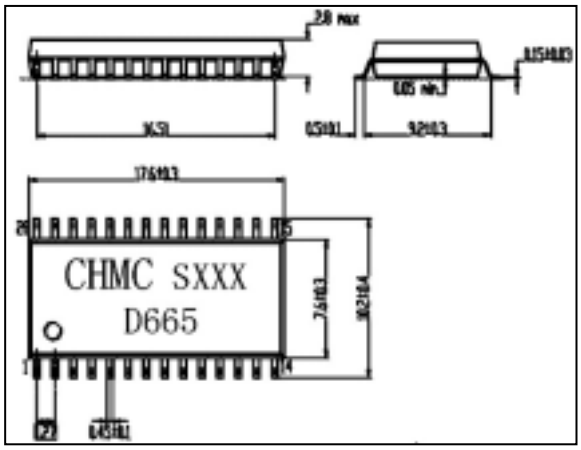
Silicore

# IC FOR HEADPHONE STEREOS MONOLITHIC IC D665

## GENERAL DESCRIPTION

D665 was developed for use in headphone stereos, and incorporates dual preamp, power amp, electronic VR and motor control circuits. It can be used in a simple circuit configuration Which requires very few external components.

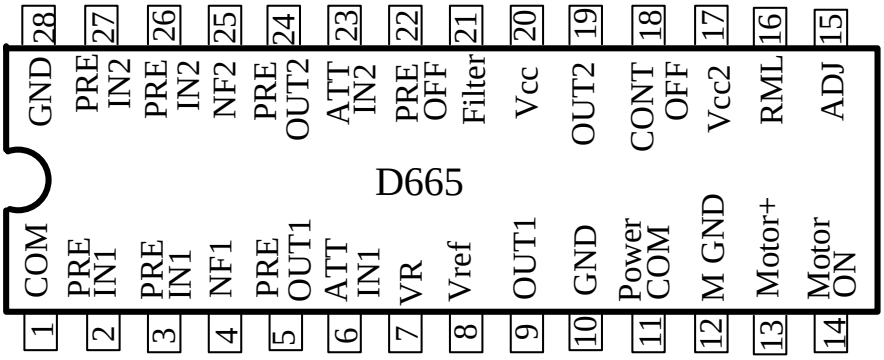



Outline drawing

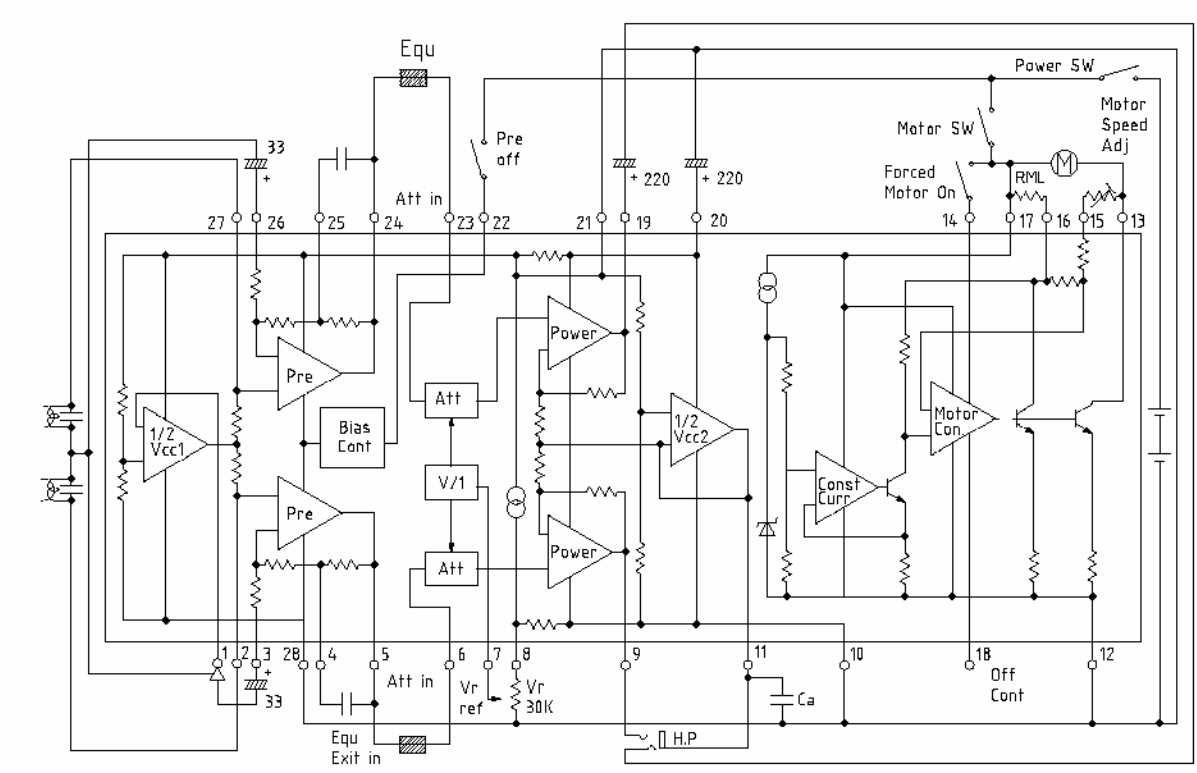
## FEATURES

- Broad operating voltage range of 2.0 to 5.0V (amp system operates to 1.8V)
- Few external components required
  1. Internal equalizer resistance
  2. Direct coupling of preamps, electronic VR, power amp
  3. No need for output coupling capacitor
- Well-balanced electronic VR, A-curve attenuation characteristic obtained with B-curve VR
- Internal motor control circuit , with noise from motor driving unit suppressed
- Provided with pin to turn off preamps
- Package: SOP28

## PIN CONNECTION



## BLOCK DIAGRAM




Note 1. The potentiometer for motor speed adjustment is 150HM (where the motor used is assumed to be M25E-7 (Mitsumi)).

Note 2. RML (motor load correction resistance)

Note 3. When the preamp off pin is connected to +Vcc, the preamp circuits are turned off.

Note 4.When the motor forced-on pin is connected to +Vcc, the motor is turned on (no control).

Ca is a 100,000pF capacitor used to prevent oscillation in the 1/2 Vcc and amp circuits. Pin 15 and pin 16 are NC.

## ABSOLUTE MAXIMUM RATINGS

| CHARACTERISTICS | SYMBOL | RATING | UNIT |
|---|---|---|---|
| Operating temperature | Topr | -20~65 | °C |
| Storage temperature | Tstg | -40~125 | °C |
| Power supply current | Vcc max. | -0.3~7.5 | V |
| Power consumption | Pd | 450 | mW |
| Operating voltage | Vop | 2.0~5.0 | V |

## ELECTRICAL CHARATERISTICS (Except where noted otherwise,Ta=25°)

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | UNIT |
|---|---|---|---|---|---|---|
| Consumption current | Icc | Vin=0V, IM=0mA | - | 18 | 25 | mA |
| Preamp. Unit (Ta=25°C) | | | | | | |
| Open-circuit gain | Gvo | Vo=-10dBm,$R_L$=∞ | - | 72 | - | dB |
| Closed-circuit gain | Gvc | Vo=-10dBm | 40 | 42 | 44 | dB |
| Maximum output voltage | Vom | THD=10% | 0.45 | 0.6 | - | Vrms |
| Total harmonic distortion ratio | THD | Vout=400mVrms | - | 0.05 | 0.5 | % |
| Output noise voltage | Vno | Vin=0,Rg=2.2k, BPF(30~20kHz) | - | 150 | 300 | μVrms |
| Input impedance | Zin | Vout=-10dBm | 18 | 22 | - | kΩ |
| Cross-talk between channel | C.T | Rg=2.2k,Vout=-10dBm | 30 | - | - | dB |
| Output voltage with pre off | Vooff | Vin=100mVrms | - | - | -50 | dB |
| Output resistance with pre off | Rooff | - | - | 10 | - | kΩ |
| Input resistance on pre off | Rioff | - | - | 10 | - | kΩ |
| Attenuation unit(Ta=25°C) | | | | | | |
| Maximum input voltage | Vi max. | - | 0.2 | - | - | Vrms |
| Maximum attenuation | Va max. | Vcont=min. | 66 | - | - | dB |
| Attenuation error | Vaerr | Vcont=max. | - | 0 | - | dB |
| Input impedance | Zin | - | 15 | 20 | - | kΩ |
| Control pin input resistance | Zicot | - | 100 | - | - | kΩ |

## ELECTRICAL CHARATERISTICS continue

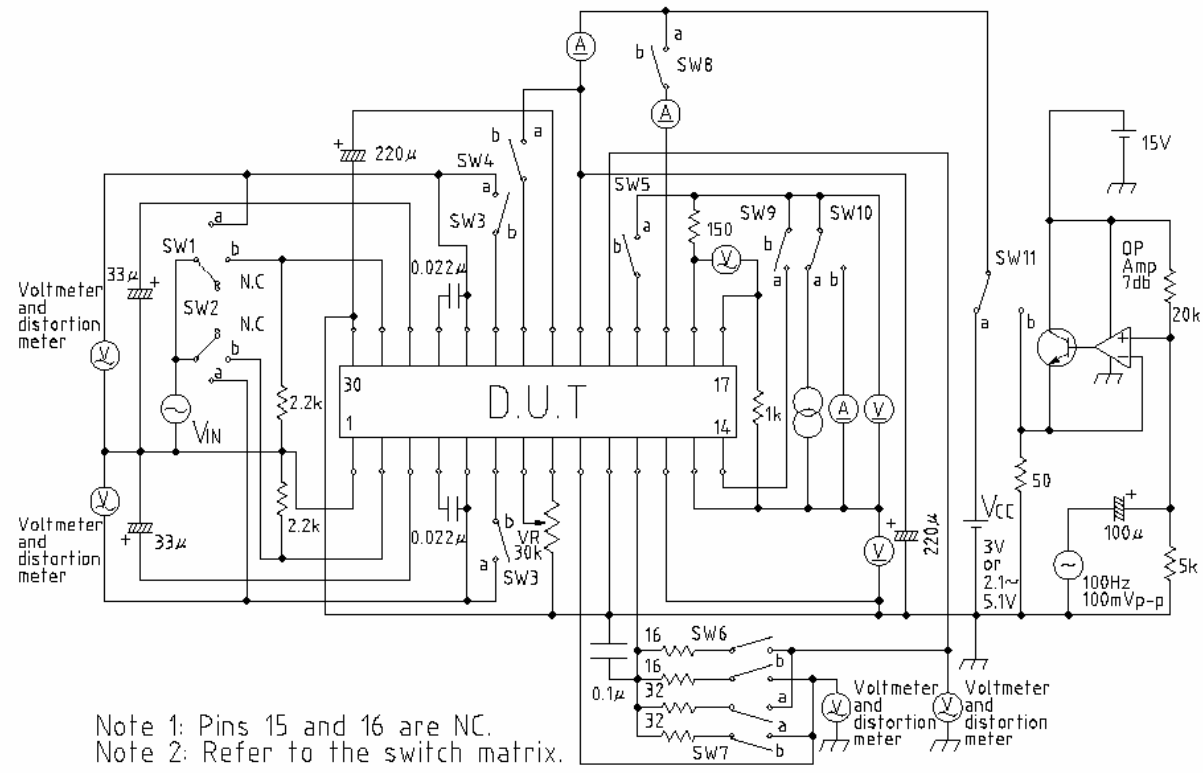
| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | UNIT |
|---|---|---|---|---|---|---|
| Power amp unit (Ta=25°C) Vcc=3.0V,f=1kHz, RL=16Ω,Pre OFF=OPEN | | | | | | |
| Voltage gain | Gv | Pout=5mW | 26 | 28 | 30 | dB |
| Voltage gain difference between channels | Δ Gv | Vcont=max. | - | 0 | 3 | dB |
| Maximum output power 1 | Pom1 | THD=10%,RL=32Ω | 20 | 28 | - | mW |
| Maximum output power 2 | Pom2 | THD=10%,RL=16Ω | 30 | | - | mW |
| Total harmonic distortion ratio | THD | Pout=5mW | - | 0.2 | 2.0 | % |
| Cross-talk between channel | C.T | Pout=5mW | 20 | 30 | - | dB |
| Output noise voltage | Vn | Rg=2.2k, Vcont=min | - | 0.25 | 1.0 | mVrms |
| Ripple rejection | R.R | Vcc=3V, 100Hz, 100mVp-p | 34 | 40 | - | dB |
| Noise of pre amp+power amp | Vnto | Vin=0V,Rg=2.2k, Vcont=max. | - | 6 | 9 | mVrms |
| Motor control unit(Ta=25°C) Vcc=3.0V,Im=100mA, Motor unit : ( Mitsumi model) | | | | | | |
| Consumption current | IMC | | - | 3.0 | 5.0 | mA |
| Startup current | IMS | | 500 | - | - | mA |
| Reference voltage | Vref | Between RML-ADJ pins | 0.72 | 0.80 | 0.87 | V |
| Reference voltage Fluctuation 1 | Vref1 | Vcc between 2.1 and 5.0V* | - | 0.05 | - | %/V |
| Reference voltage Fluctuation 2 | Vref2 | Im between 25 and 250mA | - | 0.01 | - | %/mA |
| Reference voltage Fluctuation 3 | Vref3 | Ta between -10and 50°C | - | 0.01 | - | %/°C |
| Current coefficient | K | | 32 | 38 | 43 | |
| Current coefficient Fluctuation 1 | K1 | Vcc between 2.1 and 5.0V | - | 0.5 | - | %/V |
| Current coefficient Fluctuation 2 | K2 | Im between 25 and 250mA | - | 0.05 | - | %/mA |
| Current coefficient Fluctuation 3 | K3 | Ta between -10 and 50°C | - | 0.02 | - | %/°C |
| Output voltage on forced on | Vce sat | Im=200mA, 14PIN=Vcc | - | - | 0.6 | V |
| Input resistance on forced on | Rion | | - | 5.6 | - | kΩ |
| Leakage current on forced off | IML | | - | - | 200 | μA |
| Input resistance on forced off | Ricon | | - | 33 | - | kΩ |

Note 1: Bass boost circuit constants are based on application circuit diagrams.

Note 2: Motor pin voltage fluctuation.

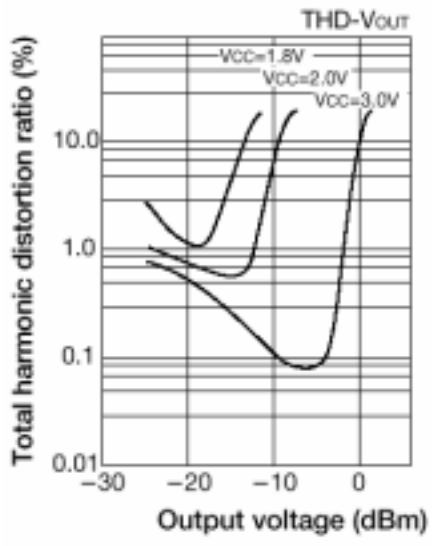
* Voltage across pins 13 and 19(motor pins ) fluctuates.

## TEST CIRCUITS

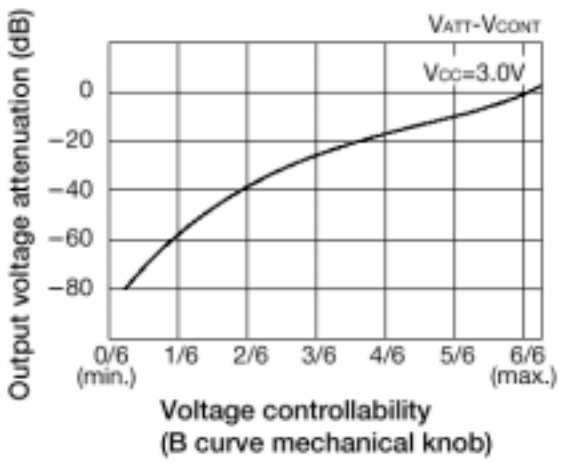



## CHARACTEISTICS CURVES

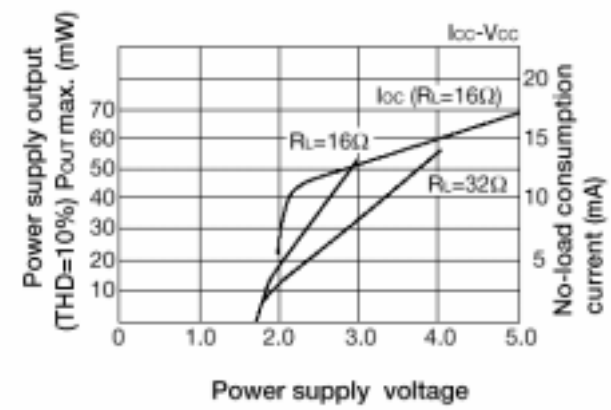
Preamp



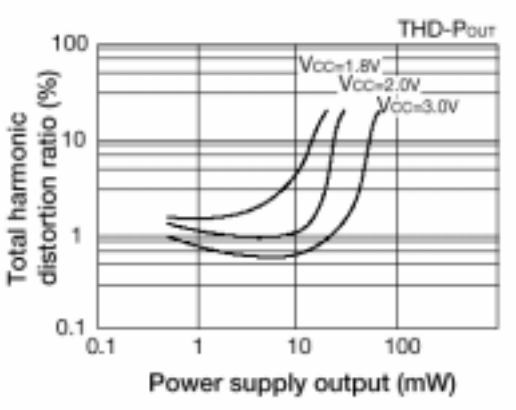

Attenuator



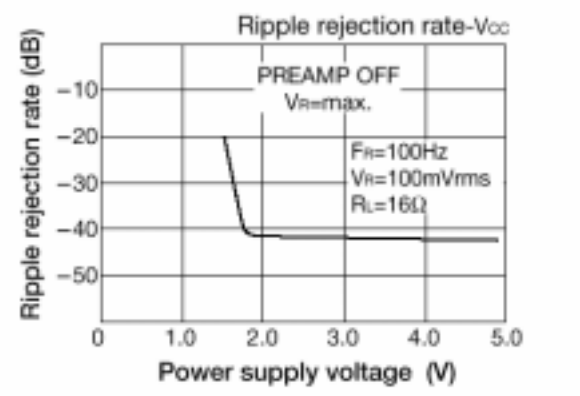
Pout.



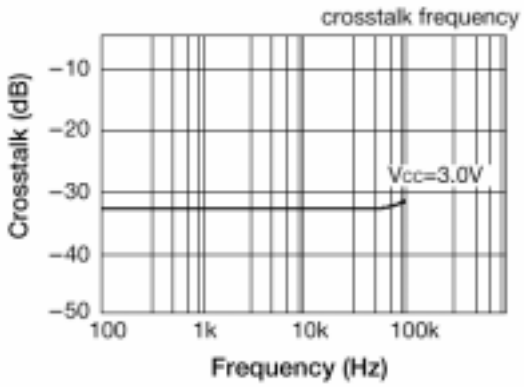

Power amp




Power amp




Power amp




Voltage gain vs. frequency