

## **RF Exposure Analysis for the SYS-D90-ITE**

**FCC ID: 2ALZB-7150PN**

**Contains FCC ID: 2ALZB-MU1MWMO146**

The SYS-D90-ITE operates at 13.56MHz and also uses a BT/WiFi pre-certified module (FCC ID: 2ALZB-MU1MWMO146).

There are two possible operation modes:

- 1) NFC and Bluetooth transmit simultaneously
- 2) NFC and WLAN transmit simultaneously

BT and WLAN cannot transmit simultaneously.

### **MAXIMUM TRANSMITTER POWER CONSIDERATIONS**

The maximum output powers (including tune-up tolerance, + 0.5 / - 0.5 dB) are:

Bluetooth 2.4GHz: + 5.55dBm (3.6mW)

BLE 2.4GHz: + 8.95dBm (7.9mW)

WLAN 2.4GHz: + 17.33dBm (54.1mW)

Considering the higher power of WLAN respect to BT (same frequency), in this evaluation has been addressed only the operation mode No. 2).

The minimum distance between the WiFi antenna and the final user is 30mm.

The following FCC Rule Parts and procedures are applicable:

Part 1.1310 – Radiofrequency radiation exposure limits

Part 2.1093 – Radiofrequency radiation exposure evaluation: portable devices

KDB447498 D01 v06 – Clause 4.3.1

Mobile and Portable Devices RF Exposure Procedures and Equipment Authorisation Policies

### **Analysis for FCC portable use:**

#### **For WLAN (2.4GHz)**

Standalone SAR test exclusion considerations are defined in KDB 447498 D01 v06, Chapter 4.3.1 where the 1-g head or body and 10-g extremity SAR exclusion threshold is defined by the following formula (4.3.1 a)):

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

- 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

For the MU1MWMO146 installed in the specific host SYS-D90-ITE the maximum conducted average output power (including tolerance +0.5dBm) is + 17.33dBm (**54.1mW**) at 2.4GHz

Applying the above data using the given KDB 447498 D01 formula, and minimum separation distance of 30mm, the following results:

$$(54.1\text{mW} / 30 \text{ mm}) \times \sqrt{2.4 \text{ GHz}} = 2.79$$

(i.e.:  $\leq 3.0$  for 1-g SAR and  $\leq 7.5$  for 10-g extremity SAR)

#### For NFC (13.56 MHz)

For the NFC installed in the specific host SYS-D90-ITE the Field Strength @ 3m is 61.1 dBμV/m.

Field Strength @ 30m = 21.1 dBμV/m

Field Strength @ 3m = 21.1 dBμV/m + 40 dBμV/m = 61.1 dBμV/m

EIRP = 61.1 - 95.3 = -34.2 dBm

ERP = -34.2 - 2.15 = -36.35 dBm

ERP = **0.000232 mW**

*Measured radiated power – Ref KDB447498 D01 v06 Section 4.1 b) –  
When an antenna port is not available on the device to support conducted power measurement, e.g.: with built-in integral antennas, the available maximum output power and tolerance allowed for production units shall be used to determine RF exposure test exemption and compliance.*

The formula at Clause 4.3.1 c) 2) in KDB 447498 D01 v06 has been used.

The power threshold for 13.56MHz at a distance less than 50mm is:

- $P_{th}$  for 1g SAR exclusion: 443mW
- $P_{th}$  for 10-g SAR exclusion: 1107 mW

The max. output power emitted by NFC module is far below the thresholds for 1g and 10g exclusion.

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**Simultaneous transmission:**

Ref. KDB447498 D01 v06 Section 4.3.2 - Simultaneous transmission SAR test exclusion considering the formula in b) 1):

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f_{\text{(GHz)}}/x}] \text{ W/kg, for test separation distances } \leq 50 \text{ mm;}$$

where  $x = 7.5$  for 1-g SAR and  $x = 18.75$  for 10-g SAR

at 30mm (for WLAN), 5mm (for NFC) and  $x = 7.5$

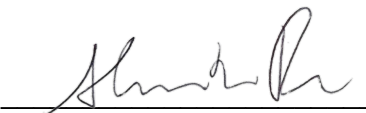
for WLAN this gives 0.3725 and for NFC this gives 0.00000072.

$$\text{SAR1} + \text{SAR2} = 0.37 < 0.4 \text{ W/kg}$$

By complying with the 1g exemption (worst case), the 10g exemption is also met.

**Conclusion**

This demonstrates the SYS-D90-ITE (2ALZB-7150PN) meets the criteria for 1-g head / body and 10-g extremity SAR test exemption for both standalone and simultaneous transmission.

Signature:  Date: 09/25/2024