dB Control
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dB-9006 Magnum Opus Microwave Synthesizer

100 MHz – 27 GHz Wide Frequency Range

1 Hz Resolution Mode

Best-in-Class Phase Noise Performance

-80 dBc Non-Harmonic Spur Performance

<50 uS Fast Tuning

The dB Control dB-9006 Magnum Opus instrument-grade synthesized signal source tunes from 100 MHz to 27 GHz with best-in-class phase noise performance. This microwave synthesizer supports three interfaces, including 4-wire SPI and two SCPI interfaces using either RS-232 or USB. Tuning speed is under 50 uS using the SPI port. A secondary output tunes from 1-2,000 MHz. Both outputs provide the standard 1 Hz resolution and also support a 1 mHz high-resolution mode.

dB-9006 Datasheet

Features

- Wide frequency range (100 MHz to 27GHz, with 1 Hz resolution mode)
- Best-in-Class instrumentation-grade phase noise performance
- -80 dBc non-harmonic spur performance
- Fundamental VCOs, no sub-harmonics
- Fast tuning (<50 uS)
- Auxillary 1-2,000 MHz DDS output
- Three control interfaces (USB, RS-232, 4-wire SPI)

Applications

- Communications Intelligence (COMMINT)
- Electronic Countermeasures (ECM)
- Low Jitter ADC & DAC Clocks
- Radars
- Satellite Links
- Test and Measurementation

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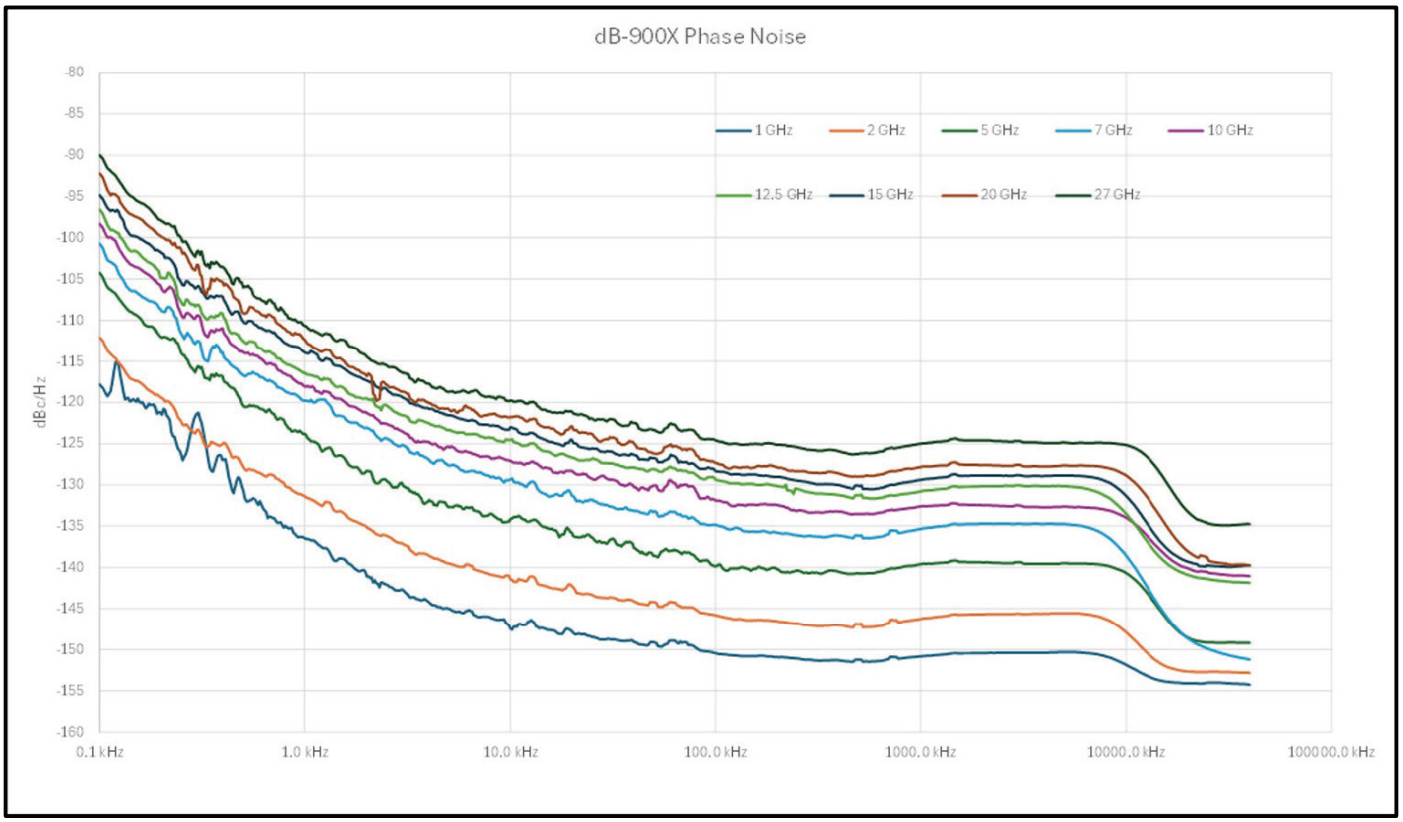
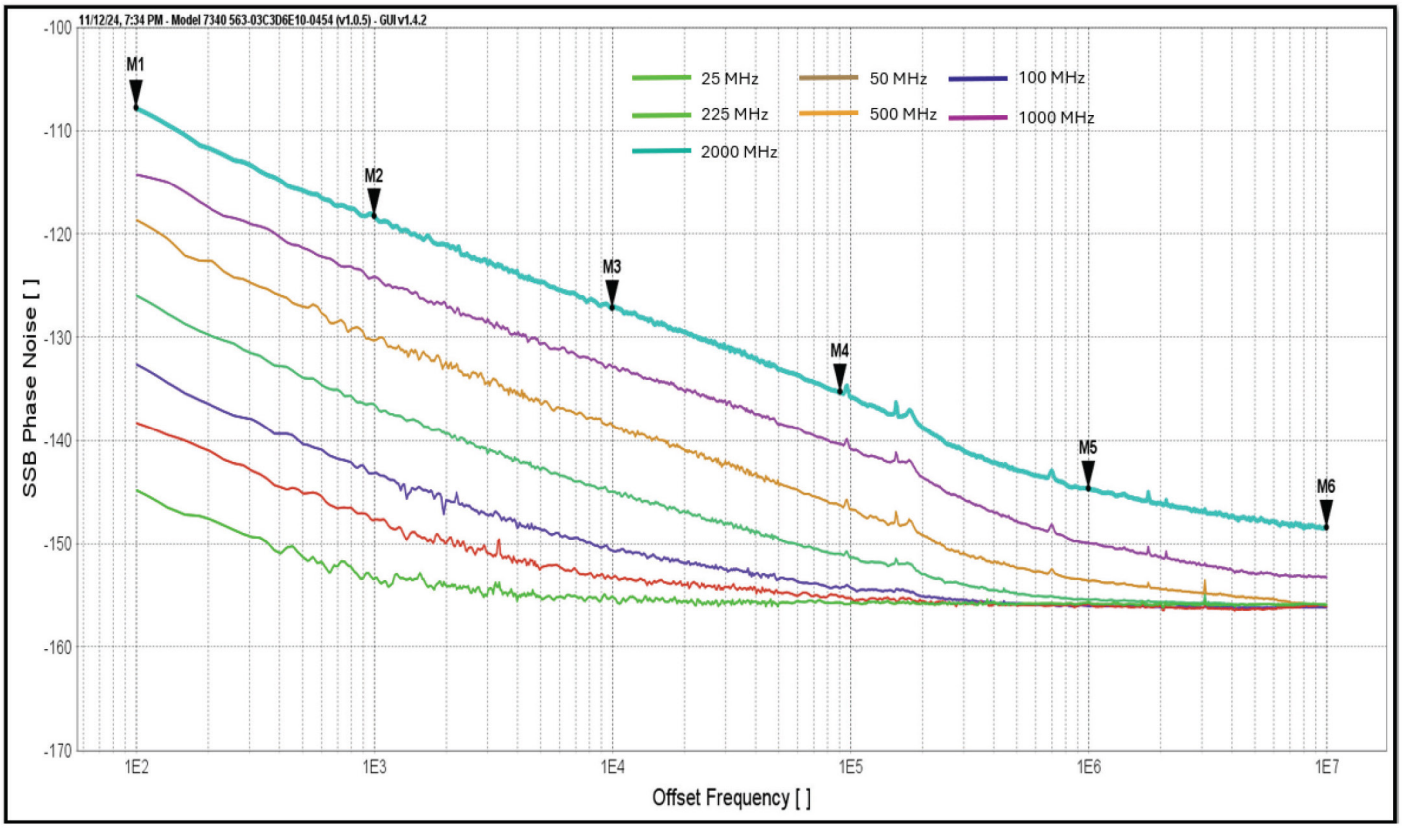
dB-9006 Compact Synthesizer Phase Noise

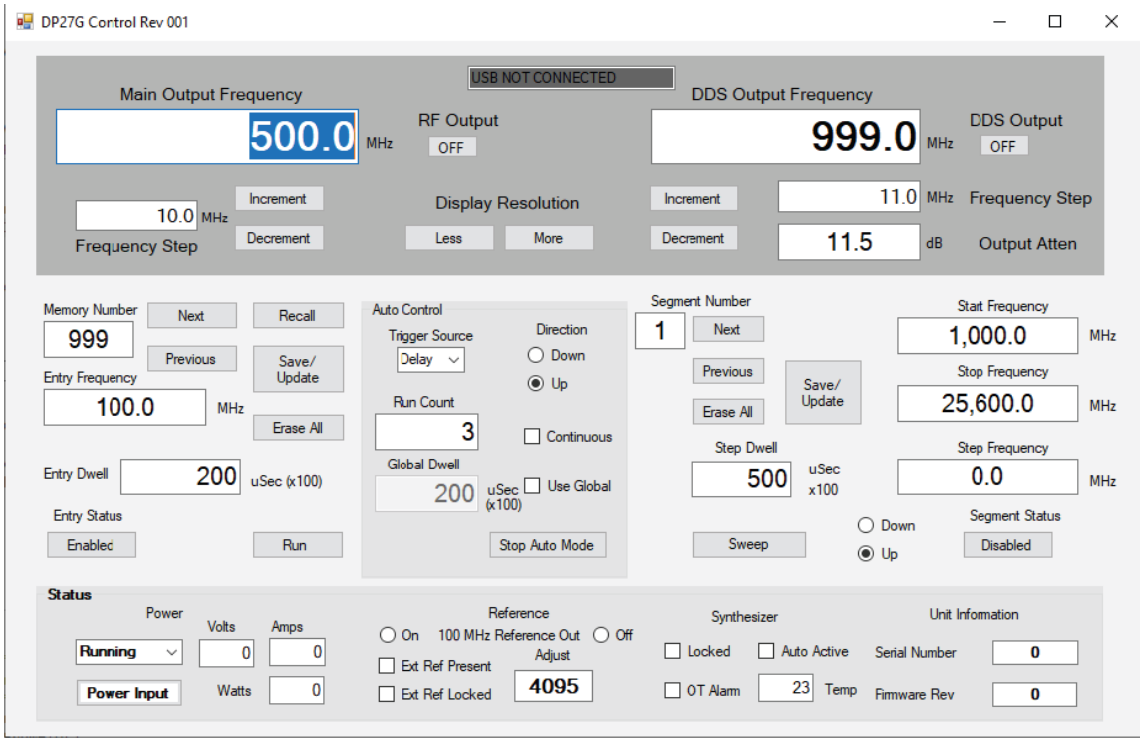
Primary Output 0.1 - 27 GHz (dBc/Hz) Typical



Auxiliary Output 1 - 2000 MHz (dBc/Hz) Typical



dB-9006 USB GUI



dB-9006 Command Summary

#	Command	SCPI	SPI	Description
1	Main Frequency	FREQ	100	Tune Main output to specified frequency, do not save
2	Read Main Freq	READ:FREQ	101	Read back current tuned frequency
3	Main Freq (Save)	FREQS	102	Tune Main Freq and save to EEPROM (slower—use BUSY)
4	Main RF On/Off	MAINRF	103	Control the main RF output
5	Main Frequency Hi Res	FREQX	105	Main Frequency with milli-Hz resolution
6	Standby/Resume	PWR	110	Select one of four states (Stby Oven off, Stby, DDS only, On 0/1/2/3)
7	Reference Adjust	REFA	120	Set DAC value to trim reference
8	Ref Output On/Off	REF100	121	Control the 100 MHz reference output
9	Read Device Info	READ:INFO	123	Read back serial number and SW revision
10	SW Trigger	TRIG	125	Used to step sweep or memory mode to the next value
11	Read Status byte	READ:STAT	130	16-bit word with each bit represents some status
12	Read Analog Value	READ:ANLG	132	Read any of the 32 possible analog values
13	Read Power	READ:PWR	133	Replies with input voltage and current
14	Read Temperature	READ:TEMP	134	Reads analog channel 30 for temp response in Deg C
15	Save to Memory	MEMSAV	140	Save Freq, dwell and control bits for up to 1000 frequencies
16	Read from Memory	READ:MEM	141	Read any memory value back
17	Erase memory	ERASE:MEM	143	Clears all (RAM and EEPROM) for security reasons 0=all, else #, ALL for USB
18	Recall a Memory	RECALL	144	Tune to the specified memories' frequency
19	Step Thru Memories	MEMRUN	145	Step through all active memories via one of three triggers
20	Enable/Disable Memory	MEMEN	146	Change the status of an existing memory location
21	Stop	STOP	149	Stop either memory step or sweep mode
22	Define Sweep Segment	DEFSEG	160	Seg#, Start, Stop, Step, Dwell, and control definitions (0-7 segments)
23	Read Sweep Segment	READ:SEG	161/164	Read back segment definition (uses 2 USB packets)
24	Enable/Disable Segment	SEGEN	162	Enables segment (ON), or Disables (OFF)
25	Run Defined Sweep	SWEEP	163	Execute one or more segments, plus global dwell, count, trigger & direction
26	Erase a Sweep segment	ERASE:SEG	165	Deletes any segment
27	List active segments	READ:ACTV	166	A single byte reply with each bit equal to a segment's status
28	DDS Frequency	DDSFREQ	200	Tune DDS output to specified frequency
29	Read DDS Frequency	READ:DDS	201	Read back current DDS Frequency
30	DDS Frequency (Save)	DDSFREQS	202	Tune DDS Freq and save to EEPROM (slower—use BUSY)
31	DDS RF On/Off	DDSRF	203	Control the DDS output
32	DDS Freq Hi Res	DDSX	204	DDS Frequency with milli-Hz resolution
33	Set DDS Atten	DDSATT	205	Control the DDS output power
34	Read DDS Atten	READ:ATT	206	Read the current DDS attenuator setting
35	Sweep DDS	DDSSWP	207	Sweep the aux output from F1 to F2 with Fstep Dwell, count Trig and Dir
36	Define DDS Sweep	DEFDDS	N/A	SCPI only, Sweep CMD combines; SCPI specifies start/stop/step Freqs
37	CAL Table Control	CAL	250	(USB Only) Various control bits for ATE Calibration (Factory Only)

dB-9006 Magnum Opus Microwave Synthesizer Specifications

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RF Output

Frequency Tuning Range	100 MHz to 27 GHz, +13 dBm Nominal
Frequency Tuning Resolution	1 Hz and 1 mHz high resolution mode
Secondary Output Port	1 to 2000 MHz, adjustable over ~30 dB range. The RF output is always available and is not shared with primary synthesizer
Voltage In	+9V to +15V dc, <20 W power consumption. Over Voltage and Reverse Polarity protection.
Two Frequency Modes:	High Speed (1 Hz step size), 40 bit word High Resolution, 48 bit tuning word
Tuning Speed	High Speed Mode, <50 uS SPI control
Non-harmonic Spur performance	-80 dBc typical, no sub harmonics

Reference

Internal Oscillator Type	OCXO
Ext. Ref. In	10 MHz, with auto detection, 0 to +10 dBm
Ref Out1	10 MHz Po = +6 dBm nom.
Ref Out2	100 MHz Po = +6 dBm nom.
Frequency Calibration	External command allows correction for long-term OCXO drift. Can be performed on sealed module
Extensive BIT Functions	All power supplies and auto-calibration function
Four Power Modes:	OFF(low power/standby) OCXO powered on, unit in standby OCXO, ref circuits enabled, DDS (LF output) only On, normal full function

Mechanical

Interfaces	SPI, USB (mini-B), and RS-232
Main Power	2.1 mm Power Plug
IO Power	Harwin M80-4602005
RF Outputs	Type SMA (F)
RF Inputs	Type SMA (F)
Dimensions	7.0” L x 5.0” W x 0.8” H (inches) 178 L x 127 W x 20.3 H (mm) excluding the RF connectors
Weight	19 oz

Environmental

Operating Temperature	-30° C to +70° C, baseplate
Operating Altitude	Up to 40,000 feet ASL
Humidity	Up to 95% RH non-condensing

Specifications subject to change without notice.

About dB Control

Established in 1990, dB Control supplies mission-critical (often sole-source) products worldwide to military organizations, major defense contractors, and commercial manufacturers. dB Control is a unique manufacturer that is agnostic to the TWT or GaN solid state output device, offering high-voltage and low-voltage power supplies for highpower amplifiers operating in very harsh environments. The company designs and manufactures high-power TWT amplifiers (TWTAs), microwave power modules (MPMs), transmitters and microwave synthesizers. dB Control products are used for a variety of military and commercial applications in harsh environments, including radar, electronic warfare (EW) electronic countermeasures (ECM) and communications on airborne, maritime, and ground-based platforms. After acquiring TTT-Cubed in 2019, Paciwave in 2021, and Charter Engineering in 2022, dB Control expanded its product lines to offer coaxial and pin diode RF switches, specialized RF/microwave components, integrated microwave subsystems, and custom radio frequency (RF) receivers and sources. dB Control also provides specialized contract manufacturing and repair depot services from its 40,000-square-foot facility in Fremont, California. The company is AS9100D and ISO 9001:2015 certified.

More information is available at www.dBControl.com or by calling 1-510-656-2325.

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MKT-0769 Rev C