MAS1016

AM Receiver IC

- **Wide Supply Voltage Range**
- **Power Down and Power Up Control**
- **Control for AGC On**

DESCRIPTION

The MAS1016 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.

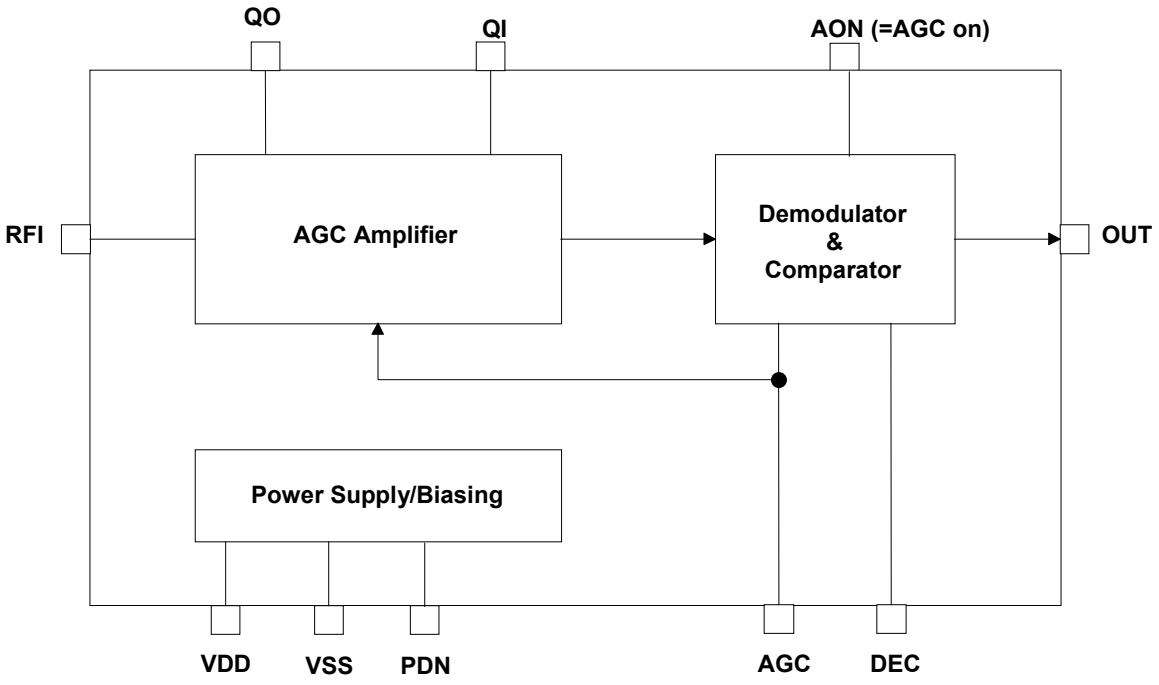
FEATURES

- Wide Supply Voltage Range
- Power Down Control
- Only a Few External Components Needed
- Highly Sensitive AM Receiver
- Control for AGC On

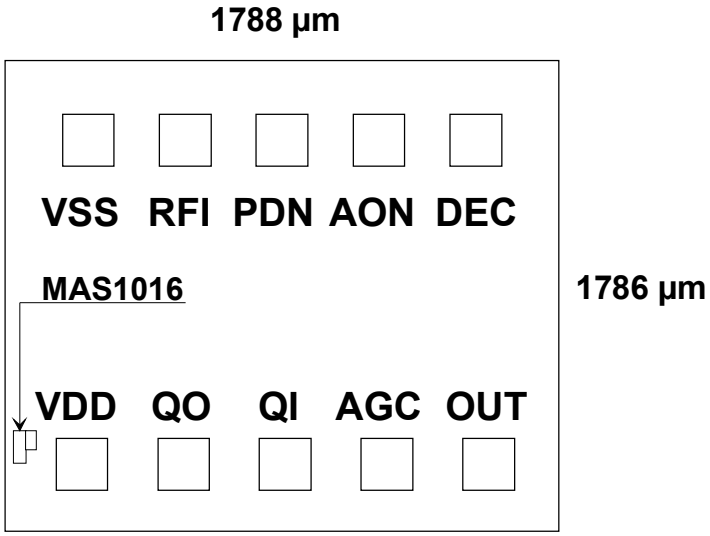
APPLICATIONS

- Time Signal Receiver designed for MSF (British), WWVB (USA), JG2AS (Japan) and DCF77 (Germany)

BLOCK DIAGRAM



PAD LAYOUT



DIE size = 1.79 x 1.79 mm; PAD size = 100 x 100 µm
Substrate is connected to Vdd.
Note: Coordinates are calculated using Vdd as a centre point

Pad Identification	Name	X-coordinate	Y-coordinate	Note
Power Supply Voltage	VDD	0 µm	0 µm	
Quarz Filter Output	QO	306 µm	19 µm	
Quarz Filter Input	QI	587 µm	19 µm	
AGC Capacitor	AGC	866 µm	19 µm	
Receiver Output	OUT	1143 µm	19 µm	3
Demodulator Capacitor	DEC	1111 µm	1436 µm	
AGC On Control	AON	868 µm	1436 µm	2
Power Down Input	PDN	551 µm	1436 µm	1
Receiver Input	RFI	309 µm	1436 µm	
Power Supply Ground	VSS	16 µm	1415 µm	

Notes:
1) Level = VSS means receiver on; VDD = receiver off
2) Level = VSS means AGC hold; VDD = AGC on (working)
   - Internal pull-up with current < 1 µA which is switched off in power down
   - During AGC hold the receiver output OUT is hold down 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

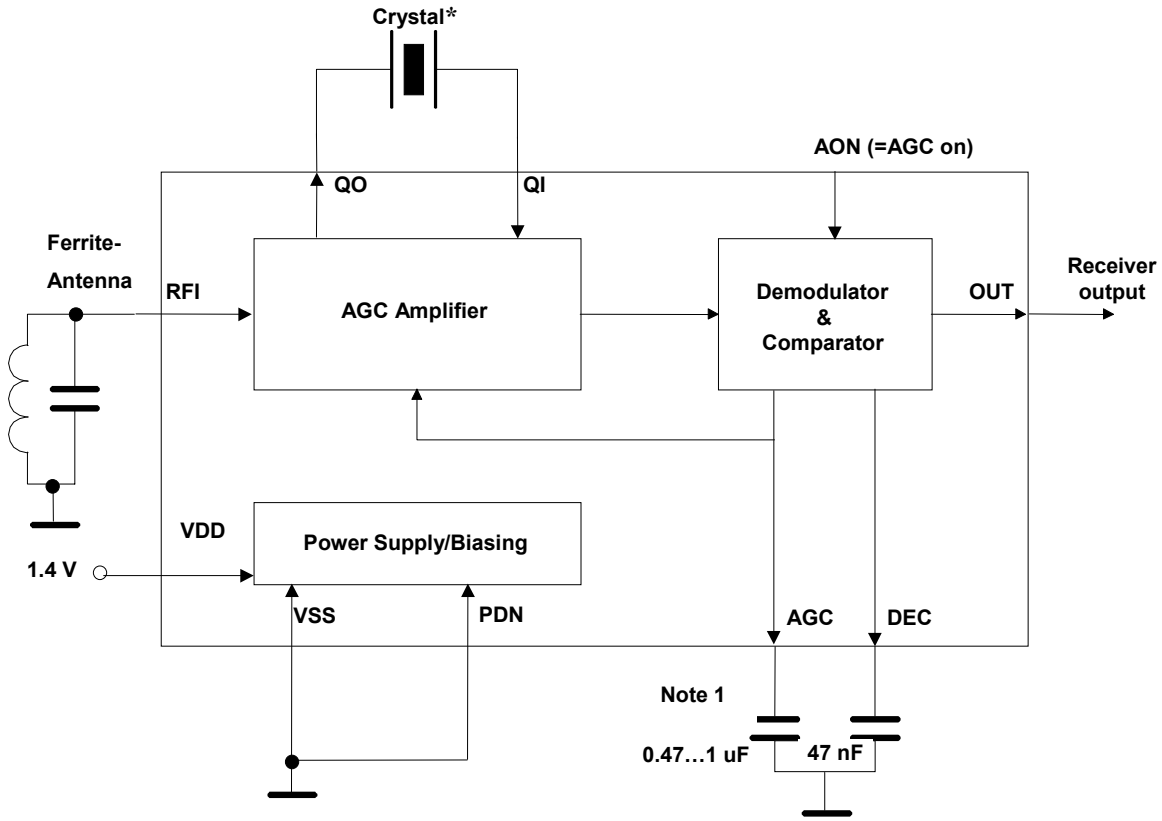
Parameter	Symbol	Conditions	Min	Max	Unit
Supply Voltage	V_{DD}-V_{SS}		-0.3	5.0	V
Input Voltage	V_{IN}		V_{SS}-0.3	V_{DD}+0.3	V
Power Dissipation	P_{MAX}			100	mW
Operating Temperature	T_{OP}		-20	70	°C
Storage Temperature	T_{ST}		-40	120	°C

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}			50	200	µA
Stand-By Current	I_{DDoff}				0.1	µA
Input Range	f_{IN}		40		100	kHz
Sensitivity	V_{IN}		0.001		50	mVrms
Input Levels $\|I_{IN}\|$<0.5 µA	V_{IL} V_{IH}		 0.8 V_{DD}		0.2 V_{DD}	V
Output Current V_{OL}<0.2 V_{DD};V_{OH} >0.8 V_{DD}	$\|I_{OUT}\|$		5			µA
Output Pulse	T_0		65		125	ms
	T_1		150		220	ms
Startup Time	T_{Start}			8		s
Output Delay Time	T_{Delay}			50	100	ms

TYPICAL APPLICATION



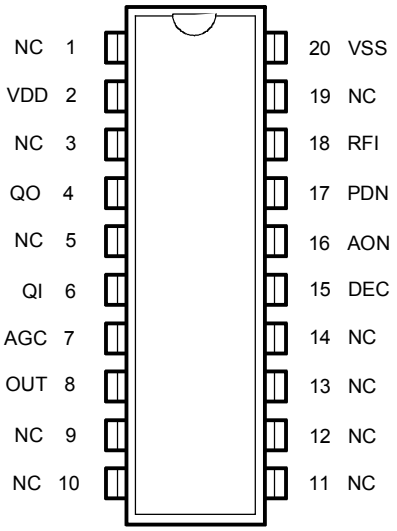
Crystal frequencies:

77.503 kHz for DCF77 Receiver,
60 kHz for WWVB (USA) and MSF (British) Receiver
40 kHz JG2AS (Japan) Receiver

Note 1: AGC Capacitor
DCF77 Receiver 0.47 to 1.0 uF
WWVB (USA), MSF (British) and JG2AS (Japan) 220 nF (external control of AON (=AGC on)is needed, for more details see also DAEV1016)

PACKAGE FOR SAMPLES

PDIP 20



PIN DESCRIPTION

Pin Name	Pin	Type	Function	Note
NC	1			
VDD	2	P	Positive Power Supply	
NC	3			
QO	4	AO	Quartz Filter Output	
NC	5			
QI	6	AI	Quartz Filter Input	
AGC	7	AO	AGC Capacitor	
OUT	8	DO	Receiver Output	3
NC	9			
NC	10			
NC	11			
NC	12			
NC	13			
NC	14			
DEC	15	AO	Demodulator Capacitor	
AON	16	DI	AGC On Control	2
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 [Iout] >5 μA
   - at power down the output is tri-state

ORDERING INFORMATION

Product Code	Product	Package	Comments
MAS1016ATB1	AM-Receiver IC	Wafer, EWS-tested	Thickness 480 µm
MAS1016ATC1	AM-Receiver IC	Wafer, EWS-tested	Thickness 400 µm

Please contact Micro Analog Systems Oy for other wafer thickness options.

LOCAL DISTRIBUTOR

MICRO ANALOG SYSTEMS OY CONTACTS

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