



EVM3695-20-PJ-00A

16V, 25A, High-Efficiency, Synchronous Step-Down Module Evaluation Board

DESCRIPTION

The EVM3695-20-PJ-00A evaluation board is designed to demonstrate the capabilities of the MPM3695-20, a fully integrated, high-efficiency, synchronous step-down power module with 25A of output current (I_{OUT}).

The MPM3695-20 adopts internally compensated constant-on-time (COT) control to provide fast transient response and ease loop

stabilization. The switching frequency (f_{SW}) can be set from 400kHz to 1MHz. Refer to the MPM3695-20 datasheet for more detailed information.

It is recommended to read the datasheet for the MPM3695-20 prior to making any changes to the EVM3695-20-PJ-00A.

PERFORMANCE SUMMARY ⁽¹⁾

Specifications are at $T_A = 25^\circ\text{C}$

Parameters	Conditions	Value
Input voltage (V_{IN}) range		3V to 16V ⁽²⁾
Output voltage (V_{OUT})	$V_{IN} = 3\text{V to } 16\text{V}$, $I_{OUT} = 0\text{A to } 25\text{A}$	1.2V
Maximum output current (I_{OUT})	$V_{IN} = 3\text{V to } 16\text{V}$, $V_{OUT} = 1.2\text{V}$	25A
Full-load efficiency	$V_{IN} = 12\text{V}$, $V_{OUT} = 1.2\text{V}$, $I_{OUT} = 25\text{A}$, $f_{SW} = 600\text{kHz}$	84.24%
Peak efficiency	$V_{IN} = 12\text{V}$, $V_{OUT} = 1.2\text{V}$, $I_{OUT} = 12\text{A}$, $f_{SW} = 600\text{kHz}$	89.08%
Default switching frequency (f_{SW})		600kHz

Notes:

- 1) For different input/output voltage specifications with different output capacitors, the application circuit parameters may require changes.
- 2) When $V_{IN} < 4\text{V}$, an external 3.3V VCC is required.

EVALUATION BOARD



LxWxH (10cmx10cmx1.5cm)

Board Number	MPS IC Number
EVM3695-20-PJ-00A	MPM3695GPJ-20

QUICK START GUIDE

The EVM3695-20-PJ-00A is easy to set up to evaluate the performance of the MPM3695-20. Refer to Figure 1 on page 4 for the proper measurement equipment set-up and follow the procedure below.

1. Preset the power source (V_{IN}) between 4V and 16V. ⁽³⁾
2. Turn the power source off.
3. Connect the power source terminals to:
 - a. Positive (+): VIN
 - b. Negative (-): GND
4. Connect the load (the initial load should be no load) terminals to:
 - a. Positive (+): VOUT
 - b. Negative (-): GND_1
5. Turn the power supply on after making the connections. The board should automatically start up.
6. Check for the proper output voltages from the VOUT_S to VOUTGND_S turrets.
7. Once the proper output voltage (V_{OUT}) is established, adjust the load within the operating range then measure the efficiency, output ripple voltage, and other relevant parameters. ⁽⁴⁾
8. After completing all tests, adjust the load to 0A, then turn the input power supply off.

Notes:

- 3) Ensure that V_{IN} does not exceed 16V.
- 4) When measuring the output or input voltage ripple, do not use the long ground lead on the oscilloscope probe.

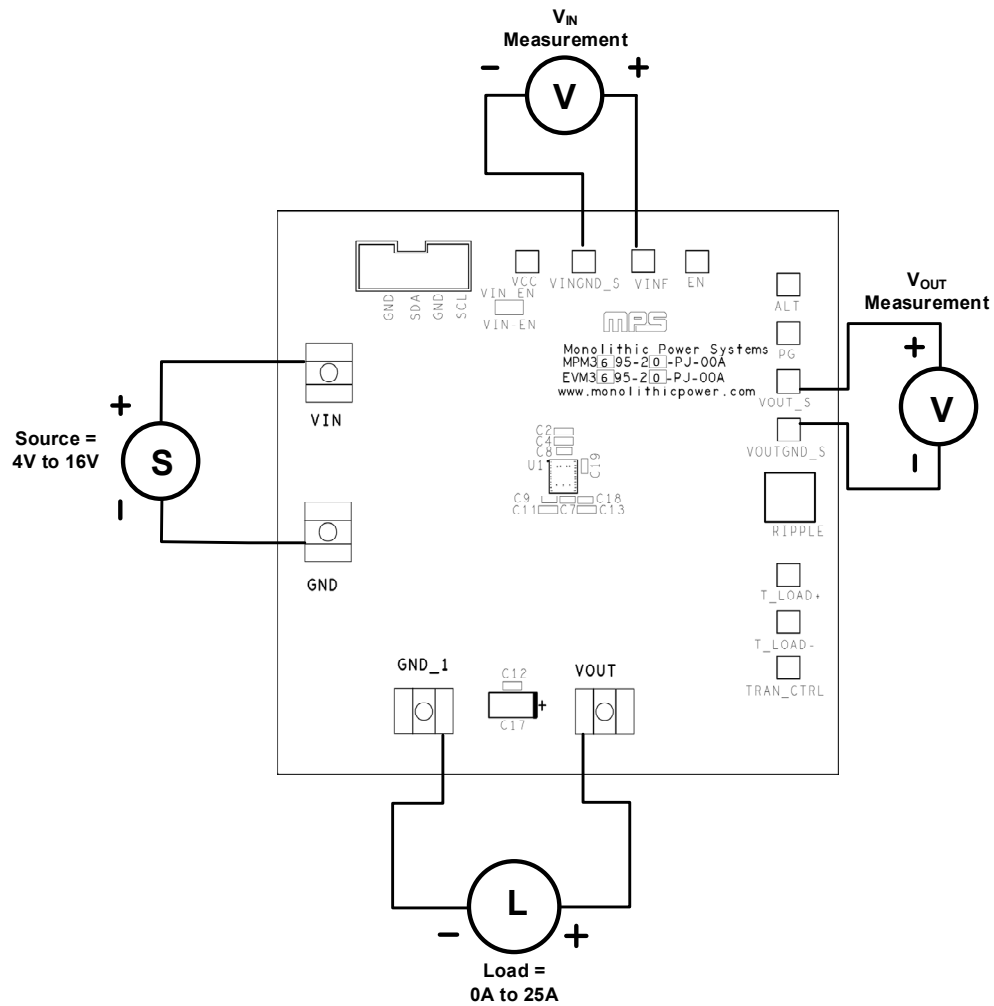


Figure 1: Proper Measurement Equipment Set-Up

EVALUATION BOARD SCHEMATIC

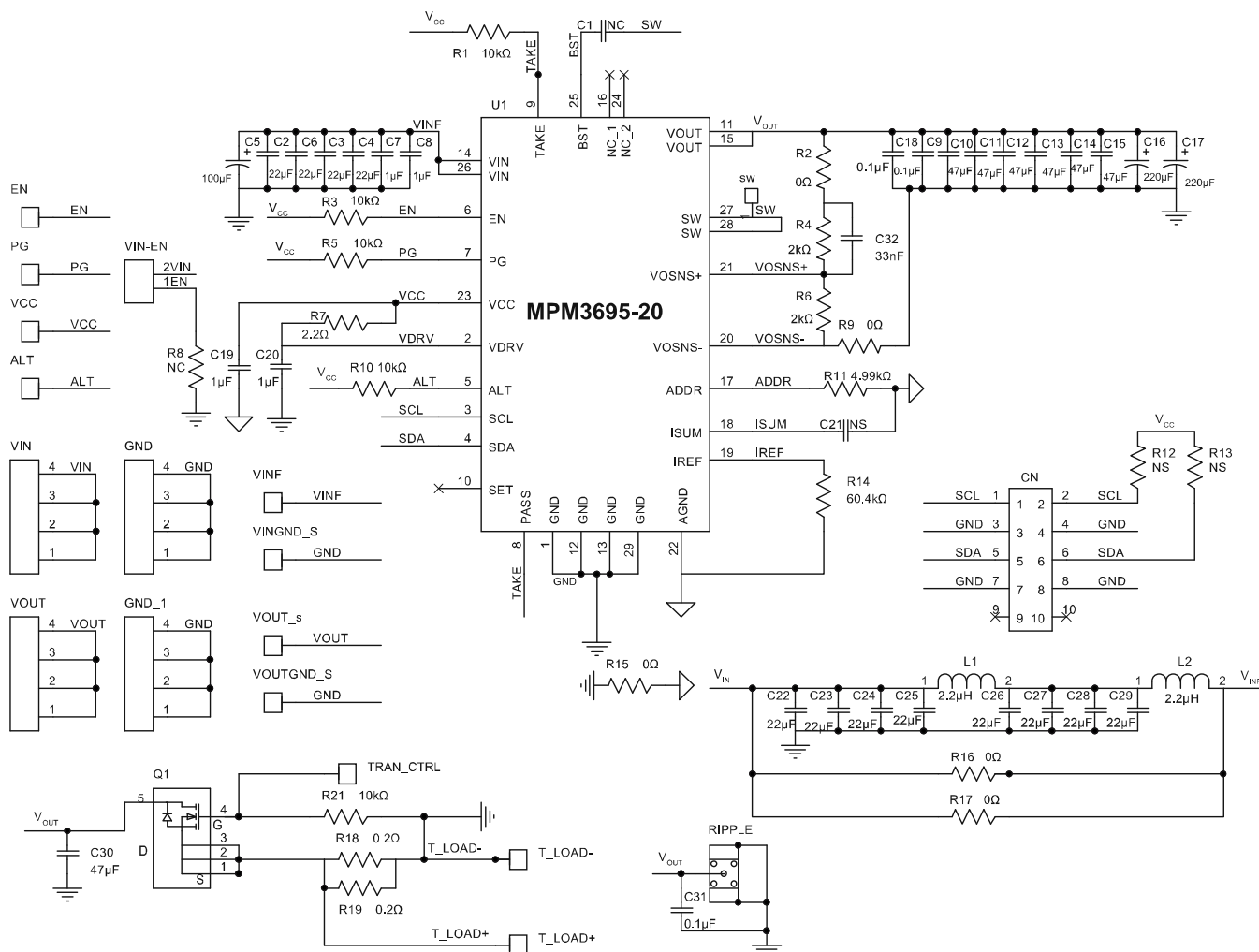


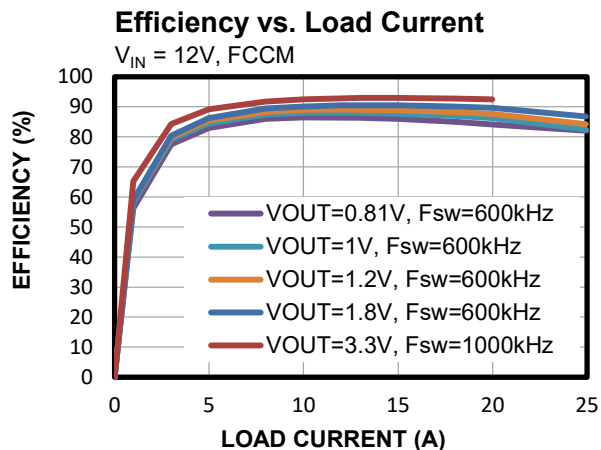
Figure 2: Evaluation Board Schematic

EVM3695-20-PJ-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
4	C2, C3, C4, C6	22μF	Capacitor, 25V, X7R, 0805	C0805	Murata	GRM21BR61E226 ME44L
1	C5	100μF	100μF, 25V, OSCON, E7	OSCON E7	Panasonic	25SVPF100M
4	C7, C8, C19, C20	1μF	Ceramic capacitor, 25V, X7R	C0603	Murata	GRT188R71E105K E13D
2	C9, C18	0.1μF	Capacitor, 25V, X7R, 0603	C0603	Würth	885012206071
6	C10, C11, C12, C13, C14, C15	47μF	Ceramic capacitor, 10V, X5R	C0805	Murata	GRM21BR61A476 ME15L
2	C16, C17	220μF	Tantalum capacitor, 6.3V, 15mΩ	SMD	Panasonic	EEFCX0J221R
1	C32	33nF	Ceramic capacitor, 25V, X7R	C0603	Murata	GRM188R71E333 KA01D
1	CN	10-pin	I ² C connector	DIP	Würth	612010235121
4	R1, R3, R5, R10	10kΩ	Film resistor, 1%, 0603	R0603	Yageo	RC0603FR-0710KL
3	R2, R9, R15	0Ω	Film resistor, 1%, 0603	R0603	Yageo	RC0603FR-070RKL
2	R4, R6	2kΩ	Film resistor, 1%, 0603	R0603	Yageo	RC0603FR-072KL
1	R7	2.2Ω	Film resistor, 1%, 0603	R0603	Yageo	RC0603FR-072R2L
1	R11	4.99kΩ	Film resistor, 1%, 0603	R0603	Yageo	RC0603FR-074K99L
1	R14	60.4kΩ	Film resistor, 1%, 0603	R0603	Yageo	RC0603FR-0760K4L
2	R16, R17	0Ω	Film resistor, 1%, 2512	R2512	Yageo	RC2512FK-070RL
1	VIN-EN	2.54mm	CN2, 2-pin,	DIP	Würth	61300211121
1	U1	MPM3695-20	16V, 25A, step-down power module	ECLGA-29 (5mmx6mmx4.4mm)	MPS	MPM3695GPJ-20

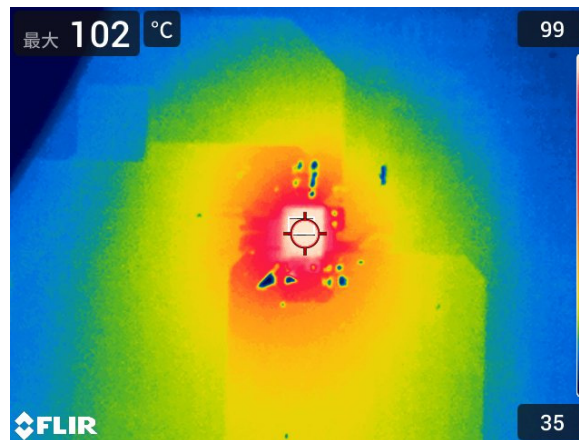
EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board. $V_{IN} = 12V$, $V_{OUT} = 1.2V$, $f_{SW} = 600kHz$, $T_A = 25^{\circ}C$, unless otherwise noted.



Thermal Performance ($T_A = 28^{\circ}C$)

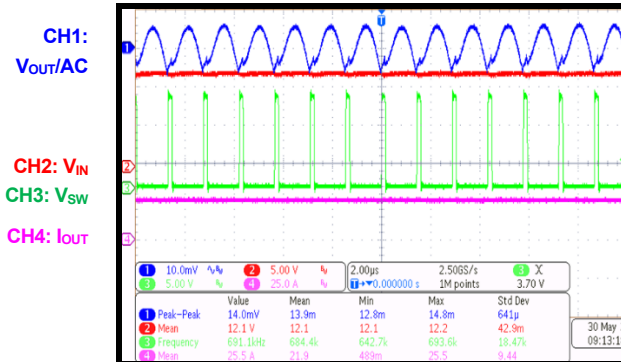
$I_{OUT} = 20A$, no forced airflow, $T_{CASE} = 102^{\circ}C$



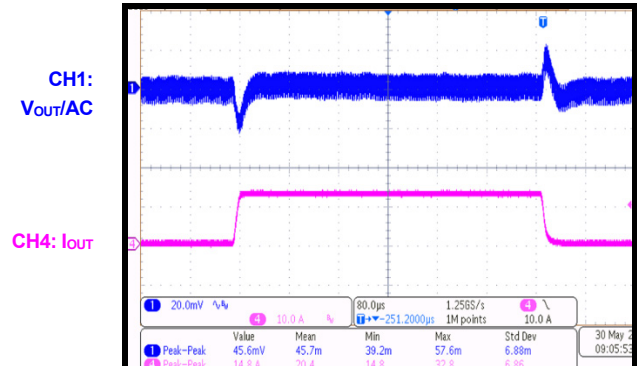
EVB TEST RESULTS (continued)

Performance curves and waveforms are tested on the evaluation board. $V_{IN} = 12V$, $V_{OUT} = 1.2V$, $f_{SW} = 600kHz$, $T_A = 25^{\circ}C$, unless otherwise noted.

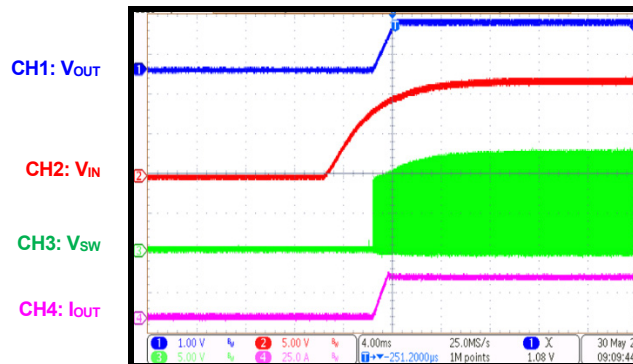
Steady State

 $I_{OUT} = 25A$


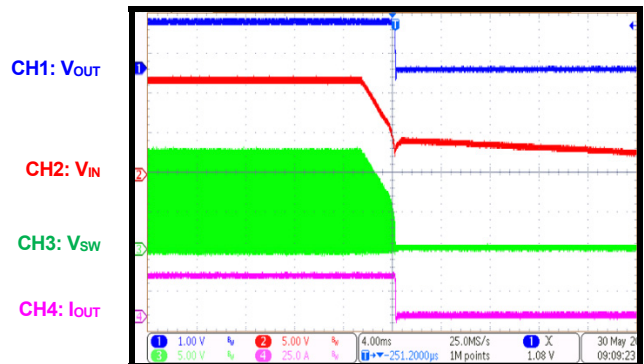
Load Transient Response Ripple

 $I_{OUT} = 0$ to $12.5A$, slew rate = $10A/\mu s$


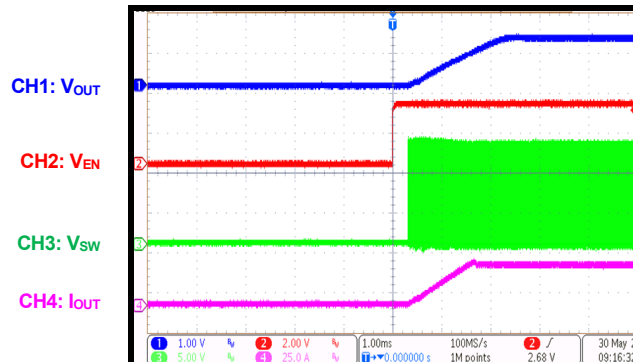
Start-Up through VIN

 $I_{OUT} = 25A$


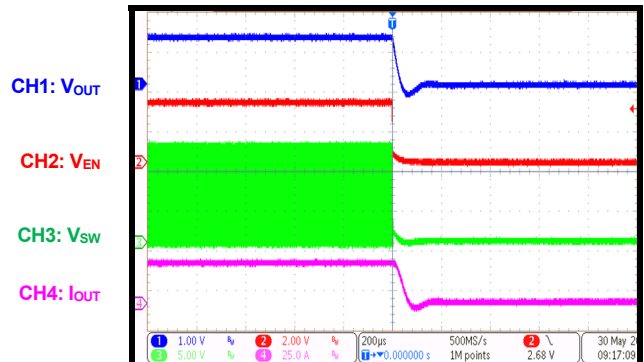
Shutdown through VIN

 $I_{OUT} = 25A$


Start-Up through EN

 $I_{OUT} = 25A$


Shutdown through EN

 $I_{OUT} = 25A$


REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	11/3/2023	Initial Release	-

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