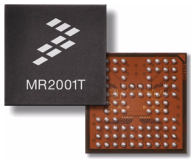
Document Number: MC33MR2001TSM
Rev. 2.0, 8/2016

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

MR2001T

ADVANCED DRIVER ASSISTANCE SYSTEM



VK SUFFIX (PB-FREE)
98ASA00541D
6.0 X 6.0 X 0.95 RCPBGA

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 MR2001T is a high performance, highly integrated, two-channel, transmitter (TX) ideally suited for automotive radar applications. In conjunction with the MR2001V, a four-channel voltage controlled oscillator, and the MR2001R, a three-channel receiver, it provides a scalable three package solution for automotive radar modules.

Features

- 76 GHz to 77 GHz TX output
- Supply voltage 3.3 V
- Supply current typ. 260 mA
- Power dissipation typ. 0.86 W
- Power Control (6-bit)
- Tx Power typ. 2 x 10 dBm
- Bi-Phase Modulation
- SPI (slow, 10 MHz) and dedicated control (fast, 100 MHz)

Applications

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

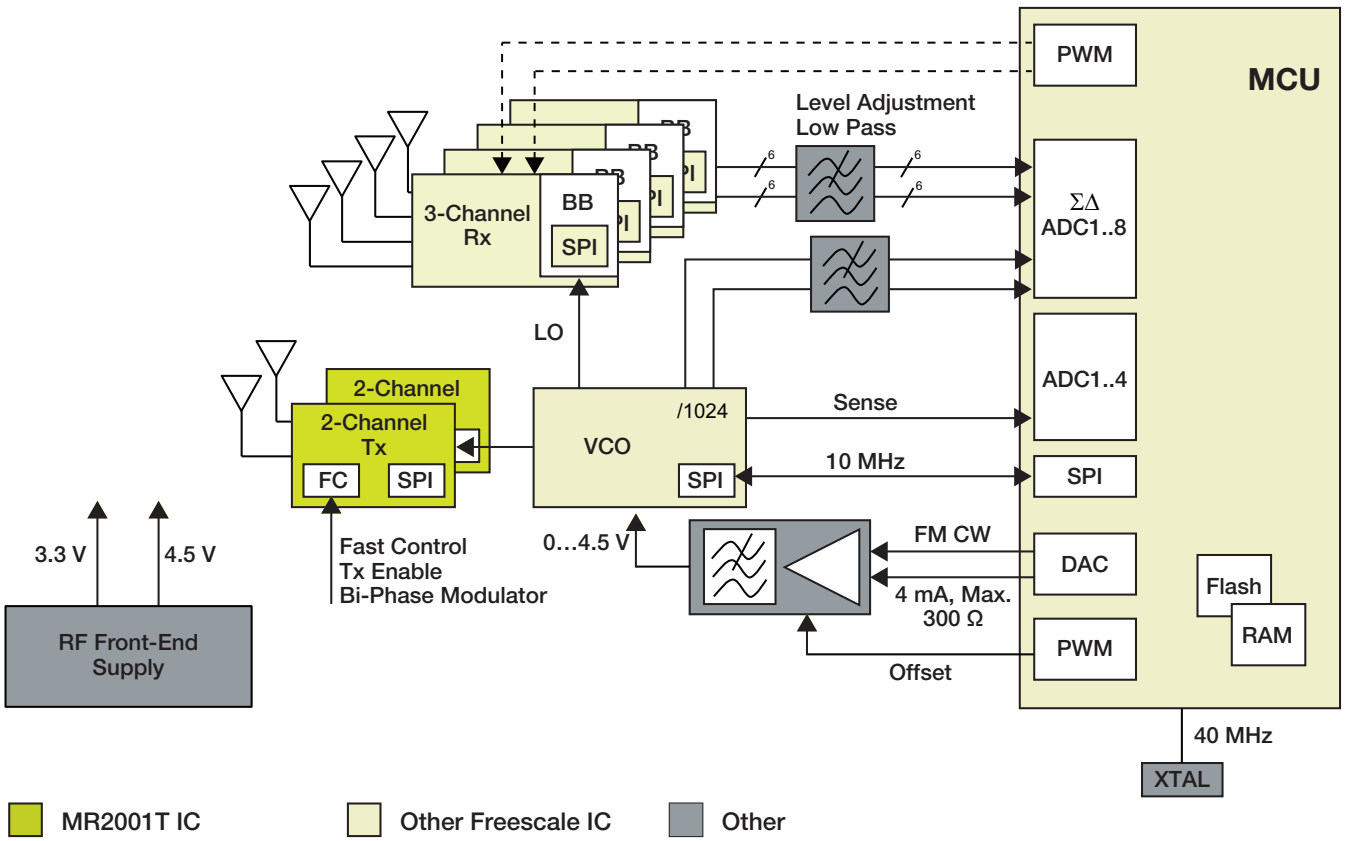


Figure 1. MR2001T simplified application diagram

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

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Table 1. Orderable part variations

Part number	Temperature (temp)	Package	Notes
MC33MR2001TVK	-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.

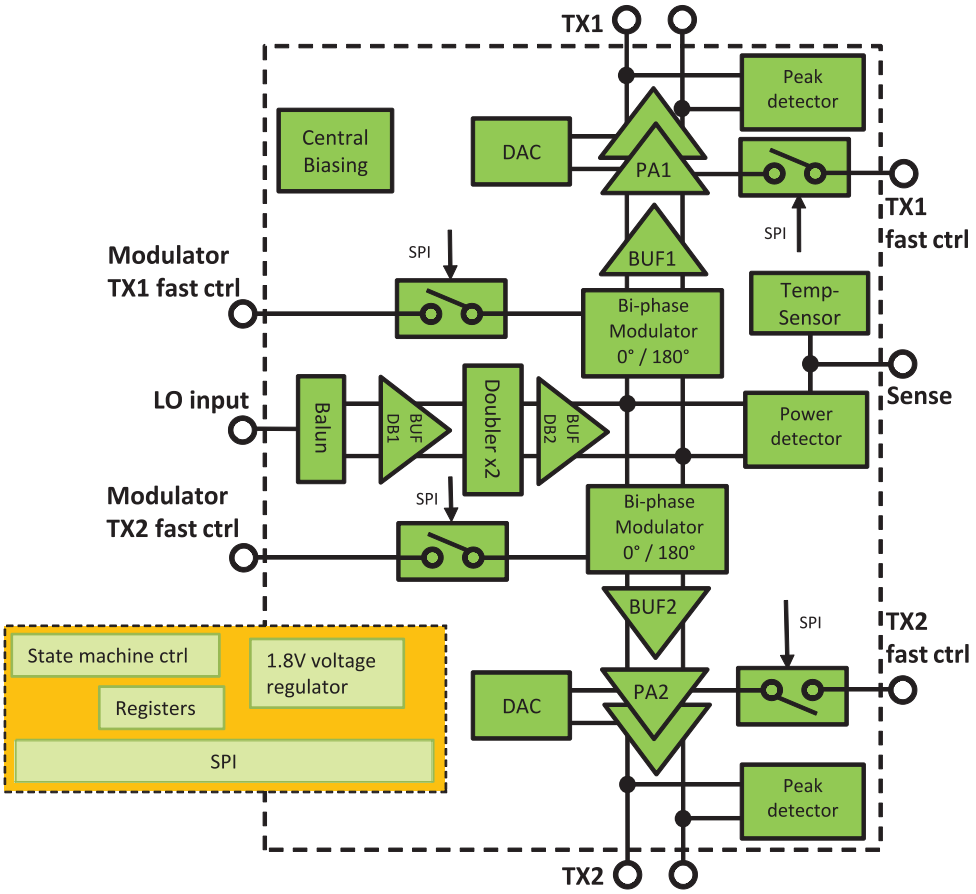

Figure 2. MR2001T two-channel transmitter block diagram

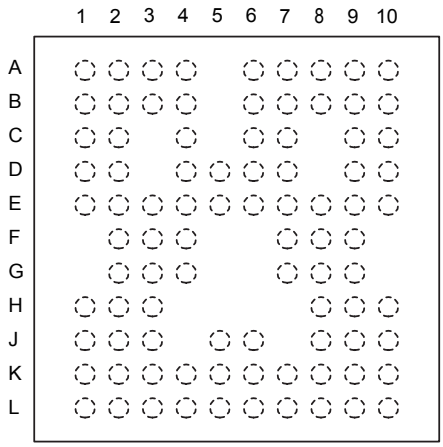

Figure 3. MR2001T pinout (ball) diagram

Table 2. MR2001T pin definitions

Ball location	Pin function
A1, A2, B2, C2	3.3 V Power Supply
A3, B3, B7, B8, C7, D1, D2, D7, D9, D10, E7, F4, F7, G4, G7, J2, J3, J8, J9, K2, K3, K4, K7, K8, K9, L1, L10	DC Ground
A4, A6, B4, B6, C4, C6, D4, D6, E1, E2, E3, E4, E5, E6, E8, E9, E10, F3, F8, G3, G8, H1, H2, H3, H8, H9, H10	RF Ground
A7	Output to monitor internal bias nodes via ASCAN
A8	Chip key bit [0]
A9, A10, B9, C9	3.3 V Power Supply
B1	Sensor output (temperature and power peak detector)
B10	Bandgap reference resistor (negative temperature slope)
C1	1.8 V Regulator Output
C10	Bandgap reference resistor (positive temperature slope)
D5	38 GHz LO input
F2	77 GHz differential output channel 1
F9	77 GHz differential output channel 2

Ball location	Pin function
G2	77 GHz differential output channel 1
G9	77 GHz differential output channel 2
J1	Bi-Phase modulator TX channel 1
J10	Bi-Phase modulator TX channel 2
K1	Fast on/off activation of TX channel 1
K10	Fast on/off activation of TX channel 2
L2	SPI serial clock
L3	SPI MISO (master in, slave out)
L4	SPI MOSI (master out, slave in)
L5, L6, K5, K6, J5, J6	3.3 V Power Supply
L7	Digital scan test
L8	Digital hard reset signal
L9	SPI enable (chip enable)

Table 3. Key parameters

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

Symbol	Parameter	Typ.	Unit	Notes
V_{CC}	Supply Voltage • Nominal supply ±5% variation	3.3	V	
I_{CC}	Supply Current • Measured at PACODE 35	260	mA	(2)
P_{DIS_1CH}	Power consumption (one Tx channel on)	0.86	W	
Power				
POUTM	TX Output Power • Differential configuration gain control at maximum, major mode only one channel active	2 x 10	dBm	
Bi-phase modulator				
DPHASE	Phase Difference • Phase difference between two states. Measurement accuracy limited to ±10deg in production	180	degree	

Notes

2. All PACODE values are decimal unless otherwise noted.

Table 4. Revision history

Revision	Date	Description of changes
1.0	6/2015	• Initial release
2.0	8/2016	• Added revision history table • Modified the target application lists • Corrected SPI access to temperature sensor and graph, and parameters • Corrected the parameters on assembly conditions

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