Merlin Adapters for Tactical Radios
the New Standard in Power Management

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Iris Technology at 25 Years

Military Power
Large Production
Intelligent Design

Aerospace Technology
Cryogenics and Imaging
Technology Development
Snapshot of Major Iris Programs Since 1994

AEROSPACE

- Boeing
  - NPOESS, SBIRS-HI, NASA TES, SBIRS-LADS
- Missile Defense Agency
  - MACE
- GenCorp Aerojet
  - CEW, Cast Load, GMD
- Teledyne
  - HS2C
- Raytheon
  - LDCM, AFRL HCC
- Other Clients


- Modular Advanced Cryocooler Electronics
- Tropospheric Emission Spectrometer
- MDA/GMD Special Test Equipment
- Onboard Vehicle Power (2000 – present)
- Radio Power Adapters (1998 – present)
- FPA Electronics
- TI AIT MWIR
- Special Test Equipment
- Tropospheric Emission Spectrometer
- MDA/GMD
- TI AIT MWIR

MILITARY

- USMC
- DSCR
- Navy
- DSCC
- USAF
- Army
- Other Clients


- OVER $10,000,000
- OVER $500,000
- OVER $1,000,000
- OVER $100,000
Military / SPACES

Tactical Solar Power
2,000 Fielded to Date
Customer: USMC
Vehicle Inverter System
10,000 Fielded to Date
Customer: Joint
Iris Radio Power Adapters (AC/DC)

1996
PAC-216/U
AN/PRC-119D
AC/DC RPA

2003
PAC-24
AN/PRC-117F
AC/DC RPA

2006
VB-90
AN/PRC-119F
AC/DC RPA
Iris Merlin-3 Radio Power Adapter

Snapshot:
- High efficiency SLICE
- Transportable by air
- User provided BX-XX90
- Reuse radio battery box
- Permits battery hot-swap
- Variety of I/O accessories

Technology:
- Software centric
- Smart cable outputs
- Native solar capable
- High power ~ 240W
- High efficiency ~ 97%
- Cell energy rebalancing

Other ideas:
- Use without battery
- Use as battery charger
Iris Merlin-2 Radio Power Adapter

**Snapshot:**
- High efficiency SLICE
- Transportable by air
- User provided BX-XX90(s)
- Reuse radio battery box
- Permits battery hot-swap
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**Technology:**
- Software centric
- Smart cable outputs
- Native solar capable
- High power ~ 240W
- High efficiency ~ 97%
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**Other ideas:**
- Use without battery
- Use as battery charger
Merlin Architecture

9-42 VDC In

Input Protection
Reverse Voltage
Inrush Control
Overvoltage Cutoff

EMC
Filter

Vin Power Supply
Buck/Boost 9-42 VDC In
S/W Set 11-34 VDC Out
Power ~ 240W @ 97.4%

Software Centric
C++ Code Set

Cell Energy
Rebalance

Vradio ~ Vbatt

Vaux Power Supply
Buck/Boost 20-33 VDC In
S/W Set 10-28 VDC Out
Power ~ 100W @ 96.8%

Notes:
1. With no input, battery is still connected to Vradio input with no losses
2. Presence of Vaux cable connection activates Vaux Power Supply operation
3. Vaux cable voltage and max current programmed into embedded 1-Wire EEPROM
4. Processor programs charge profiles for NiCd, NiMH, and LiIon batteries and the energy rebalance circuit
In series charging, cell energy rebalancing shifts charge between cells to provide headroom for full charging of the more depleted cell. Without this rebalancing, charging effectively terminates when the higher energy cell reaches capacity.
Iris Merlin-3 Radio Power Adapter

**Status:**
Available on GS-07F-0131N
Selected by USMC for RPA
M67854-11-A-5044 / $13.5M

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of Merlin-3™</td>
<td>1.8 lbs (829 g)</td>
</tr>
<tr>
<td>Size of Merlin-3™</td>
<td>7.6” (L) x 3.5” (W) x 1.9” (H)</td>
</tr>
<tr>
<td></td>
<td>193 mm (L) x 89 mm (W) x 48 mm (H)</td>
</tr>
<tr>
<td>Input Connector</td>
<td>MS3114-E8-4P</td>
</tr>
<tr>
<td>Output Connector</td>
<td>MS3114-E8-4S</td>
</tr>
<tr>
<td>Radio Connector</td>
<td>SC-C-179492</td>
</tr>
<tr>
<td>Environmental</td>
<td>MIL-STD-810, MIL-STD-461</td>
</tr>
<tr>
<td>Housing Material</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40°F (-40°C) to +131°F (+55°C)</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-59°F (-50°C) to +160°F (+71°C)</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>9-36 VDC @ 12 ADC (max)</td>
</tr>
<tr>
<td>Input Power (max)</td>
<td>280 W @ 24 VDC</td>
</tr>
<tr>
<td>Radio Power (max)</td>
<td>26.5 VDC @ 3.5 ADC</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>12 or 24 VDC @ 5 Watts for Speakers</td>
</tr>
<tr>
<td></td>
<td>or 12-28 VDC @ 4 ADC for Auxiliary</td>
</tr>
<tr>
<td>Efficiency</td>
<td>97%</td>
</tr>
<tr>
<td>BB-2590/U Charge Time</td>
<td>3 hours (typ)</td>
</tr>
</tbody>
</table>
## Merlin Technology Features / Benefits (1/2)

<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uses standard, full size rechargeable batteries</td>
<td>• No reduction in runtime when powered from battery</td>
</tr>
<tr>
<td></td>
<td>• Uses BB-2590/U (preferred) or BB-390B/U (alternate) battery</td>
</tr>
<tr>
<td></td>
<td>• Programmable charging algorithms ensure future growth capability</td>
</tr>
<tr>
<td>Uses existing battery box</td>
<td>• No tools required for installation or use</td>
</tr>
<tr>
<td></td>
<td>• Using existing parts reduces system cost and weight</td>
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<tr>
<td></td>
<td>• Eliminates need to store battery box when using the Merlin-3™</td>
</tr>
<tr>
<td>Mechanical latching system allows hot-swap of battery</td>
<td>• Able to change-out battery and recharge extra batteries without power interruption to the radio or crypto-fill loss (when powered externally)</td>
</tr>
<tr>
<td>Cell energy rebalancing</td>
<td>• Electronics redistributes charge between cells to create a healthier battery with a higher capacity</td>
</tr>
</tbody>
</table>
### Merlin Technology Features / Benefits (2/2)

<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits</th>
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</table>
| Compact size and weight                                                  | • Light weight and easy to install  
• Totally integrated with battery box and radio |
| Functions with a variety of input and output accessories                  | • Operates using a wide range of input sources including: native solar, NATO, AC/DC, Zinc-Air batteries, fuel cell, BX-XX90, and personal vehicle  
• Outputs power to a variety of accessories including speakers, laptop computer and small personal electronics – inverter compatible  
• Profile consistent with installed base of vehicle mounts |
| Solar Portable Alternative Communications Energy System (SPACES) Interoperable | • User friendly – no user controls required  
• Compatible with Iris Technology SPACES elements  
• SmartCables configure the loads to the auxiliary |