EVM3695-25-RF-03B

16V, 40A, Scalable DC/DC Power Module Demo

The Future of Analog IC Technology

NOT RECOMMENDED FOR NEW DESIGNS, REFER TO EVM3695-20-PJ-00A

DESCRIPTION

EVM3695-25-RF-03B is a high efficiency, high power density 40A synchronous step-down power converter, featuring MPM3696-25 in parallel. The input range is from 4.5V to 16V. Providing the external 3.3V supply to VCC pin can extend the operation range from 3V to 16V. The output voltage is adjustable from 0.5V to 5.5V, with default at 1.8V. The EVM3695-25-RF-03B can output up to 40A continuously/50A peak load current.

The EVM3695-25-RF-03B has two MPM3695-25 on the board. MPM3695-25 is a scalable, 16V, 20A step-down power modules with PMBus interface. It adopts MPS's proprietary multi-phase constant-on-time (MCOT) control structure which can provide ultra-fast transient responses, and simple loop compensation. The integrated PMBus interface provides flexible power management functions, including setting output voltage, switching frequency, fault management, timing control, and provide telemetry read back. For more details, please check MPM3695-25 datasheet.

The EVM3695-25-RF-03B size is 85mm x 90mm. The total solution resides in a 15mm x 21mm area, top and bottom side. The board also provides on-board load transient circuit and SMA connector, to easily measure the voltage ripple and load transient performances.

To fully explore the digital functions of the board, the EVKT-USBI2C-02 and the Virtual Bench Pro 3.0 GUI is needed. Please contact MPS for more information.

Get EVKT-3695-25-RF-03B

#	Part Number	Item	Qty	Required
1	EVM3695-25-RF-03B*	MPM3695-25 Demo board	1	√
2	EVKT-USBI2C-02*	USB to PMBus Dongle	1	√**
3	MPM3695GRF-25-2222	2pcs Power Module	2	√

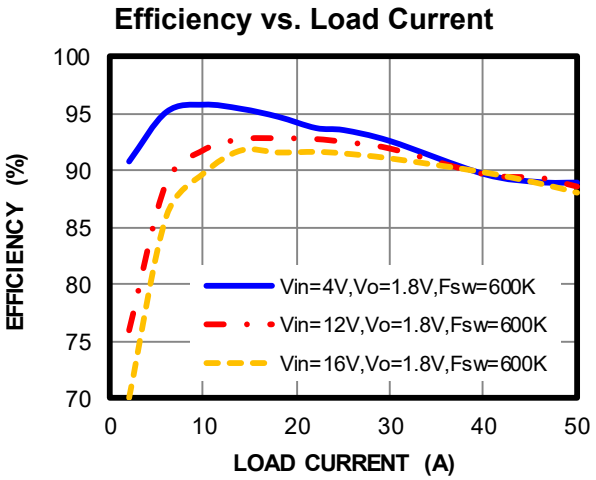
*Datasheet is available. Please contact MPS

**Only required if the customer does not have these MPS USB Dongle.

EVM3695-25-RF-03B DEMO BOARD

(L × W) 85mm × 90mm

Board Number	MPS IC Number
EVM3695-25-RF-03B	MPM3695GRF-25-2222

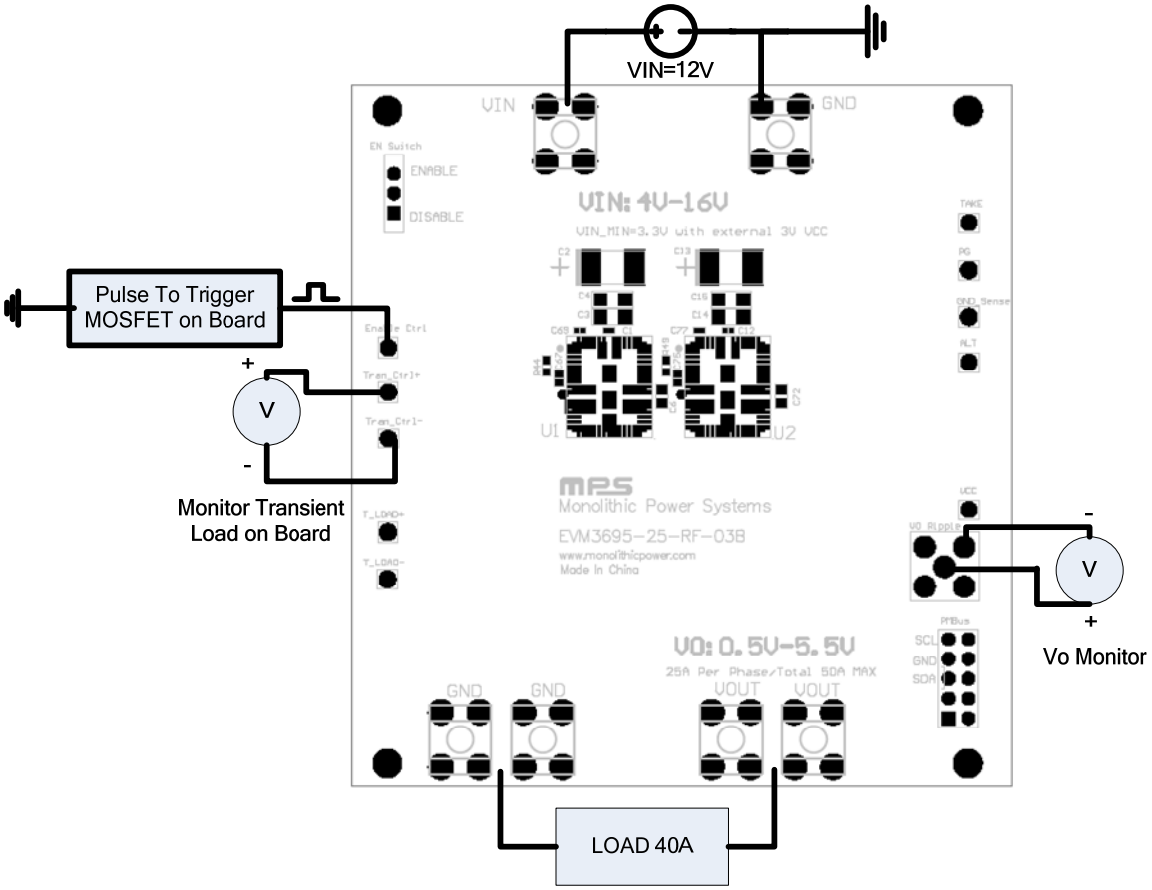


PERFORMANCE SUMMARY

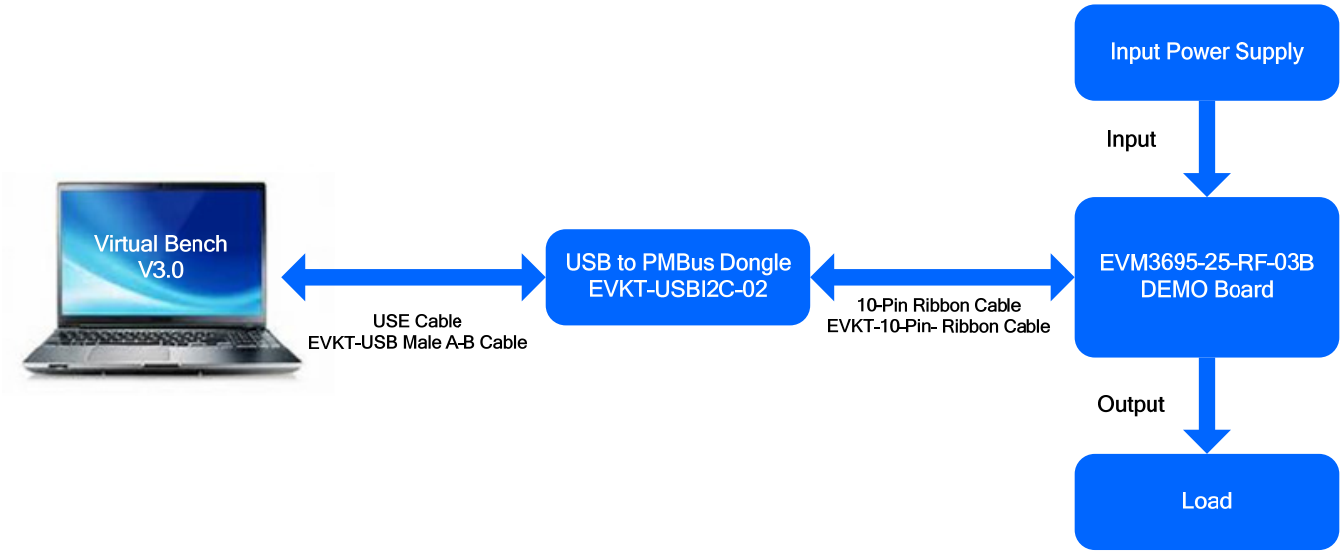
PARAMETER	CONDITIONS	VALUE
Input Voltage Range	No external VCC	4V to 16V
	With external 3.3V VCC	3V to 16V
Output Voltage Range	VIN=4V to 16V	Default: 1.8V
Maximum Output Current	VIN=4V to 16V, VOUT=0.5V to 3.3V	50A Peak
Typical Efficiency	VIN=12V, VOUT=1.8V, IOUT=40A	89.70%
Peak Efficiency	VIN=12V, VOUT=1.8V, IOUT=20A	92.50%
Default SW Frequency	Pre-Rail	600kHz

QUICK START

1. Connect the positive and negative terminals of the load to the VOUT and GND pins.
2. Preset the power supply output between 4V and 16V, and then turn off the power supply.
3. Connect the positive and negative terminals of the power supply to the VIN and GND pins.
4. Turn the power supply on. The board will automatically start up.

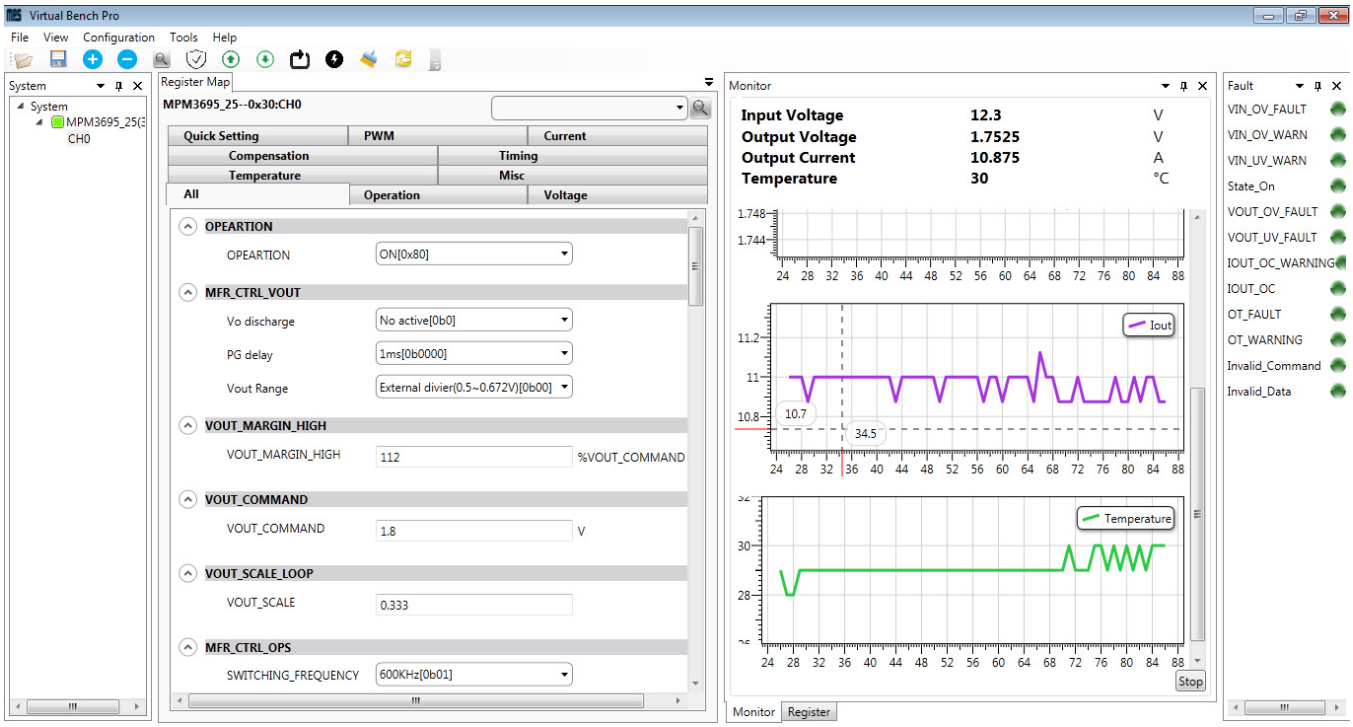


USE VIRTUAL BENCH PRO 3.0 TO EVALUATE DEMO



1. Connect PMBus wires to EVB and click the ‘Virtual Bench Pro.exe’, GUI will auto scan deceive:
2. When the part is found, the PN will be shown. The GUI allow user modify the internal parameters; please refer to the register details in IC datasheet.

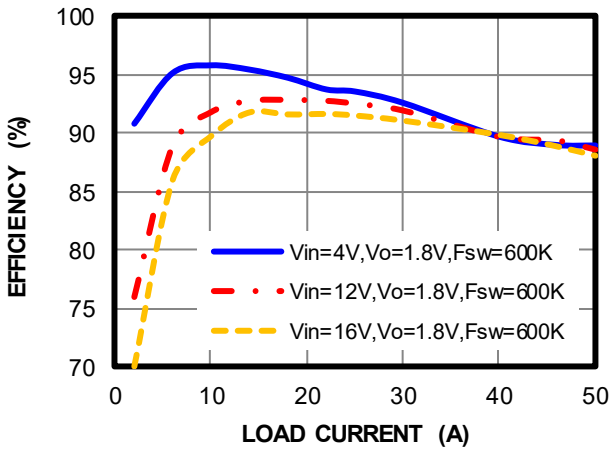
   On the right side, user can read the VOUT, IOUT, Temperature and other parameters.



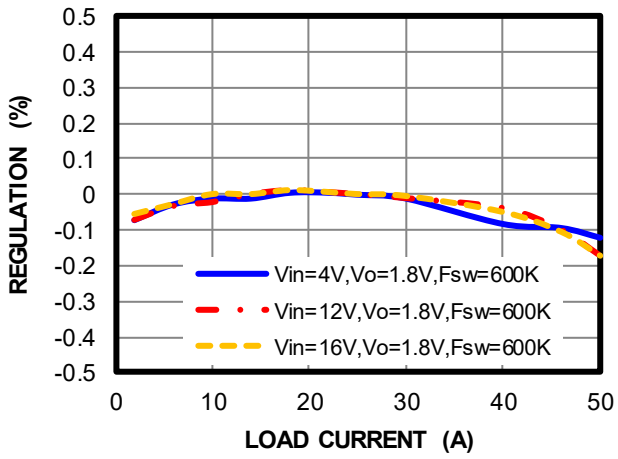
EVB TEST RESULTS

V_{IN} = 12V, V_{OUT} = 1.8V, T_A = 25ºC, unless otherwise noted.

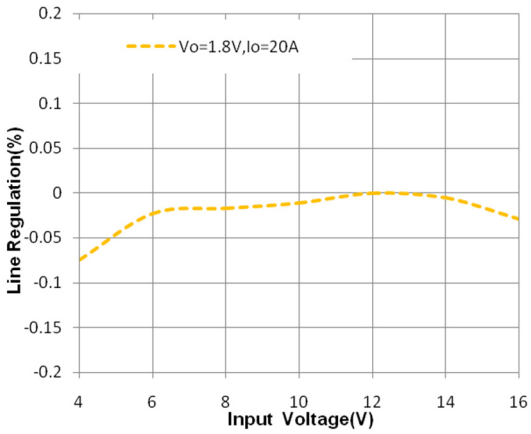
Efficiency vs. Load Current



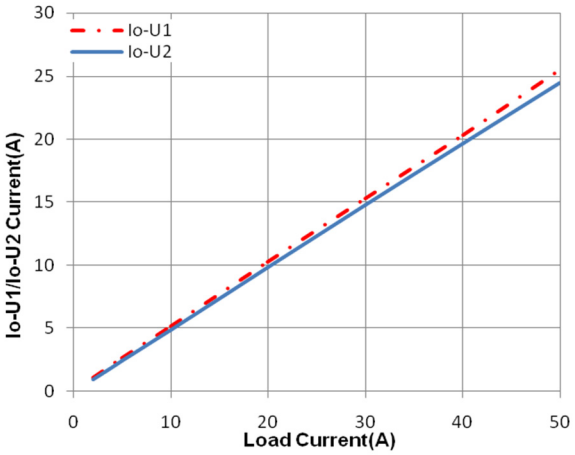
Regulation vs. Load Current



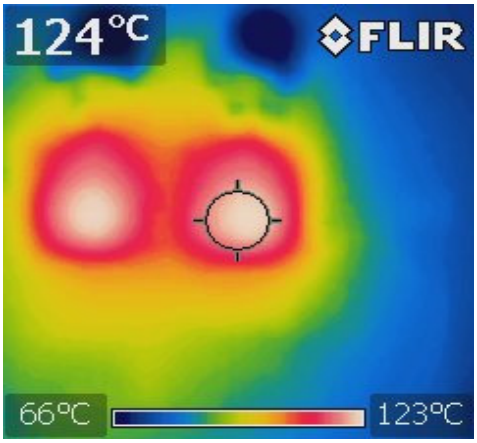
Input Voltage vs. Line Regulation



Current Sharing



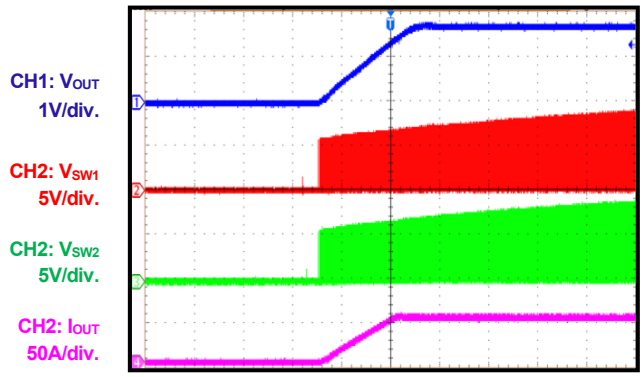
V_{IN} = 12V, V_{OUT} = 1.8V, Io=40A, T_A = 25ºC



EVB TEST RESULTS *(Continued)*

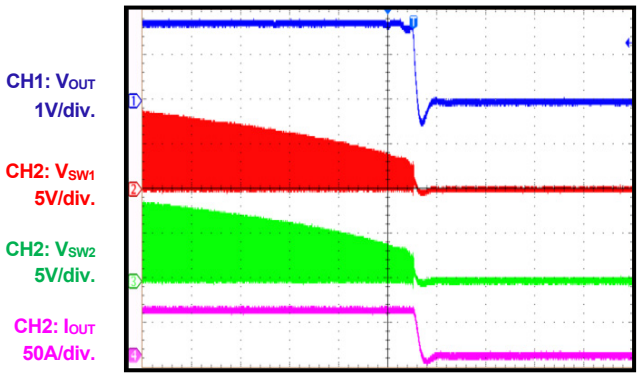
V_{IN} = 12V, V_{OUT} = 1.8V, T_A = 25ºC, unless otherwise noted.

VIN Start Up, Io=50A



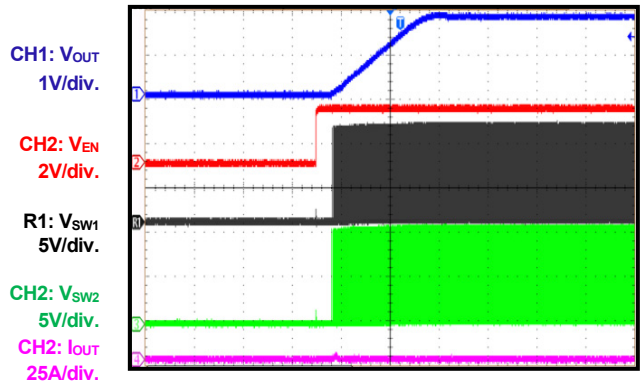
1ms/div.

VIN Shutdown, Io=50A



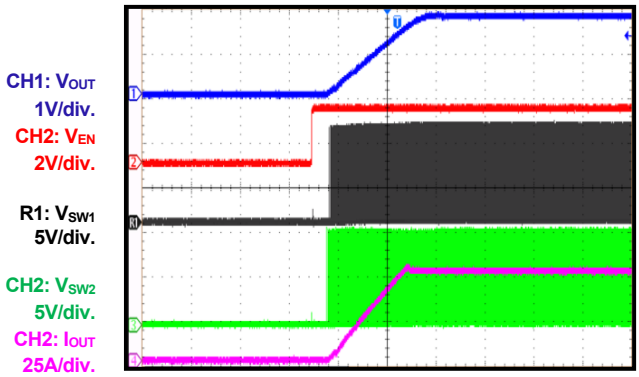
400µs/div.

EN Start Up, Io=0A



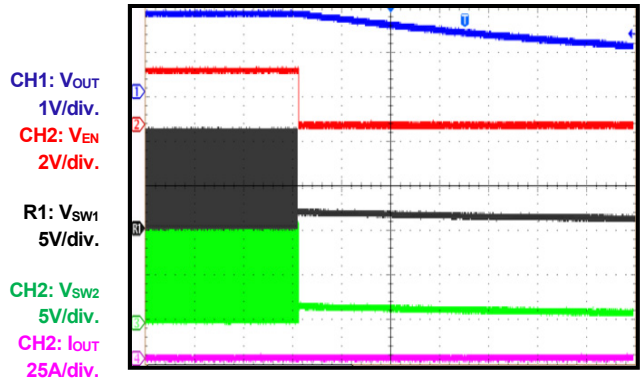
1ms/div.

EN Start Up, Io=50A



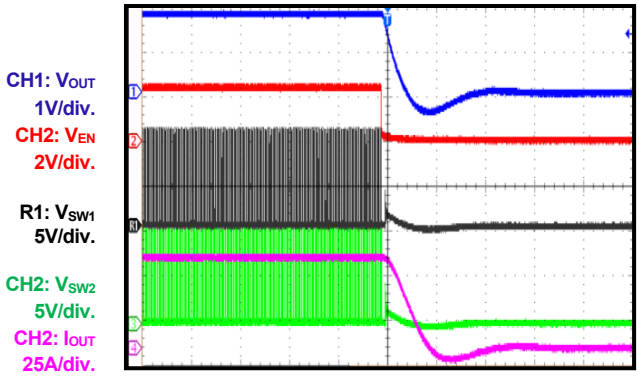
1ms/div.

EN Shutdown, Io=0A



200ms/div.

EN Shutdown, Io=50A

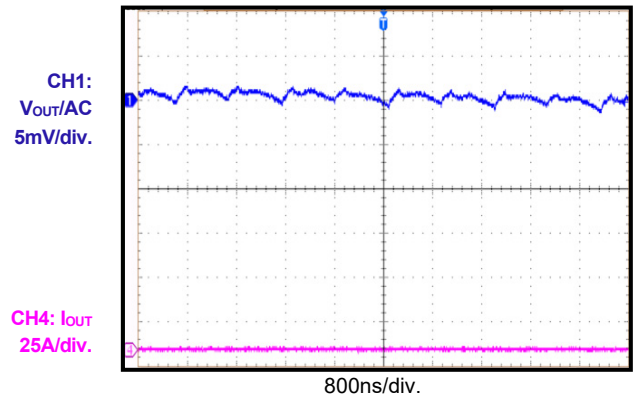


80µs/div.

EVB TEST RESULTS *(Continued)*

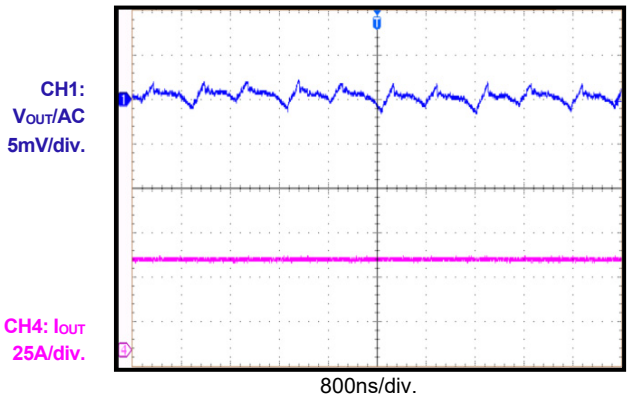
V_{IN} = 12V, V_{OUT} = 1.8V, T_A = 25ºC, unless otherwise noted.

VOUT Ripple@VIN=12V, IO=0A



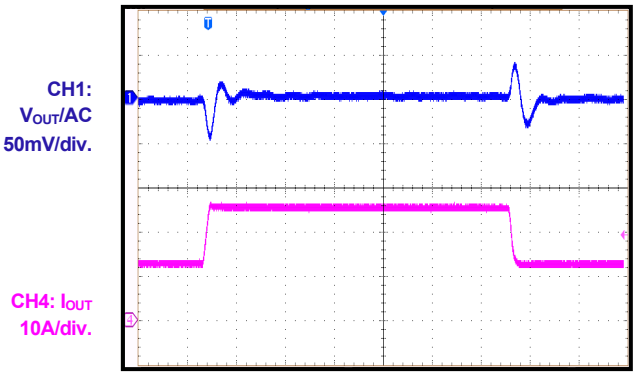
800ns/div.

VOUT Ripple@VIN=12V, IO=50A



800ns/div.

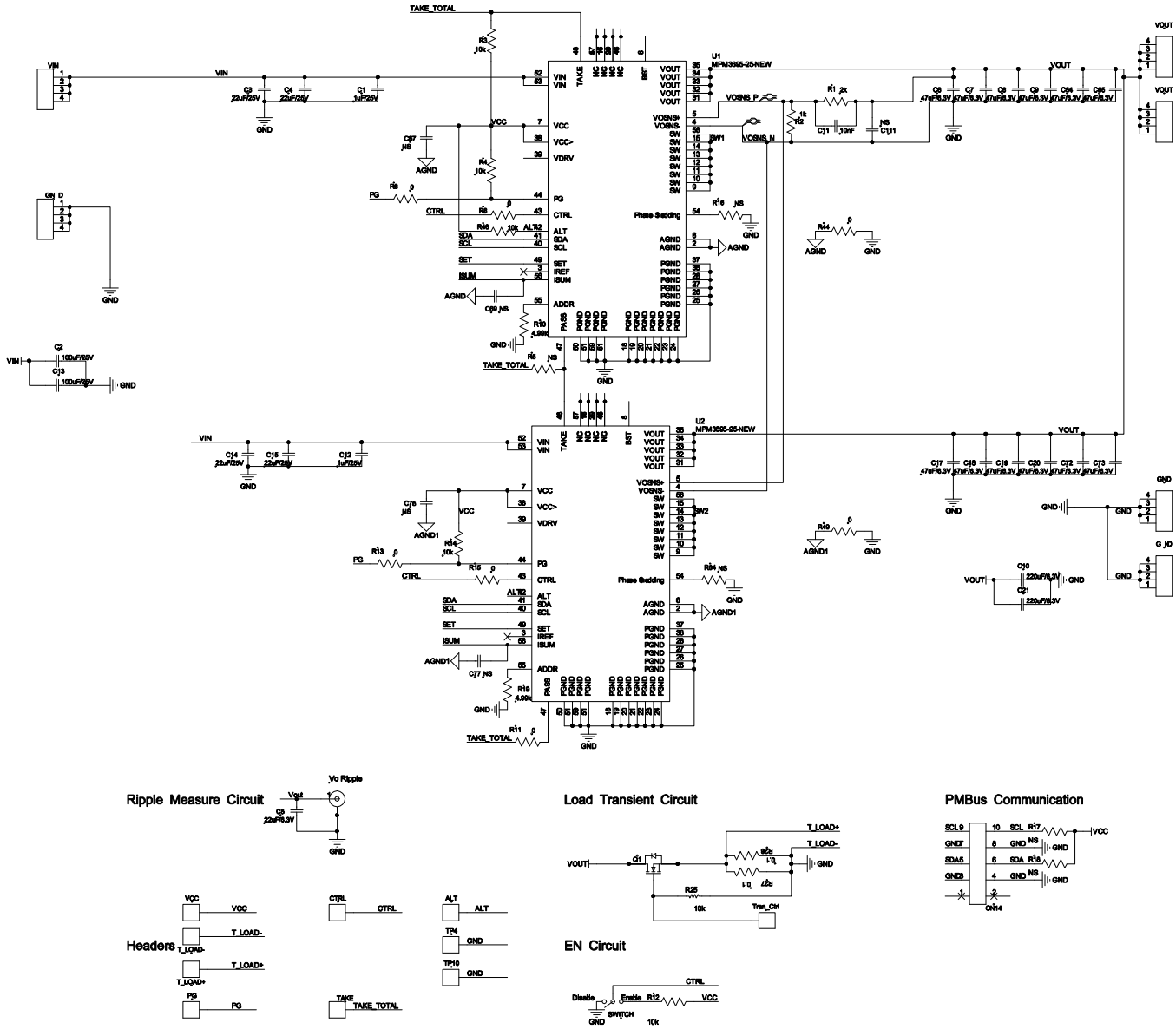
Load Transient @ 25%-50%,2.5A/us



80µs/div.

NOT RECOMMENDED FOR NEW DESIGNS, REFER TO EVM3695-20-PJ-00A

EVM3695-25-RF-03B SCHEMATIC



EVM3695-25-RF-03B POWER BOM

Qty	RefDes	Value	Description	Package	Manufacturer	Manufactuer_P/N
4	C3, C4, C14, C15	22μF	Ceramic Cap., 25V,X7R	1206	Murata	GRM31CR61E226KE15L
2	C1, C12	1μF	Ceramic Cap., 25V,X5R	0402	Murata	GRM155R61E105KA12D
1	C11	10nF	Ceramic Cap., 25V,X7R	0603	WE	885012206065
13	C5, C6, C7, C8, C9, C17, C18, C19, C20, C64, C65, C72, C73	47μF	Ceramic Cap., 10V,X5R	0805	Murata	GRM21BR61A476ME15L
2	C10, C21	220μF	Tantalum cap., 6.3V	D2	Panasonic	EEFCX0J221R
2	C2, C13	100μF	100μF/35V	SMD	NIPPON CHEMI-CON	EMZJ350ADA101MF80G
6	R3, R4, R12, R14, R25, R46	10K	Film Res, 1%,0603,10K	0603	YAGEO	RC0603FR-0710KL
2	R10, R19	4K99	Film Res, 1%,0603,4K99	0603	YAGEO	RC0603FR-074K99L
7	R6, R8, R11, R13, R15, R44, R49	0R	Film Res, 1%,0603,0R	0603	YAGEO	RC0603FR-070RL
1	R1	2k	Film Res, 1%,0603,2K	0603	YAGEO	RC0603FR-072KL
1	R2	1k	Film Res, 1%,0603,1K	0603	YAGEO	RC0603FR-071KL
2	U1, U2	MPM3695-25	20A power module	QFN	MPS	MPM3695GRF-25-2222

EVM3695-25-RF-03B OPTIONAL AND TERMINALS

Qty	RefDes	Value	Description	Package	Manufacturer	Manufactuer_P/N
9	ALT	φ1.0	φ1.0 copper pin	DIP	N/A	φ1.0 copper pin
1	Vo Ripple	N/A	4pin	DIP	N/A	SMA connector
2	R27. R28	0R1	Film Res,1%,2512,OR1	2512	YAGEO	RC2512FR-070R1L
1	Q1	N-MOS	Mosfet,VDS=30V, IDS=24A,Rds=4.9mOhm	SOIC-8PP	AnalogPower	AM7432N
1	PMBus	\	10pin connector	\	\	\
6	VIN,GND	\	\	\	Keystone	KEYSTONE7697-75
1	SWITCH	SWITCH	Tact Switch,push type,white actuator	SMD	WE	450301014042

PRINTED CIRCUIT BOARD LAYOUT

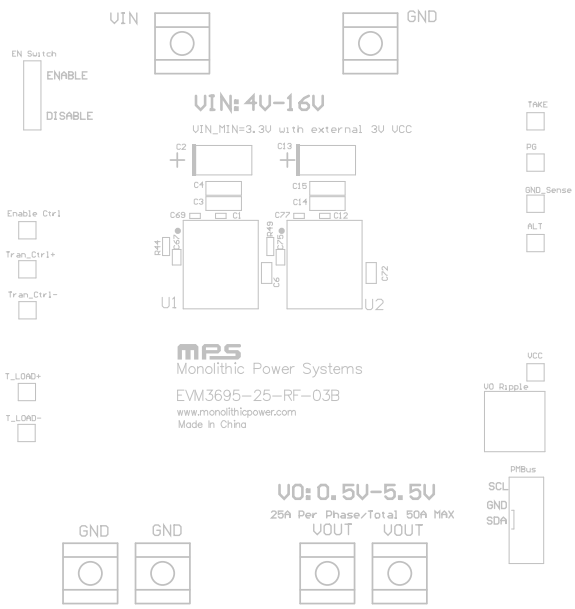


Figure 1: Top Silk Layer

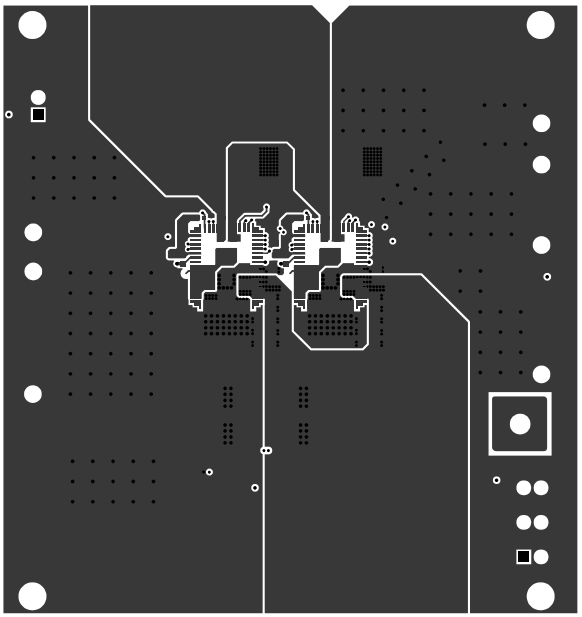


Figure 2: Top Layer

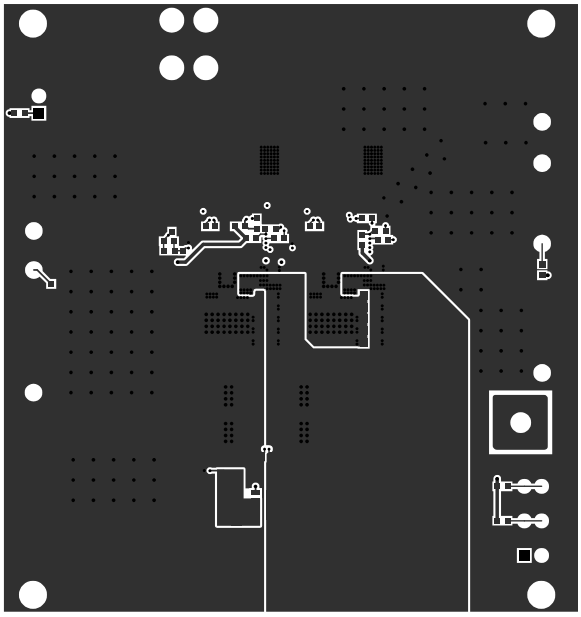


Figure 3: Bottom Layer

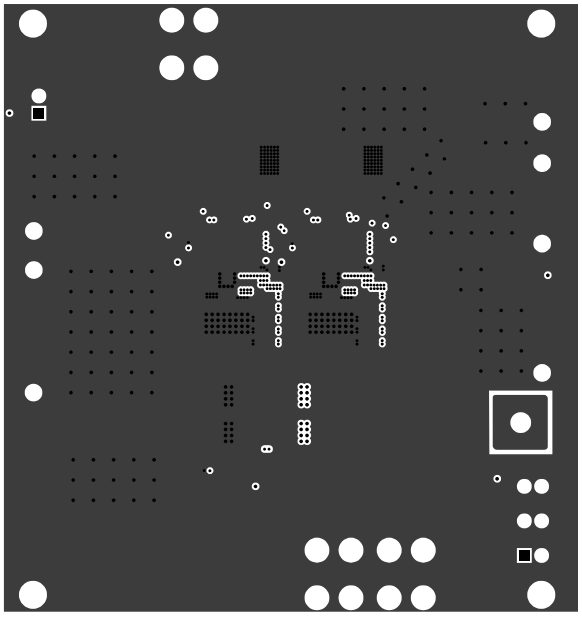


Figure 4: Inner 1 Layer

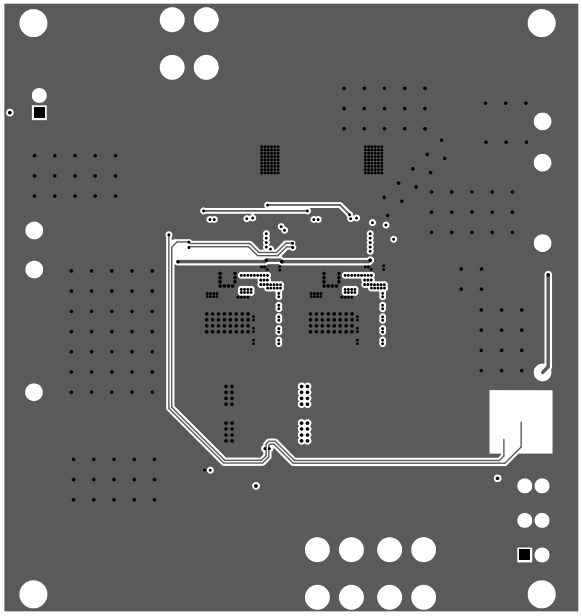


Figure 5: Inner 2 Layer

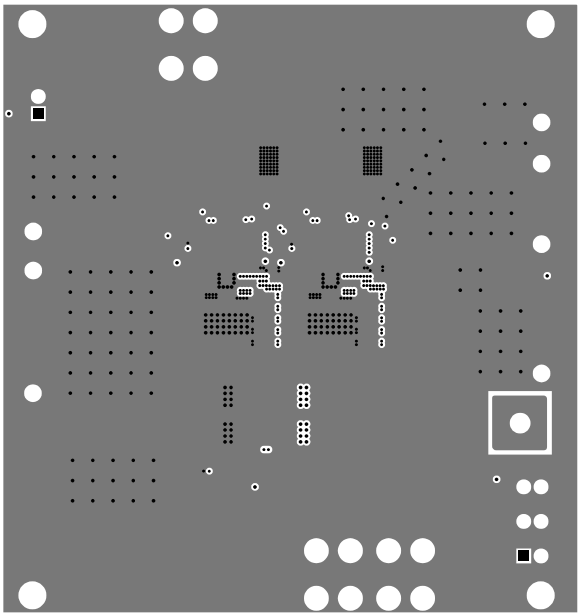


Figure 6: Inner 3 Layer

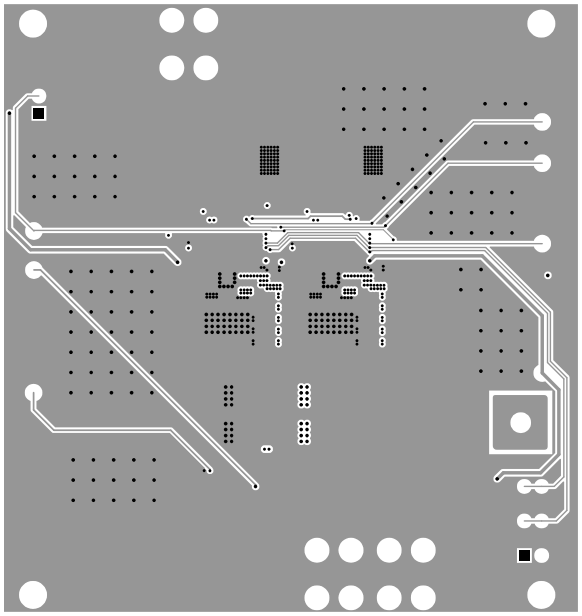


Figure 7: Inner 4 Layer