

RF Exposure Report

(Part 0: SAR Char Evaluation)

APPLICANT : Xiaomi Communications Co., Ltd.
EQUIPMENT : Mobile Phone
BRAND NAME : POCO
MODEL NAME : 2311DRK48G
FCC ID : 2AFZZK48G
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 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. (Kunshan), the test report shall not be reproduced except in full.



Approved by: Si Zhang



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1. Introduction

The RF exposure limit is defined based on time-averaged RF exposure. The product implements MediaTek TA-SAR 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) 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. TA-SAR 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 TA-SAR algorithm. Both SAR char will be entered via the MediaTek's NV suggestion to enable the TA-SAR 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 ECI



2. Product Description

Product Feature & Specification	
Equipment Name	Mobile Phone
Brand Name	POCO
Model Name	2311DRK48G
FCC ID	2AFZZK48G
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 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 48: 3550 MHz ~ 3700 MHz 5G NR n2: 1850 MHz ~ 1910 MHz 5G NR n5: 824 MHz ~ 849 MHz 5G NR n7: 2500 MHz ~ 2570 MHz 5G NR n38: 2570 MHz ~ 2620 MHz 5G NR n41: 2496 MHz ~ 2690 MHz 5G NR n48: 3550 MHz ~ 3700 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 ~ 5720 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 supported) LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR: CP-OFDM / DFT-s-OFDM, PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 2.4GHz 802.11ax HE20/HE40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac/ax VHT20/VHT40/VHT80/VHT160/HE20/HE40/HE80/HE160 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 :

Band	Antenna	Head EC11	Hotspot EC15	Body-worn EC14	Extremity EC13
GSM850	Ant 0	0.87	0.87	0.87	0.87
GSM850	Ant 1	0.78	0.78	0.78	0.78
GSM1900	Ant 1	0.77	0.33	0.87	0.87
GSM1900	Ant 2	0.78	0.78	0.78	0.78
WCDMA II	Ant 1	0.86	0.37	0.87	0.87
WCDMA II	Ant 2	0.78	0.58	0.78	0.78
WCDMA VI	Ant 1	0.86	0.37	0.87	0.87
WCDMA VI	Ant 2	0.78	0.71	0.78	0.78
WCDMA V	Ant 0	0.87	0.87	0.87	0.87
WCDMA V	Ant 1	0.74	0.19	0.78	0.78
LTE Band 2	Ant 1	0.85	0.35	0.87	0.87
LTE Band 2_Other PA	Ant 1	0.73	0.28	0.78	0.78
LTE Band 2	Ant 4	0.78	0.36	0.25	0.83
LTE Band 2_Other PA	Ant 4	0.64	0.25	0.23	0.83
LTE Band 2_Other PA	Ant 2	0.87	0.69	0.87	0.87
LTE Band 4	Ant 1	0.87	0.32	0.87	0.87
LTE Band 4	Ant 4	0.76	0.40	0.83	0.83
LTE Band 4	Ant 2	0.83	0.73	0.52	0.83
LTE Band 5	Ant 0	0.94	0.94	0.94	0.94
LTE Band 5_Other PA	Ant 0	0.87	0.87	0.87	0.87
LTE Band 5	Ant 1	0.94	0.23	0.94	0.94
LTE Band 5_Other PA	Ant 1	0.87	0.21	0.87	0.87
LTE Band 7	Ant 1	0.68	0.21	0.35	0.87
LTE Band 7_Other PA	Ant 1	0.83	0.31	0.45	0.94
LTE Band 7	Ant 4	0.75	0.38	0.10	0.78
LTE Band 7_Other PA	Ant 4	0.81	0.37	0.08	0.94
LTE Band 7	Ant 2	0.26	0.29	0.53	0.78
LTE Band 7_Other PA	Ant 2	0.34	0.42	0.51	0.94
LTE Band 38	Ant 1	0.84	0.23	0.87	0.87
LTE Band 38_Other PA	Ant 1	0.75	0.22	0.94	0.94
LTE Band 38	Ant 4	0.78	0.47	0.16	0.83
LTE Band 38_Other PA	Ant 4	0.74	0.47	0.13	0.94
LTE Band 38	Ant 2	0.83	0.44	0.83	0.83
LTE Band 38_Other PA	Ant 2	0.94	0.42	0.94	0.94
LTE Band 38	Ant 3	0.63	0.28	0.83	0.83
LTE Band 41	Ant 1	0.85	0.23	0.94	0.94
LTE Band 41_Other PA	Ant 1	0.71	0.20	0.94	0.94
LTE Band 41	Ant 4	0.89	0.48	0.15	0.94
LTE Band 41_Other PA	Ant 4	0.81	0.47	0.15	0.94
LTE Band 41	Ant 2	0.94	0.46	0.94	0.94
LTE Band 41_Other PA	Ant 2	0.94	0.42	0.94	0.94
LTE Band 41	Ant 3	0.91	0.36	0.94	0.94
LTE Band 48	Ant 5	0.78	0.37	0.87	0.87
LTE Band 48	Ant 8	0.78	0.78	0.78	0.78
LTE Band 48	Ant 6	0.57	0.31	0.13	0.78



LTE Band 48	Ant 7	0.78	0.78	0.78	0.78
LTE Band 66	Ant 1	0.85	0.31	0.87	0.87
LTE Band 66	Ant 4	0.76	0.40	0.26	0.83
LTE Band 66	Ant 2	0.83	0.60	0.83	0.83
FR1 n2	Ant 1	0.83	0.40	0.87	0.87
FR1 n2	Ant 4	0.80	0.38	0.83	0.83
FR1 n5	Ant 0	0.94	0.94	0.94	0.94
FR1 n5	Ant 1	0.94	0.26	0.94	0.94
FR1 n7	Ant 1	0.85	0.29	0.94	0.94
FR1 n7	Ant 4	0.93	0.49	0.10	0.94
FR1 n7	Ant 2	0.94	0.40	0.94	0.94
FR1 n38	Ant 1	0.80	0.29	0.94	0.94
FR1 n38	Ant 4	0.89	0.57	0.16	0.94
FR1 n38	Ant 2	0.94	0.38	0.94	0.94
FR1 n38	Ant 3	0.83	0.44	0.94	0.94
FR1 n41	Ant 1	0.57	0.23	0.87	0.87
FR1 n41 PC2	Ant 1	0.58	0.24	0.87	0.87
FR1 n41	Ant 4	0.73	0.44	0.09	0.78
FR1 n41 PC2	Ant 4	0.76	0.48	0.09	0.78
FR1 n41	Ant 2	0.78	0.24	0.78	0.78
FR1 n41 PC2	Ant 2	0.78	0.29	0.78	0.78
FR1 n41	Ant 3	0.53	0.32	0.78	0.78
FR1 n41 PC2	Ant 3	0.57	0.34	0.78	0.78
FR1 n48	Ant 5	0.79	0.41	0.87	0.87
FR1 n48	Ant 8	0.62	0.63	0.78	0.78
FR1 n48	Ant 6	0.44	0.35	0.22	0.78
FR1 n48	Ant 7	0.78	0.64	0.78	0.78
FR1 n77 PC3	Ant 5	0.70	0.40	0.87	0.87
FR1 n77 PC2	Ant 5	0.76	0.43	0.87	0.87
FR1 n77 PC3	Ant 8	0.70	0.62	0.69	0.78
FR1 n77 PC2	Ant 8	0.76	0.66	0.72	0.78
FR1 n77 PC3	Ant 6	0.41	0.34	0.19	0.78
FR1 n77 PC2	Ant 6	0.38	0.36	0.21	0.78
FR1 n77 PC3	Ant 7	0.42	0.12	0.24	0.78
FR1 n77 PC2	Ant 7	0.46	0.13	0.26	0.78
FR1 n78 PC3	Ant 5	0.63	0.30	0.87	0.87
FR1 n78 PC2	Ant 5	0.67	0.32	0.87	0.87
FR1 n78 PC3	Ant 8	0.52	0.52	0.64	0.78
FR1 n78 PC2	Ant 8	0.75	0.54	0.68	0.78
FR1 n78 PC3	Ant 6	0.51	0.39	0.18	0.78
FR1 n78 PC2	Ant 6	0.46	0.41	0.18	0.78
FR1 n78 PC3	Ant 7	0.70	0.57	0.53	0.78
FR1 n78 PC2	Ant 7	0.77	0.60	0.52	0.78



<WWAN bands and located Antennas>

Tech_Band_Antenna Main PA				
Band	Main Antenna	AUX1 Antenna	AUX2 Antenna	AUX3 Antenna
GSM 850	ANT0	ANT1		
GSM 1900	ANT2	ANT1		
WCDMA B5	ANT0	ANT1		
WCDMA B2/4	ANT2	ANT1		
LTE B5	ANT0	ANT1		
LTE B2/4/7/66	ANT1	ANT4	ANT2	
LTE 38/41	ANT1	ANT4	ANT2	ANT3
LTE 48	ANT5	ANT8	ANT6	ANT7
5G NR n5	ANT0	ANT1		
5G NR n2/7	ANT1	ANT4	ANT2	
5G 38/41	ANT1	ANT4	ANT2	ANT3
5G NR n48/77/78	ANT5	ANT8	ANT6	ANT7

Tech_Band_Antenna for Other PA				
Band	Main Antenna	AUX1 Antenna	AUX2 Antenna	AUX3 Antenna
LTE B5/	ANT0	ANT1		
LTE B2/7	ANT2	ANT4	ANT1	
38/41	ANT2	ANT4	ANT1	

<Uncertainty>

Total Uncertainty				
Tech	Antenna	Total Uncertainty (dB)	Description	
			Antenna Number	Frequency
GSM	Main	1.00	ANT0	Fre < 1GHz
		1.00	ANT2	1GHz < Fre < 2GHz
	AUX1	1.50	ANT1	All Frequency
WCDMA	Main	1.00	ANT0	Fre < 1GHz
		1.00	ANT2	1GHz < Fre < 2GHz
	AUX1	1.50	ANT1	All Frequency
LTE	Main	0.70	ANT0	All Frequency
		1.00	ANT1	1GHz < Fre < 2GHz&Band7&38
		0.70	ANT1	Band41
		1.00	ANT5	Fre>3GHz
		0.70	ANT1	Fre < 1GHz
	Aux 1	1.20	ANT4	1GHz < Fre < 2GHz&Band38
		1.50	ANT4	Band7
		0.70	ANT4	Band41
		1.50	ANT8	Fre>3GHz
		1.20	ANT2	1GHz < Fre < 2GHz&Band38
	Aux 2	1.50	ANT2	Band7
		0.70	ANT2	Band41
		1.50	ANT6	Fre>3GHz
		1.20	ANT3	Band38
	Aux 3	0.70	ANT3	Band41
1.50		ANT7	Fre>3GHz	
0.70		ANT0	All Frequency	
5GNR	Main	1.00	ANT1	1GHz < Fre < 2GHz&FR1 n41
		0.70	ANT1	FR1 n7/38
		1.00	ANT5	Fre>3GHz
		0.70	ANT1	Fre < 1GHz
	Aux 1	1.20	ANT4	1GHz < Fre < 2GHz
		0.70	ANT4	FR1 n7/38



		1.50	ANT4	FR1 n41
		1.50	ANT8	Fre>3GHz
	Aux 2	1.20	ANT2	1GHz < Fre < 2GHz
		0.70	ANT2	FR1 n7/38
		1.50	ANT2	FR1 n41
	Aux 3	1.50	ANT6	Fre>3GHz
		0.70	ANT3	FR1 n38
		1.50	ANT3	FR1 n41
		1.50	ANT7	Fre>3GHz

Total Uncertainty for Other PA				
Tech	Antenna	Total Uncertainty (dB)	Description	
			Antenna Number	Frequency
LTE	Main	1.00	ANT0	All Frequency
		1.00	ANT2	1GHz < Fre < 2GHz
		0.70	ANT2	2GHz < Fre < 3GHz
	Aux 1	1.00	ANT1	Fre < 1GHz
		1.20	ANT4	1GHz < Fre < 2GHz
		0.70	ANT4	2GHz < Fre < 3GHz
	Aux 2	1.50	ANT1	1GHz < Fre < 2GHz
		0.70	ANT1	2GHz < Fre < 3GHz

Note: The mark "Fre" means that Frequency in above tables.

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 6 GHz or below. It will then be used as input for TA-SAR algorithm to control and manage RF exposure for f < 6 GHz.

<P_{limit} for supported technologies and bands>

Table with 7 columns: Band, Antenna, Head ECI 1, Hotspot ECI 5, Body-worn ECI 4, Extremity ECI 3, Pmax*. Rows include GSM850, GSM1900, WCDMA II, WCDMA VI, WCDMA V, LTE Band 2, LTE Band 4, LTE Band 5, LTE Band 7, LTE Band 38, LTE Band 41, LTE Band 48, LTE Band 66.



FR1 n2	Ant 1	18.50	18.50	25.70	20.50	24.5
FR1 n2	Ant 4	19.50	19.50	28.90	24.50	24.5
FR1 n5	Ant 0	30.80	29.90	31.60	25.00	25.0
FR1 n5	Ant 1	25.30	24.50	32.90	24.50	25.0
FR1 n7	Ant 1	18.00	18.00	27.50	22.00	25.0
FR1 n7	Ant 4	22.00	21.00	21.00	21.00	25.0
FR1 n7	Ant 2	28.10	19.50	25.70	19.50	25.0
FR1 n38	Ant 1	18.00	18.00	28.20	21.50	25.0
FR1 n38	Ant 4	20.00	20.00	21.50	21.50	25.0
FR1 n38	Ant 2	29.10	19.50	26.00	19.50	25.0
FR1 n38	Ant 3	19.00	19.00	28.20	21.00	25.0
FR1 n41	Ant 1	16.50	16.50	27.10	20.50	22.0
FR1 n41 PC2	Ant 1	16.50	16.50	27.10	20.50	22.0
FR1 n41	Ant 4	19.00	19.00	19.00	19.00	22.0
FR1 n41 PC2	Ant 4	19.00	19.00	19.00	19.00	22.0
FR1 n41	Ant 2	27.60	18.00	25.30	18.00	22.0
FR1 n41 PC2	Ant 2	27.60	18.00	25.30	18.00	22.0
FR1 n41	Ant 3	18.00	18.00	25.70	19.00	22.5
FR1 n41 PC2	Ant 3	18.00	18.00	25.70	19.00	22.5
FR1 n48	Ant 5	17.50	17.50	27.10	19.00	23.0
FR1 n48	Ant 8	20.00	19.00	22.70	20.00	21.0
FR1 n48	Ant 6	17.00	17.00	18.00	18.00	21.0
FR1 n48	Ant 7	23.30	20.50	24.50	20.50	21.0
FR1 n77 PC3	Ant 5	15.50	15.50	24.10	17.00	22.5
FR1 n77 PC2	Ant 5	15.50	15.50	24.10	17.00	22.5
FR1 n77 PC3	Ant 8	18.00	16.00	20.00	17.00	21.0
FR1 n77 PC2	Ant 8	18.00	16.00	20.00	17.00	21.0
FR1 n77 PC3	Ant 6	16.00	16.00	17.00	17.00	22.5
FR1 n77 PC2	Ant 6	16.00	16.00	17.00	17.00	22.5
FR1 n77 PC3	Ant 7	19.50	13.00	19.50	13.00	20.5
FR1 n77 PC2	Ant 7	19.50	13.00	19.50	13.00	20.5
FR1 n78 PC3	Ant 5	15.00	15.00	24.20	17.50	23.5
FR1 n78 PC2	Ant 5	15.00	15.00	24.20	17.50	23.5
FR1 n78 PC3	Ant 8	17.00	17.00	19.50	17.50	23.5
FR1 n78 PC2	Ant 8	17.00	17.00	19.50	17.50	22.0
FR1 n78 PC3	Ant 6	16.50	16.50	17.00	17.00	23.5
FR1 n78 PC2	Ant 6	16.50	16.50	17.00	17.00	23.0
FR1 n78 PC3	Ant 7	20.00	19.00	22.50	19.00	23.5
FR1 n78 PC2	Ant 7	20.00	19.00	22.50	19.00	22.0

Note: 1) *Pmax is used for RF tune up procedure. The maximum allowed output power is equal to Pmax + total uncertainty.

2) **All Plimit 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& 5GNR TDD).

3) The max allowed output power is the Plimit + device uncertainty, and if Plimit is higher than Pmax, the device output power will be Pmax 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
NR FDD/TDD	100%	0.0
NR TDD	50%	-3.0