

**MD7130-F06****Preliminary****2.4GHz 17dBm FSK/GFSK Transceiver**

# **A7130 17dBm module specification**

## **MD7130-F06 (-01)**

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**MD7130-F06*****Preliminary******2.4GHz 17dBm FSK/GFSK Transceiver*****Revision History**

| Rev. No. | History                        | Issue Date | Remark      |
|----------|--------------------------------|------------|-------------|
| 0.0      | Initial issue<br>MD7130-F06-01 | Aug, 2012  | Preliminary |



# MD7130-F06

***Preliminary***

***2.4GHz 17dBm FSK/GFSK Transceiver***

## **Table of Contents**

|                                   |   |
|-----------------------------------|---|
| 1. General Description .....      | 3 |
| 2. Electrical specification ..... | 3 |
| 3. Interface .....                | 4 |
| 4. PA & LNA control state.....    | 4 |
| 5. External PA Control .....      | 5 |
| 6. Application circuit .....      | 6 |
| 7. Reference Layout.....          | 7 |
| 8. Module photograph.....         | 8 |
| 9. Bill of Material.....          | 9 |



# MD7130-F06

## Preliminary

## 2.4GHz 17dBm FSK/GFSK Transceiver

### 1. General Description

The MD7130-F06 module is designed for 2.4GHz ISM band with 17dBm output power wireless applications using AMICCOM's A7130 FSK/GFSK transceiver and A7700 RF Front End IC. This module features a fully programmable frequency synthesizer by SPI. The data rate is 4Mbps.

### 2. Electrical specification

| Item                  | Specification                                                                                                                     | Remark                                  |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Supply voltage        | 3.3V+/-0.1(V)                                                                                                                     |                                         |
| Current consumption   | 4uA @Sleep mode.<br>0.3mA @Idle mode.<br>2.7mA @Stand-by Mode.<br>12.5mA @PLL Mode.<br>118mA @Tx power = 17dBm<br>31.3mA @Rx mode | Typical                                 |
| Frequency             | 2400 – 2483.5 MHz                                                                                                                 | ISM band                                |
| Transmit output power | 17 dBm @ room temperature                                                                                                         | Typical<br><a href="#">Annotation 1</a> |
| Rx sensitivity        | -87.5 dBm @ 4M mode, Dev = 1MHz.                                                                                                  | Typical,<br>BER ≤ 1E-3,                 |
| Modulation            | 2.4GHz FSK/GFSK                                                                                                                   |                                         |
| Interface             | 10 pin 2.0mm header                                                                                                               |                                         |
| PCB Dimension         | 23(L) x 22(W) mm <sup>2</sup> without PCB antenna<br>(PCB thickness is 0.8mm)                                                     |                                         |
| Operating temperature | -40°C ~ 85 °C<br>(Depend on crystal Spec., example: Fork type_ -10°C ~ 60°C)                                                      |                                         |

#### Annotation:

1. a. In order to turn off 5dBm TX power.

Register:[24] IF calibration II → b[7] PWORS→disable, Value:0x7F,

b. In order to separate RX and TX signal to RFI and RFO.

Register: [2A] DASP0 →b[6] RFSP →enable, Value:0x74



## MD7130-F06

**Preliminary**

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### 3. Interface

| Pin No. | Pin name   | Comment                                                                                                                                                      | Note |
|---------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1       | REGI33     | RF module supply voltage input                                                                                                                               | 3.3V |
| 2       | CKO OR GND | If R12 =0 ohm and R11= NC,<br>the interface pin (CKO OR GND) is defined GND.<br>If R11 =0 ohm and R12= NC,<br>the interface pin (CKO OR GND) is defined CKO. |      |
| 3       | GIO2       | General Purpose I/O 2                                                                                                                                        |      |
| 4       | GIO1       | General Purpose I/O 1                                                                                                                                        |      |
| 5       | SDIO       | SPI Data I/O                                                                                                                                                 |      |
| 6       | SCK        | SPI Clock                                                                                                                                                    |      |
| 7       | SCS        | SPI Chip Selection                                                                                                                                           |      |
| 8       | TX SW      | RF front end PA/LNA select                                                                                                                                   |      |
| 9       | RX SW      | RF front end PA/LNA select                                                                                                                                   |      |
| 10      | GND        | GND                                                                                                                                                          |      |

### 4. PA & LNA control state

| Control function | RX ON | TX ON | TR/X OFF | Inhibition |
|------------------|-------|-------|----------|------------|
| TX SW            | 1     | 0     | 1        | 0          |
| RX SW            | 0     | 1     | 1        | 0          |



## MD7130-F06

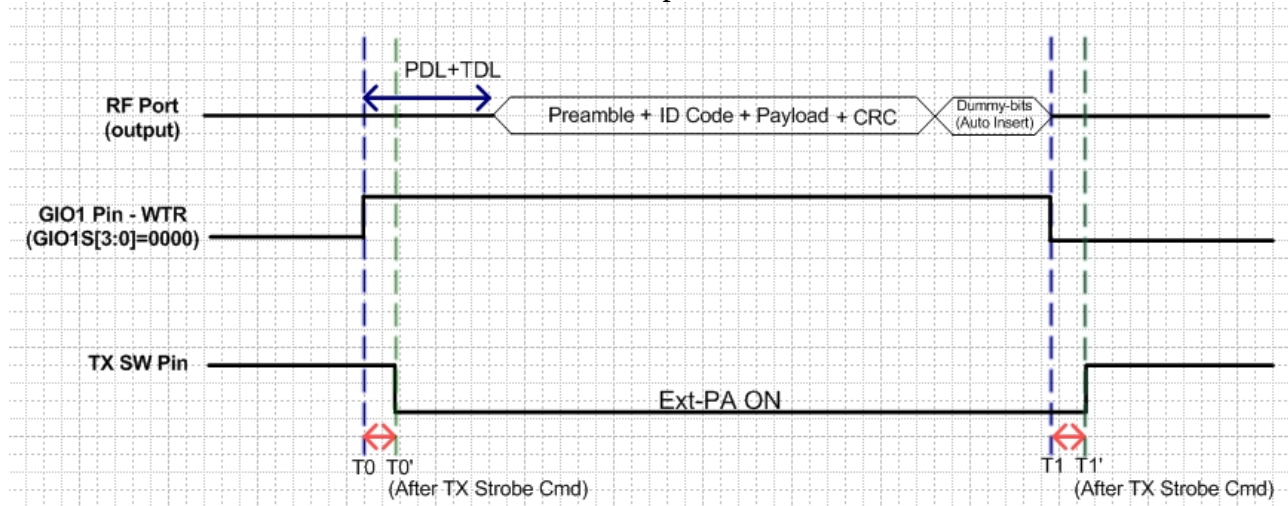
**Preliminary**

**2.4GHz 17dBm FSK/GFSK Transceiver**

### 5. External PA Control

TX SW (Ext-PA Switch)

In such case, user' MCU needs to connect TX SW pin to control external PA as shown below.



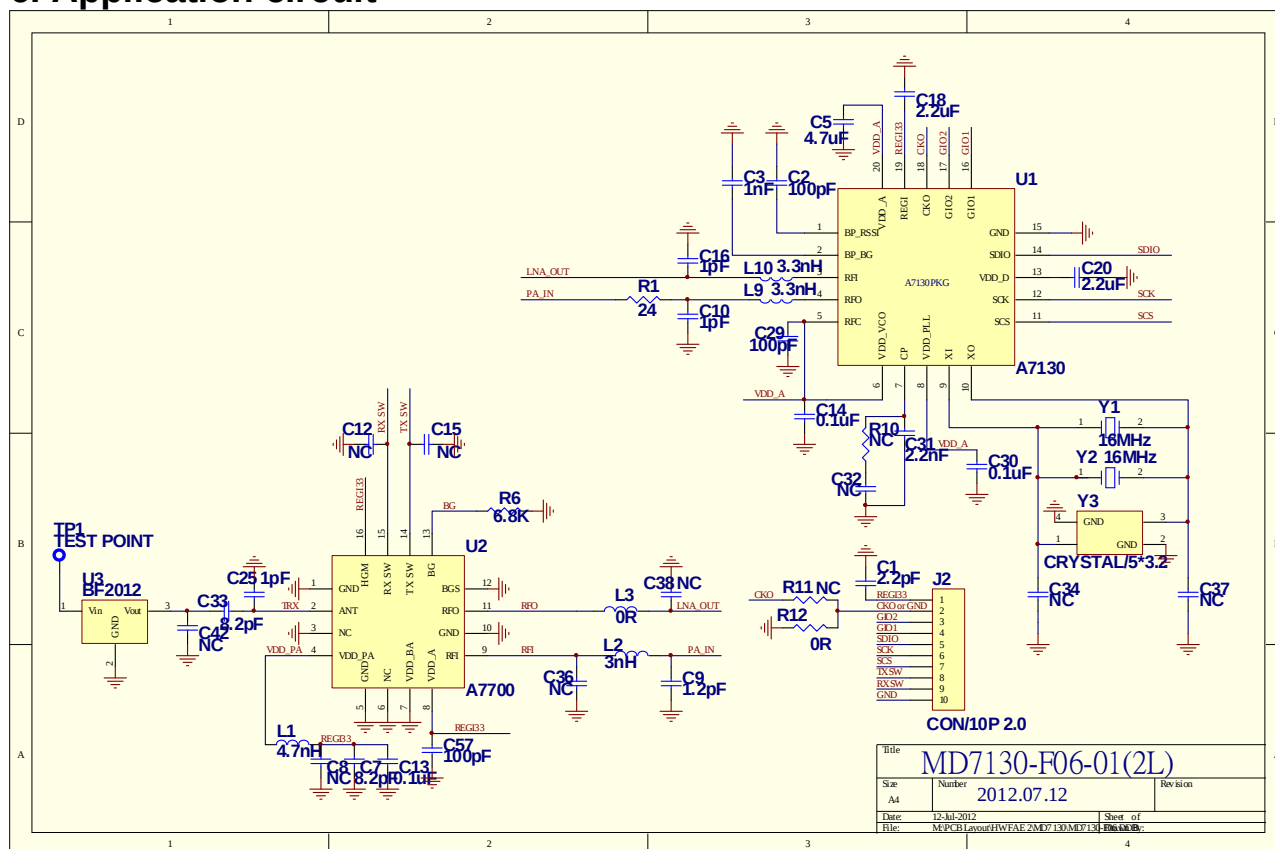


# MD7130-F06

Preliminary

2.4GHz 17dBm FSK/GFSK Transceiver

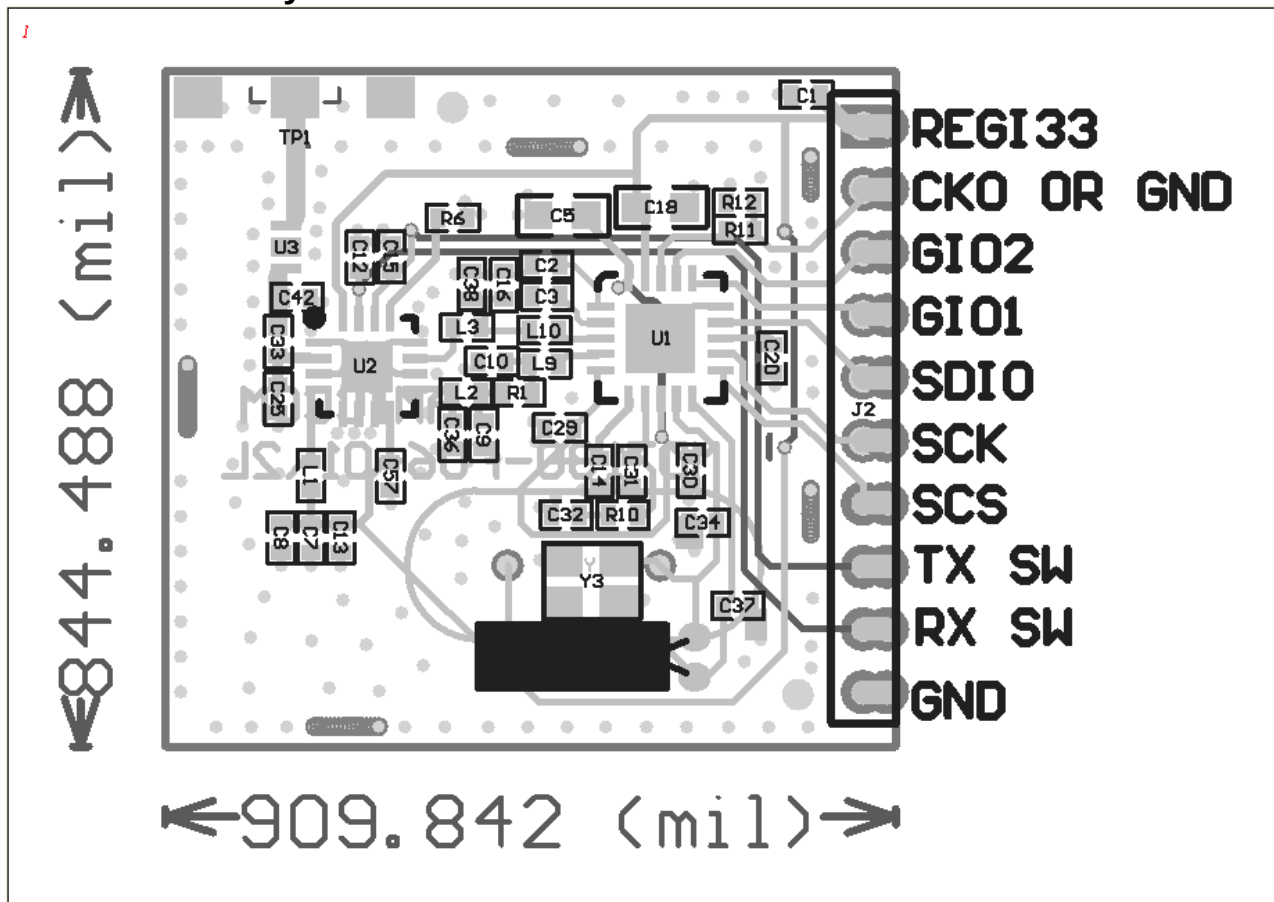
## 6. Application circuit





## 2.4GHz 17dBm FSK/GFSK Transceiver

## 7. Reference Layout



1. The back plate of the IC should connect to GND.
2. When using cylinder crystal, please take special care as below:
  - (1) Please don't apply solder to the body directly, as it may cause characteristic deterioration.
  - (2) Please fix the unit firmly with elastic glue on the board.
  - (3) Please don't cut or bend the leads within 0.5 mm from the base of the cylinder body.
  - (4) Please don't use ultrasonic washing and ultrasonic welding on the unit, because it may be damaged.



## **MD7130-F06**

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***2.4GHz 17dBm FSK/GFSK Transceiver***

### **8. Module photograph**





# MD7130-F06

**Preliminary**

**2.4GHz 17dBm FSK/GFSK Transceiver**

## 9. Bill of Material

| Item | Component      | Description                         | Size                                                | Value             | Tol.    | Part Number           | Remark                                                                         |
|------|----------------|-------------------------------------|-----------------------------------------------------|-------------------|---------|-----------------------|--------------------------------------------------------------------------------|
| 1    | C1             | C0G ceramic capacitor               | 0402                                                | 2.2pF             | ±0.25pF | Murata GRM1555C1H2R2C |                                                                                |
| 2    | C2             | ceramic capacitor                   | 0402                                                | 100pF             | ±5%     |                       |                                                                                |
| 3    | C3             | ceramic capacitor                   | 0402                                                | 1nF               | ±5%     |                       |                                                                                |
| 4    | C5             | ceramic capacitor                   | 0603                                                | 4.7uF             | ±20%    |                       |                                                                                |
| 5    | C7             | C0G ceramic capacitor               | 0402                                                | 8.2pF             | ±0.5pF  | Murata GRM1555C1H8R2D |                                                                                |
| 6    | C9             | C0G ceramic capacitor               | 0402                                                | 1.2pF             | ±0.25pF | Murata GRM1555C1H1R2C |                                                                                |
| 7    | C10            | C0G ceramic capacitor               | 0402                                                | 1pF               | ±0.25pF | Murata GRM1555C1H1R0C |                                                                                |
| 8    | C13            | ceramic capacitor                   | 0402                                                | 0.1uF             | ±10%    |                       |                                                                                |
| 9    | C14            | ceramic capacitor                   | 0402                                                | 0.1uF             | ±10%    |                       |                                                                                |
| 10   | C16            | C0G ceramic capacitor               | 0402                                                | 1pF               | ±0.25pF | Murata GRM1555C1H1R0C |                                                                                |
| 11   | C18            | ceramic capacitor                   | 0603                                                | 2.2uF             | ±20%    |                       |                                                                                |
| 12   | C20            | ceramic capacitor                   | 0402                                                | 2.2uF             | ±20%    |                       |                                                                                |
| 13   | C25            | C0G ceramic capacitor               | 0402                                                | 1pF               | ±0.25pF | Murata GRM1555C1H1R0C |                                                                                |
| 14   | C29            | ceramic capacitor                   | 0402                                                | 100pF             | ±5%     |                       |                                                                                |
| 15   | C30            | ceramic capacitor                   | 0402                                                | 0.1uF             | ±10%    |                       |                                                                                |
| 16   | C31            | ceramic capacitor                   | 0402                                                | 2.2nF             | ±10%    |                       |                                                                                |
| 17   | C33            | C0G ceramic capacitor               | 0402                                                | 8.2pF             | ±0.5pF  | Murata GRM1555C1H8R2D |                                                                                |
| 18   | C57            | ceramic capacitor                   | 0402                                                | 100pF             | ±5%     |                       |                                                                                |
| 19   | L1             | Chip inductor                       | 0402                                                | 4.7nH             | ±0.3nH  | Murata LQG15HS4N7S    |                                                                                |
| 20   | L2             | Chip inductor                       | 0402                                                | 3nH               | ±0.3nH  | Murata LQG15HS3N0S    |                                                                                |
| 21   | L3             | Chip resistor                       | 0402                                                | 0R                |         |                       |                                                                                |
| 22   | L9             | Chip inductor                       | 0402                                                | 3.3nH             | ±0.3nH  | Murata LQG15HS3N3S    |                                                                                |
| 23   | L10            | Chip inductor                       | 0402                                                | 3.3nH             | ±0.3nH  | Murata LQG15HS3N3S    |                                                                                |
| 24   | R1             | Chip resistor                       | 0402                                                | 24R               | ±5%     |                       |                                                                                |
| 25   | R6             | Chip resistor                       | 0402                                                | 6.8K              | ±5%     |                       |                                                                                |
| 26   | Y1 or Y2 or Y3 | Crystal                             | Y1=2mm × 6mm<br>Y2= DIP Type 49S<br>Y3= SMD 3.2*2.5 | 16MHz,<br>CL=18pF | ±20ppm  |                       | 昌禾:<br>Aurum<br>Technology Inc.<br>友桂:<br>YOKETAN<br>CROP.<br>台灣嘉碩:<br>TAI-SAW |
| 27   | U1             | 2.4 GHz Transceiver                 | QFN20_4*4                                           | A7130PKG          |         |                       | AMICCOM                                                                        |
| 28   | U2             | RF Front End with PA<br>and LNA     | QFN16_3*3                                           | A7700PKG          |         |                       | AMICCOM                                                                        |
| 29   | U3             | Multilayer chip<br>band pass filter | 2.0 *1.2                                            | BPF               |         | BF2012-L2R4NBA        | ACX CROP.                                                                      |
| 30   | C8             |                                     | 0402                                                | NC                |         |                       |                                                                                |
| 31   | C12            |                                     | 0402                                                | NC                |         |                       |                                                                                |
| 32   | C15            |                                     | 0402                                                | NC                |         |                       |                                                                                |
| 33   | C32            |                                     | 0402                                                | NC                |         |                       |                                                                                |
| 34   | C34            |                                     | 0402                                                | NC                |         |                       |                                                                                |
| 35   | C36            |                                     | 0402                                                | NC                |         |                       |                                                                                |
| 36   | C37            |                                     | 0402                                                | NC                |         |                       |                                                                                |
| 37   | C38            |                                     | 0402                                                | NC                |         |                       |                                                                                |
| 38   | C42            |                                     | 0402                                                | NC                |         |                       |                                                                                |
| 39   | R10            | Chip resistor                       | 0402                                                | NC                |         |                       |                                                                                |
| 40   | R11            | Chip resistor                       | 0402                                                | 0R or NC          |         |                       | <b>Annotation 1</b>                                                            |
| 41   | R12            | Chip resistor                       | 0402                                                | 0R or NC          |         |                       | <b>Annotation 1</b>                                                            |

### Annotation:

- If R12 = 0 ohm and R11 = NC, the interface pin (CKO OR GND) is defined GND.  
If R11 = 0 ohm and R12 = NC, the interface pin (CKO OR GND) is defined CKO.