

Our 2 Part E-Tender No. IPR/TPT/TN/ET/F/18-19/57 dated 19-03-2019 for Supply of 1000 W Power 13.56 MHz RF Generator with its Impedance Matching Network alongwith its accessories and 5000 W Power 13.56 MHz RF Generator with its Impedance Matching Network alongwith its accessories

**SECTION - C**

**TECHNICAL SPECIFICATIONS OF STORES AND DRAWINGS.**

Technical Specifications for  
Supply of 1000 W Power 13.56 MHz RF Generator with  
its Impedance Matching Network – 2 Nos. and 5000 W  
Power 13.56 MHz RF Generator with its Impedance  
Matching Network – 1 No.



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**Our 2 Part E-Tender No. IPR/TPT/TN/ET/F/18-19/57 dated 19-03-2019 for Supply of 1000 W Power 13.56 MHz RF Generator with its Impedance Matching Network alongwith its accessories and 5000 W Power 13.56 MHz RF Generator with its Impedance Matching Network alongwith its accessories**

**Technical Specifications of Supply, Factory Acceptance Tests and Site Acceptance Test of 1000 W Power 13.56 MHz RF Generator with its Impedance Matching Network and 5000 W Power 13.56 MHz RF Generator with its Impedance Matching Network**

RF generators along with matching network unit are intended for use of inductive and helicon RF plasma experiments for basic plasma and technological application in laboratory scale. The rf plasma experiments will be done for basic plasma physics studies and characterization studies.

**1. Supply of 1000 W (1 kW) power 13.56 MHz rf generator along with matching network unit Quantity: 2 Nos.**

**A. Specifications for 1000 W (1kW) power 13.56 MHz rf generator**

Maximum output power	: 1000 W continuous into a 50 $\Omega$ load
Reflected power limit	: 300 W or more
Frequency	: 13.56 MHz $\pm$ 0.005%
Output impedance	: 50 $\Omega$
RF output connector	: Type N female 50 $\Omega$
Modes of operation	: Continuous as well as pulsed, Manual as well as remote
I/O interface	: RS 232 or any standard interface
Power control	: Analog control system allows power control or external feedback control
Harmonic output	: better than -30dB of fundamental
Display	: LCD/VFD display with Forward and reflected power, $C_L$ , $C_T$ , unit status (Load and Tune capacitors).
Data logging	: Forward power, reflected power, $C_L$ , $C_T$ , output current and Voltage (Load and Tune capacitors).
Primary AC power source	: 230V AC, 50Hz
Cooling system	: Air cooling
Operating temperature	: 10-35 $^{\circ}$ C
Standards:	
Safety	: IEC 215 or equivalent shall be complied
Emissions ---EN50081-2	:1995 or equivalent / mention as per latest applicable
Immunity -EN50082-2	:1995 or equivalent / mention as per latest applicable
Accessories to be supplied	: Cables, operation manual, service manual.
Size and Dimensions	: Compatible with 19" rack mounting

**B. Specifications for 1000 W (1kW) power 13.56 MHz rf Impedance matching network**

Frequency	: 13.56MHz
RF power	: 1000W
Load impedance	: Resistive part 1 to 45 $\Omega$ Reactive part -j 200 to +j 30
Modes of operation	: Stand alone operation
User control	: Auto and Manual
Input impedance	: 50 $\Omega$

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Input connector	: Type N female
Output connector	: 7/18 DIN or better female connector
Capacitor type and its current rating	: Vacuum variable capacitor
Operating temperature	: 10-35 °C
Power required	: 230VAC 50Hz single phase
Cooling	: Air or Water cooling
Accessories to be supplied	: Cables and connectors, Operation manual, service manual.

RF generators along with matching network unit are intended for use of inductive and helicon RF plasma experiments for basic plasma and technological application in laboratory scale. The rf plasma experiments will be done for basic plasma physics studies and characterization studies.

**2. Supply of 5000 W (5 kW) power 13.56 MHz rf generator along with matching network unit [Quantity - 1No.]**

**A. Specifications for 5000 W (5 kW) power 13.56 MHz rf generator**

Maximum output power	: 5 KW continuous into a 50 $\Omega$ load
Reflected power limit	: 1000 W or more
Frequency	: 13.56 MHz $\pm$ 0.005%
Output impedance	: 50 $\Omega$
RF output connector	: Specify connector
Modes of operation	: Continuous as well as pulsed, Manual as well as remote
I/O interface	: RS 232 or any standard interface
Power control	: Analog control system allows power control knob or external feedback control
Harmonic output	: better than -30dB of fundamental
Display	: LCD/VFD display with Forward and reflected power, $C_L$ , $C_T$ , unit status (Load and Tune capacitors).
Data logging	: Forward power, reflected power, $C_L$ , $C_T$ , output current and Voltage (Load and Tune capacitors)
Primary AC power source	: 3 Phase 415V AC
Cooling system	: Air or Water cooling (provide requirements)
Operating temperature	: 10-35 °C
Standards:	
Safety	: IEC 215 or equivalent
Emissions -EN50081-2	: 1995 or equivalent / mention as per latest applicable
Immunity -EN50082-2	: 1995 or equivalent / mention as per latest applicable
Accessories to be supplied	: Cables and connectors, operation manual, Service manual.
Size and Dimensions	: Compatible with 19" rack mounting unit are preferred or specify the unit dimensions

**B. Specification for 5000 W (5 kW) power 13.56 MHz Impedance matching network**

Frequency	: 13.56 MHz
RF power	: 5 KW
Load impedance	: Resistive part 2.5 to 45 $\Omega$ Reactive part - j 200 to +j 30
Modes of operation	: Stand alone operation

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User control	: Auto or Manual
Input impedance	: 50 $\Omega$
Input connector	: Specify
Output connector	: Specify
Capacitor type and its current rating	: Vacuum variable capacitor
Operating temperature	: 10-35 $^{\circ}\text{C}$
Power required	: Specify details required like it uses from main RF power Source / 230V, 50Hz, 1-Phase / 415V 50Hz, 3 Phase.
Cooling	: Air or Water cooling (provide requirements)
Accessories to be supplied	: Cables and connectors, Operation manual, service manual.

**Factory Acceptance Tests:**

Vendor should provide the following test reports to IPR before dispatch for approval. IPR will issue the dispatch clearance letter after verification of the same.

**1. 1 kW rf power supply with matching network**

- Output power testing (1000 W maximum)
- Frequency test (13.56 MHz  $\pm$  0.005%)
- Reflected power protection test (300W or more)

**2. 5 kW rf power supply with matching network**

- Output power testing (5000 W maximum)
- Frequency test (13.56 MHz  $\pm$  0.005%)
- Reflected power protection test (1000 W or more)

**Acceptance tests at IPR:**

The vendor shall demonstrate the following features of the RF unit with matching network during installation at IPR.

**1. 1 kW rf power supply with matching network**

- Output power testing (1000 W maximum)
- Frequency test (13.56 MHz  $\pm$  0.005%)
- Reflected power protection test (300W or more)
- Testing of impedance matching with one dummy load.

**2. 5 kW rf power supply with matching network**

- Output power testing (5000 W maximum)
- Frequency test (13.56 MHz  $\pm$  0.005%)
- Reflected power protection test (1000 W or more)
- Testing of impedance matching with one dummy load.

**Guarantee /Warranty:** All the supplied products must be given warrantee **at least 1year** after the acceptance.

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## Compliance Statement

### Compliance Statement for Supply, Factory Acceptance Tests and Site Acceptance Test of 1000 W Power 13.56 MHz RF Generator with its Impedance Matching Network and 5000 W Power 13.56 MHz RF Generator with its Impedance Matching Network

**Bidder must submit compliance statement dully filled with exact technical values of each specifications (Not with OK, CONFIRM, COMPLY, ACCEPTABLE) alongwith official seal and signature with their offer.**

**1. Supply of 1000 W (1 kW) power 13.56 MHz rf generator along with matching network unit Quantity : 2 no**

#### **A. Specifications for 1000 W (1kW) power 13.56 MHz rf generator**

IPR specifications	Vendors specification
Maximum output power : 1000 W continuous into a 50 Ω load	
Reflected power limit : 300 W or more	
Frequency : 13.56 MHz ± 0.005%	
Output impedance : 50 Ω	
RF output connector : Type N female 50 Ω	
Modes of operation : Continuous as well as pulsed, Manual as well as remote	
I/O interface : RS 232 or any standard interface	
Power control : Analog control system allows power control or external feedback control	
Harmonic output : better than -30dB of fundamental	
Display: LCD/VFD display with Forward and reflected power, C <sub>L</sub> , C <sub>T</sub> , unit status (Load and Tune capacitors).	
Data logging : Forward power, reflected power, CL, CT, output current and voltage (Load and Tune capacitors).	
Primary AC power source : 230V AC, 50Hz	
Cooling system : Air cooling	
Operating temperature : 10-35 °C	
Standards: Safety : IEC 215 or equivalent shall be complied Emissions ---EN50081-2:1995 or equivalent / mention as per latest applicable Immunity -EN50082-2 :1995 or equivalent / mention as per latest applicable	
Accessories to be supplied: Cables, operation manual, service manual.	
Size and Dimensions : Compatible with 19" rack mounting	

#### **B. Specifications for 1000 W (1kW) power 13.56 MHz rf Impedance matching network**

Frequency : 13.56MHz	
RF power : 1000W	
Load impedance : Resistive part 1 to 45 Ω Reactive part -j 200 to +j 30	
Modes of operation : Stand alone operation	

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User control	: Auto and Manual	
Input impedance	: 50 Ω	
Input connector	: Type N female	
Output connector	: 7/18 DIN or better female connector	
Capacitor type and its current rating	: Vacuum variable capacitor	
Operating temperature	: 10-35 °C	
Power required	: 230VAC 50Hz single phase	
Cooling	: Air or Water cooling	
Accessories to be supplied:	Cables and connectors, Operation manual, service manual.	

**2 . Supply of 5000 W (5 kW) power 13.56 MHz rf generator along with matching network unit [Quantity - 1No.]**

**A. Specifications for 5000 W (5 kW) power 13.56 MHz rf generator**

<b>IPR specifications</b>	<b>Vendors specification</b>
Maximum output power	: 5000 W continuous into a 50 Ω load
Reflected power limit	: 1000 W or more
Frequency	: 13.56 MHz ± 0.005%
Output impedance	: 50 Ω
RF output connector	: Specify connector
Modes of operation	: Continuous as well as pulsed, Manual as well as remote
I/O interface	: RS 232 or any standard interface
Power control	: Analog control system allows power control or external feedback control
Harmonic output	: better than -30dB of fundamental
Display	: LCD/VFD display with Forward and reflected power, C <sub>L</sub> , C <sub>T</sub> , unit status (Load and Tune capacitors).
Data logging	: Forward power, reflected power, C <sub>L</sub> , C <sub>T</sub> , output current and voltage (Load and Tune capacitors).
Primary AC power source	: 3 Phase 415V AC
Cooling system	: Air or Water cooling (provide requirements)
Operating temperature	: 10-35 °C
Standards:	
Safety	: IEC 215 or equivalent shall be complied
Emissions	---EN50081-2:1995 or equivalent / mention as per latest applicable
Immunity	-EN50082-2 :1995 or equivalent / mention as per latest applicable
Accessories to be supplied:	Cables, operation manual, service manual.
Size and Dimensions	: Compatible with 19" rack mounting unit are preferred or specify the unit dimensions

**B. Specification for 5000 W (5 kW) power 13.56 MHz Impedance matching network**

Frequency	: 13.56MHz	
RF power	: 5000W	
Load impedance	: Resistive part 2.5 to 45 Ω	

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Reactive part	-j 200 to +j 30	
Modes of operation	: Stand alone operation	
User control	: Auto and Manual	
Input impedance	: 50 Ω	
Input connector	: Specify	
Output connector	: Specify	
Capacitor type and its current rating	: Vacuum variable capacitor	
Operating temperature	: 10-35 °C	
Power required	: Specify details required like it uses from main RF power Source / 230V, 50Hz, 1-Phase / 415V 50Hz, 3 Phase	
Cooling	: Air or Water cooling(provide requirements)	
Accessories to be supplied	: Cables and connectors, Operation manual, service manual.	

<b>Factory Acceptance Tests:</b>		
<b>IPR requirements</b>		<b>Vendor specifications</b>
Vendor should provide the following test reports to IPR before dispatch for approval. IPR will issue the dispatch clearance letter after verification of the same.		
<b>3. 1 kW rf power supply with matching network</b> <ul style="list-style-type: none"> <li>➤ Output power testing (1000 W maximum)</li> <li>➤ Frequency test (13.56 MHz ± 0.005%)</li> <li>➤ Reflected power protection test (300W or more)</li> </ul>		
<b>4. 5 kW rf power supply with matching network</b> <ul style="list-style-type: none"> <li>➤ Output power testing (5000 W maximum)</li> <li>➤ Frequency test (13.56 MHz ± 0.005%)</li> <li>➤ Reflected power protection test (1000 W or more)</li> </ul>		
<b>Acceptance tests at IPR :</b>		
The vendor shall demonstrate the following features of the RF unit with matching network during installation at IPR.		
<b>3. 1 kW rf power supply with matching network</b> <ul style="list-style-type: none"> <li>➤ Output power testing (1000 W maximum)</li> <li>➤ Frequency test (13.56 MHz ± 0.005%)</li> <li>➤ Reflected power protection test (300W or more)</li> <li>➤ Testing of impedance matching with one dummy load.</li> </ul>		
<b>4. 5 kW rf power supply with matching network</b> <ul style="list-style-type: none"> <li>➤ Output power testing (5000 W maximum)</li> <li>➤ Frequency test (13.56 MHz ± 0.005%)</li> <li>➤ Reflected power protection test (1000 W or more)</li> <li>➤ Testing of impedance matching with one dummy load.</li> </ul>		
<b>Guarantee /Warrantee:</b> All the supplied products must be given warrantee <b>at least 1year</b> after the acceptance.		

**Authorised Signatory**

**Official Seal & Date:-**