TEST REPORT

Applicant	Shenzhen SOFAR SOLAR Co., Ltd.
Address	5/F,Building 4, Antongda Industrial Park, No.1 Liuxian Avenue,Xin'an Street,Bao'an District, Shenzhen City, Guangdong Province,P.R. China.

Manufacturer or Supplier	Shenzhen SOFAR SOLAR Co., Ltd.
Address	5/F,Building 4, Antongda Industrial Park, No.1 Liuxian Avenue,Xin'an Street,Bao'an District, Shenzhen City, Guangdong Province,P.R. China.
Product	Solar Grid-tied Inverter
Brand Name	SOFARSOLAR
Model	SOFAR 33000TL-G2, SOFAR 20000TL-G2
Additional Model & Model Difference	SOFAR 25000TL-G2, SOFAR 30000TL-G2, See items 2.1
Date of tests	Aug. 01, 2017 ~ Aug. 21, 2018

The submitted sample of the above equipment has been tested according to the requirements of the following standards:

AS/NZS 61000.6.3:2012

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Tested by Ryan Lu Project Engineer / EMC Department	Approved by Glyn He Assistant Manager / EMC Department
Ryan	Date: Jan. 06, 2020

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
CE180712N013	Original release	Aug. 23, 2018
C180706N013	Based on the original report CE180712N013 changed the standards EN to AS/NZS, but it doesn't need to be retested after engineer evaluated.	Jan. 06, 2020

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EMISSION			
Standard	**Test Type**	**Result**	**Remarks**
AS/NZS 61000.6.3:2012	Conducted test	PASS	Meets Limits Minimum passing margin is –3.38dB at 29.66016MHz
	Radiated test (30MHz~1GHz)	PASS	Meets limits minimum passing margin is –2.70dB at 173.5590MHz

1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

MEASUREMENT	FREQUENCY	UNCERTAINTY
Mains Terminal Disturbance Voltage Test	0.15MHz ~ 30MHz	+ /-2.70 dB
Radiated Disturbance Test	30MHz ~ 1000MHz	+ /-4.04 dB

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Solar Grid-tied Inverter
MODEL NO.	SOFAR 33000TL-G2, SOFAR 20000TL-G2
ADDITIONAL MODELS	SOFAR 25000TL-G2, SOFAR 30000TL-G2
POWER SUPPLY	DC input: 230-960V AC output: 400V 45-65Hz
THE HIGHEST OPERATING FREQUENCY	Below 108MHz
DATA CABLE SUPPLIED	N/A

NOTE:

1. For the test results, the EUT had been tested with all conditions. But only the worst case was showed in test report.
2. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
3. Please refer to the EUT photo document (Reference No.: 180712N013) for detailed product photo.
4. Additional models SOFAR 25000TL-G2, SOFAR 30000TL-G2 are identical with test model SOFAR 33000TL-G2, SOFAR 20000TL-G2 except output power for trading purpose. The difference has been considered during this test, full test was performed for the model SOFAR 33000TL-G2 and partial test for the model SOFAR 20000TL-G2 test CE, RE, Harmonics and flicker.

2.2 DESCRIPTION OF TEST MODES

The EUT was tested under the following modes' the final worst mode was marked in boldface and recorded in this report.

◆ **FOR CONDUCTED EMISSION TEST**

Description of Test Mode	Test model	Test Voltage
Full load and Grid	**SOFAR 33000TL-G2**	Input: DC 580V, Output: AC 400V 50Hz
		Input: DC 710V, Output: AC 400V 50Hz
		Input: DC 850V, Output: AC 400V 50Hz
	SOFAR 20000TL-G2	Input: DC 480V, Output: AC 400V 50Hz
		Input: DC 660V, Output: AC 400V 50Hz
		Input: DC 850V, Output: AC 400V 50Hz

◆ **FOR RADIATED EMISSION TEST**

Description of Test Mode	Test model	Test Voltage
Full load and Grid	**SOFAR 33000TL-G2**	**Input: DC 580V, Output: AC 400V 50Hz**
		Input: DC 710V, Output: AC 400V 50Hz
		Input: DC 850V, Output: AC 400V 50Hz
	SOFAR 20000TL-G2	Input: DC 480V, Output: AC 400V 50Hz
		Input: DC 660V, Output: AC 400V 50Hz
		Input: DC 850V, Output: AC 400V 50Hz

2.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT has been tested and complied with the requirements of the following standards:

AS/NZS 61000.6.3:2012

All applicable tests have been performed and recorded as per the above standards

2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit without any other necessary accessory or support units.

3 EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY (MHz)	dBuV	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: (1) The lower limit shall apply at the transition frequencies.
(2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

3.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCS30	100340	May 02,18	May 01,19
Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100168	Oct. 20,17	Oct. 19,18
Artificial Mains Network	Rohde&Schwarz	ESH2-Z5	100071	Apr. 11,18	Apr. 10,19
Artificial Mains Network	SCHWARZBECK	NNLK 8129	8129-264	Feb. 04,18	Feb. 03,19
Voltage probe	SCHWARZBECK	TK 9421	TK 9421-176	Jan. 17,18	Jan. 16,19
Test software	ADT	ADT_Cond_V7.3.7	N/A	N/A	N/A

NOTE: 1. The test was performed in shielding Room 843.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA

3.1.3 TEST PROCEDURE

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

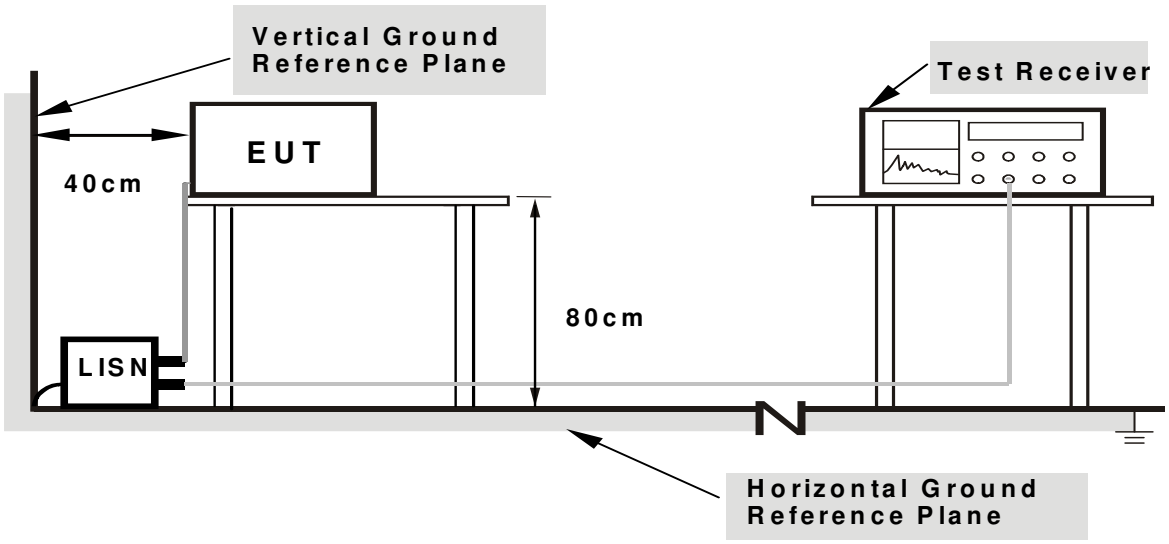
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20dB) were not recorded.

3.1.4 DEVIATION FROM TEST STANDARD

No deviation

3.1.5 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

3.1.6 EUT OPERATING CONDITIONS

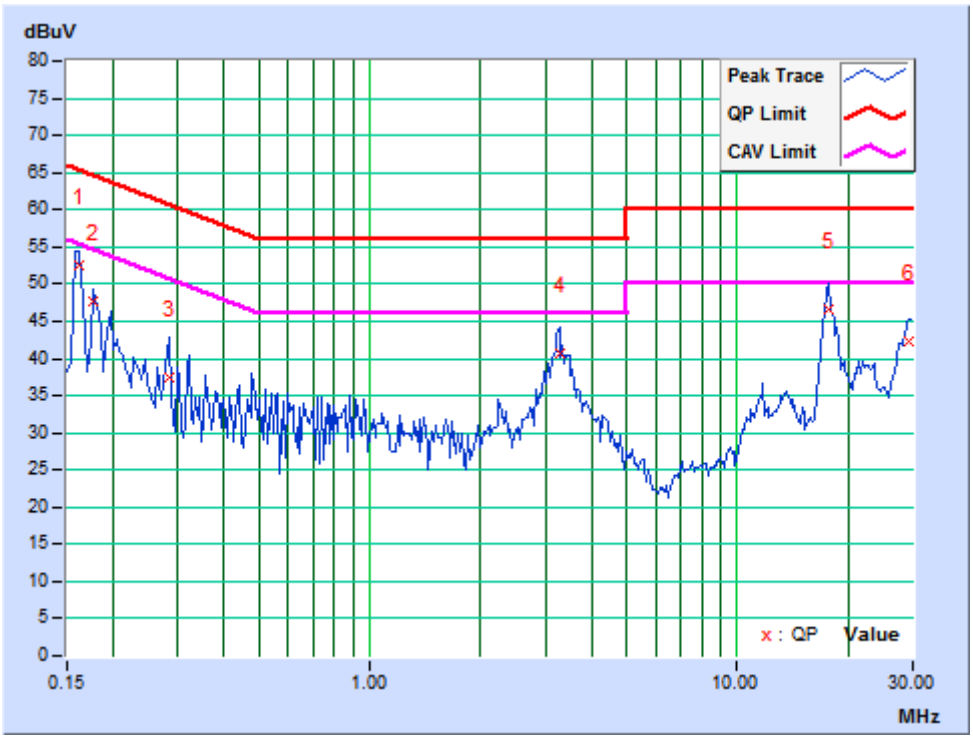
a. Turned on the power of all equipment.
b. EUT was operated according to the type description in manufacturer's specifications or the User's Manual.

3.1.7 TEST RESULTS

TEST MODE	Full load and Grid	**6dB BANDWIDTH**	9 kHz
TEST VOLTAGE	Input DC 850V output AC 400V 50Hz	**PHASE**	Line 1
ENVIRONMENTAL CONDITIONS	23 deg. C, 54% RH	**TESTED BY**: Walker	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	4.46	48.13	43.76	52.59	48.22	65.38	55.38	-12.78	-7.15
2	0.17734	6.08	41.72	36.35	47.80	42.43	64.61	54.61	-16.81	-12.18
3	0.28281	8.55	28.95	24.04	37.50	32.59	60.73	50.73	-23.23	-18.14
4	3.28125	9.20	31.59	23.70	40.79	32.90	56.00	46.00	-15.21	-13.10
5	17.80078	9.55	36.98	33.70	46.53	43.25	60.00	50.00	-13.47	-6.75
6	29.22266	9.83	32.41	28.63	42.24	38.46	60.00	50.00	-17.76	-11.54

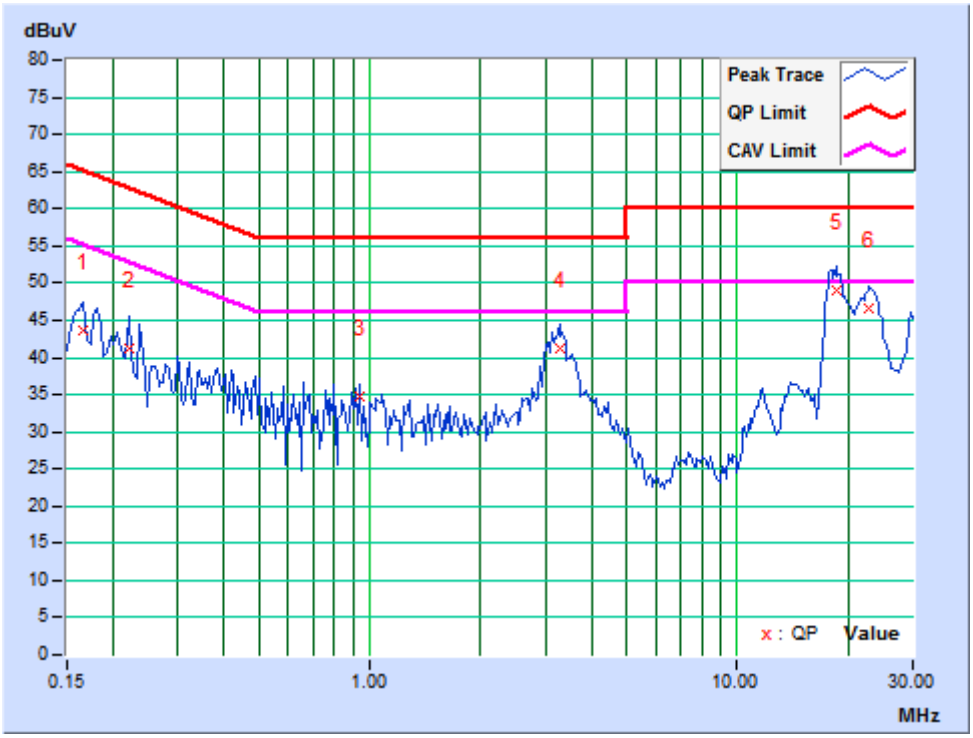
REMARKS: The emission levels of other frequencies were very low against the limit.



TEST MODE	Full load and Grid	**6dB BANDWIDTH**	9 kHz
TEST VOLTAGE	Input DC 850V output AC 400V 50Hz	**PHASE**	Line 2
ENVIRONMENTAL CONDITIONS	23 deg. C, 54% RH	**TESTED BY**: Walker	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	4.87	38.78	33.70	43.65	38.57	65.18	55.18	-21.53	-16.61
2	0.22031	8.43	32.85	27.79	41.28	36.22	62.81	52.81	-21.53	-16.59
3	0.93906	8.93	25.79	18.18	34.72	27.11	56.00	46.00	-21.28	-18.89
4	3.28125	9.20	31.99	25.07	41.19	34.27	56.00	46.00	-14.81	-11.73
5	18.51953	9.56	39.38	36.88	48.94	46.44	60.00	50.00	-11.06	-3.56
6	22.89844	9.62	36.92	34.21	46.54	43.83	60.00	50.00	-13.46	-6.17

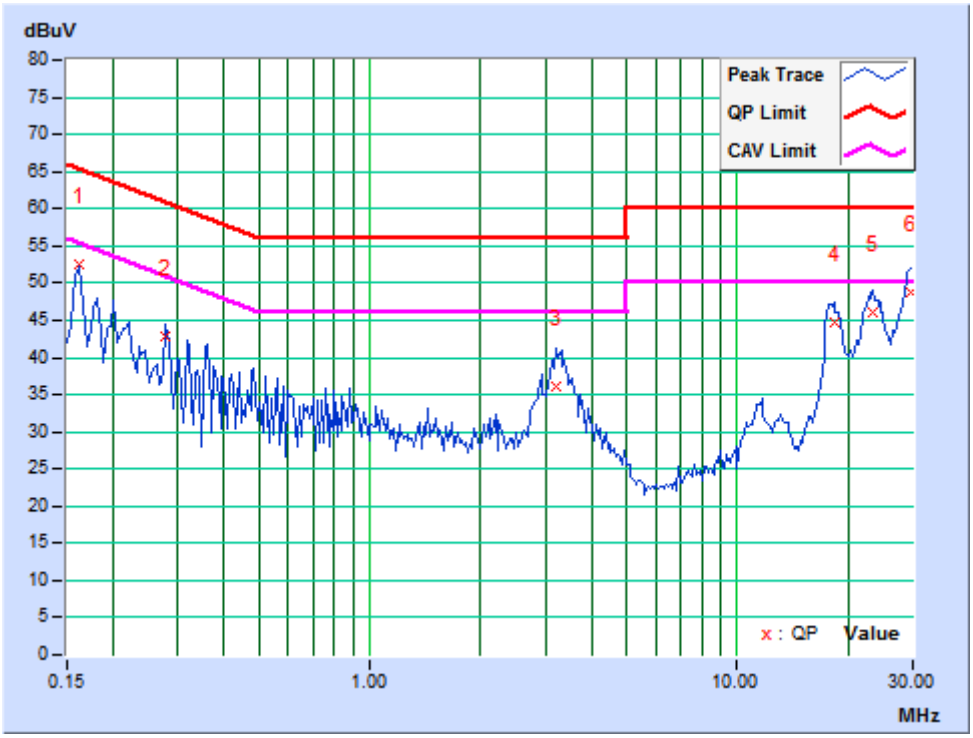
REMARKS: The emission levels of other frequencies were very low against the limit.



TEST MODE	Full load and Grid	**6dB BANDWIDTH**	9 kHz
TEST VOLTAGE	Input DC 850V output AC 400V 50Hz	**PHASE**	Line 3
ENVIRONMENTAL CONDITIONS	23 deg. C, 54% RH	**TESTED BY**: Walker	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	4.46	48.14	42.81	52.60	47.27	65.38	55.38	-12.77	-8.10
2	0.27891	8.54	34.27	31.56	42.81	40.10	60.85	50.85	-18.04	-10.75
3	3.21094	9.20	26.84	14.46	36.04	23.66	56.00	46.00	-19.96	-22.34
4	18.28125	9.55	35.26	33.51	44.81	43.06	60.00	50.00	-15.19	-6.94
5	23.46094	9.63	36.53	33.88	46.16	43.51	60.00	50.00	-13.84	-6.49
6	**29.66016**	**9.85**	**38.92**	**36.77**	**48.77**	**46.62**	**60.00**	**50.00**	**-11.23**	**-3.38**

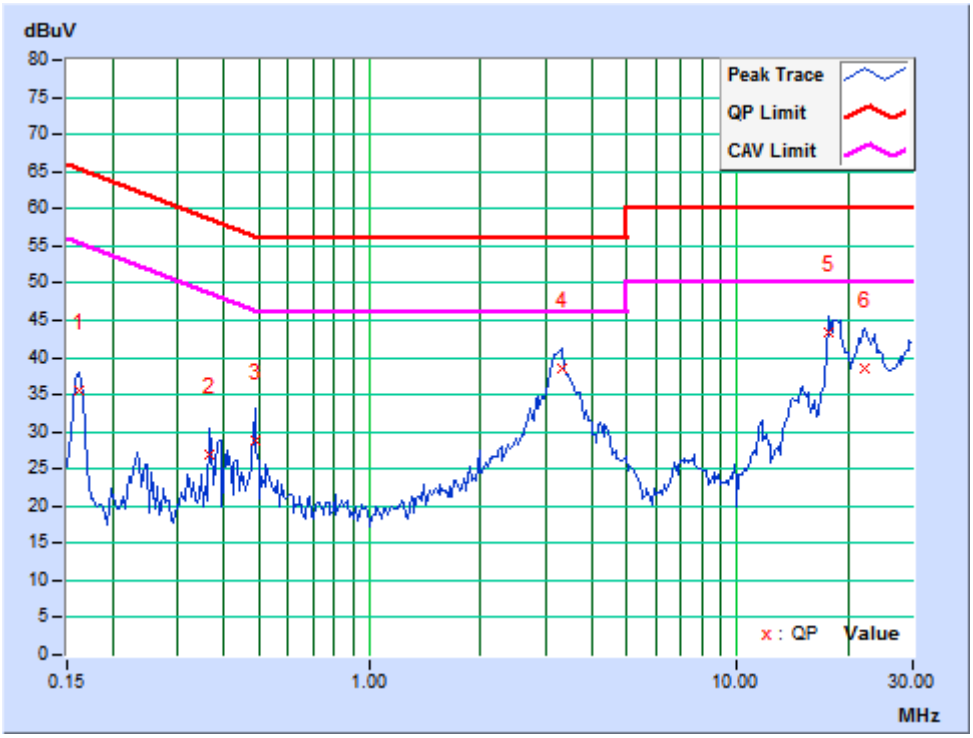
REMARKS: The emission levels of other frequencies were very low against the limit.



TEST MODE	Full load and Grid	**6dB BANDWIDTH**	9 kHz
TEST VOLTAGE	Input DC 850V output AC 400V 50Hz	**PHASE**	Neutral (N)
ENVIRONMENTAL CONDITIONS	23 deg. C, 54% RH	**TESTED BY**: Walker	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	4.47	31.03	29.42	35.50	33.89	65.38	55.38	-29.88	-21.49
2	0.36484	8.64	18.40	9.01	27.04	17.65	58.62	48.62	-31.57	-30.96
3	0.48594	8.66	20.10	18.88	28.76	27.54	56.24	46.24	-27.48	-18.70
4	3.32031	9.21	29.38	23.55	38.59	32.76	56.00	46.00	-17.41	-13.24
5	17.67969	9.55	33.82	31.58	43.37	41.13	60.00	50.00	-16.63	-8.87
6	22.27734	9.6	29.01	24.18	38.61	33.78	60.00	50.00	-21.39	-16.22

REMARKS: The emission levels of other frequencies were very low against the limit.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	Up to 5 times of the highest frequency or 6 GHz, whichever is less

FOR FREQUENCY BELOW 1000 MHz

FREQUENCY (MHz)	3m	10m
	Quasi-Peak (dBuV/m)	Quasi-Peak (dBuV/m)
30 – 230	40	30
230 – 1000	47	37

FOR FREQUENCY ABOVE 1000 MHz

FREQUENCY (GHz)	3m	
	PEAK(dBuV/m)	AVERAGE(dBuV/m)
1 to 3	70	50
3 to 6	74	54

NOTE: (1) The lower limit shall apply at the transition frequencies.
(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).

3.2.2 TEST INSTRUMENTS

FOR FREQUENCY BELOW 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI 3	101418	Jan. 02,18	Jan. 01,19
EMI Test Receiver	Rohde&Schwarz	ESR7	101564	Jan. 18,18	Jan. 17,19
Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-555	Nov. 10, 17	Nov. 09, 18
Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-554	Dec. 10, 17	Dec. 09, 18
Preamplifier	EMCI	EMC1135	980378	Mar. 19,18	Mar. 18,19
Preamplifier	EMCI	EMC1135	980423	Mar. 19,18	Mar. 18,19
10m Semi-anechoic Chamber	CHANGLING	21.4m*12.1m*8.8m	NSEMC006	Feb. 10,18	Feb. 09,19
Test Software	ADT	ADT_Radiated_V8.7.07	N/A	N/A	N/A

NOTES: 1. The test was performed in 10m Chamber.
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

FREQUENCY RANGE ABOVE 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Horn Antenna	ETS-Lindgren	3117	00085519	Dec. 10, 17	Dec. 09, 18
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170242	May 05,18	May 04,19
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101003	Apr. 21,18	Apr. 20,19
Broadband Preamplifier (1~18GHz)	SCHWARZBECK	BBV9718	266	Apr. 18,18	Apr. 18,19
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 08,17	Nov. 07,18
Test Software	ADT	ADT_Radiated_V8.7.07	N/A	N/A	N/A

NOTES: 1. The test was performed in 10m Chamber.
2. The calibration interval of the above test instruments are 12 or 24 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

3.2.3 TEST PROCEDURE

<Frequency Range below 1GHz>

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna 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.

d. 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 and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

NOTE:

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
3. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier);
4. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier).
5. Margin value = Emission level – Limit value.

<Frequency Range above 1GHz>

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter Semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. The bore sight should be used during the test above 1GHz.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test receiver/spectrum was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

NOTE:

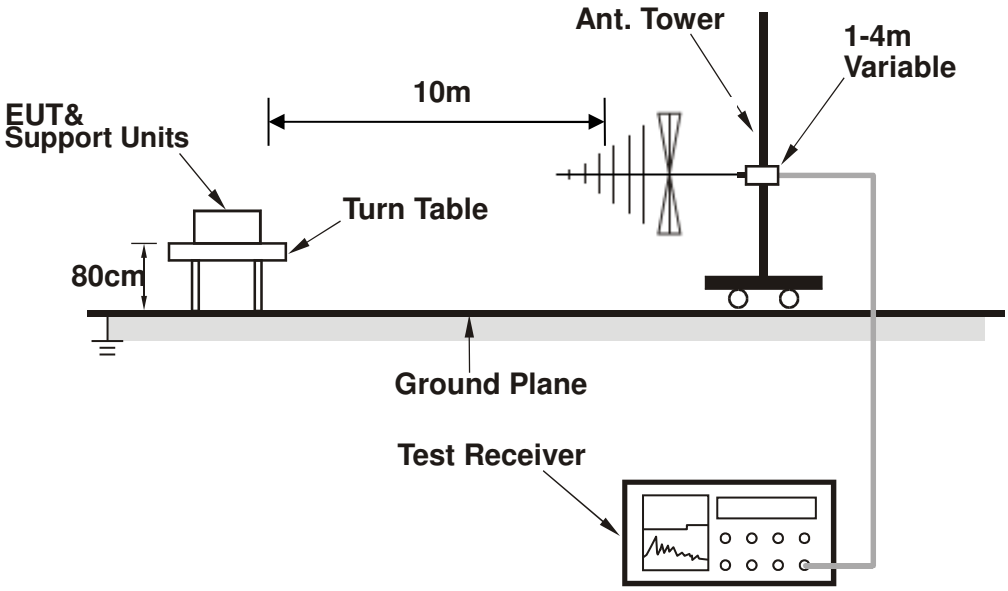
1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the receiver antenna.
3. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
4. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier).
5. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain (dB) (if the raw value contains the amplifier).
6. Margin value = Emission level – Limit value.

3.2.4 DEVIATION FROM TEST STANDARD

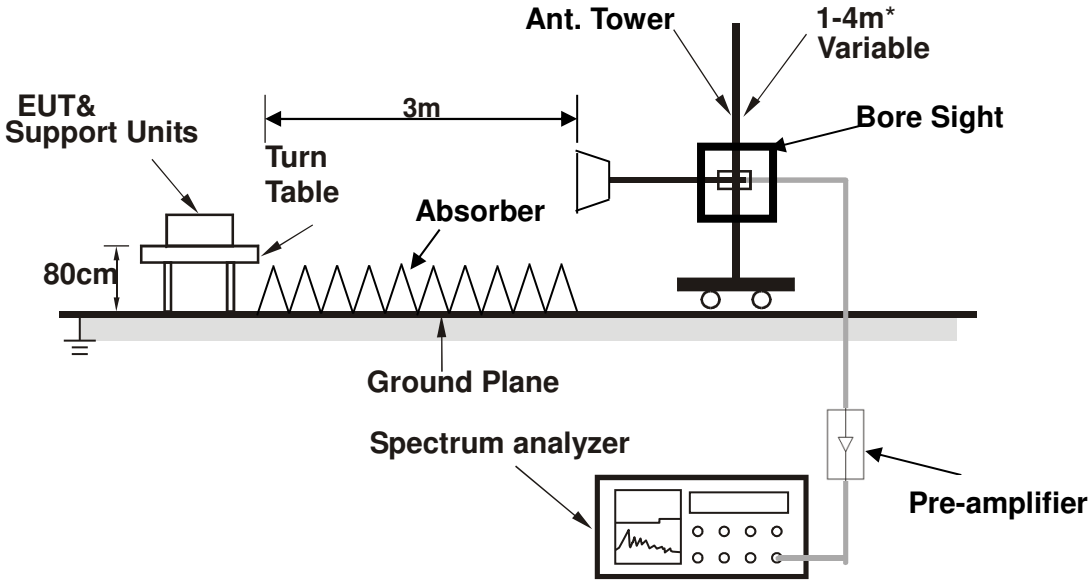
No deviation

3.2.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



* :depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3.

3.2.6 EUT OPERATING CONDITIONS

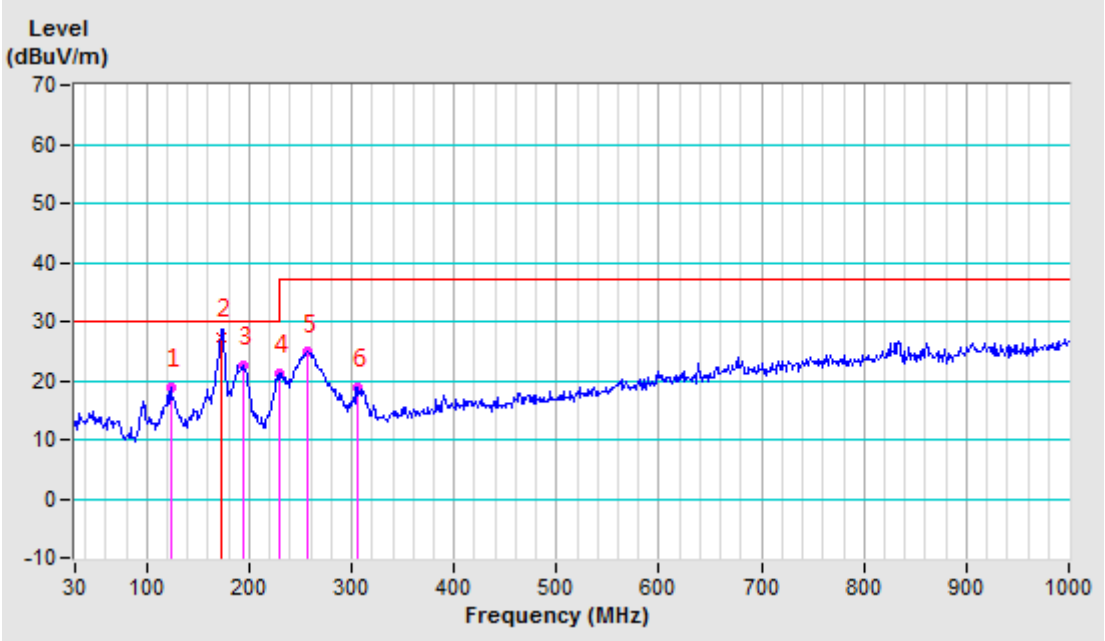
Same as item 3.1.6

3.2.7 TEST RESULTS

TEST MODE	Full load and Grid	**FREQUENCY RANGE**	30-1000 MHz
TEST VOLTAGE	Input: DC 580V, Output: AC 400V 50Hz	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	23 deg. C, 62% RH	**TESTED BY**: Wang	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 10 M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	123.2412	-18.71	37.66	18.95	30.00	-11.05	400	157
2	**173.5590**	**-17.76**	**45.06**	**27.30**	**30.00**	**-2.70**	**400**	**106**
3	193.8088	-19.00	41.61	22.61	30.00	-7.39	400	100
4	228.7287	-18.08	39.26	21.18	30.00	-8.82	400	115
5	256.9800	-17.39	42.18	24.79	37.00	-12.21	400	356
6	304.9950	-15.18	34.05	18.87	37.00	-18.13	200	84

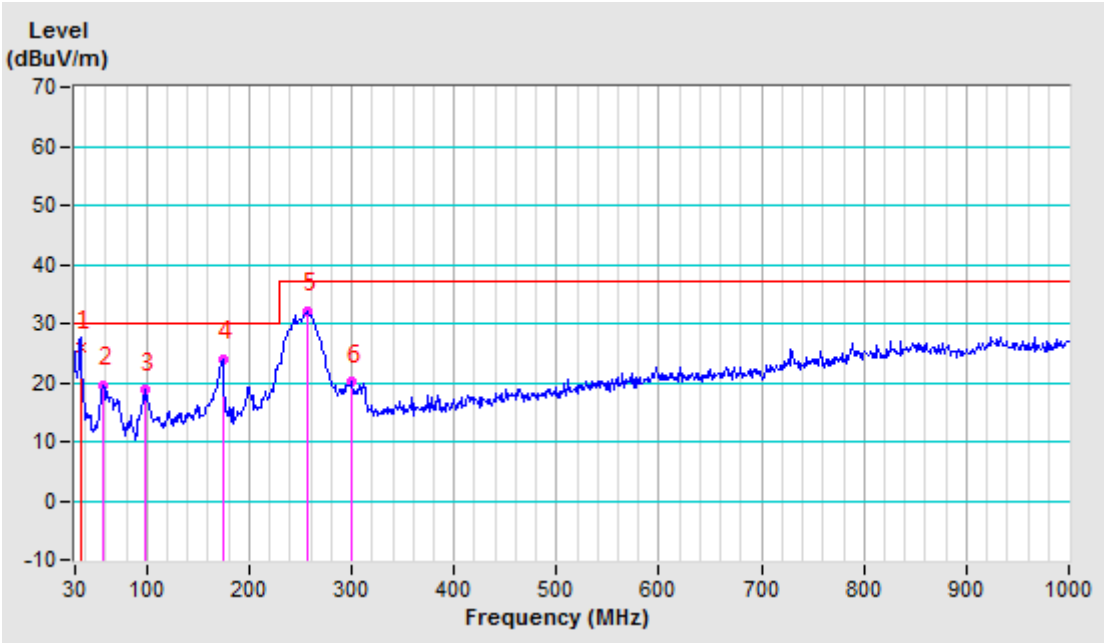
REMARKS: 1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 30MHz to 1000MHz.
4. Only emissions significantly above equipment noise floor are reported



TEST MODE	Full load and Grid	**FREQUENCY RANGE**	30-1000 MHz
TEST VOLTAGE	Input: DC 580V, Output: AC 400V 50Hz	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	23 deg. C, 62% RH	**TESTED BY**: Wang	

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 10 M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	35.0720	-18.26	44.06	25.80	30.00	-4.20	100	120
2	57.6464	-18.75	38.22	19.47	30.00	-10.53	300	91
3	98.9704	-20.12	38.78	18.66	30.00	-11.34	100	338
4	173.7612	-17.11	41.09	23.98	30.00	-6.02	100	106
5	256.1668	-16.06	48.14	32.08	37.00	-4.92	100	279
6	300.7890	-14.59	34.63	20.04	37.00	-16.96	100	127

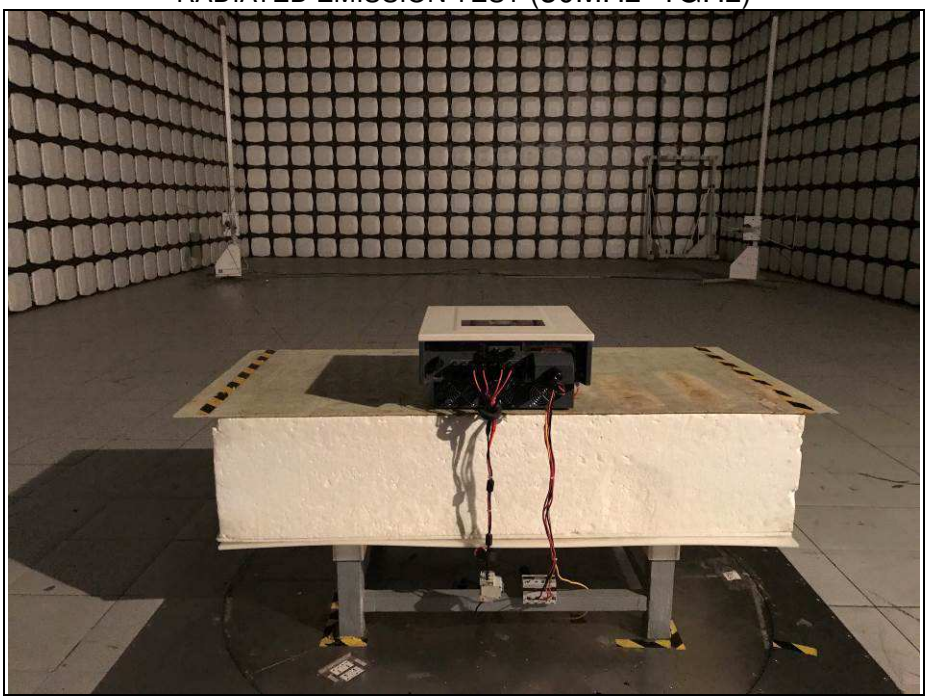
REMARKS: 1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 30MHz to 1000MHz.
4. Only emissions significantly above equipment noise floor are reported



4 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST

RADIATED EMISSION TEST (30MHz~1GHz)



5 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications were made to the EUT by the lab during the test.

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