IT900

PIM-908 Reference Design

26 February 2012

IT900-RD-001-R1.2

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1. Abstract

This document details the schematic drawing and bill of materials (BOM) for the Yitran's IT900 PIM 908 (Plug In Module 908 series).
There are 7 variations of PIM-908 modules for 4 different frequency bands defined by the following regulations:

1. US (FCC: 120-400 kHz)
2. Japan (ARIB, MPT: 120-400 kHz)
3. Europe Outdoor:
   a. CA: (CENELEC Band A: 20-80 kHz)
   b. CA2: (CENELEC Band A: 72-92 kHz)
   c. CA3: (CENELEC Band A: 65-95 kHz)
   d. CA4: (CENELEC Band A: 45-95 kHz)
4. Europe Indoor (CENELEC Band B: 95-125kHz)

To facilitate the evaluation and development process, this PIM can be operated with Yitran's Starter Kit platform.

2. PIM 908 Schematic Drawings

Table A

|	Input Filter and Clock Options					
Des.	FCC/SAE/ARIB	CA	CA2	CA3	CA4	CB
C16/C24	18nF	100nF	15nF	15nF	33nF	10nF
L1/L3	33uH	150uH	270uH	270uH	180uH	220uH
L2	150uH	1200uH	100uH	120uH	330uH	82uH
C20	3.9nF	16nF	39nF	33nF	10nF	27nF
C21	N.A.	N.A.	N.A.	1.5nF	10nF	N.A.
Y1	15.36 MHz	15.36 MHz	11.52 MHz	15.36 MHz	15.36 MHz	15.36 MHz

Table B

Capacity	Assembled components	
512Kbit	U2 M24512, R10 4.7k	
1024Kbit	U2&U3 M24512, R10 4.7k	Default
1024Kbit	U3 M24M01	
1536Kbit	U2 M24512, U3 M24M01, R9 4.7k	
2048Kbit	U2&U3 M24M01, R9 4.7k	

* All starred components are not assembled

Title block:

Title IT900-PIM908-1207
Creation Date: 14-Dec-11
Last Modified: 14-Dec-11
Size A3
CONFIDENTIAL
Number 1207
Ver_Rev: 3_1
Sheet 1 Of 1

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3. IT900 Power Line Coupler Schematic Drawings

The IT900 Line Coupler "connects" the PLC modem to the power line. The coupler provides the required insulation between high and low voltage sections and converts a balanced output of the modem to an unbalanced power line. The Line Coupler is not a part of the PIM module and should be designed as a separate unit or part of the power supply according to the schematic below.
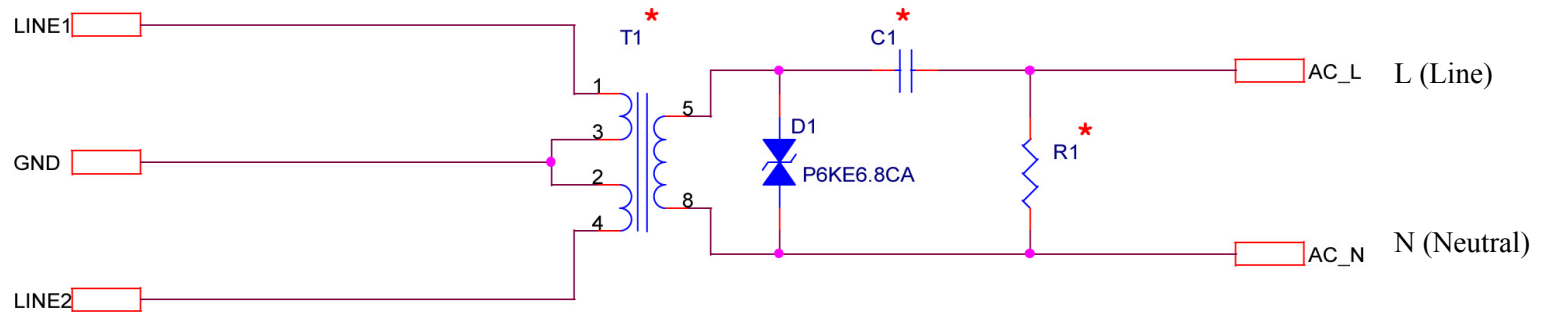
* The Line Coupler's design supports two optional input voltage levels, either 90V-265V or 90V-440V. Please refer to the Document 001_IT900 Line Coupler with HITACHI Transformer (IT900-AN-001-R1.0) for the appropriate list of components required for each voltage level.

4. Power Supply Requirements

Output Voltage, V$_{DC}$	Max. Consumed Power, mAmp		Output Ripple, mVp-p
	RX mode	Tx Mode	
3.3 (±5%)	70	450	50

5. Application Recommendation

It is recommended to use two bypass capacitors (100 uF Tantalum and 0.1 uF ceramic) connected to the power rail (+3.3V and GND). These capacitors must be located close to the power pin of the PIM.

6. BOM for PIM-908

I	Q'ty One Ass.	Part Reference	Part Description	Part Number	Manufacture
1	13	C1, C2, C5, C6, C9, C10, C11, C12, C14, C19, C26, C27	Cap.X7R, 0.1uF,0603,10%,16V, LF/ Cap.X7R, 0.1uF,0603,10%,25V, LF/ Cap.X7R 0.1uF,0603,50V,10%, LF	GMC10X7R104K16NT/ C1608X7R1E104KT/ CL10B104KB8NNNC	CAL-CHIP/ TDK/ SAMSUNG
2	4	C3, C4, C18, C23	Cap.X5R, 10uF,0805,10%,6.3V, LF	0805X106K6R3CP/ C0805C106K9PAC7800 CL21A106KQFNNNE	SINCERA/ KEMET SAMSUNG
3	2	C7, C8	Cap.COG, 18pF,0603,5%,50V, LF	CC0603N180J500T	TEAM YOUNG
4	1	C13	Cap.X7R 1uF,0603,10%,16V,LF	C1608X7R1C105KT000N	TDK
5	1	C15	Cap.X7R, 4.7uF,0603,10%,10V, LF	LMK107BJ475KA- TC1608X5R1A475K	Taiyo Yuden TDK
6	2	C17, C22	Cap.X7R, 0.22uF,0603,10%,16V, LF	CL10B224KO8NNNC GMC10X7R224K16NT	CAL-CHIP SAMSUNG
7	3	C25, C28	Cap.X7R, 4.7uF,0805,10%,16V, LF	GRM21BR71C475KA73L	MURATA
8	1	C30	Cap.X5R, 22uF,0805,10%,6.3V, LF	JMK212BJ226KG-T	Taiyo Yuden
9	2	D1,D2	LED Green 0805 SMD, LF	L-C170KGCT QTLP630C-4-TR	PARA LIGHT/ EVERLIHT
10	1	D3	LED Red 0805 SMD, LF	L-C170KRCT	PARA LIGHT
11	2	D5,D7	DIODE SCHOTTKY 20V 300MW SOT23-3	SDM40E20LS-7-F	Diodes
12	1	P1	Pin header 1.27X2.54mm 25pins. TH LF Pin header 1.27X2.54mm 24pins. TH LF	PH4S17-125GB3.1/2.0U PH4S17-124GB3.1/2.0U	AMTEK
13	1	P2	Pin header 1.27X2.54mm 6pins. TH LF	PH4S17-106GB3.1/2.0U	AMTEK
14	3	R2, R3, R4	Res.680R,5%,1/10W,0603 LF	RC0603JR-07680RL	YAGEO
15	7	R5, R6, R21, R22, R23, R24, R25	Res.100K,5%,1/10W,0603 LF	232270260104/ RC1608J104CS RC0603JR-07 100KL	PHICOMP/ SAMSUNG/ YAGEO
16	1	R8	Res.10M,5%,1/10W,0603	RC0603JR-07 10M	YAGEO
17	5	R10, R11, R20, R26, R27	Res.4.7K,5%,1/10W,0603, LF	RC0603JR-074K7L	YAGEO
18	2	R12, R17	Res.91R, 5%, 0.1W, 0603, LF	301-91-RC RC0603JR-0791RL	XICON YAGEO
19	1	R13	Res.10K,5%,1/10W,0603, LF	RC0603JR-07 10KL	YAGEO

20	2	R14, R16	Res.1R,1%,0.25W,1206, LF	RC1206FR-071RL	YAGEO
21	1	U1	IT900 Chip Renesas MCU TSQFP50P1600X1600X120_HS-100N	IT900YAINC	YITRAN
22	2	U2,U3	EEPROM 512 Kbit M24512-RMN6TP	M24512-RMN6TP	ST
23	1	PCB	IT900-PIM908-1207V3.0	1207V3_0 LF	VICTORIA

FC

				1248	
	2	C16,C24	Cap. X7R, 18nF,0603 5%,50V	CC0603X183J500T	EPCOS
	1	C20	Cap.X7R 3.9nF,0603,50V,5%	GMC10X7R392J50NT	CAL-CHIP
	2	L1,L3	Ind 33uH,1210,5%,Q-30,SRF-17MHz,Rdc-5.6, LF	NLV32T-330J-PF	TDK
	1	L2	Ind.150uH,1812,5%,Q-45,SRF-5MHz,Rdc-9,LF	NL453232T-151J-PF	TDK
	1	Y1	Crystal 15.36MHz,C load =20pF, 120PPM overall (-40 +85)C LF	SMD0603-15.360-20-30/30/E-LF	SHOULDER

Not instal: C21,C29,R7,R9,R18,R19,Q4,Q5,Q6,U4

CA2

				180	
	2	C16,C24	Cap.X7R 15nF,0603,5%,50V LF	CL10B153JB8NNNC	SAMSUNG
	1	C20	Cap.X7R 39nF,0603,5%,50V LF	GMC10X7R393J50NT	CAL-CHIP
	2	L1,L3	Ind 270uH,1210,5%,Q-20(0.796MHz),SRF-5MHz,Rdc-34 LF	NLV32T-271J-PF	TDK
	1	L2	Ind 100uH,1812LS,5%,Q-40,SRF-8.5MHz,Rdc-8.0	NL453232T-101J-PF	TDK
	1	Y1	Crystal 11.52MHz,C load =20pF, 120PPM overall (-40 +85)C LF	SMD0603-11.520-20-30/30/E-LF	SHOULDER

Not instal:C21

CB

|				**180**	
	2	C16,C24	Cap. X7R,10nF, 0603 5%,50V LF	CL10B103JB8NNNC	SAMSUNG
	1	C20	Cap. X7R, 27nF,0603,5%,50V LF	0603B273J500NT	HITANO
	2	L1,L3	Ind 220uH,1210,5%,Q-20(0.796MHz),SRF-7MHz,Rdc-21 LF	NLV32T-221J-PF	TDK
	1	L2	Ind 82uH,1812WI,5%,Q-50,SRF-8MHz,Rdc-7.0/NL453232T-820J-PF	NL453232T-820J-PF	TDK
	1	Y1	Crystal 15.36MHz,C load =20pF, 120PPM overall (-40 +85)C LF	SMD0603-15.360-20-30/30/E-LF	SHOULDER

Not instal:C21

180

CA

	2	C16,C24	Cap. X7R, 100nF,0603 5%,25V LF	CL10B104JB8NNNC	SAMSUNG
	1	C20	Cap. X7R, 16nF,0603,5%,50V, LF	0603X163J500SNT	CAPAX
	2	L1,L3	Ind 150uH,1210,5%,Q-20(0.796MHz),SRF-8MHz,Rdc-15 LF	NLV32T-151J-PF/	TDK
	1	L2	Ind 1.2mH,2220,5%,Q-30,SRF-1.5MHz,Rdc-17 LF	GS565050-122J	GANG SONG
	1	Y1	Crystal 15.36MHz,C load =20pF, 120PPM overall (-40 +85)C LF	SMD0603-15.360-20-30/30/E-LF	SHOULDER

Not instal:C21

CA4   180

	2	C16,C24	Cap.X7R 33nF,0603,5%,50V LF	0603B333J500NT	HITANO
	2	C20,C21	Cap. X7R,10nF, 0603 5%,50V LF	CL10B103JB8NNNC	SAMSUNG
	2	L1,L3	Ind 180uH,1210,5%,Q-20(0.796MHz),SRF-7MHz,Rdc-17	NLV32T-181J-PF	TDK
	1	L2	Ind 330uH,1210,5%,Q-20(0.796MHz),SRF-5MHz,Rdc-34	NLV32T-331J-PF	TDK
	1	Y1	Crystal 15.36MHz,C load =20pF, 120PPM overall (-40 +85)C LF	SMD0603-15.360-20-30/30/E-LF	SHOULDER

7. PIM-908 PCB Drawing
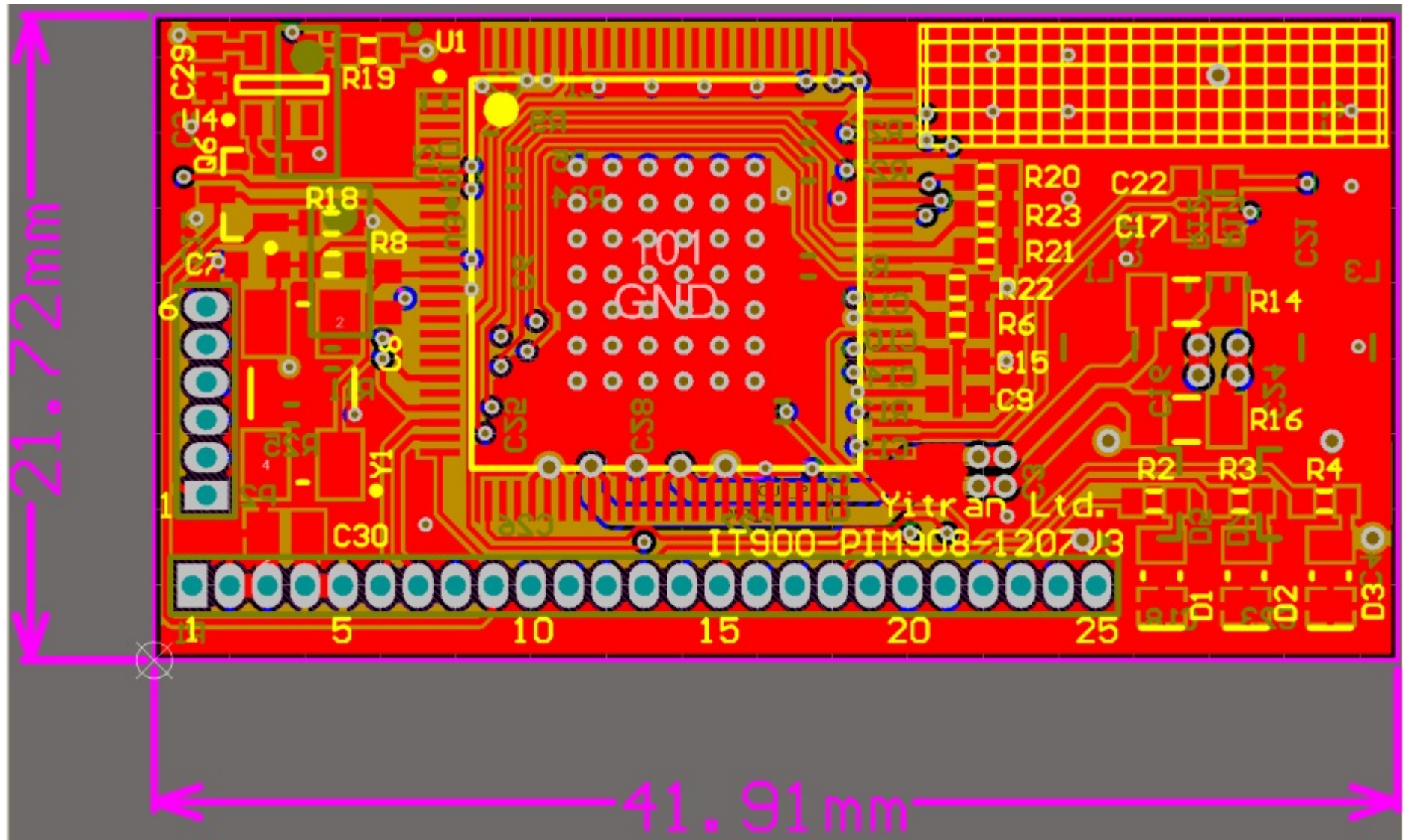
8. PIM 908 Connector Dimensions

The IT900 PIM 908 connector consists of 2 headers with single row of 25 and 6 pins (see Section **Error! Reference source not found.**) The picture below details the dimension of the <u>Female Connector</u> for the IT900 PIM908.

FEMALE HEADER Pitch 1.27mm H=4.6mm STRAIGHT TYPE

SPECIFICATION
Current Rate:1 AMP
Insulation Resistance:1000MΩ Min
Contact Resistance:20mΩ Max
Dielectric voltage:500V AC for one minute
Operation Temperature:-40 ˙C to + 105˙C

MATERIAL
Insulator:Polyester,UL 94V-0
Standard:Nylon 6T
Contact Pin:Phospor Bronze
Finish:Tin, Gold Plated
Standard:Gold Flash all over

2.50
0.75
4.60
2.40

1.27±0.10
PIN 0.40X0.40
1.27 X No. of Contacts-1.27
1.27 X No. of Positions+0.40
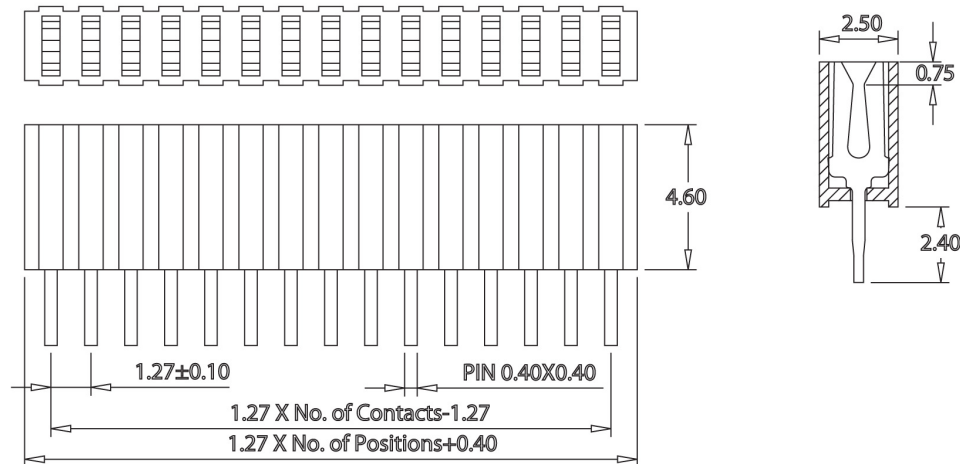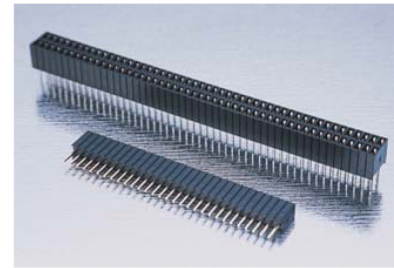
1.27
Recommended PCB Layout
(PCB TOLERANCE ±0.05)
ø0.70

Document Control

Rev.	Date	Description
1.0	20 January 2011	– Creation
1.1	13 march 2011	– Chapter 5 added
1.2	27 February 2012	– PIM-908 BOM and Schematic Drawings updated

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