



MIC22205 Evaluation Board

2A Integrated Switch High-Efficiency Synchronous Buck Regulator

General Description

The Micrel MIC22205 is a high-efficiency, 2A, integrated switch, synchronous buck (step-down) regulator. It is frequency programmable up to 4MHz. The MIC22205 achieves more than 95% efficiency and switches at 1MHz. The ultra-high-speed control loop keeps the output voltage within regulation even under the extreme transient load swings commonly found in FPGAs and low-voltage ASICs. The output voltage is pre-bias safe and is adjustable down to 0.7V.

The MIC22205 offers a full range of sequencing and tracking options. The Enable/Delay (EN/DLY) and Power Good (PG) inputs allow versatile turn-on and turn-off sequencing across multiple devices. The Ramp Control™ (RC) input allows start-up voltage tracking, either directly or ratio-metrically.

The MIC22205 is available in a 12-pin 3mm x 3mm MLF® with a junction operating range from -40°C to +125°C.

Data sheets and support documentation are available on the Micrel web site: www.micrel.com.

Requirements

The MIC22205YML EV requires a power supply of 2.9V to 5.5V, and a test load. Make sure that the power supply can provide the wattage needed for the chosen test load. The load can be active (electronic load) or passive (resistor). Additionally, monitor the Power Good output (PG) with a multimeter or an oscilloscope.

Precautions

There is no reverse input protection on this board. While connecting supplies and signals, make sure that correct polarities are observed.

Getting Started

1. V_{IN} Supplies

Connect the V_{IN} supply (2.9V to 5.5V) across the VIN and PGND terminals. Monitor V_{IN} at the VIN and PGND terminals with a voltmeter. TP9 is a 4-pin header test point provided for monitoring VIN.

2. Enable

The enable input EN is internally pulled up with a 1 μ A current source.

3. Monitor Outputs

Monitor the output V_{OUT} with a scope or DVM connected across the VOUT and PGND terminals. TP11 is a 4-pin header test point provided for monitoring VOUT.

4. Output Load

Connect a load across the VOUT and PGND terminals. Use an active or passive load.

5. Turn On the Power

Turn on the power supply and verify that $V_{OUT} = 1.8V$.

Ordering Information

| Part Number | Description |
|----------------|--------------------------------------|
| MIC22205YML EV | Evaluation Board for the MIC22205YML |

Ramp Control is a trademark of Micrel, Inc.

MLF and MicroLeadFrame are registered trademarks of Amkor Technology, Inc.

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Evaluation Board Features

See the *MIC22205YML Data Sheet* for detailed explanations of these functions.

Enable/Delay (EN/DLY)

Enable/Delay allows delayed turn-on of the MIC22205. Install a capacitor in location C7 to increase the start-up delay of the MIC22205.

$$t_{\text{EN/DLY}} = \frac{1.24 \times C_7}{1 \times 10^{-6}}$$

Ramp Control (RC)

Ramp control allows slowing the slew rate of the MIC22205 output. Increase the value of capacitor C6 to reduce the slew rate.

$$t_{\text{RAMP}} = \frac{0.7 \times C_6}{1 \times 10^{-6}}$$

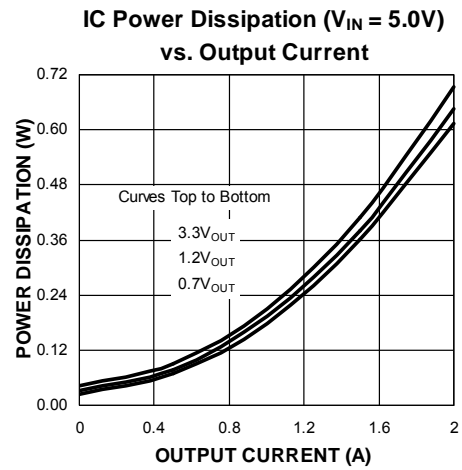
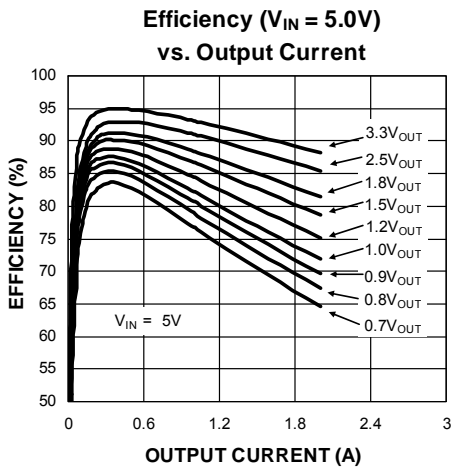
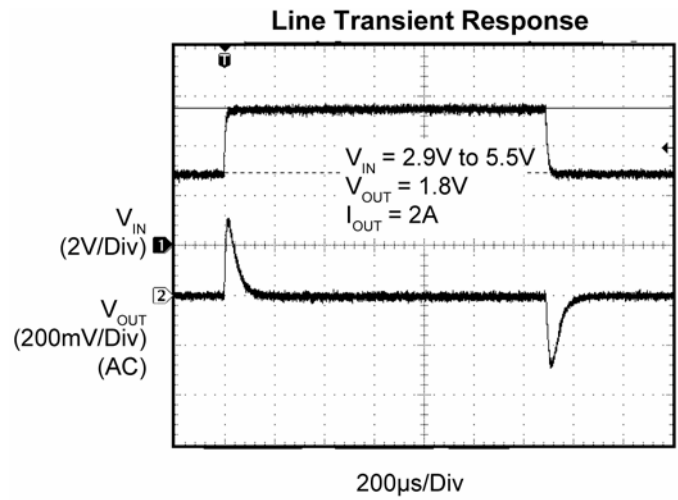
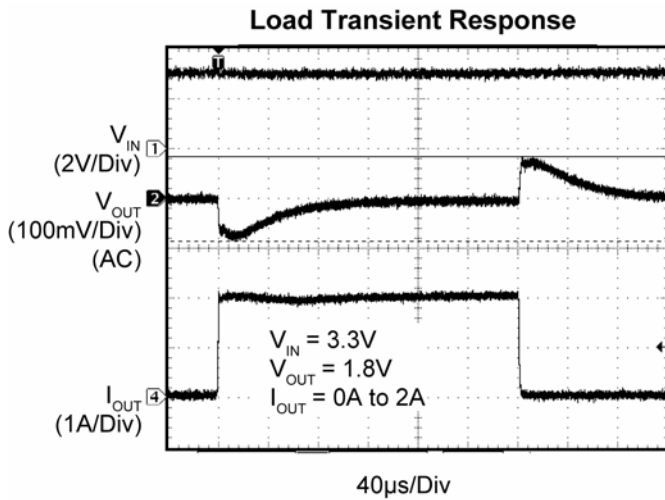
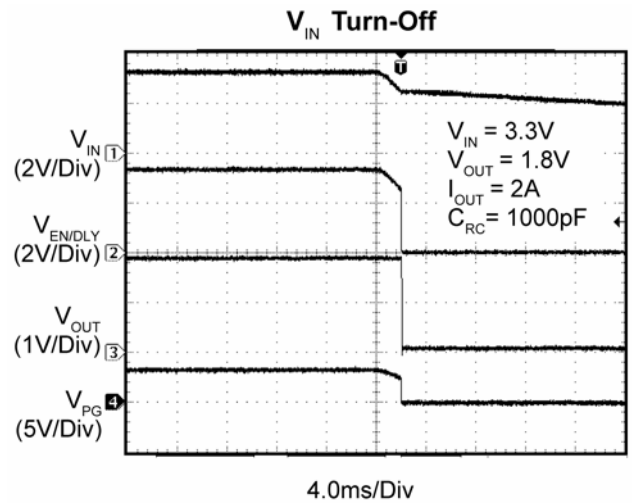
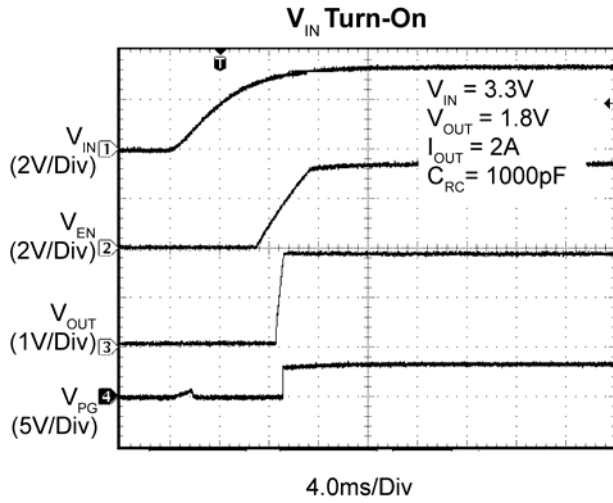
Power On Reset Output (POR)

Open drain output POR pulls low when the output voltage of the MIC22205 is out of specification. POR is pulled up to V_{IN} by a 47.5k Ω resistor.

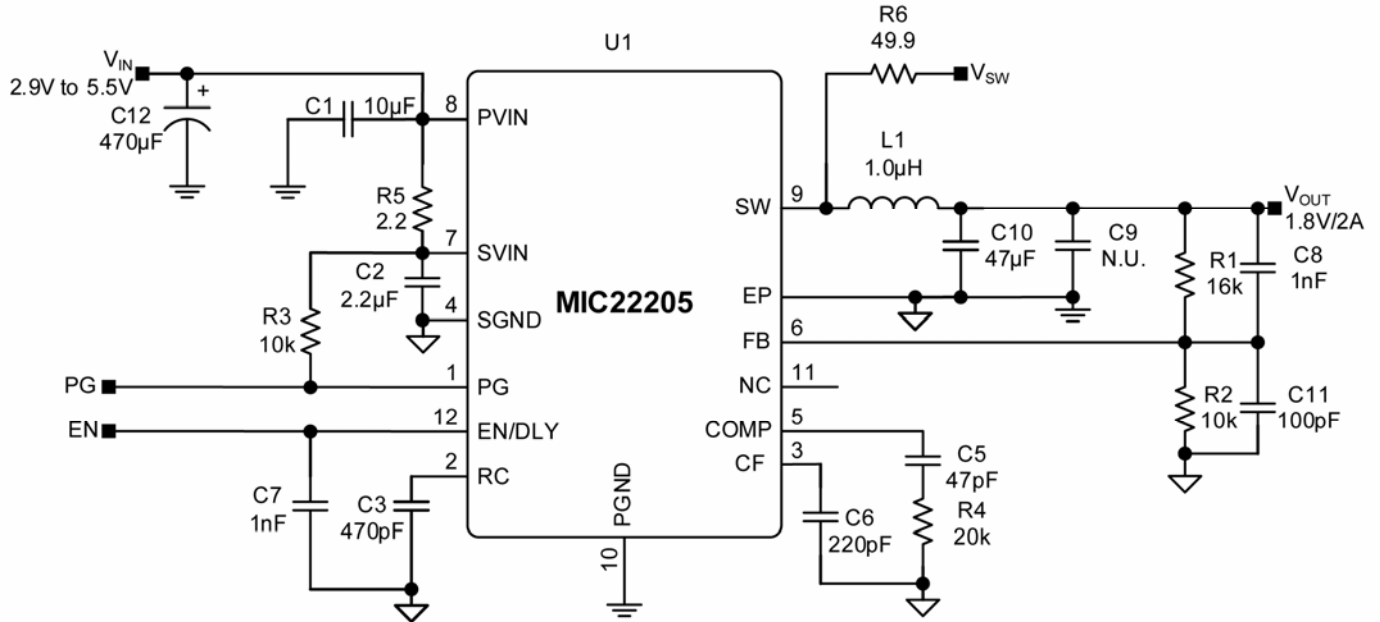
Switch Voltage (V_{SW})

Test point V_{SW} is provided to monitor the internal switching node. V_{SW} is isolated from the switch node by 49.9 Ω resistor R7. TP10 is a 2-pin header test point provided for monitoring switch voltage.

Typical Characteristics



Evaluation Board Schematic



Bill of Materials

| Item | Part Number | Manufacturer | Description | Qty. |
|--------|--------------------|-----------------------|--|------|
| C1 | C2012X5R0J106K | TDK ⁽¹⁾ | Capacitor, 10µF, 6.3V, X5R, Size 0805 | 1 |
| | GRM2196R60J106K | Murata ⁽²⁾ | | |
| | 08056D106KAT2A | AVX ⁽³⁾ | | |
| C2 | C1608X5R0J225M | TDK | Capacitor, 2.2µF, 6.3V, X5R, Size 0603 | 1 |
| | GRM188R60J225M | Murata | | |
| | 06036D225MAT2A | AVX | | |
| C3 | C1608X7RH471K | TDK | Capacitor, 470pF, 50V, X7R, Size 0603 | |
| | GRM188R71H471KA01D | Murata | | |
| | 06035C471KAT2A | AVX | | |
| C5 | C1608C0G1H470J | TDK | Capacitor, 47pF, 50V, NPO, Size 0603 | 1 |
| | GQM1885C1H470JB01D | Murata | | |
| | 06035A470JAT2A | AVX | | |
| C6 | C1608C0G1H221J | TDK | Capacitor, 220pF, 50V, NPO, Size 0603 | 1 |
| | GRM1885C1H221JA01D | Murata | | |
| | 06035A221JAT2A | AVX | | |
| C7, C8 | C1608C0G1H102J | TDK | Capacitor, 1nF, 50V, NPO, Size 0603 | 2 |
| | GRM1885C1H102JA01D | Murata | | |
| | 06035A102KAT2A | AVX | | |

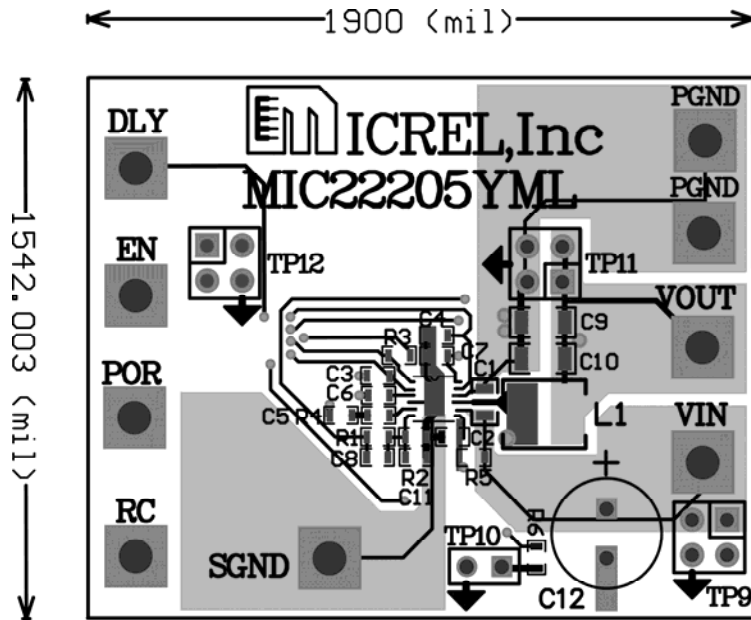
Bill of Materials (Continued)

| Item | Part Number | Manufacturer | Description | Qty. |
|--------|--------------------|-----------------------|---|------|
| C9 | D.N.P. | | | |
| C10 | C3216X5R0J476M | TDK | Capacitor, 47 μ F, 6.3V, X5R, Size 1206 | 1 |
| | GRM31CR60J476ME19L | Murata | | |
| | 1206D476MAT2A | AVX | | |
| C11 | C1608C0G1H101J | TDK | Capacitor, 100pF, 50V, NPO Size 0603 | 1 |
| | GRM1885C1H101JA01D | Murata | | |
| | 06035A101JAT2A | AVX | | |
| C12 | B41125A3477M | Epcos ⁽⁴⁾ | 470 μ F, 10V, Electrolytic, 8x10 case | 1 |
| L1 | IHLP1616BZER1R0M11 | Vishay ⁽⁵⁾ | Inductor, 1 μ H, 5A | 1 |
| R1 | CRCW06031602FKEA | AVX | Resistor, 16K, 1%, Size 0603 | 1 |
| R2, R3 | CRCW06031002FKEA | AVX | Resistor, 10K, 1%, Size 0603 | 2 |
| R4 | CRCW060320K0FKEA | AVX | Resistor, 20K, 1%, Size 0603 | 1 |
| R5 | CRCW06032R20FKEA | AVX | Resistor, 2.2 Ω , 1%, Size 0603 | 1 |
| R6 | CRCW060349R9FKEA | AVX | Resistor, 49.9 Ω , 1%, Size 0603 | 1 |
| U1 | MIC22205YML | Micrel ⁽⁶⁾ | Integrated 2A Synchronous Buck Regulator | 1 |

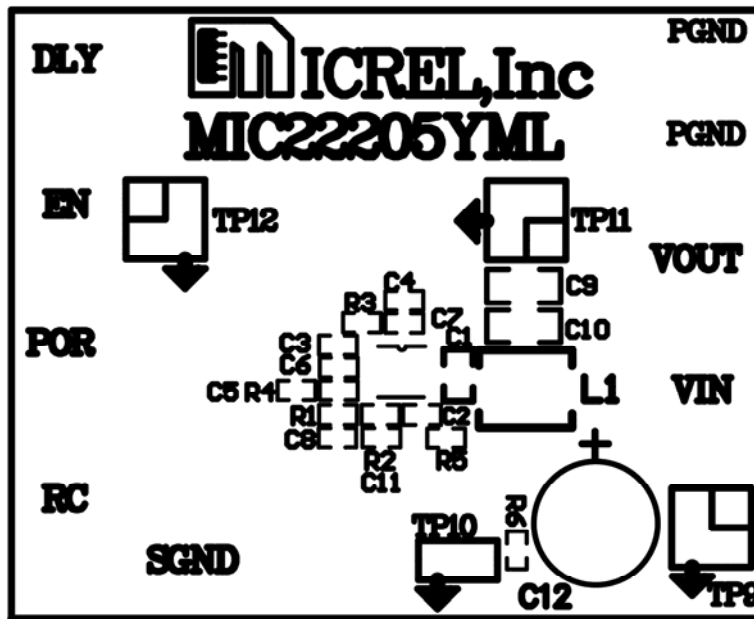
Notes:

1. TDK: www.tdk.com.
2. Murata: www.murata.com.
3. AVX: www.avx.com.
4. Epcos: www.epcos.com.
5. Vishay: www.vishay.com.
6. Micrel, Inc.: www.micrel.com.

Evaluation Board PCB Layout

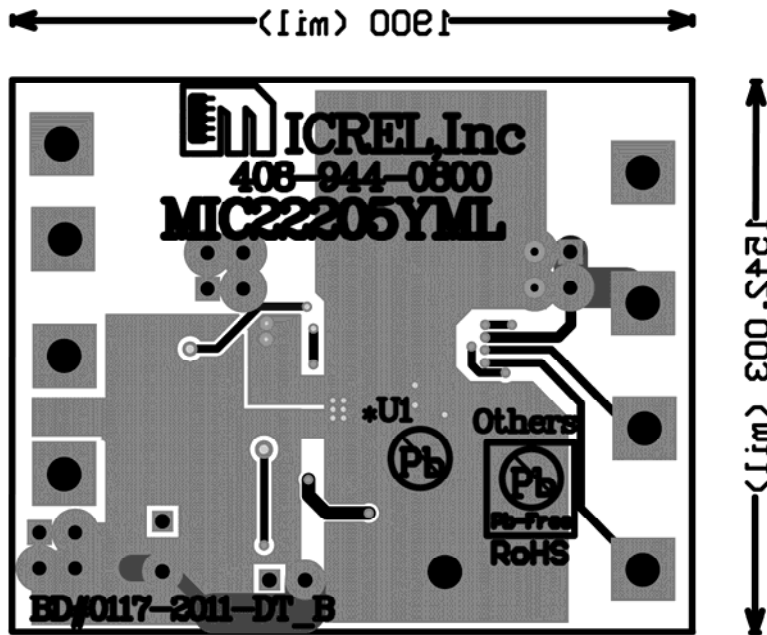


MIC22205 Evaluation Board Top Layer

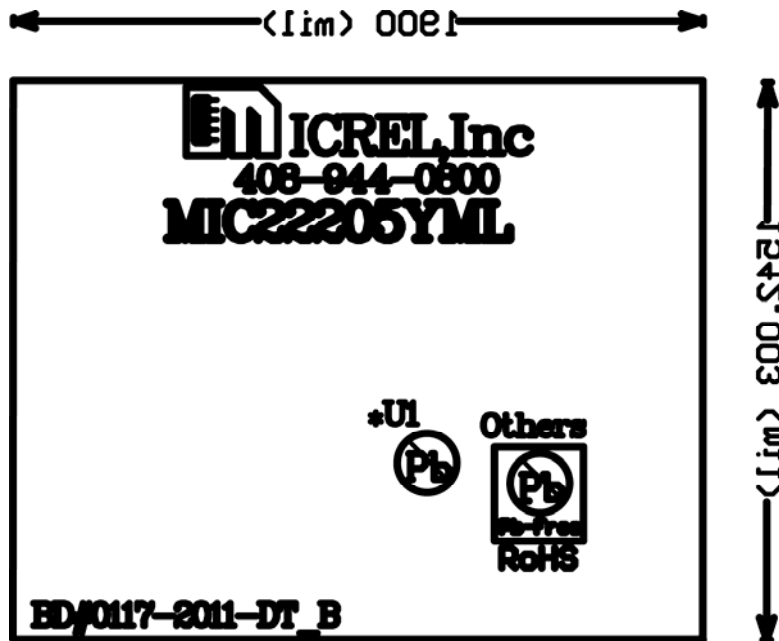


MIC22205 Evaluation Board Top Silk

Evaluation Board PCB Layout (Continued)



MIC22205 Evaluation Board Bottom Layer



MIC22205 Evaluation Board Bottom Silk

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