

# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

**Test Report No.** : W167R-D020  
**AGR No.** : A154A-171  
**Applicant** : Hanwha Corporation Asan 1 Plant  
**Address** : Asanvalleynam-Ro 144, Dunpo-Myun, Asan-City, Chungnam, 31409, South Korea  
**Manufacturer** : Flexsystem  
**Address** : #1308~13, 126, Beolmal-ro, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-060  
**Type of Equipment** : Remote Control Unit  
**FCC ID.** : 2AGC5DJO-AR-DEF  
**Model Name** : DJO-AR  
**Serial number** : N/A  
**Total page of Report** : 7 pages (including this page)  
**Date of Incoming** : April 28, 2015  
**Date of issue** : July 07, 2016

## SUMMARY

The equipment complies with the regulation; **FCC PART 15 SUBPART C Section 15.247**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Reviewed by:   
 Ki-Hong, Nam / Asst, Chief Engineer  
 ONETECH Corp.

Approved by:   
 Sung-Ik, Han/ Managing Director  
 ONETECH Corp.

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### Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
W167R-D020	July 07, 2016	Initial Issue	All

## 1. VERIFICATION OF COMPLIANCE

Applicant : Hanwha Corporation Asan 1 Plant  
Address : Asanvalleynam-Ro 144, Dunpo-Myun, Asan-City, Chungnam, 31409, South Korea  
Contact Person : SOYOUNG PARK / Assistant RESEARCH ENGINEER  
Telephone No. : +82-41-538-7886  
FCC ID : 2AGC5DJO-AR-DEF  
Model Name : DJO-AR  
Brand Name : -  
Serial Number : N/A  
Date : July 07, 2016

EQUIPMENT CLASS	<b><i>DTS – DIGITAL TRNSMISSION SYSTEM</i></b>
E.U.T. DESCRIPTION	Remote Control Unit
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10:2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None
FINAL TEST WAS CONDUCTED ON	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

## 2. GENERAL INFORMATION

### 2.1 Product Description

The Hanwha Corporation Asan 1 Plant, Model DJO-AR (referred to as the EUT in this report) is a Remote Control Unit. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Portable Device
FREQUENCY RANGE	2 405 MHz ~ 2 480 MHz
NUMBER OF CHANNEL	16 Channels
MAX. RF OUTPUT POWER	Zigbee 1: -11.40 dBm Zigbee 2: -10.99 dBm
ANTENNA TYPE	Dipole Antenna
ANTENNA GAIN	5.78 dBi
MODULATION METHOD	O-QPSK
USED RF CHIP	Marker: TEXAS INSTRUMENTS Model Name: CC2530F32RHA
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	32 MHz
POWER REQUIREMENT	DC 7.4 V
EXTERNAL CONNECTOR	-

### 2.2 Alternative type(s)/model(s); also covered by this test report.

-. None

## 3. EUT MODIFICATIONS

-. None

## 4. RADIO FREQUENCY EXPOSURE

### 4.1 RF Exposure Calculation

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

$$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$$

for 1-g SAR and  $\leq 7.5$  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 calculation
- The result is rounded to one decimal place for comparison

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 is applied to determine SAR test exclusion.

### 4.2 EUT Description

Kind of EUT	Portable Device
Operating Frequency Band	<input type="checkbox"/> Wireless Microphone: 494.000 MHz ~ 501.000 MHz and 498.200 MHz ~ 505.200 MHz <input type="checkbox"/> WLAN: 2 412 MHz ~ 2 462 MHz <input type="checkbox"/> WLAN: 5 180 MHz ~ 5 320 MHz / 5 500 MHz ~ 5 700 MHz <input type="checkbox"/> WLAN: 5 745 MHz ~ 5 825 MHz <input type="checkbox"/> Bluetooth: 2 402 MHz ~ 2 480 MHz <input type="checkbox"/> Bluetooth BLE: 2 402 MHz ~ 2 480 MHz <input checked="" type="checkbox"/> Zigbee: 2 405 MHz ~ 2 480 MHz
Device Category	<input checked="" type="checkbox"/> Portable (< 20 cm separation) <input type="checkbox"/> Mobile (> 20 cm separation) <input type="checkbox"/> Others
Max. Output Power	Zigbee 1: -11.40 dBm Zigbee 2: -10.99 dBm
Used Antenna	Dipole Antenna
Used Antenna Gain	5.78 dBi
Exposure Evaluation Applied	<input type="checkbox"/> MPE <input type="checkbox"/> SAR <input checked="" type="checkbox"/> N/A

### 4.3 Test Result

#### - Zigbee 1

According to the procedure, KDB 447498 D01, the standalone SAR test exclusion threshold is

$$[(\text{Max. Power of channel, including tune-up tolerance, mW})/(\text{Min. test separation distance, mm})] \times [\sqrt{f(\text{GHz})}] < 3$$

$$= (0.079/5) \times \sqrt{(2.405)} = 0.025$$

Conclusion: The SAR test exclusion threshold is less than 3, so the device meets the RF Exposure Requirement and excluded SAR Test.

	Frequency (MHz)	Target Power W/tolerance (dBm)	Max tune up power (dBm)	Max tune up power (mW)	Separation distance (mm)	RF exposure
Zigbee (O-QPSK)	2 405	-11.0 ± 0.5	-10.5	0.089	5.0	0.028
	2 440	-13.0 ± 0.5	-12.5	0.056	5.0	0.018
	2 480	-14.5 ± 0.5	-14.0	0.040	5.0	0.013

#### - Zigbee 2

According to the procedure, KDB 447498 D01, the standalone SAR test exclusion threshold is

$$[(\text{Max. Power of channel, including tune-up tolerance, mW})/(\text{Min. test separation distance, mm})] \times [\sqrt{f(\text{GHz})}] < 3$$

$$= (0.089/5) \times \sqrt{(2.405)} = 0.028$$

Conclusion: The SAR test exclusion threshold is less than 3, so the device meets the RF Exposure Requirement and excluded SAR Test.

	Frequency (MHz)	Target Power W/tolerance (dBm)	Max tune up power (dBm)	Max tune up power (mW)	Separation distance (mm)	RF exposure
Zigbee (O-QPSK)	2 405	-11.0 ± 0.5	-10.5	0.089	5.0	0.028
	2 440	-13.0 ± 0.5	-12.5	0.056	5.0	0.018
	2 480	-14.0 ± 0.5	-13.5	0.045	5.0	0.014