

# Microsemi Space Forum 2017

Ken O'Neill

Director of Marketing, Space, and Aviation

# Agenda

Start Time	Session Title	Presenter
9:00	Introduction and Welcome Address	Ken O'Neill
9:15	RT FPGA Product Update	Minh Nguyen
10:00	High Precision Frequency and Timing Solutions for Space	Peter Cash
10:30	Break/Demo Room	Microsemi & Partners
11:00	Space Power and Point of Load Solutions Product Overview	Chris Hart
11:45	RTG4 FPGA Power Hardware Reference Design	Brian Wilkinson
12:15	Lunch/Demo Room	Microsemi and Partners
13:15	RT FPGA Radiation Characterization	J.J. Wang
13:45	Mixed Signal Solutions for Space	Dorian Johnson
14:30	Achieving Timing Closure for Max Performance in RTG4 FPGAs	Hichem Belhadj
15:00	Break/Demo Room	Microsemi and Partners
15:30	Using DirectC and RISC-V to Reprogram RTG4 FPGAs	Ken O'Neill
15:45	Next-Generation Power Discretes	Chris Hart
16:15	Space Application Focus	Hichem Belhadj and Ken O'Neill
16:45	Q&A Session and Wrap up	All
17:00	End of Conference	

# Company Overview



- Leading-Edge Semiconductor Solutions Differentiated by:
  - Performance
  - Reliability
  - Security
  - Power
- Solid Financial Foundation
  - FY2016 Revenue: \$1.6B
  - 4800 employees today
- Major Focus Products
  - FPGA and ASIC
  - Timing and OTN
  - Mixed-Signal and RF
  - Switches and PHYs
  - Storage controllers
  - Discretes and integrated power solutions

# Diversified, Defensible Market Segments

## Aerospace and Defense

25% of Revenue

Military Communication  
Information Assurance  
Engine Control  
Avionics  
Electronic Actuation  
Bus and Payload Electronics  
Launch Systems

## Communications

38% of Revenue

Wireless Backhaul  
Base Station  
Routing and Switching  
Networking  
Access and CPE  
Wireless Terminal  
Fiber Optic Backhaul

## Data Center

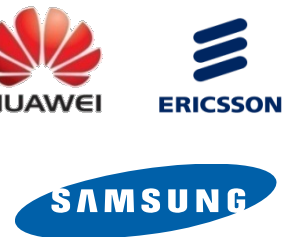
22% of Revenue

Hyperscale and Enterprise  
Servers  
Storage Systems  
Rack Disaggregation  
NVM Solutions  
Security

## Industrial

15% of Revenue

Industrial Control  
Medical Devices  
Energy  
Automotive  
SEMI Cap Equipment  
Machine to Machine



Based on FQ2 2017 revenue

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Power Matters.™

# Microsemi's Space Pedigree



## Extensive Space Heritage

- Developing space solutions for six decades
- Proven track record of innovation, quality, and reliability

## Broad Solutions Portfolio

- Power, mixed-signal, and digital, for bus and payload applications










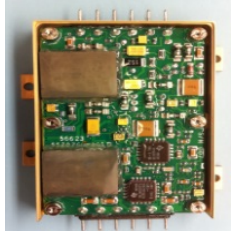
## Expanding Our Product Portfolio through Continuous Innovation

## A Partner for the Long Run

- 60-year space heritage



# Delivering A Comprehensive Space Portfolio

Radiation-Tolerant FPGAs	<p>High performance, high density, low power  TID up to 300 Krad, SEL immune  RTG4 FPGAs up to 300 MHz and 150K LE  RTProASIC3, RTAX, and RTSX-SU QML qualified</p>   
Rad-Hard Mixed Signal Integrated Circuits	<p>Telemetry and motor control space system managers  High-side drivers  Regulators and PWMs  Extensive custom IC capability</p> 
Space-Qualified Oscillators	<p>Ovenized Quartz oscillators  Hybrid voltage controlled and temperature-compensated crystal oscillators  Cesium clocks</p>  
Rad-Hard Power Solutions	<p>Rad-hard JANS diodes, bi-polar small signal transistors, and MOSFETs  Rad-hard isolated DC-DC converter modules  Custom power supplies: 2 W to &gt; 5 KW  Linear and POL hybrids  Electromechanical relays</p>    

# Microsemi's Space Legacy: 60 Years and Counting!



**Microsemi**  
Power Matters.™



**LEADING SPACE INNOVATION SINCE 1957**

Microsemi technology has been used in many major U.S. and international space initiatives since 1957. A selection of programs that have chosen Microsemi products is presented here.



**Atlas**  
NASA



**Mars Science Lab**  
NASA



**International Space Station**  
NASA



**Cassini-Huygens**  
NASA



**Juno**  
NASA



**Cygnus**  
NASA



**Mars Rovers**  
NASA



**Gaia**  
ESA



**GOES-R**  
ESA



**Mars Recon. Orbiter**  
NASA

1957-1970

- Apollo
- Atlas
- Centaur
- Delta
- Mercury
- NST-2
- Termination
- Polaris
- Poseidon
- Surveyor
- Titan

1971-1990

- FLTSATCOM
- GPS I & II/A
- Landsat-D
- Leasat
- Mission 34
- Telstar 4

1991-2000

- Cassini
- Envisat
- GPS Block IIF
- Intelsat 8
- International Space Station
- ORBCOMM
- QuickBird 1 & 2
- SBIRS HIGH
- SBIRS LOW

2001-2005

- CloudSat
- Envisat
- GOCE
- Hayabusa
- Lunar Recon. Orbiter
- Mars Exploration Rovers
- Mars Express
- Mars Recon. Orbiter
- MESSSENGER
- MUOS
- Rosetta
- SAOCOM 1A & 1B
- SAR-2000
- SBIRS
- STEREO
- Venus Express

2006-2010

- AEHF
- ALOS
- Astro-F (IRIS/Akari)
- CHIRP
- Columbus
- Cosmo IV
- GOSAT/IBUKI
- GPS III
- INTELSAT
- KOMPSAT
- MetOp
- MUOS FS3-5
- New Horizons
- PAN
- SBIRS
- HIGH 3 & 4
- SDS-1
- SELENE
- WINDS/KIZUNA
- WorldView II

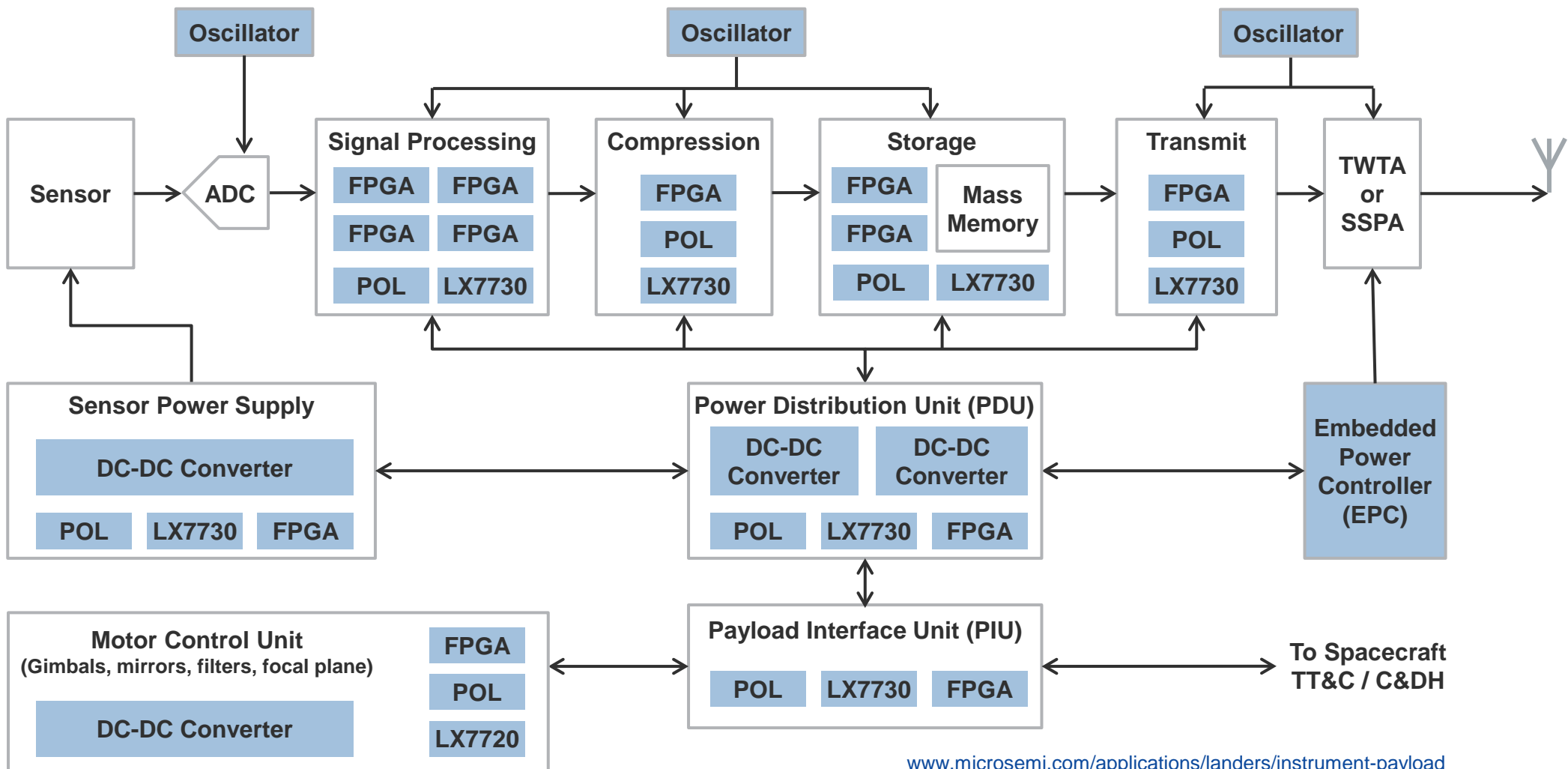
2011-2020

- ALOS 2 (DAICHI-2)
- ASNARO
- ATV
- Chandrayaan I
- CLIO (PAN II)
- Cygnus
- DSAC
- Gaia
- Galileo
- GCOM-W (SHIZUKU)
- GOES-R
- Hayabusa 2
- Himawari 8
- Iridium Next
- IRNSS Series
- JPSS-1
- Mangalyaan
- Mars Science Lab
- MetOp SG
- Orbcomm Gen 2
- PAN 2
- SBIRS 5 & 6
- Sentinel 1, 2, 3, 4
- Skyfox
- Terrasar & Tandem X
- WorldView III

GOCE Image –  
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Gaia Image – Copyright ESA/ATG  
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# Portfolio Breadth: Example Signal Processing Payload

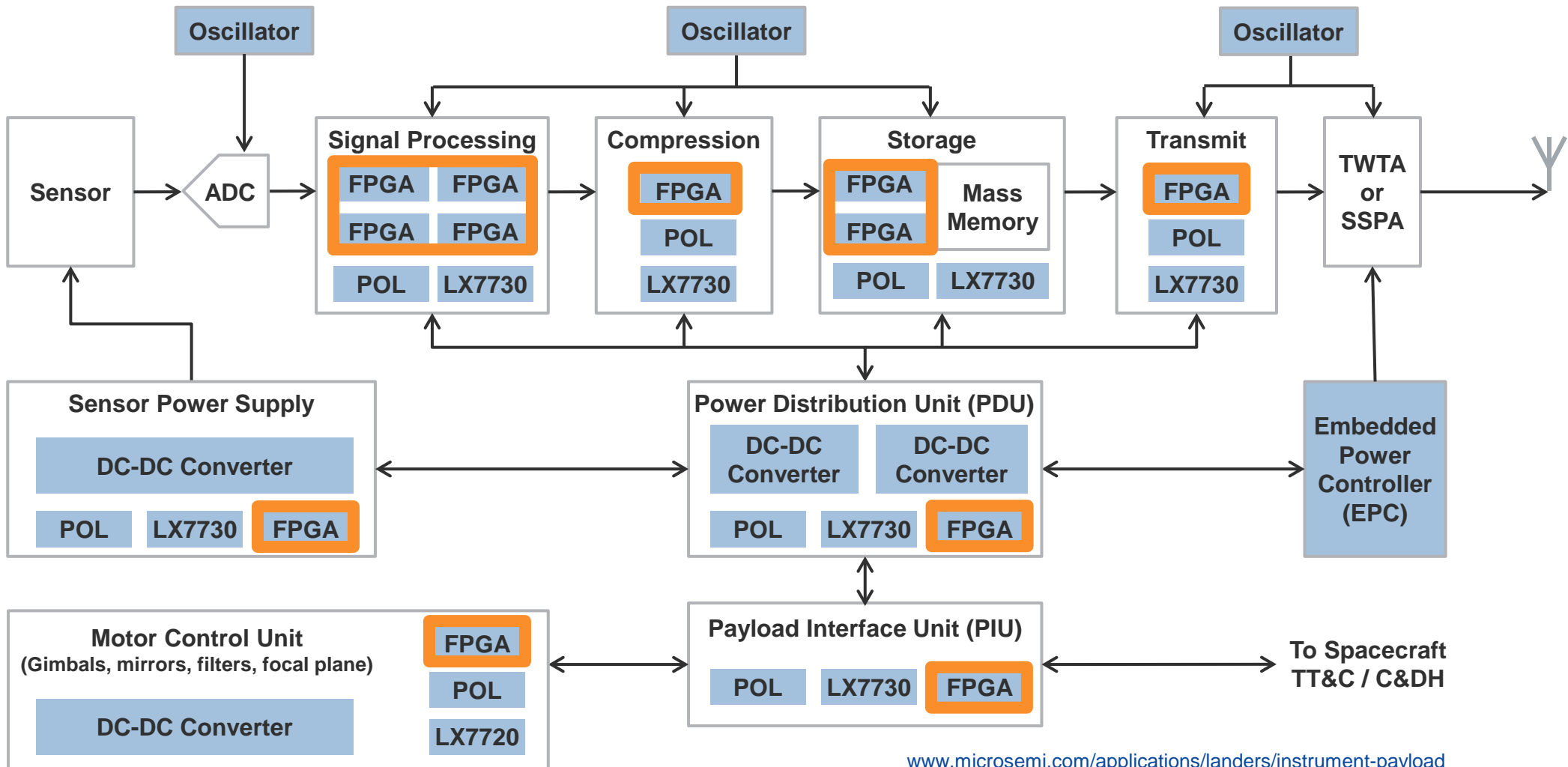


[www.microsemi.com/applications/landers/instrument-payload](http://www.microsemi.com/applications/landers/instrument-payload)



# Portfolio Breadth: Example Signal Processing Payload

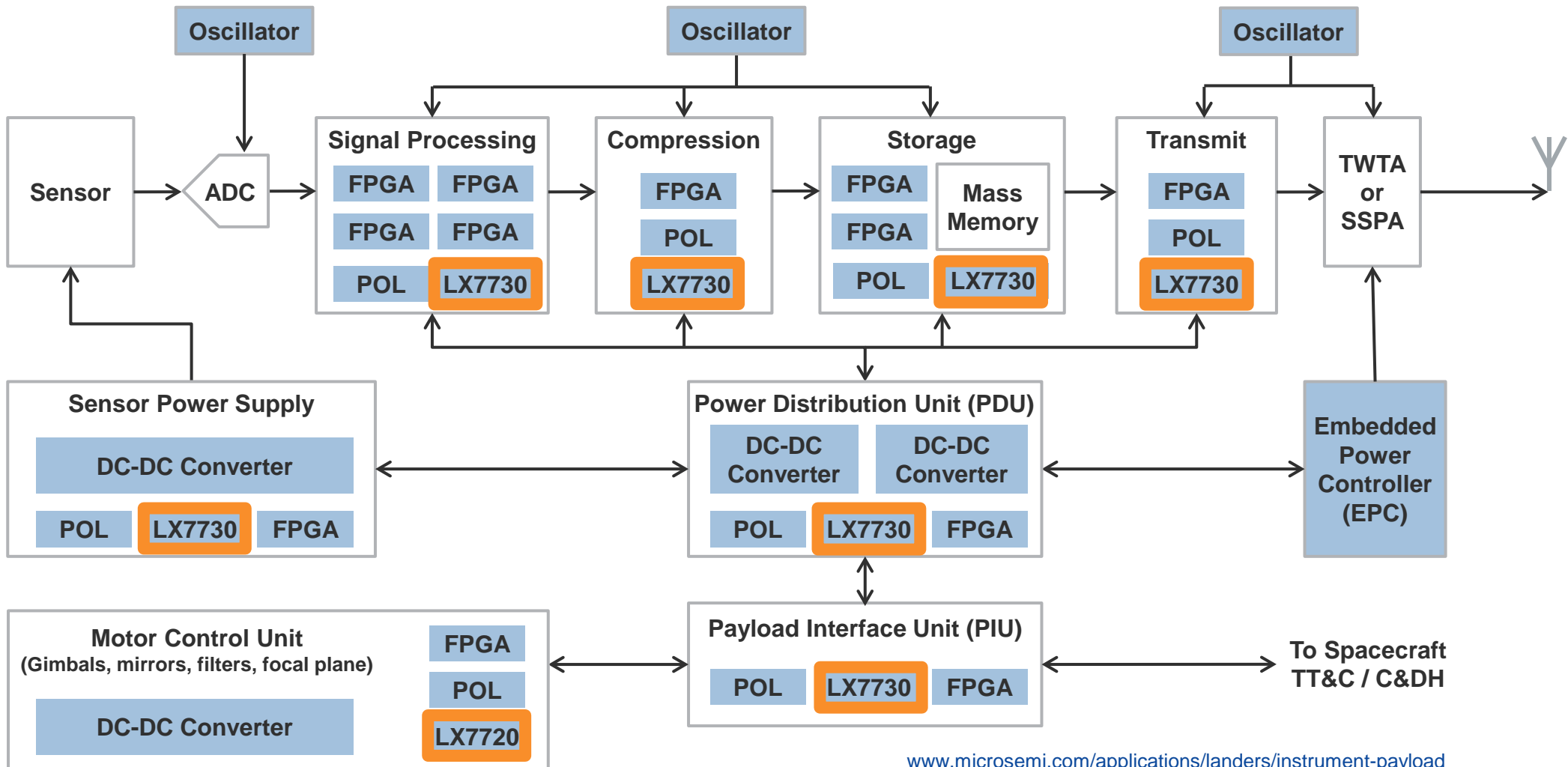
- FPGAs



[www.microsemi.com/applications/landers/instrument-payload](http://www.microsemi.com/applications/landers/instrument-payload)

# Portfolio Breadth: Example Signal Processing Payload

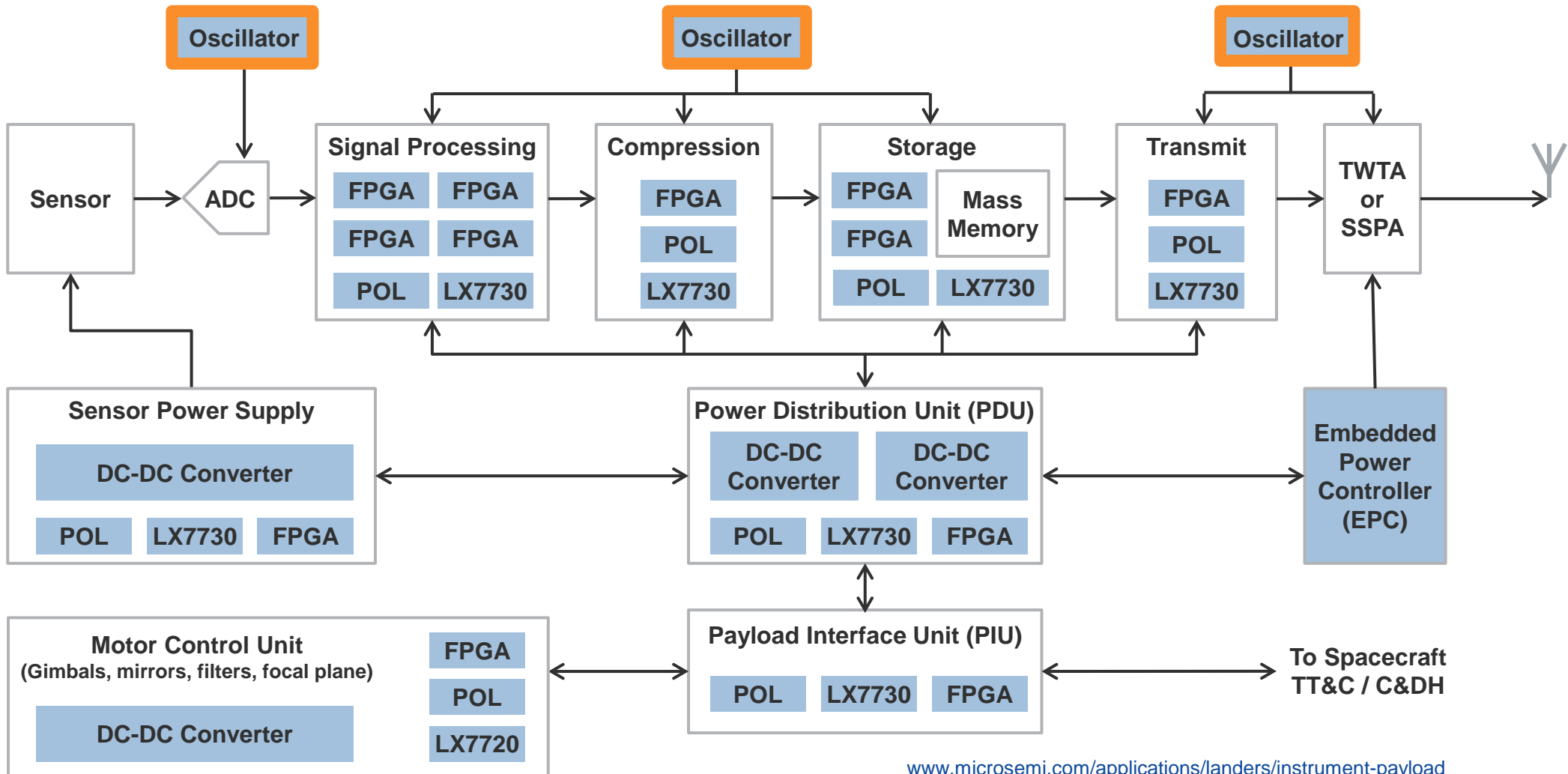
- Mixed Signal ICs: telemetry and motor control



[www.microsemi.com/applications/landers/instrument-payload](http://www.microsemi.com/applications/landers/instrument-payload)

# Portfolio Breadth: Example Signal Processing Payload

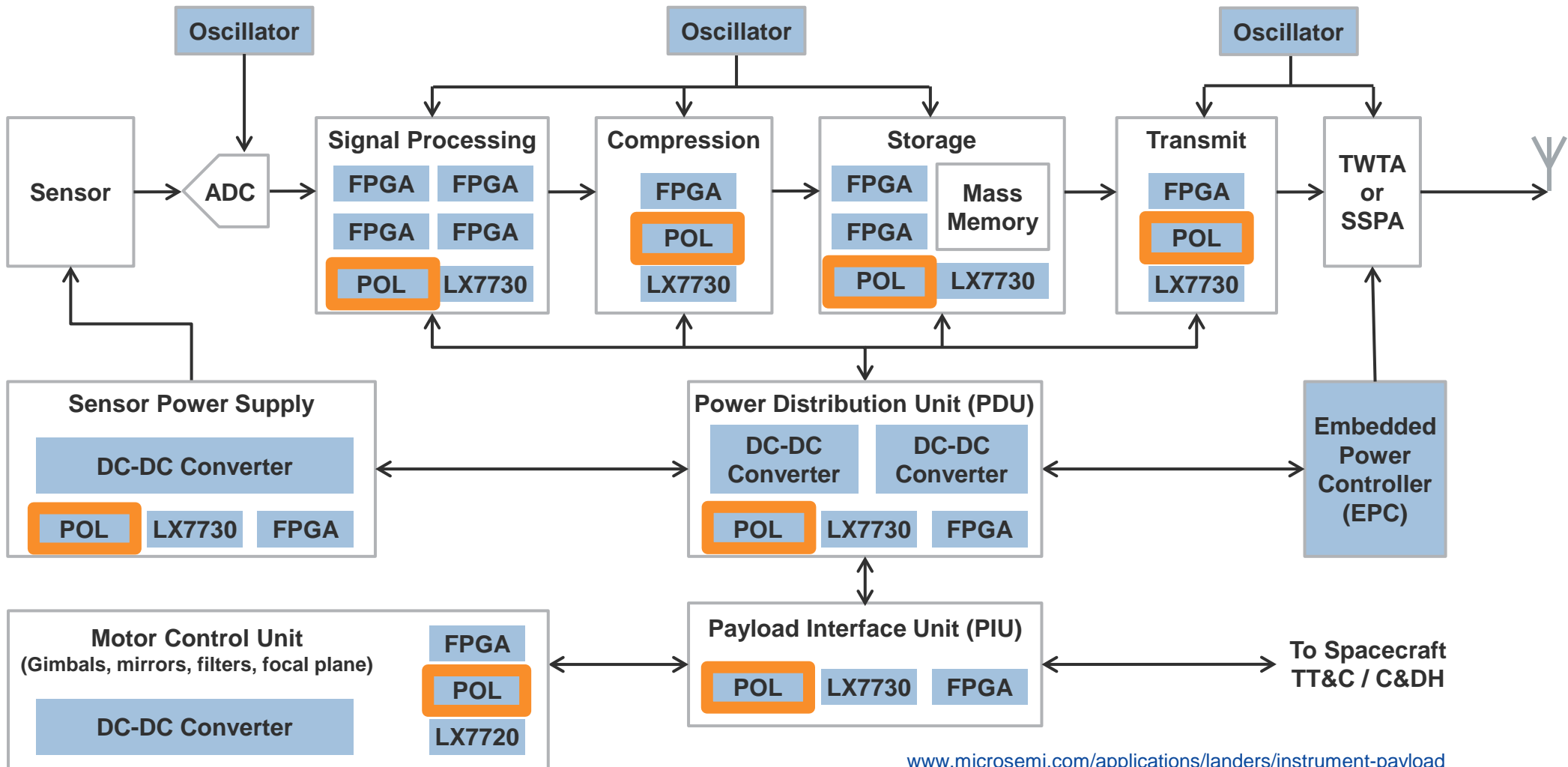
## ■ Clocks and Oscillators



[www.microsemi.com/applications/landers/instrument-payload](http://www.microsemi.com/applications/landers/instrument-payload)

# Portfolio Breadth: Example Signal Processing Payload

- LDO Regulators and Switchers

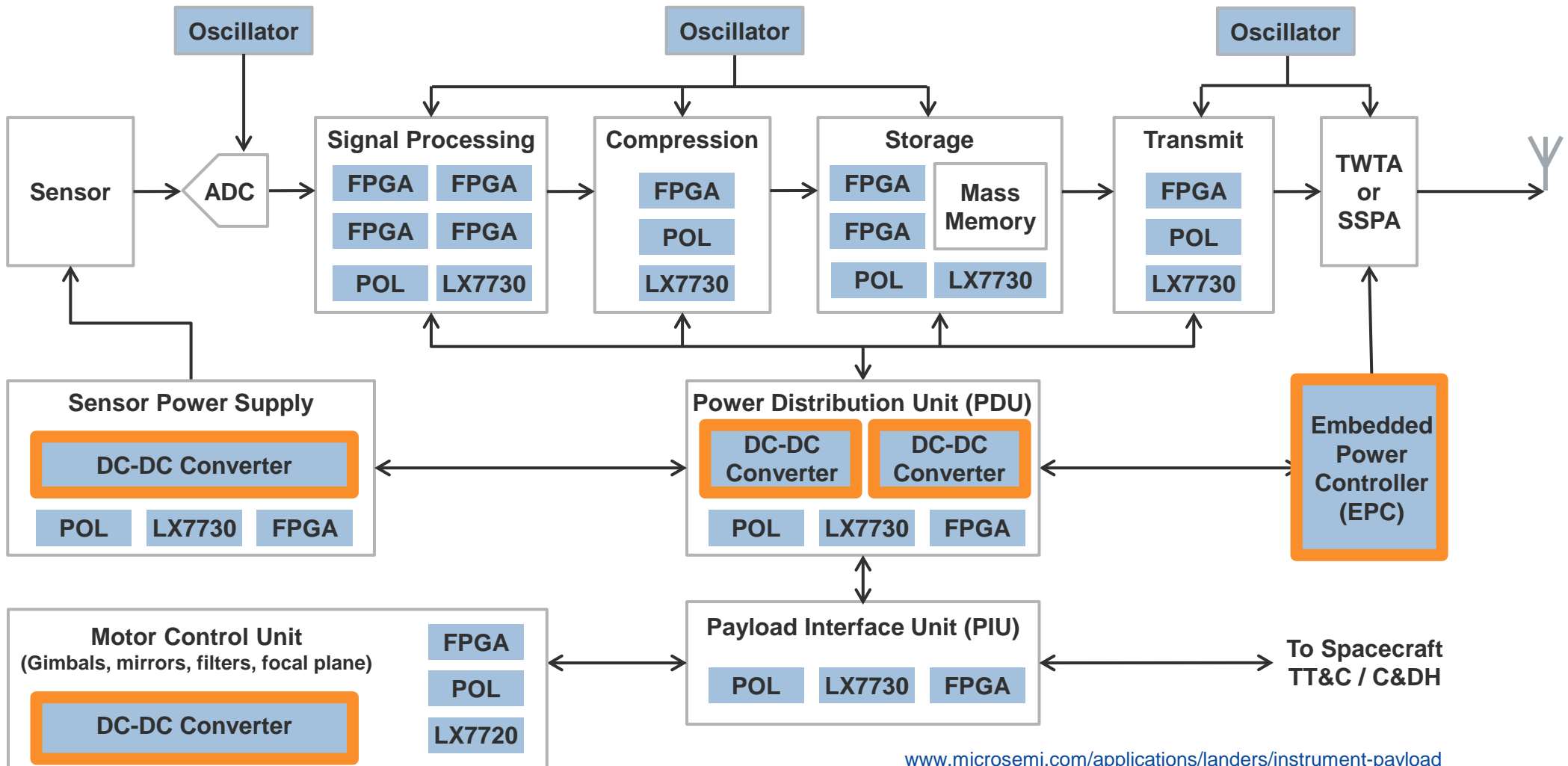


[www.microsemi.com/applications/landers/instrument-payload](http://www.microsemi.com/applications/landers/instrument-payload)



# Portfolio Breadth: Example Signal Processing Payload

- Integrated Power Solutions and Discretes



[www.microsemi.com/applications/landers/instrument-payload](http://www.microsemi.com/applications/landers/instrument-payload)

# Thank You



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