

High performance 5.8GHz power combiners and directional couplers for MW Energy Applications

The solid-state RF energy systems, at high frequency, rely on passive components to combine, deliver and control the RF power applied to the application.

In order to satisfy the need for suitable devices, AndivaTech introduced two high performance products: a two-channel power combiner and a directional coupler, both optimized for operation in 5.8GHz ISM band.

AT5g8Comb500 – 500W, 5.8GHz power combiner

Due to physical limitations (current density, heat dissipation, thermal conductivity, etc.) the semiconductor devices' can deliver limited power. At MW frequencies, the CW power level of a single power amplifier (respectively a generator) is limited to few hundreds watts. The solid state RF energy systems can provide higher power levels by using multiple power amplifiers (or generators), which outputs are combined with high-power, low-loss combiners.

The combiners must satisfy multiple performance requirements:

- high power handling capability
- low insertion loss
- minimal amplitude and phase mismatch between the channels
- sufficient isolation between the RF inputs
- good input/output match



AndivaTech's proprietary, air strip-line based, combiner design features state-of-the art performance in all of the required performance characteristics.

AT5g8Comb500 Specification

Electrical specification		Mechanical specification	
Frequency range	5725 to 5875MHz	Output RF connector	7/16 - type, female
Input power (per channel)	250W (avg.)	Input RF connectors	N- type, female
Insertion loss	0.1dB	Dimensions (wo connectors)	61x53x32mm
Return loss	20dB	Weight	0.44kg
Isolation	15dB		
Amplitude balance	+/- 0.1dB		
Phase balance	+/- 3°		

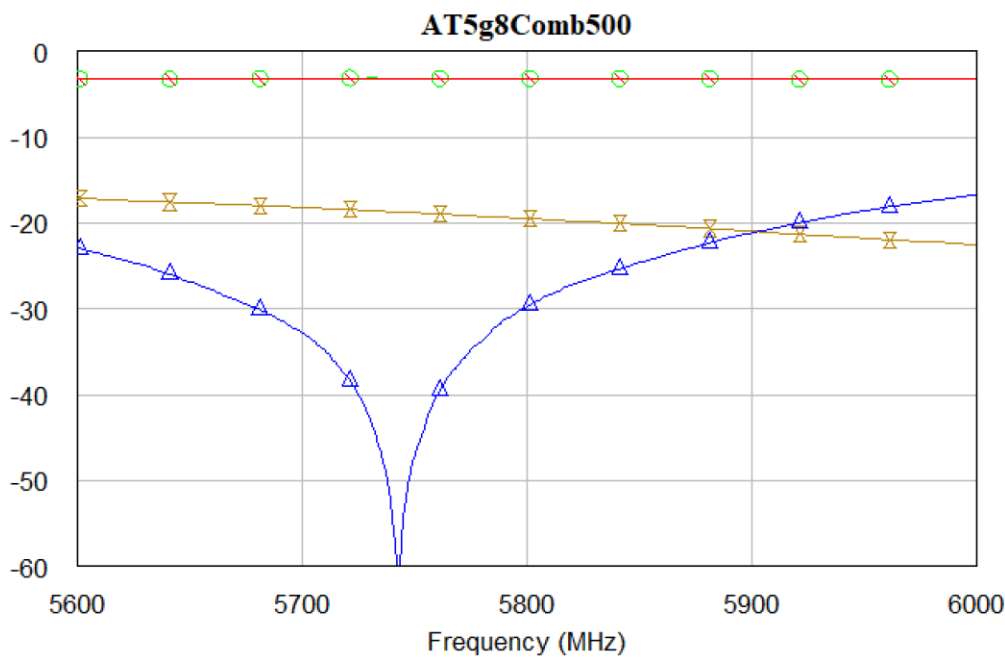
Applications

AT5g8Comb500 is developed targeting RF Energy applications, which require power levels in excess of 200W. In similar cases, AT5g8Gen200 generator could be complemented with AT5g8RF200 (or a second AT5g8Gen200), and their outputs summed up with AT5g8Comb500.

AT5g8Comb500 is perfectly suited also for other high power 5.8GHz applications, i.e. communication systems.

AT5g8Comb500 typical performance

The characteristics of AT5g8Cob500 are shown on the following plot below.



Common ports reflection coefficient (blue trace); total loss (red and green traces), which includes the 3db splitting loss; and isolation between the input ports (brown trace) of AT5g8Comb500, measured as power splitter.

AT5g8DC250 – 250W, 5.8GHz directional coupler

Many RF energy applications require an accurate measurement and precise control of the applied output power, especially when the generators operate with poorly matched and nonconstant applicator's load. In similar applications, the measurement of the power delivered to, and reflected from the load, mandates the use of high-performance directional couplers.

The couplers must satisfy several performance requirements:

- high power handling capability
- low insertion loss
- weak coupling between the main and the coupled lines



- high directivity of the forward and reflected measurements
- good impedance matching of all ports

AndivaTech’s proprietary, air strip-line based directional coupler design, features best-in-class performance in all required aspects.

AT5g8DC250 Specification

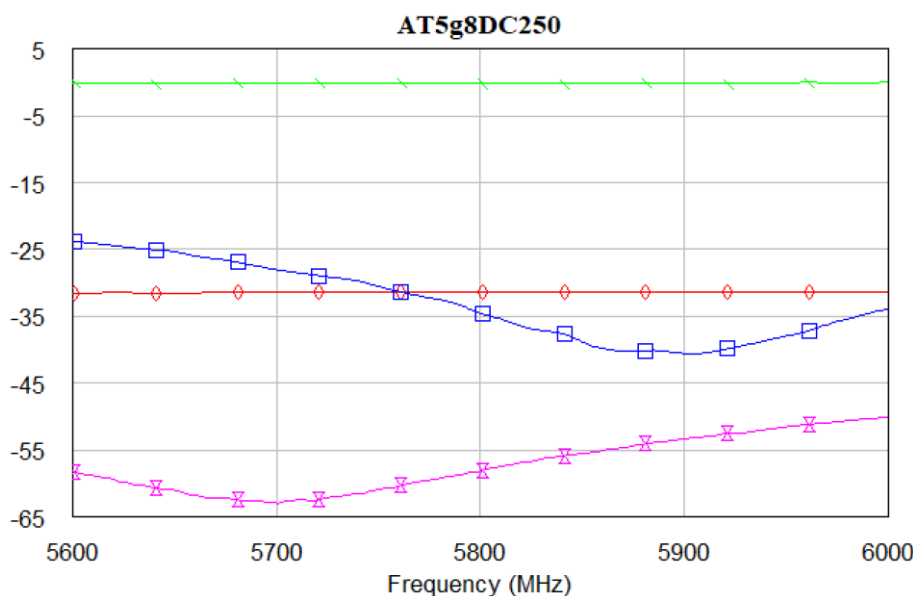
Electrical specification		Mechanical specification	
Frequency range	5725 to 5875MHz	RF connectors	N- type, female
Input power	250W (avg.)	Dimensions (wo connectors)	54x53x25mm
Insertion loss	0.1dB	Weight	0.34kg
Return loss	20dB		
Coupling factor	31.5dB +/-1dB		
Directivity	20dB		

Applications

AT5g8DC250 targets MW Energy applications, which require accurate measurement and tight control of both forward and reflected powers. AT5g8DC250 can be placed directly between the MW generator (AT5g8Gen200 or AT5g8RF200) and the applicator of the RF energy, and the sampled by the coupler forward and reflected signals shall be connected to generator’s respective RF inputs.

AT5g8DC250 is also suited for use in other 5.8GHz high power applications, which require low-loss, weak coupling and high directivity.

AT5g8DC250 typical performance



Main line insertion loss (blue) and reflection coefficient (blue); coupling factor (red); isolation (magenta).

Ordering options and services

Customized versions of the offered passive devices are available on request:

- different frequency bands
- different connectors (connector's type and/or gender)

Complementary RF accessories: cables, adapters, attenuators, etc.

Consultancy, co- development and engineering in all aspects of the RF energy generators and systems.