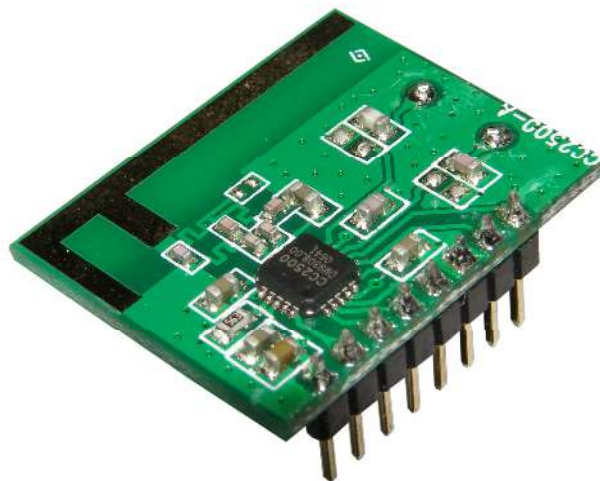


Features

- Complete RF Transceiver
- Onboard Data Encryption
- Automatic collision avoidance
- 'Wake on Radio' feature
- Low current consumption
- Wide Operating voltage 1.8 – 3.6 Volts
- Operating Frequency: 2.4 – 2.483 GHz
- Programmable Output Power and High Sensitivity
- Range up to 50 metres at +1dBm
- Data rate 1.2 – 500 kbps



Applications

- Consumer Electronics
- Wireless controllers
- Wireless Audio
- Wireless PC peripherals
- Building / Home Automation

Description

The Quasar UK 'TRX1' hybrid transceiver module provides a complete RF subsystem which can be used to transmit and receive data at up to 500Kbps from any standard CMOS/TTL source.

Extensive hardware support is provided for packet handling, data buffering, burst transmissions and link quality indication.

Automatic collision avoidance is also provided with the clear channel assessment features.

The modules are ideal for battery powered applications, current consumption is reduced with the burst transmissions and wake on radio features.

The data stream can be automatically Manchester encoded and decoded ensuring high reliability and low error rates.

The modules frequency, output power and sensitivity are all programmable through an efficient SPI interface.

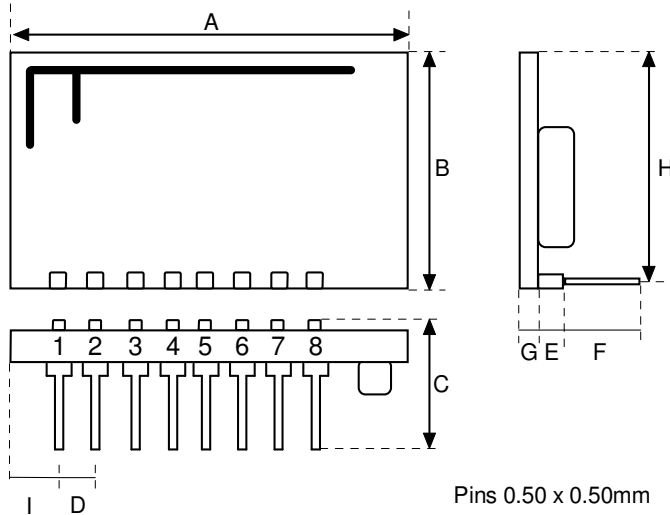
Part Numbering

| Part Number | Description |
|--------------|---------------------------|
| QFM-TRX1-24G | Transceiver Module 2.4GHz |

*Range stated is for modules used in direct line of sight, adverse conditions may reduce the maximum range.

Technical Specifications

Dimensions



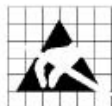
| Name | Dimension |
|------|--------------------|
| A | 24mm \pm 0.5mm |
| B | 19mm \pm 0.5mm |
| C | 8.8mm (Max) |
| D | 2.0mm |
| E | 2.17mm |
| F | 3.8mm \pm 0.2mm |
| G | 1.0mm |
| H | 17.8mm \pm 0.5mm |
| I | 3.0mm \pm 0.5mm |

Pin Descriptions

| Pin No | Pin Name | Pin Type | Description |
|--------|----------|----------------|---|
| 1 | VCC | Power | 1.8V-3.6V digital power supply for digital I/O's and for the digital core voltage regulator |
| 2 | SI | Digital Input | Serial configuration interface, data input |
| 3 | SCLK | Digital Input | Serial configuration interface, clock input |
| 4 | SO | Digital Output | Serial configuration interface, data output. Optional general output pin when CSn is high |
| 5 | GDO2 | Digital Output | Digital output pin for general use: <ul style="list-style-type: none"> • Test signals • FIFO status signals • Clear Channel Indicator • Clock output, down-divided from • Serial output RX data |
| 6 | GND | Ground | GND |
| 7 | GDO0 | Digital I/O | Digital output pin for general use: <ul style="list-style-type: none"> • Test signals • FIFO status signals • Clear Channel Indicator • Clock output, down-divided from XOSC • Serial output RX data • Serial input TX data Also used as analog test I/O for prototype/production testing |
| 8 | CSn | Digital Input | Serial configuration interface, chip select |

2 Absolute Maximum Ratings

Under no circumstances must the absolute maximum ratings given in Table 1 be violated. Stress exceeding one or more of the limiting values may cause permanent damage to the device.



Caution! ESD sensitive device. Precaution should be used when handling the device in order to prevent permanent damage.

| Parameter | Min | Max | Units | Condition |
|---|------|---------------------|-------|---|
| Supply voltage | -0.3 | 3.6 | V | All supply pins must have the same voltage |
| Voltage on any digital pin | -0.3 | VDD+0.3, max 3.6 | V | |
| Voltage on the pins RF_P, RF_N and DCOUPL | -0.3 | 2.0 | V | |
| Input RF level | | TBD | dBm | |
| Storage temperature range | -50 | 150 | °C | |
| Solder reflow temperature | | 260 | °C | T = 10 s |
| ESD | | 2 | kV | All pads (excluding RF) have 2kV HBM ESD protection |

Table 1: Absolute Maximum Ratings

3 Operating Conditions

The operating conditions for **CC2500** are listed Table 2 in below.

| Parameter | Min | Max | Unit | Condition |
|--------------------------|-----|-----|------|--|
| Operating temperature | -40 | 85 | °C | |
| Operating supply voltage | 1.8 | 3.6 | V | All supply pins must have the same voltage |

Table 2: Operating Conditions

4 Electrical Specifications

Tc = 25°C, VDD = 3.0V if nothing else stated. Measured on Chipcon's *CC2500* EM reference design.

| Parameter | Min | Typ | Max | Unit | Condition |
|---|-----|------|-----|------|---|
| Current consumption | | 8.7 | | µA | Automatic RX polling once each second, using low-power RC oscillator, with 460Hz filter bandwidth and 250kbps data rate, PLL calibration every 4 th wakeup. Average current with signal in channel <i>below</i> carrier sense level. |
| | | 35 | | µA | Same as above, but with signal in channel <i>above</i> carrier sense level, 1.9ms RX timeout, and no preamble/sync word found. |
| | | 1.4 | | µA | Automatic RX polling every 15 th second, using low-power RC oscillator, with 460kHz filter bandwidth and 250kbps data rate, PLL calibration every 4 th wakeup. Average current with signal in channel <i>below</i> carrier sense level. |
| | | 16 | | µA | Same as above, but with signal in channel <i>above</i> carrier sense level, 14ms RX timeout, and no preamble/sync word found. |
| | | 1.8 | | mA | Only voltage regulator to digital part and crystal oscillator running (IDLE state) |
| | | 7.6 | | mA | Only the frequency synthesizer running (after going from IDLE until reaching RX or TX states, and frequency calibration states) |
| | | 15.6 | | mA | Receive mode, input near sensitivity limit (RX state) |
| | | 13.3 | | mA | Receive mode, input 30dB above sensitivity limit (RX state) |
| | | 11.5 | | mA | Transmit mode, -12dBm output power (TX state) |
| | | 15.4 | | mA | Transmit mode, -6dBm output power (TX state) |
| | | 21.6 | | mA | Transmit mode, 0dBm output power (TX state) |
| Current consumption in power down modes | | 180 | | µA | Voltage regulator to digital part on, all other modules in power down (XOFF state) |
| | | 100 | | µA | Voltage regulator to digital part off, register values retained, XOSC running (SLEEP state with MCSM0.OSC_FORCE_ON set) |
| | | 900 | | nA | Voltage regulator to digital part off, register values retained, low-power RC oscillator running (SLEEP state with WOR enabled) |
| | | 500 | | nA | Voltage regulator to digital part off, register values retained (SLEEP state) |

Table 3: Electrical Specifications

5 General Characteristics

| Parameter | Min | Typ | Max | Unit | Condition/Note |
|-----------------|------|-----|--------|------|---|
| Frequency range | 2400 | | 2483.5 | MHz | |
| Data rate | 1.2 | | 500 | kbps | Modulation formats supported: (Shaped) MSK (differential offset QPSK, up to 500kbps) 2-FSK (up to 250kbps) OOK/ASK (up to 250kbps) Optional Manchester encoding (halves the data rate). |

Table 4: General Characteristics

RF Receive Section

| Parameter | Min | Typ | Max | Unit | Condition/Note |
|----------------------------------|-----|-------------|-----|----------|---|
| Differential input impedance | | 200 | | Ω | Optimised for matching to both 50 Ω single-ended load and PCB antennas with higher impedance. |
| Receiver sensitivity | | TBD | | dBm | 500kbps data rate (MSK), 1% packet error rate, 16 bytes packet length, 650kHz digital channel filter bandwidth. |
| | | -88 | | dBm | 250kbps data rate (2-FSK), 1% packet error rate, 16 bytes packet length, 460kHz digital channel filter bandwidth. |
| | | -98 | | dBm | 10kbps data rate (2-FSK), 1% packet error rate, 16 bytes packet length, 232kHz digital channel filter bandwidth. |
| Saturation | | -15 | | dBm | |
| Digital channel filter bandwidth | 58 | | 650 | kHz | User programmable. The bandwidth limits are proportional to crystal frequency (given values assume a 26.0MHz crystal). |
| Adjacent channel rejection | | 20-25 (TBD) | | dB | Desired channel 3dB above the sensitivity limit. Depends on channel spacing and digital channel filter bandwidth. |
| Alternate channel rejection | | 25-35 (TBD) | | dB | Desired channel 3dB above the sensitivity limit. Depends on channel spacing and digital channel filter bandwidth. |
| Image channel rejection | | 30 (TBD) | | dB | Desired channel 3dB above the sensitivity limit. Depends on intermediate frequency (IF), channel spacing and digital channel filter bandwidth. Image channel rejection can be limited by adjacent channel rejection or alternate channel rejection when using low IF (<100kHz). Optimum IF depends on data rate and related chip configurations provided by SmartRF [®] Studio software. |
| Selectivity at 1MHz offset | | -27 | | dB | Desired channel at -80dBm. |
| Selectivity at 2MHz offset | | -27 | | dB | Desired channel at -80dBm. |
| Selectivity at 5MHz offset | | -36 | | dB | Desired channel at -80dBm. Compliant to ETSI EN 300 440 class 2 receiver requirements. |
| Selectivity at 10MHz offset | | -51 | | dB | Desired channel at -80dBm. Compliant to ETSI EN 300 440 class 2 receiver requirements. |
| Selectivity at 20MHz offset | | -54 | | dB | Desired channel at -80dBm. Compliant to ETSI EN 300 440 class 2 receiver requirements. |
| Selectivity at 50MHz offset | | -55 | | dB | Desired channel at -80dBm. Compliant to ETSI EN 300 440 class 2 receiver requirements. |
| Spurious emissions | | | -57 | dBm | 25MHz – 1GHz |
| | | | -47 | dBm | Above 1GHz |

Table 5: RF Receive Section

7 RF Transmit Section

T_c = 25°C, VDD = 3.0V if nothing else stated. Measured on Chipcon's **CC2500** EM reference design.

| Parameter | Min | Typ | Max | Unit | Condition/Note |
|-------------------------------|-----|-----|-----|------|--|
| Differential load impedance | | 200 | | Ω | Optimised for matching to both 50Ω single-ended load and PCB antennas with higher impedance. |
| Output power, highest setting | | 1 | | dBm | Output power is programmable. Delivered to 50Ω single-ended load via Chipcon reference RF matching network. |
| Output power, lowest setting | | -30 | | dBm | Output power is programmable. Delivered to 50Ω single-ended load via Chipcon reference RF matching network. |
| Adjacent channel power | | -26 | | dBc | The given values are for 1MHz channel spacing (±1MHz from carrier) and 500kbps MSK. |
| Alternate channel power | | -45 | | dBc | The given values are for 1MHz channel spacing (±2MHz from carrier) and 500kbps MSK. |
| Spurious emissions | | | -36 | dBm | 25MHz – 1GHz |
| | | | -54 | dBm | 47-74, 87.5-118, 174-230,470-862MHz |
| | | | -47 | dBm | 1800MHz-1900MHz (restricted band in Europe) |
| | | | -41 | dBm | At 2-RF and 3-RF (restricted bands in USA) |
| | | | -30 | dBm | Otherwise above 1GHz |

Table 6: RF Transmit Parameters

References

For detailed specifications on the rf chipset used on this module please refer to the chipcon CC2500 datasheet. www.chipcon.com

QuasarUK is an internet based company. All Sales / support and interface is via our website at

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