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**User's Manual**

**IPM 09 (Rev. 3)**

**1<sup>st</sup> edition**

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## Edition

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Manual	29.03.99	EW256MA-03AA	
Schematics	06.04.98	EW256SL-03AA	



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# 1. Introduction

## 1.1 Short Description

The **IPM 09** is a single high industry pack out of the MicroSys IPack piggyback line. It contains an ISDN Basic Rate S/T Interface (S0) that conforms to ITU I.430 based on the Siemens ISDN controller ISAC-S, dual HDLC controller HSCX and audio codec ARCOFI. The **IPM 09** can be configured as Terminal Equipment (TE) or Network Termination (NT) with external power supply.

The **IPM 09** represents a class 1, 8 bit, non DMA, single wide IP-Module with single 5 volt logic interface supply. It was designed according to the Green Spring Logic Interface Specification Revision 0.7.1 for IP-Modules.

## 1.2 Features

- single IPack format
- 32 Byte ID-PROM
- in system programmable control logic
- 6 layer PCB with separate Vcc and Ground layers
- single 5 volt interface supply voltage
- conforms to Interface Specification Revision 0.7.1
- operating temperature range 0° C to 70° C
- Siemens ISDN controller ISAC-S
- Siemens dual HDLC controller HSCX
- Siemens audio codec ARCOFI
- VAC ISDN transformers

## 1.3 Specifications

The power requirements for the **IPM 09** module are shown in the following table:

- Logic interface side supply:

+5V	+/-5%	280mA
-----	-------	-------

- Environmental Requirements:

Operating Temperature	0° C to 70° C
Relative Humidity	0 to 95 % (non-condensing)
Storage Temperature	-40 ° C to + 85 ° C

- Board Dimensions:

Length	99 mm (3.900 inch)
Width	45,72 mm (1.800 inch)

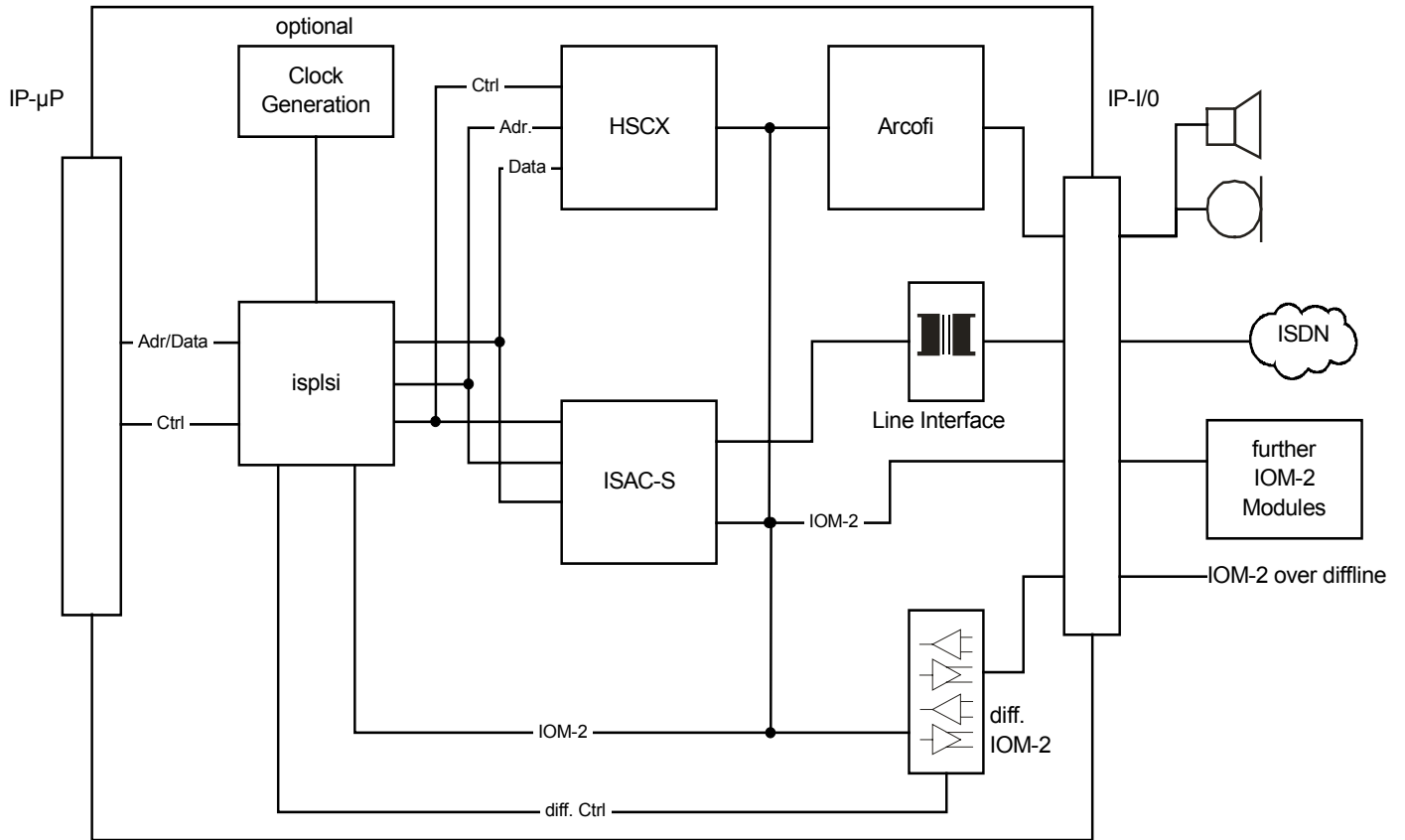
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## 1.4 Related Documentation

The following manuals are applicable to the IPM 09:

- Green Spring IndustryPack Logic Interface Specification
- Siemens ISDN Subscriber Access Controller ISAC<sup>®</sup>-S PEB 2085 User's Manual
- Siemens HSCX High-Level Serial Communications Controller Extended SAB 82525 User's Manual
- Siemens Audio Ringing Codec Filter Basic Function ARCOFI<sup>®</sup>-BA PSB 2161 Data Sheet
- Siemens IOM<sup>®</sup>-2 Interface Reference Guide

# 1.5 IPM 09 Block Diagram



## 2. Delivery

### 2.1 Items shipped with this unit

- User's Manual IPM 09 Hardware
- MicroSys shipping carton



**ATTENTION: STATIC DISCHARGE CAN DESTROY UNIT**

### 2.2 Hints for unpacking, handling and storing

- Avoid touching areas of integrated circuitry.
- Unit should only be placed on a static-free conductive surface
- Unit must only be transported using anti-static bags or MicroSys Shipping carton
- Packing should be saved if unit needs to be reshipped or returned
- When the unit needs to be stored, it should be placed in a moistfree, dustfree environment.  
The storage temperatures and humidity specifications are shown in chapter 1.

## 3. Installation

### 3.1 Items required for IPM 09 installation

For the installation of the IPM 09, the following items are required:

- IP module carrier board
- I/O-Panel for connecting ISDN line and optional external power supply or headset/microphone

### 3.2 Points to be observed

Before the unit is inserted into the card cage, the following points should be observed:

- Unit requires on logic interface side +5V (+/-5%),
- Be sure, the supply voltage is of correct polarity
- Be sure, all connected inputs are of correct polarity
- Be sure, all connected inputs do not exceed the input range voltage
- Unit should only be inserted into, and removed from carrier board when power is off.
- Be sure that no parts of the carrier board within the mounting area are in contact with parts of the IPM 09.
- The operating temperature should never exceed it's specified range.



**GUARANTEE IS VOID IF UNIT IS OPERATED  
OUT OF IT'S SPECIFICATIONS!**

## 4. Detailed Description

### 4.1 Address Map IPM 09

The **IPM 09** supports ID- and IO-Cycles with 8 bit wide data transfers on the data line D0 to D7. It responds on ID-read- and IO-read/write cycles with an acknowledge at the third rising clock edge after a select has been detected. The **IPM 09** does not respond to any select combinations with the memory select line activated.

The **IPM 09** does not drive or accept data on the data lines D8 to D15. The **IPM 09** has no connections made to the ERROR or STROBE line of the IP interface connector ST1. The **IPM 09** does not respond to byte cycles with UDS activated.

Function:	IP-Select Line	Access Type	Data Lane	Address Range
CS-HSCX	Memory Select	byte read/write	D0-D7	\$00 - \$7F
CS-ISAC	Memory Select	byte read/write	D0-D7	\$80 - \$BF
IRQ-Vector-Register	IO-Select	byte read/write	D0-D7	\$03
Control-Register	IO-Select	byte read/write	D0-D7	\$05
Time Slot Register 1	IO-Select	word write only	D0-D15	\$08
Time Slot Register 2	IO-Select	word write only	D0-D15	\$0A

## 4.1.1 Address map with IO-Select active

Vector Register \$03	D7	D6	D5	D4	D3	D2	D1	D0
Reset State	0	0	0	0	0	0	0	0
IRQ vector (Note 1)	X	X	X	X	X	X	X	
Standard mode (Note 2)								0
Freerun mode (Note 3)								1

Note 1: Basic-Vector with 7 Bit only, bit 0 is generated automatically for IRQ with bit 0 reset for ISAC-S (IRQ0), with bit 0 set for HSCX (IRQ1)

Note 2: BCLK and FSYNC is synchronized to ISDN line

Note 3: BCLK and FSYNC are in freerun mode for LT-S configuration

Control Register \$05	D7	D6	D5	D4	D3	D2	D1	D0
Reset State	0	0	0	0	0	0	0	0
IRQ0 enable								1
IRQ0 disable								0
IRQ1 enable							1	
IRQ1 disable							0	
RXE-DU enable						1		
RXE-DU disable						0		
TXE-DU enable					1			
TXE-DU disable					0			
RXE-DD enable				1				
RXE-DD disable				0				
TXE-DD enable			1					
TXE-DD disable			0					
TXE-FS enable		1						
TXE-FS disable		0						
TXE-DC enable	1							
TXE-DC disable	0							

Note: All RXE and TXE bits are only used for external differential IOM-2 connection (optional feature)

TSR1 \$08	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Reset State	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time Slot	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

TSR2 \$0A	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Reset State	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time Slot	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

Note: Time Slot bits are only used for external differential IOM-2 connection (optional feature)

Function of TSR1 & TSR2	State	DS36C200 Control
Time Slot Bit	0	disable
Time Slot Bit	1	enable

Note: Time Slot bits are only used for external differential IOM-2 connection (optional feature)

## 4.1.2 Address map with ID-Select active

Address:	Data:	ASCII or Explanation
\$01	\$49	I
\$03	\$50	P
\$05	\$41	A
\$07	\$43	C
\$09	\$75	MicroSys ID
\$0B	\$09	Model Nr.
\$0D	\$03	Revision
\$0F	\$00	Reserved
\$11	\$01	Driver ID LSB
\$13	\$00	Driver ID MSB
\$15	\$20	Nr.of Bytes used
\$17	\$C0	CRC
\$19	\$49	I
\$1B	\$53	S
\$1D	\$44	D
\$1F	\$4E	N
\$21	\$2D	-
\$23	\$53	S
\$25	\$30	0
\$27	\$2D	-
\$29	\$2D	-
\$2B	\$2D	-
\$2D	\$2D	-
\$2F	\$2D	-
\$31	\$49	I
\$33	\$50	P
\$35	\$4D	M
\$37	\$30	0
\$39	\$39	9
\$3B	\$2D	-
\$3D	\$56	V
\$3F	\$33	3

## 4.2 The Siemens ISDN chipset

The **IPM 09** contains a Siemens ISDN chipset that consists of:

- ISAC-S: ISDN Subscriber Access Controller with built in Layer 1 functionality and an HDLC controller for handling the D-Channel signaling information.
- HSCX: High-Level Serial Communications Controller Extended as a dual HDLC controller to handle the information (transparent or HDLC framed) on the B-Channels.
- ARCOFI-BA: Audio Codec for transmission of speech or audio data on one B-Channel.

## 4.3 I/O Connector ST2 Pin Assignment

ST2:	Name:	Description:
Pin 1	Shield	
Pin 2	NC	
Pin 3	A1/1A	Tx+ of S/T Interface (LT-S: Rx+)
Pin 4	A2/2A	Rx+ of S/T Interface (LT-S: Tx+)
Pin 5	B2/2B	Rx- of S/T Interface (LT-S: Tx-)
Pin 6	B1/1B	Tx- of S/T Interface (LT-S: Rx-)
Pin 7	NC	
Pin 8	Shield	
Pin 9	NC	
Pin 10	NC	
Pin 11	NC	
Pin 12	NC	
Pin 13	NC	
Pin 14	NC	
Pin 15	NC	
Pin 16	GND	
Pin 17	IOM_SDS	IOM-2 Serial Data Strobe (Note 1)
Pin 18	IOM_DD	IOM-2 Data Downstream
Pin 19	IOM_DU	IOM-2 Data Upstream
Pin 20	IOM_BCLK	IOM-2 Bit Clock
Pin 21	IOM_FSC	IOM-2 Frame Sync
Pin 22	IOM_DCLK	IOM-2 Date Clock (BCLK *2)
Pin 23	TS_A	Active Timeslot HSCX Channel A (Note 2)
Pin 24	TS_B	Active Timeslot HSCX Channel B (Note 2)
Pin 25	GND	

ST2:	Name:	Description:
Pin 26	NC	
Pin 27	Power+	External phantom power supply (Note 3)
Pin 28	NC	
Pin 29	NC	
Pin 30	NC	
Pin 31	Power-	External phantom power supply
Pin 32	NC	
Pin 33	MIC+	Microphone 600Ohm (Note 4)
Pin 34	AGND	Audio Ground
Pin 35	MIC+	Microphone 600Ohm
Pin 36	MIC-	Microphone 600Ohm
Pin 37	AGND	Audio Ground
Pin 38	LS+	Speaker/Headset 600Ohm
Pin 39	LS-	Speaker/Headset 600Ohm
Pin 40	NC	
Pin 41	GND	
Pin 42	IOM_DD-	IOM-2 Data Downstream differential (Note 5)
Pin 43	IOM_DD+	IOM-2 Data Downstream differential
Pin 44	IOM_DU-	IOM-2 Data Upstream differential
Pin 45	IOM_DU+	IOM-2 Data Upstream differential
Pin 46	IOM_FSC-	IOM-2 Frame Sync differential
Pin 47	IOM_FSC+	IOM-2 Frame Sync differential
Pin 48	IOM_DCLK-	IOM-2 Date Clock differential
Pin 49	IOM_DCLK+	IOM-2 Date Clock differential
Pin 50	GND	

Note 1: IOM-2 signals (TTL) available for measuring or possible user specific extensions

Note 2: Active Timeslot signal available for measuring (TxClkA/B of HSCX has to be configured as output)

Note 3: For LT-S applications a phantom power supply source according to ITU I.430 may be connected.

Note 4: Please see User's Manual of Siemens ARCOFI.

Note 5: Differential IOM-2 signals available for user specific extensions



**For detailed information about the IOM-2 or the Siemens chipset  
see data sheet or user's manual !**

## 4.4 Configuration of the IOM-2

The **IPM 09** may be delivered in two different configurations, one for Terminal Equipment (TE) and one for Network Termination (NT or LT-S).

Please see below the configuration differences of IOM-2 and the ISDN chips in TE and LT-S mode for programming issues:

Configuration	TE	LT-S
<b>IOM-2</b>		
IOM-2	TE timing mode	Non TE timing mode
DCLK	1,536 MHz	4,096 MHz
BCLK	768 kHz	2,048 MHz
B-Channel	2	16 (Note)
IOM data rate	768 kbit/s	2048 kbit/s
<b>ISAC</b>		
DCLK	Master	Slave
BCLK	Master	n/a
FSYNC	Master	Slave
<b>HSCX</b>		
RxCLK A/B	768 kHz - Slave	2,048 MHz - Slave
IOM-2 Channel	programmable	programmable
Clock mode	5 (over TSA)	5 (over TSA)
<b>ARCOFI</b>		
Address	1	1
IOM-2 Channel	fix	0
B-Channel	programmable	programmable
<b>S/T Line</b>		
Termination	n/a	100 Ohm
Phantom Power	n/a	feedable over ST2

Note: only 2 B-Channels are used

## 4.5 The signal description of the IPM 09

The following interface signals of connector ST1 are not used or connected onboard the **IPM 09** and will not have any effect independent of their state.

ST1	Description
Pin 12	Data lines D8 to D15
Pin 19	
Pin 21	UDS
Pin 22	-12V
Pin 23	+12V
Pin 30	DMA-Request line 0
Pin 32	DMA-Request line 1
Pin 34	DMA-Acknowledge line
Pin 36	reserved line 0
Pin 38	DMA-Done
Pin 40	board error line
Pin 46	board strobe line
Pin 49	reserved line 1

## 4.6 Pin assignment of the logical interface connector ST1

### DSUB Connector Pin:

1	26
2	27
3	28
4	29
5	30
6	31
7	32
8	33
9	34
10	35
11	36
12	37
13	38
14	39
15	40
16	41
17	42
18	43
19	44
20	45
21	46
22	47
23	48
24	49
25	50

### Signal Name:

Ground	Ground
CLOCK	+5V/1A
RESET	R/W*
D0	ID-Select*
D1	(DMA-Request0*)
D2	Memory-Select*
D3	(DMA-Request1*)
D4	Int.-Select*
D5	(DMA-Acknowledge*)
D6	I/O-Select*
D7	(reserved 0)
D8	A1
D9	(DMA-End*)
D10	A2
D11	(Error*)
D12	A3
D13	IRQ0*
D14	A4
D15	IRQ1*
LDS*	A5
UDS*	(Strobe)
(-12V)	A6
(+12V)	Acknowledge*
+5V/1A	(reserved 1)
Ground	Ground

Signals within brackets are not used !

An '\*' indicates a low active signal.

The layout of the pin numbers within this table corresponds with the physical placement of the pins on the 50 pin IP connectors.

## 4.7 Pin assignment of the interface connector ST2

### DSUB Connector Pin:

1	26
2	27
3	28
4	29
5	30
6	31
7	32
8	33
9	34
10	35
11	36
12	37
13	38
14	39
15	40
16	41
17	42
18	43
19	44
20	45
21	46
22	47
23	48
24	49
25	50

### Input Signal Name:

Shield	NC
NC	Power+
A1	NC
A2	NC
B2	NC
B1	Power-
NC	NC
Shield	MIC+
NC	AGND
NC	MIC+
NC	MIC-
NC	AGND
NC	LS+
NC	LS-
NC	NC
	GND GND
IOM_SDS	IOM_DO-
	IOM_DO IOM_DO+
IOM_DU	IOM_DU-
	IOM_BCLK IOM_DU+
IOM_FSC	IOM_FSC-
	IOM_OCLK IOM_FSC+
TS_A	IOM_OCLK-
	TS_B IOM_OCLK+
GND	GND

The layout of the pin numbers within this table corresponds with the physical placement of the pins on the 50 pin IP connectors.

---

## 5. Versions and Jumper settings

TE and LT-S version are factory configurable – no jumper settings required.

## 6. The ispLSI programming port

The 12 pin connector AA of the **IPM 09** is factory used for programming the onboard ispLSI device. This port can only be used for programming purposes with a special interface. Any other connections made to this port may cause permanent damage or not user recoverable malfunctions.



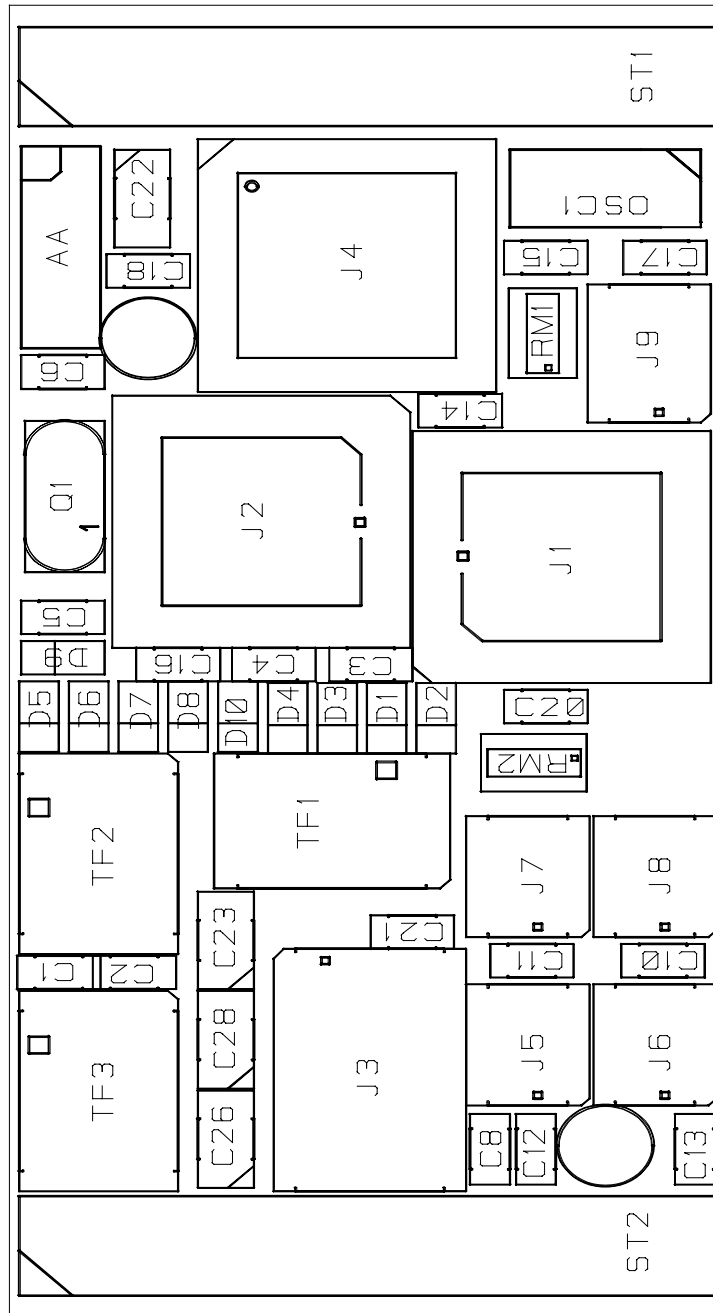
**ATTENTION: DO NOT MAKE ANY CONNECTIONS TO  
CONNECTOR AA !**



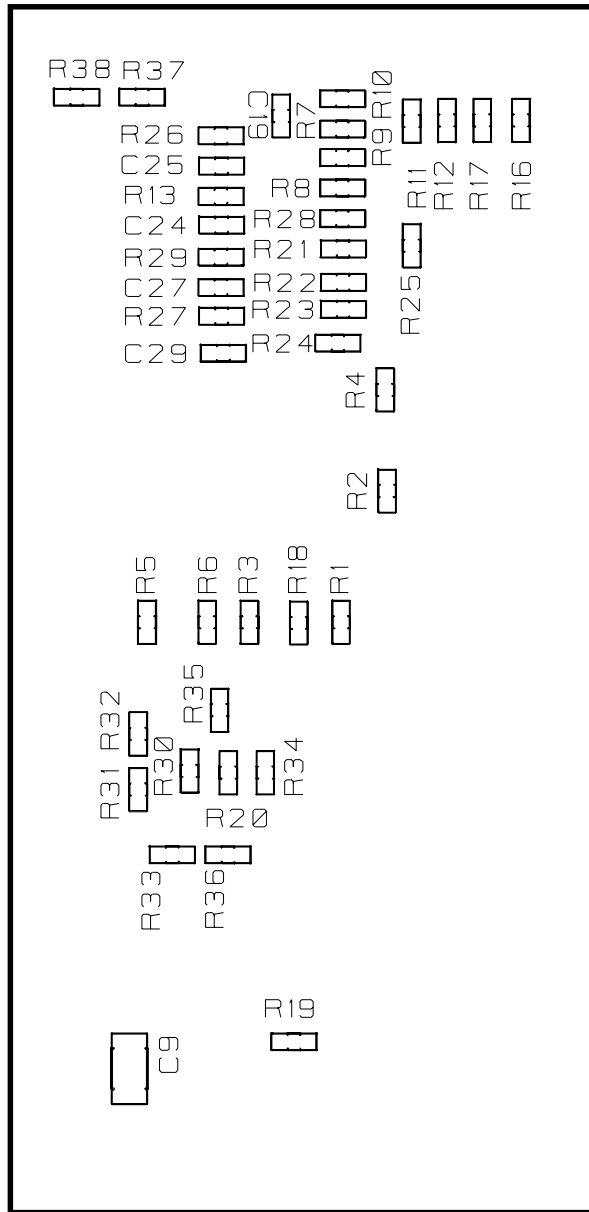
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**Appendices**

# Appendix A: Layout Component side



## Appendix B: Layout solder side



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**Appendix C: Schematics**