

EMI TEST REPORT

Test report No.: EMC- FCC-0416

Type of equipment: PNP(PORTABLE NAVIGATION PLAYER)

Model Name: NVX216

Variant Model: GMP100

FCC ID : UC5NVX216

Brand name: AUDIOVOX, CHANGHONG

Applicant: S.CAM CO.,LTD

Test standards: FCC part 15 subpart B (Class B)
FCC part 15 subpart C

Test Procedure and Items :

AC Power Line Conducted Emissions Measurement: ANSI C63.4:2003

Radiated Emissions Measurement : ANSI C63.4:2003


Test result : Complied

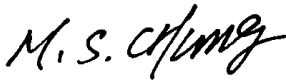
The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.

The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of test: 2006. 05. 23~25

Issued date: 2006. 06. 08

Tested by : 
KIM, CHANG-MIN

Approved by: 
CHUNG, MIN-SEOK

EMC Compliance Ltd.

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1. Client information

Applicant: S.CAM CO.,LTD
Address: #303, Kyungki Venture Bldg 1017,
Ingae-dong, Paldal-gu, Suwon city,
Kyunggi-do, Korea 442-833
Telephone Number: +82-31-233-4792
Facsimile Number: +82-31-233-4795
Contact Person: PARK GI YOUNG

Manufacturer: S.CAM CO.,LTD
Address: 35, Buk-ri, Namsa-myon, Youngin-city,
Gyeonggi-do, Korea
Telephone Number: +82-31-329-8700
Facsimile Number: +82-31-329-8729

2. Laboratory information

Address

EMC compliance Ltd.

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Telephone Number : 82 31 336 9919

Facsimile Number : 82 31 336 4767

FCC Filing No. : 793334

VCCI Registration No. : C-1713, R-1606

KOLAS NO.: 231

SITE MAP



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3. Test system configuration

3.1 Operation Environment

	Temperature	Humidity	Pressure
OATS :	23 °C	61 %	1001 hPa
Shielded room :	29 °C	53 %	1000 hPa

Test site

These testing were performed following locations;

OATS : Radiated emission

Shielded room: Conducted emission

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 NIS 80, 81, the measurement uncertainty level with a 95% confidence level was applied.

3.3 Sample calculation

The field strength is calculated by adding the LISN factor, cable loss from the measured reading.

The sample calculation is as follows :

$$FS = MR + LF + CL$$

MR = Meter Reading

LF = LISN Factor

CL = Cable Loss

If MR is 30dB, LISN Factor 1dB, CL 1dB

The result (MR) is

$$30 + 1 + 1 = 32\text{dBuV}$$

Radiated emission

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 follows :

$$FS = MR + AF + CL + AT - AG$$

MR = Meter Reading

AF = Antenna Factor

CL = Cable Loss

AP = Antenna Pad

AG=Amplifier Gain

If MR is 30dB, AF 12dB, CL 5dB, AP 10dB, AG 35dB

The result (MR) is

$$30 + 12 + 5 + 10 - 35 = 22\text{dBuV/m}$$

4. Description of E.U.T.

4.1 Product description

Applicant :	S.CAM CO.,LTD
Address of Applicant:	#303, Kyungki Venture Bldg 1017, Ingae-dong, Paldal-gu, Suwon city, Kyunggi-do, Korea 442-833
Manufacturer:	S.CAM CO.,LTD
Address of Manufacturer:	35, Buk-ri, Namsa-myon, Youngin-city, Gyeonggi-do, Korea
Brand name:	AUDIOVOX, CHANGHONG
Type of equipment:	PNP (PORTABLE NAVIGATION PLAYER)
Basic Model:	NVX216
Variant Model:	GMP100
The difference between basic model and variant model:	Buyer model name
Rating:	DC 4V Rechargeable Lithium-polyer Battery
Serial number:	N/A

4.2 Peripherals

Description	Model / Part #	Serial number	Manufacture
PC	DIMESION3000	92ZRD1S	DELL
MONITOR	52S-S	N379HVEY216482P	SAMSUNG
PRINTER	EPSON STYLUS C60	DR5K014977	EPSON
PS/2 MOUSE	SMB-400	6KFF003814	SEISJIN
PS/2 KEYBOARD	SEM-DT35	24036843	SAMSUNG
SERIAL MOUSE	Microsoft HOME	489798	Microsoft Corp.
HEADPHONE	N/A	N/A	JESIN
EARPHONE	N/A	N/A	N/A

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4.3 Operating conditions

Up & down load mode.

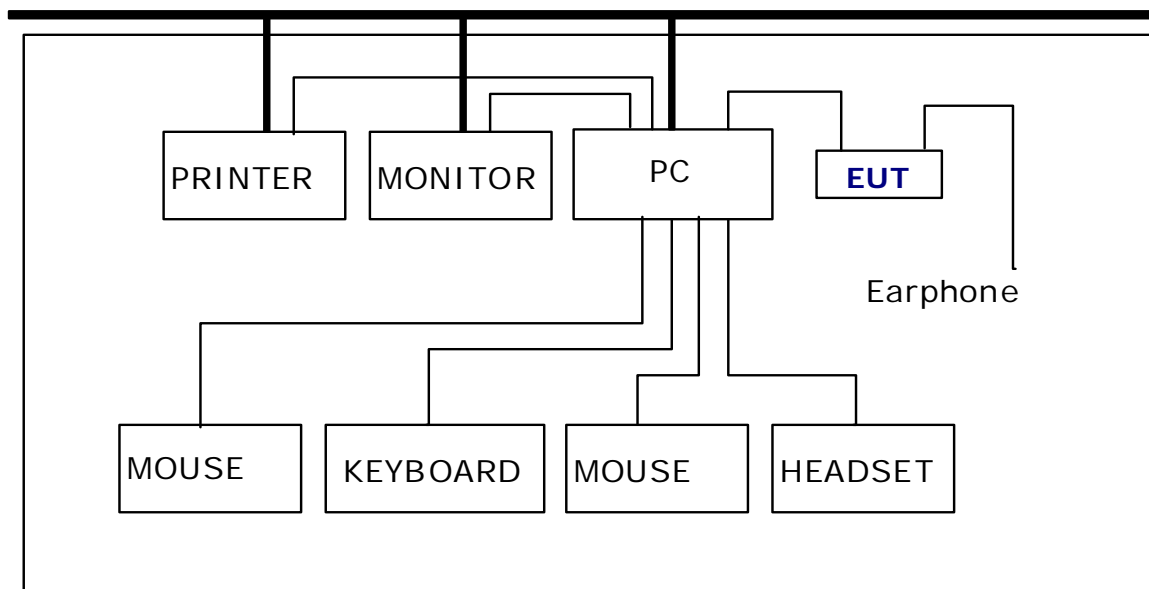
Play mode.

File copy mode.

4.4 Used cables

Start		END		Cable Spec.	
Name	I/O Port	Name	I/O Port	Length	Shield
EUT	USB	PC	USB	1.5	SHIELD
	EARPHONE	OPEN	-	1.2	NONSHIELD

4.5 EUT test configuration



5. Summary of test results

5.1 Modification to the E.U.T.

-None

5.2 Standards & results

FCC part 15 subpart B (Class B)

FCC Part 15 Subpart C

ANSI C63.4 – 2001

Test items	Test methods	Result
Conducted emission	ANSI C63.4	Pass
Radiated Electric Field emission	ANSI C63.4	Pass
Intentional radiator 200kHz bandwidth	ANSI C63.4	Pass
Intentional radiator field strength of radiation	ANSI C63.4	Pass
Intentional radiator field strength of spurious	ANSI C63.4	Pass

6. Test results

6.1 Conducted Emission

6.1.1 Measurement procedure

Mains

The measurements were performed in a shielded room.

EUT was 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.

Each EUT power lead, except ground (safety) lead, was individually connected through a LISN to input power source.

Both lines of power cord, hot and neutral, were measured.

6.1.2 Used equipments

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test receiver	ESHS10	1004.0401.10	R&S	07.05.09	<input checked="" type="checkbox"/>
L.I.S.N.	ESH3-Z5	100267	R&S	06.06.14	<input checked="" type="checkbox"/>
	L2-16A	0000J10705	PMM	06.11.30	<input checked="" type="checkbox"/>
Test site	Shield room	-	-	-	<input checked="" type="checkbox"/>

6.1.3 Measurement uncertainty

Conducted emission measurement : (k=2, 95%)

9kHz-150 kHz : ± 3.47 [dB]

150kHz-300 MHz : ± 3.01 [dB]

6.1.4 Test data

Frequency [MHz]	Correction Factor		Line	Quasi-peak			Average		
				Limit	Reading	Result	Limit	Reading	Result
	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.201	0.12	0.3	N	63.57	39.23	39.65	53.57	38.71	39.13
0.300	0.13	0.1	N	60.24	26.92	27.15	50.24	25.95	26.18
0.441	0.15	0.1	N	57.04	25.95	26.20	47.04	25.62	25.87
0.474	0.15	0.1	N	56.44	28.76	29.01	46.44	28.49	28.74
0.477	0.14	0.1	H	56.39	24.56	24.80	46.39	23.35	23.59
0.501	0.14	0.1	H	56.00	33.37	33.61	46.00	31.69	31.93
0.600	0.15	0.1	H		34.23	34.48		33.30	33.55
0.900	0.16	0.1	N		33.74	34.00		33.07	33.33
1.701	0.20	0.1	N		35.91	36.21		33.94	34.24
1.800	0.20	0.1	N		35.58	35.88		33.47	33.77
12.460	0.50	0.2	H	60.00	37.94	38.64	50.00	33.91	34.61
16.620	0.68	0.4	N		40.34	41.42		36.66	37.74
20.780	0.88	0.4	H		33.95	35.23		29.67	30.95

- Note. QP = Quasi-Peak, AV= Average / LINE(N) : NEUTRAL, LINE(H) : HOT
- Loss = LISN Loss + Cable Loss
- Measurement time : 1 s

6.1.5. Result

The EUT tested complied with the limits detailed in FCC Rules Part 15 Section 15.107(a).

6.2 Radiated Emission

6.2.1 Measurement procedure

A pretest was performed at 3 m distance in a mini chamber for searching correct frequency.

The final test was done at a 10 m open area test site with a quasi-peak detector.

EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane.

They 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.

6.2.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next cal. date	Used
Test receiver	ESCI	100001	R&S	06.10.24	<input checked="" type="checkbox"/>
TRILOG SUPER BROADBAND ANT	VULB9160	3138	SCHWARZBECK MESS-ELECTRONIK	06.10.26	<input checked="" type="checkbox"/>
Antenna Mast	A109	N/A	DEAIL	-	<input checked="" type="checkbox"/>
Turn Table	TS14	N/A	DEAIL	-	<input checked="" type="checkbox"/>
10m OATS	-	-	EMC Compliance	-	<input checked="" type="checkbox"/>

6.2.3 Measurement uncertainty

Radiated Emission measurement : (k=2, 95%)

30-300 MHz ; 3 m: ± 3.69 [dB], 10 m: ± 3.67 [dB]

300-1000 MHz ; 3 m: ± 4.07 [dB], 10 m: ± 3.41 [dB]

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6.2.4 Test data

-USB Up/Down mode-

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	angle	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
					Antenna	Cable			
50.65	10.0	V	1.0	223	12.62	0.80	30.0	23.37	6.63
126.35	9.3	V	1.3	195	11.54	1.70	30.0	22.51	7.49
177.35	8.4	H	3.8	130	11.40	2.10	30.0	21.87	8.13
202.99	13.6	H	3.7	259	9.22	2.30	30.0	25.10	4.90
625.01	1.0	V	3.5	253	19.80	5.40	37.0	26.17	10.83
658.74	2.6	V	3.2	49	20.14	5.40	37.0	28.18	8.82
665.49	6.9	V	3.1	305	20.23	5.40	37.0	32.54	4.46
875.07	0.1	H	1.0	319	22.83	7.00	37.0	29.93	7.07

* Receiving Antenna Mode : *Horizontal, Vertical*

* 10 m OATS

* Note : Reading = Test Receiver meter,

$P = \text{Polarization} \rightarrow \text{POL H} = \text{Horizontal}, \text{POL V} = \text{Vertical}$

* Result = Field Strength (Antenna factor + Cable factor + Reading)

-Play mode-

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	angle	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
					Antenna	Cable			
36.00	9.8	V	1.0	223	11.26	0.60	30.0	21.67	8.33
214.15	12.7	H	3.7	259	9.73	2.40	30.0	24.80	5.20
228.02	8.7	H	3.2	49	10.33	2.50	30.0	21.54	8.46
280.11	9.7	H	3.3	130	12.24	2.80	37.0	24.71	12.29
380.10	4.7	H	2.7	305	14.68	3.70	37.0	23.05	13.95
710.10	0.1	H	1.0	231	20.93	5.90	37.0	26.93	10.07

* Receiving Antenna Mode : *Horizontal, Vertical*

* 10 m OATS

* Note : Reading = Test Receiver meter,

$P = \text{Polarization} \rightarrow \text{POL H} = \text{Horizontal}, \text{POL V} = \text{Vertical}$

* Result = Field Strength (Antenna factor + Cable factor + Reading)

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-AV mode-

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	angle	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
					Antenna	Cable			
214.16	7.7	V	3.3	259	9.73	2.40	30.0	19.86	10.14
216.50	9.6	H	3.6	305	9.82	2.40	30.0	21.83	8.17
228.02	2.7	H	3.2	49	10.33	2.50	30.0	15.50	14.50
380.12	6.9	H	2.9	223	14.68	3.70	37.0	25.28	11.72
710.11	0.7	H	1.3	274	20.93	5.90	37.0	27.50	9.50
728.51	0.1	H	1.2	130	21.40	6.10	37.0	27.60	9.40

* Receiving Antenna Mode : *Horizontal, Vertical*

* 10 m OATS

* Note : Reading = Test Receiver meter,

P = Polarization → POL H = Horizontal, POL V = Vertical

* Result = Field Strength (Antenna factor + Cable factor + Reading)

6.2.5. Result

The EUT tested complied with the limits detailed in FCC Rules Part 15 Section 15.109(g).

6.3 Intentional radiator 200kHz Bandwidth

6.3.1 Used equipments

Equipment	Model no.	Serial no.	Makers	Next cal. date	Used
EMC Analyzer	E7401A	US38460066	Agilent	07.04.09	<input checked="" type="checkbox"/>

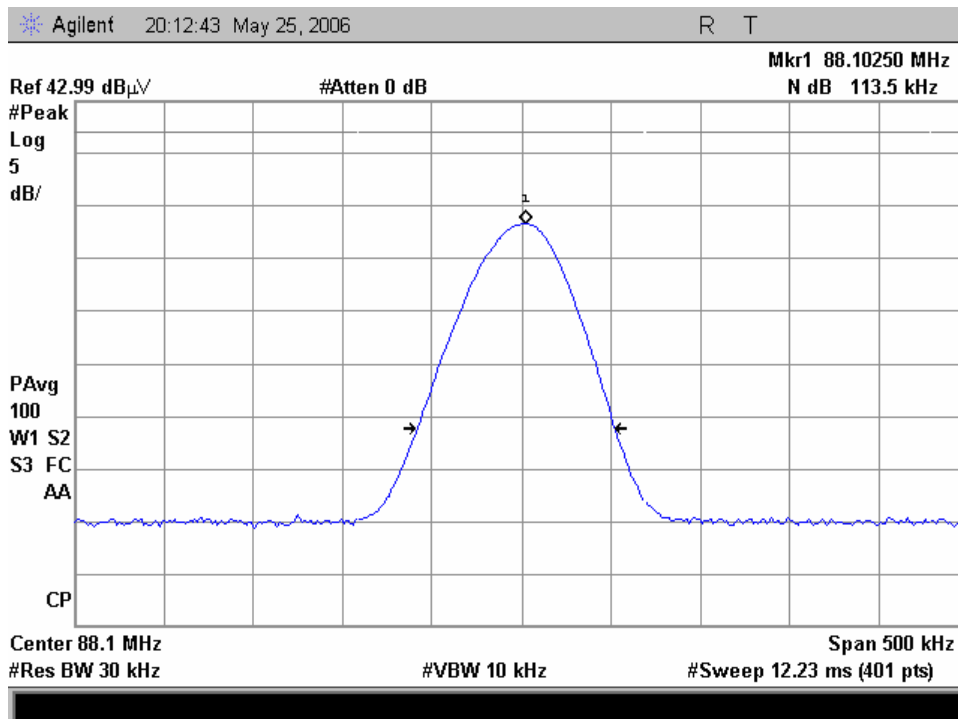
6.3.2 Instrument Settings

RES BW : 10 kHz

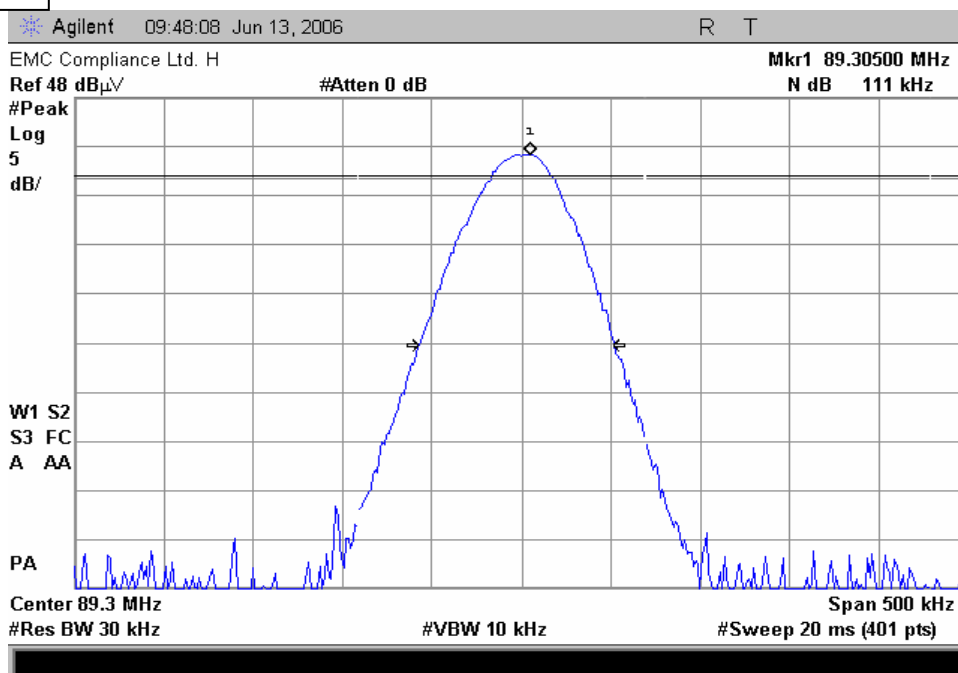
VBW : 10 kHz

6.3.3 Test data

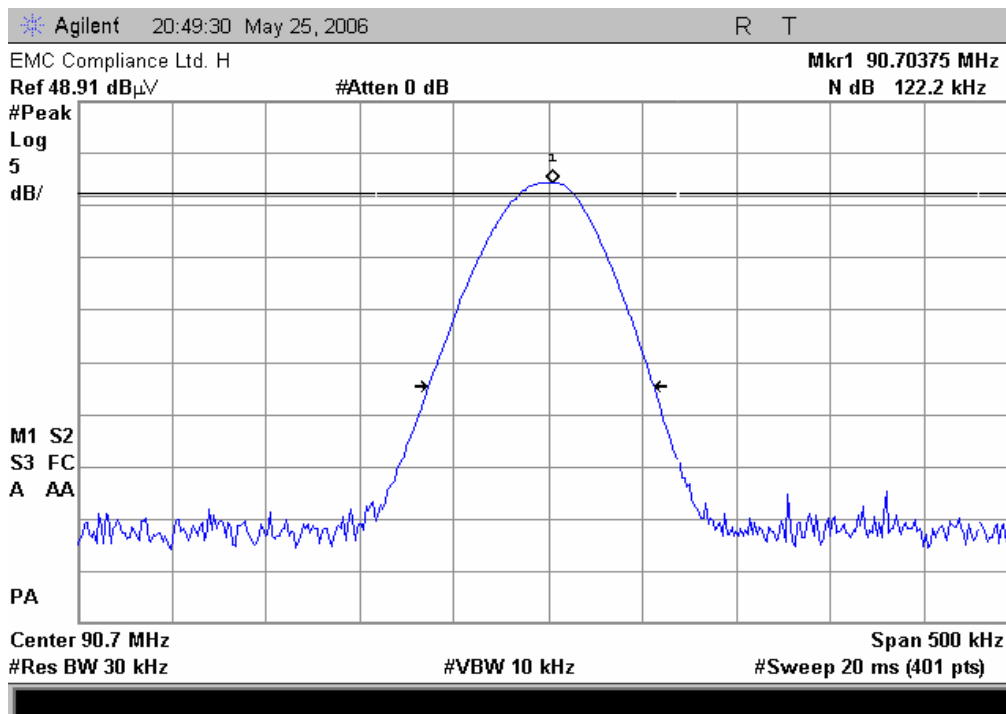
[88.1 MHz]



[89.3 MHz]



[90.7 MHz]



6.3.4 Result

Complied

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6.4 Intentional radiator Field Strength of Radiation

6.4.1 Measurement procedure

The test was done at a 3m open area test site with an average detector.

EUT was placed on a non-metallic table height of 0.8m above the reference ground plane.

They were folded back and forth forming a bundle 0.3m to 0.4m

long and were hanged at a 0.4m 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.

6.4.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next cal. date	Used
Test receiver	ESCI	100001	R&S	06.10.24	<input checked="" type="checkbox"/>
TRILOG SUPER BROADBAND ANT	VULB9160	3138	SCHWARZBECK MESS-ELECTRONIK	06.10.26	<input checked="" type="checkbox"/>
Antenna Mast	A109	N/A	DEAIL	-	<input checked="" type="checkbox"/>
Turn Table	TS14	N/A	DEAIL	-	<input checked="" type="checkbox"/>
10m OATS	-	-	EMC Compliance	-	<input checked="" type="checkbox"/>

6.2.3 Measurement uncertainty

Radiated Emission measurement : (k=2, 95%)

30-300 MHz ; 3 m: ± 3.69 [dB], 10 m: ± 3.67 [dB]

300-1000 MHz ; 3 m: ± 4.07 [dB], 10 m: ± 3.41 [dB]

6.4.4 Test data

[Peak]

Frequency	Reading	Pol.	Height	angle	Correction Factor		Limits	Result	Margin
[MHz]	[dBuV/m]		[m]		Antenna	Cable	[dBuV/m]	[dBuV/m]	[dB]
88.1	25.8	V	1.0	266	7.86	1.66	68.0	35.32	32.68
89.3	26.1	V	1.0	260	7.88	1.68	68.0	35.66	32.34
90.7	25.9	V	1.0	260	7.89	1.70	68.0	35.49	32.51

[Average]

Frequency	Reading	Pol.	Height	angle	Correction Factor		Limits	Result	Margin
[MHz]	[dBuV/m]		[m]		Antenna	Cable	[dBuV/m]	[dBuV/m]	[dB]
88.1	25.20	V	1.0	266	7.86	1.66	48.0	34.72	13.28
89.3	25.20	V	1.0	260	7.88	1.68	48.0	34.76	13.24
90.7	25.20	V	1.0	260	7.89	1.70	48.0	34.79	13.21

* Receiving Antenna Mode : P= Polarization → POL H = Horizontal, POL V =Vertical

* IF Bandwidth : 120kHz

* Note : Reading = Test Receiver meter,

* Result = Field Strength (Antenna factor + Cable factor + Reading)

6.4.5 Result

Complied

6.5 Intentional radiator Field Strength of Spurious

6.5.1 Measurement procedure

The test was done at a 3m open area test site with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8m above the reference ground plane.

They were folded back and forth forming a bundle 0.3m to 0.4m long and were hanged at a 0.4m 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.

6.5.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next cal. date	Used
Test receiver	ESCI	100001	R&S	06.10.24	<input checked="" type="checkbox"/>
TRILOG SUPER BROADBAND ANT	VULB9160	3138	SCHWARZBECK MESS-ELECTRONIK	06.10.26	<input checked="" type="checkbox"/>
Antenna Mast	A109	N/A	DEAIL	-	<input checked="" type="checkbox"/>
Turn Table	TS14	N/A	DEAIL	-	<input checked="" type="checkbox"/>
10m OATS	-	-	EMC Compliance	-	<input checked="" type="checkbox"/>

6.2.3 Measurement uncertainty

Radiated Emission measurement : (k=2, 95%)

30-300 MHz ; 3 m: ± 3.69 [dB], 10 m: ± 3.67 [dB]

300-1000 MHz ; 3 m: ± 4.07 [dB], 10 m: ± 3.41 [dB]

6.5.4 Test data

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	angle	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
					Antenna	Cable			
172.60	1.4	V	1.8	266	11.81	2.38	43.5	15.59	27.91
178.60	1.1	V	1.0	260	11.32	2.42	43.5	14.84	28.66
181.40	1.0	V	1.0	260	11.05	2.45	43.5	14.50	29.00

* Receiving Antenna Mode : P= Polarization → POL H= Horizontal, POL V = Vertical

* IF Bandwidth : 120kHz

* Note : Reading = Test Receiver meter,

* Result = Field Strength (Antenna factor + Cable factor + Reading)

6.5.5 Result

Complied

7. Test graphs

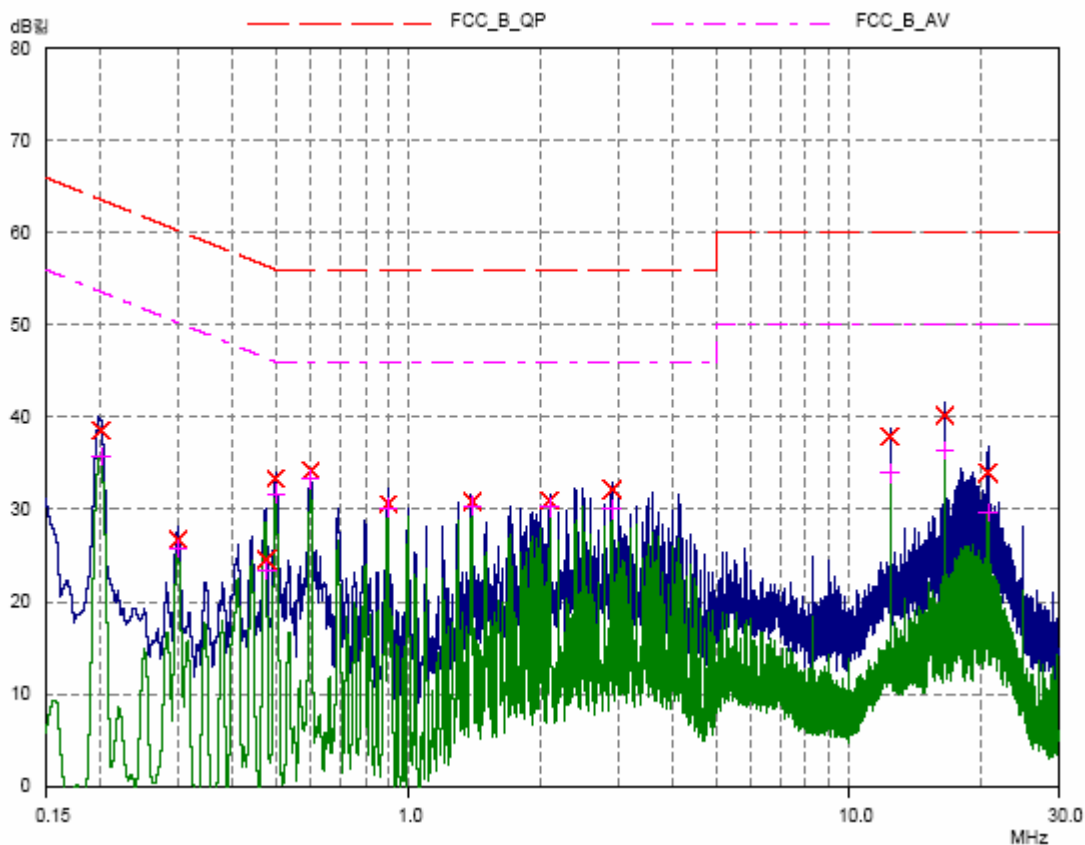
EUT: SCAM
Manuf:
Op Cond: H
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

Result File: nf1_h.dat : NF1_H

Scan Settings (2 Ranges)

Frequencies				Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB	
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB	

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 25 dB



EUT: SCAM
Manuf:
Op Cond: N
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

Result File: nf1_n.dat : NF1_N

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 25 dB

