5704FX-EK_Rev0

Professional Audio

Evaluation Board for SAM5704

Overview

5704FX-EK is a high quality reference board for effects applications based on SAM5704 (AUDIO & MUSIC MULTI-DSP PROCESSOR).
The SAM5704 can be used in 6 different hardware configurations for different applications. On 5704FX-EK board the SAM5704 is running in an hardware configuration well suited for effects processing needing a lot of RAM.
Digital Audio Streaming can be sent and received through an Audio CODEC or USB port. Effect parameter control can be done via USB port (using MIDI protocol). External SDRAM allows long delay lines at the lowest cost. The firmware is loaded from serial Flash memory. The SAM5704 provides also firmware code encryption for copy protection purpose.

Beside the SAM5704, the 5704FX-EK_Rev0 hardware includes:

- 1 Audio CODEC: AKM AK4556 (24bit | ADC: S/N=103dB, S/N+D=91dB | DAC: S/N=106dB, S/N+D=90dB)
- 64Mbit SDRAM: MICRON MT48LC4M16A2P-7E (4M*16) for extended delay lines
- SPI NOR Flash memory WINBOND W25X20CLSNIG for firmware and data storage
- USB High Speed, Device mode
- Connection to dedicated Front panel

Operating Mode

5704FX-EK operates on two modes:

- Debug mode:
  The board is connected to a PC through the Dream 5000DBG-IF adaptor. The firmware can be downloaded and debugged into internal RAM or external SDRAM with Dream SamVS-C development software. With SamVS or ProgSam software tool it is possible to program the firmware in SPI Flash memory for stand-alone mode. The ProgSam tool allows also to program the eFuses in SAM5704 with the encryption key used for code protection.
- Stand-alone mode:
  In this mode the SAM5704 loads the program from the SPI Flash memory at startup then execute it in its internal RAM or external SDRAM.

Connectors Configuration

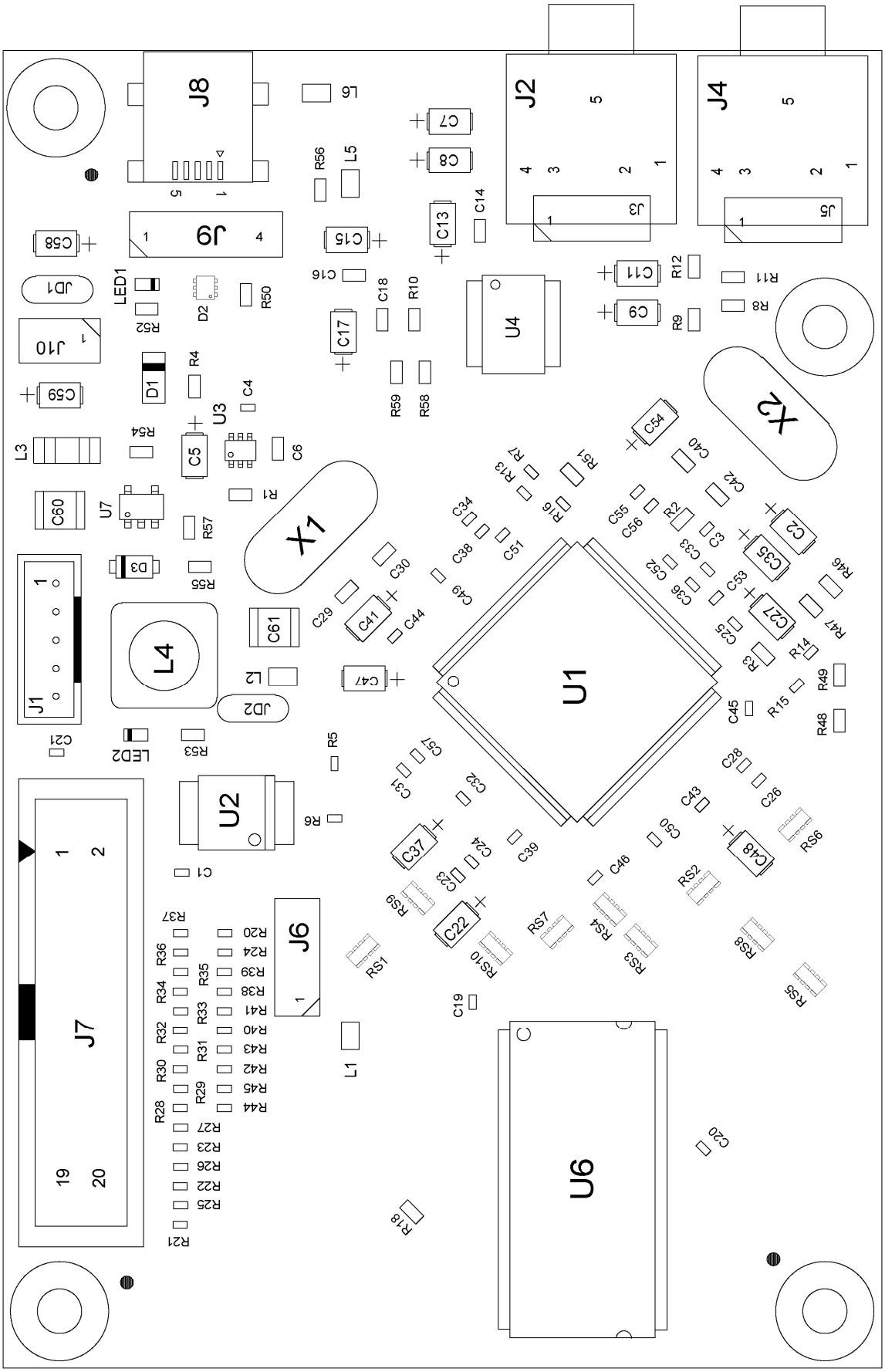
Name	Reference	Type	Description
DEBUG / PROGRAM	J1	JST PH Series, 1*5	Serial connection for debug and program, compatible with Dream 5000DBG-IF
FX IN	J2	Mini Jack	Audio stereo input channels (2.3Vpp)
	J3 (Optional, n.m.)	1*3	Audio stereo input channels (2.3Vpp)
FX OUT	J4	Mini Jack	Audio stereo output channels (2.3Vpp)
	J5 (Optional, n.m.)	1*3	Audio stereo output channels (2.3Vpp)
MIDI	J6 (Optional, n.m.)	1*3	Access to MIDI1port
FRONT PANEL	J7	HE10, 2*10	Connection to dedicated Front Panel
USB POWER SUPPLY & USB DEVICE PORT	J8	Mini USB B	USB connector used to power the board. Can also be used as USB device full or high speed port.
USB DEVICE PORT	J9 (Optional, n.m.)	1*4	USB device full or high speed port if J8 is not used.
POWER SUPPLY	J10 (Optional, n.m.)	1*2	Power supply if JD1 open, +5V/0.5A, GND on pin 1

“n.m.” = not mounted

Jumper Configuration

Reference	Default Setting	Description
JD1	Closed	Power supply source • Closed: Power supply from USB VBUS • Open: Power supply from J10
JD2	Closed	For test and measurement on 3.3V power supply

Layout

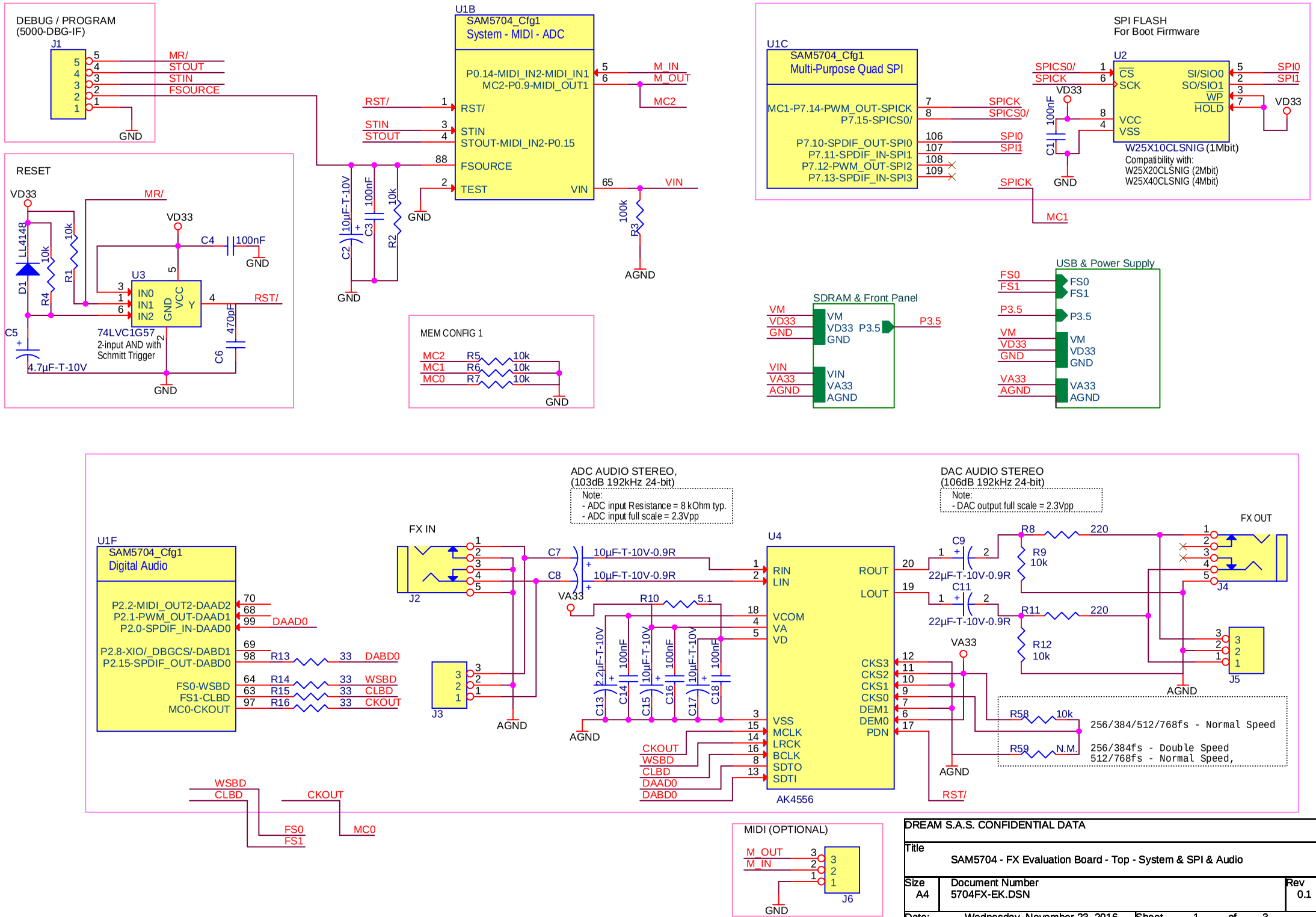


Bill of Material

SAM5704 Evaluation Board - Revised: November 23, 2016
5704FX-EK.DSN Revision: 0.1
Page 1

Item	Quantity	Reference	Part	Manufacturer	Designation
1	22	C1, C3, C4, C19, C20, C21, C23, C25, C26, C31, C33, C36, C39, C44, C45, C49, C50, C51, C52, C55, C56, C57	100nF		
2	10	C2, C15, C17, C22, C27, C35, C37, C47, C48, C54	10µF-T-10V		
3	2	C5, C41	4.7µF-T-10V		
4	1	C6	470pF		
5	2	C7, C8	10µF-T-10V-0.9R	AVX	TPSA106K010R0900
6	2	C9, C11	22µF-T-10V-0.9R	AVX	TPSA226K010R0900
7	1	C13	2.2µF-T-10V		
8	3	C14, C16, C18	100nF		
9	8	C24, C28, C32, C34, C38, C43, C46, C53	10nF		
10	4	C29, C30, C40, C42	22pF		
11	2	C58, C59	1µF-T		
12	2	C60, C61	22µF-X5R		
13	1	D1	LL4148	VISHAY	LL4148
14	1	D2	TPD2E1B06	TI	TPD2E1B06
15	1	D3	CRS08	TOSHIBA	CRS08
16	2	JD1, JD2	Jumper Disk1P		
17	1	J1	B5B-PH-K-S	JST	B5B-PH-K-S
18	2	J2, J4	JACK 3.5 STEREO	3E	15.427
19	3	J3, J5, J6	N.M.		
20	1	J7	HEAD_10X2		
21	1	J8	651 005 161 21	WERI	651 005 161 21
22	1	J9	N.M.		
23	1	J10	N.M.		
24	1	LED1	TLMG1100-Vishay	VISHAY	TLMG1100
25	1	LED2	TLMS1000-Vishay	VISHAY	TLMS1000-GS08
26	3	L1, L5, L6	742792093	WURTH	742792093
27	1	L2	7427920415	WURTH	7427920415
28	1	L3	NFM41PC204F1H3	MURATA	NFM41PC204F1H3
29	1	L4	744777003	WURTH	744777003
30	10	RS1, RS2, RS3, RS4, RS5, RS6, RS7, RS8, RS9, RS10	4x10		

Item	Quantity	Reference	Part	Manufacturer	Designation
31	16	R1, R2, R4, R9, R12, , R38, R39, R40, R41, R42, R43, R44, R45, R47, R48, R58	10k		
32	2	R3, R54	100k		
33	3	R5, R6, R7	10k		
34	2	R8, R11	220		
35	1	R10	5.1		
36	4	R13, R14, R15, R16	33		
37	1	R18	10		
38	2	R20, R24	100k		
39	16	R21, R22, R23, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37	22		
40	3	R46, R49, R59	N.M.		
41	1	R50	1k		
42	1	R51	12k, 1%		
43	2	R52, R53	750		
44	1	R55	45.3k 1%		
45	1	R56	0		
46	1	R57	10k 1%		
47	1	U1	SAM5704_Cfg1	DREAM	SAM5704
48	1	U2	W25X20CLSNIG	WINBOND	W25X20CLSNIG
49	1	U3	74LVC1G57	TI	74LVC1G57DCK
50	1	U4	AK4556	AKM	AK4556VT
51	1	U6	MT48LC4M16A2P-7E	MICRON	MT48LC4M16A2P-7E
52	1	U7	LM2830X	NS	LM2830X
53	1	X1	12.288MHz		
54	1	X2	12MHz		


DEBUG / PROGRAM
(5000-DBG-IF)
J1
MR/
STOUT
STIN
FSOURCE
GND
U1B
SAM5704_Cfg1
System - MIDI - ADC
P0.14-MIDI_IN2-MIDI_IN1
MC2-P0.9-MIDI_OUT1
RST/
STIN
STOUT-MIDI_IN2-P0.15
FSOURCE
TEST
VIN
M_IN
M_OUT
MC2
RST/
STIN
STOUT
10uF-T-10V
100nF
10k
C2
C3
R2
GND
100k
R3
AGND
U1C
SAM5704_Cfg1
Multi-Purpose Quad SPI
MC1-P7.14-PWM_OUT-SPICK
P7.15-SPICS0/
P7.10-SPDIF_OUT-SPI0
P7.11-SPDIF_IN-SPI1
P7.12-PWM_OUT-SPI2
P7.13-SPDIF_IN-SPI3
SPICK
SPICS0/
SPI0
SPI1
MC1
SPI FLASH
For Boot Firmware
U2
CS
SCK
SI/SIO0
SO/SIO1
WP
HOLD
VCC
VSS
VD33
100nF
C1
W25X10CLSNIG (1Mbit)
Compatibility with:
W25X20CLSNIG (2Mbit)
W25X40CLSNIG (4Mbit)
RESET
VD33
MR/
LL4148
D1
10k
R4
R1
C4
100nF
U3
IN0
IN1
IN2
GND
VCC
Y
74LVC1G57
2-input AND with
Schmitt Trigger
RST/
470pF
C6
C5
4.7µF-T-10V
MEM CONFIG 1
MC2
MC1
MC0
R5
R6
R7
10k
SDRAM & Front Panel
VM
VD33
GND
P3.5
VIN
VA33
AGND
USB & Power Supply
FS0
FS1
U1F
SAM5704_Cfg1
Digital Audio
P2.2-MIDI_OUT2-DAAD2
P2.1-PWM_OUT-DAAD1
P2.0-SPDIF_IN-DAAD0
P2.8-XIO/_DBGCS/-DABD1
P2.15-SPDIF_OUT-DABD0
FS0-WSBD
FS1-CLBD
MC0-CKOUT
DAAD0
DABD0
R13
R14
R15
R16
33
WSBD
CLBD
CKOUT
FS0
FS1
MC0
ADC AUDIO STEREO,
(103dB 192kHz 24-bit)
Note:
- ADC input Resistance = 8 kOhm typ.
- ADC input full scale = 2.3Vpp
FX IN
J2
J3
C7
C8
10µF-T-10V-0.9R
VA33
R10
5.1
2.2µF-T-10V
100nF
C13
C14
C15
C16
C17
C18
AGND
U4
RIN
LIN
VCOM
VA
VD
VSS
MCLK
LRCK
BCLK
SDTO
SDTI
ROUT
LOUT
CKS3
CKS2
CKS1
CKS0
DEM1
DEM0
PDN
AK4556
DAC AUDIO STEREO
(106dB 192kHz 24-bit)
Note:
- DAC output full scale = 2.3Vpp
FX OUT
J4
J5
C9
C11
22µF-T-10V-0.9R
R8
R9
R11
R12
220
10k
R58
R59
N.M.
256/384/512/768fs - Normal Speed
256/384fs - Double Speed
512/768fs - Normal Speed,
RST/
MIDI (OPTIONAL)
M_OUT
M_IN
J6
DREAM S.A.S. CONFIDENTIAL DATA
Title
SAM5704 - FX Evaluation Board - Top - System & SPI & Audio
Size
A4
Document Number
5704FX-EK.DSN
Rev
0.1
Date:
Wednesday, November 23, 2016
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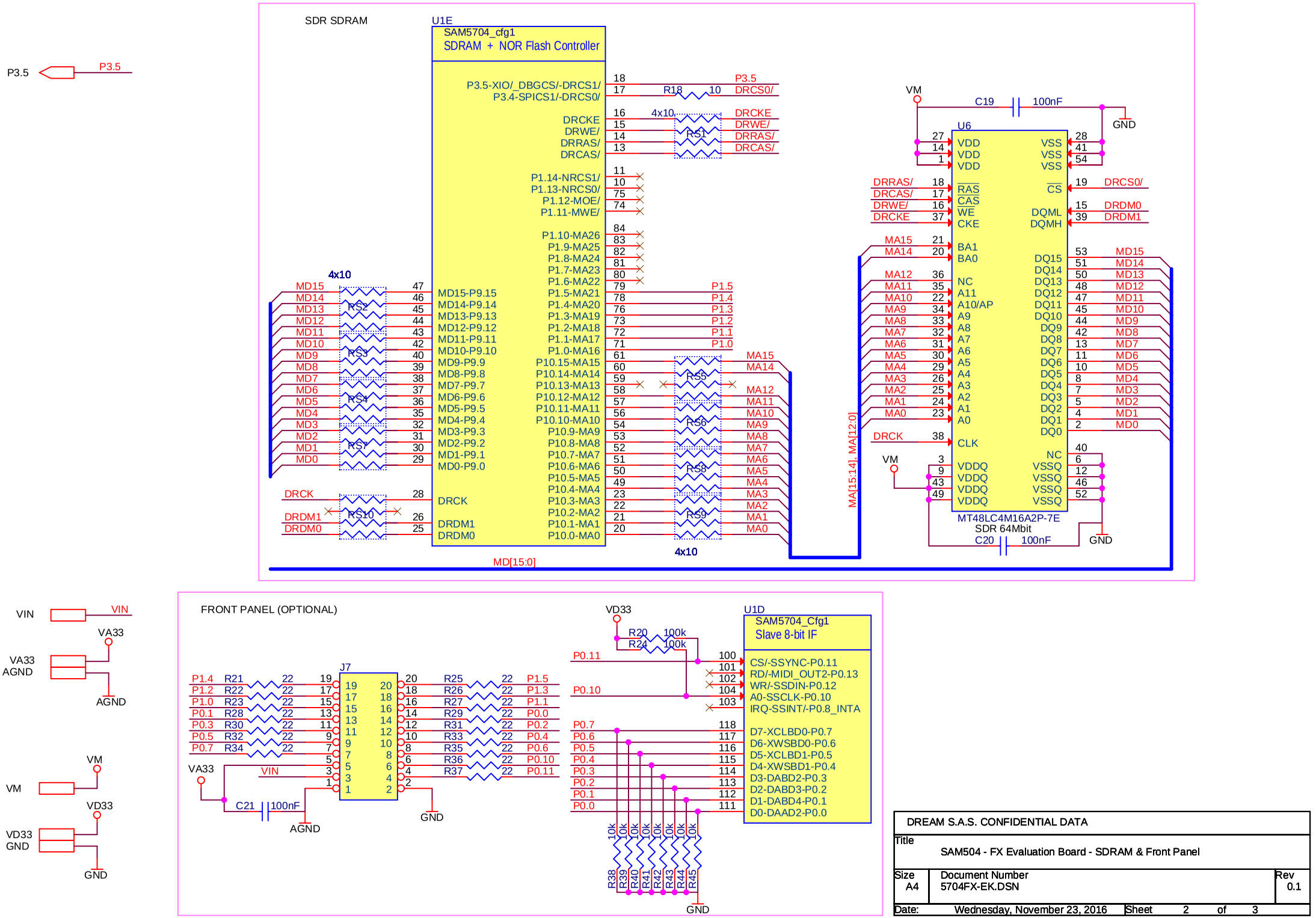
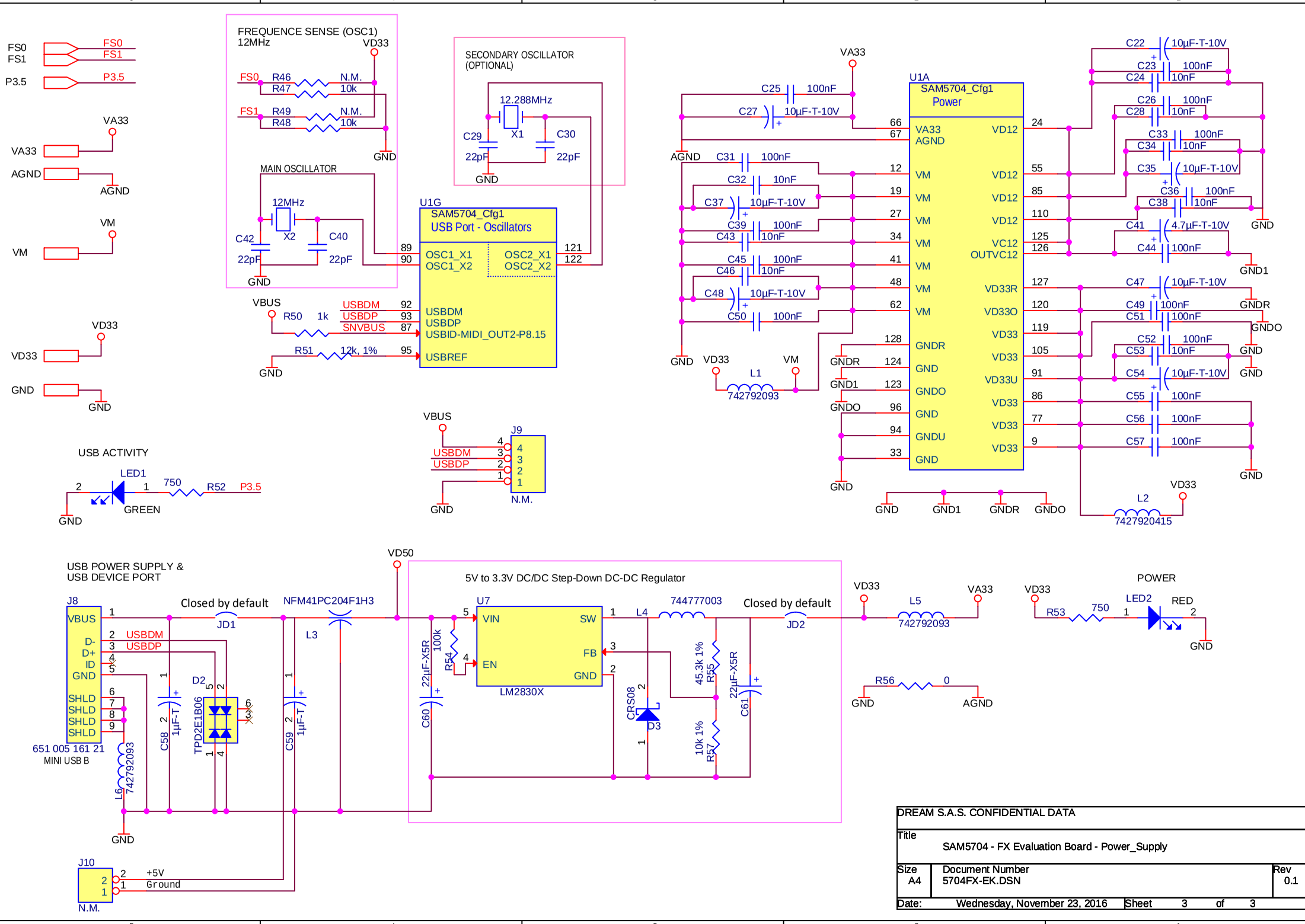
1
of
3



DREAM S.A.S. CONFIDENTIAL DATA

Title	SAM504 - FX Evaluation Board - SDRAM & Front Panel	
Size A4	Document Number 5704FX-EK.DSN	Rev 0.1
Date: Wednesday, November 23, 2016	Sheet 2 of 3	


FS0
FS1
P3.5
VA33
AGND
VM
VD33
GND
FREQUENCE SENSE (OSC1)
12MHz
R46 N.M.
R47 10k
R49 N.M.
R48 10k
MAIN OSCILLATOR
12MHz
X2
C42 22pF
C40 22pF
SECONDARY OSCILLATOR
(OPTIONAL)
12.288MHz
X1
C29 22pF
C30 22pF
U1G
SAM5704_Cfg1
USB Port - Oscillators
OSC1_X1
OSC1_X2
OSC2_X1
OSC2_X2
USBDM
USBDP
SNVBUS
USBID-MIDI_OUT2-P8.15
USBREF
R50 1k
R51 12k, 1%
VBUS
USB ACTIVITY
LED1
GREEN
750
R52
J9
N.M.
U1A
SAM5704_Cfg1
Power
VA33
AGND
VM
VD12
VC12
OUTVC12
VD33R
VD33O
VD33
VD33U
GNDR
GNDO
GNDU
GND
GND1
C25 100nF
C27 10µF-T-10V
C31 100nF
C32 10nF
C37 10µF-T-10V
C39 100nF
C43 10nF
C45 100nF
C46 10nF
C48 10µF-T-10V
C50 100nF
L1
742792093
C22 10µF-T-10V
C23 100nF
C24 10nF
C26 100nF
C28 10nF
C33 100nF
C34 10nF
C35 10µF-T-10V
C36 100nF
C38 10nF
C41 4.7µF-T-10V
C44 100nF
C47 10µF-T-10V
C49 100nF
C51 100nF
C52 100nF
C53 10nF
C54 10µF-T-10V
C55 100nF
C56 100nF
C57 100nF
L2
7427920415
USB POWER SUPPLY &
USB DEVICE PORT
J8
VBUS
D-
D+
ID
GND
SHLD
651 005 161 21
MINI USB B
Closed by default
JD1
NFM41PC204F1H3
L3
L6
742792093
C58 1µF-T
C59 1µF-T
D2
TPD2E1B06
5V to 3.3V DC/DC Step-Down DC-DC Regulator
U7
VIN
SW
EN
FB
GND
LM2830X
R54 100k
C60 22µF-X5R
L4
744777003
CRS08
D3
R55 45.3k 1%
R57 10k 1%
C61 22µF-X5R
Closed by default
JD2
L5
742792093
R56 0
POWER
LED2
RED
R53 750
J10
+5V
Ground
N.M.
DREAM S.A.S. CONFIDENTIAL DATA
Title
SAM5704 - FX Evaluation Board - Power_Supply
Size
A4
Document Number
5704FX-EK.DSN
Rev
0.1
Date:
Wednesday, November 23, 2016
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