

Prüfbericht - Nr.: 14009427 002		Seite 1 von 14	
Test Report No.		Page 1 of 14	
Auftraggeber: Applicant		IDT Technology Ltd. Block C, 9/F., Kaiser Estate, Phase 1 41 Man Yue Street Hunghom, Kowloon Hong Kong	
Gegenstand der Prüfung: Test item		Low Power Transmitter	
Bezeichnung: Identification	RM998PA	Serien-Nr.: Serial No.	Engineering sample
Wareneingangs-Nr.: Receipt No.	050726073, 050425017 050909017	Eingangsdatum: Date of receipt	25.04.2005, 26.07.2005 09.09.2005
Prüfört: Testing location		TÜV Rheinland Hong Kong Ltd. Unit 8, 25 th Floor, Skyline Tower, 39 Wang Kwong Road, Kowloon Bay Kowloon, Hong Kong Hong Kong Productivity Council HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong	
Prüfgrundlage: Test specification		FCC Part 15, Subpart C	
Prüfergebnis: Test Result		Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage. The above mentioned product was tested and passed .	
geprüft / tested by:		kontrolliert / reviewed by:	
01.09.2005	Hugo Wan	01.09.2005	Thomas Berns
Datum Date	Name Name	Datum Date	Name Name
	Unterschrift Signature		Unterschrift Signature
Sonstiges: FCC ID NMTRM998PA-01			
Other Aspects			
Abkürzungen:	OK, Pass, P = entspricht Prüfgrundlage Fail, F = entspricht nicht Prüfgrundlage N/A = nicht anwendbar NT = nicht getestet	Abbreviations:	OK, Pass, P = passed Fail, F = failed N/A = not applicable NT = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicate in extracts. This test report does not entitle to carry any safety mark on this or similar products.			

Test Summary

Conducted Emissions

Result: Pass

Periodic Operation Device

Result: Pass

Radiated Emission of Carrier Frequency

Result: Pass

Spurious Radiated Emissions

Result: Pass

Bandwidth Measurement

Result: Pass

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Appendix 5: FCCID Label, Block Diagram, Schematics and User manual.	

List of Test and Measurement Instruments

Kind of Equipment	Manufacturer	Type	S/N
Test Receiver	Rohde & Schwarz	ESVS30	842807/009
Biconical Antenna	Rohde & Schwarz	HK116	841489/015
Log.-Periodic Antenna	Rohde & Schwarz	HL223	841516/017
Double Ridge Horn Antenna	EMCO	3115	9002-3351
Double Ridge Horn Antenna	EMCO	3115	9002-3347
Signal Generator	Rohde & Schwarz	SMY 01	844146/024
Signal Generator	Rohde & Schwarz	SMY 01	844146/023
Spectrum Analyzer	Rohde & Schwarz	FSP30	1093.4495K30

General Product Information

Product Function and Intended Use

The equipment under test (EUT) is a voice activated weather station. During alarm time, the transmitter circuit will transmit the 433MHz signal to turn on the external vibrator VR101A.

The transmitter will transmit signal for less than 5 seconds when the alarm function is triggered on and off. For details, please refer to test result on page 10.

FCC ID NMTRM998PA-01

Model	Product description
RM998PA	NAPOLI Voice Activated Weather Station

In the technical documents, the model RM998PG is the same as RM998PA which is a name for indicating US market only.

Circuit Description

The unit is operated by 3 pieces of size-AAA batteries. This voltage will be then stepped down to 3.0V, which is the operating voltage for the MCU. This MCU will drive the LCD display, measure the temperature, and also control the transmitter circuit, voice chip and sound chip.

A user can preset the alarm to the time she wants. When it reaches the desired alarm time, the MCU will send out an OOK signal and transmit through the RF channel of 433.92MHz. It is consisted of 2 parts: Control part and transmitter part. The MCU outputs the digital data, then this data will be modulated into the Colpitts oscillator, where a capacitor and SAW are used to adjust the operating frequency to 433.92MHz. The transistor, with its f_T greater than 6GHz, provide a good frequency response to the oscillator circuitry. The high frequency component of the data is suppressed by the LC filter. Finally, the signal is transmitted by the antenna.

Ratings and System Details

		Transmitter
Sample number	:	050726073, 050425017
Operated Frequency	:	433.92 MHz
Number of channels	:	1
Type of antenna	:	Integral antenna
Power supply	:	Battery operated 4.5V
Ports	:	none
Protection Class	:	III
Equipment Class	:	B
		AC/DC adaptor
Sample number	:	050909017
Model	:	KU35-4.5-500D
Input voltage	:	100VAC
Output rating	:	4.5VDC, 500mA

Independent Operation Modes

The basic operation modes are:

- Alarm function wirelessly with receiver VR101A.
- Voice command activation function.
- Temperature display.
- Projection clock display.

For further information refer to User Manual

Submitted Documents

The submitted documents are listed as follow:

- Circuit diagram
- Block diagram
- User manual
- FCC ID label

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Test Operation and Test Software

Test operation should refer to test methodology.

- There was no special software to exercise the device.

Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

- none

Countermeasures to achieve EMC Compliance

The test sample, which has been tested, contained the noise suppression parts as described in the Circuit Diagram or the Technical Construction File. No additional measures were employed to achieve compliance.

Test Methodology

Radiated Emission

The radiated emission measurements were performed according to the procedures in ANSI C63.4-2003.

The equipment under test (EUT) was placed at the middle of the 80 cm height turntable, and the turntable is 3 meters far from the measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in section 7.1.1 and 7.1.2 of this test report.

Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

$$FS = R + AF + CF + FA - PA$$

$$\text{System Factor} = CF + FA - PA.$$

Where FS = Peak Value of Field Strength in dBuV/m at 3 meters.

R = Peak Reading of Spectrum Analyzer in dBuV.

AF = Antenna Factor in dB.

CF = Cable Attenuation Factor in dB.

FA = Filter Attenuation Factor in dB.

PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

Average value of FS = FS –Average factor.

Average Factor = 20 log duty cycle.

Test Results

Conducted Emissions

Section 15.207

RESULT:

Pass

Test Specification : FCC Part 15 Section 15.207
 Test Method : ANSI 63.4-2003
 Measurement Location : Shield Room
 Detector Function : Quasi Peak
 Measurement BW : 100 kHz
 Supply Voltage : AC/DC adaptor: 100VAC input, 4.5VDC output
 Measuring Frequency Range : 0.15-30MHz

Live measurement					
Frequency range (MHz)	Frequency (MHz)	Quasi-peak (dBμV)	Delta to limit QP (dBμV)	Average (dBμV)	Delta to limit AV (dBμV)
0,15 – 0,5	No peak found	-	-	-	-
> 0,5 – 5	No peak found	-	-	-	-
> 5 – 30	No peak found	-	-	-	-
Neutral measurement					
Frequency range (MHz)	Frequency (MHz)	Quasi-peak (dBμV)	Delta to limit QP (dBμV)	Average (dBμV)	Delta to limit AV (dBμV)
0,15 – 0,5	No peak found	-	-	-	-
> 0,5 – 5	No peak found	-	-	-	-
> 5 – 30	No peak found	-	-	-	-

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30MHz does not exceed the limits. For test results refer to Appendix 1, page 6-7.

Limit

Section 15.207

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Periodic Operation Device

Section 15.231(a)

RESULT:

Pass

The EUT transmits signal when the alarm function is triggered at a preset time. There are two conditions, triggered on and off. Both conditions will transmit less than 5 seconds signal to the corresponding receiver. A data graph is attached on Appendix 1 page 1 to show compliance.

Radiated Emission of Carrier Frequency**Section 15.231(b)****RESULT:****Pass**

Test Specification : FCC Part 15 Section 15.231(b1 and b2)
 Test Method : ANSI 63.4-2003
 Measurement Location : Semi Anechoic Chamber
 Measurement Distance : 3m
 Detector Function : Peak
 Measurement BW : 100 kHz
 Supply Voltage : Battery operated: DC 4.5V

Polarization: Vertical

Value	Frequency	System Factor	Measured Field strength at 3m (pk)	Average Factor	Net Field strength at 3m	Limit	Delta to Limit
	(MHz)	(dB)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
Peak	433.89	18.1	68.9	-	68.9	100.8	-31.9
Average	433.89	18.1	68.9	-11.7	57.2	80.8	-23.6

Polarization: Horizontal

Value	Frequency	System Factor	Measured Field strength at 3m (pk)	Average Factor	Net Field strength at 3m	Limit	Delta to Limit
	(MHz)	(dB)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
Peak	433.89	18.1	64.0	-	64.0	100.8	-36.8
Average	433.89	18.1	64.0	-11.7	52.3	80.8	-28.5

Remark; The calculation of average factor is shown in appendix 1 page 3-5.

Limit**Section 15.231(b2)**

Frequency within the band (MHz)	Peak Emission		Average Emission	
	(microvolt/meter)	dBuV/m	(microvolt/meter)	dBuV/m
433.89	109,950	100.8	10,995	80.8

According to section 15.35(b), when average radiated emission measurements are specified, including emission measurement below 1000MHz, there also is limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated.

Spurious Radiated Emissions**Section 15.231(b)****RESULT:****Pass**

Test Specification : FCC Part 15 Section 15.231(b1 and b3)
 Test Method : ANSI 63.4-2003
 Measurement Location : Semi Anechoic Chamber
 Measurement Distance : 3m
 Detector Function : Peak
 Measurement BW : 100 kHz
 Supply Voltage : Battery operated: DC 4.5V
 Measuring Frequency Range : 30-5000MHz

Polarization: Vertical

Frequency (MHz)	Reading (Pk) (dBuV/m)	Antenna Factor (dBuV/m)	System Factor (dB)	Field strength at 3m (pk) (dBuV/m)	Average Factor (dB)	Field strength at 3m (av) (dBuV/m)	Limit at 3m (dBuV/m)	Delta to Limit (dB)
867.78	29.63	22.20	2.67	54.50	-11.68	42.82	60.80	-17.98
*1301.71	60.45	24.90	-33.70	51.65	-11.68	39.97	54.00	-14.03
1735.60	52.21	26.50	-33.30	45.41	-11.68	33.73	60.80	-27.07
2169.53	42.57	27.80	-32.56	37.81	-11.68	26.13	60.80	-34.67
2603.37	56.90	28.88	-31.18	54.60	-11.68	42.92	60.80	-17.88
3037.30	49.72	30.00	-29.73	49.99	-11.68	38.31	60.80	-22.49
3471.19	48.10	31.20	-31.09	48.21	-11.68	36.53	60.80	-24.27
*3905.00	42.19	32.50	-30.35	44.34	-11.68	32.66	54.00	-21.34
4338.91	42.54	32.45	-29.91	45.08	-11.68	33.40	60.80	-27.40

Polarization: Horizontal

Frequency (MHz)	Reading (Pk) (dBuV/m)	Antenna Factor (dBuV/m)	System Factor (dB)	Field strength at 3m (pk) (dBuV/m)	Average Factor (dB)	Field strength at 3m (av) (dBuV/m)	Limit at 3m (dBuV/m)	Delta to Limit (dB)
867.78	30.93	22.20	2.67	55.80	-11.68	44.12	60.80	-16.68
*1301.65	59.14	24.90	-33.70	50.34	-11.68	38.66	54.00	-15.34
1735.62	48.59	26.50	-33.30	41.79	-11.68	30.11	60.80	-30.69
2169.53	43.42	27.80	-32.56	38.66	-11.68	26.98	60.80	-33.82
2603.35	57.48	28.88	-31.18	55.18	-11.68	43.50	60.80	-17.30
3037.20	53.13	30.00	-29.73	53.40	-11.68	41.72	60.80	-19.08
3471.11	52.06	31.20	-31.09	52.17	-11.68	40.49	60.80	-20.31
*3905.02	41.92	32.50	-30.35	44.07	-11.68	32.39	54.00	-21.61
4338.99	42.16	32.45	-29.91	44.70	-11.68	33.02	60.80	-27.78

Remark: ' * ' indicates the frequency of the emissions fall into the restricted band.
There are no spurious emission found between lowest oscillating frequency to 30MHz.

Limit**Section 15.231(b3)**

Frequency (MHz)	Field strength (microvolt/meter)	Field strength (dB μ V/m)	Measurement distance (meters)
433.890	1,099	$20 \cdot \log(1099) = 60.8$	3

Section 15.209

Radiated emissions, which fall in the restricted bands, as defined in Section 15.205(a), also complied with the radiated emission limits specified in Section 15.209.

Limit for Radiated Emission under Section 15.209:

Frequency (MHz)	Field strength (microvolt/meter)	Field strength (dB μ V/m)	Measurement distance (meters)
30-88	100	$20 \cdot \log(100) = 40.0$	3
88-216	150	$20 \cdot \log(150) = 43.5$	3
216-960	200	$20 \cdot \log(200) = 46.0$	3
960-2500	500	$20 \cdot \log(500) = 54.0$	3

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector and above 1000 MHz are based on the measurements employing an average detector.

Bandwidth Measurement

Section 15.231(c)

RESULT:

Pass

Test Specification : FCC Part 15 section 15.231(c)
Port of Testing : Coupling
Detector Function : Peak
Supply Voltage : Battery operated: DC 4.5V

Refer to the data graph, the 20dB points at lower edge and at higher edge are 26KHz and 24KHz respectively apart from the centre modulated carrier, the bandwidth of the emission is 0.012 % of the centre frequency. Therefore, the EUT meets the requirement of section 15.231(c).

For test results refer to Appendix 1, page 2.

Limit

Section 15.231(c)

The bandwidth of the emission shall be no wider than 0.25% if the center frequency for devices operating above 70MHz and below 900MHz.