

RF Exposure Report

(Part 0: SAR Char Evaluation)

APPLICANT : Zebra Technologies Corporation
EQUIPMENT : Tablet
BRAND NAME : Zebra
MODEL NAME : ET45CB
FCC ID : UZ7ET45CB
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.



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History of this test report

Report No.	Version	Description	Issued Date
FA230406A	01	Initial issue of report	Aug. 12, 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. 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) 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	Tablet
Brand Name	Zebra
Model Name	ET45CB
FCC ID	UZ7ET45CB
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 17: 704 MHz ~ 716 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 42: 3450 MHz ~ 3550 MHz LTE Band 66: 1710 MHz ~ 1780 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 n66 : 1710 MHz ~ 1780 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 ~ 5720MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz
Mode	GPRS/EGPRS RMC 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 2.4G 802.11b/g/n/ac/ax HT20/VHT20/HE20 WLAN 5G 802.11a/n/ac HT20/HT40/VHT20/VHT40/VHT80 WLAN 5G 802.11ax HE20/HE40/HE80 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 :

Exposure conditions		Trigger Conditions	Tx Antenna	DSI	SAR design target	W/kg
Body SAR	0 mm	Sensor On standalone	Ant 0/2/3	1	1g SAR design target	1.00
	0 mm	standalone	Ant 1/4/5	0 or 1	1g SAR design target	1.00
	0 mm	Sensor On simultaneous	Ant 0	3	1g SAR design target	0.55
	0 mm	simultaneous	Ant 5	2 or 3	1g SAR design target	0.55
	0 mm	Sensor On simultaneous	Ant 2/3	3	1g SAR design target	1.00
	0 mm	simultaneous	Ant 1/4	2 or 3	1g SAR design target	1.00
	Sensor Trigger Distance -1mm	Sensor Off standalone	Ant 0/2/3	0	1g SAR design target	1.00
	Sensor Trigger Distance -1mm	Sensor Off simultaneous	Ant 0	2	1g SAR design target	0.55
	Sensor Trigger Distance -1mm	Sensor Off simultaneous	Ant 2/3	2	1g SAR design target	1.00

Uncertainty:

Item	Uncertainty dB (k=2)
Total uncertainty	1.5

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	Sensor On standalone DSI1	Sensor On simultaneous DSI3	Sensor Off standalone DSI0	Sensor Off simultaneous DSI2	P _{max}
GSM850	Ant0	22.60	20.00	30.40	27.80	24.50
GSM1900	Ant0	15.20	12.60	27.50	24.90	21.50
WCDMA Band II	Ant0	15.80	13.20	27.10	24.50	23.00
WCDMA Band IV	Ant0	18.10	15.50	25.00	22.40	23.00
WCDMA Band V	Ant0	22.50	20.30	29.60	27.00	23.00
LTE Band 2	Ant0	16.60	14.00	26.10	23.50	24.00
LTE Band 2	Ant2	16.30	16.30	26.20	26.20	24.00
LTE Band 4	Ant0	18.00	15.40	26.40	23.50	24.00
LTE Band 5	Ant0	21.50	18.90	26.90	24.30	24.00
LTE Band 5	Ant2	23.50	23.50	30.10	30.10	24.00
LTE Band 7	Ant0	15.70	13.10	24.70	22.10	23.00
LTE Band 7	Ant2	14.20	14.20	22.30	22.30	23.00
LTE Band 17	Ant0	26.10	23.50	29.50	26.90	24.00
LTE Band 66	Ant0	18.00	15.40	26.40	23.50	24.00
LTE Band 38	Ant0	15.10	12.50	23.80	21.20	21.00
LTE Band 41	Ant2	15.00	15.00	23.80	23.80	22.00
LTE Band 42	Ant3	16.50	16.50	26.30	26.30	21.00
FR1 n2	Ant0	18.40	15.80	25.20	22.60	24.00
FR1 n5	Ant0	22.20	19.60	28.40	25.80	24.00
FR1 n7	Ant0	14.50	11.90	27.30	24.70	23.00
FR1 n7	Ant2	14.50	14.50	22.50	22.50	23.00
FR1 n66	Ant0	18.60	16.00	25.70	23.10	24.00
FR1 n38	Ant0	14.30	11.70	24.20	21.60	23.00
FR1 n41	Ant2	13.50	13.50	23.50	23.50	23.00
FR1 n41 HPUE	Ant2	13.50	13.50	23.50	23.50	26.00
FR1 n41	Ant1	14.50	14.50	14.50	14.50	20.00
FR1 n41	Ant4	17.60	17.60	17.60	17.60	20.00
FR1 n41	Ant5	21.30	18.70	21.30	18.70	20.00
FR1 n77	Ant3	16.90	16.90	27.10	27.10	23.00
FR1 n77(HPUE)	Ant3	16.90	16.90	27.10	27.10	26.00
FR1 n77	Ant1	14.30	14.30	14.30	14.30	20.00
FR1 n77	Ant4	17.20	17.20	17.20	17.20	20.00
FR1 n77	Ant5	19.20	16.60	19.20	16.60	20.00
FR1 n78	Ant3	16.90	16.90	27.10	27.10	23.00
FR1 n78(HPUE)	Ant3	16.90	16.90	27.10	27.10	26.00
FR1 n78	Ant1	14.30	14.30	14.30	14.30	20.00
FR1 n78	Ant4	17.20	17.20	17.20	17.20	20.00
FR1 n78	Ant5	19.20	16.60	19.20	16.60	20.00

Note:

- 1) *P_{max} is used for RF tune up procedure. The maximum allowed output power is equal to P_{max} + 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).
- 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) For ant1/4/5 has no SAR sensor, P_{limit} for DSI0 (sensor on) and DSI1 (sensor off) at standalone are the same, P_{limit} for DSI2 (sensor on) and DSI3 (sensor off) at simultaneous are the same.
- 5) LTE Band 2/5/7 Ant 2 only for EN-DC combination.
- 6) 5GNR n41/77/78 ant 1/4/5 supports SRS (Sounding Reference Signal) functionality.
- 7) 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