

# **F C C - TEST REPORT**

REPORT NO.: 38876/4/400F

# **FCC – Test Report**

Date: 2004-08-07

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FCC listed testlab  
acc. to Section 2.948 of the FCC - Rules  
in compliance with the requirements of  
ANSI C63.4 - 1992

**Product** : 27MHz Radio Control Transmitter  
**Product Class** : Low Power Communication Device  
Transmitter  
**Model** : 738001  
**Applicant** : ARTIN INDUSTRIAL CO LTD

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## LABORATORY - REPORT

**APPLICANT:** ARTIN INDUSTRIAL CO LTD  
**ADDRESS:** 2/F, Lee Sum Factory Building  
21-25 Sze Mei Street  
San Po Kong, Kowloon  
HONG KONG

**DATE OF SAMPLE RECEIVED:** 2004-07-07

**DATE OF TESTING:** 2004-07-29 to 2004-08-03

### DESCRIPTION OF SAMPLE:

Product: 27MHz Radio Control Transmitter  
Product class: Low Power Communication Device Transmitter  
Model number: 738001  
Rating: DC 9V ('6F22' Size Battery x 1)

**INVESTIGATIONS REQUESTED:** Measurements to the relevant clauses of F.C.C. Rules and Regulations  
Part 15 Subpart C - Intentional Radiators

**RESULTS:** See the attached test sheets

**CONCLUSIONS:** From the measurement data obtained, the tested sample was considered to have COMPLIED with the requirements for the relevant clauses of Federal Communications Commission Rules as specified above.

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Authorized Signature

**Remark:** 1. Purpose of those tests in this report is to provide the applicant with the necessary test data of their device for the submission to FCC with application for Equipment Authorization under the FCC Equipment Authorization Program. The tests themselves are not Approval Tests.  
2. The conducted emissions test (if applicable) has considered the limits in Sections 15.107 and 15.207 adopted under FCC 02-157 (ETDocket 98-80). The product may be marketed after July 11, 2005, and is not affected by the 15.37(j) transition provisions.

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## Summary of Test Results

### Interference Radiation:

Test result: O.K.  
Test data: See attached data sheet

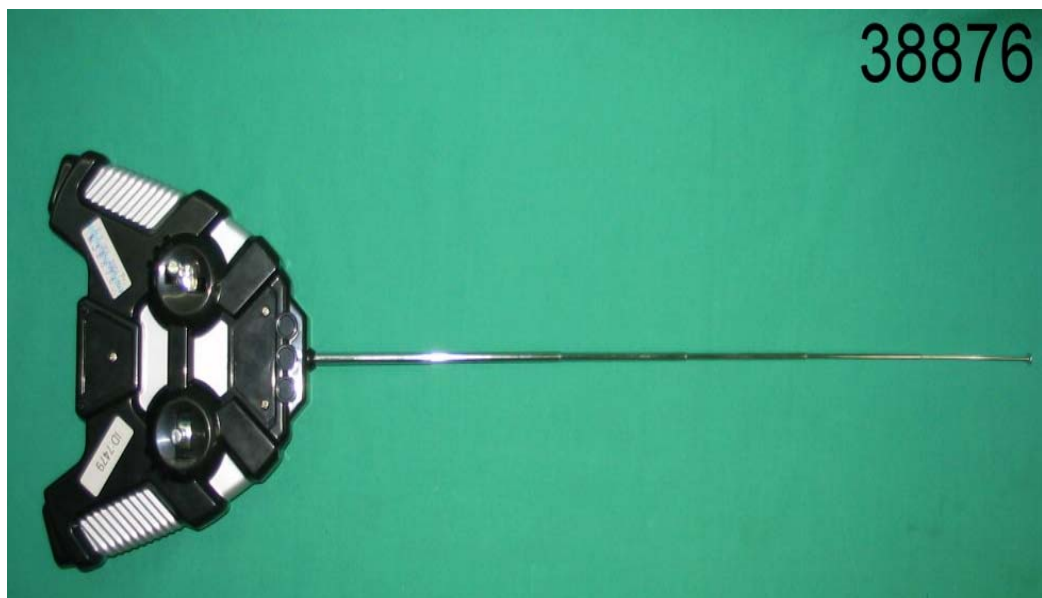
### Interference Voltage:

Test result: N.A.  
Test data: N.A.

### Measurement of Emissions within Band Edges

Test result: O.K.  
Test data: See attached data sheet

### PHOTOGRAPH OF THE SAMPLE



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## TEST EQUIPMENT LIST

Equipment	Manufacturer	Model	Serial No.	Remark
Test Receiver	Rohde & Schwarz	ESH 3	863497/015	150KHz – 30MHz
Test Receiver	Rohde & Schwarz	ESH 3	892580/006	9KHz – 30MHz
Test Receiver	Rohde & Schwarz	ESVP	860688/022	25MHz – 1,000 MHz
Test Receiver	Rohde & Schwarz	ESVP	863512/012	25MHz – 1,000 MHz
Test Receiver	Rohde & Schwarz	ESHS30	839667/002	9KHz – 30MHz
Test Receiver	Rohde & Schwarz	ESVS30	828525/006	25MHz – 1000MHz
Spectrum Analyzer with Q. Peak	Advantest	R3132	140101852	9KHz – 3GHz
Spectrum Analyzer with Q. Peak	Tektronix	2712	B023006	0.15MHz – 1000MHz
Interface for Spectrum 2712	Tektronix	TD3F14A	--	--
Impulse Limiter	Rohde & Schwarz	ESH-3-Z2	--	--
Artificial Mains Network (LISN)	Schwarzbeck	NSLK 8127	8127312	2 x 10A, 50Ω, 50μH 9KHz-30MHz
Artificial Mains Network (LISN)	Schwarzbeck	NSLK 8127	8127309	2 x 10A, 50Ω, 50μH 9KHz-30MHz
Antenna System	Schwarzbeck	BBA 9106 / UHALP 9107	--	30MHz – 1000MHz
Antenna Mast System	Schwarzbeck	AM9104	--	Max. 4 meters height
Loop Antenna	Rohde & Schwarz	HFH2-Z2	871336/48	9KHz-30MHz
Turntable with Controller	Drehtisch	DT312	--	φ120 cm

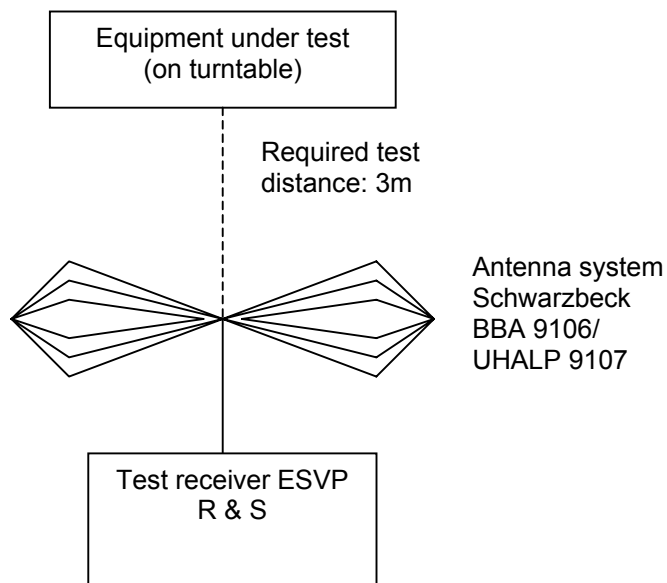
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## Radiated Emission Test Procedure (> 30MHz)



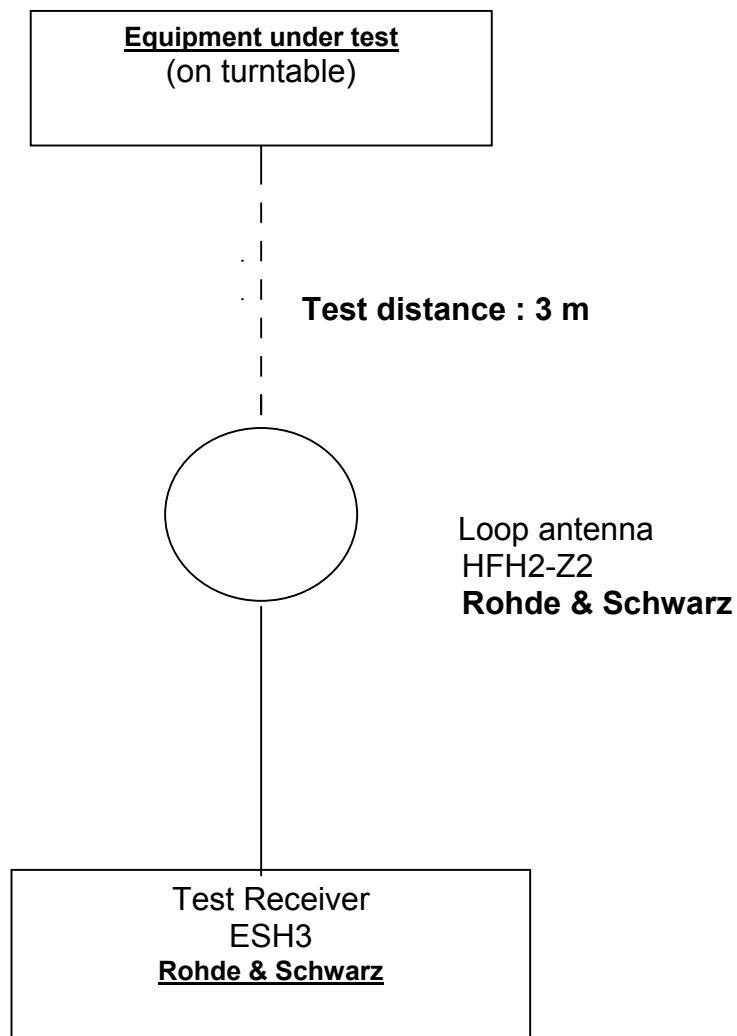
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## Radiated Emission Test Procedure ( 9kHz – 30MHz)





# Interference Radiation

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Measurement of Radiated Emissions (9kHz - 30MHz)

FCC Part 15 Subpart C

IECC Ref:	38876/4/400F	Test Equipment
Model:	738001	Receiver: ESH3 Rohde & Schwarz
Applicant:	ARTIN INDUSTRIAL CO LTD	Antenna: HFH2-Z2 Rohde & Schwarz
Sample No.:	1	
Set under test:	27MHz Radio Control Transmitter	
Connected sets:	-	
Operating mode:	Power "On"	

## Radiation Measurement (3 m) below 30MHz

a. Fundamental Frequency

Frequency (MHz)	Maximum Test Result (dB(μV/m))		FCC Limit (dB(μV/m))	
	Peak	Average *	Peak	Average
27.145	67.0	63.4	100	80

Note : (1) The above peak value is the maximum value of the measurement in 3 orthogonal planes

(2) \* Calculation for radiation (average) :

Formula :

Duty cycle =  $(N1L1 + N2L2 + \dots + Nn-1Ln-1 + NnLn) / 100$  or T

where N1 is number of type 1 pluse, L1 is length of type 1 pulse, etc.

T is the period of the pulse train (if less than 100 ms)

According to the time domain plots shown in page 10 & 11 :

Duty cycle of the EUT =  $(4 \times 2.4 + 22 \times 0.9) / 44.7 = 0.66$

Av correction factor =  $20 \times \log(0.66)$  dB  
= - 3.6 dB

Radiation (average) = Radiation (peak) + Av correction factor

Radiation (average) of the EUT =  $67.0 - 3.6$  dB(μV/m)  
= 63.4 dB(μV/m)

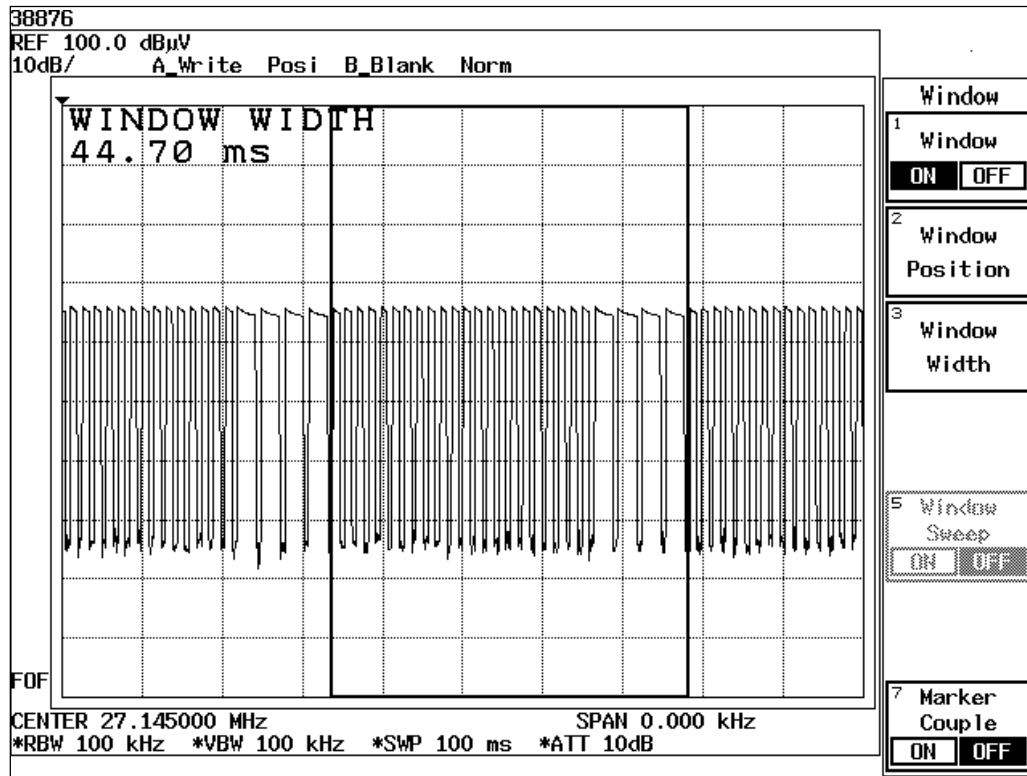
b. The measured radiation outside the operation band were negliginle

# Interference Radiation

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## Transmitter Emission - Time Domain Plots



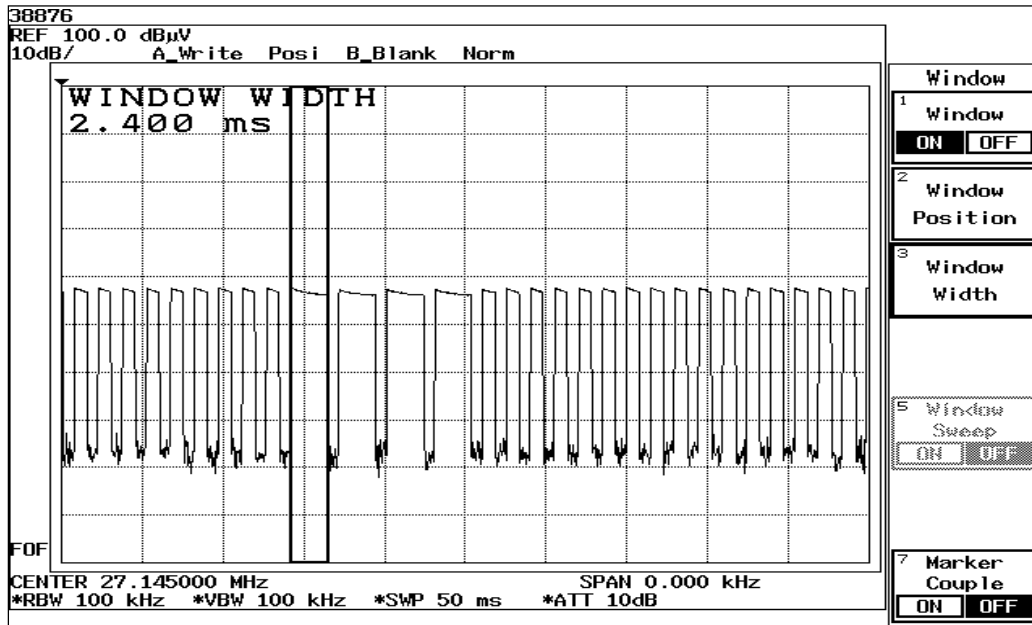
Pulse cycle period = 44.7 ms

# Interference Radiation

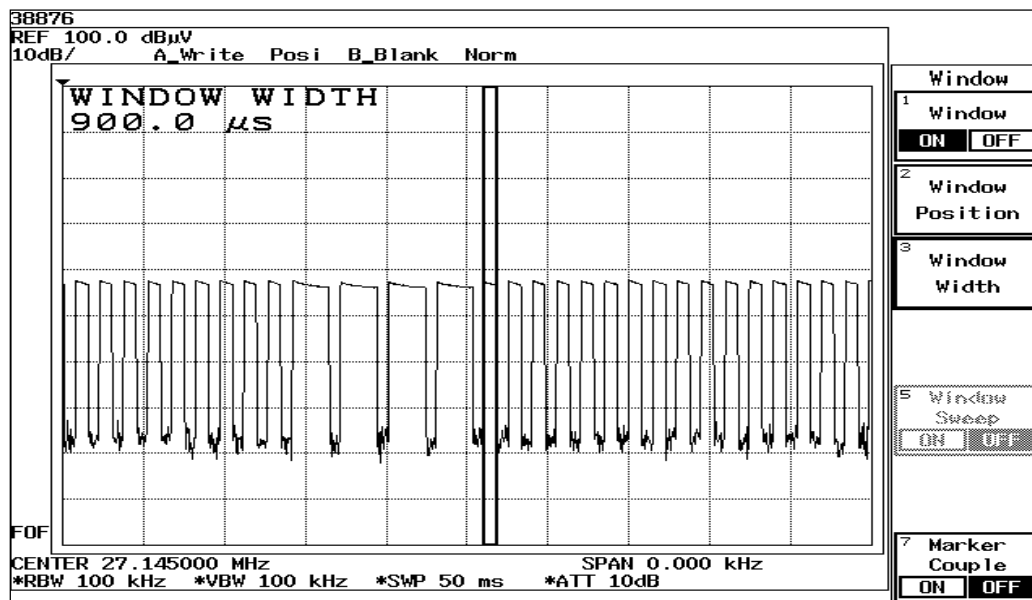
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## Transmitter Emission - Time Domain Plots



Pulse width = 2.4 ms (total number of pulse : 4)



Pulse width = 0.9 ms (total number of pulse : 22)

# Interference Radiation

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Measurement of Radiated Emissions (30MHz-1000MHz)

Acc: FCC Part 15 Subpart C

IECC Ref: 38876/4/400F  
 Model: 738001  
 Applicant: ARTIN INDUSTRIAL CO LTD  
 Sample No.: 1  
 Set under test: 27MHz Radio Control Transmitter  
 Connected sets: -  
 Operating mode: Power "On"

Test Equipment  
 Receiver: ESVP Rohde & Schwarz  
 Antenna: Schwarzbeck BBA 9106  
 and UHALP 9107

Fundamental Frequency : 27.145 MHz

## Radiation Measurement over 30MHz

	Frequency (MHz)	Horz. Reading dB(μV)	Vert. Reading dB(μV)	Antenna Factor (dB)	Horiz. Test Result dB(μV/m)	Vert. Test Result dB(μV/m)	Limit dB(μV/m)
Harm. 2	54.29	< 16	< 16	10.2	< 26.2	< 26.2	40.0
Harm. 3	81.44	< 16	< 22	7.1	< 23.1	< 29.1	40.0
Harm. 4	108.58	< 16	< 16	11.6	< 27.6	< 27.6	43.5
Harm. 5	135.73	< 16	< 16	14.3	< 30.3	< 30.3	43.5
Harm. 6	162.88	< 16	< 16	15.6	< 31.6	< 31.6	43.5
Harm. 7	190.02	< 16	< 16	16.3	< 32.3	< 32.3	43.5
Harm. 8	217.17	< 16	< 16	16.9	< 32.9	< 32.9	46.0
Harm. 9	244.31	< 16	< 16	17.6	< 33.6	< 33.6	46.0
Harm. 10	271.46	< 16	< 16	18.5	< 34.5	< 34.5	46.0
Harm. 11	298.61	< 16	< 16	19.9	< 35.9	< 35.9	46.0
Harm. 12	325.75	< 16	< 16	16.8	< 32.8	< 32.8	46.0
Harm. 13	352.90	< 16	< 16	17.4	< 33.4	< 33.4	46.0
Harm. 14	380.04	< 16	< 16	17.9	< 33.9	< 33.9	46.0
Harm. 15	407.19	< 16	< 16	18.4	< 34.4	< 34.4	46.0
Harm. 16	434.34	< 16	< 16	18.8	< 34.8	< 34.8	46.0
Harm. 17	461.48	< 16	< 16	19.2	< 35.2	< 35.2	46.0
Harm. 18	488.63	< 16	< 16	19.5	< 35.5	< 35.5	46.0
Harm. 19	515.77	< 16	< 16	19.9	< 35.9	< 35.9	46.0
Harm. 20	542.92	< 16	< 16	20.1	< 36.1	< 36.1	46.0
Harm. 21	570.07	< 16	< 16	20.5	< 36.5	< 36.5	46.0
Harm. 22	597.21	< 16	< 16	20.9	< 36.9	< 36.9	46.0
Harm. 23	624.36	< 16	< 16	21.2	< 37.2	< 37.2	46.0
Harm. 24	651.50	< 16	< 16	21.6	< 37.6	< 37.6	46.0
Harm. 25	678.65	< 16	< 16	22.1	< 38.1	< 38.1	46.0
Harm. 26	705.80	< 16	< 16	22.5	< 38.5	< 38.5	46.0
Harm. 27	732.94	< 16	< 16	22.8	< 38.8	< 38.8	46.0
Harm. 28	760.09	< 16	< 16	23.2	< 39.2	< 39.2	46.0
Harm. 29	787.23	< 16	< 16	23.5	< 39.5	< 39.5	46.0
Harm. 30	814.38	< 16	< 16	23.9	< 39.9	< 39.9	46.0
Harm. 31	841.53	< 16	< 16	24.2	< 40.2	< 40.2	46.0
Harm. 32	868.67	< 16	< 16	24.6	< 40.6	< 40.6	46.0
Harm. 33	895.82	< 16	< 16	24.9	< 40.9	< 40.9	46.0
Harm. 34	922.96	< 16	< 16	25.3	< 41.3	< 41.3	46.0
Harm. 35	950.11	< 16	< 16	25.8	< 41.8	< 41.8	46.0
Harm. 36	977.26	< 16	< 16	26.2	< 42.2	< 42.2	54.0

**Remark:** All frequencies in the required range have been scanned and only those significant and representative readings are reported above.  
 All emissions not reported above are all well below the limit.

**Note:** Unless otherwise indicated, the recorded readings are in quasi-peak values.

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## Notes for Radiation Measurement

**1. Measurement facility:**

Measurement facility located at Fanling (Hong Kong), placed on file with the FCC Pursuant to Section 2.948 of the FCC Rules.

**2. Distance between the EUT and measuring antenna:**

3 meters.

**3. Measuring instrumentations:**

Rohde & Schwarz ESVP Test Receiver ( 20 - 1300 MHz ) with a CISPR weighting QP detector, 6 dB bandwidth set at 120 KHz.

In the frequency range above 1000 MHz Spectrum Analyzer FMSM26 and Analyzer Display Unit FSA-D are used, bandwidth set at 100 kHz.

**4. Measuring antenna:**

Broad-band antenna for the frequency range 30 - 300 MHz and frequency range 300 - 1000 MHz, connected with 10 meters coaxial cable. Cable loss of the coaxial cable included in the Antenna Factor for measurement data. The antennas are capable of measuring both horizontal and vertical polarizations.

Loop antenna for the frequency range 9KHz – 30MHz, connected with 10 meters coaxial cable. Cable loss of the coaxial cable included in the measurement data. The center of the loop 1 m above the ground plane, positioned with its plane vertical at the specified distance and rotated about its vertical axis and placed horizontal for maximum response at each azimuth about the EUT.

In the frequency range above 1 GHz horn-antenna RGA 50/60 is used.

**5. Frequency range scanned:**

The frequency range 9kHz - 1000MHz has been scanned. Readings of the highest emissions relating to the limit were reported as above.

**6. Arrangement of EUT:**

During the test, the sample was operated at rated supply voltage and arranged for maximum emissions. To find the maximum emission (30MHz – 1000MHz), the broad-band antenna was raised from 1 to 4 meters and was stopped at the maximum emission point.

**7. Measuring Procedure:**

In accordance with the relevant sections of the American National Standards Institute (ANSI) C63.4-1992 'Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9KHz to 40GHz'.

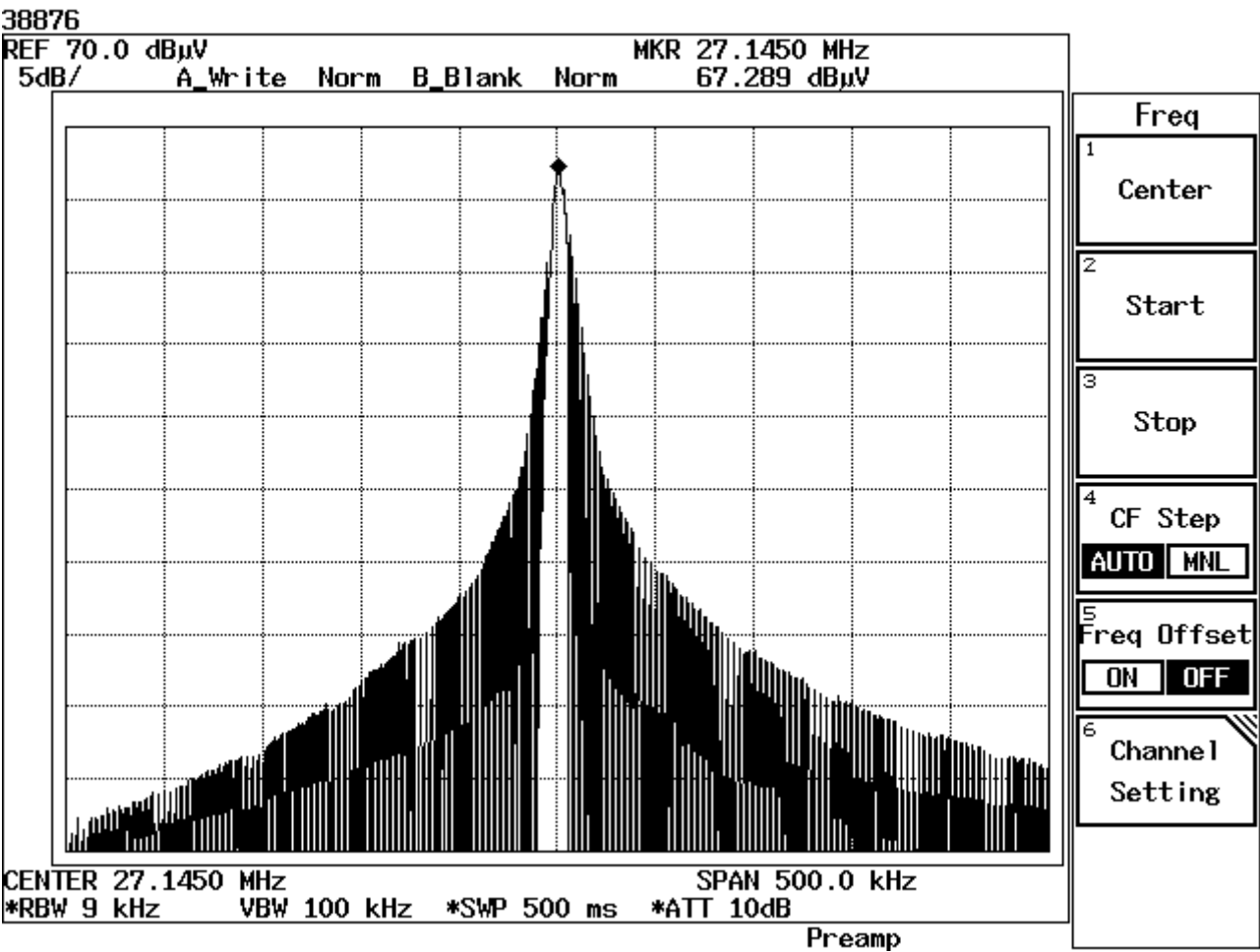
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Measurement Data of Emissions within  
Band Edges



Result : The field strength of any emission within the operation band did not exceed 80 dB(μV/m) for average value or 100 dB(μV/m) for peak value. Refer to page 9 for the recorded value for the emission at the fundamental frequency.

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# Notes for Measurement of Emissions within Band Edges

1. **Measurement facility:**  
Measurement facility located at Fanling (Hong Kong) placed on file with the FCC Pursuant to Section 2.948 of the FCC Rules.
2. **Measuring instrumentations:**  
Spectrum Analyzer: Advantest R3132
3. **Frequency range scanned:**  
The frequency range acc. to FCC rules and regulations part 15 subpart C - Intentional Radiators.
4. **Arrangement of EUT:**  
During the test, the sample was operated.
5. **Measuring Procedure:**  
In accordance with the relevant sections of American National Standards Institute (ANSI) C63.4 - 1992 'Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz'.