



## NXP RF discretés

# Design with confidence using our latest RF discretés

Our expanded portfolio of RF discretés – combined with our unrivaled RF expertise, tailored support, and manufacturing muscle – means you can conquer even your toughest RF challenges.

### KEY FEATURES

- ▶ Automotive-qualified RF transistors
- ▶ Unmatched varicap diodes
- ▶ High-efficiency DVB-S LNB solutions
- ▶ Low-power broadband access modules

### APPLICATIONS

- ▶ Automotive
- ▶ Satellite
- ▶ Broadcast
- ▶ FM radio
- ▶ General purpose

Every RF design is a little different, but no matter you need to do – whether it's an extensive redesign just swapping out a part – you can rely on NXP to have the answer. Our expanded portfolio of RF discretés lets you add flexibility and performance in every situation.

### NEW RANGE OF WIDEBAND RF TRANSISTORS (AUTOMOTIVE-QUALIFIED)

These next-generation devices offer the best RF noise figure versus gain performance for broadband amplification up to 1.5 GHz. They generate 20 dB of maximum gain and a noise figure of 0.7 dB at 900 MHz. This exceptional performance allows for better signal reception at low to medium power, and enables RF receivers to operate more robustly in noisy environments.

These devices are ideally suited for automotive, communication, and industrial applications, since they support high supply voltages and high breakdown voltages when used as (low-noise) amplifiers or oscillators. They're available in a wide range of industry-standard packages, including SOT323, SOT23, and SOT143.



### NEW UNMATCHED VARICAP DIODES BB1XX/BB2XX

For applications that need filter tuning, we're adding new varicap diodes to our PIN and band switch portfolio. These are unmatched equivalents of our discontinued varicap types, and deliver the same high level of consistency in performance and supply. We're also adding more automotive-qualified (AEC-Q101) versions to our PIN and bandswitch portfolio.

### DISCRETE AND INTEGRATED DVB-S LNB SOLUTIONS

Our complete family of wideband gain blocks, the BGA28xx series, is optimized for DVB-S (satellite) LNBS. These MMICs are well suited for general-purpose IF applications and offer best-in-class P1dB versus current consumption. Also, to save board space and streamline operation, these devices don't require an output inductor when they're used at the output stage.

For discrete oscillators in Ku-band LNBS, we recommend the BFU660F wideband transistor. For next-generation Ku-band designs, we offer fully integrated downconverters with the industry's lowest ratings for current consumption.

These Universal DVB-S compliant downconverters include a PLL, a VCO, a mixer, and an IF gain block, and consume just 52 mA of current, which is roughly 40% less than other integrated solutions. They are also fully RF tested, so they reduce manufacturing time.

### LOW-POWER CATV MODULES

In response to growing demand for more environmentally friendly products, we've introduced CATV power doublers that consume just 365 mA, or about 17% less power than our original products. The CGD982LC, CGD985LC, and CDG1042L are 1 GHz devices that are ideal for use as in-line extenders and trunk amplifiers.

### SUPPORT TOOLS

To help designers save time and simplify development, we offer several support tools. There are starter kits for each package, complete with evaluation boards and samples, as well as application notes and Mextram/SPIICE device models. To learn more, please visit [www.NXP.com](http://www.NXP.com).

## RF discrete transistors BFU5xx by package and power consumption

| Package  | Transistor Types |          |          |         |         | EVB Type nr. |
|----------|------------------|----------|----------|---------|---------|--------------|
|          | 5 mA             | 10 mA    | 20 mA    | 30 mA   | 150 mA  |              |
| SOT323   | BFU520W          | BFU530W  | BFU550W  |         |         | OM7960       |
| SOT23    | BFU520A          | BFU530A  | BFU550A  |         |         | OM7961       |
| SOT143   | BFU520           | BFU530   | BFU550   |         |         | OM7962       |
| SOT143X  | BFU520X          | BFU530X  | BFU550X  |         |         | OM7963       |
| SOT143XR | BFU520XR         | BFU530XR | BFU550XR |         |         | OM7964       |
| SOT89    |                  |          | BFU550W  | BFU580Q | BFU590Q | OM7965       |
| SOT223   |                  |          | BFU550W  | BFU580G | BFU590G | OM7966       |
| SOT363   | BFU520Y          |          | BFU550W  |         |         | -            |

Note: Evaluation boards (EVBs) include two unpopulated boards with ten each of the listed transistor type/package combinations

## RF discrete transistors BFU5xx

| Type     | Package  | $f_{T1}$ (typ)(GHz) | $h_{FE}$ (typ) | $V_{CE0}$ (max)(V) | $V_{CE5}$ (max)(V) | $V_{EB0}$ (max)(V) | $I_C$ (max)(mA) | $P_{tot}$ (max)(mW) | $G_P$ (max)(typ)(db) | @ f = (Mhz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) | $G_P$ (max)(typ)(db) | @ f = (Mhz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) | NF min (typ)(db) | @ f = (Mhz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) | NF min (typ)(db) | @ f = (Mhz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) | $P_{L(1dB,son)}$ (typ)(dBm) | @ f = (Mhz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) | IP30_son (typ)(dBm) | @ f = (Mhz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) |
|----------|----------|---------------------|----------------|--------------------|--------------------|--------------------|-----------------|---------------------|----------------------|-------------|----------------|------------------|----------------------|-------------|----------------|------------------|------------------|-------------|----------------|------------------|------------------|-------------|----------------|------------------|-----------------------------|-------------|----------------|------------------|---------------------|-------------|----------------|------------------|
| BFU520W  | SOT323   | 10                  | 95             | 12                 | 24                 | 2                  | 30              | 450                 | 23                   | 433         | 5              | 8                | 19                   | 900         | 5              | 8                | 0.7              | 900         | 5              | 8                | 0.8              | 900         | 5              | 8                | 7                           | 900         | 5              | 8                | 17                  | 900         | 5              | 8                |
| BFU530W  |          | 11                  | 95             | 12                 | 24                 | 2                  | 40              | 450                 | 24                   | 433         | 10             | 8                | 19                   | 900         | 10             | 8                | 0.8              | 900         | 10             | 8                | 0.9              | 900         | 10             | 8                | 10                          | 900         | 10             | 8                | 20                  | 900         | 10             | 8                |
| BFU550W  |          | 11                  | 95             | 12                 | 24                 | 2                  | 50              | 450                 | 24                   | 433         | 15             | 8                | 18                   | 900         | 15             | 8                | 0.9              | 900         | 15             | 8                | 0.9              | 900         | 15             | 8                | 14                          | 900         | 15             | 8                | 23                  | 900         | 15             | 8                |
| BFU520A  | SOT23    | 10                  | 95             | 12                 | 24                 | 2                  | 30              | 450                 | 23                   | 433         | 5              | 8                | 18                   | 900         | 5              | 8                | 0.7              | 900         | 5              | 8                | 0.8              | 900         | 5              | 8                | 7                           | 900         | 5              | 8                | 17                  | 900         | 5              | 8                |
| BFU530A  |          | 11                  | 95             | 12                 | 24                 | 2                  | 40              | 450                 | 23                   | 900         | 10             | 8                | 18                   | 1800        | 10             | 8                | 0.8              | 1800        | 10             | 8                | 0.9              | 1800        | 10             | 8                | 10                          | 1800        | 10             | 8                | 20                  | 1800        | 10             | 8                |
| BFU550A  |          | 11                  | 95             | 12                 | 24                 | 2                  | 50              | 450                 | 24                   | 900         | 15             | 8                | 18                   | 1800        | 15             | 8                | 0.9              | 1800        | 15             | 8                | 1.0              | 1800        | 15             | 8                | 14                          | 1800        | 15             | 8                | 23                  | 1800        | 15             | 8                |
| BFU520   | SOT143   | 11                  | 95             | 12                 | 24                 | 2                  | 30              | 450                 | 20                   | 900         | 5              | 8                | 17                   | 1800        | 5              | 8                | 0.8              | 1800        | 5              | 8                | 0.9              | 1800        | 5              | 8                | 7                           | 1800        | 5              | 8                | 17                  | 1800        | 5              | 8                |
| BFU530   |          | 11                  | 95             | 12                 | 24                 | 2                  | 40              | 450                 | 21                   | 900         | 10             | 8                | 17                   | 1800        | 10             | 8                | 0.9              | 1800        | 10             | 8                | 1.0              | 1800        | 10             | 8                | 10                          | 1800        | 10             | 8                | 19                  | 1800        | 10             | 8                |
| BFU550   |          | 11                  | 95             | 12                 | 24                 | 2                  | 50              | 450                 | 21                   | 900         | 15             | 8                | 15                   | 1800        | 15             | 8                | 1.0              | 1800        | 15             | 8                | 1.1              | 1800        | 15             | 8                | 13                          | 1800        | 15             | 8                | 23                  | 1800        | 15             | 8                |
| BFU520X  | SOT143X  | 11                  | 95             | 12                 | 24                 | 2                  | 30              | 450                 | 20                   | 900         | 5              | 8                | 17                   | 1800        | 5              | 8                | 0.8              | 1800        | 5              | 8                | 0.9              | 1800        | 5              | 8                | 10                          | 1800        | 5              | 8                | 20                  | 1800        | 5              | 8                |
| BFU530X  |          | 11                  | 95             | 12                 | 24                 | 2                  | 40              | 450                 | 21                   | 900         | 10             | 8                | 17                   | 1800        | 10             | 8                | 0.9              | 1800        | 10             | 8                | 1.0              | 1800        | 10             | 8                | 10                          | 1800        | 10             | 8                | 20                  | 1800        | 10             | 8                |
| BFU550X  |          | 11                  | 95             | 12                 | 24                 | 2                  | 50              | 450                 | 22                   | 900         | 15             | 8                | 16                   | 1800        | 15             | 8                | 1.0              | 1800        | 15             | 8                | 1.1              | 1800        | 15             | 8                | 14                          | 1800        | 15             | 8                | 23                  | 1800        | 15             | 8                |
| BFU520XR | SOT143XR | 11                  | 95             | 12                 | 24                 | 2                  | 30              | 450                 | 20                   | 900         | 5              | 8                | 17                   | 1800        | 5              | 8                | 0.8              | 1800        | 5              | 8                | 0.9              | 1800        | 5              | 8                | 7                           | 1800        | 5              | 8                | 17                  | 1800        | 5              | 8                |
| BFU530XR |          | 11                  | 95             | 12                 | 24                 | 2                  | 40              | 450                 | 21                   | 900         | 10             | 8                | 17                   | 1800        | 10             | 8                | 0.9              | 1800        | 10             | 8                | 1.0              | 1800        | 10             | 8                | 10                          | 1800        | 10             | 8                | 19                  | 1800        | 10             | 8                |
| BFU550XR |          | 11                  | 95             | 12                 | 24                 | 2                  | 50              | 450                 | 22                   | 900         | 15             | 8                | 16                   | 1800        | 15             | 8                | 1.0              | 1800        | 15             | 8                | 1.1              | 1800        | 15             | 8                | 13                          | 1800        | 15             | 8                | 23                  | 1800        | 15             | 8                |
| BFU580Q  | SOT89    | 10                  | 95             | 12                 | 24                 | 2                  | 60              | 1000                | 20                   | 433         | 20             | 8                | 13                   | 900         | 20             | 8                | 1.0              | 900         | 20             | 8                | 1.1              | 900         | 20             | 8                | 14                          | 900         | 20             | 8                | 24                  | 900         | 20             | 8                |
| BFU590Q  |          | 9                   | 95             | 12                 | 24                 | 2                  | 200             | 2000                | 17                   | 433         | 50             | 8                | 11                   | 900         | 50             | 8                | 1.0              | 900         | 50             | 8                | 1.1              | 900         | 50             | 8                | 21                          | 900         | 50             | 8                | 31                  | 900         | 50             | 8                |
| BFU580G  | SOT223   | 10                  | 95             | 12                 | 24                 | 2                  | 60              | 1000                | 22                   | 433         | 20             | 8                | 15                   | 900         | 20             | 8                | 1.0              | 900         | 20             | 8                | 1.1              | 900         | 20             | 8                | 14                          | 900         | 20             | 8                | 24                  | 900         | 20             | 8                |
| BFU590G  |          | 9                   | 95             | 12                 | 24                 | 2                  | 200             | 2000                | 18                   | 433         | 50             | 8                | 12                   | 900         | 50             | 8                | 1.0              | 900         | 50             | 8                | 1.1              | 900         | 50             | 8                | 21                          | 900         | 50             | 8                | 31                  | 900         | 50             | 8                |
| BFU520Y  | SOT363   | 10                  | 95             | 12                 | 24                 | 2                  | 30              | 450                 | 23                   | 433         | 5              | 8                | 19                   | 900         | 5              | 8                | 0.7              | 900         | 5              | 8                | 0.8              | 900         | 5              | 8                | 7                           | 900         | 5              | 8                | 17                  | 900         | 5              | 8                |

## VHF & UHF varicap diodes

| Type    | Package | $C_d$ min | $C_d$ typ | $C_d$ max | @ $V_R$ | $C_d$ min | $C_d$ typ | $C_d$ max | @ $V_R$ |
|---------|---------|-----------|-----------|-----------|---------|-----------|-----------|-----------|---------|
|         |         | (pF)      | (pF)      | (pF)      | (V)     | (pF)      | (pF)      | (pF)      | (V)     |
| BB170   | SOD323  | 36.8      | -         | 41.8      | 1       | 2.4       | 2.6       | 2.75      | 28      |
| BB171   | SOD323  | 52        | -         | 62        | 1       | 2.48      | 2.7       | 2.89      | 28      |
| BB172   | SOD323  | 34.65     | -         | 42.35     | 1       | 2.361     | 2.6       | 2.754     | 28      |
| BB173   | SOD523  | 34.65     | -         | 42.35     | 1       | 2.361     | 2.6       | 2.754     | 28      |
| BB173LX | SOD882D | 34.65     | -         | 42.35     | 1       | 2.36      | 2.6       | 2.75      | 28      |
| BB174   | SOD523  | 18.22     | -         | 21.26     | 1       | 1.951     | 2.1       | 2.225     | 28      |
| BB174LX | SOD882D | 18.2      | -         | 21.3      | 1       | 1.95      | 2.1       | 2.22      | 28      |
| BB175   | SOD523  | 52        | -         | 62        | 1       | 2.48      | 2.7       | 2.89      | 28      |

## VCO & FM radio tuning varicap diodes

| Type     | Package | $C_d$ min | $C_d$ typ | $C_d$ max | @ $V_R$ | $C_d$ min | $C_d$ typ | $C_d$ max | @ $V_R$ |
|----------|---------|-----------|-----------|-----------|---------|-----------|-----------|-----------|---------|
|          |         | (pF)      | (pF)      | (pF)      | (V)     | (pF)      | (pF)      | (pF)      | (V)     |
| BB145B   | SOD523  | 6.4       | -         | 7.2       | 1       | 2.55      | -         | 2.95      | 4       |
| BB156    | SOD323  | 14.4      | 16        | 17.6      | 1       | 4.2       | 4.8       | 5.4       | 7.5     |
| BB201    | SOT23   | 89        | 95        | 102       | 1       | 25.5      | 27.6      | 29.7      | 7.5     |
| BB202    | SOD523  | 28.2      | -         | 33.5      | 0.2     | 7.2       | -         | 11.2      | 2.3     |
| BB207    | SOT23   | 76        | 81        | 86        | 1       | 25.5      | 27.6      | 29.7      | 7.5     |
| BB208-02 | SOD523  | 19.9      | -         | 23.2      | 1       | 4.5       | -         | 5.4       | 7.5     |
| BB208-03 | SOD323  | 19.9      | -         | 23.2      | 1       | 4.5       | -         | 5.4       | 7.5     |

## Satellite down converters with PLL/VCO

| Type      | Package  | Input freq range | V <sub>cc</sub> | I    | G <sub>conv</sub> | NF   | OIP3  | LO Freq     | Integrated phase noise density (degrees RMS) |
|-----------|----------|------------------|-----------------|------|-------------------|------|-------|-------------|--|
|           |          |                  | (V)             | (mA) | (dB)              | (dB) | (dBm) | (GHz)       |  |
| TFF1012HN | SOT763-1 | 10.7 - 12.75     | 5               | 56   | 30                | 8    | 17    | 9.75 / 10.6 | 1.5  |
| TFF1013HN | SOT763-1 | 10.7 - 12.75     | 5               | 56   | 34                | 8    | 17    | 9.75 / 10.6 | 1.5  |
| TFF1014HN | SOT763-1 | 10.7 - 12.75     | 5               | 52   | 36                | 7    | 13    | 9.75 / 10.6 | 1.5  |
| TFF1015HN | SOT763-1 | 10.7 - 12.75     | 5               | 52   | 39                | 7    | 13    | 9.75 / 10.6 | 1.5  |
| TFF1017HN | SOT763-1 | 10.7 - 12.75     | 5               | 52   | 42                | 7    | 13    | 9.75 / 10.6 | 1.5  |
| TFF1018HN | SOT763-1 | 10.7 - 12.75     | 5               | 52   | 45                | 7    | 13    | 9.75 / 10.6 | 1.5  |

## Satellite wideband gain blocks: BGA28xx

General-purpose wideband amplifiers (50 mΩ)

| Type    | Package | V <sub>cc</sub> (V) | I <sub>s</sub> (mA) | G <sub>p</sub> [dB] |         |          | PI(1dB) [dBm] |         |          | NF [dB] |         |          | IP3 <sub>o</sub> [dBm] |          |         | Z <sub>out</sub> [Ohm] | External Inductor |
|---------|---------|---------------------|---------------------|---------------------|---------|----------|---------------|---------|----------|---------|---------|----------|------------------------|----------|---------|------------------------|-------------------|
|         |         |                     |                     | 250 MHz             | 500 MHz | 750 MHz  | 250 MHz       | 500 MHz | 750 MHz  | 250 MHz | 500 MHz | 750 MHz  | 250 MHz                | 500 MHz  | 750 MHz |                        |                   |
| BGA2870 | SOT363  | 2.5                 | 15.6                | 31.2                | 31.1    | 31.0     | 5.0           | 4.0     | 4.0      | 3.1     | 3.2     | 3.7      | 15.0                   | 13.0     | 50      | N                      |                   |
| BGA2874 | SOT363  | 2.5                 | 16.0                | 31.1                | 31.0    | 30.6     | 5.0           | 4.0     | 4.0      | 3.0     | 3.1     | 3.4      | 19.0                   | 17.0     | 50      | N                      |                   |
|         |         |                     |                     | 250 MHz             | 950 MHz | 2150 MHz | 250 MHz       | 950 MHz | 2150 MHz | 250 MHz | 950 MHz | 2150 MHz | 950 MHz                | 2150 MHz |         |                        |                   |
| BGA2800 | SOT363  | 3                   | 10.5                | 19.9                | 20.5    | 20.2     |               |         | -2.0     | 3.7     | 3.6     | 3.7      | 11.0                   | 8.0      | 50      | N                      |                   |
| BGA2803 | SOT363  | 3                   | 5.8                 | 23.6                | 23.4    | 23.0     | -6.0          | -6.0    | -8.0     | 3.7     | 3.6     | 3.4      | 5.0                    | 2.0      | 50      | N                      |                   |
| BGA2748 | SOT363  | 3                   | 5.7                 | 17.6                | 21.9    | 17.8     |               |         | -9.2     | -10.9   | 1.7     | 1.9      | 2.4                    | -1.9     | -1.4    | 50                     | N                 |
| BGA2714 | SOT363  | 3                   | 4.6                 | 20.7                | 20.4    | 20.8     | -7.8          | -7.9    | -9.0     | 2.4     | 2.2     | 3.0      | 2.1                    | 0.0      | 50      | N                      |                   |
| BGA2801 | SOT363  | 3                   | 14.3                | 22.2                | 22.4    | 23.0     | 2.0           | 2.0     | 0.0      | 3.8     | 3.8     | 3.9      | 14.0                   | 9.0      | 50      | N                      |                   |
| BGA2802 | SOT363  | 3                   | 12.5                | 25.6                | 25.8    | 25.5     | 3.0           | 1.0     | -3.0     | 4.2     | 4.1     | 3.6      | 13.0                   | 6.0      | 50      | N                      |                   |
| BGA2815 | SOT363  | 3                   | 18.2                | 25.8                | 25.3    | 25.2     | 8.0           | 5.0     | 1.0      | 3.7     | 3.8     | 3.7      | 17.0                   | 10.0     | 50      | N                      |                   |
| BGA2817 | SOT363  | 3                   | 20.0                | 24.5                | 24.7    | 25.1     | 6.0           | 6.0     | 5.0      | 3.9     | 3.9     | 3.8      | 18.0                   | 15.0     | 50      | N                      |                   |
| BGM1012 | SOT363  | 3                   | 14.6                | 19.6                | 20.0    | 20.4     |               | 6.0     | 3.4      | 4.9     | 4.8     | 4.9      | 18.0                   | 13.0     | 50      | Y                      |                   |
| BGA2818 | SOT363  | 3                   | 19.9                | 30.1                | 29.8    | 30.0     | 7.0           | 6.0     | 4.0      | 3.5     | 3.3     | 3.3      | 18.0                   | 14.0     | 50      | N                      |                   |
| BGA2851 | SOT363  | 5                   | 7.0                 | 23.3                | 24.7    | 25.2     | -3.0          | -4.0    | -5.0     | 4.0     | 3.2     | 3.0      | 8.0                    | 5.0      | 50      | N                      |                   |
| BGA2715 | SOT363  | 5                   | 4.3                 | 15.6                | 21.5    | 23.3     |               |         | -8.0     | -8.5    | 2.6     | 2.6      | 3.1                    | 2.3      | 0.6     | 50                     | N                 |
| BGA2717 | SOT363  | 5                   | 8.0                 | 20.0                | 24.2    | 25.1     |               |         | -2.6     | -3.1    | 2.3     | 2.3      | 2.9                    | 10.0     | 6.3     | 50                     | N                 |
| BGA2712 | SOT363  | 5                   | 12.3                | 21.1                | 21.2    | 22.0     |               | 0.2     | -2.0     | 4.2     | 3.9     | 4.3      | 11.0                   | 6.0      | 50      | N                      |                   |
| BGA2866 | SOT363  | 5                   | 17.4                | 23.2                | 23.9    | 24.3     | 4.0           | 4.0     | 3.0      | 3.9     | 3.8     | 3.9      | 17.0                   | 12.0     | 50      | N                      |                   |
| BGA2867 | SOT363  | 5                   | 21.7                | 26.4                | 27.2    | 27.2     | 6.8           | 6.5     | 4.9      | 3.7     | 3.8     | 3.7      | 18.8                   | 14.1     | 50      | N                      |                   |
| BGA2709 | SOT363  | 5                   | 23.5                | 22.5                | 22.7    | 23.0     |               | 8.3     | 5.7      | 4.3     | 4.0     | 5.1      | 22.0                   | 14.0     | 50      | Y                      |                   |
| BGA2716 | SOT363  | 5                   | 15.9                | 22.4                | 22.8    | 22.9     |               | 8.9     | 6.1      | 5.5     | 5.3     | 5.5      | 22.2                   | 15.9     | 50      | Y                      |                   |
| BGA2776 | SOT363  | 5                   | 24.4                | 22.9                | 23.2    | 23.2     |               | 7.2     | 6.0      | 4.7     | 4.9     | 5.3      | 18.6                   | 14.4     | 50      | Y                      |                   |
| BGA2869 | SOT363  | 5                   | 22.0                | 30.9                | 30.9    | 32.2     | 8.8           | 8.8     | 7.6      | 3.8     | 3.9     | 4.0      | 20.0                   | 19.0     | 50      | N                      |                   |
| BGM1013 | SOT363  | 5                   | 27.5                | 35.3                | 35.6    | 32.1     |               | 13.0    | 8.1      | 4.6     | 4.6     | 4.9      | 22.7                   | 18.6     | 75      | Y                      |                   |
| BGM1014 | SOT363  | 5                   | 21.0                | 30.2                | 32.2    | 34.3     |               | 11.2    | 5.7      | 4.3     | 4.2     | 4.2      | 20.5                   | 15.1     | 75      | Y                      |                   |

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