

SCR Series Synthesized Converters

L, C, and Ku Bands

Features

- Three-year warranty
- Excellent phase noise performance
- External 5 or 10 MHz reference input
- Ethernet network interface
- RS-232/-422/-485 serial interface
- Standard VertexRSI user interface
- STARswitch™ interface
- 30 dB attenuation range
- Universal, autoranging ac input (90–264 Vac)
- CE approved



SCR converters are housed in a 1RU rack chassis.

System Information

Available in L, C, and Ku bands, in both down- and upconverter versions, VertexRSI's high performance single-band SCR series of synthesized frequency converters have improved performance and a user-friendly design, enabling SATCOM ground station operators greater flexibility in configuring their system architecture.

SCR series converters feature modular design and a noninverting, dual-conversion frequency plan, and are backward-compatible with our existing UCS(B) and DCS(B) line. This updated converter series operates seamlessly with the company's 1:1 through 1:8 STARswitch™ redundancy controllers.

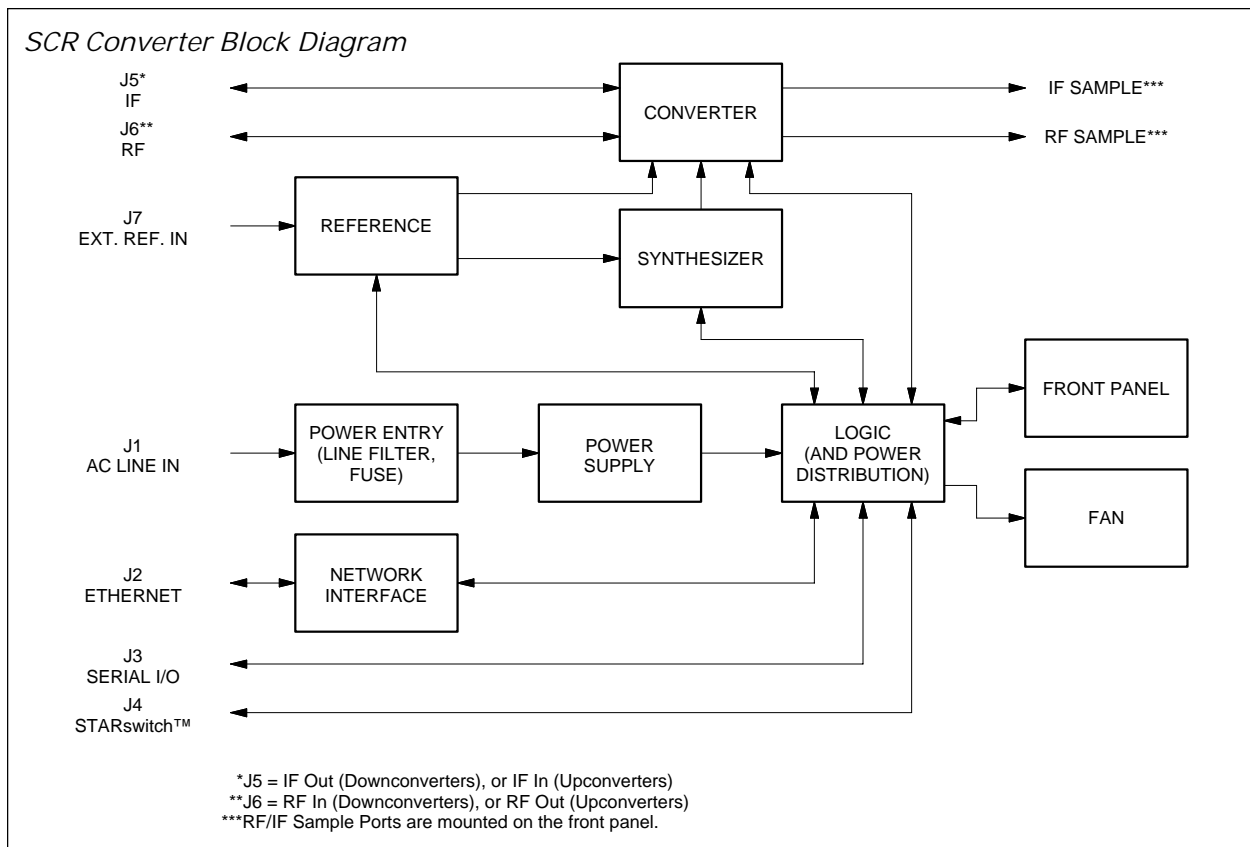
Microprocessor-based control logic uses FLASH programmable memory and allows firmware upgrades in the field via the serial interface.

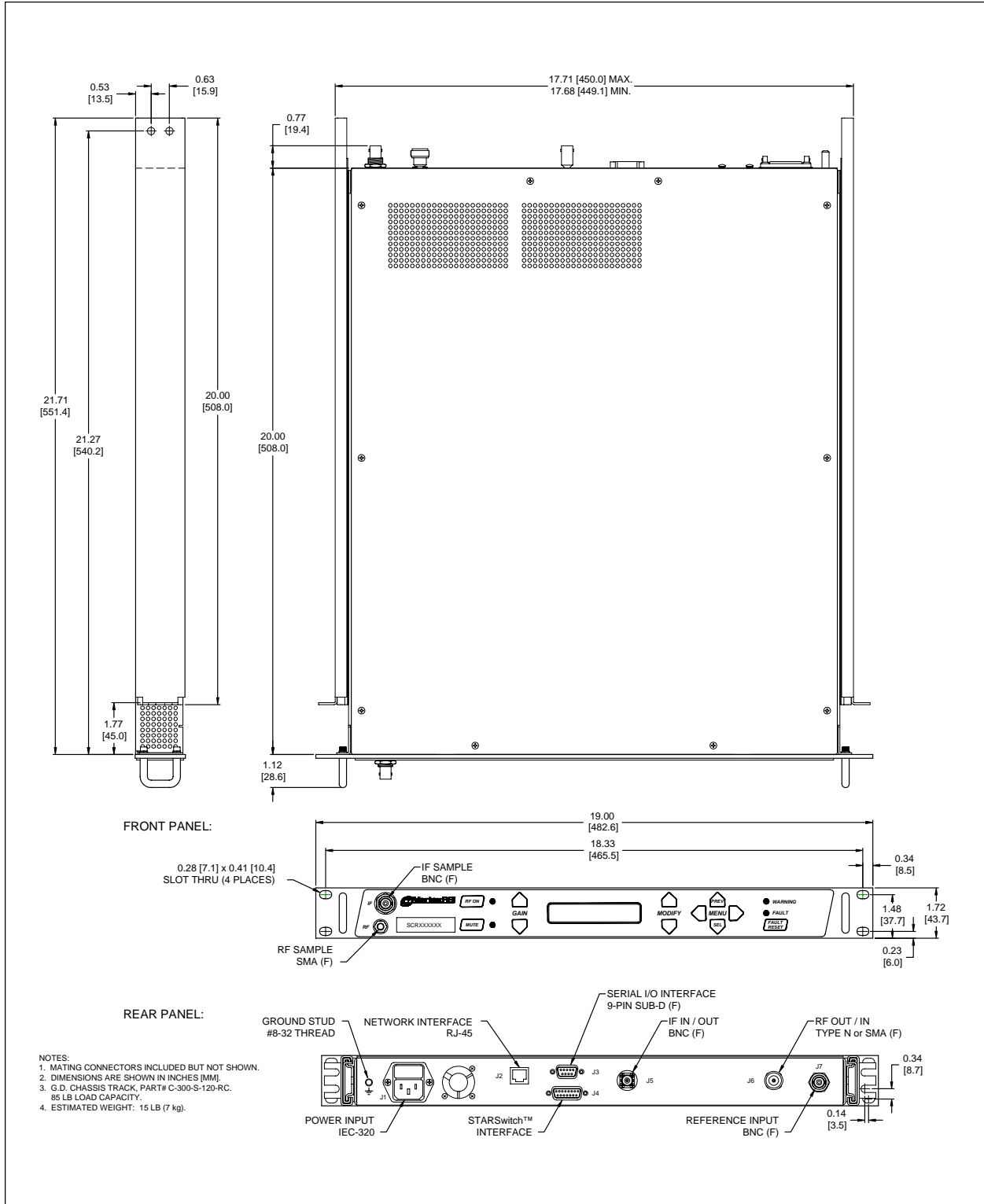
Available configurations

- L-band Downconverter, 950–1950 MHz RF
- L-band Upconverter, 950–1950 MHz RF
- C-band Downconverter, 3.40–4.20 GHz RF
- C-band Upconverter, 5.850–6.725 GHz RF
- Ku-band Downconverter, 10.70–12.75 GHz RF
- Ku-band Upconverter, 13.75–14.50 GHz RF

Options

- 70 or 140 MHz IF
- 50 or 75 ohm IF impedance
- 1 kHz or 125 kHz frequency step size





L-Band Downconverter Specifications (Ref. 17320 C)

Parameter	Conditions	Min	Nom/Typ†	Max	Units
Input Frequency	RF band	950		1950	MHz
Output Frequency	Option 1, 70 MHz IF Option 2, 140 MHz IF	50 100		90 180	MHz MHz
Output Spectrum			Dual Conversion, Non-Inverted		
Frequency Step	Option F Option C		1 125		kHz kHz
LO Phase Noise	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz			-65 -77 -82 -90 -102 -110	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz
Input Level	Damage threshold			+20	dBm
Gain	Maximum	44	45	46	dB
Gain Flatness	Across output (IF) band Across input (RF) band			±0.5 ±1.0	dB dB
Gain Slope	Per 10 MHz			0.05	dB/MHz
Gain Stability	Per day, constant temperature vs. operating temperature			±0.25 ±1.0	dB dB
Gain Adjustment Range	0.1 dB steps, max.	30			dB
Power Output at P _{1dB}	At maximum gain	+10	+12		dBm
IMD ₃	Pout = -10 dBm per tone			-60	dBc
AM/PM Conversion	-5 dBm output power			0.1	°/dB
Group Delay	Linear component Parabolic component, Option 1, Per 40 MHz Option 2, Per 80 MHz			0.03 0.01 0.004	ns/MHz ns/MHz ² ns/MHz ²
Spurious	Ripple component Signal related, Pout < 0 dBm, IF Non-signal related AC Line, Fundamental AC Line, Sum of all harmonics			1.0 -60 -70 -50 -53 -80	ns p-p dBc dBm dBc dBc dBc
Image Rejection					
Noise Figure at +23 °C	At maximum gain			12	dB
Output Impedance	Option 5 Option 7		50 75		ohms ohms
VSWR	Input Output			1.25 1.15	:1 :1
IF Sample			-20		dBc
Internal Reference	Frequency Stability vs. temperature Aging/day		10	±1 x 10 ⁻⁸ ±1 x 10 ⁻⁹	MHz
External Reference	0 to +10 dBm / ±1.5 ppm		5 or 10		MHz
Reference Output for ODU	Frequency Power at RF port when enabled Power at RF port when disabled	-3	10 -1 -75	+1 -53	MHz dBm dBm
Connectors	RF In RF Sample IF Out IF Sample External Reference In Serial I/O (RS-232/422/485) STARswitch™ Ethernet Power, AC		Type N (F) Type SMA (F) Type BNC (F) Type BNC (F) Type BNC (F) DB9 (F) DB15 (F) RJ45 IEC-320		
Power Requirements					
AC Power	Voltage Frequency Power	90 47		264 63 70	Vac Hz W
Dimensions	Rack-mount, 1U chassis		19 W x 1.75 H x 20 D 483 W x 44.5 H x 508 D		in mm
Weight	Approximate		15 (7)		lb (kg)
Temperature Range	Operating: Ambient Storage	0 -30		+50 +70	°C °C

† When there is only one entry on a line, the Nom./Typ. column is a nominal value; otherwise it is a typical value. Typical values are intended to illustrate typical performance, but are not guaranteed.

L-Band Upconverter Specifications (Ref. 17319 C)

Parameter	Conditions	Min	Nom/Typ†	Max	Units
Input Frequency	Option 1, 70 MHz IF Option 2, 140 MHz IF	50 100		90 180	MHz MHz
Output Frequency	RF band	950		1950	MHz
Output Spectrum			Dual Conversion, Non-Inverted		
Frequency Step	Option F Option C		1 125		kHz kHz
LO Phase Noise	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz			-65 -77 -82 -90 -102 -110	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz
Input Level	Damage threshold			+20	dBm
Gain	Maximum	31	32	33	dB
Gain Flatness	Across input (IF) band Across output (RF) band			±0.5 ±1.0	dB dB
Gain Slope	Per 10 MHz			0.05	dB/MHz
Gain Stability	Per day, constant temperature vs. operating temperature			±0.25 ±1.0	dB dB
Gain Adjustment Range	0.1 dB steps, max.	30			dB
Power Output at P _{1dB}	At maximum gain	+10	+12		dBm
IMD ₃	Pout = -10 dBm per tone			-60	dBc
AM/PM Conversion	-5 dBm output power			0.1	°/dB
Group Delay	Linear component			0.03	ns/MHz
	Parabolic component, Option 1, Per 40 MHz Option 2, Per 80 MHz			0.01 0.004	ns/MHz ² ns/MHz ²
Spurious	Ripple component			1.0	ns p-p
	Signal related, Pout < 0 dBm			-60	dBc
	Non-signal related, Gain < 30 dB			-70	dBm
	AC Line, Fundamental			-50	dBc
	AC Line, Sum of all harmonics			-53	dBc
Image Rejection				-75	dBc
Noise Figure at +23 °C	At maximum gain setting			22	dB
Output Impedance	Option 5 Option 7		50 75		ohms ohms
VSWR	Input Output			1.15 1.25	:1 :1
RF/IF Sample			-20		dBc
Internal Reference	Frequency Stability vs. temperature Aging/day		10	±1 x 10 ⁻⁸ ±1 x 10 ⁻⁹	MHz
External Reference	0 to +10 dBm / ±1.5 ppm		5 or 10		MHz
Reference Output for ODU	Frequency		10		MHz
	Power at RF port when enabled	-3	-1	+1	dBm
	Power at RF port when disabled		-75	-53	dBm
Connectors	IF In IF Sample RF Out RF Sample External Reference In Serial I/O (RS-232/-422/-485) STARswitch™ Ethernet Power, AC		Type BNC (F) Type BNC (F) Type N (F) Type SMA (F) Type BNC (F) DB9 (F) DB15 (F) RJ45 IEC-320		
Power Requirements	Voltage	90		264	Vac
AC Power	Frequency	47		63	Hz
	Power			70	W
Dimensions	Rack-mount, 1U chassis		19 W x 1.75 H x 20 D 483 W x 44.5 H x 508 D		in mm
Weight	Approximate		15 (7)		lb (kg)
Temperature Range	Operating; Ambient Storage	0 -30		+50 +70	°C °C

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C-Band Downconverter Specifications (Ref. 17318 B)

Parameter	Conditions	Min	Nom/Typ [†]	Max	Units
Input Frequency		3.4		4.2	GHz
Output Frequency	Option 1, 70 MHz IF Option 2, 140 MHz IF	50 100		90 180	MHz MHz
Output Spectrum			Dual Conversion, Non-Inverted		
Frequency Step	Option F Option C		1 125		kHz kHz
LO Phase Noise	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz			-48 -68 -78 -88 -96 -110	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz
Input Level	Damage threshold			+20	dBm
Gain	Maximum	43	45	47	dB
Gain Flatness (IF Band)	Option 1, Per 40 MHz Option 2, Per 80 MHz			±0.3 ±0.5	dB dB
Gain Flatness (RF Band)				±1.0	dB
Gain Slope	Per 10 MHz			0.05	dB/MHz
Gain Stability	Per day, constant temperature vs. operating temperature			±0.25 ±1.0	dB dB
Gain Adjustment Range	0.1 dB steps, max.	30			dB
Power Output at P _{1dB}	At maximum gain	+15	+16		dBm
IMD ₃	Pout = -10 dBm per tone			-60	dBc
AM/PM Conversion	-5 dBm output power			0.1	°/dB
Group Delay	Linear component Parabolic component			0.03	ns/MHz
	Option 1, Per 40 MHz Option 2, Per 80 MHz			0.01 0.004	ns/MHz ² ns/MHz ²
	Ripple component			1.0	ns
Spurious	Signal related, Pout < 0 dBm, IF Non-signal related			-60 -75 -80	dBc dBm dBc
Image Rejection				-80	dBc
Noise Figure at +23 °C	At maximum gain			13	dB
Output Impedance	Option 5 Option 7		50 75		ohms ohms
VSWR	Input Output			1.25 1.15	:1 :1
RF/IF Sample			-20		dBc
Internal Reference	Frequency Stability vs. temperature Aging/day		10	±1 x 10 ⁻⁸ ±1 x 10 ⁻⁹	MHz
External Reference	0 to +10 dBm / ±1.5 ppm		5 or 10		MHz
Connectors	RF In RF Sample IF Out IF Sample External Reference In Serial I/O (RS-232/-422/-485) STARswitch™ Ethernet Power, AC		Type N (F) Type SMA (F) Type BNC (F) Type BNC (F) Type BNC (F) DB9 (F) DB15 (F) RJ45 IEC-320		
Power Requirements					
AC Power	Voltage Frequency Power	90 47		264 63 70	Vac Hz W
Dimensions	Rack-mount, 1U chassis		19 W x 1.75 H x 20 D 483 W x 44.5 H x 508 D		in mm
Weight	Approximate		15 (7)		lb (kg)
Temperature Range	Operating: Ambient Storage	0 -30		+50 +70	°C °C

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C-Band Upconverter Specifications (Ref. 17317 B)

Parameter	Conditions	Min	Nom/Typ [†]	Max	Units
Input Frequency	Option 1, 70 MHz IF Option 2, 140 MHz IF	50 100		90 180	MHz MHz
Output Frequency		5.850		6.725	GHz
Output Spectrum			Dual Conversion, Non-Inverted		
Frequency Step	Option F Option C		1 125		kHz kHz
LO Phase Noise	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz			-48 -68 -78 -88 -96 -110	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz
Input Level	Damage threshold			+20	dBm
Gain	Maximum	30	33	35	dB
Gain Flatness (IF Band)	Option 1; Per 40 MHz Option 2; Per 80 MHz			±0.3 ±0.5	dB dB
Gain Flatness (RF Band)				±1.0	dB
Gain Slope	Per 10 MHz			0.05	dB/MHz
Gain Stability	Per day, constant temperature vs. operating temperature			±0.25 ±1.0	dB dB
Gain Adjustment Range	0.1 dB steps, max.	30			dB
Power Output at P _{1dB}	At maximum gain	+10	+12		dBm
IMD ₃	Pout = -10 dBm per tone			-60	dBc
AM/PM Conversion	-5 dBm output power			0.1	°/dB
Group Delay	Linear component Parabolic component			0.03	ns/MHz
	Option 1, Per 40 MHz Option 2, Per 80 MHz			0.01 0.004	ns/MHz ² ns/MHz ²
	Ripple component			1.0	ns
Spurious	Signal related, Pout < 0 dBm Non-signal related			-60 -70	dBc dBm
Image Rejection				-80	dBc
Noise Figure at +23 °C	At maximum gain			13	dB
Input Impedance	Option 5 Option 7		50 75		ohms ohms
VSWR	Input Output			1.15 1.25	:1 :1
RF/IF Sample			-20		dBc
Internal Reference	Frequency Stability vs. temperature Aging/day		10	±1 x 10 ⁻⁸ ±1 x 10 ⁻⁹	MHz
External Reference	0 to +10 dBm / ±1.5 ppm		5 or 10		MHz
Connectors	IF In IF Sample RF Out RF Sample External Reference In Serial I/O (RS-232/-422/-485) STARswitch™ Ethernet Power, AC		Type BNC (F) Type BNC (F) Type N (F) Type SMA (F) Type BNC (F) DB9 (F) DB15 (F) RJ45 IEC-320		
Power Requirements					
AC Power	Voltage Frequency Power	90 47		264 63 70	Vac Hz W
Dimensions	Rack-mount, 1U chassis		19 W x 1.75 H x 20 D 483 W x 44.5 H x 508 D		in mm
Weight	Approximate		15 (7)		lb (kg)
Temperature Range	Operating; Ambient Storage	0 -30		+50 +70	°C °C

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Ku-Band Downconverter Specifications (Ref. 17316 B)

Parameter	Conditions	Min	Nom/Typ [†]	Max	Units
Input Frequency		10.70		12.75	GHz
Output Frequency	Option 1, 70 MHz IF Option 2, 140 MHz IF	50 100		90 180	MHz MHz
Output Spectrum			Dual Conversion, Non-Inverted		
Frequency Step	Option F Option C		1 125		kHz kHz
LO Phase Noise	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz			-48 -68 -78 -88 -96 -110	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz
Input Level	Damage threshold			+20	dBm
Gain	Maximum	43	45	47	dB
Gain Flatness (IF Band)	Option 1; Per 40 MHz Option 2; Per 80 MHz			±0.3 ±0.5	dB dB
Gain Flatness (RF Band)				±1.0	dB
Gain Slope	Per 10 MHz			0.05	dB/MHz
Gain Stability	Per day, constant temperature vs. operating temperature			±0.25 ±1.0	dB dB
Gain Adjustment Range	0.1 dB steps, max.	30			dB
Power Output at P _{1dB}	At maximum gain	+15	+16		dBm
IMD ₃	Pout = -10 dBm per tone			-60	dBc
AM/PM Conversion	-5 dBm output power			0.1	°/dB
Group Delay	Linear component Parabolic component			0.03	ns/MHz
	Option 1, Per 40 MHz Option 2, Per 80 MHz			0.01 0.004	ns/MHz ² ns/MHz ²
	Ripple component			1.0	ns
Spurious	Signal related, Pout < 0 dBm, IF Non-signal related			-60 -75	dBc dBm
Image Rejection				-80	dBc
Noise Figure at +23 °C	At maximum gain			13	dB
Output Impedance	Option 5 Option 7		50 75		ohms ohms
VSWR	Input Output			1.25 1.15	:1 :1
RF/IF Sample			-20		dBc
Internal Reference	Frequency Stability vs. temperature Aging/day		10	±1 x 10 ⁻⁸ ±1 x 10 ⁻⁹	MHz
External Reference	0 to +10 dBm / ±1.5 ppm		5 or 10		MHz
Connectors	RF In RF Sample IF Out IF Sample External Reference In Serial I/O (RS-232/-422/-485) STARswitch™ Ethernet Power, AC		Type SMA (F) Type SMA (F) Type BNC (F) Type BNC (F) Type BNC (F) DB9 (F) DB15 (F) RJ45 IEC-320		
Power Requirements					
AC Power	Voltage Frequency Power	90 47		264 63 70	Vac Hz W
Dimensions	Rack-mount, 1U chassis		19 W x 1.75 H x 20 D 483 W x 44.5 H x 508 D		in mm
Weight	Approximate		15 (7)		lb (kg)
Temperature Range	Operating; Ambient Storage	0 -30		+50 +70	°C °C

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Ku-Band Upconverter Specifications (Ref. 17315 B)

Parameter	Conditions	Min	Nom/Typ [†]	Max	Units
Input Frequency	Option 1, 70 MHz IF Option 2, 140 MHz IF	50 100		90 180	MHz MHz
Output Frequency		13.75		14.50	GHz
Output Spectrum			Dual Conversion, Non-Inverted		
Frequency Step	Option F Option C		1 125		kHz kHz
LO Phase Noise	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz			-48 -68 -78 -88 -96 -110	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz
Input Level	Damage threshold			+20	dBm
Gain	Maximum	30	33	35	dB
Gain Flatness (IF Band)	Option 1; Per 40 MHz Option 2; Per 80 MHz			±0.3 ±0.5	dB dB
Gain Flatness (RF Band)				±1.0	dB
Gain Slope	Per 10 MHz			0.05	dB/MHz
Gain Stability	Per day, constant temperature vs. operating temperature			±0.25 ±1.0	dB dB
Gain Adjustment Range	0.1 dB steps, max.	30			dB
Power Output at P _{1dB}	At maximum gain	+10	+12		dBm
IMD ₃	Pout = -10 dBm per tone			-60	dBc
AM/PM Conversion	-5 dBm output power			0.1	°/dB
Group Delay	Linear component Parabolic component			0.03	ns/MHz
	Option 1, Per 40 MHz Option 2, Per 80 MHz			0.01 0.004	ns/MHz ² ns/MHz ²
	Ripple component			1.0	ns
Spurious	Signal related, Pout < 0 dBm Non-signal related			-60 -70	dBc dBm
Image Rejection				-80	dBc
Noise Figure at +23 °C	At maximum gain			13	dB
Input Impedance	Option 5 Option 7		50 75		ohms ohms
VSWR	Input Output			1.15 1.25	:1 :1
RF/IF Sample			-20		dBc
Internal Reference	Frequency Stability vs. temperature Aging/day		10	±1 x 10 ⁻⁸ ±1 x 10 ⁻⁹	MHz
External Reference	0 to +10 dBm / ±1.5 ppm		5 or 10		MHz
Connectors	IF In IF Sample RF Out RF Sample External Reference In Serial I/O (RS-232/-422/-485) STARswitch™ Ethernet Power, AC Line Input		Type BNC (F) Type BNC (F) Type SMA (F) Type SMA (F) Type BNC (F) DB9 (F) DB15 (F) RJ45 IEC-320		
Power Requirements					
AC Power	Voltage Frequency Power	90 47		264 63 70	Vac Hz W
Dimensions	Rack-mount, 1U chassis		19 W x 1.75 H x 20 D 483 W x 44.5 H x 508 D		in mm
Weight	Approximate		15 (7)		lb (kg)
Temperature Range	Operating; Ambient Storage	0 -30		+50 +70	°C °C

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STARswitch™ Applications

The STARswitch™ from VertexRSI is a truly unique concept in the area of redundancy switching for satellite converters. These switches are truly redundant, since no one converter has control over the system. Fully parallel and automatic switching is employed with the converters supplying both power and switch requests to the STARswitch™.

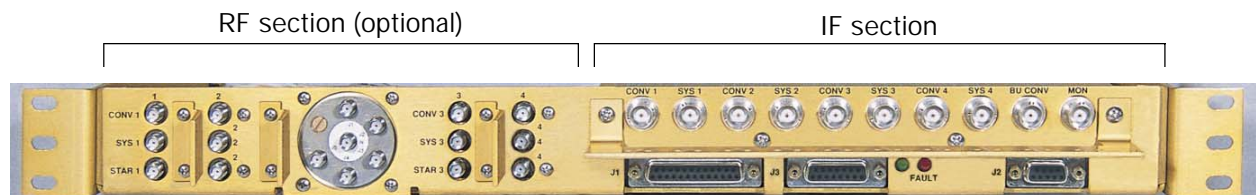
Six different models and various options allow for maximum versatility in system design. Options can be added as required; the unit is designed for ease of component addition, removal or replacement.

The basic unit handles up to four converters and one backup converter for IF switching. Added options allow for complete 1:4 RF switching within the same 1U chassis. 1:5 through 1:8 switching is accomplished by adding a second rack unit.

STARswitch™ technology allows the number of converters to be increased or decreased simply by connecting or disconnecting the converter and its associated RF switch. Since the only programming required is at the *converter*, the system recognizes the hardware that is there and operates accordingly.

Key features

- 1 RU high, 10.5" deep
- 50 and 75 ohm versions available
- Excellent RF specifications, including low RF losses, low ripple and low VSWR
- Low cost for up to 1:8 switching
- High MTBF and superior system availability
- Fully expandable with no loss of service
- Low noise and fast system response with parallel bus
- Controlled from a single menu on VertexRSI up- and downconverters



Performance Specifications	IF	RF	RF
Frequency Range	DC-180 MHz	DC-12 GHz	12-15 GHz
Return Loss (any ON path)	21 dB min.		
Insertion Loss (total path)	0.4 dB max.		
Return Loss (per switch)		16 dB min.	15 dB min.
Insertion Loss (per switch)		0.4 dB max.	0.4 dB max.
Isolation	60 dB min.	70 dB min.	60 dB min.
General Specifications			
Physical			
Weight	5 lb nominal		
Overall Dimensions	19" x 1.75" high x 10.5" (1:4 unit)		
Environmental			
Temperature Range	operating: 0 °C to +50 °C	non-operating: -20 °C to +70 °C	
Altitude	operating: 10,000 ft.	non-operating: 40,000 ft.	
Humidity	5% to 95%, non-condensing		
Shock/Vibration	As encountered in mobile trailer and commercial shipping environments.		

SCR Series Up- and Downconverters

SCR -XXX

L-Band Downconverter	1000CD
L-Band Upconverter	1000CU
C-Band Downconverter	4000BD
C-Band Upconverter	6000BU
Ku-Band Downconverter	12000RD
Ku-Band Upconverter	14000BU

Options:

IF center frequency:	70 MHz	1
	140 MHz	2
IF impedance:	50 ohms	5
	75 ohms	7
Frequency step:	1 kHz	F
	125 kHz	C

STARswitch™

SSW-XRX

Impedance:	50 ohms	R
	75 ohms	S
Expansion:	None	0
	1:8 expansion kit, 50 ohms	R
	1:8 expansion kit, 75 ohms	S
1:1		ORRO
1:2		ORSO
1:4		ORUO
1:6		OSUS
1:8		OSUU

For more information ...

The VertexRSI brand, recently acquired by General Dynamics C4 Systems, has provided thousands of high performance single-band and multi-band synthesized frequency up- and downconverters for satellite ground station applications since 1995.

For more information about the VertexRSI SCR series of synthesized frequency up- and downconverters, or to arrange for a demonstration unit, please contact the VertexRSI Sales department in State College, Pennsylvania, at 814-238-2700.

General Dynamics C4 Systems offers a family of satellite and wireless communications products under its VertexRSI, Prodelin, and Gabriel brands. Visit our website at <http://www.gdsatcom.com>.

GENERAL DYNAMICS
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