Nemko Test Report: 16728RUS1

Applicant: MPH Industries
316 East 9th St.
Owensboro, KY 42303

Equipment Under Test: (E.U.T.) Ranger Police Radar

In Accordance With: **FCC Part 15.245, Subpart C**
For Operation Within The Bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10500-10550 MHz, 24075-24175 MHz Intentional Radiators Used As Field Disturbance Sensors Excluding Perimeter Protection Systems

Tested By: Nemko Dallas Inc.
3325 River Road, R.R. 5
Dallas, Ontario K1V 1H2

TESTED BY: _____ **DATE:** **09 September 2008**
David Light, Senior Wireless Engineer

APPROVED BY: _____ **DATE:** **10 September, 2008**

Total Number of Pages: 16

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Section 1. Summary of Test Results

Manufacturer: MPH Industries

Model No.: 991055

Serial No.: RNG105500001

The system is comprised of :

Control Unit Model: RANGERK 991057
Display Head Model: RNG 991056
Antenna Model: 991055

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.245. All tests were conducted using measurement procedure ANSI C63.4-2003. Radiated emissions are made in semi-anechoic chamber. A description of the test facility is on file with the FCC.

☒ New Submission ☒ Production Unit

☐ Class II Permissive Change ☐ Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.
See " Summary of Test Data".

NVLAP®
LAB CODE: 100426-0

This report applies only to the items tested.

Summary Of Test Data

Name of Test	Paragraph Number	Results
Radiated Emissions	15.245	Complies
Powerline Conducted Emissions	15.207	Not Applicable

Footnotes: Powerline Conducted Emission testing was not performed. The device operates on an automotive battery.

Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

Frequency Range:	24,125 MHz +/- 50 MHz
Operating Frequency(ies) of Sample:	24,125 MHz +/- 50 MHz
Type of Emission:	FM
Supply Power Requirement:	12 Vdc automotive battery supply 13.6 Vdc nominal)
Duty Cycle Calculation:	Not Applicable. The device generates a continuous signal.
Occupied Bandwidth:	0 Hz (CW)

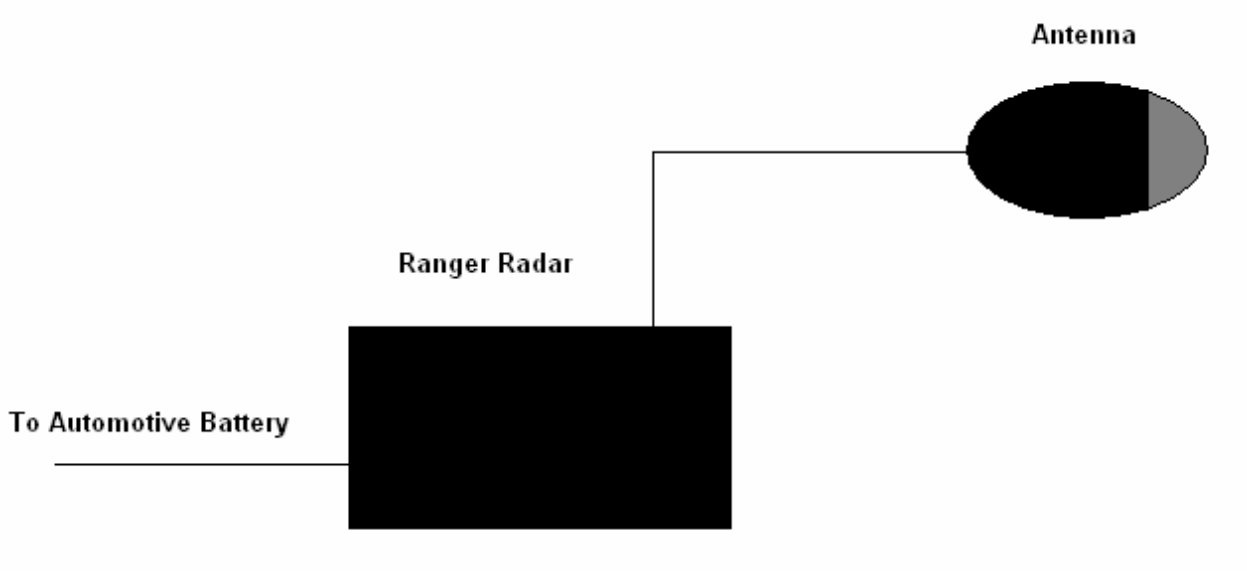
Description of E.U.T.

The Ranger Police Radar is used to measure speed, direction, and range of motor vehicles. The device uses the Doppler shift principle.

Modifications Incorporated in E.U.T.

The EUT has not been modified from what is described by the brand name and unique type identification stated above.

Configuration of the Equipment Under Test (E.U.T)



Section 3. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.245
TESTED BY: David Light	DATE: 09 September 2008

Minimum Standard: See Annex B

Test Results: Complies. The worst-case emission level is 124.4 dBμV/m @ 3m at 24133 MHz. This is 3.6 dB below the specification limit.

Test Data: See attached table.

Above 1 GHz a spectrum analyzer and low noise amplifier are used to measure emission levels. The spectrum analyzer resolution bandwidth was set to 1 MHz and video bandwidth was 1 MHz. A peak detector was used for all measurements.

Above 26.5 GHz microwave harmonic mixers are used to extend the frequency range of the spectrum analyzer. The spectrum analyzer user function automatically the real signals from image signals created by the harmonic mixer.

The device was mounted with the standard orientation using the mounting hardware provided.

The supply voltage was varied between 10 Vdc and 14.5 Vdc with no change in field strength noted.

Test Data - Radiated Emissions

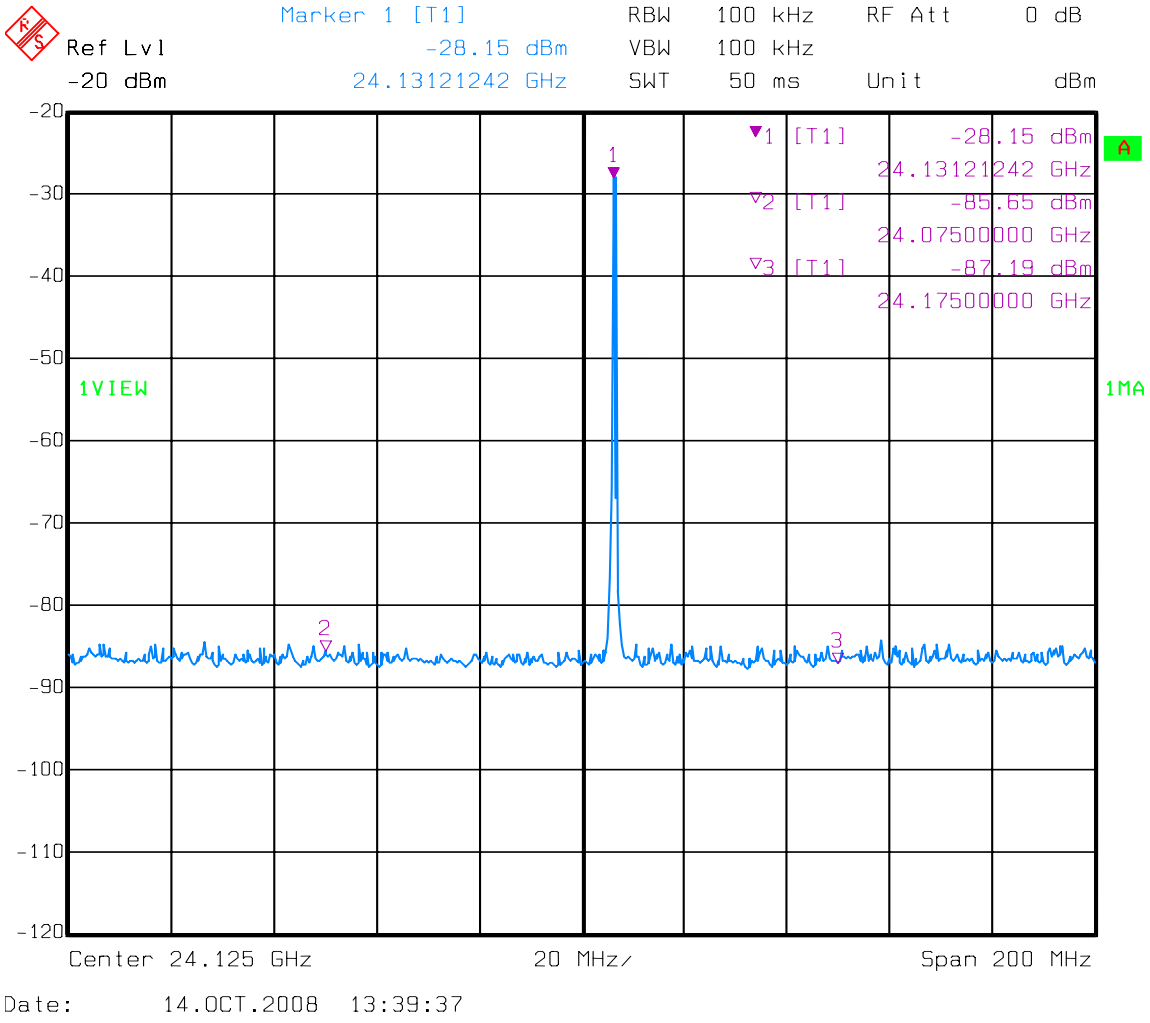
Meas. Freq. (MHz)	Ant. Pol. (H/V)	Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. limit (dBuV/m)	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
											3 meters distance
24133	V	0	77.33	40.4	6.7	0.0	124.4	128.0	-3.6	Pass	Carrier
24133	H	0	74.2	40.4	6.7	0.0	121.3	128.0	-6.7	Pass	Carrier
											1 meter distance
48250	V	0	28	40.5	0.1	0.0	68.6	97.5	-28.9	Pass	Noise floor
48250	H	0	28	40.5	0.1	0.0	68.6	97.5	-28.9	Pass	Noise floor
72375	V	0	41	43.7	0.1	0.0	84.8	97.5	-12.7	Pass	Noise floor
72375	H	0	41	43.7	0.1	0.0	84.8	97.5	-12.7	Pass	Noise floor
96500	V	0	44	46.4	0.1	0.0	90.5	97.5	-7.0	Pass	Noise floor
96500	H	0	44	46.4	0.1	0.0	90.5	97.5	-7.0	Pass	Noise floor

Above 26.5 GHz harmonic mixers were used. The conversion loss is programmed in the spectrum analyzer allowing for a direct measurement of received signal level.

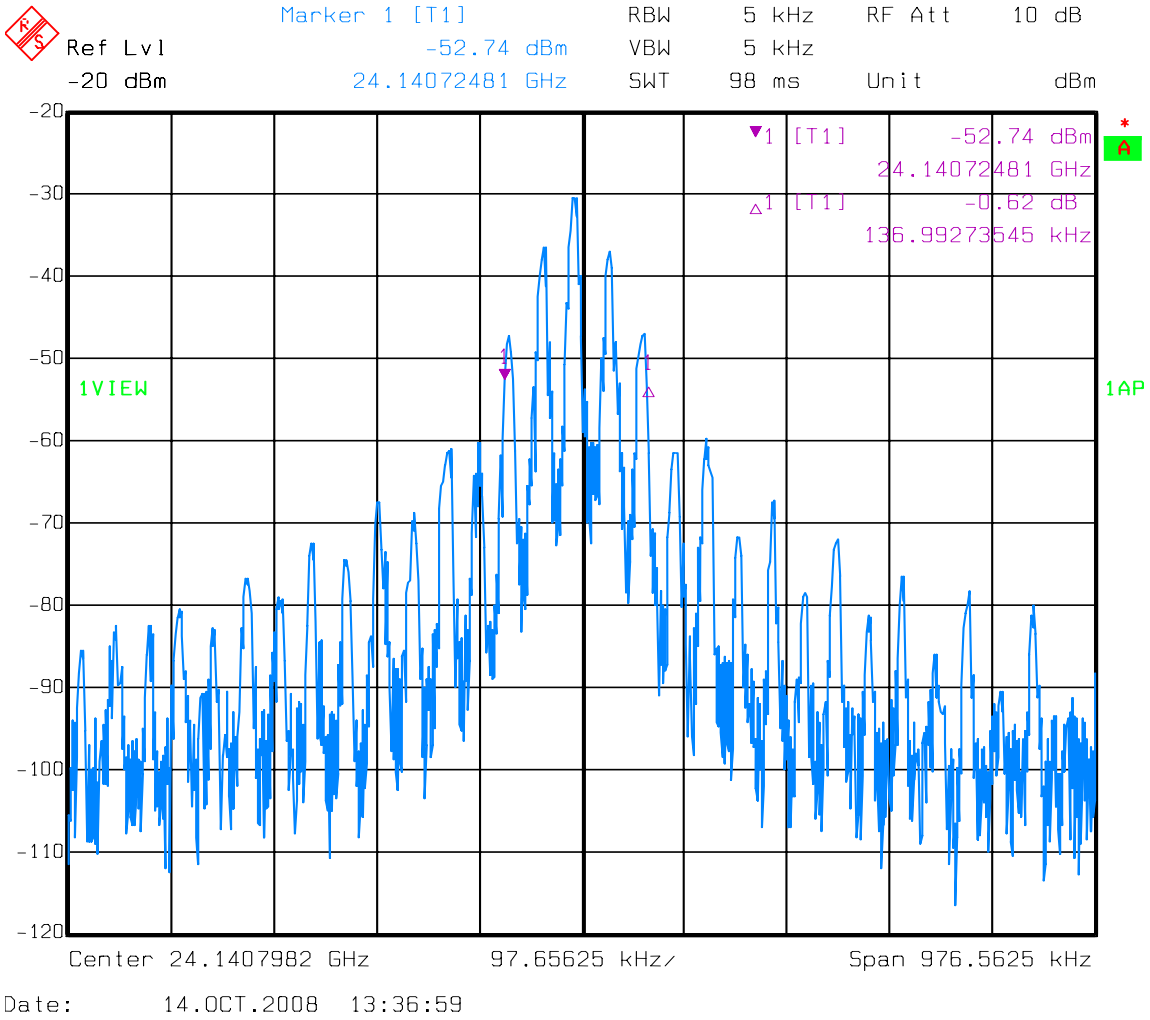
The receive antenna polarization and height are not absolute. When a signal was detected, an imaginary plane at the indicated test distance was carefully searched by slowly moving the receive antenna within this imaginary plane, orienting the receive antenna position and polarization to achieve maximum received signal level.

The spectrum was searched up to 110 GHz. The minimum threshold of detection is sufficient to detect signals within 6 dB of the specification limit.

Test Data – Band Edges

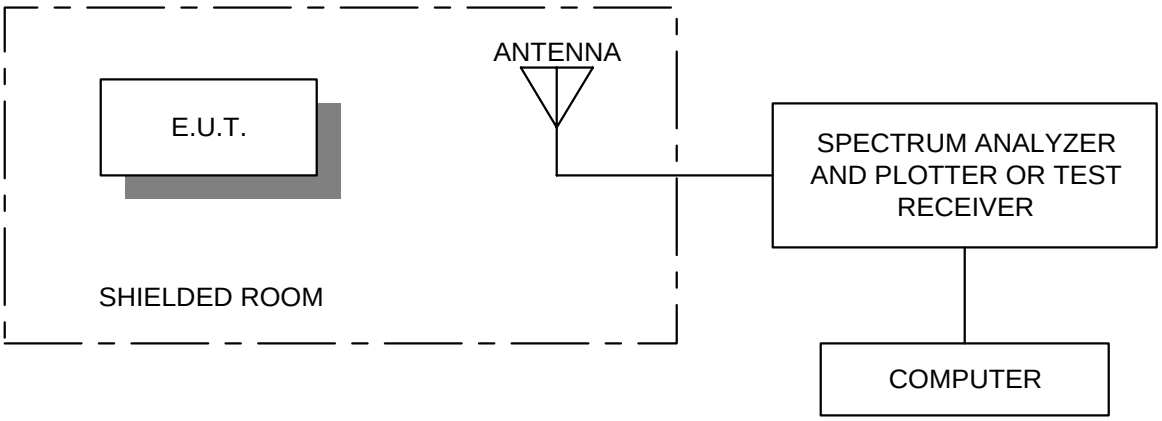


Test Data – 20 dB Bandwidth

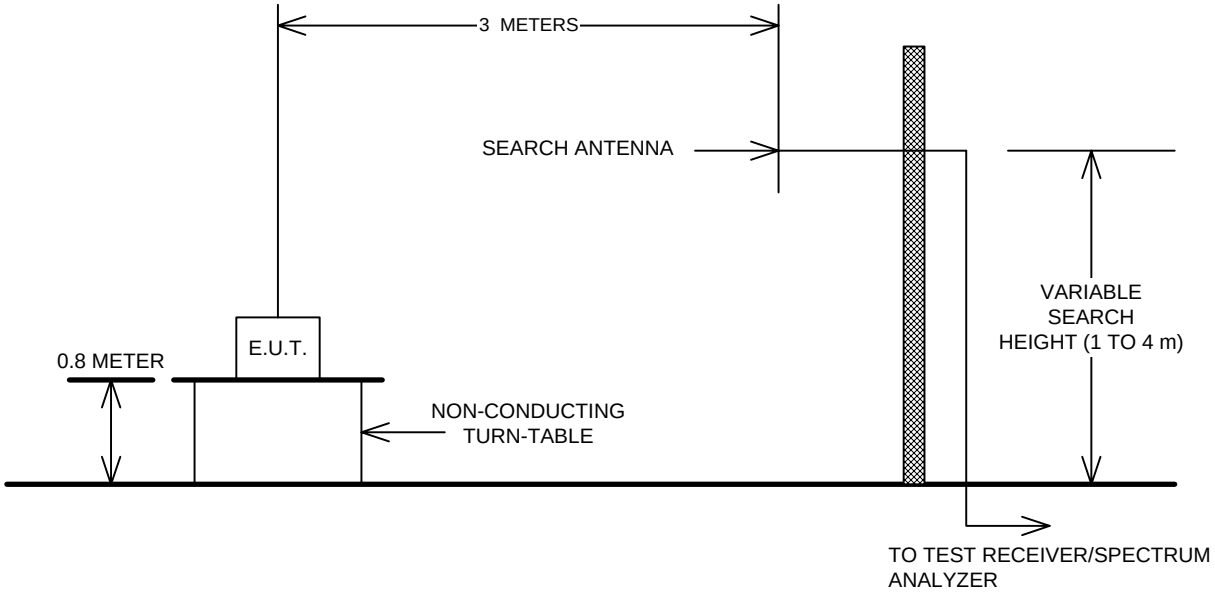


Section 4. Block Diagrams

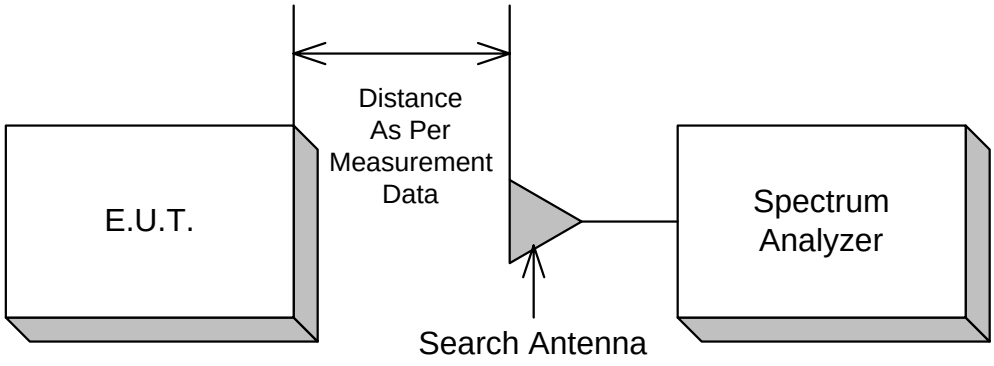
Radiated Prescan



Outdoor Test Site For Radiated Emissions



Indoor Measurement Setup for Emissions Above 10 GHz



Section 5. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/31/07	08/31/09
984	HORN ANTENNA	MILLITECH NONE	NONE	CNR	N/A
985	HORN ANTENNA	MILLITECH NONE	NONE	CNR	N/A
990	HORN ANTENNA	MILLITECH NONE	NONE	CNR	N/A
991	Horn antenna	EMCO 3160-10	9704-1049	CNR	N/A
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/07/08	05/07/09
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/24/07	01/24/09
988	HARMONIC MIXER	Hewlett Packard 11970A	2332A01929	01/15/08	01/15/09
989	HARMONIC MIXER	Hewlett Packard 11970U	2332A00116	01/15/08	01/15/09
986	HARMONIC MIXER	Hewlett Packard 11970V	2521A01222	01/15/08	01/15/09
987	HARMONIC MIXER	Hewlett Packard 5356D	2521A00583	01/15/08	01/15/09
1783	Cable	Nemko 0	0	06/12/08	06/12/09
1763	Bilog Antenna	Schaffner CBL 6111D	22926	09/21/07	09/20/08
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	05/07/08	05/07/09

Annex A Radiated Emission Limits

Radiated Emission Limits

§15.245 Operation within the bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10500-10550 MHz and 24075-24175 MHz.

(a) Operation under the provision of this section is limited to intentional radiators used as field disturbance sensors, excluding perimeter protection systems.

(b) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength Of Fundamental (millivolts/meter)	Field Strength of Harmonics (millitvolts/meter)
902-928	500	1.6
2435-2465	500	1.6
5785-5815	500	1.6
10500-10550	2500	25.0
24075-24175	2500	25.0

(1) Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in §15.205, shall not exceed the field strength limits shown in §15.209. Harmonic emissions in the restricted bands at and above 17.7 GHz shall not exceed the following field strength limits:

(i) For field disturbance sensors designed for use only within a building or to open building doors, 25 mV/m.

(ii) For all other field disturbance sensors, 7.5 mV/m.

(iii) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands fully comply with the limits given in §15.209. Continuous operation of field disturbance sensors designed to be used in farm equipment; vehicles such as fork-lifts that are intended primarily for use indoors or for very specialized operations. Or railroad locomotives, railroad cars and other equipment which travel on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is limited to specific activities of limited duration (e.g. putting a vehicle in reverse gear, activating a turn signal, etc.).

§15.245, continued

(2) Field strength limits are specified at a distance of 3 meters.

(3) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

(4) The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

§15.209 Radiated Emission Limits, General Requirements

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (millivolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	2400/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