



**BEC INCORPORATED**

**SAR REPORT**

**TEST STANDARDS:  
FCC Part 15 Subpart C Intentional Radiator**

**ARRIS Model Spectrum 110A  
Set Top Box With Bluetooth (DSS) and RF4CE (DTS)**

**REPORT BEC-1839-07**

**CUSTOMER:  
ARRIS Group Incorporated  
101 Tournament Drive  
Horsham, PA 19044**

**PREPARED BY:** Steve Fanella  
Steve Fanella, Test Engineer

**REVIEWED and APPROVED BY:** Al Fanella  
Al Fanella, Test Director

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## Revision History

Revision #	Description of Changes	Date of Changes	Date Released
0	Test Report Initial Release	N/A	11/20/2017
1	Adding the RF4CE DTS SAR Value to the Sum Value in Section 1.3	12/07/2017	12/07/2017



## 1.0 Administrative Information

### 1.1 General Information Table

<b>Project Number</b>	BEC-1893
<b>Set Top Box Manufacturer</b>	ARRIS Group Incorporated
<b>Set Top Box Model Number</b>	Spectrum 110A
<b>Set Top Box Serial Number</b>	CA0SBJ3NC9WN
<b>Set Top Box Sample Number</b>	1839-01 (Modified With SMA Port to the Antenna)
<b>Antenna Manufacturer</b>	Cypress Semiconductor Corporation
<b>Antenna Model Number</b>	CYW20704 Single Chip Blue Tooth Transceiver
<b>Set Top Box Model Number</b>	Spectrum 110A
<b>Set Top Box Serial Number</b>	CA0SBJ3NC9V5
<b>Set Top Box Sample Number</b>	1839-03 (Modified With SMA Ports to the Antennas)
<b>Antenna Manufacturer</b>	GreenPeak Technologies
<b>Antenna Model Number</b>	GP712
<b>FCC ID</b>	ACQ-SPECTRUM110
<b>Test Laboratory Location</b>	BEC Incorporated 970 East High Street Pottstown, PA 19464
<b>Test Personnel</b>	Paul Banker
<b>Test Performed For</b>	ARRIS Group Incorporated 101 Tournament Drive Horsham, PA 19044
<b>Customer Technical Contact</b>	Tom Piacentino
<b>Date Received</b>	09/30/2017
<b>Condition Received</b>	Suitable for test
<b>Sample Type</b>	Production unit
<b>EUT Classification</b>	Cable Set Top Box with wireless capability supporting Bluetooth and RF4CE
<b>FCC Classification</b>	DSS- Part 15 Direct Sequence System DTS- Part 15 Digital Transmission System



## 1.2 Maximum Permissible Exposure Calculation

### §15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

- (i) Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. *See* §1.1307(b)(1) of this chapter.

### §1.1307 Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.

(b)(1) The appropriate exposure limits in §§1.1310 and 2.1093 of this chapter are generally applicable to all facilities, operations and transmitters regulated by the Commission.

### §1.1310 Radiofrequency radiation exposure limits.

(2) At operating frequencies less than or equal to 6 GHz, the limits for maximum permissible exposure (MPE), derived from whole-body Specific Absorption Rate (SAR) limits and listed in Table 1 of paragraph (e) of this section, may be used instead of whole-body SAR limits as set forth in paragraph (a) through (c) of this section to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b), except for portable devices as defined in §2.1093 as these evaluations shall be performed according to the SAR provisions in §2.1093 of this chapter.

(4) Both the MPE limits listed in Table 1 of paragraph (e) of this section and the SAR limits as set forth in paragraph (a) through (c) of this section and in §2.1093 of this chapter are for continuous exposure, that is, for indefinite time periods. Exposure levels higher than the limits are permitted for shorter exposure times, as long as the average exposure over the specified averaging time in Table 1 is less than the limits. Detailed information on our policies regarding procedures for evaluating compliance with all of these exposure limits can be found in the FCC's *OET Bulletin 65*, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields," and in supplements to *Bulletin 65*, all available at the FCC's Internet Web site: <http://www.fcc.gov/oet/rfsafety>



**§2.1093 Radiofrequency radiation exposure evaluation: portable devices.**

(b) For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

**From: OET Bulletin 65 Edition 97-02, page 19.**

$$S = \frac{PG}{4\pi R^2} \quad (3)$$

where: S = Power Density (in appropriate units, e.g., mW/cm<sup>2</sup>)  
P = Power input to the antenna (in appropriate units, e.g., mW)  
G = Power Gain of the antenna in the direction of interest to an isotropic radiator  
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

or: 
$$S = \frac{EIRP}{4\pi R^2} \quad (4)$$

where: EIRP = equivalent (or effective) isotropically radiated power

**1.3 Maximum Permissible Exposure Calculation Results**

**Bluetooth DSS Calculation**

**Effective Isotropic Radiated Power (EIRP) =**

**Antenna Power Output (dBW) + antenna gain (dBi) or  
Antenna Power Output (Watts) X numeric gain**

Antenna Power	Antenna Gain	EIRP
dBW	dBi	dBW
-21.16	2.00	-19.16

Antenna Power	Antenna Gain	EIRP
Watts	numeric	Watts
0.007656	1.585	0.012135

The value R, distance to the center of radiation of the antenna, is 20 cm.

$$S = \frac{EIRP}{4\pi R^2} = \frac{12.135 \text{ mW}}{4\pi(20)^2} = 0.002415 \text{ mW/cm}^2$$



**RF4CE DTS Calculation**

**Effective Isotropic Radiated Power (EIRP) =**

**Antenna Power Output (dBW) + antenna gain (dBi) or  
Antenna Power Output (Watts) X numeric gain**

Antenna Power	Antenna Gain	EIRP
dBW	dBi	dBW
-26.37	1.87	-24.5

Antenna Power	Antenna Gain	EIRP
Watts	numeric	Watts
0.002307	1.54	0.003548

The value R, distance to the center of radiation of the antenna, is 20 cm.

$$S = \frac{\text{EIRP}}{4\pi R^2} = \frac{3.548 \text{ mW}}{4\pi(20)^2} = .000706 \text{ mW/cm}^2$$

**SUMMARY**

	Calculated Power Density
Radio	mW/cm <sup>2</sup>
Blue Tooth DSS	0.002415
RF4CE DTS	0.000706
<b>Combined Radios</b>	0.003121

**Results:** The calculated Power Density of the combined measurements for the Blue Tooth DSS and RF4CE DTS radios contained in the ARRIS Model Spectrum 110A Set Top Box is 0.003121 mW/cm<sup>2</sup>. This complies with the limit of 1.0 mW/cm<sup>2</sup> from Table 1(B) of 47 CFR Part 1.1310. Therefore, exposure evaluation is not required.