

RF Exposure Report

(Part 0: SAR Char Evaluation)

APPLICANT : TCL Communication Ltd.
EQUIPMENT : USB Connect 5G (NA)
BRAND NAME : Vodafone
MODEL NAME : IK512US
FCC ID : 2ACCJSCD002
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
FA450613A	01	Initial issue of report	Aug. 15, 2024

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). 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 19 to enable the Smart Transmit GEN1 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	USB Connect 5G (NA)
Brand Name	Vodafone
Model Name	IK512US
FCC ID	2ACCJSCD002
Wireless Technology and Frequency Range	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 14: 788 MHz ~ 798 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 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz LTE Band 48: 3550 MHz ~ 3700 MHz 5G NR n2: 1850 MHz ~ 1910 MHz 5G NR n5: 824 MHz ~ 849 MHz 5G NR n12: 699 MHz ~ 716 MHz 5G NR n14: 788 MHz ~ 798 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 n70: 1695 MHz ~ 1710 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
Mode	LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR: CP-OFDM / DFT-s-OFDM, PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM

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 :

FCC SAR	Measure Distance	WWAN 4/5G
Body (1g)	5 mm	0.95

Uncertainty:

Item	Uncertainty dB (k=2)
Total uncertainty	1.0

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 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	Antenna	DSI0	DSI1	P _{max} *
LTE Band 2	Ant 2	23.0	16.0	23.0
LTE Band 7	ANT1	23.0	18.2	23.0
LTE Band 7	Ant 2	23.0	19.3	23.0
LTE Band 12/17	ANT1	23.0	21.0	23.0
LTE Band 14	ANT1	23.0	21.0	23.0
LTE Band 25/2	ANT1	23.0	18.0	23.0
LTE Band 26/5	ANT1	23.0	21.0	23.0
LTE Band 30	ANT1	22.0	17.4	22.0
LTE Band 30	Ant 2	22.0	18.8	22.0
LTE Band 66/4	ANT1	23.0	19.0	23.0
LTE Band 66/4	Ant 2	23.0	17.0	23.0
LTE Band 71	ANT1	23.0	21.0	23.0
LTE Band 41/38	ANT2	21.0	18.0	21.0
LTE Band 48	ANT4	18.5	18.0	18.5
FR1 n5	ANT1	23.0	21.0	23.0
FR1 n12	ANT1	23.0	21.0	23.0
FR1 n14	ANT1	23.0	21.0	23.0
FR1 n25/2	ANT1	23.0	18.4	23.0
FR1 n25/2	Ant 2	23.0	16.0	23.0
FR1 n30	ANT1	21.5	16.6	21.5
FR1 n66	ANT1	23.0	19.0	23.0
FR1 n66	Ant 2	23.0	17.4	23.0
FR1 n70	ANT1	23.0	19.0	23.0
FR1 n71	ANT1	23.0	21.0	23.0
FR1 n38	ANT2	23.0	19.0	23.0
FR1 n41(PC3)	ANT2	23.0	19.0	23.0
FR1 n41(PC2)	ANT2	26.0		26.0
FR1 n48	ANT4	20.5	17.8	20.5
FR1 n77/78(PC3)	ANT4	23.0	18.0	23.0
FR1 n77/78(PC2)	ANT4	26.0		26.0
FR1 n77/78(PC3)	ANT6	23.0	16.2	23.0
FR1 n77/78(PC2)	ANT6	26.0		26.0

Note: 1) *P_{max} is used for RF tune up procedure. The maximum allowed output power is equal to P_{max} +1dB 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., LTE TDD & NR TDD).

3) The max allowed output power is the P_{limit} +1dB device 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.

FDD/TDD	Duty Cycle	Time average calculation factor(dB)
FDD LTE	100%	0.0
TDD LTE	63.30%	-2.0
NR FDD/TDD	100%	0.0