



MAX8709 Evaluation Kit/Evaluation System

General Description

The MAX8709 evaluation system is an assembled and tested PC board that demonstrates the MAX8709 high-efficiency, wide brightness range, CCFL backlight controller. Lamp brightness is adjustable through the SMBus™ interface.

The system includes the Maxim command module (CMOD232) and a MAX8709 evaluation kit (EV kit). The CMOD232 board connects to a computer's RS-232 serial port to provide a computer-controlled SMBus/I²C bus. Windows® 95/98/2000/XP-compatible software provides a user-friendly interface to exercise the features of the MAX8709. The program is menu driven and offers a graphics interface with control buttons and status display.

SMBus is a trademark of Intel Corp.

Windows is a registered trademark of Microsoft Corp.

MAX8709EVCMOD2 Component List

PART	QTY	DESCRIPTION
MAX8709EVKIT	1	MAX8709 evaluation kit
CMOD232	1	Interface board
AC Adapter	1	9VDC at 200mA (powers the CMOD232 board)

DESIGNATION	QTY	DESCRIPTION
C1	1	4.7µF ±20%, 25V X5R (1210) ceramic capacitor Murata GRM32RR61E475K Taiyo Yuden TMK325BJ475MN TDK C3225X7R1E475M
C2, C4, C8, C9, C14	5	0.1µF ±10%, 10V X5R (0402) ceramic capacitors Murata GRP155R61A104K Taiyo Yuden LMK105BJ104KV TDK C1005X5R1A104K
C3	1	0.47µF ±10%, 10V X5R (0603) ceramic capacitor Taiyo Yuden LMK107BJ474KA TDK C1608X5R1A474K

Features

- ◆ +7V to +24V Input Range
- ◆ Wide Brightness Adjustment Range
- ◆ Open Lamp Protection with 1.2s Timeout
- ◆ Secondary Short-Circuit Protection
- ◆ Lamp Status Output
- ◆ Brightness Adjustable Through SMBus Interface
- ◆ Strike Voltage Up to 1.2kV
- ◆ High Power to Light Efficiency
- ◆ I²C/SMBus Compatible
- ◆ Easy-to-Use Menu-Driven Software
- ◆ Assembled and Tested
- ◆ Includes Windows 95/98/2000/XP-Compatible Software and Demo PC Board

Ordering Information

PART	TEMP RANGE	SMBus INTERFACE TYPE
MAX8709EVKIT	0°C to +70°C	Not included
MAX8709EVCMOD2	0°C to +70°C	CMOD232

Note: The MAX8709 EV kit software is provided with the MAX8709EVKIT. However, to use the software, the CMOD232 board is required to interface the EV kit to the computer.

MAX8709EVKIT Component List

DESIGNATION	QTY	DESCRIPTION
C5	1	0.01µF ±10%, 50V X7R (0603) ceramic capacitor Murata GRM188R71H103K TDK C1608X7R1H103K
C6, C7	2	0.1µF ±10%, 25V X7R (0603) ceramic capacitors Murata GRM188R71E104K Taiyo Yuden TMK107BJ104KA TDK C1608X7R1E104K
C10	1	15pF ±10%, 3kV (1808) HV ceramic capacitor TDK C4520C0G3F150K



MAX8709 Evaluation Kit/Evaluation System

MAX8709EVKIT Component List (continued)

DESIGNATION	QTY	DESCRIPTION
C11	1	0.022 μ F \pm 10%, 16V X7R (0402) ceramic capacitor Murata GRP155R71C223K Taiyo Yuden EMK105BJ223KV TDK C1005X7R1C223K
C12	1	1 μ F \pm 10%, 25V X7R (1206) ceramic capacitor Murata GRM31MR71E105K Taiyo Yuden TMK316BJ105KL TDK C3216X7R1E105K
C13	0	Not installed (0603)
CN1	1	Shrouded header for CCFL lamp connection, 3.5mm pin spacing, PC board mount JST SM02B-BHSS-1-TB
D1	1	Dual silicon switching diode, common anode, SOT323 Central Semiconductor CMSD2836 Diodes Incorporated BAW56W
D2	1	Silicon switching diode, SOD-323 Diodes Incorporated 1N4148WS
F1	1	Fuse, 1A, 32V (1206) AVX F1206A1R00FWTR

DESIGNATION	QTY	DESCRIPTION
J1	1	2 x 10 right-angle female receptacle
N1A/B, N2A/B	2	Dual n-channel MOSFETs, 30V, 0.095, 6-pin SOT23 Fairchild Semiconductor FDC6561AN
R1, R2, R3	3	100k Ω \pm 1% (0402) resistors
R4	0	Not installed (0402)
R5, R6, R7	3	10k Ω \pm 5% (0603) resistors
R8	1	2k Ω \pm 5% (0402) resistor
R9	1	150 Ω \pm 1% (0402) resistor
R10	1	40.2 Ω \pm 1% (0603) resistor
R11	1	1M Ω \pm 5% (0402) resistor
R12	1	10k Ω \pm 5% (0402) resistor
R13	1	510 Ω \pm 5% (0402) resistor
T1	1	CCFL transformer, 93:1 Sumida 5371-400-W1423 (CIUH8D42 style) TOKO T912MG-1018 (BLC103B style)
U1	1	MAX8709ETI (28-lead thin QFN, 5mm x 5mm)
U2	1	Dual inverter, SC70 Fairchild Semiconductor NC7WZ04P6X
None	1	MAX8709 EV kit software CD

Component Suppliers

SUPPLIER	PHONE	FAX	WEBSITE
AVX	843-946-0238	843-626-3123	www.avxcorp.com
Central Semiconductor	631-435-1110	631-435-1824	www.centalsemi.com
Diodes Incorporated	805-446-4800	805-446-4850	www.diodes.com
Fairchild Semiconductor	888-522-5372	—	www.fairchildsemi.com
JST	847-473-1957	847-473-0144	www.jst.com
Murata	770-436-1300	770-436-3030	www.murata.com
Sumida	847-545-6700	847-545-6720	www.sumida.com
Taiyo Yuden	800-348-2496	847-925-0899	www.t-yuden.com
TDK	847-803-6100	847-390-4405	www.component.tdk.com
TOKO	847-297-0070	847-699-1194	www.tokoam.com

Note: Please indicate you are using the MAX8709 when contacting these manufacturers.

MAX8709 Evaluation Kit/Evaluation System

Quick Start

Recommended Equipment

Before you begin, the following equipment is needed:

- A computer running Windows 95, 98, 2000, or XP
- An RS-232 serial port (this is a 9-pin socket on the back of the computer)
- A standard 9-pin, straight-through, male-to-female cable to connect the computer's serial port to the Maxim CMOD232 board
- A DC power supply capable of supplying a voltage between +7V to +24V at 1A to power the MAX8709 board
- A CCFL lamp with the following specifications:
 - Maximum strike voltage $\leq 1.2\text{kV}$
 - Lamp current $\leq 6\text{mA}$
 - Input power $\leq 4\text{W}$

WARNING! High voltages are present on this evaluation kit. Use caution when making connections and applying power.

Do not turn on the power until all connections are made.

Procedure

- 1) Carefully connect the boards by aligning the 20-pin connector of the MAX8709 EV kit with the 20-pin header of the CMOD232 board. Gently press them together. The two boards should be flush against each other.
- 2) Disable the pullup resistors on the CMOD232 board by moving switch SW1 (located on the CMOD232 board) to the OFF position.
- 3) Connect the lamp to connector CN1.
- 4) Connect a cable from the computer's serial port to the CMOD232 board. Use a straight-through 9-pin female-to-male cable.
- 5) Insert the MAX8709 EV kit software CD and install the software by running the *INSTALL.EXE* program. The install program copies the files and creates icons for them in the Windows 95/98/2000/XP Start menu. (To remove the software at any time, click on the UNINSTALL icon.)
- 6) Connect the 9V plug-in transformer to the CMOD232 board.
- 7) Connect the +7V to +24V supply to the pads labeled VIN and GND on the MAX8709 EV kit.

- 8) Turn on the power supply.
- 9) Start the MAX8709 program by opening its icon in the Start menu.
- 10) Observe as the program automatically detects the address of the MAX8709 and starts the main program.

Detailed Description of Software

User-Interface Panel

The user interface is easy to operate using the mouse, or by using the tab key to navigate with the arrow keys. Each of the buttons corresponds to bits in the command and configuration bytes. Clicking on them generates the correct SMBus write operation to update the internal registers.

The brightness of the lamp can be adjusted by either moving the trackbar or by entering a value between 0 and 31 into the edit field located below the trackbar. Pressing enter after typing in the new value updates the internal register.

The SHMD register configures the operation of the device as described in Table 1.

When the automatic read feature is enabled, the program polls the MAX8709 once a second. The brightness, mode, and status are read and the appropriate fields are updated on the main display. Unchecking the checkbox disables this feature and each field can be updated individually by clicking the appropriate button.

The status register indicates whether the lamp circuit has opened (Status1 low) or an overcurrent condition has occurred (Status0 low).

The RESET button sets the MAX8709 and software to the POR state. If in doubt, click the reset button.

Table 1. SUS and SHMD Register Truth Table

SUS	SHMD2	SHMD1	SHMD0	OPERATING MODE
0	0	X	0	Operate
0	0	X	1	Shutdown, STATUS1 set
1	0	0	X	Operate
1	0	1	X	Shutdown, STATUS1 set
X	1	X	X	Shutdown, STATUS1 set

MAX8709 Evaluation Kit/Evaluation System

Simple SMBus Commands

There are two methods for communicating with the MAX8709: through the normal user-interface panel, or through the SMBus commands available from pressing the interface button. A display pops up that allows the SMBus protocols, such as read byte and write byte, to be executed. To stop normal user-interface execution so it does not override the manually set values, turn off the timer by unchecking the automatic read checkbox.

The SMBus dialog boxes accept numeric data in binary, decimal, or hexadecimal. Hexadecimal numbers should be prefixed by \$ or 0x. Binary numbers must be exactly eight digits.

Note: In places where the slave address asks for an 8-bit value, it must be the 7-bit slave address of the MAX8709 with the last bit set to 1 for a read operation and zero for a write.

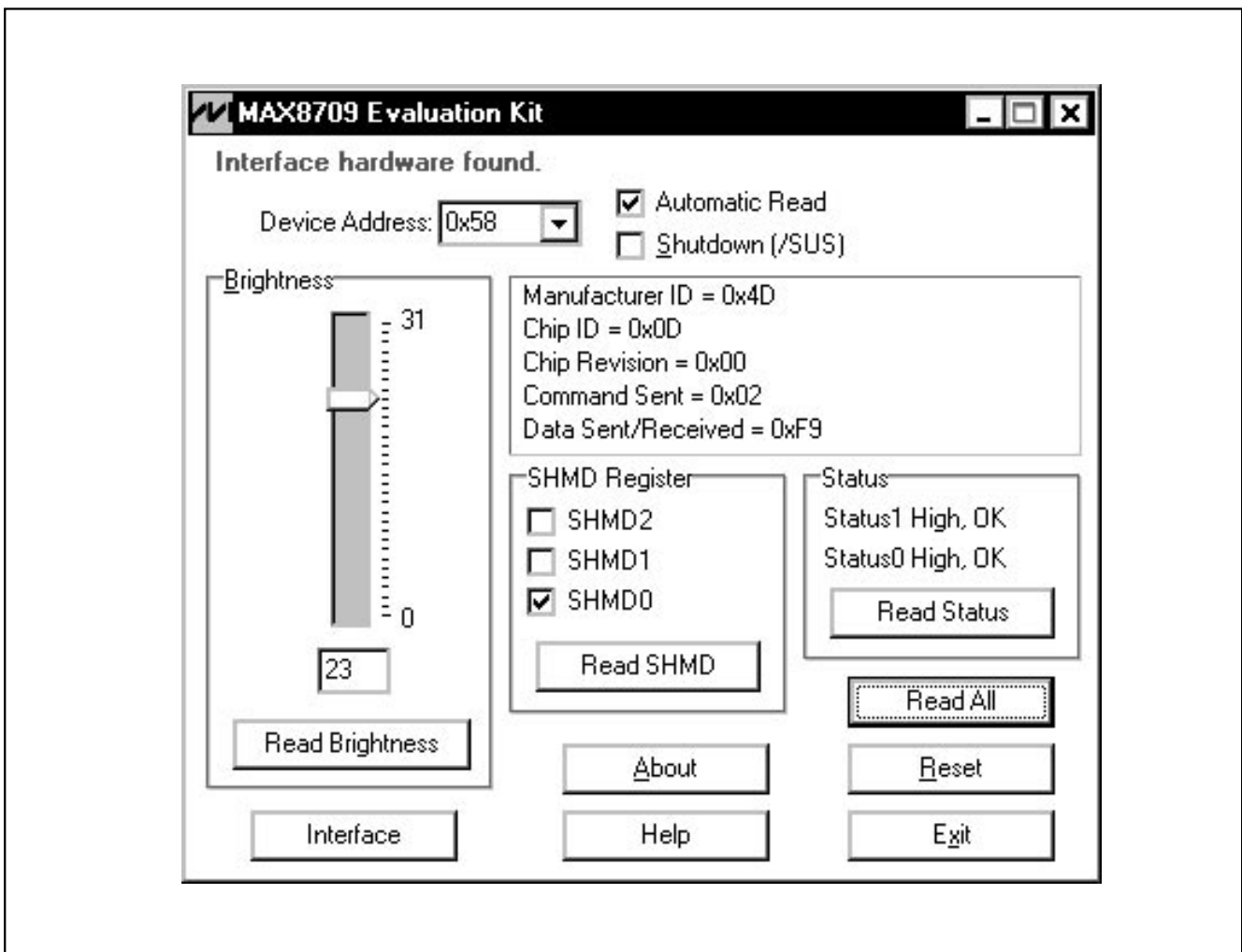


Figure 1. Main Window for the MAX8709 EV Kit Software

MAX8709 Evaluation Kit/Evaluation System

Evaluate: MAX8709

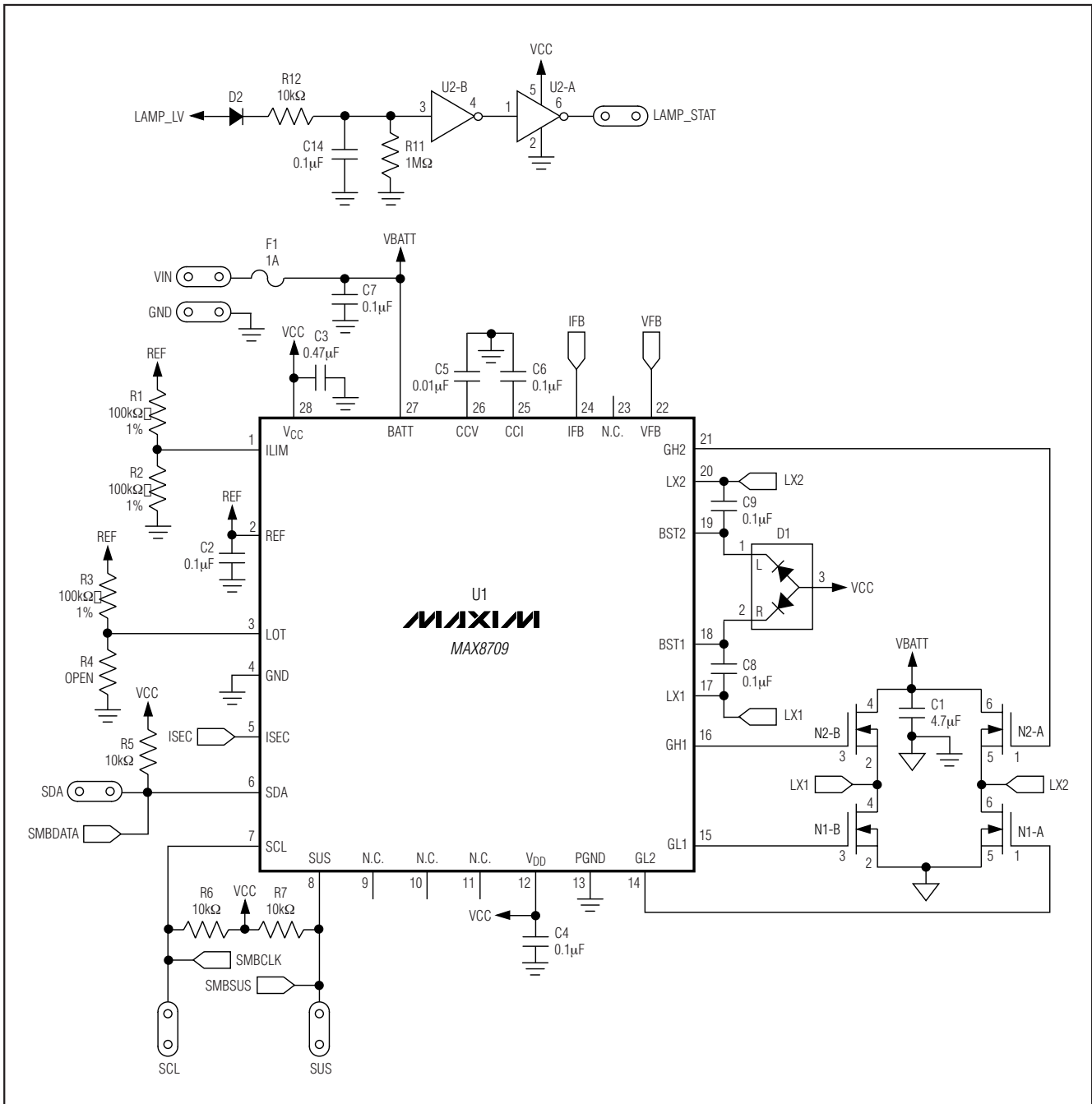


Figure 2. MAX8709 EV Kit Schematic

MAX8709 Evaluation Kit/Evaluation System

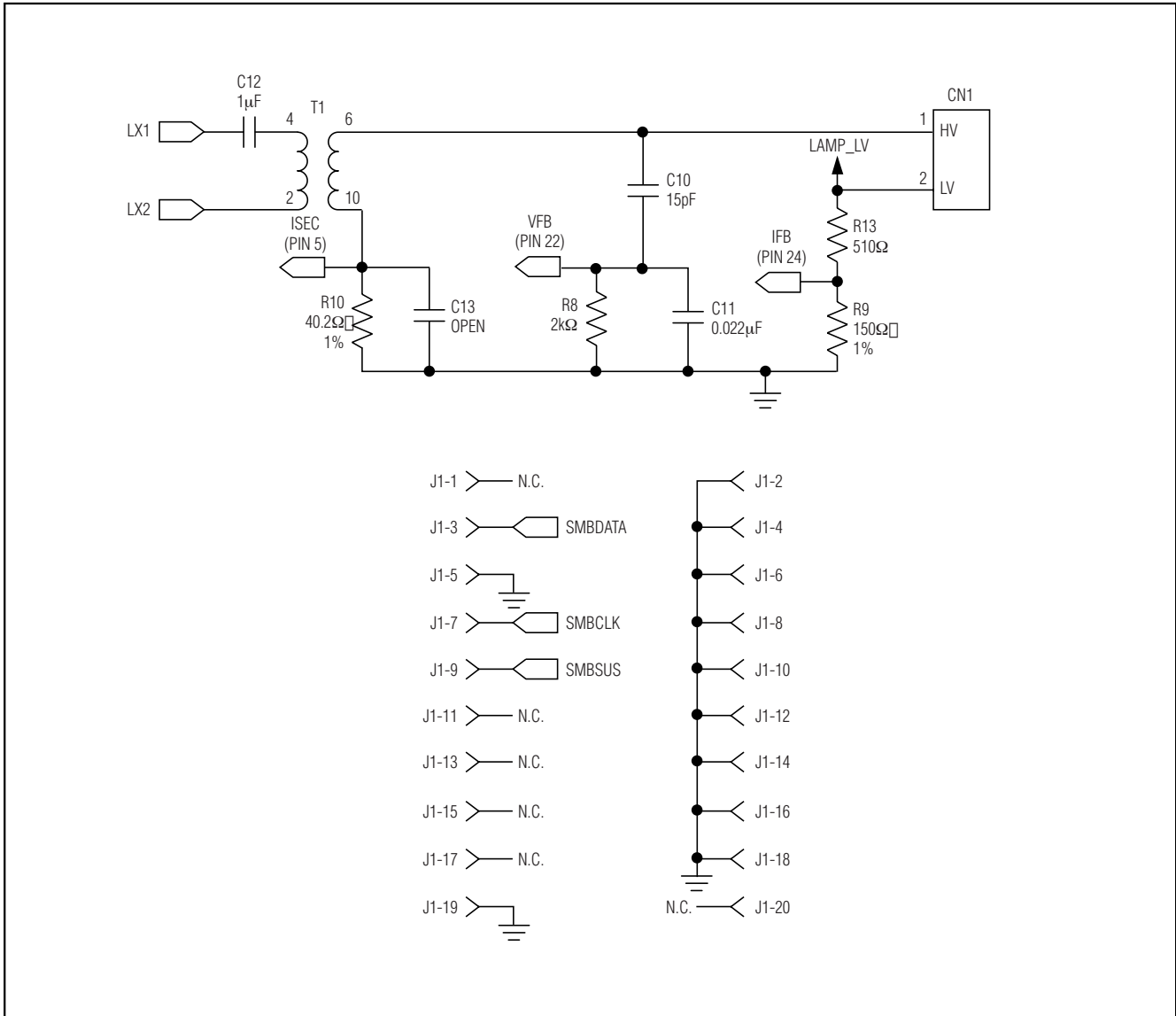


Figure 3. MAX8709 EV Kit Schematic—SMBus and High-Voltage Section

MAX8709 Evaluation Kit/Evaluation System

Evaluate: MAX8709

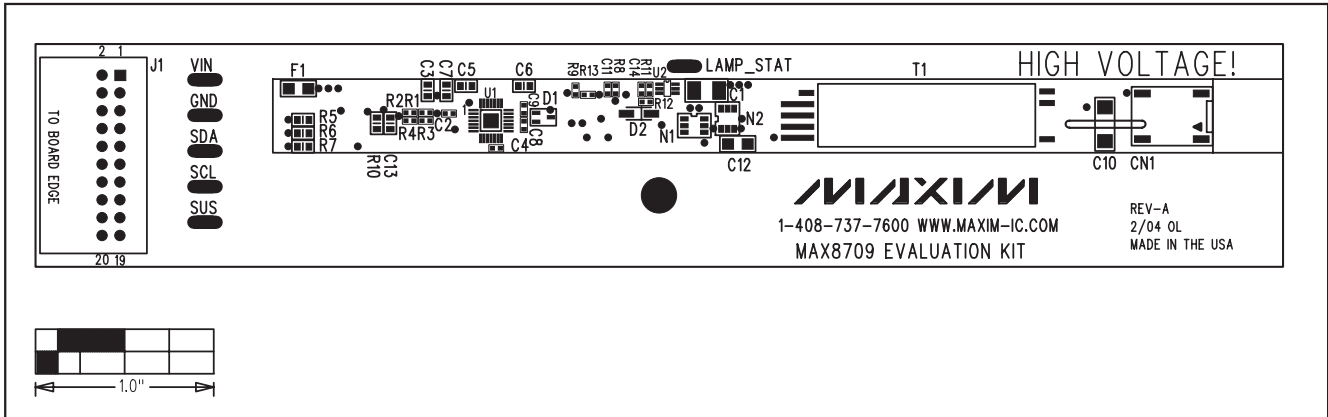


Figure 4. MAX8709 EV Kit Component Placement Guide—Component Side

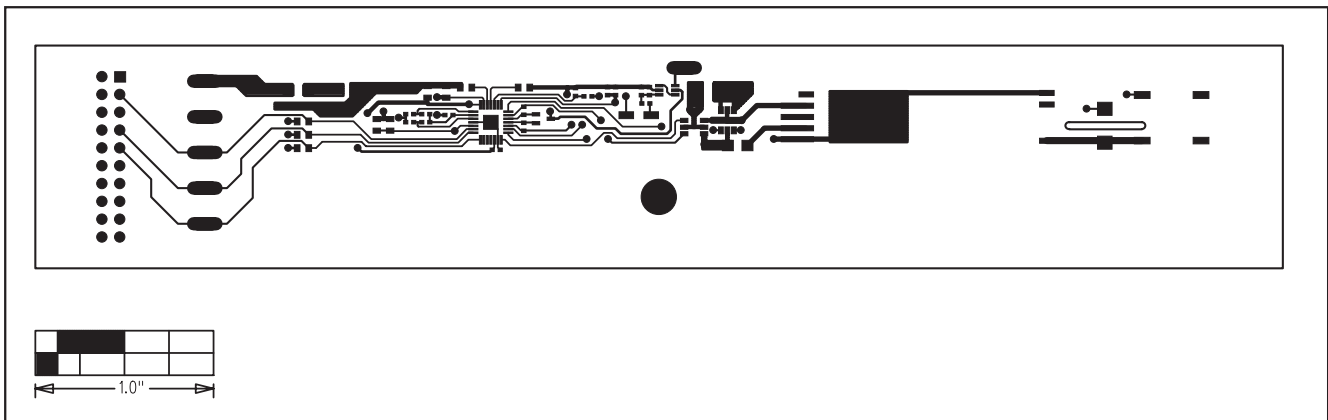


Figure 5. MAX8709 EV Kit PC Board Layout—Component Side

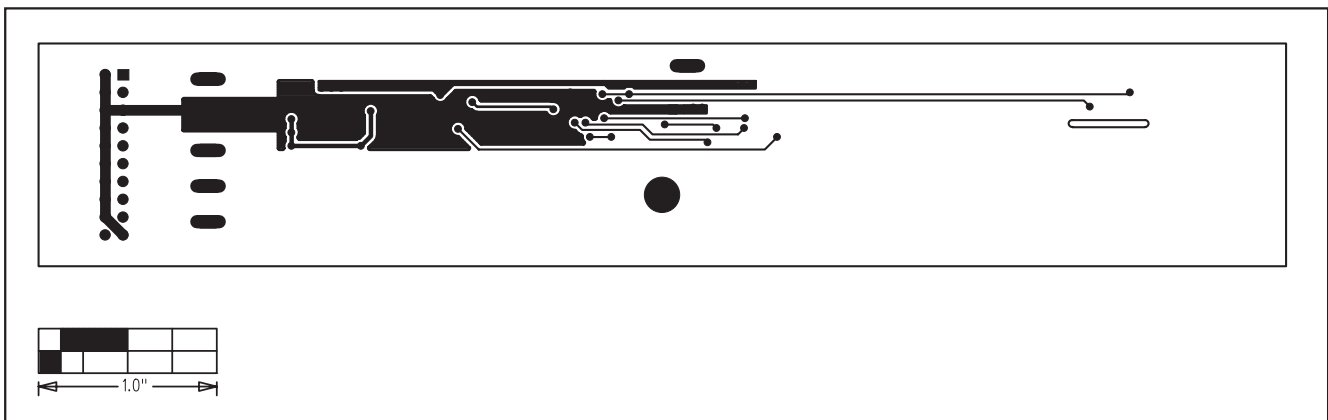


Figure 6. MAX8709 EV Kit PC Board Layout—Solder Side

Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

Maxim Integrated Products, 120 San Gabriel Drive, Sunnyvale, CA 94086 408-737-7600 _____ 7