



TEST REPORT

KCTL Inc.

65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
Tel: 82-31-285-0894 Fax: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR20-SEF0100-A
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1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do,
16677, Rep. of Korea
- Date of Receipt : 2020-06-09

2. Use of Report : -

3. Name of Product / Model : Mobile phone / SM-A013M/DS

4. Manufacturer / Country of Origin : Samsung Electronics Co., Ltd. / VIETNAM

5. Date of Test : 2020-06-15 to 2020-06-16

6. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing (Address: -)

7. Test method used : ANSI C63.4:2014Class B

8. FCC ID A3LSMA013M

9. Test Results : Refer to the test result in the test report

Affirmation	Tested by	Technical Manager
	 Name : Junggil Ryu (Signature)	 Name : Gunsu Park (Signature)

2020-07-09

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As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2020-07-02	Originally issued	-
2020-07-09	Updated	15

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Note. The report No. KR20-SEF0100 is superseded by the report No. KR20-SEF0100-A.

General remarks for test reports

Nothing significant to report.

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KCTL Inc. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea Tel: 82-31-285-0894 Fax: 82-505-299-8311 www.kctl.co.kr	Report No.: KR20-SEF0100-A Page (4) of (40)	
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1. Applicant information

Applicant: Samsung Electronics Co., Ltd.
Address: 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do,
 16677, Rep. of Korea
E-mail: sm3076.lee@samsung.com
Contact name: Sungmin Lee

Manufacturer: Samsung Electronics Co., Ltd.
Address: 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do,
 16677, Rep. of Korea
E-mail: sm3076.lee@samsung.com
Contact name: Sungmin Lee

Factory: Samsung Electronics Vietnam Co. Ltd.
Address: KCN Yen Binh I, Pho Yen, Thai Nguyen, VIETNAM

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2. Laboratory information

Address

KCTL Inc. (Suwon Lab.)

65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea

Telephone Number: 82 31 285 0894

Facsimile Number: 82 505 299 8311

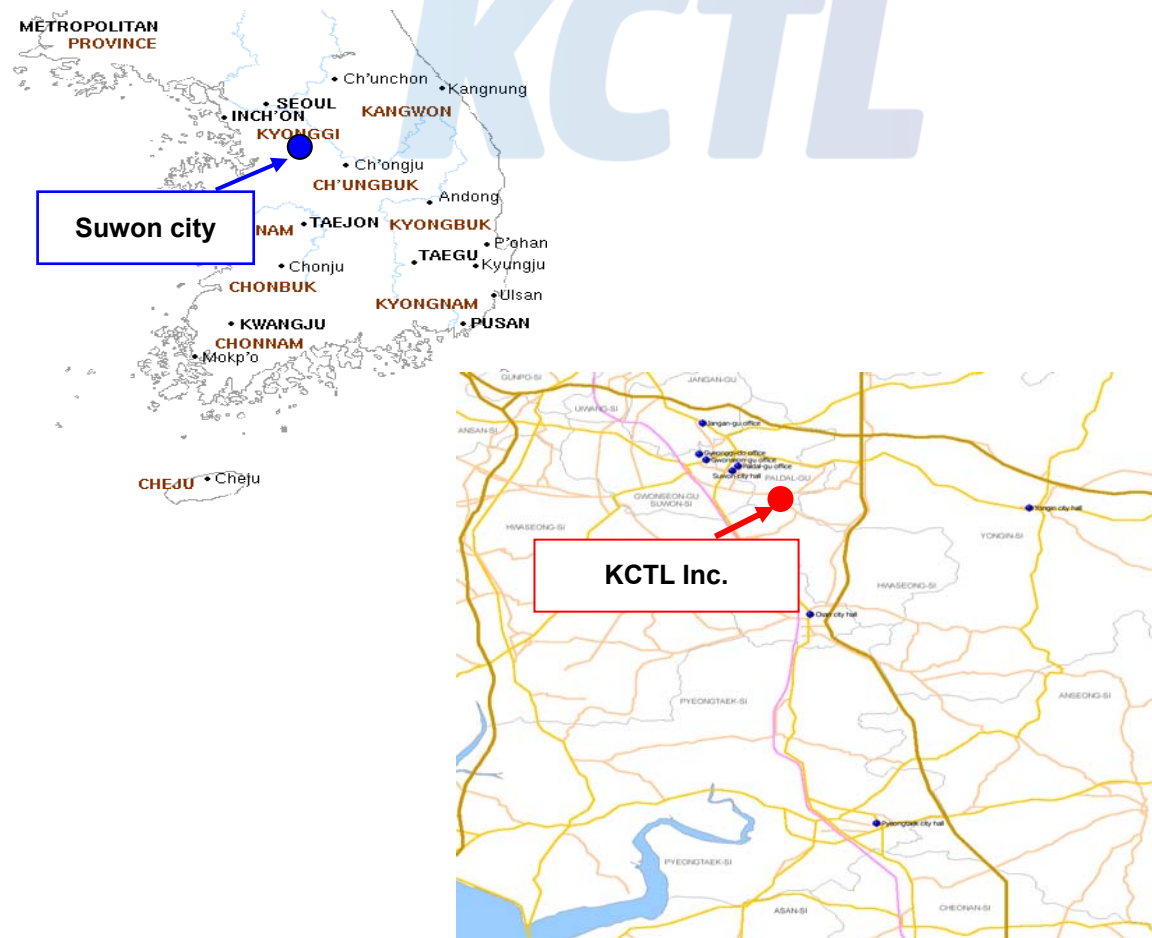
FCC Site Designation No: KR0040

VCCI Registration No.: R-20080, G-20078, C-20059, T-20056

Industry Canada Registration No. : 8035A

KOLAS NO.: KT231

SITE MAP



3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
Chamber 10 m (RE)	21.5 °C	32.6 % R.H.	-
Shielded room(CE)	20.6 °C	29.6 % R.H.	-

Test site

These testing items were performed following locations;

Test item	Test site
Conducted Emission	Shielded Room
Radiated Emission	10 m Chamber

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.

The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability. Based on CISPR 16-4-2, the measurement uncertainty level with a 95 % confidence level was applied.

Conducted Emission measurement (Confidence level about 95 %, $k = 2$)		
Shielded Room (CE#1)	9 kHz ~ 150 kHz:	3.7 dB
	150 kHz ~ 30 MHz:	3.3 dB
Shielded Room (CE#2)	9 kHz ~ 150 kHz:	3.5 dB
	150 kHz ~ 30 MHz:	3.1 dB
Radiated Emission measurement (Confidence level about 95 %, $k = 2$)		
10 m Chamber (4F)	30 MHz ~ 300 MHz	3 m: 5.4 dB
		10 m: 5.3 dB
	300 MHz ~ 1 000 MHz	3 m: 5.5 dB
		10 m: 5.4 dB
	1 GHz ~ 6 GHz	3 m: 6.4 dB
	6 GHz ~ 18 GHz	3 m: 6.6 dB
	18 GHz ~ 30 GHz	3 m: 6.7 dB
	30 GHz ~ 40 GHz	3 m: 6.2 dB
10 m Chamber (2F)	30 MHz ~ 300 MHz	3 m: 5.0 dB
		10 m: 5.0 dB
	300 MHz ~ 1 000 MHz	3 m: 5.2 dB
		10 m: 5.0 dB
	1 GHz ~ 6 GHz	3 m: 6.4 dB
	6 GHz ~ 18 GHz	3 m: 6.6 dB

3.3 Measurement Program

These test items were performed by software programs;

Test item	Measurement Program		Used
Conducted Emission	EP5CE_V 5.4.0(TOYO)		☒
Radiated Emission	2F	EP5RE_V 4.6.0(TOYO)	☒
	4F	EP5RE_V 5.11.10(TOYO)	

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4. Description of EUT

4.1 General information

Declared Hardware Version	REV1.0
Declared Software Version	A013M.001
IMEI No	351797380026142/01
Operating Band(s)	GSM 850/900/1800/1900 WCDMA FDD 1/2/4/5/8 LTE FDD 1/2/3/4/5/7/8/28/66

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4.2 Product description

Type of product	Mobile phone
Model name (Basic)	SM-A013M/DS
Model name (Variant)	-
Difference	-
Serial no	-
Testing voltage	120 V, 60 Hz
Input/Output rating	Adapter (EP-TA60JBS) Input: AC 100 V - 240 V, 50/60 Hz, 0.15 A Output: DC 5.0 V, 700 mA Serial no: R37N4EP0062HM3
Internal clock frequency	Above 108 MHz
RF Frequency	Bluetooth(BDR/EDR/BLE)_2 402 MHz ~ 2 480 MHz WIFI(802.11b/g/n20)_2 412 MHz ~ 2 472 MHz LTE Band 2_1 850.7 MHz ~ 1 909.3 MHz LTE Band 4_1 710.7 MHz ~ 1 754.3 MHz LTE Band 5_824.7 MHz ~ 848.3 MHz LTE Band 66_1 710.7 MHz ~ 1 779.3 MHz GSM 850_824.2 MHz ~ 848.8 MHz GSM 1900_1 850.2 MHz ~ 1 909.8 MHz WCDMA 850(5)_826.4 MHz ~ 846.6 MHz WCDMA 1700(4)_1 712.4 MHz ~ 1 752.6 MHz WCDMA 1900(2)_1 852.4 MHz ~ 1 907.6 MHz
Note	-

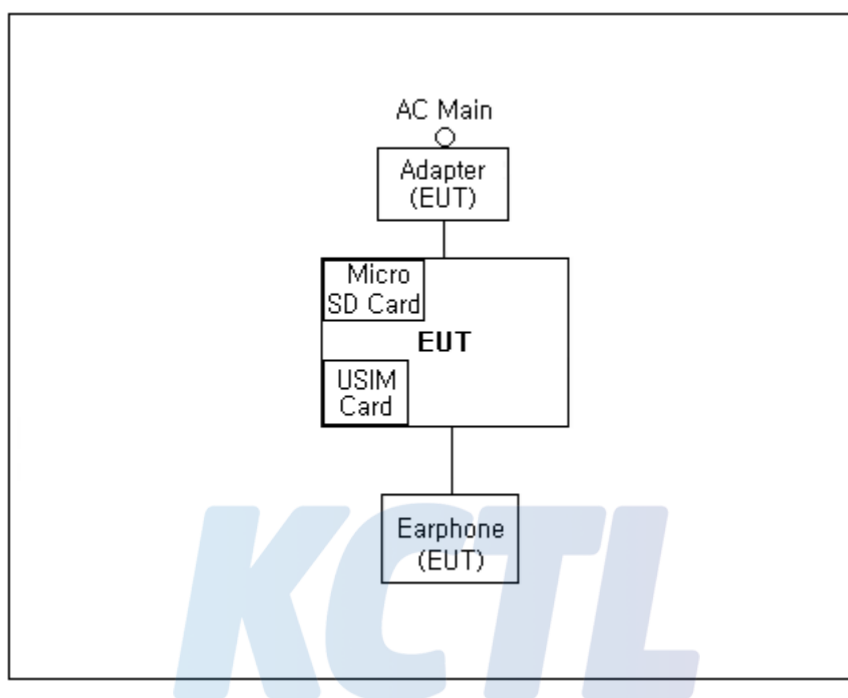
4.3 Auxiliary equipments

Type	Model / Part #	S/N	Manufacturer
Adapter (EUT)	EP-TA60JBS	R37N4EP0062HM3	HAEM
Earphone (EUT)	EHS61ASFWE	-	CRESYN
Battery (EUT)	EB-BA013ABY	-	BYD
USB Cable (EUT)	-	-	-
USIM Card	-	-	-
Micro SD Card (64 GB)	Samsung Pro Plus MB-MD64G	-	SAMSUNG
Note PC #1	HP ProBook 470 G2	CND5074WT	HP
Adapter #1	PPP009C	F220881440034736	HP



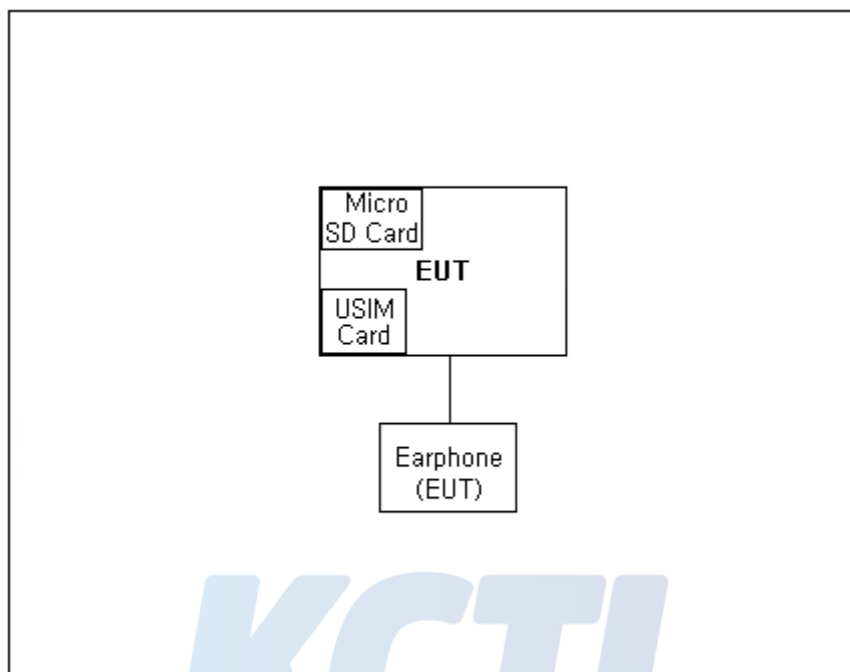
4.4 Test configuration

[Test #1 ~ Test #4_CE / Test #1_RE]



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT	Power	Adapter(EUT)	USB	1.1	Shield
2		USIM	USIM Card	-	Direct	-
3		Micro SD	Micro SD Card	-	Direct	-
4		Earphone	Earphone(EUT)	-	1.8	Unshield
5	Adapter (EUT)	Power	AC Main	-	Direct	-

[Test #2 ~ Test #4_RE]



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT	USIM	USIM Card	-	Direct	-
2		Micro SD	Micro SD Card	-	Direct	-
3		Earphone	Earphone(EUT)	-	1.8	Unshield

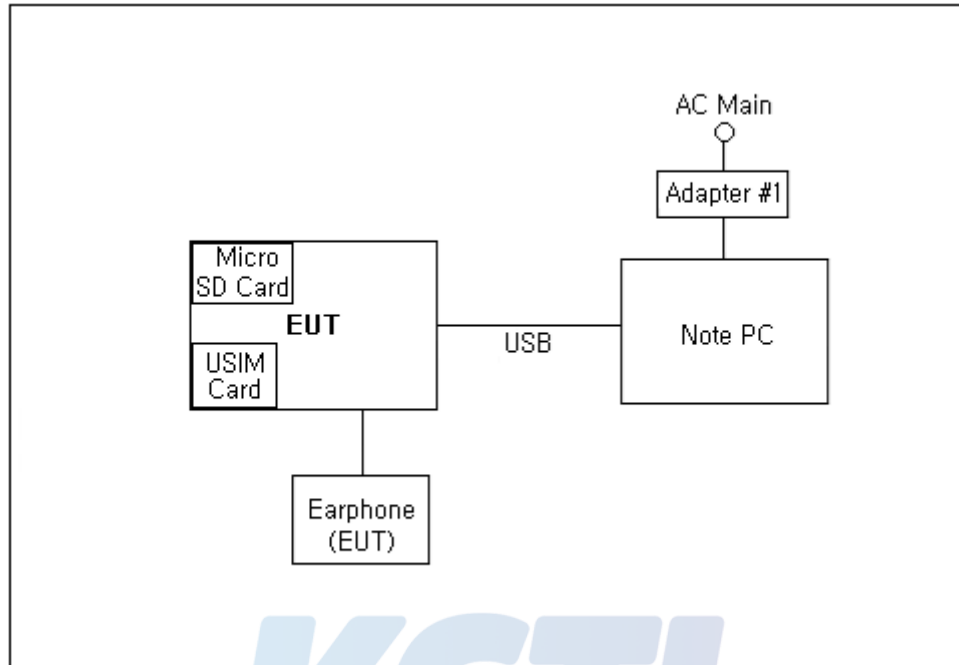
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[Test #5_CE, RE]



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT	USB	Note PC	USB	0.9	Shield
2		USIM	USIM Card	-	Direct	-
3		Micro SD	Micro SD Card	-	Direct	-
4		Earphone	Earphone(EUT)	-	1.8	Unshield
5	Note PC	Power	Adapter #1	-	1.2	Unshield

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode		Normal operating
Test #1	CE Test	Camera(Rear) + Charging(w/TA) + FM(Low Ch.) Test the operation status of the Rear Camera, Charging and FM radio low ch.
Test #2		Camera(Front) + Charging(w/TA) + FM(Mid Ch.) Test the operation status of the Front Camera, Charging and FM radio Mid ch.
Test #3		Charging(w/TA) + FM(High Ch.) Test the operation status of the Charging and FM radio High Ch.
Test #4		Charging(w/TA) + Test by playing Video & Audio files stored in internal memory.
Test #5		Connect Note PC and Mobile phone with usb cable and test it by communicating data through Micro SD Card.
Test #1	RE Test	Camera(Rear) + Charging(w/TA) + FM(Low Ch.) Test the operation status of the Rear Camera, Charging and FM radio low ch.
Test #2		Camera(Front) + FM(Mid Ch.) Test the operation status of the Front Camera, FM radio low ch.
Test #3		FM(High Ch.) Test the operation status of FM radio High ch.
Test #4		Test by playing Video & Audio files stored in internal memory.
Test #5		Connect Note PC and Mobile phone with usb cable and test it by communicating data through Micro SD Card.

5. Summary of test results

5.1 Summary of EMI emission test results

Applied	Test items	Test method	Result
☒	Conducted Emission	FCC Part 15 Subpart B (Class B) ANSI C63.4:2014,	Pass
☒	Radiated Emission	FCC Part 15 Subpart B (Class B) ANSI C63.4:2014,	Pass

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6. Test results

6.1 Conducted Emissions

Test specification	ANSI C63.4:2014, Class B FCC Part 15 Subpart B		
Testing voltage	120 V, 60 Hz		
Test facility	Shielded room (CE#1)		
Date	2020-06-15		
Temperature (°C)	20.6 °C	Humidity (% R.H.)	29.6 % R.H.
Remarks	Pass		

6.1.1 Limits of conducted emissions measurement

Frequency [MHz]	Class A (dB(μ V))		Class B (dB(μ V))	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	79	66	66 ~ 56 ¹⁾	56 ~ 46 ¹⁾
0.5 ~ 5	73	60	56	46
5 ~ 30	73	60	60	50

¹⁾ The limit decreases linearly with the logarithm of frequency

6.1.2 Measurement procedure

The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground plane. The LISN power was filtered. Each EUT power lead, except ground (safety) lead was individually connected through a LISN to input power source. EUT signal cables that hung closer than 0.4 m to the Horizontal metal ground 0.3 m ~ 0.4 m long. The power cord was bundles in the center. All peripheral equipment was powered from a sub LISN. The LISN and ISN were positioned 0.8 m from the EUT. Peak and Average detection were used in preliminary testing and Quasi-peak and Average detections were used at final measurement.

6.1.3 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
EMI TEST RECEIVER	ESCI	100001	R&S	2020.08.22	☒
TWO-LINE V-NETWORK	ENV216	101358	R&S	2020.10.02	☒
TWO-LINE V-NETWORK	ENV216	101352	R&S	2021.04.06	☒

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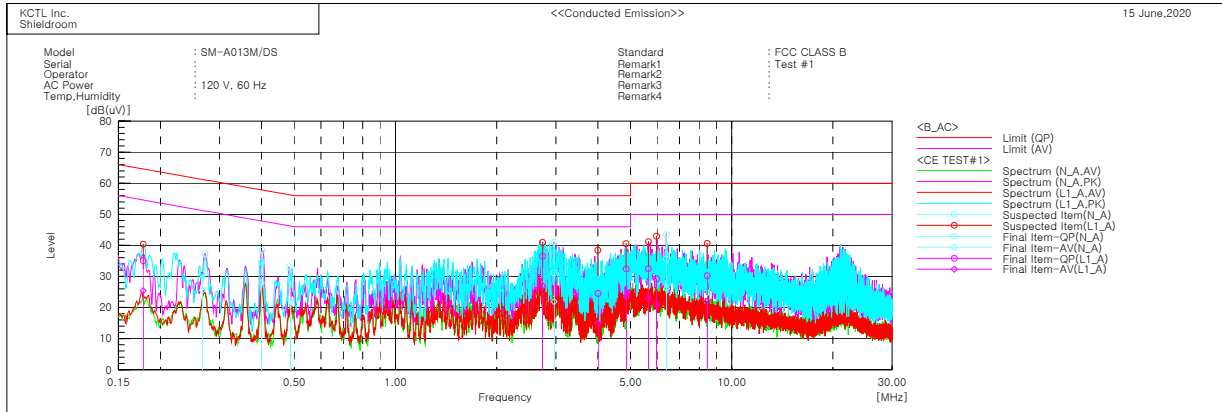
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6.1.4 Conducted emissions measurement result

AC Main



Final Result

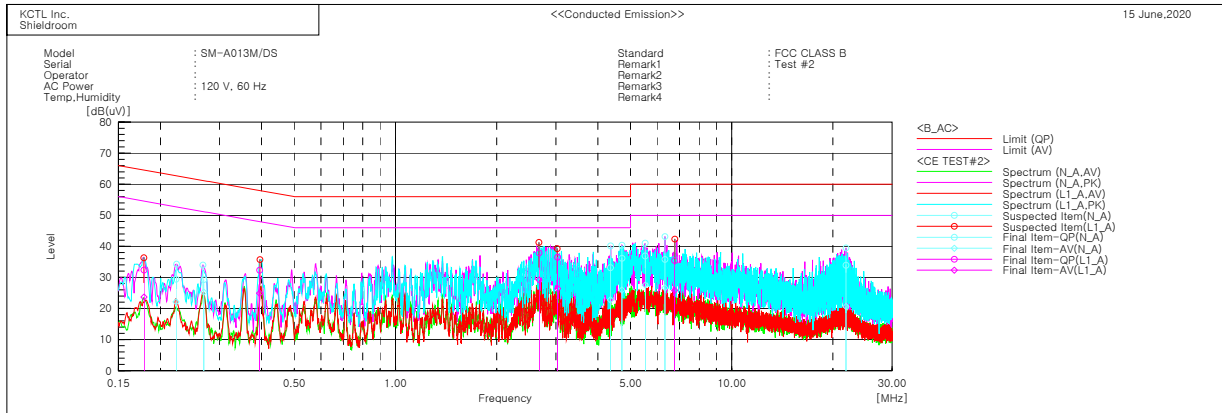
--- N_A Phase ---										
No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result CAV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin CAV [dB]
1	0.26669	20.8	15.6	9.9	30.7	25.5	61.2	51.2	30.5	25.7
2	0.39913	24.3	17.7	10.2	34.5	27.9	57.9	47.9	23.4	20.0
3	0.488	18.5	12.0	10.2	28.7	22.2	56.2	46.2	27.5	24.0
4	2.96289	20.9	11.6	10.3	31.2	21.9	56.0	46.0	24.8	24.1
5	6.39205	25.1	15.6	10.5	35.6	26.1	60.0	50.0	24.4	23.9

--- L1_A Phase ---										
No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result CAV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin CAV [dB]
1	0.17757	24.8	15.1	10.3	35.1	25.4	64.6	54.6	29.5	29.2
2	2.73832	26.2	16.7	10.3	36.5	27.0	56.0	46.0	19.5	19.0
3	4.00356	14.1	4.5	10.4	24.5	14.9	56.0	46.0	31.5	31.1
4	4.85236	22.1	13.1	10.4	32.5	23.5	56.0	46.0	23.5	22.5
5	5.65159	22.0	12.5	10.5	32.5	23.0	60.0	50.0	27.5	27.0
6	5.9735	18.8	10.5	10.5	29.3	21.0	60.0	50.0	30.7	29.0
7	8.45182	19.6	11.4	10.6	30.2	22.0	60.0	50.0	29.8	28.0

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Final Result

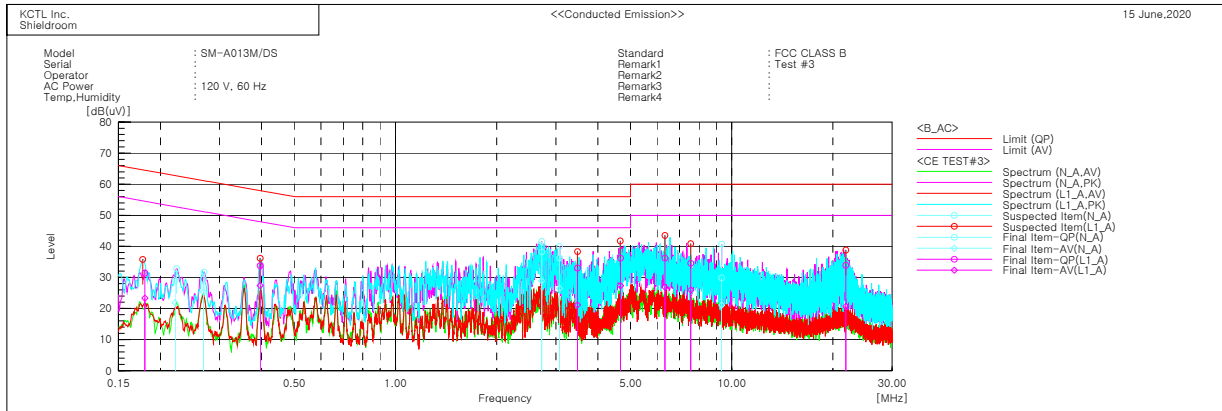
--- N_A Phase ---										
No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]
1	0.22245	19.4	12.2	10.0	29.4	22.2	62.7	52.7	33.3	30.5
2	0.26911	19.4	15.3	9.9	29.3	25.2	61.1	51.1	31.8	25.9
3	4.36137	22.7	12.4	10.4	33.1	22.8	56.0	46.0	22.9	23.2
4	4.71637	25.7	15.5	10.4	36.1	25.9	56.0	46.0	19.9	20.1
5	5.53213	26.4	17.0	10.5	36.9	27.5	60.0	50.0	23.1	22.5
6	6.32877	25.3	16.1	10.5	35.8	26.6	60.0	50.0	24.2	23.4
7	21.88778	22.6	9.3	11.3	33.9	20.6	60.0	50.0	26.1	29.4

--- L1_A Phase ---										
No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]
1	0.17882	22.1	13.4	10.3	32.4	23.7	64.5	54.5	32.1	30.8
2	0.39428	22.1	14.7	10.2	32.3	24.9	58.0	48.0	25.7	23.1
3	2.67408	27.6	18.9	10.3	37.9	29.2	56.0	46.0	18.1	16.8
4	3.03349	26.1	16.0	10.4	36.5	26.4	56.0	46.0	19.5	19.6
5	6.77003	25.0	15.4	10.5	35.5	25.9	60.0	50.0	24.5	24.1

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Final Result

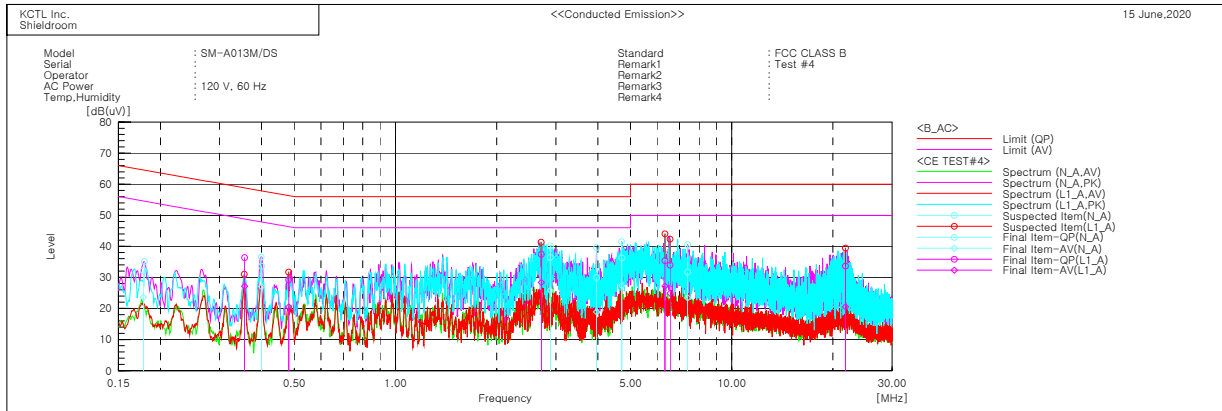
--- N_A Phase ---										
No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]
1	0.22107	19.0	11.9	10.0	29.0	21.9	62.8	52.8	33.8	30.9
2	0.26872	19.5	15.4	9.9	29.4	25.3	61.2	51.2	31.8	25.9
3	2.72049	27.9	18.6	10.3	38.2	28.9	56.0	46.0	17.8	17.1
4	3.0779	25.9	16.2	10.3	36.2	26.5	56.0	46.0	19.8	19.5
5	9.33352	19.2	10.5	10.6	29.8	21.1	60.0	50.0	30.2	28.9

--- L1_A Phase ---										
No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]
1	0.17985	21.1	13.0	10.3	31.4	23.3	64.5	54.5	33.1	31.2
2	0.3962	23.6	17.1	10.2	33.8	27.3	57.9	47.9	24.1	20.6
3	3.48072	22.6	10.7	10.4	33.0	21.1	56.0	46.0	23.0	24.9
4	4.66746	25.8	16.9	10.4	36.2	27.3	56.0	46.0	19.8	18.7
5	6.32853	25.7	16.3	10.5	36.2	26.8	60.0	50.0	23.8	23.2
6	7.55298	24.0	15.3	10.6	34.6	25.9	60.0	50.0	25.4	24.1
7	21.84303	22.7	9.4	11.2	33.9	20.6	60.0	50.0	26.1	29.4

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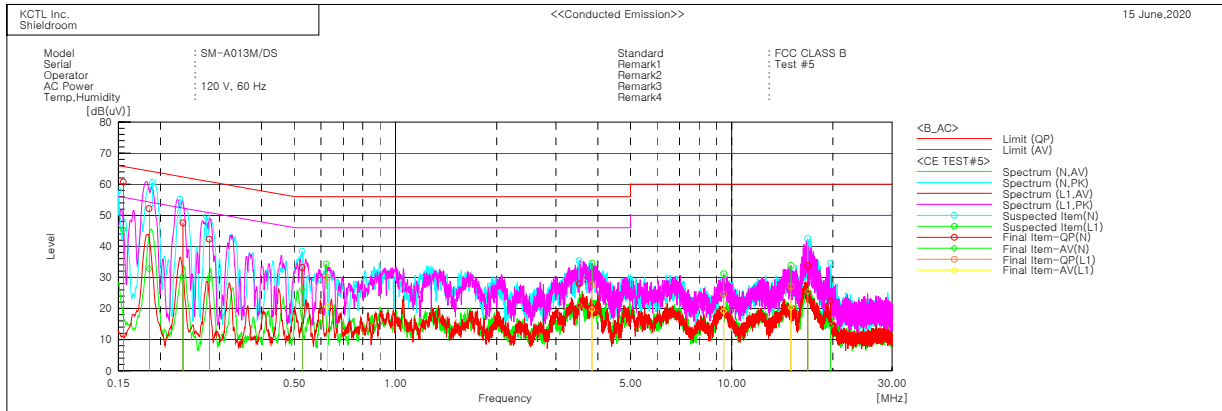
--- N_A Phase ---										
No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]
1	0.17786	21.9	13.3	10.3	32.2	23.6	64.6	54.6	32.4	31.0
2	0.39998	23.4	16.8	10.2	33.6	27.0	57.9	47.9	24.3	20.9
3	2.88734	26.1	15.6	10.3	36.4	25.9	56.0	46.0	19.6	20.1
4	3.96109	19.6	8.5	10.4	30.0	18.9	56.0	46.0	26.0	27.1
5	4.70909	25.9	17.0	10.4	36.3	27.4	56.0	46.0	19.7	18.6
6	7.39292	21.2	13.0	10.5	31.7	23.5	60.0	50.0	28.3	26.5

--- L1_A Phase ---										
No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]
1	0.35578	26.3	17.1	10.1	36.4	27.2	58.8	48.8	22.4	21.6
2	0.48128	19.0	10.3	10.2	29.2	20.5	56.3	46.3	27.1	25.8
3	2.71422	27.2	18.1	10.3	37.5	28.4	56.0	46.0	18.5	17.6
4	6.32824	24.9	16.7	10.5	35.4	27.2	60.0	50.0	24.6	22.8
5	6.55762	23.5	14.4	10.5	34.0	24.9	60.0	50.0	26.0	25.1
6	21.80782	22.5	9.3	11.2	33.7	20.5	60.0	50.0	26.3	29.5

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Final Result

--- N Phase ---

No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]
1	0.1549	50.8	35.5	9.9	60.7	45.4	65.7	55.7	5.0	10.3
2	0.18494	42.1	22.9	10.0	52.1	32.9	64.3	54.3	12.2	21.4
3	0.23332	37.9	20.6	9.7	47.6	30.3	62.3	52.3	14.7	22.0
4	0.2792	32.7	20.2	9.6	42.3	29.8	60.8	50.8	18.5	21.0
5	0.52774	23.4	16.3	9.8	33.2	26.1	56.0	46.0	22.8	19.9
6	3.51801	18.3	11.3	9.7	28.0	21.0	56.0	46.0	28.0	25.0
7	16.84159	23.9	15.5	9.9	33.8	25.4	60.0	50.0	26.2	24.6
8	19.6676	12.4	4.5	9.9	22.3	14.4	60.0	50.0	37.7	35.6

--- L1 Phase ---

No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]
1	0.6263	20.1	10.9	9.8	29.9	20.7	56.0	46.0	26.1	25.3
2	3.84101	17.9	10.0	9.7	27.6	19.7	56.0	46.0	28.4	26.3
3	9.45958	14.8	9.4	9.8	24.6	19.2	60.0	50.0	35.4	30.8
4	15.01034	17.2	10.3	9.9	27.1	20.2	60.0	50.0	32.9	29.8

6.2 Radiated Emission

Test specification	ANSI C63.4:2014, Class B FCC Part 15 Subpart B		
Testing voltage	120 V, 60 Hz		
Test facility	10 m Chamber (4F)		
Test distance	3 m		
Date	2020-06-16		
Temperature (°C)	21.5 °C	Humidity (% R.H.)	32.6 % R.H.
Remarks	Pass		

6.2.1 Limits of radiated emission measurement

Frequency [MHz]	Class A (dB(μ V/m)) @ 10 m	Class B (dB(μ V/m)) @ 3 m
30-88	39	40
88-216	43.5	43.5
216-960	46.4	46
Above 960	49.5	54

Note- Alternative standard: CISPR, Pub. 22

6.2.2 Measurement procedure

The test was done at a 10 m chamber with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane. Cables were folded back and forth forming a bundle 0.3 m to 0.4 m long and were hanged at a 0.4 m height to the ground plane.

Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

6.2.3 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
EMI TEST RECEIVER	ESR7	101078	R&S	2020.08.22	☒
Bilog Antenna	CBL 6112D	55545	TESEQ	2022.04.24	☒
AMPLIFIER	310N	293004	SONOMA	2020.08.22	☒
ATTENUATOR	8491B-6dB	MY39271060	KEYSIGHT	-	☒
Antenna Mast	MA4640-XP-ET	-	Innco Systems	-	☒
Turn Table	TT 3.0-3t	-	MATURO	-	☒
DOUBLE RIDGED HORN ANTENNA	3117-PA	00161083	ETS-LINDGREN	2020.09.18	☒
Horn antenna	3116	00086635	ETS-LINDGREN	2021.05.12	☒
AMPLIFIER	JS44-18004000-33-8P	2000996	L-3Narda-MITEQ	2021.01.22	☒
Spectrum Analyzer	FSV40	100988	R&S	2021.01.03	☒

6.2.4 Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follow:

$$\text{Result} = \text{M.R} + \text{C.F}(\text{A.F} + \text{C.L} + 6 \text{ dB Att} - \text{A.G})$$

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

A.G = Amplifier Gain

6 dB Att = 6 dB Attenuator

If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 6 dB, A.G 35 dB

The result is $30 + 12 + 5 + 6 - 35 = 18 \text{ dB } (\mu\text{V/m})$

Bilog Antenna and ATTENUATOR (6 dB) were calibrated together.

AV = CAV : Abbreviation of CISPR Average

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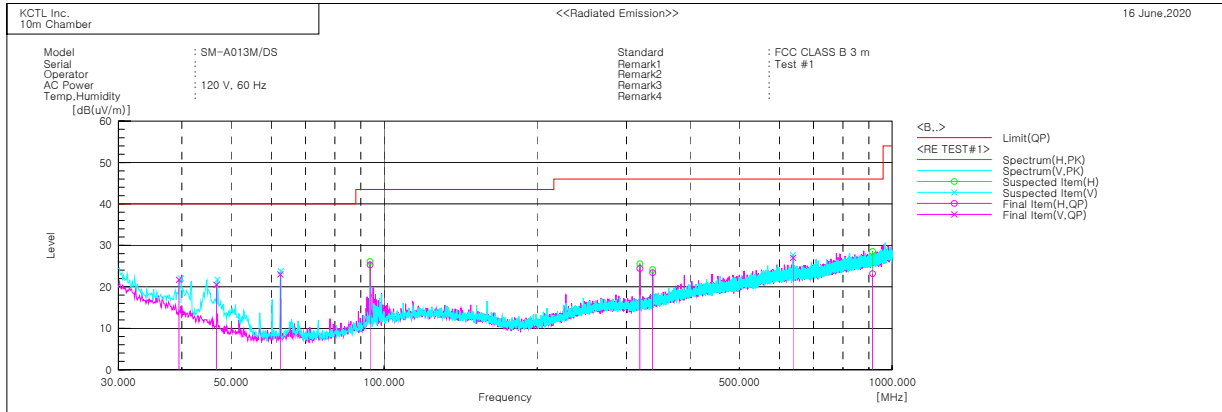
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6.2.5 Radiated emission measurement result

30 MHz ~ 1 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	39.482	V	32.1	-10.4	21.7	40.0	18.3	117.0	264.0
2	46.795	V	34.7	-14.2	20.5	40.0	19.5	118.0	274.0
3	62.462	V	39.7	-16.7	23.0	40.0	17.0	100.0	354.0
4	93.899	H	37.9	-12.6	25.3	43.5	18.2	344.0	112.0
5	318.939	H	29.6	-5.2	24.4	46.0	21.6	287.0	84.0
6	337.975	H	27.8	-4.4	23.4	46.0	22.6	299.0	184.0
7	638.069	V	23.2	3.8	27.0	46.0	19.0	177.0	184.0
8	915.489	H	14.6	8.6	23.2	46.0	22.8	280.0	231.0

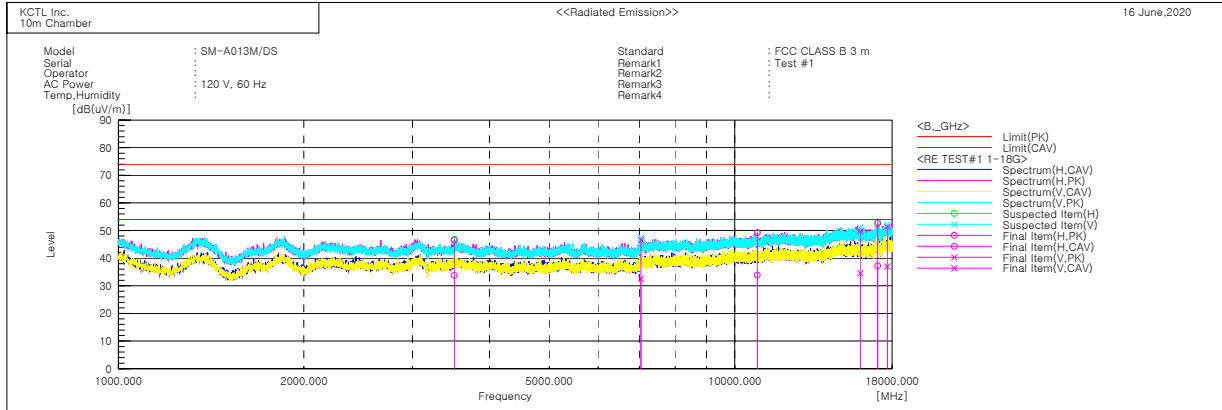
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1 GHz ~ 18 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	3506.775	H	54.2	41.5	-7.7	46.5	33.8	74.0	54.0	27.5	20.2	118.0	346.0
2	7042.952	V	51.0	36.9	-4.3	46.7	32.6	74.0	54.0	27.3	21.4	197.0	231.0
3	10876.640	H	49.8	33.5	0.4	49.2	33.9	74.0	54.0	24.8	20.1	116.0	346.0
4	15985.400	V	45.8	30.6	4.0	49.8	34.6	74.0	54.0	24.2	19.4	269.0	116.0
5	17049.650	H	44.9	29.6	7.6	52.5	37.2	74.0	54.0	21.5	16.8	227.0	28.0
6	17679.530	V	43.0	28.6	8.4	51.4	37.0	74.0	54.0	22.6	17.0	302.0	294.0

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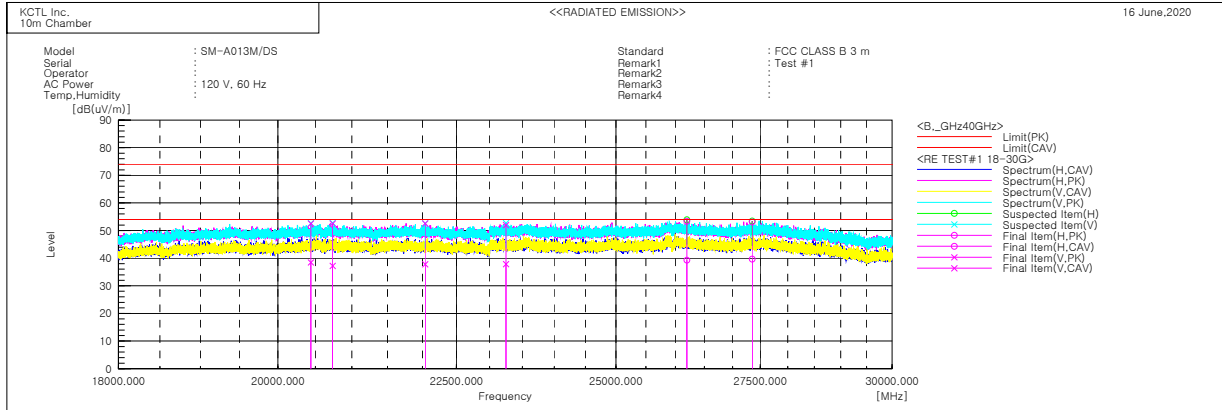
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18 GHz ~ 30 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	20438.520	V	49.6	35.6	2.9	52.5	38.5	74.0	54.0	21.5	15.5	155.0	311.0
2	20734.940	V	49.8	34.5	2.7	52.5	37.2	74.0	54.0	21.5	16.8	180.0	109.0
3	22039.400	V	49.6	34.8	3.0	52.6	37.8	74.0	54.0	21.4	16.2	120.0	324.0
4	23248.460	V	48.6	34.5	3.4	52.0	37.9	74.0	54.0	22.0	16.1	388.0	154.0
5	26198.810	H	45.6	31.5	7.8	53.4	39.3	74.0	54.0	20.6	14.7	227.0	89.0
6	27353.870	H	44.6	31.2	8.5	53.1	39.7	74.0	54.0	20.9	14.3	120.0	276.0



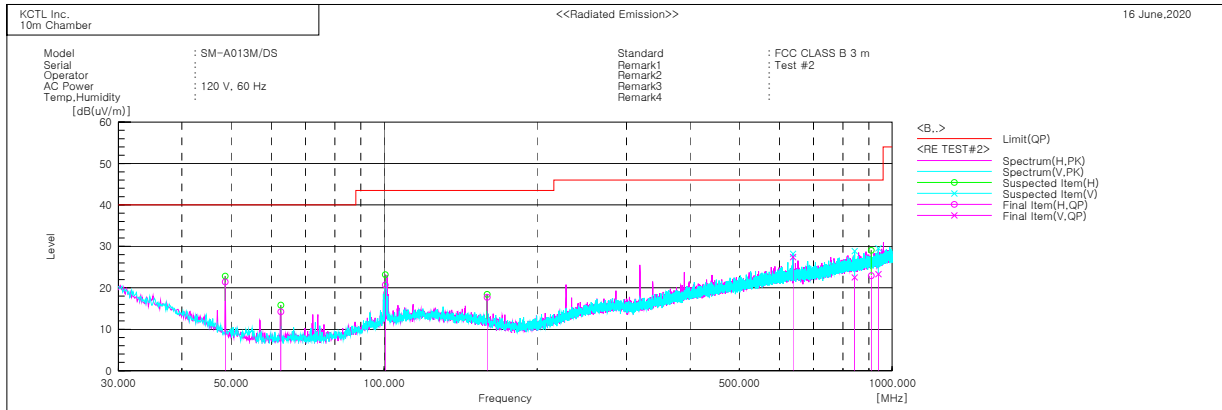
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30 MHz ~ 1 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	48.673	H	36.5	-15.1	21.4	40.0	18.6	270.0	234.0
2	62.616	H	30.9	-16.7	14.2	40.0	25.8	378.0	16.0
3	100.568	H	32.2	-11.5	20.7	43.5	22.8	337.0	76.0
4	159.495	H	28.4	-10.7	17.7	43.5	25.8	171.0	16.0
5	638.069	V	23.6	3.8	27.4	46.0	18.6	207.0	297.0
6	843.709	V	15.1	7.4	22.5	46.0	23.5	311.0	16.0
7	910.033	H	14.4	8.5	22.9	46.0	23.1	227.0	18.0
8	939.739	V	14.1	9.2	23.3	46.0	22.7	101.0	199.0

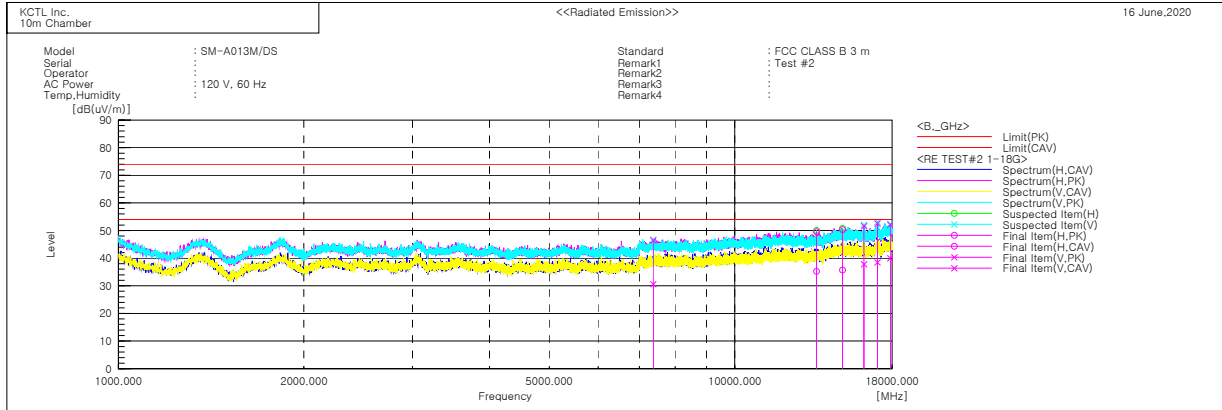
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1 GHz ~ 18 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	7371.918	V	50.6	34.8	-4.2	46.4	30.6	74.0	54.0	27.6	23.4	118.0	6.0
2	13571.280	H	48.0	33.6	1.6	49.6	35.2	74.0	54.0	24.4	18.8	227.0	78.0
3	14954.300	H	48.2	33.6	2.1	50.3	35.7	74.0	54.0	23.7	18.3	308.0	9.0
4	16200.460	V	46.9	33.1	4.7	51.6	37.8	74.0	54.0	22.4	16.2	388.0	246.0
5	17046.250	V	45.0	30.9	7.6	52.6	38.5	74.0	54.0	21.4	15.5	117.0	91.0
6	17874.190	V	43.0	30.9	9.1	52.1	40.0	74.0	54.0	21.9	14.0	148.0	254.0



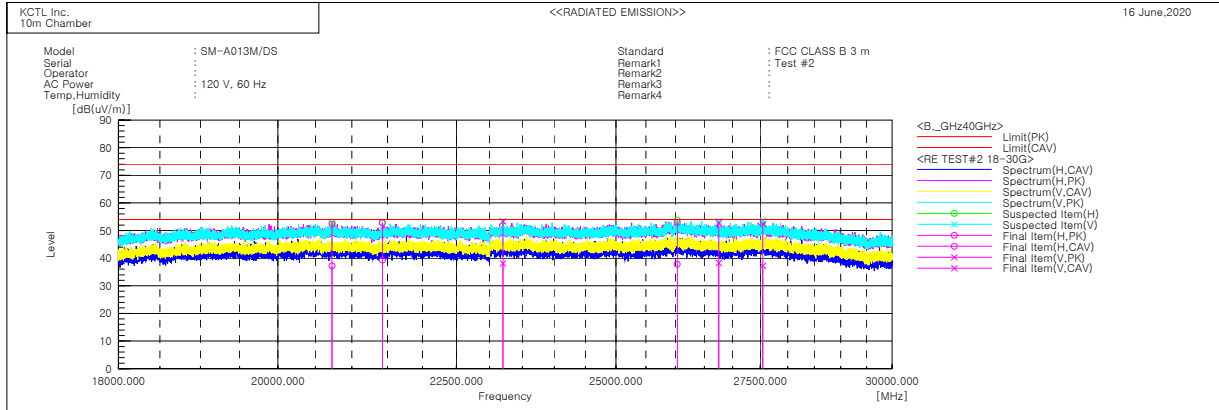
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18 GHz ~ 30 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	20725.940	H	49.6	34.5	2.7	52.3	37.2	74.0	54.0	21.7	16.8	287.0	94.0
2	21427.370	H	50.2	36.7	2.6	52.8	39.3	74.0	54.0	21.2	14.7	117.0	154.0
3	23202.260	V	50.0	34.8	3.3	53.3	38.1	74.0	54.0	20.7	15.9	377.0	26.0
4	26032.600	H	45.0	29.8	8.0	53.0	37.8	74.0	54.0	21.0	16.2	199.0	54.0
5	26756.240	V	45.2	30.7	7.6	52.8	38.3	74.0	54.0	21.2	15.7	227.0	5.0
6	27544.680	V	43.6	28.5	8.8	52.4	37.3	74.0	54.0	21.6	16.7	201.0	16.0

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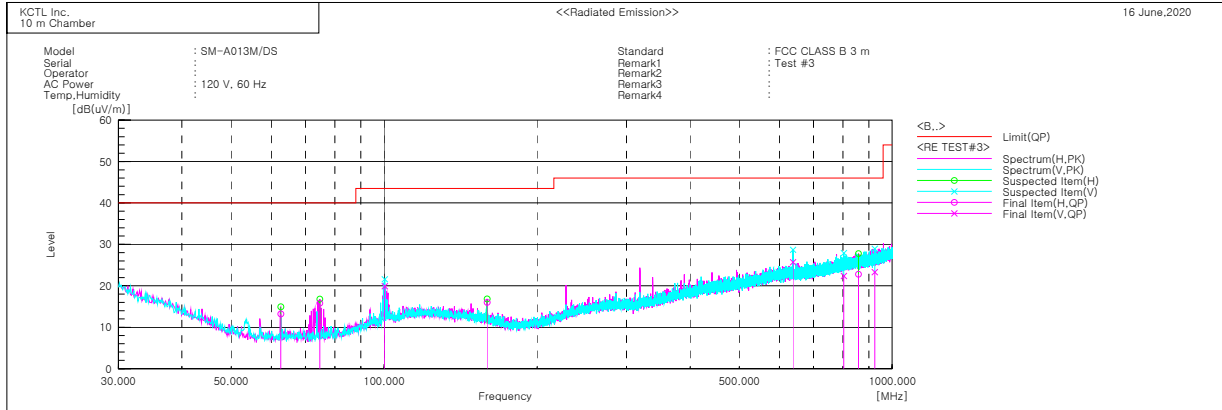
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30 MHz ~ 1 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	62.616	H	29.9	-16.7	13.2	40.0	26.8	201.0	354.0
2	74.741	H	32.0	-16.2	15.8	40.0	24.2	378.0	67.0
3	100.325	V	31.4	-11.5	19.9	43.5	23.6	117.0	81.0
4	159.495	H	26.7	-10.7	16.0	43.5	27.5	334.0	89.0
5	638.069	V	21.9	3.8	25.7	46.0	20.3	220.0	197.0
6	803.333	V	15.7	6.7	22.4	46.0	23.6	379.0	18.0
7	858.450	H	15.2	7.6	22.8	46.0	23.2	277.0	213.0
8	924.242	V	14.5	8.8	23.3	46.0	22.7	170.0	182.0

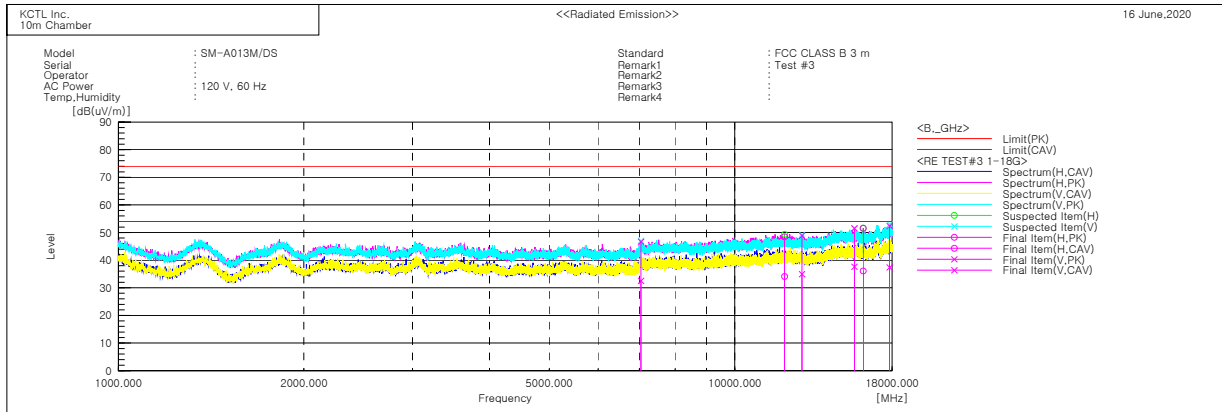
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1 GHz ~ 18 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	7044.652	V	51.0	36.8	-4.3	46.7	32.5	74.0	54.0	27.3	21.5	118.0	94.0
2	12047.150	H	48.0	33.6	0.5	48.5	34.1	74.0	54.0	25.5	19.9	277.0	164.0
3	12851.290	V	47.5	33.6	1.4	48.9	35.0	74.0	54.0	25.1	19.0	386.0	11.0
4	15636.030	V	48.6	34.7	2.9	51.5	37.6	74.0	54.0	22.5	16.4	244.0	107.0
5	16163.060	H	47.0	31.6	4.5	51.5	36.1	74.0	54.0	22.5	17.9	200.0	344.0
6	17830.840	V	43.6	28.6	8.8	52.4	37.4	74.0	54.0	21.6	16.6	117.0	13.0



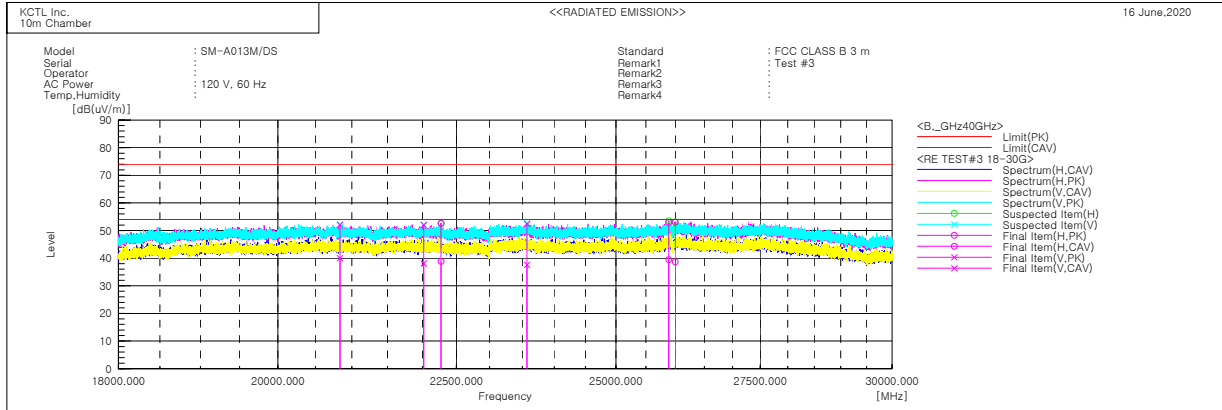
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18 GHz ~ 30 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	20833.940	V	49.5	37.5	2.5	52.0	40.0	74.0	54.0	22.0	14.0	200.0	34.0
2	22019.000	V	49.0	35.1	3.0	52.0	38.1	74.0	54.0	22.0	15.9	107.0	115.0
3	22272.210	H	49.6	35.8	3.0	52.6	38.8	74.0	54.0	21.4	15.2	377.0	165.0
4	23574.280	V	48.5	33.7	3.9	52.4	37.6	74.0	54.0	21.6	16.4	227.0	251.0
5	25887.390	H	45.2	31.8	7.7	52.9	39.5	74.0	54.0	21.1	14.5	337.0	169.0
6	25997.200	H	45.1	30.8	7.9	53.0	38.7	74.0	54.0	21.0	15.3	227.0	336.0



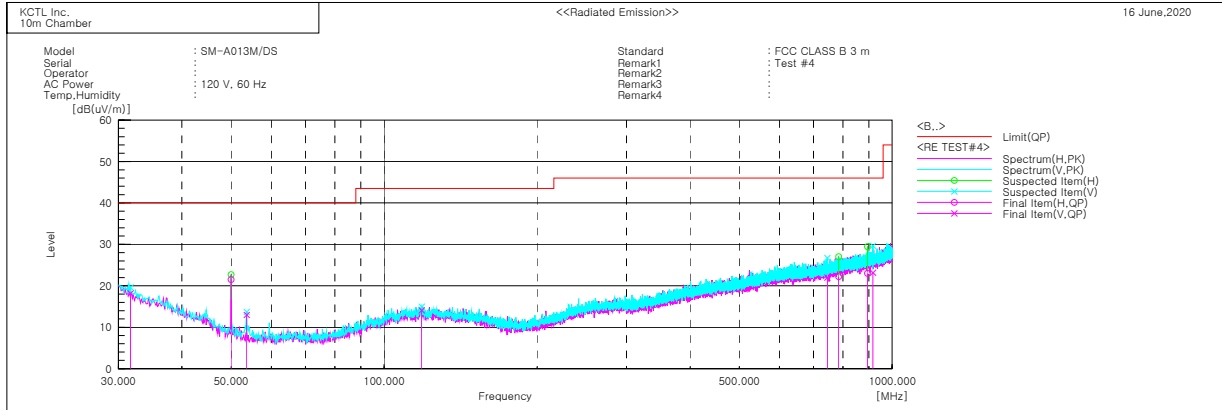
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30 MHz ~ 1 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	31.698	V	24.3	-6.1	18.2	40.0	21.8	337.0	164.0
2	50.006	H	37.1	-15.6	21.5	40.0	18.5	200.0	241.0
3	53.644	V	29.5	-16.5	13.0	40.0	27.0	186.0	352.0
4	118.634	V	23.8	-9.7	14.1	43.5	29.4	377.0	281.0
5	745.744	V	16.6	5.4	22.0	46.0	24.0	337.0	94.0
6	785.266	H	15.8	6.4	22.2	46.0	23.8	377.0	221.0
7	894.028	H	14.8	8.2	23.0	46.0	23.0	118.0	264.0
8	916.701	V	14.5	8.7	23.2	46.0	22.8	246.0	39.0

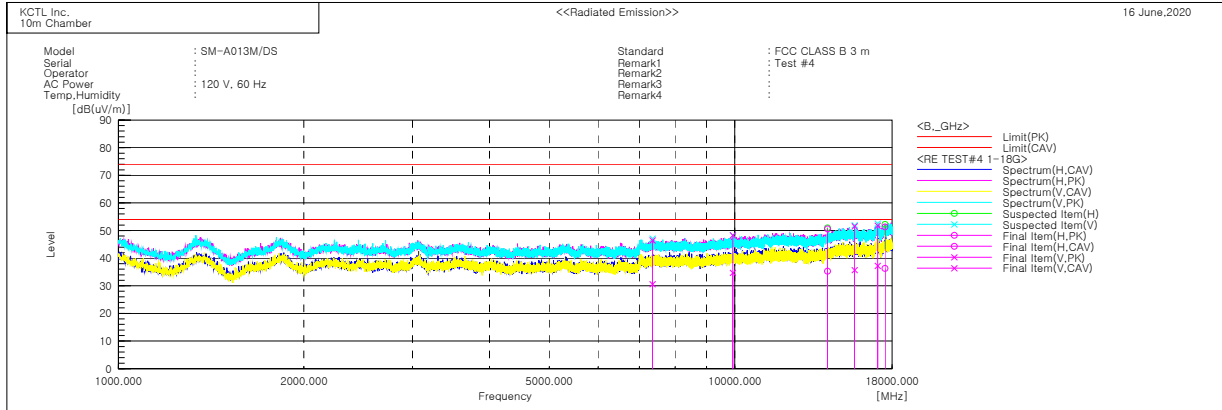
KCTL Inc.

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Suwon-si, Gyeonggi-do, 16677, Korea
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1 GHz ~ 18 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	7354.917	V	50.6	34.8	-4.2	46.4	30.6	74.0	54.0	27.6	23.4	177.0	16.0
2	9926.295	V	47.2	33.6	1.1	48.3	34.7	74.0	54.0	25.7	19.3	200.0	193.0
3	14137.410	H	48.9	33.6	1.7	50.6	35.3	74.0	54.0	23.4	18.7	104.0	37.0
4	15641.980	V	48.6	32.8	2.9	51.5	35.7	74.0	54.0	22.5	18.3	306.0	181.0
5	17059.850	V	44.2	29.6	7.6	51.8	37.2	74.0	54.0	22.2	16.8	377.0	23.0
6	17526.520	H	43.6	28.6	7.7	51.3	36.3	74.0	54.0	22.7	17.7	227.0	346.0



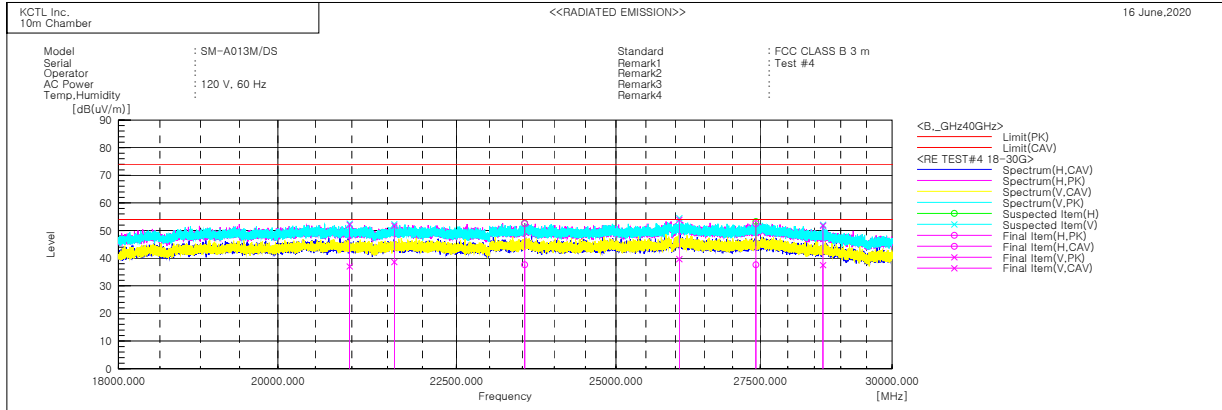
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18 GHz ~ 30 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f. [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	20967.750	V	49.8	34.7	2.3	52.1	37.0	74.0	54.0	21.9	17.0	118.0	223.0
2	21596.580	V	49.0	35.8	2.8	51.8	38.6	74.0	54.0	22.2	15.4	300.0	168.0
3	23536.480	H	48.6	33.7	3.9	52.5	37.6	74.0	54.0	21.5	16.4	110.0	138.0
4	26065.600	V	45.9	31.7	8.0	53.9	39.7	74.0	54.0	20.1	14.3	228.0	267.0
5	27418.670	H	43.8	28.9	8.7	52.5	37.6	74.0	54.0	21.5	16.4	227.0	334.0
6	28660.730	V	45.2	30.9	6.6	51.8	37.5	74.0	54.0	22.2	16.5	389.0	51.0



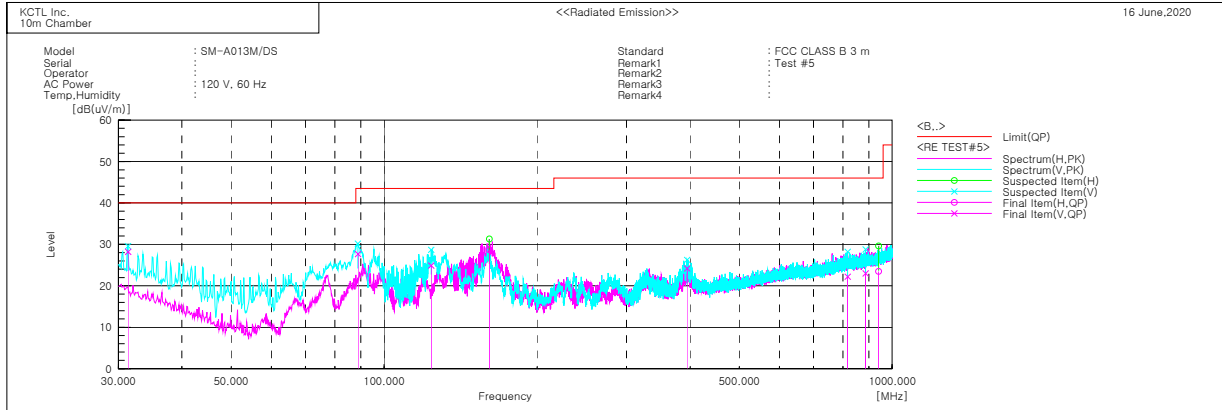
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30 MHz ~ 1 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	31.343	V	34.0	-5.8	28.2	40.0	11.8	117.0	164.0
2	88.841	V	41.4	-13.7	27.7	43.5	15.8	227.0	271.0
3	123.848	V	34.6	-9.7	24.9	43.5	18.6	117.0	297.0
4	161.193	H	39.5	-10.8	28.7	43.5	14.8	349.0	158.0
5	394.963	V	26.1	-1.9	24.2	46.0	21.8	127.0	313.0
6	817.276	V	15.2	7.0	22.2	46.0	23.8	337.0	116.0
7	886.631	V	14.9	8.1	23.0	46.0	23.0	200.0	144.0
8	940.830	H	14.3	9.2	23.5	46.0	22.5	311.0	345.0

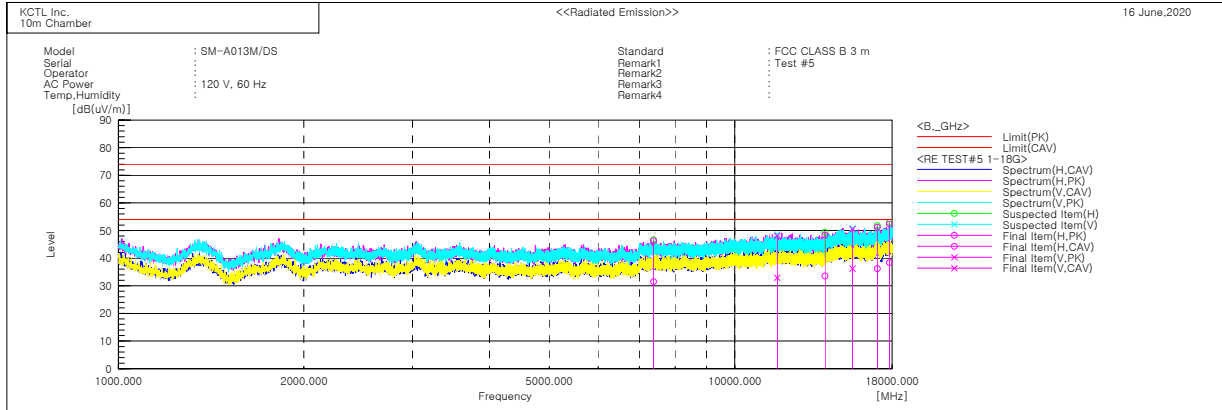
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1 GHz ~ 18 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	7382.969	H	50.6	35.8	-4.3	46.3	31.5	74.0	54.0	27.7	22.5	115.0	16.0
2	11722.440	V	47.8	32.6	0.3	48.1	32.9	74.0	54.0	25.9	21.1	380.0	131.0
3	14006.500	H	46.8	32.0	1.6	48.4	33.6	74.0	54.0	25.6	20.4	110.0	184.0
4	15522.120	V	47.9	33.6	2.6	50.5	36.2	74.0	54.0	23.5	17.8	227.0	213.0
5	17036.050	H	43.6	28.6	7.6	51.2	36.2	74.0	54.0	22.8	17.8	227.0	216.0
6	17817.240	H	43.6	29.6	8.8	52.4	38.4	74.0	54.0	21.6	15.6	120.0	294.0

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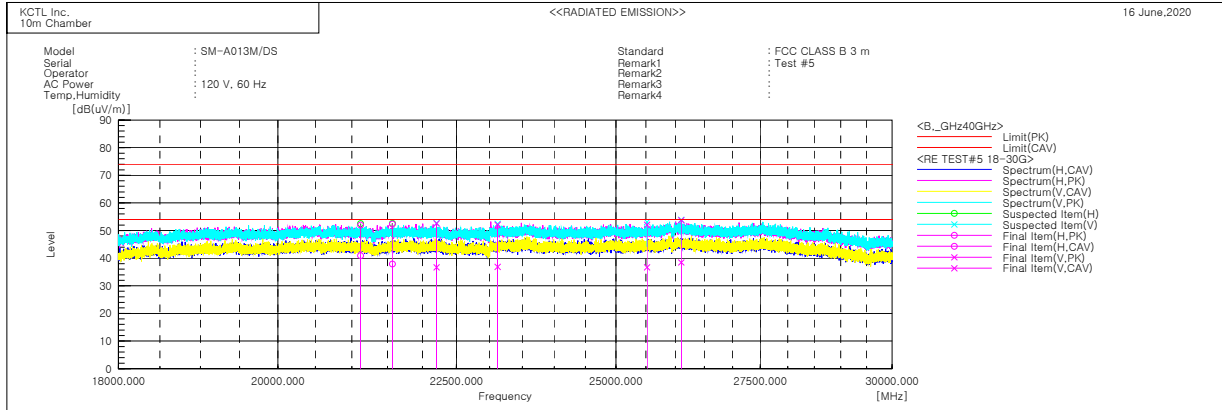
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18 GHz ~ 30 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	21120.160	H	49.6	38.5	2.4	52.0	40.9	74.0	54.0	22.0	13.1	118.0	354.0
2	21568.980	H	49.6	35.1	2.8	52.4	37.9	74.0	54.0	21.6	16.1	200.0	397.0
3	22207.410	V	49.6	33.7	3.0	52.6	36.7	74.0	54.0	21.4	17.3	370.0	16.0
4	23121.260	V	49.0	33.8	3.1	52.1	36.9	74.0	54.0	21.9	17.1	227.0	336.0
5	25516.580	V	45.9	30.5	6.2	52.1	36.7	74.0	54.0	21.9	17.3	277.0	16.0
6	26099.210	V	45.9	30.6	7.9	53.8	38.5	74.0	54.0	20.2	15.5	227.0	53.0

