TÜVRheinland®

Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**14032682 001**	**Seite 1 von 13** *Page 1 of 13*
Auftraggeber: *Client:*	**Designworks (Far East) Limited** **Unit 710, 7/F, Wing On Plaza** **No. 62 Mody Road** **TST East, Kowloon** **HONG KONG**	
Gegenstand der Prüfung: *Test Item:*	**Foot Gauge with Bluetooth function**	
Bezeichnung: *Identification:*	**GFG-DT001**	**Serien-Nr.:** *Serial No.:* **Engineering sample**
Wareneingangs-Nr.: *Receipt No.:*	**00131008077-001** **A000145899-001** **A000152703-001**	**Eingangsdatum:** *Date of Receipt:* **08.10.2013** **19.12.2014** **08.01.2015**
Zustand des Prüfgegenstandes bei Anlieferung: *Condition of test item at delivery:*	Test samples are not damaged and suitable for testing.	
Prüfort: *Testing Location:*	**TÜV Rheinland Hong Kong Ltd.** 8/F., First Group Centre, 14 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 B** **FCC Part 15 Subpart C** **ANSI C63.4-2009**	
Prüfergebnis: *Test Results:*	**Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage.** The above mentioned product was tested and **passed**.	
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland Hong Kong Ltd.** 8 - 10/F., Goldin Financial Global Square, 7 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong	

geprüft/ *tested by:*			**kontrolliert/** *reviewed by:*		
29.07.2015	Joey Leung Project Engineer		29.07.2015	Benny Lau Senior Project Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges: **FCC ID: 2AEXWGFG-DT001**
Other Aspects

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*

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Product information

Manufacturers declarations

	Transceiver
Operating frequency range	2402 - 2480 MHz
Type of modulation	GFSK
Number of channels	40
Channel separation	2 MHz
Type of antenna	PCB Antenna
Antenna gain (dBi)	0 dBi
Power level	fix
Type of equipment	stand alone radio device
Connection to public utility power line	No
Nominal voltage	V_{nor}: 3.0VDC
Independent Operation Modes	Bluetooth enable, transmitting mode Bluetooth disable, measurment mode

Product function and intended use

The EUT is a Foot width measuring device which is designed for use in Clarks stores.
The EUT is powered by CR2032 battery. There is a LCD display for displaying measurement result.
The measurement result can be transmitted via Bluetooth to the iPad.

FCC ID: 2AEXWGFG-DT001

Models	**Product description**
GFG-DT001	Foot Gauge

Submitted documents

Circuit Diagram
Block Diagram
Bill of material
User manual
Rating Label

Independent Operation Modes

The basic operation modes are:

- Foot width measurement
- Transmitting measurement result via Bluetooth to the iPad

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

Remark

- None

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

- There was no special accessories and auxiliary equipment during testing

Countermeasures to achieve EMC Compliance

- none

Test Methodology

Radiated Emission

The radiated emission measurements were performed according to the procedures in ANSI C63.4-2009.

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 particular parts 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

Where FS = Field Strength in dBuV/m at 3 meters.
R = 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.

List of Test and Measurement Instruments

Hong Kong Productivity Council (Registration number: 90656)

Radiated Emission

Equipment	Manufacturer	Type	S/N	Cal. Interval	Last Cal. Date
Semi-anechoic Chamber	Frankonia	Nil	Nil	1 year	14 Apr 2015
Cable	Hubersuhner	SUCOFLEX 104	72799 /6	2 years	31 Mar 2014
Test Receiver	R & S	ESU26	100050	1 year	12 Feb 2015
Active Loop Antenna	EMCO	6502	9107-2651	2 years	17 May 2014
Bi-conical Antenna	R & S	HK116	100242	2 years	22 Aug 2013
Horn Antenna	EMCO	3115	9002-3351	2 years	07 Aug 2013
Coaxial cable	Harbour	LL335	N/A	2 years	10 Jun 2014
Microwave amplifer 0.5-26.5GHz, 25dB gain	HP	83017A	3950M00241	2 years	17 Jul 2014
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	9829213	2 years	28 Oct 2013

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Radio Test

Equipment	Manufacturer	Type	S/N	Cal. Interval	Last Cal. Date
Spectrum Analyzer	R&S	FSP30	100007	2 year	12 Jan 2015

Results FCC Part 15 – Subpart B

Subclause 15.107 – Conducted Emission on AC Mains	**N/A**
There is no AC power input or output ports on the EUT.	

Subclause 15.109 – Radiated Emissions			**Pass**
Test Specification : ANSI C63.4 - 2009 Mode of operation : Measurement mode (LCD display activated) Port of testing : Enclosure Detector : Peak RBW/VBW : 120 kHz for f < 1 GHz Supply voltage : 3.0 VDC (coin battery) Temperature : 24ºC Humidity : 50%			
Requirement: 15.109(a)			
Results: Pass			
Vertical Polarization			
Freq range MHz	**Freq MHz**	**Level dBuV/m**	**Limit/ Detector dBuV/m**
30 – 88	No peak found	---	40.0 / QP
88 – 216	No peak found	---	43.5 / QP
216 – 960	No peak found	---	46.0 / QP
960 - 1000	No peak found	---	54.0 / QP
Horizontal Polarization			
Freq range MHz	**Freq MHz**	**Level dBuV/m**	**Limit/ Detector dBuV/m**
30 – 88	No peak found	---	40.0 / QP
88 – 216	No peak found	---	43.5 / QP
216 – 960	No peak found	---	46.0 / QP
960 - 1000	No peak found	---	54.0 / QP

Results FCC Part 15 – Subpart C

FCC 15.203 – Antenna Requirement 1		**Pass**
FCC Requirement:	No antenna other than that furnished by the responsible party shall be used with the device	
Results:	a) Antenna type: b) Manufacturer and model no: c) Peak Gain:	PCB antenna N/A 0 dBi
Verdict:	Pass	

FCC 15.204 – Antenna Requirement 2	**N/A**
FCC Requirement:	Provide information for every antenna proposed for the use with the EUT
Results:	Only one integral antenna can be used.
Verdict:	N/A

FCC 15.207 – Conducted Emission on AC Mains	**N/A**
There is no AC power input or output ports on the EUT.	

FCC 15.247 (a)(2) – 6dB Bandwidth Measurement		**Pass**
FCC Requirement:	Systems using digital modulation techniques may operate in the 902 – 928 MHz, 2400 – 2483.5 MHz, and 5725 – 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500kHz.	
Test Specification Mode of operation Port of testing Detector RBW/VBW Supply voltage Temperature Humidity	: KDB 558074 D01 DTS Measurement Guidance v03r02 section 8.1 Option 1 : TX mode : Temporary antenna port : Peak : 100KHz/ 300KHz : 3.0VDC : 23ºC : 50%	
Results:	For test protocols please refer to Appendix 1, page 2-3.	

Channel frequency (MHz)	**6 dB left (MHz)**	**6 dB right (MHz)**	**6dB bandwidth (MHz)**
2402	2401.652	2402.348	0.696
2440	2439.646	2440.348	0.702
2480	2479.640	2480.336	0.696

FCC 15.247(b)(3) – Maximum Peak Conducted Output Power **Pass**

FCC Requirement: For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850MHz bands: 1 Watt (30dBm)

Test Specification : KDB 558074 D01 DTS Measurement Guidance v03r02 section 9.1.1
Mode of operation : TX mode
Port of testing : Temporary antenna port
Detector : Peak
Supply voltage : 3.0VDC
Temperature : 23ºC
Humidity : 50%

Results: For test protocols please refer to Appendix 1, page 4-5.

Frequency (MHz)	Measured Output Power (dBm)	Cable attenuation (dB)	Output power (dBm)	Limit (W/dBm)	Verdict
2402	-3.30	0.00	-3.30	1 / 30.0	Pass
2440	-3.55	0.00	-3.55	1 / 30.0	Pass
2480	-3.71	0.00	-3.71	1 / 30.0	Pass

FCC 15.247(e) – Power Spectral Density **Pass**

FCC Requirement: For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Specification : KDB 558074 D01 DTS Measurement Guidance v03r02 section 10.2
Mode of operation : TX mode
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : ≥100 KHz / ≥3xRBW
span : ≥1.5 x DTS BW
Supply voltage : 3.0VDC
Temperature : 23ºC
Humidity : 50%

Results: For test protocols please refer to Appendix 1, page 6-7.

Operating frequency (MHz)	Power density (dBm)	Limit (dBm)	Verdict
2402	-3.49	8.0	Pass
2440	-3.69	8.0	Pass
2480	-3.84	8.0	Pass

FCC 15.247(d) – Spurious Conducted Emissions **Pass**

Test Specification : KDB 558074 D01 DTS Measurement Guidance v03r02 section 11.1
Mode of operation : TX mode
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 100 kHz / 300 kHz
Supply voltage : 3.0VDC
Temperature : 23 ºC
Humidity : 50 %

FCC Requirement: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate.

Only the worst cases is shown below. For test protocols refer to Appendix 1, page 8-13.

Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2402	4810.630	-51.30	-5.20	-46.10	Pass
2440	4888.624	-53.77	-5.17	-48.60	Pass
2480	3354.742	-54.87	-5.24	-49.63	Pass

FCC 15.247(d) or 15.205 – Radiated Emissions in Restricted Frequency Bands **Pass**

Test Specification : ANSI C63.4 – 2009
Mode of operation : TX mode
Port of testing : Enclosure
Detector : Peak
RBW/VBW : 100 kHz / 300 kHz for f < 1 GHz
1 MHz / 3 MHz for f > 1 GHz
Supply voltage : 3.0VDC
Temperature : 23ºC
Humidity : 50%

FCC Requirement: In any 100kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in section15.205(a), must also comply with the radiated emission limits specified in section 15.205(c).

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate.

All three transmit frequency modes comply with the field strength within the restricted bands. There is no spurious found below 30MHz.

Mode: 2402MHz TX Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2390.000	48.72	74.0 / PK
2390.000	37.25	54.0 / AV
4803.631	55.26	74.0 / PK
4804.016	43.65	54.0 / AV

Mode: 2402 MHz TX Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2387.949	47.66	74.0 / PK
2390.000	37.29	54.0 / AV
4803.696	54.21	74.0 / PK
4804.112	40.42	54.0 / AV

Mode: 2440 MHz TX Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4880.321	54.70	74.0 / PK
4880.048	43.56	54.0 / AV

Mode: 2440 MHz TX Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4880.013	53.27	74.0 / PK
4882.051	40.25	54.0 / AV

Mode: 2480MHz TX Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2483.500	57.66	74.0 / PK
2483.500	47.06	54.0 / AV
4960.753	55.57	74.0 / PK
4959.920	43.20	54.0 / AV
Mode: 2480 MHz TX	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	53.61	74.0 / PK
2483.500	43.91	54.0 / AV
4960.337	54.63	74.0 / PK
4959.856	41.44	54.0 / AV