

# RADIO TEST REPORT

The device described below is tested by Dongguan Nore Testing Center Co., Ltd. to determine the maximum emission levels emanating from the device, the severe levels which the device can endure and E.U.T.'s performance criterion. The test results, data evaluation, test procedures, and equipment of configurations shown in this report were made in accordance with the RED directive 2014/53/EU.

Applicant : SHENZHEN FENDA TECHNOLOGY CO., LTD.  
Address : Fenda Hi-Tech Park, Zhoushi Road, Shiyan Town, Baoan District, Shenzhen City, Guangdong, China  
Manufacturer /Factory : SHENZHEN FENDA TECHNOLOGY CO., LTD.  
Address : Fenda Hi-Tech Park, Zhoushi Road, Shiyan Town, Baoan District, Shenzhen City, Guangdong, China  
E.U.T. : Computer Multimedia Speaker  
Brand Name : F&D  
Model No. : T-70X, T-77X, T-70BT, T-80X, T-68X, T-60X Plus  
(For model difference refer to section 1)  
Measurement Standard : Final Draft ETSI EN 303 345 v 1.1.7 (2017)  
Date of Receiver : May 08, 2019; November 20, 2019  
Date of Test : May 09, 2019 to July 07, 2019;  
November 20, 2019 to December 04, 2019  
Date of Report : December 05, 2019

This Test Report is Issued Under the Authority of :

Prepared by



Alina Guo / Engineer

Approved & Authorized Signer



Iori Fan / Authorized Signatory

This test report is for the customer shown above and their specific product only. This report applies to above tested sample only and shall not be reproduced in part without written approval of Dongguan Nore Testing Center Co., Ltd.

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## 1. GENERAL INFORMATION

### PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST

E.U.T.	:	Computer Multimedia Speaker
Main model number	:	T-70X
Additional Model number	:	T-77X, T-70BT, T-80X, T-68X, T-60X Plus
Brand Name	:	F&D
Power Supply	:	AC 100-240V 50/60Hz, 1A
Adapter	:	N/A
Test Voltage	:	AC 230V 50Hz
Cable	:	Audio Line: 1 to 1: 1.54m unshielded 1 to 2: 1.54m unshielded Speaker Line: 2.94m unshielded AC Mains: 1.50m unshielded
Operating Temperature Range	:	0°C to 35°C (Declaration by manufacturer)
Model Difference Description	:	These models have the same circuitry, electrical mechanical, PCB Layout and physical construction. The difference in model number.
Note	:	According to the model difference, all tests were performed on model T-70X.
Remark	:	1. This report was an additional report based on report NTC1905056EV00. 2. Compared with original report, this report has updated the electrolytic capacitor voltage from 35V change 50V at PCB output circuit. 3. According to the changes, we re-tests item unwanted emissions in the spurious domain, other items test data were continued to be referenced. Details refer to the report.

**Technical Specification:**

Frequency Range : FM: 87.5~108MHz  
Antenna Type : Wire Antenna  
Modulation Type : Analogue for FM  
EUT Type : Class B  
HW : V1.0  
SW : V1.0

<b>SUMMARY OF TEST RESULTS</b>		
<b>Section (ETSI EN 303 345)</b>	<b>Description of Test</b>	<b>TEST RESULT</b>
<b>4.2.4</b>	<b>Sensitivity</b>	<b>Compliant</b>
<b>4.2.5</b>	<b>Receiver adjacent channel selectivity and blocking</b>	<b>Compliant</b>
<b>4.2.6</b>	<b>Unwanted emissions in the spurious domain</b>	<b>Compliant</b>

## 2. DESCRIPTION OF TEST MODES

The EUT has been tested under Normal Operating condition.

## 3. TEST METHODOLOGY

All measurements contained in this report were conducted with Final Draft ETSI EN303 345 v1.1.7 (2017) and EN 55032: 2015

## 4. TEST FACILITY

### Site Description

EMC Lab : Listed by CNAS, August 13, 2018  
The certificate is valid until August 13, 2024  
The Laboratory has been assessed and proved to be in compliance with CNAS/CL01  
The Certificate Registration Number is L5795.

Listed by A2LA, November 01, 2017  
The certificate is valid until December 31, 2021  
The Laboratory has been assessed and proved to be in compliance with ISO17025  
The Certificate Registration Number is 4429.01

Listed by FCC, November 06, 2017  
The Designation Number is CN1214  
Test Firm Registration Number: 907417

Listed by Industry Canada, June 08, 2017  
The Certificate Registration Number. Is 46405-974343

Name of Firm : Dongguan Nore Testing Center Co., Ltd.  
(Dongguan NTC Co., Ltd.)

Site Location : Building D, Gaosheng Science and Technology Park, Hongtu Road, Nancheng District, Dongguan City, Guangdong Province, China

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## 5. SUPPORT EQUIPMENT

FM : Manufacturer: LEADER  
Signal Generator M/N: 3214  
S/N: 1100164

## 6. MEASUREMENT UNCERTAINTY

<b>Parameter</b>	<b>Uncertainty</b>
Uncertainty in conducted measurements	$\pm 0.62\text{dB}$
Uncertainty in radiated measurements	$\pm 3.83\text{dB}$
Spurious emissions	$\pm 3.4\text{dB}$



## 7. Sensitivity

### 7.1 Limits:

#### Sensitivity requirements

Test	De-modulation	Tuned frequency band	Wanted signal centre frequency (MHz)	Required sensitivity limit	
				Conducted (dBm)	Radiated (dBuV/m)
1	AM	LF	0.216	-65	74
2		MF	0.999	-65	66
3		HF	9.9	-65	60
4	FM	VHF band II	98	-90	50(note 1)
5	DAB	VHF band III	202,928	-98	33(note 2)
6	DRM	LF	0.216	-101	58
7		MF	0.999	-101	52
8		HF1	4	-101	44
9		HF2	19	-101	40
10		VHF band I	65	-102	45
11		VHF band II	100	-102	46
12		VHF band III	200	-102	51

Note 1: For products with an integral antenna, the requirement is relaxed to 67 dB $\mu$ V/m.

Note 2: For products with an integral antenna, the requirement is relaxed to 50 dB $\mu$ V/m.

#### Impairment criteria for sensitivity tests

Demodulation	Impairment criteria
AM	SNR $\geq$ 28 dBQ ref 40% AM
FM	SNR $\geq$ 40dBQ ref $\pm$ 60,8 kHz deviation; clean audio (see note 1)
DAB	Clean audio (see note 2)
DRM	Clean audio (see note 2)

NOTE 1: Clean audio is defined as 10 seconds of audio with no subjective impairments (e.g. clicks resulting from FM threshold effects).

NOTE 2: Clean audio is defined as 10 seconds of audio with no subjective impairments (e.g. muting, clicks, warbles or squeaks).

## 7.2 Test Signal configurations:

### FM configuration

Parameter	FM signals		AM signal
	<i>Wanted</i>	<i>Unwanted</i>	<i>Blocking</i>
Audio modulation	1 kHz tone	Weighted noise Recommendation ITU-R BS.559-2 [5] , clause 1	1 kHz tone
	Band-limited to 15 kHz		
Other modulation parameters	±60,8 kHz peak deviation	32 kHz quasi-peak deviation (see note)	80% depth
Pilot tone	None	None	

NOTE: This is equivalent to  $19 / \sqrt{2} = 13,4$  kHz RMS deviation in the absence of pre-emphasis.

### DAB configuration

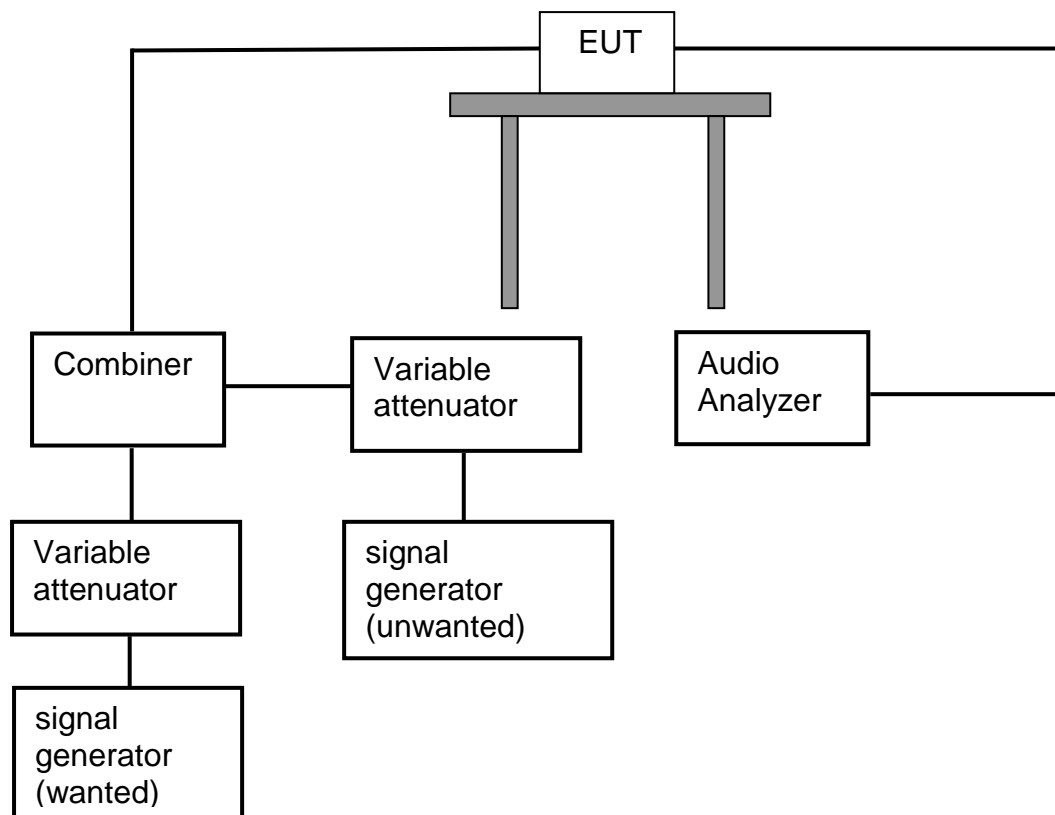
Parameter	DAB signal	AM signal
	<i>Wanted and Unwanted</i>	<i>Blocking</i>
Audio modulation	Service label: "Sine+" 1KHz tone at a level of -3 dBFS Coding: mono, 128 kbit/s AAC	1 kHz tone
Other modulation parameters	DAB signal with EEP-3A to ETSI EN 300 401 [1] clause 15	80% depth

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### 7.3 Test procedures:

- 1) The EUT is placed in the environment that high field-strengths from potential interferers should be avoided.
- 2) The 'unwanted' signal generator remains switched off for the duration of the test.
- 3) The 'wanted' signal generator is set to the required modulation method and test configuration and to the frequency specified. The signal level is adjusted to provide the level, as measured at ©, specified in plus 30 dB.
- 4) The EUT is tuned to the frequency of the 'wanted' signal generator. For a receiver without a digital frequency display, the receiver shall be tuned for optimum THD+N. The receiver's audio level shall be set so as to provide clean 1 kHz audio tone at the audio output (that is less than 10 % total harmonic distortion) but of sufficient level to drive the measurement device.
- 5) The level of the 'wanted' signal generator is adjusted to provide the level, as measured at ©.
- 6) The 'unwanted' signal generator remains switched off for the duration of the test.
- 7) The modulating audio signal for the 'wanted' signal generator is removed. The audio output, measured using the measurement device, is recorded as the noise level, N.
- 8) If the impairment criteria given are met then the receiver has passed the test.

## 7.4 Test Configuration:



### 7.5 Test Results:

Test Data:	2019-06-20	Humidity :	54 %			
Test By:	Lay	Temperature :	24 °C			
Test Voltage:	AC 230V/50Hz	Test Mode:	FM			
<b>FM (integral antenna) VHF band II 98MHz</b>						
Wanted Signal Level at © (dBm)	Total Harmonic Distortion (%)	S (mV)	N (mV)	SNR (dBQ)	SNR Limit (dBQ)	Result
67	0.72	543.3	4.8	41.08	≥40	Pass

Note:  $SNR (dBQ) = 20\log(S/N)$

## 8. Adjacent Channel Selectivity and Blocking

### 8.1 Limits:

#### Channel spacing for adjacent channel selectivity and blocking

Demodulation	Tuned frequency band	Unwanted frequency (N = 1, 2, 3)	Unwanted frequency (blocking)
AM	LF	$\pm N \times 9 \text{ kHz}$	$\pm 90 \text{ kHz}$
	MF	$\pm N \times 9 \text{ kHz}$	$\pm 90 \text{ kHz}$
	HF	$\pm N \times 10 \text{ kHz}$	$\pm 100 \text{ kHz}$
FM	VHF band II	$\pm (N + 1) \times 100 \text{ kHz}$	$\pm 800 \text{ kHz}$
DAB	VHF band III	$\pm N \times 1\,712 \text{ kHz}$	$\pm 12 \text{ MHz}$
DRM	LF	$\pm N \times 9 \text{ kHz}$	$\pm 90 \text{ kHz}$
	MF	$\pm N \times 9 \text{ kHz}$	$\pm 90 \text{ kHz}$
	HF	$\pm N \times 10 \text{ kHz}$	$\pm 100 \text{ kHz}$
	VHF band I	$\pm N \times 100 \text{ kHz}$	$\pm 800 \text{ kHz}$
	VHF band III	$\pm N \times 100 \text{ kHz}$	$\pm 800 \text{ kHz}$
	VHF band II	$\pm N \times 100 \text{ kHz}$	$\pm 800 \text{ kHz}$

### Adjacent channel selectivity and blocking requirements

Test	De-modulation	Tuned frequency band	C Wanted signal centre frequency (MHz)	C Wanted signal level		Required I/C ratio (see notes 1 and 2)			
				Conducted (dBm)	Radiated (dBµV/m)	N = 1 (dB)	N = 2 (dB)	N = 3 (dB)	Blocking (dB)
1R	AM (built-in or integral antenna, see note 4)	LF	0,216	n/a	80	-30	10	20	20
2R		MF	0,999	n/a	72	-30	10	20	20
3R		HF	9,9	n/a	66	-30	10	20	20
1C	AM (external antenna)	LF	0,216	-59	n/a	-5	25	35	40
2C		MF	0,999	-59	n/a	-5	25	35	40
3C		HF	9,9	-59	n/a	-5	25	35	40
4R	FM (built-in or integral antenna, see note 4)	VHF band II	98	n/a	56 (see note 3)	-15	-3	8	20
4C	FM (external antenna)	VHF band II	98	-84	n/a	3	17	30	30
5	DAB	VHF band III	202,928	-70	61	35	40	45	40
6	DRM	LF	0,216	-91	68	25	35	45	50
7		MF	0,999	-91	62	25	35	45	50
8		HF1	4	-91	54	25	35	45	50
9		HF2	19	-91	54	25	35	45	50
10		VHF band I	65	-91	50	35	40	45	50
11		VHF band II	100	-92	55	35	40	45	50
12		VHF band III	200	-92	61	35	40	45	50

NOTE 1: The frequency of the interferer shall be calculated using the channel spacing data in table 7 for each of the 6 defined adjacent channels  $N = \{-3, -2, -1, +1, +2, +3\}$  and the two blocking offsets. Each row of table 8 thus defines 8 individual tests.

NOTE 2: The minimum level of I for the relevant level of impairment is calculated by adding the I/C ratio to the wanted C level.

NOTE 3: The wanted signal level for receivers with integral antenna is 73 dBµV/m.

NOTE 4: The ACS and blocking requirements for AM and FM devices are currently separated into different limits for radiated and conducted testing methods. These limits are likely to be unified in a future revision of the present document. Users of the present document should consult frequently the latest list published in the Official Journal of the European Union.

### Impairment criteria for adjacent channel selectivity and blocking tests

Demodulation	Impairment criteria
AM	SNR $\geq 28$ dBQ ref 40% AM
FM	SNR $\geq 40$ dBQ ref $\pm 60,8$ kHz deviation; clean audio (see note 1)
DAB	Clean audio (see note 2)
DRM	Clean audio (see note 2)

NOTE 1: Clean audio is defined as 10 seconds of audio with no subjective impairments (e.g. clicks resulting from FM threshold effects).

NOTE 2: Clean audio is defined as 10 seconds of audio with no subjective impairments (e.g. muting, clicks, warbles or squeaks).

## 8.2 Test procedures:

- 1) The EUT is placed in the environment that high field-strengths from potential interferers should be avoided.
- 2) The 'wanted' signal generator is set to the required modulation method and test configuration as specified, and to the frequency specified. The signal level is adjusted to provide the level, as measured at ©, specified at above table, with the 'unwanted' generator switched off.
- 3) The 'unwanted' signal generator is set to the required modulation method and test configuration as specified, and to the frequency calculated from the wanted signal centre frequency and the required offset specified. The signal level is adjusted to provide the level, as measured at ©, specified in clause 4.2.5, with the 'wanted' generator switched off. For the blocking test only, the audio modulation of the 'unwanted' signal shall be removed whilst measuring the level at ©.
- 4) The 'wanted' signal generator is switched back on.
- 5) The receiver is tuned to the frequency of the 'wanted' signal generator. For a receiver without a digital frequency display, the receiver shall be tuned for optimum THD+N (i.e. as it would be tuned by a user for best quality). The receiver's audio level shall be set so as to provide clean 1 kHz audio tone at the audio output (that is less than 10 % total harmonic distortion) but of sufficient level to drive the measurement device.
- 6) The audio output, measured using the measurement device, is recorded as the signal level, S.
- 7) The modulating audio signal for the 'wanted' signal generator is removed. The audio output, measured using the measurement device, is recorded as the noise level, N.
- 8) If the impairment criteria given in above table are met then the receiver has passed the test.

## 8.3 Test Configuration:

Same as section 7.4 of this report.

## 8.4 Test Result:



Test Data:	2019-06-20	Humidity :	54 %
Test By:	Lay	Temperature :	24 °C
Test Voltage:	AC 230V/50Hz	Test Mode:	FM

**FM (integral antenna)  
VHF band II 98MHz**

Adjacency	C Wanted signal level at © (dBm)	I Unwanted signal level at © (dBuV/m)	Required I/C ratio (dB)	S (mV)	N (mV)	SNR (dBQ)	SNR Limit (dBQ)	Result
N = -1 97.8 MHz	73	58	-15	542.9	4.4	41.83	≥40	Pass
N = -2 97.7 MHz	73	58	-15	538.6	4.6	41.37	≥40	Pass
N = -3 97.6 MHz	73	70	-3	527.6	4.7	41.00	≥40	Pass
N = 1 98.2 MHz	73	70	-3	527.4	4.6	41.19	≥40	Pass
N = 2 98.3 MHz	73	81	8	517.8	4.6	41.03	≥40	Pass
N = 3 98.4 MHz	73	81	8	513.7	4.2	41.75	≥40	Pass
Blocking 97.2 MHz	73	93	20	498.1	4.8	40.32	≥40	Pass
Blocking 98.8 MHz	73	93	20	495.6	4.7	40.46	≥40	Pass

NOTE 1 : S= Measured audio level when wanted signal on and modulation on; unwanted signal on and modulation on. For blocking signal, the unwanted signal modulation is off.

N= Measured audio level when wanted signal on but modulation off; unwanted signal on and modulation on. For blocking signal, the unwanted signal modulation is off.

NOTE 2: Measured I/C ratio (dB) = Unwanted Field Level (dBuV/m) - Wanted Field Level (dBuV/m)  
SNR (dBQ) = 20log (S/N)

## 9. Unwanted emissions in the spurious domain

### 9.1 Limits:

#### Requirements for radiated emissions from FM receivers

Frequency Range MHz	Measurement			Class B Limit (dBuV/m)	
	Facility	Distance	Detector type / Bandwidth	Fundamental	Harmonics
30 to 230	SAC	10	Quasi Peak / 120	50	42
230 to 300	SAC	10			42
300 to 1000	SAC	10			46
30 to 230	SAC	3	Quasi Peak / 120	60	52
230 to 300	SAC	3			52
300 to 1000	SAC	3			56

Note : These relaxed limits apply only to emissions at the fundamental and harmonic frequencies of the LO. Signals at all other frequencies shall be compliant with the limits given in Table 2.

#### Requirements for radiated emissions at frequencies up to 1 GHz for class B equipment (Table 2)

Frequency Range MHz	Measurement			Class B Limit (dBuV/m)
	Facility	Distance	Detector type / Bandwidth	
30 to 230	SAC	10	Quasi Peak / 120	30
230 to 1000	SAC	10		37
30 to 230	SAC	3	Quasi Peak / 120	40
230 to 1000	SAC	3		47

Note : These relaxed limits apply only to emissions at the fundamental and harmonic frequencies of the LO. Signals at all other frequencies shall be compliant with the limits given in Table 2.

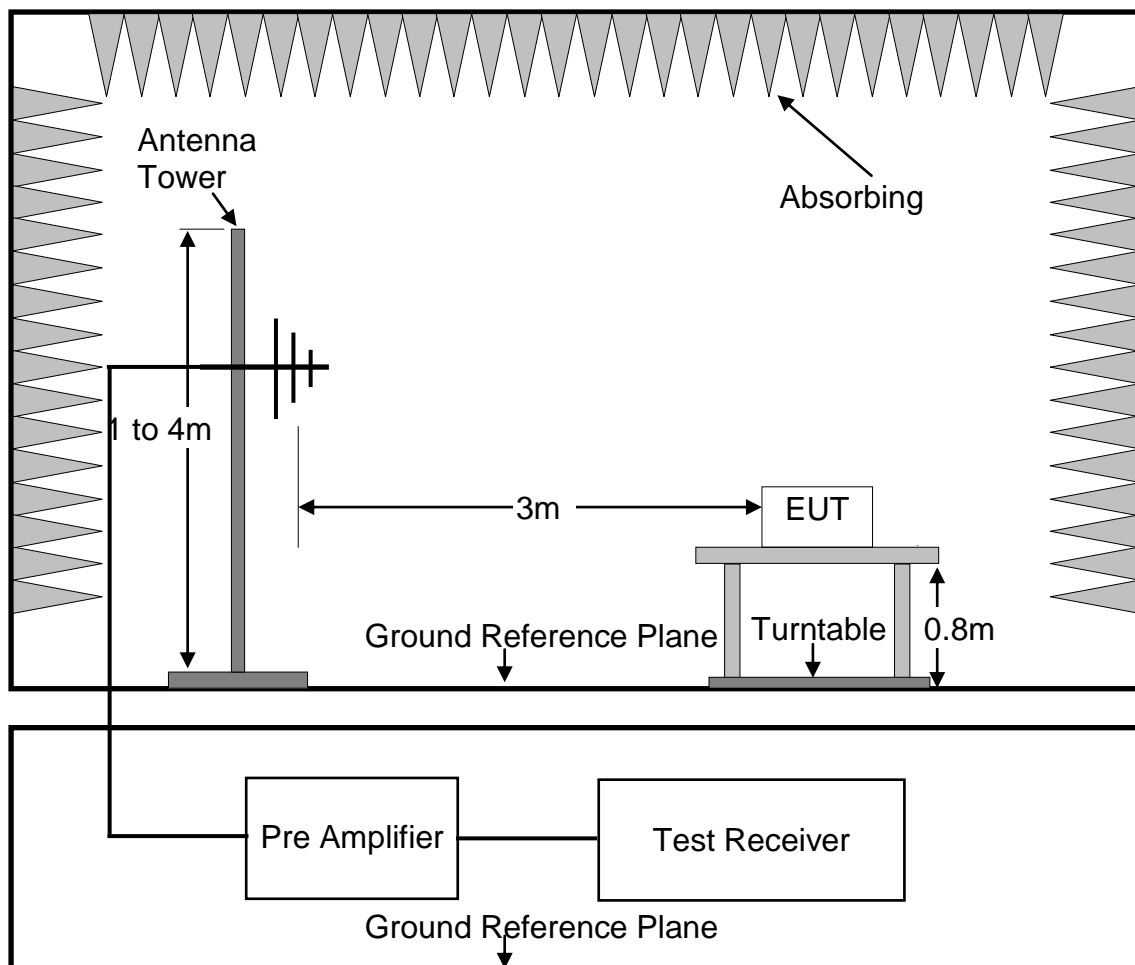
### 9.3 Test procedure:

E.U.T. and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. E.U.T. is set 3.0 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to EN 55032 on radiated emission measurement.

The bandwidth of the EMI test is set at 120 KHz.

The frequency range from 30 MHz to 1 GHz is checked.

### 9.4 Test Configuration:



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## 9.5 Test Results:

**Pass**

Please refer to following test plots.





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Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

**Radiated Emission Measurement**

File :T-70X Data :#13 Date: 2019/11/20 Time: 21:30:18

80.0 dBuV/m



Site Polarization: **Vertical** Temperature: 26  
 Limit: EN 55032(FM 98MHz)\_Class B\_3m Power: AC230V/50Hz Humidity: 47 %  
 EUT: Computer Multimedia Speaker Distance: 3m  
 M/N: T-70X  
 Mode: FM Mode  
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		68.8000	50.15	-16.95	33.20	40.00	-6.80	QP		
2		117.3000	50.16	-16.46	33.70	40.00	-6.30	QP		
3	!	159.0100	52.80	-18.20	34.60	40.00	-5.40	QP		
4		231.7600	52.58	-15.38	37.20	47.00	-9.80	QP		
5		240.4900	54.86	-14.96	39.90	47.00	-7.10	QP		
6	*	270.5600	55.28	-13.18	42.10	47.00	-4.90	QP		

## 10. Test Equipment List

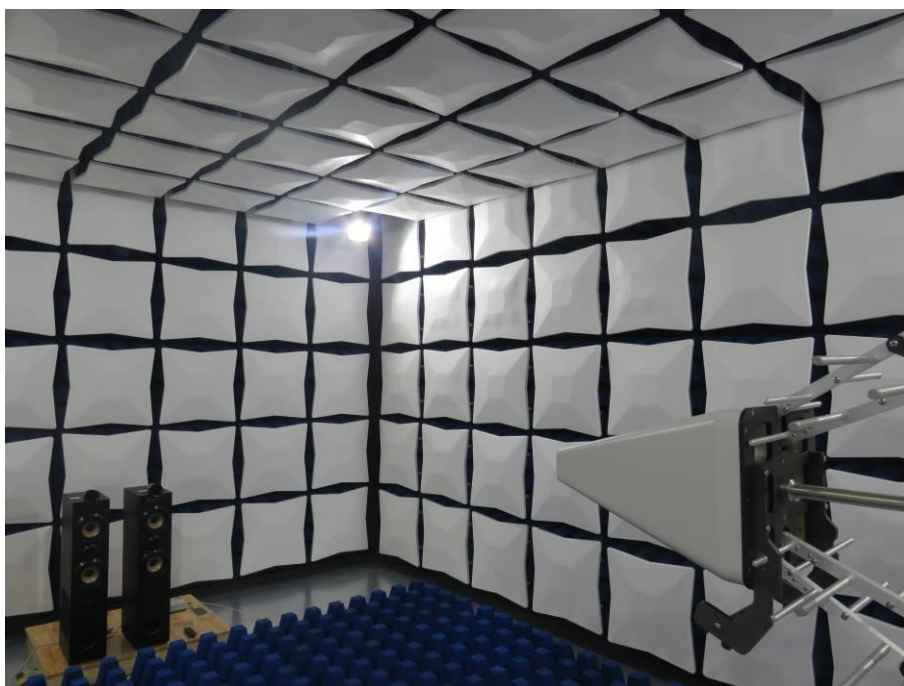
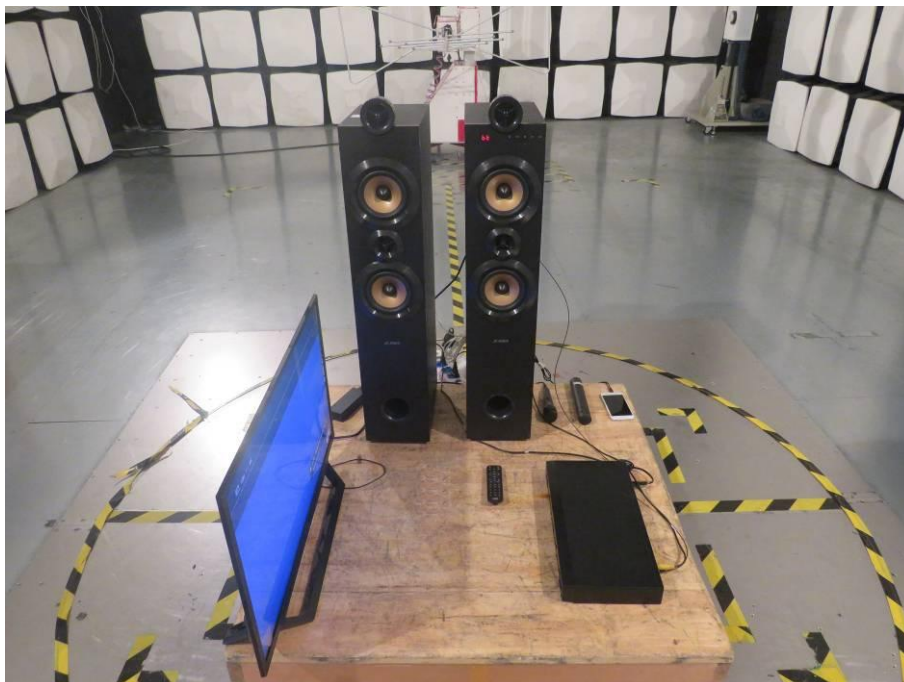
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI7	100837	Mar. 14, 2019	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Mar. 23, 2019	1 Year
3.	Loop Antenna	DAZE	ZA30900A	0708	Mar. 23, 2019	1 Year
4.	Signal generator	Agilent	E4421B	MY41000708	Mar. 14, 2019	1 Year
5.	Signal generator	Agilent	N5182A	MY48180739	Mar. 14, 2019	1 Year
6.	Signal generator	TELEVIEW	TVB593	23.36.20.10.1 2.00.00.05	N/A	N/A
7.	Signal generator	TELEVIEW	DTV800	D800-598170 62667	N/A	N/A
8..	Horn Antenna	COM-Power	AH-118	071078	Mar. 23, 2019	1 Year
9.	Pre-Amplifier	HP	HP 8449B	3008A00964	Mar. 14, 2019	1 Year
10.	Pre-Amplifier	HP	HP 8447D	1145A00203	Mar. 14, 2019	1 Year
11.	Audio Analyzer	Rohde & Schwarz	UPV	100894	Mar. 23, 2019	1 Year
12.	Band-Stop Filter	Erika Fiedler OHG	D-65396 Walluf	N/A	N/A	N/A
12.	Test Software	EZ	EZ_EMG	N/A	N/A	N/A

## **APPENDIX 1**

### **PHOTOGRAPHS OF TEST SETUP**



## RADIATED EMISSION TEST



---End ---