



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 setting 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 Min	6000MHz 23.5MHz							
Frequency Increment (Fractional-N Mode)	Frequency Range (MHz)	20MHz reference Reference Doubler ON			20MHz reference Reference Doubler OFF				
	3000~6000	9.768 kHz			4.884 kHz				
	1500~3000	4.884 kHz			2.442 kHz				
	750~1500	2.442 kHz			1.221 kHz				
	375~750	1.221 kHz			610.5 Hz				
	187.5~375	610.5 Hz			305.3 Hz				
	93.75~187.5	305.3 Hz			152.6 Hz				
	46.875~93.75	152.6 Hz			76.31 Hz				
	23.4375~46.875	76.31 Hz			38.16 Hz				
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)	Frequency Range (MHz)	20MHz reference Reference Doubler ON			20MHz reference 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							

5009 Dual Frequency Synthesizer Specifications

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	Min dBm	Typ. dBm	Max. dBm
(MHz)				
	25~100	>12	17	<17.5
	100~4000	>13	15	<17
	4000~6000	>10	14	<16
Attenuator	Relative Attenuation Range	0dB to 31.5dB		
	Attenuation Step Size	0.5dB		
RF output On/OFF	When off power is reduced by ~30dB			

Reference Frequency	
Internal Reference	Frequency: 20.000MHz Initial Accuracy: ± 2ppm (23°C) Temperature Stability: ±0.5ppm -20°C to +70°C (case temp) Reference Trim Range: ± 10ppm Reference Trim Resolution: 8-bit, 10-bit after 12/2016
Internal Phase Frequency Detector (PFD)	Max 140MHz, 125MHz Fractional mode Min 1 MHz
External Reference	50Ω nominal impedance Frequency Range: 10MHz to 210MHz (max PFD 140MHz integer mode, 125MHz fractional mode) Input power range: -10dBm min. to +13dBm max. (note, external reference as low as -50dBm with reduced phase noise performance)
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

5009 Dual Frequency Synthesizer Specifications

EFC Electronic frequency Control at external reference input	Pulling range $>\pm 10\text{ppm}$ Voltage $\pm 3\text{V}$ Input resistance $20\text{k}\Omega$ Frequency response $0\text{Hz}\sim 5\text{kHz}$
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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 wire H3BXT-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: No damage functional: Humidity: IP rating:	$-20^{\circ}\text{C}\sim +70^{\circ}\text{C}$ (case temperature) $-40^{\circ}\text{C}\sim +85^{\circ}\text{C}$ (case temperature) 5%~95% minimal condensation allowed 50 No water protection.
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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)

