Flying-800

HW Specification

Revision: P4-02
Date: Apr.2005

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Document Information

Revision	Date	History of the evolution
Original	2004-11-10	
12.16		Modify the UART description, 100pin connector , RF connecting.
Lily Ma	2005-1-6	Modify the Keyboard define, Mechanical drawing
Evan Feng	2005-4-13	Error modification

Overview

This document defines and specifies the TechFaith Wireless Flying-800 module with 128Mb of Flash memory and 32Mb of SRAM, which support CDMA1X function.

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Contents

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Caution

Information furnished herein by TechFaith Wireless is accurate and reliable. However no responsibility is assumed for its use. Please read carefully the safety precautions for a terminal based on TechFaith Wireless Flying-800 Module.

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1 General description

1.1 General information

Flying-800 Module is a self-contained CDMA CELL ONLY module including the following features:

- **44.5（±0.2） x 35.4(±0.2) x 2.6(±0.15) mm**
- **Classiii Cellular CDMA radio section running under 3.8 Volts**
- **3V R-UIM interface**
- **Battery charger**
- **Echo Cancellation + noise reduction**
- **CDMA2000 1X support, offering data rates up to 153 kbps on the forward and reverse links**
- **Full CDMA software stack**
- **Complete shielding**
- **Complete interfacing:**
  - **Power supply**
  - **Serial link**
  - **Audio**
  - **R-UIM card**
  - **Keyboard**
  - **PCM interface**
  - **General ADC**
  - **LCD (not available with AT commands)**

Flying-800 Module has two external connections:

- **RF interface**
- **General Purpose Connector (GPC) to Digital I/O, Keyboard, Audio and supply**

TechFaith Wireless Flying-800 Module is designed to fit in very small terminals and only some custom functions have to be added to make a Cell only solution:

- **Keypad and LCD module**
- **Earpiece and Microphone**
- **Base connector**
- **Battery**
- **Antenna**
- **R-UIM connector**

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1.2 Functional description

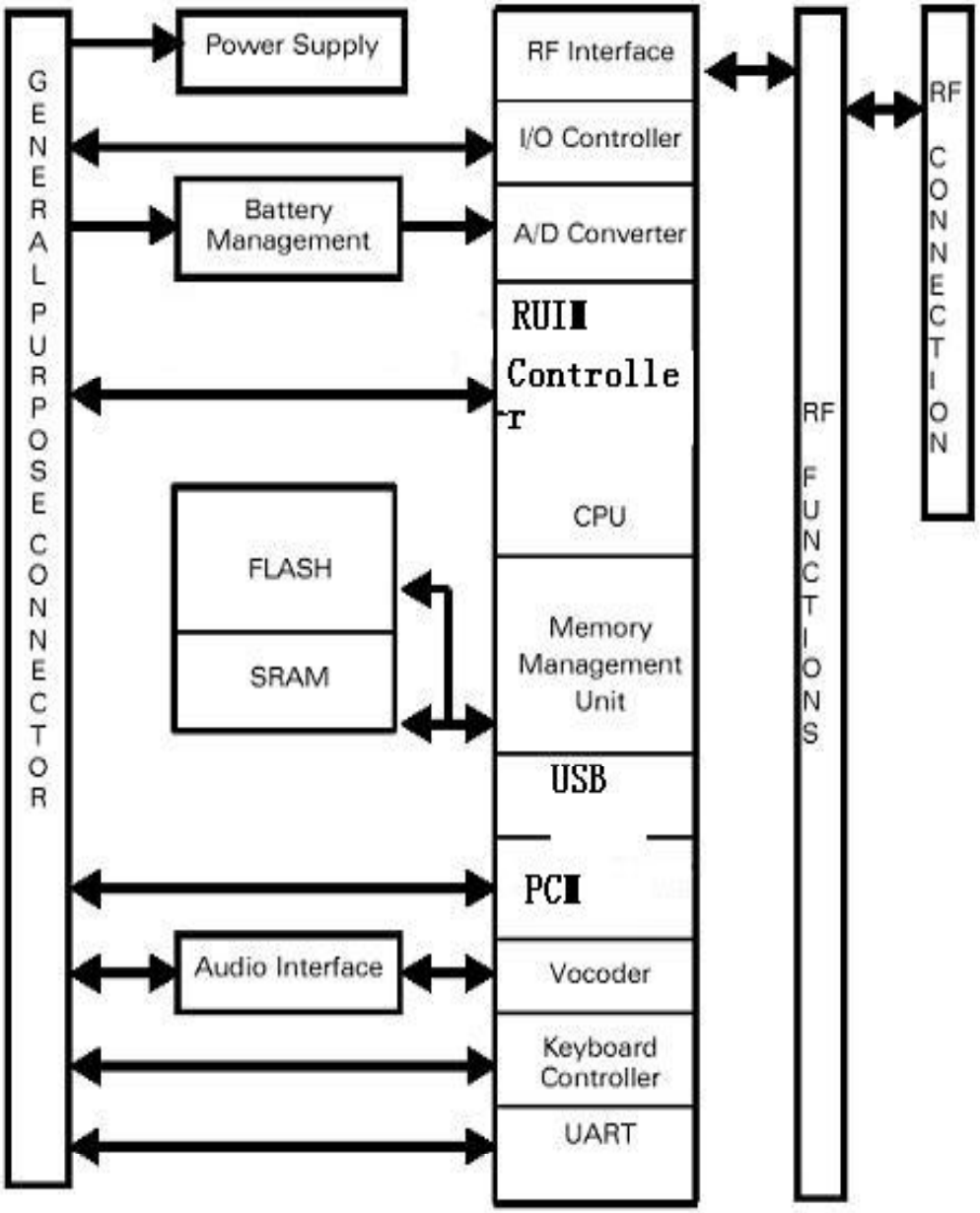

Figure 1 : Functional architecture

1.2.1 RF functionalities

The RF functionalities comply with the Cellular CDMA recommendation. The frequencies are:

- **Tx: 824 to 849 MHz**

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· Rx: 869 to 894 MHz

The RF part is based on the Cellular CDMA CMOS chipset including:

· CMOS RF receiver IC
·CMOS RF Transmitter IC
·PA module
·Duplexer and SAW filter

1.2.2 Baseband functionalities

The digital part of the TechFaith Wireless Flying-800 Module is composed of a Qualcomm MSM6025 and PM6610 chip. Which allows massive integration as well as low current consumption.

1.3 Firmware

TechFaith Wireless Flying-800 Module is designed to be integrated into various types of applications such as handsets or vertical applications (telemetry, multimedia…).

For vertical applications, the firmware offers a set of AT commands to control the module. With this standard software, some interfaces of the module are not available since they are dependent on the peripheral devices connected to the module. They are the LCD interface.

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2 Interfaces

2.1 General Purpose Connector (GPC)

A 100 pins connector[1] is provided to interface the Flying-800 Module with a board containing either a LCD module, or a keyboard, or a R-UIM connector, or a battery connection... The interfaces available on the GPC are described in the next paragraphs.

- **Please be aware that some of these interfaces can not be handled when using the Flying-800 module driven by AT commands: LCD interface.**

This symbol is used to indicate the interfaces not available with AT commands.

These functions have then to be managed externally i.e using the main processor of the application.

[1] The communication interface connector is a 100 pins connector with 0.5mm pitch from Nais Nais group with the following reference (see chapter connectors reference for further details):
AXK5F00345.
The matting connector has the following reference :
AXK6F00345.

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2.2 Power supply

2.2.1 Power supply description

The power supply is one of the key issues in the design of a CDMA terminal. Due to the gated power under some condition in CDMA, the power supply must be able to deliver high current peaks in a short time. During these peaks the supply voltage must not exceed a certain limit.

VBATT is used to supply the RF part and the base band part.
The TechFaith Wireless Flying-800 Module shielding case is the grounding. The ground has to be connected on the motherboard through a complete layer on the PCB.

Power Supply Voltage

	V_{MIN}	V_{NOM}	V_{MAX}	Ripple max (U_{ripp})
VBAT	3.4V	3.8V	4.2V	50mVpp for freq<200kHZ

When supplying the module with a battery, the total impedance (battery + protections + PCB) should be <150 mOhms

2.2.2 Power consumption

Following information are given assuming a 50Ω RF output.

Power consumption in OFF mode
(module supplied, OFF state, no software running)

	Conditions	I_{NOM}	I_{MAX}
Overall consumption	OFF	0.1uA	1uA

These values are an estimation of operating currents for the nominal VBATT voltages. This information should be used as a general guideline for system design. CDMA modes assume that the subscriber unit is operating in compliance with the CDMA specifications.

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Work state	Current (typical)
IDLE	8mA
ACTIVE（maxP ,Idc,Full rate frames）	554mA
ACTIVE（maxP ,Idc,1/8 rate frames,no gating）	553mA
ACTIVE（maxP ,Idc,1/8 rate frames,with gating）	200mA
ACTIVE(9dBm,Idc,Full rate frames)	269mA
ACTIVE（9dBm,Idc,1/8 rate frames,no gating）	266mA
ACTIVE（9dBm,Idc,1/8 rate frames,with gating）	168mA
ACTIVE(0dBm,Idc,Full rate frames)	232 mA
ACTIVE（0dBm,Idc,1/8 rate frames,no gating）	236 mA
ACTIVE（0dBm,Idc,1/8 rate frames,with gating）	157mA
ACTIVE(-9dBm,Idc,Full rate frames)	223 mA
ACTIVE（-9dBm,Idc, 1/8 rate frames,no gating）	231 mA
ACTIVE（-9dBm,Idc,1/8 rate frames,with gating）	156 mA

Power Supply Pin out

Signal	Pin number
VBAT_INT	88,90
GND	Shielding,4,11,12,36,37,84,85,99,100

2.3 Electrical information for digital I/O

All digital I/O comply with 3Volts CMOS.

Operating conditions

Parameter	Min	Max
V_{IL}	-0.3 V	0.35• VDD_P
V_{IH}	0.65 • VDD_P	VDD_P+0.3 V
V_{OL}		0.45 V
V_{OH}	VDD_P- 0.45 V	VDD_P

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VDD_P is 2.887V typical

To interface the Flying-800 Module digital signals with other logics:

· 3V logic: some serial resistors (between 2.2K and 4.7Kohms) can be added on the lines

· For higher voltage logics, a resistor bridge or a level shifter IC can be added.

2.4 LCD interface

The Flying-800 Module can be connected to a LCD module driver through the following interface.

The Flying-800 Series can be connected to a LCD module driver through the interface.

Pin description

Signal	Pin number	Description
LCD_CS	49	Chip Select
LCD_EN	50	LCD Enable
D01-D15	1,3,5,6,7,8,9,10,38,39,40,41,42,43,44,45	Data
OE	51	Read Strobe
WE	52	Write Strobe

2.5 Keyboard interface

Warning:

This interface is not available with AT commands

This interface provides 11 connections: 5 rows (KEYSENSE0 to KEYSENSE4) and 6 columns (KEYPAD00 to KEYPAD05).

The scanning is a digital one, and the debouching is done in the TechFaith Wireless Flying-800 Series. No discrete components like R, C (Resistor, Capacitor) are needed.

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Pin description

Signal	Pin number	I/O	Description
KEYSENSE0	53	I	Row scan
KEYSENSE1	54	I	Row scan
KEYSENSE2	55	I	Row scan
KEYSENSE3	56	I	Row scan
KEYSENSE4	57	I	Row scan
KEYPAD00	58	O	Column scan
KEYPAD01	59	O	Column scan
KEYPAD02	60	O	Column scan
KEYPAD03	61	O	Column scan
KEYPAD04	62	O	Column scan
KEYPAD05	63	O	Column scan

The Keyboard Scanner(KBS) implements all the logic necessary to interface matrix keyboard with up to 30 keys to the System Controller.

Keyboard define:

SENSE/STROBE	GPIO61(KSB0)	GPIO60(KSB1)	GPIO59(KSB2)	GPIO58(KSB3)	GPIO57(KSB4)
GPIO62(KS0)	SNED	UP		DOWN	OK
GPIO63(KS1)	*	7	RIGHT	4	1
GPIO64(KS2)	0	8	CLR	5	2
GPIO65(KS3)	#	9	LEFT	6	3
GPIO66(KS4)	CAM	…	…	SIDE_DOWN	SIDE_UP

Additional comments on Keyboard:

The exemplify keys are defined, the keys that unmentioned in table, can be defined anon.

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2.6 Main Serial link

The Universal Asynchronous Receiver Transmitter (UART) communicates with serial data that conforms to the RS-232 Interface protocol. The module has 2 UARTs which provide 3.0V CMOS level output and 3.0V CMOS input levels. All the control signals of the RS-232 are active low, however the data signals, RXD and TXD, are active high. UART2 port multiplexes with R-UIM pins.

UART1 interface pin

Signal	Pin number	I/O	Description
MSM_DP_TXD	16	O	Transmit serial data
MSM_DP_RXD	18	I	Receive serial data
MSM_DP_RFR	15	O	Ready to Send
MSM_DP_CTS	19	I	Clear to send
MSM_DP_DTR	17	I	Data terminal ready
MSM_DP_DCD	13	O	Data carrier detect
MSM_DP_RI	14	O	Ring indicator

UART2 interface pin

Signal	Pin number	I/O	Description
MSM_DP_RXD2	20	I	Receive serial data
MSM_DP_CTS2/R-UIMRST	22	I	Clear to send
MSM_DP_TXD2/R-UIMDATA	21	O	Transmit serial data
MSM_DP_RFR2/R-UIMCLK	23	O	Ready to Send

Support 300,600,1200,2400,4800,9600,14400,19200,38400,57600,115200,230400(only for COM1)bps baud rate.

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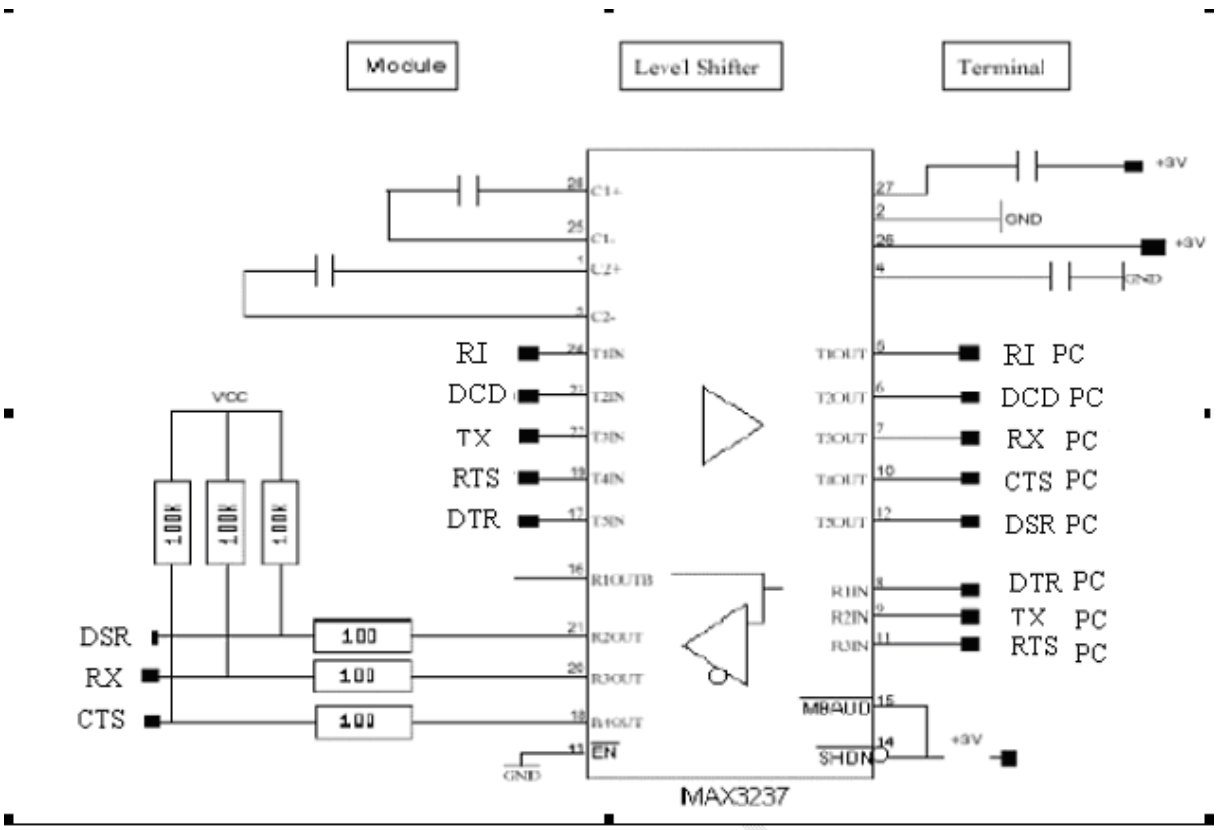
2.6.1 Typical implementation with a RS232 Terminal



The figure above shows a typical implementation when the Flying-800 Module is connected to a RS232 Terminal.

2.6.2 Typical implementation with a microprocessor

The figure above shows a typical implementation when the Flying-800 Module is connected to a host microprocessor which is 2.8V tolerant on the serial port signals.

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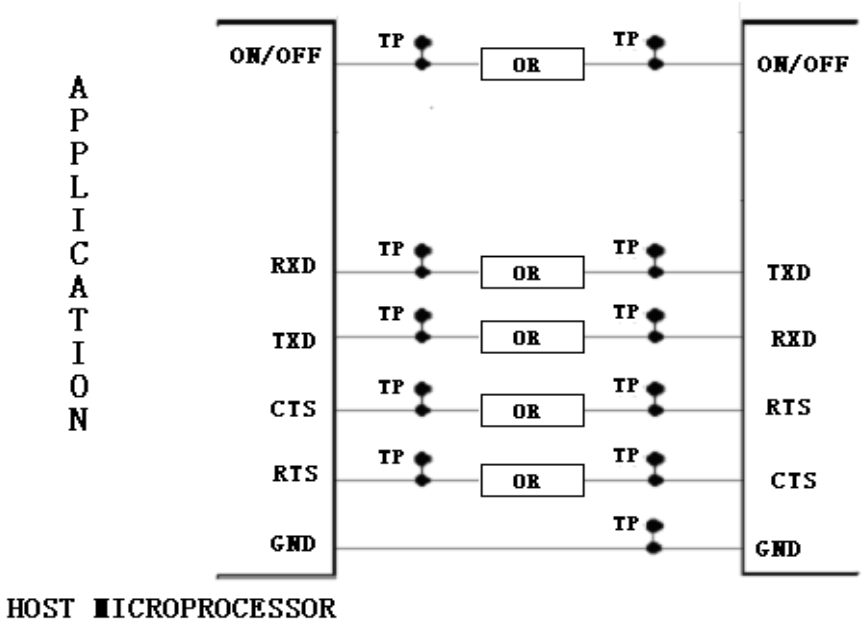

2.7 R-UIM interface

2.7.1 General Description

4 signals exist:

- **R-UIMVCC: R-UIM power supply.**
- **R-UIMRST: reset.**
- **R-UIMCLK: clock.**
- **R-UIMDATA: I/O port.**

The R-UIM Interface (R-UIM) controls the activation- and deactivation sequences of the R-UIM card and provides the driver circuits for the R-UIM card. The protocol handling is not part of this module.
The R-UIM Interface controls a 3V R-UIM.

The following references can be used:

Pin description

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Signal	Pin number	I/O	Description
R-UIMCLK	23	O	R-UIM Clock
R-UIMRST	22	O	R-UIM reset
R-UIMDATA	21	I/O	R-UIM DATA
R-UIMVCC	24	O	R-UIM Power supply

Electrical Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
R-UIMDATA V_{IH}	I_{IH} = ±20uA	0.7 R-UIM_VCC			V
R-UIMDATA V_{IL}	I_{IL} = 1mA			0.3R-UIM_VCC	V
R-UIMRST R-UIMDATA R-UIMCLK V_{OH}	Source current =20uA	R-UIM_VCC-0.1V			V
R-UIMRST R-UIMDATA R-UIMCLK V_{OL}	Sink current = 200uA			0.1	V
R-UIMVCC Output Voltage	IR-UIM_VCC<=6mA	2.70	2.80	2.85	V
R-UIMCLK Rise/Fall Time	Loaded with 100pF			50	nS
R-UIMRST, R-UIMDATA Rise/Fall Time	Loaded with 100pF			1	uS
R-UIMCLK Frequency	Loaded with 100pF			3.25	MHz

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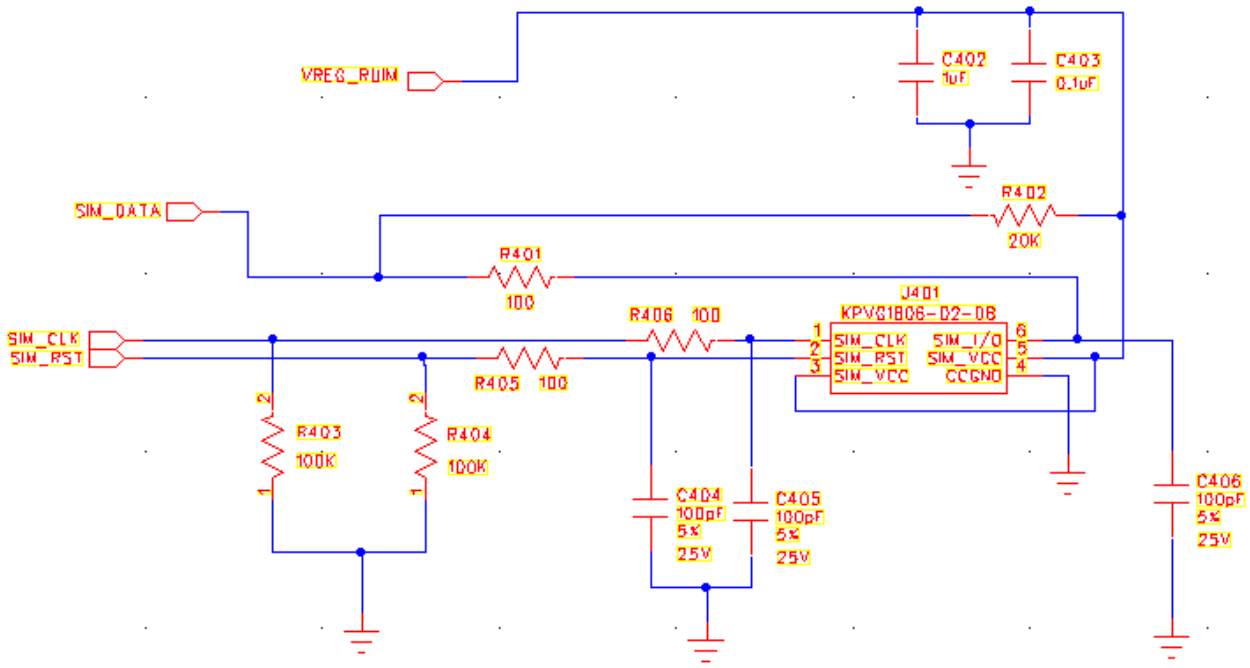
2.7.2 R-UIM socket connection

R-UIM socket pin description

Signal	Pin number	Description
CLK	1	R-UIMCLK
I/O	6	R-UIMDATA
REST	2	R-UIMRST
VCC	3,5	R-UIMVCC
GND	4	GND

Typical implementation:



R-UIM socket

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2.8 General Purpose Input/Output

The TechFaith Wireless Flying-800 Module provides General Purpose I/O. They are used to control any external device such as a LCD or a Keyboard backlight.

Pin description

Signal	Pin number	I/O	Description	Power up default state
GPIO_INT49	29	I/O	General Purpose I/O	0
GPIO_INT45	33	I/O	General Purpose I/O	0
GPIO_INT47	35	I/O	General Purpose I/O	0
GPIO_INT09	65	I/O	General Purpose I/O	0
GPIO_INT42	67	I/O	General Purpose I/O	0
GPIO_INT04	69	I/O	General Purpose I/O	0
GPIO_INT11	91	I/O	General Purpose I/O	0
GPIO_INT13	93	I/O	General Purpose I/O	0
GPIO_INT02	95	I/O	General Purpose I/O	1
GPIO_INT34	97	I/O	General Purpose I/O	1
GPIO_INT18	32	I/O	General Purpose I/O	0
GPIO_INT33	34	I/O	General Purpose I/O	1
GPIO_INT48	64	I/O	General Purpose I/O	1
GPIO_INT10	66	I/O	General Purpose I/O	0
GPIO_INT07	68	I/O	General Purpose I/O	1
GPIO_INT03	70	I/O	General Purpose I/O	1
GPIO_INT19	78	I/O	General Purpose I/O	0
GPIO_INT12	92	I/O	General Purpose I/O	1
GPIO_INT14	94	I/O	General Purpose I/O	1
GPIO_INT35	98	I/O	General Purpose I/O	1

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2.9 Analog to Digital Converter

Two Analog to Digital Converter (ADC) input is provided by the TechFaith Wireless Flying-800 Module. This ADC section is specified for voltage measurements. Its reference voltage is 2.6 Volts.

Pin description

Signal	Pin number	I/O	I/O type	Description
GP_ADC_DET	96	I	Analog	A/D converter
BAT_ID	86	I	Analog	A/D converter

2.10 Audio interface

The TechFaith Wireless Flying-800 Module's audio interface supports one differential microphone inputs （MIC1P、MIC1N）and two differential speaker outputs (EAR1O_P, EAR1O_N; AUXOP, AUXON). And one single end microphone and speaker MIC2P, EAR2O_P.

2.10.1 Main audio interface

Main audio interface consists of MIC1 (MIC_P, MIC_N). The connection can be either differential or single-ended but using a differential connection in order to reject common mode noise is strongly recommended. When using a single-ended connection, be sure to have a very good ground plane, a very good filtering as well as shielding in order to avoid any disturbance on the audio path.

2.10.1.1 Main microphone inputs (MIC1)

Typical implementation:

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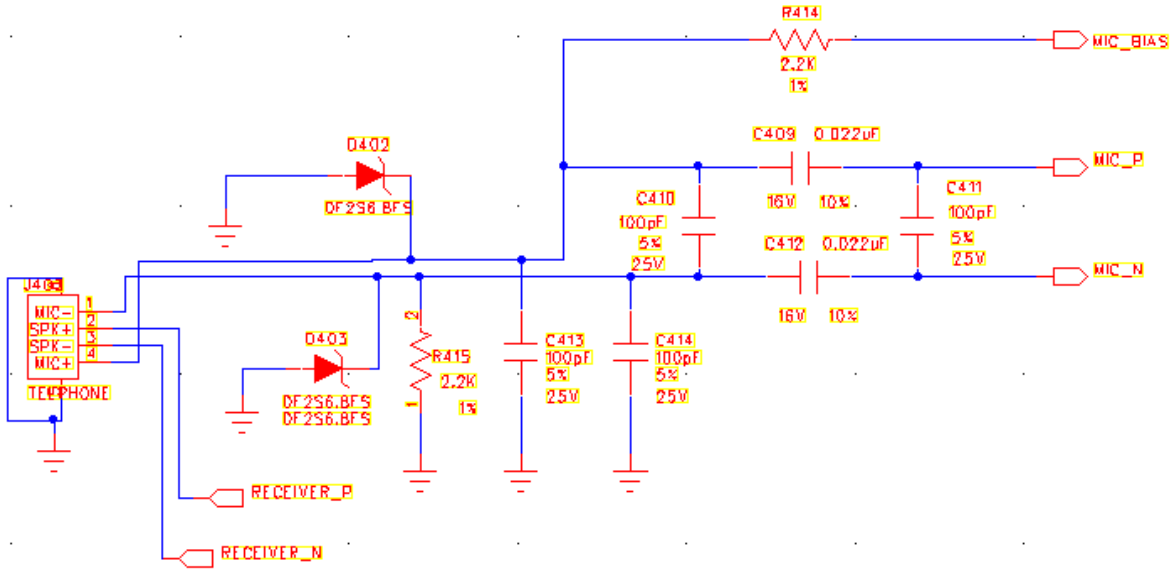

MIC input connect

Pin description

Signal	Pin number	I/O	Description
MIC1P(MIC_P)	**82**	**A**	**Microphone Positive input**
MIC1N(MIC_N)	**77**	**A**	**Microphone Negative input**

Table 3-7 Microphone interface requirements

Parameter		Test Conditions	Min	Typ	Max	Unit
V_{IO}	Input offset voltage at MIC1, MIC2 and AUX inputs	Over recommended ranges of supply voltage and free-air temperature	–5		+5	mV
C_I	Input capacitance at MIC1, MIC2 and AUX inputs			5		pF
	Input DC common mode voltage		0.90	1.0	1.10	V
V_{mbias}	Microphone bias supply voltage	Open circuit DC voltage	1.69	1.8	1.91	V
	MBIAS output DC source current	1.69 kΩ 1% resistive load	1	1.07		mA
	MICMUTE attenuation	+3 dBm0 analog input level 1.02 kHz sine-wave	80			dB
Z_{in}	Input impedance, MIC1, MIC2 and AUX inputs	Fully differential	62	72	82	kΩ

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2.10.1.2 Main speaker outputs (EAR1)

The main speaker outputs EAR1 includes EAR1ON and EAR1OP.

Pin description

Signal	Pin number	I/O	I/O type	Description
EAR1O_P(RECEIVER_P)	80	O	Analog	EAR1 positive output
EAR1O_N(RECEIVER_N)	81	O	Analog	EAR1 negative output

Output Parameter

Parameter	Test Conditions	Value
EAR_AMP1 output power (rms)	Differential, 32Ω load, PCMI = +3 dBm0, 1.02 kHz sine-wave 70 mW	70mW
Differential Output Impedance	At 1.02 kHz, for outputs EAR1 and AUX amp	1 Ω
Single-Ended Output Impedance	At 1.02 kHz, for outputs EAR1 and AUX amp	0.5 Ω

2.10.2 Auxiliary audio interface

The auxiliary audio interface consists of MIC2 AND AUX(AUX_ON,AUX_OP).

Pin description

Signal	Pin number	I/O	I/O type	Description
MIC2P(LINE_IN)	83	I	Analog	MIC1 positive input
AUX_ON	73	O	Analog	SPK negative output
AUX_OP	75	O	Analog	SPK positive output
EAR20(LINE_OUT)	79	O	Analog	EAR output

2.10.2.1 Auxiliary Microphone Inputs (MIC2)

The MIC2 inputs do not include internal bias. To use these inputs with an electret microphone, bias

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has to be generated outside the Flying-800 Module according to the characteristic of this electret microphone. These inputs are the standard ones used for an external headset or a handfree kit.
AC coupling is already embedded in the module.
Typical implementation:

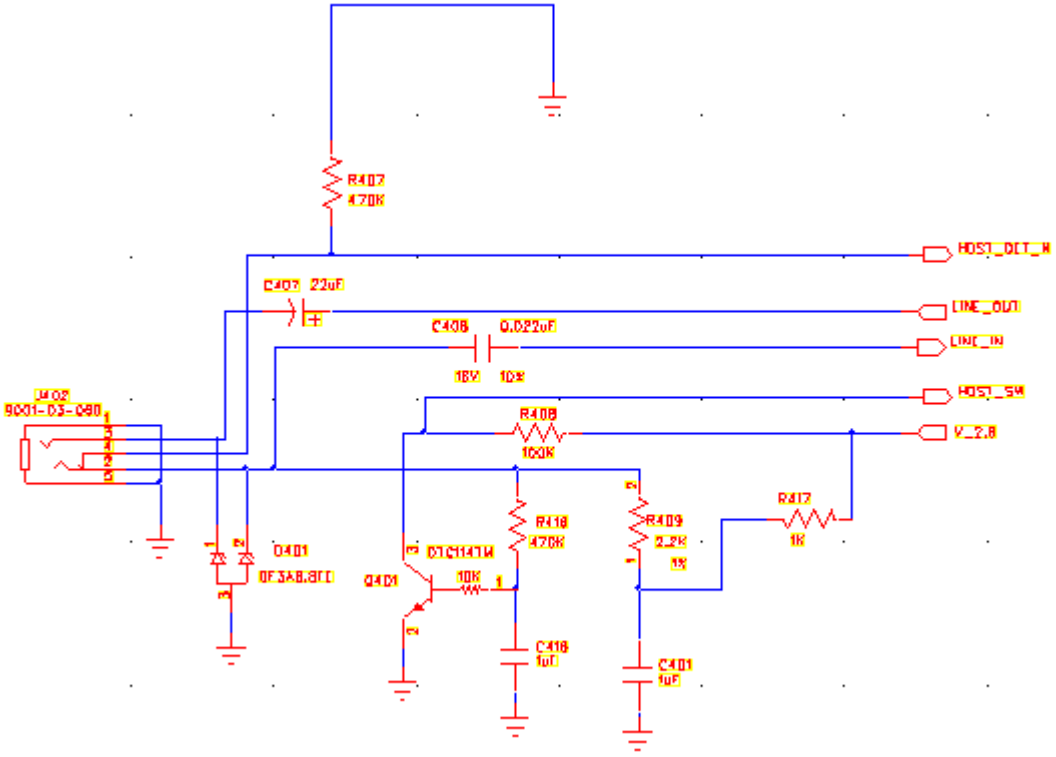

Figure 4 : MIC2 inputs

2.10.2.2 Auxiliary audio output

AUX_ON, AUX_OP can be works as MIDI output. It is 2.3mW power output.(rms). EAR20(LINE_OUT) is 10.8mW power output(rms). It can drive earpiece directly.

2.10.3 Main or Auxiliary audio selected

Main audio and auxiliary audio can not be working at the same time. They can be selected by the first general inputs status. It shoud be pull-up to VCC.

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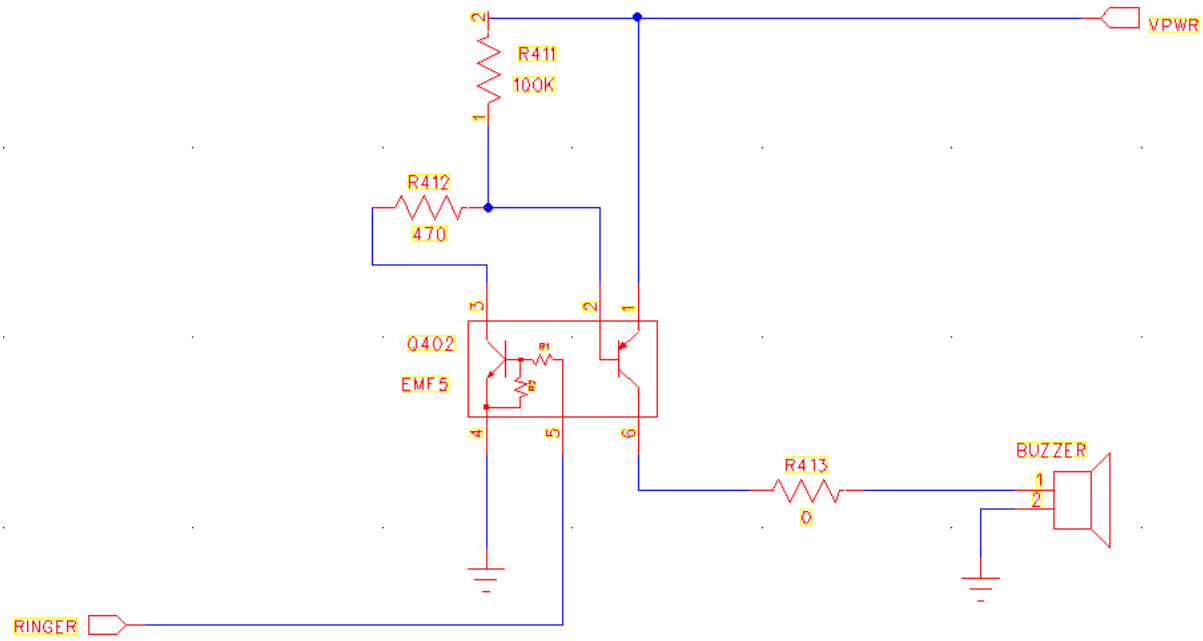
The 64pin GPIO_INT48 default is high level

GPIO_INT48	Main audio	Auxiliary audio
High level	Output	
Low level		Output

2.10.4 RINGER Output

The buzzer output is a digital one. A buzzer can not be directly connected between this output and VBAT. The example circuit as bellow:

Typical implementation:



Pin description

Signal	Pin number	I/O	I/O type	Description
SPKER/RINGER	74	O	Digital	RINGER positive output

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2.11 Battery charging interface

The PM6610 IC supports Lithium-Ion and Lithium Polymer batteries only. Nickel-based batteries are not used in newer handset designs and are no longer supported. Batteries rated for 3.6 or 3.7 V nominal are the most common and expected in PM6610 applications, but make sure the battery voltage can never exceed 4.2 V. Voltages higher than 4.2 V can damage the PMIC.
The Flying-800 Module supports one battery charging circuit for Li-Ion batteries. This circuit uses an interface, which consists of a current source input (+VEXT_DC) where the constant current has to flow in order to charge the battery. This current value depends on the battery capacity. It is recommended to provide a current equal to the value of the capacity plus 50mA. For a 550mA battery the current will be 600mA. The maximum current is 800mA.

The Flying-800 Series module monitors the battery voltage to detect the end of the charge.

Signal	Pin number	I/O type	description
+VEXT_DC	87,89	Supply	Current source input

Pin description

Parameter	Min	Max	Unit
Supply voltage, VCHG pin (Vcharge)	3.3	4.5	V
Supply voltage handset power(VBATT)	3.0	4.25	V

Electrical Characteristics

2.11.1 Li-ion charging procedure

Charge the Li-ion battery during this procedure the voltage of the battery is accurately monitored.

Note that the sense resistor measures the total current . the sum of battery charging current plus handset electronics operational current. While not ideal, this is a necessary compromise. Inserting the sense resistor in series with the battery would increase the overall series resistance, create an undesired voltage drop, and reduce the run time of the phone.
Charging begins with the constant current mode, enabled via software to charge the battery quickly. This mode is sometimes called fast charging. Once the lithium-ion battery approaches its target voltage (through constant current charging) the charge is completed using either constant voltage or pulse charging. Flying-800 uses pulse charging.

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2.12 ON / OFF

This input is used to switch ON or OFF the Flying-800 Series module. A low level signal, that more than 6ms, has to be provided on the pin ON/~OFF to switch ON the module. To be able to switch OFF the module, the pin ON/OFF has to be keeping low level signal during a minimum of 10ms. Through the firmware, the module can be switched off.

Pin description

Signal	Pin number	I/O	I/O type	Description
ON/OFF	30	I	CMOS	Module Power ON/OFF, Active Low

Operating conditions

Parameter	Min	Max	Unit
VIL	0	0.3	V
VIH	2.7	VBATT	V

2.12.1 Operating sequences

Dedicated circuits continuously monitor events that might trigger a power-on sequence. If a monitored event occurs these circuits power-on the PM6610 IC, determine the handset available power sources, enable the correct source, and take the MSM device out of reset.
The inputs to the power-on circuit (PS_HOLD and KPDPWR_N) are basic digital control signals that must meet the input voltage level requirements stated in Table 3-3. The KBDPWR_ON pin is pulled-up internally. The only external output is PON_RESET_N; it must meet the output voltage level and current drive requirements stated in that same table. Additional power-on circuit performance specifications are listed below.

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Table 3-25 Power-on circuit performance specifications

Parameter	Comments	Min	Typ	Max	Unit	Notes
Internal pull-up resistor	At KPDPWR_N pin	160	200	240	kΩ	1
Power sequencing time intervals						2
t_{reg1}	Power-on event to 1st Reg EN	0	6	10	msec	3
t_{reg}	Delay between reg turn-ons		4		clocks	4
t_{settle}	Regulator settling time		4		clocks	4
t_{reset1}	4th Reg on to PON_RESET_N = H	13	20	30	msec	
t_{pshold}	PS_HOLD timeout	133	200	300	msec	
t_{reset0}	PON_RESET_N = L to 1st Reg off	6.7	10	15	msec	
t_{off}	Delay between reg turn-offs	1.3	2.0	3.0	msec	5
Regulator accuracy	Accuracy needed to continue power-on sequence	4	7	9	%	
Keypad button delay	De-bounce	0		64	msec	6

Notes:

1. This internal resistor is pulled up to V_{DD} (the voltage at ISNS_M, pin 4) through a series diode.
2. All time intervals are derived from the selected 32.768 kHz clock source; their tolerances are set accordingly. The initial power-up sequence relies upon the internal RC oscillator that has a wide accuracy tolerance. See Figure 3-8, a high-level timing diagram, and see *PM6610 Power Management IC User Guide*, 80-V4773-7, for further discussion.
3. The first regulator turn-on time (t_{reg1}) depends upon the bandgap reference decoupling capacitor at REF_BYP (pin 27). The specified value is based upon 0.1 µF.
4. There is a delay of four SLEEP_CLK cycles after one regulator settles before the next regulator is enabled. Each regulator will settle to within 10% of its final value within four SLEEP_CLK cycles. The regulators are turned on in the following order (as illustrated in Figure 3-4): 1 = MSMC, 2 = MSMP, 3 = MSMA, and 4 = TCXO.
5. The TCXO regulator is turned off when PON_RESET_N goes low. The MSMA regulator is turned off next, after a delay of t_{reset0}. VREG_MSMA is allowed to discharge for t_{off} before the MSMP regulator is turned off, and VREG_MSMP is allowed to discharge for another t_{off} before all other regulators are disabled and the PM6610 is powered down.
6. This delay from when the KPD_PWR_N signal transitions to when the KPDPWR interrupt is triggered is SBI-programmable to binary values from 1 to 64 milliseconds (with the value of 0 milliseconds available to disable the de-bounce function).

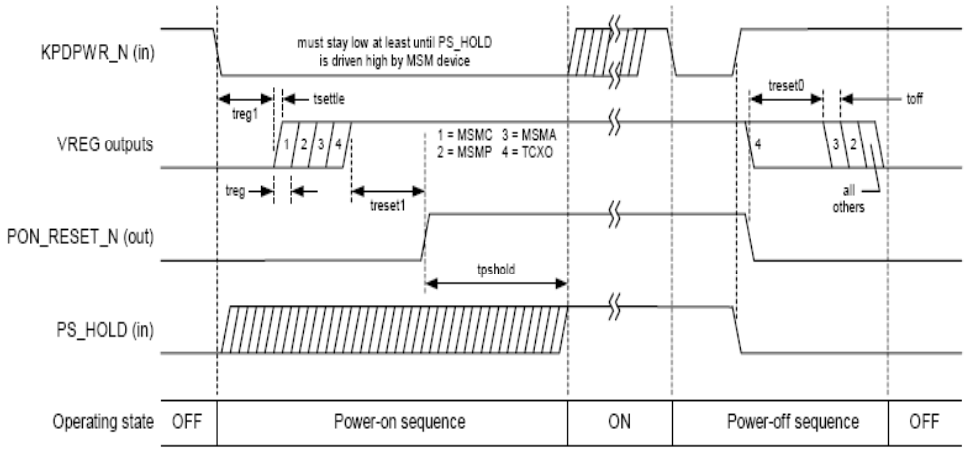

Figure 3-4 High-level power sequences timing diagram

Power-ON/OFF sequence

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2.12.2 Reset signal (EX_RESET, RESET_OUT)

EX_RESET is used to force a reset procedure by providing low level. This signal has to be considered as an emergency reset only. A reset procedure is already driven by an internal hardware during the power-up sequence.
RESET_OUT can be used to provide a reset to an external device. It then behaves as an output. If no external reset is necessary this input can be left open. If used (emergency reset), it has to be driven by an open collector or an open drain.

Pin description

Signal	Pin number	I/O	Description
EX_RESET	31	I	Module Reset, Active Low
RESET_OUT	48	O	Reset Out, Active Low

Additional comments on RESET:
The RESET process is activated either by the external EXT_RESET signal OR by an internal signal (coming from a RESET generator). This automatic reset is activated at Power-up.
The module remains in reset mode as long as the RST signal is held low. This signal should be used only for "emergency" resets.
To activate the "emergency" reset sequence, the EX_RESET signal has to be set to low. As soon as the reset is complete, the AT interface answers "OK" to the application[4].

2.13 PCM interface

The module has an Aux PCM interface that enables communication with an external Codec that provides the hardware support for hands free applications. Both mu-law and A-law Codecs are supported by the Aux PCM interface. The interface does not support linear Codecs.

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2.13.1 Pin assign

Signal	Pin number	I/O	Description
AUX_PCM_CLK	25	BS-PD	PCM clock for auxiliary CODEC port
AUX_PCM_SYNC	27	BS-PD	PCM data strobe for auxiliary CODEC port
AUX_PCM_DIN	28	IS-PD	PCM data input for auxiliary CODEC port
AUX_PCM_DOUT	26	BS-PU	PCM data output for auxiliary CODEC port

2.13.2 Aux PCM timing

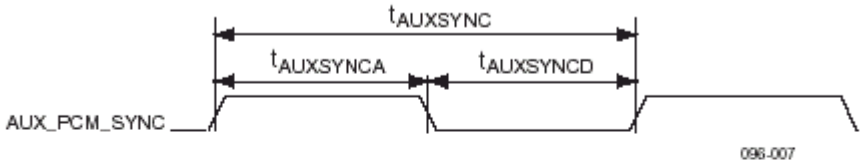
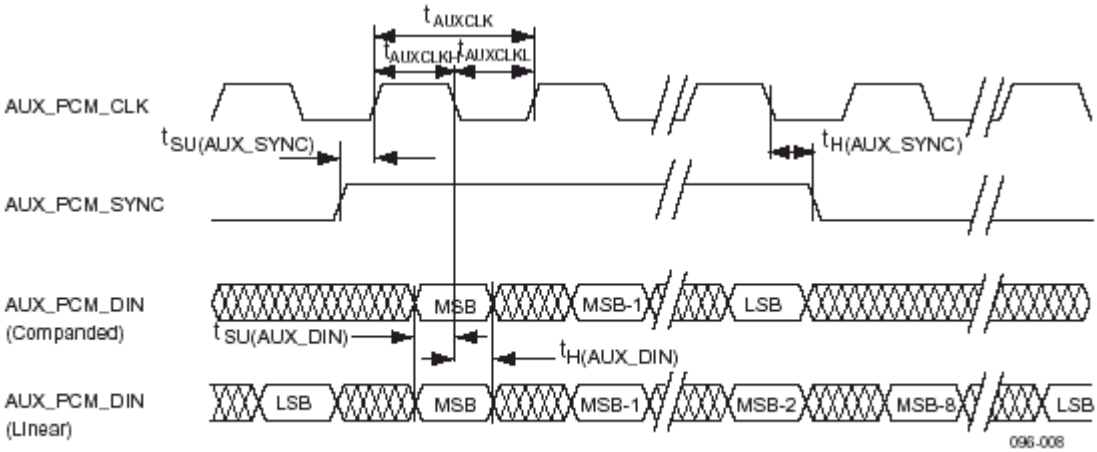


Figure 3-6 AUX_PCM_SYNC timing



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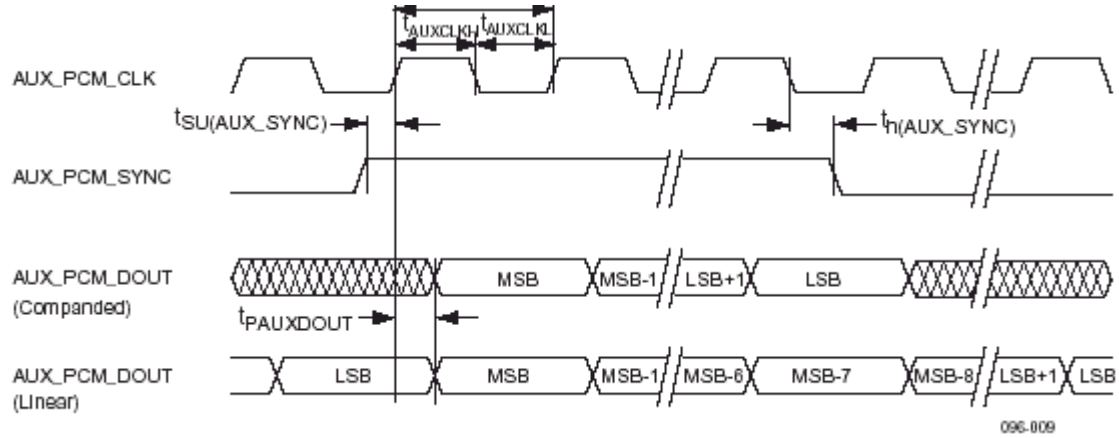

Parameter	Description	Min	Typical	Max	Units	Notes
$t_{AUXSYNC}$	AUX_PCM_SYNC cycle time	—	125	—	µs	a
$t_{AUXSYNCA}$	AUX_PCM_SYNC "asserted" time	62.4	62.5	—	µs	a
$t_{AUXSYNCD}$	AUX_PCM_SYNC "deasserted" time	62.4	62.5	—	µs	a
t_{AUXCLK}	AUX_PCM_CLK cycle time	—	7.8	—	µs	a
$t_{AUXCLKH}$	AUX_PCM_CLK high time	3.8	3.9	—	µs	a
$t_{AUXCLKL}$	AUX_PCM_CLK low time	3.8	3.9	—	µs	a
$t_{SU(AUX\_SYNC)}$	AUX_PCM_SYNC setup time to AUX_PCM_CLK rising	1.95	—	—	µs	
$t_{H(AUX\_SYNC)}$	AUX_PCM_SYNC hold time after AUX_PCM_CLK rising	1.95	—	—	µs	
$t_{SU(AUX\_DIN)}$	AUX_PCM_DIN setup time to AUX_PCM_CLK falling	70	—	—	ns	
$t_{H(AUX\_DIN)}$	AUX_PCM_DIN hold time after AUX_PCM_CLK falling	20	—	—	ns	
$t_{PAUXDOUT}$	Propagation delay from AUX_PCM_CLK rising to AUX_PCM_DOUT valid	—	—	50	ns	

[a] This value assumes that CODEC_CTL is not being used to override the CDMA CODEC clock and sync operation.

2.14 RF interface

Two types of RF connection are available:

2.14.1 RF connection

One land patterns and one connector set on the PCB to support the module connecting with antenna and application board.

1）Through RF connector S101 connects to application board with matching RF cable. This cable can be used muRata's MXTK92XXXX, which has one or two connectors, also the length can be changed.

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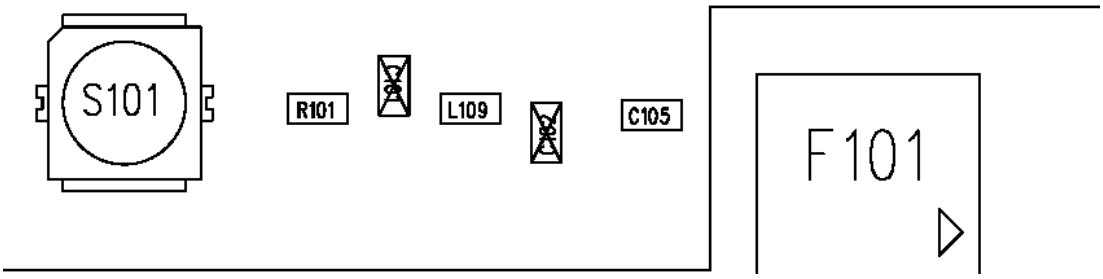
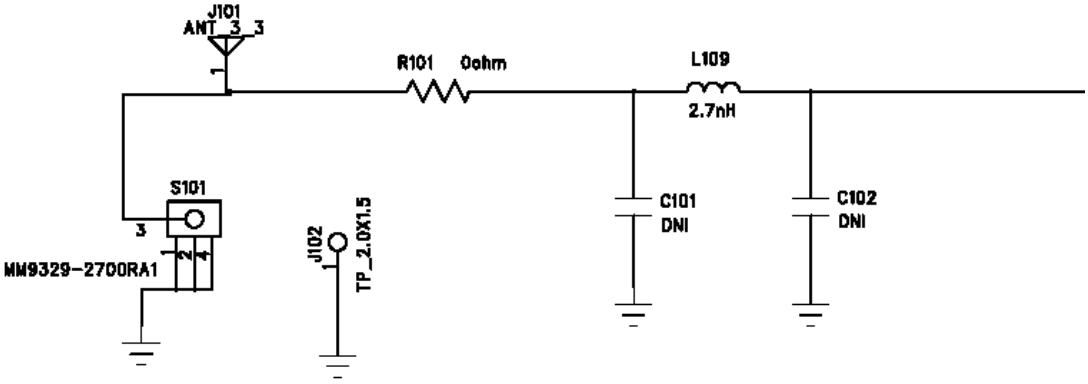


2） Connect to Antenna pad(loacated at the backside of the module, big rectangular pad) with an antenna directly. Below is the antenna matching circuit.



2.14.2 RF performances

RF performances are compliant with the TIA-EIA-98-D.

The main parameters for Receiver are:

- **·Sensitivity: < -104 dBm Static & TUHigh**
- **·Paging channel MER: <3.5%**

And for Transmitter:

- **· Rho: >0.944**
- **· Frequency error: +/-300Hz max**
- **· Time reference: +/-1uS max**
- **· Maximum output power: 23 to 30dBm at ambient temperature**
- **· Minimum output power: <-50dBm at ambient temperature**
- **· ACPR1 level: < -42dBc/30kHz**
- **· ACPR2 level: < -54dBc/30kHz**
- **· Code Domain Power: <23dB in both I and Q channel**

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2.14.3 Antenna specifications

The antenna must fulfill the following requirements:

· Frequency bands: Cellular-CDMA band

	CDMA 800
Frequency TX	824 to 849 MHz
Frequency RX	869 to 894 MHz

· Impedance: 50Ω

3 Technical specifications

3.1 Interface

Pin #	Name	Description	Comment
1	D15	DATA	
2	19.2M	19M CLOCK OUTPUT	CMOS level
3	D14	DATA	
4	GND	GND	
5	D12	DATA	
6	D13	DATA	
7	D10	DATA	
8	D11	DATA	
9	D08	DATA	
10	D09	DATA	
11	GND	GND	
12	GND	GND	

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13	MSM_DP_DCD	RS232 DATA carrier detect	
14	MSM_DP_RI	RS232 ring indicator	
15	MSM_DP_RFR	RS232 interface Request to send	
16	MSM_DP_TXD	RS232 interface transmit	
17	MSM_DP_DTR	RS232 Interface Data Terminal Ready	
18	MSM_DP_RXD	RS232 interface Receiver	
19	MSM_DP_CTS	RS232 interface Clear to sent	
20	MSM_DP_RXD2	RS232 interface Receiver	
21	MSM_DP_TXD2	RS232 interface transmit	
22	MSM_DP_CTS2	RS232 interface Clear to sent	
23	MSM_DP_RFR2	RS232 interface Request to send	
24	R-UIMVCC	R-UIM card power supply	
25	AUX_PCM_CLK	AUX_PCM INTERFACE	
26	AUX_PCM_DOUT	AUX_PCM INTERFACE	
27	AUX_PCM_SYNC	AUX_PCM INTERFACE	
28	AUX_PCM_DIN	AUX_PCM INTERFACE	
29	GPIO_INT49	General Purpose I/O	
30	POWER_ON	Power ON/OFF control	
31	EX_RESET	Module reset	
32	GPIO_INT18	General Purpose I/O	
33	GPIO_INT45	General Purpose I/O	
34	GPIO_INT33	General Purpose I/O	
35	GPIO_INT47	General Purpose I/O	
36	GND	GND	
37	GND	GND	
38	D00	DATA	
39	D01	DATA	

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40	**D02**	**DATA**	
41	**D03**	**DATA**	
42	**D04**	**DATA**	
43	**D05**	**DATA**	
44	**D06**	**DATA**	
45	**D07**	**DATA**	
46	**A02**	**ADDRESS 2**	
47	**A01**	**ADDRESS 1**	
48	**RESET_OUT**	**Reset for outer device**	
49	**LCD_CS**	**LCD chip select**	
50	**LCD_EN**	**LCD RD/WR indicator**	
51	**OE**	**READ**	
52	**WE**	**WRITE**	
53	**KEYSENSE0**	**Keyboard ROW**	
54	**KEYSENSE1**	**Keyboard ROW**	
55	**KEYSENSE2**	**Keyboard ROW**	
56	**KEYSENSE3**	**Keyboard ROW**	
57	**KEYSENSE4**	**Keyboard ROW**	
58	**KEYPAD00**	**Keyboard COLUMN**	
59	**KEYPAD01**	**Keyboard COLUMN**	
60	**KEYPAD02**	**Keyboard COLUMN**	
61	**KEYPAD03**	**Keyboard COLUMN**	
62	**KEYPAD04**	**Keyboard COLUMN**	
63	**KEYPAD05**	**Keyboard COLUMN**	
64	**GPIO_INT48**	**General Purpose I/O**	
65	**GPIO_INT09**	**General Purpose I/O**	
66	**GPIO_INT10**	**General Purpose I/O**	

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67	GPIO_INT42	General Purpose I/O	
68	GPIO_INT07	General Purpose I/O	
69	GPIO_INT04	General Purpose I/O	
70	GPIO_INT03	I^2C Interface data	
71	VIBRATOR_DRV	VIBRATOR current sink	
72	PS_HOLD	PS_HOLD	
73	AUXON	Auxiliary audio output	
74	RINGER	RINGER	
75	AUXOP	Auxiliary audio output	
76	MIC_BIAS	MIC BIAS	
77	MIC1N	MIC1 negative input	
78	GPIO_INT19	General Purpose I/O	
79	EAR2O	Earphone single-ended output	
80	EAR1O_P	EAR positive output	
81	EAR1O_N	EAR negative output	
82	MIC1P	MIC1 Positive input	
83	MIC2P	MIC2 Positive input	
84	GND	GND	
85	GND	GND	
86	BAT_ID	ADC input	
87	+VEXT_DC	Supply for battery charging	High current
88	VBATT	Battery input	High current

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89	+VEXT_DC	Supply for battery charging	High current
90	VBATT	Battery input	High current
91	GPIO_INT11	General Purpose I/O	
92	GPIO_INT12	General Purpose I/O	
93	GPIO_INT13	General Purpose I/O	
94	GPIO_INT14	General Purpose I/O	
95	GPIO_INT02	I^2C interface clock	
96	GP_ADC_DET	Analog to digital converter	
97	GPIO_INT34	General Purpose I/O	
98	GPIO_INT35	General Purpose I/O	
99	GND	GND	
100	GND	GND	

3.2 Environmental Specifications

Conditions	Temperature range
Operating / Full CDMA specification compliant	- 30℃ to + 60℃
Storage	- 40℃ to + 85℃

TechFaith Wireless FLYING-800		ENVIRONNEMENTAL CLASSES		
TYPE TEST	Standards	Storage class 1.2	Transportation class 2.3	Operating (port use) class 7.3
Cold	IEC 68-2.1 Ab test	-25℃ 72h	-40℃ 72h	-20℃ 16h -10℃ 16h

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Dry heat	**IEC 68-2.2 Bb test**	**+70℃ 72h**	**+70℃ 72h**	**+55℃ 16h**
Change of temperature	**IEC 68-2.14 Na/Nb test**		**-40 ℃ /+30 ℃ 5cycles t1=3h**	**-20/30℃ 3cycles -10/+30℃:3cycles t1=3h**
Damp heat cyclic	**IEC 68-2.30 Db test**	**+30℃2cycles 90%-100% RH variant 1**	**+40℃ 2cycles 90%-100% RH variant 1**	**+40℃ 2cycles 90%-100% RH variant 1**
Damp heat	**IEC 68-2.56 Cb test**	**+30℃ 4days**	**+40℃ 4days**	**+40℃ 4days**
Sinusoidal vibration	**IEC 68-2.6 Fc test**	**5-62Hz: 5mm/s 62-200Hz: 2m/s2 3x5 sweep cycles**		
Random vibration wide band	**IEC 68-3.36 Fdb tes**		**5-20Hz:0.96m2/s 3 20-500Hz:-3dB/oct 3X10 min**	**10-12Hz: 0.96m2/s3 12-150Hz: -3dB /oct 3 x 30 min**

3.3 Mechanical specifications

3.3.1 Physical characteristics

The Flying-800 Module has a complete self-contained shield.

- **Dimensions : 44.5（±0.2） x 35.4(±0.2) x 2.6(±0.15) mm external dimensions (except shielding pins)**
- **Weight: 10 g**

3.3.2 Mechanical drawings

The follow gives the mechanical specifications of Flying-800 module.

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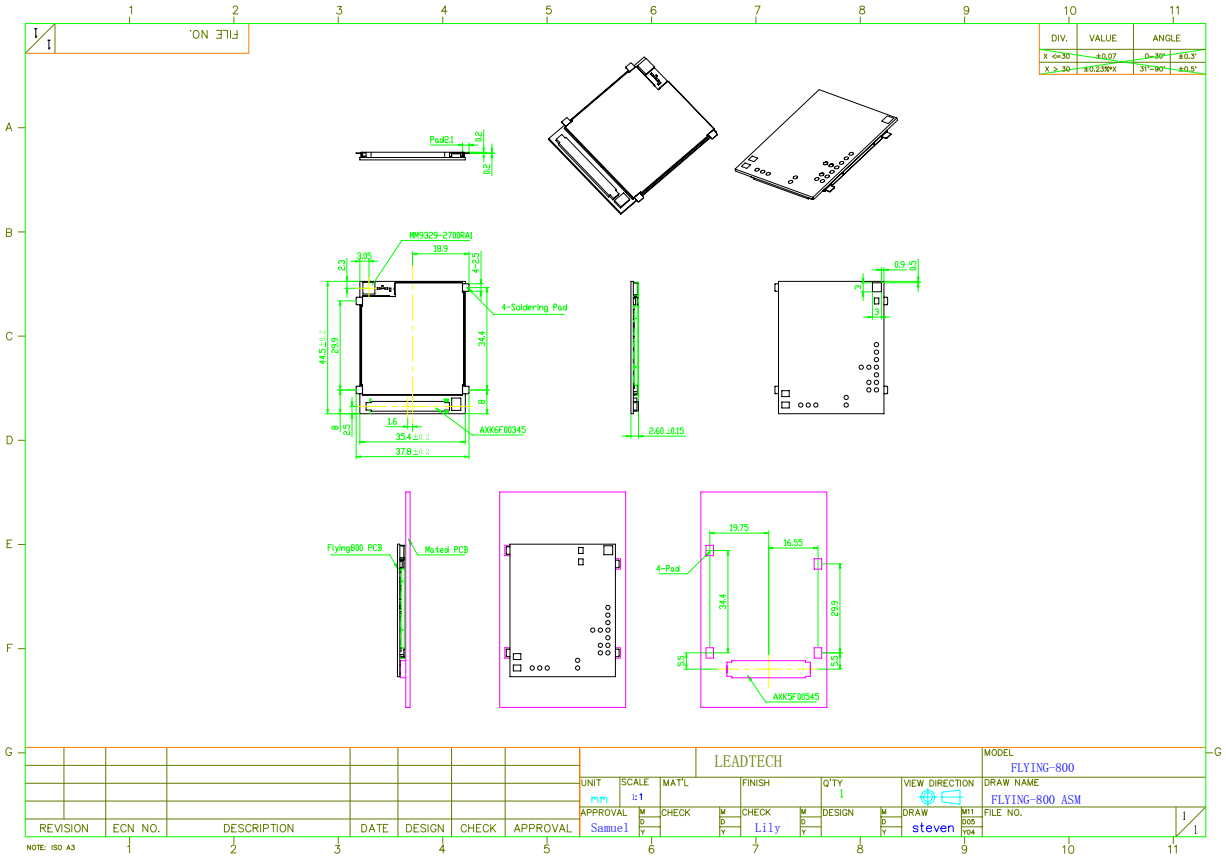

4 Connectors and peripheral devices references

4.1 General Purpose Connector

The GPC is a 100 pins connector with 0.5mm pitch from NAIS

Nais group with the following reference (see chapter connectors reference for further details):

AXK6F00345.

The matting connector has the following reference:

AXK5F00345.

For further details see GPC data sheets in appendix. More information is also available from http://www.NAIS.com

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4.2 R-UIM Card Reader

Possible suppliers:

- **ITT CANNON CCM03 series (see http://www.ittcannon.com)**
- **JAE (see http://www.jae.com)**
- **AMPHENOL C707 series (see http://www.amphenol.com)**

Drawer type :

MOLEX 99228-0002 (connector) / MOLEX 91236-0002 (holder) (see http://www.molex.com)

4.3 Microphone

Possible suppliers:

- **PANASONIC**
- **HOSIDEN**

4.4 Speaker

Possible suppliers:

- **PHILIPS**
- **SANYO**
- **HOSIDEN**
- **PRIMO**

4.5 Antenna Cable

The following cable reference has been qualified for being mounted on Flying-800 :

- **MuRata MXTK92XXXX series RF cable.**

4.6 CDMA antenna

CDMA antennas and support for antenna adaptation can be obtained from manufacturers such as:

- **Galtronics**
- **Centurion**
- **Amphenol**

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5 Design Guidelines

The purpose of the following paragraphs is to give design guidelines.

5.1 Hardware and RF

5.1.1 EMC recommendations

The EMC tests have to be performed as soon as possible on the application to detect any possible problem.

When designing, special attention should be paid to:

- **Possible spurious emission radiated by the application to the RF receiver in the receiver band**
- **EMC protection on audio input/output**
- **Bias of the Microphone inputs**
- **Length of the R-UIM interface lines (preferably <10cm)**
- **Ground plane : TechFaith Wireless recommends to have a common ground plane for analog / digital / RF grounds.**
- **Metallic case or plastic casing with conductive paint are recommended**

  Note:

  The module does not include any protection against over voltage.

5.1.2 Power Supply

The power supply is one of the key issues in the design of a CDMA terminal.

A weak power supply design could affect in particular:

- **EMC performances**
- **the emissions spectrum**
- **the modulation quality and frequency error**

Warning:

Careful attention should be paid to:

- **Quality of the power supply : Low ripple, PFM or PSM systems should be avoided (PWM converter preferred).**
- **Capacity to deliver high current peaks in a short time (pulsed radio emission).**

5.1.3 Antenna

Warning:

Flying-800 strongly recommends to work with an antenna manufacturer either to develop an antenna

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adapted to the application or to adapt an existing solution to the application. The antenna adaptation (mechanical and electrical adaptation) is one of the key issues in the design of a CDMA terminal.

5.2 Mechanical integration

Attention should be paid to :

- **Antenna cable integration (bending, length, position, etc)**
- **Legs of the module to be soldered on the Ground plane**

5.3 Firmware upgrade

The Flying-800 Module firmware is stored in flash memory and it can easily be upgraded.

TechFaith Wireless recommends that the application designed around a Flying-800 (or Flying-800 based product) allows easy firmware upgrades on the module via the standard UART protocol. Therefore, the application shall either allow a direct access to the Flying-800 serial link through an external connector or implement any mechanism allowing the Flying-800 firmware to be downloaded via UART.

5.3.1 Nominal upgrade procedure

The firmware file can be downloaded into the modem using the UART protocol.
The necessary serial signals to proceed with the UART downloading are:
Rx, Tx and GND.

6 Appendix

6.1 TechFaith Wireless acceptance test

These tests are TechFaith Wireless internal qualification tests. They are performed on a TechFaith Wireless evaluation platform (module on test board).

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Test	Applied standard	Acceptance criteria
Performance test	Mobile station (MS) conformance specification; 1: TIA/EIA-98-D 2: IS2000 REV0	Full conformity to the recommendation regarding the main RF parameters.
Stress test	Therma shocks IEC 68-2-14	Full conformity to the recommendation regarding the main parameters.
Vibration test	Sinusoidal vibration IEC 68-2-6	No performance degradation or mechanical degradation is allow after test.
Humidity test	Corrosion test IEC 68-2-3	No visible degradation of the product, both visual and functional. The unit is tested at room temperature and must be fully operative for the main RF parameters.
Warehouse test	Low temperance IEC 68-2-1	Under normal condition (room temperature) after the test, the unit must behave in full conformity with the main RF parameters specification.
Warehouse test	High temperature IEC 68-2-2	Under normal condition (room temperature) after the test, the unit must behave in full conformity with the main RF parameters specification.
Dust test1	MIL-STD-810D, method 510-3.	No visible dust in the visible areas. No more than 50 dust particules in the cabinet of the product. The unit, tested at room temperature must be fully operative.
Fall test 1	IEC 68-2-32	Only minor casing degradation is allowed, with a maximum dimension change of 1mm. The unit must remain fully operative and full specification for the main RF parameters.
Electro static discharge test	IEC 1000-4-2 or EN 61000-4-2 / A1 Edition 1998 /A2 edition 2001	No performance degradation allowed after the test.
Salt mist test	IEC 68-2-11	After the test, visual inspection on the unit.

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6.2 Safety recommendations (for information only)

IMPORTANT
FOR THE EFFICIENT AND SAFE OPERATION OF
YOUR CDMA APPLICATION BASED ON TechFaith Wireless Flying-800 Series
PLEASE READ THIS INFORMATION CAREFULLY

6.2.1 RF safety

6.2.1.1 General

Your CDMA terminal[6] is based on the CDMA standard for cellular technology. The CDMA standard is spread all over the world.
Your CDMA terminal is actually a low power radio transmitter and receiver. It sends out and receives radio frequency energy. When you use your CDMA application, the cellular system which handles your calls controls both the radio frequency and the power level of your cellular modem.

6.2.1.2 Exposure to RF energy

There has been some public concern about possible health effects of using CDMA terminals. Although research on health effects from RF energy has focused on the current RF technology for many years, scientists have begun research regarding newer radio technologies, such as CDMA. After existing research had been reviewed, and after compliance to all applicable safety standards had been tested, it has been concluded that the product was fitted for use.

If you are concerned about exposure to RF energy there are things you can do to minimize exposure. Obviously, limiting the duration of your calls will reduce your exposure to RF energy. In addition, you can reduce RF exposure by operating your cellular terminal efficiently by following the below guidelines.

[6] **based on Flying-800**

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6.2.1.3 Efficient terminal operation

For your CDMA terminal to operate at the lowest power level, consistent with satisfactory call quality:

If your terminal has an extendible antenna, extend it fully. Some models allow you to place a call with the antenna retracted. However your CDMA terminal operates more efficiently with the antenna fully extended.

Do not hold the antenna when the terminal is <IN USE > Holding the antenna affects call quality and may cause the modem to operate at a higher power level than needed.

6.2.1.4 Antenna care and replacement

Do not use the CDMA terminal with a damaged antenna. If a damaged antenna comes into contact with the skin, a minor burn may result. Replace a damaged antenna immediately. Consult your manual to see if you may change the antenna yourself. If so, use only a manufacturer-approved antenna. Otherwise, have your antenna repaired by a qualified technician.

Use only the supplied or approved antenna. Unauthorized antennas, modifications or attachments could damage the terminal and may contravene local RF emission regulations or invalidate type approval.

6.2.2 General safety

6.2.2.1 Driving

Check the laws and the regulations regarding the use of cellular devices in the area where you have to drive as you always have to comply with them. When using your CDMA terminal while driving, please :

- **give full attention to driving,**
- **pull off the road and park before making or answering a call if driving conditions so require.**

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6.2.2.2 Electronic devices

Most electronic equipment, for example in hospitals and motor vehicles is shielded from RF energy. However RF energy may affect some improperly shielded electronic equipment.

6.2.2.3 Vehicle electronic equipment

Check your vehicle manufacturer representative to determine if any on-board electronic equipment is adequately shielded from RF energy.

6.2.2.4 Medical electronic equipment

Consult the manufacturer of any personal medical devices (such as pacemakers, hearing aids, etc...) to determine if they are adequately shielded from external RF energy.

Turn your terminal OFF in health care facilities when any regulations posted in the area instruct you to do so. Hospitals or health care facilities may be using RF monitoring equipment.

6.2.2.5 Aircraft

Turn your terminal OFF before boarding any aircraft.

- **Use it on the ground only with crew permission.**
- **Do not use it in the air.**

To prevent possible interference with aircraft systems, Federal Aviation Administration (FAA) regulations require you to have permission from a crew member to use your terminal while the aircraft is on the ground. To prevent interference with cellular systems, local RF regulations prohibit using your modem while airborne.

6.2.2.6 Children

Do not allow children to play with your CDMA terminal. It is not a toy. Children could hurt themselves or others (by poking themselves or others in the eye with the antenna, for example). Children could damage the modem, or make calls that increase your modem bills.

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6.2.2.7 Blasting areas

To avoid interfering with blasting operations, turn your unit OFF when in a <blasting area > or in areas posted: <turn off two-way radio> Construction crew often use remote control RF devices to set off explosives.

6.2.2.8 Potentially explosive atmospheres

Turn your terminal OFF when in any area with a potentially explosive atmosphere. It is rare, but your modem or its accessories could generate sparks. Sparks in such areas could cause an explosion or fire resulting in bodily injuries or even death.

Areas with a potentially explosive atmosphere are often, but not always, clearly marked. They include fuelling areas such as petrol stations; below decks on boats ; fuel or chemical transfer or storage facilities ; and areas where the air contains chemicals or particles, such as grain, dust, or metal powders.

Do not transport or store flammable gas, liquid, or explosives, in the compartment of your vehicle which contains your terminal or accessories.

Before using your terminal in a vehicle powered by liquefied petroleum gas (such as propane or butane) ensure that the vehicle complies with the relevant fire and safety regulations of the country in which the vehicle is to be used.

6.3 Application notes for the R-UIM interface

The next pages are application notes to interface the module with R-UIM cards:

- **Application note: interface with 3V R-UIMs**

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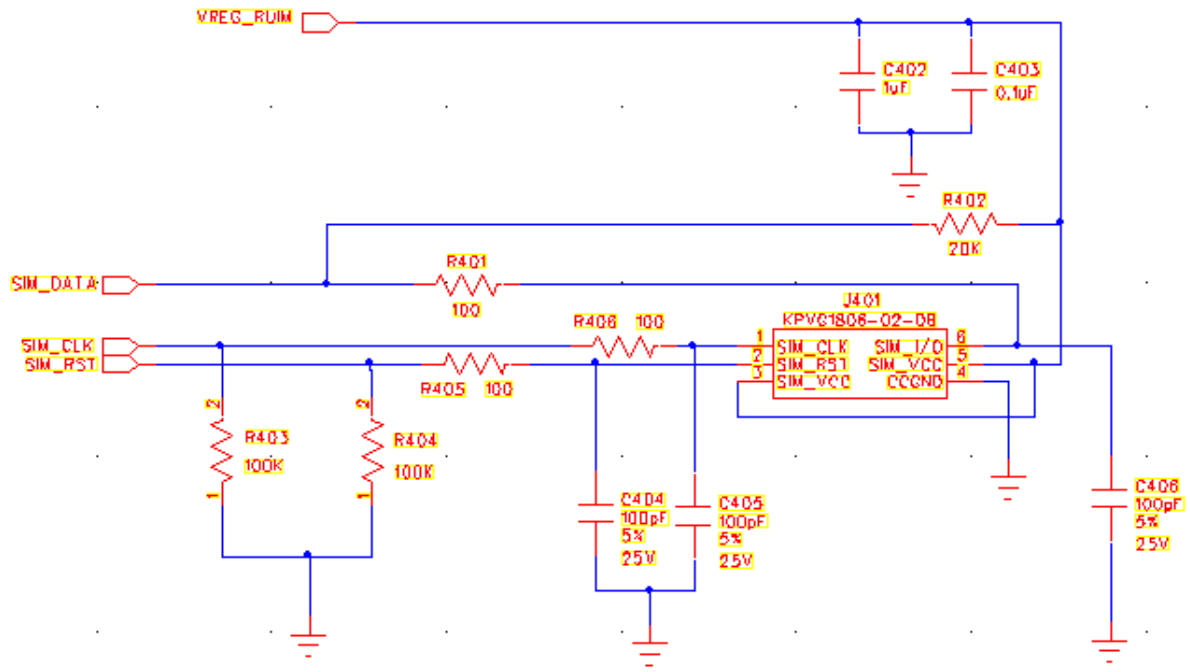

6.4 General Purpose Connector data sheet

The next pages are the NAIS data sheets for the GPC

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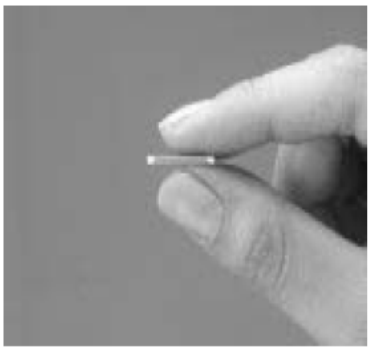
P5 SERIES — P5KF —



Socket and header are mated | Socket | Header

FEATURES

1. Ultra low profile of 1.5mm

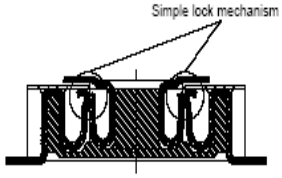
The connector is a two-piece structure and 0.5mm pitch.
The product lineup consists of the stacking height of 1.5mm, 2.0mm and 2.5mm. They allow products to be slimmer.

2. The socket and header has the same dropping shock and torsion resistant construction as the bellows-type contact.

Since the contact is formed by bending thin plate, it has a spring-like quality. This construction helps make it resistant to dropping and twisting.

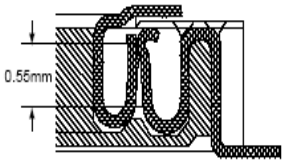
The roll surfaces are in contact with each other, providing high contact reliability.

3. Simple lock mechanism is employed which is suitable for FPC connection.



4. Mating length 0.55mm

While achieving a low profile of 1.5mm between PCBs, the effective mating length has been extended to ensure that there is some latitude in the mating.

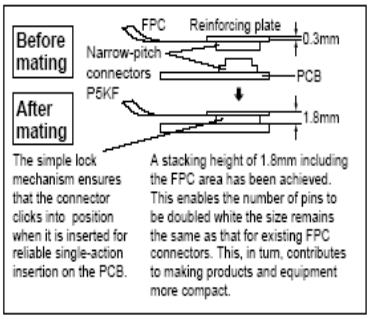


5. Terminal construction prevents solder wicking and bridging.

APPLICATIONS

- Cellular phones
- PHS
- Portable data terminals
- Compact portable devices

Ideal for FPC-to-PCB connections



The simple lock mechanism ensures that the connector clicks into position when it is inserted for reliable single-action insertion on the PCB.

A stacking height of 1.8mm including the FPC area has been achieved. This enables the number of pins to be doubled white the size remains the same as that for existing FPC connectors. This, in turn, contributes to making products and equipment more compact.

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SPECIFICATIONS

1. Characteristics

Item		Specifications	Conditions
Electrical characteristics	Rated current	0.5A/contact (Max. 10 A at total contacts)	
	Rated voltage	60V AC/DC	
	Breakdown voltage	150V AC for 1 minute	Detection current: 1mA
	Insulation resistance	Min. 1,000MΩ (initial)	Using 500V DC megger
	Contact resistance	Max. 90mΩ	Measured based on the HP4338B measurement method of JIS C 5402
Mechanical characteristics	Composite insertion force	Max. 0.981N {100gf}/contacts × contacts (initial)	
	Composite removal force	Min. 0.0588N {6gf}/contacts × contacts	
	Post holding force	Min. 0.981N {100gf}/contact	Measures the maximum load in the post axial direction until removal
Environmental characteristics	Ambient temperature	–55°C to +85°C	No freezing at low temperatures
	Soldering heat resistance	Max. peak temperature of 245°C	Infrared reflow soldering
		300°C within 5 seconds	Soldering iron
	Thermal shock resistance (header and socket mated)	5 cycles, insulation resistance min. 100MΩ, contact resistance max. 90mΩ	Sequence / Temperature (°C) / Time (minutes): 1 / -55^{+0}_{-3} / 30; 2 / 25^{+10}_{-5} / Max. 5; 3 / 85^{+3}_{-0} / 30; 4 / 25^{+10}_{-5} / Max. 5
	Humidity resistance (header and socket mated)	120 hours, insulation resistance min. 100MΩ, contact resistance max. 90mΩ	Bath temperature 40±2°C, humidity 90 to 95% R.H.
	Saltwater spray resistance (header and socket mated)	24 hours, insulation resistance min. 100MΩ, contact resistance max. 90mΩ	Bath temperature 35±2°C, saltwarter concentration 5±1%
	H_2S resistance (header and socket mated)	48 hours, contact resistance max. 90mΩ	Bath temperature 40±2°C, gas concentration 3±1 ppm, humidity 75 to 80% R.H.
	Insertion and removal life	50 times	Repeated insertion and removal speed of max. 200 times/ hours
Unit weight		Stacking height 1.5mm, 20 contacts; Socket: 0.06g Header: 0.04g	

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AXK(5/6)F

2. Material and surface treatment

Part name	Material	Surface treatment
Molded portion	Heat-resistant resin (UL94V-0)	–
Contact/Post	Copper alloy	Contact portion: Au plating over Ni Terminal portion: Au plating over Ni (Except for thick of terminal)

PRODUCT TYPES

Stacking height	No. of contacts	Part No.		Packing	
		Socket	Header	Inner carton (1-reel)	Outer carton
1.5 mm	10	AXK5F10345J	AXK6F10345J		
	12	AXK5F12345J	AXK6F12345J		
	14	AXK5F14345J	AXK6F14345J		
	16	AXK5F16345J	AXK6F16345J		
	20	AXK5F20345J	AXK6F20345J		
	22	AXK5F22345J	AXK6F22345J		
	24	AXK5F24345J	AXK6F24345J		
	26	AXK5F26345J	AXK6F26345J		
	30	AXK5F30345J	AXK6F30345J		
	32	AXK5F32345J	AXK6F32345J		
	34	AXK5F34345J	AXK6F34345J		
	40	AXK5F40345J	AXK6F40345J		
	50	AXK5F50345J	AXK6F50345J		
	60	AXK5F60345J	AXK6F60345J		
	70	AXK5F70345J	AXK6F70345J		
	80	AXK5F80345J	AXK6F80345J		
	10	AXK5F10545J	AXK6F10345J		
	12	AXK5F12545J	AXK6F12345J		
	14	AXK5F14545J	AXK6F14345J		
	16	AXK5F16545J	AXK6F16345J		
	18	AXK5F18545J	AXK6F18345J		
	20	AXK5F20545J	AXK6F20345J		

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2.0 mm	22	AXK5F22545J	AXK6F22345J	Note 1) "Asterisk" mark on end of part No.; J: 2,000 pieces (recommendation)	Note 1) "Asterisk" mark on end of part No.; J: 4,000 pieces (recommendation)
	24	AXK5F24545J	AXK6F24345J		
	30	AXK5F30545J	AXK6F30345J		
	34	AXK5F34545J	AXK6F34345J		
	40	AXK5F40545J	AXK6F40345J		
	50	AXK5F50545J	AXK6F50345J		
	60	AXK5F60545J	AXK6F60345J		
	70	AXK5F70545J	AXK6F70345J		
	80	AXK5F80545J	AXK6F80345J		
	100	AXK5F00545J	AXK6F00345J		
2.5 mm	10	AXK5F10545J	AXK6F10545J		
	12	AXK5F12545J	AXK6F12545J		
	14	AXK5F14545J	AXK6F14545J		
	16	AXK5F16545J	AXK6F16545J		
	20	AXK5F20545J	AXK6F20545J		
	22	AXK5F22545J	AXK6F22545J		
	24	AXK5F24545J	AXK6F24545J		
	30	AXK5F30545J	AXK6F30545J		
	34	AXK5F34545J	AXK6F34545J		
	40	AXK5F40545J	AXK6F40545J		
	50	AXK5F50545J	AXK6F50545J		
	60	AXK5F60545J	AXK6F60545J		
	70	AXK5F70545J	AXK6F70545J		
	80	AXK5F80545J	AXK6F80545J		
	100	AXK5F00545J	AXK6F00545J		

Notes) 1. In order to reduce the amount of packaging materials used to help protect the global environment, it is recommended that each packaging box contain 2,000 units with the "J" product number suffix. Embossed tape packages containing 1,000 units in the inner carton (1-reel) are also available. The latter have the "P" product number suffix. When placing orders, change the "J" suffix to the "suffix P."

2. Regarding ordering units, During production: Please make orders in 1-reel units.
Samples for mounting confirmation: Please consult us. (See "Regarding sample orders to confirm proper mounting" on page 9.)
Samples: Small lot orders are possible. Change the suffix "J" to the suffix "P."

3. The standard type comes with no positioning bosses. Connectors with positioning bosses are available for on-demand production. For this type of connector, 9th digit of the part no. changes from 4 to 3. e.g.
Stacking height 1.5mm, 10 contacts for sockets: AXK5F10335J

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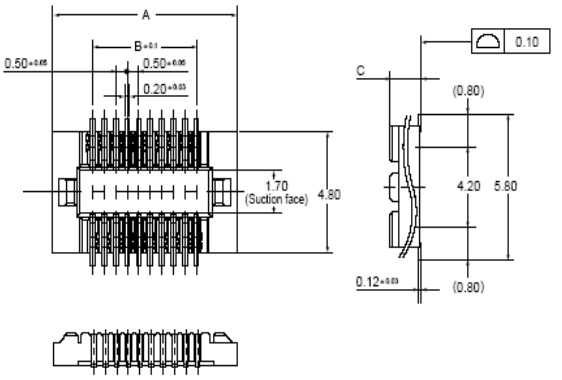
AXK(5/6)F

DIMENSIONS

mm General tolerance ±0.2

• Socket (stacking height: 1.5mm, 2.0mm, 2.5mm)



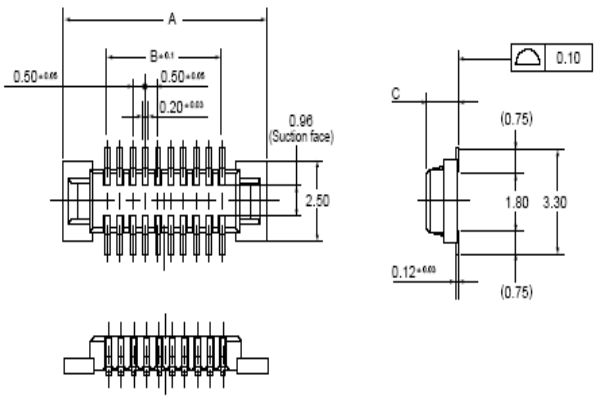
Dimension table (mm)

No. of contacts	A	B
10	5.50	2.00
12	6.00	2.50
14	6.50	3.00
16	7.00	3.50
18	7.50	4.00
20	8.00	4.50
22	8.50	5.00
24	9.00	5.50
26	9.50	6.00
30	10.50	7.00
32	11.00	7.50
34	11.50	8.00
40	13.00	9.50
50	15.50	12.00
60	18.00	14.50
70	20.50	17.00
80	23.00	19.50
100	28.00	24.50

Stacking height	C
1.5 mm	1.35
2.0 mm, 2.5 mm	1.85

Note) P5K series (stacking heights: 3 mm and 3.5 mm) and the P5KS series (stacking heights: 4.0 mm, 4.5 mm, 5.0 mm, 5.5 mm, 6.0 mm, 6.5 mm, 7 mm, 8 mm, and 9 mm) cannot be mated to this type.

• Header (stacking height: 1.5mm, 2.0mm, 2.5mm)



Dimension table (mm)

No. of contacts	A	B
10	5.50	2.00
12	6.00	2.50
14	6.50	3.00
16	7.00	3.50
18	7.50	4.00
20	8.00	4.50
22	8.50	5.00
24	9.00	5.50
26	9.50	6.00
30	10.50	7.00
32	11.00	7.50
34	11.50	8.00
40	13.00	9.50
50	15.50	12.00
60	18.00	14.50
70	20.50	17.00
80	23.00	19.50
100	28.00	24.50

Stacking height	C
1.5 mm, 2.0 mm	1.25
2.5 mm	1.75

Note) P5K series (stacking heights: 3 mm and 3.5 mm) and the P5KS series (stacking heights: 4.0 mm, 4.5 mm, 5.0 mm, 5.5 mm, 6.0 mm, 6.5 mm, 7 mm, 8 mm, and 9 mm) cannot be mated to this type.

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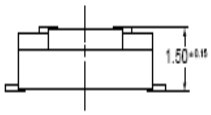
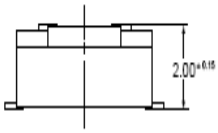
• Socket and header are mated

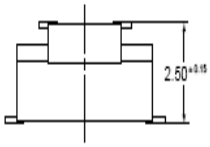
Stacking height: 1.5 mm



Stacking height: 2.0 mm

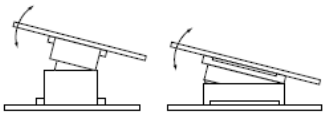


Stacking height: 2.5 mm

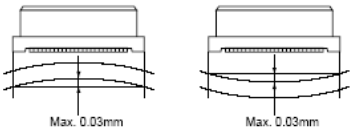


NOTES

1. As shown below, excess force during insertion may result in damage to the connector or removal of the solder. Please be careful. Also, to prevent connector damage plese confirm the correct position before mating connectors.



2. Keep the PC board warp no more than 0.03 mm in relation to the overall length of the connector.

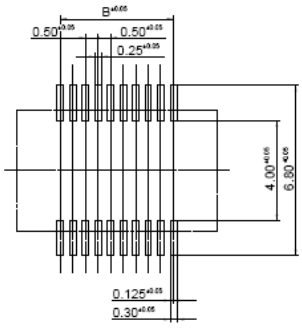


3. PC Boards and Recommended Metal Mask Patterns

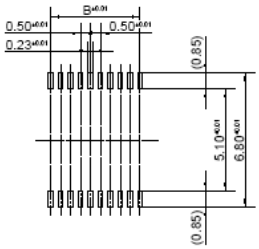
Connectors are mounted with high density, with a pitch interval of 0.4 to 0.5 mm. It is therefore necessary to make sure that the right levels of solder are used, in order to reduce solder bridge and other issues. The figures to the right are recommended metal mask patterns. Please use

• Socket

Recommended PC board pattern
(TOP VIEW)

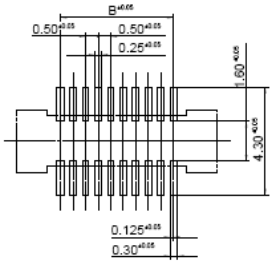


Recommended metal mask pattern
Metal mask thickness: Here, 150 µm
(Opening area ratio: 56%)

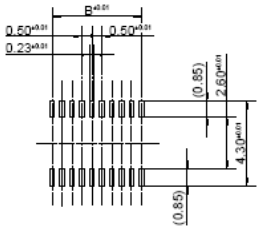


• Header

Recommended PC board pattern
(TOP VIEW)



Recommended metal mask pattern
Metal mask thickness: Here, 150 µm
(Opening area ratio: 58%)



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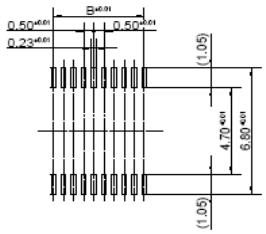
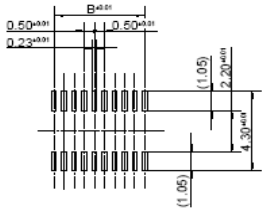
them as a reference.

Recommended metal mask pattern
Metal mask thickness: Here, 120 μm
(Opening area ratio: 69%)



Recommended metal mask pattern
Metal mask thickness: Here, 120 μm
(Opening area ratio: 72%)



* See the dimension table on page 18 for more information on the B dimension of the socket and header.

Regarding general notes, please refer to pages 8 and 9.

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