

IR3N74AN

Compander IC for Cordless Telephone

■ Description

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

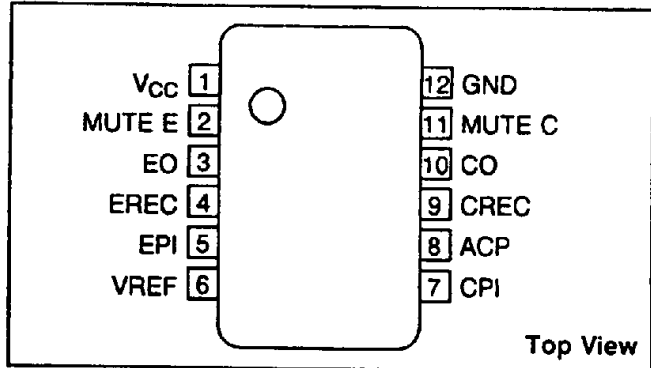
It consists of a compressor whose compressibility is 1/2 in logarithm and an expander whose expandability is 2 in logarithm. This IC ensures clearer speech quality by reducing radio-wave noise which is generated during communications using mobile communication equipment such as cordless telephones and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

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

■ Pin Connections



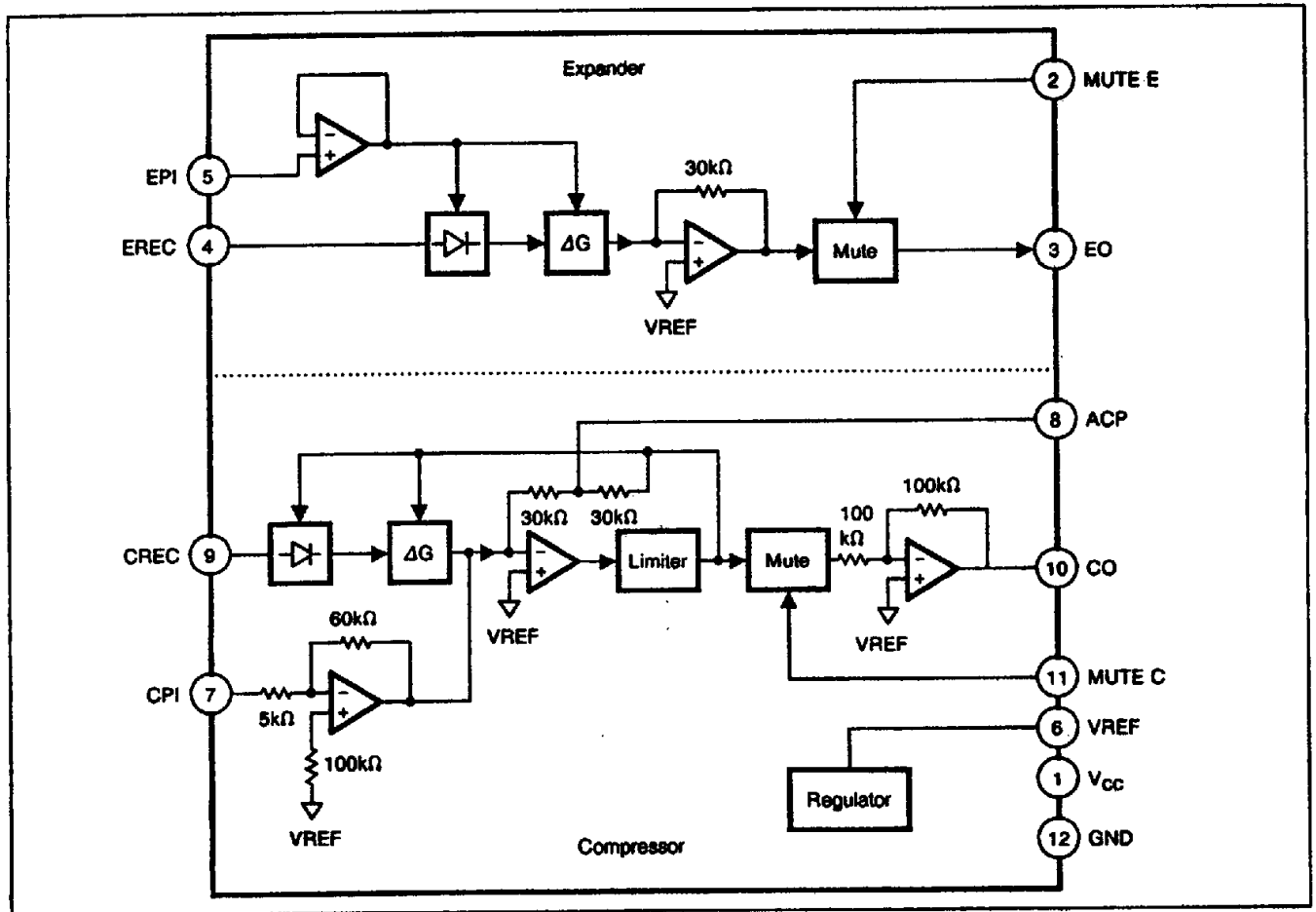
■ Pin Description

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



IR3N74AN Companion IC for Cordless Telephone

■ Block Diagram



■ Absolute Maximum Ratings

(T_a = +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	T _{opr}	-20 to +85	°C	
Storage temperature	T _{stg}	-55 to +150	°C	

Note 1: Applied to pins MUTE E and MUTE C.

Note 2: When T_a = +25°C. PD derating ratio is 3mW/°C.

Electrical Characteristics (1)

 (V_{CC} = 3.0V, f = 1kHz, R_L = 10kΩ, T_a = +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}	R _g = 600Ω		1.5	4.5	mV rms	
	Mute attenuation	MA _C	V _{IN} = -24.0dBV Pin No. 11 shall be grounded.	60	80		dB	
	Crosstalk (E→C)	CT (E→C)	Expander input should be -10.0dBV R _g = 600Ω		-40	-30	dB	
	Frequency characteristic	FR _C	V _{IN} = -24.0dBV f = 200 to 5kHz 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		

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($V_{CC} = 3.0V$, $f = 1kHz$, $R_L = 10k\Omega$, $T_a = +25^\circ C$)

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	V_{NOE}	$R_g = 600\Omega$		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 $-24.0dBV$ $R_g = 600\Omega$		-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)

($V_{CC} = 3.0V$, $f = 1kHz$, $R_L = 10k\Omega$, $T_a = -20$ to $+85^\circ C$)

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	$THDE$	$V_{IN} = -10.0dBV$		0.7	2.5	%	
	Output dynamic range	DR_{OE}	Output distortion: 10%	650	900		mV rms	
	Output noise voltage	V_{NOE}	$R_g = 600\Omega$		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 $-24.0dBV$ $R_g = 600\Omega$		-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 = $(V_{OC} - V_{ROC}) - 0.5 \times V_{IN}$ (dB)

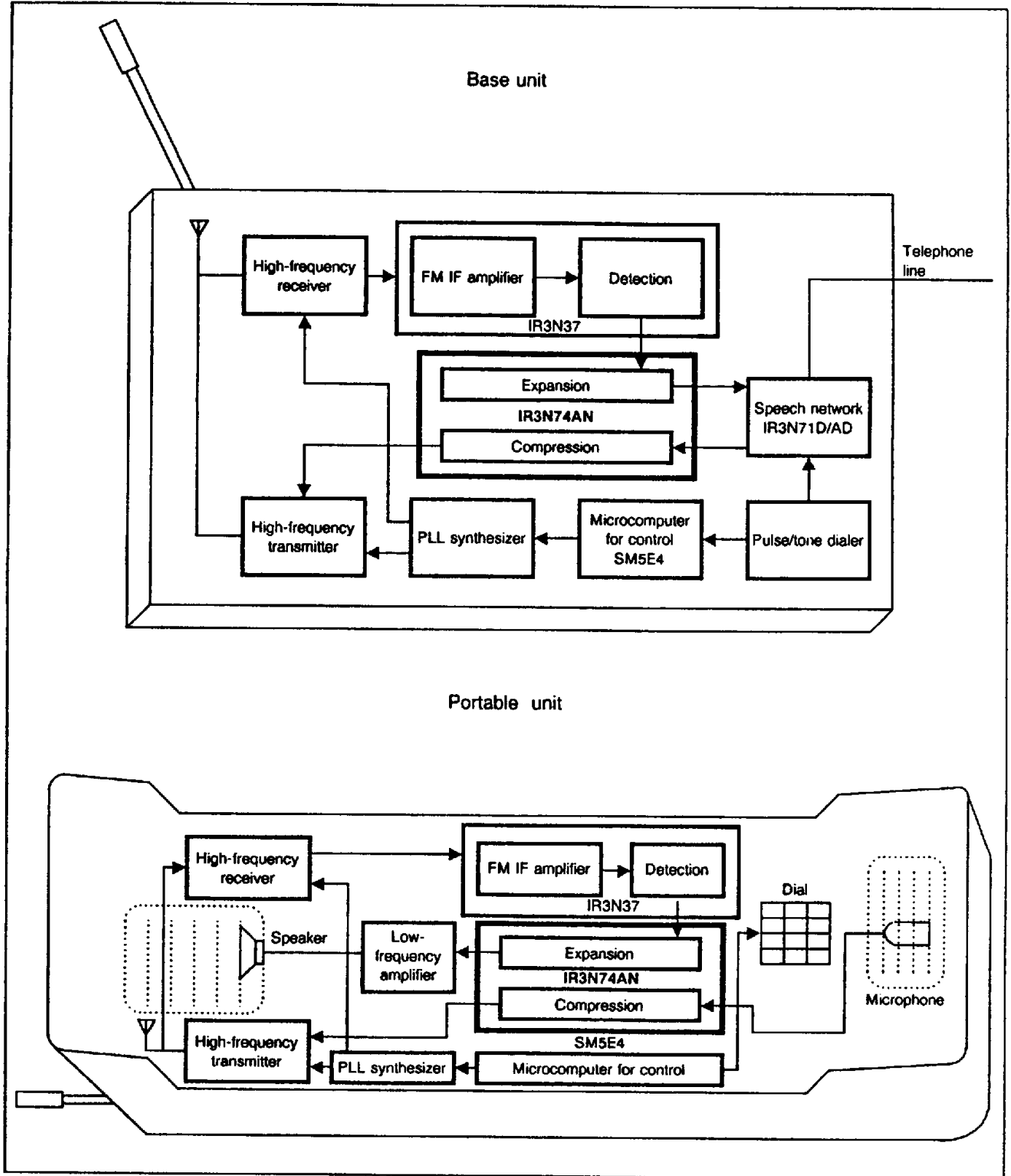
Note 2: $V_{IN} = 0dB = -10dBV$, output deviation = $(V_{OE} - V_{ROE}) - 2 \times V_{IN}$ (dB)

Electrical Characteristics (2)

 ($V_{CC} = 3.0V$, $f = 1kHz$, $R_L = 10k\Omega$, $T_a = -20$ to $+85^\circ C$)

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	V_{NOC}	$R_g = 600\Omega$		1.5	4.5	mV rms	
	Mute attenuation	MA_C	$V_{IN} = -24.0dBV$ Pin No. 11 shall be grounded.	60	80		dB	
	Crosstalk (E→C)	CT (E→C)	Expander input should be $-10.0dBV$ $R_g = 600\Omega$		-40	-30	dB	
	Frequency characteristic	FR_C	$V_{IN} = -24.0dBV$ $f = 200$ to $5kHz$ $f = 1kHz$ 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)



■ 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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