

**General Description**

The SDC2921 is a Pulse–Width Modulation (PWM) control circuit with complete protection circuits for the SMPS (Switching Mode Power Supply). It contains various functions, can minimize external components of switching power supply systems in personal computer.

**Features**

- Complete PWM control and protection circuits
- Over voltage protection for 3.3V/ 5V/ 12V/ PT
- Under voltage protection for 3.3V/ 5V/ 12V
- 280ms PG time delay
- Open drain power good output
- 280ms time delay for UVP
- Remote ON/OFF function
- Built-in soft-start function
- Package: DIP-16

**Applications**

- PC power supply

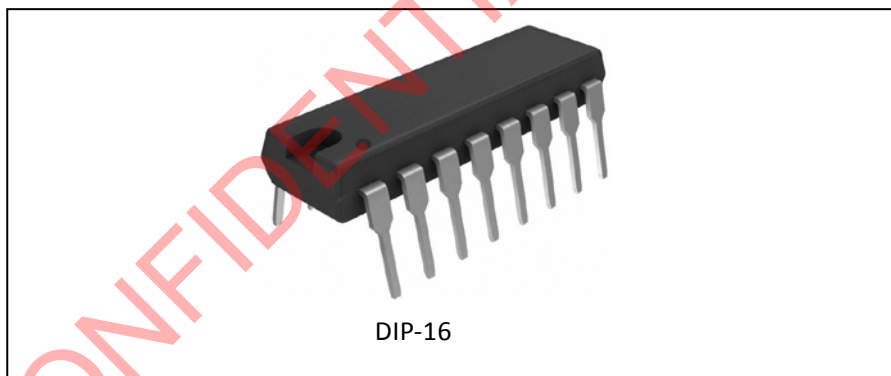


Figure 1. Package Type

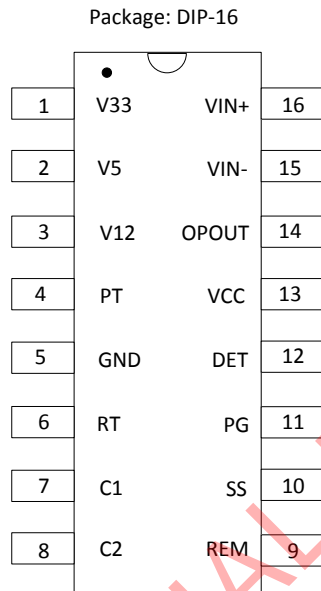
**Pin Configuration**


Figure 2. Pin Configuration

Pin Number	Pin Name	Function
1	V33	OVP/UVI input for 3.3V
2	V5	OVP/UVI input for 5V
3	V12	OVP/UVI input for 12V
4	PT	Extra OVP protection input
5	GND	Ground
6	RT	Oscillation frequency set by external resistor
7	C1	PWM open drain output 1
8	C2	PWM open drain output 2
9	REM	Remote on/off input
10	SS	Soft start function set by external capacitor
11	PG	Power good signal
12	DET	Extra protection input
13	VCC	Supply voltage
14	OPOUT	OP output
15	VIN-	OP negative input
16	VIN+	OP positive input

Table 1. Pin Description

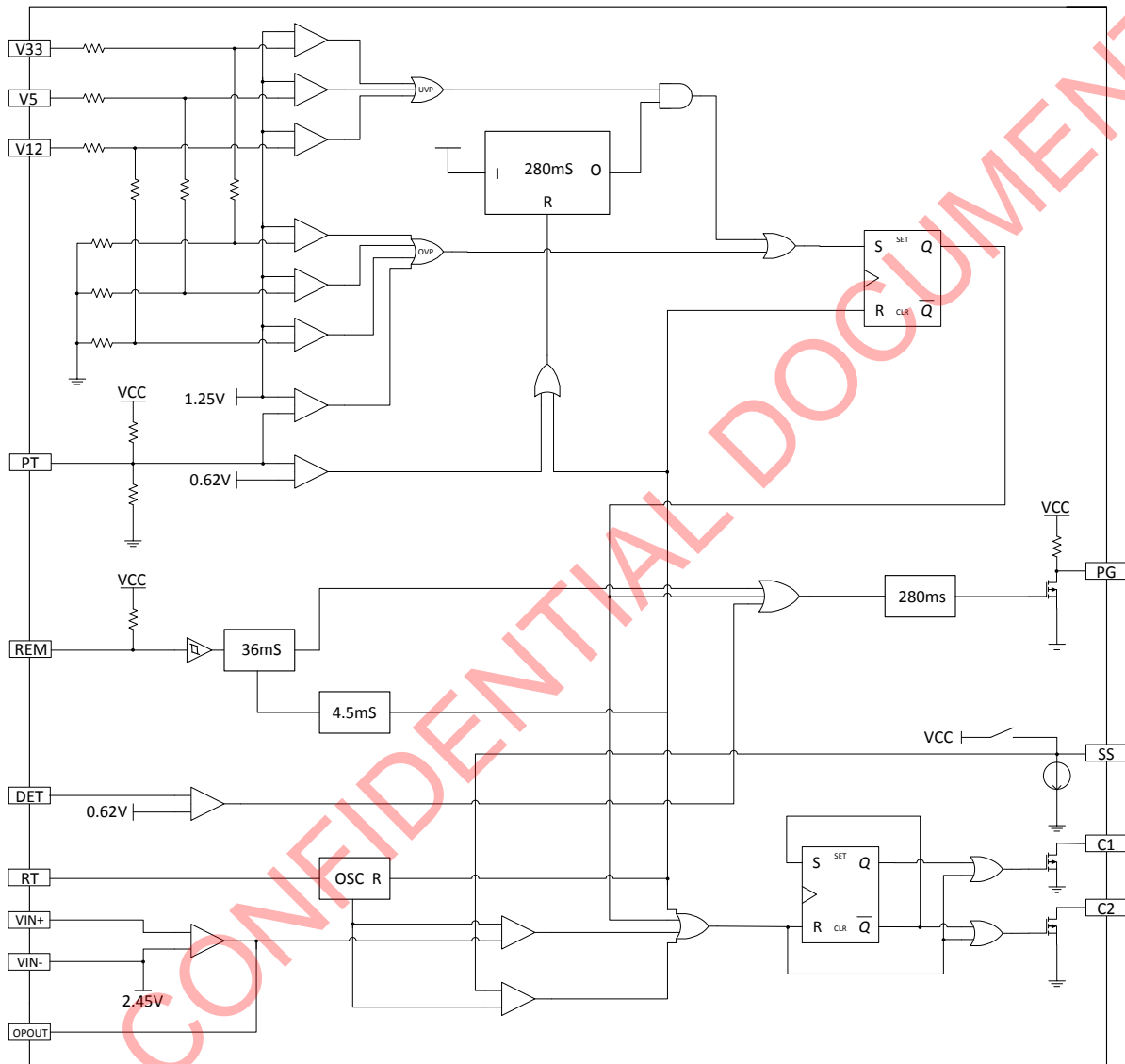
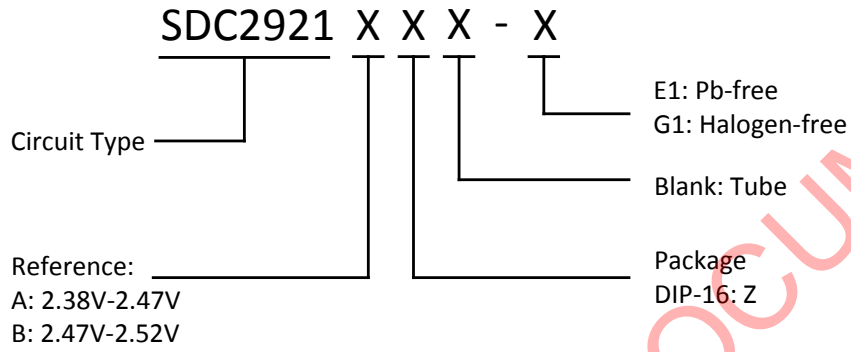
**Functional Block Diagram**


Figure 3. Functional Block Diagram

**Ordering Information**


Package	Temperature	Part Number		Marking ID		Packing Type
		Pb-free	Halogen-free	Pb-free	Halogen-free	
DIP-16	-10°C~70°C	SDC2921AZ -E1	SDC2921AZ -G1	SDC2921	SDC2921G	Tube
		SDC2921BZ -E1	SDC2921BZ -G1	SDC2921	SDC2921G	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	$V_{CC}$	5.5	V
Drain output voltage	$V_{CC1}, V_{CC2}$	5.5	V
Drain output current	$I_{CC1}, I_{CC2}$	200	mA
Power dissipation	$P_d$	200	mW
Storage temperature	$T_{STG}$	-65~150	°C
ESD, HBM model per Mil-Std-883, Method 3015	HBM	2000	V
ESD, MM model per JEDEC EIA/JESD22-A115	MM	200	V

Table 2. Absolute Maximum Ratings

**Recommended Operating Conditions**

Parameter	Symbol	Min	Max	Unit
Supply voltage	$V_{CC}$	4.5	5.5	V
Oscillation frequency	$f_{OSC}$	55	65	kHz
Operating temperature	$T_{OPR}$	-10	70	°C

Table 3. Recommended Operating Conditions

**Electrical Characteristics** (Ta=25°C, V<sub>CC</sub>=5.0V, unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Dead Time Control Section</b>						
Input threshold voltage 1	V <sub>THDT</sub>	Zero duty cycle	-	3.0	3.3	V
Input threshold voltage 2		Max duty cycle	-	0.1	-	V
<b>Error Amp Section</b>						
Open loop voltage gain	G <sub>V</sub>	0.5V~3.5V	-	65	-	dB
Cross over point	B <sub>G</sub>	0dB	1800	2200	2600	kHz
VIN- bias voltage(SDC2921A)	V <sub>N</sub>	VIN- open	2.38	-	2.47	V
VIN- bias voltage(SDC2921B)	V <sub>N</sub>	VIN- open	2.47	-	2.52	V
<b>Output Section</b>						
Output saturation voltage	V <sub>DSSAT</sub>	I <sub>C</sub> =100mA	-	1.0	1.3	V
Drain off-state current	I <sub>DOFF</sub>	V <sub>CC</sub> =V <sub>S</sub> =V <sub>D</sub> =0V	-	2	10	uA
Rising time	t <sub>r</sub>	-	-	100	200	ns
Falling time	t <sub>f</sub>	-	-	50	200	ns
<b>Protection Section</b>						
3.3V OVP	V33 <sub>OVP</sub>	-	3.8	4.1	4.3	V
5V OVP	V5 <sub>OVP</sub>	-	5.8	6.2	6.6	V
12V OVP	V12 <sub>OVP</sub>	-	4.41	4.64	4.90	V
PT OVP	VPT <sub>OVP</sub>	-	1.2	1.25	1.3	V
3.3V UVP	V33 <sub>UVP</sub>	-	1.78	1.98	2.18	V
5V UVP	V5 <sub>UVP</sub>	-	2.70	3.00	3.30	V
12V UVP	V12 <sub>UVP</sub>	-	2.11	2.37	2.63	V
UVP disable voltage	VPT <sub>DIS</sub>	-	0.55	0.62	0.68	V
UVP delay time	t <sub>UVP</sub>	-	100	280	500	ms
<b>Remote On/Off Section</b>						
Rem high input voltage	V <sub>REMH</sub>	-	2.0	-	-	V
Rem low input voltage	V <sub>REML</sub>	-	-	-	0.8	V
Rem pull high voltage	V <sub>REMO</sub>	-	2.0	-	5.25	V
Rem on delay time	t <sub>REMON</sub>	-	30	36	42	ms
Rem off delay time	t <sub>REMOFF</sub>	-	3.5	4.5	5.5	ms

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Power Good Section</b>						
Detecting input voltage	$V_{DET}$	-	0.55	0.62	0.68	V
PG output pull-up resistor	$R_{PUP}$	-	-	5	-	k $\Omega$
PG output load resistor	$R_{PG}$	-	0.5	1	2	k $\Omega$
PG delay time	$t_{PG}$	-	100	280	350	ms
PG output saturation voltage	$V_{SATPG}$	$I_{PG}=10mA$	-	0.2	0.4	V
<b>Soft Start Section</b>						
Sink current of SS	$I_{SS.SINK}$	-	-	13	-	$\mu A$
Source current of SS	$I_{SS.SOURCE}$	-	-	700	-	$\mu A$
<b>Total Device</b>						
Standby supply current	$I_{DD}$	-	-	10	20	mA
<b>Oscillation Section</b>						
Oscillation frequency	$f_{OSC}$	$R_T=120k\Omega$	50	-	70	kHz

Table 4. Electrical Characteristics

**Function Description**
**Input impedance**

Pin Number	Pin Name	Input impedance
1	V33	47 kΩ
2	V5	73 kΩ
3	V12	47 kΩ
4	PT	TO VCC: 24 kΩ; TO GND: 4.6 kΩ

Table 5. Input impedance

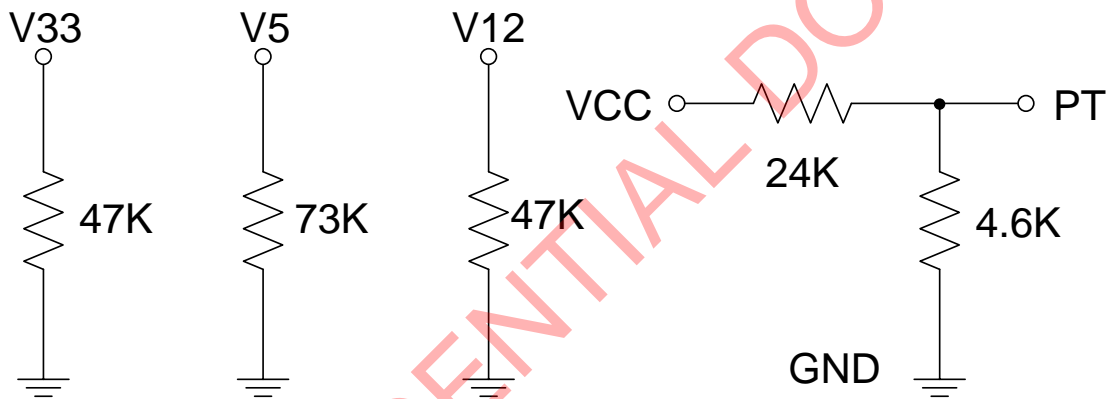


Figure 4. Electrical Characteristics



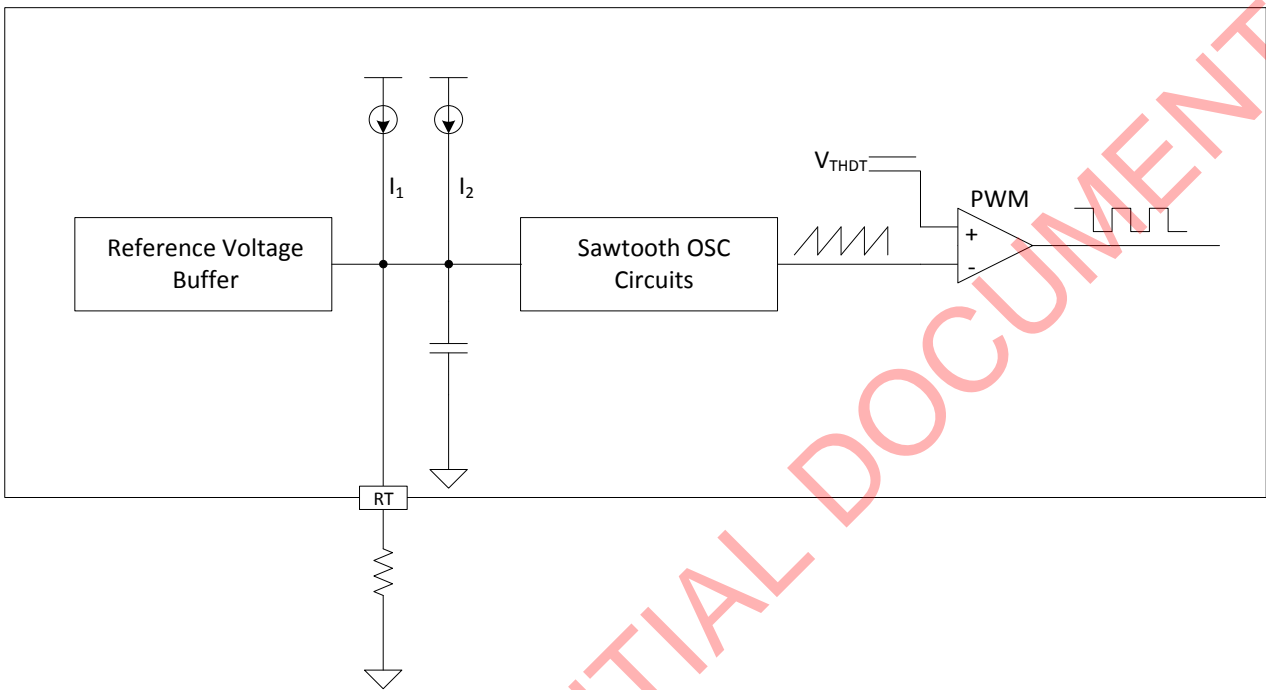
**Sawtooth OSC. Function**


Figure 5. Sawtooth OSC. Function

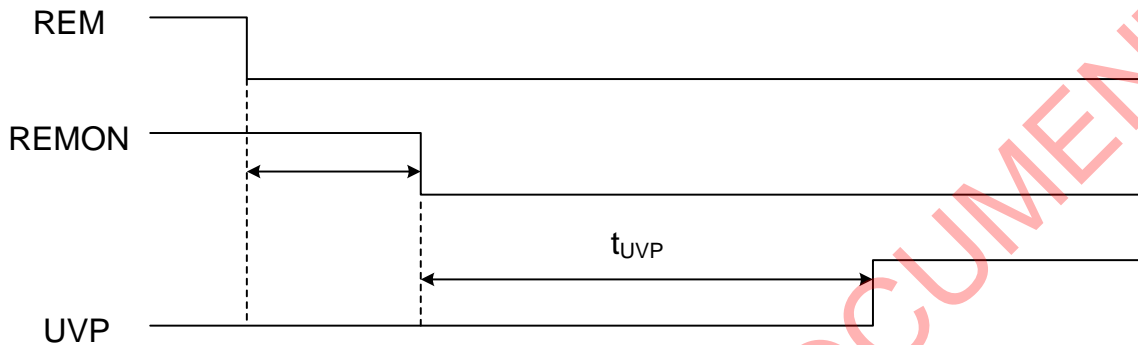
**Under Voltage Protection Delay Time**


Figure 6. Delay Time

**Pulse Width Modulation Block**

The output pulse width modulation is generated by comparison of the sawtooth waveform from the capacitor CT to the feedback of the voltage. Therefore, an increase in feedback control signal amplitude cause a linear

decrease of the output pulse width. Also, the SS(Soft-Start) limits the output pulse width. The timing diagram is shown as below:

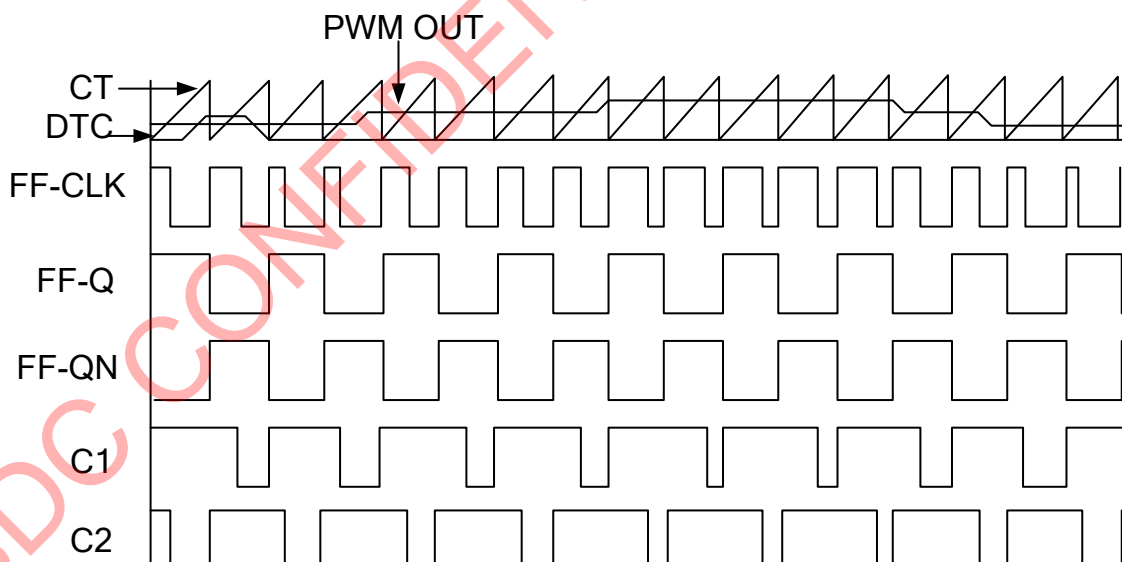


Figure 7. PWM Block

**The function of PT**

This signal is prepared for extra OVP/OPP ( $V_{PT} > 1.25V$ ) or disable under voltage protection function ( $V_{PT} < 0.62V$ )

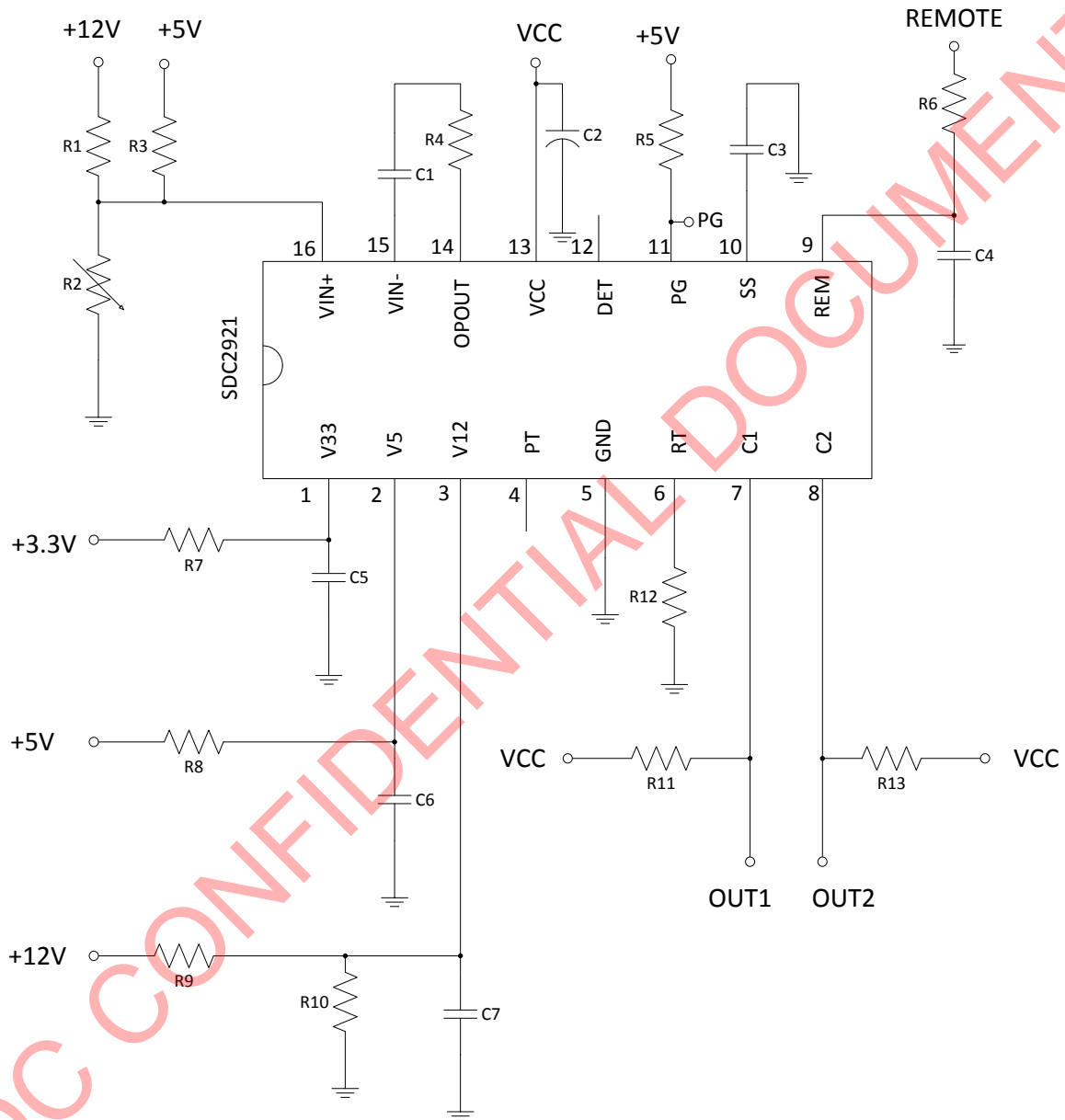
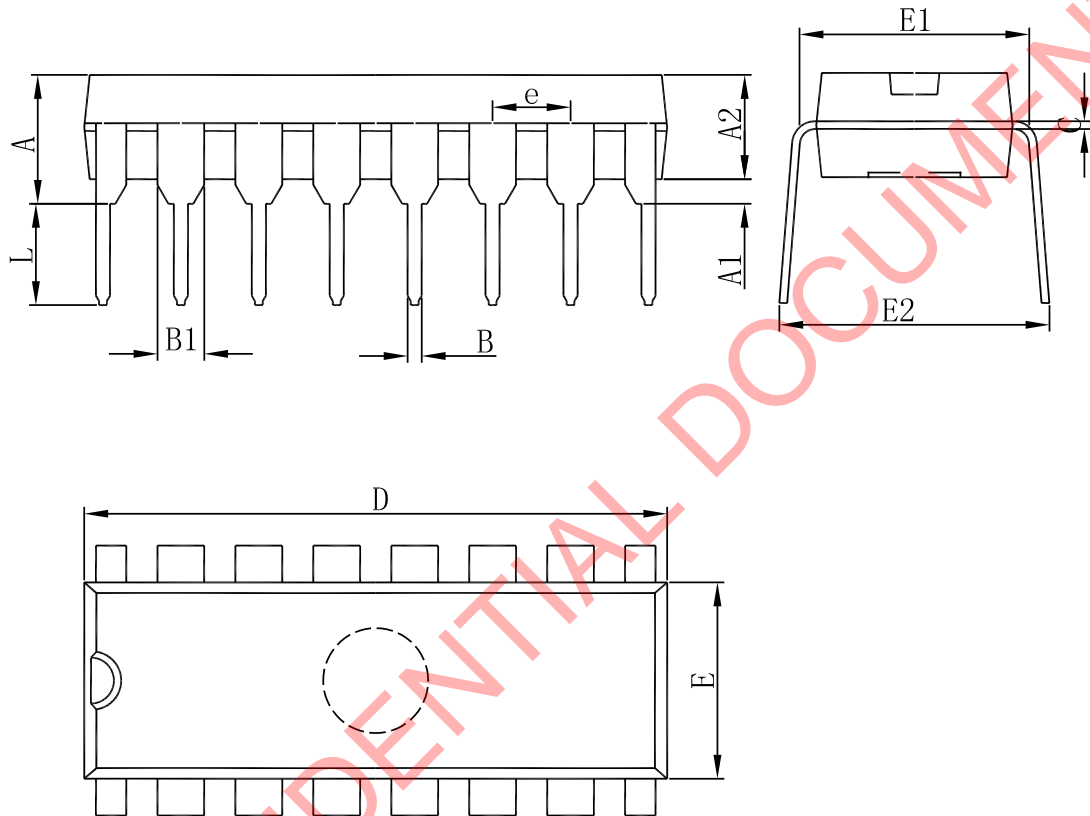
**Typical Application**


Figure 8. Typical Application

In some application power systems, adding an external resistor (R6) could reduce the peak value spike from the environments to pin 9 (REM) and avoid pin 9 (REM) damaged by the external noise.

**Package Dimension**
**DIP-16**


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	18.800	19.200	0.740	0.756
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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