SUPERAPEX CORPORATION

Your MMIC and Related Microwave Devices Partner from DC to mmW.

Updated on September, 2019

About SuperApex

SuperApex Corporation is a microwave & RF company located in the suburb of Chicago, USA. We provide the innovative solutions, products and services for our customers around the world.

The company provides GaAs MMIC products, RF/Microwave/Millimeter-wave modules and chip packaging solutions. We have completely proprietary intellectual property rights for each product which we design and manufacture. SuperApex works with our customers from feasibility contracts through to new product introductions and supply. The company prides itself on working closely with its clients and developing long-term partnerships which offers success to all parties.

- Expertise in the design & development of components and subsystems in RF, Microwave and Millimeter wave markets.
- DC-50 GHz: RF, microwave & mm-wave.
- Technology: GaAs
- MMICs, packaging, modules, sub-systems.

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Product Selection Guide

Rev 201909

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- **Attention**

Please read the Notices section before reading this article.

- **Naming rules:**

'SAC30XX' represents model of Low Noise Amplifiers
'SAC31XX' represents model of Power Amplifiers
'SAC32XX 'represents model of Switches
'SAC33XX' represents model of Phase Shifters
'SAC34XX' represents model of Attenuators
'SAC35XX' represents model of Mixers
'SAC36XX' represents model of Multifunctional chips
'SAC37XX' represents model of Amplitude Equalizers
'SAC38XX' represents model of Power Dividers
'SAC39XX' represents model of Drive Amplifier
'SAC1XXX' represents Quartz Substrate Passive Components or Module
Suffix represents QFN product, Eg .SAC3002Q3 is a Packaging products.

About QFN Packaged Chip and Bare Die Chip

Most of our MMIC products are available in both bare die chip and QFN packaged chip, except for some of the extremely high frequency products, i.e. more than 50GHz.

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1.1 Low Noise Amplifiers

Index / Model	Freq (GHz)	Gain (dB)	Gain Flatness (dB)	Noise Figure (dB)	Input VSWR (:1)	Output VSWR (:1)	Output P_{-1} dB (dBm)	Power Supply (V/mA)	Package Style
SAC3001	0.03～0.3	32.5	0.1	0.75	1.5	1.5	26.5	8/150	Die and QFN
SAC3002A	0.03～0.3	31	±0.1	0.7	1.4	1.4	20	5/75	Die
SAC3002Q3	0.03～0.3	31	±0.5	0.6	1.2	1.2	20	5/80	QFN3×3
SAC3003	0.2～0.6	38	0.3	0.8	1.6	1.6	17	5/75	Die and QFN
SAC3003Q3	0.2～0.6	38	±0.3	0.8	1.6	1.6	17	5/75	QFN3×3
SAC3004	0.2～2.6	21	5.5	1.3	1.8	1.8	20.5	5/90	Die and QFN
SAC3005	0.4～0.6	35.5	0.8	0.6	1.6	1.6	18	5/75	Die and QFN
SAC3005Q3	0.4～0.6	35.5	0.8	0.6	1.6	1.6	18	5/75	QFN3×3
SAC3006	0.4～0.6	35	0.2	0.6	1.8	1.8	17.5	4.5/75	Die and QFN
SAC3007	0.4～0.6	38	0.2	0.6	1.2	1.2	18.5	5/80	Die and QFN
SAC3008A	0.4～3.5	17.5	±1	1.2	1.4	1.4	15	5/54	Die and QFN
SAC3008B	0.4～6	18	±1	1.2	1.5	1.5	17.5	5/58	Die and QFN
SAC3010	0.7～6	16	1.8	2	1.7	1.7	16.5	5/45	Die and QFN
SAC3011	0.8～4	38	0.8	1.5	1.7	1.7	19.5	5/120	Die and QFN
SAC3012	0.9～1.3	34.5	0.2	0.65	1.2	1.2	19.5	5/90	Die and QFN
SAC3013	0.9～1.5	17	2.2	0.7	1.5	1.5	12	5/40	Die and QFN
SAC3013Q3	0.9～1.5	17	2.2	0.7	1.5	1.5	12	5/40	QFN3×3
SAC3014	1.0～3.5	24.5	2	1.7	1.6	1.6	14	5/55	Die and QFN
SAC3015	2～8	28.5	2.6	2.3	1.6	1.6	16.5	5/85	Die and QFN
SAC3016	2.1～2.5	23	1.5	2.6	1.1	1.1	8.5	5/25	Die and QFN

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SAC3017	2.1～2.5	33	0.05	0.7	1.3	1.3	9	5/40	Die and QFN
SAC3018	2.7～3.1	32	0.8	**0.7**	1.2	1.2	18	5/75	Die and QFN
SAC3019	2.7～3.1	36.5	0.6	0.75	1.1	1.1	18.5	5/105	Die and QFN
SAC3020	2.7～3.5	28	0.2	0.75	1.3	1.3	10	5/40	Die and QFN
SAC3021	5～6	7	0.1	5.2	1.6	1.6	14.5	5/20	Die and QFN
SAC3022	1.2～1.4	21	0.5	0.7	1.5	1.5	22	5/100	Die and QFN
SAC3022Q3	1.2～1.4	21	0.5	0.9	1.5	1.5	22	5/100	QFN3×3
SAC3023	1.4～3	36	1	0.8	1.4	1.4	18	5/100	Die and QFN
SAC3024	0.8～4	36	1	1.4	1.6	1.6	20	5/115	Die and QFN
SAC3029	2.0～4.5	27	0.8	0.9	1.7	1.7	13	5/45	Die and QFN
SAC3030	0.7～2.0	19.5	1	1.3	1.4	1.4	16	5/30	Die and QFN
SAC3030Q3	0.7～2.0	19.5	1	1.3	1.4	1.4	16	5/30	QFN3×3
SAC3031	2.0～4.0	29	0.8	1	1.8	1.8	13	5/45	Die and QFN
SAC3032	0.7～3.5	18	1	**1.2**	1.6	1.6	15.5	5/45	Die and QFN
SAC3033	2.7～3.5	12	1.5	1.6	1.4	1.4	19	5/54	Die and QFN
SAC3035	1.5～4.5	12	1.5	2.5	1.3	1.3	12.5	5/28	Die and QFN
SAC3036	3.0～6.5	20	2	**2.8**	1.4	1.3	15	5/60	Die and QFN
SAC3037	1.0～7.0	11	0.8	3	1.6	1.6	18.2	8/60	Die and QFN
SAC3038	1.0～7.0	10.5	1.2	3.4	1.5	1.5	17.5	8/67	Die and QFN

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SAC3039	7.0～13.0	20	1.6	1.35	1.4	1.4	14	5/35	Die and QFN
SAC3039Q3	7.0～13.0	20	±1.5	1.3	1.3	1.4	14	5/30	QFN3×3
SAC3042	1.0～12.0	20.5	1.8	2.3	1.3	1.6	16	5/60	Die and QFN
SAC3042Q4	1.0～12.0	20.5	1.8	2.3	1.3	1.6	16	5/60	Die and QFN
SAC3043	6～18	22	±0.6	1.5	1.3	1.4	14	5/55	Die and QFN
SAC3043Q4	6～18	23.5	±1.5	1.5	1.3	1.3	15	5/55	QFN4×4
SAC3045	2～20	16	±1.0	3	1.3	1.3	13	5/60	Die and QFN
SAC3047	0.2～2.2	27	±1	1	1.4	1.6	13	5/62	Die and QFN
SAC3048	1～3.5	25	2	1.2	1.3	1.3	12	5/60	Die and QFN
SAC3050	0.02～6	20	2	0.9	1.5	1.5	19	5/68	Die and QFN
SAC3050Q3	0.02～6	20	2	1.0	1.5	1.5	19	5/68	QFN3×3
SAC3051	DC～22	16	±1.0	3	1.3	1.3	14	8/60	Die and QFN
SAC3051Q5	DC～22	16	±1.0	3	1.5	1.5	14	8/60	QFN5×5
SAC3052	8～12	22	—	1.3	1.2	1.2	14	5/32	Die and QFN
SAC3053	0.4～1.5	21	±1	1.6	1.6	1.6	21	5/115	Die
SAC3054	0.4～2.1	27	±1	1	1.3	1.3	14	5/78	Die and QFN
SAC3055	0.01～2	22	±1.5	0.8	1.4	1.4	20	5/100	Die and QFN
SAC3056	2～4	29	±0.5	0.5	1.4	1.4	9	5/30	Die and QFN
SAC3056B	2～4	30	±0.75	0.4	1.5	1.5	13	5/55	Die
SAC3056Q3	2～4	27	±1.5	0.6	1.6	1.6	8	5/30	QFN3×3
SAC3057	0.4～3.6	28	1	1	1.3	1.4	14	5/72	Die and QFN
SAC3058	1～9	19	±1.5	1.1	1.5	1.5	19	5/65	Die and QFN

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SAC3059	0.4～0.6	35.5	±0.5	0.5	1.4	1.3	15	5/80	Die and QFN
SAC3062	1.0～12.0	18	±2	1.6	1.4	1.4	15	5/60	Die and QFN
SAC3062Q3	1.0～12.0	18	±2	1.6	1.4	1.4	15	5/60	QFN3×3
SAC3063	0.8～1.6	30	±1.5	0.4	1.6	1.6	12	5/50	Die and QFN
SAC3063Q3	0.8～1.6	30	±1.5	0.4	1.6	1.6	12	5/50	QFN3×3
SAC3064	DC～30	16	±2.0	4	1.5	1.3	23	8/220	Die and QFN
SAC3064Q5	DC～30	16	±1.5	4	1.6	1.4	23.5	8/220	QFN5×5
SAC3065	DC～40	11	±1.0	-50	1.6	1.4	18	8/100	Die and QFN
SAC3065Q4	DC～40	10	±2.5	-45	1.7	1.6	18	8/100	QFN4×4
SAC3066	7～11	23	±1.0	1.1	1.5	1.5	18.5	5/29	Die and QFN
SAC3066Q3	7～11	21.5	±1.5	1.2	1.7	1.7	16	5/42	QFN3×3
SAC3070	0.7～18	15	±2	2	1.85	1.85	10	5/50	Die and QFN
SAC3071	2.2～8.5	27	±1.5	1	1.8	1.6	10	5/55	Die
SAC3073	0.7～2.6	21	±1.5	1	1.8	1.5	18	5/75	Die and QFN
SAC3074	0.02～1	29	±0.75	0.4	2	2	20	5/65	Die and QFN
SAC3074Q3	0.02～1	29	±0.75	0.4	2	2	20	5/65	QFN3×3
SAC3075	6～8.5	24	±0.75	0.7	1.5	1.5	15	4/55	Die
SAC3076Q3	4.5～6	24	±1	0.8	1.5	1.5	11	5/60	QFN3×3
SAC3077Q3	0.05～6	14	±4	1.5	1.5	1.5	14	5/50	QFN3×3
SAC3078Q3	2～6	26	±1	0.8	1.5	1.5	14	5/60	QFN3×3
SAC3079	0.9～4	30	±1.5	0.6	1.5	1.5	14	5/85	Die
SAC3080Q3	1～7	12	±1	2.5	1.5	1.5	15	5/60	QFN3×3

➢ 1.2 Driver Amplifiers

Index / Model	Freq (GHz)	Gain (dB)	Gain Flatness (dB)	Noise Figure (dB)	Input VSWR (:1)	Output VSWR (:1)	Output P_{-1} dB (dBm)	Power Supply (V/mA)	Package Style
SAC3901	0.9～1.3	20.2	0.6	3.8	1.8	1.8	26.4	5/265	Die and QFN

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Index / Model	Freq (GHz)	Gain (dB)	Gain Flatness (dB)	Noise Figure (dB)	Input VSWR (:1)	Output VSWR (:1)	Output P_{-1} dB (dBm)	Power Supply (V/mA)	Package Style
SAC3902	0.9～1.3	20.2	0.4	3.4	1.4	1.4	26	8/142	Die and QFN
SAC3903	0.9～1.3	36	0.9	3.2	1.8	1.8	25.5	8/162	Die and QFN
SAC3904	7～12	24	1.5	5.5	1.4	1.4	17.5	5/68	Die and QFN
SAC3905	2～8	17	1.0	—	1.3	1.4	15	5/56	Die and QFN
SAC3906	3～10	18	2.0	—	1.3	1.4	13	5/63	Die and QFN
SAC3907	26～38	16	2.0	—	1.7	1.4	26	5～6/450	Die and QFN
SAC3908	0.1～4	14	±1.0	4	1.5	1.5	26	5～8/150	Die and QFN
SAC3908Q3	0.1～2	15	±1.0	4	1.5	1.5	26.5	5～8/100	QFN3×3
SAC3910	22～38	15	1.5	6.5	1.6	1.6	24	5/250	Die
SAC3911	24～40	12	±1.0	5	1.4	1.4	15	4/60	Die
SAC3912	20～38	8	1.5	5	1.3	1.3	18	4～6/100	Die
SAC3913	8～13	19	±2.0	—	1.4	1.4	32.5	5～6/650	Die and QFN
SAC3913Q5	8～13	19	±2.0	—	2	1.7	32	5～6/650	QFN5×5
SAC3914	14～18	19	±2.0	—	2	—	31	5～6/500	Die and QFN
SAC3914Q5	14～18	19	±2.0	—	2	—	31	5～6/500	QFN5×5
SAC3915	6～18	17	1.5	5	1.5	1.5	20	6/80	Die and QFN
SAC3915Q3	6～18	18	±1	—	1.6	1.5	18	6/80	QFN3×3
SAC3916	12～18	22	2.5	—	1.5	—	31	6/1000	Die and QFN
SAC3916Q5	12～18	22	2.5	—	1.5	—	31	6/1000	QFN5×5
SAC3917	6～18	16	1.0	3.5	1.4	1.4	16	5/52	Die and QFN
SAC3918	2～10	18	—	5.5	1.35	1.2	19	5/80	Die and QFN
SAC3918Q3	2～10	18	±1.5	—	1.7	1.3	19	5/80	QFN3×3
SAC3923	1～20	11	1.2	3	1.8	1.6	28.5	10/330	Die and

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									QFN
SAC3925	26～38	16	2	—	1.7	1.4	26	6/300	Die
SAC3926	8～14	22	±2	—	1.7	1.7	32	8/700	Die and QFN
SAC3928AQ3	0.05～1.5	10	±1	3.5	1.5	1.5	17	5/80	QFN3×3
SAC3928BQ3	0.05～1	12	±1	2.5	1.5	1.5	18	5/80	QFN3×3

➢ 1.3 Power Amplifiers

Index / Model	Freq(GHz)	Gain(dB)	Pout(dBm)	PAE(%)	Power Supply(V/A)	Package Style
SAC3106	27～33	20	33	22	6/1	Die and QFN
SAC3106Q6	27～33	17	31.5	20	6/1.1	QFN6×6
SAC3109Q6	5～6	34	35	40	8/1.1	QFN6×6
SAC3110Q6	13.5～14.75	29	38	30	7/2.25	QFN6×6
SAC3113	8.5～11	25	40.5	40	8/3	Die and QFN
SAC3114	8～12	25	39.5	33	8/3	Die and QFN
SAC3115	13.5～14.75	24	40	38	8/2.5	Die and QFN
SAC3116	13.5～14.75	33	38.5	35	7/2.5	Die and QFN
SAC3117	13.5～14.75	29	36	40	7/1.3	Die and QFN
SAC3118	27.5～32	27	35.5	18	6/2	Die and QFN
SAC3118Q6	27～30	26	35.5	20	6/2	QFN6×6
SAC3119	5.5～6	23	36	40	5/0.9	Die and QFN
SAC3122Q4	0.001～3	25	30	40	12/0.24	QFN4×4
SAC3124	33.5～36.5	25	35	20	6/2.5	Die
SAC3125Q6	0.1～2	15	38	45	28/0.1	QFN6×6
SAC3126	18～26.5	23	32	22	6/1.1	Die and QFN
SAC3127	28.5～32	25	35.5	23	6/2.5	Die and QFN
SAC3127Q6	28～31	23	35.5	22	6/2.5	QFN6×6
SAC3128Q6	26～32	17	32	23	6/1	QFN6×6
SAC3129	37～40	20	30	20	6/1	Die

➢ 1.4 Phase Shifters

Index / Model	Freq (GHz)	Digits (bit)	Insertion Loss(dB)	Input VSWR (:1)	Output VSWR (:1)	Phase Accuracy (°)	RMS (°)	Control Voltage(V)	Package Style
SAC3301	0.9～1.3	6	-5	1.3	1.3	-0.5～2	1	0/+5	Die and QFN

Index / Model	Freq (GHz)	Digits (bit)	Insertion Loss(dB)	Input VSWR (:1)	Output VSWR (:1)	Phase Accuracy (°)	RMS (°)	Control Voltage(V)	Package Style
SAC3302	1.2～1.6	6	-5	1.3	1.3	-2.2～3	1.4	0/-5	Die and QFN
SAC3303	2.2～2.6	6	-4.5	1.3	1.3	-1～1	0.8	0/+5	Die and QFN
SAC3303Q5	2.2～2.6	6	-4.8	1.3	1.3	-1～1	1	0/+5	QFN5×5
SAC3304	2.7～3.5	6	-5.2	1.55	1.4	-2～4.5	2	0/+5	Die and QFN
SAC3305	2.7～3.5	6	-4.8	1.5	1.4	-2～4	2	0/-5	Die and QFN
SAC3306	5～6	6	-5.5	1.4	1.4	-1.5～3	1	0/+5	Die and QFN
SAC3307	8～12	6	-8	1.9	1.8	-4～5	2	0/+5	Die and QFN
SAC3308	14～18	6	-10	1.7	1.5	-7～2	3	0/+5	Die and QFN
SAC3309	3.4～4.2	6	-5.5	1.5	1.5	-5～2.5	1	0/+5	Die and QFN
SAC3309Q6	3.4～4.2	6	-5.8	1.3	1.3	-5～2.5	1	0/+5	QFN6×6
SAC3310	1.2～1.4	6	-4.8	1.3	1.4	-1.5～1.5	1	0/+5	Die and QFN
SAC3311	1.2～1.6	6	-5	1.3	1.4	-1.5～2.5	1.5	0/+5	Die and QFN
SAC3312	2.0～3.2	6	-8	1.4	1.4	-3～5	2	0/+5	Die and QFN
SAC3315	1～2	6	-8	1.2	1.2	—	—	0/-5	Die and QFN
SAC3316	6～18	6	-14	1.5	1.5	—	—	0/-5	Die and QFN
SAC3323	32～38	5	-9	1.8	2	—	—	0/-5	Die

➢ 1.5 Digital Attenuators

Index / Model	Freq (GHz)	Digits (bit)	Insertion Loss(dB)	Input VSWR(:1)	Output VSWR(:1)	Attenuation Accuracy(dB)	RMS (dB)	Control Voltage (V)	Package Style
SAC3401	DC～4	3	-0.7	1.15	1.15	-0.2～0.4	0.25	-5/+5	Die and QFN
SAC3402	DC～6	6	-2.5	1.4	1.4	-0.3～1.0	0.8	0/+5	Die and QFN

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Index / Model	Freq (GHz)	Digits (bit)	Insertion Loss(dB)	Input VSWR(:1)	Output VSWR(:1)	Attenuation Accuracy(dB)	RMS (dB)	Control Voltage (V)	Package Style
SAC3402Q4	DC～6	6	-2.8	1.4	1.4	-0.3～1.0	0.8	0/+5	QFN4×4
SAC3403	8～12	6	-3.8	1.3	1.3	-0.5～1	0.5	0/+5	Die and QFN
SAC3404	DC～12	2	-2.2	1.4	1.5	-0.5～1.5	1	0/+5	Die and QFN
SAC3405	12～18	6	-3.8	1.45	1.5	-0.5～2.5	1.5	0/+5	Die and QFN
SAC3405Q4	12～18	6	-3.8	1.45	1.5	-0.5～3.5	1.5	0/+5	QFN4×4
SAC3406A	DC～12	6	-1.5	1.3	1.2	-0.6～1	0.5	0/+5	Die and QFN
SAC3406A SPQ4	DC～12	6	-1.8	1.3	1.2	-0.5～2	0.5	0/+5	SPQ4×4
SAC3407	DC～12	6	-2.8	1.3	1.4	-2～2	0.5	0/+5	Die and QFN
SAC3408	DC～12	6	-2.5	1.3	1.3	**-2～2**	0.6	0/+5	Die and QFN
SAC3408S PQ4	DC～12	6	-2.8	1.3	1.3	-1～3.5	1	0/+5	SPQ4×4
SAC3409	DC～13	6	-2	1.25	1.25	—	—	0/-5	Die and QFN

➢ 1.6 Switches

1)SPST Switches

Index / Model	Freq (GHz)	Description	Insertion Loss(dB)	Isolation (dB)	Return Loss(dB) (ON)	Return Loss(dB) (OFF)	Control Voltage (V)	Package Style
SAC3207	DC～12	SPST Non-Reflection	-0.9	-40	-20	-15	0/-5	Die and QFN
SAC3207 Q3	DC～12	SPST Non-Reflection	-0.9	-40	-20	-15	0/-5	QFN3×3
SAC3208	DC～12	SPST Reflection	-0.8	-50	-15	—	0/+5	Die and QFN
SAC3208 Q3	DC～12	SPST Reflection	-0.9	-60	-18	-18	0/+5	QFN3×3
SAC3209	DC～20	SPST Reflection	-1.5	-55	-15	—	0/+5	Die and QFN

Index / Model	Freq (GHz)	Description	Insertion Loss(dB)	Isolation (dB)	Return Loss(dB) (ON)	Return Loss(dB) (OFF)	Control Voltage (V)	Package Style
SAC3209 A	DC～20	SPST Reflection	-1	-55	-15	—	0/+5	Die and QFN
SAC3209 Q3	DC～20	SPST Reflection	1.5	-55	-14	—	0/+5	QFN3×3

2)SPDT Switches

Index / Model	Freq (GHz)	De-scrip-tion	Insertion Loss(dB)	Isolation (dB)	Return Loss(dB) (ON)	Input P_{-1}dB (dBm)	Input IP_3(dBm)	Control Voltage (V)	Package Style
SAC3201	DC～20	SPDT Non-Reflection	-2.3	-45	-15	30	48	0/-5	Die and QFN
SAC3201Q3	DC～20	SPDT Non-Reflection	-1.8	-50	-20	30	48	0/-5	QFN3×3
SAC3202	DC～12	SPDT Reflec-tion	-1.2	-48	-20	25	42	0/+5	Die and QFN
SAC3202Q3	DC～12	SPDT Reflec-tion	-1.1	-48	-20	25	42	0/+5	QFN3×3
SAC3203	DC～12	SPDT Reflec-tion	-1.1	-48	-20	25	42	0/+5	Die and QFN
SAC3203Q3	DC～12	SPDT Reflec-tion	-1.0	-48	-20	25	42	0/+5	QFN3×3
SAC3204	DC～4	SPDT Non-Reflection	-1.2	-70	-15	30	45	0/+5	Die and QFN
SAC3204Q3	DC～4	SPDT Non-Reflection	-1.2	-70	-20	30	45	0/+5	QFN3×3
SAC3204SQ3	DC～4	SPDT Non-Reflection	-0.9	-70	-20	30	45	0/+5	SQ3×3
SAC3205	DC～20	SPDT Reflec-	-1.5	-40	-18	20	35	0/+5	Die and QFN

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Index / Model	Freq (GHz)	De-scrip-tion	Insertion Loss(dB)	Isolation (dB)	Return Loss(dB) (ON)	Input P_{-1}dB (dBm)	Input IP_3(dBm)	Control Voltage (V)	Package Style
		tion							
SAC3205Q3	DC～20	SPDT Reflec-tion	-1.5	-40	-16	20	35	0/+5	QFN3×3
SAC3206	DC～20	SPDT Non-Reflection	-2.3	-45	-15	30	48	0/+5	Die and QFN
SAC3206Q3	DC～20	SPDT Non-Reflection	-2.3	-45	-20	30	48	0/+5	QFN3×3
SAC3210	0.5～6	SPDT Reflec-tion	**-0.6**	-40	-20	—	—	0/+5 0/-5	Die and QFN
SAC3210Q3	0.5～6	SPDT Reflec-tion	-0.7	-45	-20	—	—	0/+5 0/-5	QFN3×3
SAC3212	1.5～12	SPDT Non-Reflection	-1.5	-40	-15	—	—	0/+5 0/-5	Die and QFN
SAC3216	DC～12	SPDT Non-Reflection	-1.2	-45	-15	30	48	0/-5	Die and QFN
SAC3218A	0.5～3	SPDT Non-Reflection	-0.6	-70	-20	—	—	0/+5	Die and QFN
SAC3219A	1～4	SPDT Reflec-tion	-0.7	-47	-15	—	—	0/5	Die and QFN

3)SP3T Switches

Index / Model	Freq (GHz)	Description	Insertion Loss(dB)	Isolation (dB)	Return Loss (dB)(ON)	Input P_{-1}dB (dBm)	Input IP_3 (dBm)	Control Voltage (V)	Package Style
SAC3213	0.5～3.5	SP3T Non-Reflection	-1	-50	-20	—	—	0/+5	Die and QFN
SAC3214	DC～8	SP3T Non-Reflecti	-1.5	-45	-20	25	40	0/+5	Die and QFN

Index / Model	Freq (GHz)	Description	Insertion Loss(dB)	Isolation (dB)	Return Loss (dB)(ON)	Input P_{-1}dB (dBm)	Input IP_3 (dBm)	Control Voltage (V)	Package Style
		on							
SAC3214 A	DC～8	SP3T Non-Reflection	-1.5	-50	-18	20	—	0/+5	Die and QFN
SAC3215	DC～8	SP3T Non-Reflection	-1.5	-50	-20	27	—	0/+5	Die and QFN
SAC3222	DC～12	SP3T	-1.8	-38	-17	20	35	0/+5	Die and QFN

4)SP4T Switches

Index / Model	Freq (GHz)	Descrip-tion	Insertion Loss(dB)	Isolation (dB)	Return Loss (dB)(ON)	Input P_{-1}dB (dBm)	Input IP_3 (dBm)	Control Voltage (V)	Package Style
SAC3220	DC～20	SP4T Non-Reflection	-2.5	-50	-15	—	—	0/+5	Die and QFN
SAC3220Q3	DC～20	SP4T Non-Reflection	-2.5	-50	-16	—	—	0/+5	QFN3×3
SAC3223	DC～12	SP4T	-2.1	-35	-15	20	38	0/+5	Die and QFN
SAC3224	DC～18	SP4T	-3.1	-30	-12	15	27	0/+5	Die and QFN

➢ 1.7 Mixers

1)Up Converters

Index / Model	RF Freq (GHz)	LO Freq (GHz)	IF Freq (GHz)	Con-version Gain(dB)	LO-RF Isolation(dB)	LO Drive (dBm)	Power Supply (V/mA)	Package Style
SAC3501	2.0～3.5	2.0～3.5	DC～0.6	8	-40	0	5/85	Die and QFN

2)Down Converters

Index / Model	RF Freq (GHz)	LO Freq (GHz)	IF Freq (GHz)	Conver-sion Gain(dB)	NF (dB)	LO-RF Isola-tion(dB)	LO Drive（dBm）	Power Supply (V/mA)	Package Style

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Index / Model	RF Freq (GHz)	LO Freq (GHz)	IF Freq (GHz)	Conver-sion Gain(dB)	NF (dB)	LO-RF Isola-tion(dB)	LO Drive（dBm）	Power Supply (V/mA)	Package Style
SAC3502	2.0～3.5	2.0～3.5	0.01～0.6	13	5.5	-45	0	5/85	Die and QFN
SAC3503	2.0～3.5	2.0～3.5	0.01～0.6	13	6.5	-45	0	5/85	Die and QFN

3)Double Balanced Mixers

Index / Model	RF Freq (GHz)	LO Freq (GHz)	IF Freq (GHz)	Con-version Loss (dB)	LO-RF Isola-tion(dB)	LO-IF Isola-tion(dB)	RF-IF Isolation (dB)	LO Drive（dBm）	Package Style
SAC3504	7.0～14	7.0～14	DC～3	-8	-35	-27	-18	13	Die and QFN
SAC3505	3.5～9	3.5～9	DC～1	-9	-35	-21	-21	13	Die and QFN
SAC3506	11～20	11～20	DC～4	-8	-30	-27	-18	13	Die and QFN
SAC3509	5～10	5～10	DC～4	-8	-38	-35	-15	13	Die and QFN
SAC3510	5～16	5～16	DC～6	-8.5	-38	-33	-16	13	Die and QFN
SAC3511	8～12	8～12	DC～3	15	-50	-30	-40	0	Die and QFN
SAC3512	24～40	24～40	DC～10	-8.5	-40	-30	-30	13	Die
SAC3513	18～32	18～32	DC～10	-7.5	-40	-30	-35	13	Die and QFN
SAC3516	24～34	12～18	DC～4	-9	-35	-30	-25	4	Die
SAC3517	14～32	4～20	DC～7	-12	-30	-32	-30	15	Die
SAC3518	18～36	9～16	DC～7	-13	-30	-15	-35	0	Die and QFN

4)Double Balanced Mixer with LO-Drivers

Index / Model	RF Freq (GHz)	LO Freq (GHz)	IF Freq (GHz)	Conver-sion Loss(dB)	LO-RF Isolation (dB)	LO-IF Isolation (dB)	LO Drive (dBm)	Power Supply (V/mA)	Package Style
SAC3507	0.9～3.0	0.9～3.0	DC～0.8	-8	-40	-30	0	5/32	Die and QFN
SAC3507Q5	0.9～3.0	0.9～3.0	DC～0.8	-8	-40	-20	0	5/32	QFN5×5
SAC3508	2.0～6.0	2.0～6.0	DC～2	-8	-25	-20	0	5/42	Die and

Index / Model	RF Freq (GHz)	LO Freq (GHz)	IF Freq (GHz)	Conver-sion Loss(dB)	LO-RF Isolation (dB)	LO-IF Isolation (dB)	LO Drive (dBm)	Power Supply (V/mA)	Package Style
									QFN
SAC3508Q4	2.0～6.0	2.0～6.0	DC～2	-8	-24	-24	0	5/42	QFN4×4

➢ 1.8 Power Dividers

Index / Model	Freq (GHz)	Description	Insertion Loss(dB)	Amplitude Unbalance (dB)	Input VSWR (:1)	Output VSWR (:1)	Isola-tion (dB)	Package Style
SAC3801A	2～20	0°Two-Way Di-vider	-1	±1	1.3	1.3	-20	Die and QFN
SAC3801AQ4	2～20	0°Two-Way Di-vider	-1	±0.25	1.4	1.4	-20	QFN4×4
SAC3802A	6～18	0°Three-Way Divider	-0.7	±0.2	1.3	1.2	-25	Die and QFN
SAC3803A	6～18	0°Three-Way Divider	-1	±0.2	1.3	1.2	-25	Die and QFN
SAC3804	8～12	0°Two-Way Di-vider	-0.8	±0.1	1.2	1.1	-31	Die and QFN
SAC3805	18～26	0°Two-Way Di-vider	-0.9	—	1.8	1.2	-19	Die and QFN
SAC3807	8～12	0°Two-Way Di-vider	-0.9	±0.05	1.3	1.3	-23	Die and QFN
SAC3808	2～6	0°Two-Way Di-vider	-0.7	±0.07	1.4	1.3	-13	Die and QFN
SAC3809	1～18	0°Two-Way Di-vider	-1	±0.2	1.4	1.4	-20	Die and QFN
SAC3811Q5	8～12	0°Four-Way Di-vider	-1.8	±0.1	1.3(RFC VSWR)	1.25(RF1/RF2 /RF3/RF4 VSWR)	-35	QFN5×5

➢ 1.9 Multi-functional Chips

1)Multi-functional Chips

Index / Model	Freq (GHz)	Description	Gain(dB)	RMS of Phase Accuracy (°)	RMS of At-tenuation Accura-cy(dB)	Control Volt-age(V)	Die Size (mm)	Pack-age Style
SAC3601	2.7～3.1	Integrated 4 bit phase shifter and 2	-3.5(Inserti on loss)	0.8	0.08	0/+5	3.1×1.25×0.1	Die and QFN

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Index / Model	Freq (GHz)	Description	Gain(dB)	RMS of Phase Accuracy (°)	RMS of Attenuation Accuracy(dB)	Control Voltage(V)	Die Size (mm)	Package Style
		bit attenuator						
SAC3602	1.98～2.3	Integrated 12-bit serial to parallel chip,amplifier, 6-bit phase shifter, 6-bit attenuator	16.5	1.5	0.5	0/+5	3.2×3.2×0.1	Die
SAC3603	5～6	Integrated switch,amplifier, 6-bit phase shifter, 6-bit attenuator	10.5	2.5	0.3	0/+5	5.0×3.5×0.1	Die
SAC3612	2.7～3.5	S-band Integrated phase shifter, attenuator and amplifier	1.5	1	1.2	0/+5	4.5×3.5×0.1	Die
SAC3613	8～12	X-band Integrated phase shifter, attenuator	1.5	2.5	1	0/+5	5.0×3.5×0.1	Die

2)Multi-functional Mixers

Index / Model	RF Freq (GHz)	LO Freq (GHz)	IF Freq (GHz)	Conversion Gain(dB)	Description	LO Drive(dBm)	Power Supply (V/mA)	Package Style
SAC3604	0.7～2.0	0.7～2.0	DC～1	6	Integrated with RF bidirectional amplifier, LO driver amplifier, dual balanced mixer of switch	0	5/80+50	Die and QFN
SAC3605	2.5～5.0	2.5～5.0	0.65～1.5	16	Integrated with RF bidirectional amplifiers, a LO drive amplifier, a double balanced mixer, switches, a low pass filter, and 3-bit digital controlled attenuators	0	5V	Die and QFN
SAC3606	8.0～12	10.8～14.8	2.8	-8.5	Integrated Switch,mixer and	-3	5/70	Die and QFN

Index / Model	RF Freq (GHz)	LO Freq (GHz)	IF Freq (GHz)	Conversion Gain(dB)	Description	LO Drive(dBm)	Power Supply (V/mA)	Package Style
					low-pass filter			
SAC3606Q4	8.0～12	10.8～14.8	2.8	-9	Integrated Switch,mixer and low-pass filter	-3	5/70	QFN4×4
SAC3607	8.0～12	10.8～14.8	2.8	5	Integrates switch, mixer, low pass filter, amplifier	-3	5/110	Die and QFN
SAC3607Q5	8.0～12	10.8～14.8	2.8	4.5	Integrates switch, mixer, low pass filter, amplifier	-3	5/110	QFN5×5

3)Bilateral Amplifiers

Index / Model	Freq (GHz)	Description	Gain (dB)	Output P_{-1}dB (dBm)	Operating Voltage(V)	Operating Current (mA)	Die Size (mm)	Pack-age Style
SAC3608	2.0~4.0	Realization of switch transceiver and amplify	25.5	16	±5	80	2.5×2.1×0.1	Die and QFN
SAC3609	0.7~5.0	Realization of switch transceiver and amplify	21	16	+5	120	2.5×2.1×0.1	Die and QFN

➢ 2.0 Equalizers

Index / Model	Freq (GHz)	InsertionLoss(dB)	Slope(dB)	InputVSWR (:1)(Typ.)	Output VSWR(:1)(Typ.)	Package Style
SAC3702	1~20	2.5@20GHz	4	1.2	1.2	Die and QFN
SAC3702Q3	1~20	1.5@20GHz	4	1.4	1.4	QFN3×3
SAC3703	1~20	2.8@20GHz	8	1.2	1.2	Die and QFN
SAC3703Q3	1~20	2@20GHz	9	1.4	1.4	QFN3×3
SAC3704	0.5~6	0.4@6GHz	2	1.2	1.2	Die and QFN
SAC3705	1~10	0.8@10GHz	3	1.2	1.2	Die and QFN
SAC3706	1~10	0.8@10GHz	5	1.2	1.2	Die and QFN

➢ 2.1 Low Noise FETs

Index / Model	Freq(GHz)	Gain(dB)	NF(dB)	Output P_{-1}dB(dBm)	Output IP_3(dBm)	Package Style
SAC2501	0.1~8	28	0.5	24	33	Die and QFN

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Index / Model	Freq(GHz)	Gain(dB)	NF(dB)	Output P_{-1}dB(dBm)	Output IP_3(dBm)	Package Style
SAC2502	0.1~8	21	0.8	17	33	Die and QFN
SAC2502Q3	0.1～8	21	0.8	17	33	QFN3×3
SAC2503	0.1～40	10	1.5	13	22	Die and QFN
SAC2504	0.1～40	12	1.8	13	22	Die and QFN

➢ 2.2 Spiral Inductors

Index / Model	Turns	Inductance (nH)(typ.)	Rs@DC (Ohm)	Rs@GHz (Ohm)	Q@GHz	Resonant Freq(GHz)	Chip Size (mm)	Package Style
SAC6005A	3.5	5	1.0	3.7@4.0	26.5@4.0	16.5	0.75×0.75×0.2	Die and QFN
SAC6007P5A	4.5	7.5	1.3	6.0@4.0	27.0@4.0	12.8	0.80×0.80×0.2	Die and QFN
SAC6010A	5.5	10	1.6	8.0@4.0	26.0@4.0	11.3	0.80×0.80×0.2	Die and QFN
SAC6015A	6.5	15	2.1	5.6@4.0	26.5@4.0	8.5	0.80×0.80×0.2	Die and QFN
SAC6020A	7.5	20	2.6	7.5@2.0	28.5@2.0	7.0	0.80×0.80×0.2	Die and QFN
SAC6050A	9.5	50	5.1	10.6@1.0	28.5@1.5	2.8	0.95×0.95×0.2	Die and QFN
SAC6090A	12.5	90	8.0	26.3@1.0	26.5@1.0	1.8	1.10×1.10×0.2	Die and QFN
SAC6200A	17.5	200	14.0	30.0@1.0	23.0@1.0	1.0	1.37×1.37×0.2	Die and QFN

➢ 2.3 Power Detectors

Index / Model	Fre.(GHz)	Flatness (dB)	Input VSWR(:1)	Dynamic Range(dB)	Rise Time(ns)	Fall Time(ns)	I_D(mA)	Package Style
SAC1001	DC～20	1	1.6	30	50	300	2.5	Die and QFN
*SAC1001Q3E2	0.5～20	1	2	30	100	300	2.5	QFN3×3
SAC1002	1～40	1	2	30	50	300	2	Die and QFN

*Notes:" E2" in " SAC1001Q3E2"represents version number.

➢ 2.4 Quartz Substrate Passive Components

Index / Model	Freq (GHz)	Insertion Loss(dB)(typ.)	Description	Chip Size (mm)
SAC1114	24～30	0.5	—	5×5×1.2
SAC1115	28～30	0.6	3dB,90°Integrated load resistance	2.9×3.5×0.25
SAC1116	34～36	0.6	3dB,90°load absorption re-	2.65×3.3×0.25

Index / Model	Freq (GHz)	Insertion Loss(dB)(typ.)	Description	Chip Size (mm)
			sistance	
SAC1117	32～37	0.7	3dB,90°	4×5×0.25
SAC1118	26～33	0.7	3dB,90°	5.9×5.6×0.25
SAC1119	38～45	1	3dB,90°	3.85×5×0.25
SAC1120	40～50	1.2	3dB,90°	3.35×4.5×0.25

➢ 2.5 Module

1)Low Noise Amplifier Module

Index / Model	Freq (GHz)	Gain (dB)	Noise Figure (dB)	Input Return Loss(dB)	Output Return Loss(dB)	Output P_{-1}dB (dBm)	Reverse Isolation (dB)	Size (mm)	Type
SAC1130	0.030～0.45	30	0.6	-15	-13	18	-45	54×30×8	Module
SAC1131	0.35～0.7	36	—	-15	-13	18	-45	—	Module
SAC1132	0.7～1.4	33	—	-14	-13	20	-42	—	Module
SAC1133	1.7～2.7	32	—	-14	-13	8	-45	—	Module
SAC1134	2～8	32	—	-14	-13	12	-55	—	Module
SAC1135	1.2～3.4	34	0.9	-14	-13	18	-55	54×30×8	Module
SAC1136	0.9～2	15	0.7	-14	-14	15	-28	54×30×8	Module
SAC1137	2.4～2.5	27.5	—	-14	-14	11	-53	54×30×8	Module
SAC1140	0.01～2	23	0.8	-14	-14	20	-25	54×30×8	Module
SAC1149	2～4	30	0.8	-14	-14	10	—	17.8×20×8.35	Module
SAC1156	2～8.5	27	1	-13	-13	10	—	17.8×20×8.35	Module
SAC1157	2～4	28	0.6	-15	-15	10	—	17.8×20×8.35	Module
SAC1157-R	2～4	28	0.6	-15	-15	10	—	17.8×20×8.35	Module
SAC1158	0.8～1.6	32	0.5	-15	-15	13	—	17.8×20×8.35	Module
SAC1159-R	2～4	55	Noise Temperature: 45°K	-14	-14	10	—	17.8×20×8.35	Module
SAC1160	1～12	16	2	-14	-14	13	—	17.8×20×8.35	Module
SAC1160-R	1～12	16	2	-14	-14	13	—	17.8×20×8.35	Module
SAC1161	0.4～6	17	1.2	-14	-14	17	—	17.8×20×8.35	Module

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Product Selection Guide

Rev 201909

Index / Model	Freq (GHz)	Gain (dB)	Noise Figure (dB)	Input Return Loss(dB)	Output Return Loss(dB)	Output P_{-1}dB (dBm)	Reverse Isolation (dB)	Size (mm)	Type
SAC1163-R	0.8～1.6	60	Noise Temperature: 40°K	-13	-13	12	—	17.8×20×8.35	Module
SAC1168	0.0007～0.5	37	1.2	-10	-10	7	—	48.8×26.9×15.4	Module

2)Driver Amplifier Module

Index / Model	Freq (GHz)	Gain (dB)	Gain Flatness (dB)	Input Return Loss(dB)	Output Return Loss(dB)	Output P_{-1}dB (dBm)	Power Supply (V/A)	Size (mm)	Type
SAC1103	26～40	11	±1.5	-10	-10	15	5/0.1	35×19.1×19.1	Module
SAC1104	28～32	25	±1.5	-10	-10	28	6/0.8	37×23×19.1	Module
SAC1105	33～38	25	±1.5	-10	-10	26	6/0.8	37×23×19.1	Module
SAC1128	26～40	25	—	-10	-10	25	8/0.35	—	Module
SAC1151	0.1～20	28	±1.0	-15	-15	10	—	40×20×9	Module
SAC1154	0.1～20	46	±1.5	-15	-15	10	—	40×20×9	Module

3)Power Amplifier Module

Index / Model	Freq (GHz)	Gain (dB)	Gain Flatness (dB)	Input Return Loss(dB)	Output Return Loss(dB)	Output P_{-1}dB (dBm)	Power Supply (V/A)	Size (mm)	Type
SAC1121	27.5～31	25	±1.5	-15	-15	40.5	6.3/14	—	Module
SAC1123	34～36	24	—	-13	-13	40	6.3/11	—	Module
SAC1125	9～11	23	—	-14	-12	42.5 (OP_{-3}dB)	15/5.5	—	Module
SAC1127	13.5～14.75	23	—	-14	-14	47.5	8.5/25	—	Module
SAC1129	28～30	30	—	-10	-5	32.5	6/1.4	—	Module
SAC1145	0.7～1.3	31	±1.5	-14	-15	36	8/1.2	25.4×34×5.5	Module
SAC1150	9～11	22.5	—	-14	-14	45 (OP_{-3}dB)	16/8.5	200×105×41.4	Module
SAC1155	0.7～1.5	32	±1	-14	-15	40.5 (OP_{-3}dB)	28/0.3	25.4×34×5.5	Module
SAC1166	5.4～5.8	36	±1.5	-14	-11	36	8/1.5	25.4×34×5.5	Module
SAC1167	13.75～14.5	26	±2	-11	-10	35.5	7/1.1	25.4×34×5.5	Module
SAC1173	22～26	29	—	-14	-8	32	13.5/2	52.9×32×10	Module

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Index / Model	Freq (GHz)	Gain (dB)	Gain Flatness (dB)	Input Return Loss(dB)	Output Return Loss(dB)	Output P_{-1}dB (dBm)	Power Supply (V/A)	Size (mm)	Type
SAC1174	22～26	28	—	-14	-14	35	13.5/2	80×60×17	Module

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