

CONNECTING, PROTECTING AND POWERING THE WORLD

Solutions

X-BAND AESA RADAR



WEATHER



REMOTE SENSING



TARGET TRACKING



SURVEILLANCE

FEATURING

FEMs
Beamformers
Drivers
Limiters
Mixers
DSA & VGA
Switches

QORVO

The Qorvo logo is centered within a large, light blue circular shape. The logo itself consists of the word "qorvo" in a lowercase, rounded, sans-serif font, with a registered trademark symbol (®) to its upper right. The background of the entire image is a dark blue gradient, overlaid with several large, overlapping, semi-transparent shapes in various shades of blue, creating a modern, abstract design.

qorvo®

CONNECTING,

PROTECTING

AND POWERING

THE WORLD

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APPLICATIONS

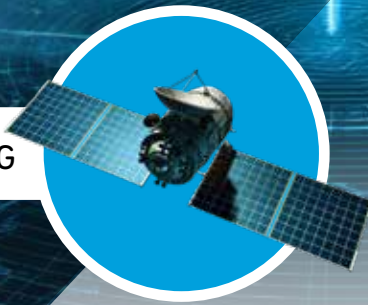
SURVEILLANCE



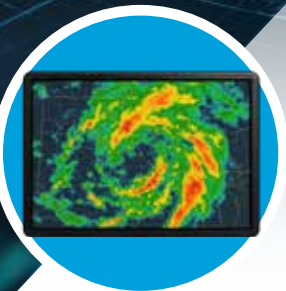
TARGET TRACKING



REMOTE SENSING



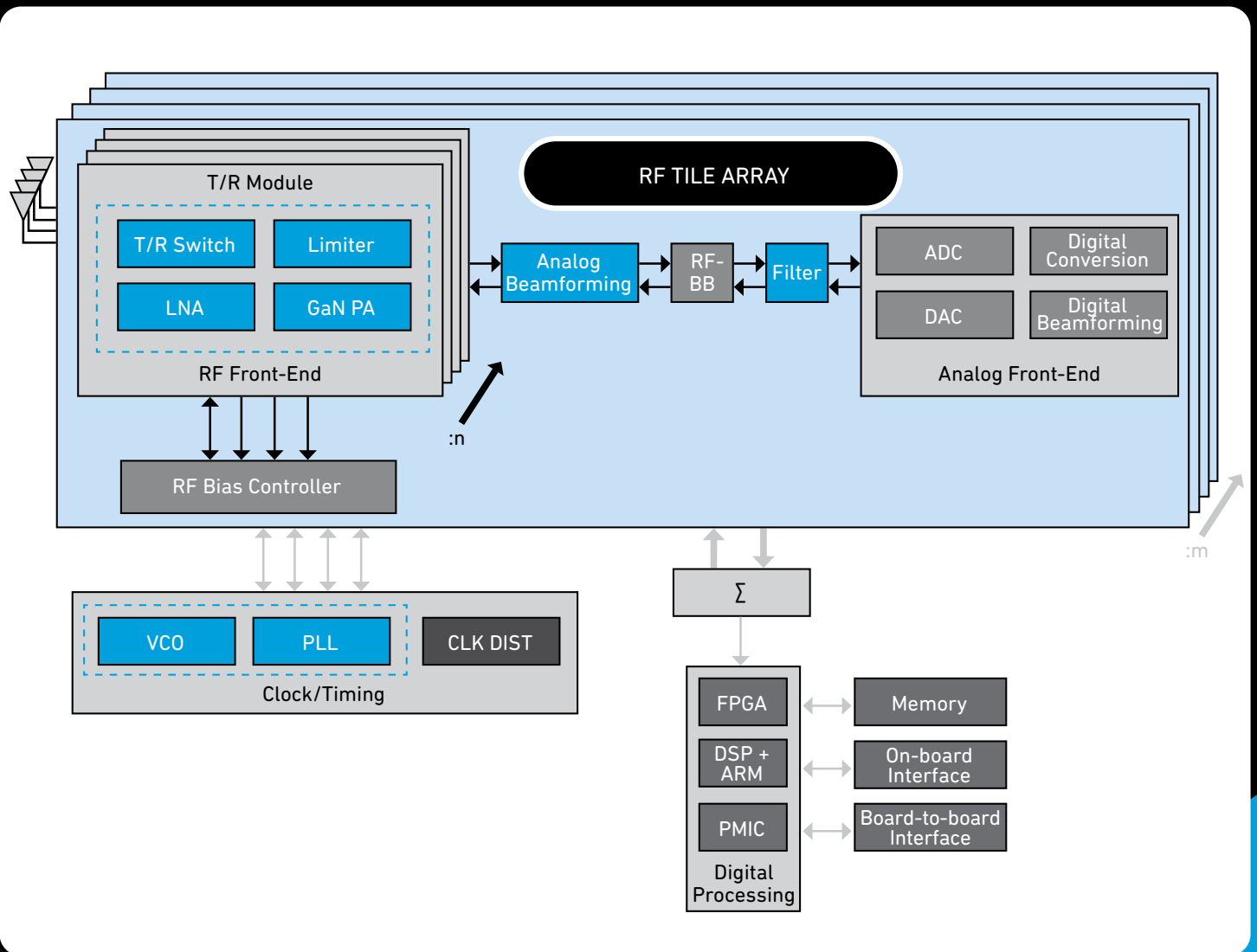
WEATHER



High Level Design Considerations

- ✓ **FEMs:** RF Power • Efficiency • Noise figure • Size
- ✓ **Beamformers:** Phase resolution • Fast updates • Low RMS error
- ✓ **Drivers:** Efficiency • Gain flatness • Footprint • RF power
- ✓ **Mixers:** IF planning • Conversion loss • LO isolation
- ✓ **DSA & VGA:** Glitch-free steps • Range/resolution • Settling time
- ✓ **PLL + VCOs:** Phase noise • Lock time • Spur control

X-BAND RADAR BLOCK DIAGRAM

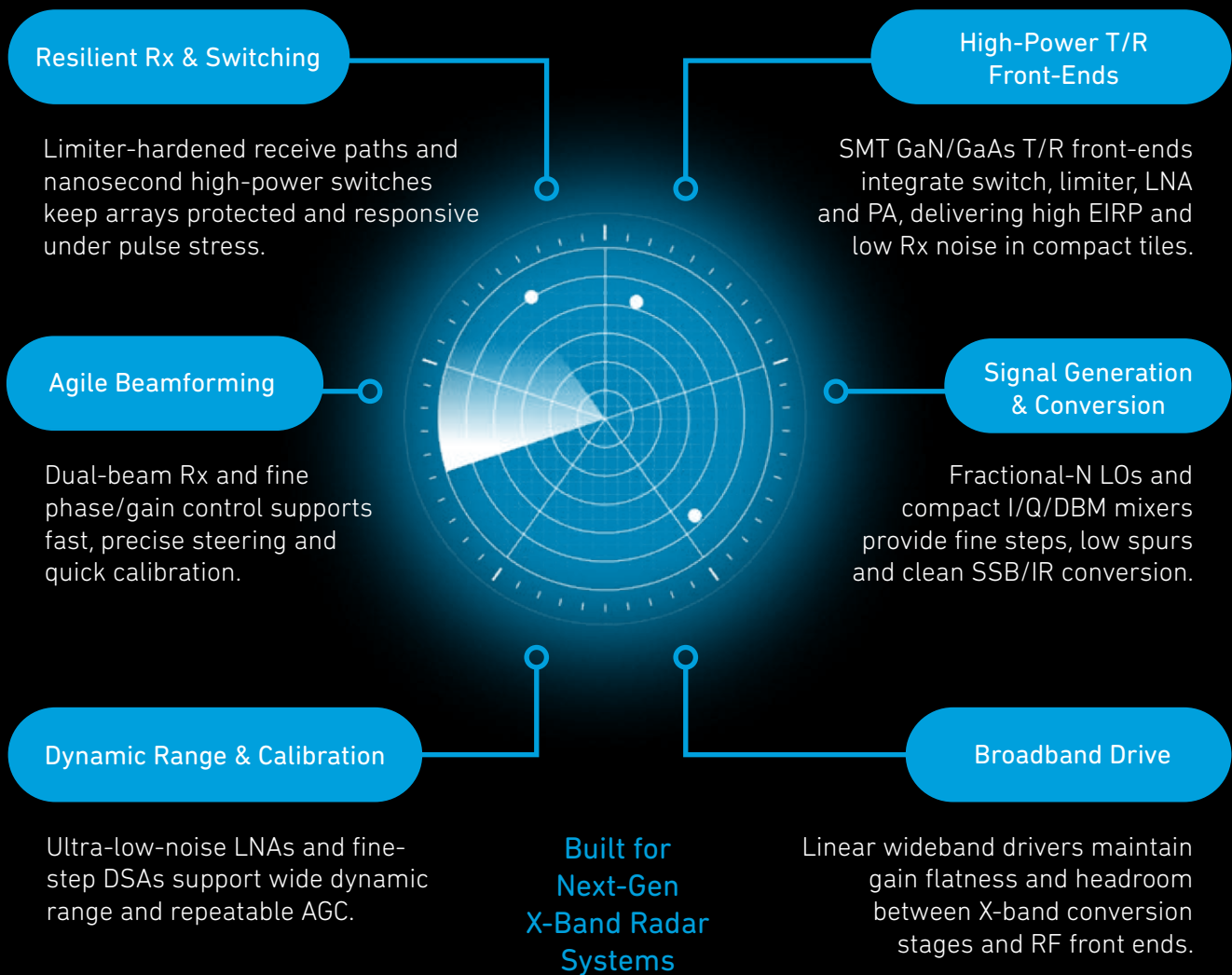


Look for
blue blocks!

Qorvo content shown in blue blocks

BRIDGING GAPS WITH INNOVATIVE SOLUTIONS

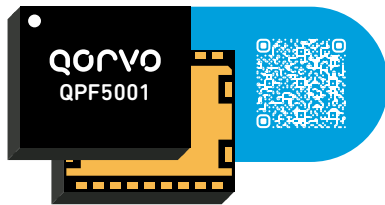
For Current Challenges



X-BAND RADAR

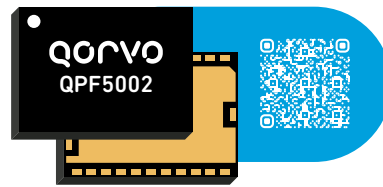
Integrated Front-End Module Portfolio

Qorvo's X-band T/R module lineup gives radar designers a scalable path to tune array power and sensitivity across different platforms without reinventing the front end. With integrated PA/LNA/limiter/switch functions in compact packages, these options support dense element spacing, reduce discrete BOM count and help maintain consistent Tx/Rx behavior from prototype through production.



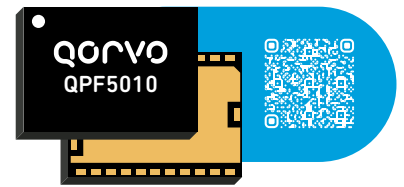
8-12 GHz Dual-Channel 12W T/R Module (PA/LNA/LIM)

Tx P_{SAT} 41.5 dBm
Rx NF 1.5 dB
PAE 45%
6x5mm QFN



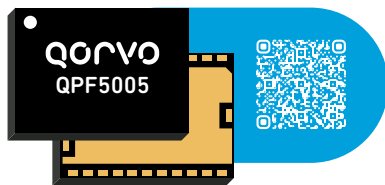
8.5-10.5 GHz 2W T/R FEM (PA/LNA/LIM/SW)

Tx P_{SAT} 32.5 dBm
Rx NF 2.1 dB
7x5mm QFN



8-12 GHz 10W T/R FEM (PA/LNA/LIM/SW)

Tx P_{SAT} 40 dBm
Rx NF 2.2 dB
7x5mm QFN



8-12 GHz 5W T/R FEM (PA/LNA/LIM/SW)

Tx P_{SAT} 37 dBm
Rx NF 2.2 dB
7x5mm QFN



8.5-10.5 GHz GaN T/R FEM (PA/LNA/SW)

Tx P_{SAT} 35 dBm
Rx Gain 25 dB | NF 2.2 dB
2W ANT input (*limiter not required*)
5x5mm QFN



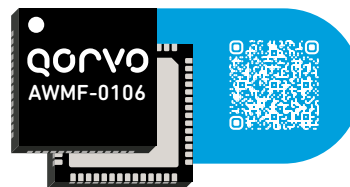
9-10.5 GHz GaN T/R FEM (Dual Rx) (PA/LNA/SW)

Tx P_{SAT} 36 dBm
Rx Gain 21 dB | NF 2.7 dB
4W ANT input (*limiter not required*)
6x5mm QFN



8.5-10.5 GHz GaAs MMIC FEM (PA/LNA/SW)

Tx P_{SAT} 27.5 dBm
Rx Gain 26 dB | NF 2.0 dB
6x6mm QFN



8.5-10.55 GHz Dual Rx/Single Tx Front-End IC (PA/LNA/LIM/SW + P_{DET})

Tx P_{SAT} 36 dBm
Rx Gain 24 dB | NF 3.3 dB
7x7mm QFN

X-BAND RADAR

Beamformer ICs

Qorvo's X-band beamformer ICs enable agile array control by combining digitally adjustable phase and gain with element-level integration that supports rapid steering updates and straightforward calibration. A quad-element architecture with dual-receive capability helps implement advanced receive modes (such as monopulse or dual-pol) while keeping the RF tile compact and digitally controllable.

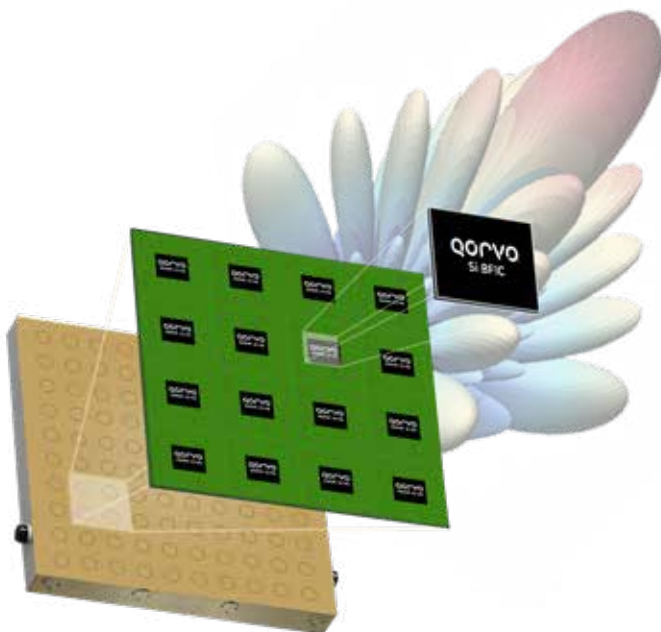


8-10.55 GHz
Quad-Core Beamformer IC
Dual-Beam Rx/Single-Beam Tx
Low Rx NF
6-bit Phase + Gain Control
7x7mm QFN



8.5-10.55 GHz
Quad-Core Beamformer IC
Dual-Beam Rx/Single-Beam Tx
High Rx IIP3
6-bit Phase + Gain Control
7x7mm QFN

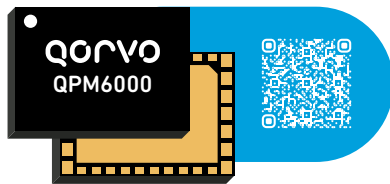
Pairs with AWMF-0106 front end (PA/LNA/limiter/T/R) for plug-and-play antenna solution.



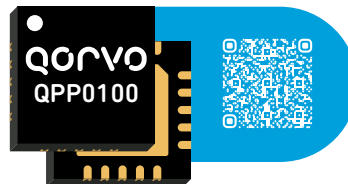
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Limiters, Gain and Driver Amplifiers

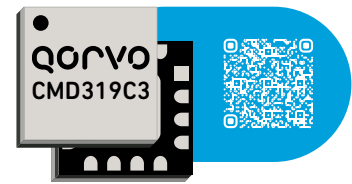
Qorvo's limiters, gain blocks, and driver amplifiers protect sensitive receive paths and provide linear drive across X-band radar transmit and distribution stages. High-power limiting and low-noise amplification preserve receiver sensitivity under pulse stress, while wideband gain devices maintain signal integrity between conversion stages and the RF front end.



8-14 GHz
100W Limiter/LNA
Gain 23 dB
NF 1.6 dB
8.5x6mm QFN



8-11.5 GHz
VPIN 100W Limiter
IL <1 dB
4x4mm QFN



8-12 GHz
Ultra Low NF LNA
NF 0.92 dB
3x3mm QFN



6-14 GHz
Gain Block Amplifier
Gain 19 dB
NF 4 dB
3x3mm QFN

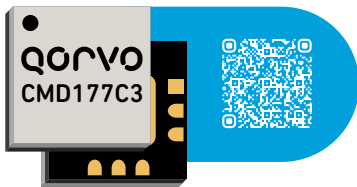


DC-22 GHz
Distributed Driver Amplifier MMIC
Gain 15 dB
P1dB 19 dBm
NF 2.2 dB
4x4mm QFN

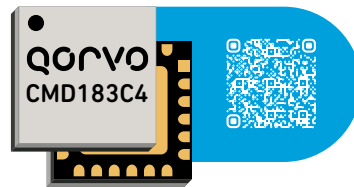
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Frequency Conversion & LO Generation

Qorvo's DBM and I/Q converters support clean RF/IF translation in X-band radar signal chains, reducing LO leakage and spurs on dense cards. Double-balanced and I/Q options support image-reject or single-sideband approaches while keeping routing and filtering simple in compact layouts.



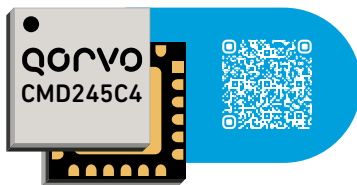
6-14 GHz
Double-Balanced Mixer
LO-RF Isolation 43 dB
Conv Loss 6.5 dB
3x3mm QFN



7.5-13 GHz
Double-Balanced Mixer
LO-RF Isolation 43 dB
Conv Loss 5.5 dB
4x4mm QFN



2.5-15 GHz
I/Q Mixer (Image Reject)
LO-RF Isolation 50 dB
Conv Loss 8 dB
4x4mm QFN



6-18 GHz
Low Phase Noise Amplifier
Gain 18 dB
OIP3 29 dBm
NF 4.5 dB
P_{SAT} 22 dBm
4x4mm QFN



85-2700 MHz
RF Synth/VCO + Mixer
IIP3 23 dBm
Phase Noise -90 dBc/Hz @1 kHz
I_{cc} 125 mA
5x5mm QFN

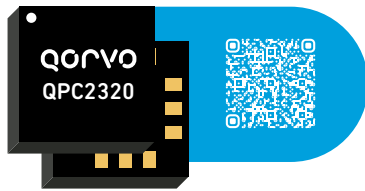
Low phase noise amplifiers keep the LO and IF distribution quiet, preserving Doppler clarity and sidelobe performance near strong signals.

Integrated synthesizers and VCOs with mixers streamline LO generation and conversion for multiply-to-X-band architectures, supporting agile tuning with low spurs in a compact footprint.

X-BAND RADAR

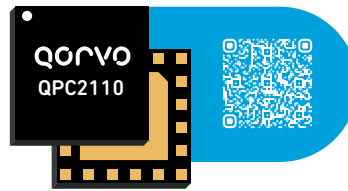
RF Phase and Gain Control

Qorvo's RF phase and gain control devices support precise beam steering and front-end routing in X-band radar arrays. Low-loss SOI switches and compact phase-control solutions maintain clean signal paths, while high-power SPDT switching supports fast Tx/Rx transitions with predictable isolation and calibration behavior.



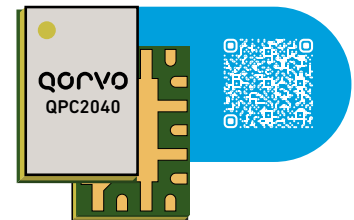
0.02-15 GHz SOI SPDT Switch

IL <1 dB
Switching Speed 47 ns
Isolation 40 dB
2.25x2.25mm QFN



8-12 GHz SOI Phase Shifter

IL <8 dB
RMS Phase Error <3°
2x2mm QFN

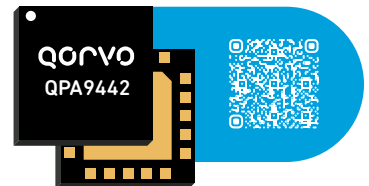


8-12 GHz GaN 10W SPDT

IL <1.2 dB
Switching Speed 35 ns
Isolation 30dB
3x4.5mm QFN

IF Phase and Gain Control

Qorvo's IF gain control portfolio combines low-noise amplification, high-linearity drive and fine-step attenuation to manage dynamic range and calibration through the IF chain. Compact, matched devices simplify gain staging while keeping AGC behavior stable and drive levels clean into downstream conversion stages.



0.6-5 GHz High Linearity Pre-Driver

Gain 19 dB
OIP3 46 dBm
4x4mm QFN



1.8-5 GHz High Gain, High Linearity Driver Amplifier

50Ω Matched RF I/O
Gain 29 dB
OIP3 35 dBm
3x3mm QFN



0.5-6 GHz Ultra Low Noise LNA

Gain 18 dB
NF 0.59 dB
OIP3 36 dBm
2x2mm QFN



0.05-6 GHz 7-bit Digital Step Attenuator

31.75 dB Atten. Range
0.25 dB Step
IL 1.7 dB @2GHz
IIP3 >55 dBm
3x3mm QFN



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Driving Defense Applications with
Beamforming, GaN and GaAs Technology



Integrating X-band Radar for Next-Level
Detection and Imaging



Qorvo's X-Band Radar Solutions Video



High Performance D&A Solutions Brochure

