SHARP

NEW PRODUCT INFORMATION

PRELIMINARY

# IR3N74AN

**Compander IC for Cordless Telephone**

## ■ Description

The IR3N74AN is a compander IC for noise reduction of wireless telephones.

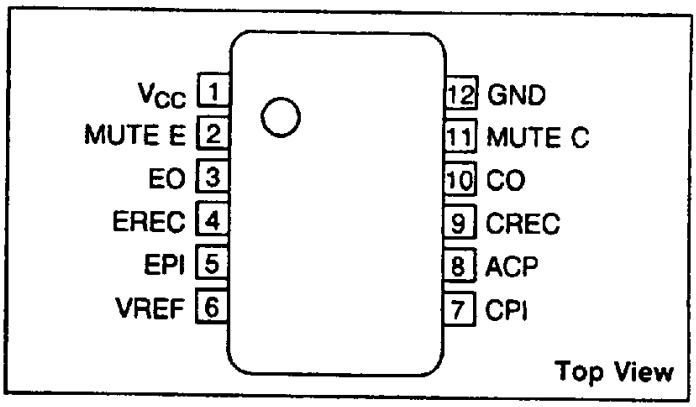
It consists of a compressor whose compressibility is 1/2 in logarithm and an expander whose expandability is 2 in logarithm. This IC ensures clearer speech quality by reducing radio-wave noise which is generated during communications using mobile communication equipment such as cordless telephones and cellular telephones.

In order to comply with the smaller size and lighter weight of those instruments, the IR3N74AN (12-pin SSOP) is offered in a smaller package with less pin count than the previous IR3N74N (16-pin SOP).

## ■ Features

1. Amplitude compression and expansion of speech signal
   Compressibility: 1/2 (logarithm),
   Expandability: 2 (logarithm)
2. Operation at low voltage, $V_{CC}$ = 2.4 to 5.5V (Ta = +25°C)
3. Low current consumption, $I_{CC}$ = 3.4mA (TYP.) ($V_{CC}$ = 3V, Ta = +25°C)
4. With a compressor input amplifier
5. Built-in limiter circuit
6. Muting capability
7. Package: 12-pin SSOP (SSOP12-P-225)

## ■ Pin Connections



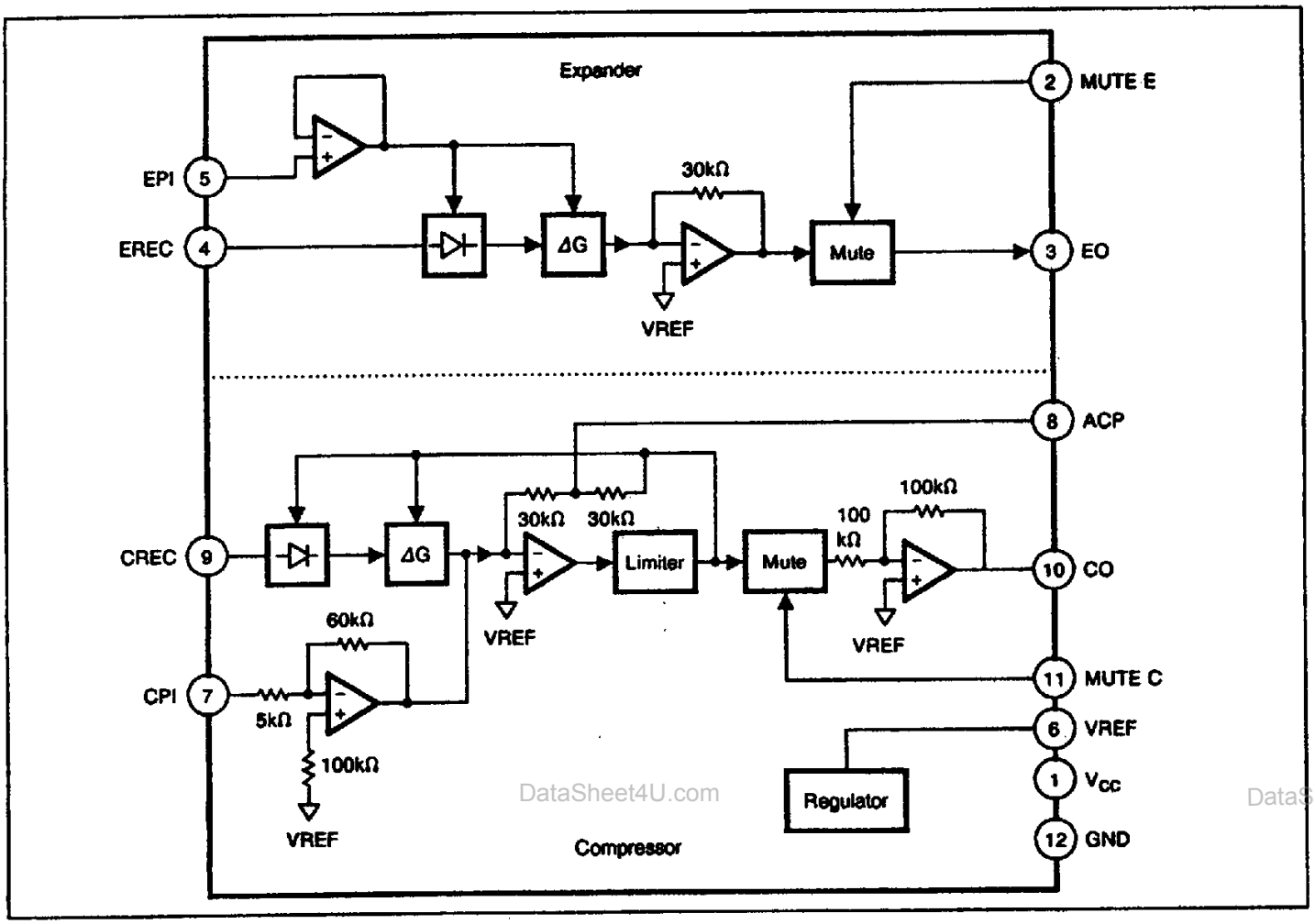

## ■ Pin Description

| Symbol | Pin name |
|---|---|
| $V_{CC}$ | Power supply pin |
| MUTE E | Mute output pin for expander |
| EO | Expander output pin |
| EREC | Smoothing capacitor pin for expander |
| EPI | Expander input pin |
| VREF | Reference voltage output pin |
| CPI | Compressor input pin |
| ACP | Decoupling capacitor pin |
| CREC | Smoothing capacitor pin for compressor |
| CO | Compressor output pin |
| MUTE C | Mute output pin for compressor |
| GND | Ground pin |

IC

# IR3N74AN Compander IC for Cordless Telephone

## Block Diagram




## Absolute Maximum Ratings

(Ta = +25°C)

| Parameter | Symbol | Rating | Unit | Note |
|---|---|---|---|---|
| Supply voltage | $V_{CC}$ | 6 | V | |
| Mute voltage | $V_{MUTE}$ | $V_{CC}$ | V | 1 |
| Power dissipation | PD | 350 | mW | 2 |
| Operating temperature | Topr | −20 to +85 | °C | |
| Strage temperature | Tstg | −55 to +150 | °C | |

Note 1: Apllied to pins MUTE E and MUTE C.
Note 2: When Ta = +25°C. PD derating ratio is 3mW/°C.

## ■ Electrical Characteristics (1)

($V_{CC}$ = 3.0V, f = 1kHz, RL = 10kΩ, Ta = +25°C)

| Parameter | | Symbol | Test condition | MIN. | TYP. | MAX. | Unit | Note |
|---|---|---|---|---|---|---|---|---|
| Operating supply-voltage | | $V_{CC}$ | | 2.4 | | 5.5 | V | |
| Current consumption at no signal | | $I_{CC}$ | | | 3.4 | 5.3 | mA | |
| Reference pin voltage | | $V_{REF}$ | | 1.15 | 1.25 | 1.35 | V | |
| Mute switching voltage | | $V_{TH}$ | | 1.8 | | $V_{CC}$ | V | |
| | | $V_{TL}$ | | 0 | | 0.8 | | |
| Compressor | Reference output voltage | $V_{ROC}$ | $V_{IN}$ = −24.0dBV | −12.0 | −10.0 | −8.2 | dBV | |
| | Output deviation | $V_{OC1}$ | $V_{IN}$ = −20.0dB | −0.6 | −0.1 | 0.4 | dB | 1 |
| | | $V_{OC2}$ | $V_{IN}$ = −40.0dB | −0.8 | −0.2 | 0.2 | | |
| | | $V_{OC3}$ | $V_{IN}$ = −60.0dB | | −1.3 | | | |
| | Distortion | $THD_C$ | $V_{IN}$ = −24.0dBV | | 0.4 | 1.0 | % | |
| | Limiting voltage | $LV_{OC}$ | Output distortion: 3% | 420 | 480 | 540 | mV rms | |
| | Output noise voltage | $VN_{OC}$ | Rg = 600Ω | | 1.5 | 4.5 | mV rms | |
| | Mute attenuation | $MA_C$ | $V_{IN}$ = −24.0dBV<br>Pin No. 11 shall be grounded. | 60 | 80 | | dB | |
| | Crosstalk (E→C) | CT (E→C) | Expander input should be −10.0dBV<br>Rg = 600Ω | | −40 | −30 | dB | |
| | Frequency characteristic | $FR_C$ | $V_{IN}$ = −24.0dBV<br>f = 200 to 5kHz<br>f = 1kHz as reference. | −0.5 | 0 | 0.5 | dB | |
| | DC voltage difference at mute switching | $V_{MOC}$ (OFF→ON) | Voltage at Pin No. 10 | −20 | | 20 | mV | |

# IR3N74AN Compander IC for Cordless Telephone

($V_{CC}$ = 3.0V, f = 1kHz, RL = 10kΩ, Ta = +25°C)

| Parameter | | Symbol | Test condition | MIN. | TYP. | MAX. | Unit | Note |
|---|---|---|---|---|---|---|---|---|
| Expander | Reference output voltage | $V_{ROE}$ | $V_{IN}$ = −10.0dBV | −12.0 | −10.0 | −8.2 | dBV | |
| | Output deviation | $V_{OE1}$ | $V_{IN}$ = −15.0dB | −0.3 | 0.2 | 0.7 | dB | 2 |
| | | $V_{OE2}$ | $V_{IN}$ = −25.0dB | −0.3 | 0.2 | 0.7 | | |
| | | $V_{OE3}$ | $V_{IN}$ = −35.0dB | −1.0 | 0.2 | 1.0 | | |
| | Distortion | $THD_E$ | $V_{IN}$ = −10.0dBV | | 0.7 | 1.5 | % | |
| | Output dynamic range | $DR_{OE}$ | Output distortion: 10% | 750 | 900 | | mV rms | |
| | Output noise voltage | $VN_{OE}$ | Rg = 600Ω | | 20 | 40 | μV rms | |
| | Mute attenuation | $MA_E$ | $V_{IN}$ = −10.0dBV Pin No. 2 shall be grounded. | 60 | 80 | | dB | |
| | Crosstalk (C→E) | CT (C→E) | Compressor input should be −24.0dBV Rg = 600Ω | | −80 | −70 | dB | |
| | Frequency characteristic | $FR_E$ | $V_{IN}$ = −10.0dBV f = 200 to 5kHz f = 1kHz as reference. | −0.5 | 0 | 0.5 | dB | |
| | DC voltage difference at mute switching | $V_{MOE}$ (OFF→ON) | Voltage at Pin No. 3 | −20 | | 20 | mV | |
| Compander | Voltage gain | $V_{ROCE}$ | $V_{IN}$ = −24.0dBV | 11.0 | 14.0 | 17.0 | dB | |
| | Distortion | $THD_{CE}$ | $V_{IN}$ = −24.0dBV | | 0.5 | 2.0 | % | |
| | Frequency characteristic | $FR_{CE}$ | $V_{IN}$ = −24.0dBV f = 200 to 5kHz f = 1kHz as reference. | −0.5 | 0 | 0.5 | dB | |

Note 1: $V_{IN}$ = 0dB = −24dBV, output deviation = $(V_{OC} - V_{ROC}) - 0.5 \times V_{IN}$ (dB)
Note 2: $V_{IN}$ = 0dB = −10dBV, output deviation = $(V_{OE} - V_{ROE}) - 2 \times V_{IN}$ (dB)

($V_{CC}$ = 3.0V, f = 1kHz, RL = 10kΩ, Ta = – 20 to + 85°C)

| Parameter | | Symbol | Test condition | MIN. | TYP. | MAX. | Unit | Note |
|---|---|---|---|---|---|---|---|---|
| Expander | Reference output voltage | $V_{ROE}$ | $V_{IN}$ = – 10.0dBV | – 12.6 | – 10.0 | – 7.6 | dBV | |
| | Output deviation | $V_{OE1}$ | $V_{IN}$ = – 15.0dBV | – 0.3 | 0.2 | 1.0 | dB | 2 |
| | | $V_{OE2}$ | $V_{IN}$ = – 25.0dBV | – 0.3 | 0.2 | 1.0 | | |
| | | $V_{OE3}$ | $V_{IN}$ = – 35.0dBV | | 0.2 | | | |
| | Distortion | $THD_E$ | $V_{IN}$ = – 10.0dBV | | 0.7 | 2.5 | % | |
| | Output dynamic range | $DR_{OE}$ | Output distortion: 10% | 650 | 900 | | mV rms | |
| | Output noise voltage | $VN_{OE}$ | Rg = 600Ω | | 20 | 40 | μV rms | |
| | Mute attenuation | $MA_E$ | $V_{IN}$ = – 10.0dBV Pin No. 2 shall be grounded. | 60 | 80 | | dB | |
| | Crosstalk (C→E) | CT (C→E) | Compressor input should be – 24.0dBV Rg = 600Ω | | – 80 | – 60 | dB | |
| | Frequency characteristic | $FR_E$ | $V_{IN}$ = – 10.0dBV f = 200 to 5kHz f = 1kHz as reference. | – 0.8 | 0 | 0.8 | dB | |
| | DC voltage difference at mute switching | $V_{MOE}$ (OFF→ON) | Voltage at Pin No. 3 | – 30 | | 30 | mV | |
| Compander | Voltage gain | $V_{ROCE}$ | $V_{IN}$ = – 24.0dBV | 10.5 | 14.0 | 17.5 | dB | |
| | Distortion | $THD_{CE}$ | $V_{IN}$ = – 24.0dBV | | 0.5 | | % | |
| | Frequency characteristic | $FR_{CE}$ | $V_{IN}$ = – 24.0dBV f = 200 to 5kHz f = 1kHz as reference. | – 0.8 | 0 | 0.8 | dB | |

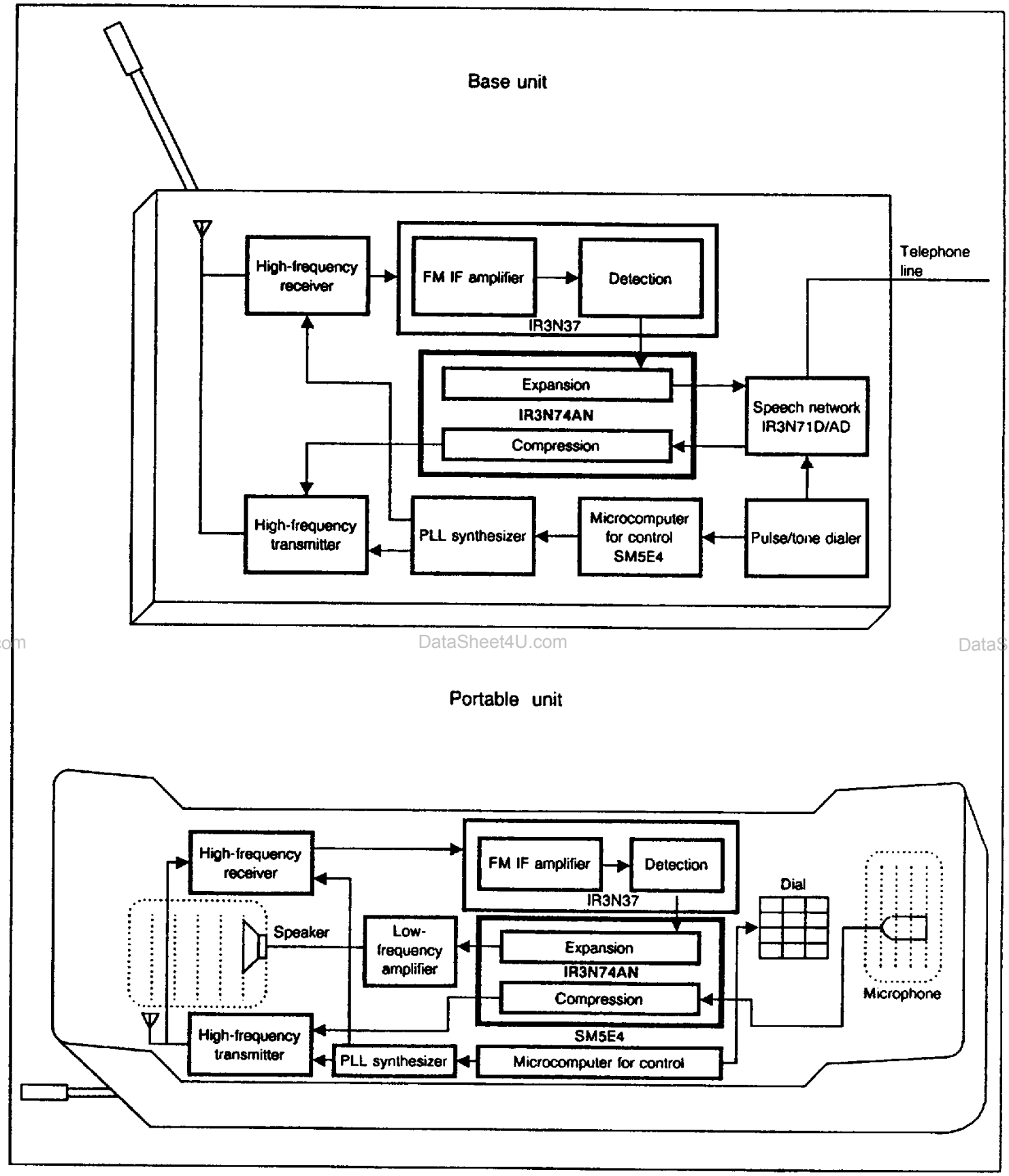
Note 1: $V_{IN}$ = 0dB = – 24dBV, output deviation = ($V_{OC}$ – $V_{ROC}$) – 0.5 × $V_{IN}$ (dB)
Note 2: $V_{IN}$ = 0dB = – 10dBV, output deviation = ($V_{OE}$ – $V_{ROE}$) – 2 × $V_{IN}$ (dB)

## ■ Electrical Characteristics (2)

($V_{CC}$ = 3.0V, f = 1kHz, RL = 10kΩ, Ta = − 20 to + 85°C)

| Parameter | | Symbol | Test condition | MIN. | TYP. | MAX. | Unit | Note |
|---|---|---|---|---|---|---|---|---|
| Operating supply voltage | | $V_{CC}$ | | 2.5 | | 5.5 | V | |
| Current consumption at no signal | | $I_{CC}$ | | | 3.4 | 5.7 | mA | |
| Reference pin voltage | | $V_{REF}$ | | 1.10 | 1.25 | 1.40 | V | |
| Mute switching voltage | | $V_{TH}$ | | 2.0 | | $V_{CC}$ | V | |
| | | $V_{TL}$ | | 0 | | 0.6 | | |
| Compressor | Reference output voltage | $V_{ROC}$ | $V_{IN}$ = − 24.0dBV | − 12.6 | − 10.0 | − 7.6 | dBV | |
| | Output deviation | $V_{OC1}$ | $V_{IN}$ = − 20.0dB | − 0.7 | − 0.1 | 0.4 | dB | 1 |
| | | $V_{OC2}$ | $V_{IN}$ = − 40.0dB | − 1.2 | − 0.2 | 0.2 | | |
| | | $V_{OC3}$ | $V_{IN}$ = − 60.0dB | | − 1.3 | | | |
| | Distortion | $THD_C$ | $V_{IN}$ = − 24.0dBV | | 0.4 | | % | |
| | Limiting voltage | $LV_{OC}$ | Output distortion: 3% | 380 | 480 | 570 | mV rms | |
| | Output noise voltage | $VN_{OC}$ | Rg = 600Ω | | 1.5 | 4.5 | mV rms | |
| | Mute attenuation | $MA_C$ | $V_{IN}$ = − 24.0dBV<br>Pin No. 11 shall be grounded. | 60 | 80 | | dB | |
| | Crosstalk (E→C) | CT (E→C) | Expander input should be − 10.0dBV<br>Rg = 600Ω | | − 40 | − 30 | dB | |
| | Frequency characteristic | $FR_C$ | $V_{IN}$ = − 24.0dBV<br>f = 200 to 5kHz<br>f = 1kHz as reference. | − 0.8 | 0 | 0.8 | dB | |
| | DC voltage difference at mute switching | $V_{MOC}$ (OFF→ON) | Voltage at Pin No. 10 | − 30 | | 30 | mV | |

## ■ System Configuration Example (Cordless Telephone)



# IR3N74AN Compander IC for Cordless Telephone

PRELIMINARY

## ■ Sharp's Product Lineup

| Model No. | | IR3N74N | IR3N74AN |
|---|---|---|---|
| Package | Type | 16SOP | 12SSOP |
| | Pin pitch | 1.27mm | 0.75mm |
| Input port | Expander | 3 ports | 1 port |
| | Compressor | 2 ports | 1 port |
| | Data | 1 port | — |

## ■ Development Schedule (Target)

Sample . . . . . Available
Mass production start . . . . . May, '91

The information described herein is intended to introduce descriptions for products that are in development, and specifications and circuitry are subject to change upon final characterization.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