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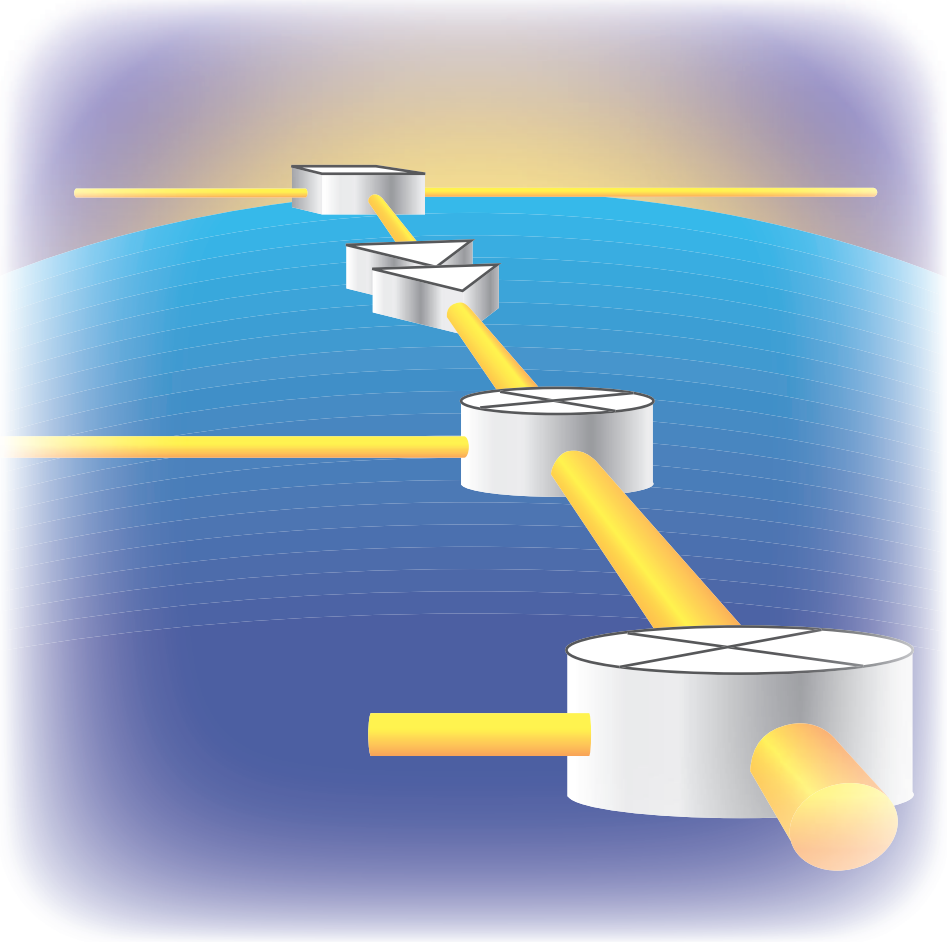
RF AND MICROWAVE DEVICES SYSTEM BLOCK DIAGRAMS



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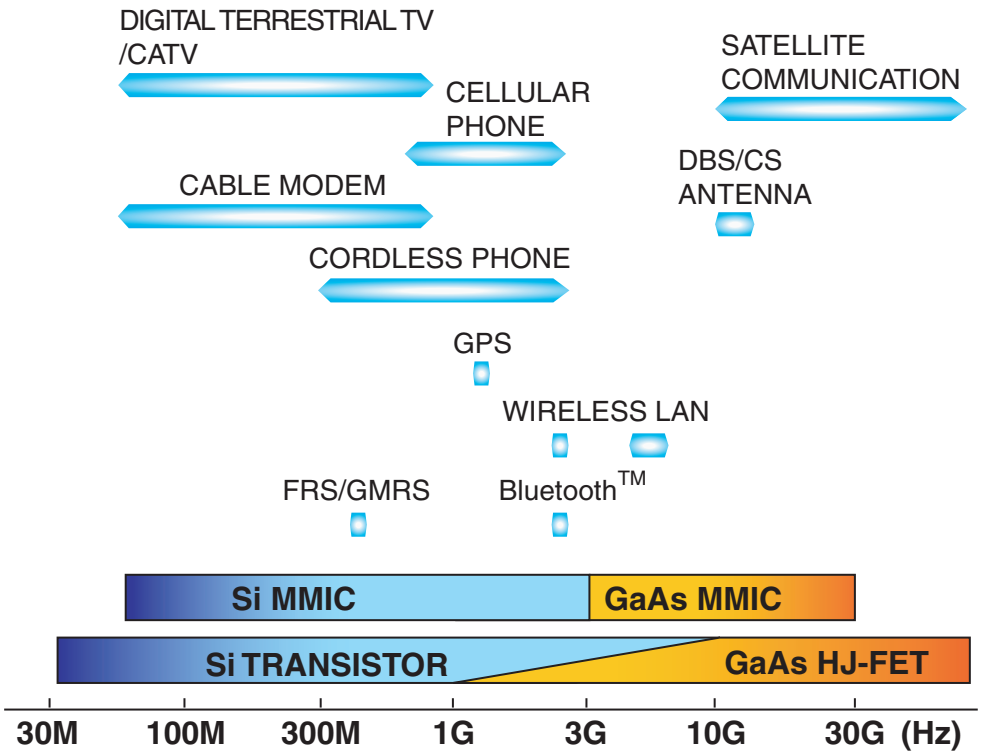
CONTENTS

1. INTRODUCTION

The Microwave Devices are used for each system as shown in Figure 1. This catalog explains the Microwave devices by each Microwave block diagram for the application system.

The basic block diagram is indicated to Figure 2.

Figure 1 Example of the Microwave application systems



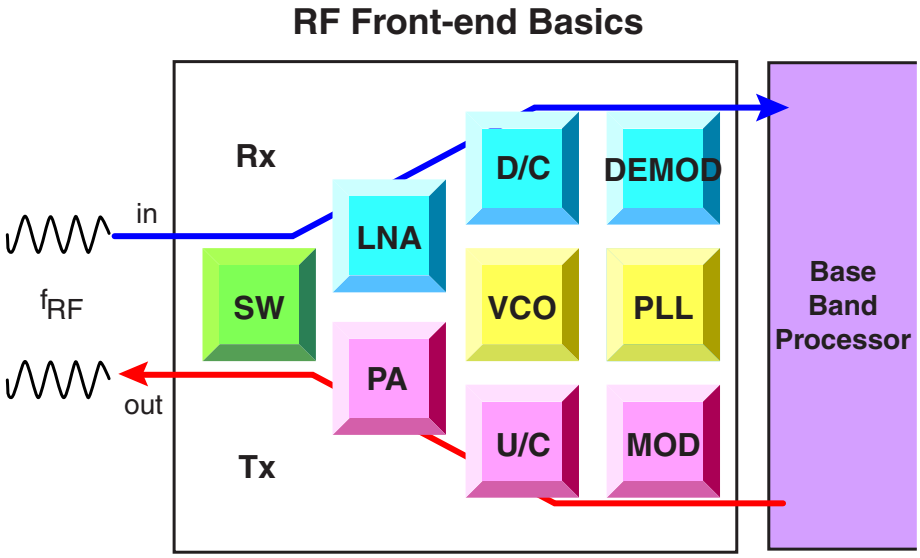
The mark <R> shows major revised points.

The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

1-1. Basic RF Blocks

The basic RF block consists of nine function blocks as shown in the next figure.

Figure 2 Microwave Basic Blocks



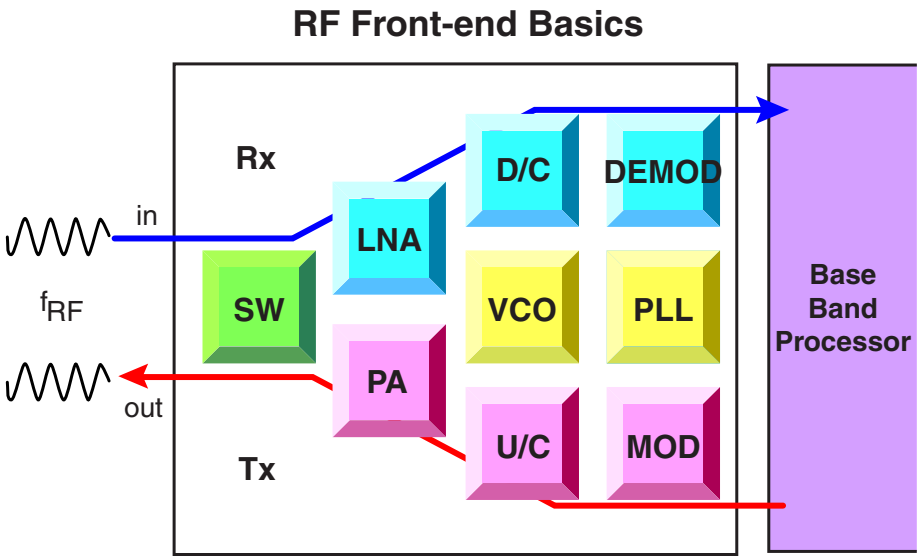
1. SW (Switch)
2. LNA (Low Noise Amplifier)
3. PA (Power Amplifier)
4. D/C (Down-converter)
5. VCO (Voltage Controlled Oscillator)
6. U/C (Up-converter)
7. DEMOD (Demodulator)
8. PLL (Phase Locked Loop)
9. MOD (Modulator)

The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

2. EXPLANATION OF THE RF AND MICROWAVE DEVICES

Explain the devices by the microwave block diagram for following application systems.

2-1. Mobile Communication System
Digital Cellular Phone

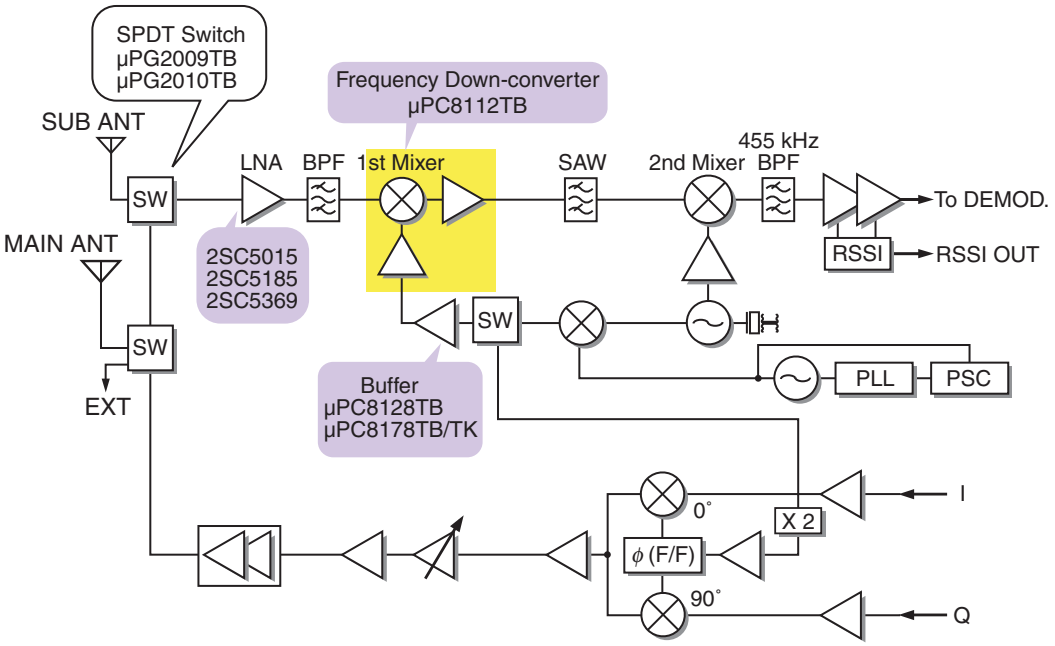


Recommended device list

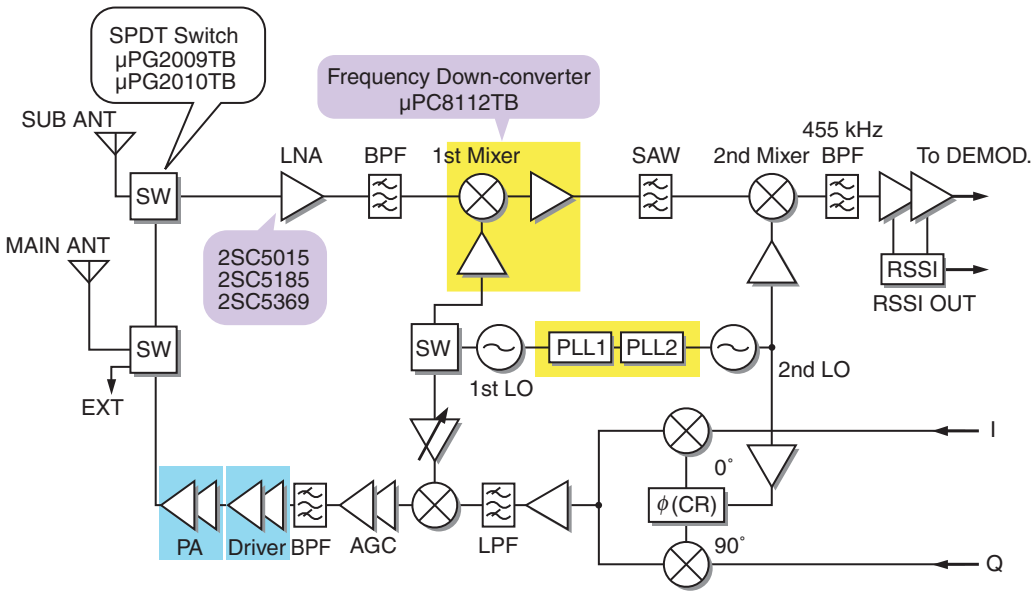
Block	Function	Type Name	Feature
LNA	Discrete Tr.	2SC5015(NE68518)	Si Bipolar Tr. (f_T = 12 GHz)
		2SC5185(NE68718) etc.	Si Bipolar Tr. (f_T = 15.5 GHz)
		2SC5369(NE696M01)	Si Bipolar Tr. (f_T = 14 GHz)
D/C	Down-converter	µPC8112TB	6-pin Super Minimold
DEMOD	2nd Mixer + RSSI	–	–
PLL	Dual PLL	–	–
<R> VCO	Oscillator + Buffer	µPA8xx Series	Twin Tr.
	Buffer	µPC8128TB µPC8178TB/TK	Low Current Consumption
U/C + MOD	I/Q Modulator	–	–
SW	SPDT SW	µPG2009TB µPG2010TB	GaAs SW IC, 6-pin Super Minimold

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

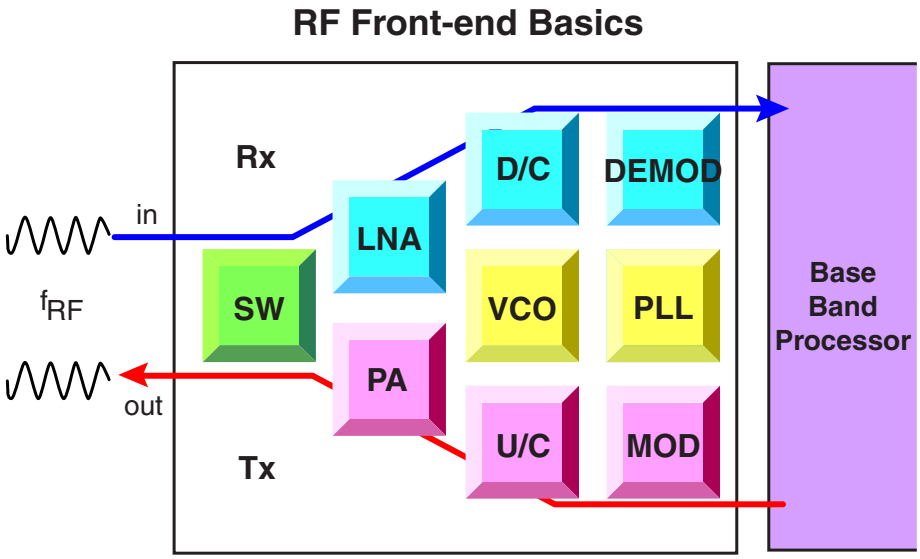
System configuration example 1
Digital Cellular Phone
(RF Modulation System)



System configuration example 2
Digital Cellular Phone
(IF Modulation System)



W-CDMA

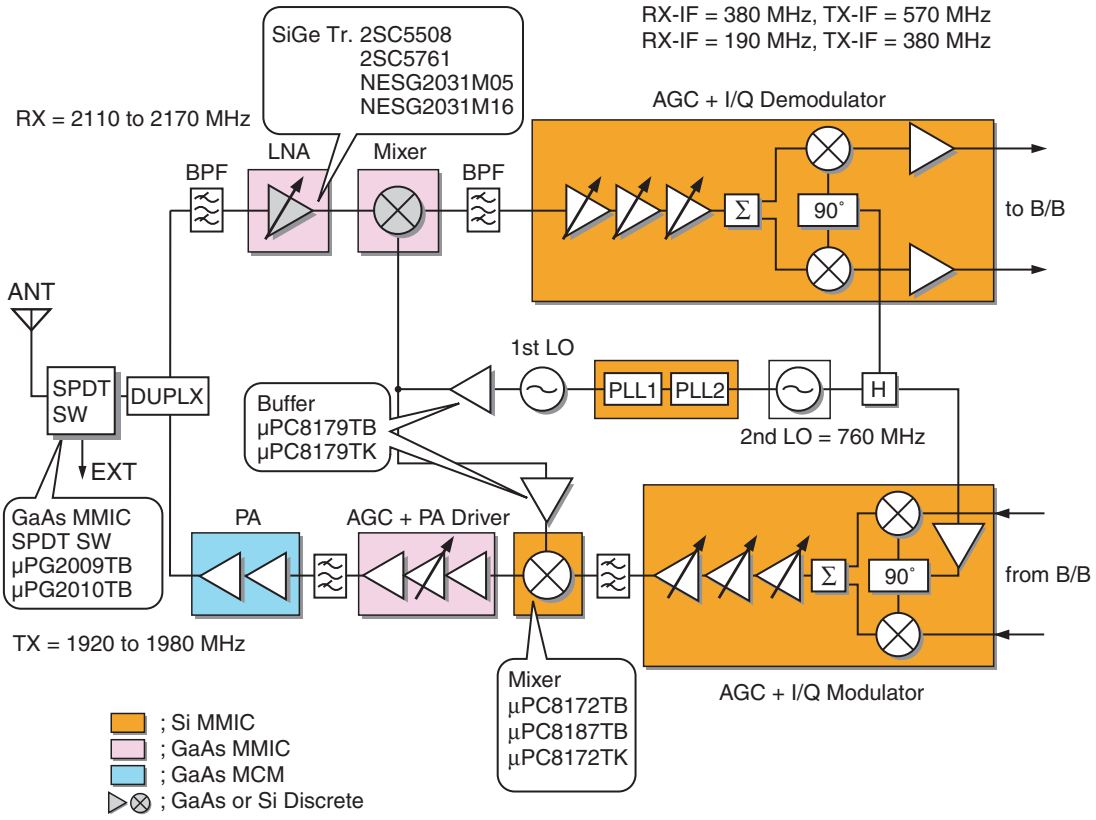


Recommended device list

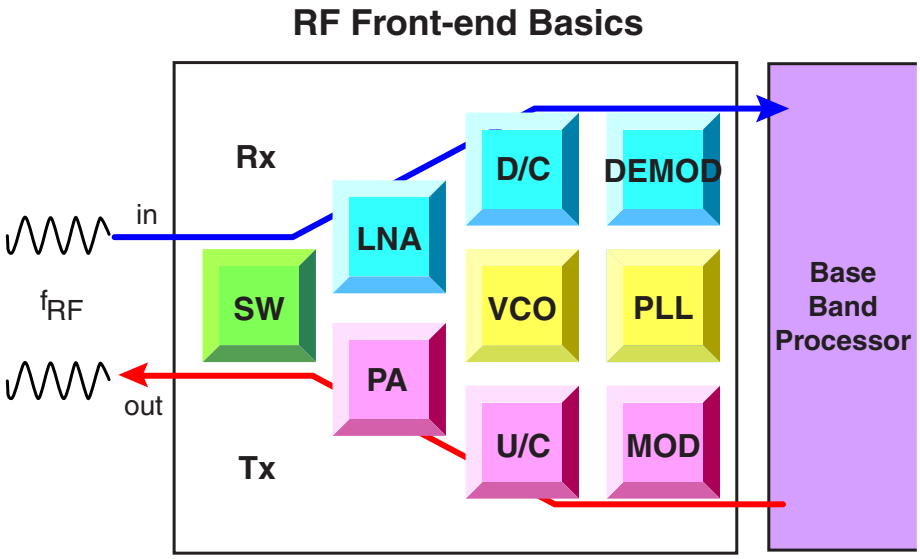
Block	Function	Type Name	Feature
LNA	Discrete Tr.	2SC5508(NE662M04)	Si Bipolar Tr. (f_T = 25 GHz)
		2SC5761(NESG2030M04) NESG2031M05 NESG2031M16	SiGe HBT
D/C	Down-converter	–	–
DEMOD	IF AGC + I/Q Demodulator	–	–
PLL	Dual PLL	–	–
<R> VCO	Oscillator + Buffer	µPA8xx Series	Twin Tr.
	Buffer	µPC8179TB µPC8179TK	–
U/C	Up-converter	µPC8172TB µPC8187TB	6-pin Super Minimold
		µPC8172TK	6-pin Lead-less Minimold (1511)
MOD	IF AGC + I/Q Modulator	–	–
SW	SPDT SW	µPG2009TB, µPG2010TB	GaAs SW IC, 6-pin Super Minimold

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

System configuration example
W-CDMA transceiver



N-CDMA

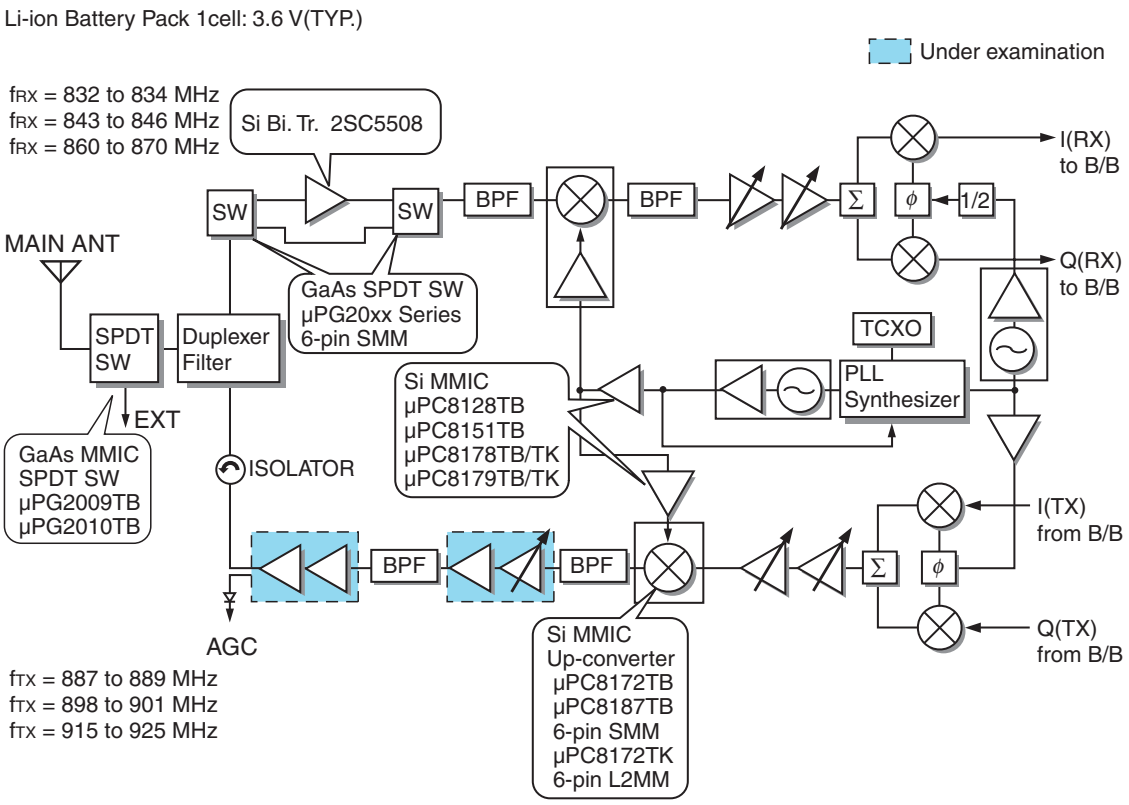


Recommended device list

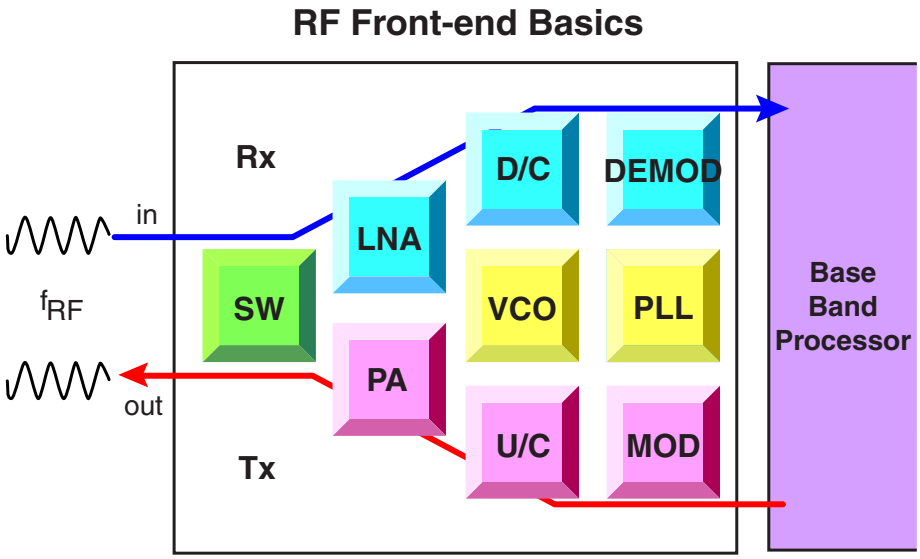
Block	Function	Type Name	Feature
LNA	Discrete Tr.	2SC5508(NE662M04)	Si Bipolar Tr. (f_T = 25 GHz)
D/C	Down-converter	–	–
DEMOD	IF AGC + I/Q Demodulator	–	–
PLL	Dual PLL	–	–
<R> VCO	Oscillator + Buffer	µPA8xx Series	Twin Tr.
	Buffer	µPC8128TB µPC8151TB µPC8178TB/TK µPC8179TB/TK	–
U/C + MOD	Up-converter	µPC8172TB µPC8187TB	6-pin Super Minimold
		µPC8172TK	6-pin Lead-less Minimold (1511)
PA	–	–	–
SW	SPDT SW	µPG2009TB µPG2010TB	GaAs SW IC
	SP3T SW	µPG2031TQ µPG2404T6Q	GaAs SW IC

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

System configuration example
N-CDMA transceiver



PHS (Digital Cordless Phone)



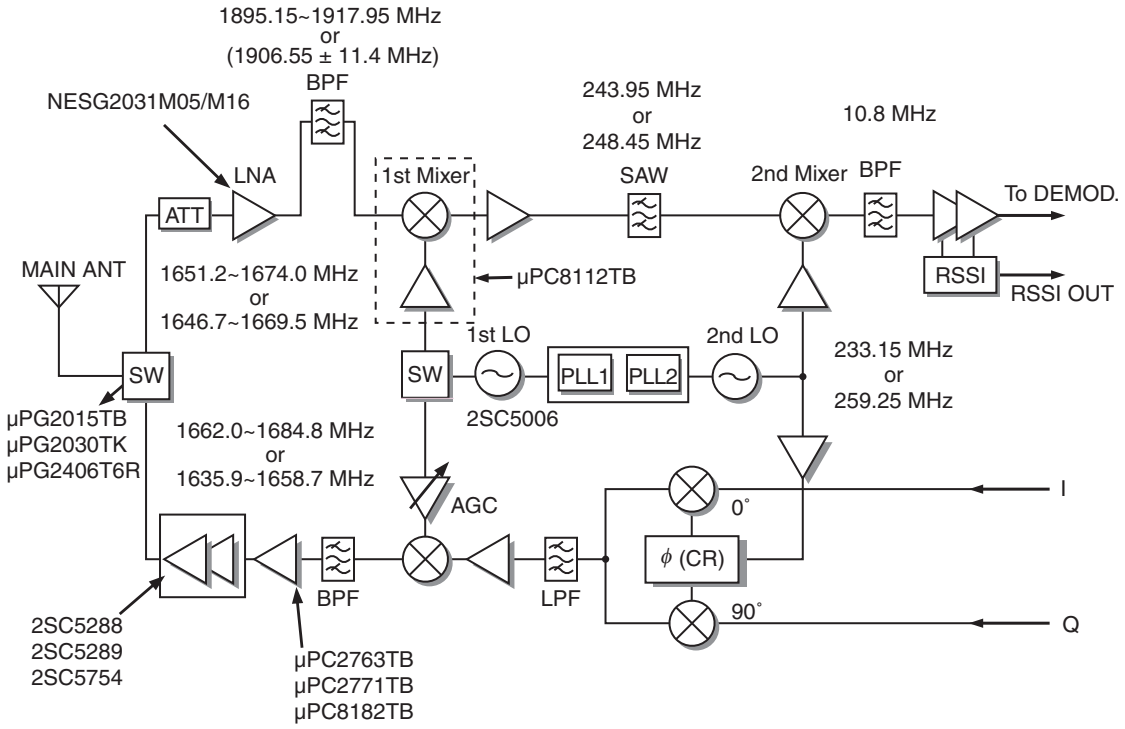
<R> **Recommended device list**

Block	Function	Type Name	Feature
LNA	SiGe HBT	NESG2031M05/M16	High Gain, Low Noise
D/C	Down-converter	µPC8112TB	6-pin Super Minimold
LNA + D/C	LNA + Down-converter	–	–
DEMOD	IF D/C + RSSI	–	–
PLL	Dual PLL Synthesizer	–	–
VCO	Oscillator + Buffer	µPA8xx Series	Twin Tr.
MOD + U/C	I/Q Modulator + Up-converter	–	–
U/C	Up-converter	µPC8106TB	6-pin Super Minimold
PA	Discrete Tr.	2SC5288(NE68939) 2SC5289(NE69039) 2SC5754(NE644M04)	Medium Output Power Use Tr.
SW	SPDT SW	µPG2015TB	GaAs SW IC, 6-pin Super Minimold
		µPG2030TK	GaAs SW IC, 6-pin Lead-less Minimold (1511)
		µPG2406T6R	GaAs SW IC, 6-pin TSSON (1010)

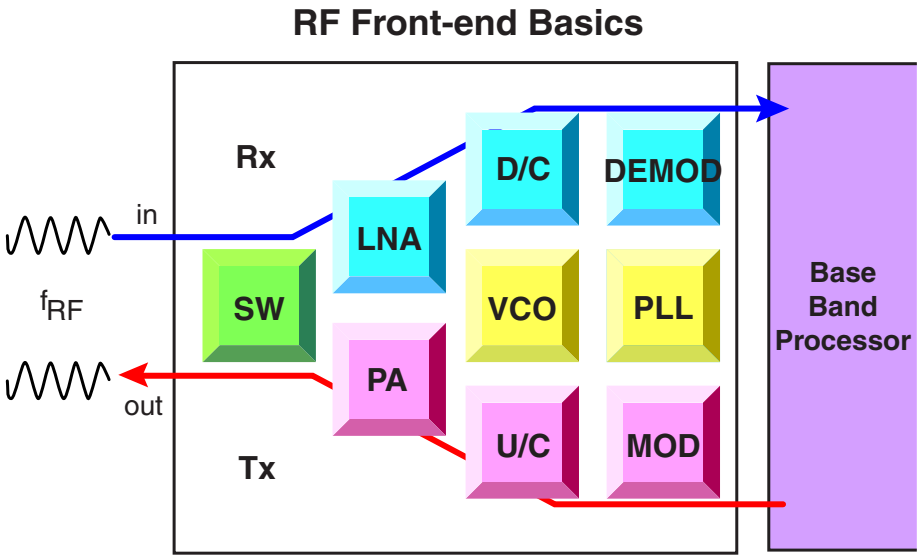
Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

System configuration example

<R> **PHS (Digital Cordless Phone)**



DECT (Digital Cordless Phone)

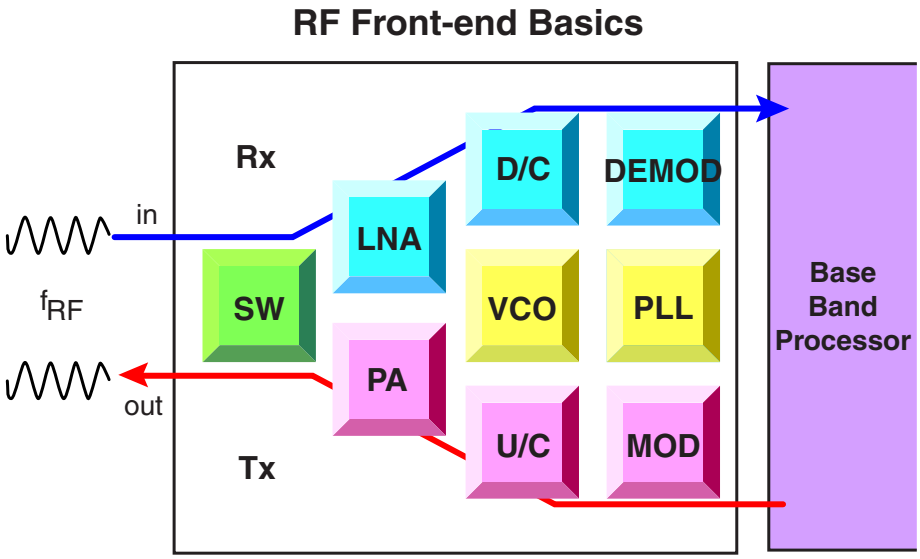


<R> **Recommended device list**

Block	Function	Type Name	Feature
LNA	Discrete Tr.	2SC5369(NE696M01)	High f_T, Low Noise
	HJ-FET	NE3509M04	Low Noise GaAs FET
D/C	Down-converter	µPC2756TB µPC2757TB µPC2758TB µPC8112TB	6-pin Super Minimold
DEMOD	IF D/C + RSSI	–	–
PLL	Dual PLL Synthesizer	–	–
VCO	Oscillator + Buffer	µPA8xx Series	Twin Tr.
MOD (OSC)	Oscillator + Buffer	µPA8xx Series	Twin Tr.
U/C	Up-converter	µPC8106TB	6-pin Super Minimold
PA	Discrete Tr.	2SC5288(NE68939) 2SC5289(NE69039) 2SC5754(NE664M04)	Medium Output Power Use Tr.
SW	SPDT SW	µPG2179TB	GaAs SW IC, 6-pin Super Minimold
		µPG2030TK	GaAs SW IC, 6-pin Lead-less Minimold (1511)
		µPG2406T6R	GaAs SW IC, 6-pin TSSON (1010)

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

CT-2 (Digital Cordless Phone)

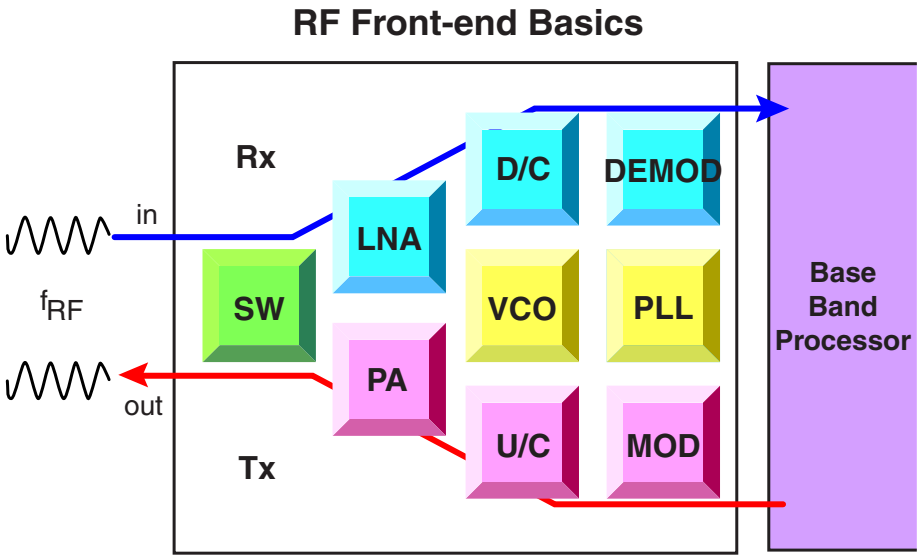


Recommended device list

Block	Function	Type Name	Feature
LNA	Discrete Tr.	2SC5369(NE696M01)	High f_T, Low Noise
	Low Noise Amplifier	µPC2749TB	Low Noise
D/C	Down-converter	µPC8112TB	6-pin Super Minimold
DEMOD	–	–	–
PLL	PLL	–	–
<R> VCO	Oscillator + Buffer	µPA8xx Series	Twin Tr.
	Buffer	µPC8151TB µPC8179TB	Low Current Consumption
MOD	I/Q Modulator	–	–
U/C	Up-converter	µPC8106TB	6-pin Super Minimold
PA	Medium Output Power Amplifier	µPC2762TB µPC2763TB µPC2771TB µPC8182TB	6-pin Super Minimold
SW	SPDT SW	µPG2009TB µPG2010TB	GaAs SW IC, 6-pin Super Minimold

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

GSM (Digital Cellular Phone)

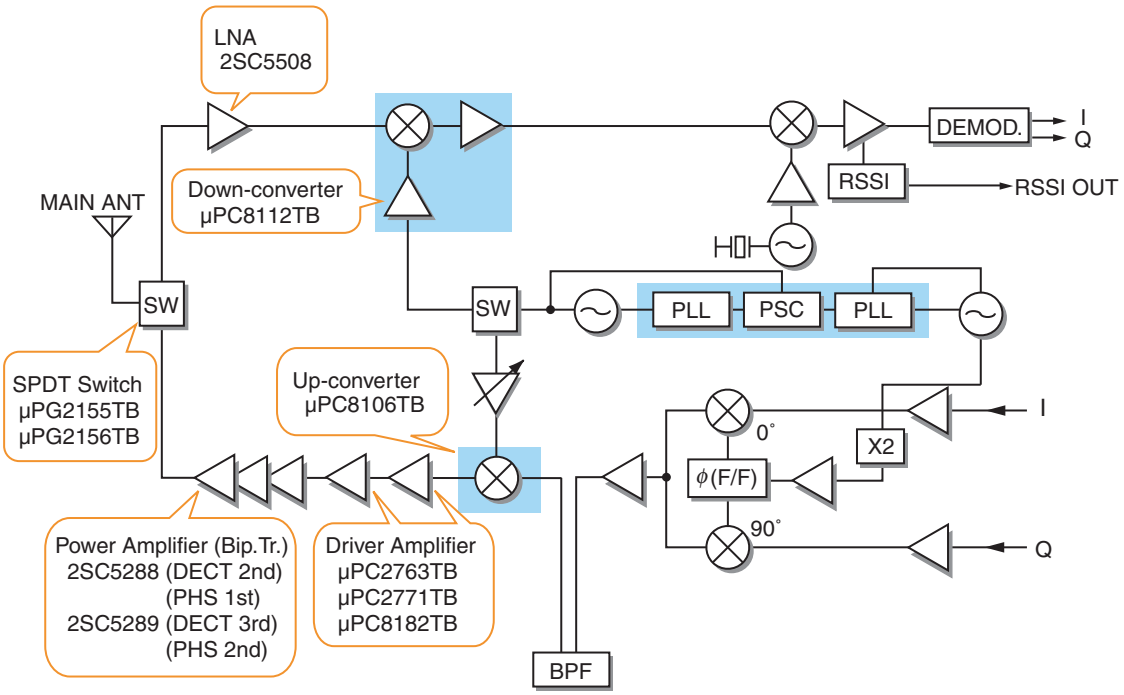


Recommended device list

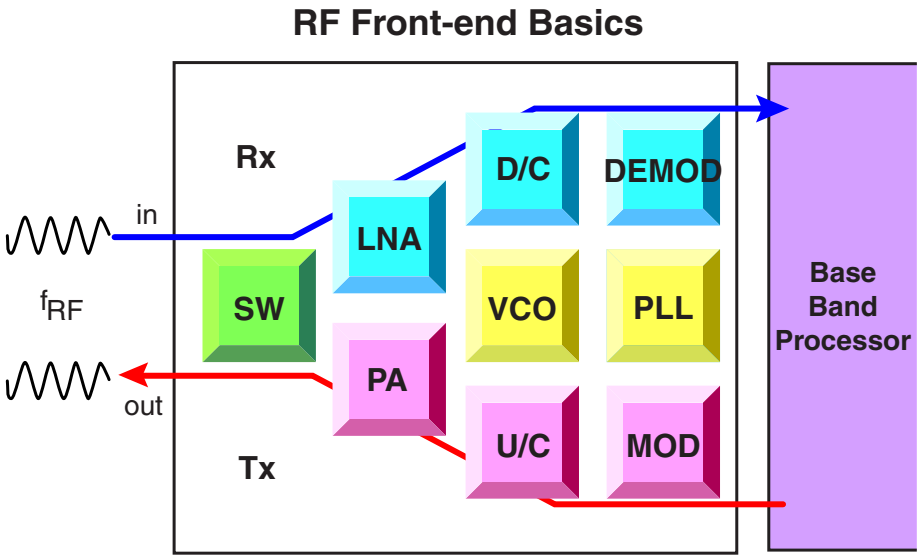
Block	Function	Type Name	Feature
LNA	Discrete Tr.	2SC5508(NE662M04)	f_T = 25 GHz Tr.
D/C	Down-converter	µPC8112TB	6-pin Super Minimold
DEMOD	I/Q Demodulator	–	–
PLL	Dual PLL	–	–
<R> VCO	Oscillator + Buffer	µPA8xx Series	Twin Tr.
MOD + U/C	I/Q Modulator	–	–
U/C	Up-converter	µPC8106TB	6-pin Super Minimold
PA	Driver Amplifier	µPC2763TB µPC2771TB µPC8182TB	6-pin Super Minimold
	Discrete Tr.	2SC5288(NE68939) 2SC5289(NE69039) NE5510279A NE5520379A	Medium Output Power Use Tr.
SW	SPDT SW	µPG2155TB µPG2156TB	6-pin Super Minimold

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

System configuration example
GSM (Digital Cellular Phone)
(IF Modulation System)



5.8 GHz Digital Cordless Phone

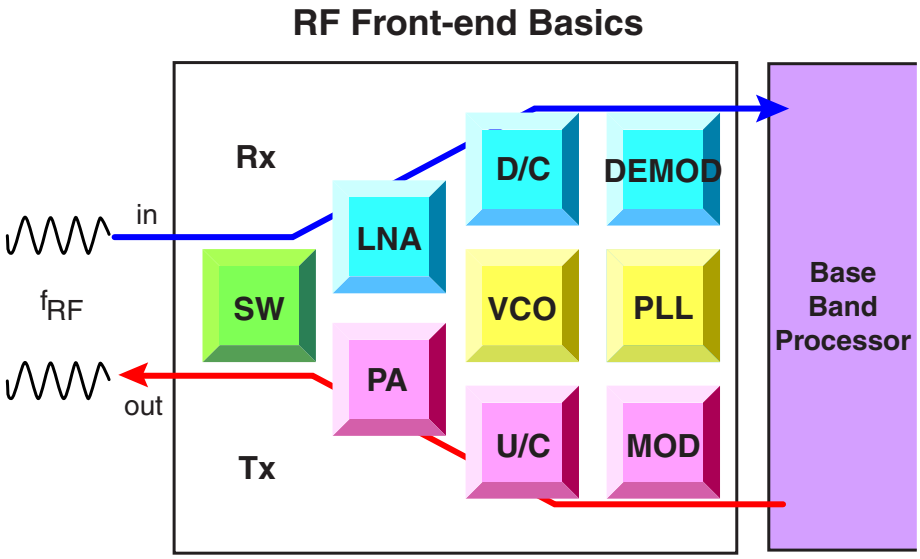


Recommended device list

Block	Function	Type Name	Feature
LNA	Discrete Tr.	2SC5507 2SC5508	Si Bipolar Tr. (f_T = 25 GHz)
		NESG2021M05/M16 NESG2031M05/M16 NESG3031M05/M14 NESG4030M14	SiGe HBT
PA	Discrete Tr.	NESG2101M05/M16	SiGe HBT
	PA + Driver	μPA901TU	SiGe HBT

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

900 MHz Cordless Phone (Analog Cordless Phone)



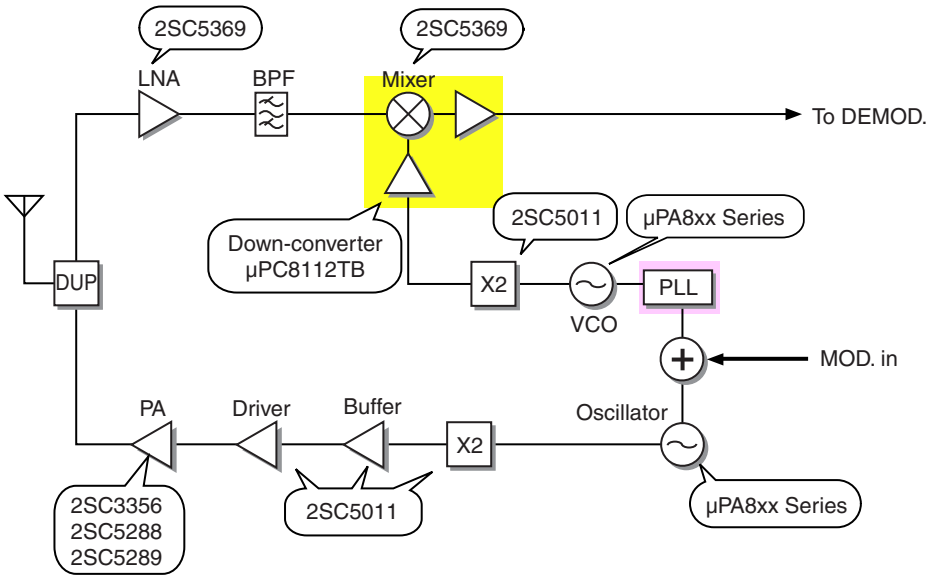
Recommended device list

	Block	Function	Type Name	Feature
	LNA	Discrete Tr.	2SC4095(NE68039E) 2SC5369(NE696M01) 2SC5507(NE661M04)	High f_T, Low Noise
	D/C	Down-converter	μPC8112TB	6-pin Super Minimold
<R>		Discrete Tr.	μPA8xx Series	Twin Tr. with Different Dice
	PLL	PLL	–	–
<R>	VCO	Oscillator + Buffer	μPA8xx Series	Twin Tr. with Different Dice
		Discrete Tr. (Doubler)	2SC5011(NE85618) etc.	f_T = 7 GHz
		Buffer	μPC8151TB μPC8179TB	Low Current Consumption
<R>	MOD	Oscillator	μPA8xx Series	Twin Tr. with Different Dice
	U/C	Discrete Tr. (Doubler)	2SC5011(NE85618) etc.	f_T = 7 GHz
	PA	Discrete Tr.	2SC3356(NE85633) etc.	f_T = 7 GHz
			2SC5288(NE68939) 2SC5289(NE69039)	Medium Output Power Use Tr.
<R>			μPA8xx Series	Twin Tr. with Different Dice
	SW	Duplexer	–	–

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

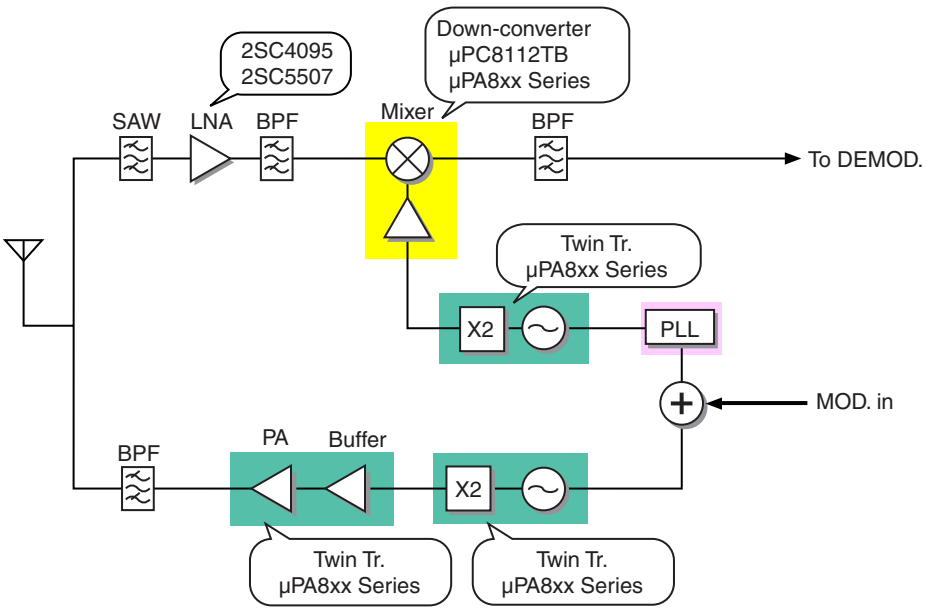
System configuration example 1

<R> **900 MHz Cordless Phone (Analog Cordless Phone)**

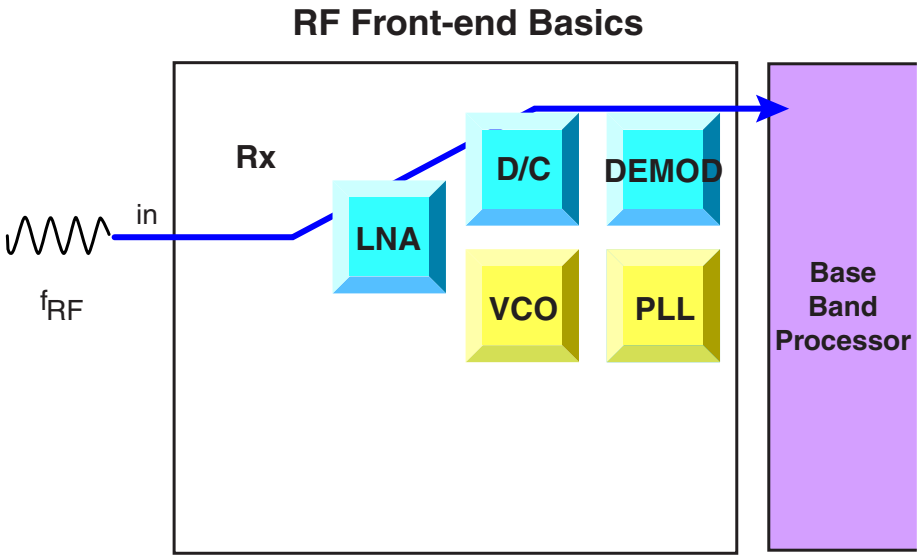


System configuration example 2

<R> **900 MHz Cordless Phone (Analog Cordless Phone)**



2-2. Multimedia System
Digital TV Tuner / Digital CATV Set-top-box



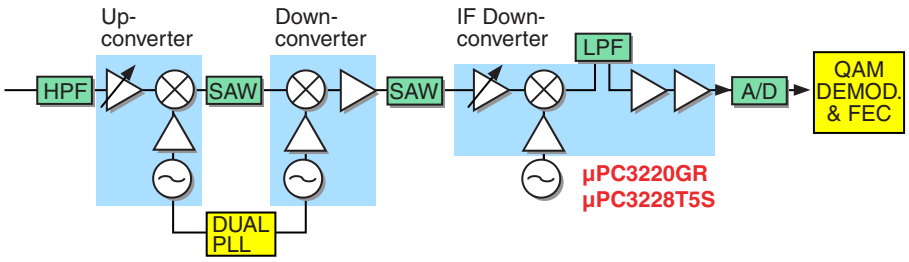
<R> **Recommended device list**

Block	Function	Type Name	Feature
LNA	Discrete Tr.	2SC3357(NE85634) 2SC4536(NE46134) 2SC4703(NE46234) 2SC5336(NE856M02) 2SC5337(NE461M02) 2SC5338(NE462M02)	Si Tr. Suitable for more than 5-6 V operation Low Distortion, Low Noise
		2SC5754(NE664M04)	Si Tr. Suitable for less than 5-6 V operation Low Distortion, Low Noise
		NESG2101M05/M16 NESG210719 NESG210833 NESG220033/34 NESG240033/34	SiGe HBT Suitable for less than 5-6 V operation Low Distortion, Low Noise
	MMIC	µPC2748TB	Si MMIC, Low Noise
		µPC3237TK	SiGe MMIC, Low Noise
		µPD5740T6N	MMIC with pass-through function, Low Noise
DEMOD	AGC Amplifier + Video Amplifier	µPC3217GV	Middle-gain Type
		µPC3218GV	High-gain Type
		µPC3219GV, µPC3221GV µPC3231GV	Low-gain, High-linearity Type
		µPC3234GV	High-gain, Low Noise Type
D/C + AGC	IF Down-converter	µPC3220GR	High-gain
		µPC3228T5S	Low Distortion

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

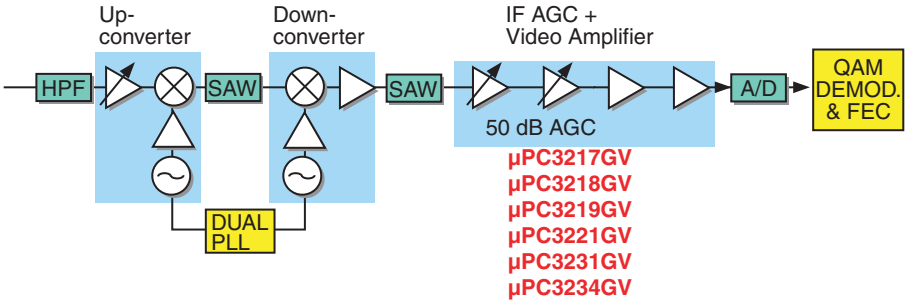
System configuration example 1

Example of receiver block for digital CATV Set-top-box

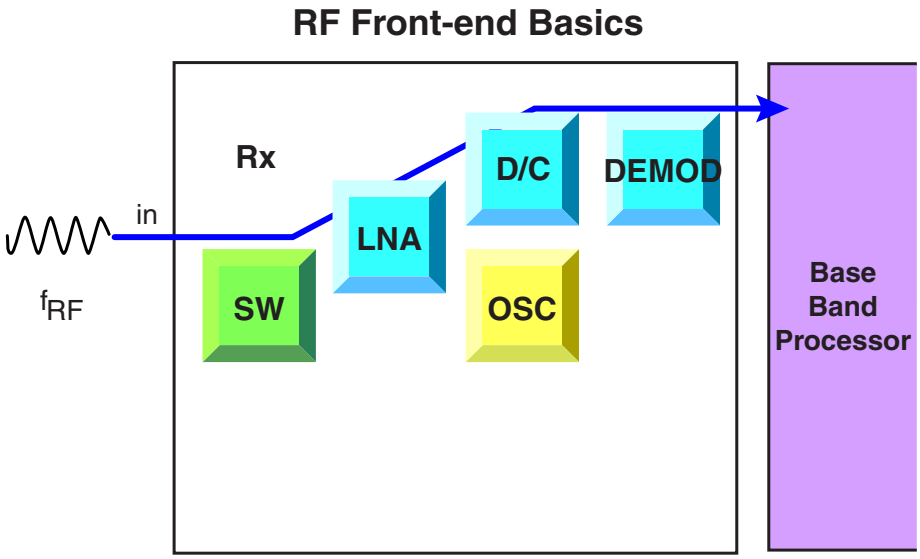


System configuration example 2

<R> **Example of receiver block for digital CATV Set-top-box**



Digital DBS (Satellite Broadcasting)

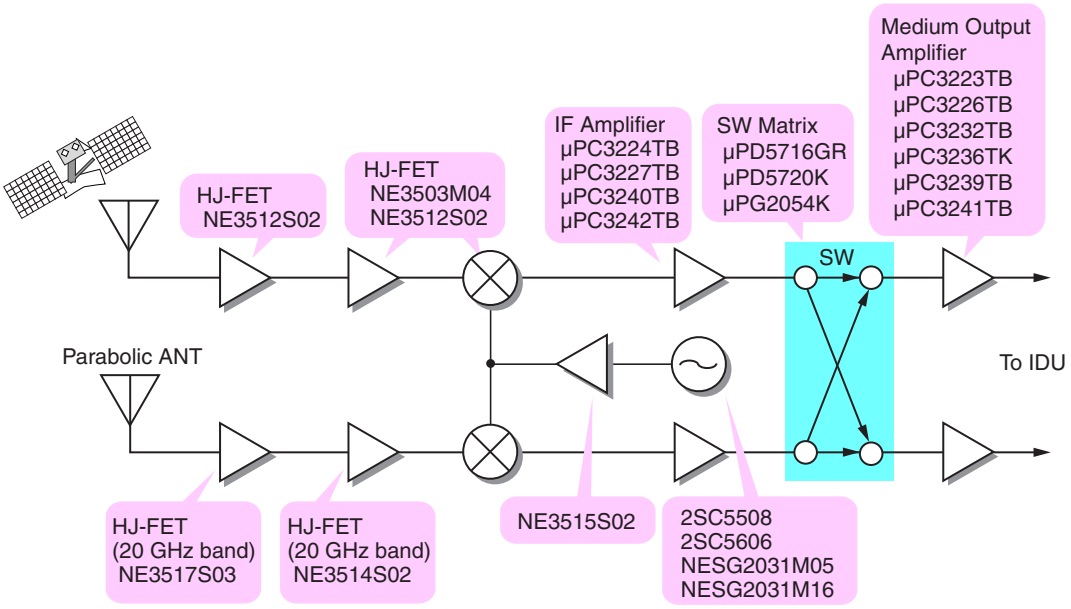


Recommended device list

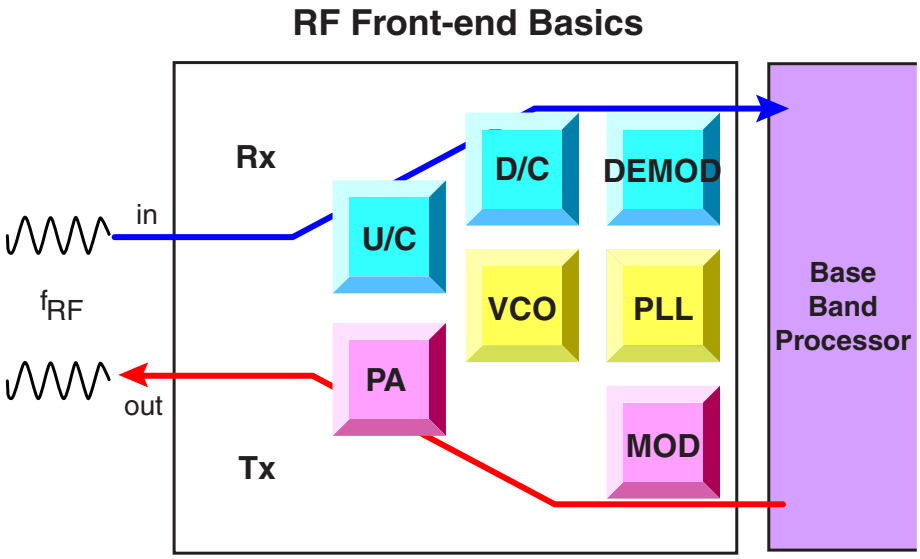
Block	Function	Type Name	Feature
LNA	LNA	HJ-FET Series	GaAs HJ-FET Series for X, Ku-band, 20 GHz band
	IF Amplifier	μPC3224TB	G_P = 21.5 dB, $P_{O\ (1\ dB)}$ = –5.5 dBm
		μPC3227TB	G_P = 22.0 dB, $P_{O\ (1\ dB)}$ = –8.0 dBm
		μPC3240TB	G_P = 25.0 dB, $P_{O\ (1\ dB)}$ = –4.0 dBm (3.3 V)
		μPC3242TB	G_P = 22.0 dB, $P_{O\ (1\ dB)}$ = –9.5 dBm (3.3 V)
	Medium Output Power Amplifier	μPC3223TB	G_P = 23.0 dB, $P_{O\ (1\ dB)}$ = +5.0 dBm
		μPC3226TB	G_P = 26.0 dB, $P_{O\ (1\ dB)}$ = +5.7 dBm
		μPC3232TB	G_P = 33.5 dB, $P_{O\ (1\ dB)}$ = +8.5 dBm
		μPC3236TK	G_P = 38.0 dB, $P_{O\ (1\ dB)}$ = +7.5 dBm
		μPC3239TB	G_P = 25.0 dB, $P_{O\ (1\ dB)}$ = +8.0 dBm (3.3 V)
		μPC3241TB	G_P = 24.0 dB, $P_{O\ (1\ dB)}$ = +6.0 dBm (3.3 V)
OSC	DRO	2SC5508(NE662M04) 2SC5606(NE66219) NESG2031M05/M16	Low Phase Noise
	Buffer	NE3515S02	$P_{O\ (1\ dB)}$ = +14 dBm
SW	Switch Matrix	μPD5716GR	ISL D/U Ratio = 29 dB
		μPD5720K	ISL D/U Ratio = 34 dB
		μPG2054K	ISL D/U Ratio = 40 dB

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

System configuration example
Digital DBS (Satellite Broadcasting)



Cable Modem



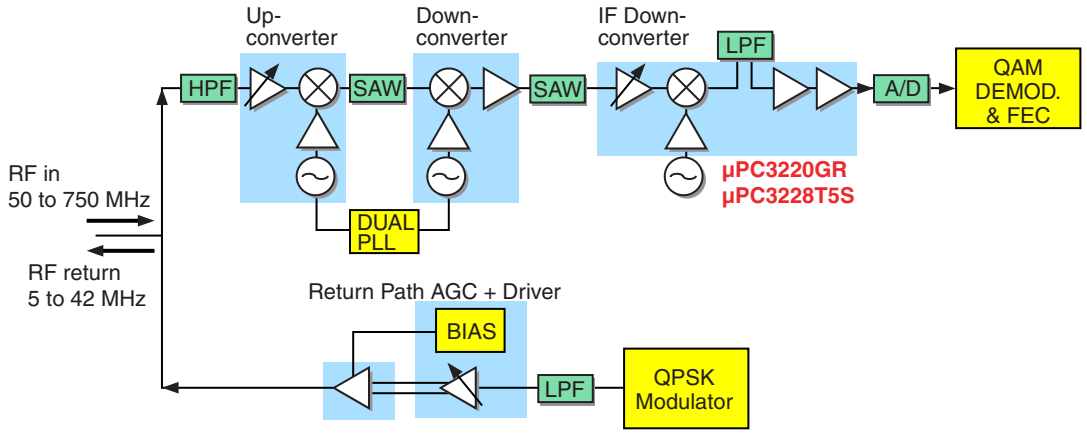
<R> **Recommended device list**

Block	Function	Type Name	Feature
U/C + VCO	U/C + VCO	–	–
D/C + VCO	D/C + VCO	–	–
DEMOD	AGC Amplifier + Video Amplifier	µPC3217GV	Middle-gain Type
		µPC3218GV	High-gain Type
		µPC3219GV µPC3221GV µPC3231GV	Low-gain, High-linearity Type
		µPC3234GV	High-gain, Low Noise Type
D/C + AGC	IF Down-converter	µPC3220GR	High-gain
		µPC3228T5S	Low Distortion
PLL	PLL	–	–
VCO	–	–	–
MOD	–	–	–
PA	Discrete Tr.	2SC5338(NE462M02)	Power Minimold

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

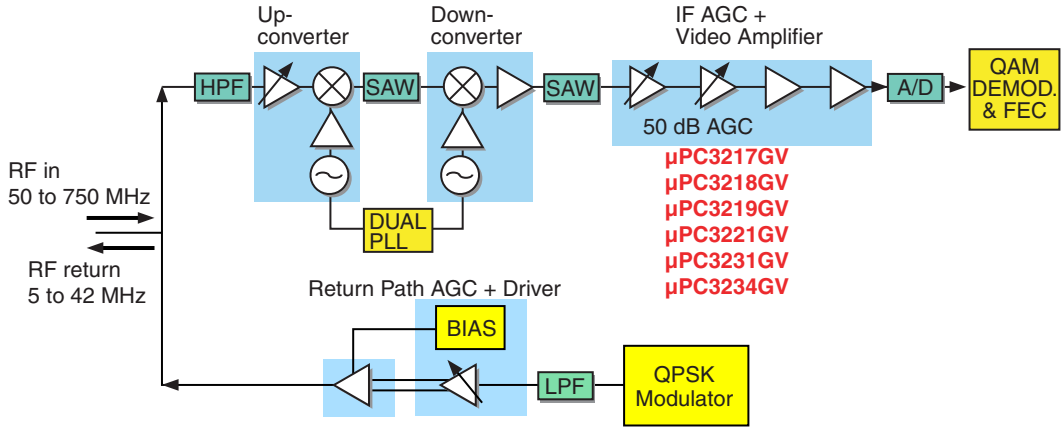
System configuration example 1

Example of transceiver block for Cable Modem Set-top-box

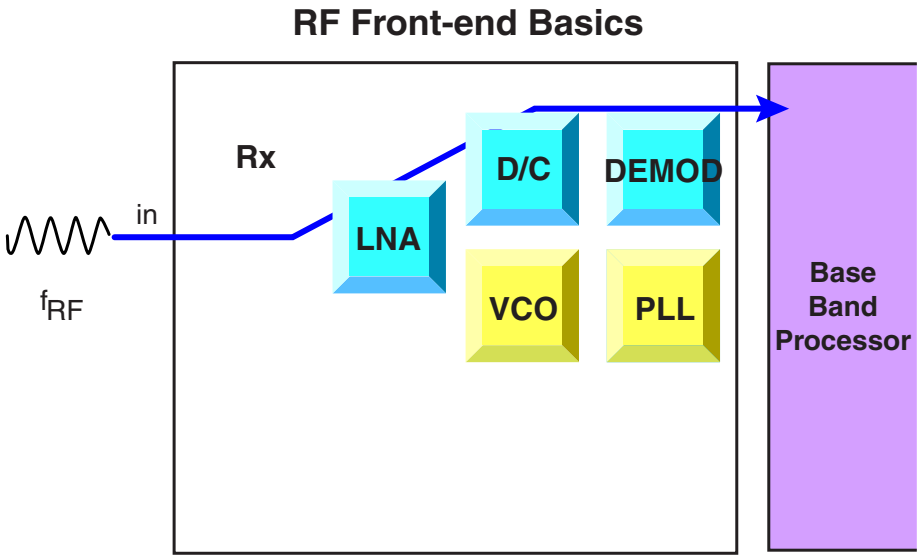


System configuration example 2

<R> **Example of transceiver block for Cable Modem Set-top-box**



2-3. Others
GPS



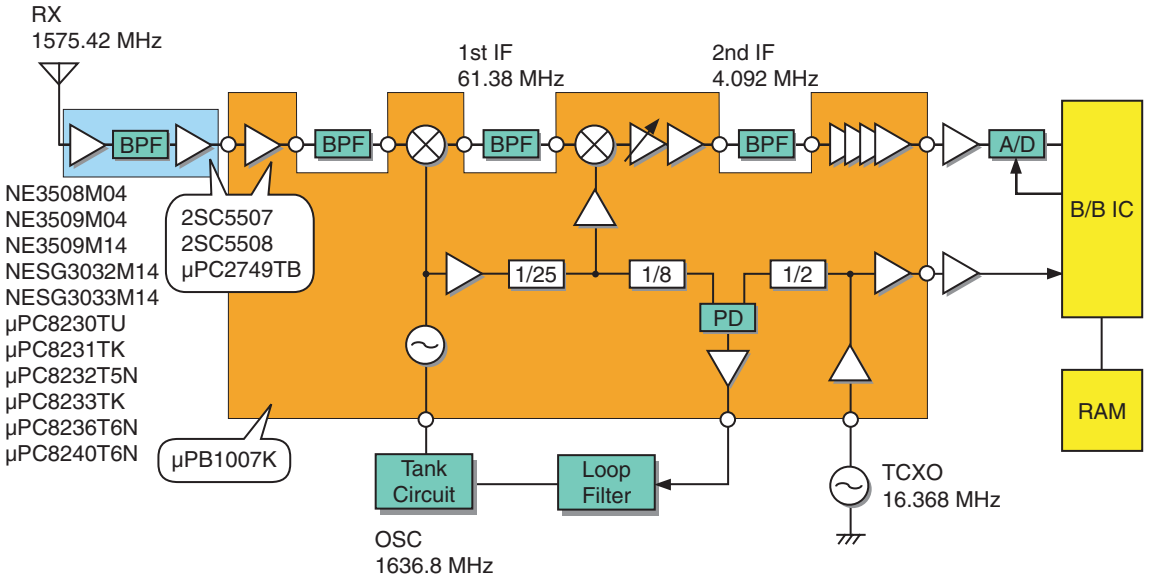
Recommended device list

Block	Function	Type Name	Feature
LNA	1st stage	NE3508M04 NE3509M04 NE3509M14	GaAs HJ-FET
		NESG3032M14 NESG3033M14	SiGe Tr.
		µPC8230TU µPC8231TK µPC8232T5N µPC8233TK µPC8236T6N µPC8240T6N	SiGe:C MMIC
	2nd stage or later	µPC2749TB	Low Noise, Si MMIC
	Discrete Tr.	2SC5507(NE661M04) 2SC5508(NE662M04)	Si Bipolar Tr. (f_T = 25 GHz)
RF SINGLE CHIP	Pre-Amplifier + 1st Down-converter + 2nd Down-converter + OP Amplifier + PLL + Oscillator + Buffer	µPB1007K	Low Current Consumption, Built-in Power Saving Function

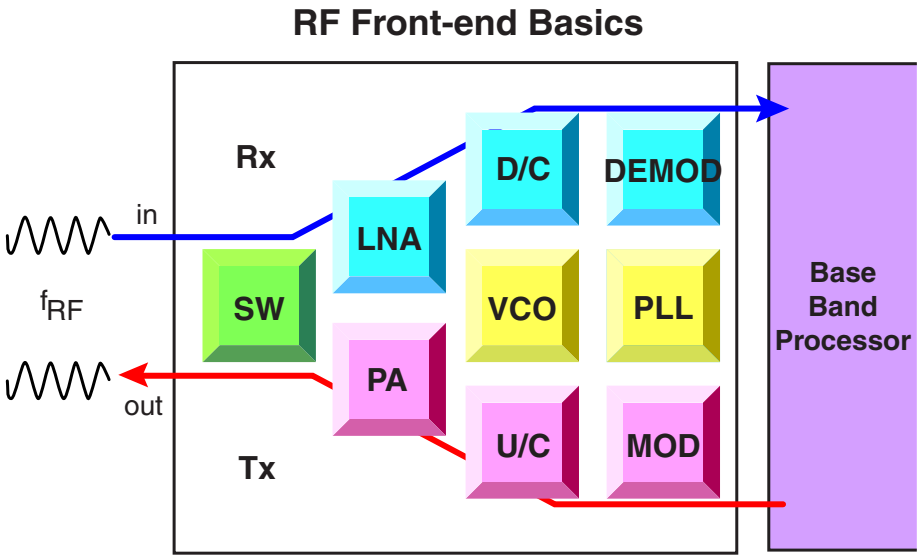
Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

System configuration example

GPS



FRS (Family Radio Service) / GMRS (General Mobile Radio Service)

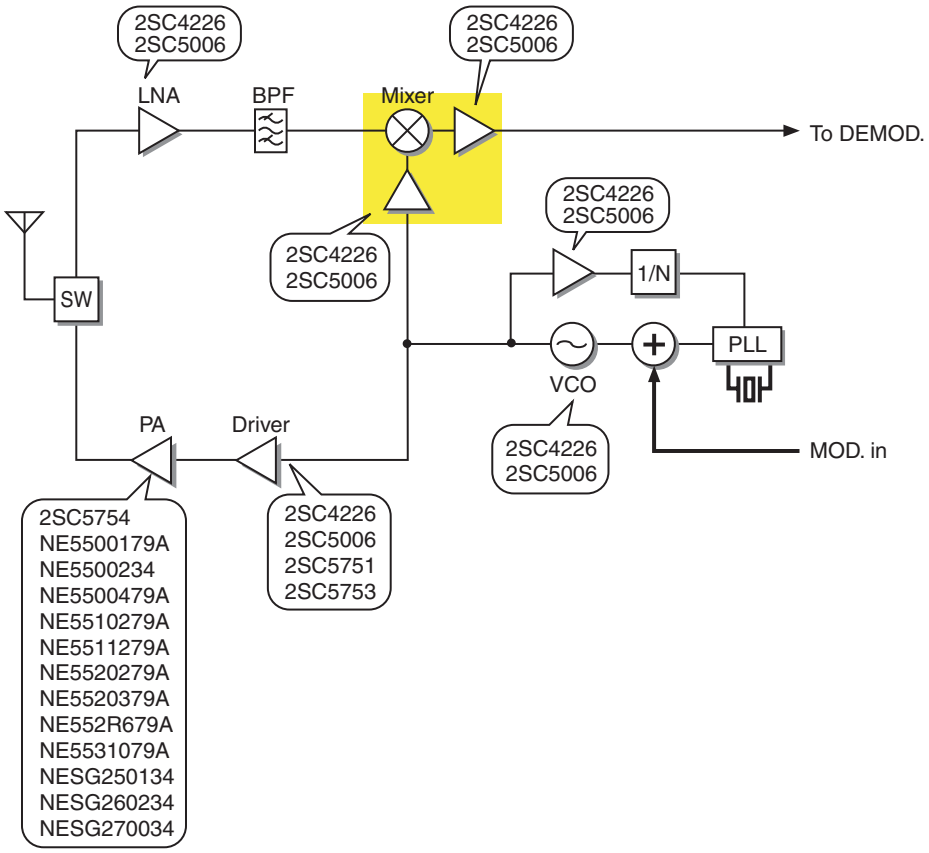


Recommended device list

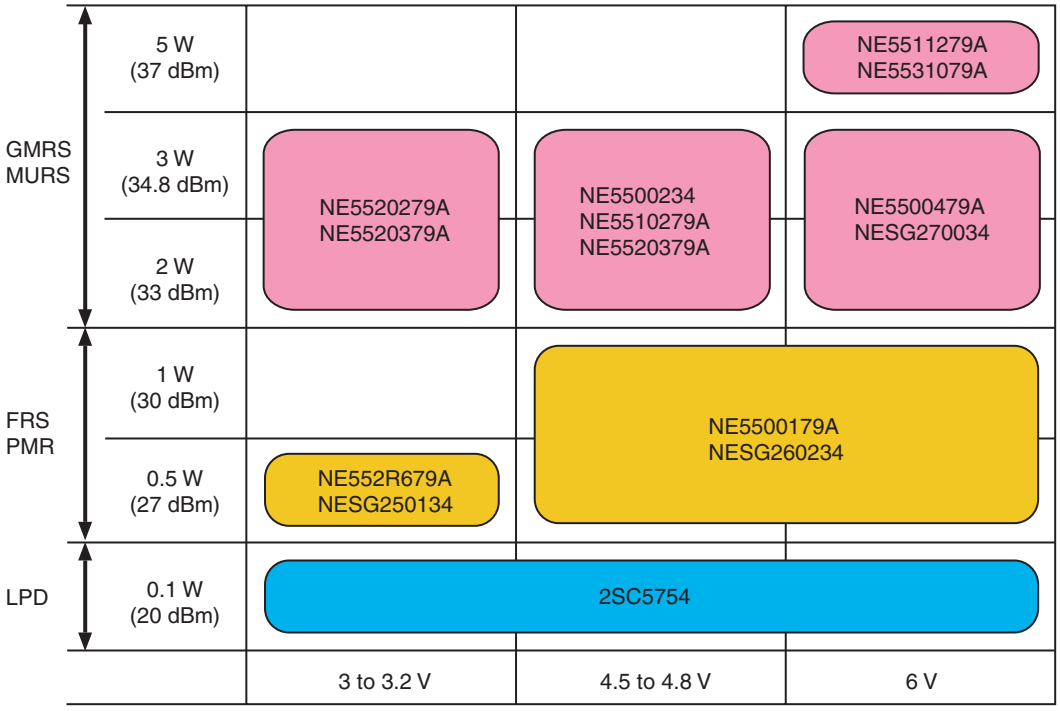
Block	Function	Type Name	Feature
LNA	Discrete Tr.	2SC4226(NE85630) 2SC5006(NE85619)	Low Noise, High Gain
D/C	Discrete Tr.	2SC4226(NE85630) 2SC5006(NE85619)	Low Noise, High Gain
DEMOD	–	–	–
PLL	PLL	–	–
VCO	Discrete Tr.	2SC4226(NE85630) 2SC5006(NE85619)	Low Current Consumption
MOD	–	–	–
U/C	–	–	–
PA	Discrete Tr.	2SC4226(NE85630) 2SC5006(NE85619) 2SC5751(NE677M04) 2SC5753(NE678M04)	Driver Use Tr.
		2SC5754(NE664M04)	Output: 100 mW class
		NESG250134	Output: 800 mW class
		NESG260234	Output: 1 W class
		NESG270034	Output: 2 W class
	Si LDMOS	NE5500179A, NE552R679A	Output: 500 mW class
		NE5500234, NE5500479A NE5510279A, NE5511279A NE5520279A, NE5520379A NE5531079A	Output: 2 W class or higher
SW	–	–	–

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

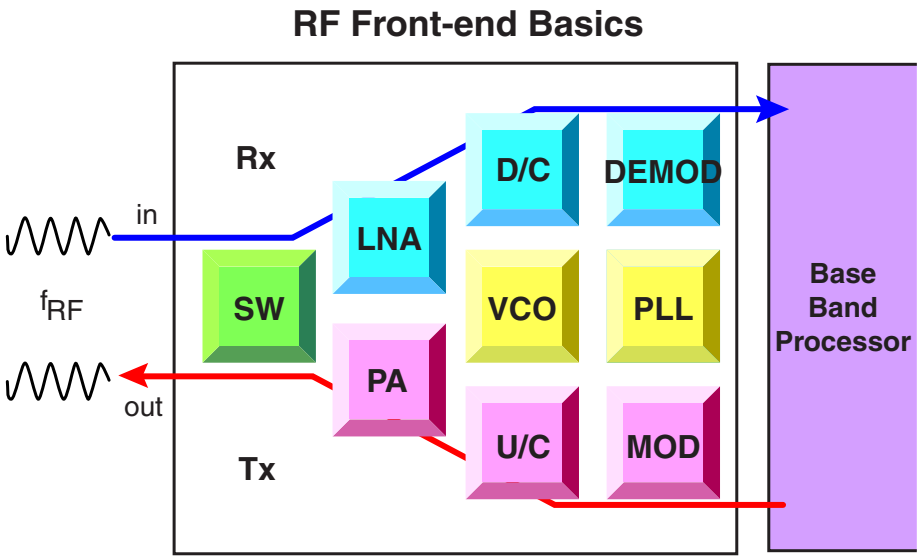
System configuration example
460 MHz FRS



PA Selection Map



Bluetooth

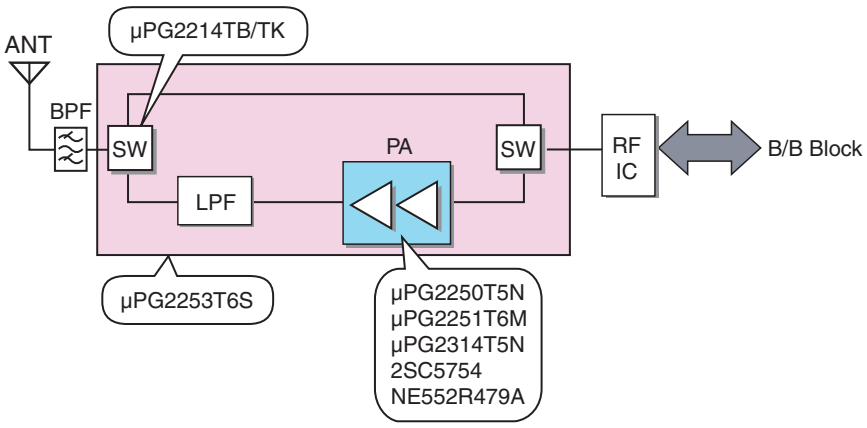


Recommended device list

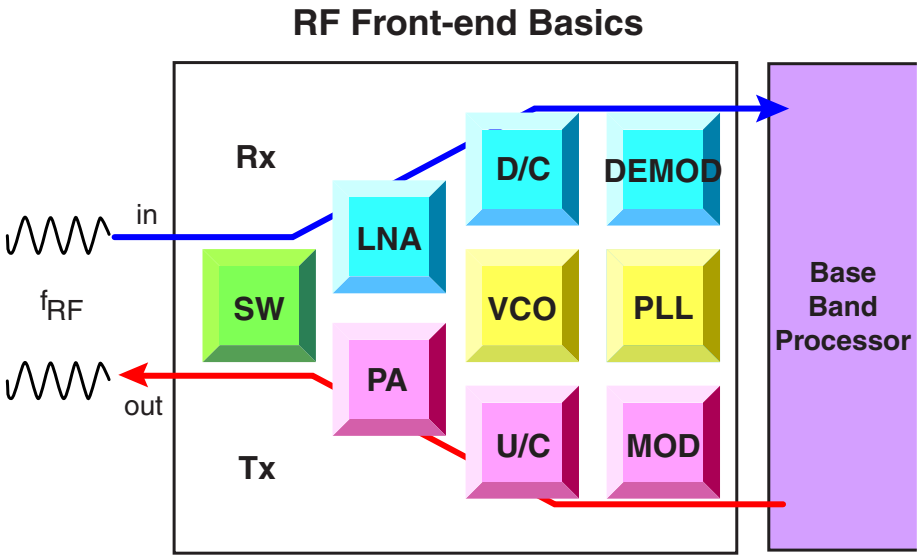
Block	Function	Type Name	Feature
LNA	–	–	–
D/C	–	–	–
DEMOD	–	–	–
PLL	–	–	–
VCO	–	–	–
MOD	–	–	–
U/C	–	–	–
PA	–	µPG2250T5N µPG2251T6M µPG2314T5N	GaAs MMIC
		2SC5754(NE664M04)	Si Tr.
		NE552R479A	Si LDMOS FET
FEIC	PA + SW + Filter	µPG2253T6S	GaAs MMIC
SW	SPDT SW	µPG2214TB	GaAs SW IC, 6-pin Super Minimold
		µPG2214TK	GaAs SW IC, 6-pin Lead-less Minimold (1511)

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

System configuration example
Bluetooth



2.4 GHz Wireless LAN



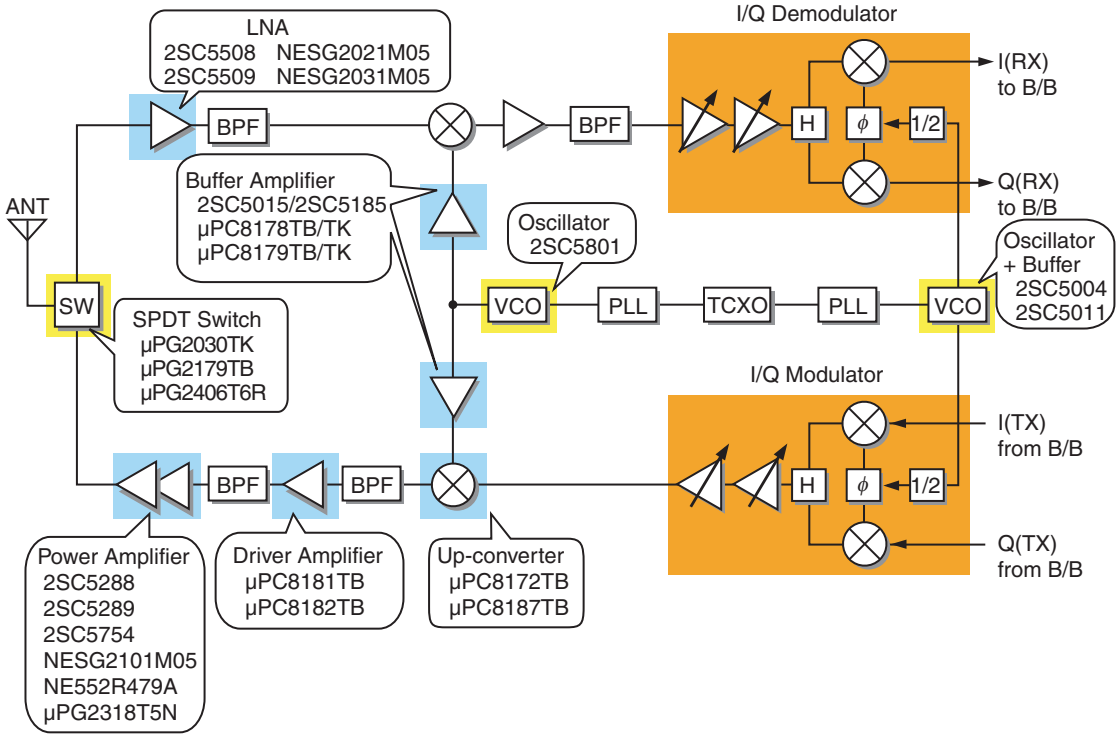
<R> **Recommended device list**

Block	Function	Type Name	Feature
LNA	Discrete Tr.	2SC5508(NE662M04)	Si Bipolar Tr. (f_T = 25 GHz)
		2SC5509(NE663M04)	Si Bipolar Tr. (f_T = 17 GHz)
		NESG2021M05, NESG2031M05	SiGe HBT
D/C	Down-converter	–	–
DEMOD	–	–	–
PLL	PLL	–	–
VCO	Oscillator + Buffer	2SC5004(NE58219), 2SC5011(NE85618) 2SC5801(NE851M13)	–
	Buffer	2SC5015(NE68518), 2SC5185(NE68718) µPC8178TB/TK, µPC8179TB/TK	Low Current Consumption
MOD	I/Q Modulator	–	–
U/C	Up-converter	µPC8172TB, µPC8187TB	6-pin Super Minimold
PA	–	µPG2318T5N	GaAs MMIC
		2SC5288(NE68939), 2SC5289(NE69039) 2SC5754(NE664M04) NESG2101M05	Medium Output Power Use Tr.
		NE552R479A	Medium Output Power (0.4 W) Si LDMOS FET
SW	SPDT SW	µPG2179TB	6-pin Super Minimold
		µPG2030TK	6-pin Lead-less Minimold (1511)
		µPG2406T6R	6-pin TSSON

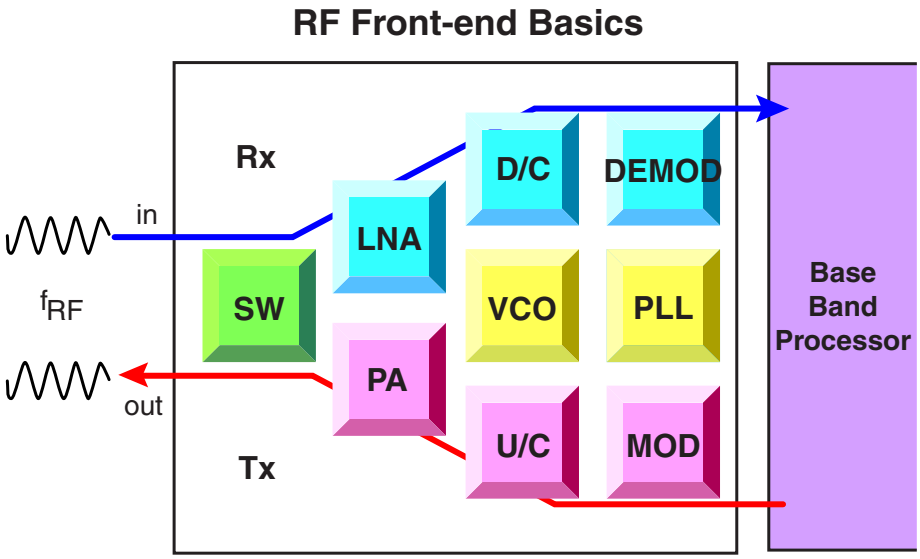
Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

System configuration example (IF Modulation System)

<R> **2.4 GHz Wireless LAN**



5 GHz Wireless LAN

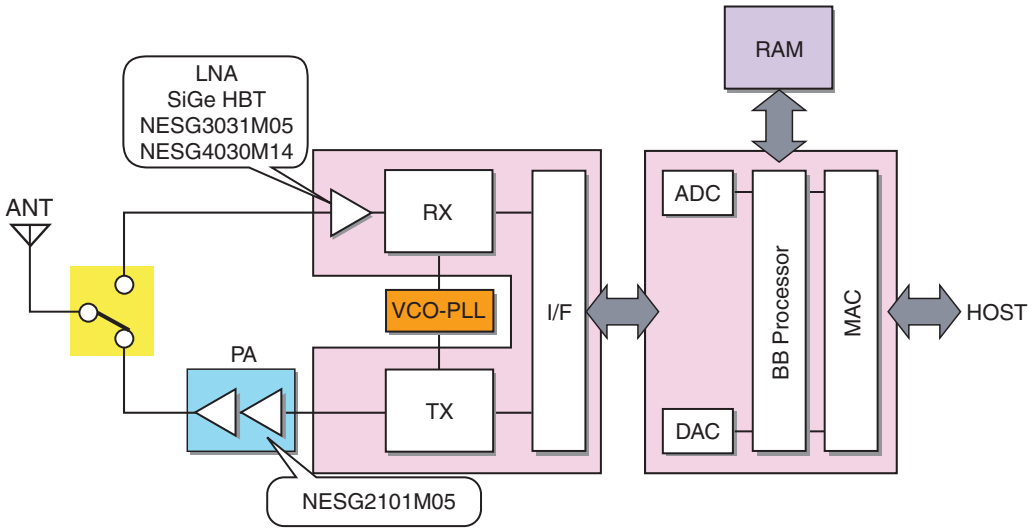


Recommended device list

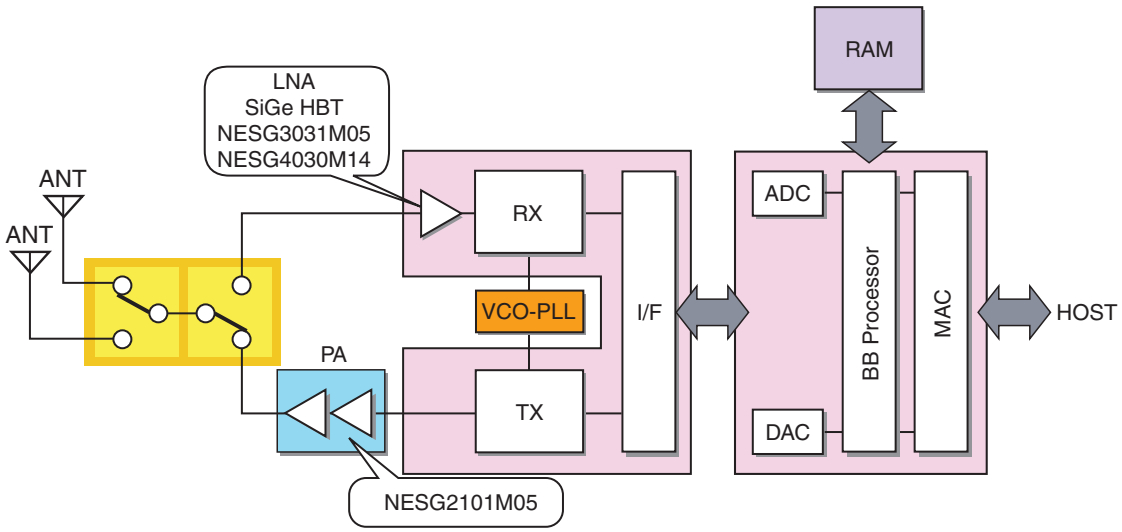
Block	Function	Type Name	Feature
LNA	Discrete Tr.	NESG3031M05 NESG4030M14	SiGe HBT
PA	Discrete Tr.	NESG2101M05	SiGe HBT

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

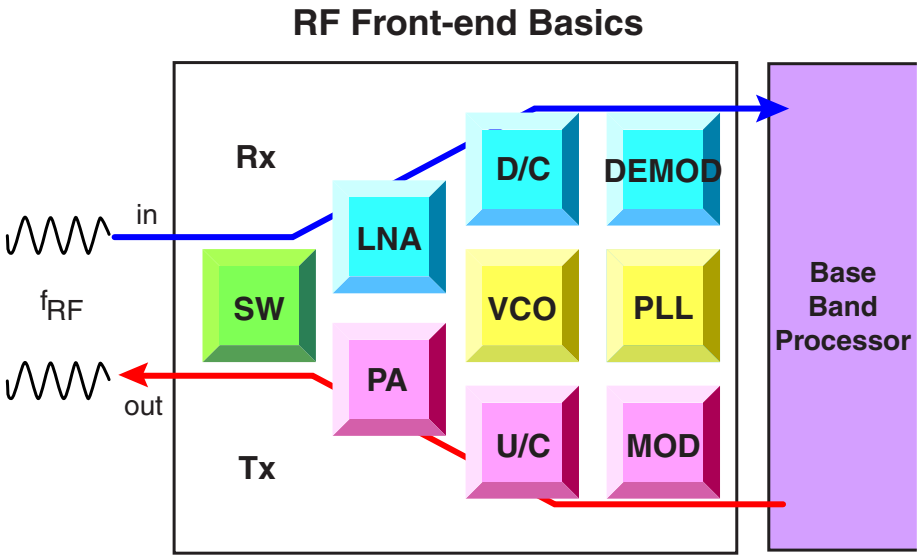
System configuration example 1
5 GHz Wireless LAN



System configuration example 2
5 GHz Wireless LAN
(Antenna Diversity)



2.4 GHz & 5 GHz Dualband Wireless LAN

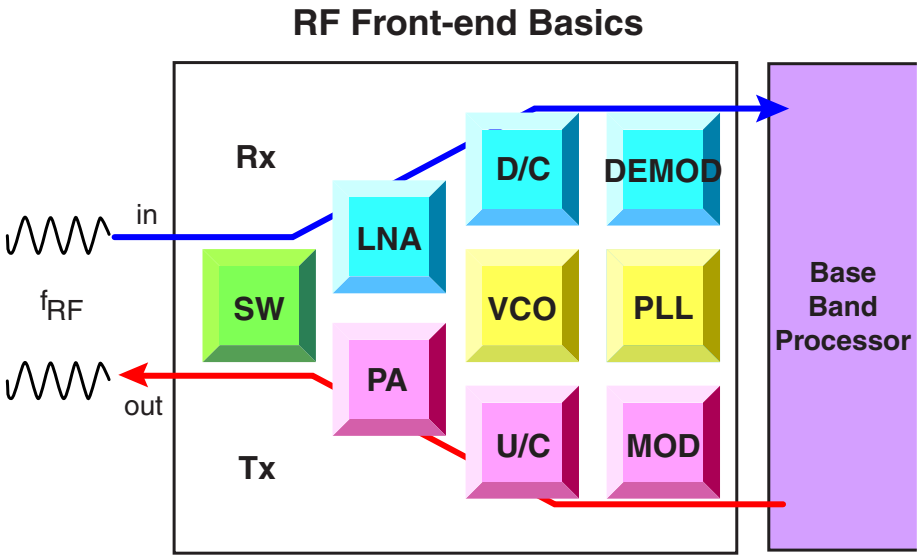


Recommended device list

Block	Function	Type Name	Feature
LNA	Discrete Tr.	NESG3031M05 NESG3031M14 NESG4030M14	SiGe HBT
SW	SPDT SW	μPG2163T5N	GaAs SW IC, Low Insertion Loss, High Isolation, 6-pin TSON
		μPG2185T6R	GaAs SW IC, 6-pin TSSON (1.0 × 1.0 × 0.37 mm, Small and Thin Package)
	DPDT SW	μPG2162T5N	GaAs SW IC, High Isolation, 6-pin TSON
		μPG2164T5N	GaAs SW IC, Low Insertion Loss, 6-pin TSON

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

N-CDMA, GSM Cellular Phone Base Station (900 MHz Band)

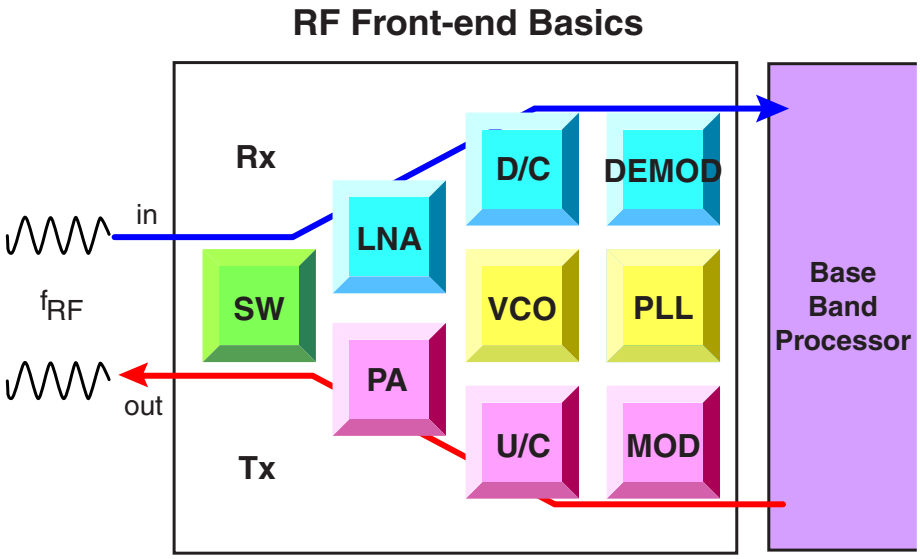


Recommended device list

Block	Function	Type Name	Feature
LNA	Discrete Tr.	2SC5508(NE662M04)	Si Bipolar Tr. (f_T = 25 GHz)
		NESG2031M05 NESG2031M16	SiGe HBT
PA	PA Driver	NE55410GR	2 W + 10 W Driver
	High Power LDMOS FET	NEM090303M-28 NEM090603M-28 NEM090853P-28 NEM091203P-28	Single-end Type, Low Distortion, High Output Power
		NEM091803S-28	Push-pull Type, Low Distortion, High Output Power

Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

W-CDMA Cellular Phone Base Station



<R> **Recommended device list**

Block	Function	Type Name	Feature
LNA	Discrete Tr.	2SC5508(NE662M04)	Si Bipolar Tr. (f_T = 25 GHz)
		NESG2031M05 NESG2031M16	SiGe HBT
PA	PA Driver	NE55410GR	2 W + 10 W Driver Si LDMOS FET

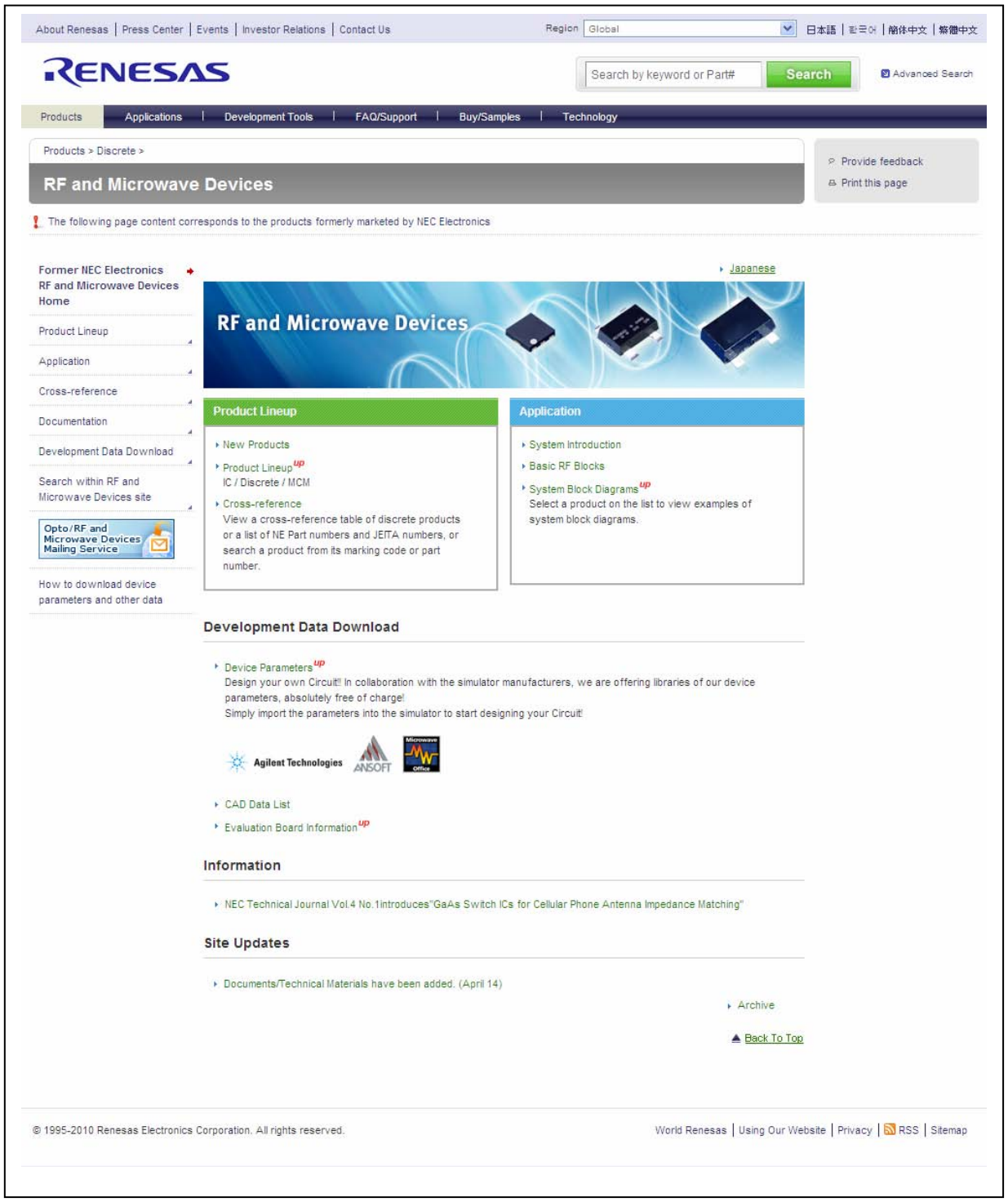
Remark The devices listed in the above table are merely examples. The product recommendation may change depending on the requirements of each system's design.

<R> **3. WEB SITE INFORMATION**

The RF and Microwave Devices homepage has many documents available for viewing or downloaded. Please see our web site. The our web site address is as follows;

RF and Microwave Devices

http://www2.renesas.com/microwave/en/index.html



Revisions History

Rev.	Date	Description	
		Page	Summary
1.00	2010.4	Throughout	μPA86x Series -> μPA8xx Series
		pp.11-13, 32, 33	Deletion of μPG2158T5K
		pp. 20, 21, 24, 25	Deletion of μPC3218T5Y
		p.38	Deletion of NES1823M-45, NES1823M-180, NES1823M-240, NES1823S-45, NES1823S-90
		p.39	Modification of **3. WEB SITE INFORMATION**

This document covers “Silicon Microwave Transistors”, “Silicon Microwave Monolithic ICs” and “Microwave GaAs Devices”.

Caution GaAs Products	This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points. • Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below. 1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials. 2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal. • Do not burn, destroy, cut, crush, or chemically dissolve the product. • Do not lick the product or in any way allow it to enter the mouth.

Renesas Electronics Corporation

R09CA0001EJ0100
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SUNSTAR商斯达实业集团是集研发、生产、工程、销售、代理经销 、技术咨询、信息服务等为一体的高科技企业，是专业高科技电子产品生产厂家，是具有 10 多年历史的专业电子元器件供应商，是中国最早和最大的仓储式连锁规模经营大型综合电子零部件代理分销商之一,是一家专业代理和分銷世界各大品牌IC芯片和電子元器件的连锁经营綜合性国际公司。在香港、北京、深圳、上海、西安、成都等全国主要电子市场设有直属分公司和产品展示展销窗口门市部专卖店及代理分销商，已在全国范围内建成强大统一的供货和代理分销网络。 我们专业代理经销、开发生产电子元器件、集成电路、传感器、微波光电元器件、工控机/DOC/DOM电子盘、专用电路、单片机开发、MCU/DSP/ARM/FPGA软件硬件、二极管、三极管、模块等，是您可靠的一站式现货配套供应商、方案提供商、部件功能模块开发配套商。**专业以现代信息产业（计算机、通讯及传感器）三大支柱之一的传感器为主营业务，专业经营各类传感器的代理、销售生产、网络信息、科技图书资料及配套产品设计、工程开发。我们的专业网站——中国传感器科技信息网（全球传感器数据库） www.SENSOR-IC.COM 服务于全球高科技生产商及贸易商，为企业科技产品开发提供技术交流平台。欢迎各厂商互通有无、交换信息、交换链接、发布寻求代理信息。欢迎国外高科技传感器、变送器、执行器、自动控制产品厂商介绍产品到 中国，共同开拓市场。**本网站是关于各种传感器-变送器-仪器仪表及工业自动化大型专业网站,深入到工业控制、系统工程计 测计量、自动化、安防报警、消费电子等众多领域，把最新的传感器-变送器-仪器仪表买卖信息,最新技术供求,最新采购商,行业动态，发展方向，最新的技术应用和市场资讯及时的传递给广大科技开发、科学研究、产品设计人员。本网站已成功为石油、化工、电力、医药、生物、航空、航天、国防、能源、冶金、电子、工业、农业、交通、汽车、矿山、煤炭、纺织、信息、通信、IT、安防、环保、印刷、科研、气象、仪器仪表等领域从事科学研究、产品设计、开发、生产制造的科技人员、管理人员 、和采购人员提供满意服务。 **我公司专业开发生产、代理、经销、**销售各种传感器、变送器、敏感元器件、开关、执行器、仪器仪表、自动化控制系统： 专门从事设计、生产、销售各种传感器、变送器、各种测控仪表、热工仪表、现场控制器、计算机控制系统、数据采集系统、各类环境监控系统、专用控制系统应用软件以及嵌入式系统开发及应用等工作。如热敏电阻、压敏电阻、温度传感器、温度变送器、湿度传感器、 湿度变送器、气体传感器、 气体变送器、压力传感器、 压力变送、称重传感器、物（液）位传感器、物（液）位变送器、流量传感器、 流量变送器、电流（压）传感器、溶氧传感器、霍尔传感器 、图像传感器、超声波传感器、位移传感器、速度传感器、加速度传感器、扭距传感器、红外传感器、紫外传感器、 火焰传感器、激光传感器、振动传感器、轴角传感器、光电传感器、接近传感器、干簧管传感器、继电器传感器、微型电泵、磁敏（阻）传感器 、压力开关、接近开关、光电开关、色标传感器、光纤传感器、齿轮测速传感器、 时间继电器、计数器、计米器、温控仪、固态继电器、调压模块、电磁铁、电压表、电流表等特殊传感器 。 同时承接传感器应用电路、产品设计和自动化工程项目。

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