



**THE DATASHEET OF
MC33MR2001TVK**



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

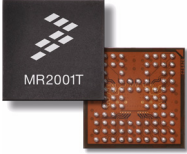
The MR2001 is a scalable three package solution for automotive radar modules. The chipset consists of a four channel VCO (voltage controlled oscillator), a two-channel Tx transmitter, and a three-channel Rx receiver. The MR2001T is a high performance, highly integrated, two-channel, transmitter (TX) 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)

MR2001T

ADVANCED DRIVER ASSISTANCE
SYSTEM



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

Applications

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

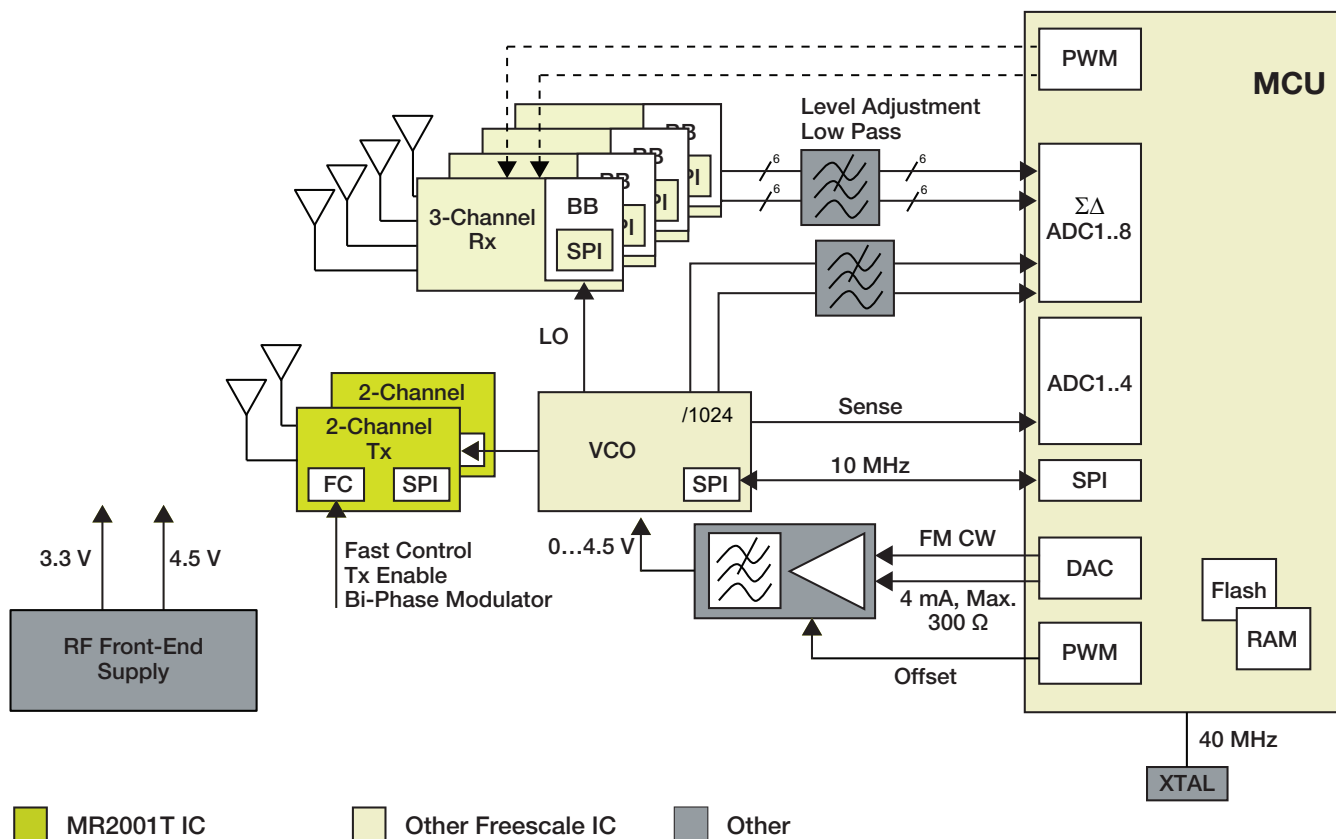


Figure 1. MR2001T simplified application diagram

* 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 |
|---------------|--------------------|---|-------|
| MC33MR2001TVK | -40 °C to 125 °C | 6.0 x 6.0 mm RCP (10 x 11 array) 0.5 mm pitch | (1) |

Notes

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

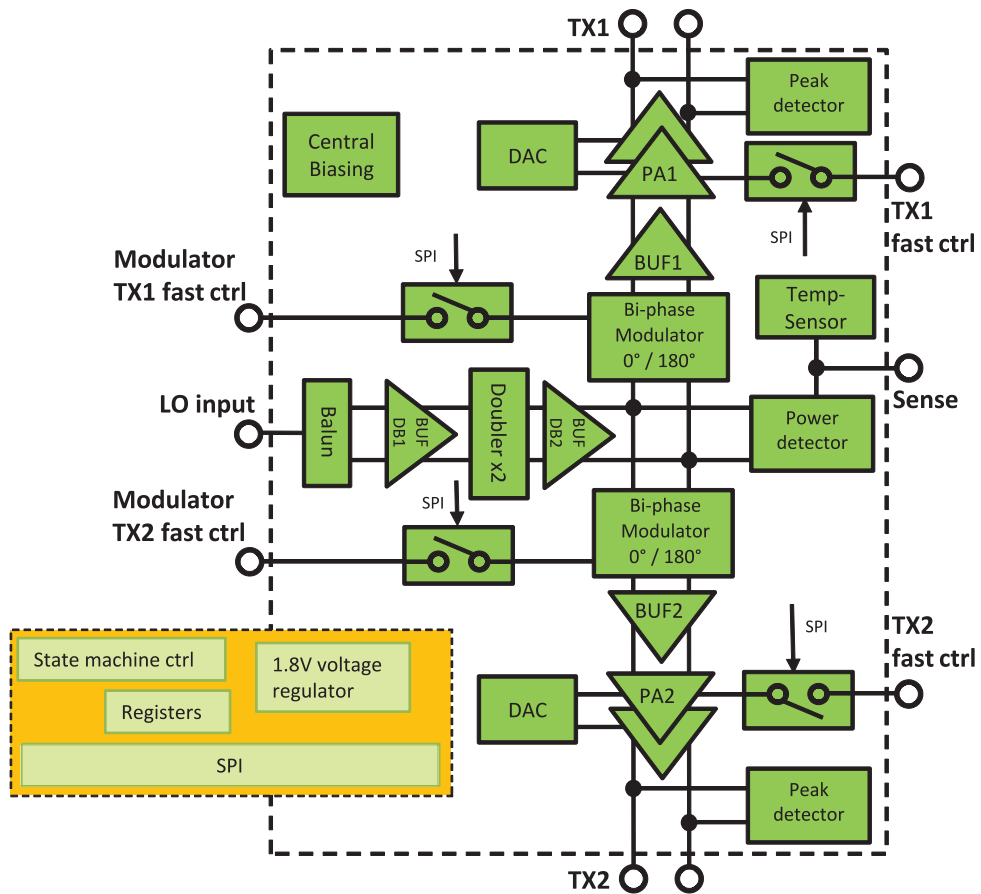


Figure 2. MR2001T two-channel transmitter block diagram

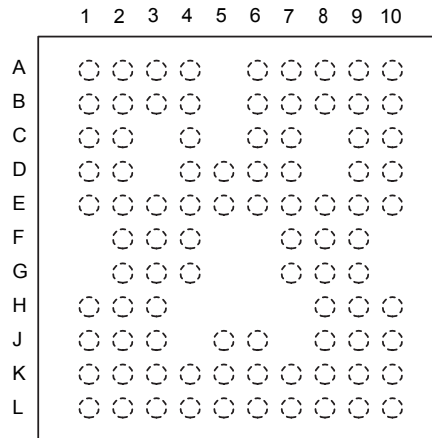


Figure 3. MR2001T pinout (ball) diagram

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 \pm 5.0%, unless otherwise noted.

| Symbol | Parameter | Typ. | Unit | Notes |
|----------------|--|------|------|-------|
| V_{CC} | Supply Voltage <ul style="list-style-type: none"> Nominal supply \pm5% variation | 3.3 | V | |
| I_{CC} | Supply Current <ul style="list-style-type: none"> Measured at PACODE 35 | 260 | mA | (2) |
| P_{DIS_1CH} | Power consumption (one Tx channel on) | 0.86 | W | |

Power

| | | | | |
|-------|--|--------|-----|--|
| POUTM | TX Output Power <ul style="list-style-type: none"> Differential configuration gain control at maximum, major mode only one channel active | 2 x 10 | dBm | |
|-------|--|--------|-----|--|

Bi-phase modulator

| | | | | |
|--------|---|-----|--------|--|
| DPHASE | Phase Difference <ul style="list-style-type: none"> Phase difference between two states. Measurement accuracy limited to \pm10deg in production | 180 | degree | |
|--------|---|-----|--------|--|

Notes

- All PACODE values are decimal unless otherwise noted.

Table 4. Revision history

| Revision | Date | Description of changes |
|----------|--------|--|
| 1.0 | 6/2015 | <ul style="list-style-type: none"> Initial release |
| 2.0 | 8/2016 | <ul style="list-style-type: none"> 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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