VisionSOM-6ULL EM Radiation Test rev. 1.1



# VisionSOM-6ULL EM Radiation Test

Revision 1.1, 11/2021

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## **Document Revision History**

Revision Date		Notes
1.0	12.11.2021	Initial
1.1	26.11.2021	Editorial improvements

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### 1. Introduction

This document presents the VisionSOM-6ULL family modules EM emission/radiation tests, held at the precompliance SoMlabs EMC test lab.

Performed tests checked compatibility of EUT with emission requirements defined in standard EN 55032 class B (CISPR 32) in simulated open space environment (OATS) with 3 meters antenna distance.

Full test consists of three emission measurements in X, Y and Z axes and recalculation of the results of the obtained measurements according to the formula included in EN 55032 (CISPR 32) standard.

### 2. Tested hardware

Test covered VisionSOM-6ULL in two hardware configurations (as on pictures below):

SLS16xx\_792C\_512R\_SD\_0SF\_C

SLS16xx\_792C\_512R\_4GE\_0SF\_C

xx - means Y0, Y1 or Y2 i.MX6ULL MPU versions





For testing purposes was prepared dedicated Linux system image with simple application using UART transmitters (*visionsom-6ull-emc-test-full-uart* for eMMC memory and the same configuration and functionality, but optimized for MicroSD memory).



## 3. Test equipment

Test item	Radiated emission below 1GHz and 1-3GHz range					
Instrument	Manufacturer	Model	Serial No.	Calibration date		
Spectrum analyzer	Rohde & Schwarz	FPL1003	102103	12.2020		
		B22, K54				
GTEM chamber	Astat	GTEM250	1000007	3.2021		
Coaxial cable	Bruel & Kjaer	AO-0015	23621	5.2021		
Analog power supply	Korad	KA3005D	-	-		

### **3.1. Standard measurements devices**

### **3.2.** Dedicated measurement items

For the correct performance of measurements, it was necessary to develop two dedicated elements:

- carrier board for SoM module with basic peripherals and power supply monitor,
- mechanical stand ensuring correct module positioning inside of GTEM chamber.

Dedicated carrier board (internally called RED) with mounted SoM is shown on picture below.



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Because of testing method base on three emission measurements in X, Y and Z axes and recalculation of the results of the obtained measurements according to the formula included in EN 55032 (CISPR 32) standard, dedicated stand was developed and produced using 3D printer as on picture below. Reference mechanical base (shown on right part of picture) is permanently glued inside of GTEM250 chamber.





### 4. Measurement setup

The general view of the measuring station with the instruments used for measurements is presented below.



### 5. Test procedure

- 1. Spectrum analyzer was warmed up for 30 minutes since power supply on.
- 2. Power supply (+5V/200mA) was connected to GTEM filter.
- 3. The EUT was installed on RED testing carrier board
- 4. The ASTAT GTEM program was started and configured.
- 5. Power cables were attached to the connectors: mounted on carrier board and internal in GTEM (filtered).
- 6. The EUT installed on RED carrier board was mounted on a dedicated stand inside of GTEM in position 1 (X) as on picture below.



- 7. First measurement was started from ASTAT GTEM menu (for X axis).
- After completing the first measurement, position of EUT with RED carrier board was changed to position 2 (Y) – as on picture below.



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- 9. Second measurement was started from ASTAT GTEM menu (for Y axis).
- 10. After completing the second measurement, position of EUT with RED carrier board was changed to position 3 (Z) as on picture below.



- 11. Third measurement was started from ASTAT GTEM menu (for Z axis).
- 12. After completing the third measurement, ASTAT software calculates correlated results.

### 6. Results

### 6.1. Results for 30MHz-1GHz frequency range (quasi-peak)

# **SoMLabs**

6ULL-full-UART-PK-do-1GHz				
Operator	Gawryluk			
EUT	VisionSOM-6ULL-eMMC-noWiFi			
Uwagi	Firmware: visionsom-6ull-emc-test-full-uart			
Nazwa Firmy	SoMLabs			
Limit	55032 30M-1G klasa B 3m QP			
Symulowany dystans	3m			



### Final Scan Correlated Data

LP	Frequency[Hz]	Level[dBuV/m]	Limit[dBuV/m]	Difference[dBm]	Detector	RBW[Hz]	Pass/Failed
1	33,24M	6,45	40,00	33,55	QP	120k	pass
2	98,76M	12,34	40,00	27,66	QP	120k	pass
3	166,50M	22,30	40,00	17,70	QP	120k	pass
4	233,10M	24,77	47,00	22,23	QP	120k	pass
5	266,40M	27,89	47,00	19,11	QP	120k	pass
6	299,70M	29,44	47,00	17,56	QP	120k	pass
7	432,90M	34,10	47,00	12,90	QP	120k	pass
8	499,50M	30,99	47,00	16,01	QP	120k	pass
9	792,00M	33,60	47,00	13,40	QP	120k	pass

### 6.2. Results for 1-3GHz frequency range (average)

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### Final Scan Correlated Data

LP	Frequency[Hz]	Level[dBuV/m]	Limit[dBuV/m]	Difference[dBm]	Detector	RBW[Hz]	Pass/Failed
1	1,50G	40,56	50,00	9,44	AVG	1M	pass
2	1,57G	43,72	50,00	6,28	AVG	1M	pass
3	1,63G	40,16	50,00	9,84	AVG	1M	pass
4	1,78G	38,46	50,00	11,54	AVG	1M	pass
5	1,98G	48,34	50,00	1,66	AVG	1M	pass
6	2,77G	42,78	50,00	7,22	AVG	1M	pass

### 6.3. Results for 1-3GHz frequency range (peak)

## **SoMLabs**

6ULL-full-UART-PK					
Operator Gawryluk					
EUT	VisionSOM-6ULL-eMMC-noWiFi				
Uwagi	Firmware: visionsom-6ull-emc-test-full-uart				
Nazwa Firmy	SoMLabs				
Limit	55032 1G-3G klasa B 3m PK				
Symulowany dystans	3m				



### Final Scan Correlated Data

LP	Frequency[Hz]	Level[dBuV/m]	Limit[dBuV/m]	Difference[dBm]	Detector	RBW[Hz]	Pass/Failed
1	1,98G	56,77	70,00	13,23	PK	1M	pass

### 6.4. Reference charts



CISPR 32/FCC radiated limits for Class A and Class B in frequency range up to 1 GHz



CISPR 32/FCC radiated limits for Class A and Class B in frequency range above 1 GHz



### 7. Summary

The conducted and documented measurements confirm that the tested modules fully meet the requirements of EN 55032 class B (CISPR 32) emission standard.

### 8. Limitation on Liability

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