



T 023-MS-OM-A3 IRF24085DS-02
T 023-MS-OM-A3 IRF24096DS-02
T 024-MS-OM-A3 IRF24192DS-02
T 010-MS-OM-A3 IRF24250DS-02

2400-2483.5 MHz RF Module

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Oct. 04, 1999

InnoMedia IRF24XXXDS

2400-2483.5 MHz RF Module

INTRODUCTION

InnoMedia IRF24XXXDS RF Module is a radio transceiver that provides all of the baseband-to-RF and RF-to-baseband signal conversion functions needed for 2400-2483.5 MHz digital communication. It can accompany the ALFA AIC9001 Spread Spectrum Transceiver integrated circuit to support either digital voice or data communication, in both full-duplex and half-duplex operations. The IRF24XXXDS are high performance, compact size and low power consumption make it ideal for portable, battery-powered wireless products such as digital cordless phone and wireless modem. It also can meet FCC part requirements to let your wireless products get FCC approval easily. Figure 1 and 2 show the typical system applications for cordless phone and wireless modem.

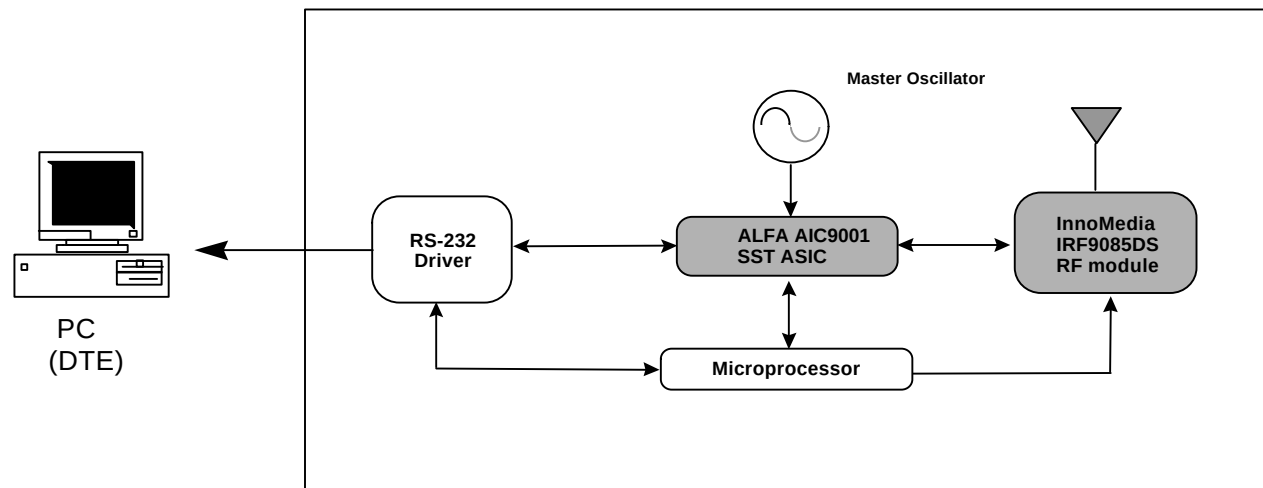


Figure 1. Block diagram of Wireless modem
Note : MO = Master Oscillator

FEATURES

- Designed for 2400-2483.5 Mhz wireless communication systems.
- Time Division Duplexing (TDD).
- GMSK Modulation/Demodulation.
- Single conversion receiver.
- Conforms to FCC part 15 requirements.
- Power management for supply current minimization.
- Low material cost.
- Two tuning points only.
- Provides 33/29/16/13 non-overlapping channels with AIC9001 SST chip.
- Compact size (45mm x 60mm x 10 mm)

RF MODULE BLOCK DIAGRAM

The IRF24XXXDS RF Module is a complete combination of transmitter and receiver . The functional block diagram is shown in Figure 2.

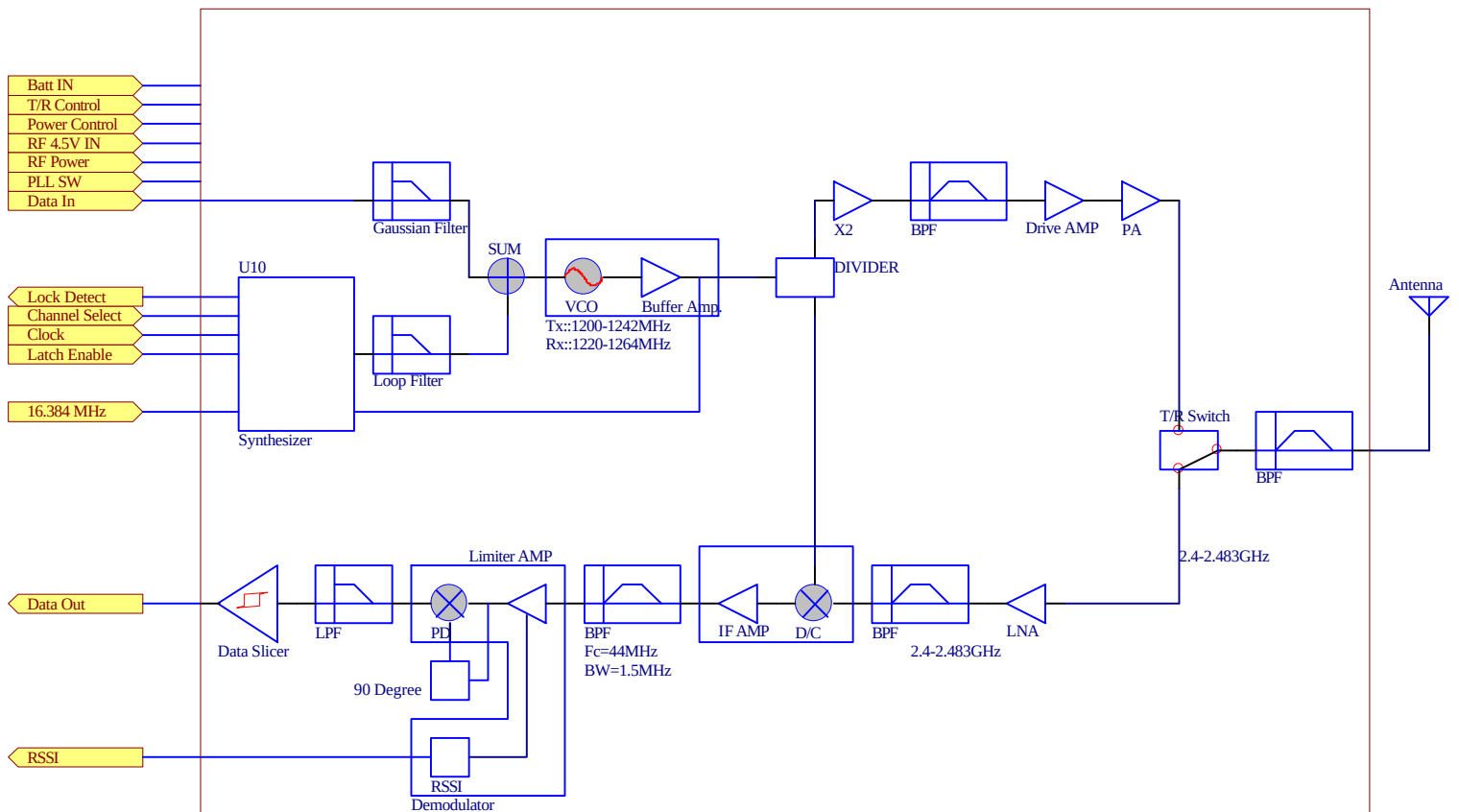


Figure 2. Block diagram of RF Module

A) TRANSMITTER

The module employs a T/R switch to switch between transmit and receive in the time domain. The MODOUT spread baseband digital data signal is filtered and up-converted to RF by the GMSK modulator. Due to the following properties: constant envelope, compact spectrum, fast roll-off of higher-order sideband, and easy detection, GMSK is used herein. Then the PA output routes through the transmit/receive (T/R) switch and a ceramic band pass filter is used to remove out-band harmonics before exiting the module at the antenna port.

B) RECEIVER

From the antenna port, the RF signal passes through the ceramic bandpass and the T/R switch to remove the signals outside the 2400-2483.5 MHz band before entering the low noise amplifier (LNA). It then is down-converted to IF signals and filtered by a very high selective SAW filter to reject the out-band spurious and interference. Before going to the Discriminator Demodulator, the IF signals is processed by a limiting amplifier with a gain over 70 dB to improve the noise performance. It finally passes through the LPF and Comparator to get the raw data information. The Receiving Signal Strength Indicator (RSSI) coming out of the limiter can be used as a power control reference for the baseband microprocessor (uP).

C) VCO & SYNTHESIZER

A Single frequency synthesizer (MB15E03SL by Fujitsu) is used together with single voltage controlled oscillator (VCO) to form a synthesized phase locked loop (PLL) for transmission and receiving channel selection. Channel selection is done by programming a control register in the MB15E03SL through a serial interface by a microcontroller. The PLL specification and related information is described in a later section. Detailed specifications for the MB15E03SL can be found in data books from Fujitsu.

SPECIFICATIONS OF RF MODULE

- Frequency Band : 2400 to 2483.5 MHz
- Channel Spacing : 2.56/4.608/5.5 MHz
- Non-overlapping channels: 33/29/16/13 (with the AIC9001 SST chip)
- Frequency Stability +/- 30 ppm (depends on input reference)
- Phase Noise : -90 dBc/Hz @ 100 KHz (depends on input reference)
- PLL Lock Up Time : < 300 us
- Transmission Data Rate : 1.536/3.072/4.0 Mbps
- Power Output : 20+/-2 dBm/high power (with BATT IN >= 4.8V)
- Modulation : GMSK
- Dynamic Range :
 - 30 to -90 dBm @ BER < 10 e-3 for IRF24085DS
 - 30 to -88 dBm @ BER < 10e-3 for IRF24096DS
 - 30 to -87 dBm @ BER < 10e-3 for IRF24192DS
 - 30 to -85 dBm @BER < 10e-3 for IRF24250DS
- Emission : FCC part 15 compliance
- Current Consumption :
 - 200 mA /TX (Typical)
 - 70 mA /RX (Typical)

- T/R Access : TDD

MECHANICAL & ENVIRONMENTAL

- Module Dimensions : 45 mm x 60 mm x 10 mm (including shield case)
- Operating Temperature : 0°C to + 50°C
- Storage Temperature : -30°C to + 70°C

RECOMMENDED ANTENNA SPECIFICATION

- Frequency Range : 2400 to 2483.5 MHz
- Frequency Center : 2442 MHz
- Gain : 2 dBi
- VSWR : 2:1

RF-BASEBAND INTERFACE DESCRIPTIONS & ASSIGNMENTS

The RF Module interface defined herein is the interface to the baseband portion and it is a 16-pin male connector (refer to appendix A). The pin-assignment and description of RF-to-BASEBAND interface is explained as follows and the pin-allocation diagram is depicted in appendix C :

Pin#	Pin Name	Type	Description
1	BATT IN	Input	DC power supply input (min 4.4 V) to provide the DC power of the power amplifiers. current consumption : 120 mA @ 5 V (Typical)
2	16.384/ 18.432/ 9.216/ 12MHz	Input	Input as the reference source of the synthesizer. frequency stability: +/- 30 ppm phase noise : < -110 dBc @ +/- 5 KHz spurious : < -70 dBc @ +/- 500 KHz BW < -45 dBc @ +/- 10 MHz BW
3	GND		Grounding.
4 *	CH SEL	Input	Serial data input to the divider in the synthesizer to set the operation channel. CMOS Level.
5 *	CLOCK	Input	Clock input to synthesizer. CMOS Level.
6 *	LE	Input	Load Enable, rising edge trigger. When LE is HIGH or OPEN, data stored in the shift register is loaded to the appropriate latch. CMOS Level.
7	DATA to DSP (DI)	Output	Demodulated data output to DSP (SST chip). CMOS Level.
8 **	RF PWR	Input	Transmitter on (HIGH) and off (LOW) control. CMOS Level.
9	ZC	Input	Open loop(PLL) , Normal pull "high".
10	DATA from DSP	Input	Data input from DSP(SST chip). As it affects the RF Module transmitter modulation index, the HIGH Level output of it

(MODOUT)		needs to be fixed at 4.0 +/- 0.2 V. HIGH input : 4.0 +/- 0.2 V LOW input : 0 V
11		Not-used.
12	GND	Grounding.
13	RSSI	Output Receiving signal strength indicator. (Voltage various range from 0.5 ~ 1.5 V)
14	**PLLSW	Input Transmitter VCO on (HIGH) and off (LOW) control. CMOS Level. Also used as Receiver on (LOW) and off (HIGH) control.
15	* LD	Not-used.
16	RF4V	Input Regulated 4.0 +/-0.2 Volts power supply input. (50 mA /TX and 70 mA /RX (Typical))

NOTE :1.* denote synthesizer dependent.
2.** denote RF Module TDD control signal from SST chip.
3. I/O pin type is reference to RF Module.

PIN #	Assignment	PIN #	Assignment
1	BATT IN	9	ZC
2	16.384/18.432 9.216/12MHz	10	DATA from DSP
3	GND	11	NC
4	CH SEL	12	GND
5	CLOCK	13	RSSI
6	LE	14	PLL SW
7	DATA to DSP	15	LD
8	RF PWR	16	RF4V

RF-ANTENNA INTERFACE DESCRIPTIONS & ASSIGNMENTS

The only other interface for the RF Module is the antenna port and it is a 2-pin male connector (refer to appendix B). The pin-assignment and descriptions of RF-to-ANTENNA interface is explained as follows and the pin-allocation diagram is depicted in appendix C :

Pin#	Pin Name	Type	Description
1	GND	Output	Grounding.
2	RF OUT	Output	2.4 GHz RF signal output and output impedance is 50 ohms.

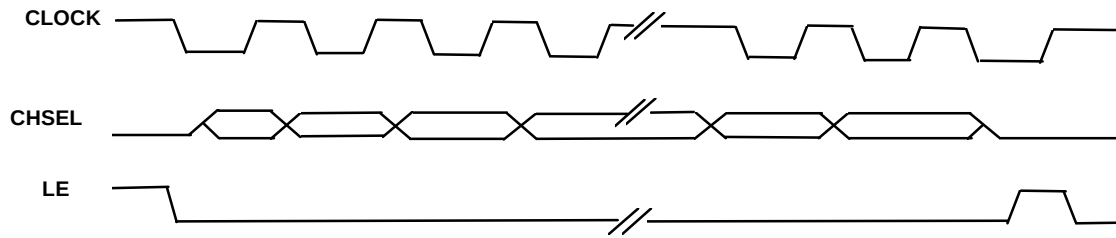
FREQUENCY SYNTHESIZED PLL SPECIFICATIONS , CONTROL REGISTER BIT ALLOCATION FOR MB15E03SL AND CHANNEL ASSIGNMENT

A) SYNTHESIZER SPECIFICATIONS

- Operation Frequency TX: please see table
RX: please see table
- Channel Spacing 2.304/2.56/4.608/5.5 MHz
- Channel Scanning Speed < 300 us
- Frequency Stability +/-50 ppm
- Phase Noise -90 dBc/Hz @ 100 KHz
- Reference Frequency 18.432/9.216/12 MHz
- Reference Input Power -10 to +6 dBm

B) REGISTER CONTROL (uses CH SEL, CLOCK,LE)

a) The control signal timing of MB15E03SL (See Fujitsu data sheet for detail)



b) Set Parameter

(a) Table for IRF24085DS

Set Parameter

Reference Frequency		16.384E+00							
Loop Reference Frequency		128.000E+03							
Reference Divider Ratio									
Main_R Register				MSB				LSB	HEX
	R=	CS	LDS	FC	SW	R14 to R1	CNT		
	0.000128	0	0	1	1	0000000000000000	1	18001	
Prescaler									
64									
Channel spece		step	11011						
2.304E+06		9							
TX VCO1 Divider Ratio									
				MSB				LSB	
Channel	FREQ	VCO FREQ	Divider Ratio	N=(DEC)	A=(DEC)	MN11 to MN1	MA7 to MA1	CNT	HEX
CH01	2.405376E+09	1.202688E+09	9396	146	52	00010010010	0110100	0	09268
CH02	2.407680E+09	1.203840E+09	9405	146	61	00010010010	0111101	0	0927A
CH03	2.409984E+09	1.204992E+09	9414	147	6	00010010011	0000110	0	0930C
CH04	2.412288E+09	1.206144E+09	9423	147	15	00010010011	0001111	0	0931E
CH05	2.414592E+09	1.207296E+09	9432	147	24	00010010011	0011000	0	09330
CH06	2.416896E+09	1.208448E+09	9441	147	33	00010010011	0100001	0	09342
CH07	2.419200E+09	1.209600E+09	9450	147	42	00010010011	0101010	0	09354
CH08	2.421504E+09	1.210752E+09	9459	147	51	00010010011	0110011	0	09366
CH09	2.423808E+09	1.211904E+09	9468	147	60	00010010011	0111100	0	09378
CH10	2.426112E+09	1.213056E+09	9477	148	5	00010010100	0000101	0	0940A
CH11	2.428416E+09	1.214208E+09	9486	148	14	00010010100	0001110	0	0941C
CH12	2.430720E+09	1.215360E+09	9495	148	23	00010010100	0010111	0	0942E

CH13	2.433024E+09	1.216512E+09	9504	148	32	00010010100	0100000	0	09440
CH14	2.435328E+09	1.217664E+09	9513	148	41	00010010100	0101001	0	09452
CH15	2.437632E+09	1.218816E+09	9522	148	50	00010010100	0110010	0	09464
CH16	2.439936E+09	1.219968E+09	9531	148	59	00010010100	0111011	0	09476
CH17	2.442240E+09	1.221120E+09	9540	149	4	00010010101	0000100	0	09508
CH18	2.444544E+09	1.222272E+09	9549	149	13	00010010101	0001101	0	0951A
CH19	2.446848E+09	1.223424E+09	9558	149	22	00010010101	0010110	0	0952C
CH20	2.449152E+09	1.224576E+09	9567	149	31	00010010101	0011111	0	0953E
CH21	2.451456E+09	1.225728E+09	9576	149	40	00010010101	0101000	0	09550
CH22	2.453760E+09	1.226880E+09	9585	149	49	00010010101	0110001	0	09562
CH23	2.456064E+09	1.228032E+09	9594	149	58	00010010101	0111010	0	09574
CH24	2.458368E+09	1.229184E+09	9603	150	3	00010010110	0000011	0	09606
CH25	2.460672E+09	1.230336E+09	9612	150	12	00010010110	0001100	0	09618
CH26	2.462976E+09	1.231488E+09	9621	150	21	00010010110	0010101	0	0962A
CH27	2.465280E+09	1.232640E+09	9630	150	30	00010010110	0011110	0	0963C
CH28	2.467584E+09	1.233792E+09	9639	150	39	00010010110	0100111	0	0964E
CH29	2.469888E+09	1.234944E+09	9648	150	48	00010010110	0110000	0	09660
CH30	2.472192E+09	1.236096E+09	9657	150	57	00010010110	0111001	0	09672
CH31	2.474496E+09	1.237248E+09	9666	151	2	00010010111	0000010	0	09704
CH32	2.476800E+09	1.238400E+09	9675	151	11	00010010111	0001011	0	09716
CH33	2.479104E+09	1.239552E+09	9684	151	20	00010010111	0010100	0	09728

IF Filter

Step

4.400000E+07

172

RX VCO2 Divider Ratio

FREQ	VCO FREQ	Divider Ratio	N=(DEC)	A=(DEC)	MSB MN11 to MN1	MA7 to MA1	LSB CNT	HEX
CH01	2.449408E+09	1.224704E+09	9568	149	32	00010010101	0100000	0 09540
CH02	2.451712E+09	1.225856E+09	9577	149	41	00010010101	0101001	0 09552
CH03	2.454016E+09	1.227008E+09	9586	149	50	00010010101	0110010	0 09564
CH04	2.456320E+09	1.228160E+09	9595	149	59	00010010101	0111011	0 09576
CH05	2.458624E+09	1.229312E+09	9604	150	4	00010010110	0000100	0 09608
CH06	2.460928E+09	1.230464E+09	9613	150	13	00010010110	0001101	0 0961A
CH07	2.463232E+09	1.231616E+09	9622	150	22	00010010110	0010110	0 0962C
CH08	2.465536E+09	1.232768E+09	9631	150	31	00010010110	0011111	0 0963E
CH09	2.467840E+09	1.233920E+09	9640	150	40	00010010110	0101000	0 09650
CH10	2.470144E+09	1.235072E+09	9649	150	49	00010010110	0110001	0 09662
CH11	2.472448E+09	1.236224E+09	9658	150	58	00010010110	0111010	0 09674
CH12	2.474752E+09	1.237376E+09	9667	151	3	00010010111	0000011	0 09706
CH13	2.477056E+09	1.238528E+09	9676	151	12	00010010111	0001100	0 09718
CH14	2.479360E+09	1.239680E+09	9685	151	21	00010010111	0010101	0 0972A
CH15	2.481664E+09	1.240832E+09	9694	151	30	00010010111	0011110	0 0973C
CH16	2.395904E+09	1.197952E+09	9359	146	15	00010010010	0001111	0 0921E
CH17	2.398208E+09	1.199104E+09	9368	146	24	00010010010	0011000	0 09230
CH18	2.400512E+09	1.200256E+09	9377	146	33	00010010010	0100001	0 09242
CH19	2.402816E+09	1.201408E+09	9386	146	42	00010010010	0101010	0 09254
CH20	2.405120E+09	1.202560E+09	9395	146	51	00010010010	0110011	0 09266
CH21	2.407424E+09	1.203712E+09	9404	146	60	00010010010	0111100	0 09278
CH22	2.409728E+09	1.204864E+09	9413	147	5	00010010011	0000101	0 0930A
CH23	2.412032E+09	1.206016E+09	9422	147	14	00010010011	0001110	0 0931C
CH24	2.414336E+09	1.207168E+09	9431	147	23	00010010011	0010111	0 0932E
CH25	2.416640E+09	1.208320E+09	9440	147	32	00010010011	0100000	0 09340
CH26	2.418944E+09	1.209472E+09	9449	147	41	00010010011	0101001	0 09352
CH27	2.421248E+09	1.210624E+09	9458	147	50	00010010011	0110010	0 09364
CH28	2.423552E+09	1.211776E+09	9467	147	59	00010010011	0111011	0 09376
CH29	2.425856E+09	1.212928E+09	9476	148	4	00010010100	0000100	0 09408
CH30	2.428160E+09	1.214080E+09	9485	148	13	00010010100	0001101	0 0941A
CH31	2.430464E+09	1.215232E+09	9494	148	22	00010010100	0010110	0 0942C
CH32	2.432768E+09	1.216384E+09	9503	148	31	00010010100	0011111	0 0943E
CH33	2.435072E+09	1.217536E+09	9512	148	40	00010010100	0101000	0 09450

(b) Table for IRF24096D

Set Parameter

Reference Frequency 18.432E+06
 Loop Reference Frequency 256.000E+03

Reference Divider Ratio

Main_R Register
 R= 72 CS 0 MSB LDS 0 FC 1 SW 1 R14 to R1 00000001001000 CNT 1 18091

Prescaler

64

Channel spece step
 2.560E+06 5

TX VCO1 Divider Ratio

Channel	FREQ	VCO FREQ	Divider Ratio	N=(DEC)	A=(DEC)	MSB MN11 to MN1	MA7 to MA1	LSB CNT	HEX
CH01	2.405888E+09	1.202944E+09	4699	73	27	00001001001	0011011	0	04936
CH02	2.408448E+09	1.204224E+09	4704	73	32	00001001001	0100000	0	04940
CH03	2.411008E+09	1.205504E+09	4709	73	37	00001001001	0100101	0	0494A
CH04	2.413568E+09	1.206784E+09	4714	73	42	00001001001	0101010	0	04954
CH05	2.416128E+09	1.208064E+09	4719	73	47	00001001001	0101111	0	0495E
CH06	2.418688E+09	1.209344E+09	4724	73	52	00001001001	0110100	0	04968
CH07	2.421248E+09	1.210624E+09	4729	73	57	00001001001	0111001	0	04972
CH08	2.423808E+09	1.211904E+09	4734	73	62	00001001001	0111110	0	0497C
CH09	2.426368E+09	1.213184E+09	4739	74	3	00001001010	0000011	0	04A06
CH10	2.428928E+09	1.214464E+09	4744	74	8	00001001010	0001000	0	04A10
CH11	2.431488E+09	1.215744E+09	4749	74	13	00001001010	0001101	0	04A1A
CH12	2.434048E+09	1.217024E+09	4754	74	18	00001001010	0010010	0	04A24
CH13	2.436608E+09	1.218304E+09	4759	74	23	00001001010	0010111	0	04A2E
CH14	2.439168E+09	1.219584E+09	4764	74	28	00001001010	0011100	0	04A38
CH15	2.441728E+09	1.220864E+09	4769	74	33	00001001010	0100001	0	04A42
CH16	2.444288E+09	1.222144E+09	4774	74	38	00001001010	0100110	0	04A4C
CH17	2.446848E+09	1.223424E+09	4779	74	43	00001001010	0101011	0	04A56
CH18	2.449408E+09	1.224704E+09	4784	74	48	00001001010	0110000	0	04A60
CH19	2.451968E+09	1.225984E+09	4789	74	53	00001001010	0110101	0	04A6A
CH20	2.454528E+09	1.227264E+09	4794	74	58	00001001010	0111010	0	04A74
CH21	2.457088E+09	1.228544E+09	4799	74	63	00001001010	0111111	0	04A7E
CH22	2.459648E+09	1.229824E+09	4804	75	4	00001001011	0000100	0	04B08
CH23	2.462208E+09	1.231104E+09	4809	75	9	00001001011	0001001	0	04B12
CH24	2.464768E+09	1.232384E+09	4814	75	14	00001001011	0001110	0	04B1C
CH25	2.467328E+09	1.233664E+09	4819	75	19	00001001011	0010011	0	04B26
CH26	2.469888E+09	1.234944E+09	4824	75	24	00001001011	0011000	0	04B30
CH27	2.472448E+09	1.236224E+09	4829	75	29	00001001011	0011101	0	04B3A
CH28	2.475008E+09	1.237504E+09	4834	75	34	00001001011	0100010	0	04B44
CH29	2.477568E+09	1.238784E+09	4839	75	39	00001001011	0100111	0	04B4E

IF Filter

Step

4.400000E+07 86

RX VCO2 Divider Ratio

FREQ	VCO FREQ	Divider Ratio	N=(DEC)	A=(DEC)	MN11 to MN1	MA7 to MA1	CNT	HEX
CH01 2.449920E+09	1.224960E+09	4785	74	49	00001001010	0110001	0	04A62
CH02 2.452480E+09	1.226240E+09	4790	74	54	00001001010	0110110	0	04A6C
CH03 2.455040E+09	1.227520E+09	4795	74	59	00001001010	0111011	0	04A76
CH04 2.457600E+09	1.228800E+09	4800	75	0	00001001011	0000000	0	04B00
CH05 2.460160E+09	1.230080E+09	4805	75	5	00001001011	0000101	0	04B0A
CH06 2.462720E+09	1.231360E+09	4810	75	10	00001001011	0001010	0	04B14
CH07 2.465280E+09	1.232640E+09	4815	75	15	00001001011	0001111	0	04B1E
CH08 2.467840E+09	1.233920E+09	4820	75	20	00001001011	0010100	0	04B28
CH09 2.470400E+09	1.235200E+09	4825	75	25	00001001011	0011001	0	04B32
CH10 2.472960E+09	1.236480E+09	4830	75	30	00001001011	0011110	0	04B3C
CH11 2.475520E+09	1.237760E+09	4835	75	35	00001001011	0100011	0	04B46
CH12 2.478080E+09	1.239040E+09	4840	75	40	00001001011	0101000	0	04B50
CH13 2.480640E+09	1.240320E+09	4845	75	45	00001001011	0101101	0	04B5A
CH14 2.483200E+09	1.241600E+09	4850	75	50	00001001011	0110010	0	04B64

CH15	2.485760E+09	1.242880E+09	4855	75	55	00001001011	0110111	0	04B6E
CH16	2.400256E+09	1.200128E+09	4688	73	16	00001001001	0010000	0	04920
CH17	2.402816E+09	1.201408E+09	4693	73	21	00001001001	0010101	0	0492A
CH18	2.405376E+09	1.202688E+09	4698	73	26	00001001001	0011010	0	04934
CH19	2.407936E+09	1.203968E+09	4703	73	31	00001001001	0011111	0	0493E
CH20	2.410496E+09	1.205248E+09	4708	73	36	00001001001	0100100	0	04948
CH21	2.413056E+09	1.206528E+09	4713	73	41	00001001001	0101001	0	04952
CH22	2.415616E+09	1.207808E+09	4718	73	46	00001001001	0101110	0	0495C
CH23	2.418176E+09	1.209088E+09	4723	73	51	00001001001	0110011	0	04966
CH24	2.420736E+09	1.210368E+09	4728	73	56	00001001001	0111000	0	04970
CH25	2.423296E+09	1.211648E+09	4733	73	61	00001001001	0111101	0	0497A
CH26	2.425856E+09	1.212928E+09	4738	74	2	00001001010	0000010	0	04A04
CH27	2.428416E+09	1.214208E+09	4743	74	7	00001001010	0000111	0	04A0E
CH28	2.430976E+09	1.215488E+09	4748	74	12	00001001010	0001100	0	04A18
CH29	2.433536E+09	1.216768E+09	4753	74	17	00001001010	0010001	0	04A22

(c) Table for IRF24192DS

Set Parameter

Reference Frequency 9.216E+06
 Loop Reference Frequency 256.000E+03
 Reference Divider Ratio

Main_R Register	MSB	LDS	FC	SW	R14 to R1	LSB	HEX
R=	CS				CNT		
36	0	0	1	1	00000000100100	1	18049

Prescaler

64

Channel spece step
 4.608E+06 9

TX VCO1 Divider Ratio

Channel	FREQ	VCO FREQ	Divider Ratio	N=(DEC)	A=(DEC)	MSB MN11 to MN1	MA7 to MA1	LSB CNT	HEX
CH01	2.406912E+09	1.203456E+09	4701	73	29	00001001001	0011101	0	0493A
CH02	2.411520E+09	1.205760E+09	4710	73	38	00001001001	0100110	0	0494C
CH03	2.416128E+09	1.208064E+09	4719	73	47	00001001001	0101111	0	0495E
CH04	2.420736E+09	1.210368E+09	4728	73	56	00001001001	0111000	0	04970
CH05	2.425344E+09	1.212672E+09	4737	74	1	00001001010	0000001	0	04A02
CH06	2.429952E+09	1.214976E+09	4746	74	10	00001001010	0001010	0	04A14
CH07	2.434560E+09	1.217280E+09	4755	74	19	00001001010	0010011	0	04A26
CH08	2.439168E+09	1.219584E+09	4764	74	28	00001001010	0011100	0	04A38
CH09	2.443776E+09	1.221888E+09	4773	74	37	00001001010	0100101	0	04A4A
CH10	2.448384E+09	1.224192E+09	4782	74	46	00001001010	0101110	0	04A5C
CH11	2.452992E+09	1.226496E+09	4791	74	55	00001001010	0110111	0	04A6E
CH12	2.457600E+09	1.228800E+09	4800	75	0	00001001011	0000000	0	04B00
CH13	2.462208E+09	1.231104E+09	4809	75	9	00001001011	0001001	0	04B12
CH14	2.466816E+09	1.233408E+09	4818	75	18	00001001011	0010010	0	04B24
CH15	2.471424E+09	1.235712E+09	4827	75	27	00001001011	0011011	0	04B36
CH16	2.476032E+09	1.238016E+09	4836	75	36	00001001011	0100100	0	04B48

IF Filter

Step

4.400000E+07 86

RX VCO2 Divider Ratio

RX VCO2 Divider Ratio					MSB		LSB		
FREQ	VCO FREQ	Divider Ratio	N=(DEC)	A=(DEC)	MN11 to MN1	MA7 to MA1	CNT	HEX	
CH01	2.450944E+09	1.225472E+09	4787	132	35	00010000100	0100011	0	08446
CH02	2.455552E+09	1.227776E+09	4796	133	8	00010000101	0001000	0	08510
CH03	2.460160E+09	1.230080E+09	4805	133	17	00010000101	0010001	0	08522
CH04	2.464768E+09	1.232384E+09	4814	133	26	00010000101	0011010	0	08534
CH05	2.469376E+09	1.234688E+09	4823	133	35	00010000101	0100011	0	08546
CH06	2.473984E+09	1.236992E+09	4832	134	8	00010000110	0001000	0	08610
CH07	2.478592E+09	1.239296E+09	4841	134	17	00010000110	0010001	0	08622
CH08	2.483200E+09	1.241600E+09	4850	134	26	00010000110	0011010	0	08634

CH09 2.399744E+09	1.199872E+09	4687	130	7	00010000010	0000111	0	0820E
CH10 2.404352E+09	1.202176E+09	4696	130	16	00010000010	0010000	0	08220
CH11 2.408960E+09	1.204480E+09	4705	130	25	00010000010	0011001	0	08232
CH12 2.413568E+09	1.206784E+09	4714	130	34	00010000010	0100010	0	08244
CH13 2.418176E+09	1.209088E+09	4723	131	7	00010000011	0000111	0	0830E
CH14 2.422784E+09	1.211392E+09	4732	131	16	00010000011	0010000	0	08320
CH15 2.427392E+09	1.213696E+09	4741	131	25	00010000011	0011001	0	08332
CH16 2.432000E+09	1.216000E+09	4750	131	34	00010000011	0100010	0	08344

(d) Table for IRF24250DS

Set Parameter

Reference Frequency 12.000E+06
 Loop Reference Frequency 250.000E+03
 Reference Divider Ratio
 Main_R Register

R=	CS	MSB LDS	FC	SW	R14 to R1	LSB CNT	HEX
48	0	0	1	1	00000000110000	1	18061

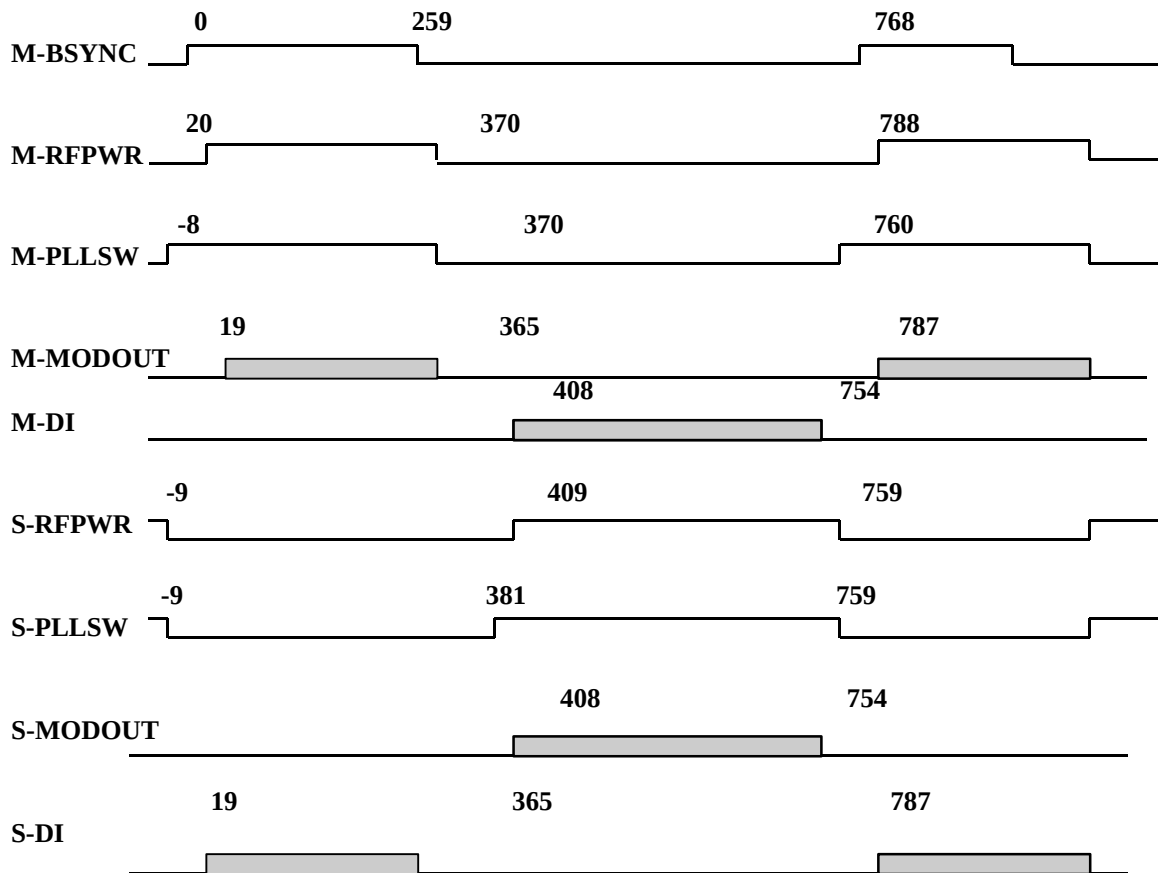
Prescaler
64
 Channel spece step
5.500E+06 11

Channel	FREQ	VCO FREQ	Divider Ratio	N=(DEC)	A=(DEC)	MSB MN11 to MN1	MA7 to MA1	LSB CNT	HEX
CH01	2.408500E+09	1.204250E+09	4817	75	17	00001001011	0010001	0	04B22
CH02	2.414000E+09	1.207000E+09	4828	75	28	00001001011	0011100	0	04B38
CH03	2.419500E+09	1.209750E+09	4839	75	39	00001001011	0100111	0	04B4E
CH04	2.425000E+09	1.212500E+09	4850	75	50	00001001011	0110010	0	04B64
CH05	2.430500E+09	1.215250E+09	4861	75	61	00001001011	0111101	0	04B7A
CH06	2.436000E+09	1.218000E+09	4872	76	8	00001001100	0001000	0	04C10
CH07	2.441500E+09	1.220750E+09	4883	76	19	00001001100	0010011	0	04C26
CH08	2.447000E+09	1.223500E+09	4894	76	30	00001001100	0011110	0	04C3C
CH09	2.452500E+09	1.226250E+09	4905	76	41	00001001100	0101001	0	04C52
CH10	2.458000E+09	1.229000E+09	4916	76	52	00001001100	0110100	0	04C68
CH11	2.463500E+09	1.231750E+09	4927	76	63	00001001100	0111111	0	04C7E
CH12	2.469000E+09	1.234500E+09	4938	77	10	00001001101	0001010	0	04D14
CH13	2.474500E+09	1.237250E+09	4949	77	21	00001001101	0010101	0	04D2A
IF Filter Step 4.500000E+07 90									
RX VCO2 Divider Ratio	FREQ	VCO FREQ	Divider Ratio	N=(DEC)	A=(DEC)	MSB MN11 to MN1	MA7 to MA1	LSB CNT	HEX
CH01	2.453500E+09	1.226750E+09	4907	76	43	00001001100	0101011	0	04C56
CH02	2.459000E+09	1.229500E+09	4918	76	54	00001001100	0110110	0	04C6C
CH03	2.464500E+09	1.232250E+09	4929	77	1	00001001101	0000001	0	04D02
CH04	2.470000E+09	1.235000E+09	4940	77	12	00001001101	0001100	0	04D18
CH05	2.475500E+09	1.237750E+09	4951	77	23	00001001101	0010111	0	04D2E
CH06	2.481000E+09	1.240500E+09	4962	77	34	00001001101	0100010	0	04D44
CH07	2.486500E+09	1.243250E+09	4973	77	45	00001001101	0101101	0	04D5A
CH08	2.492000E+09	1.246000E+09	4984	77	56	00001001101	0111000	0	04D70
CH09	2.497500E+09	1.248750E+09	4995	78	3	00001001110	0000011	0	04E06
CH10	2.503000E+09	1.251500E+09	5006	78	14	00001001110	0001110	0	04E1C
CH11	2.508500E+09	1.254250E+09	5017	78	25	00001001110	0011001	0	04E32
CH12	2.514000E+09	1.257000E+09	5028	78	36	00001001110	0100100	0	04E48
CH13	2.519500E+09	1.259750E+09	5039	78	47	00001001110	0101111	0	04E5E

NOTE : Relatively detailed document and control signals timing for MB15E03SL,
 please refer to the data sheets from Fujitsu.

RF MODULE & SST CHIP INTERFACE TIMING CHART

The RF Module interfaces with the ASIC SST chip through the following pins: DI, MODOUT, PLLSW, and RFPWR. PLLSW and RFPWR are used to switch the PLL and VCO of the transceiver and to power on/off the transmitter power amplifiers. The timing diagram for the PLLSW and RFPWR are shown in Figure 4 when it is used with AIC9001 SST chip for operation in two-way (full-duplex) communication mode, and the timing is assumed that there is no air propagation delay between master and slave. However, when operated in half-duplex communication mode, the PLLSW and RFPWR are always ON (High) when the Module is set as Master (Transmitter) and OFF (Low) when it is set as Slave mode.



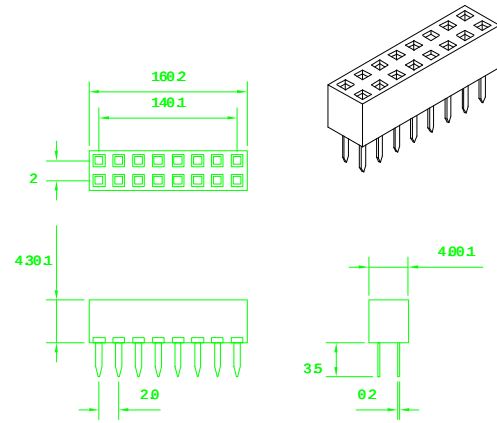
- NOTE:**
1. The timing is expressed as numbers of bits.
 2. The total number of bits per burst is fixed and equal for both the master and slave.
 3. The total Time Frame is 768 bits long.
 4. 1-bit duration = 4.34 us.
 5. Refer to AIC9001 data sheet for detail Frame timing information.

Figure 4. The timing diagram of the PLLSW and RFPWR.

MECHANICAL DRAWING AND INTERFACE PIN-LOCATION

Appendix C show the drawing and interface pin-location.

APPENDIX A



SPECIFICATIONS

Current Rating: 1 Amps

Insulator resistance: 1000M OHM MIN at 500V DC

Dielectric withstanding voltage: 500V AC for one minute

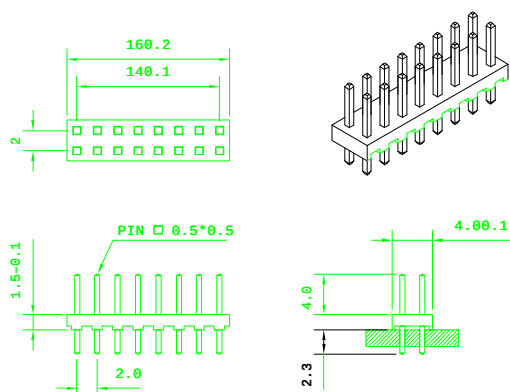
Operating Temperature: -40° ~ +105°C Operating Temperature: -40° C

Contact resistance: 30 Milliohm max at 0V DC 0.3A

Insulator Material: PBT & Glass-Fiber reinforced, UL 94V-0

Contact Material: Copper alloy

APPENDIX B



APPLICATION AND FEATURES

1. Side and end stackable (on unbroken edges).
2. Notches for easy breakable.
3. Variable pin length gold or tin plated.
4. Standoffs facilitate post solder cleaning.
5. Mates with P.C.Board connectors e.g. PLA parts No.PTF2-PTR2-

SPECIFICATIONS

Current Rating: 1 Amps

Insulator resistance: 5000 Megohms min

Dielectric withstanding: AC 500 V

Operating Temperature: -40°-+105°Operating Temperature: -40°C

Contact Material: Brass or phosphor bronze

Insulator Material: Polyester. UL 94V-0

APPENDIX C

