# STA1140 Series 400 W, C-Band Antenna Mount TWTA

## STA1140 Series 400 W, C-Band Antenna Mount TWTA

The STA1140 range of C-Band TWT amplifiers from SpacePath Communications provide over 350W of output power in a compact, lightweight, rugged, weatherproof, antenna mount enclosure.

The advanced packaging and cooling techniques (Stellar Cool™, patent pending) enable the unit to operate in extreme environmental conditions from direct rain to direct sunlight. The amplifiers can be simply deployed anywhere in the world, are user-friendly, and incorporate a comprehensive remote control facility as standard, including RS485 and Ethernet options.

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 STA1140 is available with a wide range of options and accessories, backed by round-the-clock, worldwide technical support.

### OPTIONS

- Integral solid-state amplifier (SSA)
- Gain control (requires SSA)
- L-band block upconverter
- Lineariser
- Break-out link for upconverter

### FEATURES

- Advanced cooling design (Stellar Cool™, patent pending) enables operation at +55 °C and in direct sunlight.
- Weatherproof antenna mount construction allows exposed mounting.
- CE compliant
- cETLus listed
- CB certified
- Wide input voltage range – can operate from mains supplies worldwide
- Redundant control – contains control and drive circuits for 1:1 redundancy
- Stand-alone setting – automatically sequences to transmit mode
- Round-the-clock hotline support
- Wide range of accessories including: controllers, waveguide networks, cable assemblies.

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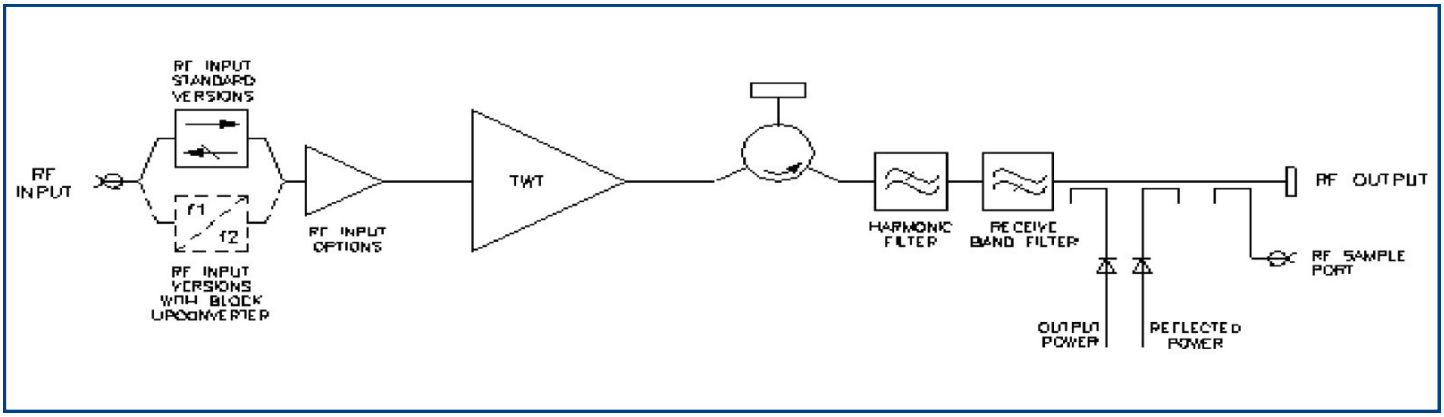
## BLOCK DIAGRAM




## PERFORMANCE (Without Upconverter)

| | | |
|---|---|---|
| Frequency range: | | |
| standard – CC1 | 5.850 to 6.425 | GHz |
| extended – CC2 | 5.850 to 6.650 | GHz |
| extended – CC3 | 5.850 to 6.725 | GHz |
| extended – CC4 | 5.850 to 7.025 | GHz |
| extended – CC5 | 5.725 to 6.725 | GHz |
| Output power: | | |
| TWT output flange | 400 | W min |
| HPA rated output | 350 | W min |
| Gain: | | |
| at rated power (C option) | 45 | dB min |
| at rated power (A, D, Z option) | 70 | dB min |
| SSG $P_{rated}$–10 dB (C option) | 50 | dB min |
| SSG $P_{rated}$–10 dB (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 (constant drive, temperature and load) | 0.5 | dB max |
| Gain stability over full operating temperature | 2.0 | dB max |
| Intermodulation (two equal carriers) with total output = $P_{rated}$–4 dB: | | |
| options C, A, D | -18 | dBc max |
| performance with linearised option, Z | -24 | dBc max |
| Harmonic output | -60 | dBc max |
| AM to PM conversion at $P_{rated}$–6 dB | 2.5 | °/dB |
| Noise power: | | |
| transmit band | -70 | dBW/4 kHz max |
| receive band (3.2 – 4.2 GHz) | -150 | dBW/4 kHz max |
| Residual AM: | | |
| <10 kHz | -50 | dBc max |
| 10 kHz< f <500 kHz | -20(1.5+log f ) | dBc max |
| >500 kHz | -85 | dBc max |
| Group delay: | | |
| linear | 0.01 | ns/MHz |
| parabolic | 0.005 | $ns/MHz^2$ |
| ripple | 0.5 | ns p-p |
| Phase noise: | | |
| continuous | 10 dB lower than IESS phase noise profile | |
| AC fundamental | -50 | dBc |
| sum of all spurs | -47 | dBc |
| 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, line-neutral or line-line | |
| Voltage | 99 to 265 | V |
| Frequency | 47 to 63 | Hz |
| Power requirement | 1500 | VA max |
| Power factor | 0.95 | min |

## MECHANICAL

| | | |
|---|---|---|
| Weight | 25.0 kg (55 lb) typ | |
| Dimensions | see outline | |
| Cooling | integral forced-air | |

## CONNECTORS

| | |
|---|---|
| RF input | N-type female |
| RF output | CPR137G with 10-32 UNF 2B threaded holes |
| RF sample port | N-type female |
| Prime power | ITT Cannon - CGL02A20-3P-E1B-B |
| Control interface | 62GB-12E-2041-PN |

**Note:** Mating connectors for the mains supply and control interface are supplied.

## ENVIRONMENTAL

For operation outside these parameters, refer to SpacePath Communications for guidance.

| | | |
|---|---|---|
| Operating temperature (see note 1) | -40 to +55 | °C |
| Derating | 2°C/300 m above sea level (3.6 °F/1000 ft) | |
| Solar gain | 1120 | $W/m_2$ |
| Storage temperature | -40 to +80 | °C |
| Relative humidity (condensing) | 100 | % |
| Altitude: | | |
| operating | 4.5 km (15,000 ft) | max |
| non-operating | 12 km (40,000 ft) | max |

Vibration: BS EN 60068-2-64 test Fh, Transportation

Shock: IEC Publication 68-2-27 Part 2 Test Ea, 25 g

EMC:

EN61000-6-3:2001 (Emissions)

EN61000-6-2:2001 (Immunity)

FCC CFR47 Part 15B

## CE CERTIFIED

EMC Directive 89/336/EEC, Low Voltage Directive 73/23/EEC.

## NOTES

1. +55 °C applies when the input supply voltage is between 180 and 265V. Below 180V, the maximum operating temperature is +50 °C.
2. Safety applies for operating altitude up to 2000 m and operating temperature up to +50 °C.

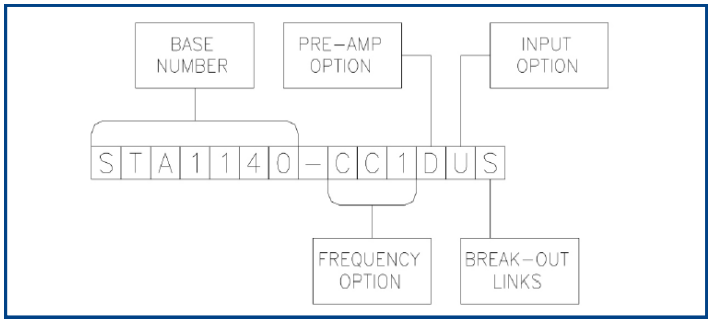
## CONTROLS

| Type | Function | |
|---|---|---|
| **REMOTE CONTROL** | Off<br>Standby<br>Transmit<br>RF inhibit | High Power Alarm Set*<br>Low Power Alarm Set*<br>Auto Redundancy Control*<br>RF Switch Control*<br>Gain Control* (when fitted) |
| **REMOTE STATUS/MONITOR** | Off<br>Warm-up<br>Standby<br>Transmit<br>Fault Summary<br>Reflected Power<br>External interlock<br>TWT too hot<br>Mean Helix Current<br>Peak Helix Current<br>High Power Alarm*<br>Low Power Alarm* | Output Power Monitor*<br>Reflected Power Monitor*<br>Helix Current Monitor*<br>Helix Voltage*<br>Collector Voltages*<br>Heater Voltage*<br>Heater Current*<br>Elapsed Hours* |
| **INTERFACES**<br>Serial<br>User | RS-422/485, Optional Ethernet<br>Dry Relay Contact | |
| **Other Features** | Auxiliary Output Voltage<br>Redundant system & waveguide switch drive<br>'Stand Alone' setting for automatic power up | |

**Note:** Controls/Monitoring marked* are only available via Serial Interface.

## OPTIONS

Extensive options are offered with the STA1140 and include; integral pre-amplifiers, gain control, linearisers and block upconverters. The options are defined by adding to the base number as shown below:




(Consult SpacePath Communications for availability of options).

**Frequency Options**
The STA1140 is offered in four frequency bands:
CC1 - 5.850 – 6.425 GHz
CC2 - 5.850 – 6.650 GHz
CC3 - 5.850 – 6.725 GHz
CC4 - 5.850 – 7.025 GHz
CC5 - 5.725 – 6.725 GHz

**Pre-Amp Option**
The pre-amp option can be selected from any of the following:
C - No pre-amp (typical SSG 52 dB).
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 linearliser that improves the linearity of the HPA, providing a C/I of typically –26 dBc at 4 dB OPBO. The linearliser also incorporates the pre-amp and gain control options.
(Consult SpacePath Communications for availability).

**Input Option**
The STA1140 can be offered with an L-Band Block Upconverter.
Specify:
N - Standard RF
U - L – C-Band Block Upconverter (see page 4)

**Note:** The upconverter requires the inclusion of either the 'D' or 'Z' options. (Consult SpacePath Communications for availability).

**Break-Out Links**
Available only with the upconverter option, this enables bypassing of the upconverter and can be used for monitoring, set-up, redundant switching etc. Specify 'S' forBreak-Out Links (leave blank if not required).

## ACCESSORIES

The STA1140 is supplied with an operation manual, prime power connector mating part, interface connector mating part and air cowls. Additional accessories include:

- **N6080 Override Controller**
Provides automatic power-up for 'emergency' situations.
- **SPC1U01 1:1 Control Unit**
Provides control of 2 HPA's in 1:1 switch configuration.
(The waveguide switch network can also be supplied).
- **Cable Assemblies**
For connecting STA1140 to controllers and waveguide switches.
Refer to data sheet A1A-Stellar_Cables.
- **DAS563750AA**
Additional mains connector parts.
- **DAS563751AA**
Additional interface connector parts.
For more information on accessories, contact SpacePath Communications.

## PERFORMANCE WITH INTEGRAL BLOCK UPCONVERTER

| | | |
|---|---|---|
| Output frequency range: | | |
| option – CC1 | 5.850 to 6.425 | GHz |
| option – CC2 | 5.850 to 6.650 | GHz |
| option – CC3 | 5.850 to 6.725 | GHz |
| option – CC4 | 5.850 to 7.025 | GHz |
| option – CC5 | 5.725 to 6.725 | GHz |
| L-band input: | | |
| frequency range option CC1 | 950 to 1525 | MHz |
| frequency range option CC2 | 950 to 1750 | MHz |
| level | 10 | dBm max |
| LO frequency (option CC1/CC2) | 4.9 | GHz |
| External reference (see note): | | |
| frequency | 10 | MHz |
| level | -3 to +7 | dBm |
| impedance | 50 | Ω |
| Output power: | | |
| TWT output flange | 400 | W min |
| HPA rated output | 350 | W min |
| Gain: | | |
| at rated power (D, Z option) | 70 | dB min |
| SSG $P_{rated}$ –10 dB (D, Z option) | 75 | dB min |
| Attenuation range (D, Z option) | 25 | dB min |
| Gain variation: | | |
| full band | 4.0 | dB max |
| over any 40 MHz band | 1.5 | dB max |
| slope | 0.08 | dB/MHz max |
| Gain stability 24hrs (constant drive, temperature and load) | 0.5 | dB max |
| Gain stability over full operating temperature | 2.0 | dB max |
| Intermodulation (two equal carriers) with total output = $P_{rated}$ –4 dB: | | |
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| AM to PM conversion at $P_{rated}$ –6 dB | 2.5 | °/dB |
| Noise power: | | |
| transmit band | -70 | dBW/4 kHz max |
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| Residual AM >100 kHz from carrier | -60 | dBc max |
| Group delay: | | |
| linear | 0.01 | ns/MHz |
| parabolic | 0.005 | ns/MHz$^2$ |
| ripple | 0.5 | ns p-p |
| Phase noise: | | |
| Continuous | meets IESS phase noise profile | |
| AC fundamental | -50 | dBc |
| Sum of all spurs | -47 | dBc |
| Input VSWR (non-operating) | 1.6:1 | max |
| Output VSWR (non-operating) | 1.3:1 | max |
| Load VSWR, no damage | 2.0:1 | max |

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

## HEALTH AND SAFETY HAZARDS

Stellar satellite amplifiers are safe to handle and operate provided that the relevant precautions are observed. SpacePath Communications 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 SpacePath Communications regarding the disposal of damaged or life expired tubes.

## Outline