



# NEOS TECHNOLOGIES

A Gooch & Housego Company

MODEL NUMBER:

## 64090-150-4ADMDFS-A SPECIFICATIONS

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**A Digital Frequency Synthesizer Oscillator OEM Module with Analog and Digital Modulation input and a 4 Watt RF Output.**

<u>PARAMETER</u>	<u>SPECIFICATION</u>
Bandwidth:	90 – 150 MHz typical
Clock Frequency:	1000 MHz
Step Size:	< 1 Hz with 30 Bits input
Frequency Settling Time:	250 ns Maximum
Power Out:	4 watts typical
Harmonic Distortion: 2 <sup>nd</sup> :	-15 dBc Maximum
3 <sup>rd</sup> :	-15 dBc Maximum
Analog Modulation:	0 to +1 volt Analog, +1 volt = Full RF power output.
Digital Modulation:	TTL levels TTL Active High = Full RF output power TTL Active Low = Minimum RF output power No Signal = Full RF output power (pulled high internally)
Rise and Fall Time:	20 ns
Extinction Ratio:	
Digital:	30 dB Minimum
Analog:	40 dB Minimum
Applied Power:	+ 28 VDC @ 3 amps Maximum + 3.3 VDC @ 1 amp Maximum
<b>MAXIMUM RATINGS:</b>	
Ambient Temperature:	40 <sup>0</sup> C
RF Output:	No DC Feedback
<b>INPUT / OUTPUT CONNECTIONS:</b>	
+28V, +3.3V, and Gnd	Filtered Feedthru
Mod In	SMC Male
Reference Out	SMC Male
RF Output	SMA Female
FREQUENCY SELECT Control	TTL 30 bit binary word, Digital Modulation input, RESET, and a LATCH control input through the 37 pin D sub connector. See page 2 for pinout.
Dimensions	2.64 X 4.27 X 5.43 inches maximum

# 64090-150-4ADMDFS-A

"FREQUENCY SELECT" PIN OUT  
37-PIN MALE D-SUB CONNECTOR

<u>PIN</u>			<u>PIN</u>		
1	FS <sub>0</sub>	LSB	20	FS <sub>1</sub>	
2	FS <sub>2</sub>		21	FS <sub>3</sub>	
3	FS <sub>4</sub>		22	FS <sub>5</sub>	
4	FS <sub>6</sub>		23	FS <sub>7</sub>	
5	FS <sub>8</sub>		24	FS <sub>9</sub>	
6	FS <sub>10</sub>		25	FS <sub>11</sub>	
7	FS <sub>12</sub>		26	FS <sub>13</sub>	
8	FS <sub>14</sub>		27	FS <sub>15</sub>	
9	FS <sub>16</sub>		28	FS <sub>17</sub>	
10	FS <sub>18</sub>		29	FS <sub>19</sub>	
11	FS <sub>20</sub>		30	FS <sub>21</sub>	
12	FS <sub>22</sub>		31	FS <sub>23</sub>	
13	FS <sub>24</sub>		32	FS <sub>25</sub>	
14	FS <sub>26</sub>		33	FS <sub>27</sub>	
15	FS <sub>28</sub>		34	FS <sub>29</sub>	MSB
16	Latch (Active High)		35	Digital Modulation Input (Active High)	
17	Master Reset (Active High)		36	N/C	
18	N/C		37	N/C	
19	Ground				

$$\text{Control Word } K_{10} = \frac{F_{\text{OUT(Hz)}}(2^{31})}{F_{\text{OSC(Hz)}}} \text{ in Decimal notation}$$

## CONTROL WORD CALCULATIONS

The output frequency and step size is a function of the clock rate and the "FREQUENCY SELECT" data. The output frequency can be calculated from the formula:

$$f_{out} = \frac{(f_c)(k_{10})}{2^n}$$

Where:  $f_c$  = clock frequency in Hz  
 $k_{10}$  = input word in decimal notation  
 $n = 31$  \*See note below.

The minimum output frequency and step size are given by:

$$f_{min} = \frac{f_c}{2^n}$$

An example of setting the frequency:

Clock frequency =  $1000 \times 10^6$  Hz

Desired output frequency =  $30.00 \times 10^6$  Hz

$$K_{10} = \frac{f_{OUT(Hz)}(2^{31})}{f_{OSC(Hz)}}$$

$$K_{10} = \frac{30 \times 10^6 (2^{31})}{(1000 \times 10^6)}$$

$K_{10} = 64424509.44$  Decimal

Convert  $K_{10}$  to HEX

∨- MSB    ∨ - LSB

$K_{HEX} = 3D70A3D$

→

03D70A3D

-Setting for front panel "HEX" switches

NOTE: The switches on the front panel of the driver are LSB to MSB - right to left.

Convert  $K_{HEX}$  to Binary

∨ LSB - pin1

$K_B = \underline{000011110101110000101000111101}$

∧

-Setting for binary word input to back panel "FREQUENCY SELECT" 37 pin

D-sub connector

These 4 bits are added to complete the 30 bit word

\*Note: This system only uses 30 bits to set the frequency output from the driver. The accumulator inside the chip is 31 bit, so use  $2^{31}$  in your calculations for precision.

The LATCH function is TTL active HIGH and is located on pin 16. The LATCH will hold the frequency at the last word sent to the driver prior to setting the latch high.

Master RESET is a TTL active HIGH and resets the accumulator to zero, ie, no frequency output, when a TTL HIGH is applied to pin 17. This is pulled LOW via a 1 K $\Omega$  resistor.