

MR3003_RD

radar transceiver
with integrated signal processing



Features

- 76-81 GHz Radar Transceiver with Digital Signal Processing
- Based on NXP's MR3003 / S32R274 chipset
- 3 TX and 4 RX channels
- Integrated PLL-based Fast Chirp Generator
- Switchable wide and narrow TX beams
- Ethernet Interface
- Detection Distance 35 m (Human) 100 m (Cars)
- Compact size: 76 × 44 × 38.5 mm

Applications

- Traffic analysis and classification
- Collision avoidance sensors
- Intersection management
- Security Systems
- Measurement and Research Applications
- Industrial Sensors

Description

The MR3003_RD is a reference design based on NXP's MR3003 ('Eagle') chipset. This design builds a high-end 2D Radar transceiver with 4 receiving channels and a low phase noise, PLL controlled transmitter. The integrated Chirp generator allows creating very fast frequency sweeps. The target information from the 4 receive antennas is digitized and the high speed digital signal processing performs range and doppler FFTs with an update rate of 10 measurements per second. The high frequency bandwidth allows good distance resolution. Target information is sent out using the integrated Ethernet interface.

The radar is delivered with an example Matlab software and also the Radar firmware in C-code. With the graphical User Interface all Radar modes can be selected and targets are visualized in 2D Range-Doppler maps or a Range-Angle display.

Blockdiagram

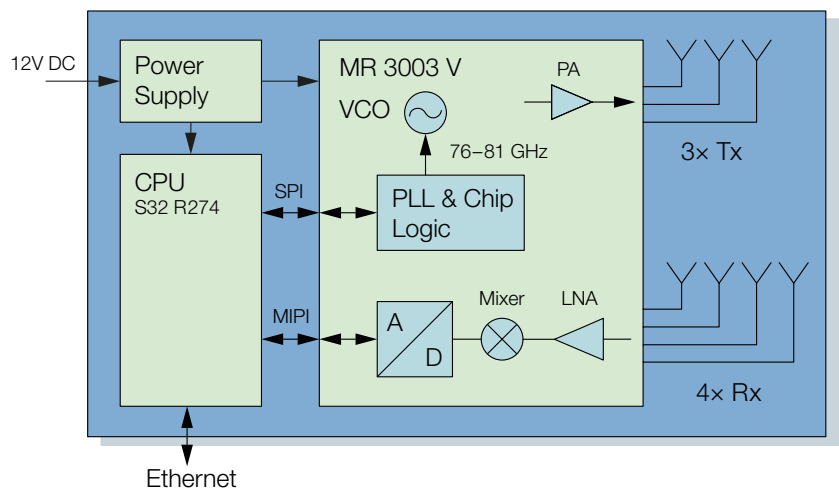


Figure 1: Blockdiagram

Characteristics

Parameter	Conditions/Notes	Symbol	Min	Typ	Max	Unit
Operating conditions						
Supply voltage		V_{cc}	10	12	14	V
Supply current		I_{cc}		800		mA
Connector Type			Power Barrel 2.5 mm/5.5 mm			
Operating temperature		T_{op}	0		+60	°C
Storage temperature		T_{st}	-20		+85	°C
Transmitter						
Transmitter frequency	Wider bandwidth on request	f_{TX}	76.000		81.000	GHz
Output power	EIRP	P_{TX}		+20		dBm
Output power deviation	$f_{TX} = 76.000 \dots 81.000$ GHz	ΔP_{TX}		± 2		dB
Maximum frequency error	$V_{cc} = 12$ V, 0 °C .. +60 °C	Δf_{Error}		50		ppm
Phase Noise	@ 100 kHz	P_N			-73	dBc
Antenna						
TX1 Antenna Gain	$f_{TX} = 76.500$ GHz	G_{Ant}		15		dBi
Horizontal -3dB beamwidth	E-Plane	W_{φ}		30		°
Vertical -3dB beamwidth	H-Plane	W_{θ}		11		°
TX2,3 Antenna Gain	$f_{TX} = 76.500$ GHz	G_{Ant}		13		dBi
Horizontal -3dB beamwidth	E-Plane	W_{φ}		48		°
Vertical -3dB beamwidth	H-Plane	W_{θ}		11		°
RX 1,2,3,4 Antenna Gain	$F_{RX} = 76.500$ GHz	G_{Ant}		10		dBi
Horizontal -3dB beamwidth	E-Plane	W_{φ}		68		°
Vertical -3dB beamwidth	H-Plane	W_{θ}		11		°
Polarisation				Vertical		
Receiver						
Receiver sensitivity	$f_s = 10$ MHz, 256/128Pt FFT, SNR = 10dB	P_{RX}		-124		dBm
Overall sensitivity	$\sigma = 1$ m ² , $r = 35$ m, S/N = 6dB	S		-144		dBc
Signal Processing						
Modulation				FMCW		
Range processing				256 point FFT		
Velocity processing				128 point FFT		
Update rate				100		ms
Output						
Ethernet Output	RJ-45 Connector		10		1000	MBit/s
Body						
Outline Dimensions				76 × 44 × 38.5		mm
Weight				150		g