



# RF manual 11<sup>th</sup> edition

Application and design manual for RF products  
December 2008

# NXP's RF Manual makes design-in work much easier

For many years, the RF Manual has proven to be the leading RF tool in the market. Also for this 11<sup>th</sup> edition we committed ourselves to make design-in work much easier and therefore we again added several new applications.

This 11<sup>th</sup> edition also features some exciting new developments and products, these include: SiGeC RF MMIC's, VSAT and CATV GaAs.

You can find our new developments and products, in chapter 2 'Focus applications and products': SiGeC RF MMIC's, VSAT and CATV GaAs

- 1: We are expanding our SiGeC portfolio to meet the trends towards higher frequencies with the latest SiGeC MMICs: BGU7003, BGU7004 and BGU7005, see chapters 2.2 and 3.4.1.
- 2: New VSAT ICs: TFF1003HN and TFF1006HN, make 2-way communication via satellite possible, enabling high speed internet over satellite, see chapter 2.4 and 3.4.2.
- 3: Specially designed high-performance GaAs amplifiers for the Chinese SARFT HFC networks: CGY888C, CGD942D and CGD944C, featuring rugged construction and optimized thermally design, see chapter 2.5, 3.6.2 and 3.6.3.

## Application driven

This manual is designed to be a dynamic source of RF information. In keeping with this, we have added some new applications that may be of interest: antenna loop through, active antenna, satellite LNB integrated solution, remote keyless entry, tire pressure monitoring systems, walki talki and e-metering.

## Interactive

We know that many of you appreciate the RF manual's interactive features. Simply 'click' on a product type and you will be taken directly to the corresponding product information page on the NXP website. On these product specific web pages you can find all detailed information of the particular product, like the datasheet.

## Internet

You can access the manual via [www.nxp.com/rfmanual](http://www.nxp.com/rfmanual) or just 'google' RF manual.

**RF manual web page**  
[www.nxp.com/rfmanual](http://www.nxp.com/rfmanual)

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**What if you could increase your network capacity for high-end services?**

Look at 1-GHz CATV, chapter 2.6

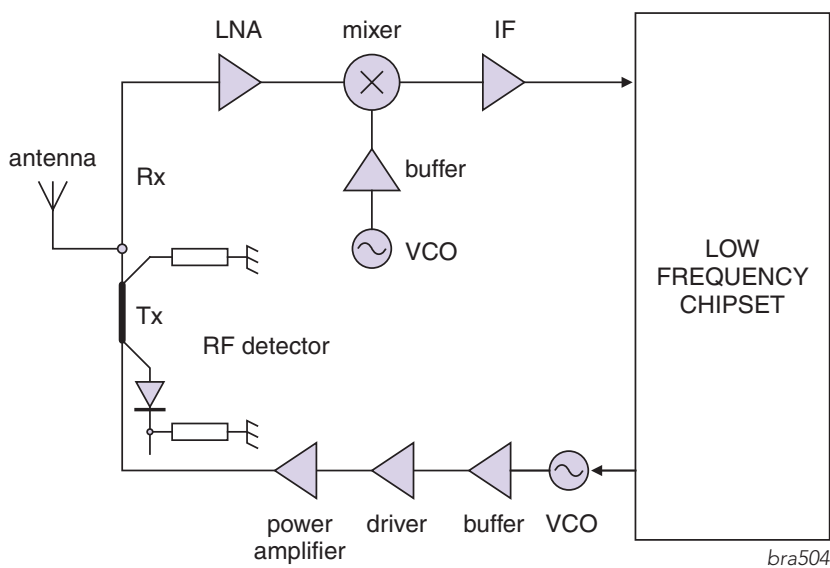
# 1. Applications & recommended products

NXP RF Applications  
<http://www.nxp.com/rf>

NXP Application notes  
[http://www.nxp.com/all\\_appnotes/index.html](http://www.nxp.com/all_appnotes/index.html)

## 1.1 Low-cost cellular phone front-end for ODM/CEM designs

### Application diagram



## Recommended products

Function	Product		Package	Type
RF detector	RF schottky diode	Low Cd schottky	SOT323	1PS70SB84
			SOD323	1PS76SB17
			SOD882	1PS10SB82
			SOT666	1PS66SB82

Function	Product		Package	Type
Buffer	RF bipolar transistor	Wideband transistor	SOT343	BFG410W
			SOT343	BFG425W
			SOT343	BFG480W
			SOT23	BFR520T
			SOT416	BFR505T
SOT323	BFS540			

Function	Product		Package	Type
Antenna switch	RF diode	PIN diode	various**	BAP50
			various**	BAP51
			various**	BAP55
			various**	BAP63
			various**	BAP64
			various**	BAP65
			various**	BAP1321

Function	Product		Package	Type
VCO	Varicap diodes	VCO varicap diodes	SOD523	BB145B
			SOD523	BB179

Function	Product		Package	Type
VCxO	Varicap diodes	VCxO varicap diodes	SOD523	BB198
			SOD523	BB199

Function	Product		Package	Type
LNA	MMIC	Low noise wideband amplifier	SOT343R	BGA2001
			SOT343R	BGA2003
			SOT363	BGA2011
			SOT363	BGA2012

\* = 2 stage variable gain linear amplifier

\*\* = also available in ultra small leadless package SOD882T.

## Recommended application notes

1880MHz PA driver	BFG21W
1880MHz PA driver	BFG480W
2GHz LNA	BFG410W
2GHz LNA	BFG425W
800MHz PA driver	BFG21W
900MHz driver	BFG480W
900MHz LNA	BFG410W
900MHz LNA	BFG480W
CDMA cellular VCO	BFG425W, BFG410W
Demoboard 900MHz LNA	BGA2003
Demoboard for BGA2001	BGA2001
Demoboard for W-CDMA	BGA2003
High IP3 MMIC LNA at 1.8 - 2.4 GHz	BGA2012
High IP3 MMIC LNA at 900MHz	BGA2011
Power amplifier for 1.9GHz DECT and PHS	BFG425W, BFG21W
Rx mixer for 2450MHz	BGA2022
Ultra LNAs for 900&2000MHz with high IP3	BFG410W, BFG425W

Function	Product		Package	Type
Driver	Bipolar transistor	Wideband transistor	SOT343	BFG21W
			SOT343	BFG425W
			SOT343	BFG480W
	MMIC	Amplifier* Gen. purpose wideband ampl.	SOT363	BGA2031/1
			SOT363	BGA2771
SOT363	BGA2776			

Function	Product		Package	Type
Mixer	RF bipolar transistor	Wideband transistor	SOT343	BFG410W
			SOT343	BFG425W
	SOT343	BFG480W		
	MMIC	Linear mixer	SOT363	BGA2022

Function	Product		Package	Type
IF	MMIC	Low noise amplifier Gen. purpose amplifier	SOT343R	BGA2001
			SOT343R	BGA2003
			SOT363	BGA2771
	RF bipolar transistor	Wideband transistor	SOT363	BGA2776
			SOT363	PRF949
SOT363	BFS17W			

Function	Product		Package	Type
Power amplifier	Bipolar transistor	Wideband transistor	SOT343	BFG21W
			SOT343	BFG480W
	MMIC	Amplifier* Gen. purpose wideband ampl.	SOT363	BGA2031/1
			SOT363	BGA2771
			SOT363	BGA2776

### Product highlight: BGA2771 MMIC General - purpose wideband amplifier

Silicon Monolithic Microwave Integrated Circuit (MMIC) wideband amplifier with internal matching circuit in a 6-pin SOT363 SMD plastic package. The BGA27xx series amplifier provides large bandwidth and high quality in wireless system applications.

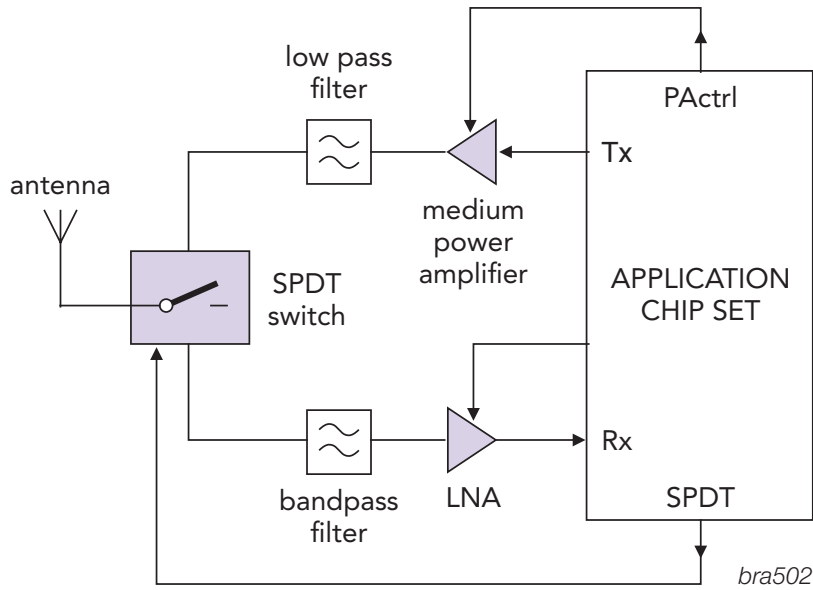
### Features

- ▶ Internally matched
- ▶ Wide frequency range
- ▶ Very flat gain
- ▶ High output power
- ▶ High linearity
- ▶ Unconditionally stable



## 1.2 A 2.4 GHz front-end for WLAN, Bluetooth™, DECT, ZigBee™, etc.

### Application diagram



### Recommended products

Function	Product		Package	Type
SPDT switch	RF diode	PIN diode	SOD523	BAP51-02
			SOD882T	BAP51LX
			SOD882T	BAP55LX

Function	Product		Package	Type
Medium power amplifier	MMIC	Gen. purpose med. power amplifier	SOT89	BGA6589

Function	Product		Package	Type
LNA	MMIC	Low noise wideband amplifier	SOT343R	BGA2003
			SOT343R	BGA2001

### Recommended application notes

2.45 Ghz T/R, RF switch	BAP51-02
Low-impedance PIN diode	BAP50-05
Demoboard 900 MHz LNA	BGA2003
Demoboard for 900&1800 MHz	BGA2001
Demoboard for W-CDMA	BGA2003

#### Product highlight: BGA6289 MMIC medium power amplifier

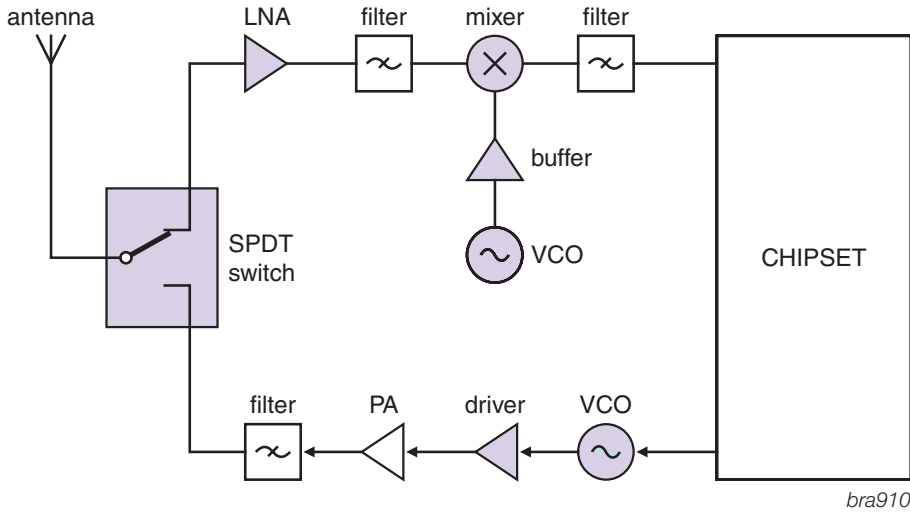
Silicon Monolithic Microwave Integrated Circuit (MMIC) wideband medium power amplifier with internal matching circuit in a 4-pin SOT89 plastic low thermal resistance SMD package. The BGA6x89 series of medium power gain blocks provides large bandwidth and high-quality performance in 2.4GHz wireless applications.

#### Features

- ▶ Broadband 50W gain block
- ▶ 17dBm output power
- ▶ Single supply voltage needed

# 1.3 Cordless Phone (Analog)

## Application diagram



## Recommended products

Function	Product	Package	Type	
RF Switch	RF diode	PIN Diode	various*	BAP51
			various*	BAP63
			various*	BAP64

Function	Product	Package	Type	
LNA	RF bipolar transistor	Wideband transistor	SOT23	BFT25
			SOT23	PBR951
			SOT323	PRF957
			SOT343	BFG425W
			SOT343F	BFG424F

Function	Product	Package	Type	
Mixer	RF bipolar transistor	Wideband transistor	SOT323	PRF957
			SOT143	BFG540
			SOT343	BFG410W
			SOT343	BFG425W
			SOT343	BFG480W
	MMIC	Linear mixer	SOT363	BGA2022

\* = also available in ultra small leadless package SOD882T.

Function	Product	Package	Type	
VCO	Varicap diodes	VCO varicap diodes	SOD323	BB131
			SOD523	BB145B
			SOD323	BB148
			SOD523	BB149

Function	Product	Package	Type	
Driver/Buffer	RF bipolar transistor	Wideband transistor	SOT23	PBR951
			SOT323	PRF957
			SOT343	BFG425W
			SOT343	BFG424F
			SOT343F	BFG424F

## Recommended application notes

2.45 Ghz T/R, RF switch	BAP51-02
Low-impedance PIN diode	BAP50-05

### Product highlight: BAP64xx PIN diode for RF switch

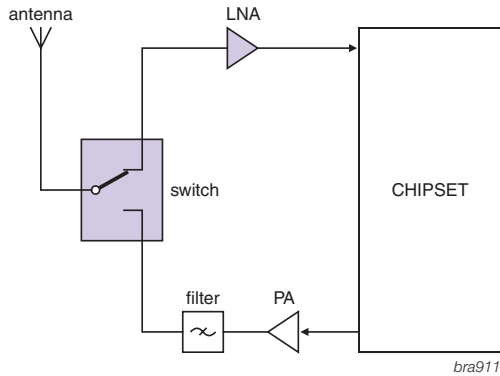
Operating up to 3GHz with high-voltage handling capabilities, NXP's PIN diodes are ideal for a wide range of wireless communication application. Together with outstanding RF performance, this component simplify design-in because of its extremely low forward resistance, diode capacitance and series inductance. Significant board space saving by supplying a range of high compact package options – including SOD523, SOD323 and leadless SOD882T.

### Features

- ▶ Operate up to 3GHz
- ▶ High isolation, low distortion, low insertion loss
- ▶ Low forward resistance (Rd) and diode capacitance (Cd)
- ▶ Ultra-small package options

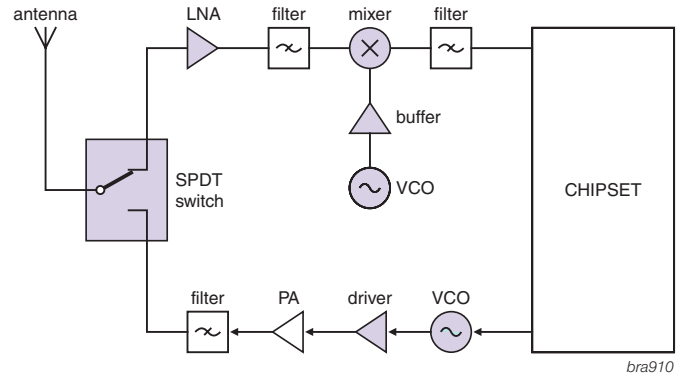
# Cordless Phone (DECT front-end)

## Application diagram



# (DECT in-house basestation)

## Application diagram



## Recommended products

Function	Product	Package	Type	
RF Switch	RF diode	PIN Diode	various	BAP51*
			various	BAP55*
			various	BAP142*
			various	BAP63*
			various	BAP64*
			various	BAP1321*

Function	Product	Package	Type	
LNA	RF bipolar transistor	Wideband transistor	SOT343	BFG425W
			SOT343F	BFG424F
	RF transistor	SiGeC transistor	SOT343F	BFU725F

\* = also available in ultra small leadless package SOD882T.

## Recommended products

Function	Product	Package	Type	
RF Switch	RF diode	PIN Diode	various	BAP51 *
			various	BAP55 *
			various	BAP142*
			various	BAP63*
			various	BAP64*
			various	BAP1321*

Function	Product	Package	Type	
LNA	RF bipolar transistor	Wideband transistor	SOT343	BFG425W
			SOT343F	BFG424F
	RF transistor	SiGeC transistor	SOT343F	BFU725F

Function	Product	Package	Type	
Mixer	RF bipolar transistor	Wideband transistor	SOT343	BFG410W
			SOT343	BFG425W
			SOT343	BFG480W
	MMIC	Linear mixer	SOT363	BGA2022

Function	Product	Package	Type	
VCO	Varicap diodes	VCO varicap diodes	SOD523	BB145B

Function	Product	Package	Type	
Driver/Buffer	RF bipolar transistor	Wideband transistor	SOT343	BFG425W
			SOT343F	BFG424F
			SOT343	BFG480W
	RF transistor	SiGeC transistor	SOT343F	BFU725F

### Product highlight: BFG425W NPN wideband transistor

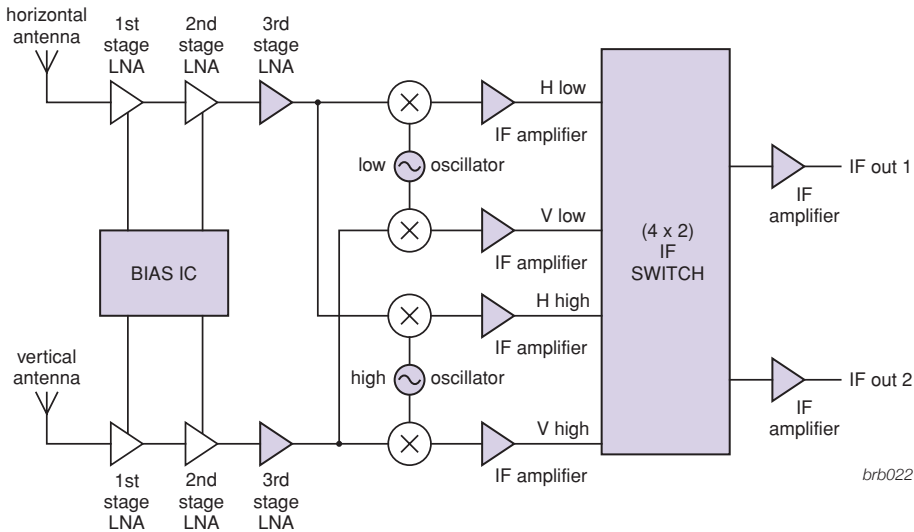
NXP NPN double polysilicon wideband transistor with buried layer is for low voltage and low noise applications in a plastic, 4-pin dual-emitter SOT343R package.

### Features

- ▶ Very high maximum power gain (20dB for 2GHz)
- ▶ Low noise figure (1.2dB for 2GHz)
- ▶ High transition frequency (25GHz)
- ▶ Emitter is thermal lead
- ▶ Low feedback capacitance (95fF)

# 1.4 Satellite outdoor unit, low noise block (LNB) for multiple users.

## Application diagram



## Recommended products

Function	Product	Package	Type
Oscillator	RF bipolar transistor	Wideband transistor	SOT343 BFG424W
			SOT343F BFG424F
Function	Product	Package	Type
1st stage IF amplifier	MMIC	General purpose amplifier	SOT363 BGA2711
			SOT363 BGA2712
			SOT363 BGA2748
			SOT363 BGA2714
			SOT363 BGA2717
	RF bipolar transistor	Wideband transistor	SOT343 BFG424W
		SOT343F BFG424F	
Function	Product	Package	Type
IF switch	RF diode	PIN diode	various BAP64 *
			various BAP51 *
			various BAP1321 *
			various BAP50 *
			various BAP63 *

\* = also available in ultra small leadless package SOD882T.

Function	Product	Package	Type
Output stage IF amplifier	MMIC	General purpose amplifier	SOT363 BGA2709
			SOT363 BGA2776
			SOT363 BGM1014
			SOT363 BGM1012
	SOT363 BGA2716		
	RF bipolar transistor	Wideband transistor	SOT343 BFG325
Function	Product	Package	Type
3rd stage LNA	RF transistor	SiGeC transistor	SOT343F BFU725F
Function	Product	Package	Type
BIAS IC	Bias IC	TSSOP16	UAF4000TS

## Recommended application notes

2.45 Ghz T/R, RF switch	BAP51-02
Low-impedance PIN diode	BAP50-05

### Product highlight: BFG424F bipolar oscillator

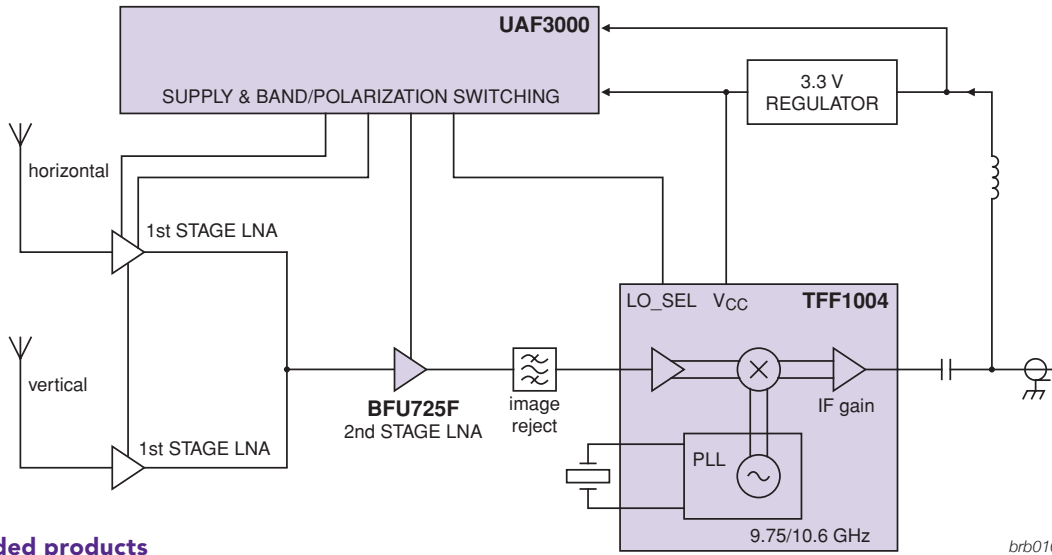
The BFG424F is an NPN double polysilicon wideband transistor with a buried layer for low-voltage applications. Housed in an easy-to-use SOT343F package, it features very high gain, stable phase noise & low feedback capacitance.

### Features

- ▶ Stable phase noise over temperature performance
- ▶ Compact flat-lead SOT343F package simplifies assembly
- ▶ Free oscillations at all LO frequencies

## 1.5 Satellite outdoor unit, low noise block (LNB), integrated solution.

### Application diagram



### Recommended products

Function	Product	Package	Type
Downconverter	Satellite LNB RF IC	Satellite LNB downconverter IC	TFF1004HN

Function	Product	Package	Type
Supply & band/polarization switching	Satellite LNB RF IC	Satellite LNB biasing IC	SOT360

Function	Product	Package	Type
2nd stage LNA	RF transistor	SiGeC transistor	SOT343F

### Complete LNB chipset

The chipset consists of the TFF1004HN, the UAF3000TS, and the BFU725F.

TFF1004HN is a highly integrated IC that includes an LNA, a mixer, a down-converter, a PLL, a crystal oscillator, and an IF buffer. It is manufactured in NXP's breakthrough SiGe BiCMOS process for microwave applications, which is more cost-effective than GaAs processes and more reliable than discrete implementations.

The UAF3000TS is a FET bias controller with a polarization switch and tone detection. It provides biasing for up to three LNA devices. An integrated bandgap reference ensures the accuracy of voltage and tone detection, also over temperature. For horizontal and vertical switching, there is an integrated supply-voltage detector, and for switching between high and low bands, there is a 22-kHz tone detector. The supply voltage range, 3.3 V or 5 V, is detected automatically.

The BFU725F is an NPN microwave transistor for high-speed, low-noise applications. In the LNB chipset, it is used for the second LNA stage. It is manufactured in a 110-GHz fT-SiGeC technology, so it delivers an excellent noise figure (1.0 dB at 12 GHz), and a high maximum stable gain (13 dB at 12 GHz). More information in chapter 2.1.

#### Product highlight: TFF1004HN

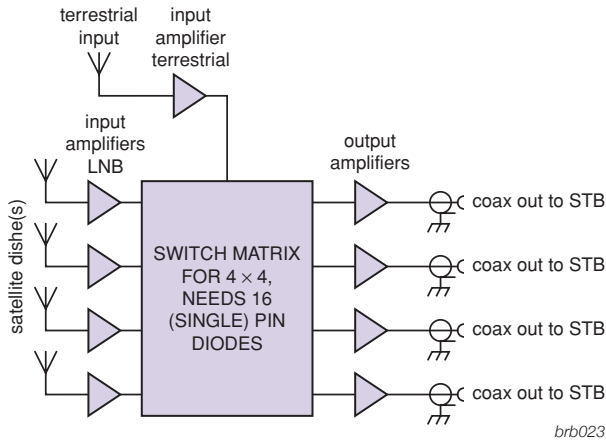
The TFF1004HN is an integrated mixer oscillator downconverter for use in Low Noise Block (LNB), in a 10.7 GHz to 12.75 GHz Ku band satellite receiver system.

#### Features:

- ▶ Pre-amplifier, mixer, buffer amplifier and PLL synthesizer in one IC
- ▶ Alignment-free concept
- ▶ Crystal controlled LO frequency generation
- ▶ Low phase noise
- ▶ Switched LO frequency (9.75 GHz and 10.6 GHz)
- ▶ Low spurious

# 1.6 Satellite Multi Switch Box - 4 x 4 (up to 16 x 16)

## Application diagram



## Recommended products

Function	Product	Package	Type
Input amplifier terrestrial	MMIC	SOT89	BGA6289
			BGA6489
			BGA6589

Function	Product	Package	Type
Input amplifier LNB	MMIC	General purpose medium power amplifier	SOT363 BGA2771
			SOT363 BGA2776
			SOT363 BGA2709
			SOT363 BGM1012
			SOT343 BFG325
			SOT343 BFG425W
	RF bipolar transistor	Wideband transistor	SOT143 BFG520
			SOT143 BFG540

Function	Product	Package	Type
Switch matrix	RF diode	PIN diode	Various
			BAP50*
			BAP51*
			BAP63*
			BAP64*
			BAP70*
BAP1321*			

\* = also available in ultra small leadless package SOD882T.

Function	Product	Package	Type
Output amplifier	MMIC	General purpose medium power amplifier	SOT89 BGA6289
			SOT89 BGA6489
			SOT89 BGA6589
			SOT363 BGM1011
			SOT363 BGM1013
			SOT363 BGM1014
	RF bipolar transistor	Wideband transistor	SOT223 BFG135
			SOT223 BFG 591
			SOT223 BFG198
SOT143 BFG540			

### Product highlight: PIN diodes for switching matrix

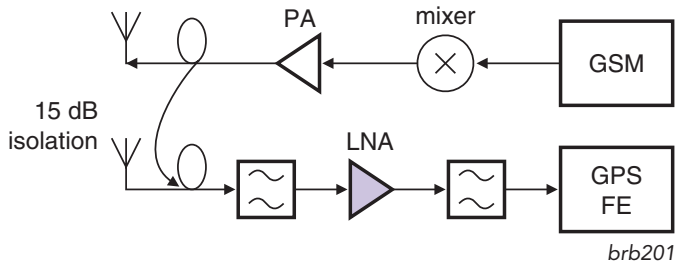
Together with outstanding RF performance, this component simplifies design-in because of its extremely low forward resistance, diode capacitance and series inductance. Significant board space saving by supplying a range of high compact package options – including SOD523, SOD323 and leadless SOD882T.

### Features

- ▶ High isolation, low distortion, low insertion loss
- ▶ Low forward resistance (Rd) and diode capacitance (Cd)
- ▶ Ultra-small package options

# 1.7 Global Positioning System (GPS)

## Application diagram



## Recommended products

Function	Product		Package	Type	
LNA	RF bipolar transistor	Wideband transistor	SOT343	BFG425W	
		Wideband transistor	SOT343	BFG410W	
	MMIC	Low noise wideband amplifier		SOT343R	BGA2001
				SOT343R	BGA2003
		General purpose wideband amplifier		SOT363	BGM1013
				SOT363	BGM1011
				SOT363	BGA2715
		SiGeC MMIC		SOT363	BGA2748
			SOT891	BGU7003	
	RF transistor	SiGeC transistor		SOT886	BGU7004
			SOT886	BGU7005	
			SOT343F	BFU725F	

## Recommended application notes

Introduction into the GPS front-end	BGAx, BGMx, BGu
900 MHz LNA	BFG410W
2 GHz LNA	BFG410W
2 GHz high IP3 LNA	BGA2003

### Product highlight: BFU725F SiGeC microwave NPN transistor

Meet the trend towards higher frequencies. The BFU725F provides high switching frequencies plus extreme high gain and low noise.

### Features

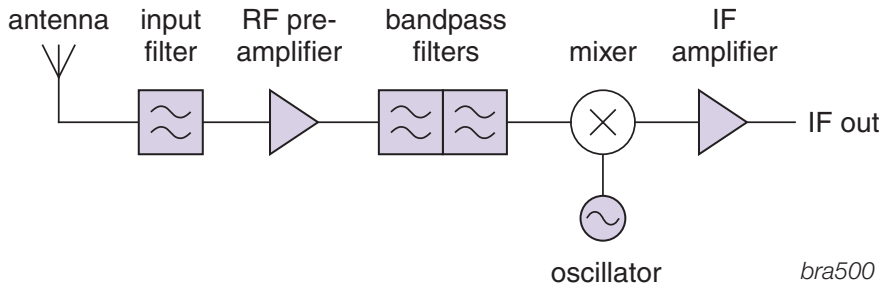
- ▶ Very low noise (0.4 dB at 1.8 GHz / 0.67 dB at 5.8 GHz)
- ▶ High maximum stable gain (27.8 dB at 1.8 GHz / 10 dB at 18 GHz)
- ▶ High switching frequency (fT >100 GHz / fMAX >150 GHz)
- ▶ Plastic surface-mount SOT343F package

### Benefits

- ▶ SiGeC process delivers high switching frequency from a silicon-based device
- ▶ Cost-effective alternative to GaAs devices
- ▶ RoHS compliant

# 1.8 TV / VCR / DVD / HDD tuning

## Application diagram



## Recommended products

Function	Product	Package	Type	
Input filter	Varicap diode	VHF low	SOD323	BB152
			SOD523	BB182
			SOD882T	BB182LX
		VHF high	SOD323	BB153
			SOD523	BB178
			SOD523	BB187
	UHF	SOD882T	BB178LX	
		SOD882T	BB187LX	
		SOD323	BB149A	
			SOD882T	BB179LX
			SOD523	BB179

Function	Product	Package	Type	
Bandpass filter	Varicap diode	VHF low	SOD323	BB152
			SOD882T	BB182LX
			SOD523	BB182
		VHF high	SOD323	BB153
			SOD882T	BB178LX
			SOD523	BB178
	UHF	SOD882T	BB187LX	
		SOD523	BB187	
		SOD323	BB149A	
			SOD882T	BB179LX
			SOD523	BB179

Function	Product	Package	Type	
RF pre-amplifier	MOSFET	5 V	SOT143	BF904
			SOT143	BF909
			SOT143	BF1201
			SOT143	BF1202
			SOT143	BF1105
			SOT143	BF1211
		9 V	SOT143	BF1212
			SOT143	BF1100
			SOT143	BF1109
		2-in-1 @ 5 V	SOT363	BF1102R
			SOT363	BF1203
			SOT363	BF1204
			SOT363	BF1205
			SOT363	BF1205C
			SOT363	BF1206
			SOT666	BF1207
			SOT666	BF1208
			SOT666	BF1208D
			SOT363	BF1210
			SOT363	BF1214
			2-in-1 @ 3 V	SOT666

Function	Product	Package	Type	
Oscillator	Varicap diode	VHF low	SOD323	BB152
			SOD882T	BB182LX
			SOD523	BB182
		VHF high	SOD323	BB153
			SOD882T	BB178LX
			SOD523	BB178
	UHF	SOD882T	BB187LX	
		SOD523	BB187	
		SOD323	BB149A	
			SOD882T	BB179LX
			SOD523	BB179

Function	Product	Package	Type	
IF amplifier	MMIC	Wideband amplifier	SOT363	BGA2717

### Product highlight: BF1206F dual gate mosfet double amplifier specified for low power applications.

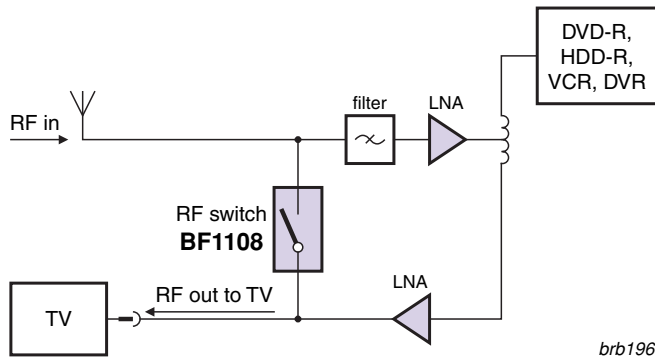
The device consists of two dual gate mosfet amplifiers in a small SOT666 flatlead package. The BF1206F is a true low power device specified for low voltage and low currents, intended for use in mobile applications where power consumption is critical. Performance is suitable for application at supply voltages of 3Volts and draincurrents of 4mA.

### Features

- ▶ Low power specified
- ▶ Two amplifiers in one small SOT666 package
- ▶ Shared gate 2 and Source leads
- ▶ Each amplifier is biased by an external bias resistor
- ▶ Excellent noise and crossmodulation performance



## 1.9 Antenna loop through



brb196

### Recommended products

Function	Product	Package	Type	
RF switch	MOSFET	Silicon RF switch	SOT23	BF1107
			SOT143B	BF1108
			SOT143R	BF1108R

Function	Product	Package	Type	
LNA	RF bipolar transistor	Wideband transistor	SOT143	BFG520
			SOT143	BFG540
			SOT89	BFQ540

Using the BF1108 as a RF switch saves considerable use of energy. The recording device (DVD-R, HDD-R, VCR, DVR) can be powered off but people can remain watching TV, although the antenna is looped via the recording device. Without using a BF1108 the antenna signal is lost.

How does it work ?

At the moment the power of the recording device is on, the BF1108 is open, so the RF signal travels via the recording device to the TV tuner.

At the moment the power of the recording device is completely off, the BF1108 closes. This ensures that the RF signal is looped through directly to the TV tuner. TV reception is guaranteed.

#### Product highlight:

##### BF1108 silicon RF switch, Mosfet

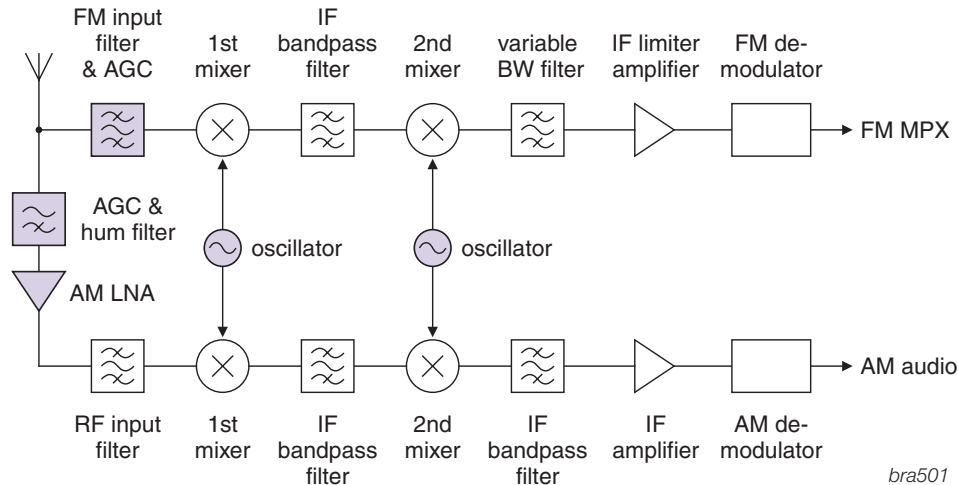
This switch is a combination of a depletion type field-effect transistor and a bandswitching diode in an SOT143B package. The low loss and high isolation capabilities of this device provide excellent RF switching functions. The gate of the MOSFET can be isolated from ground with the diode, resulting in low losses. Integrated diodes between gate and source and between gate and drain protect against excessive input voltage surges.

#### Features:

- ▶ Specially designed for low loss RF switching up to 1 GHz
- ▶ Easy to design-in
- ▶ Power ON: low losses
- ▶ Power OFF: high isolation
- ▶ ON or OFF, ZERO power consumption

# 1.10 Car radio receiver (CREST ICs: TEF6860HL, TEF6862HL)

## Application diagram



## Recommended products

Function	Product	Package	Type	
AM LNA	RF transistor	JFET	SOT23	BF862
FM input filter & AGC	RF diode	Varicap diode	SOT23	BB201*
			SOT23	BB207
		PIN diode	SOD523	BAP70-02
			SOD323	BAP70-03

\* = OIRT

Function	Product	Package	Type	
AGC & hum filter	RF diode	PIN diode	SOT363	BAP70AM
Oscillator	RF diode	Varicap diode	SOD323	BB156
			SOD523	BB208-02

### Note 1:

All these recommended discrete products are applicable for NICEPACS, CCC and DDICE: NICE:TEA6840H,TEA6845H,TEA6846H, NICEPACS:TEA6848H,TEA6849H; CCC:TEF6901H,TEF6903H; DDICE:TEA6721HL. All these recommended discrete products are applicable excluding AM LNA in: DICE2:TEF6730HWCE.

### Note 2:

Phone and portable radio (IC:TEA5767/68) use varicap BB202 as FM oscillator.

## Recommended application notes

Low-voltage FM stereo radio (TEA5767/68)	BB202
A NICE radio (TEA6848H)	JFETS,Varicaps and PIN diodes
Integrated Car Radio CCC (TEF69xxx)	JFETS,Varicaps and PIN diodes

### Product highlight: BF862 Junction Field Effect Transistor

Our Tuning component portfolio contains excellent products for car radio reception applications, playing a vital role for in-vehicle media platforms. The NXP devices for this application ensure excellent reception quality and ease of design in. Performance is demonstrated in reference designs.

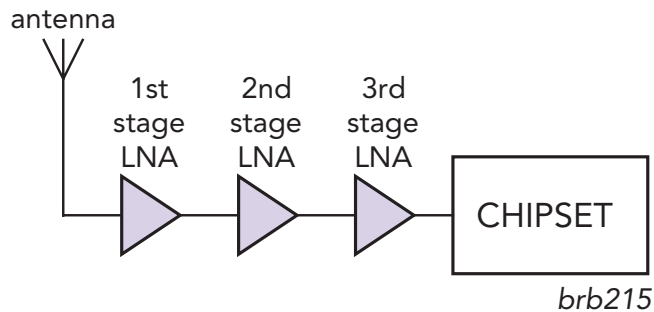
High performance Junction Fet BF862, specially designed for car radio AM amplifiers.

### Features

- ▶ High transition frequency and optimized input capacitance for excellent sensitivity
- ▶ High transfer admittance resulting in high gain
- ▶ Encapsulated in the versatile and easy to use SOT23 package

## 1.11 Active antenna

### Application diagram



### Recommended products

Function	Product		Package	Type
1st stage LNA	MMIC	Low noise wideband amplifier	SOT343R	BGA2001
			SOT343R	BGA2003

Function	Product		Package	Type
2nd stage LNA	MMIC	General purpose wideband amplifier	SOT363	BGM1013
			SOT363	BGM1011
			SOT363	BGA2715
			SOT363	BGA2748

Function	Product		Package	Type
3rd stage LNA	RF transistor	SiGeC transistor	SOT343F	BFU725F
	MMIC	SiGeC MMIC	SOT891	BGU7003

#### Product highlight:

##### BGU7003 SiGeC MMIC

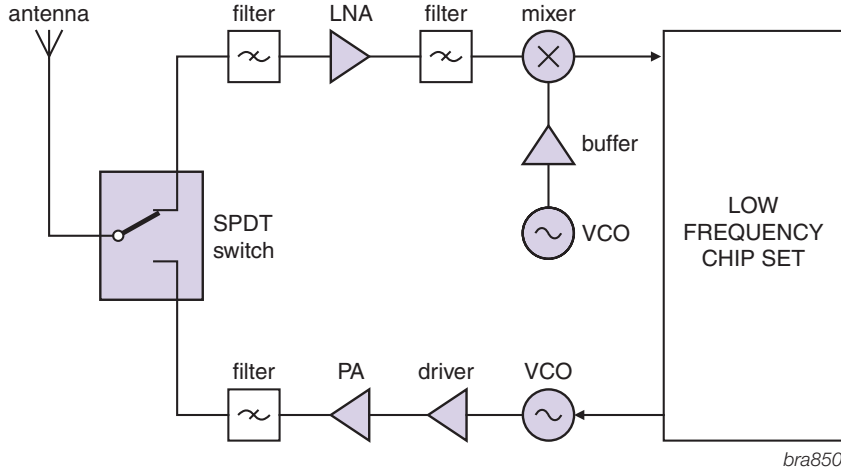
Manufactured in NXP's latest SiGeC process, this high-frequency RF MMIC delivers high-quality reception with extended battery life. It is a cost-effective, silicon based alternative to GaAs devices, and offers higher integration and easier design-in than discrete bipolar transistors.

#### Features:

- ▶ Low-noise, high-gain microwave MMIC
- ▶ Maximum stable gain =19 dB at 1.575 GHz
- ▶ 110-GHz fT-Silicon Germanium technology
- ▶ Optimized performance at low (5-mA) supply current
- ▶ Extremely thin, leadless 6-pin SOT891 package
- ▶ Integrated biasing and shutdown for easy integration

# 1.12 Walkie-talkie, RF generic front-end with a single antenna

## Application diagram



## Recommended products

Function	Product	Package	Type
SPDT Switch	RF diode	Bandswitch diode	SOD523 BA277
			SOD323 BA591
		PIN diode	various BAP51*
			various BAP1321*

Function	Product	Package	Type
Mixer	RF bipolar transistor	Wideband transistor	SOT343 BFG410W
		SOT343 BFG425W	
	MMIC	Linear mixer	SOT343 BFG480W
			SOT363 BGA2022

Function	Product	Package	Type
LNA	RF bipolar transistor	Wideband transistor	SOT23 PBR951
		SOT323 PRF957	
		SOT323 PRF947	
	MMIC	Low noise wideband ampl.	SOT343R BGA2001
		SOT343R BGA2003	

Function	Product	Package	Type
Buffer	RF bipolar transistor	Wideband transistor	SOT23 PBR951
			SOT323 PRF957
			SOT323 PRF947
			SOT416 PRF949

Function	Product	Package	Type
Driver	RF bipolar transistor	Wideband transistor	SOT323 PRF957
		SOT23 PBR951	
		Amplifier	SOT363 BGA2031/1
	MMIC	Gen. purpose wideband ampl.	SOT363 BGA2771
		SOT363 BGA2776	

Function	Product	Package	Type
Power amplifier	MMIC	Gen. purpose wideband ampl.	SOT89 BGA6289
			BGA6489
			BGA6589

Function	Product	Package	Type
VCO	Varicap diodes	VCO varicap diodes	SOD523 BB198
		SOD323 BB156	

\* = also available in ultra small leadless package SOD882T

### Product highlight: PRF957 silicon NPN UHF wideband transistor

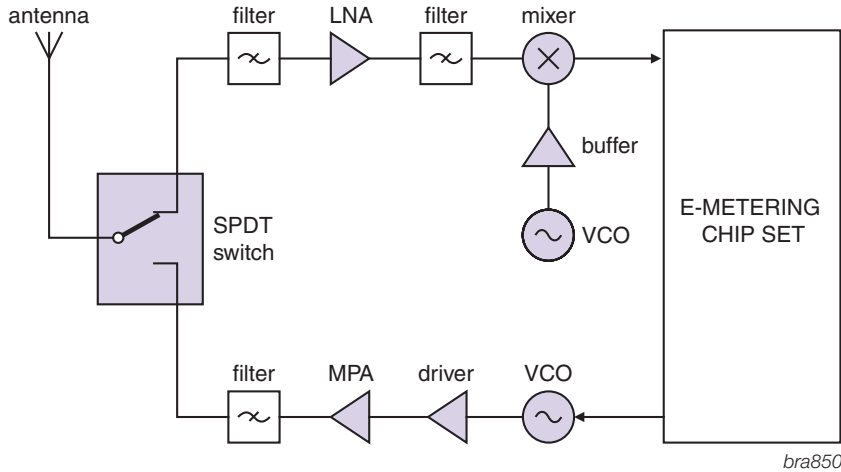
Silicon NPN UHF wideband transistor in a surface mount 3-pin SOT323 package is primarily intended for wideband applications in the RF front end. The transistor is widely built as LNA, power amplifier, driver and buffer in the UHF band application.

### Features

- ▶ Small 3-pin plastic surface mounted package
- ▶ Low noise (1.3dB at 1GHz) and high power gain (15dB at 1GHz)
- ▶ Gold metallization ensures excellent reliability

# 1.13 E-metering, RF generic front-end with a single antenna

## Application diagram



## Recommended products

Function	Product	Package	Type
SPDT Switch	RF diode	Bandswitch diode	SOD523 BA277
			SOD323 BA591
		PIN diode	various BAP51*
			various BAP1321*

Function	Product	Package	Type
LNA	RF bipolar transistor	Wideband transistor	SOT23 PBR951
			SOT323 PRF957
			SOT323 PRF947
	MMIC	Low noise wideband ampl.	SOT343R BGA2001
		SOT343R BGA2003	

Function	Product	Package	Type
Driver	RF bipolar transistor	Wideband transistor	SOT323 PRF957
			SOT23 PBR951
		Amplifier	SOT363 BGA2031/1
	MMIC	Gen. purpose wideband ampl.	SOT363 BGA2771
			SOT363 BGA2776

\* = also available in ultra small leadless package SOD882T.

Function	Product	Package	Type
Mixer	RF bipolar transistor	Wideband transistor	SOT343 BFG410W
			SOT343 BFG425W
	MMIC	Linear mixer	SOT343 BFG480W
			SOT363 BGA2022

Function	Product	Package	Type
Buffer	RF bipolar transistor	Wideband transistor	SOT23 PBR951
			SOT323 PRF957
			SOT323 PRF947
			SOT416 PRF949

Function	Product	Package	Type
Medium power amplifier	MMIC	Gen. purpose wideband ampl.	SOT89 BGA6289
			BGA6489
			BGA6589
			SOT505 BGA7027
			SOT762 BGA7127

Function	Product	Package	Type
VCO	Varicap diodes	VCO varicap diodes	SOD523 BB198
			SOD323 BB156

### Product highlight:

#### BGA7x27 MMIC medium power amplifier

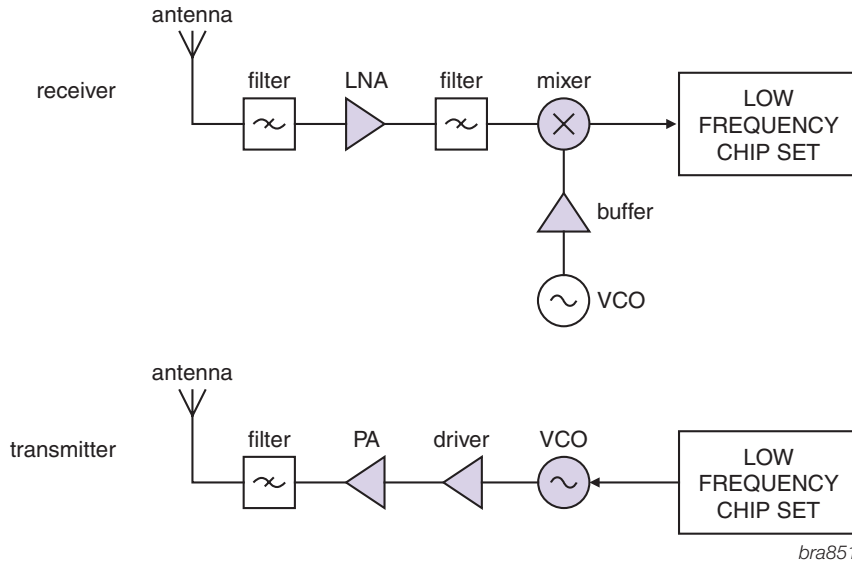
The BGA7x27 MMIC is a one-stage driver amplifier, offered in a low-cost leaded (BGA7027) or leadless (BGA7127) surface-mount package. It delivers 27dBm output power at 1 dB gain compression and a superior performance for various narrowband-tuned application circuits for frequencies up to 2700 MHz.

### Features

- ▶ 40 MHz to 2700 MHz frequency operating range
- ▶ 16 dB small signal gain at 2 GHz
- ▶ 27 dBm output power at 1 dB gain compression
- ▶ Integrated active biasing
- ▶ 3.3 V / 5 V single supply operation
- ▶ Simple quiescent current adjustment
- ▶ 1  $\mu$ A shutdown mode

# 1.14 Remote keyless entry, RF generic front-end with dedicated antenna for reception and transmission

## Application diagram



## Recommended products

Function	Product	Package	Type
LNA	RF bipolar transistor	Wideband transistor	SOT23 PBR951
			SOT323 PRF957
			SOT323 PRF947
	MMIC	Low noise wideband ampl.	SOT343R BGA2001
			SOT343R BGA2003

Function	Product	Package	Type
Driver	RF bipolar transistor	Wideband transistor	SOT323 PRF957
			SOT23 PBR951
		Amplifier	SOT363 BGA2031/1
	MMIC	Gen. purpose wideband ampl.	SOT363 BGA2771
			SOT363 BGA2776

Function	Product	Package	Type
VCO	Varicap diodes	VCO varicap diodes	SOD323 BB148
			SOD323 BB149A
			SOD523 BB198
			SOD323 BB156

Function	Product	Package	Type
Mixer	RF bipolar transistor	Wideband transistor	SOT343 BFG410W
			SOT343 BFG425W
	MMIC	Linear mixer	SOT343 BFG480W
		SOT363 BGA2022	

Function	Product	Package	Type
Buffer	RF bipolar transistor	Wideband transistor	SOT23 PBR951
			SOT323 PRF957
			SOT323 PRF947
			SOT416 PRF949

Function	Product	Package	Type
Power amplifier	RF bipolar transistor	Wideband transistor	SOT323 PRF957
			SOT23 PBR951
		Amplifier	SOT363 BGA2031/1
	MMIC	Gen. purpose wideband ampl.	SOT363 BGA2771
			SOT363 BGA2776

### Product highlight: NXP varicap diodes for VCO

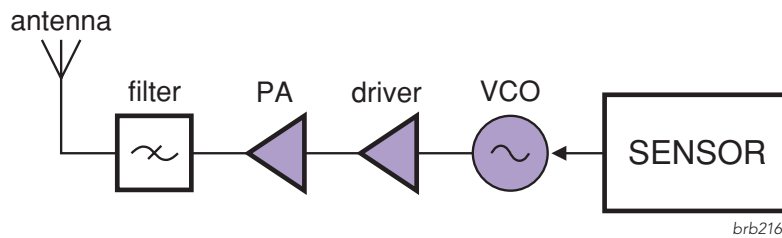
Varicap diodes are principally used as voltage varicap capacitors with their diode function a secondary option. These devices are ideal for voltage controlled oscillators (VCO) in ISM band applications.

### Features

- ▶ Excellent linearity
- ▶ Excellent matching
- ▶ Very low series resistance
- ▶ High capacitance ratio

## 1.15 Tire pressure monitoring system

### Application diagram



### Recommended products

Function	Product	Package	Type
PA	RF bipolar transistor	Wideband transistor	SOT23 BFR92A
			SOT323 BFR92AW
			SOT323 BFR93AW

Function	Product	Package	Type
Driver	RF bipolar transistor	Wideband transistor	SOT323 PRF957
			SOT23 PBR951
	MMIC	Amplifier	SOT363 BGA2031/1
		Gen. purpose wideband ampl.	SOT363 BGA2771
			SOT363 BGA2776

Function	Product	Package	Type
VCO	Varicap diodes	VCO varicap diodes	SOD523 BB198
			SOD323 BB156

#### Product highlight:

##### BFR92AW silicon NPN transistor

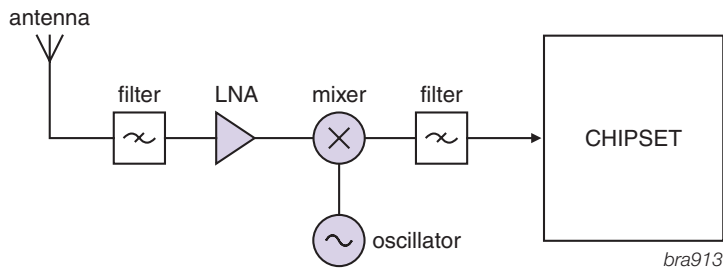
It is designed for use in RF amplifiers, mixers and oscillators with signal frequencies up to 1 GHz. This silicon NPN transistor encapsulated in a plastic SOT323 (S-mini) package. The BFR92AW uses the same crystal as the SOT23 version, BFR92A.

#### Features:

- ▶ High power gain
- ▶ Gold metallization ensures excellent reliability
- ▶ SOT323 (S-mini) package

# 1.16 Digital Audio Broadcasting (DAB)

## Application diagram



## Recommended products

Function	Frequency	Product	Package	Type		
LNA	VHF band	RF bipolar transistor	Wideband transistor	SOT23	BFS17	
				SOT323	BFS17W	
		RF transistor	JFET	SOT23	BF862	
		Mosfet	5 V		SOT143	BF904
					SOT143R	BF904R
					SOT143	BF909
					SOT143	BF1201
					SOT143	BF1202
					SOT143	BF1105
			9 V	SOT143	BF1211	
			SOT143	BF1212		
			SOT143	BF1100		
			SOT143	BF1109		
	S-band/ L-band	RF transistor	SiGeC transistor	SOT343F	BFU725F	
		RF bipolar transistor	Wideband transistor	SOT343	BFG425W	
SOT343				BFG410W		
MMIC		Low noise wideband amplifier		SOT343R	BGA2001	
				SOT343R	BGA2003	
				SOT363	BGM1013	
			SOT363	BGM1011		
	General purpose wideband amplifier	SOT363	BGA2715			
		SOT363	BGA2748			

Function	Product	Package	Type	
Mixer	RF bipolar transistor	Wideband transistor	SOT343	BFG410W
			SOT343	BFG425W
			SOT343	BFG480W
	MMIC	Linear mixer	SOT363	BGA2022

Function	Product	Package	Type	
VCO	Varicap diodes	VCO varicap diodes	SOD323	BB149

Suitable frequencies for DAB identified on VHF band, L-band and S-band:

- VHF band I: 47 - 68 MHz
- VHF band III: 174 - 240 MHz
- L-band: 1452 - 1467.5 MHz
- S-band: 2310 - 2360 MHz

### Product highlight: BFG410W NPN wideband transistor

NXP NPN double polysilicon wideband transistor with buried layer is for low voltage and low noise applications in a plastic, 4-pin dual-emitter SOT343R package.

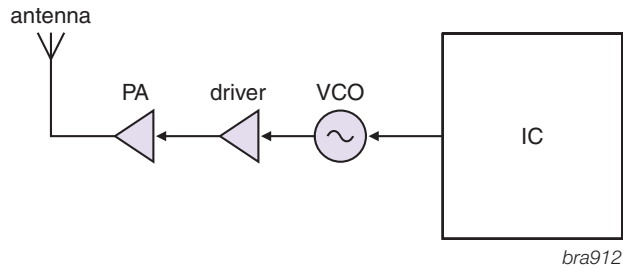
### Features

- ▶ Very high power gain (18dB at 2GHz)
- ▶ Low noise figure (1.2dB at 2GHz)
- ▶ High transition frequency (22GHz)
- ▶ Emitter is thermal lead
- ▶ Low feedback capacitance (45fF)



# 1.17 Wireless Microphone

## Application diagram



## Recommended products

Function	Product	Package	Type	
PA/Driver	RF bipolar transistor	Wideband transistor	SOT23	BFT93
			SOT323	BFT93W
			SOT23	PBR951
			SOT323	PRF957
			SOT343	BFG21W
			SOT343	BFG425W
		SOT343	BFG480W	

Function	Product	Package	Type	
VCO	Varicap diodes	VCO varicap diodes	SOD523	BB145B
			SOD323	BB149

Operation frequency:

- 70M - 72 M
- 150 MHz - 270 MHz
- 470 MHz - 1000 MHz
- 2400 MHz

### Product highlight: BFG480W NPN wideband transistor

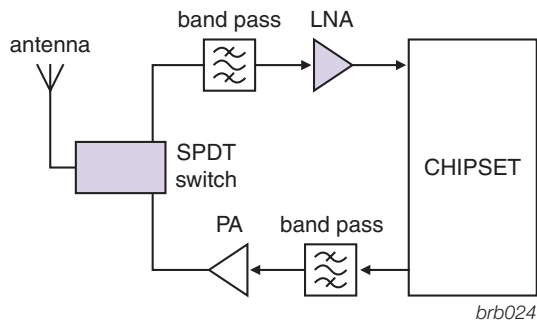
IXP NPN double polysilicon wideband transistor with buried layer is for low voltage and low noise applications in a plastic, 4-pin dual-emitter SOT343 package.

### Features

- ▶ High power gain
- ▶ Low noise figure
- ▶ High efficiency
- ▶ High transition frequency
- ▶ Emitter is thermal lead
- ▶ Low feedback capacitance
- ▶ Linear and non-linear operation

# 1.18 Wireless USB

## Application diagram



## Recommended products

Function	Product		Package	Type
LNA	RF transistor	SiGeC transistor	SOT343F	BFU725F

Function	Product		Package	Type
SPDT Switch	RF diode	PIN diode	various	BAP51*
			various	BAP63*
			various	BAP64*
			various	BAP55LX*
			various	BAP142LX*
			various	BAP1321*

\* = also available in ultra small leadless package SOD882T.

### Product highlight: BFU725F SiGeC microwave NPN transistor

Meet the trend towards higher frequencies. The BFU725F provides high switching frequencies plus extreme high gain and low noise.

#### Features

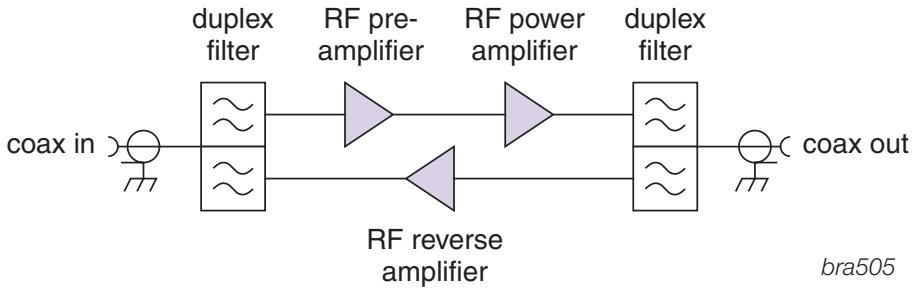
- ▶ Very low noise (0.4 dB at 1.8 GHz / 0.67 dB at 5.8 GHz)
- ▶ High maximum stable gain (27.8 dB at 1.8 GHz / 10 dB at 18 GHz)
- ▶ High switching frequency (fT >100 GHz / fMAX >150 GHz)
- ▶ Plastic surface-mount SOT343F package

#### Benefits

- ▶ SiGeC process delivers high switching frequency from a silicon-based device
- ▶ Cost-effective alternative to GaAs devices
- ▶ RoHS compliant

# 1.19 CATV electrical (line extenders)

## Application diagram



## Recommended products

Function	Product	Frequency	Gain (dB)	Type
RF pre-amplifier	Push-Pulls	550MHz	33.5 - 35.5	BGY588N
			33.5 - 35.5	BGY588C
			26.2 - 27.8	BGY587B
		600MHz	21 - 22	BGY687
			33.5 - 35.2	BGE788C
		750MHz	33.5 - 34.5	BGE788
			18 - 19	BGY785A
			21 - 22	BGY787
		870MHz	18 - 19	BGY885A
			21 - 22	BGY887
33.5 - 34.5	BGY888			
34.5 - 36.5	CGY888C			
1000MHz	18 - 19	BGY1085A		

Function	Product	Frequency	Gain (dB)	Type
RF power amplifier	Power doublers	550MHz	18-19	BGD502
			19.5 - 20.5	BGD704
		750MHz	18.2 - 18.8	BGD712
			18.2 - 18.8	BGD712C
			20 - 20.6	BGD714
		870MHz	18 -19	BGD802
			18.2 18.8	BGD812
			19.7 20.3	BGD814
			19.25 - 19.75	CGD923
			20.5 - 22.5	CGD942C
			23 - 25	CGD944C
			1000MHz	20.5 - 22.5
		20.5 - 22.5		CGD1042H
		22.5 - 24.5		CGD1044
		22.5 - 24.5		CGD1044H

Function	Product	Frequency	Gain (dB)	Type
RF reverse amplifier	Reverse hybrids	5-75 MHz	29.2 - 30.8	BGY68
		5-120 MHz	24.5 - 25.5	BGY66B
		5-200 MHz	23.5 - 24.5	BGY67A

All available in SOT115 package.

## Recommended application notes

BGS67A high-dynamic-range hybrid ampl. reverse ampl. 2-way CATV systems	BGS67A
A hybrid wideband amplifier module for digital CATV networks with BGD902	BGD902

### Product highlight: CGD1044H

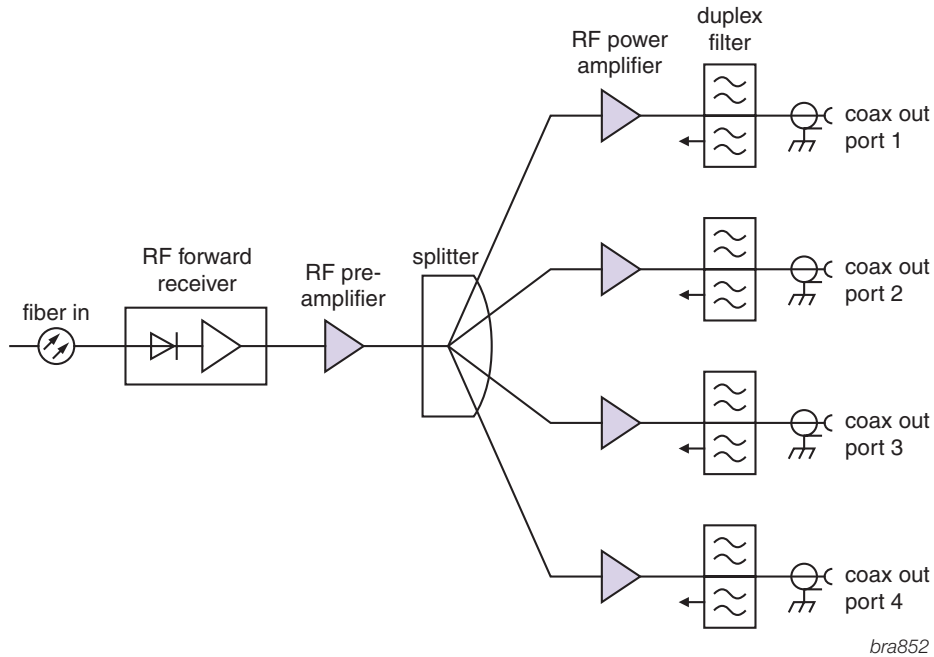
CGD1044H with high-output power is primarily designed for use in fiber deep-optical-node applications (N+0/1/2). This 1GHz solution offers an extended temperature range, high power overstress capabilities and high ESD levels resulting in a low cost of ownership. It's designed for durability and offering superior ruggedness.

### Features

- ▶ High-output power
- ▶ Excellent linearity, stability, and reliability
- ▶ High power gain
- ▶ Extremely low noise
- ▶ Silicon Nitride passivity
- ▶ GaAs HFET dies for high-end applications

## 1.20 CATV optical (optical node with multiple out-ports)

### Application diagram



### Recommended products

Function	Product	Frequency	Package	Type
RF forward receiver	Forward path receiver	870MHz	SOT115	BGO807
			SOT115	BGO807C
			SOT115	BGO827

Function	Product	Frequency	Gain (dB)	Type
RF pre-amplifier	Push-Pulls	870MHz	18 - 19	BGY885A
			21 - 22	BGY887
	Power doubler	870MHz	18.2 - 18.8	BGD812

Function	Product	Frequency	Gain (dB)	Type
RF power amplifier	Power doublers	870MHz	20.5 - 22.5	CGD942C
			23 - 25	CGD944C

### Recommended application notes

Using a Philips optical receiver in CATV applications	All optical receivers
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#### Product highlight: BGO807C

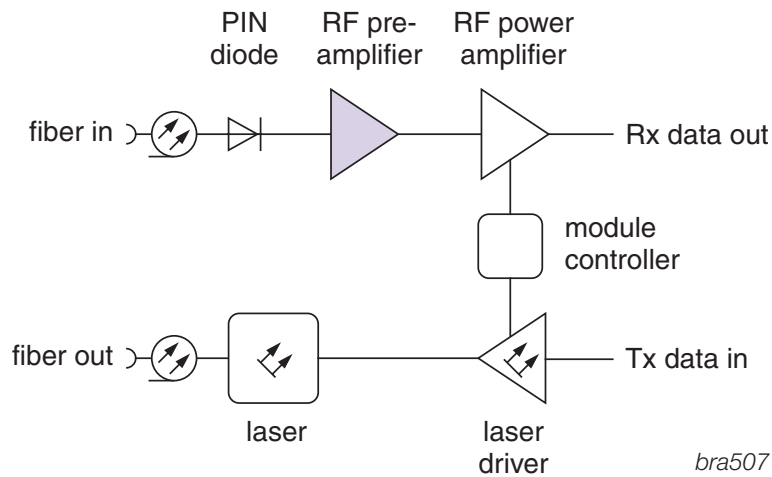
BGO807C is an integrated optical receiver module that provides high output levels and includes an integrated temperature compensated circuitry. In your optical node design, BGO807C enables a high performance/ price ratio and ruggedness. When upgrading an HFC network from analog to digital our BGO807C is the perfect fit.

#### Features

- ▶ Excellent linearity
- ▶ Low noise
- ▶ Excellent flatness
- ▶ Standard CATV outline
- ▶ Rugged construction
- ▶ Gold metallization ensures excellent reliability
- ▶ High optical input power range

## 1.21 Optical networking (SFF/SFP modules)

### Application diagram



### Recommended products

Function	Product	Data rate (Mb/s)	Package	Type
RF pre-amplifier	Trans-impedance amplifier	155	die only	TZA3036
		622	die only	TZA3026
		1200	die only	TZA3046
		2488	die only	TZA3013

### Recommended application notes

OM5811 demo boards supporting TZA47 laser drivers for 30-3200 Mb/s	TZA47
TZA30x6 – Receiver Optical Sub-Assembly	TZA30x6

#### Product highlight

##### TZA3046

TZA3046 transimpedance preamplifier brings high receiver sensitivity, wide dynamic range, and low power dissipation to Receiver Optical Sub Assemblies (ROSA). TZA3046 is optimized for Fibre Channel transmission systems and is equipped with a SFF8472-compliant output of average photo current for RSSI monitoring. A clear bonding layout and identical ports on both side of the die make assembly easy.

#### Features

- ▶ High receiver sensitivity, low equivalent input noise
- ▶ Exceptionally wide bandwidth
- ▶ On-chip AGC with options for external control
- ▶ Input overload up to 1.5 mA pp
- ▶ Differential outputs
- ▶ Bias voltage for PIN diode
- ▶ Single 3.3-V supply voltage (range: 2.9 to 3.6 V)



What if you could get a cost effective RF transistor up to 20 GHz?

Look at BFU725F, chapter 2.1

## 2. Focus applications & products

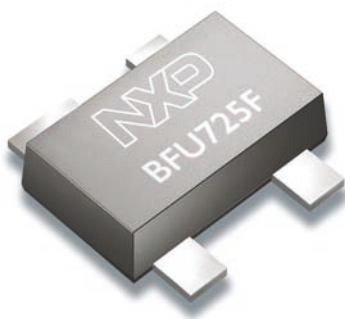
NXP RF applications:

<http://www.nxp.com/rf>

### 2.1 A perfect match up to 20 GHz

#### SiGeC microwave NPN transistor BFU725F

Meet the trend towards higher frequencies. With NXP Semiconductors' latest SiGeC microwave NPN transistor BFU725F, you get high switching frequencies plus extremely high gain and low noise. All this in an easy-to-use SOT343F package. It's the ideal solution for applications up to 20 GHz.



#### Features

- Very low noise (0.4 dB at 1.8 GHz / 0.67 dB at 5.8 GHz)
- High maximum stable gain (27.8 dB at 1.8 GHz / 10 dB at 18 GHz)
- High switching frequency ( $f_T > 100$  GHz /  $f_{MAX} > 150$  GHz)
- Plastic surface-mount SOT343F package

#### Benefits

- SiGeC process delivers high switching frequency from a silicon-based device
- Cost-effective alternative to GaAs devices
- RoHS compliant

#### Applications

- GPS systems
- DECT phones
- Low noise amplifier (LNA) for microwave communications systems
- 2nd stage LNA and mixer in direct broadcast satellite (DBS) low-noise blocks (LNBS)
- Satellite radio
- WLAN and CDMA applications
- Low-noise microwave applications

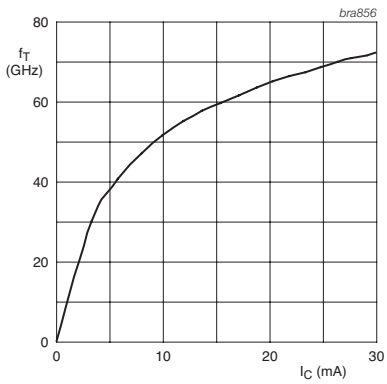
The NPN microwave transistor BFU725F delivers an unbeatable blend of high switching frequency, high gain and very low noise. Thanks to its ultra-low noise figure, it's perfect for your sensitive RF receivers particularly those for high-performance cell phones. Alternatively, with its high cut-off frequency, it's your ideal solution for microwave applications in the 10 GHz to 30 GHz range, such as satellite TV receivers and automotive collision avoidance radar.

The BFU725F get its outstanding performance from our innovative silicon-germanium-carbon (SiGeC) BiCMOS process. QUBiC4X was designed specifically to meet the needs of real-life, high-frequency applications and delivers an unrivalled fusion of high power gain and excellent dynamic range. It combines the performance of gallium-arsenide (GaAs) technologies with the reliability of a silicon-based process. In addition, with the BFU725F, you don't need a biasing IC or negative biasing voltage. So it's a much more cost-effective solution than GaAs pHEMT devices.

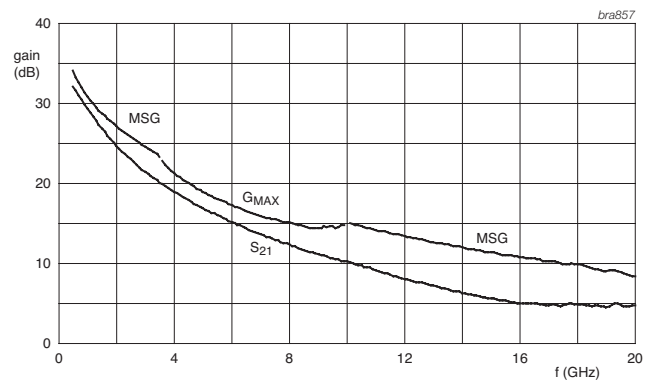
## Quick reference data

Parameter	Symbol	Conditions	Value
Collector-emitter breakdown voltage	$BV_{CE0}$	$I_C = 1 \text{ mA}; I_B = 0$	3.2 V
Maximum collector current	$I_{C(max)}$		40 mA
Transition frequency	$f_T$	$V_{CE} = 2 \text{ V}; I_C = 25 \text{ mA}; f = 2 \text{ GHz}$	68 GHz
Noise figure	NF	$V_{CE} = 2 \text{ V}; I_C = 5 \text{ mA}; f = 1.8 \text{ GHz}; \Gamma_s = \Gamma_{opt}$	0.4 dB
		$V_{CE} = 2 \text{ V}; I_C = 5 \text{ mA}; f = 2.4 \text{ GHz}; \Gamma_s = \Gamma_{opt}$	0.45 dB
		$V_{CE} = 2 \text{ V}; I_C = 5 \text{ mA}; f = 5.8 \text{ GHz}; \Gamma_s = \Gamma_{opt}$	0.7 dB
		$V_{CE} = 2 \text{ V}; I_C = 5 \text{ mA}; f = 12 \text{ GHz}; \Gamma_s = \Gamma_{opt}$	1.0 dB
Maximum stable power gain	MSG / $G_{P(max)}$	$V_{CE} = 2 \text{ V}; I_C = 25 \text{ mA}; f = 1.8 \text{ GHz}$	26.6 dB
		$V_{CE} = 2 \text{ V}; I_C = 25 \text{ mA}; f = 2.4 \text{ GHz}$	25.5 dB
		$V_{CE} = 2 \text{ V}; I_C = 25 \text{ mA}; f = 5.8 \text{ GHz}$	17 dB
		$V_{CE} = 2 \text{ V}; I_C = 25 \text{ mA}; f = 12 \text{ GHz}$	13 dB

<sup>1</sup> Calculated from noise figure using a lowpass bandwidth filter at 0.7x bit rate and a source with an extinction ratio of 10% and a photodiode responsivity of 0.9A/W.



Transition frequency as a function of collector current (typical values)



Gain as a function of frequency (typical values)



## 2.2 NXP wideband LNA MMIC BGU7003 in SiGe:C process

### High-quality reception at high RF frequencies

Manufactured in NXP's latest SiGe:C process, this high-frequency RF MMIC delivers high-quality reception with extended battery life. It is a cost-effective, siliconbased alternative to GaAs devices, and offers higher integration and easier design-in than discrete bipolar transistors.



#### Key features

- Low-noise, high-gain microwave MMIC
- Minimum noise figure is 0.85 dB at 1.575 GHz
- Maximum stable gain =20 dB at 1.575 GHz
- 110-GHz f<sub>T</sub>-Silicon Germanium Carbon technology
- Optimized performance at low (5-mA) supply current
- ESD protection > 1kV Human Body Model on all pins
- Extremely thin, leadless 6-pin SOT891 package

#### Key benefits

- Integrated biasing and shutdown for easy integration
- Power-down mode consumes less than 1  $\mu$ A
- Temperature-stabilized bias

#### Applications

- GPS
- E-metering
- WLAN and CDMA wireless communication
- Satellite radio
- Analog/digital cordless applications (DECT)
- Microwave communications systems

The BGU7003 is designed for high-speed, low-noise mobile applications. In GPS units, for example, it delivers high-quality reception with maximum battery life. That means consumers always know where they are, and can receive continuous directions, between high rises and under heavy overcast skies. It also means having a GPS device that can run for days, instead of hours.

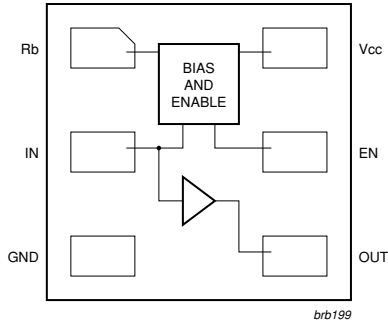
The BGU7003 gets its outstanding performance from NXP's innovative silicon-germanium-carbon (SiGe:C) BiCMOS process, called QUBiC4X. This groundbreaking process technology was designed specifically to meet the needs of real-life, high-frequency applications and delivers an unrivalled fusion of high power gain and excellent dynamic range. It combines the performance of gallium-arsenide (GaAs) technologies with the reliability of a silicon-based process.

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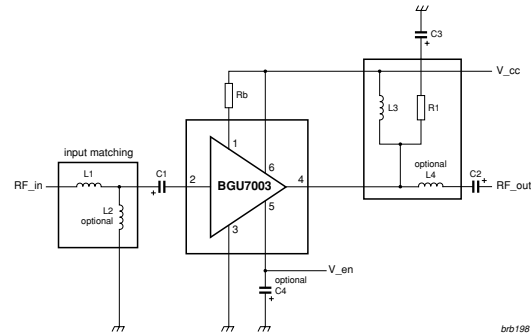
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The BGU7003 includes an integrated bias generator that simplifies the application and makes design-in easier. Biasing is done away from the RF input line, and the device offers the same full flexibility as the working range of the NXP BFU725F. The bias adapts over temperature to ensure the gain is well controlled. There is no matching on the die, and no limit to the application area.

As the latest member of NXP's growing SiGe:C portfolio, the BGU7003 joins the highly successful BFU725F device. It is available in a demo board that lets the designer evaluate noise figures, gain, input and output reflection coefficients, and reverse isolation.



BGU7003 circuit



BGU7003 demo board

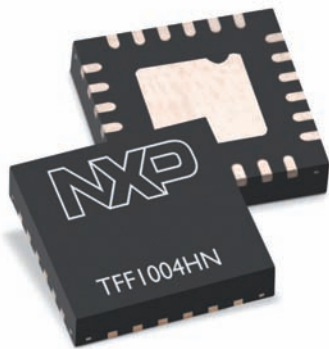
Symbol	Parameter	Conditions	Typ	Unit
$V_{CC}$	supply voltage	RF input AC coupled	2.5	V
$I_{CC}$	supply current	3,3	5	mA
$G_{p(max)}$	maximum power gain	$V_{CC} = 2.5\text{ V}; I_{CC} = 5.0\text{ mA}; f = 1.575\text{ GHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$ <sup>(1)</sup>	19	dB
NF	noise figure	$V_{CC} = 2.5\text{ V}; I_{CC} = 5.0\text{ mA}; f = 1.575\text{ GHz}; \Gamma_S = \Gamma_{opt}$	0.85	dB
$P_{L(1dB)}$	output power at 1dB gain compression	$V_{CC} = 2.5\text{ V}; I_{CC} = 15.0\text{ mA}; f = 1.575\text{ GHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$	8	dBm
$IP3_O$	output third-order intercept point	$V_{CC} = 2.5\text{ V}; I_{CC} = 15.0\text{ mA}; f = 1.575\text{ GHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$	18	dBm

## 2.3 Total solution for satellite LNB

### Create a Ku-band DVB-S LNB for less, with higher reliability

#### NXP fully integrated down converter (PLL synthesizer/mixer/amplifier) TFF1004HN for satellite LNB

The TFF1004HN is an integrated downconverter for use in Low Noise Block (LNB) converters in a 10.7 GHz to 12.75 GHz Ku band satellite receiver system. This alignment-free concept replaces current solutions that require components such as GaAs mixer and DRO. As part of our LNB chipset, it enables a Ku-band satellite receiver that lowers total cost of ownership and guarantees the stability of the local oscillator.



#### Features

- 4 Pre-amplifier, mixer, buffer amplifier, and PLL synthesizer in one IC
- State-of-the-art SiGe BiCMOS process
- Alignment-free concept
- LO frequency with XTAL control
- Low phase noise
- Switched LO frequency: 9.75 and 10.6 GHz
- Low spurious
- HVQFN24 package (4 x 4 x 0.85 mm)
- Part of complete LNB chipset:
  - NXP UAF3000TS for supply and band/polarization switching
  - NXP BFU725F for 2nd LNA stage
- Demo board available

#### Application

- 4 Ku-band DVB-S receiver

Designed for use in the Low Noise Block (LNB) of a Ku-band satellite receiver for Asian and European standards, the NXP TFF1004HN is a highly integrated IC that includes an LNA, a mixer, a down-converter, a PLL, a crystal oscillator, and an IF buffer.

It is manufactured in NXP's breakthrough SiGe BiCMOS process for microwave applications, which is more cost-effective than GaAs processes and more reliable than discrete implementations.

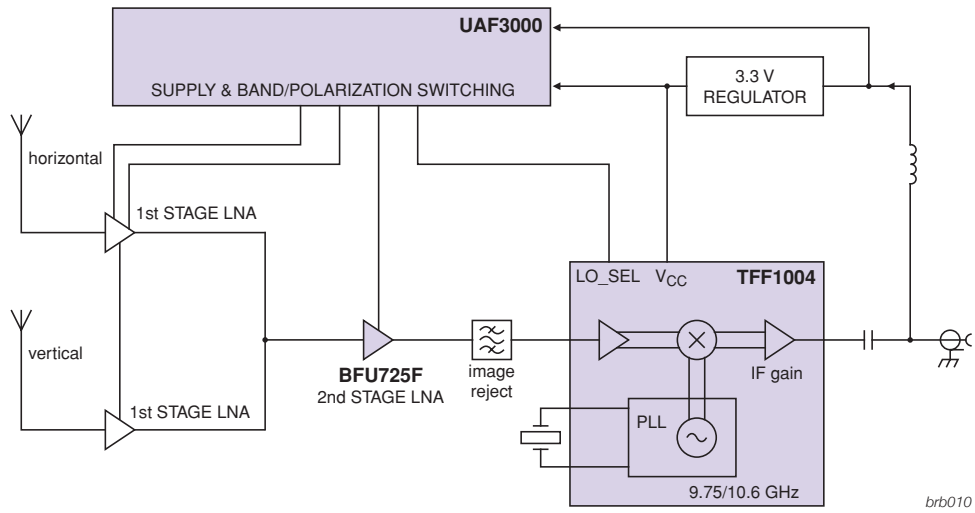
To comply with Asian and European DVB-S standards, the TFF1004HN supports RF input frequencies between 10.7 and 12.75 GHz, and uses a selectable LO that operates at 9.75 or 10.6 GHz.

It is housed in a small HVQFN24 package that measures only 4 x 4 x 0.85 mm, and is designed to work as part of a complete chipset that provides a total LNB solution.

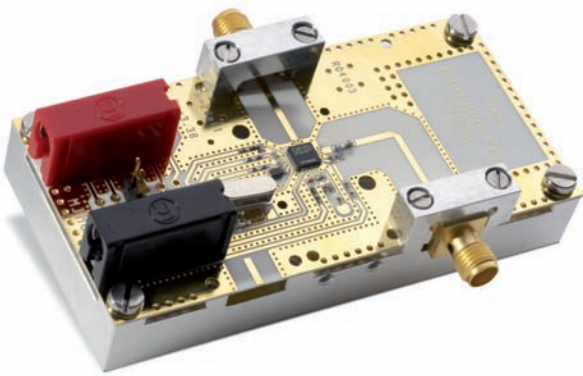
#### Complete LNB chipset

The chipset consists of the TFF1004HN, the UAF3000TS, and the BFU725F. The UAF3000TS is a FET bias controller with a polarization switch and tone detection. It provides biasing for up to three LNA devices. An integrated bandgap reference ensures the accuracy of voltage and tone detection, also over temperature. For horizontal and vertical switching, there is an integrated supply-voltage detector, and for switching between high and low bands, there is a 22-kHz tone detector. The supply voltage range, 3.3 V or 5 V, is detected automatically.

The BFU725F is an NPN microwave transistor for high-speed, low-noise applications. In the LNB chipset, it is used for the second LNA stage. It is manufactured in a 110-GHz ft-SiGeC technology, so it delivers an excellent noise figure (1.0 dB at 12 GHz), and a high maximum stable gain (13 dB at 12 GHz).



LNB application with TFF1004HN, UAF3000TS, and BFU725F



TFF1004HN demo board

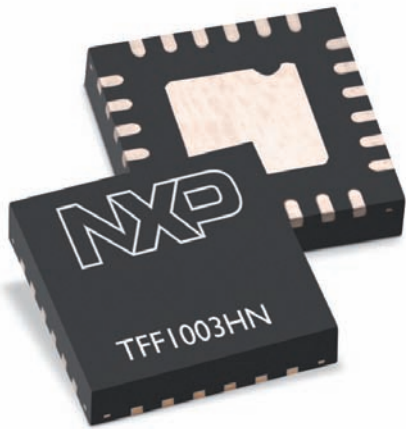
	Input frequency range (GHz)	Conversion gain Gc (dB)	Noise figure NF (dB)	Output IP3 IP3(out) (dB)	Switched LO frequency (GHz)
TFF1004HN	10.7 to 12.75	32	9	10	9.75 / 10.6
	Typ. collector current IC(max) (mA)	Transition frequency fT (GHz)	Noise figure NF (dB) @ 12 GHz	Max. stable power gain MSG/GP(max) (dB) @ 12 GHz	Collector-emitter breakdown voltage BVCEO (V)
BFU725F	8	68	1.0	13	3.2
	Supply voltage VCC (V)	Drain voltage VD (V)	Drain current IDO (mA)	Supply current ICC (mA)	Polarization detection voltage VPOL (V)
UAF3000TS	3.3 or 5	2	10	6	14.75

## 2.4 VSAT, 2-way communication via satellite

### Design a Ku-band VSAT transmitter or transceiver that meets IESS-308

#### NXP Ku-band RF PLL TFF1003HN for VSAT

The TFF1003HN is a Ku-band RF PLL intended for low phase-noise Local Oscillator (LO) circuits in Ku-band VSAT transmitters and transceivers. Manufactured in a high-performance SiGeC process, it delivers extremely low phase noise at 13.05 GHz from a 10-MHz reference, and complies with the IESS-308 from Intelsat.



#### Features

- Phase noise compliant with IESS-308 (Intelsat)
- LO generator with VCO range from 12.8 to 13.05 GHz
- Input signal from 50 to 815 MHz
- Differential input and output
- Divider settings at 16, 32, 64, 128 or 256
- Lock-detect output
- SiGeC technology (120-GHz  $f_T$  process)
- HVQFN24 (SOT616-1) package

#### Applications

- VSAT up-converters
- Local oscillator signal generation

VSAT networks are commonly used to transmit narrowband data, such as point-of-sale transactions for credit cards, or to transmit broadband data that supports satellite Internet access to a remote location, VoIP, or video.

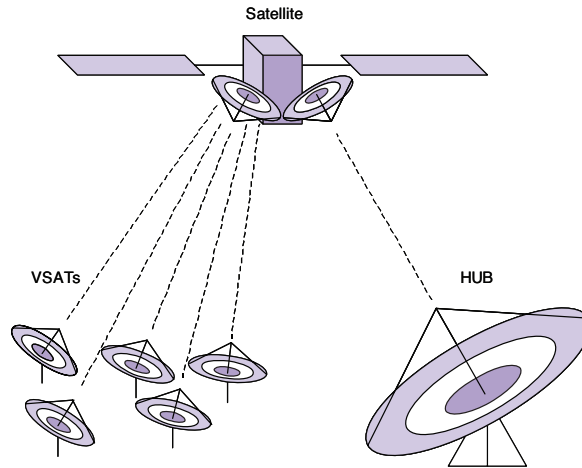
The network typically consists of a dish antenna, an outdoor unit, and an indoor unit. The outdoor unit is used for frequency translation between RF and IF, and usually includes a microwave-based uplink/downlink separator, a Low Noise Block (LNB) for receiving the downlink signals, and a Block Up Converter (BUC).

The TFF1003HN can be used to create the LO generator for a linear BUC (meaning the IF or RF conversion is done by mixing with an LO). In Ku-band applications, the LO frequency is either 13.05 GHz for standard range or 12.8 GHz for extended range.

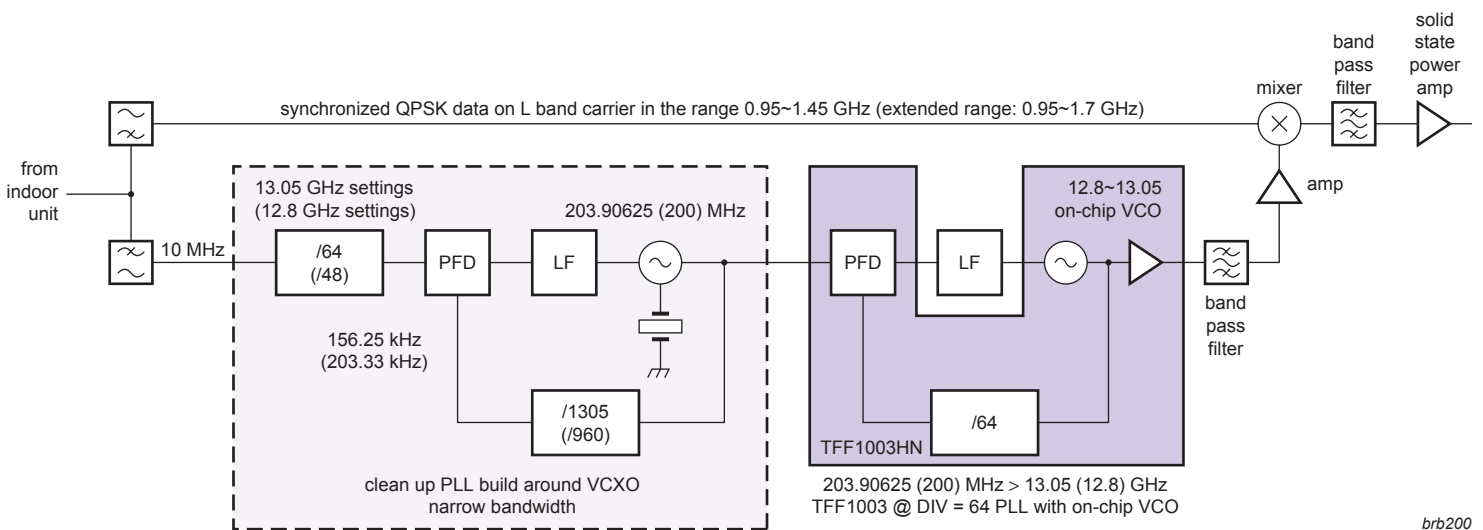
To enable precise frequency and time multiplexing, the downlink signal provides an accurate frequency reference of 10 MHz. The indoor unit frequency multiplexes this with the uplink IF signal, and the LO signal in the BUC needs to be frequency locked to the reference.

The TFF300HN is housed in a 24-pin HVQFN (SOT616-1) package. The pins have been assigned for optimal performance. Three voltage domains are used to separate the block on the IC, and two pins for each output (OUT-P) and (OUT-N) have been reserved to match a typical layout using a linewidth of  $Z=50\ \Omega$  microstrip on a 20-mil RO4003 board (1.1 mm).

The ground pins have been placed next to the reference input and the output, and, to minimize crossings in the application, all the supply pins are on the same side of the IC.



Typical VSAT network



brb200

Complete LO generator for linear BUC with TFF1003HN

Type	Input frequency range (MHz)	Supply voltage (V)	Supply current (mA)	Phase noise (dBc/Hz)	Spurious noise (dBc)	Output power (dBm)
TFF1003HN *	50 to 815	3.0 to 3.6	200	-138 with 10-MHz reference signal	-70	-7 to -3

\* As designed into complete BUC LO generator

## 2.5 NXP CATV C-family for the Chinese SARFT standard

### Connecting people, protecting your network

Specially designed for the Chinese Hybrid Fiber Coax (HFC) infrastructure, NXP CATV C-family offers you a total solution for cable TV networks. It is both flexible enough for connecting rural communities as part of China's 'Connecting every village' program and powerful enough for upgrading major cities from analog to high-end digital services. All C-type devices are compliant with the Chinese State Administration for Radio, Film and Television (SARFT) standard, and cover most HFC applications in the 550 - 870 MHz range.



#### Products

- BGY588C, BGE788C and CGY888C push-pull amplifiers
- BGD712C, CGD944C and CGD942C power doublers
- BGO807C optical receiver

#### Features

- Excellent linearity, stability and reliability
- High power gain
- Extremely low noise
- Silicon Nitride passivity
- GaAs HFET dies for high end devices

#### Benefits

- Compliant with Chinese SARFT HFC networks standard
- Transparent cap allows confirmation of product authenticity
- Rugged construction

Further extending our high quality CATV portfolio, this new family lets you address an even wider range of HFC applications. Dedicated solutions for the implementation of CATV systems in China, our C-type devices deliver the performance you need for modern TV infrastructures.

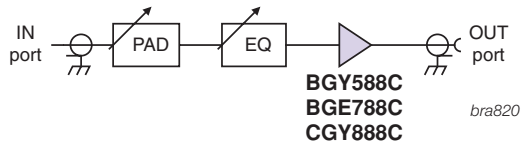
The BGY588C, BGE788C and BGD712C devices cover the frequency range from 550 MHz to 750 MHz. Extending the C-family portfolio into the high-end segment, the CGD944C, CGD942C, CGY888C and BGO807C operate between 40 MHz and 870 MHz and have been specifically tested under Chinese raster conditions. Manufactured using our GaAs HFET die process, the CGD942C, and CGD944C are high-gain, high-performance 870 MHz power doublers. They are capable of satisfying the demanding requirements of top-end applications including high-power optical nodes.

Our GaAs HFET MMIC dies are providing 'by design' the best ESD protection levels with no needs for external TVS components normally used with GaAs pHEMT devices.

All CATV C-type devices feature a see-through cap that makes it easy to distinguish them from counterfeit products.

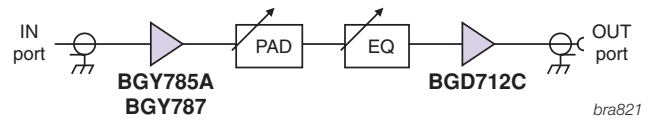
### BGY588C and BGE788C

The last stage of an HFC network structure is called a terminating amplifier or 'user amplifier' as it is close to the subscribers. Each terminating amplifier requires a single module such as BGY588C for 550 MHz, BGE788C for 750 MHz and CGY888C for 860 MHz systems. These modules are fitting perfectly in the Chinese 'Connecting to Every Village' projects.



### BGD712C

The BGD712C is a 750 MHz, 18 dB power doubler module. It has been designed for 750 MHz optical nodes including ordinary or optical receivers and distribution amplifiers. It can also be used in line extender amplifiers together with a 750 MHz push-pull module, such as BGY785A or BGY787. As such it can be used widely in Chinese 'Connecting to Every Village' projects.

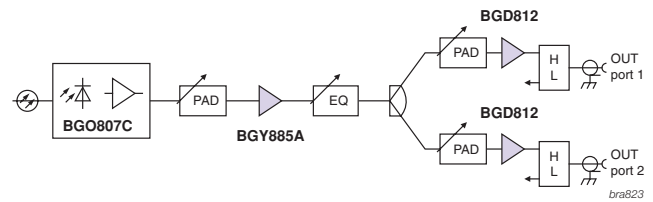
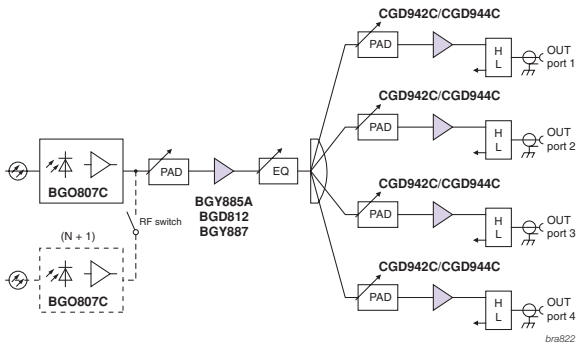


### CGD944C and CGD942C

Our full GaAs power doublers modules, CGD942C and CGD944C offer high output power and better CTB and CSO than other modules. Designed for high-end HFC networks containing optical nodes with multiple out-ports, these modules enable each port to directly cover at least 125 subscribers. These two devices are ideal when used in upgrading HFC networks to 860 MHz.

### BGO807C

BGO807C is an integrated optical receiver module that provides high output levels and includes an integrated temperature compensated circuitry. In your optical node design, BGO807C enables a high performance/ price ratio and ruggedness. When upgrading an HFC network from analog to digital our BGO807C is the perfect fit.





## C-family application information

NXP C-family by application							
Application	BGY588C	BGE788C	CGY888C	BGD712C	BGO807C	CGD944C	CGD942C
Optical node				•	•	•	•
Optical receiver				•	•	•	•
Distribution amplifier			•	•	•	•	
Line extender amplifier			•	•	•	•	
Terminating amplifier	•	•	•				

### Push-pull amplifiers

Parameters		BGY588C	BGE788C	CGY888C
Power gain (dB)	typ.	34,5	34,2	35,5
Slope cable equivalent (dB)	range	0.2 - 1.7	0.3 - 2.3	1.5 typ.
Composite triple beat (dB)	max.	-57	-49	-66
Composite 2nd order distortion (dB)	max.	-62	-52	-64
Noise (@ fmax) (dB)	max.	8	8	3 typ.
Total current consumption (mA)	typ.	325	305	280
Frequency range (MHz)	range	40 - 550	40 - 750	40 - 870

### Power doublers

Parameters		BGD712C	CGD944C	CGD942C
Power gain (dB)	typ.	18,5	25	23
Slope cable equivalent (dB)	range	0.5 - 1.5	1 - 2	1 - 2
Composite triple beat (dB)	max.	-62	-66	-66
Composite 2nd order distortion (dB)	max.	-63	-67	-67
Noise (@ fmax) (dB)	max.	7	5	5
Total current consumption (mA)	typ.	395	450	450
Frequency range (MHz)	range	40 - 750	40 - 870	40 - 870

### Optical receiver

Parameters		BGO807C
Responsivity (Rmin)	min.	800
Slope cable equivalent (dB)	range	0 - 2
Composite triple beat (dB)	max.	-71
Composite 2nd order distortion (dB)	max.	-55
Noise (@ fmax) (dB)	max.	8,5
Total current consumption (mA)	typ.	190
Frequency range (MHz)	range	40 - 870
Connector		- / SCO / FCO

## Complete GaAs amplifier solutions for Chinese HFC networks

These high-performance GaAs solutions, specially designed for the Chinese SARFT HFC standard, provide complete functionality in a format that reduces chip-count and lowers overall cost.

### Products

- 870-MHz push-pull amplifier: CGY888C
- 870-MHz power doublers: CGD942C (23-dB gain), CGD944C (25-dB gain)

### Features

- GaAs HFET process for best performance and lowest chip-count
- Excellent linearity, stability, and reliability
- High power gain
- Extremely low noise
- Excellent return-loss properties

### Benefits

- Fully compliant with Chinese SARFT HFC networks standard
- Transparent cap confirms product authenticity
- Rugged construction
- Unconditionally stable
- Thermally optimized design

### Applications

- Hybrid Fiber Coax (HFC) applications
- Line extenders
- Trunk amplifiers
- Fiber deep-optical-node (N+0/1/2)

To support Chinese HFC CATV infrastructure applications as a single-source supplier, NXP offers the C-family, a complete line of dedicated RF amplifier modules that deliver the very high level of performance required for next-generation HFC TV networks.

The family includes the 870-MHz push-pull amplifier CGY888C, a GaAs upgrade of NXP's industry-leading BGY888 and BGY835C products, and two 870-MHz power doublers: the CGD942C, which has a typical gain of 23 dB, and the CGD944C, with a typical gain of 25 dB.

The modules are flexible enough to connect rural communities as part of China's "Connect Every Village" project, and powerful enough to upgrade major cities from analog to high-end digital services.

The modules have been tested under Chinese raster conditions and fully comply with the Chinese SARFT standard. They also cover most HFC applications in the range of 550 to 870 MHz and are compatible with previous generations of NXP HFC solutions, so they can be used to upgrade existing networks to a higher level of performance.

Produced in NXP's advanced GaAs HFET die process, the modules deliver excellent linearity with extremely low noise, and work seamlessly together. The GaAs process improves performance and, by reducing chip count, saves overall cost. It offers stronger signal strength than Si, so there are fewer amplifiers required, and it provides superior ESD protection compared to GaAs pHEMT processes, so there's no need for external TVS components. The CGY888C is well suited for use in the last stage of an HFC network, which is known as a terminating amplifier or a user amplifier since it is close to subscribers.

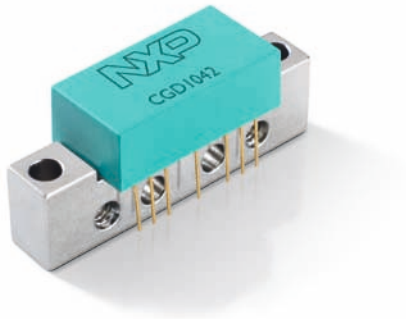
The CGD942C and the CGD944C offer higher output power and better CTB and CSO than other power doublers, so they are ideal for use in HFC networks that have optical nodes with multiple out-ports. The modules enable each port to cover at least 125 subscribers directly.

All the C-family modules are delivered with transparent caps that make it easy to distinguish them from counterfeit products.

## 2.6 Upgrade to a sustainable 1-GHz CATV network

### NXP high-gain power doublers CGD104x for 1-GHz CATV applications

These high-performance GaAs devices for 1-GHz CATV applications make it easy for cable operators to extend their services to include HDTV, VoIP, and digital simulcasting.



#### Products

- Power doublers: CGD1042, CGD1044
- High-output power doublers: CGD1042H, CGD1044H

#### Features

- Excellent linearity, stability, and reliability
- High power gain
- Extremely low noise
- Silicon Nitride passivity
- GaAs HFET dies for high-end applications
- Rugged construction

#### Benefits

- Simple upgrade to 1-GHz capable networks
- Optimized heat management
- Excellent temperature resistance
- Low total cost of ownership
- High ESD levels
- High power-stress capability
- Highly automated assembly

#### Applications

- Hybrid Fiber Coax (HFC) applications
- Line extenders
- Trunk amplifiers
- Fiber deep-optical-node (N+0/1/2)

Designed for 1-GHz “sustainable networks”, these high-performance GaAs devices enable extended bandwidth and higher data rates. They deliver increased network capacity and make way for high-end services like HDTV, VoIP, and digital simulcasting.

The power doublers CGD1042 and CGD1044 are ideal for use in line extenders and trunk amplifiers. Their high-output counterparts, the CGD1042H and CGD1044H, are designed for use in fiber deep-optical-node applications (N+0/1/2), delivering the highest output power on the market today.

The GaAs HFET die process delivers high gain and high performance, along with lower current and better CTB and CSO ratings.

These 1-GHz solutions are designed for durability and offer superior ruggedness, an extended temperature range, high-power overstress capabilities, and high ESD levels. The result is low cost of ownership.

The GaAs die is inserted in a unique HVQFN package that is then mounted on thermal vias that manage heat transfer to the heat sink. Temperature-control circuitry keeps the module’s high performance stable over a wide range of temperature changes.

Assembly is fully automated and requires almost no human intervention and therefore repeatability remains very high.

#### Upcoming push-pull products

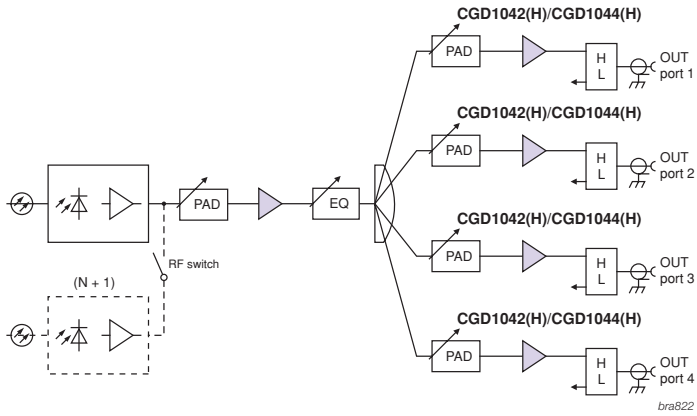
New push-pulls, currently under development, will combine with the power doublers to service almost all modern HFC applications. The push-pull CGY1041 will deliver a gain of 21 dB, the CGY1043 a gain of 23 dB and the CGY1047 a gain of 27dB.

## Quick reference data

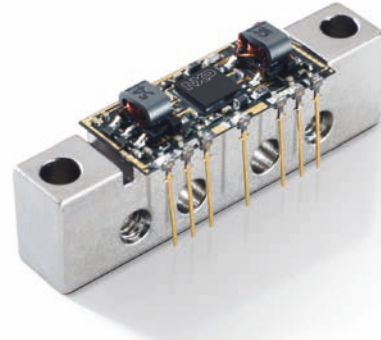
Parameters		CGD1042	CGD1044	CGD1042H	CGD1044H
Power gain (dB)	typ.	23	25	23	25
Slope cable equivalent (dB)	typ.	2	2	1,5	1
Composite triple beat (dB)	typ.	-70(1)	-70(1)	-75(2)	-75(2)
Composite 2nd order distortion (dB)	typ.	-75(1)	-75(1)	-76(2)	-76(2)
Noise (@ fmax) (dB)	max.	5	5	6	6
Total current consumption (mA)	typ.	450	450	450	450
Frequency range (MHz)	range	40 - 1000	40 - 1000	40 - 1000	40 - 1000

<sup>(1)</sup> 79 analog channels, 13.9 dB extrapolated tilt up to 1 GHz,  $V_{out} = 56.9$  dBmV @ 1GHz

<sup>(2)</sup> 79 analog channels + 75 digital channels (-6 dB offset, 18 dB extrapolated tilt up to 1 GHz,  $V_{out} = 59$  dBmV @ 1GHz)



An optical node with multiple out-ports using the CGD1042(H) and CGD1044(H)



Power doubler shown without cap

## 2.7 Boost RF performance and reduce system size

### RF PIN diodes in leadless SOD882T

Deliver the maximum performance and functionality in the smallest space with our new RF PIN diodes in SOT882T. These unique products enhance the RF performance of your system while reducing its form factor and cutting your time to market.

#### Features

- Low series inductance
- Low capacitance
- Leadless, package with very small footprint (1.0 mm x 0.6 mm)
- Low profile (0.4 mm)
- Low insertion loss

#### Benefits

- Unrivalled performance
- Faster time to market
- Smaller end products
- Easier assembly

#### Applications

- Cellular and cordless phones
- Low noise blocks
- Multi-switch boxes
- Set-top boxes
- CATV infrastructure
- Base stations
- eMetering
- Bluetooth and wireless LAN
- Car Radio

Our RF PIN diodes are ideal for a wide range of mobile communications and RF applications. Their low loss and low distortion levels improve battery life and quality in mobile phones and cordless phones. Moreover, their extremely low forward resistance, diode capacitance and series inductance simplify design-in.

We offer an extensive portfolio of RF PIN diodes. So you're sure to find the right solution for your needs. The latest additions to this portfolio are housed in the ultra-small, leadless SOD882T package, making them particularly suitable for wireless devices.

As part of our ultra-thin leadless package (UTLP) platform, the SOD882T package uses a patent-pending etch process that produces extremely high silicon to footprint ratio and a profile as low as 0.4 mm. In addition, the package has no leads and so delivers very low parasitics for maximum RF performance. This unique combination of properties results in devices that maximize the performance and functionality of your system while reducing its size and weight. They also simplify board assembly to help cut your time to market.

#### Product overview

Type	Limits		Typ. RD ( $\Omega$ ) @			Typ. Cd (pF) @		
	Vr (V)	If (mA)	0.5 mA	1 mA	10 mA	0 V	1 V	20 V
BAP50LX	50	50	25	14	3	0.45	0.35	0.3 (@ 5 V)
BAP51LX	60	60	5.5	3.6	1.5	0.4	0.3	0.2 (@ 5 V)
BAP55LX	50	100	3.4	2.3	1	0.27	0.23	0.18 (@ 5 V)
BAP63LX	50	100	2.5	1.95	1.17	0.4	0.35	0.3
BAP64LX	100	100	20	10	2	0.52	0.37	0.23
BAP65LX	30	100		1	0.56	0.65	0.6	0.375
BAP1321LX	60	100	3.4	2.4	1.2	0.4	0.35	0.25
BAP142LX	50	100	3.3	2.4	1	0.26	0.23	0.15

#### Functions of pin diodes

	Telecom		Consumer and automotive				Industrial			Connectivity		
	Cellular	Cordless	Low-noise block	Multi switch box	Walkie-talkie	Set top box	Car radio	CATV	Base station	eMetering	Bluetooth	WLAN
Switching	•	•	•	•	•				•	•	•	
Attenuating						•	•	•				•



**What if you could reduce RF component count in your wireless devices?**

Look at RF IC's – MMICs, chapter 3.4.1

# 3. Product portfolio

NXP RF product catalog:

<http://www.nxp.com/rf>

## 3.1 New products

DEV = In development

CQS = Customer qualification samples

RFS = Release for supply

Type	Application / Description	Status September 2008	Planned release	Chapter
<b>NEW: RF diodes</b>				
BB179BLX	Varicap for TV & Satellite in 1006 leadless package	RFS	Released	3.2.1
BB181LX	Varicap for TV & Satellite in 1006 leadless package	RFS	Released	3.2.1
BB182LX	Varicap for TV & Satellite in 1006 leadless package	RFS	Released	3.2.1
BB187LX	Varicap for TV & Satellite in 1006 leadless package	RFS	Released	3.2.1
<b>NEW: Satellite RF IC's</b>				
TFF1003HN	Low noise LO generator for VSAT applications	DEV	Q2 2009	3.4.2
TFF1004HN	Fully integrated mixer oscillator downconverter for Satellite LNB	RFS	Released	3.4.2
TFF1006HN	Low noise LO generator for VSAT applications	DEV	Q2 2009	3.4.2
<b>NEW: SiGeC transistors &amp; MMICs</b>				
BGU7002	SiGeC MMIC for high frequency applications, without ESD protection on RF input	CQS	Q4 2008	3.4.1
BGU7003	SiGeC MMIC for high frequency applications, with ESD protection on RF input	CQS	Q4 2008	3.4.1
BGU7004	SiGeC MMIC, incl matching input/output for GPS LNA	DEV	Q1 2009	3.4.1
BGU7005	SiGeC MMIC, incl matching output for GPS LNA	DEV	Q1 2009	3.4.1
<b>NEW: Medium power amplifier MMICs</b>				
BGA7027	Medium power amplifier for base stations and e-Metering, leaded package	DEV	Q1 2009	3.4.1
BGA7127	Medium power amplifier for base stations and e-Metering, leadless package	DEV	Q1 2009	3.4.1
<b>NEW: RF CATV modules</b>				
CGY888C	870 MHz, 35 dB gain Push Pull, GaAs HFET SOT115	RFS	Released	3.6.2
CGY1041	1 GHz, 21 dB gain Push Pull, GaAs HFET SOT115	DEV	Q1 2009	3.6.2
CGY1043	1 GHz, 23 dB gain Push Pull, GaAs HFET SOT115	DEV	Q1 2009	3.6.2
CGY1047	1 GHz, 27 dB gain Push Pull, GaAs HFET SOT115	CQS	Q4 2008	3.6.2

## 3.2 RF diodes

NXP varicaps:

<http://www.nxp.com/varicaps>

NXP RF PIN diodes:

<http://www.nxp.com/pindiodes>

NXP RF Schottky diodes:

<http://www.nxp.com/rfschottkydiodes>

### 3.2.1 Varicap diodes

#### Why choose NXP semiconductors' varicap diodes:

- Reference designs for TV and radio tuning
- Direct matching process
- Small tolerances
- Short leadtimes
- Complete portfolio covering broad frequency range and variety in package (including leadless)
- Reliable volume supply

#### VCO and FM radio tuning varicap diodes

Type	Package	number of diodes	configuration	@ f = 1 MHz												rs typ	rs max	@ f =
				Cd min	Cd typ	Cd max	@ VR =	Cd min	Cd typ	Cd max	@ VR =	Cd1/Cd2 min	Cd1/Cd2 max	@ V1 =	@ V2 =			
				(pF)	(pF)	(pF)	(V)	(pF)	(pF)	(pF)	(V)			(V)	(V)			
BB145B	SOD523	1	SG	6.4	-	7.2	1	2.55	-	2.95	4	2.2	-	1	4	-	0.6	470
BB156	SOD323	1	SG	14.4	16	17.6	1	4.2	4.8	5.4	7.5	2.7	3.9	1	7.5	0.4	0.7	470
BB198	SOD523	1	SG	25	-	28.5	1	4.8	-	6.8	4	-	-	-	-	-	0.8	100
BB199	SOD523	1	SG	36.5	-	42.5	0.5	11.8	-	13.8	2	2.8	-	0.5	2	0.25	-	100
BB201	SOT23	2	CC	89	95	102	1	25.5	27.6	29.7	7.5	3.1	3.8	1	7.5	0.25	0.5	100
BB202**	SOD523	1	SG	28.2	-	33.5	0.2	7.2	-	11.2	2.3	2.5	-	0.2	2.3	0.35	0.6	100
<b>BB202LX**</b>	SOD882T	1	SG	28.2	-	33.5	0.2	7.2	-	11.2	2.3	2.5	-	0.2	2.3	0.35	-	100
<b>BB207*</b>	SOT23	2	CC	76	81	86	1	25.5	27.6	29.7	7.5	2.6	3.3	1	7.5	0.2	0.4	100
<b>BB208-02*</b>	SOD523	1	SG	19.9	-	23.2	1	4.5	-	5.4	7.5	3.7	5.2	1	7.5	0.35	0.5	100
<b>BB208-03*</b>	SOD323	1	SG	19.9	-	23.2	1	4.5	-	5.4	7.5	3.7	5.2	1	7.5	0.35	0.5	100

**Bold** = Highly recommended product

\* = Including special design for FM car radio (CREST-IC:TEF6860).

\*\* = Including special design for mobile phone tuner ICs.

Type of connection:

SG: Single

CC: Common Cathode



## TV / VCR / DVD / HDD varicap diodes - UHF tuning

Type	Package	@ f = 1 MHz									r <sub>s</sub> typ	r <sub>s</sub> max	@ f =	@ C <sub>d</sub> =	ΔC <sub>d</sub> / C <sub>d</sub>	@ V <sub>1</sub> =	@ V <sub>2</sub> =	@ N <sub>s</sub> =
		C <sub>d</sub> min	C <sub>d</sub> typ	C <sub>d</sub> max	@ V <sub>R</sub> =	C <sub>d1</sub> /C <sub>d2</sub> min	C <sub>d1</sub> /C <sub>d2</sub> typ	C <sub>d1</sub> /C <sub>d2</sub> max	@ V <sub>1</sub> =	@ V <sub>2</sub> =								
		(pF)	(pF)	(pF)	(V)				(V)	(V)								
Matched																		
BB149	SOD323	1.9	2.1	2.25	28	8.2	9	10	1	28	-	0.75	470	9	2	0.5	28	10
BB149A	SOD323	1.951	2.1	2.225	28	8.45	9	10.9	1	28	0.6	0.75	470	9	2	1	28	10
BB179	SOD523	1.951	2.1	2.225	28	8.45	9	10.9	1	28	0.6	0.75	470	9	2	1	28	10
BB179B	SOD523	1.9	2.1	2.25	28	8.45	9	10	1	28	0.6	0.75	470	9	2	1	28	10
<b>BB179BLX</b>	SOD882T	1.9	-	2.25	28	-	9	-	1	28	0.65	-	470	9	2	1	28	10
BB179LX	SOD882T	1.95	2.1	2.22	28	8.45	9	10.9	1	28	0.65	-	470	30	2	1	28	5
BB184	SOD523	1.87	2	2.13	10	6	7	-	1	10	0.65	-	470	9	2	1	10	5
Unmatched																		
BB135	SOD323	1.7	-	2.1	28	8.9	-	12	0.5	28	-	0.75	470	9	-	-	-	-

**Bold Red** = New, highly recommended product

## TV / VCR / DVD / HDD varicap diodes - VHF tuning

Type	Package	@ f = 1 MHz									r <sub>s</sub> typ	r <sub>s</sub> max	@ f =	@ C <sub>d</sub> =	ΔC <sub>d</sub> / C <sub>d</sub>	@ V <sub>1</sub> =	@ V <sub>2</sub> =	@ N <sub>s</sub> =
		C <sub>d</sub> min	C <sub>d</sub> typ	C <sub>d</sub> max	@ V <sub>R</sub> =	C <sub>d1</sub> / C <sub>d2</sub> min	C <sub>d1</sub> / C <sub>d2</sub> typ	C <sub>d1</sub> / C <sub>d2</sub> max	@ V <sub>1</sub> =	@ V <sub>2</sub> =								
		(pF)	(pF)	(pF)	(V)				(V)	(V)								
Matched																		
BB148	SOD323	2.4	2.6	2.75	28	14.5	15	-	1	28	-	0.9	100	12	2	0.5	28	10
BB152	SOD323	2.48	2.7	2.89	28	20.6	22	-	1	28	1	1.2	100	30	2	1	28	10
BB153	SOD323	2.361	2.6	2.754	28	13.5	15	-	1	28	0.65	0.8	100	30	2	1	28	10
<b>BB178</b>	SOD523	2.361	2.6	2.754	28	13.5	15	-	1	28	0.65	0.8	100	30	2	1	28	10
<b>BB178LX</b>	SOD882T	2.36	2.6	2.75	28	13.5	15	-	1	28	0.7	-	470	30	2	1	28	5
<b>BB182</b>	SOD523	2.48	2.7	2.89	28	20.6	22	-	1	28	1	1.2	100	30	2	1	28	10
<b>BB182LX</b>	SOD882T	2.48	2.7	2.89	28	-	22	-	1	28	1	-	100	30	2	1	28	10
<b>BB187</b>	SOD523	2.57	2.75	2.92	25	11	-	-	2	25	-	0.75	470	-	2	2	25	10
<b>BB187LX</b>	SOD882T	2.57	2.75	2.92	25	11	-	-	2	25	-	0.75	470	-	2	2	25	10
Unmatched																		
BB131	SOD323	0.7	-	1.055	28	12	-	16	0.5	28	-	3	470	9	-	-	-	-
BB181	SOD523	0.7	-	1.055	28	12	-	16	0.5	28	-	3	470	9	-	-	-	-
<b>BB181LX</b>	SOD882T	0.7	-	1.055	28	-	14	-	0.5	28	2	-	470	9	-	-	-	-
BBY40	SOT23	4.3	-	6	25	5	-	6.5	3	25	-	0.7	200	25	-	-	-	-

**Bold** = Highly recommended product

**Bold Red** = New, highly recommended product

## 3.2.2 PIN diodes

### Why choose NXP Semiconductors' PIN diodes:

- Broad portfolio
- Unrivalled performance
- Short leadtimes
- Low series inductance
- Low insertion loss
- Low capacitance

### PIN diodes: typical $r_D @ 1 \text{ mA} = < 2$

Type	Package	number of diodes	Conf	VR max (V)	IF max (mA)	rD typ ( $\Omega$ )	rD max ( $\Omega$ )	rD typ ( $\Omega$ )	rD max ( $\Omega$ )	rD typ ( $\Omega$ )	rD max ( $\Omega$ )	Cd typ (pF)	Cd typ (pF)	Cd max (pF)	Cd typ (pF)	Cd max (pF)
BAP65LX	SOD882T	1	SG	30	100	-	-	0.94	-	0.49	0.9	0.61	0.48	0.85	0.37	-
BAP65-02	SOD523	1	SG	30	100	-	-	1	-	0.56	0.9	0.65	0.55	0.9	0.375	-
BAP65-03	SOD323	1	SG	30	100	-	-	1	-	0.56	0.9	0.65	0.55	0.9	0.375	-
BAP65-05	SOT23	2	CC	30	100	-	-	1	-	0.56	0.9	0.7	0.575	0.9	0.425	-
BAP65-05W	SOT323	2	CC	30	100	-	-	1	-	0.56	0.9	0.7	0.575	0.9	0.425	-
BAP63LX	SOD882T	1	SG	50	100	2.3	3.3	1.87	3	1.19	1.8	0.34	0.29	-	0.24	0.3
BAP63-02	SOD523	1	SG	50	100	2.5	3.5	1.95	3	1.17	1.8	0.36	0.32	-	0.25	0.32
BAP63-03	SOD323	1	SG	50	100	2.5	3.5	1.95	3	1.17	1.8	0.4	0.35	-	0.27	0.32
BAP63-05W	SOT323	2	CC	50	100	2.5	3.5	1.95	3	1.17	1.8	0.4	0.35	-	0.3	0.35

### PIN diodes: typical $r_D @ 1 \text{ mA} = 2.2 - 2.4$

Type	Package	number of diodes	Conf	VR max (V)	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz				
						@ IF = 0.5 mA		@ IF = 1 mA		@ IF = 10 mA		@ VR = 0 V	@ VR = 1 V		@ VR = 20 V	
						rD typ ( $\Omega$ )	rD max ( $\Omega$ )	rD typ ( $\Omega$ )	rD max ( $\Omega$ )	rD typ ( $\Omega$ )	rD max ( $\Omega$ )	Cd typ (pF)	Cd typ (pF)	Cd max (pF)	Cd typ (pF)	Cd max (pF)
BAP55LX	SOD882T	1	SG	50	100	3.3	4.5	2.2	3.3	0.8	1.2	0.28	0.23	-	0.18	0.28
BAP1321-02	SOD523	1	SG	60	100	3.4	5	2.4	3.6	1.2	1.8	0.4	0.35	0.45	0.25	0.32
BAP1321-03	SOD323	1	SG	60	100	3.4	5	2.4	3.6	1.2	1.8	0.4	0.35	0.45	0.25	0.32
BAP1321-04	SOT23	2	SR	60	100	3.4	5	2.4	3.6	1.2	1.8	0.42	0.375	0.45	0.275	0.325
BAP1321LX	SOD882T	1	SG	60	100	3.3	5	2.4	3.6	1.2	1.8	0.32	0.27	0.38	0.21	0.28
BAP142LX	SOD882T	1	SG	50	100	3.3	5	2.4	3.6	1	1.8	0.25	0.22	-	0.16	0.26

### PIN diodes: typical $r_D @ 1 \text{ mA} = 3.2 - 3.6$

Type	Package	number of diodes	Conf	VR max (V)	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz				
						@ IF = 0.5 mA		@ IF = 1 mA		@ IF = 10 mA		@ VR = 0 V	@ VR = 1 V		@ VR = 5 V	
						rD typ ( $\Omega$ )	rD max ( $\Omega$ )	rD typ ( $\Omega$ )	rD max ( $\Omega$ )	rD typ ( $\Omega$ )	rD max ( $\Omega$ )	Cd typ (pF)	Cd typ (pF)	Cd max (pF)	Cd typ (pF)	Cd max (pF)
BAP51LX	SOD882T	1	SG	60	100	4.9	9	3.2	6.5	1.4	2.5	0.3	0.22	0.4	0.17	0.3
BAP51-02	SOD523	1	SG	60	50	5.5	9	3.6	6.5	1.5	2.5	0.4	0.3	0.55	0.2	0.35
BAP51-03	SOD323	1	SG	50	50	5.5	9	3.6	6.5	1.5	2.5	0.4	0.3	0.55	0.2	0.35
BAP51-04W	SOT323	2	SR	50	50	5.5	9	3.6	6.5	1.5	2.5	0.4	0.3	0.55	0.2	0.35
BAP51-05W	SOT323	2	CC	50	50	5.5	9	3.6	6.5	1.5	2.5	0.4	0.3	0.55	0.2	0.35
BAP51-06W	SOT323	2	CA	50	50	5.5	-	3.6	-	2	-	0.4	0.3	-	0.2	-

### PIN diodes: typical $r_D @ 1 \text{ mA} = 10$

Type	Package	number of diodes	Conf	VR max (V)	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz				
						@ IF = 0.5 mA		@ IF = 1 mA		@ IF = 10 mA		@ VR = 0 V	@ VR = 1 V		@ VR = 20 V	
						rD typ ( $\Omega$ )	rD max ( $\Omega$ )	rD typ ( $\Omega$ )	rD max ( $\Omega$ )	rD typ ( $\Omega$ )	rD max ( $\Omega$ )	Cd typ (pF)	Cd typ (pF)	Cd max (pF)	Cd typ (pF)	Cd max (pF)
BAP64-02	SOD523	1	SG	175	100	20	40	10	20	2	3.8	0.48	0.35	-	0.23	0.35
BAP64-03	SOD323	1	SG	175	100	20	40	10	20	2	3.8	0.48	0.35	-	0.23	0.35
BAP64-04	SOT23	2	SR	175	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-04W	SOT323	2	SR	100	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-05	SOT23	2	CC	175	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-05W	SOT323	2	CC	100	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-06	SOT23	2	CA	175	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-06W	SOT323	2	CA	100	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35

## PIN diodes: typical $r_D @ 1 \text{ mA} = 14 - 16$

Type	Package	number of diodes	conf	VR max (V)	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz					
						@ IF = 0.5 mA		@ IF = 1mA		@ IF = 10mA		@ VR = 0 V	@ VR = 1 V		Cd typ (pF)	Cd max (pF)	@ VR = (V)
						rD typ ( $\Omega$ )	rD max ( $\Omega$ )	rD typ ( $\Omega$ )	rD max ( $\Omega$ )	rD typ ( $\Omega$ )	rD max ( $\Omega$ )	Cd typ (pF)	Cd typ (pF)	Cd max (pF)			
BAP50-02	SOD523	1	SG	50	50	25	40	14	25	3	5	0.4	0.3	0.55	0.22	0.35	5
BAP50-03	SOD323	1	SG	50	50	25	40	14	25	3	5	0.4	0.3	0.55	0.2	0.35	5
BAP50-04	SOT23	2	SR	50	50	25	40	14	25	3	5	0.45	0.35	0.6	0.3	0.5	5
BAP50-04W	SOT323	2	SR	50	50	25	40	14	25	3	5	0.45	0.35	0.6	0.3	0.5	5
BAP50-05	SOT23	2	CC	50	50	25	40	14	25	3	5	0.45	0.3	0.5	0.35	0.6	1
BAP50-05W	SOT323	2	CC	50	50	25	40	14	25	3	5	0.45	0.35	0.6	0.3	0.5	5
<b>BAP50LX</b>	SOD882T	1	SG	50	50	26	40	14	25	3	5	0.4	0.28	0.55	0.19	0.35	5
<b>BAP64LX</b>	SOD882T	1	SG	60	100	31	50	16	26	2.6	4.4	0.48	0.34	-	0.17	0.3	20

## PIN diodes: typical $r_D @ 1 \text{ mA} = 40$

Type	Package	number of diodes	Confi	VR max (V)	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz				
						@ IF = 0.5 mA		@ IF = 1mA		@ IF = 10mA		@ VR = 0 V	@ VR = 1 V		@ VR = 20 V	
						rD typ ( $\Omega$ )	rD max ( $\Omega$ )	rD typ ( $\Omega$ )	rD max ( $\Omega$ )	rD typ ( $\Omega$ )	rD max ( $\Omega$ )	Cd typ (pF)	Cd typ (pF)	Cd max (pF)	Cd typ (pF)	Cd max (pF)
<b>BAP70-02</b>	SOD523	1	SG	50	100	77	100	40	50	5.4	7	0.57	0.4	-	0.2	0.25
<b>BAP70-03</b>	SOD323	1	SG	50	100	77	100	40	50	5.4	7	0.57	0.4	-	0.2	0.25
BAP70-04W	SOT323	2	SR	50	100	77	100	40	50	5.4	7	0.6	0.43	-	0.25	0.3
BAP70-05	SOT23	2	CC	50	100	77	100	40	50	5.4	7	0.6	0.43	-	0.25	0.3
<b>BAP70AM</b>	SOT363	4	SR	50	100	77	100	40	50	5.4	7	0.57	0.4	-	0.2	0.25

Bold = highly recommended product

### 3.2.3 Band-switch diodes

#### Why choose NXP Semiconductors' bandswitch diodes:

- Reliable volume supplier
- Short leadtimes
- Low series Inductance
- Low Insertion loss
- Low capacitance
- High reverse Isolation

Type	Package	VR max (V)	IF max (mA)	rD max (Ω)	@ IF = (mA)	@ f = (MHz)	Cd max (pF)	@ VR = (V)	@ f = (MHz)
<b>BA277</b>	SOD523	35	100	0.7	2	100	1.2	6	1
BA278	SOD523V	35	100	0.7	2	100	1.2	6	1
BA591	SOD323	35	100	0.7	3	100	0.9	3	1
BA891	SOD523	35	100	0.7	3	100	0.9	3	1
BAT18	SOT23	35	100	0.7	5	200	1	20	1

**Bold** = Highly recommended product

### 3.2.4 Schottky diodes

#### Why choose NXP Semiconductors' schottky diodes:

- (Very) low diode capacitance
- (Very) low forward voltage
- Single and triple-isolated diode
- (Ultra / very) small package

#### Applications

- Digital applications:
  - ultra high-speed switching
  - clamping circuits
- RF applications:
  - diode ring mixer
  - RF detector
  - RF voltage doubler

#### Low-capacitance Schottky diodes

Type	Package	Configuration	VR max. (V)	IF max. (mA)	VF max. (mV)	CD max. (pF)
BAT17	SOT23	single	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
PMBD353	SOT23	dual series	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
PMBD354	SOT23	dual series	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
1PS76SB17	SOD323	single	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
1PS66SB17	SOT666	triple isolated	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
1PS79SB17	SOD523	single	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
1PS88SB82	SOT363	triple isolated	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS70SB82	SOT323	single	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS70SB84	SOT323	dual series	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS70SB85	SOT323	dual c.c	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS70SB86	SOT323	dual c.a.	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS66SB82	SOT666	triple isolated	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS10SB82	SOD882	single	15	30	340 @ IF = 1 mA	1 @ VR = 0 V

## 3.3 RF Bipolar transistors

### 3.3.1 Wideband transistors

RF wideband transistors:

<http://www.nxp.com/rftransistors>

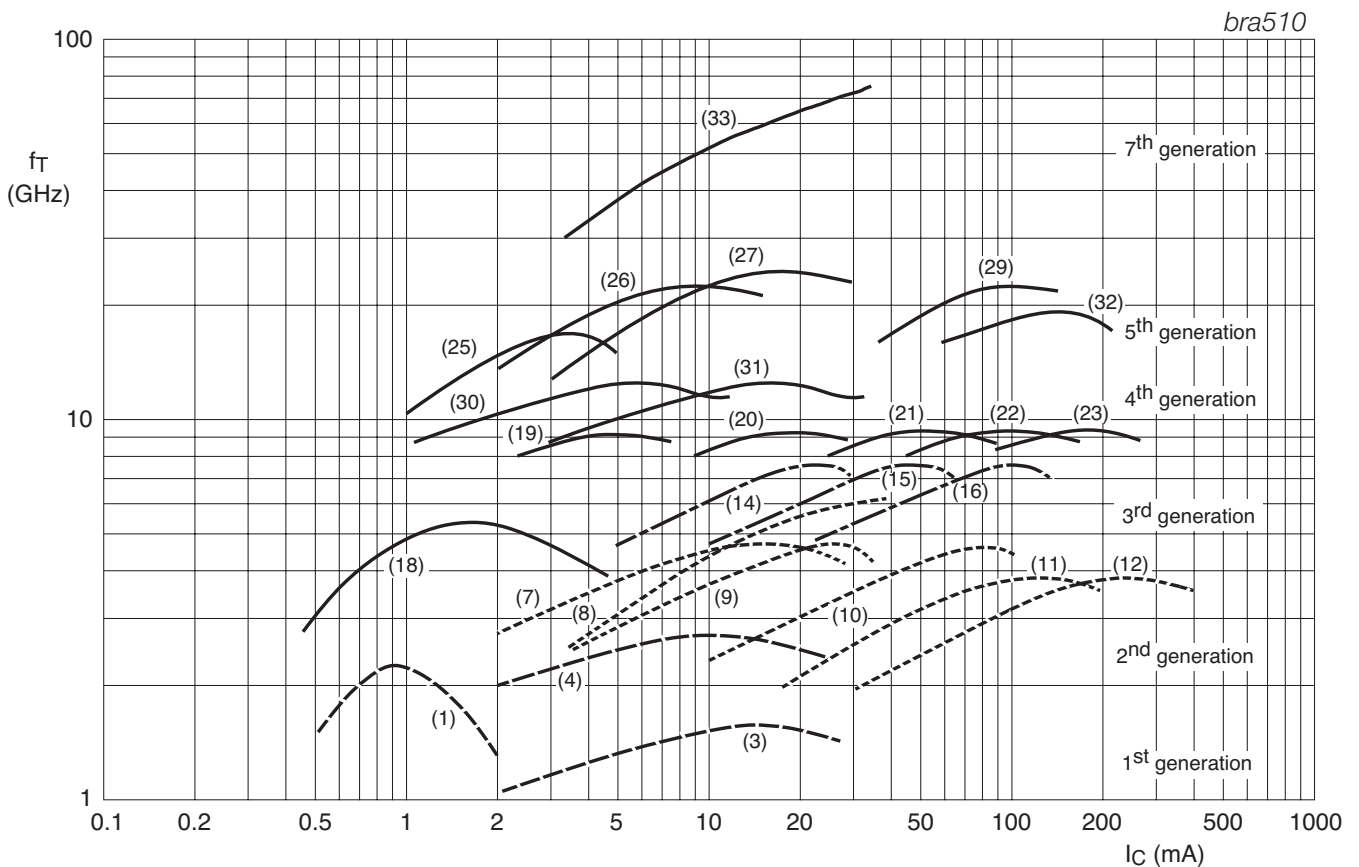
#### Why choose NXP Semiconductors' wideband transistors:

- Broad portfolio (1<sup>st</sup> - 7<sup>th</sup> generation)
- Short leadtimes
- Smallest packages
- Volume delivery

#### Wideband transistors

The  $f_T$ - $I_C$  curve represents Transition Frequency ( $f_T$ ) characteristics as a function of collector current ( $I_C$ ) for the six generations of RF wideband transistors. A group of transistors having the same collector current ( $I_C$ ) & similar transition frequencies ( $f_T$ ) represents a curve. The curve number matches products in the table, detailing their RF characteristics.

#### Wideband transistors line-up per frequency



## Wideband transistors (RF small signal)

### RF power transistors for handheld equipment

Type	Package	V <sub>CEO</sub> (max) (V)	I <sub>C</sub> (max) (mA)	P <sub>tot</sub> (max) (mW)	Polarity	GUM (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)
BFG10	SOT143	8	250	400	NPN	7	1900	1	3.6
BFG10/X	SOT143	8	250	400	NPN	7	1900	1	3.6
BFG10W/X	SOT343	10	250	400	NPN	7	1900	1	3.6
BLT50	SOT223	10	500	2000	NPN	-	-	-	-
BLT70	SOT223H	8	250	2100	NPN	-	-	-	-
BLT80	SOT223	10	250	2000	NPN	-	-	-	-
BLT81	SOT223	9.5	500	2000	NPN	-	-	-	-

### RF wideband transistors generation 1 / 2 / 3

Type	Generation	Curve	Package	f <sub>T</sub> (typ) (GHz)	V <sub>CEO</sub> (max) (V)	I <sub>C</sub> (max) (mA)	P <sub>tot</sub> (max) (mW)	Polarity	GUM (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)	GUM (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)	NF (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)	NF (typ) (dB)	@ f = (MHz)	@ I <sub>C</sub> = (mA)	@ V <sub>CE</sub> = (V)
BFS17	1st	3	SOT23	1	15	25	300	NPN	-	-	-	-	-	-	-	-	4.5	500	2	5	-	-	-	-
<b>BFS17W</b>	1st	3	SOT323	1.6	15	50	300	NPN	-	-	-	-	-	-	-	-	4.5	500	2	5	-	-	-	-
BFT25	1st	1	SOT23	2.3	5	6.5	30	NPN	18	500	1	1	12	800	1	1	3.8	500	1	1	-	-	-	-
BFG25A/X	2nd	18	SOT143B	5	5	6.5	32	NPN	-	-	-	-	18	1000	0.5	1	1.8	1000	0.5	1	-	-	-	-
BFG25AW	2nd	18	SOT343N	5	5	6.5	500	NPN	-	-	-	-	16	2000	0.5	1	2	1000	1	1	-	-	-	-
BFG25AW/X	2nd	18	SOT343N	5	5	6.5	500	NPN	16	1000	0.5	1	8	2000	0.5	1	2	1000	1	1	-	-	-	-
BFG31	2nd	10	SOT223	5	-15	-100	1000	PNP	16	500	-70	-10	12	800	-70	-10	-	-	-	-	-	-	-	-
BFG35	2nd	11	SOT223	4	18	150	1000	NPN	15	500	100	10	11	800	100	10	-	-	-	-	-	-	-	
BFG92A/X	2nd	7	SOT143B	5	15	25	400	NPN	16	1000	15	10	11	2000	15	10	2	1000	5	10	3	2000	5	10
BFG97	2nd	10	SOT223	5.5	15	100	1000	NPN	16	500	70	10	12	800	70	10	-	-	-	-	-	-	-	
BFQ149	2nd	10	SOT89	5	-15	-100	1000	PNP	12	500	-50	-10	-	-	-	-	3.75	500	-50	-10	-	-	-	
BFQ18A	2nd	11	SOT89	4	18	150	1000	NPN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BFQ19	2nd	10	SOT89	5.5	15	100	1000	NPN	11.5	500	50	10	7.5	800	50	10	3.3	500	50	10	-	-	-	
BFR106	2nd	10	SOT23	5	15	100	500	NPN	-	-	-	-	11.5	800	30	6	3.5	800	30	6	-	-	-	
BFR92A	2nd	7	SOT23	5	15	25	300	NPN	14	1000	15	10	8	2000	15	10	3	2000	5	10	2.1	1000	5	10
<b>BFR92AW</b>	2nd	7	SOT323	5	15	25	300	NPN	14	1000	15	10	8	2000	15	10	2	1000	5	10	3	2000	5	10
BFS17A	2nd	4	SOT23	2.8	15	25	300	NPN	-	-	-	-	13.5	800	14	10	2.5	800	2	5	-	-	-	
BFS25A	2nd	18	SOT323	5	5	6.5	32	NPN	-	-	-	-	13	1000	0.5	1	1.8	1000	1	1	-	-	-	
BFT25A	2nd	18	SOT89	5	5	6.5	32	NPN	-	-	-	-	15	1000	0.5	1	1.8	1000	0.5	1	-	-	-	
BFT92	2nd	7	SOT23	5	-15	-25	300	PNP	18	500	-14	-10	-	-	-	-	2.5	500	-5	-10	-	-	-	
BFT92W	2nd	7	SOT323	4	-15	-35	300	PNP	17	500	-15	-10	11	1000	-15	-10	2.5	500	-5	-10	3	1000	-5	-10
BFT93	2nd	9	SOT23	5	-12	-35	300	PNP	16.5	500	-30	-5	-	-	-	-	2.4	500	-10	-5	-	-	-	
BFT93W	2nd	9	SOT323	4	-12	-50	300	PNP	15.5	500	-30	-5	10	1000	-30	-5	2.4	500	-10	-5	3	1000	-10	-5
BFG135	3rd	16	SOT223	7	15	150	1000	NPN	16	500	100	10	12	800	100	10	-	-	-	-	-	-	-	
BFG198	3rd	15	SOT223	8	10	100	1000	NPN	18	500	50	8	15	800	50	8	-	-	-	-	-	-		
BFG590	3rd	22	SOT143B	5	15	200	400	NPN	13	900	80	4	7.5	2000	80	4	-	-	-	-	-	-		
BFG590/X	3rd	22	SOT143B	5	15	200	400	NPN	13	900	80	4	7.5	2000	80	4	-	-	-	-	-	-		
BFG591	3rd	22	SOT223	7	15	200	2000	NPN	13	900	70	12	7.5	2000	70	12	-	-	-	-	-	-		
BFG67	3rd	14	SOT143B	8	10	50	380	NPN	17	1000	15	8	10	2000	15	8	1.7	1000	15	8	2.5	2000	5	8
BFG67/X	3rd	14	SOT143B	8	10	50	380	NPN	17	1000	15	8	10	2000	15	8	1.7	1000	15	8	2.5	2000	5	8
BFG67/XR	3rd	14	SOT143R	8	10	50	380	NPN	17	1000	15	8	10	2000	15	8	1.7	1000	15	8	2.5	2000	5	8
BFG93A	3rd	8	SOT143B	6	12	35	300	NPN	16	1000	30	8	10	2000	30	8	1.7	1000	5	8	2.3	2000	5	8
BFG93A/X	3rd	8	SOT143B	6	12	35	300	NPN	16	1000	30	8	10	2000	30	8	1.7	1000	5	8	2.3	2000	5	8
BFG94	3rd	8	SOT223	6	12	60	700	NPN	-	-	-	-	13.5	1000	45	10	2.7	500	45	10	3	1000	45	10
BFQ591	3rd	22	SOT89	7	15	200	2250	NPN	11	900	70	12	5.5	2000	70	12	-	-	-	-	-	-		
BFQ67W	3rd	14	SOT323	8	10	50	300	NPN	13	1000	15	8	8	2000	15	8	1.3	1000	5	8	2.7	2000	15	8
BFR93A	3rd	8	SOT23	6	12	35	300	NPN	13	1000	30	8	7	2000	30	8	1.9	1000	5	8	3	2000	5	8
BFR93AR	3rd	8	SOT23	6	12	35	300	NPN	13	1000	30	8	7	2000	30	8	1.9	1000	5	8	3	2000	5	8
<b>BFR93AW</b>	3rd	8	SOT323	5	12	35	300	NPN	13	1000	30	8	8	2000	30	8	1.5	1000	5	8	2.1	2000	5	8

**Bold** = Highly recommended product

## RF wideband transistors generation 4 - 4.5

Type	Generation	Curve	Package	fT (typ) (GHz)	VCEO (max) (V)	IC (max) (mA)	Ptot (max) (mW)	Polarity	GUM (typ) (dB)	@ f = (MHz)	@ IC = (mA)	@ VCE = (V)	NF (typ) (dB)	@ f = (MHz)	@ IC = (mA)	@ VCE = (V)	NF (typ) (dB)	@ f = (MHz)	@ IC = (mA)	@ VCE = (V)	PL1(dB) (typ) (dBmW)	@ VCE = (V)	@ f = (MHz)	@ IC = (mA)	IP3 (typ) (dBm)	@ IC = (mA)	@ VCE = (V)
BFG505	4th	19	SOT143B	9	15	18	150	NPN	13	2000	5	6	1.6	900	5	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFG505/X	4th	19	SOT143B	9	15	18	150	NPN	13	2000	5	6	1.6	900	5	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFG505W	4th	19	SOT343N	9	15	18	500	NPN	12	2000	5	6	1.6	900	5	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFG505W/X	4th	19	SOT343N	9	15	18	500	NPN	12	2000	5	6	1.6	900	5	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFG505W/XR	4th	19	SOT343R	9	15	18	500	NPN	12	2000	5	6	1.6	900	5	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFG520	4th	20	SOT143B	9	15	70	300	NPN	13	2000	20	6	1.6	900	20	6	1.9	2000	5	6	17	6	900	20	26	20	6
<b>BFG520/X</b>	4th	20	SOT143B	9	15	70	300	NPN	13	2000	20	6	1.6	900	20	6	1.9	2000	5	6	17	6	900	20	26	20	6
BFG520/XR	4th	20	SOT143R	9	15	70	300	NPN	13	2000	20	6	1.6	900	20	6	1.9	2000	5	6	17	6	900	20	26	20	6
BFG520W	4th	20	SOT343N	9	15	70	500	NPN	11	2000	20	6	1.1	900	5	6	1.85	2000	5	6	17	6	900	20	26	20	6
<b>BFG520W/X</b>	4th	20	SOT343N	9	15	70	500	NPN	11	2000	20	6	1.1	900	5	6	1.85	2000	5	6	17	6	900	20	26	20	6
BFG540	4th	21	SOT143B	9	15	120	400	NPN	11	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG540/X	4th	21	SOT143B	9	15	120	400	NPN	11	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG540/XR	4th	21	SOT143R	9	15	120	400	NPN	11	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG540W	4th	21	SOT343N	9	15	120	500	NPN	10	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG540W/X	4th	21	SOT343N	9	15	120	500	NPN	10	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG540W/XR	4th	21	SOT343R	9	15	120	500	NPN	10	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG541	4th	21	SOT223	9	15	120	650	NPN	9	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFM505	4th	19	SOT363A	9	8	18	500	NPN	10	2000	5	3	1.1	900	1	3	1.9	2000	5	3	-	-	-	-	-	-	-
BFM520	4th	20	SOT363A	9	8	70	1000	NPN	9	2000	20	3	1.2	900	5	3	1.9	2000	5	3	-	-	-	-	-	-	-
BFQ540	4th	21	SOT89	9	15	120	1,200	NPN	-	-	-	-	1.9	900	40	8	-	-	-	-	-	-	-	-	-	-	-
BFQ67	4th	14	SOT23	8	10	50	300	NPN	8	2000	15	8	1.7	1000	15	8	2.7	2000	15	8	-	-	-	-	-	-	-
BFR505	4th	19	SOT23	9	15	18	150	NPN	10	2000	5	6	1.2	900	5	6	1.9	2000	5	6	4	6	900	5	10	5	6
<b>BFR505T</b>	4th	19	SOT416	9	15	18	150	NPN	10	2000	5	6	1.2	900	1.25	6	1.9	2000	1.25	6	5	6	900	5	10	5	6
BFR520	4th	20	SOT23	9	15	70	300	NPN	9	2000	20	6	1.1	900	5	6	1.9	2000	5	6	17	6	900	20	26	20	6
<b>BFR520T</b>	4th	20	SOT416	9	15	70	150	NPN	9	2000	20	6	1.1	900	5	6	1.9	2000	5	6	17	6	900	20	26	20	6
<b>BFR540</b>	4th	21	SOT23	9	15	120	500	NPN	7	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFS505	4th	19	SOT323	9	15	18	150	NPN	10	2000	5	6	1.2	900	1.25	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFS520	4th	20	SOT323	9	15	70	300	NPN	9	2000	20	6	1.1	900	5	6	1.9	2000	5	6	17	6	900	20	26	20	6
BFS540	4th	21	SOT323	9	15	120	500	NPN	8	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
PBR941	4th	20	SOT23	8	10	50	360	NPN	9.5	2000	15	6	1.4	1000	5	6	2	2000	5	6	-	-	-	-	-	-	-
PBR951	4th	21	SOT23	8	10	100	365	NPN	8	2000	30	6	1.3	1000	5	6	2	2000	5	6	-	-	-	-	-	-	-
PRF947	4th	20	SOT323	8.5	10	50	250	NPN	10	2000	15	6	1.5	1000	5	6	2.1	2000	5	6	-	-	-	-	-	-	-
<b>PRF949</b>	4th	20	SOT416	9	10	50	150	NPN	10	2000	15	6	1.5	1000	5	6	2.1	2000	5	6	-	-	-	-	-	-	-
PRF957	4th	21	SOT323	8.5	10	100	270	NPN	9.2	2000	30	6	1.3	1000	5	6	1.8	2000	5	6	-	-	-	-	-	-	-
BFG310/XR	4.5	30	SOT143R	14	6	10	60	NPN	18	1800	5	3	-	-	-	-	1	2000	1	3	1.8	3	1800	5	8.5	5	3
BFG310W/XR	4.5	30	SOT343R	14	6	10	60	NPN	18	1800	5	3	-	-	-	-	1	2000	1	3	1.8	3	1800	5	8.5	5	3
<b>BFG325/XR</b>	4.5	31	SOT143R	14	6	35	210	NPN	18.3	1800	15	3	-	-	-	-	1.1	2000	3	3	8.7	3	1800	15	19.4	15	3
<b>BFG325W/XR</b>	4.5	31	SOT143R	14	6	35	210	NPN	18.3	1800	15	3	-	-	-	-	1.1	2000	3	3	8.7	3	1800	15	19.4	15	3

## RF wideband transistors generation 5 - 7

Type	Generation	Curve	Package	fT (typ) (GHz)	VCEO (max) (V)	IC (max) (mA)	Ptot (max) (mW)	Polarity	GUM (typ) (dB)	@ f = (MHz)	@ IC = (mA)	@ VCE = (V)	NF (typ) (dB)	@ f = (MHz)	@ IC = (mA)	@ VCE = (V)	NF (typ) (dB)	@ f = (MHz)	@ IC = (mA)	@ VCE = (V)	PL1(dB) (typ) BmW	@ VCE = (V)	@ f = (MHz)	@ IC = (mA)	IP3 (typ) (dBm)	@ IC = (mA)	@ VCE = (V)
<b>BFG21W</b>	5th	32	SOT343R	-	4.5	500	600	NPN	10	1900	1	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BFG403W	5th	25	SOT343R	17	4.5	3.6	16	NPN	22	2000	3	2	1	900	1	2	1.6	2000	1	2	5	1	900	1	6	1	1
BFG410W	5th	26	SOT343R	22	4.5	12	54	NPN	21	2000	10	2	0.9	900	1	2	1.2	2000	1	2	5	2	2000	10	15	10	2
BFG424F	5th	27	SOT343F	25	4.5	30	135	NPN	23	2000	25	2	0.8	900	2	2	1.2	2000	2	2	12	2	2000	25	22	25	2
BFG424W	5th	27	SOT343R	25	4.5	30	135	NPN	22	2000	25	2	0.8	900	2	2	1.2	2000	2	2	12	2	2000	25	22	25	2
<b>BFG425W</b>	5th	27	SOT343R	25	4.5	30	135	NPN	20	2000	25	2	0.8	900	2	2	1.2	2000	2	2	12	2	2000	25	22	25	2
BFG480W	5th	29	SOT343R	21	4.5	250	360	NPN	16	2000	80	2	1.2	900	8	2	1.8	2000	8	2	20	3.6	2000	1	28	80	2
<b>BFU725F</b>	7th	33	SOT343F	70	2.8	40	136	NPN	18	5800	25	2	0.47	2400	5	2	0.7	5800	5	2	8	2	5800	25	19	25	2

**Bold** = Highly recommended product

## 3.4 RF ICs

### 3.4.1 MMICs

NXP RF MMICs:

<http://www.nxp.com/mmics>

#### Why choose NXP Semiconductors' MMICs:

- Reduced RF component count
- Easy circuit design-in
- Reduced board size
- Short time-to-market
- Broad portfolio
- Volume delivery
- Short leadtimes

#### General-purpose wideband amplifiers (50 Ohm gain blocks)

Type	Package	@		Fu <sup>(1)</sup>	@ 1GHz					Gain <sup>(3)</sup> (dB) @				Limits		
		Vs	Is	@-3dB	NF	Psat	Gain <sup>(3)</sup>	P1dB	OIP3	100	2.2	2.6	3.0	Vs	Is	Ptot
		(V)	(mA)	(GHz)	(dB)	(dBm)	(dB)	(dBm)	(dBm)	MHz	GHz	GHz	GHz	(V)	(mA)	(mW)
BGA2711	SOT363	5	12.6	3.6 <sup>(2)</sup>	4.8	2.8	13.1	-0.7	8.3	13.0	14.1	13.8	12.7	6	20	200
BGA2748	SOT363	3	5.7	1.9	1.9 <sup>(2)</sup>	-2.3	21.8	-9.2	-1.9	14.8	17.6	15.0	11.9	4	15	200
BGA2771	SOT363	3	33.3	2.4	4.5	13.2 <sup>(2)</sup>	21.4	12.1	21.9	20.3	20.4	17.9	15.5	4	50	200
BGA2776	SOT363	5	24.4	2.8	4.9	10.5	23.2 <sup>(2)</sup>	7.2	18.6	22.4	23.2	21.8	19.3	6	34	200
BGA2709	SOT363	5	23.5	3.6	4.0	12.5	22.7	8.3	22	22.2	23.0	22.1	21.1	6	35	200
BGA2712	SOT363	5	12.3	3.2	3.9	4.8	21.3	0.2	11	20.8	21.9	21.2	19.3	6	25	200
BGM1011	SOT363	5	25.5	-	4.7	13.8	30 <sup>(2)</sup>	12.2	23	25.0	37.0	32.0	28.0	6	35	200
BGM1012	SOT363	3	14.6 <sup>(2)</sup>	3.6	4.8	9.7	20.1	5.6	18	19.5	20.4	19.9	18.7	4	50	200
BGM1013	SOT363	5	27.5	2.1	4.6	14.0	35.5 <sup>(2)</sup>	12.0	22.7	35.2	31.8	29.7	26.1	6	35	200
BGM1014	SOT363	5	21.0 <sup>(2)</sup>	2.5	4.2	12.9	32.3	11.2	20.5	30.0	34.1	30.5	26.4	6	30	200
BGA2714	SOT363	3	4.58	2.7	2.2	-3.4	20.4	-7.9	2.1	20.8	20.8	19.4	16.8	4	10	200
BGA2715	SOT363	5	4.3 <sup>(2)</sup>	3.3	2.6	-4.0	21.7	-8.0	2.3	13.3	23.3	22.1	20.1	6	8	200
BGA2716	SOT363	5	15.9 <sup>(2)</sup>	3.2	5.3	11.6	22.9	8.9	22.2	22.1	22.8	22.1	20.8	6	25	200
BGA2717	SOT363	5	8.0	3.2	2.3 <sup>(2)</sup>	1.4	23.9	-2.6	10.0	18.6	25.1	24.0	22.1	6	15	200

Notes: <sup>(1)</sup> Upper -3 dB point, to gain at 1 GHz. <sup>(2)</sup> Optimized parameter <sup>(3)</sup> Gain =  $|S_{21}|^2$

#### 2-stage variable-gain linear amplifier

Type	Package	@		Frequency Range	@ 900MHz				@1900 MHz				Limits		
		Vs	Is		Gain <sup>(1)</sup>	DG <sup>(2)</sup>	P1dB	ACPR	Gain <sup>(1)</sup>	DG <sup>(2)</sup>	P1dB	ACPR	Vs	Is	Ptot
		(V)	(mA)		(dB)	(dB)	(dBm)	(dBc)	(dB)	(dB)	(dBm)	(dBc)	(V)	(mA)	(mW)
BGA2031/1	SOT363	3	51	800-2500	24	62	11	49	23	56	13	49	3.3	77	200

Notes: <sup>(1)</sup> Gain = GP, power gain. <sup>(2)</sup> DG = Gain control range

#### Wideband linear mixer

Type	Package	@		RF Input	IF Output	@ 880MHz			@1900 MHz			Limits		
		Vs	Is	Frequency Range	Frequency Range	NF	Gain <sup>(1)</sup>	OIP3	NF	Gain <sup>(1)</sup>	OIP3	Vs	Is	Ptot
		(V)	(mA)	Range	Range	(dB)	(dB)	(dBm)	(dB)	(dB)	(dBm)	(V)	(mA)	(mW)
BGA2022	SOT363	3	6	800-2500	50-500	9	5	4	9	6	10	4	10	40

Notes: <sup>(1)</sup> Gain = GP, power gain. <sup>(2)</sup> DG = Gain control range



## Low-noise wideband amplifiers

Type	Package	@		@ 900MHz			@1800 MHz			Gain <sup>(3)</sup> (dB) @				Limits		
		V <sub>s</sub>	I <sub>s</sub>	NF	Gain	IIP3	NF	Gain	IIP3	100	1	2.6	3.0	V <sub>s</sub>	I <sub>s</sub>	P <sub>tot</sub>
		(V)	(mA)	(dB)	(dB)	(dBm)	(dB)	(dB)	(dBm)	MHz	GHz	GHz	GHz	(V)	(mA)	(mW)
BGA2001	SOT343R	2.5	4	1.3	22 <sup>(1)</sup>	-7.4	1.3	19.5 <sup>(1)</sup>	-4.5	20	17.1	11.6	10.7	4.5	30	135
BGA2003	SOT343R	2.5	10 <sup>(2)</sup>	1.8	24 <sup>(1)</sup>	-6.5	1.8	16 <sup>(1)</sup>	-4.8	26	18.6	11.1	10.1	4.5	30	135
BGA2011	SOT363	3	15	1.5	19 <sup>(3)</sup>	10	-	-	-	24	14.8	8	6.5	4.5	30	135
BGA2012	SOT363	3	7	-	-	-	1.7	16 <sup>(3)</sup>	10	22	18.2	11.6	10.5	4.5	15	70

Notes: <sup>(1)</sup> MSG <sup>(2)</sup> Adjustable bias <sup>(3)</sup> |S<sub>21</sub>|<sup>2</sup>

## General-purpose, med. power ampl. (50 ohm gain blocks)

Type	Package	@		@ 900MHz				@1800 MHz				Gain <sup>(2)</sup>	Limits		
		V <sub>s</sub> <sup>(1)</sup>	I <sub>s</sub>	NF	Gain <sup>(2)</sup>	OIP3	P1dB	NF	Gain <sup>(2)</sup>	OIP3	P1dB	2.5	V <sub>s</sub> <sup>(1)</sup>	I <sub>s</sub>	P <sub>tot</sub>
		(V)	(mA)	(dB)	(dB)	(dBm)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	GHz	(V)	(mA)	(mW)
BGA6289	SOT89	4.1	84	3.5	15	31	17	3.7	13	28	15	12	6	120	480
BGA6489	SOT89	5.1	78	3.1	20	33	20	3.3	16	30	17	15	6	120	480
BGA6589	SOT89	4.8	81	3.0	22	33	21	3.3	17	32	20	15	6	120	480

Notes: <sup>(1)</sup> Device voltage without bias resistor. <sup>(2)</sup> Gain = |S<sub>21</sub>|<sup>2</sup>

## Medium power amplifier MMICs for e.g.: base stations, e-Metering, with shutdown function

Type	Package		f	@ f = 400 MHz - 1 GHz	@ f = 1.8 - 2.2 GHz	@ f = 2.7 GHz	@ V <sub>cc</sub> = 3.3 V	@ V <sub>cc</sub> = 5 V	Efficiency	@ V <sub>cc</sub> = 3.3 V	@ V <sub>cc</sub> = 5 V
				GP	GP	GP	PL(1dB)	PL(1dB)		IP <sub>3o</sub>	IP <sub>3o</sub>
				(MHz)	(dB)	(dB)	(dB)	(dBm)		(dBm)	(dBm)
<b>BGA7027</b>	SOT505	leaded	400 - 2700	19	16	15	26.5	27	40	38.5	43.5
<b>BGA7127</b>	SOT908	leadless	400 - 2700	19	16	15	26.5	27	40	38.5	43.5

**Bold Red** = New, highly recommended product

## SiGeC MMICs:

Type	Package	@		@ 1.575 GHz				Limits	
		V <sub>cc</sub>	I <sub>cc</sub>	G <sub>p(max)</sub>	NF	P <sub>L(1dB)</sub>	IP <sub>3o</sub>	V <sub>cc</sub>	I <sub>cc</sub>
		(V)	(mA)	(dB)	(dB)	(dBm)	(dBm)	(V)	(mA)
<b>BGU7002</b>	SOT891	2.5	5	19	0.7	8	18	2.8	25
<b>BGU7003</b>	SOT891	2.5	5	19	0.85	8	18	2.8	25
<b>BGU7004</b>	SOT886	1.8	5	20	1.1	-29	-18	2.8	-
<b>BGU7005</b>	SOT886	1.8	5	21	0.8	-29	-18	2.8	-

**Bold Red** = New, highly recommended product

### 3.4.2 Satellite LNB RF ICs

#### Why choose NXP Semiconductors' RF ICs:

- Lowest total cost of ownership
- Alignment free concept
- Easy circuit design-in
- Improved LO stability

#### Satellite LNB Downconverter ICs

Type	Package	Input frequency range	Conversion gain	Noise figure	Output IP3	Switched LO frequency
		(GHz)	Gc (dB)	NF (dB)	IP3(out) (dB)	(GHz)
TFF1000HN	SOT616	10.7 to 12.75	42	9	10	9.75 / 10.6
TFF1004HN	SOT616	10.7 to 12.75	32	9	10	9.75 / 10.6

#### Low noise LO generators for VSAT applications

Type	Package	f <sub>IN(REF)</sub>	V <sub>CC</sub>	I <sub>CC</sub>	PLL phase noise @ N=64			PLL				Output buffer		Input
								f <sub>0(RF)</sub>	V <sub>0 (VREGVCO)</sub>	I <sub>CP</sub>	K <sub>VCO</sub>	P <sub>o</sub>	RL <sub>out(RF)</sub>	S <sub>i</sub>
						Typ	Typ		Typ	Typ	Max	Min		
					MHz	V	mA	dBc/Hz @ 1 kHz	dBc/Hz @ 100 kHz	dBc/Hz @ 1 MHz	(GHz)	V	mA	GHz/V
<b>TFF1003HN</b>	SOT616	50~815	3.3	130	-94	-100	-130	12.8~13.05	2.7	1	0.75	-5	-10	-10
<b>TFF1006HN</b>	SOT616	36~586	3.3	130	-94	-100	-130	9.375	2.7	1	0.75	-5	-10	-10

**Bold Red** = New, highly recommended product

#### Satellite LNB Biasing ICs

Type	Package	Supply voltage	Drain voltage	Drain current	Supply current	Polarisation detection voltage
		V <sub>CC</sub> (V)	V <sub>D</sub> (V)	I <sub>DO</sub> (mA)	I <sub>CC</sub> (mA)	VPOL (V)
UAF3000TS	SOT360	3.3 or 5	2	10	6	14.75
UAF4000TS	SOT403	3.3 or 5	2.2	10	6	-

## 3.5 RF MOS transistors

### 3.5.1 JFETs

NXP RF FETs:

<http://www.nxp.com/rffets>

#### Why choose NXP Semiconductors' JFETs:

- Reliable volume supplier
- Short leadtimes
- Broad portfolio

#### N-channel junction field-effect transistors for switching

Type	Package	V <sub>DS</sub> (V)	I <sub>G</sub> (mA)	CHARACTERISTICS										
				I <sub>DSS</sub> (mA)		-V <sub>gsoff</sub> (V)		R <sub>DS(on)</sub> (Ω)	C <sub>rs</sub> (pF)		t <sub>on</sub> (ns)		t <sub>off</sub> (ns)	
				min	max	min	max	max	min	max	typ	max	typ	max
BSR56	SOT23	40	50	50	-	4	10	25	-	5	-	-	-	25
BSR57	SOT23	40	50	20	100	2	6	40	-	5	-	-	-	50
BSR58	SOT23	40	50	8	80	0.8	4	60	-	5	-	-	-	100
PMBFJ108	SOT23	25	50	80	-	3	10	8	-	15	4	-	6	-
PMBFJ109	SOT23	25	50	40	-	2	6	12	-	15	4	-	6	-
PMBFJ110	SOT23	25	50	10	-	0.5	4	18	-	15	4	-	6	-
PMBFJ111	SOT23	40	50	20	-	3	10	30	-	typ.3	13	-	35	-
PMBFJ112	SOT23	40	50	5	-	1	5	50	-	typ.3	13	-	35	-
PMBFJ113	SOT23	40	50	2	-	0.5	3	100	-	typ.3	13	-	35	-
J108	SOT54	25	50	80	-	3	10	8	-	15	4	-	6	-
J109	SOT54	25	50	40	-	2	6	12	-	15	4	-	6	-
J110	SOT54	25	50	10	-	0.5	4	18	-	15	4	-	6	-
J111	SOT54	40	50	20	-	3	10	30	-	typ.3	13	-	35	-
J112	SOT54	40	50	5	-	1	5	50	-	typ.3	13	-	35	-
J113	SOT54	40	50	2	-	0.5	3	100	-	typ.3	13	-	35	-
PMBF4391	SOT23	40	50	50	150	4	10	30	-	3.5	-	15	-	20
PMBF4392	SOT23	40	50	25	75	2	5	60	-	3.5	-	15	-	35
PMBF4393	SOT23	40	50	5	30	0.5	3	100	-	3.5	-	15	-	50

#### P-channel junction field-effect transistors for switching

Type	Package	V <sub>DS</sub> (V)	I <sub>G</sub> (mA)	CHARACTERISTICS										
				I <sub>DSS</sub> (mA)		-V <sub>gsoff</sub> (V)		R <sub>DS(on)</sub> (Ω)	C <sub>rs</sub> (pF)		t <sub>on</sub> (ns)		t <sub>off</sub> (ns)	
				min	max	min	max	max	min	max	typ	max	typ	max
PMBFJ174	SOT23	30	50	20	135	5	10	85	-	typ.4	7	-	15	-
PMBFJ175	SOT23	30	50	7	70	3	6	125	-	typ.4	15	-	30	-
PMBFJ176	SOT23	30	50	2	35	1	4	250	-	typ.4	35	-	35	-
PMBFJ177	SOT23	30	50	1.5	20	0.8	2.25	300	-	typ.4	45	-	45	-
J174	SOT54	30	50	20	135	5	10	85	-	typ.4	7	-	15	-
J175	SOT54	30	50	7	70	3	6	125	-	typ.4	15	-	30	-
J176	SOT54	30	50	2	35	1	4	250	-	typ.4	35	-	35	-
J177	SOT54	30	50	1.5	20	0.8	2.25	300	-	typ.4	45	-	45	-

## N-channel junction field-effect transistors for general RF applications

Type	Package	V <sub>DS</sub> (V)	I <sub>G</sub> (mA)	CHARACTERISTICS							
				I <sub>loss</sub> (mA)		V <sub>gs,off</sub> (V)		Y <sub>fs</sub>   (mS)		C <sub>rs</sub> (pF)	
				min	max	min	max	min	max	min	max
<b>DC, LF and HF amplifiers</b>											
BF245A	SOT54	30	10	2	6.5	<8		3	6.5	Typ.=1.1	-
BF245B	SOT54	30	10	6	15	<8		3	6.5	Typ.=1.1	-
BF245C	SOT54	30	10	12	25	<8		3	6.5	Typ.=1.1	-
BF545A	SOT23	30	10	2	6.5	0.4	7.5	3	6.5	0.8	-
BF545B	SOT23	30	10	6	15	0.4	7.5	3	6.5	0.8	-
BF545C	SOT23	30	10	12	25	0.4	7.5	3	6.5	0.8	-
BF556A	SOT23	30	10	3	7	0.5	7.5	4.5	-	0.8	-
BF556B	SOT23	30	10	6	13	0.5	7.5	4.5	-	0.8	-
BF556C	SOT23	30	10	11	18	0.5	7.5	4.5	-	0.8	-
<b>Pre-amplifiers for AM tuners in car radios</b>											
BF861A	SOT23	25	10	2	6.5	0.2	1.0	12	20	2.1	2.7
BF861B	SOT23	25	10	6	15	0.5	1.5	16	25	2.1	2.7
BF861C	SOT23	25	10	12	25	0.8	2	20	30	2.1	2.7
<b>BF862</b>	SOT23	20	10	10	25	0.3	2	35	-	typ=1.9	-
<b>RF stages FM portables, car radios, main radios &amp; mixer stages</b>											
BF510 <sup>1)</sup>	SOT23	20	10	0.7	3	typ. 0.8		2.5	0.4	0.5	
BF511 <sup>1)</sup>	SOT23	20	10	2.5	7	typ. 1.5		4	0.4	0.5	
BF512 <sup>1)</sup>	SOT23	20	10	6	12	typ. 2.2		6	0.4	0.5	
BF513 <sup>1)</sup>	SOT23	20	10	10	18	typ. 3		7	0.4	0.5	
<b>Low-level general purpose amplifiers</b>											
BFR30	SOT23	25	5	4	10	<5		1	4	1.5	-
BFR31	SOT23	25	5	1	5	<2.5		1.5	4.5	1.5	-
<b>General-purpose amplifiers</b>											
BFT46	SOT23	25	5	0.2	1.5	<1.2		>1	1.5	-	
<b>AM input stages UHF/VHF amplifiers</b>											
PMBFJ308	SOT23	25	50	12	60	1	6.5	>10	1.3	2.5	
PMBFJ309	SOT23	25	50	12	30	1	4	>10	1.3	2.5	
<b>PMBFJ310</b>	SOT23	25	50	24	60	2	6.5	>10	1.3	2.5	
<b>PMBFJ620</b>	SOT363	25	50	24	60	2	6.5	10	1.3	2.5	

**Bold** = Highly recommended product

<sup>1)</sup> Asymmetrical

## 3.5.2 MOSFETs

### Why choose NXP Semiconductors' MOSFETs:

- Reference designs for TV tuning
- Short leadtimes
- Broad portfolio
- Smallest packages
- 2-in-1 FETs for tuner applications
- Reliable volume supply
- Best performance MOSFETs for TV tuning

### N-channel, single MOSFETs for switching

Type	Package	V <sub>DS</sub> (V) max	CHARACTERISTICS															
			I <sub>D</sub> (mA)		I <sub>DSS</sub> (mA)		V <sub>(p)GS</sub> (V)		R <sub>DS(on)</sub> (Ω)	C <sub>rs</sub> (pF)		t <sub>on</sub> (ns)		t <sub>off</sub> (ns)		S <sub>21(on)</sub>   <sub>2</sub> (dB)	S <sub>21(off)</sub>   <sub>2</sub> (dB)	MODE
			max	min	max	min	max	max	min	max	typ	max	typ	max	max	min		
BSS83	SOT143	10	50	-	-	0.1 <sup>2)</sup>	2 <sup>1)</sup>	45	typ.0.6		-	1	-	5	-	-	enh.	
<b>Silicon RF Switches</b>																		
<b>BF1107</b>	SOT23	3	10	-	100 <sup>3)</sup>	-	7 <sup>4)</sup>	20	-	-	-	-	-	-	2.5	30	depl.	
<b>BF1108<sup>5)</sup></b>	SOT143B	3	10	-	100 <sup>3)</sup>	-	7 <sup>4)</sup>	20	-	-	-	-	-	3	30	depl.		
<b>BF1108R<sup>5)</sup></b>	SOT143R	3	10	-	100 <sup>3)</sup>	-	7 <sup>4)</sup>	20	-	-	-	-	-	3	30	depl.		

**Bold** = Highly recommended product

### N-channel, dual-gate MOSFETs

Type	Package	V <sub>DS</sub> (V) max	I <sub>D</sub> (mA) max	CHARACTERISTICS											VHF	UHF
				I <sub>DSX</sub> (mA)		V <sub>(th)GS</sub> (V)		Y <sub>fs</sub>   (mS)		C <sub>is</sub> (pF)	C <sub>os</sub> (pF)	F @ 800 MHz (dB)				
				min	max	min	max	min	max	typ	typ	typ				

#### With external bias

BF908	SOT143	12	40	3	27	-	-2	36	50	3.1	1.7	1.5	X	X
BF908R	SOT143R	12	40	3	27	-	-2	36	50	3.1	1.7	1.5	X	X
BF908WR	SOT343R	12	40	3	27	-	-2	36	50	3.1	1.7	1.5	X	X
BF991	SOT143	20	20	4	25	-	-2.5	10	-	2.1	1.1	1	X	-
BF992	SOT143	20	40	-	-	-	-1.3	20	-	4	2	1.2 <sup>7)</sup>	X	-
BF994S	SOT143	20	30	4	20	-	-2.5	15	-	2.5	1	1 <sup>7)</sup>	X	-
BF996S	SOT143	20	30	4	20	-	-2.5	15	-	2.3	0.8	1.8	-	X
BF998	SOT143	12	30	2	18	-	-2.0	21	-	2.1	1.05	1	X	X
BF998R	SOT143R	12	30	2	18	-	-2.0	21	-	2.1	1.05	1	X	X
BF998WR	SOT343R	12	30	2	18	-	-2.5	22	-	2.1	1.05	1	X	X

#### Fully internal bias

BF1105	SOT143	7	30	8	16	0.3	1.2 <sup>6)</sup>	25	-	2.2 <sup>9)</sup>	1.2 <sup>8)</sup>	1.7	X	X
BF1105R	SOT143R	7	30	8	16	0.3	1.2 <sup>6)</sup>	25	-	2.2 <sup>9)</sup>	1.2 <sup>8)</sup>	1.7	X	X
BF1105WR	SOT343R	7	30	8	16	0.3	1.2 <sup>6)</sup>	25	-	2.2 <sup>9)</sup>	1.2 <sup>8)</sup>	1.7	X	X
BF1109	SOT143	11	30	8	16	0.3	1.2 <sup>6)</sup>	24	-	2.2 <sup>9)</sup>	1.3 <sup>8)</sup>	1.5	X	X
BF1109R	SOT143R	11	30	8	16	0.3	1.2 <sup>6)</sup>	24	-	2.2 <sup>9)</sup>	1.3 <sup>8)</sup>	1.5	X	X
BF1109WR	SOT343R	11	30	8	16	0.3	1.2 <sup>6)</sup>	24	-	2.2 <sup>9)</sup>	1.3 <sup>8)</sup>	1.5	X	X

#### Partly internal bias

BF904	SOT143	7	30	8	13	0.3	1 <sup>6)</sup>	22	30	2.2	1.3	2	X	X
BF904R	SOT143R	7	30	8	13	0.3	1 <sup>6)</sup>	22	30	2.2	1.3	2	X	X
BF904WR	SOT343R	7	30	8	13	0.3	1 <sup>6)</sup>	22	30	2.2	1.3	2	X	X
BF909	SOT143	7	40	12	20	0.3	1 <sup>6)</sup>	36	50	3.6	2.3	2	X	X
BF909R	SOT143R	7	40	12	20	0.3	1 <sup>6)</sup>	36	50	3.6	2.3	2	X	X
BF909WR	SOT343R	7	40	12	20	0.3	1 <sup>6)</sup>	36	50	3.6	2.3	2	X	X

<sup>1)</sup> Asymmetrical

<sup>2)</sup> V<sub>GS(th)</sub>

<sup>3)</sup> I<sub>D</sub>

<sup>4)</sup> V<sub>SG</sub>

<sup>5)</sup> Depletion FET plus diode in one package

<sup>6)</sup> V<sub>GS(th)</sub>

<sup>7)</sup> @ 200 MHz

<sup>8)</sup> C<sub>OSS</sub>

<sup>9)</sup> C<sub>ig</sub>

## N-channel, dual-gate MOSFETs

Type	Package	V <sub>DS</sub> (V)	I <sub>D</sub> (mA)	CHARACTERISTICS										VHF	UHF
				I <sub>DSX</sub> (mA)		V <sub>(th)igs</sub> (V)		Y <sub>fs</sub>   (mS)		C <sub>is</sub> (pF)	C <sub>os</sub> (pF)	F @ 800 MHz (dB)			
				min	max	min	max	min	max	typ	typ	typ			
				max	max	min	max	min	max	typ	typ	typ			
<b>Partly internal bias</b>															
BF1100	SOT143	14	30	8	13	0.3	1.2 <sup>6)</sup>	24	33	2.2	1.4	2	X	X	
BF1100R	SOT143R	14	30	8	13	0.3	1.2 <sup>6)</sup>	24	33	2.2	1.4	2	X	X	
BF1100WR	SOT343R	14	30	8	13	0.3	1.2 <sup>6)</sup>	24	33	2.2	1.4	2	X	X	
BF1101	SOT143	7	30	8	16	0.3	1 <sup>6)</sup>	25	-	2.2	1.2 <sup>8)</sup>	1.7	X	X	
BF1101R	SOT143R	7	30	8	16	0.3	1 <sup>6)</sup>	25	-	2.2	1.2 <sup>8)</sup>	1.7	X	X	
BF1101WR	SOT343R	7	30	8	16	0.3	1 <sup>6)</sup>	25	-	2.2	1.2 <sup>8)</sup>	1.7	X	X	
BF1102(R) <sup>10)</sup>	SOT363	7	40	12	20	0.3	1.2 <sup>6)</sup>	36	-	2.8 <sup>9)</sup>	1.6 <sup>8)</sup>	2	X	X	
BF1201	SOT143	10	30 <sup>1)</sup>	11	19	0.3	1.2 <sup>6)</sup>	23	35	2.6	0.9	1.9	X	X	
BF1201R	SOT143R	10	30 <sup>1)</sup>	11	19	0.3	1.2 <sup>6)</sup>	23	35	2.6	0.9	1.9	X	X	
BF1201WR	SOT343R	10	30 <sup>1)</sup>	11	19	0.3	1.2 <sup>6)</sup>	23	35	2.6	0.9	1.9	X	X	
BF1202	SOT143	10	30	8	16	0.3	1.2 <sup>6)</sup>	25	40	1.7	0.85	1.1	X	X	
BF1202R	SOT143R	10	30	8	16	0.3	1.2 <sup>6)</sup>	25	40	1.7	0.85	1.1	X	X	
BF1202WR	SOT343R	10	30	8	16	0.3	1.2 <sup>6)</sup>	25	40	1.7	0.85	1.1	X	X	
BF1203 <sup>11)</sup>	SOT363	10	30	11	19	0.3	1.2 <sup>6)</sup>	23	35	2.6	0.9	1.9	X	-	
		10	30	8	16	0.3	1.2	25	40	1.7	0.85	1.1	-	X	
BF1204 <sup>10)</sup>	SOT363	10	30	8	16	0.3	1.2 <sup>6)</sup>	25	40	1.7	0.85	1.1	X	X	
<b>BF1205C<sup>11)</sup>(12)(13)</b>	SOT363	6	30	14	24	0.3	1	26	41	2.2	0.9	1.4	X	-	
		6	30	9	17	0.3	1	28	43	2	0.85	1.4	-	X	
BF1205 <sup>11)(12)(13)</sup>	SOT363	10	30	8	16	0.3	1.0	26	40	1.8	0.75	1.2	X	-	
		7	30	8	16	0.3	1.0	26	40	2.0	0.85	1.4	-	X	
<b>BF1206<sup>11)</sup></b>	SOT363	6	30	14	23	0.3	1.0	33	48	2.4	1.1	1.6	X	-	
		6	30	9	17	0.3	1.0	29	44	1.7	0.85	1.4	-	X	
<b>BF1206F<sup>11)</sup></b>	SOT666	6	30	3	6.5	0.3	1.0	17	32	2.4	1.1	1.1	X	-	
		6	30	3	6.5	0.3	1.0	17	32	1.7	0.85	1.0	-	X	
<b>BF1207<sup>11)(13)(14)</sup></b>	SOT363	6	30	13	23	0.3	1.0	25	40	2.2	0.9	1.4	X	-	
		6	30	9	19	0.3	1.0	26	41	1.8	0.8	1.4	-	X	
<b>BF1208<sup>11)(12)(13)</sup></b>	SOT666	6	30	14	24	0.3	1	26	41	2.2	0.9	1.4	X	-	
		6	30	9	17	0.3	1	28	43	2	0.85	1.4	-	X	
<b>BF1208D<sup>11)(12)(13)</sup></b>	SOT666	6	30	14	24	0.3	1	26	41	2.1	0.8	1.1	X	-	
		6	30	10	20	0.3	1	25	40	2.1	0.85	1.4	-	X	
<b>BF1210<sup>11)(12)</sup></b>	SOT363	6	30	14	24	0.3	1	26	41	2.2	0.9	1.4	X	-	
		6	30	9	17	0.3	1	28	43	2	0.85	1.4	-	X	
<b>BF1211</b>	SOT143	6	30	11	19	0.3	1.0	25	40	2.1	0.9	1.3	X	-	
<b>BF1211R</b>	SOT143R	6	30	11	19	0.3	1.0	25	40	2.1	0.9	1.3	X	-	
<b>BF1211WR</b>	SOT343	6	30	11	19	0.3	1.0	25	40	2.1	0.9	1.3	X	-	
<b>BF1212</b>	SOT143	6	30	8	16	0.3	1.0	28	43	1.7	0.9	1.1	-	X	
<b>BF1212R</b>	SOT143R	6	30	8	16	0.3	1.0	28	43	1.7	0.9	1.1	-	X	
<b>BF1212WR</b>	SOT343	6	30	8	16	0.3	1.0	28	43	1.7	0.9	1.1	-	X	
BF1214 <sup>10)</sup>	SOT363	6	30	13	23	0.3	1.0	25	35	2.2	0.9	1.4	X	X	

**Bold** = Highly recommended product

<sup>1)</sup> Asymmetrical

<sup>2)</sup> V<sub>GS(th)</sub>

<sup>3)</sup> I<sub>D</sub>

<sup>4)</sup> V<sub>SG</sub>

<sup>5)</sup> Depletion FET plus diode in one package

<sup>7)</sup> @200 MHz

<sup>8)</sup> C<sub>OSS</sub>

<sup>9)</sup> C<sub>ig</sub>

<sup>10)</sup> Two equal dual gate MOSFETs in one package

<sup>11)</sup> Two low noise gain amplifiers in one package

<sup>12)</sup> Transistor A: fully internal bias, transistor B: partly internal bias

<sup>13)</sup> Internal switching function

<sup>14)</sup> Transistor A: partly internal bias, transistor B: fully internal bias

## 3.6 RF Modules

NXP RF CATV-HFC modules:

<http://www.nxp.com/catv>

### Why choose NXP Semiconductors' RF Modules:

- Excellent linearity, stability and reliability
- Rugged construction
- Extremely low noise
- High power gain
- Low total cost of ownership

### CATV types for Chinese (C-types) and Indian market (OM-types)

New in our CATV Hybrid portfolio are two families of products. The C types are specially designed for the Chinese market, fitting two major governmental projects. And the OM types, also called the INDI types, are designed for low-end CATV

infrastructure networks deployed in India. Both families will be extended in the following months to cover most of those two specific market segments.

### C types (China)

- CATV push pulls, chapter 3.6.2 :  
BGY588C, BGE788C, CGY888C
- CATV power doublers, chapter 3.6.3 :  
BGD712C
- CATV optical receivers, chapter 3.6.4 :  
BGO807C

### OM types (India)

- CATV push pulls, chapter 3.6.2 :  
OM7650 and OM7670

### 3.6.1 CATV Reverse Hybrids

Frequency range	Type number	Gain	Slope	FL	RL <sub>IN</sub> /RL <sub>OUT</sub>	CTB	XMOD	CSO	@ Ch	@ Vo	F @ fmax	Itot
		(dB)	(dB)							(dBmV)		
5 -65 MHz	BGS67A	25 - 26	-0.1 - 0.6	± 0.2	20/20	-64	-54	-	4	50	3.5	85
5 -75 MHz	BGY68	29.2 - 30.8	-0.2 - 0.5	± 0.2	20/20	-68	-60	-	4	50	3.5	135
5 -120 MHz	BGY66B	24.5 - 25.5	-0.2 - 0.5	± 0.2	20/20	-66	-54	-	14	48	5	135
5 -200 MHz	BGY67	21.5 - 22.5	-0.2 - 0.5	± 0.2	20/20	-67	-60	-	22	50	5.5	230
	BGY67A	23.5 - 24.5	-0.2 - 0.5	± 0.2	20/20	-67	-59	-	22	50	5.5	230
5-200 MHz	BGR269	34.5 - 35.5	0 - 0.6	± 0.4	20/20	-57	-50	-70	28	50	5.2	160

### 3.6.2 CATV Push-Pulls

Frequency range	Type number	Gain	Slope	FL	RL <sub>IN</sub> /RL <sub>OUT</sub>	CTB	XMOD	CSO	@ Ch	@ Vo	F @ fmax	Itot
		(dB)	(dB)							(dBmV)		
40 - 550 MHz	OM7650	33.2 - 35.5	0.2 - 2	-	10/10	-45	-	-57	77	44	8	340
	BGY588C	33.2 - 35.5	0.2 - 1.7	± 0.5	16/16	-57	-	-62	77	44	8	345
	BGY585A	17.7 - 18.7	0.5 - 2	± 0.2	20/20	-59	-62	-59	77	44	8	240
	BGY587	21.5 - 22.5	0.2 - 1.5	± 0.2	20/20	-57	-58	-54	77	44	7	240
	BGY587B	26.2 - 27.8	0.5 - 2.5	± 0.4	20/20	-57	-60	-57	77	44	6.5	340
	BGY588N	33.5 - 35.5	0.5 - 1.5	± 0.4	20/20	-57	-59	-62	77	44	6	340
40 - 600 MHz	BGY685A	17.7 - 18.7	0.5 - 2.2	± 0.2	20/20	-55	-60	-56	85	44	8.5	240
	BGY687	21 - 22	0.8 - 2.2	± 0.2	20/20	-54	-54	-52	85	44	6.5	240
40 - 750 MHz	OM7670	33.2 - 35.2	1/4	-	10/8	-43	-	-54	110	44	8	340
	BGY785A	18 - 19	0 - 2	± 0.3	20/20	-53	-56	-53	110	44	7	240
	BGE788C	33.2 - 35.2	0.3 - 2.3	± 0.6	16/16	-49	-	-52	110	44	8	325
	BGY787	21 - 22	0 - 1.5	± 0.5	20/20	-53	-52	-53	110	44	6.5	240
	BGE787B	28.5 - 29.5	0.2 - 2.2	± 0.5	20/20	-50	-54	-56	110	44	7	320
	BGE788	33.5 - 34.5	0.5 - 2.5	± 0.5	20/20	-49	-51	-52	110	44	7	320
40 - 870 MHz	BGY883	14.5 - 15.5	0 - 2	± 0.3	20/20	-61	-61	-61	49	44	8.5	235
	BGE885	16.5 - 17.5	0.2 - 1.2	± 0.5	14/14	-	-	-	129	59	8	240
	BGX885N	16.5 - 17.5	0.2 - 1.4	± 0.3	20/20	-	-	-	129	59	8	240
	BGY885A	18 - 19	0 - 2	± 0.3	20/20	-61	-61	-61	49	44	8	240
	BGY887	21 - 22	0.2 - 2	± 0.3	20/20	-55	-61	-57	129	40	6.5	235
	<b>CGY888C</b>	34.5 - 36.5	0.5 - 2.5	± 0.5	20/20	-68	-	-66	112	44	4.0	280
	BGY835C	33.5 - 34.5	0.5 - 2.5	± 0.6	21/21	-60	-59	-55	49	44	7.0	340
	BGY887B	28.5 - 29.5	0.5 - 2.5	± 0.5	20/20	-60	-60	-60	49	44	6.5	340
	BGY888	33.5 - 34.5	0.5 - 2.5	± 0.5	20/20	-60	-59	-55	49	44	7	340
40 -1000 MHz	BGY1085A	18 - 19	0 - 2	± 0.3	20/20	-53	-54	-56	150	44	7.5	240

**Bold Red** = New, highly recommended product

## CATV Push-Pulls 1 GHz

freq range	type	gain	slope	fl	Rlin/RLout	CTB	Xmod	CSO	@ Ch	@ Vout	NF	Itot
40-1000MHz	<b>CGY1041</b>	21	1.0 - 2.0dB	±0.5	20/18dB	-62dBc	-58dBc	-64dBc	79NTSC+75digital	44dBmV flat	4.0dB	270mA
40-1000MHz	<b>CGY1043</b>	23	1.0 - 2.0dB	±0.5	20/18dB	-62dBc	-58dBc	-64dBc	79NTSC+75digital	44dBmV flat	4.0dB	270mA
40-1000MHz	<b>CGY1047</b>	27	1.0 - 2.0dB	±0.5	20/18dB	-62dBc	-58dBc	-64dBc	79NTSC+75digital	44dBmV flat	4.0dB	270mA

**Bold Red** = New, highly recommended product

### 3.6.3 CATV power doublers

Frequency range	Type number	Gain	Slope	FL	RL-IN/RL-OUT	CTB	XMOD	CSO	@ Ch	@ Vo	F @ fmax	Itot
		(dB)	(dB)							(dBmV)		
40 - 550 MHz	BGD502	18 - 19	0.2 - 2.2	± 0.3	20/20	-65	-68	-62	77	44	8	435
	BGD702	18 - 19	0.2 - 2	± 0.5	20/20	-58	-62	-58	110	44	8.5	435
40 -750 MHz	BGD702N	18 - 19	0.2 - 2	± 0.25	20/20	-58	-62	-58	110	44	8.5	435
	BGD712	18.2 - 18.8	0.5 - 1.5	± 0.35	23/23	-62	-63	-63	112	44	7	410
	<b>BGD712C</b>	18.2 - 18.8	0.5 - 1.5	± 0.4	17/17	-62	-	-63	112	44	7	410
	BGD704	19.5 - 20.5	0 - 2	± 0.5	20/20	-57	-61	-56	110	44	8.5	435
	BGD714	20 - 20.6	0.5 - 1.5	± 0.35	23/23	-61	-62	-62	112	44	7	410
	BGD885	16.5 - 17.5	0.2 - 1.6	± 0.5	20/20	-	-	-	129	59	8	450
40 - 870 MHz	BGD802	18 - 19	0.2 - 2	± 0.5	20/20	-54	-59	-56	129	44	9	410
	BGD812	18.2 - 18.8	0.4 - 1.4	± 0.5	23/23	-58	-62	-60	132	44	7.5	410
	BGD804	19.5 - 20.5	0.2 - 2	± 0.5	20/20	-53	-61	-54	129	44	7.5	410
	BGD814	19.7 - 20.3	0.4 - 1.4	± 0.5	22/25	-57.5	-62	-59	132	44	7.5	410
	BGD816L	21.2 - 21.8	0.5 - 1.5	± 0.5	22/25	-55	-58	-56	129	44	7.5	375
	<b>CGD942C</b>	20.5 - 22.5	1 - 2	± 0.3	18/18	-66	-58	-68	132	48	3.5	450
	<b>CGD944C</b>	23 - 25	1 - 2	± 0.3	18/18	-66	-58	-68	132	48	3.5	450
	<b>CGD1042</b>	20.5 - 22.5	1.5 - 2.5	± 0.3	17/17	-68	-64	-68	79	56.9	5.0	450
40 - 1000 MHz	<b>CGD1044</b>	22.5 - 24.5	1.5 - 2.5	± 0.3	17/17	-68	-64	-68	79	56.9	5.0	450
	<b>CGD1042H</b>	22 - 24	0 - 1.5	± 0.3	17.5/20	-70	-67	-68	79 + 75*	59	5.0	450
	<b>CGD1044H</b>	23 - 25	0 - 1	± 0.3	17.5/20	-70	-67	-68	79 + 75*	59	5.0	450

**Bold** = Highly recommended product  
 \* = digital channels

### 3.6.4 CATV optical receivers

Frequency range	Type number	Rmin	Slope	FL	S22	d3	d2	@fm	@Pi	F @ fmax	Conn.	Itot
		(V/W)	(dB)		(dB)			(MHz)	(mW)			
<b>Forward Path Receiver</b>												
40 - 870 MHz	<b>BGO807</b>	800	0 - 2	1	11	-71	-55	854.5	1	8.5		205
	BGO807/FC0	750	0 - 2	1	11	-71	-55	854.5	1	8.5	FC	205
	BGO807/SC0	750	0 - 2	1	11	-71	-55	854.5	1	8.5	SC	205
	<b>BGO807C</b>	800	0 - 2	1	11	-71	-54	854.4	1	8.5		205
	BGO807C/FC0	750	0 - 2	1	11	-71	-55	854.5	1	8.5	FC	205
	BGO807C/SC0	750	0 - 2	1	11	-71	-55	854.5	1	8.5	SC	205
	BGO827	800	0 - 2	1	11	-73	-57	854.5	1	8.5		205
	BGO827/FC0	750	0 - 2	1	11	-73	-57	854.5	1	8.5	FC	205
	BGO827/SC0	750	0 - 2	1	11	-73	-57	854.5	1	8.5	SC	205

**Bold** = Highly recommended product

\* NOTES: This table is for reference only.  
 For full data please refer to the latest datasheet.  
 For availability please check the NXP Sales office.

#### Description

Frequency range: minimum and maximum frequency in MHz at which data are characterized @Ch/@Vo. The number of channels and the output voltage at which CTB, XM, CSO and d2 are characterized @fm. Measurement frequency is F. Noise Figure is in dB or Noise in pA/Sqrt(Hz). FL is Flatness Rmin is Minimum responsivity of optical receivers.



## 3.7 Fiber-optic transceiver ICs

NXP Optical Networking

<http://www.nxp.com/opticalnetworking>

### Why choose NXP Semiconductors' Fiber Optic Transceivers:

- Reliable supplier
- Easy to design in
- Robust products

### 3.7.1 Transimpedance amplifiers

Part number	Data-rate	Package type	Bare die	In	Eq Sens	RSSI	Output	Vcc	Power dissipation
				[nA]	[dBm]				mW
TZA3036	0-155	die only	X	10	-40	Yes	50 Ohm	3.3	50
TZA3026	0-622	die only	X	67	-32	Yes	50 Ohm	3.3	60
<b>TZA3046</b>	0-1250	die only	X	130	-29	Yes	50 Ohm	3.3	70
TZA3013	0-2488	die only	X	450	-24	-	50 Ohm	3.3	86

**Bold** = highly recommended product

\*) NOTES: All figures given are typical at 25 deg C

Power dissipation is given for Vcc = 3.3 V

Eq. sensitivity conditions: Calculated from noise figure using a lowpass bandwidth filter at 0.7x bit rate and a source with an extinction ratio of 10% and a photodiode responsivity of 0.9A/W.



**What if you could lower total cost of ownership for your satellite solutions?**

Look at TFF1004HN RF ICs for satellite LNB,  
chapter 2.3

# 4. Design-in tools

This chapter will make it easier to find and get hold of design-in information and materials, with web links or references to the NXP representative / authorized distributor.

## 4.1 S-Parameters

S-Parameters help you to simulate the behaviour of our devices to your specific adjustments for e.g. voltage, current.

### Wideband transistors, FETs & MMICs

First, click on the type number, which takes you directly to the corresponding product information page on the NXP Semiconductors internet.

Second, scroll down on this product information page to find the S-Parameters.

Wideband transistors			
BFG67	BFG480W	BFQ19	BFS520
BFG135	BFG505	BFQ67	BFS540
BFG198	BFG520	BFQ67W	BFT25
BFG21W	BFG520W	BFR106	BFT25A
BFG25A/X	BFG540	BFR505	BFT92
BFG31	BFG540W	BFR520	BFT92W
BFG35	BFG541	BFR540	BFT93
BFG310/XR	BFG590	BFR92A	BFT93W
BFG310W/XR	BFG591	BFR92AW	BRF505T
BFG325/XR	BFG93A	BFR93A	PBR941
BFG325W/XR	BFG94	BFR93AW	PBR951
BFG403W	BFG97	BFS17	PRF947
BFG410W	BFM505	BFS17A	PRF949
BFG424F	BFM520	BFS17W	PRF957
BFG424W	BFQ149	BFS25A	
BFG425W	BFQ18A	BFS505	

FETs		
BF1211	BF1212	BF511
BF1211R	BF1212R	BF513
BF1211WR	BF1212WR	BF862

MMICs		
BGA2001	BGA2712	BGA2716
BGA2003	BGM1011	BGA2717
BGA2711	BGM1012	BGA2011
BGA2748	BGM1013	BGA2012
BGA2771	BGM1014	BGA6289
BGA2776	BGM2011	BGA6489
BGA2709	BGA2715	BGA6589

## 4.2 Spice models

Spice models help you to create the optimal performance and to understand which external components have a certain influence on that performance.

### Wideband transistors, FETs & Varicaps diodes

First, click on the type number which takes you directly to the corresponding product information page on the NXP Semiconductors internet.

Second, scroll down on this product information page to find the Spice models.

Wideband transistors			
BFG10	BFG505	BFG92A/X	BFR93AW
BFG10/X	BFG505/X	BFG93A	BFS17
BFG10W/X	BFG505W/X	BFG94	BFS17A
BFG135	BFG520	BFG97	BFS17W
BFG198	BFG520/X	BFM505	BFS25A
BFG21W	BFG520/XR	BFM520	BFS505
BFG25A/X	BFG520W	BFQ149	BFS520
BFG25AW/X	BFG520W/X	BFQ18A	BFS540
BFG31	BFG540	BFQ19	BFT25A
BFG310/XR	BFG540/X	BFQ540	BFT92
BFG310W/XR	BFG540/XR	BFQ67	BFT92W
BFG325/XR	BFG540W	BFQ67W	BFT93
BFG325W/XR	BFG540W/X	BFR106	BFT93W
BFG35	BFG540W/XR	BFR505	PBR941
BFG403W	BFG541	BFR505T	PBR951
BFG410W	BFG590	BFR520	PRF947
BFG424F	BFG590/X	BFR540	PRF949
BFG424W	BFG591	BFR92A	PRF957
BFG425W	BFG67	BFR92AW	
BFG480W	BFG67/X	BFR93A	

FETs			
BF862	BF908	BF909	BF998
BF904			

Varicap diodes			
BB145B	BB156	BB201	BB208-02
BB149	BB179	BB202	
BB149A	BB179B	BB207	

## 4.3 Application notes

[http://www.nxp.com/products/all\\_appnotes/](http://www.nxp.com/products/all_appnotes/)

For the application notes we refer you to chapter 1 of this manual. For each application, we have given the recommended application notes which are available on the internet (with interactive link) or via your local NXP representative or authorized distributor (look at the last chapter: Web Links and Contacts).

## 4.4 Demo boards



### 4.4.1 MMIC and SiGeC transistor demo boards

MMIC demo boards are available (although limited) via your local NXP representative or authorized distributor (look at the last chapter: Web Links and Contacts).

BFU725F	BGA2709	BGA2748	BGM1011
BGA2001	BGA2711	BGA2771	BGM1012
BGA2003	BGA2712	BGA2776	BGM1013
BGA2011	BGA2714	BGA6289	BGM1014
BGA2012	BGA2715	BGA6489	BGU7003
BGA2031	BGA2716	BGA6589	

## 4.5 Samples of products in development

For development samples, please ask your local NXP representative or authorized distributor (see last chapter: Web Links and Contacts) to order the latest versions at the RF development team.

## 4.6 Samples of released products

For all released products, samples are available in the sample warehouse. Look on the home page of the NXP web site for the link to the online sample store: [www.nxp.com](http://www.nxp.com)

## 4.7 Datasheets

For all released products, datasheets are available on the NXP Semiconductors internet. Simply 'clicking' on a product type (in this manual chapter 1 or 2) takes you to the corresponding product information page on the NXP Semiconductors website.

## 4.8 Design-in support

If you need special design-in support from our design-in engineers, please ask your local NXP representative or authorized distributor (see last chapter: Web Links and Contacts), to pass on your request to the RF development team.

# 5. Cross-references & replacements

NXP cross-references:

<http://www.nxp.com/search/index.html>

NXP end-of-life:

<http://www.nxp.com/products/eol/>

## 5.1 Cross-references: Manufacturer types versus NXP types

### In alphabetical order of manufacturer type

Abbreviations:

BS diode	Band Switch Diode
CATV PD	CATV Power Doubler
CATV PPA	CATV Push Pull Amplifier
CATV PPA/HG	CATV Push Pull Amplifier High Gain
CATV RA	CATV Reverse Amplifier
FET	Field Effect Transistor
Standard	Standard in Industry
MMIC	Monolithic Microwave Integrated Circuit
Varicap	Varicap Diode
WB trs 1-4	Wideband Transistor 1-4 generation
WB trs 5-7	Wideband Transistor 5-7 generation

Manufacturer type	Manufacturer	NXP type	Product family
1SS314	Toshiba	BA591	BS diode
1SS356	Rohm	BA591	BS diode
1SS381	Toshiba	BA277	BS diode
1SS390	Rohm	BA891	BS diode
1SV172	Toshiba	BAP50-04	PIN diode
1SV214	Toshiba	BB149	Varicap
1SV214	Toshiba	BB149A	Varicap
1SV215	Toshiba	BB153	Varicap
1SV228	Toshiba	BB201	Varicap
1SV231	Toshiba	BB152	Varicap
1SV232	Toshiba	BB148	Varicap
1SV233	Sanyo	BAP70-03	PIN diode
1SV234	Sanyo	BAP64-04	PIN diode
1SV239	Toshiba	BB145B	Varicap
1SV241	Sanyo	BAP64-02	PIN diode
1SV246	Sanyo	BAP64-04W	PIN diode
1SV247	Sanyo	BAP70-02	PIN diode
1SV248	Sanyo	BAP50-02	PIN diode
1SV249	Sanyo	BAP50-04W	PIN diode
1SV250	Sanyo	BAP50-03	PIN diode
1SV251	Sanyo	BAP50-04	PIN diode
1SV252	Toshiba	BAP50-04W	PIN diode
1SV254	Toshiba	BB179	Varicap
1SV263	Sanyo	BAP50-02	PIN diode
1SV264	Sanyo	BAP50-04W	PIN diode
1SV266	Sanyo	BAP50-03	PIN diode
1SV267	Sanyo	BAP50-04	PIN diode
1SV269	Toshiba	BB148	Varicap
1SV270	Toshiba	BB156	Varicap
1SV271	Toshiba	BAP50-03	PIN diode

Manufacturer type	Manufacturer	NXP type	Product family
1SV278	Toshiba	BB179	Varicap
1SV279	Toshiba	BB179	Varicap
1SV282	Toshiba	BB178	Varicap
1SV282	Toshiba	BB178	Varicap
1SV282	Toshiba	BB187	Varicap
1SV283	Toshiba	BB187	Varicap
1SV283	Toshiba	BB178	Varicap
1SV283	Toshiba	BB178	Varicap
1SV283	Toshiba	BB187	Varicap
1SV284	Toshiba	BB156	Varicap
1SV288	Toshiba	BB152	Varicap
1SV290	Toshiba	BB182	Varicap
1SV294	Sanyo	BAP70-03	PIN diode
1SV305	Toshiba	BB202	Varicap
1SV307	Toshiba	BAP51-03	PIN diode
1SV308	Toshiba	BAP51-02	PIN diode
1SV322	Toshiba	BB202LX	Varicap
1SV322	Toshiba	BB202LX	Varicap
1SV322	Toshiba	BB202LX	Varicap
1T362	Sony	BB149	Varicap
1T362 A	Sony	BB149A	Varicap
1T363 A	Sony	BB153	Varicap
1T368 A	Sony	BB148	Varicap
1T369	Sony	BB152	Varicap
1T379	Sony	BB131	Varicap
1T397	Sony	BB152	Varicap
1T399	Sony	BB148	Varicap
1T402	Sony	BB179B	Varicap
1T402	Sony	BB179B	Varicap
1T403	Sony	BB178	Varicap

Manufacturer type	Manufacturer	NXP type	Product family
1T403	Sony	BB178	Varicap
1T404A	Sony	BB187	Varicap
1T405 A	Sony	BB187	Varicap
1T406	Sony	BB182	Varicap
1T408	Sony	BB187	Varicap
2F1G20DS	RFHIC	CGD1042	CATV PD
2F1G20P	RFHIC	CGY1041	CATV PP
2F1G22DS	RFHIC	CGD1042	CATV PD
2F1G23P	RFHIC	CGY1043	CATV PP
2F1G24DS	RFHIC	CGD1044	CATV PD
2F722DS	RFHIC	BGD816L	CATV PD
2F8718P	RFHIC	BGY885A	CATV PP
2F8719DS	RFHIC	BGD812	CATV PD
2F8720DS	RFHIC	BGD814	CATV PD
2F8723P	RFHIC	BGY887	CATV PP
2F8734P	RFHIC	CGY888C	CATV PP
2N3330	Standard	J176	FET
2N3331	Standard	J176	FET
2N4220	Standard	BF245A	FET
2N4856	Standard	BSR56	FET
2N4857	Standard	BSR57	FET
2N4858	Standard	BSR58	FET
2N5114	Standard	J174	FET
2N5115	Standard	J175	FET
2N5116	Standard	J175	FET
2N5432	Standard	J108	FET
2N5433	Standard	J108	FET
2N5434	Standard	J109	FET
2N5457	Standard	BF245A	FET
2N5458	Standard	BF245A	FET
2N5459	Standard	BF245B	FET
2N5653	Standard	J112	FET
2N5654	Standard	J111	FET
2SC4094	NEC	BFG520/XR	WB trs 1-4
2SC4095	NEC	BFG520/XR	WB trs 1-4
2SC4182	NEC	BFS17W	WB trs 1-4
2SC4184	NEC	BFS17W	WB trs 1-4
2SC4185	NEC	BFS17W	WB trs 1-4
2SC4186	NEC	BFR92AW	WB trs 1-4
2SC4226	NEC	PRF957	WB trs 1-4
2SC4227	NEC	BFQ67W	WB trs 1-4
2SC4228	NEC	BFS505	WB trs 1-4
2SC4247	Toshiba	BFR92AW	WB trs 1-4
2SC4248	Toshiba	BFR92AW	WB trs 1-4
2SC4315	Toshiba	BFG520/XR	WB trs 1-4
2SC4320	Toshiba	BFG520/XR	WB trs 1-4
2SC4321	Toshiba	BFQ67W	WB trs 1-4
2SC4325	Toshiba	BFS505	WB trs 1-4
2SC4394	Toshiba	PRF957	WB trs 1-4
2SC4536	NEC	BFQ19	WB trs 1-4
2SC4537	Renesas	BFR93AW	WB trs 1-4
2SC4592	Renesas	BFG520/XR	WB trs 1-4
2SC4593	Renesas	BFS520	WB trs 1-4
2SC4703	NEC	BFQ19	WB trs 1-4
2SC4784	Renesas	BFS505	WB trs 1-4
2SC4807	Renesas	BFQ18A	WB trs 1-4
2SC4842	Toshiba	BFG540W/XR	WB trs 1-4
2SC4899	Renesas	BFS505	WB trs 1-4
2SC4900	Renesas	BFG520/XR	WB trs 1-4
2SC4901	Renesas	BFS520	WB trs 1-4
2SC4988	Renesas	BFQ540	WB trs 1-4
2SC5011	NEC	BFG540W/XR	WB trs 1-4
2SC5012	NEC	BFG540W/XR	WB trs 1-4
2SC5065	Toshiba	PRF957	WB trs 1-4
2SC5085	Toshiba	PRF957	WB trs 1-4
2SC5087	Toshiba	BFG520/XR	WB trs 1-4
2SC5088	Toshiba	BFG540W/XR	WB trs 1-4
2SC5090	Toshiba	BFS520	WB trs 1-4
2SC5092	Toshiba	BFG520/XR	WB trs 1-4
2SC5095	Toshiba	BFS505	WB trs 1-4
2SC5107	Toshiba	BFS505	WB trs 1-4
2SC5463	Toshiba	BFQ67W	WB trs 1-4
2SC5593	Renesas	BFG410W	WB trs 5-7
2SC5594	Renesas	BFG425W	WB trs 5-7
2SC5623	Renesas	BFG410W	WB trs 5-7
2SC5624	Renesas	BFG425W	WB trs 5-7

Manufacturer type	Manufacturer	NXP type	Product family
2SC5631	Renesas	BFQ540	WB trs 1-4
2SC6023	Sanyo	BFG424W	WB trs 5-7
2SC6023	Sanyo	BFG424W	WB trs 5-7
2SC6023	Sanyo	BFG424W	WB trs 5-7
2SJ105GR	Standard	J177	FET
2SK163-K	Renesas	J113	FET
2SK163-L	Renesas	J113	FET
2SK163-M	Renesas	J113	FET
2SK163-N	Renesas	J113	FET
2SK210BL	Renesas	PMBFJ309	FET
2SK370BL	Renesas	J109	FET
2SK370GR	Renesas	J109	FET
2SK370V	Renesas	J109	FET
2SK381	Renesas	J113	FET
2SK43	Renesas	J113	FET
2SK435	Renesas	J113	FET
2SK508	Renesas	PMBFJ308	FET
3SK290	Renesas	BF998WR	FET
BA592	Infineon	BA591	BS diode
BA592	Infineon	BA591	BS diode
BA595	Infineon	BAP70-03	PIN diode
BA595	Infineon	BAP51-03	PIN diode
BA597	Infineon	BAP70-03	PIN diode
BA885	Infineon	BAP70-03	PIN diode
BA892	Infineon	BA891	BS diode
BA892	Infineon	BA891	BS diode
BA892-02V	Infineon	BA277	PIN diode
BA892-02V	Infineon	BA891	PIN diode
BA895	Infineon	BAP70-02	PIN diode
BAR14-1	Infineon	BAP70-03	PIN diode
BAR15-1	Infineon	BAP70-03	PIN diode
BAR16-1	Infineon	BAP70-03	PIN diode
BAR17	Infineon	BAP50-03	PIN diode
BAR50-02L	Infineon	BAP50LX	PIN diode
BAR50-02L	Infineon	BAP50LX	PIN diode
BAR50-02V	Infineon	BAP50-02	PIN diode
BAR50-02V	Infineon	BAP50-03	PIN diode
BAR50-02V	Infineon	BAP50-05	PIN diode
BAR50-03W	Infineon	BAP70-02	PIN diode
BAR60	Infineon	BAP50-03	PIN diode
BAR61	Infineon	BAP50-03	PIN diode
BAR63	Infineon	BAP63-03	PIN diode
BAR63-02L	Infineon	BAP63LX	PIN diode
BAR63-02L	Infineon	BAP63LX	PIN diode
BAR63-02L	Infineon	BAP63-02	PIN diode
BAR63-02V	Infineon	BAP63-02	PIN diode
BAR63-02W	Infineon	BAP63-02	PIN diode
BAR63-03W	Infineon	BAP63-03	PIN diode
BAR63-05	Infineon	BAP63-05W	PIN diode
BAR63-05W	Infineon	BAP63-05W	PIN diode
BAR64-02LRH	Infineon	BAP64LX	PIN diode
BAR64-02LRH	Infineon	BAP64LX	PIN diode
BAR64-02V	Infineon	BAP64-02	PIN diode
BAR64-02W	Infineon	BAP64-02	PIN diode
BAR64-03W	Infineon	BAP64-03	PIN diode
BAR64-04	Infineon	BAP64-04	PIN diode
BAR64-04W	Infineon	BAP64-04W	PIN diode
BAR64-05	Infineon	BAP64-05	PIN diode
BAR64-05W	Infineon	BAP64-05W	PIN diode
BAR64-06	Infineon	BAP64-06	PIN diode
BAR64-06W	Infineon	BAP64-06W	PIN diode
BAR65-02L	Infineon	BAP65LX	PIN diode
BAR65-02L	Infineon	BAP65LX	PIN diode
BAR65-02V	Infineon	BAP65-02	PIN diode
BAR65-02W	Infineon	BAP65-02	PIN diode
BAR65-03W	Infineon	BAP65-03	PIN diode
BAR66	Infineon	BAP1321-04	PIN diode
BAR67-02W	Infineon	BAP1321-02	PIN diode
BAR67-03W	Infineon	BAP1321-03	PIN diode
BAT18-04	Infineon	BAT18	PIN diode
BB304C	Renesas	BF1201WR	FET
BB304M	Renesas	BF1201R	FET
BB305C	Renesas	BF1201WR	FET
BB305M	Renesas	BF1201R	FET
BB403M	Renesas	BF909R	FET
BB501C	Renesas	BF1202WR	FET

Manufacturer type	Manufacturer	NXP type	Product family
BB501M	Renesas	BF1202R	FET
BB502C	Renesas	BF1202WR	FET
BB502M	Renesas	BF1202R	FET
BB503C	Renesas	BF1202WR	FET
BB503M	Renesas	BF1202R	FET
BB535	Infineon	BB149	Varicap
BB545	Infineon	BB149A	Varicap
BB555	Infineon	BB179B	Varicap
BB555	Infineon	BB179B	Varicap
BB565	Infineon	BB179	Varicap
BB601M	Renesas	BF1202	FET
BB639	Infineon	BB148	Varicap
BB639	Infineon	BB153	Varicap
BB640	Infineon	BB152	Varicap
BB641	Infineon	BB152	Varicap
BB659	Infineon	BB178	Varicap
BB659	Infineon	BB178	Varicap
BB664	Infineon	BB187	Varicap
BB664	Infineon	BB178	Varicap
BB664	Infineon	BB178	Varicap
BB669	Infineon	BB152	Varicap
BB814	Infineon	BB201	Varicap
BB831	Infineon	BB131	Varicap
BB833	Infineon	BB131	Varicap
BB835	Infineon	BB131	Varicap
BBY58-02V	Infineon	BB202	Varicap
BBY65	Infineon	BB202	Varicap
BF1005S	Infineon	BF1105	FET
BF1009S	Infineon	BF1109	FET
BF1009SW	Infineon	BF1109WR	FET
BF2030	Infineon	BF1101	FET
BF2030R	Infineon	BF1101R	FET
BF2030W	Infineon	BF1101WR	FET
BF244A	Standard	BF245A	FET
BF244B	Standard	BF245B	FET
BF244C	Standard	BF245C	FET
BF247A	Standard	J108	FET
BF247B	Standard	J108	FET
BF247C	Standard	J108	FET
BF256A	Standard	BF245A	FET
BF256B	Standard	BF245B	FET
BF256C	Standard	BF245C	FET
BF770A	Infineon	BFR93A	WB trs 1-4
BF771	Infineon	PBR951	WB trs 1-4
BF771W	Infineon	BFS540	WB trs 1-4
BF772	Infineon	BFG540	WB trs 1-4
BF775	Infineon	BFR92A	WB trs 1-4
BF775A	Infineon	BFR92A	WB trs 1-4
BF775W	Infineon	BFR92AW	WB trs 1-4
BF851A	Standard	BF861A	FET
BF851B	Standard	BF861B	FET
BF851C	Standard	BF861C	FET
BF994S	Vishay	BF994S	FET
BF996S	Vishay	BF996S	FET
BF998	Vishay	BF998	FET
BF998	Infineon	BF998	FET
BF998R	Vishay	BF998R	FET
BF998RW	Vishay	BF998WR	FET
BF998W	Infineon	BF998WR	FET
BFG135A	Infineon	BFG135	WB trs 1-4
BFG193	Infineon	BFG198	WB trs 1-4
BFG194	Infineon	BFG31	WB trs 1-4
BFG196	Infineon	BFG541	WB trs 1-4
BFG19S	Infineon	BFG97	WB trs 1-4
BFG235	Infineon	BFG135	WB trs 1-4
BFP180	Infineon	BFG505/X	WB trs 1-4
BFP181	Infineon	BFG67/X	WB trs 1-4
BFP182	Infineon	BFG67/X	WB trs 1-4
BFP183	Infineon	BFG520/X	WB trs 1-4
BFP183R	Infineon	BFG520/XR	WB trs 1-4
BFP193	Infineon	BFG540/X	WB trs 1-4
BFP193W	Infineon	BFG540W/XR	WB trs 1-4
BFP196W	Infineon	BFG540W/XR	WB trs 1-4
BFP280	Infineon	BFG505/X	WB trs 1-4
BFP405	Infineon	BFG410W	WB trs 5-7
BFP420	Infineon	BFG425W	WB trs 5-7

Manufacturer type	Manufacturer	NXP type	Product family
BFP450	Infineon	BFG480W	WB trs 5-7
BFP740	Infineon	BFU725F	WB trs 5-7
BFP740	Infineon	BFU725F	WB trs 5-7
BFP740F	Infineon	BFU725F	WB trs 5-7
BFP740F	Infineon	BFU725F	WB trs 5-7
BFP81	Infineon	BFG92A/X	WB trs 1-4
BFP93A	Infineon	BFG93A/X	WB trs 1-4
BFQ193	Infineon	BFQ540	WB trs 1-4
BFQ195	Infineon	BFQ19	WB trs 1-4
BFR106	Infineon	BFR106	WB trs 1-4
BFR180	Infineon	BFR505	WB trs 1-4
BFR180W	Infineon	BFS505	WB trs 1-4
BFR181	Infineon	BFR520	WB trs 1-4
BFR181W	Infineon	BFS520	WB trs 1-4
BFR182	Infineon	PBR941	WB trs 1-4
BFR182W	Infineon	PRF947	WB trs 1-4
BFR183	Infineon	PBR951	WB trs 1-4
BFR183W	Infineon	PRF957	WB trs 1-4
BFR193	Infineon	PBR951	WB trs 1-4
BFR193W	Infineon	PRF957	WB trs 1-4
BFR35AP	Infineon	BFR92A	WB trs 1-4
BFR92AL	Motorola	BFR92A	WB trs 1-4
BFR92P	Infineon	BFR92A	WB trs 1-4
BFR92W	Infineon	BFR92AW	WB trs 1-4
BFR93A	Infineon	BFR93A	WB trs 1-4
BFR93AL	Motorola	BFR93A	WB trs 1-4
BFR93AW	Infineon	BFR93AW	WB trs 1-4
BFS17L	Motorola	BFS17	WB trs 1-4
BFS17P	Infineon	BFS17A	WB trs 1-4
BFS17W	Infineon	BFS17W	WB trs 1-4
BFS481	Infineon	BFM505	WB trs 1-4
BFS483	Infineon	BFM520	WB trs 1-4
BFT92	Infineon	BFT92	WB trs 1-4
BFT93	Infineon	BFT93	WB trs 1-4
BIC701C	Renesas	BF1105WR	FET
BIC701M	Renesas	BF1105R	FET
BIC702C	Renesas	BF1105WR	FET
BIC702M	Renesas	BF1105R	FET
BIC801M	Renesas	BF1105	FET
BSR111	Standard	PMBFJ111	FET
BSR112	Standard	PMBFJ112	FET
BSR113	Standard	PMBFJ113	FET
BSR174	Standard	PMBFJ174	FET
BSR175	Standard	PMBFJ175	FET
BSR176	Standard	PMBFJ176	FET
BSR177	Standard	PMBFJ177	FET
CA901	Standard	BGX885N	CATV PPA
CA901A	Standard	BGX885N	CATV PPA
CA922	Standard	BGD885	CATV PD
CA922A	Standard	BGD885	CATV PD
CMY91	Infineon	BGA2022	MMIC
CXE1089Z	RFMD	BGA6489	MMIC
CXE1089Z	RFMD	BGA6589	MMIC
D5540185	Standard	BGD502	CATV PD
D7540185	Standard	BGD702	CATV PD
D7540200	Standard	BGD704	CATV PD
DB640185	Standard	BGD802	CATV PD
EC2C03C	Sanyo	BB145B	Varicap
EC2C03C	Sanyo	BB145B	Varicap
EC2C03C	Sanyo	BB145B	Varicap
FSD273TA	Skyworks	BB148	Varicap
FSD273TA	Skyworks	BB178	Varicap
FSD273TA	Skyworks	BB178	Varicap
HBFP0405	Agilent	BFG410W	WB trs 5-7
HBFP0420	Agilent	BFG425W	WB trs 5-7
HBFP0450	Agilent	BFG480W	WB trs 5-7
HSC277	Renesas	BA277	BS diode
HSMP3800	Agilent	BAP70-03	PIN diode
HSMP3802	Agilent	BAP50-04	PIN diode
HSMP3804	Agilent	BAP50-05	PIN diode
HSMP3810	Agilent	BAP50-03	PIN diode
HSMP3814	Agilent	BAP50-05	PIN diode
HSMP381B	Agilent	BAP50-03	PIN diode
HSMP381C	Agilent	BAP50-05	PIN diode
HSMP381F	Agilent	BAP64-05W	PIN diode
HSMP3820	Agilent	BAP1321-03	PIN diode

Manufacturer type	Manufacturer	NXP type	Product family
HSMP3822	Agilent	BAP1321-04	PIN diode
HSMP3830	Agilent	BAP64-03	PIN diode
HSMP3832	Agilent	BAP64-04	PIN diode
HSMP3833	Agilent	BAP64-06	PIN diode
HSMP3834	Agilent	BAP64-05	PIN diode
HSMP3860	Agilent	BAP50-03	PIN diode
HSMP3862	Agilent	BAP50-04	PIN diode
HSMP3864	Agilent	BAP50-05	PIN diode
HSMP386B	Agilent	BAP50-02	PIN diode
HSMP386E	Agilent	BAP50-04W	PIN diode
HSMP386L	Agilent	BAP50-05W	PIN diode
HSMP3880	Agilent	BAP51-03	PIN diode
HSMP3890	Agilent	BAP51-03	PIN diode
HSMP3892	Agilent	BAP64-04	PIN diode
HSMP3894	Agilent	BAP64-05	PIN diode
HSMP3895	Agilent	BAP51-02	PIN diode
HSMP389B	Agilent	BAP51-02	PIN diode
HSMP389C	Agilent	BAP64-04	PIN diode
HSMP389F	Agilent	BAP51-05W	PIN diode
HVB14S	Renesas	BAP50-04W	PIN diode
HVC131	Renesas	BAP65-02	PIN diode
HVC132	Renesas	BAP51-02	PIN diode
HVC200A	Renesas	BB178	Varicap
HVC200A	Renesas	BB187	Varicap
HVC202A	Renesas	BB179	Varicap
HVC202B	Renesas	BB179B	Varicap
HVC300A	Renesas	BB182	Varicap
HVC300B	Renesas	BB182	Varicap
HVC306A	Renesas	BB187	Varicap
HVC306B	Renesas	BB187	Varicap
HVC355B	Renesas	BB145B	Varicap
HVC359	Renesas	BB202	Varicap
HVC363A	Renesas	BB178	Varicap
HVC363A	Renesas	BB178	Varicap
HVC376B	Renesas	BB198	Varicap
HVC376B	Renesas	BB202	Varicap
HVD132	Renesas	BAP51-02	PIN diode
HVU131	Renesas	BAP65-03	PIN diode
HVU132	Renesas	BAP51-03	PIN diode
HVU202(A)	Renesas	BB149	Varicap
HVU202(A)	Renesas	BB149A	Varicap
HVU300A	Renesas	BB152	Varicap
HVU307	Renesas	BB148	Varicap
HVU315	Renesas	BB148	Varicap
HVU316	Renesas	BB131	Varicap
HVU363A	Renesas	BB148	Varicap
HVU363A	Renesas	BB153	Varicap
HVU363B	Renesas	BB148	Varicap
INA-51063	Agilent	BGA2001	MMIC
J270	Standard	J177	FET
J308	Standard	J108	FET
J309	Standard	J109	FET
J310	Standard	J110	FET
JDP2S01E	Toshiba	BAP65-02	PIN diode
JDP2S01U	Toshiba	BAP65-03	PIN diode
JDP2S02AFS	Toshiba	BAP51-02	PIN diode
JDP2S02AFS	Toshiba	BAP51-02	PIN diode
JDP2S02AFS	Toshiba	BAP51-03	PIN diode
JDP2S02AS	Toshiba	BAP51-03	PIN diode
JDP2S02AS	Toshiba	BAP51-03	PIN diode
JDP2S02T	Toshiba	BAP63-02	PIN diode
JDP2S04E	Toshiba	BAP50-02	PIN diode
JDS2S03S	Toshiba	BA891	BS diode
JDS2S03S	Toshiba	BA891	BS diode
JDS2S03S	Toshiba	BA891	BS diode
KP2310R	Toko	BAP64-04W	PIN diode
KV1700S	Toko	BB201	varicap
KV1735S	Toko	BB201	varicap
KV1735S	Toko	BB207	varicap
KV1837K	Toko	BB202	varicap
KV1841E	Toko	BB156	varicap
KV1841E	Toko	BB208-03	varicap
KV1841K	Toko	BB208-02	varicap
KTK920BT	KEC	BF1108	FET
KTK920T	KEC	BF1108R	FET

Manufacturer type	Manufacturer	NXP type	Product family
KV1835E	Toko	BB199	Varicap
MA2S077	Standard	BA277	BS diode
MA2S357	Matsushita	BB187	Varicap
MA2S357	Matsushita	BB178	Varicap
MA2S357	Matsushita	BB178	Varicap
MA2S372	Matsushita	BB179	Varicap
MA2S374	Matsushita	BB182	Varicap
MA2SV01	Renesas	BB202	Varicap
MA357	Matsushita	BB153	Varicap
MA366	Matsushita	BB148	Varicap
MA368	Matsushita	BB131	Varicap
MA372	Matsushita	BB149	Varicap
MA372	Matsushita	BB149A	Varicap
MA4CP101A	Matsushita	BAP65-03	PIN diode
MA4P274-1141	Matsushita	BAP51-03	PIN diode
MA4P275-1141	Matsushita	BAP65-03	PIN diode
MA4P275CK-287	Matsushita	BAP65-05	PIN diode
MA4P277-1141	Matsushita	BAP70-03	PIN diode
MA4P278-287	Matsushita	BAP70-03	PIN diode
MA4P789-1141	Matsushita	BAP1321-03	PIN diode
MA4P789ST-287	Matsushita	BAP1321-04	PIN diode
MC7712	Standard	BGY785A	CATV PPA
MC7716	Standard	BGY787	CATV PPA
MC7722	Standard	BGY785A	CATV PPA
MC7726	Standard	BGY787	CATV PPA
MC7852	Standard	BGY885A	CATV PPA
MC7866	Standard	BGD816L	CATV PD
MCH4009	Sanyo	BFG424F	WB trs 5-7
MCH4009	Sanyo	BFG424F	WB trs 5-7
MCH4009	Sanyo	BFG424F	WB trs 5-7
MHW10186N	Freescale	BGY1085A	CATV PP
MHW10236N	Freescale	CGY1043	CATV PP
MHW10247AN	Freescale	CGD1044H	CATV PD
MHW10276N	Freescale	CGY1047	CATV PP
MHW1224	Freescale	BGY67	CATV RA
MHW1244	Freescale	BGY67A	CATV RA
MHW1253LA	Freescale	BGY67A	CATV RA
MHW1254L	Freescale	BGY68	CATV RA
MHW1254LA	Freescale	BGY68	CATV RA
MHW1304L	Freescale	BGY68	CATV RA
MHW1304LAN	Freescale	BGY68	CATV RA
MHW1346	Freescale	BGY67A	CATV RA
MHW1353LA	Freescale	BGY67A	CATV RA
MHW1354LA	Freescale	BGY68	CATV RA
MHW5182A	Freescale	BGY585A	CATV PPA
MHW5185B	Freescale	BGD502	CATV PD
MHW5222A	Freescale	BGY587	CATV PPA
MHW5272A	Freescale	BGY587B	CATV PPA/HG
MHW5342A	Freescale	BGY588N	CATV PPA/HG
MHW5342T	Freescale	BGY588N	CATV PPA/HG
MHW6182	Freescale	BGY585A	CATV PPA
MHW6182-6	Freescale	BGY685A	CATV PPA
MHW6182T	Freescale	BGY585A	CATV PPA
MHW6185B	Freescale	BGD502	CATV PD
MHW6185T	Freescale	BGD502	CATV PD
MHW6205	Freescale	BGD704	CATV PD
MHW6222	Freescale	BGY587	CATV PPA
MHW6222B	Freescale	BGY687	CATV PPA
MHW6222T	Freescale	BGY587	CATV PPA
MHW6272	Freescale	BGY587B	CATV PPA
MHW6272T	Freescale	BGY587B	CATV PPA
MHW6342	Freescale	BGY588N	CATV PPA
MHW6342T	Freescale	BGY588N	CATV PPA
MHW7182B	Freescale	BGY785A	CATV PPA
MHW7182C	Freescale	BGY785A	CATV PPA
MHW7185C	Freescale	BGY785A	CATV PPA
MHW7185C	Freescale	BGD712	CATV PD
MHW7185CL	Freescale	BGD712	CATV PD
MHW7205C	Freescale	BGD714	CATV PD
MHW7205CL	Freescale	BGD714	CATV PD
MHW7205CLN	Freescale	BGD714	CATV PD
MHW7222	Freescale	BGY787	CATV PPA
MHW7222A	Freescale	BGY787	CATV PPA
MHW7222B	Freescale	BGY787	CATV PPA
MHW7222B	Freescale	BGY787	CATV PPA



Manufacturer type	Manufacturer	NXP type	Product family
MHW7242A	Freescale	BGE787B	CATV PPA/HG
MHW7272A	Freescale	BGE787B	CATV PPA/HG
MHW7292	Freescale	BGE787B	CATV PPA/HG
MHW7292A	Freescale	BGE787B	CATV PPA/HG
MHW7292AN	Freescale	BGE787B	CATV PPA/HG
MHW7342	Freescale	BGE788	CATV PPA/HG
MHW8142	Freescale	BGY883	CATV PPA
MHW8182B	Freescale	BGY885A	CATV PPA
MHW8182C	Freescale	BGY885A	CATV PPA
MHW8182CN	Freescale	BGY885A	CATV PP
MHW8185	Freescale	BGD814	CATV PD
MHW8185L	Freescale	BGD812	CATV PD
MHW8188AN	Freescale	CGD942C	CATV PD
MHW8205	Freescale	BGD814	CATV PD
MHW820L	Freescale	BGD814	CATV PD
MHW8222BN	Freescale	BGY887	CATV PP
MHW8227A	Freescale	CGD942C	CATV PD
MHW8227AN	Freescale	CGD942C	CATV PD
MHW8247A	Freescale	CGD944C	CATV PPA
MHW8247AN	Freescale	CGD944C	CATV PD
MHW8292	Freescale	BGY887B	CATV PPA
MHW8342	Freescale	BGY888	CATV PPA
MHW8342N	Freescale	CGY888C	CATV PP
MHW9146	Freescale	BGY883	CATV PPA
MHW9182B	Freescale	BGY1085A	CATV PPA
MHW9182C	Freescale	BGY1085A	CATV PPA
MHW9182CN	Freescale	BGY1085A	CATV PP
MHW9186	Freescale	BGY885A	CATV PPA
MHW9186A	Freescale	BGY885A	CATV PPA
MHW9187N	Freescale	CGD942C	CATV PD
MHW9188AN	Freescale	CGD942C	CATV PD
MHW9188N	Freescale	CGD942C	CATV PD
MHW9227AN	Freescale	CGD942C	CATV PD
MHW9242A	Freescale	CGD1042	CATV PD
MHW9247	Freescale	CGD944C	CATV PD
MHW9247A	Freescale	CGD944C	CATV PD
MHW9247AN	Freescale	CGD944C	CATV PD
MHW9247N	Freescale	CGD944C	CATV PD
MHWJ5272A	Freescale	BGY587B	CATV PPA
MHWJ7185A	Freescale	BGD712	CATV PD
MHWJ7205A	Freescale	BGD714	CATV PD
MHWJ7292	Freescale	BGE787B	CATV PPA/HG
MHWJ9182	Freescale	BGY1085A	CATV PPA
MMBF4391	Motorola	PMBF4391	FET
MMBF4392	Motorola	PMBF4392	FET
MMBF4393	Motorola	PMBF4393	FET
MMBF4860	Motorola	PMBFJ112	FET
MMBF5484	Motorola	BFR31	FET
MMBFJ113	Motorola	PMBFJ113	FET
MMBFJ174	Motorola	PMBFJ174	FET
MMBFJ175	Motorola	PMBFJ175	FET
MMBFJ176	Motorola	PMBFJ176	FET
MMBFJ177	Motorola	PMBFJ177	FET
MMBFJ308	Motorola	PMBFJ308	FET
MMBFJ309	Motorola	PMBFJ309	FET
MMBFJ310	Motorola	PMBFJ310	FET
MMBFU310	Motorola	PMBFJ310	FET
MMBR5031L	Motorola	BFS17	WB trs 1-4
MMBR5179L	Motorola	BFS17A	WB trs 1-4
MMBR571L	Motorola	PBR951	WB trs 1-4
MMBR901L	Motorola	BFR92A	WB trs 1-4
MMBR911L	Motorola	BFR93A	WB trs 1-4
MMBR920L	Motorola	BFR93A	WB trs 1-4
MMBR931L	Motorola	BFT25A	WB trs 1-4
MMBR941BL	Motorola	PBR941	WB trs 1-4
MMBR941L	Motorola	PBR941	WB trs 1-4
MMBR951AL	Motorola	PBR951	WB trs 1-4
MMBR951L	Motorola	PBR951	WB trs 1-4
MMBV105GLT1	ON Semicond.	BB156	Varicap
MMBV109LT1	ON Semicond.	BB148	Varicap
MMG2001NT1	Freescale	BGD816L	CATV PD
MMG2001T1	Freescale	BGD816L	CATV PD
MPF102	Standard	BF245A	FET
MPF970	Standard	J174	FET
MPF971	Standard	J176	FET
MRF577	Motorola	PRF957	WB trs 1-4

Manufacturer type	Manufacturer	NXP type	Product family
MRF5811L	Motorola	BFG93A/X	WB trs 1-4
MRF917	Motorola	BFQ67W	WB trs 1-4
MRF927	Motorola	BFS25A	WB trs 1-4
MRF9411L	Motorola	BFG520/X	WB trs 1-4
MRF947	Motorola	BFS520	WB trs 1-4
MRF947A	Motorola	PRF947	WB trs 1-4
MRF9511L	Motorola	BFG540/X	WB trs 1-4
MRF957	Motorola	PRF957	WB trs 1-4
MT4S200T	Toshiba	BFG424W	WB trs 5-7
MT4S200T	Toshiba	BFG424W	WB trs 5-7
MT4S200T	Toshiba	BFG424W	WB trs 5-7
MT4S200U	Toshiba	BFG425W	WB trs 5-7
MT4S200U	Toshiba	BFG425W	WB trs 5-7
MT4S200U	Toshiba	BFG425W	WB trs 5-7
MT4S34U	Toshiba	BFG410W	WB trs 5-7
MV2109G	ON Semicond.	BB182LX	Varicap
MV2109G	ON Semicond.	BB182LX	Varicap
MV2109G	ON Semicond.	BB182LX	Varicap
NE5G3032M14	NEC	BFU725F	WB trs 5-7
NE5G3032M14	NEC	BFU725F	WB trs 5-7
PRF947B	Motorola	PRF947	WB trs 1-4
PZFJ108	Standard	J108	FET
PZFJ109	Standard	J109	FET
PZFJ110	Standard	J110	FET
R0605250L	Standard	BGY66B	CATV RA
R0605300L	Standard	BGY68	CATV RA
R2005240	Standard	BGY67A	CATV RA
RN142G	Rohm	BAP1321-03	PIN diode
RN142S	Rohm	BAP1321-02	PIN diode
RN242CS	Rohm	BAP51LX	PIN diode
RN731V	Rohm	BAP50-03	PIN diode
RN739D	Rohm	BAP50-04	PIN diode
RN739F	Rohm	BAP50-04W	PIN diode
S505T	Vishay	BF1101	FET
S595TR	Vishay	BF1101R	FET
S505TRW	Vishay	BF1101WR	FET
S5540220	Standard	BGY587	CATV PPA
S595T	Vishay	BF1105	FET
S595TR	Vishay	BF1105R	FET
S595TRW	Vishay	BF1105WR	FET
S7540185	Standard	BGY785A	CATV PPA
S7540215	Standard	BGY787	CATV PPA
S8740190	Standard	BGD812	CATV PD
S8740220	Standard	BGD814	CATV PD
S8740230	Standard	BGD816L	CATV PD
S949T	Vishay	BF1109	FET
S949TR	Vishay	BF1109R	FET
S949TRW	Vishay	BF1109WR	FET
S974T	Vishay	BF1109	FET
S974TR	Vishay	BF1109R	FET
S974TRW	Vishay	BF1109WR	FET
SMP1302-004	Skyworks	BAP50-05	PIN diode
SMP1302-005	Skyworks	BAP50-04	PIN diode
SMP1302-011	Skyworks	BAP50-03	PIN diode
SMP1302-074	Skyworks	BAP50-05W	PIN diode
SMP1302-075	Skyworks	BAP50-04W	PIN diode
SMP1302-079	Skyworks	BAP50-02	PIN diode
SMP1304-001	Skyworks	BAP70-03	PIN diode
SMP1304-011	Skyworks	BAP70-03	PIN diode
SMP1307-001	Skyworks	BAP70-03	PIN diode
SMP1307-011	Skyworks	BAP70-03	PIN diode
SMP1320-004	Skyworks	BAP65-05	PIN diode
SMP1320-011	Skyworks	BAP65-03	PIN diode
SMP1320-074	Skyworks	BAP65-05W	PIN diode
SMP1321-001	Skyworks	BAP1321-03	PIN diode
SMP1321-005	Skyworks	BAP1321-04	PIN diode
SMP1321-011	Skyworks	BAP1321-03	PIN diode
SMP1321-075	Skyworks	BAP1321-04	PIN diode
SMP1321-079	Skyworks	BAP1321-02	PIN diode
SMP1322-004	Skyworks	BAP65-05	PIN diode
SMP1322-011	Skyworks	BAP65-03	PIN diode
SMP1322-074	Skyworks	BAP65-05W	PIN diode
SMP1322-079	Skyworks	BAP65-02	PIN diode
SMP1340-011	Skyworks	BAP63-03	PIN diode
SMP1340-079	Skyworks	BAP63-02	PIN diode
SMP1352-011	Skyworks	BAP64-03	PIN diode

Manufacturer type	Manufacturer	NXP type	Product family
SMP1352-079	Skyworks	BAP64-02	PIN diode
SMV1235-004	Skyworks	BB181	Varicap
SMV1236-004	Skyworks	BB156	Varicap
SST111	Standard	PMBFJ111	FET
SST112	Standard	PMBFJ112	FET
SST113	Standard	PMBFJ113	FET
SST174	Standard	PMBFJ174	FET
SST175	Standard	PMBFJ175	FET
SST176	Standard	PMBFJ176	FET
SST177	Standard	PMBFJ177	FET
SST201	Standard	BFT46	FET
SST202	Standard	BFR31	FET
SST203	Standard	BFR30	FET
SST308	Standard	PMBFJ308	FET
SST309	Standard	PMBFJ309	FET
SST310	Standard	PMBFJ310	FET
SST4391	Standard	PMBF4391	FET
SST4392	Standard	PMBF4392	FET
SST4393	Standard	PMBF4393	FET
SST4856	Standard	BSR56	FET
SST4857	Standard	BSR57	FET
SST4859	Standard	BSR56	FET
SST4860	Standard	BSR57	FET
SST4861	Standard	BSR58	FET
SVC201SPA	Sanyo	BB187	Varicap
TBB1016	Renesas	BF1204	FET
TMF3201J	AUK	BF1204	FET

Manufacturer type	Manufacturer	NXP type	Product family
TMF3202Z	AUK	BF1202WR	FET
TMPF4091	Standard	PMBF4391	FET
TMPF4092	Standard	PMBF4392	FET
TMPF4093	Standard	PMBF4393	FET
TMPF4391	Standard	PMBF4391	FET
TMPF4392	Standard	PMBF4392	FET
TMPF4393	Standard	PMBF4393	FET
TMPFB246A	Standard	BSR56	FET
TMPFB246B	Standard	BSR57	FET
TMPFB246C	Standard	BSR58	FET
TMPFJ111	Standard	PMBFJ111	FET
TMPFJ112	Standard	PMBFJ112	FET
TMPFJ113	Standard	PMBFJ113	FET
TMPFJ174	Standard	PMBFJ174	FET
TMPFJ175	Standard	PMBFJ175	FET
TMPFJ176	Standard	PMBFJ176	FET
TMPFJ177	Standard	PMBFJ177	FET
TSDF54040	Vishay	BF1102	FET
uPC2709	NEC	BGA2709	MMIC
uPC2711	NEC	BGA2711	MMIC
uPC2712	NEC	BGA2712	MMIC
uPC2745	NEC	BGA2001	MMIC
uPC2746	NEC	BGA2001	MMIC
uPC2748	NEC	BGA2748	MMIC
uPC2771	NEC	BGA2771	MMIC
uPC8112	NEC	BGA2022	MMIC

## 5.2 Cross-references: NXP discontinued types versus NXP replacement types

### In alphabetical order of manufacturer discontinued type

Abbreviations:

BS diode	Band Switch Diode
CATV	Community Antenna Television System
FET	Field Effect Transistor
Varicap	Varicap Diode
WB trs	Wideband Transistor
OM	Optical Module

NXP discontinued type	Product family NXP	Replacement type NXP	NXP discontinued type	Product family NXP	Replacement type NXP
BA277-01	BS diode	BA277	BFR93AT	WB trs	BFR93AW
BA792	BS diode	BA591	BFR93R	WB trs	BFR93A
BAP142L	PIN diode	BAP142LX	BFU510	WB trs	BFU725F
BAP51-01	PIN diode	BAP51LX	BFU540	WB trs	BFU725F
BAP51L	PIN diode	BAP51LX	BGA2031	WB trs	BGA2031/1
BAP55L	PIN diode	BAP55LX	BGD102/02	CATV	BGD502
BB132	Varicap	BB152	BGD102/04	CATV	BGD502
BB145	Varicap	BB145B	BGD104	CATV	BGD704
BB145B-01	Varicap	BB145B	BGD104/04	CATV	BGD704
BB151	Varicap	BB135	BGD502/01	CATV	BGD502
BB157	Varicap	BB187	BGD502/01	CATV	BGD502
BB178L	Varicap	BB178LX	BGD502/01	CATV	BGD502
BB179BL	Varicap	BB179BLX	BGD502/01	CATV	BGD502
BB179L	Varicap	BB179LX	BGD502/03	CATV	BGD502
BB181L	Varicap	BB181LX	BGD502/03	CATV	BGD502
BB182B	Varicap	BB182	BGD502/05	CATV	BGD502
BB182B	Varicap	BB182	BGD502/07	CATV	BGD502
BB182L	Varicap	BB182LX	BGD502/6M	CATV	BGD702
BB187L	Varicap	BB187LX	BGD502/C7	CATV	BGD502
BB190	Varicap	BB149	BGD502/R	CATV	BGD502
BB202L	Varicap	BB202LX	BGD504	CATV	BGD704
BB804	Varicap	BB207	BGD504/01	CATV	BGD704
BBY42	Varicap	BBY40	BGD504/02	CATV	BGD704
BF1203	FET	BF1203	BGD504/09	CATV	BGD704
BF689K	WB trs	BFS17	BGD602	CATV	BGD702
BF763	WB trs	BFS17	BGD602/02	CATV	BGD702
BF851A	FET	BF861A	BGD602/07	CATV	BGD702
BF851A	FET	BF861A	BGD602/09	CATV	BGD702
BF851C	FET	BF861C	BGD602/14	CATV	BGD702
BF851C	FET	BF861C	BGD602D	CATV	BGD712
BF992/01	FET	BF992	BGD702D	CATV	BGD712
BFC505	WB trs	BFM505	BGD702D/08	CATV	BGD712
BFC520	WB trs	BFM520	BGD704/01	CATV	BGD704
BFET505	WB trs	BFM505	BGD704/07S	CATV	BGD704
BFET520	WB trs	BFM520	BGD704/S9	CATV	BGD704
BFG17A	WB trs	BFS17A	BGD704N	CATV	BGD714
BFG197	WB trs	BFG198	BGD802/09	CATV	BGD802
BFG197/X	WB trs	BFG198	BGD802N	CATV	BGD812
BFG25AW/XR	WB trs	BFG25AW/X	BGD802N	CATV	BGD812
BFG410W/CA	WB trs	BFG410W	BGD802N/07	CATV	BGD812
BFG425W/CA	WB trs	BFG425W	BGD802N/07	CATV	BGD812
BFG425W/CA	WB trs	BFG425W	BGD804N	CATV	BGD814
BFG505/XR	WB trs	BFG505/X	BGD804N	CATV	BGD814
BFG505W/XR	WB trs	BFG505	BGD804N/02	CATV	BGD814
BFG520W/XR	WB trs	BFG520W/X	BGD804N/02	CATV	BGD814
BFG590/XR	WB trs	BFG590/X	BGD902	CATV	BGD812
BFG590W	WB trs	BFG590	BGD902/07	CATV	BGD902
BFG590W/XR	WB trs	BFG590	BGD902L	CATV	BGD812
BFG67/XR	WB trs	BFG67	BGD904	CATV	BGD814
BFG92A	WB trs	BFG92A/X	BGD904/02	CATV	BGD904
BFG92A/XR	WB trs	BFG92A/X	BGD904/07	CATV	BGD904
BFG93A/XR	WB trs	BFG93A/X	BGD904L	CATV	BGD814
BFQ34/01	WB trs	BFG35	BGD906	CATV	CGD942C
BFR92	WB trs	BFR92A	BGD906/02	CATV	BGD906
BFR92AR	WB trs	BFR92A	BGE847BO	CATV	BGO827
BFR92AT	WB trs	BFR92AW	BGE847BO	CATV	BGO827
BFR93	WB trs	BFR92A	BGE847BO	CATV	BGO827

NXP discontinued type	Product family NXP	Replacement type NXP	NXP discontinued type	Product family NXP	Replacement type NXP
BGE847BO/FC	CATV	BGO827/SC0	BGY785AD	CATV	BGY785A
BGE847BO/FC0	CATV	BGO827/SC0	BGY785AD/06	CATV	BGY785A
BGE847BO/FC0	CATV	BGO827/SC0	BGY785AD/8M	CATV	BGY885A
BGE847BO/FC1	CATV	BGO827/SC0	BGY785AD/8M	CATV	BGY885A
BGE847BO/SC	CATV	BGO827/SC0	BGY787/02	CATV	BGY787
BGE847BO/SC0	CATV	BGO827/SC0	BGY787/07	CATV	BGY787
BGE847BO/SC0	CATV	BGO827/SC0	BGY787/09	CATV	BGY787
BGE887BO	CATV	BGO827	BGY847BO	CATV	BGO827
BGE887BO/FC	CATV	BGO827/SC0	BGY847BO/SC	CATV	BGO827/SC0
BGE887BO/FC1	CATV	BGO827/SC0	BGY84A	CATV	BGY585A
BGE887BO/SC	CATV	BGO827/SC0	BGY84A/04	CATV	BGY585A
BGO847/01	CATV	BGO847	BGY84A/05	CATV	BGY585A
BGO847/01	CATV	BGO847	BGY85	CATV	BGY585A
BGO847/FC0	CATV	BGO827/SC0	BGY85A	CATV	BGY585A
BGO847/FC0	CATV	BGO827/SC0	BGY85A/04	CATV	BGY585A
BGO847/FC01	CATV	BGO827/SC0	BGY85A/05	CATV	BGY585A
BGO847/FC01	CATV	BGO827/SC0	BGY85H/01	CATV	BGY585A
BGO847/SC0	CATV	BGO827/SC0	BGY86	CATV	BGY587
BGO34/01	WB	BFG35	BGY86/05	CATV	BGY587
BGU2003	WB trs	BGA2003	BGY87	CATV	BGY587
BGX885/02	CATV	BGX885N	BGY87/J1	CATV	BGY587
BGY1085A/07	CATV	BGY1085A	BGY87B	CATV	BGY587B
BGY584A	CATV	BGY585A	BGY88	CATV	BGY588N
BGY585A/01	CATV	BGY585A	BGY88/04	CATV	BGY588N
BGY586	CATV	BGY587	BGY88/04	CATV	BGY588N
BGY586/05	CATV	BGY587	BGY88/07	CATV	BGY588N
BGY587/01	CATV	BGY587	BGY887/02	CATV	BGY887
BGY587/01	CATV	BGY587	BGY887BO	CATV	BGO827
BGY587/02	CATV	BGY587	BGY887BO/FC	CATV	BGO827/FC0
BGY587/02	CATV	BGY587	BGY887BO/SC	CATV	BGO827/SC0
BGY587/07	CATV	BGY587	CGD914	CATV	CGD1042H
BGY587/09	CATV	BGY587	CGY887A	CATV	CGY1043
BGY587B/01	CATV	BGY587B	CGY887B	CATV	CGY1047
BGY587B/02	CATV	BGY587B	GD923	CATV	CGD942C
BGY587B/09	CATV	BGY587B	ON4520/09	CATV	BGY687
BGY588	CATV	BGY588N	ON4520/2	CATV	BGY687
BGY588/04	CATV	BGY588N	ON4594/M5	CATV	BGY585A
BGY66B/04	CATV	BGY66B	ON4749	CATV	BGY588N
BGY67/04	CATV	BGY67	ON4749	CATV	BGY588N
BGY67/09	CATV	BGY67	ON4831-2	CATV	BGY885A
BGY67/14	CATV	BGY67	ON4869	CATV	BGY587
BGY67/19	CATV	BGY67	ON4876	CATV	BGY1085A
BGY67A/04	CATV	BGY67A	ON4890	CATV	BGD712
BGY67A/14	CATV	BGY67A	ON4890	CATV	BGD712
BGY68/01	CATV	BGY68	ON4990	CATV	BGD885
BGY685A/07	CATV	BGY685A	PMBT3640/AT	WB trs	BFS17
BGY685AD	CATV	BGY785A	PN4392	FET	PMBF4392
BGY685AD	CATV	BGY785A	PN4393	FET	PMBF4393
BGY685AL	CATV	BGY785A	SA5223	OM	TZA3036
BGY687/07	CATV	BGY687	TZA3023	OM	TZA3026
BGY687/14	CATV	BGY687	TZA3033	OM	TZA3036
BGY687B	CATV	BGE787B	TZA3043	OM	TZA3046
BGY687B/02	CATV	BGE787B	TZA3043B	OM	TZA3046
BGY785A/07	CATV	BGY785A	XSA5223	OM	TZA3036
BGY785A/09	CATV	BGY785A	XSA5223	OM	TZA3036



**What if you could create a smaller form factor?**

Look at UTLP packages, chapter 6

# 6. Packing and packaging information

## 6.1 Ultra thin leadless package platform



NXP ultra-thin leadless package (UTLP) platform for faster time-to-market, smaller form factor.

### Features

- Low height (0.4 mm)
- Small footprint
- Very flexible platform
- High silicon-to-footprint ratio
- Increased performance
- Footprint compatible with JETA standard SC-101
- Very efficient packing (15k/7" reel)
- RoHs-compliant, green plastic.

### Benefits

- Improved electrical, thermal and moisture resistance
- Reduced noise
- Easier board assembly
- More functionality in a smaller space
- Excellent RF performance.

The NXP ultra-thin leadless package (UTLP) uses a patent-pending etch process, enabling a lead frame with independent top and bottom layouts, giving maximum product creation flexibility. A very high silicon-to-footprint ratio, combined with a low profile of 0.4 mm makes the device perfectly suited for space constrained portable applications, like mobile communications, PDA's and handheld devices, increasing performance with same footprint.

The unique design improves the package's electrical and thermal performance, and at the same time increases the moisture resistance. The chosen technology enables the reduction of added package material to a minimum, to come as close to a bare die as possible, without the bare die drawbacks in assembly. The resulting very low parasitics give a much better performance than leaded packages or even QFN type, enabling a design-in range, which includes high-frequency applications operating at up to 24 GHz.






















The product creation flexibility also supports packaging techniques like multiple dies, multiple leads with isolated die pads, re-routing and even fine pitch flip chip, which enhances RF performance even further. This enables more functionality in a smaller space. The result is a package, which increases customer's design flexibility, reduces time to market and improves performance in a broad range of (mobile) applications.

The package makes board assembly easier. The footprint is compatible with JETA standard SC-101 and because of the built-in standoff; both metal defined and solder resist defined PCB layouts can be used. To lessen the impact on the environment the package is already dark green and packed with as many as 15k units on a 7" reel.

### Ordering information

Type number	Description	Package
BAP50LX	Silicon PIN diode	SOD882T
BAP51LX	Silicon PIN diode	SOD882T
BAP63LX	Silicon PIN diode	SOD882T
BAP64LX	Silicon PIN diode	SOD882T
BAP65LX	Silicon PIN diode	SOD882T
BAP1321LX	Silicon PIN diode	SOD882T
BB202LX	Low-voltage variable FM capacitance diode	SOD882T
BB178LX	VHF-high variable capacitance diode	SOD882T
BB179LX	UHF variable capacitance diode	SOD882T
BB182LX	VHF-low variable capacitance diode	SOD882T
BAP55LX	Silicon PIN diode	SOD882T
BAP142LX	Silicon PIN diode	SOD882T

## 6.2 Packing quantities per package with relevant ordering code

	Package	package dimensions	Packing quantity	Product 12NC ending	Packing method
	SOD323/SC-76	1.7 x 1.25 x 0.9	3,000	115	8 mm tape and reel
10,000			135	8 mm tape and reel	
	SOD523/SC-79	1.2 x 0.8 x 0.6	3,000	115	8 mm tape and reel
10,000			135	8 mm tape and reel	
8,000			315	2 mm pitch tape and reel	
20,000			335	2 mm pitch tape and reel	
	SOD882T	1.0 x 0.6 x 0.4	15,000	315	8 mm tape and reel
	SOT23	2.9 x 1.3 x 0.9	3,000	215	8 mm tape and reel
10,000			235	8 mm tape and reel	
	SOT54	4.6 x 3.9 x 5.1	5,000	112	bulk, delta pinning
5,000			412	bulk, straight leads	
10,000			116	tape and reel, wide pitch	
10,000			126	tape ammpack, wide pitch	
	SOT89/SC-62	4.5 x 2.5 x 1.5	1,000	115	12 mm tape and reel
4,000			135	12 mm tape and reel	
	SOT115	44.5 x 13.65 x 20.4	100	112	4 tray/box
	SOT143(N/R)	2.9 x 1.3 x 0.9	3,000	215	8 mm tape and reel
10,000			235	8 mm tape and reel	
	SOT223/SC-73	6.7 x 3.5 x 1.6	1,000	115	12 mm tape and reel
4,000			135	12 mm tape and reel	
	SOT323/SC-70	2.0 x 1.25 x 0.9	3,000	115	8 mm tape and reel
10,000			135	8 mm tape and reel	
	SOT343(N/R)	2.0 x 1.25 x 0.9	3,000	115	8 mm tape and reel
10,000			135	8 mm tape and reel	
	SOT360	6.5 x 4.4 x 0.9	2,500	118	16 mm tape and reel
	SOT363/SC-88	2.0 x 1.25 x 0.9	3,000	115	8 mm tape and reel
10,000			135	8 mm tape and reel	
	SOT403	5.0 x 4.4 x 0.9	2,500	118	12 mm tape and reel
	SOT416/SC-75	1.6 x 0.8 x 0.75	3,000	115	8 mm tape and reel
	SOT616	4.0 x 4.0 x 0.85	6,000	118	12 mm tape and reel
	SOT666	1.6 x 1.2 x 0.7	4,000	115	8 mm tape and reel
	SOT724	8.7 x 3.9 x 1.47	2,500	118	16 mm tape and reel
	SOT778	6.0 x 6.0 x 0.85	490	551	tray
4,000			518	multiple trays	
	SOT886	1.45 x 1.0 x 0.5	5000	115	8 mm tape and reel
	SOT891	1.0 x 1.0 x 0.5	5000	132	8mm tape and reel

## 6.3 Marking codes list

Search online on marking code: <http://www.nxp.com/package/>

In alphabetical order of marking code

In case a '%' is given in the marking code, it means this type can be assembled at different assembly sites.

Instead of a '%', you will find:

p = made in Hong-Kong

t = made in Malaysia

W = made in China

Marking code	Type	Package	Marking code	Type	Package	Marking code	Type	Package
%1W	BAP51-05W	SOT323	4L%	BAP50-04	SOT23	A9	BAP70-03	SOD323
%3A	BGA6289	SOT89	4W%	BAP64-04W	SOT323	B6-	BGA2715	SOT363
%4A	BGA6489	SOT89	5K%	BAP64-05	SOT23	B6%	BFU725F	SOT343F
%5A	BGA6589	SOT89	5W%	BAP64-05W	SOT323	B7%	BGA2716	SOT363
%6G	PMBF4393	SOT23	6F%	BAP1321-04	SOT23	BC%	BFG591	SOT89
%6J	PMBF4391	SOT23	6K%	BAP64-06	SOT23	BFG135	BFG135	SOT223
%6K	PMBF4392	SOT23	6W%	BAP50-04W	SOT323	BFG198	BFG198	SOT223
%6S	PMBFJ176	SOT23	7	BA891	SOD523	BFG31	BFG31	SOT223
%6W	PMBFJ175	SOT23	7K%	BAP65-05	SOT23	BFG35	BFG35	SOT223
%6X	PMBFJ174	SOT23	8	BB178	SOD523	BFG541	BFG541	SOT223
%6Y	PMBFJ177	SOT23	8K%	BAP70-05	SOT23	BFG591	BFG591	SOT223
%AB	BF1210	SOT363	9	BB179	SOD523	BFG94	BFG94	SOT223
%M1	BF908	SOT143	10%	BAT18	SOT23	BFG97	BFG97	SOT223
%M2	BF908R	SOT143	13%	BB207	SOT23	BLT50	BLT50	SOT223
%M3	BF909	SOT143	20%	BF545A	SOT23	BLT70	BLT70	SOT223
%M4	BF909R	SOT143	21%	BF545B	SOT23	BLT80	BLT80	SOT223
%M5	BF909A	SOT143	22%	BF545C	SOT23	BLT81	BLT81	SOT223
%M6	BF909AR	SOT143	24%	BF556A	SOT23	C1%	BGM1011	SOT363
%M7	BF904A	SOT143	25%	BF556B	SOT23	C2%	BGM1012	SOT363
%M8	BF904AR	SOT143	26%	BF556C	SOT23	C4%	BGM1013	SOT363
%M9	BSS83	SOT143	28%	BF861A	SOT23	C5%	BGM1014	SOT363
%MA	BF991	SOT143	29%	BF861B	SOT23	D2	BAP63-03	SOD323
%MB	BF992	SOT143	30%	BF861C	SOT23	D3	BAP65-03	SOD323
%MC	BF904	SOT143	31%	BF9505	SOT23	D4%	BF930/B	SOT23
%MD	BF904R	SOT143	32%	BFR520	SOT23	E1%	BFS17	SOT23
%ME	BFG505	SOT143	33%	BFR540	SOT23	E1%	BFS17/FD	SOT23
%MF	BFG520	SOT143	34%	BFT25A	SOT23	E1%	BFS17W	SOT323
%MG	BFG540	SOT143	38%	PMBFJ108	SOT23	E2%	BFS17A	SOT23
%MH	BFG590	SOT143	39%	PMBFJ109	SOT23	E2%	BGA2712	SOT363
%MK	BFG505/X	SOT143	40%	PMBFJ110	SOT23	E3%	BGA2709	SOT363
%ML	BFG520/X	SOT143	41%	PMBFJ111	SOT23	E6%	BFG17A	SOT143
%MM	BFG540/X	SOT143	42%	PMBFJ112	SOT23	FB	BFQ19	SOT89
%MN	BFG590/X	SOT143	47%	PMBFJ113	SOT23	FF	BFQ18A	SOT89
%MP	BFG520/XR	SOT143	48%	PMBFJ308	SOT23	FG	BFQ149	SOT89
%MR	BFG540/XR	SOT143	49%	PMBFJ309	SOT23	G2	BA278	SOD523
%MS	BFG10	SOT143	50%	PMBFJ310	SOT23	G2%	BGA2711	SOT363
%MT	BFG10/X	SOT143	A1	BA591	SOD323	G3%	BGA2748	SOT363
%MU	BFG25A/X	SOT143	A1	BB208-02	SOD523	G4%	BGA2771	SOT363
%MV	BFG67/X	SOT143	A1	BGA2001	SOT343	G5%	BGA2776	SOT363
%MW	BFG92A/X	SOT143	A2	BAT18	SOT23	K1	BAP51-02	SOD523
%MX	BFG93A/X	SOT143	A2	BB184	SOD523	K2	BAP51-05W	SOD523
%MY	BF1100	SOT143	A2	BB208-03	SOD323	K4	BAP50-02	SOD523
%MZ	BF1100R	SOT143	A2%	BGA2022	SOT363	K5	BAP63-02	SOD523
1	BA277	SOD523	A3	BAP64-03	SOD323	K6	BAP65-02	SOD523
1B%	BGA2717	SOT363	A3	BB198	SOD523	K7	BAP1321-02	SOD523
1C%	BAP50-05	SOT23	A3	BGA2003	SOT343	K8	BAP70-02	SOD523
1N%	BAP70-04W	SOT323	A3%	BGA2031/1	SOT363	K9	BB199	SOD523
2	BB182	SOD523	A5	BAP51-03	SOD323	L1	BB202LX	SOD882T
2A%	BF862	SOT23	A5%	BGA2011	SOT363	L2	BAP51LX	SOD882T
2L	BF1208	SOT666	A6%	BGA2012	SOT363	L2	BB202	SOD523
2N	BF1206F	SOT666	A7%	BFG310W/XR	SOT343	L2%	BF1203	SOT363
2R	BF1207F	SOT666	A8	BAP50-03	SOD323	L3	BB178LX	SOD882T
4A	BF1208D	SOT666	A8%	BFG325W/XR	SOT343	L3%	BF1204	SOT363
4K%	BAP64-04	SOT23	A8%	PMBFJ620	SOT363	L4	BB179LX	SOD882T



Marking code	Type	Package
L4%	BF1205	SOT363
L5	BB179BLX	SOD882T
L6	BB181LX	SOD882T
L6%	BF1206	SOT363
L7	BB182LX	SOD882T
L8	BB187LX	SOD882T
L9%	BF1208	SOT363
LA	BF1201WR	SOT343
LA%	BF1201	SOT143
LB%	BF1201R	SOT143
LD%	BF1202	SOT143
LE	BF1202WR	SOT343
LE%	BF1202R	SOT143
LF%	BF1211	SOT143
LG%	BF1212	SOT143
LH%	BF1211R	SOT143
LK%	BF1212R	SOT143
M08	PMBFJ308	SOT23
M09	PMBFJ309	SOT23
M1%	BFR30	SOT23
M10	PMBFJ310	SOT23
M2%	BF1207	SOT363
M2%	BFR31	SOT23
M3%	BFT46	SOT23
M33	BF861A	SOT23
M34	BF861B	SOT23
M35	BF861C	SOT23
M6%	BF1205C	SOT363
M65	BF545A	SOT23
M66	BF545B	SOT23
M67	BF545C	SOT23
M84	BF556A	SOT23
M85	BF556B	SOT23
M86	BF556C	SOT23
MB	BF998WR	SOT343
MC	BF904WR	SOT343
MD	BF908WR	SOT343
ME	BF909WR	SOT343
MF	BF1100WR	SOT343
MG	BF909AWR	SOT343
MG%	BF994S	SOT143
MH	BF904AWR	SOT343
MH%	BF996S	SOT143
MK	BF1211WR	SOT343
ML	BF1212WR	SOT343
MO%	BF998	SOT143

Marking code	Type	Package
MO%	BF998R	SOT143
N	BB181	SOD523
N0	BFR505T	SOT416
N0%	BFM505	SOT363
N0%	BFS505	SOT323
N1	BFG505W/X	SOT343
N2	BFR520T	SOT416
N2%	BFM520	SOT363
N2%	BFS520	SOT323
N3	BFG520W	SOT343
N4	BFG520W/X	SOT343
N4	BFQ540	SOT89
N4%	BFS540	SOT323
N6%	BFS25A	SOT323
N7	BFG540W/X	SOT343
N8	BFG540W/XR	SOT343
N9	BFG540W	SOT343
N9%	BAP70AM	SOT363
NA	BF1105WR	SOT343
NA%	BF1105R	SOT143
NB	BF1109WR	SOT343
NB%	BF1109R	SOT143
NC	BF1101WR	SOT343
NC%	BF1101R	SOT143
ND	BFG424W	SOT343
ND%	BF1101	SOT143
NE	BFG424F	SOT343
NE%	BF1105	SOT143
NF%	BF1109	SOT143
NG%	BF1108	SOT143
NH%	BF1108R	SOT143
P08	PMBFJ108	SOT23
P09	PMBFJ109	SOT23
P1	BFG21W	SOT343
P1	BB131	SOD323
P10	PMBFJ110	SOT23
P11	PMBFJ111	SOT23
P12	PMBFJ112	SOT23
P13	PMBFJ113	SOT23
P2%	BFR92A	SOT23
P2%	BFR92AW	SOT323
P3	BFG403W	SOT343
P4	BFG410W	SOT343
P5	BB135	SOD323
P5	BFG425W	SOT343
P6	BFG480W	SOT343

Marking code	Type	Package
P7	BB147	SOD323
P8	BB148	SOD323
P9	BB149	SOD323
PB	BB152	SOD323
PC	BB153	SOD323
PE	BB155	SOD323
PF	BB156	SOD323
PL	BB149A	SOD323
R2%	BFR93A	SOT23
R2%	BFR93AW	SOT323
R5	BFR93AR	SOT23
R7%	BFR106	SOT23
R8%	BFG93A	SOT143
S	BAP64-02	SOD523
S1%	BFG310/XR	SOT143
S2%	BBY40	SOT23
S2%	BFG325/XR	SOT143
S3%	BF1107	SOT23
S6%	BF510	SOT23
S7%	BF511	SOT23
S8%	BF512	SOT23
S9%	BF513	SOT23
SB%	BF1214	SOT363
SC%	BB201	SOT23
T5	BFG10W/X	SOT343
V1	BFG25AW/X	SOT343
V1%	BFT25	SOT23
V10	BFT25A	SOT23
V2%	BFQ67	SOT23
V2%	BFQ67W	SOT323
V3%	BFG67	SOT143
V4%	BAP64-06W	SOT323
V6%	BAP65-05W	SOT323
V8	BAP1321-03	SOD323
W1	BF1102	SOT363
W1%	BFT92	SOT23
W1%	BFT92W	SOT323
W2%	BF1102R	SOT363
W4%	BAP50-05W	SOT323
W6%	BAP51-04W	SOT323
W7%	BAP51-06W	SOT323
W9%	BAP63-05W	SOT323
X	BB187	SOD523
X1%	BFT93	SOT23
X1%	BFT93W	SOT323

# 7. Contacts and web links

How to contact your authorized distributor or local NXP representative?

## Authorized distributors

### Asia Pacific:

[http://www.nxp.com/profile/sales/asia\\_pacific\\_dist](http://www.nxp.com/profile/sales/asia_pacific_dist)

### Europe / Africa / Middle East:

[http://www.nxp.com/profile/sales/europe\\_dist](http://www.nxp.com/profile/sales/europe_dist)

### North America:

[http://www.nxp.com/profile/sales/northamerica\\_dist](http://www.nxp.com/profile/sales/northamerica_dist)

### South America:

[http://www.nxp.com/profile/sales/southamerica\\_dist](http://www.nxp.com/profile/sales/southamerica_dist)

## Local NXP Offices

### Asia Pacific:

[http://www.nxp.com/profile/sales/asia\\_pacific](http://www.nxp.com/profile/sales/asia_pacific)

### Europe / Africa / Middle East:

<http://www.nxp.com/profile/sales/europe>

### North America:

<http://www.nxp.com/profile/sales/northamerica>

### South America:

<http://www.nxp.com/profile/sales/southamerica>

## Web links

### NXP Semiconductors:

<http://www.nxp.com>

### NXP RF Manual web page:

<http://www.nxp.com/rfmanual>

### NXP varicaps:

<http://www.nxp.com/varicaps>

### NXP RF PIN diodes:

<http://www.nxp.com/pindiodes>

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