

M13-RZA2M-EK

RZA2M (Cortex-A9) m13_rza2m_ek_bsp_demo

Application Note Guide

Updated on the: 06 Aug. 21

Board name: MPU: Version M13-RZA2M-EK R7S921053VCBG 1.0.0

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1 INTRODUCTION

This application guide describes how to install the needed development tools/software, download the needed project, load it into the software environment and debug it with the M13-RZA2M-EK evaluation kit. The demo project **m13_rza2m_ek_bsp_demo** let you discover a few features of the board.

1.1 **PROJECT BRIEF DESCRIPTION**

All the board's features used in the project al listed in Table 1.

Table 1. M13-RZA2M-EK Feature used	
32Mbyte external SDRAM	 ✓
16Kbit I ² C EEPROM (Initialisation only)	 Image: A second s
4.3-inch 480x272 TFT LCD with capacitive touch panel	 Image: A second s
USB Interface	×
LAN Interface	×
SD/MMC Host Interface	×
OctaRAM (Initialisation only)	 Image: A second s
I2S Audio codec	×
3-Axis accelerometer	
On-board JLINK-OB debugger with VCOM	
8bit camera	×
Mikrobus	×
PMOD	×
Mono-turn 10KΩ Potentiometer	×
User led	 ✓
User switch and 1 x Reset switch	 Image: A second s

2 REQUIRED RESOURCES

2.1 DEVELOPMENT TOOLS AND SOFTWARE

- IDE: e2studio 2021-04 (21.4.0) or greater
- Tool Chain: GNU ARM Embedded Toolchain 9.3.1.20200408
- Serial Terminal (Free Serial Port Terminal, PuTTY)

2.2 HARDWARE

- M13design M13-RZA2M-EK Evaluation Kit https://www.m13design.fr/products/M13-RZA2M-EK.html
- USB cable: Micro-B male to USB-A male (Not included in the kit)

2.3 RELATED DOCUMENTS

- Renesas RZA2M Group User's Manual https://www.renesas.com/us/en/document/mah/rza2m-group-users-manualhardware?language=en&r=1054511
- M13-RZA2M-EK schematic https://www.m13design.fr/download/pdf/M13design_M13-RZA2M-EK_Schematic.pdf
- M13-RZA2M-EK User manual https://www.m13design.fr/download/pdf/M13design_M13-RZA2M-EK_User_Manual.pdf

3 DOWNLOAD AND INSTALLATION

3.1 E²STUDIO

The latest e2studio IDE is downloadable here https://www.renesas.com/us/en/software-tool/e-studio

Make sure to have Renesas account or create one before downloading

Refer to the "Getting Started Guide for e2studio for RA" section 2 for a compete installation guide.

3.2 PROJECT DEMO

You can find the **rza2m_ek_bsp_demo** project for the M13-RZA2M-EK board to download here: https://www.m13design.fr/download/software/m13_rza2m_ek_bsp_demo.zip

3.3 SERIAL TERMINAL CONFIGURATION

Make sure to launch your Serial Terminal program with the following configuration:

- Baud Rate: 115200
- Data Bits: 8
- Parity: None
- Stop Bits: 1
- Flow Control: None
- COM Port: As detected in your Windows[™] Device Manager

IMPORTING THE DEMO PROJECT 4

4.1 LAUNCH E²STUDIO

Assuming you have e²studio installed, launch the software and enter a workspace location as shown in Figure 1 below than click "launch" and wait until the environment is fully loaded.

Figure 1. Workspace location

e² studio Launcher	×
elect a directory as workspace e ^e studio uses the workspace directory to store its preferences and development artifacts.	
Workspace ¹⁹ D\Workspace\e2studio Browse	
_∐se this as the default and do not ask again Launch	

4.2 **FILE/IMPORT**

To import the previously downloaded project, in the top menu, click on "File" and choose the "import" option in the dropdown menu as shown in the Figure 2 below.

() 1	3_Workspace_e2studio_2020 - e ²	tudio
<u>F</u> ile	<u>E</u> dit <u>S</u> ource Refactor <u>N</u> av	gate Se <u>a</u> rch <u>P</u> rojec
	New	Alt+Shift+N >
	Open File	
	Open Projects from File System.	
	Recent Files	>
	Close Editor	Ctrl+W
	Close All Editors	Ctrl+Shift+W
	Save	Ctrl+S
	Save As	
6	Save All	Ctrl+Shift+S
	Revert	
	Move	
	Rename	F2
20	Refresh	F5
	Convert Line Delimiters To	>
•	Print	Ctrl+P
	Import	t
	Export	
	Properties	Alt+Enter
	Switch Workspace	>
	Restart	
	Fyit	

4.3 EXISTING PROJECT

From the "**Import**" popup box, select in the "**General**" file section the option "**Existing Projects into Workspace**" and click "Next"

 Import Select Create new projects from an archive file or directory 	> . 25	×
Select an import wizard: ype filter text → Constant Sector S	ersion to GCC ARM Embedded t into Workspace 0 L es) Project	
(?) < <u>B</u> ack Next>	<u>Finish</u> Cancel	

Figure 3. Existing Project

4.4 **PROJECT LOCATION**

In the next box, select your project location by clicking on the "**Browse**" button on the right side as shown in Figure 4. If preferred, you can import an archived project instead by checking the "**Select Archive file**" mark. In both cases, make sure the project is checked in the "**Project**" area. Any other options can be left unmarked and click the "**Finish**" button down below.

Figure 4. Select root directory	
S Import –	×
Import Projects Some projects cannot be imported because they already exist in the workspace	
Select root directory: F:\10_SVN_M13\m13-rza2m-ek\m13_rza2m_ Brow	/se
Select archive file:	/se
Projects:	
m13_rza2m_ek_bsp_demo (F<10_SVN_M13\m13-rza2m-ek\m13_rz Selec Desele Rgfr Options Geserch for nested projects Gopy projects into workspace Glgse newly imported projects upon completion Hidd newly control that head newly in the newly near an and the set of th	esh
Working sets New Working sets: Sglect.	
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4.5 PROJECT EXPLORER VIEW

Close the "**Welcome**" page if you haven't done it yet and you should see your newly imported project on the left side "**Project Explorer view**" as shown in Figure 5.

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5 BUILD AND DEBUG

5.1 DEBUG CONFIGURATION SELECT

The demo project comes with a "Debug" and a "Release" build configuration. By default, the project is set in the "Debug" build configuration. To switch between the "Debug" and the "Release" configurations, navigate through the menu "*Project>Build Configurations>Set Active<Select_Build>*" as shown in Figure 6 below.

Proj	ect Renesas Views Run	Window Help					
	Open Project Close Project Open FSP Configuration		} - [] 🖻 🕲 🕶 🔦 🕶 🔜 !	0	÷	🎉 🎋 ▾ 💁 ▾: ଼ 0∿ ▾ ർ७ ୦୦୦ 📽 🖏 :
010	Build All	Ctrl+Alt+B	ain.c	m13_rza2m_ek_lcd.c	: 23		
	Build Configurations	>	:	Set Active	>	~	1 HardwareDebug_QSPI (Boot Mode 3)
	Build Project Build Working Set Clean Build Automatically	Ctrl+B >		Vanage Build by Working Set Set Active by Working Set Manage Working Sets	> >	Γ	2 Kelease
	Build Targets	>	r;	_104_10_11110(0010)			
e²	C/C++ Index Update All Dependencies Change Device	Alt+D	ndle _hand	= direct_open("gpio", le < 0)	0);		
	C/C++ Project Settings	Ctrl+Alt+P	urn B	SP_STATUS_FAILURE;			

Before launching the debug session, make sure the M13-RZA2M-EK board is connected to your computer via the USB connector CN5 as shown in Figure 7.

Figure 7. Connecting the board to the computer

5.2 BUILD BEFORE DEBUG SESSION

After selecting the debug configuration, proceed to build the project. If you have more than one projects imported, make sure the desired project folder to be built is selected before building the project. As highlighted in Figure 8, after selected the project, click on the build icon to proceed into the debug session.

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5.3 LAUNCH THE DEBUG SESSION

Click on the Debug icon to launch the debug session as shown in Figure 9 below

Figure 9. Launcl	hing the [Debug s	ession
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The session starts in the vector table as shown in Figure 10 below. "Resume" the session (F8 shortcut) will bring you in the main() function. From here on, you can either Step into (F5), Step over (F6) or just launch the session (F8).



Figure 10. Starting in the Vector Table section

6 MANIPULATING THE DEMO

Figure 11 below shows you the starting screen of the demo project which should be displayed on the board's LCD screen.



The User Led should be blinking all the time, proving that the demo is up and running. Also, at each corner of the screen, you should have the displayed coordinates of each corner. Note that the coordinates progression is shown above with the orange arrows with its origin (0,0) located in the top left corner.

The debug console should display the below starting messages as show in Figure 12.

<u>File View Log Settings H</u> elp	
COM Port COM11 V X Close 2 Refresh Clear Auto Scroll	
04/08/2021 16:27:27,267 <cl> EEPROM ready!</cl>	
04/08/2021 16:27:27,275 <cl> Accelerometer Init Success!</cl>	<u>New</u>
04/08/2021 16:27:27,283 <cl> Initializing OctaRAM</cl>	
04/08/2021 16:27:27,283 <cl> Initializing SDRAM</cl>	
04/08/2021 16:27:27,284 <cl></cl>	
04/08/2021 16:27:27,285 <cl> ************************************</cl>	
04/08/2021 16:27:27,294 <cl> ****** M13-RZA2M-EK BSP DEMO ******</cl>	
04/08/2021 16:27:27,303 <cl> ************************************</cl>	
04/08/2021 16:27:27,304 <cl> Copyright: 2010-2021 M13design SARL</cl>	
04/08/2021 16:27:27,314 <cl> Compiled: Aug 4 2021 15:08:20</cl>	
04/08/2021 16:27:27,315 <cl> Target: RZ/A2M</cl>	
04/08/2021 16:27:27,315 <cl></cl>	
	l I

Figure 12. Starting debug message in Console Terminal

6.1 THE CAPACITIVE TOUCHSCREEN

You can play with the touchscreen as shown in Figure 13. By touching the screen with one finger, you will have a feedback on the screen right under your finger as a yellow square. By moving the finger around on the screen, the yellow square should be following your finger.



Figure 14. On finger Console feedback

🦫 Free Serial Port Terminal 1.0.0.710		— C	x c
Eile View Log Settings Help			
COM Port COM11 V X Close 2 Refresh	Clear Auto Scroll		
04/08/2021 16:38:09,790 <cl></cl>			
04/08/2021 16:38:09,796 <cl> Numb</cl>	er of finger detecte	ed = 1	• <u>N</u> ew
04/08/2021 16:38:09,797 <cl></cl>	T1 T2 T3	T4 T5	
04/08/2021 16:38:09,804 <cl> X =</cl>	168		
04/08/2021 16:38:09,805 <cl> Y =</cl>	150		
Г			
		✓ Send	
COM Dat COM11 115300 8 Mars 1 DTB	rc 👝		

You will also have an information feedback in the console as shown in Figure 14. The displayed information should indicate the following:

- The number of fingers detected
- The X and Y coordinates location of the finger (T1) on the screen

The capacitive touchscreen is configurated to detect up to five fingers. As shown if Figure 15 and Figure 16, doing so, you will have a visual feedback on the screen and a feedback in the console.



Figure 15. Five finger visual feedback display

Figure 16. Five finger Console feedback



6.2 THE ACCELEROMETER

With the help of the on-board accelerometer, the application allows the screen to always face up will the board is held in landscape view. The starting default view (**ROTATION_ZERO**) is shown in Figure 17 below. This view is also the default view when the board is lying flat on a desk on a horizontal surface. Please note that there is no "Portrait" display available.



When the board is rotated 180° (still in landscape view), the screen will rotate its display information to match the user's view. In order to this, the application checks the changes in the accelerometer's Y axis and rotates the display if a threshold is reached. In addition, you will also have access to the rotation value through the console as shown below in Figure 18. Note that the board will recognize two rotation position, **ROTATION_ZERO** or **ROTATION_180**.

Figure 18	. Rotation	feedback	in	Console
-----------	------------	----------	----	---------

: Elle View Lee Cettinge Hale		
<u>rite view Log Settings H</u> eip		
; COM Port COM11 V X Close 2 Refresh ; Clear Auto Scroll		
06/08/2021 13:51:53,796 <cl></cl>		^
06/08/2021 13:51:55,798 <cl> Screen ROTATION_180</cl>		💟 <u>N</u> ew
06/08/2021 13:51:56,359 <cl> Screen ROTATION_ZERO</cl>		
06/08/2021 13:51:57,366 <cl> Screen ROTATION_180</cl>		
06/08/2021 13:51:58,345 <cl> Screen ROTATION_ZERO</cl>		
06/08/2021 13:51:59,411 <cl> Screen ROTATION_180</cl>		
06/08/2021 13:52:00,210 <cl> Screen ROTATION_ZERO</cl>		
06/08/2021 13:52:01,98 <cl> Screen ROTATION_180</cl>		
06/08/2021 13:52:01,809 <cl> Screen ROTATION_ZERO</cl>		
06/08/2021 13:52:02,641 <cl> Screen ROTATION_180</cl>		
06/08/2021 13:52:03,349 <cl> Screen ROTATION_ZERO</cl>		
06/08/2021 13:52:04,148 <cl> Screen ROTATION_180</cl>		
06/08/2021 13:52:05,67 <cl> Screen ROTATION_ZERO</cl>		
06/08/2021 13:52:05,807 <cl> Screen ROTATION_180</cl>		
06/08/2021 13:52:07,110 <cl> Screen ROTATION_ZERO</cl>		
06/08/2021 13:52:07,850 <cl> Screen ROTATION_180</cl>		
06/08/2021 13:52:08,740 <cl> Screen ROTATION_ZERO</cl>		
		~
	Send	

Please note that the touch coordinates will also be rotated 180° to match the screen display will in ROTATION_180.

5.4 TRACE LEVEL CONFIGURATION

The debug messages through the JLink Virtual COM port can be configurated, turned off or on in the m13_rza2m_ek_config.h file. This file can be found in the folder located in <Project_install>/ src/m13design/

Trace level	PRINTF_INFO () / PRINTF_ARRAY ()	PRINTF_DEBUG () / PRINTF_ARRAY_DEBUG ()
BSP_TRACE_LEVEL_OFF	OFF	OFF
BSP_TRACE_LEVEL_INFO	ON	OFF
BSP_TRACE_LEVEL_DEBUG	ON	ON

As shown in Table 2, each level will activate/deactivate the **printf** macros for debug purposes throughout M13design bsp files.

As shown in the code below, "Trace levels" can be redefined/reconfigured for each predefined available features in the **m13_rza2m_ek_config.h** file. As the board BSP will progress, more configuration will become available (More Trace levels, more board feature will be traceable etc...)

#define	BSP_CONFIG_TRACE_LEVEL_ACC	BSP_TRACE_LEVEL_INFO // Trace level for Accelerometer
#define	<pre>BSP_CONFIG_TRACE_LEVEL_TOUCH</pre>	BSP_TRACE_LEVEL_INFO // Trace level for Touch screen
#define	<pre>BSP_CONFIG_TRACE_LEVEL_SDRAM</pre>	<pre>BSP_TRACE_LEVEL_INFO // Trace level for SDRAM</pre>
#define	BSP_CONFIG_TRACE_LEVEL_SDRAM_T	BSP_TRACE_LEVEL_OFF // Trace level for SDRAM Test routine
#define	<pre>BSP_CONFIG_TRACE_LEVEL_OCTARAM</pre>	<pre>BSP_TRACE_LEVEL_INFO // Trace level for OctaRAM</pre>
#define	BSP_CONFIG_TRACE_LEVEL_OCTARAM_T	BSP_TRACE_LEVEL_OFF // Trace level for OctaRAM Test routine
#define	BSP_CONFIG_TRACE_LEVEL_EEPROM	BSP_TRACE_LEVEL_DEBUG // Trace level for EEPROM

7 CONTACT AND SUPPORT

7.1 GENERAL CONTACT

For any general inquiries, fill-in our online contact form here: https://www.m13design.fr/contact/

Or send us a request by email at: sales@m13design.fr

7.2 SUPPORT CONTACT

For any technical support request, contact us via email at: support@m13design.fr

8 **REVISION HISTORY**

Revision	Date	Revision content
V1.0	6 th of July 2021	Initial release.

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