

December 04, 2019



PTCRB Project 79233

MFAST-A-010-2 Rev B Product Certification

Exhibit B1 – External Photos of DCTU

SHORT TERM CONFIDENTIALITY – This notice expires 180 days from grant issue date.

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Product Designation:

Manufacturer: Pratt & Whitney Engine Services, Norwood
249 Vanderbilt Avenue
Norwood, MA 02062 USA

Marketing Name: DCTU (Data Collection & Transmission Unit)

HVIN- Part #:	MFAST-A-010-2
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FCC ID: 2AJ6A-DCTU1	IC_ID: 22451-DCTU1
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Product Distribution and Identification:

The DCTU product is produced by Pratt & Whitney Engine Services (PWES) - Norwood, a Pratt & Whitney Canada managed business unit. The sole customer of this product is Pratt & Whitney Canada Corporation, Longueuil, QC, Canada. As such, the DCTU is identified as an accessory to one of several engine programs and is certified for airworthiness by Transport Canada, Civil Aviation (TCCA). The part number that appears on the product, (example shown in Figure 2 is 3134180-04) will change with the engine and aircraft model it is associated with to reflect engine parameter changes. The underlying DCTU product will be produced by PWES-Norwood under part number MFAST-A-010-2 regardless of engine or aircraft type.

Product Overview:

The product being submitted for PTCRB testing and registration is identified by Pratt & Whitney Engine Services, Inc., as having a set of functionality to collect and wirelessly transmit following end of flight, full engine performance and operational data for predictive analysis and proactive maintenance.

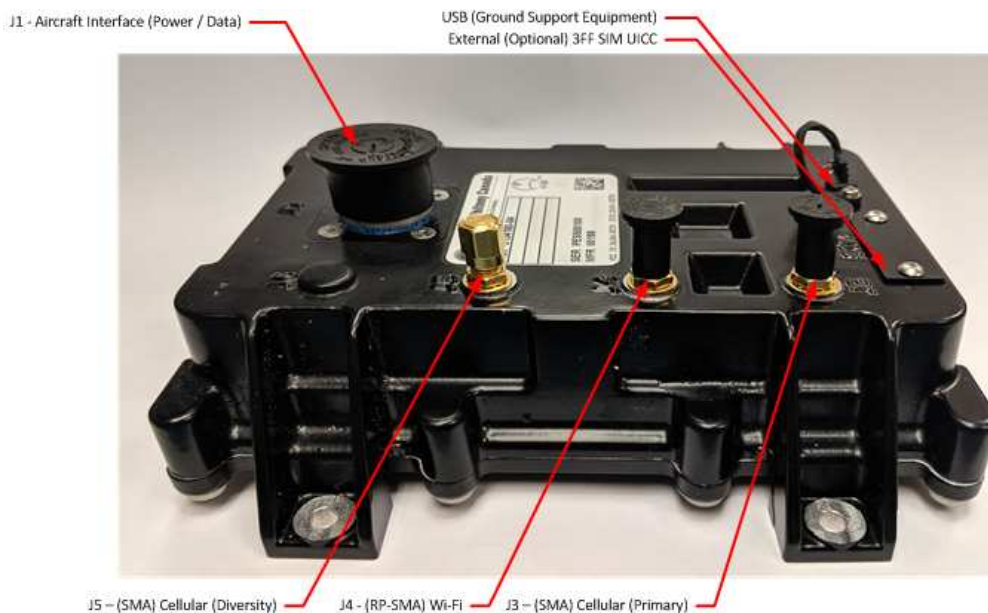
The DCTU product uses the global cellular network and customer provided wireless LAN access points for data communication between the DCTU and the P&WC ground station servers across the open internet with a VPN secured data connection. These terrestrial communication links are only used when the aircraft is on the ground with the engines shut-down. DCTU does not support any voice communications modes of operation and presently does not use SMS.

External Photos:

The DCTU Product is mounted in an aircraft compartment that will be indirectly exposed to high altitude environmental conditions up to 47,000Ft when collecting aircraft information. The DCTU only transmits wireless data (both Wi-Fi and Cellular) when the aircraft is on the ground.

The product measures 2.2”H x 5.5”W x 7.2”L and weighs < 2.0Lbs.

Figure 1: Isometric View of DCTU product as installed in aircraft



The top of the product has two SMA (J3 & J5) and one RP-SMA (J4) connector for attaching remote antennas for the cellular modem and the Wi-Fi modems respectively as shown in Figure 1. The SIM card is accessed on the top of the product behind a door secured with two 1/16” socket head screws. A USB connector is provided for ground support connections for the product in the application.

Figure 2: Top View

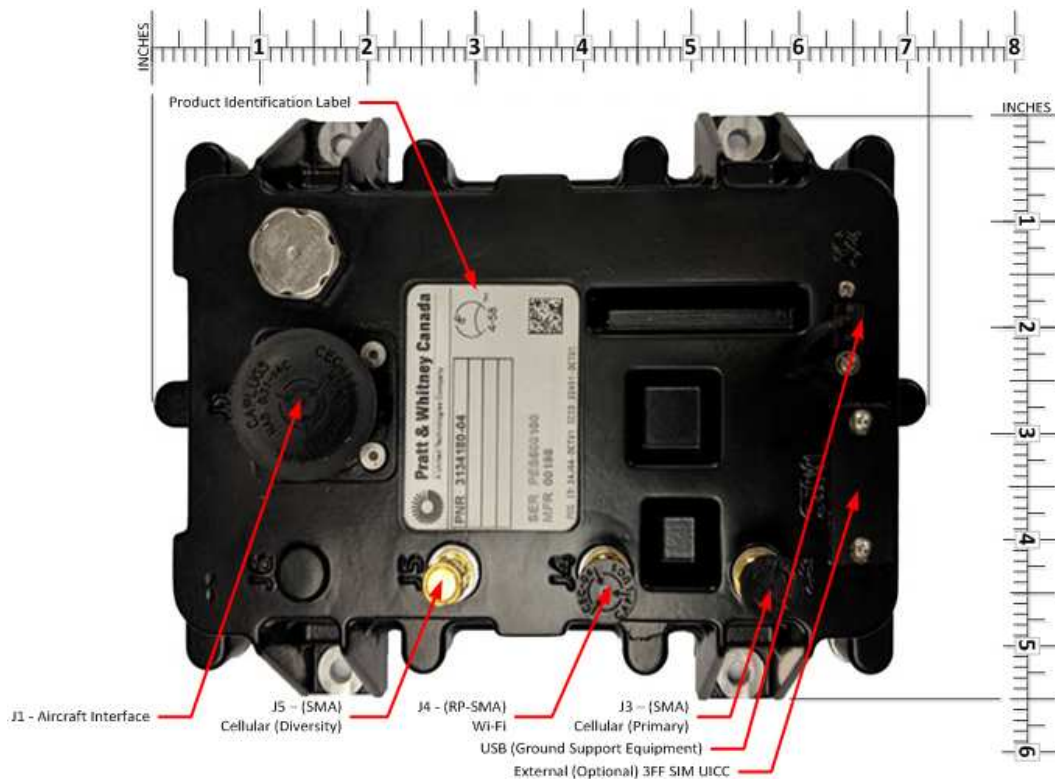


Figure 3: DCTU Side View



The top of the product (Figure 2) has a J2 connector for a ground support cable, commercially available USB type A to USB type Mini-B through which commands may be sent to the UUT to control the radios and to setup Wi-Fi configurations for testing purposes. Configuration of cellular and Wi-Fi radios is normally handled with configuration files loaded into the product at final production process.

This cable is procured locally by the end user of the DCTU. Pratt & Whitney Engine Services may supply such commodity cables in future to customers on an as-required basis.

External Support Accessories

The following external components are typically used in conjunction with FAST installations in aircraft:

Antenna Coax Cable:

- Recommended coax cable: MIL-DTL-17 / 128-RG400 or eq,
- Diameter: 0.195, Impedance: 50Ω, Capacitance: 29.4pF/Ft, Max Bend Radius: 1.0", Jacket: FFP,
- Typical loss for a 10ft cable: 698-960 MHz 1.3dB, 1710-2170 MHz 2.0dB, 2400-2700 MHz 2.4dB.

Cellular Antenna

- Laird Technologies, CFS69271-FSMAF
- P&WES P/N: DTU-D-094-1
- Manufacturer Specifications are as follows:

PARAMETER	
Frequency (MHz)	698-806, 824-960, 1710-1880, 1850-1990, 1920-2170, 2100-2500, 2500-2700
Gain (dBi)	
	698-960 MHz 1.5
	1710-2170 MHz 3.0
	2500-2700 MHz 4.5
Average Efficiency	
	698-960 MHz 80%
	1710-2170 MHz 85%
	2500-2700 MHz 85%
VSWR	2.1 max across all bands (Typical)
Polarization	Linear
3 dB Beamwidth (H-plane)	Omnidirectional
Nominal Impedance	50 Ohms
Max Input Power	50 Watts
Dimension	100 x 164 x 1.6 mm
Operating/Storage Temperature	-40° to 70°C

- Antenna shall be connected to SMA connector on face of FAST by means of a 10 Ft. coaxial cable consisting of:
 - Right angle SMA Plug, Amphenol-RF P/N: 901-9874
 - Straight SMA Plug, Amphenol-RF P/N: 901-9511-1
 - Coaxial Cable, RG400; 10 Ft.

Figure4: Cellular Antenna and RF Cable



Wireless LAN Antenna

- Pulse Larsen Technologies, P/N: W-50001-RPSMA-B
- P&WES P/N: MFAST-D-054
- Manufacturer Specifications are as follows:

Freq Range (MHz)	Max Gain [dBi]	Efficiency [%] / [dB]	Rtn Loss min. [dB]	Impedance [Ω]	Operating Temp [$^{\circ}$ C]
2400-2500	1.5	70 / -1.5	-10	50	-40 to +85

- Antenna shall be connected to RP-SMA connector on top of MFAST by means of a 10 Ft. coaxial cable consisting of:
 - Straight SMA Plug, Amphenol-RF P/N: 901-9511-1
 - Right Angle RP-SMA connector; Amphenol-RF P/N 132194RP
 - Coaxial Cable, RG400; 10 Ft.
 - A separate Cinch “plug to plug” adapter (142-0901-801) permits the RP-SMA antenna plug to connect to the straight SMA plug of the cable assembly above.

Figure5: Wireless LAN Antenna and RF Cable

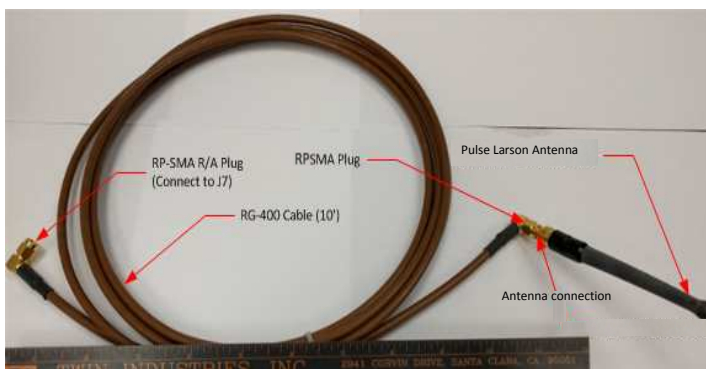


Figure 6: Antenna Configuration

