

# C/Ku-Band high power transceivers

Codan's 5700 series C-Band and 5900 series Ku-Band high power transceivers offer a wide range of distinctive advantages and enhanced features for satellite communications systems based in remote or challenging geographic regions.

Available in single or dual synthesiser options, extended C-Band and Ku-Band frequency bands and 70 or 140 MHz IF configurations—and a range of power outputs—the 5700 and 5900 series provide industry leading technical performance.

## KEY FEATURES

### Durability

The 5700 series and 5900 series are designed and tested to meet their performance specifications in an ambient temperature range from -40°C to +55°C, ensuring long-term survival in extreme conditions. Field experience shows that MTBFs of greater than 90,000 hours can be expected.

### RF performance

RF performance is superb, particularly intermodulation performance, gain stability over temperature and flatness across the IF band.

These transceivers also boast industry leading spurious and harmonics specifications while guaranteed RF performance ensures expensive system link margins do not have to be used to cope with RF transceiver variations. The high linearity and low spurious characteristics contribute to superior multi-carrier performance.

### Output power options

The 5700 series C-Band transceiver is available with 60 watts and 120 watts output power rating. The 5900 series Ku-Band transceiver is available with 40 watts output rating.

### Power consumption

Codan's high power transceivers feature low power consumption and low temperature rise, ensuring internal components do not suffer undue stress.

### Power supply

All the high power transceivers are AC mains powered and may be field selected to operate from either 115 V AC or 230 V AC.

### Internal protection

Internal protection against high temperature and short or open circuit RF output is standard.

## ADVANCED FEATURES

### Enhanced monitor and control

All operating functions can be controlled and monitored via the serial interface, and the operating configuration is stored in EEPROM to ensure the set-up parameters are restored in the event of a power failure.



High Power Transceiver

### Universal interface compatibility

The transceivers have universal interface compatibility capable of operating with dumb terminals, laptop/PC emulating terminals, handheld terminals and personal organisers without requiring proprietary software. The versatile configuration options support contact closure, RS232, RS422 and RS485 (2 or 4 wire).

Two dedicated controllers are available from Codan:

- 5560 Hand-held Controller, suitable for in the field installation setup

- 5570 Remote Controller, suitable for indoor rack mounting to provide permanent monitoring and control capabilities

### Redundancy switching system

A redundancy switching system is available to provide an automatic changeover to a second transceiver to maximise availability and minimise any disruption to service. This system is fully outdoor mounted, but can be supplied with the 5587 Redundant System Monitor to provide indoor monitoring and control.

## MAJOR CONFIGURATION OPTIONS

<b>C-Band frequency band (GHz)</b>		<b>Transmit</b>	<b>Receive</b>
2	C-Band extended	5.850–6.425	3.625–4.200
<b>C-band transmit/receive frequency control</b>			
D	Dual synthesiser		
S	Single synthesiser		
<b>C-Band LNA</b>			
A selection of LNAs is available to best meet noise temperature and configuration needs.			
<b>Ku-Band transmit frequency band (GHz)</b>		<b>Transmit</b>	
1	Ku-Band standard	14.00–14.50	
2	Ku-Band extended	13.75–14.50	
<b>Ku-Band receive frequency bands</b>			
All systems use the common 5900 series converter module, which has an RF input of 950-1700 MHz. Receive bands are selected by the use of an appropriate LNB. Standard frequency bands are listed below.			
<b>Ku-Band LNB</b>			
Standard noise temperature 90 K			
Band 1	10.95–11.7 GHz		
Band 2	11.7–12.2 GHz		
Band 3	12.25–12.75 GHz		
(LNBs are phase locked to the internal 10 MHz reference in the 5900 converter module)			
<b>Bandwidth</b>			
N	Narrow band (40 MHz)	Field selectable 70 or 140 MHz IF	
W	Wide band (80 MHz)	140 MHz IF only	
<b>Output power</b>			
C-Band	60 W and 120 W	WR137 waveguide output standard	
Ku-Band	40 W	WR75 waveguide output standard	
<b>Options and accessories</b>			
Hand-held Controller			
Remote Controller			
Redundancy Switching Systems			
Transmit Reject Filters			
Antenna Mounting Kits			



5560 Hand-held Controller



5570 Remote Controller

## CODAN QUALITY AND SERVICE



Redundancy Switching System

The high power transceivers are built and tested in Codan's ISO9001 quality certified manufacturing facility, and undergo 100% burn in and performance monitoring.

Codan's fully trained staff and agents provide in-factory and in-country training services and complete installation and on-site assistance. This service is backed up by a 24 hour customer service line and a warranty of three years on manufacturing, design or component defects.

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# C-Band High Power Transceiver

## 5700 series

### SPECIFICATIONS

#### TRANSMIT SECTION

<b>IF input</b>	
Frequency range	70 ± 20 MHz/140 ± 20 MHz selectable
Narrow BW option	140 ± 40 MHz
Wide BW option	
Impedance	50/75 Ω selectable
Connector	N female
Return loss	18 dB minimum @ 50 Ω
<b>Gain specification</b>	
Gain	74 dB minimum (0 dB SSPA & Converter attenuator settings)
60 W, 120 W	
Attenuator ranges	0 dB to 25 dB nominal (Converter) 0 dB to 20 dB nominal (SSPA)
Attenuator step size	1 dB nominal
Gain flatness	±1.0 dB maximum, 40 MHz
Narrow BW option	±2.0 dB maximum, 80 MHz
Wide BW option	
Gain stability	±2.0 dB maximum, -40°C to +55°C
<b>RF output</b>	
Frequency range	5.850 to 6.425 GHz
Connector	CPR137G
VSWR	1.25:1 maximum
<b>60 W SSPA</b>	
Output power @ 1 dB GCP	+47.8 dBm (60 W) typical +47.0 dBm (50 W) minimum
Carrier to intermodulation ratio	-26 dBc, two carriers, each @ 6 dB OPBO from 1 dB GCP
<b>120 W SSPA</b>	
Output power @ 1 dB GCP	+50.8 dBm (120 W) typical +50.0 dBm (100 W) minimum
Carrier to intermodulation ratio	-26 dBc, two carriers, each @ 6 dB OPBO from 1 dB GCP
<b>Spurious output</b>	
	-60 dBc maximum @ 1 dB GCP
<b>Harmonics</b>	
	-50 dBc maximum @ 1 dB GCP
<b>Phase noise (SSB)*</b>	
100 Hz	-60 dBc/Hz maximum, -75 dBc/Hz typical
1 kHz	-70 dBc/Hz maximum, -80 dBc/Hz typical
10 kHz	-80 dBc/Hz maximum, -85 dBc/Hz typical
100 kHz	-90 dBc/Hz maximum, -95 dBc/Hz typical
<b>Synthesiser step size</b>	
	1 MHz
<b>Frequency stability</b>	
-40°C to +55°C	±1 × 10 <sup>-8</sup>
Aging	±1 × 10 <sup>-7</sup> /year

#### RECEIVE SECTION (EXCLUDING LNA)

<b>RF input</b>	
Frequency range	3.625 to 4.200 GHz
Impedance	50 Ω
Connector	N female
VSWR	1.4:1 maximum
Noise figure	18 dB typical
DC output (switch selectable)	+15 V @ 75 to 250 mA
<b>IF output</b>	
Frequency range	70 ± 20 MHz/140 ± 20 MHz selectable
Narrow BW option	140 ± 40 MHz
Wide BW option	
Impedance	50/75 Ω selectable
Connector	N female
Return loss	18 dB minimum @ 50 Ω
<b>Gain specification</b>	
Gain	45 dB nominal
Attenuator range	0 dB to 30 dB nominal
Attenuator step size	1 dB nominal
Gain flatness	±1.0 dB maximum, 40 MHz
Narrow BW option	±2.0 dB maximum, 80 MHz
Wide BW option	
Gain stability	±4.0 dB maximum, -40°C to +55°C
Image rejection	50 dB minimum
Spurious output	-65 dBm maximum
<b>Phase noise (SSB)*</b>	
100 Hz	-60 dBc/Hz maximum, -75 dBc/Hz typical
1 kHz	-70 dBc/Hz maximum, -80 dBc/Hz typical
10 kHz	-80 dBc/Hz maximum, -85 dBc/Hz typical
100 kHz	-90 dBc/Hz maximum, -95 dBc/Hz typical
<b>Synthesiser step size</b>	
	1 MHz
<b>Frequency stability</b>	
-40°C to +55°C	±1 × 10 <sup>-8</sup>
Aging	±1 × 10 <sup>-7</sup> /year

## LOW NOISE AMPLIFIER

Indicative specifications; LNAs with lower noise temperatures are also available.

### Input

Interface	CPR229G
Noise temperature	40 K @ 25°C

### Gain specification

Gain	50 dB minimum
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### Output

1 dB GCP	+5 dBm minimum
3rd order intercept	+16 dBm minimum
Impedance	50 Ω
Connector	N female
VSWR	1.5:1 typical

## TRANSMIT REJECT FILTER (OPTIONAL)

Indicative specifications

Insertion loss	0.05 dB maximum
Rejection	55 dB minimum

## POWER

Input voltage	104 to 274 V AC, 47 to 63 Hz
Power consumption	
AC 60 W	440 VA @ 115/230 V AC maximum SSPA On
120 W	760 VA @ 115/230 V AC maximum SSPA On

## MONITOR AND CONTROL

### LNA interface

DC output	+15 V @ 75 to 400 mA
Alarm input	Current monitoring as specified, and contact closure; O/C is fault condition

### Monitor and control facilities (converter)

**Indicators:** Standby, On, Warm-up, SSPA activated, Converter fault, LNA fault, SSPA fault, Temperature fault, Fan fault

**Controls:** Power control (off/standby/on), SSPA control (inhibit/remote/activate), Serial interface settings, LNA supply via RX RF input connector, Mains/Battery supply select

### Monitor and control facilities (SSPA)

**Indicators:** Online, Alarm, Standby, Maintenance

**Display:** Output power, Heatsink temperature, Alarms

**Controls:** State, Gain, Compensation

### Remote monitor and control facilities (only via converter)

Serial interface standards	RS232, RS422 (RS485)
Protocol standards	ASCII, Packet (RS485)
Packet protocol address	0 to 127 range

**Remote monitoring functions (serial interface):** Standby, On, Warm-up, SSPA activated, Converter fault, LNA fault, SSPA fault, Temperature fault, SSPA inhibit control, SSPA activate control\*, Transmit frequency\*, Receive frequency\*, Transmit attenuation\*, Receive attenuation\*, Cable compensation\*, Reference oscillator override\*, SSPA alarm enable\*, LNA alarm enable\*, Fan alarm enable\*, Temperature compensation\*, Address\*, SSPA mode\*, Converter lock, Packet protocol\*, IF impedance\*, IF frequency\*

**Remote control functions (serial interface):** Power control (standby/on), SSPA inhibit control, SSPA activate control\*, Transmit frequency\*, Receive frequency\*, Transmit attenuation\*, Receive attenuation\*, Cable compensation\*, Reference oscillator override\*, SSPA alarm enable\*, LNA alarm enable\*, Fan alarm enable\*, Temperature compensation select\*, Address range\*, SSPA mode\*, Packet protocol\*, IF impedance\*, IF frequency\*

All of the above serial interface functions are accessible via the Remote Controller 5570. The functions supported by the Hand-Held Controller 5560 are indicated by an asterisk (\*)

**Remote monitoring functions (contact closure):** Standby, Warm-up, SSPA activated control, Converter fault, LNA fault, SSPA fault, Temperature fault

**Remote control functions (contact closure):** Power control, (standby/on), SSPA inhibit control, SSPA activate control

## ENVIRONMENTAL

### Converter module

Temperature	-40°C to 55°C
Relative humidity	100%
Cooling	Convection
Weatherproofing	Sealed to IP68

### SSPA module

Temperature	-40°C to +55°C
Relative humidity	100%
Cooling	Forced air
Weatherproofing	Sealed to IP66

## PHYSICAL

All dimensions are measured over the connectors.

### Size

Converter module	110 mm W x 410 mm D x 240 mm H
SSPA module, 60/120 W	280 mm W x 355 mm D x 495 mm H

### Weight

Converter module	8 kg
SSPA module, 60/120 W	27 kg

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# Ku-Band High Power Transceiver

## 5900 series

### SPECIFICATIONS

#### TRANSMIT SECTION

<b>IF input</b>	
Frequency range	70 ± 20 MHz/140 ± 20 MHz selectable
Narrow BW option	140 ± 40 MHz
Wide BW option	
Impedance	50/75 Ω selectable
Connector	N female
Return loss	18 dB minimum @ 50 Ω
<b>Gain specification</b>	
Gain	78 dB minimum (0 dB SSPA & Converter attenuator settings)
Attenuator ranges	0 to 25 dB nominal (Converter) 0 to 20 dB nominal (SSPA)
Attenuator step size	1 dB nominal
<b>Gain flatness</b>	
Over IF	
Narrow BW option	±1.0 dB maximum, 40 MHz
Wide BW option	±2.0 dB maximum, 80 MHz
Over frequency range	±2.0 dB maximum
Gain stability	±1.5 dB maximum, -40°C to +55°C
<b>RF output</b>	
Frequency range	
Band 1	14.0 to 14.5 GHz
Band 2	13.75 to 14.50 GHz
Connector	WR75
VSWR	1.25:1 maximum
Output power (1 dB GCP)*	+46.7 dBm (47 W) typical +46.0 dBm (40 W) minimum
Carrier to intermodulation ratio	-25 dBc, two carriers, each @ 6 dB OPBO from 1 dB GCP
Spurious output	-60 dBc maximum @ 1 dB GCP
Harmonics	-50 dBc maximum @ 1 dB GCP
<b>Phase noise (SSB)**</b>	
100 Hz	-60 dBc/Hz maximum
1 kHz	-70 dBc/Hz maximum
10 kHz	-75 dBc/Hz maximum
100 kHz	-85 dBc/Hz maximum
<b>Synthesiser step size</b>	
	1 MHz
<b>Frequency stability</b>	
-40°C to +55°C	±2 × 10 <sup>-8</sup>
Aging	±1 × 10 <sup>-7</sup> /year

#### RECEIVE SECTION (EXCLUDING LNB)

<b>RF input</b>	
Frequency range	950 to 1700 MHz
Impedance	50 Ω
Connector	N female
VSWR	1.4:1 maximum
Noise figure	20 dB typical
DC output (switch selectable)	+15 V @ 75 to 400 mA
10 MHz output	0 dBm ±1 dB
<b>IF output</b>	
Frequency range	
Narrow BW option	70 ± 20 MHz/140 ± 20 MHz selectable
Wide BW option	140 ± 40 MHz
Impedance	50/75 Ω selectable
3rd order intercept	+15 dBm minimum
Connector	N female
Return loss	18 dB minimum @ 50 Ω
<b>Gain specification</b>	
Gain	35 dB nominal
Attenuator range	0 dB to 25 dB nominal
Attenuator step size	1 dB nominal
<b>Gain flatness</b>	
Over IF	
Narrow BW option	±1.0 dB maximum, 40 MHz
Wide BW option	±2.0 dB maximum, 80 MHz
Over frequency range	±2.0 dB maximum
Gain stability	±3.0 dB maximum, -40°C to +55°C
<b>Image rejection</b>	
	50 dB minimum
<b>Spurious output</b>	
	-65 dBm maximum
<b>Phase noise (SSB)**</b>	
100 Hz	-60 dBc/Hz maximum
1 kHz	-70 dBc/Hz maximum
10 kHz	-80 dBc/Hz maximum
100 kHz	-90 dBc/Hz maximum
<b>Synthesiser step size</b>	
	1 MHz
<b>Frequency stability</b>	
-40°C to +55°C	±2 × 10 <sup>-8</sup>
Aging	±1 × 10 <sup>-7</sup> /year
<b>L-Band IF monitor port</b>	
Output frequency range	950 to 1700 MHz
Gain	10 ± 3 dB Rx RF I/P to L-Band monitor
Gain ripple	±2 dB maximum
Connector	N female
Impedance	50 Ω
Return loss	15 dB minimum

\* 2 dB less for Band 2

\*\* Meets Intelsat Phase Noise requirement using Limit-2 for data rates up to 8 Mbps. Excludes mains related sidebands.

## LOW NOISE BLOCK CONVERTER

### Indicative specifications

#### Input

##### Frequency range

Band 1	10.95 to 11.7 GHz
Band 2	11.7 to 12.2 GHz
Band 3	12.25 to 12.75 GHz

##### Interface

WR75

##### VSWR

2.5:1 typical

#### Noise temperature

75K @ 25°C maximum

#### Gain specification

##### Gain

60 dB typical

##### Gain flatness

±1.5 dB maximum full band

#### Output

##### 1 dB GCP

0 dBm minimum

##### 3rd order intercept

+11 dBm minimum

##### Impedance

50 Ω

##### Connector

N female

##### VSWR

1.5:1 typical

## TRANSMIT REJECT FILTER (OPTIONAL)

#### Pass band

10.95 to 12.75 GHz

#### Insertion loss

0.05 dB maximum

#### Reject band

13.75 to 14.5 GHz

#### Rejection

55 dB minimum

## POWER

#### Input voltage

104 to 274 V AC, 47 to 63 Hz

#### Power consumption

500 VA typical, SSPA on

## MONITOR AND CONTROL

#### Monitor and control facilities (converter)

**Indicators:** Standby, On, Warm-up, SSPA activated, Converter fault, LNB fault, SSPA fault, Temperature fault

**Controls:** Power control (off/standby/on), SSPA control (inhibit/remote/activate), Serial interface settings, LNB supply via Rx RF input connector, Mains/Battery supply select

#### Monitor and control facilities (SSPA)

**Indicators:** Online, Alarm, Standby, Maintenance

**Display:** Output power, Heatsink temperature, Alarms

**Controls:** State, Gain

#### Remote monitor and control facilities (only via converter)

**Serial interface standards:** RS232, RS422 (RS485)

**Protocol standards:** ASCII, Packet (RS485)

**Packet protocol address range:** 0 to 127

**Remote monitoring functions (serial interface):** Standby, On, Warm-up, SSPA activated, Converter temperature, Converter fault, LNB fault, SSPA fault, Temperature fault, SSPA inhibit control, SSPA activate control, Transmit frequency, Receive frequency, Transmit attenuation, Receive attenuation, Cable compensation, Reference oscillator override, SSPA alarm enable, LNB alarm enable, Temperature compensation select, Packet address (ASCII mode only), Packet address range (ASCII mode only), Packet protocol select (ASCII mode only), SSPA mode select, Converter lock, Status change poll

**Remote control functions (serial interface):** Power control (standby/on), SSPA inhibit control, SSPA activate control, Transmit frequency, Receive frequency, Transmit attenuation, Receive attenuation, Cable compensation, Reference oscillator override, SSPA alarm enable, LNB alarm enable, Temperature compensation select, Address range select (ASCII mode only), Packet protocol select (ASCII mode only), SSPA mode select, Reset, Reset change bits

**Remote monitoring functions (contact closure):** Standby, Warm-up, SSPA activated, Converter fault, LNB fault, SSPA fault, Temperature fault

**Remote control functions (contact closure):** Power control (standby/on), SSPA inhibit control, SSPA activate control

## ENVIRONMENTAL

#### Converter module

Temperature	-40°C to +55°C
Relative humidity	100%
Cooling	Convection
Weatherproofing	Sealed to 34 kPa

#### SSPA module

Temperature	-40°C to +55°C
Relative humidity	100%
Cooling	Forced air
Weatherproofing	Sealed to IP66

## PHYSICAL

All dimensions are measured over the connectors.

#### Size

Converter module	110 mm W x 410 mm D x 240 mm H
SSPA module	280 mm W x 355 mm D x 495 mm H

#### Weight

Converter module	8 kg
SSPA module	27 kg

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