

Introduction

The **Building Block Solutions – Automotive LDOs** board is a modular demonstration platform designed to evaluate and demonstrate the features of several Microchip Technology low dropout linear regulators (LDO) developed for the automotive and e-mobility industry. The board consists of nine independent sub-modules, each featuring a different automotive rated LDO, allowing users to easily test, compare and integrate these solutions into their own designs. The maximum input voltage and output current for each sub-module are specified at the respective values to ensure that each LDO does not enter thermal shutdown while operating at room ambient temperature. Please refer to the LDOs data sheets for more information on the typical operating ratings of each LDO.

Sub-Modules Descriptions

- **BBS1: MCP1722 Dual Output High Voltage LDO**
24V Input, 50 mA Output for both Channels, 10V/3.3V Output Voltages, Low Quiescent Current, Short Circuit Current Foldback Protection, Extended Junction Temperature Range (-40°C to + 150°C), Power Good Monitoring for Both Outputs
Ideal for e-mobility applications that require powering of both a microprocessor and a motor driver.
- **BBS2: MAQ5283 High Voltage LDO**
100V Input, 20 mA Output, 3V Output Voltage, Adjustable Between 1.23V to 5.5V, Low Quiescent Current, High PSRR (75 dB at 10 kHz)
Suitable for sensitive analog and RF automotive applications.
- **BBS3: MCP1781 High Voltage LDO**
48V Input, 80 mA Output, 5V Output Voltage, Adjustable Between 1.3V to 5V, Low Quiescent Current, Short Circuit Current Foldback Protection, Extended Junction Temperature Range (-40°C to + 150°C)
Designed for flexible voltage rails (12V/24V/48V) in automotive and industrial systems.
- **BBS4: MCP1826S High Current LDO**
6V Input, 1A Output, 5V Output Voltage, Stable with Only a 1 μ F Ceramic Capacitor
Ideal for high-current automotive power rails.
- **BBS5: MCP1825S Low Voltage LDO**
5V Input, 500 mA Output, 1.8V Output Voltage, Stable with Only a 1 μ F Ceramic Capacitor
Suitable for medium-current automotive applications.
- **BBS6: MAQ5300 Very Low Dropout Linear Regulator**
5.5V Input, 300 mA Output, 3.3V Output Voltage, Very Low Dropout Voltage (200 mV at Full Load)
Designed for efficient low-voltage rails.
- **BBS7: MCP1726 High Current LDO**
4.5V Input, 1A Output, 3.3V Output Voltage, Adjustable Between 0.8V to 5V, Stable with Only a 1 μ F Ceramic Capacitor, Power Good Monitoring
Ideal for high-current automotive power rails.
- **BBS8: MIC5233 High Voltage LDO**
12V Input, 50 mA Output, 1.8V Output Voltage, Reverse Battery and Reverse Leakage Protection

Suitable for low-voltage automotive logic and sensor applications.

- **BBS9: MCP1793 High Voltage LDO**

24V Input, 100 mA Output, 5V Output Voltage, Short Circuit Current Foldback Protection, Extended Junction Temperature Range (-40°C to + 150°C)

Suitable in 12V to 48V automotive power rails and in high-voltage battery packs.

Features

- Modular Design for Easy Evaluation of Each LDO
- Clearly Labeled Sub-Modules for Quick Identification
- Pre-Configured Output Voltages for Typical Use Cases
- Test Points and Connectors for Easy Measurement and Integration

Applications

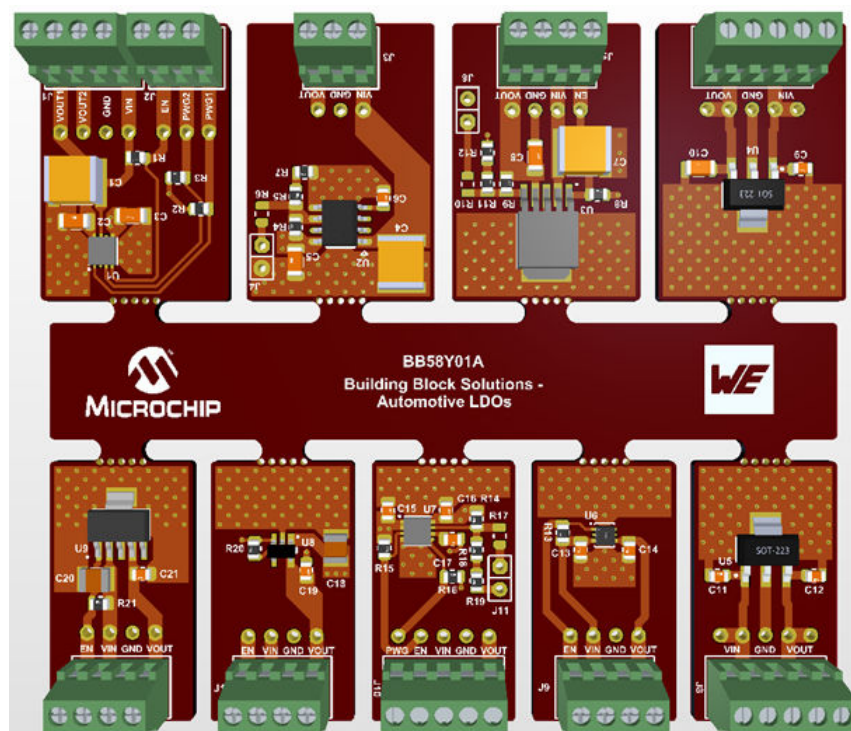
- Rapid Prototyping and Evaluation of Automotive LDOs
- Educational Tool for Understanding Low Dropout Linear Regulators
- Reference Design for Integrating Microchip Technology Automotive LDOs into Custom Projects

Kit Contents

The Building Block Solutions – Automotive LDOs kit includes:

- Building Block Solutions – Automotive LDOs Board (BB58Y01A)

Figure 1. Building Block Solutions – Automotive LDOs Board Overview



1. Setup and Configuration

The Building Block Solutions – Automotive LDOs Board is fully assembled and tested to evaluate and demonstrate the features of the MCP1722, MAQ5283, MCP1781, MCP1826S, MCP1825S, MAQ5300, MCP1726, MIC5233 and MCP1893 low dropout linear regulators. For proper evaluation, this board requires an external laboratory power supply, multimeter and load.

Table 1-1. Building Block Solutions – Automotive LDOs: Sub-Modules Main Parameters and Features

Module's Name	Module's Input Voltage Range	Module's Output Voltage	Module's Maximum Output Current	Special Features
BBS1: MCP1722 Dual Output High Voltage LDO	11V – 24V	OUT1: 10V (Fixed) OUT2: 3.3V (Fixed)	OUT1: 50 mA OUT2: 50 mA	•Power Good Pins •Enable Pin •Short-circuit Current Foldback Protection •Undervoltage Lockout (UVLO)
BBS2: MAQ5283 High Input Voltage LDO	6V – 100V	3V (Adjustable)	20 mA	•High PSRR •Undervoltage Lockout (UVLO)
BBS3: MCP1781 High Voltage LDO	6V – 48V	5V (Adjustable)	80 mA	•Short-circuit Current Foldback Protection •Enable Pin •Undervoltage Lockout (UVLO)
BBS4: MCP1826S High Current LDO	5.5V – 6V	5V (Fixed)	1A	•Undervoltage Lockout (UVLO)
BBS5: MCP1825S Low Voltage LDO	2.1V – 5V	1.8V (Fixed)	500 mA	•Undervoltage Lockout (UVLO)
BBS6: MAQ5300 Very Low Dropout Linear Regulator	3.5V – 5.5V	3.3V (Fixed)	300 mA	•Very Low Dropout Voltage •Enable Pin
BBS7: MCP1726 High Current LDO	3.8V – 4.5V	3.3V (Adjustable)	1A	•Enable Pin •Power Good Pin
BBS8: MIC5233 High Voltage LDO	3.5V – 12V	1.8V (Fixed)	50 mA	•Enable Pin •Reverse Battery Protection •Reverse Leakage Protection
BBS9: MCP1793 High Voltage LDO	6.2V – 24V	5V (Fixed)	100 mA	•Enable Pin •Short-circuit Current Foldback Protection •Undervoltage Lockout (UVLO)

1.1. Powering the Building Block Solutions – Automotive LDOs Board

The Building Block Solutions – Automotive LDOs Board provides typical circuit applications for various output voltages and is used to evaluate the performance of the MCP1722, MAQ5283, MCP1781, MCP1826S, MCP1825S, MAQ5300, MCP1726, MIC5233, and MCP1893 products. The maximum output current for each LDO will vary depending on the input and output voltages. The maximum input voltage and output current for each sub-module are specified at the respective values to ensure that each LDO does not enter thermal shutdown while operating at room ambient temperature ($T_A = 23^\circ\text{C}$). Refer to the MCP1722, MAQ5283, MCP1781, MCP1826S, MCP1825S,

MAQ5300, MCP1726, MIC5233 and MCP1893 data sheets for more information on the typical operating ratings of each LDO.

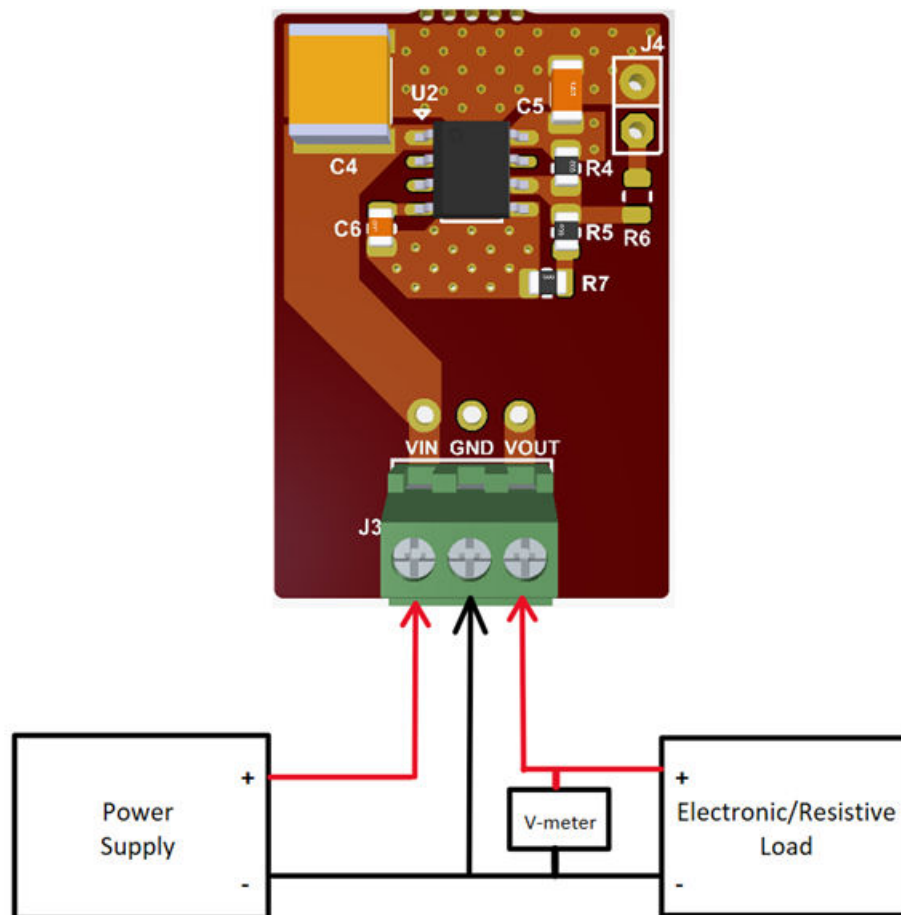
For each of the three adjustable LDOs (MAQ5283, MCP1781 and MCP1726), an 0805 resistor footprint and a 1×2 header connector footprint have been placed, unpopulated, in parallel with the lower resistors of the feedback divider. This allows the output voltage to be adjusted to other required values. Refer to the adjustable output sections of the respective LDO data sheets for guidance on calculating the desired output voltage.

1.1.1. Sub-Modules Power-up Procedure

The following procedure applies for all BBS's. To power up each board, complete the following steps:

1. Connect the power supply to the input terminals of the BBS sub-module (see [BBS2: MAQ5283 High Input Voltage LDO Test Setup Example](#)).
2. Connect the load to the VOUT and GND terminals; connect the (+) side of the load to the VOUT terminal and the (-) side of the load to the GND terminal of the board (see [BBS2: MAQ5283 High Input Voltage LDO Test Setup Example](#)). The maximum load varies with the input and output voltage (refer to the Data Sheet for more information on the typical operating ratings). By default, the EN pin is pulled high through a resistor.
3. When the power supply is turned on, a voltmeter can be used to monitor VOUT. The measured output voltage should be very close to the nominal value. Adjusting the input voltage and load should not cause the output to vary more than a few percentage points, depending on each LDOs output voltage accuracy.

Figure 1-1. BBS2: MAQ5283 High Input Voltage LDO Test Setup Example



2. Board Design

This chapter contains the following schematics and layouts for the Building Block Solutions – Automotive LDOs Board:

- [BBS1: MCP1722 Dual Output High Voltage LDO Schematic](#)
- [BBS2: MAQ5283 High Input Voltage LDO Schematic](#)
- [BBS3: MCP1781 High Voltage LDO Schematic](#)
- [BBS4: MCP1826S High Current LDO Schematic](#)
- [BBS5: MCP1825S Low Voltage LDO Schematic](#)
- [BBS6: MAQ5300 Very Low Dropout Linear Regulator Schematic](#)
- [BBS7: MCP1726 High Current LDO Schematic](#)
- [BBS8: MIC5233 High Voltage LDO Schematic](#)
- [BBS9: MCP1793 High Voltage LDO Schematic](#)
- [Board – Top Silk](#)
- [Board – Top Copper and Silk](#)
- [Board – Top Copper](#)
- [Board – Bottom Copper](#)
- [Board – Bottom Copper and Silk](#)
- [Board – Bottom Silk](#)

2.1. Schematics

Figure 2-1. BBS1: MCP1722 Dual Output High Voltage LDO Schematic

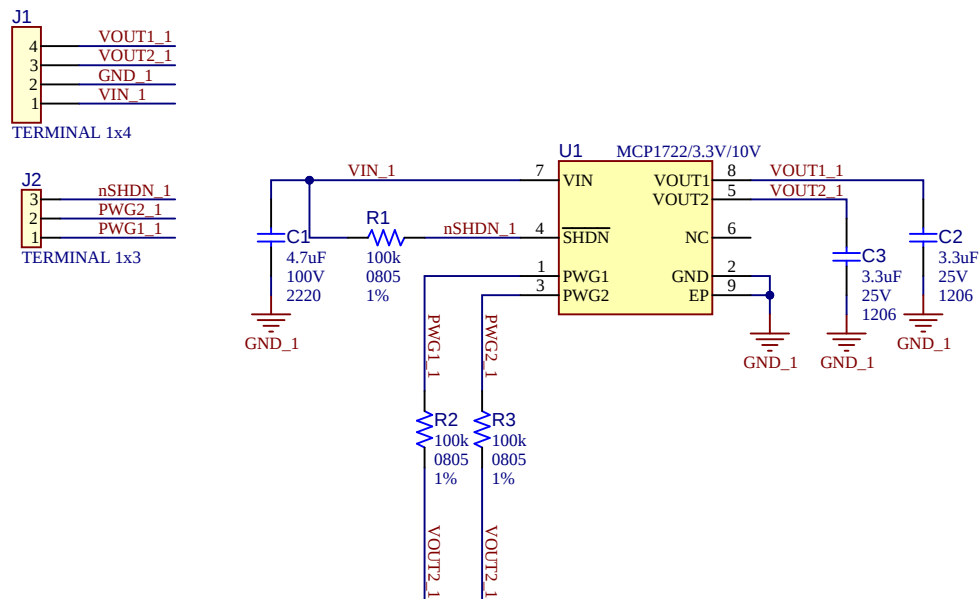


Figure 2-2. BBS2: MAQ5283 High Input Voltage LDO Schematic

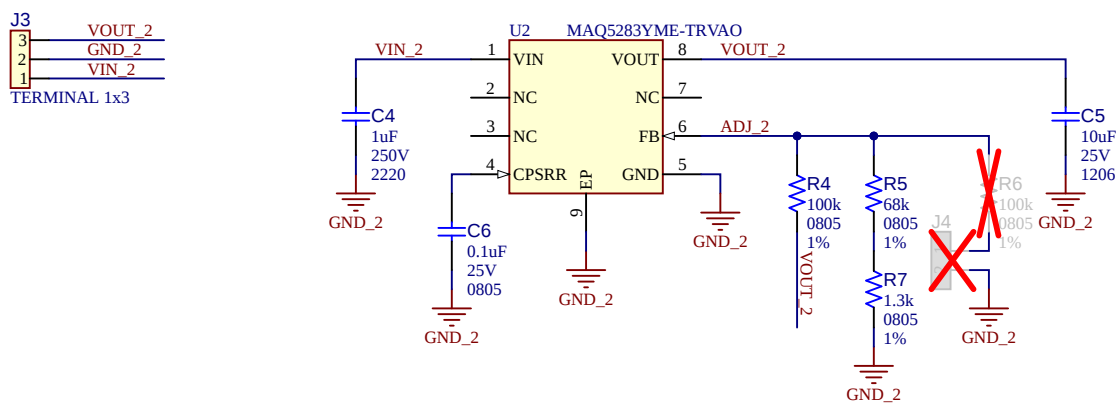


Figure 2-3. BBS3: MCP1781 High Voltage LDO Schematic

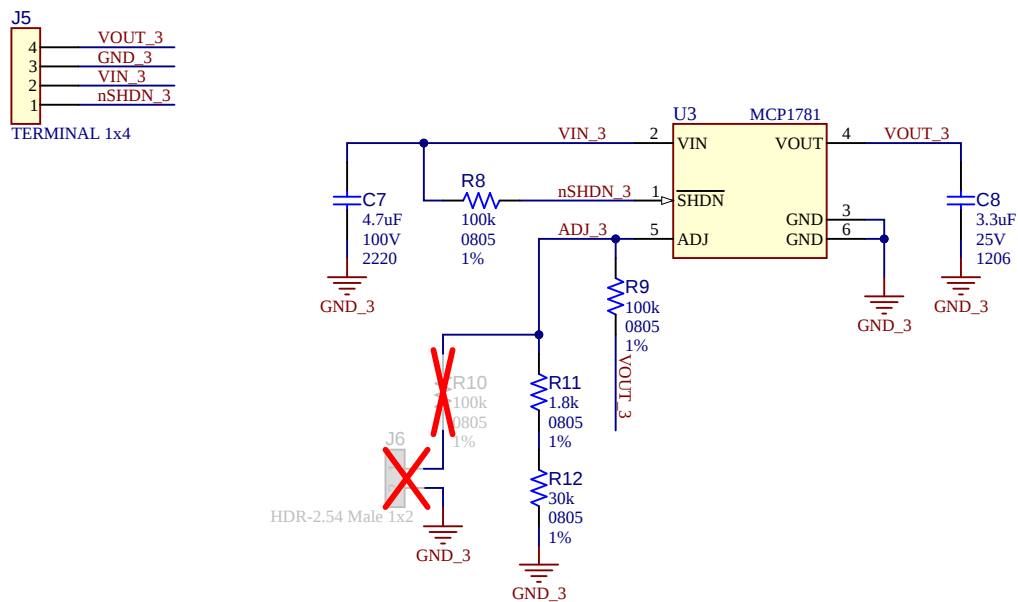


Figure 2-4. BBS4: MCP1826S High Current LDO Schematic

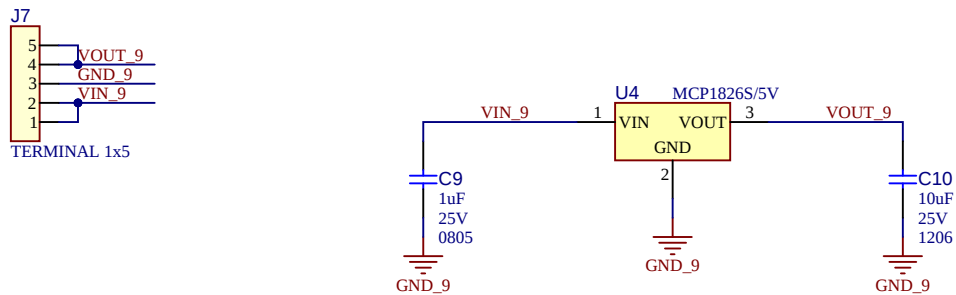


Figure 2-5. BBS5: MCP1825S Low Voltage LDO Schematic

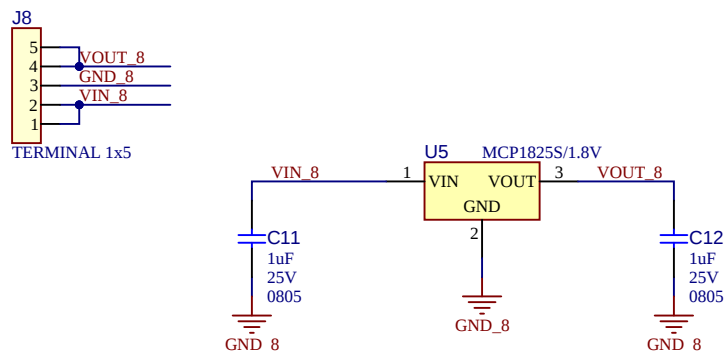


Figure 2-6. BBS6: MAQ5300 Very Low Dropout Linear Regulator Schematic

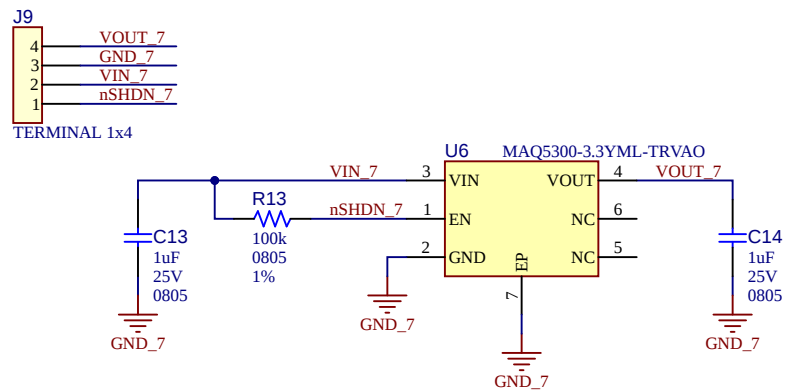


Figure 2-7. BBS7: MCP1726 High Current LDO Schematic

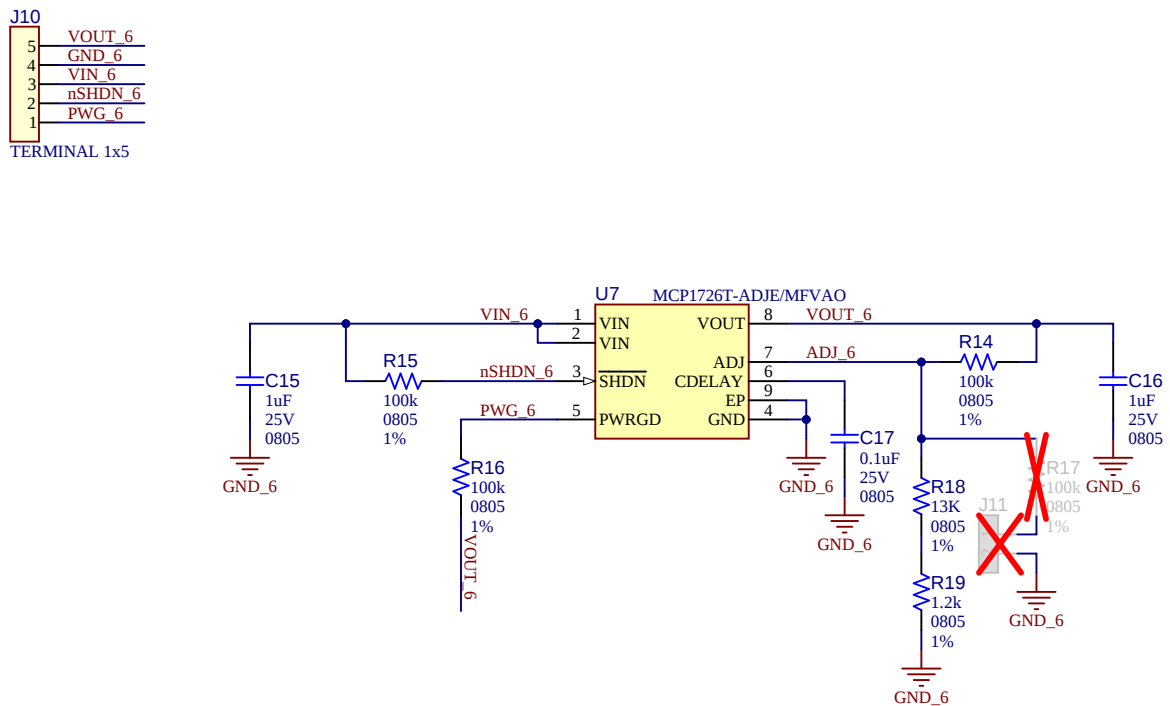


Figure 2-8. BBS8: MIC5233 High Voltage LDO Schematic

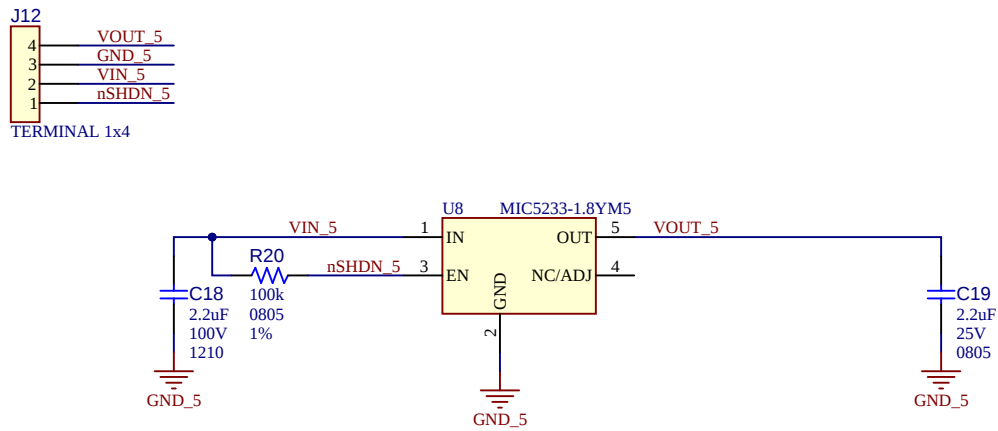
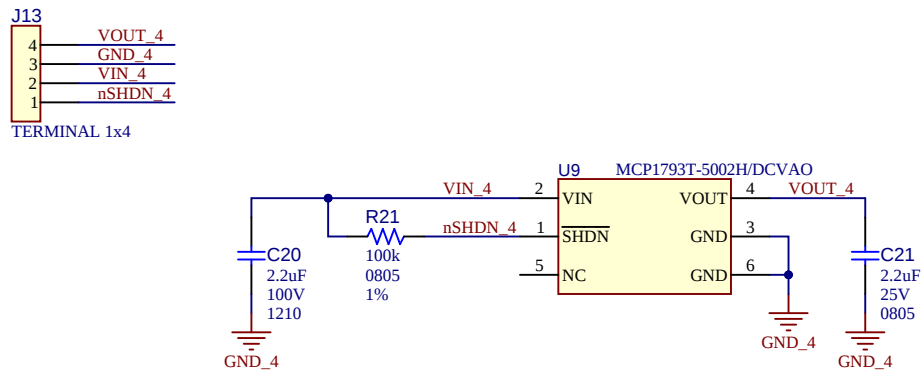


Figure 2-9. BBS9: MCP1793 High Voltage LDO Schematic



2.2. Layouts

Figure 2-10. Top Silk

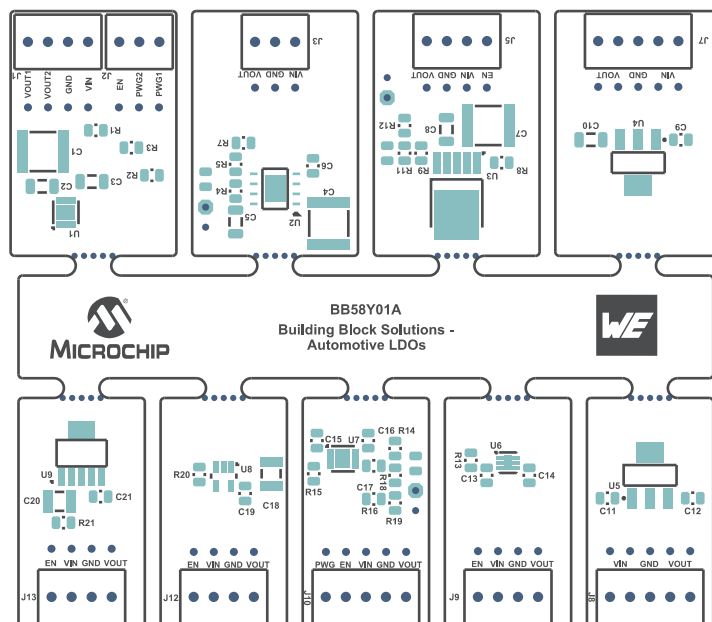


Figure 2-11. Top Copper and Silk

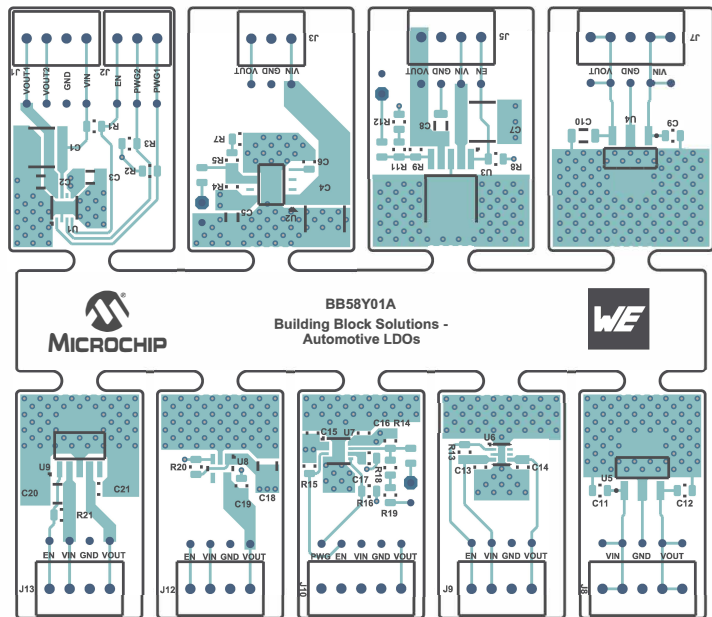


Figure 2-12. Top Copper

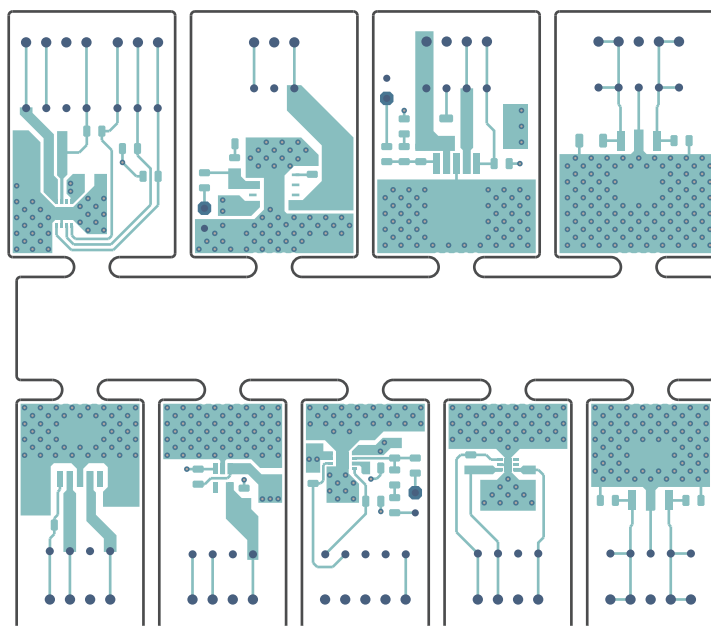


Figure 2-13. Bottom Copper

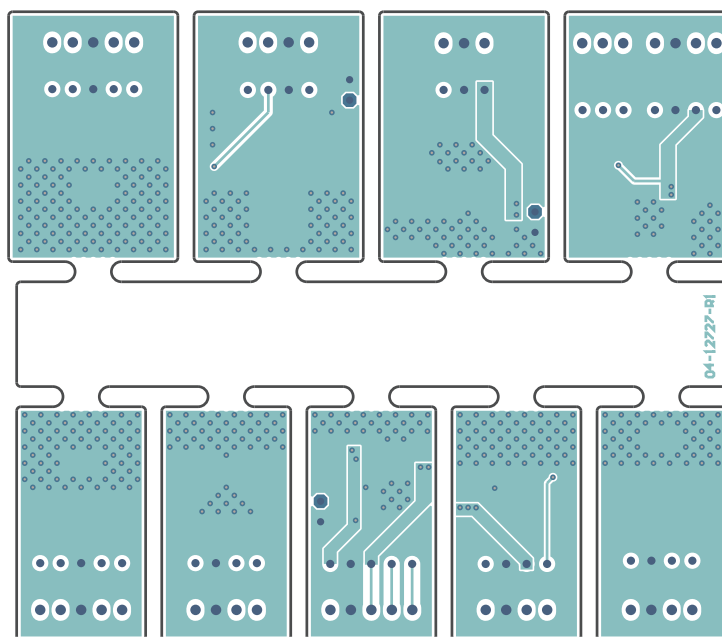


Figure 2-14. Bottom Copper and Silk

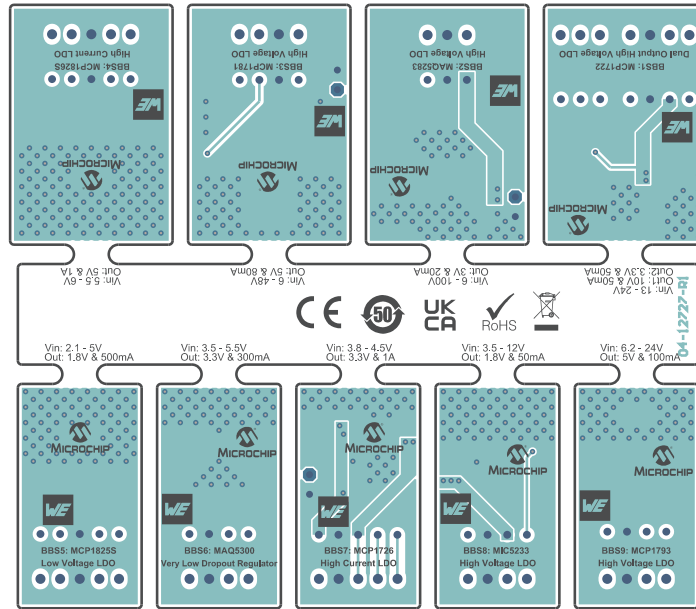
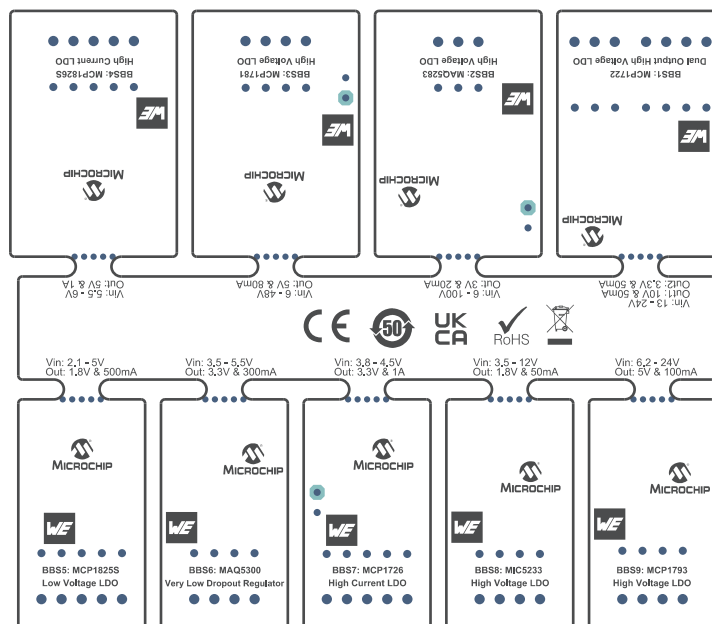


Figure 2-15. Bottom Silk



3. Bill of Materials (BOM)

Table 3-1. Bill of Materials (BOM)

Qty	Reference	Description	Manufacturer	Part Number
2	C1, C7	Capacitor, Ceramic, 4.7 μ F, 100V, 10%, X7R, SMD, 2220	Würth Elektronik	885012214003
3	C2, C3, C8	Capacitor, Ceramic, 3.3 μ F, 25V, 10%, X7R, SMD, 1206	Würth Elektronik	885012208067
1	C4	Capacitor, Ceramic, 1 μ F, 250V, 10%, X7R, SMD, 2220	Würth Elektronik	885342214002
2	C5, C10	Capacitor, Ceramic, 10 μ F, 25V, 10%, X7R, SMD, 1206	Würth Elektronik	885012208069
2	C6, C17	Capacitor, Ceramic, 0.1 μ F, 25V, 10%, X7R, SMD, 0805	Würth Elektronik	885012207072
7	C9, C11, C12, C13, C14, C15, C16	Capacitor, Ceramic, 1 μ F, 25V, 10%, X7R, SMD, 0805	Würth Elektronik	885012207078
2	C18, C20	Capacitor, Ceramic, 2.2 μ F, 100V, 10%, X7R, SMD, 1210	Würth Elektronik	885012209071
2	C19, C21	Capacitor, Ceramic, 2.2 μ F, 25V, 10%, X7R, SMD, 0805	Würth Elektronik	885012207079
5	J1, J5, J9, J12, J13	Connector, Terminal, 2.54 mm 1x4, Female, 18-30AWG, 6A, TH, R/A	Würth Elektronik	691210910004
2	J2, J3	Connector, Terminal, 2.54 mm, 1x3, Female, 18-30AWG, 6A, TH, R/A	Würth Elektronik	691210910003
3	J7, J8, J10	Connector, Terminal, 2.54 mm, 1x5, Female, 18-30AWG, 6A, TH, R/A	Würth Elektronik	691210910005
12	R1, R2, R3, R4, R8, R9, R13, R14, R15, R16, R20, R21	Resistor, TKF, 100k, 1%, 1/4W, SMD, 0805, AEC-Q200	KOA Speer	RK73H2ATTD1003F
1	R5	Resistor, TKF, 68k, 1%, 1/8W, SMD, 0805, AEC-Q200	TE Connectivity Passive Product	CRGCQ0805F68K
1	R7	Resistor, TKF, 1.3k, 1%, 1/8W, SMD, 0805	Yageo Corporation	RC0805FR-071K3L
1	R11	Resistor, TKF, 1.8k, 1%, 1/8W, SMD, 0805	Panasonic	ERJ-6ENF1801V
1	R12	Resistor, TKF, 30k, 1%, 1/8W, SMD, 0805	Panasonic	ERJ-6ENF3002V
1	R18	Resistor, TKF, 13k, 1%, 1/8W, SMD, 0805	Panasonic	ERJ-U06F1302V
1	R19	Resistor, TKF, 1.2k, 1%, 1/8W, SMD, 0805	Yageo Corporation	RC0805FR-071K2L
1	PCB1	Printed Circuit Board		04-12727-R1
1	PCBA1	PCB Assembly		02-01711-R1

Table 3-2. Microchip Parts

Qty	Reference	Description	Manufacturer	Part Number
1	U1	LDO, 3.3V/10V, DFN-8, AEC-Q100	Microchip Technology Inc.	MCP1722-3310H/Q8BVAO
1	U2	LDO, ADJ 1.2V to 5.5V, SOIC-8, AEC-Q100	Microchip Technology Inc.	MAQ5283YME-VAO
1	U3	LDO, ADJ 1.3V-5V, TO-252-5, AEC-Q100	Microchip Technology Inc.	MCP1781-ADJH/9EAVAO
1	U4	LDO, 5V, SOT-223-3, AEC-Q100	Microchip Technology Inc.	MCP1826S-5002E/DBVAO
1	U5	LDO, 1.8V, SOT-223-3, AEC-Q100	Microchip Technology Inc.	MCP1825S-1802E/DBVAO
1	U6	LDO, 3.3V, 300 mA, DFN-6, AEC-Q100	Microchip Technology Inc.	MAQ5300-3.3YML-TRVAO
1	U7	LDO, ADJ 0.8V-5V, DFN-8, AEC-Q100	Microchip Technology Inc.	MCP1726T-ADJE/MFVAO
1	U8	LDO, 1.8V, SOT-23-5, AEC-Q100	Microchip Technology Inc.	MIC5233-1.8YM5-TRVAO
1	U9	LDO, 5V, SOT-223-5, AEC-Q100	Microchip Technology Inc.	MCP1793T-5002H/DCVAO

Table 3-3. Do Not Populate

Qty	Reference	Description	Manufacturer	Part Number
0	J4, J6, J11	Connector, HDR-2.54, Male, 1x2, Gold 5.84MH, TH, Vertical	Amphenol ICC (FCI)	68001-202HLF
0	R6, R10, R17	Resistor, TKF, 100k, 1%, 1/4W, SMD, 0805, AEC-Q200	KOA Speer	RK73H2ATTD1003F

4. References

Table 4-1. Recommended Reading

Source	Document Title	Literature Number	Available
Microchip Technology, Inc.	MCP1722 Data Sheet	DS20006561	www.microchip.com/en-us/product/mcp1722
Microchip Technology Inc.	MAQ5283 Data Sheet	DS20006151	www.microchip.com/en-us/product/maq5283
Microchip Technology Inc.	MCP1781 Data Sheet	DS20007050	www.microchip.com/en-us/product/mcp1781
Microchip Technology Inc.	MCP1826S Data Sheet	DS20002057	www.microchip.com/en-us/product/mcp1826s
Microchip Technology Inc.	MCP1825S Data Sheet	DS20002056	www.microchip.com/en-us/product/mcp1825s
Microchip Technology Inc.	MAQ5300 Data Sheet	DS20006504	www.microchip.com/en-us/product/maq5300
Microchip Technology Inc.	MCP1726 Data Sheet	DS20001936	www.microchip.com/en-us/product/mcp1726
Microchip Technology Inc.	MIC5233 Data Sheet	DS20006033	www.microchip.com/en-us/product/mic5233
Microchip Technology Inc.	MCP1793 Data Sheet	DS20006229	www.microchip.com/en-us/product/mcp1793

5. Revision History

Doc. Rev.	Date	Comments
A	4/2026	Initial release of this document.

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