SFC6400A C-Band Synthesized Frequency Up Converter

Converters

Overview

The SFC6400A C-Band Synthesized Frequency Up Converter was designed to provide performance that meets or exceeds industry standards. The SFC6400A also provides ease of integration and operation. The SFC6400A offers the highest standard output power of any rack-mount up converter available. With an output P1 dB in excess of +15 dBm, the SFC6400A may eliminate the need for line amplifiers in your next installation. Installation of the SFC6400A into any existing earth station is easily accomplished due to the presence of independently adjustable input and output attenuators that provide total gain control of 50 dB. The input attenuator optimizes the existing IF power applied to the converter to a level which guarantees optimal performance over 30 dB of input signal power. Output power is adjustable over 20 dB, which further guarantees that spurious performance is maintained independently of up converter gain. Linearity of the converter is equally impressive. The SFC6400A boasts a two tone IMD products of -44 dBc for a combined output power of 5 dBm. Phase linearity is maintained through an internal group delay equalizer that limits parabolic plus linear group delay to less than three nanoseconds across the band. Thus, the SFC6400A is ideally suited for multiple carrier or DVB uplinks where linearity and group delay distortion becomes critical.

Features

- Low-Cost and High Performance in a 1.75” High Chassis
- Built-in 1:N Series Switching Option
- +27 dBm Output Intercept Drives 200 Extra Feet of Coaxial Cable
- 50 dB of Gain Control at 0.1 dB Resolution
- Versatile Input and Output Attenuator Eases Integration
- -80 dBc Spurious Suited for Large Earth Stations
- 125 kHz Frequency Resolution (optional 1 KHz)
- Low Phase Noise
- Low Group Delay Distortion for High Data Rates and DVB

Monitor and Control

All of the configuration, monitor and control functions are available at the front panel. Operating parameters such as frequency, channel, gain, gain offset and switch settings (backup only) can be readily set and changed at the front panel. Additionally, all functions can be accessed with a terminal or personal computer via a serial link (RS-232, RS-485, or Ethernet) for complete remote monitor and control (M&C) capabilities. Extensive fault monitoring with masking capability, along with time and date stamped event storage are available.

Protection Switch Versatility

Redundancy for the SFC converter products can be supported by a built-in Series Switch or an external rack mounted RCU101 (1:1) or RCU108 (1:N) system. These redundant systems are designed to ensure continuous operation thus allowing a unit to be replaced without disruption of the signal transmission. The built in Series Switching can be configured from a 1:1 to 1:8 redundant system without the need for additional hardware or support equipment. In either case, the built in Series Switch, RCU101 or the RCU108 can be easily configured by connecting the cables and starting the plug and play process.

Identical firmware enables any converter to be plugged into the backup slot and assume the role of protection switch controller. It is the backup converter that learns and stores the frequency, gain and channel settings of the primary converters. The backup converter can be operated automatically, in which case an automatic backup of a failed on-line converter occurs after a user pre-programmed delay. The backup may also be operated manually, allowing the operator to manually switch-in the backup unit. In the event the stored setting of the primary converter is changed, the backup converter will notify the user.

Switching configuration settings, such as priority, fault delay, force and learn controls, backup testing, and compensation, are available on the front panel and all serial interfaces. Status information on all primes, such as summary fault, learn and backup status tests, configuration change, relay status, and converter type, is also available. All circuits are protected upon installation of the switch and upon completion of the learning process. This eliminates the need for complicated software configurations that might otherwise leave a circuit vulnerable. Likewise, replacing a failed converter is as simple as plugging in a replacement.

Specifications

Output Characteristics

Frequency	5.845 - 6.425 GHz Standard 5.845 - 6.650 GHz Extended 5.850 – 6.725 GHz Extended Palapa
Impedance	50 Ohms
Return Loss	> 19 dB
P1 dBm Output	+15 dBm Minimum
Output Attenuation	0 -20 dB Continuously; Variable in 0.1 dB Steps
Connector	N, Type-F

Input Characteristics

Frequency	70 MHz ±18 MHz Standard 140 MHz ±36 MHz Optional
Impedance	75 Ohms
Return Loss	> 23 dB
P1 dBm Input	-15 dBm (Input Attenuator @ 0 dB)
Pin Nominal	-25 dBm (Input Attenuator @ 0 dB)

Transfer Characteristics

Type	Double Conversion, No Spectral Inversion
Gain	30 dB Maximum @ 0 dB Total Attenuation
Gain control	50 dB in 0.1 dB Increments (30 dB to -20 dB Conversion Gain)
Gain Ripple	± 0.25 dB/36 MHz Typical, ± 0.50 dB Maximum
Gain Slope	± 0.05 dB/MHz
Gain stability	± 0.25 dB/24 Hours, ± 1.0 dB; 0 to 50°C Typical
Spurious	-80 dBm Local Oscillator Related Spurious (In-band) at Maximum gain -60 dBc Signal Related Spurious (In-band) at Minimum Attenuation
Third Order Intercept	+27 dBm -44 dBc IMD Two Tones With +5 dBm Total Output Power
AM/PM Conversion	0.1°/dB @ +5 dBm Output
Type	Double Conversion, No Spectral Inversion
Gain	30 dB Maximum @ 0 dB Total Attenuation

Frequency Synthesizer Characteristics

Resolution	125 kHz Step Size (optional 1 KHz)
Accuracy	± 5 x 10^{-9}
Stability	± 5 x 10^{-9} Over Temperature (0 to 50°C) ± 1 x 10^{-9}/24 Hours
Accuracy	± 5 x 10^{-9}

Single Side Band Phase Noise

Offset	**C-Band Standard**
10 Hz	-50 dBc/Hz
100 Hz	-70 dBc/Hz
1 kHz	-80 dBc/Hz
10 kHz	-88 dBc/Hz
100 kHz	-95 dBc/Hz
1 MHz	-110 dBc/Hz
Offset	C-Band Standard

Group Delay

Linear	0.025 nsec./MHz
Parabolic	0.005 nsec./MHz^2
Ripple	1 nsec. p-p

Ext. Reference 10 MHz, 0 dBm, 50 Ohms (5 MHz Optional)

Operator Interface

Front Panel	Keypad Control, LED Indicators, and LCD Indicators
Remote Interfaces	Terminal (RS-232), ASCII and RLLP (RS-232/ RS-485) Serial Interfaces, and SNMP (Ethernet) 10Base-T
Rear Panel Connections	RF Output (N-Type), IF Input (75 Ohm BNC), Operator Serial Port (D Sub 9-Pin), 10 MHz REF In (50 Ohm BNC), 10 MHz REF Out (50 Ohm BNC), Fault/Test (D Sub 9-Pin), Switch Interface (D Sub 15-Pin), Equipment RS-485 Interface (D Sub 9-Pin), IEC/EN60320/C13 Power Entry Module/Switch, #10 Ground Lug, Series Switch Interface (Optional)
Front Panel Test Ports:	RF Monitor -15 dB SMA (F), IF Monitor -15 dB SMA (F), L01 & L02 Monitor SMA (F) (Optional)

Converter Settings

Monitored and/or controlled from the front panel or remotely, using the RS-232/RS-484 or Ethernet remote port:

- Frequency
- Current Channel
- Event Buffer
- Power Supply Voltages
- Input Attenuation
- Carrier Control and Status
- RF Detector, IF Detector, and DAC Attenuation Voltages
- Converter and Frequency Type
- Terminal Emulation and Baud Rate
- Channel Gain
- Gain Offset
- Faults Status and Mask
- Frequency Reference Status and Offset Control
- Remote Protocol, Baud, Line, and Echo Modes
- Converter Band and User Minimum/Maximum Frequencies

Switch Settings:

Monitored and/or controlled from the front panel or remotely, using the RS-232/RS-484 or Ethernet remote port (backup only):

- Priority
- Fault Delay
- Force Backup
- Learn Control
- Backup Testing
- Compensation Control
- All Available Prime Summary Fault
- All Available Prime Learn Status
- All Available Prime Backup Test Status
- All Available Prime Configuration Change Status
- All Available Prime Relay Status
- All Available Prime Converter Types

LED Indications	Standby, LO Fault, Ext Ref Online, Backup, Sw Fault, Manual (Backup Only), Power, Fault, Event, Remote

Physical & Environmental Characteristics

Dimensions (height x width x depth)	1.72" x 19" x 21" (4.44 x 48.26 x 48.26 cm)
Weight:	12 lbs (5.44 kg)
Primary Power	100 - 240 VAC, 50 - 60 Hz
Power Consumption:	50 W
Operating Temperature	0 to 50°C
Humidity	To 95% non-condensing
Altitude	To 8,000 Feet (2438.4 meters) AMSL
Shock & Vibration	No loss of frame synchronization at the BER Test set due to a standard hammer drop test on any outside surface of converter. Likewise, no loss of frame sync for temperature gradient of ± 22°C/hour
Non-Operating Temperature	-32 to +70°C, 99% Humidity, Non-Condensing

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