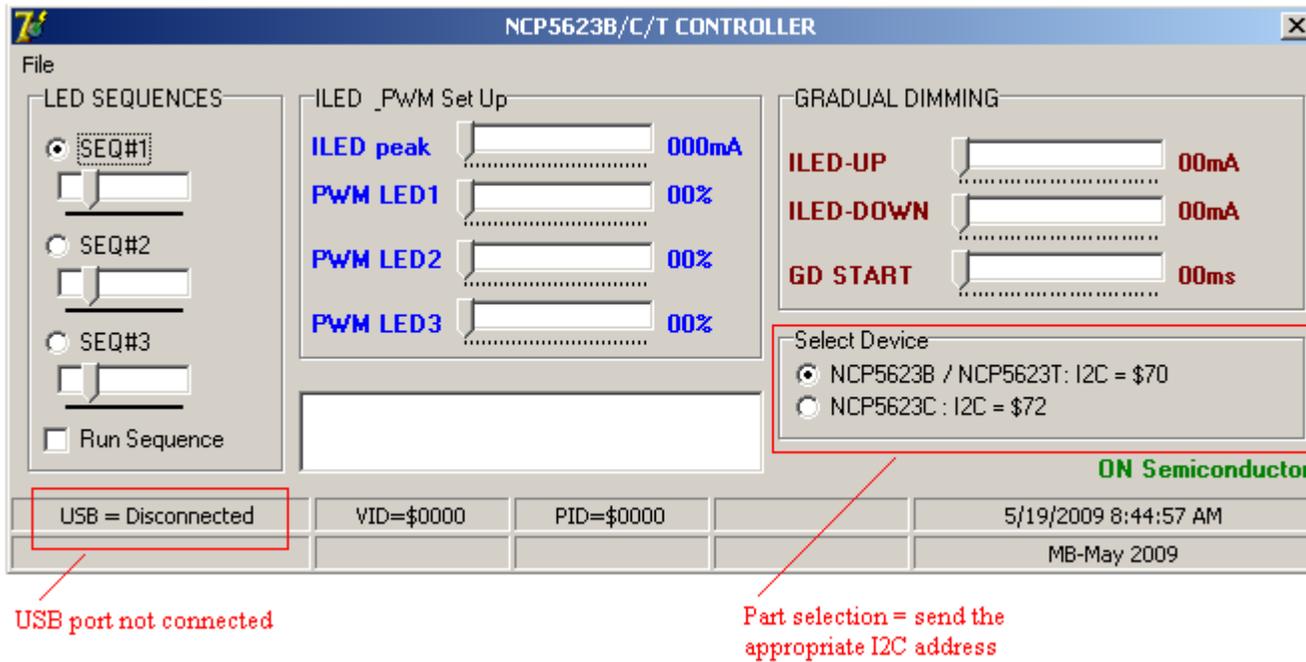
- 1 - Double check the power supply is set up at 3.6V, *maximum rating is 5.0V.*
- 2 – Download the NCP5623B/T demo software into the MCU flash memory. Use the P&E standard hardware and software tools.
- 3 – Download the GUI program and run it
- 4 – Turn ON the power supply : the input current shall be in the 4mA to 10mA range, no LED shall be ON. Reset the MCU if necessary by pushing the RESET button S7
- 5– Attach the USB connector to the USB port of the external computer. The “USB OPEN” message should be displayed on the bottom, left hand side of the window.
- 6– Use the slider, located on the left side of the GUI, to increase/decrease the ILED current: the chip is considered PASS if the brightness of the three LED varies accordingly to the position of the slider.
- 7 – Set the ILED current to zero
- 8– Disconnect the USB port
- 9- Turn off the power supply to complete the sequence.

At this point, the final test is completed and considered PASS if all the LED have been properly activated.

**Digital Control :** it is possible to drive the NCP5623T demo board with an ON Semiconductor MCU board and a Window™ based software dedicated to the chip. To operate such mode of operation, the board shall be connected to the USB port of the host PC with a standard mini USB connector attached to the MCU board USB port.

USING THE GRAPHICAL USER INTERFACE

Download the NCP5623\_USB software, unzip and run : the here below screen ( Screen 1) should be present on the display



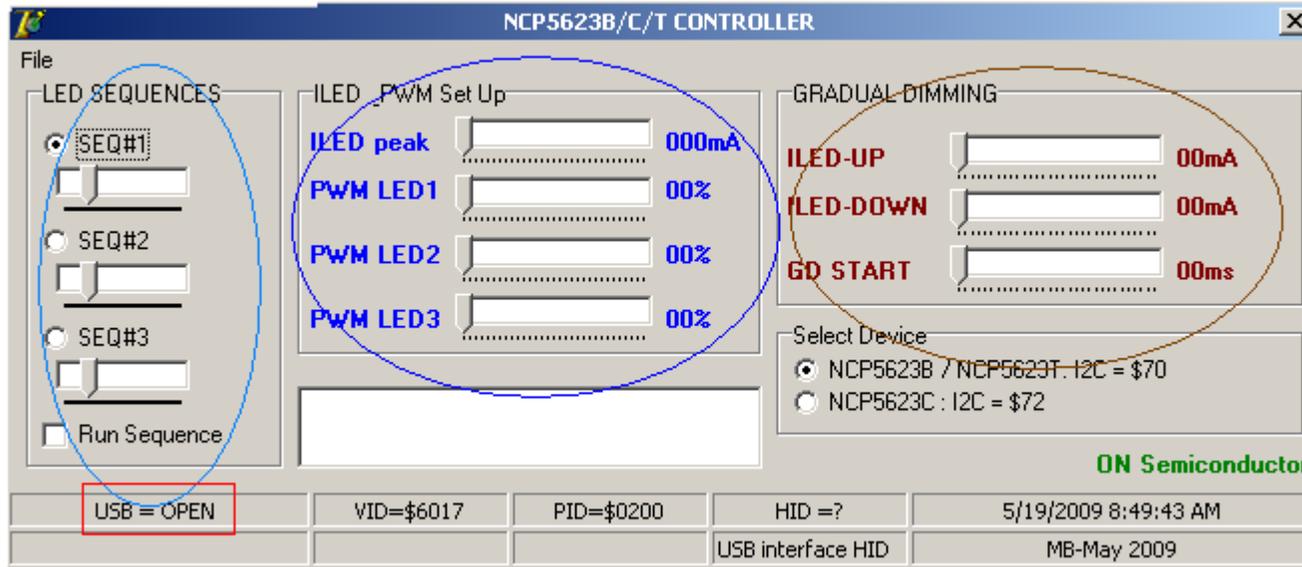
Screen 1 : Start Up with no NCP5623x demo board connected to the USB port

Connect the NCP5623B, NCP5623 or NCP5623T demo board to the USB port:

- the screen must be updated as depicted in Screen 2
- the green LED, located on the MCU board, will be activated
- 

This block controls the ILED max and the brightness of each LED

This block controls the Fun sequences



This block controls the Gradual Dimming UP/DOWN functions

The demo board has been connected and acknowledged by the MCU

**Screen 2: Screen updated when the demo board is connected to the USB port**

At this point, all the functions of the NCP5623B, NCP5623C or NCP5623T can be activated by using the sliders available on the GUI screen.

*Note : the charge pump function is NOT implemented in the NCP5623T version.*

**MANUAL LED BRIGHTNESS CONTROL**

- set each PWM at the appropriate percentage. Any PWM loaded with zero will switch OFF the associated LED
- set the ILED maximum current with the ILED slider : the DC current flowing through each LED will increase/decrease accordingly, the brightness being a function of the associated PWM per LED.

**AUTOMATIC GRADUAL DIMMING**

## Gradual Dimming UP

- In order to visualize the effect, make sure to set the ILED slider to zero and the three PWM to maximum.
- Preset the end ILED current by using the ILED-UP slider
- Adjust the GD START slider to start the Gradual Dimming UP sequence.
- Repeat the same sequence with any ILED-UP and GD START position of the related sliders.

## Gradual Dimming Down

- in order to visualize the effect, make sure the LED are activated to any value higher than zero, the PWM being set up as well.
- Preset the end ILED current by using the ILED-DOWN slider
- Adjust the GD START slider to start the Gradual Dimming DOWN sequence.
- Repeat the same sequence with any ILED-DOWN and GD START position of the related sliders.

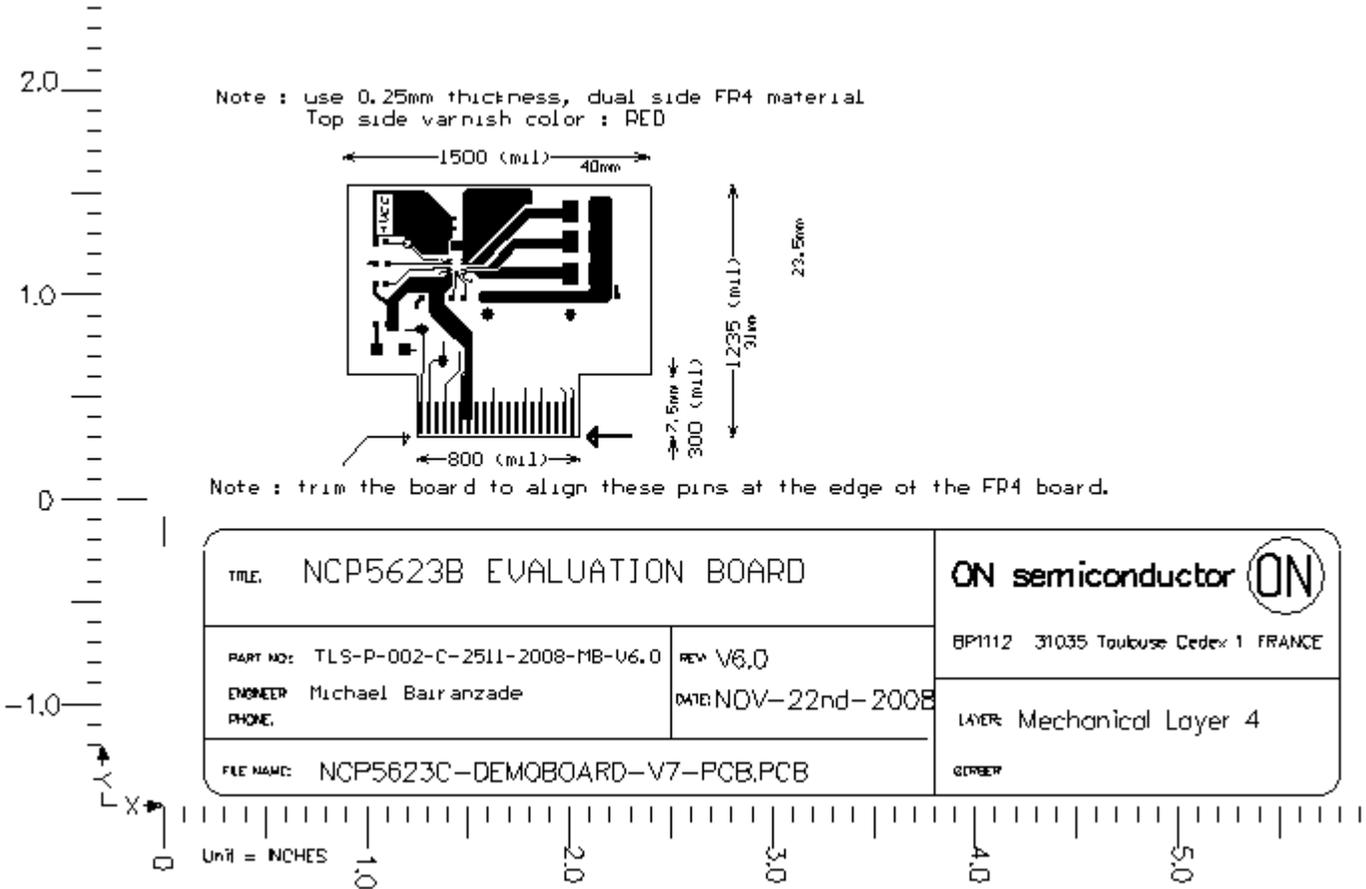


Figure 1: NCP5623C demo board : TOP Layer

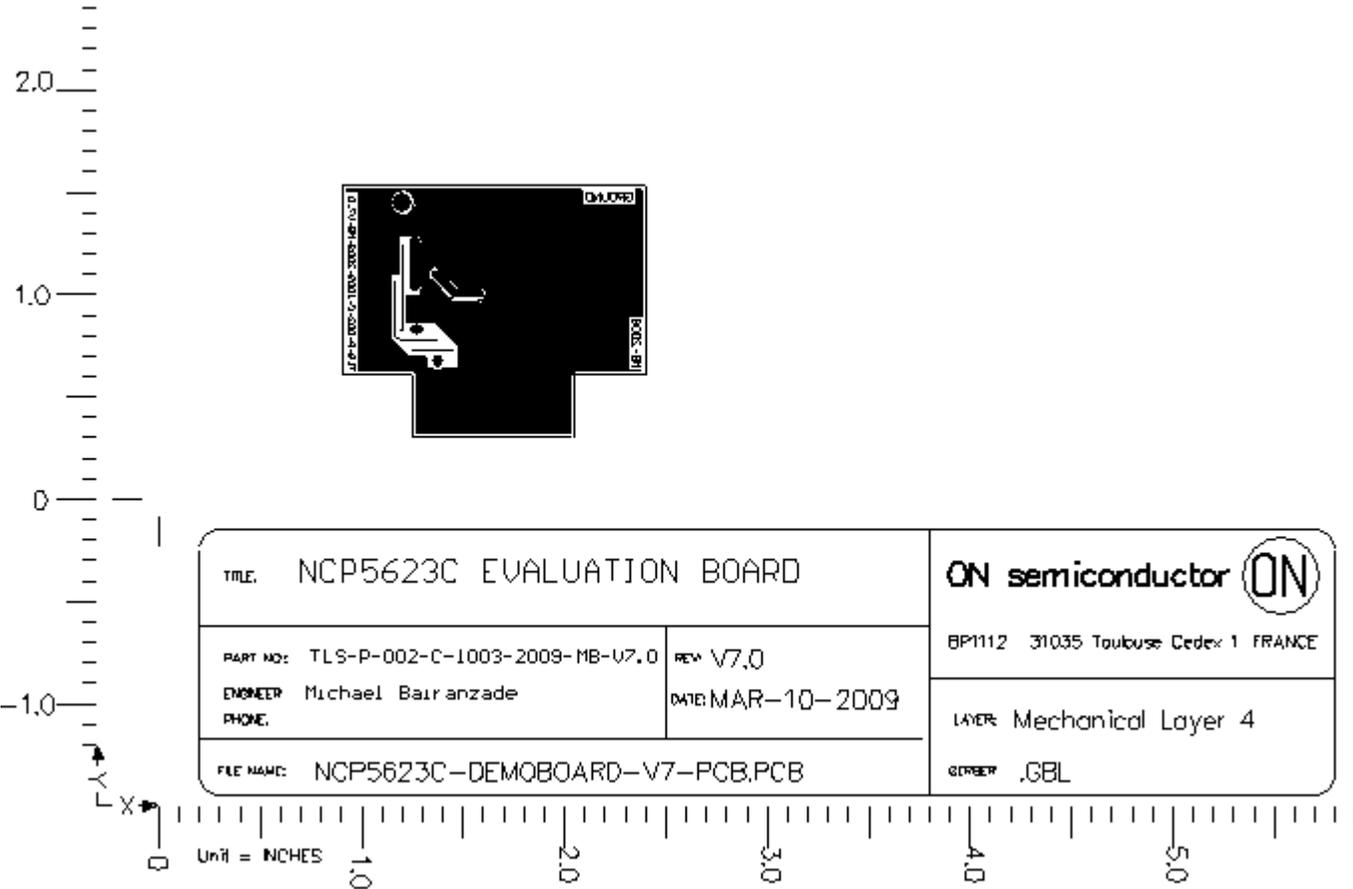


Figure 2 : NCP5623C Demo Board BOTTOM View

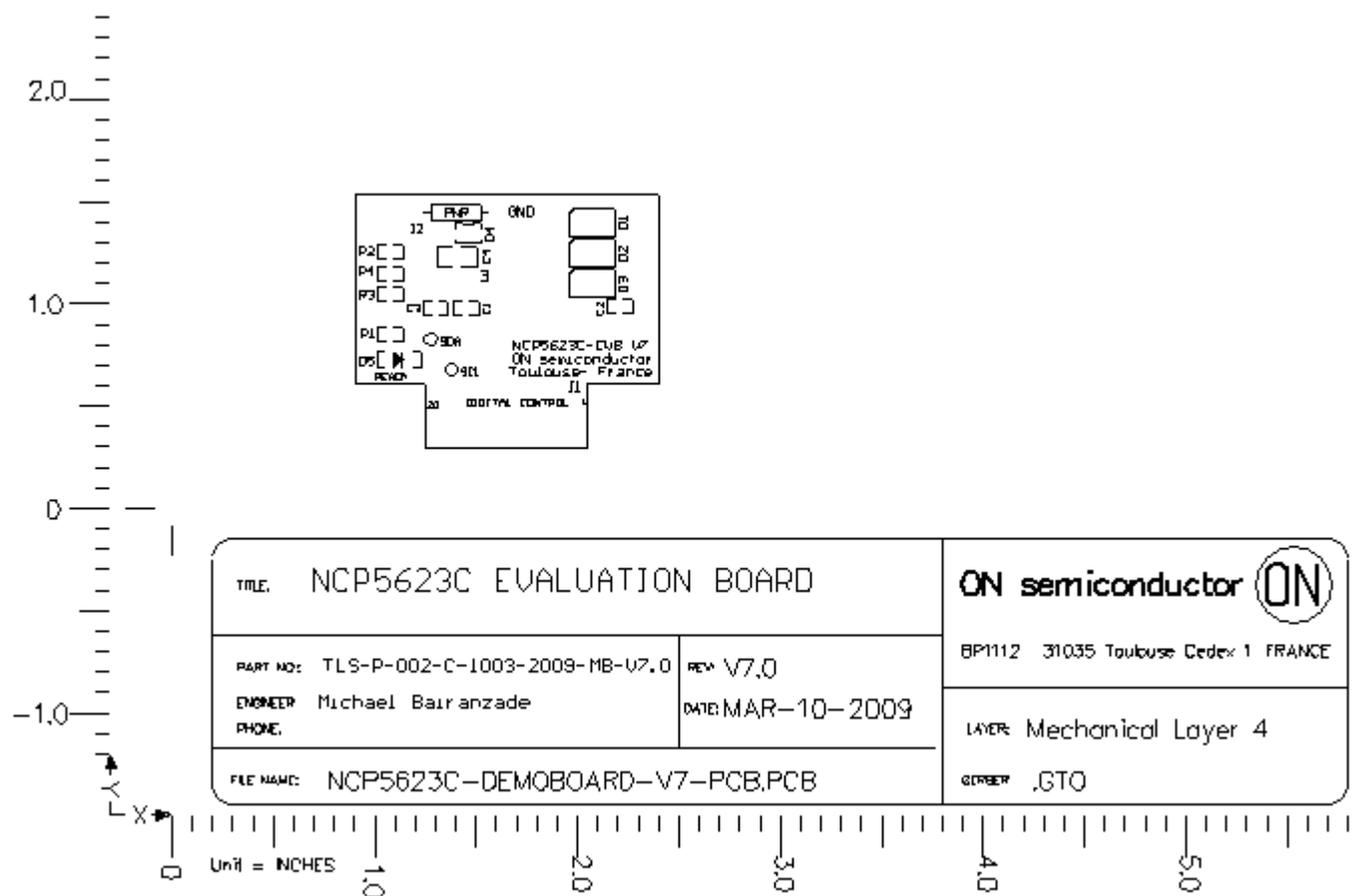
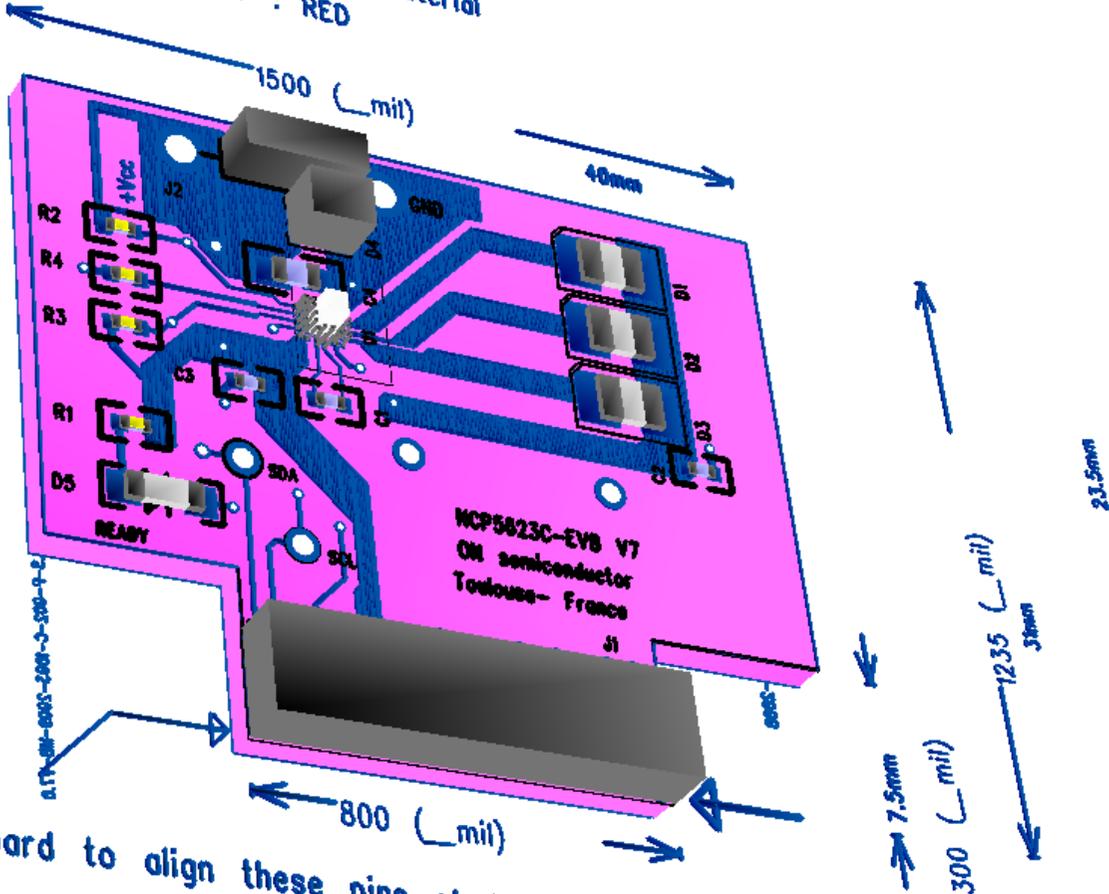


Figure 3 : NCP5623B Demo Board Silk View

Note : use 0.25mm thickness, dual side FR4 material  
Top side varnish color : RED



Note : trim the board to align these pins at the edge of the FR4 board.

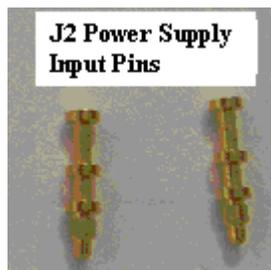


Figure 3 : Typical Input Power pins used to built the EVB board

#### COMPONENT MANUFACTURERS

VISHAY – DRALORIC  
TDK  
BC Components

<http://www.vishay.com/resistors-discrete/>  
<http://www.component.tdk.com>  
<http://www.bccomponents.com/>

Radio Spares : in the USA, see **ALLIED ELECTRONICS Inc.**  
7410, Pebble Drive  
Fort Worth / Texas / 76118-6997  
Phone : 817-595-3500