

## 24GHz Chipset-Family for Industrial Applications

The BGT24Mxx family is the highest integrated 24GHz ISM Band Radar Transceiver Family currently in the market. It saves ~30% board space compared to discrete line ups. Infineon offers 3 different components, the BGT24MTR11 which combines one Transmit- and one Receive channel, the BGT24MTR12 which comprises one Transmit- and 2 Receive channels, and the BGT24MR2, a chip with 2 Receive channels, combinable with both chipsets.

There is far more to Radar Applications than what springs to mind immediately! It's not all about submarines and weather forecasts. In fact, they are something that we come into contact with every day! They can be found in tank level meters, street or office lighting and intruder alarms, just to give a few examples.

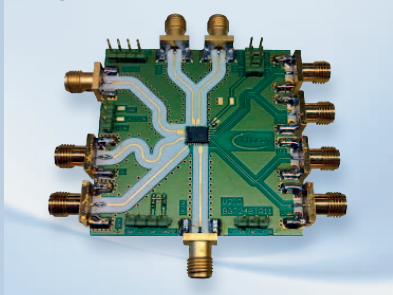
In an industrial environment, energy efficiency becomes more and more important. At the same time, certain health and safety regulations have to be observed. Thanks to Infineon's new 24GHz Radar product family BGT24Mxx, these needs can now be addressed. The BGT24MTR11 makes it possible to have products in applications with a far higher sensitivity than were previously possible with other sensors. Doors will open only if someone actually wants to walk through, for example. And the person does not get caught between the sliding doors. Where it is important to detect also the position of the person or object in the area, the BGT24MTR12 or a combination of one transceiver chip with the BGT24MR2 is the ideal choice.

The high integration of the Infineon solution – transmit channel and receive channel on one chip – saves expensive PCB space and makes the design easy as no 24GHz RF-Matching/ RF-Transmission Lines are required. The industrial standard VQFN package can be mounted in standard SMD lines.

### Applications

- Tank level meters
- Street lighting projects
- Intruder alarms
- Police speed meters
- Intelligent door openers
- Motion detectors
- Wall Washers

Highly Integrated 24GHz  
Single Die RF Solution



### Features

- Temperature range: -40°C ~ 105°C
- Detection range >100m @ 500mW power consumption
- Accuracy in mm-range for near field
- Fully integrated solution, only 1 external blocking-C required
- Enabler to use standard Di-electric PCB-material (Rogers) and assembly lines for reducing design-cycle time and production cost by a factor of ~4

### Why Infineon's 24GHz solution?

- High integration (1 chip for transmitting & receiving)
  - Opens up new markets
  - Less PCB space required
- No 24GHz RF-Matching/ RF-Transmission Lines required on PCB
  - Ease of use
  - Easy PCB design
- Industry standard QFN-style package for mounting in standard SMD-lines
  - All kind of customers can be targeted, no special technologies are required
- Roadmap approach
  - Looking into future requirements

# 24GHz Chipset-Family for Industrial Applications

Typical Electrical Characterisation  $T_A = -40 \dots 105^\circ\text{C}$

Parameter	Symbol	Values			Unit	Note / Test Condition
		BGT24MR2	BGT24MTR11	BGT24MTR12		
		2 Rx	1 Tx / 1 Rx	1 Tx / 2 Rx		

## Power Supply

Supply Voltage	$V_{CC}$	3.135 ... 3.465	3.135 ... 3.465	3.135 ... 3.465	V	–
Supply Current	$I_{CC}$	90	150	200	mA	–

## TX Section

VCO frequency range	$f_{VCO}$	–	24.00 ... 26.00	24.00 ... 26.00	GHz	–
VCO tuning voltage	$V_{FINE}, V_{FCourse}$	–	0.5 ... 5.0	0.5 ... 5.0	V	–
VCO tuning slope fine	$\Delta f / \Delta V_{FINE}$	–	<1000	<1000	MHz/V	–
VCO tuning slope coarse	$\Delta f / \Delta V_{FCourse}$	–	<1800	<1800	MHz/V	–
VCO pushing	$\Delta f / \Delta V_{CC}$	–	<300	<300	MHz/V	@ f = 24GHz
VCO phase noise	$P_N$	–	-85	-85	dBc/Hz	–
TX output power	$P_{TX}$	–	8	8	dBm	–
TX output power adjustable range	$a_{TX}$	–	9	9	dB	Adjustable via SPI
TX output power in “off” mode	$P_{TXoff}$	–	<-15	<-15	dBm	–
LO output power	$P_{LO}$	–	0	-	dBm	–

## RX Section

RFIN frequency range	$f_{RFIN}$	24.00 ... 26.00	24.00 ... 26.00	24.00 ... 26.00	GHz	–
IF frequency range	$f_{IF}$	<1	<1	<1	MHz	–
Voltage conversion gain	$G_C$	26	26	26	dB	$R_{LOAD,IF} > 10k\Omega$
SSB noise figure	$NF_{SSB}$	11	12	12	dB	Single sideband at 100kHz
IF 1/f corner frequency	$f_C$	10	10	10	kHz	–
Input compression point	$P_{1dB}$	-12	-12	-12	dBm	–
Quadrature phase imbalance	$\varepsilon_P$	<10	<10	<10	deg	–
Quadrature amplitude imbalance	$\varepsilon_A$	<1	<1	<1	dB	–

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