



Product Catalogue

- **RF Amplifiers for Particle Accelerators**
- **Radar Hardware**
- **Amplifiers for Magnetic Resonance**
- **Custom Design**

rugged solid-state technology

Amplifiers for Particle Accelerators

Tomco offers a wide range of RF power amplifiers for particle accelerators. Our products are all solid-state, class A/AB systems based on new LDMOS power transistor technology. Available in both water and air cooled configurations, Tomco Technologies supplies a wide range of RF amplifiers to particle accelerator installations worldwide.

We offer:

- Fixed frequency and broadband systems from 1MHz to 900MHz and 1.3GHz
- Power levels up to ~110kW CW/ ~ 500kW pulsed.
- Rugged designs - 100% reflected power handling
- Systems available capable of handling 400% transient reflections
- Standard 19" chassis, modular systems - simple to service, minimal maintenance requirements
- High reliability - extensive protection and monitoring features
- True inbuilt redundancy available
- High MTBF design



Overview of narrowband RF amplifiers for particle accelerators

Tomco RF amplifiers are in use as

- RF power sources for superconducting and non-superconducting cavities
- ultra fast pulsed RF sources for beam kickers
- drivers for klystrons
- RF generators for ion sources
- Pulsed and CW systems for cavity conditioning



Series range	Frequency	Maximum Peak power
BTK-Alpha	Narrowband in the range 100MHz to 200MHz	90kW CW 500kW PEP pulsed
BTK-Delta	Narrowband in the range 200MHz to 600MHz	110kW CW 500kW PEP pulsed
BTK-Lambda	Narrowband in the range 600MHz to 900MHz 1.3GHz	80kW CW 500kW PEP pulsed 10kW CW

Specifications are tailored to meet the requirements of different accelerator applications. Customized systems, including broadband systems, are available.



Mismatch Handling

Tomco Technologies can offer systems capable of handling 100% continuous reflected power and up to 400% transient reflected power. These amplifiers are rugged solutions for driving superconducting cavities.

A critical consideration in such systems is the increased RF voltage present under conditions of 100% reflected power and partial PA failure. In under-engineered systems this can result in failure of cables, connectors, combiners, circulators and other passive components. Tomco amplifiers are designed with adequate headroom and isolation in all components to withstand these worst case conditions.



Simplified servicing for reduced downtime

We know that facility downtime can be costly to our customers. To minimize this, all parts that are usually replaced during scheduled maintenance are easily sourced, off-the-shelf components. In addition, the modular design makes it simple to switch in spares.



Customizable levels of redundancy

To maximize reliability and up-time, Tomco amplifiers can be optioned with a level of redundancy to meet the user's budget and specifications.

Installation Examples



Recent Tomco accelerator projects:

- KAERI (Korea Atomic Energy Research Institute): 350MHz, 30kW and 60kW. 200MHz, 240kW
- Fermilab: 2 x 8kW, 3.5MHz
- Paul Scherrer Institute for European XFEL: 8 x 3kW, 1-100MHz
- Lawrence Berkeley National Laboratory: 1.3GHz 4 x 2.5kW
- Brookhaven National Laboratory: 9MHz, 6 x 15kW
- Bevatron OHG for JINR, Dubna: 100.625MHz, 140kW, 340kW
- Los Alamos National Laboratory: 10 - 300MHz, 15kW
- MIT, Plasma Science Fusion Center: 425MHz, 60kW
- JLAB: 499MHz, 4 x 10kW
- Argonne National Laboratory: 72.75MHz, 8 x 4kW CW



499MHz, 10kW CW

Location:	Nagoya Synchrotron, Japan
Model:	BT10K-Delta
Amplifier type:	Class AB
Technology:	Solid-state 6G LDMOS
Frequency:	499MHz
Max. output power:	10kW CW min.
P1dB:	8kW CW min.
Efficiency:	60% typical
Cooling:	Water (amp) / air (PSU)
Max. load mismatch:	Infinite



1.3GHz, 2.5kW module

Location: Lawrence Berkeley National Laboratory
 Model: BT10K-Lambda
 Amplifier type: Class AB
 Frequency: 1.3GHz±10MHz
 Max. output power: 4 x 2.5kW min.
 Cooling: Water (amp)/forced air (PSU)
 Reflected power handling: Full power operation with 100% reflected power (internal circulators)



1.3GHz, 4 x 2.5kW

Location: Argonne National Laboratory, USA
 Model: BT4K-Alpha x 8
 Amplifier type: Class AB
 Technology: Solid-state 6G LDMOS
 Frequency: 72.75MHz
 Max. output power: 8 x 4kW CW min.
 P1dB: 8 x 4kW CW min.
 Efficiency: 60% typical
 Cooling: Water (amp) / air (PSU)
 Max. load mismatch: Infinite, driving super conducting cavities



72.75MHz, 2 x 4kW amplifiers and power supplies



72.75MHz, 8 x 4kW CW



340kW final combiner

Location: JINR, Dubna as part of a LINAC supplied by Bevatech OHG

Model: BT340K-Alpha

Amplifier type: Class AB

Technology: Solid-state 6G LDMOS

Frequency: 100.625MHz

Max. output power: 340kW min.

Max. pulse width: 200 microseconds

Max. duty cycle: 0.2%

VSWR: Handles 100% reflected power

Cooling: Forced air



100.625MHz, 340kW amplifier system

Location: Brookhaven National Laboratory
 Model: BT15K-Alpha
 Amplifier type: Class AB
 Frequency: 9MHz
 Max. output power: 15kW min.
 P1dB: 15kW min.
 Cooling: Amplifier water
 PSU forced air
 Mismatch: Up to 100%



15kW amplifier

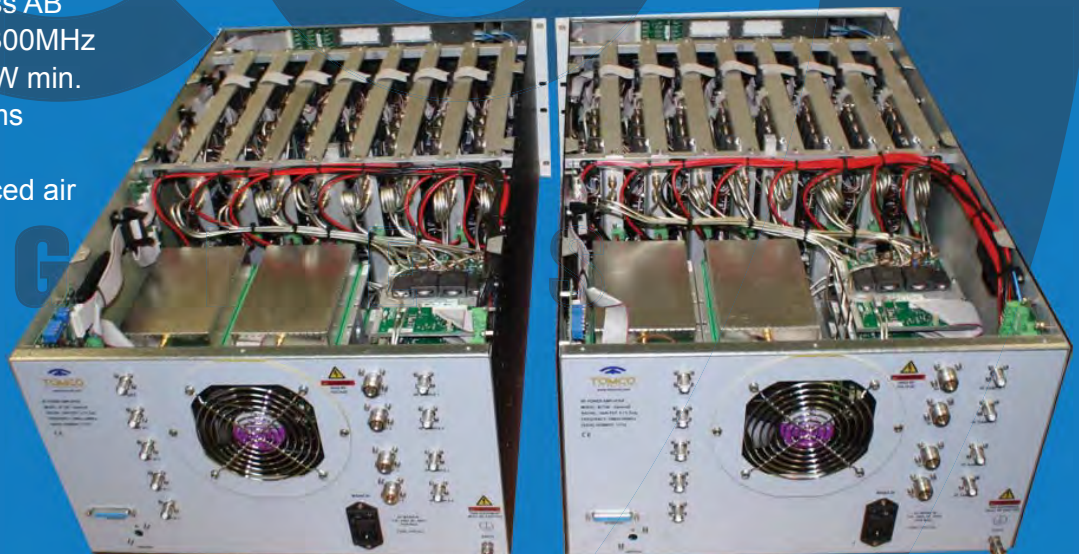


Power supply



9MHz, 2.5kW module

Location: Los Alamos National Laboratory
 Model: 2 x BT15K-Alpha
 Amplifier type: Class AB
 Frequency: 10-300MHz
 Max. output power: 15kW min.
 Max. pulse width: 1.3ms
 Max. duty cycle: 8%
 Cooling: Forced air



2 x 15kW broadband amplifiers

Company Profile

Tomco Technologies specializes in the manufacture and design of RF amplifiers and associated RF hardware.

Tomco RF power amplifiers are all solid-state products covering frequencies from 10kHz to ~1GHz, at power levels from 50W to 500kW. Tomco today supplies RF equipment to scientific and industrial customers worldwide with over 90% of our products being exported. We are focused on supplying high performance, high reliability products which are simple to integrate and have minimal maintenance and servicing requirements.

Key market areas include particle accelerators, plasma systems, nuclear magnetic resonance, ultrasonics, radar, RF therapy, HF/VHF communications and test & measurement.

Our technical team, headed by specialist RF engineers, has extensive experience in the field of RF design. As a small-to-medium enterprise our experts are readily accessible and we are able to work closely with our customers to offer optimized solutions and strong after sales support.

Tomco has an active R&D program ensuring that Tomco RF products offer the best performance using the most cutting-edge current technology.



Founded in 1986, Tomco was incorporated in 1994 and operates from its design, production and test facilities in Adelaide, South Australia "The Defence State" - an area recognized for its defence and advanced technology resources and expertise.

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