



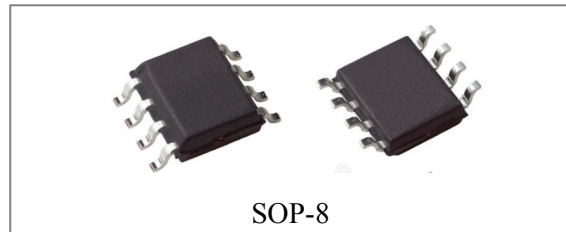
XsP Technology

MU1001

Cap Isolated Low Ripple AC Direct to DC Regulation 1.8V~3.3V low ripple output 50mA

FEATURES

- **No switching for good EMI performance**
- **Capacitive isolation from AC line**
- **No AC noise to the supply output**
- **Low output ripple in 10mV**
- Single 1.8V~3.3V adjustable output
- Wide AC operating range
- Output loading capacity of 50mA
- Good efficiency above 70%
- Output short-circuit protection
- Patent pending **XsP technology**
(Xtra Small Power AC Direct to DC Regulation)



SOP-8

APPLICATIONS

- Plug-in MCU module to an AC machine
- AC powered BLE and Wifi modules
- AC powered IoT sensor modules

ORDER INFORMATION

Order Code	Package	Packing
MU1001	SOP-8	Tape & Reel

DESCRIPTION

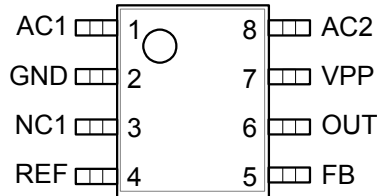
MIoT MU1001 is an innovated high performance AC direct to DC power supply for IoT devices. Our patent pending **XsP** technology provides IoT devices a safe and efficient AC plug with the capacitive isolation, the good EMI performance, no AC noise and a low ripple output. The 1.8V~3.3V adjustable output and the 50mA loading capacity meet the needs of IoT wireless control with sensors, such as Bluetooth BLE, LoRa and Zwave.

MU1001 is simple, few components and no inductors. It is the best cost-effective and space saving solution for IoT power and any smart control machine.

OUTPUT POWER TABLE

		Output Load	220V _{AC}	110V _{AC}
		V _{OUT} = 3V	C1=C2=1500nF C3=680µF	Loading capacity
Burst current in 5ms	100mA			
C1=C2=3000nF C3=680µF	Loading capacity			50mA
	Burst current in 5ms			100mA

PIN ASSIGNMENT & DESCRIPTION



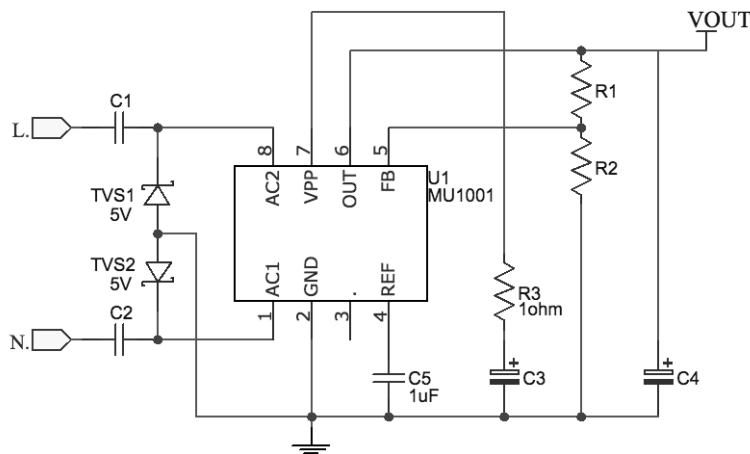
Pin	Pin Name	Description
1	AC1	AC line (L) after capacitive isolation
2	GND	Ground to the output load circuit
3	NC1	no connection
4	REF	Voltage reference
5	FB	Output voltage feedback
6	OUT	Regulated DC output
7	VPP	IC internal supply
8	AC2	AC line (N) after capacitive isolation

FUNCTIONAL CIRCUIT DIAGRAM

The AC line terminals are fed to AC1 and AC2 via the capacitive isolation elements C1 and C2. The 5-volt TVS protects MU1001 from AC surge attack. The internal regulator converts the AC current directly to the DC output at OUT. The VOUT voltage is adjustable with the divider network R1 and R2.

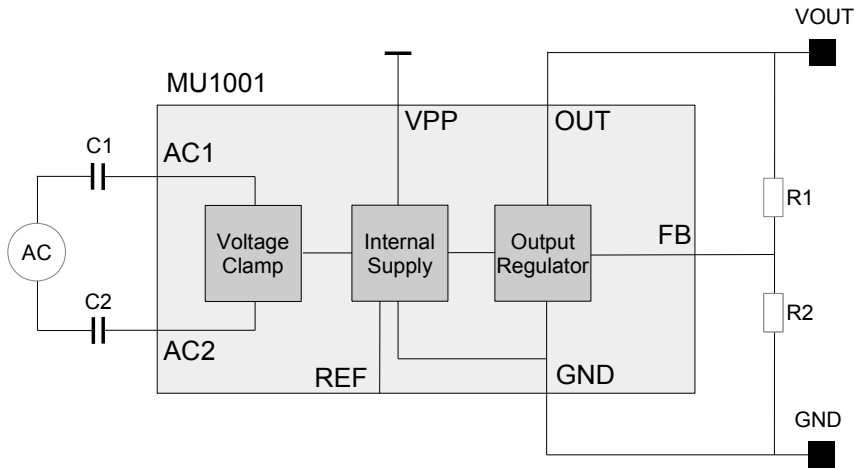
C1, C2 and C3 are also the energy storage elements of the loading capacity at OUT. C4 is the decoupling capacitor at VOUT.

VOUT is capacitive isolated from the AC line. GND can connect to the attached circuit board at any ground reference point.

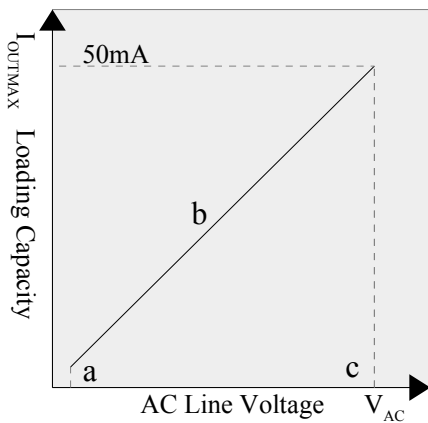


VOUT	R1	R2
1.8V	0.8 K Ω	100 K Ω
2.7V	170 K Ω	100 K Ω
3.0V	200 K Ω	100 K Ω
3.3V	230 K Ω	100 K Ω

BLOCK DIAGRAM

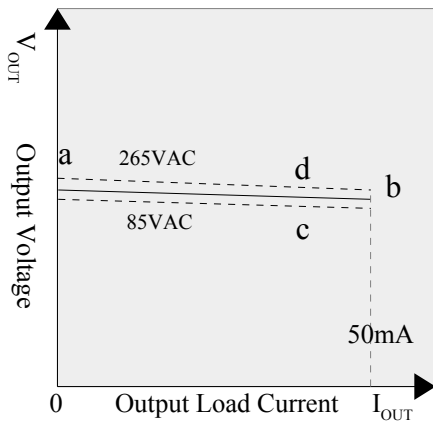


REFERENCE CHARACTERISTIC CHARTS



- a) Startup voltage $> V_{pp}$
- b) Loading capacity increases as V_{AC} rises

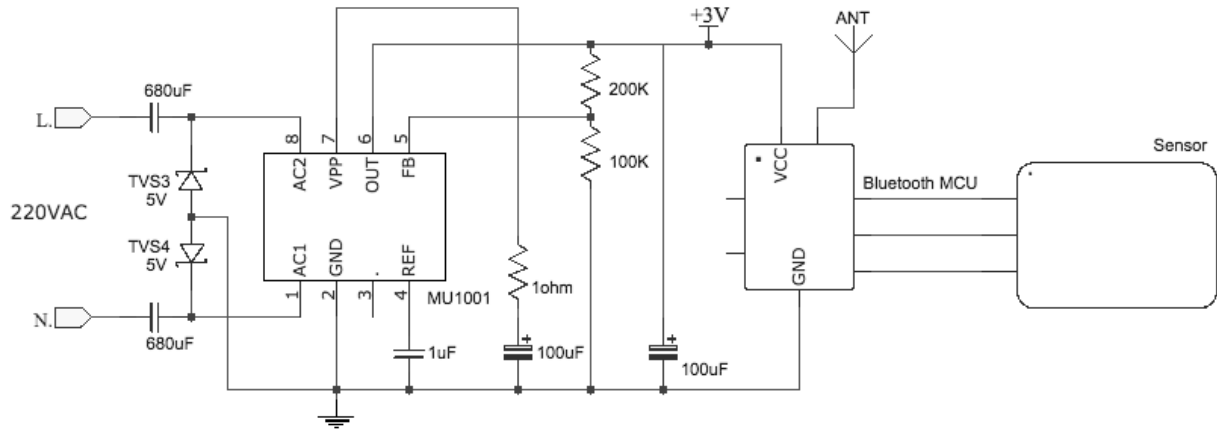
$$I_{OUTMAX} \sim V_{AC} * (C1+C2) * 80$$
- c) AC operating range is limited by the voltage rating of C1 and C2



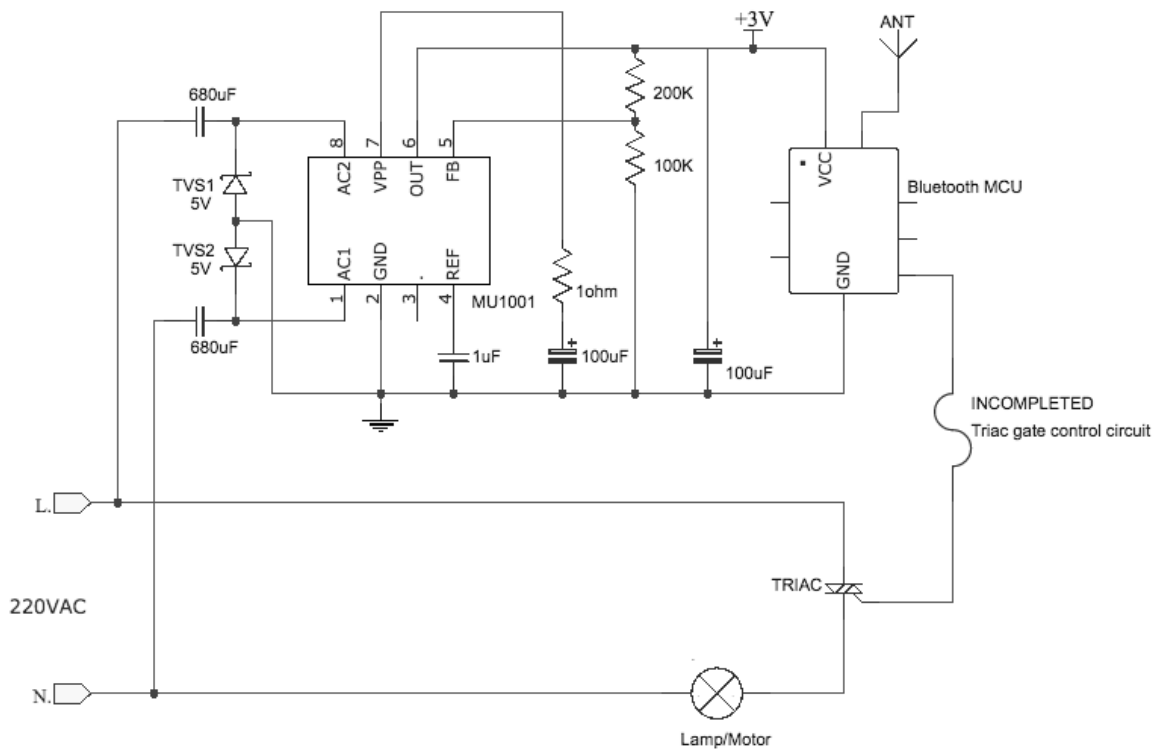
- a to b) Load regulation from no load to full load 50mA specified in $\Delta V_{OUT/IOUT}$
 - c to d) Line regulation from 85V_{AC} to 265V_{AC} specified in $\Delta V_{OUT/VAC}$
- Temperature coefficient is specified in $\Delta V_{OUT/TA}$

REFERENCE APPLICATION CIRCUITS

No AC noise and capacitive isolated Bluetooth sensor



Plug-in Bluetooth TRIAC control over AC lamp or motor





ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

PARAMETER	SYMBOL	LIMITS		UNIT
		MIN	MAX	
AC1/AC2 Input Voltage	V_{ACIN}	-0.3	6.5	V
AC leakage current	I_{ACLEAK}	-30	+30	mA
Regulated output voltage	V_{OUT}	0	4.5	V
DC Supply output current	I_{OUT}	0	80	mA
Operating Junction Temperature	T_J	-40	125	°C
Storage Temperature	T_{STJ}	-55	150	°C

Absolute maximum ratings are the values beyond which the safety of the device cannot be guaranteed

Operating Characteristics

$V_{PP} = 4V$, $T_{AMBIENT} = 25^{\circ}C$, $C1=C2=1500nF$, $C3=C4=100\mu F$, $V_{AC}=220V_{RMS}$ unless otherwise specified.

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES			UNIT
			MIN	TYP	MAX	
Internal supply voltage	V_{PP}			4		V
Regulated output voltage	V_{OUT}		1.8		3.3	V
Supply output current	I_{OUT}				50	mA
VOOUT output accuracy	ΔV_{OUT}			± 1		%
VOOUT load regulation	$\Delta V_{OUT/I_{OUT}}$	$V_{OUT} = 3V$ $I_{OUT} = 0 \sim 20mA$		0.3		V
VOOUT line regulation	$\Delta V_{OUT/V_{AC}}$	$V_{OUT} = 3V$ $V_{AC} = \pm 10\%$		1		%
VOOUT ripple	$V_{OUTRIPPLE}$	$V_{OUT} = 3V$ $I_{OUT} = 20mA$		10	30	mV
VOOUT temperature coefficient	$\Delta V_{OUT/T_A}$	$V_{OUT} = 3V$ $T_A = -40^{\circ}C \sim +85^{\circ}C$		± 1		%
Conversion efficiency	η	$V_{OUT} = 3.3V$ $I_{OUT} = 30mA$		70		%

Data and figures in the above charts are subject to change without notice

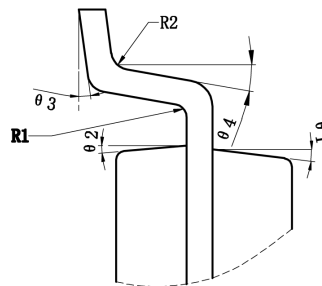
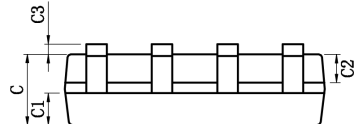
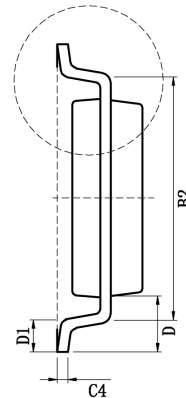
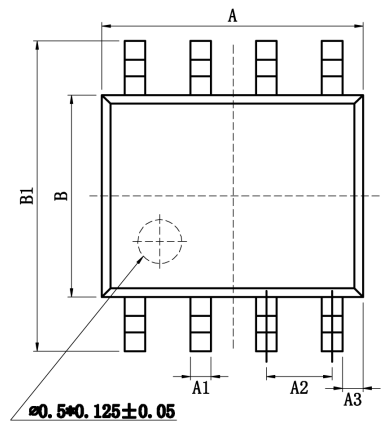


PACKAGE DIMENSIONS

SOP-8

DIMENSIONS	MIN	MAX	DIMENSIONS	MIN	MAX
A	4.80	5.00	C3	0.05	0.20
A1	0.356	0.456	C4	0.203 (TYP)	
A2	1.27 (TYP)		D	1.05 (TYP)	
A3	0.345 (TYP)		D1	0.40	0.60
B	3.80	4.00	R1	0.20 (TYP)	
B1	5.80	6.20	R2	0.20 (TYP)	
B2	5.00 (TYP)		θ1	17° (TYP)	
C	1.30	1.50	θ2	13° (TYP)	
C1	0.55	0.65	θ3	0° - 8°	
C2	0.55	0.65	θ4	4° - 12°	

Controlling dimensions are in millimeters



IMPORTANT NOTICE

MIoT Limited reserves the right to make changes in the circuitry and the specification of this chip without prior notice. Customers are advised to check MIoT for the latest information.