



# **Datenblatt Parsec**

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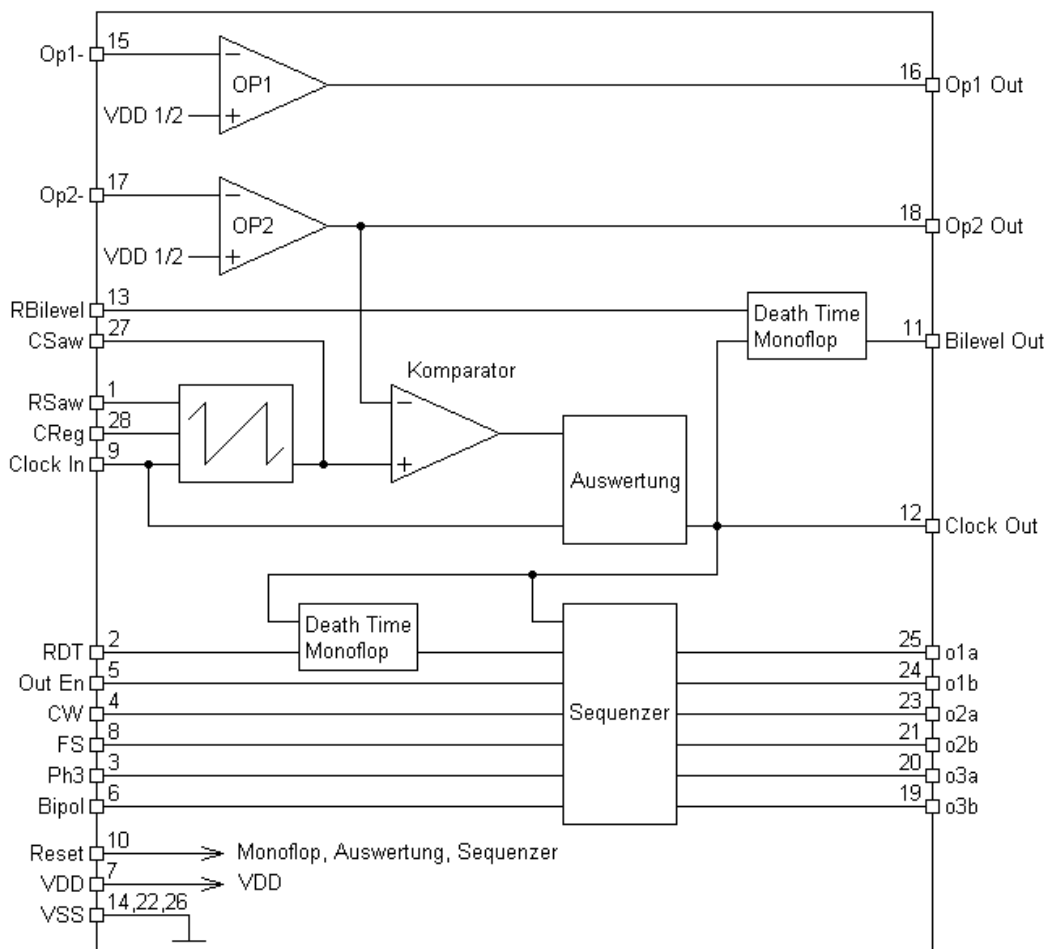
## Parsec Parametric resonance free controller

**Aufgabe:** Unterdrücken der parametrischen Resonanzen von Schrittmotoren um den höheren Wirkungsgrad bei höheren Drehzahlen auszuschöpfen  
Integration von Korrekturschaltung und Sequenzer (2 und 3 Phasen) auf einem Chip  
Ein externer Indexer gibt Motorposition und Drehzahl vor, Parsec korrigiert die Phase und generiert optimal die Sequenzen

**Ziel:** Wirkungsgrad von Schrittmotoren steigern

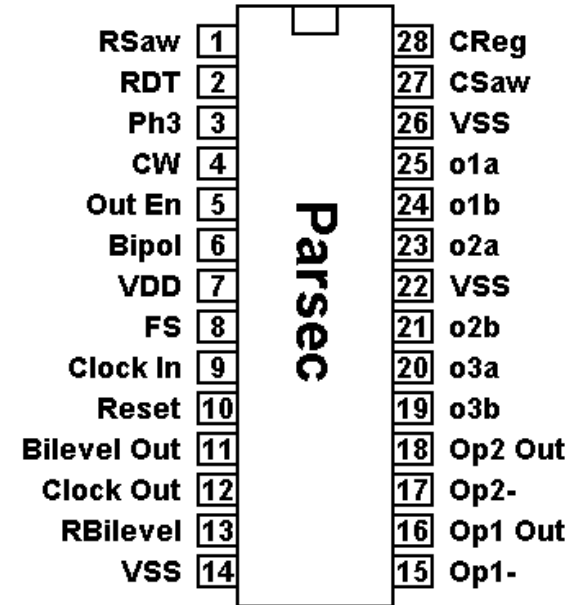
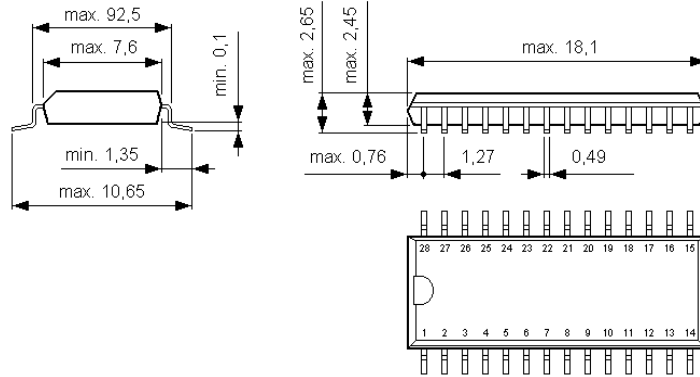
**Nebeneffekte:** Geräuscharmes Laufverhalten der Antriebe  
Ersetzt 6 bis 7 Standard IC's und ca. 25 diskrete Bauelemente  
Einfache EMV-Kompatibilität durch Bilevel statt Chopper-Ansteuerung  
Geringe Anforderung an die Siebung der Motorenspeisung  
Geringe Anforderung an den Indexer bezüglich Schitterfreiheit des Clocksignals  
Wesentlich günstiger als diskrete Lösung

## Blockschema



## Gehäuse

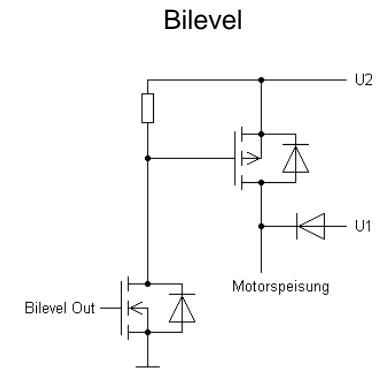
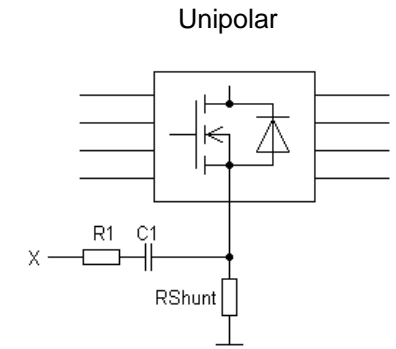
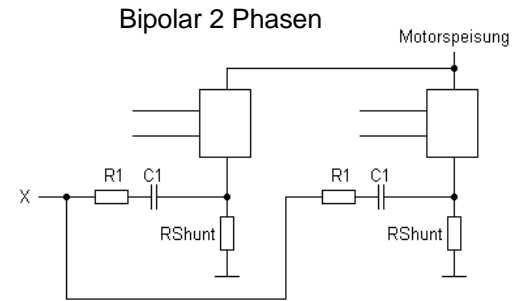
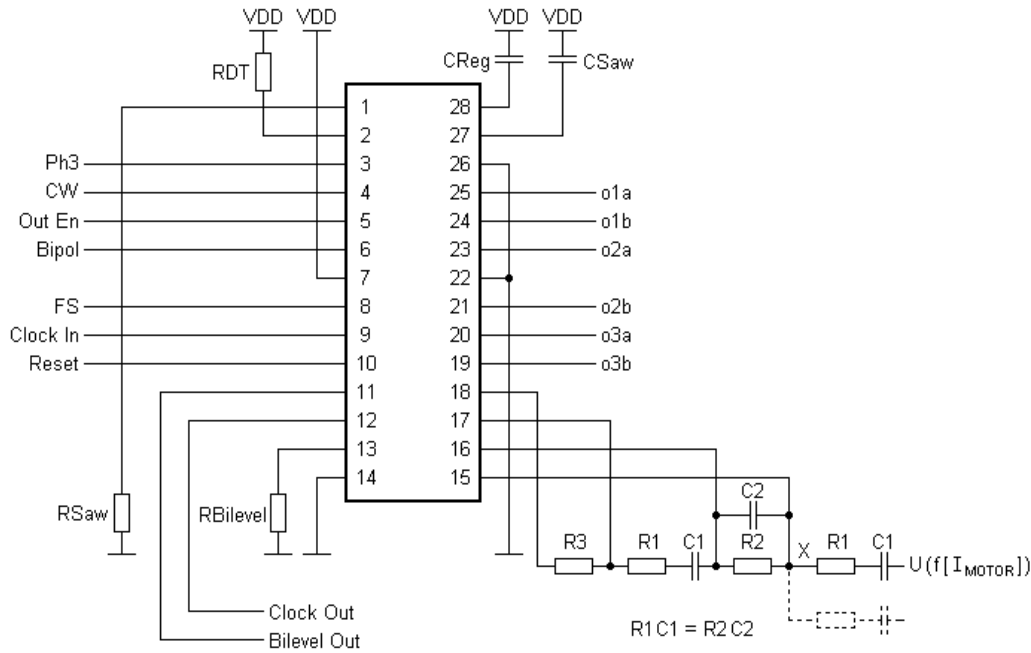
SO-28



## Absolute Maximums

|                         |               |
|-------------------------|---------------|
| Speisespannung:         | 6V            |
| ESD Festigkeit:         | >2kV          |
| Lötzeit und Temperatur: | 260°C / 4s    |
| Lagertemperatur:        | -50°C ..150°C |

## Anwendungsbeispiel



| Symbol                              | Parameter   | Figure | Condition  | Pin     | Pin name                                 | Supply 3.3V |             |       | Unit             |
|-------------------------------------|---|--------|--|---------|--|-------------|-------------|-------|------------------|
|                                     |   |        |  |         |  | Min         | Typ         | Max   |                  |
| V <sub>B</sub>                      | Working point   | 1      | R <sub>L</sub> → ∞   | 15.16   | OP1 <sub>out</sub>                       | 1.64        | 1.65        | 1.66  | [V]              |
|                                     |   |        |  | 17.18   | OP2 <sub>out</sub>                       | 1.64        | 1.65        | 1.66  |                  |
| V <sub>o</sub>                      | Output voltage swing  | 2      | R <sub>L</sub> → ∞<br>Value measured to V <sub>SS</sub>                        | 16      | OP1 <sub>out</sub>                       | 0.50        | 0.53        | 0.70  | [mV]             |
|                                     |   |        |  | 18      | OP2 <sub>out</sub>                       | 0.40        | 0.42        | 0.60  |                  |
|                                     |   | 3      | R <sub>L</sub> → ∞<br>Value measured to V <sub>DD</sub>                        | 16      | OP1 <sub>out</sub>                       | 0.70        | 0.77        | 0.80  |                  |
|                                     |   |        |  | 18      | OP2 <sub>out</sub>                       | 0.70        | 0.71        | 0.80  |                  |
|                                     |   | 4      | R <sub>L</sub> → 100kΩ to V <sub>DD</sub><br>Value measured to V <sub>SS</sub> | 16      | OP1 <sub>out</sub>                       | 22.9        | 23.5        | 24.1  |                  |
|                                     |   |        |  | 18      | OP2 <sub>out</sub>                       | 6.6         | 6.7         | 6.8   |                  |
| 5                                   | R <sub>L</sub> → 100kΩ<br>Value measured to V <sub>DD</sub> | 16     | OP1 <sub>out</sub>   | 53.1    | 54.2                                     | 55.5        |             |       |                  |
|                                     |   | 18     | OP2 <sub>out</sub>   | 36.2    | 37.7                                     | 39.7        |             |       |                  |
| SR                                  | Slew Rate ↓   | 6      | R <sub>L</sub> → 10MΩ, C <sub>L</sub> ≈ 2pF<br>(f <sub>in</sub> = 10kHz)       | 16      | OP1 <sub>out</sub>                       | 0.20        | 0.21        | 0.22  | [V/μS]           |
|                                     | Slew Rate ↑   |        |  | 16      | OP1 <sub>out</sub>                       | 0.20        | 0.22        | 0.23  |                  |
|                                     | Slew Rate ↓   |        |  | 18      | OP2 <sub>out</sub>                       | 0.20        | 0.21        | 0.22  |                  |
|                                     | Slew Rate ↑   |        |  | 18      | OP2 <sub>out</sub>                       | 0.20        | 0.22        | 0.23  |                  |
| A <sub>0</sub>                      | Open loop gain  | 7      | R <sub>L</sub> → ∞<br>(f <sub>in</sub> = 40Hz)                                 | 16      | OP1 <sub>out</sub>                       | 59.60       | 60.81       | 61.60 | [dB]             |
|                                     |   |        |  | 18      | OP2 <sub>out</sub>                       | 59.60       | 60.78       | 61.60 |                  |
|                                     |   | 8      | R <sub>L</sub> → 100kΩ<br>(f <sub>in</sub> = 40Hz)                             | 16      | OP1 <sub>out</sub>                       | 57.60       | 58.26       | 58.90 |                  |
|                                     |   |        |  | 18      | OP2 <sub>out</sub>                       | 57.60       | 58.42       | 59.30 |                  |
| f <sub>(A-3dB)</sub>                | Open loop bandwidth   | 9      | R <sub>L</sub> → ∞<br>C <sub>L</sub> → 10pF                                    | 16 , 18 | OP1 <sub>out</sub><br>OP2 <sub>out</sub> | 360         | 395         | 460   | [Hz]             |
| f <sub>t</sub> at φ <sub>s</sub>    | Closed loop bandwidth<br>Phase security                     | 10     | A = 1<br>C <sub>L</sub> → 15pF   | 16      | OP1 <sub>out</sub>                       | ---         | 0.890<br>83 | ---   | [MHz]<br>[° Deg] |
| φ <sub>s</sub> at f <sub>t</sub>    |   |        |  | 18      | OP2 <sub>out</sub>                       | ---         | 0.970<br>83 | ---   | [° Deg]<br>[MHz] |
| f <sub>t</sub><br>at φ <sub>s</sub> |   |        |  | 16      | OP1 <sub>out</sub>                       | ---         | ---         | ---   |                  |
|                                     |   |        |  | 18      | OP2 <sub>out</sub>                       | ---         | ---         | ---   |                  |
| φ <sub>s</sub> at f <sub>t</sub>    |   |        |  | 16      | OP1 <sub>out</sub>                       | ---         | ---         | ---   | [° Deg]<br>[kHz] |
|                                     |   |        |  | 18      | OP2 <sub>out</sub>                       | ---         | ---         | ---   |                  |

| Symbol           | Parameter  | Figure | Condition   | Pin    | Pin name         | Supply 3.3V |           |        | Unit  |
|------------------|--|--------|---|--------|------------------|-------------|-----------|--------|-------|
|                  |  |        |   |        |                  | Min         | Typ       | Max    |       |
| V <sub>HC</sub>  | Comparator hysteresis level                              | 11     | f <sub>clockIn</sub> =100Hz; Reset=V <sub>SS</sub> ; R <sub>Saw</sub> =10MΩ to V <sub>SS</sub> ; C <sub>Saw</sub> =1nF; C <sub>Reg</sub> =1nF; Test on Pin 12 (Clock Out) | 27     | C <sub>Saw</sub> | 0.683       | 0.689     | 0.700  | [V]   |
| T1               | Clock input preparation for intern clock; Delay1, Delay2 | 12     | Reset=V <sub>SS</sub> ; f <sub>clockIn</sub> =300kHz; OP2- = V <sub>DD</sub>  | 12     | ClockOut         | 1.18        | 1.24      | 1.31   | [μs]  |
| T2               |  |        |   |        |                  | 2.32        | 2.44      | 2.67   |       |
| T <sub>Bt</sub>  | Bilevel Monoflop time                                    |        | R <sub>Bilevel</sub> = 10KΩ to V <sub>SS</sub> ; Reset=V <sub>SS</sub> ; f <sub>clockIn</sub> =100Hz  | 11     | BilevelOut       | 50.0        | 68.96     | 91.60  | [ms]  |
|                  |  |        | R <sub>Bilevel</sub> = 100KΩ to V <sub>SS</sub> ; Reset=V <sub>SS</sub> ; f <sub>clockIn</sub> =100Hz   |        |                  | 318.00      | 480.27    | 712    |       |
|                  |  |        | R <sub>Bilevel</sub> = 1MΩ to V <sub>SS</sub> ; Reset=V <sub>SS</sub> ; f <sub>clockIn</sub> =100Hz   |        |                  | 2.56        | 4.20      | 6.44   |       |
| T <sub>dt</sub>  | Deathtime Monoflop time                                  |        | f <sub>clockIn</sub> =200KHz; Reset, Ph3=V <sub>SS</sub> ; OutEn,FS=V <sub>DD</sub><br>R <sub>DT</sub> = 100KΩ to V <sub>DD</sub> ;                                       | 24, 25 | O1a, O1b         | 112         | 115       | 124    | [ns]  |
|                  |  |        | f <sub>clockIn</sub> =200KHz; Reset, Ph3=V <sub>SS</sub> ; OutEn,FS=V <sub>DD</sub><br>R <sub>DT</sub> = 1MΩ to V <sub>DD</sub> ;   |        |                  | 860         | 890       | 924    |       |
| τ <sub>Saw</sub> | Discharge  | 13     | f <sub>clockIn</sub> =1KHz; Reset=V <sub>SS</sub> ; Buffer=highspeed<br>C <sub>Reg</sub> = 1nF; C <sub>Saw</sub> =2.2nF; R <sub>Saw</sub> =10MΩ                           |        | C <sub>Saw</sub> | 0.89        | 0.91      | 0.97   | [μs]  |
| f <sub>Max</sub> | Maximal Saw frequency                                    |        | Reset=V <sub>SS</sub> ; Buffer=highspeed C <sub>Reg</sub> = 1nF;<br>C <sub>Saw</sub> = 100pF; R <sub>Saw</sub> =10MΩ  | 27     | C <sub>Saw</sub> | 75          | 80.21     | 84     | [kHz] |
|                  |  |        |   | 28     | C <sub>Reg</sub> | at 536      | at 585.21 | at 630 | [mV]  |
| f <sub>Min</sub> | Minimal Saw frequency                                    |        | Reset=V <sub>SS</sub> ; C <sub>Reg</sub> = 1nF; Buffer=highimpedance;<br>C <sub>Saw</sub> = 100pF; R <sub>Saw</sub> = 1kΩ   | 27     | C <sub>Saw</sub> | 4.83        | 6.06      | 7.04   | [Hz]  |
|                  |  |        | Reset=V <sub>SS</sub> ; C <sub>Reg</sub> = 1nF; Buffer=highimpedance;<br>C <sub>Saw</sub> = 100pF; R <sub>Saw</sub> = 100kΩ   |        |                  | 201         | 297.42    | 420    |       |
|                  |  |        | Reset=V <sub>SS</sub> ; C <sub>Reg</sub> = 1nF; Buffer=highimpedance;<br>C <sub>Saw</sub> = 100pF; R <sub>Saw</sub> = 10MΩ  |        |                  | 3.53        | 5.44      | 8.47   |       |
|                  |  |        | Reset=V <sub>SS</sub> ; C <sub>Reg</sub> = 1nF; Buffer=highimpedance;<br>C <sub>Saw</sub> = 1nF; R <sub>Saw</sub> = 1kΩ   |        |                  | 585         | 730.50    | 855    |       |
|                  |  |        | Reset=V <sub>SS</sub> ; C <sub>Reg</sub> = 1nF; Buffer=highimpedance;<br>C <sub>Saw</sub> = 1nF; R <sub>Saw</sub> = 100kΩ   |        |                  | 23.40       | 34.60     | 48.30  |       |
|                  |  |        | Reset=V <sub>SS</sub> ; C <sub>Reg</sub> = 1nF; Buffer=highimpedance;<br>C <sub>Saw</sub> = 1nF; R <sub>Saw</sub> = 10MΩ  |        |                  | 0.408       | 0.625     | 0.980  |       |

| Symbol              | Parameter   | Figure | Condition   | Pin | Function         | Supply 3.3V |       |       | Unit |
|---------------------|---|--------|---|-----|------------------|-------------|-------|-------|------|
|                     |   |        |   |     |                  | Min         | Typ   | Max   |      |
| C <sub>Min</sub>    | C <sub>Reg</sub> Minimal Test on C <sub>Saw</sub> (Instability) |        | Reset=V <sub>SS</sub> ; f <sub>ClockIn</sub> =10KHz; Buffer=highimpedance;<br>C <sub>Saw</sub> =1nF; R <sub>Saw</sub> =10MΩ   | 27  | C <sub>Saw</sub> | 220         | 220   | 330   | [pF] |
|                     | C <sub>Reg</sub> Minimal Test on C <sub>Reg</sub> (Overdrive)   |        |   | 28  | C <sub>Reg</sub> | 330         | 330   | 470   |      |
| I <sub>c</sub>      | Current consumption   |        | Reset, OutEn=V <sub>DD</sub> ; FS, Bipol, Cw, Ph3=V <sub>SS</sub> ;<br>R <sub>Saw</sub> =∞ R <sub>dt</sub> =∞ R <sub>Bilevel</sub> =∞ OP <sub>1,2</sub> =Follower<br>f <sub>ClockIn</sub> =0Hz; C <sub>Saw</sub> =0; C <sub>Reg</sub> =0                  | 7   | V <sub>DD</sub>  | 0.950       | 0.966 | 0.990 | [mA] |
|                     |   |        | FS, OutEn=V <sub>DD</sub> ; Reset, Bipol, Cw, Ph3=V <sub>SS</sub><br>R <sub>Saw</sub> =10MΩ R <sub>dt</sub> =10kΩ R <sub>Bilevel</sub> =10kΩ<br>OP <sub>1,2</sub> =Follower f <sub>ClockIn</sub> =20kHz;<br>C <sub>Saw</sub> =100pF C <sub>Reg</sub> =1nF | 7   |                  | 1.550       | 1.669 | 1.710 |      |
| S <sub>eq-IST</sub> | Input Schmitt-Trigger V <sub>↑</sub>                            |        | f[OutEn]=20Hz triangle from V <sub>DD</sub> to V <sub>SS</sub> ;<br>OP2 <sub>in</sub> , Ph3, Clock, FS, Bipol, Cw=V <sub>SS</sub> ; Reset=V <sub>DD</sub>   | 5   | OutEn            | 2.16        | 2.16  | 2.16  | [V]  |
|                     | Input Schmitt-Trigger V <sub>↓</sub>                            |        |   |     |                  | 1.20        | 1.20  | 1.20  |      |

| Symbol                           | Parameter                               | Figure | Condition  | Pin                              | Pin name                                 | Supply 5.0V        |            |            | Unit    |
|----------------------------------|---|--------|--|----------------------------------|--|--------------------|------------|------------|---------|
|                                  |   |        |  |                                  |  | Min                | Typ        | Max        |         |
| V <sub>B</sub>                   | Working point                           | 1      | R <sub>L</sub> → ∞   | 15.16                            | OP1 <sub>out</sub>                       | 2.50               | 2.51       | 2.52       | [V]     |
|                                  |   |        |  | 17.18                            | OP2 <sub>out</sub>                       | 2.50               | 2.51       | 2.52       |         |
| V <sub>o</sub>                   | Output voltage swing                    | 2      | R <sub>L</sub> → ∞<br>Value measured to V <sub>SS</sub>                        | 16                               | OP1 <sub>out</sub>                       | 0.70               | 0.88       | 1.10       | [mV]    |
|                                  |   |        |  | 18                               | OP2 <sub>out</sub>                       | 0.60               | 0.75       | 0.90       |         |
|                                  |   | 3      | R <sub>L</sub> → ∞<br>Value measured to V <sub>DD</sub>                        | 16                               | OP1 <sub>out</sub>                       | 1.30               | 1.38       | 1.70       |         |
|                                  |   |        |  | 18                               | OP2 <sub>out</sub>                       | 1.20               | 1.33       | 1.80       |         |
|                                  |   | 4      | R <sub>L</sub> → 100kΩ to V <sub>DD</sub><br>Value measured to V <sub>SS</sub> | 16                               | OP1 <sub>out</sub>                       | 33.5               | 34.6       | 35.4       |         |
|                                  |   |        |  | 18                               | OP2 <sub>out</sub>                       | 8.9                | 9.1        | 9.3        |         |
|                                  |   | 5      | R <sub>L</sub> → 100kΩ<br>Value measured to V <sub>DD</sub>                    | 16                               | OP1 <sub>out</sub>                       | 66.7               | 67.8       | 69.2       |         |
|                                  |   |        |  | 18                               | OP2 <sub>out</sub>                       | 41.0               | 42.6       | 44.8       |         |
| SR                               | Slew Rate ↓                             | 6      | R <sub>L</sub> → 10MΩ, C <sub>L</sub> ≈ 2pF<br>(f <sub>in</sub> = 10kHz)       | 16                               | OP1 <sub>out</sub>                       | 0.36               | 0.36       | 0.37       | [V/μS]  |
|                                  | Slew Rate ↑                             |        |  | 16                               | OP1 <sub>out</sub>                       | 0.33               | 0.36       | 0.36       |         |
|                                  | Slew Rate ↓                             |        |  | 18                               | OP2 <sub>out</sub>                       | 0.36               | 0.36       | 0.37       |         |
|                                  | Slew Rate ↑                             |        |  | 18                               | OP2 <sub>out</sub>                       | 0.34               | 0.36       | 0.38       |         |
| A <sub>0</sub>                   | Open loop gain                          | 7      | R <sub>L</sub> → ∞<br>(f <sub>in</sub> = 40Hz)                                 | 16                               | OP1 <sub>out</sub>                       | 60.70              | 61.16      | 61.90      | [dB]    |
|                                  |   |        |  | 18                               | OP2 <sub>out</sub>                       | 60.70              | 61.20      | 61.90      |         |
|                                  |   | 8      | R <sub>L</sub> → 100kΩ<br>(f <sub>in</sub> = 40Hz)                             | 16                               | OP1 <sub>out</sub>                       | 58.90              | 59.48      | 60.30      |         |
|                                  |   |        |  | 18                               | OP2 <sub>out</sub>                       | 59.30              | 59.50      | 60.30      |         |
| f <sub>(A-3dB)</sub>             | Open loop bandwidth                     | 9      | R <sub>L</sub> → ∞<br>C <sub>L</sub> → 10pF                                    | 16 , 18                          | OP1 <sub>out</sub><br>OP2 <sub>out</sub> | 560                | 631        | 690        | [Hz]    |
| f <sub>t</sub> at φ <sub>s</sub> | Closed loop bandwidth<br>Phase security | 10     | A = 1<br>C <sub>L</sub> → 15pF   | 16                               | OP1 <sub>out</sub>                       | 1.60<br>74         | 1.67<br>73 | 1.73<br>73 | [MHz]   |
| φ <sub>s</sub> at f <sub>t</sub> |   |        |  | 18                               | OP2 <sub>out</sub>                       | 1.70<br>73         | 1.79<br>74 | 1.84<br>73 | [° Deg] |
|                                  |   |        |  | f <sub>t</sub> at φ <sub>s</sub> | 16                                       | OP1 <sub>out</sub> |            |            |         |
| 18                               |   |        |  |                                  | OP2 <sub>out</sub>                       |                    |            |            | [MHz]   |
| φ <sub>s</sub> at f <sub>t</sub> |   |        |  | 16                               | OP1 <sub>out</sub>                       | ---                | 177<br>42  | ---        | [kHz]   |
|                                  |   |        |  | 18                               | OP2 <sub>out</sub>                       | ---                | 185<br>42  | ---        | [° Deg] |
| φ <sub>s</sub> at f <sub>t</sub> |   |        |  | 16                               | OP1 <sub>out</sub>                       |                    |            |            | [° Deg] |
|                                  |   |        |  | 18                               | OP2 <sub>out</sub>                       |                    |            |            | [kHz]   |

| Symbol           | Parameter  | Figure | Condition   | Pin    | Pin name         | Supply 5.0V |        |        | Unit  |
|------------------|--|--------|---|--------|------------------|-------------|--------|--------|-------|
|                  |  |        |   |        |                  | Min         | Typ    | Max    |       |
| V <sub>HC</sub>  | Comparator hysteresis level                              | 11     | f <sub>clockIn</sub> =100Hz; Reset=V <sub>SS</sub> ; R <sub>Saw</sub> =10MΩ to V <sub>SS</sub> ; C <sub>Saw</sub> =1nF; C <sub>Reg</sub> =1nF; Test on Pin 12 (Clock Out) | 27     | C <sub>Saw</sub> | 0.690       | 0.695  | 0.700  | [V]   |
| T <sub>1</sub>   | Clock input preparation for intern clock; Delay1, Delay2 | 12     | Reset=V <sub>SS</sub> ; f <sub>clockIn</sub> =300kHz; OP2- = V <sub>DD</sub>  | 12     | ClockOut         | 1.06        | 1.11   | 1.20   | [μs]  |
| T <sub>2</sub>   |  |        |   |        |                  | 2.11        | 2.18   | 2.18   |       |
| T <sub>Bt</sub>  | Bilevel Monoflop time                                    |        | R <sub>Bilevel</sub> = 10KΩ to V <sub>SS</sub> ; Reset=V <sub>SS</sub> ; f <sub>clockIn</sub> =100Hz  | 11     | BilevelOut       | 35.40       | 47.09  | 60.60  | [ms]  |
|                  |  |        | R <sub>Bilevel</sub> = 100KΩ to V <sub>SS</sub> ; Reset=V <sub>SS</sub> ; f <sub>clockIn</sub> =100Hz   |        |                  | 227.00      | 338.27 | 492.00 |       |
|                  |  |        | R <sub>Bilevel</sub> = 1MΩ to V <sub>SS</sub> ; Reset=V <sub>SS</sub> ; f <sub>clockIn</sub> =100Hz   |        |                  | 1.87        | 3.01   | 4.93   |       |
| T <sub>dt</sub>  | Deathtime Monoflop time                                  |        | f <sub>clockIn</sub> =200kHz; Reset, Ph3=V <sub>SS</sub> ; OutEn,FS=V <sub>DD</sub><br>R <sub>DT</sub> = 100KΩ to V <sub>DD</sub> ;                                       | 24, 25 | O1a, O1b         | 94          | 97     | 105    | [ns]  |
|                  |  |        | f <sub>clockIn</sub> =200kHz; Reset, Ph3=V <sub>SS</sub> ; OutEn,FS=V <sub>DD</sub><br>R <sub>DT</sub> = 1MΩ to V <sub>DD</sub> ;   |        |                  | 745         | 771    | 804    |       |
| τ <sub>Saw</sub> | Discharge  | 13     | f <sub>clockIn</sub> =1kHz; Reset=V <sub>SS</sub> ; Buffer=highspeed<br>C <sub>Reg</sub> = 1nF; C <sub>Saw</sub> =2.2nF; R <sub>Saw</sub> =10MΩ                           |        | C <sub>Saw</sub> | 0.84        | 0.86   | 0.91   | [μs]  |
| f <sub>Max</sub> | Maximal Saw frequency                                    |        | Reset=V <sub>SS</sub> ; Buffer=highspeed C <sub>Reg</sub> = 1nF;<br>C <sub>Saw</sub> = 100pF; R <sub>Saw</sub> =10MΩ  | 27     | C <sub>Saw</sub> | 109         | 113.16 | 116    | [kHz] |
|                  |  |        |   | 28     | C <sub>Reg</sub> | 660         | 692.95 | 750    | [mV]  |
| f <sub>Min</sub> | Minimal Saw frequency                                    |        | Reset=V <sub>SS</sub> ; C <sub>Reg</sub> = 1nF; Buffer=highimpedance;<br>C <sub>Saw</sub> = 100pF; R <sub>Saw</sub> = 1kΩ   | 27     | C <sub>Saw</sub> | 9.43        | 11.14  | 12.69  | [kHz] |
|                  |  |        | Reset=V <sub>SS</sub> ; C <sub>Reg</sub> = 1nF; Buffer=highimpedance;<br>C <sub>Saw</sub> = 100pF; R <sub>Saw</sub> = 100kΩ   |        |                  | 377         | 559.74 | 775    | [Hz]  |
|                  |  |        | Reset=V <sub>SS</sub> ; C <sub>Reg</sub> = 1nF; Buffer=highimpedance;<br>C <sub>Saw</sub> = 100pF; R <sub>Saw</sub> = 10MΩ  |        |                  | 6.19        | 9.57   | 15.53  | [Hz]  |
|                  |  |        | Reset=V <sub>SS</sub> ; C <sub>Reg</sub> = 1nF; Buffer=highimpedance;<br>C <sub>Saw</sub> = 1nF; R <sub>Saw</sub> = 1kΩ   |        |                  | 1.16        | 1.364  | 1.55   | [kHz] |
|                  |  |        | Reset=V <sub>SS</sub> ; C <sub>Reg</sub> = 1nF; Buffer=highimpedance;<br>C <sub>Saw</sub> = 1nF; R <sub>Saw</sub> = 100kΩ   |        |                  | 45.20       | 66.11  | 91.70  | [Hz]  |
|                  |  |        | Reset=V <sub>SS</sub> ; C <sub>Reg</sub> = 1nF; Buffer=highimpedance;<br>C <sub>Saw</sub> = 1nF; R <sub>Saw</sub> = 10MΩ  |        |                  | 0.716       | 1.112  | 1.786  | [Hz]  |

| Symbol              | Parameter   | Figure | Condition   | Pin | Function         | Supply 5.0V |       |       | Unit |
|---------------------|---|--------|---|-----|------------------|-------------|-------|-------|------|
|                     |   |        |   |     |                  | Min         | Typ   | Max   |      |
| C <sub>Min</sub>    | C <sub>Reg</sub> Minimal Test on C <sub>Saw</sub> (Instability) |        | Reset=V <sub>SS</sub> ; f <sub>ClockIn</sub> =10KHz; Buffer=highimpedance;<br>C <sub>Saw</sub> =1nF; R <sub>Saw</sub> =10MΩ   | 27  | C <sub>Saw</sub> | 220         | 330   | 470   | [pF] |
|                     | C <sub>Reg</sub> Minimal Test on C <sub>Reg</sub> (Overdrive)   |        |   | 28  | C <sub>Reg</sub> | 470         | 470   | 680   |      |
| I <sub>c</sub>      | Current consumption   |        | Reset, OutEn=V <sub>DD</sub> ; FS, Bipol, Cw, Ph3=V <sub>SS</sub> ;<br>R <sub>Saw</sub> =∞ R <sub>dt</sub> =∞ R <sub>Bilevel</sub> =∞ OP <sub>1,2</sub> =Follower<br>f <sub>ClockIn</sub> =0Hz; C <sub>Saw</sub> =0; C <sub>Reg</sub> =0                  | 7   | V <sub>DD</sub>  | 1.680       | 1.712 | 1.770 | [mA] |
|                     |   |        | FS, OutEn=V <sub>DD</sub> ; Reset, Bipol, Cw, Ph3=V <sub>SS</sub><br>R <sub>Saw</sub> =10MΩ R <sub>dt</sub> =10kΩ R <sub>Bilevel</sub> =10kΩ<br>OP <sub>1,2</sub> =Follower f <sub>ClockIn</sub> =20kHz;<br>C <sub>Saw</sub> =100pF C <sub>Reg</sub> =1nF | 7   |                  | 2.790       | 3.013 | 3.110 |      |
| S <sub>eq-IST</sub> | Input Schmitt-Trigger V <sub>↑</sub>                            |        | f[OutEn]=20Hz triangle from V <sub>DD</sub> to V <sub>SS</sub> ;<br>OP2 <sub>in</sub> , Ph3, Clock, FS, Bipol, Cw=V <sub>SS</sub> ; Reset=V <sub>DD</sub>   | 5   | OutEn            | 3.12        | 3.12  | 3.12  | [V]  |
|                     | Input Schmitt-Trigger V <sub>↓</sub>                            |        |   |     |                  | 1.80        | 1.80  | 1.80  |      |

**Measurement figures**

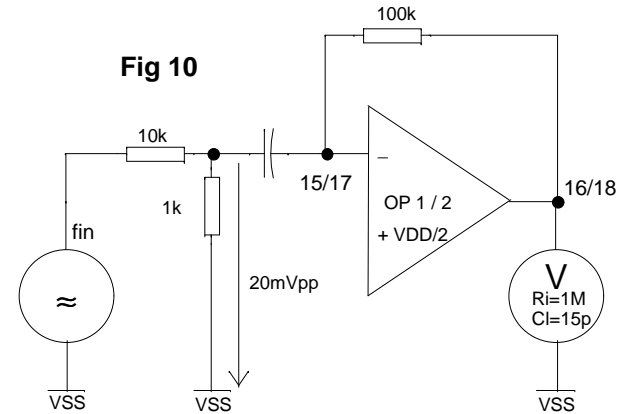
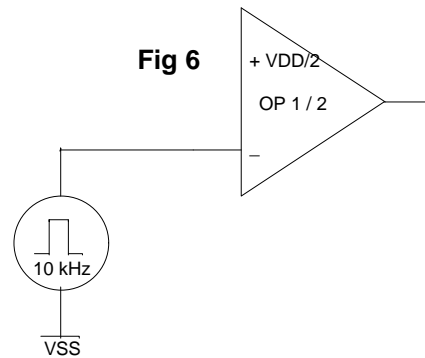
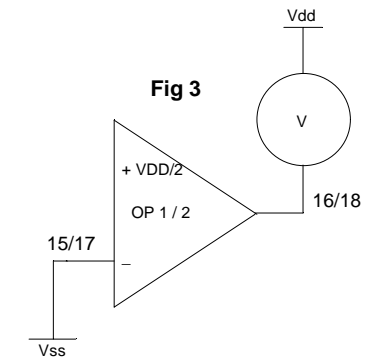
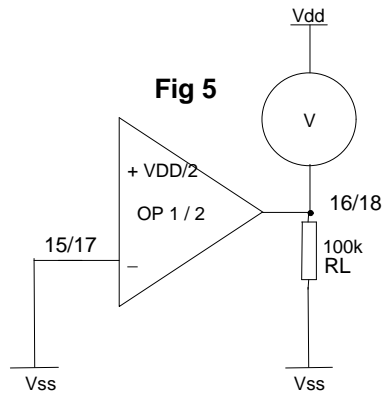
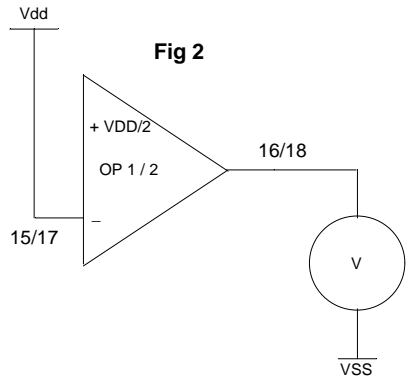
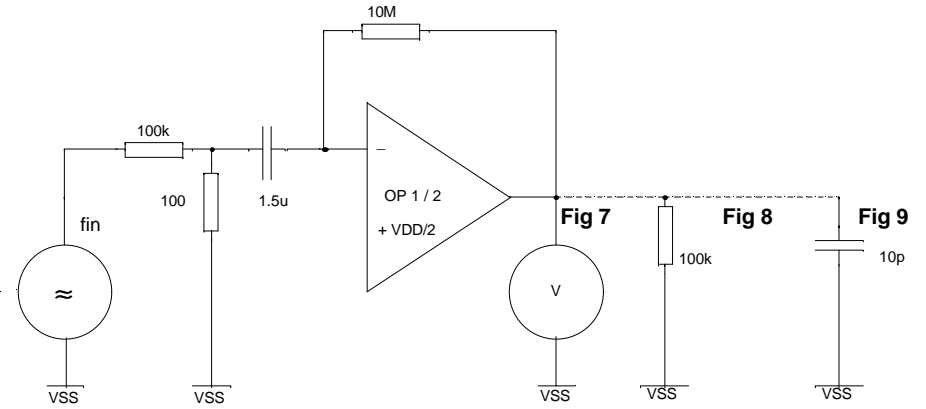
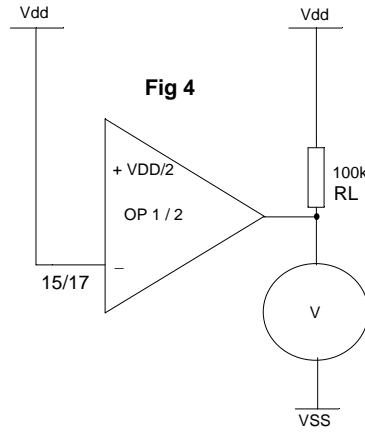
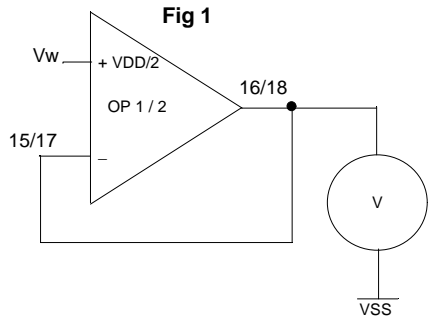


Fig 11

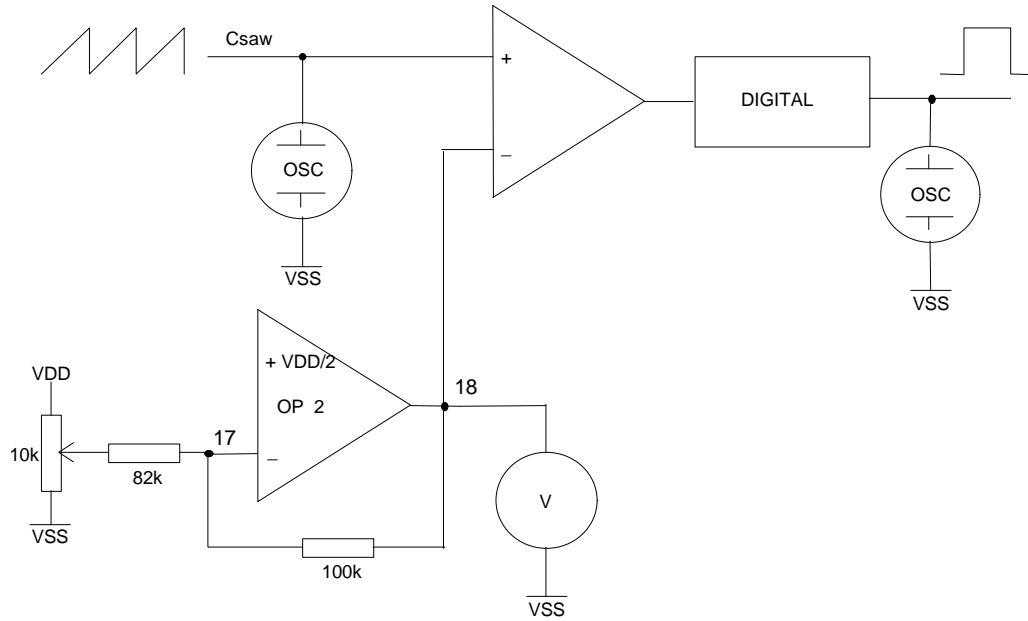


Fig 13

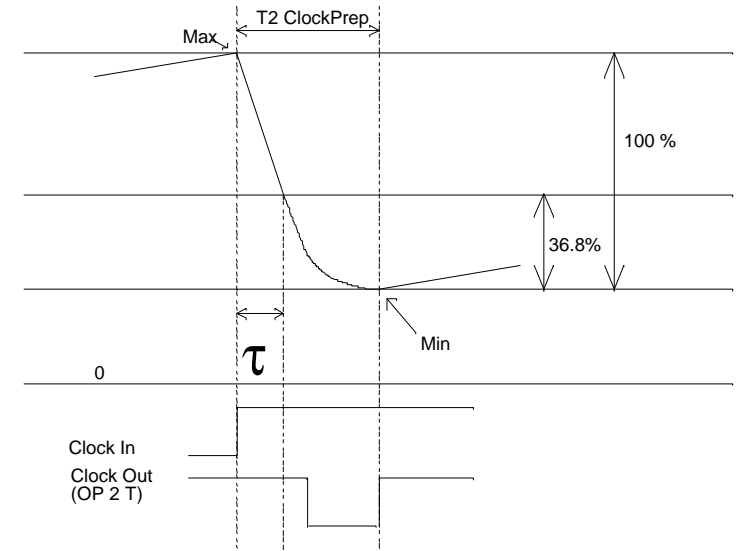


Fig 12

