

General

This document describes the FCC/ETSI radiation test report of the ARF2496K. The test result inside this document should be seen as the reference for your product design; the final radiation/emission result of the ARF2496K is depended on the various parameters of the design of the final product; circuit design, PCB layout and component replacement for example.

Test Environment

Followed Requirement: FCC part 15.247 and ETSI EN 300 328

Device Under Test: ARF2496K RF module

Medium of Radiation: PCB antenna on board

Test Condition: In TX mode, output power is 0dBm under direct mode

In RX mode, it operates under direct mode

Power Condition: DC 3V battery

Test Lab: SPORTON International Inc.

Frequency range: 30 MHz to 1 GHz , above 1 GHz

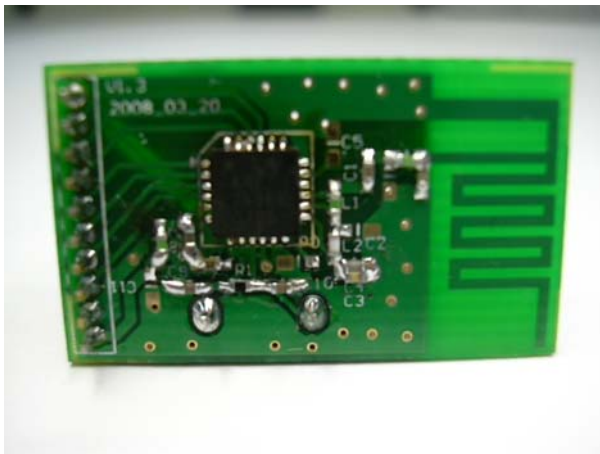


Figure-1 Photo of ARF2496K Module

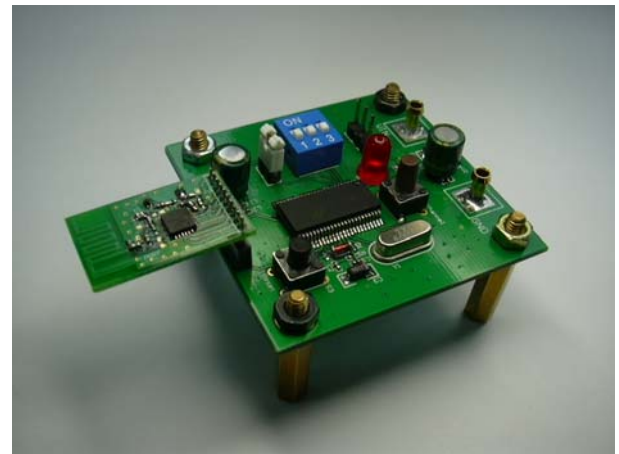


Figure-2 Photo of Test Board

FCC Test Information

Test Condition

Here lists the test conditions of the FCC test at TX/RX mode.

Followed Requirement: FCC part 15.247

Test Chamber: Semi Anechoic Chamber (966)

Measurement Mode: RF antenna radiation test

Operation Mode of ARF2496K: direct mode

Operation Frequency: 2.402GHz, 2.444GHz, 2.483GHz

Output Power: 0 dBm

Test Item

Transmitter field strength at 3m : Measurement the transmitter radiated emission power

Transmitter radiated emissions test : Below 1 GHz , above 1 GHz

Receiver radiated emissions test : Below 1 GHz , above 1 GHz

Summary of the test results

Applied Standard : FCC part 15.247			
Rule Section	Description of Test	Result	Under Limit
15.247(d)	Transmitter of 30 MHz to 1 GHz	Complies	14 dB
15.247(d)	Transmitter above 1 GHz	Complies	4.7 dB
15.247(d)	Receiver of 30 MHz to 1 GHz	Complies	9.4 dB
15.247(d)	Receiver above 1 GHz	Complies	4.6 dB

Transmitter field strength at 3m

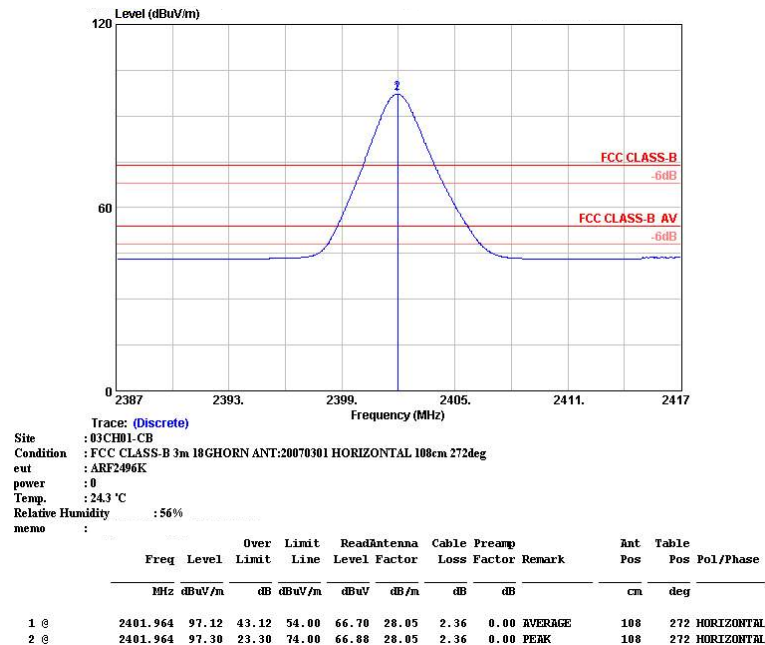


Figure-3 Transmitter field strength at 3m – 2402 MHz (Horizontal)

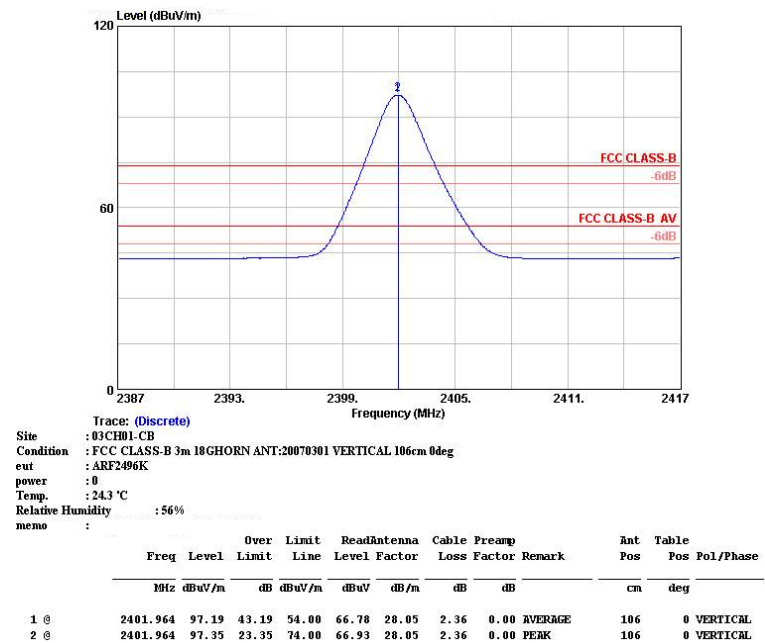


Figure-4 Transmitter field strength at 3m – 2402 MHz (Vertical)

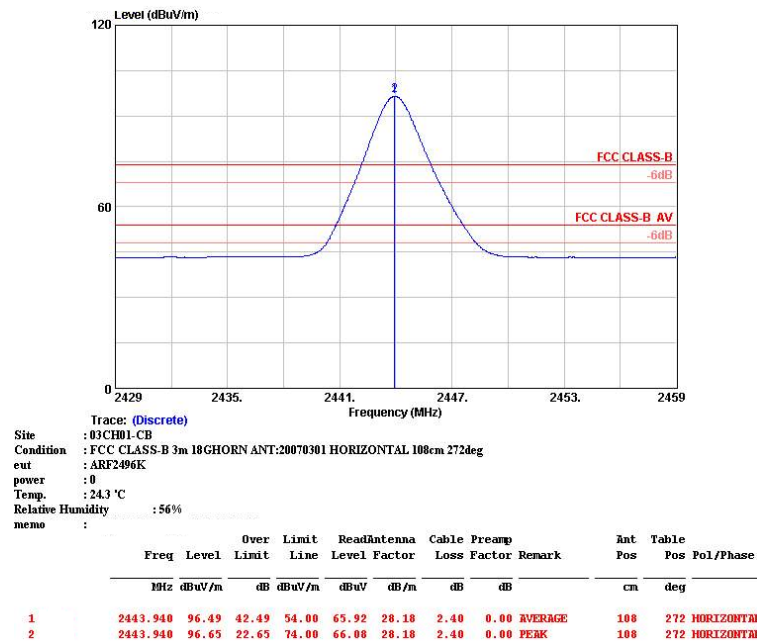


Figure-5 Transmitter field strength at 3m – 2444 MHz (Horizontal)

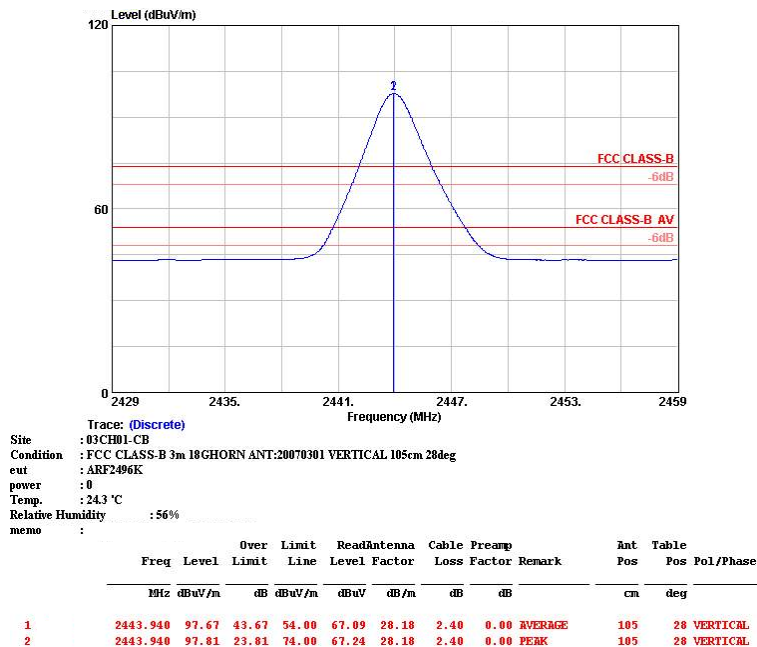


Figure-6 Transmitter field strength at 3m – 2444 MHz (Vertical)

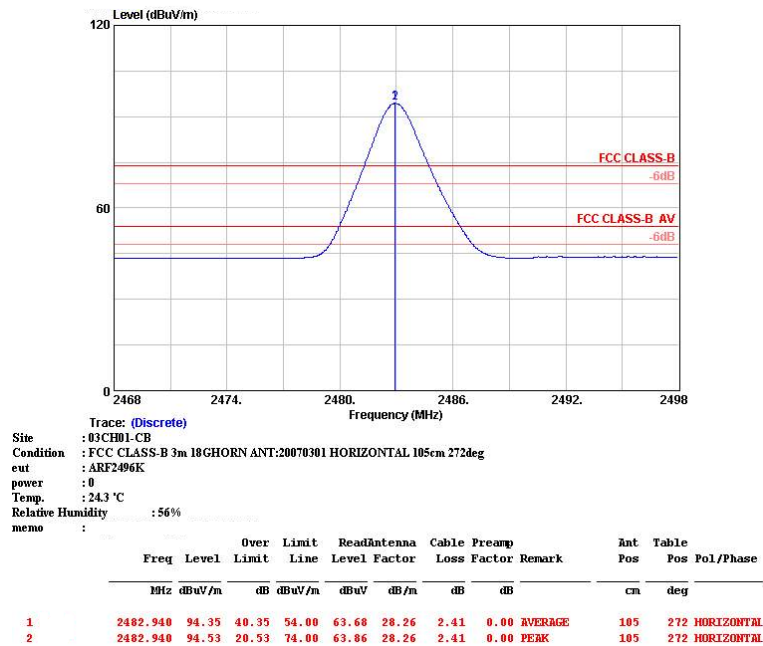


Figure-7 Transmitter field strength at 3m – 2483 MHz (Horizontal)

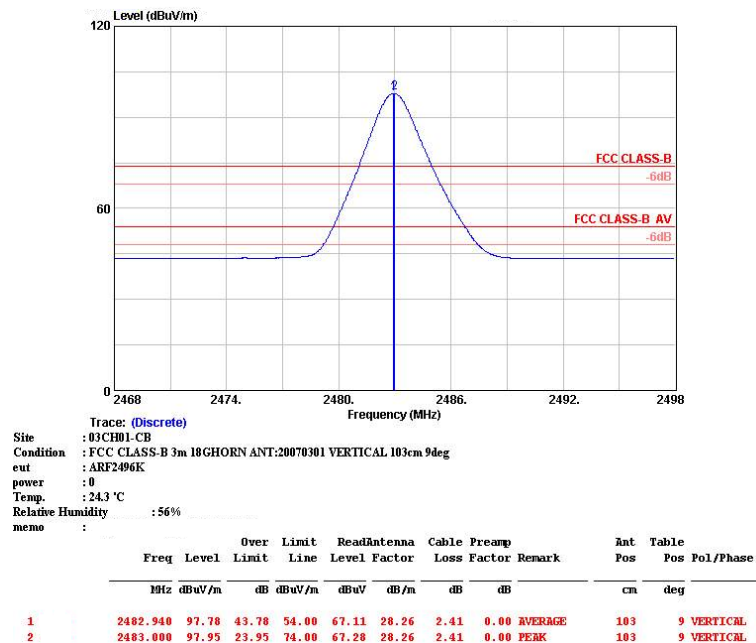


Figure-8 Transmitter field strength at 3m – 2483 MHz (Vertical)

FCC Test Result at TX Mode (Below 1GHz)

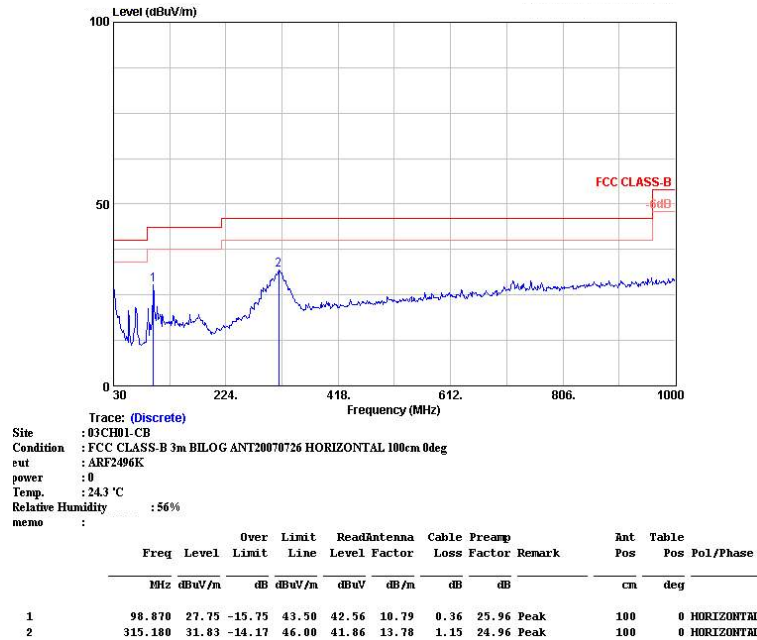


Figure-9 Transmitter Radiated Emission - 30 MHz ~ 1 GHz (Horizontal)

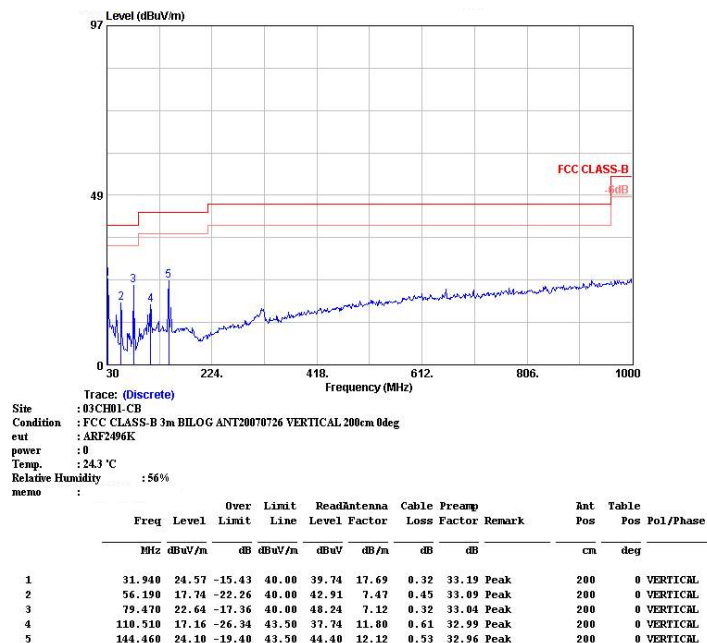


Figure-10 Transmitter Radiated Emission - 30 MHz ~ 1 GHz (Vertical)

FCC Test Result at TX Mode (Above 1GHz)

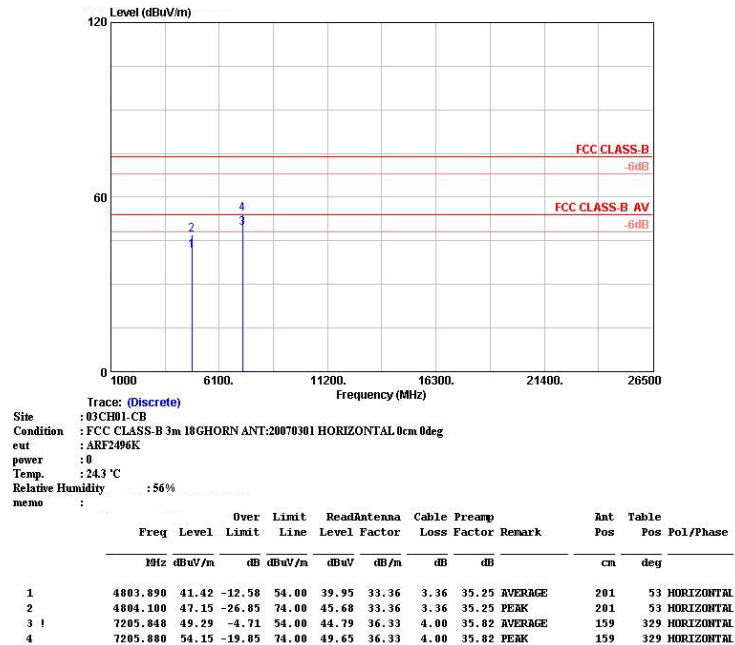


Figure-11 TX harmonic of 2402 MHz (Horizontal)

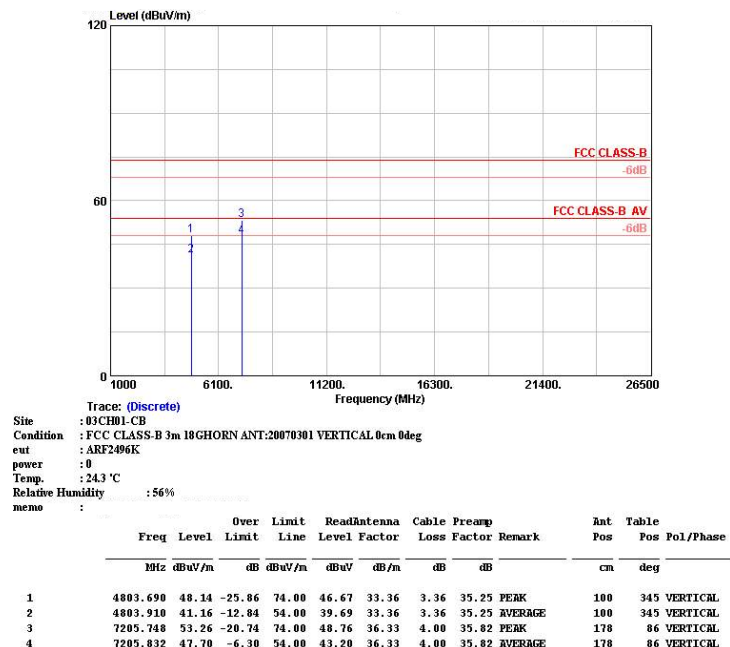
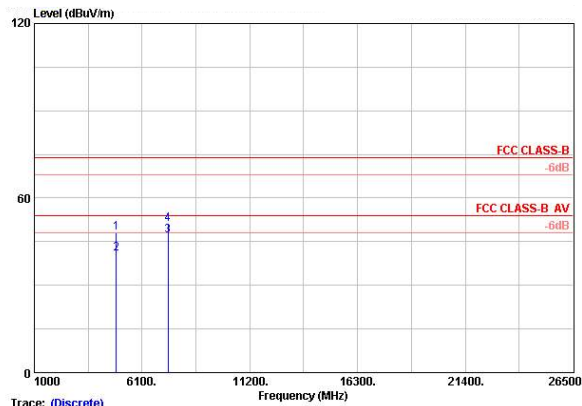


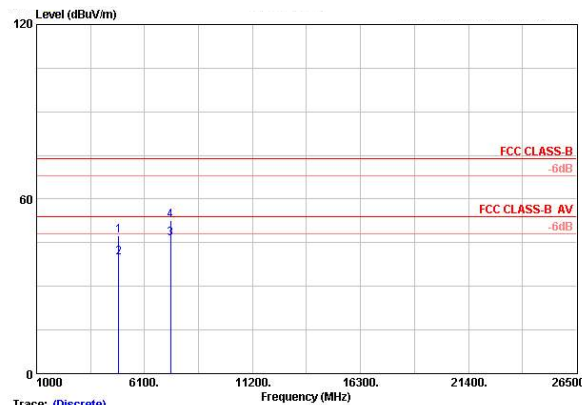
Figure-12 TX harmonic of 2402 MHz (Vertical)



Trace: (Discrete)
 Site : 03CH01-CB
 Condition : FCC CLASS-B 3m 18GHORN ANT:20070301 HORIZONTAL 0cm 0deg
 eut : ARF2496K
 power : 0
 Temp. : 24.3 °C
 Relative Humidity : 56%
 memo :

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	4887.828	48.20	-25.80	74.00	46.54	33.51	3.38	35.25	PEAK	180	298	HORIZONTAL
2	4887.988	40.95	-13.05	54.00	39.30	33.51	3.38	35.25	AVERAGE	180	298	HORIZONTAL
3	7331.828	47.20	-6.80	54.00	42.40	36.52	4.04	35.77	AVERAGE	164	257	HORIZONTAL
4	7332.112	50.97	-23.03	74.00	46.17	36.52	4.04	35.77	PEAK	164	257	HORIZONTAL

Figure-13 TX harmonic of 2444 MHz (Horizontal)



Trace: (Discrete)
 Site : 03CH01-CB
 Condition : FCC CLASS-B 3m 18GHORN ANT:20070301 VERTICAL 0cm 0deg
 eut : ARF2496K
 power : 0
 Temp. : 24.3 °C
 Relative Humidity : 56%
 memo :

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	4887.820	47.37	-26.63	74.00	45.72	33.51	3.38	35.25	PEAK	157	12	VERTICAL
2	4887.872	39.89	-14.11	54.00	38.24	33.51	3.38	35.25	AVERAGE	157	12	VERTICAL
3	7331.828	46.42	-7.58	54.00	41.62	36.52	4.04	35.77	AVERAGE	197	108	VERTICAL
4	7331.856	52.66	-21.34	74.00	47.86	36.52	4.04	35.77	PEAK	197	108	VERTICAL

Figure-14 TX harmonic of 2444 MHz (Vertical)

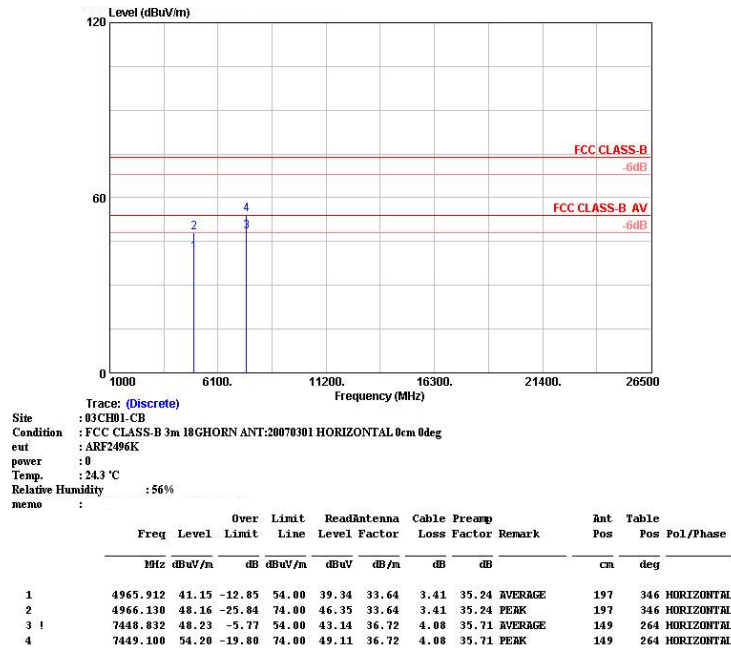


Figure-15 TX harmonic of 2483 MHz (Horizontal)

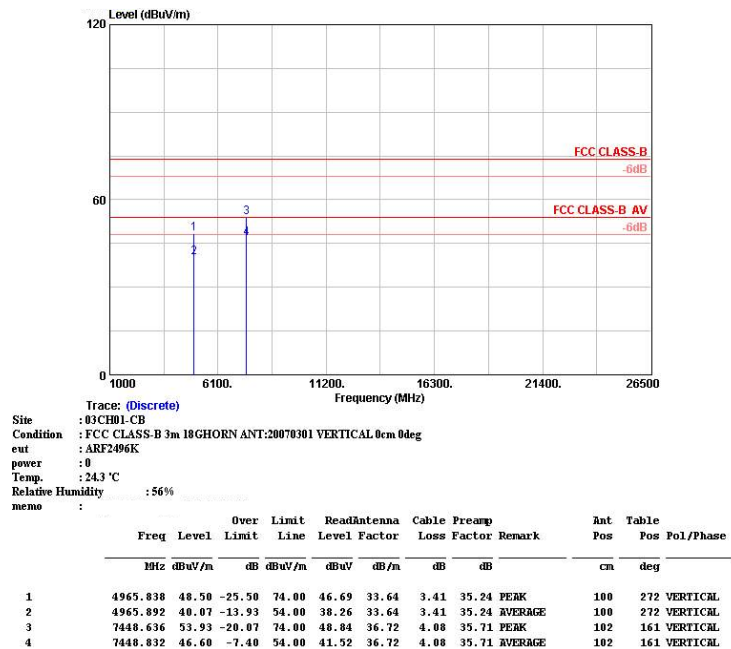


Figure-16 TX harmonic of 2483 MHz (Vertical)

FCC Test Result at RX Mode (Below 1GHz)

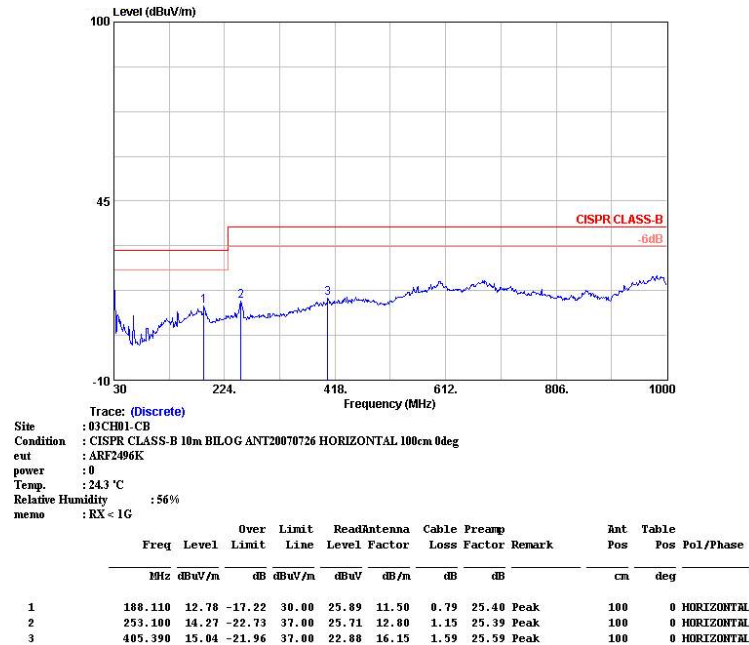


Figure-17 Receiver Radiated Emission - 30 MHz ~ 1 GHz (Horizontal)

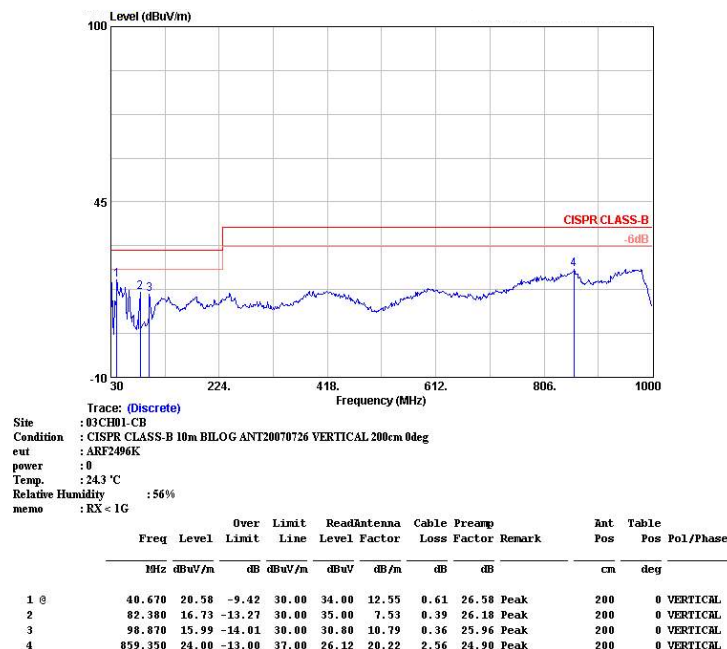


Figure-18 Receiver Radiated Emission - 30 MHz ~ 1 GHz (Vertical)

FCC Test Result at RX Mode (Above 1GHz)

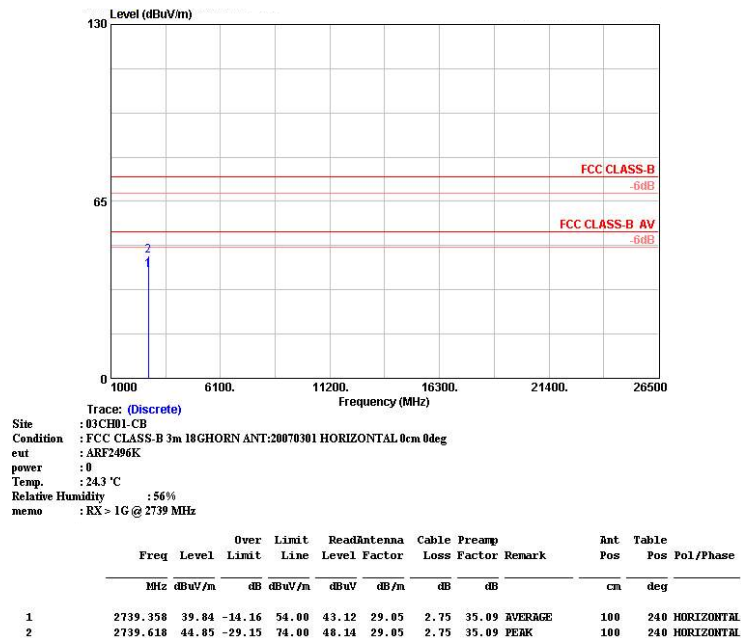


Figure-19 RX_LO of 2739 MHz (Horizontal)

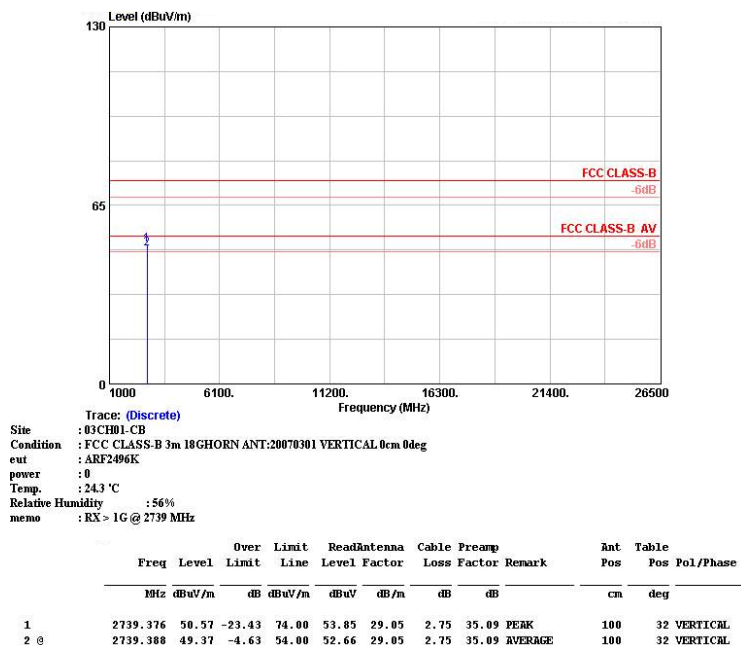


Figure-20 RX_LO of 2739 MHz (Vertical)

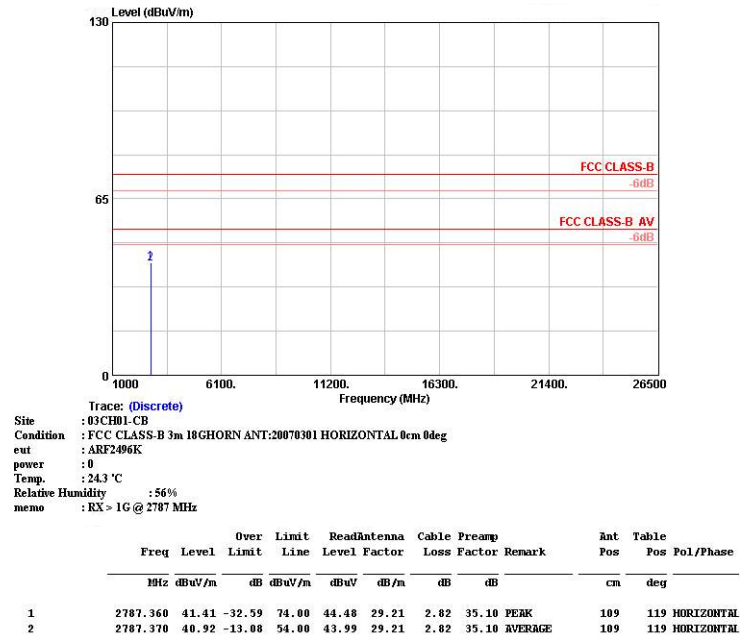


Figure-21 RX_LO of 2787 MHz (Horizontal)

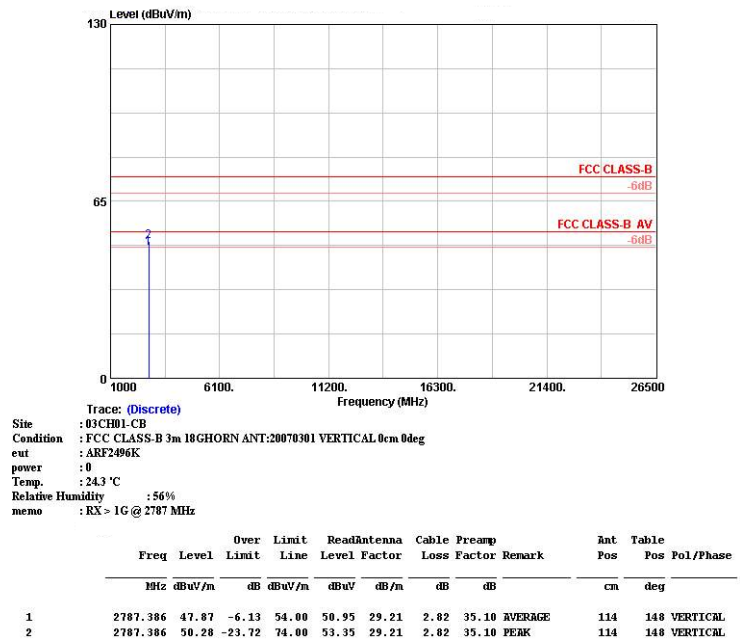


Figure-22 RX_LO of 2787 MHz (Vertical)

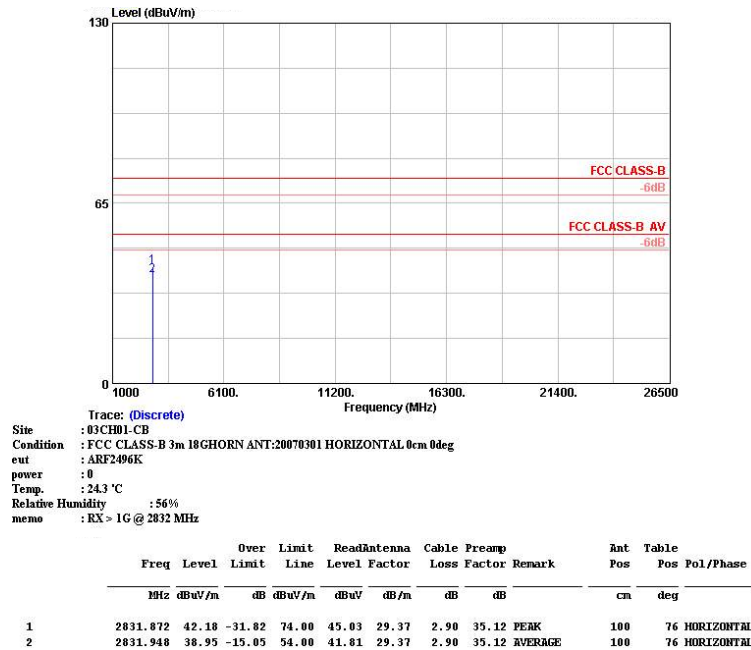


Figure-23 RX_LO of 2832 MHz (Horizontal)

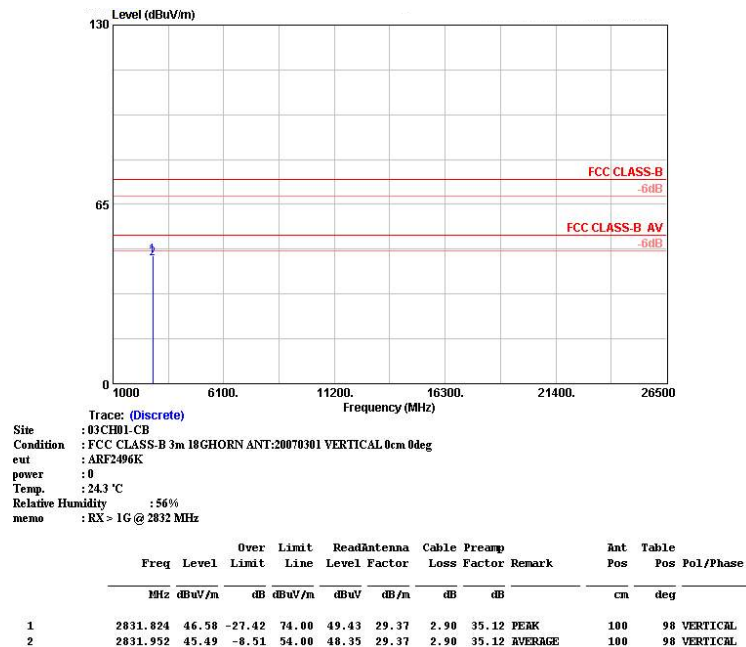


Figure-24 RX_LO of 2832 MHz (Vertical)

ETSI Test Information

Test Condition

Here lists the test conditions of the ETSI test at TX/RX mode.

Followed Requirement: ETSI EN 300 328 V1.6.1

Test Chamber: Fully Anechoic Chamber

Measurement Mode: RF antenna radiation test

Operation Mode of ARF2496K: direct mode

Operation Frequency: 2.402GHz, 2.444GHz, 2.483GHz

Output Power: 0 dBm

Test Item

Transmitter radiated emissions test : Below 1 GHz , above 1 GHz

Receiver radiated emissions test : Below 1 GHz , above 1 GHz

Summary of the test results

Applied Standard : ETSI EN 300 328 V1.6.1			
Rule Section	Description of Test	Result	Under Limit
EN 300 328	Transmitter of 30 MHz to 1 GHz	Complies	27 dB
EN 300 328	Transmitter above 1 GHz	Complies	21.7 dB
EN 300 328	Receiver of 30 MHz to 1 GHz	Complies	6 dB
EN 300 328	Receiver above 1 GHz	Complies	3.6 dB

ETSI Test Result at TX Mode (Below 1GHz)

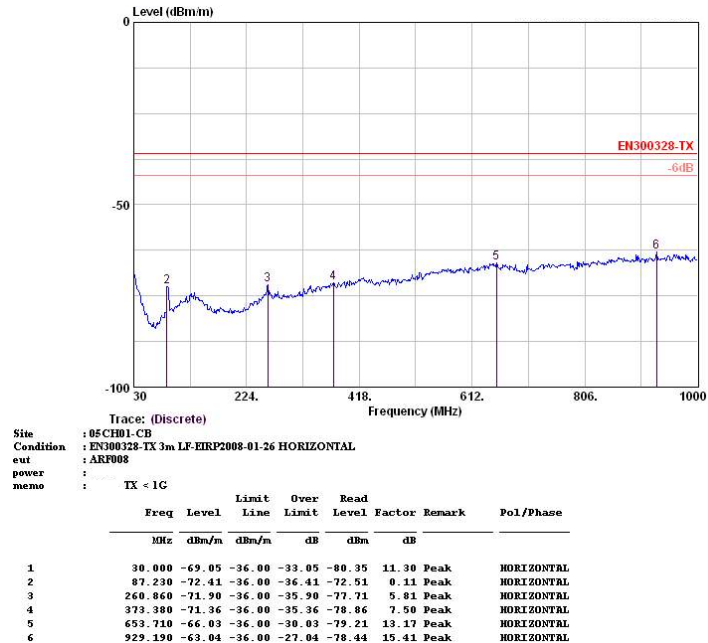


Figure-25 Transmitter Radiated Emission - 30 MHz ~ 1 GHz (Horizontal)

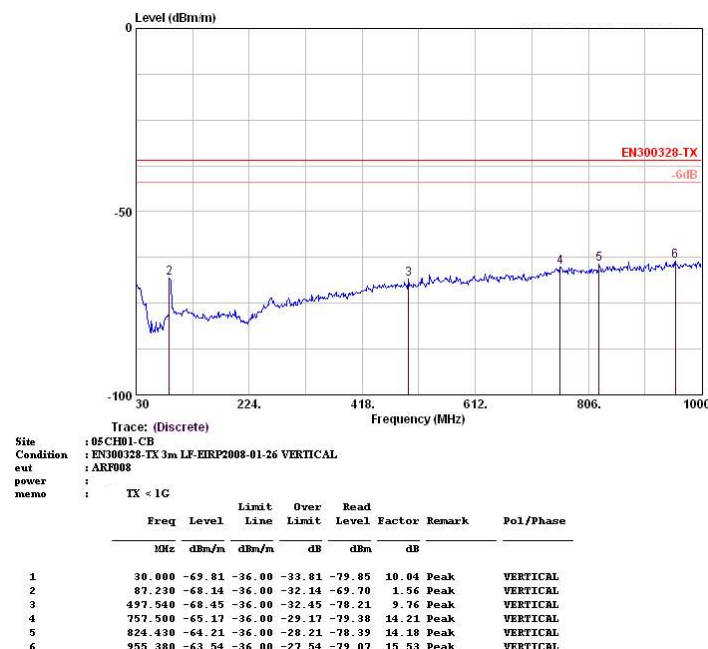


Figure-26 Transmitter Radiated Emission - 30 MHz ~ 1 GHz (Vertical)

ETSI Test Result at TX Mode (Above 1GHz)

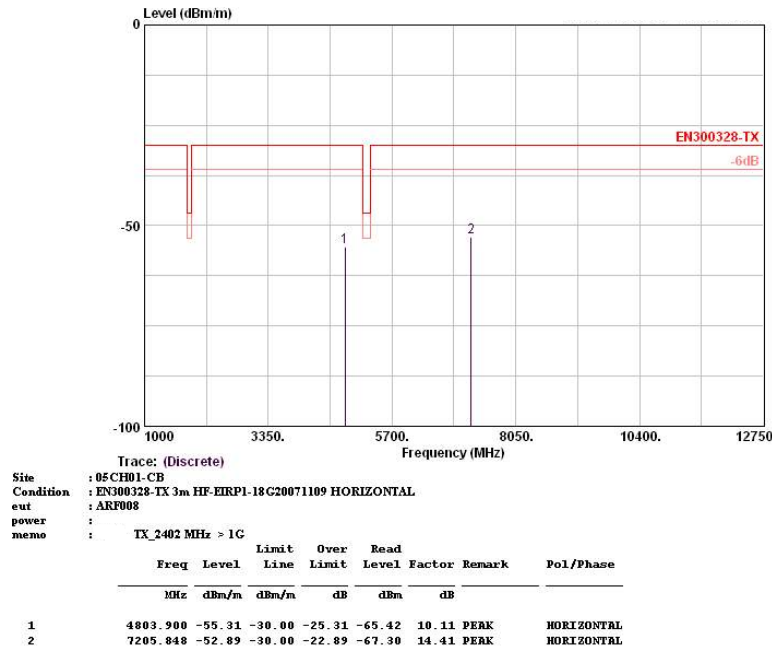


Figure-27 TX harmonic of 2402 MHz (Horizontal)

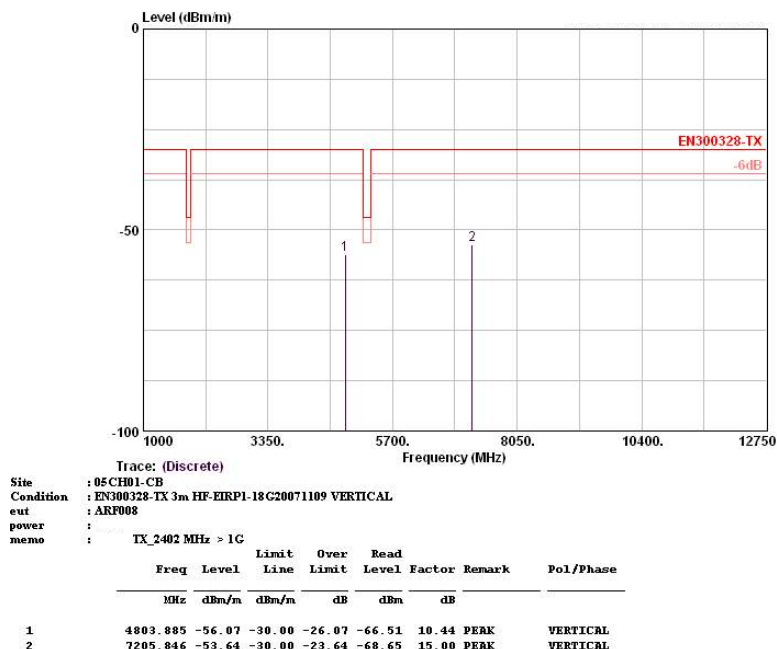


Figure-28 TX harmonic of 2402 MHz (Vertical)

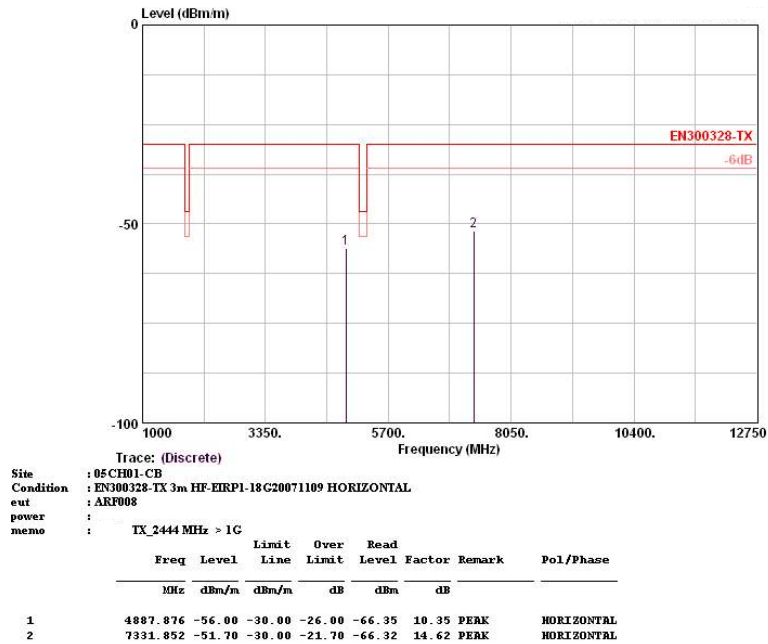


Figure-29 TX harmonic of 2444 MHz (Horizontal)

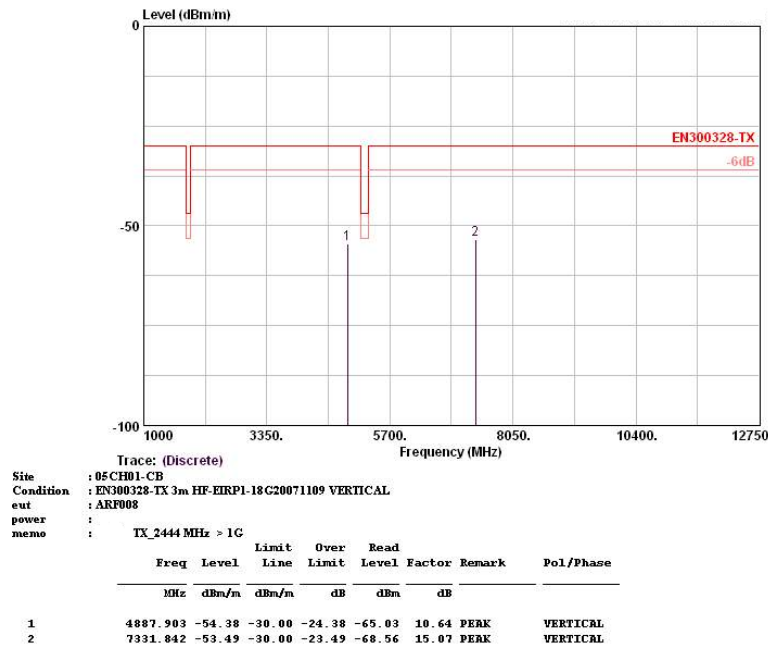


Figure-30 TX harmonic of 2444 MHz (Vertical)

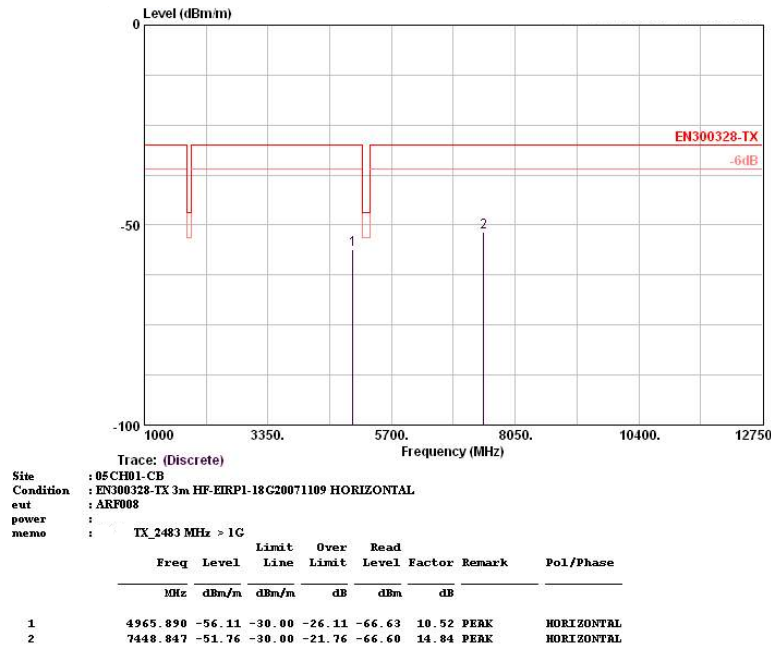


Figure-31 TX harmonic of 2483 MHz (Horizontal)

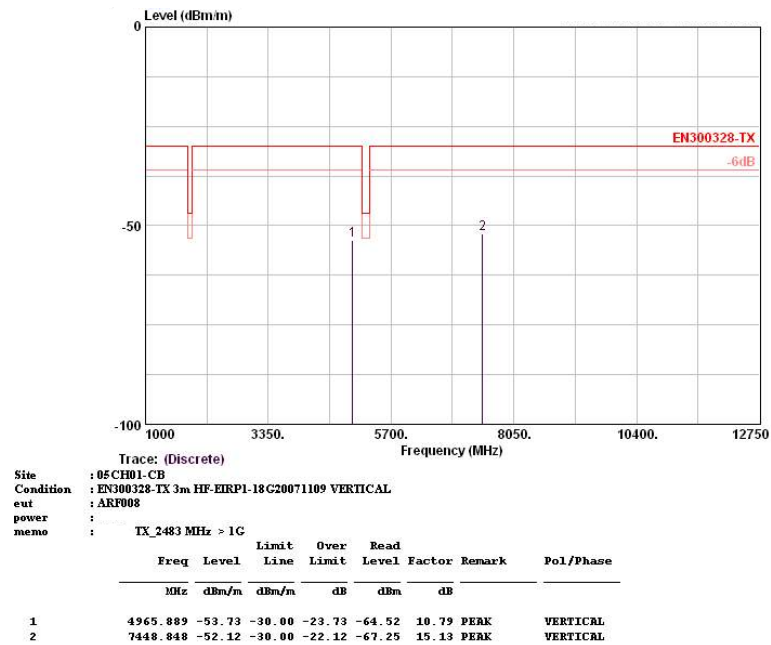


Figure-32 TX harmonic of 2483 MHz (Vertical)

ETSI Test Result at RX Mode (Below 1GHz)

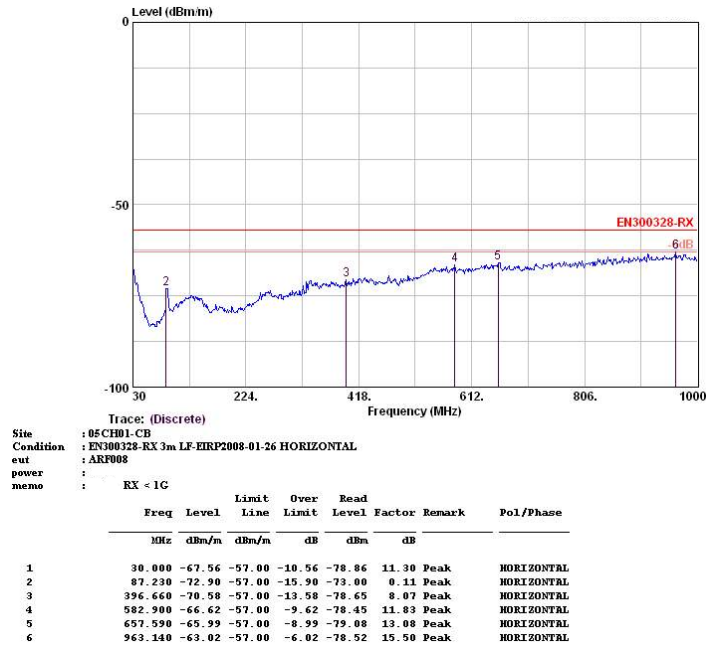


Figure-33 Receiver Radiated Emission - 30 MHz ~ 1 GHz (Horizontal)

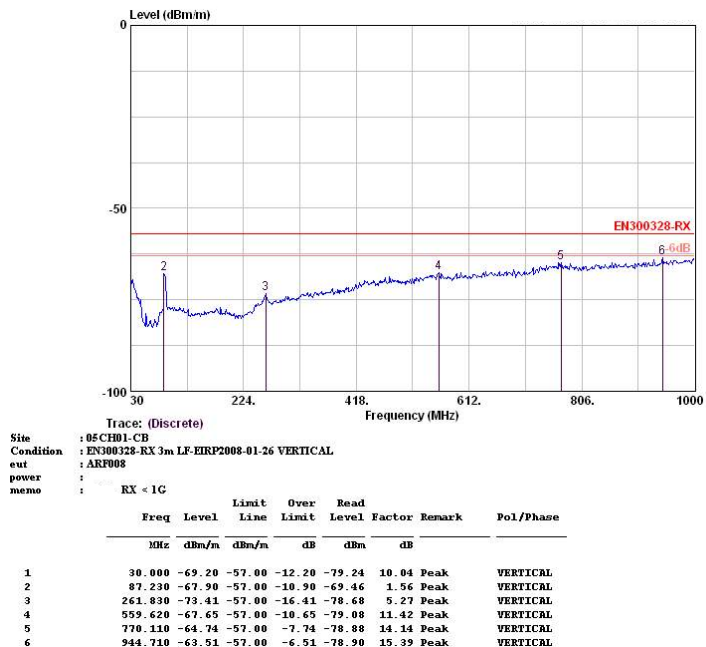


Figure-34 Receiver Radiated Emission - 30 MHz ~ 1 GHz (Vertical)

ETSI Test Result at RX Mode (Above 1GHz)



Figure-35 RX_LO of 2739 MHz (Horizontal)

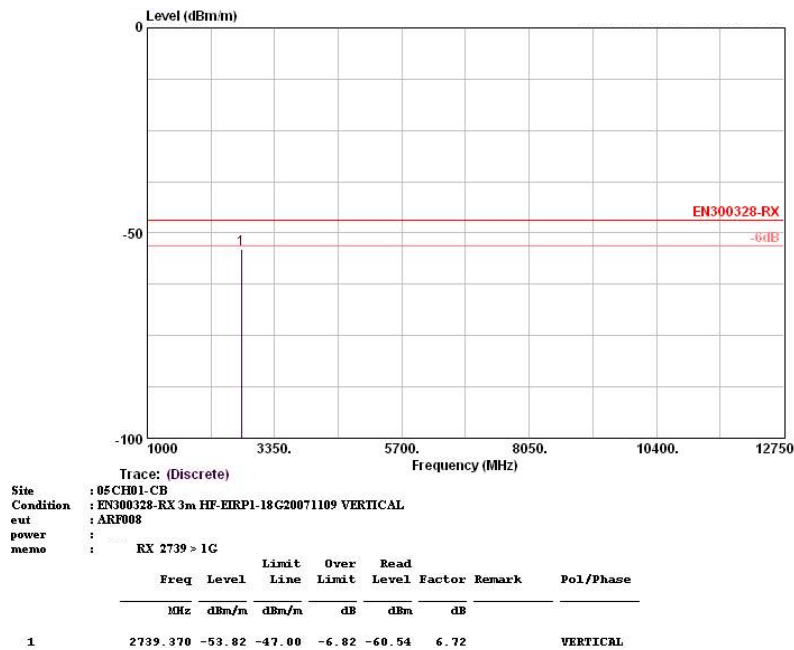
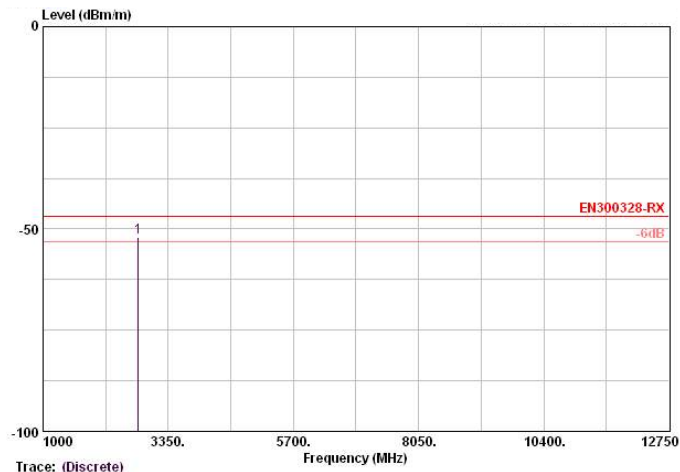


Figure-36 RX_LO of 2739 MHz (Vertical)

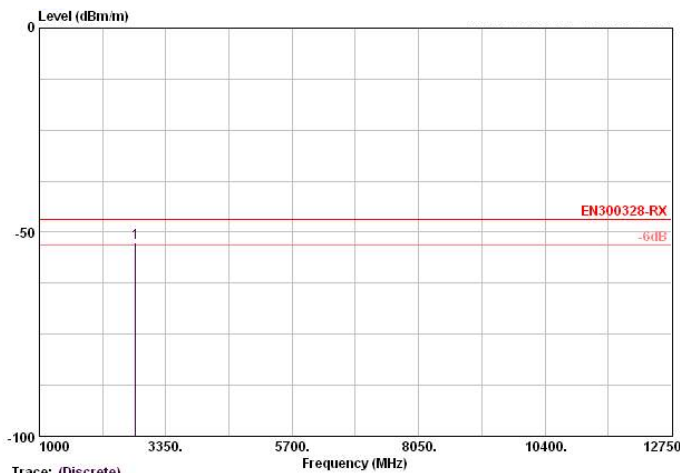


Trace: (Discrete)

Site : 05CH01-CB
 Condition : EN300328-RX 3m HF-EIRP1-18G20071109 HORIZONTAL
 out : ARF008
 power :
 memo : RX 2787 > 1G

	Freq	Level	Limit	Over	Read	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB		
1 !	2787.383	-52.06	-47.00	-5.06	-58.69	6.63		HORIZONTAL

Figure-37 RX_LO of 2787 MHz (Horizontal)



Trace: (Discrete)

Site : 05CH01-CB
 Condition : EN300328-RX 3m HF-EIRP1-18G20071109 VERTICAL
 out : ARF008
 power :
 memo : RX 2787 > 1G

	Freq	Level	Limit	Over	Read	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB		
1 !	2787.391	-52.47	-47.00	-5.47	-59.13	6.67		VERTICAL

Figure-38 RX_LO of 2787 MHz (Vertical)

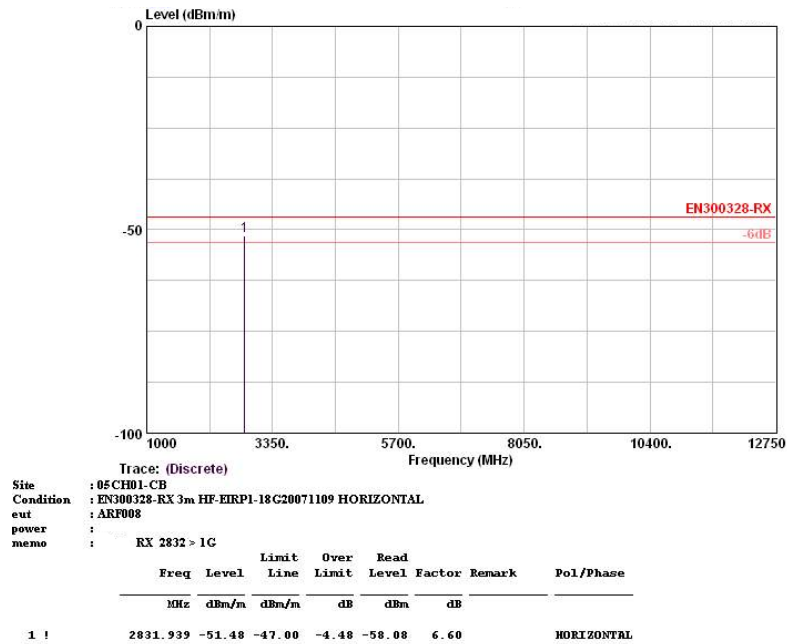


Figure-39 RX_LO of 2832 MHz (Horizontal)

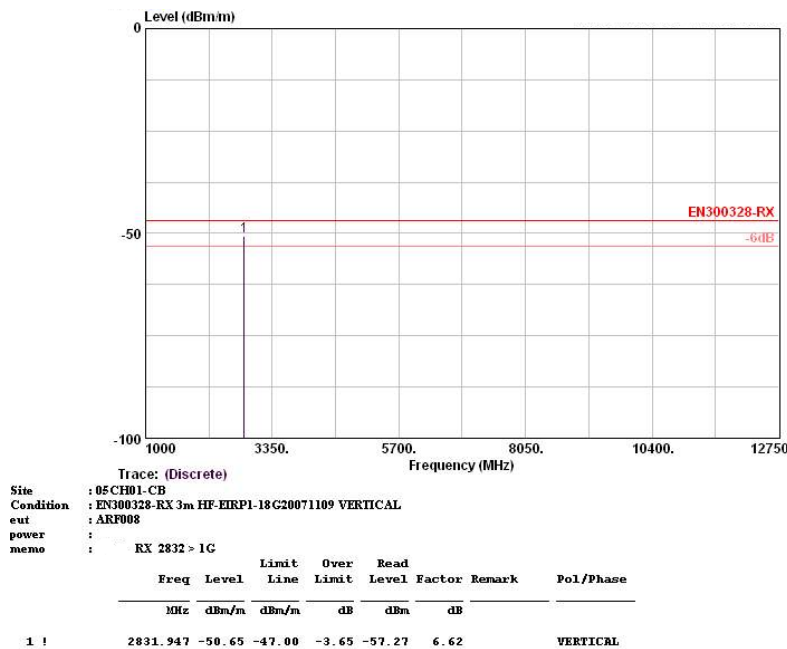


Figure-40 RX_LO of 2832 MHz (Vertical)

PHOTOGRAPHS OF TEST SET-UP



Figure-41 FCC measurement environment

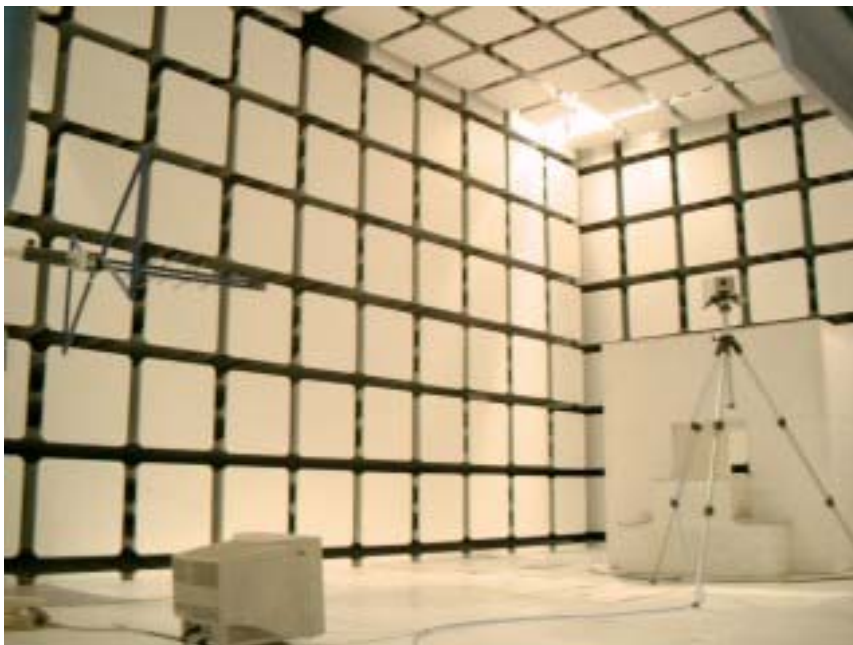


Figure-42 ETSI measurement environment

Revision Information

Version	Modify Information	Updated Date
V1.0	Initial Drift	11/Dec/06'
V1.1	Add FCC test result at transmit mode for 30MHz~1GHz	18/Jan/06'
V1.2	Add FCC test result by RX mode and ETSI test result by TX mode.	19/Jan/07'
V1.3	Replace ARF008_D2 version FCC & ETSI test result	16/Feb/07'
V2.0	Replace ARF008_E version FCC & ETSI test result with 100% duty cycle	7/May/08