

EMI TEST REPORT

Test report No. : EMC- FCC- 0145

Type of equipment : DIGITAL CAMCORDER

Model No. : SCD6050

FCC ID. : A3L04GAMMA2

Applicant : SAMSUNG ELECTRONICS CO., LTD.

Test standards : FCC part 15 subpart B, Class B

Test Procedure and Items :

- AC Power Line Conducted Emissions Measurement: ANSI C63.4-1992
- Radiated Emissions Measurement : ANSI C63.4-1992

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: 2004. 4.23~4.26 Issued date: 2004 .4. 27

Tested by : J. S. Kim Approved by: M. S. Chung

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1. Client information

Applicant: SAMSUNG ELECTRONICS CO., LTD.
Address: 416, Maetan-3Dong, Yeongtong-Gu, Suwon City,
Kyungki-Do, Korea
Telephone number: 82-31-200-5922
Facsimile number: 82-31-200-5938
Contact person: Jei-Soon Kang / Manager

Manufacture: SAMSUNG ELECTRONICS CO., LTD.
Address: 416, Maetan-3Dong, Yeongtong-Gu, Suwon City,
Kyungki-Do, Korea
Telephone number: 82-31-200-5922
Facsimile number: 82-31-200-5938

2. Laboratory information

Address

EMC compliance Ltd.

82-1, JEIL-RI, YANGJI-MYUN, YOUNGIN-CITY, KYUNGGI-DO, KOREA

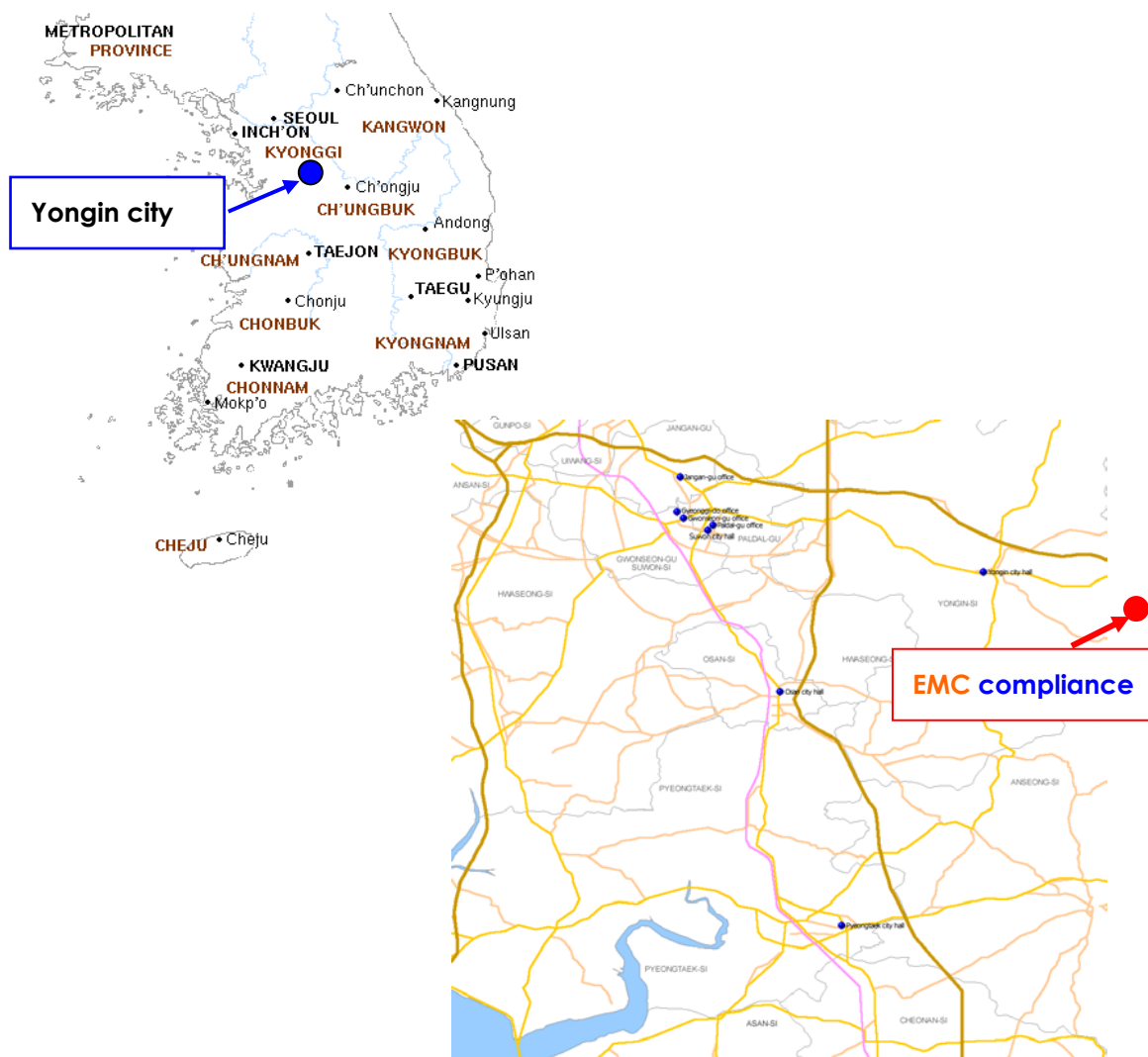
Telephone Number : 82 31 336 9919

Facsimile Number : 82 31 336 4767

FCC Filing No. : 793334

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

SITE MAP



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3. Test system configuration

3.1 Operation Environment

	Temperature	Humidity	Pressure
OATS :	14 °C	36 %	1014 hPa
Shielded room :	26 °C	33 %	1014 hPa

Test site

These testing were performed following locations;

Shielded room: Conducted emission

OATS (10m) : Radiated emission

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMI. 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, mismatching, and system repeatability.

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

3.3 Sample calculation

Conducted emission

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

The sample calculation is as follows :

$$\text{FS} = \text{MR} + \text{LF} + \text{CL}$$

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 :

$$\text{FS} = \text{MR} + \text{AF} + \text{CL} + \text{AT} - \text{AG}$$

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

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

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4. Description of EUT

4.1 Product Description

Manufactured by:	SAMSUNG ELECTRONICS CO., LTD.
Address:	416, Maetan-3Dong, Yeontong-Gu, Suwon City, Kyungki-Do, Korea
Type of equipment:	DIGITAL CAMCORDER
Model:	SCD6050
Serial number:	None
Video recording system:	2 rotary heads, helical scanning system
Audio recording system:	Rotary heads, PCM system
Image device:	CCD(Charge Coupled Device)
Power supply:	DC 8.4V, Lithium Ion Battery pack 7.4V (Power Supply(100V-240V) or Lithium Ion battery pack)

4.2 Peripherals

Description	Model / Part #	Serial Number	Manufacture
PC	DIMENSION4600	Y-0452RV-M0145-364-52	DELL
LCD MONITOR	SyncMaster 750S	P223HVBR701830	SEC
CRT MONITOR	SyncMaster Magic CX910MP	N434H4JX317171F	SEC
KEYBOARD	SEM-DT35	24036843	SEC
SERIAL MOUSE	SWW-23	N/A	A4Tech
PS/2 MOUSE	M-S69	F466B0MN3NG1CHX	COMPAQ
MIC	N/A	N/A	N/A
HEADSET	Stereo LS1 HEADSET	N/A	Microsoft

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4.3 Used cables

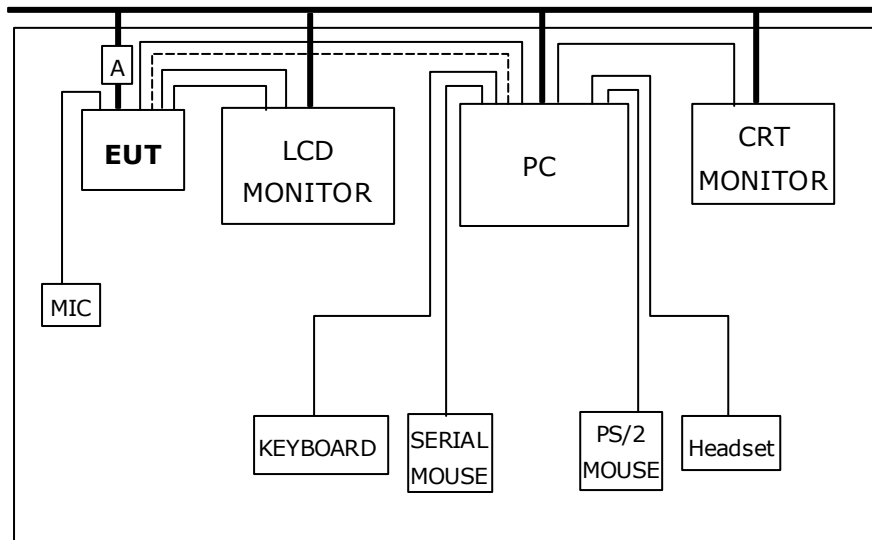
EUT Port	Type	Shield (Y/N)	Length (m)	Connection point 1	Connection point 2
USB	USB	N	1.5	EUT	PC
AV	DIN	N	1.5		LCD MONITOR
S-Video	DIN	N	1.5		LCD MONITOR
MIC	P-Jack	N	1.3		MIC
DV	IEEE1394	Y	1.5		PC
VGA	D-Sub	Y	1.8	PC	CRT MONITOR
PS/2	PS/2	Y	1.8		KEYBOARD
PS/2	PS/2	Y	1.8		PS/2 MOUSE
SERIAL	SERIAL	Y	1.8		SERIAL MOUSE
EAR-MIC	P-Jack	N	2.0		Headset

4.4 Operating conditions

Operating :

1. Recording through USB cable.
 2. Data up/download with memory card.
- The test was performed the worst case(Recording through the USB cable).
 - The system was configured in typical fashion (as a customer would normally use it) for testing.

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)
ANSI C63.4 – 1992

Test items	Test methods	Result
Conducted emission	ANSI C63.4-1992	Pass
Radiated emission	ANSI C63.4-1992	Pass

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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 0.8m above the reference ground plane.

The rear of tabletop was located 0.4m to the vertical conducted plane.

All other surfaces of tabletop were at least 0.8m away from any other grounded conducting surface.

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.

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	843276/003	R&S	04.05.13	☒
L.I.S.N.	ESH3-Z5	100267	R&S	04.06.17	☒
	L3-32A	0120J20305	PMM	05.04.03	☒
Test site	Shield room	-	-	-	☒

6.1.3 Measurement uncertainty

Conducted emission measurement : ± 2.4 (K=2)

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6.1.4 Test data

Frequency [MHz]	Correction Factor		Line	Quasi-peak			Average		
	LISN	Cable		Limit [dBuV]	Reading [dBuV]	Result [dBuV]	Limit [dBuV]	Reading [dBuV]	Result [dBuV]
	0.192	0.05		0.2	H	63.95	57.96	58.21	53.95
0.195	0.05	0.2	N	63.82	55.39	55.64	53.82	43.51	43.76
0.258	0.05	0.2	H	61.50	52.58	52.83	51.50	40.36	40.61
0.324	0.05	0.1	H	59.60	50.18	50.33	49.60	38.96	39.11
0.393	0.06	0.3	H	58.00	46.58	46.94	48.00	35.29	35.65
0.447	0.06	0.3	H	56.93	46.07	46.43	46.93	33.48	33.84
0.573	0.06	0.3	H	56.00	43.91	44.27	46.00	29.21	29.57
0.660	0.07	0.2	H		44.41	44.68		32.24	32.51
1.137	0.08	0.3	H		44.30	44.68		29.29	29.67
1.206	0.09	0.3	H		43.65	44.04		30.55	30.94
3.880	0.14	0.5	H		45.52	46.16		33.87	34.51
3.910	0.14	0.5	N		44.12	44.76		33.87	34.51
5.400	0.16	0.5	H	60.00	37.06	37.72	50.00	27.32	27.98
5.630	0.20	0.5	H		36.48	37.18		25.40	26.10
5.960	0.20	0.5	H		34.26	34.96		25.99	26.69
8.960	0.26	0.5	N		34.32	35.08		25.32	26.08
9.910	0.27	0.2	N		34.81	35.28		24.23	24.70
14.770	0.45	0.5	N		37.28	38.23		25.45	26.40

- Note. QP = Quasi-Peak, AV= Average
- Loss = LISN Loss + Cable Loss
- Measurement time : 1 s

6.1.5. Result

Complied

6.2 Radiated emission

6.2.1 Measurement procedure

A pretest was performed at 3m distance in a semi-anechoic chamber for searching correct frequency. The final test was done at a 10m 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.

6.2.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Test receiver	ESVS 10	82786/006	R&S	04.05.13	<input checked="" type="checkbox"/>
TRILOG Broadband Antenna	VULB 9160	3138	SCHWARZBECK	05.04.10	<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)

30-300 MHz : 3 m: ± 3.67 , 10 m: ± 4.4

300-1000 MHz ; 3 m: $+4.6/-2.92$, 10 m: $+2.94/-2.88$

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6.2.4 Test data

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	angle	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
					Antenna	Cable			
36.00	13.1	V	1.0	100	11.10	1.60	30.0	25.80	4.20
47.92	9.5	V	1.2	281	12.07	1.70		23.27	6.73
60.01	12.8	V	1.0	190	11.28	1.80		25.88	4.12
132.00	10.6	V	1.0	234	12.35	2.60		25.55	4.45
143.98	10.0	H	4.0	36	13.22	2.70		25.92	4.08
156.24	5.4	H	4.0	185	13.36	2.70		21.46	8.54
234.00	13.1	H	4.0	154	10.87	3.40	37.0	27.37	9.63
324.84	8.1	H	4.0	292	13.57	4.40		26.07	10.93
399.95	5.6	V	1.0	54	15.32	4.70		25.62	11.38
432.45	4.2	H	3.2	186	16.46	5.00		25.66	11.34
559.00	2.1	V	1.0	201	19.17	6.10		27.37	9.63
597.24	0.9	V	1.4	24	19.80	6.20		26.90	10.10

* Receiving Antenna Mode : *Horizontal, Vertical*

* 10 m OATS

* Note : Reading = Test Receiver meter,

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

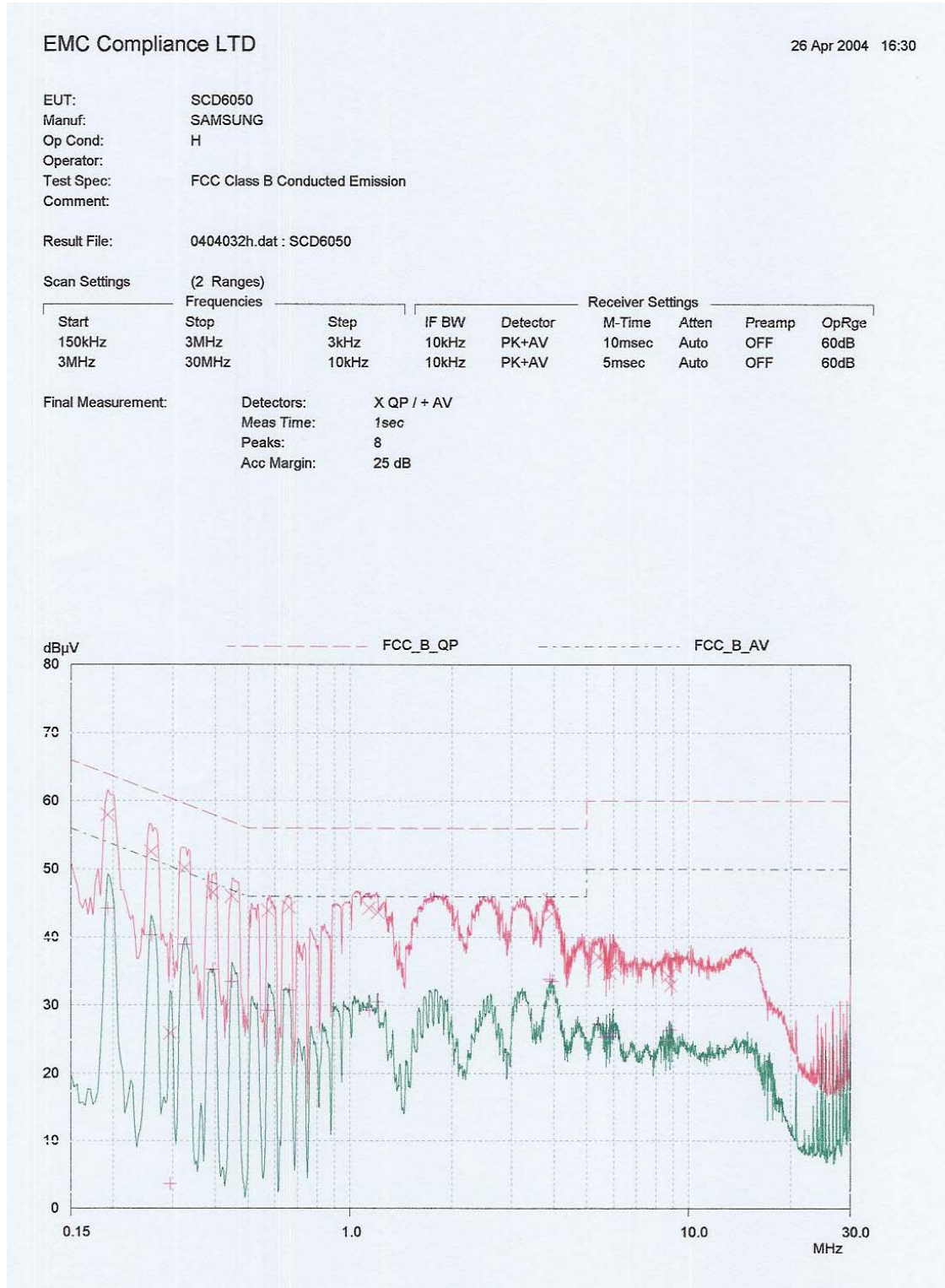
Result = Field Strength (Antenna factor + Cable factor + Reading)

6.2.5. Result

Complied

7. Test Graph

Conducted Emission test graph



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26 Apr 2004 16:48

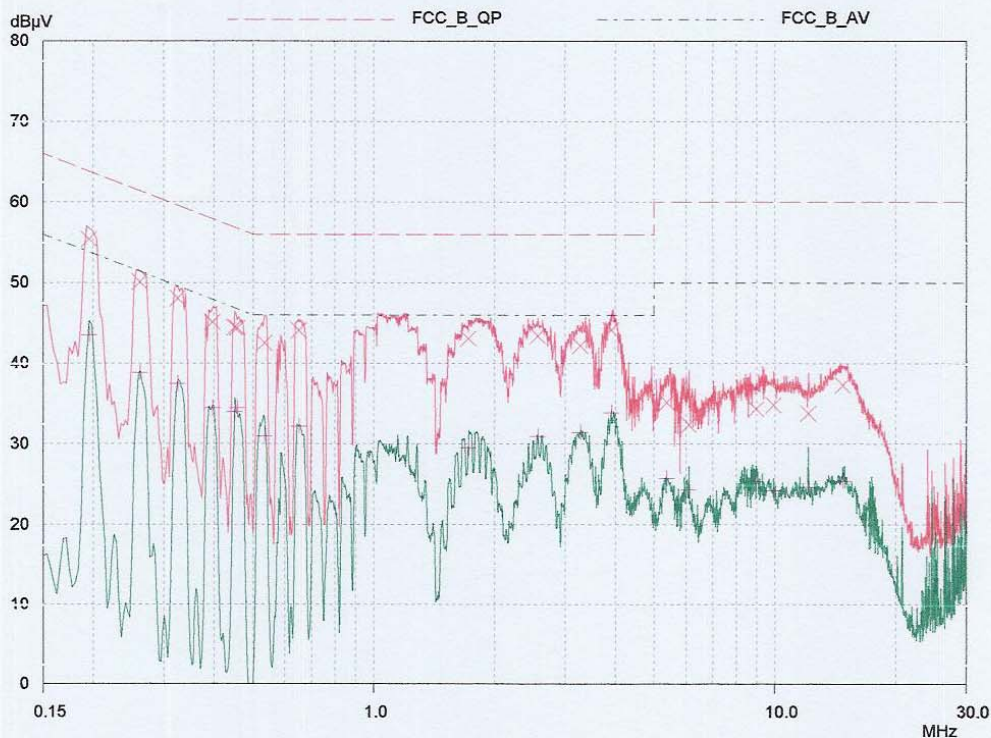
EUT: SCD6050
Manuf: SAMSUNG
Op Cond: N
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

Result File: 0404032n.dat : SCD6050

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



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