

# UTC LAG668 LINEAR INTEGRATED CIRCUIT

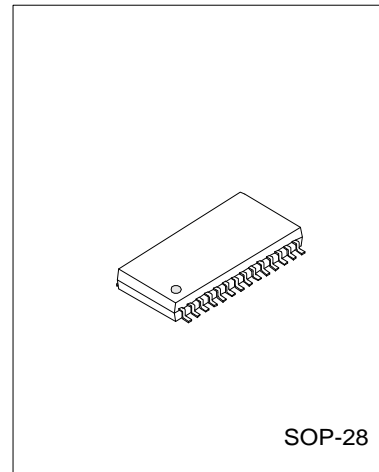
## RADIO AND CASSETTE RECORDER CIRCUIT

### DESCRIPTION

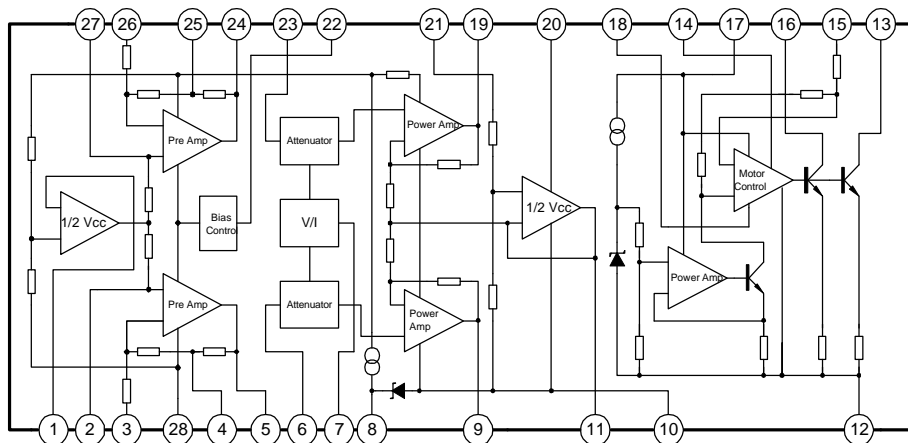
The UTC LAG668 is a monolithic integrated circuit, designed for portable radio cassette.

### FEATURES

\*1-Chip IC for headphone stereo

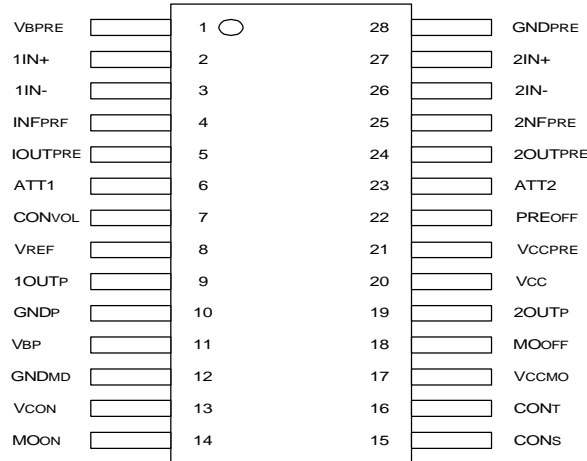


### BLOCK DIAGRAM



# UTC LAG668 LINEAR INTEGRATED CIRCUIT

## PIN CONFIGURATION



| PIN NO. | SYMBOL   | DESCRIPTION            | PIN NO. | SYMBOL   | DESCRIPTION         |
|---------|----------|------------------------|---------|----------|---------------------|
| 1       | VBPRE    | Pre Amp Bias Voltage   | 15      | CONs     | Speed Control       |
| 2       | 1 IN+    | Channel 1 "+" Input    | 16      | CONt     | Torqu Control       |
| 3       | 1 IN -   | Channel 1 "-" Input    | 17      | VCCMO    | Motor Power Control |
| 4       | 1 NFPRE  | Feedback 1             | 18      | MOOFF    | Motor Forced Stop   |
| 5       | 1 OUTPRE | Pre Amp Output 1       | 19      | 2 OUTP   | Power Amp Output 2  |
| 6       | ATT 1    | Attenuator 1           | 20      | VCC      | Supply Voltage      |
| 7       | CONVOL   | Volume Control         | 21      | VCCPRE   | Supply Voltage      |
| 8       | VREF     | Reference Voltage      | 22      | PREOFF   | Pre Amp Off         |
| 9       | 1 OUTP   | Power Amp Output 1     | 23      | ATT 2    | Attenuator 2        |
| 10      | GNDP     | Power GND              | 24      | 2 OUTPRE | Pre Amp Output 2    |
| 11      | VBP      | Power Amp Bias Voltage | 25      | 2 NFPRE  | Feedback 2          |
| 12      | GNDMD    | Motor GND              | 26      | 2 IN-    | Channel 2 "-" Input |
| 13      | VCON     | Motor Control Voltage  | 27      | 2 IN+    | Channel 2 "+" Input |
| 14      | MOON     | Motor Forced Start     | 28      | GNDPRE   | Pre GND             |

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## ABSOLUTE MAXIMUM RATINGS(Ta=25°C)

| PARAMETER             | SYMBOL | VALUE     | UNIT |
|-----------------------|--------|-----------|------|
| Supply Voltage        | Vcc    | -0.3~+7.5 | V    |
| Power Dissipation     | Pd     | 750       | mW   |
| Operating Voltage     | Vop    | 2~5       | V    |
| Operating Temperature | Topr   | -20~+65   | °C   |
| Storage Temperature   | Tstg   | -40~+125  | °C   |

## AMPLIFIER ELECTRICAL CHARACTERISTICS(Ta=25°C)

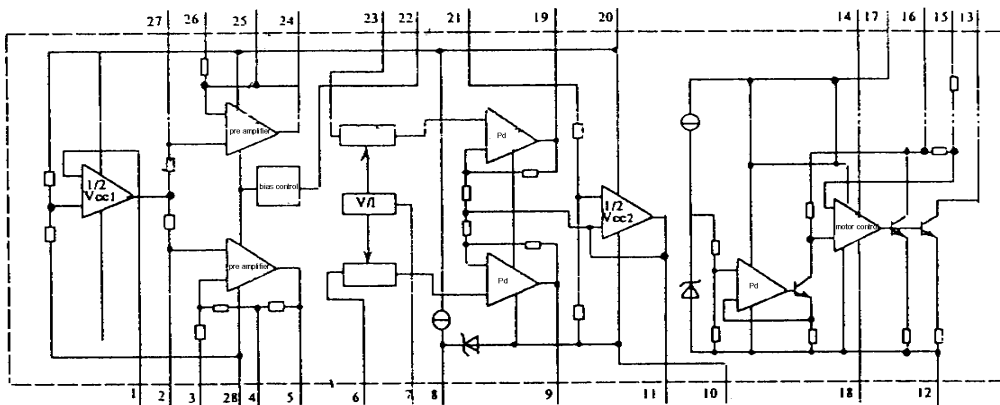
| PARAMETER                        | SYMBOL | TEST CONDITIONS             | MIN  | TYP  | MAX | UNIT  |
|----------------------------------|--------|-----------------------------|------|------|-----|-------|
| Supply Current                   | Icc    | Vin=0V, Im=0mA              |      | 18   | 25  | mA    |
| <b>PRE-AMPLIFIER</b>             |        |                             |      |      |     |       |
| Open Loop Gain                   | Gvo    | Vo=-10dBm, RL=∞             |      | 72   |     | dB    |
| Close Loop Gain                  | Gvc    | Vo=-10dBm                   | 40   | 42   | 44  | dB    |
| Maximum Output Voltage           | Vom    | THD=10%                     | 0.45 | 0.6  |     | Vrms  |
| Total Harmonic Distortion        | THD    | Vout=100mVrms               |      | 0.05 | 0.5 | %     |
| Output Noise Voltage             | Von    | Vin=0, Rg=2.2k, BPF(30~20k) |      | 150  | 300 | μVrms |
| Input Impedance                  | Zin    | Vout=-10dBm                 | 18   | 22   |     | kΩ    |
| Cross Talk between CH            | CT     | Rg=2.2k, Vout=-10dBm        | 30   |      |     | dB    |
| Output Voltage when Pre-Off      | Vooff  | Vin=100mVrms                |      |      | -50 | dB    |
| Output Impedance when Pre-Off    | Rooff  |                             |      | 10   |     | kΩ    |
| Input Impedance when Pre-Off     | Rloff  |                             |      | 10   |     | kΩ    |
| <b>Attenuator</b>                |        |                             |      |      |     |       |
| Maximum Input Voltage            | Vimax  |                             | 0.2  |      |     | Vrms  |
| Maximum Attenuation              | Vamax  | Vcont=Min                   | 66   |      |     | dB    |
| Attenuation Error                | Vaerr  | Vcont=Max                   |      | 0    |     | dB    |
| Input Impedance                  | Zia    |                             | 200  |      |     | kΩ    |
| Control Terminal Input Impedance | Zicot  |                             | 100  |      |     | kΩ    |
| <b>Power Amplifier</b>           |        |                             |      |      |     |       |
| Voltage Gain                     | GV     | Pout=5mW                    | 36   | 38   | 40  | dB    |
| Channel Voltage Difference       | ΔGV    | Vcont=Max                   |      | 0    | 3   | dB    |
| Maximum Output Power I           | Pom 1  | THD=10%, RL=32Ω             | 20   | 28   |     | mW    |
| Maximum Output Power II          | Pom 2  | THD=10%, RL=16Ω             | 30   |      |     | mW    |
| Total Harmonic Distortion        | THD    | Pout=5mW                    |      | 0.5  | 2   | %     |
| Cross Talk between CH            | CT     | Pout=5mW                    | 20   | 30   |     | dB    |
| Output Noise Voltage             | Von    | Rg=2.2k, Vcont=Max          |      | 1    | 2   | mVrms |
| Ripple Rejection                 | RR     | Vcc=3V, 100Hz, 100mVp-p     | 31   | 37   |     | dB    |
| Pre + Pulse Boost + Power Noise  | Vnto   | Vin=0V, Rg=2.2k, Vcont=Max* |      | 3    | 6   | mVrms |

\*Vcc=3V, f=1kHz, RL=16Ω, unless otherwise specified.

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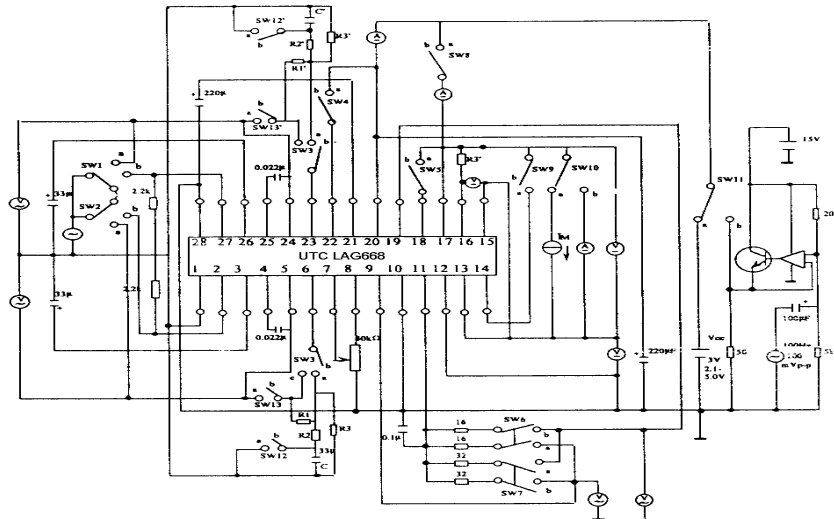
## MOTOR ELECTRICAL CHARACTERISTICS (Ta=25°C)

| PARAMETER                            | SYMBOL | TEST CONDITIONS      | MIN  | TYP  | MAX  | UNIT |
|--------------------------------------|--------|----------------------|------|------|------|------|
| Current Consumption                  | IMC    |                      |      | 3    | 5    | mA   |
| Starting Current                     | IMS    |                      | 500  |      |      | mA   |
| Reference Voltage                    | Vref   |                      | 0.72 | 0.8  | 0.87 | V    |
| Reference Voltage Change I           | Vref 1 | Vcc=2.1~5V           |      | 0.05 |      | %/V  |
| Reference Voltage Change II          | Vref 2 | Im=25~250mA          |      | 0.01 |      | %/mA |
| Reference Voltage Change III         | Vref 3 | Ta=-10~50°C          |      | 0.01 |      | %/°C |
| Current Factor                       | K      |                      | 32   | 38   | 43   |      |
| Current Factor Change I              | K 1    | Vcc=2.1~5V           |      | 0.5  |      | %/V  |
| Current Factor Change II             | K 2    | Im=25~250mA          |      | 0.05 |      | %/mA |
| Current Factor Change III            | K 3    | Ta=-10~50°C          |      | 0.02 |      | %/°C |
| Saturation Voltage at Forced ON      | VCEsa  | IM=200mA, Pin 14=Vcc |      |      | 0.6  | V    |
| Input Impedance at Forced ON<br>Pin  | Rion   |                      |      | 5.6  |      | KΩ   |
| Leakage Current at Forced OFF        | IML    |                      |      |      | 200  | μA   |
| Input Impedance at Forced OFF<br>Pin | Ricon  |                      |      | 33   |      | KΩ   |



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## TEST CIRCUIT 1

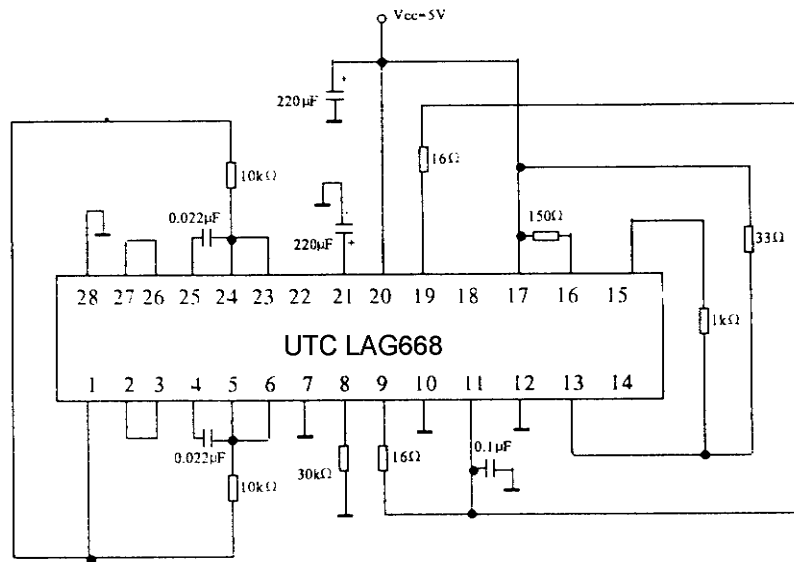


NOTE1 : SW12,SW12  
 R1,R' =33kΩ  
 R2,R2' =5.1kΩ  
 R3,R3' =200kΩ  
 R2,R2,=5.1kΩ  
 C1,C' =0.1μF

NOTE2 : See figure 1/2 for SW

# UTC LAG668 LINEAR INTEGRATED CIRCUIT

## TEST CIRCUIT 2



# UTC LAG668 LINEAR INTEGRATED CIRCUIT

FIGURE 1

| Item                        | Symbol            | SW No. |     |      |   |   |   |   |   |   |    |    |        |        | TEST CONDITION                                   |
|-----------------------------|-------------------|--------|-----|------|---|---|---|---|---|---|----|----|--------|--------|--------------------------------------------------|
|                             |                   | 1      | 2   | 3,3' | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12,12' | 13,13' | V <sub>CC</sub> =3V, f=1kHz, R <sub>L</sub> =16Ω |
| AMP                         |                   |        |     |      |   |   |   |   |   |   |    |    |        |        |                                                  |
| Supply Current              | I <sub>CC</sub>   | c      | c   | a    | b | b | a | b | b | b | a  | a  | a      | a      | I <sub>m</sub> =0mA                              |
| Pre AMP                     |                   |        |     |      |   |   |   |   |   |   |    |    |        |        |                                                  |
| Open Loop Gain              | G <sub>vo</sub>   | b      | b   | b    | b | b | a | b | b | b | a  | a  | b      | b      | V <sub>o</sub> =244mV                            |
| Maximum Output Voltage      | V <sub>om</sub>   | b      | b   | b    | b | b | a | a | b | b | a  | a  | b      | b      | THD=10%                                          |
| Total Harmonic Distortion   | THD               | b      | b   | b    | b | b | a | b | b | b | a  | a  | b      | b      | V <sub>o</sub> =400mV                            |
| Output Noise Voltage        | V <sub>on</sub>   | c      | c   | b    | b | b | a | b | b | b | a  | a  | b      | b      | B.P.F.(30-20kHz)                                 |
| Cross Talk between CH       | CT                | b-c    | c-b | b    | b | b | a | b | b | b | a  | a  | b      | b      | V <sub>o</sub> =244mV                            |
| Output Voltage when Pre-Off | V <sub>ooff</sub> | b      | b   | b    | a | b | a | b | b | b | a  | a  | b      | b      | V <sub>in</sub> =100mV                           |
| Attenuator                  |                   |        |     |      |   |   |   |   |   |   |    |    |        |        |                                                  |
| Maximum Input Voltage       | V <sub>imax</sub> | a      | a   | c    | a | b | a | b | b | b | a  | a  | b      | a      | V <sub>r</sub> =Min, THD=10%,                    |
| Maximum Attenuation         | V <sub>amax</sub> | a      | a   | c    | a | b | a | b | b | b | a  | a  | b      | a      |                                                  |
| Power AMP                   |                   |        |     |      |   |   |   |   |   |   |    |    |        |        |                                                  |
| Voltage Gain                | G <sub>V</sub>    | a      | a   | c    | a | b | a | b | b | b | a  | a  | b      | a      | P <sub>out</sub> =5mV                            |
| Channel Voltage Difference  | i @/              | a      | a   | c    | a | b | a | b | b | b | a  | a  | b      | a      | V <sub>R</sub> =MAX                              |
| Maximum Output Power I      | P <sub>om 1</sub> | a      | a   | c    | a | b | b | a | b | b | a  | a  | b      | a      | R <sub>L</sub> =32Ω, THD=10%                     |
| Maximum Output Power II     | P <sub>om 2</sub> | a      | a   | c    | a | a | a | b | b | b | a  | a  | b      | a      | R <sub>L</sub> =16Ω, THD=10%                     |

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FIGURE 2

| Item                              | Symbol | SW No. |     |      |   |   |   |   |   |   |    |    |        |        | TEST CONDITION       |
|-----------------------------------|--------|--------|-----|------|---|---|---|---|---|---|----|----|--------|--------|----------------------|
|                                   |        | 1      | 2   | 3,3' | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12,12' | 13,13' |                      |
| POWER AMP                         |        |        |     |      |   |   |   |   |   |   |    |    |        |        |                      |
| Total Harmonic Distortion         | THD    | a      | c   | c    | a | b | a | b | b | b | a  | a  | b      | a      | Pout=5mV             |
| Cross Talk between CH             | CT     | a-c    | c-a | c    | a | b | a | b | b | b | a  | a  | b      | a      | Pout=5mV             |
| Output Noise Voltage              | Von    | c      | c   | c    | b | b | a | b | b | b | a  | a  | b      | a      | VR=MIN               |
| Ripple Rejection                  | RR     | c      | c   | b    | a | b | a | b | b | b | a  | a  | b      | b      | VR=MAX               |
| Pre + Pulse Boost + Power Noise   | Vnto   | c      | c   | a    | b | b | a | b | b | b | a  | a  | b      | a      | VR=MAX, BB ON        |
| Motor                             |        |        |     |      |   |   |   |   |   |   |    |    |        |        |                      |
| Current Consumption               | IMC    | c      | c   | a    | a | b | a | b | a | b | a  | a  | a      | a      | Im=0mA               |
| Starting Current                  | IMS    | c      | c   | a    | a | b | a | b | a | b | a  | a  | a      | a      |                      |
| Reference Voltage                 | Vref   | c      | c   | a    | a | b | a | b | a | b | a  | a  | a      | a      | Im=100mA             |
| Reference Voltage Change I        | Vref 1 | c      | c   | a    | a | b | a | b | a | b | a  | a  | a      | a      | Im=100mA, Vcc=2.1-5V |
| Reference Voltage Change II       | Vref 2 | c      | c   | a    | a | b | a | b | a | b | a  | a  | a      | a      | Vcc=3V, Im=25-250mA  |
| Saturation Voltage at Forced ON   | VCEsa  | c      | c   | a    | a | b | a | b | a | b | a  | a  | a      | a      | Im=200mA             |
| Input Impedance at Forced OFF Pin | Ricon  | c      | c   | a    | a | a | a | b | a | b | a  | a  | a      | a      |                      |

\*Note: a=ON, b=OFF