



TELEDYNE MICROWAVE SOLUTIONS
Everywhere **you**look™

The background of the advertisement is an aerial, wide-angle photograph of a snowy forest. The trees are heavily covered in snow, and the ground is a mix of white and brown. In the center of the image, a commercial airplane is flying towards the viewer. Above it, a missile or rocket is streaking downwards, leaving a bright orange and white trail. Below the airplane, a small, dark, star-shaped object is visible. To the right of the main text, there is a large, black, stylized arrow pointing to the right.

Your Single Source for Advanced Microwave and RF Technologies



TMS: The Power of Consolidation

7
Industry
Leaders
1
Global Company

Microwave Assembly

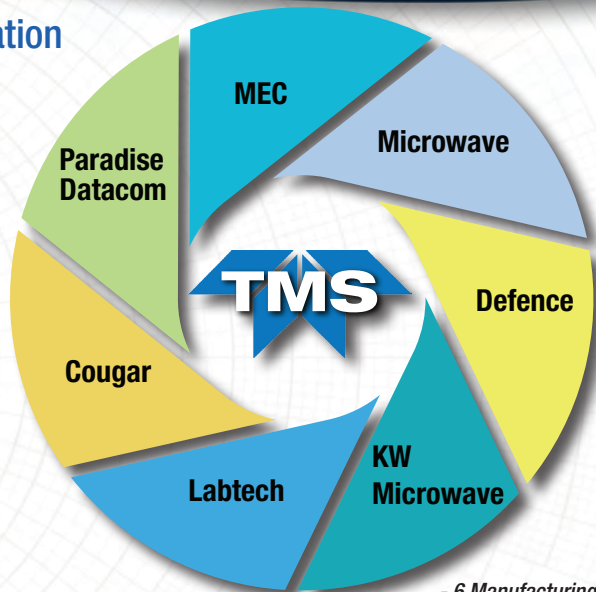
- Cleanroom Class 10,000 Manufacturing
- Cleanroom Class 1,000 Work Cells
- Manual and Automated Die Attach and Wire Bonding
- Chip and Wire Hybrid Assemblies
- Soft and Hard Substrates
- Hermetic Packaging and Laser Sealing

Microwave Testing

- VNA through 110 GHz
- Noise, BER
- Automated Testing and Burn-in

Environmental Testing

- Vibration and Acceleration
- Thermal Shock Class
- Mechanical Shock
- Temperature-Altitude



- 6 Manufacturing
Facilities in U.S. and U.K.
- 200,000 sq ft of Manufacturing Space
- Approximately 1,000 Employees



TMS: The Power of Consolidation

Focus

**Design and Manufacture
of Custom RF & Microwave
Products for Demanding
Applications**

Markets

**Radar
Electronic Warfare
Space
Missile and Missile Defense
Communications
Commercial Aerospace
Satcom
Test and Measurement**





TMS: The Gold Standard for MW&RF Engineering

50+ Years of Industry Leadership and Achievement

▶ The Long-time
World Leader
in TWT Technology

▶ World's Sole Supplier
of Microwave BAW
Delay Devices

▶ Industry-First
Advancements in YIG
and Filter Technologies

▶ Vast Repository of Parts
for Custom Engineering



▶ The Most Comprehensive
Portfolio of MW&RF
Components and
Capabilities

▶ Renowned
Space Heritage
from the Birth of the
Space Program

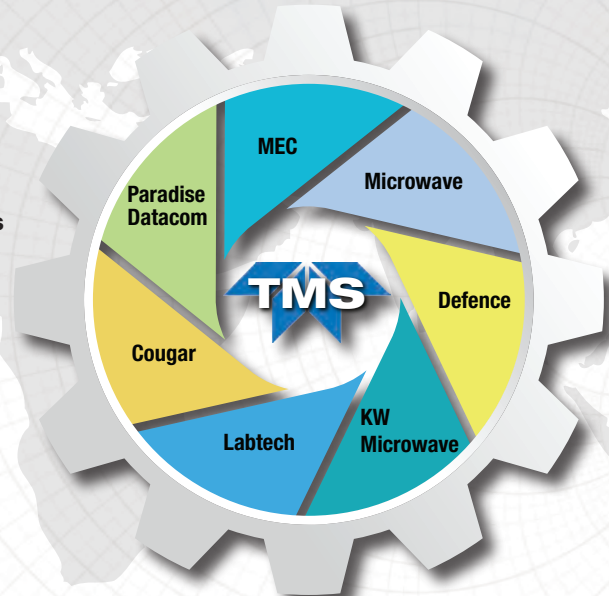
▶ Advanced Amplifier
Technologies for
Diverse Markets and
Applications

▶ Broad Spectrum of
EW / ECM / CIED / SIGINT /
ELINT Capabilities



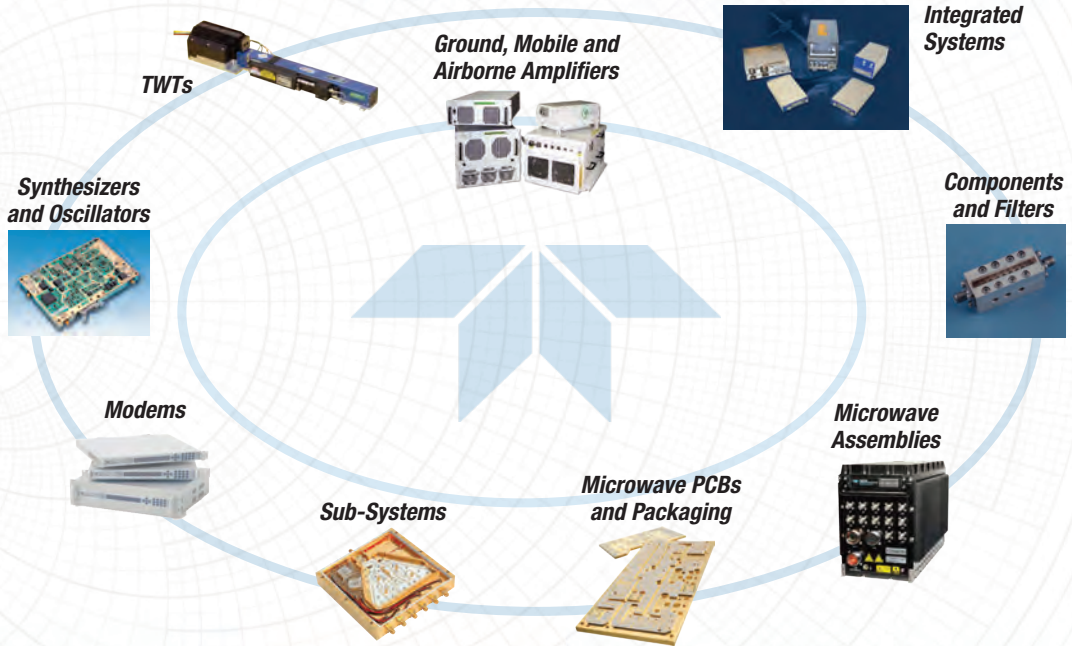
TMS: The Benefits of Consolidation

- ▶ **Extensive Pool of Design and Production Capabilities**
- ▶ **Solutions Generated based on Customers' Total Requirements**
- ▶ **Simplified Customer Experience –
Intuitive Web Navigation,
Borderless Project Management**
- ▶ **Direct, Field based,
Sales Force Worldwide –
Fluent Across all Product Lines**





Comprehensive Portfolio of Capabilities





The Full Range of Components: DC to 40 GHz

GaN, GaAs, InP, LDMOS Amplifiers

Voltage Controlled Amplifiers

Voltage Controlled Attenuators

Analog/Threshold Detectors

VCO's, DRO's

RF and Microwave Mixers

Detectors and Limiters

Frequency Doublers

Power Dividers

Switches

IQ Networks Narrowband

IQ MOD / DEMOD

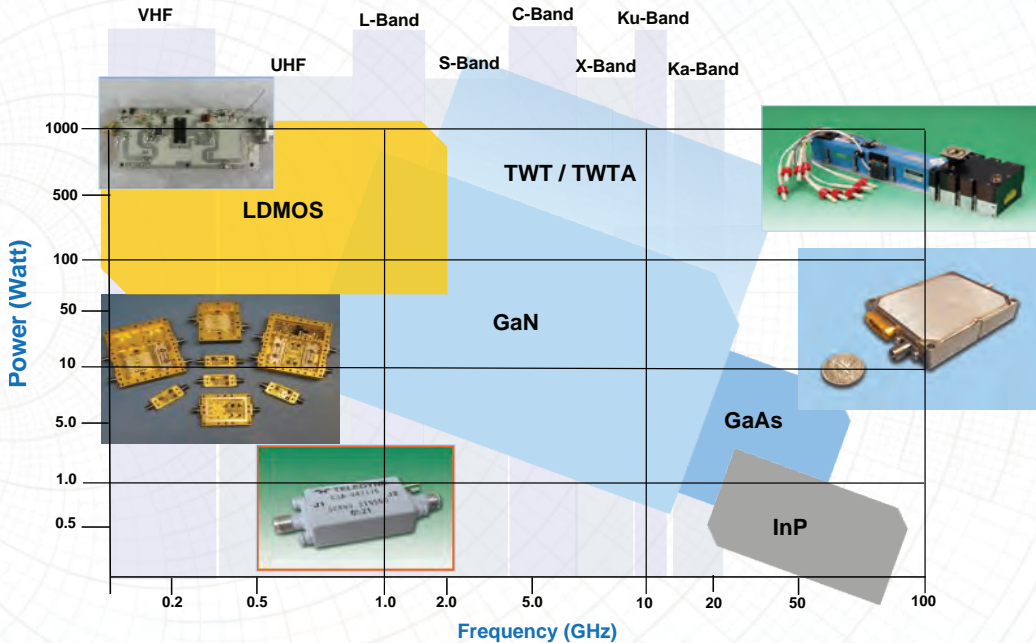
Limiting Amplifiers

DLVAs





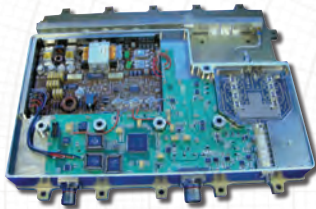
An Array of Amplifier Technologies





Military and Aerospace Solid State High Power Amplifiers

1000's of SSPA Designs Produced



*Space Qualified
Amplifier Assembly*

4W 4-18GHz SSPA

4W Ku-band SSPA

4W Ka-band SSPA

5W Ku-band SSPA

8W Ku-band SSPA

10W Ku-band SSPA

12W Ka-band SSPA

15W Ku-band SSPA

**20W Ku-band SSPA
w/ Integrated VGA**

**20W Ku-band
Space-grade SSPA**

50W X-band Pulsed SSPA

50W L-band LDMOS SSPA

300W->1kW X-Band SSPA



TWT Technology: the World Leader

► **Design and Manufacture of
Microwave Vacuum Products**

► **High Level of Systems
Integration Expertise**

► **Markets**

- Defense: Radar, Missiles, EW, COMS
- Telecommunications
- Instrumentation

► **Over 50 Years of TWT Experience**



Airborne EW



Fast Warm Up TWT



Radar



Satcom



Mini TWT for Radar and EW



UAV



Filter and Assembly Products

Design and Manufacture of Microwave Filters and Filter-based Integrated Assemblies

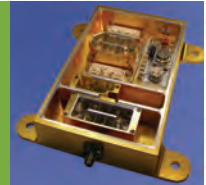
Product Types 0.1 to 50 GHz

Filters: Combine, Lumped Element, Waveguide
Multiplexers: Switch Filter Banks,
Suspended Stripline, Ceramic
Mixed-technology: Tuneable, Switched
Multiplexer and Channeliser



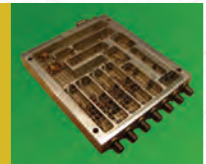
Applications

EW, Radar, CIED
Communication Systems
Satellite Payloads



Advantages / Benefits

Custom Engineering to Specific
Requirements High Reliability
for Space Applications





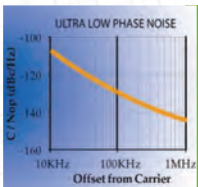
Comprehensive YIG Products and Capabilities

Vertically Integrated Design, Manufacturing and Test for Standard and Custom YIG Products



Filters: 0.5 to 50 GHz

Bandpass, Band Reject, Closed-loop
PM Biased Filters



Oscillators

Bipolar, FET
Ideal for Stable, Low Phase Noise
Signal Generation



Subsystems: 0.5 to 20 GHz

Receiver Front-ends
Receiver Protection Assemblies



TMS: The Industry's Sole Supplier of BAW Devices

40 Years of Experience ***Supporting Commercial and Military Markets***

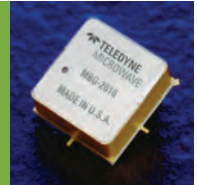
Delay Devices

400MHz to 17GHz range, Fc up to 1 octave
Delays from 100nS to 15μS Available
Transmission (2 port) or Reflective (1 port)
100's of Standard Designs



Primary Applications

Altimeter Calibration
Radar Ranging Anytime a
Microwave Signal Needs to be DELAYED



Advantages / Benefits

Small, Weight, Reliable

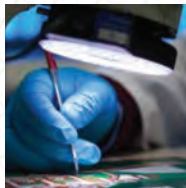
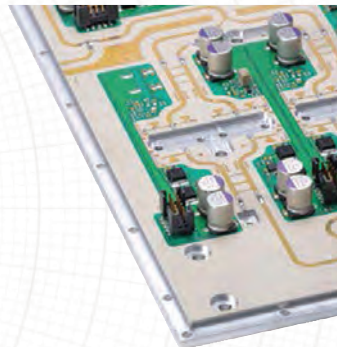




30+ Years of Leadership in RF/Microwave PCBs

Manufacturing based on Teledyne Labtech's World-leading Printed Circuit Board Processes and Technologies

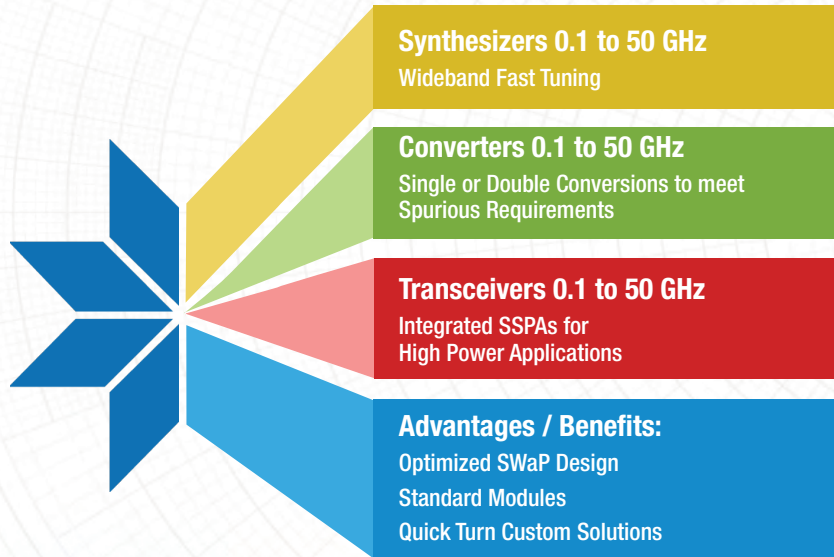
- ▶ **Metal-backed PCB's**
- ▶ **Multilayer PCB's**
- ▶ **Large Format PCB's**
- ▶ **Precision Single Sided and Double Sided PCB's**
- ▶ **Large Ku/Ka-Band Antenna Manufacture**
Antenna Structures – up to 78"
- ▶ **Assembly and Test to 40 GHz**
- ▶ **High Power SSPA PCB**
- ▶ **MMIC Packaging**





TMS Integrated Assembly Products

Serving the Communications, Radar, EW, and Test Markets





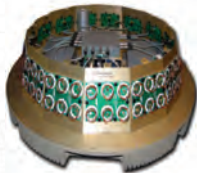
TMS Sub-Systems

Serving the Communications, Radar, EW, and Test Markets



Line Replaceable Units (LRUs)

Multi-channel Frequency Converters and
Noise Source Broadband Amp
with Transfer Switch



Antenna System

Transmit/Receive Module
Converter/Synthesizer/Controller Module
RF Switch Module (SP18T)
Power Supply Module



Advantages / Benefits

Custom Design
Immense In-house Component Base



TMS Defence and Space

The Leader in ITAR-free Solutions & Systems Engineering

30+ Years Providing ITAR-free Solutions for EW, Radar, C4ISR, Space, Communications and Test and Measurement Markets

► Unique Portfolio of
Broadband Capabilities

► Low SWaP-C4ISR Systems

► CIED Systems

► Single and Multiple
Channel Receivers

► ES Broadband Sub-systems





The Leader in Satcom Engineering Innovations

Teledyne Paradise Datacom continues to Produce Industry-first Advancements in SATCOM Ground Station Technologies

Business Focus

- SSPAs, BUCs, LNAs, Switching and Combining
- SCPC Modems, Redundancy Switching
- System Engineering and Network Management

Markets

- Defense, Commercial and Broadcast



100 Watt and 200 Watt Compact Outdoor SSPAs



Universal Hand-held SSPA Controller



*PowerMAX High-power SSPA Systems
INDOOR and OUTDOOR!*



*Q-Lite High Speed Modem for
COMMS-On-The-Move Applications*

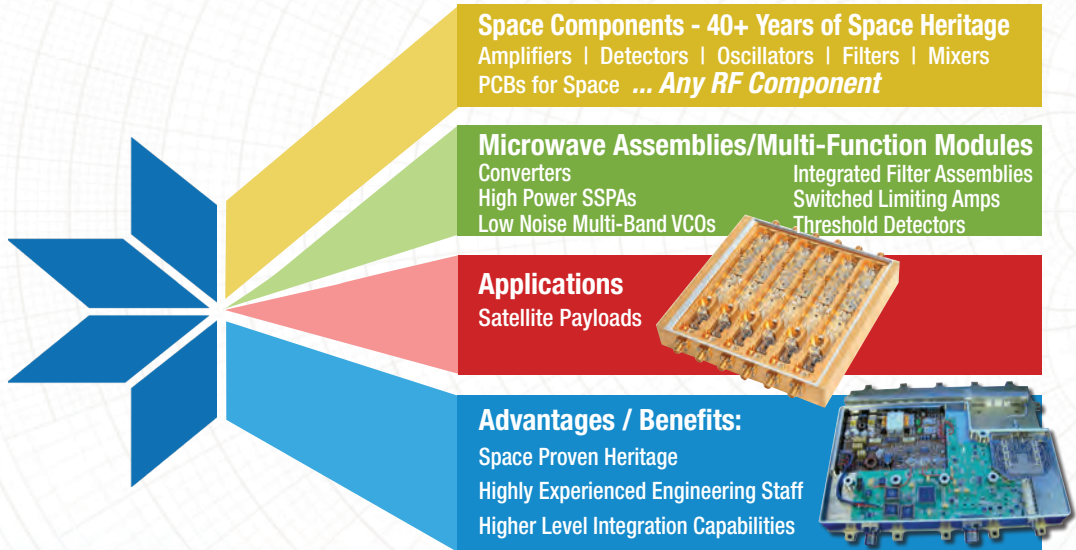


Q-Flex Satellite Modem



TMS Space Products

The Broadest Range of Mission-proven Space Components, Integrations, and Services





Are Your Parts Board-Ready?

***A 30+ Year Heritage Providing Services,
with Test Capabilities up to 40 GHz and Chip and Wire Assembly***

▶ Up Screening / LAT to
MIL-PRF-19500, 38534, 38535 and
MIL-STD-883 for Military, Space

▶ Space Level Screening:
K-Level, S-Level, and H-Level

▶ Verification and Testing of
Counterfeit Parts

▶ LAT and Up Screening on
FETS and MMICs, Bipolar
Transistors, Diodes

▶ Packaging / Screening of Active Die

▶ Build to Print Assembly





Your Single Source for Advanced Microwave and RF Technologies



From microwave components to integrated assemblies, Teledyne Microwave Solutions (TMS) brings 50+ years of experience to the design, development, and manufacture of advanced microwave technologies.



U.S. Locations

Teledyne Microwave / Teledyne Cougar

RF and Integrated Products

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Teledyne MEC

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Teledyne Microwave Solutions



The Power of Consolidation

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