



MG39U301 – Demo Module for 1 Foot, 5W Pipe Driver

General Description

This demo module demonstrates a non-isolated, off-line, 5W led lamp application with the MPC301U driver IC. The LED load is configured as 13 leds in one string and 2 strings in parallel.

The driver is operated in PWM mode. The switching frequency is fixed by the design and the duty of the switching is adjusted automatically based the on the line-in voltage level & sensed current.

Besides the necessary RLC components that are needed to work a buck based, open loop current controller, the demo board also integrates a power noise filter, inrush current limiter & valley filler (PFC correction) into the module.

The board is designed to supply a string of LED with a current of 120mA and a voltage in the range ~39V from a 90V to 265V AC input. The LED current is set by a variable resistor which controls the input level of LD pin.

Note that the LED load is **NOT** galvanically isolated. The electric current flows from the AC line into LED load directly.

Electrical Characteristics

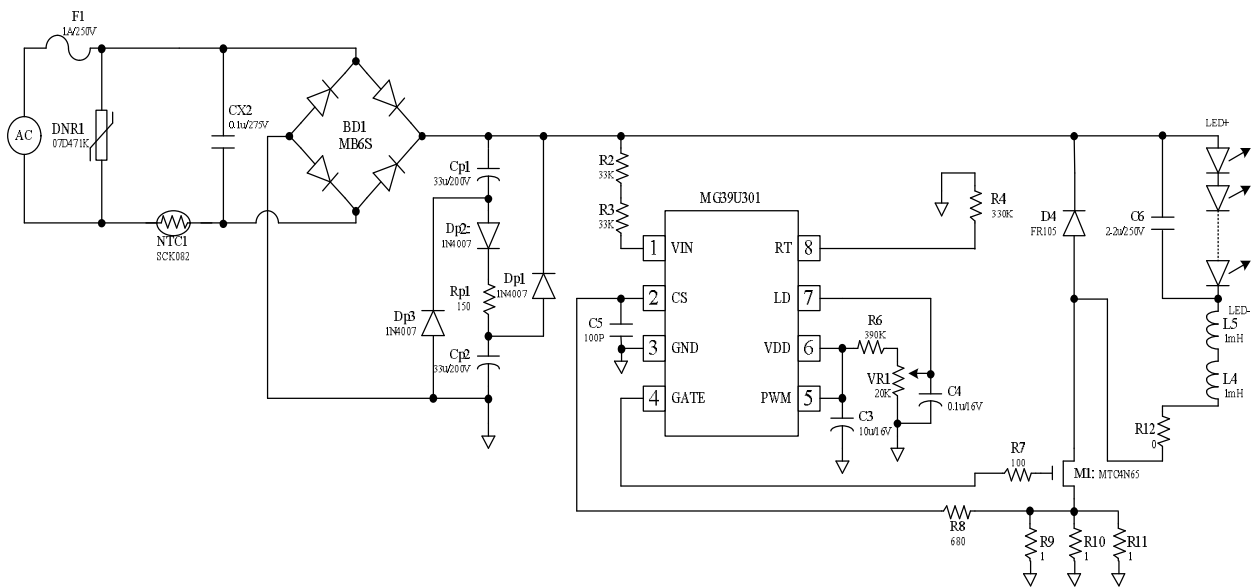
Parameter	Value
VDD of Driver IC	5.6V
V _{LED}	nominal 39V
I _{LED}	120mA ± 15%
Input Power	5W
Switching Frequency	~ 70Khz
Line In Voltage : 90~130V, 60Hz	
Power Factor	0.9 ~ 0.93
Efficiency	~ 88%
I _{LED} current	114 ~ 124mA
I _{LED} Ripple	< 30mA
Line Regulation	< +/- 10%
Temp. of MOS	< 50 Degree (@RT=22
Temp. Of L	< 50 Degree (@RT=22
Line In Voltage : 180~265V, 50Hz	
Power Factor	0.82 ~ 0.87
Efficiency	~ 85%
I _{LED} current	114 ~ 125mA
I _{LED} Ripple	< 30mA
Line Regulation	< +/- 10%
Temp. of MOS	< 50 Degree (@RT=22
Temp. Of L	< 50 Degree (@RT=22



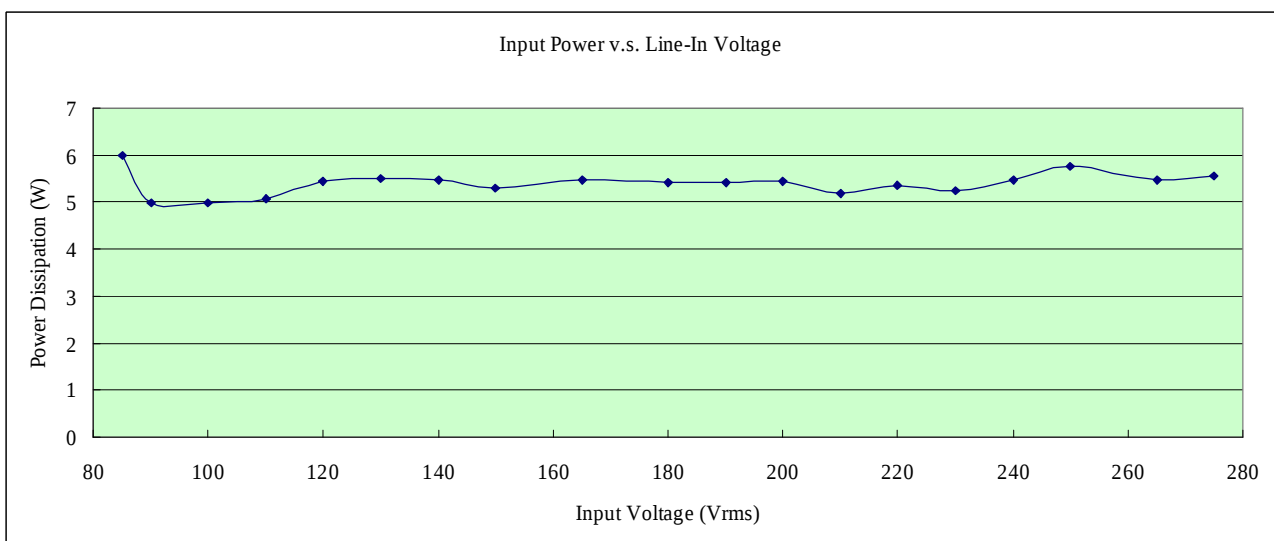
Board Layout

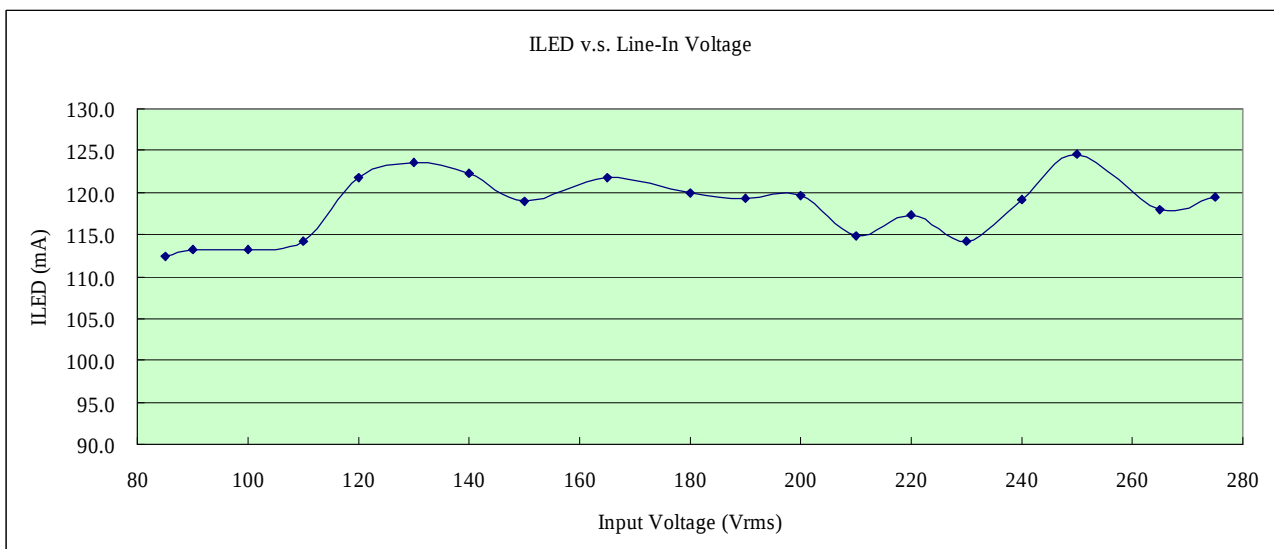
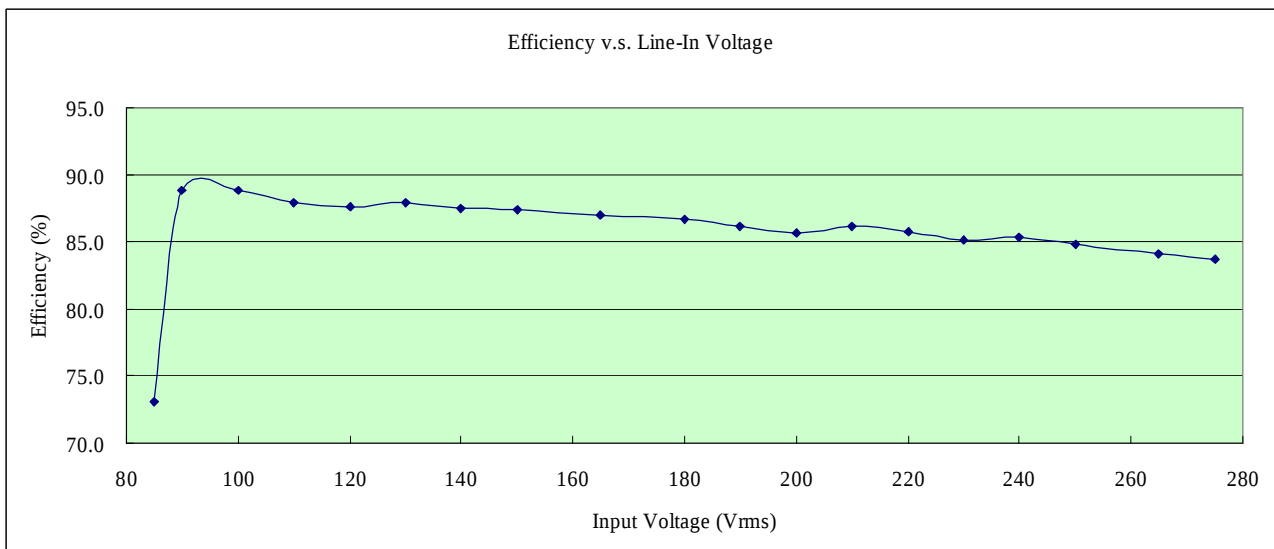
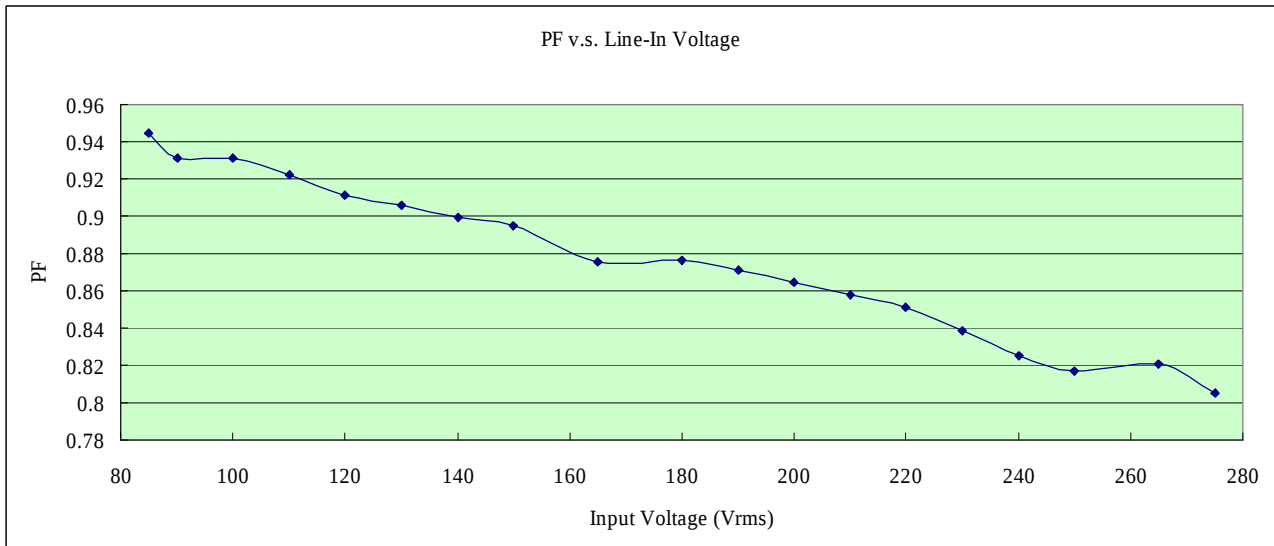


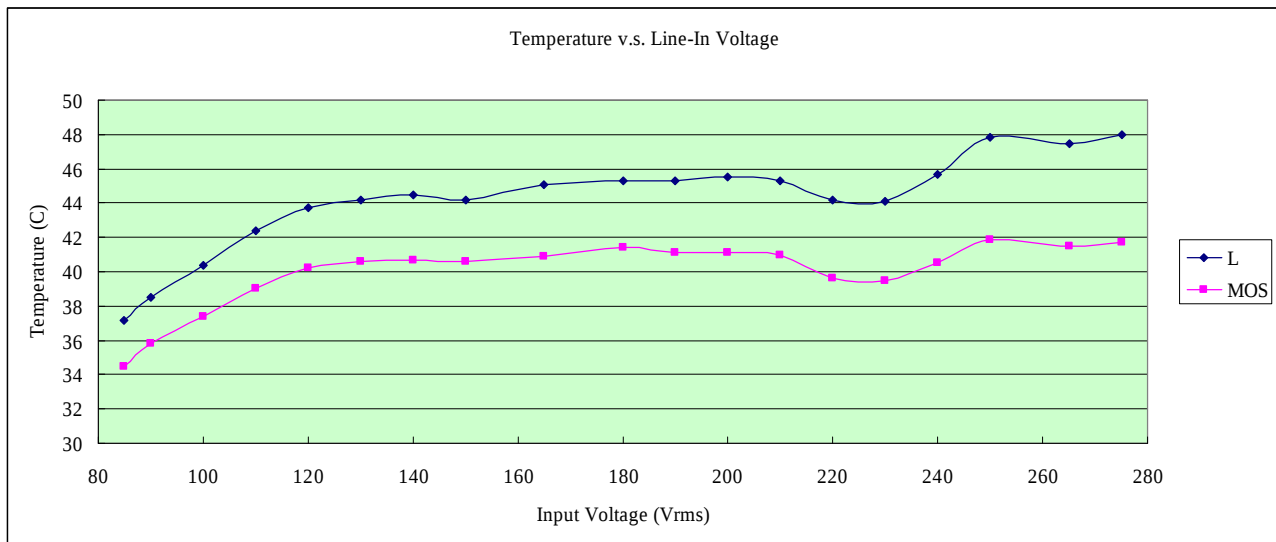
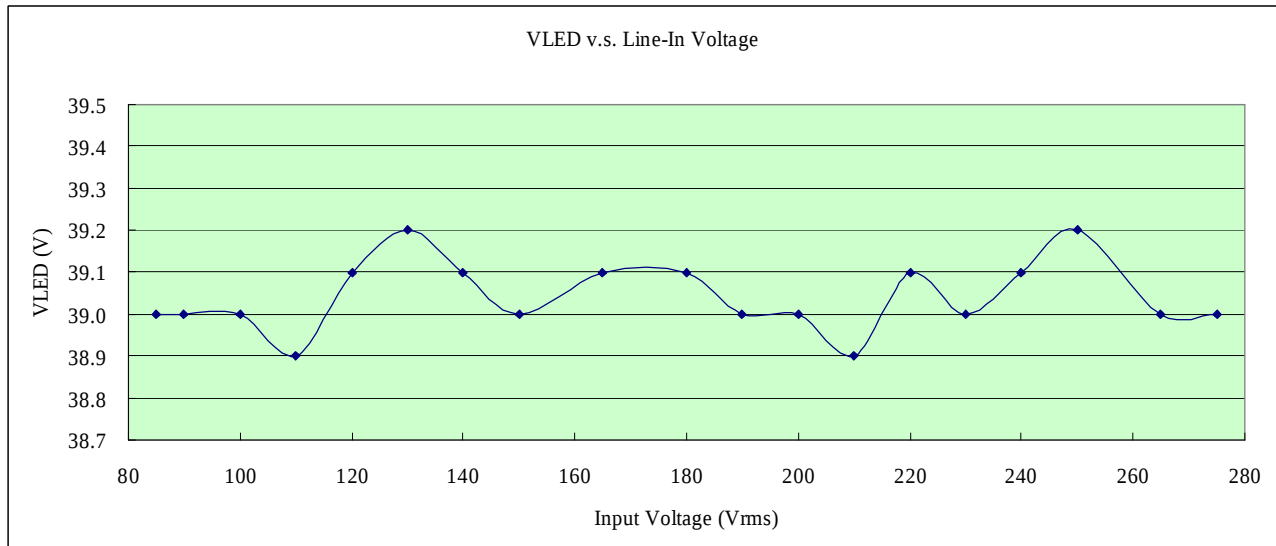
Application Circuit



Characteristics









Bill of Materials

Component	Description	Mfr/Part No
Power Input Stage		
F1	1A/250V fuse	
DNR1	7.471K Metal Oxide Varistor	
NTC1	NTC Thermister	Meritek: SCK-082
CX2	0.1u/275V Metalized Poly Film Capacitor (X2)	
BD1	Surface Mount Bridge Rectifier	
Power Factor Correction		
CP1 / CP2	33u/200V Electrolytic Capacitor	
DP1~DP3	Surface mount fast recovery diode	
RP1	150 Ohms/0.5W Cement wire wound resister	
Basic Components		
R2 / R3	33K ohms , 0805 5%	
R4	330K ohms, 0805 1%	
R6	390K ohms, 0805 1%	
R7	100 Ohms, 0805 1%	
R8	820 Ohms, 0805 1%	
R9	1 Ohm, 0805 1%	
R10	1 Ohm, 0805 1%	
R11	1 Ohm, 0805 1%	
R12	0 Ohm, 0805	
VR1	20K ohms, variable resister value	
C3	10u/16V, 0805	
C4	0.1u/16V, 0805	
C5	100p, 0805	
C6	2.2u/250V, 1206	
D4	FR106, Surface mount fast recovery diode	
L4 ~ L6	SMD Shielding Power Choke DCR : 1.82 Ω , IDC : 0.55A, 1mH	



Appendix

Test Data

VAC[V] (60Hz)	IAC [mA]	PAC [W]	P.F	ILED[mA]	VLED[V]	PDC[W]	L_TEMP [°C]	MOS TEMP [°C]	Efficiency [%]
85	62.531	5.9913	0.9448	112.354	39	4.381806	37.2	34.5	73.136147
90	53.724	4.9721	0.9313	113.231	39	4.416009	38.5	35.8	88.815772
100	53.724	4.9721	0.9313	113.231	39	4.416009	40.4	37.4	88.815772
110	49.812	5.0567	0.922	114.263	38.9	4.4448307	42.4	39	87.899830
120	49.741	5.4375	0.911	121.842	39.1	4.7640222	43.7	40.2	87.614201
130	46.755	5.5109	0.9062	123.574	39.2	4.8441008	44.2	40.6	87.900357
140	43.298	5.4647	0.8992	122.243	39.1	4.7797013	44.5	40.7	87.465026
150	39.598	5.3119	0.8945	119.023	39	4.641897	44.2	40.6	87.386754
165	37.824	5.4773	0.8755	121.832	39.1	4.7636312	45.1	40.9	86.970427
180	34.282	5.4149	0.8766	120.014	39.1	4.6925474	45.3	41.4	86.65990877
190	32.638	5.4023	0.871	119.345	39	4.654455	45.3	41.1	86.15691465
200	31.316	5.4441	0.8643	119.576	39	4.663464	45.5	41.1	85.66088059
210	29.036	5.19	0.8578	114.876	38.9	4.4686764	45.3	41	86.10166474
220	28.516	5.3542	0.8513	117.356	39.1	4.5886196	44.2	39.6	85.70131112
230	27.056	5.2297	0.8387	114.131	39	4.451109	44.1	39.5	85.1121288
240	27.613	5.464	0.8254	119.183	39.1	4.6600553	45.7	40.5	85.2865172
250	28.08	5.7524	0.8174	124.533	39.2	4.8816936	47.8	41.9	84.8635978
265	25.15	5.4683	0.8209	117.944	39	4.599816	47.5	41.5	84.11784284
275	25.045	5.5645	0.8053	119.423	39	4.657497	48	41.7	83.7001887

Test Equipments

Item	Function	Model
1	Programmable AC Source	CHROMA 61501
2	Digital Power Meter	CHROMA 66202
3	6-1/2 Digits Multi-meter	Agilent 34410A
4	LCR meter	CHY 24CS
5	Digital Oscilloscope	Tektronix TDS3014B
6	AC/DC Current Probe	Tektronix TCPA300