

EW Capabilities



Introduction

TELEDYNE MICROWAVE INTRODUCTION

Teledyne Microwave, a business unit of Teledyne Electronics and Communications, is located in Mountain View, CA, and has over 50 years experience as a worldwide leader in the design, development, and manufacture of microwave components and integrated assemblies. We have delivered high quality products for communications, aerospace, defense, aviation, and instrumentation markets. Recent acquisition of some parts of Filtronic Solid State, Celeritek, Filtronic in the UK and KW Microwave has given Teledyne Microwave the ability to strengthen its product portfolio and to design new sub-systems.

Our product line includes:

- Amplifiers
- Filters
- Synthesizers
- YIG Filters & Oscillators
- Transceivers and Converters
- Integrated Microwave Assemblies (IMA's)
- BAW Delay lines



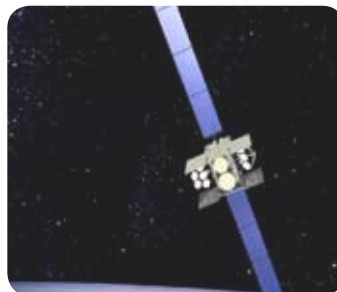
Communications



Military



Instrumentation



Space

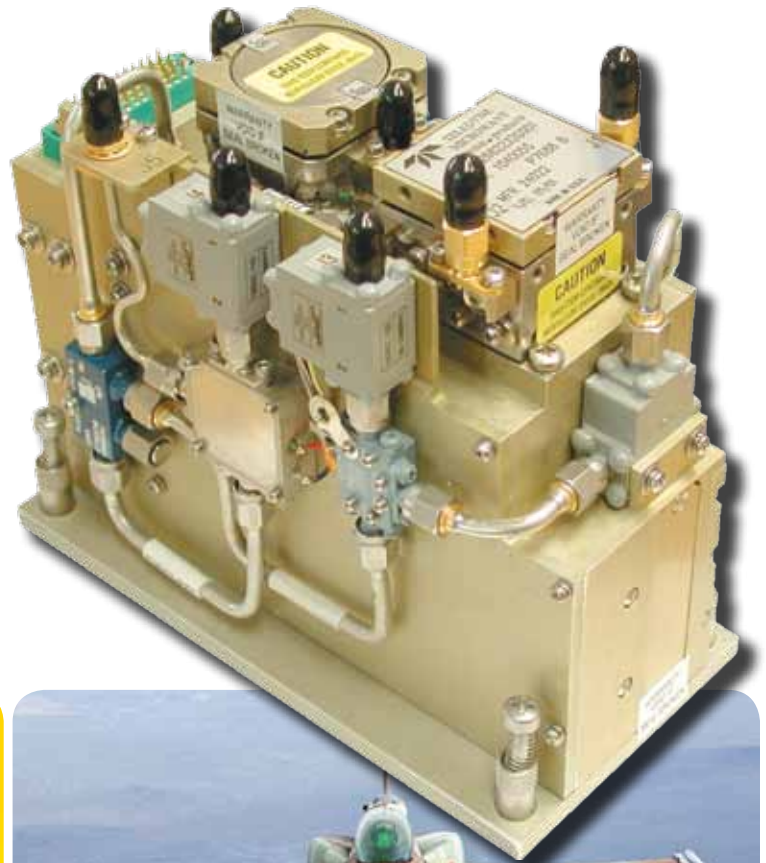
YIG Products

YIG'S: A PRODUCT IN TRANSITION

Historically, Teledyne Microwave acquired the Ferretec YIG product line in 2004 and incorporated it into our Mountain View facility in the same year. Ferretec was originally incorporated in 1981 by the same people that work at Teledyne Microwave today. The Ferretec product line is now fully embedded in the Teledyne Microwave product line and serves as one of our main component product areas.

YIG products have a unique ability to provide exceptional performance over a multi-octave bandwidth making them ideally suited to instrument and electronic warfare applications. When used as part of an Oscillator, the phase noise performance is an industry beater. When used as part of a tracking filter, the bandwidth of operation is superior to any other product available.

Though YIG based technology is relatively dated, improvements in materials and manufacturing have seen an introduction of new products, developed by Teledyne, over recent years.



Integrated Microwave Assemblies

TELEDYNE MICROWAVE HAS DEVELOPED A NUMBER OF INTEGRATED PRODUCTS USED IN TODAY'S MODERN SYSTEMS

Teledyne Microwave offers a full range of Integrated Microwave Assemblies (IMA), used on many EW systems.

General construction consists of a RF/Microwave circuit using microwave modules and either a single or multiple printed circuit boards for control and power conditioning. The microwave modules are produced in house, on thin film circuits which are then wire bonded together to make a complete microwave chain. By using a common module concept, design cycles and risk are very much reduced when developing new designs for custom applications. With over 1,500 microwave modules designed and available, most requirements are met using existing proven module designs. The power and control circuit boards usually circle the main microwave modules, as these circuits are more flexible in location, and are therefore more specialized for any given IMA.

With experiences from UHF to 40 GHz we have a wide portfolio of circuit architectures, configurations and functionality to meet many different platform needs. A large part of our work when designing new converters is power management and digital control and functionality. Over the years we have found these criteria often more demanding than the microwave design itself. Experience in isolating supply lines and designing the unit with utmost isolation between adjacent circuits is critical to achieving the best design possible.



Frequency Generation

A FULL RANGE OF FREQUENCY GENERATION PRODUCTS

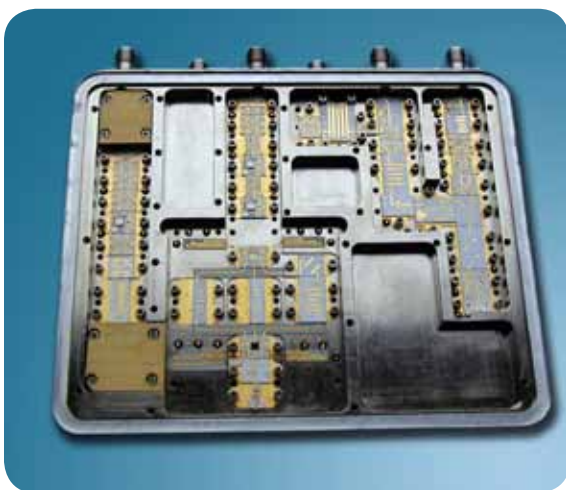
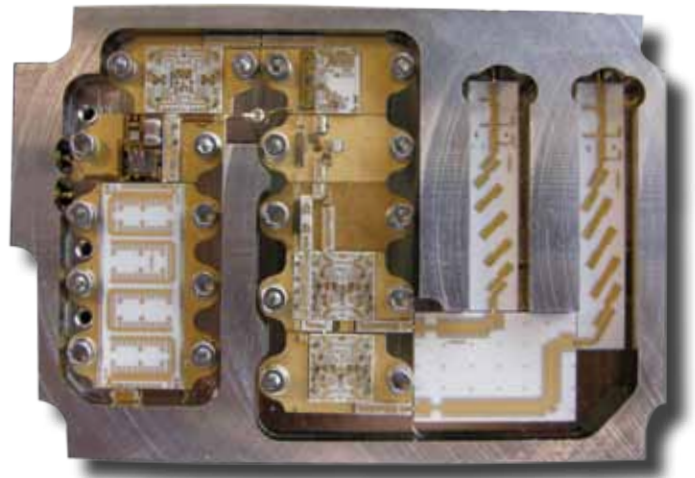
Many products needed in today's wideband architectures need frequency generation products including that either manipulate or generate a signal. Teledyne Microwave has expertise in combining many of these approaches to produce a IMA that meets a specific customer need.

Building blocks for these assemblies include:

- ◆ Phase Locked Loops
- ◆ Step Recovery Diode Comb Generators incorporating Switched Filters
- ◆ SAW Multipliers
- ◆ Multi-loop Frequency Synthesizers, YIG, VCO, and DDS based
- ◆ Stand alone Multipliers

Many of these products features include:

- ◆ Broadband Coverage
- ◆ Fast Tuning
- ◆ Sub-Hz Resolution
- ◆ Low Phase Noise
- ◆ Integrated BIT
- ◆ Output Filtering for low Harmonic and Spurious
- ◆ Fast Output Blanking

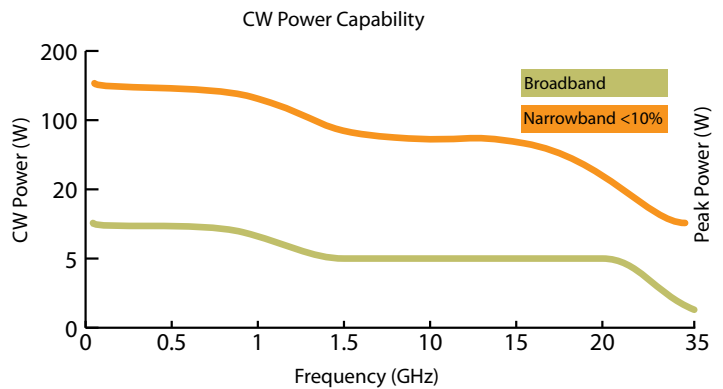


Broadband Amplifiers

Incorporated into many EW applications, Teledyne Microwave has become the benchmark in RF SSPA design

SOLID STATE POWER AMPLIFIERS

A strong recent development within Teledyne Microwave has been the strengthening of our Solid State Power Amplifier (SSPA) portfolio. Over recent years we've had the opportunity to work with most of the large OEM system manufacturers to develop custom SSPA's for EW needs. These amplifier developments have a frequency of operation as low as L-Band (1 KW) and as high as Ka-Band (15W). Our units have worked in a number of applications including; Satcom Subsystems, common data link (CDL), Space qualified CDL, Airborne, Ship & Ground EW, IED Jammer, Radar and Missile (CDL). Many of our SSPA designs are only 0.6" high making them ideally suited for airframe or mobile applications. With reduced size comes reduced weight. At only 0.6lbs our 15W, Ku-Band amplifier is the smallest and lightest on the market. A graphic example of our RF power capabilities for both peak & CW is shown below.



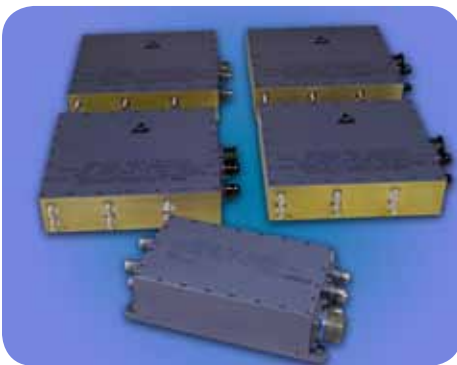
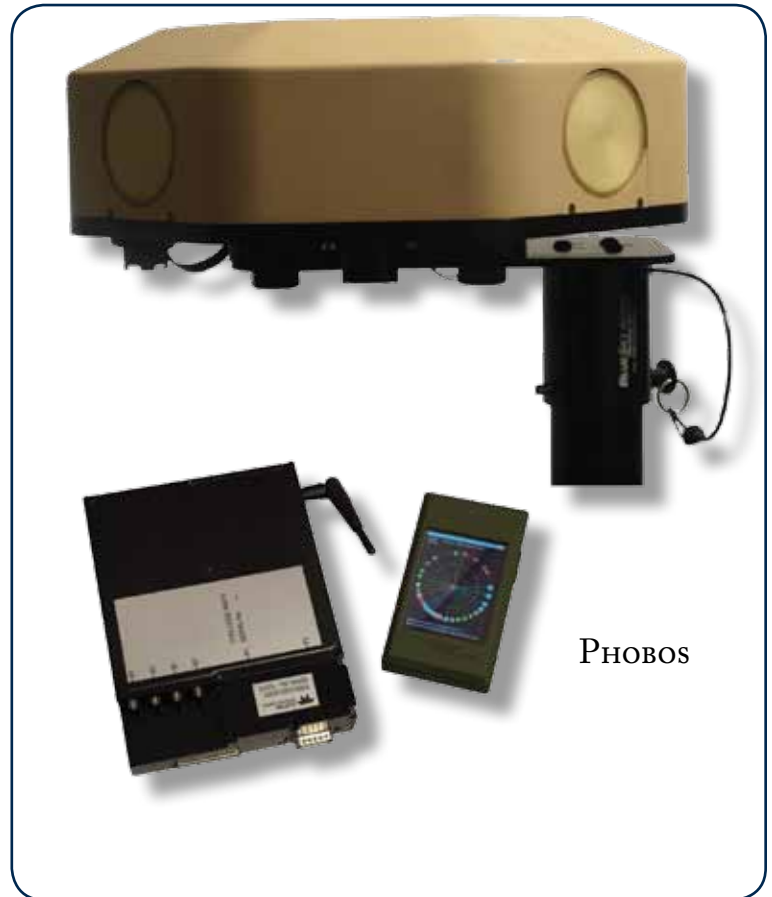
Receivers & Threat Warning

Receivers

Teledyne has developed a family of high performance superhet receivers for ESM / ELINT applications incorporating patented features and offering wide band synthesized capability from 0.5 to 18 GHz. Frequency extensions are available to above 40 GHz and the modular approach enables options including multiple phase and gain matched channels or integrated High POI wideband receivers.

Threat Warning

The Phobos tactical threat warning system includes a high sensitivity radar warning receiver and a highly portable hand held display. Weight, size and power consumption have been minimized - without compromising detection performance - to deliver true tactical flexibility. The system includes de-interleaving, emitter identification and MMI software - a truly integrated solution.



Traveling Wave Tubes (TWT)

The Teledyne MEC facility continues to be a world leader in the design, development and manufacture of broadband metal ceramic Traveling Wave Tubes (TWTs), Traveling Wave Tube Amplifiers (TWTAs) and Solid State Power Amplifiers (SSPAs) meeting stringent airborne and shipboard environments used in today's ECM, Radar and Communications markets.

- Communications

Highly efficient TWTs for Tri-Band, C, X, Ku, C/Ku, X/Ku, DBS, Ka and Ka/Q Band for use in Earth, Mobile and Fly-Away Terminals

- EW and Radar

Shadow Gridded Helix TWTs for Broadband EW and Radar Applications from L through Ku Bands at Peak Power Levels to 12 kW and Average Power Levels to >700 W

- Instrumentation/General Purpose

CW and Pulse TWTs for General Laboratory Amplifier Use. Output Power to 750 W Spanning the 1 to 44 GHz Frequency Range with Average. Output Power to 750W

