TÜVRheinland®

Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**14020024 001**	**Seite 1 von 12** *Page 1 of 12*
Auftraggeber: *Client:*	**Hideki Electronics Ltd., Unit 2304-06, 23/F, Riley House, 88 Lei Muk Road, Kwai Chung, N.T., Hong Kong**	
Gegenstand der Prüfung: *Test item:*	**Low Power Transmitter - Anemometer Transmitter**	
Bezeichnung: *Identification:*	**TS815**	**Serien-Nr.:** *Serial No.* **Engineering sample**
Wareneingangs-Nr.: *Receipt No.:*	**081111001**	**Eingangsdatum:** *Date of receipt:* **11.11.2008**
Prüfort: *Testing location:*	**TÜV Rheinland Hong Kong Ltd.** 9-10th Floor, Emperor International Square, 7 Wang Tai 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** **RSS-210 Issue 7**	
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test item passed the test specification(s).*	
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland Hong Kong Ltd.** 9-10th Floor, Emperor International Square, 7 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong	

geprüft */ tested by:* **kontrolliert** */ reviewed by:*

Datum / Date	Name/Stellung / Name/Position	Unterschrift / Signature	Datum / Date	Name/Stellung / Name/Position	Unterschrift / Signature
09.12.2008	Derek Leung Project Manager		09.12.2008	Thomas Berns Manager	

Sonstiges */Other Aspects:* **FCC ID : Q9PTS815**
IC: 7436A - TS815

Abkürzungen:				*Abbreviations:*			
	P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*
	F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*
	N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*
	N/T	=	*nicht getestet*		*N/T*	=	*not tested*

Test Summary and corelation between FCC and IC references:

Measurement	FCC Reference	IC Reference	Result
Periodic Operation Device	§15.231(e)	RSS-210 Issue 7 – A1.1.5	Pass
Radiated Emission of Carrier Frequency	§ 15.231(b)	RSS-210 Issue 7 – A1.1.2- (table 4) & (table 5)	Pass
Spurious Radiated Emissions	§15.231(b)	RSS-210 Issue 7 – A1.1.2(3)	Pass
Bandwidth Measurement	§ 15.231(c)	RSS-210 Issue 7 – A1.1.3	Pass

Content

List of Test and Measurement Instruments

Equipment	Manufacturer	Type	S/N	Calibration Due Date
Test Receiver	Rohde & Schwarz	ESU26	100050	06 Aug 2009
Biconical Antenna	Rohde & Schwarz	HK116	841489/015	08 Mar 2009
Log Periodic Antenna	Rohde & Schwarz	HL223	841516/017	28 Feb 2009
Active Loop Antenna	EMCO	6502	9107-2651	20 Dec 2009
Double Ridge Horn Antenna	EMCO	3115	9002-3347	27 Feb 2009
Spectrum Analyzer	Rohde & Schwarz	FSP30	1093.4495K30	28 Feb 2010

General Product Information

Product Function and Intended Use

The equipment under test (EUT) is an anemometer transmitter operating at 433.8 MHz. The EUT senses and transmits information of wind speed to the associated weather station receiver.

The transmitter meets the requirement on periodic transmission as specified in FCC §15.231 (e). For details, refer to page 2 of appendix 1.

FCCID: Q9PTS815
IC: 7436A - TS815

Ratings and System Details

		Transmitter
Operating Frequency	:	433.834 MHz
Number of RF channel(s)	:	1
Type of antenna	:	Integral antenna
Power supply	:	Battery operated 3.0V (AA battery x 2)
Port	:	none

Independent Operation Modes

The basic operation model:

- transmits information of wind speed to the associated weather station receiver.

For further information refer to User Manual

Submitted Documents

The submitted documents are listed as follow:

- Circuit diagram
- Block diagram and operation description
- User manual
- FCC & IC label diagram

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 test mode was configured on the equipment under test (EUT) to obtain the maximum emission.

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

- none

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 measurement was 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.

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 factor, cable loss, preamplifiers gain and filter attenuation.

The equation is expressed as follow:

FS = R + AF + CF + FA – PA

System Factor = CF + FA – PA.

Where FS = Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer in dBuV.
AF = Antenna Factor in dB/m.
CF = Cable Loss in dB.
FA = Filter Attenuation Factor in dB.
PA = Preamplifier Gain in dB.

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

Average value of FS (dB) = FS (dB) – Duty cycle averaging factor (dB).

Duty Cycle Averaging Factor (dB) = 20 log [duty cycle].

Test Results

Periodic Operation Device FCC §15.231(e) and IC-RSS-210 A1.1.5

RESULT: **Pass**

The EUT was preprogrammed to transmit signal for every 33 seconds, and the duration of each transmission is about 0.38 seconds. Hence it meets the requirements of FCC §15.231(e) and IC-RSS-210 A1.1.5 that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

Radiated Emission of Carrier Frequency FCC §15.231(b) and IC- RSS-210 A1.1.2

RESULT: **Pass**

Test Specification	:	FCC §15.231(b1 and b2) and IC- RSS-210 A1.1.2
Test Method	:	ANSI C63.4-2003
Measurement Location	:	Semi Anechoic Chamber
Measurement BW	:	120 kHz
Supply Voltage	:	DC 3.0V

Polarization: Vertical

Detector	Frequency (MHz)	Measured Field Strength at 3m (dBµV/m)	Duty Cycle Averaging Factor (dB)	Field Strength at 3m (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Peak	433.834	79.7	-	79.7	92.86	-13.16
Average	433.834	79.7	-7.15	72.55	72.86	-0.31

Polarization: Horizontal

Detector	Frequency (MHz)	Measured Field Strength at 3m (dBµV/m)	Duty Cycle Averaging Factor (dB)	Field Strength at 3m (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Peak	433.834	75.6	-	75.6	92.86	-17.26
Average	433.834	75.6	-7.15	68.45	72.86	-4.41

Remark: The calculation of averaging factor is shown in appendix 1 page 5.

FCC §15.231(e)

Limit

Frequency within the band (MHz)	Peak Emission		Average Emission	
	(microvolt/meter)	dBµV/m	(microvolt/meter)	dBµV/m
433.834	43972.50	92.86	4397.25	72.86

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

Spurious Radiated Emissions FCC §15.231(b) and IC- RSS-210-A1.1.2(3)

RESULT: **Pass**

Test Specification	:	FCC §15.231(b1 and b3) and IC-RSS-210-A1.1.2(3)
Test Method	:	ANSI C63.4-2003
Measurement Location	:	Semi Anechoic Chamber
Detector Function	:	QP for <1GHz, Peak for >1GHz.
Measurement Bandwidth	:	120 kHz for frequency range of 30Mz-1GHz, 1MHz for frequency > 1GHz.
Supply Voltage	:	DC 3.0V
Measuring Frequency Range	:	30kHz-4500MHz (10^{th} harmonic of the fundamental frequency)

Frequency (MHz)	Antenna Polarization	Field Strength at 3m (dBµV/m)	Limit (dBµV/m)	Margin (dB)
867.6760	Vertical	38.00	52.87	-14.9
867.6744	Horizontal	31.50	52.87	-21.4

There is no spurious emission was found between the lowest oscillating frequency within the EUT (32.768kHz) and 30 MHz.

Limit for FCC §15.231(e)

Frequency (MHz)	Field strength (microvolt/meter)	Field strength (dBµV/m)	Measurement distance (meters)
433.834	439.725	20*log(439.725) = 52.86	3

FCC §15.209

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

Limit for Radiated Emission under FCC §15.209 and RSS-210 table 2:

Frequency (MHz)	Field strength (microvolt/meter)	Field strength (dBµV/m)	Measurement distance (meters)
30-88	100	20*log(100) = 40.00	3
88-216	150	20*log(150) = 43.52	3
216-960	200	20*log(200) = 46.02	3
Above 960	500	20*log(500) = 53.98	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 FCC §15.231(c) and IC- RSS-210 A1.1.3

RESULT: **Pass**

Test Specification : FCC Part 15 section 15.231(c) and IC-RSS-210 A1.1.3
Detector Function : Peak
Supply Voltage : DC 3.0V

Centre Frequency (MHz)	20dB Bandwidth (kHz)	FCC/ IC Limits* (kHz)
433.834	286	1084.585

* FCC Limit of 20dB (or IC Limit: 99%) bandwidth measurement =(0.25%)(Center Frequency)

=(0.25%)(433.834 x 10^6)

=1084.585kHz

For test result refer to page 1 of appendix 1.

Limit **FCC §15.231(c) and IC-RSS-210 A1.1.3**

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