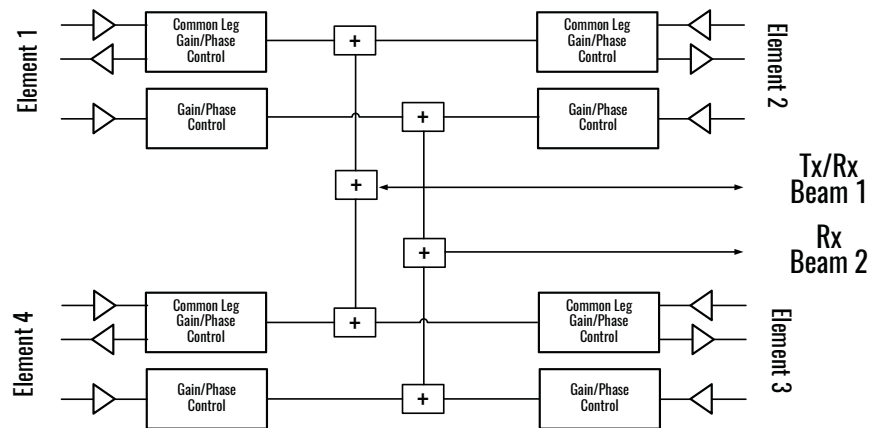


Product Features

- 8-11 GHz operation
- Supports 4 radiating elements
- Dual beam Rx
- Single beam Tx
- +15 dBm Tx OP1dB
- +21 dB Tx gain
- +7 dB Rx coherent gain*
- 14 dB Rx NF
- +7 dBm Rx IIP3
- 6 bit phase control (LSB=5.625°)
- 6 bit gain control (LSB=0.5dB)
- Fast beam steering
- 7x7 mm QFN
- +1.8 V operation
- 1.8 W DC Tx mode/1.7 W DC Rx mode

Block Diagram



Applications

Commercial and Weather RADARs, 5G Communications

General Description

The AWS-0103 is a highly integrated silicon quad core IC intended for RADAR and 5G phased array applications. The device supports four radiating elements, single beam transmit, and dual beam receive and includes all requisite beam steering controls for 6 bit phase and gain control. The device provides 21 dB gain and +15 dBm output power during transmit mode and 7 dB gain and +7 dBm IIP3 during receive mode. Additional features include gain compensation over temperature, temperature reporting, and fast beam switching using eight on-chip beam weight storage registers. The device features ESD protection on all pins, operates from +1.8 V, and is packaged in a 56 lead 7x7 mm QFN for easy installation in planar phased array antennas.

*Coherent gain (CG) is the RF gain with all Rx input ports energized and is most useful for assessing RF power handling in the beam forming network. Electronic gain (EG) is the RF gain exclusive of the 4:1 sum and is most useful for cascaded NF and gain calculation. The total gain of the antenna aperture can be calculated from $EG + 10 \cdot \log(n)$, where n is the number of antenna elements in the array. Single path gain (SPG) is the RF gain with only one input port energized. This is representative of the RF gain measured in a 2 port measurement system, such as with the Developer's Kit.

$CG = SPG + 12 \text{ dB} = EG + 6 \text{ dB}$ for a quad IC



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X-Band Silicon RADAR Quad Core IC

AWS-0103

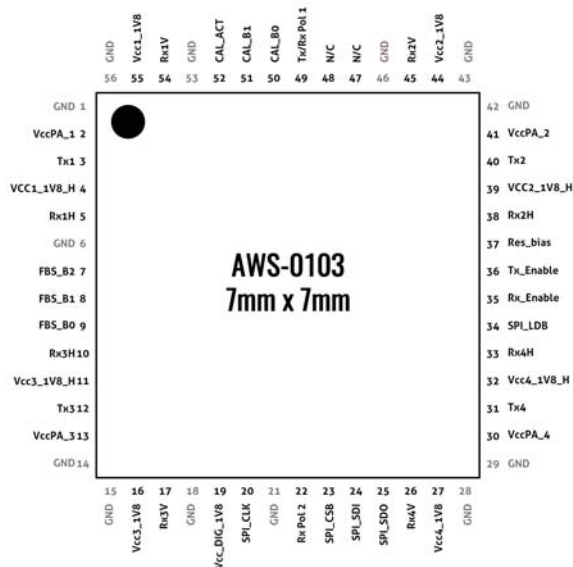
Product Overview

Specifications

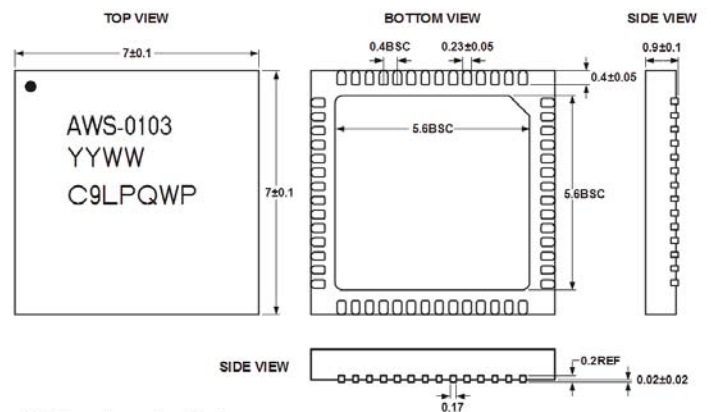
Parameter	Nominal Performance	Units
General		
Frequency	8-11	GHz
# Elements	4	-
Tx # Beams	Single	-
Rx # Beams	Dual	-
Supply Voltage	+1.8	V
Beam Steering		
Phase Bits	6	
Phase LSB	5.625	degrees
RMS Phase Error	3	deg RMS
Amplitude Bits	6	-
Amplitude LSB	0.5	dB
Amplitude Dynamic Range	31.5	dB
RMS Amplitude Error	0.5	dB RMS

Parameter	Nominal Performance	Units
Transmit Mode		
Channel Gain	+21	dB
Tx Output P1dB	+15	dBm
Receive Mode		
Coherent Channel Gain	+7	dB
Noise Figure	14	dB
IIP3	+7	dBm
Other		
Telemetry	Temperature, Tx output power	-
DC Power Tx Mode	1.8	W
DC Power Rx Mode	1.7	W
Operating Range	-40 to +85	°C
Package Size	56 lead 7x7 (PQFN)	mm
Additional Features	Eight beam weight registers for storage for fast beam switching	-

Package and Pin Out



SPI_{rx} -Serial command and telemetry reporting
FBS_{rx} -Fast beam steering address select



1. All dimensions are in millimeters.
2. Die pad 5.8X5.8mm has 5.6X5.6mm exposed pad size.
3. JEDEC STANDARD MO-220.
4. This part is lead-free and is compliant with the RoHS directive.

This part is lead-free and is compliant with the RoHS directive



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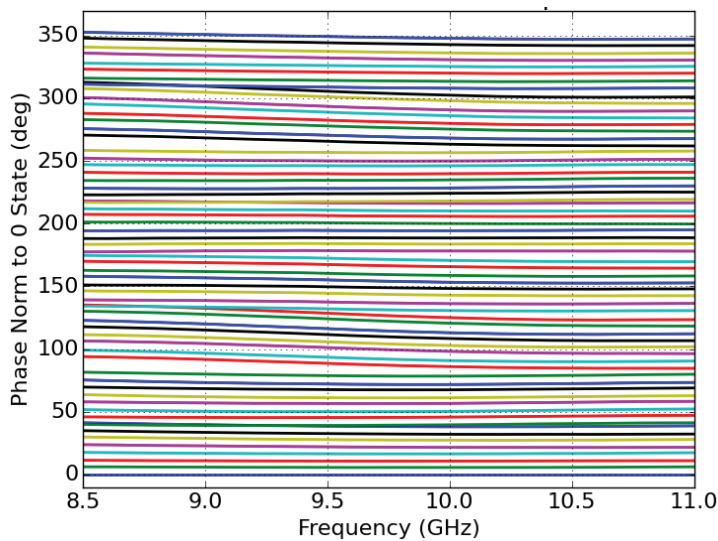
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Product Overview

Data

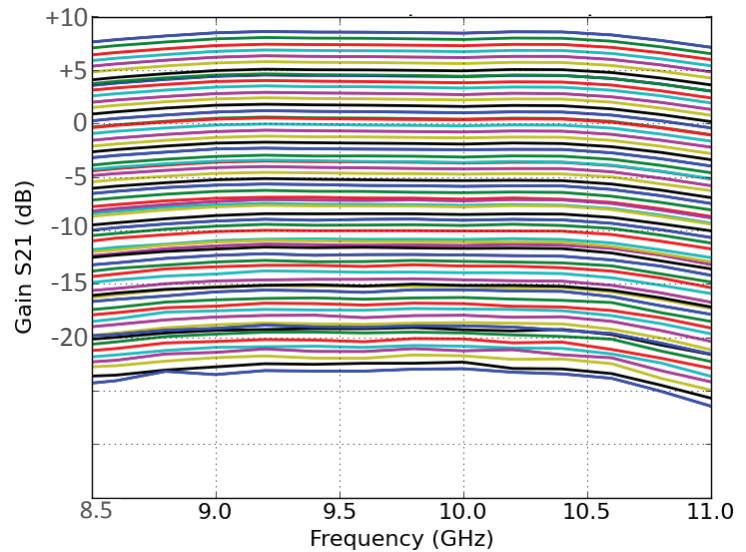
Phase Control vs. Phase State & Frequency

Temp = +25°C, Vs = +1.8V



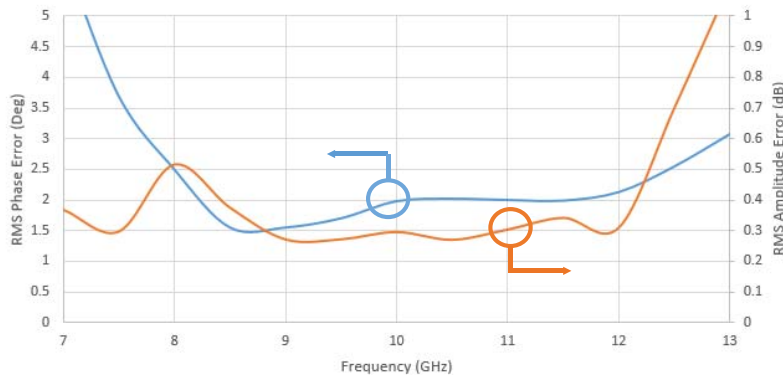
Gain Control vs. Gain State & Frequency

Temp = +25°C, Vs = +1.8V



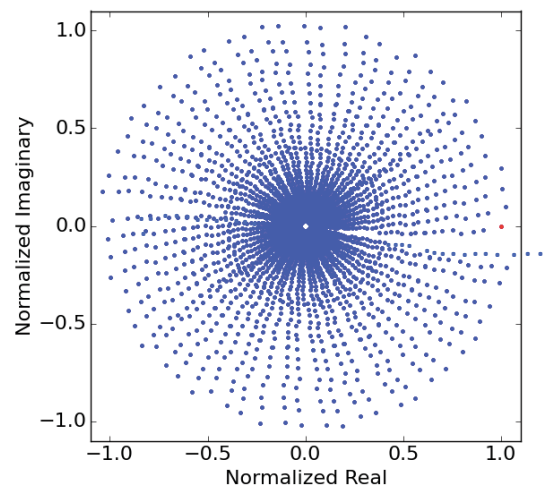
RMS Phase and Amplitude Error

Temp = +25°C, Vs = +1.8V



All Amplitude & Phase States

Temp = +25°C, Vs = +1.8V



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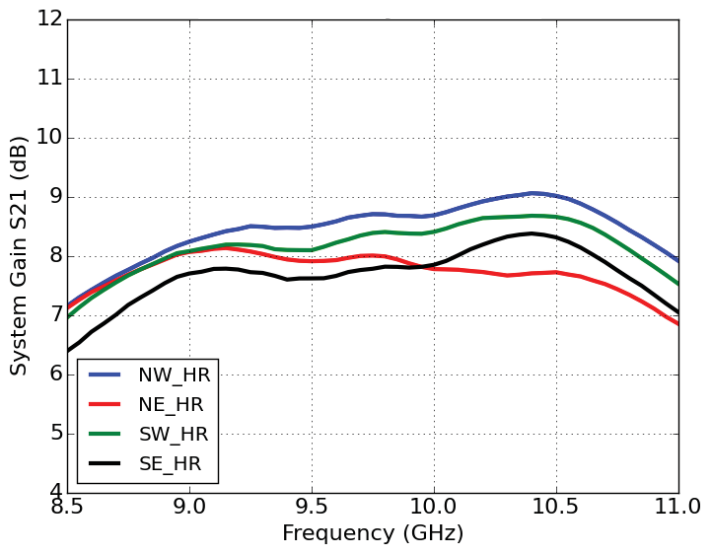
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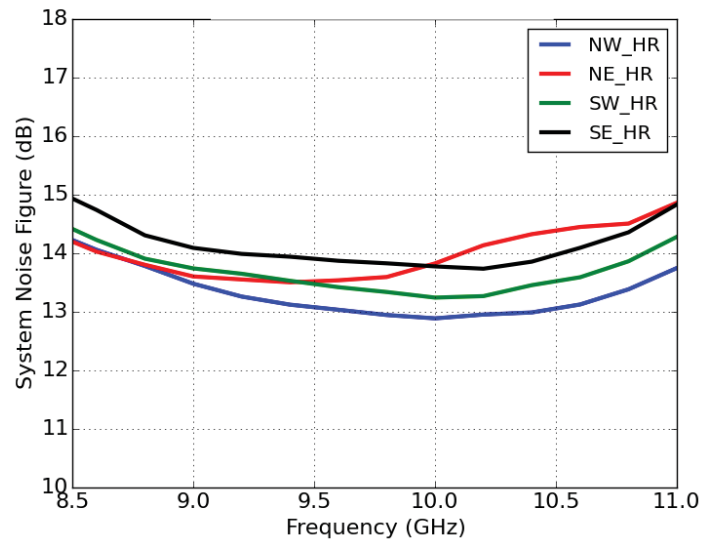
Product Overview

Data

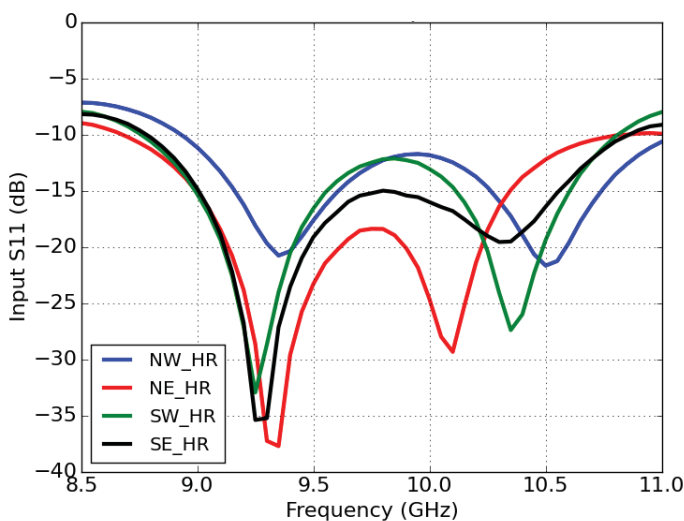
Rx Gain vs. Frequency
Temp = +25°C, Vs = +1.8V



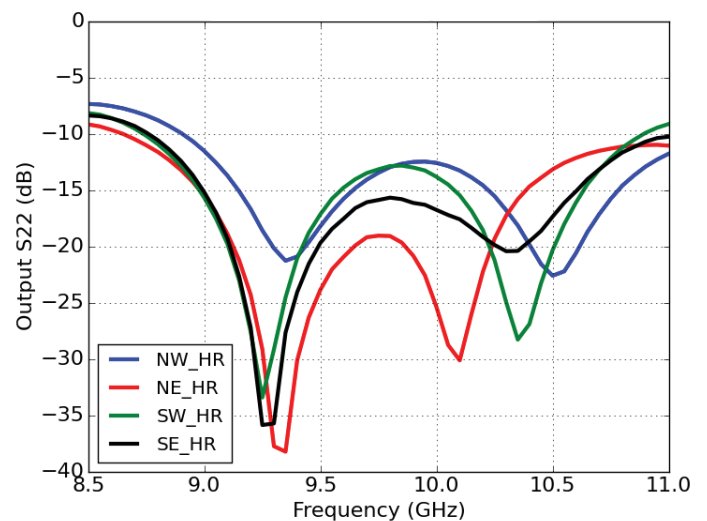
Rx Noise Figure vs. Frequency
Temp = +25°C, Vs = +1.8V



Rx Input Match vs. Frequency
Temp = +25°C, Vs = +1.8V



Rx Output Match vs. Frequency
Temp = +25°C, Vs = +1.8V



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