

Produkte Products

Prüfbericht - Nr.: Test Report No.:	14017025 001	-	Seite 1 von 13 Page 1 of 13
Auftraggeber: Client:	ModeLabs Technologies Ltd 31/F., China Online Centre 333 Lockhart Road Wanchai Hong Kong	l.	
Gegenstand der Prüfung: Test Item:	Wideband Transmission Sys	stem - Bluetooth Hea	dset
Bezeichnung: Identification:	Bluetrek SENSE	Serien-Nr.: Serial No.:	Engineering sample
Wareneingangs-Nr.: Receipt No.:	071009013	Eingangsdatum: Date of Receipt:	09.10.2007
Prüfort: Testing Location:	TÜV Rheinland Hong Kong L 9th Floor, Oriental News Building, 7 W Hong Kong Productivity Cou HKPC Building, 78 Tat Chee Avenue,	/ang Tai Road, Kowloon Ba Incil	y, Kowloon, Hong Kong
Prüfgrundlage: Test Specification:	FCC Part 15 Subpart C ANSI C63.4-2003 CISPR 22:1997		
Prüfergebnis: Test Result:	Das vorstehend beschrieben genannter Prüfgrundlage. The above mentioned product v		-
Prüflaboratorium: Testing Laboratory:	TÜV Rheinland Hong Kong L 9th Floor, Oriental News Building, 7 W	. td. /ang Tai Road, Kowloon Ba	y, Kowloon, Hong Kong
geprüft/ tested by:	kontroliie	rtl checked by:	
Sharon Li 18.12.2007 Project Engineer Datum Name/Stellung Date Name/Position	Unterschrift Datum Signature Date	Thomas Berns 007 Manager Name/Stellung Name/Position	Unterschrift Signature
Sonstiges:FCCOther Aspects	ID: QITBT3N		
F(ail) = entspri	cht nicht Prüfgrundlage wendbar	Abbreviations: P(ass) = F(ail) = N/A = N/T =	passed failed not applicable not tested
auszugsweise vervielfältig This test report relates to the a. r.	ich nur auf das o.g. Prüfmuster un t werden. Dieser Bericht berechti n. test sample. Without permission of is test report does not entitle to cam	gt nicht zur Verwendui of the test center this tes	gung der Prüfstelle nicht ng eines Prüfzeichens. t report is not permitted to be

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 Rev. 3.4.1 2007-09-06 / approved: R.M. Müller



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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	Integral Antenna
Antenna gain (dBi)	0
Power level	fix
Type of equipment	stand alone, plug-in radio device
Connection to public utility power line	No
Nominal voltage	V _{nor} : 3.8 V
Independent Operation Modes	Page scan
	Inquiry scan
	Connection state - ACL Link
	Connection state - SCO Link

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 μ s, where each slot corresponds to different RF hop frequencies. The nominal hop rate is 1600 hops/s. The symbol rate on the channel is 1 Ms/s.

Submitted documents

Circuit Diagram Block Diagram Bill of material User manual



List of Test and Measurement Instruments

	Equipment used	Manufacturer	Model	S/N	Cal. Date	Due Date
			No.			
\square	Semi-anechoic Chamber	Frankonia	Nil	Nil	28-Mar-07	28-Mar-08
\square	Test Receiver	R&S	ESVS30	842807/009	06-Aug-07	06-Aug-08
\boxtimes	Bi-conical Antenna	R&S	HK116	841489/016	08-Feb-06	08-Feb-08
\boxtimes	Log Periodic Antenna	R&S	HL223	841516/020	03-Feb-06	03-Feb-08
\boxtimes			RTK081-			
			05S-05S-	LA2-001-10M /		
	Coaxial cable 50ohm	Rosenberger	10m	002	15-May-07	15-May-08
\boxtimes	Microwave amplifer 0.5-					
	26.5GHz, 25dB gain	HP	83017A	3950M00241	Nil	Nil
\boxtimes	High Pass Filter (cutoff					
	freq. =1000MHz)	Trilithic	23042	9829213	Nil	Nil
\boxtimes	Horn Antenna	EMCO	3115	9002-3347	02-Feb-06	02-Feb-08
\boxtimes	Spectrum Analyser	R & S	FSP 30	100416	08-Jun-07	08-Jun-08
\boxtimes	Loop Antenna	EMCO	6502	9107-2651	16-Nov-05	16-Nov-07
\boxtimes	EMI Test receiver	R & S	ESCS 30	100201	05-Dec-06	05-Dec-07
	Artificial Mains Network	R & S	ESH3-Z5	100230	05-Dec-06	05-Dec-07
	Pulse Limiter	R & S	ESH3-Z2	100161	06-Dec-06	06-Dec-07
	Spectrum Analyzer	R & S	FSP 30	100007	13-Feb-06	12-Feb-08



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Result FCC Part 15 – Subpart C

Subclause	Pass	
Requirement:	No antenna other than that furnished by the respo device	nsible party shall be used with the
Result:	Permanent attached antenna	
Verdict:	Pass	

Subclau	ubclause 15.204 – Antenna Information		
Requirement	t: Provide information for every a	ntenna proposed for the use with the EUT	
	tenna type: anufacturer and model no: in with reference to an isotropic ra	Permanent attached antenna N.A. adiator: 0 dBi	
Verdict:	Pass		

Subclause 15.207 – Disturbance Voltage on AC Mains

Test Port: AC mains input port of the charger Applied voltage: 110VAC Applicable only to equipment designed to be connected to the public utiliy power line.

1) Mode of operation: Charging only

Live measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	0.282	42.7	32.2	66 - 56	56 - 46	Pass
> 0,5 - 5	1.782	33.0	21.6	56	46	Pass
> 5 - 30				60	50	Pass

Neutral measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	0.282	40.1	37.2	66 - 56	56 - 46	Pass
> 0,5 - 5	1.722	30.3	25.6	56	46	Pass
> 5 - 30				60	50	Pass

Result: 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.

Pass



Subclause	15.247 (a) – Carrier Frequency Separation	Pass
Requirement:	Frequency hopping systems shall have hopping channel carr a minimum of 25kHz or the 20dB bandwidth of the hopping c	
	: Peak : 100 kHz / 300 kHz	
	ntre frequencies of the hopping channels are separated by mo lots refer to Appendix 1, page 2.	ore than the 20dB bandwidth.



Subclause	15.247 (a) – Time of Occupancy (Dwell Time)	Pass	
Requirement: Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least overlapping channels. The average time of occupancy on any channel shall not than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hochannels employed.			
	: Peak : 1 MHz / 3 MHz : 3.8VDC from DC power supply		
In norn 64 time	reenshot in Appendix 1 page 4 shows the occurrence of a c nal hopping mode Bluetooth is using 79 hopping channels c es. The dwell time for the longest supported packet type is a e time of occupancy will not be greater than 400 ms.	only. The frequency was used	
0.4 x 79 Limit calo			
For test protocols	s please refer to Appendix 1, page 3.		



Subclause 1	5.247 (a) –	20 dB Bandwidth		Pass
				er frequencies separated by annel, whichever is greater.
Mode of operation Port of testing Detector	: Tx mode : Tempora : Peak : 30 kHz /	t 15 Subpart A – Subcla (2402MHz, 2441MHz, 2 ry antenna port 100 kHz rom DC power supply		
Results				
For test protocols i	refer to App	endix 1, page 4-5.		
Frequency (MHz)		20 dB left (MHz)	20 dB right (MHz)	20dB bandwidth (MHz)
2402		0.448	0.468	0.916
2441		0.448	0.460	0.908
2480		0.452	0.460	0.912

Subclause	15.247 (a) – Hopping Sequence	Pass
Requirement:	The hopping sequence is generated and provided with an example).
Hopping sequer	ice	
The hopping se master. The X is master-to-slave	epresented by a pseudo-random hopping sequence hopping through quence is unique for the piconet and is determined by the Bluetooth of put determines the phase in the 32-hop segment, whereas Y1 and Y and slave-to-master transmission. The inputs A to D determine the o buts E and F determine the mapping onto the hop frequencies.	levice address of the 2 selects between



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 0x0000000: 04 00 00 07 00 05 00 00 00 70 04 70 00 05 00 00
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
0x0000000: 72 29 76 31 74 61 78 63 01 41 05 43 03 73 07 75
0x00000000. 72 29 70 31 74 01 78 83 01 41 03 43 03 73 07 73 0 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 I

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 1	5.247 (b) – Peak Ou	tput Power		Pass	
	: Peak : 1 MHz / 3 MHz	lz, 2441MHz, 2480M a port			
Requirement:	For frequency hoppir 75 hopping channels 1 Watt. For all other Watts.	, and all frequency h	nopping systems in the	ne 5725-5850 MHz	band:
Result					
All three transmit	frequency modes cor	nply with the maxim	um peak output pow	er limit.	
For test protocols	please refer to Appen	ndix 1, page 6-7.			
Frequency (MHz)	Maximum peak output power (dBm)	Cable attenuation (dB)	Output power (dBm)	Limit (W/dBm)	Verdict
2402	2.49	3.52	6.01	1 / 30.0	Pass

1.83

1.38

2441

2480

3.65

3.60

5.48

4.98

Pass

Pass

1/30.0

1/30.0



Pass

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	: FCC Part 15 Subpart A – Subclause 15.31 : Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet : Temporary antenna port
Detector	: Peak
RBW/VBW	: 300 kHz / 1 MHz
Supply voltage	: 3.8VDC from DC power supply
Temperature	: 23°C
Humidity	: 50%
	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.

Result

There is no peak found outside any 100 kHz bandwidth of the operating frequency band in the three transmit frequency. All three transmit frequency modes comply with the limit stated in subclause 15.247(c).

For test protocols refer to Appendix 1, page 8-12.

Subclause 1	5.247 (c) – Spurious	s Conducted Emiss	ions	Pass	
	: FCC Part 15 Subp : Tx mode (2402MH : Temporary antenn : Peak : 100 kHz / 300 kHz : 3.8VDC from DC p : 23 °C : 50 %	Iz, 2441MHz, 2480№ la port			
	In any 100 kHz band digitally modulated ir produced by the inte bandwidth within the either an RF conduc	ntentional radiator is ntional radiator shall band that contains t	operating, the radio f be at least 20 dB be he highest level of th	requency power the low that in the 100	at is kHz
Result					
	ound outside any 100 e transmit frequency				e transmit
For test protocols	refer to Appendix 1, I	page 13			
Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2402	3200.460	-47.68	2.37	-50.05	Pass

2441

2480

No peak found

No peak found

-

-

-

-

-

-

Pass

Pass



	15.247 (C) = 3purious	s Radiated Emissions	Pass
	n : ANSI C63.4 - 2003 n : Tx mode (2402MH : Enclosure : Peak : 100 kHz / 300 kHz 1 MHz / 3 MHz for : internal batteries h : 23°C : 50%	Hz, 2441MHz, 2480MHz), DH1 pa z for f < 1 GHz f > 1 GHz	acket
Requirement:	digitally modulated in produced by the inte bandwidth within the	ntentional radiator is operating, the ntional radiator shall be at least 2	
Result			
Result			
	frequency modes cor	mply with the field strength within	the restricted bands.
All three transmit	frequency modes cor found below 30MHz.	mply with the field strength within	the restricted bands.
All three transmit	found below 30MHz.	mply with the field strength within	the restricted bands.
All three transmit There is no peak Tx frequency 240	found below 30MHz.)2MHz	Vertical Polarization	
All three transmit There is no peak Tx frequency 240 Fr	found below 30MHz.)2MHz	Vertical Polarization	Limit/ Detector
All three transmit There is no peak Tx frequency 240 Fr M	found below 30MHz. 02MHz eq Hz	Vertical Polarization	Limit/ Detector dBuV/m
All three transmit There is no peak Tx frequency 240 Fr M No pea	found below 30MHz. 02MHz eq Hz k found	Vertical Polarization Level dBuV/m	Limit/ Detector dBuV/m 43.5 / QP
All three transmit There is no peak Tx frequency 240 Fr M No pea 160	found below 30MHz. 02MHz eq Hz k found 0.67	Vertical Polarization Level dBuV/m - 40.49	Limit/ Detector dBuV/m 43.5 / QP 74.0 / P
All three transmit There is no peak Tx frequency 240 Fr M No pea 160 160	found below 30MHz. 02MHz req Hz k found 0.67 0.71	Vertical Polarization Level dBuV/m 	Limit/ Detector dBuV/m 43.5 / QP 74.0 / P 54.0 / A
All three transmit There is no peak Tx frequency 240 Fr M No pea 160 160 480	found below 30MHz. 22MHz 22M	Vertical Polarization Level dBuV/m 	Limit/ Detector dBuV/m 43.5 / QP 74.0 / P 54.0 / A 74.0 / P
All three transmit There is no peak Tx frequency 240 Fr M No pea 160 160 480	found below 30MHz. 02MHz req Hz k found 0.67 0.71 3.98 3.96	Vertical Polarization Level dBuV/m 	Limit/ Detector dBuV/m 43.5 / QP 74.0 / P 54.0 / A
All three transmit There is no peak Tx frequency 240 Fr M No pea 160 160 480 480 Tx frequency 240	found below 30MHz. 02MHz req Hz k found 0.67 0.71 3.98 3.96	Vertical Polarization Level dBuV/m - - 40.49 38.12 57.06 49.05	Limit/ Detector dBuV/m 43.5 / QP 74.0 / P 54.0 / A 74.0 / P
All three transmit There is no peak Tx frequency 240 Fr M No pea 160 160 480 480 Tx frequency 240	found below 30MHz. 22MHz eq Hz k found 0.67 0.71 3.98 3.96 02MHz	Vertical Polarization Level dBuV/m 	Limit/ Detector dBuV/m 43.5 / QP 74.0 / P 54.0 / A 74.0 / P 54.0 / A
All three transmit There is no peak Tx frequency 240 Fr M No pea 160 160 480 480 Tx frequency 240 Fr M	found below 30MHz. 22MHz req Hz k found 0.67 0.71 3.98 3.96 22MHz req	Vertical Polarization Level dBuV/m - - 40.49 38.12 57.06 49.05 Horizontal Polarization Level	Limit/ Detector dBuV/m 43.5 / QP 74.0 / P 54.0 / A 74.0 / P 54.0 / A Limit/ Detector
All three transmit There is no peak Tx frequency 240 Fr M No pea 160 160 480 480 Tx frequency 240 Fr M No pea	found below 30MHz. 22MHz req Hz k found 0.67 0.71 3.98 3.96 02MHz req Hz	Vertical Polarization Level dBuV/m - - 40.49 38.12 57.06 49.05 Horizontal Polarization Level	Limit/ Detector dBuV/m 43.5 / QP 74.0 / P 54.0 / A 74.0 / P 54.0 / A Limit/ Detector dBuV/m
All three transmit There is no peak Tx frequency 240 Fr M No pea 160 160 480 480 Tx frequency 240 Fr M No pea 160	found below 30MHz. 22MHz 22M	Vertical Polarization Level dBuV/m 	Limit/ Detector dBuV/m 43.5 / QP 74.0 / P 54.0 / A 74.0 / P 54.0 / A Limit/ Detector dBuV/m 43.5 / QP
All three transmit There is no peak Tx frequency 240 Fr M No pea 160 160 480 480 Tx frequency 240 Fr M No pea 160 160 160	found below 30MHz. 22MHz 22MHz 24 24 25 27 27 27 27 27 27 27 27 27 27	Vertical Polarization Level dBuV/m - 40.49 38.12 57.06 49.05 Horizontal Polarization Level dBuV/m - 48.32	Limit/ Detector dBuV/m 43.5 / QP 74.0 / P 54.0 / A 74.0 / P 54.0 / A Limit/ Detector dBuV/m 43.5 / QP 74.0 / P



Tx frequency 2441MHz	Vertical Polarization	
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
No peak found	dBuv/III	43.5 / QP
1626.65	42.97	74.0 / P
1626.57	41.36	54.0 / A
4881.99	55.52	74.0 / P
4882.00	51.88	54.0 / A
Tx frequency 2441MHz	Horizontal Polarization	
Freq	Level	Limit/ Detector
MHz	dBuV/m	dBuV/m
No peak found	-	43.5 / QP
1626.62	50.02	74.0 / P
1626.59	49.20	54.0 / A
4881.97	54.91	74.0 / P
4881.89	50.83	54.0 / A
Tx frequency 2480MHz	Vertical Polarization	
Freq	Level	Limit/ Detector
MHz	dBuV/m	dBuV/m
No peak found	-	43.5 / QP
1652.60	43.61	74.0 / P
1652.71	42.16	54.0 / A
4959.97	55.00	74.0 / P
4959.95	51.83	54.0 / A
Tx frequency 2480MHz	Horizontal Polarization	
Freq	Level	Limit/ Detector
MHz	dBuV/m	dBuV/m
No peak found	-	43.5 / QP
1652.63	52.19	74.0 / P
1652.58	51.58	54.0 / A
4960.19	51.95	74.0 / P
4959.98	49.73	54.0 / A