

DESCRIPTION

The ARGO Semi AS0201 IP is a Quad core Transceiver suitable for Wifi 6/6e/7 applications. It can be used for fast access points, routers and extenders.

It supports 4K QAM, Multi-Link Operation, 320 MHz channel bandwidths (can be extended up to 1200 MHz for DPD calibration), doubling the maximum Wi-Fi peak speed compared to Wi-Fi 6/6E ancestors

Multi radio/Multi channel Link Operation

- MU-MIMO and OFDMA technologies supported both in uplink and downlink directions: allows for high bandwidth and multi-user data transfer
- Multi channel link provides high throughput, low latency and high reliability

ABOUT ARGO SEMICONDUCTORS

Argo Semiconductors offers high quality RF IP products operating in the frequency region between 2 GHz and 10 GHz. Argo's team has a long experience on Wi-Fi RF silicon product development and cellular RF silicon product development, bringing billions of chips to the market. Leveraging on these capabilities and building on its solid IP base, Argo helps its customers develop products that can meet the most stringent requirements, while shrinking the development time. IP customization is possible upon request

APPLICATIONS

≻ WiFi6/6E, WiFi-7

FEATURES

- ✓ Programmable frequency up/down conversion
- ✓ Four cores (4T4R)
- ✓ RF freq range: 2.4 GHz & 4.9 GHz to 7.2 GHz
- ✓ Tx bandwidth:5 MHz to 320 MHz
- ✓ Rx bandwidth: 5 MHz to 320 MHz
- ✓ Time Division Duplex (TDD) supported
- ✓ Supports 4096 QAM
- ✓ TX EVM = -46 dB including PLL IPN
- ✓ Fully integrated fractional-N radio frequency synthesizer (0.21 deg integrated phase error)
- ✓ TX Output power (1dB CP): 11 dBm
- ✓ Tx/Rx voltage supply: 1.8V / 0.8V
- ✓ Tx core power consumption: 160mW
- ✓ Rx core power consumption: 73mW
- ✓ Sleep mode supported
- ✓ Support for calibration feedback path (DPD and antenna, Rcal, RCcal, LOFT, IQcal, TSSI, RX DCO cal, VCO cal, IP2 cal)
- ✓ Technology node: GF 22FDX CMOS SOI
- ✓ 80 MHz reference clock
- ✓ Total area for 4 cores : 25mm²
- ✓ IEEE 802.11.ax/be (Wi-Fi 6 & 6E/7) compliant



Simplified Block Diagram



AS0201 Wi-Fi 6/6E quad RF core with Synthesizer



Table 1 System Characteristics							
Power consumption			812	mW	<1 watt for a 4X4 system (2.5GHz) or (4.9-7.2GHz) system assuming both TX and RX active		
Area		25		mm2			
Other							
2.5GHz Transmitter Characteristics							
Parameter	Minimum	Typical	Maximum	Units	Comments		
Center frequency	2400		2500	MHz			
BW support	5		20	MHz	5, 10, 15, 20		
Maximum output power per channel		11		dBm	O1dBCP		
Maximum Input power			2	dBm	I1dBCP		
Cascaded gain range			32	dB			
Gain step			0.5	dB	6-bit gain control		
Gain step accuracy	-0.3		0.3	dB			
Power variation over process	-2.5		2.5	dB			
Noise floor	-153		-135	dBm/Hz			
Output load		50		Ohm			
Flatness	-2		2	dB	800MHz bandwidth		
Output harmonics			-33	dBm	2nd, 3rd harmonics		
IMD3		65		dBm	Max gain,total output two tones each 20,40 space @total-3dBm@2.4G		
Settling time	180		260	ns			
Gain change time			200	ns	depends on the gain setting		
Carrier leakage		-52	-35	dBc	Uncalibrated		
Sideband suppression		-38		dBc	Uncalibrated		
Power consumption		117		mW	55mA from 1.8V, 15mA from 1.22V		
Area		1.31		mm2			

2.5GHz Receiver Characteristics							
Center frequency	2400		2500	MHz			
BW support	5		20	MHz	5, 10, 15, 20		
	1.6	1.7		dB	external inductor		
Cascaded noise figure	2.1	2.2		dB	internal inductor		
	1.8	1.9		dB	external LNA (10dB gain/1.5 dB NF)		
Cascaded voltage gain	-28.17	51.88	63.14	dB			
Gain step			0.5	dB			
Gain flatness			1.5	dB			
max RX output power			8.5	dBm	O1dBCP		
IP3		-8.19		dBm	max RF gain, 0dB BB gain		
IP2		55		dBm	max RF gain, input power -18dBm per tone, calibrated		
input 1dBCP		-19		dBm	max RF gain, 0dB BB gain		
Noise floor		-139		dBm	in reference to RX bandwidth		
Settling time			500	ns	0-100%		
Gain change time			300	ns	0-100%		
Spur suppression		-60		dBc	Pout=-10~-20dBm output power, Max Gain		
DC offset		-55		dBc	calibrated (Min <gain<max)< td=""></gain<max)<>		
Power consumption		73		mW	60mA from 1.22V		
Area		1.4		mm2			





AS0201 Wi-Fi 6/6E quad RF core with Synthesizer



Table 3

4.9-7.2GHz Transmitter Characteristics							
Parameter	Minimum	Typical	Maximum	ximum Units Comments			
Center frequency	4900		7200	MHz			
BW support	5		320	MHz	5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100, 160, 200, 320		
Maximum output power		11		dBm	O1dBCP		
Maximum Input power			2	dBm	I1dBCP		
Cascaded gain range			32	dB			
Gain step			0.5	dB	6-bit gain control		
Gain Step accuracy	-0.3		0.3	dB			
Power variation over process	-2		2	dB			
Power variation over temperature	-1.5		1.5	dB			
Output load		50		Ohm			
Flatness	-2		2	dB	BW=400MHz, uncompensated		
Output harmonics			-33	dBm	2nd, 3rd harmonics		
IMD3		65		dDate	Max gain, total output two tones each		
		83		UBIII	20,40 space @total-3dBm@3.8G		
Settling time	180		260	ns			
Gain change time			200	ns	depends on gain setting		
Carrier leakage		-52	-35	dBc	Uncalibrated		
sideband suppression		-38			Uncalibrated		
Power consumption		156		mW	80mA from 1.8V, 10mA from 1.22V		
Area		1.39		mm2			

4.9-7.2GHz Receiver Characteristics							
Parameter	Minimum	Typical	Maximum	Units	Comments		
Center frequency	4900		7200	MHz			
BW support	5		400	MHz	5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100, 160, 200, 320		
Cascadad paica figura	1.94	2.47		dB	external inductor		
(do omboddod)	2.51	3.04		dB	internal inductor		
(de-embedded)	2.13	2.66		dB	external LNA(10dB gain/1.5dB NF)		
Cascaded voltage gain	-24	41.63	55.01	dB			
Gain step			0.5	dB			
BW ripple			1.5	dB			
IIP3		-18.3		dBm	max RF gain, 0dB BB gain		
IIP2		55		dBm	max RF gain, input power -18dBm per tone, calibrated		
input 1dBCP		-27		dBm	max RF gain, 0dB BB gain		
max output power			8.5	dBm	O1dBCP		
Noise floor		-139		dBm/Hz	in reference to RX BW		
Settling time			500	ns	0-100%		
Gain change time			300	ns	0-100%		
Spur suppression		-60		dBc	Pout=-10~-20dBm output power, Max Gain		
DC offset		-55		dBc	calibrated(min <gain<max)< td=""></gain<max)<>		
Power consumption		73		mW	60mA from 1.22V		
Area		1.4		mm2			

Table 4



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AS0201 Wi-Fi 6/6E quad RF core with Synthesizer



Table 5

	Synthesizer Characteristics								
Parameter	test conditions	Minimum	Typical	Maximum	Units	comments			
LO frequency	2.4G Band	2.4		2.5	GHz				
	5G Band	4.9		5.925	GHz				
	6G Band	5.925		7.125	GHz				
LO frequency Ste	≥p			1	KHz				
Phase Noise	LO=2.484GHz @ 1MHz offset			-126.0	dBc/Hz	jitter = 0.045 ps			
	LO=2.484GHz @ offset >10MHz			-146.0	dBc/Hz				
	LO=2.484GHz @ offset >20MHz			-152.0	dBc/Hz				
	LO=2.484GHz @ offset >50MHz			-156.0	dBc/Hz				
	LO=5.920GHz @ 1MHz offset			-120.0	dBc/Hz	jitter = 0.038 ps			
	LO=5.920GHz @ offset >10MHz			-140.0	dBc/Hz				
	LO=5.920GHz @ offset >20MHz			-145.5	dBc/Hz				
	LO=5.920GHz @ offset >50MHz			-154.0	dBc/Hz				
	LO=7.105GHz @ 1MHz offset			-118.6	dBc/Hz	jitter = 0.036 ps			
	LO=7.105GHz @ offset >10MHz			-138.5	dBc/Hz				
	LO=7.105GHz @ offset >20MHz			-144.6	dBc/Hz				
	LO=7.105GHz @ offset >50MHz			-153.0	dBc/Hz				
reference clock			80		MHz				
lock time			6	9	us				
integrated phase error			0.21		deg				
jitter		0.036		0.055	ps				
area				2.38	mm2	821um X 2900 um = 2.38 mm2			
consumption				52	mW	12.8 mA from 1.22V + 20mA from 1.8V (VCO)			
						= 15.61+36 = 52 mW @ 0.21 deg Int Phase error			

Table 6

Other Characteristics								
Parameter	Minimum	Typical	Maximum	Units	Comments			
DPD feedback path attenuation			40	dB				
Temperature sensor range	-40		140	deg C				
Temperature sensor resolution		2		mV/degC				
Rx LDO output voltage	0.85		1	V				
Rx LDO PSRR		39		dB	1MHz			
VDD1		1.8		V	from external DC			
VDD2		1.22		V	to DC with heavy			
TX/RX port isolation		35		dB				

