EV4021DS-00A

85V~265Vac with PFC
8W@500mA Evaluation Board
Primary side control, Off-line WLED Driver

The Future of Analog IC Technology

PRELIMINARY SPECIFICATIONS SUBJECT TO CHANGE
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DESCRIPTION

The EV4021DS-00A Evaluation Board is designed to demonstrate the capabilities of MP4021. The MP4021 is a primary-side-control offline LED lighting controller which can achieve high power factor and accurate LED current for an isolate lighting application in a single stage converter. It works in boundary conduction mode for reducing the MOSFET and Diode switching losses.

The EV4021DS-00A can supply 8W output power with $16V_{TYP}$, 500mA LED load at universal input (85V~265V, 50/60Hz).

The EV4021DS-00A has an excellent efficiency and meets IEC61000-3-2 Class C harmonics, EN55015B conducted EMI. It has multi-protection function as over-voltage protection, short-circuit protection, cycle by cycle current limit, etc.

FEATURES

- Low BOM cost with primary side control
- High current accuracy of line regulation
- High Power Factor
- High Efficiency with boundary conduction mode operation
- Input UVLO
- Cycle by cycle current limit
- Over-voltage Protection
- Short-circuit Protection
- Over-temperature Protection

APPLICATIONS

- Solid State Lighting
- Industrial and Commercial Lighting
- Residential Lighting

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input voltage	V_{IN}	85 ~ 265	V
Output voltage	V_O	16	V
Output current	I_O	500	mA
Output power	P_O	8	W
Efficiency (full load)	η	82	%
Power factor		0.9	

EV4021DS-00A EVALUATION BOARD

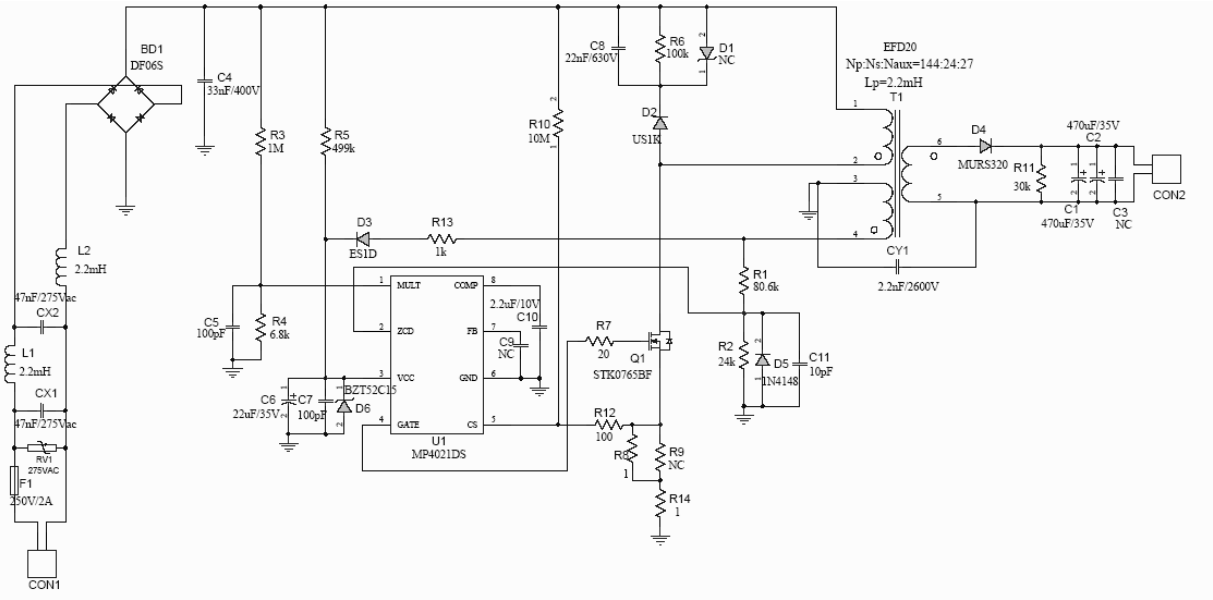
TBD

TBD

(L x W x H) 63cm x 37cm x cm

Board Number	MPS IC Number
EV4021DS-00A	MP4021DS

EVALUATION BOARD SCHEMATIC



EV4021DS-00A BILL OF MATERIALS

Qty	Designator	Value	Description	Package	Manufacture	Manufacture PN
1	BD1	DF06S	DIODE/BRIDGE/DF02S/B	SMD	Vishay	
2	C1, C2	470μF/35V	Electrolytic Capacitor;35V;Electrolytic	DIP	Rubycon	ECQV1J474JM
1	C3	NC				
1	C4	33nF/400V	CBB,400V	DIP	Panasonic	
1	C5	100pF	Ceramic Cap,50V,X7R	0603	LION	0603B10K500T
1	C6	22μF/50V	Electrolytic Capacitor;50V;Electrolytic	DIP	Jianghai	
1	C7	100pF	Ceramic Cap,50V,X7R	0603	LION	0603B10K500T
1	C8	22nF/630V	Ceramic Cap, 630V,JB	TDK	C3216JB2J223K	
1	C9	NC				
1	C10	2.2μF/10V	Ceramic Capacitor;10V;X7R;0805	0805	LION	C1608X7R1H102K
1	C11	10pF	Ceramic Cap,50V,X7R	0603	LION	0603N100J500T
2	CX1,CX2	47nF	Film Capacitor, X2,275V	DIP	carli	
1	CY	2.2nF/2600V	Y Capacitor,2600V	DIP	Hongke	JN09F222ML72N
1	D1	NC				
1	D2	US1K-E3	Diode, 1A,800V	SMA	Vishay	US1K-E3/61T
1	D3	ES1D	Diode, 1A,200V	SMA	Premier	ES1D
1	D4	MURS320T3	Diode,3A,200V	SMC		MURS320T3
1	D5	1N4148W	DIODES/SOD-123	SOD-123	Diodes	1N4148W
1	D6	BZT52C15	DIODES/SOD-123	SOD-123	Diodes	BZT52C15
1	F1	250V/2A	SS-5-2A	DIP		
1	L1	Inductor, 2.2mH	Inductor,2.2mH	DIP		
1	Q1	STK0765BF	MOSFET,650V	TO-220	AUK	STK0765BF
1	R1	80.6k	Film RES, 1%	0603	Yageo	RC0603FR-0780K6L
1	R2	24K	Film RES, 1%	0603	Yageo	RC0603FR-0724L
1	R3	1M	Film RES, 1%	1206	Panasonic	ERJ8EF1004V
1	R4	6.8k	Film RES, 1%	0603	Yageo	RC0603FR-076K8L
1	R5	499k	Film RES, 1%	0603	Yageo	RC0603FR-0720RL
1	R6	100K	Film RES, 5%	1206	Yageo	RM12JTN104

EV4021DS-00A BILL OF MATERIALS *(continued)*

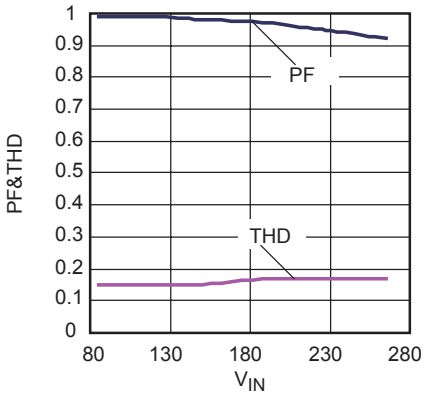
Qty	Designator	Value	Description	Package	Manufacture	Manufacture PN
1	R7	20	Film RES, 1%	0603	Yageo	RC0603FR-07560KL
2	R8,R14	1	Film RES,1%	1206	Royalohm	1206100KT5E
1	R9	NC				
1	R10	10M	Film RES,1%	1206	Royalohm	12061005T5E
1	R11	30k	Film RES,1%	1206	Royalohm	12063002T6E
1	R12	100	Film RES,1%	0603	Yageo	RC0603FR-07100RL
1	R13	1k	Film RES,1%	1206	Royalohm	12061001T5E
1	RV1	NC				
1	T1	EFD20	EFD20			
1	U1	MP4021 DS_R2	MP4021DS	SOIC8	MPS	

EVB TEST RESULTS

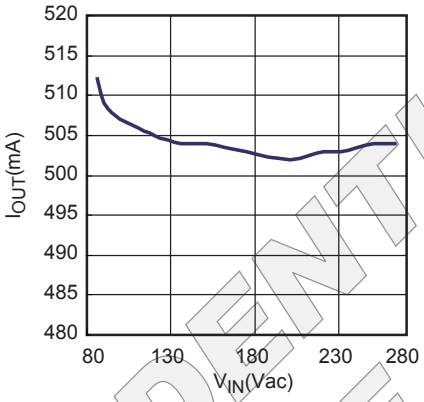
Performance waveforms are tested on the evaluation board.

5 LEDs in series, I_O=500mA, V_O=16V, Lm=2.2mH, Np:Ns:Naux =144:24:24

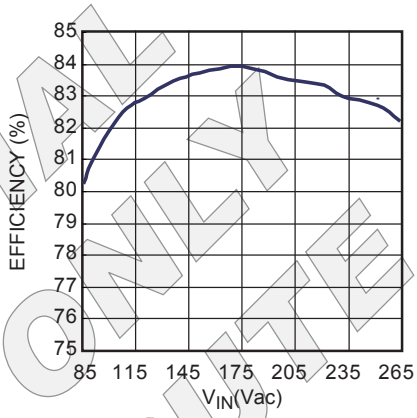
PF&THD vs. VIN



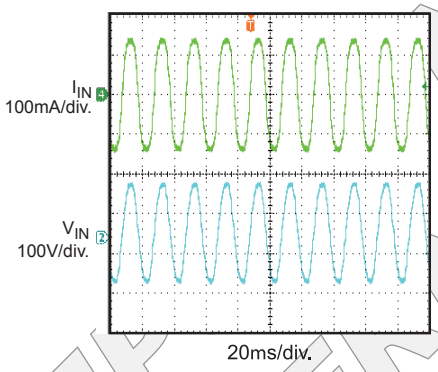
Line regulation



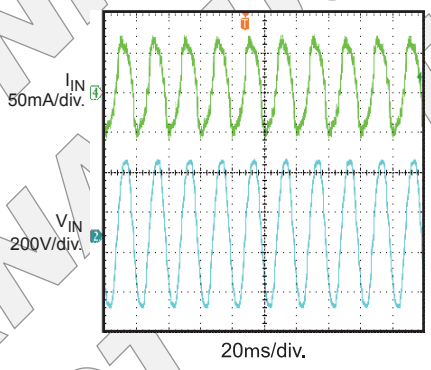
Efficiency vs. VIN



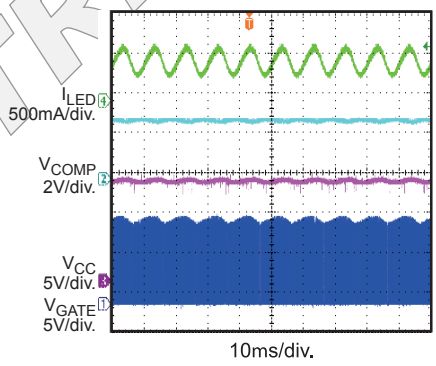
Input voltage and current
V_{IN}=110V, full load



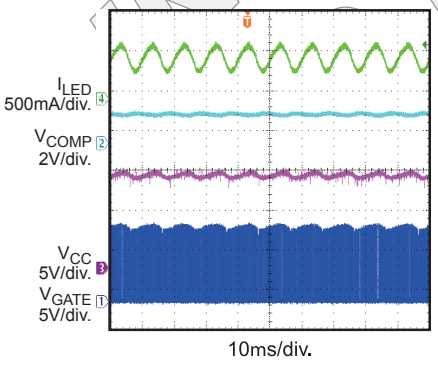
Input voltage and current
V_{IN}=220V, full load



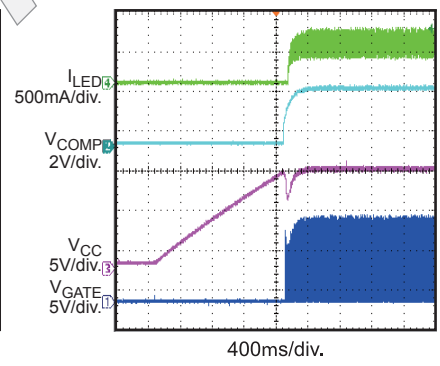
Steady State
V_{IN}=110V, full load



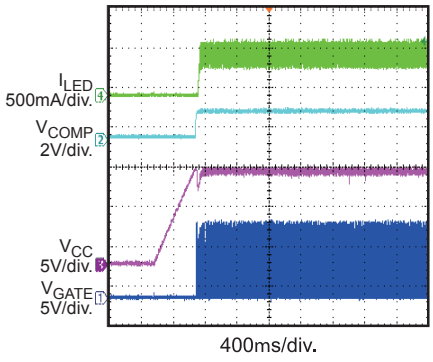
Steady State
V_{IN}=220V, full load



VIN Start up
V_{IN}=110V, full load



VIN Start up
V_{IN}=220V, full load



EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

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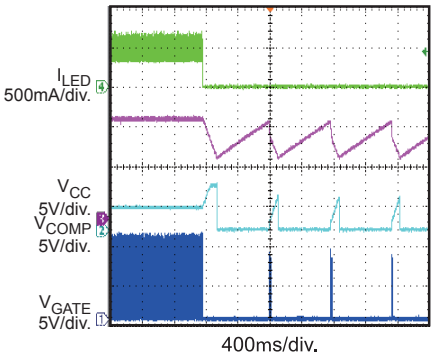
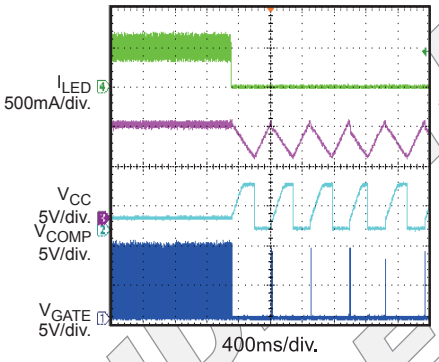
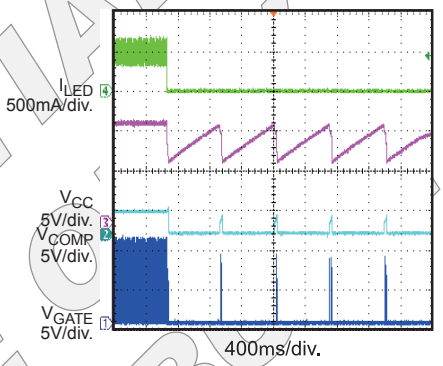
OVP, LED load open when working
V_{IN}=110V,Full load



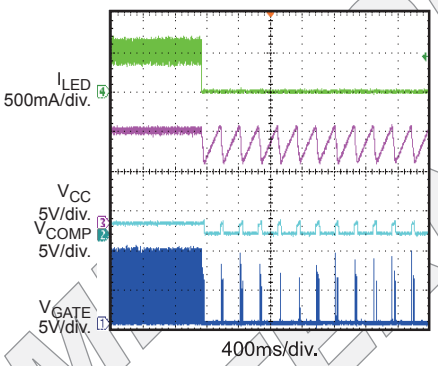
OVP, LED load open when working
V_{IN}=220V,Full load



OCP,LED+ short to LED- when working
V_{IN}=110V,Full load



OCP,LED+ short to LED- when working
V_{IN}=220V,Full load



RINTED CIRCUIT BOARD LAYOUT

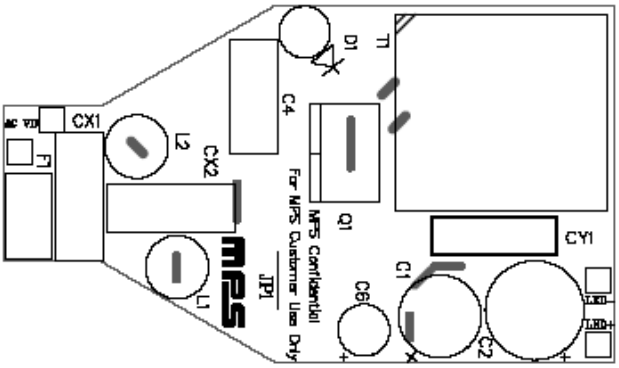


Figure 1—Top Silk Layer

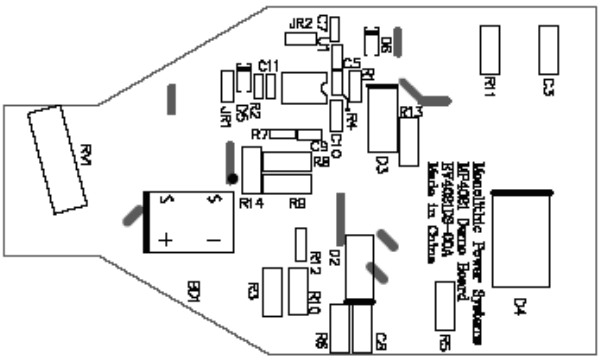


Figure 2—Bottom Silk Layer

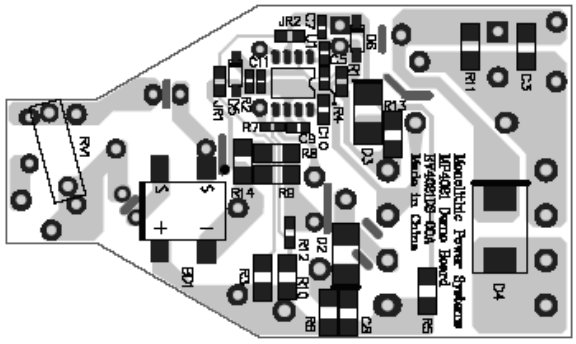


Figure 3—Bottom Layer

QUICK START GUIDE

1. Preset AC Power Supply to 85V ≤ V_{IN} ≤265V.
2. Turn Power Supply off.
3. Connect the LED string between ”LED+”(anode of LED string) and “-”(cathode of LED string).
4. Connect Power Supply terminals to AC VIN terminals as shown on the board.
5. Turn AC Power Supply on after making connections.