F3 Modular Frequency Equipment

Short Form Catalogue

Flexible Chassis

F3 Modular Frequency Equipment from Oscilloquartz is a highly ***Flexible*** approach to economic and efficient custom ***Frequency*** management.

A wide range of shelves are available, to which are added a selection of plug-in modules to perform the required ***Functions.***

F3 shelves are based on the 19" standard and are perfectly suited for integration into OEM systems.

- Modular concept with front panel access
- Redundant power supplies
- Alarms and monitoring

Function Modules

An extensive range of **Function** modules is available to suit most applications involving frequency management or timing of digital telecommunications networks.

These include:

- Quartz, Rubidium, Cesium or GPS sources
- Tracking Oscillator modules
- Frequency converters
- Timing extraction modules
- Input interfaces
- A wide choice of output interface modules
- Signal processing modules and many more

Frequency Solutions

F3 also offers a number of **Frequency** instruments with standard configurations **Solutions** including Master or Slaved Generators, Signal Processors, Tracking Oscillators, Distribution Amplifiers, Phase Comparators and TIE Measuring Instruments.

The F3 line represents a unique solution for applications such as:

- Frequency management in satellite ground stations
- Frequency distribution time & frequency laboratories
- Synchronization of digital networks according to **ITU-T** standards
- Frequency reference unit for Cellular telephony base stations

The leading partner for your synchronisation needs

OSCILLOQUARTZ

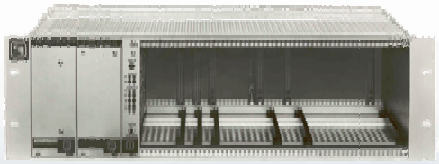
A COMPANY OF THE SWATCH GROUP

F3 Flexible Chassis

Basic frame

The basic frame for all F³ instruments is a 19" rack (DIN 41494 or IEC 297-3), 3 standard units in height (133,35 mm), using the DIN 41612 or IEC 603-2 family of connectors. These standards are not only used for the basic framework but also for the plug-in modules and interconnections.
Each F³ rack has a total useable area of 84 SI[(1)], of which 24 SI[(1)] are reserved for the three basic modules - primary power supply, secondary power supply and alarms.
The remaining 60 SI[(1)] are at one's disposal to accomplish the desired function, that is to insert the required Function modules.

[(1)]The abbreviation "SI" signifies "Space Interval" and is equivalent to 5.08 mm (2/10").



F³ basic frame, consisting of a 19" rack with dual power supplies and alarms module

Alarms Module

F³ equipment often contains a combination of function modules and can thus be viewed as a "Mini System".
Consequently, it requires a central alarms unit to centralise the operational and status data from all modules in the equipment.
If a failure is detected, a visual display is given on the front panel indicating a continuous fault, Direct alarm or intermittent fault, Memorised alarm.
A summary of the alarms is also available from opto-coupled or relay contacts at the unit's rear panel for remote monitoring of the equipment's status. This feature greatly simplifies the fault finding process.

Alarms modules

Power Supply Modules

Power supply redundancy is considered essential by most users, owing to the importance of not only the modules in the equipment but also the function of the equipment.
Each frame in the F³ line holds two power supply converters, one being the primary and the other a secondary supply.
These may be either AC/DC and DC/DC or dual AC/DC or dual DC/DC converters. The 24 VDC outputs from the converters are linked using a diode network to ensure uninterrupted supply distribution to the frame's internal 24 VDC supply bus

Power converter modules

General Information

- Generally, all inputs and outputs are located on the equipment's rear panel and access to the plug-in modules is from the front.
- Alarm indicators, test points and controls are accessible on the equipment's front panel.
- To reduce unwanted earth loops, the F³ mechanical structure is connected to electrical oV.
- On request, the F³ equipment can be supplied in metal cabinets for table top use, or in a convenient carrying case for portable applications, or in special enclosures for use in harsh environments.

Example of a complete F³ solution showing the modular concept

Frequency Solutions

The F³ line represents a unique solution for anyone who has a project involving the efficient management of frequency and timing signals.

A number of F³ instruments with standard configurations are available to meet demanding customer needs for exacting performance and reliability.

These include:
- Master or Slave Frequency Generators
- Signal Processors
- Tracking Oscillators
- Distribution Amplifiers
- Phase Comparators

Each unit is housed in a 19" rack equipped with redundant power supplies and alarms module, making it perfectly suited for stand alone operation or integration into OEM systems. Below are just some examples from a wide range of standard instruments employing the F³ concept.

The F³ line offers all the flexibility and performance features expected for applications such as:
- synchronization of digital networks
- frequency reference units for Cellular telephony base stations
- frequency management in satellite ground stations
- distribution of standard frequencies in a calibration laboratory.

5542 Compact Tracking Oscillator

The compact 5542 C.T.O. designed to fulfill clocking requirements for Stratum 2 and 3 with jitter reduction exceeding G.823.

Available in single or dual configurations, the 5542 can be equipped with synthesizers, processors and timing distribution, all in a single 3U high 19" rack, to provide a complete solution for private and public networks.

The CTO is the perfect network clocking solution with features such as: high performance D-PLL, high stability OCXO (hold-over stability $\leq 5 \times 10^{-10}$/day), and a wide choice of input and output interfaces.

5530 Distribution Amplifier

The 5530 can be equipped to provide up to 48 frequency output ports for a wide variety of applications, or up to 96 digitally coded signals for telecommunications applications according to CITT/ ANSI recommendations.

Frequency modules are available with 1,2 or 4 outputs per module (50; 75 or 120 Ω) whilst modules for distribution of digitally coded signals are available with 4 or 8 outputs per module (75; 100; 110 or 120Ω).

The wide choice of amplifier modules allows the 5530 to be configured for specific requirements.

Frequency Solutions

5500 Redundant 5 MHz Frequency Generation

The 5500 generates extremely stable and low noise frequencies of 5 MHz from two oven controlled crystal oscillators (BVA OCXO 8600).
The first oscillator is the "MASTER", and the second is the stand-by. The stand-by unit is slaved to the "MASTER" in order to minimise frequency and phase offsets when a switch-over occurs.
Optionally, the unit can be supplied with a Rubidium master oscillator or with other OCXO's either as master or as slave oscillators.
The oscillator outputs are fed to switching amplifiers which monitor and control the distribution of the two references (with automatic switch-over in case of failure).

5520/5525 Signal Processors

The 5520/5525 processors are designed to be used in conjunction with atomic or quartz references in redundant frequency distribution systems to perform three vital functions with an extremely high degree of reliability.

- redundant conversion of the 5 MHz inputs to 2.048 MHz (or 1.544 MHz)
- phase coherence between channels to within < 1/8 UI according to G.811
- automatic switch-over to the stand-by channel in case of failure.

5510 Frequency Conversion/Distribution

The 5510 is designed to house frequency conversion and/or distribution modules in the same chassis.

The unit is particularly useful for requirements calling for special frequencies or digitally coded signals in applications such as synchronization of digital networks, frequency management in satellite ground stations or frequency standard distribution in calibration laboratories. The wide choice of amplifier and converter modules allows to be configured for specific distribution needs.

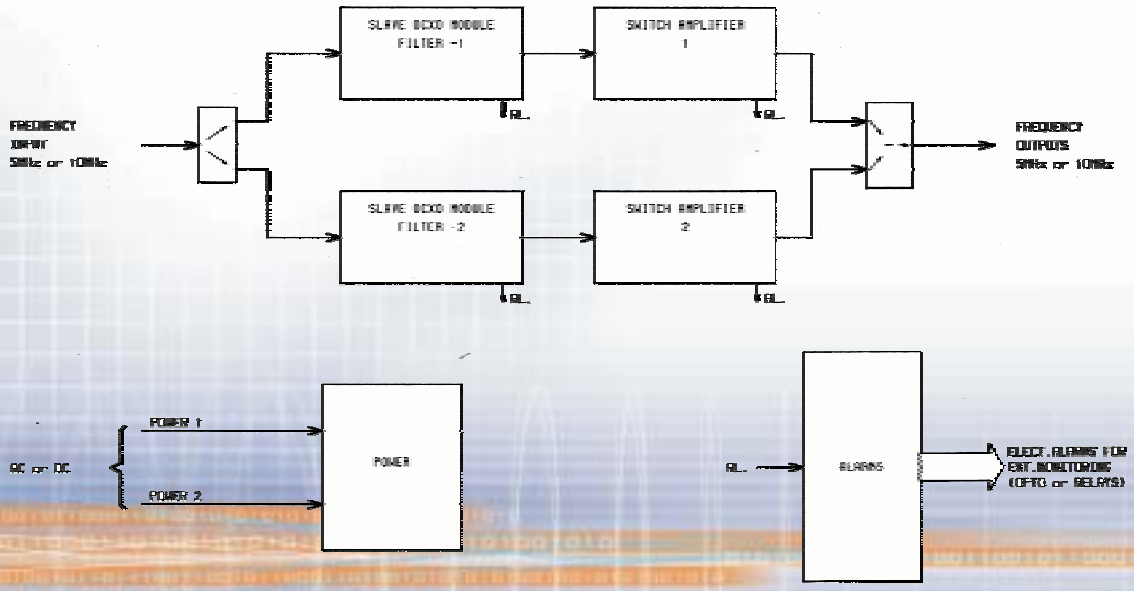
Typical Examples

5545 line - Low-noise 5/10 MHz re-generator

Key features :

- Excellent filtering of an existing frequency source
- Redundant design, automatic switchover (no phase jump, no loss of signal)
- Optical or electrical outputs
- Typical phase noise on the output :

  1Hz - 100 dB
  10 Hz - 120 dB
  100 Hz - 130 dB
  1 kHz - 140 dB
  10 kHz - 140 dB

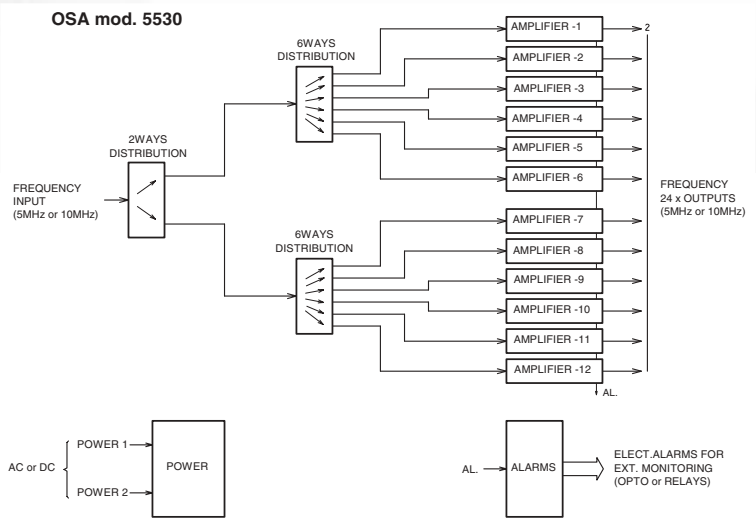


5530 line - 5 or 10 MHz Frequency Distributor

Key features :

- Low-noise design
- Up to 24 outputs from a single input
- Optical or electrical outputs
- Typical phase noise on the output (with an input 3dB) better :

  1Hz - 115 dB
  10 Hz - 130 dB
  100 Hz - 135 dB
  1 kHz - 140 dB
  10 kHz - 140 dB



Function Modules

F3

Modular Frequency Equipment

Master/Slave Generation Module

Master Oscillator with BVA 8600 (1)

- Equipped with BVA OCXO
- Long term stability typically $1x10^{-11}$ /day; $1x10^{-9}$ /year
- Very low phase noise close to the carrier −120 dBc at 1 Hz
- Digital potentiometer for fine frequency adjustment

Master Oscillator with Rubidium

- ≤ $4x10^{-11}$ /month
- High stability option available, typ. $1x10^{-11}$ /month
- Low phase noise
- Digital potentiometer for fine frequency adjustment

Slaved Oscillator with BVA 8600 (1)

- Equipped with BVA OCXO
- Free run stability typically $1x10^{-11}$ /day; $1x10^{-9}$ /year
- Very low phase noise close to the carrier −120 dBc at 1 Hz
- Built-in digital PLL with memory of correction values

Slaved Oscillator with Rubidium (2)

- Free run stab. ≤ $4x10^{-11}$ / month
- High stability option available, typ. $1x10^{-11}$ /month
- Low phase noise
- Built-in digital PLL with memory of correction values

Tracking Oscillator Module (TOM) (3)

- Clock extraction and regeneration
- Standard input interface include 64/1544/ or 2048 kbit/s
- Analogue input available
- User programmable D-PLL
- Jitter reduction exceeds G.823

Input Interface Modules

Time Extraction Unit-Active

- Standard inputs: 64kbit/s/1,544 Mbit/sDS1 or 2,048 Mbit/s HDB3
- Dialogue for automatic switching between dual units
- Visual and electrical alarms for REF, AIS, FA, ER and Bit det.

Line Receiver (6)

- Input signal amplifications/conversion
- Wide input frequency range: 64 to 10'000 kHz
- Built-in frequency converter switching between dual units

Active Interface

- Input signal amplification
- 0,1//2,048/5/10 MHz in/out
- Sine or square wave input
- Input/output monitoring
- Low output versus input level variation

Passive Signal Splitter

- 2/3/4 or 6 way splitting
- Only passive components used for highly reliable signal distribution
- Input transformer coupled
- Extended frequency range (100 kHz to 20 MHz)

Time Extraction Unit-Passive

- Peripheral for use with TEX-A for extraction of timing signal form PCM line (64kbit/s/1,544 or 2,048 Mbit/s)
- Only passive components used for high reliability
- 0,3 dB insertion loss

Signal Processing Modules

Phase Stepper

- Maintains phase coherence between signals to within 1/8 UI for g.811 compliance
- 1.544/2.048 and 5 MHz versions available
- TTL outputs for dialogue with other similar modules

Switching Amplifier with Priority

- Automatic/manual switching
- Minimal degradation of signal
- Before and after switch monitoring
- Dialogue for automatic (or manual) switching between dual or triple units

Frequency Converter (4)

- Frequency synthesis using PLL technique
- Input: 2.048/5 MHz or other submultiples
- Standard frequencies outputs: 1,544/2,048/4,096/10,24/44,736 or 139,264 MHz

Frequency Doubler

- Multiplies the input frequency by a factor of 2
- Input : 1 to 10 MHz
- Single or dual outputs
- Input and output transformer coupled

Frequency Divider

- Divides the input frequency by a factor of n
- Input : 1 to 10 MHz
- Single or dual outputs
- Input and output transformer coupled

(1) Other OCXO's available

(2) Available soon

(3) Choice of internal oscillator

(4) Version available for other frequencies

Oscilloquartz SA — Rue des Brévards 16 — CH-2002 Neuchâtel — Switzerland — Tel. : +41 32 722 55 55 — Fax : +41 32 722 55 56 — osa@oscilloquartz.com - www.oscilloquartz.com

Function Modules

F³

Modular Frequency Equipment

Output Interface Module

Output Amplifier Module-Analogue (5)

- Standard output frequencies : 64/1544/2048/6312/8448/ 34368/44736/139264 kHz
- CCITT/ANSI compatible
- 1, 2 or 4 outputs per module
- Outputs; 75Ω(co-ax) or 100/110/120Ω symmetrical

Output Amplifier Module-Digital (5)

- Digitally coded outputs (64 kbit/s; 1,544 Mbit/s DS1/AMI and 2,048 Mbit/s HDB3)
- Compatible with CCITT/ANSI recommendations
- 4 or 8 outputs per module

Output Amplifier Module-RS 422A (5)

- Standard output frequencies: 8 kHz/64 kHz/ 1,544 MHz/2,048 MHz and others
- Outputs according to RS 422A, V11 compatible
- 4 or 8 outputs per module

Output Amplifier Module-Standard (5)

- Standard output frequencies: 1, 5 and 10 MHz
- Cascode, tuned output buffer
- Very low phase noise
- 1, 2 or 4 outputs per module

Available with high reverse isolation

Synchronised Converter 5 MHz/1 pps

- Input: 5 MHz
- Output 1 pps
- TTL compatible

Input and output transformer coupled

Modules for Telecommunications Application

Code Generator CCITT G.703-6

- Input : 2.048 MHz
- Output : 2.048 Mbit/s HDB3 coded, 75 or 120 Ω
- Frame structure according to G.704 with frame alignment word

Code Generator CCITT G.703-2 (DS1)

- Input : 1,544 MHz
- Output : 1,544 Mbit/s DS1/AMI or B8ZS coded
- Frame structure according to G.704/G.733
- Available in 12 or 24 frame multi-frames

Code Generator CCITT G.703-1 (2)

- Input : 2.048 MHz
- Output : 64 kbit/s with 64 kHz and 8 kHz timing signals
- Signal structure according to G.703

General Function Modules

AC Converter (7)

- Primary or secondary supply
- Input: 115 or 230 VAC
- Alarm Monitoring

DC Converter (7)

- Primary or secondary supply
- Input: 36 or 72 VDC (for other, please contact OSA)

Alarms Module

- Essential for status monitoring
- Centralises all key alarms within and F³ chassis
- Direct and Memorised alarms
- Opto-coupled or relay outputs for remote monitoring

Phase Comparator Module

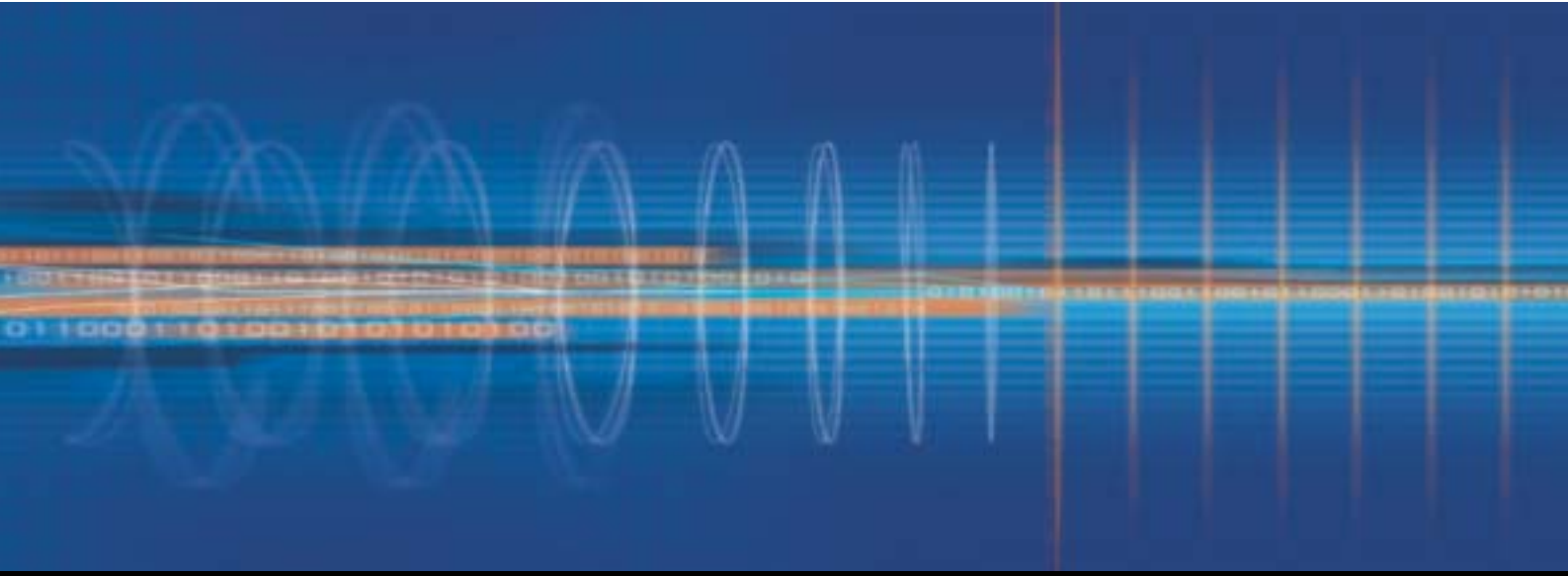
- Available for frequencies between 1 and 10 MHz
- Electrical and visual phase limit indicators
- Front panel calibration
- Adjustable analogue output

(5) Many other standard frequencies available

(6) Other input/output frequencies available on request

(7) Other power converters available on request

Oscilloquartz SA — Rue des Brévards 16 — CH-2002 Neuchâtel — Switzerland — Tel. : +41 32 722 55 55 — Fax : +41 32 722 55 56 — osa@oscilloquartz.com - www.oscilloquartz.com



F3 Modular Frequency Equipment

Short Form Catalogue

Other brochures available :

- Oscilloquartz brochure
- OSA 6500B PRC
- OSA 5581C PRS-SR
- OSA 5585 PRS
- OSA 5548B SASE
- OSA 5548C SASE
- OSA 5533C SDU
- OSA SyncView
- OSA Services
- OSA Oscillators Short Form Catalogue

OSCILLOQUARTZ S.A.
Rue des Brévards 16
CH-2002 Neuchâtel
Tel.: +41 32 722 55 55
Fax : +41 32 722 55 56
E-mail : osa@oscilloquartz.com
www.oscilloquartz.com

Version DRAFT6/Jan. 2004/ORIS