



**BEC INCORPORATED**

**SAR REPORT**

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

**ARRIS Model VMS4100 Set Top Box (DSS)**

**REPORT BEC-1792-04**

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

**PREPARED BY:** \_\_\_\_\_

Steve Fanella, Test Engineer

**REVIEWED and APPROVED BY:** \_\_\_\_\_

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             | 06/01/2017    |



## 1.0 Administrative Information

### 1.1 General Information Table

|                                  |                                                                       |
|----------------------------------|-----------------------------------------------------------------------|
| <b>Project Number</b>            | BEC-1792                                                              |
| <b>Set Top Box Manufacturer</b>  | ARRIS Group Incorporated                                              |
| <b>Set Top Box Model Number</b>  | VMS4100                                                               |
| <b>Set Top Box Serial Number</b> | M11707TCP165                                                          |
| <b>Set Top Box Sample Number</b> | 1792-03<br>(Modified With SMA Ports to the Antennas)                  |
| <b>AC Power Adapter</b>          | Delta Electronics, Inc. Model ADP-36KR A                              |
| <b>AC Power Adapter Serial #</b> | IEAD66BB002L                                                          |
| <b>AC Power Adapter Sample #</b> | 1792-04                                                               |
| <b>FCC ID</b>                    | ACQ-VMS4100                                                           |
| <b>Antenna Manufacturer</b>      | Broadcom Corporation                                                  |
| <b>Antenna Model Number</b>      | BCM20705 Single Chip Blue Tooth Transceiver                           |
| <b>Frequency of Operation</b>    | 2402.0 - 2480.0 MHz                                                   |
| <b>Test Laboratory Location</b>  | BEC Incorporated<br>970 East High Street<br>Pottstown, PA 19464       |
| <b>Test Performed For</b>        | ARRIS Group Incorporated<br>101 Tournament Drive<br>Horsham, PA 19044 |
| <b>Test Personnel</b>            | Paul Banker                                                           |
| <b>Technical Contact</b>         | Robert Sicilia / Mark Haegali                                         |
| <b>Date Received</b>             | 03/10/2017                                                            |
| <b>Condition Received</b>        | Suitable for test                                                     |
| <b>Sample Type</b>               | Production unit                                                       |
| <b>EUT Classification</b>        | Cable Set Top Box with wireless capability<br>supporting Bluetooth    |



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

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

## 1.3 Maximum Permissible Exposure Calculation Results

**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    |
| -22.29        | 1.87         | -20.42 |

| Antenna Power | Antenna Gain | EIRP   |
|---------------|--------------|--------|
| Watts         | numeric      | Watts  |
| 0.0059        | 1.54         | 0.0091 |

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

$$S = \frac{\text{EIRP}}{4\pi R^2} = \frac{9.1 \text{ mW}}{4\pi(20)^2} = .00181 \text{ mW/cm}^2$$

**Results:** The calculated Power Density of the measurements for the ARRIS Model VMS4100 Set Top Box, powered by the Delta AC Adapter, is 0.00181 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.