UM1058
User manual

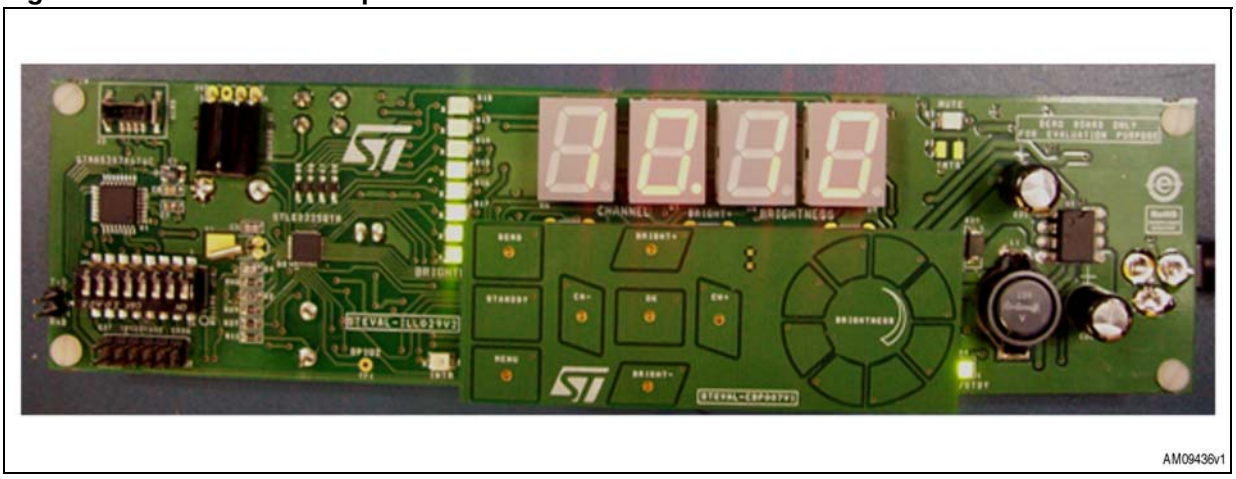
STEVAL-ILL029V2/STEVAL-CBP007V1: front panel demo with STLED325 and STMPE24M31 based touch panel

Introduction

This document explains the operation of the front panel demonstration board based on the advanced LED controller driver STLED325 and 8-bit microcontroller STM8S as I^2C master. This system can be operated along with the STMPE24M31-based touch panel or the mechanical keys. The objective of this board is to demonstrate the features of the STLED325 LED controller driver, such as key scanning, RTC, IR decoding, standby management, etc., as well as features of the advanced S-Touch device STMPE24M31 to fit the market segment of DVD players, DVD recorders, set-top boxes, washing machines, etc., keeping the system cost as low as possible.

The system can be operated using the various touchkeys or mechanical front panel keys provided on the system, as well as by remote control. System I/O is handled completely by STLED325 and STMPE24M31 with minimal load on the host processor. The system can be operated in two modes: touch interface mode or standalone mode (with mechanical keys on STEVAL-ILL029V2). On power-up, the system automatically detects the presence of the touch interface daughter card (STEVAL-CBP007V1) and goes into touch interface mode. If there is no touch card plugged in, the system enters standalone mode and can be operated using mechanical keys.

Figure 1. STLED325 front panel demo with STMPE24M31 touch interface



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1 Features

The salient features of the system are:

- 4-digit, 7-segment (and decimal point) LED display
- 8 x discrete LEDs
- 8 front panel touchkeys for channel and brightness up/down, OK, menu, and standby (in touch interface mode)
- 8-channel touch status type rotator on STEVAL-CBP007V1 for brightness control (clockwise/anticlockwise) (in touch interface mode)
- 8 front panel mechanical keys for channel and brightness up/down, OK, menu, and standby (in standalone mode with no touch interface)
- A bicolor power/standby LED
- An interrupt LED (blinks with the interrupt)
- A potentiometer for adjusting the brightness of the display (accessible in standalone mode)
- Demo mode
- Multi format remote control operation (only RC5 supported currently, but easily extendable for various other formats. Refer to the STLED325 datasheet)
- Embedded in-circuit programming using SWIM interface for STM8S

The complete functionality and operation of the demonstration board is explained in the sections below.

2 Hardware description

Figure 2. STEVAL-ILL029V2 demonstration board front view

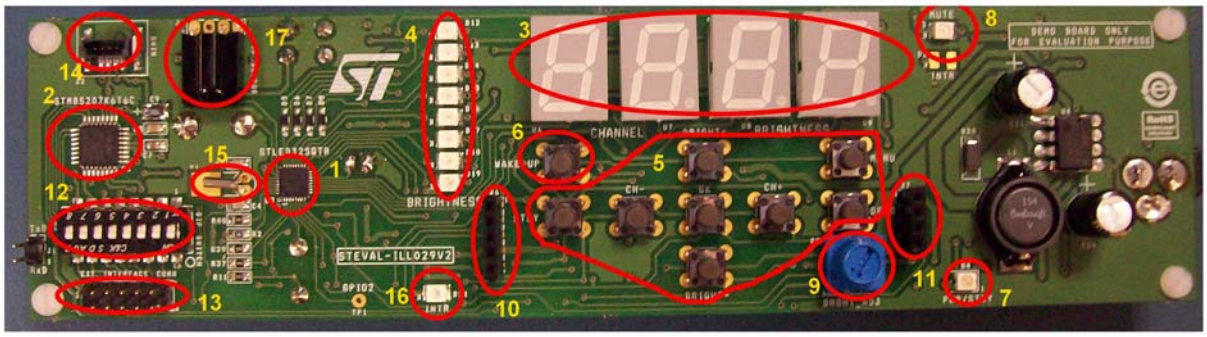


Figure 3. STEVAL-ILL029V2 demonstration board rear view

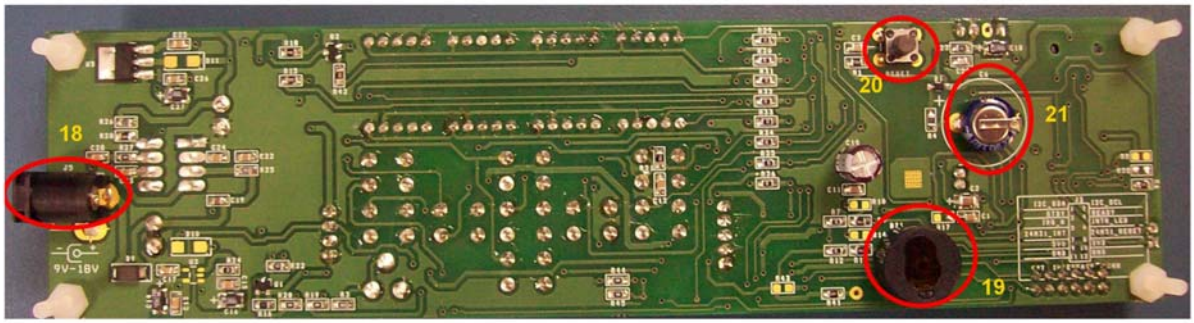


Figure 4. STEVAL-CBP007V1 front view

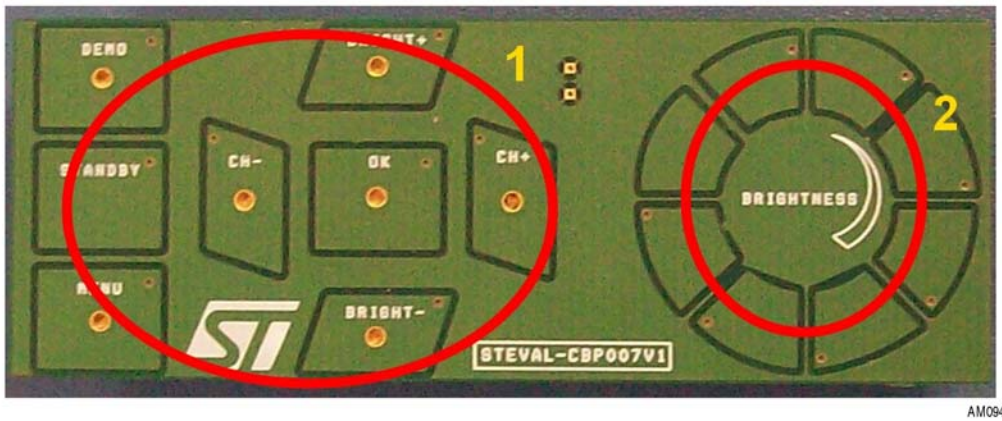


Figure 5. STEVAL-CBP007V1 rear view

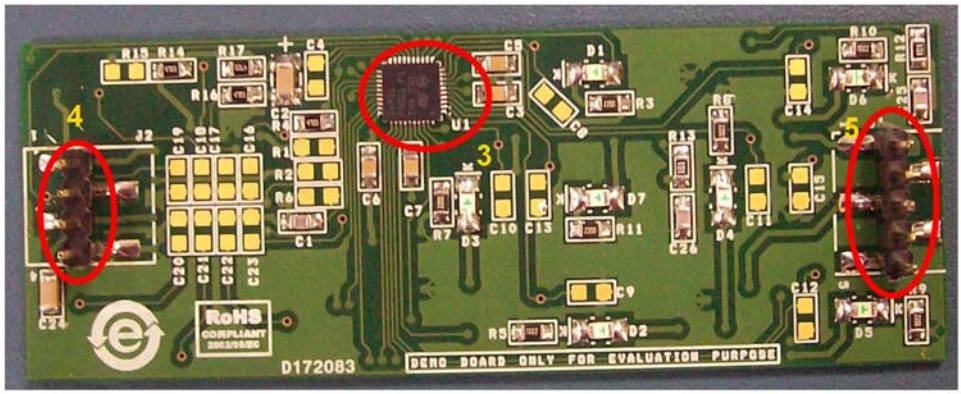
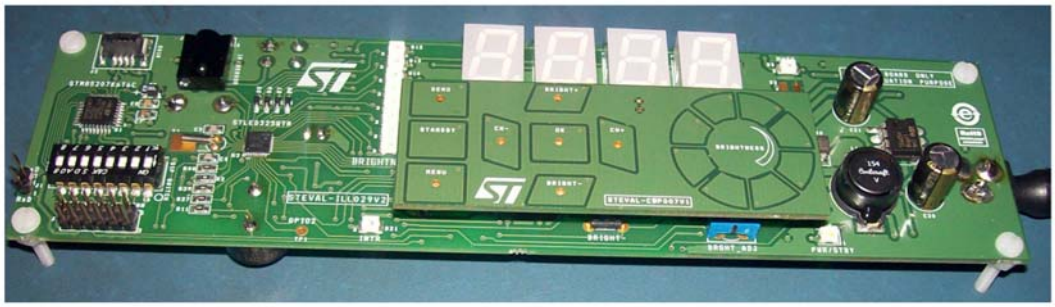


Figure 6. STLED325 board with STEVAL-CBP007V1



Major components present on STEVAL-ILL029V2 board are (refer to *Figure 2* and *3*):

- 8 front panel keys (1): CH+, CH-, BRGHT+, BRGHT-, STBY, MENU, OK, DEMO
- 8 front panel keys (5): CH+, CH-, BRGHT+, BRGHT-, STBY, MENU, OK, DEMO
- BRGHT_ADJ potentiometer (9)
- PWR/STBY LED (7)
- Interrupt LED (16)
- MUTE LED (8)
- External Host Interface connector (13)
- DIP switch(12)
- SWIM connector (14)
- IR sensor (17)
- STM8S207K6T6 microcontroller(2)
- 7-segment (+dot) display (3)
- STLED325(1)
- 32.768 kHz RTC crystal(15)
- 8 discrete LEDs for brightness(4)

- Wake-up key (6)
- DC buzzer for alarm function(19)
- Super cap for backup (21) (battery can also be used as an alternative to super cap)
- System reset switch (20)
- DC power jack (18)

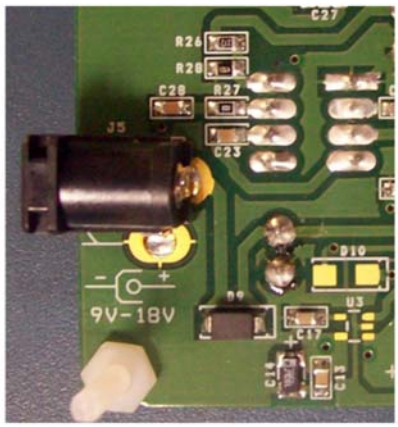
Major components present on STEVAL-CBP007V2 are (refer *Figure 4* and *5*):

- STMPE24M31QTR (3)
- Connectors to interface STEVAL-CBP007V1 with STEVAL-ILL029V2 (4, 5)
- 8 touchkeys for individual functions, 8-channel rotator for brightness control (1,2)

2.1 Power supply unit

The board is equipped with a DC jack, shown in *Figure 7*, into which an external adaptor (9 V-18 V, 500 mA) can be plugged. The board consists of a 5 V output switching regulator for higher efficiency and a 3.3 V output linear regulator onboard to give regulated outputs, as required. The board may also be powered up using a PC laptop adaptor. The user must ensure that the external PSU jack is of the center positive type, although reverse polarity does not damage the demonstration board. A bicolor “PWR/STBY” LED (D4), shown in *Figure 2*, signifies the presence of supply on the board. When in normal operation the PWR/STBY LED is green and turns red when the system is in standby condition.

Figure 7. DC power jack



2.2 7-segment (+decimal point) and discrete LED display

The board consists of 4 7-segment (+decimal point) display modules driven by STLED325. By default, the left two digits display the channel information while the right two display the brightness level information.

Figure 8. 7-segment LED display

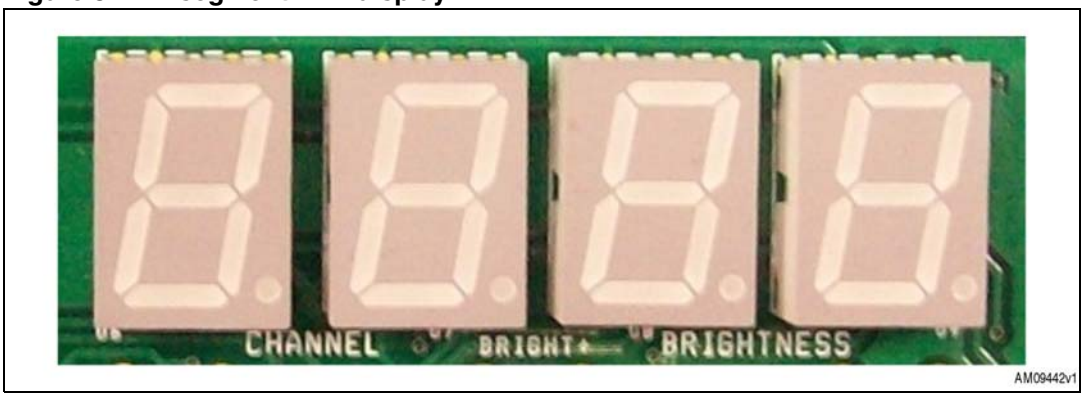
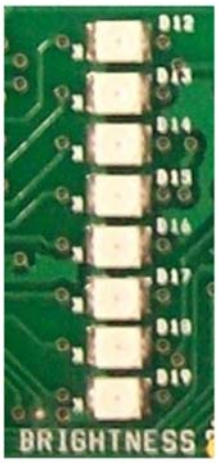


Figure 9. Discrete LEDs



2.3 Front panel keys / wake-up mechanical keys

STEVAL-ILL029V2 is provided with 8 front panel keys: CH+, CH-, BRGHT+, BRGHT-, OK, MENU, DEMO and STBY. There is one wake-up designated as WAKE-UP to wake up the system from standby.

2.4 DIP switch / external interface connector

STEVAL-ILL029V2 consists of an 8-position DIP switch (SW2). All the switches should be in the ON position (towards circle/ON side) for the demo to work. When the device STLED325 is required to be isolated from the onboard STM8S host and controlled through an external I^2C host, all the switches should be moved to the OFF position. Then, STLED325 control pins can be accessed through an external interface connector (J3). A detailed description of the external interface connector is provided on the bottom silkscreen of the board and also listed below for reference:

Figure 10. External interface connector

2.5 IR sensor connector

A 38 kHz IR sensor is mounted at J4 for IR control and supports RC5 protocol.

2.6 Interrupt LED

There is a blue interrupt LED (D21: INTR) which blinks whenever an interrupt is asserted from the STLD325 device, which may be due to front panel key press, remote control key press, RTC alarm, wake-up from standby, etc.

2.7 Interface connectors

Please refer to (10, 11) *Figure 2*, STEVAL-ILL029V2 consists of touch board interface connectors (J6, J7) on which the STMPE24M31 touch board can be mounted. STEVAL-CBP007V1 also consists of two interface connectors J1, J2 refer to (4, 5) *Figure 4*. J1 on the touch board connects with J6 on the STLED325 board while J2 on the touch board connects with J7 on the STLED325 board.

2.8 Touch pads / 8-channel touch status type rotator

STEVAL-CBP007V1 consists of 8 touch pads for individual functions such as BRIGHT-, BRIGHT+, CH+, CH-, OK, DEMO, STANDBY, and MENU. *Figure 4* (2) refers to the touch status type 8-channel rotator for brightness increase/decrease.

3 Getting started

3.1 Package content

The STLED325 front panel with STMPE24M31 interface demonstration board package includes:

- STLED325 demonstration board (STEVAL-ILL029V2)
- STMPE24M31 touch panel card (STEVAL-CBP007V1)
- UM1058 user manual (this document)
- Schematics
- Gerber files

3.2 System requirements

The STEVAL-CBP007V1 board needs to be interfaced to the STEVAL-ILL029V2 host board in such a way that connector J1, J2 (on touch board) connects with connectors J6, J7 (on host board). The system operates by powering externally through an external adaptor (9 V-18 V, 500 mA). The board can also be powered up using a laptop adaptor.

3.3 Powering on the system

As soon as DC power supply is plugged in, the system is up and running. PWR/STBY LED (D4) is green with MUTE LED (D3) turned off.

3.4 Startup display sequence / default setting of the system

On startup the system displays a rotating text welcome message on the 7-segment display.

If the touch board is present, the message is “STLED325-STMPE24M31”; otherwise it displays “STLED325”. Then, “c h b r” is displayed for about 2 seconds, after which the system displays the channel number and brightness level information. When the board is powered on for the first time, the following default settings are programmed:

- Channel number: 00
- Brightness information: 01 (01/16)

Subsequently, every time the board is powered on, it retains the last configured data and displays the same on startup. The STM8S internal EEPROM is used to store the user data (channel number and brightness information), and this feature is not available if an external host is used.

4 System features (touch board connected)

Connect the STEVAL-CBP007V1 board to STEVAL-ILL029V2 with connectors J1 (5-pin) and J2 (4-pin) on the touch board, mating with the female connectors J6 (5-pin) and J7 (4-pin), on the host board. It is important that the touch board is mounted with proper orientation before the system is powered on.

On powering on the system, a rotating text message “STLED325-STMPE24M31” is displayed on the 7-segment display. After this, channel-brightness information is displayed followed by blinking, one time, of all LEDs present on the touch board. After this sequence is over, the system is ready for operation. There are a total of 7 LEDs at the bottom of the individual keys: BRIGHT+, BRIGHT-, CH+, CH-, OK, DEMO, and MENU. Touch of any of these keys is indicated by blinking of the corresponding LED as well as a buzzer sound.

4.1 Channel number - brightness level display mode

In this mode the system displays the channel number (on the leftmost two 7-segment display modules) and brightness level (on the rightmost two displays). Channel number and brightness can be increased/decreased using the touchkeys provided on the board (CH+, CH-, BRIGHT+, and BRIGHT-).

A similar operation can be performed using the remote control keys explained in *Section 4.4*.

Maximum and minimum limits for the channel number are 99 and 00 while the maximum and minimum values for brightness level are 16 and 1 (16/16, 1/16).

Brightness level is also shown by the number of discrete LEDs glowing. (1 LED each for 2 levels). Brightness level can also be increased/decreased using the 8-channel touch status type rotator present on the board. The brightness increases on clockwise rotation and decreases for anticlockwise rotation.

In one complete rotation, the brightness changes by 16 levels.

4.2 RTC operation

STLED325 also features an inbuilt RTC. A MENU key on the touch board is provided to select RTC set/view options. Various touchkeys can be used to operate the real time clock.

Use the MENU touchkey to enter into menu options and navigate through them. Touch the MENU once - “rtc' is displayed. Now touch OK to enter into RTC options. By using the MENU key the user can navigate through:

“TIME” (view time), “DATE” (view date), “SETT”(set time), “SETD”(set date), “SETA”(set alarm).

4.2.1 Display time

Choose MENU to go to “rtc” and then OK. “tIME” is displayed. Now choose OK again to go to view time. “HH.MM” is displayed for a second to signify time display in Hours-Minutes format, followed by current RTC time display with hours and minutes separated by a “.”. Choose OK again to exit to the channel-brightness display.

4.2.2 Display date

Choose MENU and then OK. Now use the MENU touchkey again to reach “dAtE” and choose the OK key. “DD.MM” is displayed for a second to signify date display in date-month format, after which, the current RTC date is displayed. Date and month data are separated by a “.”. Choose OK again to exit to the channel-brightness display.

4.2.3 Set time

Choose MENU, and then OK. Use the MENU key to go to “SETT”. Now choose OK. The system prompts to enter the time in “Hours-Minutes” format. Use front panel keys BRGHT+ and BRGHT- to increase and decrease the value and CH- and CH+ to move left/right. The seconds field is taken as 0.

After adjusting the time, choose OK. The time is set and the display returns to channel-brightness display.

4.2.4 Set date

Choose MENU, and then OK. Choose MENU again multiple times to go to “SETD”. Now choose OK. The system prompts to enter the date in “Date-Month” format. Use touchkeys BRIGHT+ and BRIGHT- to increase and decrease the value and CH- and CH+ to move left/right. After adjusting the date, choose OK again. Now the system prompts to enter the year (two digits “e.g 10 for 2010 and week day (1-Monday…..7-Sunday). After entering the information, choose OK. The date is set and the system returns to channel-brightness display.

4.2.5 Set alarm

Choose MENU, and then OK. Choose MENU again multiple times to go to “SETA”. Now choose OK. The system shows the current RTC time and prompts to enter the alarm time in “Hours-Minutes” format. Use front panel keys BRIGHT+ and BRIGHT- to increase and decrease the value and CH- and CH+ to move left/right. The seconds field is taken as 0 and current RTC date as the alarm date, automatically. After adjusting the value, choose OK again. The alarm is set and the system returns to channel-brightness display.

4.2.6 Alarm condition display

When the alarm alert is received from the STLED325 internal RTC, “-AL-” is displayed along with the buzzer sound (Tick-Tick sound: This buzzer is driven by GPIO1 of STLED325). If the system is in display RTC mode (display RTC time/RTC date) when the alarm condition is met, the system display remains at its previous display state (display RTC) during the alarm while the buzzer still sounds. The alarm goes off when any interrupt is received (touchkey press/RC key press) and the system returns to channel-brightness display mode.

Figure 11. Alarm display



4.3 Demo mode

The system enters into demo mode by using the DEMO touchkey on the front panel. In this mode, scrolling text with varying brightness and increasing scrolling speed is displayed continuously on the display.

Text displayed: “STLED325-STMPE24M31 Front Panel Demo” followed by blinking of 325 two times (left aligned and right aligned).

The system comes out of demo mode and returns to channel-brightness display when either any of the touchkeys or RC key is pressed, or RTC alarm condition is met.

4.4 Remote control operation

The system currently supports only RC5 protocol; however, it can be easily adapted to implement other RC protocols. The MENU options support changing the currently used RC protocol but are not currently implemented in the system. For more details, refer to the STLED325 datasheet.

The following RC operations can be done using IR decoding feature of STLED325.

Device address programmed: 0x08

- Channel up (key value: 7 and key value: 45)
- Channel down (key value: 14 and key value: 44)
- Brightness increase (key value: 8)
- Brightness decrease (key value: 27)
- DEMO (key value: 21)
- STANDBY (key value: 12)

Figure 12. Example RC5 remote



1. CH+
2. CH-
3. BRGHT+
4. BRGHT-
5. CH-
6. CH+
7. STANDBY

4.5 Standby mode

STLED325 also features standby power management to host. The system can enter into standby mode by:

1. Using standby touchkey
2. Remote control standby key

On entering standby mode, the PWR/STBY LED (D4) turns red. The MUTE LED (D3) also turns ON. “STBY” is displayed on the LED panel for about two seconds (refer to *Figure 13*), after which the complete display is blanked (discrete LEDs also turned off), refer to *Figure 14*. If the system is in display RTC mode (time/date display) when the standby key is pressed, the 7-segment display does not get blanked but displays RTC during standby mode (discrete LEDs are off). During standby, all the RC keys except the hot keys are non-functional.

Figure 13. Entering into standby

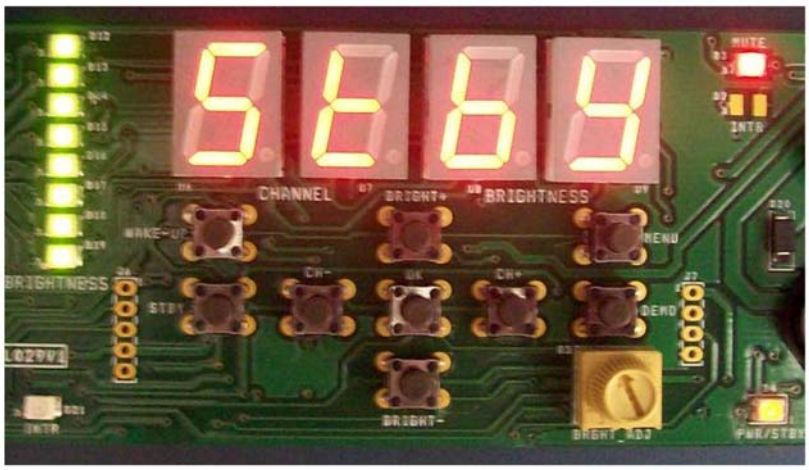
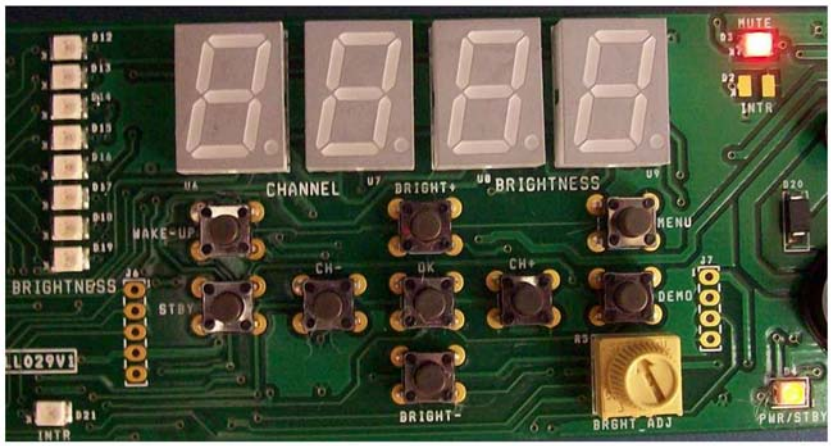


Figure 14. System is in standby



The system can wake up from standby through any of the following modes:

1. A touch on any of the touchkeys
2. Remote control hot key press (RC standby key configured as a hot key)
3. RTC alarm

The system returns to channel-brightness display after wake-up from standby mode.

5 System features (touch interface not connected)

5.1 Brightness adjustment through potentiometer

The system is also provided with a potentiometer “BRGHT_ADJ” (R5) which can be used to vary the brightness of the LEDs by setting the output current. The brightness increases when the potentiometer is rotated clockwise and decreases with anticlockwise rotation.

5.2 Channel number - brightness level display mode

In this mode the system displays the channel number (on the leftmost two 7-segment display modules) and brightness level on the rightmost two displays. Channel number and brightness can be increased/decreased using the front panel keys provided on the board (CH+, CH-, BRGHT+, BRGHT-).

A similar operation can be performed using remote control keys as explained in *Section 5.5*.

Maximum and minimum limits for channel number are 99 and 00 while the maximum and minimum values for brightness level are 16 and 1 (16/16, 1/16).

Brightness level is also shown by number of discrete LEDs glowing. (1 LED each for 2 levels).

5.3 RTC operation

STLED325 also features an inbuilt RTC. The MENU key on the front panel is provided to select RTC set/view options. Various front panel keys can be used to operate the real time clock.

Choose MENU to enter into menu options and navigate through them. Choose MENU once - “rtc' is displayed. Now press OK to enter into RTC options. Now, using the MENU key the user can navigate through:

“TIME” (view time), “DATE” (view date), “SETT”(set time), “SETD”(set date), “SETA”(set alarm).

5.3.1 Display time

Choose MENU to go to “rtc” and then OK. “tIME” is displayed. Now press OK again to go to view time. “HH.MM” is displayed for a second to signify time display in Hours-Minutes format, followed by current RTC time display with hours and minutes separated by a “.”. Choose OK again to exit to the channel-brightness display.

5.3.2 Display date

Choose MENU and then OK. Now use the MENU key again to reach “dAtE” and press OK key. “DD.MM” is displayed for a second to signify date display in date-month format, after which the current RTC date is displayed. Date and month data are separated by a “.”. Choose OK again to exit to the channel-brightness display.

5.3.3 Set time

Choose MENU and then OK. Use the MENU key to go to “SETT”. Now press OK. The system prompts to enter the time in “Hours-Minutes” format. Use front panel keys BRGHT+ and BRGHT- to increase and decrease the value and CH- and CH+ to move left/right. The seconds field is taken as 0.

After adjusting the time, press OK. The time is set and the display returns to channel-brightness display.

5.3.4 Set date

Choose MENU and then OK. Choose MENU again multiple times to go to “SETD”. Now press OK. The system prompts to enter the date in “Date-Month” format. Use front panel keys Bright+ and Bright- to increase and decrease the value and CH- and CH+ to move left/right. After adjusting the date, choose OK again. Now the system prompts to enter the year (two digits “e.g 10 for 2010 and week day (1-Monday…..7-Sunday). After entering the information, press OK. The date is set and the system returns to channel-brightness display.

5.3.5 Set alarm

Choose MENU and then OK. Choose MENU again multiple times to go to “SETA”. Now press OK. The system shows the current RTC time and prompts to enter the alarm time in “Hours-Minutes” format. Use front panel keys Bright+ and Bright- to increase and decrease the value and CH- and CH+ to move left/right. The seconds field is taken as 0 and current RTC date as alarm date automatically. After adjusting the value, press OK again. The alarm is set and the system returns to channel-brightness display.

5.3.6 Alarm condition display

When the alarm alert is received from the STLED325 internal RTC, “-AL-” is displayed along with the buzzer sound (Tick-Tick sound: this buzzer is driven by GPIO1 of STLED325). If the system is in display RTC mode (display RTC time/RTC date) when the alarm condition is met, the system display remains at its previous display state (display RTC) during the alarm while the buzzer still sounds. The alarm goes off when any interrupt is received (FP key press/RC key press) and the system returns to channel-brightness display mode.

5.4 Demo mode

The system enters into demo mode by pressing the DEMO key on the front panel. In this mode, scrolling text with varying brightness and increasing scrolling speed is displayed continuously on the display.

Text displayed: “STLED325 Front Panel Demo” followed by blinking of 325 two times (left aligned and right aligned).

The system comes out of demo mode and returns to channel-brightness display when either any of the front panel or RC key is pressed or the RTC alarm condition is met.

5.5 Remote control operation

The remote control operation remains the same as mentioned in *Section 4.4*.

5.6 Standby mode / hot keys

Standby operation remains the same as that mentioned in *Section 4.5* except that the system can enter into standby by:

- Pressing the front panel standby key
- Remote control standby key

During standby, all the front panel and RC keys except the hot keys are non-functional.

The system can wake up from standby by any of the following modes:

- Wake-up key press
- Front panel hot key press (STBY and OK are configured as hot keys)
- Remote control hot key press (RC standby key configured as a hot key)
- RTC alarm

The system returns to channel-brightness display after wake-up from standby mode.

6 Schematics

6.1 STEVAL-ILL029V2 schematics

Figure 15. STLED325 section

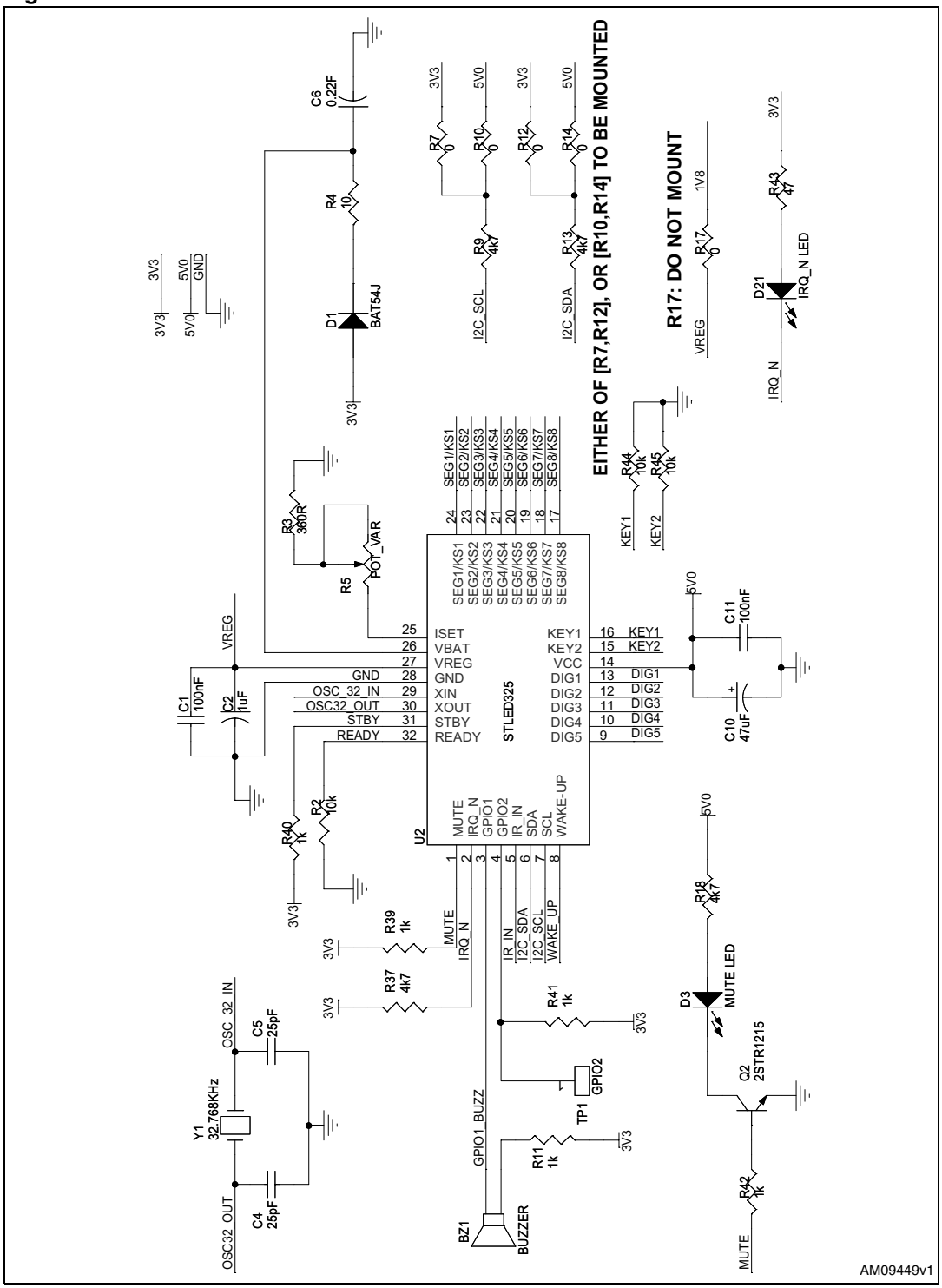


Figure 16. Microcontroller section

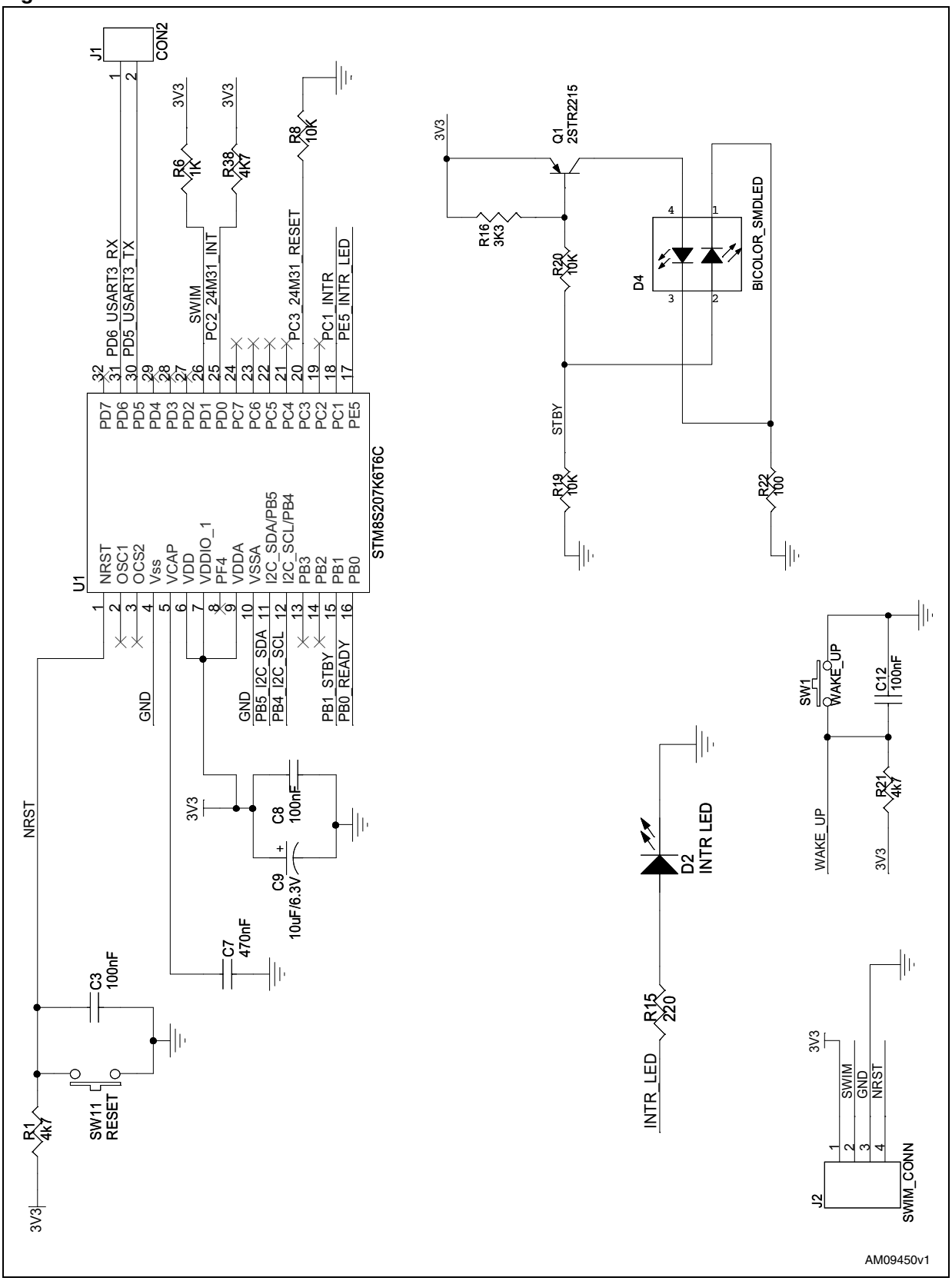


Figure 17. Keyscan circuit

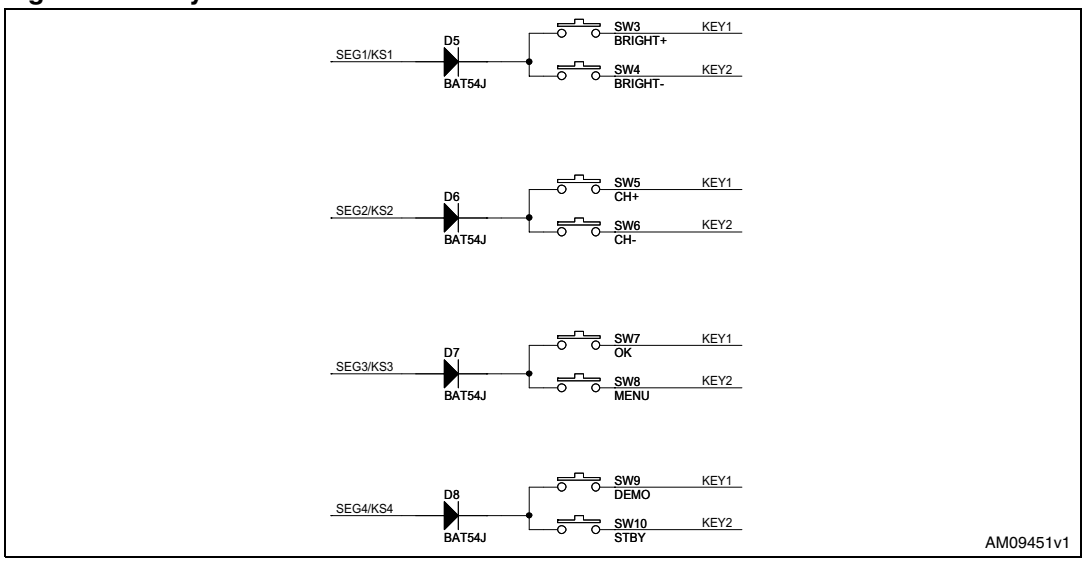


Figure 18. Connectors

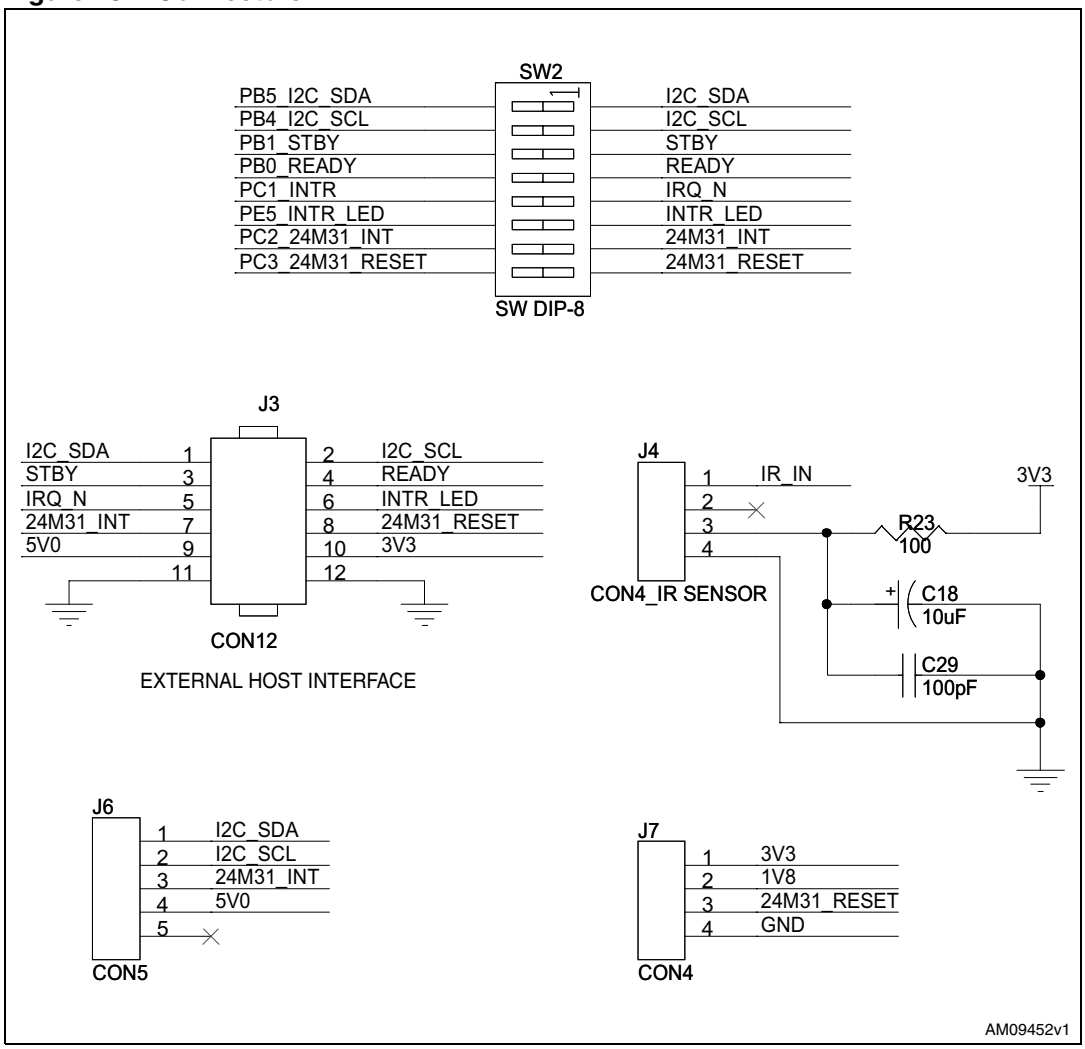


Figure 19. Power supply section

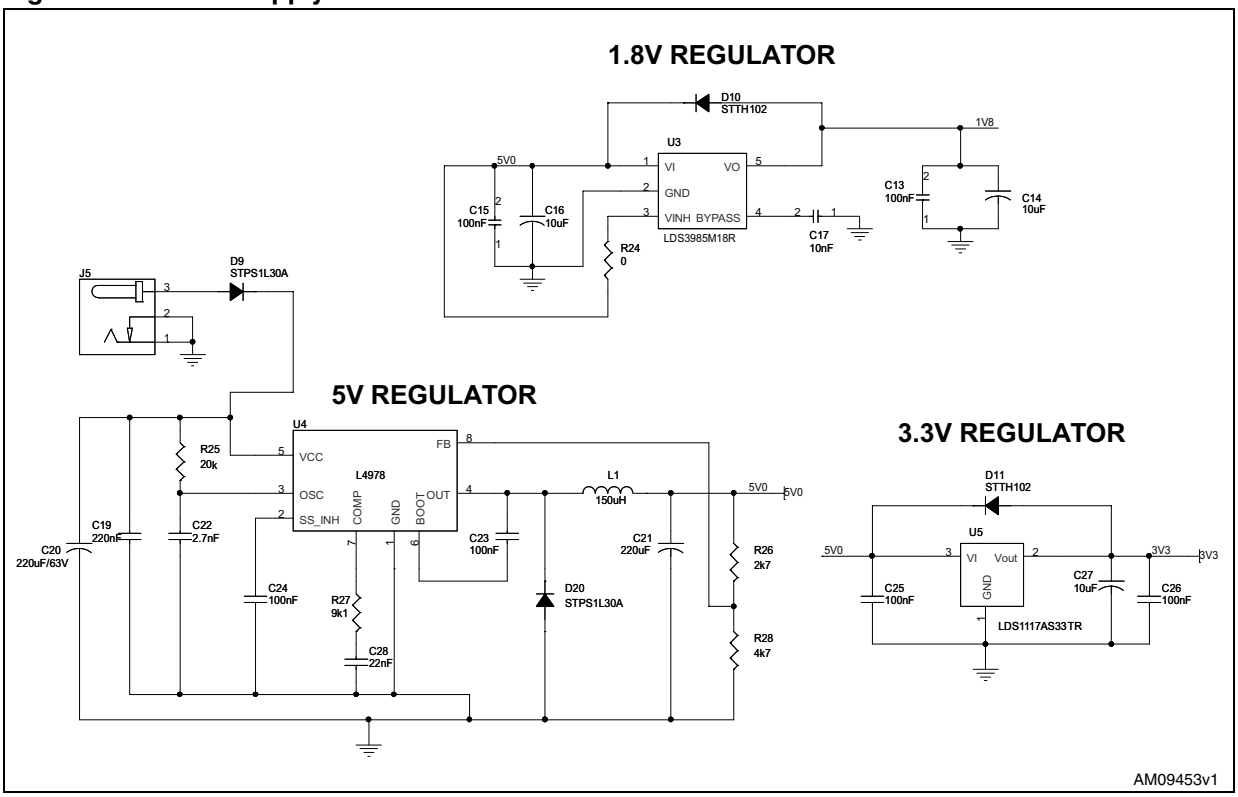


Figure 20. Discrete LED

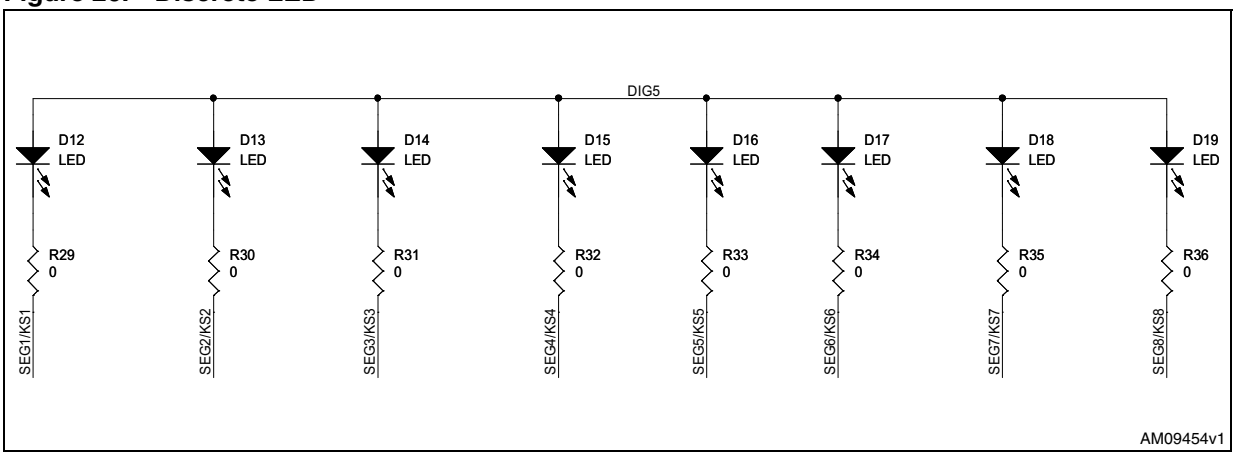
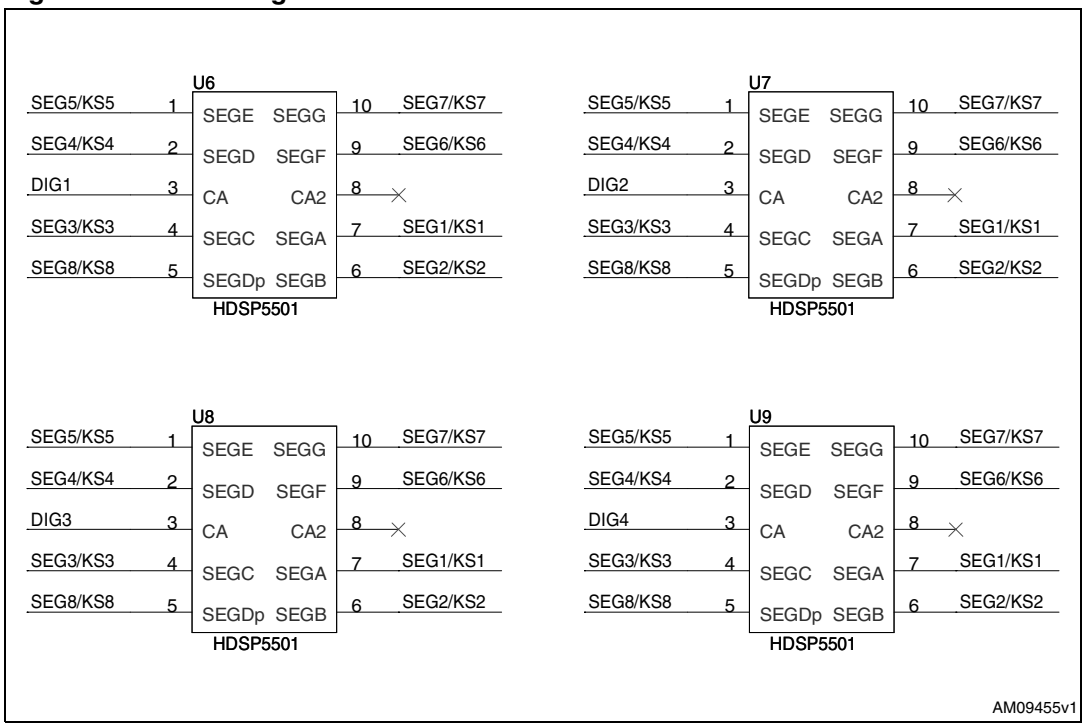


Figure 21. Seven segment LED



6.2 STEVAL-CBP007V1

Figure 22. STMPE24M31 section

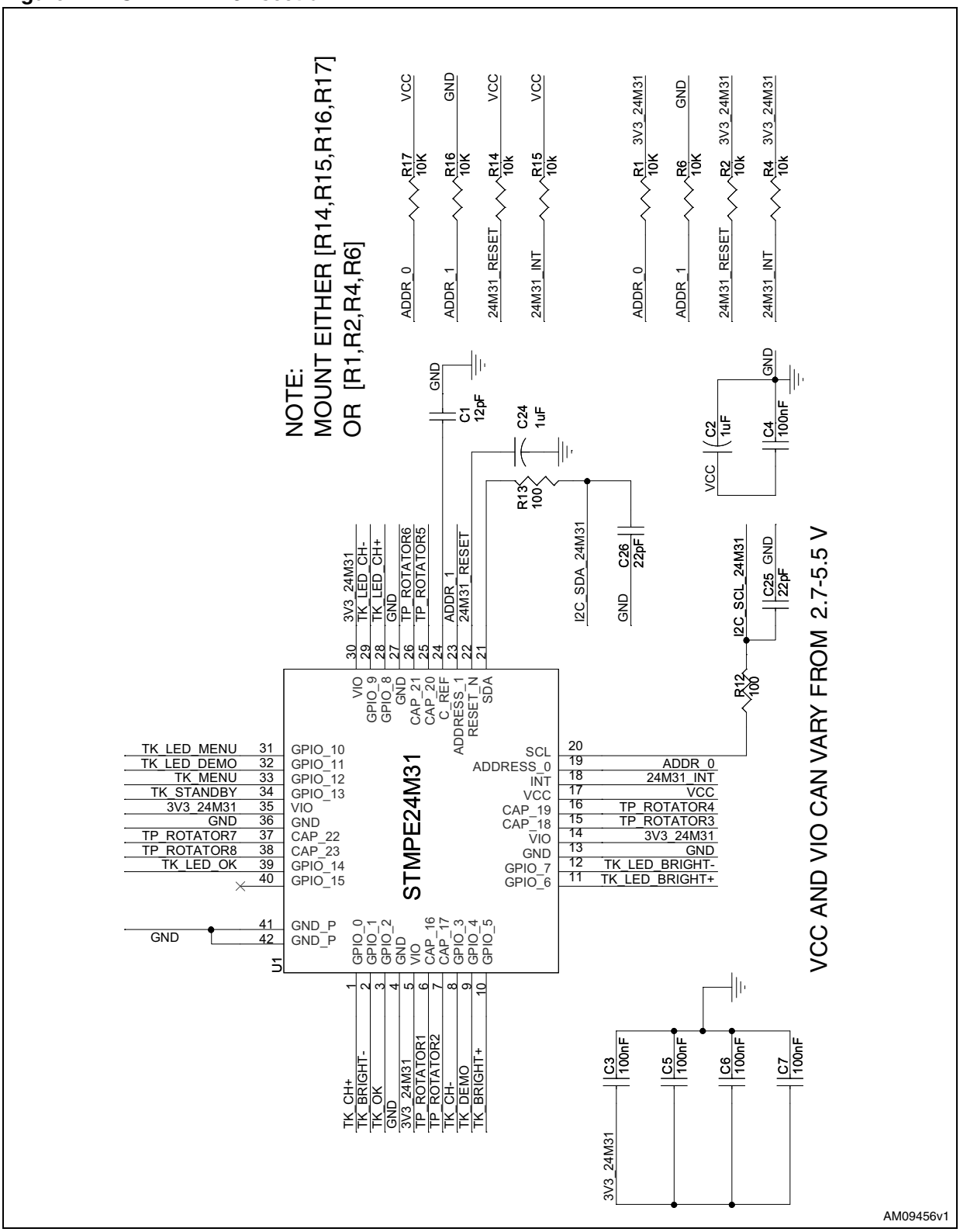


Figure 23. LED section

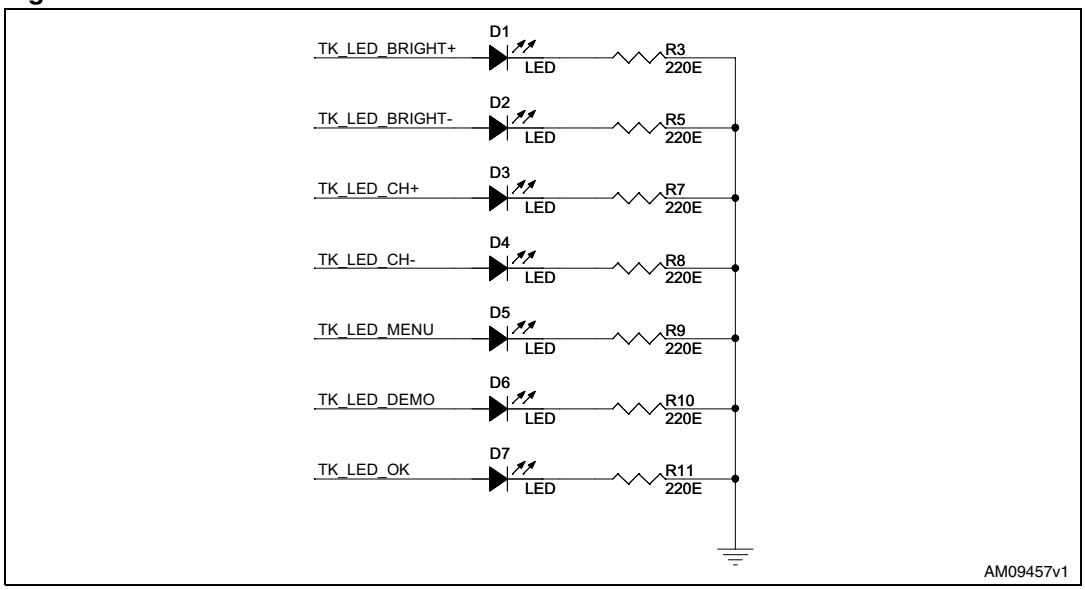


Figure 24. Connectors

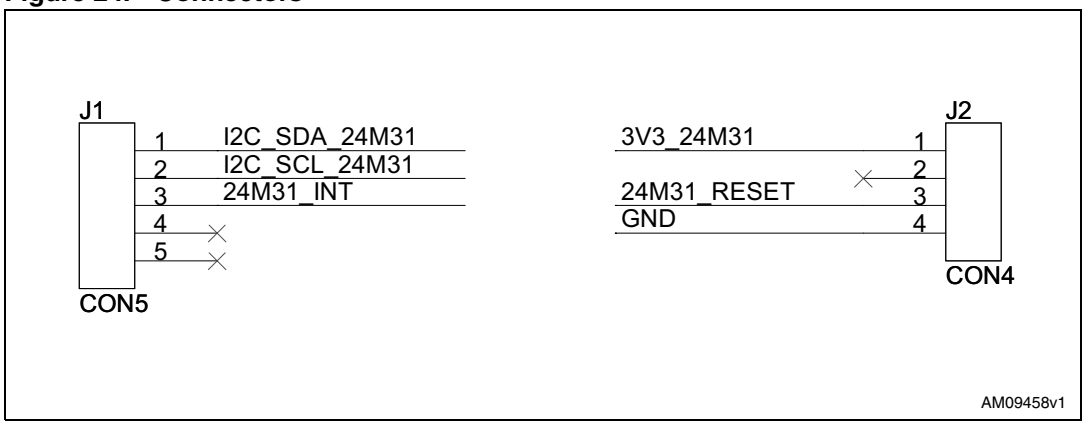


Figure 25. Touchkeys

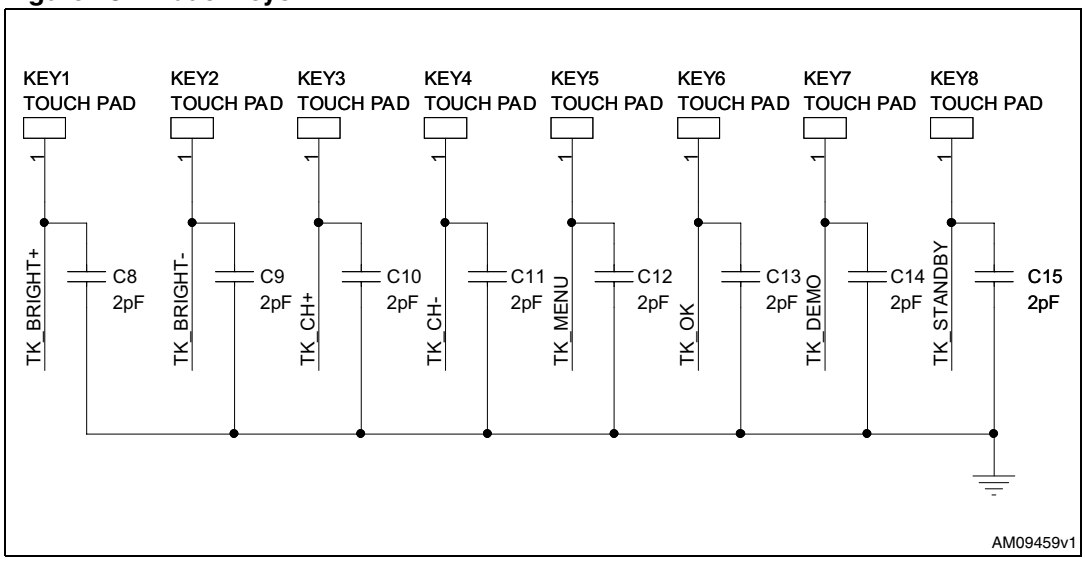
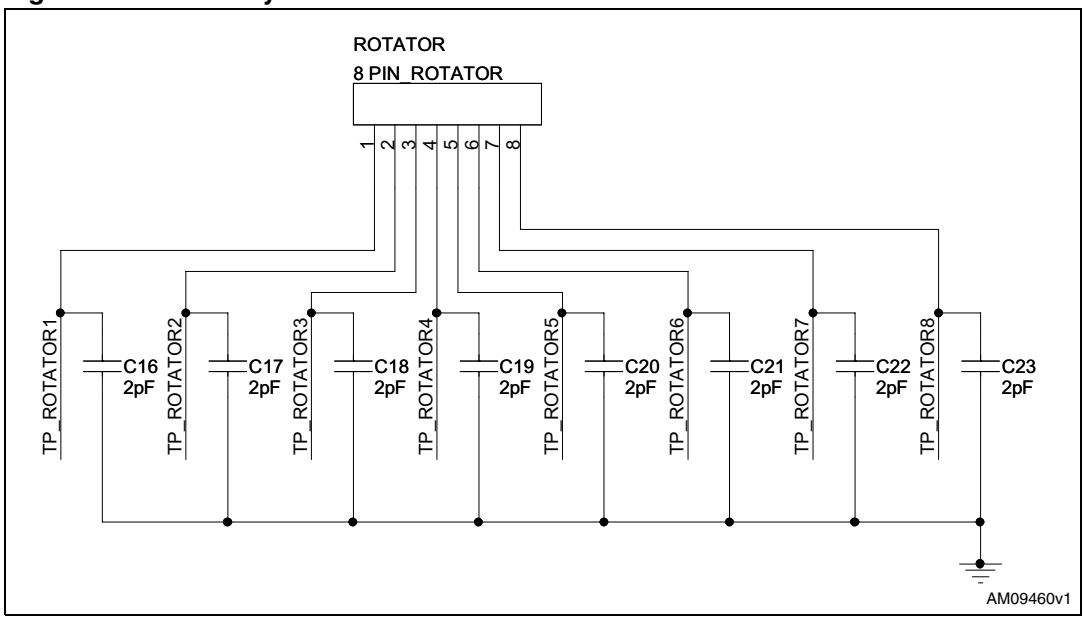


Figure 26. Touchkeys for rotator



7 Bill of material

7.1 BOM STEVAL-ILL029V2

Table 1. BOM for STEVAL-ILL029V2

Reference designator	Component description	Package	Manufacturer	Manufacturer's ordering code / orderable part number	Supplier	Supplier ordering code
U1	STM8S 8-bit microcontroller	LQFP32	STMicroelectronics	STM8S207K6T6C	STMicroelectronics	STM8S207K6T6C
U2	LED controller/driver	QFN32	STMicroelectronics	STLED325QTR	STMicroelectronics	STLED325QTR
U3	LDS3985M18TR/voltage regulator	SOT23-5L	STMicroelectronics	LDS3985M18TR	STMicroelectronics	LDS3985M18TR
U4	L4978	DIP8	STMicroelectronics	L4978	STMicroelectronics	L4978
U5	LD1117AS33TR	SOT-223	STMicroelectronics	LD1117AS33TR	STMicroelectronics	LD1117AS33TR
D1, D5, D6, D7, D8	BAT54J	SOD323	STMicroelectronics	BAT54JFILM	STMicroelectronics	BAT54JFILM
D9, D20	Schottky diode	SMA	STMicroelectronics	STPS1L30A	STMicroelectronics	STPS1L30A
D10, D11 (Do not mount)	Diode	SMA	STMicroelectronics	STTH102	STMicroelectronics	STTH102
Q1	PNP transistor	SOT-23	STMicroelectronics	2STR2215	STMicroelectronics	2STR2215
Q2	NPN transistor	SOT-23	STMicroelectronics	2STR1215	STMicroelectronics	2STR1215
Y1	32.768 kHz crystal	Through hole	Vishay/Dale	XT26TTA32K768	MOUSER	73-XT26T
BZ1	Piezoelectric buzzer	Through hole	CUI	CEP-2242	Digi-Key	102-1115-ND
D4	Bicolor PWR/STBY LED	PLCC-4	Kingbright	KAA-3528ESGC	Farnell	1318239
D2	Interrupt LED (blue)	PLCC2	OSRAM Opto Semiconductors Inc	LB T673-L2P1-35-0-10-R18-Z	Digi-Key	475-1387-1-ND

Table 1. BOM for STEVAL-ILL029V2 (continued)

Reference designator	Component description	Package	Manufacturer	Manufacturer's ordering code / orderable part number	Supplier	Supplier ordering code
D3	Mute LED (red)	PLCC2	Avago Technologies US	HSMC-A101-S00J1	Digi-Key	516-2122-2-ND
U6, U7, U8, U9	HDSP5501 common anode	0.55 inch, 2.5 mm pitch	Avago Technologies US Inc.	HDSP-5501	Digi-Key	516-1212-5-ND
SW2	DIP-8 switch	SMT	C & K	SDA08H0SBD	MOUSER	611-SDA08H0SBD
SW1, SW3, SW4, SW5, SW6, SW7, SW8, SW9, SW10, SW11	Tactile switches	6.0x6.0x7.0 mm 160 gf Through hole	ALPS	SKHHBWA010	MOUSER	688-SKHHBW
J1, J4, J6, J7 (J6 and J7 not mounted)	Single row Bergstrip	2.54 mm pitch Through hole	Protectron	P9102-40-12-1	Protectron	P9102-40-12-1
J3	Dual row Bergstrip	2.54 mm pitch Through hole	Protectron	P9103-80-12-1	Protectron	P9103-80-12-1
J4 (Do not mount)	4-pin female Bergstrip header (do not mount)	2.54 mm pitch Through hole	Protectron	P9301-36-11	Protectron	P9301-36-11
J5	DC jack connector	2.5 mm right angle locking type	Protectron	PDCJ01-08	Protectron	PDCJ01-08
L1	100 µH	SMD	Coil-craft	DS5022P-104MLB	Coilcraft	DS5022P-104MLB
R1, R9, R13, R18, R21, R28, R37, R38	4.7 kΩ	SMD0805	Panasonic - ECG	ERJ-6GEYJ472V or equivalent	Digi-Key	P4.7KATR-ND
R2, R8, R19, R20, R44, R45	10 kΩ	SMD0805	Panasonic - ECG	ERJ-6GEYJ103V or equivalent	Digi-Key	P10KACT-ND
R3	360 Ω	SMD0805	Panasonic - ECG	ERJ-6GEYJ361V or equivalent	Digi-Key	P360ATR-ND
R4	10 Ω	SMD0805	Panasonic - ECG	ERJ-6GEYJ100V or equivalent	Digi-Key	P10ATR-ND

Table 1. BOM for STEVAL-ILL029V2 (continued)

Reference designator	Component description	Package	Manufacturer	Manufacturer's ordering code / orderable part number	Supplier	Supplier ordering code
R16	3.3 kΩ	SMD0805	Panasonic - ECG	ERJ-6GEYJ472V or equivalent	Digi-Key	P3.3KATR-ND
R6, R11, R39, R40, R41, R42	1 kΩ	SMD0805	Panasonic - ECG	ERJ-6GEYJ102V or equivalent	Digi-Key	P1.0KATR-ND
R7, R10, R12, R14, R17, R24, R29, R30, R31, R32, R33, R34, R35, R36 (Do not mount: R10, R14, R17)	0	SMD0805	Panasonic - ECG	ERJ-6GEY0R00V or equivalent	Digi-Key	P0.0ATR-ND or equivalent
R15	220 Ω	SMD0805	Panasonic - ECG	ERJ-6GEYJ221V or equivalent	Digi-Key	P220ATR-ND
R22, R23	100 Ω	SMD0805	Panasonic - ECG	ERJ-6GEYJ101V	Digi-Key	P100ATR-ND
R25	20 kΩ	SMD0805	Panasonic - ECG	ERJ-6GEYJ203V or equivalent	Digi-Key	P20KATR-ND
R26	2.7 kΩ	SMD0805	Panasonic - ECG	ERJ-6GEYJ272V or equivalent	Digi-Key	P2.7KATR-ND
R27	9.1 kΩ	SMD0805	Panasonic - ECG	ERJ-6ENF9101V or equivalent	Digi-Key	P9.10KCCT-ND
R43	47 Ω	SMD0805	Panasonic - ECG	ERJ-P06J470V or equivalent	Digi-Key	P47ADCT-ND
C1, C3, C8, C11, C12, C13, C15, C23, C24, C25, C26	100 nF	SMD0805	Panasonic - ECG or equivalent	ECJ-2VB1E104K or equivalent	Digi-Key	PCC1828CT-ND
C2	1 µF	SMD1206	Panasonic - ECG	ECJ-3YB1C105K or equivalent	Digi-Key	PCC1882CT-ND
C4,C5	25 pF	SMD0805	AVX Corporation	08051A200JAT2A CAP CERM	Digi-Key	478-3735-1-ND
C7	470 nF	SMD0805	Murata Electronics North America	GRM21BF51E474ZA01L or equivalent	Digi-Key	490-1730-1-ND
C9, C14, C16, C18, C27	10 µF	Case A	Vishay/Sprague or equivalent	293D106X96R3A2TE3 or equivalent	MOUSER	74-293D106X96R3A2TE3

Table 1. BOM for STEVAL-ILL029V2 (continued)

Reference designator	Component description	Package	Manufacturer	Manufacturer's ordering code / orderable part number	Supplier	Supplier ordering code
C10	47 µF	Leaded 50volts 47uF 6.3x11 20% 2.5 LS	Nichicon	UPS1H470MED	MOUSER	647-UPS1H470MED
C17	10 nF	SMD0805	Panasonic - ECG	ECJ-2VB1H103K	Digi-Key	PCC103BNCT-ND
C19	220 nF	SMD0805	Panasonic - ECG	ECJ-1VB1A224K	Digi-Key	PCC1749CT-ND
C20, C21	220 µF/63 V	Through Hole	Panasonic - ECG	EEU-FM1E221	Digi-Key	P12383-ND
C22	2.7 nF	SMD0805	Panasonic - ECG	ECJ-2VB1H272K	Digi-Key	PCC272BNCT-ND
C28	22 nF	SMD0805	Panasonic - ECG	ECJ-2VB1H223K	Digi-Key	PCC223BGCT-ND
C29	100 pF	SMD0805	Panasonic - ECG	ECJ-2VC1H101J	Digi-Key	PCC101CGCT-ND
C6	0.22 F Supercap		Cornell Dubilier	EDLSD224H5R5C	Mouser	598-EDLSD224H5R5C
R5	Potentiometer (0 - 1 kΩ)	Through Hole	VISHAY Spectrol	63M-T607-102 or equivalent	Farnell	9608206
IR Sensor	IR sensor (38 kHz)	Through Hole	Vishay Semiconductors	TSOP31238	Farnell	1469635
Mounting screws	Slotted Pan Head Screw 4-40 Thread 1" Long		AEL Hardware		AEL Hardware	
Mounting nuts	440 Hex Nut Natural Nylon(UL94V-2) Natural Nylon (UL94V-2)		AEL Hardware		AEL Hardware	

7.2 BOM STEVAL-CBP007V1

Table 2. BOM

Reference Designator	Component Description	Package	Manufacturer	Manufacturer's ordering code / Orderable Part Number	Supplier	Supplier Ordering Code
U1	24-channel touch controller STMPE24M31	QFN40	STMicroelectronics	STMPE24M31QTR	STMicroelectronics	STMPE24M31QTR
D1, D2, D3, D4, D5, D6, D7	Yellow LEDs	SMD 0805	Kingbright Corp	APT2012SYCK	Digi-Key	754-1134-2-ND
J1, J2	Single row Bergstrip SMD (4, 5-pin)	2.54 mm pitch Through hole	Protectron	P9102-40-12-1	Protectron	P9102-40-12-1
R1,R2,R4,R6,R14,R15,R16,R17 [Do not mount: R1,R2,R6,R15]	4.7 kΩ	SMD0805	Panasonic - ECG	ERJ-6GEYJ472V or equivalent	Digi-Key	P4.7KATR-ND
R1, R6	0	SMD0805	Panasonic - ECG	ERJ-6GEY0R00V or equivalent	Digi-Key	P0.0ATR-ND
R3,R5,R7,R8,R9,R10,R11	220 Ω	SMD0805	Panasonic - ECG	ERJ-6GEYJ221V or equivalent	Digi-Key	P220ATR-ND
R12, R13	100 Ω	SMD0805	Panasonic - ECG	ERJ-6GEYJ101V or equivalent	Digi-Key	P100ATR-ND
C3, C4, C5, C6, C7 [Do not mount: C4]	100 nF	SMD0805	Murata Electronics North America	GRM21BR71E104KA01Lor equivalent	Digi-Key	490-1673-1-ND
C2, C24	1 µF	SMD1206	Murata Electronics North America	GRM31MF51E105ZA01L or equivalent	Digi-Key	490-1832-1-ND
C1	12 pF	SMD0805	AVX Corporation	08051A120JAT2A or equivalent	Digi-Key	478-5011-1-ND
C8,C9,C10,C11,C12,C13,C14,C15,C16,C17,C18,C19,C20,C21,C22,C23 [Do Not Mount]	2 pF	SMD0805	Murata Electronics North America	GQM2195C2A2R0CB01D or equivalent	Digi-Key	490-3588-1-ND
C25, C26	22 pF	SMD0805	Murata Electronics North America	GRM2195C2A220JZ01D	Digi-Key	490-1591-1-ND

8 Revision history

Table 3. Document revision history

Date	Revision	Changes
04-May-2011	1	Initial release.

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