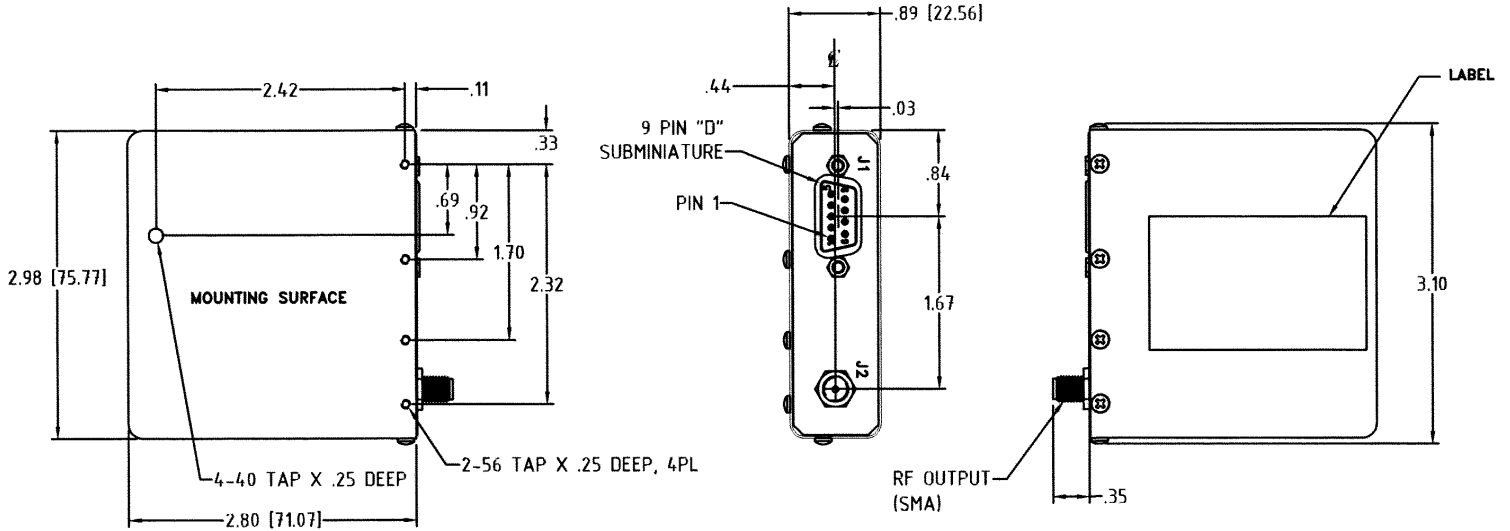


## Model FE-505A Low Silhouette Model



Pin #	Function
1	15 VDC Input
2	15 VDC Return (Ground)
3	No Connection
4	5 VDC Input
5	5 VDC Return (Ground)
6	No Connection
7	No Connection
8	TTL Interface Rx Port (Data In)
9	TTL Interface Tx Port (Data Out)



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# STATE OF THE ART QUARTZ CRYSTAL STANDARDS

## Models

FE-205A

FE-405A

FE-505A

## DESCRIPTION

This new design concept features a precision double oven crystal oscillator capable of analog or digital tuning. The serial digital tuning is ideal for disciplined applications in today's telecommunications industry. The temperature coefficient of this device is less than  $1 \times 10^{-10}$ . This is accomplished with no frequency over or under shoot, with fast temperature slew rates of  $4^\circ\text{C}$  per minute. Performance is Determined by a Double Oven SC Cut 5<sup>th</sup> Overtone Crystal. Output Frequency is Digitally Synthesized.

## TYPICAL APPLICATIONS

- Cellular Base Stations
- Test Equipment
- Stratum Clocks
- GPS Timing Systems
- Rubidium Replacement
- Radar Timing
- Military Communications Systems

“PATENTED DESIGN No. 6,577,201”



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FE-205A



FE-405A & FE-505A

## FEATURES

- Analog or Digital Interface [LSB  $\approx 1.7 \times 10^{-14}$ ]
- Excellent Temperature Stability  $< 1 \times 10^{-10}$
- $-40^\circ\text{C}$  to  $+70^\circ\text{C}$  Operation
- Low Aging  $< 5 \times 10^{-8}$  for 10 yrs.
- Retrace  $1 \times 10^{-10}$  after 1 hour, 24 hrs off
- Any frequency 5 MHz to 25 MHz
- Wide Linear Frequency Tuning  
Greater Than  $\pm 50$  ppm

# TECHNICAL CHARACTERISTICS

## Output

Frequency: 10 MHz and 15MHz Standard  
(Option for any other frequency  
5 to 25MHz)

## RF Output

Level: 9dBm  $\pm$ 2dB into 50 ohm load  
Waveform: Sine wave  
Harmonics: -40dBc max  
Spurious: -65dBc to 1 GHz

## Frequency Stability

Temperature:  $<1 \times 10^{-10}$  (-40° C to +70° C)  
(Including frequency over or undershoot at any  
fast or slow temperature slew rate)

Supply Voltage:  $<\pm 2 \times 10^{-11}$  (15v $\pm$ 5%)  
 $<\pm 2 \times 10^{-11}$  (+5v $\pm$ 5%)

Aging: (also see Option 28)  
Per Day:  $<1 \times 10^{-10}$  (after 14 days continuous  
operation) Typical  $5 \times 10^{-11}$   
Per Year:  $<1 \times 10^{-9}$   
Per 10 Years:  $<5 \times 10^{-8}$

## Phase Noise

1Hz -85dBc/Hz  
10Hz -95dBc/Hz  
100Hz -125dBc/Hz  
1KHz -135dBc/Hz  
10KHz -145dBc/Hz

Short Term Frequency Stability (Allan Standard Deviation):

$t = 1$  second  $1 \times 10^{-11}$   
 $t = 10$  second  $2 \times 10^{-12}$   
 $t = 100$  second  $1 \times 10^{-12}$

## Retrace

$1 \times 10^{-10}$  in 1 hr. after 24 hours power off  
 $5 \times 10^{-10}$  in 20 min. after 24 hours power off

G-Sensitivity:  $2 \times 10^{-9}$  per G, any axis

## Input \*

Digital Frequency Adjustment: Standard

RF output Frequency Adjustment: Digital control  
Via TTL serial port interface. (For details see manual)  
Serial Communication  
9600 Baud, TTL level, 8 bits, no parity, 1 stop bit

Adjustment resolution: LSB  $\approx 1.7 \times 10^{-14}$   
Adjustment range:  $\pm 20$ Hz for 15MHz output  
 $\pm 9.5$ Hz for 10MHz output

\*Other trim ranges can be special ordered

## Electrical

Power:  
Supply Voltage: +15v DC  $\pm$ 5% I amp max  
+5v DC  $\pm$ 5%, 200ma  
Warm-Up: 15W max.  
Steady State: 3.5W Max at 25°C

## Environmental

Temperature Range:  
Operating -40°C to +70°C meets all specifications  
Operational -55°C to +85°C may not meet frequency stability

## Physical Size

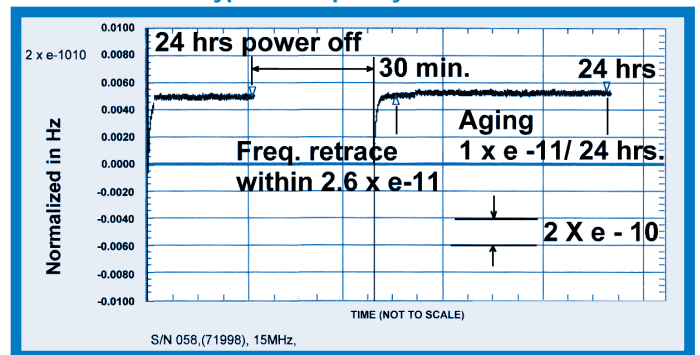
FE-205A 2.03" x 2.03" x 1.54"  
FE-405A 3.01" x 3.03" x 1.44"  
FE-505A 2.98" x 2.80" x 0.89"

## Ordering information \*

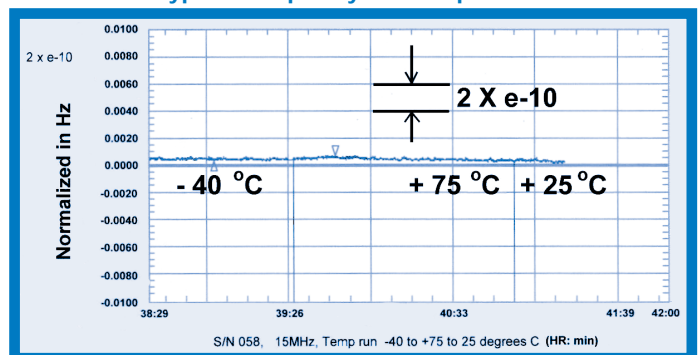
Option	Characteristic
20 (FE-205A Only)	Single 15v input
28	Aging $2.5 \times 10^{-11}$ /day after 15 days of continuous Operation $2.5 \times 10^{-9}$ / 10 year
30 (FE-205A Only)	Analog Frequency Adjustment: Via DC input of 5v $\pm$ 5v (0 to +10v) Course Adjust Range: $\pm 2.4 \times 10^{-7}$ Fine Adjust Range: $\pm 0.5 \times 10^{-8}$
32	-40°C to +75°C
34	-40°C to +80°C

\* Contact factory for specials including custom packages

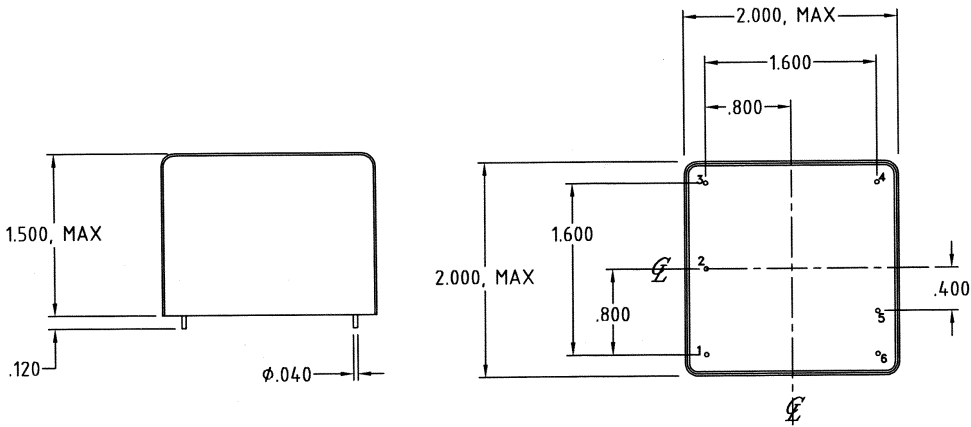
## Typical Frequency Retrace



## Typical Frequency VS. Temperature

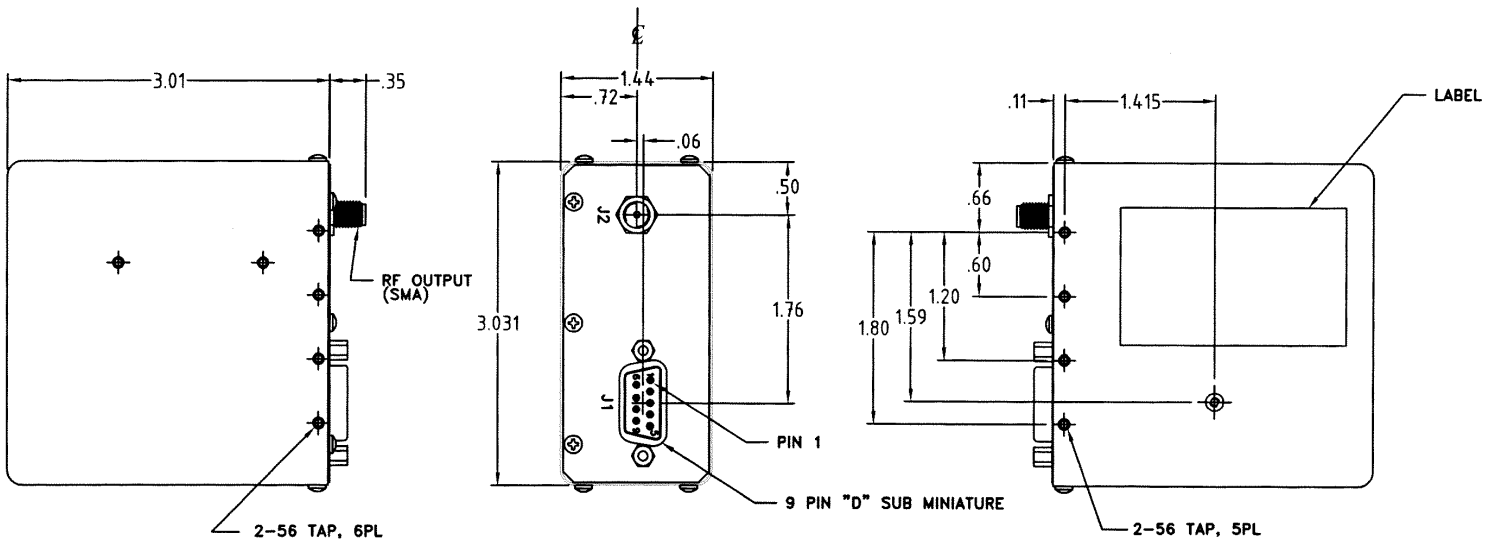


### Model FE-205A



Pin #	Function
1	Frequency Tuning, Serial Interface TTL, RX Port or Analog VCO Course Tuning Input
2	+15 Volts B+ Input
3	RF Output
4	DC Return, Serial Digital return and Chassis Ground
5	+5 Volts dc Input
6	Frequency Tuning, Serial Interface TTL, TX Port or Analog VCO Fine Tuning input

### Model FE-405A



Pin #	Function
1	15 VDC Input
2	15 VDC Return (Ground)
3	No Connection
4	5 VDC Input
5	5 VDC Return (Ground)
6	No Connection
7	No Connection
8	TTL Interface Rx Port (Data In)
9	TTL Interface Tx Port (Data Out)