RFbeam Microwave GmbH

product information

MR2001_RD

radar transceiver
with integrated signal processing

Features

– 76-77 GHz Radar Transceiver with Digital Signal Processing
– Based on NXP's MR2001/MPC5775 chipset
– Open frame construction
– Antenna-PCB and Processing Board can be replaced
– 4 TX and 6 RX channels
– Open Loop Frequency generation
– Switchable wide and narrow TX beams
– Ethernet Interface
– Detection Distance 50 m (Human), 200 m (Cars)
– Compact size: $91 \times 73 \times 35.5$ mm

Applications

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

Description

The MR2001_RD is a reference design based on NXP's MR2001 ('Spirit') chipset. This design builds a high-end 2D Radar transceiver with 6 receiving channels and a low phase noise transmitter. The frequency sweeps are generated using the CPU's D/A-converter. The target information from the 6 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.

This design allows the user to exchange the Antenna and also the use of own Signal Processing hardware. 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.
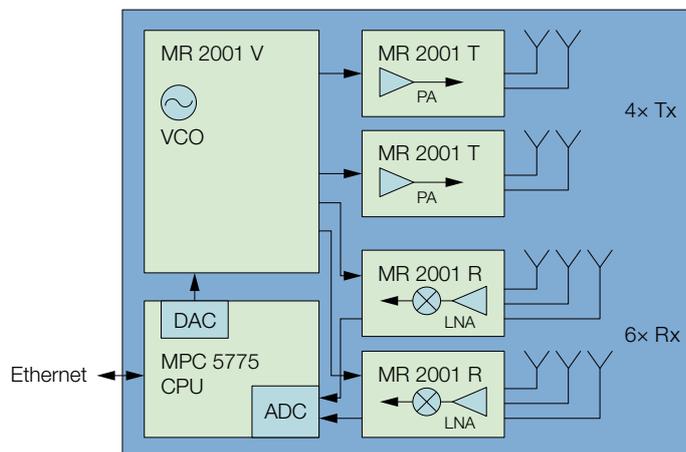
Blockdiagram

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}		1000		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		77.000	GHz
Output power	EIRP	P_{TX}		+27		dBm
Output power deviation	f_{TX} = 76.000 .. 77.000 GHz	ΔP_{TX}		±2		dBm
Frequency drift vs temp.	V_{cc} = 12 V, 0 °C .. +60 °C	Δf_{TX}		-35		MHz/°C
Phase Noise	@ 100 kHz	P_N		-75		dBc
Antenna						
TX1 Antenna Gain	f_{TX} = 76.500 GHz	G_{Ant}		17		dBi
Horizontal -3dB beamwidth	E-Plane	W_φ		11		°
Vertical -3dB beamwidth	H-Plane	W_θ		12		°
TX2 Antenna Gain	f_{TX} = 76.500 GHz	G_{Ant}		13		dBi
Horizontal -3dB beamwidth	E-Plane	W_φ		45		°
Vertical -3dB beamwidth	H-Plane	W_θ		12		°
TX3 Antenna Gain	f_{TX} = 76.500 GHz	G_{Ant}		10		dBi
Horizontal -3dB beamwidth	E-Plane	W_φ		70		°
Vertical -3dB beamwidth	H-Plane	W_θ		12		°
RX1,2,3,4 Antenna Gain	F_{RX} = 76.500 GHz	G_{Ant}		10		dBi
Horizontal -3dB beamwidth	E-Plane	W_φ		70		°
Vertical -3dB beamwidth	H-Plane	W_θ		12		°
Polarisation				Vertical		
Receiver						
Receiver sensitivity	f_s = 5MHz, 256/128Pt FFT, SNR = 6dB	P_{RX}		-131		dBm
Overall sensitivity	σ = 1 m², r = 35 m, S/N = 6dB	D_{system}		-158		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		100	MBit/s
Body						
Outline Dimensions				91 × 73 × 35.5		mm
Weight				220		g