

Installation Manual and Operating Instructions

TRUE BLUE POWER

**TWC15
SERIES**

WIRELESS
CHARGER

Manual Number
9019726



Revision A • February 15, 2022

FOREWORD

This manual provides information intended for use by persons who, in accordance with current regulatory requirements, are qualified to install this equipment. If further information is required, please contact:

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We welcome your comments concerning this manual. Although every effort has been made to keep it free of errors, some may occur. When reporting a specific problem, please describe it briefly and include the manual part number, the paragraph/figure/table number and the page number. Send your comments to:

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REVISION HISTORY

| Rev | Date | Detail | Approved |
|------------|-------------|------------------|-----------------|
| A | 02/15/2022 | Initial release. | WVC |

SECTION 1 GENERAL DESCRIPTION

1.1 INTRODUCTION

The TWC15 Series, part numbers 6430015-() are Qi Compatible High Power Wireless Chargers. The units are certified accessories that convert 12 to 32 volts of DC electrical input from the aircraft to a maximum of 15 Watts of wireless charging for personal electronic devices (PEDs), such as phones, tablets, etc. The TWC15 wireless chargers can be mounted in a variety of locations and orientations throughout the aircraft. Three different units provide aircraft owners with flexibility to select the best wireless charger suitable for installation. The 6430015-1 (referred to as -1) is very thin (0.21") and can be located where a low profile product is required to fit into locations such as beverage trays. The 6430015-2 (-2) has the smallest footprint (2.28" x 2.45") and can fit in those locations where mounting area is very small. For installations where a larger charging area is desired, the 6430015-3 (-3) has 3 coils that provide a larger 'sweet-spot' for locating your device to be charged. All three units are certified to FAA TSO-C71 and qualified to multiple RTCA DO-160G requirements, providing confidence for installation in the cockpit or cabin. The TWC15 Series of wireless chargers have built-in protections for short circuit, over-load, over temperature, power surge and foreign object detection (FOD). They are designed to protect against reverse polarity installation and have temperature monitoring and shutdown capability, allowing the unit to handle unforeseen conditions safely.

Small, compact and powerful, with plenty of installation flexibility, the TWC15 Wireless Chargers are an ideal choice as a highly useful and effective addition to any aircraft.

1.2 PHYSICAL ATTRIBUTES

The TWC15 wireless charger family provides three different configurations, each an integrated component contained in a metal enclosure that can be mounted in many different aircraft locations with a variety of mounting options/alternatives. All units utilize the same external connection that provides for power input and return, a line for enabling the charger and lastly a dedicated line for providing operating status of the wireless charger. Each wireless charger features four (4) threaded holes designed for attachment with 2-56 screws. Refer to Figures 1.1, 1.2 and 1.3 for specific unit dimensions.

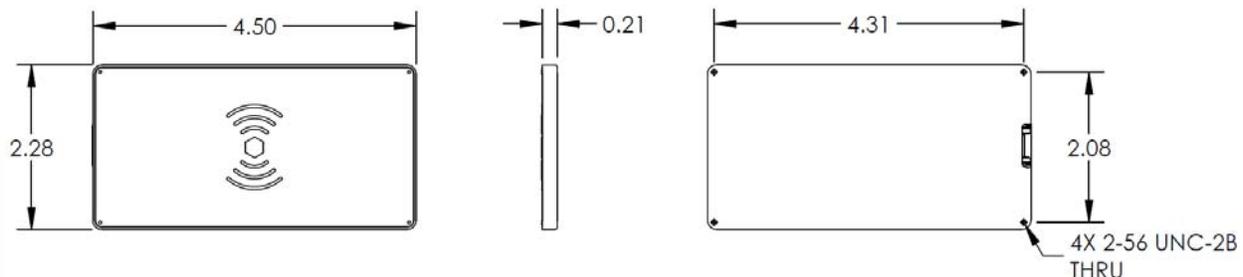


Figure 1.1
6430015-1 Drawing

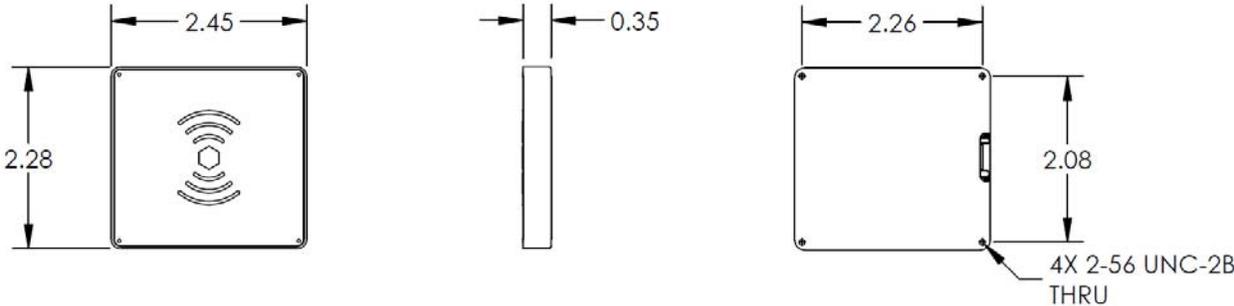


Figure 1.2
6430015-2 Drawing

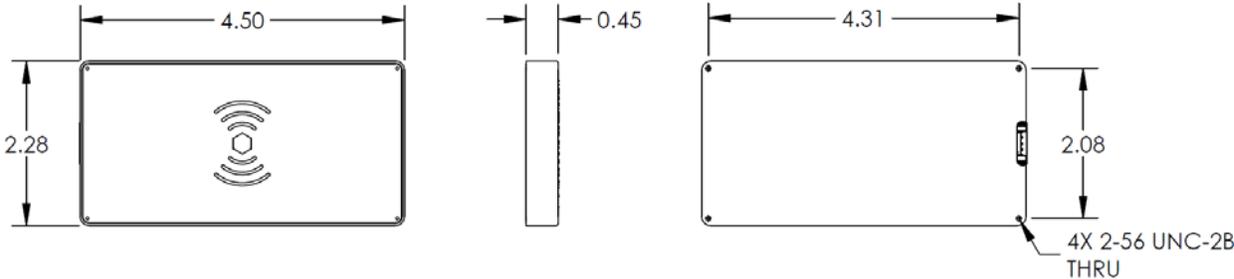


Figure 1.3
6430015-3 Drawing

1.3 TECHNICAL SPECIFICATIONS

| TWC15 Models and Type | |
|-----------------------|--|
| Part Number: | Description: |
| 6430015-1 | Thin wireless charger – 1 coil |
| 6430015-2 | Compact wireless charger – 1 coil |
| 6430015-3 | Triple coil wireless charger – 3 coils |

Table 1.1

| Electrical Attributes | |
|-----------------------|---|
| Input Voltage | 12-32 VDC |
| Input Power | 26 watts max; 2.2 amps @ 14 VDC / 0.9 amps @ 28 VDC |
| Output Power | 15 watts maximum |

Table 1.2

| Physical Attributes | |
|---|---|
| Weight: | |
| -1: | 3.4 oz. (96 g) |
| -2: | 3.0 oz. (85 g) |
| -3: | 5.9 oz. (167 g) |
| Dimensions | |
| -1: | 4.50 inches wide X 2.28 inches deep X 0.21 inches high (114.3 mm wide x 57.9 mm deep x 5.3 mm high) |
| -2: | 2.45 inches wide X 2.28 inches deep X 0.35 inches high (62.2 mm wide x 57.9 mm deep x 8.9 mm high) |
| -3: | 4.50 inches wide X 2.28 inches deep X 0.45 inches high (114.3 mm wide x 57.9 mm deep x 11.4 mm high) |
| Charging Port Type | Qi Compatible Wireless Charging |
| Maximum Device Height Above Charging Port | 3/8" (0.375") / 9.5 mm |
| Connector Kit | MCIA P/N 9019739-1 |
| Mounting | Under mount, flush mount |

Table 1.3

| Qualifications | |
|-----------------------------|--|
| Certification | FAA TSO-C71 |
| Environmental Qualification | RTCA DO-160G Environmental Category See Section 5.2 |

Table 1.4

| Wireless Power Consortium (WPC) Standard | |
|--|---------------------------------|
| -1/-2: | Compliant to WPC 1.2.2 Standard |
| -3: | Compliant to WPC 1.2.4 Standard |

Table 1.5

SECTION 2 PRE-INSTALLATION CONSIDERATIONS

2.1 COOLING

No external cooling is required. The unit will become warm when in use. This is normal and within operational parameters. No special mounting considerations are required; however, mounting to a metal surface can help dissipate any heat generated and extend the life of the product.

2.2 EQUIPMENT LOCATION

The TWC15 wireless chargers are designed for mounting flexibility, allowing for installation in the cockpit or in the cabin. They are designed for mounting typically directly underneath a panel that will generally be in a horizontal orientation so that devices to be charged (phones, tablets, etc.) will not move during steady flights. Clearance should be provided for the mating connector which may require an additional inch beyond the rear of the unit.

2.3 ROUTING OF CABLES

Avoid sharp bends in cabling and routing near aircraft control cables. Avoid close proximity and contact with aircraft structures, avionics equipment or other obstructions that could chafe wires during flight and cause undesirable effects.

2.4 LIMITATIONS

Environmental qualifications were verified per RTCA DO-160, Revision G in lieu of those identified within the minimum performance standards (MPS) of the TSO. The TWC15 wireless chargers meet the DC power input requirements of TSO-C71; however, there is no direct output of DC power as that function is replaced by wireless charging.

The conditions and tests for TSO approval of this article are minimum performance standards. Those installing this article, on or in a specific type or class of aircraft, must determine that the aircraft installation conditions are within the TSO standards, specification of the article and deviations as listed above. TSO articles must have separate approval for installation in an aircraft. The article may be installed only according to 14 CFR part 43 or the applicable airworthiness requirements.

The wireless chargers are exciting new interfaces for charging electronic devices. The TWC15 products have been tested with and supports a wide variety of devices now emerging in the open market. However, compatibility with all devices may not be guaranteed. True Blue Power continues to be proactive in evaluating new devices and strives to continually improve the product as needed to serve the vast majority of Qi Compatible personal electronic devices (PEDs).

2.5 MODIFICATIONS

This product has a nameplate that identifies the manufacturer, part number, description, certification(s) and technical specifications of the unit. It also includes the “MOD” or modification number representing notable changes in the hardware design of the unit.

Modification (MOD) 0 is the initial release of the product and is identified on the nameplate by the lack of marking on the MOD numbers 1 through 9 (i.e. 1-9 are visible). All subsequent modifications are identified on the nameplate by the marking/blacking out of that particular MOD number (i.e. for MOD 1, the number 1 is not visible and 2-9 are visible - see Figure 2.2.1 for examples). MODs do not have to be sequentially inclusive and may be applied independent of each other.

For additional details regarding specific changes associated with each MOD status refer to the product published Service Bulletins at www.truebluepowerusa.com.

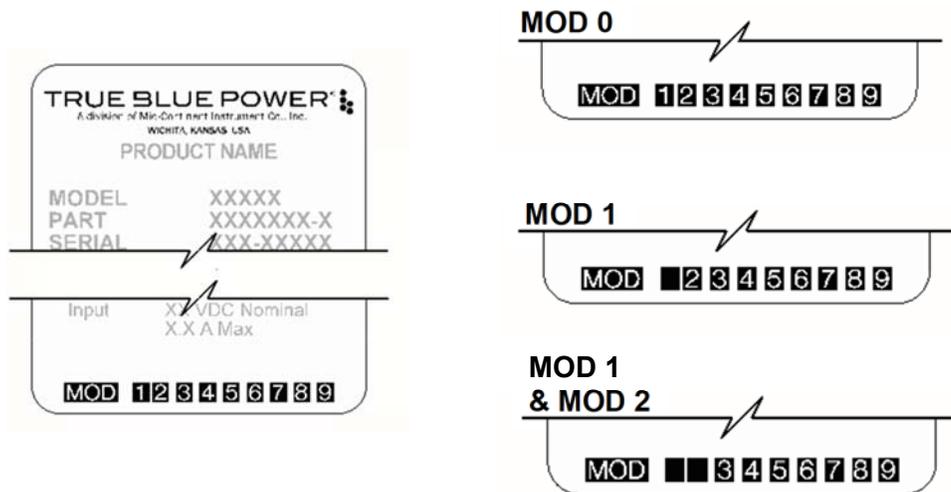


Figure 2.2.1
Nameplate and MOD Status Example

SECTION 3 INSTALLATION

3.1 GENERAL INFORMATION

This section contains interconnect diagrams, mounting dimensions and other information pertaining to the installation of the TWC15 family of Qi Compatible Wireless Chargers. After installation of cabling and before installation of the equipment, ensure that power and ground are applied to the proper pins specified in Section 3.3.2, Pin Assignment Information.

3.2 UNPACKING AND INSPECTING EQUIPMENT

When unpacking this equipment, make a visual inspection for evidence of any damage that may have occurred during shipment.

3.3 PARTS

3.3.1 Included Parts

- | | |
|--|----------------------|
| A. Qi Compatible Wireless Charging Port | MCIA P/N 6430015-() |
| B. Installation Manual | MCIA P/N 9019726 |
| C. Connector Kit | MCIA P/N 9019739-1 |
| <ul style="list-style-type: none"> • Mating Connector, 4-pin • Pins (6) (4 required, 2 spares) • Screws, #2-56 x 1/4 flat-head (4) • Screws, #2-56 x 3/16 pan-head (4) | |

3.3.2 Installer Supplied Parts

- | | |
|-----------------------------------|--|
| A. Cable Harness Wire | See Section 3.4.1 for specifications |
| B. Circuit Breaker Recommendation | 3 amp (2 amp may be sufficient for 28V aircraft) |

3.4 CABLE HARNESS

Construct the cable harness following the instructions outlined below and per Figure 3.1. Refer to Section 2: Pre-Installation Considerations, for routing precautions.

3.4.1 Wire Gauge Selection

Use of PTFE, ETFE, TFE, Teflon or Tefzel insulated wire is recommended for aircraft use. The wire harness should utilize 20-24 AWG stranded wire. Refer to table 3.1 below. This table is provided to aid in the consideration of voltage drop due to harness length. Any other wiring standards that are applicable to the installation should also be considered.

| Wire Gauge | Wire Length |
|----------------------|-------------|
| 20 AWG stranded wire | 24 ft |
| 22 AWG stranded wire | 14 ft |
| 24 AWG stranded wire | 9 ft |

**Table 3.1
Wire Gauge and Length**

3.4.2 Pin Assignment Information and Location

See Table 3.2 for pinout definition and Figure 3.1 for pin locations.

| Pin Number | Signal |
|------------|----------------------------|
| 1 | Aircraft Power (12-32 VDC) |
| 2 | Ground |
| 3 | Status |
| 4 | Enable |

Table 3.2
Wireless Charger Pin Assignment

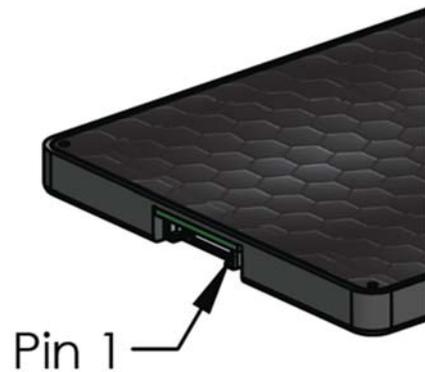


Figure 3.1
Wireless Charger Pin Locations

Note: Pins should be crimped using Molex Hand Crimp Tool 213309-1000. See the Molex Hand Crimp Tool User Manual for crimp procedures.

3.4.3 Wiring Connections

3.4.3.1 Enable Pin

The TWC15 enable pin will automatically turn on the wireless charger power supply if it is floating or not connected to power (12-32 VDC). If the wireless charger is to be enabled whenever power is provided, the enable pin does not need to be connected. However, if the aircraft installation includes the capability to enable/disable the wireless charger, the enable pin can be wired accordingly; if the enable pin is open it will enable input power; if connected to aircraft power (12-32 VDC) it will disable input power. Controlling the enable can be performed through an external 100K Ω series resistor if desired. If controlling the enable is performed from external electronics operating at 5V, the external series resistor should be 2.2K Ω or less.

3.4.3.2 Status Indication

The status output is designed to drive an external LED with minimum additional components. A LED connected between this output and 28V will light with 32 mA of current. For lower LED current (less brightness) add an external resistor in series with your LED. The status can survive a continuous short to 28V.

For a more complex flight monitoring systems, the status line is an open-drain output switching to ground with a 1 Watt 866 Ω resistor. If interfacing to 5 volt electronics, a 10K Ω resistor pull-up to an external 5V will provide levels between 5V (Status is Off) and 0.4V (Status is on) to interface to other circuits.

3.4.4 Harness Verification

Note:

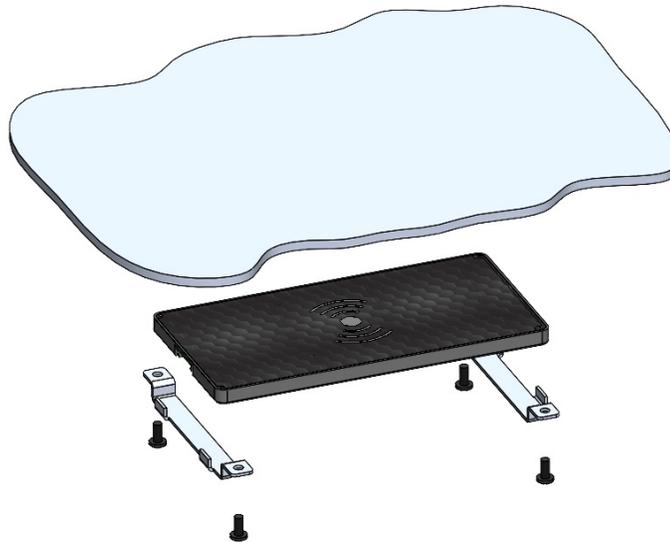
The TWS15 High Power Wireless Chargers have built-in reverse polarity protection for the power connector. If Pins 1 and 2 are swapped, the unit will not be damaged, but will also not function.

Once the cable harness is prepared, prior to connecting the TWC15, activate the aircraft power bus and use a multimeter to verify that aircraft power and ground are supplied with appropriate voltage on the proper pins within the mating harness.

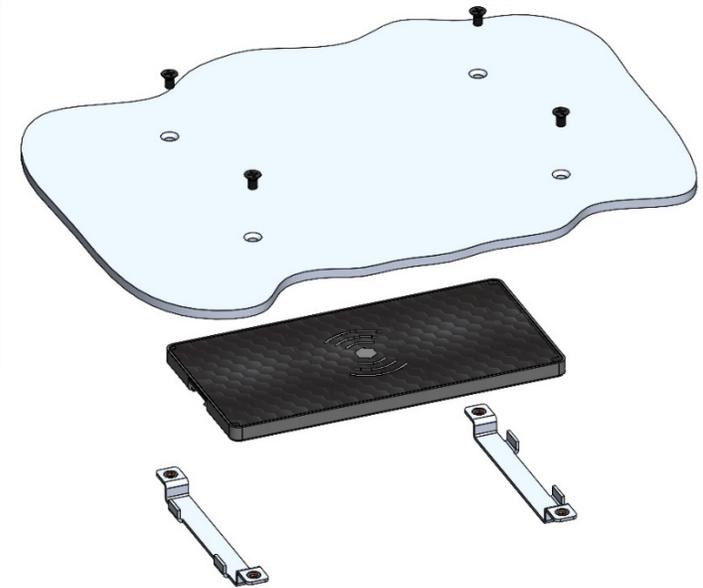
3.5 INSTALLATION

The TWC15 can be installed in many different ways and locations, noting that in order for the TWC15 to charge wireless devices, the panel thickness + device (phone, tablet, etc.) case combined thickness should not exceed 0.375". Below are typical mounting methods:

- Undermount panel concepts with brackets attaching to the aircraft panel per Figures 3.2 and 3.3.
- Undermount panel with screws attaching directly to charger per Figure 3.4.
- Flush mount with screws attaching bottom of charger to recessed panel per Figure 3.7.
- Many other options are available for mounting the TWC15 wireless chargers depending on your aircraft's available mounting locations and orientations.



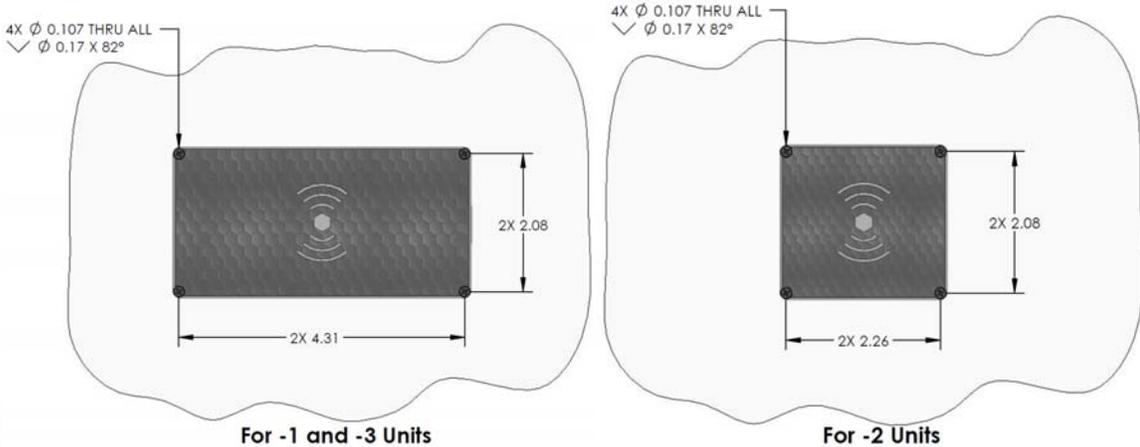
**Figure 3.2 Undermount Through Hole Bracket Concept
(-1 Configuration Shown)**



**Figure 3.3 Undermount With Threaded Bracket Concept
 (-1 Configuration Shown)**



**Figure 3.4 Undermount Direct to Charger
 (-1 Configuration Shown)**



For -1 and -3 Units

For -2 Units

**Figure 3.5
 Undermount Direct Mounting to TWC15 Dimensions**

Mounting TWC15 units below the panel using a direct mount to the wireless charger requires countersinking holes (see Figure 3.5 above) for a #2 screw. Additionally, the label on top of the wireless charger has 4 small gray dots in each corner. A push pin can be used to punch through the label to allow the 2-56 screws (qty 4) to attach from above per Figure 3.6.



Punch holes with push pin to provide clearance for 2-56 screw

Figure 3.6
Threaded Hole Locations for 2-56 Threaded Holes



Figure 3.7 Flush Mount
(-1 Configuration Shown)

Mounting TWC15 units flush (from above) requires providing a recess height equivalent to the height of the charger. Cutouts need to be made in the panel to allow for connection of the 4-pin connector; 4 drilled holes are also required to provide attachment from below with 2-56 screws.

SECTION 4 OPERATION

4.1 UNIT ARCHITECTURE

The TWC15 Series Wireless Chargers convert an aircraft (DC) input voltage (from 12 to 32 volts) to a wireless charger that can charge personal electronic devices compatible with the Qi wireless specification.

The unit is designed as a DC-to-DC converter output regulated to meet the Qi standard that regulates wireless charging up to 15 watts. The TWC15 units provide several protections to assure continued safe operation of your aircraft.

4.2 PROTECTIVE FEATURES

4.2.1 Short Circuit Protection

The TWC15 units are capable of surviving a short circuit event without permanent damage. The unit goes into an over-current condition so that the average current is significantly reduced and the device is protected.

4.2.2 Power Surge

The TWC15 units have transient voltage suppressor circuitry included to protect the wireless chargers.

4.2.3 Reverse Polarity

The TWC15 units have reverse polarity protection; no damage to the unit will occur if the power and return lines are connected incorrectly.

4.2.4 Over-Load Protection

The TWC15 monitors the power draw individually on each charging coil. If the requested power from the personal electronic device is too high, the charger will indicate a FAULT on the status line.

4.2.5 Low Input voltage Shutdown

If the input voltage applied to the TWC15 drops below 12 VDC the unit will shut down until the applied voltage returns to an operational level within range.

4.2.6 Over-Temperature

When the internal temperature of the TWC15 exceeds designed thresholds, the unit will shut down and stop providing power.

4.2.7 Foreign Object Detect (FOD)

If foreign objects (items like coins, paper clips, etc.) are placed above the wireless coil charging surface (with or without a personal electronic device present), it will indicate a FAULT on the status line.

4.3 OPERATIONAL MODES AND ALARM CONDITIONS

The TWC15 High Power Wireless Chargers provide external status via connector pin #3. Table 4.1 provides indications for all operational modes and alarm conditions.

| Operational Mode | Status Indication -1/-2 Units | Status Indication -3 Units |
|------------------------------|----------------------------------|-------------------------------|
| Standby | On | On |
| Charging | 1000ms on, 500ms off | 1000ms on, 500ms off |
| Charge Complete | Off/No Indication | 500ms on, 500ms off |
| Short Circuit | Off/No Indication | Off/No Indication |
| Power Surge | Off/No Indication | Off/No Indication |
| Low Input Voltage Shutdown | Off/No Indication | Off/No Indication |
| Over-Temperature | Off/No Indication | Off/No Indication |
| Alarm: Over-Load Protection | On | 200ms on, 200ms off |
| Alarm: Foreign Object Detect | On | 200ms on, 200ms off |

**Table 4.1
Status Indications**

4.4 CHARGER OPERATION

Be sure to adhere to the following precautions when charging your Personal Electronic Device (PED):

- A. Do not use a case with a magnetic or iron plate.
- B. Do not use a case with a pop socket.
- C. Do not use a device with a thick (> 3/16") protective case.
- D. Do not place any foreign objects between your device and the wireless charger's surface, including metal pads, credit cards, keys, coins or metal.
- E. The protective phone case (thickness) and the position of your device on the wireless charger will affect the charging speed. The farther it is placed above and from the center of the wireless charger, the slower the charging speed will be.

Connecting to the TWC15 wireless chargers is relatively straightforward. Be sure to place your PED above the wireless charger, making note of the optimal location for that charger. The -3 unit (triple coil) has a much larger area for PED charging. See Figures 4.1, 4.2 and 4.3.

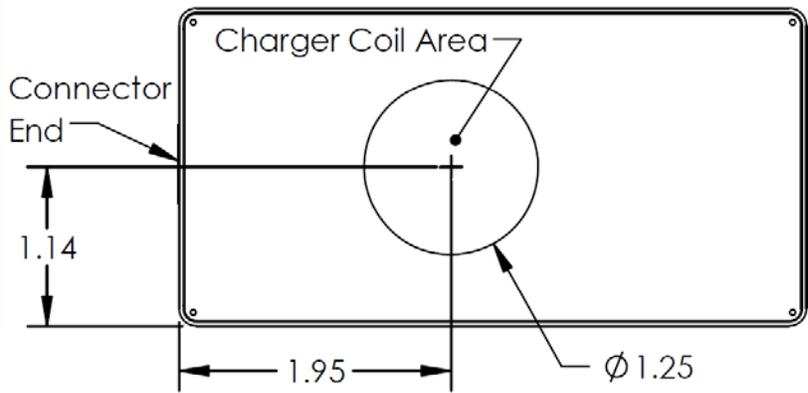


Figure 4.1
Charging Optimal Area (-1)

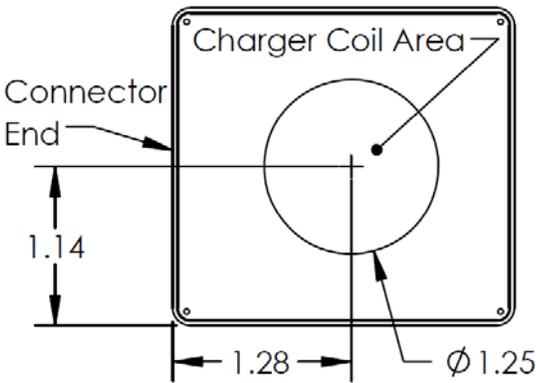


Figure 4.2
Charging Optimal Area (-2)

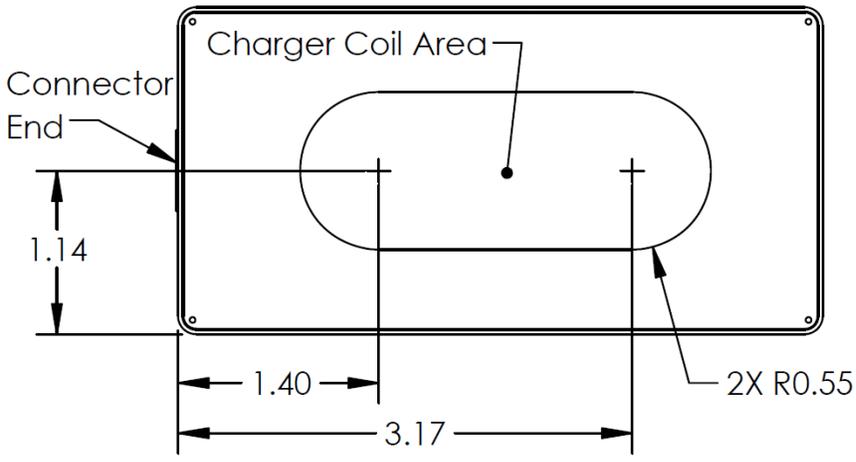


Figure 4.3
Charging Optimal Area (-3)

SECTION 5 CONFORMANCE

5.1 INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

No periodic scheduled maintenance or calibration is necessary for continued airworthiness of the TWC15 series Wireless Chargers. If the unit fails to perform to specifications, the unit must be removed and serviced by Mid-Continent Instruments and Avionics or their authorized designee.

5.2 ENVIRONMENTAL QUALIFICATION STATEMENT

MODEL NUMBER: TWC15 Series **PART NUMBER:** 6430015-()
DESCRIPTION: Wireless Charger **CERTIFICATION:** FAA TSO-C71
MANUFACTURER: True Blue Power, a division of Mid-Continent Instrument Co., Inc.
ADDRESS: 9400 E. 34th St. North, Wichita, KS 67226, USA.
SPECIFICATION: Test Specification (TS) 809 Test Data Sheet (TDS) 809
STANDARD: RTCA DO-160, Rev G, dated 12/08/10

| CONDITIONS | SECTION | DESCRIPTION OF TEST |
|--|---------|--|
| Temperature and Altitude | 4 | Category C4 |
| Temperature Variation | 5 | Category S2 |
| Humidity | 6 | Category B |
| Operational Shock and Crash Safety | 7 | Category B |
| Vibration | 8 | Category R; Curves C, C1 |
| Explosion | 9 | Category X |
| Waterproofness | 10 | Category X |
| Fluids | 11 | Category X |
| Sand and Dust | 12 | Category X |
| Fungus | 13 | Category X |
| Salt Spray | 14 | Category X |
| Magnetic Effect | 15 | Category Z |
| Power Input | 16 | Category B(XX) |
| Voltage Spike | 17 | Category B |
| Audio Frequency Conducted Susceptibility | 18 | Category R |
| Induced Signal Susceptibility | 19 | Category X |
| Radio Frequency Susceptibility | 20 | Category X |
| Emission of Radio Frequency Energy | 21 | Category ML (-1) Category BL (-2, -3) |
| Lightning Induced Transient Susceptibility | 22 | Category X |
| Lightning Direct Effects | 23 | Category X |
| Icing | 24 | Category X |
| ESD | 25 | Category A |
| Fire, Flammability | 26 | Category X |

REMARKS:
 Section 4: Category C4 with excursions as declared by the manufacturer:
 • 4.6.1: Altitude adjusted from 35k to 55k feet.
 Section 7: Category B with excursions as declared by the manufacturer:
 • 7.2.1: Operational Shock adjusted from 11ms, 6g to 11ms, 15g
 • 7.3.1: Crash Safety Impulse adjusted from 11ms, 20g to 11ms, 30g
 • 7.3.3: Crash Safety Sustained adjusted from 20g to 30g