

RF Exposure Report

(Part 0: SAR Char Evaluation)

APPLICANT : FairPhone B.V.
EQUIPMENT : Fairphone 4 5G
BRAND NAME : FAIRPHONE
MODEL NAME : FP4
FCC ID : 2AUWUFP4
STANDARD : FCC 47 CFR Part 2 (2.1093)

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.



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History of this test report

Report No.	Version	Description	Issued Date
FA152403-02A	01	Initial issue of report	Apr. 08, 2022



1. Introduction

The RF exposure limit is defined based on time-averaged RF exposure. The product implements Qualcomm Smart Transmit feature which controls the instantaneous transmitting power for WWAN transmitter to ensure the product in compliance with RF exposure limit over a defined time window, for SAR (transmit frequency \leq 6GHz) and power density (transmit frequency $>$ 6GHz) to control and manage transmitting power in real time and to ensure at all times the time-averaged RF exposure is compliant to the regulation requirement. Cannot operate without SAR characterization at the device level, beforehand.

This report describes the procedures for the SAR char generation, and the parameters obtained from SAR characterization (referred to as SAR char, respectively) will be used as input for Smart Transmit. Both SAR char will be entered via the Embedded File System (EFS) to enable the Smart Transmit Feature.

Terminologies in this report

P_{limit}	The time-averaged RF power which corresponds to SAR_design_target.
P_{max}	Maximum target power level
SAR_design_target:	The design target for SAR compliance. It should be less than regulatory power density limit to account for all device design related uncertainty.
SAR char	P_{limit} for all the technologies/bands for all applicable DSI



2. Product Description

Product Feature & Specification	
Equipment Name	Fairphone 4 5G
Brand Name	FAIRPHONE
Model Name	FP4
FCC ID	2AUWUFP4
Wireless Technology and Frequency Range	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850 MHz ~ 1910 MHz WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n5: 824 MHz ~ 849 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3450 MHz ~ 3550 MHz, 3700 MHz ~ 3980 MHz 5G NR n78: 3450 MHz ~ 3550 MHz, 3700 MHz ~ 3800 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC: 13.56 MHz
Mode	GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+(16QAM uplink is not supported) LTE: QPSK, 16QAM, 64QAM 5G NR : CP-OFDM / DFT-s-OFDM, PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE NFC: ASK

3. SAR Characterization

SAR char must be generated to cover all radio configurations and usage scenarios that the wireless device supports for operating at 6 GHz or below. It will then be used as input for Smart Transmit to control and manage RF exposure for f < 6 GHz.

3.1 SAR design target and uncertainty

<SAR design target and uncertainty>:

	Uncertainty dB (k=2)
Sub6 radio TxAGC	1.0
Device to device variation	1.2
Total uncertainty	1.49

To account for total uncertainty, SAR_design_target should be determined as:

$$SAR_{design_target} < SAR_{regulatory_limit} \times 10^{\frac{-total\ uncertainty}{10}}$$

SAR design Target :

Band	Antenna	Head DSI 3	Body-Worn DSI 1	Hotspot DSI 1	Extremity DSI 1
GSM850	Ant 0	0.75	0.75	0.75	1.75
GSM1900	Ant 3	0.75	0.75	0.75	1.75
WCDMA II	Ant 3	0.75	0.75	0.75	1.75
WCDMA VI	Ant 3	0.75	0.75	0.75	1.75
WCDMA V	Ant 0	0.75	0.75	0.75	1.75
LTE Band 2	Ant 3	0.75	0.75	0.75	1.75
LTE Band 4	Ant 3	0.75	0.75	0.75	1.75
LTE Band 5	Ant 0	0.75	0.75	0.75	1.75
LTE Band 7	Ant 1	0.75	0.26	0.55	1.75
LTE Band 12	Ant 0	0.75	0.75	0.75	1.75
LTE Band 71	Ant 0	0.75	0.75	0.75	1.75
LTE Band 41(38)	Ant 1	0.75	0.75	0.75	1.75
5G NR n5	Ant 0	0.75	0.75	0.75	1.75
5G NR n71	Ant 0	0.75	0.75	0.75	1.75
5G NR n77(78)	Ant 4	0.75	0.30	0.70	1.75
5G NR n78(HPUE)	Ant 4	0.75	0.30	0.70	1.75
5G NR n77(78)	Ant 7	0.75	0.75	0.75	1.75
5G NR n78(HPUE)	Ant 7	0.75	0.75	0.75	1.75

3.2 SAR Char Table

SAR char must be generated to cover all radio configurations and usage scenarios that the wireless device supports for operating at 6 GHz or below. It will then be used as input for Smart Transmit to control and manage RF exposure for $f < 6$ GHz.

<P_{limit} for supported technologies and bands (P_{limit} in EFS file)>

Band	Duty Cycle %	Antenna	Head DSI 3	Body-Worn&Hotspot&Extremity DSI 1	P _{max} *
GSM850 (2 Tx slots)	25	Ant 0	24.1	27.5	24.5
GSM1900 (2 Tx slots)	25	Ant 3	19.4	24.9	21.5
WCDMA II	100	Ant 3	18.0	24.8	23.5
WCDMA IV	100	Ant 3	18.3	24.6	23.5
WCDMA V	100	Ant 0	23.6	27.2	24.5
LTE Band 2	100	Ant 3	18.6	24.3	23.0
LTE Band 4	100	Ant 3	19.2	24.9	23.0
LTE Band 5	100	Ant 0	23.2	27.3	24.0
LTE Band 7	100	Ant 1	30.6	20.0	23.5
LTE Band 12	100	Ant 0	24.5	26.9	24.0
LTE Band 71	100	Ant 0	24.2	27.2	24.0
LTE Band 41(38)	63.3	Ant 1	29.7	22.7	21.5
5G NR n5	100	Ant 0	22.9	27.3	23.5
5G NR n71	100	Ant 0	22.6	27.0	23.5
5G NR n77(78)	100	Ant 4	20.4	20.4	23.5
5G NR n78(HPUE)	100	Ant 4	20.4	20.4	26.0
5G NR n77(78) Part 27O	100	Ant 7	21.3	26.7	16.0
5G NR n77(78) Part 27Q	100	Ant 7	21.3	26.7	18.5
5G NR n78(HPUE) Part 27O	100	Ant 7	28.1	25.9	17.0
5G NR n78(HPUE) Part 27Q	100	Ant 7	28.1	25.9	21.5

Note: 1) *P_{max} is used for RF tune up procedure. The maximum allowed output power is equal to P_{max} + device uncertainty.

2) All P_{limit} power levels entered in the Table correspond to average power levels after accounting for duty cycle in the case TDD modulation schemes (for e.g., GSM & LTE TDD).

3) The max allowed output power is the P_{limit} + device uncertainty, and if P_{limit} is higher than P_{max}, the device output power will be P_{max} instead.

4) 5G NR n77/n78 ant 7 support SRS (Sounding Reference Signal) functionality.