EVM3593-QY-00B

45V Input 3A Module Step-Down Converter Evaluation Board

DESCRIPTION

The EVM3593-QY-00B Evaluation Board is designed to demonstrate the capabilities of MPS' MPM3593, a step-down regulator module integrated with I²C control interface and a multipage one-time programmable memory. The MPM3593 offers a very compact solution that requires only input and output capacitors to achieve 3A of continuous output current with excellent load and line regulation over a wide input supply range.

Voltage slew rate, switching frequency, enable and power savings mode are also programmable via the I2C interface. This allows users to optimize each output for their particular requirements.

Full protection features include under-voltage lockout (UVLO), over-voltage protection (OVP), over-current protection (OCP) and over-temperature protection (OTP).

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	24	V
Output Voltage	V_{OUT}	5	V
Output Current	I_{OUT}	3	A

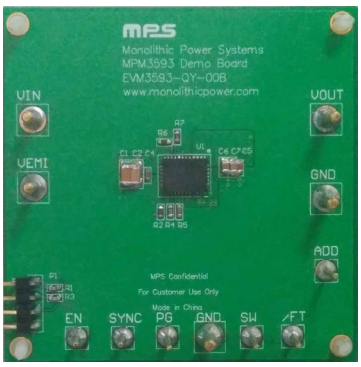
FEATURES

- Continuous Output Current
  - 3A Continuous Output Current at Vout≤ 5V
  - 2A Continuous Output Current at Vout>5V
- Wide 3.5V to 45V Operation Input Range
- High Efficiency Synchronous Mode Module
- Power Good and Fault Indications
- OVP, OCP and OTP
- Internal Soft-Start
- Programmable Address by Resistor
- Programmability via I²C Interface
- Multipage One-Time Programmable Memory for Permanent storage
- Available in 41-pin QFN6x8mm Package

APPLICATIONS

- Industrial Power Systems
- Automotive Power Systems
- Telecommunication Systems

EVM3593-QY-00B EVALUATION BOARD

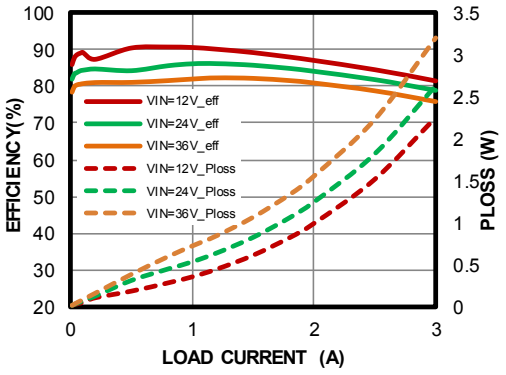


(L × W × H) 63.5mm × 63.5mm × 1.6mm

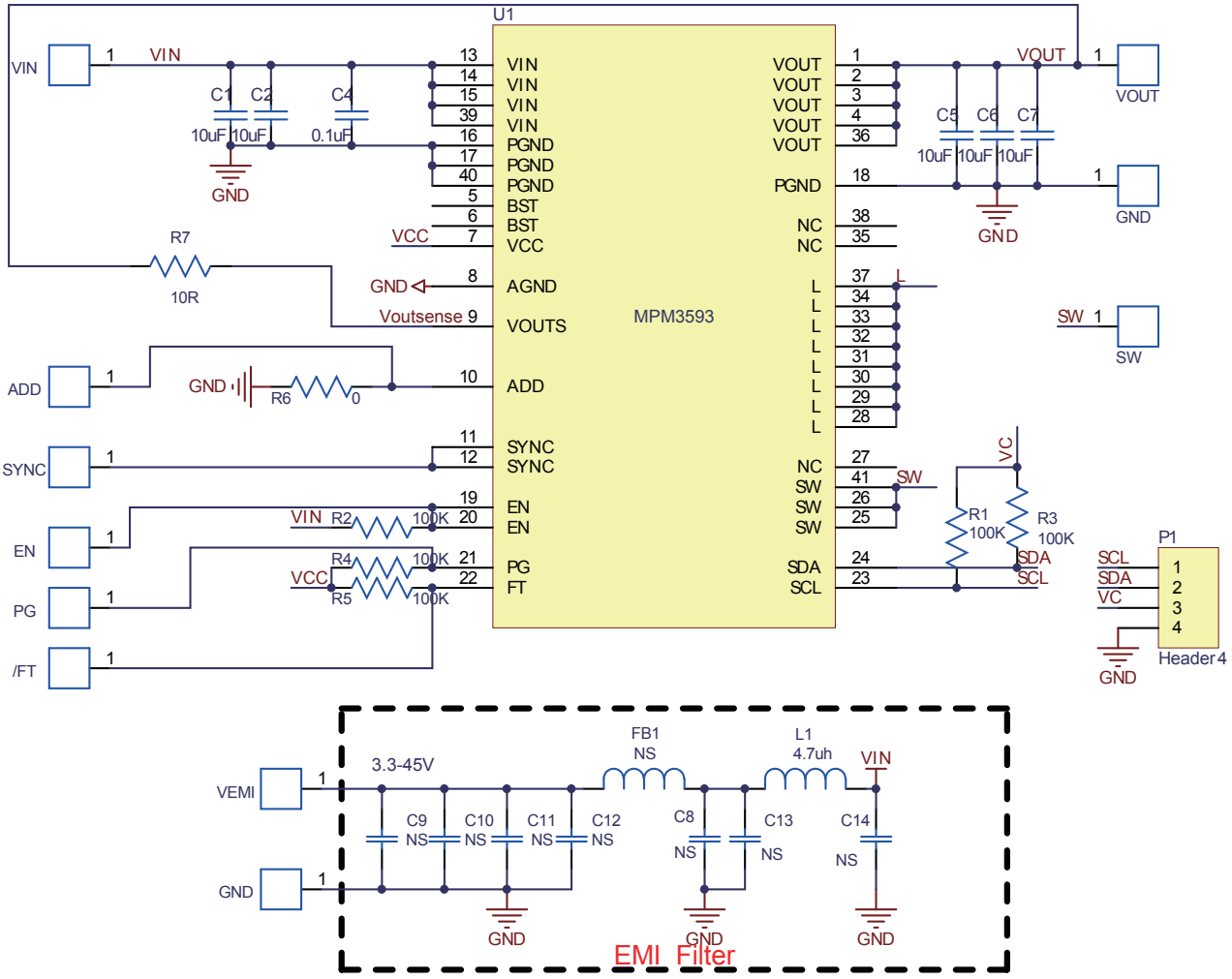
Board Number	MPS IC Number
EVM3593-QY-00B	MPM3593GQY

Efficiency & Ploss vs. Load Current

V_{OUT}=3.3V



EVALUATION BOARD SCHEMATIC



EVM3595-QY-00B BILL OF MATERIALS

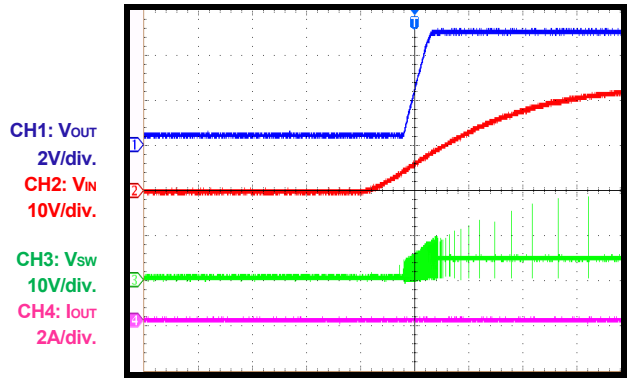
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
2	C1.C2	10μF	Ceramic Cap., 50V,X5R	1206	Murata	GRT31CR61H106KE01L
1	C4	0.1μF	Ceramic Cap., 50V,X7R	0603	Murata	GRM188R71H104KA93D
1	C5	10μF	Ceramic Cap., 25V,X5R	0603	Murata	GRM188R61E106MA73L
2	C6.C7	10μF	Ceramic Cap., 25V,X5R	0805	TDK	C2012X5R1E106K
5	R1, R2, R3, R4, R5	100K	Film Res, 1%,0603,100K	0603	YAGEO	RC0603FR-07100KL
1	R7	10R	Film Res, 1%,0603,10R	0603	YAGEO	RC0603FR-0710RL
1	R6	0R	Film Res, 1%,0603,0R	0603	YAGEO	RC0603FR-070RL
5	VIN, VEMI, VOUT, GND, GND	φ2.0	φ2.0 copper pin	DIP	NS	φ2.0 copper pin
6	ADD, EN, SYNC, PG, SW, /FT	Φ1.0	Φ1.0 copper pin	DIP	NS	Φ1.0 copper pin
1	P1	4Pins	4Pins,1 row ,straight	DIP	WE	61300411121
1	U1	MPM3593	45V Input 3A Module	QFN41 (6mmx8mm)	MPS	MPM3593GQY

EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board.
V_{IN} = 24V, T_A = 25°C, unless otherwise noted.

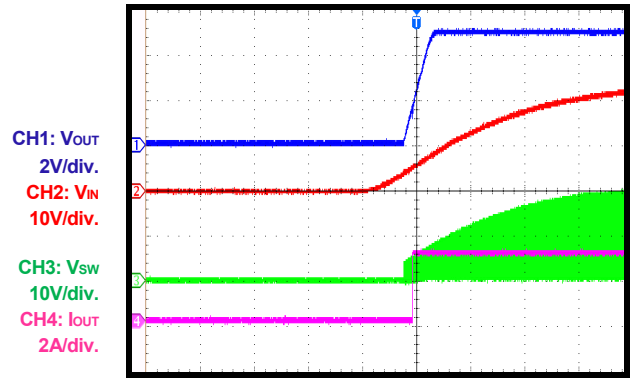
Start-Up through VIN

V_{OUT}=5V, I_{OUT}=0A



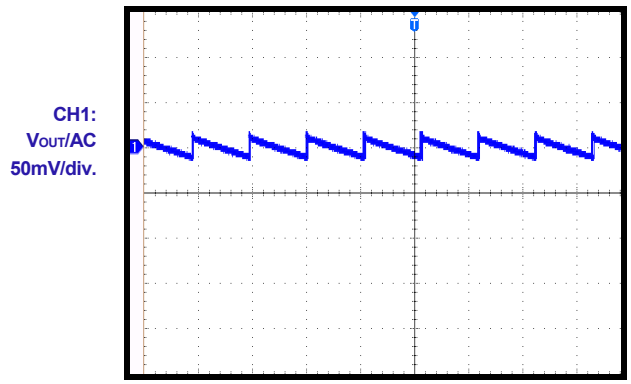
Start-Up through VIN

V_{OUT}=5V, I_{OUT}=3A



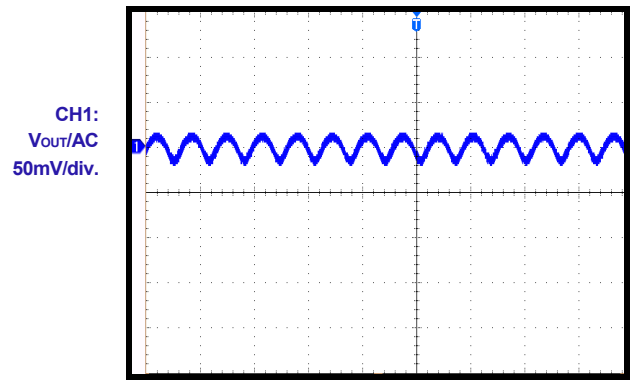
Output Ripple

V_{OUT}=5V, I_{OUT}=0A, 3x22µF Caps



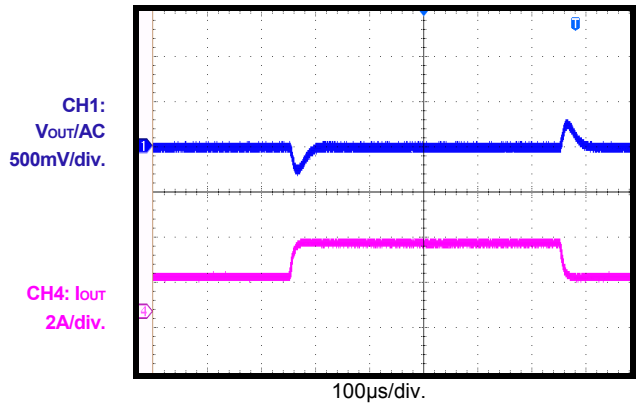
Output Ripple

V_{OUT}=5V, I_{OUT}=3A, 3x22µF Caps



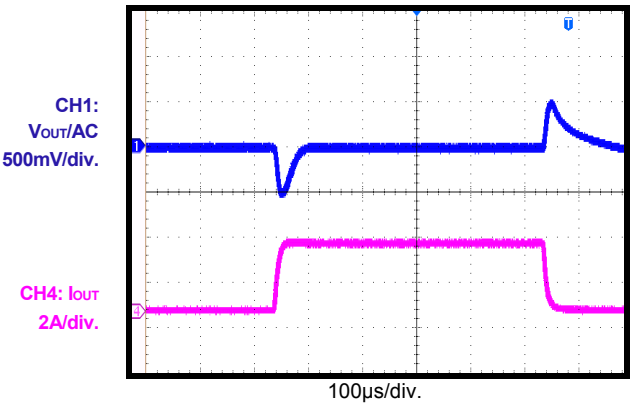
Load Transient Response

V_{OUT}=5V, 1.5 to 3A, 3x22µF Caps



Load Transient Response

V_{OUT}=5V, 0 to 3A, 3x22µF Caps

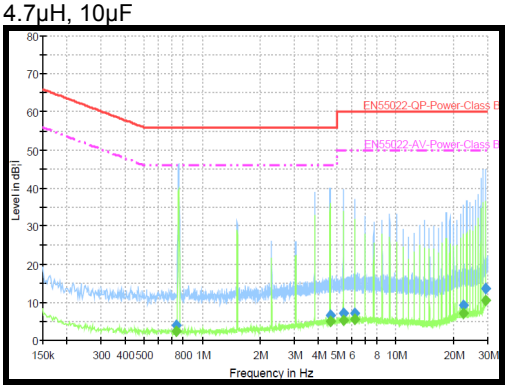


EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board.
V_{IN} = 24V, T_A =25°C, unless otherwise noted.

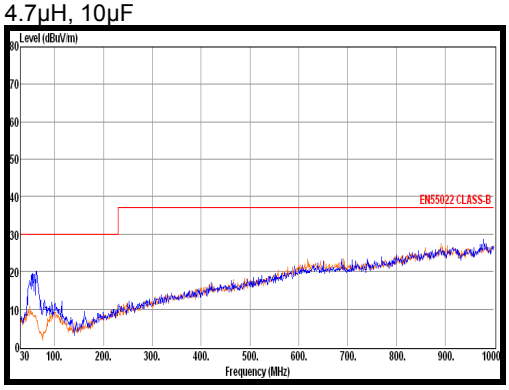
Conducted Emission, EV55022 Class B

V_{OUT}=3.3V, I_{OUT}=3A, Input Pi Filter: 10μF, 4.7μH, 10μF



Radiated Emission, EV55022 Class B

V_{OUT}=3.3V, I_{OUT}=3A, Input Pi Filter: 10μF, 4.7μH, 10μF



PRINTED CIRCUIT BOARD LAYOUT

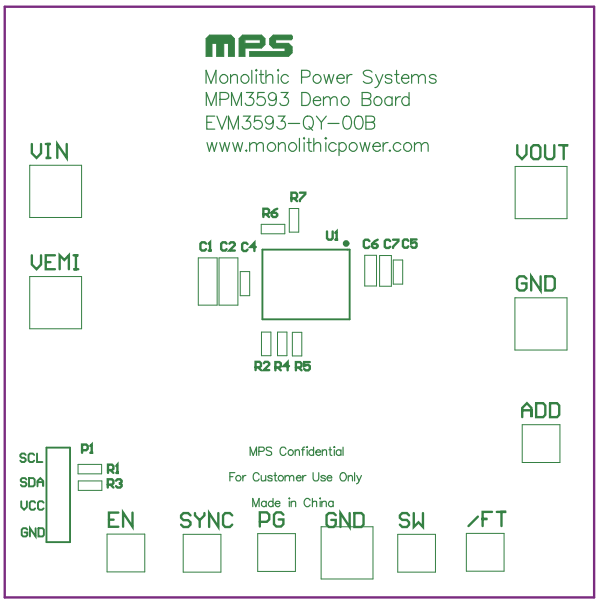


Figure 1: Top Silk Layer

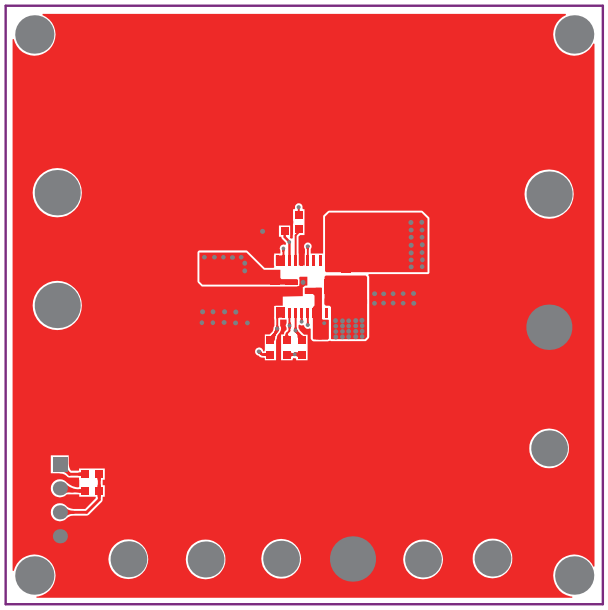


Figure 2: Top Layer

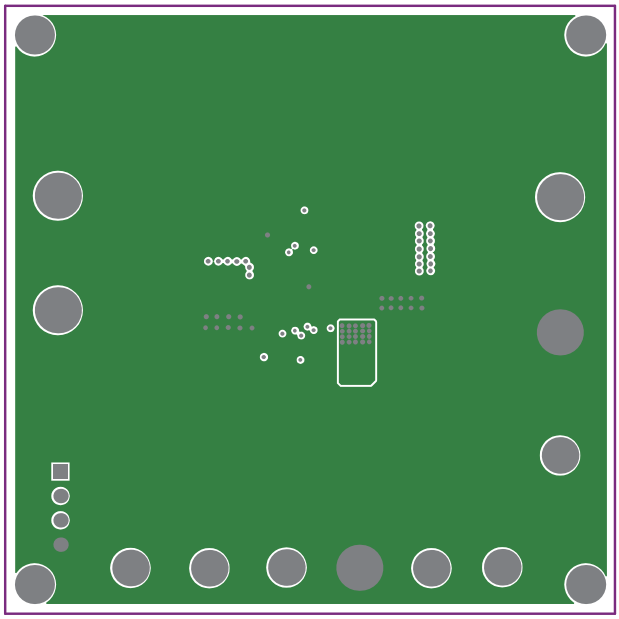


Figure 3: Mid Layer1

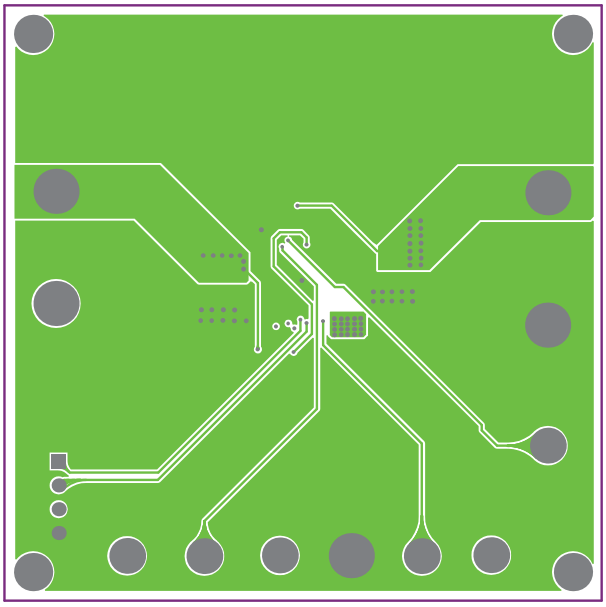


Figure 4: Mid Layer2

PRINTED CIRCUIT BOARD LAYOUT *(continued)*

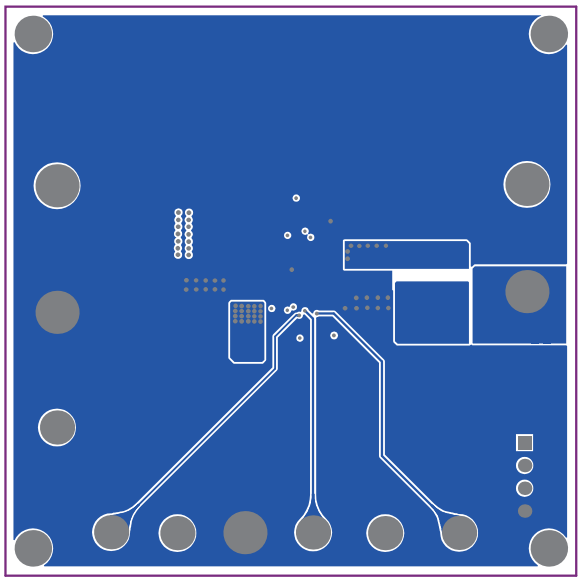


Figure 5: Bottom Layer

QUICK START GUIDE

1. Preset Power Supply to 3.5V ≤ V_{IN} ≤ 45V.
2. Turn Power Supply off.
3. Connect SCL, SDA and GND of the EVB to I2CBUS KIT.
4. Connect I2CBUS KIT to PC Via USB Cable (Like Figure6 shows).
5. Connect Power Supply terminals to:
    a. Positive (+): VIN
    b. Negative (–): GND
6. Connect Load to:
    a. Positive (+): VOUT
    b. Negative (–): GND

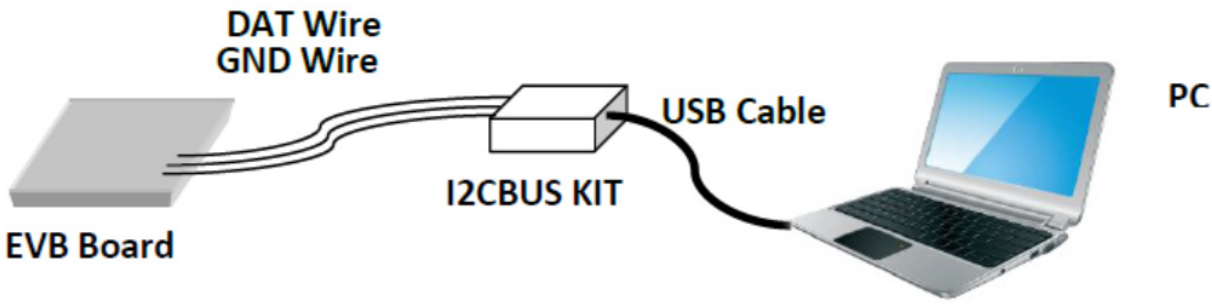


Figure6: Connection Diagram

7. Turn Power Supply on after making connections. The board will automatically start up.
8. Start the software.
9. Click the “+” button, then select the MPM3593, and click “Yes”, you will see the interface like Figure7, If the light of upper left corner is blue, the communication is successful, If not, you must check the driver and the wires.

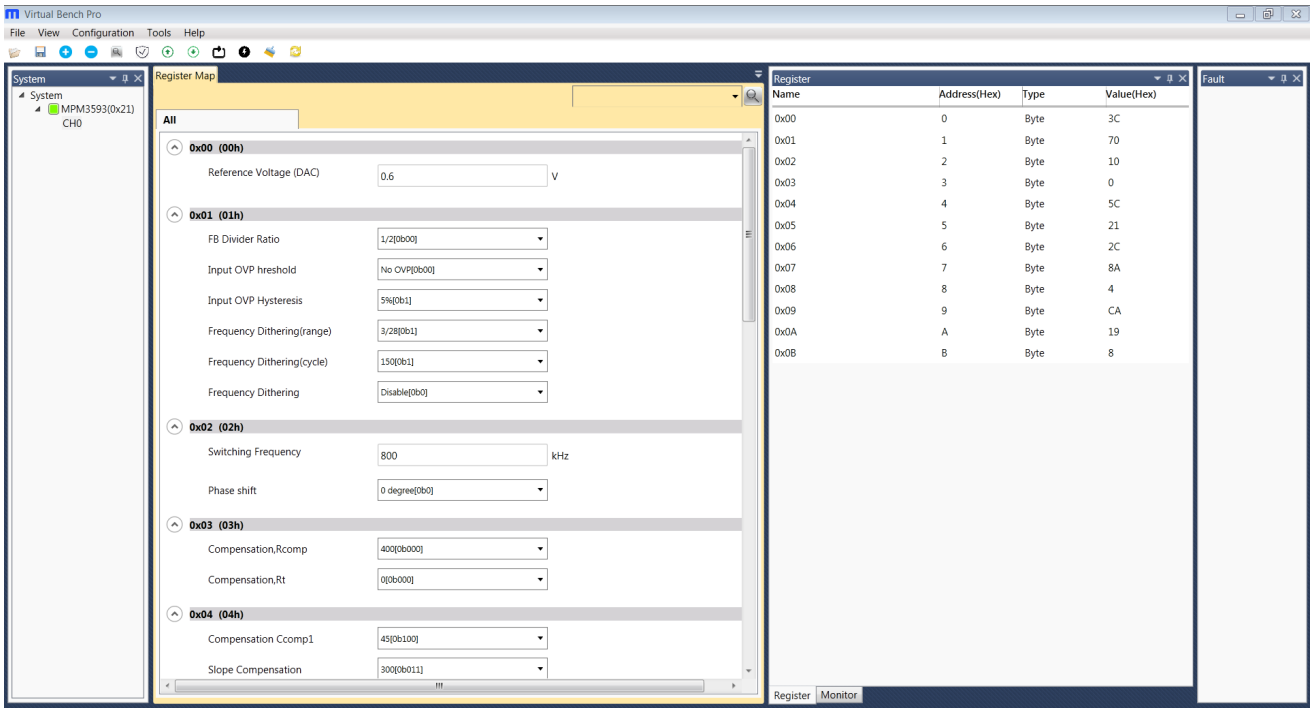


Figure7: Interface of the GUI

10. Then you can customize the parameters as the Right of the Figure7 listed, then you can click the “write to chip” button for debugging, or the “write to MTP” button for permanent use.
11. Detailed information please see MPM3593 EVKT User Guide.