



## CSU-CHILL is a dual-wavelength S- and X-band radar with a state-of-the-art dual-offset 8.5m antenna

### SALIENT FEATURES

- 2×12 kW S-band solid-state transmitters
- 25 kW Magnetron X-band transmitter
- Ultra-low sidelobe and cross-polarization antenna
- 1° beamwidth at S-band, 0.3° at X-band
- Built-in automatic calibration system
- Customizable signal processing subsystem, with advanced clutter filtering and dual-pol processing
- Dual-wavelength hail signature and rain-rate retrievals

The CSU-CHILL radar measures dual-wavelength, dual-polarization data over a range of > 150 km.

### Dual wavelength

The radar operates at two widely separated wavelengths through a common antenna, allowing differential attenuation measurements.

### Dual offset antenna

The unique dual-offset 8.5m antenna achieves very high cross-pol isolation and ultra-low sidelobes, eliminating many sources of contamination that other radars suffer from.

## Technical Specifications

SYSTEM SPECIFICATIONS	
Radar Type	Dual-pol pulsed Doppler
Polarization Modes	STSR, ATSR, Single-pol
Frequency range	2.725, 9.41 GHz
Beam width	1.0° (S-band), 0.3° (X-band)
Along-range resolution	Typ. 150m, configurable between 15-150m
Sensitivity	-38 dBZ at 1 km
Max. Range	200 km (0 dBZ, 1 km AGL)

ANTENNA	
Type	Offset-fed parabolic
Reflector diameter	8.5 m
Gain (at 2.725 GHz)	45 dBi
Half-power beam width	< 1.0° (S-band)
Gain (at 9.41 GHz)	54 dBi
Half-power beam width	< 0.3° (X-band)
Sidelobes at ±45° planes	< -45 dB
Integrated Cross-pol isolation	< -38 dB (from LDR data)

PEDESTAL	
Type	Elevation over azimuth
Elevation limits	-2° – 90°
Maximum scan rate	18 °/s
Acceleration	6 °/s <sup>2</sup>
Position accuracy	< 0.1°

X-BAND TRANSMITTER	
Type	25 kW Magnetron
Average Power	12 W per channel
Pulse width	0.3-1 μs
Pulse Repetition Frequency	50-2400 Hz, continuously variable

### Radar Site and operations

CSU-CHILL is located in Greeley, CO. The radar is normally operated remotely through its network connection.

The antenna is housed under an inflated 20m tall radome, The S-band transceiver is housed in a 20' ISO shelter, while the X-band transceiver is mounted on the antenna itself.

S-BAND TRANSMITTER	
Amplifier Type	Power-combined GaN FET
Peak power	12 kW (per channel)
Average Power	1.2 kW (per channel)
Pulse width	1-100 μs
Duty Cycle	10% maximum
Phase stability	< 0.5° rms
Pulse Repetition Frequency	50 – 2400 Hz, continuously variable

RADAR FREQUENCY CONVERTER	
Type	Dual-stage, dual-channel IF up/down converter
Noise figure	< 2 dB
Dynamic Range	> 99 dB
Image rejection	> 100 dB (including waveguide filters)
First IF	500 MHz
Second IF	70 MHz
Test and Calibration features	Front-end switch to measure TX output power, noise source for absolute gain calibration

SIGNAL PROCESSING	
Signal processor	CSU DXR+SP
Azimuth averaging	16 – 256 pulses
Clutter filter	Adaptive (GMAP), > 50 dB clutter suppression
Data outputs	All dual-polarization moment data
IF digitization	16 bit, 200 MHz
Number of range bins	Up to 5000
Optional data output	Raw I/Q time-series
Processing modes	Pulse pair, FFT
Range resolution	15m-150m (in 4m steps)

### Contact information

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