



EVQ6628-F-00A

40V, 0.8A, Octal Half-Bridge Motor Driver with Serial Input Control Evaluation Board, AEC-Q100 Qualified

DESCRIPTION

The EVQ6628-F-00A is an evaluation board designed to demonstrate the capabilities of the MPQ6628, a motor driver with serial input control and eight half-bridges. The input voltage (V_{IN}) ranges from 5.5V to 40V, with up to 0.8A of output current (I_{OUT}) capability.

The eight half-bridges can be controlled separately via a standard serial data interface, and have various diagnostic functions, including shorted output, open load, over-temperature (OT), over-voltage (OV), and under-voltage (UV).

The MPQ6628 has a very low quiescent current (I_Q) in standby mode, and requires a minimum number of readily available, standard external components. The MPQ6628 is available in a TSSOP-28EP package, and is AEC-Q100 Grade 1 qualified.

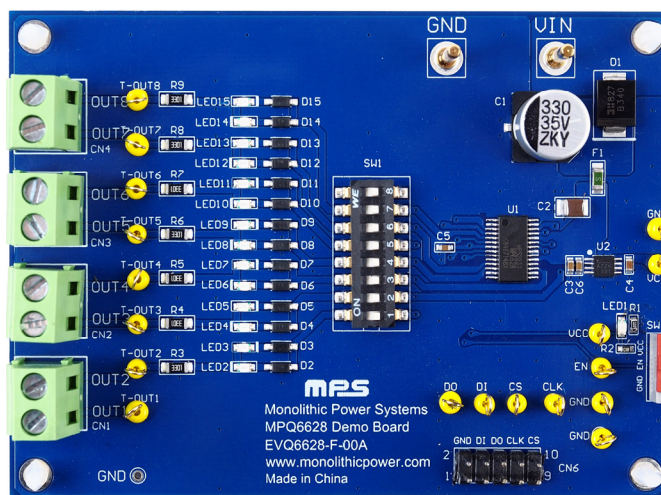
The MPQ6628 is suitable for motor drivers, telecommunication half-bridge power supplies, and avionics DC/DC converters.

PERFORMANCE SUMMARY

Specifications are at $T_A = 25^\circ\text{C}$, unless otherwise noted.

| Parameters | Conditions | Value |
|--|------------|-------------|
| Input power supply voltage (V_S) range | | 5.5V to 40V |
| Maximum output current (I_{OUT}) | | 0.8A |

EVQ6628-F-00A EVALUATION BOARD



LxWxH (9.7cmx7.2cmx2.5cm)

| Board Number | MPS IC Number |
|---------------|----------------|
| EVQ6628-F-00A | MPQ6628GF-AEC1 |

QUICK START GUIDE

The EVQ6628-R-00A evaluation board is easy to set up and use to evaluate the performance of the MPQ6628. For proper measurement equipment set-up, refer to Figure 1 and follow the steps below:

1. Pull SW2 down to enable the IC.
2. Apply external SPI signals to CN6.
3. Connect the loads from OUT1 to OUT8.
4. The 3.3V logic power supply is on the board.
5. Connect the V_{IN} power supply terminals (recommended operating voltage range is 5.5V to 40V) to:
 - a. Positive (+): VIN
 - b. Negative (-): GND

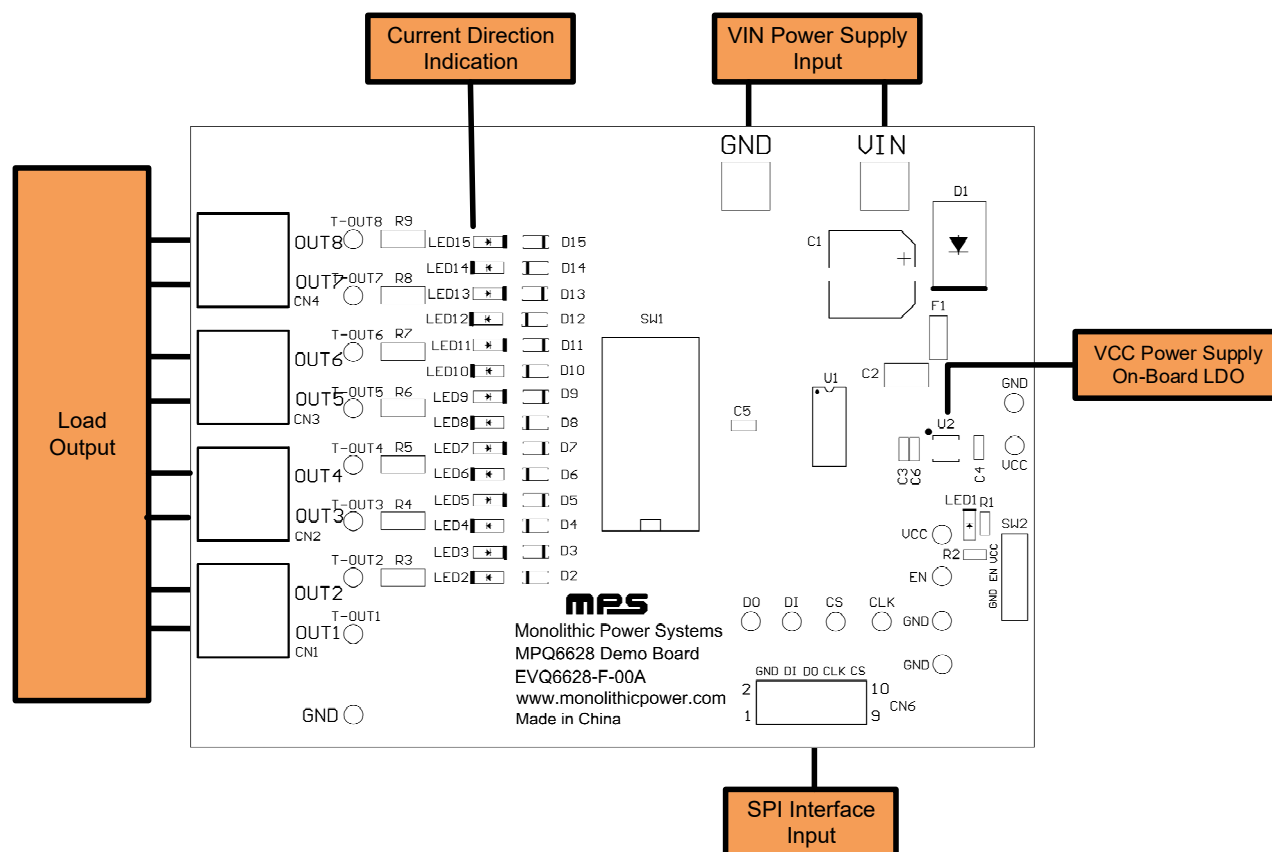


Figure 1: Test Set-Up for the EVQ6628-F-00A

The EVQ6628-F-00A also includes monitors and a GUI interface:

Monitor Set-Up

1. For H-bridge applications, the rotation direction of the DC motors can be observed via the LED circuit, which is enabled when SW1 is turned on.
2. All pins are accessible via test points.

GUI Operation

Figure 2 shows the very simple control interface for the multi-channel half-bridges.

The GUI interface for the EVQ6628-F-00A motor driver evaluation board. It features a CLK dropdown menu set to 100 kHz. There are two main sections for channel configuration: 'Channel 1-6' and 'Channel 7-10'. Each section has checkboxes for 'Input Register' and 'Output Register'. The 'Input Register' section includes checkboxes for OVLO, CNF1, CNF2, CNF3, CNF4, CNF5, CNF6, EN1, EN2, EN3, EN4, EN5, EN6, SRR, CH_SEL, OLSD, PSF, OC, and TSD. The 'Output Register' section includes checkboxes for TW, CNF7, CNF8, CNF9, CNF10, SHBEN1, SHBEN2, SHBEN3, SHBEN4, SHBEN5, SHBEN6, SHBEN7, SHBEN8, SHBEN9, SHBEN10, and TSD. There are also 'Send Data' and 'Loop Send Data' buttons.

Figure 2: EVQ6628-F-00A GUI Interface

1. Select the SPI clock frequency using the CLK drop-down menu.
2. Select the “Channel 1-6” box to activate input register configuration. All bits can be set flexibly.
3. Select the “Channel 7-10” box to activate channels 7 and 8. Ignore channels 9 and 10.
4. Click “Send Data” to send serial data once, or click “Loop Send Data” to send data repeatedly with a fixed frequency.
5. All the register bits are labeled, making it is easy to find the output register status.

EVALUATION BOARD SCHEMATIC

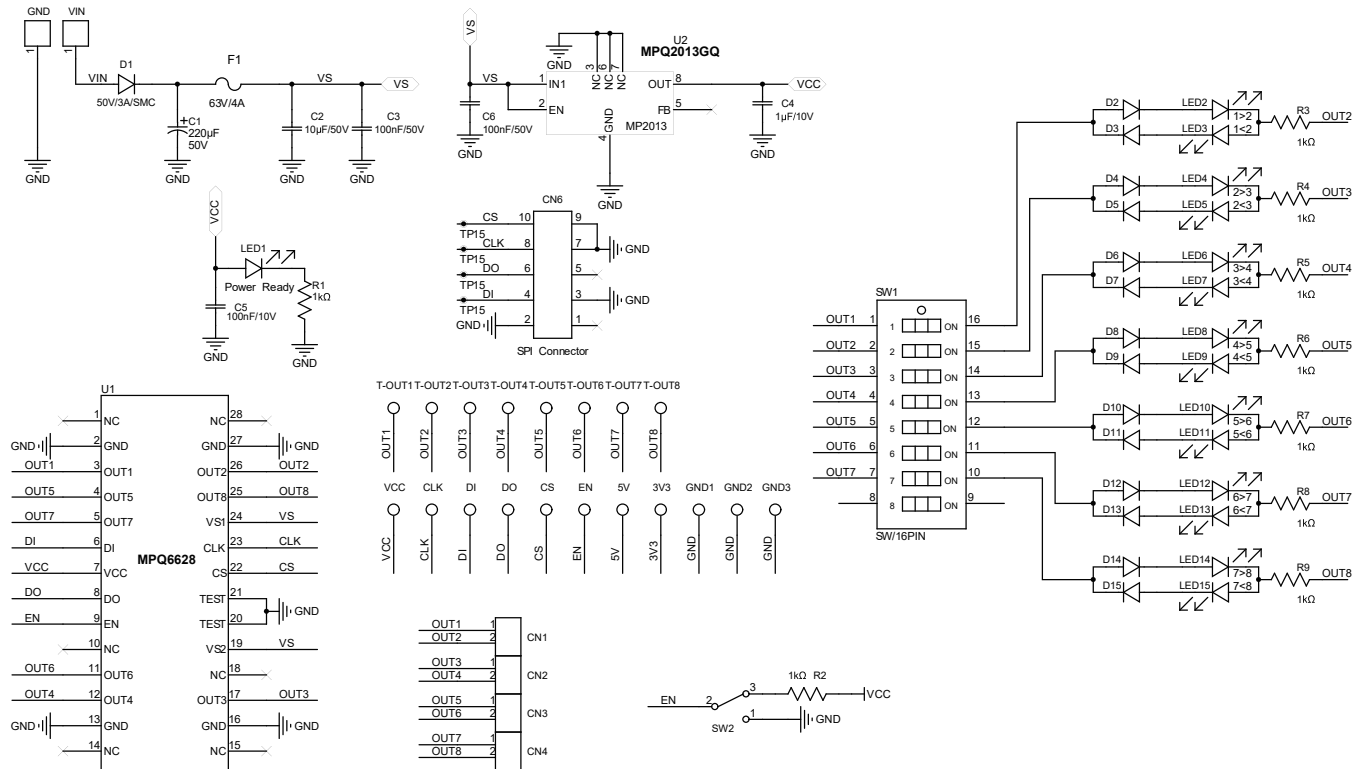


Figure 3: Evaluation Board Schematic

EVQ6628-F-00A BILL OF MATERIALS

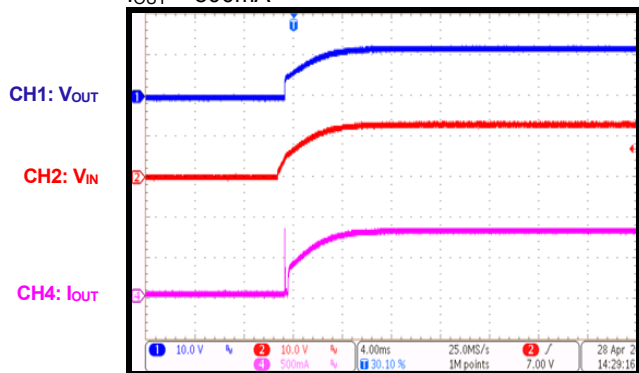
| Qty | Ref | Value | Description | Package | Manufacturer | Manufacturer PN |
|-----|---|----------|--|-----------------|--------------|--------------------|
| 19 | 3.3V, CLK, CS, DI, DO, EN, GND1, GND2, GND3, OUT1, OUT2, OUT3, OUT4, OUT5, OUT6, OUT7, OUT8, VCC, VS1 | 1mm | Test points | SIP | Custom | |
| 1 | C1 | 330µF | Electrolytic capacitor, 35V | SMD | Panasonic | EEV-TG1J221Q |
| 1 | C2 | 10µF | Ceramic capacitor, 50V, X7R | 1210 | Murata | GRM32ER71H106KA12L |
| 3 | C3, C5, C6 | 100nF | Ceramic capacitor, 50V, X7R | 0603 | Murata | GCJ188R71H104KA12D |
| 1 | C4 | 4.7µF | Ceramic capacitor, 6.3V, X5R | 0603 | Murata | GRM188R60J475ME19D |
| 4 | CN1, CN2, CN3, CN4 | 2mm | Connector, 2-pin | DIP | Würth | 691216510002 |
| 1 | CN6 | 2.54mm | Dual line connector | DIP | Custom | |
| 1 | D1 | 40V | Diode, 3A | SMC | Diodes, Inc. | B340 |
| 14 | D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, D13, D14 | 75V | Diode, 0.15A | SOD-123 | Diodes, Inc. | 1N4148W |
| 1 | F1 | 63V | Fuse, 4A | 1206 | Cooper | CC12H4A |
| 2 | GND, VIN | 2mm | Connector | SIP | Custom | |
| 1 | LED1 | 20mA | Red LED | 0805 | Bright LED | BL-HUE35A-AV-TRB |
| 14 | LED2, LED3, LED4, LED5, LED6, LED7, LED8, LED9, LED10, LED11, LED12, LED13, LED14, LED15 | 20mA | Green LED | 0805 | Bright LED | BL-HGE36A-AV-TRB |
| 2 | R1, R2 | 1kΩ | Film resistor, 1% | 0603 | Yageo | RC0603FR-071KL |
| 7 | R3, R4, R5, R6, R7, R8, R9 | 3.3kΩ | Film resistor, 1% | 1206 | Yageo | RC1206FR-073K3L |
| 1 | SW2 | 500mA | Switch, 3-pin | DIP | Würth | 450301014042 |
| 1 | SW1 | 25mA | Switch, 6-bit | SMD | Würth | 418121270806 |
| 1 | U2 | MPQ2013A | 3.3V step-down regulator | QFN-8 (3mmx3mm) | MPS | MPQ2013AGQ-33-Z |
| 1 | U1 | MPQ6628 | Half-bridge motor driver with serial input control | TSSOP-28EP | MPS | MPQ6628GF |

EVB TEST RESULTS

$V_{VS} = 13V$, $V_{VCC} = 3.3V$, $T_A = 25^\circ C$, unless otherwise noted.

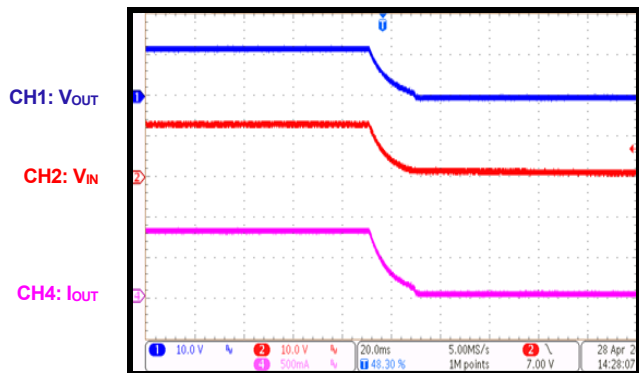
Start-Up through VIN

High-side MOSFET (HS-FET) on,
 $I_{OUT} = 800mA$



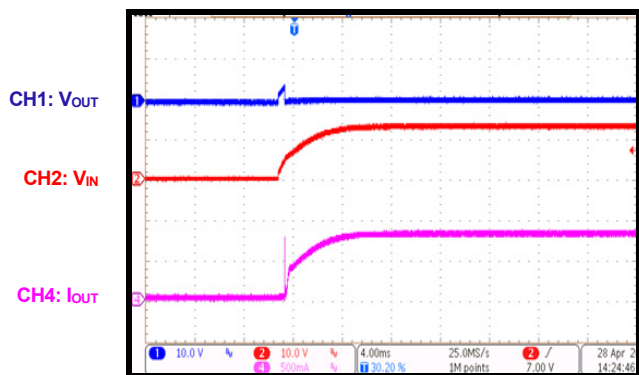
Shutdown through VIN

HS-FET on, $I_{OUT} = 800mA$



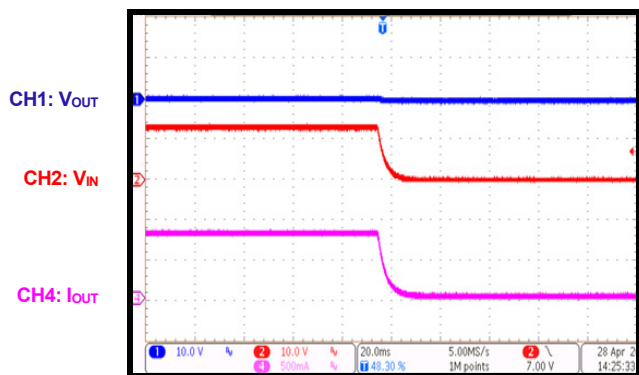
Start-Up through VIN

Low-side MOSFET (LS-FET) on, $I_{OUT} = 800mA$



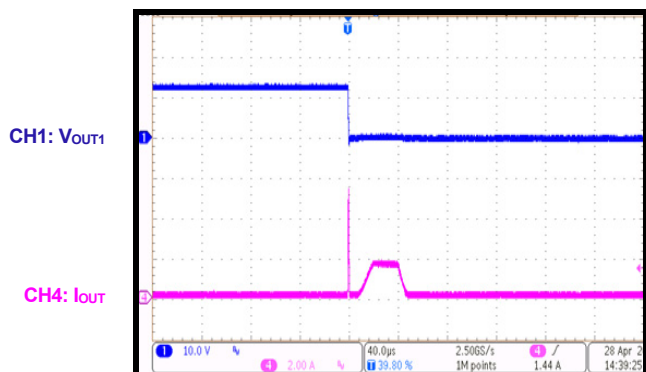
Shutdown through VIN

LS-FET on, $I_{OUT} = 800mA$



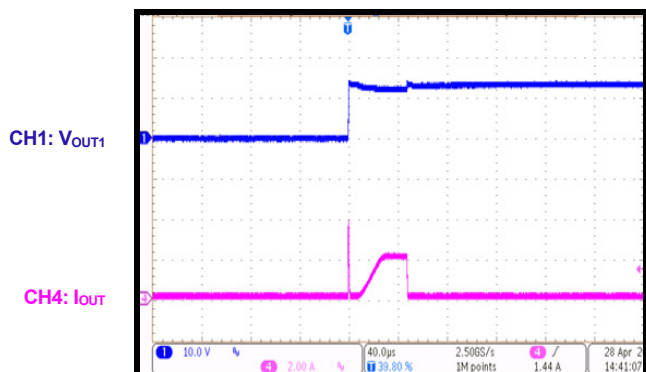
Over-Current Protection (OCP)

OUT shorted to GND



OCP

OUT shorted to VIN

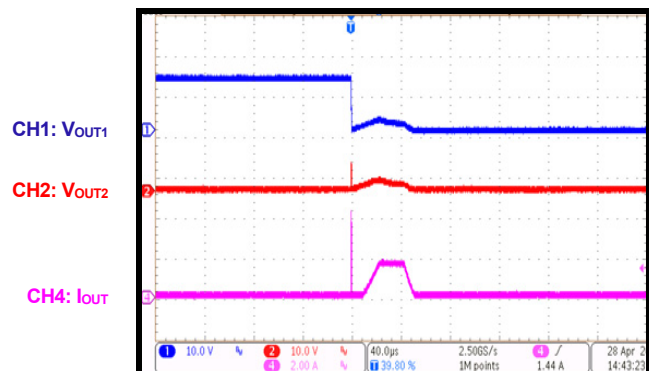


EVB TEST RESULTS *(continued)*

$V_{VS} = 13V$, $V_{VCC} = 3.3V$, $T_A = 25^\circ C$, unless otherwise noted.

OCP

OUT shorted to OUT



PCB LAYOUT

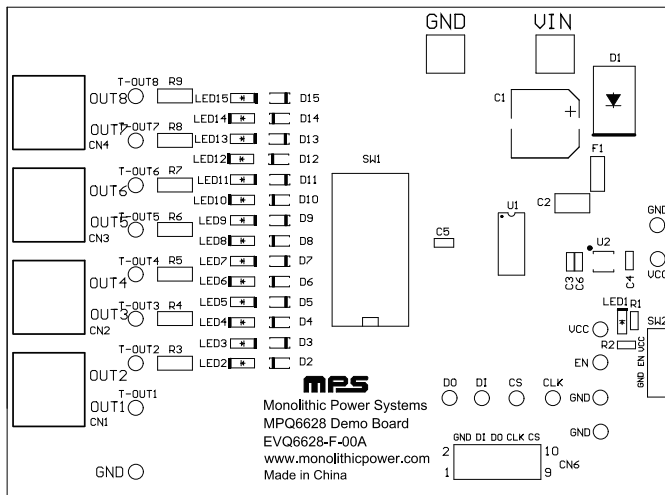


Figure 4: Top Silk

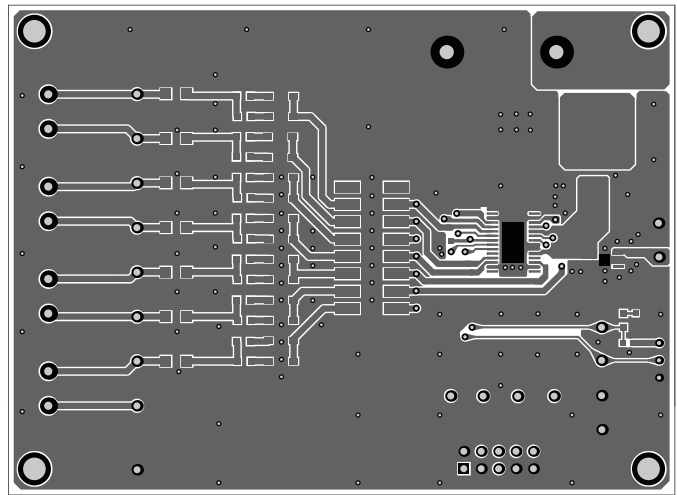


Figure 5: Top Layer

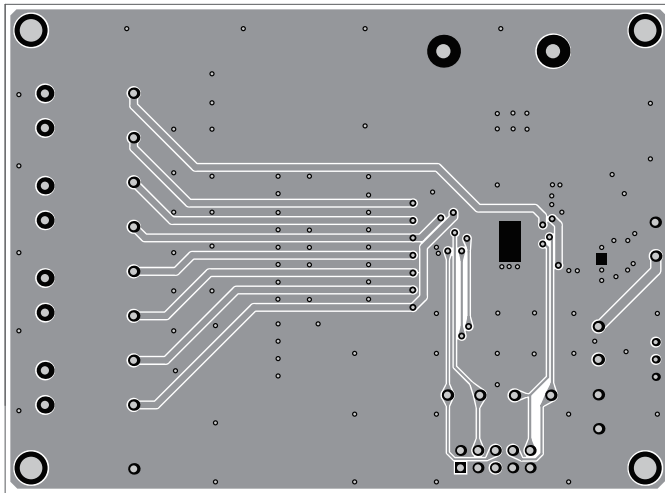


Figure 6: Bottom Layer

REVISION HISTORY

| Revision # | Revision Date | Description | Pages Updated |
|------------|---------------|-----------------|---------------|
| 1.0 | 5/17/2022 | Initial Release | - |

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