

Installation Manual and Operating Instructions

TRUE BLUE POWER

**TWC15
SERIES**

WIRELESS
CHARGER

Manual Number
9020158



Revision D • October 24, 2024

FOREWORD

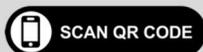
This manual provides information intended for use by persons who, in accordance with current regulatory requirements, are qualified to install this equipment. If further information is required, please send inquiries per the contact information below.

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	05/30/2024	Initial release.	PHW
B	6/14/2024	Edited table 4.1 for clarity.	PHW
C	8/19/2024	Corrected table 4.1. Updated 3.4.3.2 for lower LED current and section 2.1 for recommended cooling.	PHW
D	10/24/2024	Updated table 4.1 to reflect a change in LED startup behavior.	PHW

SECTION 1 GENERAL DESCRIPTION

1.1 INTRODUCTION

The TWC15 Series, part numbers 6430015-() are Qi/Qi2 compatible High Power Wireless Chargers. The units are FAA 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, earbuds, and more. The TWC15 is compatible with most Android™, Apple™, and other branded devices that support wireless charging, including those with MagSafe™ capability.

The TWC15 wireless chargers can be mounted in a variety of locations and orientations throughout the aircraft. Two different units provide aircraft owners with flexibility to select the best wireless charger suitable for the application and desired functionality. The TWC15 has a small footprint (2.28" x 2.45") and comes in two versions: the 6430015-21 ("-21") and the 6430015-22 ("-22"). The -21 is designed to be mounted below an intermediate surface for invisible integration into the aircraft interior, whereas the -22 includes a magnetic alignment feature for compatible devices to optimize alignment, charging power, and speed.

All 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, reverse polarity installation, and foreign object detection (FOD), allowing the unit to handle unforeseen conditions safely. They also provide integrated installation mounting points and offer external status notification for remote monitoring.

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 two configurations, both in a metal enclosure with the same dimensions. The enclosure can be mounted in many different aircraft locations with a variety of mounting options/alternatives. Both units utilize the same external electrical connection that provides for power input and return, an input for enabling the charger, and an output dedicated 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 Figure 1.1 for unit dimensions.

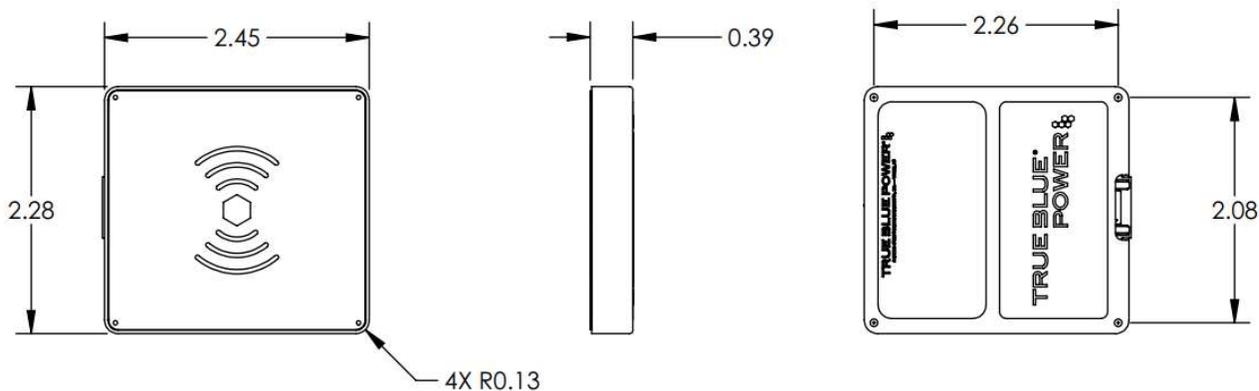


Figure 1.1
6430015-2() Drawing

1.3 TECHNICAL SPECIFICATIONS

TWC15 Models and Type	
Part Number: 6430015-21 6430015-22	Description: Compact wireless charger Compact wireless charger with magnetic alignment feature

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:	4 ounces (113 g)
Dimensions	2.28 inches x 2.45 inches x 0.4 inches high (57.9 mm x 62.2 mm x 10.2 mm high)
Charging Type	Qi/Qi2 Compatible Wireless Charging protocol
Maximum Device -21	0.4 inches / 10 mm * see section 3.5
Height Above Charger: -22	0.1 inches / 2.5 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
Industry compliance	Wireless Power Consortium (WPC) Standard 1.3

Table 1.4

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. There are also over-temperature protections in place. 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. Mounting to a metal surface or other thermal management is recommended for better high power charging performance. If a metal surface is unavailable, installing the unit in a location with air movement would be another thermal management option.

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 thin material that will generally be in a horizontal orientation so that devices to be charged (phones, earbuds, 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 RF 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 support a wide variety of devices now emerging in the consumer electronics market. However, compatibility with all current or future 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 and Qi2 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.

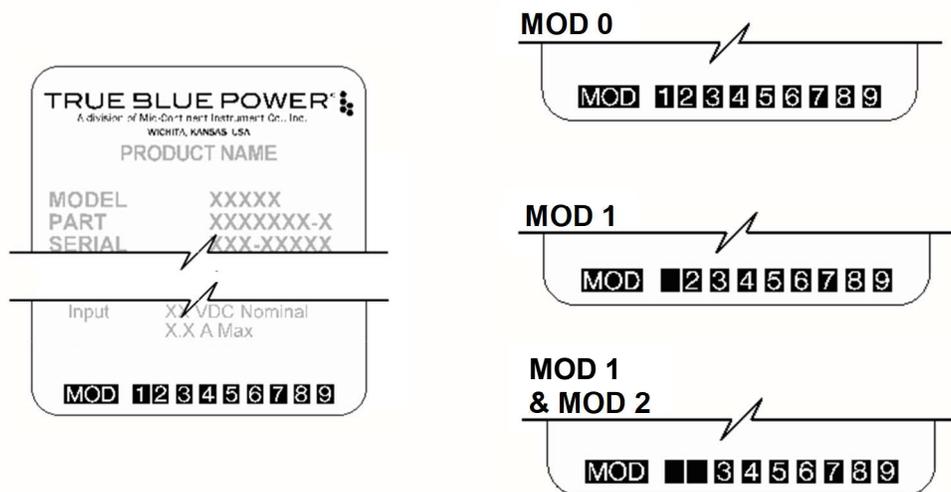


Figure 2.2.1
Nameplate and MOD Status Example

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/Qi2 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. Compact Wireless Charger | MCIA P/N 6430015-() |
| B. Installation Manual | MCIA P/N 9020158 |
| 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 or equivalent. See the Molex Hand Crimp Tool User Manual for crimp procedures.

3.4.3 Wiring Connections

3.4.3.1 Enable Pin

The installation and use of the Enable function is optional. With input power applied, the TWC15 will automatically be enabled (allow charging) when the enable pin is open or not connected. With input power applied, the charger can be manually enabled or disabled (charging available or not available, respectively). To disable the charger by remote action, apply aircraft power (12-32 VDC) to the enable pin. To enable the charge, remove (switch off) power from the enable pin. Controlling the enable pin 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 installation and use of the Status Indicator is optional. It is designed to drive an external LED with minimum additional components. A LED connected between this output and 28V will light with 11 mA of current. For lower LED current (less brightness) add an external resistor in series with your LED. The status pin can survive a continuous short to 28V.

For more complex flight monitoring systems, the status line is an open-drain output switching to ground with a 1 Watt 2.49K Ω resistor. If interfacing to 5 volt electronics, a 28K 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 TWC15 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

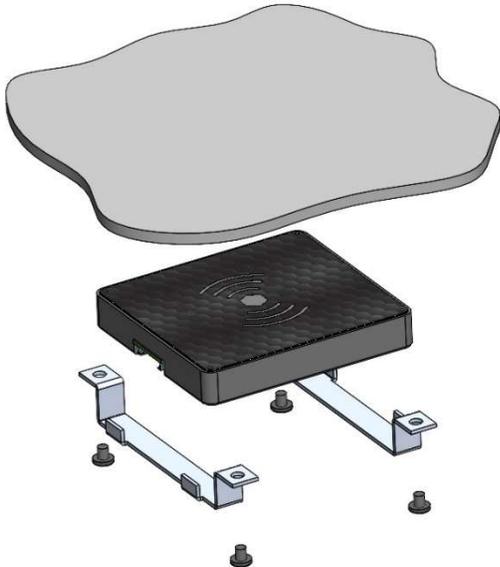
The TWC15 can be installed in many ways and locations, noting that in order for the TWC15 to charge wireless devices, the panel thickness should not exceed 0.2 inches (5mm) for the -21, or 0.1 inches (2.5mm) for the -22.

For the -21, the charger is designed to charge devices directly or when mounted below an intermediate surface. The recommended distance between device and charger is 0.2 inches (5mm) or less. Some devices may charge at up to 0.4 inches (10mm) away from the charger, however, charging rate and efficiency will diminish with distance between the charger and device. The material between the charger and device must not be metal or have metallic properties.

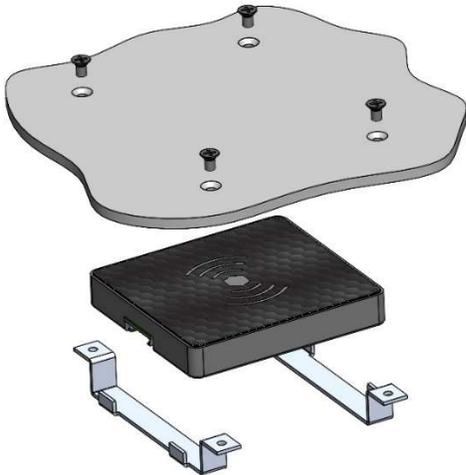
The -22 is designed with a magnetic alignment feature to optimize centering of compatible devices. It is recommended that the charger be mounted with the charging surface exposed so the device magnetically couples directly to the TWC charger. However, the charger may be mounted below an intermediate surface and still be able to charge, and possibly take advantage of the magnetic coupling. In this case, the maximum recommended intermediate surface thickness is 0.1 inches (2.5mm). Note that the effectiveness of the charging and magnetic coupling will decrease with distance/thickness.

Below are examples of potential mounting methods:

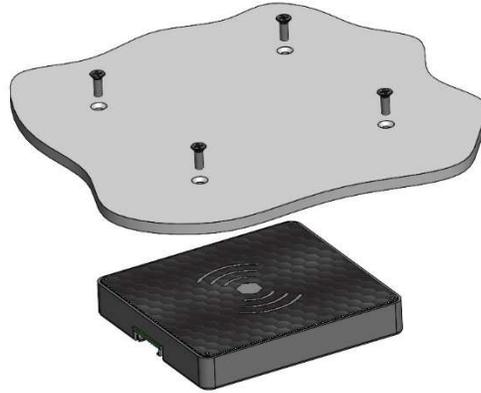
- Figures 3.2 and 3.3: Undermount with brackets attaching to the aircraft surface with screws
- Figure 3.4 and 3.5: Undermount attaching directly the aircraft surface with screws
- Figure 3.6: Exposed mount for use with magnetic alignment devices
- Many other options are available for mounting the TWC15 wireless chargers depending on your aircraft's available mounting locations and orientations.



**Figure 3.2 Undermount Through Hole Bracket Concept
(-21 Configuration Shown; brackets not provided)**



**Figure 3.3 Undermount With Threaded Bracket Concept
(-21 Configuration Shown; brackets not provided)**



**Figure 3.4 Undermount Direct to Charger
(-21 Configuration Shown)**

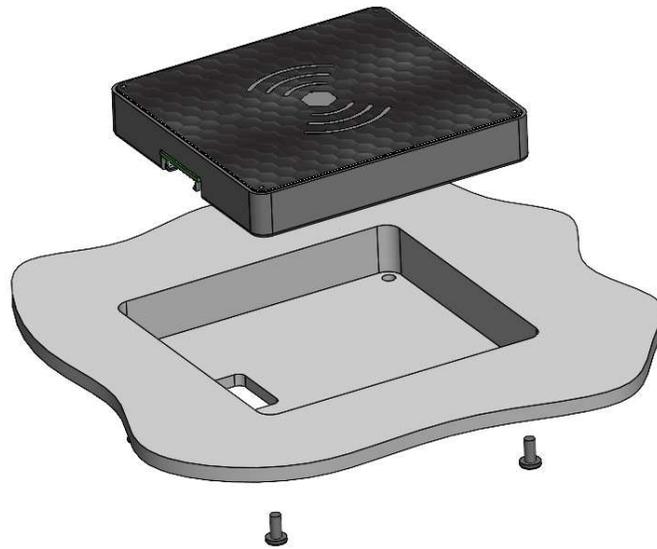
Mounting TWC15 units below the panel using a direct mount to the wireless charger requires four (4) #2 screws (two types/sizes provided. Other lengths/types to be provided by installer). For this method, note that the label on top of the wireless charger has 4 small gray dots in each corner. A push pin can be used to punch through the label to allow the 2-56 screws (qty 4) to attach from above per Figure 3.4.

The dimensional locations of the four mounting holes can be found in Figure 1.1.



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

**Figure 3.5
Preparation for Direct Mounting**



**Figure 3.7 Magnetic Alignment Installation
(-22 Configuration Shown)**

Mounting the TWC15 -22 unit to utilize the magnetic alignment requires that the charger be exposed and contact the device being charged directly. This can be accomplished in a number of ways. One option is shown above in Figure 3.6. Note that an appropriate recess is required to allow clearance for the connecting power harness. #2 threaded mounting holes on the bottom of the unit are available for securing the unit.

NOTE: It is highly recommended that the charger be installed above the surface around it to allow for devices with protruding camera features and/or for cases that have associated features. Installed height above the surrounding surface is recommended to be 0.20 to 0.25 inches (5-7 mm). Select the appropriate height to match the application needs. This allows the phone to sit flush onto the charger and maximize charging power and speed. Additionally, make sure to plan for clearance *around* the charger to prevent interference. A few inches above and below the charger, and one inch on each side should accommodate most phones.

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 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 on the 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
Power On	Blink, then turn off
Charging / No Faults	On
Fault	500ms on, 500ms off

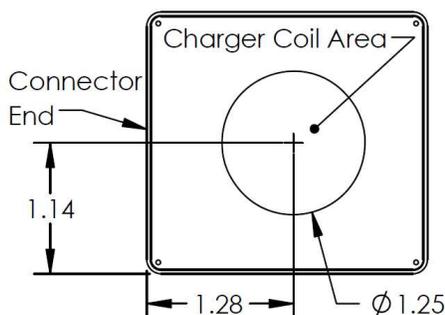
**Table 4.1
Status Indications**

4.4 USAGE PRECAUTIONS

Please note the following precautions when charging your Personal Electronic Device (PED):

- A. Do not use a case with an metal 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 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. See Figure 4.1.



**Figure 4.1
Optimal Charging Area**

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 (5R)
Vibration	8	Category R [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 M
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 C

REMARKS:

Section 4: Category C4 specifications as declared by the manufacturer:

- 4.5.1 & 4.5.2 Short-Time Operating Low Temp & Operating Low Temp of 0°C.
- 4.5.3 & 4.5.4 Short-Time Operating High Temp of 40°C, Operating High Temp of 40°C.
- 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

Section 26: By analysis