SpacePath 750W C-Band Rack Mount TWTA

The new generation of STR Series rack mount TWTAs provide an easy to operate, colour touch screen interface with a multi-functional selector wheel. The colour touch screen display provides clear, easy to read status of the amplifier's operation, including: RF output power monitoring, heater, helix monitoring, & TWT temperature. Set up screens are intuitive and simple to manage and the touch panel allows full local control and monitoring of all amplifier parameters, including automatic level control, system event logging and graphical trend analysis. Remote control operation can be made via RS485 or through an Ethernet interface, and a web page interface is also available. If a redundancy system is required, this can be set up and controlled via the touch screen.
Changes to operating parameters can be locked and password protected if required.

The HPA incorporates a high efficiency multi-collector TWT powered by an advanced power supply built on over 30 years of experience in the design and manufacture of satellite amplifiers. The company's products have an enviable reputation for performance, robust quality and reliable service.

The STR1140 is available with a wide range of options and accessories, backed by round-the-clock, worldwide technical support.

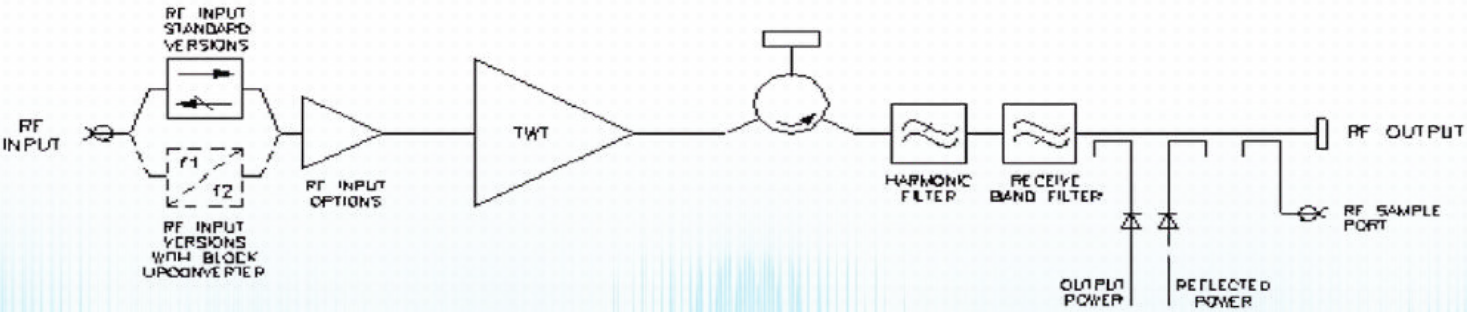
Options

- Integral solid-state amplifier (SSA)
- L-Band Block upconverter
- 10MHz reference
- Lineariser
- Redundant system control
- Quick connect waveguide options

Features

- Compact 4RU enclosure
- Touch screen control
- Ethernet interface
- Remote diagnostics
- Forward and reverse power monitoring
- TWTA performance Data and Event logging

Block Diagram



Performance (without Upconverter)			
Frequency	CC1	5.850 – 6.425 GHz	
	CC2	5.850 – 6.650 GHz	
	CC3	5.850 – 6.750 GHz	
	CC4	5.850 – 7.025 GHz	
	CC5	5.725 – 6.725 GHz	
	CC6	6.725 – 7.025 GHz	
Output Power	TWT output flange	750 W min	
	HPA rated output	650 W min	
Gain		At rated power (A,D, Z option), 70 dB min SSG P_{rated} - 10dB (A,D,Z option), 75 dB min Attenuation range (D,Z option), 25 dB min	
Gain Variation		Full band, 2.5 dB max Over any 40 MHz band, 1.0 dB max	
Slope		0.08 dB/MHz max	
Gain stability 24hrs		0.5 dB max	@ constant drive, temperature and load
Gain stability		2.0 dB max	over full operating temperature
Intermodulation (two equal carriers) with total output = P_{rated} –4dB		Options A, D –18 dBc max Performance with linearised option, Z -26 dBc max	
Harmonic output		-60 dBc max	
AM to PM conversion at P_{rated} –6dB		2.5°/dB	
Inter-modulations (IMD) 2-tone		≤ -18 dBc @ $P_O \leq P_{LIN} - 1$ dB[1] ≤ -26 dBc @ $P_O \leq P_{LIN} - 1$ dB[2]	
Transmit band		–70 dBW/4 kHz max	
Receive band (3.2-4.2 GHz)		-150 dBW/4 kHz max	
Residual AM		<10kHz –50 dBc max 10kHz< f <500kHz –20 (1.5+ log f) dBc max >500kHz -85 dBc max	
Phase Noise		Continuous 10dB lower than IESS phase noise profile AC fundamental -50 dBc max Sum of all spurs -47 dBc max	
Group Delay	Linear	0.01 nsec/MHz, max	
	Parabolic	0.005 nsec/MHz^2, max	
	Ripple	0.5 nsec/Peak-Peak, max	
Input VSWR (operating)		1.3:1 max	
Output VSWR (non-operating)		1.3:1 max	
Load VSWR, no damage		2.0:1 max	

Electrical	
Prime power	Single phase
Voltage	180 to 265 V
Frequency	47 to 63 Hz
Power requirement	2600 VA max
Power factor	0.95 min

Physical	
Dimensions (outline below)	60.98 cm deep x 43.18 cm wide x 17.70 cm height
Weight	35Kg (75lb) typ
Cooling	integral forced-air
RF Input	N-type female
RF Output	CPRG-137G with 10-32 UNC 2B threaded holes
RF Sample port	N-type female
Prime power	C20 Male IEC
RS232	D-Sub 9P
RS485 (4-Wire)	D-Sub 9S
Ethernet	RJ45
Aux Interface	D-Sub 25P
WG Switch	D-Sub 15S
USB Port	USB A

Note: Mating connectors for the mains supply, RS232, RS485, Aux Int and WG Switch are included.

Environmental	
Operating temperature	-10˚C to +50˚C
Derating	2 °C/300 m above sea level (3.6 °F/1000ft)
Storage temperature	-40 to +80 °C
Relative humidity (non-condensing)	95%
Altitude	Operating 4.5 Km (15,000 ft)max Non-operating 12 Km (40,000 ft)max
Shock	IEC Publication 68-2-27 Part 2 test Ea, 25g
Vibration	BS EN 600668-2-64 test Fh, transportation
Acoustic Noise	68 dBa typ
Heat Dissipation	1500W to duct, 350W to room

For operation outside these parameters, refer to ETL Systems for guidance.

Interface		
Controls	Local	AC Power On/Off
	Front panel touch screen	HPA State (Standby, Transmit etc) Gain Automatic Level Control and Go To Power Configuration, single HPA, 1:1 Redundant High/Low power Alarms System Set Up (Front panel touch screen controls include but are not limited to the functions above)
Status	Front panel touch screen	HPA State Forward and Reverse Power TWT Parameters (Temperature, Voltages) Logs and Trend Analysis Fault Conditions Elapsed Hours (Front panel touch screen status include but are not limited to the parameters above)
	Dry-form- C Relay Contacts	Summary Fault
M&S Serial Ethernet		RS232 and RS485 (4-wire) Webpage, TVN, TCP, SNMP
Auxiliary interface		Summary Fault RF Inhibit +24V, +15V Supply
WG Switch		WG Switch drives for 1:1 Redundant System
USB Port		Log and Trend Analysis download

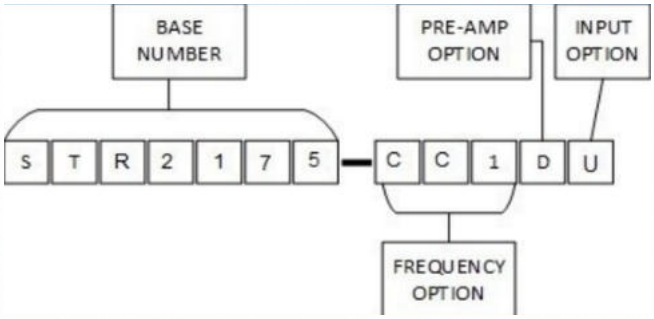
Options
Extensive options are offered with the STR2175 and include; integral pre-amplifiers, gain control, linearisers and block upconverters.

Input Options
The STR2175 can be offered with an L-Band Block Upconverter.
Specify:
N - Standard RF
U - L to C-Band Block Upconverter (see page 5)

Frequency Options
The following frequency options are available

Ref	Frequency Range (GHz)	BUC Option
CC1	5.85—6.425	Yes
CC2	5.85—6.65	Yes
CC3	5.85—6.75	Yes
CC4	5.85—7.025	Yes
CC5	5.725—6.725	Yes
CC6	6.725—7.025	Yes

Note
The upconverter requires the inclusion of the ‘D’ and ’Z’ option



Pre-Amp Option
The pre-amp option can be selected from any of the following:
A - Integral solid-state amplifier (typical SSG 78 dB)
D - As option ‘A’ but includes an attenuator to provide 25 dB (min) of gain control
Z - Integral linearisers that improves the linearity of the HPA,
providing a C/I of typically –26 dBc at 4dB OPBO.
The linearisers also incorporates the pre-amp and gain control options.

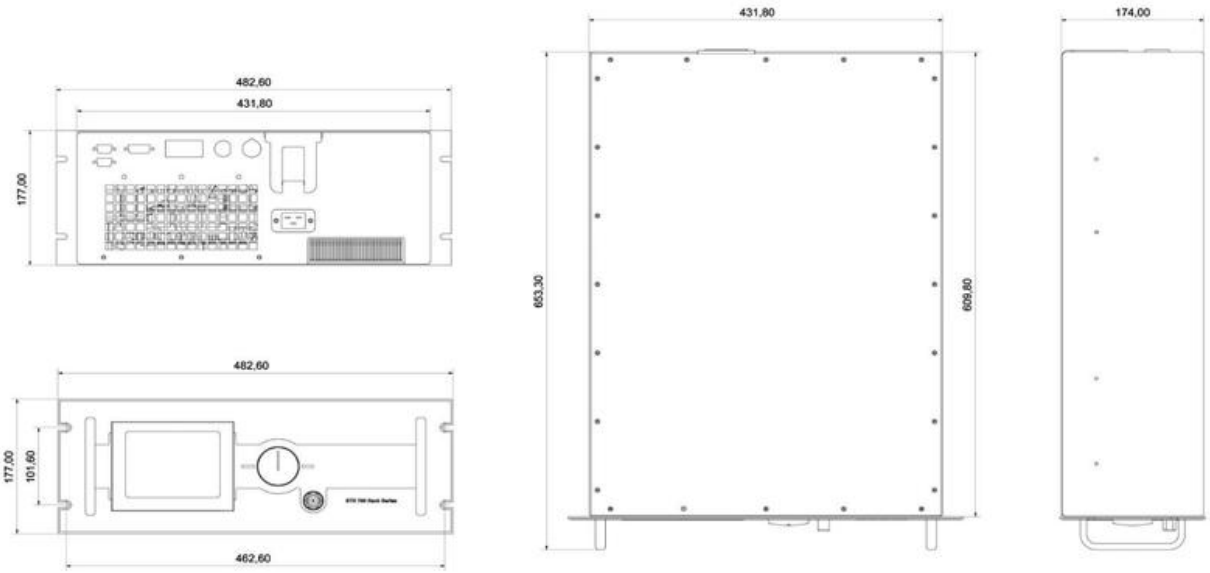
(Consult ETL Systems for availability)

Performance with Integral Block Upconverter		
L-Band input Frequency range option:	CC1	950 to 1525 MHz
	CC2	950 to 1750 MHz
	CC3	950 to 1850 MHz
	CC4	950 to 2125 MHz
	CC5	950 to 1950 MHz
	CC6	950 to 1250 MHz
LO frequency All options		4.9 GHz
External reference (see note):		Frequency 10 MHz Level -3 to +7 dBm Impedance 50 Ω
Gain Variation		Over Any 575 MHz band 4.0 dB max Over any 40 MHz band 1.5 dB max
Phase Noise Continuous		meets IESS phase noise profile
Input VSWR (non-operating)		1.6:1 max

Note
The BUC can be operated without the external reference, typical frequency stability ±0.25 ppm.

Options
Extensive options are offered with the STR1140 and include; integral pre-amplifiers, gain control, linearisers and block upconverters.

Health and Safety Hazards
SpacePath satellite amplifiers are safe to handle and operate provided that the relevant precautions are observed. ETL Systems does not accept responsibility for damage or injury resulting from the use of electronic devices it produces.
High Voltage
Dangerous voltages are present within the TWT amplifier when operating normally. However, the equipment is designed so that personnel cannot come into contact with high voltage circuits unless covers are removed.
RF Radiation
All RF connectors must be correctly fitted before operation.
Beryllia
The TWT in the amplifier contains Beryllium Oxide ceramic parts. These are not accessible unless the TWT casing is damaged. Consult ETL Systems regarding the disposal of damaged or life expired tubes



Note 1: The specification is subject to regular reviews and will be updated from time to time as part of our continuing product development and improved spec accuracy.
Note 2: Operation beyond the quoted limits stated above may cause instantaneous and permanent damage.