



Order Code - 10501

Klystron Power Supply, is a state-of-the-art solid-state, regulated Power Supply for operating low power Klystrons tube.

It incorporates a number of proprietary features:

1. Regulated Beam Supply and Repeller Supply voltages.
2. LED Digital metering for Beam voltage, current and Repeller voltage.
3. Compact and Reliable.
4. Modular construction for easy maintenance.

In addition to AM and FM modulation of Beam current, a provision for externally modulating the Klystron supply with desired signal waveform has been provided.

Klystron Power Supply utilizes the quality components and rugged construction. A careful handling of the instrument will provide years of trouble free service. The equipment is divided in two parts one is high voltage unit and other is modulation unit. It makes it user friendly.

Technical Specifications

Beam Supply	:	Voltage	:	190 - 420 V DC, Variable
		Current	:	50 mA
		Regulation	:	0.5 % for 10% I/P variation
		Ripple	:	< 5m Vrms
Repeller Supply	:			-10 to -240V DC Variable
Regulation	:			0.25%, for 10% I/P variation
Filament Supply	:			6.3 VDC
Over-Load Trip Current	:			50mA
Modulation	:			AM (Square) FM (Saw-tooth)
Frequency Range	:			500-2000 HZ 50-150 Hz
Amplitude	:			0-110 Vpp 0-60 Vpp
External	:			For External Modulating Signal
Display	:			Digital display for
				1. Beam voltage
				2. Beam Current
				3. Repelled voltage
Modulation Selector	:			CW/AM/FM/EXT/MIC
Connectors	:			a. 8-Pin Octal Socket
				b. BNC for External Modulation
Power Supply	:			230 V AC \pm 10%, 50Hz
Dimensions (mm)	:			315 x 225 x 130

Note: Specifications are subject to change.

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The VSWR meter model is a high gain low noise, tuned voltmeter operating at fixed frequency. It is designed for making standing wave measurement in conjunction with a suitable detector and slotted line or wave guide section. It may be used as null detector in bridge circuit and as fixed frequency indicator. It is calibrated to indicate directly VSWR or dB when used with square law devices such as crystal diode. It is adjusted for operation at 980Hz to 1020 Hz to avoid harmonics of the line frequency.

Technical Specifications	Order Code - 10502
Display	: LCD (16 X 2)
Sensitivity	: 0.1V for 200 input impedance
Noise Level	: Less than 0.02V
Range	: 0 60dB in 10dB steps
Input	: Un-biased low and high impedance crystal biased crystal (200 and 200K)
Display Select	: VSWR 1 9 dB 0 10
Modes	: Normal Audio PC (this mode can be used only with Gunn based bench)
Gain Control	: Adjusts the reference level, variable range 0-10dB (approximately)
Input Connector	: BNC (F)
Input Frequency	: 1000Hz \pm 10%
Power	: 230 Volts AC \pm 10%, 50Hz
Dimension (mm)	: 295 \times 200 \times 95



Gunn Power Supply comprises of an electronically regulated DC Power Supply and a square wave generator designed to operate Gunn oscillator and PIN modulator simultaneously.

The DC voltage is variable from 0 to 10 volts. The frequency of square wave can be continuously varied from 800 to 1200 Hz. The front panel meter can read the Gunn voltage and the current drawn by the Gunn diode.

The Power Supply is designed to protect Gunn diode from reverse voltage application from over voltage transients and from low frequency oscillations.

Technical Specifications	Order Code - 10503
Display	: LCD (16 X 2)
Voltage Range	: 0 to 10V
Current	: 750 mA maximum
Stability	: 0.1 % for + 10% mains variation
Ripple	: 1.0 mV typical
Mode Select	: Continuous wave Internal Modulation (Square wave output), Audio Modulation PC data Modulation
Int. Modulating Frequency	: 800 to 1200 Hz
Int. Modulating Voltage	: 0 10 Vpp variable
Output Connector	: BNC for Gunn Bias
PC-Interface	: RS232
Dimension (mm)	: 285 X 200 X 95



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Order Code - 10501
Klystron Power Supply



Order Code - 10502
VSWR Meter



Order Code - 10503
Gunn Power Supply



Order Code - 10504
Coaxial WaveGuide Adaptor

Adaptors transform waveguide impedance to coaxial impedance. Adaptors consist of a short section of waveguide with a probe transition mounted on broad wall. Power can be transmitted in either direction. Each adaptor covers the 50% of the waveguide.

Band	X
Frequency Range	(GHz) 8.2-12.4
Waveguide	WR-90
Flange	UG-39/U
Connector	N Type (F)
VSWR Max.	1.12 At 10.5GHz
Return Loss	-24.5 At 10.5GHz



Order Code - 10505
Cooling Fan



Order Code - 10506
Cross Directional Coupler 20 dB

Cross Directional Coupler consists of two waveguide sectional joint at (90°) with the coupling element mounted into the common broad wall.

Band	C	X
Frequency Range(GHz)	3.95-5.85	8.2-12.4
Waveguide	WR-187	WR-90
Flange	UG-149/U	UG-39/U
Coupling (dB)	20 dB	20 dB
Directivity (Min)	25 dB	25 dB
Coupling Accuracy	±1dB	± 1dB



Order Code - 10507
Detector Mount

The crystal detector can be used for the detection of microwave signal. At low level of microwave power, the response of each detector approximates to square law characteristics and may be used with a high gain selective amplifier having a square law meter calibration.

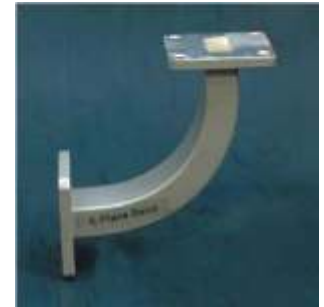
Band	C	J	X
Frequency Range(GHz)	3.95-5.85	5.85-8.2	8.2-12.4
Waveguide	WR-187	WR-137	WR-90
Flange	UG-149/U	UG-344/U	UG-39/U
Detector	IN21(any equivalent)	IN21 (any equivalent)	IN21(any equivalent)
Output Connector	BNC (F)	BNC (F)	BNC (F)



Order Code - 10508
Dielectric Antenna



Order Code - 10510
E-Plane Sectoral Horn Antenna



Order Code - 10509
E-Plane Bend

In measurements it is often necessary to bend a waveguide by some angle. Waveguide bends in E and H plane of 90° is normally available. Waveguide bends designed by a section of rectangular waveguide and flange.

Band	C	X
Frequency Range(GHz)	3.95-5.85	8.2-12.4
Waveguide	WR-187	WR-90
Flange	UG-149/U	UG-39/U
VSWR Max.	--	1.25 At 10.5GHz
Return Loss	--	-25.7 dB At 10.5GHz

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**Order Code - 10511
E Plane Tee**

Tees are used to combine power from two input or divided the microwave power from one input to two output lines. Tee is an intersection of three waveguides in the form of alphabet T.

Band	X
Frequency Range(GHz)	8.2-12.4
Waveguide	WR-90
Flange	UG-39/U
Max. Length of cell	200 mm
Plunger Movement	65 mm



**Order Code - 10512, 10513, 10514
Fixed Attenuators 3dB, 6dB, 10dB**

Attenuators are required to adjust power or attenuate the power flowing in waveguide. There are two type of attenuators fixed and variable. Fixed attenuators available in various range like 3dB, 6dB, 10dB etc. These attenuators are calibrated at center frequency of respective frequency band. By Variable attenuators power can be adjusted for different level.

Band	C	X
Frequency Range(GHz)	3.95-5.85	8.2-12.4
Waveguide	WR-187	WR-90
Flange	UG-149/U	UG-39/U
VSWR Max.	1.08	1.06 At 10.5GHz
Av. Power 2W 2W		
Accuracy	± 0.5 dB	± 0.5 dB
Return Loss	--	31 dB At 10.5GHz

**Order Code - 10515
Fixed Short**



**Order Code - 10516
Direct Reading Frequency Meter**

Direct Reading frequency meters are used to measure the microwave frequency accurately. There long scale length and numbered calibration marks provide high resolution which is particularly useful when measuring frequency difference of small frequency changes

Band	C	X
Frequency Range(GHz)	3.95-5.85	8.2-12.4
Waveguide	WR-187	WR-90
Flange	UG-149/U	UG-39/U
Calibration Accuracy	--	±2%
Calibration Increment	--	5 MHz
Max. VSWR	--	1.28 At 10.5GHz
Return Loss	---	18.2 At 10.5GHz



**Order Code - 10517
Gunn Oscillator**

Gunn Oscillators are used to generate the microwave signal and its Micrometer is used to tune the output frequency of Gunn oscillator.

Band	C	X
Frequency(GHz)	3.95-5.85	8.2-12.4
Waveguide	WR187	WR-90
Flange	UG-149/U	UG-39/U
Pushing Factor	8 MHz/V	--
Bias Voltage max.	10V	10V
Normal Power Output	5mW	10mW
Temp. Coefficient	±0.2MHz/°C	--
Output Connection	BNC(F)	BNC(F)
Frequency Adjustment	By Micrometer	By Micrometer



**Order Code - 10518
H Plane Bends**

Band	C	X
Frequency Range(GHz)	3.95-5.85	8.2-12.4
Waveguide	WR-187	WR-90
Flange	UG-149/U	UG-39/U
VSWR Max.	--	1.06 At 10.5GHz
Return Loss	--	-31 dB At 10.5GHz



**Order Code - 10519
H Plane Sectoral Horn Antenna**

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**Order Code - 10520
H Plane Tee**

Band	C	X
Frequency Range(GHz)	3.95-5.85	8.2-12.4
Waveguide	WR-187	WR-90
Flange	UG-149/U	UG-39/U



Order Code - 10521 Ferrite Isolator
Order Code-10542 T Circulator
Order Code-10548 Y Circulator

The ferrites isolators and circulators are matched 2 port and 3 port devices respectively, which offer low insertion loss and high isolation over 1GHz band width. An isolator is a 2 port device which allows signals from port 1 to port 2 & provides maximum attenuation for transmission from port 2 to 1. A circulator is a three port device which has a peculiar property of coupling power to the adjacent port clockwise

Band	C	J	X
Frequency Range	3.95-5.8	5 5.85-8.2	8.2-12.4
Waveguide	WR-187	WR-137	WR-90
Flange	UG-149/U	UG-344/U	UG-39/U
Max. VSWR	1.2	--	1.15
Min. Insertion			
Loss	0.4dB	--	0.46 dB
Min. Isolation	20dB	--	20 dB
Return Loss	--	--	22.4



Order Code - 10524
Magic Tee

Band	X
Frequency Range	8.2-12.4
Waveguide	WR-90
Flange	UG-39/U



Order Code - 10527, 10528,
Multihole Directional Coupler (3dB, 10dB)

Directional coupler are designed to measure incident and reflected power values and also provide a signal path to a receiver or perform other desirable operation. In its most common form, the directional coupler is a four port waveguide junction consisting of a primary main waveguide and a secondary auxiliary waveguide. These are available in 3, 6, 10, 20, 40 dB coupling.

Band	X
Frequency Range(GHz)	8.2-12.4
Waveguide	WR-90
Flange	UG-39/U
VSWR Max.	1.06 At 10.5GHz
Return Loss	-31 dB At 10.5GHz
Coupling (dB)	10.1 ± 0.6
Directivity (Min)	46.0 dB (3%)

Note: Specifications are subject to change.



Order Code - 10522
Klystron Mount

Klystron mounts are used to transmit microwave power from reflex klystron tube to rectangular waveguide. Klystron mounts are designed by a section of waveguide, one end of waveguide is fitted with a movable short plunger. A small hole on the broad wall of waveguide is provided through which coupling pin of reflex klystron tube enters into the waveguide. By moving plunger (matching the impedance of klystron tube and waveguide) maximum output can be achieved.

Band	C	J	X
Frequency(GHz)	3.95-5.8	5 5.85-8.2	8.2-12.4
Waveguide	WR-187	WR-137	WR-90
Flange	UG-149/U	UG-344/U	UG-39/U



Order Code - 10525
Matched Termination

Matched terminations are used to terminate the waveguide transmission line operating at low average power. The loads are carefully designed to absorb all the applied power and VSWR of matched termination is low. These are used in the measurement of reflection coefficient and where the matched load is required.

Band	C	J	X
Frequency(GHz)	3.95-5.85	5.85-8.2	8.2-12.4
Waveguide	WR187	WR-137	WR-90
Flange	UG-149/U	UG-344/U	UG-39/U
VSWR	(1.02)	(1.02)	1.03 At 10.5GHz -33dB At 10.5GHz
Return Loss	--	--	
Av. Power	2W	2W	2W
Type	Fixed	Fixed	Fixed



Order Code - 10529 -Parabolic Dish Antenna

Order Code - 10523
Liquid Dielectric Cell

Band	X
Frequency Range(GHz)	8.2-12.4
Waveguide	WR-90
Flange	UG-39/U
Max. Length of cell	200 mm
Plunger Movement	65 mm



Order Code - 10526 - Movable Shorts
Order Code - 10533 - Precision Movable Short

Movable shorts are used to obtain a phase reference in the calibration of various experimental setups. These are also used to vary the effective plane of reflection and therefore the phase of reflected wave. Movable shorts are used to measure the impedance of a device. Movable shorts are of two types one has no provision to record position of short in the waveguide and other type of movable short is precision movable short in which position of short can be accurately recorded from micrometer.

Band	C	J	X
Frequency (GHz)	3.95-5.85	5.85-8.2	8.2-12.4
Waveguide	WR-187	WR-137	WR-90
Flange	UG-149/U	UG-344/U	UG-39/U
Reflection Coefficient (0.98)	(0.98)	(0.98)	0.98



Order Code - 10530 Phase Shifter

Many applications require phase shift to be introduced between two given position in a waveguide system. It consists of a dielectric slab or vane specially shaped to minimize reflection effect. Phase shifter are used to change the effective electrical length of transmission line without changing its physical length. They are particularly useful in microwave bridge circuit where the phase and amplitude must be adjusted independently.

Band	J	X
Frequency(GHz)	5.85-8.2	8.2-12.4
Waveguide	WR-137	WR-90
Flange	UG-344/U	UG-39/U
VSWR	(1.3)	1.15 At 10.5GHz
Return Loss	--	-23.1 At 10.5GHz
Calibration Accuracy	(±2.5°)	±2.5°



Order Code - 10531
Pick-up Horn Antenna

Order Code - 10535
Radiation Pattern Turn Table



Order Code - 10536
Slide Screw Tuners

Slide Screw Tuner is a very useful component in a microwave laboratory. It is mainly used for Impedance measurement. Its tuner can be adjusted for low and high impedance position.

Band	J	X
Frequency(GHz)	5.85-8.2	8.2-12.4
Waveguide	WR-137	WR-90
Flange	UG-344/U	UG-39/U
Max.	VSWR -- 20 : 1.02	



Order Code - 10539
Slotted Section

Slotted section is used to measure various measuring parameter in microwave. for example to determine VSWR, phase and impedances. These consists of a slot in center of waveguide in which we can connect a probe and probe can be moved in slot and position of probe can be measured by its Vernier scale. The travel of probe carriage is more than three times of half wavelength.

Band	C	J	X
Frequency Range	3.95-5.8	5.85	-8.2 8.2-12.4
Waveguide	WR-187	WR-137	WR-90
Flange	UG-149/U	UG-344/U	UG-39/U
Residual VSWR	--	--	1.01
Slope (dB)	--	--	± (0.2dB)

Note: Specifications are subject to change.



Order Code - 10532
Pin Modulator

Pin diode modulators are used to provide amplitude or pulse modulation in wide range of microwave to study many applications. These modulators uses PIN diode which is mounted across the waveguide line with RF isolated DC bias lead passing to an external TNC(F)

Band	C	X
Frequency(GHz)	3.95-5.85	8.2-12.4
Waveguide	WR-187	WR-90
Flange	UG-149/U	UG-39/U
Bias Voltage	0-12 Vpp	0-12 Vpp
Output Connector	TNC(F)	TNC(F)



Order Code - 10537
Slotted Broad Wall Antenna



Order Code - 10540
Solid Dielectric Cell

These are used to measure dielectric constant of any solid material these consists of a cavity for keeping the sample and micrometer to read the position of sample.

Band	X
Frequency Range (Ghz)	8.2-12.4
Waveguide	WR-90
Flange	UG-39/U
Max. Length of cell	100 mm
Plunger Movement	25 mm



Order Code - 10534
Pyramidal Horn



Order Code - 10538
Slotted Narrow Wall Antenna



Order Code - 10541
Standard Gain Horn Antenna



Order Code - 10543
Tunable Probe

Tunable probes are very useful devices to measure the SWR and Impedances. Tunable probe is consists of a crystal detector and a small wire antenna in coaxial housing. Its depth of penetration into the slotted section is variable.

Band	C	J	X
Frequency(GHz)	3.95-5.85	5.85-8.2	8.2-12.4
Detector	IN21 I	N23	IN23
Output connector	BNC(F)	BNC(F)	BNC(F)
Type	Tunable	Tunable	Tunable

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Order Code - 10544
Variable Attenuator

10 dB / 20 dB

Band	J	X
Frequency Range(GHz)	5.85-8.2	8.2-12.4
Waveguide	WR-137	WR-90
Flange	UG-344/U	UG-39/U
VSWR Max.	1.08	1.25 At 10.5GHz
Av. Power	2 W	2 W
Return Loss	--	-19.23 At 10.5GHz



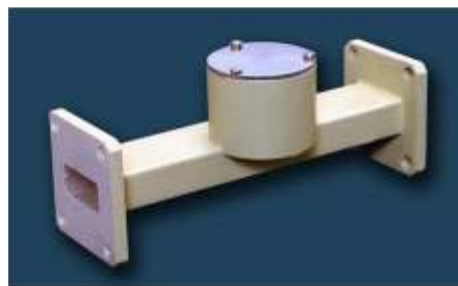
Order Code - 10545
Wave Guide Stand



Order Code - 10546
Waveguide Twist

Waveguide Twist is used to change the plane of Polarization of a wave Guide transmission line . Twist is made from a section of waveguide which has been precisely twisted. 900 twist is a standard available model.

Band	X
Frequency(GHz)	8.2-12.4
Waveguide	WR-90
Flange	UG-39/U
VSWR	1.09 At 10.5GHz
Return Loss	-26.9dB At 10.5GHz



Order Code - 10547
Waveguide Cavity

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