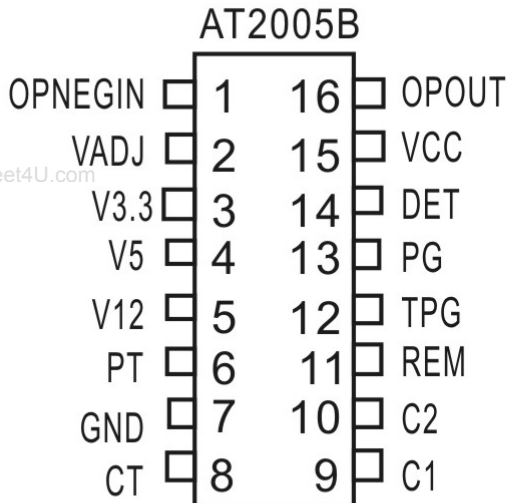


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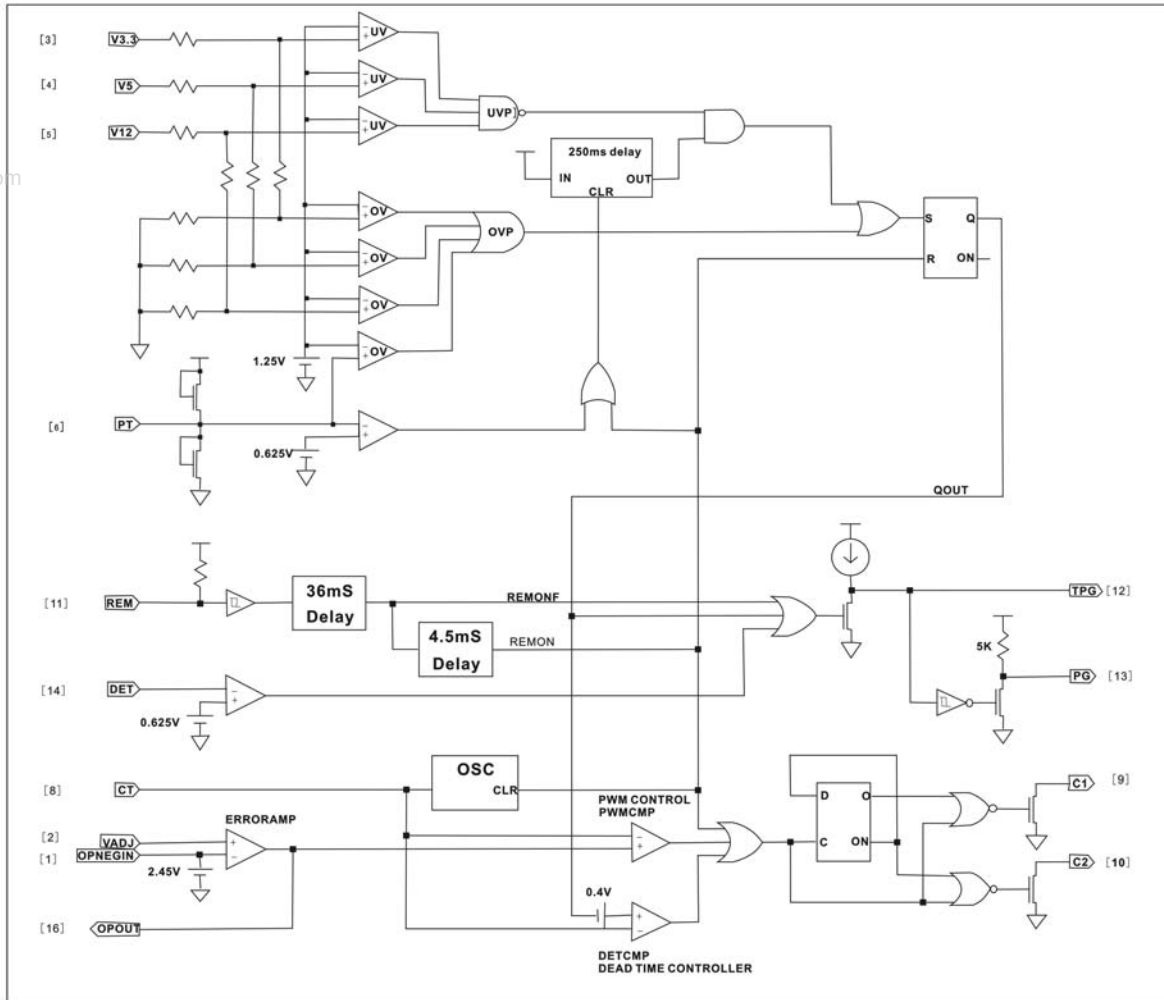
PIN CONFIGURATION



PIN DESCRIPTION

| Pin No. | Pin Name | TYPE | FUNCTION |
|---------|----------|------|---|
| 1 | OPNEGIN | I | OP COMPENSATION NEGATIVE INPUT |
| 2 | VADJ | I | VOLTAGE ADJUST |
| 3 | V3.3 | I | OVP/UVI INPUT FOR 3.3V |
| 4 | V5 | I | OVP/UVI INPUT FOR 5V |
| 5 | V12 | I | OVP/UVI INPUT FOR 12V |
| 6 | PT | I | EXTRA OVP INPUT PROTECTION |
| 7 | GND | P | GROUND |
| 8 | CT | - | OSCILLATION FREQUENCY BY SETTING CAP |
| 9 | C1 | O | OUTPUT1 |
| 10 | C2 | O | OUTPUT2 |
| 11 | REM | I | REMOTE ON/OFF INPUT,IF REM="LOW" THAT MEANS THE MAIN SMPS IS OPERATION,WHEN REM="HIGH",THE MAIN SMPS IS TURNED-OFF. |
| 12 | TPG | - | POWER GOOD DELAY TIME |
| 13 | PG | O | POWER GOOD SIGNAL IF PG="HIGH" MEANS "POWER GOOD" AND PG="LOW" MEANS "POWERFAIL" |
| 14 | DET | I | POWER GOOD SIGNAL INPUT |
| 15 | VCC | P | SUPPLY VOLTAGE |
| 16 | OPOUT | O | OP COMPENSATION OUTPUT |

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS, VCC=5.5V

| CHARACTERISTICS | SYMBOL | VALUE | Unit |
|-----------------------|------------|------------|------|
| Supply voltage | VCC | 5.5 | V |
| Drain output voltage | Vcc1, Vcc2 | 5.5 | V |
| Drain output current | Icc1, Icc2 | 200 | mA |
| Power dissipation | Pd | 200 | mW |
| Operating temperature | Topr | -10 ~ +70 | °C |
| Storage temperature | Tstg | -65 ~ +150 | °C |

TEMPERATURE CHARACTERISTICS, VCC=5V

| CHARACTERISTICS | SYMBOL | Min. | Typ. | Max. | Unit |
|---------------------------------------|--------|------|------|------|------|
| Coefficient of Vref (-10°C ~ +85°C) | | | 0.01 | | %/°C |

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ELECTRICAL CHARACTERISTICS, TA=25°C, V_{CC}=5V,

| CHARACTERISTICS | SYMBOL | TEST CONDITION | Min. | Typ. | Max. | Unit |
|-----------------|--------|----------------|------|------|------|------|
|-----------------|--------|----------------|------|------|------|------|

DEAD TIME CONTROL SECTION

| | | | | | | |
|-------------------------|-------------------|-----------------|--|-----|-----|---|
| INPUT THRESHOLD VOLTAGE | V _{thdt} | ZERO DUTY CYCLE | | 3.0 | 3.3 | V |
| | | MAX. DUTY CYCLE | | 0.1 | | |

ERROR AMP SECTION

| | | | | | | |
|-------------------------|--|-------------|------|------|------|-----|
| CLOSE LOOP VOLTAGE GAIN | | 0.5V ~ 3.5V | | 65 | | dB |
| CROSS OVER POINT | | 0dB | | 320 | | KHZ |
| OPNEG BIAS VOLTAGE | | OPNEG OPEN | 2.38 | 2.45 | 2.52 | V |

OUTPUT SECTION

| | | | | | | |
|---------------------------|--------------------|---|--|-----|-----|----|
| OUTPUT SATURATION VOLTAGE | V _{dssat} | I _d =200mA | | 1.1 | 1.3 | V |
| DRAIN OFF-STATE CURRENT | I _{doff} | V _{cc} =V _d =V _s =0V | | 2 | 10 | uA |
| RISING TIME | T _r | | | 100 | 200 | ns |
| FALLING TIME | T _f | | | 50 | 200 | ns |

PROTECTION SECTION

| | | | | | | |
|--------------------------------|--------------------|--|------|------|------|----|
| OVER VOLTAGE PROTECTION (OVP) | V33 | | 3.8 | 4.1 | 4.3 | V |
| | V5 | | 5.8 | 6.2 | 6.6 | V |
| | V12 | | 4.41 | 4.64 | 4.90 | V |
| | PT | | 1.2 | 1.25 | 1.3 | V |
| UNDER VOLTAGE PROTECTION (UVP) | V33 | | 1.78 | 1.98 | 2.18 | V |
| | V5 | | 2.70 | 3.00 | 3.30 | V |
| | V12 | | 2.11 | 2.37 | 2.63 | V |
| UVP DISABLE VOLTAGE | PT | | 0.55 | 0.62 | 0.68 | V |
| UVP DELAY TIME | T _{d.uvp} | | 100 | 250 | 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 DELAY TIME | T _{rem} | | 30 | 36 | 42 | ms |
| REM OFF DELAY TIME | T _{off} | | 3.5 | 4.5 | 5.5 | ms |

POWER GOOD SECTION

| | | | | | | |
|----------------------------|----------------------|-----------------------|------|------|------|----|
| DETECTING INPUT VOLTAGE | V _{det} | | 0.55 | 0.62 | 0.68 | V |
| PG OUTPUT PULL-UP RESISTOR | R _{pup, pg} | | | 5 | | KΩ |
| PG OUTPUT LOAD RESISTOR | R _{pg} | | 0.5 | 1 | 2 | KΩ |
| CHARGING CURRENT FOR TPG | I _{chg.tpg} | | | 30 | | uA |
| PG DELAY TIME | T _{d.pg} | C=2.2uF | 100 | 250 | 500 | ms |
| OUTPUT SATURATION VOLTAGE | V _{sat.pg} | I _{pg} =10mA | | 0.2 | 0.4 | V |

TOTAL DEVICE

| | | | | | | |
|------------------------|-----------------|--|--|----|----|----|
| STANDBY SUPPLY CURRENT | I _{cc} | | | 10 | 20 | mA |
|------------------------|-----------------|--|--|----|----|----|

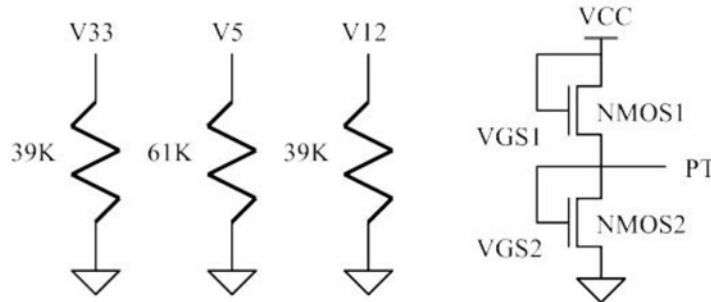
OSCILLATION SECTION

| | | | | | | |
|-------------------------|--------------------|----------|----|---|----|-----|
| OSCILLATION FREQUENCY | F _{osc} | CT=2200P | 50 | | 60 | KHZ |
| FREQ. CHANGE WITH TEMP. | F _{osc/T} | CT=2200p | | 2 | | % |

APPLICATION NOTE

1. Input impedance:

| Pin No. | Pin Name | Input impedance |
|---------|----------|---|
| 3 | V33 | 39KΩ |
| 4 | V5 | 61KΩ |
| 5 | V12 | 39KΩ |
| 6 | PT | 279KΩ (VGS1=4.12V) 59.8KΩ (VGS2=0.88V) (VCC=5V, PT=0.88V) |



2. Operation Frequency:

The period of the sawtooth is T_{OSC} :

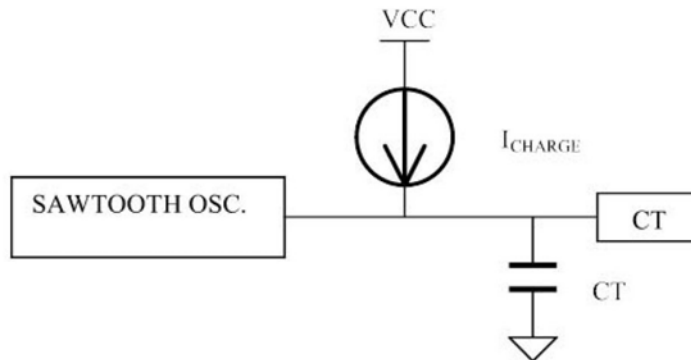
$$I_{CHARGE} = (1.25V / 6.1 K\Omega) * 2 = 410\mu A$$

$$T_{OSC} = (3.3V * C_T) / I_{CHARGE} = (3.3V * 2200pF) / 410\mu A$$

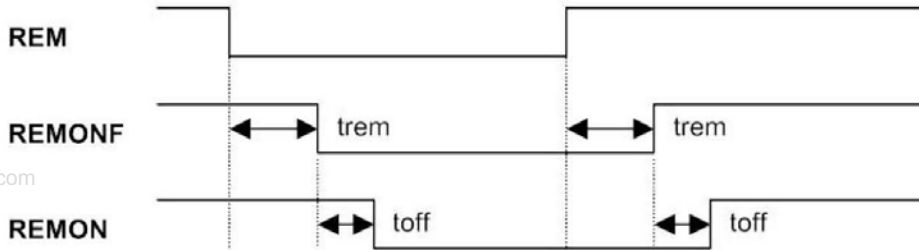
$$F_{OSC} = 1 / T_{OSC} = 56.5 KHZ$$

For Push-Pull applications:

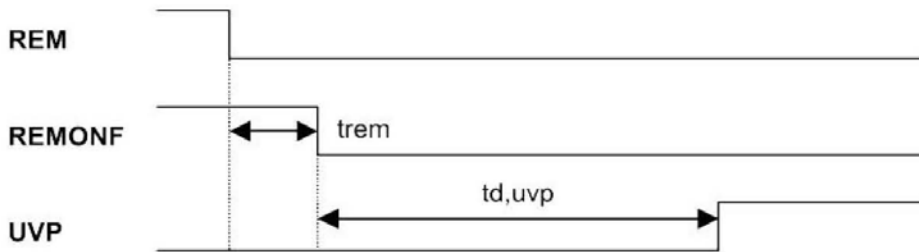
$$F_{PUSH-PULL} = 1 / 2 T_{OSC}$$



3. REMOTE ON/OFF :



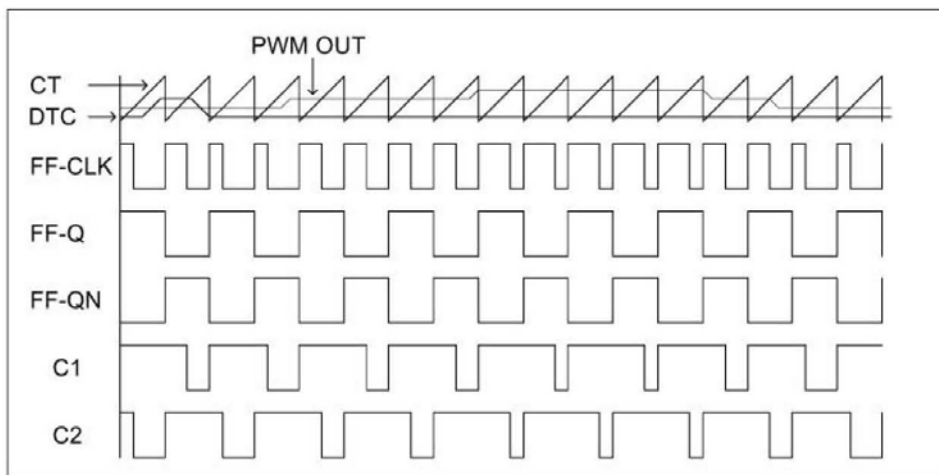
4. Under Voltage Protection Delay Time :



5. Pulse Width Modulation Block :

The output pulse width modulation is generated by comparison of the saw-tooth waveform from the capacitor C_T to the feedback of the voltage.

Therefore, an increase in feedback control signal amplitude cause a linear decrease of the output pulse width. The timing diagram is shown as below:



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6. Protection Control of the Soft-Start:

The soft-start function is to reduce the large current surge during power-up & prevent the output voltages (V33/V5/V12) reach the Over Voltage Protection level . The circuit is shown in reference application circuit .

7. The function of "PT": (Default floating $V_{PT} = 0.8V$)

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This signal is prepared for extra Over Voltage Protection Input ($V_{PT} > 1.25V$) or another Disable Under Voltage Protection function ($V_{PT} < 0.62V$)

8. Reference Application Circuit:

