

Report on the FCC and IC Testing of the
Konrad Hornschuch AG

Model: P53

In accordance with
FCC 47 CFR Part 2.1091 &
ISED RSS-GEN Issue 5, section 3.4 and ISED RSS-102,
Issue 5, section 2.5

Prepared for: Konrad Hornschuch AG
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30419 Hannover
Germany

FCC ID: 2BCO4V54-B01
IC: ---



Product Service

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Date: 2024-02-14
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RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Alexander Deese	2024-02-14	 SIGN-ID 883554
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Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 2.1091 & ISED RSS-GEN Issue 5, section 3.4 and ISED RSS-102, Issue 5, section 2.5. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	
Testing	Alexander Deese	2024-02-14	 SIGN-ID 883554

Laboratory Accreditation DAkkS Reg. No. D-PL-11321-11-02 DAkkS Reg. No. D-PL-11321-11-03	Laboratory recognition Registration No. BNetzA-CAB-16/21-15	ISED Canada test site registration 3050A-2
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EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 2.1091 & ISED RSS-GEN Issue 5, section 3.4 and ISED RSS-102, Issue 5, section 2.5

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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2022-03-30
2	FCC ID added. Applicant and Manufacturer name updated.	2023-11-08
3	Part 1.1310 removed from Test specifications. RSS-102 added in summary. Evaluation Results corrected. Measurement uncertainty removed.	2023-12-18
4	"adjusted for tune-up tolerance" added, page 9	2024-01-24
5	Maximum output power value changed to 6 dBm (as stated by customer)	2024-02-14

Table 1

1.2 Introduction

Applicant	Konrad Hornschuch AG
Manufacturer	Konrad Hornschuch AG
Model Number(s)	P53
Serial Number(s)	12539921361002
Firmware	---
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 2.1091 & ISED RSS-GEN Issue 5, section 3.4 and ISED RSS-102, Issue 5, section 2.5
Test Plan/Issue/Date	---
Order Number	5589320
Date of Receipt of EUT	2022-02-21
Start of Test	2022-03-09
Finish of Test	2022-03-09
Name of Engineer(s)	Michael Ingerl
Related Document(s)	KDB 447498 D01 General RF Exposure Guidance v06 ANSI C63.10 (2013)



1.3 Brief Summary of Results

A brief summary of the exemption criteria evaluated in accordance with FCC 47 CFR Part 2.1091 & ISSED RSS-GEN Issue 5, section 3.4 and ISSED RSS-102, Issue 5, section 2.5 is shown below.

Section	Test Description	Result	Comments/Base Standard
Configuration and Mode: Continuously transmitting			
2.1	Evaluation of exemption criteria	Pass	KDB 447498 D01 v06
2.1	Evaluation of exemption criteria	Pass	RSS-102 section 2.5.1

Table 2



1.4 Basic information of EUT

Equipment characteristics:			
Type designation	P53		
Type of equipment:	Portable Electronic Device		
Power supply:	<input type="checkbox"/> AC Nominal: Minimum: Maximum: Nominal frequency: Hz	<input type="checkbox"/> DC Nominal: Minimum: Maximum:	<input checked="" type="checkbox"/> Batterie Nominal: 3.7 V
Kind of equipment:	Transceiver		
Frequency range:	2400-2483.5 MHz		
Number of RF-channels:	40		
Channel spacing	2 MHz		
Adaptive	No		
FHHS	No		
Type(s) of Modulation (e.g. BPSK, FSK, ASK, ...)	As per Bluetooth 4.2 Low Energy Standard		
Type of radio transmission / Use of frequency spectrum (e.g. DSSS, OFDM,.)	As per Bluetooth 4.2 Low Energy Standard		
Number / Type of Antenna(s)	Fractus Antenna Micro Reach Xtend™ NN01-110 (Integral Antenna)		
Antenna Gain:	0.2 dBi		
Temperature Range:	-5°C – 53°C		



1.5 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer / SN: 12539921361002 (Conducted Sample for Tests)	Not Applicable	Not Applicable

Table 3

1.6 Test Location

TÜV SÜD Product Service conducted the following tests at our Straubing Test Laboratory.

Test Name	Name of Engineer(s)
Configuration and Mode: Continuously transmitting	
Exposure of Humans to RF Fields	Michael Ingerl

Table 4

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany



2 Test Details

2.1 Exposure of Humans to RF Fields

2.1.1 Specification Reference

FCC 47 CFR Part 2.1091 &
ISED RSS-GEN Issue 5, section 3.4 and ISED RSS-102, Issue 5, section 2.5
KDB 447498 D01 General RF Exposure Guidance v06, chapter 4.3.1

2.1.2 Equipment Under Test and Modification State

P53, S/N: 12539921361002 - Modification State 0

2.1.3 Date of Test

2022-03-09

2.1.4 Evaluation Results

Standalone SAR Test Exclusion acc. to KDB 447498 D01:

Assessment against 1 g SAR

Maximum Output Power	
adjusted for tune up tolerance:	6 dBm (as stated by customer)
Antenna Gain:	0.2 dBi
Maximum conducted output power:	$6 \text{ dBm} - 0.2 \text{ dBi} = 5.8 \text{ dBm} = 3.8 \text{ mW}$
Minimum test separation distance d:	5 mm
Frequency f:	2402 MHz = 2.402 GHz
Numeric Threshold (P_{max} / d) (f) ^{0.5}	$(3.8 \text{ mW} / 5 \text{ mm}) * 2.402^{0.5} = 1.2$
Numeric Threshold Limit (1 g SAR):	3.0



ISED RSS-GEN Issue 5, section 3.2 and ISED RSS-102, Issue 5, section 2.5:

Exposure of Humans to RF Fields	Applicable	Declared by applicant	Measured	Exemption
The antenna is				
<input type="checkbox"/> detachable				
<p>The conducted output power (CP in watts) is measured at the antenna connector:</p> <p>$CP =$</p> <p>The effective isotropic radiated power (EIRP in watts) is calculated using</p> <p><input type="checkbox"/> the numerical antenna gain: $G =$</p> <p>$EIRP = G \cdot CP \Rightarrow EIRP =$</p> <p><input type="checkbox"/> the field strength¹ in V/m: $FS = \dots\dots\dots$ V/m</p> <p>$EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP =$ mW</p> <p>with:</p> <p>Distance between the antennas in m: $D =$ mm</p>		<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/> not detachable				
<p>A field strength measurement is used to determine the effective isotropic radiated power (EIRP in watts) given by:</p> <p>$EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP = 6 \text{ dBm} = 4 \text{ mW}$ (as stated by customer)</p> <p>with:</p> <p>Field strength in V/m: $FS =$</p> <p>$=$</p> <p>Distance between the two antennas in m: $D =$</p>			<input checked="" type="checkbox"/>	
Selection of output power				
<p>The output power TP is the higher of the conducted or effective isotropic radiated power (e.i.r.p.):</p> <p>Conducted power = 6 dBm - 0.2 dBi = 5.8 dBm</p> <p>EIRP = 6 dBm</p> <p>TP = 6 dBm = 4 mW</p>				

¹ The conversion formula is valid only for properly matched antennas. In other cases the transmitter output power may have to be measured by a terminated measurement when applying the exemption clauses. If an open area test site is used for field strength measurement, the effect due to the metal ground reflecting plane should be subtracted from the maximum field strength value in order to reference it to free space, before calculating TP.



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Exposure of Humans to RF Fields (continued)	Applicable	Declared by applicant	Measured	Exemption
Separation distance between the user and the transmitting device is				
<input checked="" type="checkbox"/> less than or equal to 20 cm	<input type="checkbox"/> greater than 20 cm	<input checked="" type="checkbox"/>		
Transmitting device is				
<input type="checkbox"/> in the vicinity of the human head	<input checked="" type="checkbox"/> body-worn	<input checked="" type="checkbox"/>		



SAR evaluation											Applicable	Declared by applicant	Measured	Exemption																																																																																								
<p>SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in the table.</p> <p>For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in the table, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.</p> <p>For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.</p> <table><tr><th>Frequency (MHz)</th><th colspan="10">Exemption limits (mW)² at separation distance of</th></tr><tr><th></th><th>≤5 mm</th><th>10 mm</th><th>15 mm</th><th>20 mm</th><th>25 mm</th><th>30 mm</th><th>35 mm</th><th>40 mm</th><th>45 mm</th><th>≥50 mm</th></tr><tr><td>450</td><td>52</td><td>70</td><td>88</td><td>106</td><td>123</td><td>141</td><td>159</td><td>177</td><td>195</td><td>213</td></tr><tr><td>835</td><td>17</td><td>30</td><td>42</td><td>55</td><td>67</td><td>80</td><td>92</td><td>105</td><td>117</td><td>130</td></tr><tr><td>1900</td><td>7</td><td>10</td><td>18</td><td>34</td><td>60</td><td>99</td><td>153</td><td>225</td><td>316</td><td>431</td></tr><tr><td>2450</td><td>4</td><td>7</td><td>15</td><td>30</td><td>52</td><td>83</td><td>123</td><td>173</td><td>235</td><td>309</td></tr><tr><td>3500</td><td>2</td><td>6</td><td>16</td><td>32</td><td>55</td><td>86</td><td>124</td><td>170</td><td>225</td><td>290</td></tr><tr><td>5800</td><td>1</td><td>6</td><td>15</td><td>27</td><td>41</td><td>56</td><td>71</td><td>85</td><td>97</td><td>106</td></tr></table>											Frequency (MHz)	Exemption limits (mW) ² at separation distance of											≤5 mm	10 mm	15 mm	20 mm	25 mm	30 mm	35 mm	40 mm	45 mm	≥50 mm	450	52	70	88	106	123	141	159	177	195	213	835	17	30	42	55	67	80	92	105	117	130	1900	7	10	18	34	60	99	153	225	316	431	2450	4	7	15	30	52	83	123	173	235	309	3500	2	6	16	32	55	86	124	170	225	290	5800	1	6	15	27	41	56	71	85	97	106				
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<p>Environment: Uncontrolled</p> <p>Assessment against: Head/Body</p> <p>Carrier frequency: f = 2402 MHz</p> <p>Distance: d = 5 mm</p> <p>Transmitter output power (adjusted for tune-up tolerance): TP = 4 mW</p> <p>Limit: TP_{limit} = 4.26 mW</p>											<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>																																																																																								

² The exemption limit in the table are based on measurements and simulations on half-wave dipole antennas at separation distances of 5 mm to 25 mm from a flat phantom, providing a SAR value of approximately 0.4 W/kg for 1 g of tissue. For low frequencies (300 MHz to 835 MHz), the exemption limits are derived from a linear fit. For high frequencies (1900 MHz and above), the exemption limits are derived from a third order polynomial fit.