



## **Eval Kit Manual**

# **AS3722**

## **Standard Board**

**AS3722-CT-00\_EK\_ST AS3728**

## Table of Contents

1	Introduction .....	3
1.1	Kit Content .....	4
2	Getting Started.....	5
3	Hardware Description.....	6
4	Software Description .....	8
4.1	LDO .....	9
4.2	DCDC.....	10
4.2.1	DCDC0, DCDC1, DCDC6.....	10
4.2.2	DCDC2 – DCDC5 .....	11
4.2.3	OC_PG / PWM Settings.....	12
5	Schematics, Layers and BOM .....	13
5.1	Schematics of AS3722 and AS3728 Evaluation Board .....	14
5.2	Board Layout of AS3722 and AS3728 Evaluation Board .....	18
5.3	BOM .....	21
6	Ordering & Contact Information .....	22
7	Copyrights & Disclaimer.....	23
8	Revision Information .....	24

## 1 Introduction

This document describes the AS3722 and AS3728 Evaluation Kit.

The AS3722 is a compact System PMU supporting up to 20 high current rails. It features 4 DCDC buck converters as well as 12 low noise LDOs. The different regulated supply voltages are programmable via the serial control interface. AS3722 further features 3DCDC buck controller which are ideal to support processor currents ranging from 5A up to 32A.

The single supply voltage may vary from 2.5V to 5.5V

The Evaluation Kit has to be externally supplied. The graphical user interface (GUI) runs on PC running Windows 7 and allows the user to control the AS3722. Use the enclosed USB cable to connect the PC with the Evaluation board.

The AS3728 is a companion power stage, intended to be used with AS372x products.

It cannot be used without a DCDC controller. It contains the power FETs for 2 phases and is capable to handle output currents of 4A per phase.

## 1.1 Kit Content

The AS3722 and AS3728 Evaluation Kit include all items listed in Figure 1: Kit Content.

**Figure 1: Kit Content**

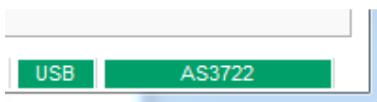
Item	Comment
USB flash drive	Includes document and software
Evaluation board	AS3722 and AS3728
USB connection cable	

## 2 Getting Started

Drive the AS3722 and AS3728 only with the recommended settings and values as described in the datasheet. Please check [www.ams.com](http://www.ams.com) for the latest version.

For a detailed description of the Kit please read sections 3-5 of this document.

- Install the GUI from the attached USB flash drive
- Establish the connection between PC and Evaluation board via the enclosed USB cable
- Supply AS3722 Evaluation Board with the battery which is included in this kit. Check first if the battery is loaded (~ 3.7 VDC).
- Connect the battery to VBAT and GND. Make sure that all four Jumpers are set between J43 and J44 in order to connect VBAT to VSUP.
- Remain all other Jumpers in the default setting (ex-factory).
- Start the GUI and connect the USB Box to a PC USB Port.
- First of all please **perform a firmware upgrade** on the Evaluation board in order to ensure a proper communication to the GUI! The appropriate firmware file for the Evaluation board comes with the GUI software and can be found in the GUI installation directory (default: C:\Program Files (x86)\ams\AS372x Evaluation Software\firmware). Open "Help" in the top command bar and press "Firmware update" to initiate the procedure. Never disconnect the battery or interrupt the connection to the PC during the update!!!
- If the AS3722 Evaluation Board is supplied and connected properly to the PC and the appropriate firmware file is installed, the field at the right bottom corner of the GUI becomes green

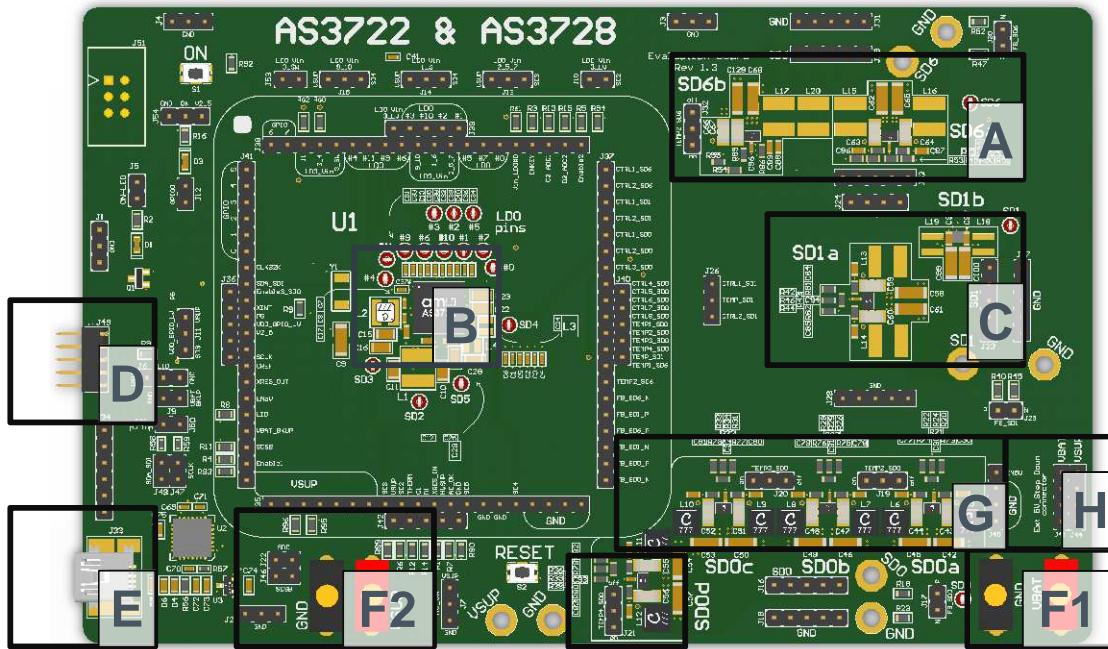


For further information do not hesitate to contact us.

### 3 Hardware Description

The AS3722 and AS3728 Evaluation Board can be powered via an external power supply or via battery (label E). The AS3722 and AS3729 can be controlled with the onboard µC or any other controller board via 10 pole connector which enables fast code debugging (label D).

**Figure 2: Evaluation Board Overview**



Label	Name	Designator	Description	Info
A	SD6	SD6a, SD6b	2 pcs. AS3728 external Power Stages providing max. 12A	Can be used in a special mode using 2 phases with 2 power stages which provides up to 12A. Requires coils capable of supporting 6A each
B	AS3722	U1		PMU supporting up to 20 high current rails
C	SD1	SD1	1 pc. AS3728 external Power Stage providing max. 6A	Support for single, dual or combined phase(s) operation, 3A per phase
D	Controller interface	J49	Controller interface	Can be connected to an external controller
E	USB connector	J33	USB Mini B	Interface to the PC
F1 F2	VBAT, GND VSUP,GND	BU1,BU2 BU11,BU12	VBAT VSUP	Voltage Range: 2.7V to 5.5V. You can use the Battery for VBAT and an ext. Supply for VSUP (default: no jumper on J43, J44) or one ext. Supply on VBAT with jumper on J34, J44).
G	SD0	SD0a, SD0b, SD0c, SD0d	4 pcs. AS3728 external Power Stages providing max. 24A	The output current is easily scalable by varying the number of phases and power-stages from 3A up to 24A
H	VBAT to VSUP	J43, J44	Connect VBAT to VSUP	With this jumper setting the max. permissible voltage supply is 5.5V. Default setting = all 4 Jumpers are set between J43 and J44.   J43 J44

## 4 Software Description

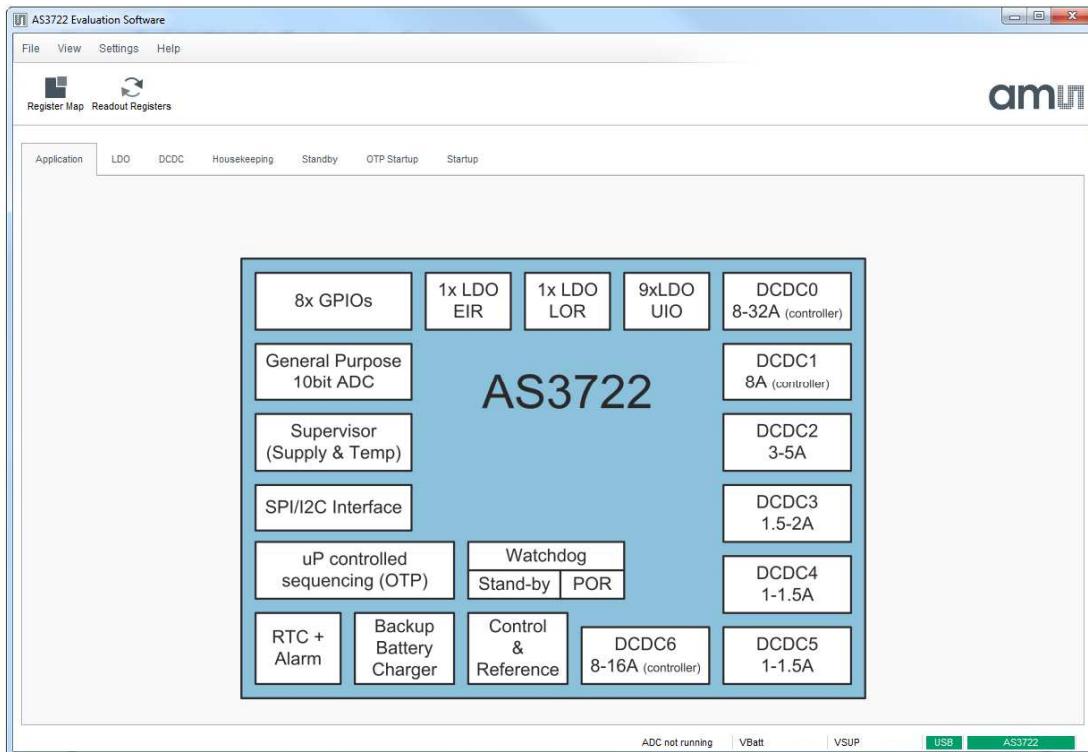
The graphical user interface (GUI) is used to control the AS3722 Evaluation board.

Start the GUI and setup the Hardware according section **Error! Reference source not found.**

**Error! Reference source not found..**

Make sure hardware is recognized and indicators on the bottom right side of the GUI are green colored.

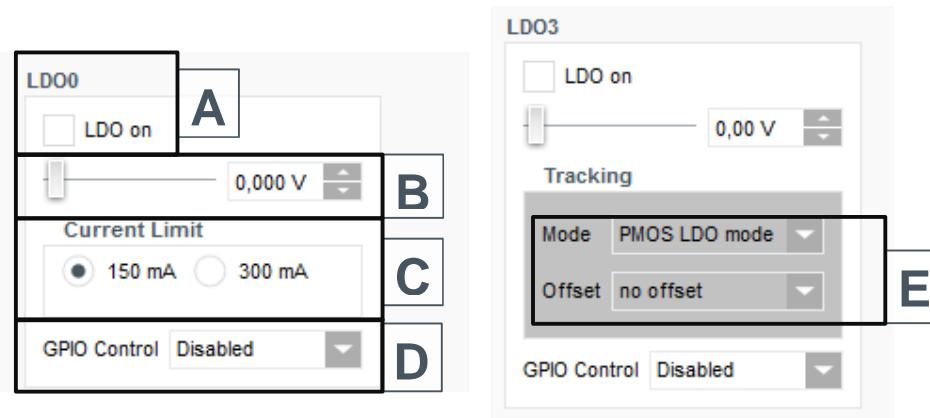
**Figure 3: AS3722 Evaluation Software**



## 4.1 LDO

The AS3722 features 12 low noise LDO's.

**Figure 4: LDO Settings**



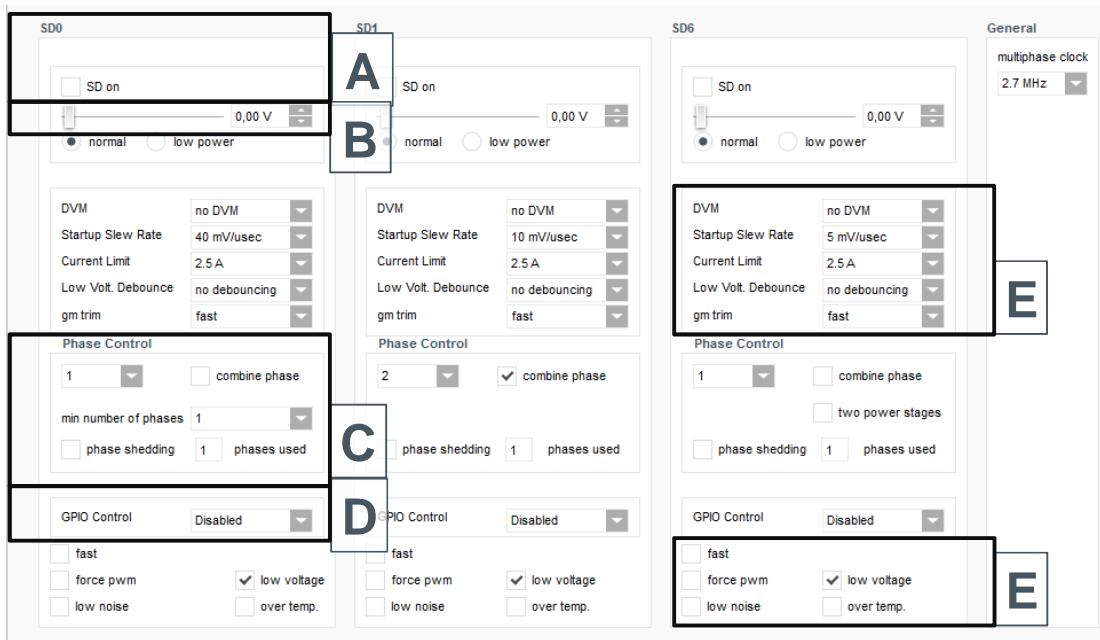
Label	Name	Comment
A	LDO on	Enabling / Disabling of LDOs
B	Vout Regulator	Output voltage
C	Current Limit	Minimum current Limit setting
D	GPIO Control	GPIO controlling of LDOs
E	Tracking	LDO3 works independent or tracks the Vout of DCDC1

## 4.2 DCDC

### 4.2.1 DCDC0, DCDC1, DCDC6

The AS3720 features 3 DCDC step down controller which are generally used in combination with the external Power Stages AS3729.

**Figure 5: Settings for DCDC controllers**

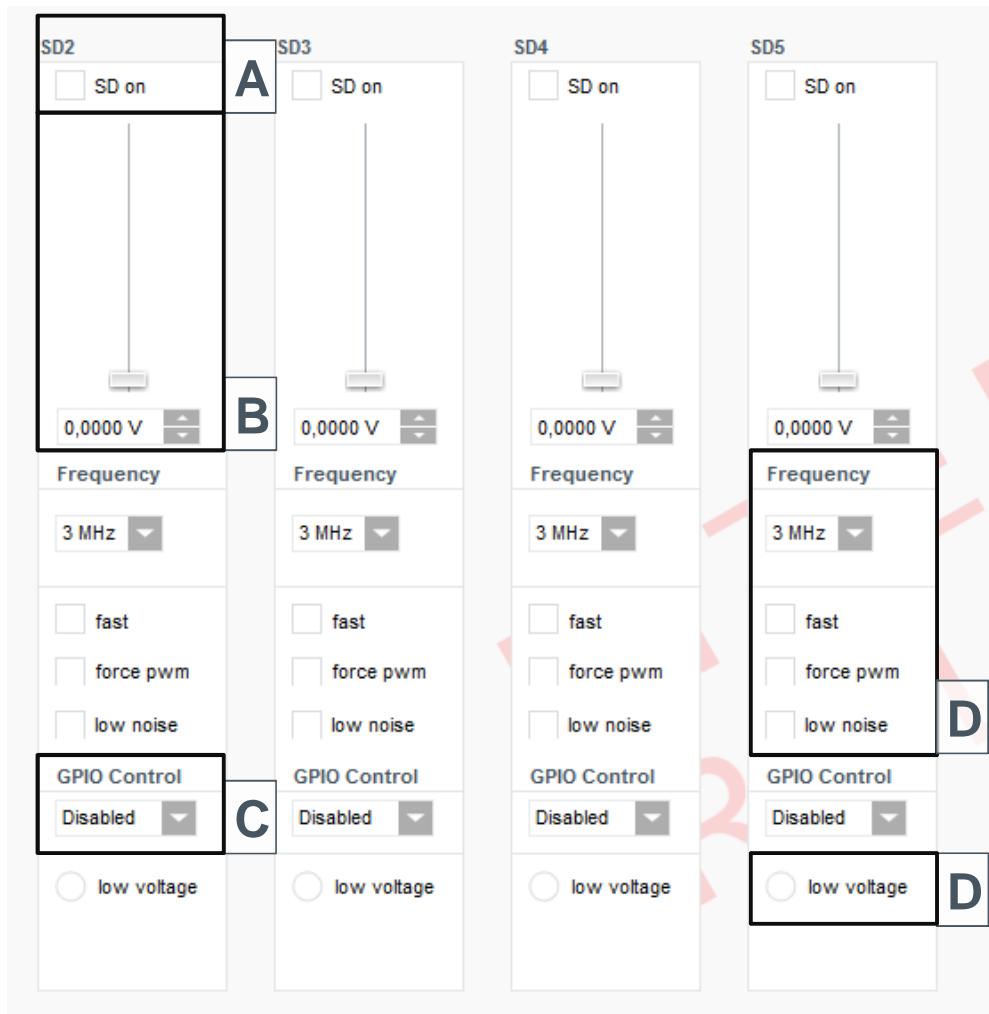


Label	Name	Comment
A	SD on	Enabling / Disabling of DCDCs
B	Vout Regulator	Output voltage
C	Phase Control	SD0: Up to 4 Power Stages and 8 phases can be used. As well as a combined mode of phases 1 and 2, 3 and 4, 5 and 6, 7 and 8 is possible. SD1 and SD6: Support for single, dual or combined phase(s) operation
D	GPIO Control	GPIO controlling of DCDCs
E	Mode Settings	For further details please refer to the AS3720/21 datasheet. The latest version of the datasheet can be found on our homepage, <a href="http://www.ams.com">www.ams.com</a>

#### 4.2.2 DCDC2 – DCDC5

The AS3722 features 4 DCDC step down regulators.

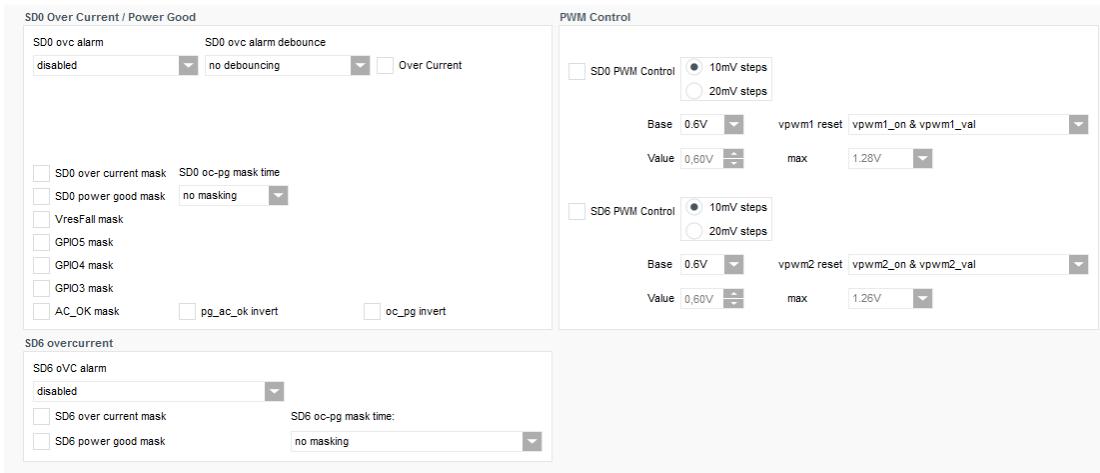
Figure 6: Settings for DCDC regulators



Label	Name	Comment
A	SD on	Enabling / Disabling of DCDCs
B	Vout Regulator	Output voltage
C	GPIO Control	GPIO controlling of DCDCs
D	Mode Settings	For further details please refer to the AS3720/21 datasheet. The latest version of the datasheet can be found on our homepage, <a href="http://www.ams.com">www.ams.com</a>

### 4.2.3 OC\_PG / PWM Settings

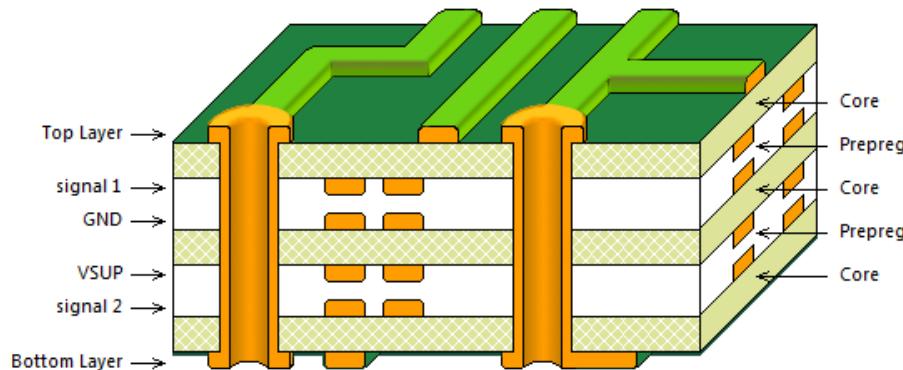
The AS3722 features for SD0 a PWM Control.



## 5 Schematics, Layers and BOM

The AS3722 and AS3728 Evaluation Board is a 6-layer FR4 board. The main components are the AS3722 together with the Power Stages AS3728 plus additionally some active components, passive components, several test points and connectors.

**Figure 7: AS3722 and AS3728 PCB Layer Stack up**



## 5.1 Schematics of AS3722 and AS3728 Evaluation Board

**Figure 8: Schematic page 1**

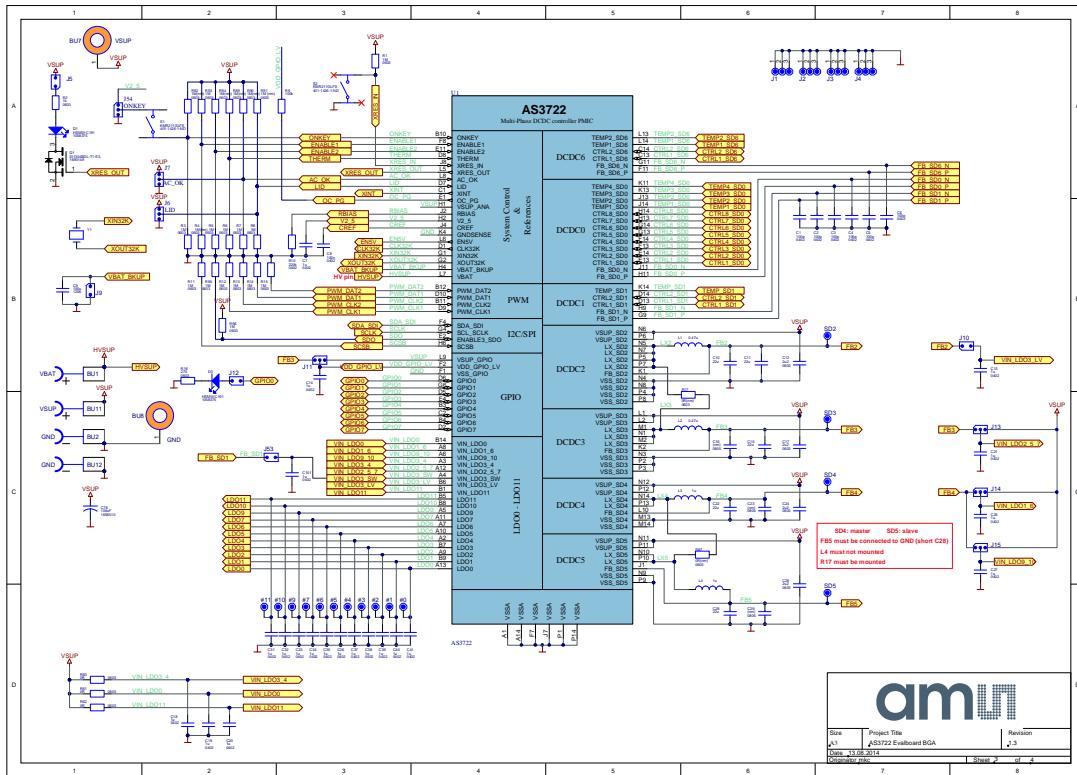


Figure 9: Schematic page 2

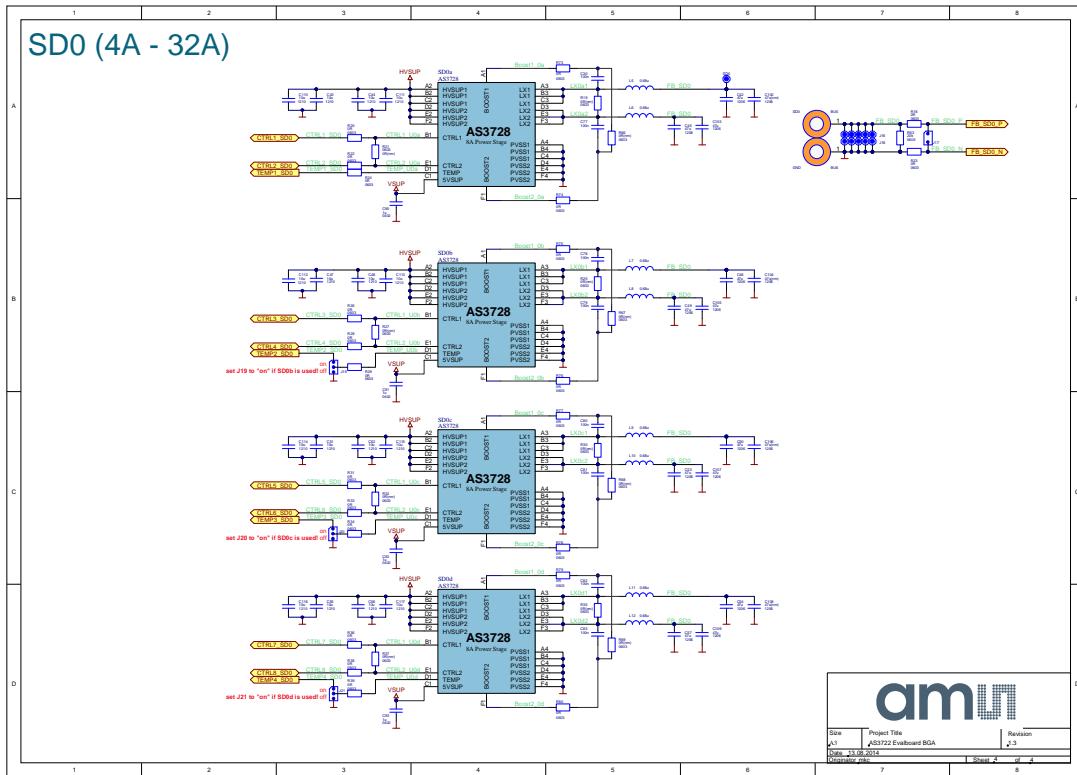


Figure 10: Schematic page 3

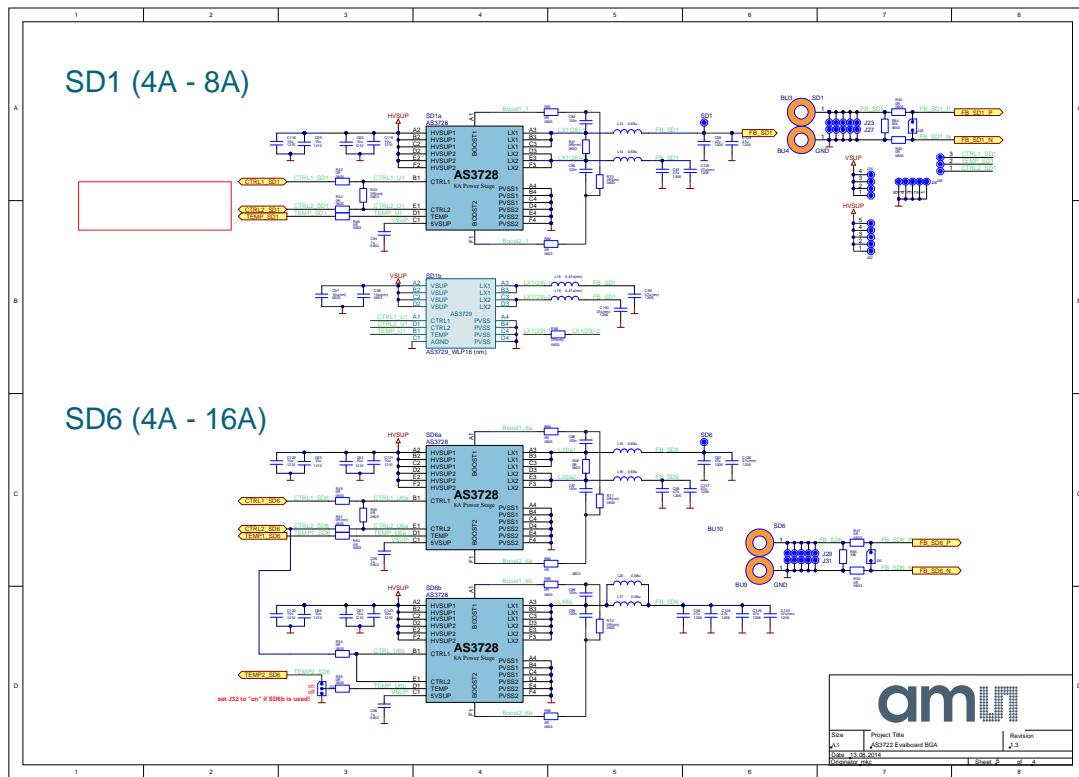
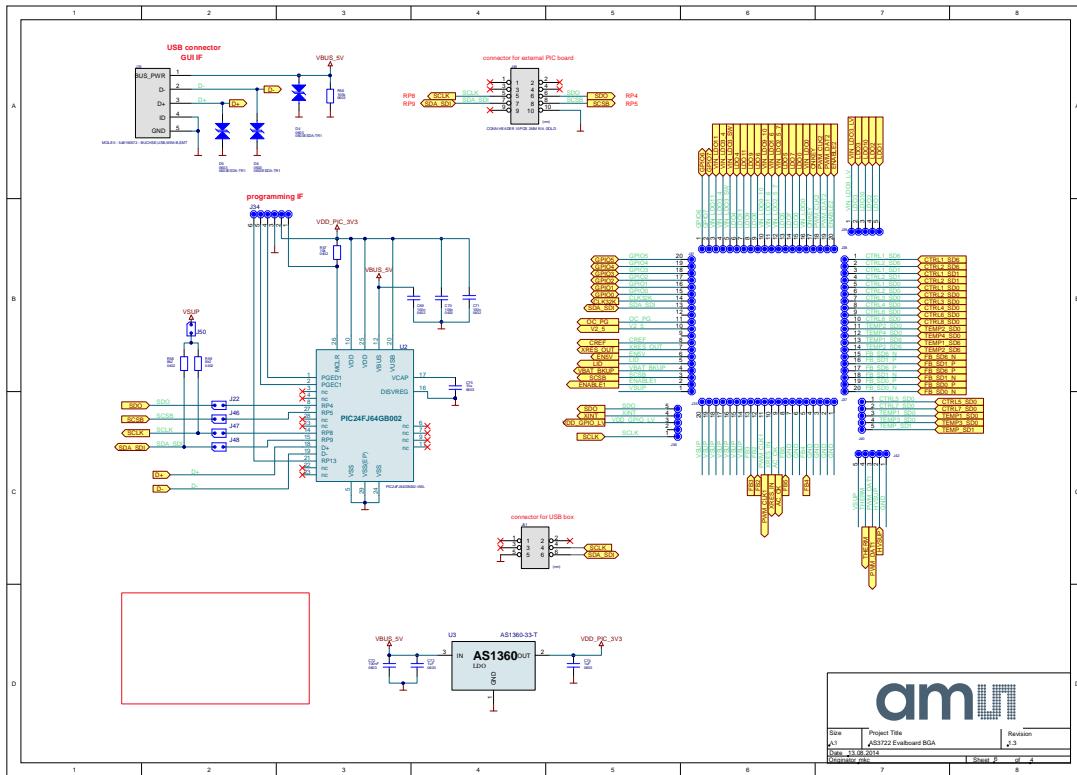
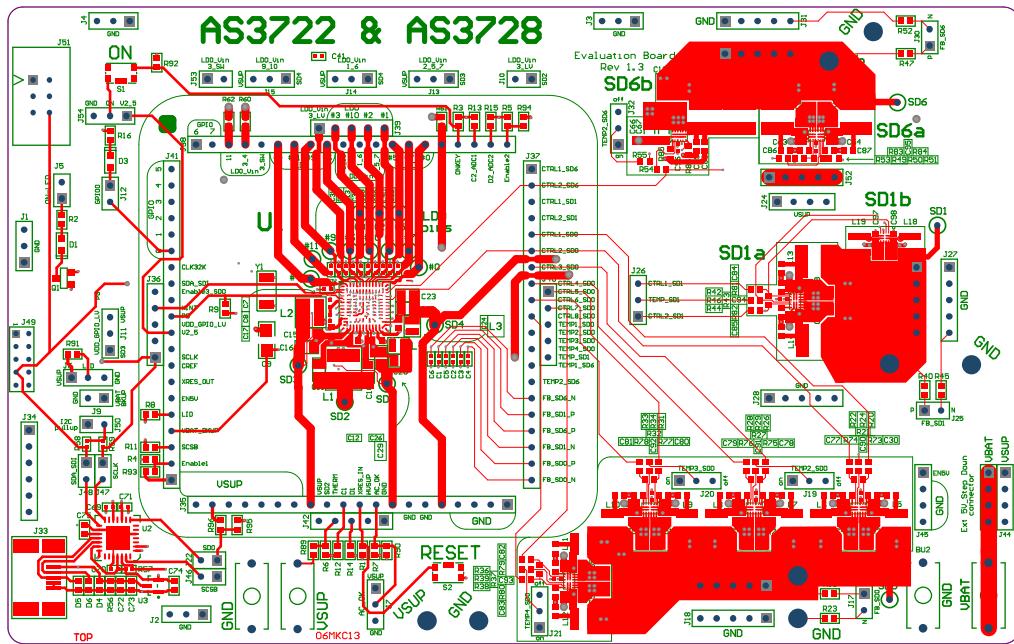


Figure 11: Schematic page 4



## 5.2 Board Layout of AS3722 and AS3728 Evaluation Board

**Figure 12: Top Layer & Silk**



**Figure 13: Layer INNER1 - SIGNAL1 & GND**

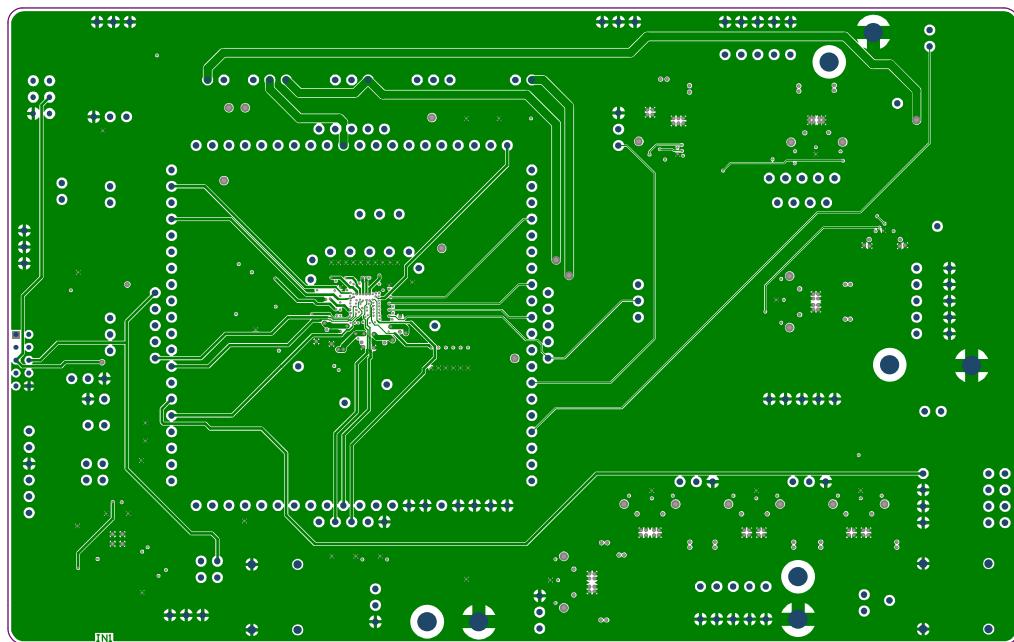


Figure 14: Layer INNER2 - GND

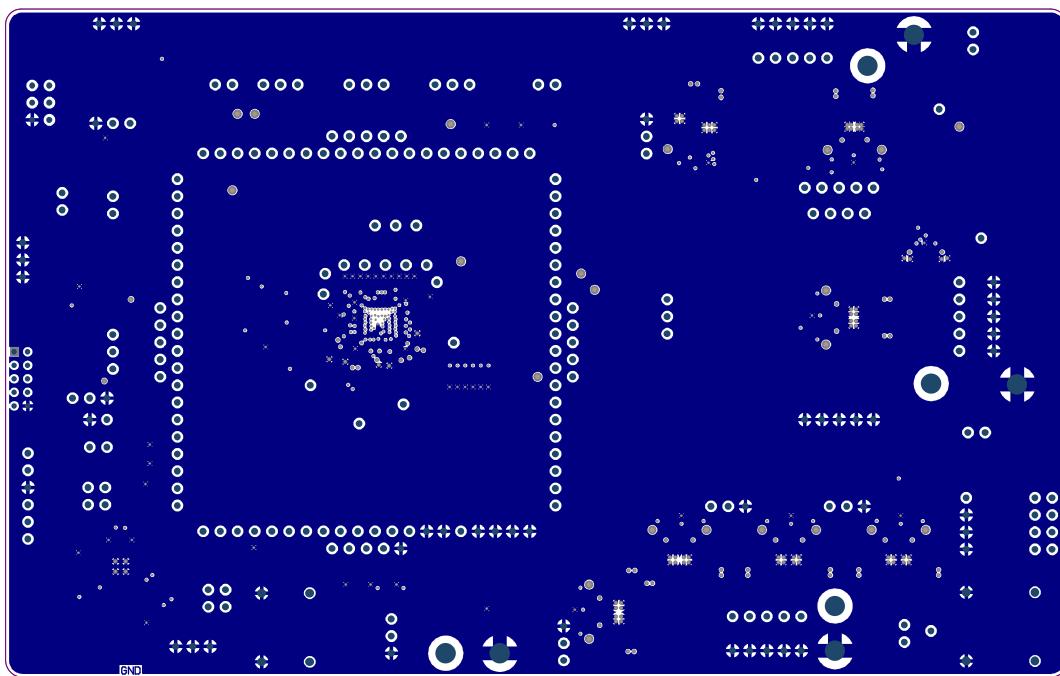


Figure 15: Layer INNER3 - VSUP

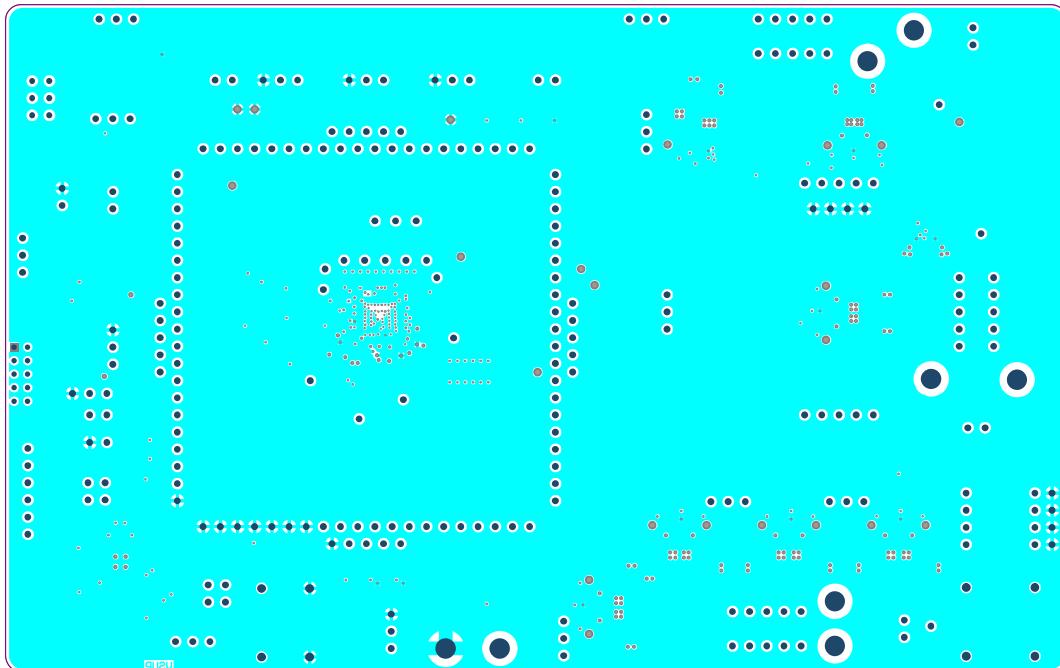


Figure 16: Layer INNER4 - SIGNAL2 &amp; GND

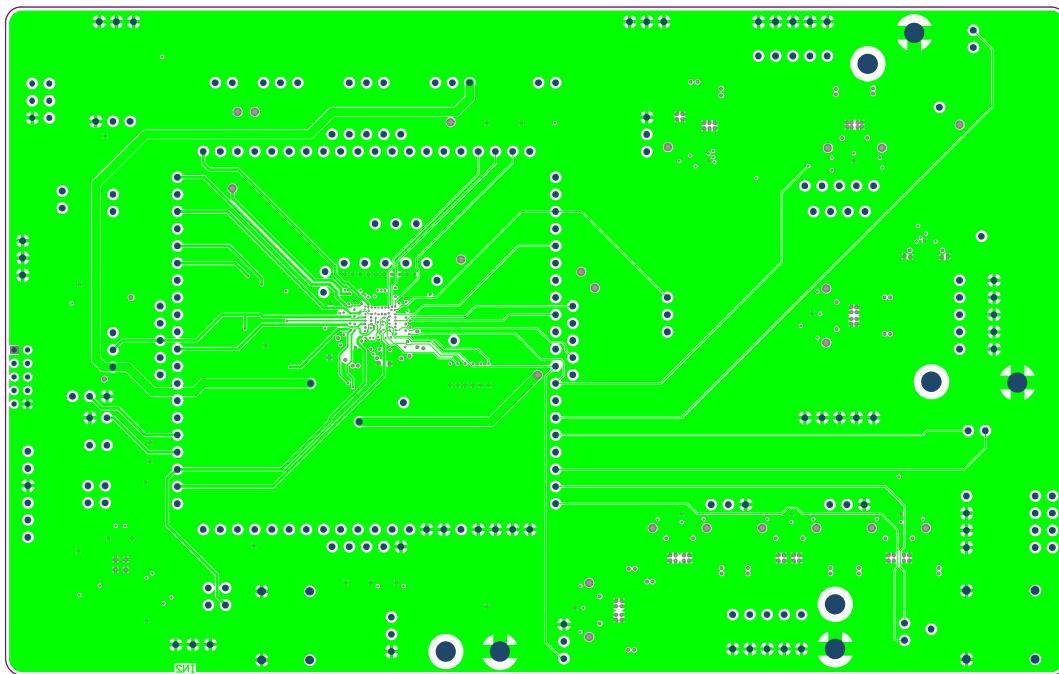
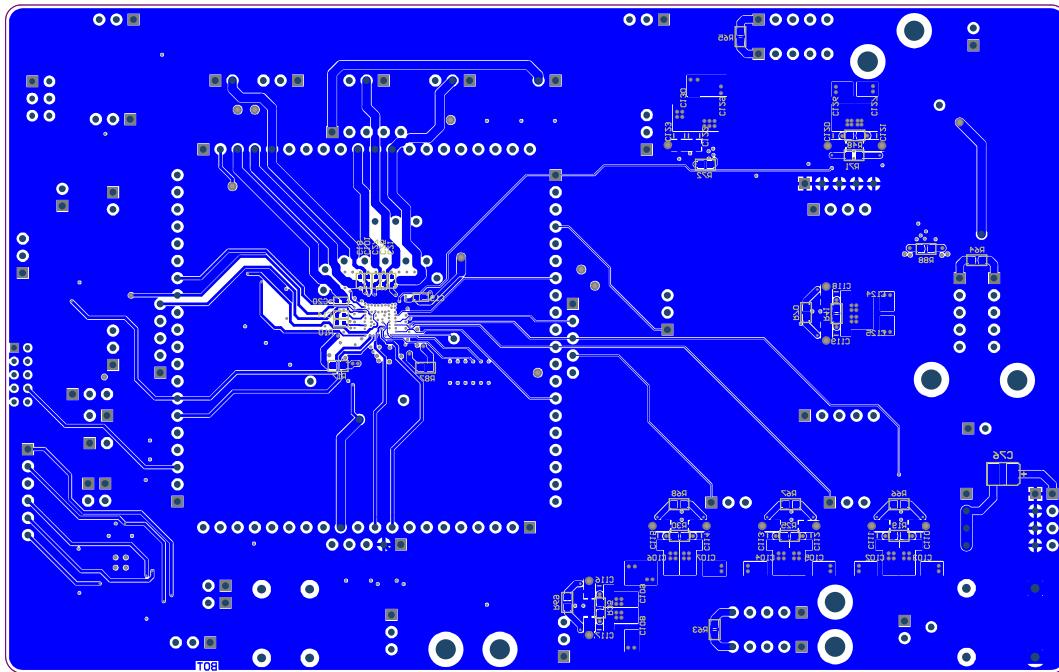


Figure 17: Bottom Layer &amp; Silk



### 5.3 BOM

**Figure 18: Bill of Material**

Bill of Materials		AS3722 Evalboard BGA					
#	Designator	Comment	Component Description	Manufacturer	Manufacturer Part Number	Quantity	
1	BU1, BU11	VBAT, VSUP	HIRSCHMANN TEST AND MEASUREMENT - MFB1 RED - MINI-PRUEFLEUCHSE ROT	HIRSCHMANN TEST AND MEASUREMENT	MFB1 RED	2	
2	BU2, BU12	GND	HIRSCHMANN TEST AND MEA SURMENT - MFB1 BLACK - MINI-PRUEFLEUCHSE SW	HIRSCHMANN TEST AND MEA SURMENT	MFB1 BLACK	2	
3	C1, C2, C3, C4, C5, C6	100p	MURATA - GRM155R1C1H01JD01D - KONDENSATOR, 0402, 100PF, 50V	MURATA	GRM155R1C1H01JD01D	6	
4	C34, C35, C36, C37, C38, C39, C40, C41, C90, C91, C92, C93, C94, C95, C96, C101	1u	MURATA - GRM155R61A105KE15D - KONDENSATOR, 0402, 1.0UF, 10V	MURATA	GRM155R61A105KE15D	28	
5	C8, C69, C70, C71	100n	MURATA - GRM155R71A104KA01D - CAPACITOR, 0402, X7R, 100nF, 50V	MURATA	GRM155R71A104KA01D	4	
6	C9	100u	MURATA - GRM1CR60J107ME39L - KONDENSATOR, 0603, 100uF, 6.3V	MURATA	GRM1CR60J107ME39L	1	
7	C10, C11, C15, C22, C28	22u	CAP CER 22uF 6.3V 20% X5R 0805	Taiyo Yuden	JMK212B226M-D-T	5	
8	C12, C17, C24, C26	2u2	CAP CER 2u2F 10V 10% X7R 0603	Murata Electronics North America	GRM188R71A225KE15D	1	
9	C30, C71, C78, C79, C80, C81, C82, C83, C84, C85, C86, C97, C98, C99	100n	CAP CER 0.1uF 16V 10% X7R 0603	Murata Electronics North America	GRM188R71C01KA01D	14	
10	C42, C43, C46, C49, C50, C53, C54, C57, C58, C61, Q62, C65, C68, C103, C105, C107, C109, C124, C127, C128, C129	47u	CAP CER 47uF 6.3V 20% X5R 0805	Taiyo Yuden	JMK212B476M-G-T	21	
11	C43, C44, C47, C48, C51, C52, C55, C56, C59, C60, Q63, C64, C66, C67, C110, C111, C12, C13, C114, C115, C116, C117, C118, C119, C120, C121, C122, C123	10u	CAP CER 10uF 25V 10% X5R 1206	Taiyo Yuden	JMK316ABJ106KD-T	28	
12	C72	100nF	MURATA - GRM188R71E104KA01D - CAPACITOR, 0603, X7R, 25V, 100nF	MURATA	GRM188R71E104KA01D	1	
13	C73, C74	1uF	MURATA - GRM188R60J106ME47D - KONDENSATOR, 0603, 1.0uF, 25V	MURATA	GRM188R60J106ME47D	2	
14	C75	10u	MURATA - GRM188R60J106ME47D - KONDENSATOR, 0603, 10uF, 6.3V	MURATA	GRM188R60J106ME47D	1	
15	C76	100uF	AVX - TPSB107M010R0400 - KONDENSATOR, BAUF: B, 100 uF, 10V	AVX	TPSB107M010R0400	1	
16	D1, D3	LED	AVAGO TECHNOLOGIES - HSMW-C191 - LED, SMD WEISS	AVAGO TECHNOLOGIES	HSMW-C191	2	
17	D4, D5, D6	ESD	COOPER BUSSMANN - 0603ESDA-TR1 - DIODE	COOPER BUSSMANN	0603ESDA-TR1	3	
18	J1, J2, J3, J5, J6, J10, J11, J12, J13, J14, J15, J16, J17, J18, J19, J20, J21, J23, J25, J27, J29, J30, J31, J32, J35, J36, J37, J38, J39, J40, J41, J42, J43, J44, J45, J47, J48, J50, J53	100u	Jumper, THMD	FISCHER ELEKTRONIK - SL11 124 36G - STIFTLBSTE, 36POL, 2.54MM RASTER	FISCHER ELEKTRONIK	SL11 124 36G	39
19	J6, J7, J54	100u	LID_AC_OK, ONKEY	FISCHER ELEKTRONIK - SL11 124 36G - STIFTLBSTE, 36POL, 2.54MM RASTER	FISCHER ELEKTRONIK	SL11 124 36G	3
20	J33	100u	USB, AB, MINI, SMD, MOLEX	MOLEX - MOLEX 190572 - BUCHSE, USB, MINI-B, SMT	MOLEX	548190572	1
21	L1, L2	0.47u	INDUCTOR POWER 470mH 20% SMD	TDK Corporation	SPM4015T-R47M	2	
22	L3, L4	1u	INDUCTOR POWER 1.0uH 20% 100uH	TDK	TPM252010GHM-1ROMTAA	2	
23	L5, L6, L7, L8, L9, L10, L11, L12, L13, L14, L15, L16, L17, L20	0.68u	INDUCTOR POWER: 680uH SMD	TDK	SPM4015T-R68	14	
24	Q1	S1304	VISHAY SILICONIX - SI304BDL-T1-E3 - N CHANNEL	VISHAY SILICONIX	SI304BDL-T1-E3	1	
25	R1, R3, R5, R6, R7, R8, R11, R12, R13, R14, R15, R93, R95	1M	BOURNS - CRW0603-1M000Z-1W	BOURNS	CR0603-JW-105GLF	13	
26	R2	1k	BOURNS - CRW0603-JW-102GLF - WIDERSTAND, 0603, 1K6%, 0.1W	BOURNS	CR0603-JW-102GLF	1	
27	R6, R56	100k	BOURNS - CRW0603-FX-1003ELF - WIDERSTAND, 0603, 100K, 1% 0.1W	BOURNS	CRW0603-FX-1003ELF	2	
28	R10	220k	MULTICOMP - MC 0.0625W 0402 1% 220K - WIDERSTAND	MULTICOMP	MC 0.0625W 0402 1% 220K	1	
29	R16	270	VISHAY DRALORIC - CRCW0603270RFKEAHP - WIDERSTAND, 0603, 1%, 270K	VISHAY DRALORIC	CRCW0603270RFKEAHP	1	
30	R18, R20, R22, R23, R24, R26, R28, R29, R31, R33, R34, R36, R38, R39, R40, R42, R44, R45, R46, R47, R48, R49, R50, R52, R53, R54, R55, R60, R61, R62, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86	0R	VISHAY DRALORIC - CRCW0603000Z0EA - RESISTOR, 0603, 0R, 0.1W, 1%	VISHAY DRALORIC	CRCW0603000Z0EA	44	
31	R57	10k	VISHAY DRALORIC - CRCW040210K0FKEAHP - WIDERSTAND, 0402, 1%, 10K	VISHAY DRALORIC	CRCW040210K0FKEAHP	1	
32	R58, R59	8u2	VISHAY DRALORIC - CRCW04028K20FKEAHP - WIDERSTAND, 0402, 1%, 8K2	VISHAY DRALORIC	CRCW04028K20FKEAHP	2	
33	R63	20k	MULTICOMP - MC 0.063W 0603 1% 20K - WIDERSTAND	MULTICOMP	MC 0.063W 0603 1% 20K	1	
34	R64	82k	MULTICOMP - MC 0.063W 0603 1% 82K - WIDERSTAND	MULTICOMP	MC 0.063W 0603 1% 82K	1	
35	R65	39k	MULTICOMP - MC 0063W 0603139K - WIDERSTAND, 0603	MULTICOMP	MC0063W0603139K	1	
36	S1, S2	ON, Reset	SWITCH TACTILE SPST-NO 0.05A 32V	C&K Components	KMR211GLFS	2	
37	SD0a, SD0b, SD0c, SD0d, SD1a, SD6a, SD6b	A50128	SD2, SD3, SD4, SD5, #3, #0, #11, #10, #9, #7, #6, #5, #4, #2, #1, SD1, SD1, SD6	A53728	A53728-BWLT	1	
38	TP1, TP3, TP4, TP5, TP6, TP7, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP18, TP19, TP20	100ST	VERO - 20-313137 - LOTSTUTZPUNKT ROT BIS MAX 475	VERO	20-313137	16	
39	U1	A53722	A53722-BCTT-00	A53722-BCTT-00	1		
40	U2	PIC24F54GB002	MICROCHIP - PIC24F54GB002-IML - MCU 16BIT, 64K FLASH, USB, OTG, 280FN	MICROCHIP	PIC24F54GB002-IML	1	
41	U3	A51380	IC LDO 150mA 3.3V SOT23-3	ams AG	A51380-33-T	1	
42	Y1	CRYSTAL	CRYSTAL 32.768kHz 7PF SMD	Citizen Finetech Miyota	CM519-32.768KQZYT	1	

Approved: Notes: 286

Note: Populated components may vary!

## 6 Ordering & Contact Information

The AS3722 Evaluation Kit can be ordered via [www.ams.com](http://www.ams.com).

Ordering Code	Description
AS3722-CT-00_EK_ST AS3728	AS3722 Eval Kit Standard Board

**Buy our products or get free samples online at:**

[www.ams.com/ICdirect](http://www.ams.com/ICdirect)

**Technical Support is available at:**

[www.ams.com/Technical-Support](http://www.ams.com/Technical-Support)

**Provide feedback about this document at:**

[www.ams.com/Document-Feedback](http://www.ams.com/Document-Feedback)

**For further information and requests, e-mail us at:**

[ams\\_sales@ams.com](mailto:ams_sales@ams.com)

**For sales offices, distributors and representatives, please visit:**

[www.ams.com/contact](http://www.ams.com/contact)

### Headquarters

ams AG

Tobelbaderstrasse 30

8141 Unterpremstaetten

Austria, Europe

Tel: +43 (0) 3136 500 0

Website: [www.ams.com](http://www.ams.com)

## 7 Copyrights & Disclaimer

Copyright ams AG, Tobelbader Strasse 30, 8141 Unterpremstaetten, Austria-Europe. Trademarks Registered. All rights reserved. The material herein may not be reproduced, adapted, merged, translated, stored, or used without the prior written consent of the copyright owner.

Demo Kits, Evaluation Kits and Reference Designs are provided to recipient on an “as is” basis for demonstration and evaluation purposes only and are not considered to be finished end-products intended and fit for general consumer use, commercial applications and applications with special requirements such as but not limited to medical equipment or automotive applications. Demo Kits, Evaluation Kits and Reference Designs have not been tested for compliance with electromagnetic compatibility (EMC) standards and directives, unless otherwise specified. Demo Kits, Evaluation Kits and Reference Designs shall be used by qualified personnel only.

ams AG reserves the right to change functionality and price of Demo Kits, Evaluation Kits and Reference Designs at any time and without notice.

Any express or implied warranties, including, but not limited to the implied warranties of merchantability and fitness for a particular purpose are disclaimed. Any claims and demands and any direct, indirect, incidental, special, exemplary or consequential damages arising from the inadequacy of the provided Demo Kits, Evaluation Kits and Reference Designs or incurred losses of any kind (e.g. loss of use, data or profits or business interruption however caused) as a consequence of their use are excluded.

ams AG shall not be liable to recipient or any third party for any damages, including but not limited to personal injury, property damage, loss of profits, loss of use, interruption of business or indirect, special, incidental or consequential damages, of any kind, in connection with or arising out of the furnishing, performance or use of the technical data herein. No obligation or liability to recipient or any third party shall arise or flow out of ams AG rendering of technical or other services.

## 8 Revision Information

Initial version 1-00

ООО "ЛайфЭлектроникс"

"LifeElectronics" LLC

ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибуторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибуторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помочь разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)  
Email: org@lifeelectronics.ru