



## Radio Frequency Exposure Evaluation Report

FOR:

**Square, Inc.**

Model Name:  
S8

Product Description:  
Wireless card reader accepting NFC contactless payments and EMV chip card transactions.

FCC ID: 2AF3K-SHR1  
IC ID: 21827-JBR1

Applied Rules and Standards:  
CFR 47 Part 2.1093  
FCC KDB 447498 D01 General RF Exposure Guidance v06  
IC RSS-102 Issue 5

Report number: EMC\_SQUAR-023-16001\_FCC\_IC\_SAR-EX

DATE: 2017-01-03



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IC recognized #  
3462B-1

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## 1. Assessment

The following device was evaluated against the limits for general population uncontrolled exposure specified in CFR 47 Part 2.1093 according to SAR evaluation exclusion requirements specified in FCC regulation as listed in KDB 447498, and IC RSS-102 Issue 5.

The device meets the requirements for SAR exclusion as stipulated by the above given FCC/IC rules.

Company	Description	Model #
Square, Inc.	Wireless card reader accepting NFC contactless payments and EMV chip card transactions.	S8

### Responsible for Testing Laboratory:

2017-01-03	Compliance	James Donnellan (Sr. EMC Test Engineer)	
Date	Section	Name	Signature

### Responsible for the Report:

2017-01-03	Compliance	Douglas Antioco (EMC Engineer)	
Date	Section	Name	Signature

The test results of this test report relate exclusively to the test item specified in Section 3.

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## **2. Administrative Data**

### **2.1. Identification of the Testing Laboratory Issuing the Test Report**

<b>Company Name:</b>	CETECOM Inc.
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<b>Compliance Manager:</b>	Franz Engert
<b>Responsible Project Leader:</b>	Douglas Antioco

### **2.2. Identification of the Client**

<b>Applicant's Name:</b>	Square, Inc.
<b>Street Address:</b>	1455 Market Street, Suite 600
<b>City/Zip Code</b>	San Francisco, CA 94103
<b>Country</b>	USA

### **2.1. Identification of the Manufacturer**

<b>Applicant's Name:</b>	Dongguan Fuqiang Electronics Co.,Ltd
<b>Street Address:</b>	Chenguei Industry District
<b>City/Zip Code</b>	Dong-Keng, Dong-Guan, Guang-Dong 523457
<b>Country</b>	China

### 3. Equipment under Assessment

<b>Model No</b>	S8
<b>HW Version</b>	A-PRD-0084
<b>SW Version</b>	Ver.201043
<b>FCC-ID</b>	2AF3K-SHR1
<b>IC ID</b>	21827-JBR1
<b>Product Description</b>	Wireless card reader accepting NFC contactless payments and EMV chip card transactions.
<b>Device Category</b>	<input type="checkbox"/> Fixed Installation <input type="checkbox"/> Mobile <input checked="" type="checkbox"/> Portable <input type="checkbox"/> Mixed Mobile and Portable
<b>Frequency Range / number of channels</b>	2402 MHz (Ch. 0) – 2480 (Ch.39), 40 channels;
<b>Type(s) of Modulation</b>	Bluetooth LE, using Direct Sequence Spread Spectrum with GFSK modulation.
<b>Modes of Operation</b>	Bluetooth LE
<b>Max. declared antenna gain</b>	Internal antenna: Antenna Gain: 0.9 dBi @ 2.4 GHz.
<b>Minimum distance of antenna or radiating parts to user</b>	5mm or less
<b>Max. declared conducted output power including tune up</b>	Maximum conducted power 1.5 dBm + 1.1 dBm tolerance
<b>Max. measured conducted output power</b>	2.1 dBm (Peak)
<b>Power Supply/ Rated Operating Voltage Range</b>	lithium battery pack Vmin: 3.2V / Vnom: 3.7V / Vmax: 5V DC
<b>Operating Temperature Range</b>	0 °C to 40 °C
<b>Other Radios included in the device</b>	13.56 MHz NFC with ASK Modulation 13.553-13.567MHz Band, 1 Channel
<b>Co-located Transmitters/ Antennas</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>Sample Revision</b>	<input type="checkbox"/> Prototype <input checked="" type="checkbox"/> Production <input type="checkbox"/> Pre-Production
<b>Exposure Category</b>	<input type="checkbox"/> Occupational/ Controlled <input checked="" type="checkbox"/> General Population/ Uncontrolled

#### **4. FCC and IC Exemption Limits for Routine Evaluation**

##### **4.1. FCC SAR test exclusions are set by KDB 447498 D01 General RF Exposure Guidance v06**

KDB 447498 Section: 4.3.1. Standalone SAR test exclusion considerations

- a) For 100 MHz to 6 GHz and test separation distances  $\leq 50$  mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

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

- $f(\text{GHz})$  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
- The values 3.0 and 7.5 are referred to as *numeric thresholds* in step b) below

The test exclusions are applicable only when the minimum *test separation distance* is  $\leq 50$  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 4.1 f) is applied to determine SAR test exclusion.

##### **4.2. IC SAR test exclusions are set by IC RSS-102 Issue 5**

IC RSS-102 Section: 2.5.1 Exemption Limits for Routine Evaluation — SAR Evaluation

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

- For BT LE radio, the maximum RF channel power for the device under evaluation is 1.82 mW.
- For NFC Radio, the measured maximum duty cycle of 7.8% (See Note) and the maximum conducted output power to the NFC antenna port of 1.1 W declared by the client in section 2.2, yields the corrected output power of 0.085 W using a duty cycle correction factor.

Note: Measured maximum Duty Cycle is obtained from report # EMC\_SQUAR-023-16001\_15.225\_NFC\_rev2 from Cetecom, inc, dated 2016-12-22.

For a limb worn device operating at 2.45GHz the SAR evaluation exemption limit at distance 5mm or less is 10mW

For a limb worn device operating at 13.56MHz the SAR evaluation exemption limit at distance 5mm or less is 177mW

#### **4.3. Stand-Alone SAR Evaluation Exclusion**

According to KDB 447498, SAR evaluation can be excluded if the following equation is satisfied:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 7.5$$

- The maximum RF channel power for the device under evaluation is 1.82 mW.

Using the above equation:

$$[(1.82\text{mW}) / (5\text{mm})] \cdot [\sqrt{2.480}] = 0.6$$

#### **5. Conclusion:**

##### **BTLE Radio**

- SAR testing for FCC is excluded because the exclusion threshold of 0.6 is less than the 7.5 FCC limit
- SAR testing for IC is excluded because the maximum power of 1.8mW is less than the 4mW IC limit

##### **NFC Radio**

- SAR testing for FCC is excluded as per §2.1093 (c) (1) & (2)
- SAR testing for IC is excluded because the maximum duty cycle corrected output power of 85 mW is less than the 177mW IC limit

**6. Revision History**

Date	Report Name	Changes to report	Report prepared by
2017-01-03	EMC_SQUAR-023-16001_FCC_IC_SAR-EX	Initial version superseding report # EMC_SQUAR-023-16001_FCC_IC_MPE	Douglas Antioco