



preliminary

20G-PSDD-8

**20G phase shifter with
integrated Doubler & Driver**

Description

The **20G-PSDD-8** is an analog phase shifter with integrated frequency doubler and variable gain stage with output power amplifier in SMD package.

For an input frequency of 10,7GHz the device delivers an output signal at 21,4 GHz.

The device is capable of up to 600° phase shift at 10GHz. The output amplifier is designed to deliver up to 8Vpp with low distortion (also included output a filter). The variable gain stage has a wide dynamic range of 20dB.

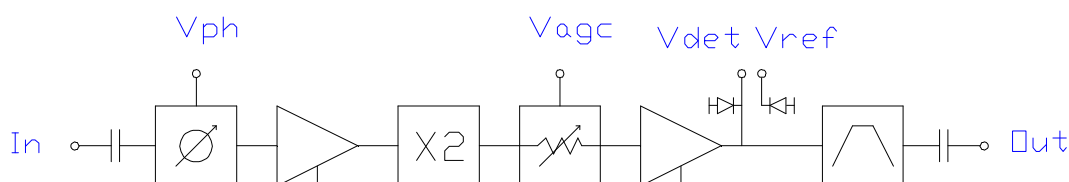
A power detector, with reference diode, is also included, giving a direct measurement of the output power.

Features

- 16x16 mm² SMD
- 48 pins w/1mm pitch
- 50Ω RF Single ended input and output
- RF input and output are AC coupled
- Input frequency band : 9.9 – 11.5 GHz
- Output frequency band : 19.8 – 23 GHz
- Wide phase shift >360°(up to 600°) at 10GHz
- Low power < 3.5W
- +/-5V voltage supplies
- Output level, up to 8Vpp
- Wide dynamic gain control 20dB
- Phase shift command
- Gain command
- Output level detection
- Ref diode output

Applications

- Phase control
- Radar
- Fiber transmission
- DPSK
- 20GBps, 40GBps



ANALOG PHASE SHIFTER DOUBLER FUNCTIONNAL BLOCK DIAGRAM

Typical Characteristics (ambient 25°C on heat sink otherwise stated)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	Comment
Positive supply voltage 1	Vcc1		4.75	5	5.25	V	
Positive supply voltage 2	Vcc2		4.75	5	5.25	V	Output amp
Negative supply voltage 1	Vee		-5.46	-5.2	-4.95	V	
Positive supply current 1	Icc1	Vcc1		140	185	mA	
Positive supply current 2	Icc2	Vcc2		250	300	mA	
Negative supply current 1	Iee	Vee			1	mA	
Input frequency	F		9.95	10.709	11.5	GHz	
Input impedance adaptation	S11	50 Ohm			-10	dB	
Output impedance adaptation	S22	50 Ohm			-8	dB	
Input amplitude	Vin		300		1 000	mVpp	
Output amplitude min	Voutmin	With AGC			2	Vpp	
Output amplitude max	Voutmax	With AGC	8			Vpp	
AGC amplitude control voltage	Vagc1,2	Vout and Vin from Min to Max	-5		0	V	
AGC modulation bandwidth	AGC _{BW}	Vagc1,2	10			kHz	
AGC gain slope	Sagc	Monotonic		6		dB/V	Note 1
AGC input current	Iagc	Vagc1,2			100	μA	Note 2
Minimum Max output controlled phase delay	Ph delay Max	Vph=5V @ Fout=21.4 GHz	155			ps	
Phase delay control voltage	Vph		0		5	V	
Phase delay modulation Bandwidth	Vph _{BW}		10			kHz	
Phase delay control slope	Sph	Monotonic		30		ps/V	
Vph input current	Iph				100	μA	Note 3
Input signal at output	H0	10.7 GHz		-30	-20	dB	
Third harmonic	H3	32.1 GHz		-30	-20	dB	
Power detector output voltage	Vdet-Vref	Vout = 4Vpp		400		mV/Vpp	Note 4
Output voltage variation with phase delay control	ΔVout(Δ _{ph})	Vph from Min to Max			1	dBpp	
Phase delay variation with temperature	ΔPh delay(Δ _T)	Input and controls = constants			0.5	ps/°C	
Phase delay variation with gain control	ΔPhdelay(Δ _G)	Vout from Min to Max			5	ps	

Note1 : Vagc1 and Vagc2 average. Min and max to be confirmed

Note2: input command is a MESFET grid. Max current to be confirmed

Note3: input command equivalent circuit is a series connected diode and resistor.

Note4: Vdet-Vref monotonic with output power.

Environment Parameters

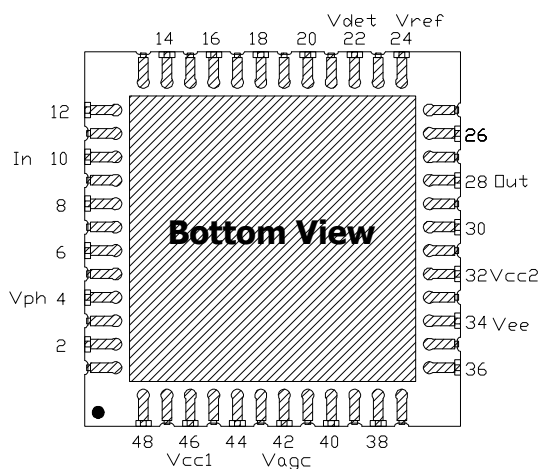
Environment Parameters		Symbols	Min	Max	Units
Operating temperature	Case (bottom)	T_{op}	-5	+75	°C
Storage temperature	Case (bottom)	T_{stg}	- 40	+85	°C

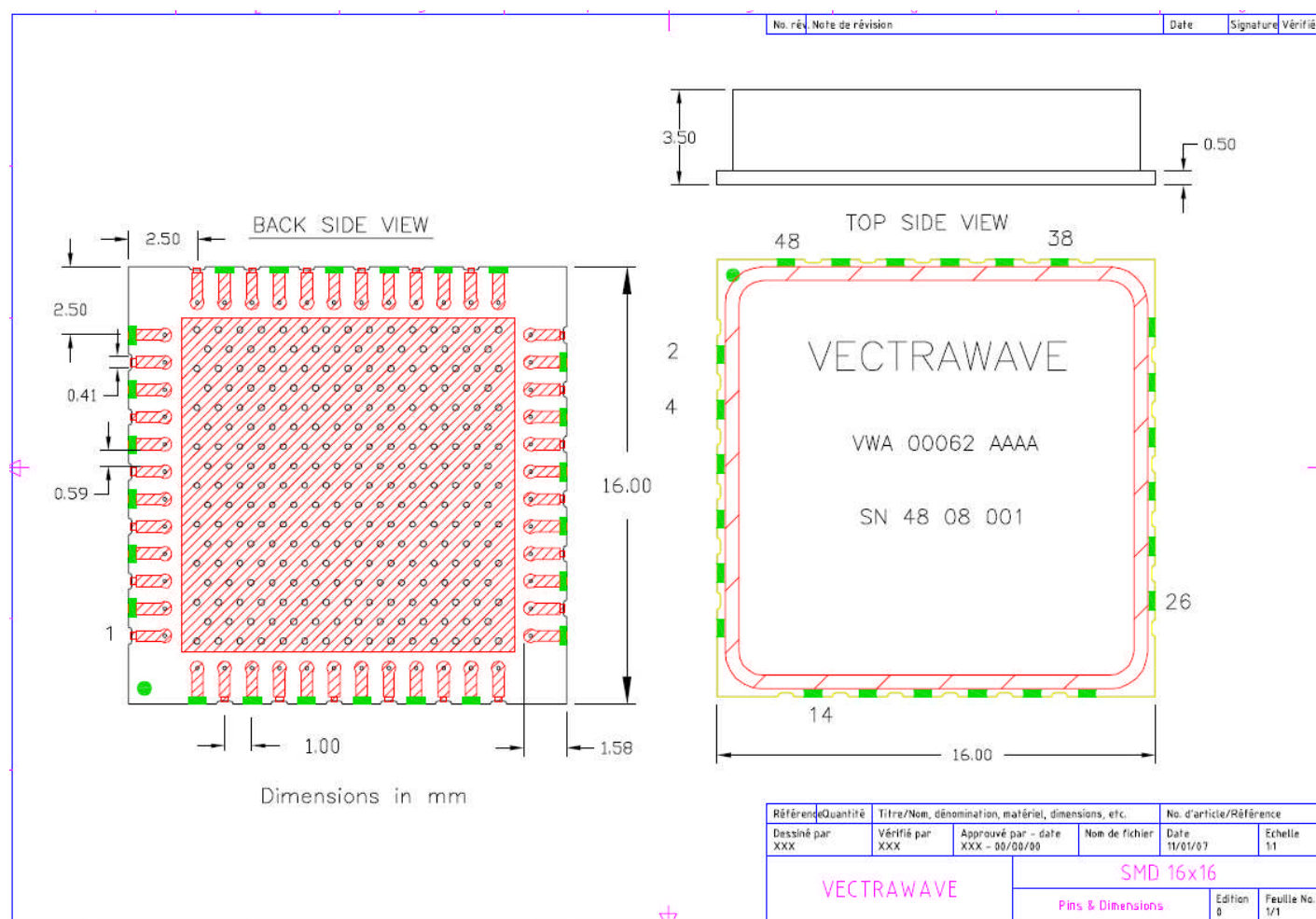
Absolute maximum ratings

Maximum ratings	Symbols	Min	Max	Units
Positive supply voltage 1,2	$V_{CC\ max}$		+6	V
Storage temperature	$T_{st\ max}$		125	°C
Phase delay control voltage command	$V_{ph\ max}$	-1	+8	V
AGC amplitude control voltage	$V_{agc\ max}$	-6	+6	V

Pin out and pin description

Pad #	Function	Pad #	Function	Pad #	Function	Pad #	Function
1	Ground	13	Ground	25	Ground	37	Ground
2	Ground	14	Ground	26	Ground	38	Ground
3	Ground	15	Ground	27	Ground	39	Ground
4	V_{ph}	16	Ground	28	Output	40	Ground
5	Ground	17	Ground	29	Ground	41	Ground
6	Ground	18	Ground	30	Ground	42	V_{agc}
7	Ground	19	Ground	31	Ground	43	Ground
8	Ground	20	Ground	32	V_{CC2}	44	Ground
9	Ground	21	Ground	33	Ground	45	Ground
10	Input	22	V_{det}	34	V_{ee}	46	V_{CC1}
11	Ground	23	Ground	35	Ground	47	Ground
12	Ground	24	V_{ref}	36	Ground	48	Ground



Mechanical dimensions


Handling This product is sensitive to electrostatic discharge and should not be handled except at a static free workstation. Take precautions to prevent ESD; use wrist straps, grounded work surfaces and recognized anti-static techniques when handling the **20G-PSDD-8** modules.

Care should be taken to avoid supply transient and over voltage. Over voltage above the maximum specified in absolute maximum rating section may cause permanent damage to the device.

Ordering information

Product code	Name
VWA 00066 AA	20G-PSDD-8 SMD 600°Phase shifter
VWA 00064 AB	Demonstration board equipped w/phase shifter VWA 00066 AA


Bias On/Off procedures

Bias On	Bias Off
Vee	RF
Vph	Vcc2
	Vcc1
Vagc	
Vcc1	Vagc
Vcc2	Vph
RF	Vee