


RF Exposure Report

(Part 0: SAR Char Evaluation)

APPLICANT : OnePlus Technology (Shenzhen) Co., Ltd.
EQUIPMENT : Mobile Phone
BRAND NAME : ONEPLUS, ⁺
MODEL NAME : CPH2655
FCC ID : 2ABZ2-OP23895
STANDARD : FCC 47 CFR PART 2 (2.1093)

We, Sporton International Inc. (Shenzhen), would like to declare that the tested sample has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB 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. (Shenzhen), 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
FA461101D	01	Initial issue of report	Sep. 27, 2024



1. Introduction

The Qualcomm® Smart Transmit™ 5.0 of Smart Transmit (GEN2) Feature operates based on pre-defined sub6 antenna groups (AG). This Device is enabled with the Qualcomm® Smart Transmit Gen2 feature. The RF exposure limit is defined based on time-averaged RF exposure. 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 and WLAN/BT transmitter to ensure the product in compliance with RF exposure limit over a defined time window. 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. Smart Transmit 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) version 23 to enable the Smart Transmit of GEN2 phase VI (do not support Antenna group).

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	Mobile Phone
Brand Name	ONEPLUS,
Model Name	CPH2655
FCC ID	2ABZ2-OP23895
Wireless Technology and Frequency Range	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850MHz ~ 1910MHz 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 13: 777 MHz ~ 787 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 30: 2305 MHz ~ 2315 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 48: 3550 MHz ~ 3700 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n7 : 2500 MHz ~ 2570 MHz 5G NR n12 : 699 MHz ~ 716 MHz 5G NR n25 : 1850 MHz ~ 1915 MHz 5G NR n30 : 2305 MHz ~ 2315 MHz 5G NR n38 : 2570 MHz ~ 2620 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n48 : 3550 MHz ~ 3700 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3700 MHz ~ 3980 MHz, 3450MHz ~ 3550MHz 5G NR n78: 3700 MHz ~ 3800 MHz, 3450MHz ~ 3550MHz 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 WLAN U-NII 5: 5925 MHz ~ 6425 MHz WLAN U-NII 6: 6425 MHz ~ 6525 MHz WLAN U-NII 7: 6525 MHz ~ 6875 MHz WLAN U-NII 8: 6875 MHz ~ 7125 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz WPT: 110.1KHz ~ 148.5KHz
Mode	GSM/GPRS/EGPRS/DTM RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+ (16QAM uplink is supported) LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 2.4GHz 802.11ac VHT20/VHT40 WLAN 2.4GHz 802.11ax/be HE20/HE40/EHT20/EHT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/VHT160 WLAN 5GHz 802.11ax HE20/HE40/HE80/HE160 WLAN 5GHz 802.11be EHT20/EHT40/EHT80/EHT160 WLAN 6GHz 802.11a/ax HE20/HE40/HE80/HE160 WLAN 6GHz 802.11be EHT20/EHT40/EHT80/EHT160/EHT320 Bluetooth BR/EDR/LE NFC: ASK WPT: 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 WWAN and WLAN/BT bands. It will then be used as input for Smart Transmit to control and manage RF exposure for WWAN and WLAN/BT bands.

3.1 SAR design target and uncertainty

SAR design Target :

Band	Antenna	DSI 4 Hotspot	DSI 4 Extremity	DSI 4 Body Worn	DSI 5 Head
GSM850	1	0.910	2.270	0.910	0.910
GSM1900	5	0.910	2.270	0.910	0.910
WCDMA II	0	0.696	2.270	0.380	0.851
WCDMA II	5	0.743	2.270	0.328	0.051
WCDMA IV	0	0.815	2.270	0.454	0.723
WCDMA IV	5	0.896	2.270	0.414	0.069
WCDMA V	0	0.954	2.270	0.620	0.699
WCDMA V	1	0.910	2.270	0.910	0.910
LTE Band 2	5	0.749	2.270	0.285	0.054
LTE Band 2	0	0.682	2.270	0.458	0.977
LTE Band 2	6	0.923	2.270	0.494	0.679
LTE Band 2	7	0.912	2.270	0.710	0.622
LTE Band 4	5	0.913	2.270	0.488	0.086
LTE Band 4	0	0.664	2.270	0.402	0.862
LTE Band 4	6	0.518	2.270	0.229	0.699
LTE Band 4	7	0.751	2.270	0.503	0.585
LTE Band 5	0	0.766	2.270	0.471	0.500
LTE Band 5	1	0.910	2.270	0.910	0.910
LTE Band 7	5	0.908	2.270	0.534	0.212
LTE Band 7	0	0.961	2.270	0.523	0.995
LTE Band 7	6	0.885	2.270	0.321	0.898
LTE Band 7	7	0.501	2.270	0.192	0.461
LTE Band 12	0	0.910	2.270	0.910	0.792
LTE Band 12	1	0.910	2.270	0.910	0.910
LTE Band 13	0	0.910	2.270	0.910	0.854
LTE Band 13	1	0.910	2.270	0.910	0.910
LTE Band 17	0	0.910	2.270	0.910	0.792
LTE Band 17	1	0.910	2.270	0.910	0.910
LTE Band 25	5	0.749	2.270	0.285	0.054
LTE Band 25	0	0.704	2.270	0.336	0.876
LTE Band 25	6	0.923	2.270	0.494	0.637
LTE Band 25	7	0.912	2.270	0.710	0.622
LTE Band 26	0	0.910	2.270	0.910	0.500
LTE Band 26	1	0.910	2.270	0.910	0.910
LTE Band 30	5	0.824	2.270	0.345	0.084
LTE Band 30	0	0.630	2.270	0.398	0.981
LTE Band 30	6	0.387	2.270	0.219	0.843
LTE Band 30	7	0.438	2.270	0.227	0.594
LTE Band 66	5	0.913	2.270	0.488	0.086
LTE Band 66	0	0.664	2.270	0.402	0.862
LTE Band 66	6	0.518	2.270	0.229	0.699
LTE Band 66	7	0.751	2.270	0.503	0.585
LTE Band 71	0	0.910	2.270	0.910	0.910
LTE Band 71	1	0.910	2.270	0.910	0.910
LTE Band 38	5	1.030	2.270	0.599	0.176



LTE Band 38	0	0.869	2.270	0.468	1.030
LTE Band 41_PC3	5	1.030	2.270	0.599	0.910
LTE Band 41_PC2	5	0.849	2.270	0.487	0.163
LTE Band 41_PC3	0	0.869	2.270	0.468	1.030
LTE Band 41_PC2	0	0.742	2.270	0.391	0.946
LTE Band 41_PC3	6	0.935	2.270	0.403	1.040
LTE Band 41_PC2	6	0.701	2.270	0.319	0.762
LTE Band 41_PC3	7	0.910	2.270	0.910	0.910
LTE Band 41_PC2	7	0.910	2.270	0.910	0.910
LTE Band 48	10	0.931	2.270	0.462	0.874
LTE Band 48	6	0.619	2.270	0.381	0.807
LTE Band 48	11	0.535	2.270	0.509	0.988
LTE Band 48	12	1.090	2.270	0.897	0.966
FR1 n2	5	0.781	2.270	0.363	0.054
FR1 n2	0	0.751	2.270	0.349	0.876
FR1 n2	6	0.942	2.270	0.487	0.637
FR1 n2	7	0.784	2.270	0.463	0.622
FR1 n5	0	0.849	2.270	0.515	0.884
FR1 n5	1	0.264	2.270	0.264	0.116
FR1 n7	5	0.820	2.270	0.441	0.055
FR1 n7	0	0.789	2.270	0.577	0.839
FR1 n7	6	0.999	2.270	0.370	1.000
FR1 n7	7	0.555	2.270	0.213	0.583
FR1 n12	0	0.910	2.270	0.910	0.728
FR1 n12	1	0.910	2.270	0.910	0.090
FR1 n25	5	0.781	2.270	0.363	0.054
FR1 n25	0	0.751	2.270	0.349	0.876
FR1 n25	6	0.942	2.270	0.487	0.637
FR1 n25	7	0.784	2.270	0.463	0.622
FR1 n30	5	0.659	2.270	0.307	0.042
FR1 n30	0	0.715	2.270	0.440	0.873
FR1 n66	5	0.787	2.270	0.437	0.065
FR1 n66	0	0.674	2.270	0.489	0.898
FR1 n66	6	0.516	2.270	0.221	0.843
FR1 n66	7	0.764	2.270	0.523	0.658
FR1 n71	0	0.910	2.270	0.910	0.910
FR1 n71	1	0.910	2.270	0.910	0.910
FR1 n38	5	0.759	2.270	0.512	0.091
FR1 n38	0	0.862	2.270	0.345	0.891
FR1 n38	6	0.980	2.270	0.347	0.759
FR1 n38	7	0.839	2.270	0.211	0.663
FR1 n41_PC3	5	0.759	2.270	0.512	0.091
FR1 n41_PC2	5	0.759	2.270	0.512	0.091
FR1 n41_PC3	0	0.862	2.270	0.345	0.891
FR1 n41_PC2	0	0.862	2.270	0.345	0.891
FR1 n41_PC3	6	0.737	2.270	0.306	0.759
FR1 n41_PC2	6	0.737	2.270	0.306	0.759
FR1 n41_PC3	7	0.839	2.270	0.211	0.663
FR1 n41_PC2	7	0.839	2.270	0.211	0.663
FR1 n48	10	0.884	2.270	0.483	0.825
FR1 n48	6	0.849	2.270	0.723	0.719
FR1 n48	11	0.530	2.270	0.486	0.892
FR1 n48	12	0.927	2.270	0.526	0.918
FR1 n77_PC3	10	0.435	2.270	0.203	0.647
FR1 n77_PC2	10	0.435	2.270	0.203	0.647
FR1 n77_PC3	6	0.557	2.270	0.432	0.842



FR1 n77_PC2	6	0.557	2.270	0.432	0.842
FR1 n77_PC3	11	0.867	2.270	0.779	0.951
FR1 n77_PC2	11	0.867	2.270	0.779	0.951
FR1 n77_PC3	12	0.812	2.270	0.458	0.844
FR1 n77_PC2	12	0.812	2.270	0.458	0.844
FR1 n78_PC3	10	0.621	2.270	0.275	0.647
FR1 n78_PC2	10	0.621	2.270	0.275	0.647
FR1 n78_PC3	6	0.845	2.270	0.708	0.842
FR1 n78_PC2	6	0.845	2.270	0.708	0.842
FR1 n78_PC3	11	0.867	2.270	0.779	0.951
FR1 n78_PC2	11	0.867	2.270	0.779	0.951
FR1 n78_PC3	12	0.812	2.270	0.458	0.802
FR1 n78_PC2	12	0.812	2.270	0.458	0.802
Bluetooth	1	0.910	2.270	0.910	0.910
Bluetooth	10	0.910	2.270	0.910	0.401
Bluetooth	13	0.910	2.270	0.910	0.499
WLAN2.4GHz	13	0.757	2.270	0.509	0.803
WLAN2.4GHz	10	0.656	2.270	0.324	0.755
WLAN2.4GHz	13+10	0.598	2.270	0.313	0.686
WLAN5.2GHz	14	0.272	2.270	0.232	0.549
WLAN5.2GHz	15	0.103	2.270	0.105	0.910
WLAN5.2GHz	14+15	0.088	2.270	0.084	0.229
WLAN5.3GHz	14		1.120	0.232	0.549
WLAN5.3GHz	15		0.236	0.105	0.910
WLAN5.3GHz	14+15		0.201	0.084	0.229
WLAN5.5GHz	14		1.350	0.327	0.880
WLAN5.5GHz	15		0.469	0.278	0.910
WLAN5.5GHz	14+15		0.318	0.146	0.347
WLAN5.8GHz	14	0.339	2.270	0.215	0.630
WLAN5.8GHz	15	0.423	2.270	0.423	0.164
WLAN5.8GHz	14+15	0.149	2.270	0.149	0.309
WLAN6GHz	14		2.270	0.910	0.910
WLAN6GHz	15		2.270	0.910	0.910
WLAN6GHz	14+15		2.270	0.910	0.910

<SAR design target>

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

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



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 WWAN and WLAN/BT bands. It will then be used as input for Smart Transmit to control and manage RF exposure for WWAN and WLAN/BT bands.

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

Table with 6 columns: Band, Antenna, DSI 4, DSI 5, Total Uncertainty dB (k=2), Pmax*. Rows include GSM850, GSM1900, WCDMA II, WCDMA II, WCDMA IV, WCDMA IV, WCDMA V, WCDMA V, LTE Band 2, LTE Band 2, LTE Band 2, LTE Band 2, LTE Band 4, LTE Band 4, LTE Band 4, LTE Band 4, LTE Band 5, LTE Band 5, LTE Band 7, LTE Band 7, LTE Band 7, LTE Band 12, LTE Band 12, LTE Band 13, LTE Band 13, LTE Band 17, LTE Band 17, LTE Band 25, LTE Band 25, LTE Band 25, LTE Band 25, LTE Band 26, LTE Band 26, LTE Band 30, LTE Band 30, LTE Band 30, LTE Band 30, LTE Band 66, LTE Band 66, LTE Band 66, LTE Band 66, LTE Band 71, LTE Band 71, LTE Band 38, LTE Band 38, LTE Band 41_PC3.



LTE Band 41_PC2	5	20.60	21.60	1.2	22.5
LTE Band 41_PC3	0	19.10	20.10	1.2	20.6
LTE Band 41_PC2	0	19.10	20.10	1.2	21.5
LTE Band 41_PC3	6	19.60	18.60	1.2	21.6
LTE Band 41_PC2	6	19.60	18.60	1.2	22.0
LTE Band 41_PC3	7	24.70	23.50	1.2	21.6
LTE Band 41_PC2	7	24.70	23.50	1.2	22.0
LTE Band 48	10	20.60	19.10	1.2	21.6
LTE Band 48	6	20.10	15.10	1.2	21.1
LTE Band 48	11	21.10	16.60	1.2	21.6
LTE Band 48	12	18.10	14.10	1.2	20.1
FR1 n2	5	21.20	20.70	1.2	24.2
FR1 n2	0	20.00	19.00	1.2	24.0
FR1 n2	6	20.00	18.00	1.2	23.5
FR1 n2	7	21.00	21.00	1.2	24.0
FR1 n5	0	22.50	21.00	1.2	24.0
FR1 n5	1	23.70	23.70	1.2	24.2
FR1 n7	5	21.00	21.00	1.2	23.5
FR1 n7	0	20.00	19.00	1.2	23.0
FR1 n7	6	18.50	16.50	1.2	23.0
FR1 n7	7	21.50	20.00	1.2	23.0
FR1 n12	0	24.00	23.00	1.2	24.0
FR1 n12	1	27.90	23.20	1.2	24.2
FR1 n25	5	22.20	20.70	1.2	24.2
FR1 n25	0	20.00	19.00	1.2	24.0
FR1 n25	6	21.70	18.20	1.2	23.2
FR1 n25	7	22.00	21.00	1.2	24.0
FR1 n30	5	21.00	21.00	1.2	24.0
FR1 n30	0	21.00	20.00	1.2	23.0
FR1 n66	5	21.70	21.70	1.2	24.2
FR1 n66	0	22.00	22.00	1.2	24.0
FR1 n66	6	19.50	19.00	1.2	24.0
FR1 n66	7	22.20	21.20	1.2	24.2
FR1 n71	0	26.30	25.40	1.2	23.2
FR1 n71	1	29.70	33.30	1.2	24.0
FR1 n38	5	19.70	19.70	1.2	24.2
FR1 n38	0	19.00	19.00	1.2	24.0
FR1 n38	6	18.50	16.50	1.2	24.0
FR1 n38	7	21.20	20.20	1.2	24.2
FR1 n41_PC3	5	20.50	21.00	1.2	24.0
FR1 n41_PC2	5	20.50	21.00	1.2	26.5
FR1 n41_PC3	0	19.50	19.50	1.2	23.0
FR1 n41_PC2	0	19.50	19.50	1.2	25.5
FR1 n41_PC3	6	18.00	16.50	1.2	23.0
FR1 n41_PC2	6	18.00	16.50	1.2	25.5
FR1 n41_PC3	7	22.50	22.00	1.2	23.5
FR1 n41_PC2	7	22.50	22.00	1.2	26.0
FR1 n48	10	21.00	20.00	1.2	24.0
FR1 n48	6	22.50	16.00	1.2	23.5
FR1 n48	11	21.50	16.50	1.2	24.0
FR1 n48	12	17.50	14.50	1.2	22.5
FR1 n77_PC3	10	18.50	18.50	1.2	24.0
FR1 n77_PC2	10	18.50	18.50	1.2	26.0
FR1 n77_PC3	6	19.50	14.50	1.2	23.5
FR1 n77_PC2	6	19.50	14.50	1.2	25.5
FR1 n77_PC3	11	22.00	16.50	1.2	24.0



FR1 n77_PC2	11	22.00	16.50	1.2	25.3
FR1 n77_PC3	12	18.00	14.50	1.2	23.0
FR1 n77_PC2	12	18.00	14.50	1.2	25.0
FR1 n78_PC3	10	19.50	18.50	1.2	24.0
FR1 n78_PC2	10	19.50	18.50	1.2	26.0
FR1 n78_PC3	6	21.00	14.50	1.2	23.5
FR1 n78_PC2	6	21.00	14.50	1.2	25.5
FR1 n78_PC3	11	21.00	16.00	1.2	24.0
FR1 n78_PC2	11	21.00	16.00	1.2	25.3
FR1 n78_PC3	12	18.00	15.00	1.2	23.0
FR1 n78_PC2	12	18.00	15.00	1.2	25.0
Bluetooth	1	12.60	12.60	1.2	12.6
Bluetooth	10	16.10	14.60	1.2	16.1
Bluetooth	13	17.60	15.60	1.2	17.6
WLAN2.4GHz	13	19.80	17.80	1.2	21.3
WLAN2.4GHz	10	18.30	17.30	1.2	21.3
WLAN2.4GHz	13+10	20.30	19.30	1.2	24.3
WLAN5.2GHz	14	15.80	16.80	1.2	20.3
WLAN5.2GHz	15	12.80	20.30	1.2	20.3
WLAN5.2GHz	14+15	11.80	15.80	1.2	20.3
WLAN5.3GHz	14	15.80	16.80	1.2	20.3
WLAN5.3GHz	15	12.80	20.30	1.2	20.3
WLAN5.3GHz	14+15	11.80	15.80	1.2	20.3
WLAN5.5GHz	14	15.80	16.80	1.2	20.3
WLAN5.5GHz	15	12.80	20.30	1.2	20.3
WLAN5.5GHz	14+15	11.80	15.80	1.2	20.3
WLAN5.8GHz	14	15.80	16.80	1.2	21.8
WLAN5.8GHz	15	12.80	20.80	1.2	21.8
WLAN5.8GHz	14+15	11.80	15.80	1.2	21.8
WLAN6GHz	14	12.30	12.30	1.2	12.3
WLAN6GHz	15	12.30	12.30	1.2	12.3
WLAN6GHz	14+15	12.30	12.30	1.2	15.3

- Note: 1) *P_{max} is used for RF tune up procedure. The maximum allowed output power is equal to P_{max} +total 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 & NR TDD).
 3) The max allowed output power is the P_{limit} +total uncertainty, and if P_{limit} is higher than P_{max}, the device output power will be P_{max} instead.
 4) The following table is duty cycle and factor used for calculating time average power.

GSM/FDD/TDD	Duty Cycle	Time average calculation factor(dB)
GSM 1TX	12.50%	-9.0
GSM 2TX	25%	-6.0
GSM 3TX	37.50%	-4.3
GSM 4TX	50%	-3.0
FDD LTE	100%	0.0
TDD LTE	63.30%	-2.0
TDD HPUE	43.30%	-3.6
NR FDD/TDD	100%	0.0