

SAR Evaluation Report

Application No.: SZEM1812000152CR
Applicant: ALIGN CORPORATION LIMITED
Address of Applicant: NO. 345, SHUI YUAN RD., FENG YUAN DIST. TAICHUNG 42076, TAIWAN
Manufacturer: ALIGN CORPORATION LIMITED
Address of Manufacturer: NO. 345, SHUI YUAN RD., FENG YUAN DIST. TAICHUNG 42076, TAIWAN
Factory: FLYSKY RC Model Technology Co., Ltd
Address of Factory: Building 3, West of Huangjinyuan Ind Park, North Gate of Qiaoli, Changping Lek, Dongguan, China

Equipment Under Test (EUT):
EUT Name: A13 GST Transmitter
Model No.: A13
Trade mark: ALIGN
FCC ID: Y6IA13
Standards: 47 CFR Part 1.1307
47 CFR Part 2.1093
KDB447498D01 General RF Exposure Guidance v06

Date of Receipt: 2018-12-22
Date of Test: 2018-12-26 to 2019-01-29
Date of Issue: 2019-02-01

Test Result :	PASS*
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* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager



2 Version

<i>Revision Record</i>				
<i>Version</i>	<i>Chapter</i>	<i>Date</i>	<i>Modifier</i>	<i>Remark</i>
01		2019-02-01		Original

Authorized for issue by:			
			
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		Harry Wu /Project Engineer	
			
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4 General Information

4.1 General Description of EUT

Power supply:	DC7.4V Rechargeable Battery or AC/DC adapter, Model: SR-C6B1201500U2 Input: AC100-240V, 50/60Hz, 0.55A Max. Output: DC 12V, 1500mA
Cable:	DC cable: 100cm, Unshielded
For 2.4GHz RF	
Operation Frequency:	2408-2475MHz
Modulation Type:	GFSK
Channel Spacing:	0.5MHz
Number of Channels:	135
Antenna Type:	Integral Antenna
Antenna Gain:	Antenna 1: 1.91dBi; Antenna 2: 1.91dBi Two antennas cannot synchronously transmit.
For BLE	
Operation Frequency	2402MHz to 2480MHz
Antenna Gain	2dBi
Antenna Type	Integral Antenna
Channel Spacing	2MHz
Modulation Type	GFSK
Number of Channels	40



4.2 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

4.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.



4.4 Deviation from Standards

None.

4.5 Abnormalities from Standard Conditions

None.

4.6 Other Information Requested by the Customer

None.



5 SAR Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 Standard Requirement

According to KDB447498D01 General RF Exposure Guidance v06

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 Exclusion Threshold condition, listed below, is satisfied.

5.1.2 Limits

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

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

f(GHz) is the RF channel transmit frequency in GHz

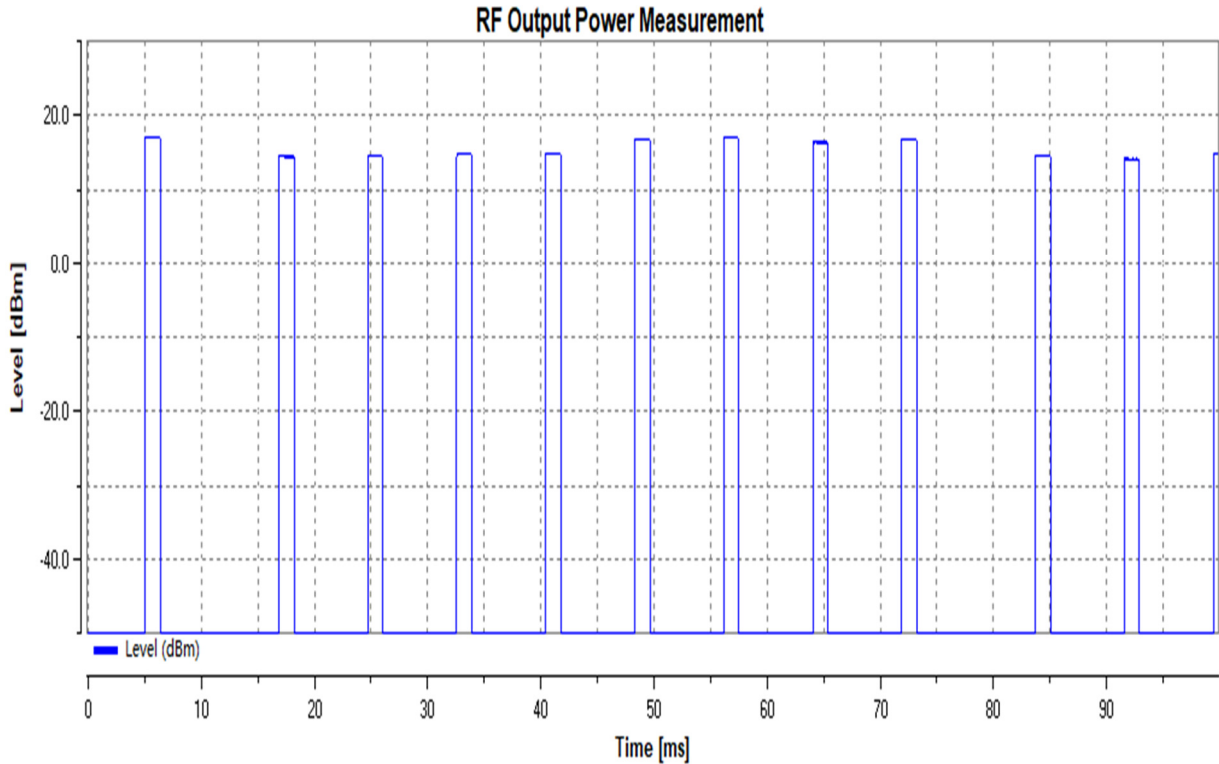
Power and distance are rounded to the nearest mW and mm before calculation¹⁷

The result is rounded to one decimal place for comparison

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 is applied to determine SAR test exclusion

5.1.3 EUT RF Exposure





Duty cycle=15.62%

The Conducted Output Power of the EUT is 16.6dBm(45.71mW).

Source-based time-averaging power:

$(45.71 * 15.62\%) \text{ mW} = 7.14 \text{ mW};$

According to the formula, calculate the test exclusion thresholds:

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

General RF Exposure = $(7.14 \text{ mW} / 5 \text{ mm}) \times \sqrt{2.475 \text{ GHz}} = 2.25$ (1)

SAR requirement: $S=3$ (2)

$(1) < (2)$



BLE:

The Max. power (including tune-up tolerance) is 6.21 dBm on the lowest channel 2.402 GHz (*)
 6.21 dBm logarithmic terms convert to numeric result is nearly 4.18 mW
 According to the formula. calculate the test exclusion thresholds:

$$\text{General RF Exposure} = \frac{(\text{Max. Power of channel, including tune-up tolerance, mW}) * \sqrt{f \text{ (GHz)}}}{(\text{min. test separation distance, mm})}$$

$$\text{General RF Exposure} = (4.18 \text{ mW} / 5 \text{ mm}) * \sqrt{2.402 \text{ GHz}} = 1.30 \quad (1)$$

SAR requirement:

$$S = 3.0 \quad (2)$$

$$(1) < (2)$$

So the SAR report is not required.

(*) Max. power refer to Report No.:GTS201811000096F01

SAR test exclusion for simultaneously transmitting mode:

For 2.4GHz RF

Because the min test separation distance is ≤50mm, so the SAR values is[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]·[√f(GHz)/x] W/kg
 =(7.14/5)*(√2.475/7.5) W/kg =0.300W/kg.

For BLE

Because the min test separation distance is ≤50mm, so the SAR values is[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]·[√f(GHz)/x] W/kg
 =(4.18/5)*(√2.402/7.5) W/kg =0.173W/kg.

Exposure conditions for simultaneous transmission operations

Simultaneous transmission SAR test is not required,because the sum of estimated SAR for 2.4GHz RF and BLE is (0.300+0.173)W/kg=0.473W/kg<1.6 W/kg.

- End of the Report -

