MICRONAS

T-75-11-09

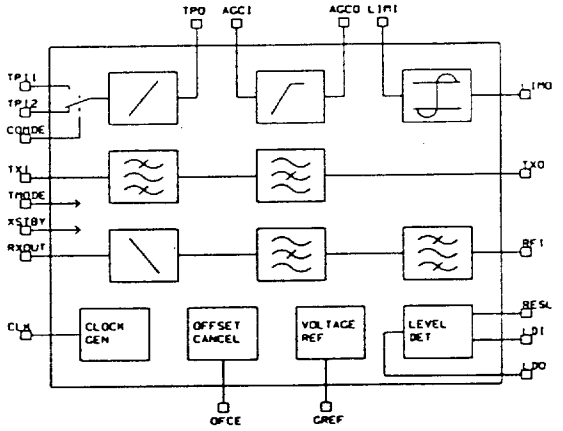
MAS 7826
NMT AUDIO FILTER
CMOS

APPLICATIONS

- NMT 450, NMT 900, R2000 mobile phones

FEATURES

- Supervisory (4 kHz) notch filter in TX and RX audio path
- TX band pass filter, limiter, pre-emphasis and AGC
- RX de-emphasis and band pass filter
- Low power consumption and stand-by mode
- 28 PIN SO package



GENERAL INFORMATION

The MAS7826 is an audio/supervisory signal filter chip intended to be used in conjunction with a modem chip (MAS 7834 and a gain control chip MAS 7827) in NMT and R2000 mobile phones.

It is packed in a 28 pin small outline (SO).

The device is consuming less than 100 mW:s from a single 5 volt supply when it is operational. A stand-by mode reduces the power to 50 mW.

POWER CONTROL

The filter chip has two operational modes, a stand-by mode where the receiver section is operational and a talk mode where the whole IC is operational.

TX-FILTERING

The TX-filter is a chain of signal shaping blocks which limit the microphone signal bandwith and the amplitude within the NMT/R2000 specifications.

The first stage is a 6 dB/oct pre-emphasis filter feeding an AGC stage. The output of the AGC goes into a limiter and then to a 0.3 - 4 kHz pass filter. A sharp 4 kHz notch cuts the pilot signal and finally a low pass post filter cuts the harmonics of the final transmitter output.

RX-FILTERING

The RX-filter first limits the received signal bandwith to 0.3 - 4 kHz.

The output of the RX-filter feeds a 4 kHz notch. The output of the notch goes into a de-emphasis filter (-6dB/oct).

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CLOCK GENERATOR

The clock generator/divider produces all internal timing signals from the input (CLK) frequency 307.2 kHz.
The duty cycle of the clock is not critical, but the minimum on or off time should not be less than 100 ns.

OFFSET CANCELLATION

The AGC-stage amplifier has an offset cancellation mechanism. The offset compensation is a function, which should be activated at the beginning of the transmission (talk). For that purpose the OFCE input starts the cancellation sequence. The OFCE should remain high for 20 ms minimum.
Note that the AGC circuit is not operational during offset cancellation cycle.

VOLTAGE REFERENCE

The analog signal reference (ground) circuit is a high input impedance voltage follower based by two internal resistors to form approximately 2.5 V level for internal use.
Pin GREF should be connected to external signal ground via 1µF capacitor.

LEVEL DETECTOR

The level detector circuit measures the signal level at pin LDI. When the signal reaches 25 ± 2 mV rms the level detector output LDO goes high (after a delay less than 3 ms when the input frequency is 1 kHz).
If the signal level drops below 10 ± 2 mV rms the detector output returns low (after a delay less than 20 ms).

The level detector can be reset by signal PBSL.

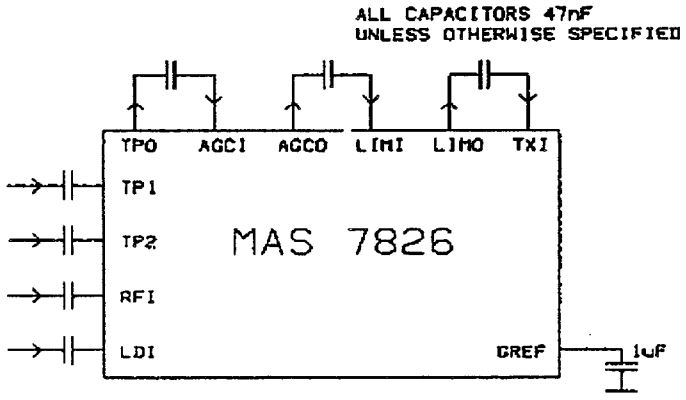
EXTERNAL COMPONENTS

Couple of external capacitors should be used to avoid wrong DC-biasign of input signals. The capacitor values are recommended to be 47 nF unless otherwise noted.

ASSOCIATED IC:S

Micronas has a complete NMT chip set including:

MAS 7834	NMT450/NMT900/R2000 modem
MAS 7826	Audio filter unit
MAS 7827	Gain control unit



Note that the capacitors should also be used in circuit test/evaluation.

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PIN ASSIGNMENT

PIN	NAME	I/O	FUNCTION
1	CLK	I	Master clock input 307.2 kHz
2	VDD	-	+ 5 V digital power supply
3	VSS	-	0 V digital power ground
4	VSA	-	0 V analog power ground
5	GREF	I	Signal ground input
6	VDA	-	+ 5 V analog power supply
7	N.C.	-	Not in use
8	TXI	I	Transmitter 0.3 - 4 kHz band pass filter input
9	AGCI	I	Automatic gain control input
10	LIMO	O	Limiter output
11	TLIM	O	Limiter test output
12	LIMI	I	Limiter input
13	N.C.	-	Not in use
14	TPO	O	Tx pre-emphasis filter output
15	TPI2	I	Tx pre-emphasis filter input 2. (Active when COMDE = 1)
16	TPI1	I	Tx pre-emphasis filter input 1. (Active when COMDE = 0)
17	COMDE	I	Tx-pre-emphasis input control
18	TESTO	O	Test output
19	OFCE	I	Offset compensation control input
20	XSTBY	I	Stand-by control input (0-level active)
21	AGCO	O	Automatic gain control output
22	TXO	O	Transmitter 0.3 - 4 kHz band pass filter output
23	N.C.	-	Not in use
24	RFO	O	Rx-filter output
25	RFI	I	Rx-filter input
26	LDI	I	Level detector input
27	RESL	I	Level detector reset
28	LDO	O	Level detector output

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ELECTRICAL CHARACTERISTICS

ABSOLUTE MAXIMUM RATING:

Supply Voltage VDD	0 to 6 Vdc
Voltage on any input	-0.5 Vdc to VDD +0.5 Vdc

OPERATING CONDITIONS:

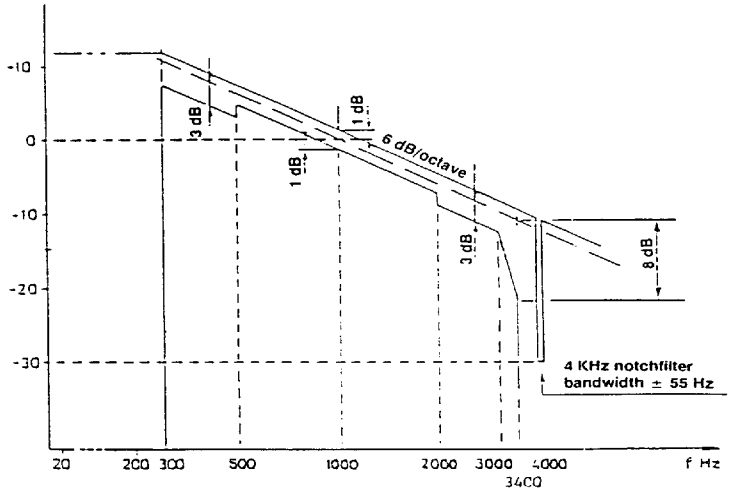
Supply voltage VDD	+4.75 Vdc to 5.25 Vdc
Temperature	-35°C to +85°C
Storage temperature	-55°C to +125°C

DC CHARACTERISTICS

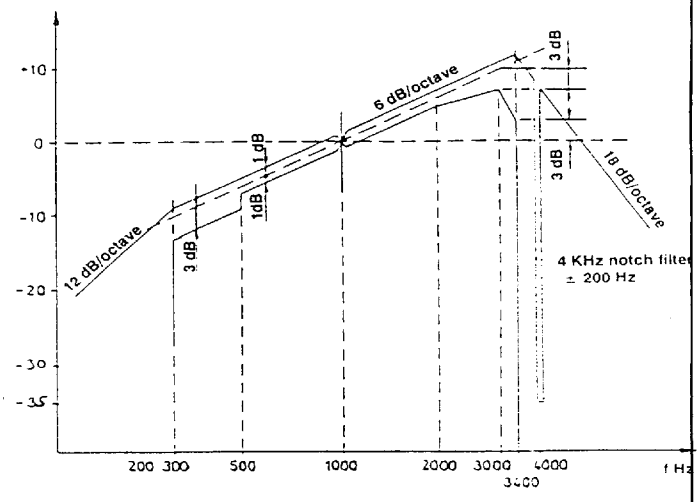
Parameter	Symbol	Limits Min	Max	Unit
Supply Current	IDD		20	mA
Stand-by Current			10	mA
Output low voltage	VOL		0.05	V
Output high voltage	VOH	4.95		V
Output low (sink) current, VOL = 0.4V	IOL	0.6		mA
Output high (source) current, VOH = 4.6V	IOH	-0.4		mA
Input high voltage	VIH	3.5		V
Input low voltage	VIL		1.0	V
Input current	IIN	± 1.0		µA
	CIN		5	pF
Analog output high voltage	VIH	4.0		V

(VDD = 5 V TA = 25°C)

AC-CHARACTERISTICS



Rx de-emphasis filter specification, relative frequency responce.



Tx pre-emphasis filter specification, relative frequency responce.

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AC CHARACTERISTICS CONT.

	MIN	MAX	UNIT
Tx pre-emphasis filter gain at 1 kHz (Input TP1, output TP0)	-0.5	+0.5	dB
Tx path harmonic distortion at 1 kHz (Input TP1, output AGCO, 47 nF capacitor between pin TPO and AGCI Vin = 100 mV - 1 V rms		25	%
Rx de-emphasis filter gain at 1 kHz (Input RFI, output RXOUT)	-0.5	+0.5	dB
AGC absolute gain at Vin = 100 mV rms (Input TP1, output LIMO, 47 nF capacitors between pins TPO and AGCI, AGCO and LIMI respectively)	-0.5	+0.5	dB
AGC relative gain at Vin = 5.5 mV - 125 mV rms	-0.4	+0.4	dB
AGC output level at Vin = 140 mV - 1.75 V rms	125	150	mV rms
Limiter absolute gain at Vin - 100 mV rms (Input LIMI, output LIMO)	-0.5	+0.5	dB
Limiter output voltage at Vin = 165 mV - 1.75 V rms	400	440	mV rms
Limiter distortion difference between input LIMI and output LIMO		1	%
Level detector treshold level (1.5 kHz)	10	25	mV rms
Level detector attack time Vin = 25 mV rms 1500 Hz	1.6	3.0	ms
Level detector delay time	8	12	ms

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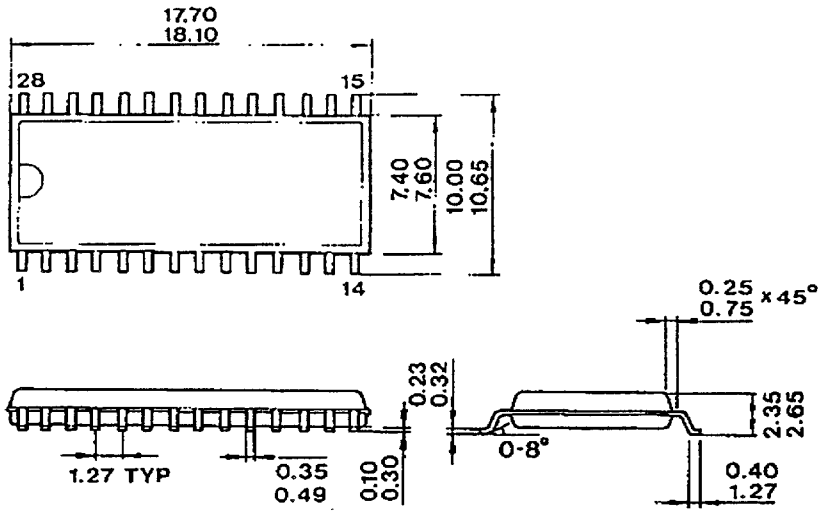
PACKAGE DIMENSIONS

SO 28



All measurements in mm.

ORDERING INFORMATION

Our product code	Product:	Package:
7826SO28X	MAS7826 NMT AUDIO CIRCUIT	28 PIN SO

Please refer to our product code in ordering.

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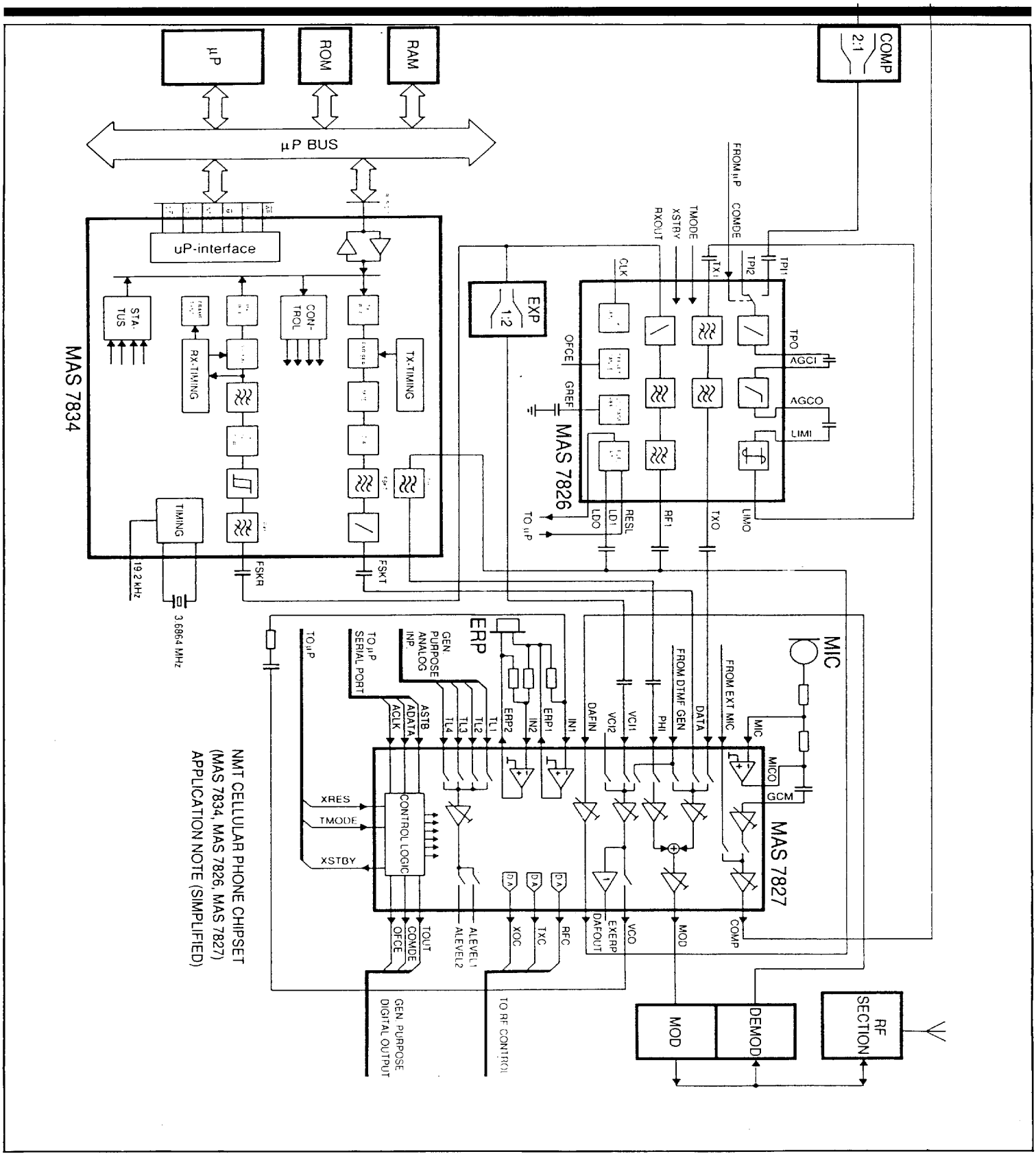

NMT CELLULAR PHONE CHIPSET
(MAS 7834, MAS 7826, MAS 7827)
APPLICATION NOTE (SIMPLIFIED)