

LT8692S

42V/2A plus 3x 8V/1A, 2MHz Quad Monolithic Synchronous Step-Down Regulator

DESCRIPTION

Demonstration circuit EVAL-LT8692S-AZ is an ultra-compact 4 rail power supply featuring the **LT[®]8692S**, a 42V quad monolithic synchronous step-down Silent Switcher[®]. The demo circuit is designed for 5V, 3.3V, 1.8V, and 1.2V outputs from a nominal 12V input. The 3.3V, 1.8V and 1.2V converters are powered from the high voltage buck regulator with 5V output, which is powered from a wide range of 6.2V to 42V input. The current capability is 2A for the channel 1, and 1A for the low voltage channels.

Internal soft-start, individual current limit, independent enable for each channel simplify the complex design of

quad-output power converters. All regulators can be synchronized to a common external clock input or internal oscillator of 2MHz.

The table below summarizes the performance of the demo board at room temperature. The circuit can be easily modified for different applications.

The LT8692S data sheet gives a complete description of the part, operation and application information. The data sheet must be read in conjunction with this quick start guide for demo circuit EVAL-LT8692S-AZ.

[Design files for this circuit board are available.](#)

All registered trademarks and trademarks are the property of their respective owners.

PERFORMANCE SUMMARY Specifications are at T_A = 25°C

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage		6.2	12	42	V
Output Voltage V _{OUT1}	V _{IN} = 12V , I _{OUT1} = 1A	4.80	5	5.20	V
Output Voltage V _{OUT2}	I _{OUT2} = 1A	3.17	3.3	3.43	V
Output Voltage V _{OUT3}	I _{OUT3} = 1A	1.73	1.8	1.87	V
Output Voltage V _{OUT4}	I _{OUT4} = 1A	1.15	1.2	1.25	V
Maximum Output Current I _{OUT1}	Total Current with Channels 2 , 3 , 4 Disabled	2			A
Maximum Output Current I _{OUT2}		1			A
Maximum Output Current I _{OUT3}		1			A
Maximum Output Current I _{OUT4}		1			A
Switching Frequency		1.8	2	2.2	MHz
Channel 1 Efficiency	V _{IN} = 12V, V _{OUT} = 5V, I _{OUT} = 2A with Channels 2, 3, 4 Disabled		90		%
Channel 2 Efficiency	V _{IN234} = 5V , V _{OUT} = 3.3V , I _{OUT} = 1A		92		%
Channel 3 Efficiency	V _{IN234} = 5V , V _{OUT} = 1.8V , I _{OUT} = 1A		90		%
Channel 4 Efficiency	V _{IN234} = 5V , V _{OUT} = 1.2V , I _{OUT} = 1A		87		%

QUICK START PROCEDURE

Demo circuit EVAL-LT8692S-AZ is easy to set up to evaluate the performance of the LT8692S. Refer to Figure 1 for proper equipment setup and follow the procedure below.

1. With power off, connect the input power supply to the board through VIN and GND terminals on the top layer. Connect the loads to the terminals VOUT1 and GND, VOUT2 and GND, VOUT3 and GND, VOUT4 and GND on the board. The default positions of the Headers are given in Table 1.

Table 1. Default Positions of the Headers

NAME	JUMPER	POSITION
EN/UVLO	JP1	ON
EN3	JP2	RUN
EN2	JP3	RUN
EN1	JP4	RUN
EN4	JP5	RUN
VIN234	JP6	VOUT1

2. Turn on the power at the input (VEMI+, VEMI-). Increase voltage to 12V. Make sure that the input voltage is always within spec. Refer to data sheet on the burst mode operation in light load and high V_{IN} condition.
3. Check for the proper output voltages. The output should be regulated at 5V ($\pm 4\%$), 3.3V ($\pm 4\%$), 1.8V ($\pm 4\%$), 1.2V ($\pm 4\%$). Do not overload unless proper thermal cooling method such as air flow or heat sink is applied.
4. Once the proper output voltage is established, adjust the input voltage and load currents within the operating range and observe the output voltage regulation, transient, ripple voltage, efficiency and other parameters. When measuring the input or output voltage ripples, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across the VIN or VOUT capacitor terminals.

QUICK START PROCEDURE

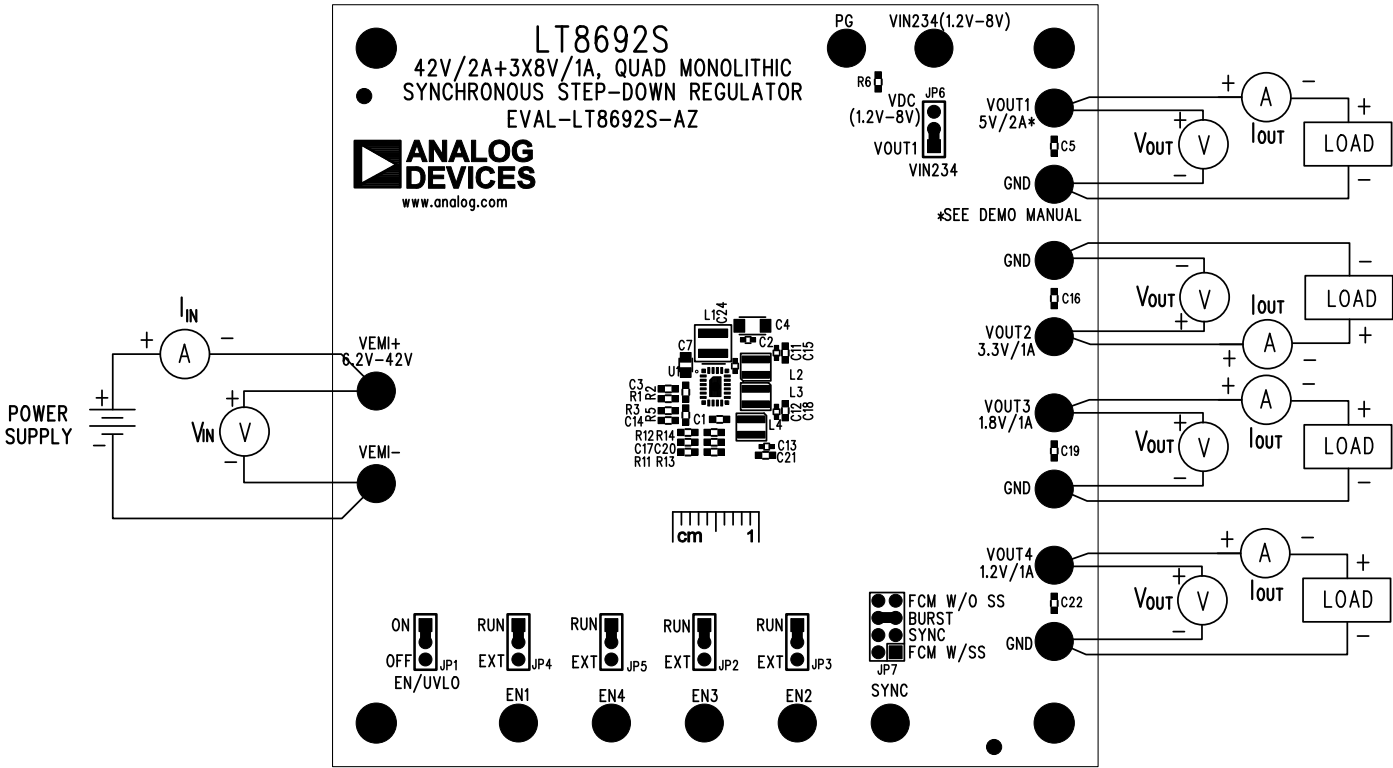


Figure 1. Proper Measurement Equipment Setup

DEMO MANUAL

EVAL-LT8692S-AZ

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C1	CAP., 2.2 μ F, X5R, 6.3V, 10%, 0603	AVX, 06036D225KAT2A
2	1	C3	CAP., 10pF, C0G, 50V, 5%, 0603	AVX, 06035A100JAT2A
3	1	C4	CAP., 47 μ F, X5R, 10V, 20%, 1206	TAIYO YUDEN, LMK316ABJ476ML-T
4	4	C5, C16, C19, C22	CAP., 0.1 μ F, X7R, 50V, 10%, 0603	AVX, 06035C104KAT2A
5	1	C6	CAP., 22 μ F, ALUM ELECT, 50V, 20%, 6.3mm \times 5.4mm, RADIAL, SMD, CE-BSS SERIES, AEC-Q200	SUN ELECTRONIC INDUSTRIES CORP, 50CE22BSS
6	1	C7	CAP., 2.2 μ F, X7R, 50V, 10%, 0805	AVX, 08055C225KAT2A
7	1	C8	CAP., 0.1 μ F, X7R, 50V, 10%, 0402	AVX, 04025C104KAT2A
8	1	C9	CAP., 4.7 μ F, X7R, 10V, 10%, 0805, AEC-Q200	KEMET, C0805C475K8RACAUTO
9	2	C10, C23	CAP., 10 μ F, X5R, 50V, 10%, 1206	TAIYO YUDEN, UMK316BBJ106KL-T
10	1	C14	CAP., 4.7pF, C0G/NPO, 50V, \pm 0.25pF, 0603	MURATA, GRM1885C1H4R7CA01D
11	3	C15, C18, C21	CAP., 47 μ F, X5R, 4V, 20%, 0603	MURATA, GRM188R60G476ME15D
12	1	C17	CAP., 10pF, C0G, 50V, 5%, 0603	AVX, 06035A100JAT2A
13	1	C20	CAP., 39pF, C0G, 50V, 5%, 0603	AVX, 06035A390JAT2A
14	1	FB1	IND., 100 Ω AT 100MHZ, FERRITE BEAD, 25%, 2A, 40m Ω , 0603	TDK, MPZ1608Y101BTA00
15	1	L1	IND., 2.2 μ H, PWR, SHIELDED, 20%, 7.8A, 22.1m Ω , 4.3mm \times 4.3mm, XEL4030, AEC-Q200	COILCRAFT, XEL4030-222MEB
16	1	L2	IND., 1.8 μ H, POWER SHIELDED, 20%, 2.9A, 24.1m Ω , 3.2mm \times 3.5mm, AEC-Q200	COILCRAFT, XGL3520-182MEB
17	1	L3	IND., 1.5 μ H, POWER SHIELDED, 20%, 3.1A, 19.8m Ω , 3.2mm \times 3.5mm, AEC-Q200	COILCRAFT, XGL3520-152MEB
18	1	L4	IND., 1.2 μ H, POWER SHIELDED, 20%, 3.5A, 15.8m Ω , 3.2mm \times 3.5mm, AEC-Q200	COILCRAFT, XGL3520-122MEB
19	1	L5	IND., 0.22 μ H, PWR, SHIELDED, 20%, 6.5A, 11.4m Ω , 1212BZ, IHLP-11 SERIES	VISHAY, IHLP1212BZERR22M11
20	4	R1, R3, R11, R14	RES., 1M, 1%, 1/10W, 0603, AEC-Q200	NIC, NRC06F1004TRF
21	1	R2	RES., 191k, 1%, 1/10W, 0603	VISHAY, CRCW0603191KFKEA
22	1	R4	RES., 340k, 1%, 1/10W, 0603	VISHAY, CRCW0603340KFKEA
23	1	R5	RES., 316k, 1%, 1/10W, 0603, AEC-Q200	NIC, NRC06F3163TRF
24	1	R6	RES., 19.1k, 1%, 1/10W, 0603, AEC-Q200	PANASONIC, ERJ3EKF1912V
25	9	R10, R21, R22, R26-R31	RES., 100k, 1%, 1/10W, 0603	STACKPOLE ELECTRONICS, INC., RMCF0603FG100K
26	1	R12	RES., 806k, 1%, 1/10W, 0603, AEC-Q200	NIC, NRC06F8063TRF
27	1	R13	RES., 499k, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW0603499KFKEA
28	1	U1	IC, QUAD MONOLITHIC SYNCHRONOUS STEP DOWN REGULATOR, LQFN-20	ANALOG DEVICES, LT8692SIV#TRPBF

Additional Demo Board Circuit Components

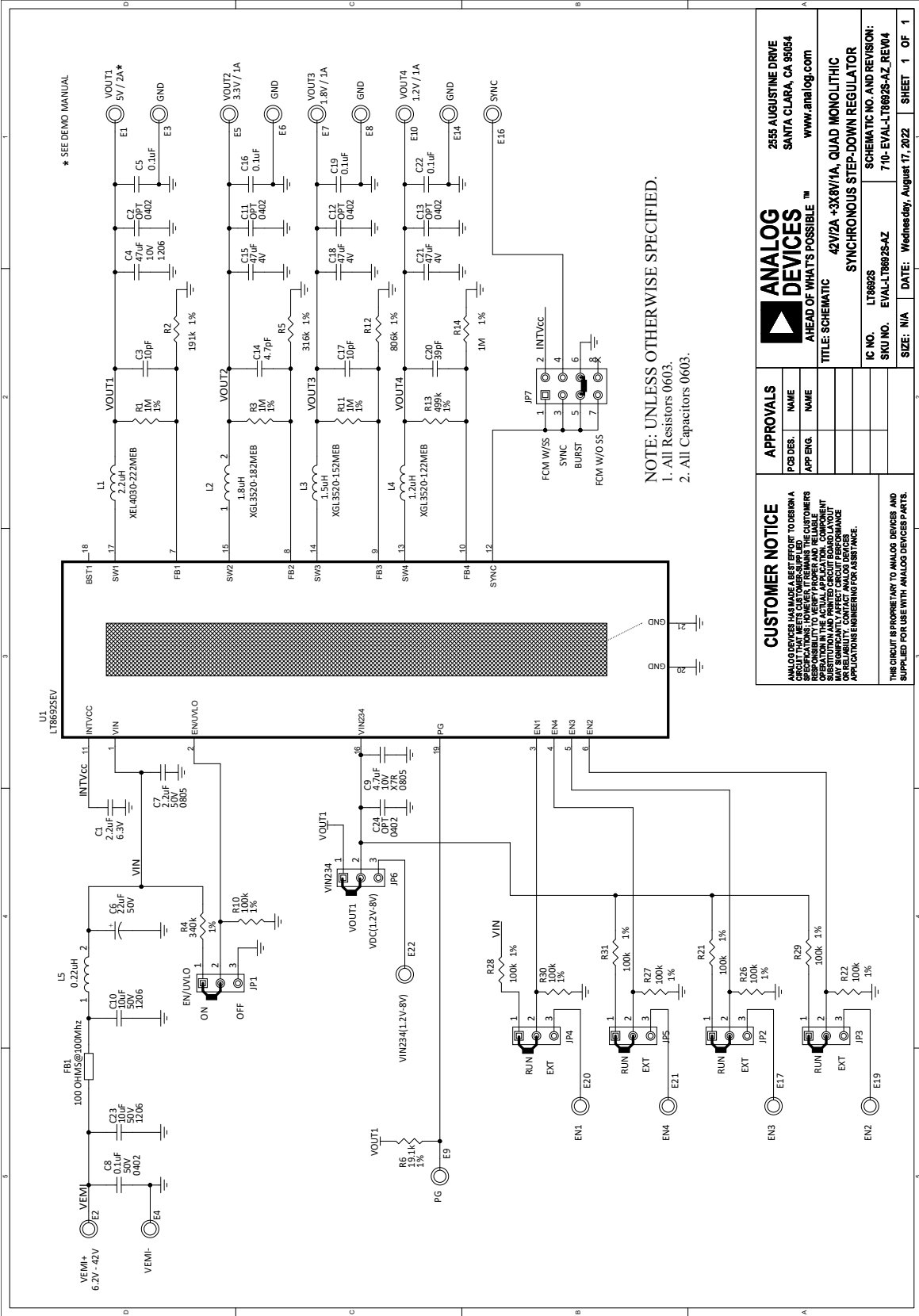
1	0	C2, C11-C13, C24	CAP., OPTION, 0402	
---	---	------------------	--------------------	--

Hardware: For Demo Board Only

1	17	E1-E10, E14, E16, E17, E19-E22	TEST POINT, TURRET, 0.094" MTG. HOLE, PCB 0.062" THK	MILL-MAX, 2501-2-00-80-00-00-07-0
2	6	JP1-JP6	CONN., HDR, MALE, 1 \times 3, 2mm, VERT, ST, THT, NO SUBS. ALLOWED	WURTH ELEKTRONIK, 62000311121
3	1	JP7	CONN., HDR, MALE, 2 \times 4, 2mm, VERT, ST, THT	WURTH ELEKTRONIK, 62000821121
4	4	MP1-MP4	STANDOFF, NYLON, SNAP-ON, 0.50"	KEYSTONE, 8833
5	7	XJP1-XJP7	CONN., SHUNT, FEMALE, 2-POS, 2mm	WURTH ELEKTRONIK, 60800213421

Rev. 0

SCHEMATIC DIAGRAM



		2555 AUGUSTINE DRIVE SANTA CLARA, CA 95054 www.analog.com	
		ANALOG DEVICES AHEAD OF WHAT'S POSSIBLE™	
CUSTOMER NOTICE ANALOG DEVICES HAS MADE A BEST EFFORT TO DESIGN A CIRCUIT THAT MEETS CUSTOMER-SUPPLIED REQUIREMENTS. ANALOG DEVICES ASSUMES NO RESPONSIBILITY TO VERIFY PROPER AND RELIABLE OPERATION IN THE ACTUAL APPLICATION. COMPONENTS ARE PROVIDED AS A GUIDE ONLY. COMPONENTS THAT MAY SIGNIFICANTLY AFFECT CIRCUIT PERFORMANCE OR RELIABILITY CONTACT ANALOG DEVICES APPLICATION ENGINEERING FOR GUIDANCE.		APPROVALS PCB DES. NAME APP ENG. NAME	
TITLE: SCHEMATIC 42V/2A *3X8V/1A, QUAD MONOLITHIC SYNC/CHRONOUS STEP-DOWN REGULATOR		IC NO. LTR8692S SKU NO. EVAL-LT8692S-AZ DATE: Wednesday, August 17, 2022	
THIS CIRCUIT IS PROPRIETARY TO ANALOG DEVICES AND SUPPLIED FOR USE WITH ANALOG DEVICES PARTS		SCHEMATIC NO. AND REVISION: 710-EVAL-LT8692S-AZ-REV04 SIZE: N/A	



ESD Caution

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

Legal Terms and Conditions

By using the evaluation board discussed herein (together with any tools, components documentation or support materials, the "Evaluation Board"), you are agreeing to be bound by the terms and conditions set forth below ("Agreement") unless you have purchased the Evaluation Board, in which case the Analog Devices Standard Terms and Conditions of Sale shall govern. Do not use the Evaluation Board until you have read and agreed to the Agreement. Your use of the Evaluation Board shall signify your acceptance of the Agreement. This Agreement is made by and between you ("Customer") and Analog Devices, Inc. ("ADI"), with its principal place of business at One Technology Way, Norwood, MA 02062, USA. Subject to the terms and conditions of the Agreement, ADI hereby grants to Customer a free, limited, personal, temporary, non-exclusive, non-sublicensable, non-transferable license to use the Evaluation Board FOR EVALUATION PURPOSES ONLY. Customer understands and agrees that the Evaluation Board is provided for the sole and exclusive purpose referenced above, and agrees not to use the Evaluation Board for any other purpose. Furthermore, the license granted is expressly made subject to the following additional limitations: Customer shall not (i) rent, lease, display, sell, transfer, assign, sublicense, or distribute the Evaluation Board; and (ii) permit any Third Party to access the Evaluation Board. As used herein, the term "Third Party" includes any entity other than ADI, Customer, their employees, affiliates and in-house consultants. The Evaluation Board is NOT sold to Customer; all rights not expressly granted herein, including ownership of the Evaluation Board, are reserved by ADI. CONFIDENTIALITY. This Agreement and the Evaluation Board shall all be considered the confidential and proprietary information of ADI. Customer may not disclose or transfer any portion of the Evaluation Board to any other party for any reason. Upon discontinuation of use of the Evaluation Board or termination of this Agreement, Customer agrees to promptly return the Evaluation Board to ADI. ADDITIONAL RESTRICTIONS. Customer may not disassemble, decompile or reverse engineer chips on the Evaluation Board. Customer shall inform ADI of any occurred damages or any modifications or alterations it makes to the Evaluation Board, including but not limited to soldering or any other activity that affects the material content of the Evaluation Board. Modifications to the Evaluation Board must comply with applicable law, including but not limited to the RoHS Directive. TERMINATION. ADI may terminate this Agreement at any time upon giving written notice to Customer. Customer agrees to return to ADI the Evaluation Board at that time. LIMITATION OF LIABILITY. THE EVALUATION BOARD PROVIDED HEREUNDER IS PROVIDED "AS IS" AND ADI MAKES NO WARRANTIES OR REPRESENTATIONS OF ANY KIND WITH RESPECT TO IT. ADI SPECIFICALLY DISCLAIMS ANY REPRESENTATIONS, ENDORSEMENTS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, RELATED TO THE EVALUATION BOARD INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, TITLE, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. IN NO EVENT WILL ADI AND ITS LICENSORS BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES RESULTING FROM CUSTOMER'S POSSESSION OR USE OF THE EVALUATION BOARD, INCLUDING BUT NOT LIMITED TO LOST PROFITS, DELAY COSTS, LABOR COSTS OR LOSS OF GOODWILL. ADI'S TOTAL LIABILITY FROM ANY AND ALL CAUSES SHALL BE LIMITED TO THE AMOUNT OF ONE HUNDRED US DOLLARS (\$100.00). EXPORT. Customer agrees that it will not directly or indirectly export the Evaluation Board to another country, and that it will comply with all applicable United States federal laws and regulations relating to exports. GOVERNING LAW. This Agreement shall be governed by and construed in accordance with the substantive laws of the Commonwealth of Massachusetts (excluding conflict of law rules). Any legal action regarding this Agreement will be heard in the state or federal courts having jurisdiction in Suffolk County, Massachusetts, and Customer hereby submits to the personal jurisdiction and venue of such courts. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to this Agreement and is expressly disclaimed.