RF Exposure Report

(Part 0: SAR Char Evaluation)

FCC ID	**: UZ7-RTL10C1**
Equipment	**: Tablet PC with Windows OS**
Brand Name	**: Zebra**
Model Name	**: RTL10C1**
Applicant	**: Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742**
Manufacturer	**: Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742**
Standard	**: FCC 47 CFR Part 2 (2.1093)**

We, SPORTON INTERNATIONAL INC., 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., the test report shall not be reproduced except in full.

Approved by: Cona Huang / Deputy Manager

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History of this test report

Report No.	Version	Description	Issued Date
FA181117	01	Initial issue of report	Feb. 21, 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 sto ensure the product in compliance with RF exposure limit over a defined time window, for SAR (transmit frequency ≤ 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 uncertainties.
SAR char	P_{limit} for all the technologies/bands for all applicable DSI

2. Product Description

Product Feature & Specification	
Equipment Name	Tablet PC with Windows OS
Brand Name	Zebra
Model Name	RTL10C1
FCC ID	UZ7-RTL10C1
Wireless Technology and Frequency Range	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 14: 788 MHz ~ 798 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 n41 : 2496 MHz ~ 2690 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3700 MHz ~ 3980 MHz WLAN 2.4 GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2 GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3 GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.6 GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8 GHz Band: 5725 MHz ~ 5850 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz NFC : 13.56 MHz
Mode	RMC 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM WLAN: 802.11a/b/g/n/ac/ax HT20/HT40/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

The detail SAR design target relate to each exposure conditions.

Band	Antenna	SAR Design Target 1g SAR (W/kg)	Total Uncertainty (dB)
WCDMA V	Main	0.95	1
LTE B12	Main	0.76	2
LTE B13	Main	0.76	2
LTE B14	Main	0.76	2
LTE B26/5	Main	0.76	2
LTE B26_IC	Main	0.76	2
LTE B71	Main	0.76	2
FR1 n5	Main	0.76	2
FR1 n12	Main	0.76	2
FR1 n71	Main	0.76	2
WCDMA II	MIMO1	0.79	1
WCDMA IV	MIMO1	0.79	1
LTE B7	MIMO1	0.63	2
LTE B25/2	MIMO1	0.63	2
LTE B30	MIMO1	0.63	2
LTE B66/4	MIMO1	0.63	2
LTE B41/38	MIMO1	0.63	2
LTE B41/38_HPUE	MIMO1	0.79	1
FR1 n7	MIMO1	0.63	2
FR1 n25/2	MIMO1	0.63	2
FR1 n66	MIMO1	0.63	2
FR1 n41	MIMO1	0.63	2
FR1 n41 HPUE	MIMO1	0.79	1
LTE B48	Aux	0.76	2
FR1 n41	Aux	0.76	2
FR1 n41 HPUE	Aux	0.95	1
FR1 n77	Aux	0.76	2
FR1 n77 HPUE	Aux	0.95	1

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

General Note:

The Plimit is associated with SAR design target, and the test results are available in Part 1 SAR test report

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

Band	Antenna	Duty cycle	P limit (dBm) time-average power	P Max* (dBm) time-average power
WCDMA V	Main	100	23.4	24.0
LTE B12	Main	100	23.8	23.0
LTE B13	Main	100	23.5	23.0
LTE B14	Main	100	23.3	23.0
LTE B26/5	Main	100	23.3	23.0
LTE B71	Main	100	23.8	23.0
FR1 n5	Main	100	23.4	23.0
FR1 n12	Main	100	23.0	23.0
FR1 n71	Main	100	23.6	23.0
WCDMA II	MIMO1	100	20.5	24.0
WCDMA IV	MIMO1	100	19.6	24.0
LTE B7	MIMO1	100	14.7	23.0
LTE B25/2	MIMO1	100	19.2	23.0
LTE B30	MIMO1	100	15.7	23.0
LTE B66/4	MIMO1	100	18.2	23.0
LTE B41/38**	MIMO1	63.3	14.2	21.0
LTE B41/38_HPUE**	MIMO1	43.3		21.4
FR1 n7	MIMO1	100	15.0	23.0
FR1 n25/2	MIMO1	100	19.7	23.0
FR1 n66	MIMO1	100	19.1	23.0
FR1 n41	MIMO1	100	15.0	21.0
FR1 n41 HPUE**	MIMO1	50		20.0
LTE B48	Aux	63.3	21.7	19.0
FR1 n41	Aux	100	16.8	23.0
FR1 n41 HPUE**	Aux	50		23.0
FR1 n77	Aux	100	20.6	23.0
FR1 n77 HPUE**	Aux	50		23.0

*P_{max} is used for RF tune up procedure. The maximum allowed output power is equal to Pmax + uncertainty.

**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.

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.