Produkte
Products

TÜVRheinland®

Prüfbericht - Nr.: 16800862 001
Test Report No.:

Auftraggeber: *Client:*	**Beijing Fulei Industrial & Commercial Co., Ltd.** No.1 Anxiangli, Deshengmenwai, Chaoyang District, Beijing 100101 P.R. China
Gegenstand der Prüfung: *Test item:*	**Heat Transfer Machine**
Bezeichnung: *Identification:*	**TTM-1700A,TTM-1700B, TTM-2500**
Serien-Nr.: *Serial No.:*	**Engineering sample**
Wareneingangs-Nr.: *Receipt No.:*	**1143006341**
Eingangsdatum: *Date of receipt:*	**2011-10-18**
Zustand des Prüfgegenstandes bei Anlieferung: **Condition of test item at delivery:**	**The sample is ok for test and not damaged.**
Prüfort: *Testing location:*	**Refer to section 1.1**
Prüfgrundlage: *Test specification:*	**EN 61000-6-2:2005** **EN 61000-6-4:2007+A1**
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test item passed the test specification(s).*
Prüflaboratorium: *Testing Laboratory:*	**Refer to section 1.1**

geprüft/ *tested by:*			**kontrolliert/** *reviewed by:*		
2012-1-17	Yang, Kai/PE	Yangkai	2012-01-17	Zhu, Qiusheng/TC	Zhuqiusheng
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges/ *Other Aspects:*

Abkürzungen:				*Abbreviations:*			
P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*	
F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*	
N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*	
N/T	=	*nicht getestet*		*N/T*	=	*not tested*	

TEST SUMMARY

4.1.1 MAINS TERMINAL DISTURBANCE VOLTAGE
Result:
Passed

4.2.1 RADIO FREQUENCY (RF) EMISSION
Result:
Passed

5.1.1 RADIATED RADIO-FREQUENCY ELECTROMAGNETIC FIELD (RS)
Result:
Passed

5.1.2 RADIO-FREQUENCY CONTINUOUS CONDUCTED
Result:
Passed

5.2.1 ELECTRICAL FAST TRANSIENT (EFT)
Result:
Passed

5.2.2 ELECTROSTATIC DISCHARGE (ESD)
Result:
Passed

5.2.3 SURGE
Result:
Passed

5.2.4 VOLTAGE DIP AND SHORT INTERRUPTIONS
Result:
N.A.

Contents

1. Test Sites

1.1 Test Facilities

Test Site: Beijing Fulei industrial & Commercial Co., Ltd.
Address: Songlanpu west, Shahe town, Changping District, Beijing 102206, P.R. China

The used test equipment is in accordance with CISPR 16-1 for measurement of radio interference.

1.2 Instruments

Table 1: List of Test and Measurement Equipment

Kind of Equipment	Type	S/N	Manufacturer	Calibrated until
Test system for conducted immunity	NSG 4070	28169	TESEQ	2012-04-07
Attenuator	ATN 6050	27190	TESEQ	2012-04-07
EM Injection Clamp	KEMZ 801	28522	TESEQ	2012-04-07
GSM Mobile Phone	ME525	----	Motorola	N/A
Walkie-Talkie	VX-168-G3-5	5N117084	VERTEX	N/A
Walkie-Talkie	VX-160V	41760033	VERTEX	N/A
ESD Generator	Dito	V0702102130	EM TEST AG	2012-07-07
Ultra Compact Simulator	UCS 500 M4	V0702102131	EM TEST AG	2012-04-12
EMI Signal Analyzer	PMM 9010	143WJ70608	Narda S.T.S./PMM	2012-09-28
EMI Signal Analyzer	PMM 9030	110WJ70502	Narda S.T.S./PMM	2012-07-01
Biconical antenna	3110BP	00102010	ETS-Lindgren	2014-04-12
Log periodic antenna	3148B	00102016	ETS-Lindgren	2014-04-12
Artificial mains network	PMM L2-32	0120J70603	Narda S.T.S./PMM	2012-04-18

2. General Product Information

2.1 Product Function and Intended Use

The EUT (equipments under test) are heat transfer machines. For the further information, refer to the user's manual.

2.2 Ratings and System Details

Type	: TTM-1700A	TTM-1700B	TTM-2500
Rated Voltage	: AC 380V	AC 380V	AC 380V
Frequency	: 50Hz	50Hz	50Hz
Rated Current	: 30A (Max.)	30A (Max.)	50A (Max.)
Protection Class	: I	I	I
Class	A	A	A

Identities and difference:
The differences of these models are showed below:

Different points	TTM-1700A	TTM-1700B	TTM-2500
Circuit breaker	DZ47LE-63 C60 3P+N /Chint	DZ47LE-63 C60 3P+N /Chint	DZ158LE-100 80A 3P+N /Chint
Fuse	RT18-63X 40A	RT18-63X 40A	RT18-63X 63A
AC Contactor	CJX2 4011 40A /Chint	CJX2 4011 40A /Chint	CJX2 8011 80A /Chint
Heating power	2.5KW×9=22.5KW	2.5KW×9=22.5KW	2.5KW×12=30KW
Inverter	DV300-2007-T / Defu	DV300-2007-T / Defu	DV300-2015-T / Defu
Motor	GV-40 0.75KW 1:70 /Orient	GV-40 0.75KW 1:70 /Orient	GV-40 1.5KW 1:70 /Orient
Method of cooling	forced cooling with 5 fans 3610KL-05W-B60 DC24V	natural cooling without fans	natural cooling without fans
Motor	DC24V 30W	NO	DC24V 100W

According to the difference listed in the table, all the EMC tests are performed on the TTM-1700A and TTM-2500, which are more complex than the model TTM-1700B.

2.3 Independent Operation Modes

The basic operation modes: "On", "Off".

2.4 Submitted Documents

Nameplate.
Circuit diagram, Construction diagram, BOM and User's manual should be refereed to the safety report 16800861 001 and files

3. Test Set-up and Operation Modes

3.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test conditions were adapted accordingly in reference to the instructions for use.
Refer to the related paragraph of this report.

Immunity: The equipment under test (EUT) was configured to have its highest possible susceptibility against the tested phenomena. The test conditions were adapted accordingly in reference to the instructions for use.
Refer to the related paragraph of this report.

3.2 Physical Configuration for Testing

For it was not possible to test at full load, so the equipment was tested under below applicable light load condition:

Type	:	TTM-1700A	TTM-2500
Input Voltage	:	AC 380V	AC 380V
Frequency	:	50Hz	50Hz
Input Current	:	3.41A	6.82A

3.3 Test Operation and Test Software

None.

3.4 Special Accessories and Auxiliary Equipment

None.

3.5 Countermeasures to achieve EMC Compliance

An EMI filter which model is FLET01-10A made by Beijing Jones Co., Ltd. was used at the transducer's input port of TTM-1700A and TTM-2500 to pass the Mains Terminal Disturbance Voltage test.

4. Test Results EMISSION

4.1 Emission in the Frequency Range up to 30 MHz

4.1.1 Mains Terminal Disturbance Voltage

Result:	**Passed**

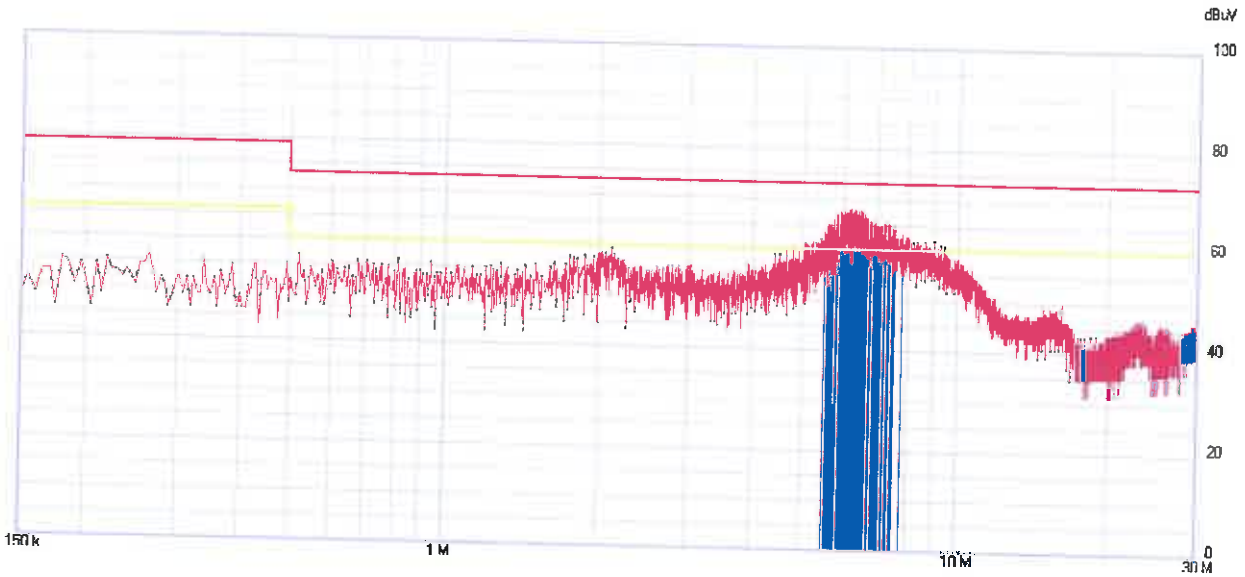
Date of testing	:	2011-12-06
Test procedure	:	EN 61000-6-4:2007+A1
Frequency range	:	0.15 – 30MHz
Kind of test site	:	In situ

Test Setup

AC input Voltage	:	3phase AC380V 50Hz
Operational mode	:	On
Earthing	:	Applied

The measurement equipment like test receivers, quasi-peak, average detector and Artificial Mains Network (AMN) are in compliance with CISPR 16-1 series standards. The tested object was operated under its rated voltage and its rated frequency. Prior to the measurements the test object operated about 15 minutes (warm-up) in order to stabilize its operating conditions and to ensure reliable measurement values.
Furthermore an internal calibration with the test receiver was conducted prior to each measurement.
The tested object was settled on a 10cm wooden table. The EUT was set 0.8m away from the AMN.
The following figures and tables were those measured by an automatic measuring system at AC mains port. The quasi-peak and average values were measured and listed where they had a maximum in previous scanning survey.

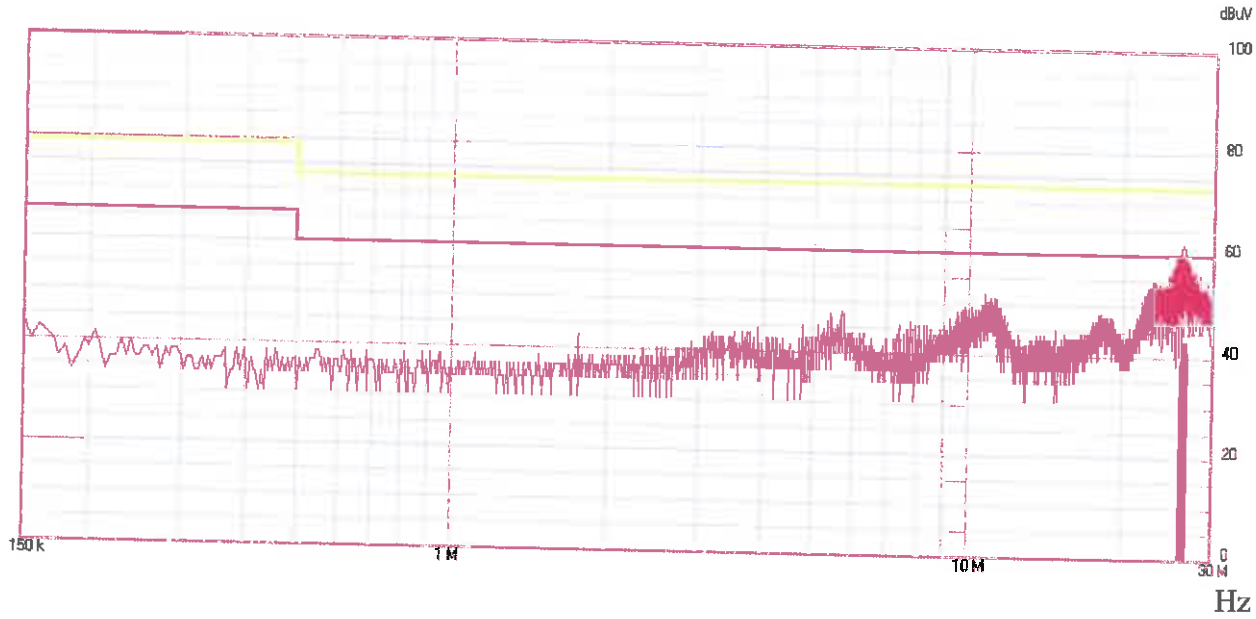
Figure 1: Spectral Diagrams, Conducted Emission, TTM-1700A, L1 QP



Final quasi-peak measurement results:

Frequency MHz	Quasi-Peak Measurement		Result
	Measured Value dB(µV)	Limit dB(µV)	
6.11	60.27	73	Passed
6.15	60.13	73	Passed
6.28	60.15	73	Passed
6.29	60.11	73	Passed
6.32	60.24	73	Passed
6.48	60.12	73	Passed

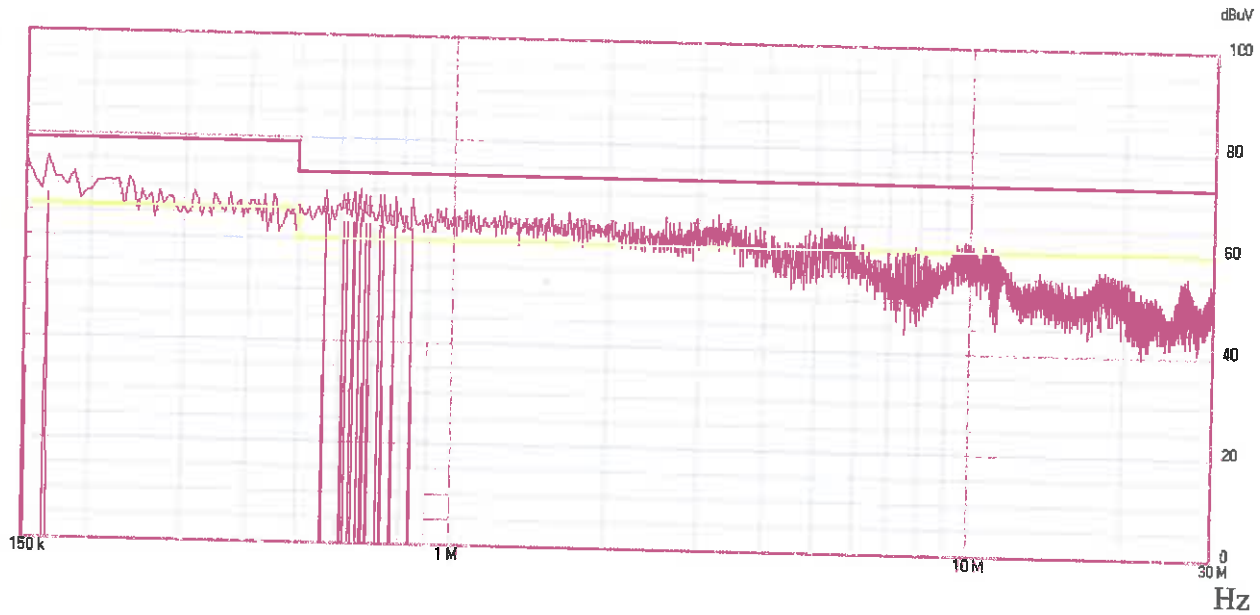
Figure 2: Spectral Diagrams, Conducted Emission, TTM-1700A L1 AV



Final average measurement results:

Frequency MHz	Average Measurement		Result
	Measured Value dB(µV)	Limit dB(µV)	
25.99	43.01	60	Passed
26.15	43.09	60	Passed
26.25	43.05	60	Passed
26.37	43.13	60	Passed
26.40	43.20	60	Passed
26.43	43.19	60	Passed

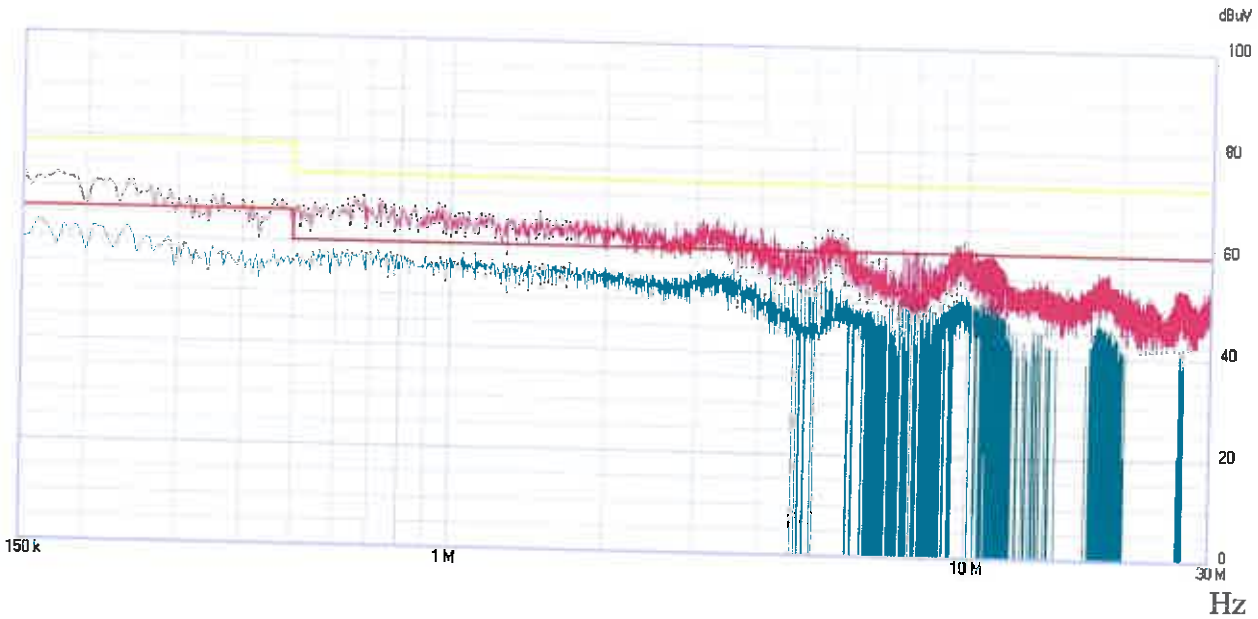
Figure 3: Spectral Diagrams, Conducted Emission, TTM-1700A, L2 QP



Final quasi-peak measurement results:

Frequency MHz	Quasi-Peak Measurement		Result
	Measured Value dB(µV)	Limit dB(µV)	
0.17	68.04	79	Passed
0.57	66.12	73	Passed
0.62	63.45	73	Passed
0.63	63.24	73	Passed
0.64	63.26	73	Passed
0.65	63.11	73	Passed

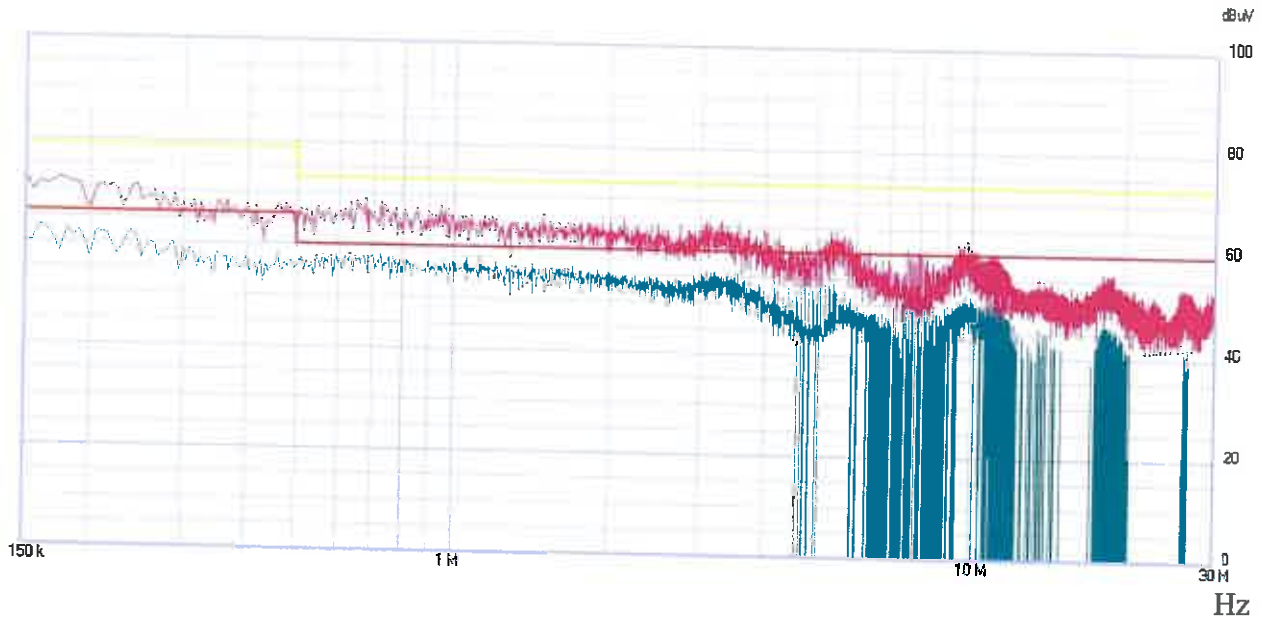
Figure 4: Spectral Diagrams, Conducted Emission, TTM-1700A, L2 AV



Final average measurement results:

Frequency MHz	Average Measurement		Result
	Measured Value dB(μV)	Limit dB(μV)	
0.60	58.25	60	Passed
0.64	58.16	60	Passed
0.70	58.07	60	Passed
0.73	58.31	60	Passed
1.07	58.16	60	Passed
1.12	58.24	60	Passed

For 0.60MHz, 0.64MHz, 0.73MHz, 1.07MHz, 1.12MHz the test result was close to limit, so additional point test was carried out and the test result is showed below:



Frequency MHz	Average Measurement		Result
	Measured Value dB(μV)	Limit dB(μV)	
0.60	57.15	60	Passed
0.64	57.84	60	Passed
0.73	57.61	60	Passed
1.07	57.66	60	Passed
1.12	57.18	60	Passed

For Expanded uncertainty of this test was 3.7dB under k=2 (95%), and this test result belonged to case 2. The definition of Case 2 is as below:

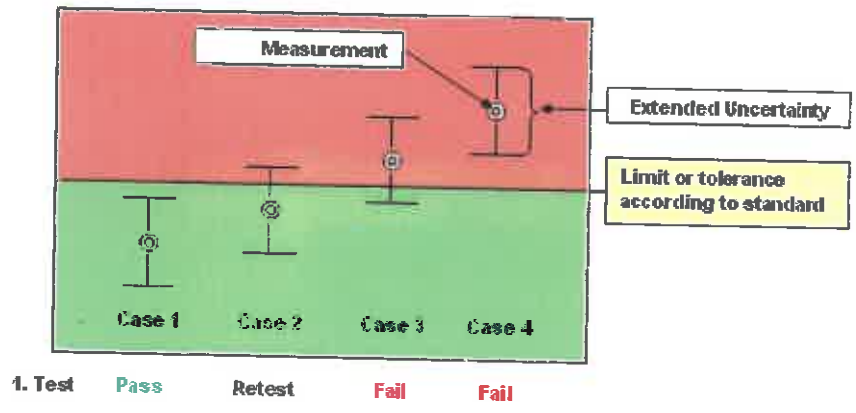
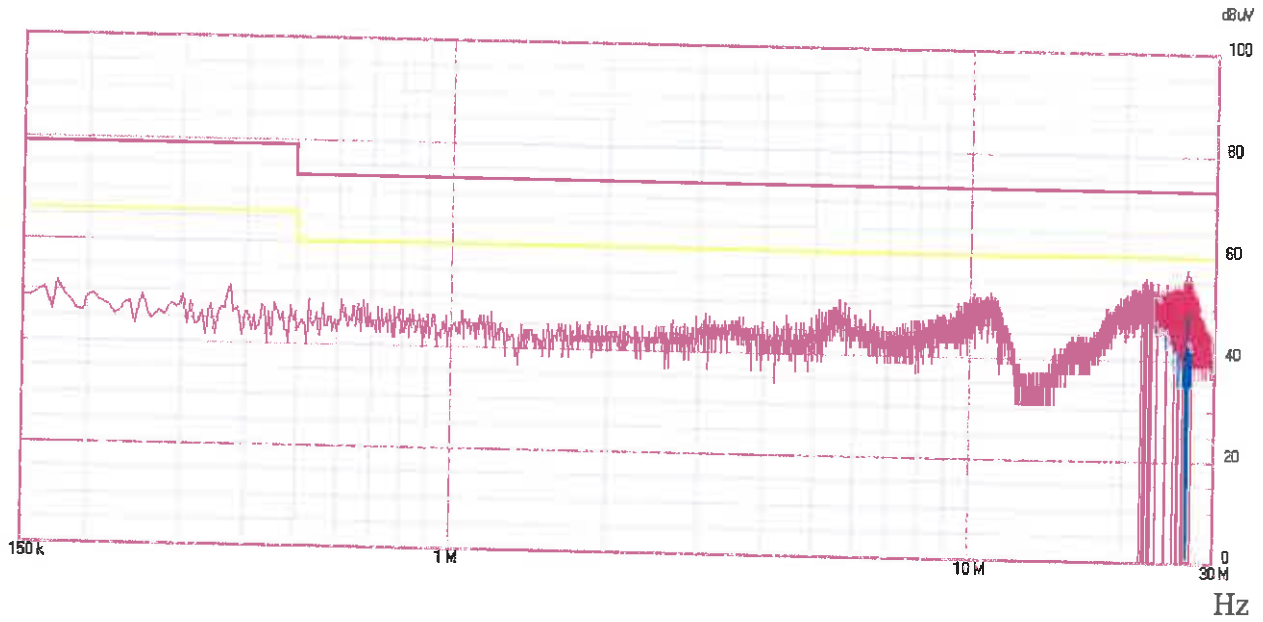


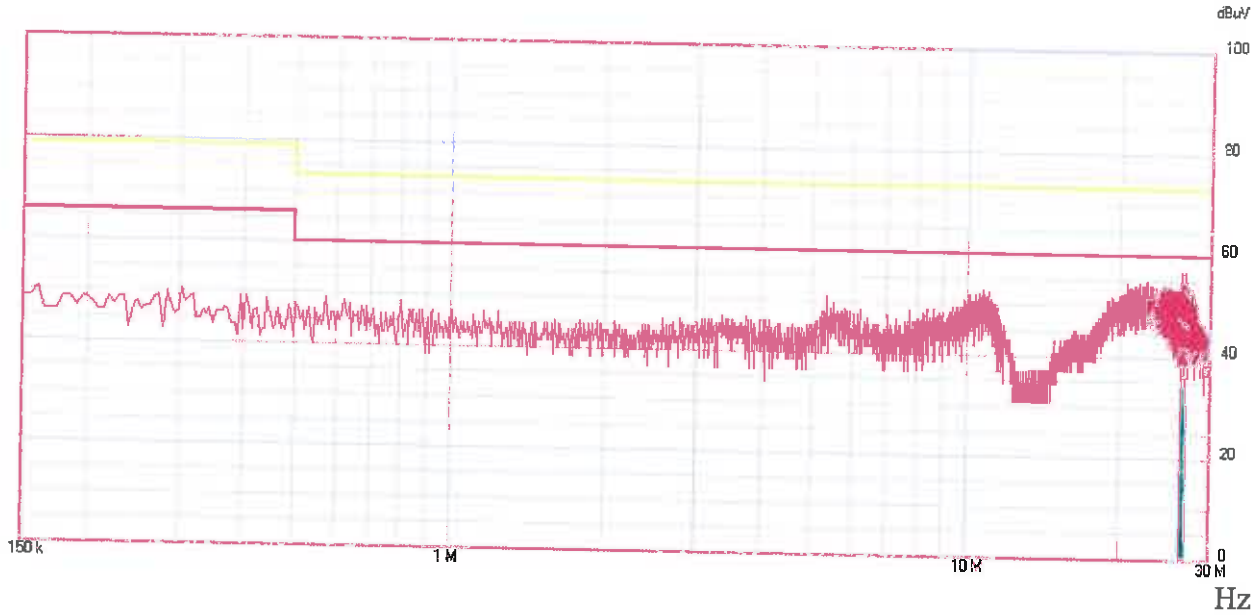
Figure 5: Spectral Diagrams, Conducted Emission, TTM-1700A, L3 QP



Final quasi-peak measurement results:

Frequency MHz	Quasi-Peak Measurement		Result
	Measured Value dB(µV)	Limit dB(µV)	
26.22	49.20	73	Passed
26.245	49.47	73	Passed
26.29	49.58	73	Passed
26.315	49.43	73	Passed
26.41	49.48	73	Passed
26.445	49.49	73	Passed

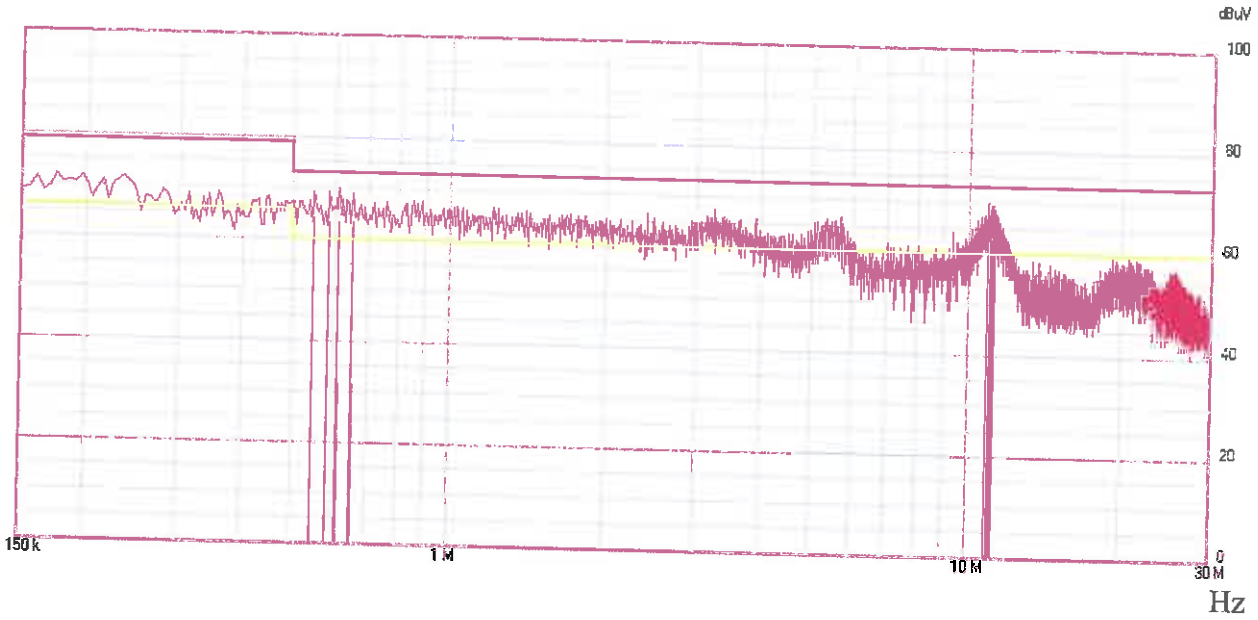
Figure 6: Spectral Diagrams, Conducted Emission, TTM-1700A, L3 AV



Final average measurement results:

Frequency MHz	Average Measurement		Result
	Measured Value dB(µV)	Limit dB(µV)	
26.245	56.83	60	Passed
26.485	56.60	60	Passed
26.595	56.61	60	Passed
26.685	56.90	60	Passed
26.73	56.08	60	Passed
26.74	55.79	60	Passed

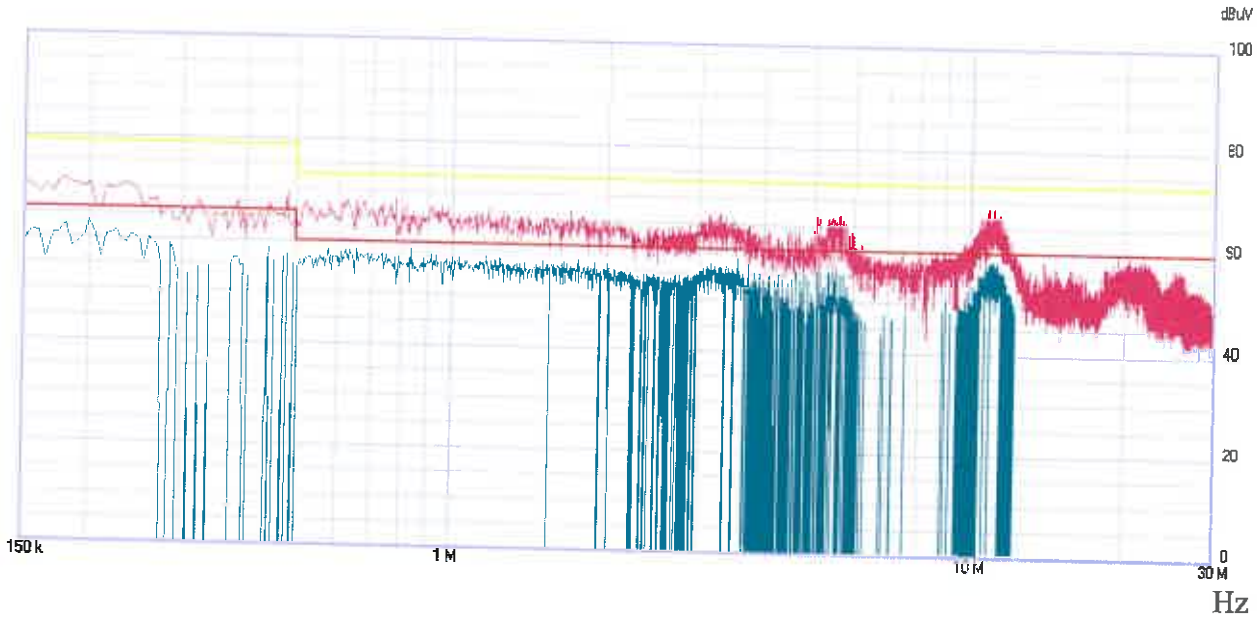
Figure 7: Spectral Diagrams, Conducted Emission, TTM-1700A, N QP



Final quasi-peak measurement results:

Frequency MHz	Quasi-Peak Measurement		Result
	Measured Value dB(µV)	Limit dB(µV)	
0.55	64.09	73	Passed
0.59	63.37	73	Passed
0. 615	63.28	73	Passed
0 .655	63.33	73	Passed
10.97	62.50	73	Passed
11.06	62.53	73	Passed

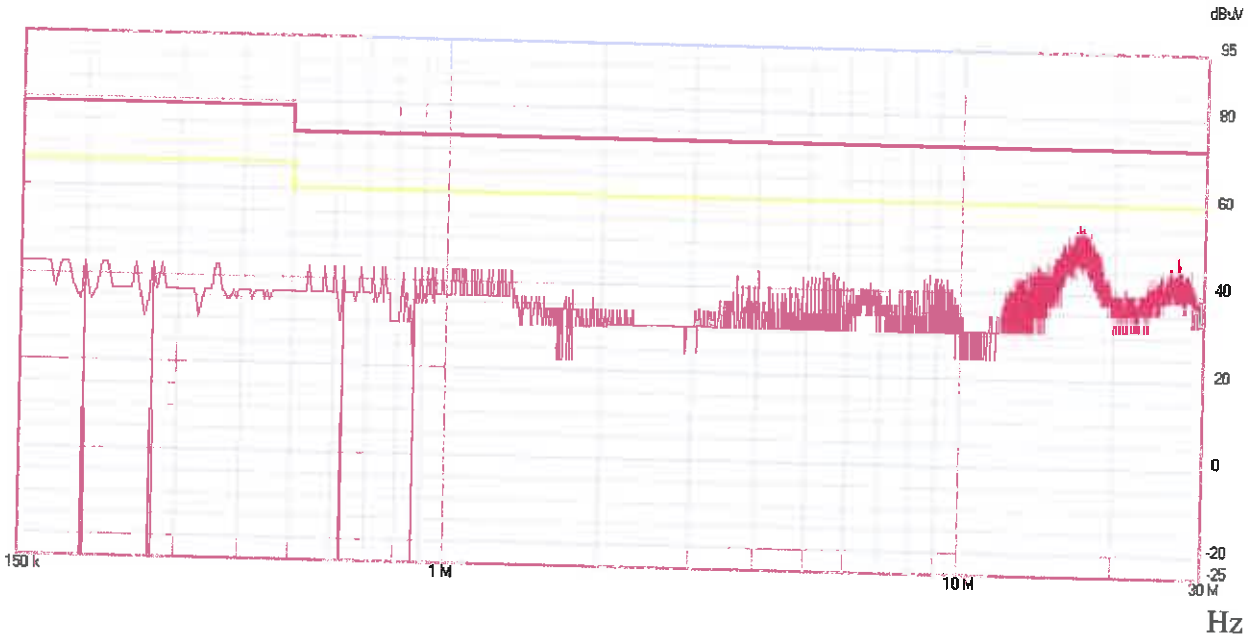
Figure 8: Spectral Diagrams, Conducted Emission, TTM-1700A, N AV



Final average measurement results:

Frequency MHz	Average Measurement		Result
	Measured Value dB(µV)	Limit dB(µV)	
0.61	58.01	60	Passed
0.62	58.06	60	Passed
3.55	58.14	60	Passed
10.925	58.01	60	Passed
11.00	58.01	60	Passed
11.07	58.13	60	Passed

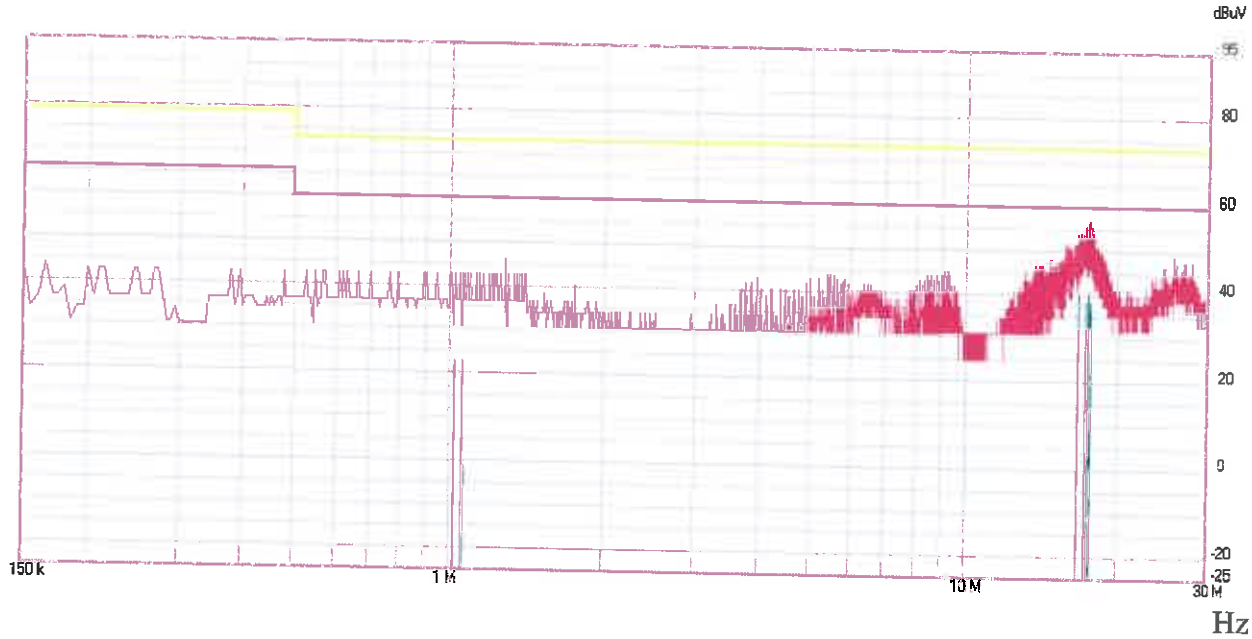
Figure 9: Spectral Diagrams, Conducted Emission, TTM-2500, L1 QP



Final quasi-peak measurement results:

Frequency MHz	Quasi-Peak Measurement		Result
	Measured Value dB(µV)	Limit dB(µV)	
0.63	42.55	73	Passed
0. 865	42.55	73	Passed

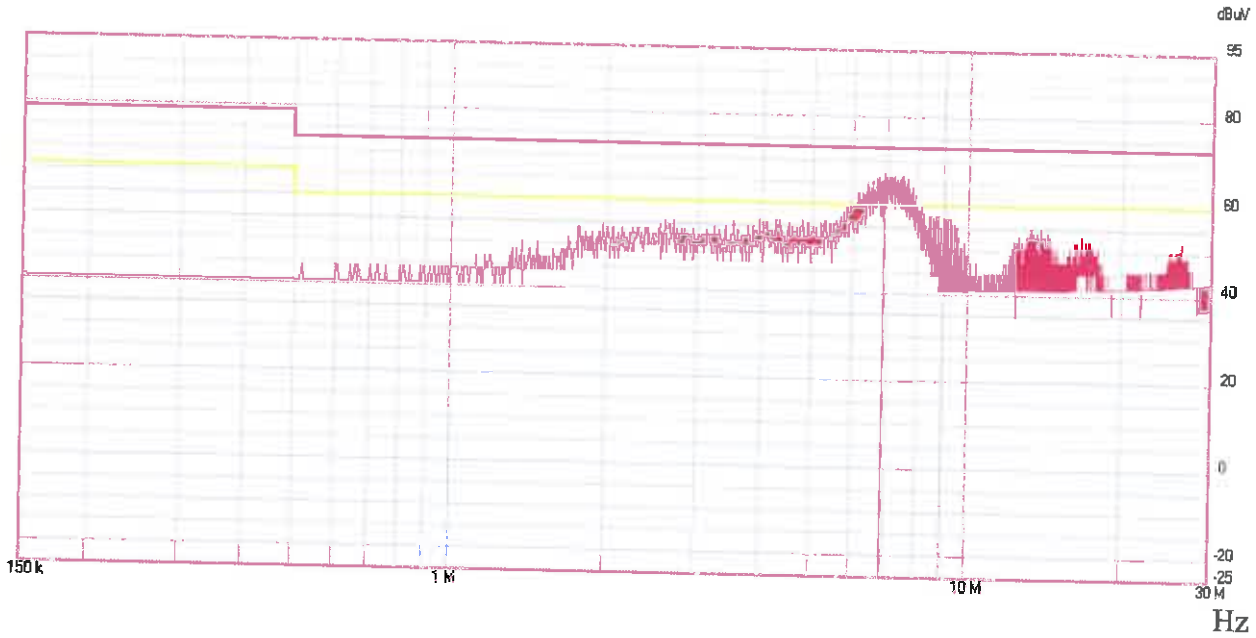
Figure 10: Spectral Diagrams, Conducted Emission, TTM-2500, L1 AV



Final average measurement results:

Frequency MHz	Average Measurement		Result
	Measured Value dB(µV)	Limit dB(µV)	
17.46	40.77	60	Passed

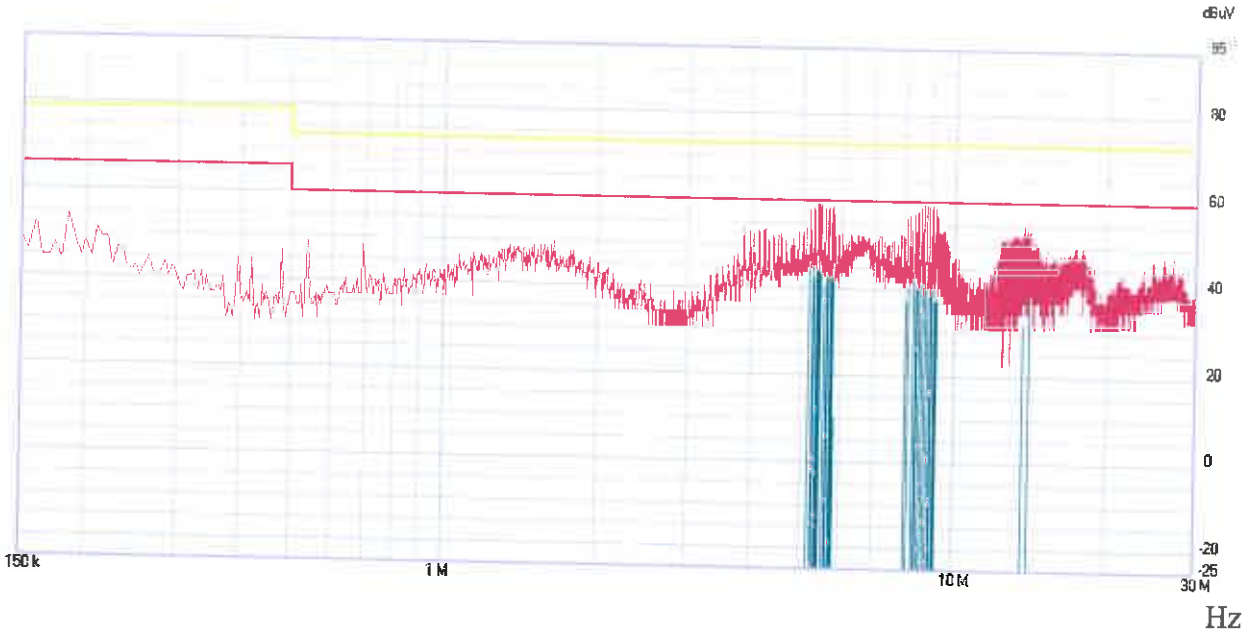
Figure 11: Spectral Diagrams, Conducted Emission, TTM-2500, L2 QP



Final quasi-peak measurement results:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(µV)	Limit dB(µV)	Result
6.895	61.43	73	Passed

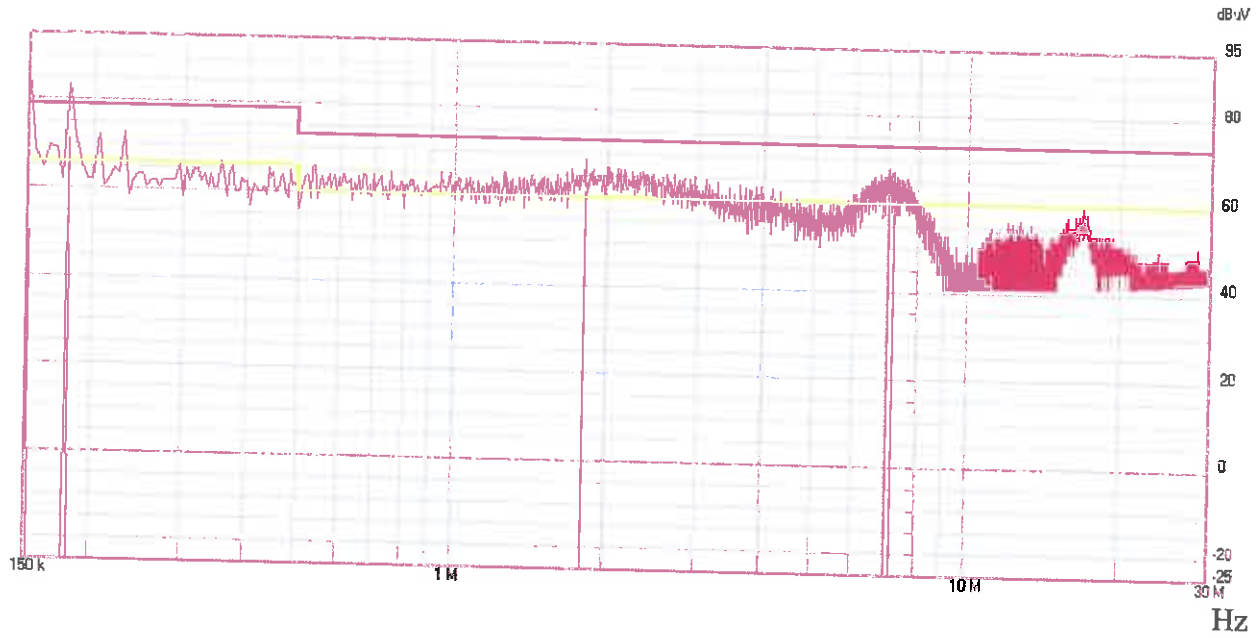
Figure 12: Spectral Diagrams, Conducted Emission, TTM-2500, L2 AV



Final average measurement results:

Frequency MHz	Average Measurement		Result
	Measured Value dB(µV)	Limit dB(µV)	
5.375	47.40	60	Passed
5.465	46.58	60	Passed
5.64	46.54	60	Passed
5.82	45.90	60	Passed
8.505	45.63	60	Passed
8.595	45.56	60	Passed

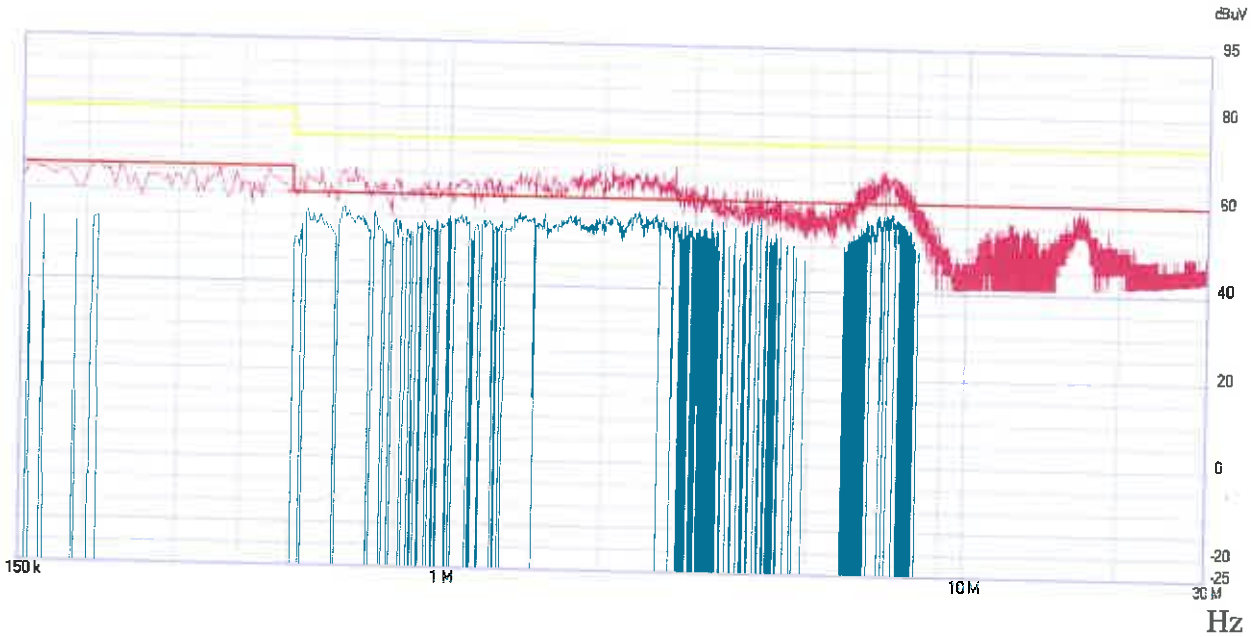
Figure 13: Spectral Diagrams, Conducted Emission, TTM-2500, L3 QP



Final quasi-peak measurement results:

Frequency MHz	Quasi-Peak Measurement		Result
	Measured Value dB(µV)	Limit dB(µV)	
0.15	75.18	79	Passed
0.18	70.96	79	Passed
1.805	61.25	73	Passed
7.02	62.01	73	Passed
7.185	62.40	73	Passed

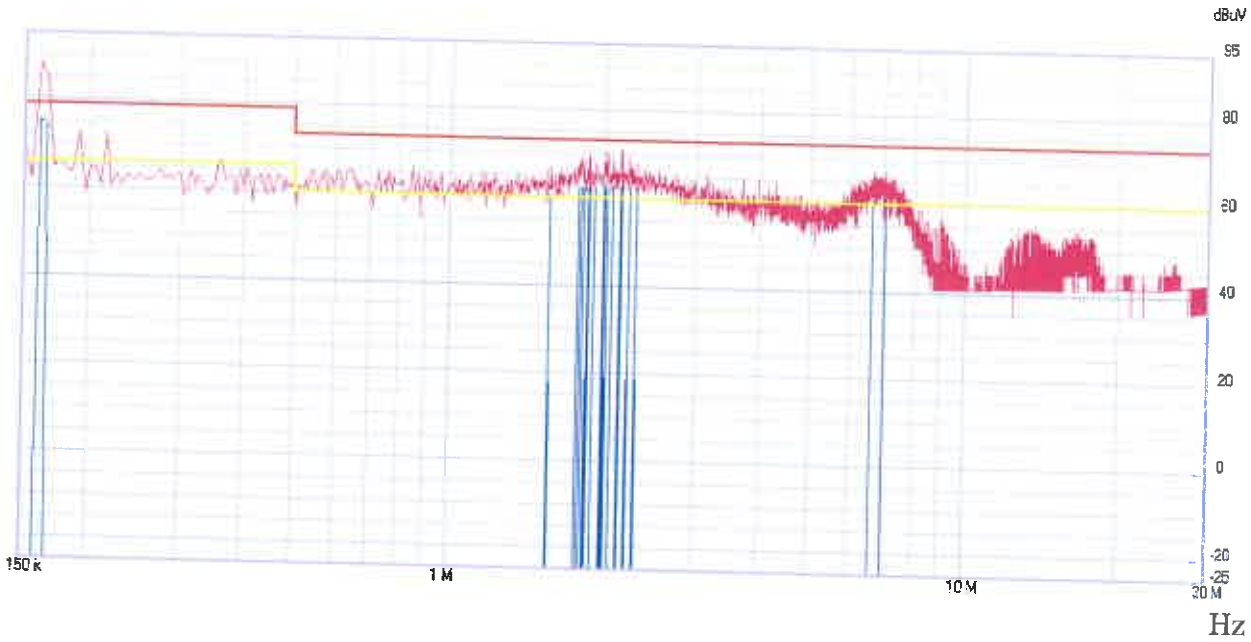
Figure 14: Spectral Diagrams, Conducted Emission, TTM-2500, L3 AV



Final average measurement results:

Frequency MHz	Average Measurement		Result
	Measured Value dB(µV)	Limit dB(µV)	
2.335	57.41	60	Passed
6.775	57.25	60	Passed
6.91	57.45	60	Passed
7.04	57.67	60	Passed
7.055	57.29	60	Passed
7.185	57.57	60	Passed

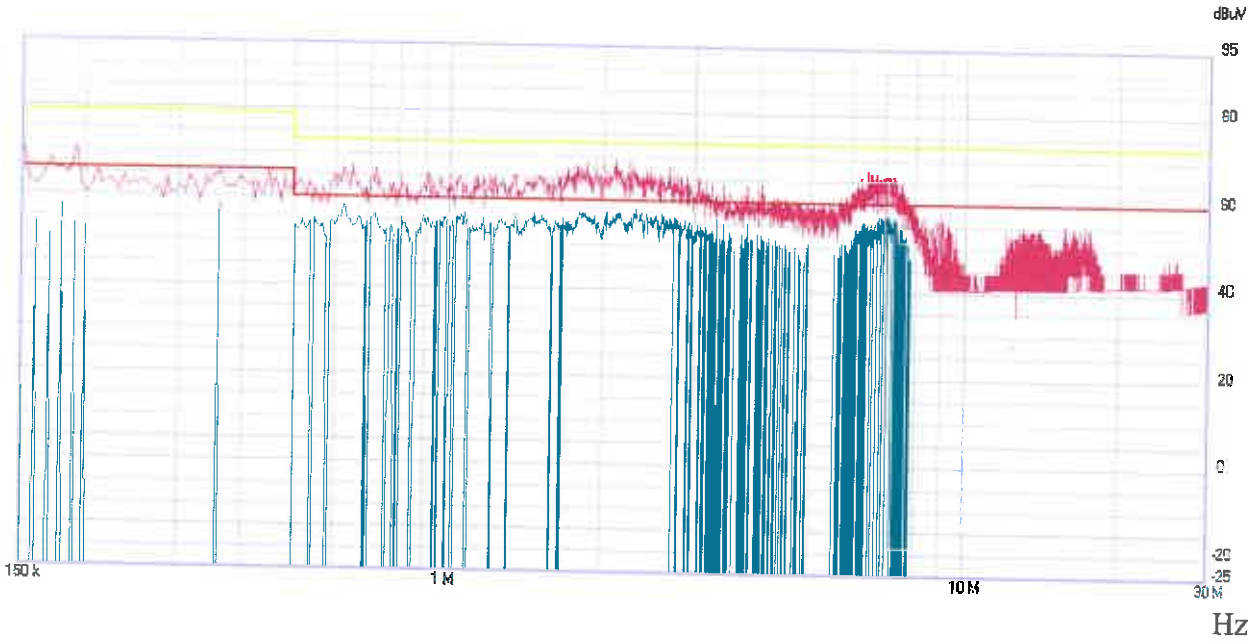
Figure 15: Spectral Diagrams, Conducted Emission, TTM-2500, N QP



Final quasi-peak measurement results:

Frequency MHz	Quasi-Peak Measurement		Result
	Measured Value dB(µV)	Limit dB(µV)	
0.16	75.45	79	Passed
0 .165	74.30	79	Passed
1.78	62.19	73	Passed
1.86	62.62	73	Passed
2.005	62.85	73	Passed
7.01	61.76	73	Passed

Figure 16: Spectral Diagrams, Conducted Emission, TTM-2500, N AV



Final average measurement results:

Frequency MHz	Average Measurement		Result
	Measured Value dB(µV)	Limit dB(µV)	
0.625	58.09	60	Passed
1.795	57.16	60	Passed
2.02	57.04	60	Passed
2.29	57.13	60	Passed
2.305	58.06	60	Passed
2.31	57.44	60	Passed

4.2 Emission in the Frequency Range above 30 MHz

4.2.1 Radio Frequency (RF) Emission

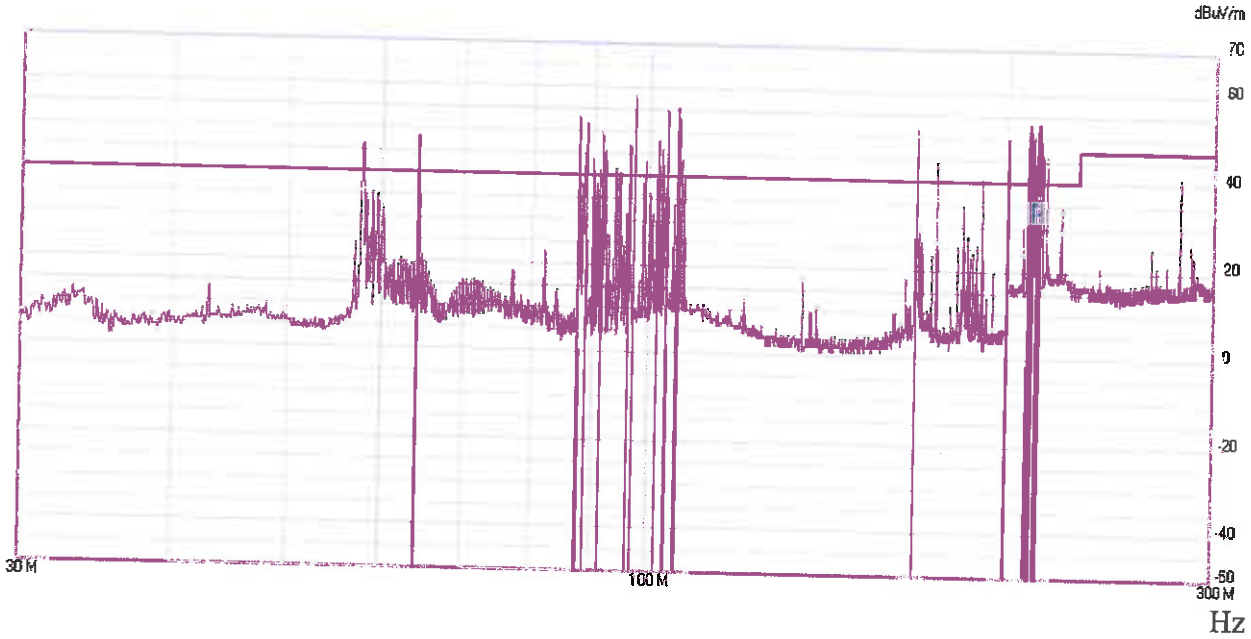
Result:	**Passed**

Date of testing	:	2011-12-05
Basic Standard	:	EN 61000-6-4:2007+A1
Test procedure:	:	EN 61000-6-4:2007+A1, CISPR 11, CISPR 16-1 series standards
Frequency Range	:	30 – 1000MHz
Limit	:	30-230MHz, 40dBµV/m with 10m test distance; 230-1000MHz, 47dBµV/m with 10m test distance.

Measuring configuration and description

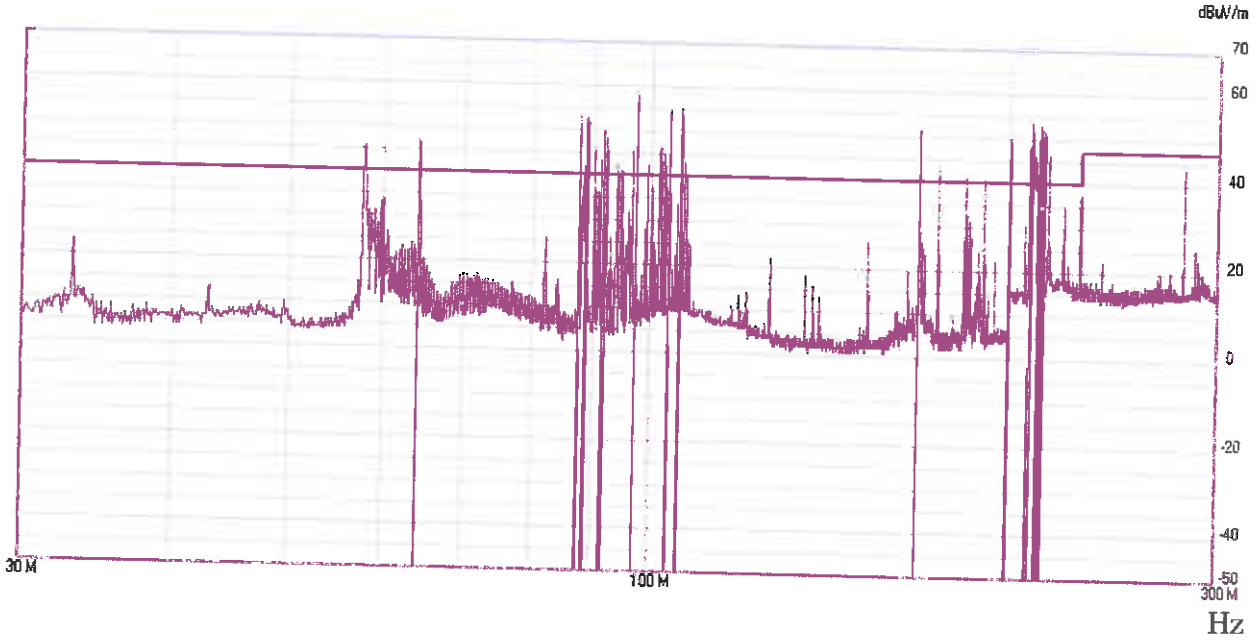
The measurement setup was made according to EN 61000-6-4:2007+A1.
The measurement was performed in situ.
The test equipment listed in 1.1, table 1 of this report are as specified in CISPR 16-1.
The EUT was placed on a turn platform. The turn platform can turn in 360°. A Bi-log periodic antenna is fixed 10m from centre of the turn platform.
During the test, the turn platform was rotated fully with a measurement antenna oriented for both horizontal and vertical polarization. The antenna was adjusted between 1m and 4m in height above the ground plane to find the max. disturbance.
The following diagram and table show the measurement value:

Figure 17: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Front, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 18: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Front, 30MHz-300MHz

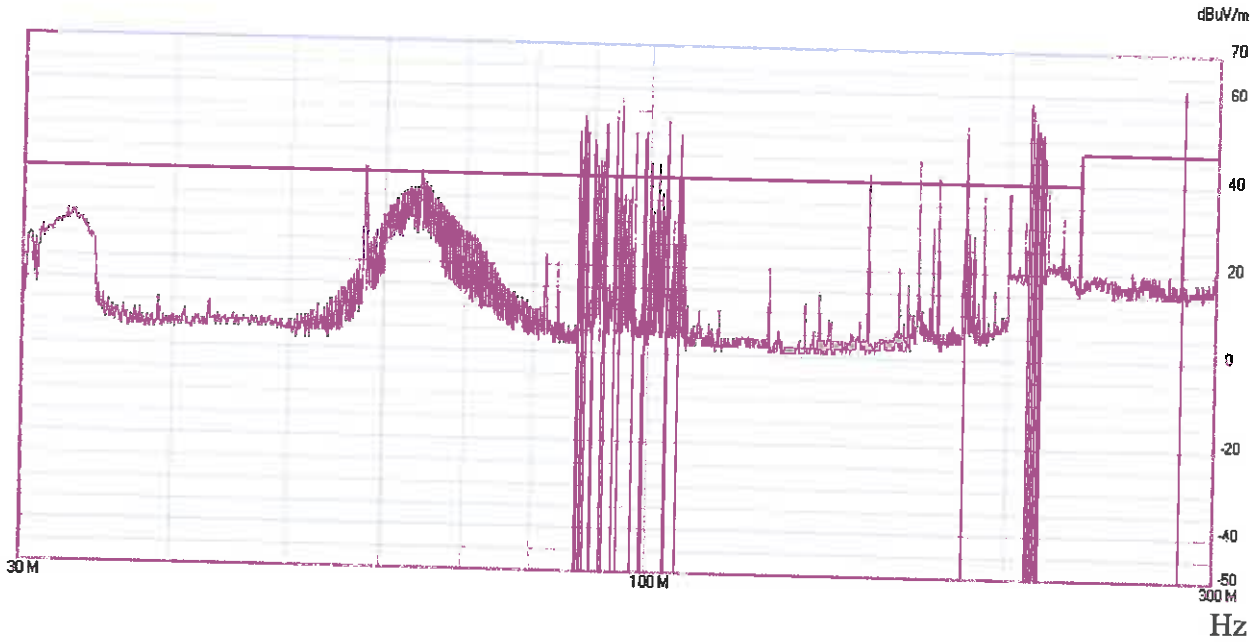


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
64.2	45.12	40	Passed
87.6	51.08	40	Passed
97.4	57.21	40	Passed
103.9	53.74	40	Passed
106.1	52.37	40	Passed
168.2	47.52	40	Passed
200.2	49.97	40	Passed
212.9	47.48	40	Passed

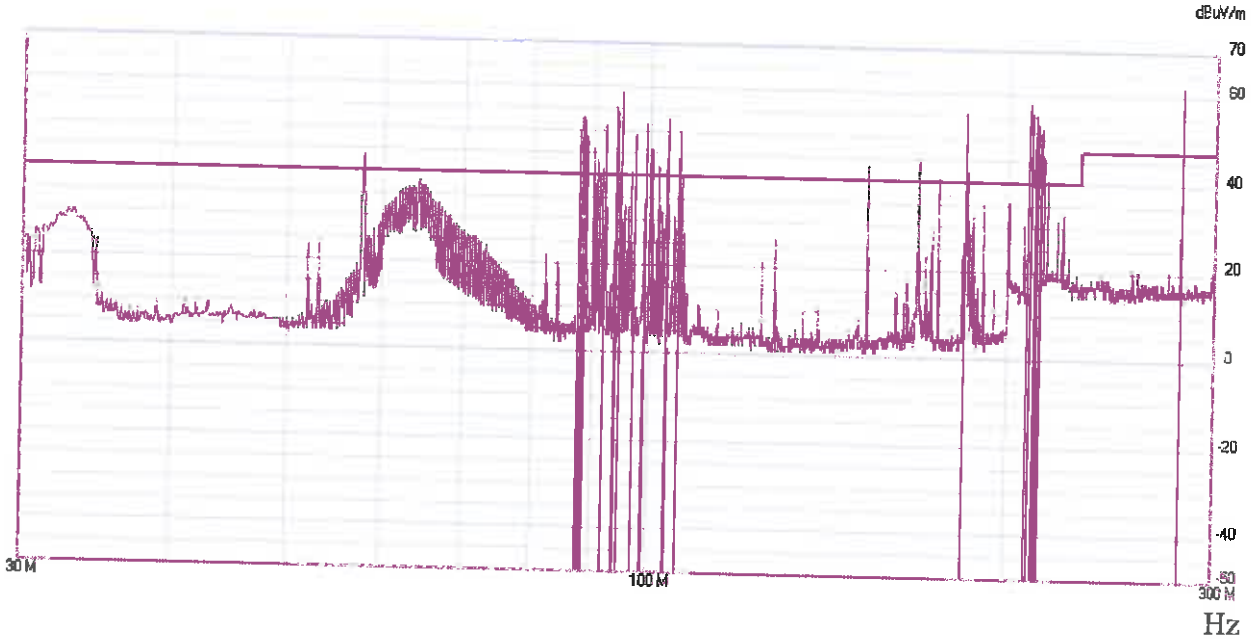
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 19: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Front, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 20: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Front, 30MHz-300MHz

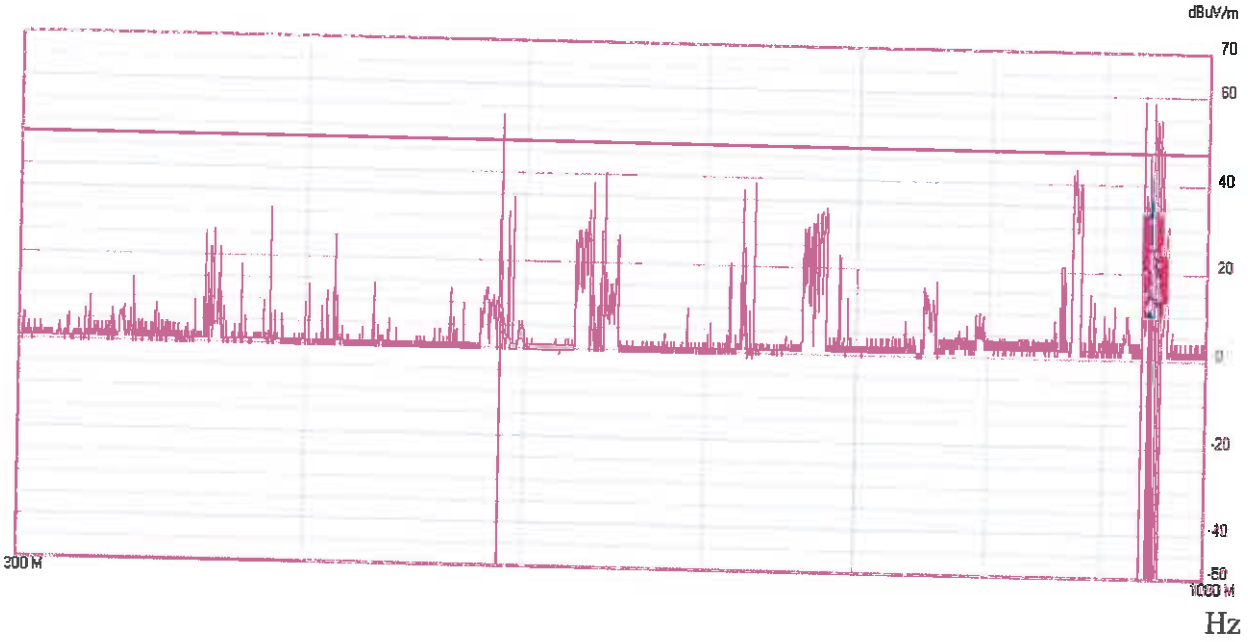


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
87.6	47.49	40	Passed
97.4	49.05	40	Passed
103.9	52.49	40	Passed
184.2	52.00	40	Passed
211.0	50.81	40	Passed
280.0	61.84	47	Passed

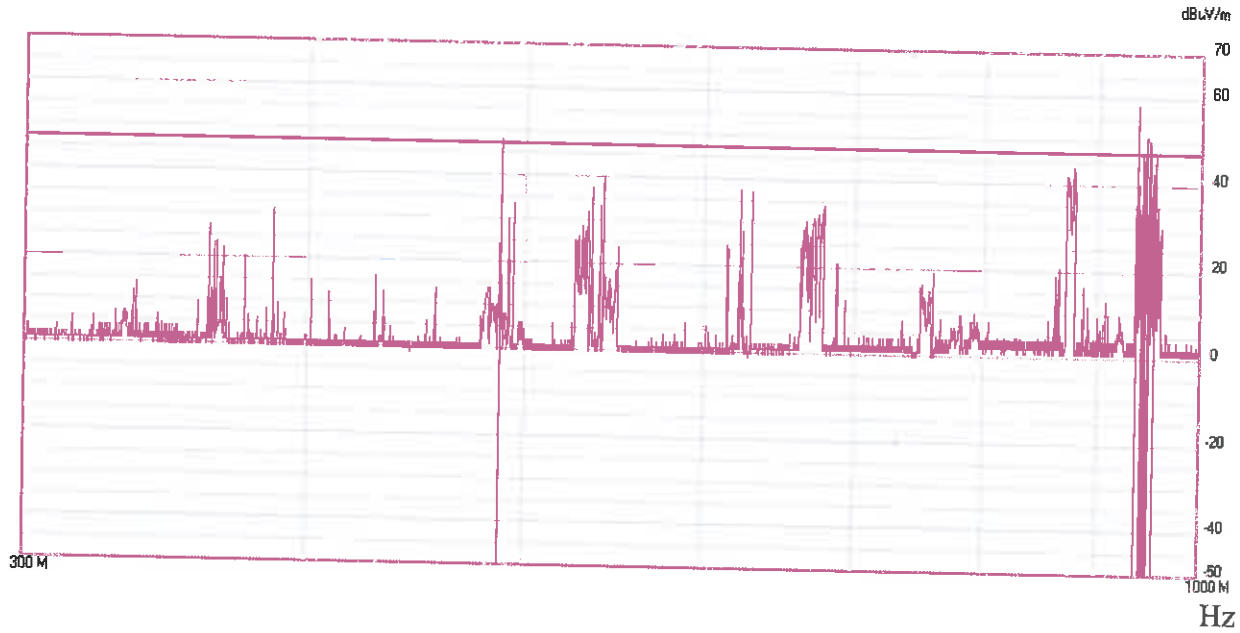
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 21: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Front, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 22: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Front, 300MHz-1000MHz

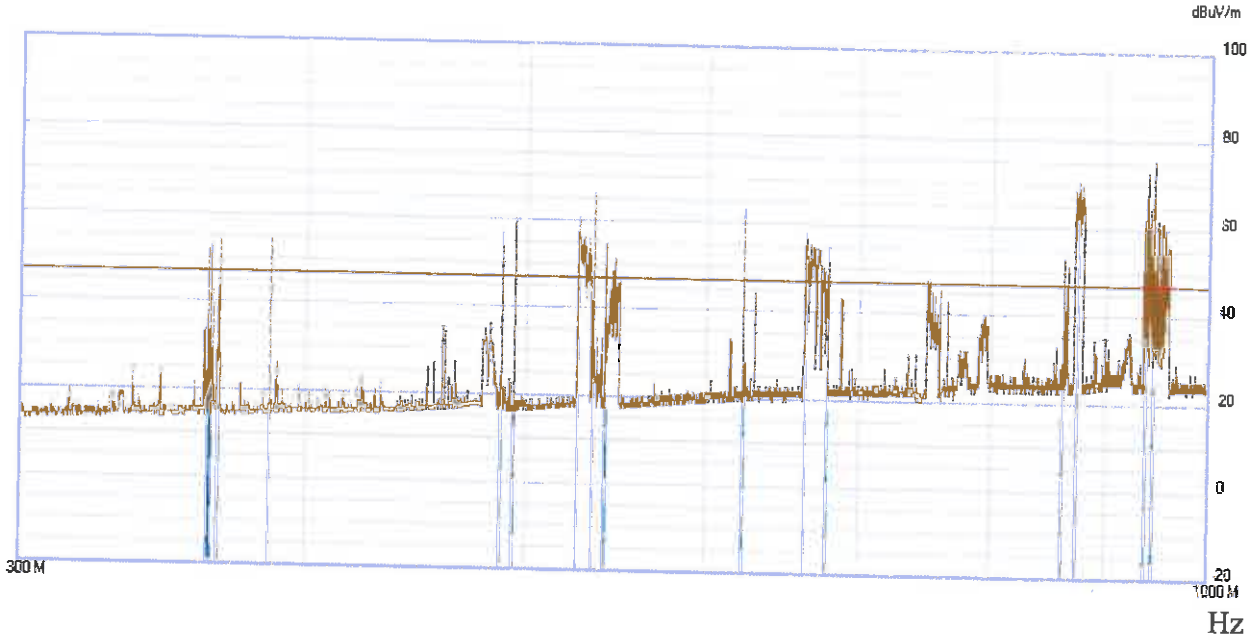


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
487.2	45.67	47	Passed
935.4	47.47	47	Passed
941.8	46.11	47	Passed

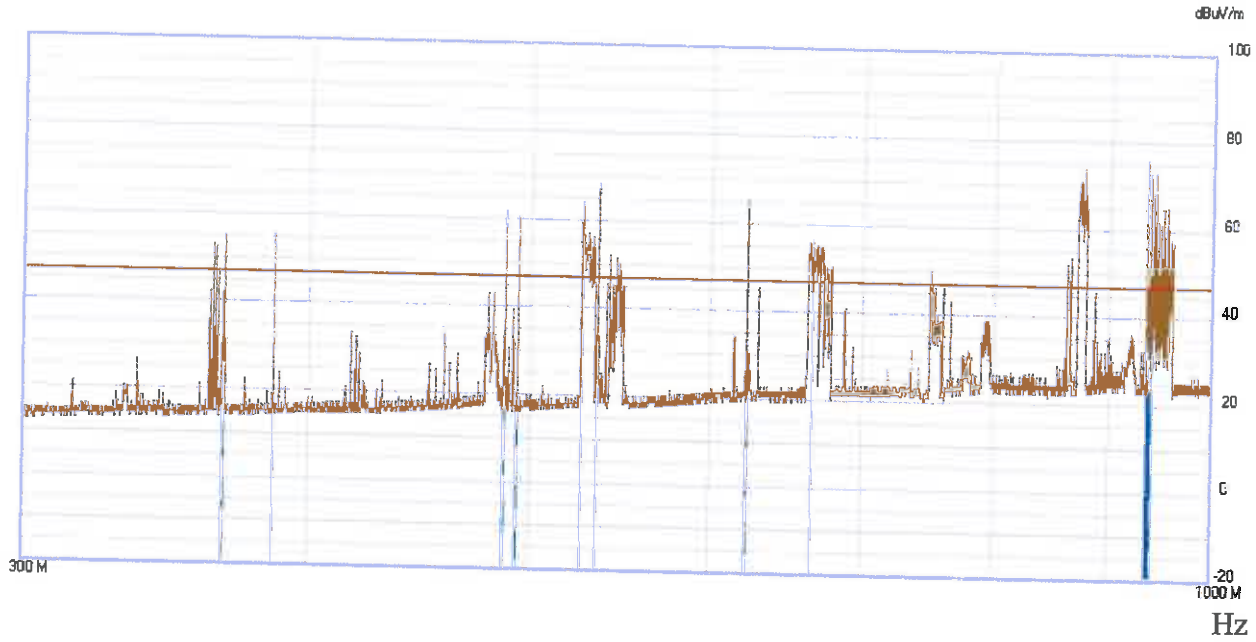
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 23: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Front, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 24: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Front, 300MHz-1000MHz

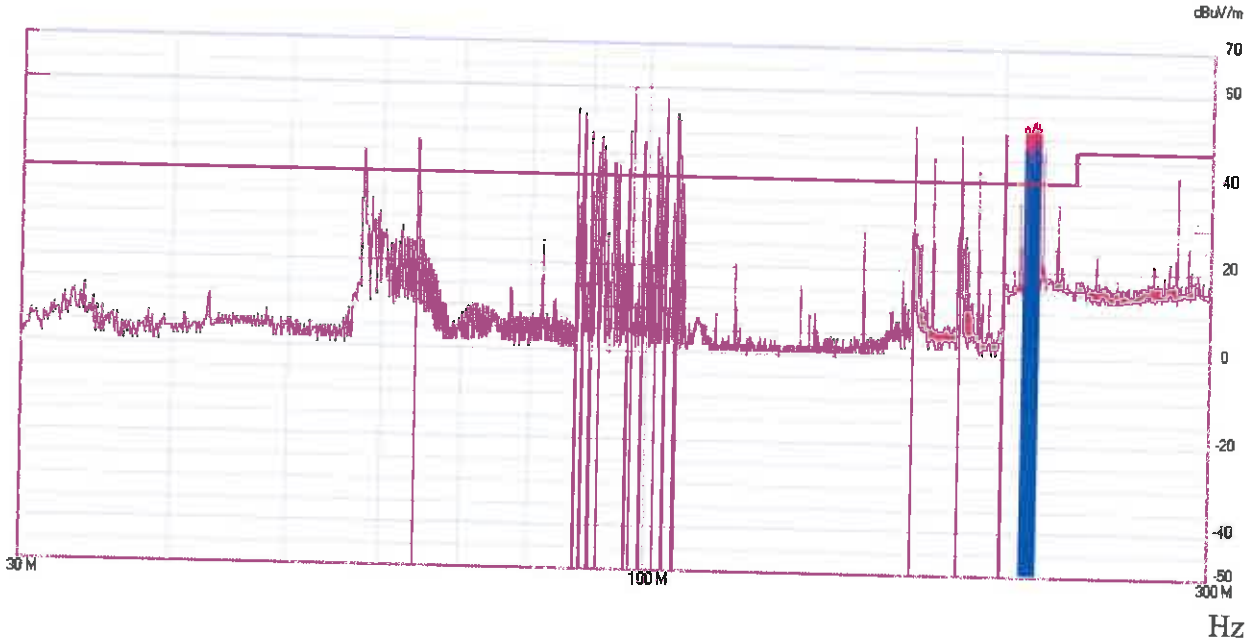


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
386.3	54.54	47	Passed
493.7	58.84	47	Passed
535.3	56.07	47	Passed
623.3	65.18	47	Passed
937.1	67.36	47	Passed

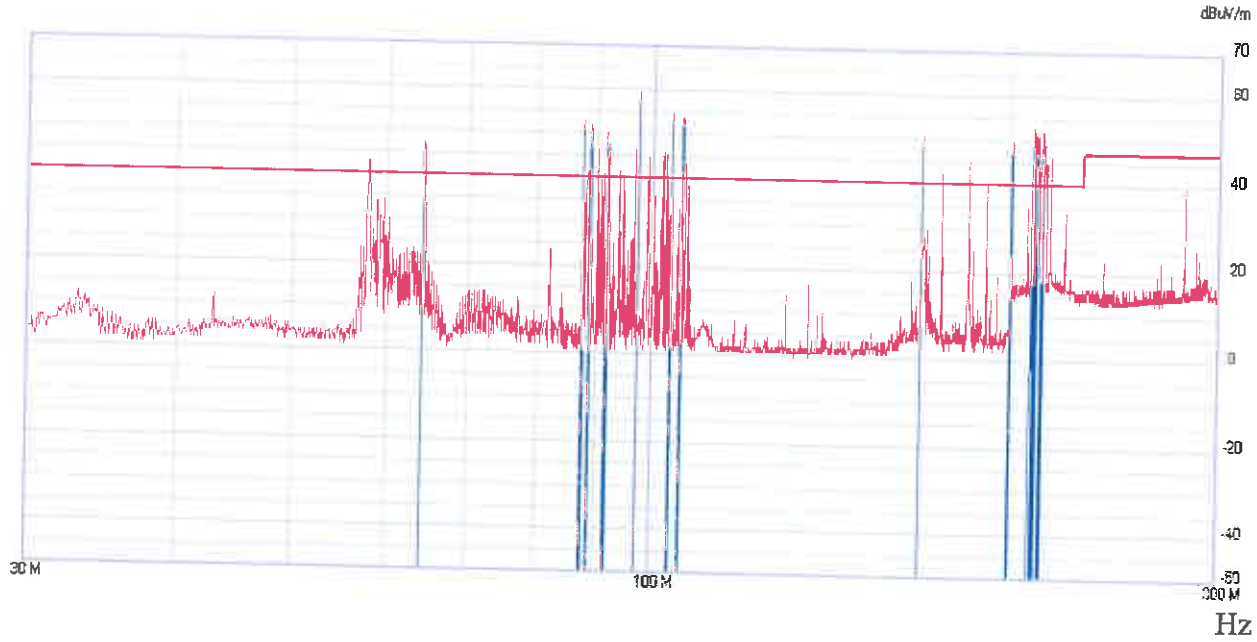
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 25: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Left, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 26: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Left, 30MHz-300MHz

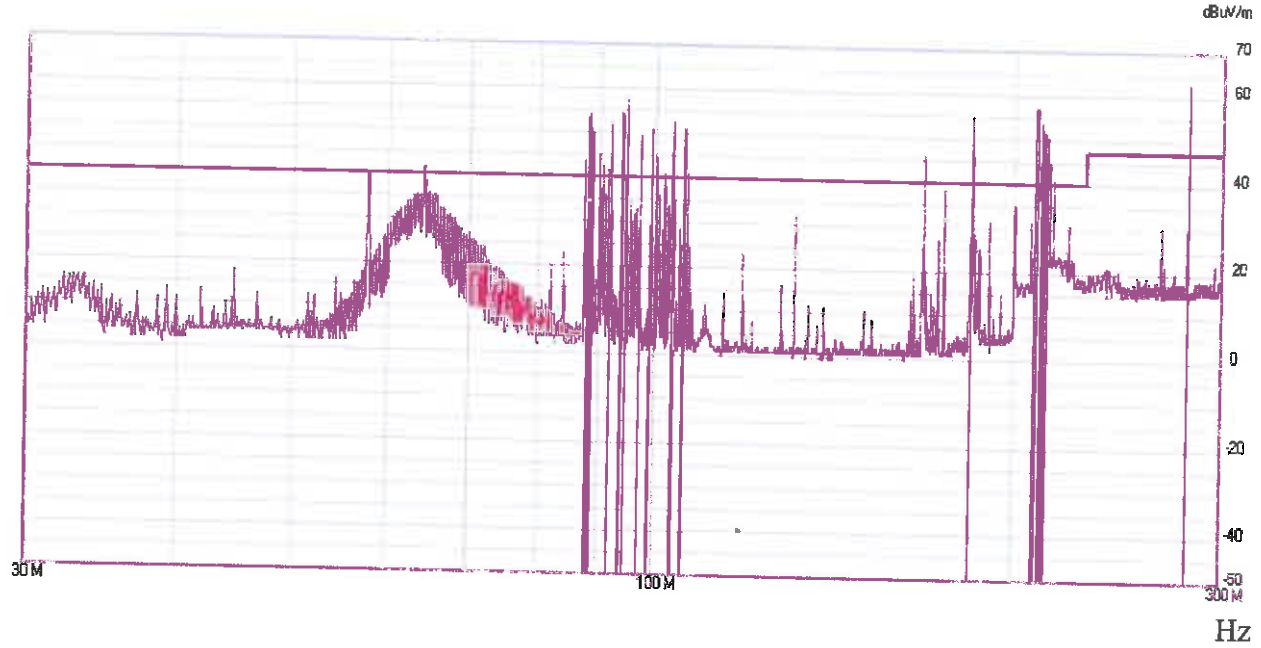


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
64.2	45.12	40	Passed
87.6	51.08	40	Passed
103.9	53.74	40	Passed
168.3	49.02	40	Passed
208.8	46.01	40	Passed

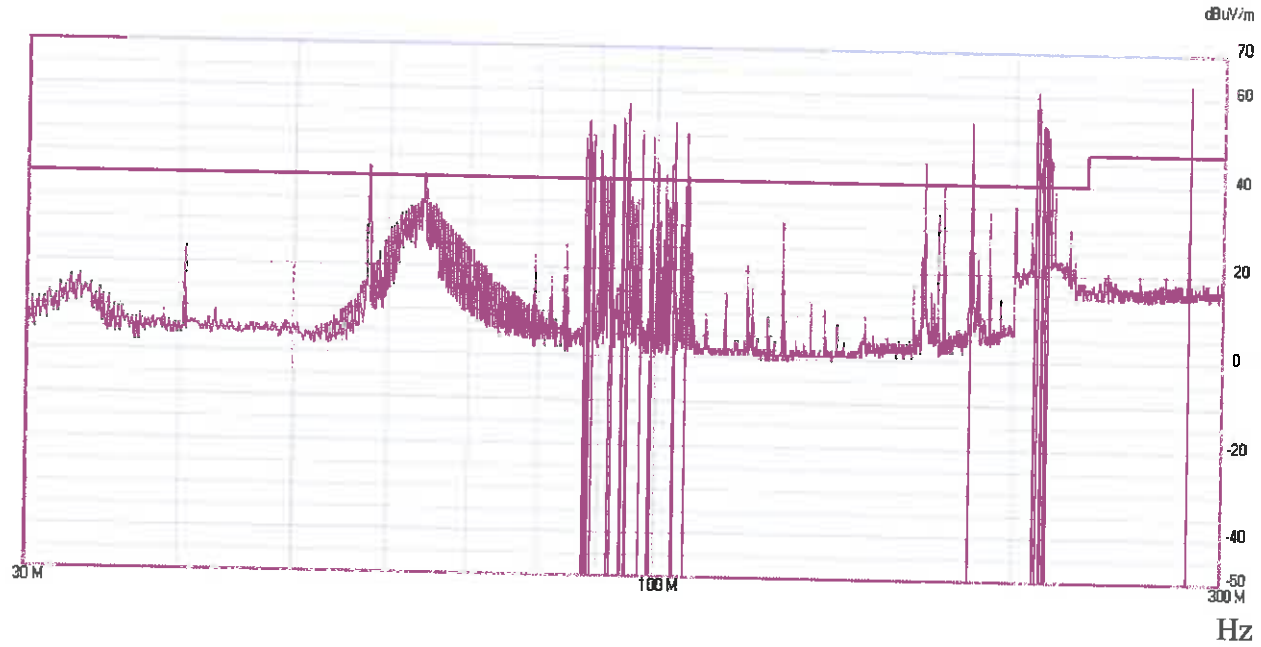
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 27: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Left, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 28: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Left, 30MHz-300MHz

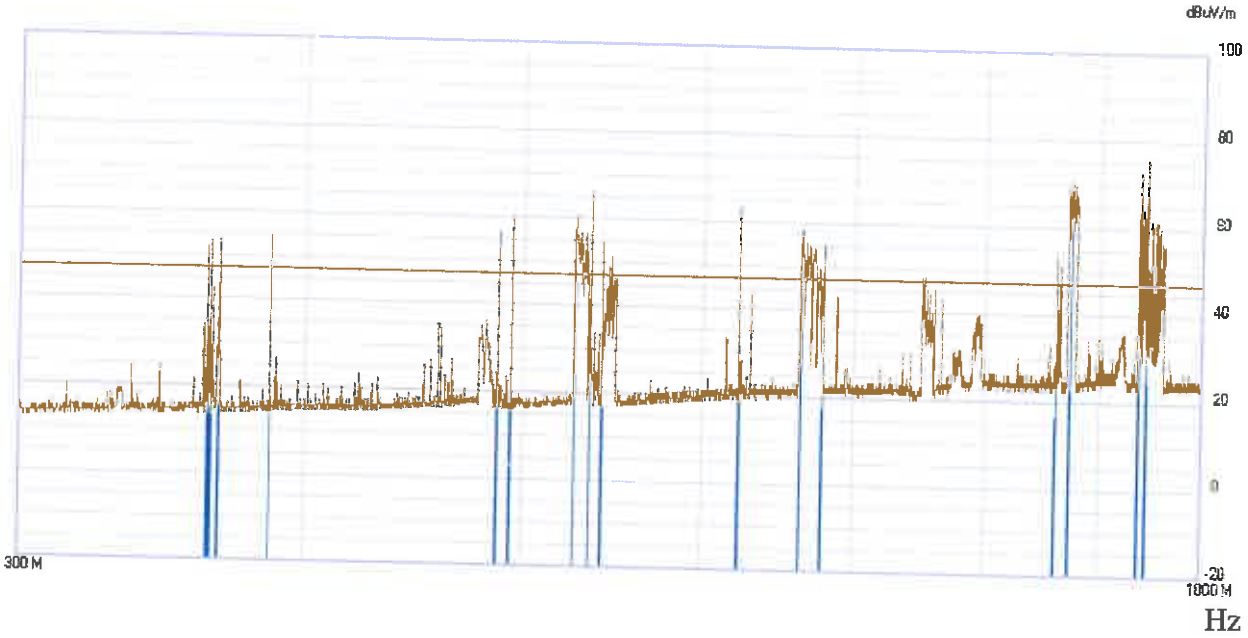


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
88.1	49.47	40	Passed
93.8	51.21	40	Passed
184.3	49.07	40	Passed
208.4	53.00	40	Passed
280.0	62.66	47	Passed

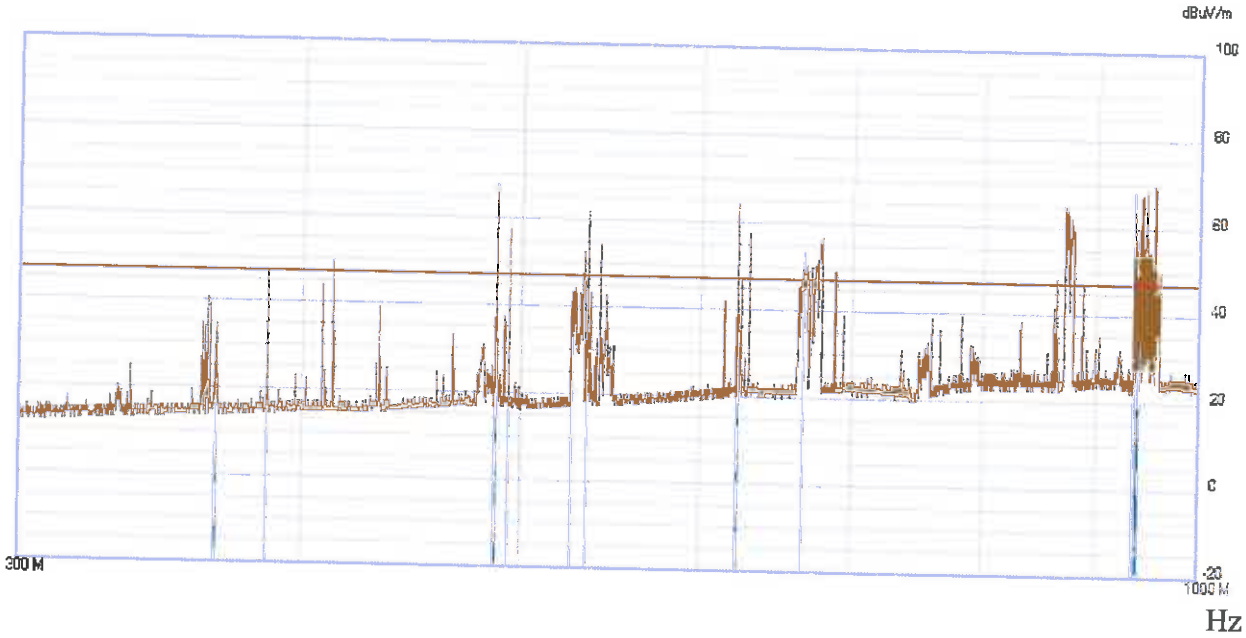
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 29: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Left, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 30: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Left, 300MHz-1000MHz

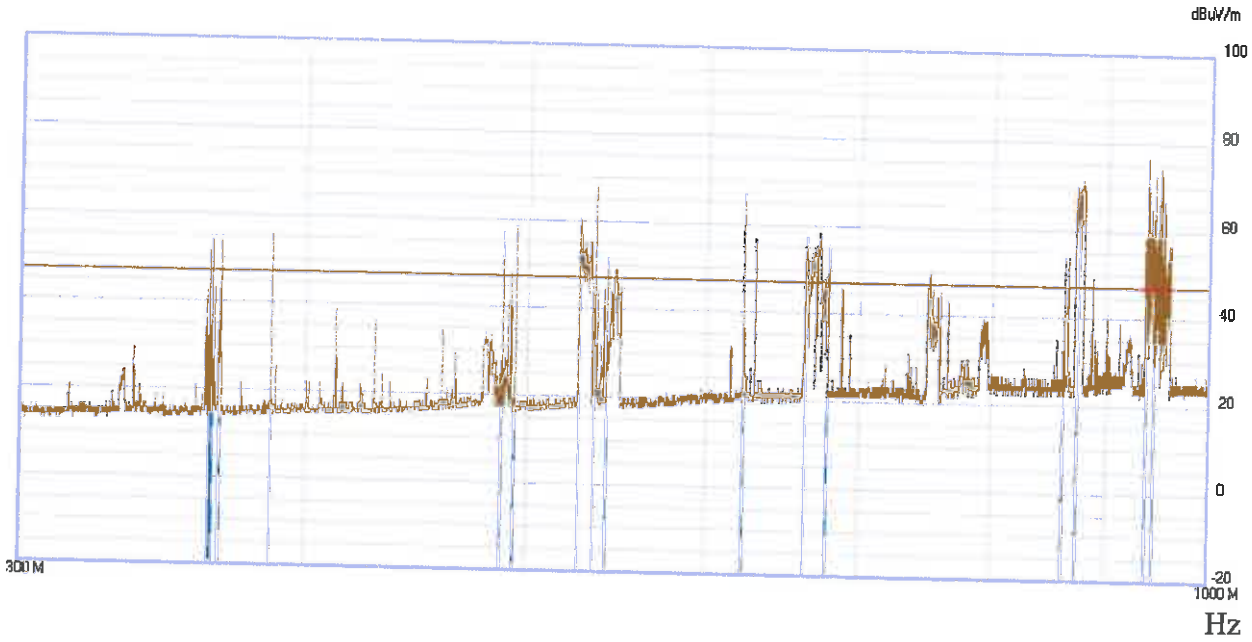


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
487.2	67.61	47	Passed
535.3	59.73	47	Passed
623.3	62.71	47	Passed
935.3	68.16	47	Passed

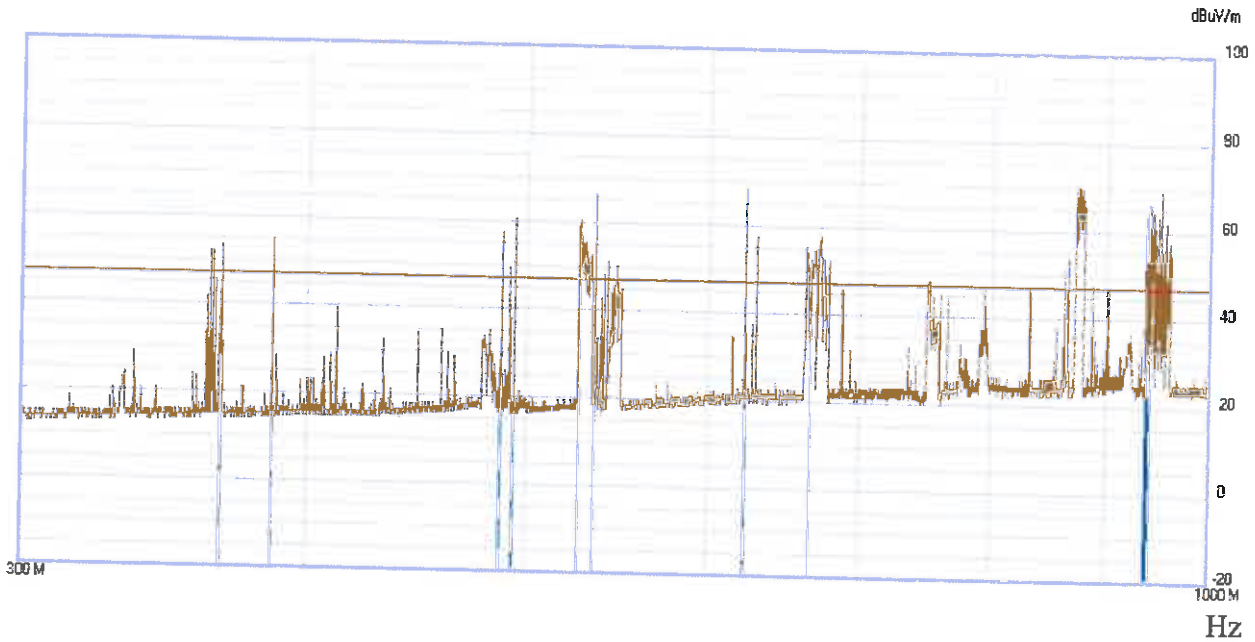
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 31: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Left, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 32: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Left, 300MHz-1000MHz

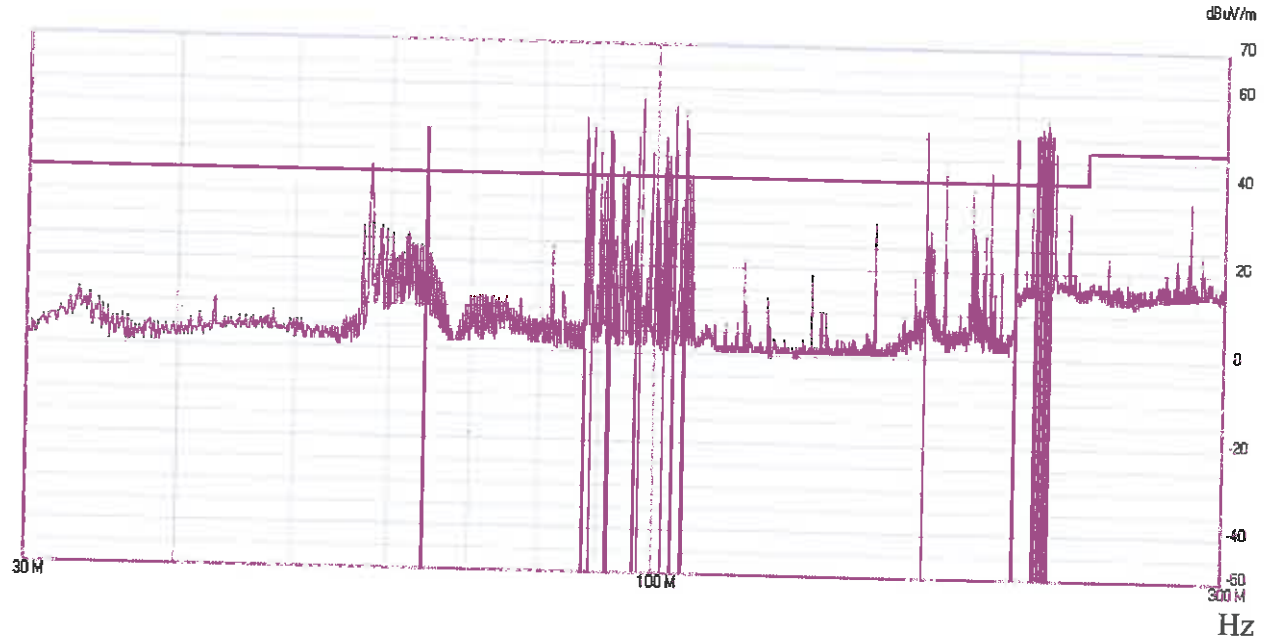


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
386.3	54.44	47	Passed
493.7	59.64	47	Passed
535.3	66.23	47	Passed
623.3	68.32	47	Passed
939.2	66.18	47	Passed

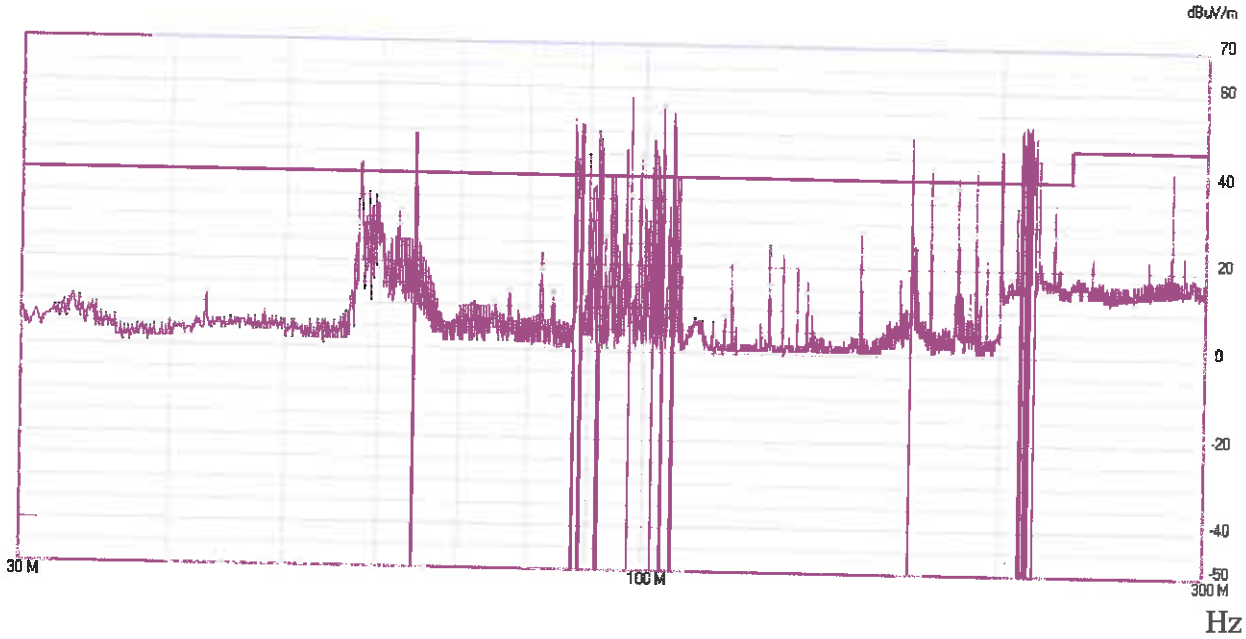
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 33: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Rear, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 34: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Rear, 30MHz-300MHz

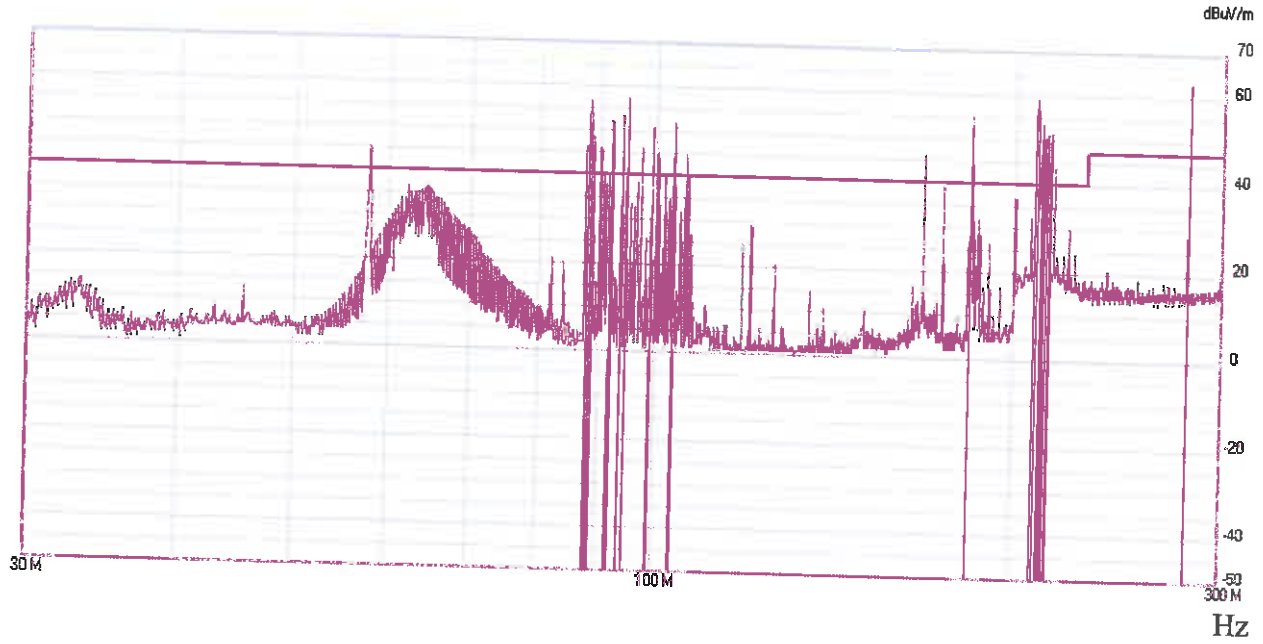


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
64.3	47.19	40	Passed
97.4	56.75	40	Passed
168.3	47.10	40	Passed
214.5	48.01	40	Passed

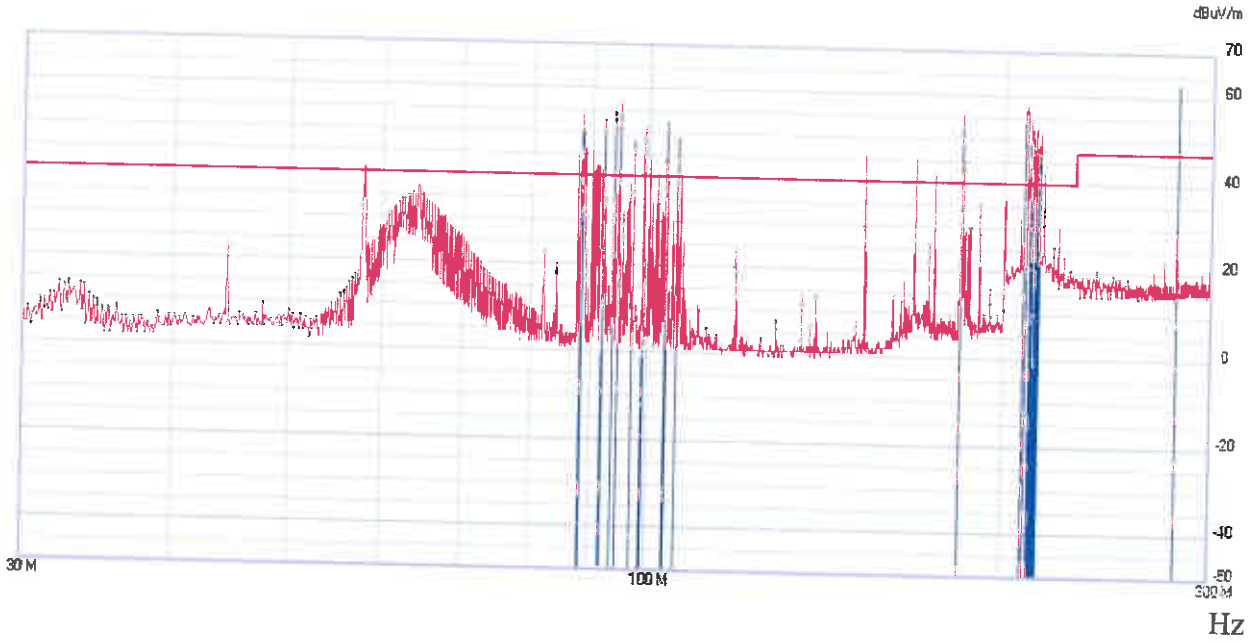
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 35: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Rear, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 36: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Rear, 30MHz-300MHz

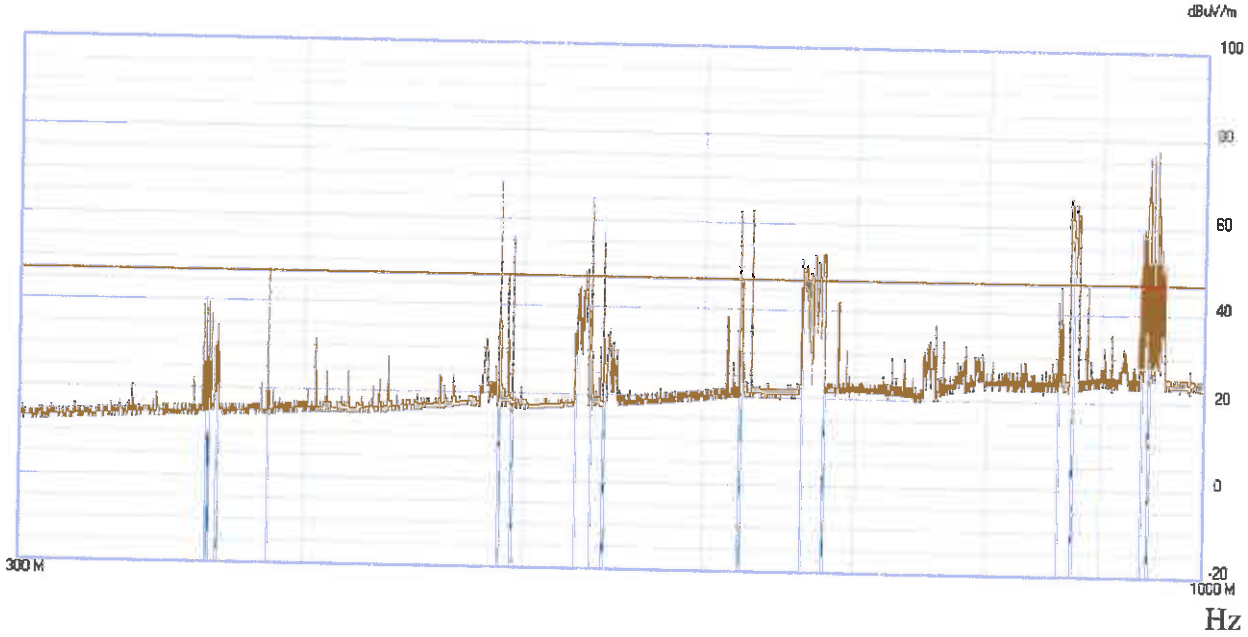


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
94.8	54.52	40	Passed
103.9	51.42	40	Passed
184.3	52.98	40	Passed
208.5	54.13	40	Passed
280.0	62.70	47	Passed

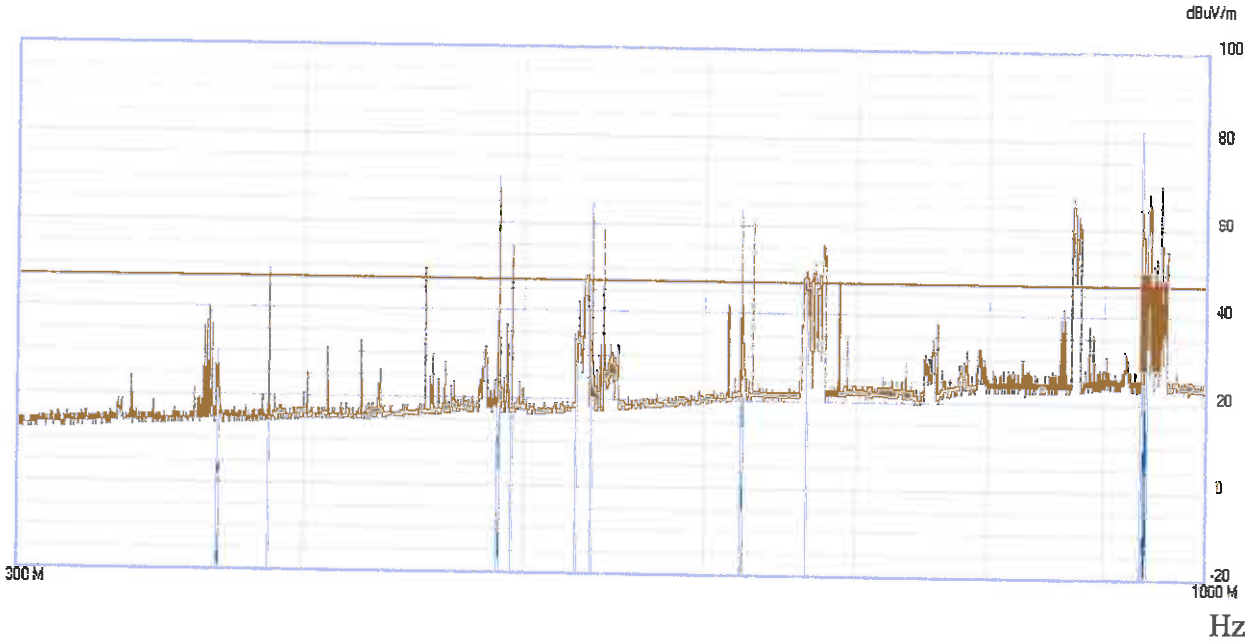
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 37: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Rear, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 38: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Rear, 300MHz-1000MHz

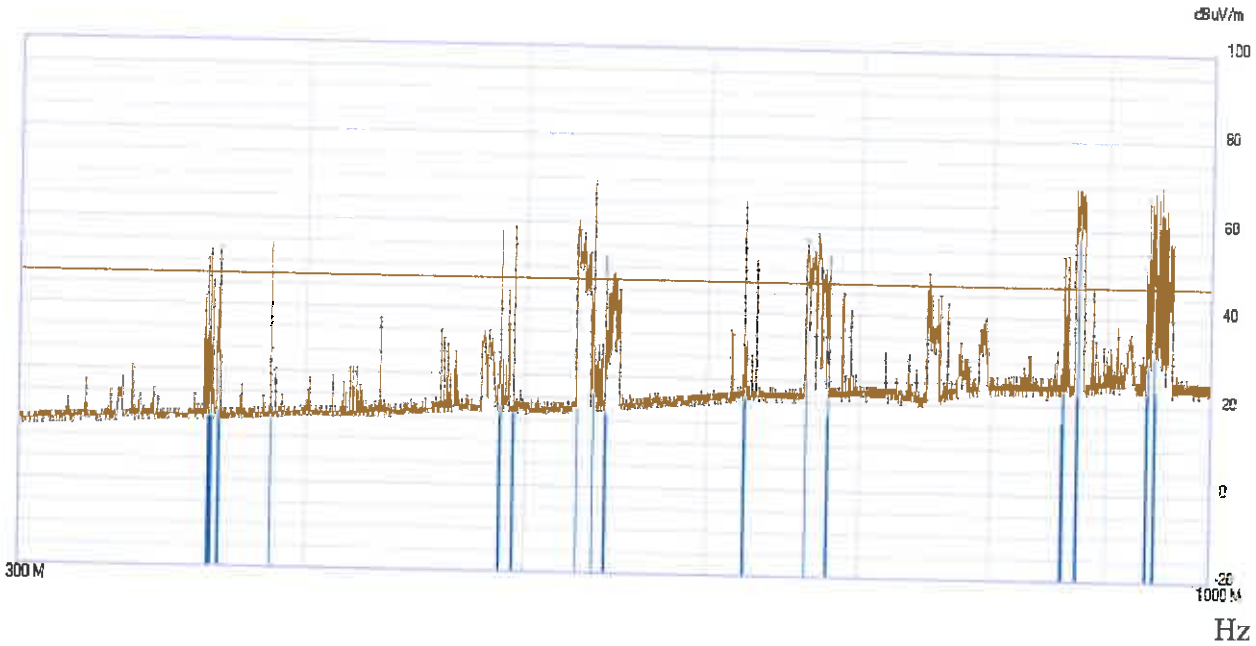


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
487.2	66.72	47	Passed
535.3	61.46	47	Passed
623.3	63.53	47	Passed
935.3	72.12	47	Passed

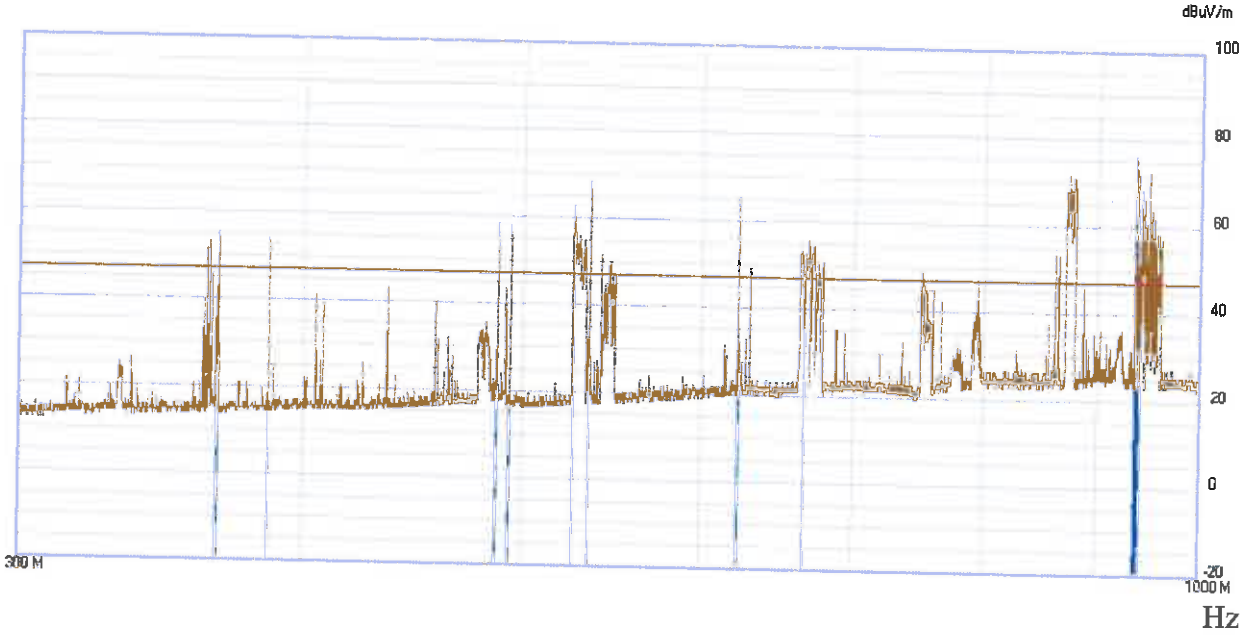
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 39: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Rear, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 40: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Rear, 300MHz-1000MHz

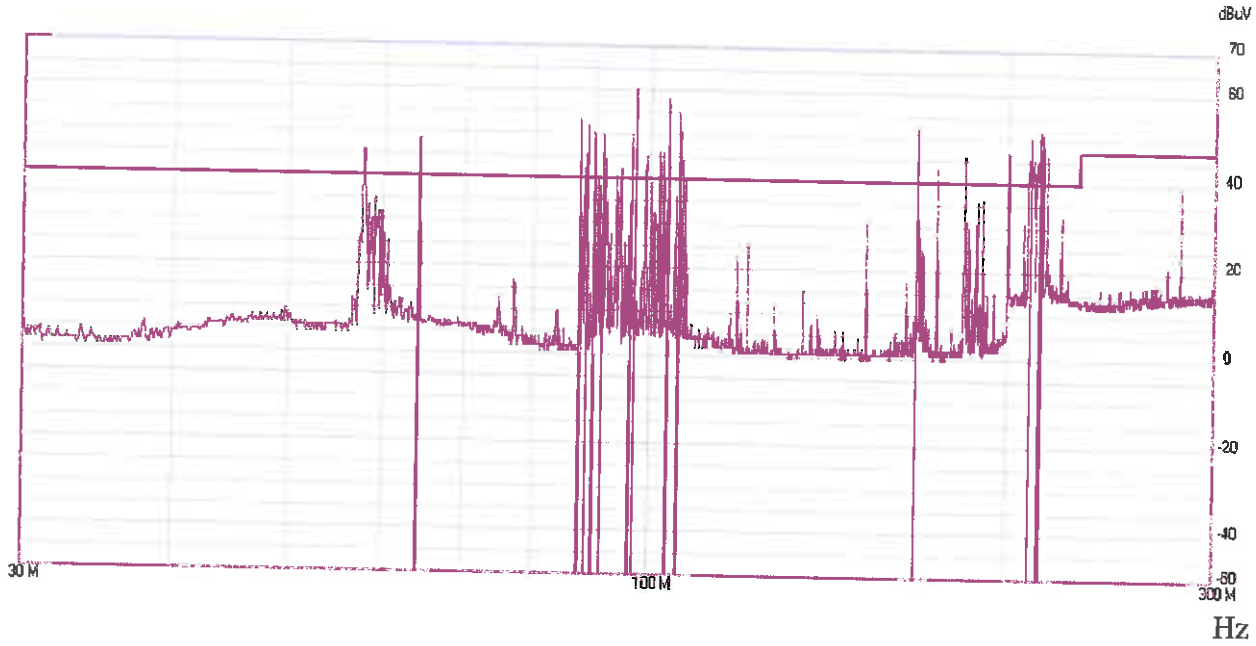


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
386.3	53.40	47	Passed
535.3	65.58	47	Passed
937.1	66.78	47	Passed

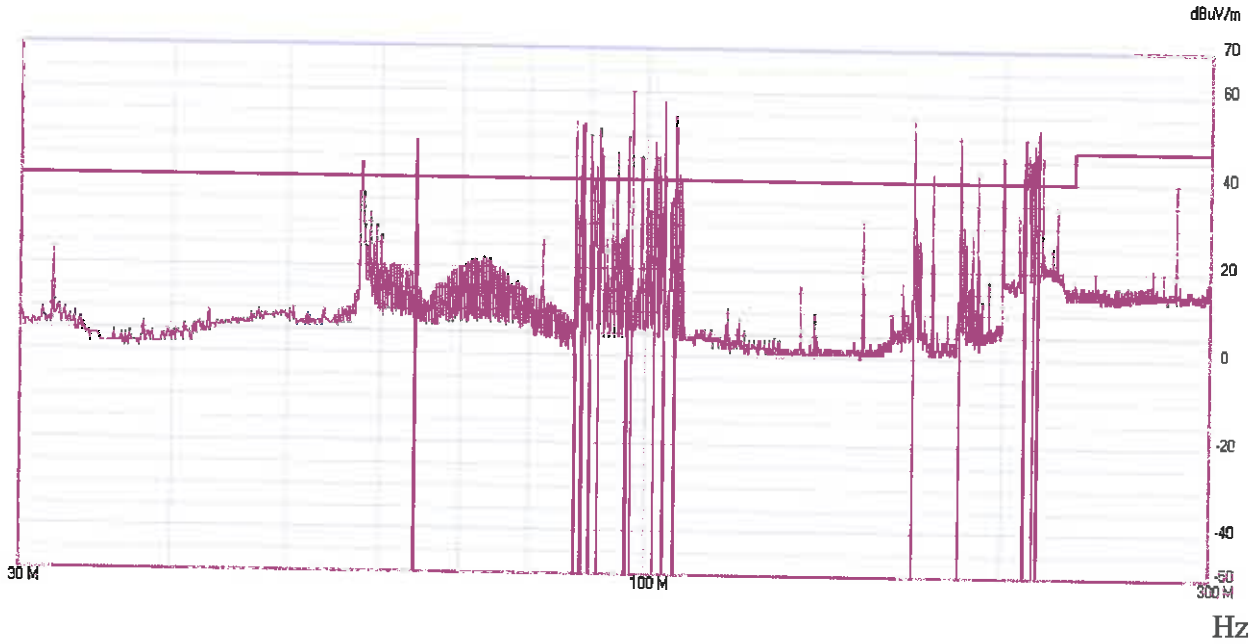
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 41: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Right, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 42: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Right, 30MHz-300MHz

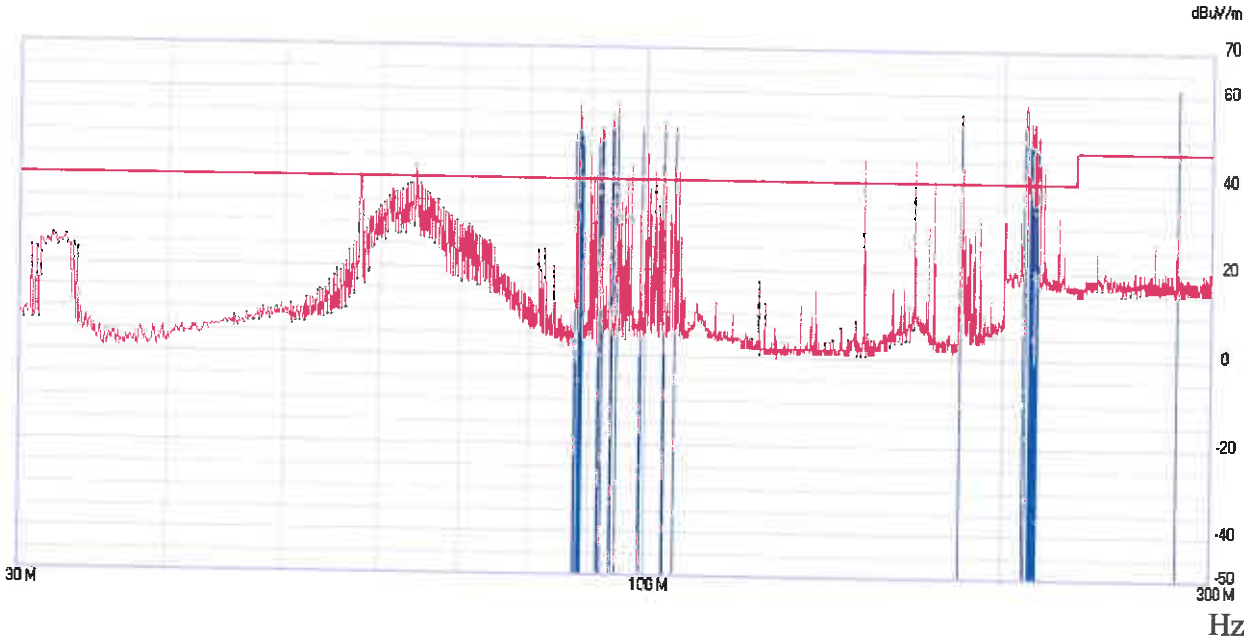


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
64.3	47.32	40	Passed
97.4	59.09	40	Passed
103.9	57.06	40	Passed
208.7	49.37	40	Passed

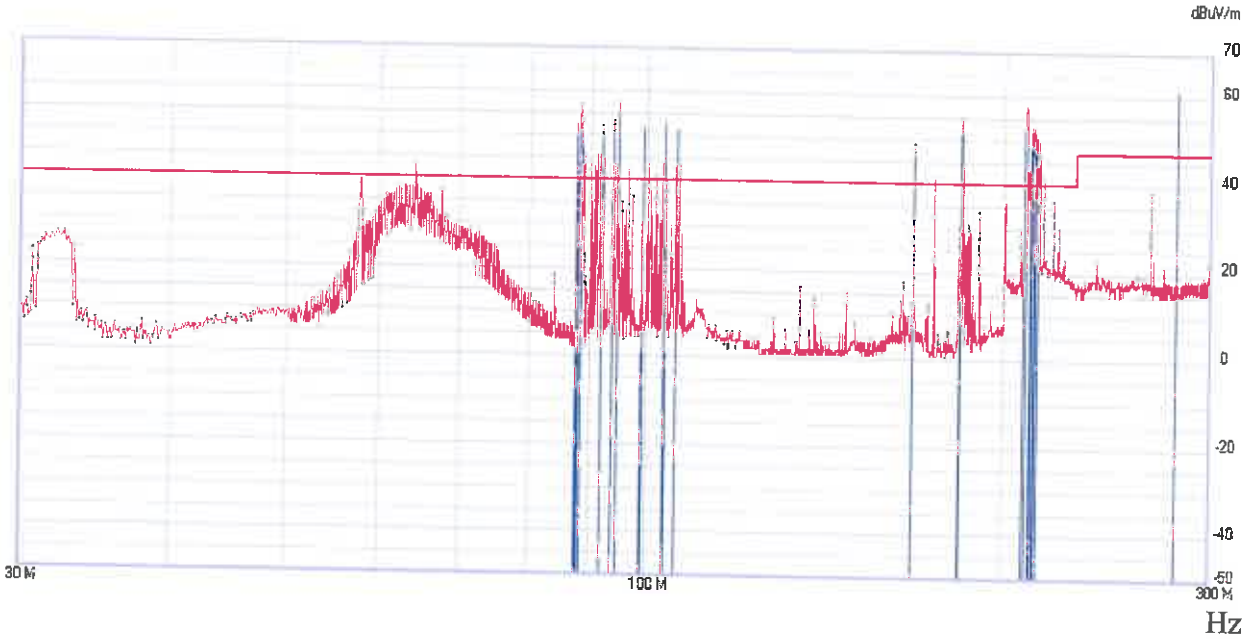
Note: For the frequency that **out** of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 43: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Right, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 44: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Right, 30MHz-300MHz

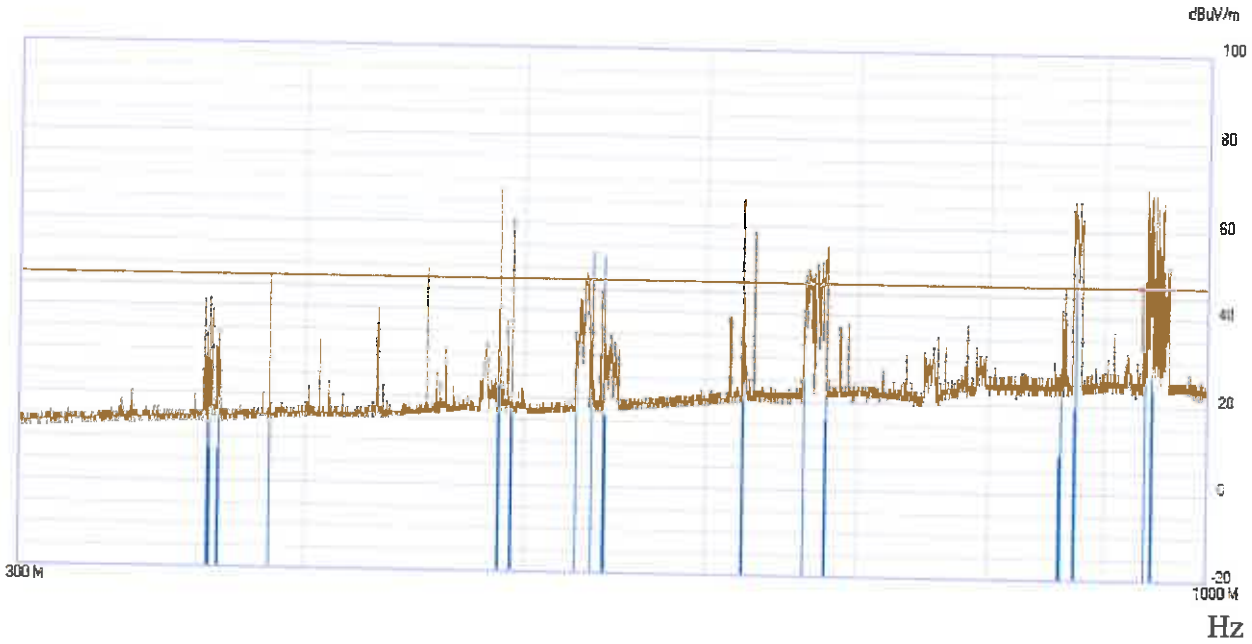


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
94.8	54.84	40	Passed
208.8	53.87	40	Passed
280.0	61.34	47	Passed

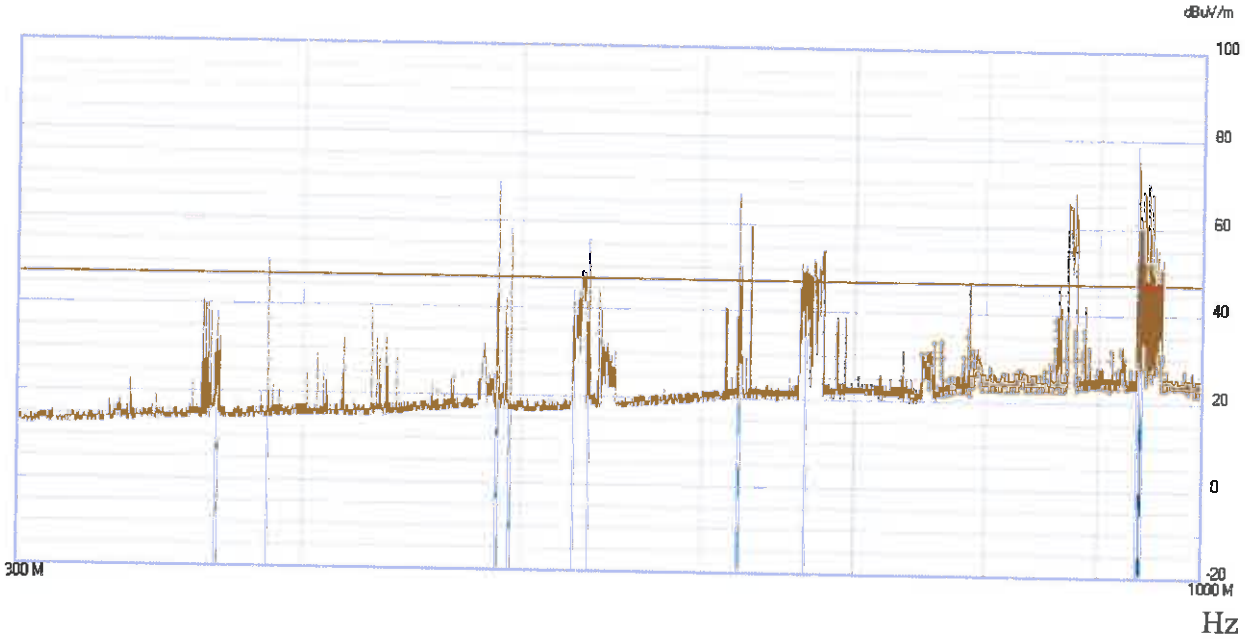
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 45: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Right, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 46: Spectral diagrams and measurement results, TTM-1700A, Horizontal polarization, Right, 300MHz-1000MHz

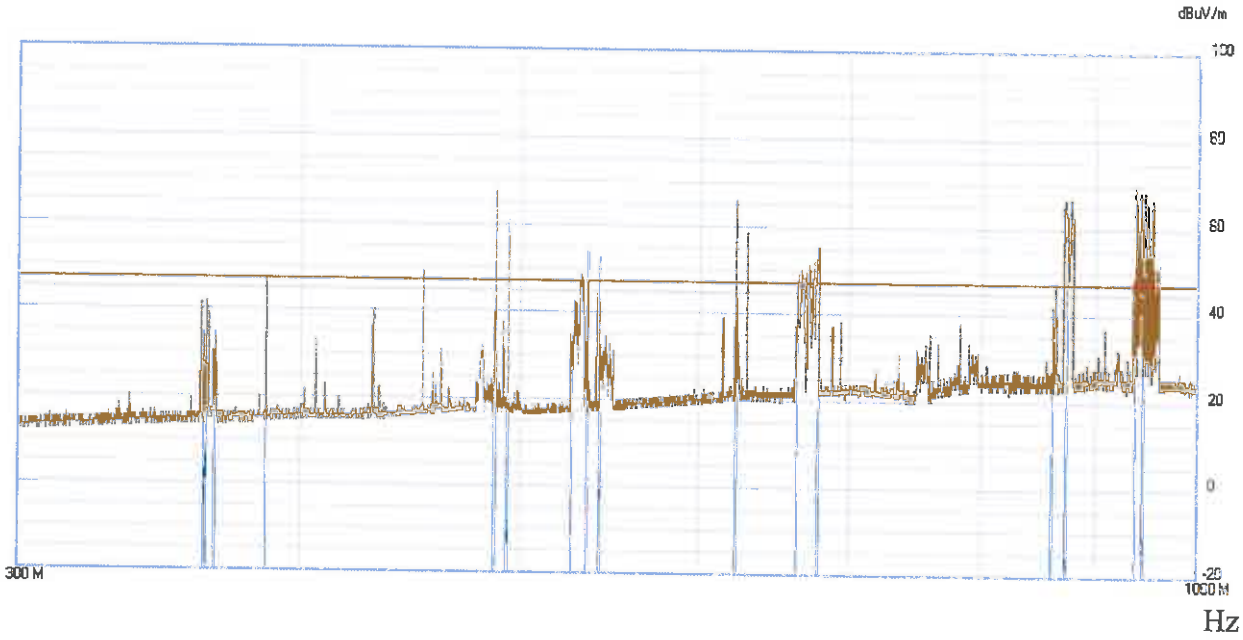


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
487.2	65.64	47	Passed
623.3	63.35	47	Passed
935.3	67.18	47	Passed

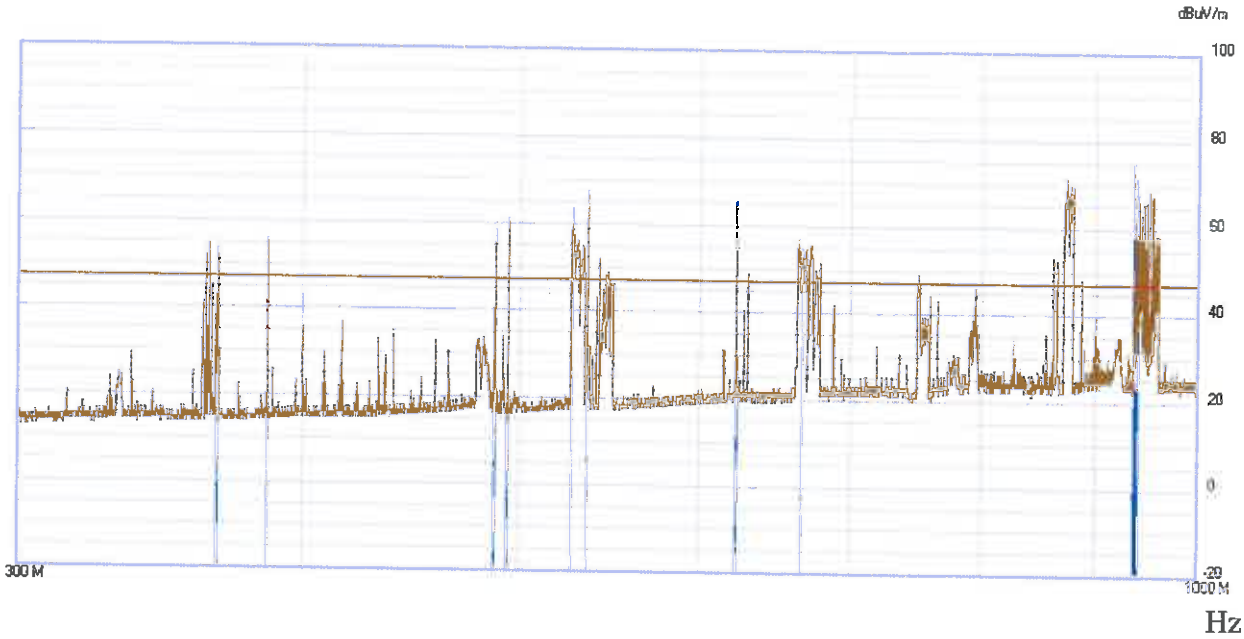
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 47: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Right, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 48: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Right, 300MHz-1000MHz

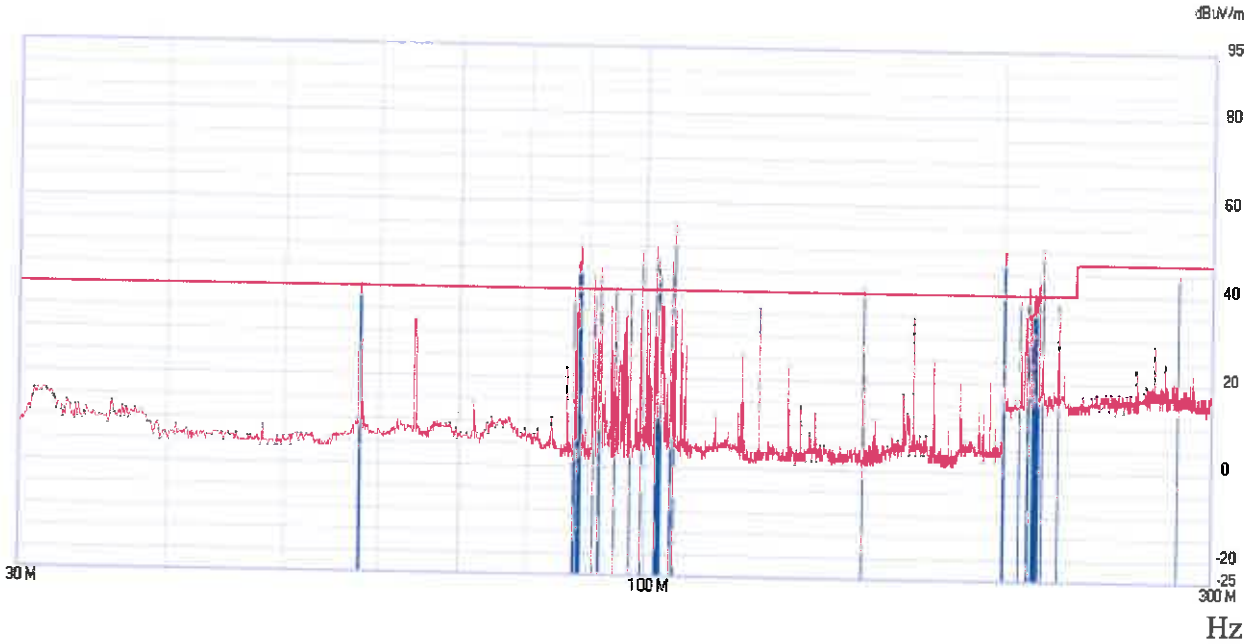


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
386.3	54.48	47	Passed
623.3	65.51	47	Passed
937.1	67.06	47	Passed

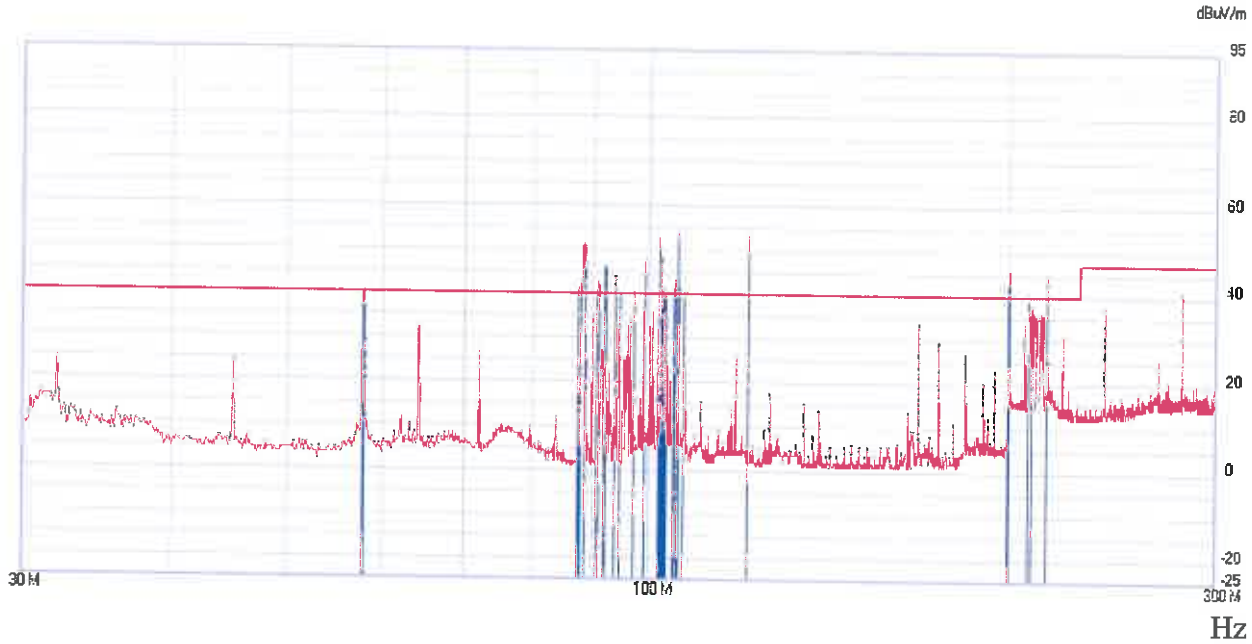
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 49: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Front, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 50: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Front, 30MHz-300MHz

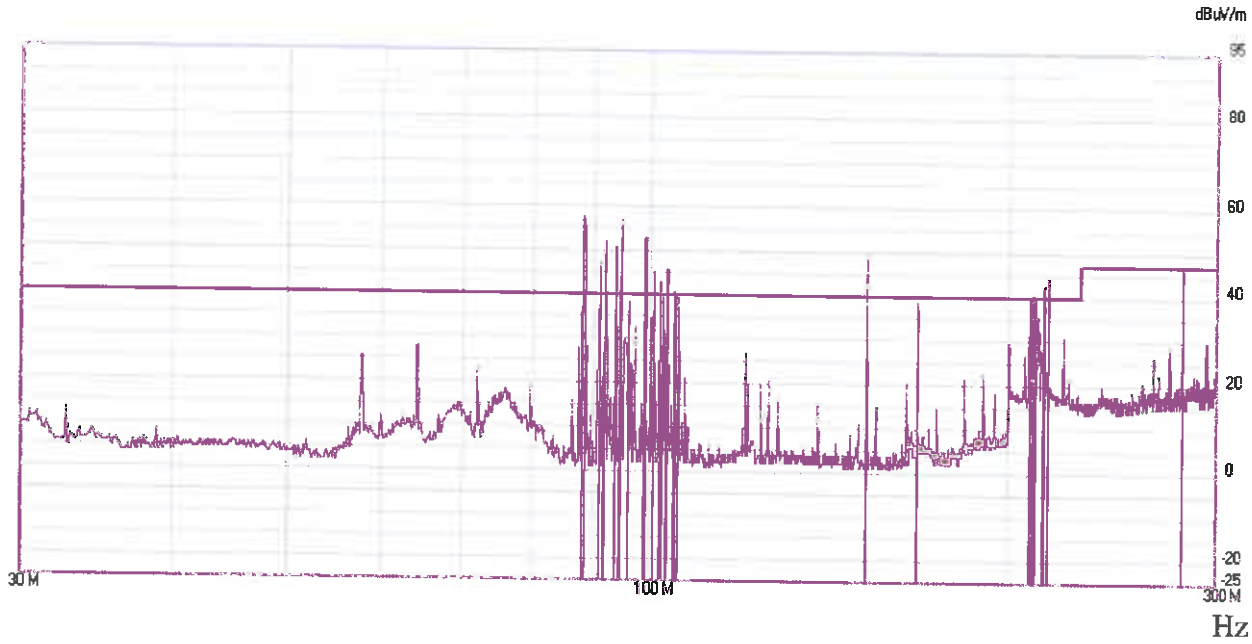


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
88.6	47.25	40	Passed
102.1	50.30	40	Passed
121.1	49.68	40	Passed

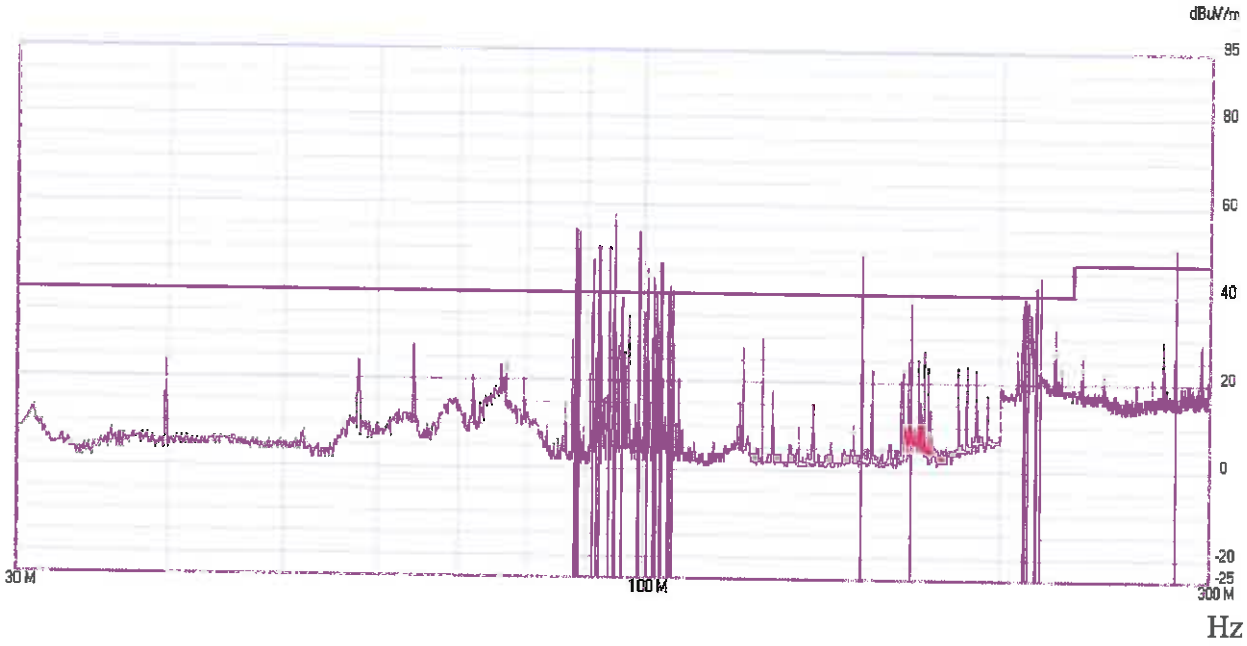
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 51: Spectral diagrams and measurement results, TTM-2500, Vertical polarization, Front, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 52: Spectral diagrams and measurement results, TTM-2500, Vertical polarization, Front, 30MHz-300MHz

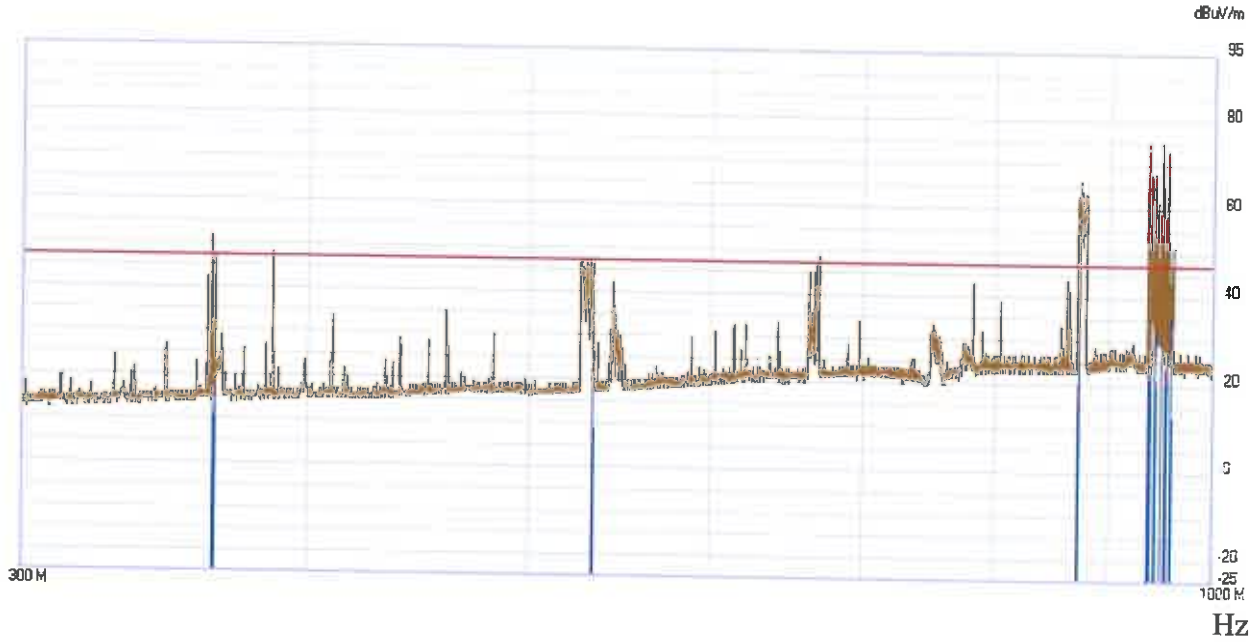


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
88.5	50.38	40	Passed
94.8	54.97	40	Passed
152.6	48.85	40	Passed
280.0	50.42	47	Passed

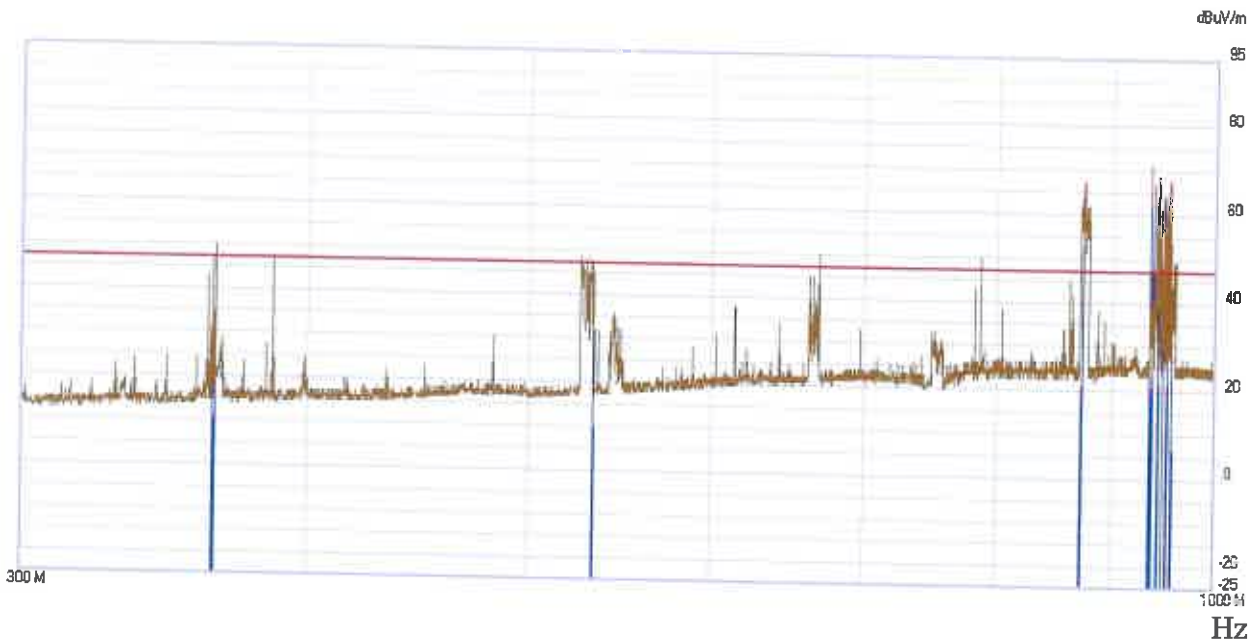
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 53: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Front, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 54: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Front, 300MHz-1000MHz

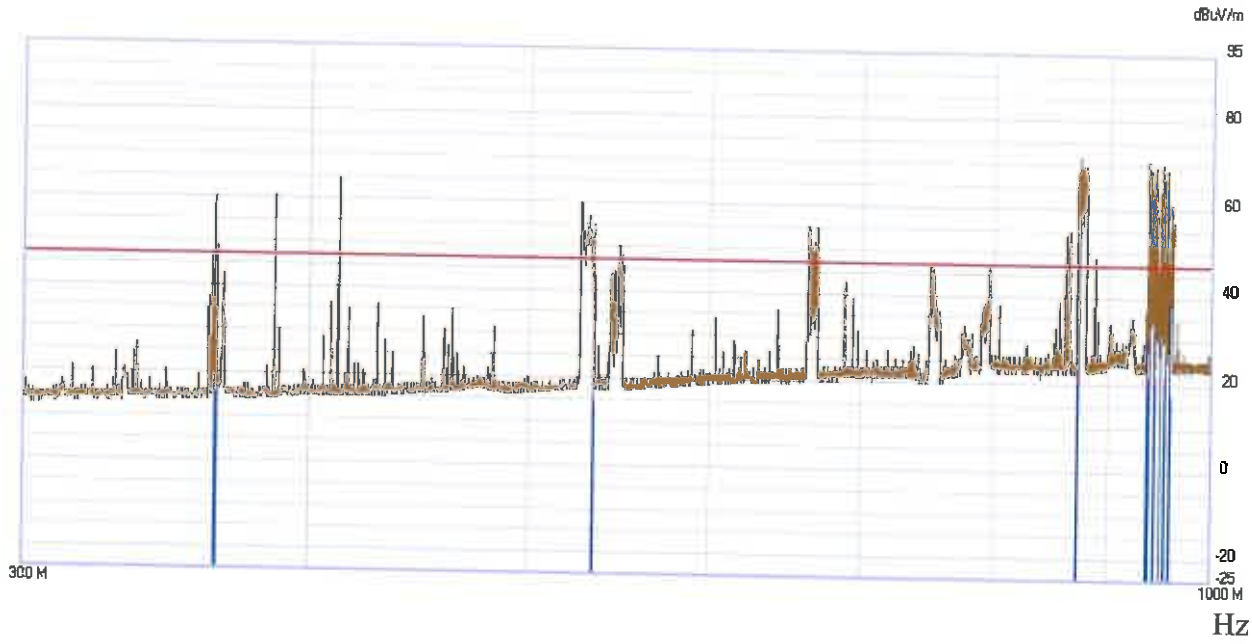


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
364.4	47.68	47	Passed
872.9	59.91	47	Passed
942.2	65.58	47	Passed

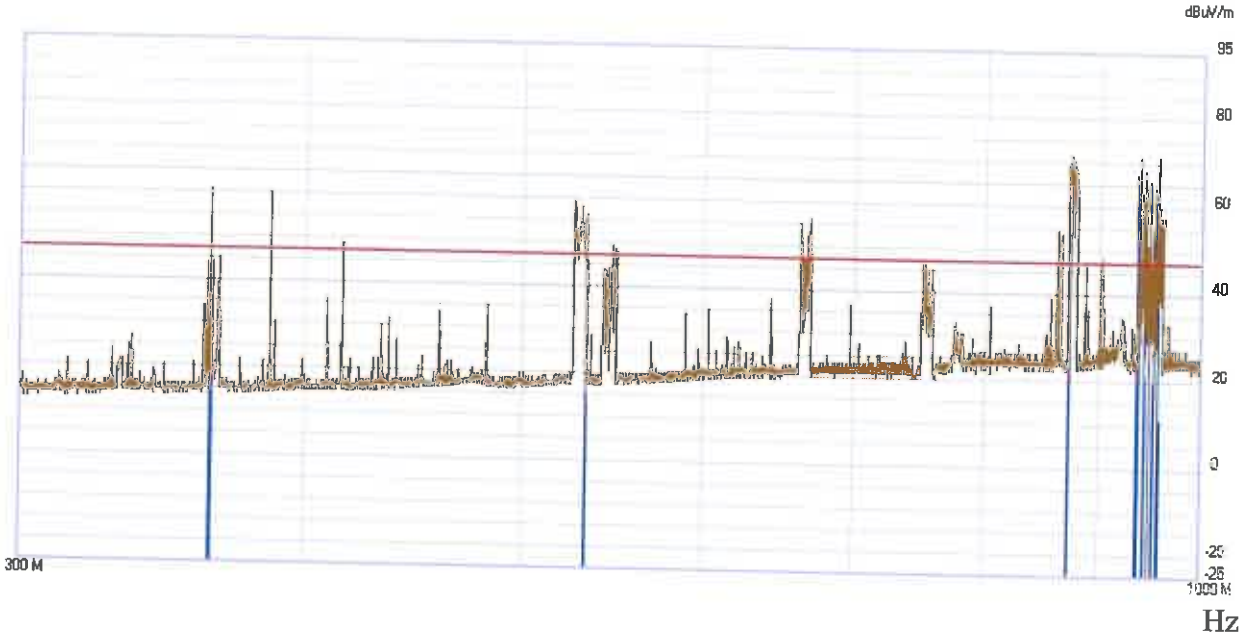
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 55: Spectral diagrams and measurement results, TTM-1700A, Vertical polarization, Front, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 56: Spectral diagrams and measurement results, TTM-2500, Vertical polarization, Front, 300MHz-1000MHz

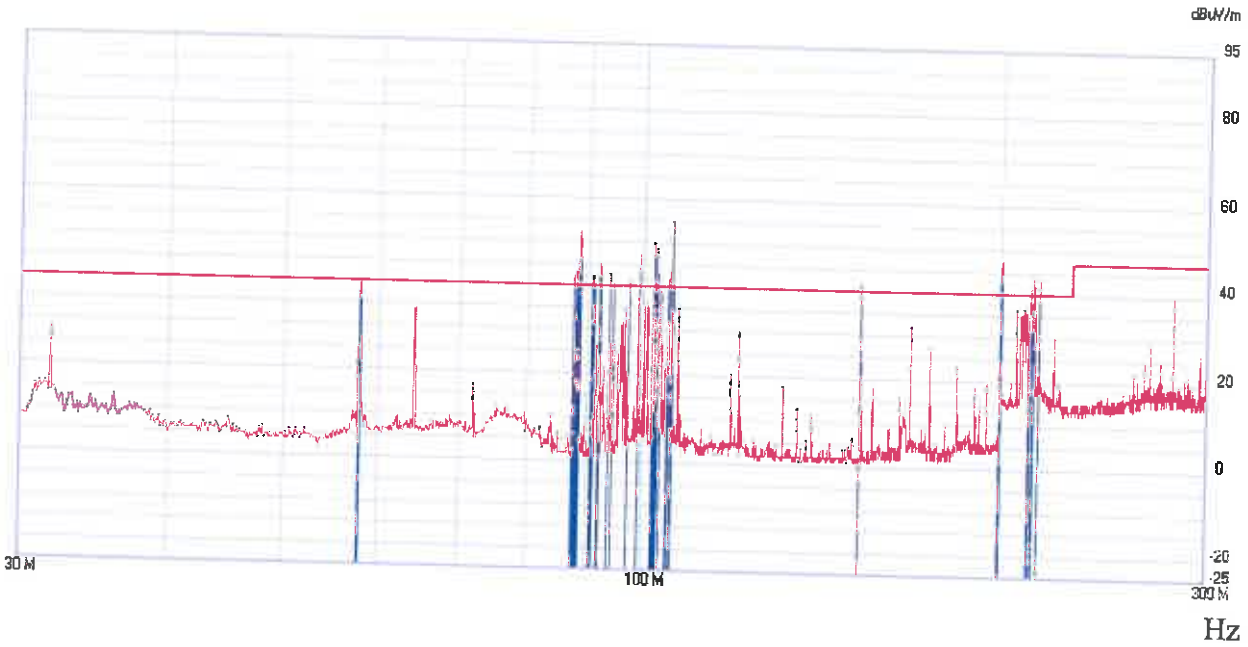


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
363.6	57.53	47	Passed
533.5	50.08	47	Passed
935.3	65.43	47	Passed
942.2	65.20	47	Passed

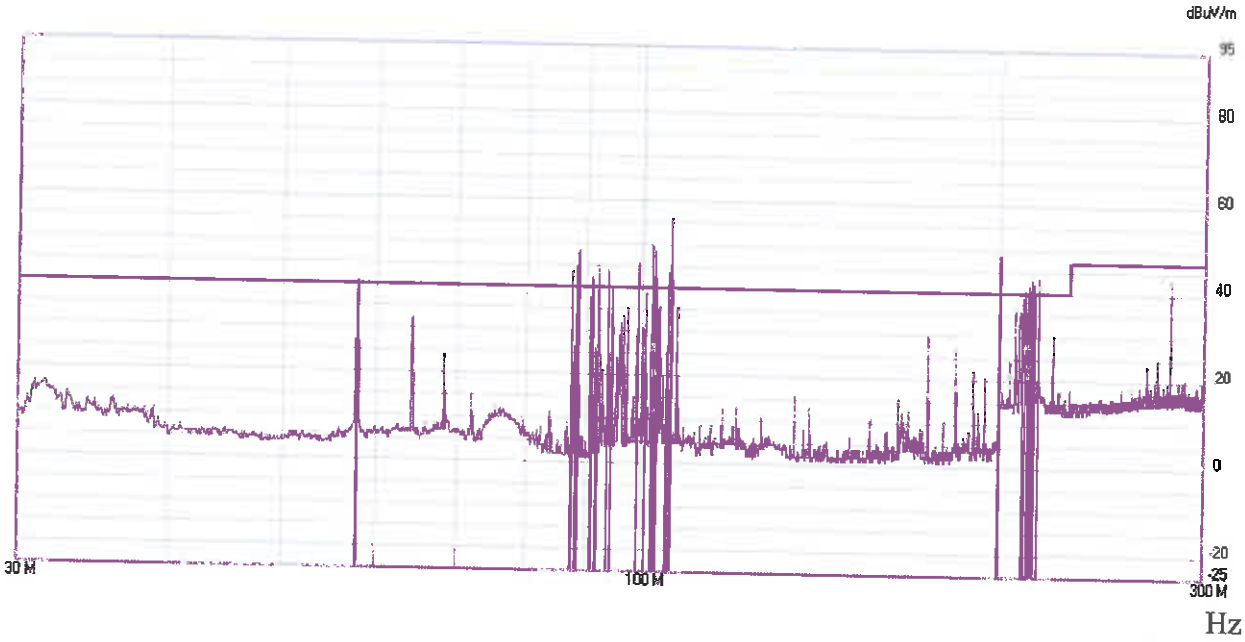
Note: For the frequency that **out** of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 57: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Left, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 58: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Left, 30MHz-300MHz

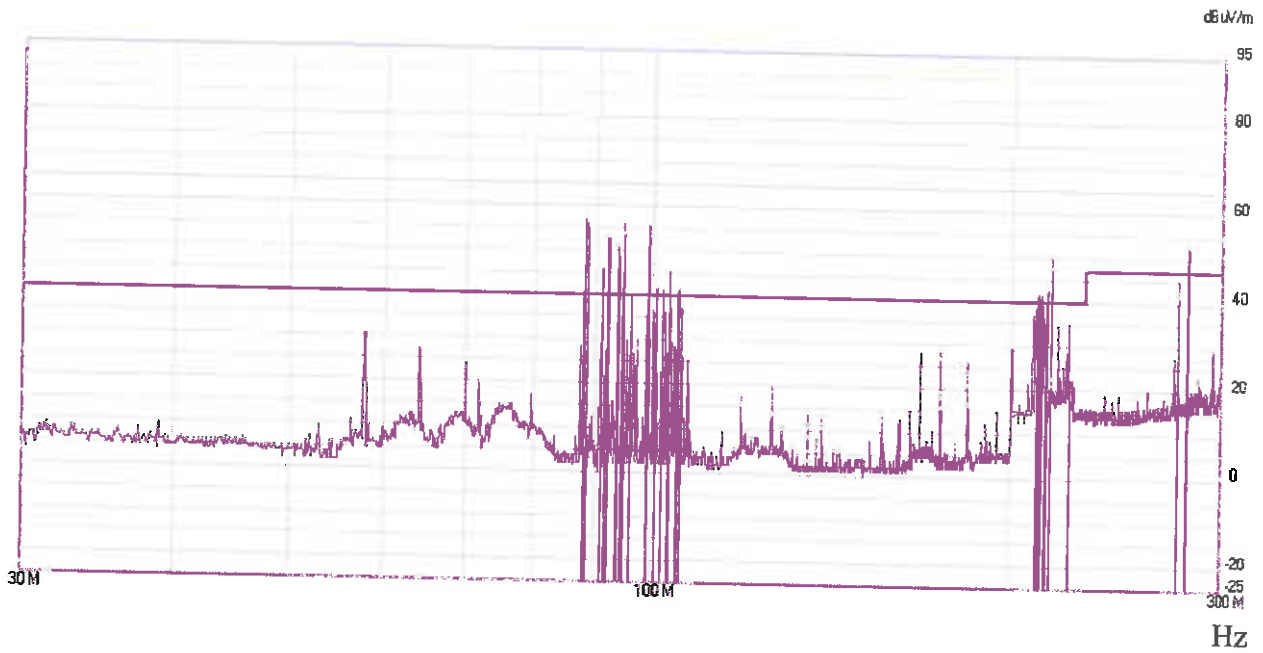


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
88.5	45.65	40	Passed
102.1	47.05	40	Passed
200.3	45.68	40	Passed

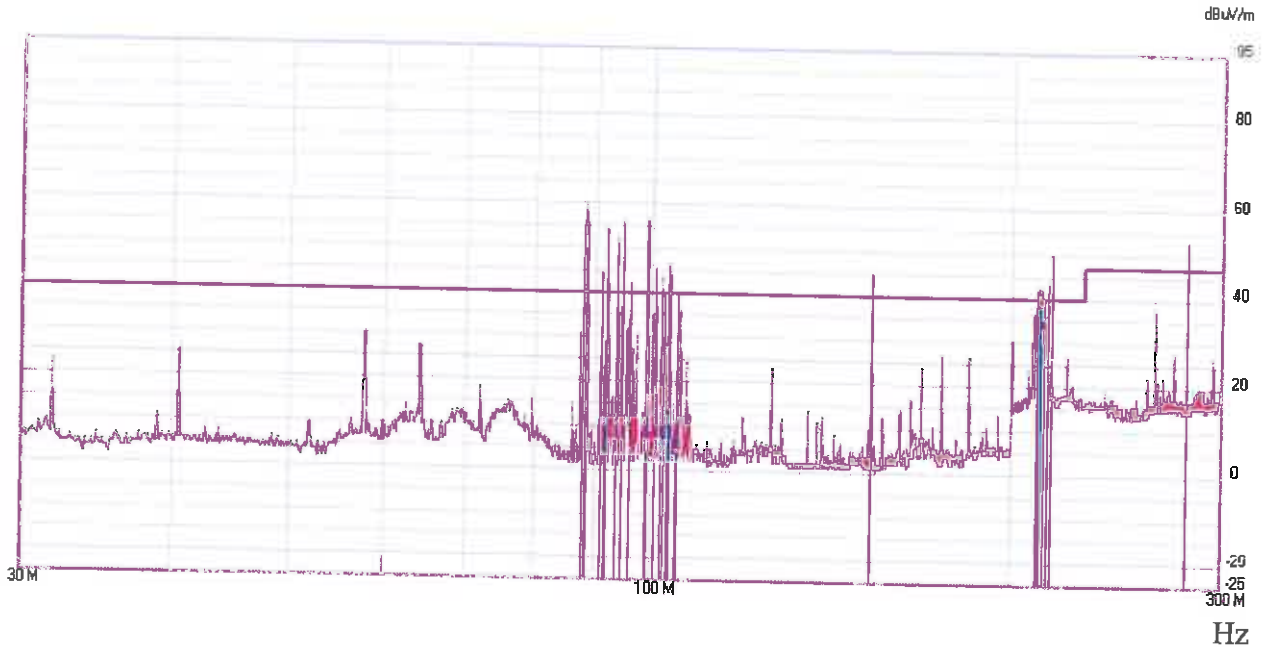
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 59: Spectral diagrams and measurement results, TTM-2500, Vertical polarization, Left, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 60: Spectral diagrams and measurement results, TTM-2500, Vertical polarization, Left, 30MHz-300MHz

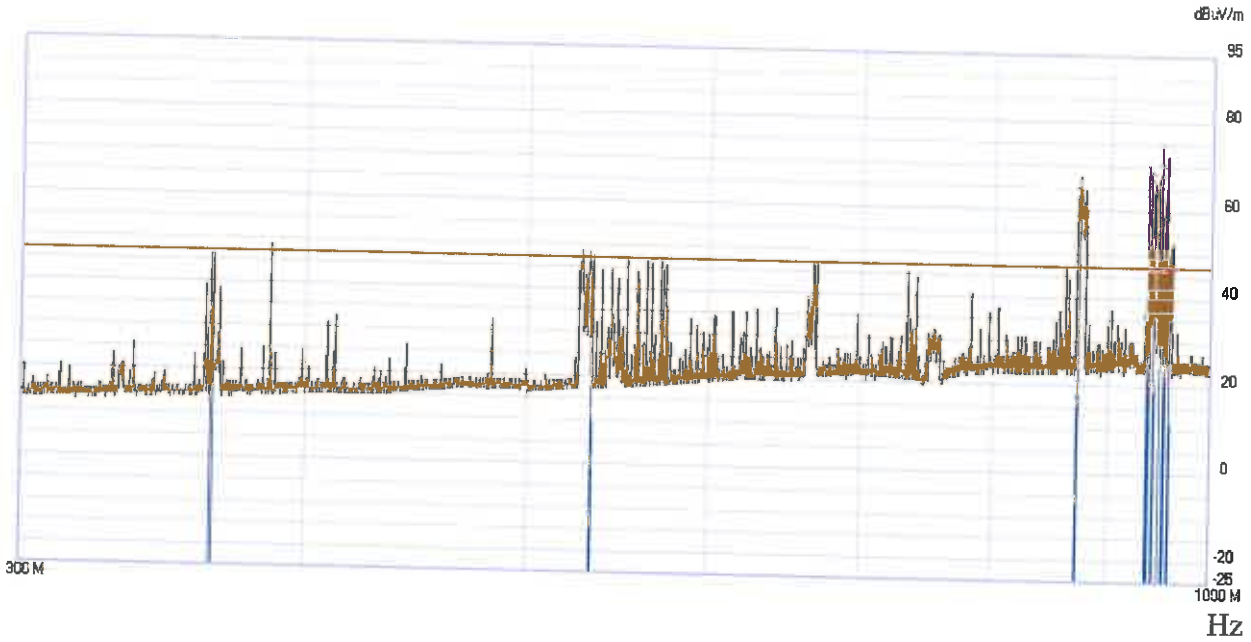


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
88.3	53.95	40	Passed
94.8	54.80	40	Passed
152.6	44.51	40	Passed
280.0	52.40	47	Passed

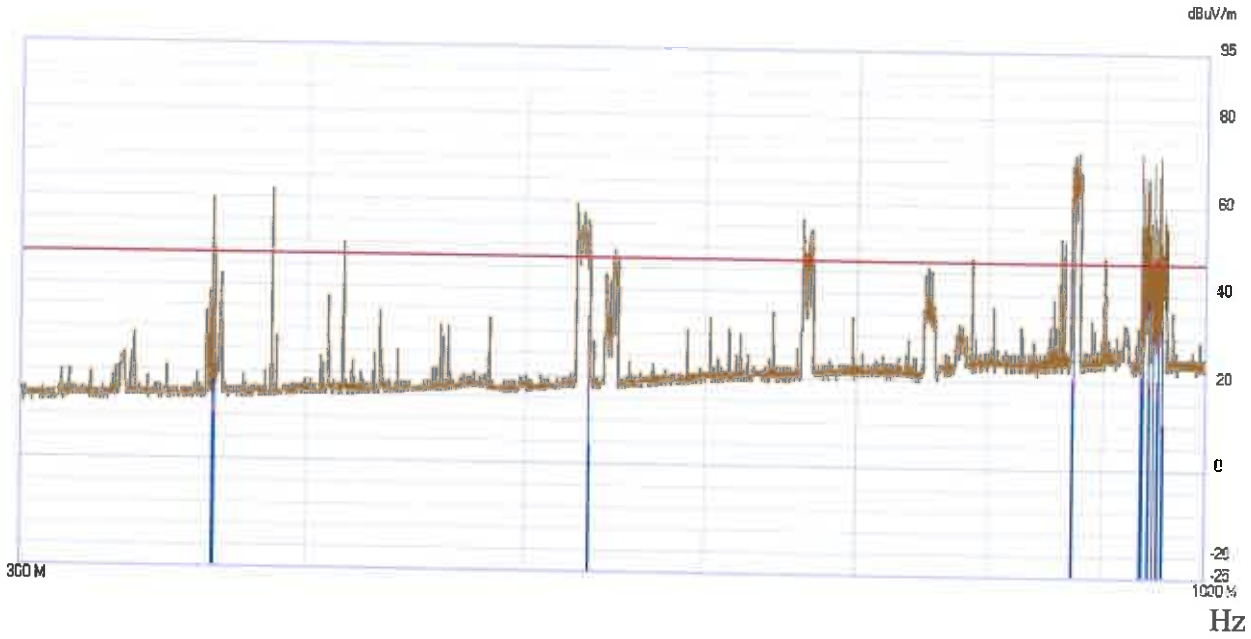
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 61: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Left, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 62: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Left, 300MHz-1000MHz

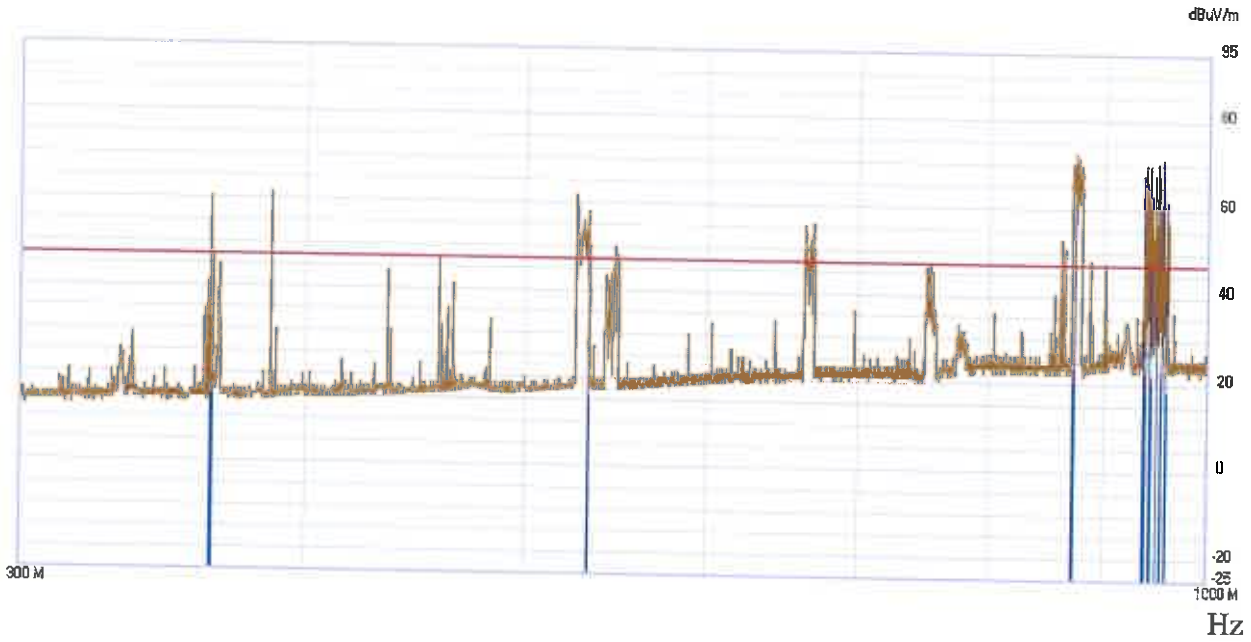


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
363.6	57.42	47	Passed
533.5	52.69	47	Passed
872.9	63.71	47	Passed
942.2	66.77	47	Passed

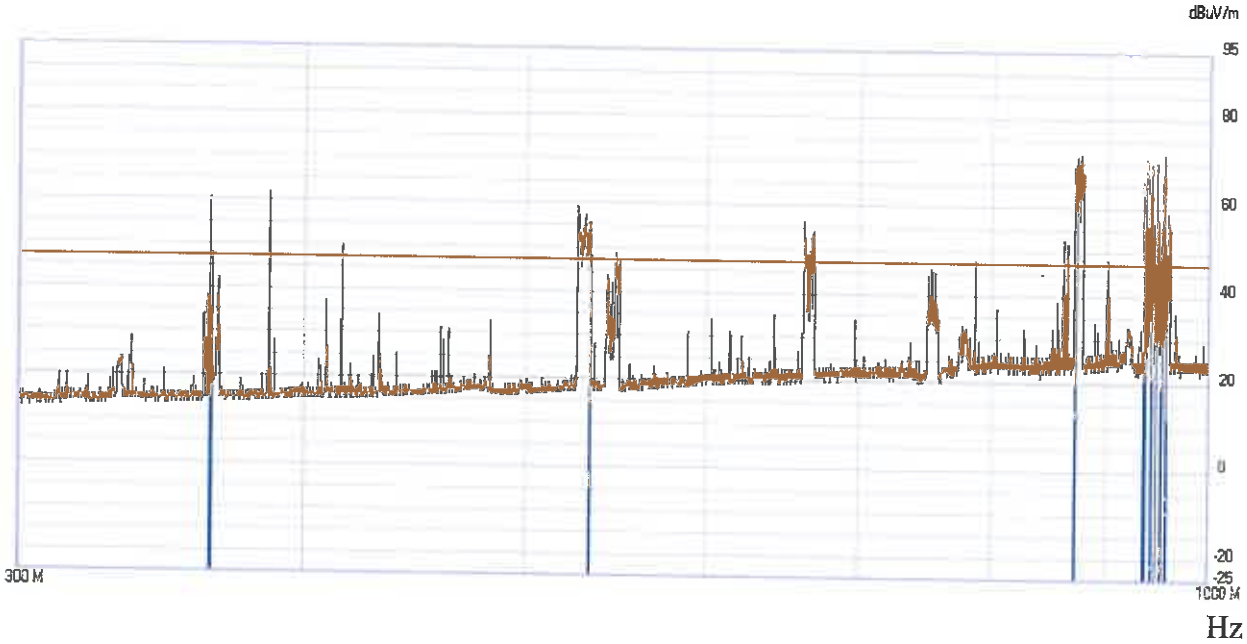
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 63: Spectral diagrams and measurement results, TTM-2500, Vertical polarization, Left, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 64: Spectral diagrams and measurement results, TTM-2500, Vertical polarization, Left, 300MHz-1000MHz

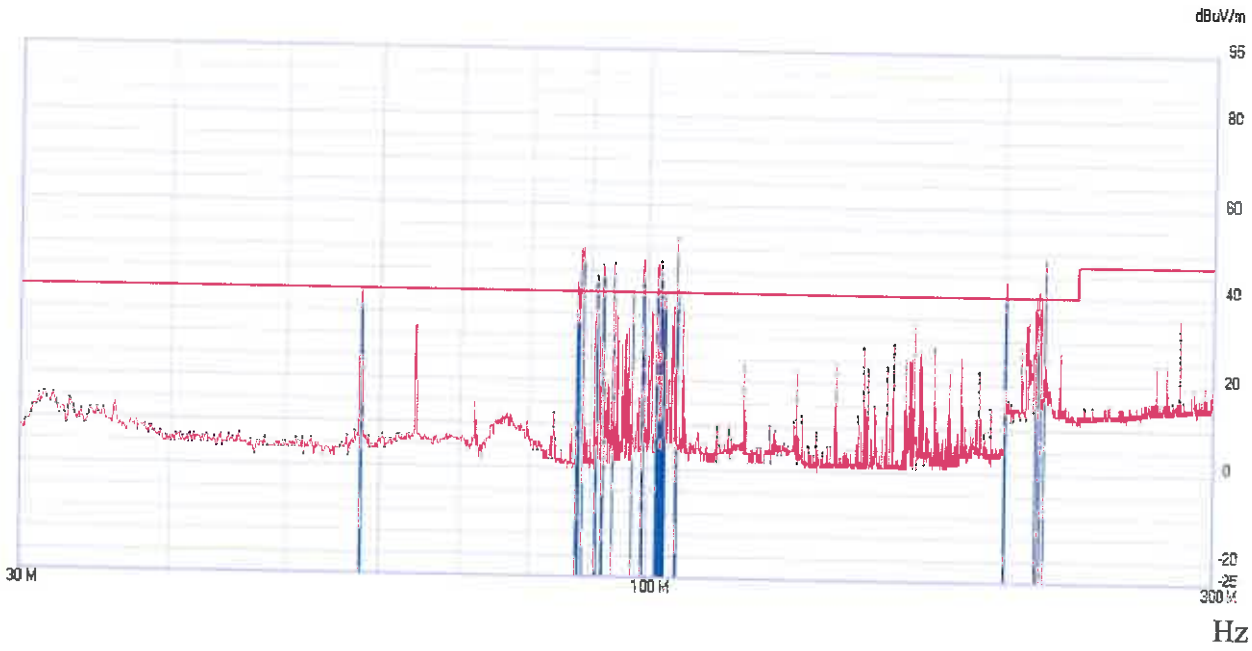


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
363.6	57.42	47	Passed
533.5	52.69	47	Passed
872.9	63.71	47	Passed
942.2	66.77	47	Passed

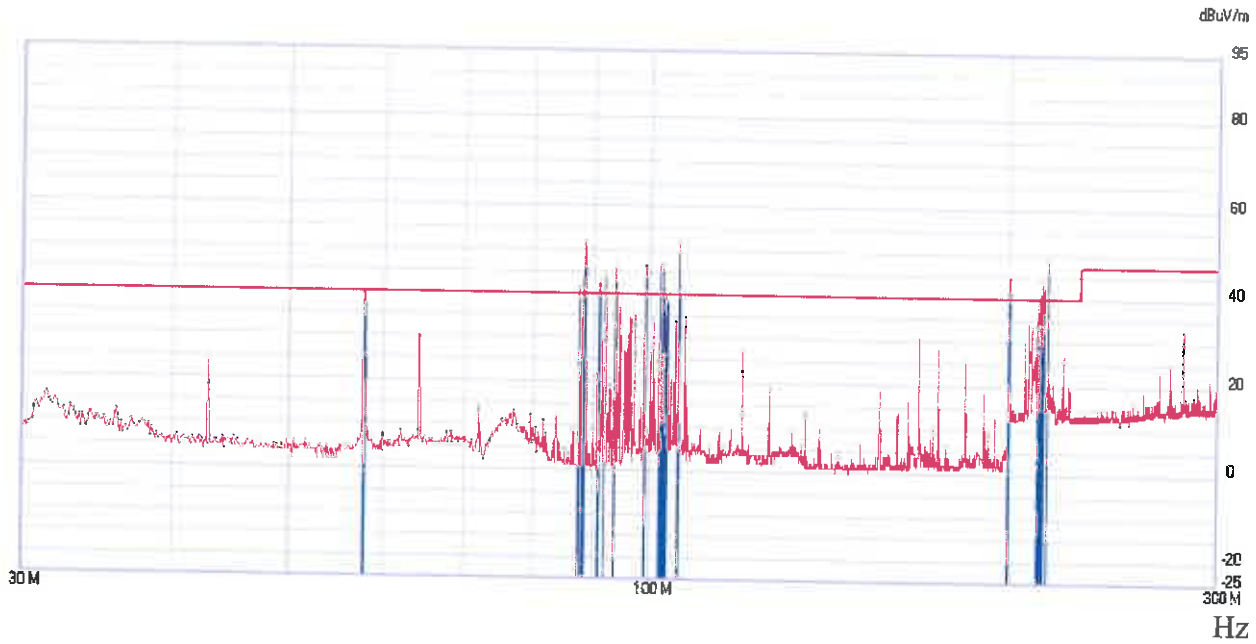
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 65: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Rear, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 66: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Rear, 30MHz-300MHz

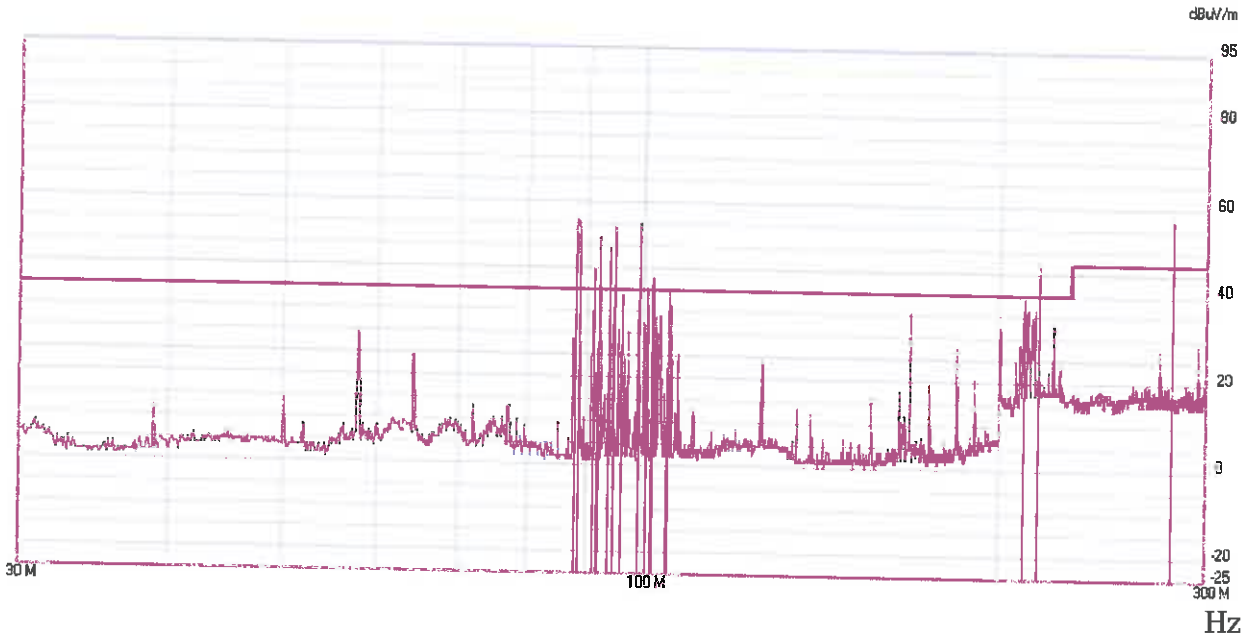


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
88.6	46.48	40	Passed
102.5	45.14	40	Passed
216.3	45.71	40	Passed

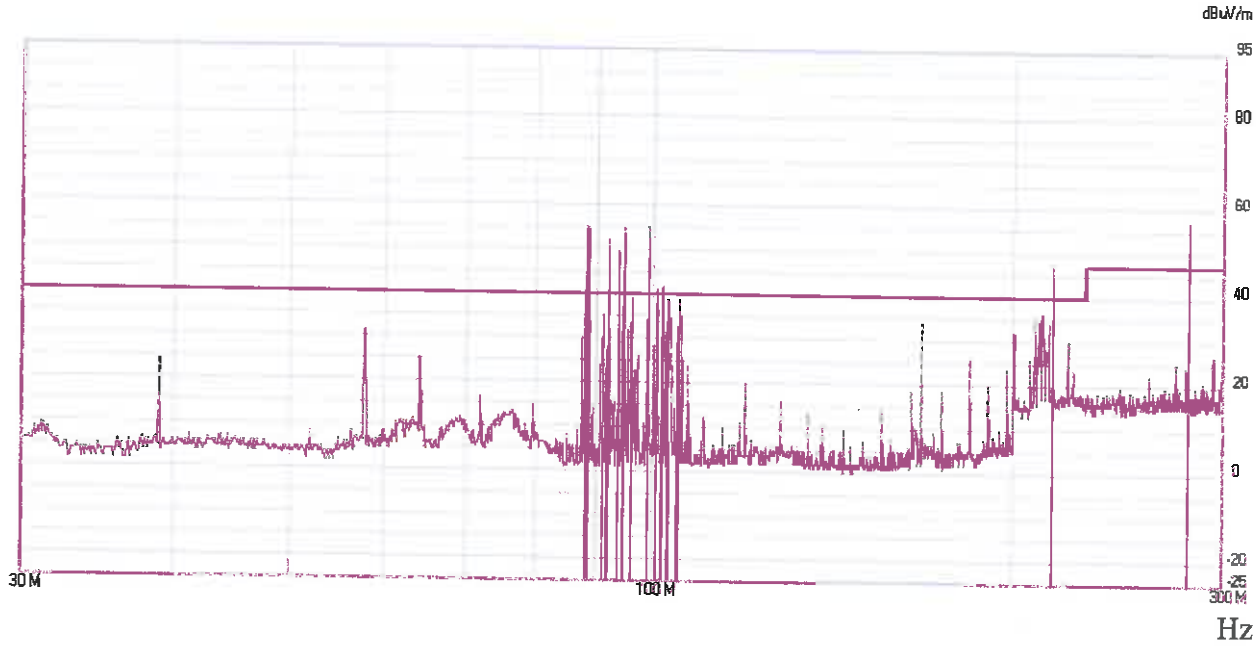
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 67: Spectral diagrams and measurement results, TTM-2500, Vertical polarization, Rear, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 68: Spectral diagrams and measurement results, TTM-2500, Vertical polarization, Rear, 30MHz-300MHz

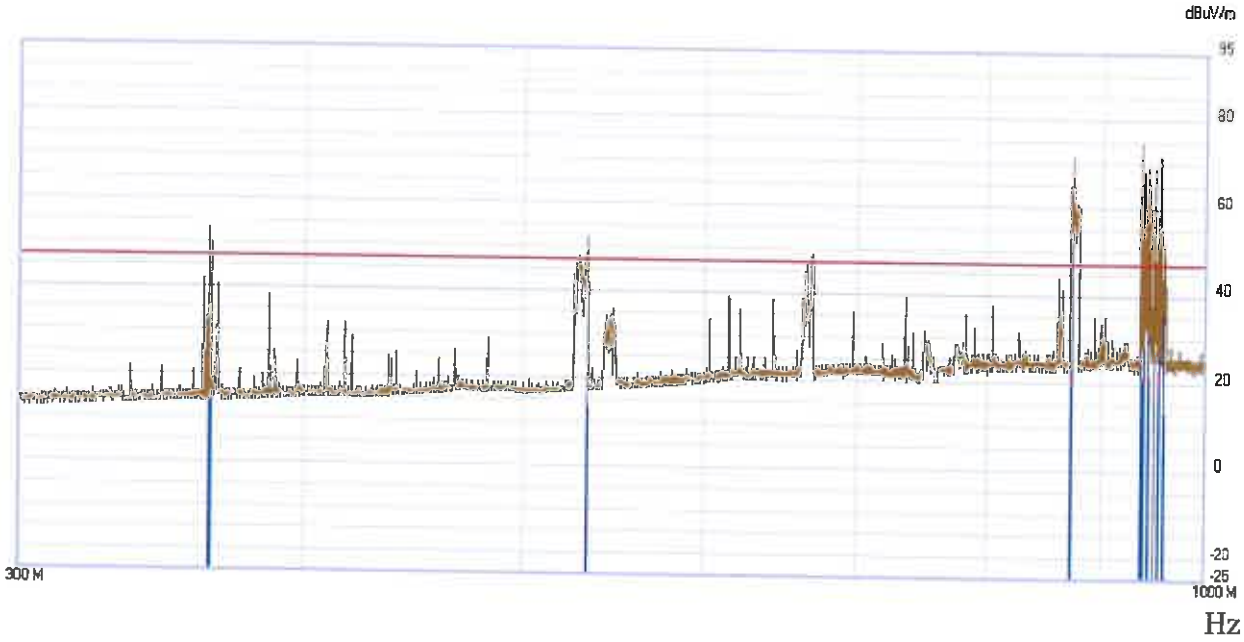


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
88.4	51.91	40	Passed
94.8	53.23	40	Passed
101.0	41.04	40	Passed
280.0	56.65	47	Passed

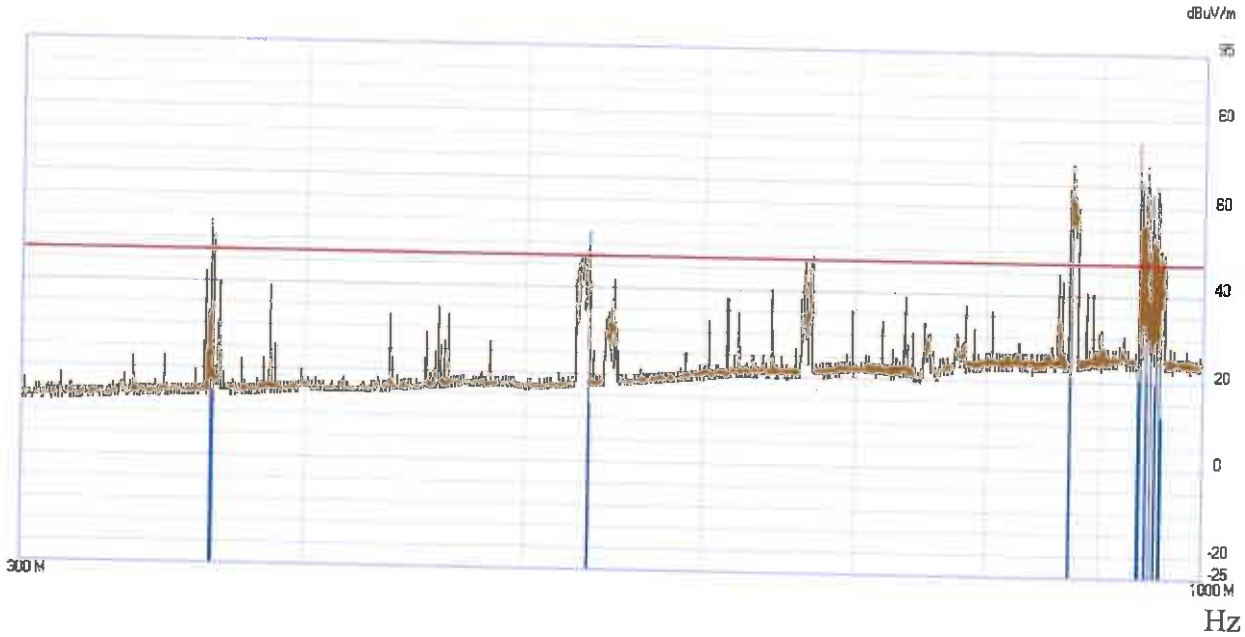
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 69: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Rear, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 70: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Rear, 300MHz-1000MHz

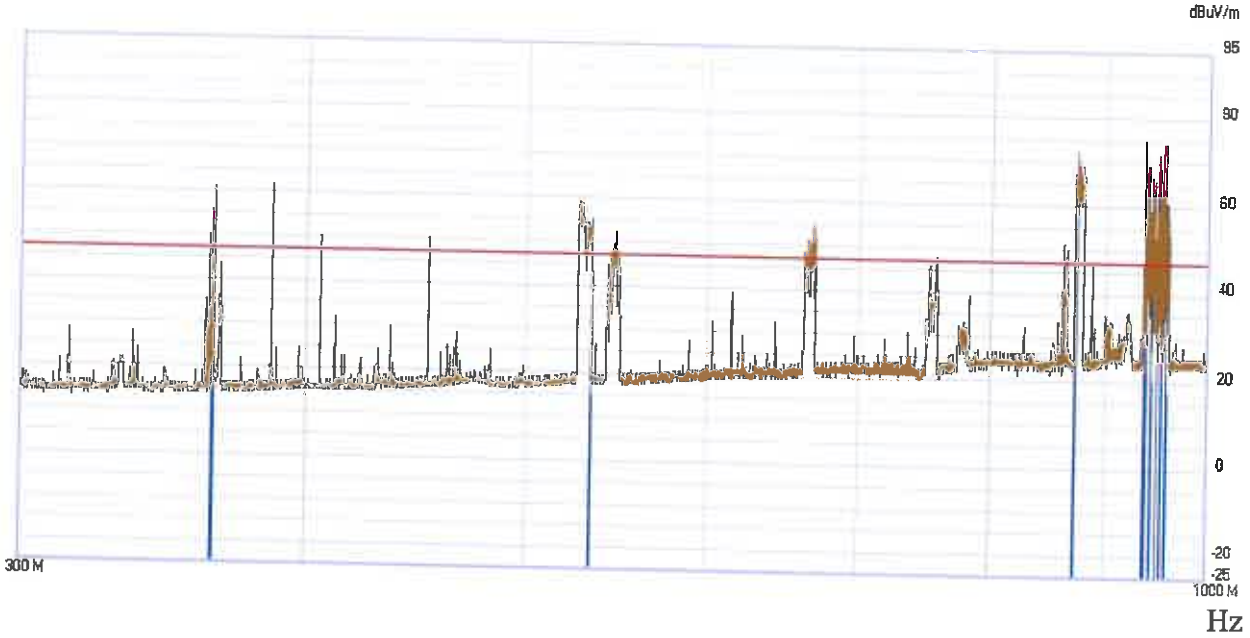


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
363.6	50.69	47	Passed
533.5	52.44	47	Passed
872.9	63.04	47	Passed
942.2	66.33	47	Passed

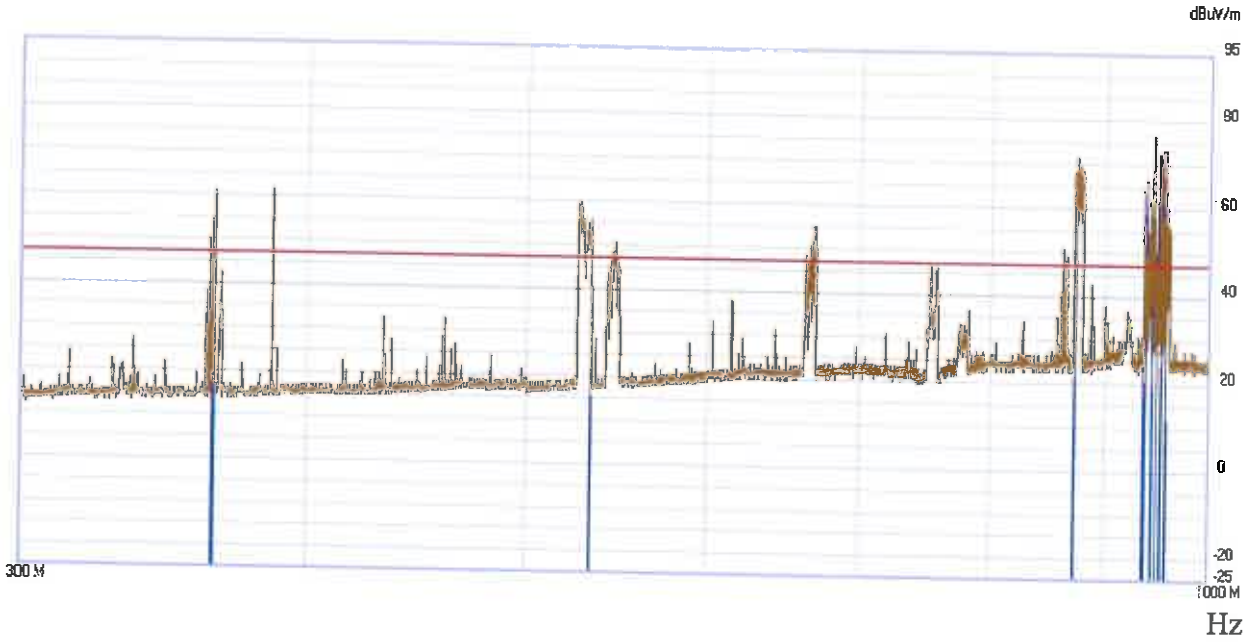
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 71: Spectral diagrams and measurement results, TTM-2500, Vertical polarization, Rear, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 72: Spectral diagrams and measurement results, TTM-2500, Vertical polarization, Rear, 300MHz-1000MHz

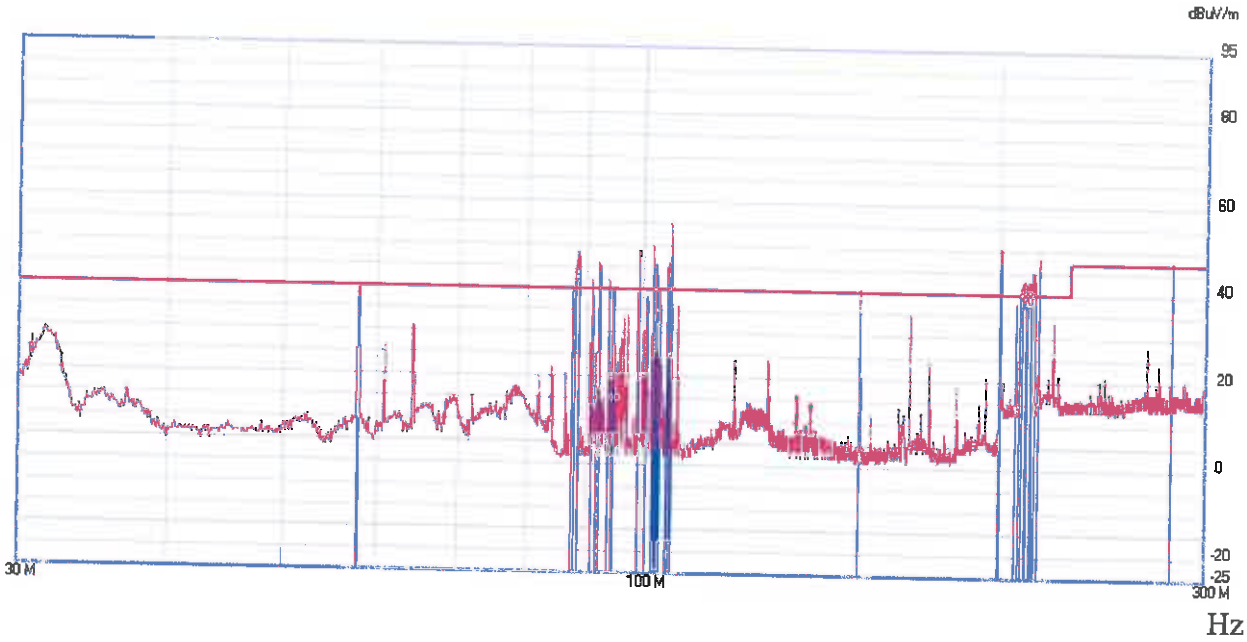


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
364.4	58.42	47	Passed
533.5	58.42	47	Passed
872.9	61.79	47	Passed
952.4	64.21	47	Passed

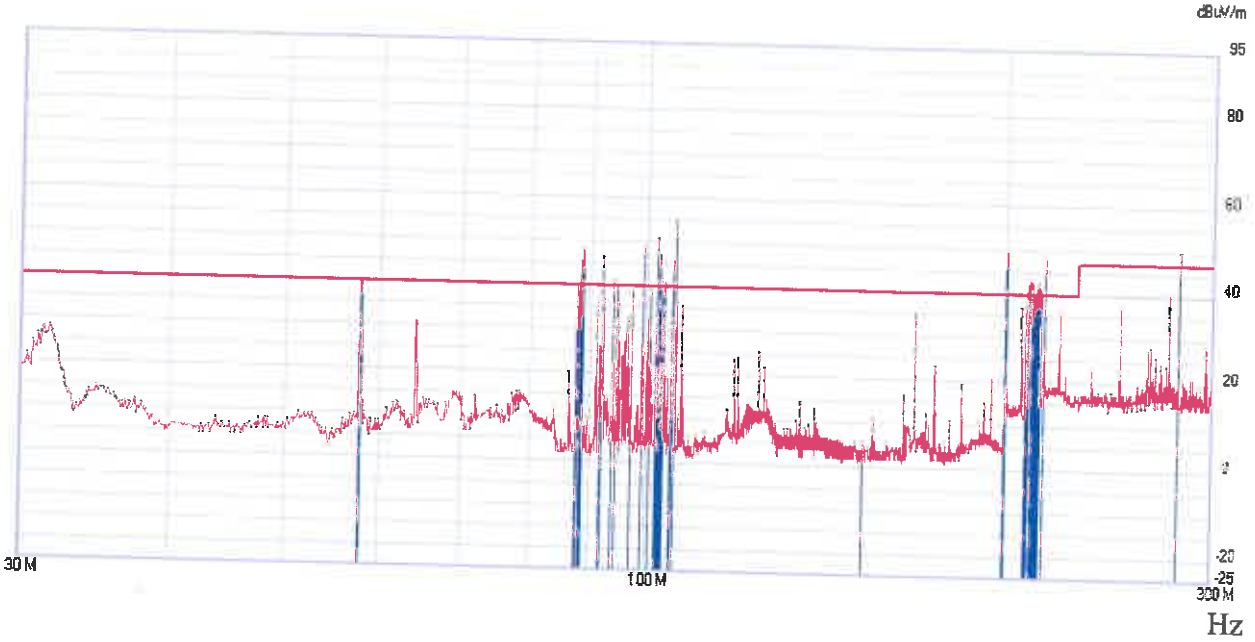
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 73: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Right, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 74: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Right, 30MHz-300MHz

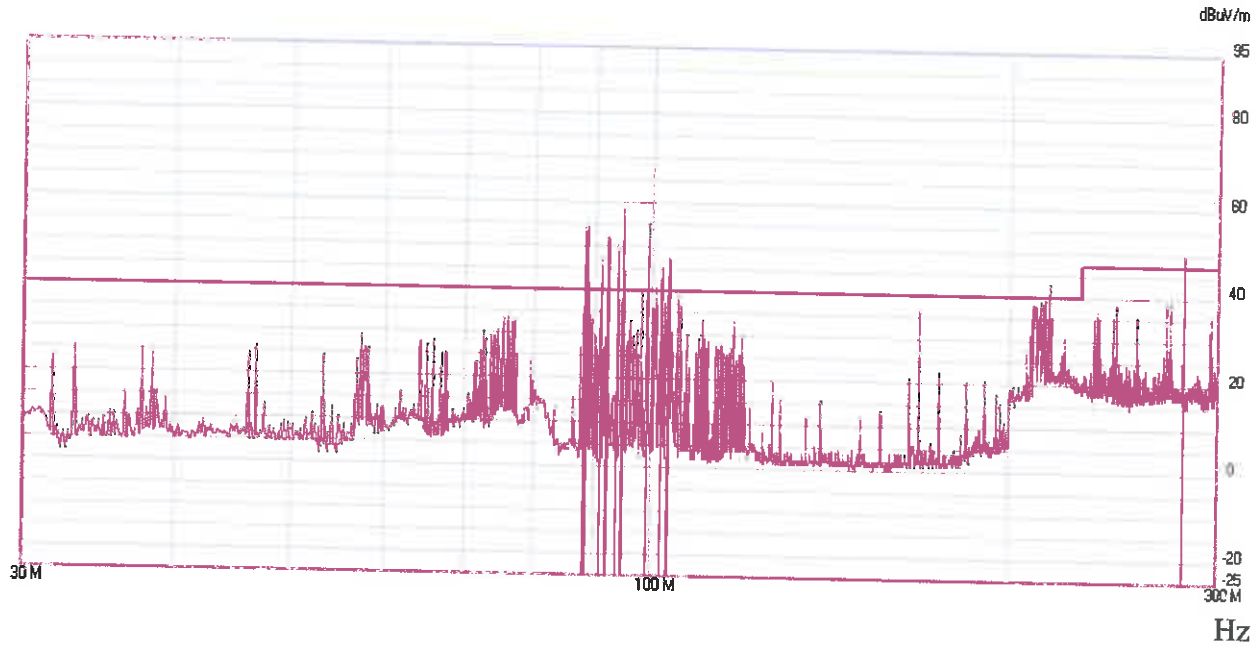


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
88.5	43.90	40	Passed
102.2	47.49	40	Passed
200.3	46.42	40	Passed
280.0	46.56	47	Passed

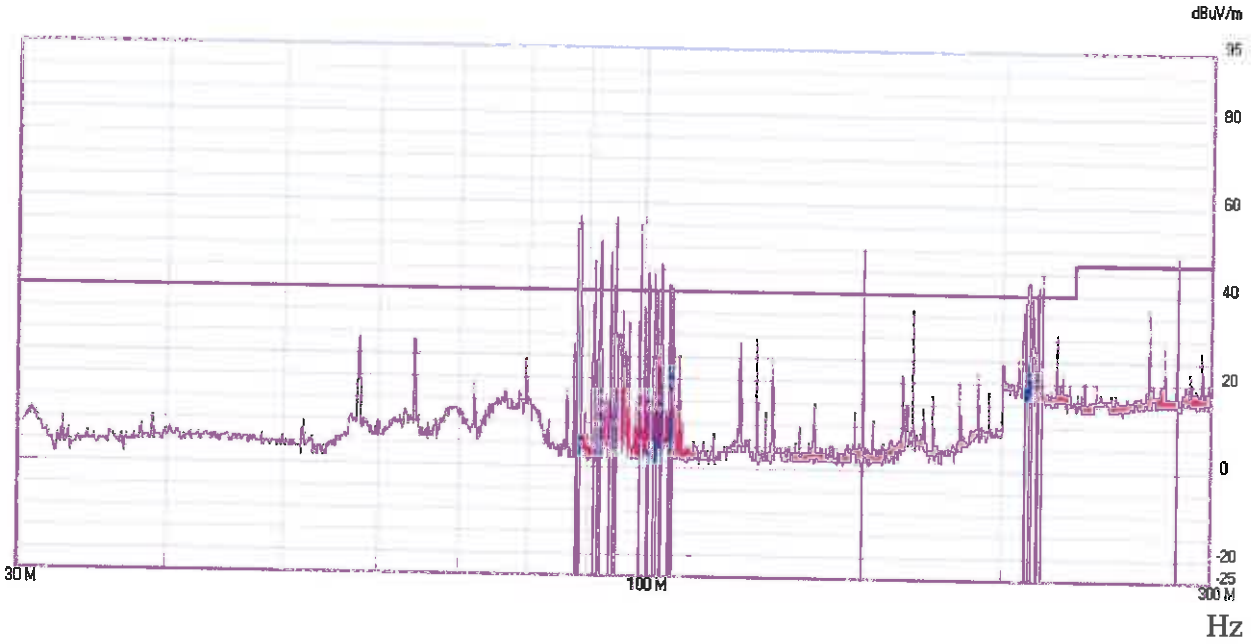
Note: For the frequency that **out** of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 75: Spectral diagrams and measurement results, TTM-2500, Vertical polarization, Right, Background, 30MHz-300MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 76: Spectral diagrams and measurement results, TTM-2500, Vertical polarization, Right, 30MHz-300MHz

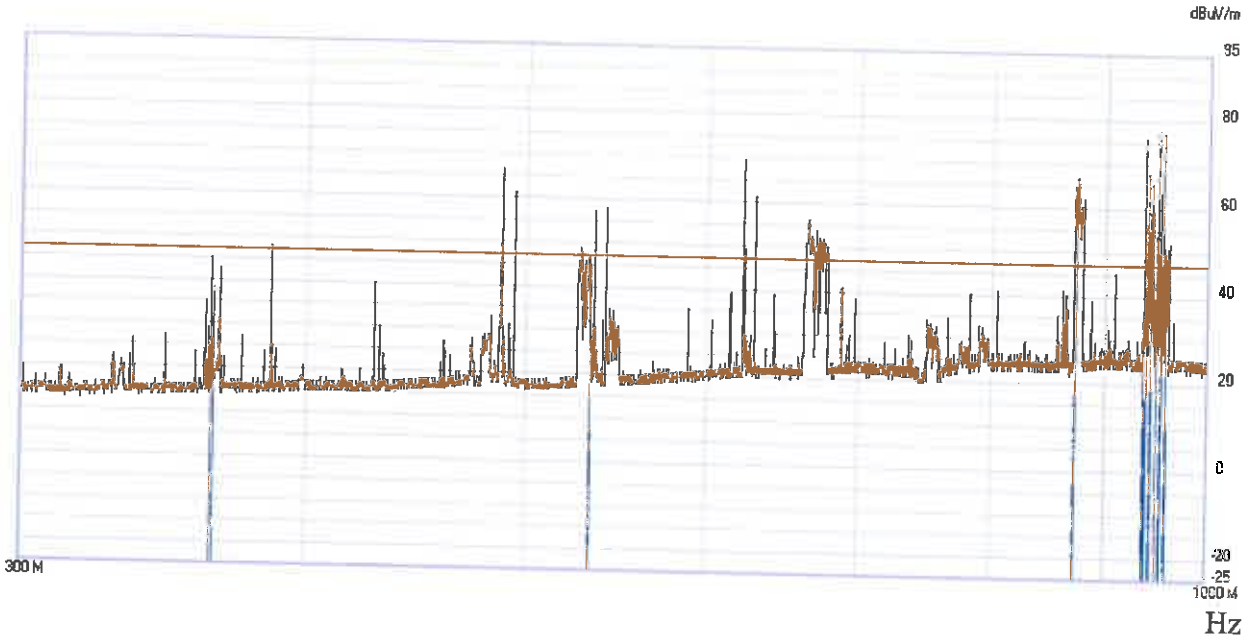


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
88.1	51.06	40	Passed
99.3	51.68	40	Passed
152.6	49.86	40	Passed
280.0	48.70	47	Passed

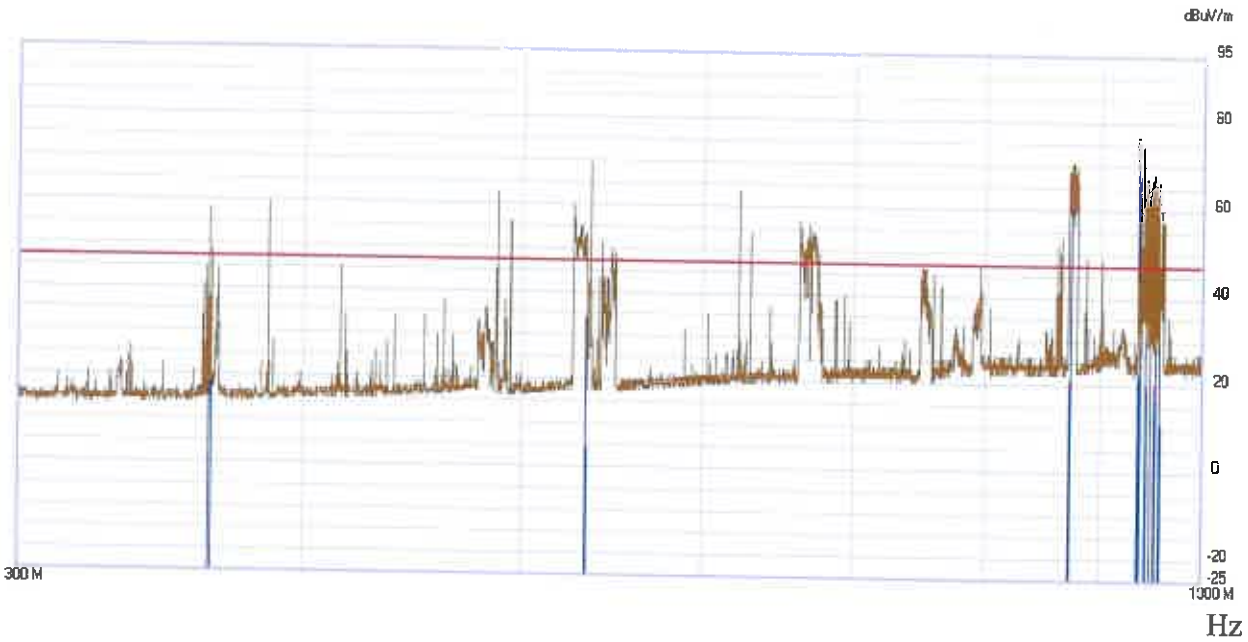
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 77: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Right, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 78: Spectral diagrams and measurement results, TTM-2500, Horizontal polarization, Right, 300MHz-1000MHz

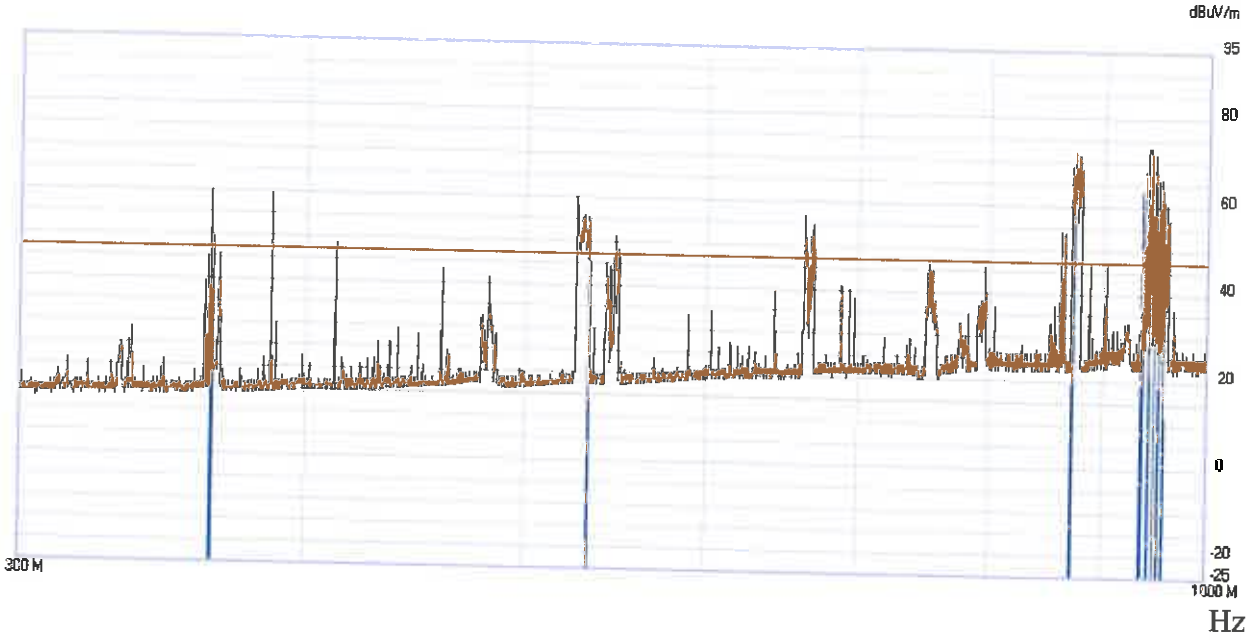


Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
872.9	60.64	47	Passed
935.3	68.78	47	Passed
942.2	62.26	47	Passed

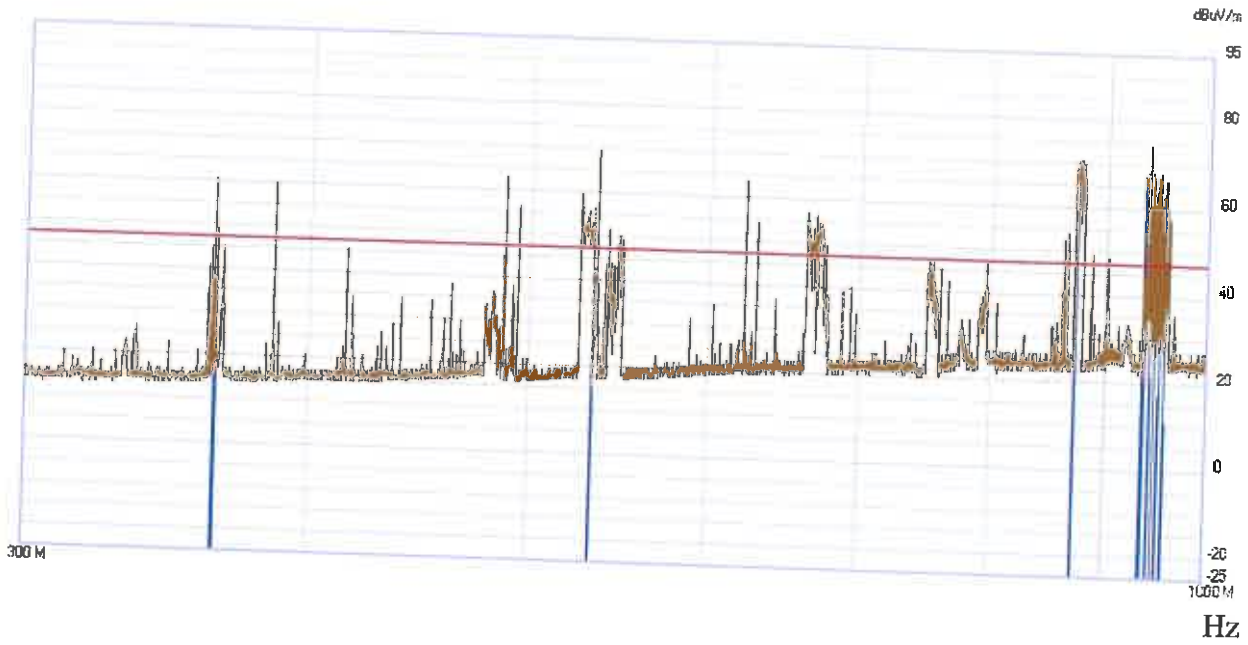
Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

Figure 79: Spectral diagrams and measurement results, TTM-2500, Vertical polarization, Right, Background, 300MHz-1000MHz



Note: All the results are FM broadcasting, TV broadcasting, GSM and other noises in the air.

Figure 80: Spectral diagrams and measurement results, TTM-2500, Vertical polarization, Right, 300MHz-1000MHz



Final quasi-peak measurement result:

Frequency MHz	Quasi-Peak Measurement		
	Measured Value dB(μV/m)	Limit dB(μV/m)	Result
363.6	57.23	47	Passed
533.5	53.45	47	Passed
872.9	65.47	47	Passed
935.3	65.57	47	Passed

Note: For the frequency that out of background spectrum, we checked it with analyze mode and found that these frequencies are all instantaneous noise which come from the air, so it can not influence the test result.

5. Test Results IMMUNITY

According to EN 61000-6-2:2005 for in situ test, the EUT must fulfill the requirements of:

Continuous Disturbances

Radiated Radio-frequency Electromagnetic Field (RS)	**Criterion A**
Radio-frequency Continuous Conducted	**Criterion A**

Transient Disturbances

Electrical Fast Transient (EFT)	**Criterion B**
Electrostatic Discharge (ESD)	**Criterion B**
Surges	**Criterion B**
Voltage Dips and Short Interruptions	**Criterion B+C**

Criterion A: The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

5.1 Continuous Disturbances

5.1.1 Radiated Radio-frequency Electromagnetic Field (RS)

Result:	**Passed**

Date of Testing	:	2011-12-06
Test Specification	:	EN 61000-6-2:2005
Basic Standard	:	IEC 61000-4-3:2010
Criterion	:	Criterion A
Test level	:	10V/m at 144,440MHz; 3V/m at 900, 1800MHz, 1V/m at 2402MHz(unmodulated, rms.)
Frequency Range	:	80-2700MHz:144MHz,440MHz(Walkie-Talkie), 900MHz, 1800MHz,(GSM mobile phone), 2402MHz(Bluetooth)
Modulation	:	----

Test Setup

AC iutput Voltage	:	3phase AC380V 50Hz
Operation Mode	:	On
Earthing	:	Applied
Temperature	:	20°C
Humidity	:	40%

Table 2: Immunity against radiated radio-frequency electromagnetic field,(RS), TTM-1700A

field generator	Frequency	result	remarks
Walkie-Talkie	144MHz	A	Equipment operated as intended, no degradation of function
Walkie-Talkie	440MHz	A	Equipment operated as intended, no degradation of function
GSM mobile phone	900MHz	A	Equipment operated as intended, no degradation of function
GSM mobile phone	1800MHz	A	Equipment operated as intended, no degradation of function
Bluetooth	2402MHz	A	Equipment operated as intended, no degradation of function

For in situ test, considering the interference to local radio communication systems and hazard to human body, so radiated EMF test can not be made, only point test is the applicable test method.

Table 3: Immunity against radiated radio-frequency electromagnetic field (RS), TTM-2500

field generator	Frequency	result	remarks
Walkie-Talkie	144MHz	A	Equipment operated as intended, no degradation of function
Walkie-Talkie	440MHz	A	Equipment operated as intended, no degradation of function
GSM mobile phone	900MHz	A	Equipment operated as intended, no degradation of function
GSM mobile phone	1800MHz	A	Equipment operated as intended, no degradation of function
Bluetooth	2402MHz	A	Equipment operated as intended, no degradation of function

For in situ test, considering the interference to local radio communication systems and hazard to human body, so radiated EMF test can not be made, only point test is the applicable test method.

5.1.2 Radio-frequency Continuous Conducted

Result:	Passed

Date of Testing	:	2011-12-06
Test Specification	:	EN 61000-6-2:2005
Basic Standard	:	IEC 61000-4-6:2008
Criterion	:	Criterion A
Frequency Range	:	150kHz - 230MHz
Test Voltage	:	10V
Modulation	:	AM 80%, 1kHz sine-wave
Sweep Mode	:	automatic
Sweep Rate	:	$< 1.5\times10^{-3}$ decade / sec.

Test Setup

AC iutput Voltage	:	3phase AC380V 50Hz
Operation Mode	:	On
Earthing	:	Applied
Temperature	:	20°C
Humidity	:	40%

Table 4: Immunity against radio-frequency continues conducted, TTM-1700A

coupling port	coupling method:	result	remarks
L1	EM Clamp	A	Equipment operated as intended, no degradation of function
L2	EM Clamp	A	Equipment operated as intended, no degradation of function
L3	EM Clamp	A	Equipment operated as intended, no degradation of function
N	EM Clamp	A	Equipment operated as intended, no degradation of function

Table 5: Immunity against radio-frequency continues conducted, TTM-2500

coupling port	coupling method:	result	remarks
L1	EM Clamp	A	Equipment operated as intended, no degradation of function
L2	EM Clamp	A	Equipment operated as intended, no degradation of function
L3	EM Clamp	A	Equipment operated as intended, no degradation of function
N	EM Clamp	A	Equipment operated as intended, no degradation of function

5.2 Transient Disturbances

5.2.1 Electrical Fast Transient (EFT)

Result:	Passed

Date of Testing	:	2011-12-07
Test Specification	:	EN 61000-6-2:2005
Basic Standard	:	IEC 61000-4-4:2004+A1:2010
Performance Criterion	:	Criterion B
Test Duration	:	≥60sec
Repetition Frequency	:	5kHz
Test Voltage	:	±2kV

Test Setup

AC iutput Voltage	:	3phase AC380V 50Hz
Operation Mode	:	On
Earthing	:	Applied
Temperature	:	20°C
Humidity	:	40%

Table 6: Immunity against electrical fast transient (EFT), TTM-1700A

coupling port	coupling method:	test voltage / result	remarks
AC input port	Capacitive Clamp	±2kV/B	The apparatus could continue to operate as intended after the test

Table 7: Immunity against electrical fast transient (EFT), TTM-2500

coupling port	coupling method:	test voltage / result	remarks
AC input port	Capacitive Clamp	±2kV/B	The apparatus could continue to operate as intended after the test

5.2.2 Electrostatic Discharge (ESD)

Result:	Passed

Date of Testing	:	2011-12-07
Test Specification	:	EN 61000-6:2005
Basic Standard	:	IEC 61000-4-2:2008
Performance Criterion	:	Criterion B
Charge Voltage	:	±4.0kV (contact discharge) ±8.0kV (air discharge)
Number of Discharges	:	>200

Test Setup

AC iutput Voltage	:	3phase AC380V 50Hz
Operation Mode	:	On
Earthing	:	Applied
Temperature	:	20°C
Humidity	:	40%

Table 8: Immunity against electrostatic discharge (ESD), TTM-1700A

discharge points	type of discharge	result	remarks
Non-metallic enclosure, Button, LCD panel	Air discharge	B	The apparatus could continue to operate as intended after the test
Metallic enclosure and Screw	Contact discharge	B	The apparatus could continue to operate as intended after the test
VCP	Indirect Contact discharge	B	The apparatus could continue to operate as intended after the test

Table 9: Immunity against electrostatic discharge (ESD), TTM-2500

discharge points	type of discharge	result	remarks
Non-metallic enclosure, Button, LCD panel	Air discharge	B	The apparatus could continue to operate as intended after the test
Metallic enclosure and Screw	Contact discharge	B	The apparatus could continue to operate as intended after the test
VCP	Indirect Contact discharge	B	The apparatus could continue to operate as intended after the test

5.2.3 Surge

Result:	**Passed**

Date of testing	:	2011-12-07
Test Specification	:	EN 61000-6-2:2005
Basic Standard	:	IEC 61000-4-5:2005
Performance Criterion	:	Criterion B
Test Voltages	:	±2, ±1, ±0.5kV (Line to Ground) ±1, ±0.5kV (Line to Line)
Coupling Phases	:	0, π/2, π, 3π/2 for AC output port
Number of Surges	:	5 (for each combination of parameters)
Repetition Rate	:	1/min

Test Setup

AC iutput Voltage	:	3phase AC380V 50Hz
Operation Mode	:	On
Earthing	:	Applied
Temperature	:	25°C
Humidity	:	45%

Table 10: Immunity against surge, TTM-1700A

coupling port	test voltage	result	remarks
AC input port(Line – Line)	±1, ±0.5kV	Passed B	The apparatus could continue to operate as intended after the test
AC input port (Line – Ground)	±2, ±1, ±0.5kV	Passed B	The apparatus could continue to operate as intended after the test

Table 11: Immunity against surge, TTM-2500

coupling port	test voltage	result	remarks
AC input port(Line – Line)	±1, ±0.5kV	Passed B	The apparatus could continue to operate as intended after the test
AC input port (Line – Ground)	±2, ±1, ±0.5kV	Passed B	The apparatus could continue to operate as intended after the test

5.2.4 Voltage Dip and Short Interruptions

Result:	**N.A.**

Date of testing	:	----
Test Specification	:	EN 61000-6-2:2005
Basic Standard	:	IEC 61000-4-11:2004
Performance Criterion	:	Criterion B+C
Test Levels	:	0% during 1 cycle 40% during 10 cycles 70% during 25 cycles 0% during 250 cycles
Number of Dips	:	3 (for each test level)

According to IEC 61000-4-11:2004's scope and EN 61000-6-2:2005 table 4 that this standard applies to electrical and electronic equipment having a rated input current not exceeding 16 A per phase and to AC input port. So this test is not applicable to this EUT.

6. Photographs of the Test Set-Up

Photograph 1: Set-up for mains terminal disturbance voltage, TTM-1700A

Photograph 2: Set-up for mains terminal disturbance voltage, TTM-2500

Photograph 3: Set-up for radio frequency (RF) emission, 30MHz-230MHz, TTM-1700A

Photograph 4: Set-up for radio frequency (RF) emission, 300MHz-1000MHz, TTM-1700A

Photograph 5: Set-up for radio frequency (RF) emission, 30MHz-230MHz, TTM-2500

Photograph 6: Set-up for radio frequency (RF) emission, 300MHz-1000MHz, TTM-2500

Photograph 7: Set-up for Immunity against radiated radio-frequency electromagnetic field (RS), TTM-1700A

Photograph 8: Set-up for Immunity against radiated radio-frequency electromagnetic field (RS), TTM-2500

Photograph 9: Set-up for Immunity against radio-frequency continuous conducted, TTM-1700A

Photograph 10: Set-up for Immunity against radio-frequency continuous conducted, TTM-2500

Photograph 11: Set-up for Immunity against electrostatic discharge, TTM-1700A

Photograph 12: Set-up for Immunity against electrostatic discharge, TTM-2500

Photograph 13: Set-up for Immunity against electrical fast transient (EFT), TTM-1700A

Photograph 14: Set-up for Immunity against electrical fast transient (EFT), TTM-2500

Photograph 15: Set-up for Immunity against Surge, TTM-1700A

Photograph 16: Set-up for Immunity against Surge, TTM-2500

7. List of Tables

8. List of Figures

9. List of Photographs