[01] - COVER PAGE.SchDoc
[01] - COVER PAGE.SchDoc

[02] - BLOCK DIAGRAM.SchDoc
[02] - BLOCK DIAGRAM.SchDoc

[03] - CONNECTORS_1.SchDoc
[03] - CONNECTORS_1.SchDoc

[04] - CONNECTORS_2.SchDoc
[04] - CONNECTORS_2.SchDoc

[05] - DAC.SchDoc
[05] - DAC.SchDoc

[06] - ADC.SchDoc
[06] - ADC.SchDoc

[07] - Power_Stage.SchDoc
[07] - Power_Stage.SchDoc

[08] - REVISION HISTORY.SchDoc
[08] - REVISION HISTORY.SchDoc

TEMPLATE NOTES

Set Project Parameters

1) Go to Project -> Project Options -> Parameters
2) Set Company, Project and VersionRevision

Mark Not Fitted Components as
NF

Net Class Example

Net Class
ClassName: PCIE

Differential signal example

TITLE Examples (You can change the color to reflect your company color)

PAGE TITLE

Peripheral / Group of component title

Smaller Ttitle

Schematic Status Explanation

DRAFT - Very early stage of schematic, ignore details.

PRELIMINARY - Close to final schematic.

CHECKED - There should not be any mistakes. Tell the engineer if you find one.

RELEASED - A board with this schematic has been sent to production.

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Title: FPGA_Interface_Baseboard		Variant: [No Variations]
Page Contents: FPGA_Interface_BaseBoard V3l1 Project.SchDoc		Jesús Fuente Porta
Size:	DWG NO	Revision: v3.0
Date: 28/06/2019		Sheet 1 of 9

FPGA_Interface_Baseboard

Variant: [No Variations]

28/06/2019
v3.0

CHECKED 05-JUN-2019

DESIGN CONSIDERATIONS

DESIGN NOTE:
Example text for informational design notes .

DESIGN NOTE:
Example text for cautionary design notes.

DESIGN NOTE:
Example text for debug notes.

DESIGN NOTE:
Example text for critical design notes.

LAYOUT NOTE:
Example text for critical layout guidelines.

TOP VIEW

Cannot open file S:\FEDEVEL\iMX6 Rex Development Baseboard\Docs\iMX6 Rex Development bb - top view.jpg

BOTTOM VIEW

Cannot open file S:\FEDEVEL\iMX6 Rex Development Baseboard\Docs\iMX6 Rex Development bb - bottom view.jpg

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FPGA_Interface_Baseboard

(Block Diagram)

Power Supplies

Page 8 **Input Power (10,8~13,2V DC)** +12V

Page 8 **Linear Regulator 10,5 V** → +10,5 V

Page 8 **DC / DC Regulator (+/-) 5V** → (+/-)5 V

Page 8 **Linear Regulator + 3,3 V** → +3,3 V

Page 8 **LDO (Reference) + 2,5 V** → +2,5 V

ADCs

Page 4 **Analog Input 1 (0~2V DC)** — IDC Connector / RF Connector → Page 7 **ADC 1 2 Msps**

Page 4 **Analog Input 2 (0~2V DC)** — IDC Connector / RF Connector → Page 7 **ADC 2 2 Msps**

Page 4 **Analog Input 3 (0~2V DC)** — IDC Connector / RF Connector → Page 7 **ADC 3 2 Msps**

+3,3 V

Page 4 **FPGA Board**

DAC

Page 4 **Analog Output 1 (0~10V DC)** / **Digital Output 1 (0~3,3V DC)** — IDC Connector / RF Connector; Analog Output / Digital Output; Page 5 **Jumper 1**

+10,5 V → Page 6 **Current Transductor G = 10 k**

(+/-)5 V → Page 6 **DAC 1 1 Msps**

+2,5 V → Page 6 **Reference current 1 mA**

Page 4 **Analog Output 2 (0~10V DC)** / **Digital Output 2 (0~3,3V DC)** — IDC Connector / RF Connector; Analog Output / Digital Output; Page 5 **Jumper 2**

+10,5 V → Page 6 **Current Transductor G = 10 k**

(+/-)5 V → Page 6 **DAC 2 1 Msps**

+2,5 V → Page 6 **Reference current 1 mA**

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Page Contens: [02] - BLOCK DIAGRAM.SchDoc	Jesús Fuente Porta	
Size: A2	DWG NO	Revision: v3.0
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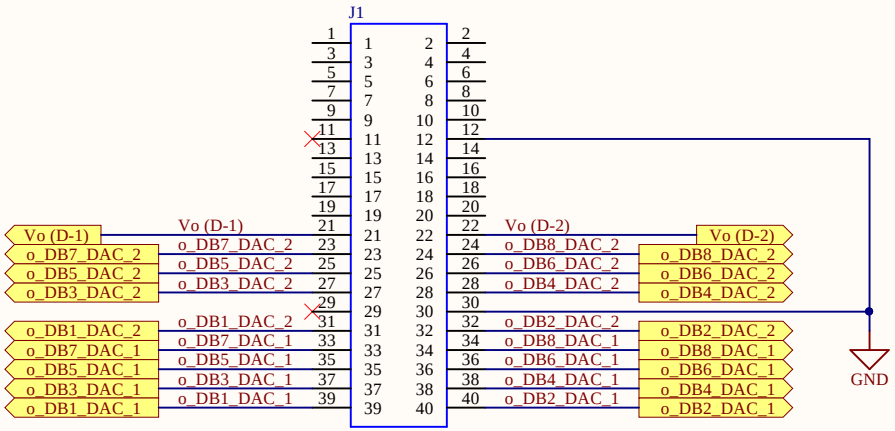
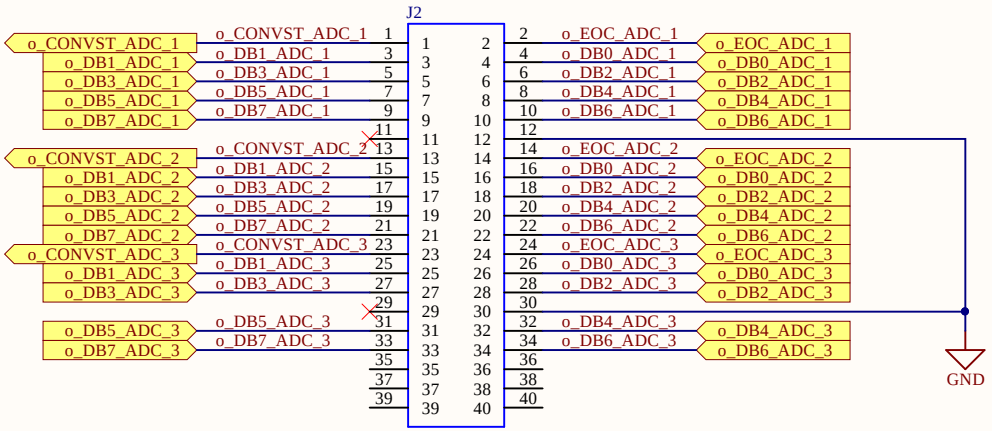
CONNECTORS

DAC
Digital signals



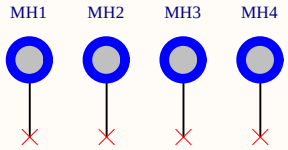
LAYOUT NOTE:
Taces shall be the same length.

ADC
Digital signals



LAYOUT NOTE:
Taces shall be the same length.

Mechanical
Board Mounting Holes

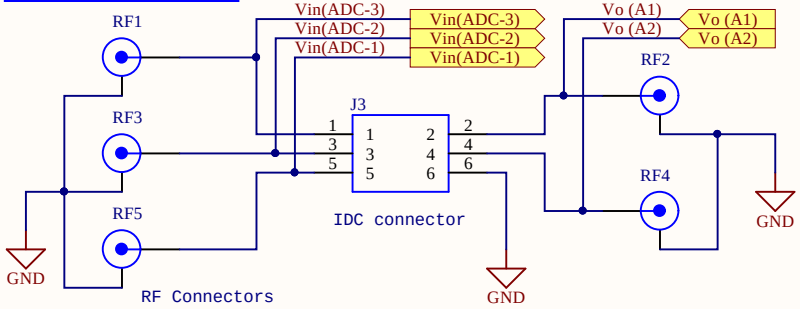


Mounting holes 7.4mm pad 3.2mm drill

BOARD MOUNTING HOLES
ONE IN EACH CORNER

LAYOUT NOTE:
- Place connectors as near as possible to ADC Analog Input pin and DAC Analog Output pin.

DAC & ADC
Analog signals



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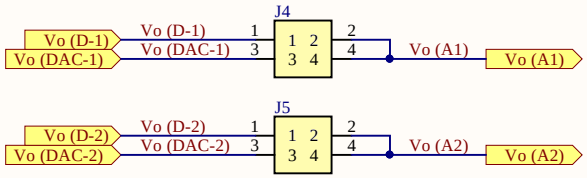
Title:	FPGA_Interface_Baseboard	Variant: [No Variations]
Page Contents:	[03] - CONNECTORS_1.SchDoc	Jesús Fuente Porta
Size: A4	DWG NO	Revision: v3.0
Date: 28/06/2019	Sheet 4 of 9	

CONNECTORS

DAC

Jumpers



DESIGN NOTE:
Option (1-2) -> DAC Analog Output
Option (3-4) -> FPGA/Microcontroller Digital Output

Objective -> Activate Mosfets Drivers.

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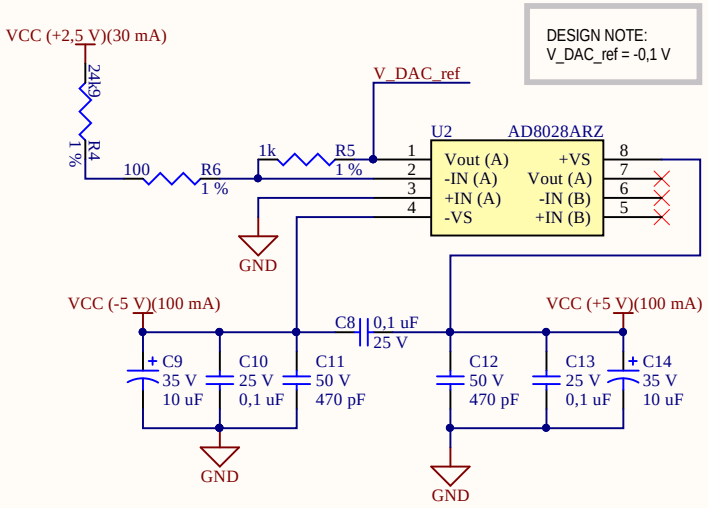
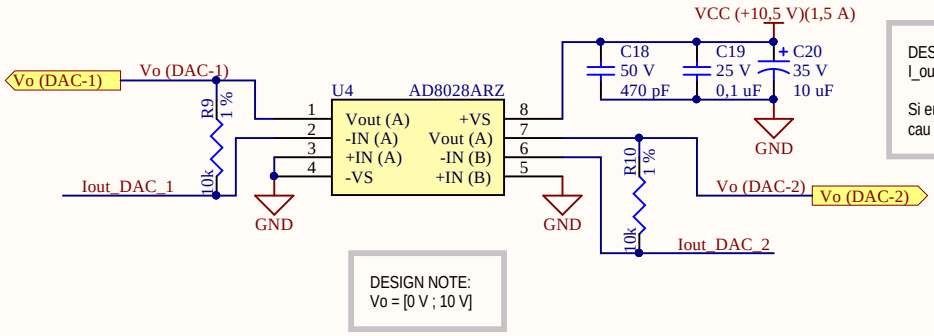
DAC

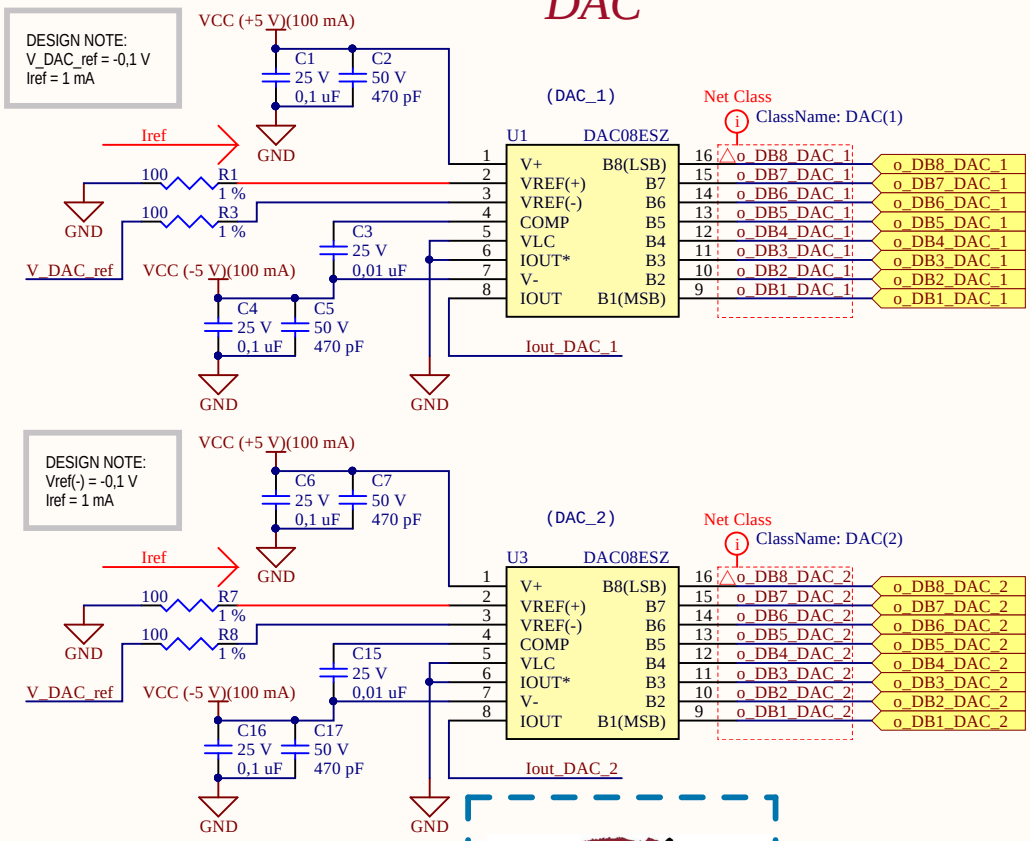
DAC Voltage reference



DAC Current Transductor



DAC



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URV		CONFIDENTAL. Do not distribute.
Title: FPGA_Interface_Baseboard		Variant: [No Variations]
Page Contents: [05] - DAC.SchDoc		Jesús Fuente Porta
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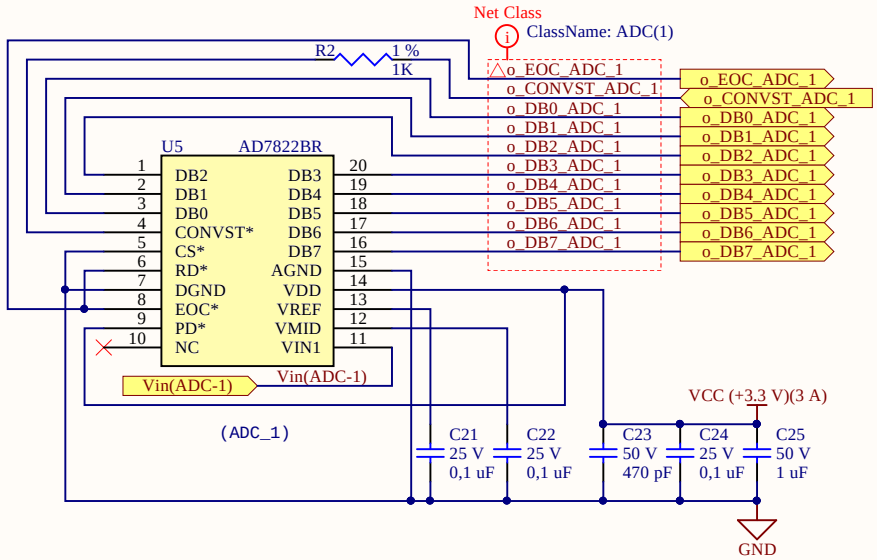
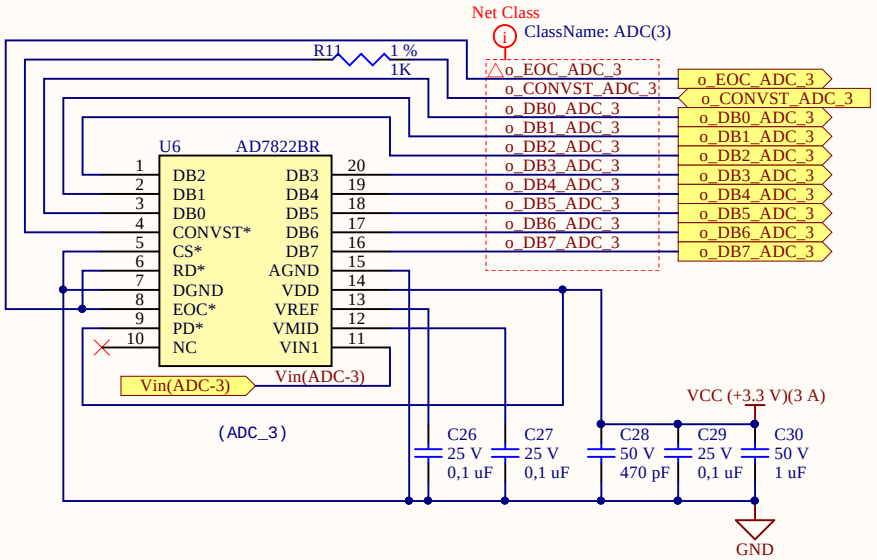
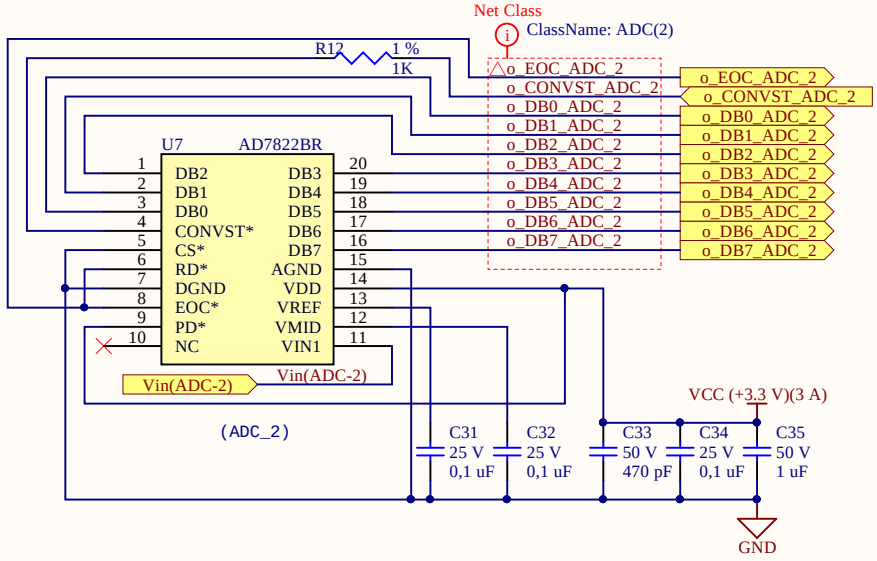
Date: 28/06/2019	Sheet 6 of 9	

ADC

ADC







DESIGN NOTE:
For all ADC ->

Vin = [0 V ; 2 V]

LAYOUT NOTE:
- Make separate return paths for DGND (Digital Ground) and AGND (Analog Ground).

DGND -> PIN 7
AGND -> PIN 15

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Title:	FPGA_Interface_Baseboard	Variant: [No Variations]
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Size: A4	DWG NO	Revision: v3.0
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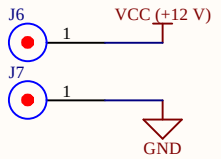
Power Supplies

VCC Input

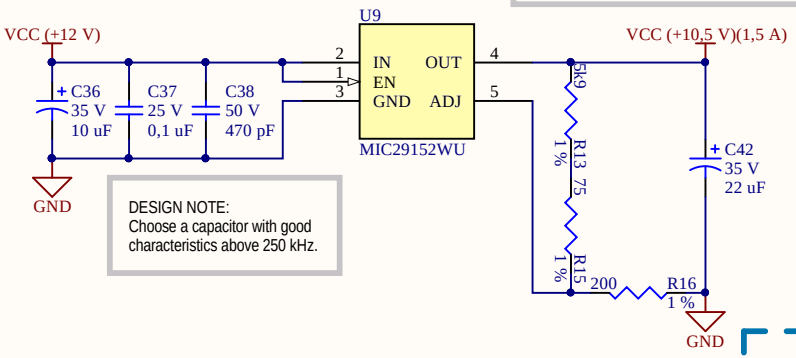


DESIGN NOTE:
Vin = [10,8 V ; 13,2 V]

10,5 V Voltage Regulator

DESIGN NOTE:
Minimum 10,5 V Regulator Load to Enable Voltage Regulation. In case of < 5 mA current Load, the Voltage Regulators doesn't regulate the output.

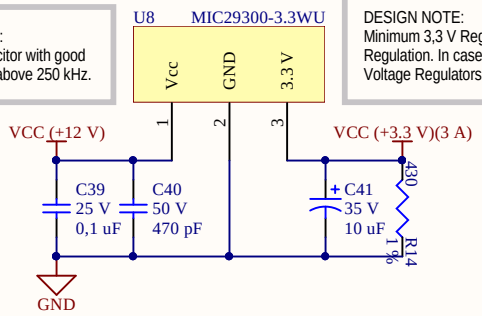
(R35+R37) = R36 * (Vout/1.240 - 1)



DESIGN NOTE:
Choose a capacitor with good characteristics above 250 kHz.

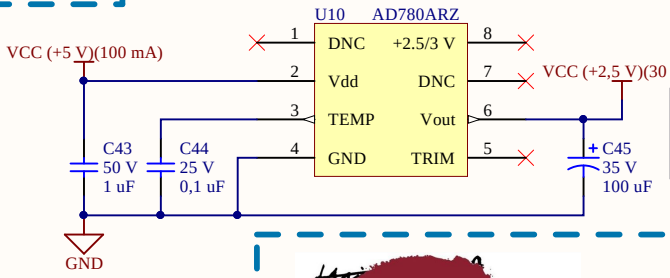
3,3 V Voltage Regulator

DESIGN NOTE:
Choose a capacitor with good characteristics above 250 kHz.



DESIGN NOTE:
Minimum 3,3 V Regulator Load to Enable Voltage Regulation. In case of < 7 mA current Load, the Voltage Regulators doesn't regulate the output.

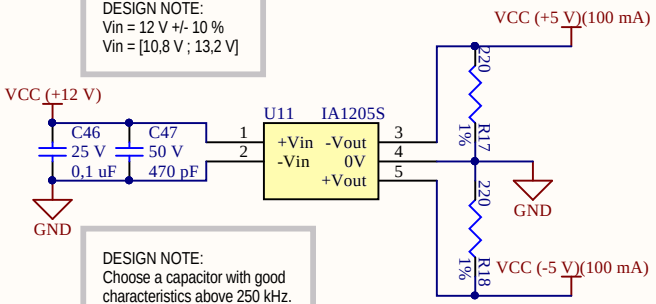
2,5 V Voltage Precision Reference



DESIGN NOTE:
High Precision 2,5 V reference.

(+/-)5 V DC/DC Converter

DESIGN NOTE:
Vin = 12 V +/- 10 %
Vin = [10,8 V ; 13,2 V]



DESIGN NOTE:
Choose a capacitor with good characteristics above 250 kHz.

DESIGN NOTE:
Line Regulation = 1.2%/1% ΔVin
Load Regulation = 10% (20-100% load change)
Setpoint Accuracy = ±3%
Maximum Capacitive Load = ±100 µF
Switching Frequency = Variable, 80 KHz typical
Efficiency = 75%

DESIGN NOTE:
Minimum 5 V Regulator Load to Enable Voltage Regulation. In case of < 20 mA current Load, the Voltage Regulators doesn't regulate the output.

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Page Contents: [08] - REVISION HISTORY.SchDoc		Jesús Fuente Porta	
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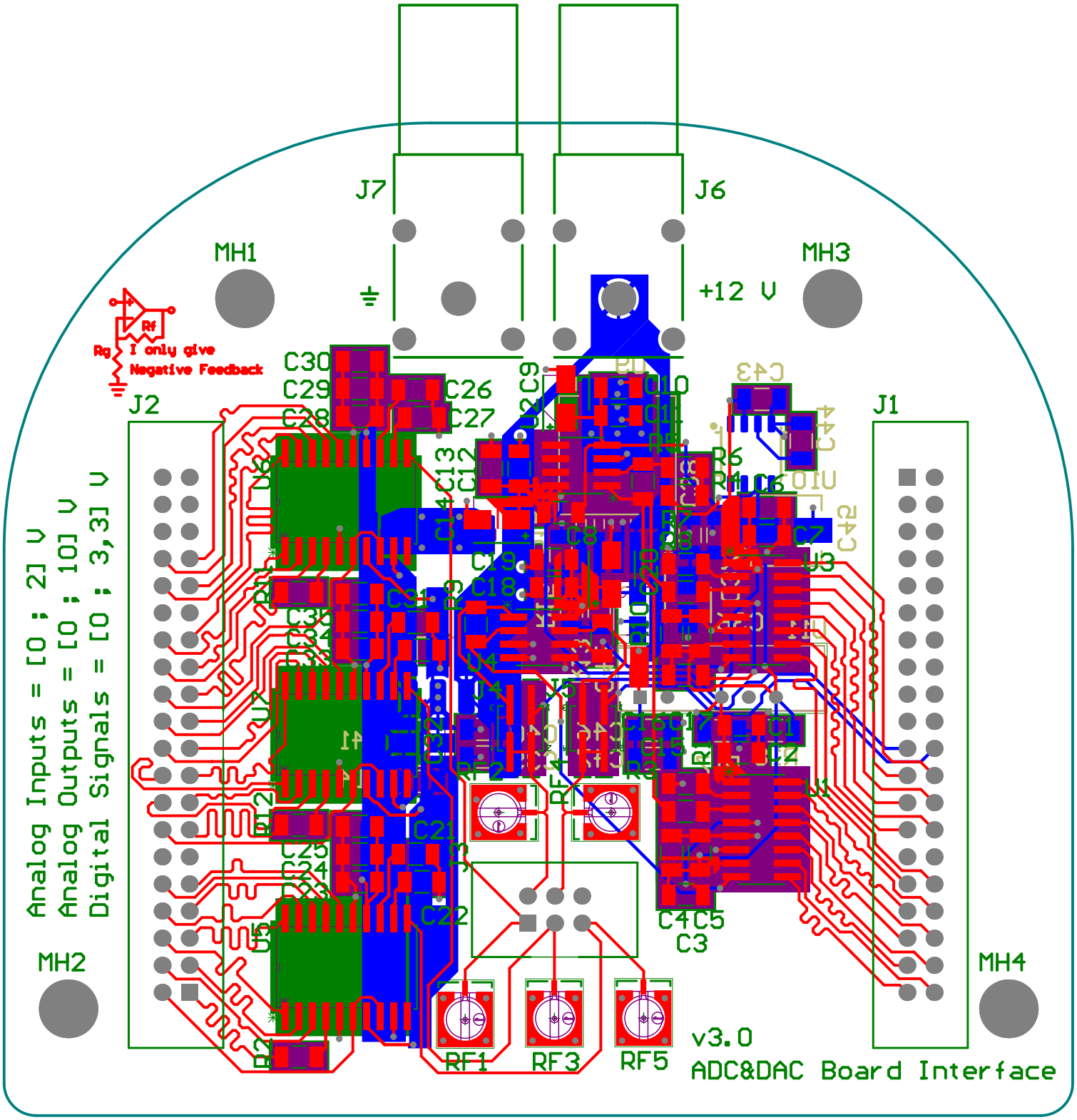
J7
J6
MH1
MH3
+12 V
Rf
Rg
I only give
Negative Feedback
J2
J1
Analog Inputs = [0 ; 2] V
Analog Outputs = [0 ; 10] V
Digital Signals = [0 ; 3,3] V
MH2
MH4
RF1
RF3
RF5
v3.0
ADC&DAC Board Interface

Designator	Description	Comment	Footprint	Quantity	ComponentLink1Description	ComponentLink1URL	ComponentLink2Description	ComponentLink2URL	ComponentLink3Description	ComponentLink3URL	ComponentLink4Description	ComponentLink4URL
C1, C4, C6, C8, C10, C13, C16, C19, C21, C22, C24, C26, C27, C29, C31, C32, C34, C37, C39, C44, C46	VJ1206Y104KXXCW1BC - Condensador de Cerámica Multicapa, 0.1 µF, 25 V, 1206 [Métrica 3216], ± 10%, X7R, VJ Series	0,1 uF	1206 [Métrica 3216]	21	Farnell Webpage	https://es.farnell.com/vishay/vj1206y104kxxcw1bc/conden-0-1-f-25v-10-x7r-1206/dp/2896645						
C2, C5, C7, C11, C12, C17, C18, C23, C28, C33, C38, C40, C47	VJ1206A471JXACW1BC - Condensador de Cerámica Multicapa, 470 pF, 50 V, 1206 [Métrica 3216], ± 5%, C0G / NP0, VJ Series	470 pF	1206 [Métrica 3216]	13	Farnell Webpage	https://es.farnell.com/vishay/vj1206a471jxacw1bc/conden-470pf-50v-5-c0g-np0-1206/dp/2896616						
C3, C15	MCSH31B103K250CT - Condensador de Cerámica Multicapa, 10000 pF, 25 V, 1206 [Métrica 3216], ± 10%, X7R, Serie MCSH	0,01 uF	1206 [Métrica 3216]	2	Farnell Webpage	https://es.farnell.com/multicomp/mcsh31b103k250ct/conden-0-01-f-25v-10-x7r-1206/dp/1856586						
C9, C14, C20, C36, C41	EEE1VA100WR - Condensador Electrolítico Aluminio SMD, Radial - SMD, 10 µF, 35 V, S Series, 1000 horas a 85°C	10 uF	EEE1VA100WR	5	Farnell Webpage	https://es.farnell.com/panasonic/eee1va100wr/conden-10-f-35v-smd/dp/2808004?st=EEE1VA100WR						
C25, C30, C35, C43	MC1206B105K500CT - Condensador de Cerámica Multicapa, 1 µF, 50 V, 1206 [Métrica 3216], ± 10%, X7R, Serie MC	1 uF	1206 [Métrica 3216]	4	Farnell Webpage	https://es.farnell.com/multicomp/mcsh31b105k500ct/conden-1-f-50v-10-x7r-1206/dp/1856643						
C42	EEE1VA220WR - Condensador Electrolítico Aluminio SMD, Radial - SMD, 22 µF, 35 V, Serie S, 1000 horas a 85°C	22 uF	EEE1VA220WR	1	Farnell Webpage	https://es.farnell.com/panasonic/eee1va220wr/conden-22-f-35v-radial-smd/dp/2326173?st=EEE1VA220WR						
C45	EEE1VA101XP - Condensador Electrolítico Aluminio SMD, Radial - SMD, 100 µF, 35 V, Serie S, 2000 horas a 85°C	100 uF	EEE-1VA101XP	1	Farnell Webpage	https://es.farnell.com/panasonic/eee1va101xp/conden-100-f-35v-radial-smd/dp/2326172?st=EEE1VA101XP						
J1, J2	MC-254-40-00-ST-DIP - Conector de Cable a Placa, 2.54 mm, 40 Contactos, Header, Agujero Pasante, 2 Filas	IDC Connector_40p	IDC Connector - 40 pins	2	Farnell Webpage	https://es.farnell.com/multicomp/mc-254-40-00-st-dip/conector-macho-40pos-2fila-2-54mm/dp/2843536						
J3	MC-254-06-00-ST-DIP - Conector de Cable a Placa, 2.54 mm, 6 Contactos, Header, Agujero Pasante, 2 Filas	IDC Connector_6p	IDC Connector - 6 pins	1	Farnell Webpage	https://es.farnell.com/multicomp/mc-254-06-00-st-dip/conector-macho-6pos-2fila-2-54mm/dp/2843525?ost=MC-254-06-00-ST-DIP&ddkey=https%3Aes-ES%2FElement14_Spain%2Fsearch						
J4, J5	TMM-102-01-L-D-SM - Conector de Placa a Placa, 2 mm, 4 Contactos, Header, TMM Series, Montaje Superficial, 2 Filas	TMM-102-01-G-D00 (2 connectors)	TMM-102-01-G-D00 (2 connectors)	2	Farnell WebPage	https://es.farnell.com/samtec/tmm-102-01-l-d-sm/conector-macho-4pos-2fila-2mm/dp/2856897?scope=partnumberlookahead&ost=TMM-102-01-L-D-SM&searchref=searchlookahead&exaMfpn=true&ddkey=https%3Aes-ES%2FElement14_Spain%2Fw%2Fsearch						
J6	FCR7350R - Conector Banana de Prueba, 4mm, Hembra, Montaje en PCB, 24 A, 1 kV, Contactos Chapados en Oro	RED Banana connector	Banana Connector	1	Farnell Webpage	https://es.farnell.com/cliff-electronic-components/fcr7350r/toma-pcb-4-mm-r-a-s16n-pc-rojo/dp/1854508						
J7	FCR7350R - Conector Banana de Prueba, 4mm, Hembra, Montaje en PCB, 24 A, 1 kV, Contactos Chapados en Oro	BLACK Banana connector	Banana Connector	1	Farnell Webpage	https://es.farnell.com/cliff-electronic-components/fcr7350b/toma-pcb-4-mm-r-a-s16n-pc-negro/dp/1854507						
MH1, MH2, MH3, MH4	Mounting Hole 5,5 mm Diameter, 3 mm Drill; 30 mm body length 05.13.301 - Separador, Galvanizado, Acero, M3, Hexagonal, Macho-Hembra, 30 mm, 05.13 Series	MH_5.5MMC_3MMD	MH_5.5MMC_3MMD	4	http://www.farnell.com/datasheets/58394.pdf?src-supplier=Element14	http://www.farnell.com/datasheets/58394.pdf?src-supplier=Element14						
R1, R3, R6, R7, R8	MCWR12X1000FTL - Resistencia SMD de Tipo Chip, Película Gruesa, 1206 [Métrica 3216], 100 ohm, Serie MCWR, 200 V	100	1206 [Métrica 3216]	5	Farnell Webpage	https://es.farnell.com/multicomp/mcwr12x1000ftl/res-100r-1-0-25w-pel-c-gruesa/dp/2447454						
R2, R11, R12	MCWR12X1001FTL - Resistencia SMD de Tipo Chip, Película Gruesa, 1206 [Métrica 3216], 1 kohm, Serie MCWR, 200 V	1 %	1206 [Métrica 3216]	3	Farnell Webpage	https://es.farnell.com/multicomp/mcwr12x1001ftl/res-1k-1-0-25w-1206-pel-c-gruesa/dp/2447473						
R4	MCWR12X2492FTL - Resistencia SMD de Tipo Chip, 1206 [Métrica 3216], 24.9 kohm, MCWR12 Series, 200 V, Película Gruesa	24k9	1206 [Métrica 3216]	1	Farnell Webpage	https://es.farnell.com/multicomp/mcwr12x2492ftl/res-24k9-1-0-25w-1206-pel-c-gruesa/dp/2695140						
R5	MCWR12X1001FTL - Resistencia SMD de Tipo Chip, Película Gruesa, 1206 [Métrica 3216], 1 kohm, Serie MCWR, 200 V	1k	1206 [Métrica 3216]	1	Farnell Webpage	https://es.farnell.com/multicomp/mcwr12x1001ftl/res-1k-1-0-25w-1206-pel-c-gruesa/dp/2447473						
R9, R10	CRGCQ1206F10K - Resistencia SMD de Tipo Chip, 1206 [Métrica 3216], 10 kohm, CRGCQ Series, 200 V, Película Gruesa	10k	1206 [Métrica 3216]	2	Farnell Webpage	https://es.farnell.com/te-connectivity/crgcq1206f10k/res-10k-1-1206-pel-c-gruesa/dp/2861595						
R13	ERJ8ENF5901V - Resistencia SMD de Tipo Chip, Película Gruesa, 1206 [Métrica 3216], 5.9 kohm, Serie ERJ8E, 200 V	5k9	1206 [Métrica 3216]	1	Farnell Webpage	https://es.farnell.com/panasonic/erj8enf5901v/res-5k9-1-0-25w-1206-pel-c-gruesa/dp/2307783						
R14	MCWR12X4300FTL - Resistencia SMD de Tipo Chip, Película Gruesa, 1206 [Métrica 3216], 430 ohm, Serie MCWR, 200 V	430	1206 [Métrica 3216]	1	Farnell Webpage	https://es.farnell.com/multicomp/mcwr12x4300ftl/res-430r-1-0-25w-1206-pel-c-gruesa/dp/2447518						
R15	ERJ8ENF75R0V - Resistencia SMD de Tipo Chip, Película Gruesa, 1206 [Métrica 3216], 75 ohm, Serie ERJ8E, 200 V	75	1206 [Métrica 3216]	1	Farnell Webpage	https://es.farnell.com/panasonic/erj8enf75r0v/res-75r-1-0-25w-1206-pel-c-gruesa/dp/2057747						
R16	MCWR12X2000FTL - Resistencia SMD de Tipo Chip, Película Gruesa, 1206 [Métrica 3216], 200 ohm, Serie MCWR, 200 V	200	1206 [Métrica 3216]	1	Farnell Webpage	https://es.farnell.com/multicomp/mcwr12x2000ftl/res-200r-1-0-25w-1206-pel-c-gruesa/dp/2447482						
R17, R18	MCWR12X2200FTL - Resistencia SMD de Tipo Chip, Película Gruesa, 1206 [Métrica 3216], 220 ohm, Serie MCWR, 200 V	220	1206 [Métrica 3216]	2	http://www.farnell.com/datasheets/1849611.pdf?src-supplier=Element14	http://www.farnell.com/datasheets/1849611.pdf?src-supplier=Element14						
RF1, RF2, RF3, RF4, RF5	85305-0232 - Conector de RF / Coaxial, Coaxial SMP, Macho Recto, Montaje Superficial Vertical, 50 ohm, Latón	85305-0232	ROS-19S101-40ML5_V	5	Farnell Webpage	https://es.farnell.com/molex/85305-0232/coax-rf-smp-macho-50-ohm-pcb/dp/2396235	Datasheet	http://rosenberger.de/ok/images/documents/db/19S101-40ML5.pdf	Package Specification	http://rosenberger.de/ok/images/documents/db/19S101-40ML5.pdf	Series Overview / Design Note	http://rosenberger.de/ok/images/documents/spez/19.pdf
U1, U3	DAC08ESZ - Convertidor de Señal Digital a Analógica, 8 bit, ± 4.5V a ± 18V, NSOIC, 16 Pines	DAC08ESZ	DAC08ESZ_(R_16-M)	2	Farnell Webpage	https://es.farnell.com/analog-devices/dac08esz/conv-dac-8-bits-nsoic-16/dp/2462586?ost=DAC08ESZ&ddkey=https%3Aes-ES%2FElement14_Spain%2Fsearch						
U2, U4	AD8028ARZ - Amplificador Operacional, Doble, 2 Amplificadores, 190 MHz, 100 V/µs, 2.7V a 12V, SOIC, 8 Pines	AD8028ARZ	AD8028ARZ - (R_8-M)	2	Farnell Webpage	https://es.farnell.com/analog-devices/ad8028arz/amp-de-baja-distorsi-n-rri-o-smd/dp/1581947?ost=AD8028ARZ&ddkey=https%3Aes-ES%2FElement14_Spain%2Fsearch						
U5, U6, U7	1-Channel Single ADC Semiflash 2Msps 8-bit Parallel 20-Pin SOIC W Tube	AD7822BR	RW_20-M (AD7822BR)	3	Arrow Webpage	https://www.arrow.com/es-mx/products/ad7822br/analog-devices	RS webpage (Different Footprint but equivalent functionality)	https://es.rs-online.com/web/p/convertidores-analogico-a-digital-para-uso-general/5384656/				
U8	MIC29300-3.3WU - Regulador de Tensión Fija LDO, 2.5 V a 26 V, Caída de 370 mV, 3.3 Vout, 3 Aout, TO-263-3	MIC29300-3.3WU	MIC29300	1	Farnell Webpage	https://es.farnell.com/microchip/mic29300-3-3wu/ic-reg-ldo-3a-3-3v/dp/2510017?st=MIC29300-3.3WU						
U9	MIC29152WU - Regulador de Tensión LDO, Ajustable, Entrada 2V a 26V, Caída 350mV, Salida 1.27V-25V/1.5A, TO-263-5	MIC29152WU	MIC29152WU	1	Farnell WebPage	https://es.farnell.com/microchip/mic29152wu/ic-v-reg-ldo-1-5a-adj-smd-29152/dp/2510008?scope=partnumberlookahead&ost=MIC29152WU&searchref=searchlookahead&exaMfpn=true&ddkey=https%3Aes-ES%2FElement14_Spain%2Fw%2Fsearch						
U10	AD780CRZ - Referencia de Tensión, Alta Precisión, Serie - Programable, Serie AD780, 2.5V, 3V, NSOIC-8	AD780ARZ	AD780ARZ	1	Farnell Webpage	https://es.farnell.com/analog-devices/ad780arz/ref-de-tensi-n-serie-2-5v-3v-nsoic/dp/2112642?scope=partnumberlookahead&ost=AD780ARZ&searchref=searchlookahead&exaMfpn=true&ddkey=https%3Aes-ES%2FElement14_Spain%2Fw%2Fsearch	Farnell Webpage (Compatible Chip)	https://es.farnell.com/analog-devices/ad780crz/ref-de-tensi-n-serie-2-5v-3v-nsoic/dp/2461818?st=AD780				
U11	IA1205S - Convertidor DC/DC Aislado de Montaje en Placa, Orificio Pasante, 1W, 5V, 100mA, -5V, 100mA	IA1205S	IA0305S	1	Farnell WebPage	https://es.farnell.com/xp-power/ia1205s/converter-dc-dc-1w-5v/dp/8727546						