

Prüfbericht - Nr.: 14014459 002			Seite 1 von 13 Page 1 of 13		
<i>Test Report No.:</i>					
Auftraggeber: <i>Client:</i>		i. Tech Dynamic Ltd. 5/F., Harbourfront Landmark 11 Wan Hoi Street Hunghom, Kowloon Hong Kong			
Gegenstand der Prüfung: <i>Test Item:</i>		Bluetooth Headset			
Bezeichnung: <i>Identification:</i>		i.Tech Clip D (C51-B08009-xx)		Serien-Nr.: <i>Serial No.:</i> Engineering sample	
Wareneingangs-Nr.: <i>Receipt No.:</i>		080903005-3		Eingangsdatum: <i>Date of Receipt:</i> 03.09.2008	
Prüfört: <i>Testing Location:</i>		TÜV Rheinland Hong Kong Ltd. 9-10/F., 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: <i>Test Specification:</i>		FCC Part 15 Subpart C ANSI C63.4-2003 CISPR 22:1997			
Prüfergebnis: <i>Test Results:</i>		Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage. The above mentioned product was tested and passed .			
Prüflaboratorium: <i>Testing Laboratory:</i>		TÜV Rheinland Hong Kong Ltd. 9-10/F., Emperor International Square, 7 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong			
geprüft/ tested by:			kontrolliert/ reviewed by:		
23.10.2008 Sharon Li Project Engineer			23.10.2008 Thomas Berns Manager		
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>
					
Sonstiges:		FCCID: RKIC51-A06059-XX			
Other Aspects		This test report is issued for the modification of the previously test EUT of model i.Tech Clip D (C51-A06059-XX) in test report number 14014459 001. For details, please refer to "Remark" on page 5.			
Abkürzungen:		P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet		Abbreviations: P(ass) = passed F(ail) = failed N/A = not applicable N/T = 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. <i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i>					

Table of Content

	Page
Cover Page	1
Table of Content	2
Product information.....	4
Manufacturers declarations	4
Product function and intended use.....	5
Submitted documents.....	5
Remarks	5
List of Test and Measurement Instruments.....	6
Results FCC Part 15 – Subpart C	7
Subclause 15.203 – Antenna Information	Pass..... 7
Subclause 15.204 – Antenna Information	Pass..... 7
Subclause 15.207 – Disturbance Voltage on AC Mains.....	N.A..... 7
Subclause 15.247 (a)(1) – Carrier Frequency Separation.....	Pass..... 8
Subclause 15.247 (a)(1)(iii) – Number of hopping channels	Pass..... 8
Subclause 15.247 (a)(1)(iii) – Time of Occupancy (Dwell Time)	Pass..... 8
Subclause 15.247 (a) – 20 dB Bandwidth.....	Pass..... 8
Subclause 15.247 (a) – Hopping Sequence	Pass..... 8
Subclause 15.247 (a) – Equal Hopping Frequency Use.....	Pass..... 9
Subclause 15.247 (a) – Receiver Input Bandwidth.....	Pass..... 10
Subclause 15.247 (a) – Receiver Hopping Capability	Pass..... 10
Subclause 15.247 (b)(1) – Peak Output Power	Pass..... 10
Subclause 15.247 (d) – Band edge compliance of conducted emissions	Pass..... 11
Subclause 15.205 – Band edge compliance of radiated emissions	Pass..... 11
Subclause 15.247 (d) – Spurious Conducted Emissions	Pass..... 11
Subclause 15.247 (c) – Spurious Radiated Emissions	Pass..... 12
Appendix 1 – Test Results.....	4 pages
Appendix 2 – Test Setup Photos.....	2 pages
Appendix 3 – Construction Photos.....	6 pages

www.tuv.com

Appendix 4 – Technical Documents..... 19 pages

www.tuv.com

Product information

Manufacturers declarations

	Transceiver
Operating frequency range	2402 - 2480 MHz
Type of modulation	FHSS modulation
Number of channels	79
Channel separation	1 MHz
Type of antenna	Integrated Antenna
Antenna gain (dBi)	1.2
Power level	fix
Type of equipment	stand alone, plug-in radio device
Connection to public utility power line	No
Nominal voltage	V _{nom} : 3.7 V
Independent Operation Modes	Page scan Inquiry scan Connection state - ACL Link Connection state - SCO Link

www.tuv.com

Product function and intended use

The test item is a Bluetooth Headset based on the Bluetooth technology.

Bluetooth is a short-range radio link intended to be a cable replacement between portable and/or fixed electronic devices.

Bluetooth operates in the unlicensed ISM Band at 2.4 GHz. In the US a band of 83.5 MHz width is available. In this band, 79 RF channels spaced 1 MHz apart are defined.

The channel is represented by a pseudo-random hopping sequence through the 79 channels. The channel is divided into time slots, with a nominal slot length of 625 µs, where each slot corresponds to different RF hop frequencies. The nominal hop rate is 1600 hops/s.

Submitted documents

Circuit Diagram
Block Diagram
Bill of material

Remarks

Components change as follow:

- OLED display changed from 96x16 to 106x16
- added a DC-DC step-up circuit for OLED
- added a 3V LDO for mic bias
- SMD antenna changed to other model

To show compliance Radiated Spurious Emission and Peak Output Power were repeated on the revised sample.

List of Test and Measurement Instruments

	Equipment used	Manufacturer	Model No.	S/N	Due Date
☒	Semi-anechoic Chamber	Frankonia	Nil	Nil	28-Mar-09
☒	Test Receiver	R & S	ESU26	100050	06-Aug-09
☒	Bi-conical Antenna	R & S	HK116	841489/015	08-Mar-09
☒	Log Periodic Antenna	R & S	HL223	841516/017	28-Feb-09
☒	Coaxial cable 50ohm	Rosenberger	RTK081-05S-05S-10m	LA2-001-10M / 002	15-May-09
☒	Microwave amplifier 0.5-26.5GHz, 25dB gain	HP	83017A	3950M00241	01-Oct-08
☒	High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	9829213	31-Oct-08
☒	Bass Pass Filter (2.4GHz)	Micro-Tronic	BRM130 26	1	31-Oct-08
☒	Horn Antenna	EMCO	3115	9002-3351	27-Feb-10
☒	Spectrum Analyser	R & S	FSP 30	100416	08-Jun-09
☒	Active Loop Antenna	EMCO	6502	9107-2651	20-Dec-09
☒	Test Receiver	R & S	ESCS 30	100201	14-Dec-08
☒	Artificial Mains Network	R & S	ESH3-Z5	100230	10-Dec-08
☒	Pulse Limiter	R & S	ESH3-Z2	100161	10-Dec-08

Results FCC Part 15 – Subpart C

Subclause 15.203 – Antenna Information		Pass
Requirement:	No antenna other than that furnished by the responsible party shall be used with the device	
Results:	Permanent attached antenna	
Verdict:	Pass	

Subclause 15.204 – Antenna Information		Pass
Requirement:	Provide information for every antenna proposed for the use with the EUT	
Results:	a) Antenna type:	Permanent attached antenna
	b) Manufacturer and model no:	N.A.
	c) Gain with reference to an isotropic radiator:	1.2 dBi
Verdict:	Pass	

Subclause 15.207 – Disturbance Voltage on AC Mains		N.A.
The device is not functioning (no. RF radiations) during charging.		

Subclause 15.247 (a)(1) – Carrier Frequency Separation
Pass

Remark: Test result refers to test report 14014459 001.

Subclause 15.247 (a)(1)(iii) – Number of hopping channels
Pass

Remark: Test result refers to test report 14014459 001.

Subclause 15.247 (a)(1)(iii) – Time of Occupancy (Dwell Time)
Pass

Remark: Test result refers to test report 14014459 001.

Subclause 15.247 (a) – 20 dB Bandwidth
Pass

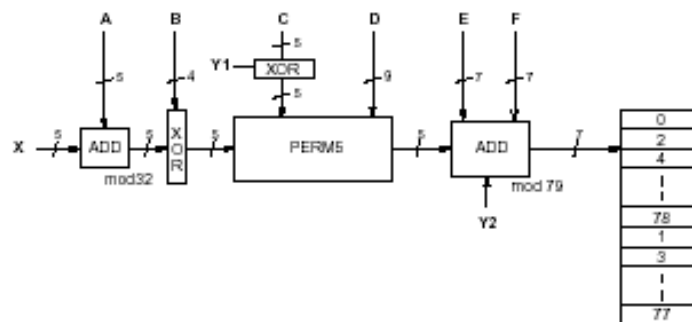
Remark: Test result refers to test report 14014459 001.

Subclause 15.247 (a) – Hopping Sequence
Pass

Requirement: The hopping sequence is generated and provided with an example.

Hopping sequence

The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master. The X input determines the phase in the 32-hop segment, whereas Y1 and Y2 selects between master-to-slave and slave-to-master transmission. The inputs A to D determine the ordering within the segment, the inputs E and F determine the mapping onto the hop frequencies.



www.tuv.com

Example data:

Hop sequence {k} for CONNECTION STATE:

CLK start: 0x0000010

ULAP: 0x00000000

#ticks: 00 02 | 04 06 | 08 0a | 0c 0e | 10 12 | 14 16 | 18 1a | 1c 1e |

```

0x0000010: 08 66 | 10 70 | 12 19 | 14 23 | 16 01 | 18 05 | 20 33 | 22 37 |
0x0000030: 24 03 | 26 07 | 28 35 | 30 39 | 32 72 | 34 76 | 36 25 | 38 29 |
0x0000050: 40 74 | 42 78 | 44 27 | 46 31 | 48 09 | 50 13 | 52 41 | 54 45 |
0x0000070: 56 11 | 58 15 | 60 43 | 62 47 | 32 17 | 36 19 | 34 49 | 38 51 |
0x0000090: 40 21 | 44 23 | 42 53 | 46 55 | 48 33 | 52 35 | 50 65 | 54 67 |
0x00000b0: 56 37 | 60 39 | 58 69 | 62 71 | 64 25 | 68 27 | 66 57 | 70 59 |
0x00000d0: 72 29 | 76 31 | 74 61 | 78 63 | 01 41 | 05 43 | 03 73 | 07 75 |
0x00000f0: 09 45 | 13 47 | 11 77 | 15 00 | 64 49 | 66 53 | 68 02 | 70 06 |
0x0000110: 01 51 | 03 55 | 05 04 | 07 08 | 72 57 | 74 61 | 76 10 | 78 14 |
0x0000130: 09 59 | 11 63 | 13 12 | 15 16 | 17 65 | 19 69 | 21 18 | 23 22 |
0x0000150: 33 67 | 35 71 | 37 20 | 39 24 | 25 73 | 27 77 | 29 26 | 31 30 |
0x0000170: 41 75 | 43 00 | 45 28 | 47 32 | 17 02 | 21 04 | 19 34 | 23 36 |
0x0000190: 33 06 | 37 08 | 35 38 | 39 40 | 25 10 | 29 12 | 27 42 | 31 44 |
0x00001b0: 41 14 | 45 16 | 43 46 | 47 48 | 49 18 | 53 20 | 51 50 | 55 52 |
0x00001d0: 65 22 | 69 24 | 67 54 | 71 56 | 57 26 | 61 28 | 59 58 | 63 60 |
0x00001f0: 73 30 | 77 32 | 75 62 | 00 64 | 49 34 | 51 42 | 57 66 | 59 74 |
0x0000210: 53 36 | 55 44 | 61 68 | 63 76 | 65 50 | 67 58 | 73 03 | 75 11 |
0x0000230: 69 52 | 71 60 | 77 05 | 00 13 | 02 38 | 04 46 | 10 70 | 12 78 |
0x0000250: 06 40 | 08 48 | 14 72 | 16 01 | 18 54 | 20 62 | 26 07 | 28 15 |
0x0000270: 22 56 | 24 64 | 30 09 | 32 17 | 02 66 | 06 74 | 10 19 | 14 27 |
0x0000290: 04 70 | 08 78 | 12 23 | 16 31 | 18 03 | 22 11 | 26 35 | 30 43 |
0x00002b0: 20 07 | 24 15 | 28 39 | 32 47 | 34 68 | 38 76 | 42 21 | 46 29 |
0x00002d0: 36 72 | 40 01 | 44 25 | 48 33 | 50 05 | 54 13 | 58 37 | 62 45 |
0x00002f0: 52 09 | 56 17 | 60 41 | 64 49 | 34 19 | 36 35 | 50 51 | 52 67 |
0x0000310: 38 21 | 40 37 | 54 53 | 56 69 | 42 27 | 44 43 | 58 59 | 60 75 |
0x0000330: 46 29 | 48 45 | 62 61 | 64 77 | 66 23 | 68 39 | 03 55 | 05 71 |
0x0000350: 70 25 | 72 41 | 07 57 | 09 73 | 74 31 | 76 47 | 11 63 | 13 00 |
0x0000370: 78 33 | 01 49 | 15 65 | 17 02 | 66 51 | 70 67 | 03 04 | 07 20 |
0x0000390: 68 55 | 72 71 | 05 08 | 09 24 | 74 59 | 78 75 | 11 12 | 15 28 |
0x00003b0: 76 63 | 01 00 | 13 16 | 17 32 | 19 53 | 23 69 | 35 06 | 39 22 |
0x00003d0: 21 57 | 25 73 | 37 10 | 41 26 | 27 61 | 31 77 | 43 14 | 47 30 |
0x00003f0: 29 65 | 33 02 | 45 18 | 49 34 | 19 04 | 21 08 | 23 20 | 25 24 |

```

Subclause 15.247 (a) – Equal Hopping Frequency Use

Pass

Requirement: Each of the transmitter's hopping channels is used equally on average.

Equal hopping frequency use

The EUT complies with the Bluetooth RF specifications. For details refer to the Bluetooth standard.

Subclause 15.247 (a) – Receiver Input Bandwidth		Pass
Requirement:	The associated receiver(s) complies with the requirement that its input bandwidth matches the bandwidth of the transmitted signal.	
Receiver input bandwidth		
The receiver bandwidth is equal to the receiver bandwidth in the 79 hopping channel mode, which is 1 MHz. The receiver bandwidth was verified during Bluetooth RF conformance testing.		

Subclause 15.247 (a) – Receiver Hopping Capability		Pass
Requirement:	The associated receiver has the ability to shift frequencies in synchronisation with the transmitted signals.	
Receiver hopping Capability		
The EUT complies with the Bluetooth RF specifications. For details refer to the Bluetooth standard.		

Subclause 15.247 (b)(1) – Peak Output Power				Pass	
Test Specification : FCC Part 15 Subpart A – Subclause 15.31 Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz) Port of testing : Temporary antenna port Detector : Peak RBW/VBW : 3 MHz / 10 MHz Supply voltage : 3.7VDC from DC power supply Temperature : 23°C Humidity : 50%					
Requirement:		For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 Watt. For all other frequency hopping systems in the 2400 – 2483.5 MHz band: 0.125 Watts.			
Results:		For test protocols please refer to Appendix 1, page 2-4.			
GFSK Modulation					
Frequency (MHz)	Maximum peak output power (dBm)	Cable attenuation (dB)	Output power (dBm)	Limit (W/dBm)	Verdict
2402	-6.83	3.52	-3.31	1 / 30.0	Pass
2441	-6.37	3.65	-2.72	1 / 30.0	Pass
2480	-6.46	3.60	-2.86	1 / 30.0	Pass

www.tuv.com

Subclause 15.247 (d) – Band edge compliance of conducted emissions

Pass

Remark: Test result refers to test report 14014459 001.

Subclause 15.205 – Band edge compliance of radiated emissions

Pass

Remark: Test result refers to test report 14014459 001.

Subclause 15.247 (d) – Spurious Conducted Emissions

Pass

Remark: Test result refers to test report 14014459 001.

Subclause 15.247 (c) – Spurious Radiated Emissions		Pass
Test Specification : ANSI C63.4 – 2003 Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), 8DPSK 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 : internal batteries has been activated Temperature : 23°C Humidity : 50%		
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:	All three transmit frequency modes comply with the field strength within the restricted bands. There is no spurious found below 30MHz.	
Tx frequency 2402MHz Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
No peak found	-	46 / QP
1602.031	35.17	74.0 / P
1602.080	22.20	54.0 / A
4804.147	49.92	74.0 / P
4803.974	31.15	54.0 / A
Tx frequency 2402MHz Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
No peak found	-	46.0 / QP
1602.176	35.26	74.0 / P
1602.176	21.89	54.0 / A
Tx frequency 2441MHz Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
1627.976	34.77	74.0 / P
1627.976	21.99	54.0 / A
4881.891	50.65	74.0 / P
4882.019	31.99	54.0 / A
Tx frequency 2441MHz Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
No peak found	-	46 / QP
1627.935	35.34	74.0 / P
1627.935	22.11	54.0 / A

www.tuv.com

Tx frequency 2480MHz		
Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
1654.064	35.90	74.0 / P
1653.968	22.37	54.0 / A
4959.695	54.05	74.0 / P
4960.064	38.10	54.0 / A
Tx frequency 2480MHz		
Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
No peak found	-	46 / QP
1653.891	35.37	74.0 / P
1653.411	22.83	54.0 / A