Power Supply Pwm Supervisor **SDC4818**

General Description

The SDC4818 controller is designed for switching mode power supply for desktop PCs. Utilizing minimum number of external components, the SDC4818 includes all of the functions for push-pull and/or half-bridge topology, decreasing the production cost and PCB space, and increasing the MTBF for power supply.

Two internal TL431 shunt regulators provide stable reference voltage for 3.3V and 5V standby regulator.

Features

- Over-voltage/Under-voltage protection for 3.3V/±5V/±12V
- Over-power protection
- Short-circuit protection
- AC input under voltage protection
- Power good circuitry
- PSON for remote controller
- Delay time for PSON and PG signal
- Two internal TL431 shunt regulators provide stable reference voltage for 3.3V and 5V standby regulator
- Soft-start and maximum 93% duty cycle

Applications

- ATX power supply
- SFX(MICRO-ATX) power supply
- NLX power supply

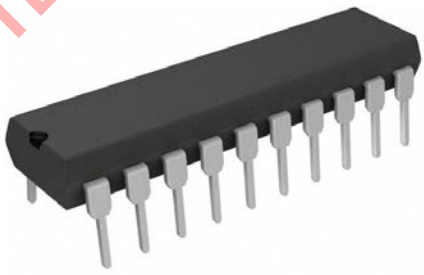

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Figure 1. Package Type

Pin Configuration

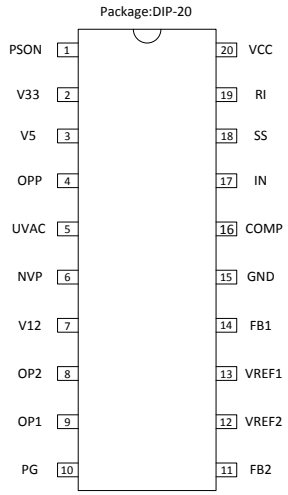


Figure 2. Pin Configuration

Pin Number	Pin Name	Function
1	PSON	Remote on/off input
2	V33	OVP/UVP sense input for 3.3V
3	V5	OVP/UVP sense input for 5V
4	OPP	Over-power sense input
5	UVAC	Power good detection input
6	NVP	UVP sense input for negative voltage
7	V12	OVP/UVP sense input for 12V
8	OP2	PWM totem-pole output 2
9	OP1	PWM totem-pole output 1
10	PG	Power good signal
11	FB2	Output for second opamp loop
12	VREF2	Input for second opamp loop
13	VREF1	Input for first opamp loop
14	FB1	Output for first opamp loop
15	GND	Ground
16	COMP	Error amplifier output
17	IN	Input of error amplifier
18	SS	The soft-start function set through an external capacitor
19	RI	Reference setting by an external resistor
20	VCC	Supply voltage

Table 1. Pin Description

Functional Block Diagram

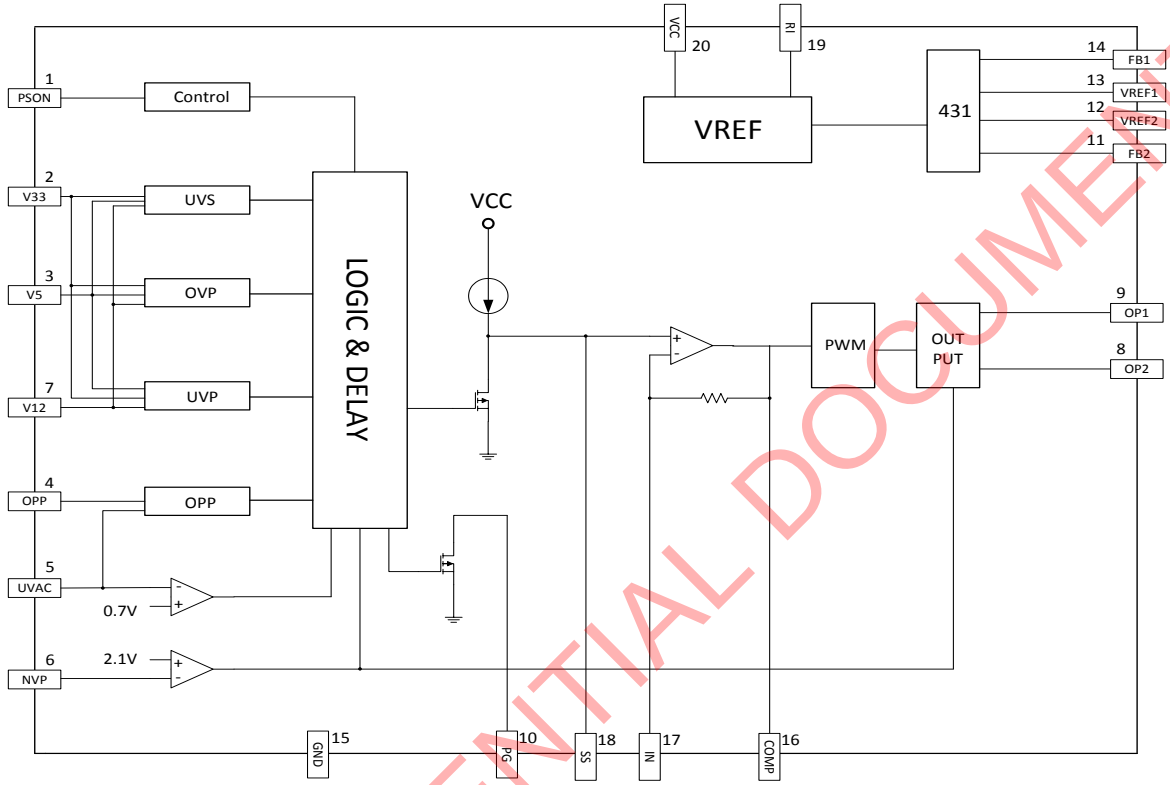
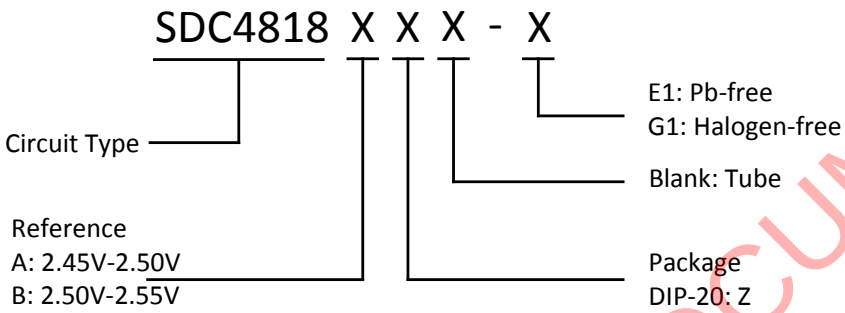


Figure 3. Functional Block Diagram

Ordering Information



Package	Temperature	Part Number		Marking ID		Packing Type
		Pb-free	Halogen-free	Pb-free	Halogen-free	
DIP-20	-40°C~85°C	SDC4818AZ -E1	SDC4818AZ -G1	SDC4818	SDC4818G	Tube
		SDC4818BZ -E1	SDC4818BZ -G1	SDC4818	SDC4818G	Tube

Absolute Maximum Ratings (NOTE: Stresses greater than those listed under Absolute Maximum Ratings may cause permanent damage to the device.)

Parameter	Symbol	Value	Unit
Supply voltage	V_{CC}	12	V
FB1, FB2 Output	V_{FB}	16	V
PG Output	I_{OUT1}	30	mA
FB1, FB2 Output	I_{OUT2}	30	mA
Power dissipation(Ta=25°C)	P_{D1}	1.5	W
Power dissipation(Ta=90°C)	P_{D2}	0.5	W
Storage temperature	T_{STG}	-55~155	°C
Latch-up test per JEDEC 78	-	200	mA
ESD, HBM model per Mil-Std-883, Method 3015	HBM	2000	V
ESD, MM model per JEDEC EIA/JESD22-A115	MM	200	V
Thermal Resistance（Junction to Ambient）	θ_{JA}	82.5	℃/W

Table 2. Absolute Maximum Ratings

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply voltage	V_{CC}	4.5	5.5	V
Oscillation frequency	f_{OSC}	60	70	kHz
Operating temperature	T_{OPR}	-40	85	°C

Table 3. Recommended Operating Conditions

Electrical Characteristics (Ta=25°C, V_{CC}=5.0V, unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply voltage	V_{CC}	-	4.5	5.0	7.0	V
Standby supply current	I_{CC}	PG=High	-	5	10	mA
3.3V_{OVP}	V_{OVP1}	-	3.9	4.1	4.3	V
5V_{OVP}	V_{OVP2}	-	5.8	6.1	6.5	V
12V_{OVP}	V_{OVP3}	-	13.9	14.5	14.9	V
3.3V_{UVP}	V_{UVP1}	-	2.0	2.6	2.8	V
5V_{UVP}	V_{UVP2}	-	3.0	3.6	3.9	V
12V_{UVP}	V_{UVP3}	-	6.0	7.2	8.0	V
3.3V_{UVS}	V_{UVS1}	-	2.5	2.8	3.0	V
5V_{UVS}	V_{UVS2}	-	4.0	4.3	4.5	V
12V_{UVS}	V_{UVS3}	-	9.4	10.1	10.4	V
Over power protection with delay time	V_{OPPS}	V_{UVAC}=1.5V	2.02	2.40	2.66	V
Negative voltage protection	V_{NVP}	-	1.9	2.05	2.2	V
NVP source current	I_{NVP}	RI=75k	50	61	72	uA
OVP debounce Time	t_{OVP}	RI=75k	0.5	0.7	1.3	ms
UVP debounce Time	t_{UVP}	RI=75k	35	60	80	ms
UVS debounce Time	t_{UVS}	RI=75k	0.5	0.7	1.3	ms
OPP debounce Time	t_{OPP}	RI=75k	4.0	7.0	10.0	ms
NVP debounce Time	t_{NVP}	RI=75k	4.0	7.0	10.0	ms
Reference						
Reference voltage	V_{REF}	I_{FB}=0.5mA, Ta=25°C	2.475	2.5	2.525	V
Regulation	$R_{EGLI-FB}$	4V<V_{FB}<16V	-	1	-	mV/V
Output pull current	I_{OUT-FB}	V_{FB}>2V	10	-	-	mA
PG						
PG delay time	t_{PG}	RI=75k	200	300	400	ms
UVAC sense voltage	V_{UVAC}	-	0.65	0.7	0.75	V
PG output rise time	t_R	C_L=100pF,V_{PULLUP}=5V,	-	1	-	us
PG output fall time	t_F	R_{PULLUP}=1k	-	300	-	ns
Output low voltage	V_{OL2}	I_{PG}=5mA	-	-	0.5	V
Sink current of PG	I_{ON2}	V_{PG}=5V	-	-	1	uA
Remote On/Off Section						
PSON input voltage	V_{PSON}	-	1	1.4	2.0	V
PSON drive current	I_{PSON}	-	-	-	0.5	mA
PSON to on debounce time	$t_{PSON\ (ON)}$	RI=75k	20	40	50	ms
PSON to off debounce time	$t_{PSON\ (OFF)}$	RI=75k	10	20	30	ms
PSON to off delay time	t_{PSOFF}	RI=75k	2	4.8	6.5	ms

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Error Amp Section						
Reference voltage(SDC4818A)	V2.5	-	2.45	-	2.50	V
Reference voltage(SDC4818B)	V2.5	-	2.50	-	2.55	V
Bias current	I_{IB}	-	-	-	0.1	uA
Open loop voltage gain	V_{AOL}	-	50	60	-	dB
Unit gain bandwidth	BW	-	0.3	1	-	MHz
Power supply rejection ratio	PSRR	-	50	-	-	dB
Oscillation Section						
Oscillation frequency	f_{OSC}	RI=75k	60	65	70	kHz
Soft Start Section						
Charge current	I_{SS}	RI=75k	4.0	5.7	7.0	uA
Pwm Output Section						
Output voltage low	V_{OL}	I_O=5mA	-	0.25	0.5	V
Output voltage high	V_{OH}	V_{12}=12V	4	-	-	V
Output restance	R_O	-	2.0	3.9	4.2	kΩ
Max duty	D_{MAX}	-	85	-	93	%

Table 4. Electrical Characteristics

Function Description

The SDC4818 is a power management IC for computers. It integrates various monitoring functions and protections, such as AC fail detection, over power protection, negative voltage protection, over/under voltage protection and provides power down signal for PG. Built-in high precision oscillator provides accurate protection and delay time for monitoring. And internal regulators TL431 are used for stable output 3.3V and 5V standby, with few peripheral components. Built-in soft-start decreases stress of transformer against saturation. SD4818 used for pull-push or half-bridge power system with high efficiency and stability.

Remote Switch Control (PSON)

The PC generates the remote switch control signal which is connected to PSON. When the control signal is low, PC power is on. And when the control signal is high, PC power is off.

AC Fails Detection (UVAC)

The AC line voltage is coupled from the primary side to the secondary side through the main transformer, and UVAC is connected to the secondary side by a resistor. When UVAC voltage drops below 0.7V and maintains this situation over 200us, the PG signal will be pulled low , and it indicates that the AC line is power-down. The voltage amplitude of the PWM switching signal from the secondary side is proportional to the AC line voltage. Adjusting the ratio of the voltage divider can set the threshold for the power-down.

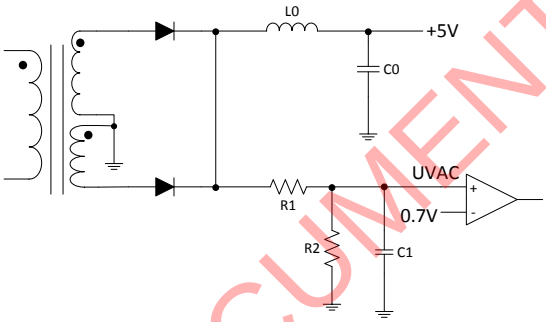


Figure 4. AC Fails Detection

Over Power Protection (OPP)

The over power protection is designed to detect over power and short circuit. When the voltage of OPP is higher than 2.4V and maintain this situation over 7msec, PG will be pulled low and the power outputs will be locked.

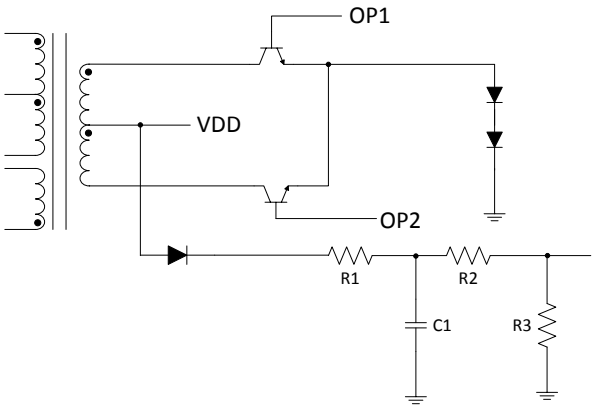


Figure 5. Over Power Protection

Negative Voltage Protection (NVP)

The negative voltage protection is designed to provide under voltage protection for negative voltage output. Overload and short circuit can cause under voltage of negative voltage output. When the voltage of NVP is higher than 2.1V and this situation exists for longer than 7msec, the power outputs will be off and be locked. Adjusting the resistor will set the threshold for locking the power outputs off. The threshold is determined by:

$$V_{NVP}=I_{NVP}\times (R_1+R_2)+V_{-12V}$$

$$V_{NVP}=I_{NVP}\times R_1+V_{-5V}-0.7V$$

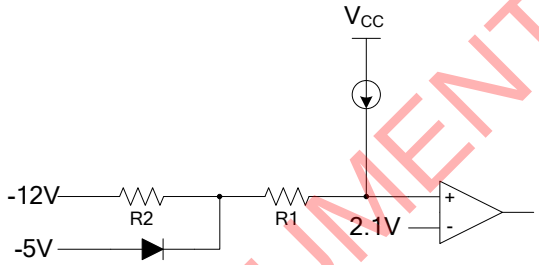


Figure 6. Negative Voltage Protection

Timing Diagram

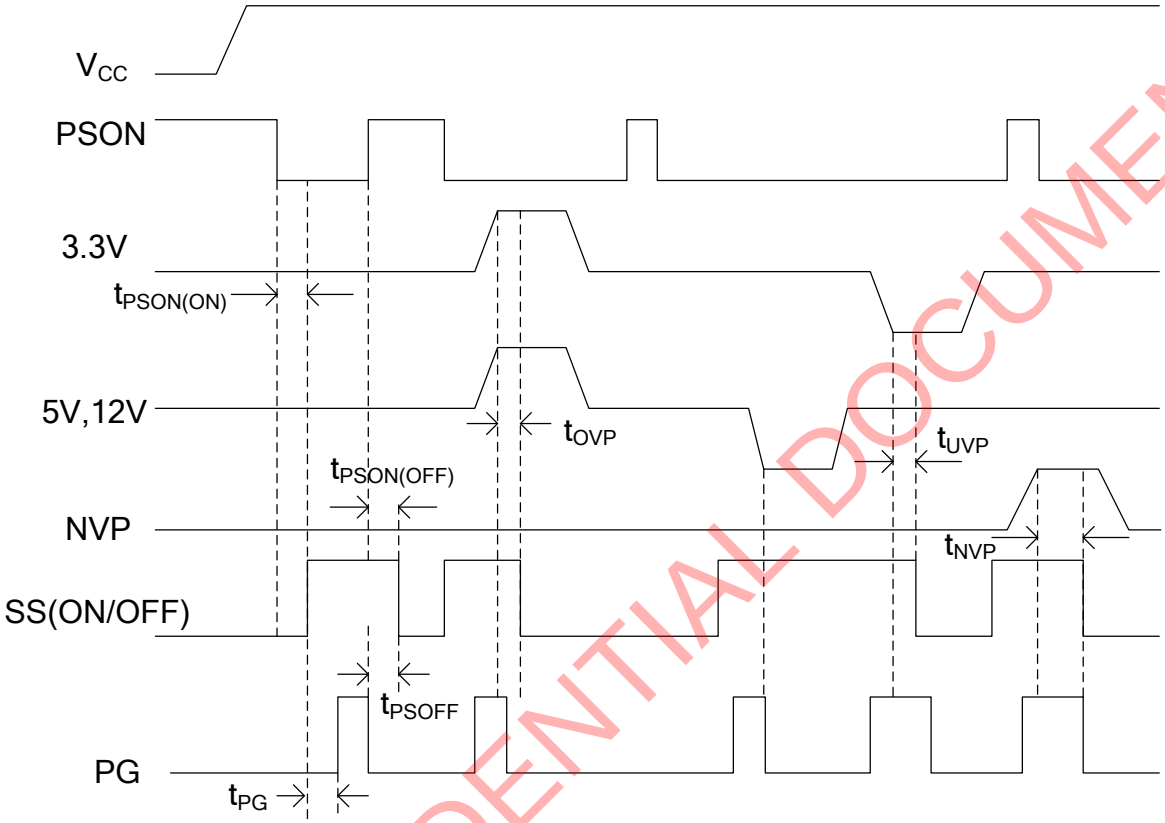


Figure 6

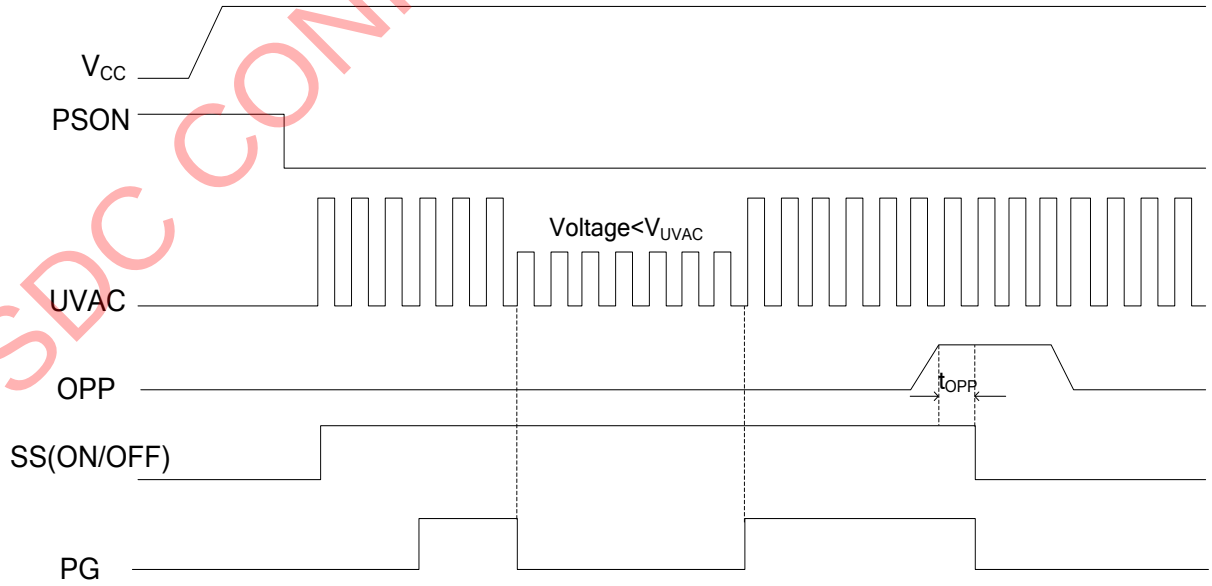
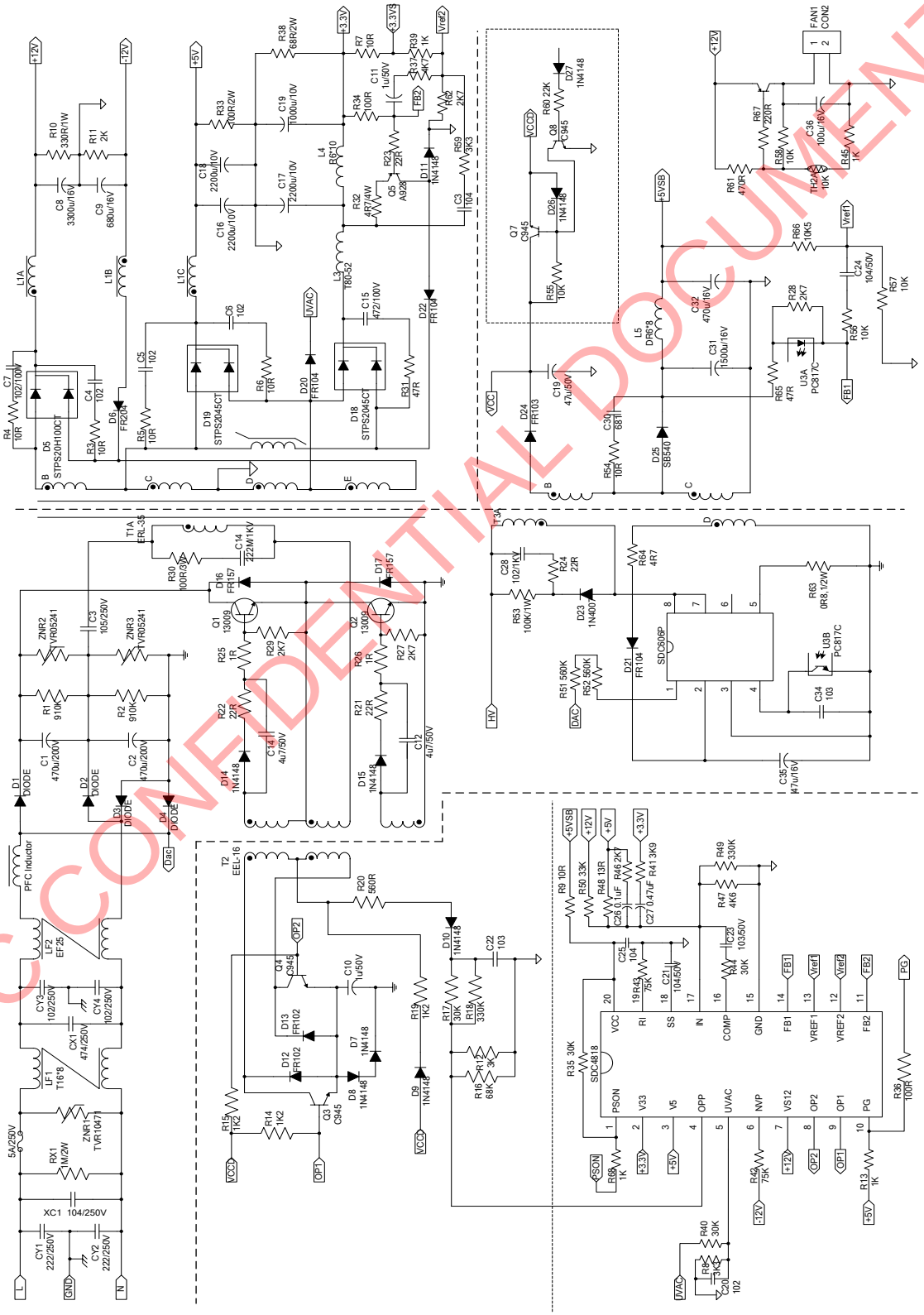


Figure 7

Typical Application



Package Dimension

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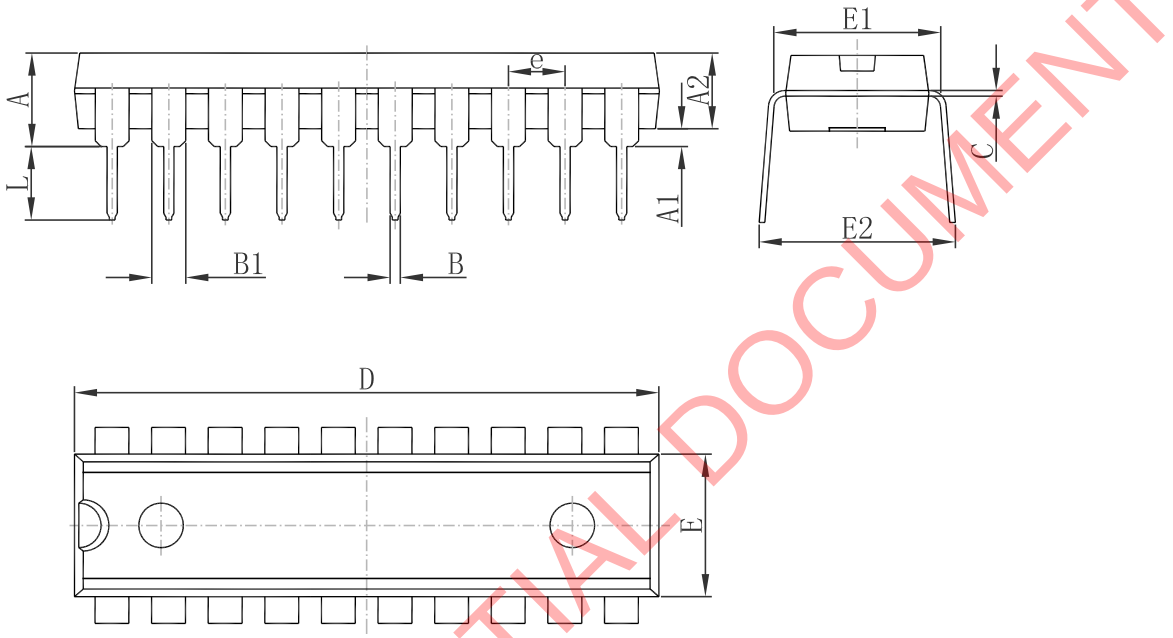

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524(BSC)		0.060(BSC)	
C	0.204	0.360	0.008	0.014
D	25.950	26.550	1.022	1.045
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540(BSC)		0.100(BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354

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