

**KEIRONE**

**Complete Engineering Solutions...**

# About KERONE

**KERONE is one of the most admired and valuable company for customer satisfaction.**



**KERONE has reported annual revenue of \$18 to \$20 Million , increasing year-on-year.**



**KERONE is possessing employee strength of more than 280 experts continuously putting efforts for happy industrial engineering solutions**



**KERONE is possessing experience of 48+ years in engineering excellence.**

**KERONE is having immense expertise in manufacturing and implementing various types of engineering solutions.**

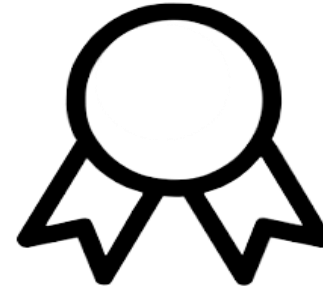
**KERONE is possessing employee strength of more than 280 experts continuously putting efforts for happy industrial engineering solutions.**





**48+**

**Years Experience**



**150+**

**Experts**



**5000+**

**Satisfied Clients**



**280+**

**Employees**

# Our Vision and Mission



## Vision

- Turn into world leader in providing specialized, top-notch quality and ecologically sustainable industrial heating, cooling , drying and engineering solution across the globe.
- To attain global recognition as best of quality and environment friendly engineering solution company.

## Mission

- To enhance the value of customer operation through our customer need centric engineering solution.
- We are committed to provide our customers, unique and best in class products in Industrial heating, drying and cooling segment, with strategic tie-up for the technical know-how with renowned leader in the industry specific segment.
- We are company that believes in strong ethics and timely commitment helps to build long term relationship.



# Value Propositions



Highly  
Customized Product



Sound  
Infrastructure



Adherence  
to  
Standards



Timely  
Delivery



Team of experts  
Delivering Quality



Cost Effective  
Solutions

# We are in collaboration with...

Member of AIMCAL



Member of IHEA



Strategic Partners of  
Emitech Italy



IRQAO Certified For  
Quality



Recognized and Rated by  
CRISIL



CRISIL Verified



Member of A.M.P.E.R.E.  
(Europe)



ASCB(E) Certification for  
Best practice



## We are Certified by...



ISO 9001:2008 | ISO 9001:2015 | OHSAS 18001 | EMS 14001

# Microwave Solid State Generators



# Introduction

- Microwave solid-state generators are advanced electronic devices that utilize solid-state components to generate and amplify microwave signals. Unlike traditional vacuum tube-based generators, which rely on bulky and less efficient technologies, solid-state generators leverage semiconductor devices to achieve compactness, reliability, and high energy efficiency.
- By incorporating high-power transistors, such as field-effect transistors (FETs) or bipolar junction transistors (BJTs), along with passive components like filters and resonators, solid-state generators can efficiently convert electrical power into microwave radiation. These generators offer numerous advantages, including their small form factor, extended lifespan, instant startup, and reduced maintenance requirements.
- Microwave solid-state generators provide a reliable, efficient, and compact solution for generating microwave signals, enabling advancements in various fields, including communication, medicine, industry, and scientific research.



# Principle

- The basic principle of microwave solid state generators is to use the nonlinear properties of semiconductor devices to convert direct current (DC) power into microwave power. The most common type of microwave solid state generator is the Gunn diode, which is a type of semiconductor diode that exhibits negative differential resistance (NDR). NDR is a property of a semiconductor device that allows it to amplify microwave signals.
- A Gunn diode microwave generator typically consists of a Gunn diode, a resonant cavity, and a DC power supply. The Gunn diode is placed in the resonant cavity, which is a structure that amplifies the microwave signal generated by the Gunn diode. The DC power supply provides the power to the Gunn diode.
- When the Gunn diode is biased with DC power, it enters a region of operation where it exhibits NDR. This causes the Gunn diode to amplify the microwave signal that is present in the resonant cavity. The amplified microwave signal is then extracted from the resonant cavity and used for further processing or applications.
- Microwave solid state generators have a number of advantages over traditional microwave generators, such as vacuum tubes. They are smaller, lighter, and more efficient. They also have a longer lifetime and are less expensive to operate.

# Key Features

- Designed for industry heating, drying and plasma processes
- Frequency band 2400 MHz – 2500 MHz.
- Maximum 1150 W output power.
- 20 W – 1150 W setting range in 5 W steps.
- Flexible signal generator with CW or Pulse.
- Protected against total mismatch (isolator)
- High efficiency water cooling mechanical design.
- Interlock (one or two channel)
- Knob switch to turn on the generator (lockable)
- Local or remote operation
- Measuring of forward and reverse power
- All connectors on the back side

# Working Principle

## ■ Oscillation

The generation of microwave signals begins with an oscillation circuit. This circuit consists of a microwave diode, such as a Gunn diode or an IMPATT diode. These diodes are specially designed to exhibit a negative resistance characteristic, which allows them to oscillate at microwave frequencies.

## ■ Biasing

The oscillation circuit is biased using a DC power supply. The biasing provides the necessary voltage and current conditions for the diode to oscillate and generate a microwave signal.

## ■ Amplification

The generated microwave signal from the oscillation circuit is usually weak and requires amplification to achieve the desired power level. This amplification is accomplished using high-power transistors, such as field-effect transistors (FETs) or bipolar junction transistors (BJTs).

# Working Principle

## ■ Matching Networks

To optimize the power transfer and impedance matching between different components, matching networks are used. These networks ensure that the output of the oscillation circuit and the input of the amplifier are properly matched to maximize power transfer and minimize signal reflections.

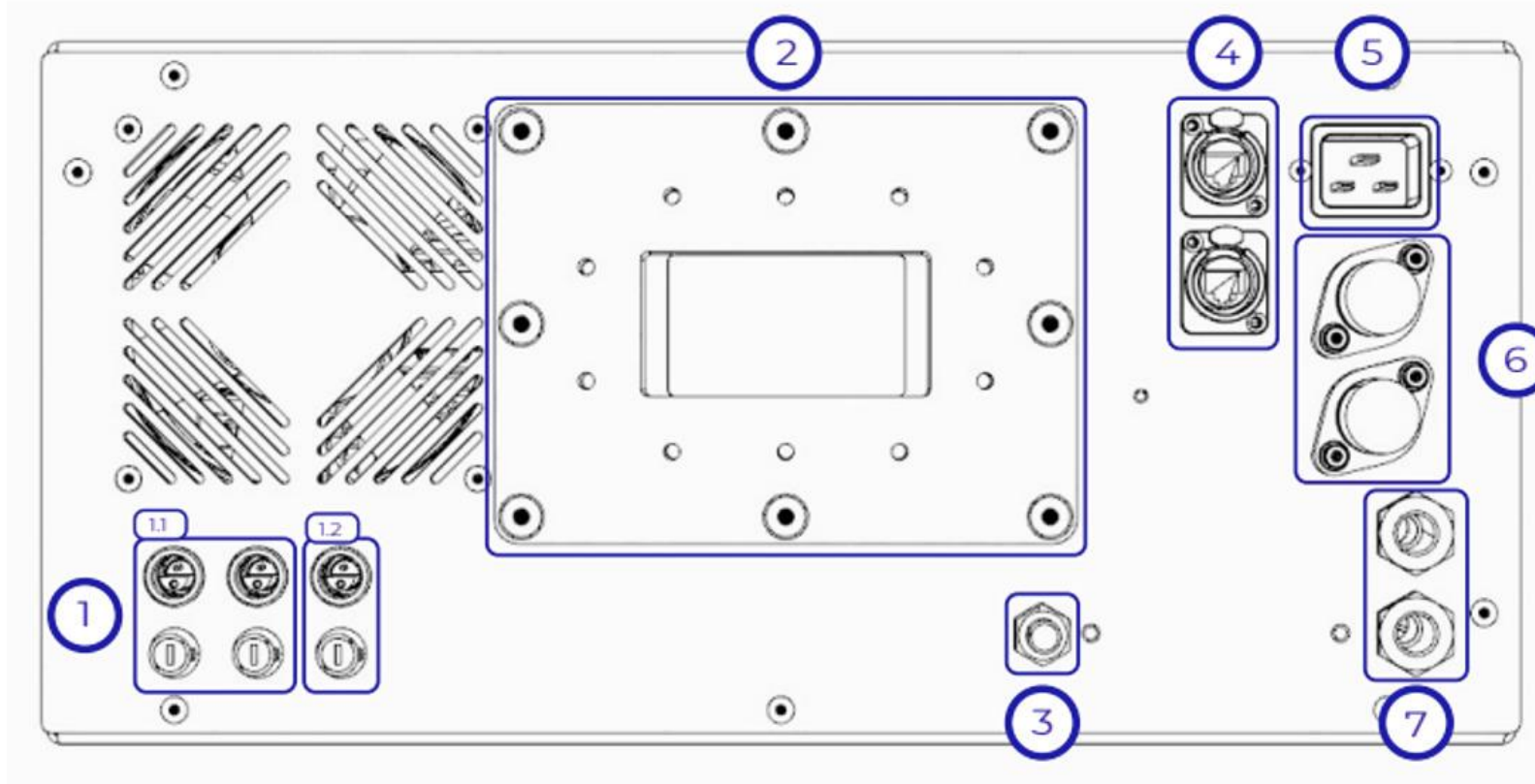
## ■ Power Control and Modulation

Depending on the application, microwave solid-state generators may include power control and modulation capabilities. Power control allows for adjusting the output power level, while modulation enables the superimposition of data or information onto the microwave signal for various modulation schemes like amplitude modulation (AM), frequency modulation (FM), or phase modulation (PM).

## ■ Filtering and Output

The amplified microwave signal may undergo filtering to remove any unwanted harmonics or noise. Finally, the filtered signal is provided as the output of the solid-state generator.

# Working Principle



# Advantages

## ■ Compact Size

Solid-state generators are generally more compact and space-efficient compared to vacuum tube-based generators. They integrate multiple functions and components into a smaller form factor, making them suitable for applications where space is limited.

## ■ Lightweight

Solid-state generators are lighter in weight compared to vacuum tube-based systems. This makes them more portable and easier to install or transport, particularly in mobile or field applications.

## ■ High Efficiency

Solid-state technology allows for higher power efficiency compared to vacuum tube-based generators. Solid-state components, such as transistors and diodes, have better power conversion efficiency, resulting in reduced power consumption and lower operating costs.

# Advantages

## ▪ Enhanced Reliability

Solid-state generators are known for their improved reliability and longer lifespan. Solid-state components have no moving parts, reducing the risk of mechanical failure. They also have a lower susceptibility to environmental factors like vibration or shock.

## ▪ Faster Start-up Time

Solid-state generators have faster warm-up and startup times compared to vacuum tube-based systems. They reach operational stability quickly, allowing for rapid system activation and reducing downtime.

## ▪ Greater Frequency Range

Solid-state technology enables generators to cover a broader frequency range, from lower microwave frequencies up to millimeter-wave frequencies. This versatility makes solid-state generators suitable for a wide range of applications across various industries.



# Advantages

## ■ Precise Control

Solid-state generators offer precise control over the generated microwave signal. They provide stable and consistent output power levels, frequency control, and modulation capabilities, allowing for accurate and controlled signal generation.

## ■ Lower Maintenance Requirements

Solid-state generators generally have lower maintenance requirements compared to vacuum tube-based systems. With fewer components and no filament or cathode replacement needs, they require less frequent servicing and reduce overall maintenance costs.

## ■ Improved Safety

Solid-state generators have improved safety features compared to vacuum tube-based systems. They operate at lower voltages and currents, reducing the risk of electrical hazards. Additionally, they do not require high-voltage power supplies or cooling systems associated with vacuum tube technology.

# Application

## ■ Medical Imaging

Solid-state generators are used in medical imaging technologies such as magnetic resonance imaging (MRI) and positron emission tomography (PET). They generate microwave signals that are utilized in the imaging process, aiding in the diagnosis and treatment of various medical conditions.

## ■ Scientific Research

Solid-state generators are used in research laboratories for scientific experiments and studies. They provide microwave signals for various applications such as spectroscopy, materials characterization, plasma research, and particle accelerators.

## ■ Industrial Heating

Solid-state generators find application in industrial processes that require microwave heating, such as drying, curing, and sterilization. They generate high-power microwave signals for heating materials rapidly and uniformly.

# Application

## ▪ Telecommunications

Solid-state generators are used in wireless communication systems, including cellular networks, satellite communication, and microwave links. They provide stable and reliable microwave signals for transmitting and receiving data over long distances.

## ▪ Radar Systems

Solid-state generators are employed in radar systems for military and civilian applications. They generate microwave signals for radar transmitters, enabling detection, tracking, and imaging of objects in the air, on land, or at sea.

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# Application

## ▪ Automotive Radar

Solid-state generators are used in automotive radar systems for advanced driver assistance systems (ADAS) and autonomous vehicles. They provide the necessary microwave signals for collision avoidance, adaptive cruise control, and other radar-based safety features.

## ▪ Space Applications

Solid-state generators are employed in space-based communication systems and satellite payloads. They generate microwave signals for transmitting and receiving data between satellites, ground stations, and other space-based platforms.

## ▪ Defence and Military

Solid-state generators are used in defense applications such as electronic warfare, radar systems, missile guidance, and communication systems. They provide reliable microwave signals for military operations and surveillance.

# Conclusion

- Microwave solid-state generators offer numerous advantages in terms of their compact size, high efficiency, reliability, precise control, and broader frequency range. These generators are constructed by integrating various solid-state components, such as transistors and microwave diodes, into a cohesive system. They are designed to generate microwave signals with controllable power output, modulation capabilities, and frequency stability.
- The construction process involves assembling components on a circuit board or substrate, including the microwave oscillation circuit, high-power amplifier, matching networks, control circuitry, and filtering circuitry. The generator is housed in an enclosure for protection and may incorporate cooling systems, power supply units, and safety features.
- Microwave solid-state generators are versatile and reliable tools for generating microwave signals in a wide range of applications. Their compact size, efficiency, and precise control make them valuable assets in the field of microwave technology.

# Trusted Partner of following consultants...





# Our Clients...

# Serving Across Borders...







**KEIRONE**



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