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# END-TO-END CONNECTIVITY FOR NEXT GENERATION SOLDIERS



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## ABSTRACT

In the new age of warfare, the more battlefield data available to field commanders, the better. If commanders know in real-time the position of every one of their soldiers, as well as the status of the soldiers' weaponry and the proximity of the enemy, they can make dynamic adjustments to the battle plan and potentially avoid losing the lives of many of their soldiers. Today's 'Next Generation' soldier has the equipment to make this possible. A previous ODU whitepaper, "Harsh Military Environments Demand Tough Solutions", discussed

the importance of connector durability in the battlefield environment, and introduced the ODU AMC<sup>®</sup> Series T connectors, specifically designed for military applications. In this whitepaper, we introduce ODU AMC<sup>®</sup> High-Density (the original High-Density connector, trusted since 2013) with a new high power insert – and the newer ODU AMC<sup>®</sup> NP – with the roles they play in enabling secure end-to-end connectivity.

# THE NEXT GENERATION SOLDIER

To face the challenges of modern warfare, today's soldiers must be equipped with numerous wearable electronic devices to give them the greatest chance of survival in the battlefield (Figure 1). Such equipment includes voice and data communications systems, headsets, night vision goggles, GPS, battery packs and more. Similarly, their vehicles, whether ground or air, are equipped with devices such as data communications systems, spare battery packs and chargers, IED (Improvised Explosive Devices) detectors, ruggedized PCs, et al.

A previous ODU whitepaper ("Harsh Military Environments Demand Tough Solutions") focused on the importance of durability of the cables and connectors interlinking the various devices, where applicable. It also described how ODU AMC® Series T connectors exceed the requirements of the U.S. armed forces, as specified in military standard MIL-DTL-38999.

However, ODU AMC® Series T connectors were designed primarily for use with manned or unmanned vehicle mounted equipment, due to their size and weight. For interconnecting wearable equipment, ODU introduced two new standards-compliant members of the ODU AMC® family that are both lighter and smaller than the ODU AMC® Series T connectors.



Fig 1. The Next-Generation soldier

# INTERCONNECTIVITY FOR WEARABLE EQUIPMENT

ODU AMC® High-Density (Figure 2) and a newer member of the ODU AMC® family, ODU AMC® NP (Figure 3).



Fig 2. ODU AMC® High-Density Connector

With its capacity for up to 27 contacts, ODU AMC® High-Density connectors offer the user the ability to configure splitter cables supporting multiple interfaces. Provided that there is no crosstalk between the diverse signal lines, the multiple interfaces may be for the same or different protocols. Because of their outstanding durability and reliability, NASA selected ODU AMC® High-Density connectors for use in its



Fig 3. ODU AMC® NP Connector

Mars 2020 Perseverance Rover mission [1] (Figure 4). The M2020 spacecraft utilized the ODU AMC® High-Density connectors with the equipment and cables used to transmit video of the parachute inflating in the Martian atmosphere and the separation of the rover from the Descent Stage (aka rocket jet pack). In addition to supporting data and signal lines,



Fig 4. Mars Perseverance Rover



Fig 5. ODU AMC® High-Density connector with high-power inserts

the traditional ODU AMC® High-Density connector can also support a limited number of low power transmission lines. Customers can work with ODU's technical representatives to develop valid contact configurations.

However, some military applications require transmission of higher power than the traditional ODU AMC® High-Density can carry. With a current capacity of up to 12 amps on a single contact or 9.5 amps on each of 3 contacts, the newer ODU AMC® High-Density with combination power inserts satisfies that need [Figure 5].

The third series of ODU AMC® connectors – ODU AMC® NP – offers ease of handling and robust break-away design, making

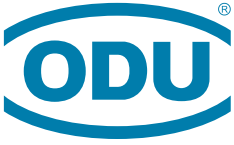
them well-suited for the harsh military environments to which they may be exposed. Some of the special applications supported by ODU AMC® NP include:

- Tactical soldier batteries
- Power distribution units
- Conformable wearable batteries

Table 1 summarizes the characteristics of the three ODU AMC® Series connectors. The diverse sizes and number of contact pins supported enable equipment manufacturers to configure cables for all their connectivity requirements, for both vehicle mounted equipment and wearable equipment for the next generation soldier.

	ODU AMC® Series T	ODU AMC® High-Density	ODU AMC® NP
Connection types	Push-pull, break-away or thread-lock	Break-away or thread-lock	Break-away
Protection class (mated)	Up to IP6K9K	Up to IP6K9K	IP68
Protection class (unmated)	IP68	IP68	IP68 [for overmolded & potted connectors only]
Keying	Pin & groove	Pin & groove	Pin & groove
Mating cycles	> 500	> 5,000	> 2,000
Operating temperatures	-65° C to +175° C	-51° C to +125° C	-18° C to +71° C
Termination types	Solder, Crimp, PCB	Solder, PCB	Solder, PCB
Shell material	Aluminum	Brass	Aluminum
Plating	Tin – Nickel	Ruthenium	RoHS-compliant black carbon
Number of contacts	5 – 22	2 – 27	6 or 7
Shell sizes	09 and 12	00, 0 and 1	6
Max current	10 A on each of 2 contacts, or 20 A on a single contact	Approx. 3 A on each of 3 contacts, or 12 A on a single contact	Approx. 1.25 A on each of 6 contacts, or 1 A on each of 7 contacts

Table 1. Characteristics of ODU AMC® Series T, ODU AMC® High-Density and ODU AMC® NP connectors



## CONCLUSION

The extraordinary miniaturization of electronic equipment that has been achieved in recent years has made it possible for the next generation soldier to carry or wear more battlefield equipment than ever before. Accompanying this reduction in the size and weight of equipment, the cables and connectors used to link the various systems have also been reduced in size and weight, as exemplified by the ODU AMC® family of military grade connectors.

### FIND OUT MORE

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