MAS1017

AM Receiver IC

- •Wide Supply Voltage Range
- •Power Down and Power Up Control

DESCRIPTION

The MAS1017 AM-Receiver chip is a highly sensitive, simple to use AM receiver specially intended to receive time signals in the frequency range from 40 kHz to 100 kHz. There are only a few external components needed. The circuit has a preamplifier, wide range automatic gain control, demodulator and output comparator built in. The output signal can be processed directly with an additional digital circuitry to extract the data from the received signal.
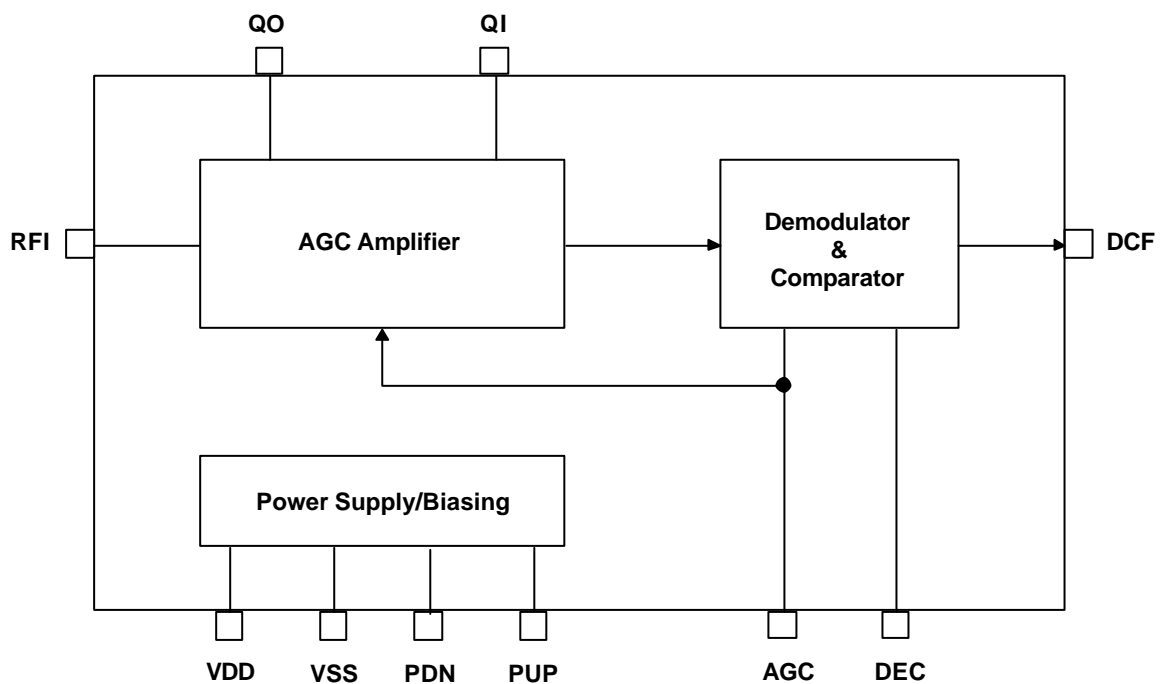
FEATURES

- • Wide Supply Voltage Range
- • Power Down and Power Up Control
- • Only a Few External Components Needed
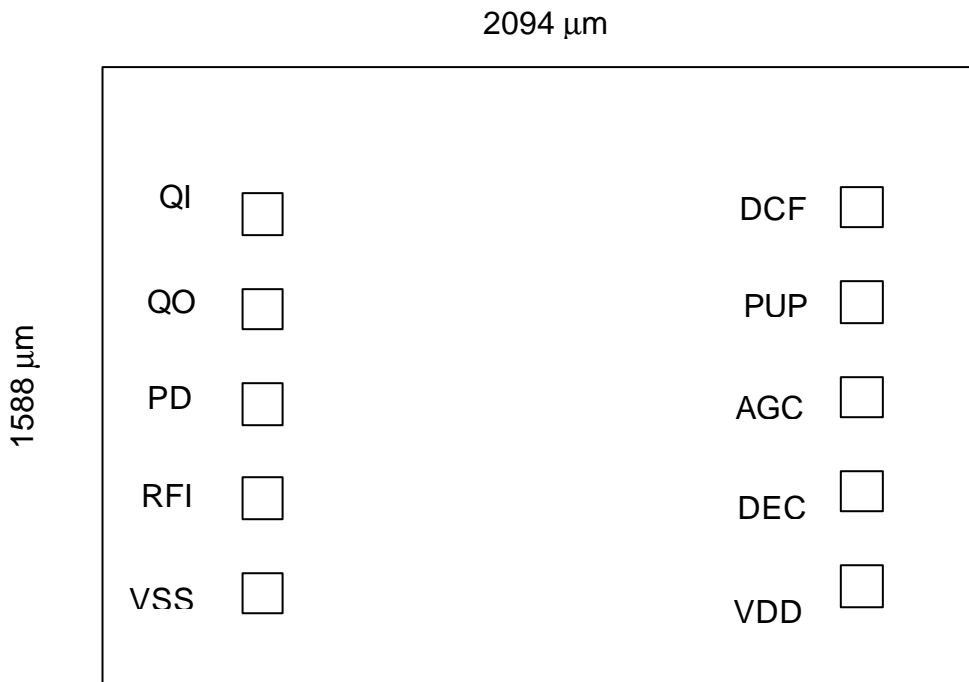- • Highly Sensitive AM Receiver

APPLICATIONS

- • Time Signal Receiver (designed for DCF77)

BLOCK DIAGRAM

PAD LAYOUT

2094 µm

1588 µm

DIE size = 2.09 x 1.59 mm; PAD size = 100 x 100 µm
Substrate is connected to VDD. Please make sure that VDD is bonded first.

Pad Identification	Name	X-coordinate	Y-coordinate	Note
Power Supply Voltage	VDD	1867 µm	270 µm	
Power Supply Ground	VSS	262 µm	257 µm	
Power Down Input	PDN	242 µm	751 µm	1
Power Up Input	PUP	1859 µm	1029 µm	2
AGC Capacitor	AGC	1859 µm	790 µm	
Demodulator Capacitor	DEC	1859 µm	514 µm	
Receiver Input	RFI	242 µm	513 µm	
Quarz Filter Output	QO	242 µm	1029 µm	
Quarz Filter Input	QI	242 µm	1307 µm	
DCF Signal Output	DCF	1859 µm	1345 µm	3

Notes:
1) Level = VSS means receiver on; VDD = receiver off (PUP = VSS)
   Internal pull-up resistor > 1 MOhm to VDD
2) Level = VDD means receiver on; VSS = receiver off (PDN = VDD)
   Internal pull-down resistor > 1MOhm to VSS
3) 100% AM results in Level = VSS; 25% AM results in Level = VDD
   - the output is a current source/sink with $|I_{OUT}| > 5$ µA
   - at power down the output is tri-state
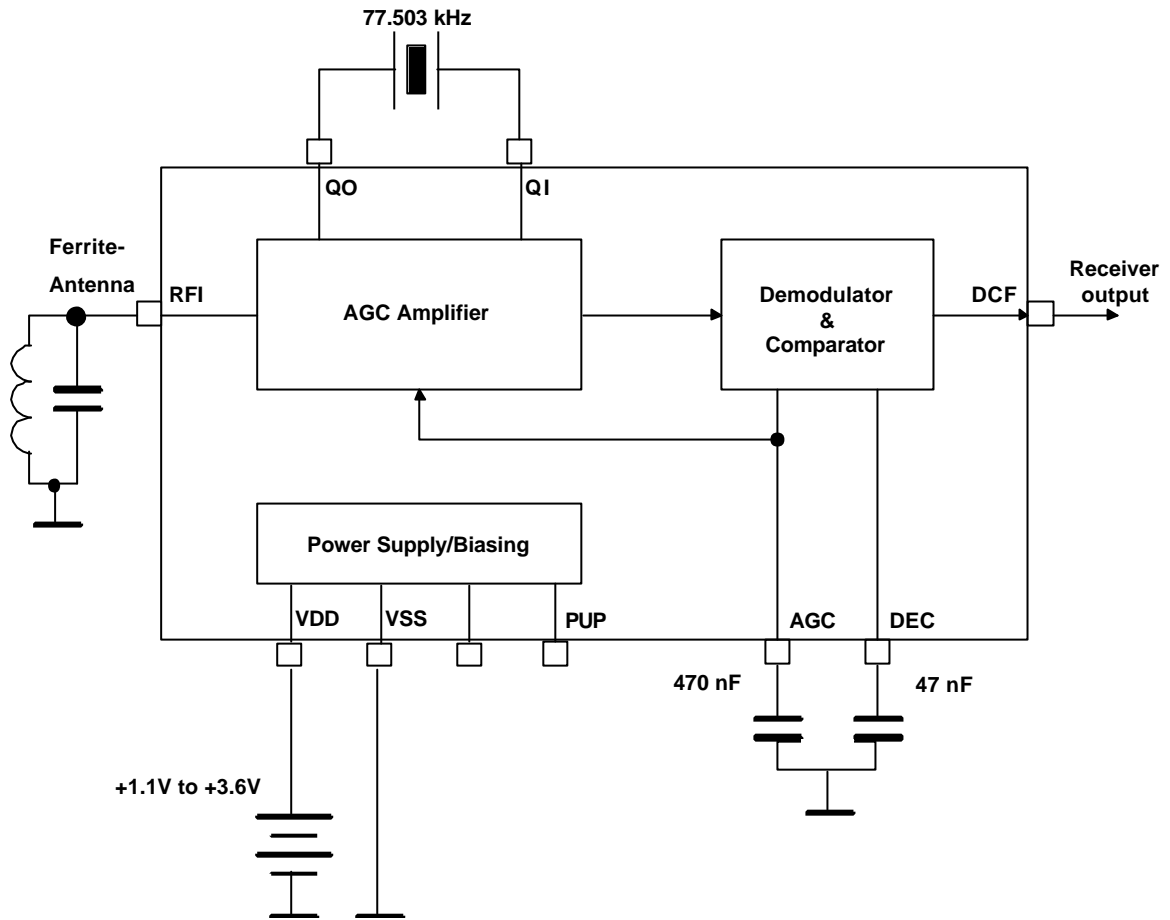
ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Conditions	Min	Max	Unit
Supply Voltage	V_{DD}-V_{SS}		-0.3	5.0	V
Input Voltage	V_{IN}		V_{SS}-0.3	V_{DD}+0.3	V
Power Dissipation	P_{MAX}			100	mW
Operating Temperature	T_{OP}		-20	70	$^{\circ}$C
Storage Temperature	T_{ST}		-40	120	$^{\circ}$C

ELECTRICAL CHARACTERISTICS

Operating Conditions: VDD = 1.4V, Temperature = 25°C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating Voltage	V_{DD}		1.10		3.60	V
Current Consumption	I_{DD}			40	100	µA
Stand-By Current	I_{DDoff}				0.1	µA
Input Range	f_{IN}		40		100	kHz
Sensitivity	V_{IN}		0.001		20	mVrms
Input Levels $|I_{IN}|$<0.5 µA	V_{IL} V_{IH}		$V_{DD}-0.3$		0.3	V
Output Current V_{OL}<0.2 V_{DD};V_{OH}>0.8 V_{DD}	$|I_{OUT}|$		5			µA
Output Pulse	T_0		30		125	ms
	T_1		130		220	ms
Startup Time	T_{Start}			8		s
Output Delay Time	T_{Delay}			50		ms

TYPICAL APPLICATION

PACKAGE (an example, see ordering information)

PDIP 20

```
          NC   1  ▯        ▯  20  VSS
          VDD  2  ▯        ▯  19  NC
          NC   3  ▯        ▯  18  RFI
          DEC  4  ▯        ▯  17  PDN
          AGC  5  ▯        ▯  16  NC
          NC   6  ▯        ▯  15  QO
          PUP  7  ▯        ▯  14  NC
          DCF  8  ▯        ▯  13  QI
          NC   9  ▯        ▯  12  NC
          NC  10  ▯        ▯  11  NC
```
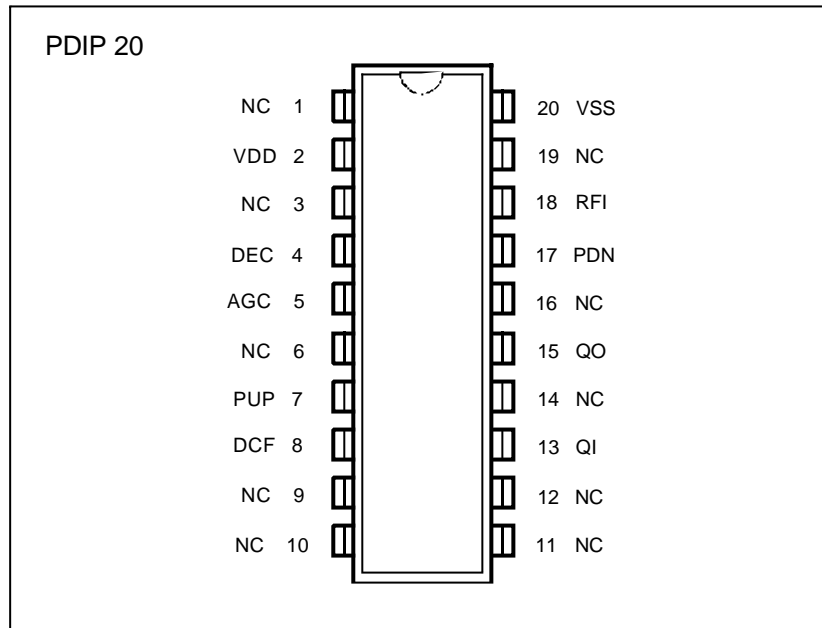
PIN DESCRIPTION

Pin Name	Pin	Type	Function	Note
NC	1			
VDD	2	P	Positive power supply	
NC	3			
DEC	4	AO	Demodulator capacitor	
AGC	5	AO	AGC capacitor	
NC	6			
PUP	7	AI	Power up input	2
DCF	8	DO	Demodulator output	3
NC	9			
NC	10			
NC	11			
NC	12			
QI	13	AI	Quartz filter input	
NC	14			
QO	15	AO	Quartz filter output	
NC	16			
PDN	17	AI	Power down input	1
RFI	18	AI	Receiver input	
NC	19			
VSS	20	G	Power supply ground	

Notes:
1) Level = VSS means receiver on; VDD = receiver off
2) Level = VDD means receiver on; VSS = receiver off (PDN = VDD)
   Internal pull-down resistor > 1MOhm to VSS
3) 100 % AM results in Level = VSS; 25 % AM results in Level = VDD
   - the output is a current source/sink with $\lvert Iout \rvert > 5\ \mu A$
   - at power down the output is tri-state

ORDERING INFORMATION

Product Code	Product	Package	Comments
MAS1017AZAA	AM-Receiver IC	Dice on sticky tape	
MAS1017ATAA	AM-Receiver IC	Wafer, EWS-tested	

More package options (e.g., SO14) available upon request.

LOCAL DISTRIBUTOR

MICRO ANALOG SYSTEMS OY CONTACTS

Micro Analog Systems Oy	Tel. (09) 80 521
Kamreerintie 2, P.O. Box 51	Tel. Int. +358 9 80 521
FIN-02771 ESPOO, FINLAND	Telefax +358 9 805 3213
http://www.mas-oy.com	E-mail: hitech@mas-oy.com