

Design Of Ku/C/L and S Band Cassegrain Feed

Space Applications Centre of ISRO has designed Ku/C/L/S band Cassegrain feed for its own payload missions. These feeds are used in earth station antenna.

Earth station antenna is used to provide communication and/or tracking, telemetry and tele-command to various in-orbit satellites. Earth station antenna for communication and/or tracking for geostationary orbit satellites typically consist of Main reflector, sub-reflector, feed system, LNA, power amplifiers, control units, network control management and its associated circuitry.

One of the most important elements in earth station antenna is feed system. Feed system is used to transmit/receive power from amplifier to sub/main reflector. It also serves to provide the desired radiation patterns to reflectors to achieve the specified gain. Feed system combines / separates

different polarizations and/or transmit/receive/tracking frequency bands. It is the feed system's insertion-loss, return-loss, tracking performance, radiation patterns, polarization and transmit/receive isolation, power handling capability – which determines the overall earth station antenna performance, governs EIRP and G/T.

So, ISRO offers to transfer technology of different feeds to industries in India with adequate experience and facilities. Enterprises interested in obtaining knowhow may write giving details of their present activities, infrastructure and facilities.

Applications

Feed systems for Earth station Antenna

Specifications

Ku band Cassegrain feed for 7.2m antenna

S. No.	Item description	Specifications	
1.	Operating FrequencyReceive	10.70 GHz to 12.00GHz	
	Transmit	12.75 GHz to 14.00GHz	
2.	Feed Type	4 port LP rotatable frequency re-use feed. 2 ports for Tx and 2 ports for Rx.	
3.	Feed Insertion LossReceive	< 0.6dB	
	Transmit	< 0.5dB	
4.	Feed VSWR at feed flange	1.3:1 Typical	
5.	Power Rating	2.4 KW CW Per Port	
6.	Waveguide Interface	Receive	CPR 75 (square flange, four hole)
		Transmit	CPR 75 (square flange, four hole)
7.	Isolation	Tx-Tx	> 35dB
		Rx-Rx	> 35dB
		Tx-Rx	> 85dB
		XPD	> 30dB

Note- Above is the specs of feed system which will be compliant to 7.2m Cassegrain antenna.

C band LP/CP Cassegrain feed for 7.2m and 11m antenna

S. No.	Item description		Specifications
1.	Operating Frequency	Receive Transmit	3.625-4.200 GHz 5.850-6.425 GHz
2.	Feed Type		4 port selectable LP/CP frequency re-use feed. 2 ports for Tx and 2 ports for Rx.
3.	Feed Insertion Loss	Receive Transmit	< 0.9 dB < 0.8 dB
4.	Feed VSWR at feed flange		1.3:1 Typical
5.	Power Rating		2.0 KW CW Per Port
6.	Waveguide Interface	Receive Transmit	WR 137 (for 6 GHz band) WR 229 (for 4 GHz band)
7.	Isolation	Tx-Tx Rx-Rx Tx-Rx XPD	> 35 dB > 35 dB > 85 dB > 30 dB

L and S band Cassegrain feed for 11m antenna

S. No.	Item description		Specifications
1.	Antenna Size and Type		11 meter Cassegrain Antenna
2.	Feed type		4 port circularly polarized L & S Band receive only feed system
3.	Operating Frequency	L Band S Band	1150 to 1650 MHz 2475 to 2540 MHz
4.	Gain at Feed Output		39.4 + 20 log (F/1.15) dBi (L Band Rx) 45.4 + 20 log (F/2.475) dBi (S Band Rx)
5.	G/T at 5 deg. Elevation		17.9 dB/ deg K + 20 log (F/1.15) (L Band) 23.4 dB/ deg K + 20 log (F/2.475) (S- Band)
6.	Polarization (Rx)		Dual Circular (RHCP/LHCP) in both the bands
7.	VSWR		1.5 : 1 Typical in both Receive Bands
8.	Axial Ratio within 1 dB BW		1.5 dB in both Receive Bands
9.	Feed Insertion Loss		<0.9 dB
10.	Rx to Rx port isolation in both bands		20 dB min.
11.	Rx Pattern		Shall conform to ITU-RS 580 ⁻⁵ . Typical first side lobe level shall be better than 14 dB.

Note- Above is the specifications of feed system which will be compliant to 7.2m and 11m Cassegrain antenna.