



# MIC4102 Evaluation Board

## MIC4102 Gate Driver Evaluation Board

### General Description

This evaluation board provides a platform for evaluating the MIC4102 Power MOSFET driver. The MIC4102 is a high voltage synchronous gate driver controlled by a single input signal and is housed in an SOIC-8L package. The MIC4102 operates from VDD of 6 to 16 V while the switch and high side node operates up to 118V. The Driver can be used in a variety of topologies. This evaluation board is configured as an open loop buck converter operating in continuous conduction mode (CCM) or discontinuous conduction mode (DCM). The duty cycle D is determined by the input PWM signal. The internal circuitry of the MIC4102 generates delays between transitions to prevent shoot-through currents.

The MIC4102 bias supply VDD is separate from the power stage Vin. The high side driver is powered by an external bootstrap capacitor CB and an internal bootstrap diode. No external bootstrap diode is required. The CB cap is charged by VDD during when the low side MOSFET is on.

### Specifications (evaluation board only)

- Recommended operating input voltage Vin ....12-90V
- Recommended operating input VDD.....12V
- Recommended operating frequency...200khz-500khz
- Maximum input Vin Voltage.....90V
- Maximum input VDD voltage.....16V

### Requirements

The MIC4102 evaluation board requires an input voltage for VDD and a Vin voltage for the power stage. The output may be loaded with a resistive or and active load. The active load can be set for constant current or constant resistance.

### Precautions

Although the 4102 can operate up to 118V this evaluation board was designed with parts rated at 100V maximum. Operation of the evaluation board less than 90Vin is recommended. These limitations are for the evaluation board only and not for the Mic4102. The output voltage is dependent on the duty cycle of the PWM and the input voltage.  $V_{out} = V_{in}(T_{on}/T)$  (CCM only). T is the period of the input PWM pulse and the on time is when the high side FET Q1 is on and the off time is when the low side FET Q2 is on.

The operating conditions need to be within limits to keep the inductor L1 from saturating. It is important to keep  $I_{L\_pk}$  below  $I_{sat}$

$$I_{L\_pk} = I_{out} + \frac{(V_{in} - V_{out})DT}{2L} < I_{sat} \quad \text{For CCM}$$

$$I_{L\_pk} = \frac{(V_{in} - V_{out})DT}{L} < I_{sat} \quad \text{For DCM}$$

Where;  $D=T_{on}/T$ ,  $T=1/F$ ,  $L=L1$ ,  $I_{sat}$  is the saturating current of L1.

Table 1 lists a set of safe operating parameters. Additional power FETs may be installed on the back for higher voltages.

### Ordering Information

Part Number	Description
MIC4102YM-EV	MIC4102 Gate Driver Evaluation Board

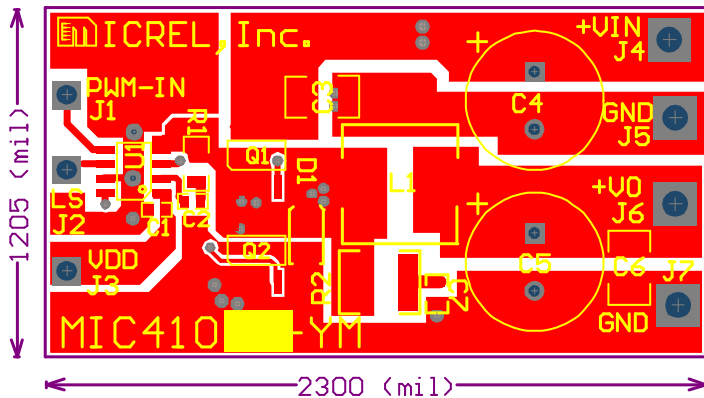
**Some safe operating conditions**

V <sub>IN</sub> (V)	V <sub>OUT</sub> (V)	Freq (hz)	I <sub>OUT</sub> (A)	I <sub>IN</sub> (A)(ave)	Duty	Mode	IL_pk	IL_sat
12	3.3	100k	2.0 A	0.55	.29%	CCM	3.3 A	4.4A
12	3.3	200k	2.0 A	0.55	.29%	CCM	2.6 A	4.4A
12	3.3	400k	2.0 A	0.55	.29%	CCM	2.3 A	4.4A
24	5	100k	2.0 A	0.42	.22%	CCM	3.0 A	4.4A
24	5	200k	2.0 A	0.42	.22%	CCM	4.1 A	4.4A
24	5	400k	2.0 A	0.42	.22%	CCM	4.1 A	2.5A
48	12	300k	2.0 A	0.56	.26%	CCM	3.6 A	4.4A
48	12	400k	2.0 A	0.56	.26%	CCM	3.2 A	4.4A
48	12	500k	2.0 A	0.56	.26%	CCM	3	4.4A
48	24	300k	2.0 A	1	.56%	CCM	4.2 A	4.4A
48	24	400k	2.0 A	1	.56%	CCM	3.7 A	4.4A
48	24	500k	2.0 A	1	.56%	CCM	3.3 A	4.4A
60	12	300k	2.0 A	0.42	.21%	CCM	3.8 A	4.4A
60	12	400k	2.0 A	0.42	.21%	CCM	3.4 A	4.4A
60	12	500k	2.0 A	0.42	.21%	CCM	3.1 A	4.4A
80	12	400k	2.0 A	0.37	.12%	CCM	3.4 A	4.4A
90	12	400k	2.0 A	0.33	.15%	CCM	3.4 A	4.4A

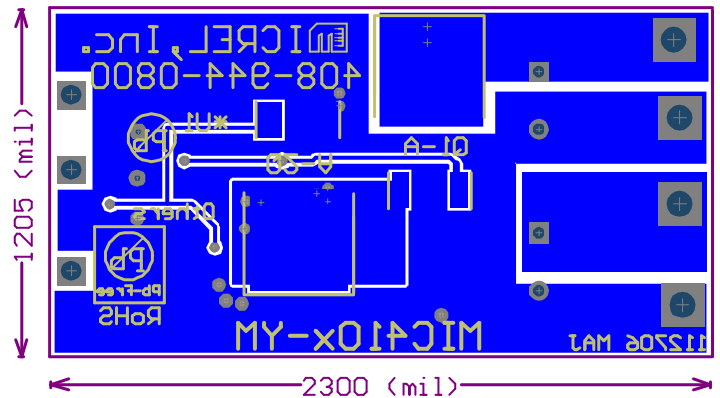
L is 10uh, Sumida # CDRH104R-100

**Table 1. Set of safe operating parameters**

**PCB Layout**



**Top**



**Bottom**

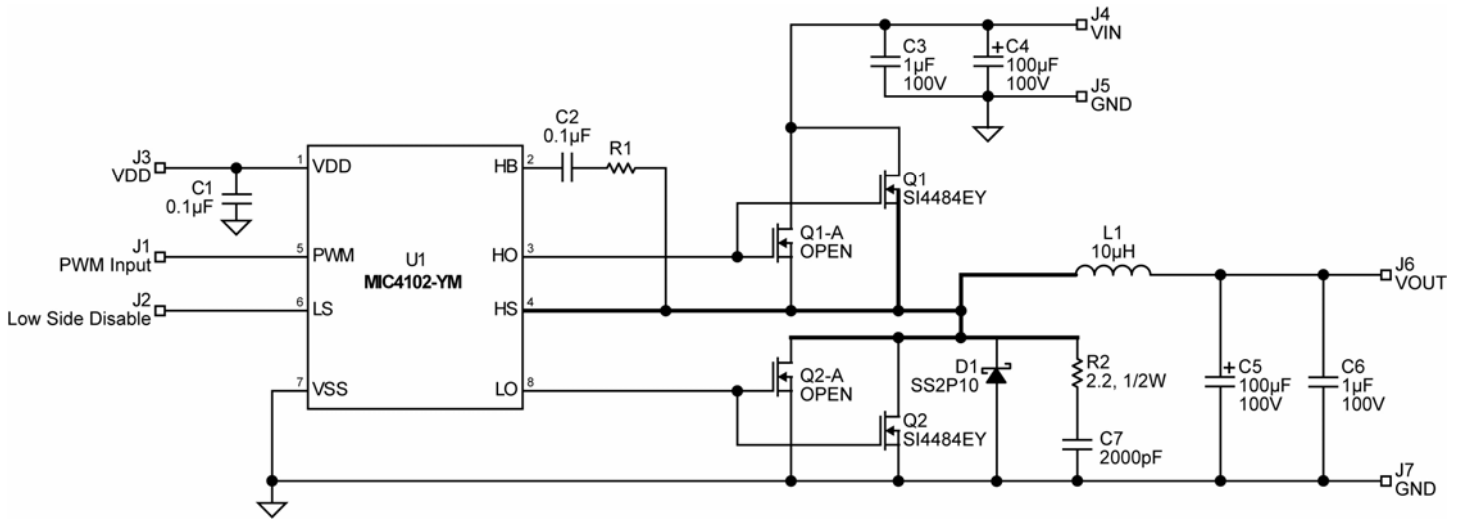


Figure1. Schematic Diagram

**Bill of Materials**

Item	Part Number	Manufacturer	Description	Qty.
U1	MIC4102YM	Micrel.Inc	Buck controller	1
Q1,Q2	Si4484EY	Vishay/Siliconix	100V N-channel MOSFET	2
Q1A,Q2A		Vishay/Siliconix	open location for D2PAK FETs	0
C1, C2	VJ0603Y104KXXAT	Vishay BC	0.1uf/50V, X7R ceramic cap 0603 size	2
C3,C6	GRM31CR72A105KA01L	muRata	1uF, 100V, ceramic, X7R,1206	2
C4,C5	EKA00DD310L00K	Vishay	100uF Cap, 100v Aluminium	2
	038RSU			OR
C7	VJ0805X222KXABT	Vishay	2200pf/100V,0805	1
D1	SS2PHH10-E3	Vishay General	2A,100V, High voltage Schottky Diode,	1
L1	CDRH104R-100	Sumida	10uH Inductor	1
J1-J9	2551-2-00-01-00-00-07-0	MilMax	Turret Pins	8

## Notes:

Micrel Semiconductor tel: 408-944-0800

Vishay Corp. tel: 206-452-5664

Diodes, Inc. tel: 805-446-4800

muRata tel: 800-831-9172

Sumida tel: 408-321-9660

AVX tel: 843-448-9411

TDK tel: 847-803-6100

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