UM1560
User manual

STEVAL-IPC004V1: handheld point-of-sale (POS) based on the STM32F1 series

Introduction

This user manual describes the functioning of the handheld point-of-sale system (the STEVAL-IPC004V1) based on the STM32F1 series.

The system consists of the inbuilt thermal printer, external bar code scanner, memory interface, LCD display, rechargeable battery supply system and many other features.

This system works like a typical POS. It catches the item information thanks to a USB-based bar code scanner and after processing the information, adds it to the transaction record. There are 2 methods of payment: smart card/ magnetic card interface over GPRS or cash through keypad. The thermal printer prints the sales report and the result is recorded in the onboard memory. The STEVAL-IPC004V1 operates from a 5 V adaptor, which is connected to the board through the power jack provided. The system also comes with a PC-based server application which has various access levels to control the STEVAL-IPC004V1 activities such as registration, the loading of item allotment tables in the internal memory, and the storage of sales data for future reference. The server keeps sales data in the database up to 2 months and it also monitors the STEVAL-IPC004V1 health status and accordingly enables/disables its functioning. For human interaction, there is a keypad with 16 keys allowing a flexible interface. Finally, the system can be customized to include interfaces such as: smart card, GPRS as per customer requests.

Figure 1. STEVAL-IPC004V1 evaluation board

AM12567v1

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1 Getting started

1.1 System requirements

Software

- Processor: minimum 500 MHz, recommended 1.0 GHz
- RAM: minimum 256 MB, recommended 1 GB depending on the operating system used
- Hard disk: 7200 rpm HDD
- Supported operating systems: Windows Server 2003; Windows XP
- The latest service pack and critical updates are requested according to the version of Windows used. These can be downloaded from Microsoft update website
- Microsoft .NET Framework 2.0 SP1 has to be installed on the PC
- Microsoft Internet Explorer 7.0 (with the latest service pack) has to be installed
- VC++ 2005 runtime has to be installed on the system
- Full installation of POS software application requires about 10 MB of hard disk space. Additional space may be required for inventory database

To know the operating system present in the computer, below steps can be followed:

1. Click “start”
2. Right click “my computer”
3. Click “properties”
4. Go to system tab where the operating system is listed

1.2 Package contents

The STEVAL-IPC004V1 system includes the following items:

1. Hardware content: the STEVAL-IPC004V1 evaluation board
2. Software content: PC-based server application software with help file

1.3 Hardware installation

1.3.1 Power supply

The board can be powered either connecting a 5 V, 2.5 A adapter to J12 or by 7.2 V, 2 A Li-Ion-based battery pack. The correct terminal of the battery, BT1, has to be connected to the main board (refer to the schematic in appendix A). A battery charging circuitry is also implemented on the board.

1.3.2 Jumper/ connector settings

Most of connectors are always available on the system and some of them are very important for the correct use of the system.

BT1 (battery connector):

BT1 is the optional battery connector, which connects the battery to the system and its specifications are: 7.2 V, 2 A.

J12 (power jack connector):

J12, power jack connector, connects the external DC supply to the system (2.5 A power supply); the default supply is 5 V, 2.5 A. However, the print quality of the thermal printer can be improved if a higher voltage: 7 V, 2.5 A is connected.Therfore, J12 should be connected manually to the appropriate external power supply. The maximum DC input should be less than 10 V for safe operation.

J14 (USB micro AB connector):

J14 is used for USB operation to connect to PC or to connect to USB scanner. J2 (DFU connector) enables DFU mode to upgrade the firmware.

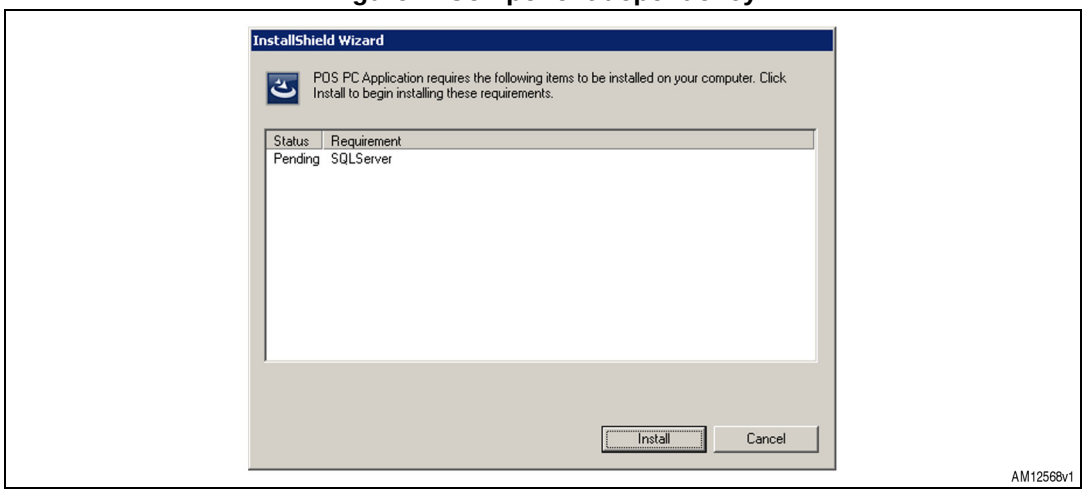
1.4 Software installation

The latest version of the PC application software can be downloaded from St's official website.

To install the PC-based STEVAL-IPC004V1 server application software, follow below steps:

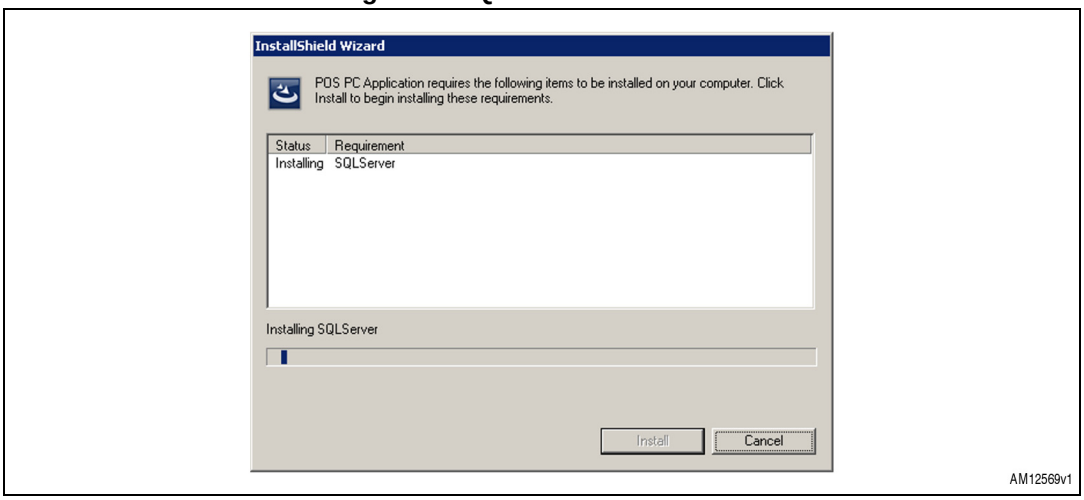
- Step 1: click the setup.exe icon and the following window appears.

Figure 2. Component dependency



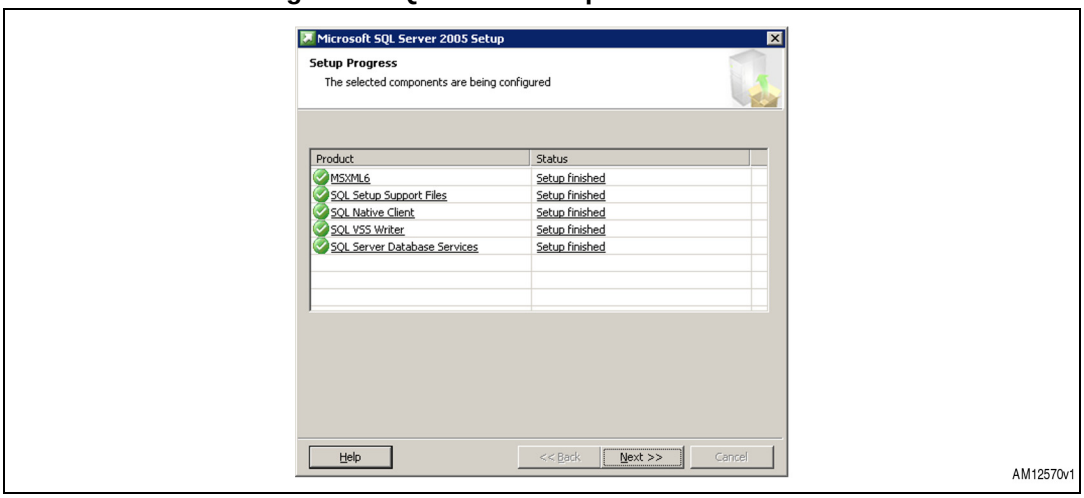
This window appears if SQL server 2005 is not installed in your system. So, click "Install" to start the installation as shown in *Figure 3*.

Figure 3. SQL server installation



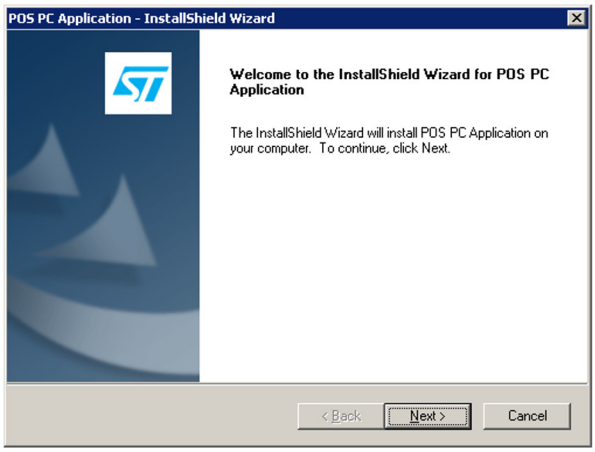
Please, follow instructions and accept both terms and conditions as displayed in *Figure 4*.

Figure 4. SQL server component installation



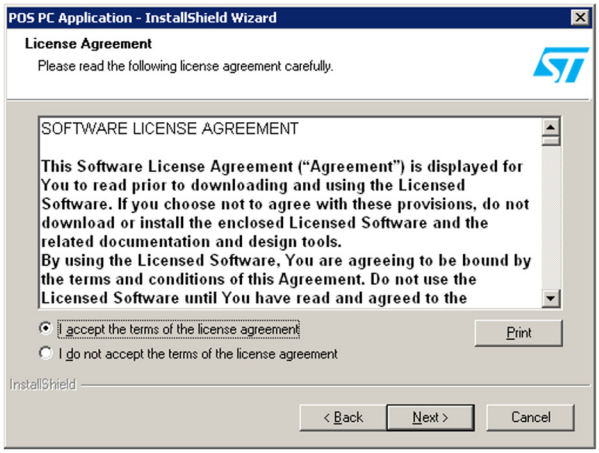
- Step 2: when the software has been installed, the following window appears, see *Figure 5*. Click on “Next” button.

Figure 5. Installation window



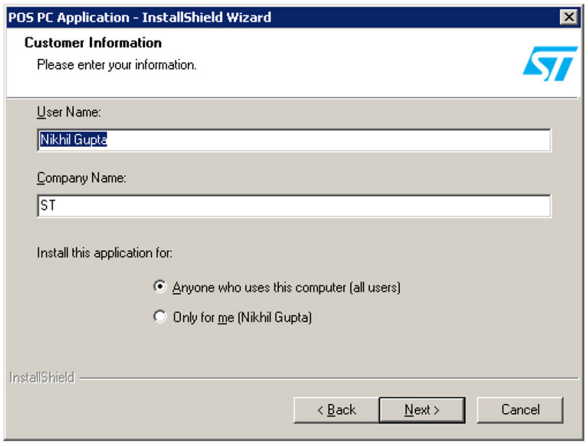
- Step 3: read the license file and click on “I accept” button if you accept it.

Figure 6. License window



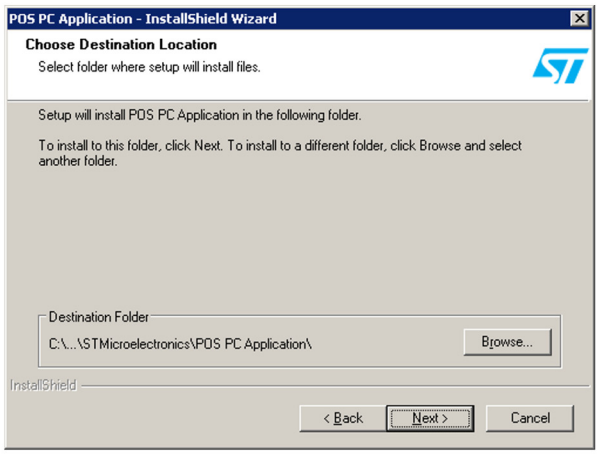
- Step 4: below, the application registration window, fill in the form and click on “Next” button.

Figure 7. Customer information



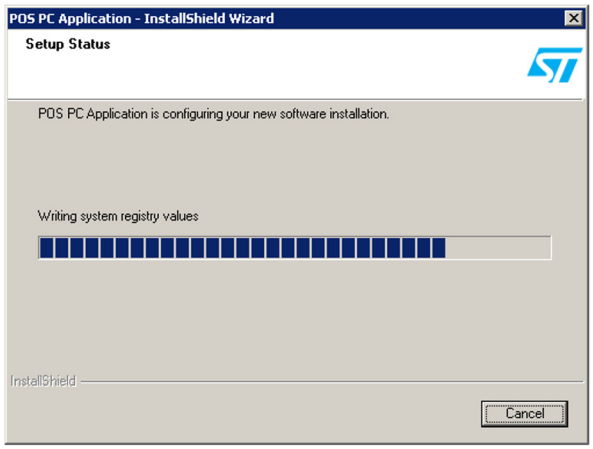
- Step 5: select the folder where the software has to be installed. The destination folder is by default C:\....\STMicroelectronics\POS PC Application\.

Figure 8. Destination folder



- Step 6: click on “Next” button to start the software installation.

Figure 9. Ongoing installation



When the installation has been completed, the window appears, so click on “Finish” button to complete the operation. The software is now available in the selected directory or in the default directory. Besides, the shortcut of this software is also available in START menu.

Warning: When POS evaluation board is connected for the first time, the driver is requested. The path for driver installation is by default C:\Program Files\STMicroelectronics\POS PC Application\Driver.

2 STEVAL-IPC004V1 evaluation board description

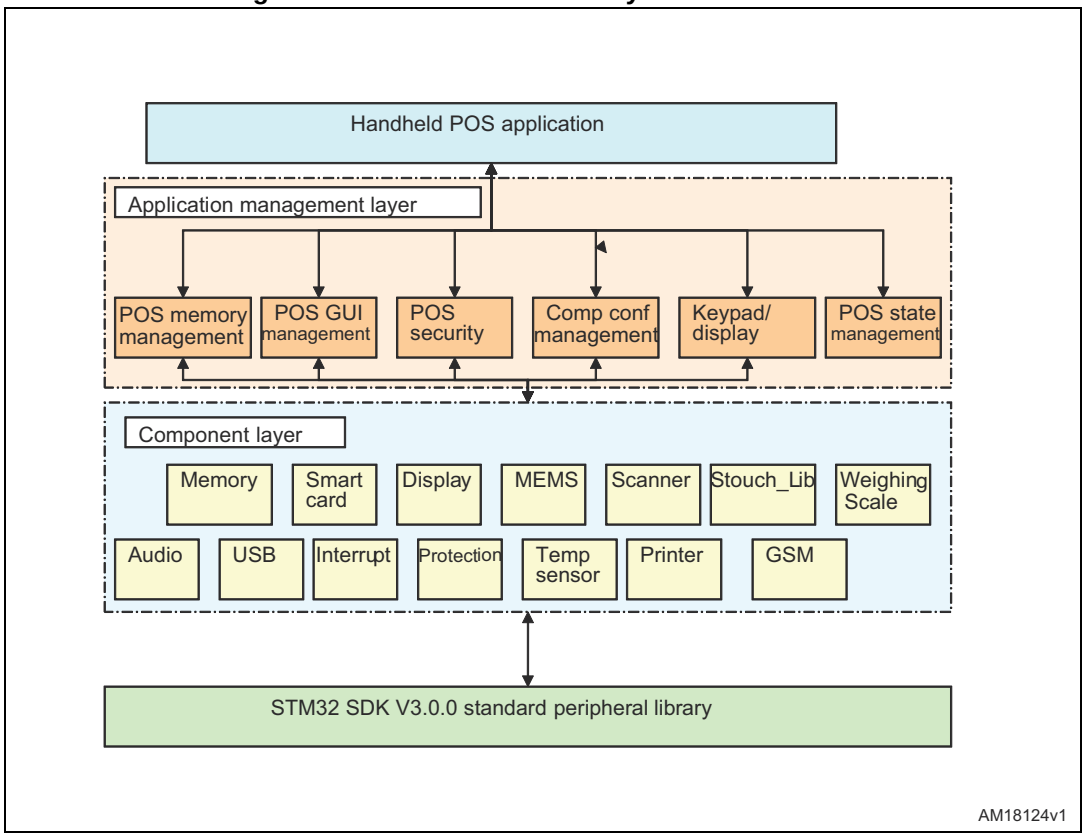
2.1 STEVAL-IPC004V1 evaluation board architecture

POS evaluation board is a modular system based on the STM32F1 series which comes with server applications to complete the transaction.

The STEVAL-IPC004V1 bases on a layered architecture which can be divided in the following sections:

a) Application management layer
b) Component layer
c) Peripheral layer

Figure 10. STEVAL-IPC004V1 layered architecture



a) Application management layer.

This is the main application layer of the STEVAL-IPC004V1, whose major role is to interact with the server application and to handle various events and output the correct message on LCD.

b) Component layer management.

This is a critical layer, which acts as a bridge between various device libraries and the application layer. Each component of this layer has a specific behavior. For example the bar code scanner component handles all events related to the bar code scanner.

c) Peripheral layer.

This is the driver layer and it is the software implementation over the STM32F1 hardware to use all available peripherals.

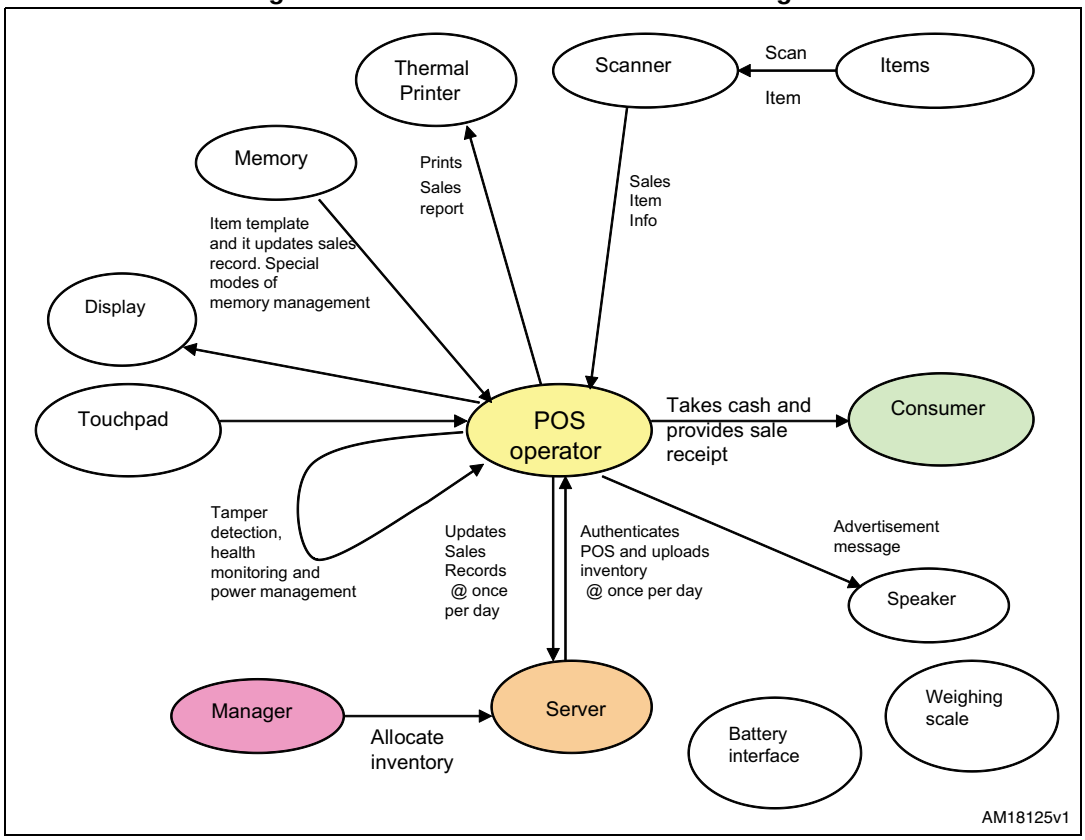
2.2 STEVAL-IPC004V1 evaluation board block diagram

Figure 11. STEVAL-IPC004V1 block diagram

2.3 STEVAL-IPC004V1 behavior diagram

Figure 12 shows the STEVAL-IPC004V1 behavior diagram.

Figure 12. STEVAL-IPC004V1 behavior diagram



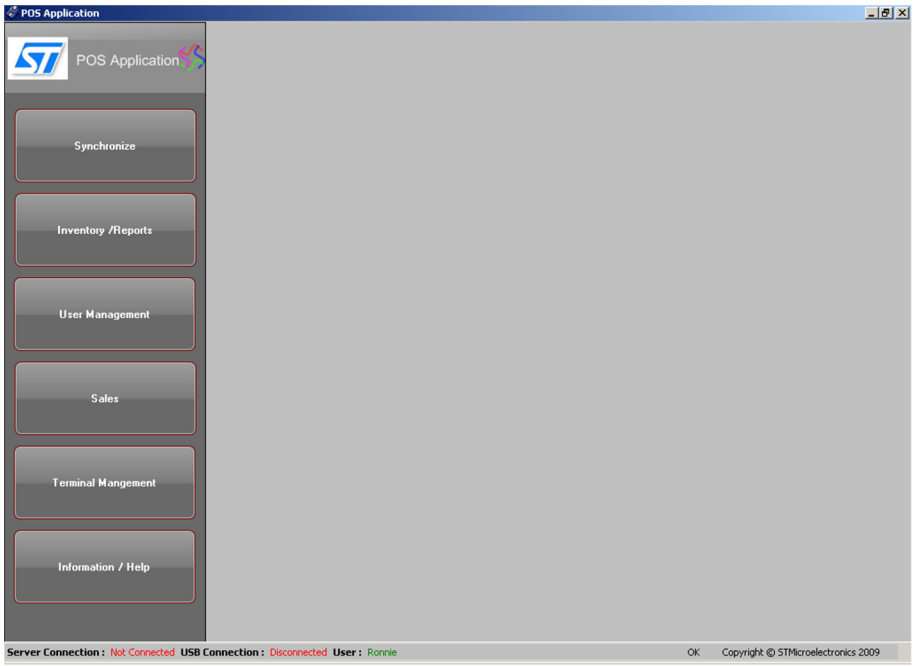
3 Major component description

3.1 STEVAL-IPC004V1 PC server application

The STEVAL-IPC004V1 evaluation board is a modular system based on the STM32F1 series, which comes with server applications to complete the transaction.

The system interacts with a PC-based server application on a USB-based vendor specific protocol. Before the initialization, an authentication process based on AES128 encryption algorithm is performed. Once the STEVAL-IPC004V1 system is authenticated, access to sales record is allowed.

Figure 13. STEVAL-IPC004V1 PC-based server application

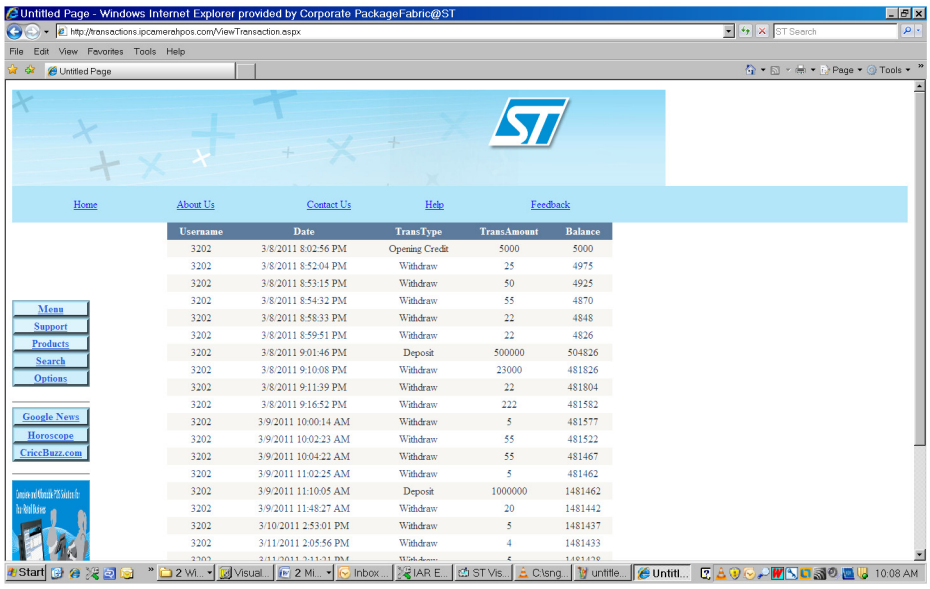


To know the details about the STEVAL-IPC004V1 server application, please refer to its help file.

3.2 Web-based virtual bank application

In this web-based virtual bank application, a new account can be added. During the cashless transaction, the STEVAL-IPC004V1 system uses the magnetic card/ smart card interface over GPRS.

Figure 14. Virtual bank application



3.3 Front keypad

The STEVAL-IPC004V1 keypad is given in *Figure 15*.

Figure 15. STEVAL-IPC004V1 keypad

On the front keypad, 16 keys are present:

- “A” complete key: to complete the ongoing transaction.
- “C” cancel key: to cancel the ongoing transaction.
- “B” back key: to delete one character from the LCD during bar code and cash entry from the numeric keypad. By pressing “B” key the previous transaction can be deleted.

- “*” up key: to go up in the menu.
- “#” down key: to go down in the menu.
- “D” enter key: to select the current selected item from the menu.
- “0” - “9” numeric keys: they are only used to manually enter the bar code information and the cash information.

3.4 Thermal printer

Fujitsu FTP-628 MCL101/103 series ultra compact thermal printer is used in the current STEVAL-IPC004V1 evaluation board. This kind of printer is quite useful in applications such as handheld POS. For detailed information, please refer to FTP-628 MCL101/103 series.

3.5 External bar code scanner

The STEVAL-IPC004V1 supports any USB driver bar code scanner. So any external power supply for this scanner is useless.

3.6 Monochrome graphic LCD

This system uses a 132x64 monochrome graphic LCD HTG13264C, with a 3.3 V supply.

3.7 GPRS interface

This system supports GPRS interface over USART. The current supported module is SIM900D but it can also be customized for other modules.

3.8 Smart card interface

This system supports the ST8024 smart card interface.

3.9 Magnetic card interface

The system supports dual and single track interface.

3.10 Memory interface

The system uses serial NOR N25Q064. In addition, NAND512 interface is also provided for additional memory requirements.

3.11 Battery charger interface

Driven by the STM8S microcontroller, this section comes with a customizable dual cell Li-Ion battery charger. This charger is flexible in terms of setting charging voltage, charging current etc.

3.12 Other interfaces

The STEVAL-IPC004V1 also has the following interfaces:

- UART interface
- Pen drive interface

4 Interaction with the server to setup the STEVAL-IPC004V1

4.1 Starting the STEVAL-IPC004V1 evaluation board

The STEVAL-IPC004V1 evaluation board has to be powered up, as described in *Section 1.3.1*. Some messages can be read on the LCD screen, finally the below message appears:

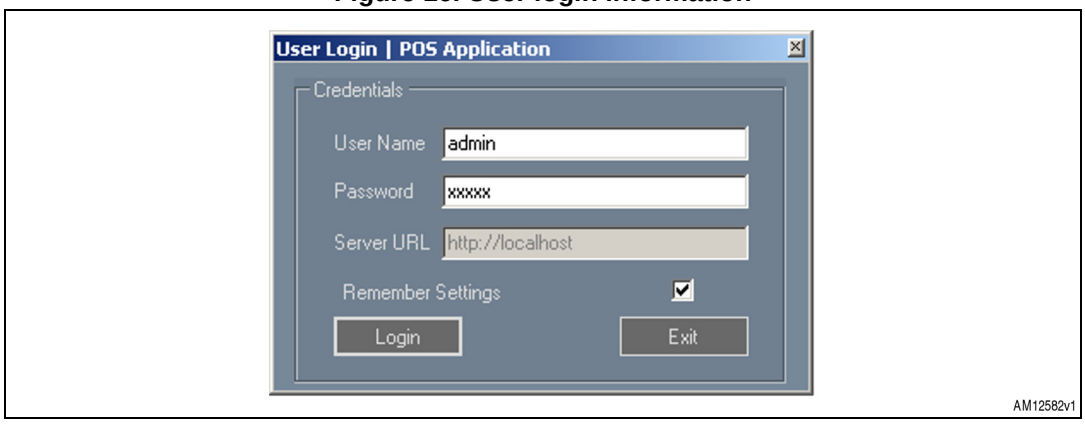
- "In Conf Mode"

This means that the STEVAL-IPC004V1 board has been correctly started and user can go ahead.

Note: A different final message appears when the STEVAL-IPC004V1 evaluation board is connected to the server application, as described in the coming section.

4.2 Starting the STEVAL-IPC004V1 server application

Figure 16. User login information



Double click on POSApplication.exe, and the user login window appears. The administration password is given by default and it allows the user to enter the application. Click on “Login” button, and the server application opens.

User access levels

Depending on the access level given, the following user profiles are supported.

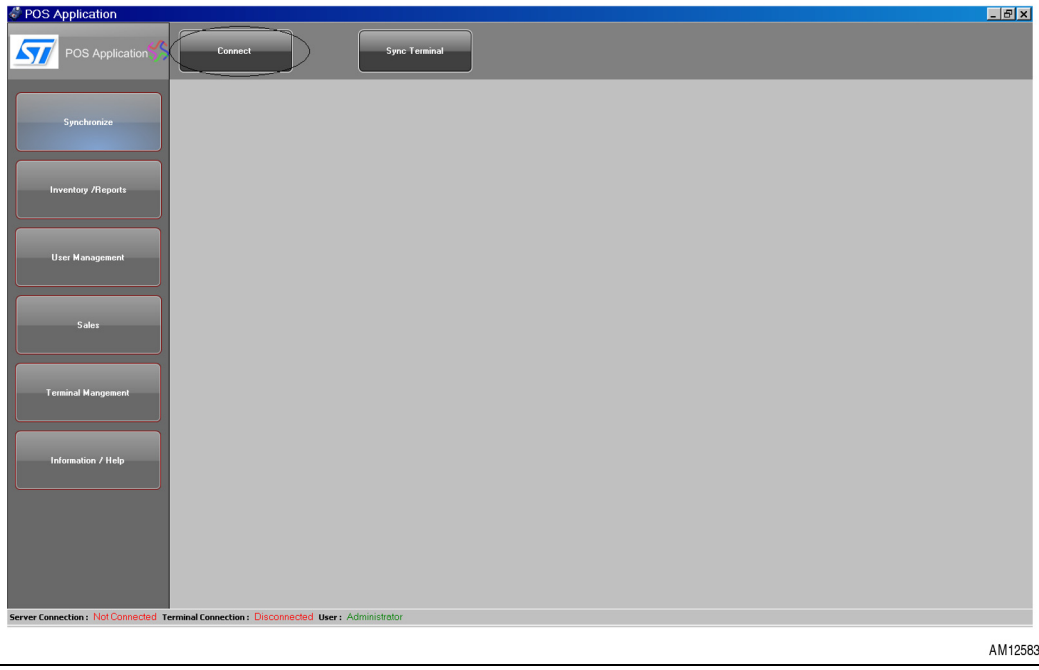
Table 1. User access levels in GUI

Feature	Description	Change password	View inventory	Synchronize terminal	Sales record	Add to inventory	Update inventory	Delete inventory	Register terminal	Remove\ clear terminal	Add\ delete user	Unconditional format
Level 0	No access	Yes	No	No	No	No	No	No	No	No	No	No
Level 1	Guest	Yes	Yes	Yes	No	No	No	No	No	No	No	No
Level 2	Sales person	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No
Level 3	Store manager	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Level 4	System manager	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Level 5	Administrator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

4.3 Connecting the STEVAL-IPC004V1 to the server application

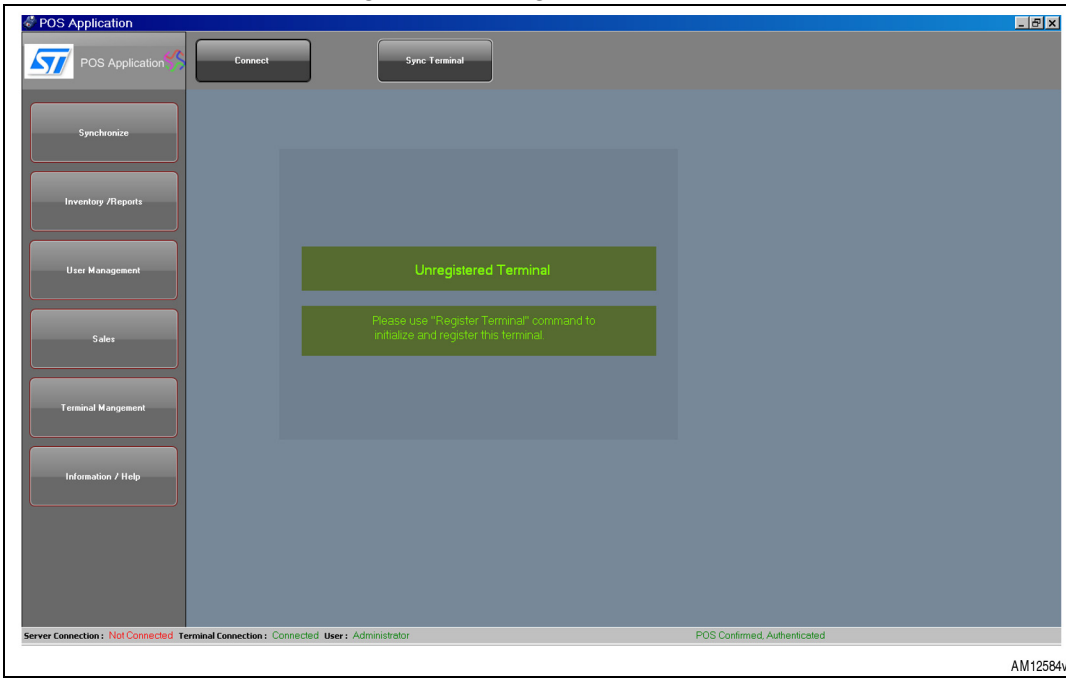
To connect a new STEVAL-IPC004V1 to the server application, go to “Synchronize” tab, click on “Connect” button as shown in *Figure 17*.

Figure 17. Connecting STEVAL-IPC004V1 to server



A new STEVAL-IPC004V1 appears as shown in *Figure 18*:

Figure 18. Unregistered terminal

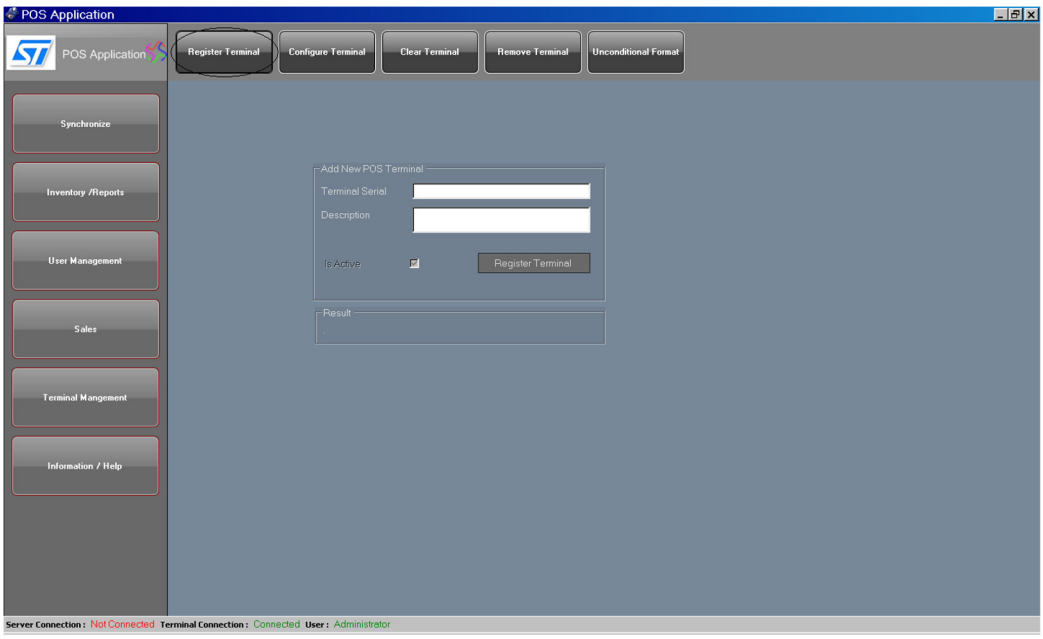


Next step is to register the STEVAL-IPC004V1.

4.4 STEVAL-IPC004V1 registration

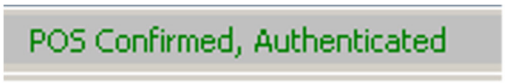
Go to “Terminal Management” tab, click on “Register Terminal” button as shown in *Figure 19*.

Figure 19. Register window



Enter POS serial key in “Terminal Serial” text box and the STEVAL-IPC004V1 description in “Description” text box. Click on “Register Terminal” button. Go back to the “Synchronize” tab window and click on “Connect” button again, “POS Confirmed, Authenticated” is the application bottom status bar as shown in *Figure 20*.

Figure 20. Authenticated STEVAL-IPC004V1

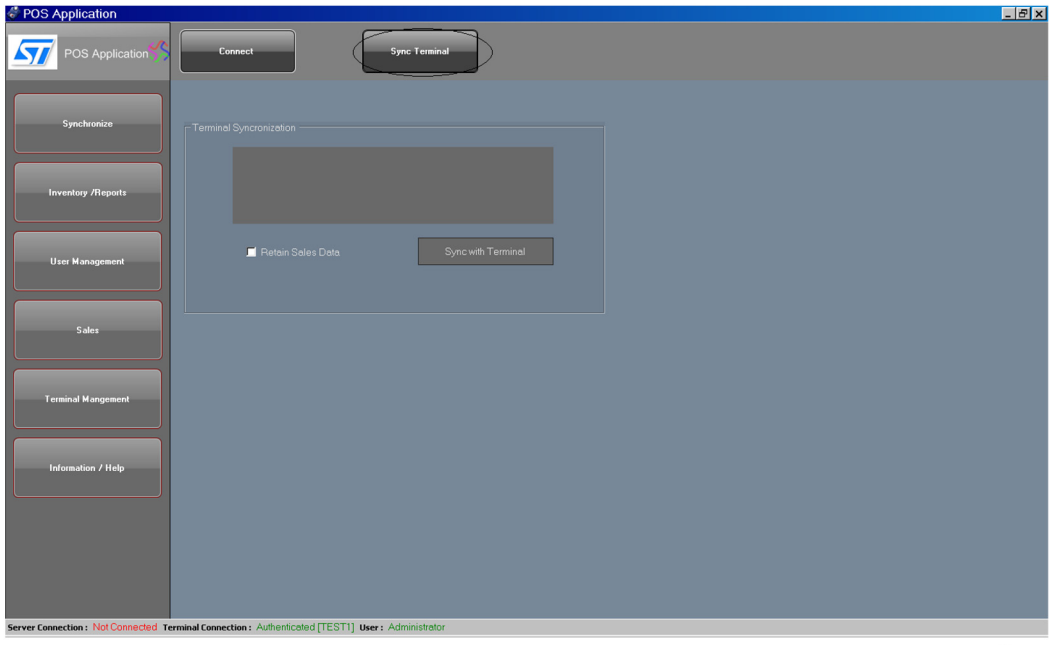


4.5 STEVAL-IPC004V1 synchronization with server application

After connecting and authenticating the STEVAL-IPC004V1 with the server application as described in the previous section, the synchronization between the STEVAL-IPC004V1 and the server application can be performed.

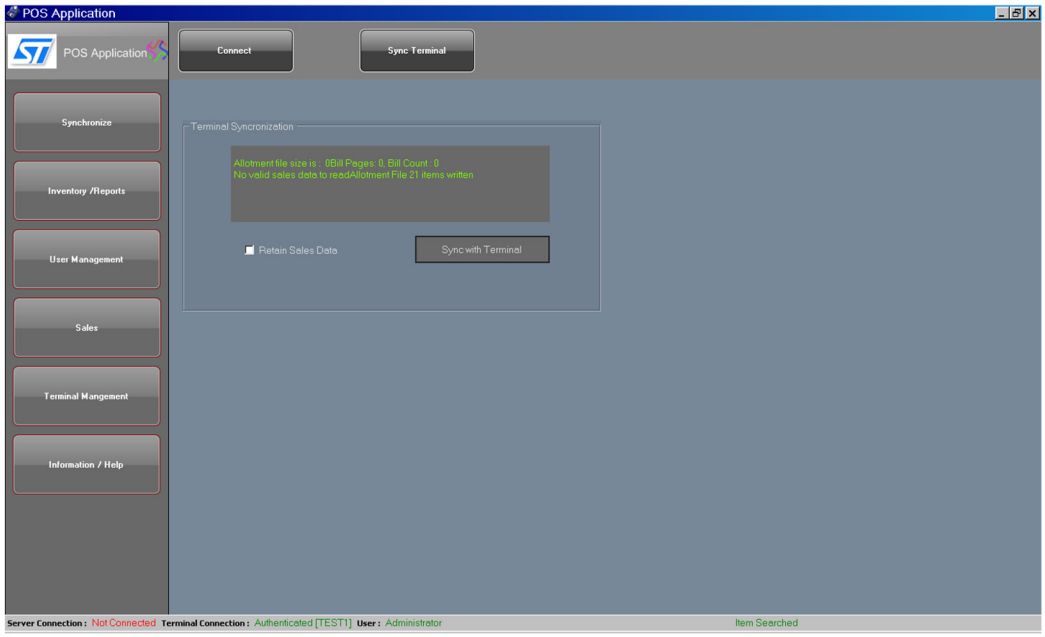
Go to “Synchronize” tab, click “Sync Terminal” button. The following window opens as shown in *Figure 21*.

Figure 21. Synchronize tab



Click “Sync Terminal” button and the synchronization starts. See *Figure 22*.

Figure 22. Synchronization operation result



There is a default item allotment table (table containing item information about the transaction) available in the STEVAL-IPC004V1 server application.

During the synchronization, any sales record available in the STEVAL-IPC004V1 terminal merges with the server database and updated item allotment table is downloaded in the STEVAL-IPC004V1 memory. Thanks to the option available in the form “Retain Sales Data”, sales data can be retained in the STEVAL-IPC004V1 memory.

Note: Default item allotment table is given just for demo purpose. The administrator of the STEVAL-IPC004V1 server application can generate a new item allotment table. How to generate the item allotment table is described in the following section.

5 Using the STEVAL-IPC004V1 for transactions

To perform the transaction, follow below steps.

Power up the board and the following message appears:

'Welcome to'

'STMicroelectronics'

After few seconds, the following menu shows modes to be selected on the LCD:

'Normal Mode'

'USB Mode'

'REPORT'

'GPRS DEMO'

'SELF DIAG'

'REG MODE"

Please wait for 3-4 minutes (for GPRS connectivity stabilization) press 'D' (enter) key to select modes.

Note: Don't leave the board in idle status for long time during a transaction. In fact, after a while the board goes to screensaver mode and the transaction has to be deleted by pressing “C” cancel key.

5.1 Starting transaction

Selecting “Normal Mode”, the transaction mode is automatically set and the following message can be read on the LCD screen.

'New Transaction Started'

After few seconds, below message appears:

'Add Items using Keypad or Scanner'

5.2 Adding item to the transaction table

Currently the item information can be retrieved from the STEVAL-IPC004V1 using the bar code assigned for each item. The current system supports up to 5000 types of item information which is stored in the onboard memory. This can be easily customized.

An external bar code scanner is used to add item information. Alternatively, the bar code info can be added using the keypad as well. Please make sure that bar code scanner is connected to USB connector of the board before powering the board.

Once the bar code information is entered (for example: press button 3), the following message appears:

'ITEM BARCODE'.

3

If entered bar code is not present, the below message appears:

'Wrong Item Bar code'

Then the correct bar code has to be entered.

Now press “D” enter key and the following message is displayed:

'3000000000000000'

Press Enter to proceed'.

Press “D” enter key to be added to the current transaction. In each transaction, around 100 different item types can be inserted.

Now the following message appears:

'SN ITEM QNT INR'

1. Cheese 001 0040'

Total Amt = 0040.0 R

By pressing “A” complete key, the payment mode selection is requested.

Further quantity of the same item can be added. For example, if 2 pieces of cheese have to be bought, then item bar code has to be added as shown below:

'SN ITEM QNT INR'

1. Cheese 002 0080'

Total Amt = 0080.0 R

By pressing “A” complete key, the payment mode selection is asked.

5.3 Completing the transaction

To complete the transaction, press “A” complete key. This forces the STEVAL-IPC004V1 to compile the current transaction list and asks for the payment mode which is shown as follows:

'1) Cash Mode

2) Card Mode'

Select the payment mode using “*” up and “#” down key and then press “D” enter key.

5.4 Payment

5.4.1 Cash mode

If the cash mode has been selected, the amount has been entered using the keypad. The LCD display also shows the total amount required.

Press “D” enter key. The recording of the current traction is carried out in the memory and once it is completed, the following message can be read:

'Amt Rec. = 0030.0 R

Total Amt. = 0027.0 R

Change = 0003.0 R'

Now press “D” enter key to get the transaction slip.

5.4.2 Card mode

Please make sure that SIM card has been inserted before choosing the card mode. The slot for SIM card is on the back of the board. Also, the content of atcommands.h file has to be changed according to GPRS connection.

For example: if airtel SIM card is used, settings have to be changed accordingly in atcommands.h file.

static uc8 uc8_GDefinePDP[]="AT+CGDCONT=1,\"IP\",\"airtelgprs.com\"";

static uc8 uc8_GSetAPN[]="AT+CSTT=\"airtelgprs.com\"";

If the card mode has been selected, the following message is shown:

'Card mode selected'

Total Amt = 0040.0 R'

The amount is entered using the keypad and pressing “D” enter key. The below message can be read.

'Insert card for payment using card'

Now the card can be placed in the magnetic card slot. If the card insertion is successful, then the following message appears.

'Wait

Initializing GPRS'

Then the below message is given:

'GPRS initialized, verifying card'

For the successful transaction, the LCD shows the transaction detail as follows:

'Amt Rec. = 0030.0 R

Total Amt. = 0027.0 R

Change = 0003.0 R'

Now wait for 1-2 minutes so that GPRS data transaction takes place successfully.

Now press “D” enter key to get the transaction slip.

5.5 Recording of sales record

After recording the transaction, the print of the transaction automatically comes out.

Note: Magnetic card is enabled by default, to enable smart card, please contact the technical support.

Transaction details on the virtual bank application are available as mentioned in Section 3.2.

6 Inventory management

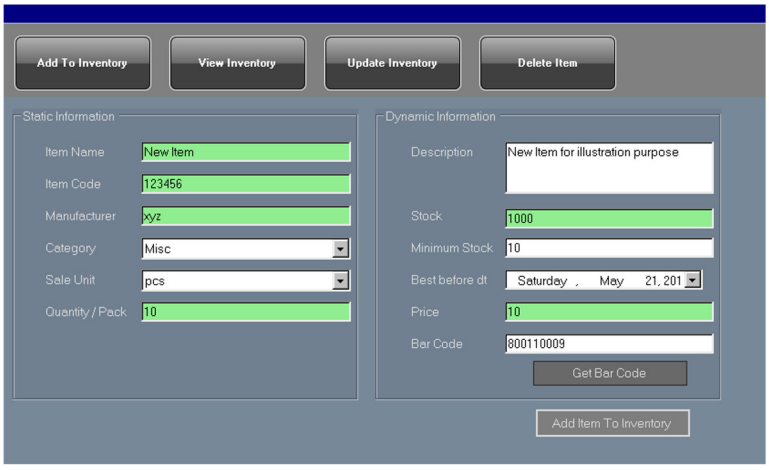
The inventory in the STEVAL-IPC004V1 system is managed by PC software application. To update the inventory, go to “Inventory/Reports” tab as shown in *Figure 23*.

Figure 23. Inventory report tab

6.1 Adding item to the inventory list

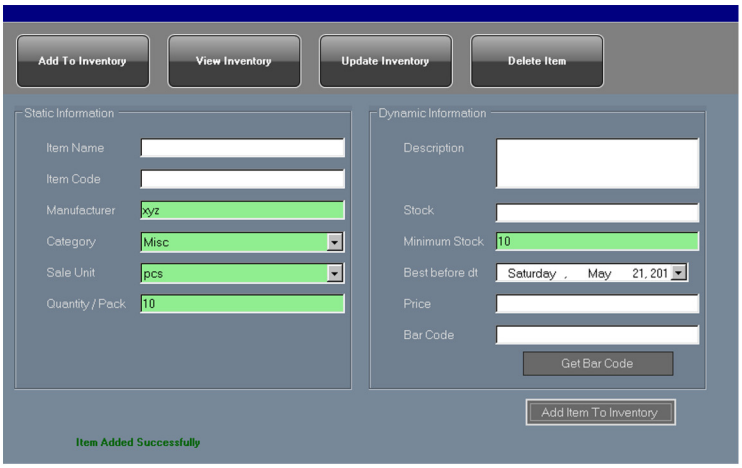
To add a new item to the inventory, click “Add To Inventory” button. A complete form is displayed (see *Figure 24*). Now fill in the form.

Figure 24. Add to inventory tab



Click “Add Item To Inventory” button available at the bottom of the form. If the addition is successful then the message given in *Figure 25* is displayed.

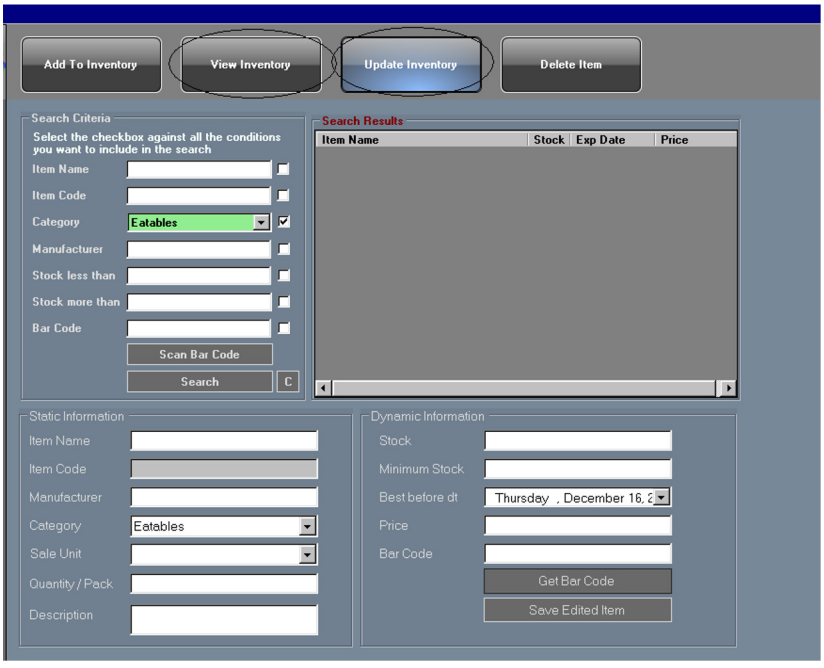
Figure 25. Item added successfully



6.2 To view the inventory

To view the inventory, click either “View Inventory” or “Update Inventory” button as shown in *Figure 26*.

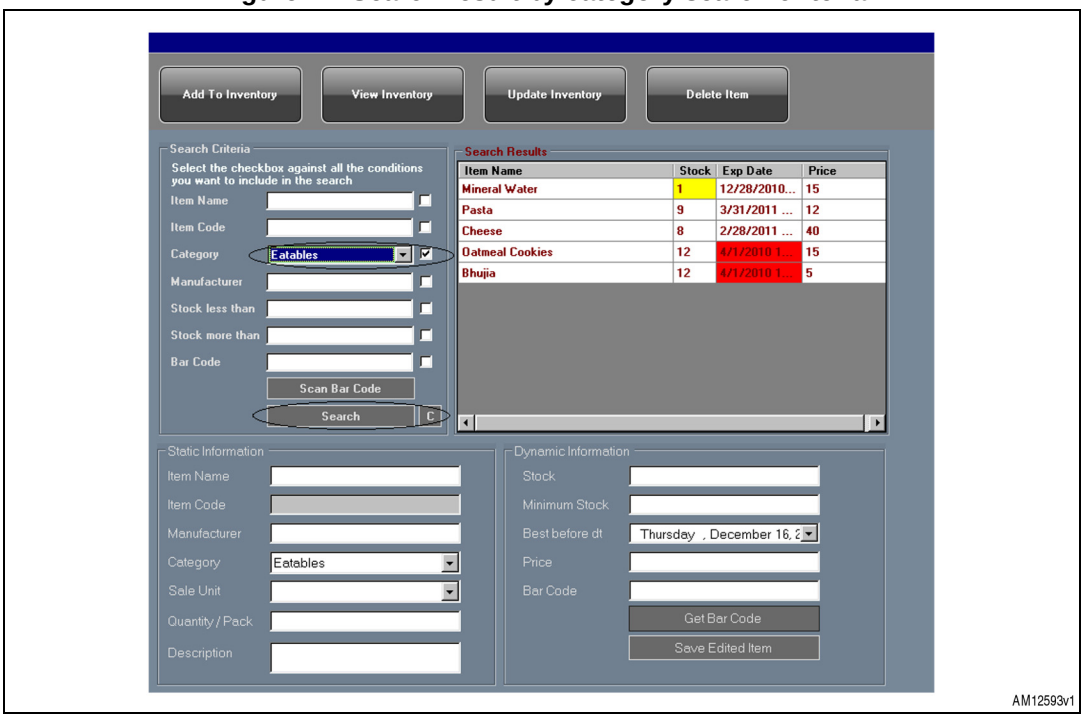
Figure 26. View inventory



As shown in *Figure 25*, there are various options to search the inventory. Click on “Check” button to specify the search. If you have unchecked all search criteria and if you click “Search” button then you can see the complete inventory in the “Search Result” window.

In *Figure 27*, a search by using the category search criterion.

Figure 27. Search result by category search criteria

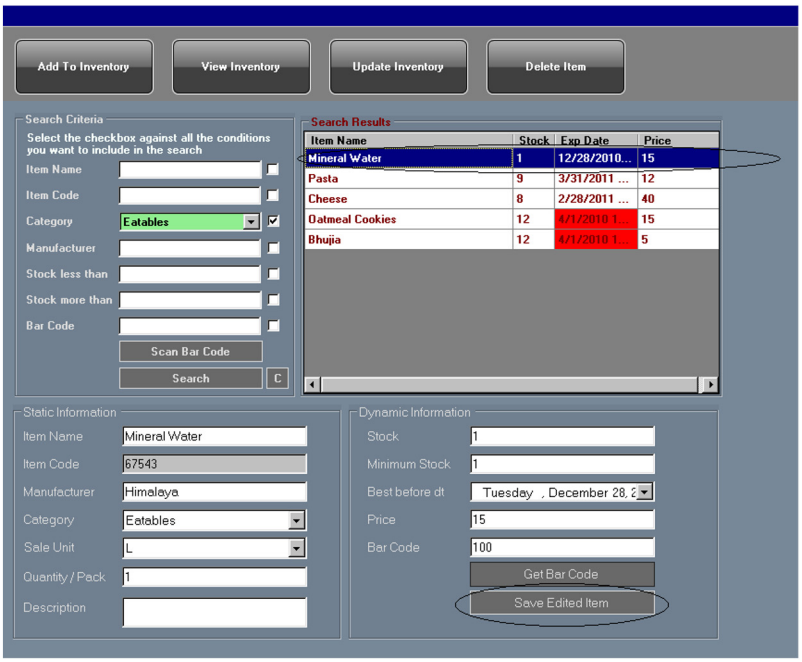


6.3 Updating inventory

To update the item, first go to “Update Inventory” then search the item as mentioned in *Section 6.2* using various search criteria.

To update any item visible in the “Search Result” window, just double click it and the complete information is given as shown in *Figure 28*. The field mentioned in the “Dynamic Information” can be changed such as: the desired stock, price, expiry date etc.

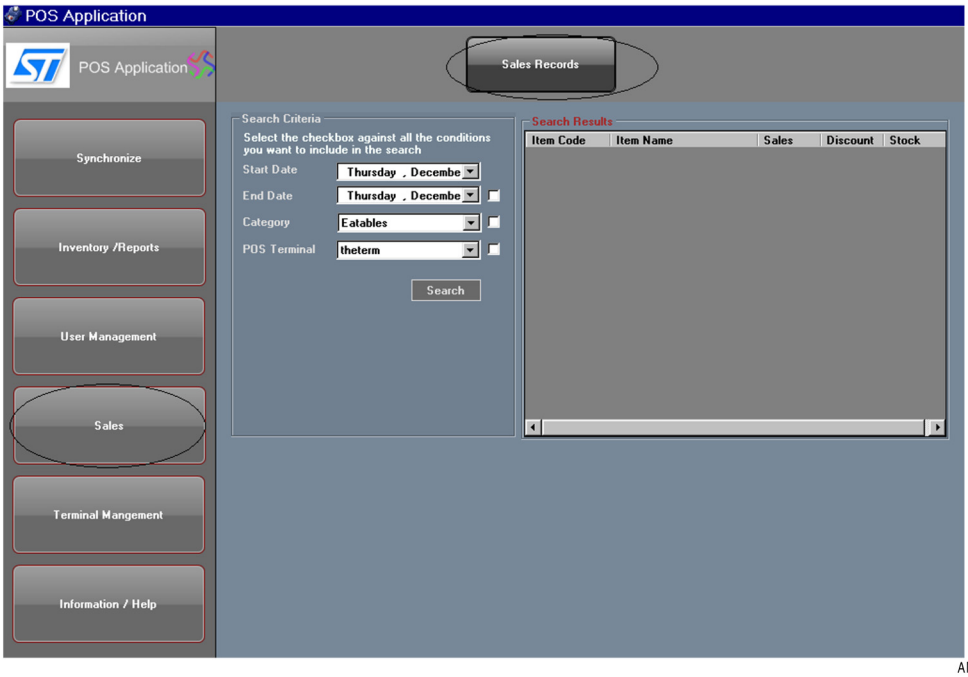
Figure 28. Updated item in inventory



6.4 Sales record view

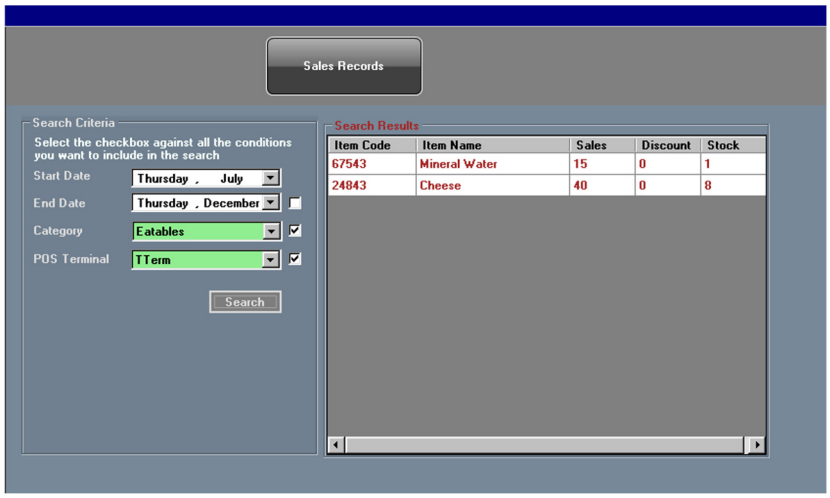
To view the sales record, go to “Sales Records” tab as shown in *Figure 29*.

Figure 29. Sales tab



To view the sales record, click “Sales Records” button. You can optimize the search criteria as per the option mentioned in *Figure 30*. Start date is always enabled by default.

Figure 30. Sales record tab



Appendix A Schematic diagram and bill of materials

Figure 31. Schematic diagram (1/11)

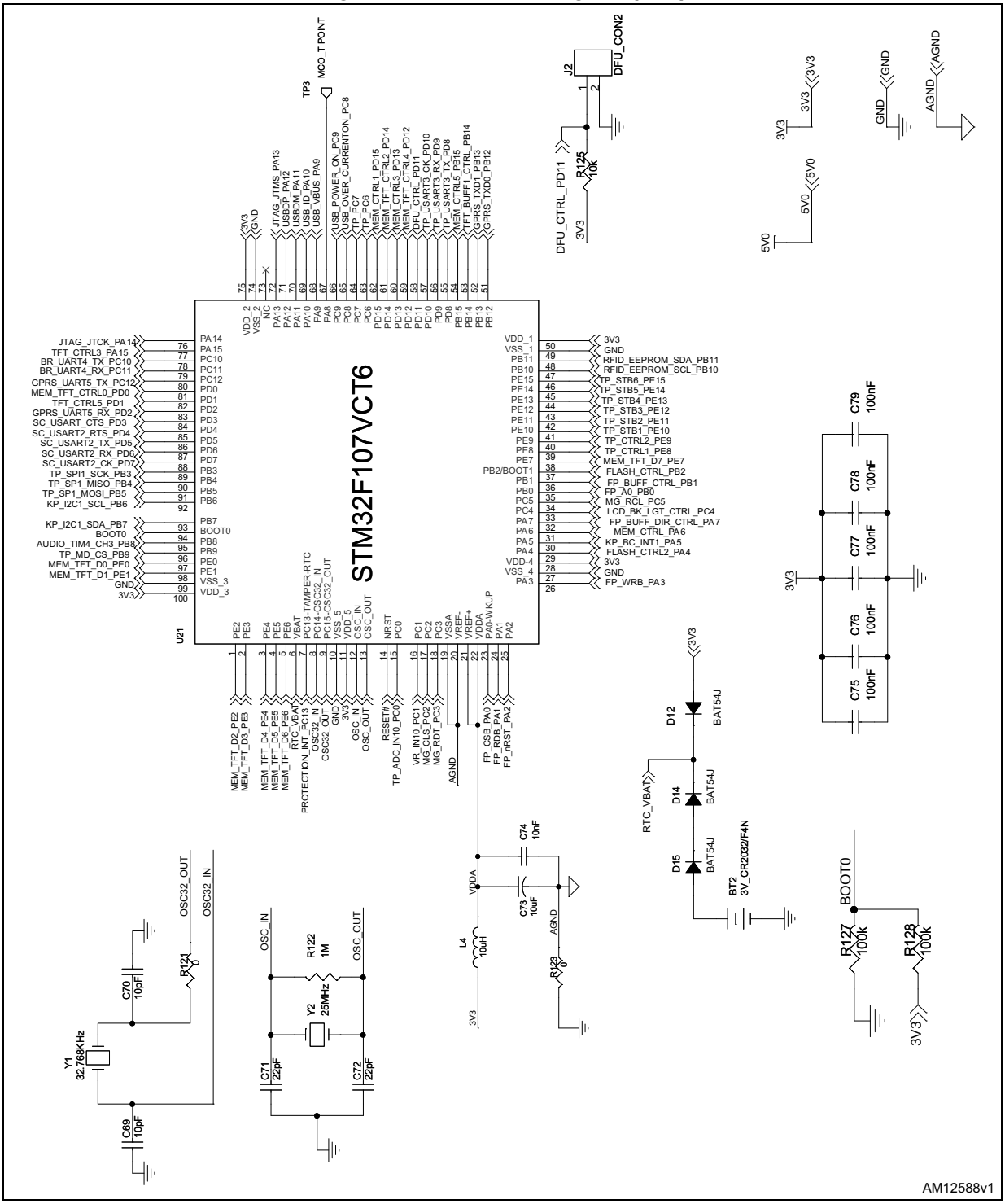


Figure 32. Schematic diagram (2/11)

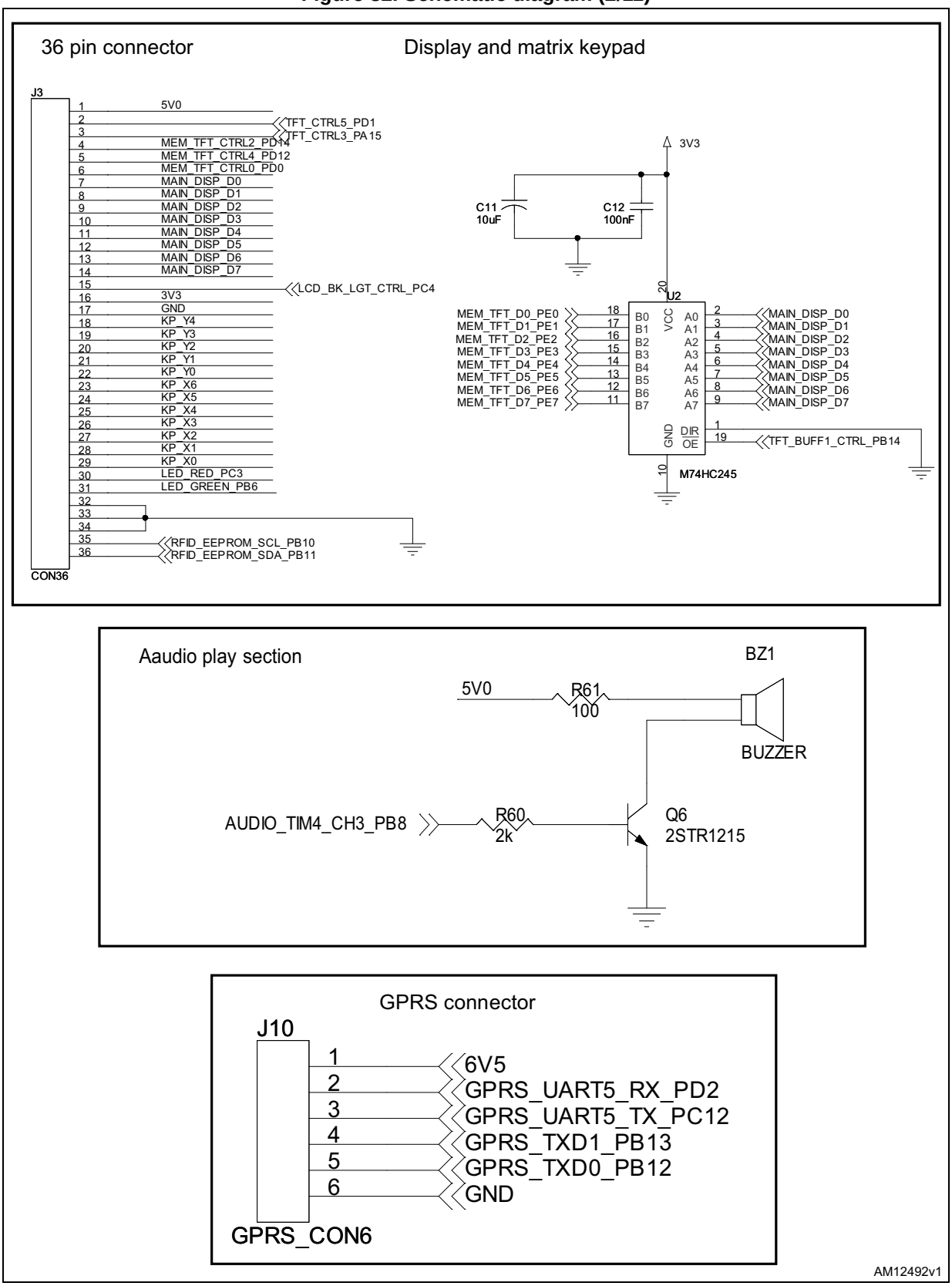


Figure 33. Schematic diagram (3/11)

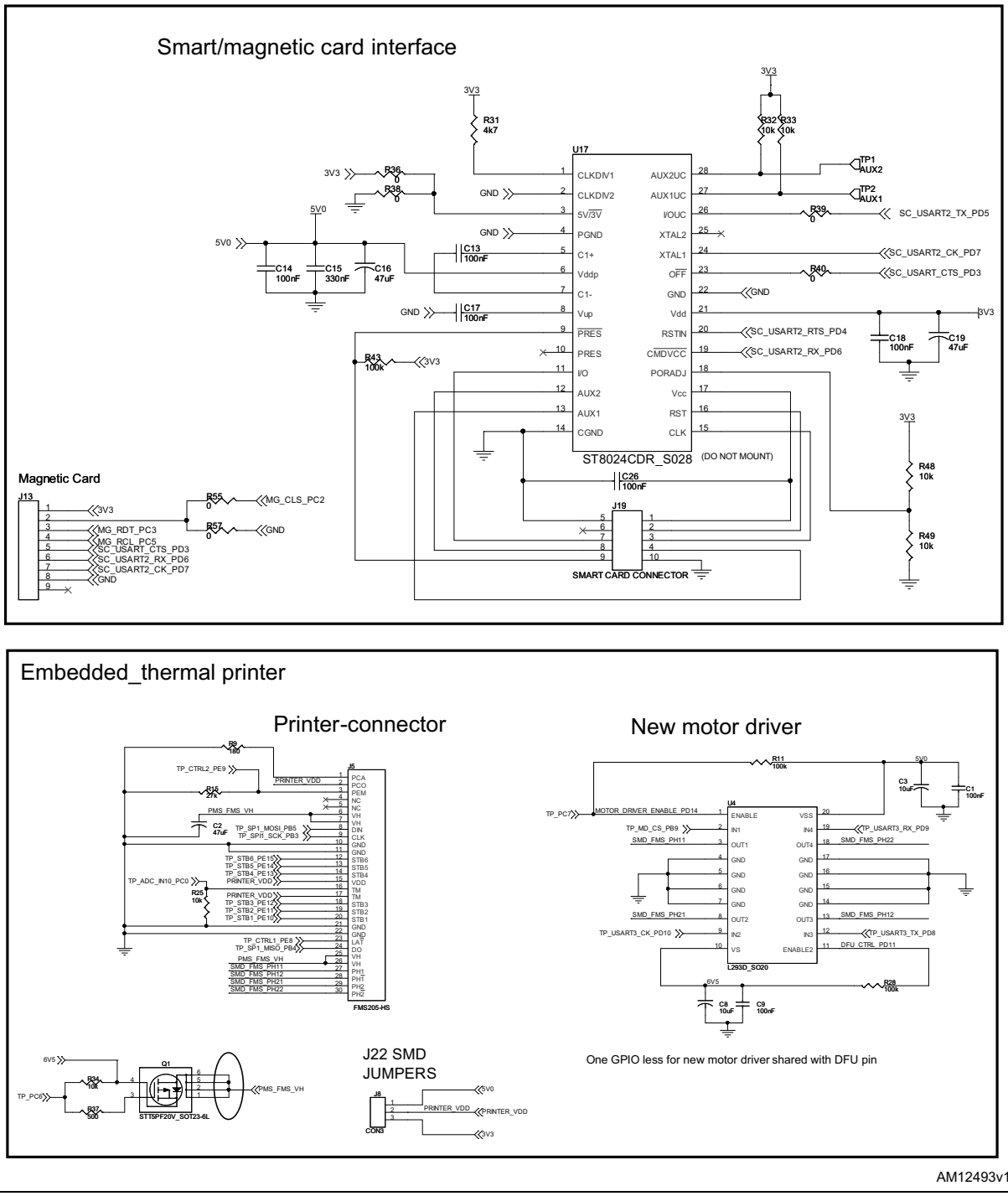


Figure 34. Schematic diagram (4/11)

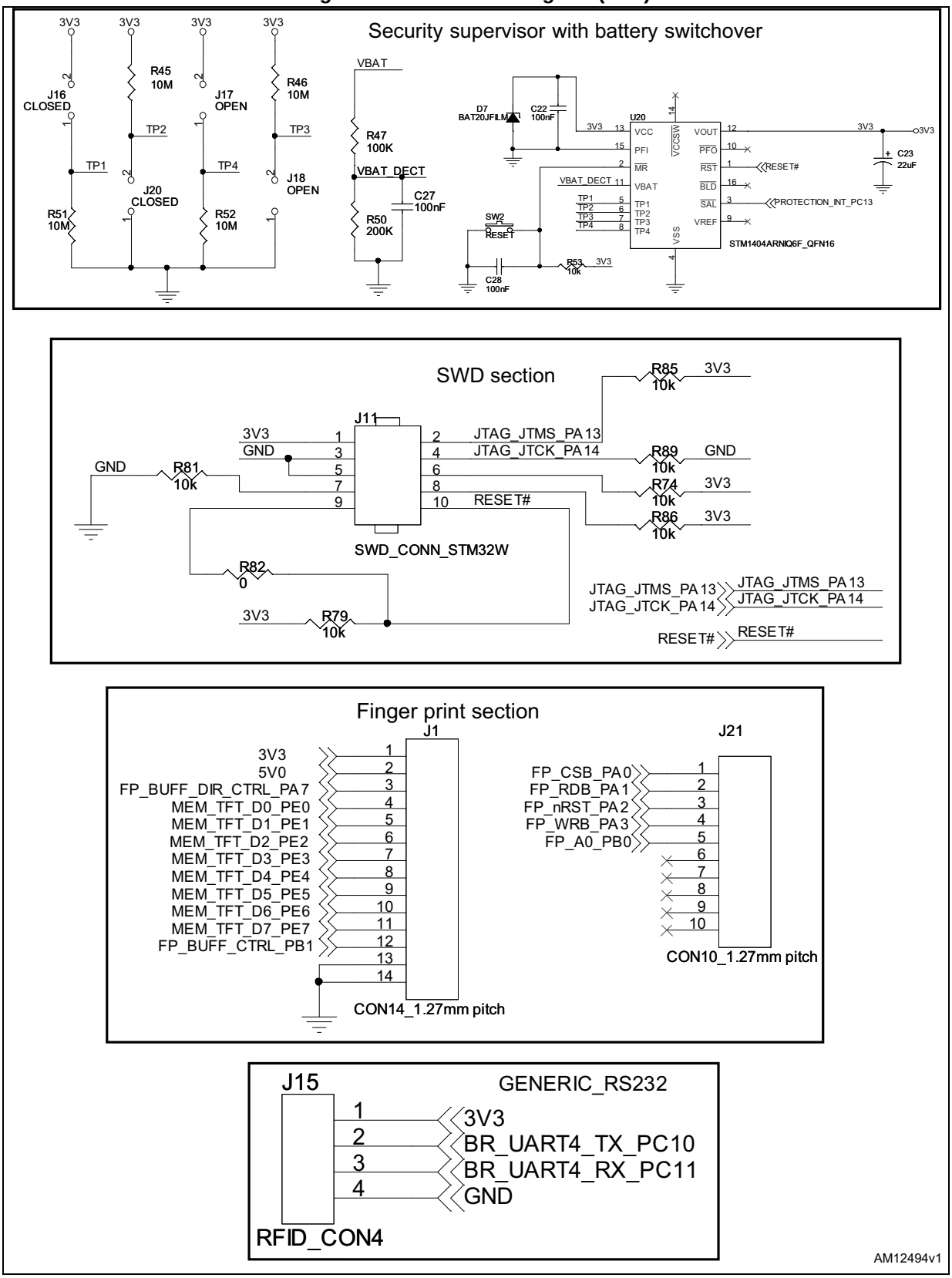


Figure 35. Schematic diagram (5/11)

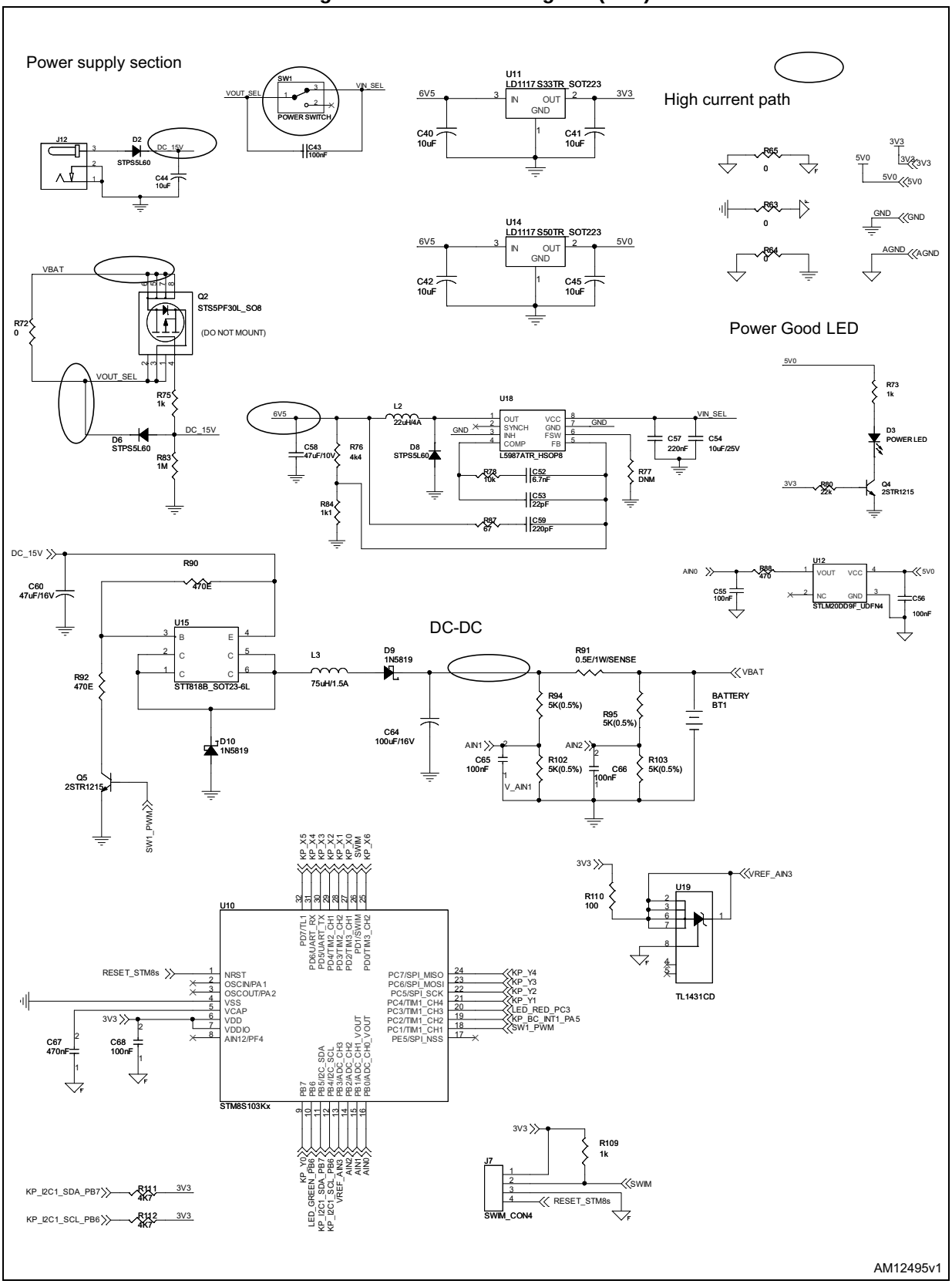


Figure 36. Schematic diagram (6/11)

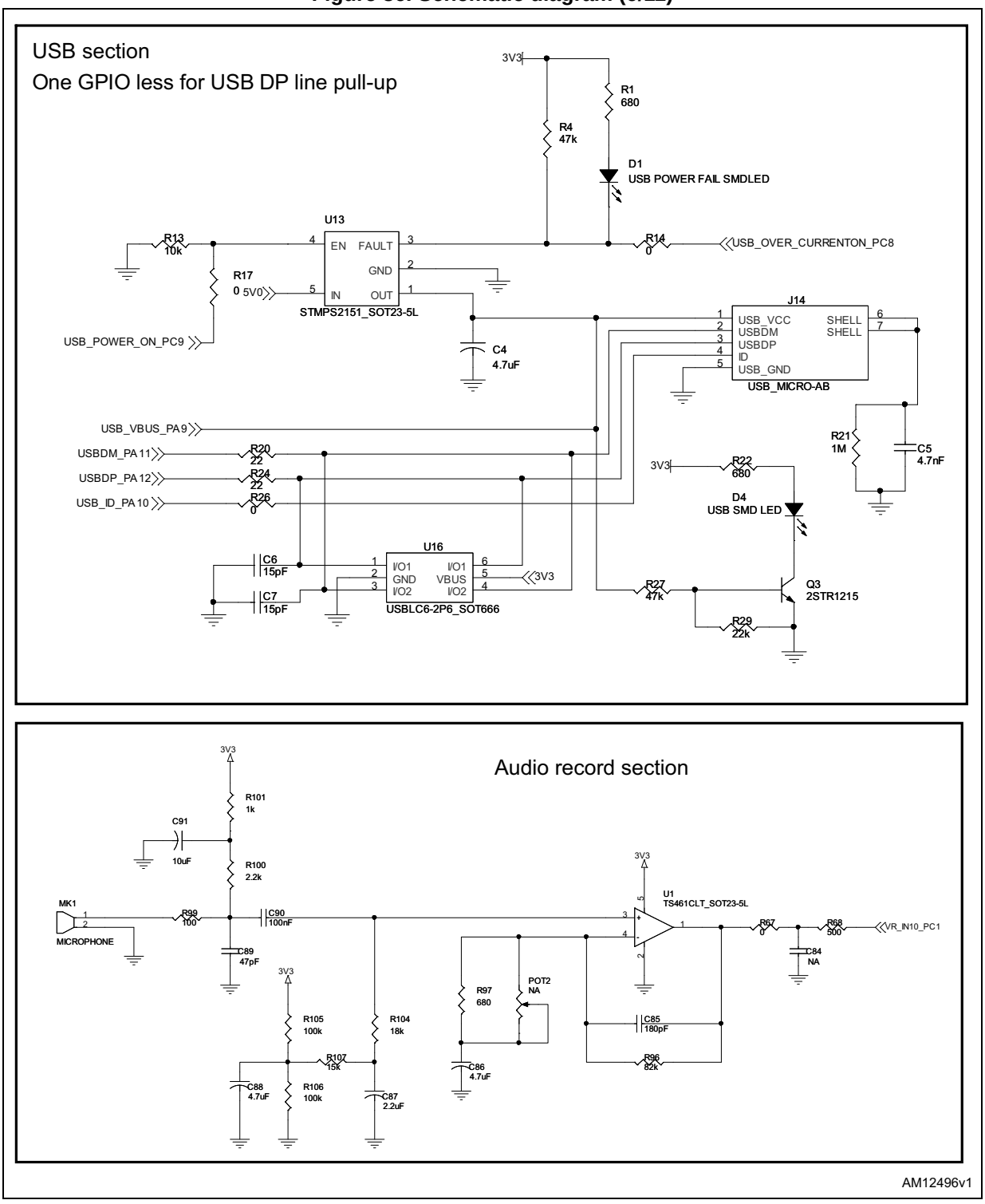


Figure 37. Schematic diagram (7/11)

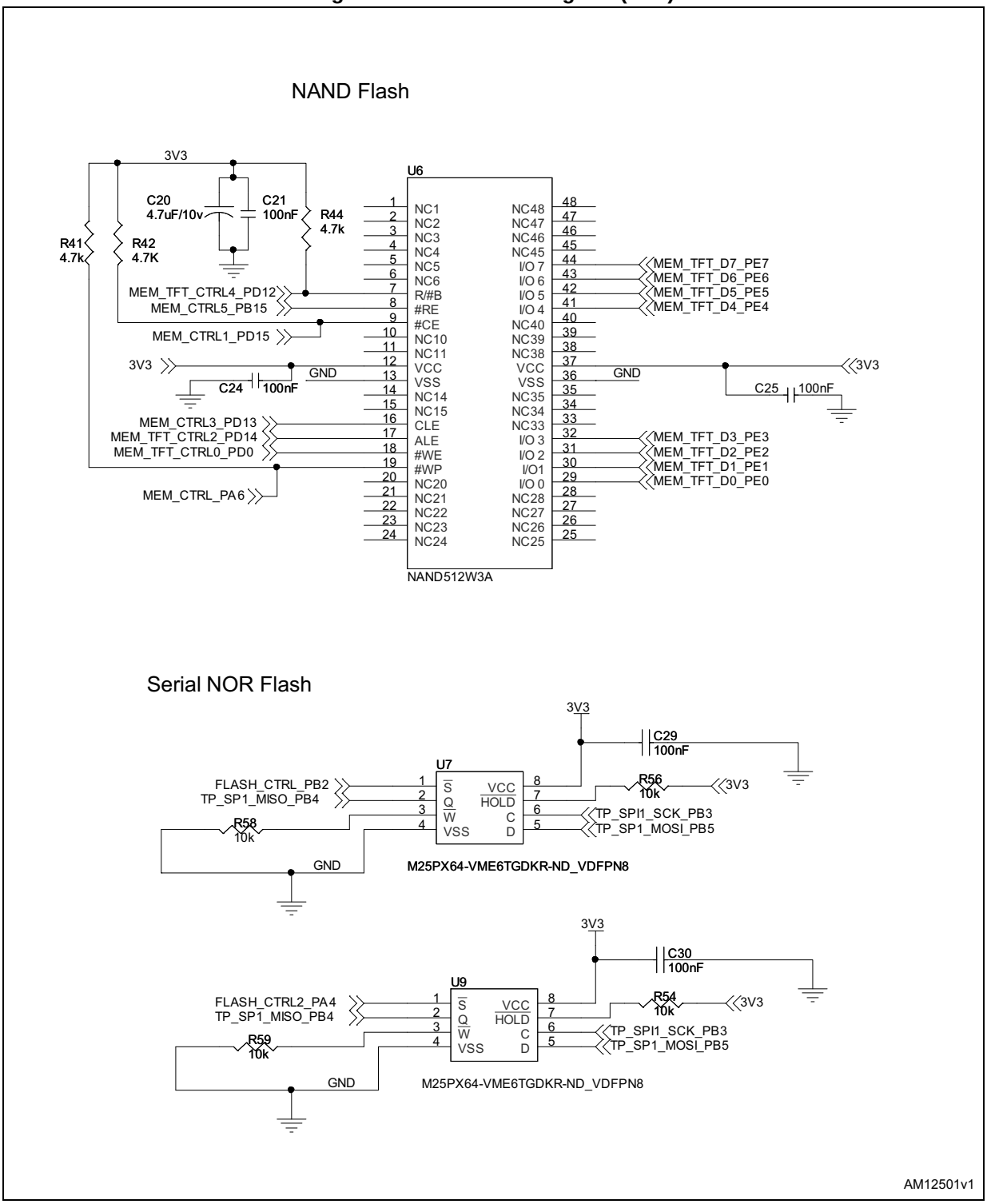


Figure 38. Schematic diagram (8/11)

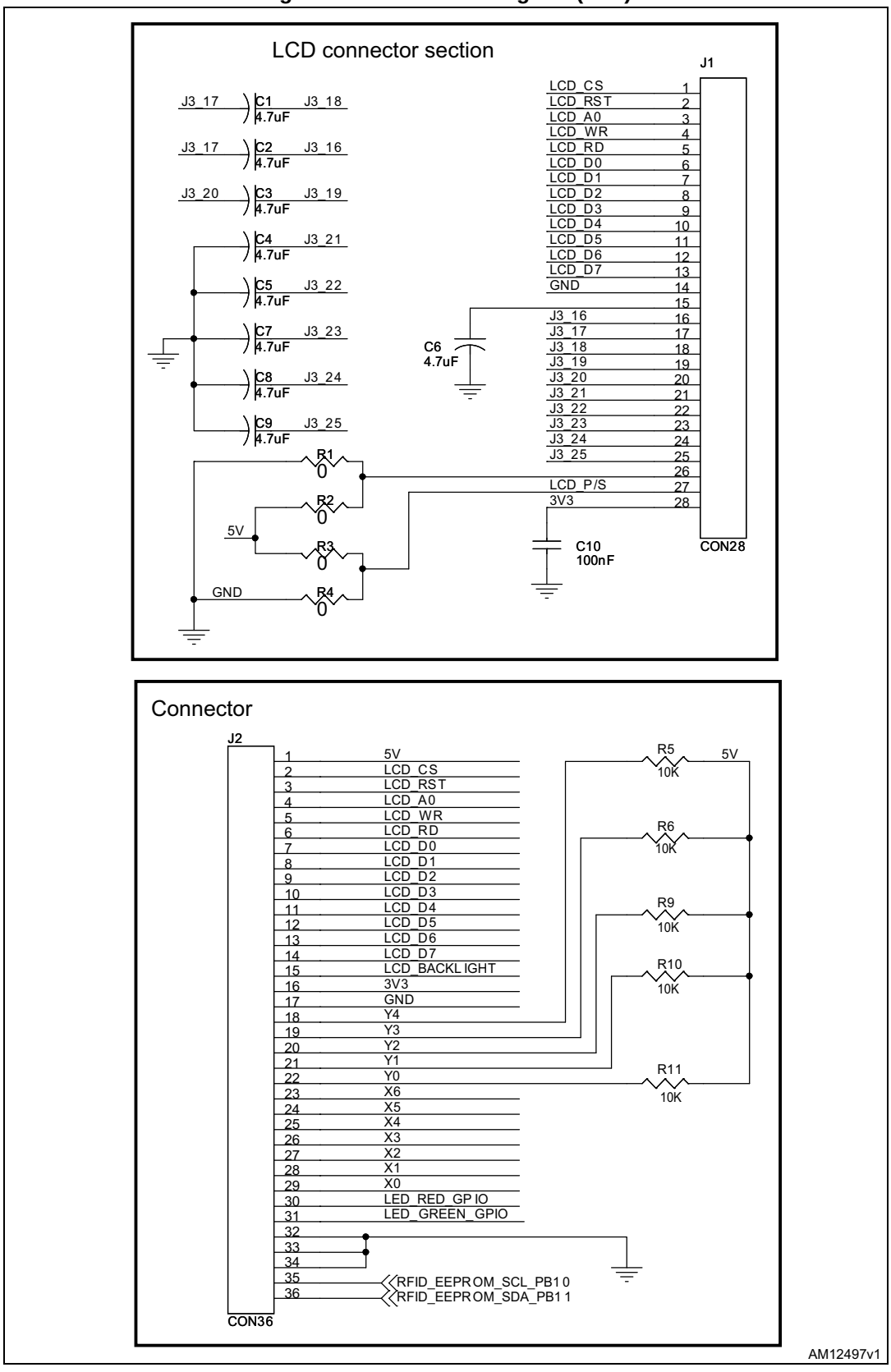


Figure 39. Schematic diagram (9/11)

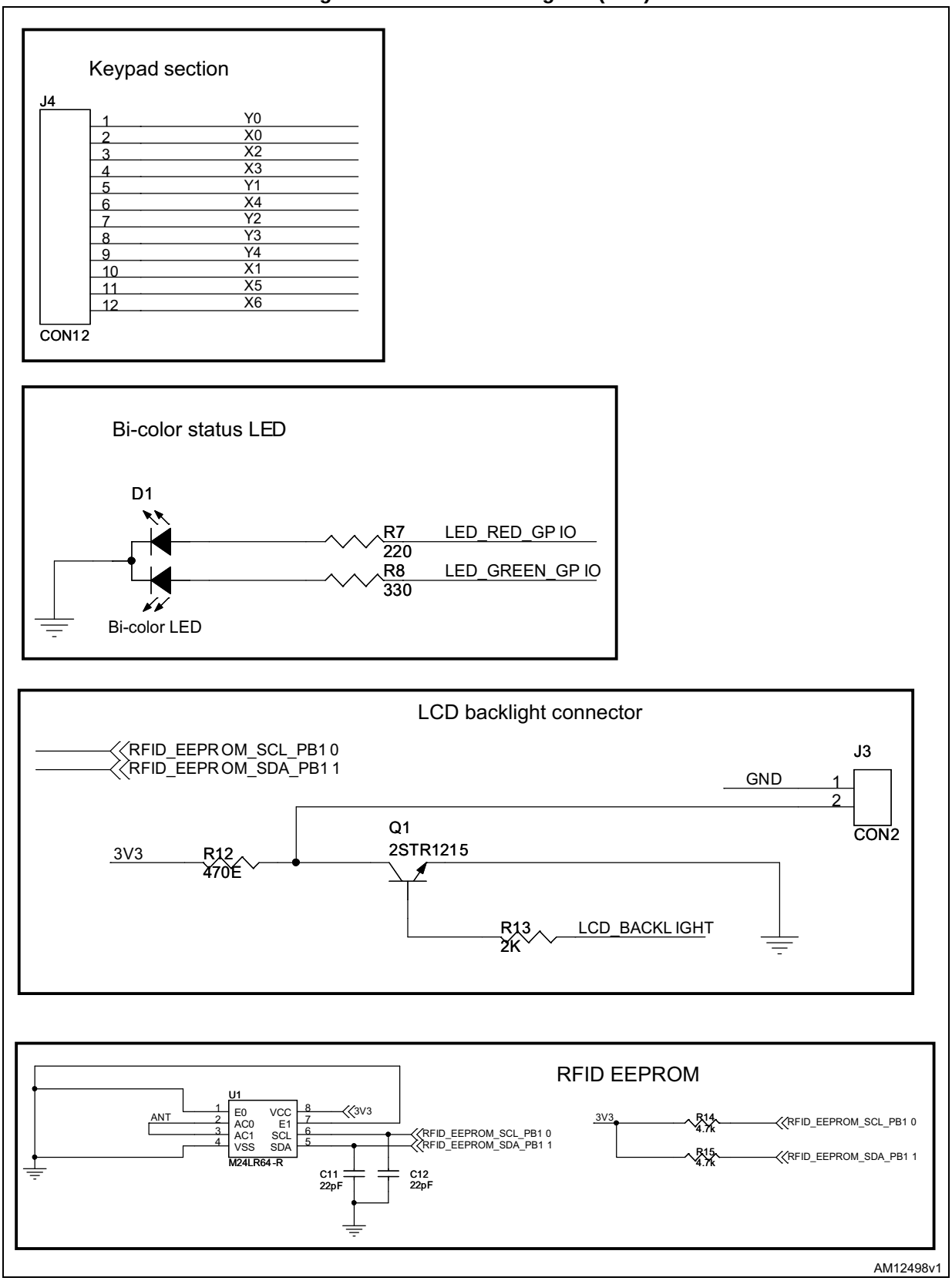


Figure 40. Schematic diagram (10/11)

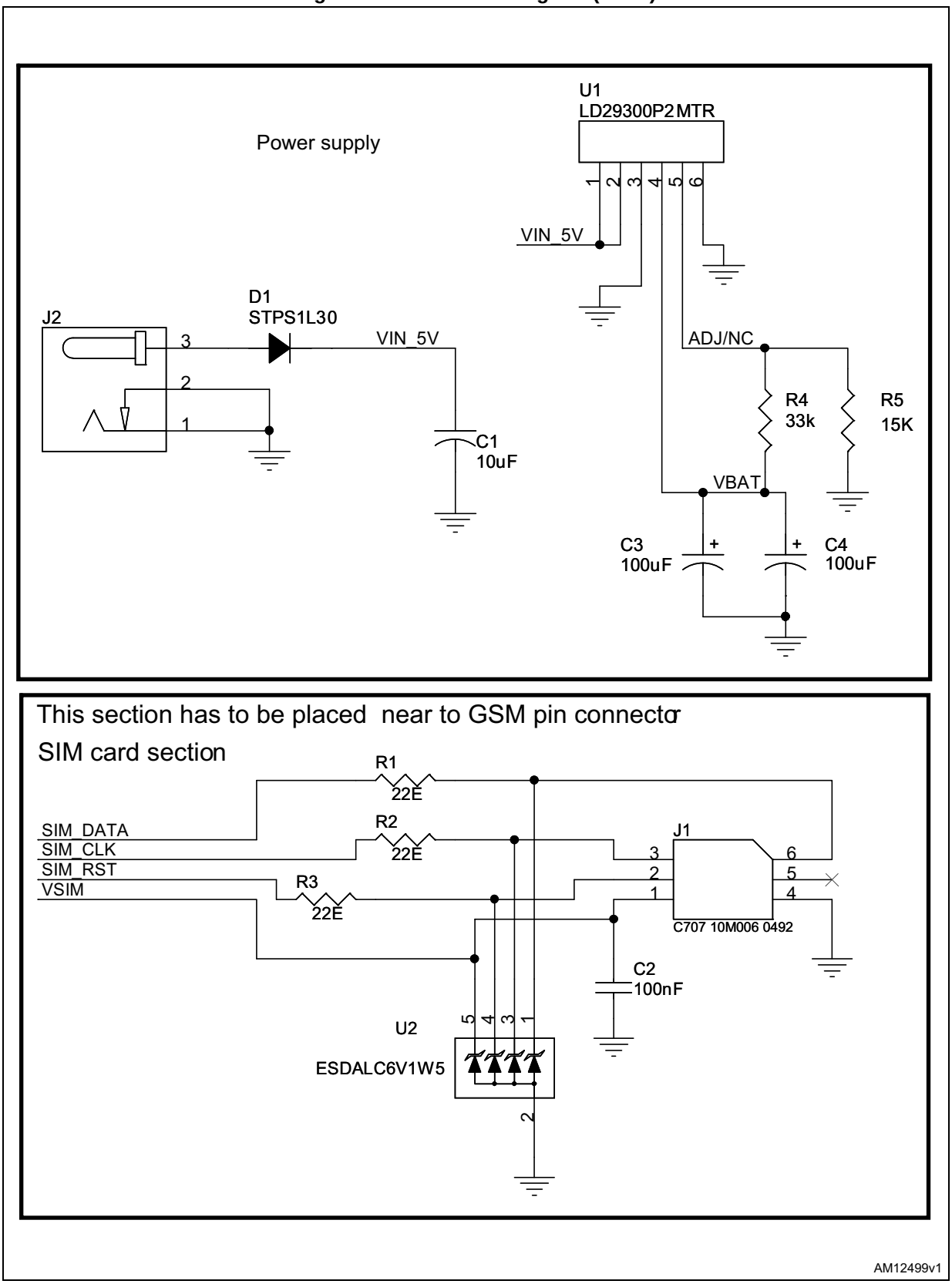


Figure 41. Schematic diagram (11/11)

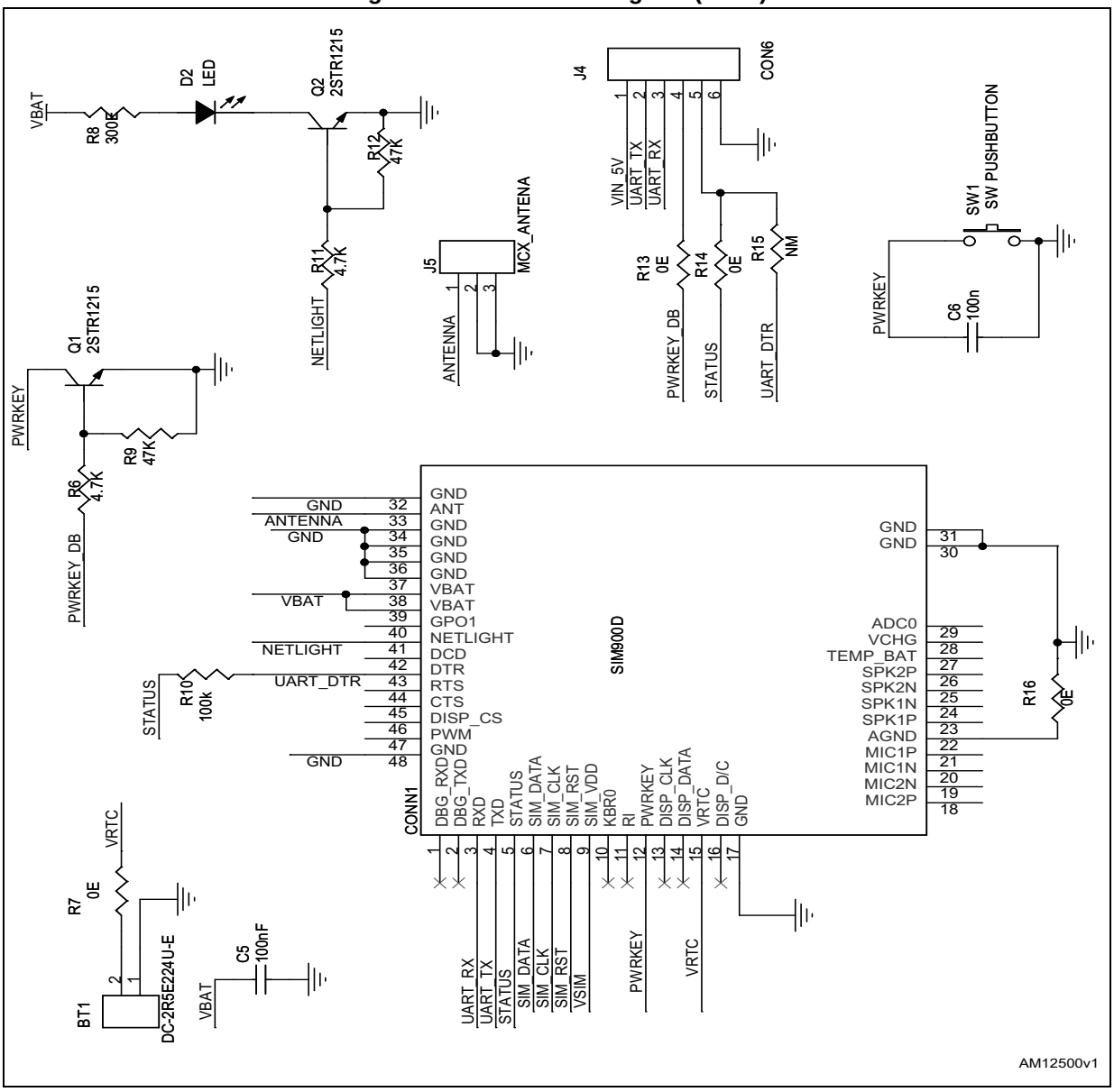


Table 2.BOM

Category	Reference designator	Component description	Package	Manufacturer	Manufacturer ordering code / orderable part number	Supplier	Supplier ordering code
ST devices	U10	STM8S103K3T6	LQFP32	ST	STM8S103K3T6TR		
	U11	LD1117S33TR	SOT223	ST	LD1117S33TR		
	U12	STLM20DD9F	UDFN4	ST	STLM20DD9F		
	U13	STMPS2151	SOT23-5L	ST	STMPS2151		
	U14	LD1117S50TR	SOT223	ST	LD1117S50TR		
	U15	STT818B	SOT23-6L	ST	STT818B		
	U16	USBLC6-2P6	SOT666	ST	USBLC6-2P6		
	U17	ST8024CDR	S028	ST	ST8024CDR		
	U18	L5987ATR	HSOP8	ST	L5987ATR		
	U19	TL1431CD	SO-8	ST	TL1431CDT		
	U20	STM1404ARNIQ6F	QFN16	ST	STM1404ARNIQ6F		
	U21	STM32F107VCT6	LQFP100	ST	STM32F107VCT6TR		
	U1	TS461CLT	SOT23-5L	ST	TS461CLT		
	U2	M74HC245	TSSOP-20	ST	M74HC245		
	U4	L293D	SO20	ST	L293DD		
	Q1	STT3P2UH7	SOT23-6L	ST	STS5PF30L		
	Q2	STS5PF30L	SO8	ST	2STR1215		
	Q3,Q4,Q5,Q6	2STR1215	SOT-23	ST	STPS5L60		
	D2,D6,D8	STPS5L60	SMC	ST	BAT20JFILM		
	D7	BAT20JFILM	SOD-323	ST	1N5819		
	D9,D10	1N5819	DO41	ST	BAT54JFILM		
	D12,D14,D15	BAT54JFILM	SOD-323	ST			

Table 2.BOM (continued)

Category	Reference designator	Component description	Package	Manufacturer	Manufacturer ordering code / orderable part number	Supplier	Supplier ordering code
Not ST devices							
Crystal and oscillator	Y1	32.768 kHz				Mouser	815-AB26T 32.768KHZ
	Y2	25 MHz				Mouser	520-HCU2500-18X

Table 2.BOM (continued)

Category	Reference designator	Component description	Package	Manufacturer	Manufacturer ordering code / orderable part number	Supplier	Supplier ordering code
Connectors and jumpers	J1	CON14_1.27 mm pitch	1.27 mm x 4 (Axial)	Any			
	J2	DFU_CON2	2.54 mm x 2 (Axial)	Any			
	J3	CON36	SMD 0.5mm x 36			Digi-Key	HFL136CT-ND
	J5	FMS205-HS	SMD 1MM x 30			Digi-Key	609-1169-1-ND
	J7	SWIM_CON4	SRCP 1,27 4 M 1 SMD 1 37 E1 094 GU-H * J 0	ERNI	284697		
	J8	CON3	SMD 0.5 mm x 3	Any			
	J10	GPRS_CON6	Axial 2.54 mm x 6	Any			
	J11	SWD_CONN_STM32W		SAMTEC	FTSH-105-01-L-DV-K		
	J12	SKT_PWR_2R0 mm_4A_THRU_RA	Any				
	J13	Magnetic card	Axial 1.25 mm x 9	Any			
	J14	USB_MICRO-AB	Micro-USB AB			Digi-Key	WM17144CT-ND
	J15	RFID_CON4	Axial 2.54 mm x 4	Any			
	J16,J20	Closed	Axial 2.54 mm x 2	Any			
	J17,J18	Opened	Axial 2.54 mm x 2	Any			
	J19	Smart card connector				Mouser	611-CCM02-2504LFTT30
	J21	CON10_1.27 mm pitch	Axial 1.27 mm x 10	Any			
LEDs	D3	Power LED					

Table 2.BOM (continued)

Category	Reference designator	Component description	Package	Manufacturer	Manufacturer ordering code / orderable part number	Supplier	Supplier ordering code
LEDs	D4	USB SMD LED					
	D1	USB power fail SMD LED					
Capacitors	C1,C9,C12,C13,C14,C17,C18, C21,C22,C24, C25,C26,C27, C28,C29,C30, C43,C55,C56, C65,C66,C68, C75,C76,C77, C78,C79,C90	100 nF	402			Mouser	810-CGA2B1X7R1C104K
	C2,C16,C19	47 µF	1206			Mouser	810-C3216X5R0J476M
	C3,C8,C11,C40,C41,C42,C44, C45,C73,C91	10 µF	1206			Mouser	81-GRM319C81C106KA2D
	C4,C86,C88	4.7 µF	1206			Mouser	80-T491A475K016
	C5	4.7 nF	402			Mouser	81-GRM15F51H472ZA01D
	C6,C7	15 pF	402			Mouser	581-UQCL2A150JAT2A
	C15	220 nF	402			Mouser	81-GRM155F51C224ZA1D

Table 2.BOM (continued)

Category	Reference designator	Component description	Package	Manufacturer	Manufacturer ordering code / orderable part number	Supplier	Supplier ordering code
Capacitors	C20	4.7 µF/10 V	1206			Mouser	80-T491A475K016
	C23	22 µF	1206			Mouser	81-GRM31CR61C226KE5K
	C52	6.7 nF	402			Digi-Key	445-4950-1-ND

Table 2.BOM (continued)

Category	Reference designator	Component description	Package	Manufacturer	Manufacturer ordering code / orderable part number	Supplier	Supplier ordering code
Capacitors	C71,C72	22 nF	402			Mouser	810-CGA2B2C0G1H220J
	C53	100 µF	402			Mouser	810-CGA2B2C0G1H101J
	C54	10 µF	1206			Digi-Key	587-1337-1-ND
	C57	220 nF	402			Mouser	81-GRM155F51C224ZA1D
	C58	47 µF/16 V	1206			Mouser	810-C3216X5R1C476M
	C59	47 nF	402			Mouser	810-CGA2B2X7R1H472K
	C60	47 µF/16 V	1206			Mouser	810-C3216X5R1C476M
	C64	100 µF/16V	2010				581-TPSF107M016R0200
	C67	470 nF	402			Mouser	81-GRM155F51C474ZA1D
	C69,C70	10 pF	402			Mouser	810-CGA2B2C0G1H100D

Table 2.BOM (continued)

Category	Reference designator	Component description	Package	Manufacturer	Manufacturer ordering code / orderable part number	Supplier	Supplier ordering code
Capacitors	C74	10 nF	402			Mouser	810-CGA2B2X8R1E103K
	POT2,C84	NA					
	C85	180 pF	402			Mouser	
	C87	2.2 µF	1206			Mouser	810-C3216X5R1A225M
	C89	47 pF	402			Mouser	77-VJ0402A470KXXCBC
Inductors	L2	22 µH/4 A				Mouser	710-744770127
	L3	68 µH/1.5 A				Digi-Key	587-2635-1-ND
	L4	Ferrite bead 10 Ω				Mouser	652-MH2029-100Y

Table 2.BOM (continued)

Category	Reference designator	Component description	Package	Manufacturer	Manufacturer ordering code / orderable part number	Supplier	Supplier ordering code
Resistors	R1,R22,R97	680 Ω	402			Mouser	71-CRCW0402-680-E3
	R4,R27	47 kΩ	402			Mouser	660-RK73B1ETTP473J
	R9	180 Ω	402			Mouser	660-RK73H1ETTP1800F
	R11,R28,R43, R47,R105,R106, R127,R128	100 kΩ	402			Mouser	660-RK73B1ETTP104J
	R13,R25,R32, R33,R34,R48, R49,R53,R54, R56,R58,R59, R74,R79,R81, R85,R86,R89, R125	10 kΩ	402			Mouser	660-RK73H1ETTP1002F
	R14,R17,R26, R38,R39,R40, R57,R63,R64, R67,R72,R82, R121,R123	0	402			Digi-Key	RMCF0402ZT0R00CT-ND
	R15	27 kΩ	402			Mouser	71-CRCW040227K0FKED
	R20,R24	22 Ω	402			Mouser	660-RK73H1ETTP22R0F
	R21,R83,R122	1 MΩ					

Table 2.BOM (continued)

Category	Reference designator	Component description	Package	Manufacturer	Manufacturer ordering code / orderable part number	Supplier	Supplier ordering code
Resistors	R29,R80	22 kΩ	402			Mouser	660-RK73H1ETTP2202F
	R31, R76,R111,R112	4.7 kΩ	402			Mouser	71-CRCW0402-4.7K-E3
	R37,R68	510 Ω	0402				
	R41,R42,R44	4.7 kΩ	402			Mouser	71-CRCW0402-4.7K-E3
	R45,R46,R51, R52	10 kΩ	0402			Mouser	660-RK73H1ETTP1002F
	R50	200 kΩ	402			Mouser	71-CRCW0402J-200K-E3
	R60	2.2 kΩ	0402				
	R61,R99,R110	100 Ω	402			Mouser	754-RR0510P-101D
	R73,R75,R101, R109	1.1 kΩ	0402				
	R76	5.1 kΩ	402			Mouser	71-CRCW0402-4.7K-E3
	R77	DNM					
	R84	470 Ω	402			Mouser	660-RK73H1ETTP4700F
	R87	120 Ω	402				
	R88	470 Ω	402			Mouser	660-RK73H1ETTP4700F

Table 2.BOM (continued)

Category	Reference designator	Component description	Package	Manufacturer	Manufacturer ordering code / orderable part number	Supplier	Supplier ordering code
Resistors	R90,R92	470 E	402			Mouser	660-RK73H1ETTP4700F
	R91	0.5 E/1 W/SENSE	1206			Mouser	66-LR1206-LF-R500-F
	R94,R95,R102, R103	5.1 kΩ(0.5%)	0402			Mouser	71-CRCW0402-5.1K-E3
	R96	82 kΩ	402			Mouser	71-CRCW0402J-82K-E3
	R100	2.2 kΩ	402			Mouser	71-CRCW0402-2.2K-E3
	R104	18 kΩ	402			Mouser	71-CRCW0402-18K-E3
	R78	6.8 kΩ	402				
	R107	15 kΩ	402			Mouser	660-RK73H1ETTP1502F

Table 2.BOM (continued)

Category	Reference designator	Component description	Package	Manufacturer	Manufacturer ordering code / orderable part number	Supplier	Supplier ordering code
Misc	MK1	Microphone					
	BT1	Battery					
	BT2	3V_CR2032/F4N				Digi-Key	A99327CT-ND (Battery Holder) / P189-ND (Battery)
	BZ1	Buzzer					
	U6	NAND512W3AN	TSOP48				
	U7,U9	N25Q064A13EF840F	VDFPN8	Micron			N25Q064A13EF840F
	SW1	Power switch					
	SW2	Reset					
	TP1	AUX2					
	TP2	AUX1					
	TP3	MCO_T POINT					
	1	ST_LOGO					
	Flex Cable	Cable supporting 36 pin connector				Digi-Key	WM10229-ND
Display and keypad							
ST devices	Q1	2STR1215	SOT-23	ST	2STR1215		
	U1	M24LR64-RDW6T/2	TSSOP8	ST	M24LR64-RDW6T/2		
Capacitors	C1,C2,C3,C4,C5, C6,C7,C8,C9	4.7 μF	1206				
	C10	100 nF	0805			Mouser	810-CGJ4J2X7R1C104K

Table 2.BOM (continued)

Category	Reference designator	Component description	Package	Manufacturer	Manufacturer ordering code / orderable part number	Supplier	Supplier ordering code
Resistors	R14,R15	4.7 kΩ	0805			Mouser	71-CRCW0805-4.7K-E3
	R1,R2,R3,R4,R5, R6,R9,R10,R11	10 kΩ	0805			Mouser	71-CRCW0805-10K-E3
	R7	220 Ω	0805			Mouser	71-CRCW0805-220-E3
	R8	330 Ω	0805			Mouser	71-CRCW0805-330-E3
	R12	470E	0805			Mouser	71-CRCW0805-470-E3
	R13	2 kΩ	0805			Mouser	71-CRCW0805-2.0K-E3
Connectors	J1	CON28	SMD 0.8 mm x 28				
	J2	CON36				Digi-Key	HFL136CT-ND
	J3	CON2	PCB	Any			
Misc	D1	Bi-color LED				Digi-Key	P392-ND
	E1	ANTENA	PCB	Any			
	S1,S2,S3,S4,S5, S6,S7,S8,S9,S10, S11,S12,S13,S14 ,S15,S16,S17,S1 8,S19,S20,S21,S 22,S23,S24,S25, S26,S27,S28,S29 ,S30	SMD 6 mm X 6 mm				Digi-Key	679-2420-1-ND
	1	ST_LOGO	PCB				

Table 2.BOM (continued)

Category	Reference designator	Component description	Package	Manufacturer	Manufacturer ordering code / orderable part number	Supplier	Supplier ordering code
GSM evaluation board BOM							
ST devices	D1	STPS1L30	SOT-23	ST	STPS1L30		
	Q1,Q2	2STR1215	SOT-23	ST	2STR1215		
	U1	LD29300P2MTR	P2PAK/A	ST	LD29300P2MTR		
	U2	ESDALC6V1W5	SOT323-5L	ST	ESDALC6V1W5		
Resistors	R1,R2,R3	22E	0805			Mouser	71-CRCW080522R0JNEA
	R4	33 kΩ	0805			Mouser	71-RCV0805301KFKEA
	R5	15 kΩ	0805			Mouser	71-CRCW0805-15K-E3
	R6,R11	4.7 kΩ	0805			Mouser	71-CRCW0805-4.7K-E3
	R7,R13,R14,R16	0E	0805			Mouser	667-ERJ-6GEY0R00V
	R8	300E	0805			Mouser	71-CRCW0805300RFKEA
	R9,R12	47 kΩ	0805			Mouser	71-CRCW0805300RFKEA
	R10	100 kΩ	0805			Mouser	71-CRCW0805-100K-E3
	R15	NM					

Table 2.BOM (continued)

Category	Reference designator	Component description	Package	Manufacturer	Manufacturer ordering code / orderable part number	Supplier	Supplier ordering code
Connectors	J1	C707 10M006 0492	SIM card connector				361-1021-1-ND
	J2	SKT_PWR_2R0mm_4A_THRU_RA		Any			
	J4	CON6	Axial 2.54 mm x 6				
	J5	CON3 (RCPT IPEX MHF)	Receptacle, male pins			Digi-Key	931-1107-1-ND
Capacitors	C1	10 μF	1206			Mouser	81-GRM319C81C106KA2D
	C2,C5	100 nF	0805			Mouser	810-C2012X7R2A104K
	C3,C4	100 μF	1206			Mouser	810-C3216X5R1A107M
	C6	100 nF	0805			Mouser	810-C2012X7R2A104K
Misc	BT1	DC-2R5E224U-E					
	CONN1	SIM900D					
	D2	LED					
	SW1	SW Pushbutton					
	TP1	Test point					

Revision history

Document revision history

Date	Revision	Changes
13-May-2014	1	Initial release.

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