

Compander IC Monolithic IC MM1100

Outline

This IC was developed for use in mobile communication equipment. It is a compander IC incorporating compressor/expander circuits for a significant noise reduction effect without complicated external circuitry. On the transmission side, the dynamic range of audio signals is compressed by the compressor circuit; on the receiving side, the expander expands the signals. As a result the dynamic range over the transmission channel is reduced logarithmically by one-half.

Features

1. Can be driven at low voltages (down to 2.4V)
2. Compression and expansion circuits enable suppression of unwanted radio waves
3. Consumption current 2.8mA typ.

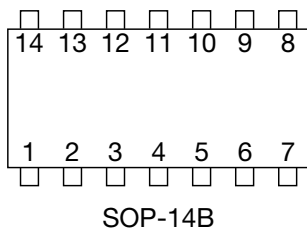
Package

SOP-14B (MM1100XF)

Applications

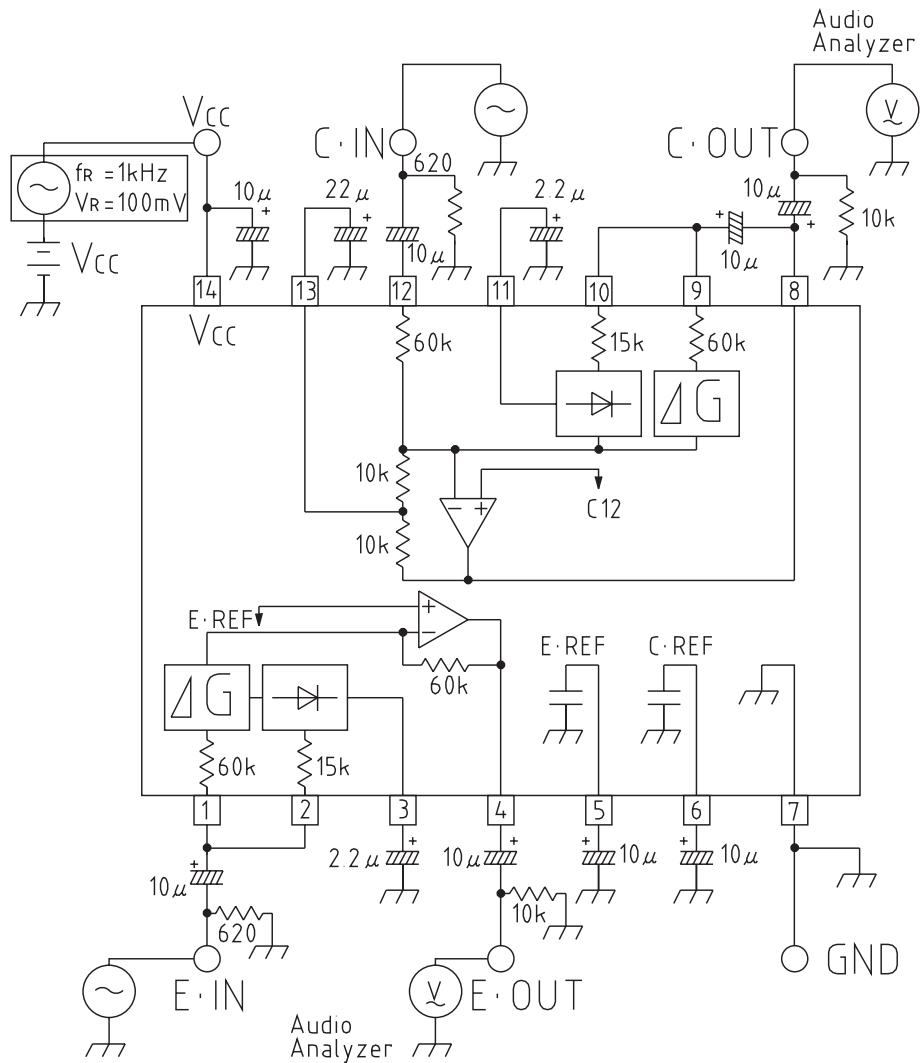
1. Cordless telephones
2. Various mobile communication devices

Pin Assignment



| | | | |
|---|--------|----|-----------------|
| 1 | E.GIN | 8 | C.OUT |
| 2 | E.RIN | 9 | C.GIN |
| 3 | E.RECT | 10 | C.RIN |
| 4 | E.OUT | 11 | C.RECT |
| 5 | E.REF | 12 | C.IN |
| 6 | C.REF | 13 | C.NF |
| 7 | GND | 14 | V _{cc} |

Block Diagram



Absolute Maximum Ratings (Ta=25°C)

| Item | Symbol | Ratings | Units |
|-----------------------|----------------------|----------|-------|
| Storage temperature | T _{STG} | -40~+125 | °C |
| Operating temperature | T _{OPR} | -10~+70 | °C |
| Power supply voltage | V _{CC max.} | -0.3~+8 | V |
| Allowable loss | P _d | 350 | mW |
| Operating voltage | V _{OP} | +2.4~+7 | V |

Electrical Characteristics (Except where noted otherwise, Ta=25°C, Vcc=3V, fin=1kHz, VR=0mVrms)

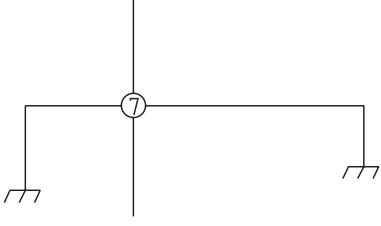
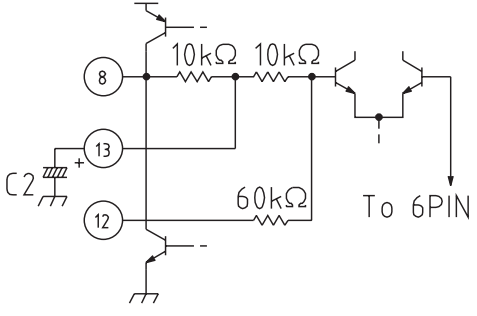
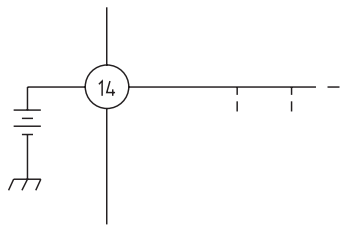
| Item | | Symbol | Measurement conditions | Min. | Typ. | Max. | Units |
|------------------------|------------------------------|----------------------|------------------------|------|------|------|-------|
| | Consumption current | Icc | No signal | 1.8 | 2.8 | 3.8 | mA |
| | Compressor reference voltage | Vrefc | 6PIN DC voltage | 1.3 | 1.4 | 1.5 | V |
| | Expander reference voltage | Vrefc | 5PIN DC voltage | 1.3 | 1.4 | 1.5 | V |
| Compressor unit | Input reference level | Vinc | Voc=300mVrms, VIN=0dB | 100 | 120 | 145 | mVrms |
| | Gain error difference * | Gec1 | VIN=-20dB | -0.5 | 0 | 0.5 | dB |
| | | Gec2 | VIN=-40dB | -1.0 | 0 | 1.0 | dB |
| | Distortion | THDC | VIN=0dB | | 0.3 | 1.0 | % |
| | Output noise voltage | Vnc | No signal (CCITT) | | 2.5 | 5.0 | mVrms |
| | Limit voltage | Vlimc | THD=10% | 1.20 | 1.40 | 1.60 | VP-P |
| | Crosstalk | CTc | EXPVIN=0dB | | -45 | -35 | dB |
| Ripple rejection ratio | RRc | VR=100mVrms, fr=1kHz | | -20 | -12 | dB | |
| Expander unit | Input reference level | Vine | Voe=300mVrms, VIN=0dB | 310 | 375 | 450 | mVrms |
| | Gain error difference * | Gee1 | VIN=-10dB | -0.5 | 0 | 0.5 | dB |
| | | Gee2 | VIN=-20dB | -1.0 | 0 | 1.0 | dB |
| | | Gee3 | VIN=-30dB | -1.5 | 0 | 1.5 | dB |
| | Distortion | THDe | VIN=0dB | | 0.15 | 1.0 | % |
| | Maximum output voltage | Ve max. | THD=10% | 700 | 900 | | mVrms |
| | Output noise voltage | Vne | No signal (CCITT) | | 20 | 40 | uVrms |
| Crosstalk | CTe | COMPVIN=0dB | | -75 | -60 | dB | |
| Ripple rejection ratio | RRe | VR=100mVrms, fr=1kHz | | -60 | -50 | dB | |

*Gain error difference = (VOUT (dBV) + 10.46dB) - VIN (dB) × G (dB)

G : COMP=0.5, EXP=2

Pin Description

| Pin no. | Function | Pin voltage (typ.) | Internal equivalent circuit |
|---------|--|--------------------|-----------------------------|
| 1 9 | Input pin E Feedback signal input pin | 1.4V 1.4V | |
| 2 10 | Rectifier input pin E Rectifier input pin C | 1.4V 1.4V | |
| 3 11 | Rectifier pin E Rectifier pin C The rectifier is a full-wave rectifier. The response characteristics (attack time, release time) are determined by the time constant of the external capacitor C1 and the internal resistance (10kΩ) | 0.7V 0.7V | |
| 4 | Output pin E | 1.4V | |
| 5 6 | Reference voltage pin E Reference voltage pin C | 1.4V 1.4V | |

| | | | |
|------------------------|--|-------------------------------|--|
| <p>7</p> | <p>GND pin</p> | <p>0V</p> |  |
| <p>8 12 13</p> | <p>Output pin C Input pin E AC signal cut pin</p> <p>The compressor amp must have a DC gain of unity and AC gain of infinity. In order to satisfy this requirement, a capacitor C2 is connected to pin 13 to remove AC components. The cutoff frequency is determined by the product with the internal resistance (10kΩ)</p> | <p>1.4V 1.4V 1.4V</p> |  |
| <p>14</p> | <p>Vcc pin</p> | <p>3.0V</p> |  |