



**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C REQUIREMENT**
OF

Automobile Alarm Transceiver

MODEL No.: HT-491/HT-492

BRAND NAME: King's GUN

FCC ID: MDXRF1011

REPORT NO: 020037-RF-ID

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1. GENERAL INFORMATION

1.1 Product Description

The Win Far Technology Co., Ltd. Model: HT-491/HT-492 (referred to as the EUT in this report) is a Transceiver of car alarm security system. It offers wireless remote control, ideal for use in vehicle security system to activate the function of center door lock control system and car searching except the alarm system. The Mode HT-491 is similar to HT-492 except the shape and the number of the button.

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 433.92 MHz
- B). Modulation : Pulse Modulation
- C). Antenna Designation: Non-User Replaceable (Fixed)
- D). Power Supply: 1.5V, Battery Operated.
Transmitting Time: Periodic \leq 5 seconds
- E). Receiver type : Super heterodyne

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: MDXRF1011 filing to comply with Section 15.231 of the FCC Part 15, Subpart C Rules. The composite system (receiver) is compliance with Subpart B is authorized under a DoC procedure.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (1992). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of C&C Laboratory, Co., Ltd. No. 81-1, 210 Lane, Pa-de 2nd Road, Lu-Chu Hsiang, Taoyuan, Taiwan, R.O.C.. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2000 and CISPR 22/EN 55022 requirements.

1.5 Special Accessories

Not available for this EUT intended for grant.

1.6 Equipment Modifications

Not available for this EUT intended for grant.



2. System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT (Transmitter) was operated in the normal operating mode. the Tx frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions (not apply in this report)

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-1992. Conducted emissions from the EUT measured in the **frequency range between 0.15 MHz and 30MHz** using **CISPR Quasi-Peak and Average detector mode**.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-1992.

2.4 Limitation

(1) Conducted Emission (Not applicable in this report)

According to section 15.207(a) Conducted Emission Limits is as following.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

- 1.The lower limit shall apply at the transition frequencies
- 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

(2) Radiated Emission

According to 15.231(b), the field strength of emissions from Intentional Radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental		Field Strength of Spurious	
	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)
40.66 - 40.70	67.04	2,250	47.04	225
70 - 130	61.94	1,250	41.94	125
130 - 174	* 61.94 - 71.48	* 1,250 - 3,750	* 41.94 - 51.48	* 125 - 375
174 - 260	71.48	3,750	51.48	375
260 - 470	* 71.48 - 81.94	* 3,750 - 12,500	* 51.48 - 61.94	* 375 - 1,250
above 470	81.94	12,500	61.94	1,250



* Linear Interpolations.

- Remark:
1. Emission level in $\text{dBuV/m} = 20 \log (\text{uV/m})$
 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
 3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of ξ 15.205
 4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of ξ 15.205, then the general radiated emission limits in ξ 15.209 apply.

2.5 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

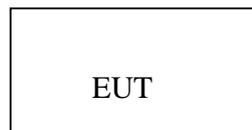




Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	Automobile Alarm Transceiver	King's GUN	HT-491	MDXRF1011		EUT

Note:

- (1) Unless otherwise denoted as EUT in 'Remark' column, device(s) used in tested system is a support equipment.



Table 2-2 Information of Interface Cable

Item	I/O Cable	Device Connected	Shielded Type	Ferrite Core	Detachable/ Permanently	Length	Note

Note:

- (1) Unless otherwise marked as in **Remark** column, Neutron consigns the support equipment to the tested system.
- (2) For detachable type I/O cable should be specified the length in cm in **Length** column.



3. Summary Of Test Results

FCC Rules	Description Of Test	Result
§15.207	Conducted Emission	N/A
§15.231	Radiated Emission	Compliant
§15.231	20dB Bandwidth	Compliant
§15.231	Duty Cycle Test (Pulse Modulation)	Compliant

4. Description of test modes

The EUT (Automobile Alarm Transceiver) has been tested under engineering test mode condition and the EUT staying in continuous transmitting mode.

The Frequency 433.92MHz is chosen for testing.



5. Conducted Emissions Test (Not applicable in this report)

5.1 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

5.2 Test SET-UP (Block Diagram of Configuration)

5.3 Measurement Equipment Used:

Conducted Emission Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NO.	SERIAL NO.	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCS30	847793/012	12/19/2001	12/18/2002
LISN	R&S	ESH2-Z5	843285/010	12/10/2001	12/09/2002
LISN	EMCO	3825/2	9003-1628	07/16/2001	07/15/2002
Spectrum Analyzer	ADVANTEST	R3261C	71720533	11/05/2001	11/04/2002
2X2 WIRE ISN	R&S	ENY22	100020	06/20/2002	06/19/2003
FOUR WIRE ISN	R&S	ENY41	100006	06/20/2002	06/19/2003

5.4 Measurement Result:

5.5 Conducted Measurement Photos:



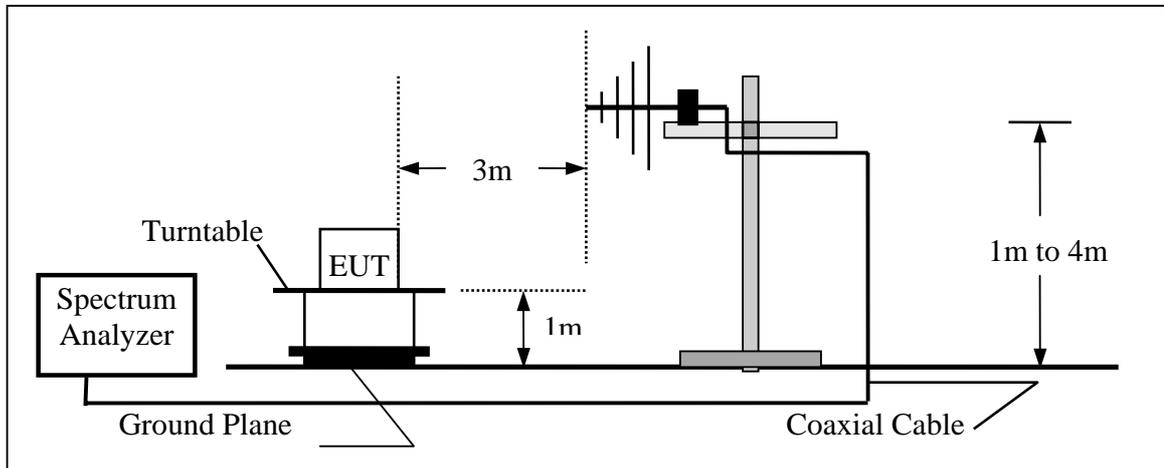
6. Radiated Emission Test

6.1 Measurement Procedure

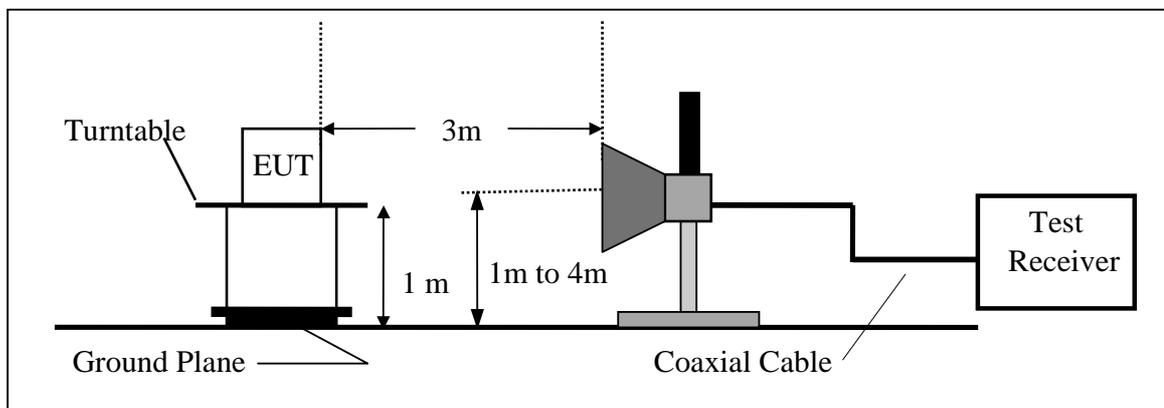
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level. 3
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until all frequency measured were complete.

6.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz





6.3 Measurement Equipment Used:

Open Area Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3261A	N/A	03/19/2002	03/18/2003
EMI Test Receiver	R&S	ESVS20	838804/004	01/05/2002	01/04/2003
Pre-Amplifier	HP	8447D	2944A09173	03/04/2002	03/03/2003
Bilog Antenna	SCHWAZBECK	VULB9163	145	07/06/2002	07/05/2003
Turn Table	EMCO	2081-1.21	9709-1885	N.C.R	N.C.R
Antenna Tower	EMCO	2075-2	9707-2060	N.C.R	N.C.R
Controller	EMCO	2090	9709-1256	N.C.R	N.C.R
RF Switch	ANRITSU	MP59B	M53867	N.C.R	N.C.R
Site NSA	C&C	N/A	N/A	11/17/2001	11/16/2002
Spectrum Analyzer	R&S	FSP30	1093.4495.30	07/23/2002	07/22/2003
Horn antenna	Schwarzbeck	BBHA 9120	D210	2/24/2002	2/23/2003
Pre-Amplifier	HP	8449B	3008B00965	10/01/2001	10/02/2002

6.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG - DFC$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	DFC = Duty Cycle Correction Factor



6.5 Measurement Result

Operation Mode: Transmitting Mode

Test Date : July 16, 2002

Fundamental Frequency: 433.92MHz

Test By: Markba

Temperature : 26

Pol: Vertical

Humidity : 68 %

Judgement : Passed by -1.64 dB at 867.9 MHz Ant.Pol. Ver EUT Axis Y

Freq. (MHz)	F /S	Ant.Pol. (H/V)	Reading (dBuV)	Ant./CL CF(dB)	Duty		Peak		A V		Margin (dB)	
					Cycle CF(dB)	Peak (dBuV/m)	A V (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)			
433.9	F	V	59.36	20.35	-7.63	79.71	72.08	99.00	79.00	-6.92	AV	
867.9	S	V	37.40	27.59	-7.63	64.99	57.36	79.00	59.00	-1.64	AV	
1300.0	S	V	67.29	-10.26	-7.63	57.03	49.40	74.00	54.00	* -4.60	AV	
1736.0	S	V	72.08	-8.52	-7.63	63.56	55.93	79.00	59.00	-3.07	AV	
2172.0	S	V	57.90	-6.95	-7.63	50.95	43.32	79.00	59.00	-15.68	AV	
2604.0	S	V	52.06	-5.55	-7.63	46.51	38.88	79.00	59.00	-20.12	AV	
3030.0	S	V	46.16	-4.68	-7.63	41.48	33.85	79.00	59.00	-25.15	AV	
3470.0	S	V	50.64	-3.5	-7.63	47.14	39.51	79.00	59.00	-19.49		
3900.0	S	V	39.51	-1.68	-7.63	37.83	30.20	74.00	54.00	* -23.80		
4340.0	S	V	38.36	-0.4	-7.63	37.96	30.33	74.00	54.00	* -23.67		

Remark :

- (1) + F/S F : denotes Fundamental Frequency ; S : denotes Spurious Frequency
- (2) EUT Orthogonal Axes : X denotes Laid on Table ; Y denotes Vertical Stand .
- (3) Measuring frequencies from 30 MHz to the 10th harmonic of fundamental frequency of 433.92 MHz.
- (4) Datas of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) * denotes spurious frequency which falls within the Restricted Bands specified in provision of §15.205, then the general radiated emission limits in § 15.209 apply.
- (6) Spectrum Setting : 30MHz – 1000MHz , RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz- 5GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms



Operation Mode: Transmitting Mode Test Date : July 16, 2002
 Fundamental Frequency: 433.92MHz Test By: Markba
 Temperature : 26 Pol: Vertical
 Humidity : 68 %
 Judgement : Passed by -2.65 dB at 1735.8 MHz Ant.Pol. Ver. EUT Axis X

Freq. (MHz)	F /S	Ant.Pol. (H/V)	Reading (dBuV)	Ant./CL CF(dB)	Duty		Peak		A V		Margin (dB)
					Cycle CF(dB)	Peak (dBuV/m)	A V (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
433.9	F	V	46.17	20.35	-7.63	66.52	58.89	99.00	79.00	-20.11	AV
867.9	S	V	26.36	27.59	-7.63	53.95	46.32	79.00	59.00	-12.68	AV
1300.0	S	V	65.85	-10.26	-7.63	55.59	47.96	74.00	54.00	* -6.04	AV
1736.0	S	V	72.50	-8.52	-7.63	63.98	56.35	79.00	59.00	-2.65	AV
2172.0	S	V	58.72	-6.95	-7.63	51.77	44.14	79.00	59.00	-14.86	AV
2604.0	S	V	43.96	-5.55	-7.63	38.41	30.78	79.00	59.00	-28.22	AV
3030.0	S	V	32.03	19.21	-7.63	51.24	43.61	79.00	59.00	-15.39	AV
3470.0	S	V	44.76	-3.5	-7.63	41.26	33.63	79.00	59.00	-25.37	AV
3900.0	S	V	38.38	-1.68	-7.63	36.7	29.07	74.00	54.00	* -24.93	AV
4340.0	S	V	41.72	-0.4	-7.63	41.32	33.69	74.00	54.00	* -20.31	AV

Remark :

- (1) + F/S F : denotes Fundamental Frequency ; S : denotes Spurious Frequency
- (2) EUT Orthogonal Axes : X denotes Laid on Table ; Y denotes Vertical Stand .
- (3) Measuring frequencies from 30 MHz to the 10th harmonic of fundamental frequency of 433.92 MHz.
- (4) Datas of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) * denotes spurious frequency which falls within the Restricted Bands specified in provision of §15.205, then the general radiated emission limits in § 15.209 apply.
- (6) Spectrum Setting : 30MHz – 1000MHz , RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz- 5GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms



7. Occupied Bandwidth

7.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set ETU normal operating mode.
3. Set SPA Center Frequency = fundamental frequency , RBW,VBW= 100KHz, Span =2MHz.
4. Set SPA Max hold. Mark peak, -20dB.

7.2 Test SET-UP (Block Diagram of Configuration)

Same as 4.2 Radiated Emission Measurement.

7.3 Measurement Equipment Used:

Same as 4.2 Radiated Emission Measurement.

7.4 Measurement Results: Refer to attached data chart.

The center frequency f_c is **433.92Mhz (point 1)**, according to the Rules, section 15.231(C), the Bandwidth of Center Frequency at-20dB should be calculated as following:

$$433.92 \times 0.0025 = 1.0848(\text{MHz})$$

So, the Uper/Lower frequencies should be specified as :

$$f_{(U)} = f_c + \Delta f/2 = 433.92 + 0.5424 = 434.46(\text{MHz})$$

$$f_{(L)} = f_c - \Delta f/2 = 433.92 - 0.5424 = 433.377 (\text{MHz})$$

The measured frequencies at -20dB Bandwidth of Fundamental are f (point 2) and f (point 3) as shown in the spectrum graphic above. Either f (point 4) or f(point 2) located within the band of frequency between $f_{(L)}=433.377$ MHz and $f_{(U)} = 434.46$ MHz. So, it is complacence with the requirements.

Measurement Result:

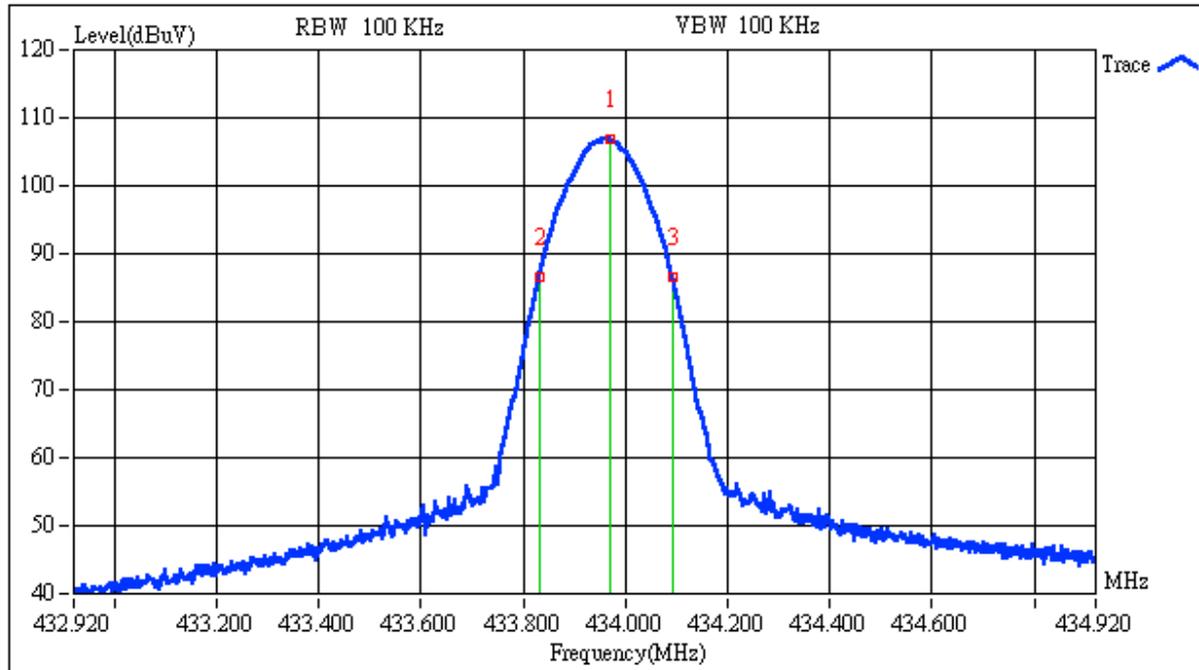
Center Frequency = 433.92 MHz

Upper Frequency = 433.83 MHz

Lower Frequency= 434.09 MHz



20dB BandWidth Test Data



Custom Name:	Engineer:	Peak	Band Width
源發	markba	0.00 MHz	0.260 MHz
Model Name:	Report No.:	0.00 dBuV	
HT-491		Delta1 433.83 MHz	Delta2 434.09 MHz
Test Mode:		86.71 dBuV	86.47 dBuV
TX bandwidth			



8. Duty Cycle Measurement (Pulse Modulation)

8.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set ETU normal operating mode.
3. Set SPA Center Frequency = fundamental frequency , RBW,VBW= 100KHz, Span =0 Hz. Adjacent sweep.
4. Set SPA View. Mark delta.

8.2 Test SET-UP (Block Diagram of Configuration)

Same as 4.2 Radiated Emission Measurement.

8.3 Measurement Equipment Used:

Same as 4.2 Radiated Emission Measurement.

8.4 Measurement Results: Refer to attached data chart.

T_p measurement = 120 ms

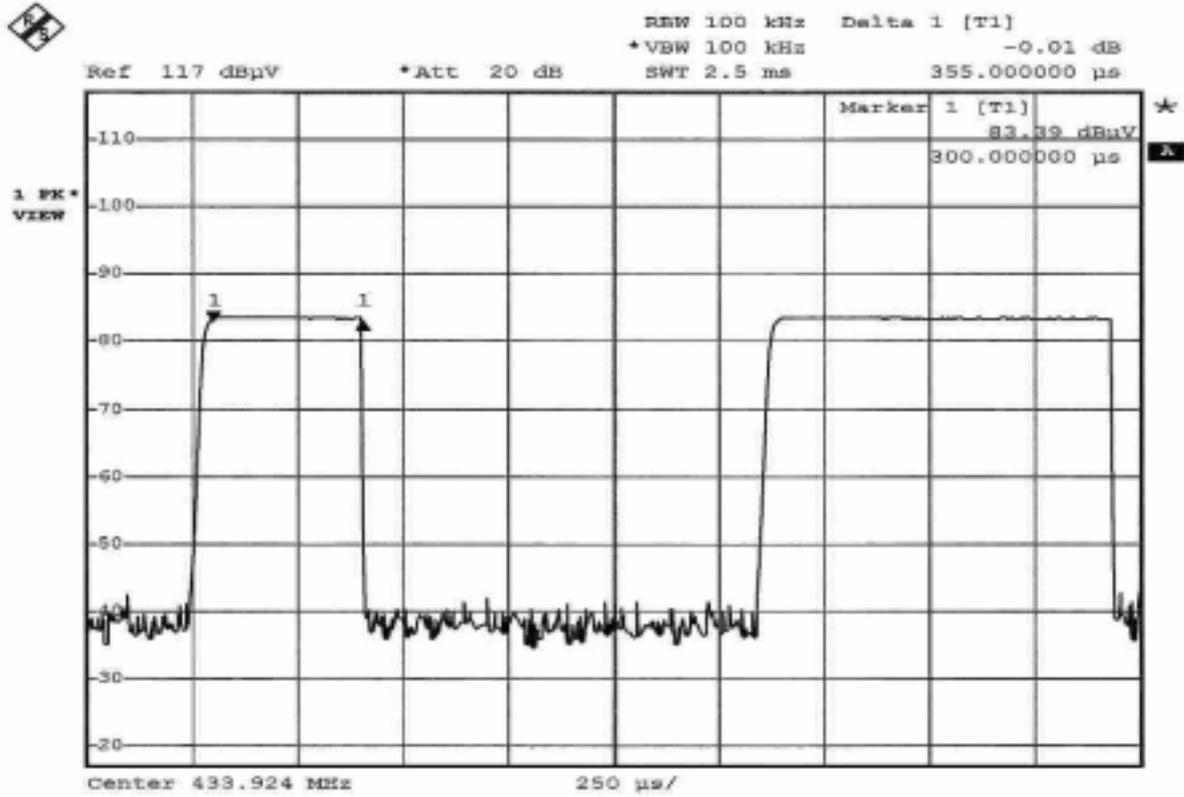
T_p = 100 ms

T_{on} = $33 \times 0.785 + 32 \times 0.355 + 12 \times 0.355 = 41.52$ (ms)

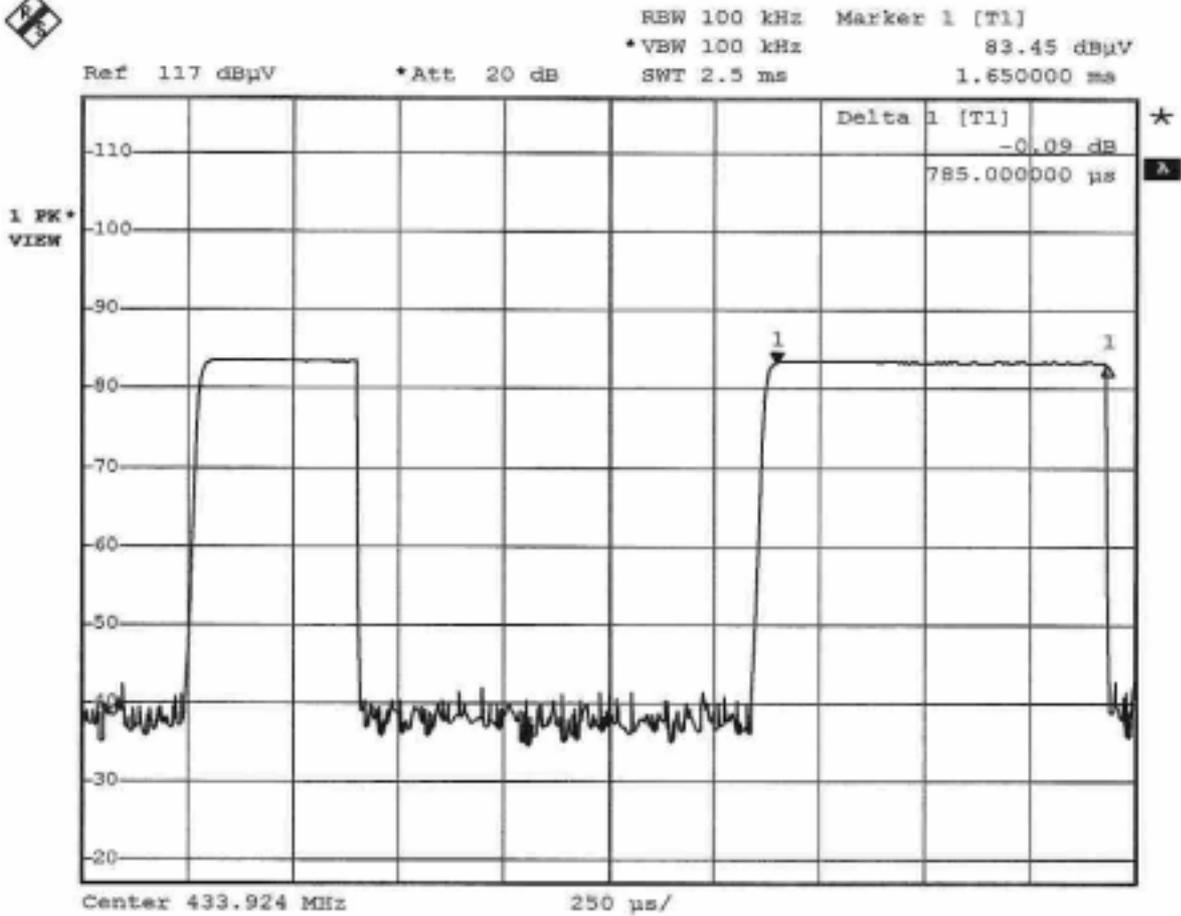
Factor = $20 \times \log(T_{on} / T_p) = 20 \times \log(41.52 / 100)$
= -7.63 dB



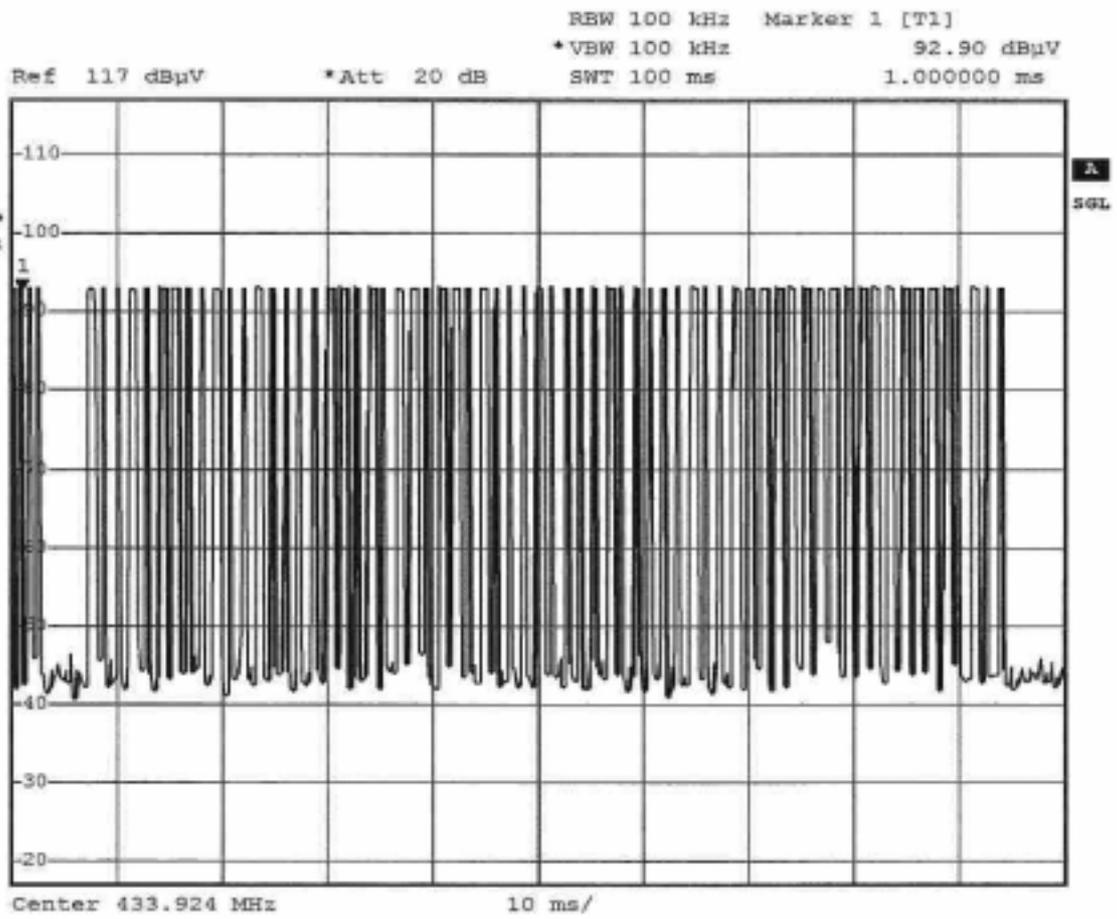
Duty cycle test



Comment A: TX CH-HIGH(2480MHz)
Date: 2.AUG.2002 07:38:05



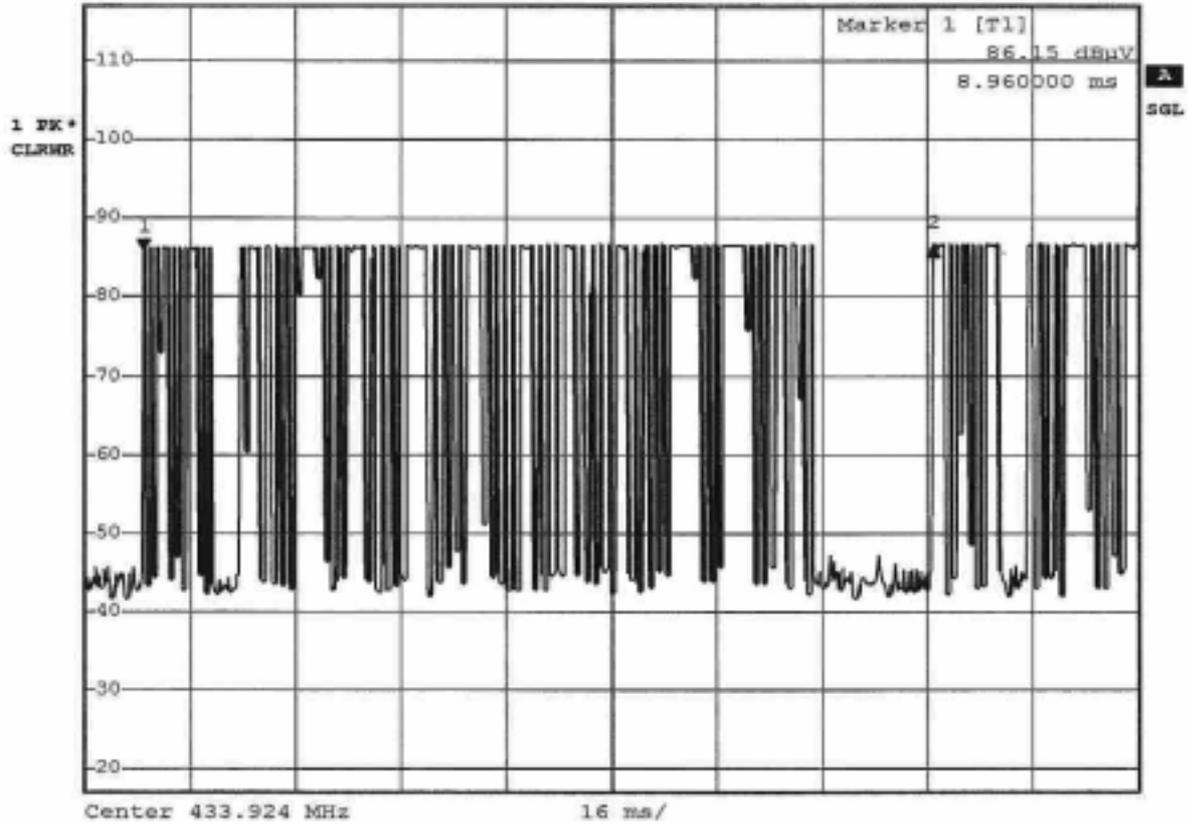
Comment A: TX CH-HIGH(2480MHz)
Date: 2.AUG.2002 07:40:14



Comment A: TX CH-HIGH(2480MHz)
Date: 2.AUG.2002 08:15:38



RBW 100 kHz Delta 2 [T1]
*VBW 100 kHz 0.61 dB
Ref 117 dBuV *Att 20 dB SWT 160 ms 120.000000 ms



Comment A: TX CH-HIGH(2480MHz)
Date: 2.AUG.2002 08:32:13