SoMLabs
Connecting the Future

VisionSOM-STM32MP1 EM Radiation Test

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CERTIFIED ISO 9001:2015 COMPANY

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Document Revision History

Revision	Date	Notes
1.0	25.01.2022	Initial

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1. Introduction

This document presents the VisionSOM-STM32MP1 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.

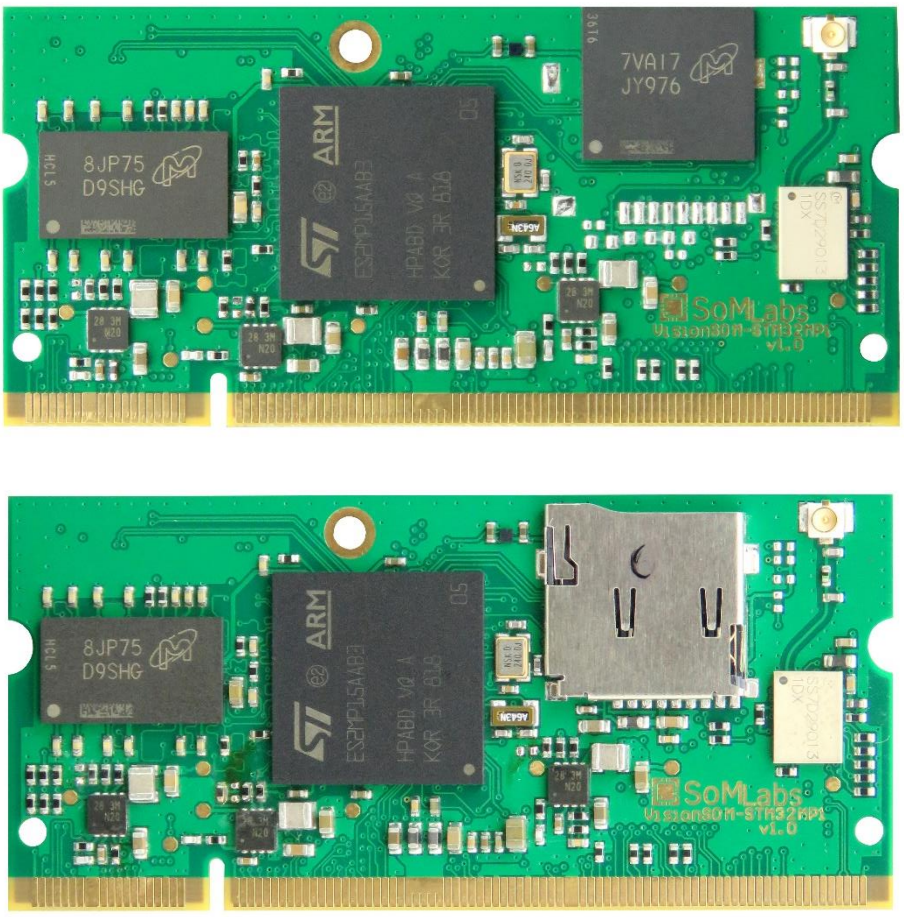
Full test consists of three emission measurements in X, Y and Z axes and recalculation of the results of the obtained measurements according to the formula included in EN 55032 (CISPR 32) standard.

2. Tested hardware

Test covered VisionSOM-STM32MP1 in hardware configurations:

SLS18MP15xy_650C_uuu_zzz_r

Where:
x – means 1, 3 or 7
y – means A or C
uuu – means 512R or uSD
zzz – means 0SF or 1WB (if z=1WB, SoM is tested with RF module switched off)
r – means I, E or C



For testing purposes was prepared dedicated Linux system image with simple application using UART transmitters with active MIPI-DSI outputs (*emmc_stm32mp-visionsom-dsi-UART-mx-trusted* for eMMC memory and the same configuration and functionality, but optimized for MicroSD memory).

3. Test equipment

3.1. Standard measurements devices

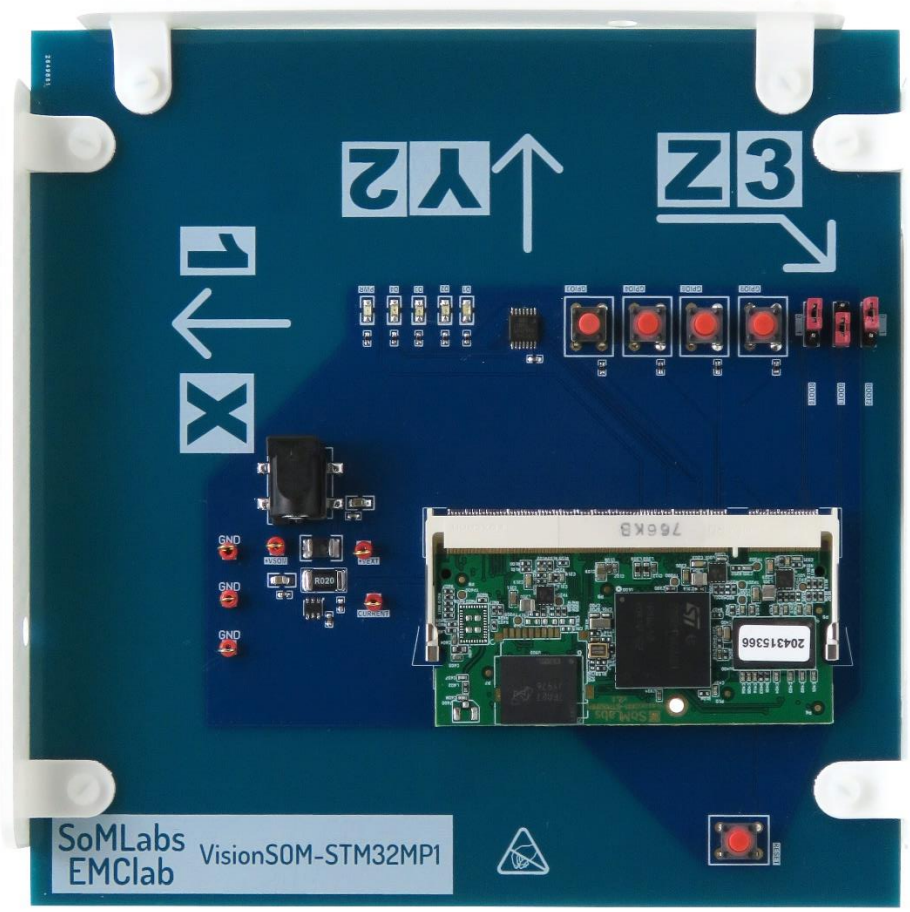
Test item	Radiated emission below 1GHz and 1-3GHz range			
Instrument	**Manufacturer**	**Model**	**Serial No.**	**Calibration date**
Spectrum analyzer	Rohde & Schwarz	FPL1003 B22, K54	102103	12.2020
GTEM chamber	Astat	GTEM250	1000007	3.2021
Coaxial cable	Bruel & Kjaer	AO-0015	23621	5.2021
Analog power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

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.

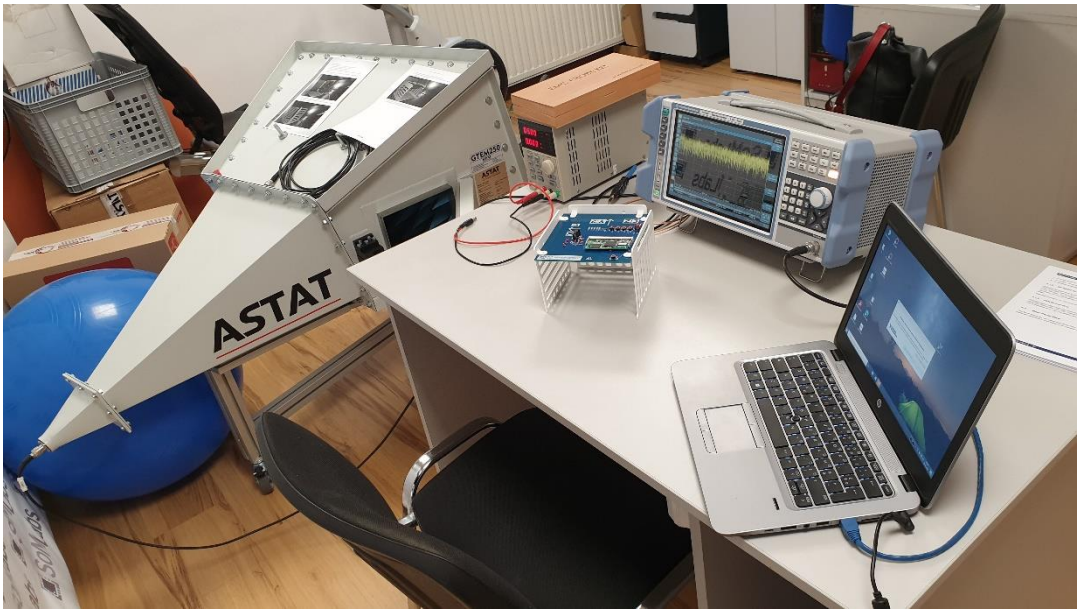
Dedicated carrier board (internally called BLUE) with mounted SoM is shown on picture below.

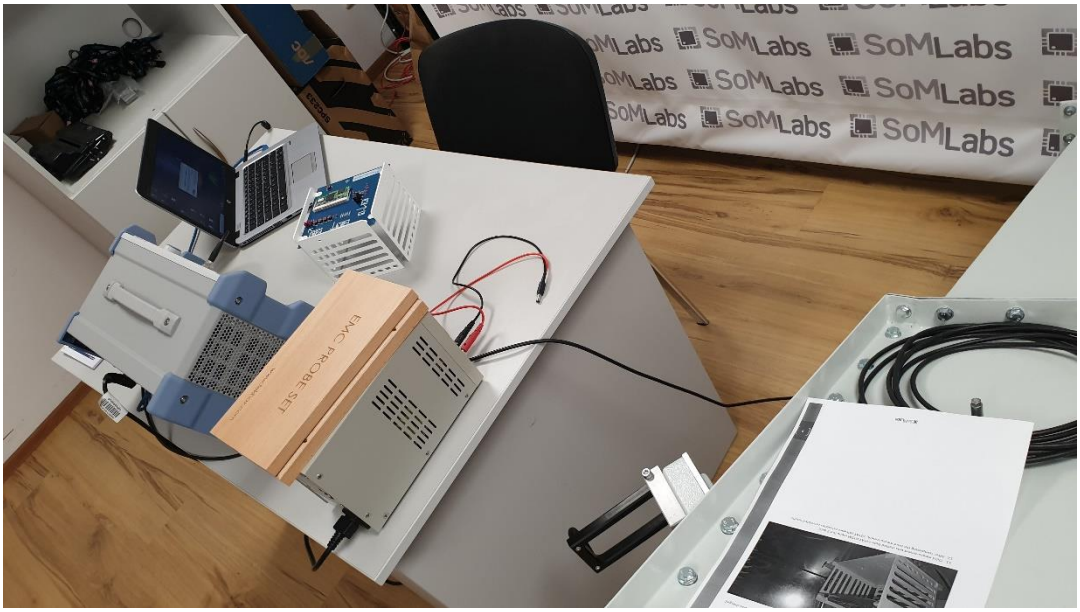


Because of testing method base on three emission measurements in X, Y and Z axes and recalculation of the results of the obtained measurements according to the formula included in EN 55032 (CISPR 32) standard, dedicated stand was developed and produced using 3D printer as on picture below. Reference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



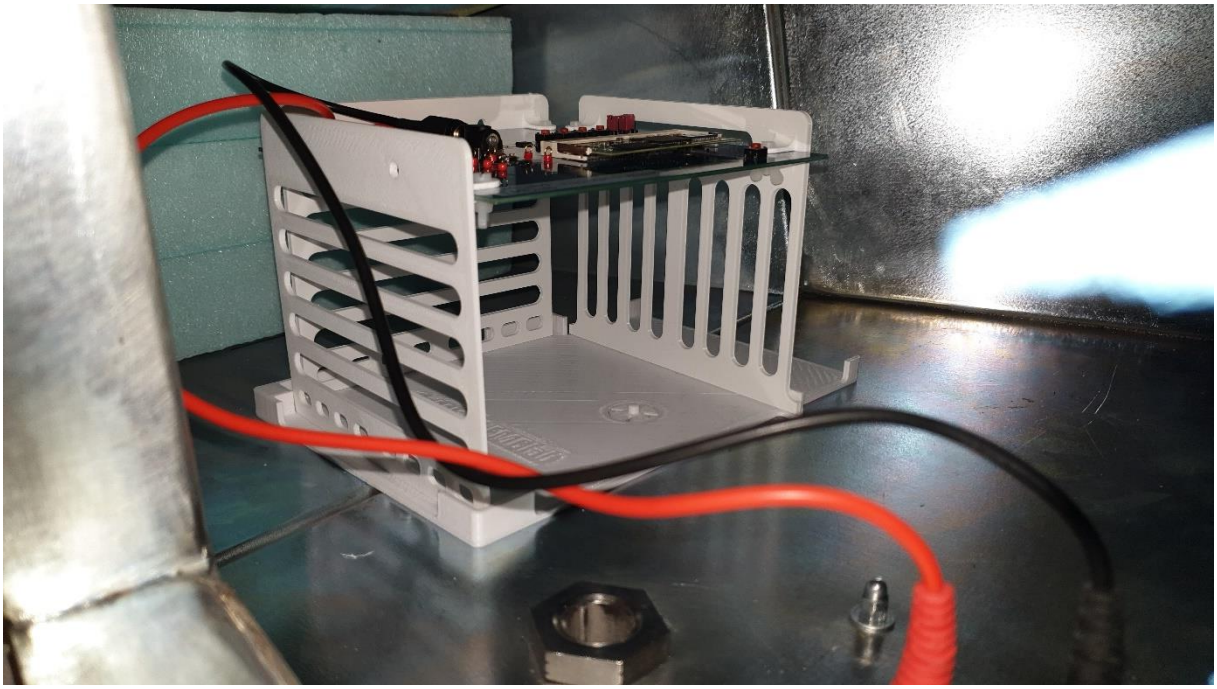


5. Test procedure

1. Spectrum analyzer was warmed up for 30 minutes since power supply on.
2. Power supply (+5V/250mA) was connected to GTEM filter.
3. The EUT was installed on BLUE 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 BLUE 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).
8. After completing the first measurement, position of EUT with BLUE carrier board was changed to position 2 (Y) – as on picture below.

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

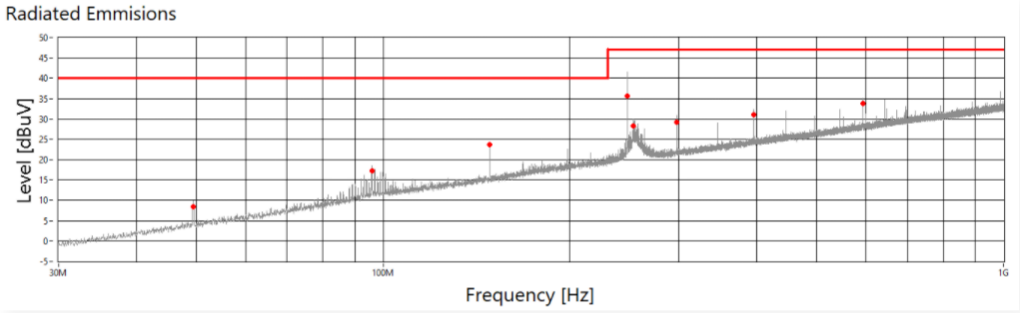


11. Third measurement was started from ASTAT GTEM menu (for Z axis).
12. After completing the third measurement, ASTAT software calculates correlated results.

6. Results

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

STM32MP157-full-UART-QP	
Operator	Jarosław Harasimiuk
EUT	VisionSOM-STM32MP157-noWiFi
Uwagi	Firmware: emmc_stm32mp-visionsom-dsi-UART-mx-trusted
Nazwa Firmy	SoMLabs
Limit	55032 30M-1G klasa B 3m QP
Symulowany dystans	3m

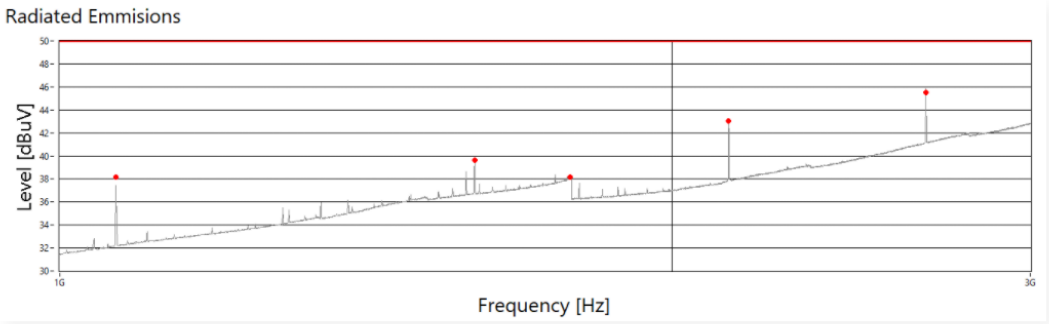


Final Scan Correlated Data

LP	Frequency[Hz]	Level[dBuV/m]	Limit[dBuV/m]	Difference[dBm]	Detector	RBW[Hz]	Pass/Failed
1	49,44M	8,46	40,00	31,54	QP	120k	pass
2	96,00M	17,33	40,00	22,67	QP	120k	pass
3	148,50M	23,72	40,00	16,28	QP	120k	pass
4	247,38M	35,64	47,00	11,36	QP	120k	pass
5	253,14M	28,33	47,00	18,67	QP	120k	pass
6	297,00M	29,31	47,00	17,69	QP	120k	pass
7	396,00M	31,06	47,00	15,94	QP	120k	pass
8	594,06M	33,74	47,00	13,26	QP	120k	pass

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

STM32MP157-full-UART-AVG	
Operator	Jarosław Harasimiuk
EUT	VisionSOM-STM32MP157-noWiFi
Uwagi	Firmware: emmc_stm32mp-visionsom-dsi-UART-mx-trusted
Nazwa Firmy	SoMLabs
Limit	55032 1G-3G klasa B 3m AV
Symulowany dystans	3m

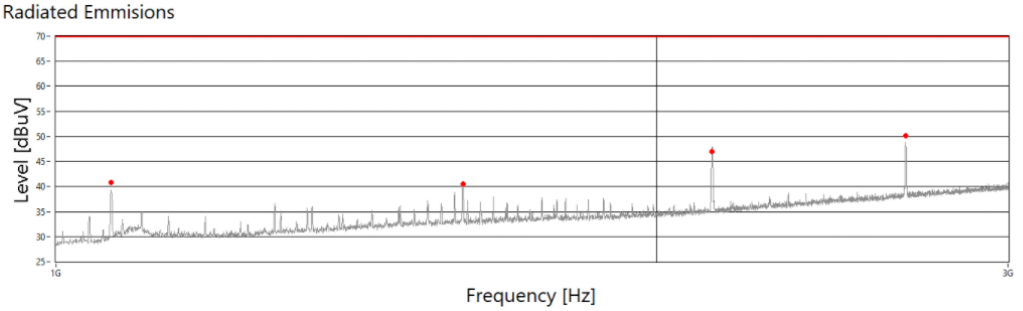


Final Scan Correlated Data

LP	Frequency[Hz]	Level[dBuV/m]	Limit[dBuV/m]	Difference[dBm]	Detector	RBW[Hz]	Pass/Failed
1	1,07G	38,14	50,00	11,86	AVG	1M	pass
2	1,60G	39,66	50,00	10,34	AVG	1M	pass
3	1,78G	38,16	50,00	11,84	AVG	1M	pass
4	2,13G	43,05	50,00	6,95	AVG	1M	pass
5	2,67G	45,52	50,00	4,48	AVG	1M	pass

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

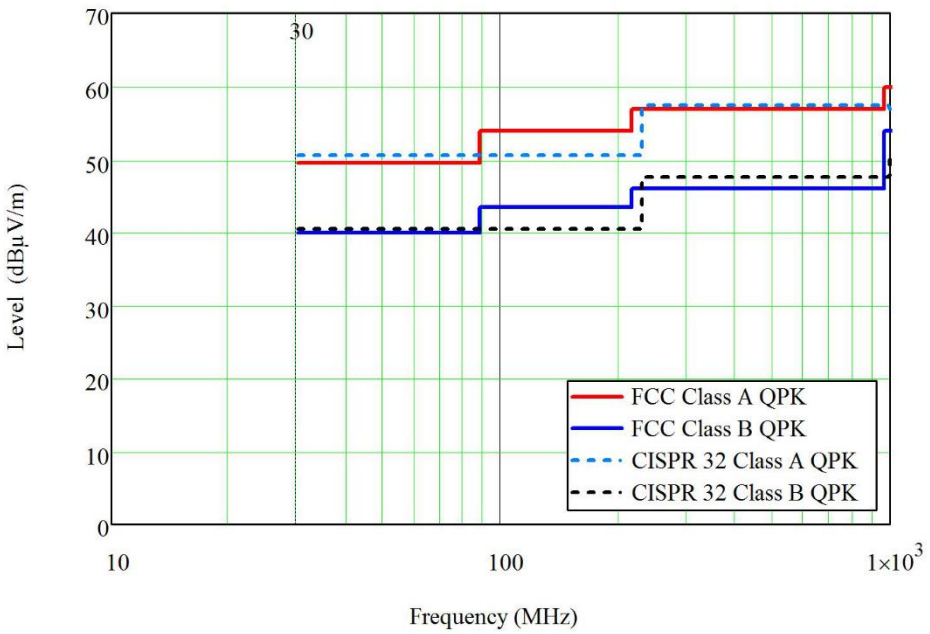
STM32MP157-full-UART-PK	
Operator	Jarosław Harasimiuk
EUT	VisionSOM-STM32MP157-noWiFi
Uwagi	Firmware: emmc_stm32mp-visionsom-dsi-UART-mx-trusted
Nazwa Firmy	SoMLabs
Limit	55032 1G-3G klasa B 3m PK
Symulowany dystans	3m



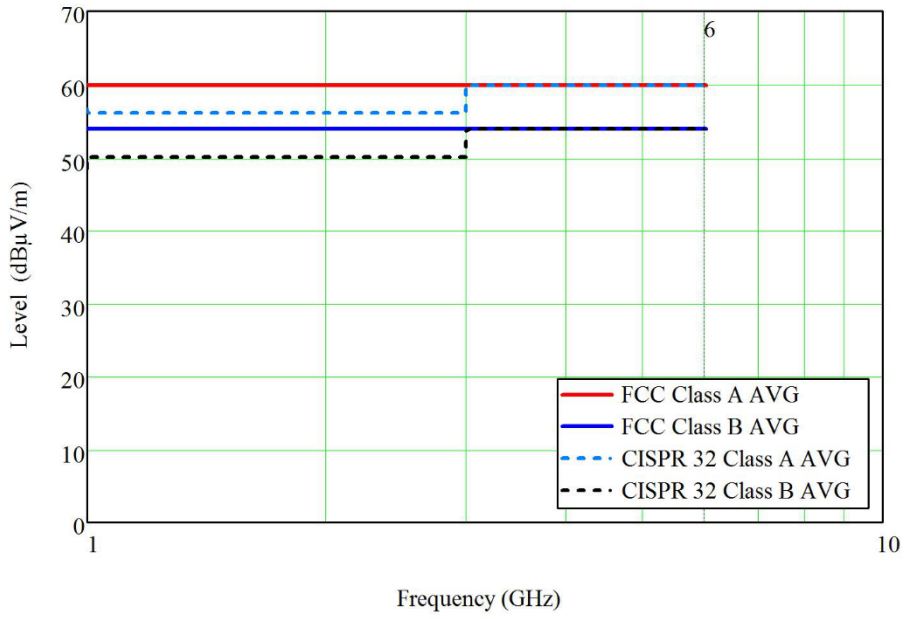
Final Scan Correlated Data

LP	Frequency[Hz]	Level[dBuV/m]	Limit[dBuV/m]	Difference[dBm]	Detector	RBW[Hz]	Pass/Failed
1	1,07G	40,74	70,00	29,26	QP	1M	pass
2	1,60G	40,44	70,00	29,56	QP	1M	pass
3	2,13G	47,01	70,00	22,99	QP	1M	pass
4	2,67G	50,11	70,00	19,89	QP	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

Under no circumstances shall SoMLabs Sp. z o. o. be liable for any loss, damage or expense suffered or incurred with respect to any defective product.

In no event shall SoMLabs Sp. z o. o. be liable for any incidental or consequential damages that you may suffer directly or indirectly from use of any product.