



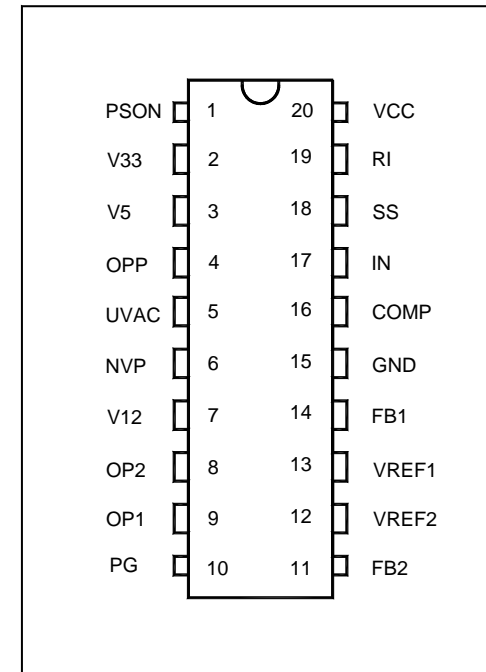
FSP3529 INTRODUCE.

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the
power
franchise™



- 特性
- 半桥式（或者494）电源供应器监控IC+两个431+ PWM
- 高集成度和少量的外部组件
- 3.3V、5V 和12V 过压保护
- 3.3V、5V 和12V 欠压保护
- -12V 和/或 -5V欠压保护
- 过功率和短路保护
- AC输入电压下降报警电路
- PG电路
- PSON和PG信号用延迟时间
- 远程开/关功能
- 内含振荡器和误差放大器
- 两个431调整器用于3.3和5V电压
- 锁存脉宽调制（PWM），可逐周期开关
- 推挽式脉宽调制工作方式和图腾柱驱动输出
- 软启动和最大93%占空比

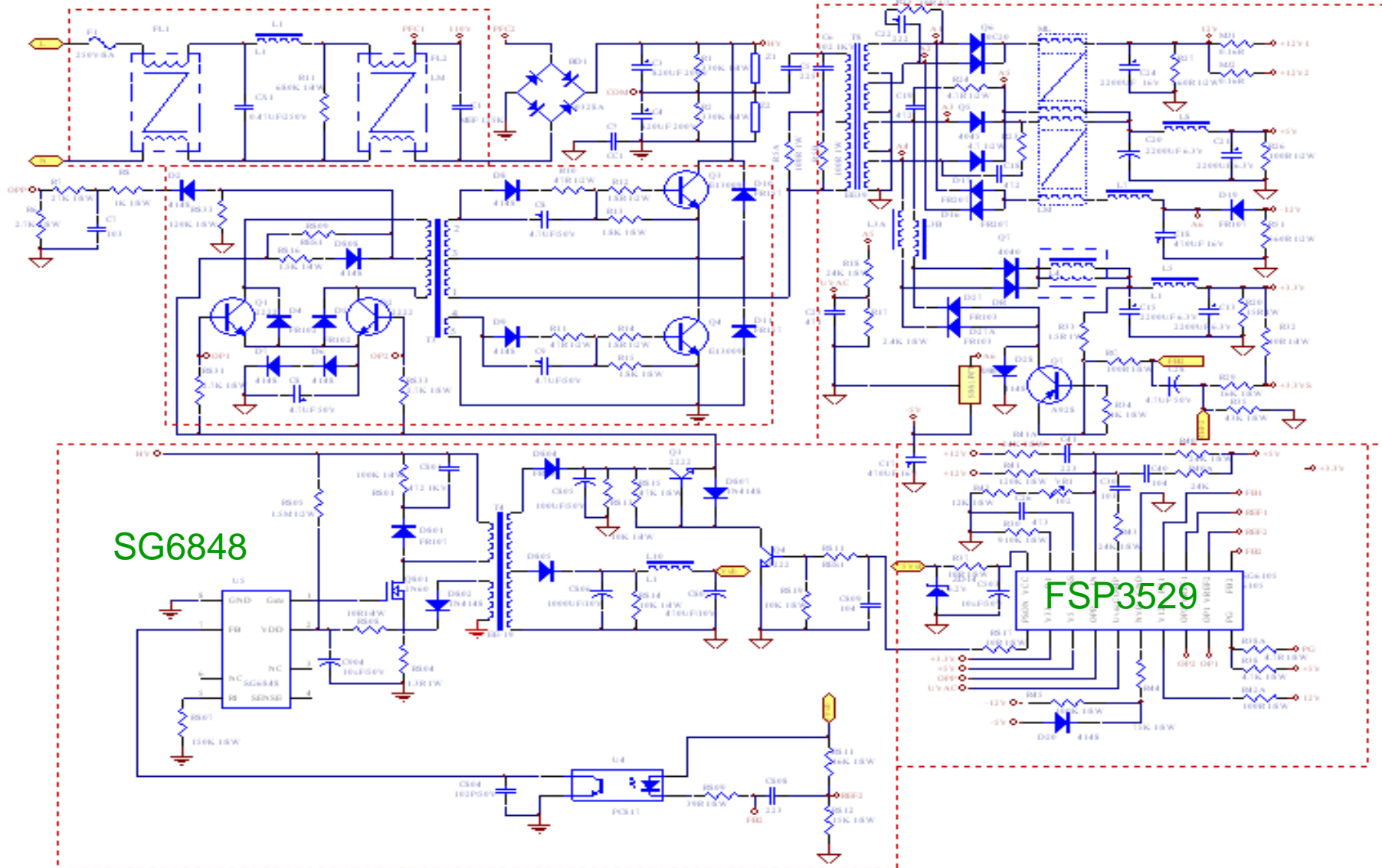




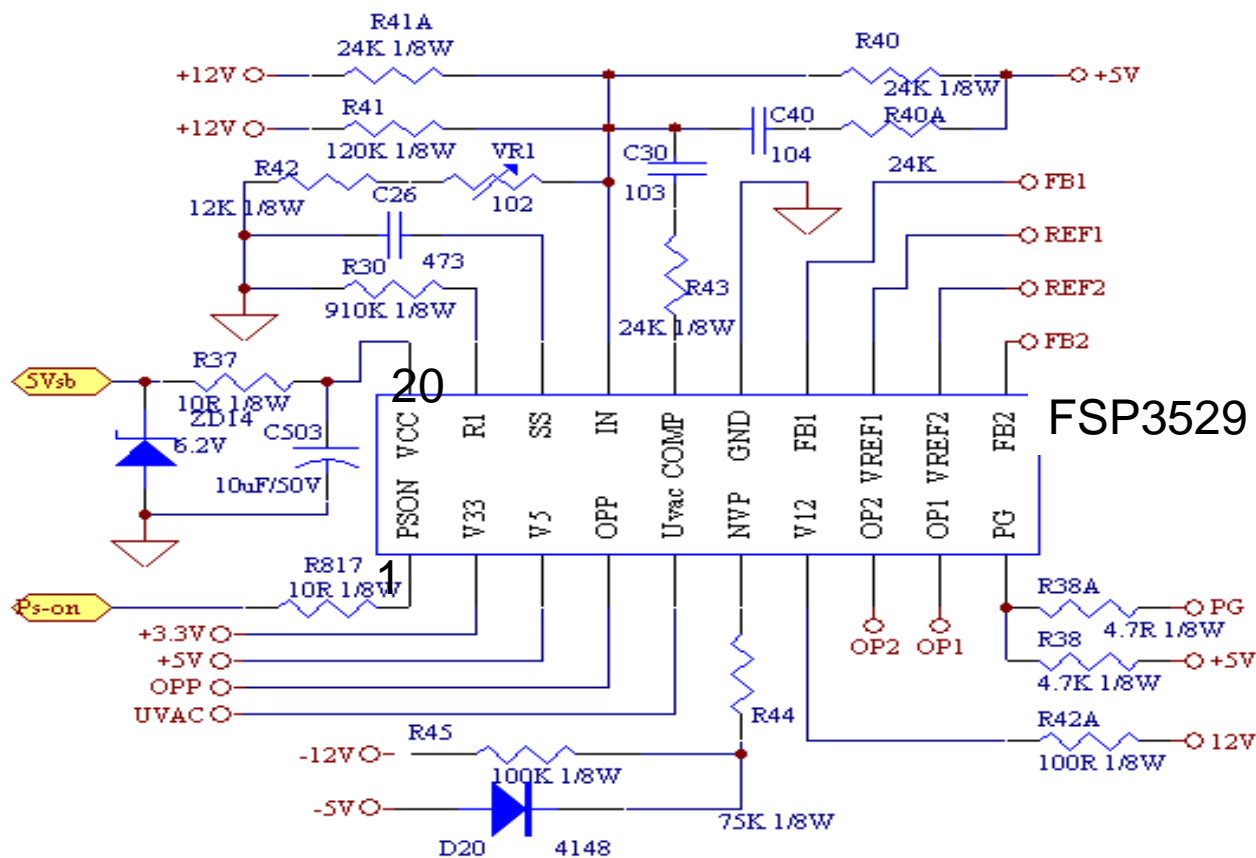
TL494 PWM Controller	x 1
LM339 Quad Comparator	x 1
TL431 Regulator	x 2
Transistor	x 7
Zener Diode	x 4
Diode	x 6
Capacitor 10u/50V	x 1
Capacitor 1u/50V	x 1
Resistor	x 27

Total : **50**

CIRCUIT DIAGRAM

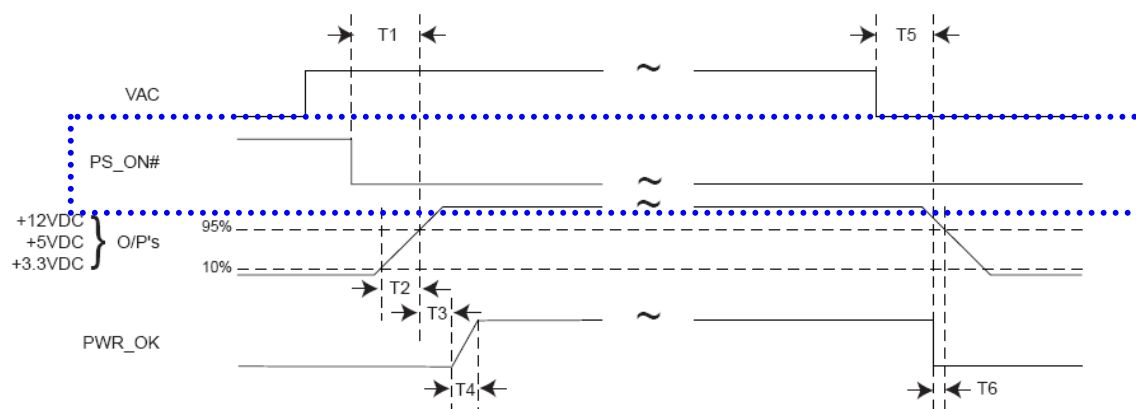


FSP3529 外围零件



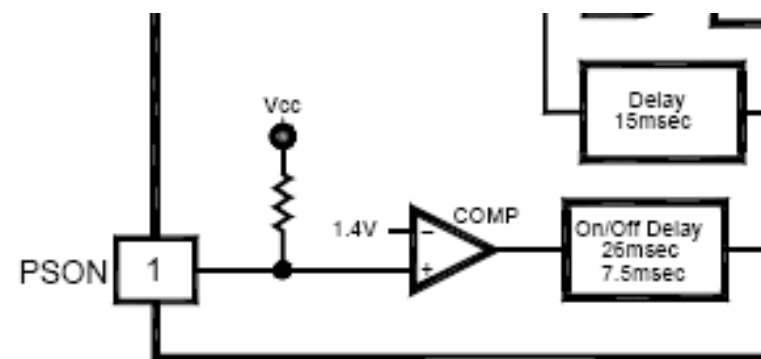


- CPU或者控制器的远程开/关逻辑输入。
- PS ON 7.5毫秒/PS OFF 26毫秒延迟之后打开/关闭脉宽调制输出。
- PSON = 0(0~0.8V)开关电源工作。
- PSON = 1(>2V)开关电源关闭。
- PSON=0.8V~2V ,没定义。



PWR_OK Sense Level = 95% of nominal

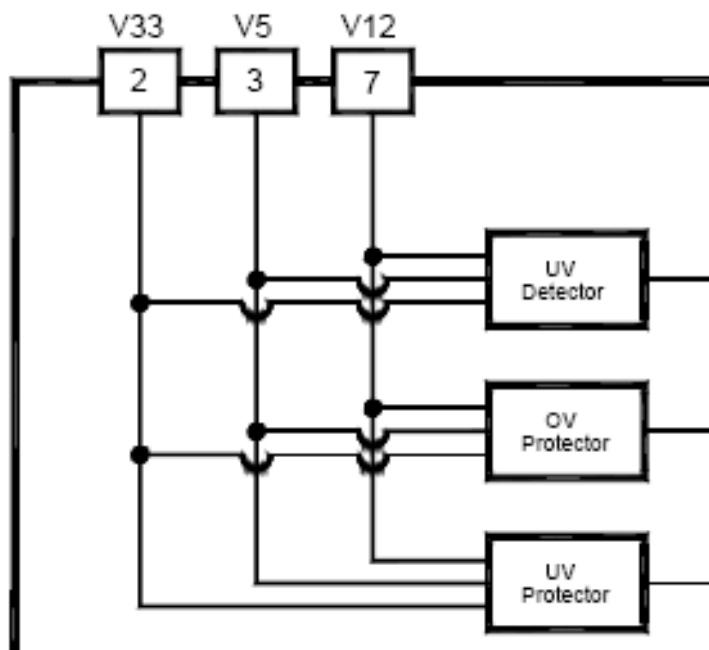
timing_3_5_12b



PIN2: +3.3V 过压/欠压保护(橙色线)

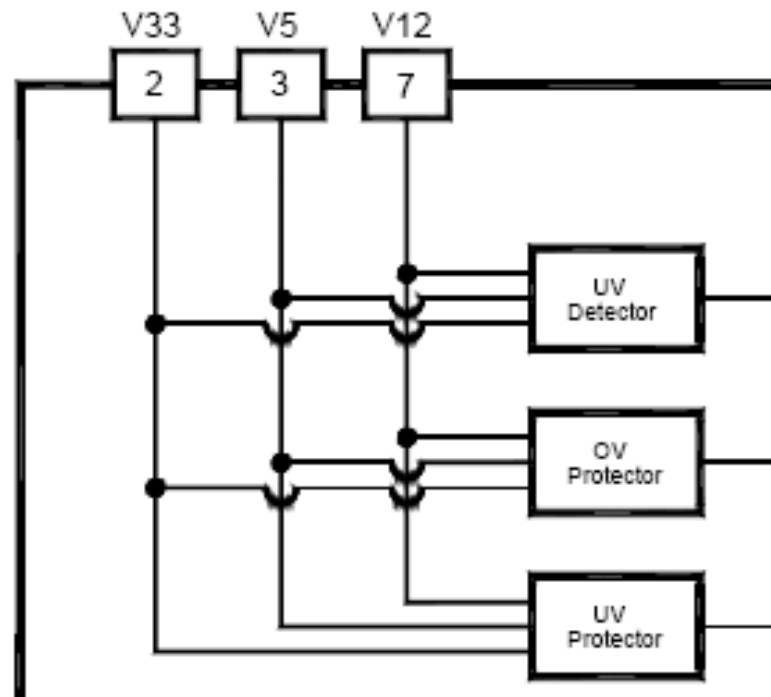


- 条件
- $3.3V > 4.1V (3.9V \sim 4.3V)$ 0.7ms 电源无输出。
- $3.3V < 2.6V (2 \sim 2.8V)$ 2.4ms 电源无输出。
- $3.3V : 2.8V (2.5V \sim 3V)$ 1.2ms PG 无输出。





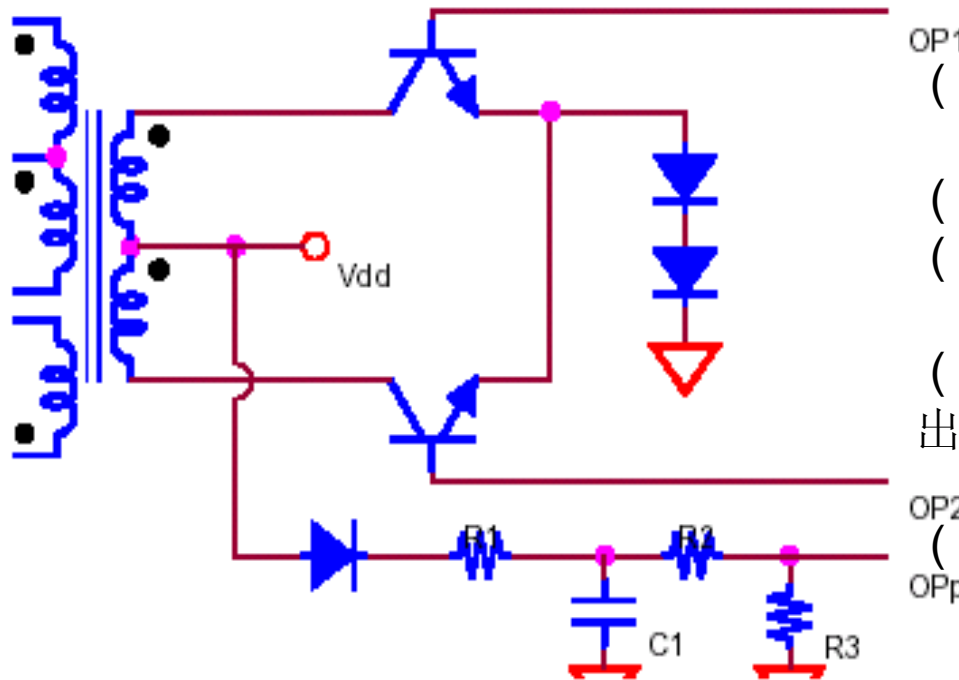
- 条件
- $+5V > 6.1V (5.8 \sim 6.5V)$ 0.7ms 电源无输出。
- $+5V < 3.6V (3 \sim 3.9V)$ 2.4ms 电源无输出。
- $+5V: 4.3V (4V \sim 4.5V)$ 1.2ms PG 无输出。



PIN4 : Opp input



(1) 过功率检测输入。该脚连接到驱动变压器或者电流变压器的输出端。不使用时，该脚应当接地。



OP1

$$(2) V_{opp} = V_{dds} * R3 / (R1 + R2 + R3)$$

(3) 当 $V_{opp} \geq 2.4V$ /7ms后，无输出（保护）。

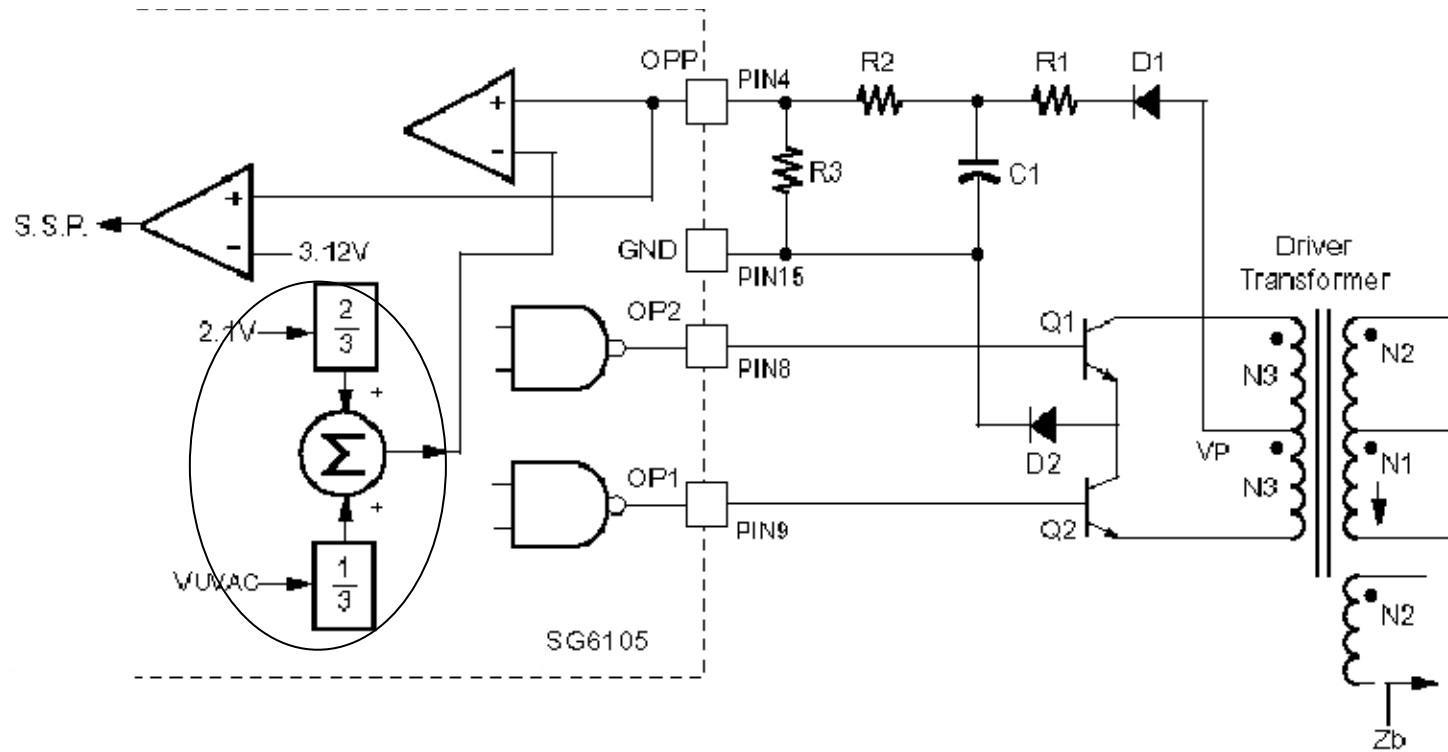
(4) 当 $V_{opp} \geq 3.2V$ 则无时间延迟而无输出（保护）。

OP2

$$(5) V_{opp} \geq 2/3V_{opp} + 1/3V_{uvac}$$

OPp

$$V_{opp} \geq 2/3V_{opp} + 1/3V_{uvac}$$





$$V_{opp-Limit} = (V_{opp} * 0.67) + [(UVAC + 0.1) * 0.33]$$

When $V_{opp-Limit} > 2.1V$ Delay 7ms OPP Protect.

例:

$$V_{opp-Limit} = 2.1V$$

假設 $UVAC = 0.7V (V_{in} = 90V) \sim 1.02V (V_{in} = 135V)$

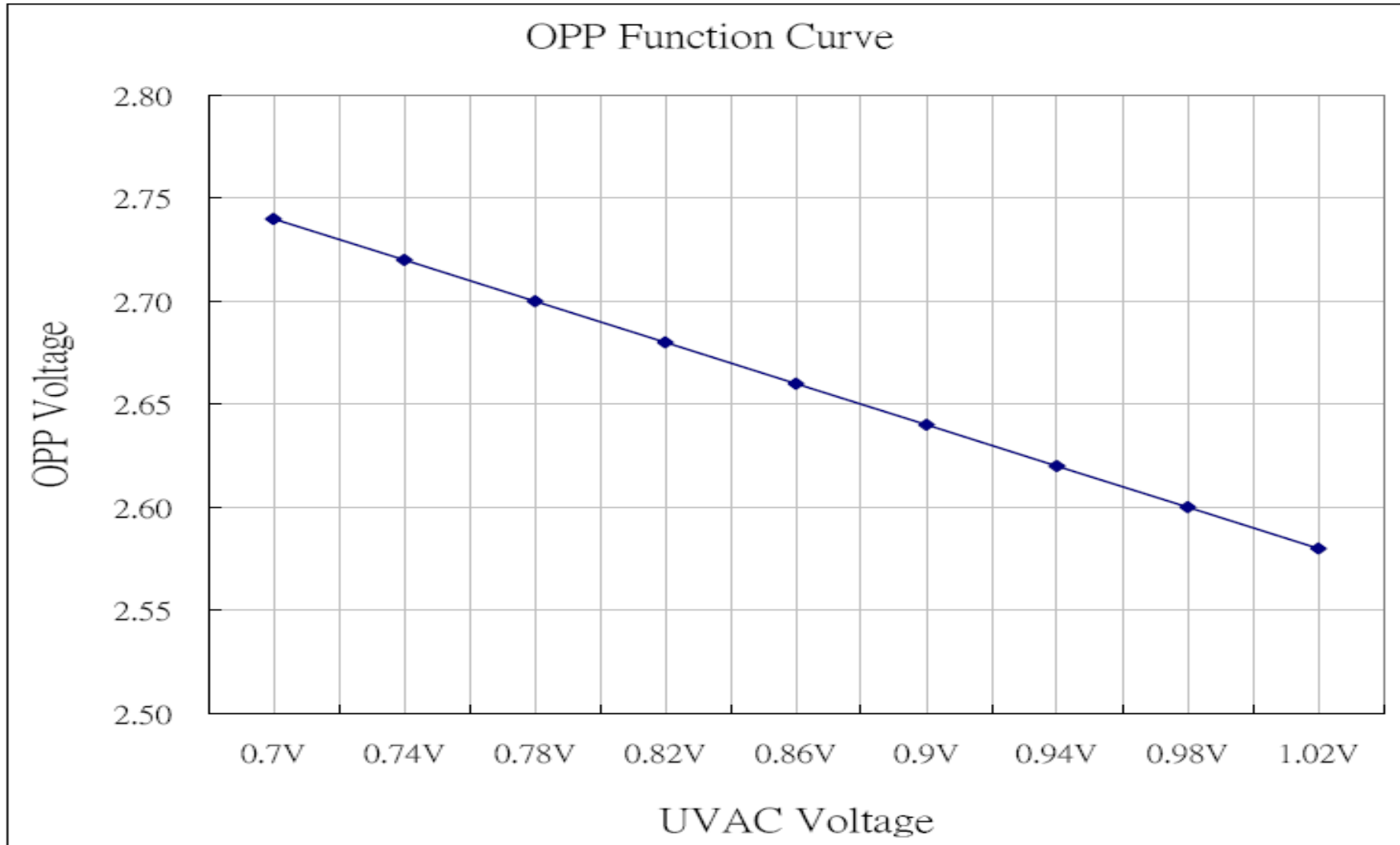
依公式計算:

$$V_{opp} = \{V_{opp-limit} - [(UVAC + 0.1) * 0.33]\} / 0.67$$

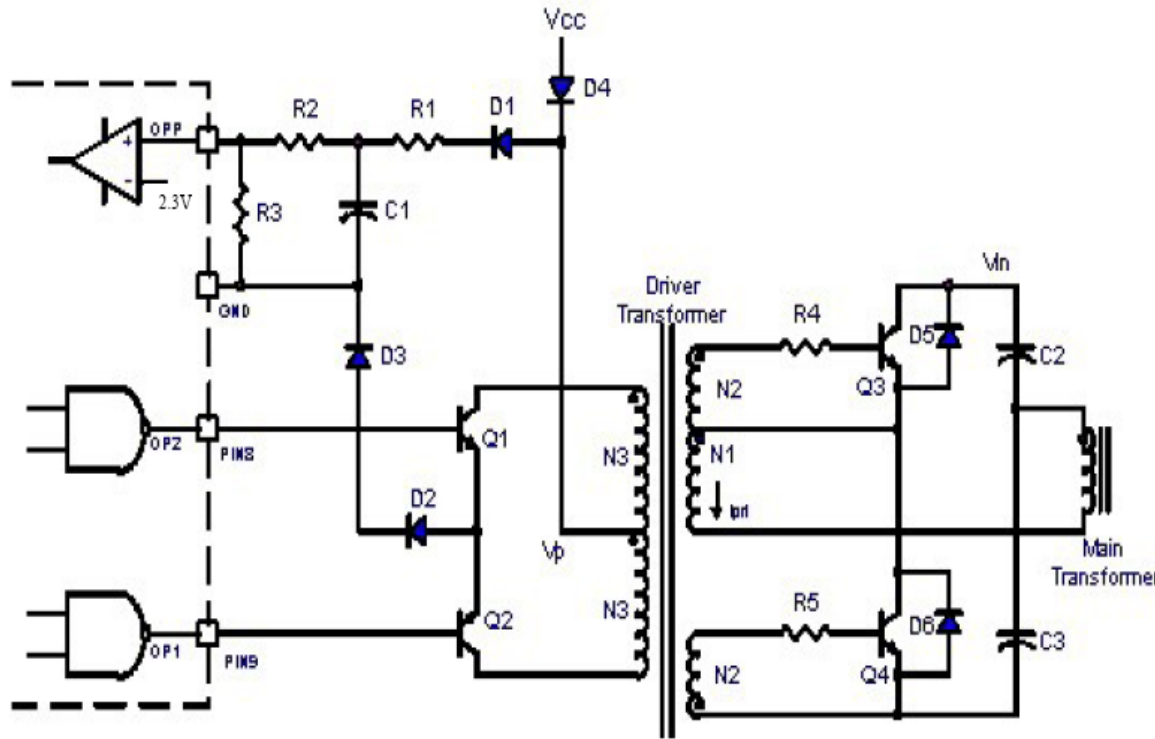
因此 OPP(pin-4)輸入端須上升大於下列電壓值, OPP 進入保護狀態

UVAC(V)	0.7V	0.74V	0.78V	0.82V	0.86V	0.9V	0.94V	0.98V	1.02V
Vopp-Limit	2.1V	2.1V	2.1V	2.1V	2.1V	2.1V	2.1V	2.1V	2.1V
OPP(V)	2.74	2.72	2.70	2.68	2.66	2.64	2.62	2.60	2.58

VOPP VS UVAC



PIN4 : Vopp



$$I_{pri} \cdot \frac{N_1}{N_2}$$

$$V_{N2} = I_{pri} \cdot \frac{N_1}{N_2} \cdot Z_b$$

$$V_{N3} = V_{N2} \cdot \frac{N_3}{N_2}$$

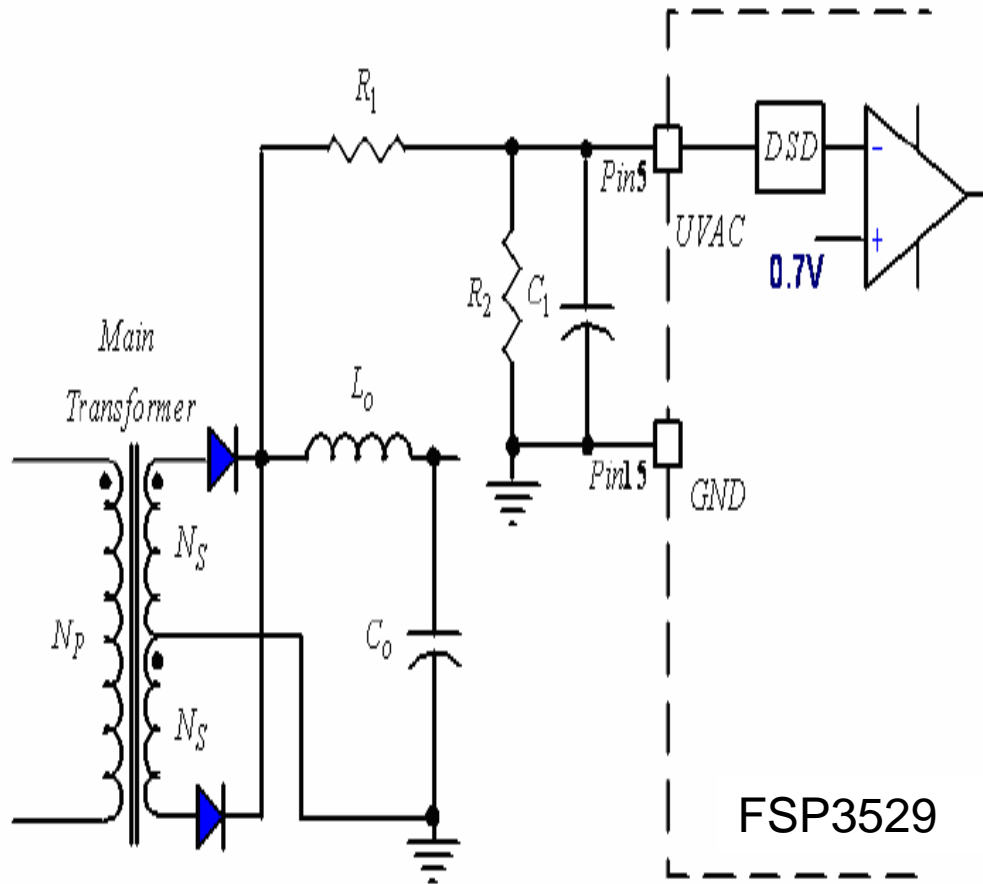
$$V_p = V_{N3} + 2V_{diode} = I_{pri} \cdot \frac{N_1}{N_2} \cdot Z_b \cdot \frac{N_3}{N_2} + 1.4V$$



交流故障检测，检测交流电压的欠或故障

当Uvac<0.7V,PG无

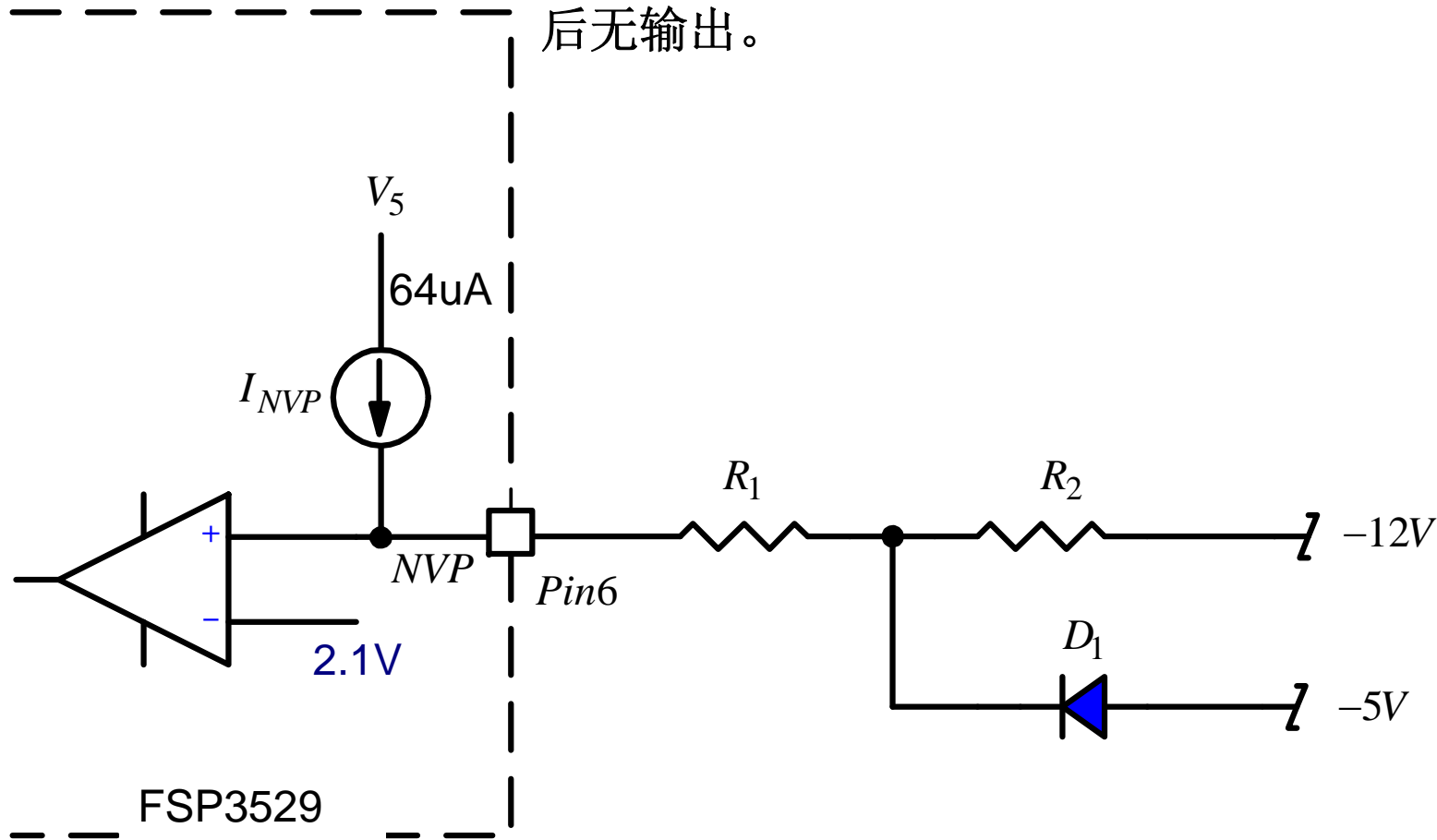
$$U_{vac} = V_s \cdot R_2 / (R_1 + R_2)$$



PIN 6:NVP



负电压保护输入，如-12V或-5V，触发电压2.1V 7mS
后无输出。





$$2.1 = I_{NVP} \times (R_1 + R_2) + V_{-12V}$$

With the -12V output within limits and the -5V output under voltage, the diode D₁ will be forward-biased. The threshold is then determined by:

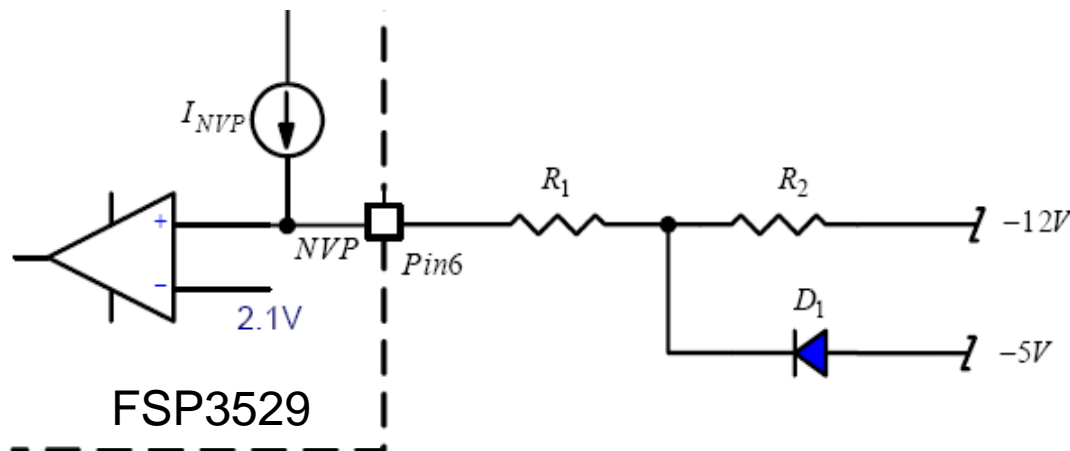
$$2.1 = I_{NVP} \times R_1 + (V_{-5V} - 0.7V)$$

With I_{NVP} equal to 64μA and the desired protection thresholds equal to -10V/-3.3V for the -12V/-5V outputs, the values of R₁/R₂ will be determined by the following equations:

$$2.1V = 64\mu A \times (R_1 + R_2) - 10V$$

$$2.1V = 64\mu A \times R_1 + (-3.3V - 0.7V)$$

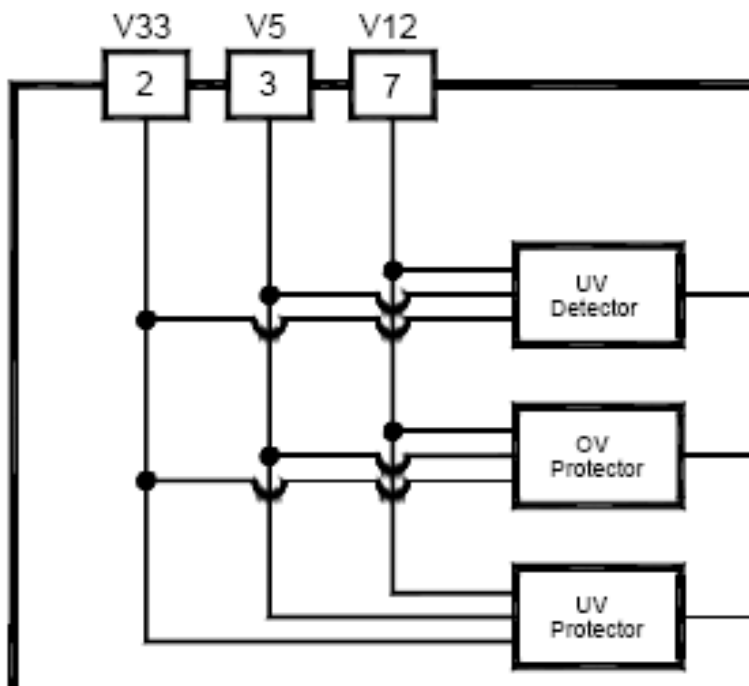
Solving the above equations, we get R₁= 95.3kΩ and R₂= 93.7kΩ.



PIN7: +12V 过压/欠压保护 (Yellow wire)

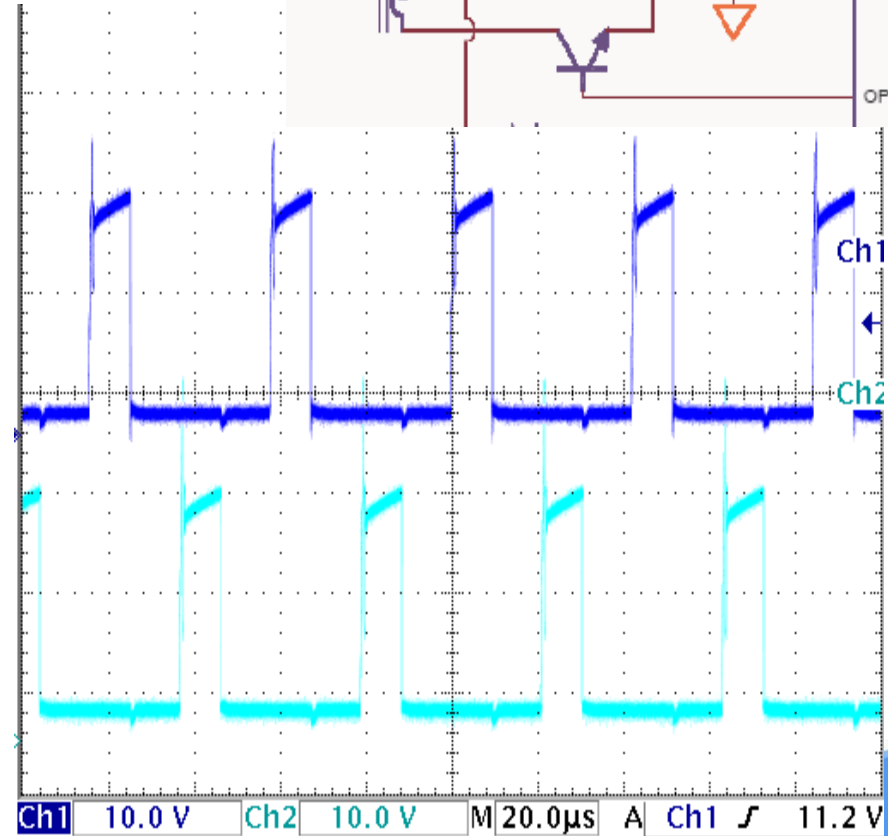
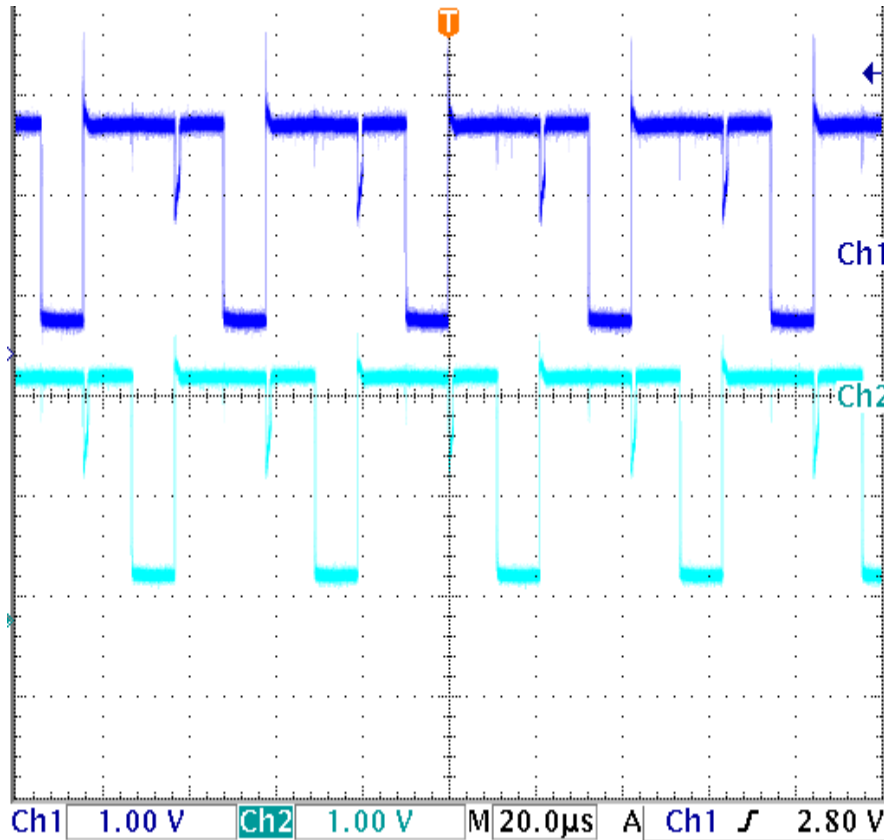
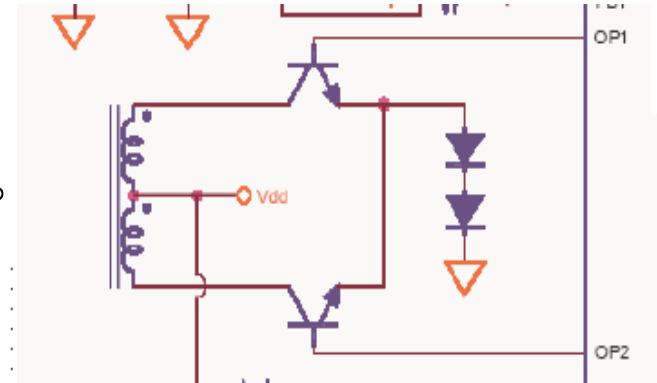


- 条件
- +12V > 14.5V (13.9~14.9V) 0.7ms 电源无输出。
- +12V < 7.2V (6~8V) 2.4ms 电源无输出。
- +12V: 10.1V (9.4V~10.4V) 1.2ms PG 无输出。

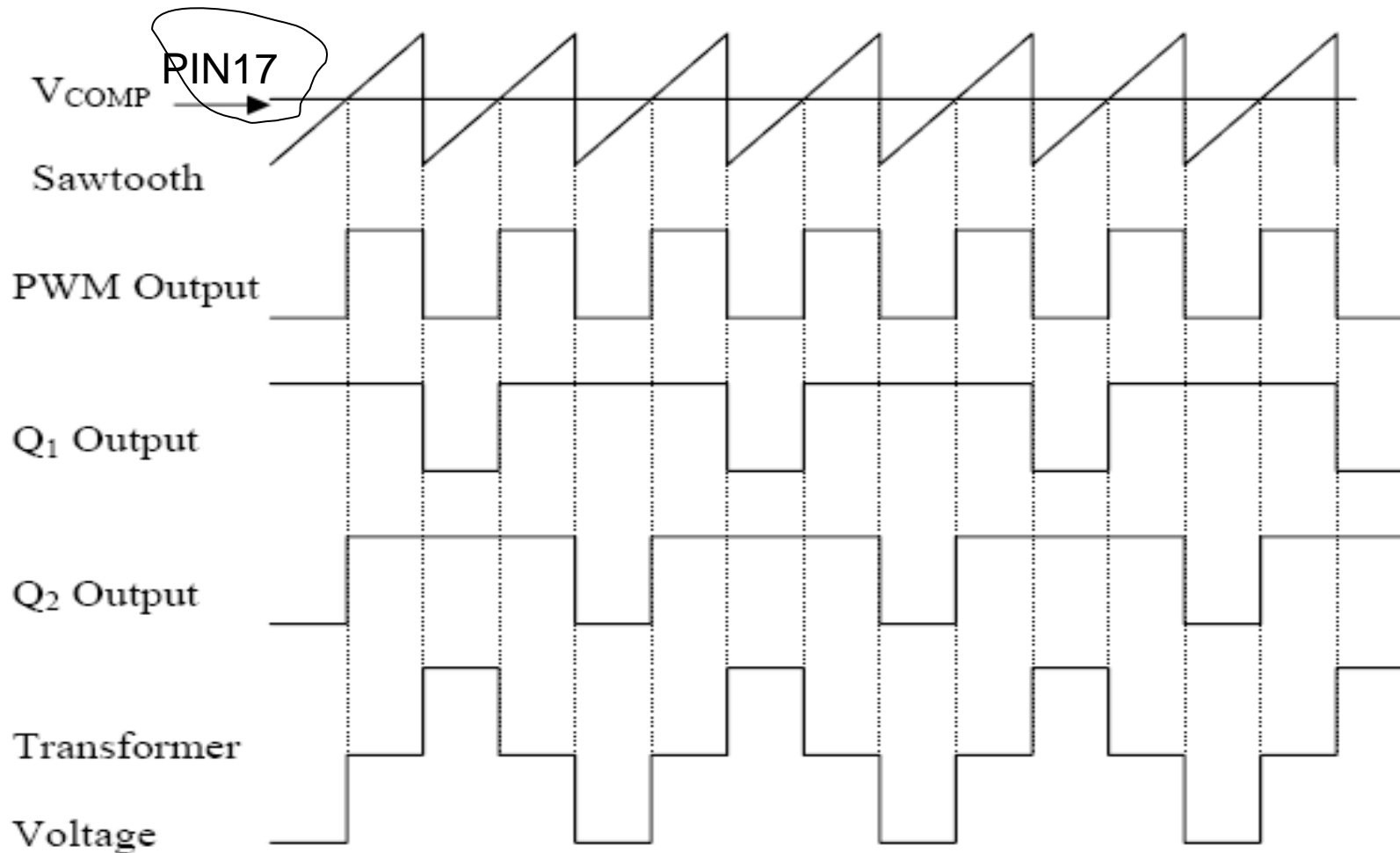




- 推挽式PWM图腾柱驱动输出。
- 输出的最大占空比OP1或者OP2为46%。



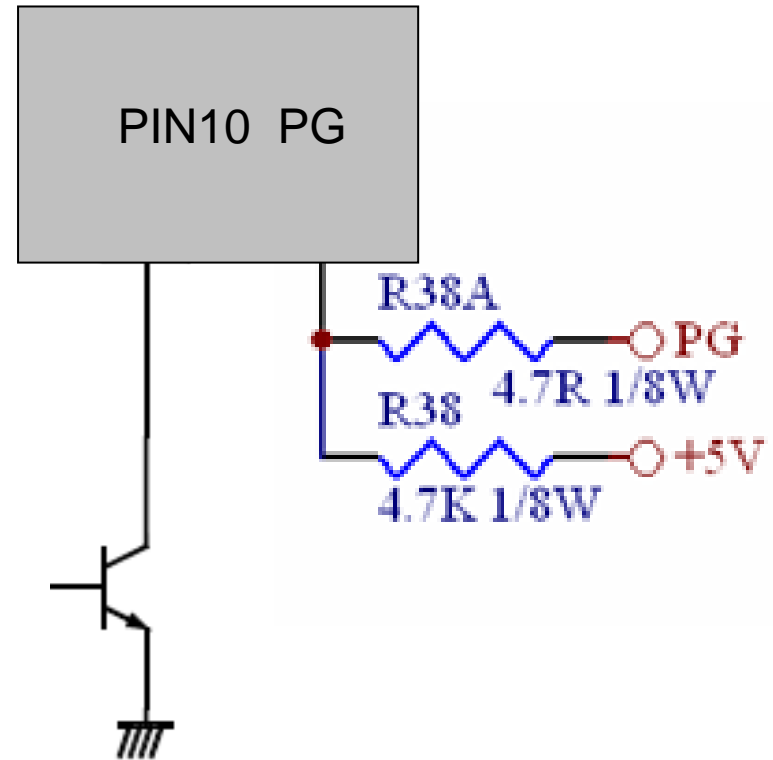
OP2/OP1 Time diagram



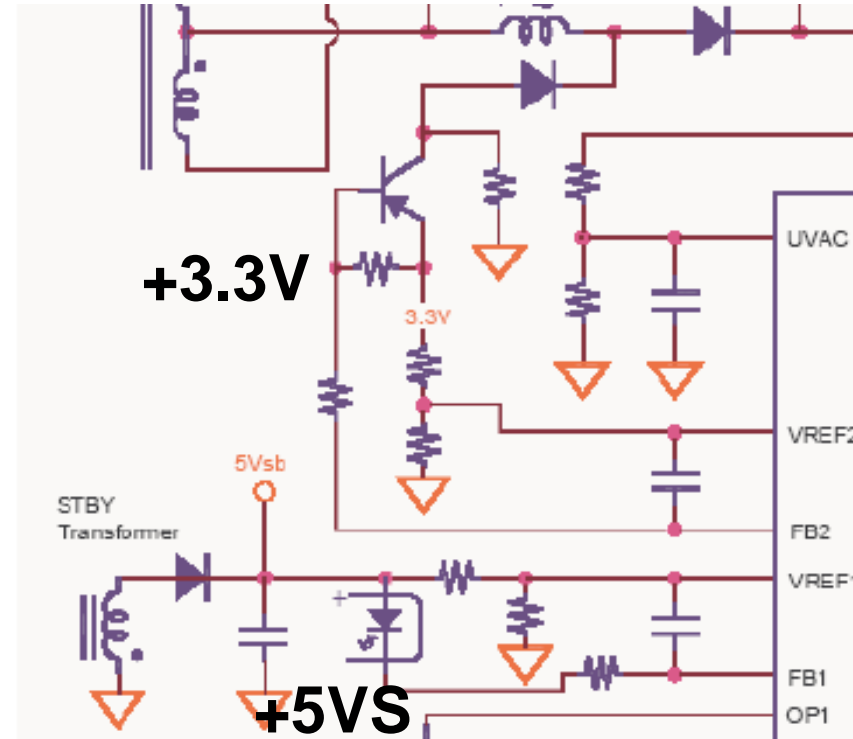
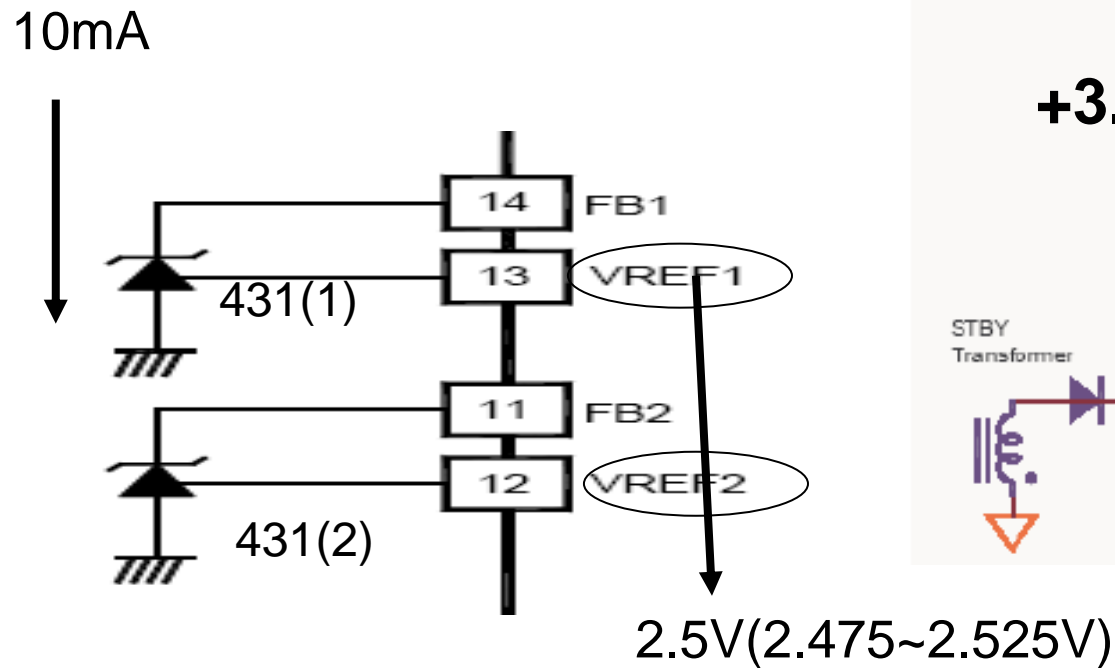
PIN10: PG (Gray Wire)



- PG逻辑输出，0或者1。
- PG = 1 (+5V) 电源工作正常。
- PG的延迟为300毫秒



PIN 11, P12: FB2, REF2
PIN 13, P14: REF2, FB2

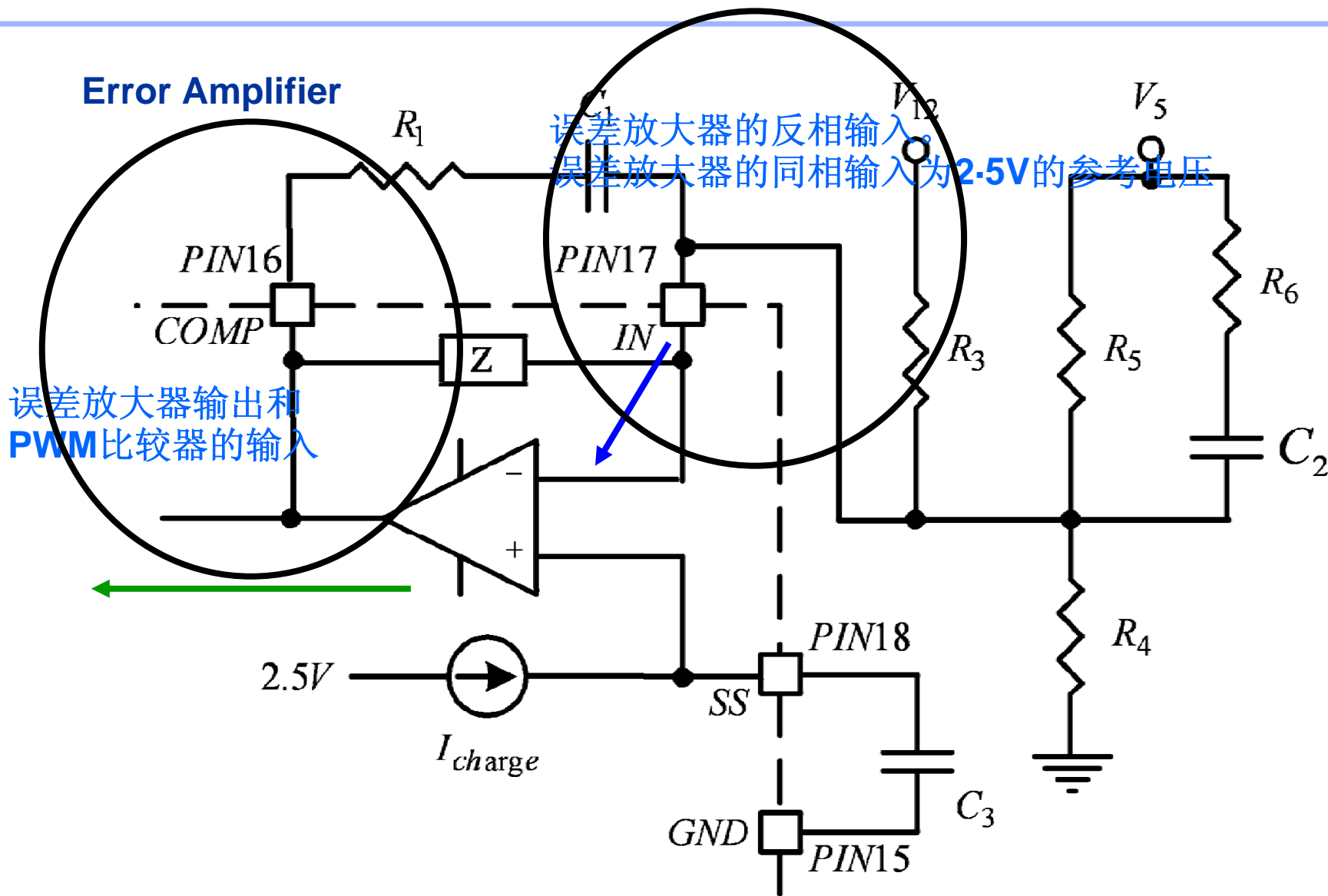




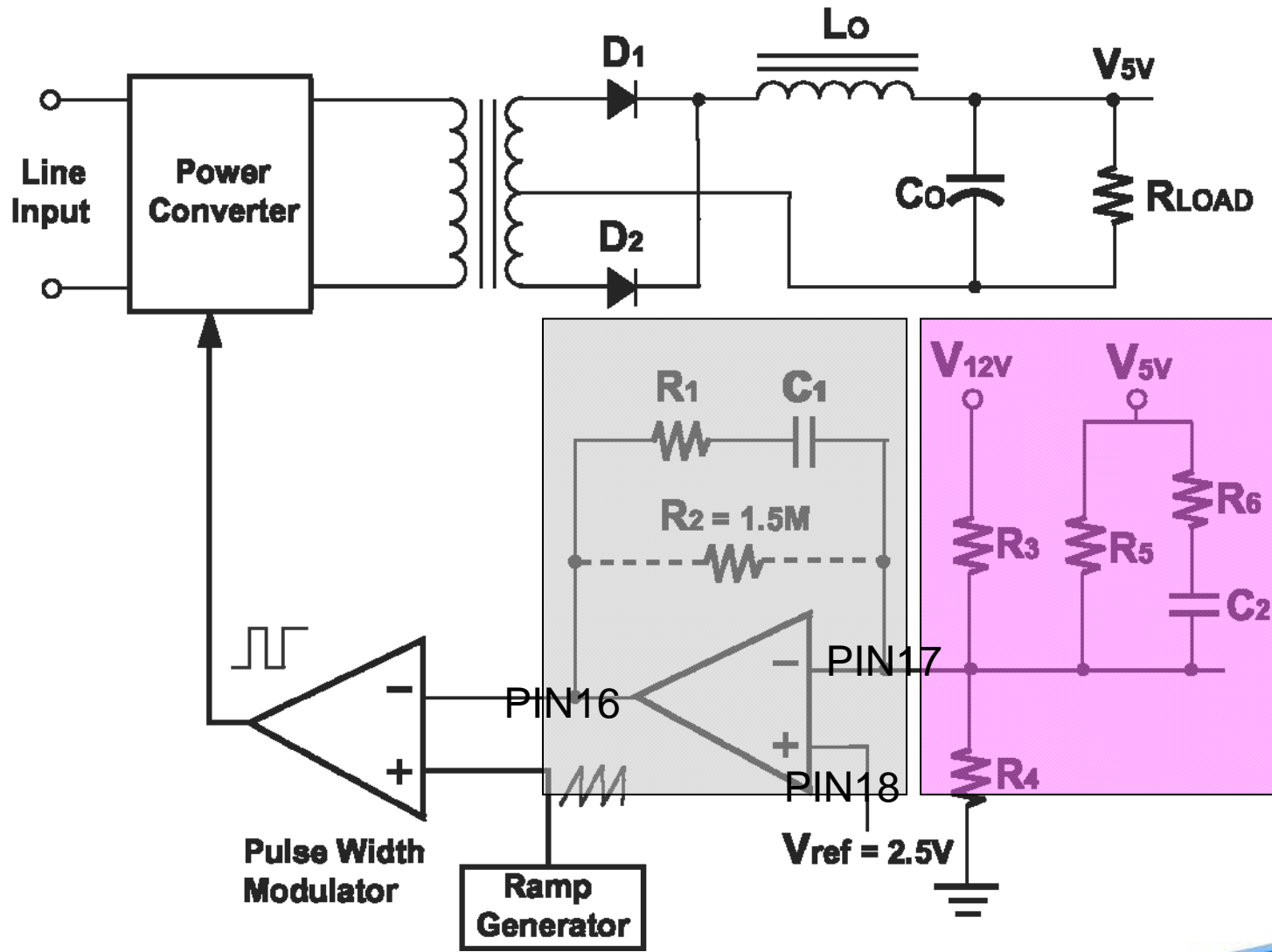
- 建议VDD到此PIN接104 C.C电容，能加强ESD和SURGE。
- IC 各PIN电压测试均此PIN为参考点。

PIN16: COMP

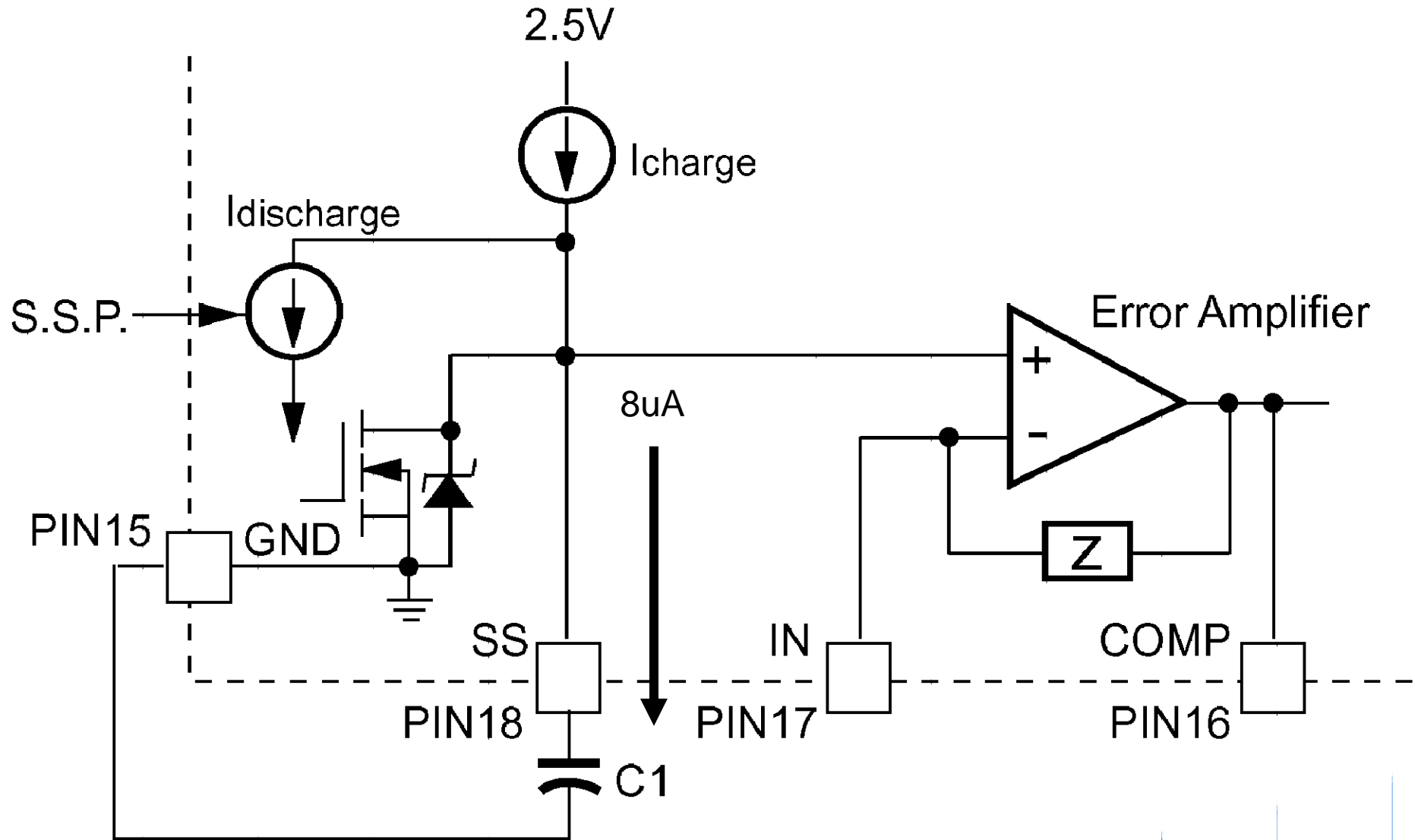
PIN17: IN



Feedback Compensation

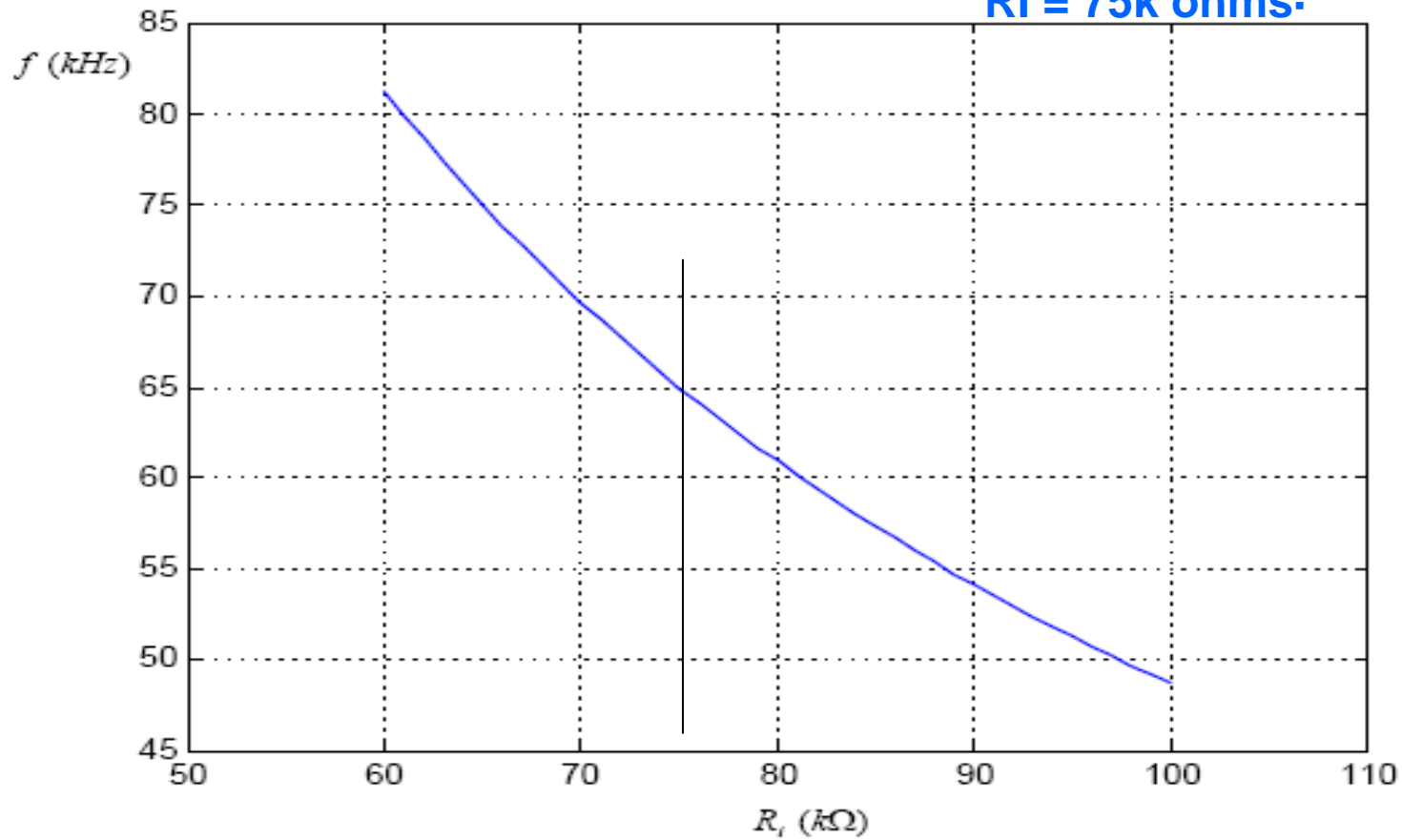


PIN18: SS Soft-Start Circuit





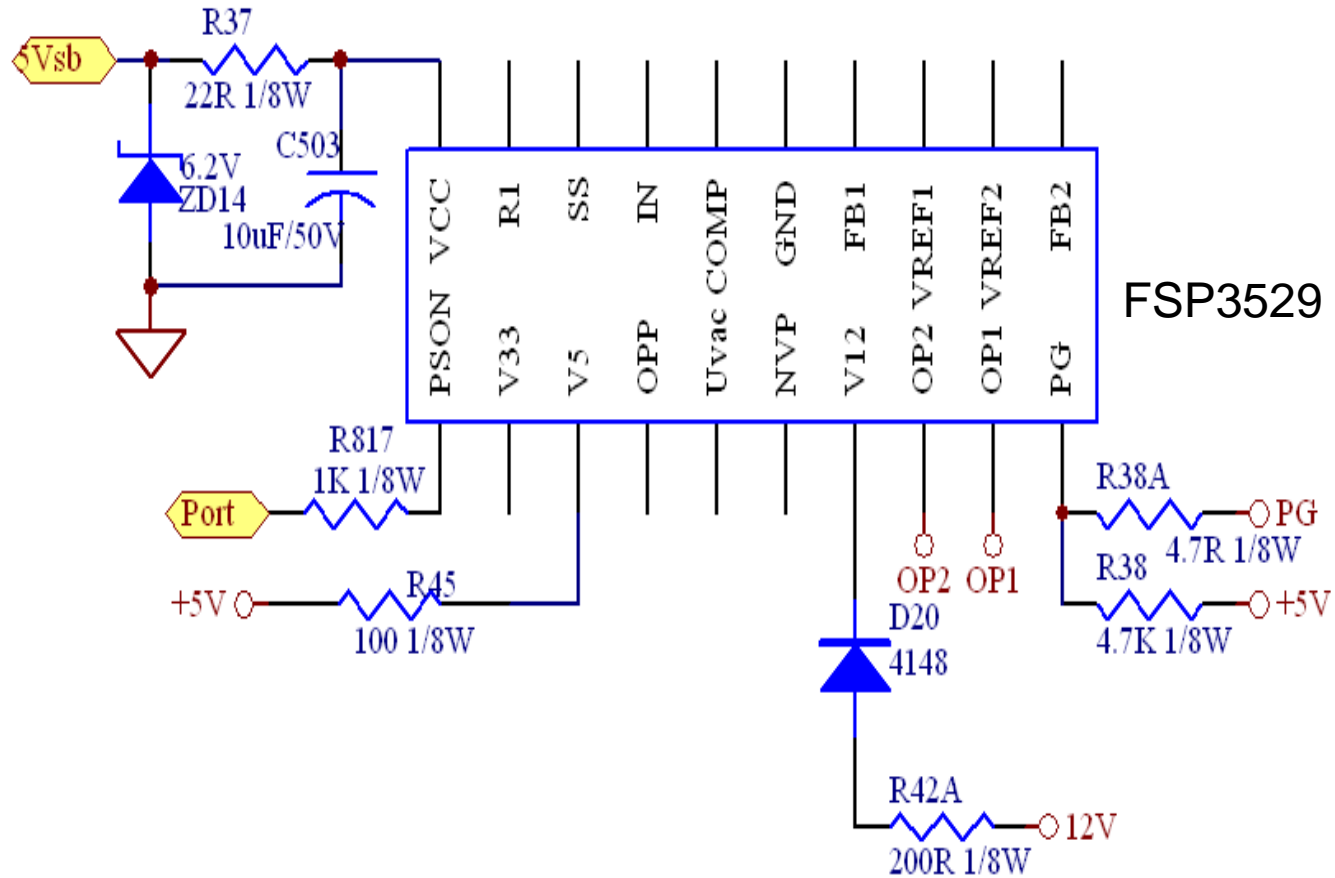
外接一个电阻作为参考设置
RI = 75k ohms.



$$f_{osc}(\text{kHz}) = \frac{4875}{R_i(\text{k}\Omega)}$$



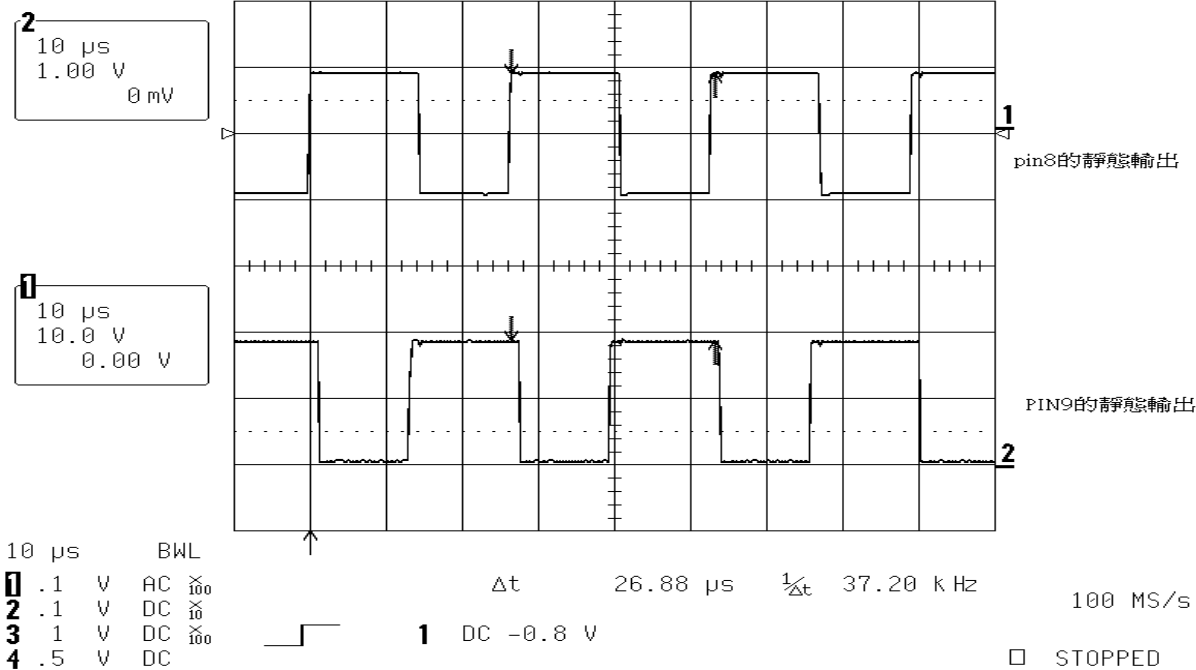
- 电源电压4.5V ~ 5.5 V.连接到5V辅助电源.
-





- 測試方法：
- **(1)PS-ON**為“L”電平(接地)。
- **(2)NVP**為“L”電平(接地)。
- **(3)VCC & V5**為“H”電平(接+5VDC)。
- **(4)示波器設置**為“正常”模式。

13-Nov-01
9:43:16





Thank you !