

MACRO BTS PRODUCT OVERVIEW

Complete RF signal chain solution



Renesas is a leader in developing circuit-level RF innovations and a trusted supplier to the leading communications systems providers. Unlike other suppliers, Renesas continues to invest in Macro Base Transceiver Station (BTS) RF devices with unique circuit design innovation to support next-generation system development, which requires lower Noise Figures, higher linearity, lower power consumption and more integration for next-generation 4G architecture and rolling over to 5G applications.

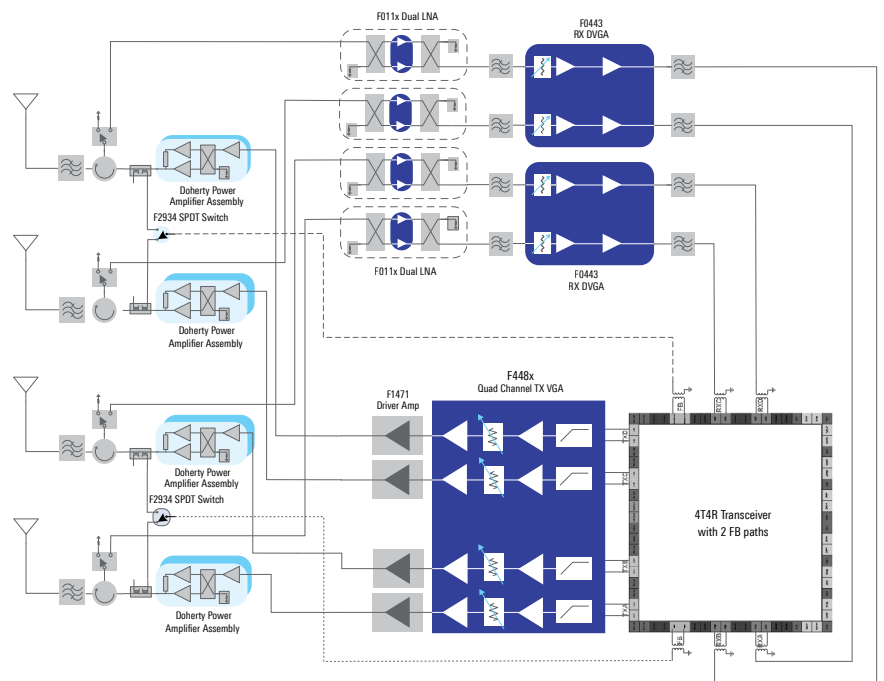
The Renesas portfolio delivers the high performance, high reliability, flexibility, and smaller form factor demanded by 5G Macro BTS systems. These devices perform well across a wide range of environmental conditions and frequency bandwidths, and integrate Renesas' Smart Silicon™ innovations, which enable smaller footprints for a given function, a key advantage for the large number of antenna paths required in each system.

Features

- Lower Noise Figures
- Higher linearity
- Lower power consumption
- Higher levels of integration

Advantages

- High isolation from channel to channel
- No glitches during switching gain
- Better return loss for both input and output
- Wide frequency range system support
- Current tuning to optimize balance between power consumption and performance
- Integration and flexibility simplify design to reduce time to market



Macro BTS System Diagram

RX CHAIN

Low Noise Amplifiers

Part Number	Frequency (GHz)	Gain (dB)	NF (dB)	OP1dB (dBm)	OIP3 (dBm)
F0109 ²	0.65 – 1	18	0.55 ³	24.5	41
F0110 ²	1.5 – 2.3	18.5	0.55 ³	22	39
F0111	2.3 to 2.7	18	0.7 ³	23	38

RF VGA

Part Number	Frequency (GHz)	# Ch	Att. Range (dB)	Att. Step (dB)	Gain (dB)	NF (dB)	OP1dB (dBm)
F0440	0.6 – 2.7	2	6, 23, 18	6, 1, 6	11.6	4.7	20.2
F0443	0.6 – 2.7	2	6, 6, 23, 18	6, 6, 1, 6	29.5	3.2	19.7
F0448	3.4 – 3.8	2	6, 23, 18	6, 1, 6	13	5.9	18
F0480	0.4 – 2.7	1	23	1	13	4	22.2
F1106	1.4 – 3	2	31.5	0.5	32	7.3	20
F1107	3 – 4	2	31.5	0.5	30.5	8.7	21

Amplifiers

Part Number	Frequency (GHz)	Gain (dB)	NF (dB)	OP1dB (dBm)	OIP3 (dBm)
F0424	0.6 – 5.0	17	2.3	21	40
F1420	0.7 – 1.1	17.4	4.5	23.2	42
F1421	1.7 – 2.2	20.3	5.5	23	40

Mixers

Part Number	Description	RF Freq. (GHz)	LO Freq. (GHz)	IF Freq. (GHz)	Gain (dB)	IP1dB (dBm)	OIP3 (dBm)
F1102	RF to IF Dual	0.4 – 1	0.5 – 1.15	0.05 – 0.3	9.2	12.5	43
F1152	RF to IF Dual	1.4 – 2.2	1.35 – 2.1	0.05 – 0.35	8.5	13.2	43
F1162	RF to IF Dual	2.3 – 2.7	1.8 – 2.9	0.05 – 0.5	8.9	13	43
F1178	RF to IF Dual	3.4 – 3.8	2.9 – 3.62	0.05 – 0.5	9	11	37.5
F1192B	Dual Wideband Gain—settable	0.4 – 3.8	0.4 – 3.6	0.05 – 0.6	11.1	7	35
F1701	RF to IF Single	0.6 – 1.06	0.63 – 1.26	0.07 – 0.3	11.8	10.2	43
F1751	RF to IF Single	1.4 – 2.5	1.4 – 2.5	0.05 – 0.5	11.8	9.7	43
F1763	RF to IF Single	2 – 2.9	1.8 – 3	0.05 – 0.5	11.7	10.2	42
F1792	Single Wideband Gain—settable	0.4 – 3.8	0.4 – 3.6	0.05 – 0.6	11.1	7	35

IF VGA

Part Number	Frequency (GHz)	# Ch	Att. Range (dB)	Att. Step (dB)	Gain (dB)	NF (dB)	OP1dB (dBm)	OIP3 (dBm)
F1200	0.05 – 0.16	1	23	0.25	21.7	2.6	19.4	48
F1240	0.01 – 0.5	2	31.5	0.5	20	4	19.7	47

Multi-Function AFE

Part Number	Description	Frequency (GHz)	Gain (dB)	OP1dB (dBm)	OIP3 (dBm)
F0502	Dual Path Rx IC	0.6 – 1.0	28.2	20.2	44
F0552	Dual Path Rx IC	1.7 – 2.0	28	19.5	46
F0562	Dual Path Rx IC	2.3 – 2.7	29	19.8	44
F1130	RF to IF Dual	0.4 – 1.1	9.0	19	43
F1180	RF to IF Dual	1.4 – 2.7	8.2	17.5	38

TX CHAIN

Amplifiers

Part Number	Frequency (GHz)	Input	Output	Gain (dB)	NF (dB)	OP1dB (dBm)	OIP3 (dBm)
F1423	0.6 – 3.0	50Ω DIFF	50Ω SE	13.1	5.1	21.5	41.8
F1471	0.4 – 4.2	50Ω SE	50Ω SE	17	4.3	28.5	39
F1475					5	30	–
F1490	1.8 – 5	50Ω SE	50Ω SE	39.5 / 35.5 ¹	2.5	24	38
F1495					5	30	–

VGA

Part Number	Frequency (GHz)	# Ch	Att. Range (dB)	Att. Step (dB)	Gain (dB)	NF (dB)	OP1dB (dBm)	OIP3 (dBm)
F1451	0.45 – 1.1	1	29.5	0.5	32	3.6	23	41
F1455	1.4 – 2.3	1	29.5	0.5	32.8	3.9	23	38.5
F1456	2.1 – 2.95	1	31.5	0.5	32.1	3.9	21.5	38
F4481	0.4 – 1.1	4	31.5	0.5	28	5.7	17	35
F4482	1.3 – 2.8	4	31.5	0.5	27.5	5.7	16.7	36.8
F1431B	0.35 – 3	1	23	0.5	14.3	4.2	23.3	41.1

Modulator

Part Number	Description	RF Freq. (GHz)	LO Freq. (GHz)	BB Freq. (GHz)	Gain (dB)	OP1dB (dBm)	OIP3 (dBm)
F1653	ZIF / CIF	0.6 – 2.9	0.6 – 2.9	0 – 0.6	3	15	36

Integrated TX Solution

Part Number	Description	Frequency (GHz)	Gain (dB)	OP1dB(dBm)	OIP3 (dBm)
F159V	Dual Path Tx IC	0.45 – 2.8	18.3	14	31

DPD

Down Converters

Part Number	Description	RF Freq. (GHz)	LO Freq. (GHz)	IF Freq. (GHz)	Gain (dB)	IP1dB (dBm)	OIP3 (dBm)
F1701	RF to IF Single	0.6 – 1.06	0.63 – 1.26	0.07 – 0.3	11.8	10.2	43
F1751	RF to IF Single	1.4 – 2.5	1.4 – 2.5	0.05 – 0.5	11.8	9.7	43
F1763	RF to IF Single	2 – 2.9	1.8 – 3	0.05 – 0.5	11.7	10.2	42

Demodulators

Part Number	Description	RF Freq. (GHz)	LO Freq. (GHz)	IF Freq. (GHz)	Gain (dB)	Max Att. (dB)	OIP3 (dBm)
F1320	DPD for PA Linearization	0.55 – 1.15	0.5 – 1.3	0.02 – 0.035	12.5	25.5	43
F1350	DPD for PA Linearization	1.30 – 2.90	1.40 – 2.90	0.02 – 0.500	12.5	25.5	41
F1358	DPD for PA Linearization	3.2 – 4	3.1 – 3.8	0.02 – 0.5	10.2	25.5	41

SWITCHES

Part Number	Description	Frequency (GHz)	Type	IL (dB)	IP0.1dB (dBm)	IP1dB (dBm)	IIP3 (dBm)
F2910	SPST	0.03 – 8	Absorptive	0.55	34	35	67
F2912	SPDT	0.000009 – 9	Absorptive	0.4	–	30	66
F2913	SPDT	0.05 – 6	Absorptive	0.79	–	36	65
F2932	SPDT	0.05 – 8	Absorptive	0.79	32.3	36.5	64
F2933	SPDT	0.05 – 8	Absorptive	0.79	32.3	36.5	64
F2934	SPDT	0.05 – 8	Absorptive	0.79	32.3	36.5	64
F2914	SP4T	0.05 – 8	Absorptive	1.1	35	–	60
F2915	SP5T	0.05 – 8	Absorptive	1.1	35	36.5	60.5

DIGITAL STEP ATTENUATORS

Part Number	Description	Frequency (GHz)	Max Att. (dB)	Resolution (dB)	IL (dB)	IP0.1dB (dBm)	IIP3 (dBm)
F1912	6-bit	0.001 – 4	31.5	0.5	1.4	31	60
F1950	7-bit	0.15 – 4	31.75	0.25	1.3	27.5	63
F1951	6-bit	0.1 – 5	31.5	0.5	1.2	29	64
F1953	6-bit	0.4 – 4	31.5	0.5	1.4	28.5	66
F1956	7-bit	0.001 – 6	31.75	0.25	1.6	34.5	64
F1958	7-bit	0.001 – 6	31.75	0.25	1.6	35	64

¹ Dual gain modes (high gain and low gain settings)

² Dual path amplifiers specified in a balanced configuration

³ De-embedded to input pin of input hybrid couple

Visit [renesas.com/macrobits](https://www.renesas.com/macrobits) for more details on the complete portfolio of Macro BTS products, including datasheets, evaluation boards and samples.



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