ARTICLE

LIGHTWEIGHT RF COAXIAL CABLES

RISING INDUSTRY DEMAND FOR LIGHTWEIGHT CABLE TECHNOLOGY

Aerospace engineers are consistently being challenged to design lighter aircraft. Saving weight is a top priority in both forward-fit and retrofit designs to reduce materials and fuel costs, while increasing payload. One major way to save aircraft weight is by installing lightweight cables. PIC Wire and Cable has designed a line of lightweight cables that address industry demands for weight-saving technology and its requirement for high performance, reliable interconnects. PICMates ULTRALITE is an extension of its 50 ohm RF coaxial cable line and engineered to provide significant cable weight savings.

ULTRALITE cables offer a robust solution for a variety of advanced electronic applications:

- Communications: Satcom, Iridium, Cellular, VHF, UHF and HF
- Navigation: GPS, Radio Altimeter, DME, VOR and Marker Beacon
- Collision Avoidance: ADS-B, TCAS, TAS, ACAS and Skywatch

ULTRALITE CABLE SAVE AIRCRAFT CABLE WEIGHT

The ULTRALITE family has been rapidly adopted by major aircraft and avionics OEMs in response to the rising industry demand for weight saving cables. These lightweight, flexible cables offer significant weight savings over competitor and RG cables:

UH25107 IS **81%** LIGHTER THAN RG211 & **33%** LIGHTER THAN CABLES OF SIMILAR SIZE AND PROPERTIES
UH22089 IS **59%** LIGHTER THAN RG393 & **62%** LIGHTER THAN CABLES OF SIMILAR SIZE AND PROPERTIES
UH67163 IS **80%** LIGHTER THAN RG393 & **55%** LIGHTER THAN CABLES OF SIMILAR SIZE AND PROPERTIES
UH44193 IS **56%** LIGHTER THAN RG142 & **63%** LIGHTER THAN CABLES OF SIMILAR SIZE AND PROPERTIES

In addition to weight savings, these cables are low loss solutions with high shielding effectiveness, and feature crush resistant VOP dielectrics and laser markable jackets.

Coaxial Cable	Weight lbs/100 ft (kg/100 m)	Loss @ 1.0 GHz dB/100 ft (dB/100 m)	Bend Radius in (mm)	Cable O.D. in (mm)	Shielding Effectiveness (dB)
UH25107	12.0 (17.9)	2.8 (9.2)	2.50 (63.50)	0.445 (11.303)	-110
Cable of Similar Size and Properties	18 (8.2)	3.1 (10.2)	3.00 (76.2)	0.485 (12.319)	-90
UH22089	7.2 (10.7)	3.5 (11.5)	1.70 (43.18)	0.345 (8.763)	-110
Cable of Similar Size and Properties	19 (8.6)	3.6 (11.8)	2.26 (57.40)	0.452 (11.481)	-90
UH67163	3.4 (5.1)	6.2 (20.3)	1.20 (30.48)	0.227 (5.766)	-110
Cable of Similar Size and Properties	7.5 (3.4)	6.3 (20.7)	1.60 (40.64)	0.313 (7.950)	-80
UH44193	1.9 (2.9)	10.4 (34.1)	0.80 (20.32)	0.152 (3.861)	-110
Cable of Similar Size and Properties	4.3 (2.0)	12.2 (40.0)	1.00 (25.4)	0.195 (4.953)	-90
RG211	64.1 (95.4)	4.5 (14.8)	3.60 (91.44)	0.730 (18.542)	-50
RG393	17.5 (26.4)	7.7 (25.2)	1.95 (49.53)	0.390 (9.906)	-75
RG142	4.3 (6.4)	13.4 (44.0)	1.00 (25.40)	0.195 (4.953)	-75

50% CABLE WEIGHT SAVED ON HELICOPTER

A leading helicopter manufacturer asked PIC Wire & Cable to help find a solution to reduce coax cable weight on one of its airframes. Each helicopter used 809.1 feet of coax cable, and the manufacturer needed to reduce some of the 59.06 pounds of cable on the airframe. To reduce weight, ULTRALITE cables were installed on the airframe and weighed only 28.82 pounds. Choosing ULTRALITE cables reduced the helicopter's cable weight by 51% and saved 30.24 pounds.

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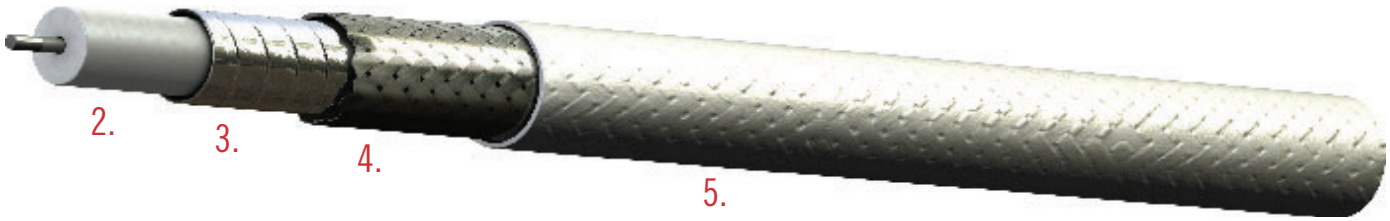
LIGHTWEIGHT RF COAXIAL CABLES

INNOVATIVE CABLE CONSTRUCTION



1. CONDUCTOR
UH67163, UH25107 and UH22089 use a Silver Plated Copper Clad Aluminum (SPCCA) conductor to increase weight savings. SPCCA conductors are 69% lighter compared to copper conductors of the same gauge. Based on its size, UH44193 uses a Silver Plated Copper Clad Steel. Steel conductors are 11% lighter compared to copper conductors of the same gauge.

2. DIELECTRIC
ULTRALITE cables use either an expanded extruded Polytetrafluoroethylene (PTFE) or tape wrapped PTFE dielectric. The dielectrics have a high Velocity of Propagation (VoP) which lowers the cable's insertion (dB) loss, while still maintaining a strong composition. This dielectric also saves weight and increases flexibility.

3. INNER SHIELD
ULTRALITE cables use a Silver Plated Copper spiral (helically) wrapped shield. With this design, the -110 dB shielding effectiveness is the same as a semi-rigid coaxial cable (solid copper tube), such as RG405. This is significantly higher than the standard -75 dB for dual braided shields used in RG cables, and -90 dB for cables with a foil and outer braid shield. The spiral wrapped shield provides 100% coverage compared to flat braided shields. This shield design increases the cable's shielding effectiveness and lowers its dB loss.

4. OUTER BRAID
ULTRALITE cables use a Silver Plated Copper Clad Aluminum (SPCCA) outer braid. This braid is designed to minimize dB loss and its lightweight material contributes to weight savings.

5. OUTER JACKET
ULTRALITE jackets are made of high temperature, white ethylene tetrafluoroethylene (ETFE). This material allows cables to be used and stored in high temperature environments. They are chemical resistant, abrasion resistant, and meet the FAA flammability requirements 14 CFR Part 25.869 (a)(4) Amdt 25-113 Appendix F Part 1 (a)(3). Each cable is also laser markable to streamline and simplify the labeling process.

ULTRALITE CONNECTORS
The ULTRALITE family includes a variety of matching connectors, including a full line of M39012 style RF connectors. Pairing ULTRALITE cables and connectors provides a robust interconnect solution by optimizing electrical performance and increases weight savings. The connectors also improve termination, installation, maintenance and reliability. To ensure proper field installation and termination, crimp die sets are available for the connectors. In addition, PIC Wire & Cable offers complete certified cable assemblies to streamline the installation process.

TESTED CABLE RELIABILITY

ULTRALITE cables and connectors passed rigorous EWIS testing. Our EWIS testing includes: Vibration, Shock, Thermal Shock, Aging Stability, Flammability, Smoke & Toxicity testing per Airbus ABD0031 and many more tests to ensure the cables and connectors are robust enough for their rugged aerospace and defense applications. A concentrated load testing per MIL-T-81490 was conducted to demonstrate ULTRALITE cables have better compressive resistance compared to similar sized cables. In addition, the ULTRALITE line is Skydrol resistant, RoHS compliant, meets the FAA flammability requirements 14 CFR Part 25.869 (a)(4) Amdt 25-113 Appendix Part 1 (a)(3), and complies with MIL-C-17 as applicable. EWIS tests and qualification test reports are available by request.

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