

The 5009 Dual Frequency Synthesizer module provides two independent RF frequency synthesizers covering the frequency range 23.5MHz to 6 GHz. Each synthesizer is phase locked to the same internal TCXO reference or can be locked to a high stability external reference. Programming the non-volatile settings can be accomplished using 5009 Configuration Manager or any terminal emulation program including the Valon 5000term through the micro-USB interface. List Mode and Sweep Step mode is also provided as well as serial TTL control through the User Port.



Electrical Specifications

Note: The 5009 is **NOT** USB powered. You may purchase a Valon **PS6V-1** power supply kit.

DC Input

Input Voltage Range Absolute Max Operational Max Operational Min Reduced performance Min non-operational	+16V to -16V (reverse protected) +8v +6V Recommended Operation Voltage +4.8 to 5.8V (output power reduced) +3.5V (synthesizer remains locked and serial port ok) >10V for >10sec resets the synthesizer to factory default settings
Input Current Source 1 and Source 2 on Source 1 or Source 2 on Source and Source 2 off	560mA Output Enabled 330m Output disabled 190mA Output disabled 270mA Output enable 30mA both disabled
DC Input Connector	Hirose DF3A-2P-2DS Mates with Hirose DF3-2S-2C plug and pre-crimped wire H2BXT-10112-R4 (red) and H2BXT-10112-B4 (black). Custom 20" dc cables supplied with synthesizer, additional cables available.

Full performance is obtained when the dc input voltage is in the operational range. If the input voltage is increased above the operational range, the output will be disabled and the synthesizer will be in standby mode. The synthesizer may be operated with reduced RF output power in the reduced performance voltage range. If the dc voltage is in the Min non-operational range, the output will be disabled but all user settings will be retained. Input voltages below the minimum non-operational range will cause a reset condition.

RF Synthesizer Specifications

(Unless otherwise noted, all specifications apply equally to both synthesizers.)

Frequency Range	Max 6000MHz Min 23.5MHz							
Frequency Increment (Fractional-N Mode)	20MHz reference	20MHz reference						
Frequency Range (MHz)	Reference Doubler ON	Reference Doubler OFF						
3000~6000	10 kHz	5 kHz						
1500~3000	5 kHz	2.5 kHz						
750~1500	2.5 kHz	1.25 kHz						
375~750	1.25 kHz	1 kHz						
187.5~375	1 kHz	500 Hz						
93.75~187.5	500 Hz	250 Hz						
46.875~93.75	250 Hz	100 Hz						
23.4375~46.875	100 Hz	50 Hz						
	(minimum step size)	(minimum step size)						
Frequency Lock Time	<100uS Lock time is from the time the frequency command is sent, or a frequency step in sweep mode, or input from User Port in List mode to a stable Lock Detector output							
Frequency Increment (Integer-N Mode)	20MHz reference	20MHz reference						
Frequency Range (MHz)	Reference Doubler ON	Reference Doubler OFF						
3000~6000	40 MHz	20 MHz						
1500~3000	20 MHz	10 MHz						
750~1500	10 MHz	5 MHz						
375~750	5 MHz	2.5 MHz						
187.5~375	2.5 MHz	1.25 MHz						
93.75~187.5	1.25 MHz	625 kHz						
46.875~93.75	625 kHz	312.5 kHz						
23.4375~46.875	312.5 kHz	156.25kHz						
Sweep rate	0.1ms to 1sec in 0.1ms steps							
Phase Noise	Typical phase noise as measured with Berkeley Nucleonics 7300 Signal Source Analyzer							
	10Hz	100Hz	1kHz	10kHz	100kHz	1MHz	10MHz	
6GHz	-54	-59	-85	-90	-94	-126	-147	dBc/Hz
5GHz	-57	-61	-86	-93	-94	-127	-149	dBc/Hz
4GHz	-76	-82	-89	-98	-95	-129	-150	dBc/Hz
3GHz	-60	-65	-93	-101	-100	-134	-150	dBc/Hz
2GHz	-64	-69	-96	-104	-100	-130	-152	dBc/Hz
1GHz	-70	-99	-99	-107	-106	-140	-152	dBc/Hz
500MHz	-76	-81	-105	-113	-112	-124	-152	dBc/Hz
200MHz	-83	-89	-113	-121	-124	-152	-155	dBc/Hz
40MHz	-90	-104	-126	-132	-135	-156	-157	dBc/Hz
Harmonics	The 5009 output waveform is a clipped sine wave. Harmonics are typically 12dBc. Odd harmonics are most prominent.							
Spurious	Non-Harmonic <-60dBc except boundary spurs							
Output Return loss	Min.(dB)	Typical(dB)						
25~ 100MHz	>5	8dB						

100 ~ 1000MHz	>9	15	
1000 ~ 2000MHz	>8	10	
2000 ~ 4000MHz	>6	8	
4000 ~ 6000MHz	>7	10	
Connectors	SMA Female		

Unless otherwise noted, all specifications apply equally to both synthesizers.

AM Modulation	0.5dB to 31.5dB
AM Frequency	0.5Hz to 10kHz
Range	±0.5Hz
Accuracy	
AM Waveform	50% duty cycle square wave

Output Amplitude Frequency Response (PLEV=4, ATT=0) Freq. Range (MHz)	Min dBm	Typ. dBm	Max. dBm
25~100	>12	17	<17.5
100~4000	>13	15	<17
4000~6000	>10	14	<16

Attenuator	0dB to 31.5dB
Relative Attenuation Range	0.5dB
Attenuation Step Size	
RF output On/OFF	When off power is reduced by ~30dB

Reference Frequency	
Internal Reference	20.000MHz ± 2ppm (23°C) ±0.5ppm -20°C to +70°C (case temp) ± 10ppm 8-bit, 10-bit after 12/2016
Frequency	
Initial Accuracy	
Temperature Stability	
Reference Trim Range	
Reference Trim Resolution	
Internal Phase Frequency Detector (PFD)	Max 140MHz, 125MHz Fractional mode Min 1 MHz
External Reference	50Ω nominal impedance 10MHz to 210MHz (max PFD 140MHz integer mode, 125MHz fractional mode) -10dBm min. +13dBm max. (note, external reference as low as -50dBm with reduced phase noise performance)
Frequency Range	
Input power range	
External Reference Connector	SMA Female 50Ω nominal impedance Note: Ext input is ac coupled to synthesizer but dc coupled to internal VCTCXO control circuit. External reference should be disconnected when using internal reference.
External Reference Return Loss	10dB typical 50Ω nominal impedance
10MHz	>24dB
20MHz	>20dB
50MHz	>14dB
100MHz	>6dB
200MHz	>5dB
EFC Electronic frequency Control at external reference input	Pulling range >±10ppm Voltage ±3V Input resistance 20kΩ Frequency response 0Hz~>5kHz

Interface

USB	Micro-B socket FTDI virtual com port 9600, 8, N,1,N default- Automatically shift to 115200 with GUI See FTDI for drivers for your computer. Note: The Configuration Manager GUI will automatically configure the USB port and switch to 115200 baud rate.
USER PORT	3.3V TTL TXD & RXD <i>(see section 5)</i> 115200,8,N,1,N default Hirose DF11-8DP-2DS Mates with Hirose DF11-8DS-2C plug and pre-crimped wireH3BXT-10112-** (DigiKey) LSW-1 LIST Mode switch and cable accessory is also available. External Trigger Input: 3.3V TTL Hi-Z input
Selectable Baud Rates	Either port: 9600, 19200, 38400, 57600,115200, 230400, 460800, 921600

Environmental

Operational full specifications:	-20°C~+70°C (case temperature)
No damage functional:	-40°C~+85°C (case temperature)
Humidity:	5%~95% minimal condensation allowed
IP rating:	50 No water protection.

Mechanical Dimensions

3.625"W x 2.685"L x 0.55"H

Weight: 0.2lbs, 91g

Material: AL-6061-T6

Finish: Clear Alodine (conductive)

