Voltage Mode PWM Controller **SDC2921**

General Description

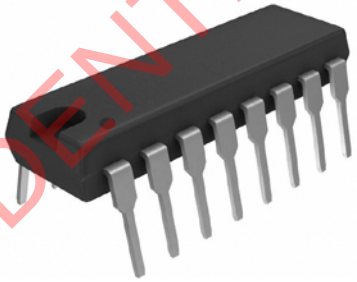
The SDC2921 is a Pulse–Width Modulation (PWM) control circuit with complete protection circuits for the SMPS (Switching Mode Power Supply). It contains various functions, can minimize external components of switching power supply systems in personal computer.

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



DIP-16

Figure 1. Package Type

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Pin Configuration

Package: DIP-16

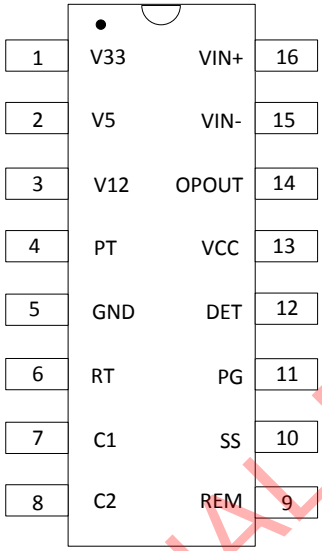

Figure 2. Pin Configuration

Pin Number	Pin Name	Function
1	V33	OVP/UVP input for 3.3V
2	V5	OVP/UVP input for 5V
3	V12	OVP/UVP 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

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Functional Block Diagram

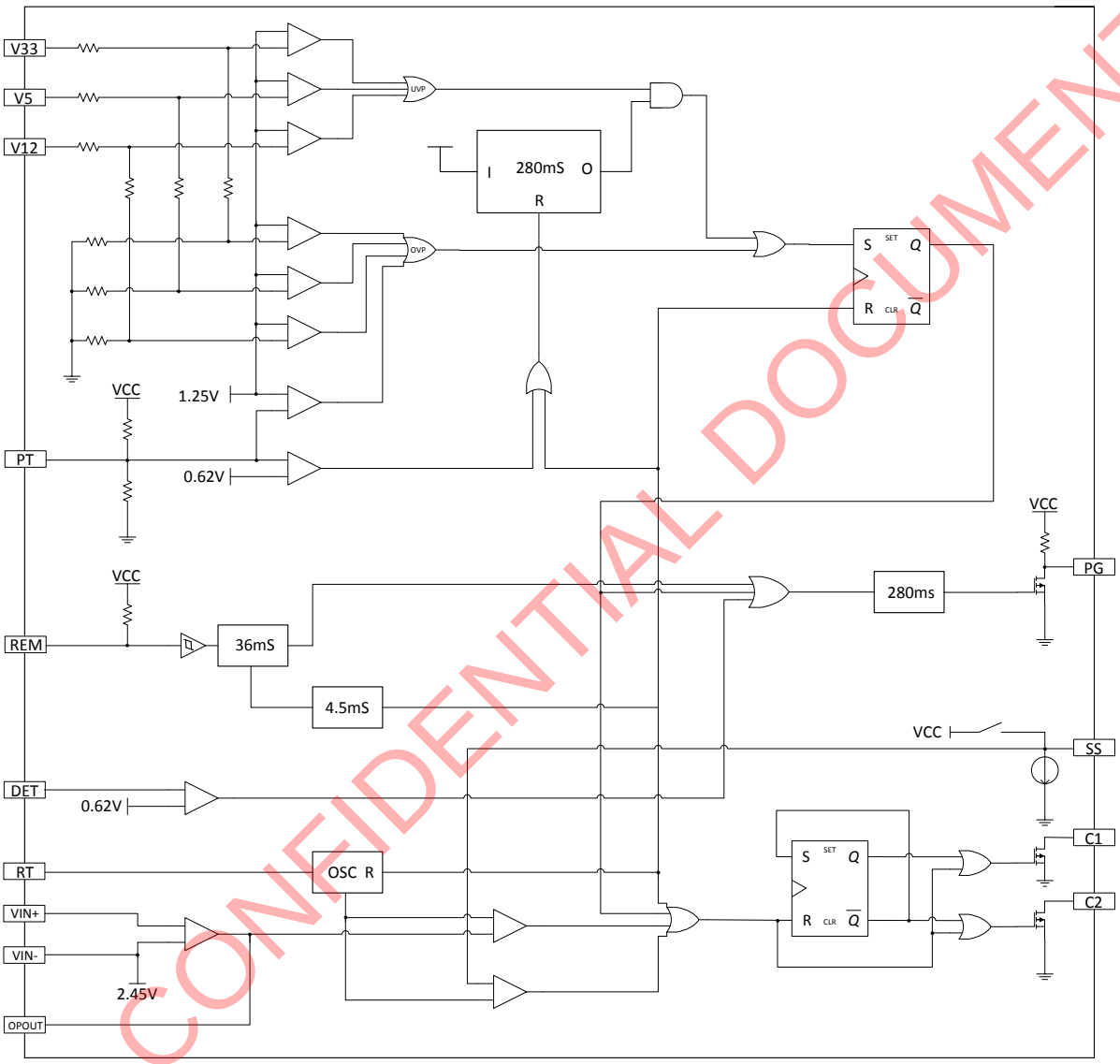

Figure 3. Functional Block Diagram

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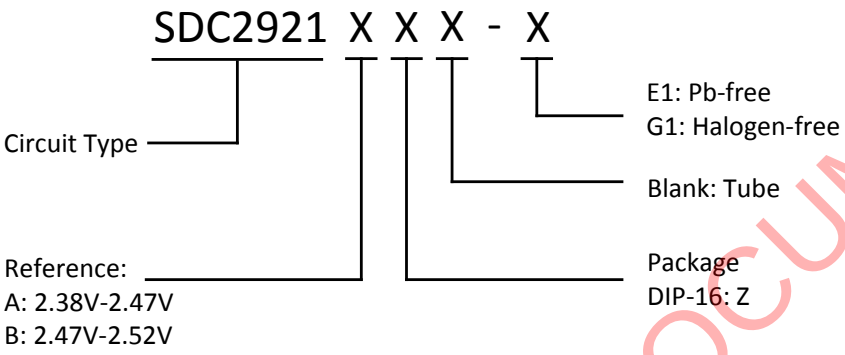
Ordering Information



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

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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

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Dead Time Control Section						
Input threshold voltage 1	V_{THDT}	Zero duty cycle	-	3.0	3.3	V
Input threshold voltage 2		Max duty cycle	-	0.1	-	V
Error Amp Section						
Open loop voltage gain	G_V	0.5V~3.5V	-	65	-	dB
Cross over point	B_G	0dB	1800	2200	2600	kHz
VIN- bias voltage(SDC2921A)	V_N	VIN- open	2.38	-	2.47	V
VIN- bias voltage(SDC2921B)	V_N	VIN- open	2.47	-	2.52	V
Output Section						
Output saturation voltage	V_{DSSAT}	I_C=100mA	-	1.0	1.3	V
Drain off-state current	I_{DOFF}	V_{CC}=V_S= V_D=0V	-	2	10	uA
Rising time	t_r	-	-	100	200	ns
Falling time	t_f	-	-	50	200	ns
Protection Section						
3.3V OVP	$V33_{OVP}$	-	3.8	4.1	4.3	V
5V OVP	$V5_{OVP}$	-	5.8	6.2	6.6	V
12V OVP	$V12_{OVP}$	-	4.41	4.64	4.90	V
PT OVP	VPT_{OVP}	-	1.2	1.25	1.3	V
3.3V UVP	$V33_{UVP}$	-	1.78	1.98	2.18	V
5V UVP	$V5_{UVP}$	-	2.70	3.00	3.30	V
12V UVP	$V12_{UVP}$	-	2.11	2.37	2.63	V
UVP disable voltage	VPT_{DIS}	-	0.55	0.62	0.68	V
UVP delay time	t_{UVP}	-	100	280	500	ms
Remote On/Off Section						
Rem high input voltage	V_{REMH}	-	2.0	-	-	V
Rem low input voltage	V_{REML}	-	-	-	0.8	V
Rem pull high voltage	V_{REMO}	-	2.0	-	5.25	V
Rem on delay time	t_{REMON}	-	30	36	42	ms
Rem off delay time	t_{REMOFF}	-	3.5	4.5	5.5	ms

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

Table 4. Electrical Characteristics

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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

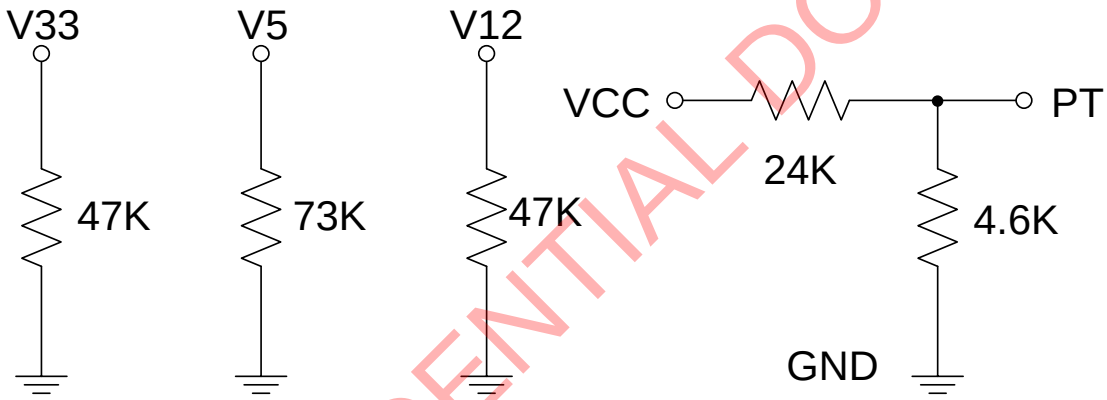

Figure 4. Electrical Characteristics

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Sawtooth OSC. Funcition

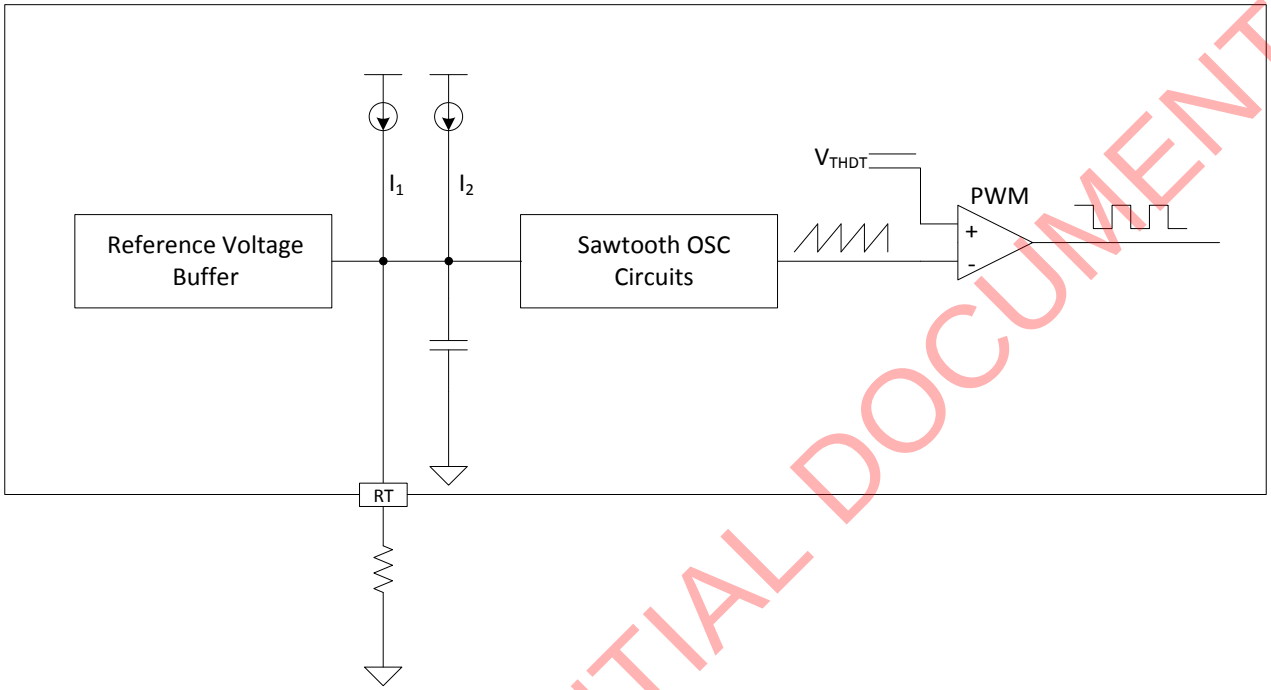

Figure 5. Sawtooth OSC. Funcition

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Under Voltage Protection Delay Time

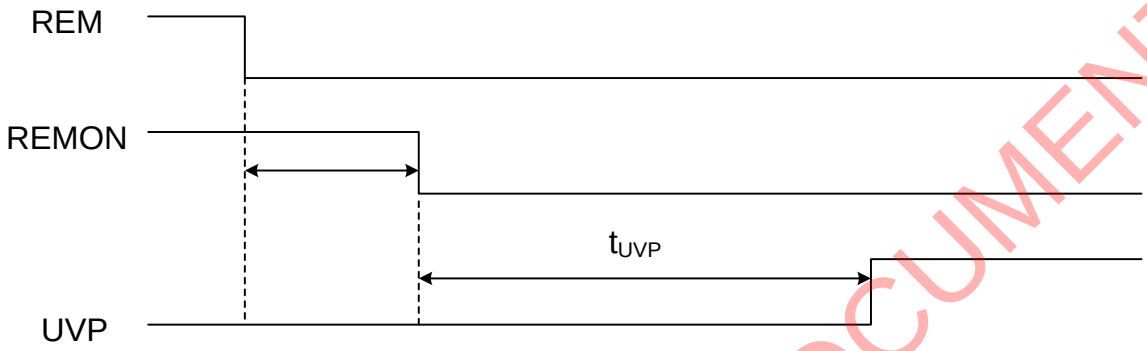

Figure 6. Delay Time

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:

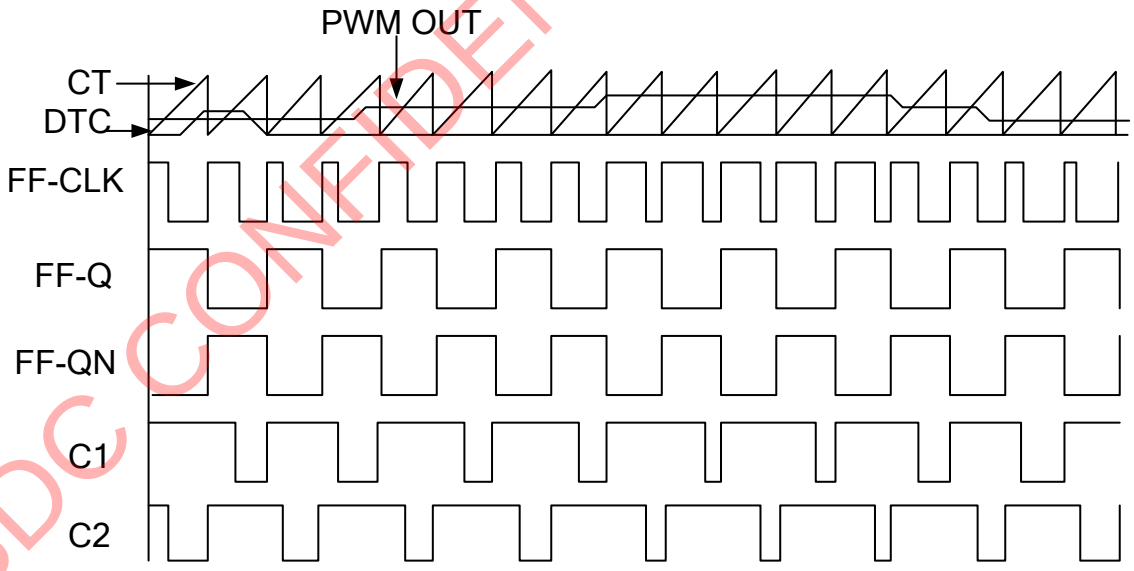

Figure 7. PWM Block

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)

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Typical Application

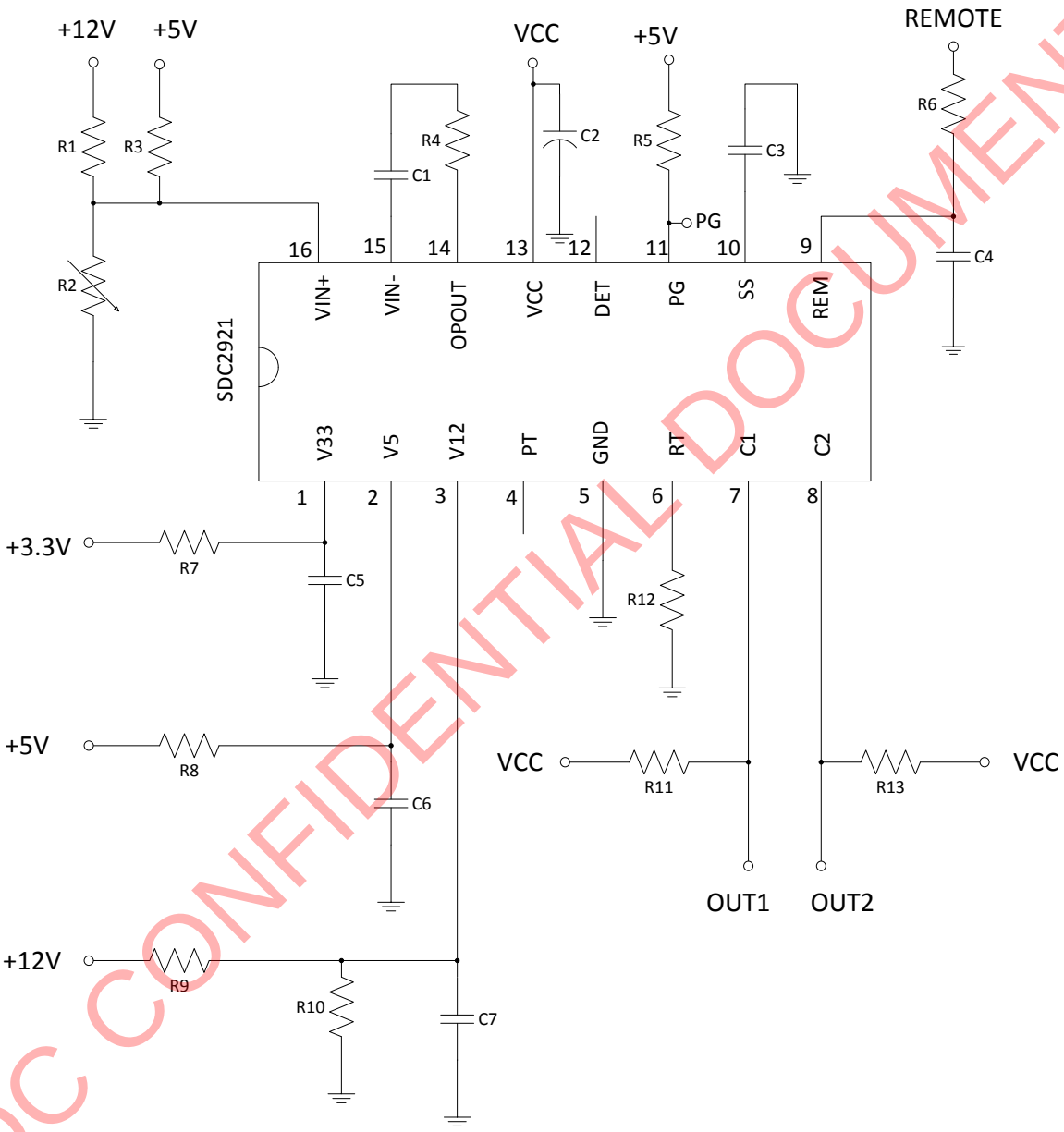

Figure 8. Typical Application

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.

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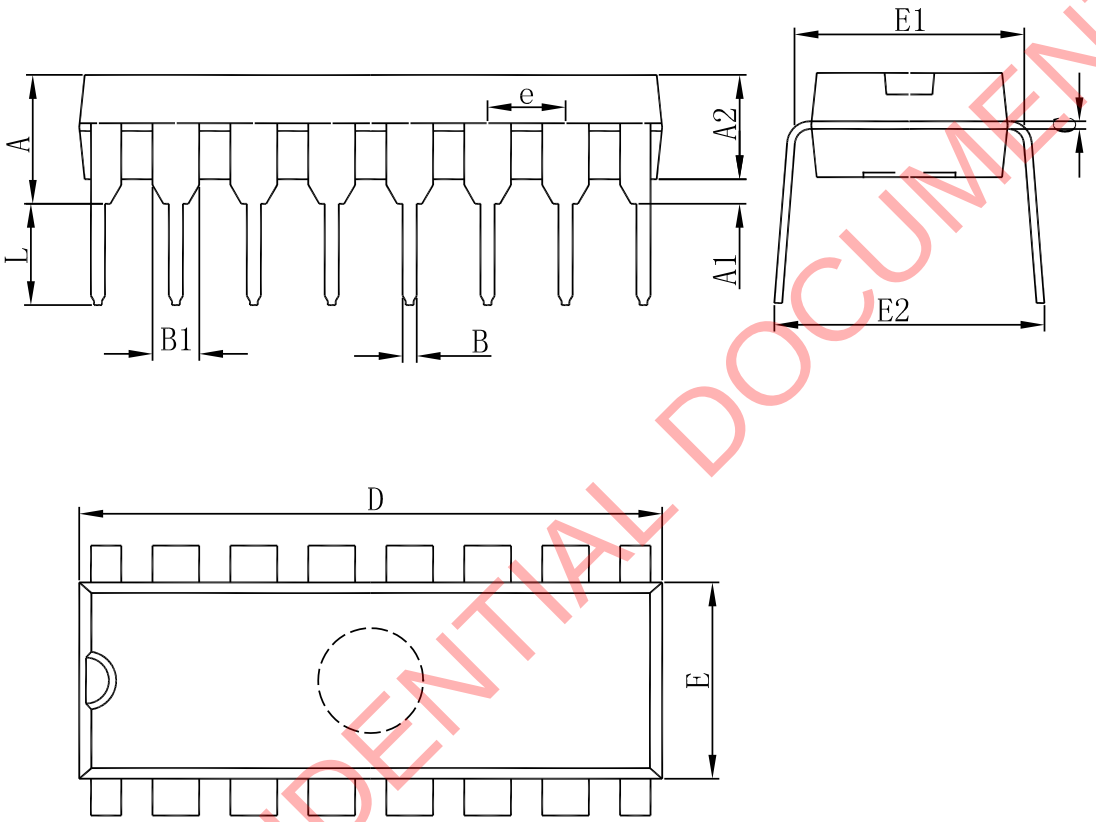
Package Dimension

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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