GSG 勁力 半導体

Gunter Semiconductor GmbH

AK2125

EDITION 09/00

Receiver/ Demodulator for time code signals transmitted by the transmitter DCF77(Germany) , MSF(UK), or WWVB(USA)

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Radio Controlled Clock Receiver

Short Description

The AK2125 bipolar manolithic integrated circuit receives and demodulates digital time signals emitted by time signal transmitters in the long-wave range.
It is designed for low-current battery operation and can be switched in power-down mode.

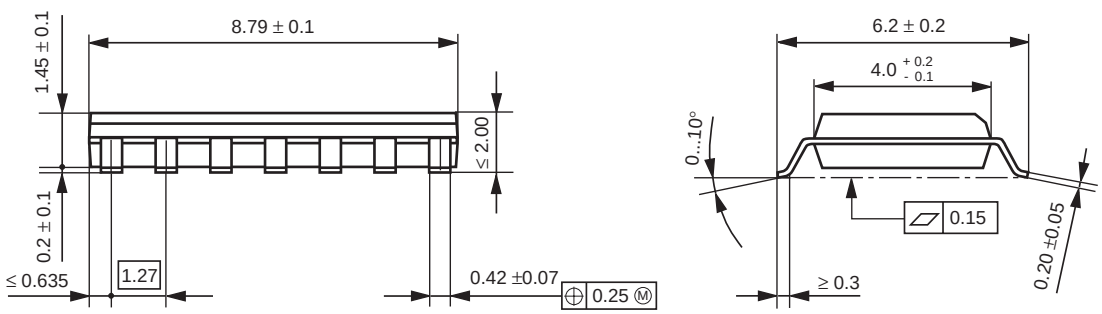
Features

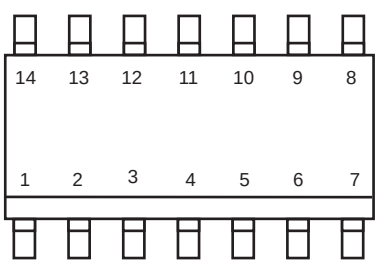
- very low battery drain
- power-down mode

Package

The AK2125 is available in

- SOP 14



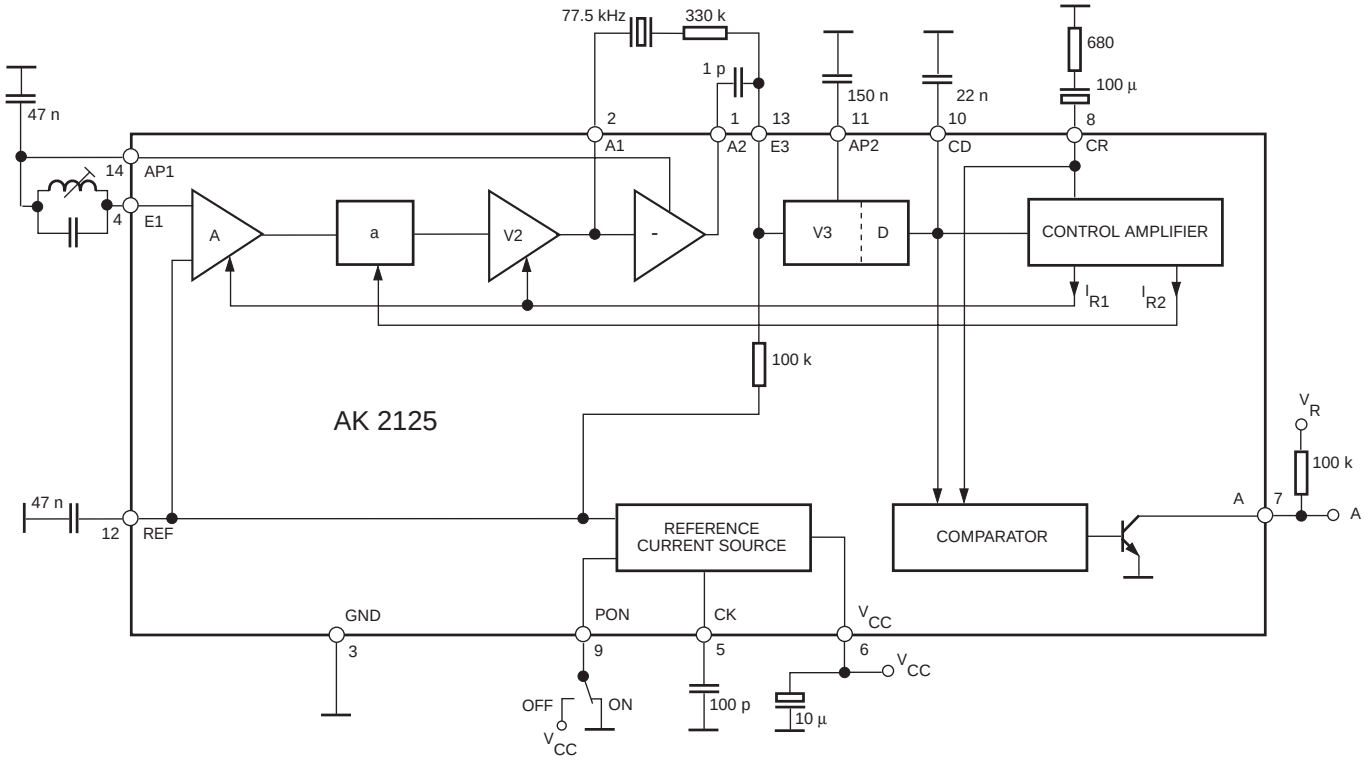


Pinning

SOP 14 - package

Pin	Symbol	Pin designation
01	A2	RF output 2
02	A1	RF output 1
03	M	Ground
04	E1	Antenna input
05	CK	Compensation capacity
06	V_{CC}	Supply voltage
07	A	Output
08	CR	Charging capacitor (for control amplifier)
09	PON	Stand by switch
10	CD	Demodulation capacity
11	AP2	Operating point regulator 2
12	REF	Reference voltage
13	E3	Booster amplifier input
14	AP1	Operating point regulator 1

Block Diagram and Application Circiut



Absolute Maximum Ratings

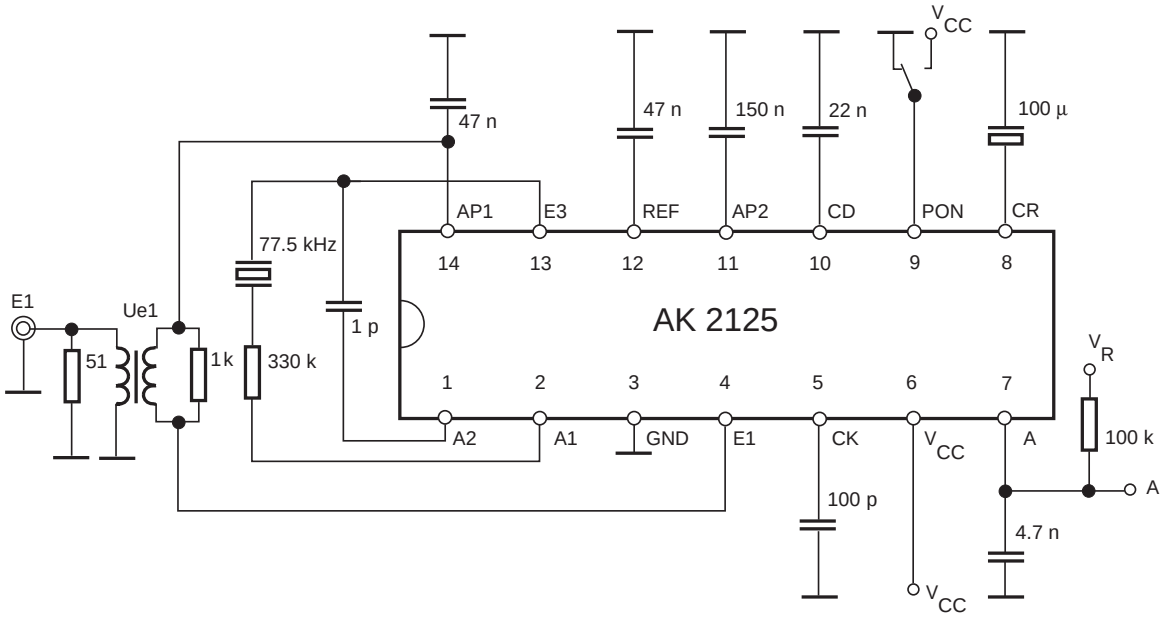
	symbol	min.	max.	unit
Supply voltage	V_{CC}	0	5.25	V
Output voltage	V_A	0	5.25	V
Stand-by switch voltage PON	V_{PON}	0	V_{CC}	V
Junction temperature	T_j		150	°C
Operating temperature	T_a	-25	+85	°C

Recommended Operational Conditions

Supply voltage	V_{CC}	1.4	V
Frequency	f	50 ... 80	kHz
Operational temperature	T_a	0 ... 55	°C
RF input voltage	V_{iE}	> 3	µV

Electrical Characteristics

1. Test circuits



Ue1 : pot core A_L1100 nH/w^2 ; 2 x 25 windings with 0.2 CuL

2. Parameters

Refering to the test circuit with generator signal
f = 77500 Hz ± 5 Hz
pulse modulation of RF-signal from 100% to 25 %
during modulation time t = 200 ms,
V_{CC} = 1.4 V ; V_{PON} = 0 V ; T_a = 25 °C
unless specified otherwise

	min.	typ.	max.	unit
Supply voltage range (+5 °C < T_a < +55 °C)	1.2	1.4	2.2	V
supply voltage range (-25 °C < T_a < +85 °C)	1.4		2.2	V
current consumption (normal operating)		600	1000	µA
current consumption (Stand - by)		<1	10	µA
Switch current I_{PON} (V_{PON} = ground)		-15	-50	µA
Input voltage	3		100000	µV
Input impedance of the RF amplifier		750		kΩ
Input impedance of the booster amplifier		95		kΩ
Output impedance of the RF segment (A1)		0.3		kΩ
Output impedance of the RF segment (A2)		7.5		kΩ
Amplification RF segment A1		53		dB
Range of input voltage booster amplifier	30		450	µV
Internal resistance of the demodulator		70		kΩ
Output voltage of the demodulator		200		mV_{pp}
Control time for ΔV_i = 0.1 mV - 1 mV for ΔV_i = 1 mV - 0.5 mV		 0.8 5.0		 s s
Output pulse width at transmitter pulse width =200 ms for V_R = 1.4 V, V_{iE} = 3 µV	180	195	220	ms

	min.	typ.	max.	unit
Output current I_{OH} (V_R = 6 V)			10	µA
Output current I_{OL} (U_R = 6 V)	60	200		µA
Output voltage V_{OL} (I_{OL}= 15 µA)		20	200	mV

Application Hints

1. RF Component

An inductive coupling of signals occurs between E1 and AP.
The output A2, with an impedance of 7.5 kΩ, has an inverted output signal ca. 5 dB lower than A1. The filter band width of the quartz filter between A1 and E3 should be set to 20...25 Hz with a series resistance of 330 kΩ.The associated signal attenuation of ca. 12 dB is also desirable when other filter cofigurations are applied.

2. Demodulator, Control time constants

The demodulated time signal impulses are available at CD. The time constant is CD $*$ 70 kΩ. Regulated voltage is attained at the CR pin, whereby the control-time constant is determined by an internal decharging circuit and CR. The control rate can be increased by means of an external resistor parallel to CR.
To reduce oscillating overdrive the additional connection with a series resistor of 680 Ω on the CR is recommended.

3. Receiver circuit

The optimal supply voltage is 1.4 V. At applications with a voltage supply above 1.4 V it is better to connect V_{CC} with a bias resistor so that there is about 1.4 V, whereby there is a simultaneous dynamic decoupling to other components. The output is able to bear load resistance with working voltages of up to 5.25 V independent of V_{CC}. It is therefore advantageous to block the V_{CC} - pin with a capacitor > 4.7 µF.
The usual RF-technical aspects are valid for the board layout, whereby special attention should be given to the fact that between A and E3 the greatest possible area is intended for purposes of shielding.