



The Future of Analog IC Technology®

# EV2905EK-00A

## 12A, 3~28V, 300kHz, Hysteretic Synchronous Step-Down Controller Evaluation Board

### DESCRIPTION

The EV2905EK-00A is the evaluation board for the MP2905EK, a hysteretic synchronous step-down controller. It offers a very compact solution to achieve 1.8V, 12A continuous output current over a wide operation input voltage. An adjustable soft-start prevents inrush current at turn-on.

Hysteretic voltage control can provide fast transient without any loop compensation. Full protection features include OCP, output OVP, thermal shut down.

The EV2905EK frequency is about 300kHz (12V input). The efficiency is up to 90% (12V input) with the supplied components.

### FEATURES

- 12A output current, 1.8V output voltage
- Programmable Soft-Start
- Hiccup current limit and thermal shut down

### APPLICATIONS

- Motherboard Power Supplies
- AGP and PCI-Express Power Supplies
- Graphic-Card Power Supplies
- Set-Top Boxes
- Point-of-Load Power Supplies

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### ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input Voltage	V <sub>IN</sub>	12 <sup>(1)</sup>	V
Output Voltage	V <sub>OUT</sub>	1.8	V
Hold Current	I <sub>OUT</sub>	12	A

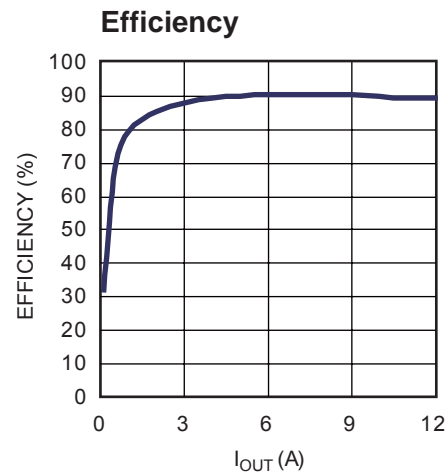
**Notes:** Circuit can work up to about 12A over a wide input voltage range. This EVB shows the performance at 12V input. So the frequency and current limit are designed for the 12V application.

### EV2905EK-00A EVALUATION BOARD

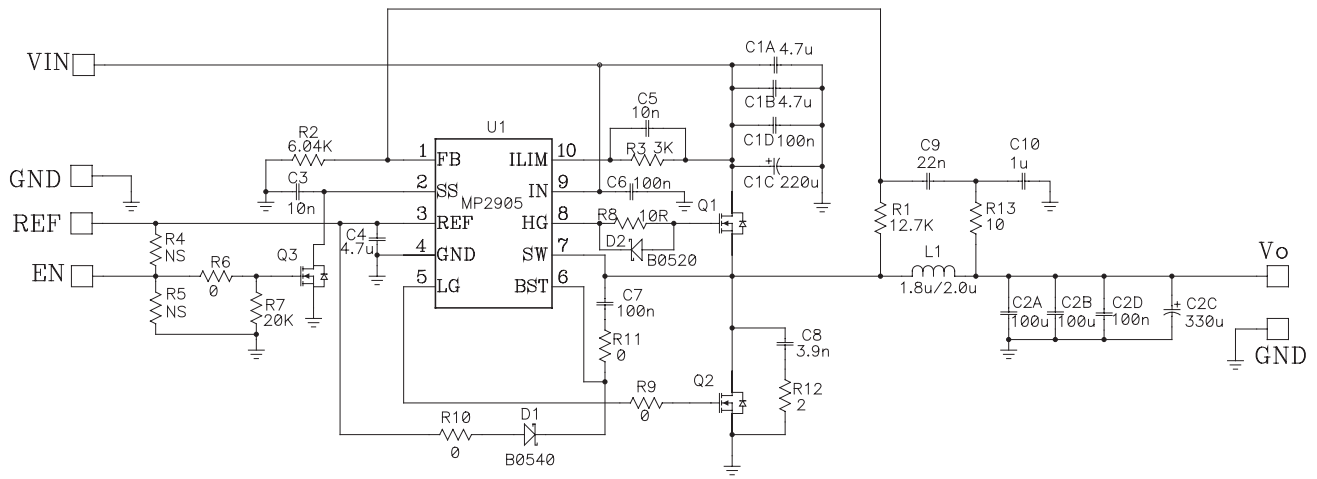


(L x W x H) 2.5" x 2.5" x 0.63"  
(6.3cm x 6.3cm x 1.6cm)

Board Number	MPS IC Number
EV2905EK-00A	MP2905EK



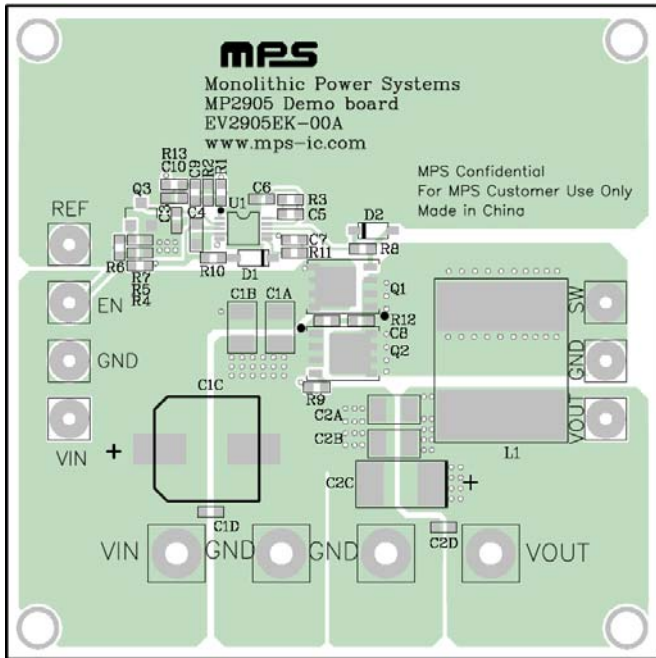
**EVALUATION BOARD SCHEMATIC**



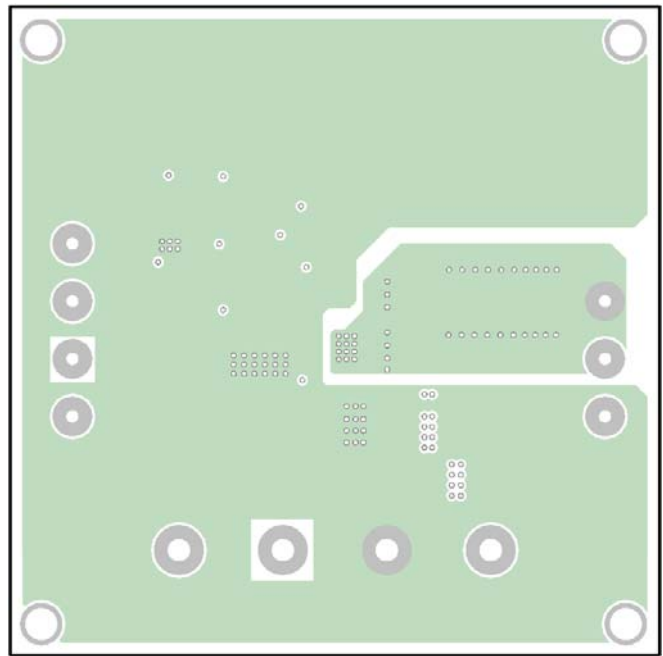
**EV2905EK-00A BILL OF MATERIALS**

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
2	C1A, C1B	4.7uF	Ceramic Cap, 50V,X7R	1210	Murata	GRM32ER71H475KA88L
4	C1D, C2D, C6, C7	100nF	Ceramic Cap, 50V,X7R	0603	Murata	GRM188R71H104KA93D
2	C2A, C2B	100uF	Ceramic Cap, 6.3V,X5R	1210	Murata	GRM32ER60J107ME20L
1	C1C	220uF	Electrolytic, 35V	ELC SMD	jiang hai	VTD-35V220
1	C2C	330uF	Poscap, 6.3V	Poscap	Sanyo	6TPE330MIL
2	C3,C5	10nF	Ceramic Cap, 50V,X7R	0603	Murata	GRM188R71H103KA01D
1	C4	4.7uF	Ceramic Cap, 16V,X5R	0805	Murata	GRM21BR61C475KA88L
1	C8	3.9nF	Ceramic Cap, 50V,X7R	0603	Murata	GRM188R71H392KA01D
1	C9	22nF	Ceramic Cap, 50V,X7R	0603	Murata	GRM188R71H223KA01D
1	C10	1uF	Ceramic Cap, 16V,X7R	0603	Murata	GRM188R71C105KA12D
1	R1	12.7K	Film Res,1%	0603	Yageo	RC0603FR-0712K7L
1	R2	6.04K	Film Res,1%	0603	Yageo	RC0603FR-076K04L
1	R3	3K	Film Res,1%	0603	Yageo	RC0603FR-073KL
3	R4, R5	NS		0603		
1	R7	20K	Film Res,5%	0603	Any	
2	R8, R13	10	Film Res,1%	0603	Yageo	RC0603FR-0710RL
3	R6, R9, R10, R11	0	Film Res,5%	0603	Any	
1	R12	2	Film Res,5%	0603	Any	
1	Q1		Si7112DN, 30V, 17A, 8.2mΩ@4.5Vgs	PowerPAK 1212-8	Vishay	Si7112DN-T1-E3
1	Q2		Si7658ADP, 30V,36A, 2.8mΩ@4.5Vgs	PowerPAK SO-8	Vishay	Si7658ADP-T1-GE3
1	Q3		2N7002 (60V, 115mA)	SOT-23	Diodes	2N7002(60V,115mA)
1	D1		B0540W 40V,0.5A	SOD-123	Diodes	B0540W
1	D2		B0520LW-7-F 20V, 0.5A	SOD-123	Diodes	B0520LW-7-F
1	L1	1.5uH	Inductor, Isat=24A, DCR=2.8mΩ	SMT	Toko	FDU1250C-1R5M
1	U1		MP2905	MSOP10	MPS	MP2905EK

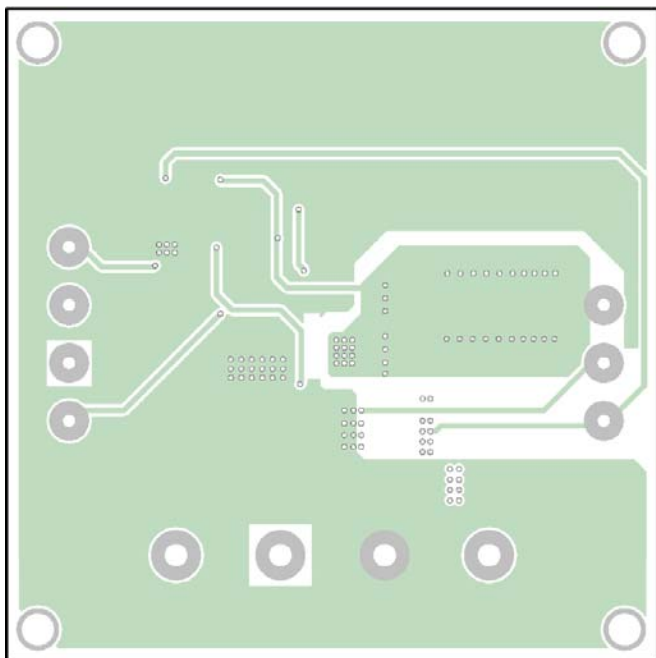
**PRINTED CIRCUIT BOARD LAYOUT**



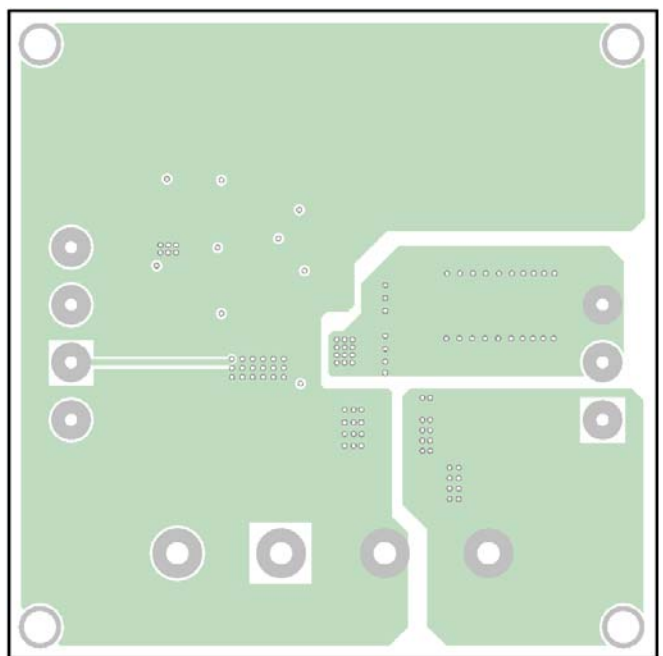
**Figure 1—Top Layer**



**Figure 2—IN1 Layer**



**Figure 3—IN2 Layer**



**Figure 4—Bottom Layer**

## QUICK START GUIDE

1. Connect the positive terminal of the load to VOUT pin, and the negative terminal of the load to GND pin.
2. Preset the power supply output to 12V and turn off the power supply.
3. Connect the positive terminal of the power supply output to the VIN pin and the negative terminal of the power supply output to the GND pin.
4. Turn the power supply on. The MP2905EK will automatically startup.
5. To use the Enable function, apply an input to EN pin. Drive EN higher than 3V to turn on the MOS Q3, then SS is pulled down, part shuts down. Drive EN less than 0.5V to turn off the MOS Q3, then SS is released, part turns on. And at no load condition, a dummy load which is less than 10kΩ is needed at output terminal to consume the BST leakage current.
6. The output voltage VOUT can be programmed by R1 and R2. Calculate the new value using the formula:

$$R1 = R2 * \left( \frac{V_{out} + 0.01V + (R_{DC} \times 0.5 \times I_{LOAD})}{V_{FB}} - 1 \right)$$

Where  $V_{FB}=0.59V$ ,  $R_{DC}$  is the DC resistance of the output inductor,  $I_{LOAD}$  is the full load current. R2 is for approximately 50uA to 150uA bias current in the resistor-divider. And the frequency will be influenced by R1 and R2 value. So please refer to DS to set the frequency.

7. The EV board is designed for 12V input. So, for other input voltage, some parameters such as current limit and frequency need to be redesigned. Please refer to DS to set related parameters.

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