

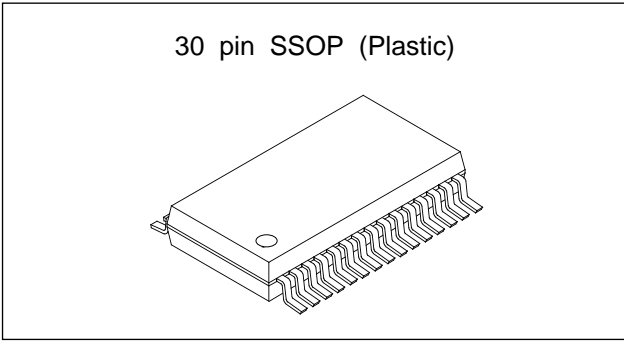
8 mm VCR ATF

**Description**

The CXA1814N is an IC developed for ATF (Automatic Track Finding) in 8 mm VCRs, and integrates the major functions necessary for ATF onto a single chip.

**Features**

- Built-in pilot signal detector and BPF
- Adopts a high-precision analog filter with no switching noise
- Built-in SP/LP identification circuit and clog detection circuit
- Low noise, high-precision bipolar process



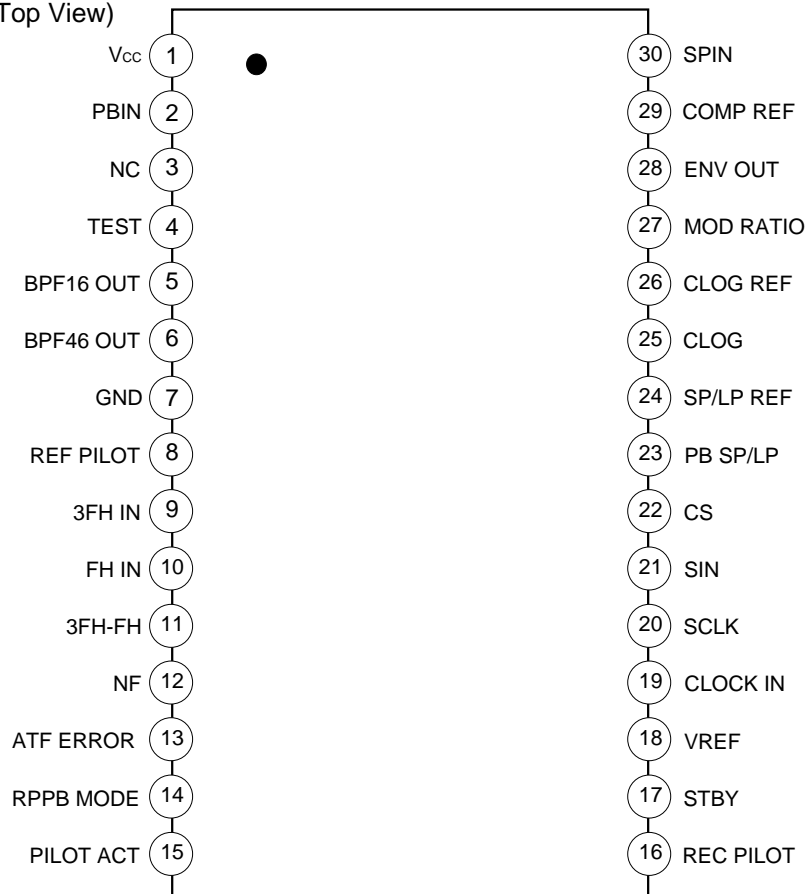
**Applications**

ATF for 8 mm VCRs

**Structure**

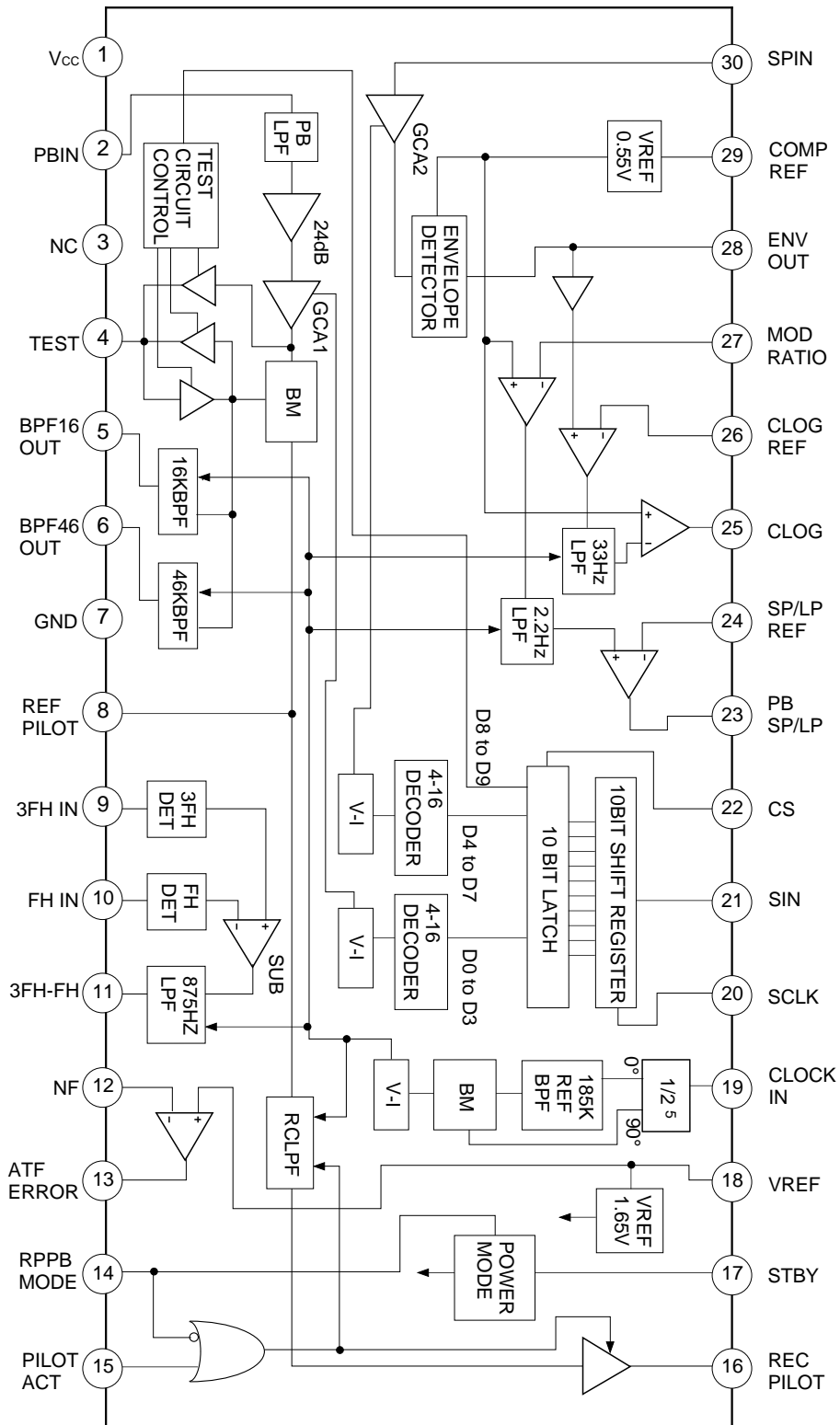
Bipolar silicon monolithic IC

**Pin Configuration (Top View)**



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Block Diagram



Pin Description

| Pin No. | Symbol          | Pin voltage                           |   | Equivalent circuit | I/O impedance | Description  |
|---------|-----------------|---------------------------------------|---|--------------------|---------------|--|
|         |                 | DC                                    | AC  |                    |               |  |
| 1       | V <sub>CC</sub> | 3.15 V                                | —   |                    | —             | Power supply for all circuits.   |
| 2       | PBIN            | 1.77 V typ                            | 0.1 to 1.0 V <sub>p-p</sub>   |                    | 50 kΩ         | Playback RF signal input.  |
| 3       | NC              |                                       | —   |                    | —             | Unconnected.   |
| 4       | TEST            | 1.77 V for output<br>1.58 V for input | Approx. 0.5 V <sub>p-p</sub> Typ.<br>for output<br>0.5 V <sub>p-p</sub> or less for input |                    | 100 kΩ        | GCA1, BMIN and BMOUT test I/O.<br>Pull up to V <sub>CC</sub> with a 100 kΩ resistor during signal input. |
| 5       | BPF16 OUT       | 1.77 V                                | Approx. 0.5 V <sub>p-p</sub> Typ.   |                    |               | BPF16K output.   |
| 6       | BPF46 OUT       | 1.77 V                                | Approx. 0.5 V <sub>p-p</sub> Typ.   |                    |               | BPF46K output.   |
| 7       | GND             | 0 V                                   | —   |                    | —             | GND for all circuits.  |
| 8       | REF PILOT       | 1.77 V                                | 1.0 V <sub>p-p</sub> or less  |                    | 130 kΩ        | Input for reference pilot signal. Maximum input level is 1 V <sub>p-p</sub> .                            |

| Pin No. | Symbol    | Pin voltage                 |                  | Equivalent circuit | I/O impedance | Description   |
|---------|-----------|-----------------------------|------------------|--------------------|---------------|---|
|         |           | DC                          | AC               |                    |               |   |
| 9       | 3FHIN     | 1.58 V                      | 1.0 Vp-p or less |                    | 60 kΩ         | 3FH signal input.<br>Connect it to Pin 6 with capacitor coupled.                    |
| 10      | FHIN      |                             |                  |                    |               | FH signal input.<br>Connect it to Pin 5 with capacitor coupled.                     |
| 11      | 3FH-FH    | 1.58 V                      | —                |                    |               | FH detection circuit output.  |
| 12      | NF        | 1.58 V                      | —                |                    |               | Operational amplifier inverted input for the FH detection circuit output amplifier. |
| 13      | ATF ERROR | 1.58 V                      | —                |                    |               | Operational amplifier output for the FH detection circuit output amplifier.         |
| 14      | RPPB MODE | LOW ≤ 0.8 V<br>HIGH ≥ 2.1 V | —                |                    |               | Mode control.<br>High: Playback mode<br>Low: Recording mode                         |
| 15      | PILOT ACT |                             |                  |                    |               | Pilot signal output control.<br>High: ENABLE<br>Low: DISABLE                        |

| Pin No. | Symbol    | Pin voltage                 |                          | Equivalent circuit | I/O impedance   | Description  |
|---------|-----------|-----------------------------|--------------------------|--------------------|---|--|
|         |           | DC                          | AC                       |                    |   |  |
| 16      | REC PILOT | 1.10 V                      | Approx. 0.5 Vp-p         |                    |   | Pilot signal output.   |
| 17      | STBY      | LOW ≤ 0.8 V<br>HIGH ≥ 2.1 V | —                        |                    |   | Power save mode control.<br>High: STBY                           |
| 18      | VREF      | 1.58 V                      | —                        |                    |   | Electric potential for FH detection operating point.             |
| 19      | CLOCK IN  | Vcc - 0.7 V                 | Approx. 0.3 Vp-p<br>Typ. |                    | 150 kΩ  | External clock input.  |
| 20      | SCLK      | LOW ≤ 0.8 V<br>HIGH ≥ 2.1 V | —                        |                    |   | Serial input clock for GCA1 and GCA2 gain and TEST mode control. |
| 21      | SIN       |                             |                          |                    |   | Serial data input for GCA1 and GCA2 gain and TEST mode control.  |
| 22      | CS        |                             |                          |                    | Chip select input for GCA1 and GCA2 gain and TEST mode control. |  |

| Pin No. | Symbol       | Pin voltage                                      |    | Equivalent circuit | I/O impedance | Description  |
|---------|--------------|--|----|--------------------|---------------|--|
|         |              | DC   | AC |                    |               |  |
| 23      | PB<br>SP/LP  | HIGH $\geq V_{CC}$<br>-0.8 V<br>LOW $\leq 0.4V$  | —  |                    |               | This pin is as follows during variable speed playback.<br>During SP mode: High<br>During LP mode: Low<br>“Low” during normal playback. |
| 24      | SP/LP<br>REF | 0 V to $V_{CC}$<br>-1.4 V                        | —  |                    |               | Threshold level setting for LP/SP identification during special playback.  |
| 25      | CLOG         | HIGH $\geq V_{CC}$<br>-0.8 V<br>LOW $\leq 0.4 V$ | —  |                    |               | Clog detection output.<br>Clogged state: High<br>Normal state: Low   |
| 26      | CLOG<br>REF  | 0 V to $V_{CC}$<br>-1.4 V                        | —  |                    |               | Threshold level setting for clog detection.  |
| 27      | MOD<br>RATIO |  |    |                    |               | Input for DC shifted envelope signal.  |
| 28      | ENV<br>OUT   | 0.53 V   | —  |                    |               | Envelope detector output.  |

| Pin No. | Symbol   | Pin voltage |                 | Equivalent circuit | I/O impedance | Description                              |
|---------|----------|-------------|-----------------|--------------------|---------------|--|
|         |          | DC          | AC              |                    |               |  |
| 29      | COMP REF | 0.53 V      | —               |                    |               | Reference voltage output for comparator. |
| 30      | SPIN     | 2.1 V       | 0.1 to 1.0 Vp-p |                    | 133 kΩ        | Playback RF signal input.                |

**Electrical Characteristics****Absolute Maximum Ratings**

| Item  | Symbol           | Rating                  | Unit |
|---|------------------|-------------------------|------|
| Supply voltage (Note 1)                                 | V <sub>CC</sub>  | -0.4 to 7.0             | V    |
| Input voltage (Note 1)                                  | V <sub>I</sub>   | -0.4 to V <sub>CC</sub> | V    |
| Total power dissipation T <sub>a</sub> ≤ 25 °C (Note 2) | P <sub>D</sub>   | 1025                    | mW   |
| Operating temperature range                             | T <sub>opr</sub> | -10 to 75               | °C   |
| Storage temperature range                               | T <sub>stg</sub> | -40 to 125              | °C   |

**Note 1)** The circuit GND pin is used as the reference for all voltages.

**Note 2)** Substrate mounting (Sony's standard pattern on a 50 mm × 50 mm, 1.6 mm thick glass fabric base epoxy substrate) and no-wind conditions.

Total power dissipation follows a load reduction ratio of 8.2 mW/°C at temperatures above T<sub>a</sub> = 25 °C.

**Recommended Operating Conditions**

| Item                        | Symbol           | Min. | Typ. | Max. | Unit |
|-----------------------------|------------------|------|------|------|------|
| Supply voltage              | V <sub>CC</sub>  | 3.0  |      | 5.5  | V    |
| Operating temperature range | T <sub>OPR</sub> | -10  |      | 75   | °C   |



**Electrical Characteristics**

(DC characteristics 1)

(Unless otherwise specified, Ta = 25 °C, Vcc = 3.15 V)

| Item                                     | Symbol | Conditions   | Rating values |       |       | Unit | Remarks |
|--|--------|--|---------------|-------|-------|------|---------|
|  |        |  | Min.          | Typ.  | Max.  |      |         |
| Playback mode supply current             | Icc1   | 14 = H 15 = H 17 = L   |               | 7     | 10    | mA   |         |
|  |        | 14 = H 15 = L 17 = L   |               | 6     | 9     |      |         |
| Recording mode supply current            | Icc2   | 14 = L 15 = H 17 = L   |               | 3.5   | 5     |      |         |
|  |        | 14 = L 15 = L 17 = L   |               | 3.5   | 5     |      |         |
| Power mode supply current                | Icc3   | 14 = L 15 = L 17 = H   |               | 1     | 2     |      |         |
|  |        | 14 = H 15 = L 17 = H   |               | 1     | 2     |      |         |
|  |        | 14 = L 15 = H 17 = H   |               | 1     | 2     |      |         |
|  |        | 14 = H 15 = H 17 = H   |               | 1     | 2     |      |         |
| Reference voltage                        | Vref   | Vcc = 3.15 V, entire operating temperature range   | 1.545         | 1.575 | 1.605 | V    |         |
| Power supply fluctuation characteristics | D Vr1  | Vcc = 3.0 V, Vref fluctuation range  | -80           | -75   | -70   | mV   |         |
|  | D Vr2  | Vcc = 4.0 V, Vref fluctuation range  | -445          |       | -405  |      |         |
| REF PILOT input resistance               | Rpi    | REFPILOT Vin/lin   | 100           | 137   | 180   | kΩ   |         |
| FH detection offset voltage              | D Ver1 | FHIN and 3FHIN = AC GND, difference between Vref and 3FH-FH                                      | -40           | 0     | 40    | mV   |         |
| Error output voltage                     | D Ver2 | FHIN and 3FHIN = AC GND, difference between Vref and ATFError                                    | -200          | 0     | 200   |      |         |
| Subtractor output voltage                | Vsub0  | FHIN: 16.46 kHz, 20 mVp-p<br>3FHIN: 46.20 kHz, 20 mVp-p<br>3FH-FH pin voltage                    | 1.505         | 1.575 | 1.645 | V    |         |
|  | Vsub1  | FHIN: 16.46 kHz, 60 mVp-p<br>3FHIN: 46.20 kHz, 20 mVp-p<br>3FH-FH pin voltage, Vsub0 reference   | -60           | -40   | -20   | mV   |         |
|  | Vsub2  | FHIN: 16.46 kHz, 20 mVp-p<br>3FHIN: 46.20 kHz, 60 mVp-p<br>3FH-FH pin voltage, Vsub0 reference   | 20            | 40    | 60    |      |         |
|  | Vsub3  | FHIN: 16.46 kHz, 400 mVp-p<br>3FHIN: 46.20 kHz, 20 mVp-p<br>3FH-FH pin voltage, Vsub0 reference  | -430          | -370  | -310  |      |         |
|  | Vsub4  | FHIN: 16.46 kHz, 20 mVp-p<br>3FHIN: 46.20 kHz, 400 mVp-p<br>3FH-FH pin voltage, Vsub0 reference  | 310           | 370   | 430   |      |         |
|  | Vsub5  | FHIN: 16.46 kHz, 1000 mVp-p<br>3FHIN: 46.20 kHz, 20 mVp-p<br>3FH-FH pin voltage, Vsub0 reference | -1060         | -930  | -800  |      |         |
|  | Vsub6  | FHIN: 16.46 kHz, 20 mVp-p<br>3FHIN: 46.20 kHz, 1000 mVp-p<br>3FH-FH pin voltage, Vsub0 reference | 800           | 930   | 1060  |      |         |
|  | Vsub7  | FHIN: 16.46 kHz, 440 mVp-p<br>3FHIN: 46.20 kHz, 400 mVp-p<br>3FH-FH pin voltage, Vsub0 reference | -60           | -40   | -20   |      |         |
|  | Vsub8  | FHIN: 16.46 kHz, 400 mVp-p<br>3FHIN: 46.20 kHz, 440 mVp-p<br>3FH-FH pin voltage, Vsub0 reference | 20            | 40    | 60    |      |         |
| Error "High" level voltage               | Vher1  | NF = Vref -20 mV ATF Error Ioer = 10 μA  | 2.95          | 3.05  |       | V    |         |
|  | Vher2  | NF = Vref -20 mV ATF Error Ioer = 10 μA Vcc = 3 V  | 2.8           | 2.9   |       |      |         |
| Error "Low" level voltage                | Vler1  | NF = Vref +20 mV ATF Error Ioer = -10 μA   |               | 0.1   | 0.2   | V    |         |
| LPF 2 linearity                          | Rlpf2  | REFPILOT = 100 kHz, 0.4orl Vp-p in RPPBMODE = H<br>PILOTACT = H RECPILLOT voltage ratio          | 0.95          | 0.99  | 1.05  |      |         |
| CLOCK IN input resistance                | Rck    | CLOCKIN Vin/lin  | 80            | 150   |       | kΩ   |         |

(DC characteristics 2)

(Unless otherwise specified, Ta = 25 °C, Vcc = 3.15 V)

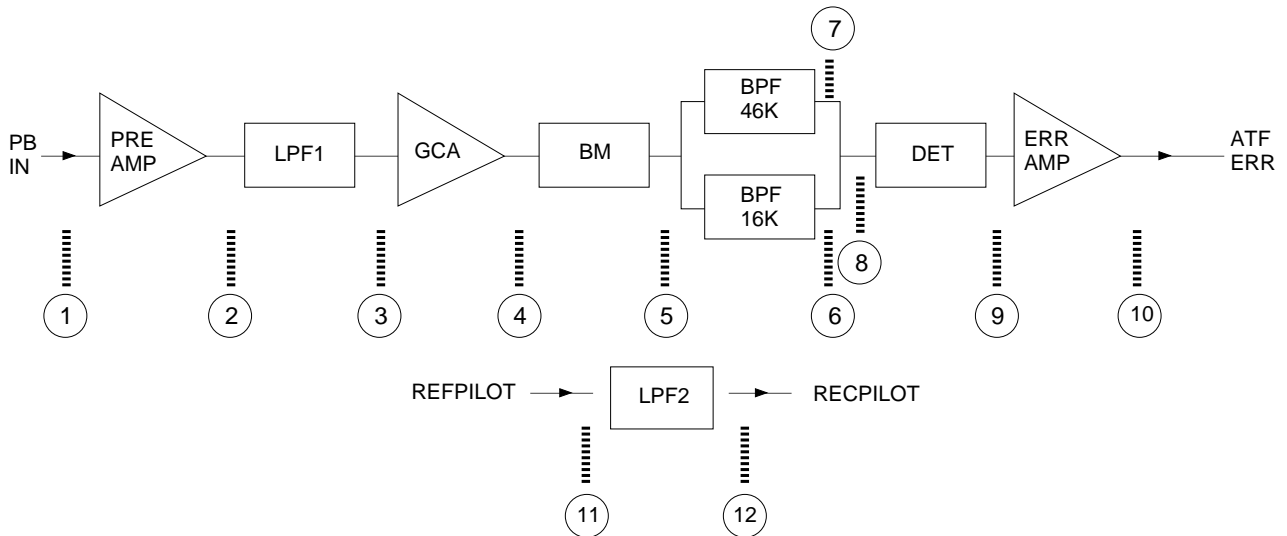
| Item   | Symbol | Conditions  | Rating values |       |       | Unit | Remarks |
|--|--------|---|---------------|-------|-------|------|---------|
|  |        |   | Min.          | Typ.  | Max.  |      |         |
| CLOG REF input voltage                             | Vcc1   |   | 0             |       | Vcc   | V    |         |
| SP/LP REF input voltage                            | Vsc2   |   | 0             |       | Vcc   |      |         |
| CLOG detection high check                          |        | SPIN = 50 mVp-p, 5 MHz/GCA2 = 1000/CLOGREF = 0.39 V   | 2.4           |       |       |      |         |
| CLOG detection low check                           |        | SPIN = 150 mVp-p, 5 MHz/GCA2 = 1000/CLOGREF = 0.39 V  |               |       | 0.4   |      |         |
| CLOG output voltage                                | Vclgl  | SPIN = 500 mVp-p, 5 MHz/GCA2 = 1000/CLOGREF = COMPREF<br>Vcc = 3.0...4.0 V                  |               | 0.01  | 0.4   | V    | Note 1  |
|  | Vclgh  | SPIN = AC GND/GCA2=1000/CLOGREF = COMPREF<br>Vcc = 3.0...4.0 V                              | 2.5           | 3.0   |       |      |         |
| PB SP/LP output voltage                            | Vspl   | SPIN = AC GND/MODRATIO: See fig1<br>SPLPREF = Vref/Vcc=3...4 V/GCA2 = 1000                  | 2.5           | 3.0   |       | V    | Note 1  |
|  | Vsph   | SPIN = 500 mVp-p, 5 MHz/MODRATIO: See fig1<br>SPLPREF = Vref/Vcc=3...4 V/GCA2 = 1000        |               | 0.01  | 0.4   |      |         |
| "High" level input voltage                         | Vih    | Pins 14, 15 and 17; Vcc = 3 to 4 V  | 2.1           |       | Vcc   | μA   | Note 1  |
| "Low" level input voltage                          | Vil    | Pins 14, 15 and 17; Vcc = 3 to 4 V  | -0.4          |       | 0.8   |      |         |
| "High" level input current                         | Iih    | Pins 14, 15 and 17; Vcc = 3 to 4 V  |               | 0     | 1     |      |         |
| "Low" level input current                          | Iil    | Pins 14, 15 and 17; Vcc = 3 to 4 V  | -1            | -0.5  |       |      |         |
| CLOG identification time                           | Tcl1   | SPIN = 500 mVp-p, 5 MHz/Burst = 0.5 Hz/GCA2 = 1000  | 0.7           | 1.3   | 2.6   | mS   |         |
|  | Tcl2   | CLOGREF = COMPREF (See: fig2)   | 4             | 7.5   | 10.6  |      |         |
| SPLP identification time                           | Tsp1   | SPIN = 500 mVp-p, 5 MHz/Burst = 0.5 Hz/GCA2 = 1000  | 30            | 50    | 70    | mS   |         |
|  | Tsp2   | SPLPREF = Vref/MODRATIO = See: fig1 (See: fig3)   | 30            | 50    | 70    |      |         |
| ENV OUT DC voltage                                 | VEnv0  | SPIN = AC GND, GCA2 = 0000; ENVOUT pin voltage  | 0.425         | 0.525 | 0.625 | V    |         |
| RF detection offset voltage                        | Denv   | SPIN = AC GND, GCA2 = 0000; ENVOUT - COMPREF voltage  | -80           | 0     | 80    | mV   |         |
| RF detection output voltage                        | Venv1  | ENVOUT voltage difference when SPIN = 0 V and 0.5 Vp-p, 5 MHz, GCA2 = 1111 and Vcc = 3.15 V | 2.3           | 2.5   |       | V    |         |
|  | Venv2  | ENVOUT voltage difference when SPIN = 0 V and 0.5 Vp-p, 5 MHz, GCA2 = 1111 and Vcc = 3.0 V  | 2.2           | 2.4   |       |      |         |
| CLOG REF input current                             | Icc1h  | Pin current value when CLOG REF = 3.15 V  |               | 0     | 1     | μA   |         |
|  | Icc1l  | Pin current value when CLOG REF = 0 V   | -1            | -0.1  |       |      |         |
| MOD RATIO input current                            | Icc1h  | Pin current value when MOD RATIO = 3.15 V   |               | 0     | 1     | μA   |         |
|  |        | Pin current value when MOD RATIO = 0 V  | -1            | -0.1  |       |      |         |
| SP/LP REF input current                            | Icc1h  | Pin current value when SPLPREF = 3.15 V   |               | 0     | 1     | μA   |         |
|  |        | Pin current value when SPLPREF = 0 V  | -1            | -0.1  |       |      |         |
| Switching time between playback and recording mode |        | Time until RECATF stabilizes when RPPBMODE goes from high to low                            |               |       | 20    | μS   |         |
| Switching time between standby and playback mode   |        | Time until PBATF Error stabilizes when STBY goes from high to low                           |               |       | 25    | mS   |         |

**Note 1)** The Typ. value is Vcc = 3.15 V

Electrical Characteristics

(AC characteristics 1)

(Unless otherwise specified, Ta = 25 °C, Vcc = 3.15 V)



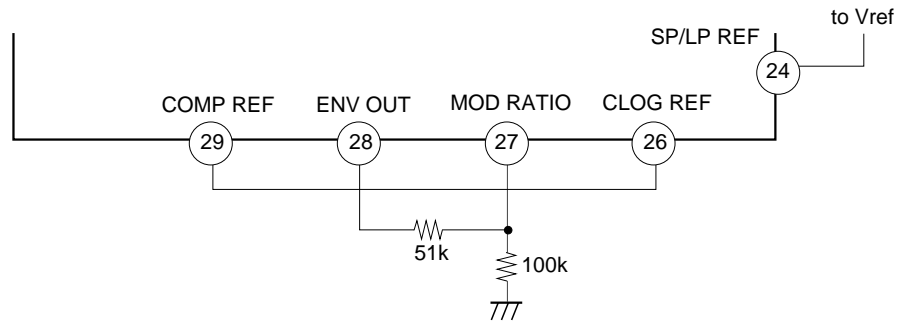
| Item                  | Symbol | Conditions   | Rating values |      |       | Unit  | Remarks                   |
|-----------------------|--------|--|---------------|------|-------|-------|---------------------------|
|                       |        |  | Min.          | Typ. | Max.  |       |                           |
| LPF1 Gain             | Glp1M  | PBIN – GCA1OUT Vin=30 mVp-p, 100 kHz, GCA1: 0000   | 23            | 25   | 27    | dB    | Measurement points 1 to 4 |
|                       | Glp11  | PBIN = 30 mVp-p, 120 kHz, GCA1: 0000   | -1.5          | 0.5  | 1.5   |       |                           |
|                       | Glp12  | PBIN = 30 mVp-p, 150 kHz, GCA1: 0000   | -1.5          | 0.5  | 1.5   |       |                           |
|                       | Glp13  | PBIN = 30 mVp-p, 170 kHz, GCA1: 0000   | -1.5          | 0    | 1.5   |       |                           |
|                       | Glp14  | PBIN = 100 mVp-p, 250 kHz, GCA1: 0000  |               | -10  | -6.5  |       |                           |
|                       | Glp15  | PBIN = 300 mVp-p, 400 kHz, GCA1: 0000  |               | -27  | -17.5 |       |                           |
|                       | Glp16  | PBIN = 800 mVp-p, 750 kHz, GCA1: 0000  |               | -50  | -35   |       |                           |
|                       | Glp17  | PBIN = 800 mVp-p, 3 MHz, GCA1: 0000  |               | -65  | -50   |       |                           |
| GCA1 S/N ratio        | Vgca11 | PBIN = 10 mVp-p, 100 kHz; Measure GCA1OUT.<br>RBW = 300 Hz, VBW = 100 Hz; Maximum value from 50 to 250 kHz | 40            | 50   |       | mVp-p |                           |
| GCA1 folded noise     | Vgca   | PBIN = 0.6 Vp-p, 6 MHz; Measure GCA1OUT.<br>RBW = 300 Hz, VBW = 100 Hz; Maximum value from 50 to 250 kHz   |               | 1    | 50    |       |                           |
| BPF16K reference gain | Gbp1M  | BPFIn = 0.5 Vp-p, 16.46 kHz  | 1             | 4    | 7     | dB    | Measurement points 5 to 6 |
| BPF16K Gain           | Gbp11  | BPFIn = 0.5 Vp-p, 9 kHz; Gbp1M reference   |               | -24  | -20   |       |                           |
|                       | Gbp12  | BPFIn = 0.5 Vp-p, 28 kHz; Gbp1M reference  |               | -22  | -20   |       |                           |
|                       | Gbp13  | BPFIn = 0.5 Vp-p, 150 kHz; Gbp1M reference   |               | -35  | -26   |       |                           |
| BPF46K reference gain | Gbp2M  | BPFIn = 0.5 Vp-p, 46.2 kHz   | 1             | 4    | 7     | dB    | Measurement points 5 to 7 |
| BPF46K Gain           | Gbp21  | BPFIn = 0.5 Vp-p, 16 kHz; Gbp2M reference  |               | -31  | -26   |       |                           |
|                       | Gbp22  | BPFIn = 0.5 Vp-p, 33 kHz; Gbp2M reference  |               | -26  | -20   |       |                           |
|                       | Gbp23  | BPFIn = 0.5 Vp-p, 60 kHz; Gbp2M reference  |               | -24  | -20   |       |                           |
|                       | Gbp24  | BPFIn = 0.5 Vp-p, 150 kHz; Gbp2M reference   |               | -36  | -26   |       |                           |
| BPF Gain Diff         | D Gbp  | Difference between Gbp1M and Gbp2M   | -2            | 0    | 2     | dB    | Measurement point 4       |
| Cross Talk            | Gcap   | REFPILOT = 0.5 Vp-p, 200 kHz; PILOTACT = Low<br>PBIN = AC GND; Measure GCA1OUT                             |               | -60  | -46   |       |                           |
| LPF2 reference gain   | Glp2M  | 500 mVp-p, 100 kHz   | -1            | 0    | 1     | dB    | Measurement points 1 to 4 |
|                       | Glp21  | 500 mVp-p, 120 kHz; Glp2M reference  | -1.5          | 0.5  | 1.5   |       |                           |
|                       | Glp22  | 500 mVp-p, 150 kHz; Glp2M reference  | -1.5          | 0.4  | 1.5   |       |                           |
|                       | Glp23  | 500 mVp-p, 170 kHz; Glp2M reference  | -1.5          | -0.5 | 1.5   |       |                           |
|                       | Glp24  | 500 mVp-p, 300 kHz; Glp2M reference  |               | -16  | -12   |       |                           |
|                       | Glp25  | 500 mVp-p, 500 kHz; Glp2M reference  |               | -37  | -33   |       |                           |
|                       | Glp26  | 500 mVp-p, 1.5 MHz; Glp2M reference  |               | -80  | -40   |       |                           |

(AC characteristics 2)

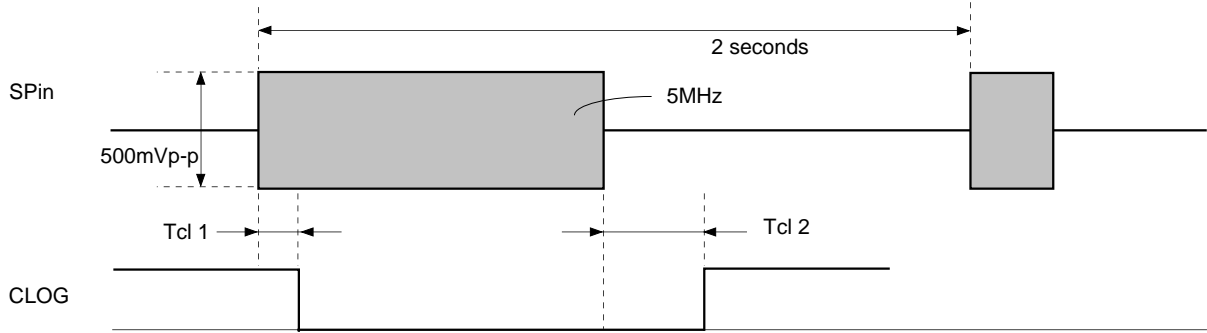
(Unless otherwise specified, Ta = 25 °C, Vcc = 3.15 V)

| Item                         | Symbol | Conditions  | Rating values |      |      | Unit | Remarks |
|------------------------------|--------|---|---------------|------|------|------|---------|
|                              |        |   | Min.          | Typ. | Max. |      |         |
| Clock input                  | Vck    | CLOCKIN = 6 MHz, C = 5Pf  | 0.1           | 0.3  | 1.5  | Vp-p |         |
| Clock Duty                   | Vdk    |   | 30            | 50   | 70   | %    |         |
| PBIN input                   | Vpd    |   | 0.1           | 0.4  | 1.0  | Vp-p |         |
| SPIN input                   | Vsp    |   | 0.1           | 0.4  | 1.0  |      |         |
| REF PILOT input              | Vpi    |   | 0.1           | 0.5  | 1.0  |      |         |
| REF PILOT output             | Vrec   | REFPILOT = 0.5 Vp-p input   |               | 0.5  |      | V    |         |
| GCA1 gain fluctuation        | D Gpd  | Vcc = 3.0...3.6 V Gpd (Vcc = 3.6 V) – Gpd (Vcc = 3.0 V)   | -1.5          | 0    | 1.5  | dB   |         |
| GCA2 gain fluctuation        | D Grf  | Vcc = 3.0...3.6 V Gpd (Vcc = 3.6 V) – Gpd (Vcc = 3.0 V)   | -1.0          | 0    | 1.0  |      |         |
| GCA2 Gain                    | Grf1   | Value obtained by dividing the ENVOUT electric potential difference when SPIN = 5 MHz, 0.4 Vp-p and 0 Vp-p by 0.2 V; GCA2 = 0000  | 2.0           | 5.0  | 8.0  |      |         |
|                              | Grf2   | Value obtained by dividing the ENVOUT electric potential difference when SPIN = 5 MHz, 0.2 Vp-p and 0 Vp-p by 0.1 V; GCA2 = 1000  | 10.0          | 13.0 | 16.0 |      |         |
|                              | Grf3   | Value obtained by dividing the ENVOUT electric potential difference when SPIN = 5 MHz, 0.1 Vp-p and 0 Vp-p by 0.05 V; GCA2 = 1111 | 17.0          | 20.0 | 23.0 |      |         |
| GCA2 frequency response      | fw     | Frequency -3 dB from SPIN = 0.2 Vp-p, 3 MHz; GCA2 = 1000  | 10            | 14   |      | MHz  |         |
| GCA1 gain difference         | Gdif1  | PBIN = 10 mVp-p, 100 kHz; Gain difference between GCA1 = n-1 → n (n = 1 to 15)  | 0.2           | 1.0  | 1.8  | dB   |         |
| GCA2 gain difference         | Gdif2  | SPIN = 200 mVp-p, 5 MHz; Gain difference between GCA1 = n - 1 → n (n = 1 to 15)   | 0.2           | 1.0  | 1.8  |      |         |
| ATF total gain               | Gerr1  | PBIN = 30 mVp-p. 116.46 kHz/GCA1 = 0000<br>REFPILOT=100 kHz/PBIN → BPF16OUT Gain  | 22            | 25   | 28   |      |         |
|                              | Gerr2  | PBIN = 30 mVp-p. 146.2 kHz/GCA1 = 0000<br>REFPILOT = 100 kHz/PBIN → BPF46OUT Gain   | 22            | 25   | 28   |      |         |
| ATF total gain difference    |        | Gerr1 – Gerr2   | -2            | 0    | 2    |      |         |
| ENV OUT output Tr/Tf time    | Trenv  | SPIN = 5 MHz, 1 Vp-p/Burst 10 Hz GCA2 = 1000 (Fig-4)  | 50            | 100  | 150  | μS   |         |
|                              | Tfenv  |   | 50            | 100  | 150  |      |         |
| Subtractor output Tr/Tf time | Trsub1 | FHIN = 1 Vp-p, 16 kHz/Burst = 10 Hz/3FHIN = AC GND  | 320           | 400  | 600  |      |         |
|                              | Tfsub1 | Measure 3FH-FH (fig. 5)   | 320           | 400  | 600  |      |         |
|                              | Trsub2 | 3FHIN = 1 Vp-p, 46 kHz/Burst = 10 Hz/FHIN = AC GND  | 320           | 400  | 600  |      |         |
|                              | Tfsub2 | Measure 3FH-FH (fig. 6)   | 320           | 400  | 600  |      |         |

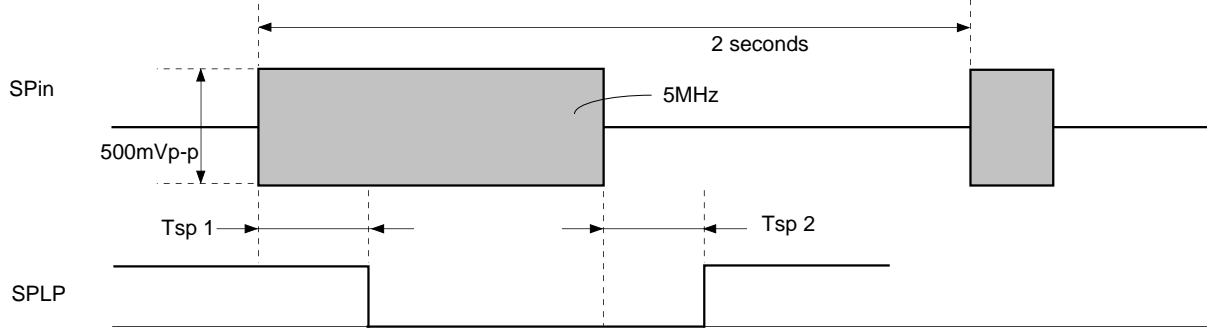
(fig 1)



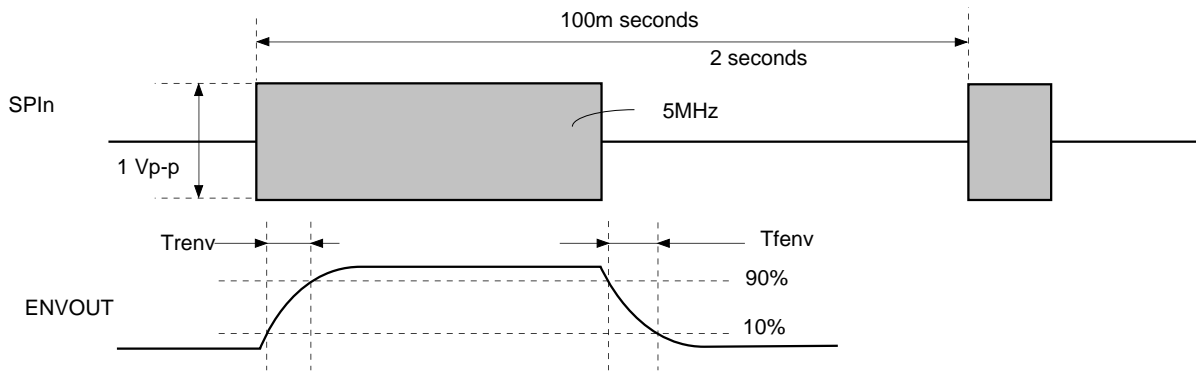
(fig 2)



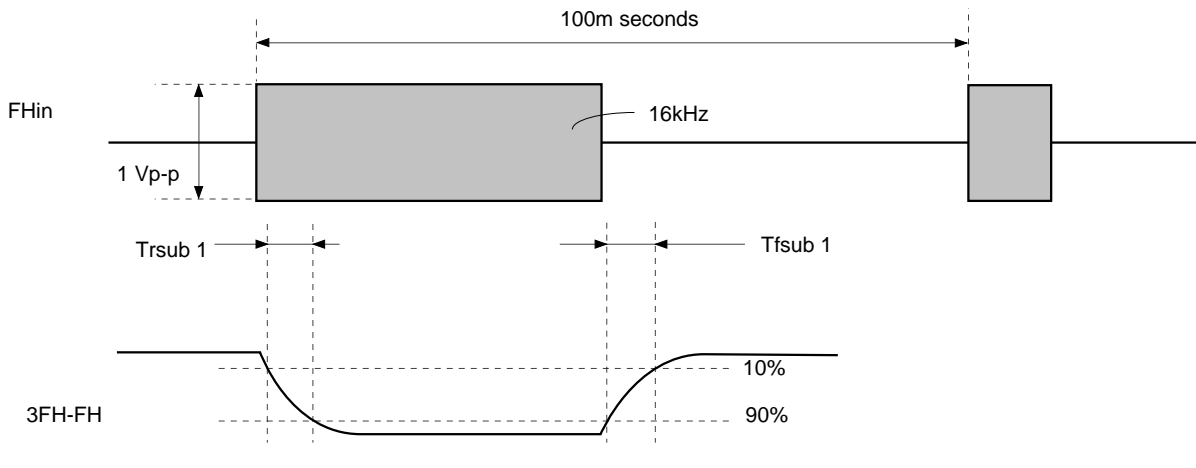
(fig 3)



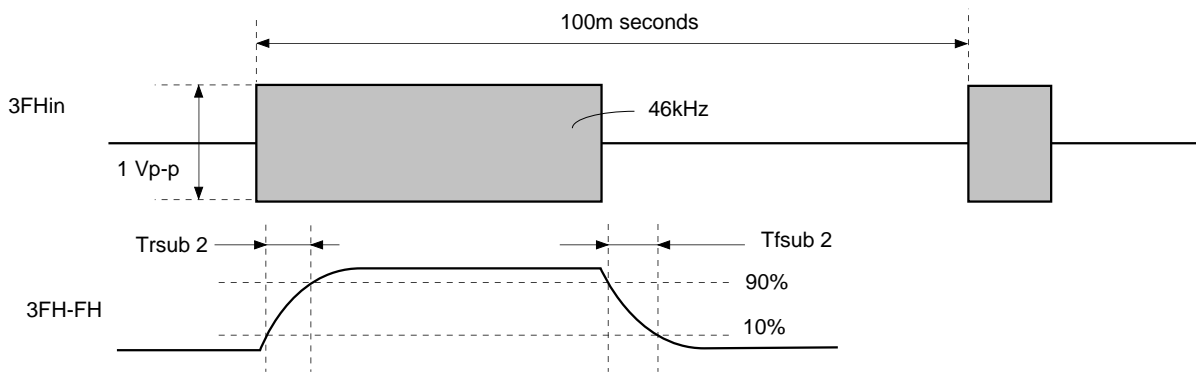
(fig 4)



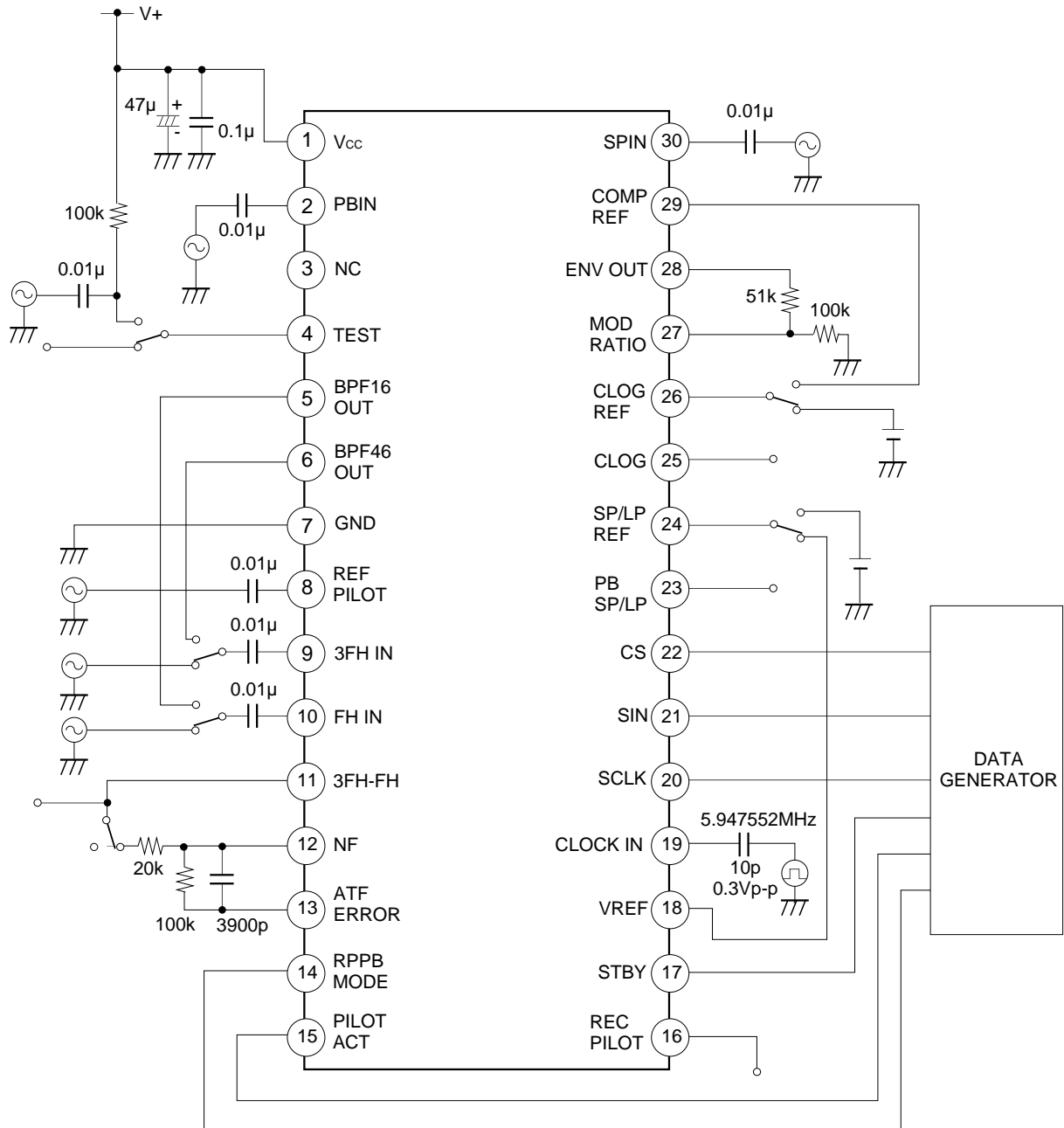
(fig 5)



(fig 6)

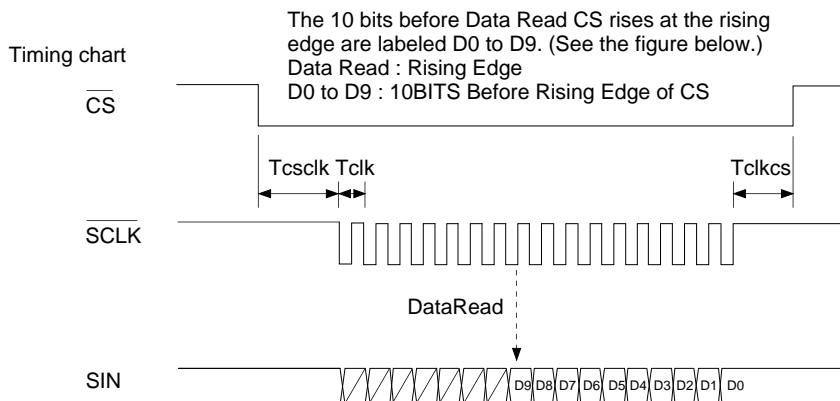
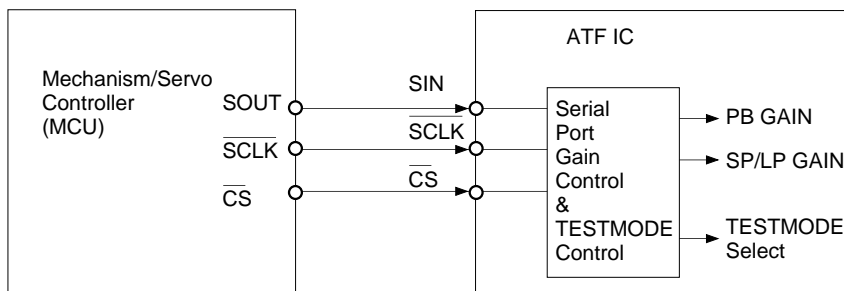


Electrical Characteristics Measurement Circuit



**Serial Control Block**

Block connection



|        | NIN    | MAX |
|--------|--------|-----|
| Tcsclk | 5 μsec |     |
| Tclk   | 1 μsec |     |
| Tclkcs | 5 μsec |     |

**Serial Data Contents (SERIAL DATA)**

GCA1

| D0 | D1 | D2 | D3 | PBAMPGAIN (dB) |
|----|----|----|----|----------------|
| 0  | 0  | 0  | 0  | 0 ± 0.5        |
| 0  | 0  | 0  | 1  | 1 ± 0.5        |
| 0  | 0  | 1  | 0  | 2 ± 0.5        |
| 0  | 0  | 1  | 1  | 3 ± 0.5        |
| 0  | 1  | 0  | 0  | 4 ± 0.5        |
| 0  | 1  | 0  | 1  | 5 ± 0.5        |
| 0  | 1  | 1  | 0  | 6 ± 0.5        |
| 0  | 1  | 1  | 1  | 7 ± 0.5        |
| 1  | 0  | 0  | 0  | 8 ± 0.5        |
| 1  | 0  | 0  | 1  | 9 ± 0.5        |
| 1  | 0  | 1  | 0  | 10 ± 0.5       |
| 1  | 0  | 1  | 1  | 11 ± 0.5       |
| 1  | 1  | 0  | 0  | 12 ± 0.5       |
| 1  | 1  | 0  | 1  | 13 ± 0.5       |
| 1  | 1  | 1  | 0  | 14 ± 0.5       |
| 1  | 1  | 1  | 1  | 15 ± 0.5       |

\*Glp1M REF  
 (Glp1M = 25 ± 2 dB)

GCA2

| D4 | D5 | D6 | D7 | SPAMPGAIN (dB) |
|----|----|----|----|----------------|
| 0  | 0  | 0  | 0  | 0 ± 0.5        |
| 0  | 0  | 0  | 1  | 1 ± 0.5        |
| 0  | 0  | 1  | 0  | 2 ± 0.5        |
| 0  | 0  | 1  | 1  | 3 ± 0.5        |
| 0  | 1  | 0  | 0  | 4 ± 0.5        |
| 0  | 1  | 0  | 1  | 5 ± 0.5        |
| 0  | 1  | 1  | 0  | 6 ± 0.5        |
| 0  | 1  | 1  | 1  | 7 ± 0.5        |
| 1  | 0  | 0  | 0  | 8 ± 0.5        |
| 1  | 0  | 0  | 1  | 9 ± 0.5        |
| 1  | 0  | 1  | 0  | 10 ± 0.5       |
| 1  | 0  | 1  | 1  | 11 ± 0.5       |
| 1  | 1  | 0  | 0  | 12 ± 0.5       |
| 1  | 1  | 0  | 1  | 13 ± 0.5       |
| 1  | 1  | 1  | 0  | 14 ± 0.5       |
| 1  | 1  | 1  | 1  | 15 ± 0.5       |

\*Grf1 REF  
 (Grf1 = 5 ± 2 dB)

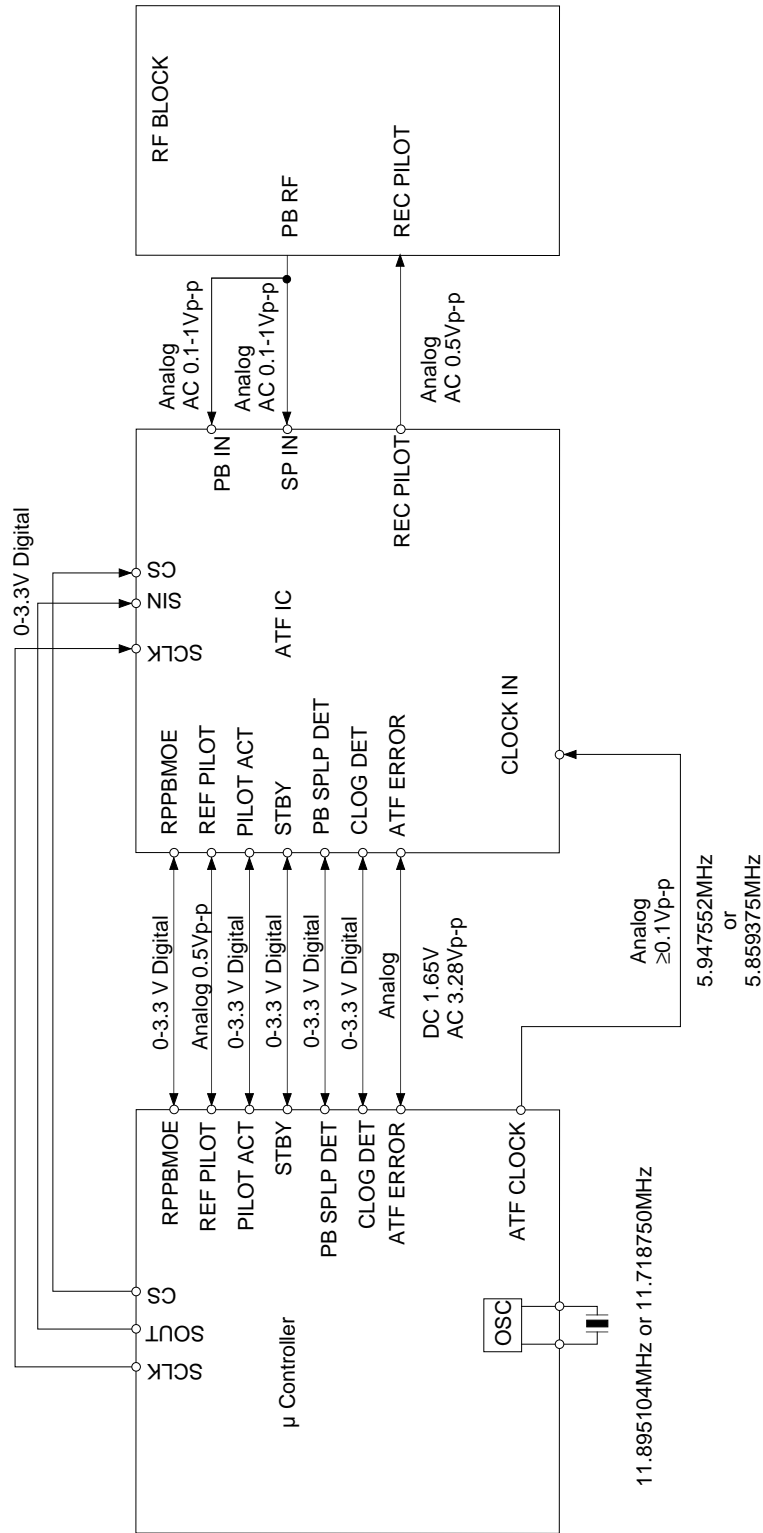
TEST

| D8 | D9 | TESTMODE               |
|----|----|------------------------|
| 0  | 0  | OUTPUT OF GCA          |
| 0  | 1  | OUTPUT OF B.M          |
| 1  | 0  | INPUT OF BPF16 k, 46 k |
| 1  | 1  | NOT USED               |

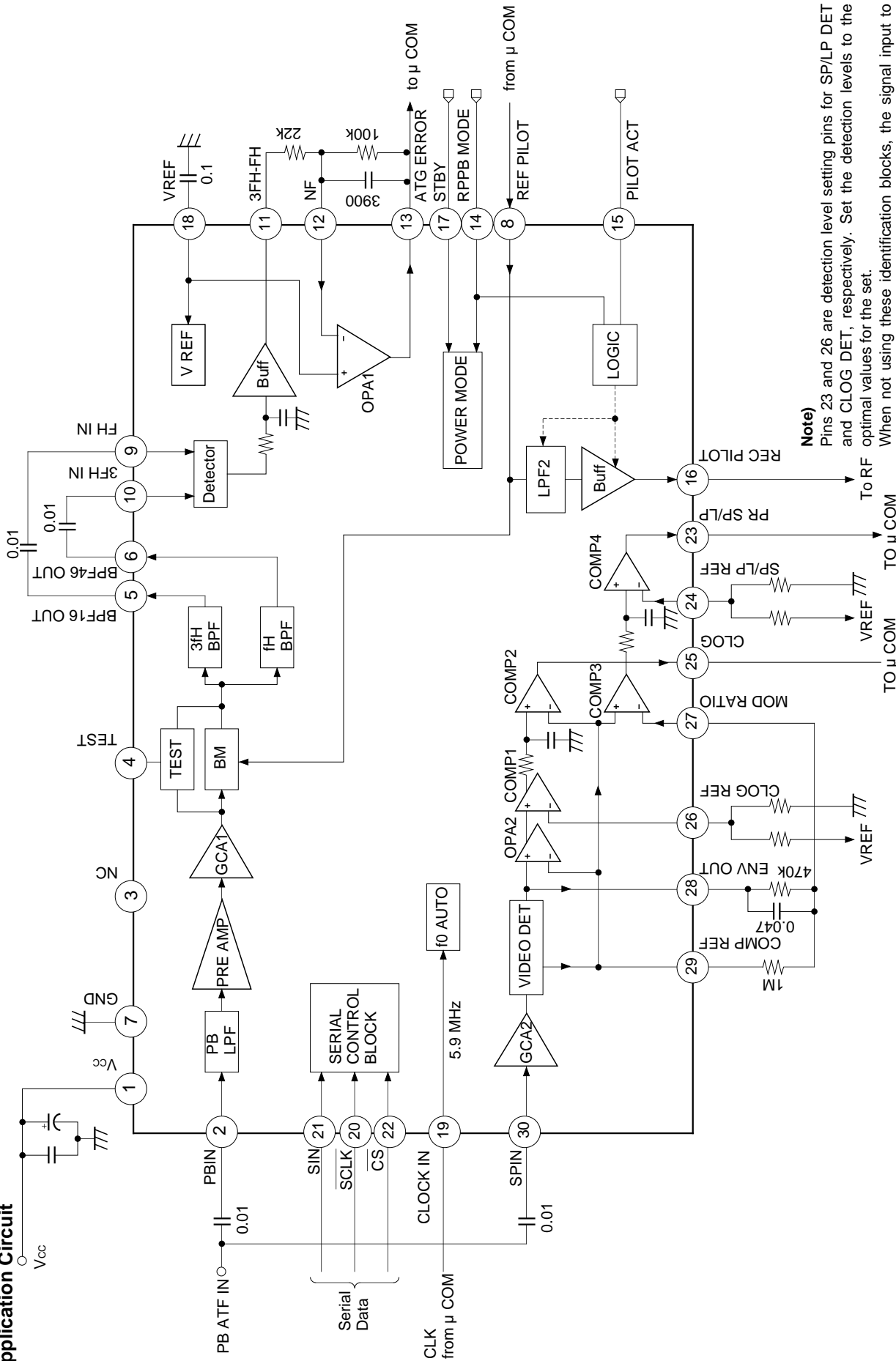
**Note)** For input mode, pull up to Vcc with a 100 kΩ resistor. Input voltage is 0.5 Vp-p or less.



Example of External Connections



Application Circuit

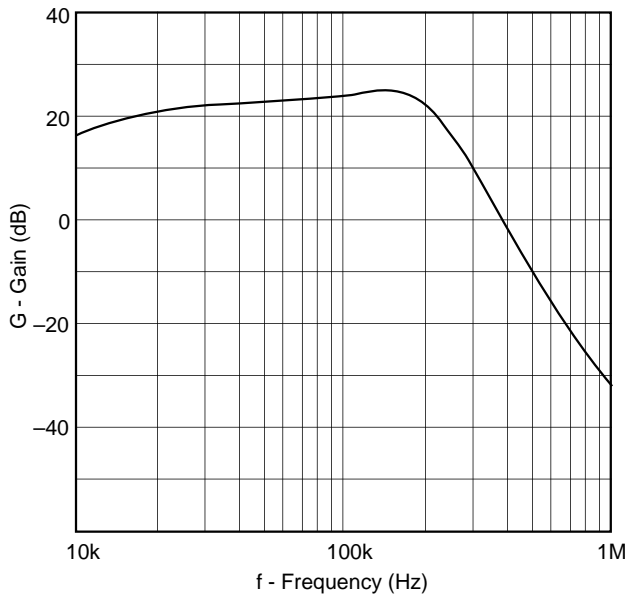


**Note)**  
 Pins 23 and 26 are detection level setting pins for SP/LP DET and CLOG DET, respectively. Set the detection levels to the optimal values for the set.  
 When not using these identification blocks, the signal input to Pin 30 (SPIN) and other related peripheral components are also unnecessary.

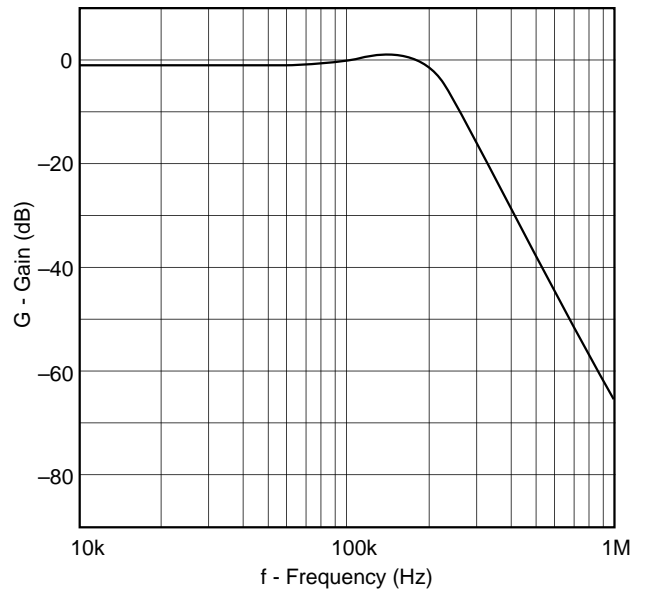
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Example of Representative Characteristics (TA = 25 °C, VCC = 3.15 V)

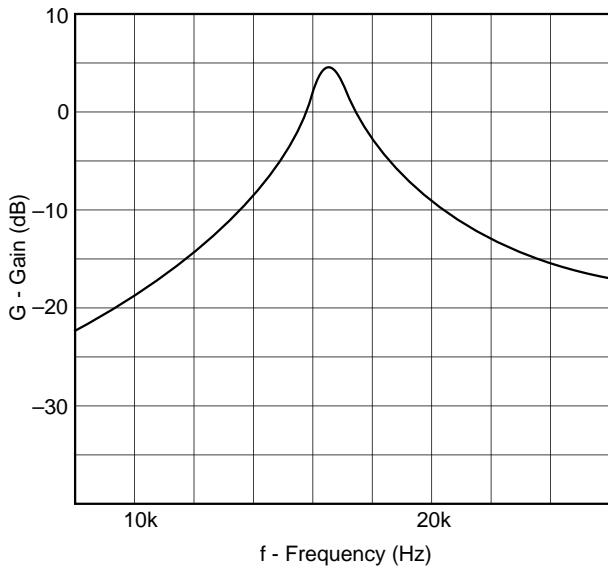
LPF1 frequency response



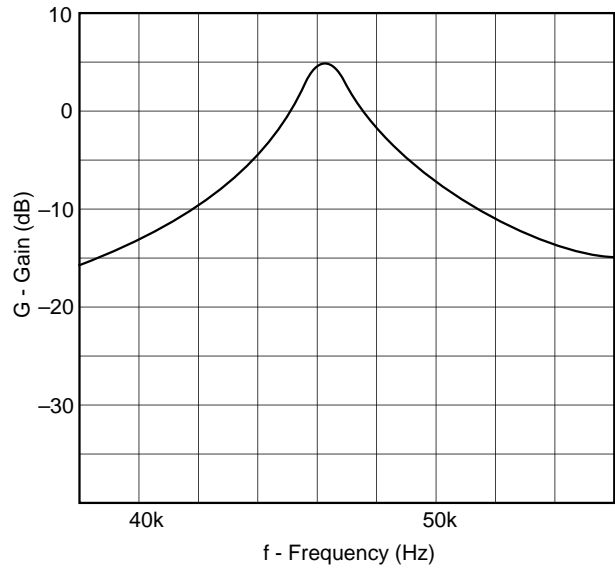
LPF1 frequency response



BPF16 frequency response



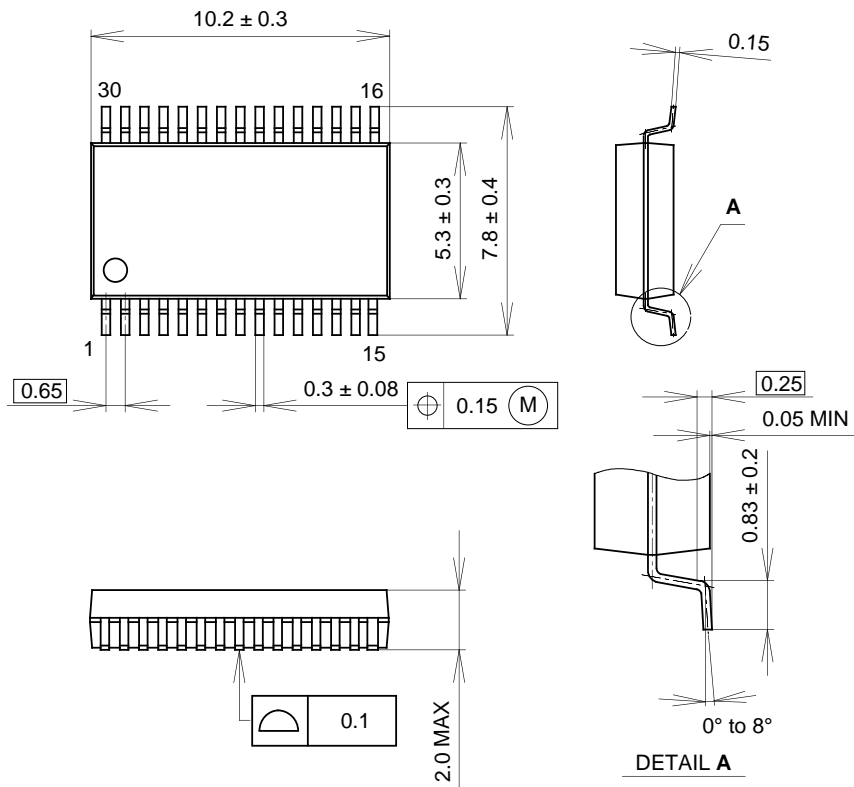
BPF46 frequency response



Package Outline

Unit: mm

30PIN SSOP (PLASTIC)



PACKAGE STRUCTURE

|            |                |
|------------|----------------|
| SONY CODE  | SSOP-30P-L123  |
| EIAJ CODE  | SSOP030-P-0300 |
| JEDEC CODE | _____          |

|                  |                |
|------------------|----------------|
| PACKAGE MATERIAL | EPOXY RESIN    |
| LEAD TREATMENT   | SOLDER PLATING |
| LEAD MATERIAL    | COPPER ALLOY   |
| PACKAGE WEIGHT   | 0.21g          |