

CFR 47 FCC PART 15 SUBPART C

TEST REPORT

For

Smart Projector

MODEL NUMBER: HY300

REPORT NUMBER: E01A23070868F00303

ISSUE DATE: August 31, 2023

FCC ID:2BCAX-T08

Prepared for

**GuangDong SINOY Smart Technology CO., LTD
5TH Floor, Building #2, RunFengZhiGu Industrial Park, Changpin Town, DongGuan
City, Guangdong, China**

Prepared by

Dong Guan Anci Electronic Technology Co., Ltd.

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	August 31, 2023	Initial Issue	Poal Chen

Summary of Test Results

Test Item	Clause	Limit/Requirement	Result
Antenna Requirement	N/A	FCC Part 15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	ANSI C63.10-2013, Clause 6.2	FCC Part 15.207	Pass
Conducted Output Power	ANSI C63.10-2013, Clause 11.9.1.3	FCC Part 15.247 (b)(3)	Pass
6dB Bandwidth and 99% Occupied Bandwidth	ANSI C63.10-2013, Clause 11.8.1	FCC Part 15.247 (a)(2)	Pass
Power Spectral Density	ANSI C63.10-2013, Clause 11.10.2	FCC Part 15.247 (e)	Pass
Conducted Band edge and spurious emission	ANSI C63.10-2013, Clause 11.11	FCC Part 15.247(d)	Pass
Radiated Band edge and Spurious Emission	ANSI C63.10-2013, Clause 11.11 & Clause 11.12	FCC Part 15.205/15.209	Pass
Duty Cycle	ANSI C63.10-2013, Clause 11.6	None; for reporting purposes only.	Pass

*This test report is only published to and used by the applicant, and it is not for evidence purpose in China.

*The measurement result for the sample received is <Pass> according to <CFR 47 FCC PART 15 SUBPART C> when <Accuracy Method> decision rule is applied.

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Guangdong SINOY Smart Technology CO., LTD
Address: 5TH Floor, Building #2, RunFengZhiGu Industrial Park, Changpin Town, DongGuan City, Guangdong, China

Manufacturer Information

Company Name: Guangdong SINOY Smart Technology CO., LTD
Address: 5TH Floor, Building #2, RunFengZhiGu Industrial Park, Changpin Town, DongGuan City, Guangdong, China

Factory Information

Company Name: Guangdong SINOY Smart Technology CO., LTD
Address: 5TH Floor, Building #2, RunFengZhiGu Industrial Park, Changpin Town, DongGuan City, Guangdong, China

EUT Information

Product Description: Smart Projector
Model: HY300
Series Model: P1, P2, P5, P6, P7, P8, P9, HY300A, S27, T08, T09, W13-S, W13-M, M8, G1, G5, BL108, BL128, A1
Sample Received Date: July 31, 2023
Sample Status: Normal
Sample ID: A23070868 004
Date of Tested: August 3, 2023 to August 30, 2023

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 FCC PART 15 SUBPART C	Pass

Prepared By:


Poai Chen
Project Engineer

Checked By:


Dyson Dai
Project Engineer

Approved By:


Tiger Xu
Laboratory Supervisor

2. TEST METHODOLOGY

All tests were performed in accordance with the standard CFR 47 FCC PART 15 SUBPART C

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	A2LA (Certificate No.: 4422.01) Dong Guan Anci Electronic Technology Co., Ltd. has been assessed and proved to be in compliance with A2LA. FCC (FCC Designation No.: CN1230) Dong Guan Anci Electronic Technology Co., Ltd. has been recognized to perform compliance testing on equipment subject to Supplier's Declaration of Conformity (SDoC) and Certification rules ISED (Company No.: 22768) Dong Guan Anci Electronic Technology Co., Ltd. has been registered and fully described in a report filed with ISED. The Company Number is 22768 and the test lab Conformity Assessment Body Identifier (CABID) is CN0079.
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Note: All tests measurement facilities use to collect the measurement data are located at 1-2/F., Building A, and 1F Building B, No.11, Headquarters 2 Road, Songshan Lake High-tech Industrial Development Zone, Dongguan, Guangdong, China

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Items	k	Uncertainty
DTS Bandwidth	1.96	±9.2 PPM
20dB Emission Bandwidth	1.96	±9.2 PPM
Carrier Frequency Separation	1.96	±9.2 PPM
Number of Hopping Channel	1.96	±9.2 PPM
Time of Occupancy	1.96	±0.57%
Maximum Conducted Output Power	1.96	± 0.73 dB
Max Peak Conducted Output Power	1.96	±1.5 dB
Maximum Power Spectral Density Level	1.96	±1.9 dB
Conducted Band edge	1.96	±9.2 PPM
Conducted spurious emission	1.96	9 kHz-30 MHz: ± 0.95 dB 30 MHz-1 GHz: ± 1.5 dB 1GHz-12.75GHz: ± 1.8 dB 12.75 GHz-26.5 GHz: ± 2.1dB
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.		

Test Item	Measurement Frequency Range	K	U(dB)
Conducted emissions from the AC mains power ports (AMN)	150 kHz ~ 30 MHz	2	3.37
Radiated emissions	30 MHz ~ 1 GHz	2	3.79
Radiated emissions	1 GHz ~ 18 GHz	2	5.62
Radiated emissions	18 GHz ~ 40 GHz	2	5.54
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.			

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name		Smart Projector
Model		HY300
Series Model		P1, P2, P5, P6, P7, P8, P9, HY300A, S27, T08, T09, W13-S, W13-M, M8, G1, G5, BL108, BL128, A1
EUT Classification		Class B
Hardware Version		V1.0
Software Version		V1.0
Ratings		AC100-260V~ 50/60Hz 2.5A
Power Supply	AC	120V/60Hz

Frequency Band:	2400 MHz to 2483.5 MHz
Frequency Range:	2412 MHz to 2462 MHz
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11ax HE20, IEEE 802.11ax HE40
Type of Modulation:	IEEE 802.11b: DSSS(CCK, DQPSK, DBPSK) IEEE 802.11g/n: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11ax: OFDMA(1024-QAM, 256-QAM, 64-QAM, 16-QAM, QPSK, BPSK)
Data Rate:	IEEE 802.11b: Up to 11 Mbps IEEE 802.11g: Up to 54 Mbps IEEE 802.11n: Up to MCS7 IEEE 802.11ax: Up to MCS11
Number of Channels:	IEEE 802.11b/g/n-HT20/ax-HE20: 11 IEEE 802.11n-HT40/ax-HE40: 7
Antenna Type:	PCB Antenna
Antenna Gain:	-3.91dBi
EUT Test software:	rf_test

5.2. CHANNEL LIST

Channel List for 802.11b/g/n/ax (20 MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	4	2427	7	2442	10	2457
2	2417	5	2432	8	2447	11	2462
3	2422	6	2437	9	2452	/	/

Channel List for 802.11n/ax (40 MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)

3	2422	5	2432	7	2442	9	2452
4	2427	6	2437	8	2447	/	/

5.3. MAXIMUM CONDUCTED PEAK OUTPUT POWER

IEEE Std. 802.11	Frequency (MHz)	Channel Number	Maximum Conducted Peak Output Power (dBm)
b	2412 ~ 2462	1-11[11]	16.59
g	2412 ~ 2462	1-11[11]	16.16
n HT20	2412 ~ 2462	1-11[11]	16.17
ax HE20	2412 ~ 2462	1-11[11]	15.83
n HT40	2422 ~ 2452	3-9[7]	16.44
ax HE40	2422 ~ 2452	3-9[7]	16.02

5.4. TEST CHANNEL CONFIGURATION

IEEE Std. 802.11	Test Channel Number	Frequency
b	CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel)	2412 MHz, 2437 MHz, 2462 MHz
g	CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel)	2412 MHz, 2437 MHz, 2462 MHz
n HT20	CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel)	2412 MHz, 2437 MHz, 2462 MHz
ax HE20	CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel)	2412 MHz, 2437 MHz, 2462 MHz
n HT40	CH 3(Low Channel), CH 6(MID Channel), CH 9(High Channel)	2422 MHz, 2437 MHz, 2452 MHz
ax HE40	CH 3(Low Channel), CH 6(MID Channel), CH 9(High Channel)	2422 MHz, 2437 MHz, 2452 MHz

5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Test Software		rf_test					
Modulation Mode	Transmit Antenna Number	Test Channel					
		NCB: 20MHz			NCB: 40MHz		
		CH 1	CH 6	CH 11	CH 3	CH 6	CH 9
802.11b	1	05	05	05			
802.11g	1	05	05	05			
802.11n HT20	1	05	05	05			
802.11ax HE20	1	05	05	05			
802.11n HT40	1				05	05	05
802.11ax HE40	1				05	05	05

WORST-CASE CONFIGURATIONS

The EUT was tested in the following configuration(s):

Controlled in test mode using a software application on the EUT supplied by customer. The application was used to enable a continuous transmission and to select the mode, test channels, bandwidth, data rates as required.

Test channels referring to section 5.4.

Maximum power setting referring to section 5.5.

Worst-case data rates as provided by the client were:

802.11b mode: 1 Mbps
 802.11g mode: 6 Mbps
 802.11n HT20 mode: MCS0
 802.11ax HE20 mode: MCS0
 802.11n HT40 mode: MCS0
 802.11ax HE40 mode: MCS0

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)
1	2412-2462	PCB	-3.91

Test Mode	Transmit and Receive Mode	Description
IEEE 802.11b	☒ 1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
IEEE 802.11g	☒ 1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
IEEE 802.11n HT20	☒ 1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
IEEE 802.11ax HE20	☒ 1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
IEEE 802.11n HT40	☒ 1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
IEEE 802.11ax HE40	☒ 1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
Note: 1.BT&WLAN 2.4G, BT & WLAN 5G, WLAN 2.4G & WLAN 5G can't transmit simultaneously. (declared by client)		

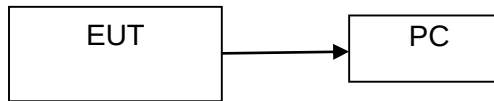
Note: The value of the antenna gain was declared by customer.

5.7. SUPPORT UNITS FOR SYSTEM TEST

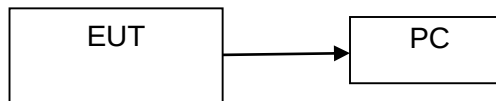
Equipment	Manufacturer	Model No.
PC	Lenovo	T14

5.8. SETUP DIAGRAM

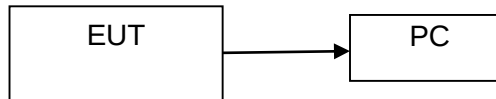
AC conducted emission :



Radiated Emission:



RF conducted:



6. MEASURING EQUIPMENT AND SOFTWARE USED

Test Equipment of Conducted RF					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
Spectrum Analyzer	KEYSIGHT	N9020A	MY51281878	2022-10-08	2023-10-07
USB RF Power sensor	RadiPower	RPR3006W	17I00015SNO88	2022-10-08	2023-10-07
Radio Frequency control box	MWRF-test	MW200-RFCB	MW220111ANCI	2023-05-10	2024-05-09
Radio Frequency control box	MWRF-test	MW200-RFCB 2#	/	2023-05-10	2024-05-09
RF Test Software	MWRF-test	MTS 8310	N/A	N/A	N/A

Test Equipment of Radiated emissions below 1GHz					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
3m Semi-anechoic Chamber	Keysight	9m*6m*6m	N/A	2021-11-13	2024-11-12
EMI Test Receiver	ROHDE&SCHWARZ	ESCI	100302	2023-05-10	2024-05-09
Bilog Antenna	Schwarzbeck	VULB9163	VULB9163-1290	2022-12-12	2023-12-11
RF Cable	ZKJC	ZT06S-NJ-NJ-11M	19060398	2023-05-10	2024-05-09
RF Cable	ZKJC	ZT06S-NJ-NJ-0.5M	19060400	2023-05-10	2024-05-09
RF Cable	ZKJC	ZT06S-NJ-NJ-2.5M	19060404	2023-05-10	2024-05-09
Test Software	Farad	EZ-EMC (Ver.FA-03A2 RE)	N/A	N/A	N/A

Test Equipment of Radiated emissions above 1GHz					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
3m Semi-anechoic Chamber	Keysight	9m*6m*6m	N/A	2021-11-13	2024-11-12
Spectrum Analyzer	Rohde & Schwarz	FSV40	US40240623	2022-10-29	2023-10-28
Horn antenna	A-INFO	LB-10180-SF	J203109061 2123	2023-05-10	2024-05-09
Low noise Amplifiers	A-INFO	LA1018N400 9	J101313052 4001	2023-05-10	2024-05-09
RF Cable	ZKJC	ZT26-NJ-NJ-11M	19060401	2023-05-10	2024-05-09
RF Cable	ZKJC	ZT26-NJ-NJ-2.5M	19060402	2023-05-10	2024-05-09

RF Cable	ZKJC	ZT26-NJ-NJ-0.5M	19060403	2023-05-10	2024-05-09
Test Software	Farad	EZ-EMC (Ver.FA-03A2 RE)	N/A	N/A	N/A
Test Equipment of Conducted emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
1# Shielded Room	chengyu	8m*4m*3.3m	N/A	2022-11-22	2025-11-21
EMI Test Receiver	ROHDE&SCHWARZ	ESCI	101358	2023-05-10	2024-05-09
LISN	ROHDE&SCHWARZ	ENV216	101413	2022-10-08	2023-10-07
RF Cable	N/A	ZT06S-NJ-NJ-2.5M	19044022	2023-05-10	2024-05-09
Test Software	Farad	EZ-EMC (Ver.ANCI-3A1)	N/A	N/A	N/A

7. ANTENNA PORT TEST RESULTS

7.1. CONDUCTED OUTPUT POWER

LIMITS

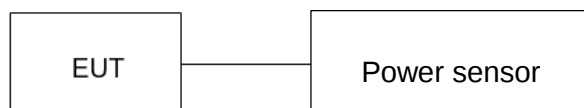
CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(b)(3)	Peak Conduct Output Power	1 watt or 30 dBm	2400-2483.5

TEST PROCEDURE

Connect the EUT to a low loss RF cable from the antenna port to the power sensor (video bandwidth is greater than the occupied bandwidth).

Measure peak emission level, the indicated level is the peak output power, after any corrections for external attenuators and cables.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.6°C	Relative Humidity	41%RH
Atmosphere Pressure	101kPa		

TEST RESULTS

Test results refer to report E01A23070868F00304 - Appendix B.

7.2. 6DB BANDWIDTH

LIMITS

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(a)(2)	6 dB Bandwidth	≥ 500 kHz	2400-2483.5

TEST PROCEDURE

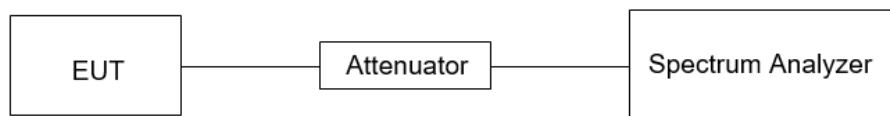
Refer to ANSI C63.10-2013 clause 11.8 for DTS bandwidth.

Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Frequency Span	For 6 dB Bandwidth: Enough to capture all products of the modulation carrier emission
Detector	Peak
RBW	For 6 dB Bandwidth: 100 kHz
VBW	For 6 dB Bandwidth: $\geq 3 \times$ RBW
Trace	Max hold
Sweep	Auto couple

a) Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.6°C	Relative Humidity	41%RH
Atmosphere Pressure	101kPa		

TEST RESULTS

Test results refer to report E01A23070868F00304 - Appendix C .

7.3. POWER SPECTRAL DENSITY

LIMITS

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC §15.247 (e)	Power Spectral Density	8 dBm in any 3 kHz band	2400-2483.5

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.10.

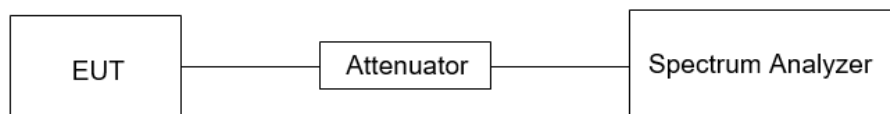
Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	PEAK
RBW	$3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
VBW	$\geq 3 \times \text{RBW}$
Span	$1.5 \times \text{DTS bandwidth}$
Trace	Max hold
Sweep time	Auto couple

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.6°C	Relative Humidity	41%RH
Atmosphere Pressure	101kPa		

TEST RESULTS

Test results refer to report E01A23070868F00304 - Appendix D.

7.4. CONDUCTED BAND EDGE AND SPURIOUS EMISSION

LIMITS

CFR 47 FCC Part15 (15.247) Subpart C		
Section	Test Item	Limit
CFR 47 FCC §15.247 (d)	Conducted Bandedge and Spurious Emissions	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.11 and 11.13.

Connect the EUT to the spectrum analyser and use the following settings for reference level measurement:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times \text{RBW}$
Span	$1.5 \times \text{DTS bandwidth}$
Trace	Max hold
Sweep time	Auto couple.

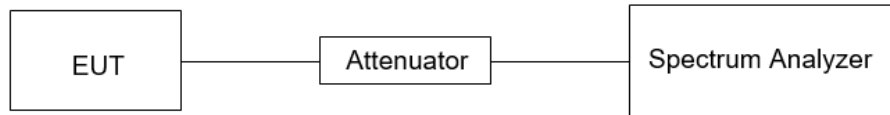
Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level.

Change the settings for emission level measurement:

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times \text{RBW}$
measurement points	$\geq \text{span}/\text{RBW}$
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.6°C	Relative Humidity	41%RH
Atmosphere Pressure	101kPa		

TEST RESULTS

Test results refer to report E01A23070868F00304 - Appendix E and Appendix F.

7.5. DUTY CYCLE

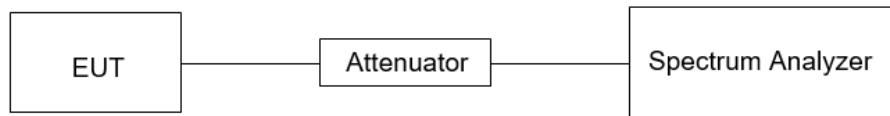
LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.6 Zero – Span Spectrum Analyzer method.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.6°C	Relative Humidity	41%RH
Atmosphere Pressure	101kPa		

TEST RESULTS

Test results refer to report E01A23070868F00304 - Appendix A.

8. RADIATED TEST RESULTS

Radiated Band edge and Spurious Emission LIMITS

Please refer to CFR 47 FCC §15.205 and §15.209.

Radiation Disturbance Test Limit for FCC (Class B)

Emissions radiated outside of the specified frequency bands above 30 MHz			
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m	
		Quasi-Peak	
30 - 88	100	40	
88 - 216	150	43.5	
216 - 960	200	46	
Above 960	500	54	
Above 1000	500	Peak	Average
		74	54

FCC Emissions radiated outside of the specified frequency bands below 30 MHz		
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30

FCC Restricted bands of operation refer to FCC §15.205 (a):

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

Note: ¹Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

²Above 38.6c

TEST PROCEDURE

Below 30 MHz

The setting of the spectrum analyser

RBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
VBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
Sweep	Auto

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.4.
2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80 cm above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1 m height antenna tower.
5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.
6. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak and average detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak and average detector and reported.
7. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field site based on KDB 414788.
8. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω . For example, the measurement frequency X KHz resulted in a level of Y dBuV/m, which is equivalent to $Y-51.5 = Z$ dBuA/m, which has the same margin, W dB, to the corresponding 15.209(a) limit.

Below 1 GHz and above 30 MHz

The setting of the spectrum analyser

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.5.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80 cm above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

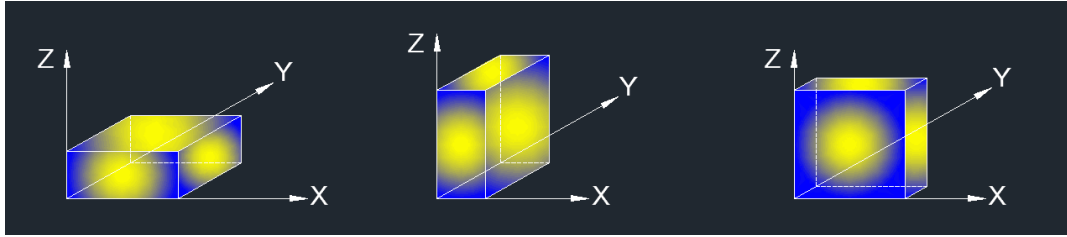
Above 1G

The setting of the spectrum analyser

RBW	1 MHz
VBW	PEAK: 3 MHz AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

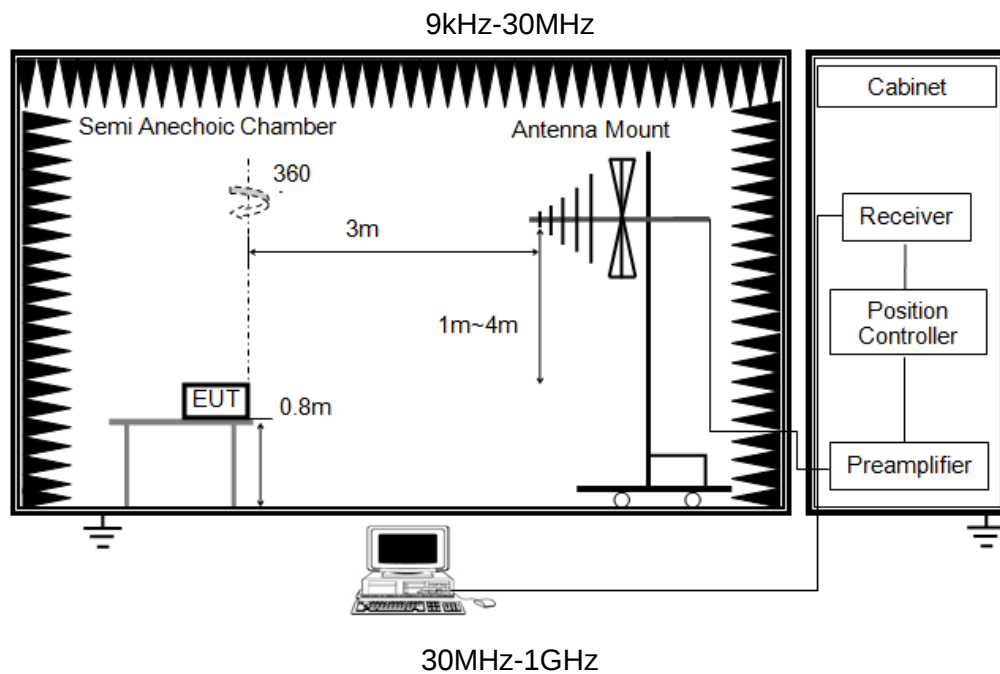
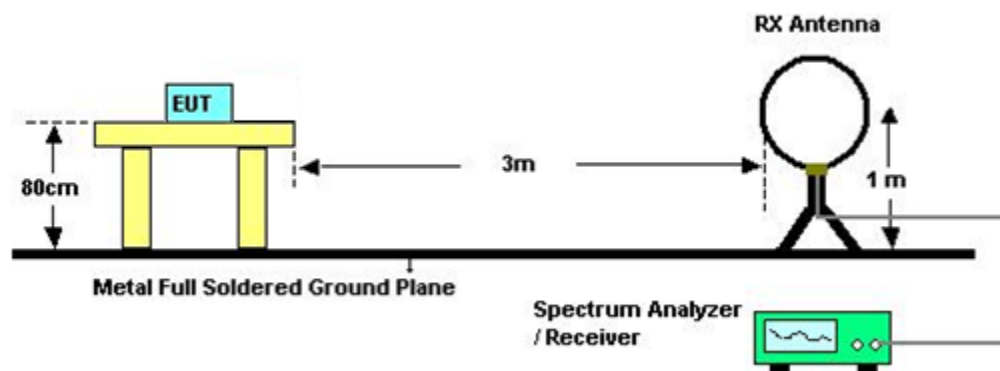
1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.6.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 1.5 m above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement above 1 GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.
6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 7.1.ON TIME AND DUTY CYCLE.

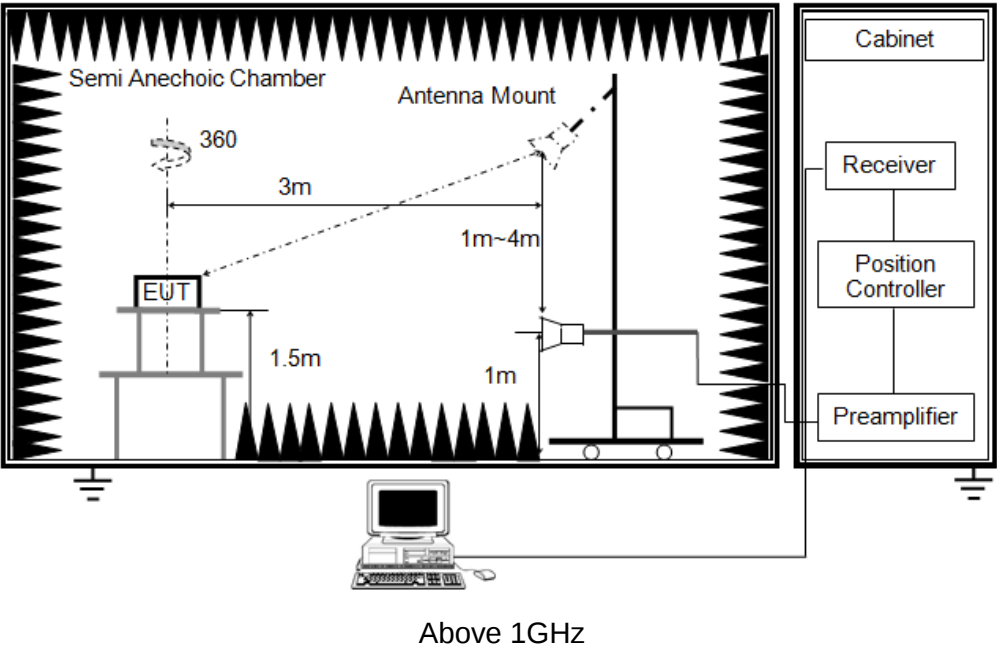
X axis, Y axis, Z axis positions:



Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

TEST SETUP





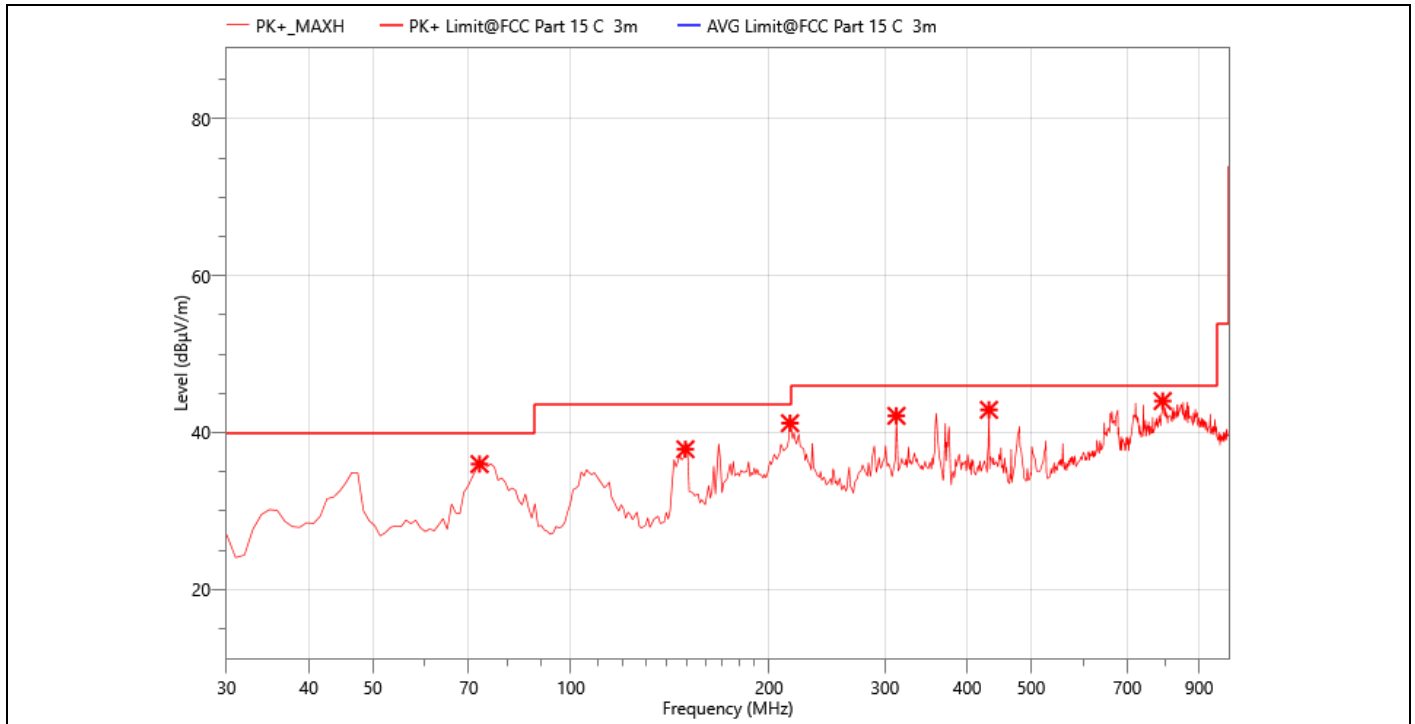
TEST ENVIRONMENT

Temperature	24.3℃	Relative Humidity	54%RH
Atmosphere Pressure	101kPa		

TEST RESULTS

- Undesirable radiated Spurious Emission below 1GHz (30MHz to 1GHz)

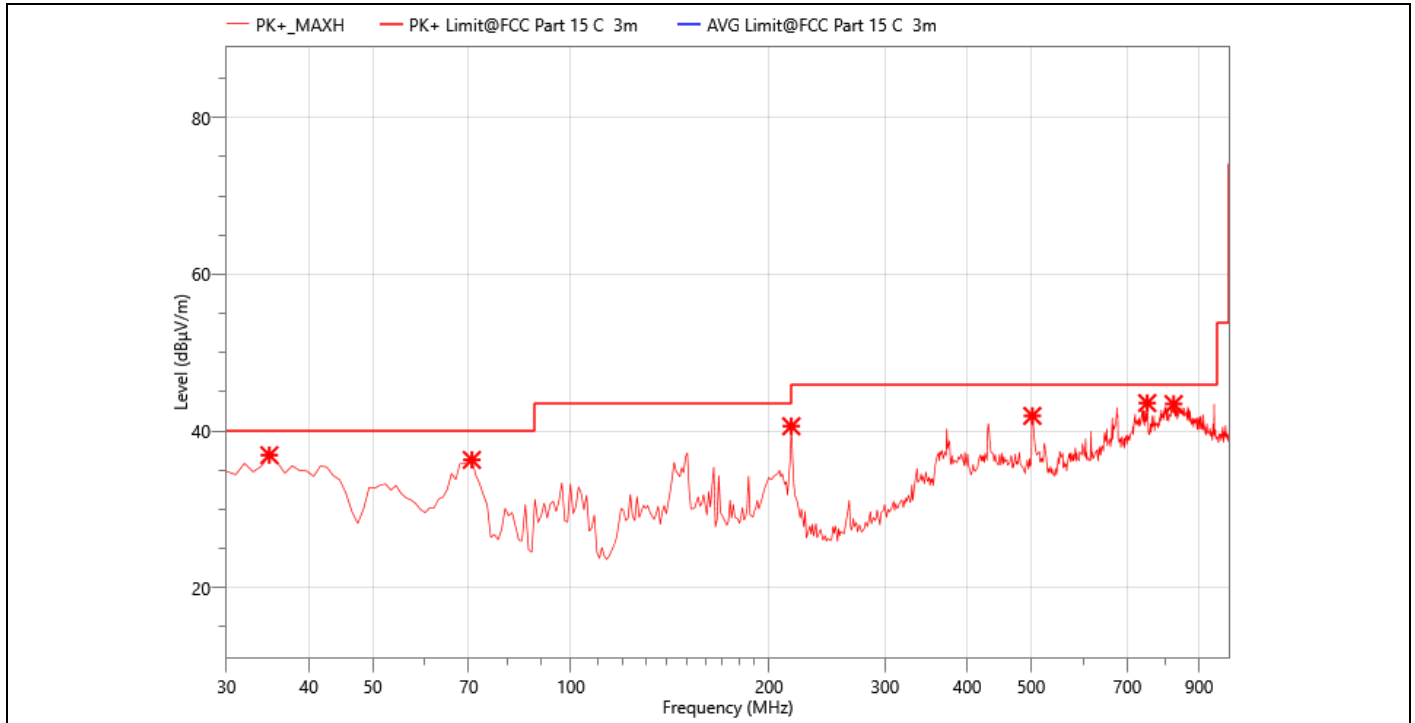
The worst result as bellow:



EUT: Smart Projector
M/N.: HY300
Mode: 802.11b 2412MHz
Test Engineer: Berny

Temperature: 24.3°C
Humidity: 54%RH
Power Rating: AC 120V/60Hz
Test Time: 2023-08-30

No.	Freq. (MHz)	Reading (dBμV)	Meas. (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)
1	72.680	41.13	35.99	40.00	4.01	PK+	100.0	H	182.1	-5.14
2	149.310	43.14	37.88	43.50	5.62	PK+	100.0	H	182.1	-5.26
3	215.270	45.90	41.20	43.50	2.30	PK+	100.0	H	182.1	-4.7
4	312.270	42.64	42.14	46.00	3.86	PK+	100.0	H	182.1	-0.5
5	431.580	38.85	42.90	46.00	3.10	PK+	100.0	H	182.1	4.05
6	792.420	31.63	44.03	46.00	1.97	PK+	100.0	H	182.1	12.4



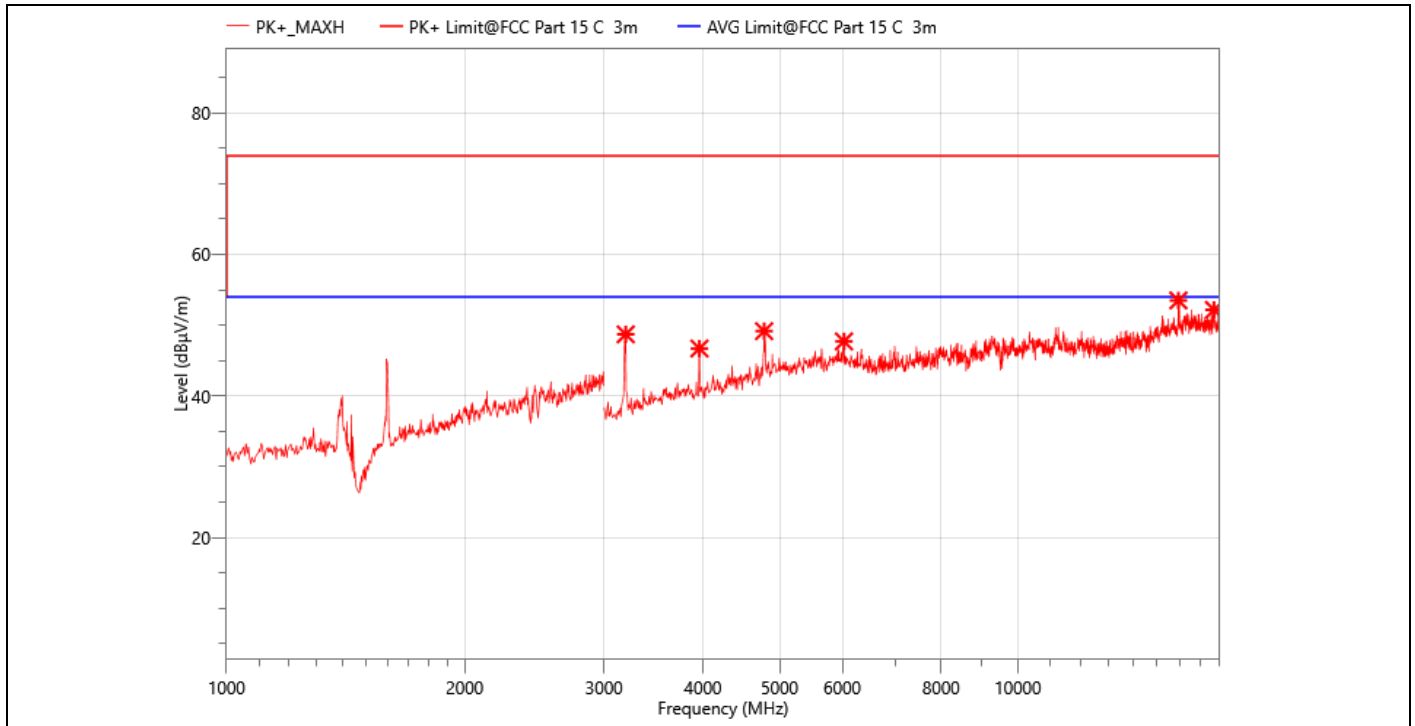
EUT: Smart Projector
M/N.: HY300
Mode: 802.11b 2412MHz
Test Engineer: Berny

Temperature: 24.3°C
Humidity: 54%RH
Power Rating: AC 120V/60Hz
Test Time: 2023-08-30

No.	Freq. (MHz)	Reading (dBμV)	Meas. (dBμV/m)	Limit (dBμV/m)	Margin (dBμV/m)	Det.	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)
1	34.850	42.41	36.93	40.00	3.07	PK+	100.0	V	182.1	-5.48
2	70.740	41.03	36.32	40.00	3.68	PK+	100.0	V	182.1	-4.71
3	216.240	45.27	40.62	46.00	5.38	PK+	100.0	V	182.1	-4.65
4	502.390	36.31	41.94	46.00	4.06	PK+	100.0	V	182.1	5.63
5	750.710	32.60	43.58	46.00	2.42	PK+	100.0	V	182.1	10.98
6	823.460	30.40	43.45	46.00	2.55	PK+	100.0	V	182.1	13.05

● Undesirable radiated Spurious Emission Above 1GHz (1GHz to 26.5GHz)

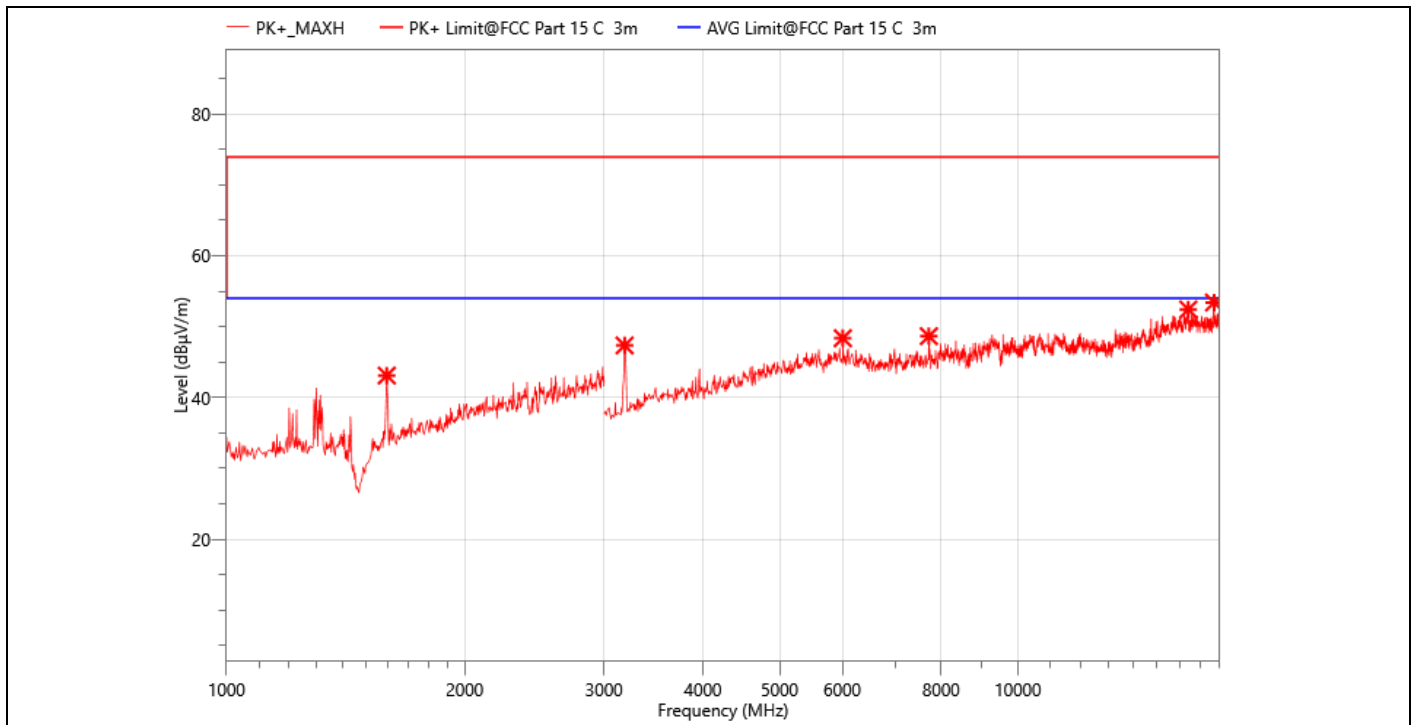
All modes has been tested and the worst result (3-DH5) recorded as below:



EUT: Smart Projector
M/N.: HY300
Mode: 802.11b 2412MHz
Test Engineer: Berny

Temperature: 24.3°C
Humidity: 54%RH
Power Rating: AC 120V/60Hz
Test Time: 2023-08-30

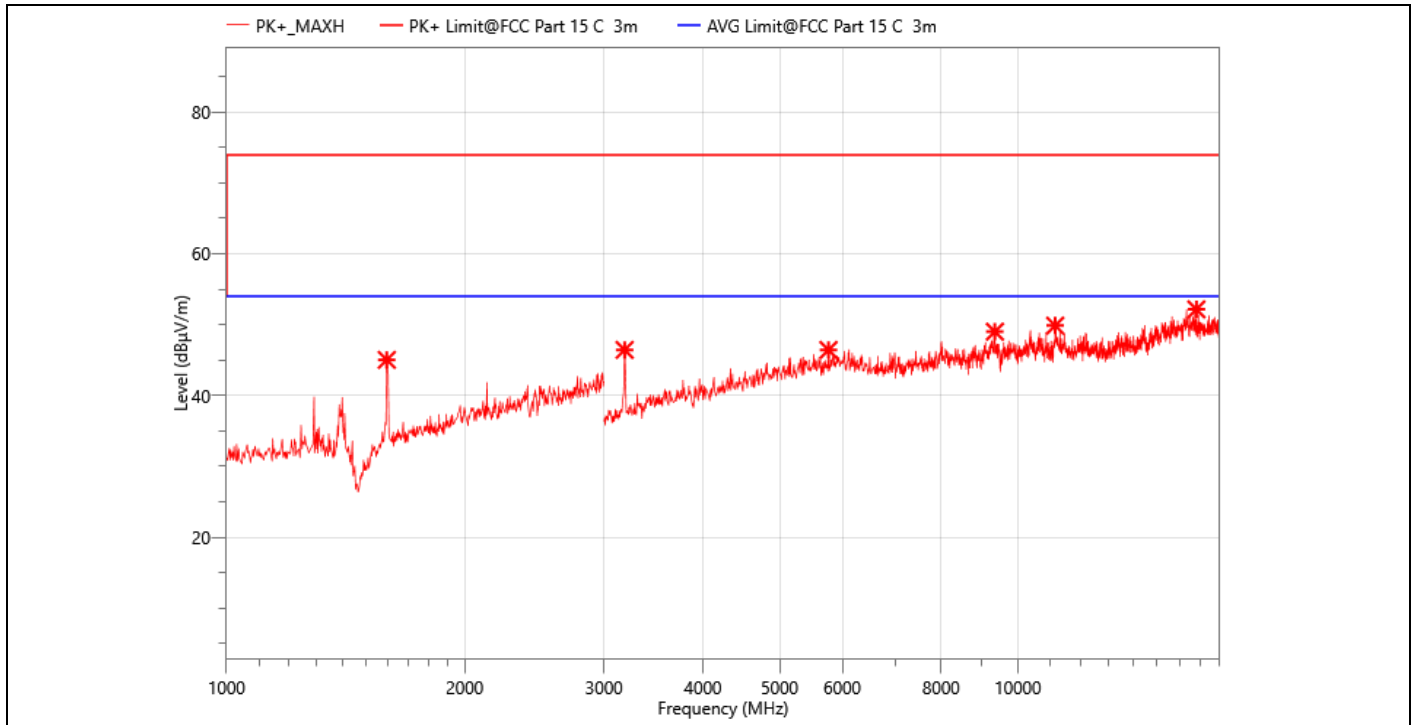
No.	Freq. (MHz)	Reading (dBμV)	Meas. (dBμV/m)	Limit (dBμV/m)	Margin (dBμV/m)	Det.	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)
1	3195.000	64.80	48.71	74.00	25.29	PK+	150.0	H	182.1	-16.09
2	3960.000	59.48	46.71	74.00	27.29	PK+	150.0	H	182.1	-12.77
3	4780.000	58.81	49.16	74.00	24.84	PK+	150.0	H	182.1	-9.65
4	6030.000	52.95	47.72	74.00	26.28	PK+	150.0	H	182.1	-5.23
5	15960.000	50.06	53.50	74.00	20.50	PK+	150.0	H	182.1	3.44
6	17700.000	47.42	52.17	74.00	21.83	PK+	150.0	H	182.1	4.75



EUT: Smart Projector
M/N.: HY300
Mode: 802.11b 2412MHz
Test Engineer: Berny

Temperature: 24.3°C
Humidity: 54%RH
Power Rating: AC 120V/60Hz
Test Time: 2023-08-30

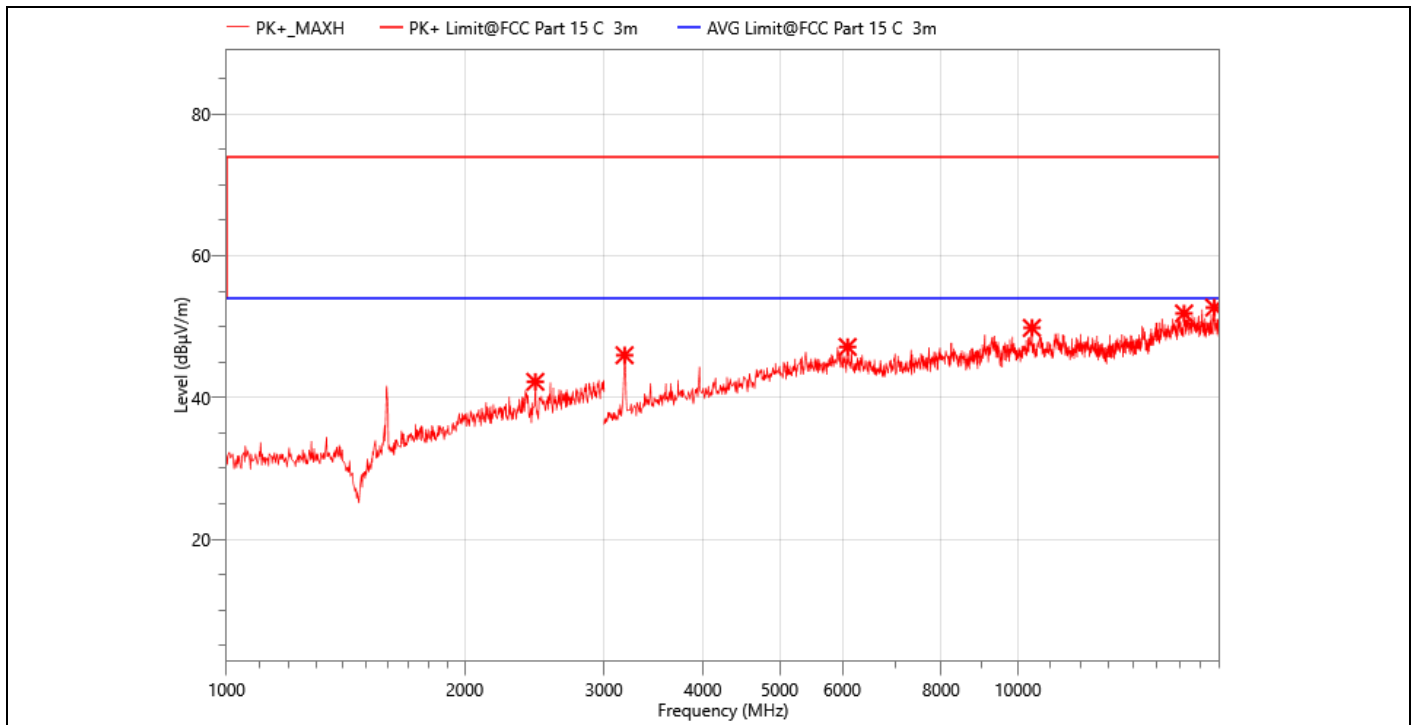
No.	Freq. (MHz)	Reading (dBμV)	Meas. (dBμV/m)	Limit (dBμV/m)	Margin (dBμV/m)	Det.	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)
1	1594.000	60.37	43.10	74.00	30.90	PK+	150.0	V	182.1	-17.27
2	3185.000	63.48	47.35	74.00	26.65	PK+	150.0	V	182.1	-16.13
3	6010.000	53.82	48.37	74.00	25.63	PK+	150.0	V	182.1	-5.45
4	7720.000	51.44	48.66	74.00	25.34	PK+	150.0	V	182.1	-2.78
5	16425.000	48.34	52.43	74.00	21.57	PK+	150.0	V	182.1	4.09
6	17705.000	48.74	53.40	74.00	20.60	PK+	150.0	V	182.1	4.66



EUT: Smart Projector
M/N.: HY300
Mode: 802.11b 2437MHz
Test Engineer: Berny

Temperature: 24.3°C
Humidity: 54%RH
Power Rating: AC 120V/60Hz
Test Time: 2023-08-30

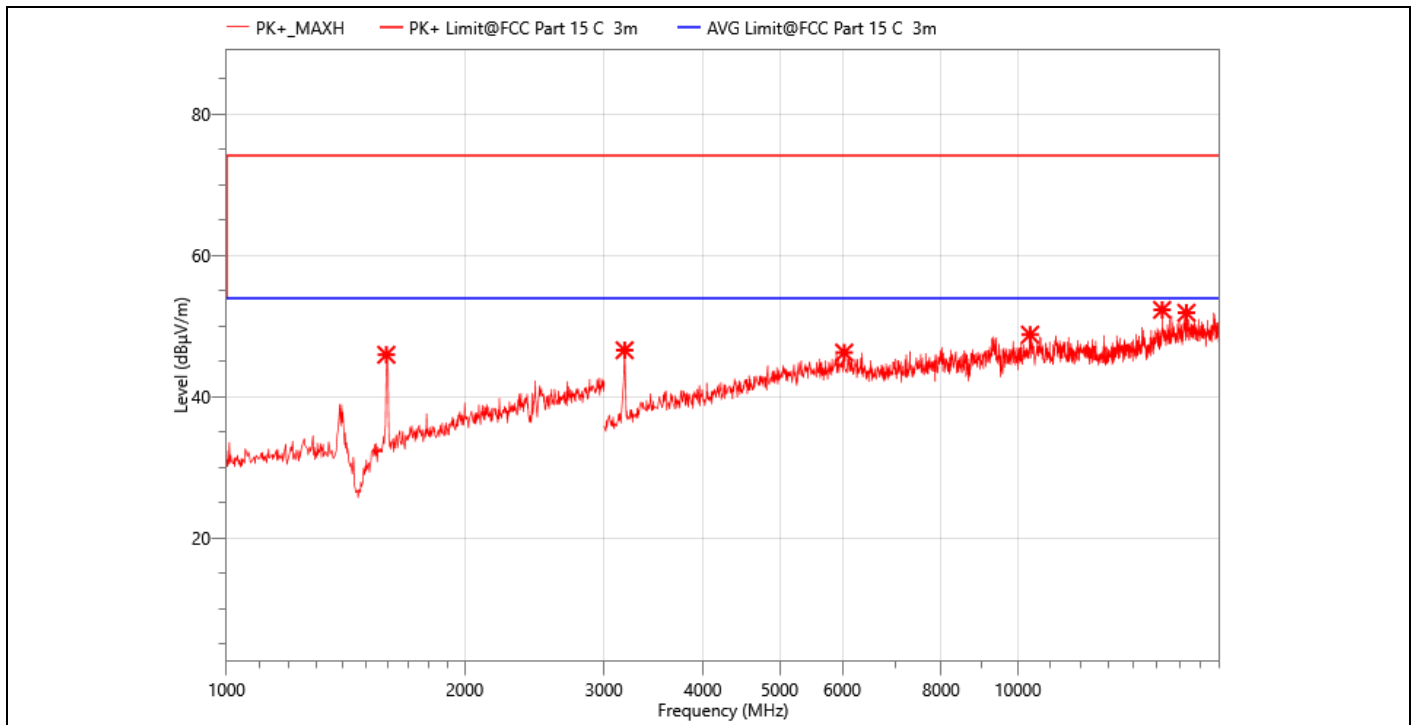
No.	Freq. (MHz)	Reading (dBμV)	Meas. (dBμV/m)	Limit (dBμV/m)	Margin (dBμV/m)	Det.	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)
1	1594.000	62.30	45.03	74.00	28.97	PK+	150.0	H	182.1	-17.27
2	3185.000	62.56	46.43	74.00	27.57	PK+	150.0	H	182.1	-16.13
3	5765.000	52.99	46.43	74.00	27.57	PK+	150.0	H	182.1	-6.56
4	9355.000	50.05	49.01	74.00	24.99	PK+	150.0	H	182.1	-1.04
5	11150.000	49.20	49.87	74.00	24.13	PK+	150.0	H	182.1	0.67
6	16815.000	48.48	52.16	74.00	21.84	PK+	150.0	H	182.1	3.68



EUT: Smart Projector
M/N.: HY300
Mode: 802.11b 2437MHz
Test Engineer: Berny

Temperature: 24.3°C
Humidity: 54%RH
Power Rating: AC 120V/60Hz
Test Time: 2023-08-30

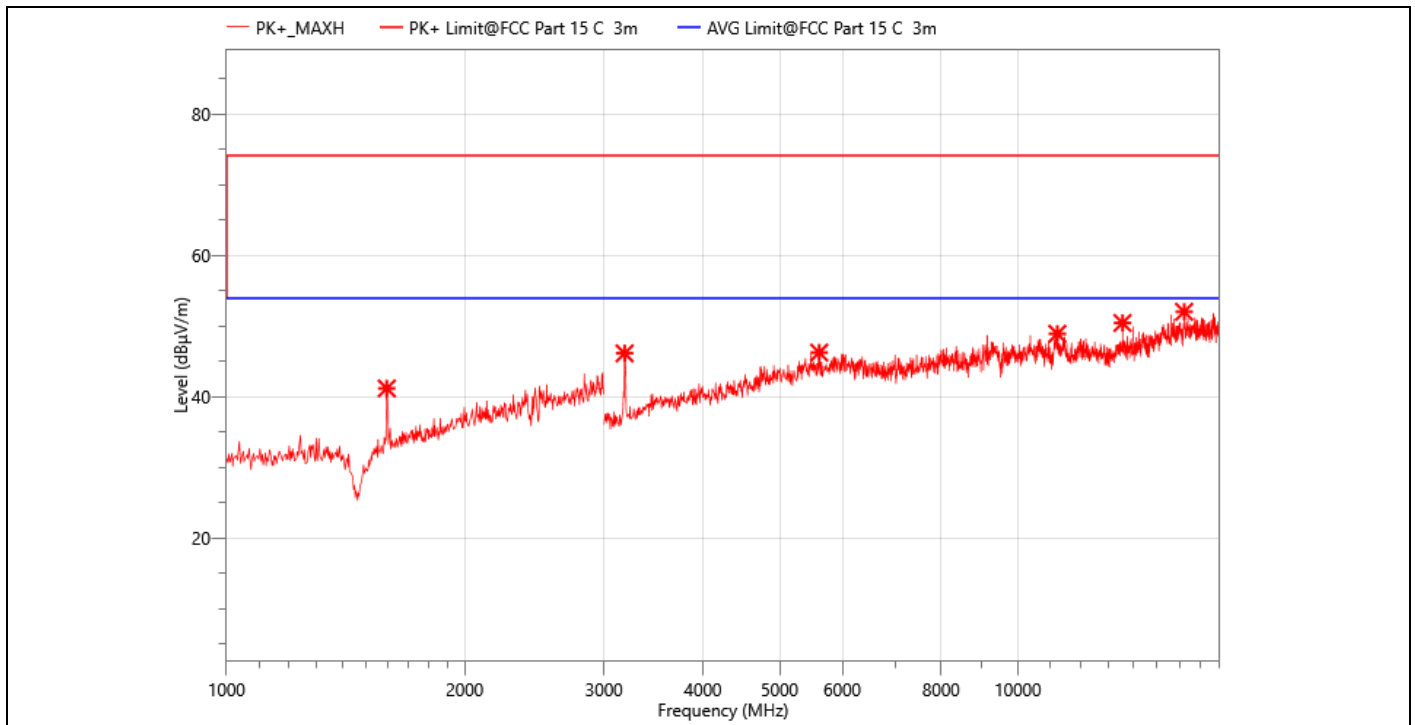
No.	Freq. (MHz)	Reading (dBμV)	Meas. (dBμV/m)	Limit (dBμV/m)	Margin (dBμV/m)	Det.	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)
1	2456.000	53.41	42.22	74.00	31.78	PK+	150.0	V	182.1	-11.19
2	3185.000	62.10	45.97	74.00	28.03	PK+	150.0	V	182.1	-16.13
3	6095.000	52.25	47.13	74.00	26.87	PK+	150.0	V	182.1	-5.12
4	10420.000	50.36	49.82	74.00	24.18	PK+	150.0	V	182.1	-0.54
5	16225.000	47.60	51.86	74.00	22.14	PK+	150.0	V	182.1	4.26
6	17715.000	48.22	52.69	74.00	21.31	PK+	150.0	V	182.1	4.47



EUT: Smart Projector
M/N.: HY300
Mode: 802.11b 2462MHz
Test Engineer: Berny

Temperature: 24.3°C
Humidity: 54%RH
Power Rating: AC 120V/60Hz
Test Time: 2023-08-30

No.	Freq. (MHz)	Reading (dBμV)	Meas. (dBμV/m)	Limit (dBμV/m)	Margin (dBμV/m)	Det.	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)
1	1592.000	63.21	45.92	74.00	28.08	PK+	150.0	H	182.1	-17.29
2	3185.000	62.69	46.56	74.00	27.44	PK+	150.0	H	182.1	-16.13
3	6035.000	51.26	46.23	74.00	27.77	PK+	150.0	H	182.1	-5.03
4	10365.000	49.08	48.76	74.00	25.24	PK+	150.0	H	182.1	-0.32
5	15220.000	49.57	52.27	74.00	21.73	PK+	150.0	H	182.1	2.7
6	16335.000	48.67	51.86	74.00	22.14	PK+	150.0	H	182.1	3.19



EUT: Smart Projector
M/N.: HY300
Mode: 802.11b 2462MHz
Test Engineer: Berny

Temperature: 24.3°C
Humidity: 54%RH
Power Rating: AC 120V/60Hz
Test Time: 2023-08-30

No.	Freq. (MHz)	Reading (dBμV)	Meas. (dBμV/m)	Limit (dBμV/m)	Margin (dBμV/m)	Det.	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)
1	1594.000	58.43	41.16	74.00	32.84	PK+	150.0	V	182.1	-17.27
2	3185.000	62.25	46.12	74.00	27.88	PK+	150.0	V	182.1	-16.13
3	5610.000	52.71	46.23	74.00	27.77	PK+	150.0	V	182.1	-6.48
4	11220.000	48.46	48.88	74.00	25.12	PK+	150.0	V	182.1	0.42
5	13565.000	49.06	50.42	74.00	23.58	PK+	150.0	V	182.1	1.36
6	16230.000	47.73	52.00	74.00	22.00	PK+	150.0	V	182.1	4.27

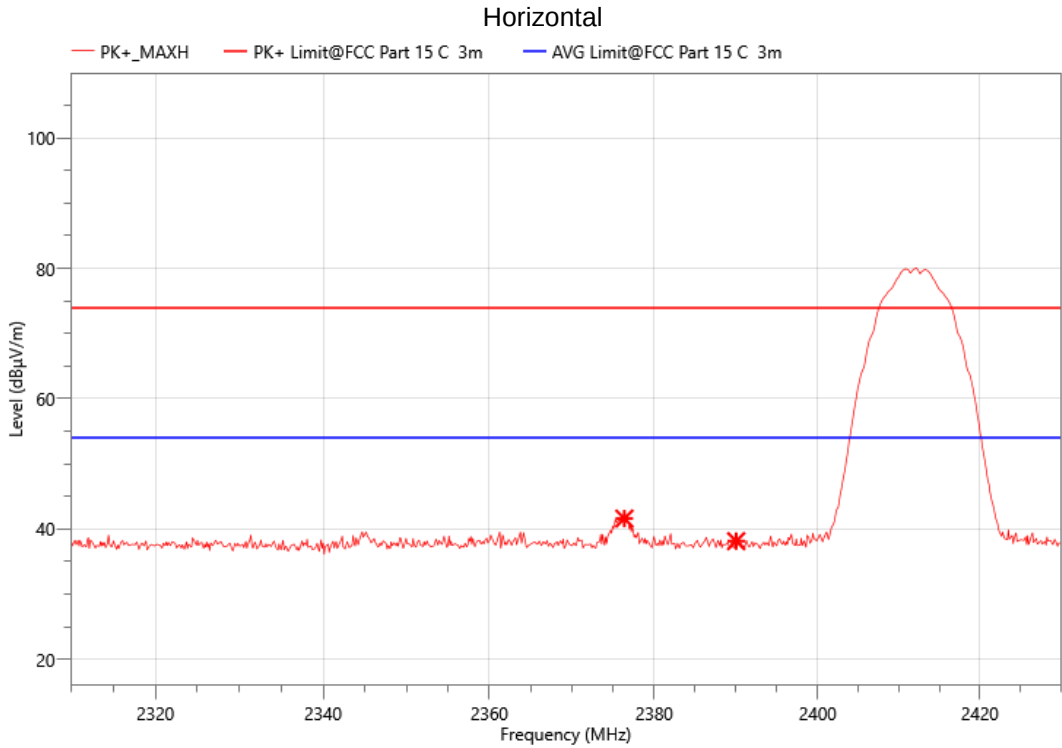
Note: 1. All Readings are Peak Value (VBW=3MHz) and Peak Value (VBW=10Hz).

2. Emission Level = Reading Level + Probe Factor + Cable Loss.

3. $EIRP[dBm] = E[dBμV/m] + 20 \log(d[meters]) - 104.77$

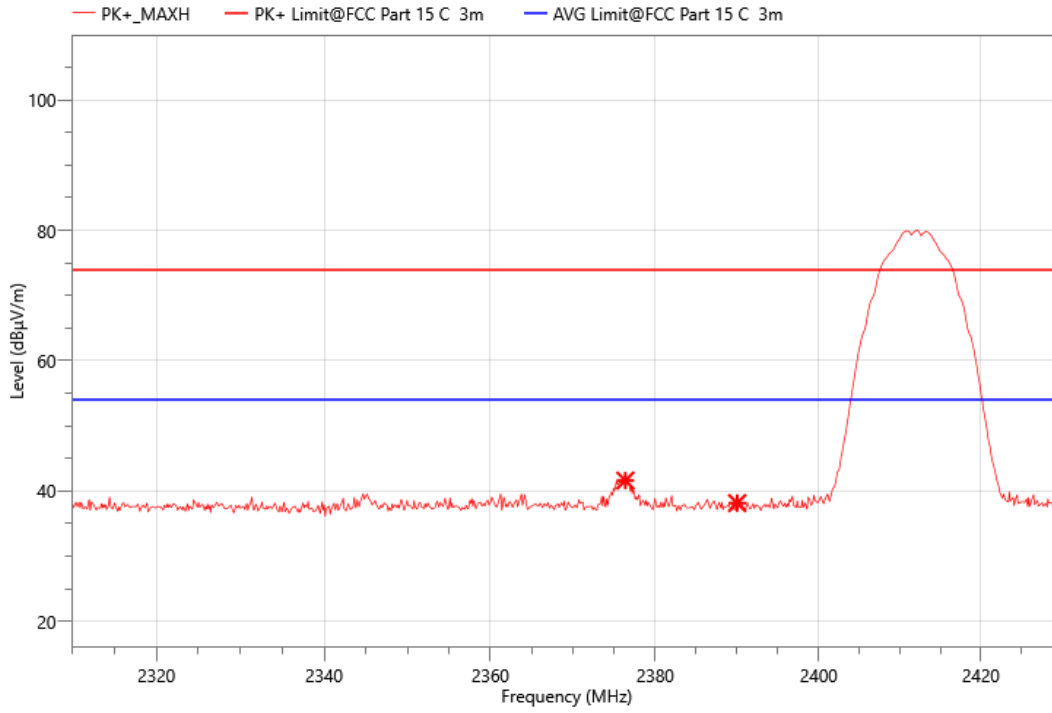
d is the measurement distance in 3 meters

- Band Edge
802.11b 2412MHz



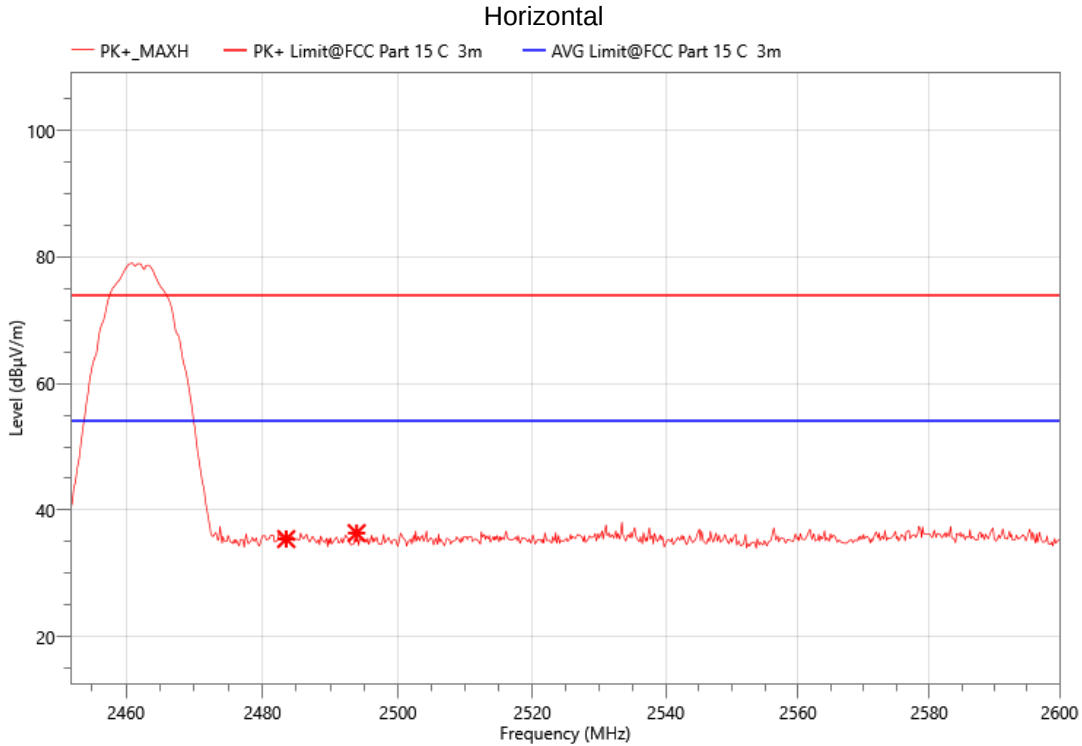
Freq. (MHz)	Reading (dBµV)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dBµV/m)	Det.	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)
2376.360	62.35	41.61	74.00	32.39	PK+	150.0	H	182.1	-20.74
2390.000	58.87	38.14	74.00	35.86	PK+	150.0	H	182.1	-20.73

Vertical



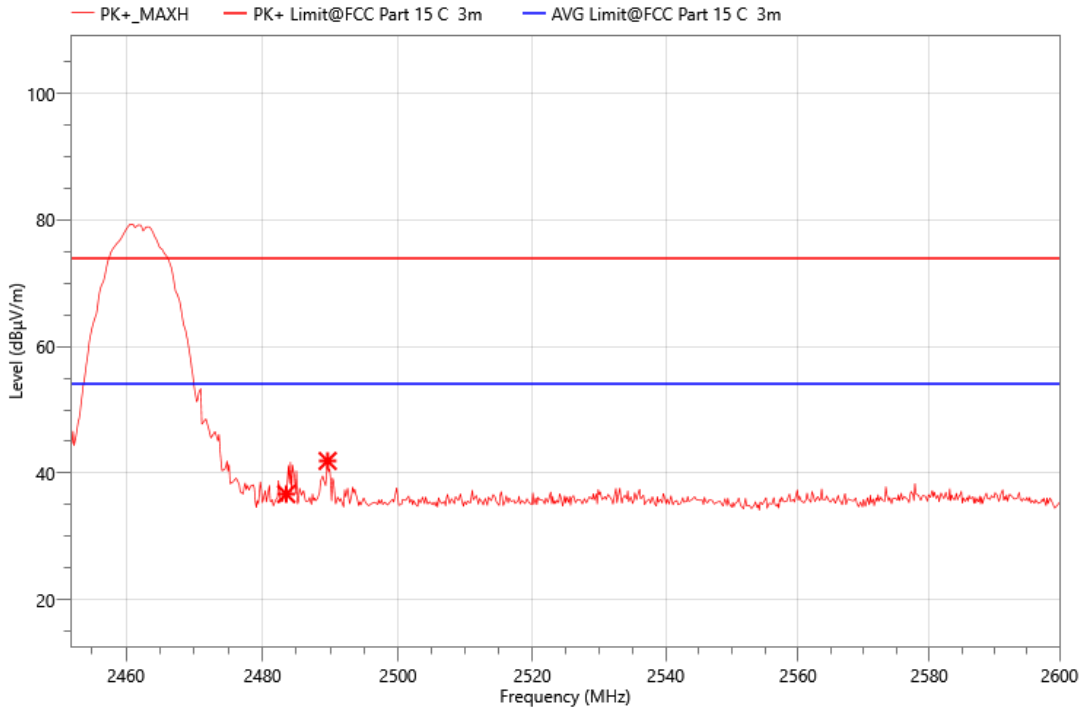
Freq. (MHz)	Reading (dBµV)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dBµV/m)	Det.	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)
2376.360	62.35	41.61	74.00	32.39	PK+	150.0	V	182.1	-20.74
2390.000	58.87	38.14	74.00	35.86	PK+	150.0	V	182.1	-20.73

802.11b 2462MHz



Freq. (MHz)	Reading (dBµV)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dBµV/m)	Det.	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)
2483.500	55.74	35.44	74.00	38.56	PK+	150.0	H	182.1	-20.3
2493.884	56.65	36.38	74.00	37.62	PK+	150.0	H	182.1	-20.27

Vertical



Freq. (MHz)	Reading (dBμV)	Meas. (dBμV/m)	Limit (dBμV/m)	Margin (dBμV/m)	Det.	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)
2483.500	57.00	36.70	74.00	37.30	PK+	150.0	V	182.1	-20.3
2489.592	62.21	41.93	74.00	32.07	PK+	150.0	V	182.1	-20.28

Note: 1.802.11b, 802.11g, 802.11n HT20, 802.11n HT40, 802.11ax HE20, 802.11ax HE40, all has been tested, the worst case is 802.11b, only shown the worst case.

9. ANTENNA REQUIREMENT

REQUIREMENT

Please refer to FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DESCRIPTION

Pass

10. AC POWER LINE CONDUCTED EMISSION

LIMITS

Please refer to CFR 47 FCC §15.207 (a)

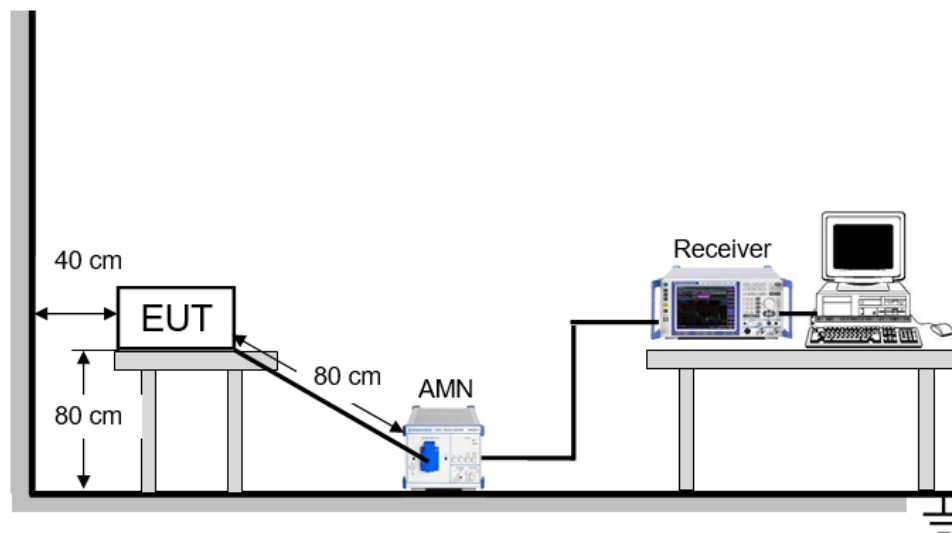
FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

TEST PROCEDURE

The EUT is put on a table of non-conducting material that is 80 cm high. The vertical conducting wall of shielding is located 40 cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9 kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

TEST SETUP

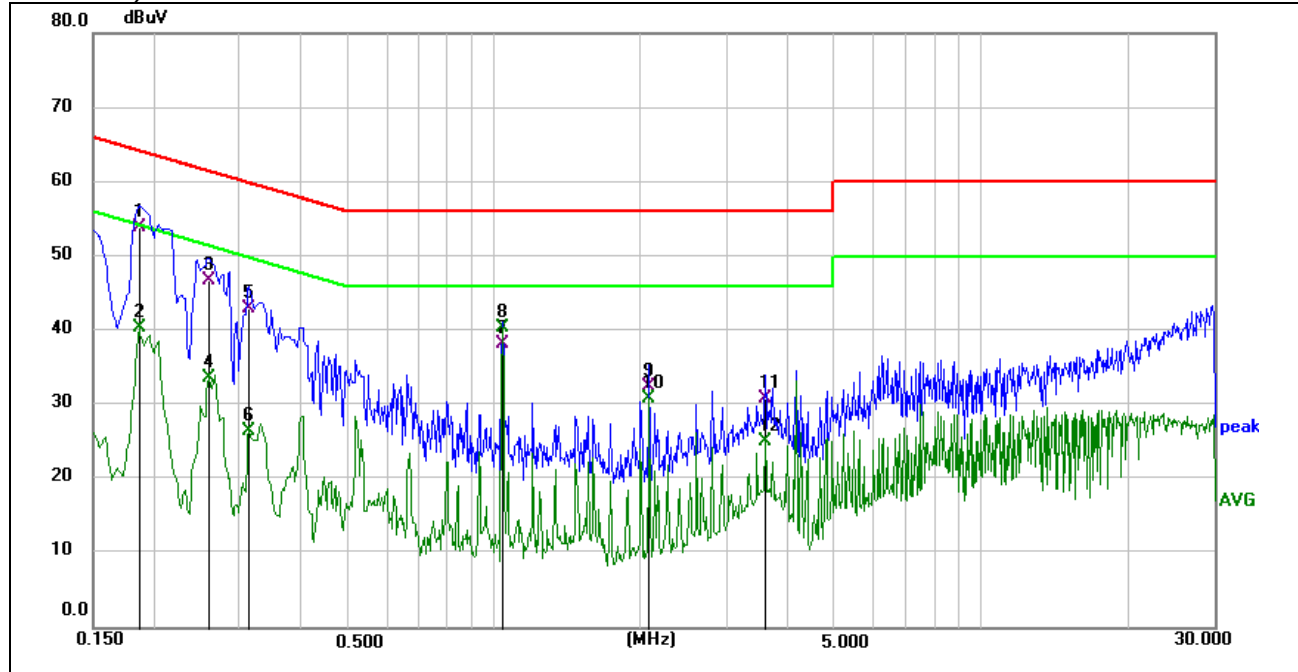


TEST ENVIRONMENT

Temperature	26°C	Relative Humidity	54%RH
Atmosphere Pressure	101kPa		

TEST RESULTS

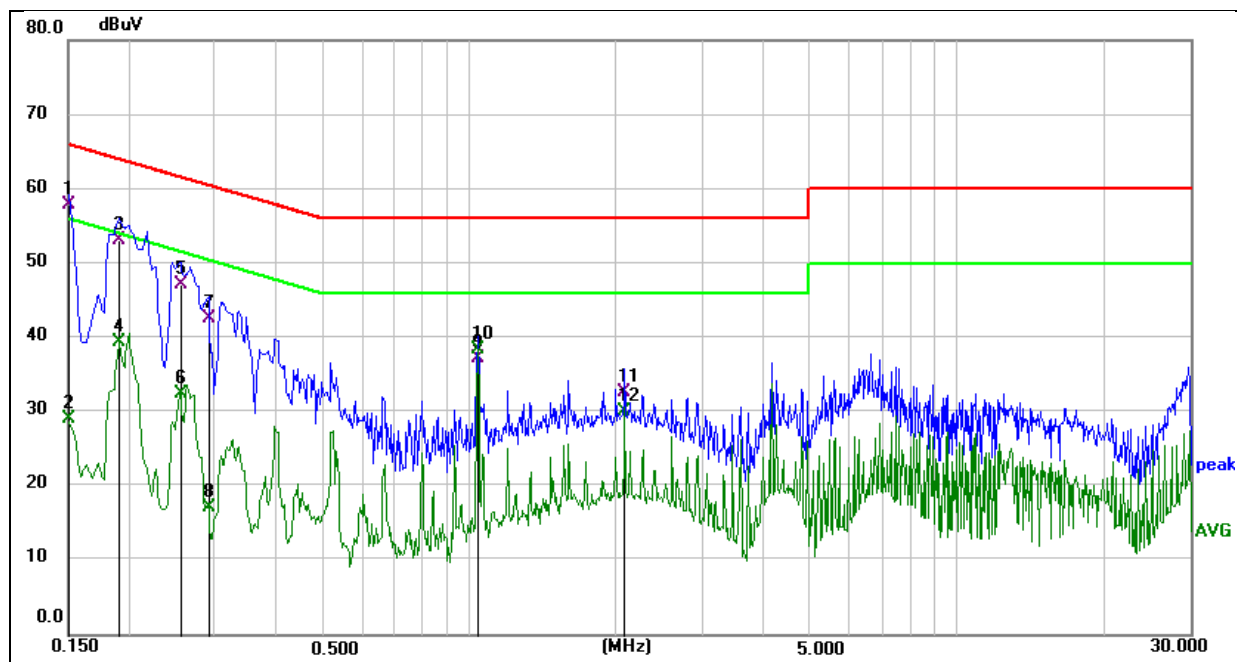
All the modes have been tested, only the worst data was recorded in the report (802.11b 2412MHz).



EUT: Smart Projector
M/N.: HY300
Mode: 802.11b 2412MHz
Test Engineer: Aiden
Test Time: 2023-08-04

Phase: L1
Temperature: 26°C
Humidity: 54%RH
Power Rating: AC120V/60Hz

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Measure-ment(dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1860	43.99	9.81	53.80	64.21	-10.41	QP
2	0.1860	30.61	9.81	40.42	54.21	-13.79	AVG
3	0.2580	37.13	9.67	46.80	61.50	-14.70	QP
4	0.2580	23.93	9.67	33.60	51.50	-17.90	AVG
5	0.3120	32.99	9.91	42.90	59.92	-17.02	QP
6	0.3120	16.68	9.91	26.59	49.92	-23.33	AVG
7	1.0410	28.51	9.79	38.30	56.00	-17.70	QP
8	1.0410	30.52	9.79	40.31	46.00	-5.69	AVG
9	2.0805	22.57	9.83	32.40	56.00	-23.60	QP
10	2.0805	21.12	9.83	30.95	46.00	-15.05	AVG
11	3.5970	20.92	9.98	30.90	56.00	-25.10	QP
12	3.5970	15.04	9.98	25.02	46.00	-20.98	AVG



EUT:	Smart Projector	Phase:	N
M/N.:	HY300	Temperature:	26°C
Mode:	802.11b 2412MHz	Humidity:	54%RH
Test Engineer:	Aiden	Power Rating:	AC120V/60Hz
Test Time:	2023-08-04		

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Measurement(dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1500	48.25	9.65	57.90	66.00	-8.10	QP
2	0.1500	19.46	9.65	29.11	56.00	-26.89	AVG
3	0.1905	43.35	9.75	53.10	64.01	-10.91	QP
4	0.1905	29.67	9.75	39.42	54.01	-14.59	AVG
5	0.2535	37.36	9.84	47.20	61.64	-14.44	QP
6	0.2535	22.61	9.84	32.45	51.64	-19.19	AVG
7	0.2895	32.78	9.72	42.50	60.54	-18.04	QP
8	0.2895	7.36	9.72	17.08	50.54	-33.46	AVG
9	1.0410	27.43	9.87	37.30	56.00	-18.70	QP
10	1.0410	28.45	9.87	38.32	46.00	-7.68	AVG
11	2.0805	22.77	9.93	32.70	56.00	-23.30	QP
12	2.0805	20.09	9.93	30.02	46.00	-15.98	AVG

Note: 1. Result = Reading + Correct Factor.

2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).

4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.

PENDIX: PHOTOGRAPHS OF TEST CONFIGURATION

Please refer to report E01A23070868F00307.

APPENDIX: PHOTOGRAPHS OF THE EUT

Please refer to report E01A23070868F00308.

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