

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

**Test Report No.** : W167R-D018  
**AGR No.** : A154A-171  
**Applicant** : Hanwha Corporation Asan 1 Plant  
**Address** : Asanvalleynam-Ro 144, Dunpo-Myun, Asan-City, Chungnam, 31409, South Korea  
**Manufacturer** : ROHAU  
**Address** : BMR Center, 55 Hanyangdaehak-ro, Sangnok-gu, Ansan-si Kyeonggi-do, 426-791, Korea  
**Type of Equipment** : Lever/Pedal Control Unit  
**FCC ID.** : 2AGC5DJO-ALPC-DEF  
**Model Name** : DJO-ALPC  
**Serial number** : N/A  
**Total page of Report** : 6 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.

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 ONETECH Corp.

## CONTENTS

### PAGE

<b>1. VERIFICATION OF COMPLIANCE .....</b>	<b>4</b>
<b>2. GENERAL INFORMATION .....</b>	<b>5</b>
<b>2.1 PRODUCT DESCRIPTION.....</b>	<b>5</b>
<b>2.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT.....</b>	<b>5</b>
<b>3. EUT MODIFICATIONS.....</b>	<b>5</b>
<b>4. RADIO FREQUENCY EXPOSURE .....</b>	<b>6</b>
<b>4.1 RF EXPOSURE CALCULATION .....</b>	<b>6</b>
<b>4.2 CALCULATED MPE SAFE DISTANCE.....</b>	<b>6</b>

### Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
W167R-D018	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-ALPC-DEF  
Model Name : DJO-ALPC  
Brand Name : -  
Serial Number : N/A  
Date : July 07, 2016

EQUIPMENT CLASS	<b><i>DTS – DIGITAL TRNSMISSION SYSTEM</i></b>
E.U.T. DESCRIPTION	Lever/Pedal 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-ALPC (referred to as the EUT in this report) is a Lever/Pedal 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	-11.69 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 24 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

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment are  $f/1500 \text{ mW/cm}^2$  for the frequency range between 300 MHz and 1 500 MHz and  $1.0 \text{ mW/cm}^2$  for the frequency range between 1 500 MHz and 100 000 MHz.

The electric field generated for a  $1 \text{ mW/cm}^2$  exposure is calculated as follows:

$$E = \sqrt{(30 * P * G) / d}, \text{ and } S = E^2 / Z = E^2 / 377, \text{ because } 1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$$

Where

$S$  = Power density in  $\text{mW/cm}^2$ ,  $Z$  = Impedance of free space,  $377 \Omega$

$E$  = Electric field strength in  $\text{V/m}$ ,  $G$  = Numeric antenna gain, and  $d$  = distance in meter

Combining equations and rearranging the terms to express the distance as a function of the remaining variable

$$d = \sqrt{(30 * P * G) / (377 * 10 S)}$$

Changing to units of  $\text{mW}$  and  $\text{cm}$ , using  $P (\text{mW}) = P (\text{W}) / 1000$ ,  $d (\text{cm}) = 0.01 * d (\text{m})$

$$d = 0.282 * \sqrt{(P * G) / S}$$

Where

$d$  = distance in  $\text{cm}$ ,  $P$  = Power in  $\text{mW}$ ,  $G$  = Numeric antenna gain, and  $S$  = Power density in  $\text{mW/cm}^2$

### 4.2 Calculated MPE Safe Distance

According to above equation, the following result was obtained.

Operating Freq. Band (MHz) Frequency	Target Power W/tolerance	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density ( $\text{mW/cm}^2$ ) @ 20 cm Separation	Limit ( $\text{mW/cm}^2$ )
	(dBm)	(dBm)	(mW)	Log	Linear			
2 405 ~ 2 480	$-11.50 \pm 0.5$	-11.0	0.08	5.78	3.78	0.15	0.000 06	1.00

According to above table, for 2 405 ~ 2 480 MHz Band, safe distance,

$$D = 0.282 * \sqrt{(0.08 * 3.78) / 1.00} = 0.15 \text{ cm}.$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 0.08 * 3.78 / (4 * 3.14 * 20^2) = 0.000 06$$

Where:

$S$  = Power Density,

$P$  = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

$G$  = Gain of Transmit Antenna (linear gain),  $R$  = Distance from Transmitting Antenna