APVSG Target Specification 1.0

(March 2018)

Ultra-agile Vector Signal Generators

up to 2.5, 20 GHz

Introduction

The APVSG is an ultra fast-switching vector-modulated signal source covering a continuous frequency ranges up to 2.5 or 20 GHz, respectively, with a 0.001 Hz resolution.

The standard APVSG enables ultra-fast CW frequency sweeping, chirping, intra-pulse modulation, pulse shaping all with very low phase noise.
A high performance internal I/Q modulatator enables customized modulationw waveforms and supports dedicated modulation schemes including avionics modulation.

The compact unit allows full front panel control via touch panel display.

Options: -

Signal Specifications

The specifications in the following pages describe the warranted performance of the signal generator for 23 ± 10 °C after a 30 minute warm-up period and for all configurations. Typical specifications describe expected, but not warranted performance. Min and Max specifications are warranted.

Parameter	Min.	Typ.	Max.	Note
CW mode				
Frequency range	100 kHz		2.5 GHz 20 GHz	APVSG2 APVSG20
Frequency bands	100 kHz 10 MHz 500 MHz 1 GHz 1.8 GHz		10 MHz 500 MHz 1 GHz 1.8 GHz 2.5 GHz	Band 0 Band 1 Band 3 Band 4 Band 5
resolution		0. 001 Hz		
Frequency / Amplitude settling time				
Output power				
	-20 dBm -90 dBm		+20 dBm +15 dBm	Electrical step attenuator
Level resolution		0.01 dB		
Level uncertainty, ALC on Temperature effects		0.015 dB/ °C	1.0 dB	-15 to +15 dBm 0 to 45 °C
Output impedance		50 Ω		
Reverse Power Protection				
DC Voltage			±15 V	
RF power			30 dBm	
Spectral purity at + 10 dBm Output harmonics		-40 dBc	-30 dBc	
Non-harmonic spurious Up to 2.5 GHz		-65 dBc		CW +10 dBm, > 3 kHz offset

Sweeping Capability

Parameter	Min.	Typ.	Max.	Note
Digital list sweeps List of frequency, phase, amplitude, pulse, chirp, and modulation parameters				
Step time	100 ns 500 ns			Within band Band to band
Resolution		1 ns	s	

Reference Frequency

REF IN input and REF OUT output are at rear panel

Parameter	Min.	Typ.	Max.	Note
Internal reference frequency		10 / 100 MHz		
Initial accuracy			±20 ppb	calibrated at 23 ± 3 °C at time of calibration , user adjustable
Temperature stability (0 to 50 degC)			±20 ppb	
Aging 1st year		0.5 ppm 0.1 ppm		
Aging per day (after 30days operations)			tbm	
Warm-Up time		5 min		
Output of internal reference Output power Output impedance		10 MHz 10/100 MHz 0 dBm 50 Ohms		
Phase Lock to External Reference	1		250	
Reference input level 1-250 MHz	-5 dBm	0 dBm	+13 dBm	
Lock Range 10 MHz			±2 ppm	
Reference input impedance		50 Ohms		

Trigger Input (TRIG IN)

Input is TRIG IN at rear panel

Parameter	Min.	Typ.	Max.	Note
Trigger Types	**Continuous, point, list, gated, gated direction**			
Trigger Source	**external, bus (GPIB, LAN, USB)**			
Trigger Modes	**Continuous free run, trigger and run, reset and run**			
Trigger latency		5 ns		

Parameter	Min.	Typ.	Max.	Note
Trigger uncertainty		1 ns		
External Trigger delay	5 ns		10 s	User settable
External Delay Resolution		1 ns		
Trigger Modulo	1		255	Execute only on Nth trigger event
Trigger Polarity		Rising, falling		

Trigger Output (TRIG OUT)

tbd

Modulation Capabilities

Parameter	Min.	Typ.	Max.	Note
Pulse Modulation Modulation source		Internal/External		
External input amplitude		TTL		
Pulse rise/fall time		10 ns		
On/off ratio		80 dB 70 dB		at +10 dBm , <7 GHz at +10 dBm , >7 GHz
Pulse overshoot			10 %	
Pulse delay		20 ns		
Pulse polarity		Normal, inverse		selectable
Internal I/Q baseband generator		2 channels		Random, memory data
Resolution		16bits		
Waveform memory		8 GSamples		
Waveform Segments		1024		
Max Waveform sequences		32767		
Waveform Clock Resolution Accuracy	1 Hz	 0.01 Hz Timebase	500 MHz	
Reconstruction filters		TBD		
Multicarrier Number of carrier Frequency offset Power offset	 -250 MHz -40 dB		 1024 250 MHz 0 dB	
Two or Multitone Number of tones Frequency spacing Power offset per tone Phase per tone	 2 10 Hz -40 dB	 settable	 128 500 MHz 0 dB	

Parameter	Min.	Typ.	Max.	Note
PSK	BPSK, QPSK, 8PSK, 16PSK			
FSK	2^N			
QAM	4, 16, 32, 64, 128, 256			
MSK	Settable phase diviation			
Data	Random, Memory			
DME Moduation	Interrogator signals			
DME operating modes	DME interrogation & reply			
Frequency range	950 MHz		1215 MHz	
Level Range	-60 dBm		15 dBm	
Pulse on/off ratio		*80 dB*		At 10 dBm output
Pulse shaping	Cos, cos^2 individually settable for rising & falling edge			
Pulse rise/fall times	100 ns		50 us	
Pulse width	100 ns		100 us	
Pulse spacing	100 ns		300 us	
Pulse rate	10 Hz		10 kHz	
DME channel	X, Y			
Pulse parameters	Signle pulse, squitter pulse			

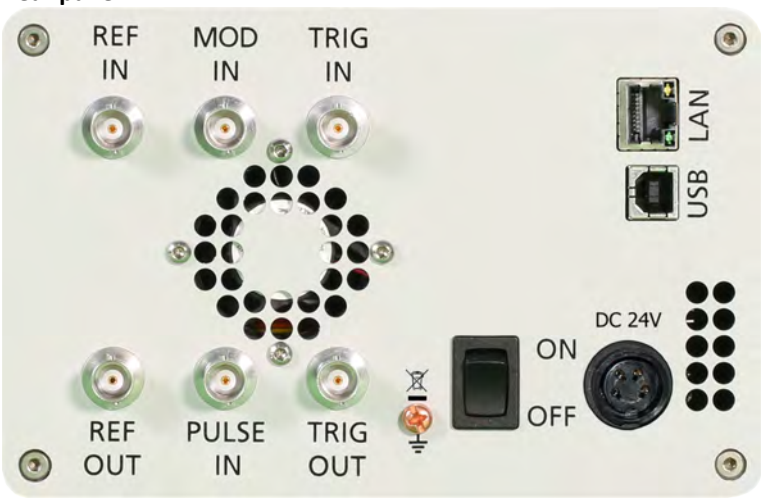
Typical performance curves

tdb

Connectors

Front panel:

Rear panel:



General Characteristics

Remote programming interfaces

Ethernet 100BaseT LAN interface,
USB 2.0 host & device
GPIB (IEEE-488.2,1987) with listen and talk (optional)
Control language SCPI Version 1999.0

Power requirements 24V ± 3.0 VDC ; 25 W maximum
Mains adapter supplied: 100-240 VAC in/ 24 V 4.0 A DC out
Environmental (Levels similar to MIL-PRF-28800F Class 3/4)
Environmental stress Samples of this product have been type tested to be robust against the environmental stresses of storage, transportation, and end-use; those stresses to temperature, humidity, shock, vibration, altitude, and power line conditions.
Operating temperature range 0 to 45 °C
Storage temperature range –40 to 70 °C
Operating and storage altitude up to 15,000 feet (4600 m)

CE notice

EMC complies and EMC regulations and directives for emission and immunity to interference (EN 61326-1 Industrial, EN/IEC 61326-2-1).
Safety complies with applicable Safety regulation in line with IEC/EN 61010-1
This product complies with directive 2011/65/EU

Weight ≤ 2.5 kg (6 lbs) net, ≤ 4 kg (8 lb.) shipping
Dimensions 106 mm H x 172 mm W x 290 mm L (incl. connectors)
[4.21 in H x 6.77 in W x 11.42 in L]

Recommended calibration cycle 24 months

Options

Document History

Version/Status	Date	Author	Notes
V10	2018-4-3	jk	first release