

TEST REPORT

Application No.: HR/2019/10002

Applicant: Huawei Technologies Co., Ltd.

Address of Applicant: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

Manufacturer: Huawei Technologies Co., Ltd.

Address of Manufacturer: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

Factory: Huawei Technologies Co., Ltd.

Address of Factory: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

Equipment Under Test (EUT):

EUT Name: Smart Phone

Model No.: VOG-L29
VOG-L09

Trade mark: HUAWEI

FCC ID: QISVOG-LX9

Standard(s) : 47 CFR Part 18

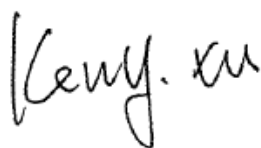
Date of Receipt: 2019-01-02

Date of Test: 2019-01-09 to 2019-01-10

Date of Issue: 2019-01-31

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.



Keny Xu
EMC Laboratory Manager





Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2019-01-31		Original

Authorized for issue by:			
			
		Leo Lai /Project Engineer	
			
		Eric Fu /Reviewer	



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2 Test Summary

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted disturbance	47 CFR Part 18	FCC MP-5	Part 18.307	Pass
Radiated emission	47 CFR Part 18	FCC MP-5	Part 18.305	Pass

Note:

The differences between are L29 and L04 as follows:

Model	VOG-L29	VOG-L04
PCB	The same	The same
Frequency-GSM	The same	The same
Frequency-WCDMA	The same	The same
Frequency-LTE	The same Support B32 Unsupport B66	Different Support B66 Unsupport B32
4*4 Mimo	The same Support B1、B3、B7	Different Support B2、B4、B7、B66
SIM Card	Dual	Single
Hard ware	Support B32 Location ID: SAW filter:Z3401,Z4104, B32 Diplexer:Z3402,Z5403 RF low noise amplifier:U3405,U4103 Capacitor:C3422,C3423,C3425,C3442,C2912,C3411,L3533,L4416,C3418,C4102 Inductor:L3412,L3422,L3413,L3408,L4124,L4137,L4139,L4140 Function Description:B32 main RF circuit and diversity RF circuit	Unsupport B32 Delete components related to the B32 RF circuit.



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SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

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4*4 MIMO (the 3rd & 4th antenna)	Support B1/3/7 4*4MIMO and delete/replace components related circuit; Location ID: B1/3/7 SAW filter of the 4th antenna :Z4403 (Vendor:KYOCERA type:SF18-1842M8SUA3) SAW filter of the 3rd antenna :Z4301 (Vendor:KYOCERA type:SF18-1842M8SUA3) Capacitor:L5507,C5401,C5402,C5517,C3411,L3533,L4416 Inductor:L5510,L4330,L5415,L3408,L4419 Function Description: B1/3/7 4*4MIMO RF circuit	Support B2/7/66(4) 4*4MIMO and delete/replace components related circuit; Location ID: B2/7/66(4) SAW filter: SAW filter of the 4th antenna :Z4403 (Vendor:MURATA type:SATEY1G96AU3F0AR00) SAW filter of the 3rd antenna :Z4301 (Vendor:MURATA type:SATEY1G96AU3F0AR00) Inductor:L4419,L4412,L4416,C5444,C5407,L5510 Function Description:B2/7/66(4) 4*4MIMO RF circuit
B1/B3/B32 & B2/B66 RF & CA circuit	Unsupport B66 and delete/replace components related circuit; Support CA_1-3-32 Location ID: B1/B3 Quadruplexer:Z3502(Vendor:QORVO, type:QM25002TR13-5KHW) Capacitor:C3533 B2 SAW filter: Z4101(Vendor:MURATA ect. type:SAFFB1G96AB0F0AR1X ect.) L4123,L4122,L3523,L3532,C3520,L3512,L4419 Function Description:B2 RX and CA_1-3-32 diplexer RF circuit	Unsupport CA_1-3-32 and delete/replace components related circuit; Support B66 &Support CA_2-66 Location ID: B2/B7/B66(4) diversity TRI SAW filter:Z4105 (Vendor:MURATA type:SATEY1G96AU3F0AR00) B2/B66(B4) Quadruplexer:Z3502(Vendor:KYOCERA type:SQ25-1745K6SUA4) Capacitor:C3401,C3402,C3504,L4110 Inductor:L3532,L4111,L4112,L4107,L4109,L4114,L4108,L4118,C3520,L3533,L3512 Function Description:B2/B66 Single-band and CA main and diversity RF circuits
B7 RX circuit	B7 receive matching circuit include: Inductor:L4127,L4126	B7 receiving matching circuit is adjusted to include: Inductor:C4101 B7 diversity TRI SAW filter:Z4105(Vendor:MURATA type:SATEY1G96AU3F0AR00)
Software	Different	Different
Dimensions	The same	The same
Appearance	The same	The same
main antenna	The same	The same
DIV antenna	The same	The same
BT/Wi-Fi	The same	The same



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antenna		
MIMO antenna	The same	The same
NFC	The same	The same
WPC	The same	The same
Supported CA configurations for DL CA	Different	Different
Supported CA configurations for UL CA	The same	The same
Others	NA	NA

The differences between are L29 and L09 as follows:

Model	VOG-L29	VOG-L09
PCB	The same	The same
Frequency-GSM	The same	The same
Frequency-WCDMA	The same	The same
Frequency-LTE	The same	The same
4*4 Mimo	The same	The same
SIM Card	Dual	Single
Hardware	B32 RF circuit	The same
	4*4 MIMO(the 3rd & 4th antenna)	The same
	B1/B3/B32 & B2/B66 RF &CA circuit	The same
	B7 RX circuit	The same
Software	The same	The same
Dimensions	The same	The same
Appearance	The same	The same
main antenna	The same	The same
DIV antenna	The same	The same
BT/Wi-Fi antenna	The same	The same
MIMO antenna	The same	The same
NFC	The same	The same
WPC	The same	The same
Supported CA configurations for DL CA	The same	The same
Supported CA configurations for UL CA	The same	The same



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Others	NA	NA
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Remark:

The only difference between L29 and L09 is the SIM card number, L29 support dual SIM cards, but L09 support single SIM card, no more other hardware difference.

According to the differences between L04, L09 and L29 ,all the data in this report were copied from the L04 report(HR/2019/1000201).



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4 General Information

4.1 Details of E.U.T.

Power supply:	DC 3.82V from internal battery or AC/DC adapter
Antenna Type:	Loop Antenna
Modulation Type:	Load Modulation
Operation Frequency:	110kHz-148kHz

4.2 Description of Support Units

Description	Manufacturer	Model No.	Specification
Smart Phone	Huawei	VOG-L04	---
Adapter	Huawei	HW-05045U00	---
USB Cable	Huawei	WA0009	100cm shielded

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Duty cycle	$\pm 0.37\%$
3	Occupied Bandwidth	$\pm 3\%$
4	RF conducted power	$\pm 0.75\text{dB}$
5	RF power density	$\pm 2.84\text{dB}$
6	Conducted Spurious emissions	$\pm 0.75\text{dB}$
7	RF Radiated power	$\pm 4.5\text{dB}$ (below 1GHz)
		$\pm 4.8\text{dB}$ (above 1GHz)
8	Radiated Spurious emission test	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
9	Temperature test	$\pm 1^\circ\text{C}$
10	Humidity test	$\pm 3\%$
11	Supply voltages	$\pm 1.5\%$
12	Time	$\pm 3\%$



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4.4 Test Location

All tests were performed at:

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No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

Conducted disturbance					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	ChangZhou ZhongYu	GB-88	SEM001-06	2017-05-10	2020-05-09
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2018-07-12	2019-07-11
LISN	Rohde & Schwarz	ENV216	SEM007-01	2018-09-25	2019-09-24
LISN	ETS-LINDGREN	3816/2	SEM007-02	2018-04-02	2019-04-01
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2018-04-02	2019-04-01

Radiated emission					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2018-03-31	2021-03-30
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM029-01	2018-07-12	2019-07-11
EMI Test Receiver (9kHz-7GHz)	Rohde & Schwarz	ESR	SEM004-03	2018-04-02	2019-04-01
Trilog-Broadband Antenna 30MHz-1GHz)	Schwarzbeck	VULB9168	SEM003-18	2016-06-29	2019-06-28
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-04	2018-04-13	2019-04-12
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2018-09-27	2019-09-26
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2018-09-27	2019-09-26
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2018-09-27	2019-09-26
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2018-04-08	2019-04-07

6 Radio Spectrum Matter Test Results

6.1 Conducted disturbance

Test Requirement Part 18.307
Test Method: FCC MP-5
Limit:

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

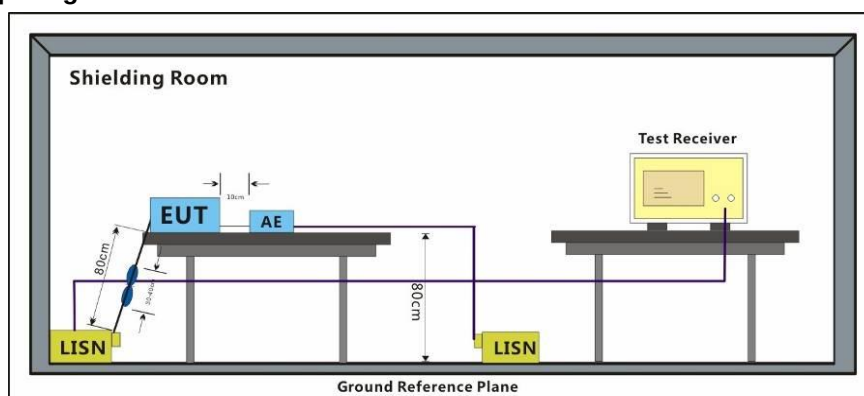
6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 21.7 °C Humidity: 57.5 % RH Atmospheric Pressure: 1000 mbar

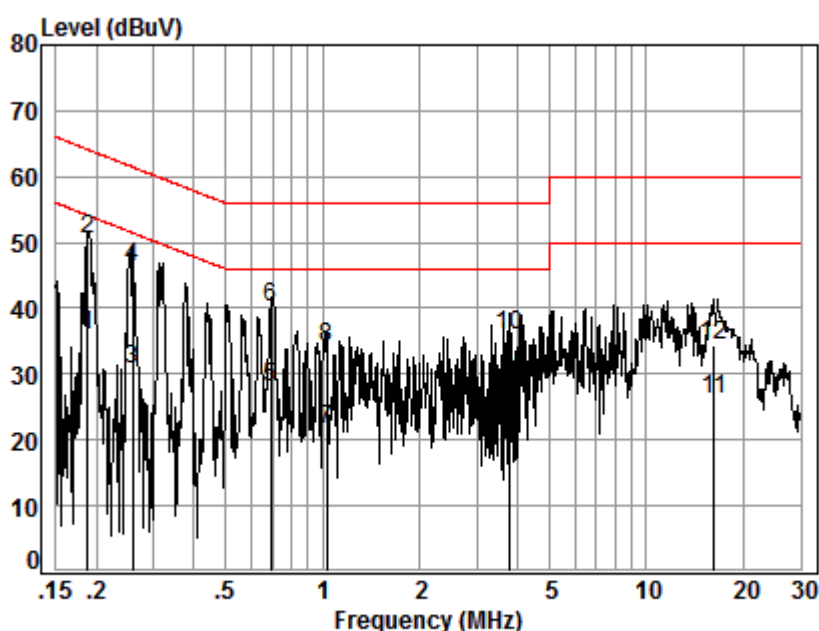
Test mode e: Charge mode_Keep the EUT in charging and reverse charging

6.1.2 Test Setup Diagram



6.1.3 Measurement Procedure and Data

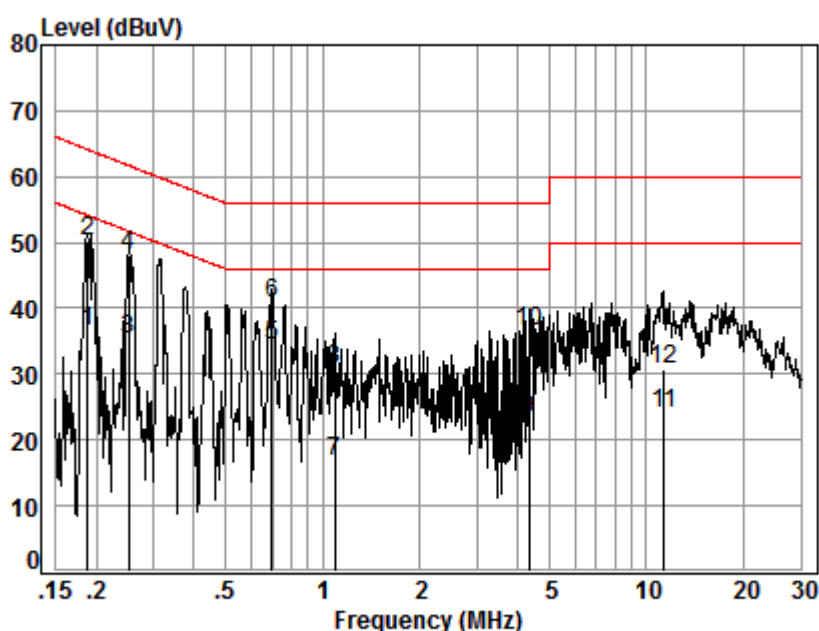
Mode:e; Line:Live Line



Site : Shielding Room
Condition: Line
Job No. : 10002
Test mode: e

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.19	0.02	9.66	26.06	35.74	54.11	-18.37	Average
2	0.19	0.02	9.66	40.71	50.39	64.11	-13.72	QP
3	0.26	0.03	9.67	21.06	30.76	51.47	-20.71	Average
4	0.26	0.03	9.67	36.54	46.24	61.47	-15.23	QP
5	0.69	0.07	9.68	18.38	28.13	46.00	-17.87	Average
6	0.69	0.07	9.68	30.45	40.20	56.00	-15.80	QP
7	1.03	0.09	9.74	11.66	21.49	46.00	-24.51	Average
8	1.03	0.09	9.74	24.32	34.15	56.00	-21.85	QP
9	3.78	0.16	9.72	18.65	28.53	46.00	-17.47	Average
10	3.78	0.16	9.72	26.06	35.94	56.00	-20.06	QP
11	16.14	0.22	10.28	15.72	26.22	50.00	-23.78	Average
12	16.14	0.22	10.28	23.86	34.36	60.00	-25.64	QP

Mode:e; Line:Neutral Line



Site : Shielding Room
Condition: Neutral
Job No. : 10002
Test mode: e

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.19	0.02	9.64	26.74	36.40	54.15	-17.75	Average
2	0.19	0.02	9.64	40.52	50.18	64.15	-13.97	QP
3	0.25	0.03	9.64	25.66	35.33	51.69	-16.36	Average
4	0.25	0.03	9.64	38.40	48.07	61.69	-13.62	QP
5	0.70	0.07	9.65	24.74	34.46	46.00	-11.54	Average
6	0.70	0.07	9.65	31.10	40.82	56.00	-15.18	QP
7	1.09	0.10	9.71	6.83	16.64	46.00	-29.36	Average
8	1.09	0.10	9.71	20.85	30.66	56.00	-25.34	QP
9	4.34	0.16	9.70	13.12	22.98	46.00	-23.02	Average
10	4.34	0.16	9.70	26.58	36.44	56.00	-19.56	QP
11	11.38	0.18	10.01	13.98	24.17	50.00	-25.83	Average
12	11.38	0.18	10.01	20.54	30.73	60.00	-29.27	QP

6.2 Radiated emission

Test Requirement Part 18.305
Test Method: FCC MP-5
Measurement Distance: 3m
Limit:

(b) The field strength levels of emissions which lie outside the bands specified in §18.301, unless otherwise indicated, shall not exceed the following:

Equipment	Operating frequency	RF Power generated by equipment (watts)	Field strength limit (uV/m)	Distance (meters)
Any type unless otherwise specified (miscellaneous)	Any ISM frequency	Below 500 500 or more	25 $25 \times \text{SQRT}(\text{power}/500)$	300 ¹ 300
	Any non-ISM frequency	Below 500 500 or more	15 $15 \times \text{SQRT}(\text{power}/500)$	300 ¹ 300
Industrial heaters and RF stabilized arc welders	On or below 5,725 MHz Above 5,725 MHz	Any Any	10 (²)	1,600 (²)
Medical diathermy	Any ISM frequency	Any	25	300
	Any non-ISM frequency	Any	15	300
Ultrasonic	Below 490 kHz	Below 500 500 or more	2,400/F(kHz) $2,400/\text{F(kHz)} \times \text{SQRT}(\text{power}/500)$	300 ³ 300
	490 to 1,600 kHz Above 1,600 kHz	Any Any	24,000/F(kHz) 15	30 30
Induction cooking ranges	Below 90 kHz	Any	1,500	⁴ 30
	On or above 90 kHz	Any	300	⁴ 30

¹Field strength may not exceed 10 µV/m at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts.

²Reduced to the greatest extent possible.

³Field strength may not exceed 10 µV/m at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts.

⁴Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.

6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 51 % RH Atmospheric Pressure: 1030 mbar

Pretest these e: Charge mode_Keep the EUT in charging and reverse charging

modes to find f: Charge mode_Keep the EUT in reverse charging

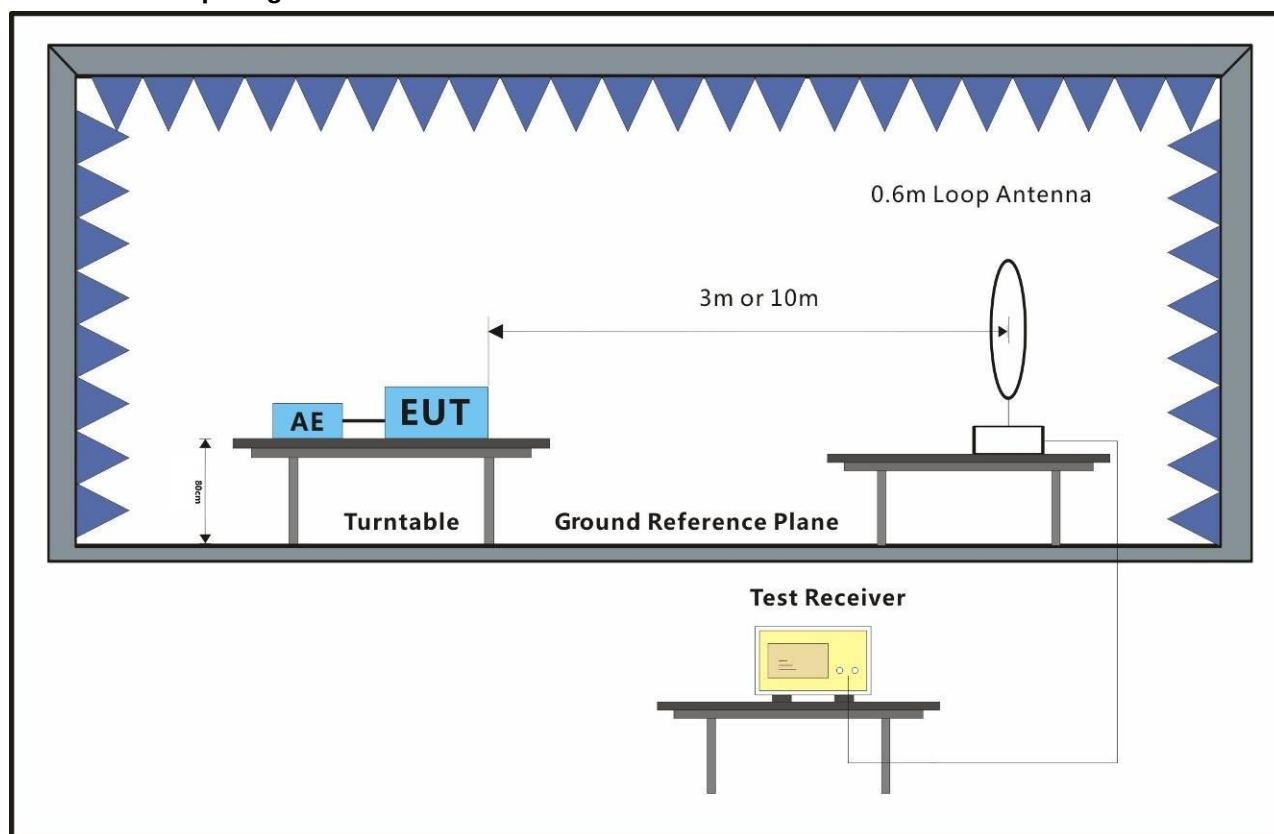
the worst case:

The worst case f: Charge mode_Keep the EUT in reverse charging

for final test:

Test Mode:

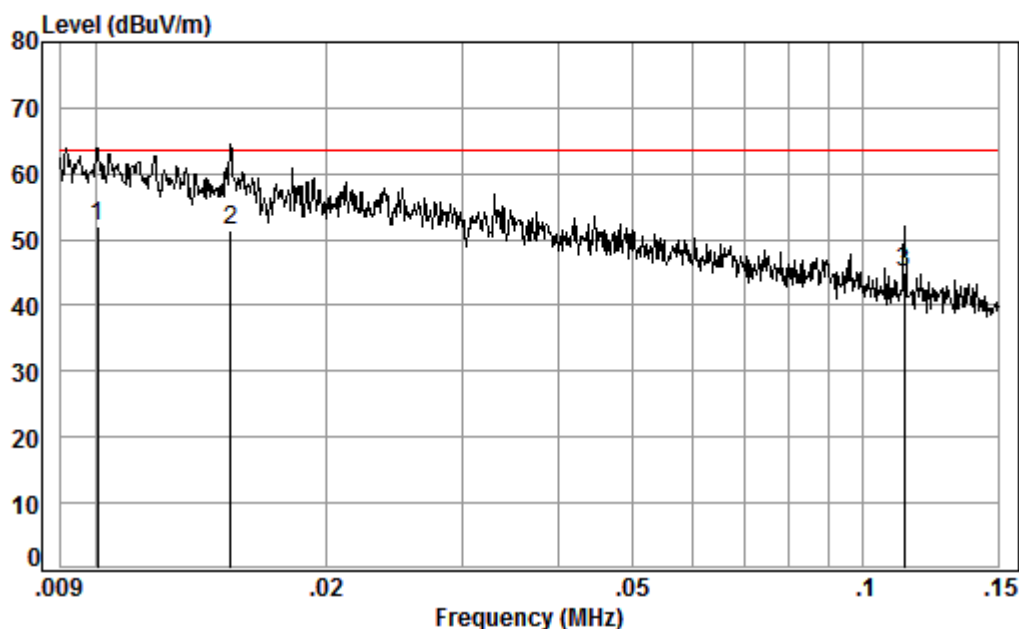
6.2.2 Test Setup Diagram



6.2.3 Measurement Procedure and Data

- Test Procedure:
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter semi-anechoic chamber(30MHz-1000MHz) and 10 meter semi-anechoic chamber(9kHz-30MHz). The table was rotated 360 degrees to determine the position of the highest radiation.
 - The EUT was set 10 meters(30MHz-1000MHz) and 10 meter (9kHz-30MHz) away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
 - Above 30MHz: The Analyzer/Receiver scanned from 30MHz to 1000MHz. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
 - Below 30MHz: The Analyzer/Receiver scanned from 9kHz to 30MHz. The antenna height is 2 meters above the ground to determine the maximum value of the field strength.
 - For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 2 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
 - The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
 - If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
 - Repeat above procedures until all frequencies measured was complete.
 - Measurement Requirement:
 - This product belongs to non-ISM equipment, the field strength limit is 15uV/m at 300 meter distance.
 - Limit: $20\log(15\text{uV/m}) + 20\log(300/3) = 23.52 + 40 = 63.52\text{dBuV/m}$ at 3 meters distance

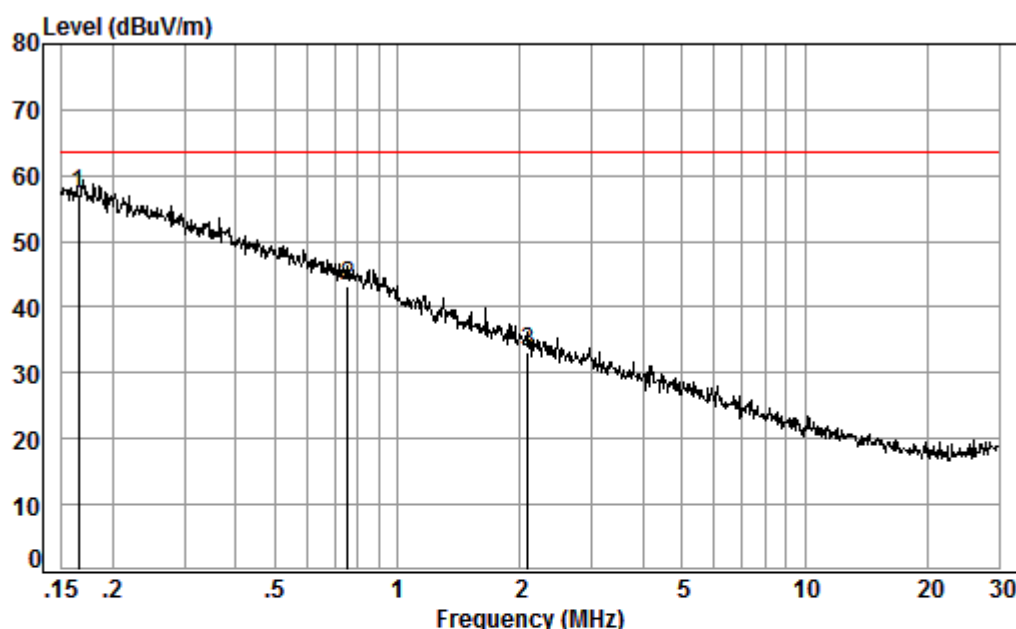
Mode f:
9kHz-150kHz



Condition: 3m
Job No. : 10002
Test Mode: f

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	0.01	0.29	19.27	31.39	63.78	51.95	63.52	-11.57	Average
2	0.01	0.25	16.79	31.62	65.92	51.34	63.52	-12.18	Average
3	0.11	0.05	11.91	32.68	65.63	44.91	63.52	-18.61	Average

Mode f:
150kHz-30MHz



Condition: 3m
Job No. : 10002
Test Mode: f

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	0.17	0.07	11.76	32.67	77.96	57.12	63.52	-6.40	Average
2	0.75	0.18	12.00	32.65	63.65	43.18	63.52	-20.34	Average
3	2.09	0.34	12.11	32.65	53.29	33.09	63.52	-30.43	Average



7 Photographs

7.1 Test Setup

Please refer to setup photos.

7.2 EUT Constructional Details (EUT Photos)

Please refer to external and internal photos for details.

- End of the Report -



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