Data Sheet Summary for MC33MR2001R

76-77 GHz RF receiver front-end for W-band radar applications

The MR2001 is a scalable three package solution for automotive radar modules. The chipset consists of a four channel VCO (voltage controlled oscillator), a two-channel Tx transmitter, and a three-channel Rx receiver. The MR2001R is a high performance, highly integrated, three-channel, receiver (RX) ideally suited for automotive radar applications. In conjunction with the MR2001V, a four-channel voltage controlled oscillator, and an MR2001T, a two-channel transmitter, it provides a scalable three package solution for automotive radar modules.

Features

- 76 GHz to 77 GHz RX input
- Supply voltage 3.3 V
- · Supply current typ. 240 mA
- Power dissipation typ. 0.8 W
- · Conversion gain 23 dB to 60 dB
- · SSB noise figure typical 14 dB
- · Saturation detectors
- Tri-state IF outputs

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MR2001R ADVANCED DRIVER ASSISTANCE SYSTEM VK SUFFIX (PB-FREE) 98ASA00540D 6.0 X 6.0 X 0.95 RCPBGA

Applications

- Automotive proximity radar
- LRR, MRR and SRR
- ADAS
- Industrial surveillance and security systems

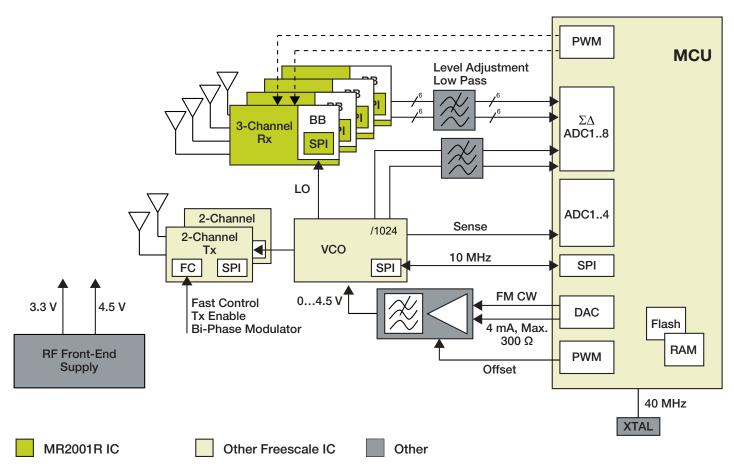


Figure 1. MR2001R simplified application diagram

^{*} This document contains certain information on a new product. Specifications and information herein are subject to change without notice.





Table 1. Orderable part variations

Part number	Temperature (temp)	Package	Notes
MC33MR2001RVK	-40 °C to 125 °C	6.0 x 6.0 mm RCP (10 x 11 array) 0.5 mm pitch	(1)

Notes

1. To order parts in Tape & Reel, add R2 to the suffix of the part number.

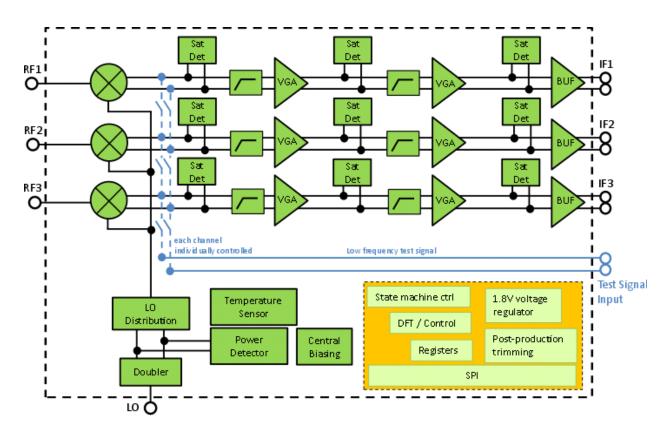


Figure 2. MR2001R three-channel receiver block diagram

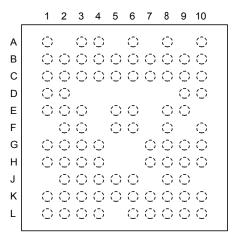


Figure 3. MR2001R pinout (ball) diagram

Table 2. MR2001R pin definitions

Ball location	Pin function	
A1, A10, D1, D2, E8, F5, F6, F8, G4, G7, G8, G9, G10, H4, H7, K7, L1, L2, L3, L7, L8, L9, L10	DC Ground	
A3	SPI MOSI (master out, slave in)	
A4	Digital hard reset signal	
A6	Differential IF output channel 1	
A8	Differential IF output channel 3	
B1	SPI enable (chip enable)	
B2	SPI serial clock	
B3	SPI MISO (master in, slave out)	
B4	Digital scan test	
B5	Differential IF output channel 2	
B6	Differential IF output channel 2	
B7	Differential IF output channel 1	
B8	Differential IF output channel 3	

Ball location	Pin function	
C1, C2	3.3 V Power Supply	
C6	3.3 V Power Supply	
C8	3.3 V Power Supply	
D9	Sensor output (temperature and power peak detector)	
D10	Bandgap reference resistor (positive temperature slope)	
E1, E2, E3, F3, G1, G2, G3, H1, H2, H3, H8, H9, H10, J3, J4, J5, J6, J8, K1, K2, K3, K4, K6, K8, K9, K10, L4, L6	RF Ground	
E5	Chip key Bit [1]	
E6	Chip key bit [0]	
E9	Saturation detector output	
F2	77 GHz RX input channel 2	
F10	Bandgap reference resistor (negative temperature slope)	
J2	77 GHz RX input channel 1	
J9	77 GHz RX input channel 3	
K5	LO input	

Table 3. Key parameters

Temp = -40 $^{\circ}$ C to +125 $^{\circ}$ C, f_{OUT} = 76 to 77 GHz, and V_{CC3P3} = 3.3 V ±5.0%, unless otherwise noted.

Symbol	Parameter	Тур.	Unit	Notes
V _{CC}	Supply Voltage, Nominal supply ±5% variation	3.3	V	
I _{CC}	Supply Current (all channels on)	242	mA	
I _{CC0}	Supply Current S0 (chip de-activated)	19	mA	
P _{ON}	Power Consumption (on)	0.8	W	
BB parameters				
f _{HP}	High-pass (HP) Filter Edge Frequency (-6.0 dB)	300	kHz	
s _{HP}	Slope Below f_HP	40	dB/decade	
LP_order	Low Pass Filter (LP) Order - center freq. at approx. 8.0 MHz - information only	1.0	-	
Conversion gain				
CG _{MAX}	Max. Conversion Gain at f = 4.0 MHz - 22 dB 1st VGA, 16 dB 2nd VGA	57	dB	
CG _{MIN}	Min. Conversion Gain at f = 4.0 MHz - 10 dB 1st VGA, -2.0 dB 2nd VGA	26.5	dB	
CG _{STEP}	Conversion Gain Step-size (VGA settings)		dB	
Control				
R _{SAT}	Overload Detected Output Load	365	W	
P_MIXER_SAT	Input Referred Saturation Detector Threshold at CG = min at f = 10 kHz	-3.0	dBm	
V _{VGA1_SAT}	1st VGA Stage Output Saturation Level (stage directly after mixer core)	400	mVpk	
V _{VGA2_SAT}	2nd VGA Stage Output Saturation Level	350	mVpk	

Table 4. Revision history

Revision	Date	Description of changes
1.0	6/2015	Initial release
2.0	9/2016	 Added revision history table Modified the target application lists Updated Figure 2

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