Micropac Industries, Inc.

Solutions Through Technology
Company at a Glance

Locations:
- Garland, TX (Headquarters)
- Juarez, Mexico

Product Lines:
- Power Management
- Sensors
- Embedded Displays
- Optocouplers
- High Temperature Electronics

Markets
- Space / Aerospace / Military
- Industrial
- Medical
Micropac Vision

Customers value our PARTNERSHIP that inspires and delivers innovative, reliable product solutions.

Employees value our CULTURE of innovation, teamwork, learning, and continuous improvement.

“Micropac exists to provide innovative and integrated electronic product solutions for “Mission Critical” applications in the Military, Space, Medical, and Industrial markets.”

“Micropac is committed to deliver products 100% defect free and 100% on-time to our customers.”

23 Key Metrics

<table>
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<tr>
<th>EMPLOYEE DEVELOPMENT / TRAINING</th>
<th>PROCESS / CYCLE TIME IMPROVEMENTS</th>
<th>ELIMINATE DEFECTS</th>
<th>CUSTOMER SATISFACTION / OTD</th>
<th>PROFITABLE REVENUE GROWTH</th>
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<tr>
<td></td>
<td>8. Kit to Delivery Cycle Time</td>
<td></td>
<td></td>
<td>22. $ Gross Margin</td>
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<td>9. Kit to Floor</td>
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<td>23. $ Overhead Cost</td>
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Core Values

1. Servant Leadership / Teamwork
   • *We encourage leaders to serve others with honesty and integrity*
     
     **People First**
     • Above all else, our people are the most important

     **Integrity and Honesty**
     • We say what we do --- We do what we say

     **Trust Builders**
     • We are open, honest, and trustworthy in all that we do

2. Customers’ “Go To Place” For Innovation
   • *Customers rely on us to solve their most difficult problems*
     
     **Continuous Improvers (Goal Driven)**
     • Each day – every day, we respond with new ways to improve

     **Proactive Innovators**
     • We invent ideas and solutions and respond quickly

3. Learning Organization
   • *We create an environment where everyone continues to learn*
     
     **Risk Managers (Ambassadors for Optimism)**
     • We study the future to mitigate risk and create a successful outcome

4. Having Fun Through Our Achievements
   • *We celebrate our successes and enjoy the ride along the way*
Customer Focused Solutions Through Technology

Serving Multiple Markets

- Downhole Oil Exploration
- Semiconductor Wafer Fabrication
- Space Exploration
- Medical
- Defense Industry
Product Applications

Hall Effect Sensor - Folding Wings - JSF

Gyro Sensor - Hellfire Missile

53278, 53503, 53504, 53506, 53507, 53513, 53514 
Satellite Systems
Product Applications

53111 - Relay
PAC-3

52494 - Current Limiter - (EMU) Spacesuit

Display - Boeing 737 Fuel Qty

Optocoupler Array - CT Scanner and Radiation Delivery System
Product Applications

- Viewfinder Display - Laser Speed Gun
- Heart Transplant Blood Gas Analyzer Sensor
- 42094 – Voltage Regulator Downhole
- XM-25 Grenade Launcher Pressure Sensor for Ballistic Computer
Product Applications

66005 - High Voltage Optocouplers - Phoenix Lander

53124, 42115 – James Webb Space Telescope

66099, 53124 - Power Distribution System, Kepler Spacecraft

Hall Effect Devices - Cameras for MSL Rover
Product Applications

- Harpoon Missile: Mii P/N 42097
- Hellfire Missile: Mii P/N 67068
- ASRAAM Missile: Mii P/N 42106
- Sky Flash Missile: Mii P/N 51676
- Titan IVB
- Standard Missile 2 & 3: Mii P/N 4N48U
Qualifications and Certifications

• Military Certifications
  • Microcircuits; MIL-PRF-38534 “K” level (Space)
  • Semiconductors; MIL-PRF-19500 “S” level (Space)
  • MIL-PRF-28750 (Relays)
  • NASA-STD-8739 (Soldering)
  • NASA – Core Supplier
  • SSQ 25000 (Space Station) Supplier
• Certification to ISO-9001-2008
• Certification to AS9100B
Beginning with custom power hybrids on the Viking Lander in the mid 1970's, Micropac has provided countless custom and standard products for the space community.

Over the past decade Micropac has shipped over 150,000 Solid State Relays and Power Controllers, over 15,000 of which were for space programs.

Micropac Optoelectronic components and modules have been used on numerous space programs also:

- Atlas
- Cassini
- Dawn
- Deep Impact
- Delta
- EELV
- MILSTAR
- NSTARC
- GALILEO
- GPM
- GPS-NAVSTAR
- Optus-D1/D2/D3
- Hubble Space Telescope
- INTELSAT
- International Space Station
- Kepler
- LCROSS
- LISA Pathfinder
- LRO
- Mars Rovers
- Messenger
- MMS
- New Horizons
- NFIRE
- NPOESS
- Orbital Express
- OrbView 5
- Sea Launch
- SDO
- Space Shuttle
- ST-5 / ST-8
- Stereo
- Swift
- Titan
- Viking Lander
Micropac’s Space Exploration Involvement

- Viking Lander
- Delta
- Space Shuttle
- Titan
- Hubble
- Mars Rover
- Galileo
- ISS
- New Horizons
- Cassini
- Phoenix Lander
- LRO
- Dawn
- LCROSS
- JWST
- GPM
- MSL
- SDO
- Messenger
- 1970
- 1980
- 1990
- 2000
- 2010
- 2020

Solutions Through Technology
Space Qualified Products

**Solid State Relays**
- Radiation Tolerant
- DC and AC Operation
- 90 to 400 Volt
- 1 to 10 Amp
- TTL / CMOS compatible control

**Solid State Power Controllers**
- Radiation Tolerant – NASA radiation characterization to 100KRads (Si) TIDS and LET up to 87 MeV/(mg/cm²)
- 100 Volt
- 1 to 30 Amp
- TTL / CMOS compatible control
- Instant Trip and $I^2T$ short circuit protection

**Custom Products**
- Build to spec; build to print
- One time, small quantity; on-going production
- Power switching; signal conditioning; thermostats
Optocouplers / Optoisolators
- Radiation tolerance up to 500KRad Total Dose
- High voltage Isolators up to 40KRad Through hole and surface mount packaging available
- Standard devices have Space heritage

Displays
- High reliability VLED’s for status reporting.
- Seven segment displays in stackable modules
- Integrating LEDs, drivers and CPU
- Embedded heads-up display, target reticle night vision compatible

Hall Effect Devices
- Available in Latching, Non-latching, Reverse Bias configurations
- Accurate/Cost Effective Position and Proximity Sensors
- Appropriate for Harsh Environments and High / Low Temperatures

Emitter / Detectors
- Phototransistors
- Photodarlingtons
- Photodiodes
- 660, 850, 880, and 930nm emitters in a wide range of packages
Micropac’s Customers

Solutions Through Technology

Customer Focused
Capabilities

- **Multi-Chip Modules**
  - Design, development & manufacturing
  - Standard products / build to print / build to spec
  - Thick film substrate screen print
  - Laser trim and laser marking
  - Full electrical and environmental testing

- **Integration of Optoelectronic Devices with Peripheral Electronic Assemblies**
  - In-House Wafer Fab for LEDs and Photodetectors
  - Custom packaging / interconnects / assemblies
  - Embedded displays

- **Harsh environment understanding**
  - Radiation (space, nuclear effects & medical) tolerant
  - High temperature ($\geq 200^\circ$C)
  - High shock / vibration / pressure

- **Process controls / governance**
  - Military, NASA, medical, industrial ("copy exact") requirements
  - Process / product verification & validation
Test Capabilities

In-House Capabilities

- Temperature Cycle
- Constant Acceleration
- PIND Test
- Thermal Shock
- Fine / Gross Leak
- X-Ray
- Electrical Test
- Burn-In
- Steam Aging
- Life Test
- Wire Bond
- Evaluations
- Die Shear
- Solderability
- Resistance to Solvents
- Lead Integrity
- Element Evaluation

Outside Facilities

- Shock & Vibration
- SEM Analysis
- Salt Spray
- Residual Gas Analysis
Design & Development Approach

- Requirements Definition
  - SRR
  - SCD development

- Design Activities
  - Schematic capture
  - Simulation
  - Breadboard
  - Design reviews
  - Design verification / 4-corner testing

- Production Release
  - MRR
  - Qualification
  - SPC limits / outlier determination
  - Send-ahead product / process validation

- Risk Management
  - Program manager assigned
  - Technical, cost and schedule risk management plan implemented
  - Mitigation factors / contingency plans identified
  - Production capability at multiple sites
Summary

• Micropac is uniquely qualified for high reliability packaging and integrated Assemblies.

• Micropac maintains a leadership position in the development and manufacture of critical applications
  • Strength in Optoelectronics and Microcircuits Integration
  • Over 45 Years Experience in Complex Packaging
    • Long-Time Supplier to Military / Space / Industrial Communities
    • Multi-Chip Modules, Solid State Relays, Solid State Power Controllers, Optoelectronic Assemblies
    • Custom Packaging to address complex customer requirements

• Validated Quality System
  • Comprehensive Certifications and Processes
  • MIL-PRF-38534 Class K, MIL-PRF-19500 JANS, MIL-PRF-28750
  • ISO 9001 (2008) Certification
  • AS9100B Certification
# Micropac Industries, Inc.

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