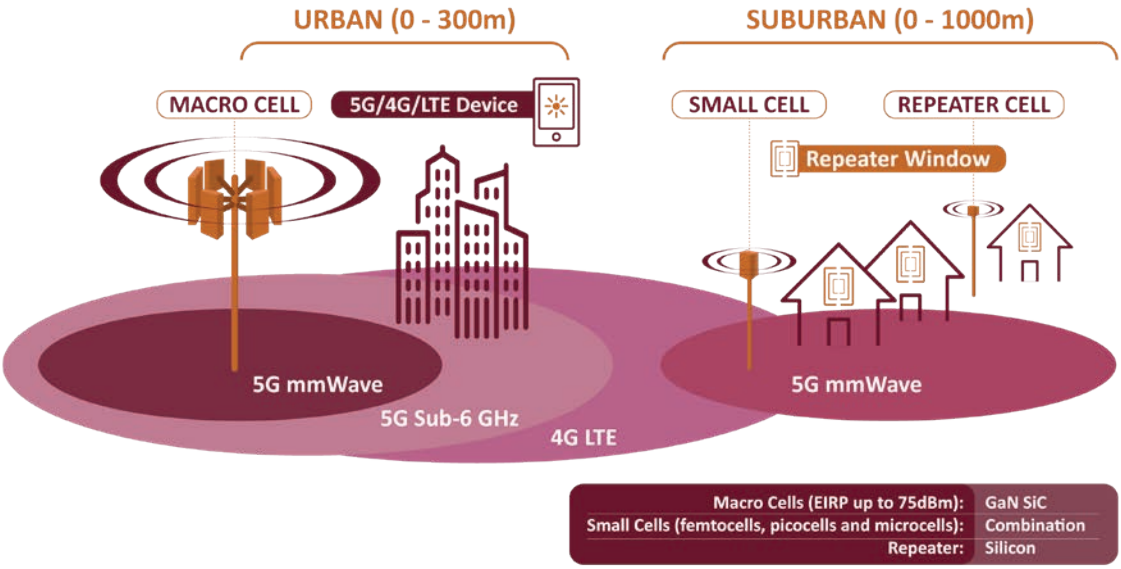
High-Performance RF Semiconductor Components for 4G and 5G Infrastructure

5G promises very high-speed data transfer rates, much lower latency and greater capability to handle a vast amount of data and a massive number of connected devices. Network providers are required to build wireless infrastructures that are capable to meet these requirements, at a low cost. At the RF components level, iCana strives to develop components that offer wide bandwidth, high power efficiency and high linearity, providing engineers with design flexibility. Also, iCana offers highly integrated and efficient Front-End Modules that help to reduce system size and design complexity, accelerating time to market and lowering both costs of system and operations.

For Sub-6 GHz bands, iCana is developing Power Amplifiers (PA), Driver Amplifiers (DA), Switches and Front-End Modules (FEM) at different frequency bands.

For 5G Millimeter Wave (mmWave) applications iCana is designing Beamforming ICs (BFIC), and integrated Front-End Modules (FEM).



Rich ecosystem of multiple technologies and solutions

With 5G, there are multiple architectures, use cases and network solutions. We will observe the coexistence of 4G/LTE together with 5G Sub-6 GHz and 5G mmWave networks.

Small Cells will gain more relevance in 5G

Small Cells enable Mobile Network Operators to deploy sites in strategic locations offering network densification with higher capacities, using licensed and unlicensed wireless spectrum.

Phased Arrays will be widely adopted in 5G NR FR2

Phased Arrays technologies with beamforming capability will be specifically used to solve the mmWave technical challenges.

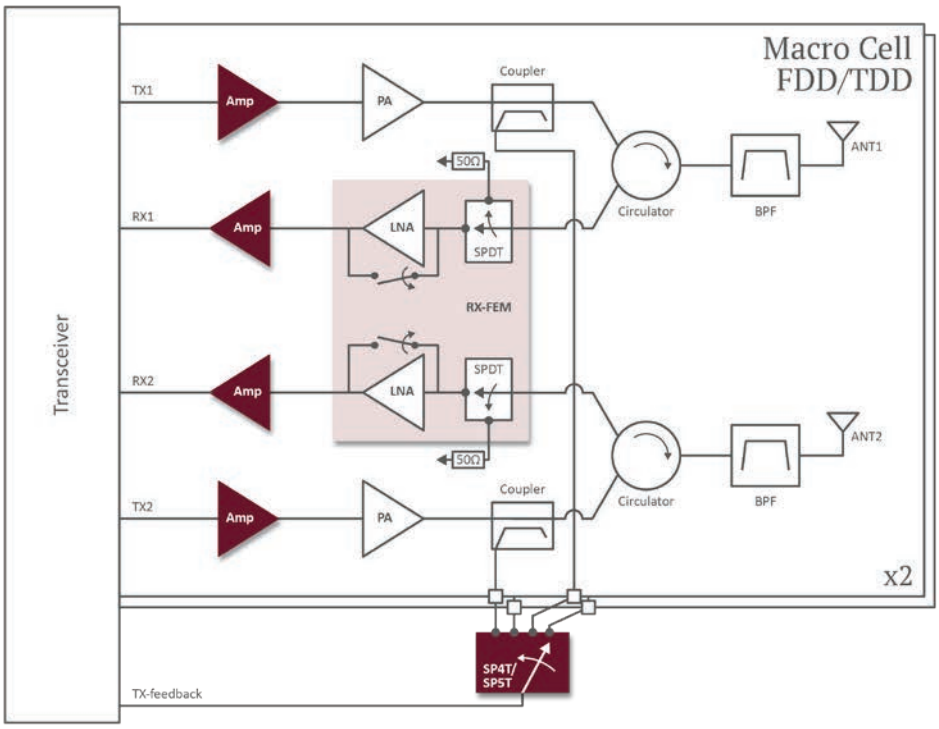
REV 1.0

iCana Ltd.

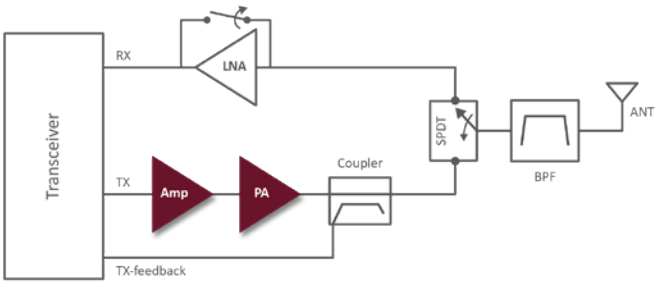
5F., No. 28-2, Baogao Road, Xindian District,
New Taipei City 231, Taiwan (ROC)

icana-rf.com

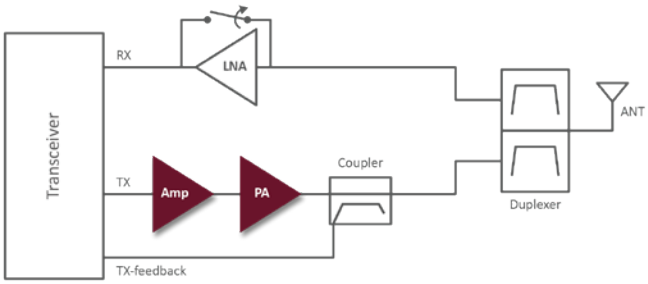
New Family of Products for 4G LTE & 5G NR FR1 Sub-6 GHz



Macro Cell Block Architecture



Small Cell TDD
Block Architecture



Small Cell FDD
Block Architecture

Coloured products are **being developed by iCana**

iCana Ltd.

5F., No. 28-2, Baogao Road, Xindian District,
New Taipei City 231, Taiwan (ROC)

icana-rf.com

Power Amplifiers: High Efficiency DPD-Friendly

ARQSP1819-4
1.8 GHz to 1.9 GHz
Gain = 37 dB
Psat = 36 dBm
PAE = 32%
V_{CC} = 5.0 V

- High Efficiency 4W Power Amplifier
- Fully matched (50 Ω input/output)
- High linearity
- Excellent input and output return loss
- Pin-to-pin compatible PA family for 3GPP 5G NR FR1
- Compact package size: 5.0 x 5.0 x 1.1 mm^3

ARQSP2122-4
2.1 GHz to 2.2 GHz
Gain = 38 dB
Psat = 36.2 dBm
PAE = 32%
V_{CC} = 5.0 V

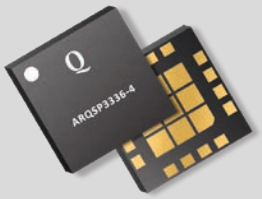
- High Efficiency 4W Power Amplifier
- Fully matched (50 Ω input/output)
- High linearity
- Excellent input and output return loss
- Pin-to-pin compatible PA family for 3GPP 5G NR FR1
- Compact package size: 5.0 x 5.0 x 1.1 mm^3

ARQSP2324-4
2.3 GHz to 2.4 GHz
Gain = 40 dB
Psat = 35.4 dBm
PAE = 31%
V_{CC} = 5.0 V

- High Efficiency 4W Power Amplifier
- Fully matched (50 Ω input/output)
- High linearity
- Excellent input and output return loss
- Pin-to-pin compatible PA family for 3GPP 5G NR FR1
- Compact package size: 5.0 x 5.0 x 1.1 mm^3

ARQSP3336-4
3.3 GHz to 3.6 GHz
Gain = 38 dB
Psat = 35 dBm
PAE = 25%
V_{CC} = 5.0 V

- High Efficiency 4W Power Amplifier
- Fully matched (50 Ω input/output)
- High linearity
- Excellent input and output return loss
- Pin-to-pin compatible PA family for 3GPP 5G NR FR1
- Compact package size: 5.0 x 5.0 x 1.1 mm^3



ARQSP4450-4
4.4 GHz to 5.0 GHz
Gain = 35 dB
Psat = 35.5 dBm
PAE = 25%
V_{CC} = 5.0 V

- High Efficiency 4W Power Amplifier
- Fully matched (50 Ω input/output)
- High linearity
- Excellent input and output return loss
- Pin-to-pin compatible PA family for 3GPP 5G NR FR1
- Compact package size: 5.0 x 5.0 x 1.1 mm^3

iCana Ltd.
5F., No. 28-2, Baogao Road, Xindian District,
New Taipei City 231, Taiwan (ROC)
icana-rf.com

Rx Dual-Channel Receiver Front-End Modules

ARQSF2442-RX-A
2.4 GHz to 4.2 GHz
High Gain = 37 dB
Low Gain = 16 dB
Noise Figure = 1.3 dB
V_{DD} = 5.0 V

- Dual-Channel Front-End Module
- High power handling
- Low current consumption in power down mode
- Excellent linearity
- Package size: 6.0 x 6.0 x 0.85 mm^3

ARQSF3753-RX-A
3.7 GHz to 5.3 GHz
High Gain = 35 dB
Low Gain = 16 dB
Noise Figure = 1.45 dB
V_{DD} = 5.0 V

- Dual-Channel Receiver Front-End Module
- High power handling
- Low current consumption in power down mode
- Excellent linearity
- Package size: 6.0 x 6.0 x 0.85 mm^3

Switches

ARQSS1050-5T
1 GHz to 5 GHz
Insertion Loss: < 0.7 dB
Return Loss: > 20 dB
Isolation: > 65 dB
V_{DD} = 3 - 6 V

- Silicon SP5T Switch
- High power handling
- Fast switching time
- Very low current consumption
- 3.3 V or 1.8 V compatible control logic
- Package size: 4.0 x 4.0 x 0.75 mm^3

ARQSS1050-4T
1 GHz to 5 GHz
Insertion Loss: < 0.7 dB
Return Loss: > 20 dB
Isolation: > 65 dB
V_{DD} = 3 - 6 V

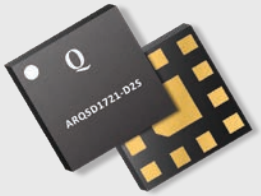
- Silicon SP4T Switch
- High power handling
- Fast switching time
- Very low current consumption
- 3.3 V or 1.8 V compatible control logic
- Package size: 4.0 x 4.0 x 0.75 mm^3

iCana Ltd.
5F., No. 28-2, Baogao Road, Xindian District,
New Taipei City 231, Taiwan (ROC)
icana-rf.com

D2SE Driver Amplifiers

ARQSD1721-D2S
1.7 GHz to 2.1 GHz
Noise figure: NF = 2.4 dB
Linearity: OIP3 = 33 dBm
Power: OP1dB = 19 dBm
V_{DD} = 3.3 - 5 V

- Differential To Single-Ended Gain Amplifier
- High and flat gain
- Excellent return loss
- Low drain current
- Power down mode
- Package size: 2.0 x 2.0 x 0.75 mm^3



ARQSD2328-D2S
2.3 GHz to 2.8 GHz
Noise figure: NF = 2.6 dB
Linearity: OIP3 = 32 dBm
Power: OP1dB = 19 dBm
V_{DD} = 3.3 - 5 V

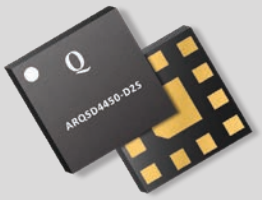
- Differential To Single-Ended Gain Amplifier
- High and flat gain
- Excellent return loss
- Low drain current
- Power down mode
- Package size: 2.0 x 2.0 x 0.75 mm^3

ARQSD3338-D2S
3.3 GHz to 3.8 GHz
Noise figure: NF = 2.7 dB
Linearity: OIP3 = 30 dBm
Power: OP1dB = 18 dBm
V_{DD} = 3.3 - 5 V

- Differential To Single-Ended Gain Amplifier
- High and flat gain
- Excellent return loss
- Low drain current
- Power down mode
- Package size: 2.0 x 2.0 x 0.75 mm^3

ARQSD4450-D2S
4.4 GHz to 5.0 GHz
Noise figure: NF = 3.6 dB
Linearity: OIP3 = 27 dBm
Power: OP1dB = 17 dBm
V_{DD} = 3.3 - 5 V

- Differential To Single-Ended Gain Amplifier
- High and flat gain
- Excellent return loss
- Low drain current
- Power down mode
- Package size: 2.0 x 2.0 x 0.75 mm^3

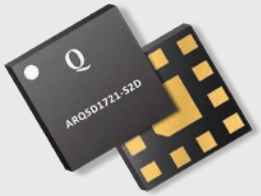


iCana Ltd.
5F., No. 28-2, Baogao Road, Xindian District,
New Taipei City 231, Taiwan (ROC)
icana-rf.com

SE2D Driver Amplifiers

ARQSD1721-S2D
1.7 GHz to 2.1 GHz
Noise figure: NF = 1.5 dB
Linearity: OIP3 = 31 dBm
Power: OP1dB = 17.5 dBm
V_{DD} = 3.3 - 5 V

- Single-Ended To Differential Gain Amplifier
- High and flat gain
- Excellent return loss
- Low drain current
- Power down mode
- Package size: 2.0 x 2.0 x 0.75 mm^3



ARQSD2328-S2D
2.3 GHz to 2.8 GHz
Noise figure: NF = 1.6 dB
Linearity: OIP3 = 30 dBm
Power: OP1dB = 17.5 dBm
V_{DD} = 3.3 - 5 V

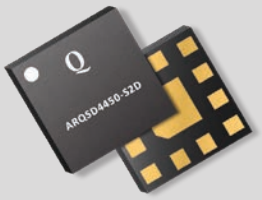
- Single-Ended To Differential Gain Amplifier
- High and flat gain
- Excellent return loss
- Low drain current
- Power down mode
- Package size: 2.0 x 2.0 x 0.75 mm^3

ARQSD3338-S2D
3.3 GHz to 3.8 GHz
Noise figure: NF = 1.8 dB
Linearity: OIP3 = 29 dBm
Power: OP1dB = 17 dBm
V_{DD} = 3.3 - 5 V

- Single-Ended To Differential Gain Amplifier
- High and flat gain
- Excellent return loss
- Low drain current
- Power down mode
- Package size: 2.0 x 2.0 x 0.75 mm^3

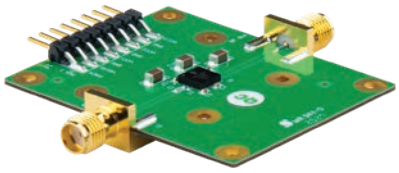
ARQSD4450-S2D
4.4 GHz to 5.0 GHz
Noise figure: NF = 2.0 dB
Linearity: OIP3 = 25 dBm
Power: OP1dB = 15.8 dBm
V_{DD} = 3.3 - 5 V

- Single-Ended To Differential Gain Amplifier
- High and flat gain
- Excellent return loss
- Low drain current
- Power down mode
- Package size: 2.0 x 2.0 x 0.75 mm^3



iCana Ltd.
5F., No. 28-2, Baogao Road, Xindian District,
New Taipei City 231, Taiwan (ROC)
icana-rf.com

Evaluation Boards: Availability



Power Amplifiers

P/N	Status	EVB	Type	Frequency Range (GHz)	Supply Voltage (V)	Peak Output Power (W)	Package Size (mm²)
ARQSP1819-4-EVB	Engineering	Now Available	HPA	1.8 - 1.9	5.0	4	5 x 5
ARQSP2122-4-EVB	Engineering	Now Available	HPA	2.1 - 2.2	5.0	4	5 x 5
ARQSP2324-4-EVB	Engineering	Now Available	HPA	2.3 - 2.4	5.0	4	5 x 5
ARQSP3336-4-EVB	Engineering	Now Available	HPA	3.3 - 3.6	5.0	4	5 x 5
ARQSP4450-4-EVB	Engineering	Now Available	HPA	4.4 - 5.0	5.0	4	5 x 5

Driver Amplifiers

P/N	Status	EVB	Type	Frequency Range (GHz)	Supply Voltage (V)	OP1dB (dBm)	Package Size (mm²)
ARQSD1721-D2S-EVB	Engineering	Now Available	D2SE	1.7 - 2.1	3.3 - 5.0	19.0	2 x 2
ARQSD2328-D2S-EVB	Engineering	Now Available	D2SE	2.3 - 2.8	3.3 - 5.0	19.0	2 x 2
ARQSD3338-D2S-EVB	Engineering	Now Available	D2SE	3.3 - 3.8	3.3 - 5.0	18.0	2 x 2
ARQSD4450-D2S-EVB	Engineering	Now Available	D2SE	4.4 - 5.0	3.3 - 5.0	17.0	2 x 2
ARQSD1721-S2D-EVB	Engineering	Now Available	SE2D	1.7 - 2.1	3.3 - 5.0	17.5	2 x 2
ARQSD2328-S2D-EVB	Engineering	Now Available	SE2D	2.3 - 2.8	3.3 - 5.0	17.5	2 x 2
ARQSD3338-S2D-EVB	Engineering	Now Available	SE2D	3.3 - 3.8	3.3 - 5.0	17	2 x 2
ARQSD4450-S2D-EVB	Engineering	Now Available	SE2D	4.4 - 5.0	3.3 - 5.0	15.8	2 x 2

Rx Front-End Modules

P/N	Status	EVB	Type	Frequency Range (GHz)	Supply Voltage (V)	NF (dB)	Package Size (mm²)
ARQSF2442-RX-A-EVB	Engineering	Now Available	Dual Rx FEM	2.4 - 4.2	5.0	1.3	6 x 6
ARQSF3753-RX-A-EVB	Engineering	Now Available	Dual Rx FEM	3.7 - 5.3	5.0	1.45	6 x 6

Switches

P/N	Status	EVB	Type	Frequency Range (GHz)	Supply Voltage (V)	Insertion Loss (dB)	Package Size (mm²)
ARQSS1050-5T-EVB	Engineering	Now Available	SP5T Switch	1.0 - 5.0	3.0 - 6.0	< 0.7	4 x 4
ARQSS1050-4T-EVB	Engineering	Now Available	SP4T Switch	1.0 - 5.0	3.0 - 6.0	< 0.7	4 x 4

REV 1.0

iCana Ltd.

5F., No. 28-2, Baogao Road, Xindian District,
New Taipei City 231, Taiwan (ROC)

icana-rf.com

iCana 5G NR Bands Coverage

Power Amplifiers: High Efficiency DPD-Friendly

5G NR FR 1 Frequency Band	1	2	3	5	7	8	12	14	18	20	25	28	29	30	34	38	39	40	41	48	50	51	53	65	66	70	71	74	75	76	77	78	79	80	81	82	83	84	86	89	90	91	92	93	94	95	GHz
ARQSP1819-4			■														■																														1.8 - 1.9
ARQSP2122-4	■																																														2.1 - 2.2
ARQSP2324-4														■				■																													2.3 - 2.4
ARQSP3336-4																															■	■																3.3 - 3.6
ARQSP4450-4																																	■															4.4 - 5.0

Driver Amplifiers

5G NR FR 1 Frequency Band	1	2	3	5	7	8	12	14	18	20	25	28	29	30	34	38	39	40	41	48	50	51	53	65	66	70	71	74	75	76	77	78	79	80	81	82	83	84	86	89	90	91	92	93	94	95	GHz
ARQSD1721-D2S	■	■	■								■				■		■							■	■	■								■					■	■						■	1.7 - 2.1
ARQSD2328-D2S					■									■		■		■	■																							■						2.3 - 2.8
ARQSD3338-D2S																				■												■	■														3.3 - 3.8
ARQSD4450-D2S																																	■															4.4 - 5.0
ARQSD1721-S2D	■	■	■								■				■		■							■	■	■								■					■	■						■	1.7 - 2.1
ARQSD2328-S2D					■									■		■		■	■																							■						2.3 - 2.8
ARQSD3338-S2D																				■												■	■														3.3 - 3.8
ARQSD4450-S2D																																	■															4.4 - 5.0

Rx Front-End Modules

5G NR FR 1 Frequency Band	1	2	3	5	7	8	12	14	18	20	25	28	29	30	34	38	39	40	41	48	50	51	53	65	66	70	71	74	75	76	77	78	79	80	81	82	83	84	86	89	90	91	92	93	94	95	GHz
ARQSF2442-RX					■											■			■	■			■								■	■															2.4 - 4.2
ARQSF3753-RX																															■		■															3.7 -5.3

Switches

5G NR FR 1 Frequency Band	1	2	3	5	7	8	12	14	18	20	25	28	29	30	34	38	39	40	41	48	50	51	53	65	66	70	71	74	75	76	77	78	79	80	81	82	83	84	86	89	90	91	92	93	94	95	GHz
ARQSS1050-5T	■	■	■		■						■			■	■	■	■	■	■	■	■	■	■	■	■	■			■	■	■	■	■	■				■	■		■					■	1.0 - 5.0
ARQSS1050-4T	■	■	■		■						■			■	■	■	■	■	■	■	■	■	■	■	■	■			■	■	■	■	■	■				■	■		■					■	1.0 - 5.0

iCana Ltd.

5F., No. 28-2, Baogao Road, Xindian District,
New Taipei City 231, Taiwan (ROC)

icana-rf.com