



FCC RF Exposure Evaluation

1. Product Information

General Description	
EUT :	NFC Android Reader
Model/Type reference:	FX335
Additional Model No.	/
Model Declaration:	/
Hardware Version	FX335_V1.0
Software Version:	alps-mp-q0.mp1-V9.347_droi.qomp1.k61v1.64.bsp_P3
Power supply:	Input: 12V $\overline{\sim}$ 1.25A For AC Adapter Input: 100-240V~, 50/60Hz, 0.5A Max Adapter Output: 5V/7V/9V $\overline{\sim}$ 1.67A, 12V $\overline{\sim}$ 1.25A DC 3.8V by Rechargeable Li-ion Battery, 5000mAh Recharge Voltage:3.8V /1000mA Maximum Charging Voltage: 4.35V
The EUT is NFC Android Reader. the NFC Android Reader is intended for WLAN transmission. It is equipped with WiFi2.4G,5.2G,5.8G; WCDMA Band IV; LTE 2,4,12,13,17. For more information see the following datasheet	

Technical Characteristics	
LTE	
Support Band:	☒ E-UTRA Band 2(U.S.-Band) ☒ E-UTRA Band 4(U.S.-Band) ☒ E-UTRA Band 7(U.S.-Band) ☒ E-UTRA Band 12(U.S.-Band) ☒ E-UTRA Band 13(U.S.-Band) ☒ E-UTRA Band 17(U.S.-Band)
Modulation Type:	QPSK/16QAM
Release Version:	R9
Power Class:	Class 3
Antenna Description:	PIFA Antenna -4.41dBi (max.) For E-UTRA Band 2 -0.9dBi (max.) For E-UTRA Band 4 -2.9dBi (max.) For E-UTRA Band 7 -6.68dBi (max.) For E-UTRA Band 12 -4.54dBi (max.) For E-UTRA Band 13 -2.13dBi (max.) For E-UTRA Band 17

Bluetooth	
Frequency Range:	2402MHz ~ 2480MHz
Chanel Number:	79 channels for Bluetooth V4.2 (DSS) 40 channels for Bluetooth V4.2 (DTS)
Chanel Spacing:	1MHz for Bluetooth V4.2 (DSS)



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	2MHz for Bluetooth V4.2 (DTS)
Modulation Type;	GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth V4.2(DSS) GFSK for Bluetooth V4.2 (DTS)
Bluetooth Version:	V4.2
Antenna Description:	PIFA Antenna, 2.41dBi(Max.)
WIFI 2.4G	
Frequency Range:	2412MHz-2462MHz
Type of Modulation:	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Channel number:	11 Channels for 20MHz bandwidth (2412~2462MHz) 7 Channels for 40MHz bandwidth (2422~2452MHz)
Channel separation:	5MHz
Antenna Description:	PIFA Antenna, 2.41dBi(Max.)
5.2G WLAN	
Frequency Range	5180MHz~5240MHz
Channel Number	4 channels for 20MHz bandwidth(5180MHz~5240MHz) 2 channels for 40MHz bandwidth(5190MHz~5230MHz)
Modulation Type	IEEE 802.11a/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Description	PIFA Antenna, 1.14dBi(Max.)
5.8G WLAN	
Frequency Range	5745MHz-5825MHz
Channel Number	5 channels for 20MHz bandwidth(5745MHz~5825MHz) 2 channels for 40MHz bandwidth(5755MHz~5795MHz)
Modulation Type	IEEE 802.11a/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Description	PIFA Antenna, 1.14dBi(Max.)
UMTS	
Support Band:	☒ WCDMA Band IV (U.S.-Band)
Modulation Type:	QPSK,16QAM
WCDMA Release Version:	R9
Antenna Description:	PIFA Antenna -0.72dBi (max.) For WCDMA Band IV
NFC	
Operating Frequency	13.56MHz
Modulation Type	ASK
Antenna Description	PIFA Antenna, 0dBi(Max.)
GPS function	Support and only RX
FM function	Support and only RX



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2. Evaluation method and Limit

According to KDB447498 D01 General RF Exposure Guidance v06 Section 4.3.1 Standalone SAR test exclusion considerations: "Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition, listed below, is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions. The minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander (see 5) of section 4.1). To qualify for SAR test exclusion, the test separation distances applied must be fully explained and justified by the operating configurations and exposure conditions of the transmitter and applicable host platform requirements, typically in the SAR measurement or SAR analysis report, according to the required published RF exposure KDB procedures. When no other RF exposure testing or reporting is required, a statement of justification and compliance must be included in the equipment approval, in lieu of the SAR report, to qualify for the SAR test exclusion. When required, the device specific conditions described in the other published RF exposure KDB procedures must be satisfied before applying these SAR test exclusion provisions; for example, handheld PTT two-way radios, handsets, laptops & tablets etc."

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f} \text{ (GHz)}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR, where:}$$

- f (GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to f in section 4.1 is applied to determine SAR test exclusion.

When one of the following test exclusion conditions is satisfied for all combinations of simultaneous transmission configurations, further equipment approval is not required to incorporate transmitter modules in host devices that operate in the mixed mobile and portable host platform exposure conditions. The grantee is responsible for documenting this according to Class I permissive change requirements. Antennas that qualify for standalone SAR test exclusion must apply the estimated standalone SAR to determine simultaneous transmission test exclusion.

- a) The $[\sum \text{ of (the highest measured or estimated SAR for each standalone antenna configuration, adjusted for maximum tune-up tolerance) / } 1.6 \text{ W/kg}] + [\sum \text{ of MPE ratios}] \leq 1.0$.
- b) The SAR to peak location separation ratios of all simultaneously transmitting antenna pairs operating in portable device exposure conditions are all ≤ 0.04 , and the $[\sum \text{ of MPE ratios}] \leq 1.0$.

3. Refer Evaluation Method

[ANSI C95.1–1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB publication 447498 D01 General RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1093](#): Radiofrequency radiation exposure evaluation: portable devices



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4. Conducted Power Results

<BT>

Mode	Channel	Frequency (MHz)	Conducted Output Power (dBm)
GFSK	0	2402	-0.10
	39	2441	-0.86
	78	2480	0.54
$\pi/4$ DQPSK	0	2402	-0.10
	39	2441	0.27
	78	2480	-0.41
8DPSK	0	2402	-0.07
	39	2441	0.24
	78	2480	-0.40

<BT LE>

Mode	Channel	Frequency (MHz)	Conducted Output Power (dBm)
GFSK	0	2402	-7.50
	19	2440	-6.75
	39	2480	-6.42

5. Manufacturing Tolerance

<BT>

GFSK			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	-1.0	-1.0	0.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
$\pi/4$ DQPSK			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	-1.0	-0.5	-1.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
8DPSK			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	-1.0	-0.5	-1.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

<BT LE>

GFSK			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	-8.0	-7.0	-7.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0



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6. Evaluation Results

6.1 Standalone Evaluation

Band/Mode		Frequency (GHz)	Antenna Distance (mm)	RF output power		SAR Test Exclusion Threshold	SAR Test Exclusion
				dBm	mW		
BT	GFSK	2.480	5	1.0	1.2589	0.3965<3.0	Yes
	$\pi/4$ DQPSK	2.480	5	1.0	1.2589	0.3965<3.0	Yes
	8DPSK	2.480	5	1.0	1.2589	0.3965<3.0	Yes
BT LE	GFSK	2.480	5	-6.0	0.2512	0.0791<3.0	Yes

Remark:

1. Output power including tune up tolerance;
2. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to f) in section 4.1 is applied to determine SAR test exclusion.

6.2 Simultaneous Transmission for SAR Exclusion

The sample support one BT modular. No need consider simultaneous transmission.

7. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1093 for the uncontrolled RF Exposure and SAR Exclusion Threshold per KDB 447498 v06.

.....THE END OF REPORT.....



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