



FCC TEST REPORT (15.407)

REPORT NO.: RF110914C28-1

MODEL NO.: F7D4515v1A

FCC ID: K7SF7D4515V1A

RECEIVED: Aug. 10, 2011

TESTED: Aug. 10 ~ Sep. 19, 2011

ISSUED: Sep. 27, 2011

APPLICANT: Belkin International, Inc.

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A D T

TABLE OF CONTENTS

RELEASE CONTROL RECORD.....	4
1. CERTIFICATION.....	5
2. SUMMARY OF TEST RESULTS	6
2.1 MEASUREMENT UNCERTAINTY	6
3. GENERAL INFORMATION.....	7
3.1 GENERAL DESCRIPTION OF EUT.....	7
3.2 DESCRIPTION OF TEST MODES.....	8
3.2.1 CONFIGURATION OF SYSTEM UNDER TEST	8
3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL.....	9
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS	11
3.4 DESCRIPTION OF SUPPORT UNITS	11
4. TEST TYPES AND RESULTS	12
4.1 RADIATED EMISSION MEASUREMENT	12
4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT.....	12
4.1.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS.....	12
4.1.3 TEST INSTRUMENTS	13
4.1.4 TEST PROCEDURES	14
4.1.5 DEVIATION FROM TEST STANDARD	14
4.1.6 TEST SETUP	15
4.1.7 EUT OPERATING CONDITION	15
4.1.8 TEST RESULTS	16
4.2 CONDUCTED EMISSION MEASUREMENT	22
4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT.....	22
4.2.2 TEST INSTRUMENTS	22
4.2.3 TEST PROCEDURES	23
4.2.4 DEVIATION FROM TEST STANDARD	23
4.2.5 TEST SETUP	24
4.2.6 EUT OPERATING CONDITIONS	24
4.2.7 TEST RESULTS	25
4.3 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT	27
4.3.1 LIMITS OF MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT	27
4.3.2 TEST INSTRUMENTS	27
4.3.3 TEST PROCEDURE	28
4.3.4 DEVIATION FROM TEST STANDARD	28
4.3.5 TEST SETUP	28
4.3.6 EUT OPERATING CONDITIONS	28
4.3.7 TEST RESULTS	29
4.4 PEAK POWER EXCURSION MEASUREMENT	32
4.4.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT.....	32
4.4.2 TEST INSTRUMENTS	32
4.4.3 TEST PROCEDURE	32
4.4.4 DEVIATION FROM TEST STANDARD	33
4.4.5 TEST SETUP	33
4.4.6 EUT OPERATING CONDITIONS	33
4.4.7 TEST RESULTS	34
4.5 PEAK POWER SPECTRAL DENSITY MEASUREMENT	38
4.5.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT.....	38
4.5.2 TEST INSTRUMENTS	38



A D T

- 4.5.3 TEST PROCEDURES 38
- 4.5.4 DEVIATION FROM TEST STANDARD 39
- 4.5.5 TEST SETUP 39
- 4.5.6 EUT OPERATING CONDITIONS 39
- 4.5.7 TEST RESULTS 40
- 4.6 FREQUENCY STABILITY 42
- 4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT 42
- 4.6.2 TEST INSTRUMENTS 42
- 4.6.3 TEST PROCEDURE 42
- 4.6.4 DEVIATION FROM TEST STANDARD 43
- 4.6.5 TEST SETUP 43
- 4.6.6 EUT OPERATING CONDITION 43
- 4.6.7 TEST RESULTS 44
- 4.7 BAND EDGES MEASUREMENT 45
- 4.7.1 TEST INSTRUMENTS 45
- 4.7.2 TEST PROCEDURE 46
- 4.7.3 EUT OPERATING CONDITION 46
- 4.7.4 TEST RESULTS 47
- 5. PHOTOGRAPHS OF THE TEST CONFIGURATION 77
- 6. INFORMATION ON THE TESTING LABORATORIES 78
- 7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB 79



RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	NA	Sep. 27, 2011



1. CERTIFICATION

PRODUCT: ScreenCast AV 4 – Transmitter
MODEL NO.: F7D4515v1A
BRAND: Belkin
APPLICANT: Belkin International, Inc.
TEST SAMPLE: ENGINEERING SAMPLE
TESTED: Aug. 10 ~ Sep. 19, 2011
STANDARDS: **FCC Part 15, Subpart E (Section 15.407)**
ANSI C63.4-2003
ANSI C63.10-2009

The above equipment (Model: F7D4515v1A) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Andrea Hsia DATE: Sep. 27, 2011
Andrea Hsia / Specialist

APPROVED BY : Gary Chang DATE: Sep. 27, 2011
Gary Chang / Technical Manager



2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.407(b)(5)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -12.20dB at 0.150MHz.
15.407(b)(1/2/3) (b)(5)	Electric Field Strength Spurious Emissions, 30MHz ~ 40000MHz	PASS	Meet the requirement of limit. Minimum passing margin is -1.1dB at 546.06MHz.
15.407(a)(1/2/3)	Peak Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(6)	Peak Power Excursion	PASS	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

2.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

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



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	ScreenCast AV 4 – Transmitter
MODEL NO.	F7D4515v1A
FCC ID	K7SF7D4515V1A
NOMINAL VOLTAGE	5Vdc
MODULATION TECHNOLOGY	OFDM
MODULATION TYPE	16QAM
TRANSFER RATE	WHDI (20MHz): 31.5Mbps WHDI (40MHz): 63.0Mbps
OPERATING FREQUENCY	5180.0 ~ 5240.0MHz
NUMBER OF CHANNEL	4 for WHDI (20MHz) 2 for WHDI (40MHz)
OUTPUT POWER	22.0mW
ANTENNA TYPE	Refer to note as below
ANTENNA CONNECTOR	NA
DATA CABLE	1.2m shielded HDMI cable with 2 cores
I/O PORTS	Refer to user’s manual
ACCESSORY DEVICES	Adapter, Remote control

NOTE:

1. The EUT was powered by the following adapter:

BRAND:	DVE
MODEL:	DSA-12PFA-05 FUS
INPUT:	100-240Vac
OUTPUT:	5Vdc, 2A
POWER LINE:	1.5m non-shielded cable without core

2. The EUT incorporates a MIMO function. Physically, the EUT provides four completed transmitters and one receiver for 5.0GHz band.

MODULATION MODE	TX FUNCTION
WHDI (20MHz)	4TX
WHDI (40MHz)	4TX

3. The EUT used the following antennas:

ITEM	ANTENNA TYPE	ANTENNA GAIN	ANTENNA CONNECTOR
Antenna 1 (Tx)	Printed	3dBi	none
Antenna 2 (Tx)	Printed	3dBi	none
Antenna 3 (Tx)	Printed	3dBi	none
Antenna 4 (Tx)	Printed	3dBi	none
Antenna 5 (Rx)	Printed	3dBi	none

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 DESCRIPTION OF TEST MODES

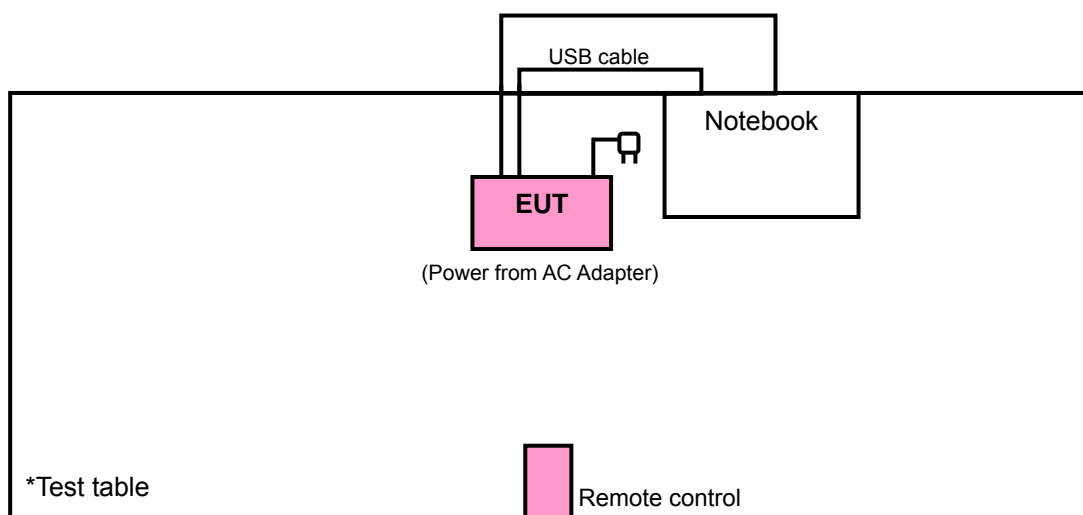
4 channels are provided for WHDI (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
36	5180MHz	44	5220MHz
40	5200MHz	48	5240MHz

2 channels are provided for WHDI (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190MHz	46	5230MHz

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE \geq 1G	RE $<$ 1G	PLC	APCM	
-	√	√	√	√	-

Where **RE \geq 1G**: Radiated Emission above 1GHz
RE $<$ 1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission
APCM: Antenna Port Conducted Measurement

RADIATED EMISSION TEST (ABOVE 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
WHDI (20MHz)	36 to 48	36, 40, 48	OFDM	16QAM	31.5
WHDI (40MHz)	38 to 46	38, 46	OFDM	16QAM	63.0

RADIATED EMISSION TEST (BELOW 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
WHDI (20MHz)	36 to 48	48	OFDM	16QAM	31.5

POWER LINE CONDUCTED EMISSION TEST:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
WHDI (20MHz)	36 to 48	48	OFDM	16QAM	31.5

BANDEDGE MEASUREMENT:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
WHDI (20MHz)	36 to 48	36, 48	OFDM	16QAM	31.5
WHDI (40MHz)	38 to 46	38, 46	OFDM	16QAM	63.0



ANTENNA PORT CONDUCTED MEASUREMENT:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
WHDI (20MHz)	36 to 48	36, 40, 48	OFDM	16QAM	31.5
WHDI (40MHz)	38 to 46	38, 46	OFDM	16QAM	63.0

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Brad Wu
RE<1G	22deg. C, 65%RH	120Vac, 60Hz	Frank Wang
PLC	25deg. C, 65%RH	120Vac, 60Hz	Mark Liao
APCM	22deg. C, 65%RH	120Vac, 60Hz	Brad Wu

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart E (15.407)

ANSI C63.4-2003

ANSI C63.10-2009

All test items have been performed and recorded as per the above standards.

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK	DELL	E5420	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.5m USB cable

NOTE: All power cords of the above support units are non shielded (1.8m).

4. TEST TYPES AND RESULTS

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a). Other emissions shall be at least 20dB below the highest level of the desired power.

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

FREQUENCIES (MHz)	EIRP LIMIT (dBm)	EQUIVALENT FIELD STRENGTH AT 3m (dBµV/m) *NOTE 3
	PK	PK
5150 ~ 5250	-27	68.3

NOTE: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$



4.1.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Dec. 27, 2010	Dec. 26, 2011
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Feb. 23, 2011	Feb. 22, 2012
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Apr. 12, 2011	Apr. 11, 2012
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-408	Jan. 06, 2011	Jan. 05, 2012
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Dec. 27, 2010	Dec. 26, 2011
Preamplifier Agilent	8449B	3008A01961	Nov. 02, 2010	Nov. 01, 2011
Preamplifier Agilent	8447D	2944A10738	Nov. 02, 2010	Nov. 01, 2011
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250792/4	Jan. 27, 2011	Jan. 26, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	283397/4	Jan. 27, 2011	Jan. 26, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Jan. 27, 2011	Jan. 26, 2012
Software ADT.	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table ADT.	TT100.	TT93021704	NA	NA
Turn Table Controller ADT.	SC100.	SC93021704	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Nov. 03, 2010	Nov. 02, 2011

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Chamber 4.
 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The FCC Site Registration No. is 988962.
 5. The IC Site Registration No. is IC7450F-4.

4.1.4 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

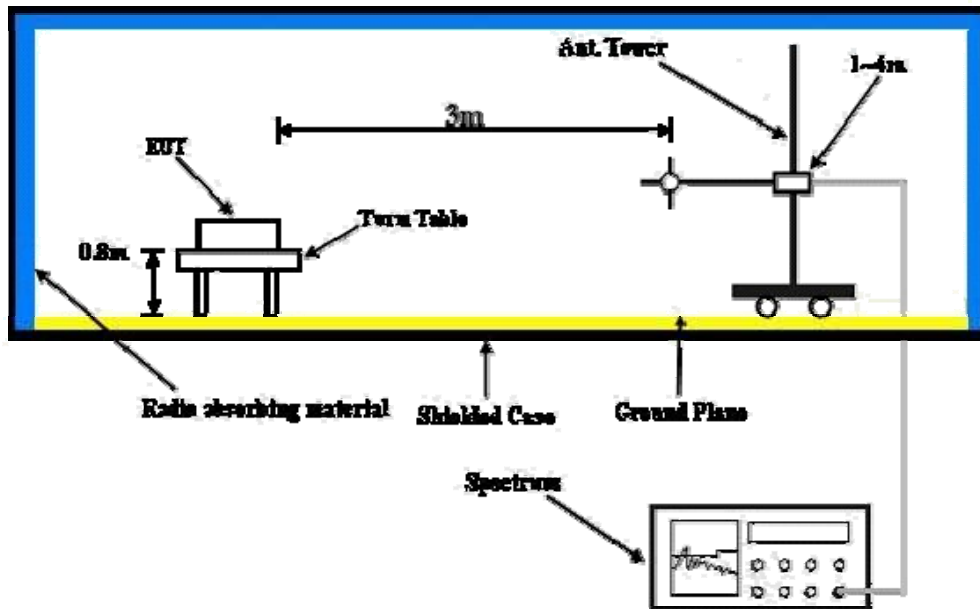
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.5 DEVIATION FROM TEST STANDARD

No deviation.

4.1.6 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.7 EUT OPERATING CONDITION

- a. Placed the EUT on the testing table.
- b. Prepared the Notebook on test table to act as a communication partners.
- c. The communication partners ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.



4.1.8 TEST RESULTS

ABOVE 1GHz DATA :

WHDI (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 36	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Brad Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	51.1 PK	74.0	-22.9	1.00 H	206	11.50	39.60
2	5150.00	39.0 AV	54.0	-15.0	1.00 H	206	-0.60	39.60
3	*5180.00	110.6 PK			1.00 H	206	70.90	39.70
4	*5180.00	96.3 AV			1.00 H	206	56.60	39.70
5	#10360.00	59.1 PK	68.3	-9.2	1.02 H	114	8.80	50.30

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	48.2 PK	74.0	-25.8	1.34 V	269	8.60	39.60
2	5150.00	35.6 AV	54.0	-18.4	1.34 V	269	-4.00	39.60
3	*5180.00	105.2 PK			1.34 V	269	65.50	39.70
4	*5180.00	90.6 AV			1.34 V	269	50.90	39.70
5	#10360.00	60.7 PK	68.3	-7.6	1.72 V	216	10.40	50.30

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. “#”:The radiated frequency is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Brad Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	110.9 PK			1.00 H	203	71.20	39.70
2	*5200.00	96.8 AV			1.00 H	203	57.10	39.70
3	#10400.00	59.5 PK	68.3	-8.8	1.02 H	116	9.10	50.40
4	15600.00	59.8 PK	74.0	-14.2	1.00 H	15	9.00	50.80
5	15600.00	46.6 AV	54.0	-7.4	1.00 H	15	-4.20	50.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	105.5 PK			1.35 V	268	65.80	39.70
2	*5200.00	90.8 AV			1.35 V	268	51.10	39.70
3	#10400.00	61.0 PK	68.3	-7.3	1.70 V	215	10.60	50.40
4	15600.00	59.9 PK	74.0	-14.1	1.02 V	105	9.10	50.80
5	15600.00	46.9 AV	54.0	-7.1	1.02 V	105	-3.90	50.80

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. “#”:The radiated frequency is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 48	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Brad Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	110.7 PK			1.00 H	205	71.00	39.70
2	*5240.00	96.7 AV			1.00 H	205	57.00	39.70
3	5350.00	51.5 PK	74.0	-22.5	1.02 H	206	11.70	39.80
4	5350.00	38.0 AV	54.0	-16.0	1.02 H	206	-1.80	39.80
5	#10480.00	59.6 PK	68.3	-8.7	1.04 H	116	8.90	50.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	105.2 PK			1.36 V	269	65.50	39.70
2	*5240.00	90.5 AV			1.36 V	269	50.80	39.70
3	5350.00	50.1 PK	74.0	-23.9	1.36 V	269	10.30	39.80
4	5350.00	36.8 AV	54.0	-17.2	1.36 V	269	-3.00	39.80
5	#10480.00	61.4 PK	68.3	-6.9	1.65 V	224	10.70	50.70

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. “#”: The radiated frequency is out the restricted band.



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WHDI (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 38	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Brad Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	56.6 PK	74.0	-17.4	1.00 H	209	17.00	39.60
2	5150.00	38.8 AV	54.0	-15.2	1.00 H	209	-0.80	39.60
3	*5190.00	108.0 PK			1.00 H	209	68.30	39.70
4	*5190.00	93.8 AV			1.00 H	209	54.10	39.70
5	#10380.00	59.1 PK	68.3	-9.2	1.12 H	120	8.70	50.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	49.1 PK	74.0	-24.9	1.32 V	268	9.50	39.60
2	5150.00	36.4 AV	54.0	-17.6	1.32 V	268	-3.20	39.60
3	*5190.00	102.6 PK			1.32 V	268	62.90	39.70
4	*5190.00	88.0 AV			1.32 V	268	48.30	39.70
5	#10380.00	60.4 PK	68.3	-7.9	1.25 V	16	10.00	50.40

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. "#":The radiated frequency is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 46	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Brad Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	108.2 PK			1.02 H	210	68.50	39.70
2	*5230.00	94.0 AV			1.02 H	210	54.30	39.70
3	5350.00	51.9 PK	74.0	-22.1	1.02 H	210	12.10	39.80
4	5350.00	38.3 AV	54.0	-15.7	1.02 H	210	-1.50	39.80
5	#10460.00	59.6 PK	68.3	-8.7	1.05 H	115	8.90	50.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	102.9 PK			1.30 V	265	63.20	39.70
2	*5230.00	88.2 AV			1.30 V	265	48.50	39.70
3	5350.00	50.6 PK	74.0	-23.4	1.30 V	265	10.80	39.80
4	5350.00	38.1 AV	54.0	-15.9	1.30 V	265	-1.70	39.80
5	#10460.00	60.5 PK	68.3	-7.8	1.02 V	101	9.80	50.70

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. “#”: The radiated frequency is out the restricted band.



BELOW 1GHz WORST-CASE DATA : WHDI (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 48	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Frank Wang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	197.11	42.1 QP	43.5	-1.4	2.00 H	307	29.70	12.40
2	409.04	42.6 QP	46.0	-3.4	2.00 H	358	23.70	18.90
3	546.06	44.9 QP	46.0	-1.1	1.17 H	0	22.40	22.50
4	683.18	42.1 QP	46.0	-3.9	1.50 H	352	17.30	24.80
5	819.28	43.5 QP	46.0	-2.5	1.00 H	283	15.80	27.70
6	881.50	41.2 QP	46.0	-4.8	2.00 H	256	12.80	28.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	199.05	41.5 QP	43.5	-2.0	2.00 V	307	29.30	12.20
2	296.27	42.1 QP	46.0	-3.9	1.50 V	58	26.90	15.20
3	445.98	42.3 QP	46.0	-3.7	1.50 V	115	22.40	19.90
4	547.08	44.2 QP	46.0	-1.8	1.00 V	292	21.70	22.50
5	599.58	42.0 QP	46.0	-4.0	1.50 V	55	18.30	23.70
6	819.28	43.9 QP	46.0	-2.1	1.00 V	10	16.20	27.70

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Nov. 23, 2010	Nov. 22, 2011
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 30, 2010	Dec. 29, 2011
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Jan. 06, 2011	Jan. 05, 2012
LISN ROHDE & SCHWARZ	ESH3-Z5	100312	Jul. 07, 2011	Jul. 06, 2012
V-LISN SCHWARZBECK	NNBL 8226-2	8226-142	Jun. 30, 2011	Jun. 29, 2012
LISN ROHDE & SCHWARZ	ENV216	100072	Jun. 10, 2011	Jun. 09, 2012
Software ADT	ADT_Cond_ V7.3.7	NA	NA	NA

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Shielded Room 2.
 3. The VCCI Site Registration No. is C-2047.

4.2.3 TEST PROCEDURES

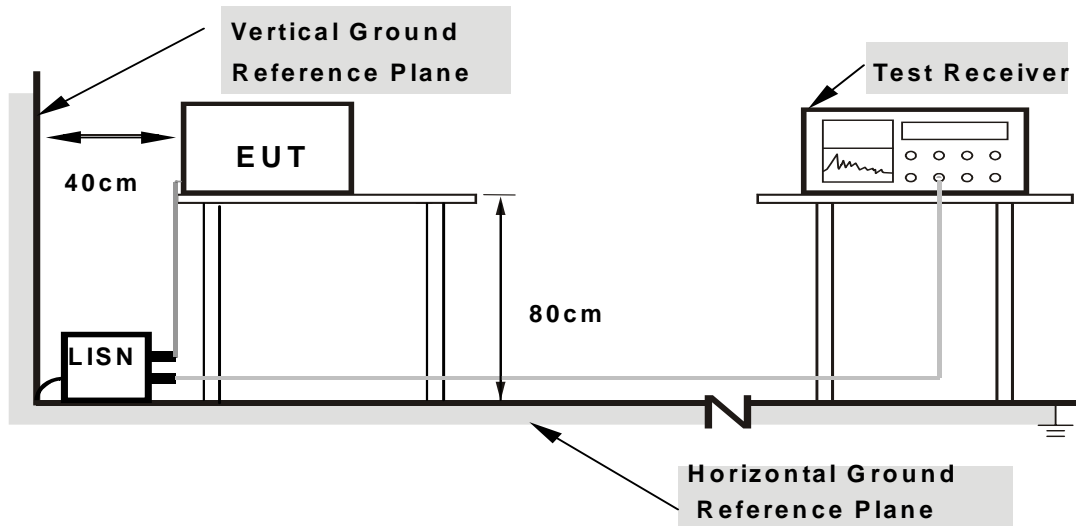
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

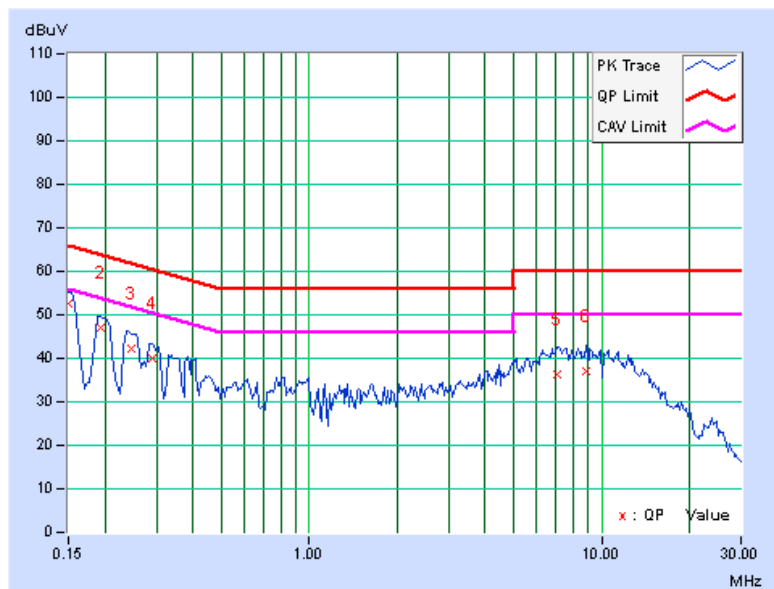
4.2.7 TEST RESULTS

CONDUCTED WORST-CASE DATA : WHDI (20MHz)

PHASE	Line 1	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.16	52.51	-	52.67	-	66.00	56.00	-13.33	-
2	0.193	0.17	46.79	-	46.96	-	63.91	53.91	-16.95	-
3	0.245	0.18	42.08	-	42.26	-	61.92	51.92	-19.66	-
4	0.291	0.18	39.78	-	39.96	-	60.51	50.51	-20.54	-
5	7.078	0.49	35.86	-	36.35	-	60.00	50.00	-23.65	-
6	8.840	0.56	36.60	-	37.16	-	60.00	50.00	-22.84	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.



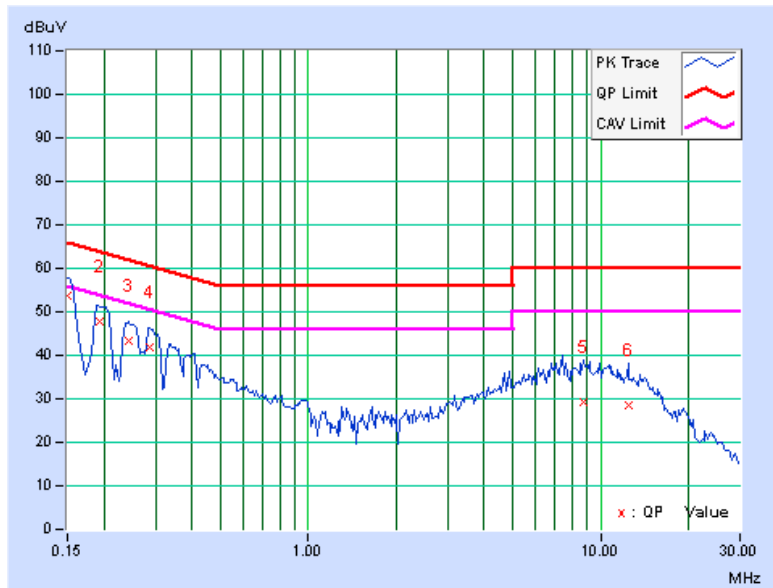


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PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.19	53.61	-	53.80	-	66.00	56.00	-12.20	-
2	0.194	0.18	47.69	-	47.87	-	63.86	53.86	-15.99	-
3	0.244	0.19	43.00	-	43.19	-	61.97	51.97	-18.78	-
4	0.287	0.19	41.68	-	41.87	-	60.62	50.62	-18.75	-
5	8.766	0.54	28.87	-	29.41	-	60.00	50.00	-30.59	-
6	12.445	0.70	27.91	-	28.61	-	60.00	50.00	-31.39	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.





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4.3 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

4.3.1 LIMITS OF MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

FREQUENCY BAND	LIMIT
5.15 ~ 5.25GHz	The lesser of 50mW (17dBm) or 4dBm + 10logB

NOTE: Where B is the 26dB emission bandwidth in MHz.

4.3.2 TEST INSTRUMENTS

FOR POWER OUTPUT MEASUREMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
High Speed Peak Power Meter	ML2495A	0824011	Aug. 04, 2011	Aug. 03, 2012
Power Sensor	MA2411B	0738171	Aug. 04, 2011	Aug. 03, 2012

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Measurement Bandwidth of ML2495A is 65MHz greater than 26dB bandwidth of emission.

FOR 26dB OCCUPIED BANDWIDTH

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
SPECTRUM ANALYZER R&S	FSP40	100039	Feb. 23, 2011	Feb. 22, 2012

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.3.3 TEST PROCEDURE

FOR POWER OUTPUT MEASUREMENT

A power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

FOR 26dB OCCUPIED BANDWIDTH

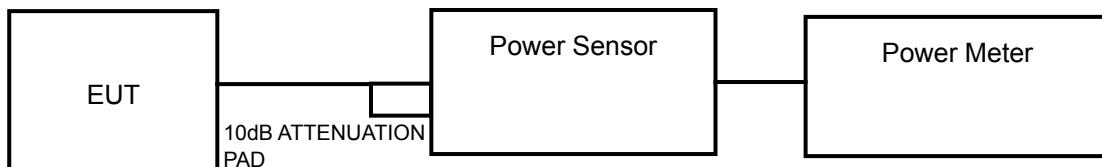
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 300kHz RBW and 1MHz VBW. The 26dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 26dB.

4.3.4 DEVIATION FROM TEST STANDARD

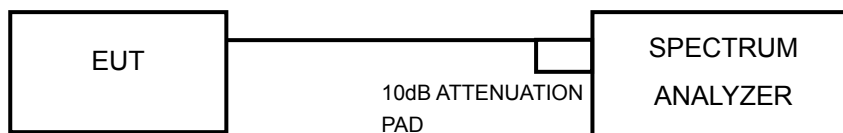
No deviation.

4.3.5 TEST SETUP

FOR POWER OUTPUT MEASUREMENT



FOR 26dB OCCUPIED BANDWIDTH



4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.



4.3.7 TEST RESULTS

POWER OUTPUT: WHDI (20MHz)

CHAN.	CHAN. FREQ. (MHz)	POWER OUTPUT (dBm)				TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
36	5180	7.7	7.1	6.9	7.4	21.4	13.3	14	PASS
40	5200	7.5	6.0	7.2	7.6	20.6	13.1	14	PASS
48	5240	7.1	7.5	7.1	7.9	22.0	13.4	14	PASS

Directional gain = $3\text{dBi} + 10\log(4) = 9\text{dBi} > 6\text{dBi}$, so the conducted power limit shall be reduced to $17 - (9 - 6) = 14\text{dBm}$

WHDI (40MHz)

CHAN.	CHAN. FREQ. (MHz)	POWER OUTPUT (dBm)				TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
38	5190	7.0	7.5	7.4	7.1	21.3	13.3	14	PASS
46	5230	6.5	7.0	7.8	7.8	21.5	13.3	14	PASS

Directional gain = $3\text{dBi} + 10\log(4) = 9\text{dBi} > 6\text{dBi}$, so the conducted power limit shall be reduced to $17 - (9 - 6) = 14\text{dBm}$

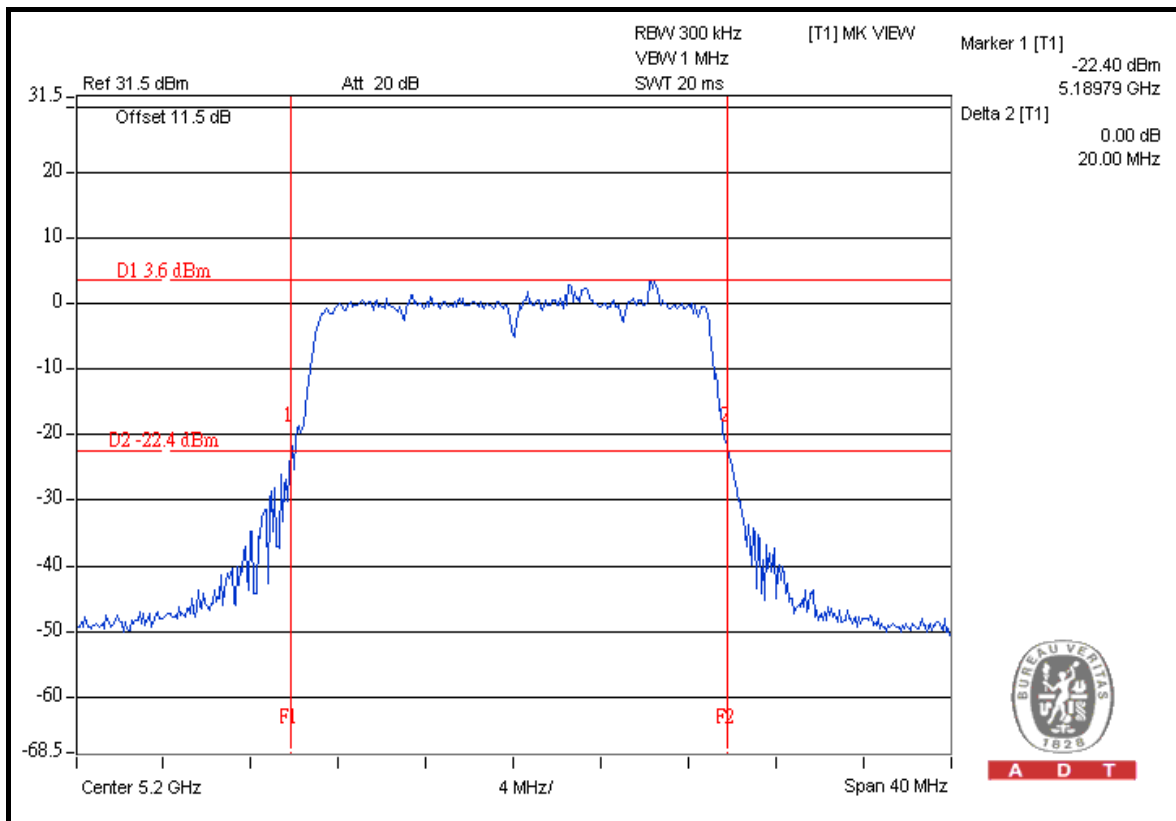


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26dB OCCUPIED BANDWIDTH: WHDI (20MHz)

CHAN.	CHAN. FREQ. (MHz)	26dBc OCCUPIED BANDWIDTH (MHz)				PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3	
36	5180	19.66	19.82	19.72	19.87	PASS
40	5200	19.76	19.82	20.00	19.80	PASS
48	5240	19.96	19.68	19.65	19.98	PASS

FOR CHAIN 2: CH 40



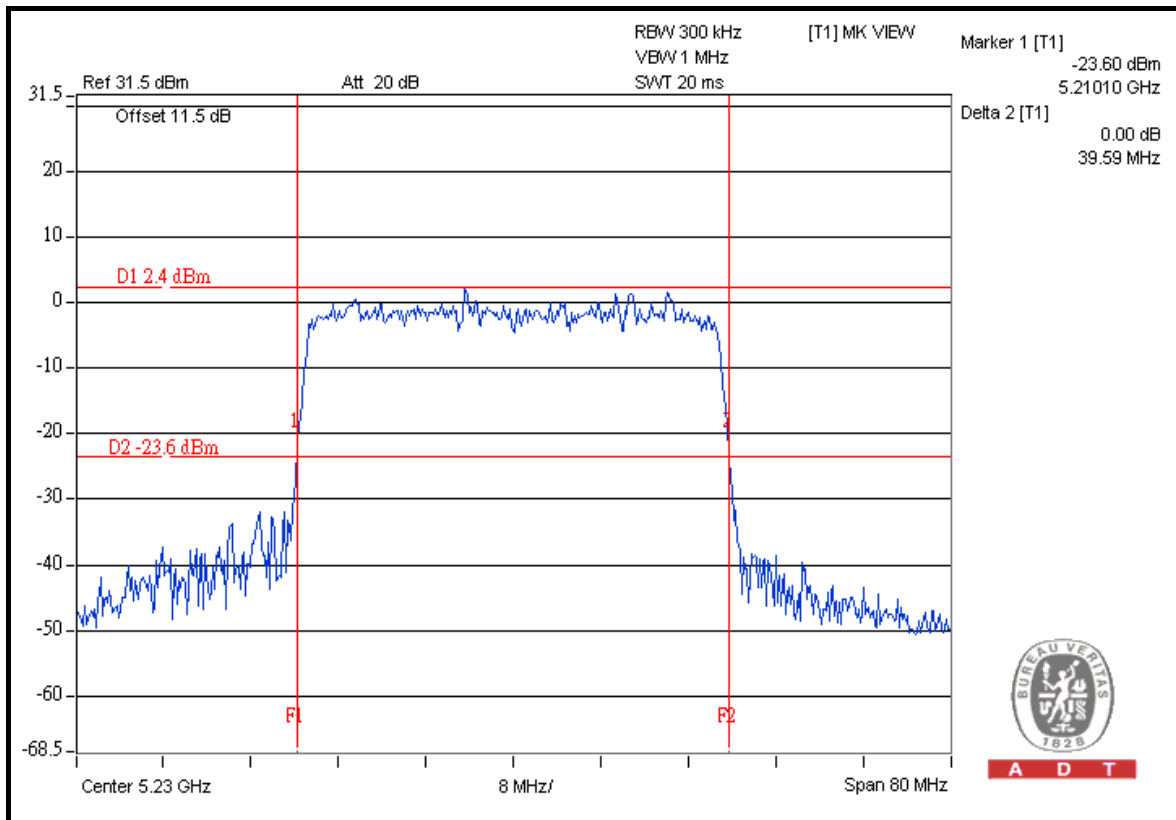


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WHDI (40MHz)

CHAN.	CHAN. FREQ. (MHz)	26dBc OCCUPIED BANDWIDTH (MHz)				PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3	
38	5190	39.56	39.44	39.52	39.43	PASS
46	5230	39.43	39.45	39.55	39.59	PASS

FOR CHAIN 3: CH 46



4.4 PEAK POWER EXCURSION MEASUREMENT

4.4.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

FREQUENCY BAND	LIMIT
5.15 ~ 5.25GHz	13dB

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
SPECTRUM ANALYZER R&S	FSP40	100039	Feb. 23, 2011	Feb. 22, 2012

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

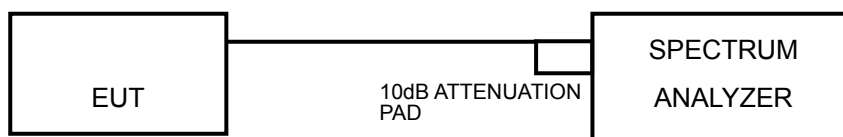
4.4.3 TEST PROCEDURE

- a. The transmitter output was connected to the spectrum analyzer.
- b. Set the spectrum bandwidth span to view the entire spectrum.
- c. Using peak detector and Max-hold function for Trace 1 (RB = 1MHz, VB = 3MHz) and 2 (RB = 1MHz, VB = 300kHz).
- d. The differences between Trace1 and Trace 2 in any 1MHz band at f1 to f2 range were recorded and showed to another trace.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.



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4.4.7 TEST RESULTS

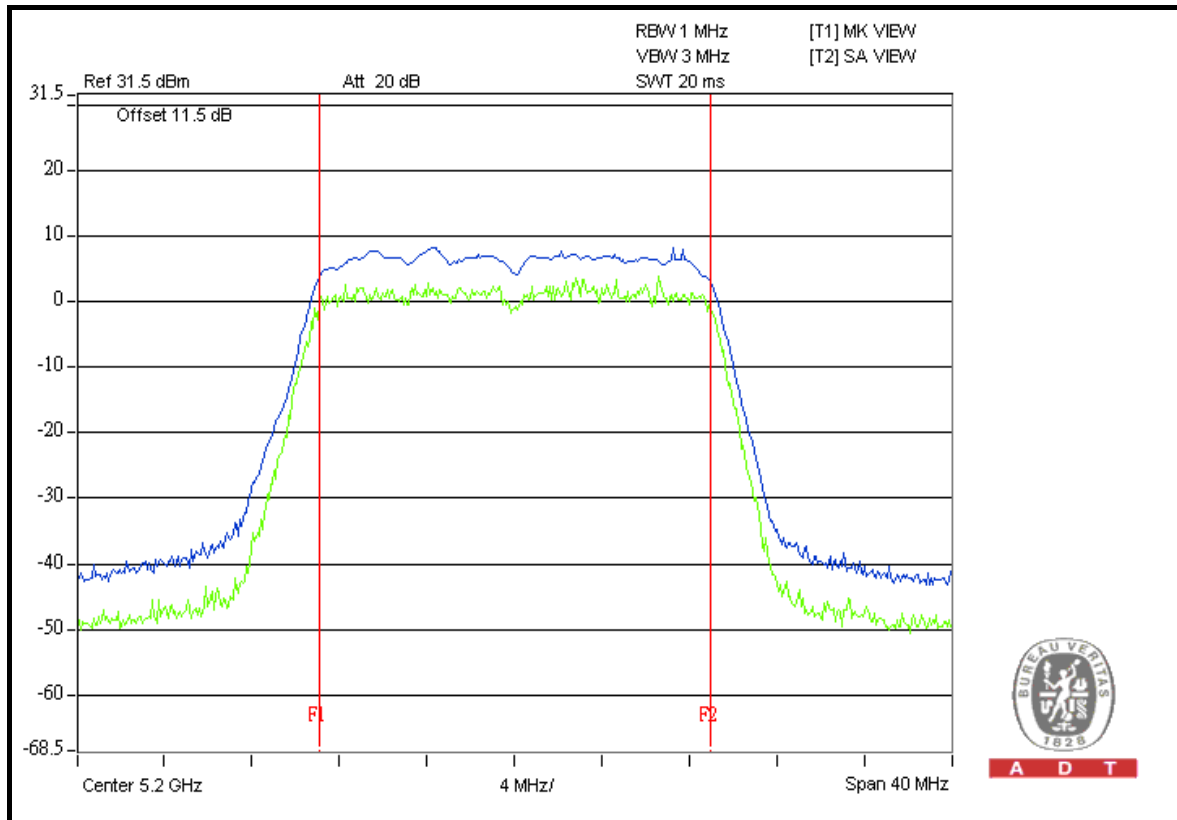
802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER EXCURSION (dB)				PEAK TO AVERAGE EXCURSION LIMIT (dB)	PASS/ FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3		
36	5180	7.77	7.41	7.67	7.04	13	PASS
40	5200	8.22	7.97	8.00	7.48	13	PASS
48	5240	7.61	8.18	7.90	7.60	13	PASS

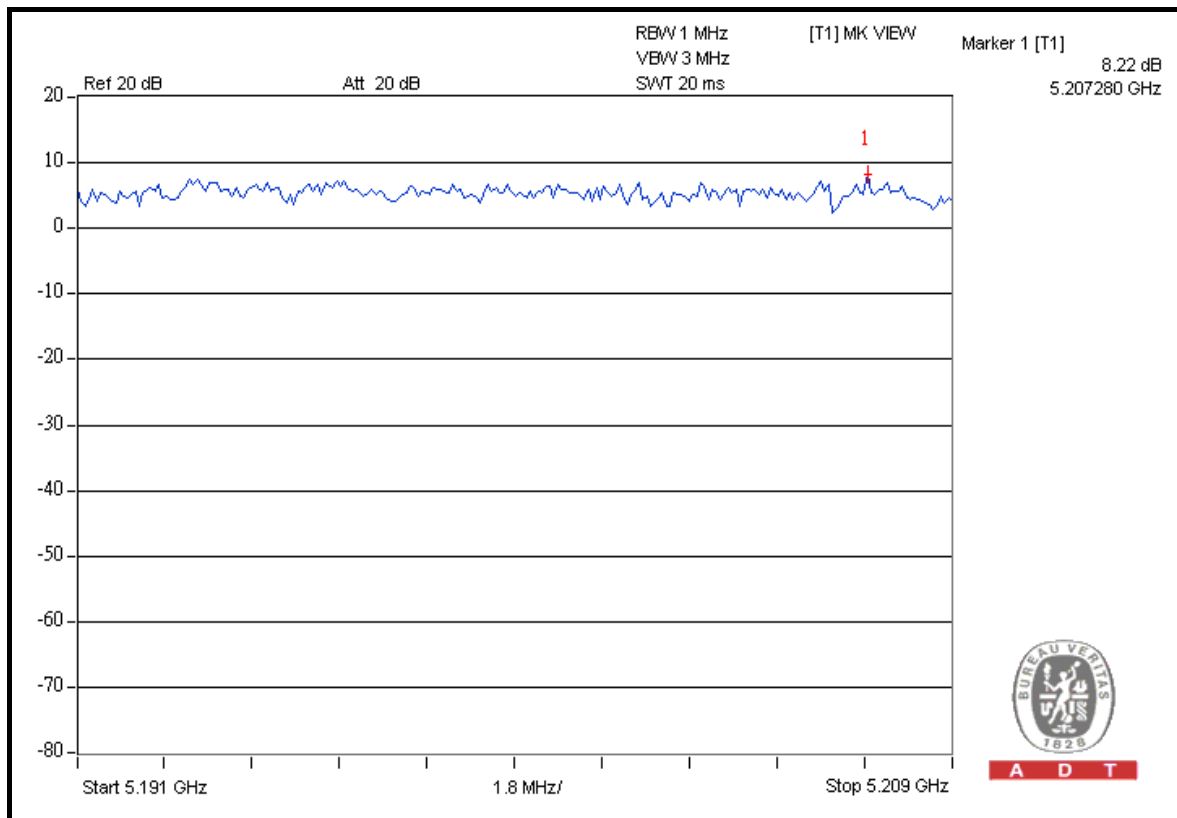


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FOR CHAIN 0: CH 40



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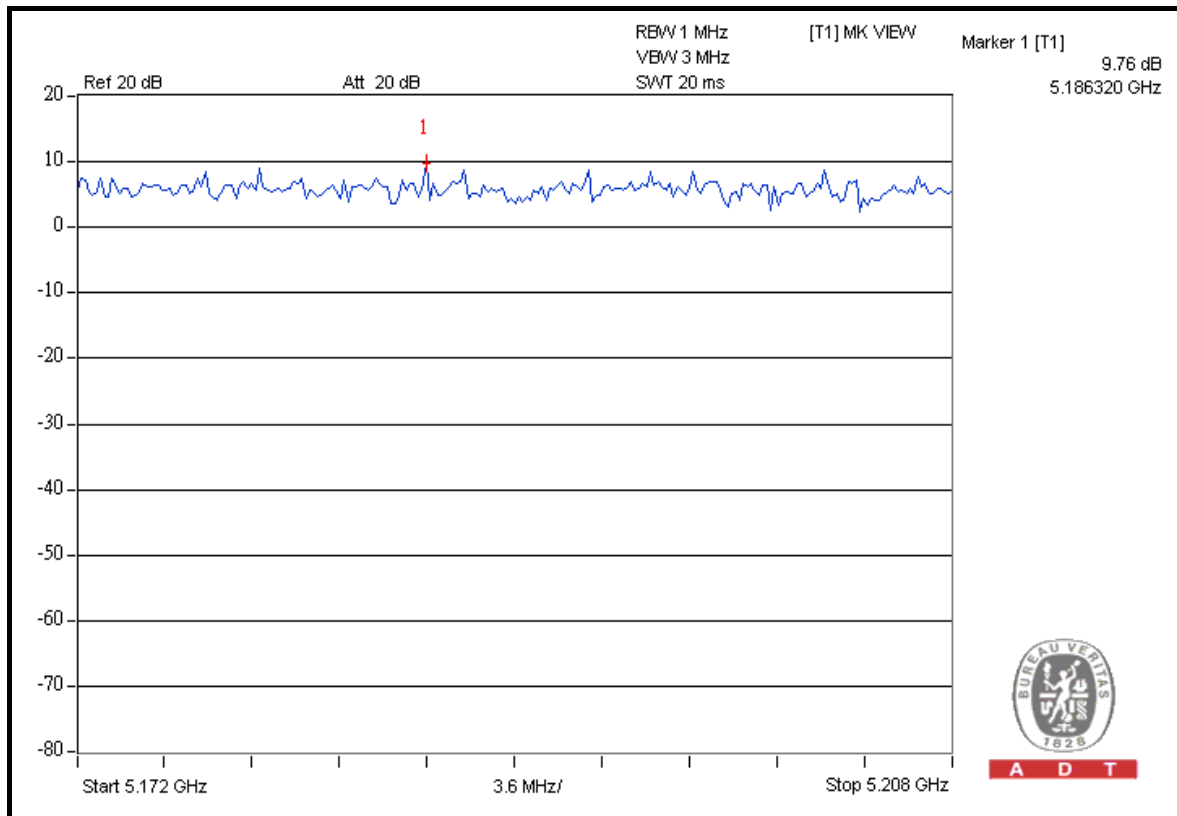
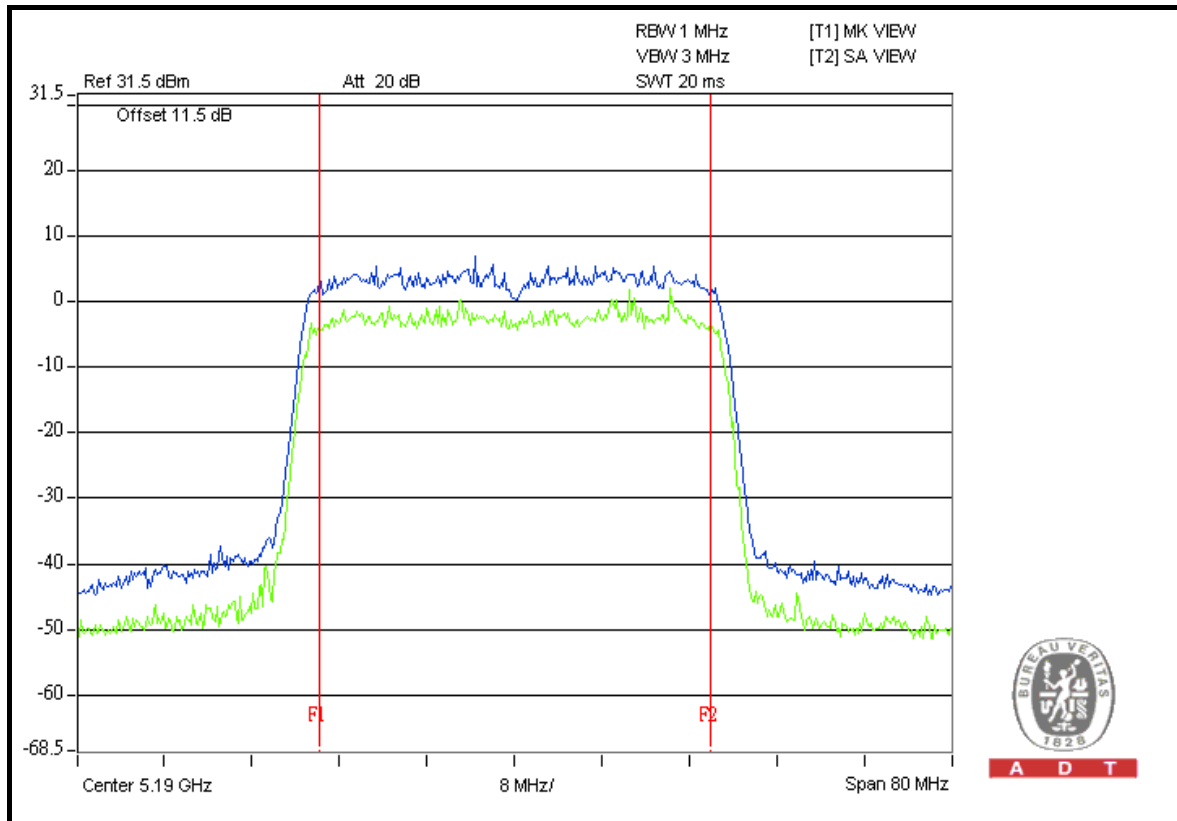
802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER EXCURSION (dB)				PEAK TO AVERAGE EXCURSION LIMIT (dB)	PASS/ FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3		
38	5190	8.60	8.55	8.41	9.76	13	PASS
46	5230	8.74	9.04	9.20	9.52	13	PASS



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FOR CHAIN 3: CH 38





4.5 PEAK POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

FREQUENCY BAND	LIMIT
5.15 ~ 5.25GHz	4dBm

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
SPECTRUM ANALYZER R&S	FSP40	100039	Feb. 23, 2011	Feb. 22, 2012

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

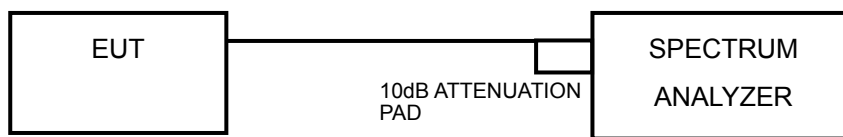
4.5.3 TEST PROCEDURES

- a. The transmitter output was connected to the spectrum analyzer.
- b. Set RBW = 1MHz, VBW = 3MHz. The PPSD is the highest level found across the emission in any 1MHz band.
- c. Follow method 1 of KDB 662911 D01 Multiple Transmitter Output v01 to calculate total power density of 4 TX port.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITIONS

Same as 4.3.6.



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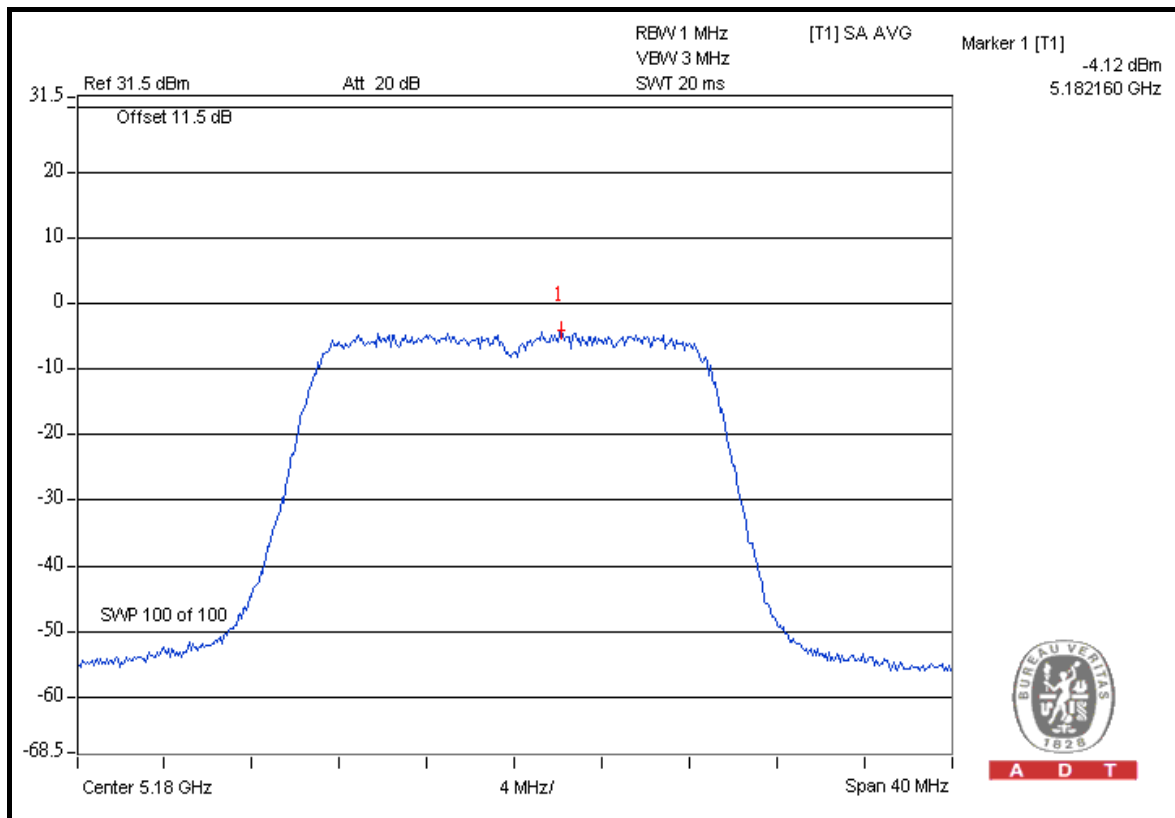
4.5.7 TEST RESULTS

WHDI (20MHz)

CHAN.	CHAN. FREQ. (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)				TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3			
36	5180	-4.9	-5.5	-4.1	-4.9	0.5	1	PASS
40	5200	-4.8	-5.8	-5.1	-4.8	0.4	1	PASS
48	5240	-4.7	-4.6	-4.3	-4.6	0.8	1	PASS

Directional gain = $3\text{dBi} + 10\log(4) = 9\text{dBi} > 6\text{dBi}$, so the conducted power limit shall be reduced to $4 - (9 - 6) = 1\text{dBm}$

FOR CHAIN 2: CH 36





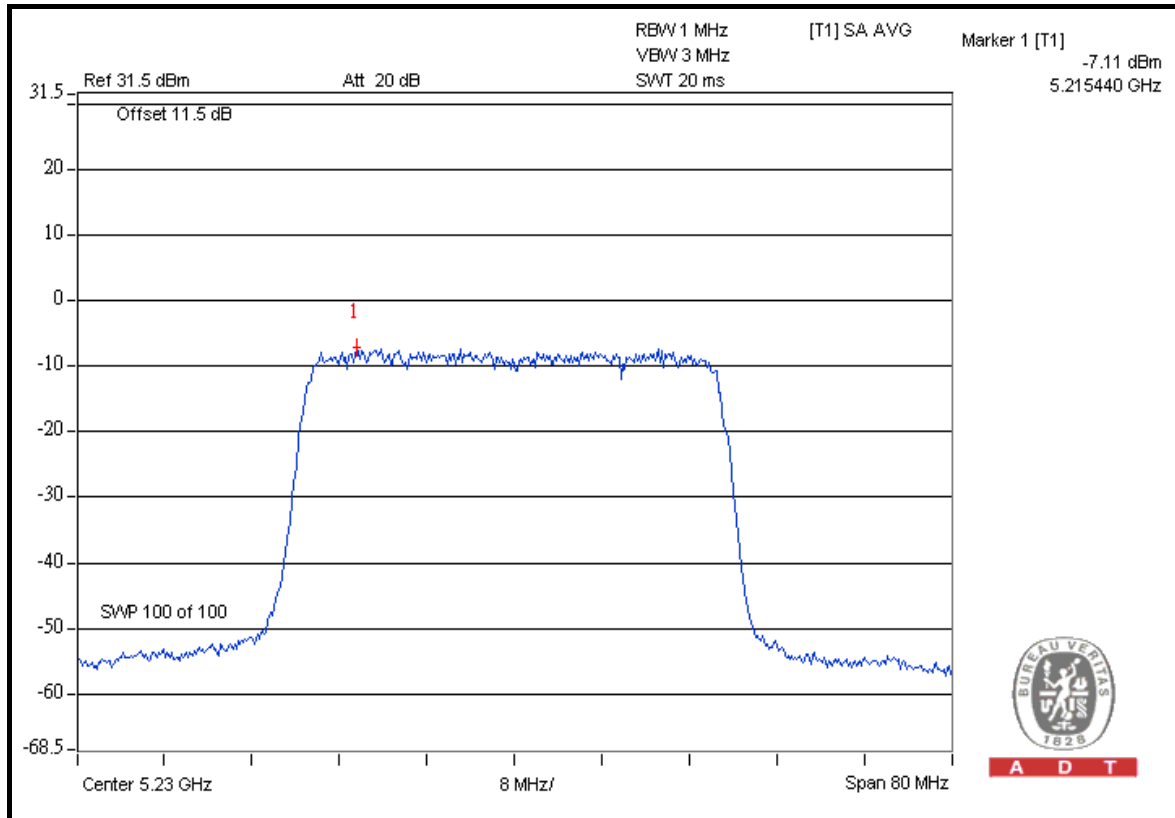
A D T

WHDI (40MHz)

CHAN.	CHAN. FREQ. (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)				TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3			
38	5190	-7.8	-7.3	-7.6	-8.2	-2.3	1	PASS
46	5230	-8.2	-8.0	-7.1	-7.2	-2.3	1	PASS

Directional gain = $3\text{dBi} + 10\log(4) = 9\text{dBi} > 6\text{dBi}$, so the conducted power limit shall be reduced to $4 - (9 - 6) = 1\text{dBm}$

FOR CHAIN 2: CH 46



A D T

4.6 FREQUENCY STABILITY

4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within +/- 0.02% of the operating frequency over a temperature variation of -20 degrees to 55 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
SPECTRUM ANALYZER R&S	FSP40	100039	Feb. 23, 2011	Feb. 22, 2012
WIT STANDARD TEMPERATURE AND HUMIDITY CHAMBER	TH-4S-C	W981030	Jun. 15, 2011	Jun. 14, 2012

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

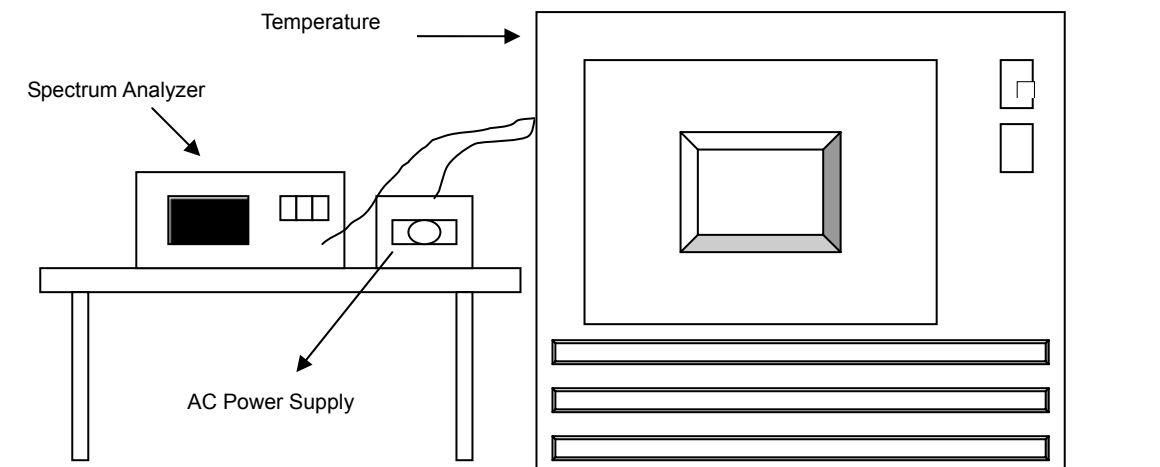
4.6.3 TEST PROCEDURE

- a. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- b. Turn the EUT on and couple its output to a spectrum analyzer.
- c. Turn the EUT off and set the chamber to the highest temperature specified.
- d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation.

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

Same as Item 4.1.6.



4.6.7 TEST RESULTS

FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5200MHz									
TEMP. ()	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	ppm	(MHz)	ppm	(MHz)	ppm	(MHz)	ppm
55	110.0	5199.988477	-2.216	5199.988593	-2.194	5199.988542	-2.203	5199.988931	-2.129
50	110.0	5199.989305	-2.057	5199.989404	-2.038	5199.989758	-1.970	5199.989528	-2.014
40	110.0	5199.990460	-1.835	5199.990529	-1.821	5199.990295	-1.866	5199.990572	-1.813
30	110.0	5199.991702	-1.596	5199.991878	-1.562	5199.992100	-1.519	5199.991923	-1.553
20	110.0	5199.993600	-1.231	5199.994040	-1.146	5199.993484	-1.253	5199.993842	-1.184
10	110.0	5199.991323	-1.669	5199.991617	-1.612	5199.991198	-1.693	5199.991466	-1.641
0	110.0	5199.990445	-1.837	5199.990771	-1.775	5199.990365	-1.853	5199.990373	-1.851
-10	110.0	5199.989667	-1.987	5199.989602	-2.000	5199.989851	-1.952	5199.990055	-1.912
-20	110.0	5199.987652	-2.375	5199.987951	-2.317	5199.987535	-2.397	5199.987713	-2.363
-30	110.0	5199.987776	-2.351	5199.988000	-2.308	5199.988162	-2.277	5199.988305	-2.249

FREQUENCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5200MHz									
TEMP. ()	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	ppm	(MHz)	ppm	(MHz)	ppm	(MHz)	ppm
20	93.5	5199.992179	-1.504	5199.991717	-1.593	5199.991908	-1.556	5199.991921	-1.554
	110.0	5199.993600	-1.231	5199.994040	-1.146	5199.993484	-1.253	5199.993842	-1.184
	126.5	5199.991685	-1.599	5199.991681	-1.600	5199.991407	-1.652	5199.991694	-1.597



4.7 BAND EDGES MEASUREMENT

4.7.1 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Dec. 27, 2010	Dec. 26, 2011
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Feb. 23, 2011	Feb. 22, 2012
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Apr. 12, 2011	Apr. 11, 2012
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-408	Jan. 06, 2011	Jan. 05, 2012
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Dec. 27, 2010	Dec. 26, 2011
Preamplifier Agilent	8449B	3008A01961	Nov. 02, 2010	Nov. 01, 2011
Preamplifier Agilent	8447D	2944A10738	Nov. 02, 2010	Nov. 01, 2011
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250792/4	Jan. 27, 2011	Jan. 26, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	283397/4	Jan. 27, 2011	Jan. 26, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Jan. 27, 2011	Jan. 26, 2012
Software ADT.	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table ADT.	TT100.	TT93021704	NA	NA
Turn Table Controller ADT.	SC100.	SC93021704	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Nov. 03, 2010	Nov. 02, 2011

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.7.2 TEST PROCEDURE

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. Set both RBW and VBW of spectrum analyzer to 1MHz and 3MHz with suitable frequency span including 100MHz bandwidth from band edge. The band edges was measured and recorded.

NOTE: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz

4.7.3 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

4.7.4 TEST RESULTS

For signals in the restricted bands above and below the 5.15 to 5.25GHz allocated band a measurement was made of the amplitude of the spurious emissions with respect to the intentional signals. The relative amplitude, in dBc, was applied to the average and peak field strength of the intentional signal made on the OATS to calculate the field strength of the unintentional signals.

The spectrum plots (Peak RBW = 1MHz, VBW = 3MHz) are attached on the following pages.

WHDI (20MHz)

RESTRICT BAND (4500 ~ 5150 MHz)

FREQUENCY (MHz)	FUNDAMENTAL EMISSION (dBuV/m)	DELTA (dB)	MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m)	LIMIT (dBuV/m)
5180.00 (PK)	110.6	47.72	62.88	74.00
5180.00 (AV)	96.30	48.41	47.89	54.00

RESTRICT BAND (5350 ~ 5460 MHz)

FREQUENCY (MHz)	FUNDAMENTAL EMISSION (dBuV/m)	DELTA (dB)	MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m)	LIMIT (dBuV/m)
5240.00 (PK)	110.7	47.39	63.31	74.00
5240.00 (AV)	96.7	47.80	48.90	54.00

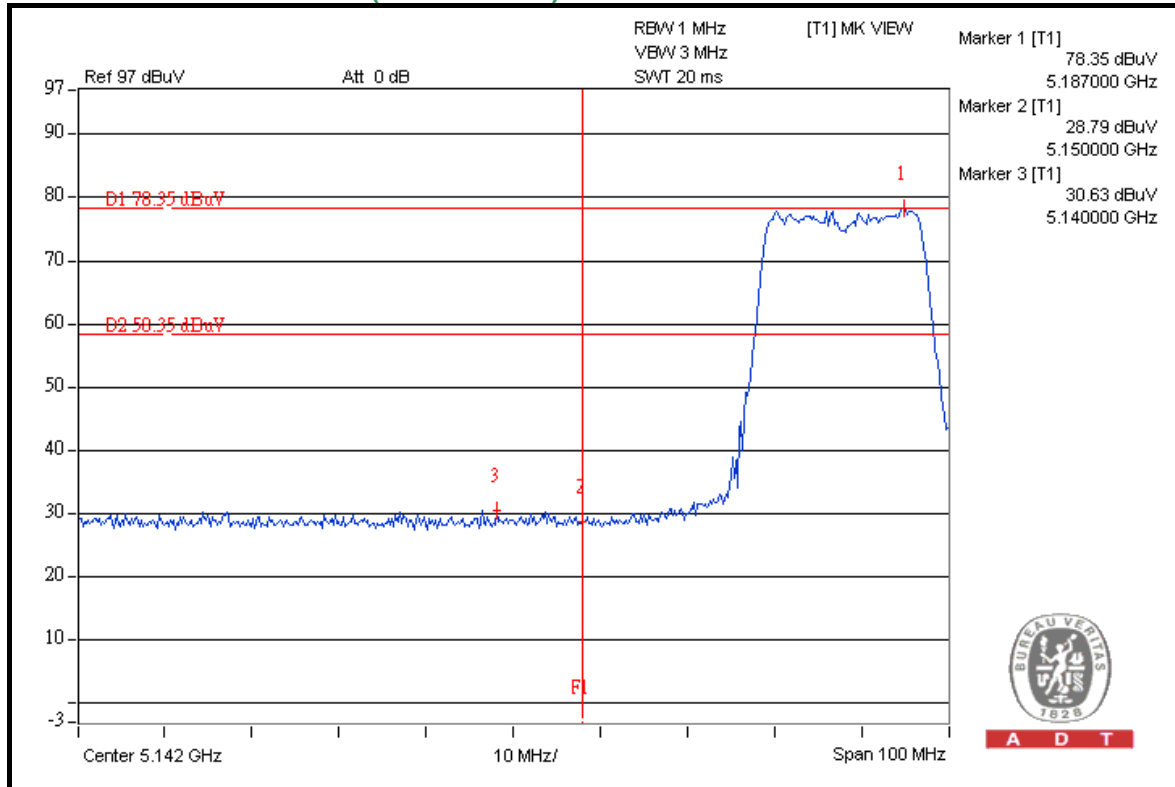
NOTE:

- Delta = Amplitude between the peak of the fundamental and the peak of the band edge emission. Please check following 2 pages.
- Maximum field strength in restrict band = Fundamental emission – Delta.

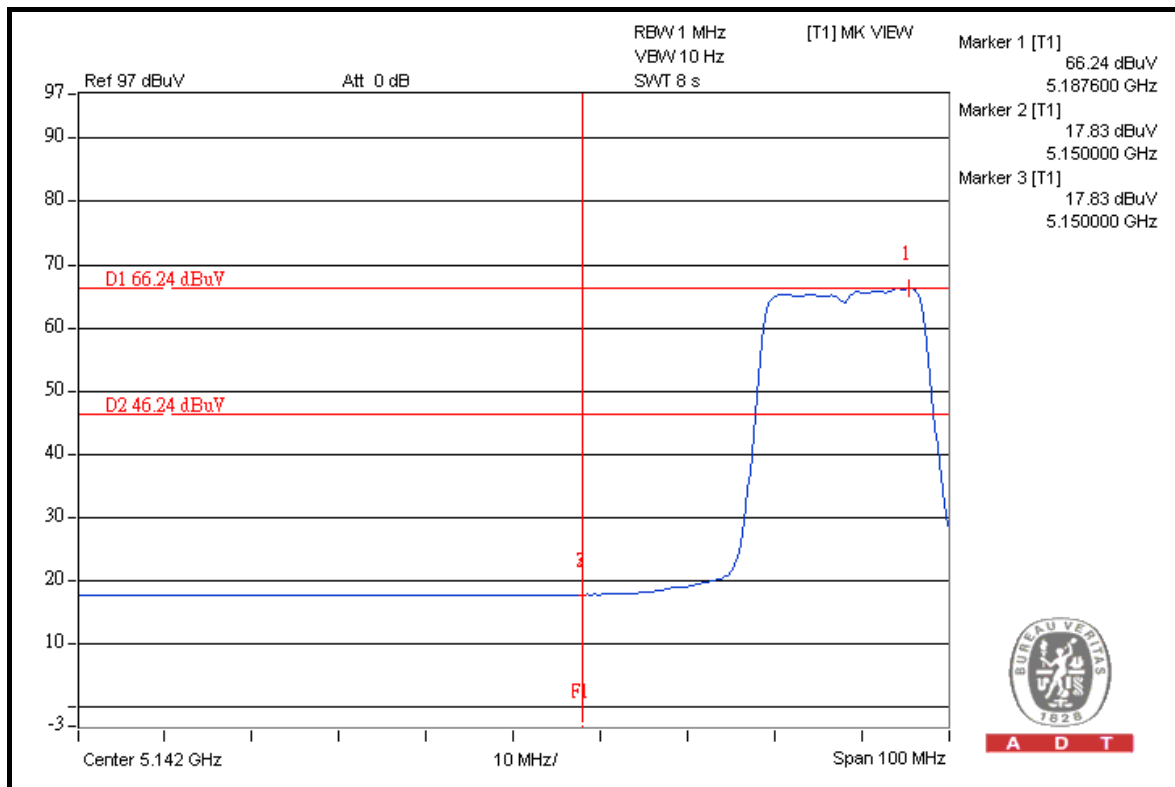


A D T

FOR RADIATED MEASURED (4 CHAINS ON)



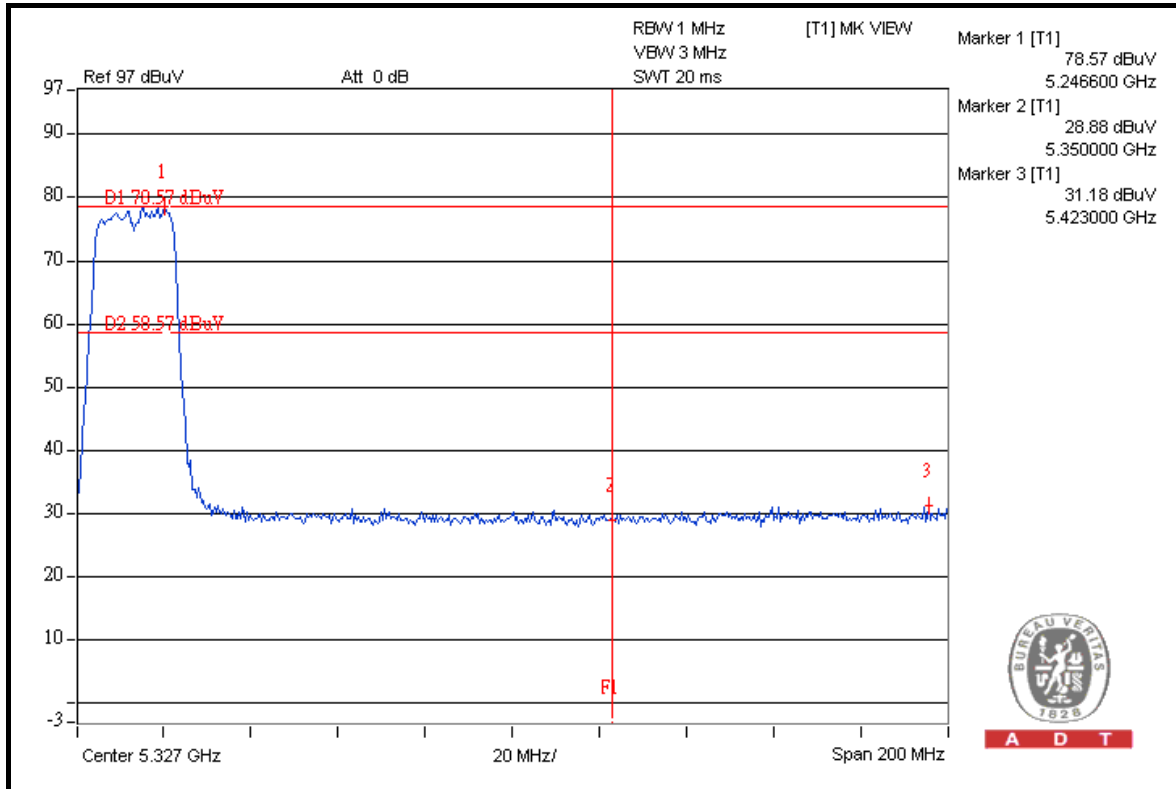
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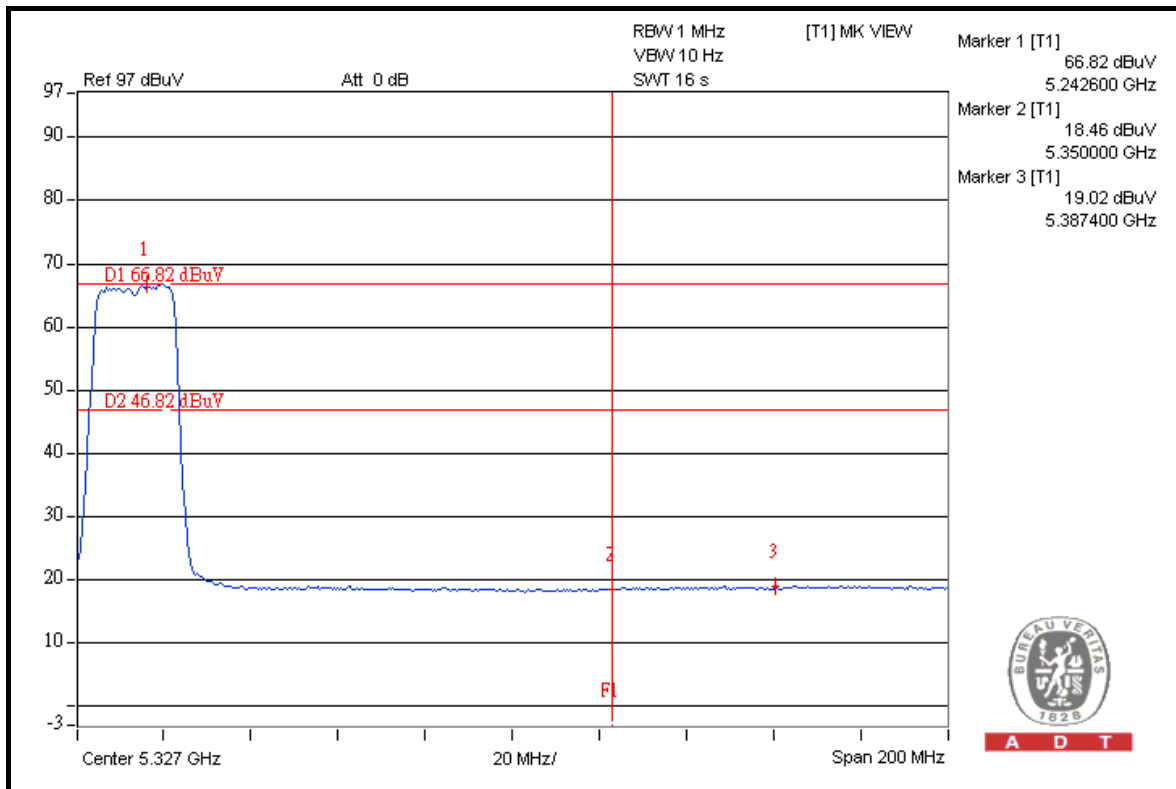
A D T



A D T



A D T

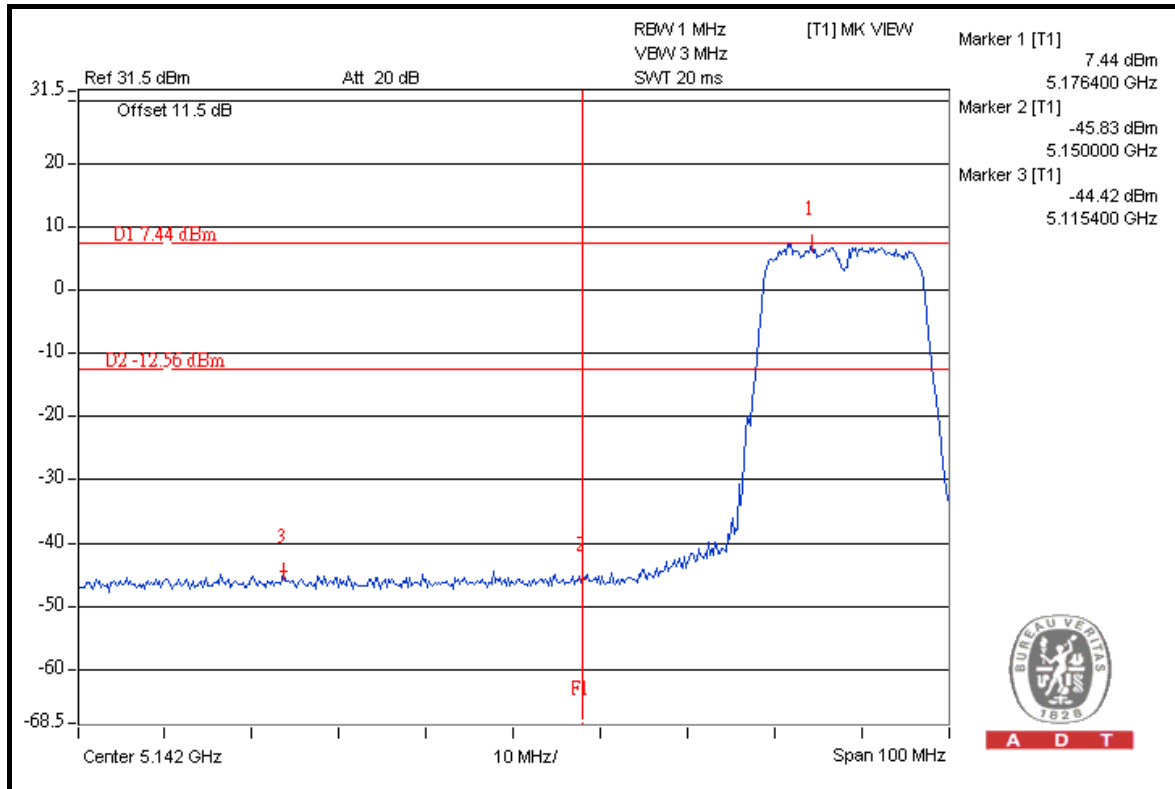


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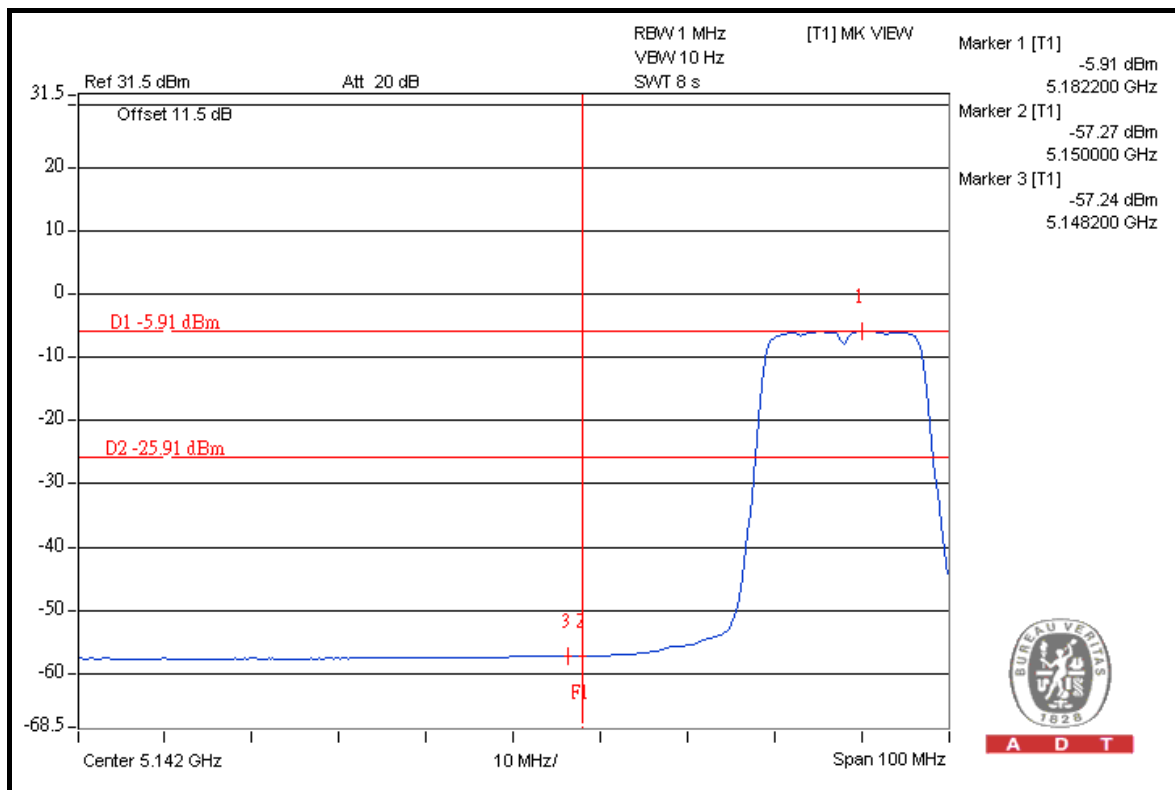


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FOR CONDUCTED MEASURED CHAIN 0



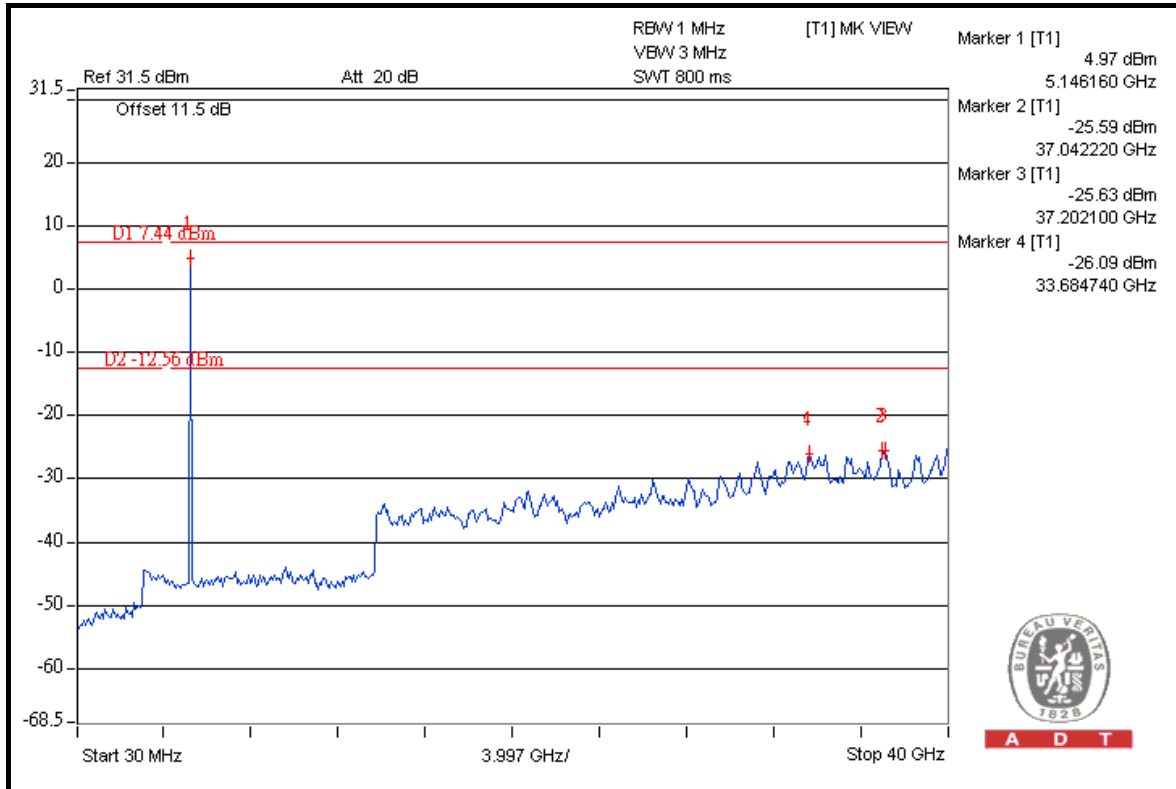
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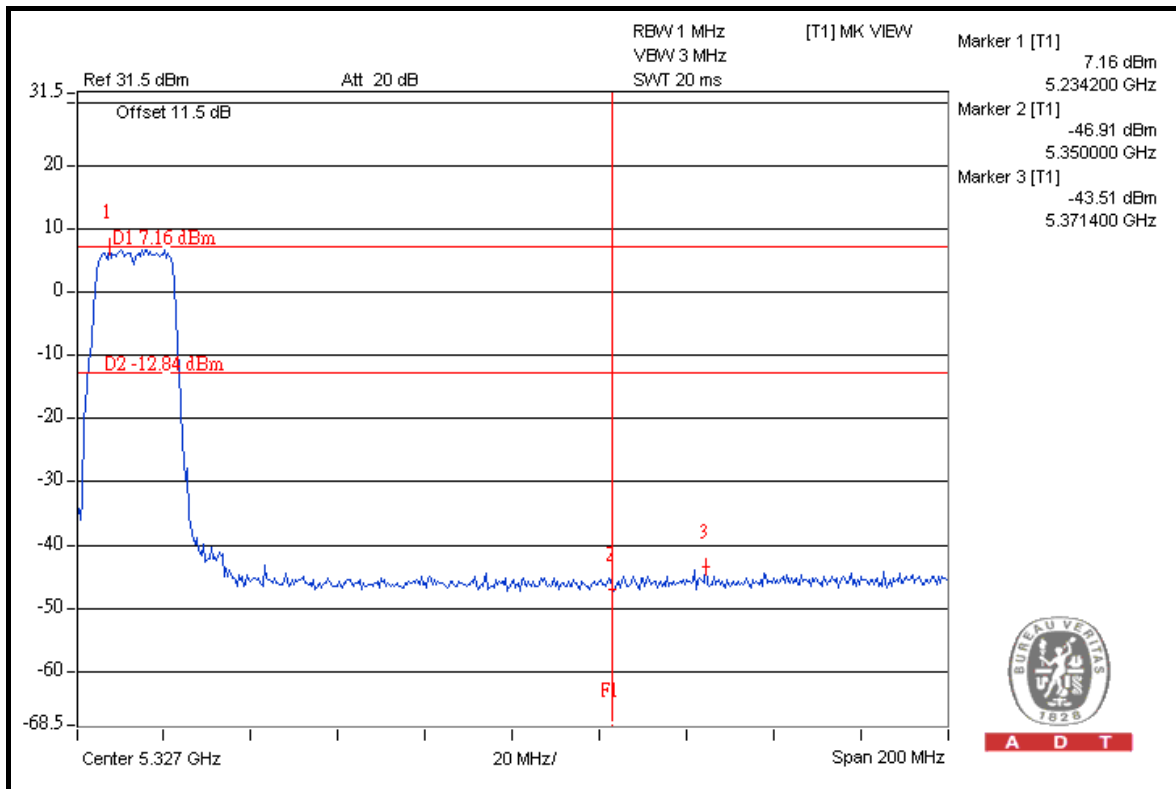
A D T



A D T



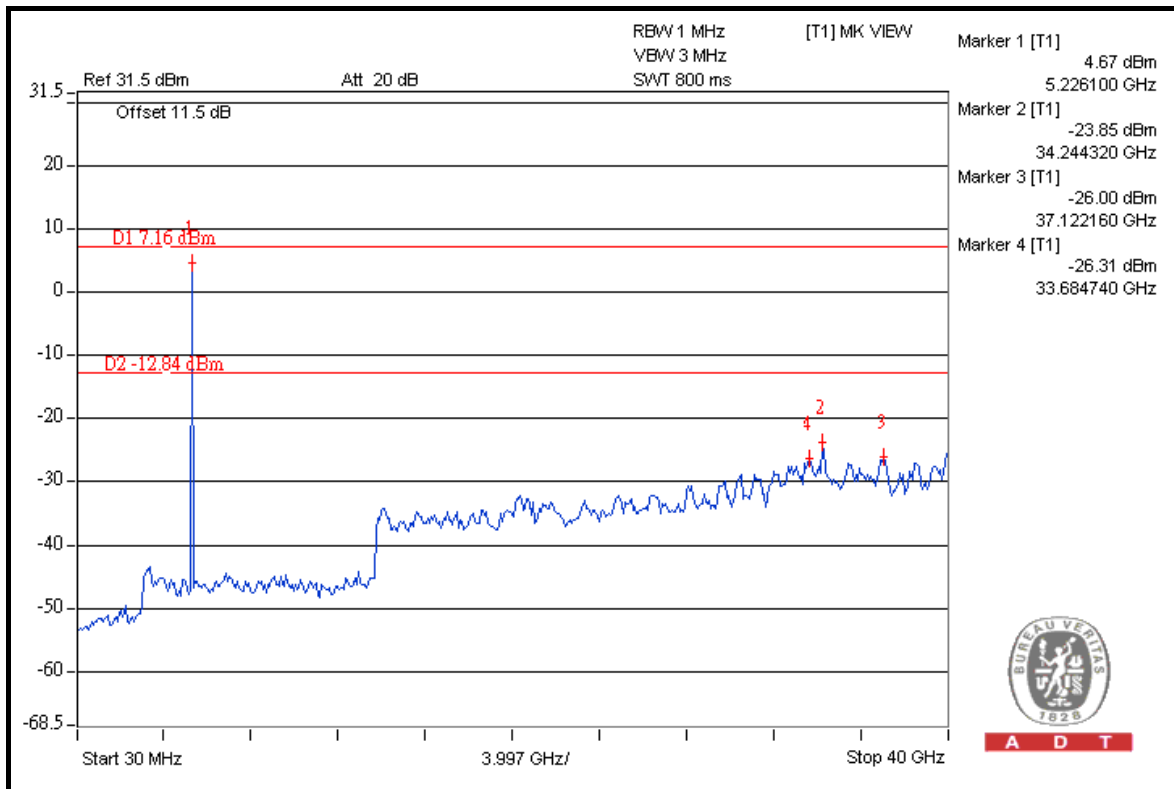
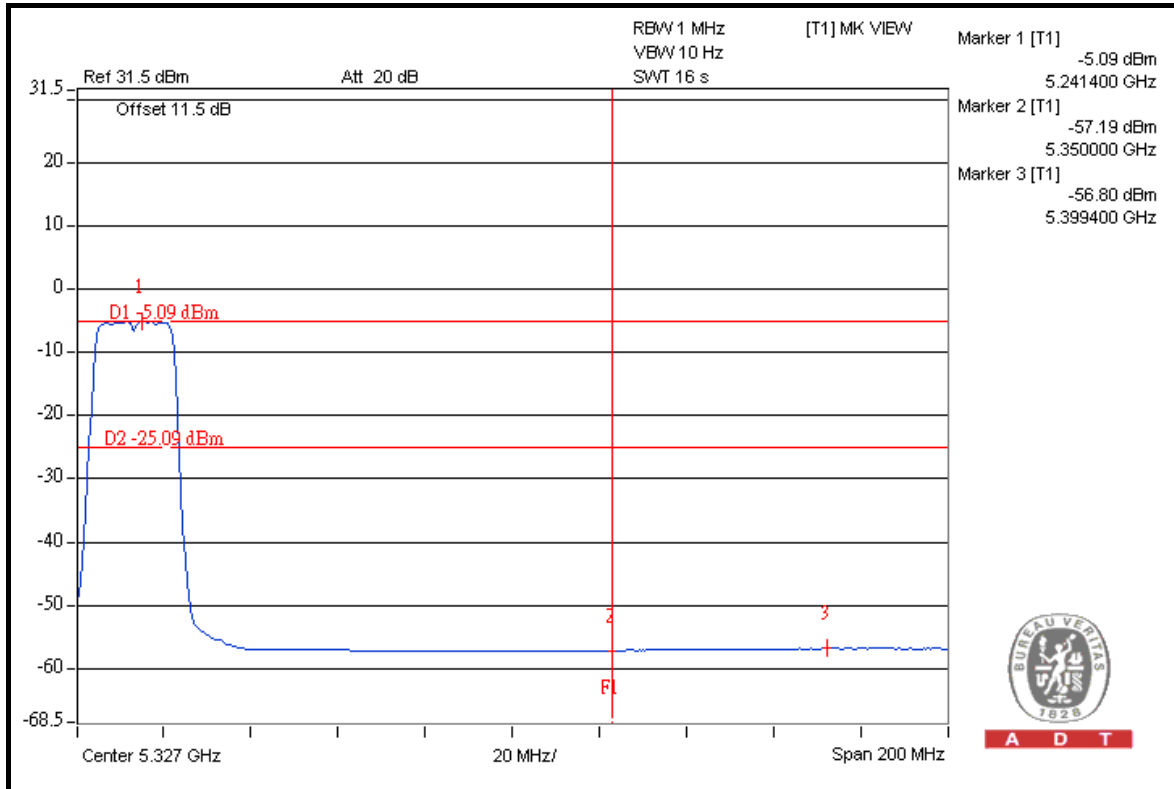
A D T



A D T



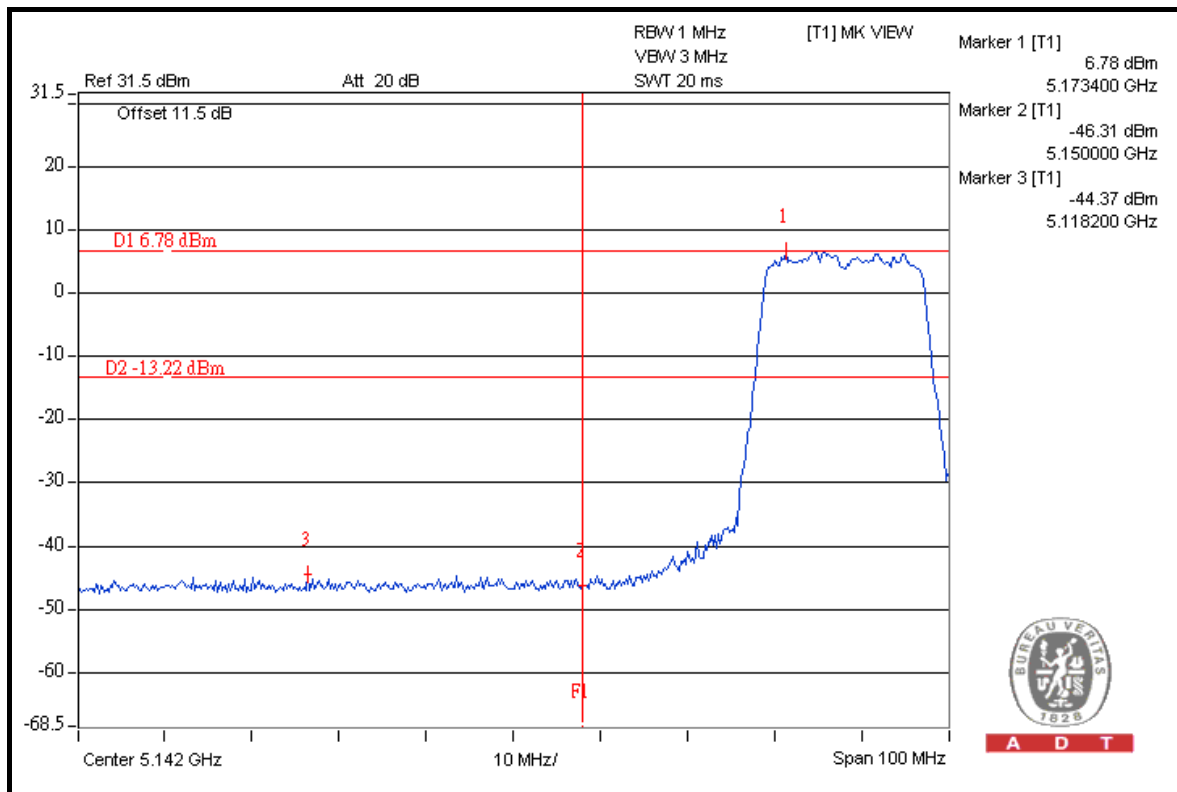
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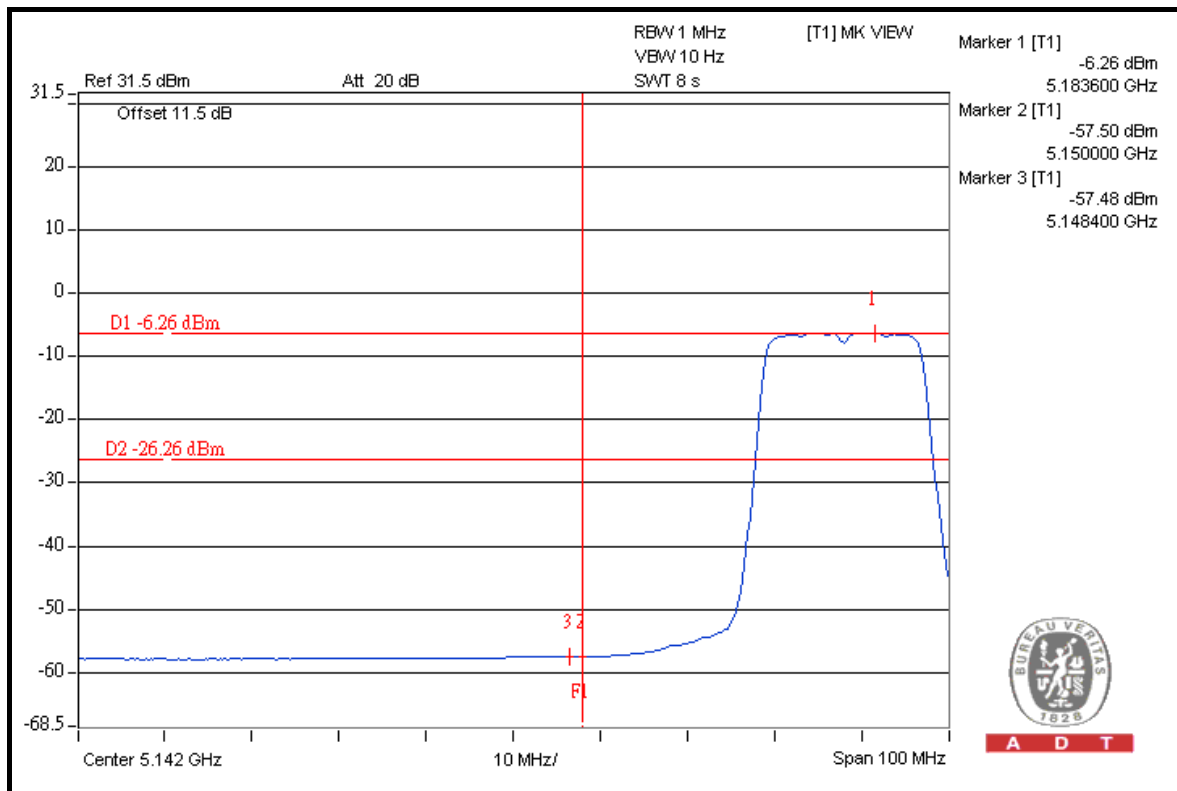


A D T

CHAIN 1



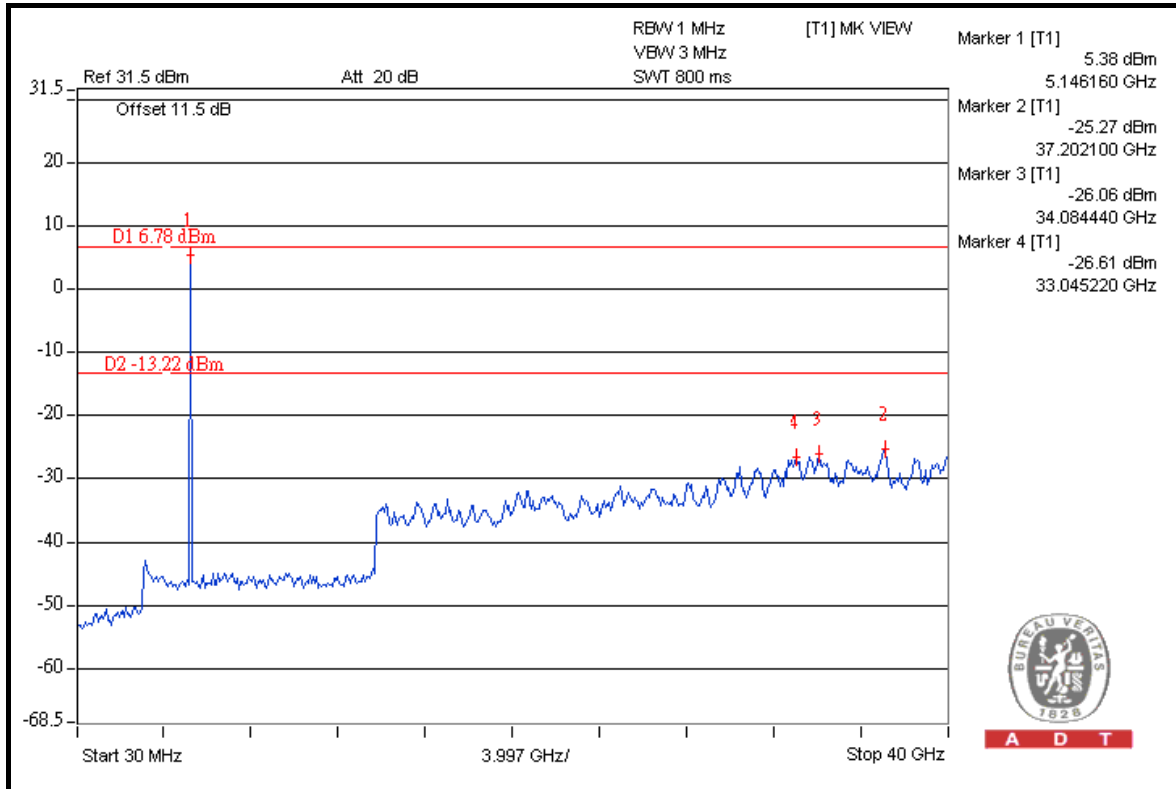
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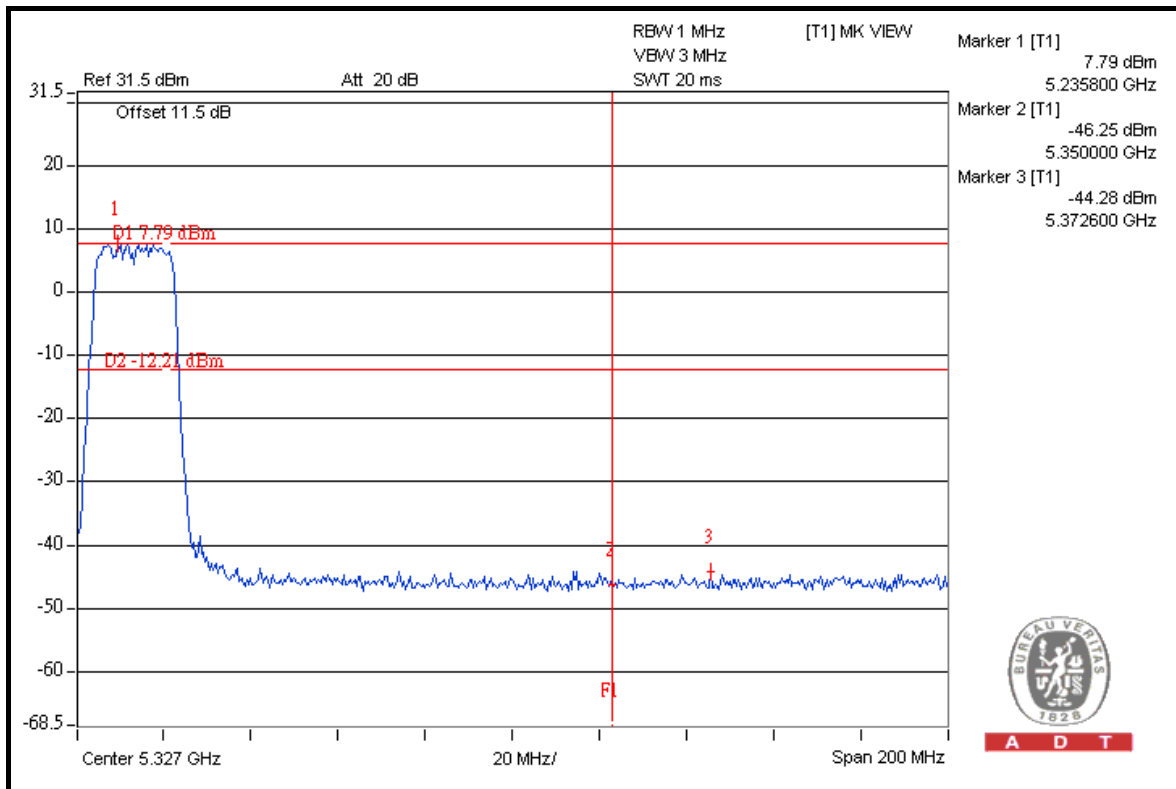
A D T



A D T



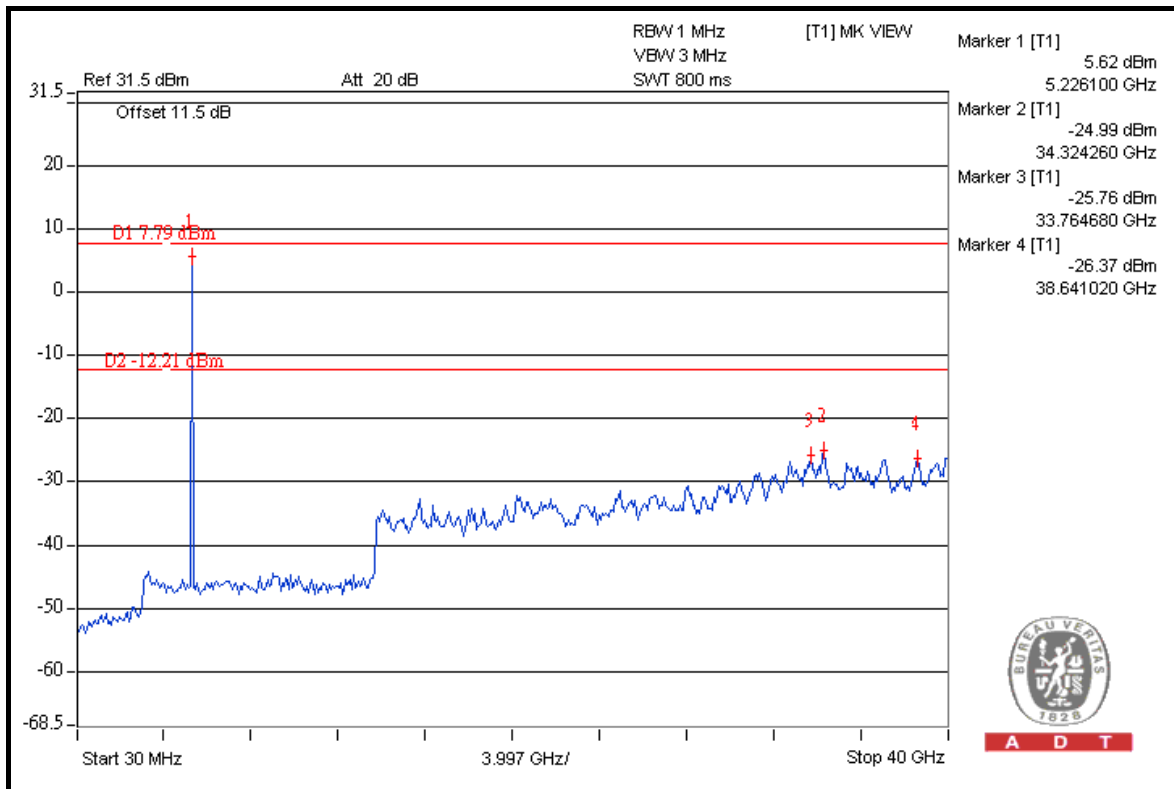
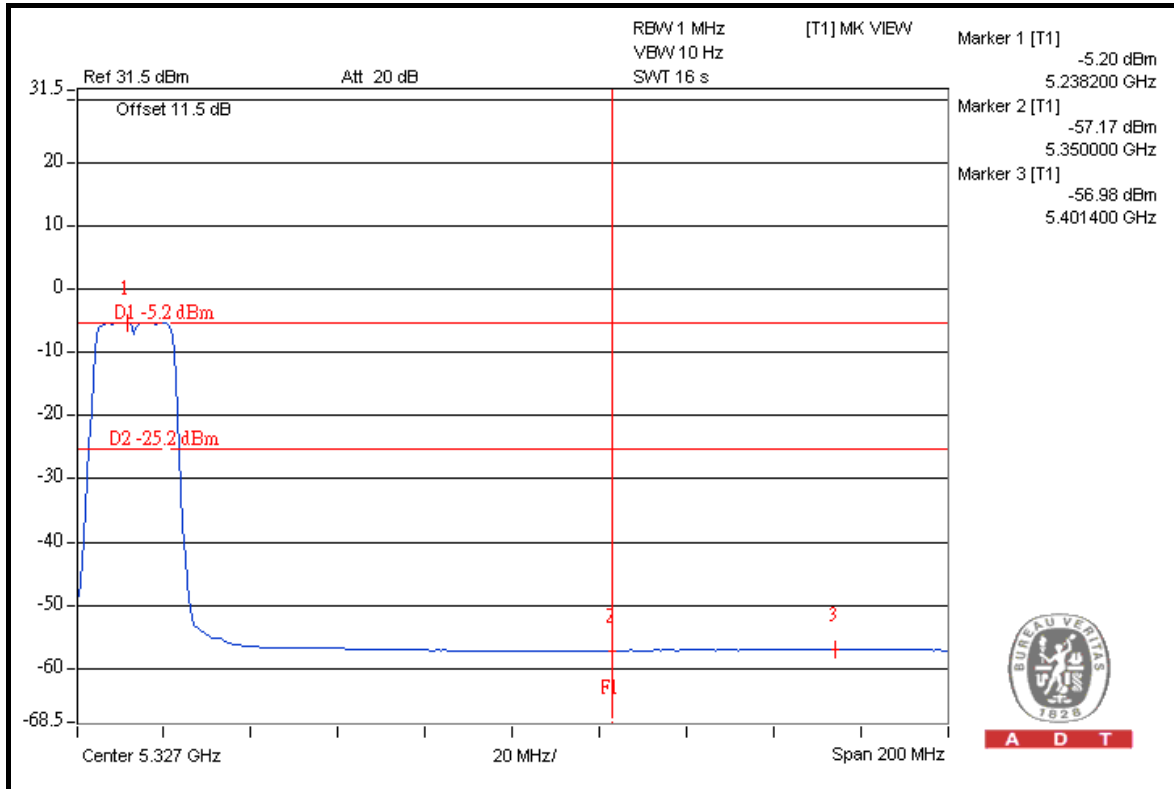
A D T



A D T



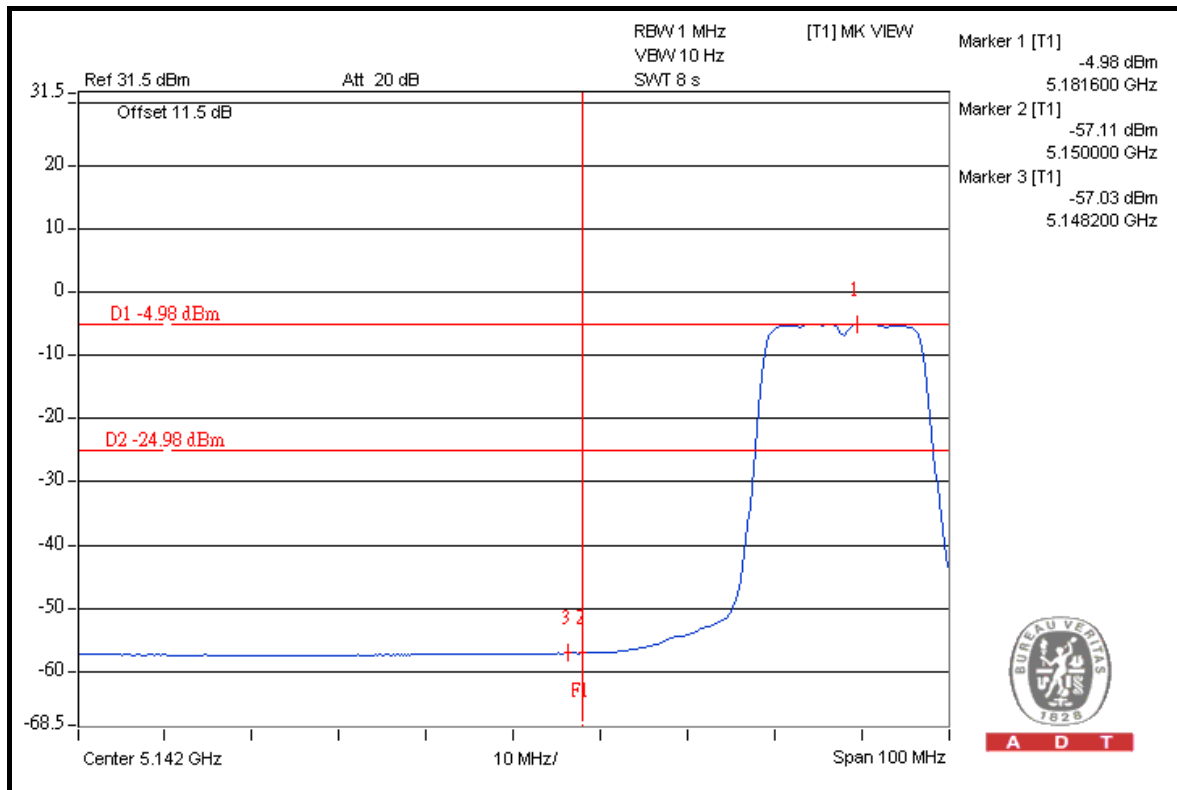
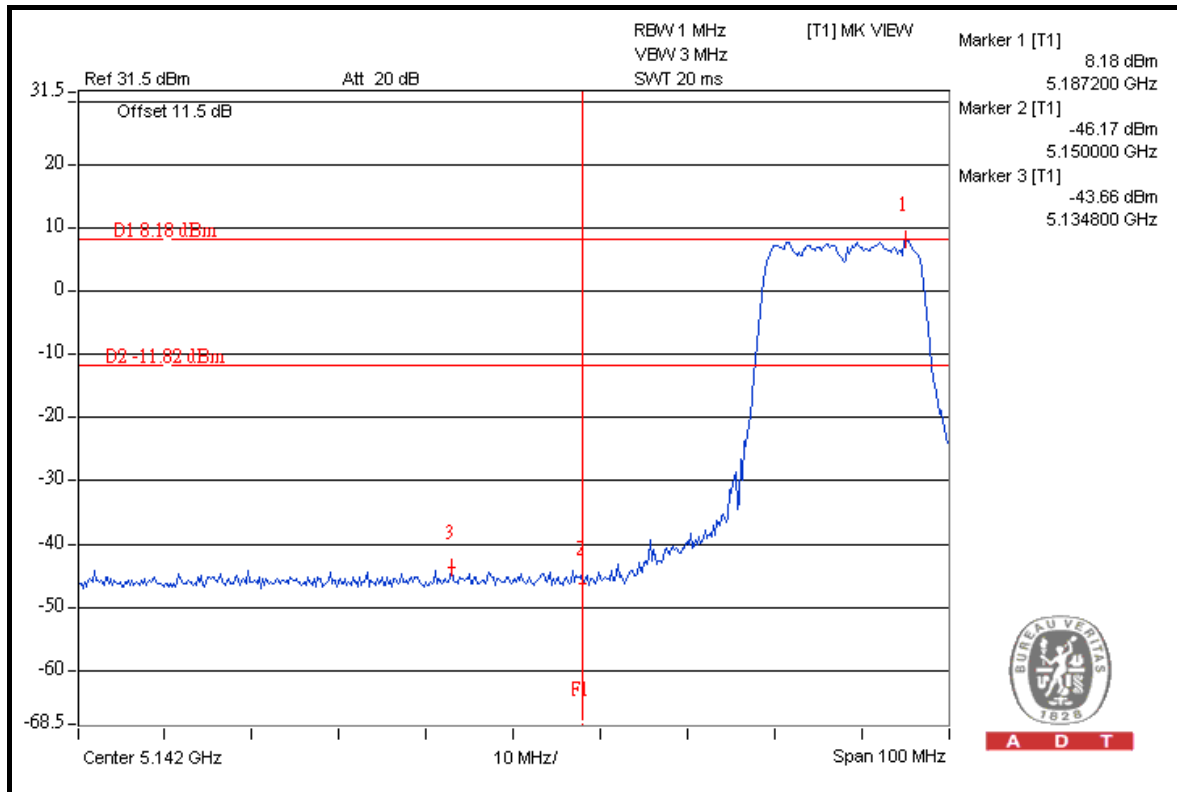
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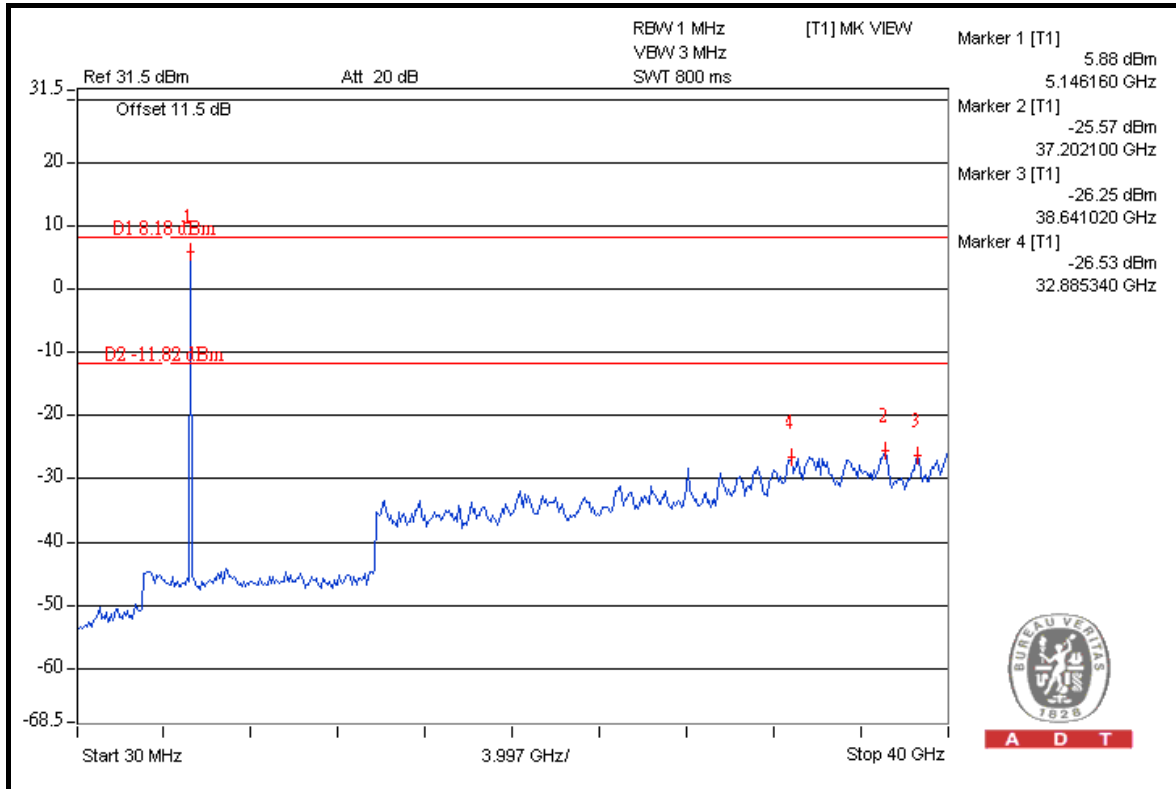
A D T

CHAIN 2

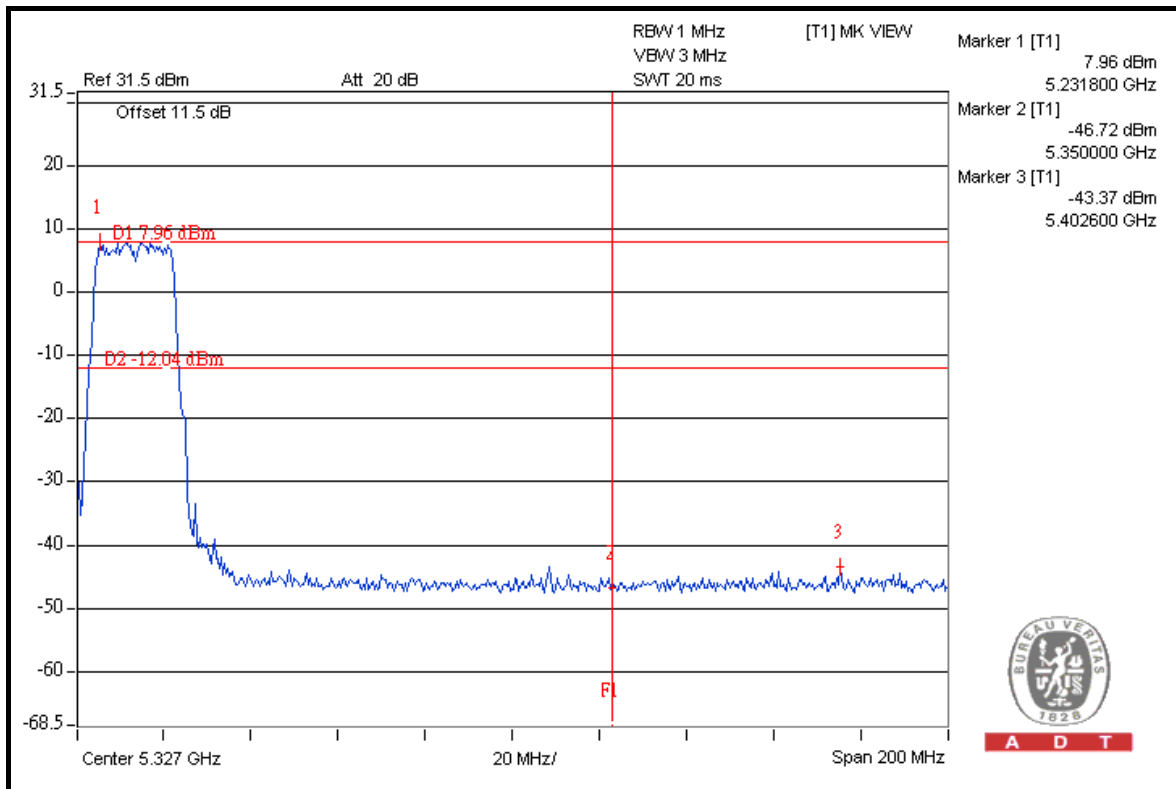




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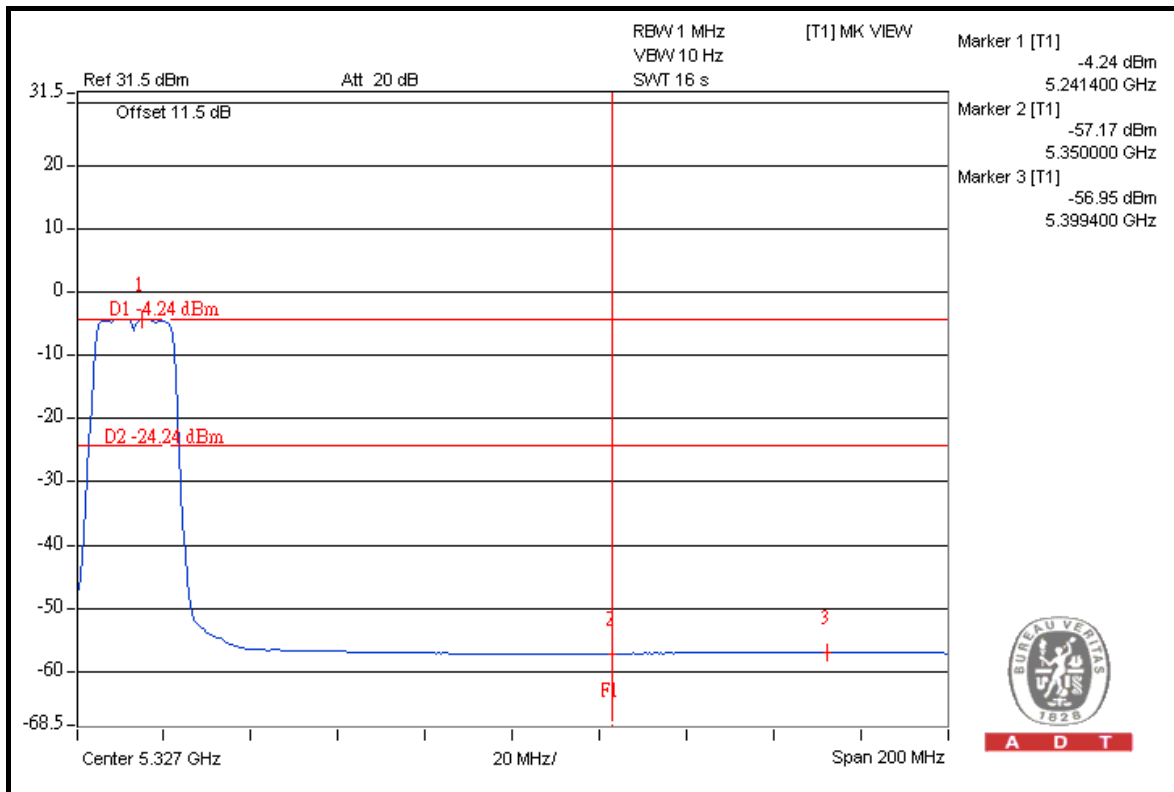
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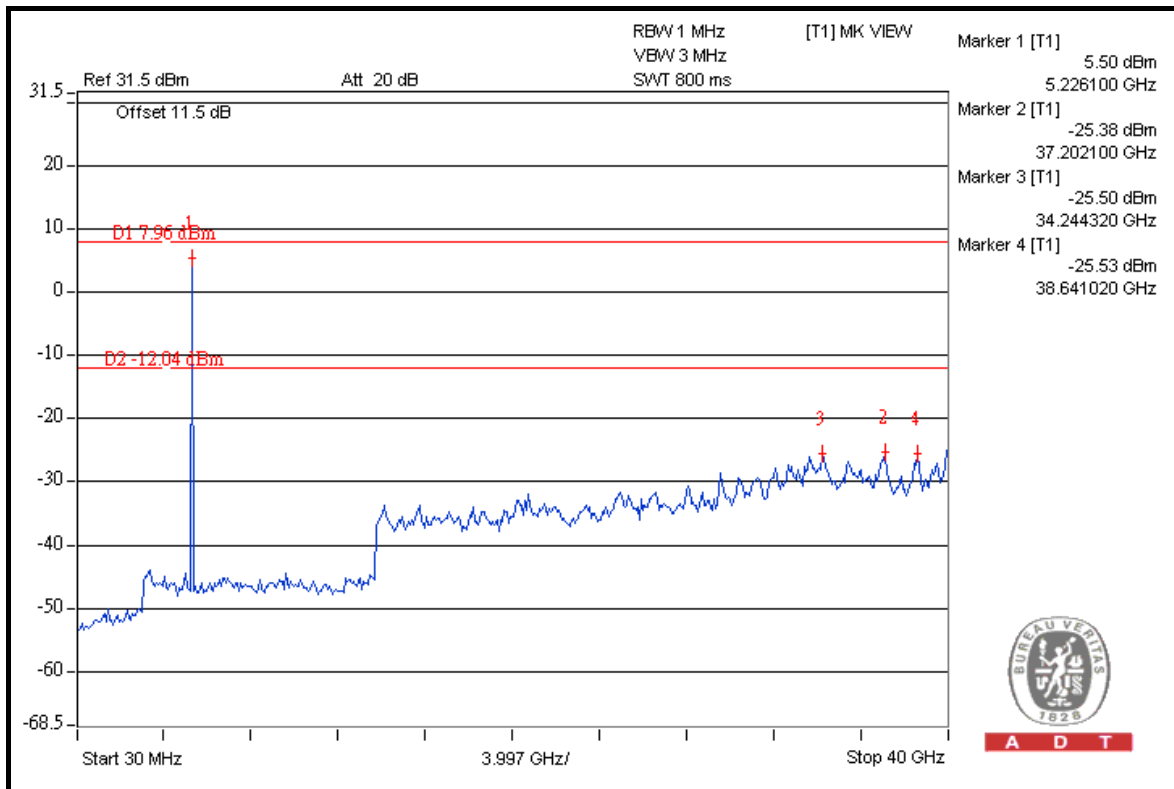
A D T



A D T



A D T

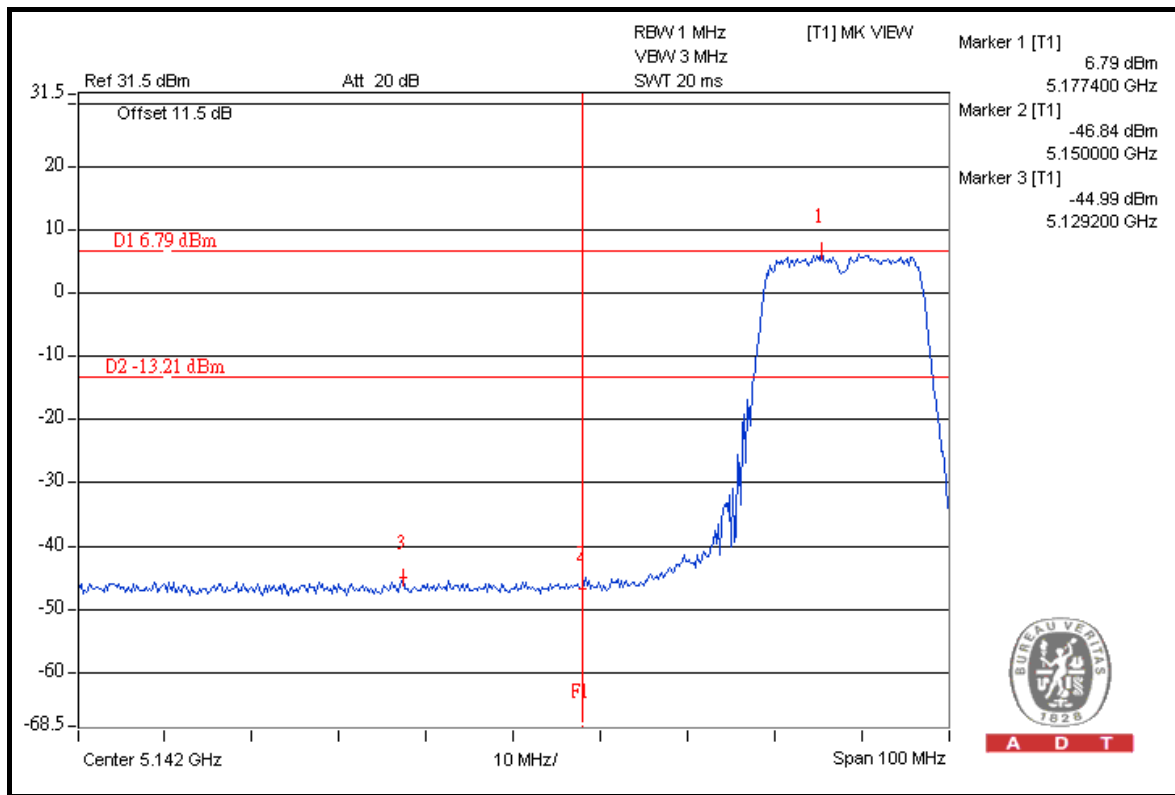


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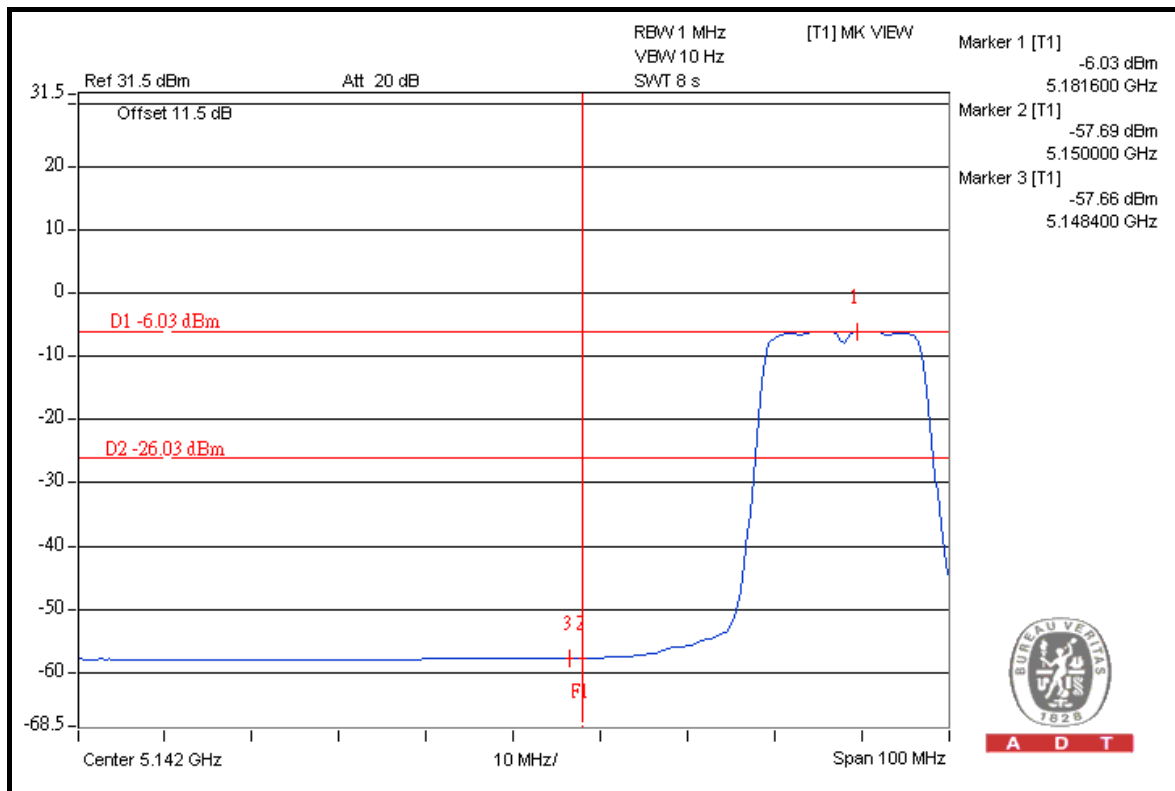


A D T

CHAIN 3



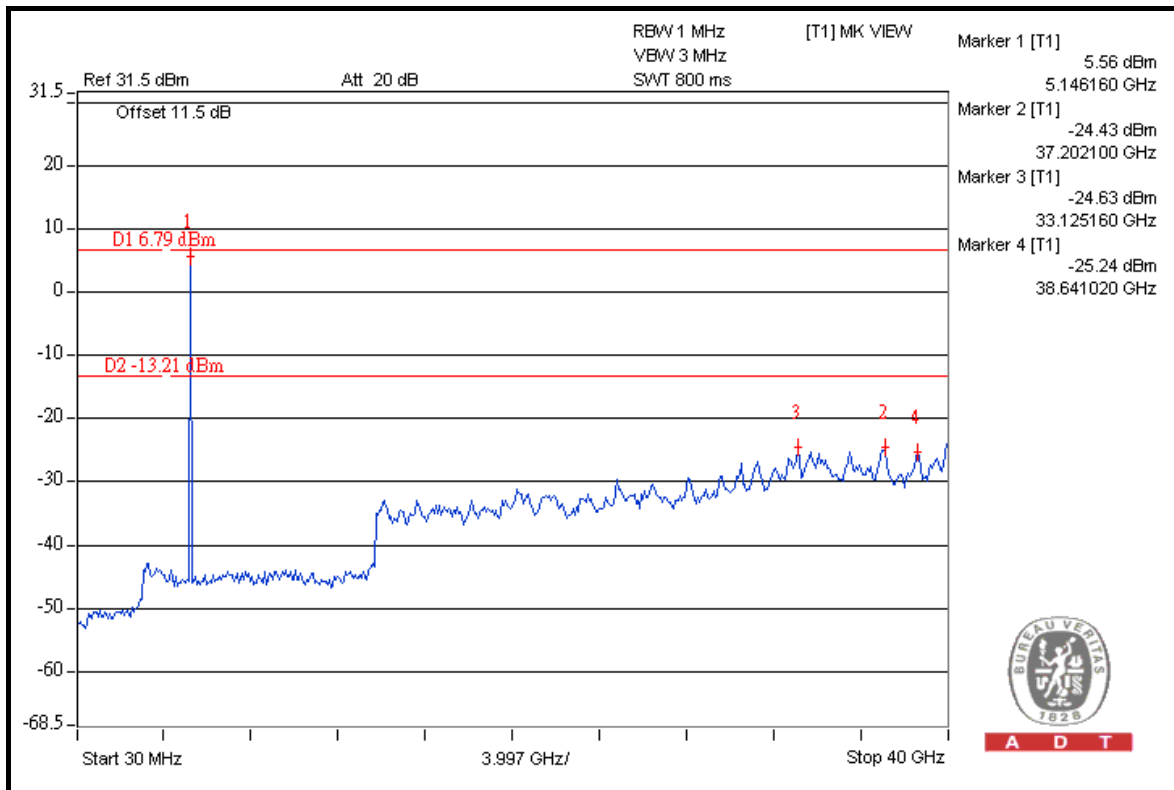
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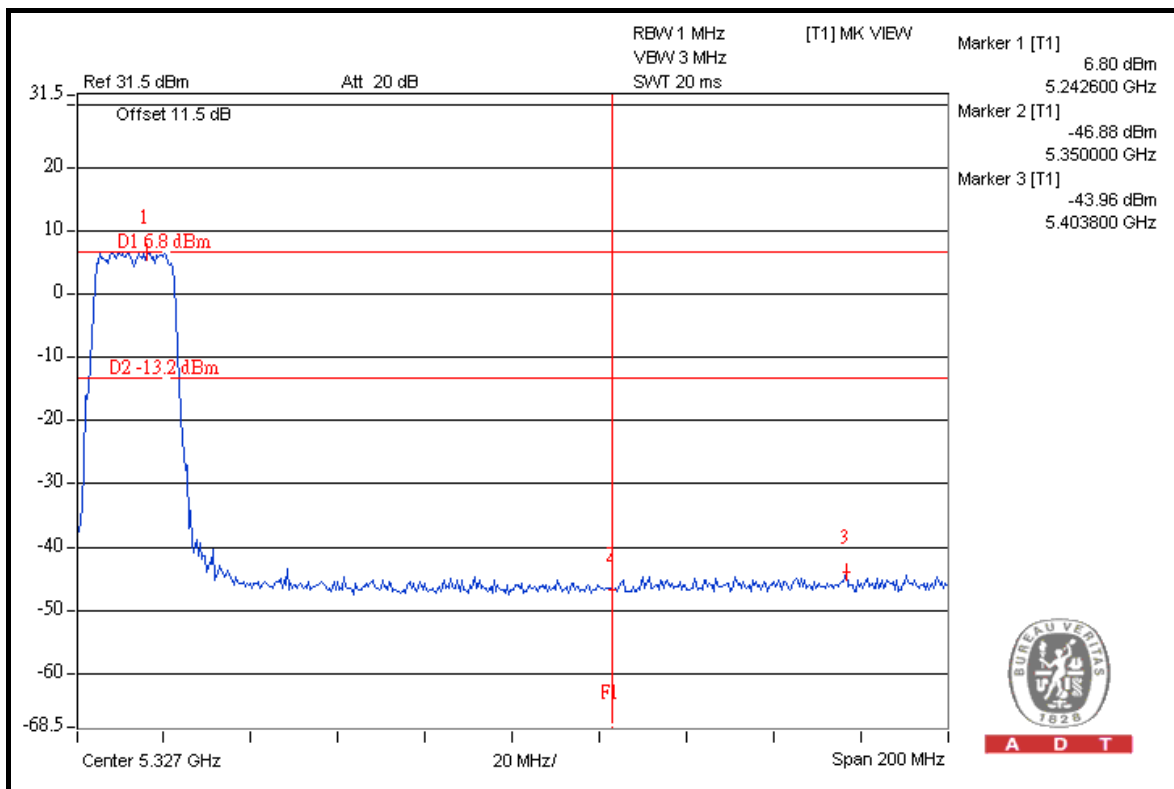
A D T



A D T



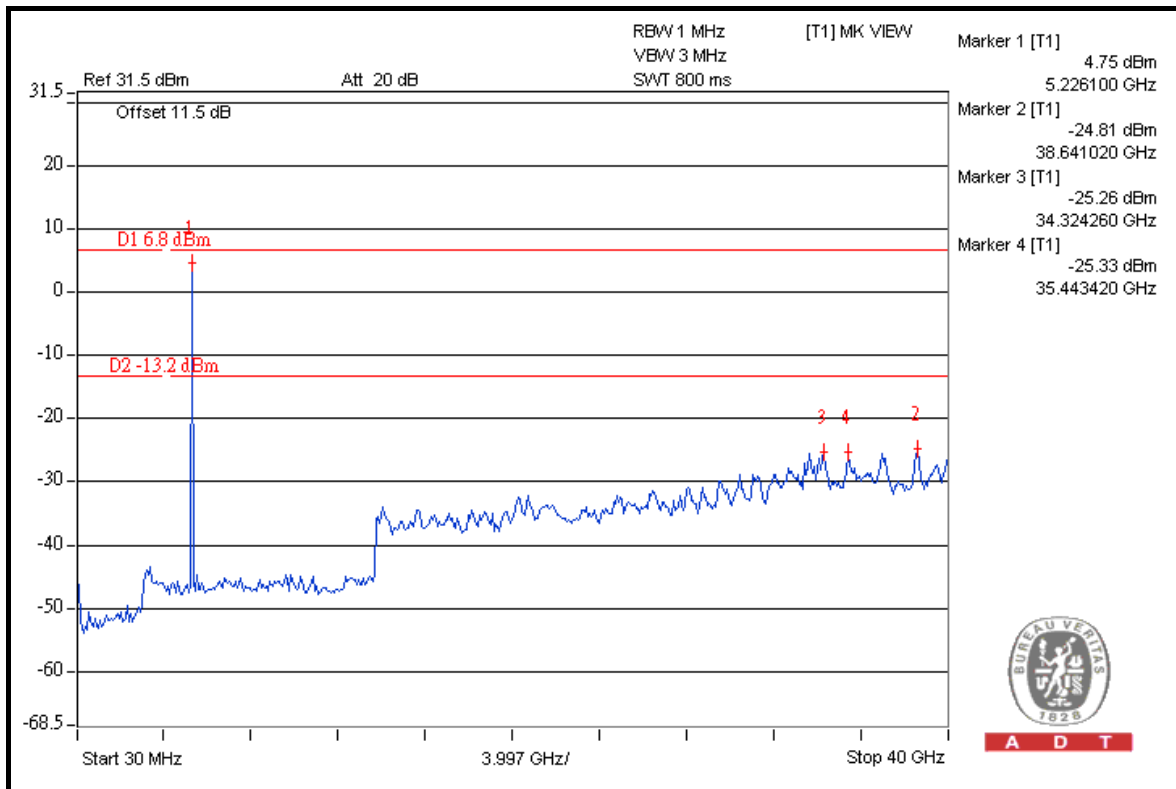
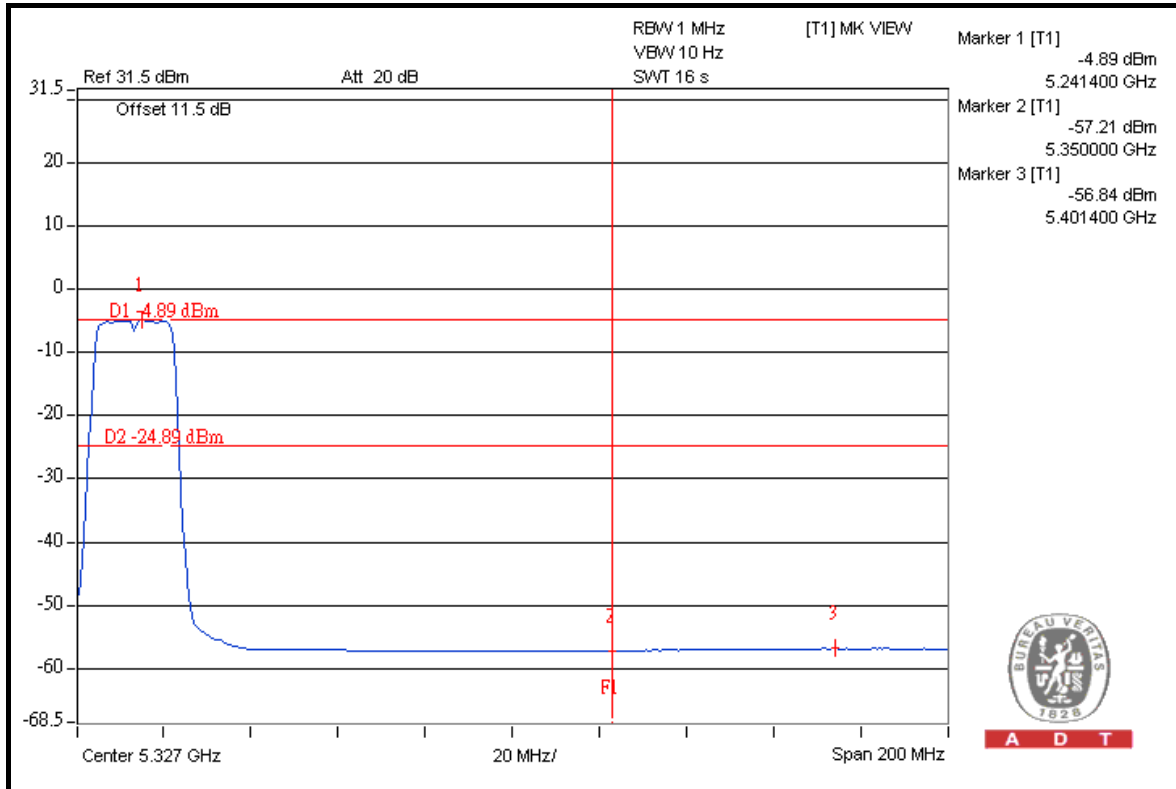
A D T



A D T



A D T





WHDI (40MHz)

RESTRICT BAND (4500 ~ 5150 MHz)

FREQUENCY (MHz)	FUNDAMENTAL EMISSION (dBuV/m)	DELTA (dB)	MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m)	LIMIT (dBuV/m)
5190.00 (PK)	108.0	44.74	63.26	74.00
5190.00 (AV)	93.8	45.39	48.41	54.00

RESTRICT BAND (5350 ~ 5460 MHz)

FREQUENCY (MHz)	FUNDAMENTAL EMISSION (dBuV/m)	DELTA (dB)	MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m)	LIMIT (dBuV/m)
5230.00 (PK)	108.2	45.26	62.94	74.00
5230.00 (AV)	94.0	45.53	48.47	54.00

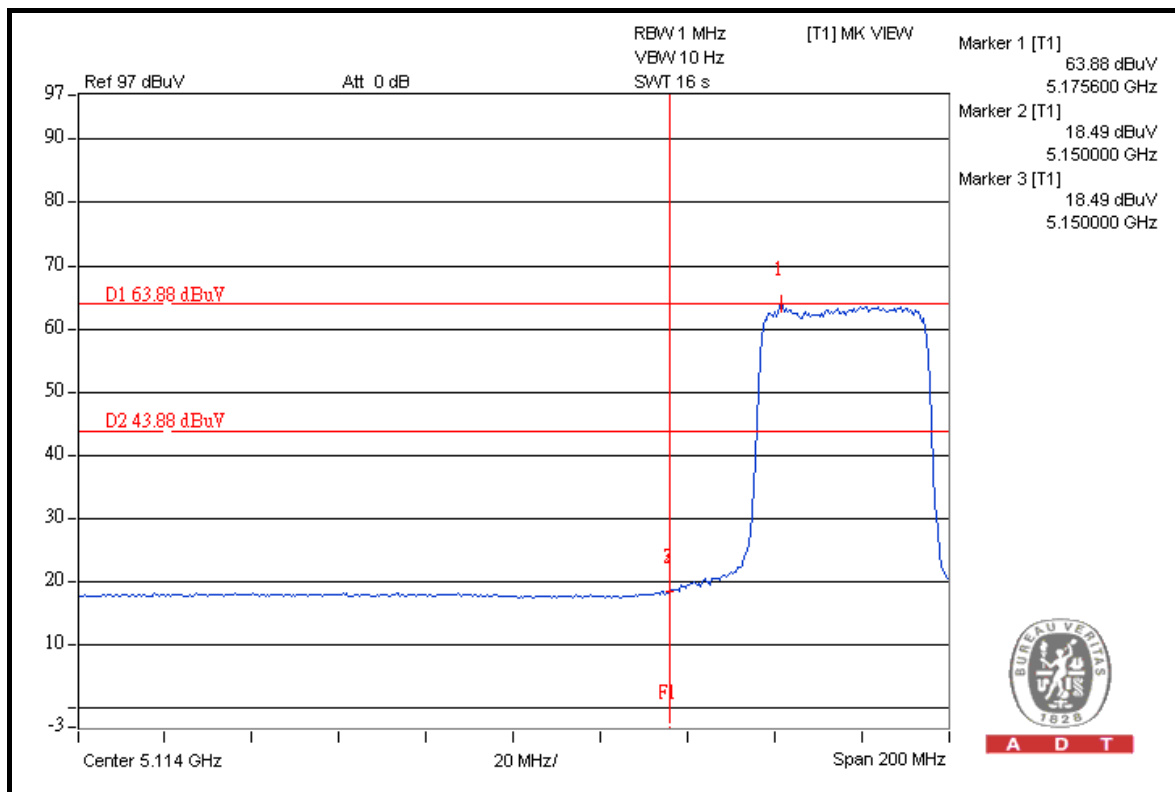
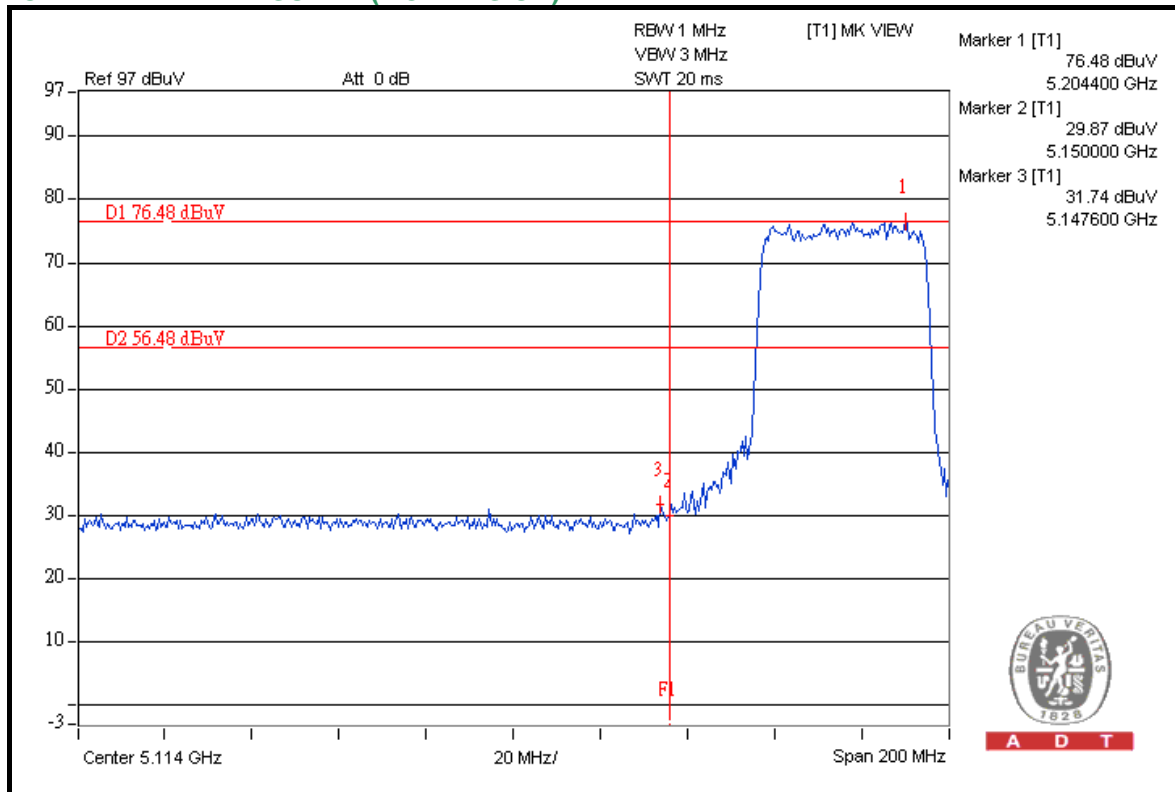
NOTE:

1. Delta = Amplitude between the peak of the fundamental and the peak of the band edge emission. Please check following 2 pages.
2. Maximum field strength in restrict band = Fundamental emission – Delta.



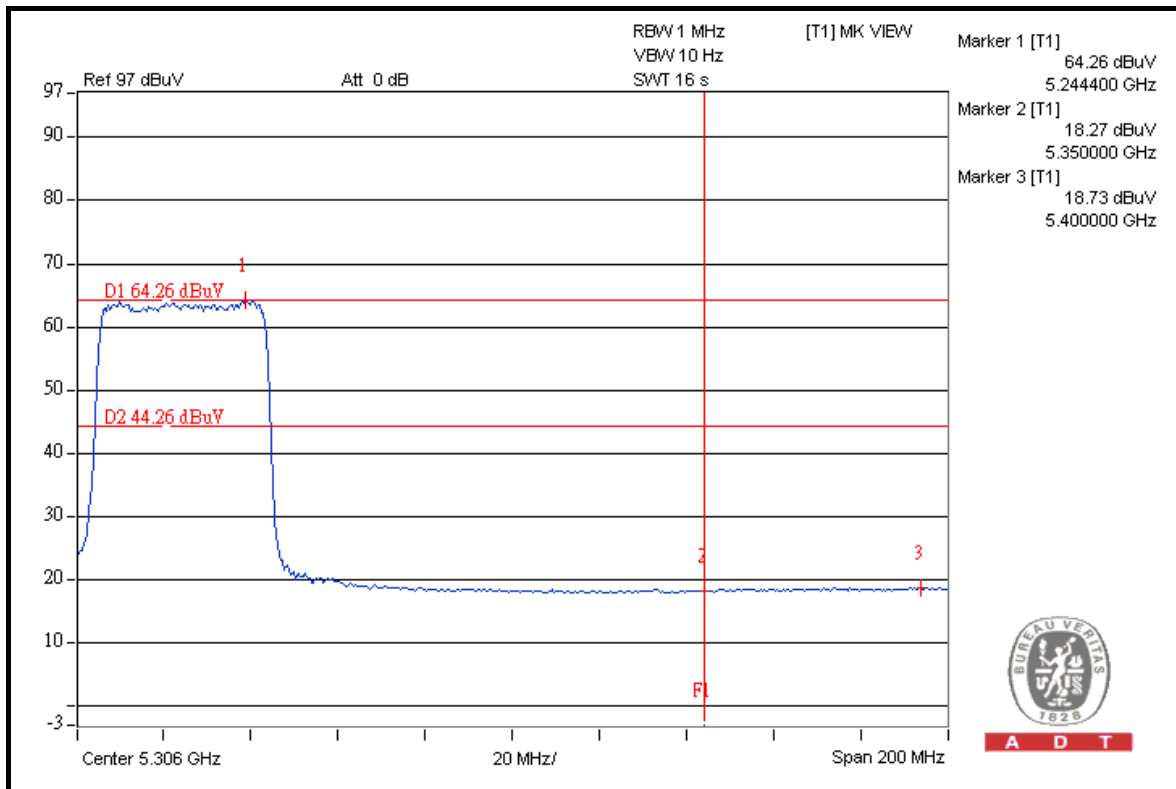
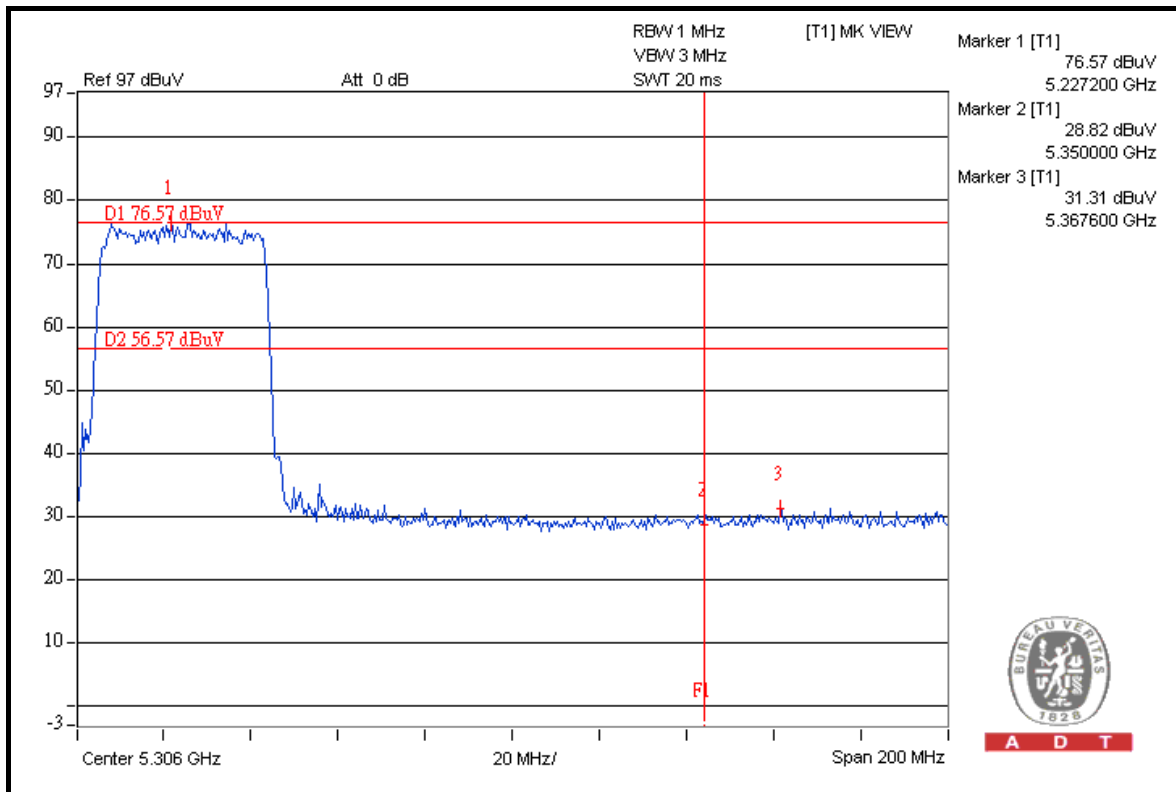
A D T

FOR RADIATED MEASURED (4 CHAINS ON)





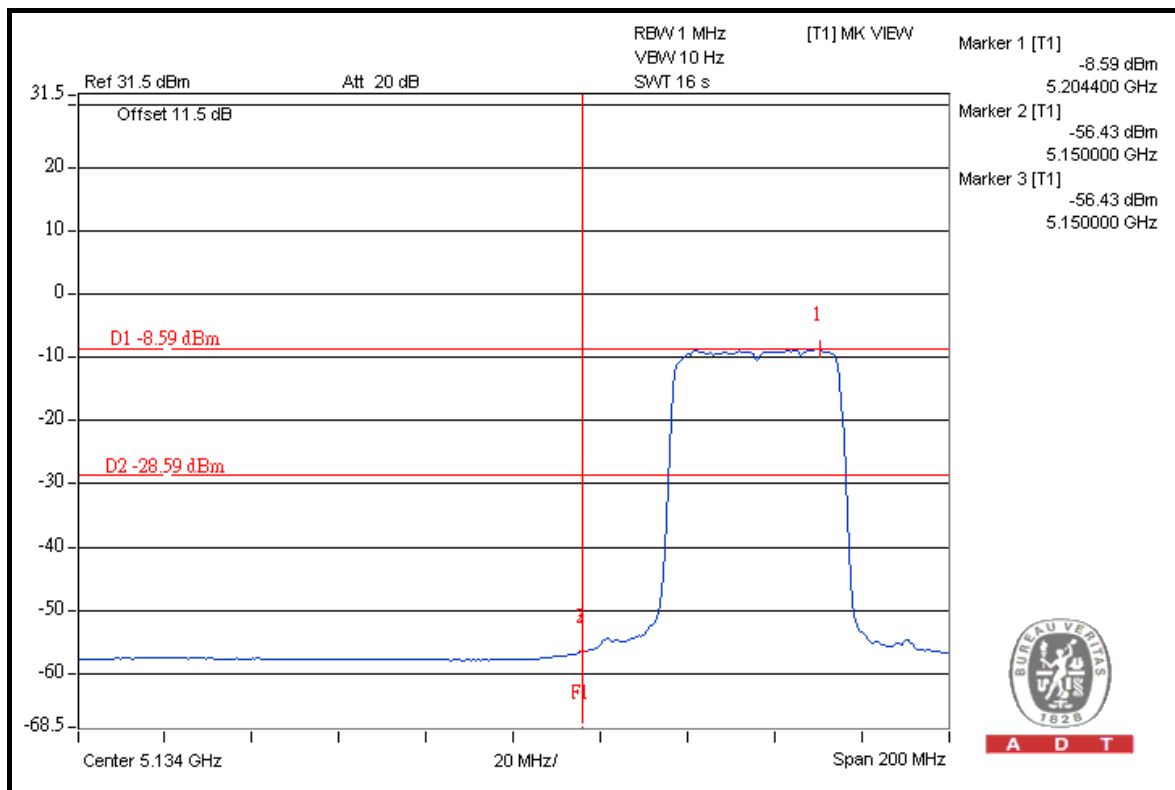
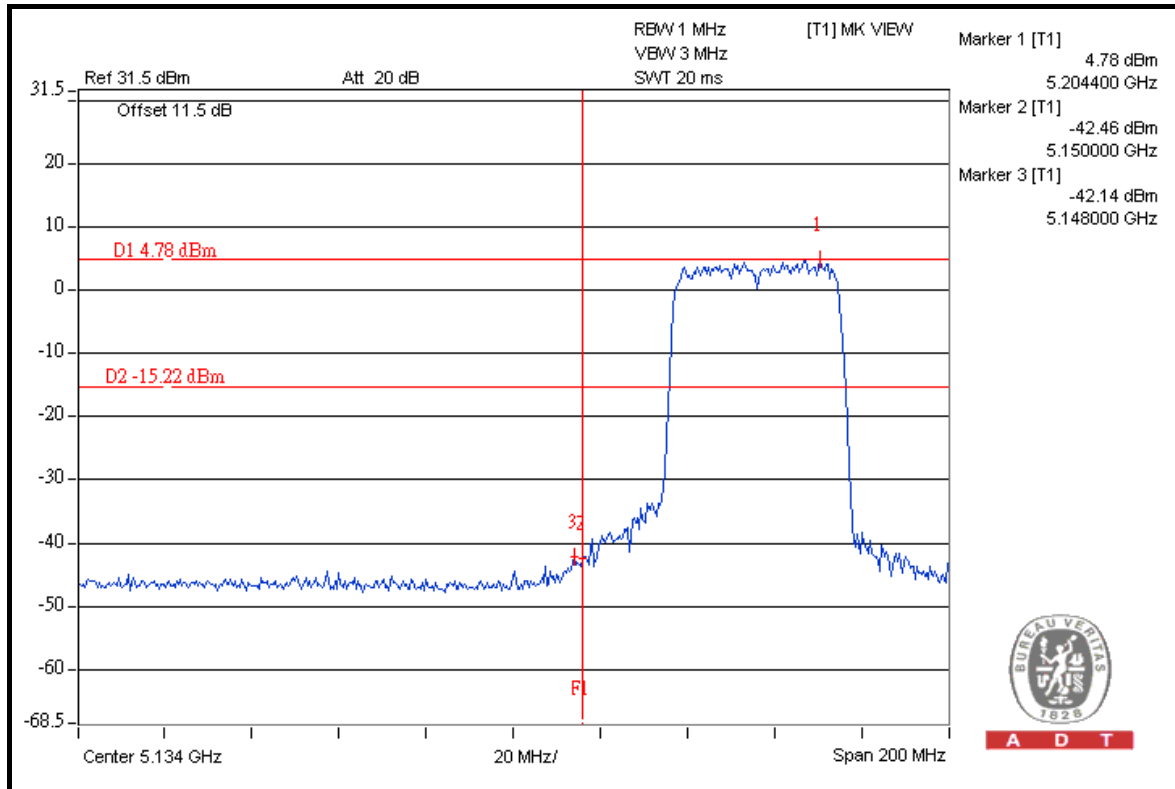
A D T





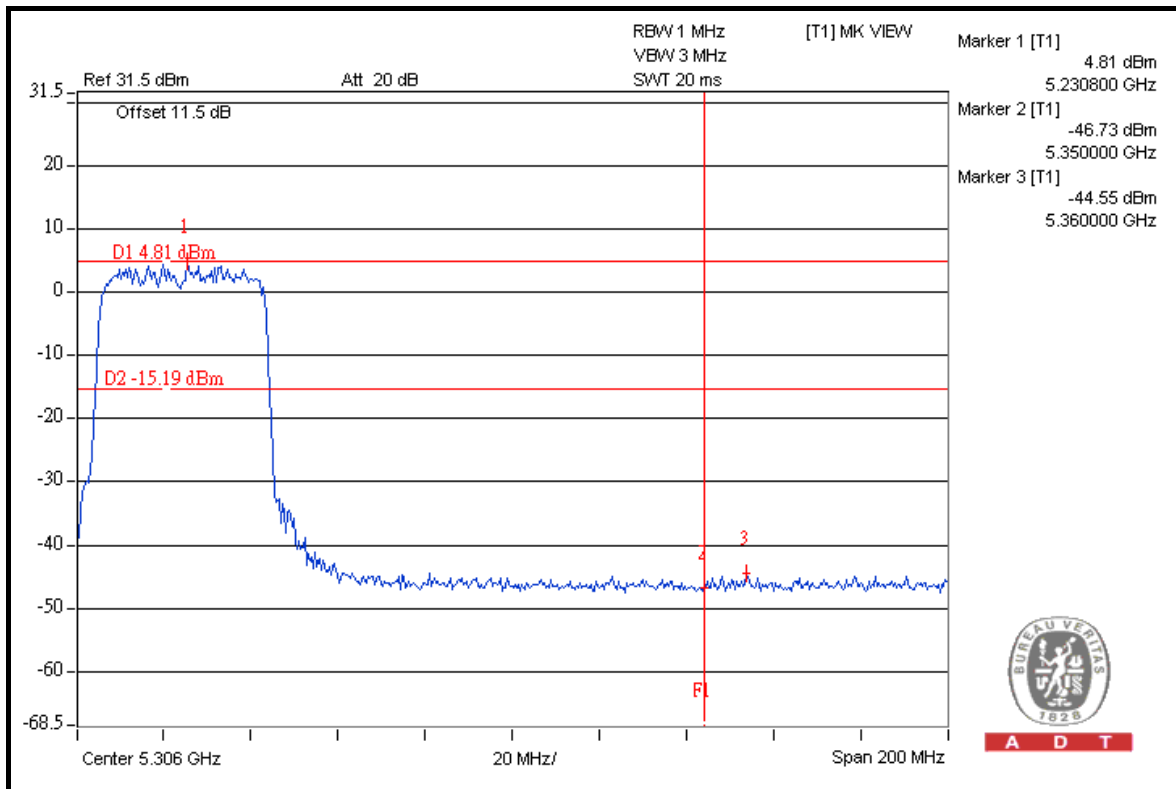
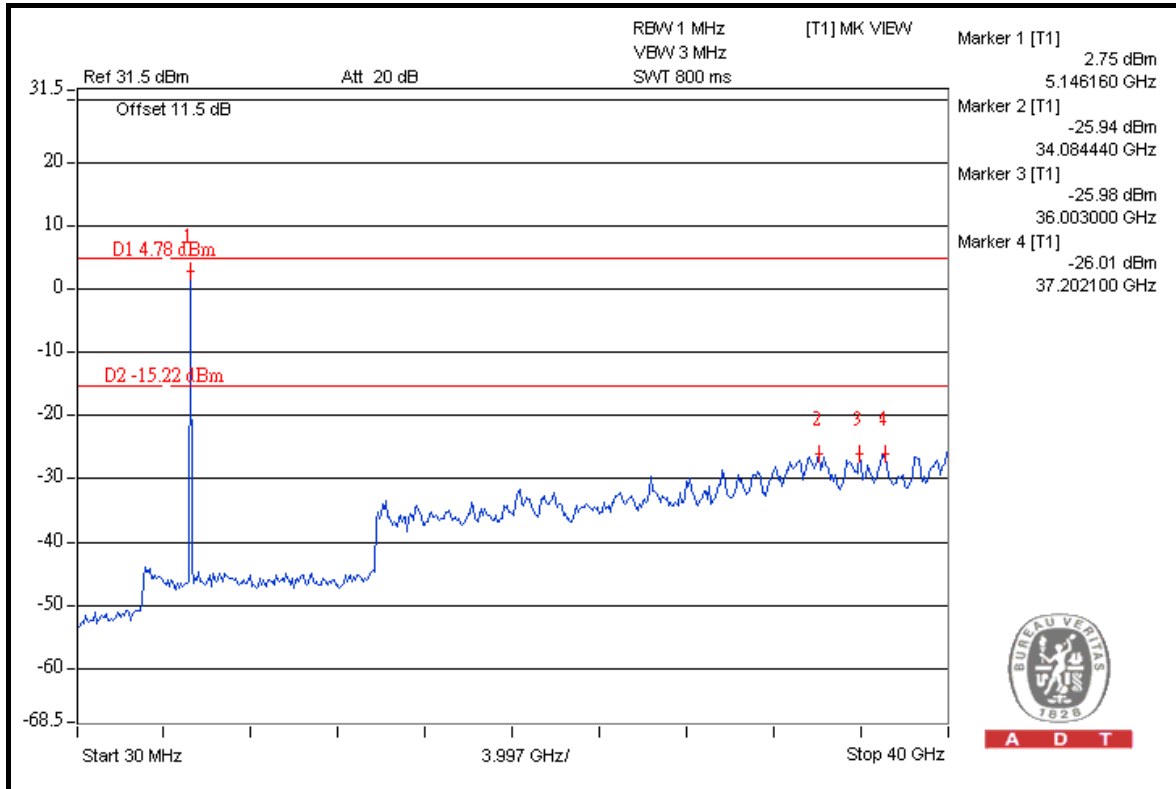
A D T

FOR CONDUCTED MEASURED CHAIN 0



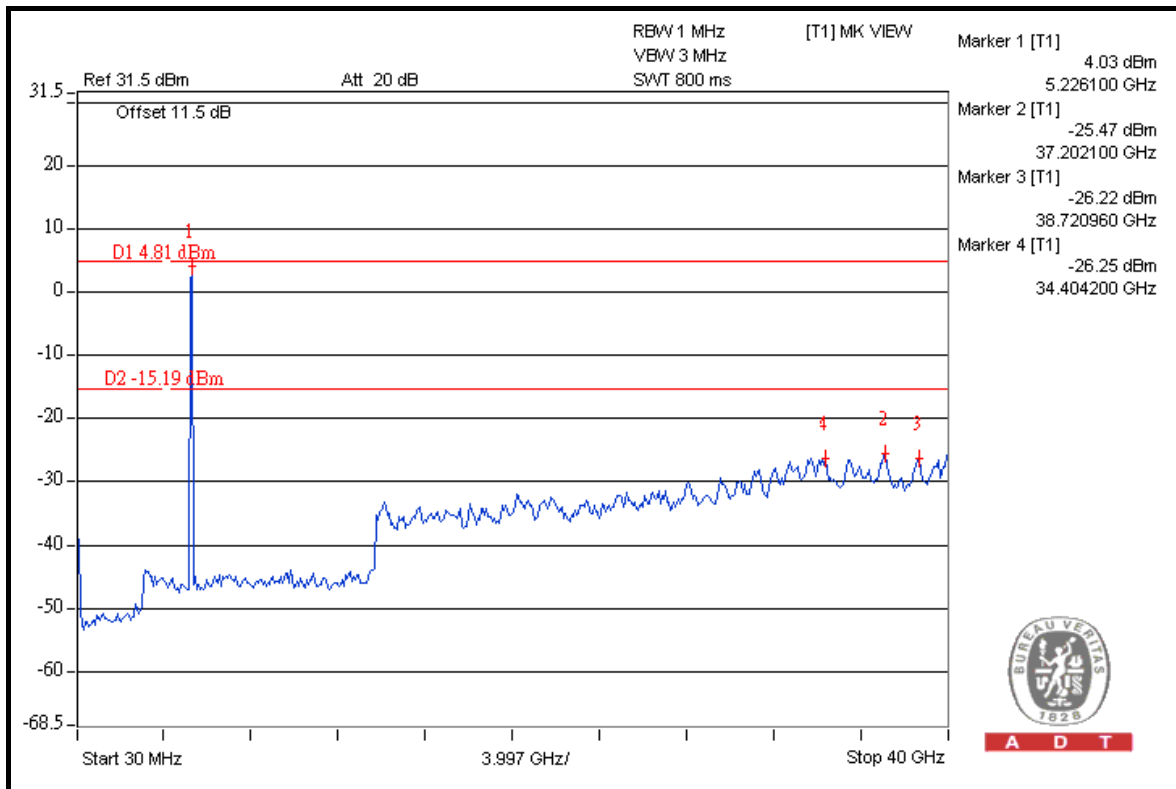
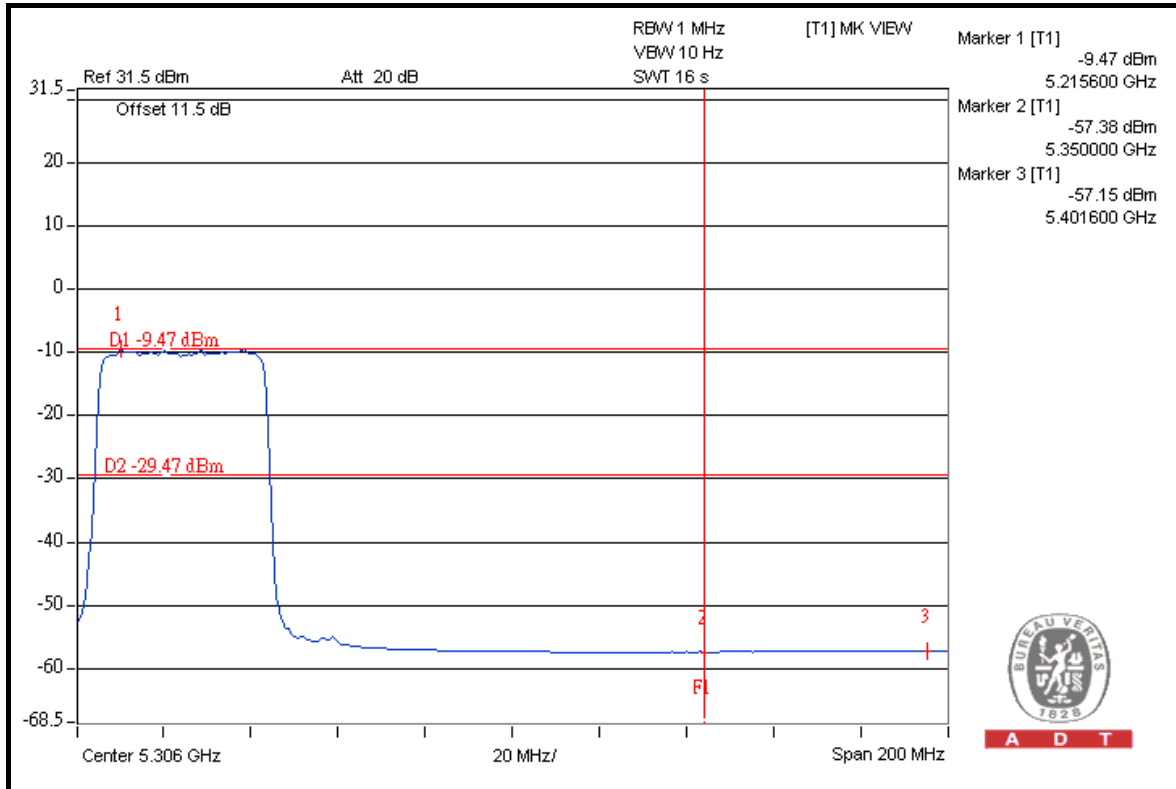


A D T





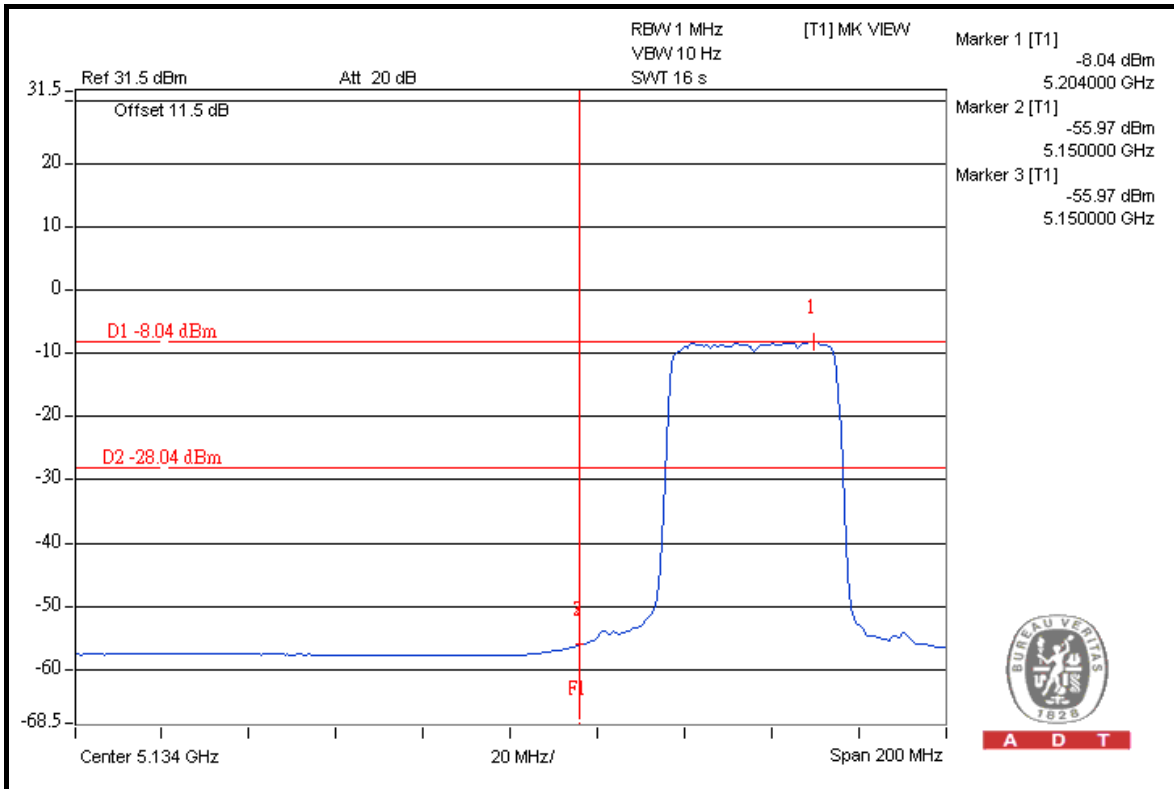
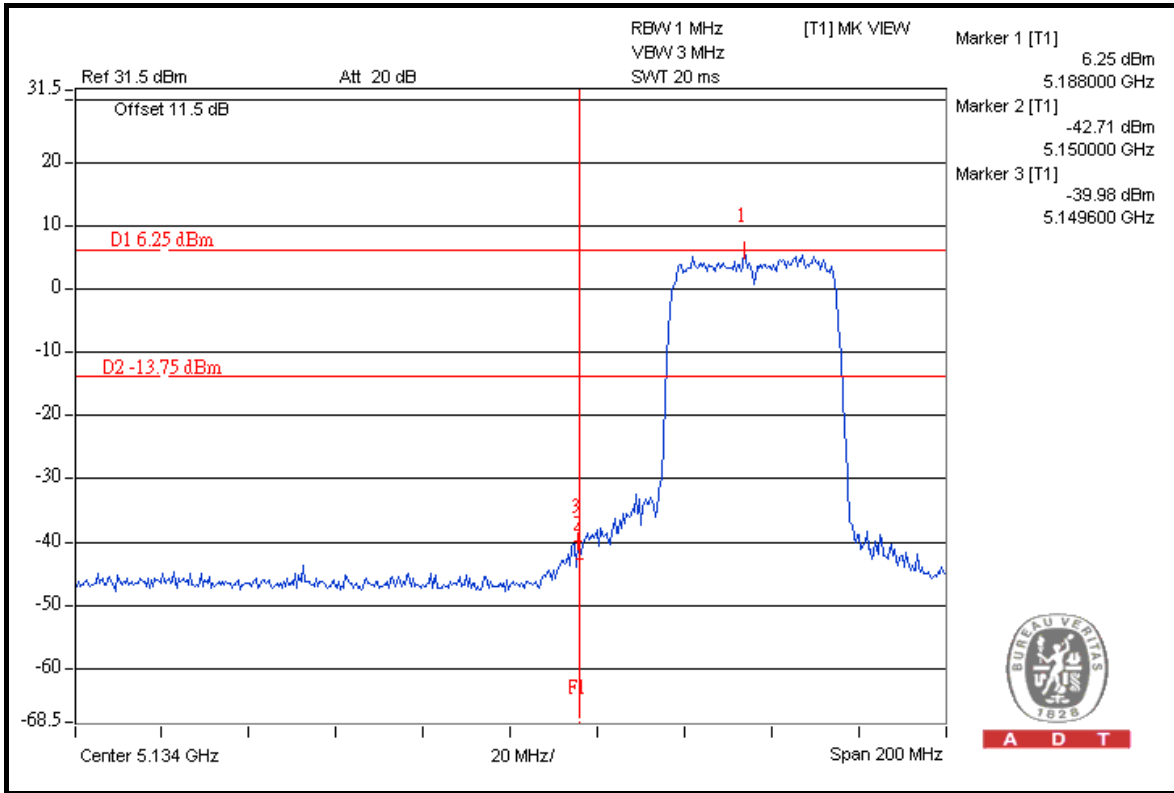
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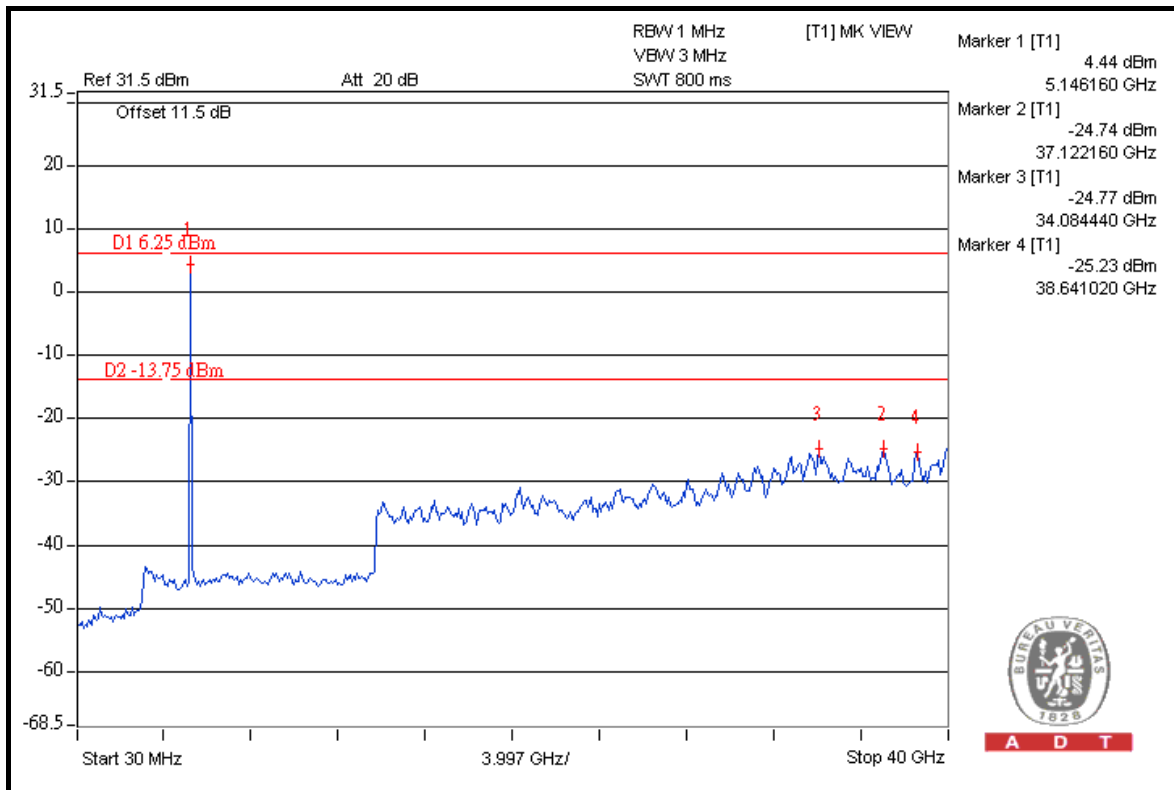
A D T

CHAIN 1

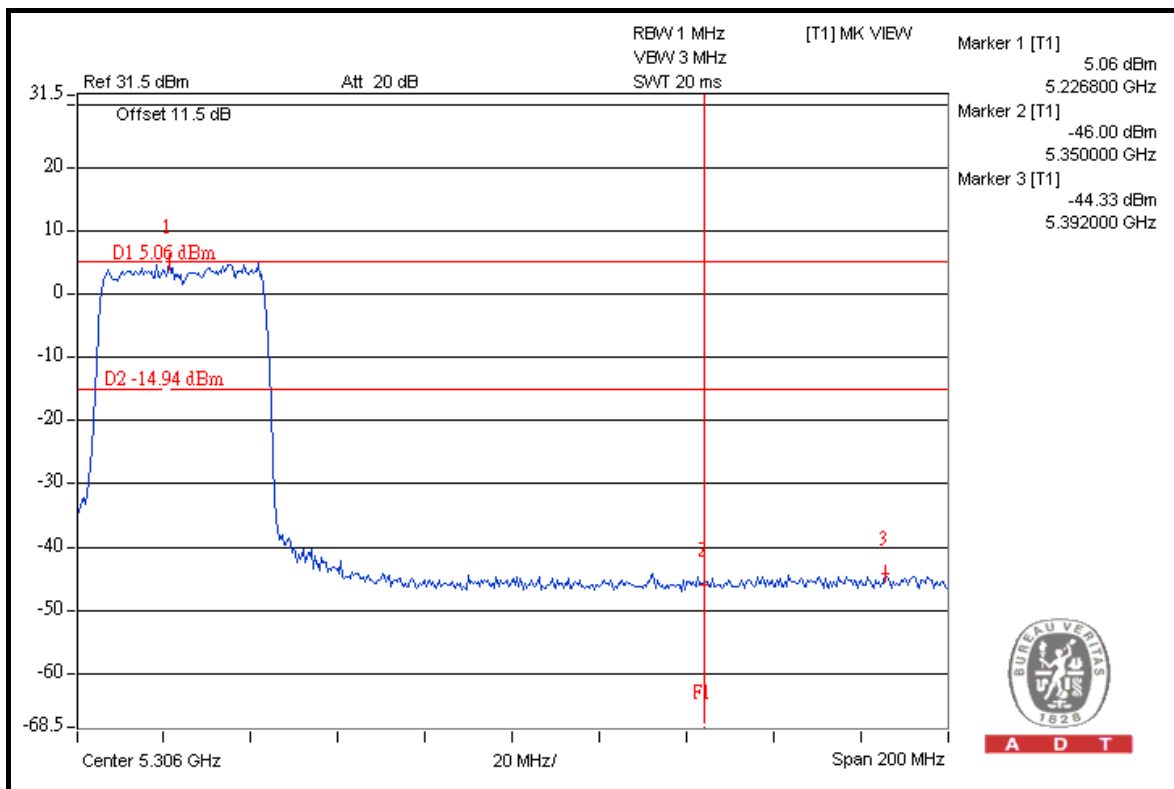




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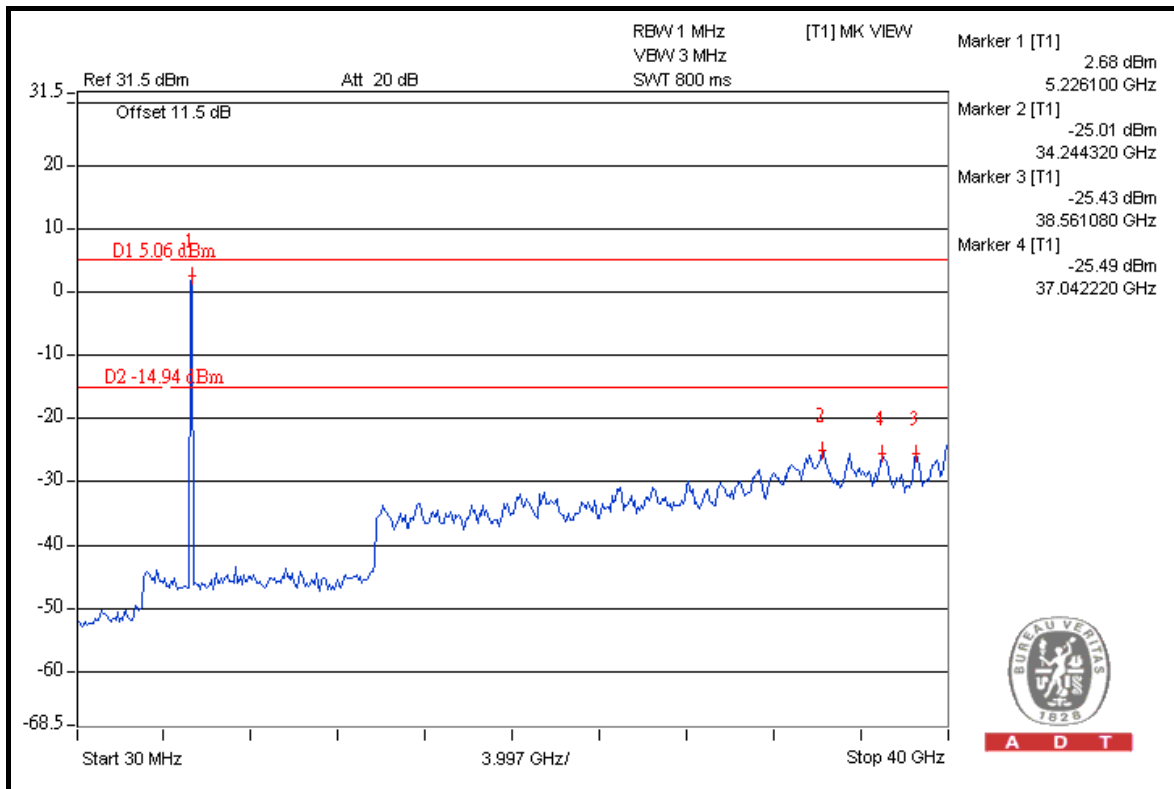
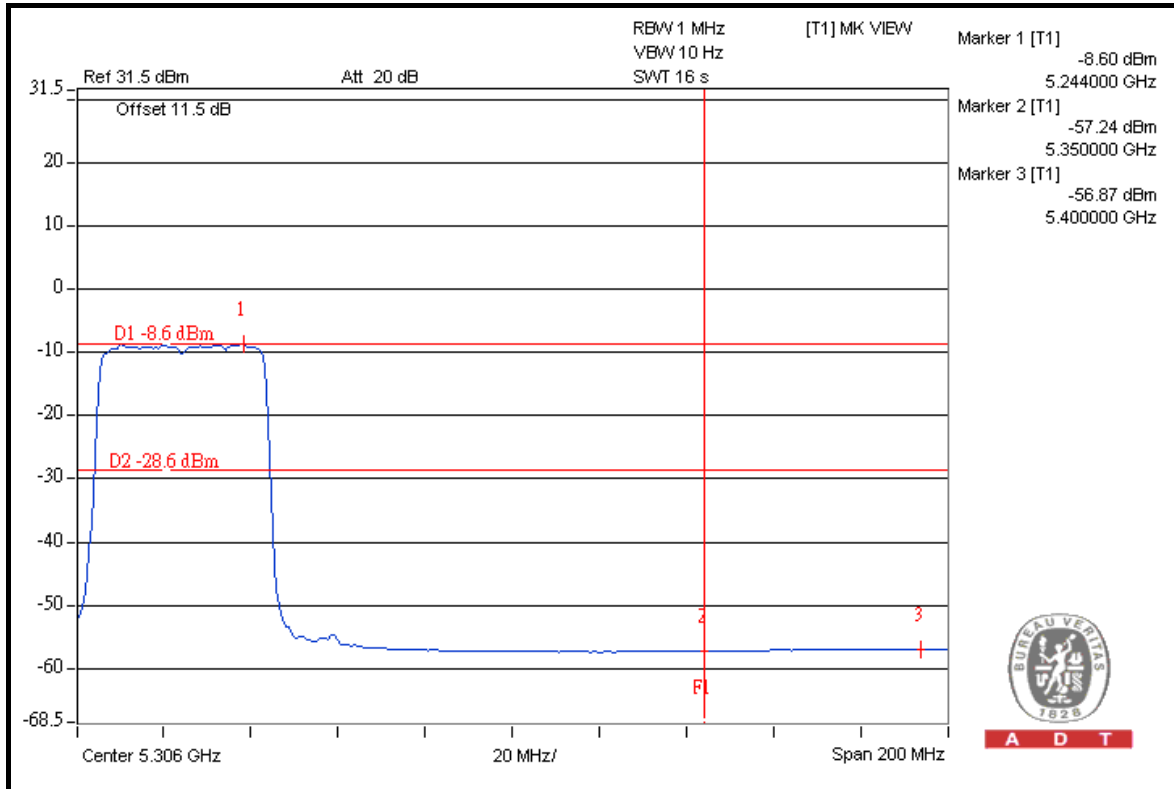
A D T



A D T



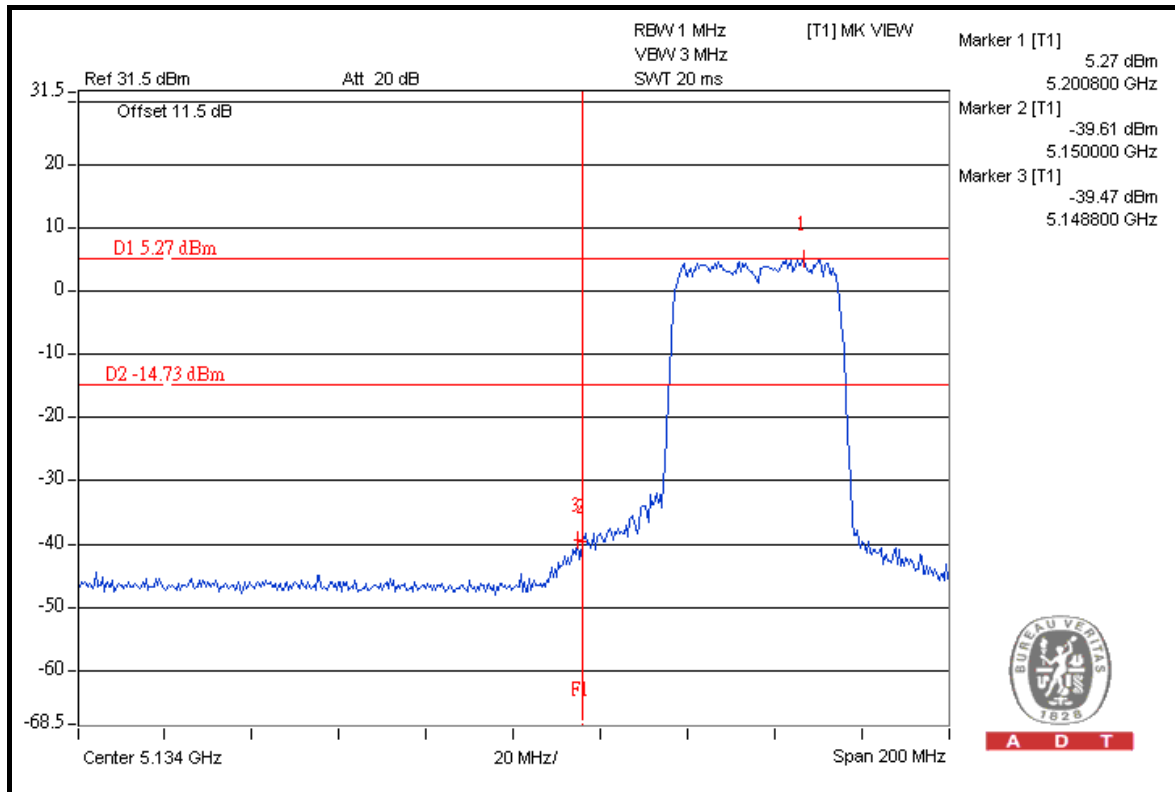
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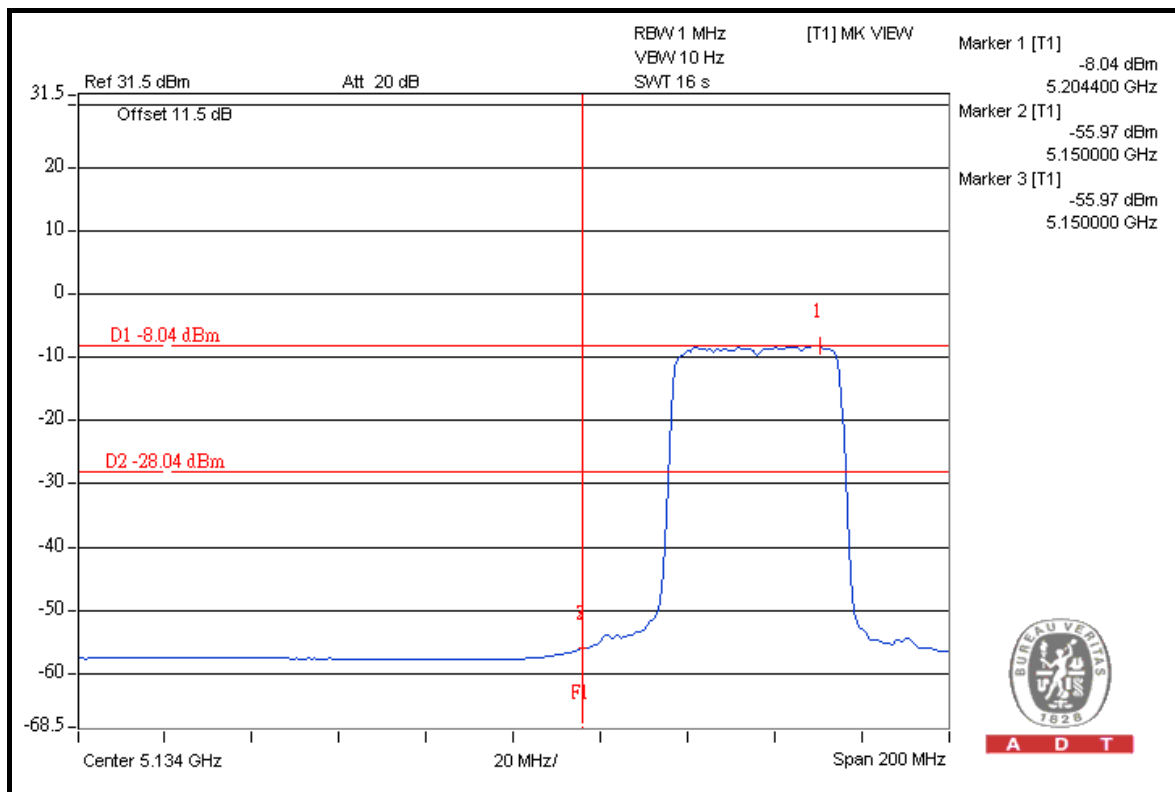


A D T

CHAIN 2



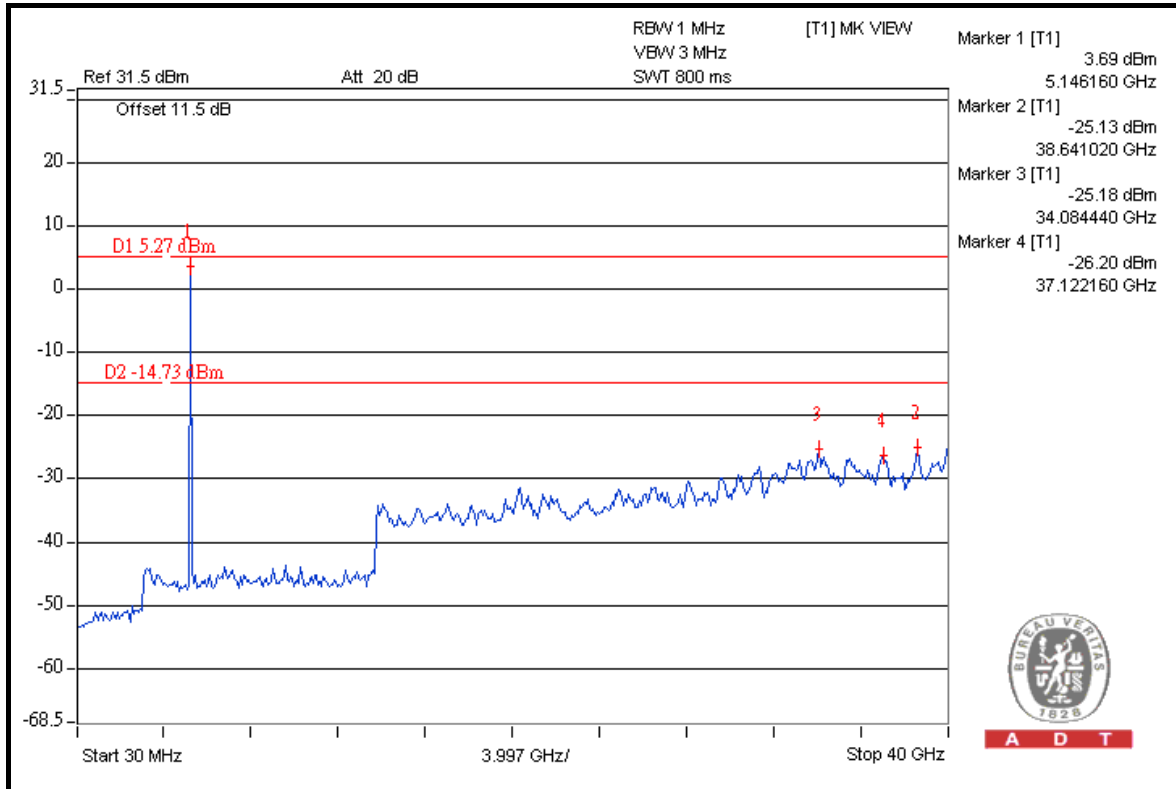
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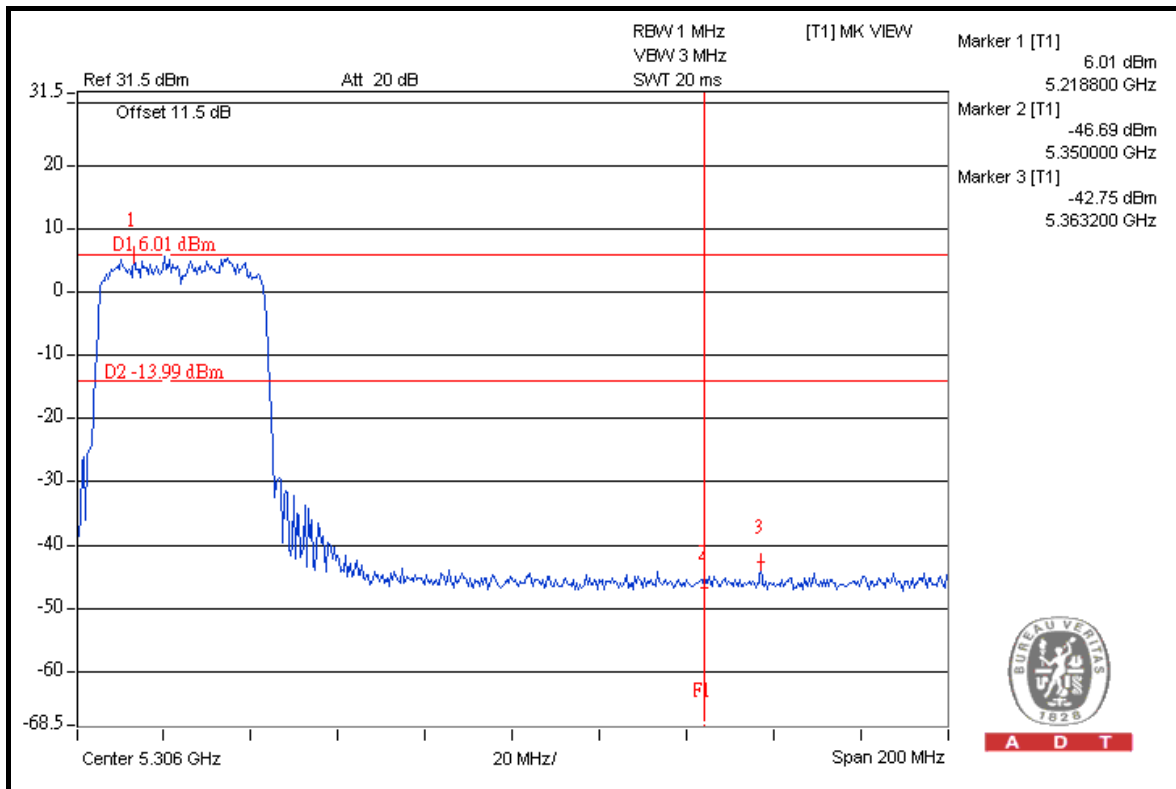
A D T



A D T



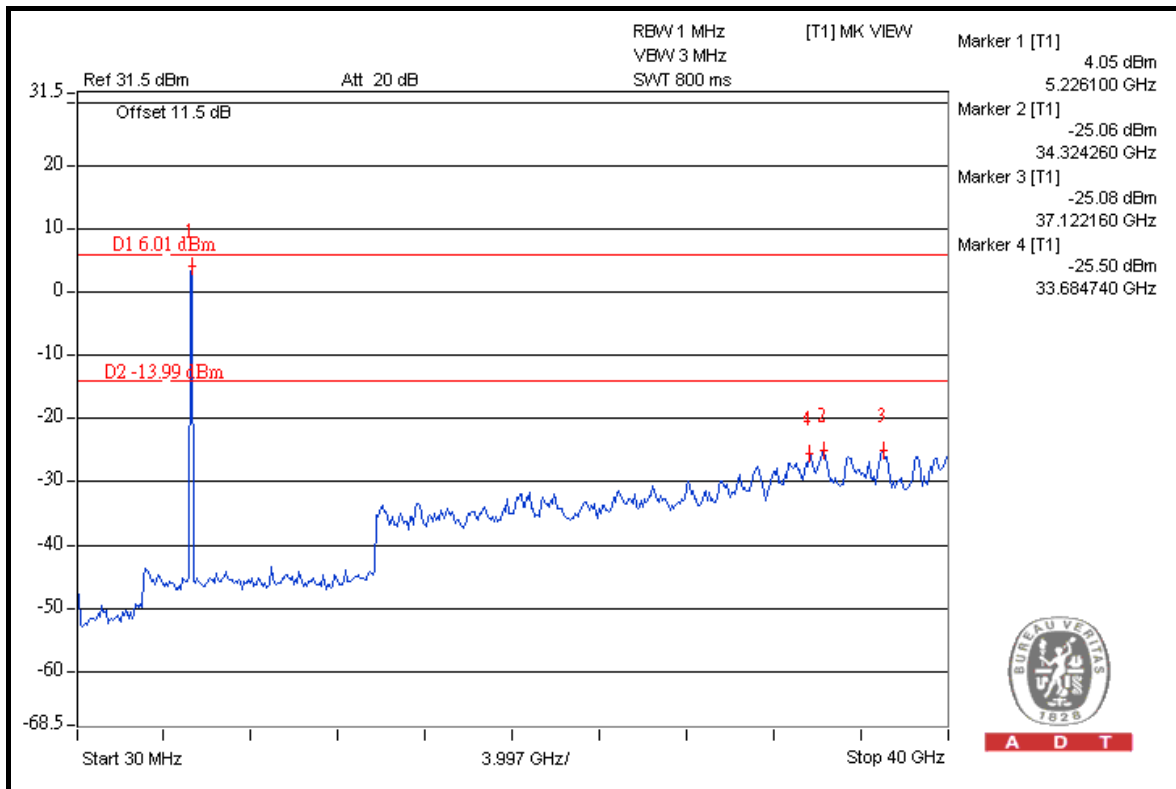
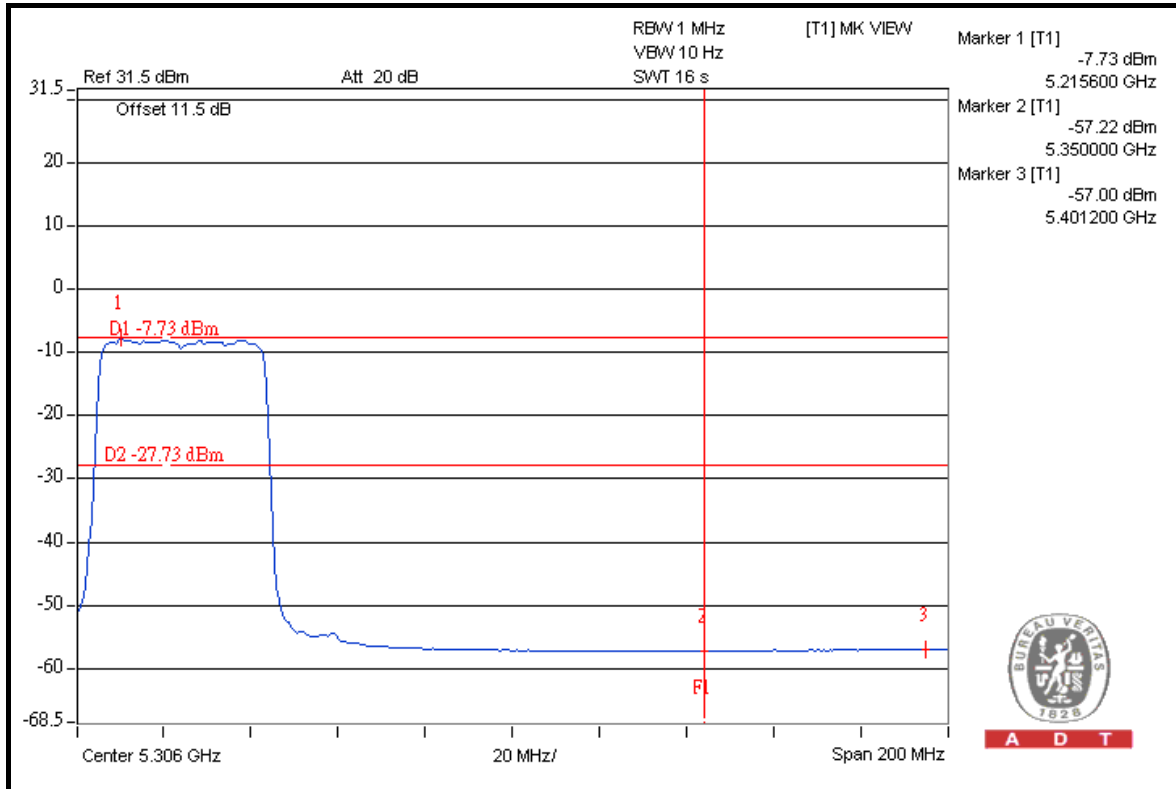
A D T



A D T



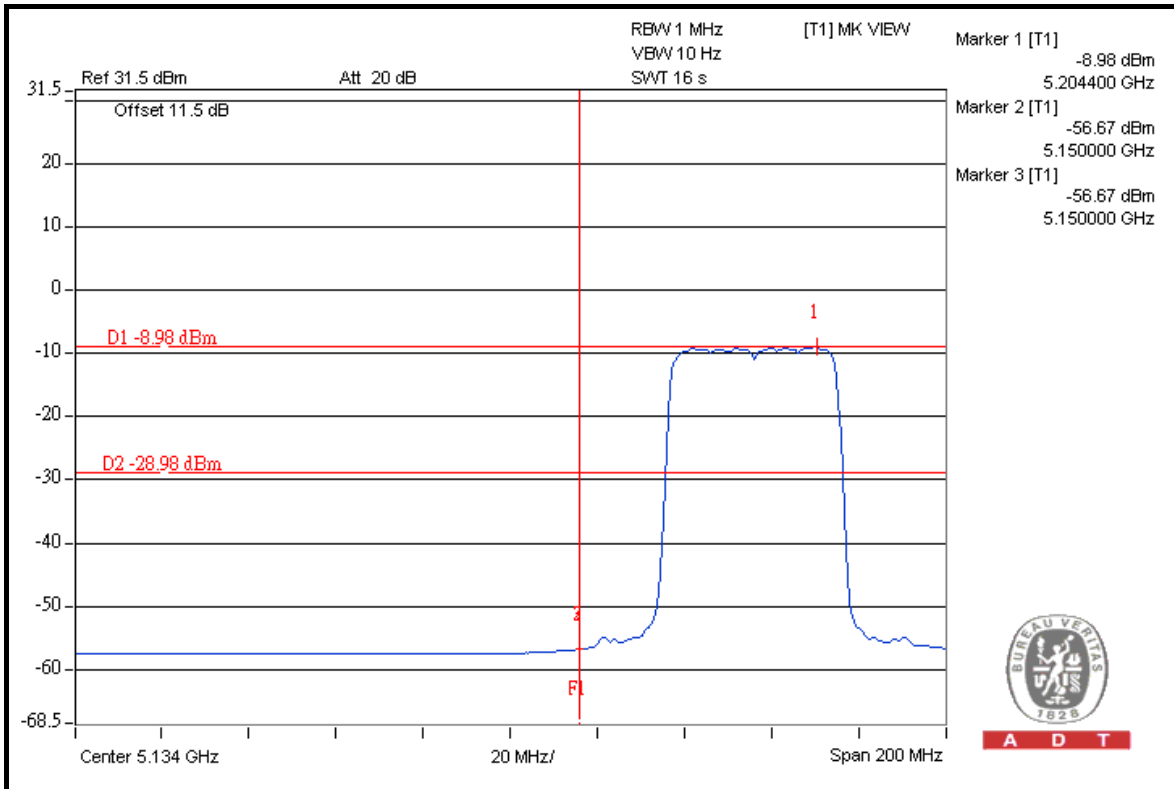
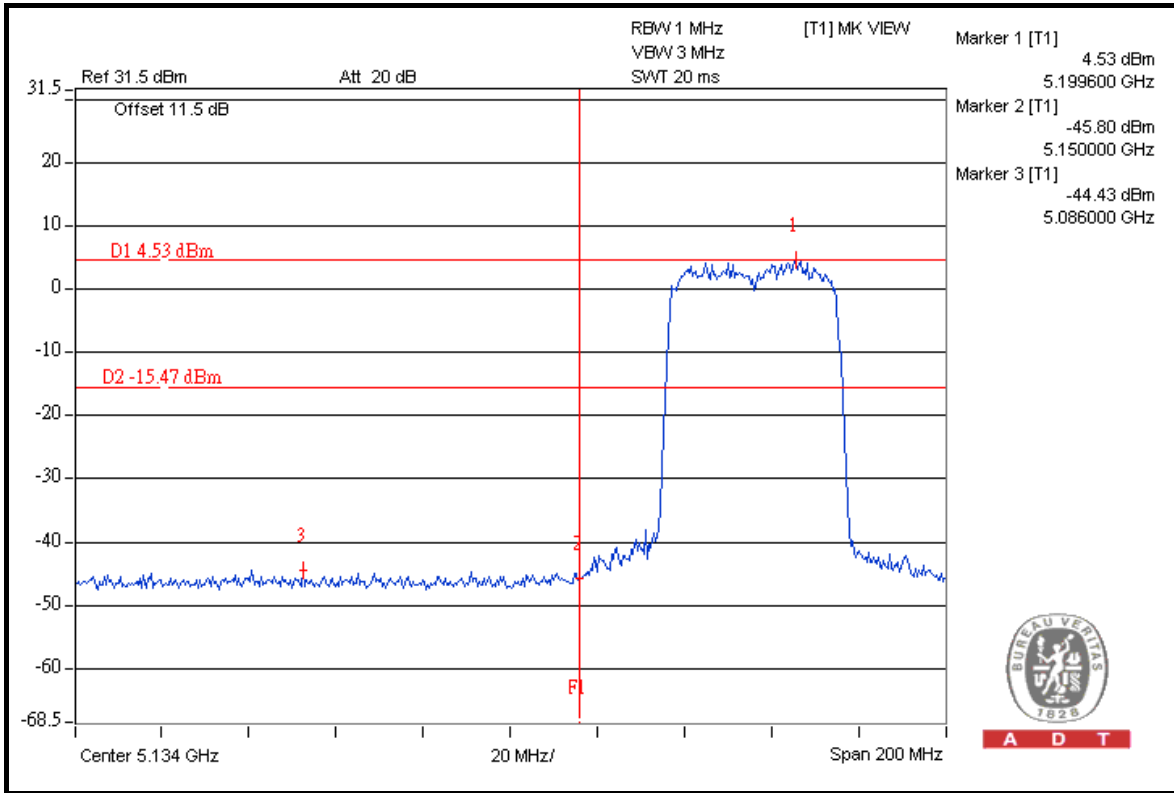
A D T





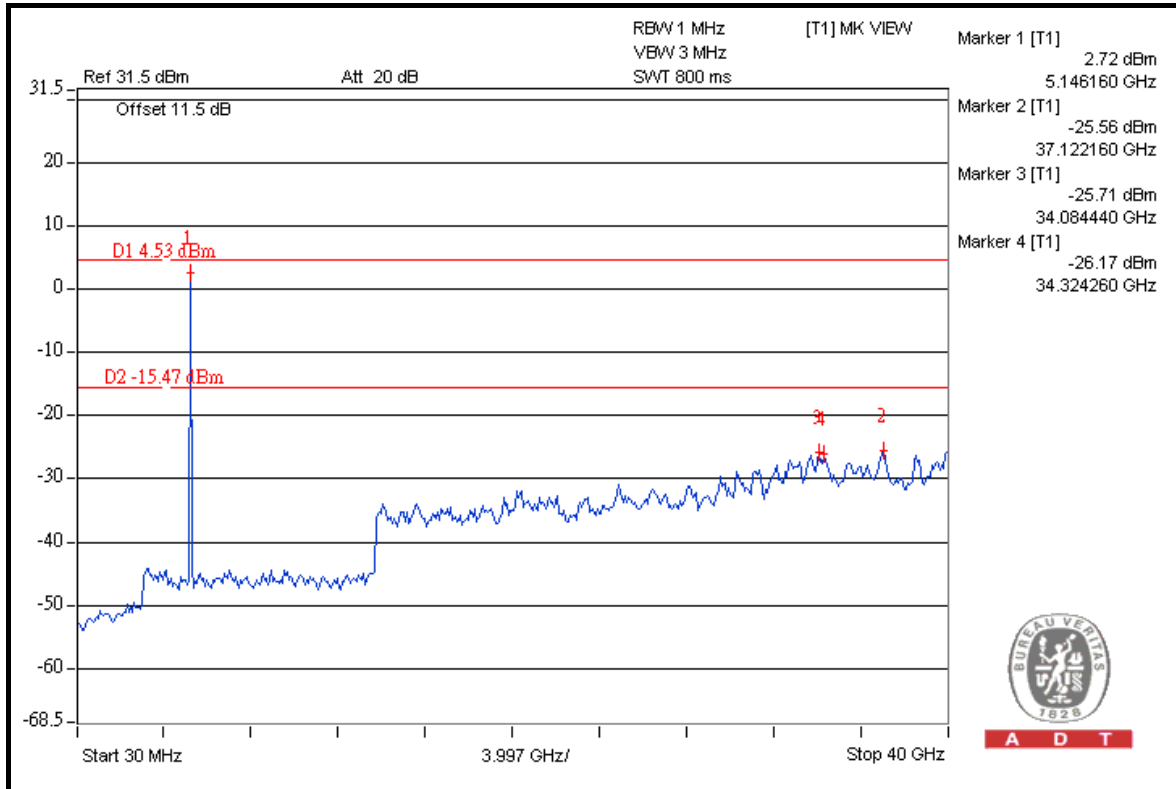
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CHAIN 3

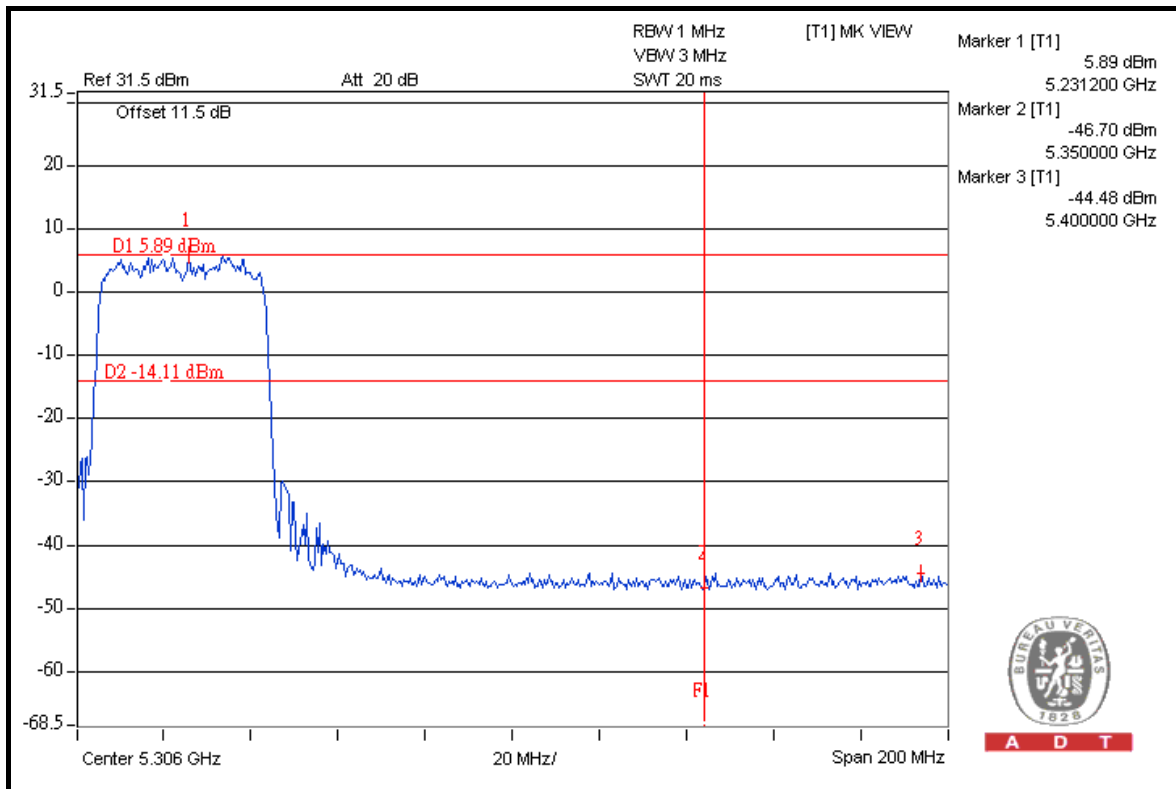




A D T



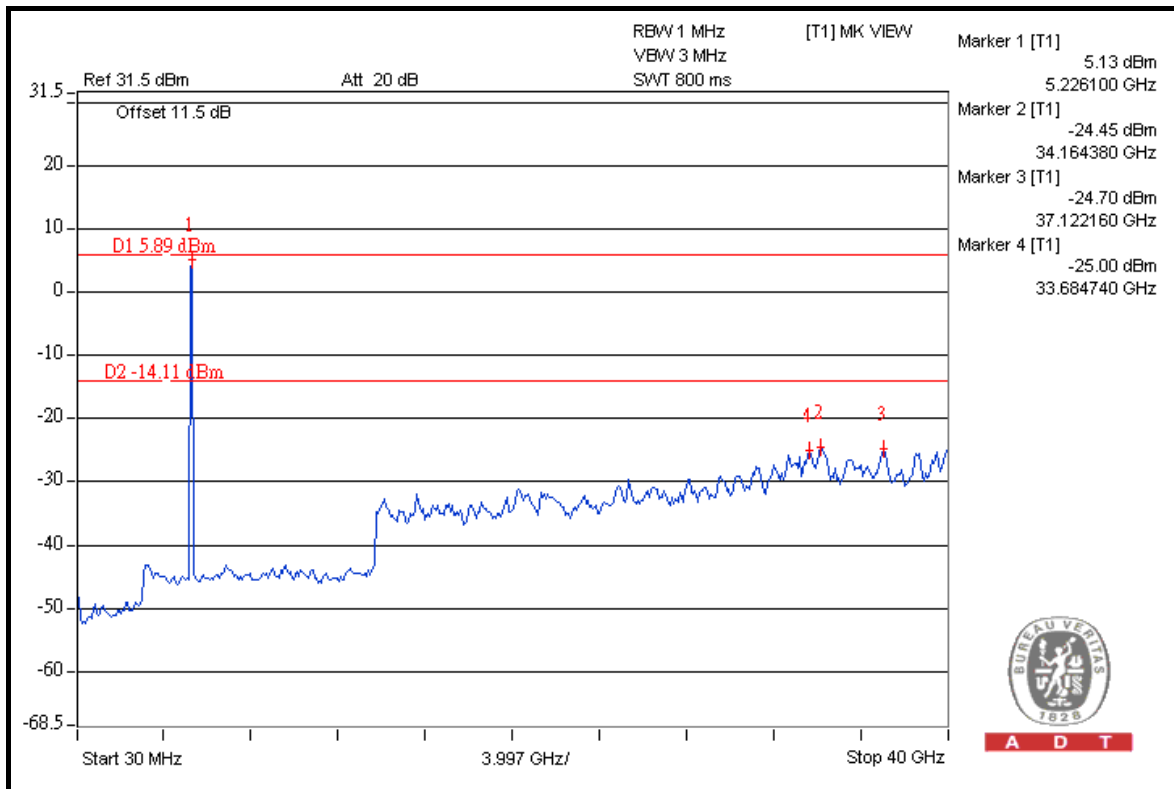
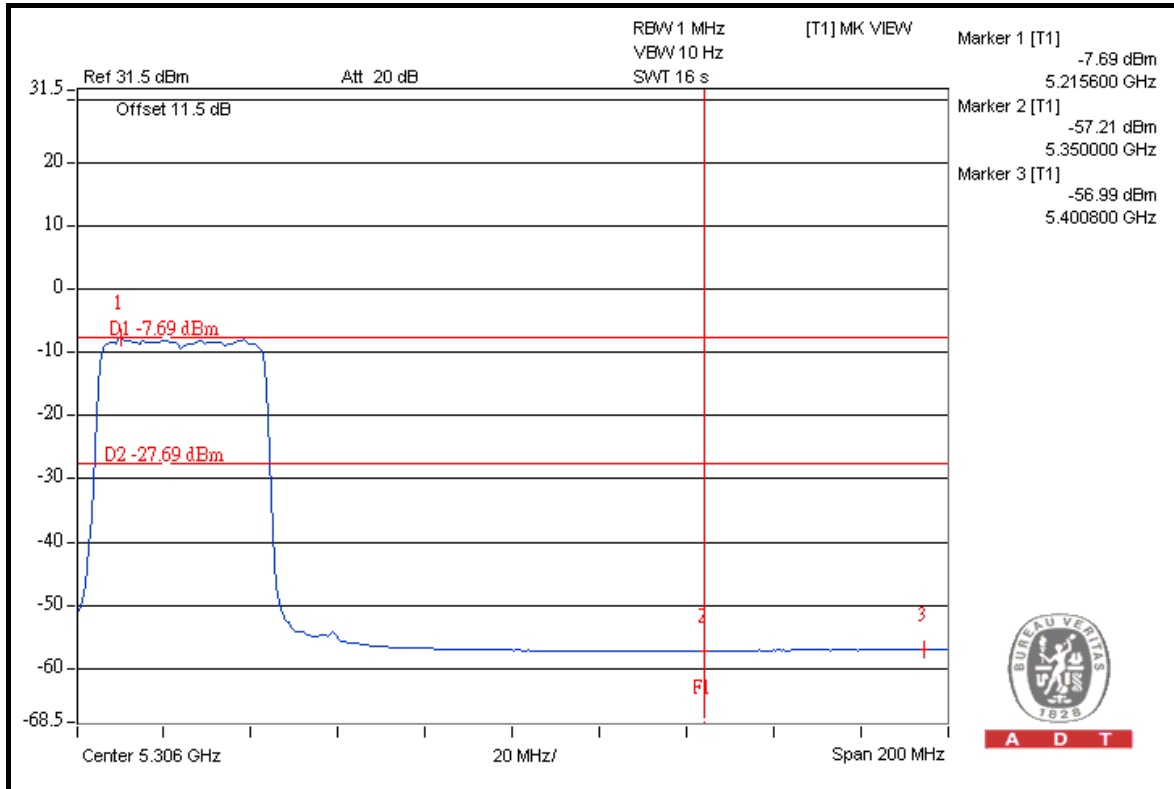
A D T



A D T



A D T





5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



6. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site:

www.adt.com.tw/index.5.phtml. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Telecom Lab:

Tel: 886-3-3183232

Fax: 886-3-3185050

Email: service.adt@tw.bureauveritas.com

Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.



7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

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

---END---