

FCC PART 15.407

TEST REPORT

For

Shenzhen Crystal Video Technology Co.,LTD.

F13, F518 Idea Land, BaoYuan Road, Baoan Central Area, ShenZhen, China

FCC ID: Y3HCH797020141101

Report Type: Original Report	Product Type: HD Wireless Video Transmission System
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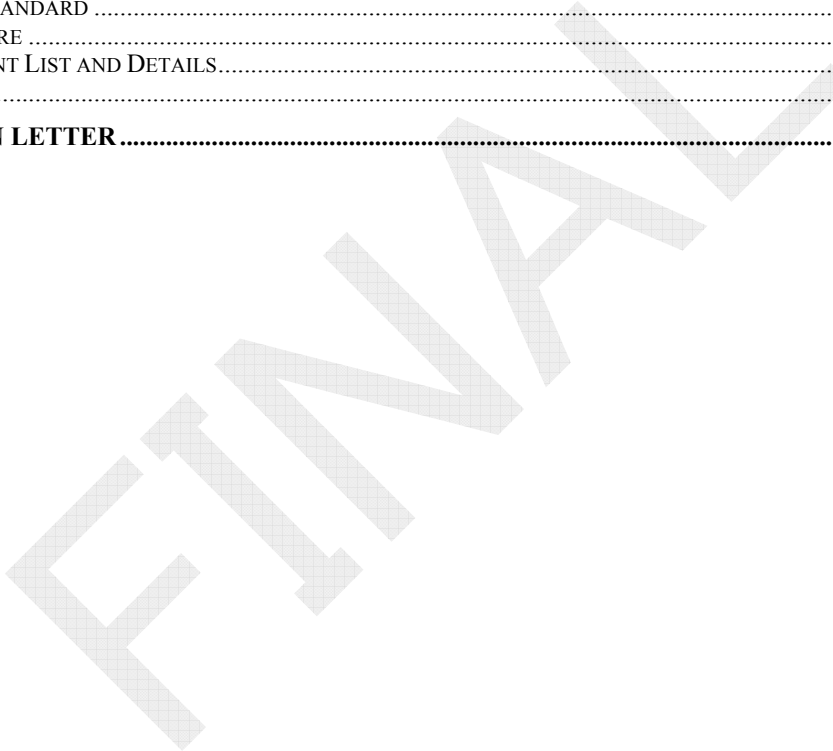
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Shenzhen Crystal Video Technology Co.,LTD.*'s product, model number: *CH7970* (FCC ID: *Y3HCH797020141101*) or ("EUT") in this report is a *HD Wireless Video Transmission System*, which was measured approximately: 10 cm (L) x 5.8 cm (W) x 2.1 cm (H), rated input voltage: DC 5.0V from adapter.

Adapter information: KUANTEN
Model: KT10W050200USU
Input: AC 100-240V, 50/60Hz, 0.4A
Output: DC 5.0V, 2.0A

Note: The model CH7970, CH4970 are electrically identical, the only difference between them is the model name, we selected CH7970 for testing, the details was explained in the attached declaration letter.

** All measurement and test data in this report was gathered from production sample serial number: 141024001 (Assigned by BACL.Dongguan). The EUT was received on 2014-10-24.*

Objective

This type approval report is prepared on behalf of *Shenzhen Crystal Video Technology Co.,LTD.* in accordance with Part 2-Subpart J, Part 15-Subparts A, B and E of the Federal Communications Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

Related Submittal(s)/Grant(s)

N/A

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communications Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

FEMVA

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

For 5150~5250 MHz band, 6 channels are provided:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	5180	4	5220
2	5190	5	5230
3	5200	6	5240

For 20MHz bandwidth, channel 1, 3 and 6 were tested, and for 40MHz bandwidth, channel 2 and 5 were tested.

For 5725~5850 MHz band, 7 channels are provided to test:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	5745	5	5795
2	5755	6	5805
3	5765	7	5825
4	5785	/	/

For 20MHz bandwidth, channel 1, 4 and 7 were tested, and for 40MHz bandwidth, channel 2 and 5 were tested.

The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations.

EUT Exercise Software

The software “Hyperterminal” was used for testing, and the commands were provided by manufacturer. The worst condition (maximum power) was setting by the software as following table:

5150–5250MHz Band:

Test Mode	Test Software Version	Hyperterminal		
20MHz Bandwidth	Test Frequency	5180MHz	5200MHz	5240MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting Chain0	39	41	43
	Power Level Setting Chain1	39	41	43
40MHz Bandwidth	Test Frequency	5190MHz	/	5230MHz
	Data Rate	13.5Mbps	13.5Mbps	13.5Mbps
	Power Level Setting Chain0	41	/	42
	Power Level Setting Chain1	41	/	42

5725–5850MHz Band:

Test Mode	Test Software Version	Hyperterminal		
20MHz Bandwidth	Test Frequency	5745MHz	5785MHz	5825MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting Chain0	58	61	63
	Power Level Setting Chain1	58	61	63
40MHz Bandwidth	Test Frequency	5755MHz	/	5795MHz
	Data Rate	13.5Mbps	13.5Mbps	13.5Mbps
	Power Level Setting Chain0	54	/	63
	Power Level Setting Chain1	54	/	63

Equipment Modifications

No modification was made to the EUT.

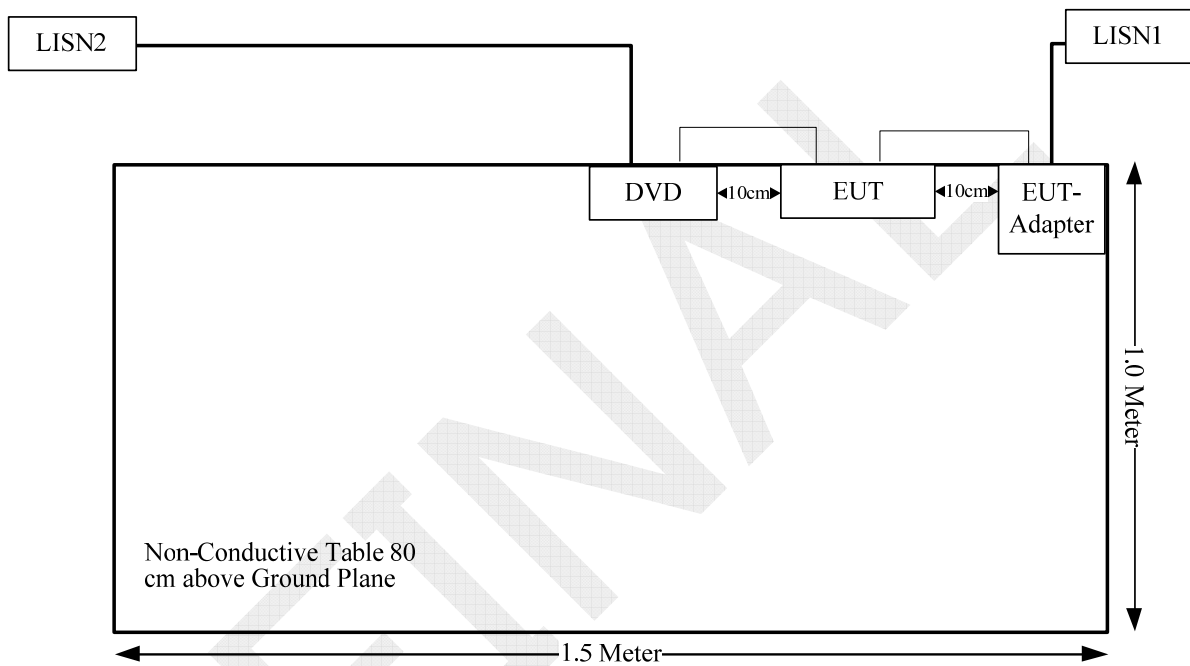
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Philips	DVD	DVP3560K/93	KX1C1108079973

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
HDMI Cable	yes	YES	1.2	EUT	DVD
Adapter	no	YES	1.2	EUT	Adapter

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.407 (f) & §1.1310 & §2.1091	Maximum Permissible Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b)(6)& §15.207(a)	Conducted Emissions	Compliance
§15.205& §15.209 &§15.407(b) (1),(6),(7)	Undesirable Emission& Restricted Bands	Compliance
§15.407(b)	Conducted Spurious Emissions At Antenna Port	Compliance
§15.407(b) (1),(2),(3),(4)	Out Of Band Emissions	Compliance
§15.407(a) (1)	26 dB Bandwidth	Compliance
§15.407(a)(1),	Conducted Transmitter Output Power	Compliance
§15.407 (a)(1),(5)	Power Spectral Density	Compliance

FCC §15.407 (f) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.407(f) and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’s guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

Frequency Band	Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
5.2Band	5240	4.6	2.88	15.07	32.14	20.00	0.01845	1.0
5.8Band	5745	4.6	2.88	14.57	28.64	20.00	0.01644	1.0

Result: The device meet FCC MPE at 20 cm distance

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC 47 CFR section 15.407 (a)(1),if transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

This product used two internal antennas, the maximum gain is 4.6 dBi, which fulfill the requirement of this section, please refer to the EUT photos.

Result: Compliance.

FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207, §15.407(b) (6)

Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cispr} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} of Table 1, then:

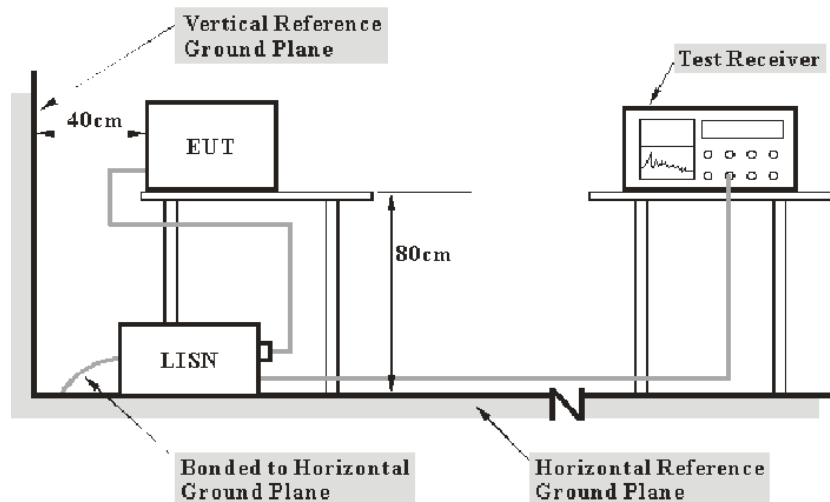
- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

Based on CISPR 16-4-2: 2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.46 dB (150 kHz to 30 MHz).

Table 1 – Values of U_{cispr}

Measurement	U_{cispr}
Conducted disturbance at mains port using AMN (150 kHz to 30 MHz)	3.4 dB

EUT Setup



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

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter of EUT was connected to a 120 VAC/60 Hz power source

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

$$C_f = A_C + VDF$$

Herein,

V_C (cord. Reading): corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF: voltage division factor of AMN

C_f : Correction Factor

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2014-10-16	2015-10-16
R&S	L.I.S.N	ESH3-Z5	843331/015	N/A	N/A
R&S	Two-line V-network	ENV 216	3560.6550.12	2014-01-22	2015-01-22
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

During the conducted emission test, the adapter of EUT was connected to the first LISN and the other support equipments were connected to the outlet of the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

5.30 dB at 0.581275 MHz in the Line conducted mode

Test Data

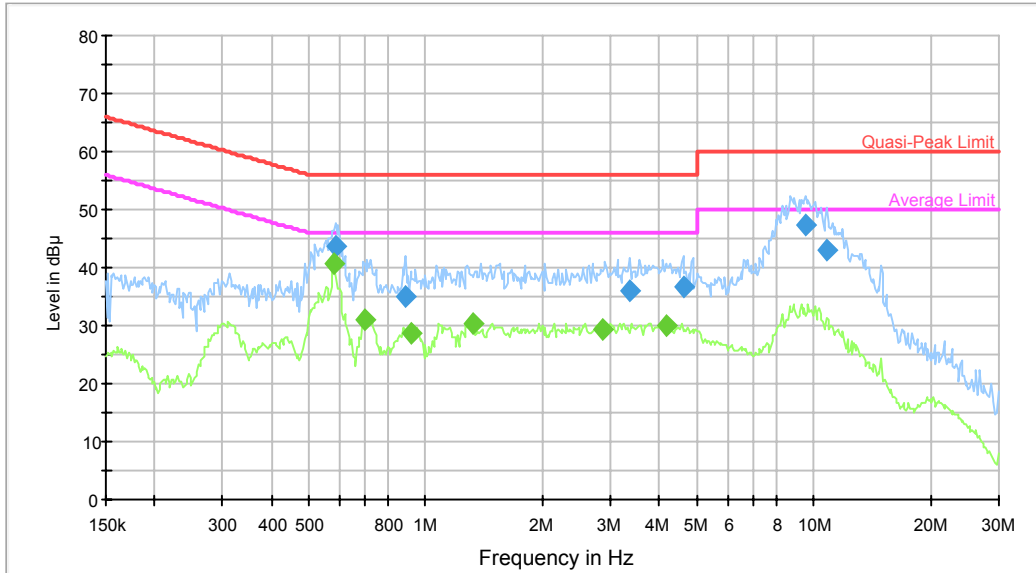
Environmental Conditions

Temperature:	25 °C
Relative Humidity:	43 %
ATM Pressure:	100.9 kPa

The testing was performed by Dean Liu on 2014-11-04.

Test Mode: Transmitting

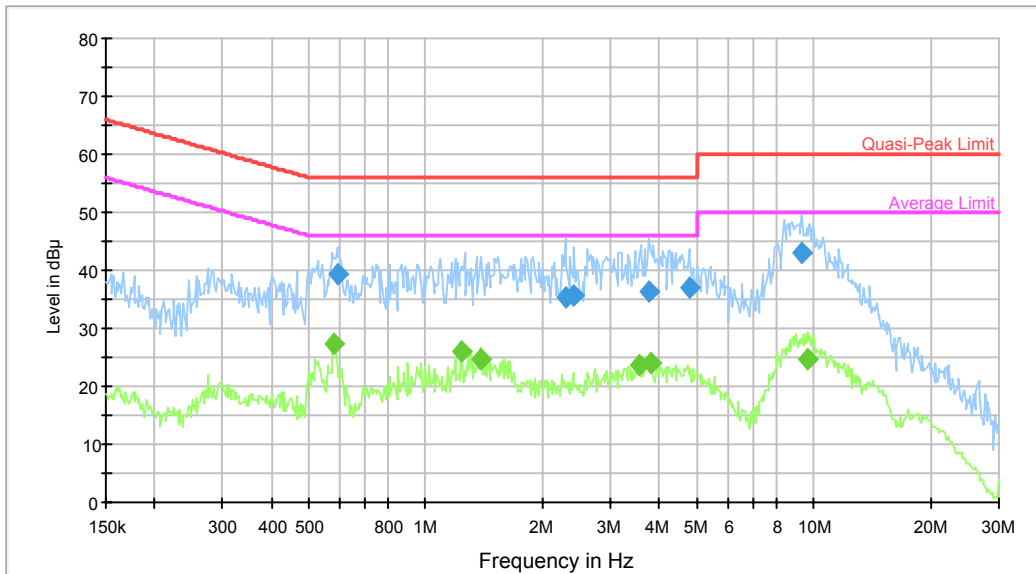
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.585926	43.7	9.000	L1	10.4	12.3	56.0	Compliance
0.886728	35.0	9.000	L1	10.5	21.0	56.0	Compliance
3.355051	36.1	9.000	L1	10.6	19.9	56.0	Compliance
4.614454	36.6	9.000	L1	10.7	19.4	56.0	Compliance
9.528593	47.4	9.000	L1	10.6	12.6	60.0	Compliance
10.824237	43.2	9.000	L1	10.6	16.8	60.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.581275	40.7	9.000	L1	10.4	5.3	46.0	Compliance
0.698191	30.9	9.000	L1	10.6	15.1	46.0	Compliance
0.915445	28.6	9.000	L1	10.5	17.4	46.0	Compliance
1.331304	30.5	9.000	L1	10.4	15.5	46.0	Compliance
2.860806	29.5	9.000	L1	10.6	16.5	46.0	Compliance
4.160384	30.0	9.000	L1	10.7	16.0	46.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.590613	39.3	9.000	N	10.4	16.7	56.0	Compliance
2.288725	35.3	9.000	N	10.5	20.7	56.0	Compliance
2.420011	35.6	9.000	N	10.5	20.4	56.0	Compliance
3.750995	36.2	9.000	N	10.7	19.8	56.0	Compliance
4.763898	37.0	9.000	N	10.8	19.0	56.0	Compliance
9.303518	42.9	9.000	N	10.6	17.1	60.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.581275	27.4	9.000	N	10.4	18.6	46.0	Compliance
1.239175	25.9	9.000	N	10.5	20.1	46.0	Compliance
1.385415	24.8	9.000	N	10.5	21.2	46.0	Compliance
3.547503	23.6	9.000	N	10.7	22.4	46.0	Compliance
3.811251	23.9	9.000	N	10.8	22.1	46.0	Compliance
9.604822	24.7	9.000	N	10.6	25.3	50.0	Compliance

FCC §15.209, §15.205 & §15.407(b) (1) (6) (7) –UNWANTED EMISSION

Applicable Standard

FCC §15.407; §15.209; §15.205;

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cispr} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:

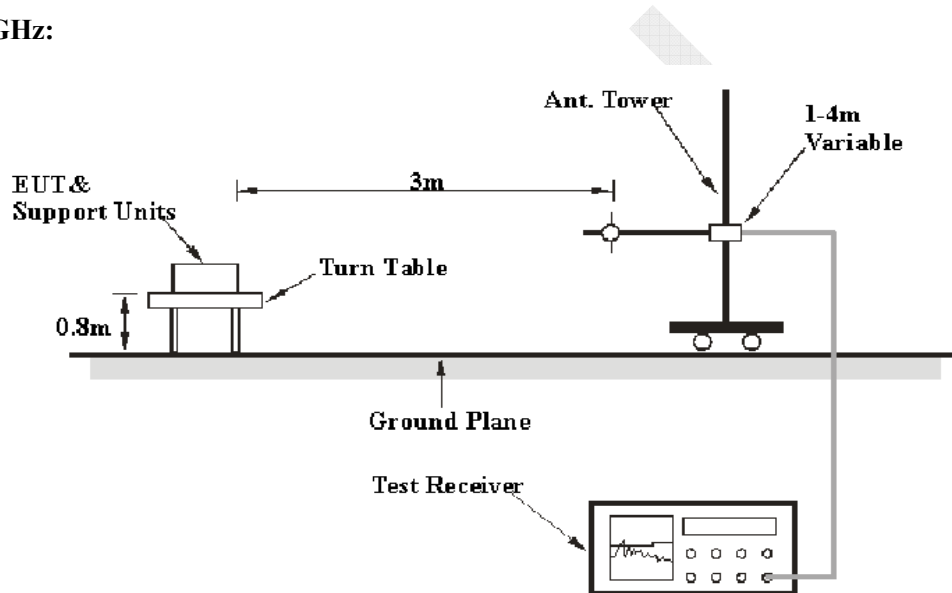
- 30M~200MHz: 5.0 dB
- 200M~1GHz: 6.2 dB
- 1G~6GHz: 4.45 dB
- 6G~18GHz: 5.23 dB

Table 1 – Values of U_{cispr}

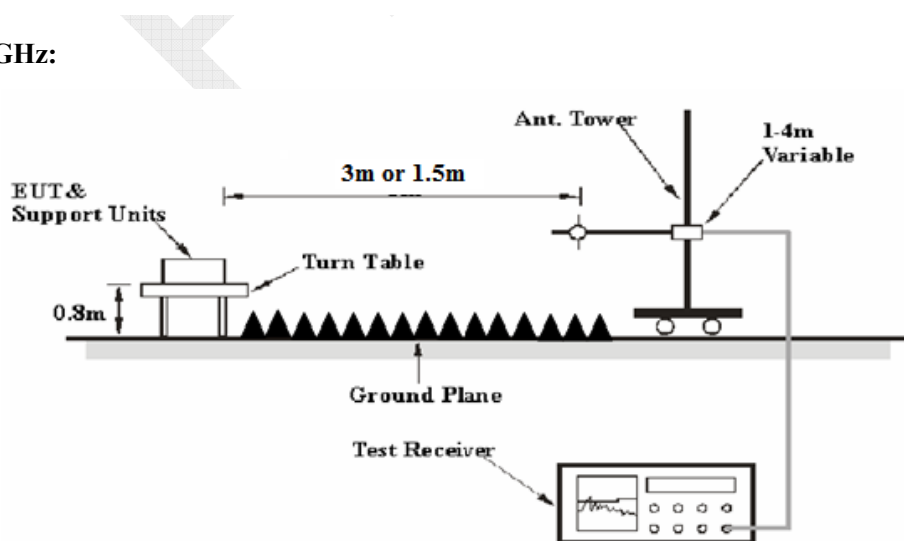
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters chamber, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209, and FCC 15.407 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter of EUT was connected to a 120 VAC/60 Hz power source

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

During the radiated emission test, the adapter of EUT was connected to the first AC floor outlet and the other support equipments were connected to the second AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

According to KDB 789033 D02 General UNII Test Procedures New Rules v01, emission shall be computed as: $E [dB\mu V/m] = EIRP[dBm] + 95.2$, for $d = 3$ meters.

According to C63.4, the above 1G test result shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade from 3m to 1.5m

Distance extrapolation factor = $20 \log (\text{specific distance } [3m] / \text{test distance } [1.5m])$ dB

Extrapolation result = Corrected Amplitude (dBμV/m) - distance extrapolation factor (6dB)

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Extrapolation result}$$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2014-05-09	2015-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-07-28	2017-07-27
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09
ETS LINDGREN	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2014-02-19	2015-02-19
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-01 1302	2014-06-16	2017-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2014-09-06	2015-09-06

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, Section 15.205, 15.209 and 15.407, with the worst margin reading of:

0.10 dB at 11650 MHz in the Vertical polarization

Test Data

Environmental Conditions

Temperature:	22.6 °C-26.8°C
Relative Humidity:	37 %-66%
ATM Pressure:	100.8 kPa-102.2 kPa

The testing was performed by Dean Liu from 2014-11-12 to 2014-12-12.

Mode: Transmitting

Note: For above 1GHz, the test distance is 1.5m.

5150MHz-5250MHz:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)						
20MHz bandwidth, Low Channel:5180 MHz										
5180	69.81	PK	H	31.46	5.94	0.00	107.21	101.21	N/A	N/A
5180	61.27	AV	H	31.46	5.94	0.00	98.67	92.67	N/A	N/A
5180	71.15	PK	V	31.46	5.94	0.00	108.55	102.55	N/A	N/A
5180	63.55	AV	V	31.46	5.94	0.00	100.95	94.95	N/A	N/A
5150	33.85	PK	V	31.40	6.03	0.00	71.28	65.28	74.00	8.72
5150	20.94	AV	V	31.40	6.03	0.00	58.37	52.37	54.00	1.63*
10360	49.29	PK	V	36.97	8.60	25.52	69.34	63.34	74.00	10.66
10360	35.38	AV	V	36.97	8.60	25.52	55.43	49.43	54.00	4.57 *
15540	31.54	PK	V	37.43	14.71	24.98	58.70	52.70	74.00	21.30
15540	22.16	AV	V	37.43	14.71	24.98	49.32	43.32	54.00	10.68
4772	33.59	PK	V	30.51	5.98	27.40	42.68	36.68	74.00	37.32
4772	18.69	AV	V	30.51	5.98	27.40	27.78	21.78	54.00	32.22
13193	31.81	PK	V	38.75	9.91	25.09	55.38	49.38	74.00	24.62
13193	20.67	AV	V	38.75	9.91	25.09	44.24	38.24	54.00	15.76
271	28.20	QP	V	13.71	2.00	21.50	22.41	22.41	46.00	23.59
20MHz bandwidth Middle, Channel:5200 MHz										
5200	69.19	PK	H	31.50	5.88	0.00	106.57	100.57	N/A	N/A
5200	59.90	AV	H	31.50	5.88	0.00	97.28	91.28	N/A	N/A
5200	71.81	PK	V	31.50	5.88	0.00	109.19	103.19	N/A	N/A
5200	63.19	AV	V	31.50	5.88	0.00	100.57	94.57	N/A	N/A
10400	48.89	PK	V	36.98	8.57	25.50	68.94	62.94	74.00	11.06
10400	35.48	AV	V	36.98	8.57	25.50	55.53	49.53	54.00	4.47 *
15600	32.15	PK	V	37.32	14.61	24.69	59.39	53.39	74.00	20.61
15600	22.69	AV	V	37.32	14.61	24.69	49.93	43.93	54.00	10.07
4772	31.54	PK	V	30.51	5.98	27.40	40.63	34.63	74.00	39.37
4772	18.51	AV	V	30.51	5.98	27.40	27.60	21.60	54.00	32.40
13193	30.95	PK	V	38.75	9.91	25.09	54.52	48.52	74.00	25.48
13193	19.25	AV	V	38.75	9.91	25.09	42.82	36.82	54.00	17.18
271	28.40	QP	V	13.71	2.00	21.50	22.61	22.61	46.00	23.39
401	30.10	QP	V	16.22	2.43	21.77	26.98	26.98	46.00	19.02
20MHz bandwidth High, Channel:5240 MHz										
5240	70.69	PK	H	31.58	5.82	0.00	108.09	102.09	N/A	N/A
5240	62.25	AV	H	31.58	5.82	0.00	99.65	93.65	N/A	N/A
5240	72.44	PK	V	31.58	5.82	0.00	109.84	103.84	N/A	N/A
5240	64.04	AV	V	31.58	5.82	0.00	101.44	95.44	N/A	N/A
5350	27.63	PK	V	31.80	6.11	0.00	65.54	59.54	74.00	14.46
5350	15.58	AV	V	31.80	6.11	0.00	53.49	47.49	54.00	6.51
10480	49.71	PK	V	37.00	8.51	26.01	69.21	63.21	74.00	10.79
10480	36.31	AV	V	37.00	8.51	26.01	55.81	49.81	54.00	4.19 *
15720	34.14	PK	V	37.10	14.42	24.92	60.74	54.74	74.00	19.26
15720	22.12	AV	V	37.10	14.42	24.92	48.72	42.72	54.00	11.28
4772	30.20	PK	V	30.51	5.98	27.40	39.29	33.29	74.00	40.71
4772	18.18	AV	V	30.51	5.98	27.40	27.27	21.27	54.00	32.73
13204	31.25	PK	V	38.77	9.94	25.11	54.85	48.85	74.00	25.15
13204	19.56	AV	V	38.77	9.94	25.11	43.16	37.16	54.00	16.84
271	28.70	QP	V	13.71	2.00	21.50	22.91	22.91	46.00	23.09

*Within measurement uncertainty!

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)						
40MHz bandwidth, Low Channel:5190 MHz										
5190	68.06	PK	H	31.48	5.91	0.00	105.45	99.45	N/A	N/A
5190	58.48	AV	H	31.48	5.91	0.00	95.87	89.87	N/A	N/A
5190	69.39	PK	V	31.48	5.91	0.00	106.78	100.78	N/A	N/A
5190	59.80	AV	V	31.48	5.91	0.00	97.19	91.19	N/A	N/A
5150	33.42	PK	V	31.40	6.03	0.00	70.85	64.85	74.00	9.15
5150	20.31	AV	V	31.40	6.03	0.00	57.74	51.74	54.00	2.26 *
10380	47.47	PK	V	36.98	8.59	25.51	67.53	61.53	74.00	12.47
10380	33.62	AV	V	36.98	8.59	25.51	53.68	47.68	54.00	6.32
15570	29.78	PK	V	37.37	14.66	24.83	56.98	50.98	74.00	23.02
15570	20.39	AV	V	37.37	14.66	24.83	47.59	41.59	54.00	12.41
4772	33.55	PK	V	30.51	5.98	27.40	42.64	36.64	74.00	37.36
4772	18.68	AV	V	30.51	5.98	27.40	27.77	21.77	54.00	32.23
13193	31.78	PK	V	38.75	9.91	25.09	55.35	49.35	74.00	24.65
13193	20.63	AV	V	38.75	9.91	25.09	44.20	38.20	54.00	15.80
271	28.20	QP	V	13.71	2.00	21.50	22.41	22.41	46.00	23.59
40MHz bandwidth, High Channel:5230 MHz										
5230	68.94	PK	H	31.56	5.84	0.00	106.34	100.34	N/A	N/A
5230	58.45	AV	H	31.56	5.84	0.00	95.85	89.85	N/A	N/A
5230	69.31	PK	V	31.56	5.84	0.00	106.71	100.71	N/A	N/A
5230	59.26	AV	V	31.56	5.84	0.00	96.66	90.66	N/A	N/A
5350	27.51	PK	V	31.80	6.11	0.00	65.42	59.42	74.00	14.58
5350	15.64	AV	V	31.80	6.11	0.00	53.55	47.55	54.00	6.45
10460	47.91	PK	V	36.99	8.52	25.88	67.54	61.54	74.00	12.46
10460	34.55	AV	V	36.99	8.52	25.88	54.18	48.18	54.00	5.82
15690	32.38	PK	V	37.16	14.47	24.87	59.14	53.14	74.00	20.86
15690	20.31	AV	V	37.16	14.47	24.87	47.07	41.07	54.00	12.93
4772	31.19	PK	V	30.51	5.98	27.40	40.28	34.28	74.00	39.72
4772	18.41	AV	V	30.51	5.98	27.40	27.50	21.50	54.00	32.50
13204	32.55	PK	V	38.77	9.94	25.11	56.15	50.15	74.00	23.85
13204	19.49	AV	V	38.77	9.94	25.11	43.09	37.09	54.00	16.91
271	28.80	QP	V	13.71	2.00	21.50	23.01	23.01	46.00	22.99

*Within measurement uncertainty!

5725MHz-5850MHz:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)						
20MHz bandwidth, Low Channel:5745 MHz										
5745	68.18	PK	H	32.15	6.10	0.00	106.43	100.43	N/A	N/A
5745	58.65	AV	H	32.15	6.10	0.00	96.90	90.90	N/A	N/A
5745	68.41	PK	V	32.15	6.10	0.00	106.66	100.66	N/A	N/A
5745	59.21	AV	V	32.15	6.10	0.00	97.46	91.46	N/A	N/A
5725	27.16	PK	V	32.15	6.04	0.00	65.35	59.35	74.00	14.65
5725	16.37	AV	V	32.15	6.04	0.00	54.56	48.56	54.00	5.44
11490	49.89	PK	V	37.89	9.86	26.14	71.50	65.50	74.00	8.50
11490	37.34	AV	V	37.89	9.86	26.14	58.95	52.95	54.00	1.05 *
17235	31.25	PK	V	40.91	14.02	25.63	60.55	54.55	74.00	19.45
17235	19.34	AV	V	40.91	14.02	25.63	48.64	42.64	54.00	11.36
11483	35.08	PK	V	37.88	9.85	26.14	56.67	50.67	74.00	23.33
11483	23.54	AV	V	37.88	9.85	26.14	45.13	39.13	54.00	14.87
4723	32.16	PK	V	30.38	5.81	27.38	40.97	34.97	74.00	39.03
4723	17.67	AV	V	30.38	5.81	27.38	26.48	20.48	54.00	33.52
258	36.20	QP	V	12.50	1.93	21.49	29.14	29.14	46.00	16.86
20MHz bandwidth, Middle Channel:5785 MHz										
5785	67.17	PK	H	32.16	6.12	0.00	105.45	99.45	N/A	N/A
5785	58.16	AV	H	32.16	6.12	0.00	96.44	90.44	N/A	N/A
5785	69.55	PK	V	32.16	6.12	0.00	107.83	101.83	N/A	N/A
5785	61.39	AV	V	32.16	6.12	0.00	99.67	93.67	N/A	N/A
11570	50.05	PK	V	37.90	9.76	26.07	71.64	65.64	74.00	8.36
11570	38.30	AV	V	37.90	9.76	26.07	59.89	53.89	54.00	0.11 *
17355	31.58	PK	V	41.63	13.37	25.63	60.95	54.95	74.00	19.05
17355	19.68	AV	V	41.63	13.37	25.63	49.05	43.05	54.00	10.95
4723	30.47	PK	V	30.38	5.81	27.38	39.28	33.28	74.00	40.72
4723	17.51	AV	V	30.38	5.81	27.38	26.32	20.32	54.00	33.68
13200	31.17	PK	V	38.76	9.93	25.10	54.76	48.76	74.00	25.24
13200	18.32	AV	V	38.76	9.93	25.10	41.91	35.91	54.00	18.09
258	36.10	QP	V	12.50	1.93	21.49	29.04	29.04	46.00	16.96
329	29.50	QP	V	14.66	2.15	21.59	24.72	24.72	46.00	21.28
20MHz bandwidth, High Channel:5825 MHz										
5825	67.11	PK	H	32.17	6.24	0.00	105.52	99.52	N/A	N/A
5825	58.20	AV	H	32.17	6.24	0.00	96.61	90.61	N/A	N/A
5825	69.19	PK	V	32.17	6.24	0.00	107.60	101.60	N/A	N/A
5825	60.23	AV	V	32.17	6.24	0.00	98.64	92.64	N/A	N/A
5850	26.71	PK	V	32.17	6.34	0.00	65.22	59.22	74.00	14.78
5850	15.55	AV	V	32.17	6.34	0.00	54.06	48.06	54.00	5.94
11650	50.08	PK	V	37.90	9.63	25.75	71.86	65.86	74.00	8.14
11650	38.12	AV	V	37.90	9.63	25.75	59.90	53.90	54.00	0.10 *
17475	32.15	PK	V	42.35	12.73	25.39	61.84	55.84	74.00	18.16
17475	20.87	AV	V	42.35	12.73	25.39	50.56	44.56	54.00	9.44
13200	31.26	PK	V	38.76	9.93	25.10	54.85	48.85	74.00	25.15
13200	19.54	AV	V	38.76	9.93	25.10	43.13	37.13	54.00	16.87
4723	31.69	PK	V	30.38	5.81	27.38	40.50	34.50	74.00	39.50
4723	17.85	AV	V	30.38	5.81	27.38	26.66	20.66	54.00	33.34
258	36.30	QP	V	12.50	1.93	21.49	29.24	29.24	46.00	16.76

*Within measurement uncertainty!

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)						
40MHz bandwidth, Low Channel:5755 MHz										
5755	64.90	PK	H	32.15	6.11	0.00	103.16	97.16	N/A	N/A
5755	56.38	AV	H	32.15	6.11	0.00	94.64	88.64	N/A	N/A
5755	65.19	PK	V	32.15	6.11	0.00	103.45	97.45	N/A	N/A
5755	56.97	AV	V	32.15	6.11	0.00	95.23	89.23	N/A	N/A
5725	31.53	PK	V	32.15	6.04	0.00	69.72	63.72	74.00	10.28
5725	20.59	AV	V	32.15	6.04	0.00	58.78	52.78	54.00	1.22*
11510	47.67	PK	V	37.90	9.86	26.12	69.31	63.31	74.00	10.69
11510	35.07	AV	V	37.90	9.86	26.12	56.71	50.71	54.00	3.29 *
17265	29.04	PK	V	41.09	13.86	25.63	58.36	52.36	74.00	21.64
17265	17.05	AV	V	41.09	13.86	25.63	46.37	40.37	54.00	13.63
11483	32.86	PK	V	37.88	9.85	26.14	54.45	48.45	74.00	25.55
11483	21.26	AV	V	37.88	9.85	26.14	42.85	36.85	54.00	17.15
4723	32.35	PK	V	30.38	5.81	27.38	41.16	35.16	74.00	38.84
4723	17.46	AV	V	30.38	5.81	27.38	26.27	20.27	54.00	33.73
258	36.50	QP	V	12.50	1.93	21.49	29.44	29.44	46.00	16.56
40MHz bandwidth, High Channel:5795 MHz										
5795	65.91	PK	H	32.16	6.13	0.00	104.20	98.20	N/A	N/A
5795	56.96	AV	H	32.16	6.13	0.00	95.25	89.25	N/A	N/A
5795	67.95	PK	V	32.16	6.13	0.00	106.24	100.24	N/A	N/A
5795	58.94	AV	V	32.16	6.13	0.00	97.23	91.23	N/A	N/A
5850	27.03	PK	V	32.17	6.34	0.00	65.54	59.54	74.00	14.46
5850	15.84	AV	V	32.17	6.34	0.00	54.35	48.35	54.00	5.65
11590	48.85	PK	V	37.90	9.73	26.06	70.42	64.42	74.00	9.58
11590	36.92	AV	V	37.90	9.73	26.06	58.49	52.49	54.00	1.51 *
17385	30.90	PK	V	41.81	13.21	25.63	60.29	54.29	74.00	19.71
17385	19.66	AV	V	41.81	13.21	25.63	49.05	43.05	54.00	10.95
13200	32.32	PK	V	38.76	9.93	25.10	55.91	49.91	74.00	24.09
13200	19.47	AV	V	38.76	9.93	25.10	43.06	37.06	54.00	16.94
4723	32.25	PK	V	30.38	5.81	27.38	41.06	35.06	74.00	38.94
4723	17.71	AV	V	30.38	5.81	27.38	26.52	20.52	54.00	33.48
258	36.10	QP	V	12.50	1.93	21.49	29.04	29.04	46.00	16.96

*Within measurement uncertainty!

FCC§15.407(b) –CONDUCTED SPURIOUS EMISSION AT ANTENNA PORT

Applicable Standard

FCC §15.407;

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

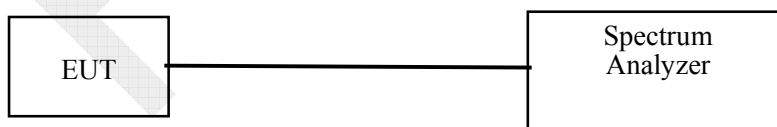
(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The Resolution bandwidth is set to 1MHz, The Video bandwidth is set to ≥ 1 MHz, report the peak value out of the operating band. Offset the antenna gain and cable loss.
3. Repeat above procedures until all frequencies measured were complete.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	22.6 °C-26.8°C
Relative Humidity:	37 %-66%
ATM Pressure:	100.8 kPa-102.2 kPa

The testing was performed by Dean Liu from 2014-11-11 to 2014-12-12.

Please refer to the following table and plots.

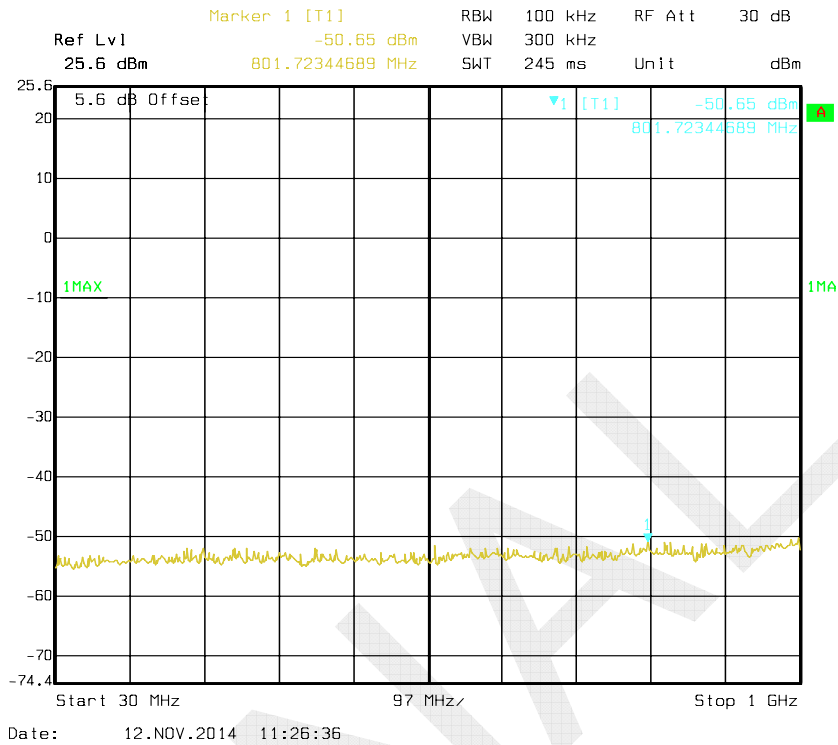
Frequency Bands	Test Mode	Test Frequency (MHz)	Worst Reading Level (dBm)			Limit (dBm)	Result
			Chain 0	Chain 1	Total		
5.2G Band	20MHz Bandwidth	5180	-31.08	-31.86	-28.44	-27	PASS
		5200	-31.34	-29.58	-27.36	-27	PASS
		5240	-32.94	-32.85	-29.88	-27	PASS
	40MHz Bandwidth	5190	-34.83	-34.35	-31.57	-27	PASS
		5230	-33.63	-33.86	-30.73	-27	PASS
5.8G Band	20MHz Bandwidth	5745	-31.19	-31.57	-28.37	-27	PASS
		5785	-33.23	-33.03	-30.12	-27	PASS
		5825	-33.29	-31.92	-29.54	-27	PASS
	40MHz Bandwidth	5755	-33.05	-33.29	-30.16	-27	PASS
		5795	-31.07	-32.84	-28.86	-27	PASS

Note: the antenna gain was 4.6dBi, the cable loss was 1dB for 5.2G band, and 1.5dB for 5.8G band.

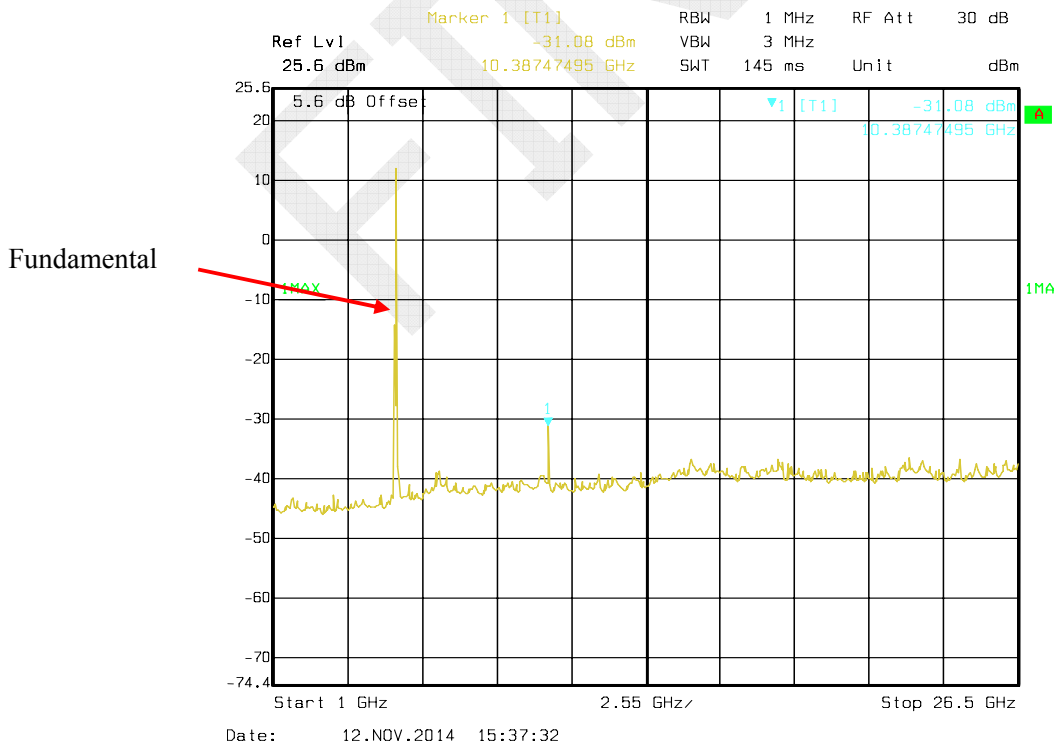
Conducted Spurious Emission at Antenna Port

5150MHz-5250MHz:
20MHz Bandwidth

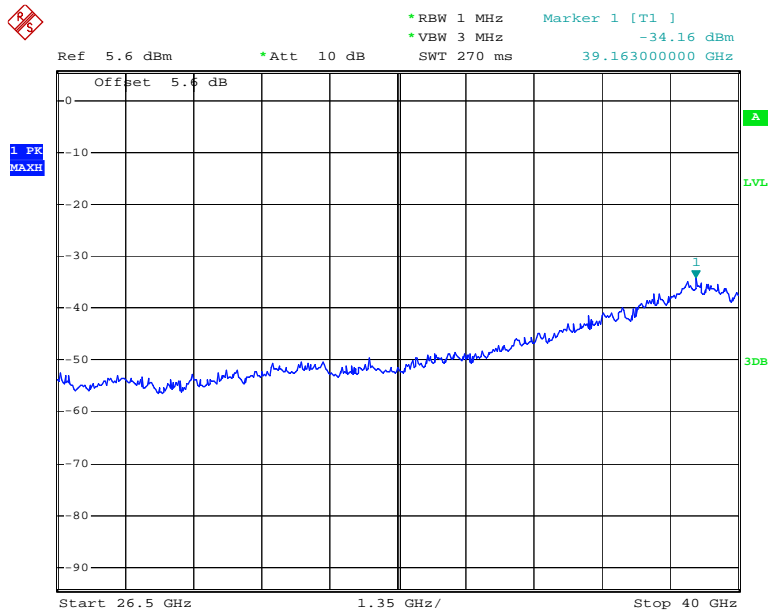
Chain0 Low Channel 30MHz-1GHz



Chain0 Low Channel 1GHz-26.5GHz

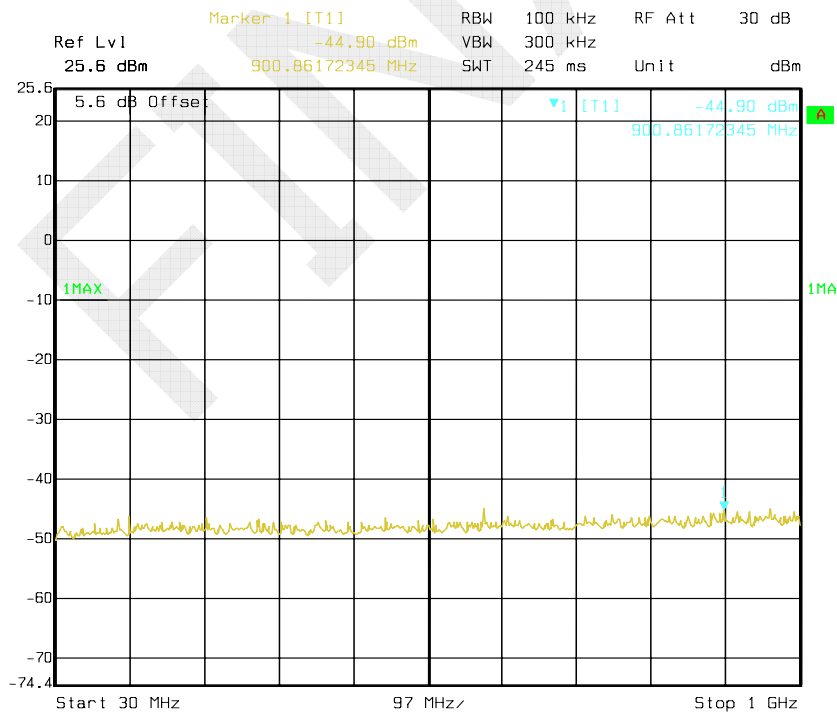


Chain0 Low Channel 26.5GHz-40GHz



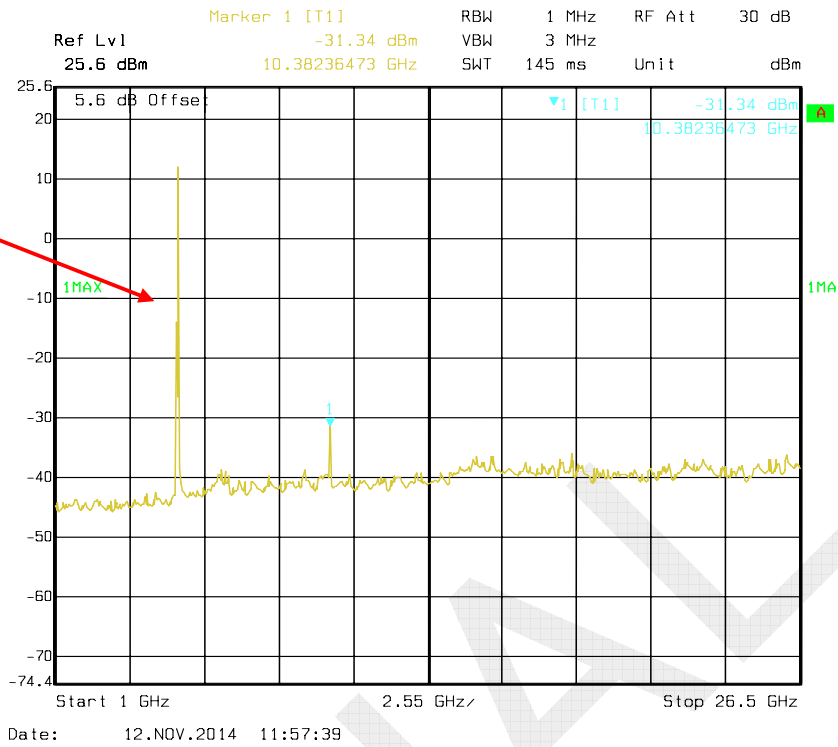
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Chain0 Middle Channel 30MHz-1GHz

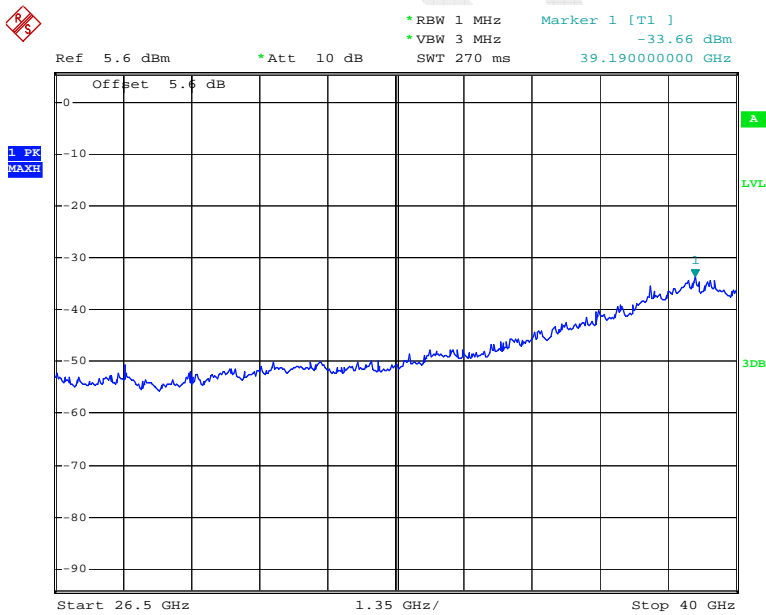


Date: 12.NOV.2014 11:57:10

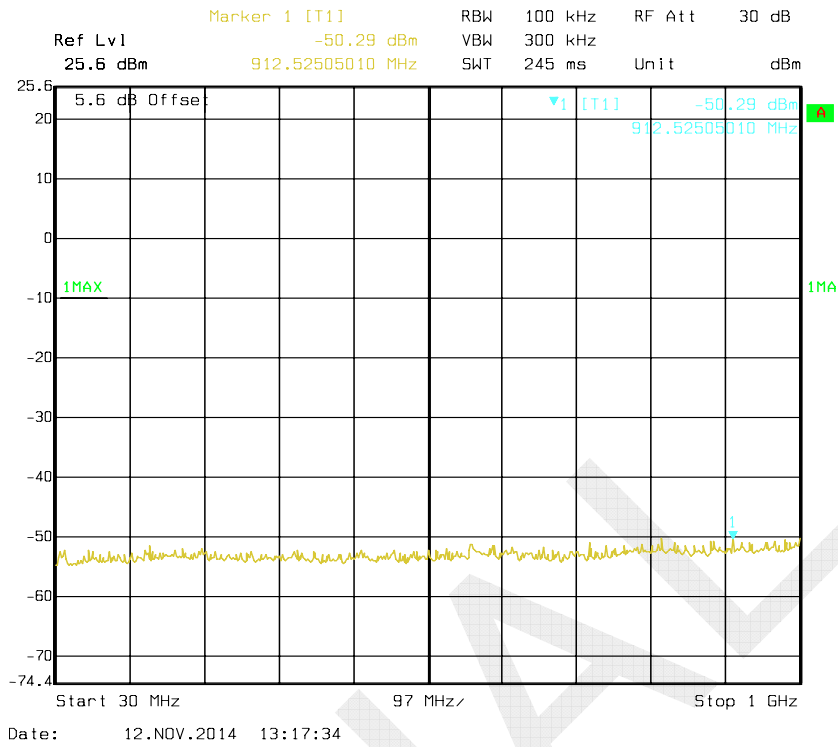
Chain0 Middle Channel 1GHz -26.5GHz



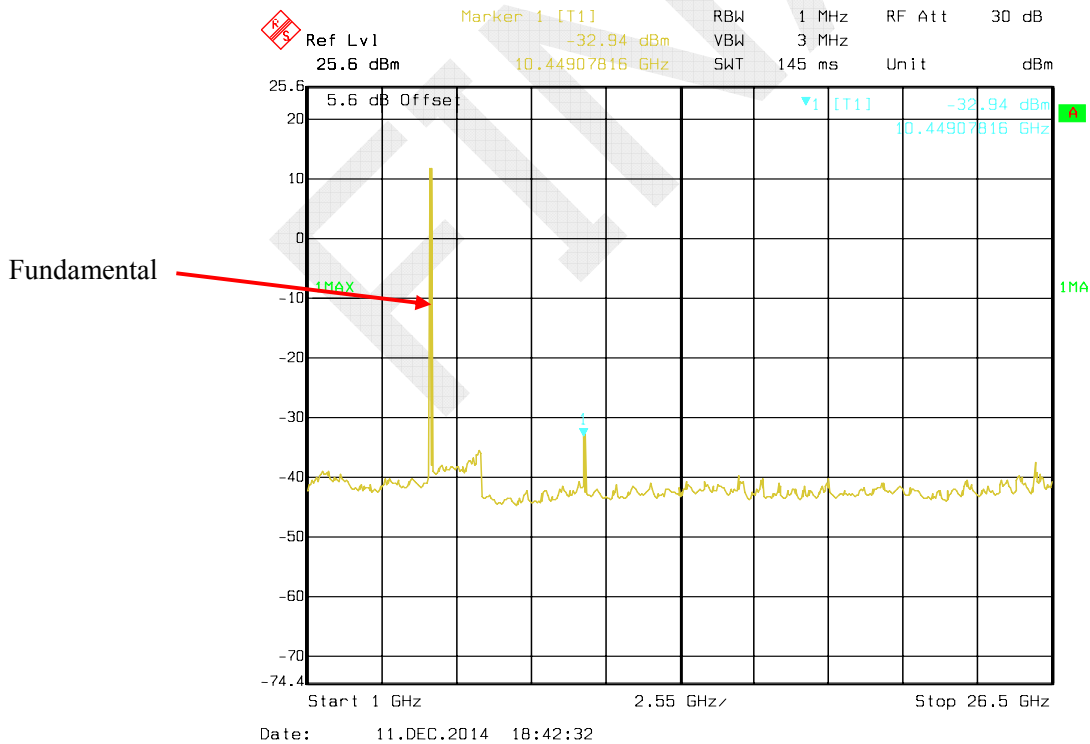
Chain0 Middle Channel 26.5GHz-40GHz



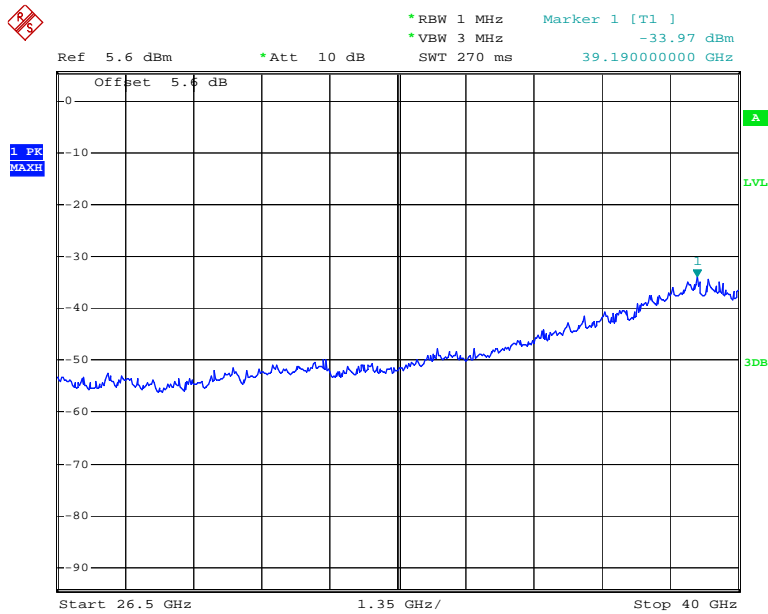
Chain0 High Channel 30MHz-1GHz



Chain0 High Channel 1GHz-26.5GHz

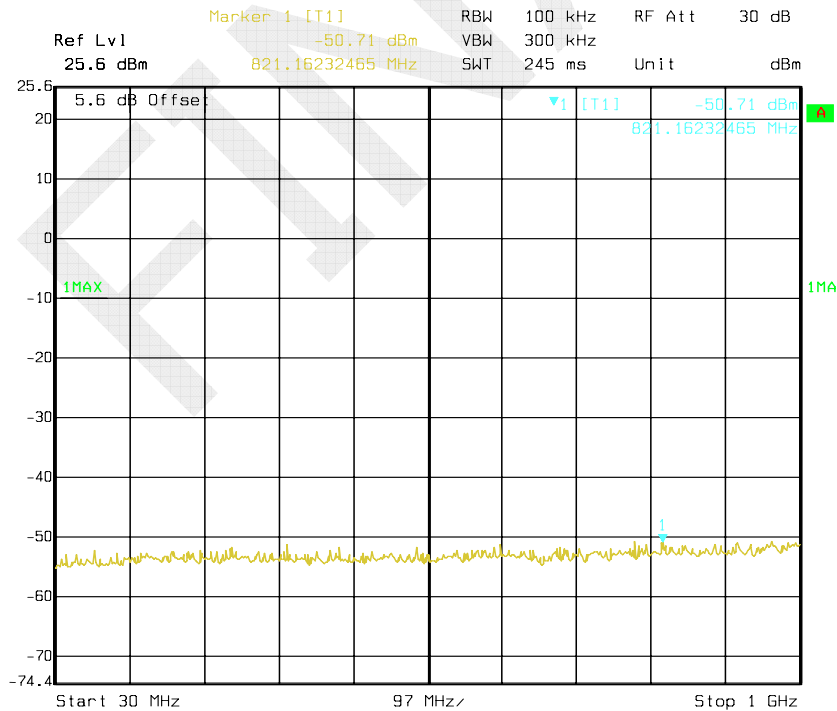


Chain0 High Channel 26.5GHz-40GHz



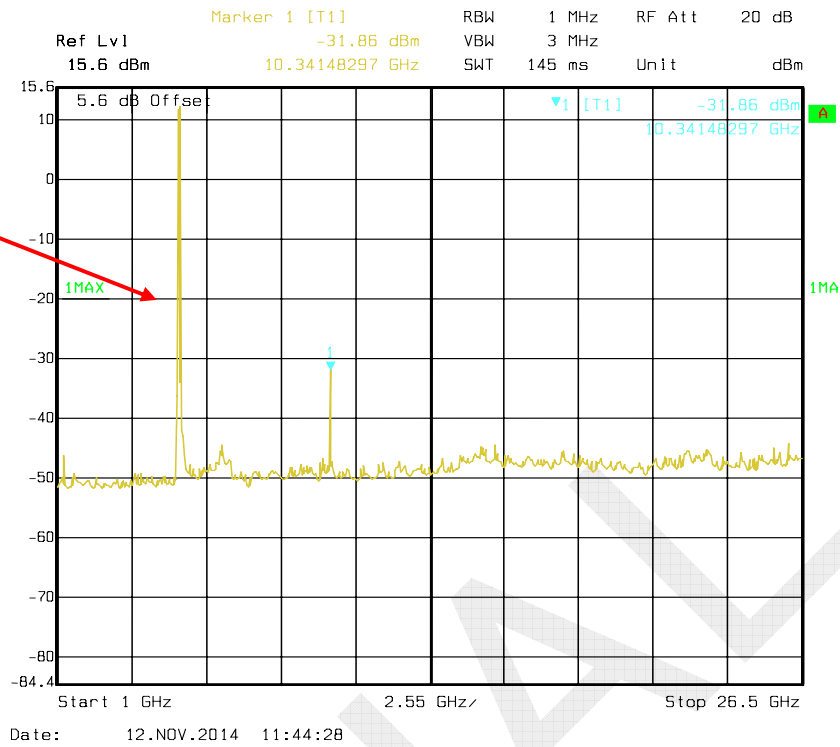
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Chain1 Low Channel 30MHz-1GHz

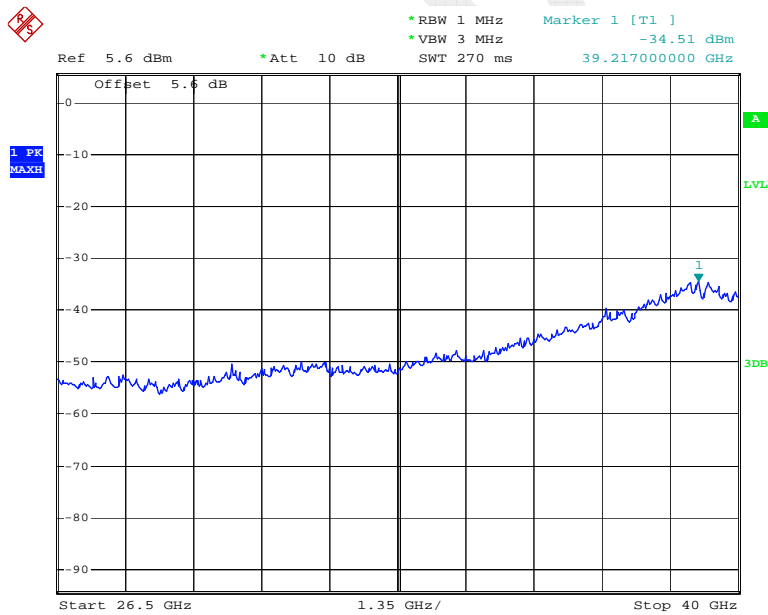


Date: 12.NOV.2014 11:43:50

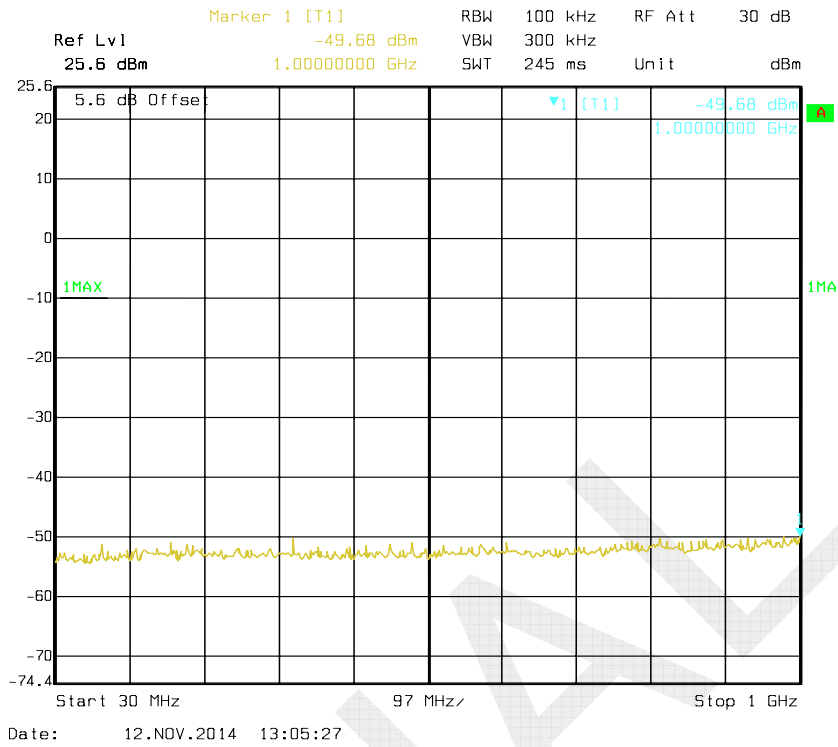
Chain1 Low Channel 1GHz-26.5GHz



Chain1 Low Channel 26.5GHz-40GHz

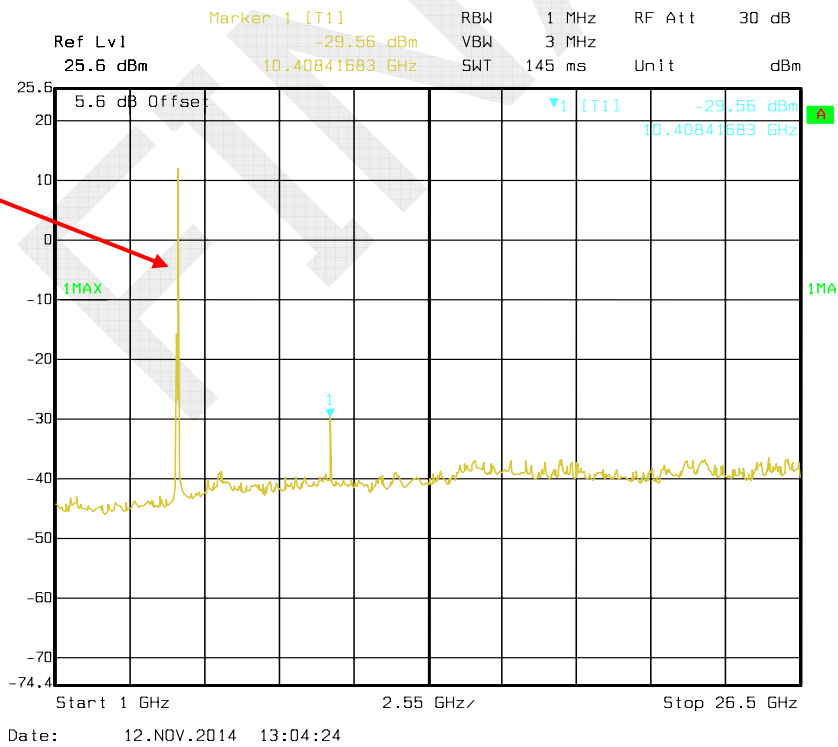
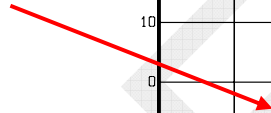


Chain1 Middle Channel 30MHz-1GHz

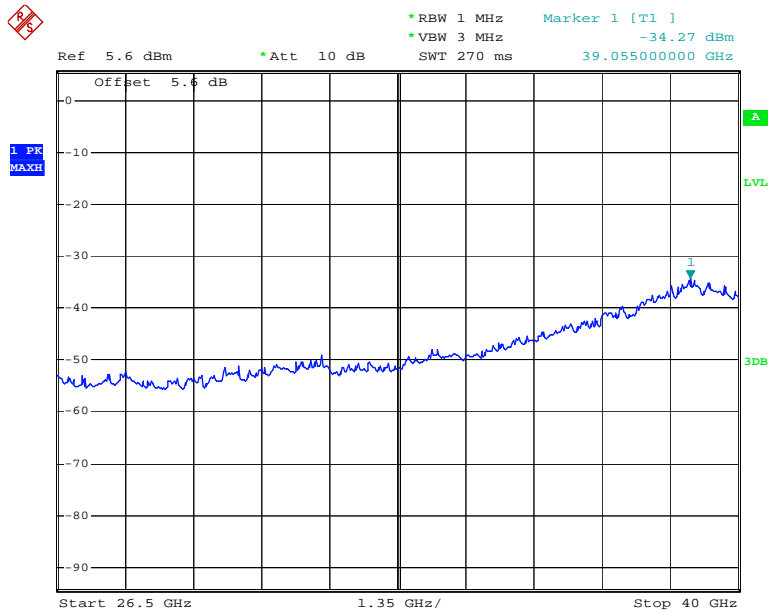


Chain1 Middle Channel 1GHz -26.5GHz

Fundamental

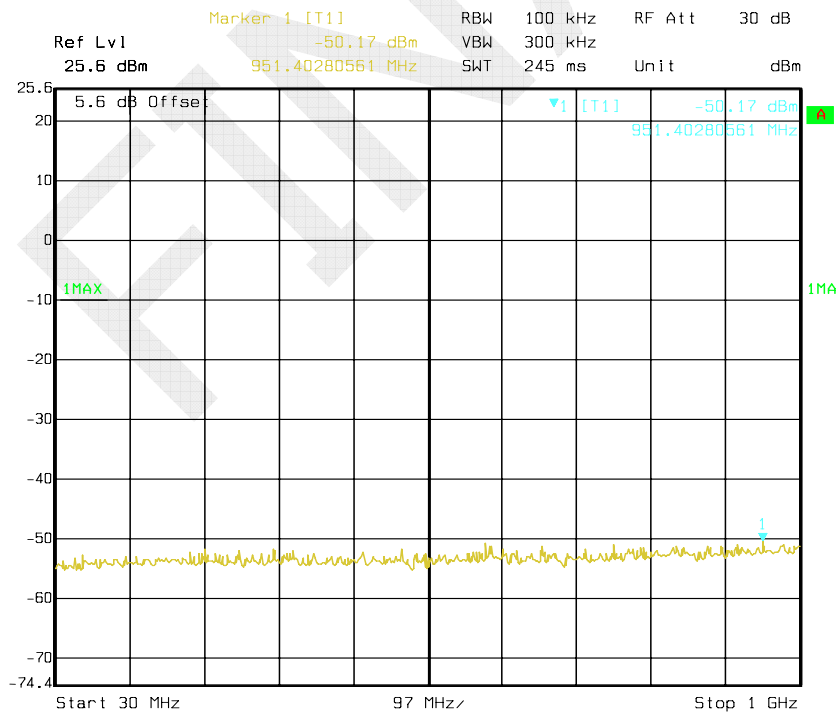


Chain1 Middle Channel 26.5GHz-40GHz



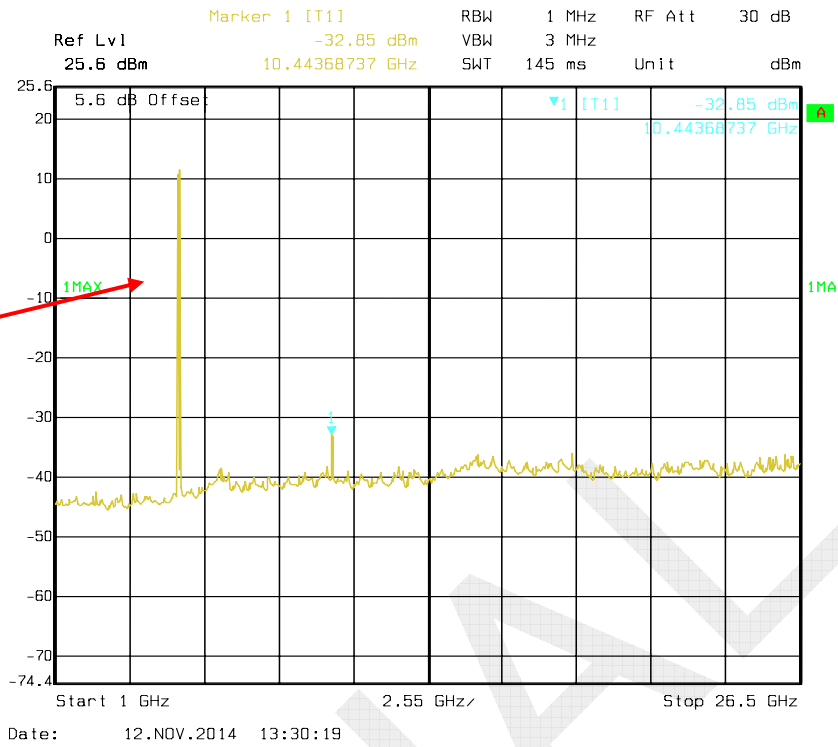
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Chain1 High Channel 30MHz-1GHz

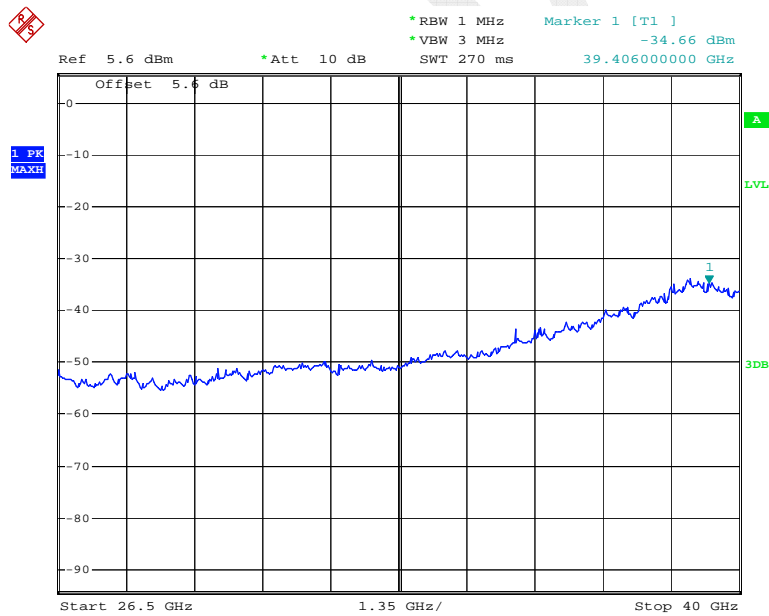


Date: 12.NOV.2014 13:30:50

Chain1 High Channel 1GHz-26.5GHz



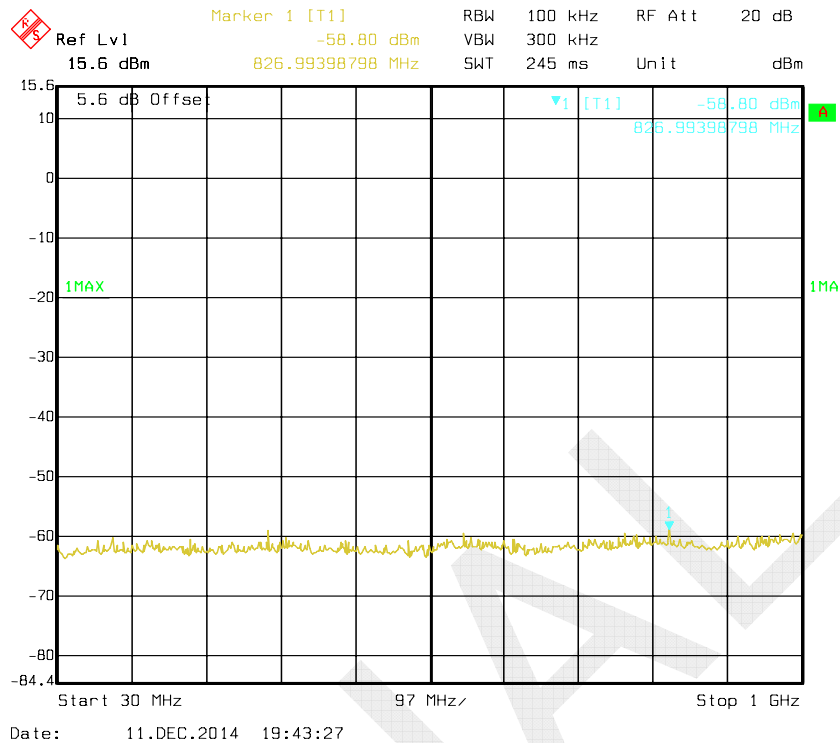
Chain1 High Channel 26.5GHz-40GHz



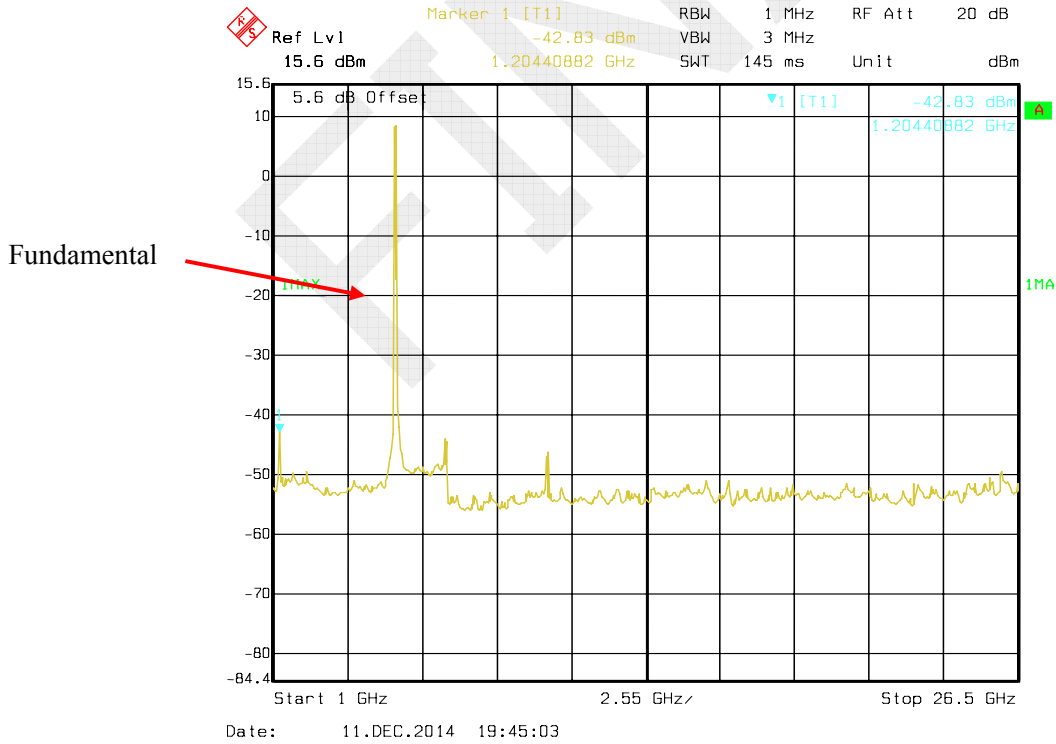
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40MHz Bandwidth:

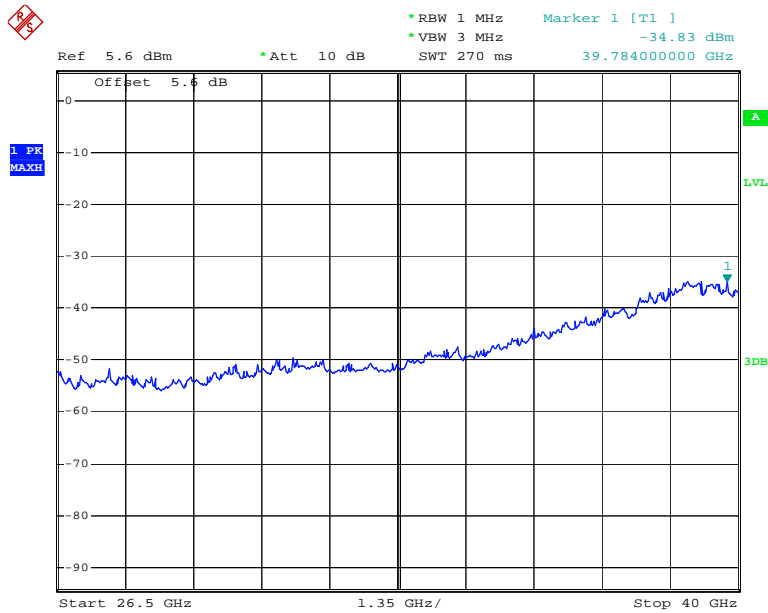
Chain0 Low Channel 30MHz-1GHz



Chain0 Low Channel 1GHz-26.5GHz

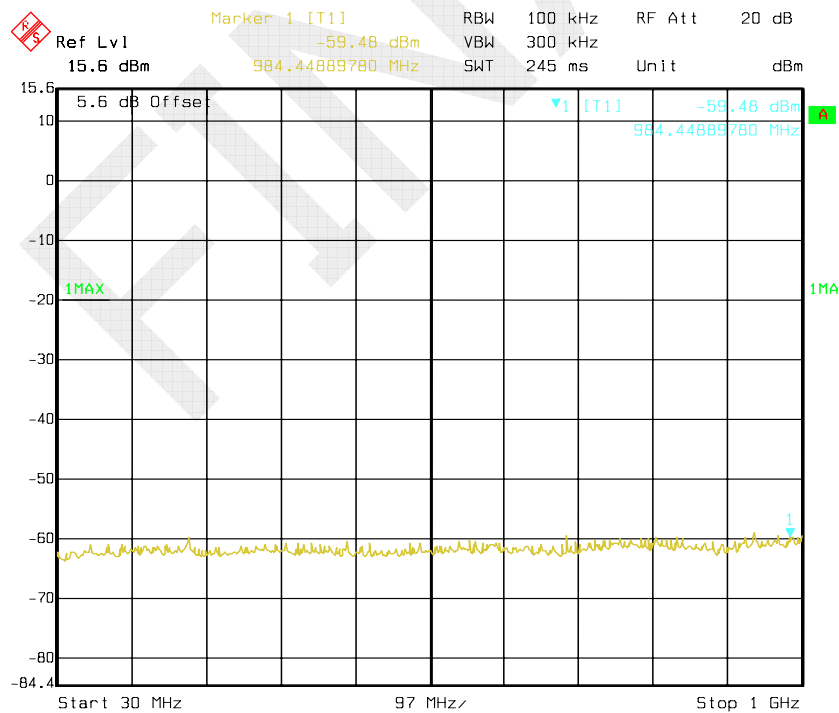


Chain0 Low Channel 26.5GHz-40GHz



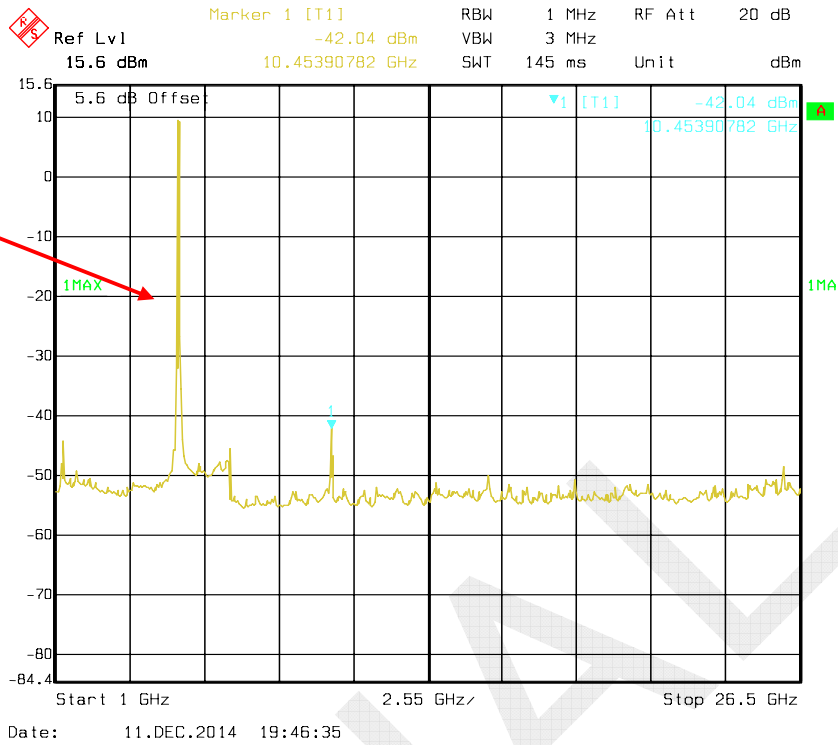
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Chain0 High Channel 30MHz-1GHz

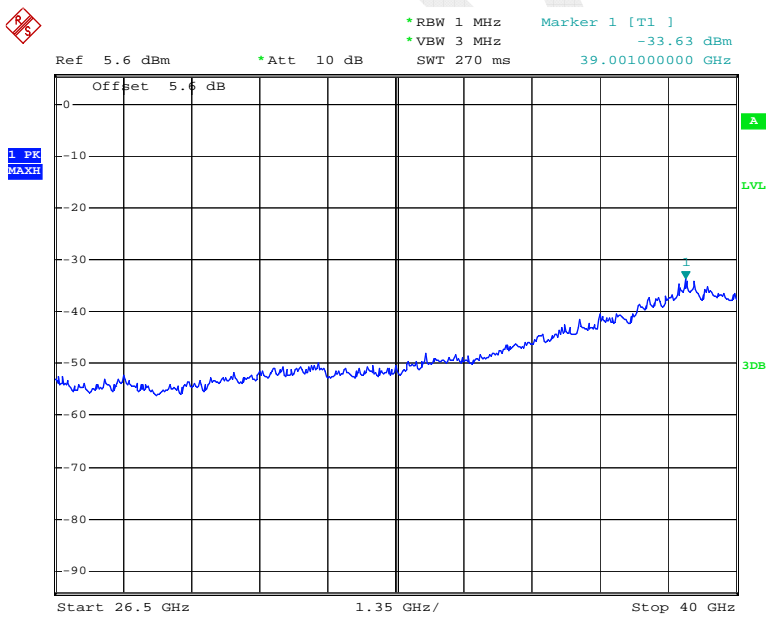


Date: 11.DEC.2014 19:47:43

Chain0 High Channel 1GHz -26.5GHz

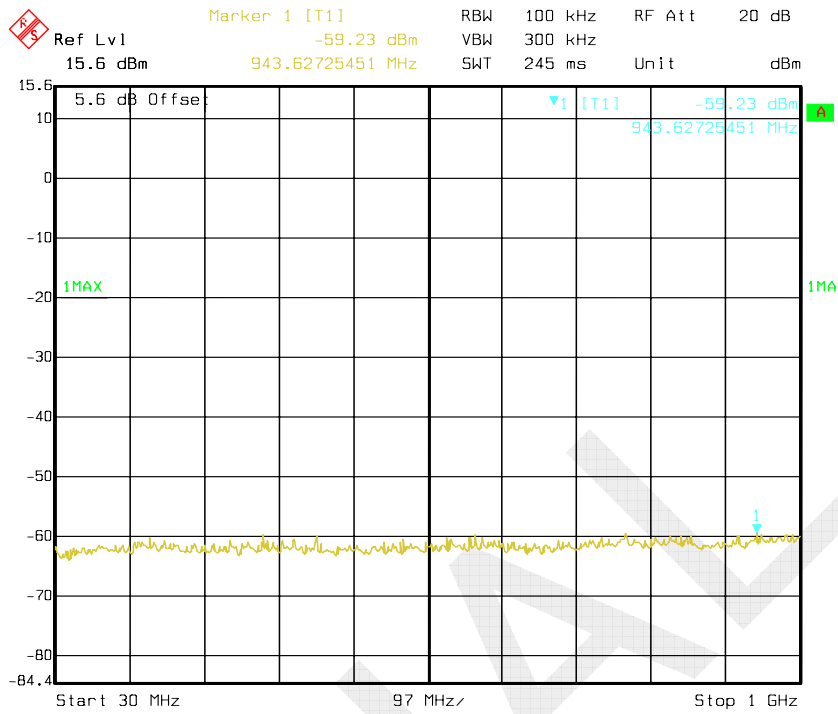


Chain0 High Channel 26.5GHz-40GHz

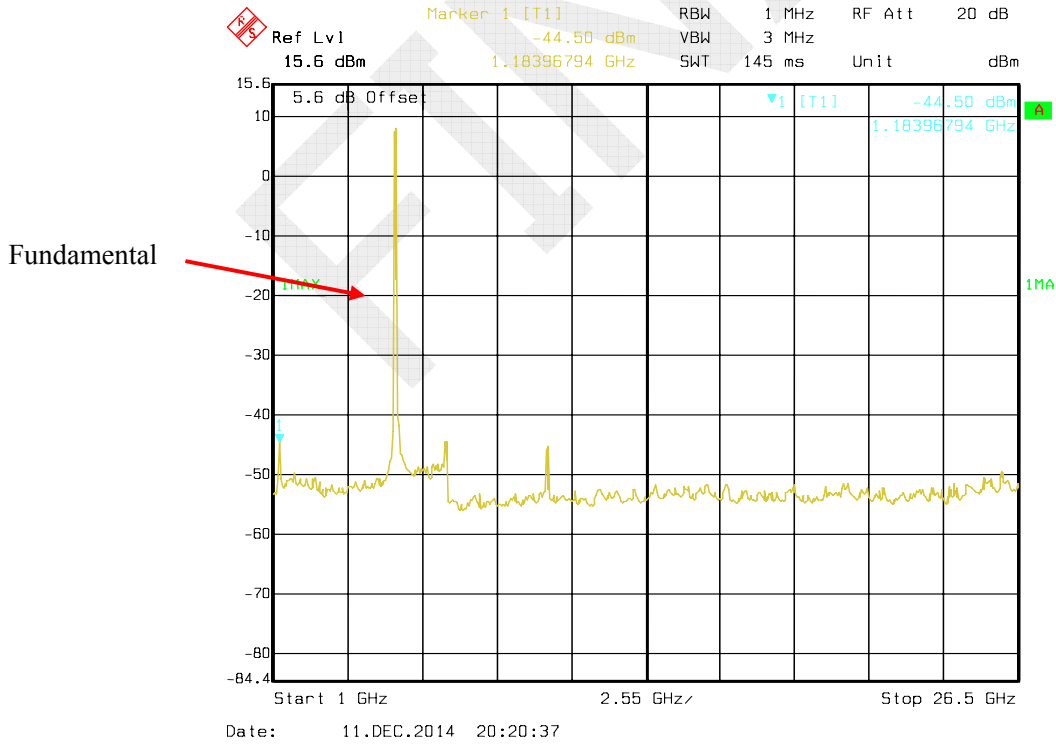


Date: 13.NOV.2014 11:21:09

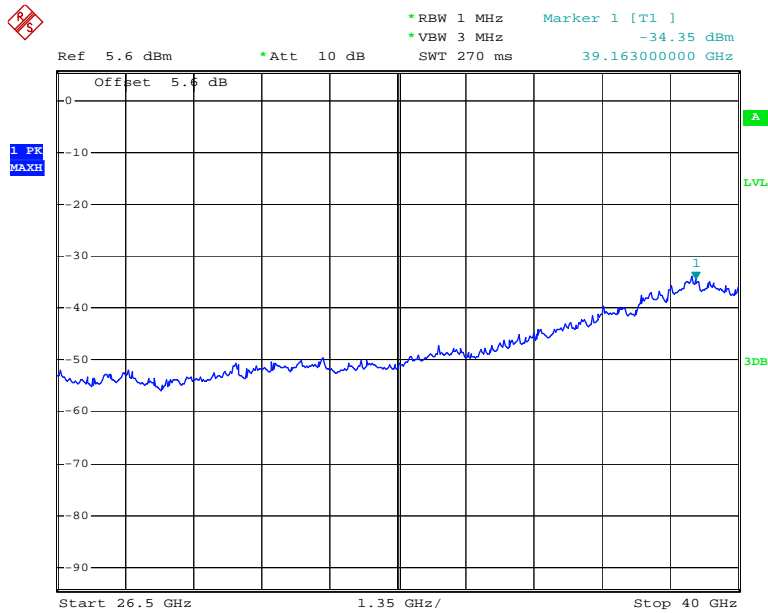
Chain1 Low Channel 30MHz-1GHz



Chain1 Low Channel 1GHz-26.5GHz

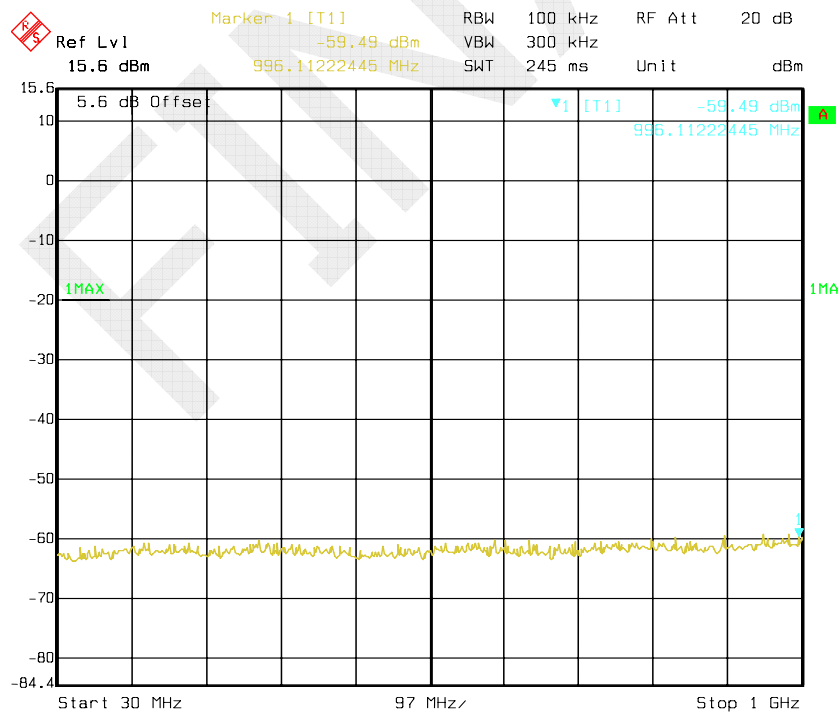


Chain1 Low Channel 26.5GHz-40GHz



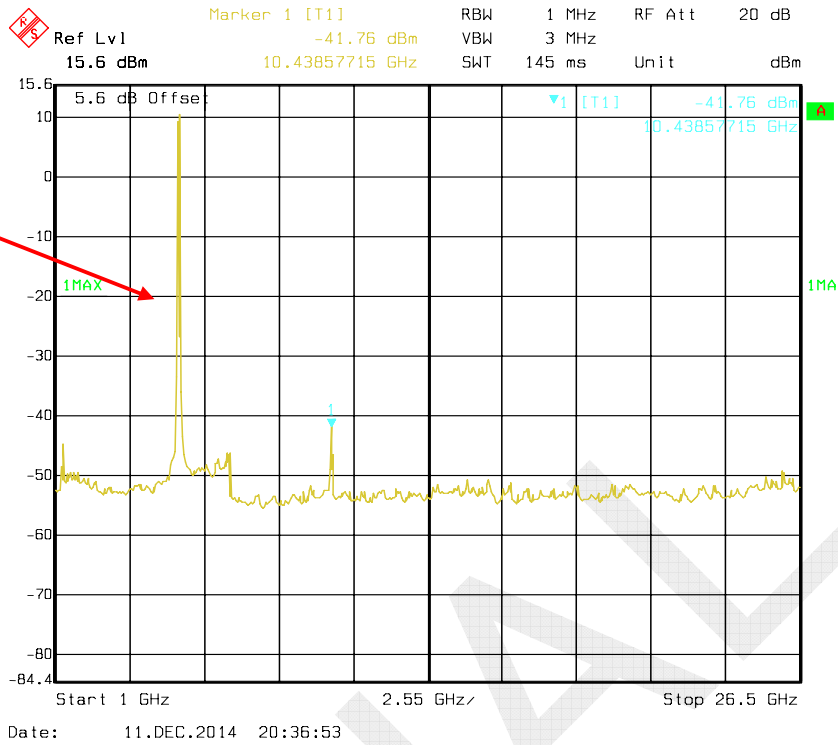
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Chain1 High Channel 30MHz-1GHz

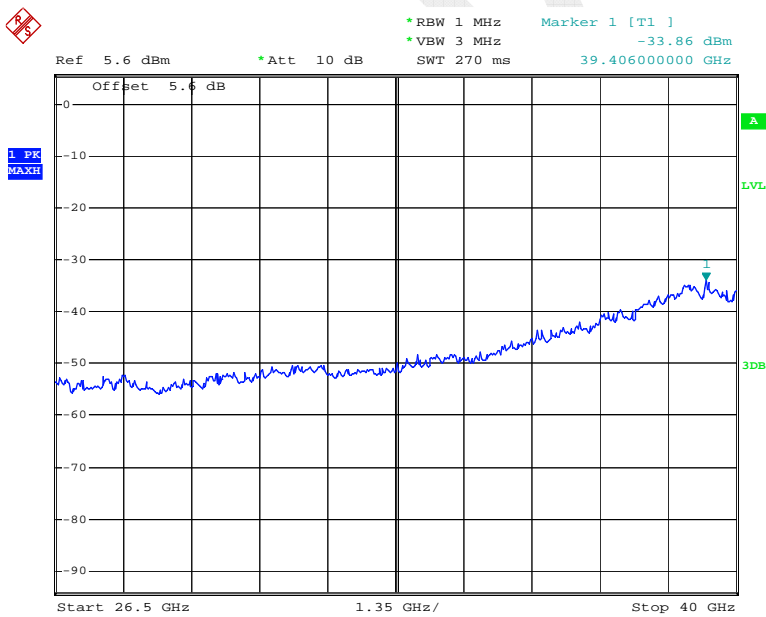


Date: 11.DEC.2014 20:35:38

Chain1High Channel 1GHz -26.5GHz



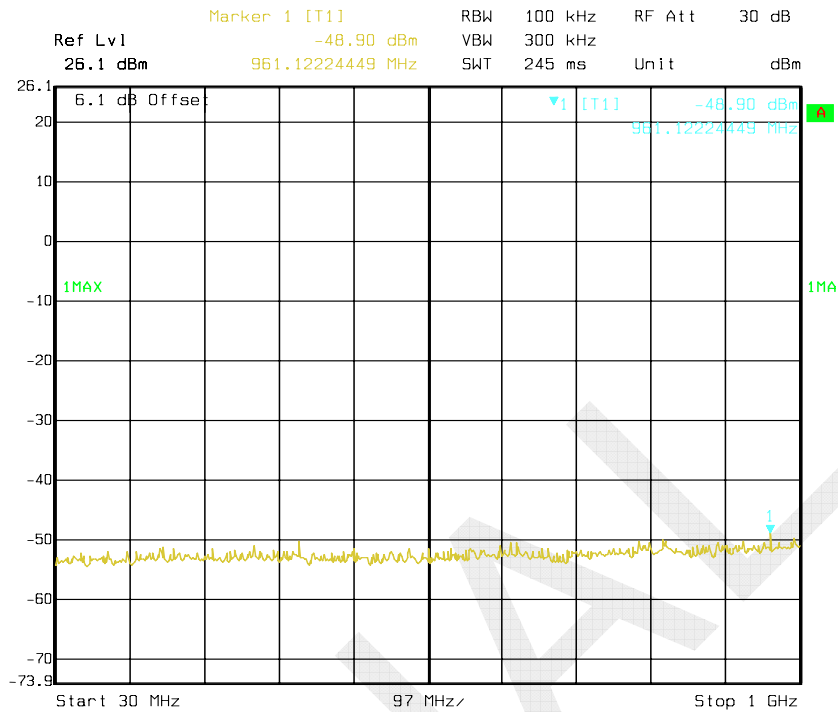
Chain1 High Channel 26.5GHz-40GHz



Date: 13.NOV.2014 11:33:40

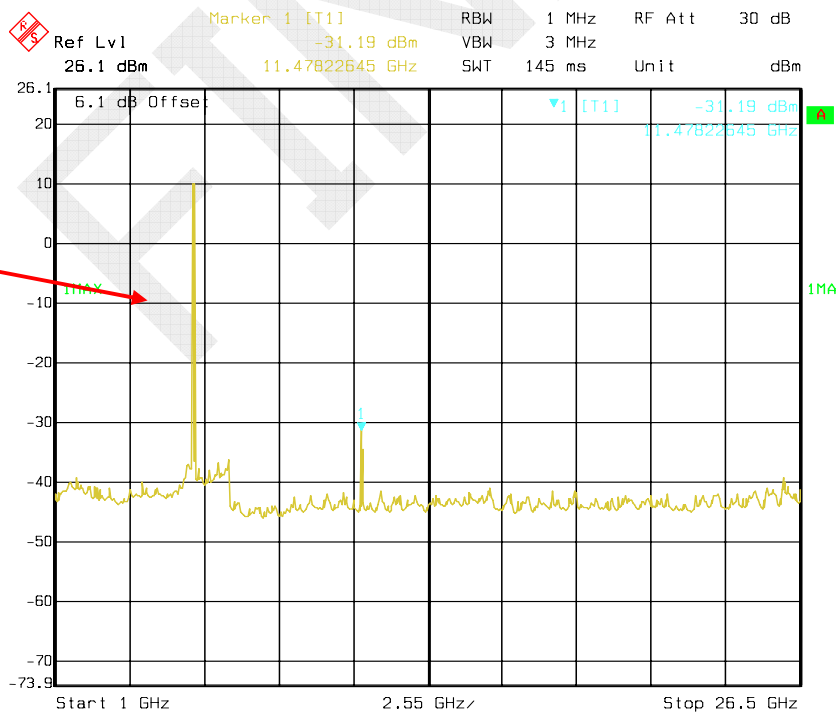
5725MHz-5850MHz:
20MHz Bandwidth:

Chain0 Low Channel 30MHz-1GHz



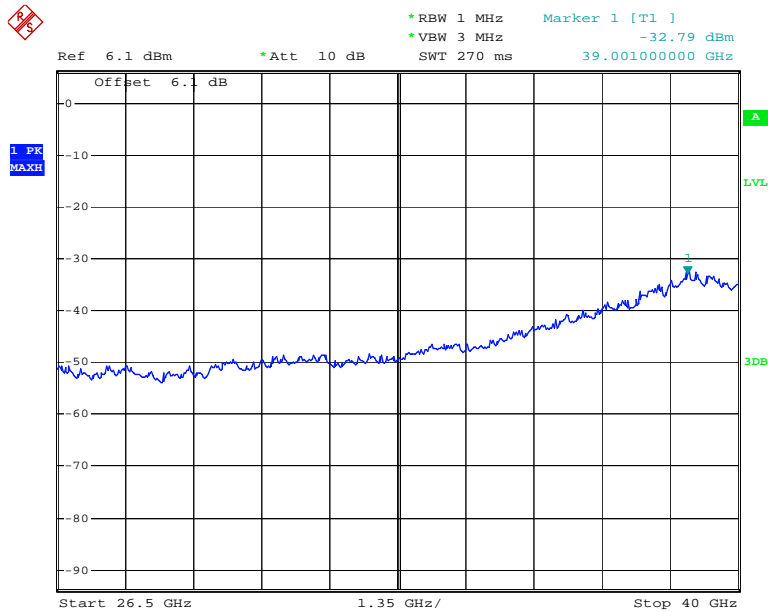
Date: 19.NOV.2014 15:31:57

Chain0 Low Channel 1GHz-26.5GHz



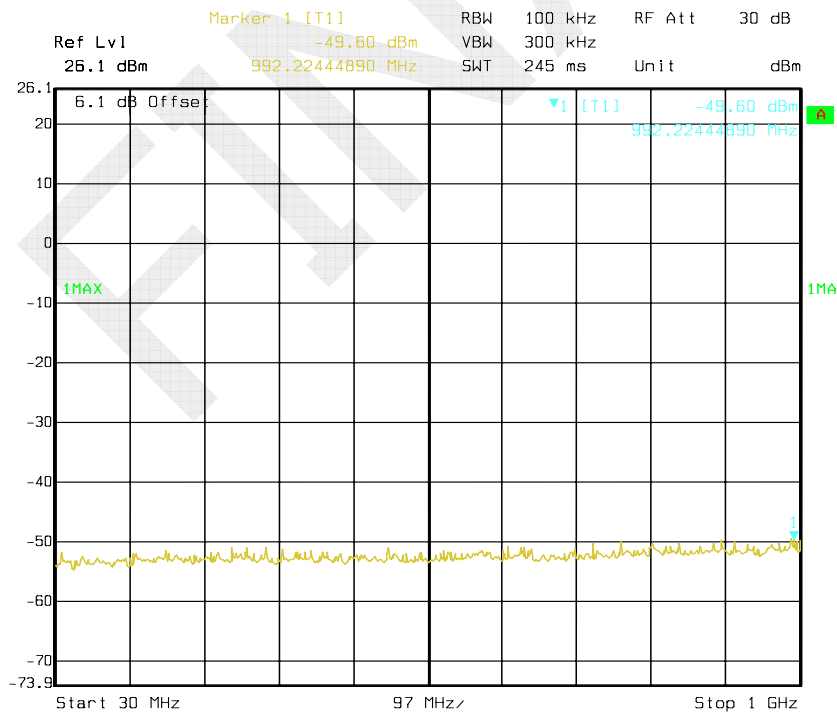
Date: 11.DEC.2014 18:53:59

Chain0 Low Channel 26.5GHz-40GHz



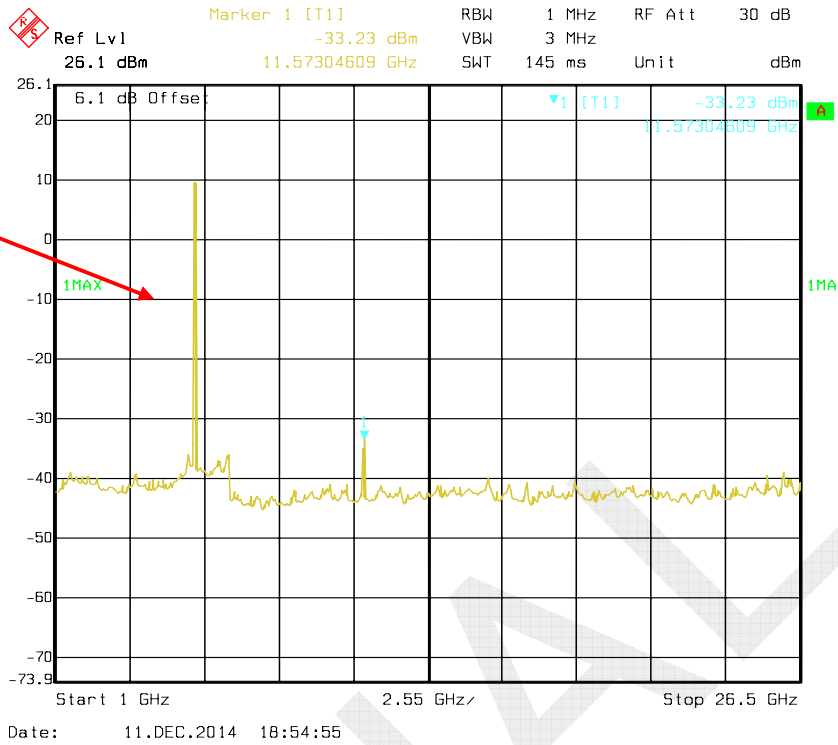
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Chain0 Middle Channel 30MHz-1GHz

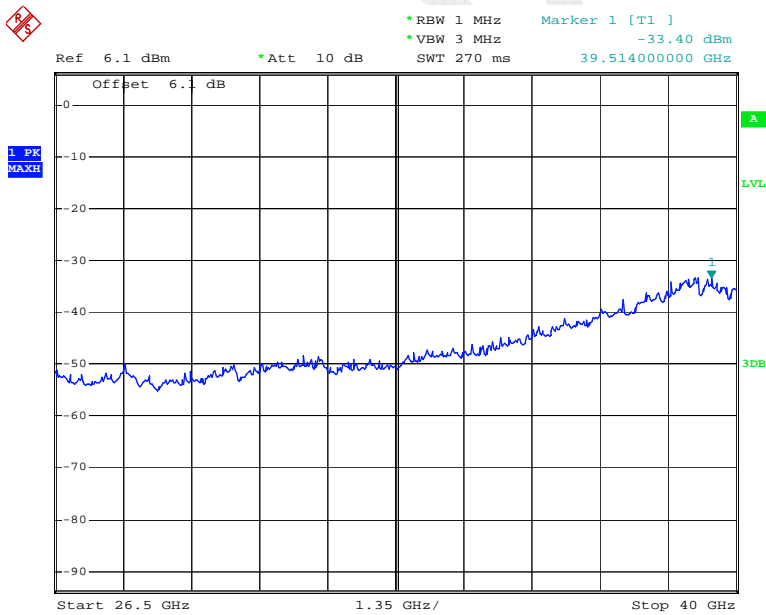


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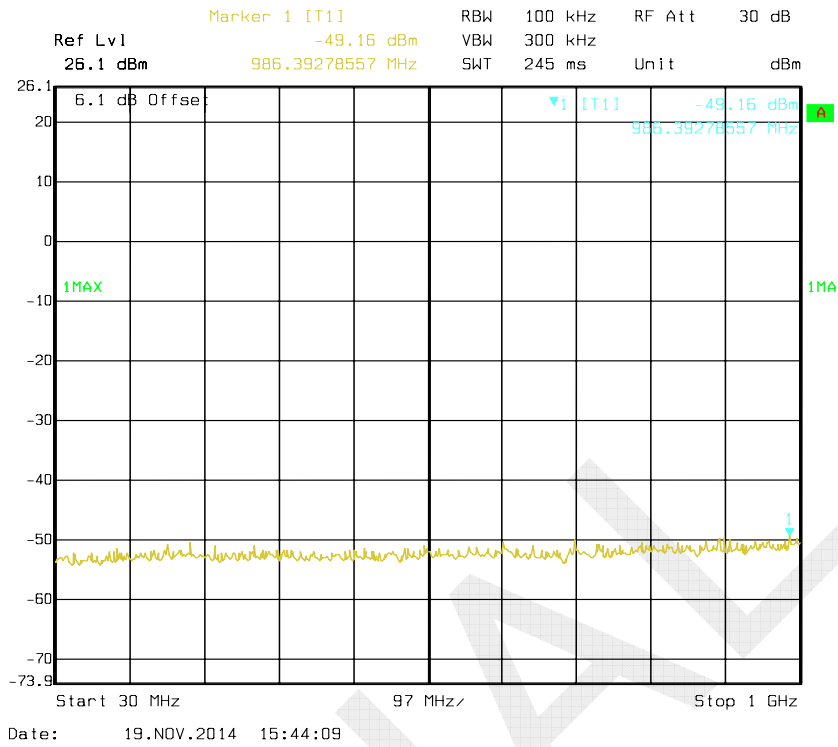
Chain0 Middle Channel 1GHz -26.5GHz



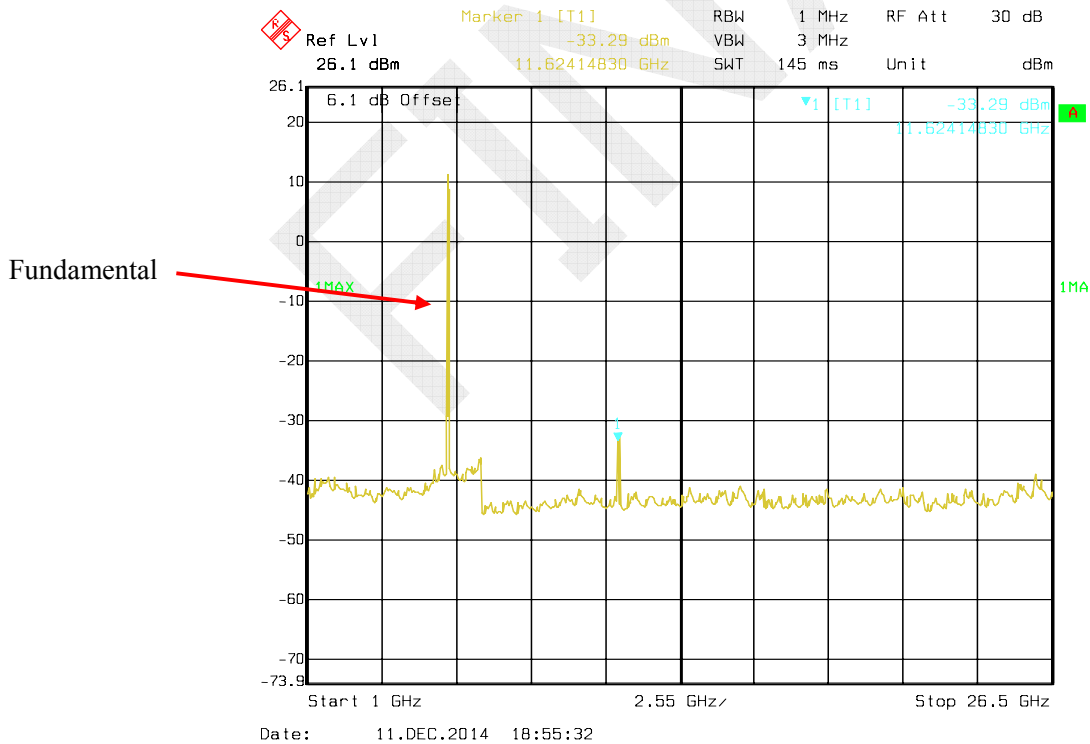
Chain0 Middle Channel 26.5GHz-40GHz



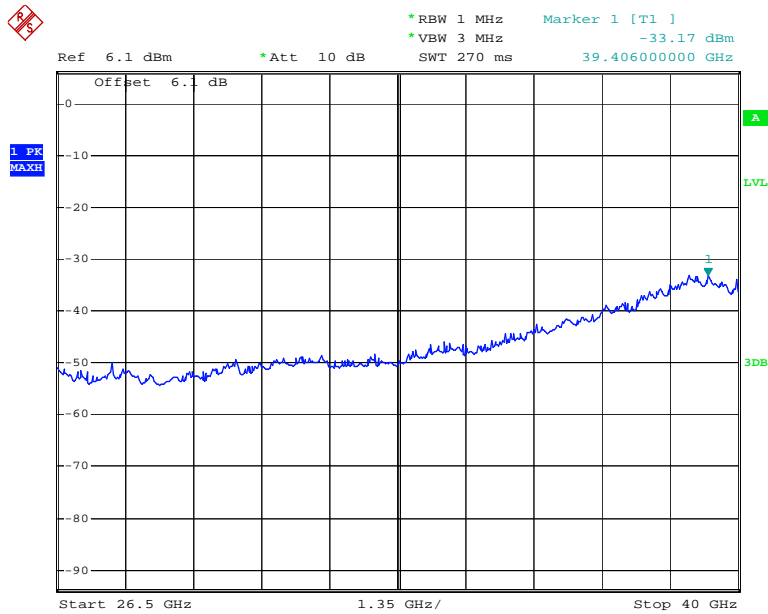
Chain0 High Channel 30MHz-1GHz



Chain0 High Channel 1GHz-26.5GHz

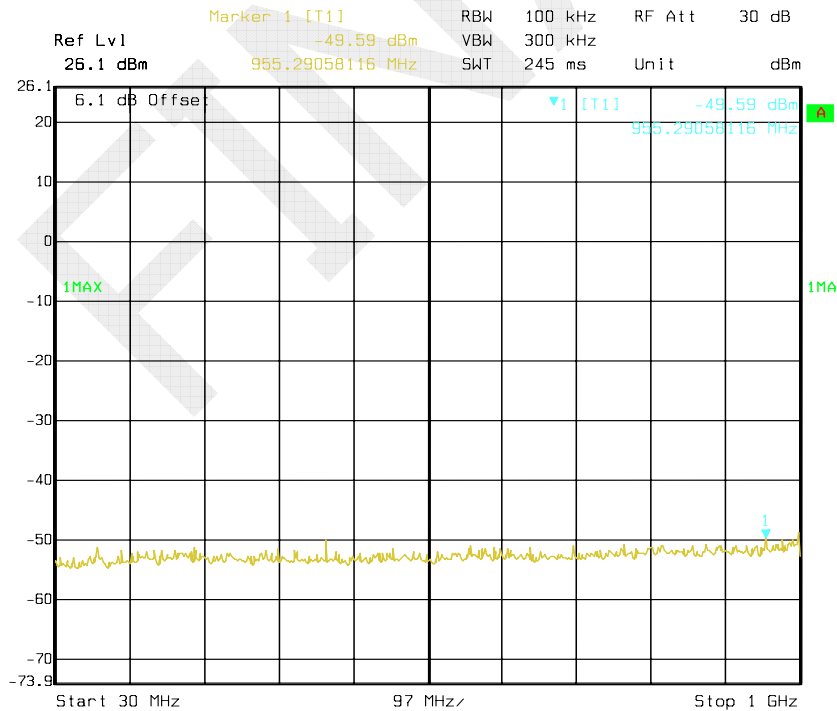


Chain0 High Channel 26.5GHz-40GHz



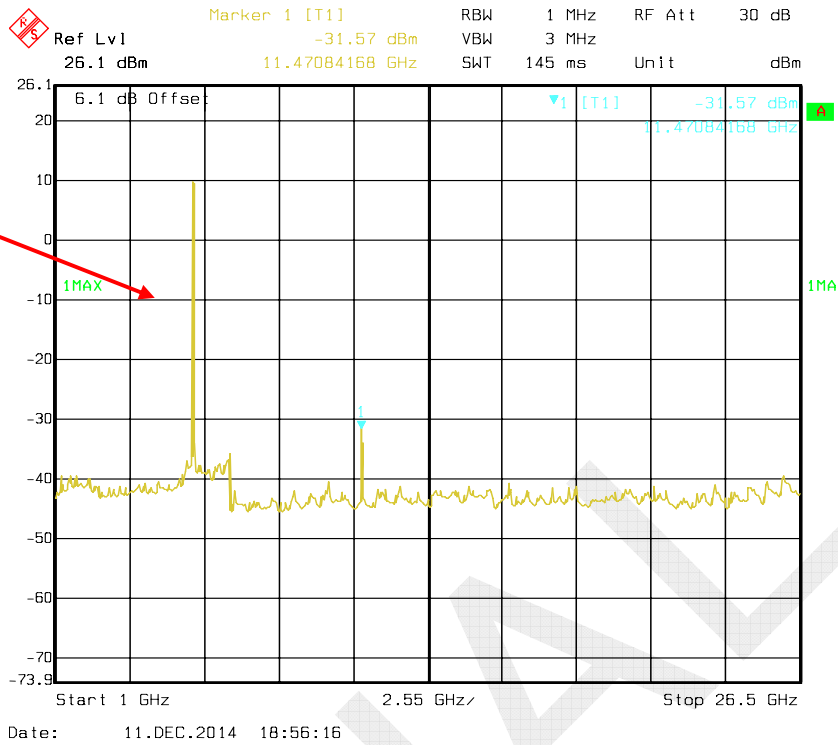
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Chain1 Low Channel 30MHz-1GHz

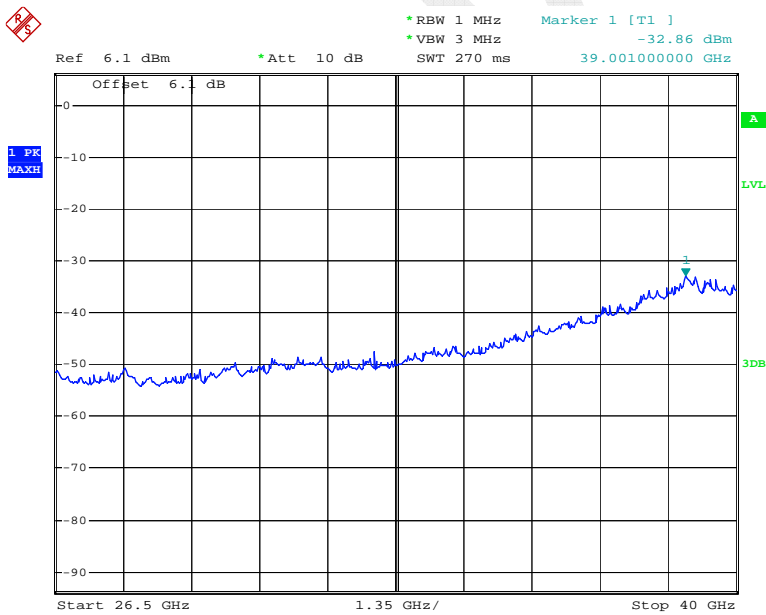


Date: 19.NOV.2014 16:13:22

Chain1 Low Channel 1GHz-26.5GHz

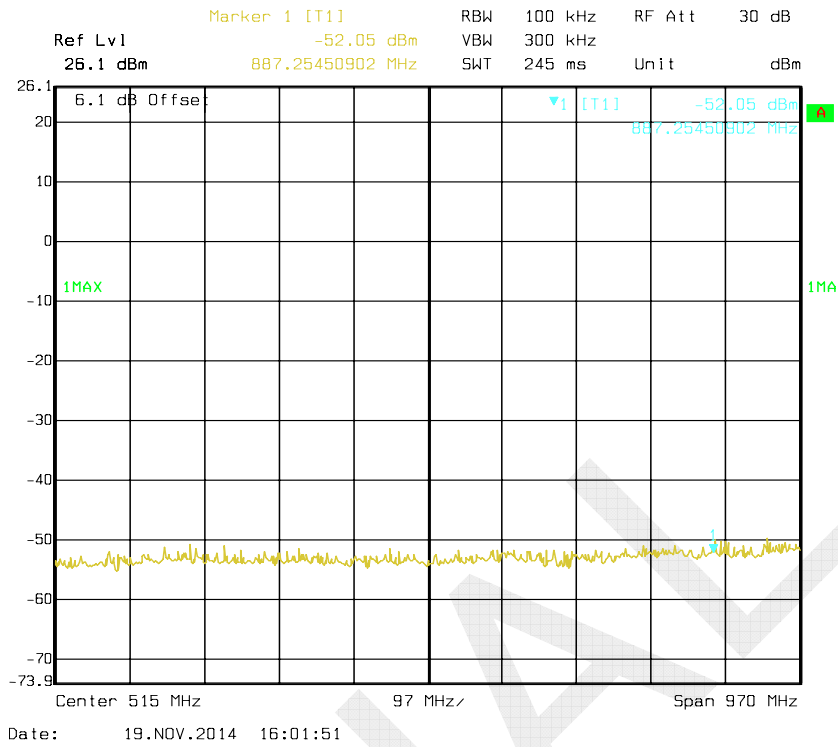


Chain1 Low Channel 26.5GHz-40GHz



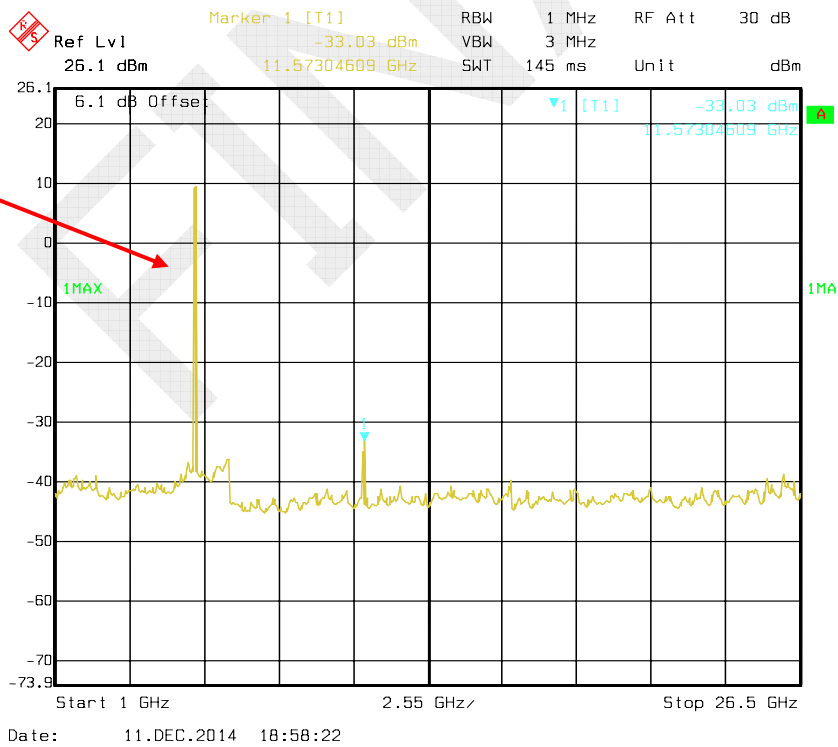
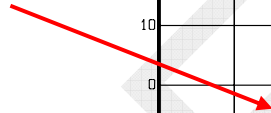
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Chain1 Middle Channel 30MHz-1GHz

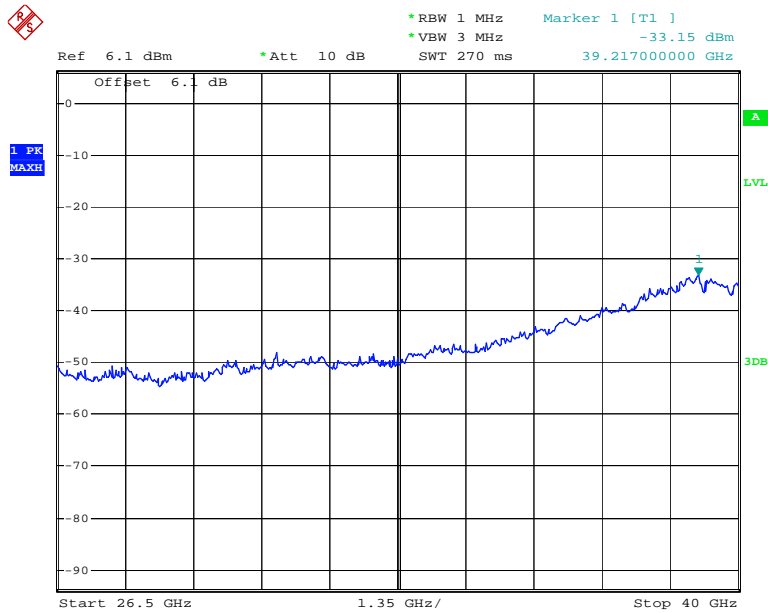


Chain1 Middle Channel 1GHz -26.5GHz

Fundamental

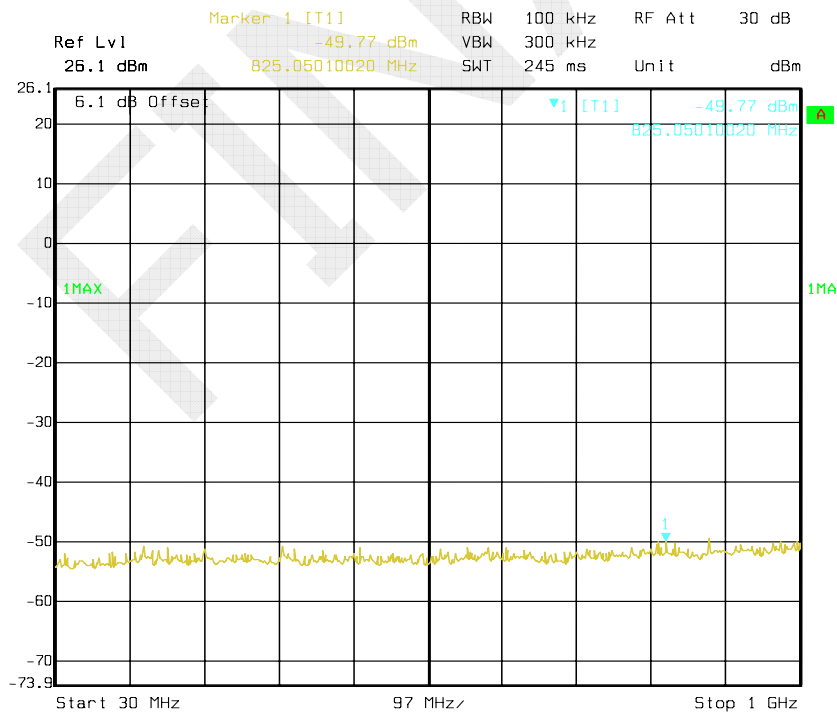


Chain1 Middle Channel 26.5GHz-40GHz



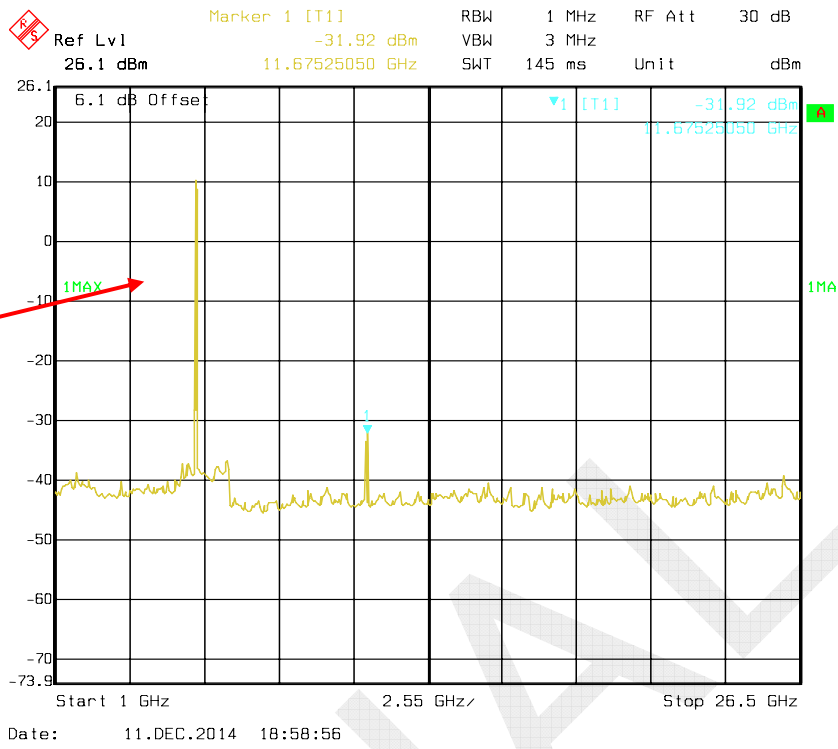
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Chain1 High Channel 30MHz-1GHz

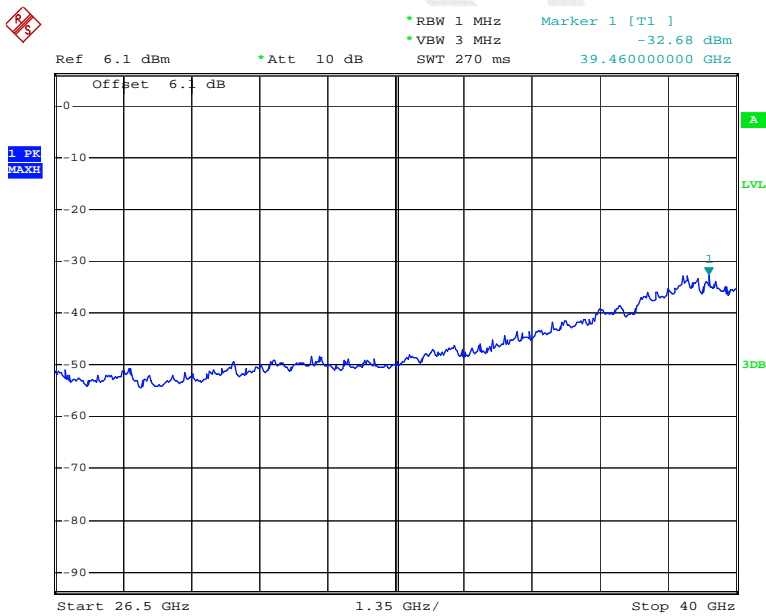


Date: 19.NOV.2014 16:00:37

Chain1 High Channel 1GHz-26.5GHz



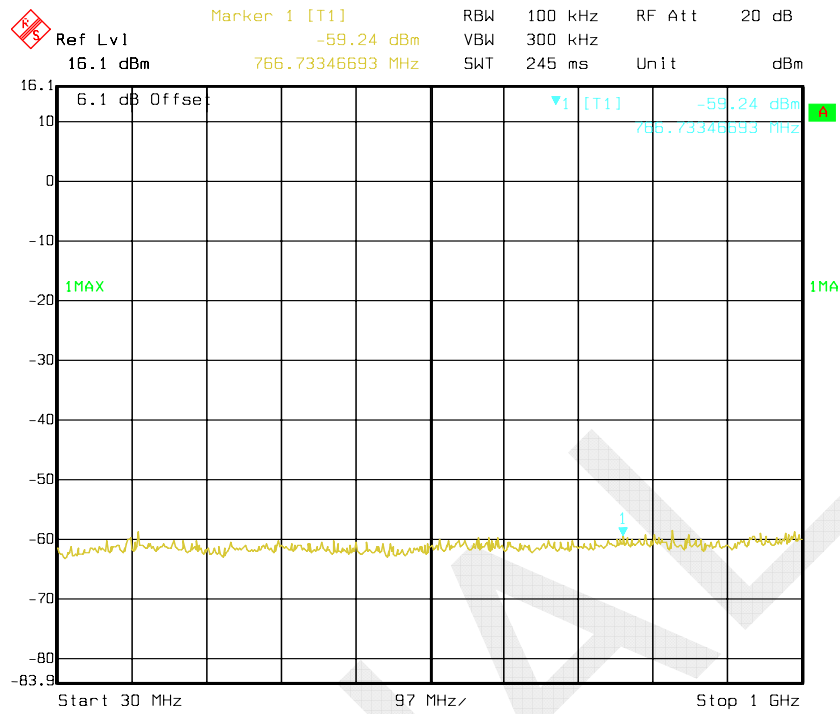
Chain1 High Channel 26.5GHz-40GHz



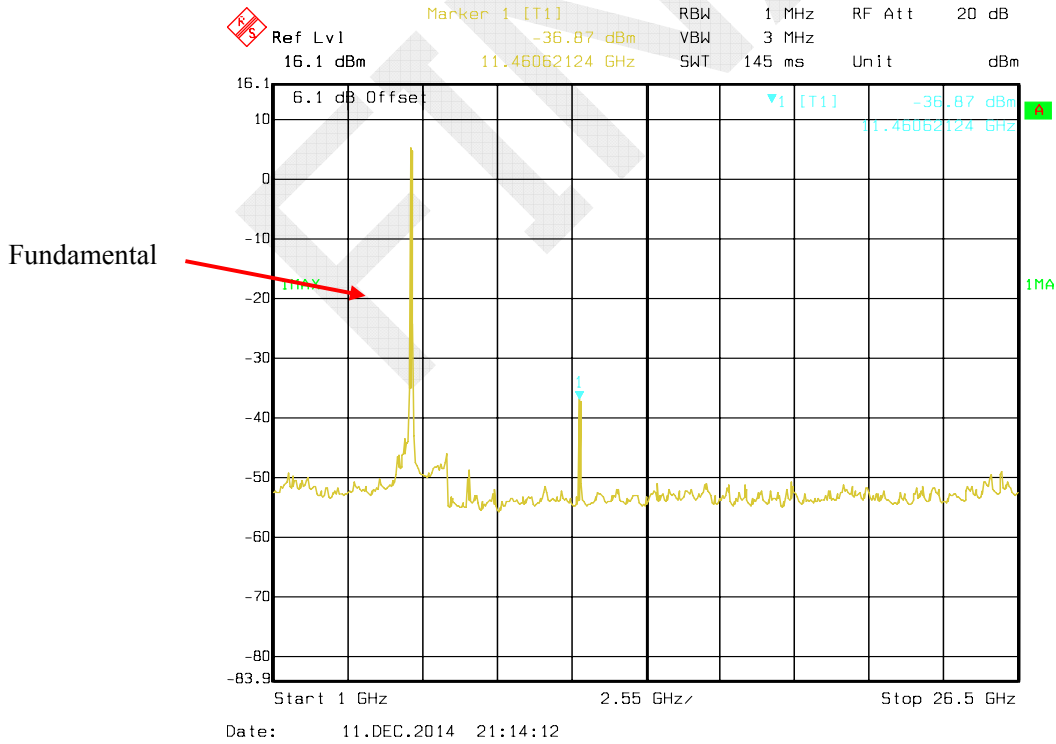
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40MHz Bandwidth:

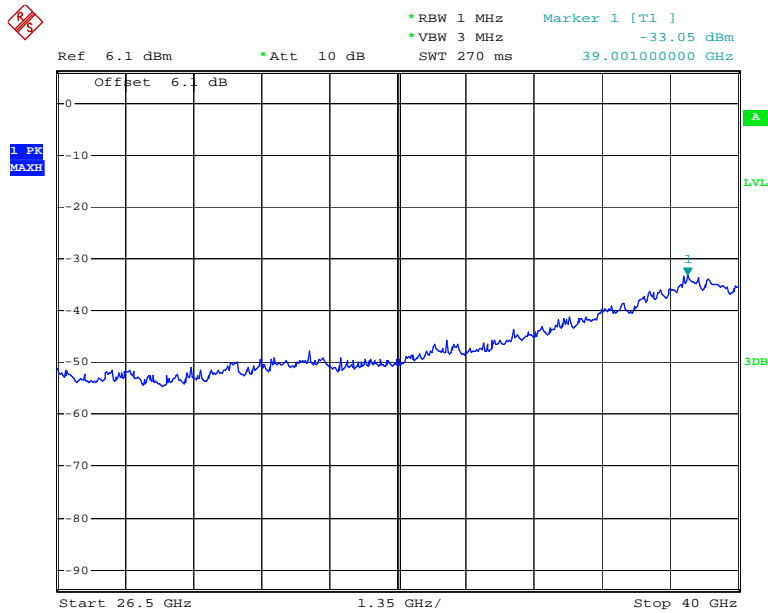
Chain0 Low Channel 30MHz-1GHz



Chain0 Low Channel 1GHz-26.5GHz

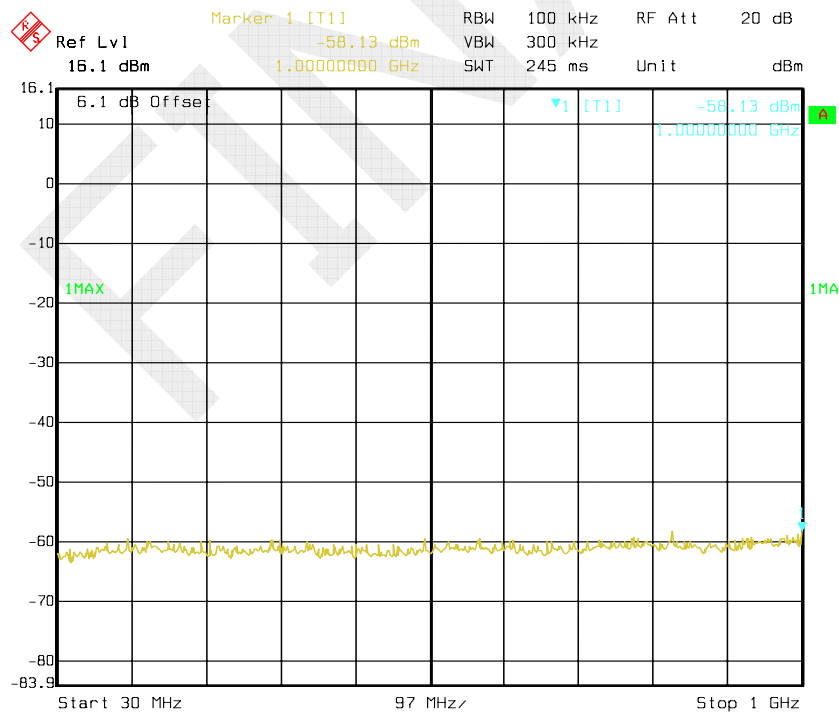


Chain0 Low Channel 26.5GHz-40GHz



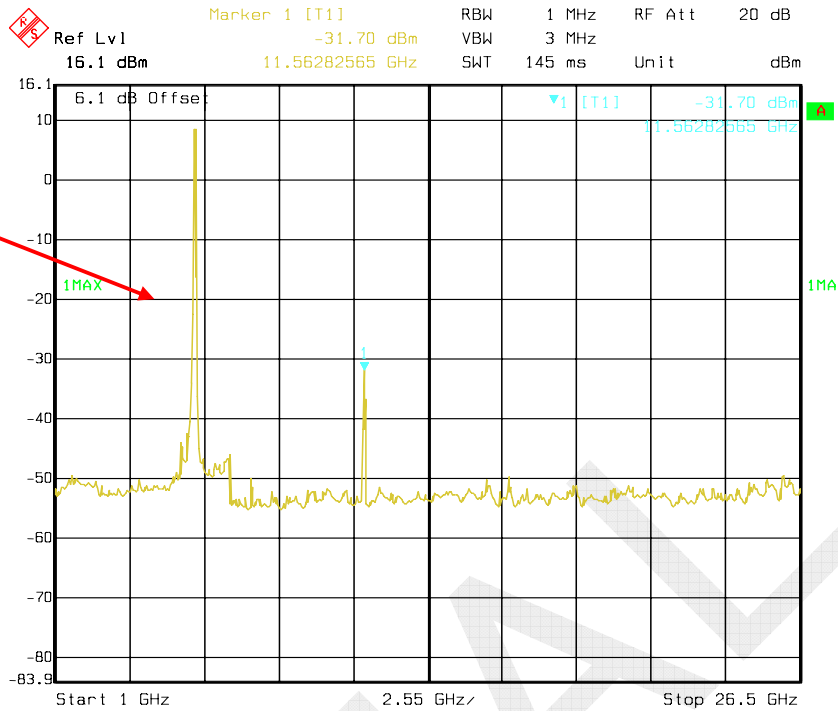
Date: 22.NOV.2014 18:38:03

Chain0 High Channel 30MHz-1GHz

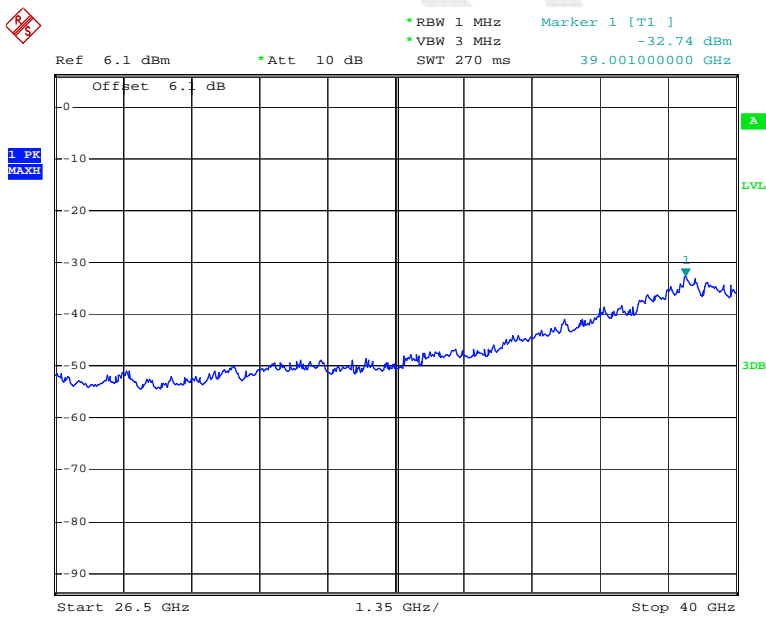


Date: 12.DEC.2014 14:10:42

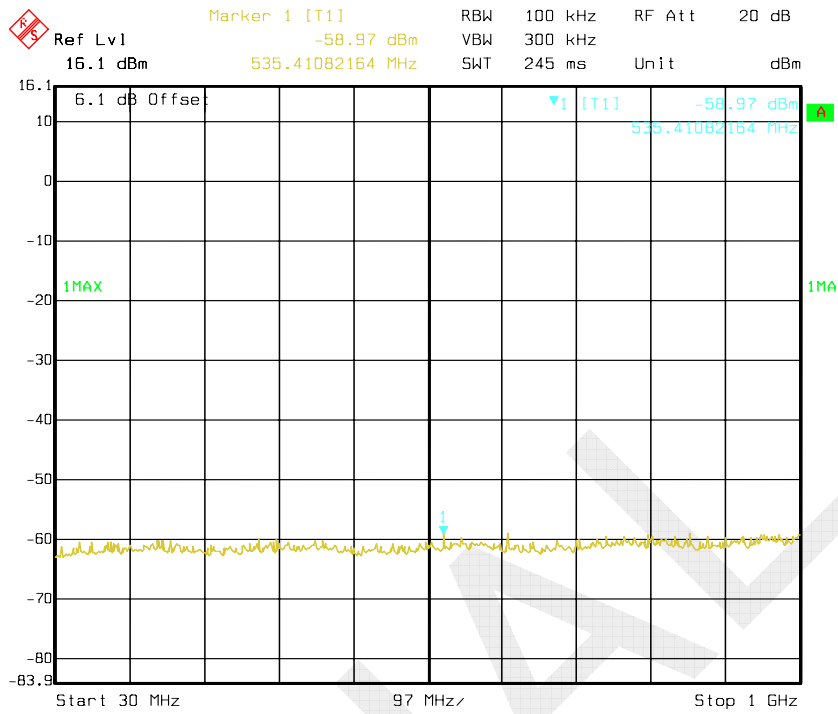
Chain0 High Channel 1GHz -26.5GHz



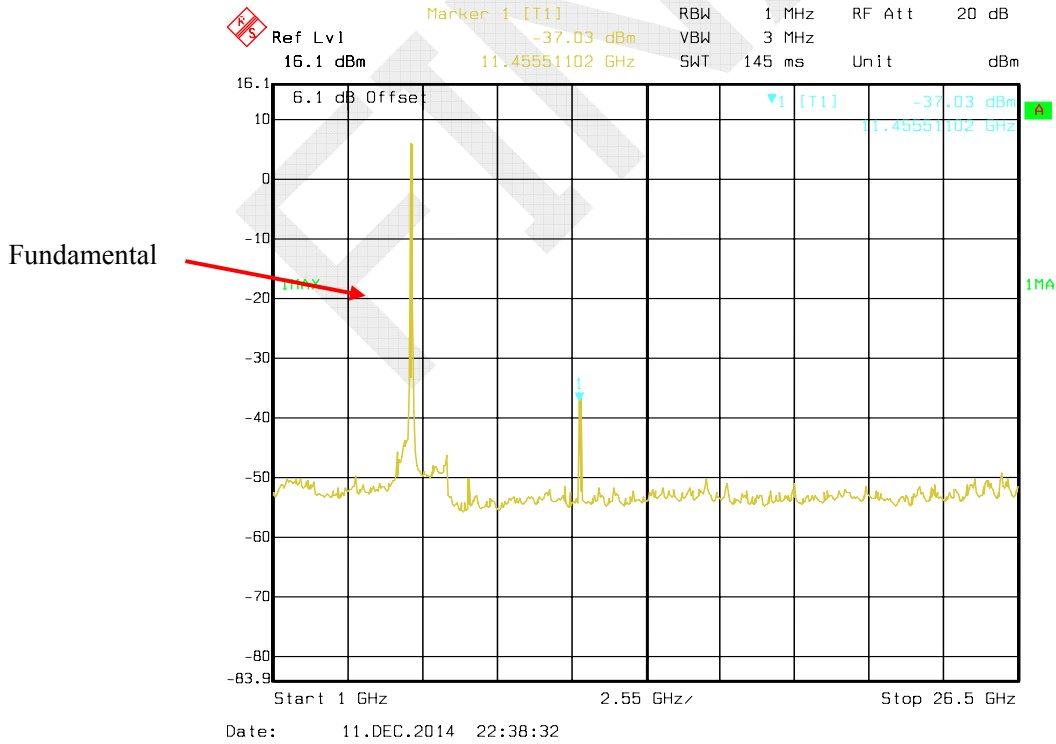
Chain0 High Channel 26.5GHz-40GHz



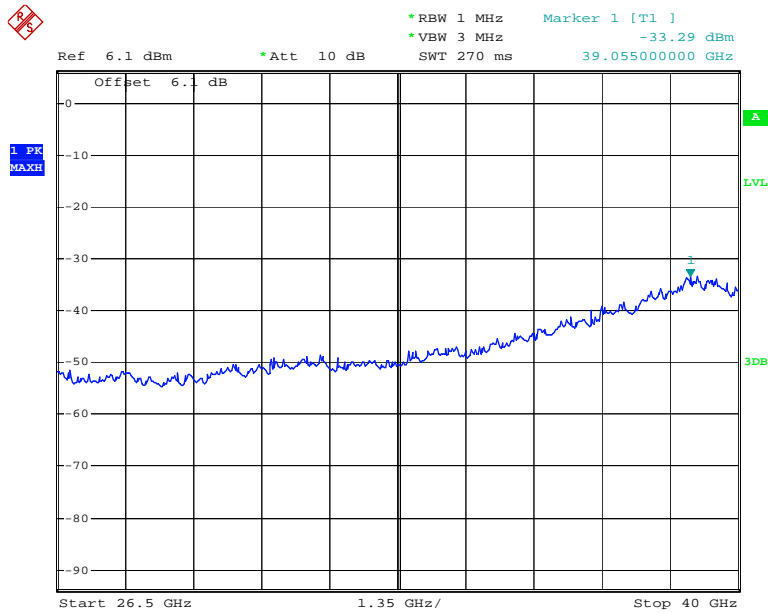
Chain1 Low Channel 30MHz-1GHz



Chain1 Low Channel 1GHz-26.5GHz

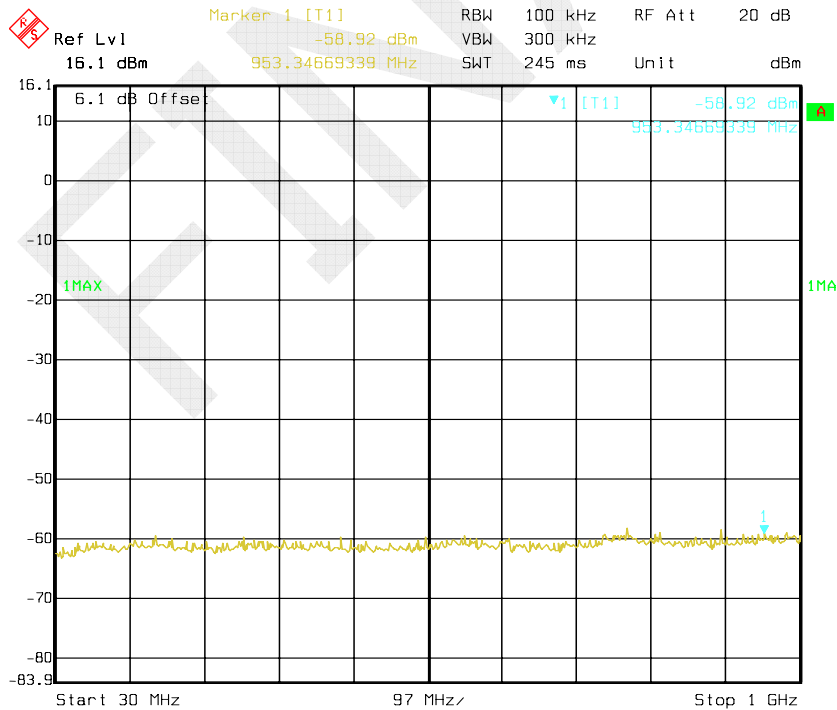


Chain1 Low Channel 26.5GHz-40GHz



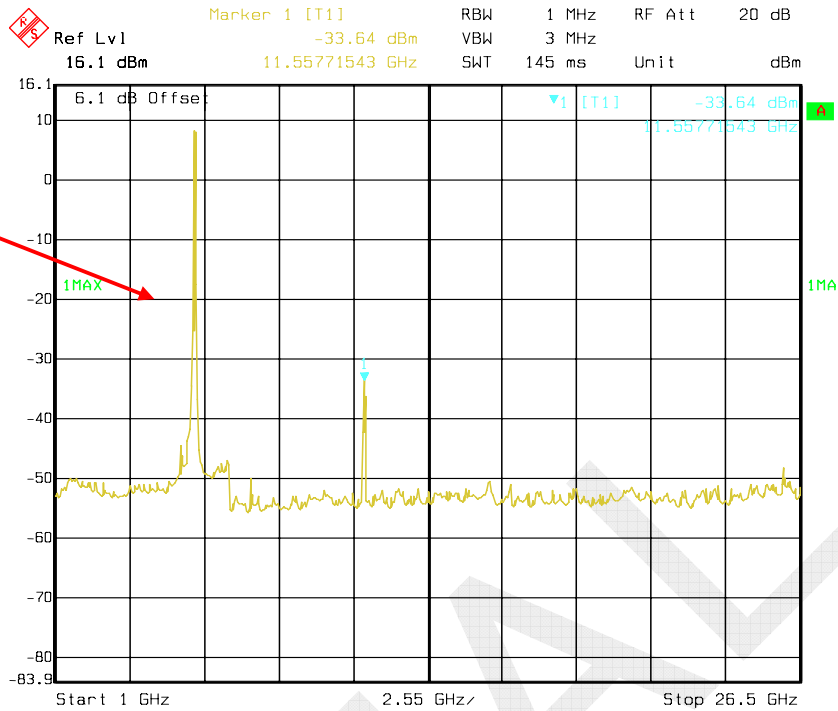
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Chain1 High Channel 30MHz-1GHz



Date: 12.DEC.2014 14:11:02

Chain1 High Channel 1GHz -26.5GHz



Chain1 High Channel 26.5GHz-40GHz

