FCC ID TEST REPORT

for

Paging Transmitter

Model: Intelpage High Power

FCC ID: 2ADHF- INTELPAGE

Prepared for: SPOK Aus Pty. Ltd.
130 Main Street, Osborne Park, Perth 6017, Western Australia, Australia

Prepared by: Shenzhen TCT Testing Technology Co.,Ltd
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Report Number：TCT141009E006
Date of Test： Oct. 10-Oct. 25, 2014
Date of Report： Oct. 29, 2014

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1.0 General Details

1.1 Test Lab Details

Name :	Shenzhen Tongce Testing Lab
Address:	1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China
Telephone:	13410377511
Fax:	--

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

FCC Registration Number: 572331

Shenzhen TCT Testing Technology Co., Ltd., Shenzhen EMC Laboratory: Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

Registration Number: 572331

Industry Canada (IC)

The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

Registration Number IC: 10668A-1

1.2 Applicant Details

Applicant:	SPOK Aus Pty. Ltd.
Address:	130 Main Street, Osborne Park, Perth 6017, Western Australia, Australia
Telephone:	618 6240 0000
Fax:	618 6240 0000

Manufacturer:	SPOK Aus Pty. Ltd.
Address:	130 Main Street, Osborne Park, Perth 6017, Western Australia, Australia
Telephone:	618 6240 0000
Fax:	618 6240 0000

1.3 Description of EUT

Product:	Paging Transmitter
Model No.:	Intelpage High Power
Additional Model No.:	N.A.
Brand Name	SPOK
Power supply:	Input: AC 100-240V, 50-60Hz
Test power:	AC 120V/60Hz
Modulation Type:	FSK
Emission designator	F1D
Rated Power	10~25Watts
Operation Frequency:	From 450MHz-470MHz
Channel Spacing:	12.5kHz

1.4 Statement

1.5 Test Engineer

The sample tested by 

Printed name: SKY

2.0 Test equipments and Associated Equipment used during the test.

2.1 Test Equipments

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	July 2, 2014	July 1, 2015
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	July 2, 2014	July 1, 2015
Spectrum Analyzer	Agilent	N9020A	MY49100060	July 3, 2014	July 2, 2015
Pre-amplifier	Teseq	LNA6900	--	July 3, 2014	July 2, 2015
Pre-amplifier	Agilent	8447D	83153007374	July 3, 2014	July 2, 2015
Pre-amplifier	Agilent	8449B	3008A01738	July 3, 2014	July 2, 2015
Loop antenna	A.R.A.	PLA-1030/B	1029	July 3, 2014	July 2, 2015
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	July 3, 2014	July 2, 2015
Broadband Antenna	Schwarzbeck	VULB9163	340	July 3, 2014	July 2, 2015
Horn Antenna	ETS LINDGREN	3117	--	July 3, 2014	July 2, 2015
Horn Antenna	ETS LINDGREN	3160	--	July 3, 2014	July 2, 2015
EMI Test Receiver	R&S	ESCS30	100139	July 2, 2014	July 1, 2015
LISN	AFJ	LS16C	16010222119	July 2, 2014	July 1, 2015
Signal Generator	HP	83650B	3614A00276	July 2, 2014	July 1, 2015
RF Communications Test Set	HP	8920A	3438A05338	July 2, 2014	July 1, 2015
Function Generator	Agilent	33220A	MY43004878	July 2, 2014	July 1, 2015
Spectrum Analyzer	Agilent	E4446A	US44300386	July 3, 2014	July 2, 2015
DC Power Supply	BK Precision	1621A	D185052265	July 2, 2014	July 1, 2015
MXA	Agilent	N9010A	MY/SG/US5340	May 12, 2014	May 11, 2015
Spectrum Analyzer	Agilent	N9020A	MY49100060	July 3, 2014	July 2, 2015
Spectrum Analyzer	Tektronix	RSA3308A	--	July 3, 2014	July 2, 2015

2.2 AE used during the test

Equipment type	Manufacturer	Model
Notebook	Lenovo	G480
Maxpage	Commtech Wireless	T002
N/A		
N/A		

2.3 Test Mode

Conducted emission	
TM 1: CH01+12.5KBW+TX+Charging **TM 2: CH02+12.5KBW+TX+Charging** TM 3: CH03+12.5KBW+TX+Charging	
Remark:	The highlight part means the worst case modes which were shown in report.

3.0 Technical Details

3.1 Summary of test results

The EUT has been tested according to the following specifications

Requirement	CFR 47 Section	Result
Modulation Characteristics	**§ 2.1047, §90.207**	**N/A**
Field Strength of Spurious Radiation	**§ 2.1053, §90.210**	**PASS**
RF Output Power	**§ 2.1046, §90.205**	**PASS**
Occupied Bandwidth & Emission Mask	**§ 2.1049, §90.209, §90.210**	**PASS**
Spurious Emissions at Antenna Terminals	**§ 2.1051, §90.210**	**PASS**
Frequency stability	**§ 2.1055, § 90.213**	**PASS**

Remark:The radio is data only. There are no voice or audio circuits.

3.2 Test Standards

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 90: Private Land Mobile Radio Services

Applicable Standards: TIA 603-D

4.0 EUT Modification

No modification by Shenzhen TCT Testing Technology Co., Ltd

5.0 Measurement Uncertainty（95% confidence levels, k=2)

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase centre variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

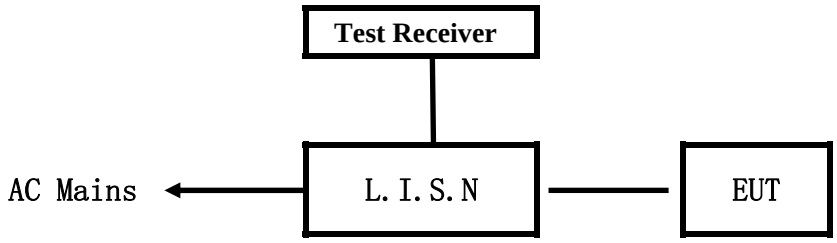
Based on CISPR16-4-2:2003, The Treatment of Uncertainty in EMC Measurements, the values ranging from +2.0 dB for Conducted Emissions tests and +4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at TCT Lab.

Note: 1) The EUT is a portable device, and measurements were conducted in all three axis (X, Y, Z), and the worst case (X axis) was submitted only.

6.0 Power Line Conducted Emission Test

Not applicable

6.1 Schematics of the test



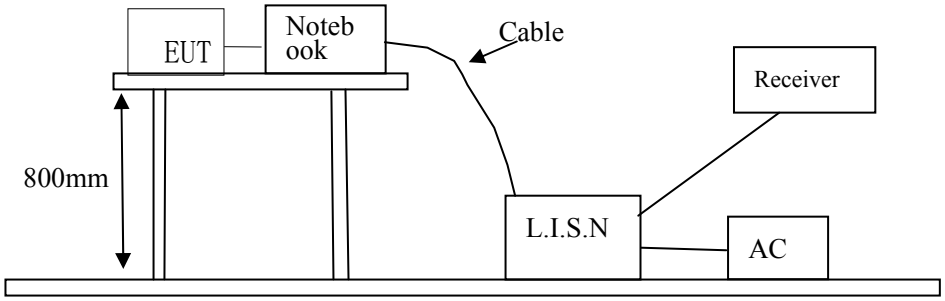
EUT: Equipment Under Test

6.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2009and ANSI C63.4-2003.The Frequency spectrum from 0.15MHz to 30MHz was investigated.

Test Voltage: 120V~, 60Hz

Block diagram of Test setup



6.3 EUT Operating Condition

Operating condition is according to ANSI C63.10 -2009 and ANSI C63.4-2003

1) Setup the EUT and simulators as shown on the following

2) Enable AF signal and confirm EUT active to normal condition

6.4 Conducted Emission Limit

Frequency(MHz)	Class A Limits (dB μ V)		Class B Limits (dB μ V)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ～ 0.50	79.0	66.0	66.0～56.0*	56.0～46.0*
0.50 ～ 5.00	73.0	60.0	56.0	46.0
5.00 ～ 30.00	73.0	60.0	60.0	50.0

Notes: 1) *Decreasing linearly with logarithm of frequency.

2）The tighter limit shall apply at the transition frequencies

6.5 Photo documentation of the test set-up

Please refer to the Document Setup photo

6.6 Test specification:

Environmental conditions: Temperature: 22° C Humidity: 52% Atmospheric pressure: 103kPa

Frequency range: 0.15 MHz – 30 MHz

The test was carried out in the following operation mode(s):

- TM2

6.7 Test result

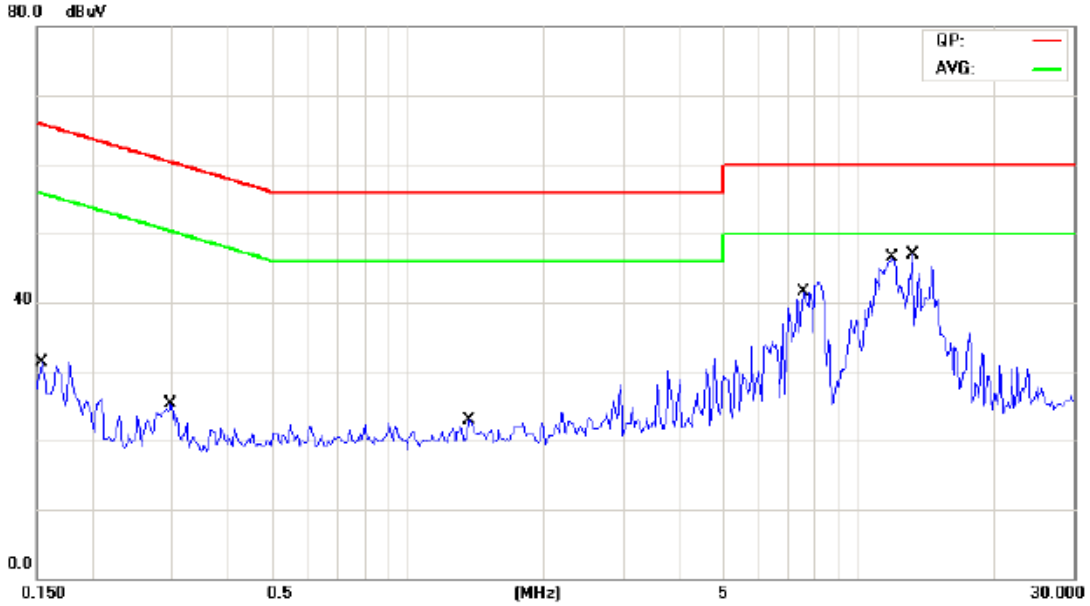
Min. limit margin >10 dB from 0.15MHz to 30MHz

The requirements are FULFILLED

Remarks: _____

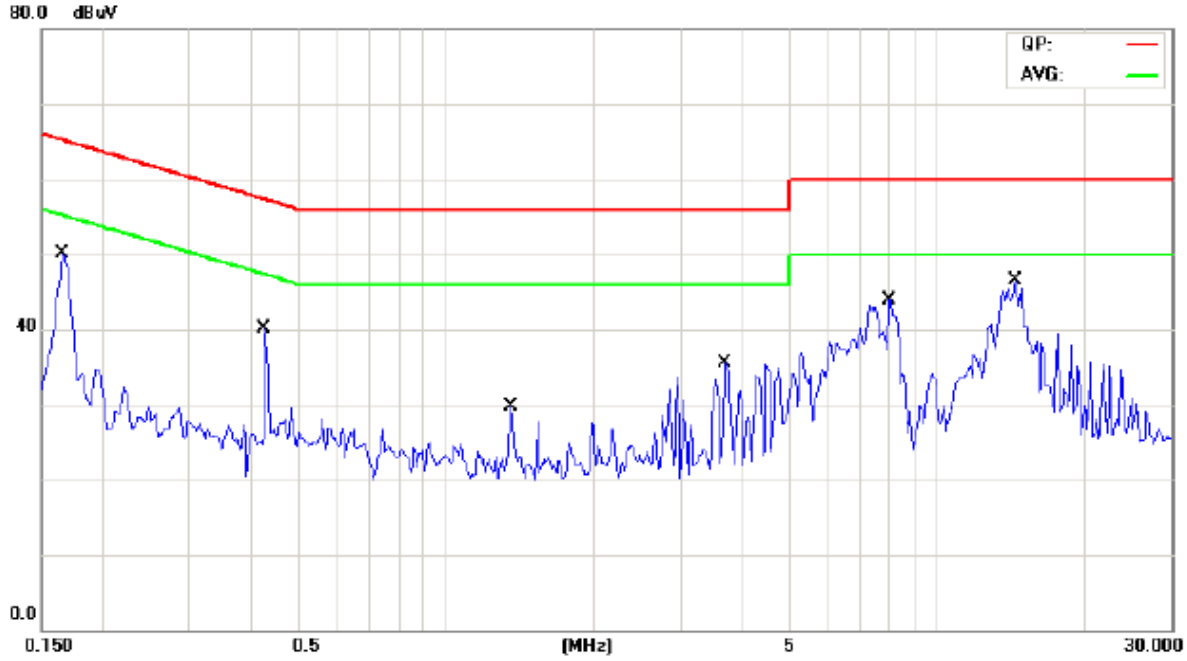
_____

A Conducted Emission on Line Terminal of the power line (150kHz to 30MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1539	16.33	10.70	27.03	65.78	-38.75	QP	
2		0.1539	-0.91	10.70	9.79	55.78	-45.99	AVG	
3		0.2983	4.31	10.28	14.59	60.29	-45.70	QP	
4		0.2983	-0.94	10.28	9.34	50.29	-40.95	AVG	
5		1.3727	1.06	10.60	11.66	56.00	-44.34	QP	
6		1.3727	-0.97	10.60	9.63	46.00	-36.37	AVG	
7		7.5469	27.28	11.01	38.29	60.00	-21.71	QP	
8		7.5469	18.16	11.01	29.17	50.00	-20.83	AVG	
9		11.9063	31.11	11.05	42.16	60.00	-17.84	QP	
10		11.9063	23.15	11.05	34.20	50.00	-15.80	AVG	
11		13.1836	35.37	10.95	46.32	60.00	-13.68	QP	
12	*	13.1836	26.04	10.95	36.99	50.00	-13.01	AVG	

B Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1655	20.10	10.60	30.70	65.18	-34.48	QP	
2		0.1655	9.13	10.60	19.73	55.18	-35.45	AVG	
3		0.4273	5.74	10.24	15.98	57.30	-41.32	QP	
4		0.4273	-1.36	10.24	8.88	47.30	-38.42	AVG	
5		1.3531	1.61	10.60	12.21	56.00	-43.79	QP	
6		1.3531	-1.30	10.60	9.30	46.00	-36.70	AVG	
7		3.7188	1.83	10.71	12.54	56.00	-43.46	QP	
8		3.7188	-0.50	10.71	10.21	46.00	-35.79	AVG	
9		8.0195	21.16	11.06	32.22	60.00	-27.78	QP	
10		8.0195	3.79	11.06	14.85	50.00	-35.15	AVG	
11		14.4648	32.64	10.81	43.45	60.00	-16.55	QP	
12	*	14.4648	24.51	10.81	35.32	50.00	-14.68	AVG	

7.0 RF Output Power

7.1 Applicable Standard

According to FCC §2.1046, and §90.205,

The maximum allowable station effective radiated power (ERP) is dependent upon the station's antenna HAAT and required service area and will be authorized in accordance with table 2.

TABLE 2—450-470 MHz—MAXIMUM ERP/REFERENCE HAAT FOR A SPECIFIC SERVICE AREA RADIUS

	Service area radius (km)									
	3	8	13	16	24	32	40[4]	48[4]	64[4]	80[4]
Maximum ERP (w)1	2	100	2500	2500	2500	2500	2500	2500	2500	2500
Up to reference HAAT (m)3	15	15	15	27	63	125	250	410	950	2700

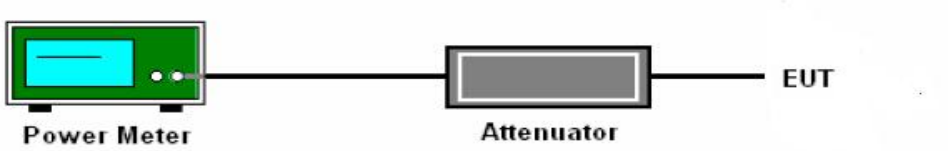
[1]Maximum ERP indicated provides for a 39 dBu signal strength at the edge of the service area per FCC Report R-6602, Fig. 29 (See §73.699, Fig. 10 b).

[2]Maximum ERP of 500 watts allowed. Signal strength at the service area contour may be less than 39 dBu.

[3]When the actual antenna HAAT is greater than the reference HAAT, the allowable ERP will be reduced in accordance with the following equation: $ERP_{allow} = ERP_{max} \times (HAAT_{ref} / HAAT_{actual})^2$.

[4]Applications for this service area radius may be granted upon specific request with justification and must include a technical demonstration that the signal strength at the edge of the service area does not exceed 39 dBu.

7.2 Test setup



7.3 Test specification:

Environmental conditions: Temperature 23° C Humidity: 51% Atmospheric pressure: 103kPa

7.4 Test Procedure

1. The RF output of EUT was connected to the power meter through 50 dB attenuator.
2. Measure the power by power meter

7.5 Test Result PASS

Channel Spacing	Channel	Frequency (MHz)	Conducted Output Power (Watt)	Limit (Watt)
12.5KHz	1	450.325	23.4	Reference Table 2
	2	462.775	24.5	
	3	469.500	24.2	

8.0 Occupied Bandwidth & Emission Mask

8.1 Applicable Standards

FCC §2.1049 and §90.209, §90.210.

Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

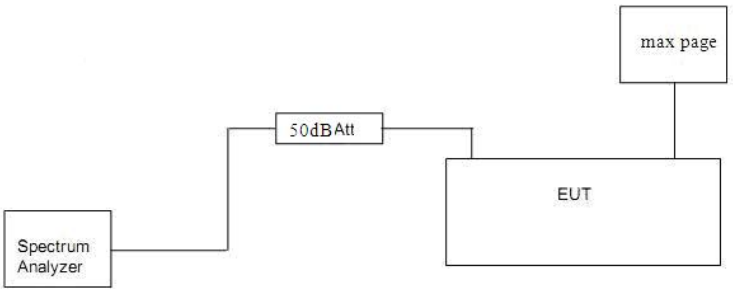
(1) On any frequency from the center of the authorized bandwidth f0 to 5.625 kHz removed from f0: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(fd−2.88 kHz) dB.

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

8.2 Test Procedure

(1). Configure EUT and assistant system as following:



(2). The EUT was modulated by 512Hz, 1200 Hz, 2400 Hz, 4800Hz, 9600Hz, POCSAG square wave signal from max page .

(3). Set EUT as normal operation.

(4). Set SPA Center Frequency = fundamental frequency, RBW=100Hz, VBW= 300Hz, span =100 KHz.

(5). Set SPA Max hold. Mark peak, Set 99% Occupied Bandwidth and 26dB Occupied Bandwidth.

(6). Set SPA Center Frequency=fundamental frequency, set RBW=100Hz, VBW=300Hz, span=100 KHz

Test result:

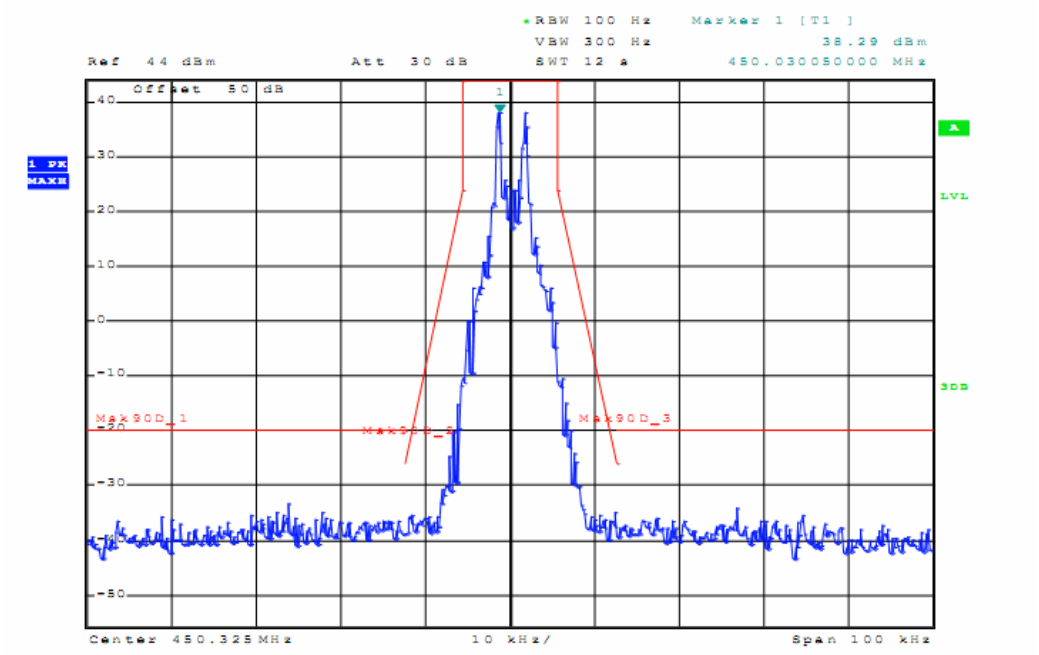
Emission Designator：

For 12.5KHz Channel Spacing: 2M+2D=2x3+2x2.5=> 7K40F1D,

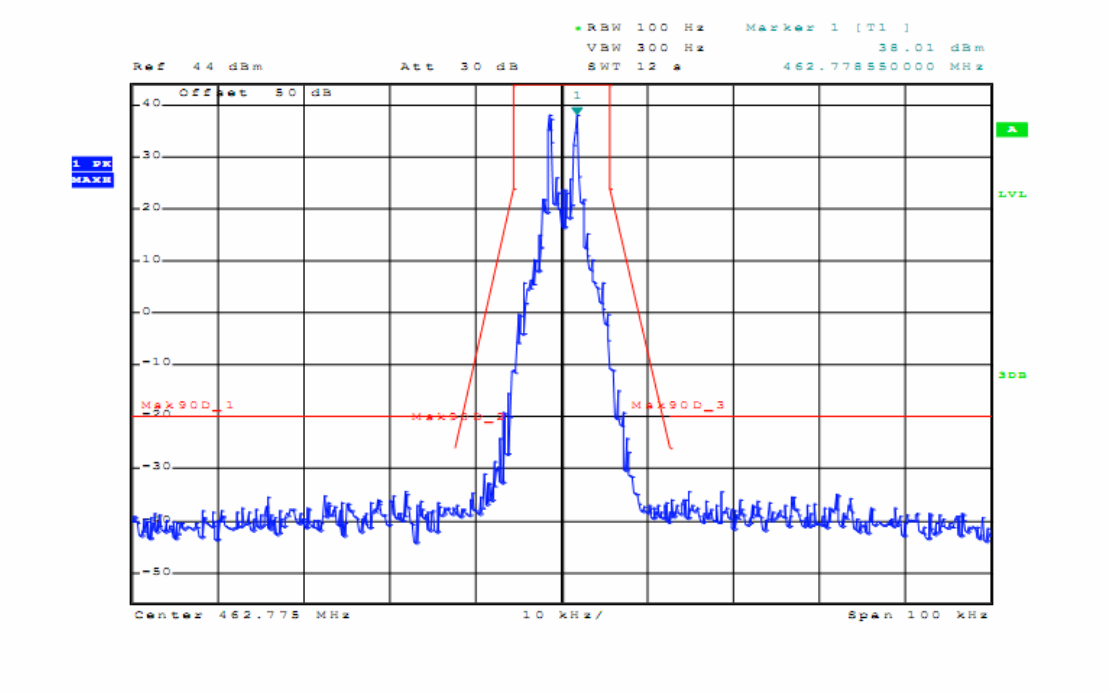
	99% bandwidth (KHz)				
Date rate	512	1200	2400	4800	9600
450.325 MHz	4.68	5.26	7.01	9.42	7.14
462.775 MHz	4.74	5.26	7.03	9.42	7.14
469.50 MHz	4.68	5.28	7.02	9.42	7.20

Emission Mask

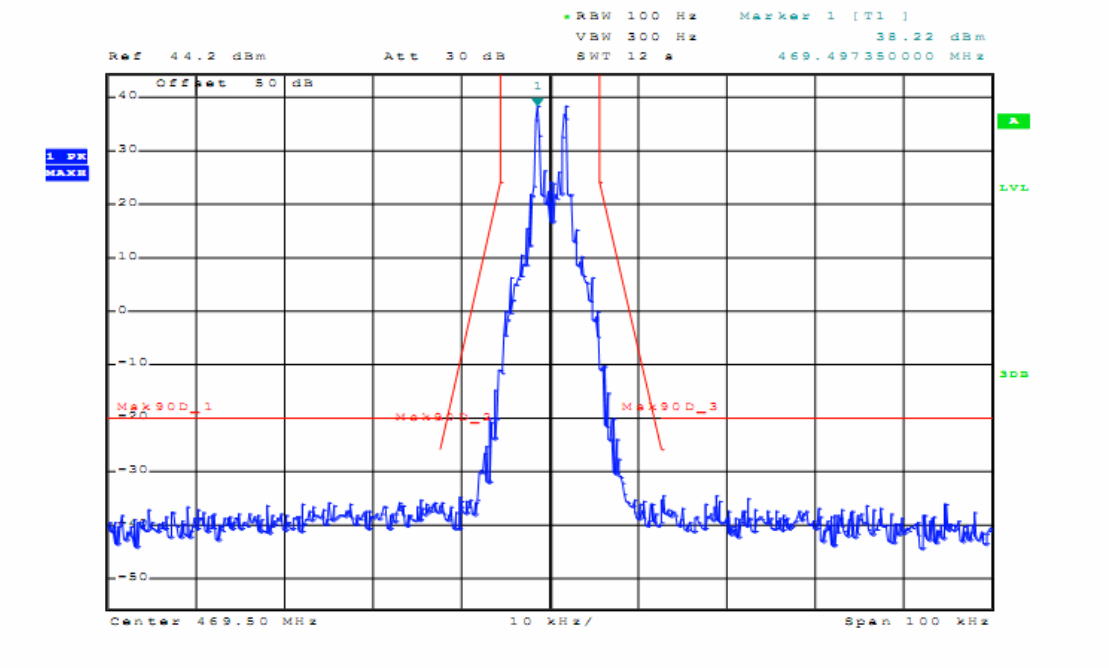
Emission Mask D – Low channel – 512 bits per second



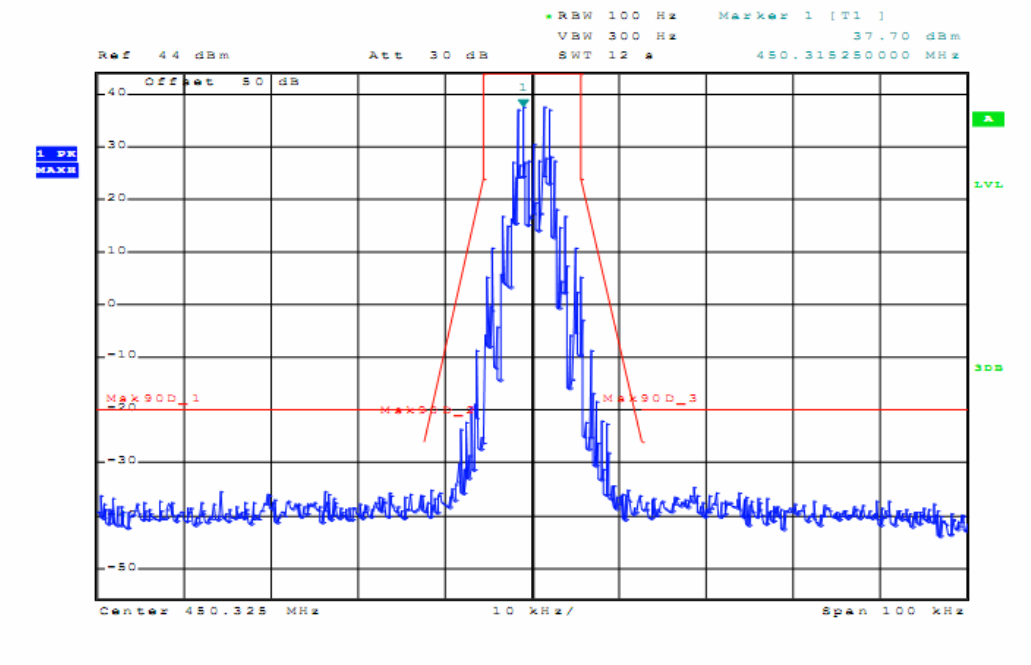
Emission Mask D – Middle channel – 512 bits per second



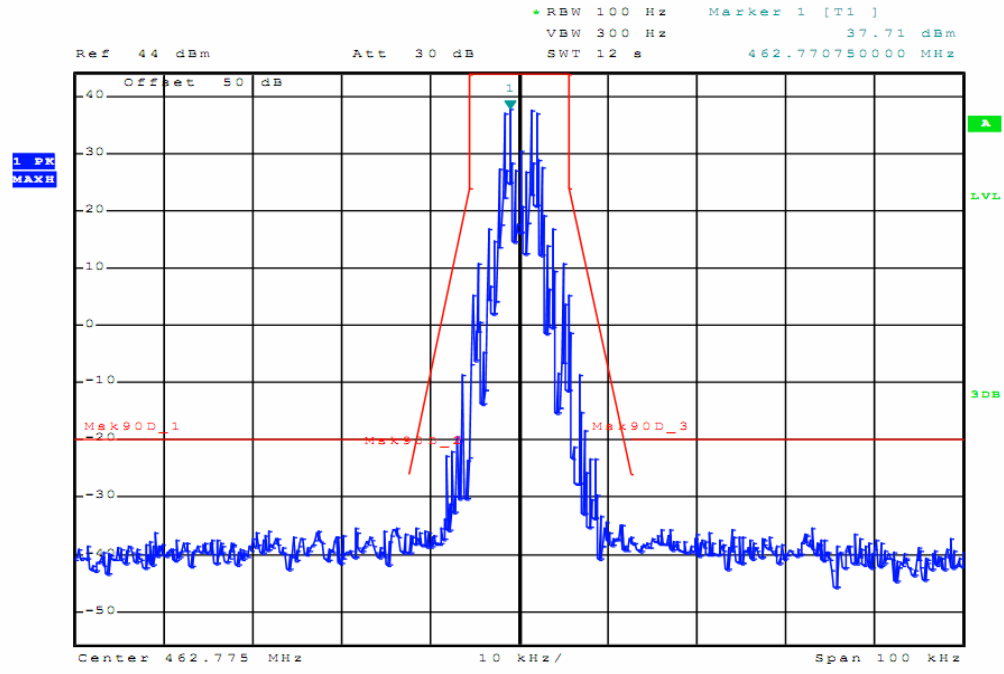
Emission Mask D – High channel – 512 bits per second



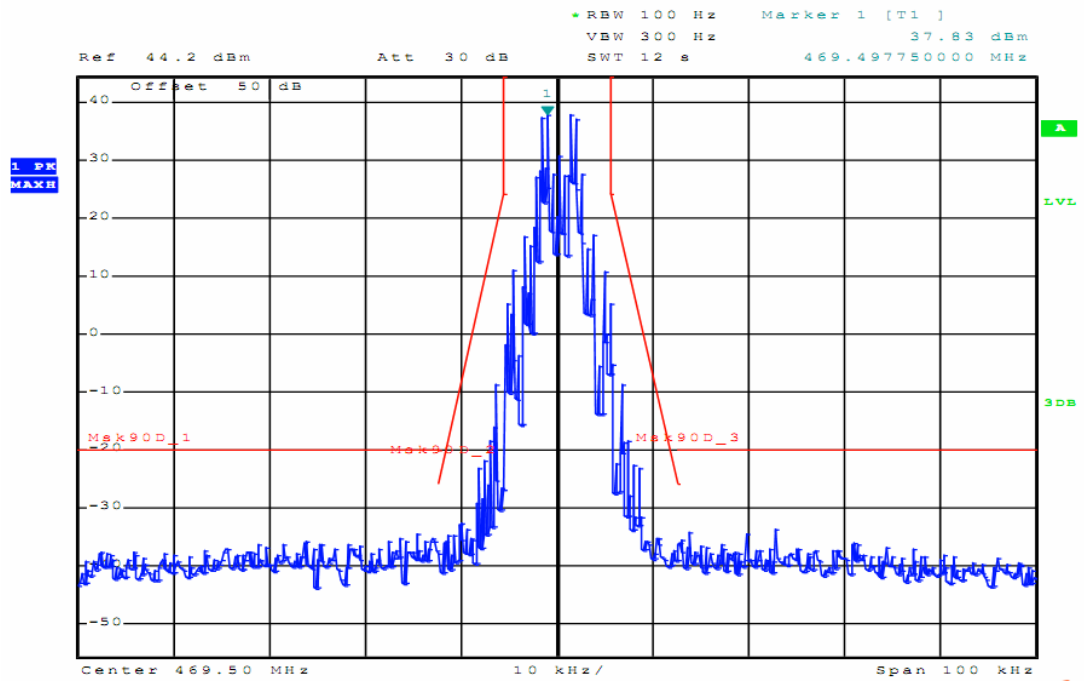
Emission Mask D –Low channel – 1200 bits per second



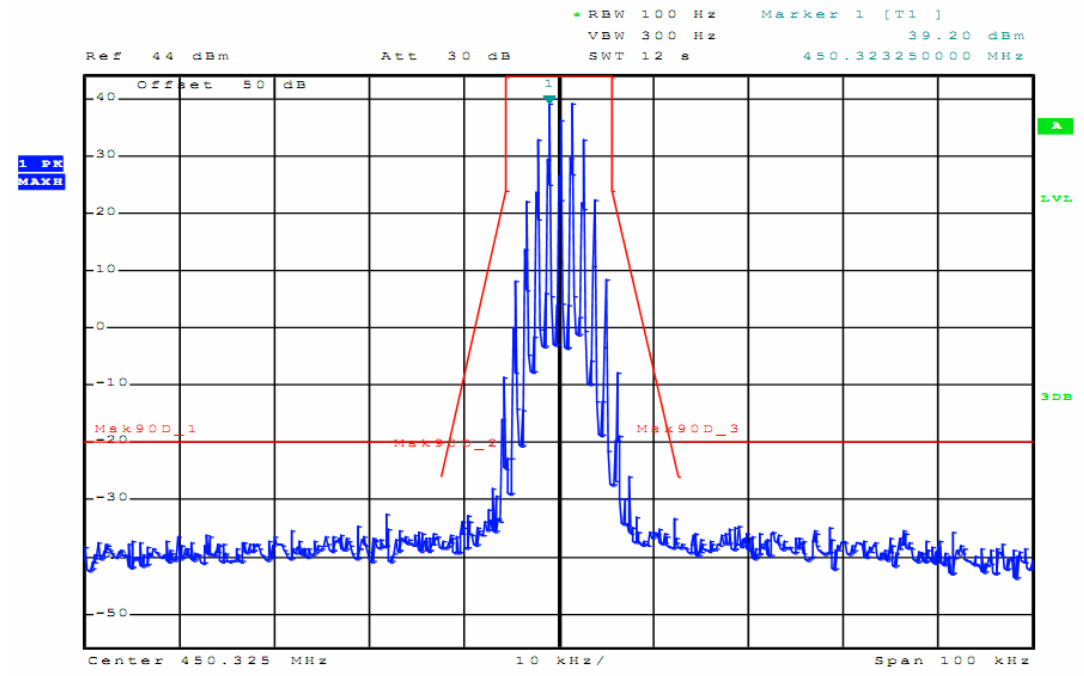
Emission Mask D –Middle channel – 1200 bits per second



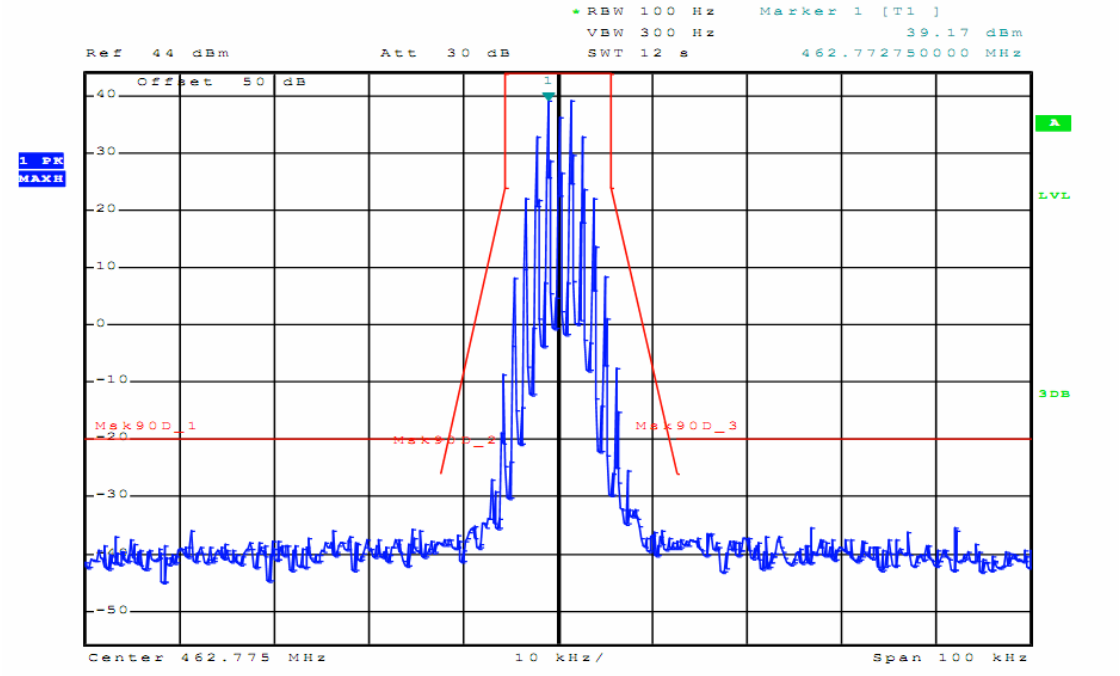
Emission Mask D –High channel – 1200 bits per second



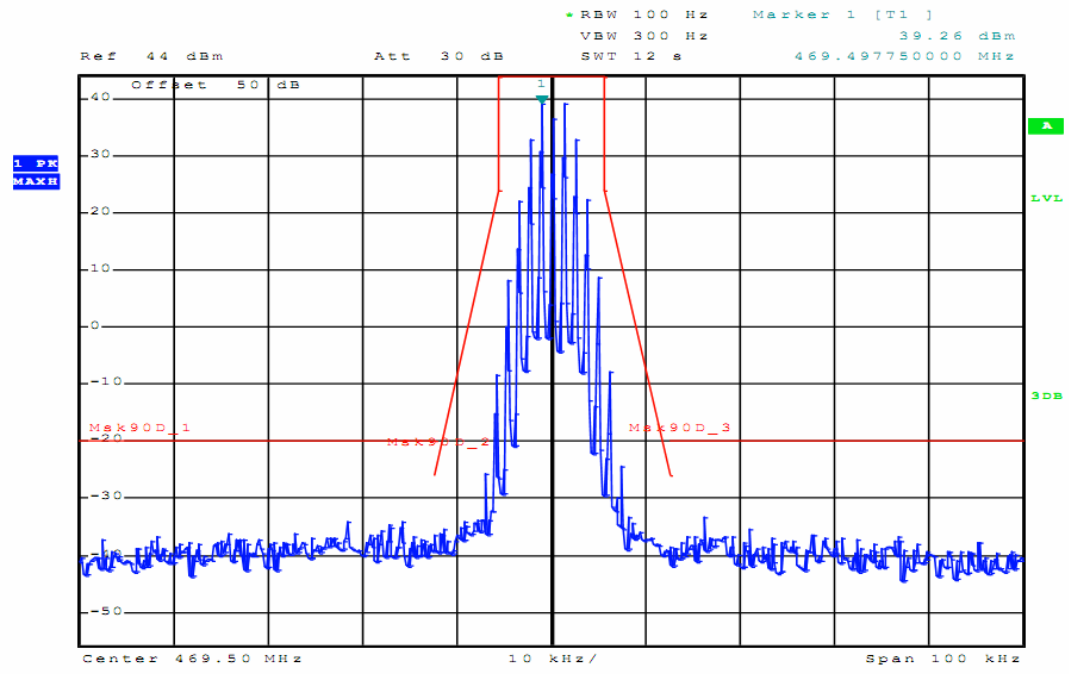
Emission Mask D –Low channel – 2400 bits per second



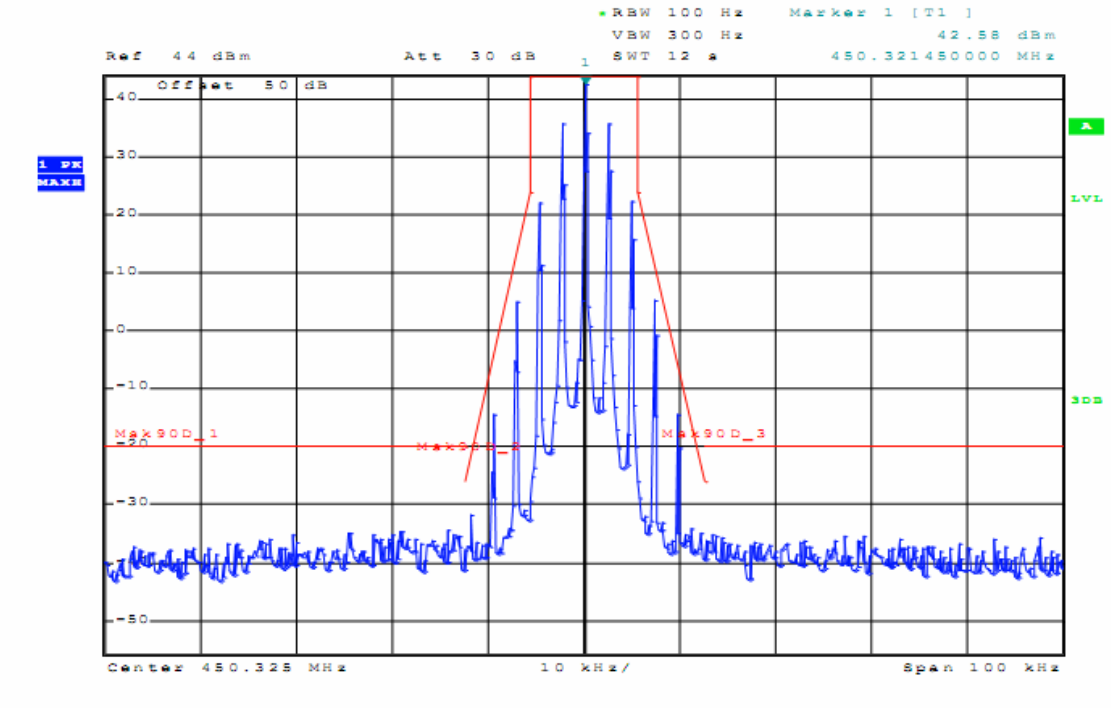
Emission Mask D –Middle channel – 2400 bits per second



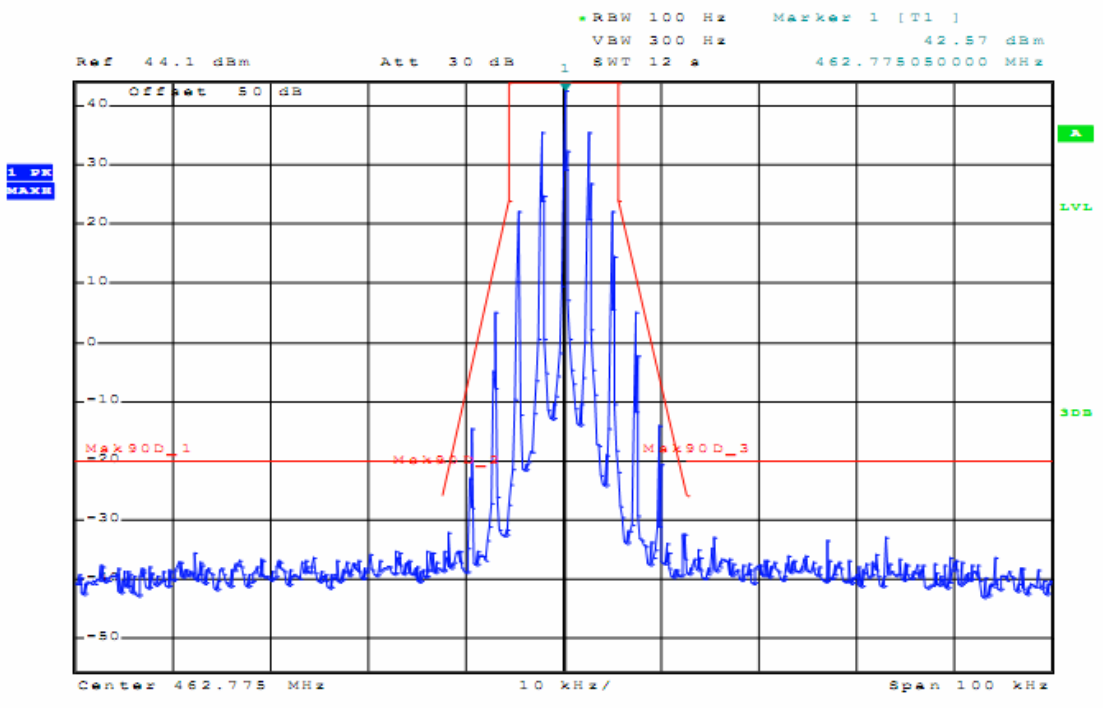
Emission Mask D –High channel – 2400 bits per second



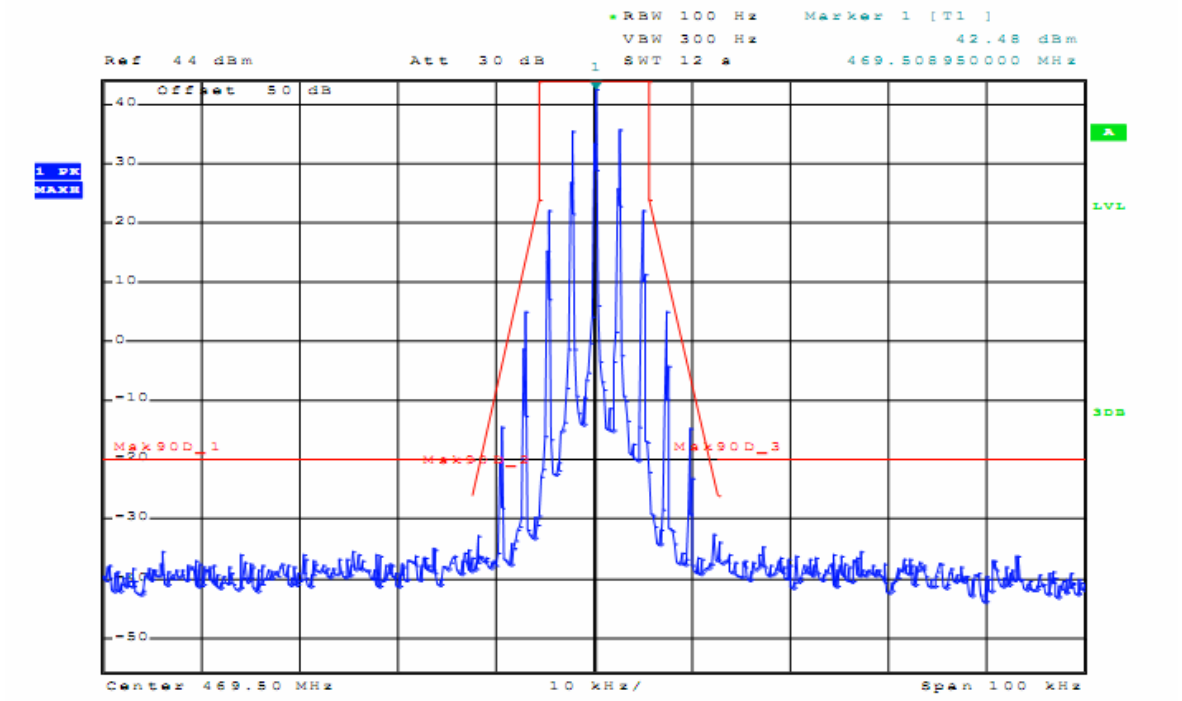
Emission Mask D –Low channel – 4800 bits per second



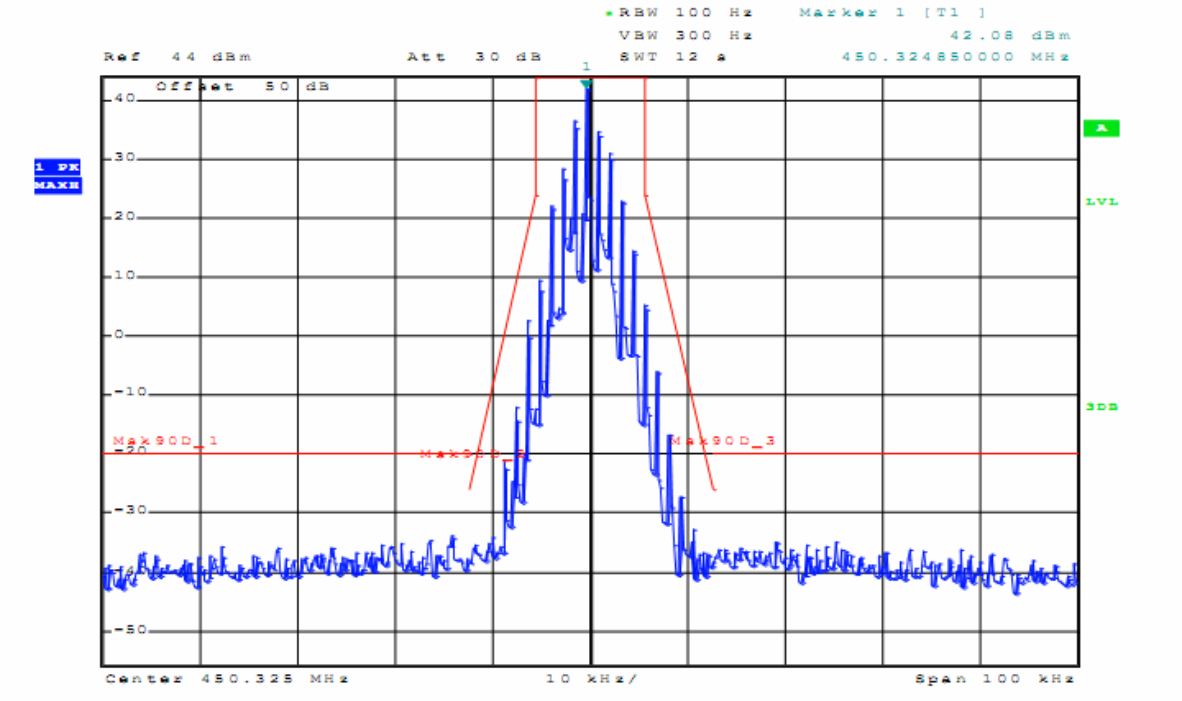
Emission Mask D –Middle channel – 4800 bits per second



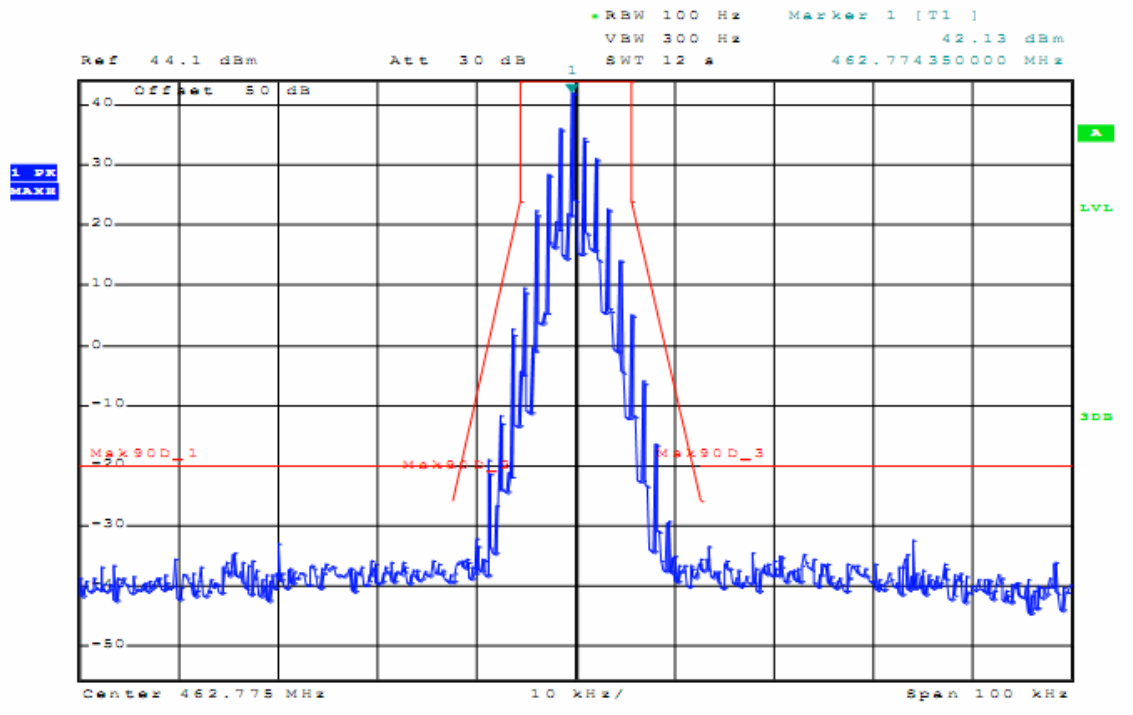
Emission Mask D –High channel – 4800 bits per second



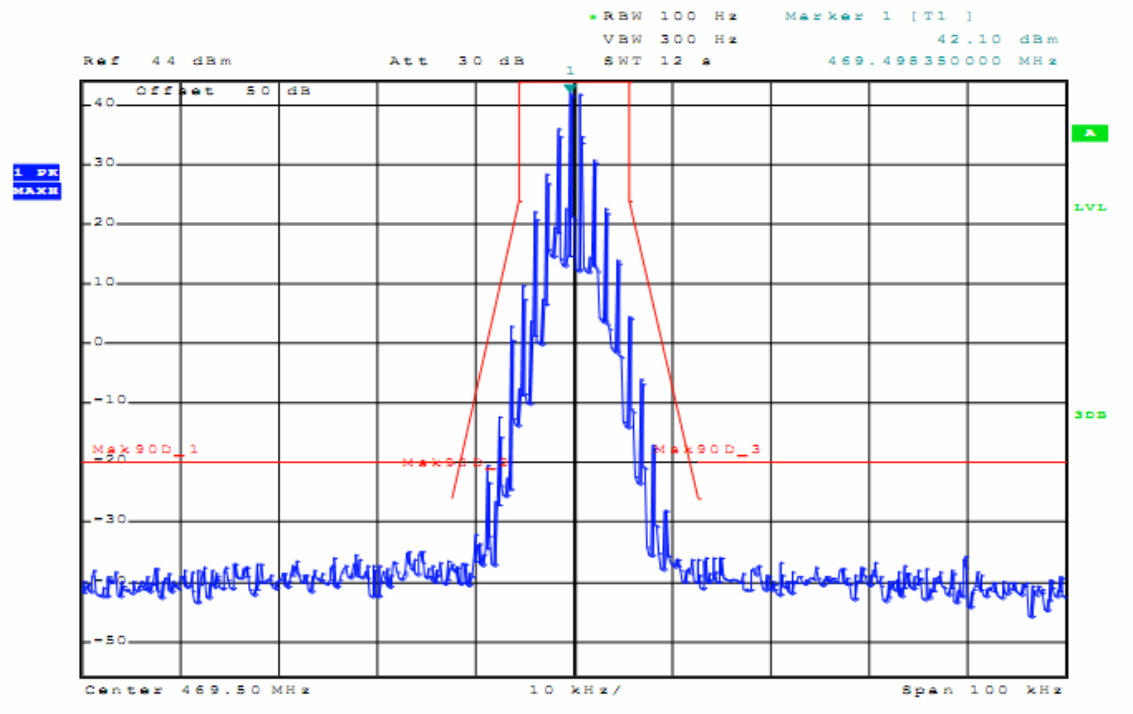
Emission Mask D –Low channel – 9600 bits per second



Emission Mask D –Middle channel – 9600 bits per second



Emission Mask D –High channel – 9600 bits per second



Remark:The max power 25W emission mask test data reported only.

9.0 Spurious Emissions at Antenna Terminals

9.1 Applicable Standards

FCC §2.1051 and §90.210.

Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f0 to 5.625 kHz removed from f0: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(fd−2.88 kHz) dB.

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

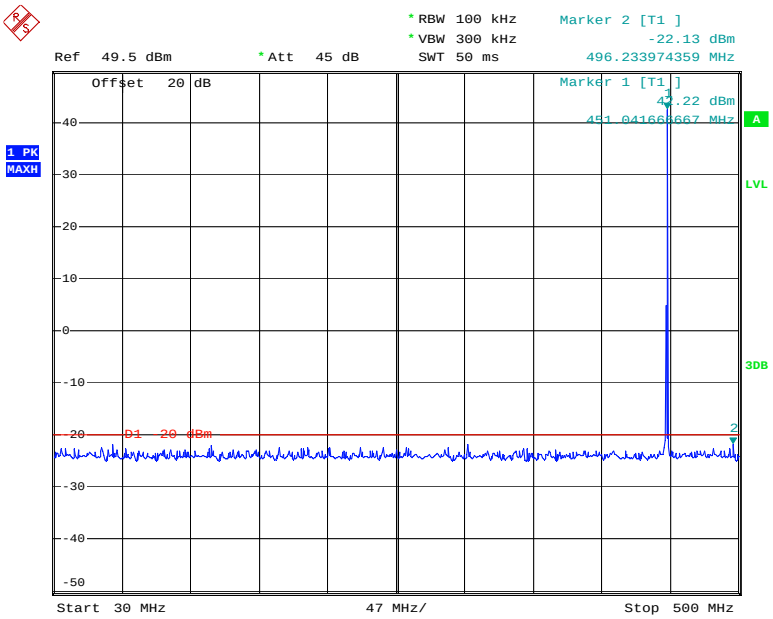
9.2 Test Procedure

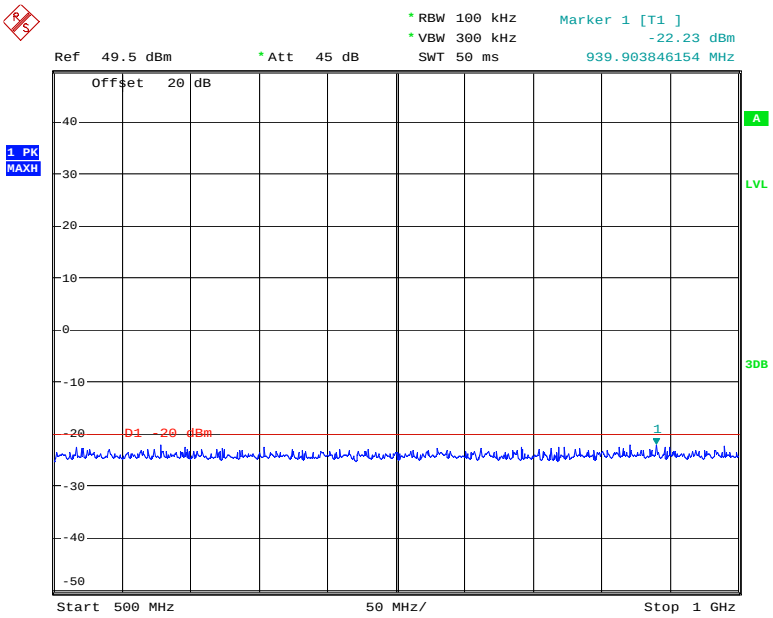
The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set to 100 kHz. Sufficient scans were taken to show any out of band emission up to 10th. Harmonic for the lower and the highest frequency range. Set RBW 100 kHz, VBW 300 kHz in the frequency band 30MHz to 500MHz, 500MHz to 1GHz,while set RBW 1MHz, VBW 3MHz from the 1GHz to 10th Harmonic.

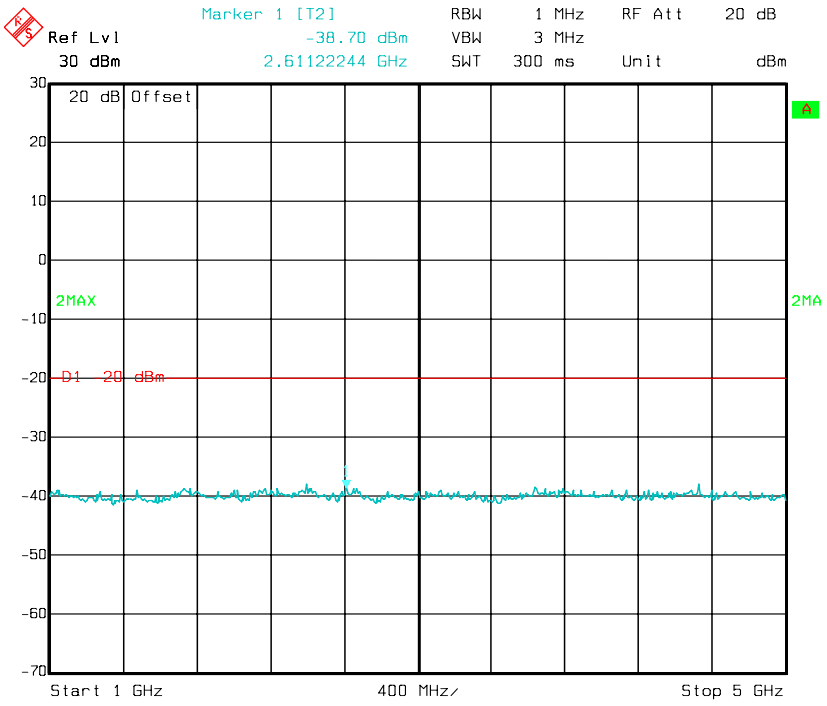
9.3 Test Result : PASS

Remark: Three data rate has been tested and the worse case(25W,512 bits per second data rate) reported only.

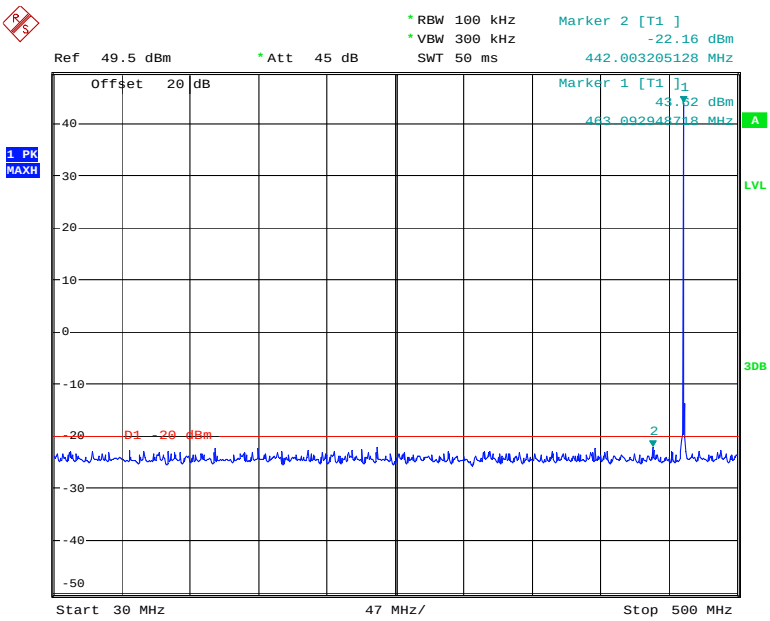
CH1, 450.32MHz

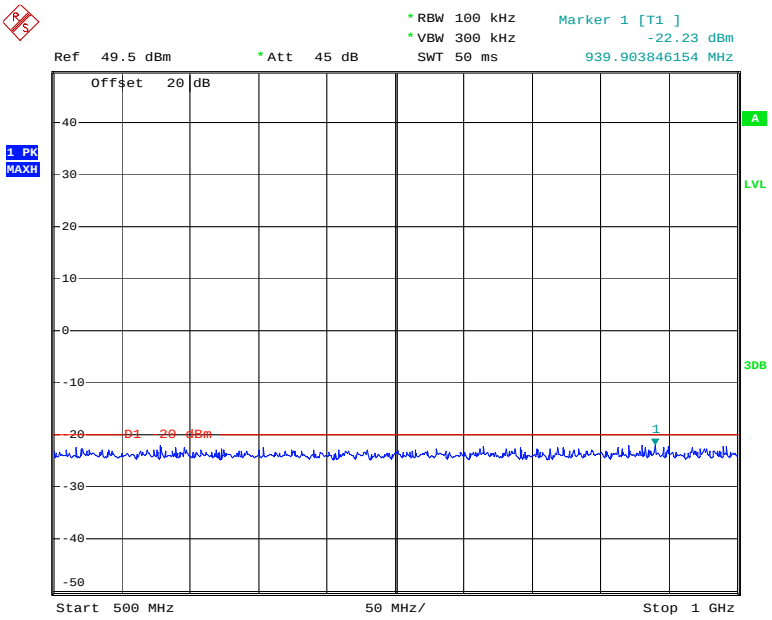


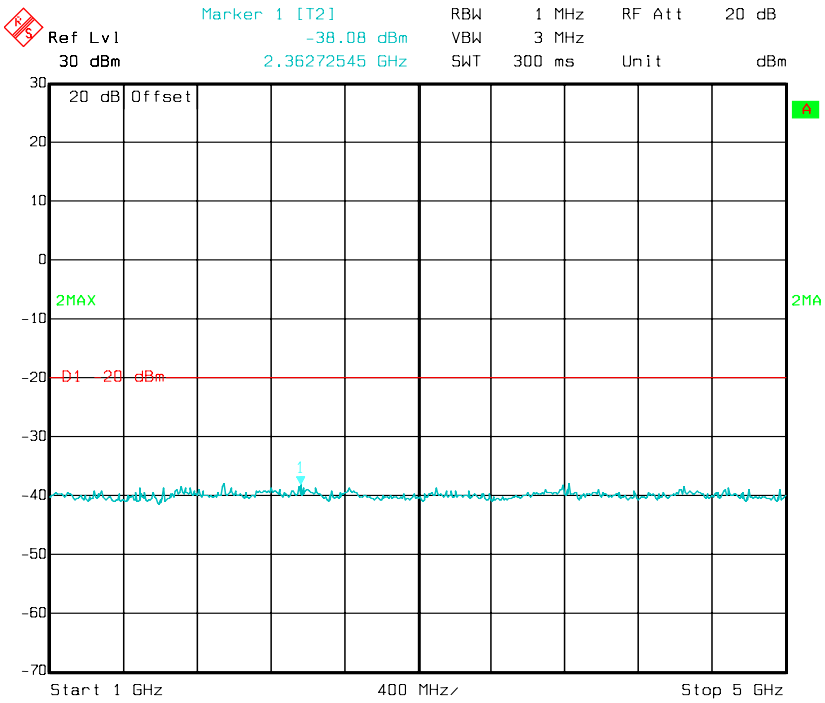




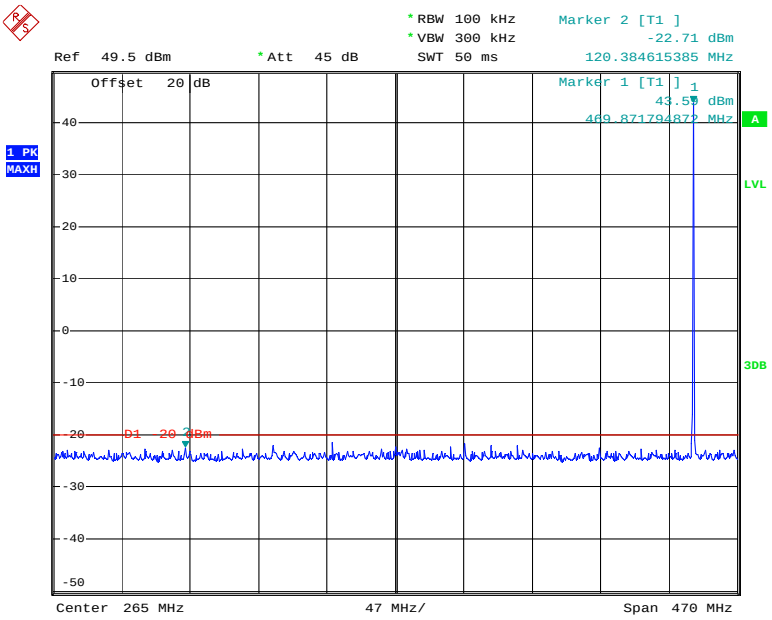
CH2, 462.775MHz

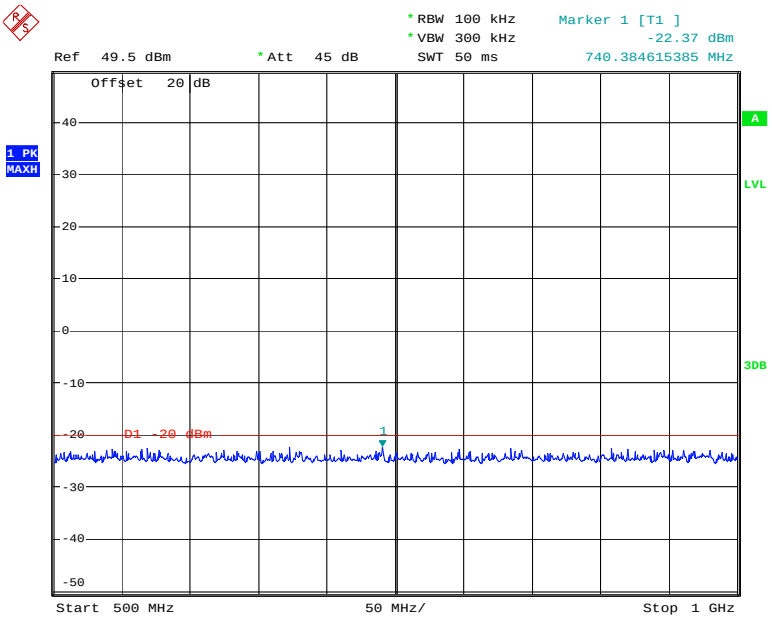


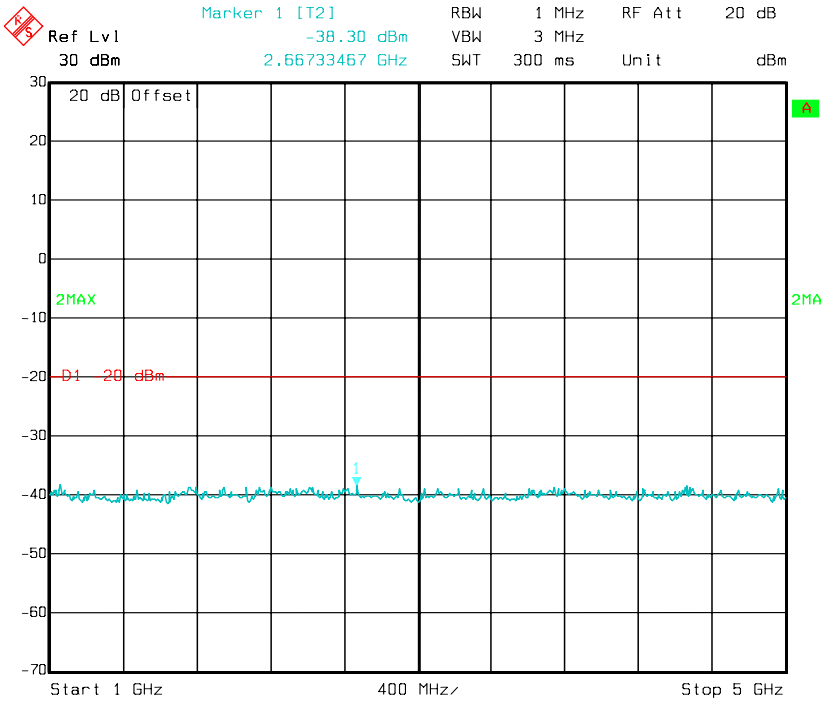

*RBW 100 kHz
*VBW 300 kHz
SWT 50 ms
Marker 1 [T1]
-22.23 dBm
939.903846154 MHz
Ref 49.5 dBm
*Att 45 dB
Offset 20 dB
1 PK
MAXH
A
LVL
3DB
D1 -20 dBm
Start 500 MHz
50 MHz/
Stop 1 GHz


Marker 1 [T2]
-38.08 dBm
2.36272545 GHz
RBW 1 MHz
VBW 3 MHz
SWT 300 ms
RF Att 20 dB
Unit dBm
Ref Lvl
30 dBm
20 dB Offset
A
2MAX
2MA
D1 -20 dBm
Start 1 GHz
400 MHz/
Stop 5 GHz

CH3, 469.5MHz


RBW 100 kHz
VBW 300 kHz
SWT 50 ms
Marker 2 [T1]
-22.71 dBm
120.384615385 MHz
Ref 49.5 dBm
Att 45 dB
Offset 20 dB
Marker 1 [T1]
43.57 dBm
469.871794872 MHz
1 PK
MAXH
A
LVL
3DB
D1 -20 dBm
Center 265 MHz
47 MHz/
Span 470 MHz


RBW 100 kHz
VBW 300 kHz
SWT 50 ms
Marker 1 [T1]
-22.37 dBm
740.384615385 MHz
Ref 49.5 dBm
Att 45 dB
Offset 20 dB
1 PK
MAXH
A
LVL
3DB
D1 -20 dBm
Start 500 MHz
50 MHz/
Stop 1 GHz


Marker 1 [T2]
-38.30 dBm
2.66733467 GHz
RBW 1 MHz
VBW 3 MHz
SWT 300 ms
RF Att 20 dB
Unit dBm
Ref Lvl
30 dBm
20 dB Offset
2MAX
2MA
D1 -20 dBm
Start 1 GHz
400 MHz/
Stop 5 GHz

10.0 Spurious Radiated Emissions

10.1 Spurious Radiated Emissions

FCC §2.1051 and §90.210.

The power of each unwanted emission shall be less than Transmitted Power as specified below for transmitters designed to operate with 12.5 KHz channel bandwidth:

1 On any frequency removed from the center of the authorized bandwidth f_o to 5.625 KHz removed from f_o: Zero dB

2 On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in KHz) f_o of more than 5.625 KHz but no more than 12.5 KHz: At least 7.27dB

3 On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in KHz) f_o of more than 12.5 KHz: At least 50+10 log (P) dB or 70 dB, which ever is lesser attenuation.

10.2 Test Procedure

The transmitter was placed on a turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT .The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to teeth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =10 1g (TXpwr in Watts/0.001)-the absolute level

Spurious attenuation limit in dB =43+10 Log10 (power out in Watts)

Spurious attenuation limit in dB =50+10 Log10 (power out in Watts) for EUT with a 12.5 kHz channel bandwidth.

10.3Test result:

CH1

Frequency (MHz)	Reading(dB μ V)				Conclusion
	Antenna polarization	Result (dBm)	Limit (dBm)	Margin (dB)	
900.65	H	-32.62	-20	12.62	PASS
1350.97	H	-43.31		23.31	
1801.30	H	-40.89		20.89	
2251.62	H	-50.84		30.84	
--	--	--		--	
--	--	--		--	
900.65	V	-32.24		12.24	
1350.97	V	-41.51		21.51	
1801.30	V	-38.63		18.63	
2251.62	V	-50.17		30.17	
--	--	--		--	
--	--	--		--	

CH2

Frequency (MHz)	Reading(dB μ V)				Conclusion
	Antenna polarization	Result (dBm)	Limit (dBm)	Margin (dB)	
925.55	H	-34.20	-20	14.20	PASS
1388.32	H	-45.06		25.06	
1851.10	H	-40.71		20.71	
2313.87	H	-48.84		28.84	
--	--	--		--	
--	--	--		--	
925.55	V	-33.54		13.54	
1388.32	V	-43.09		23.09	
1851.10	V	-38.65		18.65	
2313.87	V	-49.16		29.16	
--	--	--		--	
--	--	--		--	

CH3

Frequency (MHz)	Reading(dB μ V)				Conclusion
	Antenna polarization	Result (dBm)	Limit (dBm)	Margin (dB)	
939.0	H	-33.07	-20	13.07	PASS
1408.50	H	-42.11		22.11	
1878.00	H	-43.15		23.15	
2347.50	H	-54.64		34.64	
--	--	--		--	
--	--	--		--	
939.0	V	-34.21		14.21	
1408.50	V	-42.01		22.01	
1878.00	V	-39.35		19.35	
2347.50	V	-52.24		32.24	
--	--	--		--	
--	--	--		--	

Note：(1) Measurements were conducted from 30 MHz to the 10th harmonic of highest fundamental frequency.

(2) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

11.0 Frequency Stability

11.1 Applicable Standard

FCC §2.1055, §90.213

1 According to Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30℃ to +50℃ centigrade.

2 According to FCC Part 2 Section 2.1055 (d) (1), Vary primary supply voltage from 85 to 115 percent of the nominal value.

4 According to §90.213, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 1.5 ppm.

11.2 Test Procedure

Frequency Stability vs. Temperature:

The equipment under test was connected to an AC power supply and the RF output was connected to a frequency counter via feed through attenuators. EUT was placed inside the temperature chamber. The AC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the frequency counter.

Frequency Stability vs. Voltage:

A variable AC power supply was connected to the EUT, The voltage was set to 115%, 100%, and 85% of the nominal operating input voltage, and the frequency output was recorded from the frequency counter.

11.3 Test conclusion

PASS

11.4 Test result

See next page

CH 2

Reference Frequency 462.775 MHz, Limit : 1.5 PPM			
Environment Conditions		Frequency Measure with Time Elapsed	
Temperature (OC)	Power supplied (Vac)	Measured Frequency (MHz)	Error (PPM)
Frequency Stability vs. Temperature			
50	120	462.77512	0.259389354
40	120	462.77524	0.518778708
30	120	462.77555	1.188867873
20	120	462.77522	0.475547149
10	120	462.77512	0.259389354
0	120	462.77525	0.540394488
-10	120	462.77522	0.475547149
-20	120	462.77511	0.237773575
-30	120	462.77515	0.324236693
Frequency Stability vs. Voltage			
20	138	462.77524	0.518778708
20	102	462.77523	0.497162929

Remark：The worse channel CH2 reported only.

12.0 Transmitter Frequency Behavior

12.1 Applicable Standard

FCC §90.214

Transmitters designed to operate in the 150-174 MHz and 421-512 MHz frequency bands must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:

Time intervals[1] [2]	Maximum frequency difference[3]	All equipment	
		150 to 174 MHz	421 to 512 MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels			
t_1[4]	±25.0 kHz	5.0 ms	10.0 ms
t_2	±12.5 kHz	20.0 ms	25.0 ms
t_3[4]	±25.0 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels			
t_1[4]	±12.5 kHz	5.0 ms	10.0 ms
t_2	±6.25 kHz	20.0 ms	25.0 ms
t_3[4]	±12.5 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels			
t_1[4]	±6.25 kHz	5.0 ms	10.0 ms
t_2	±3.125 kHz	20.0 ms	25.0 ms
t_3[4]	±6.25 kHz	5.0 ms	10.0 ms

[1] t_{on} is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.

t_1 is the time period immediately following t_{on}.

t_2 is the time period immediately following t_1.

t_3 is the time period from the instant when the transmitter is turned off until t_{off}.

t_{off} is the instant when the 1 kHz test signal starts to rise.

[2] During the time from the end of t_2 to the beginning of t_3, the frequency difference must not exceed the limits specified in §90.213.

[3] Difference between the actual transmitter frequency and the assigned transmitter frequency.

[4] If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

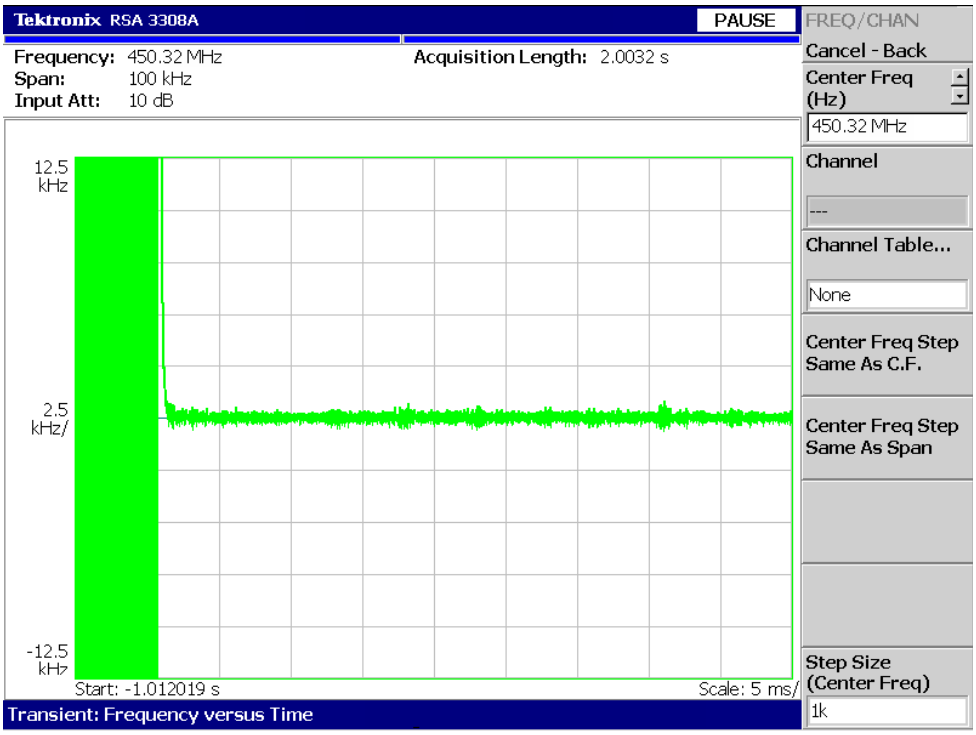
12.2 Test Procedure

TIA-603-D, section 2.2.19

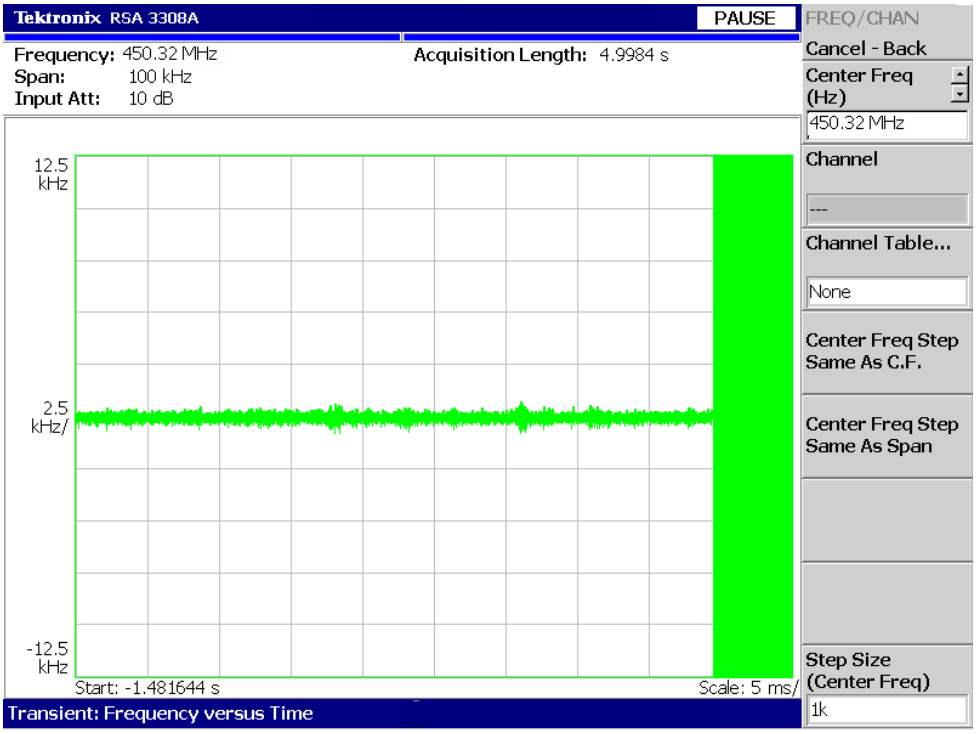
12.3 Test result

Operation Frequency (MHz)	Channel Separation (kHz)	Time Period (ms)	Maximum frequency difference (kHz)	Result
450.32	12.5	10	±12.5 kHz	Pass
462.775	12.5	25	±6.5 kHz	Pass
469.50	12.5	10	±12.5 kHz	Pass

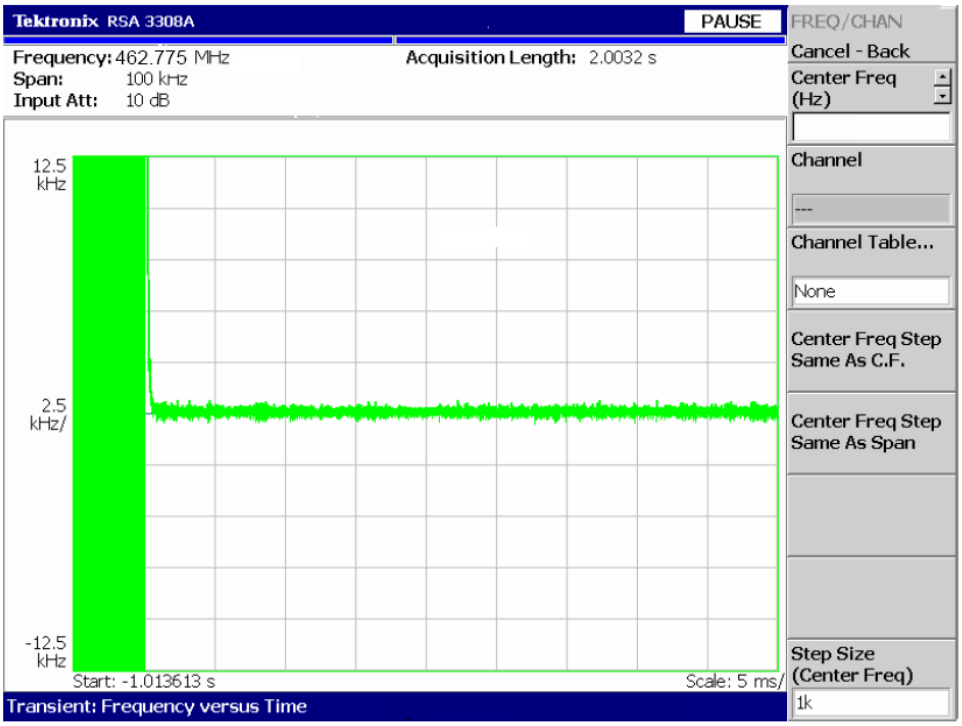
450.32 MHz On Time



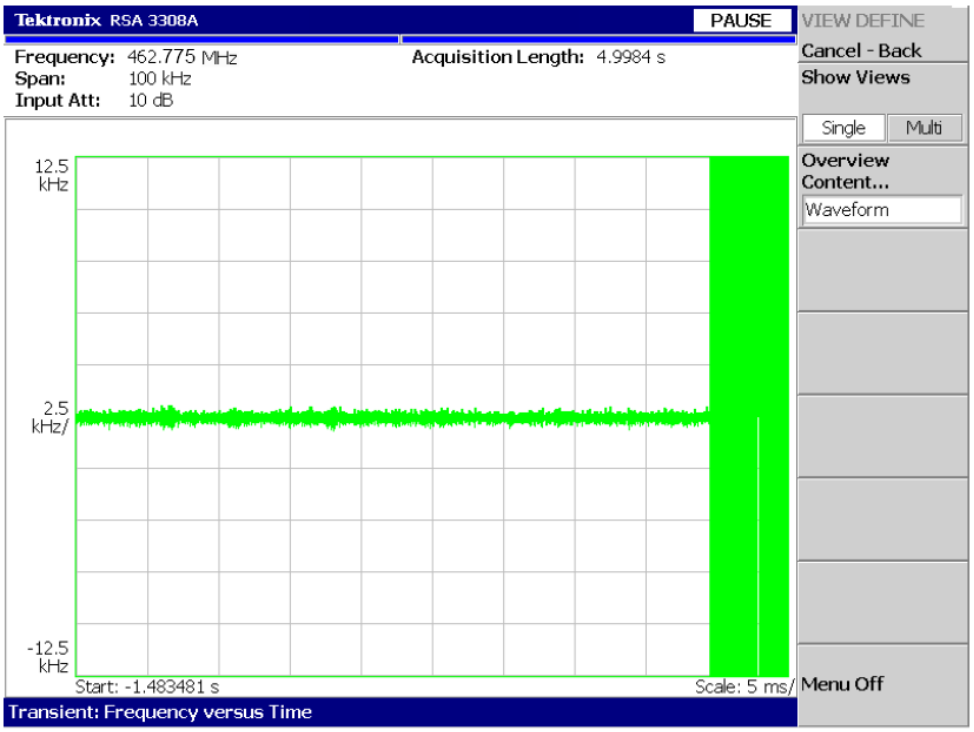
450.32 MHz Off Time



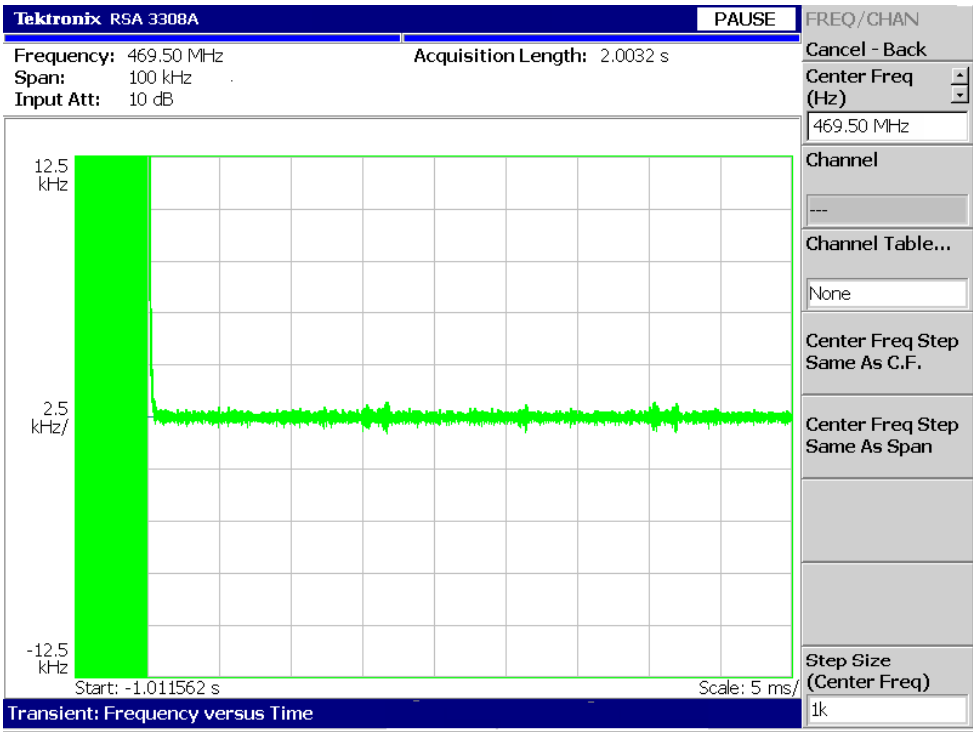
462.775 MHz On Time



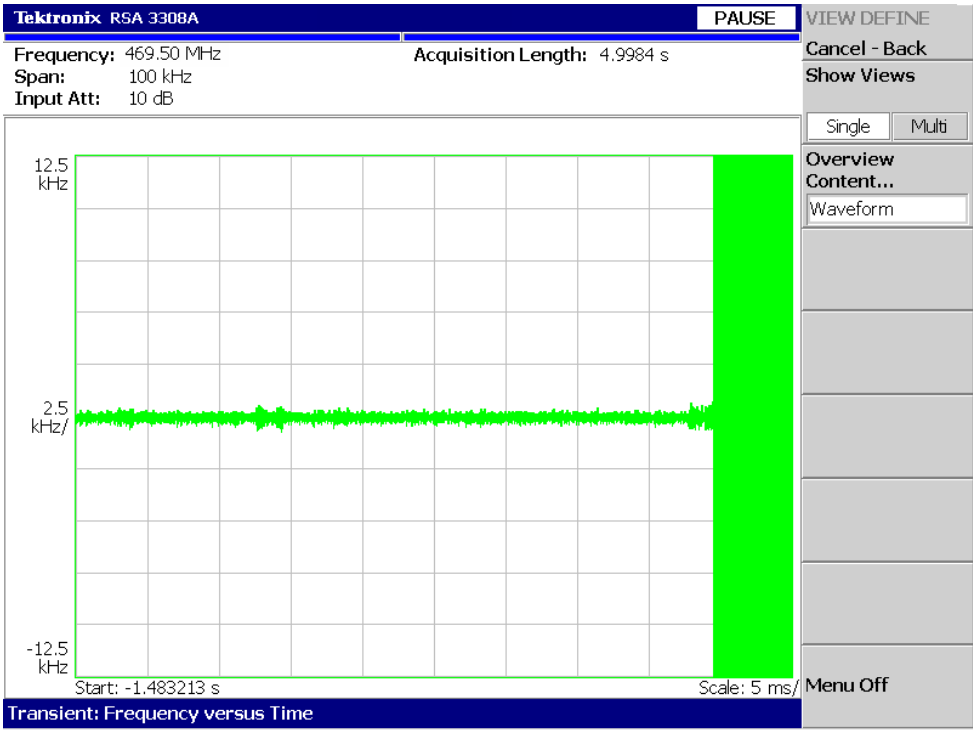
462.775 MHz Off Time



469.50 MHz On Time



469.50 MHz Off Time



END OF REPORT