GSG 勁力 半導体

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AK2127

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

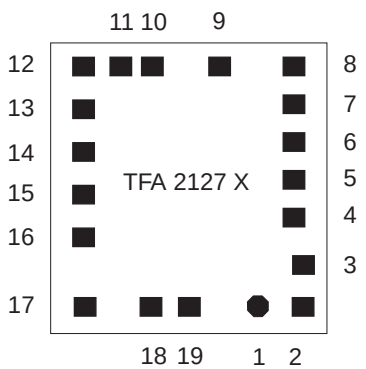
The TFA2127 is a bipolar integrated straight through receiver circuit in the frequency range of 50...80 kHz. The integrated circuit is designed for radio controlled clock application with high sensitivity.

Features

- Supply voltage range 1.2 ... 3.5 V
- Very high sensitivity < 1 µV
- High selectivity by X-tal resonator
- Start/stop-function available
- Complementary output stages
- Minimum external components

Package

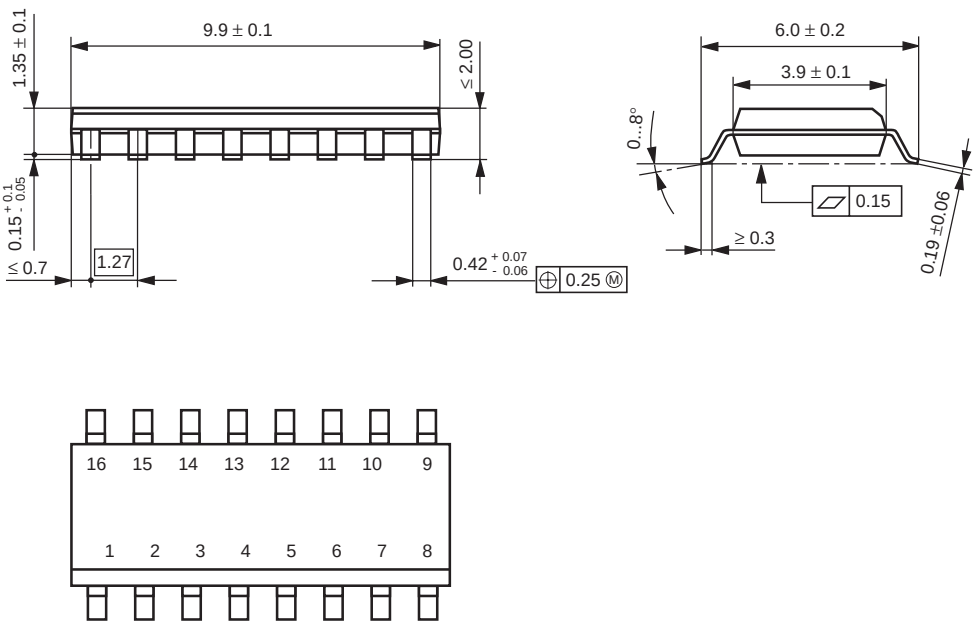
1. Die
   Pad-layout



Die dimensions

- die measures:	1.8 mm x 2.1 mm
- bond-pad measures:	100 µm x 100 µm
- die height:	320 µm ± 15 µm
- width of scribe line:	80 µm

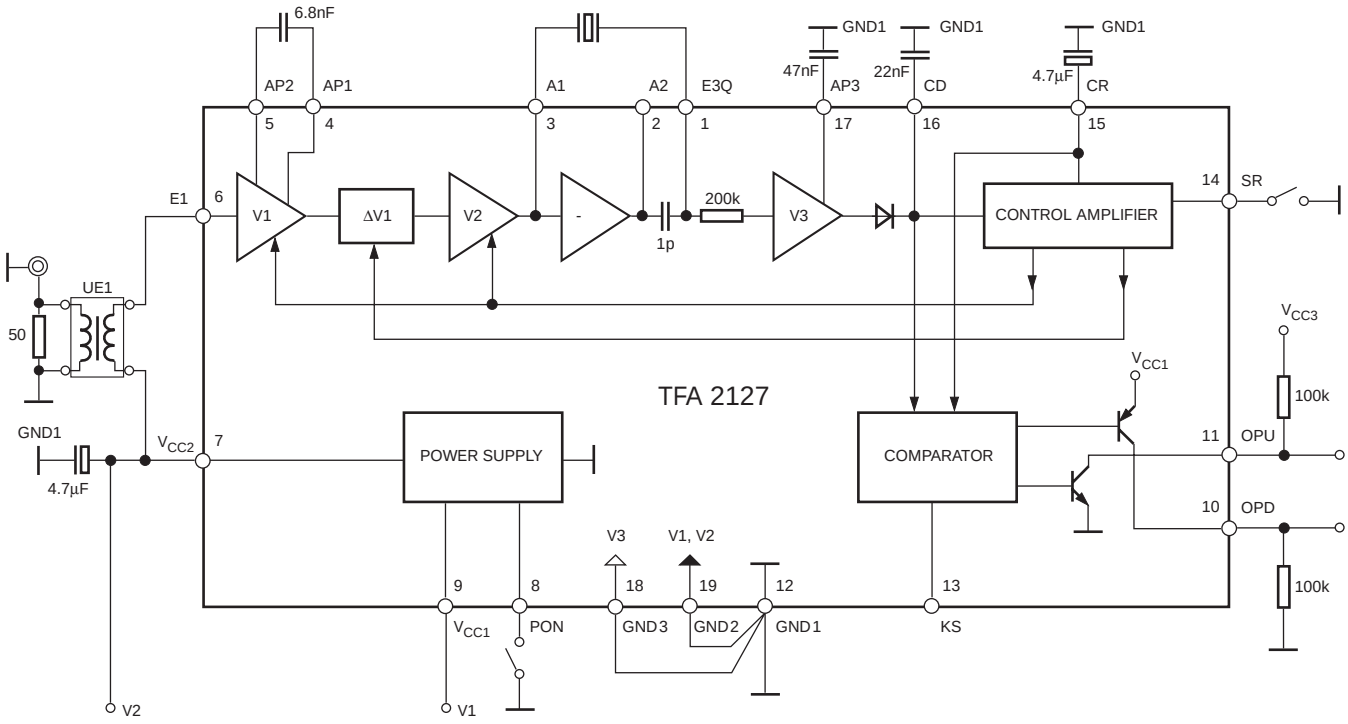
2. SOP 16
   only for test purposes



Pin Description

Pad-No.	Pin-No. (SOP 16)	Symbol	Function
1	1	E3Q	Amplifier 3 input
2	-	A2	Amplifier 2, non inverting output
3	2	A1	Amplifier 2, inverting output
4	3	AP1	Bias control
5	4	AP2	Bias control
6	5	E1	RF input, antenna
7	6	V_{CC2}	Supply voltage 2, internal band gap
8	7	PON	Stand-by and Start / Stop-switch
9	8	V_{CC1}	Supply voltage 1
10	9	OPD	Output time code, pull-down
11	10	OPU	Output time code, pull-up
12	11	GND1	Ground (digital)
13	-	KS	Comparator threshold
14	12	SR	Clamping control input
15	13	CR	AGC time constant
16	14	CD	Low pass filter
17	15	AP3	Capacitor for bias stability
18	16	GND3	Ground (analog)
19	16	GND2	Ground (analog)

Block Diagram and Test Circuit



UE1: pot core A_L1100 nH/w^2 ; 2 x 25 windings with 0.2 CuL

Absolute Maximum Ratings

Parameter	Symbol	min.	max.	Unit
Supply voltage 1	V_{CC1}	0	5.25	V
Supply voltage 2	V_{CC2}	0	5.25	V
Output voltage OPD	V_{OPD}	-0.3	V_{CC1}	V
Output voltage OPU	V_{OPU}	-0.3	5.25	V
Input voltage SR	V_{SR}	0	V_{CC1}	V
Input voltage PON	V_{PON}	0	V_{CC1}	V
Junction temperature	T_j		150	°C
Ambient temperature range	T_{amb}	-25	+70	°C

Recommended Operational Conditions

Parameter	Symbol	min.	max.	Unit
Supply voltage 1	V_{CC1}	2.2	3.5	V
Supply voltage 2	V_{CC2}	1.2	1.8	V
RF input voltage	V_{iE1}	1	50000	µV
Reception frequency	f	50	80	KHz

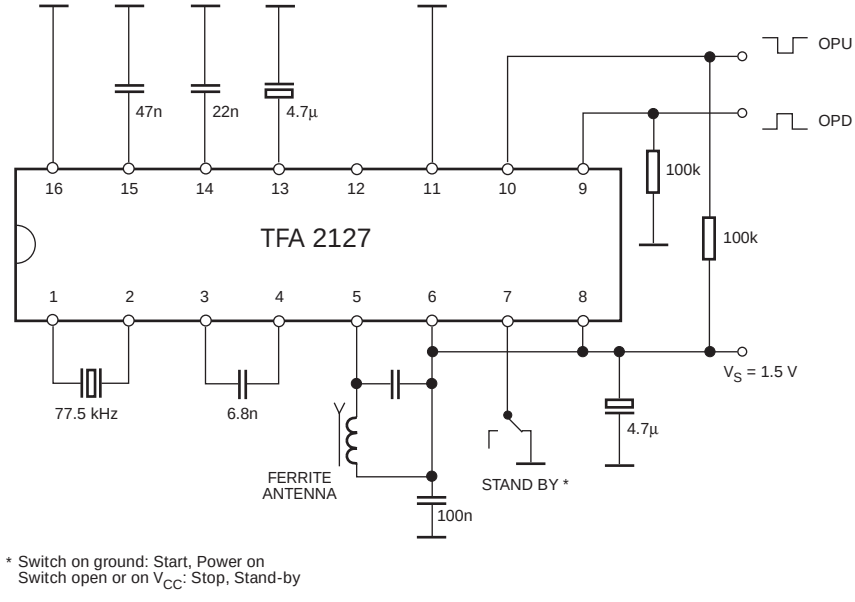
Electrical Characteristics

Refering to the test circuit with generator signal
f = 77500 ± 5 Hz
pulse modulation of RF-signal from 100 % to 25 %
during modulation time t = 200 ms,
V_{CC1} = V_{CC2} = 1.4 V; V_{PON} = 0 V; T_a = 25 °C,
unless specified otherwise

Parameter	Symbol	min.	typ.	max.	Unit
Supply voltage 1	V_{CC1}	2.2	3.5	5.25	V
Supply voltage 2	V_{CC2}	1.2	1.4	1.8	V
Supply current (V_{CC1} = 3.5 V) (V_{CC1} = 2.2 V)	 I_{CC11} I_{CC12}	 400 400	 540 530	 690 690	 µA µA
Supply current	I_{CC2}	300	500	640	µA
Supply current stand-by (V_{PON} = V_{CC1})	I_{CC10}		0.03	1	µA
Input current stand-by switch	$-I_{PON}$		14	20	µA
Input current on SR	$-I_{SR}$		0.3	2	µA
Output pulse duration (OPU) [1)] V_{iE1} = 3 µV, 10 mV	t_{OL}	180	190	220	ms
Output LOW-current (OPU) V_{iE1} = 30 µV	I_{OL}	100	200		µA
Output LOW-voltage (OPU) V_{iE1} = 30 µV; I_{OL} = 15 µA	V_{OL}		45	200	mV
Output HIGH-current (OPD) V_{iE1} = 30 µV	$-I_{OH}$	100	330		µA
Output HIGH-voltage (OPD) V_{iE1} = 30 µV; $-I_{OH}$ =15 µA	V_{OH}	1.1	1.3		V
Sensitivity (min. RF input for $t_{OL} \geq 180$ ms)[1)]	V_{iE1}		0.8	1	µV

[1)] Test in a special application circuit without socket.

Application Circuit With TFA2127 in SOP 16 for DCF-Receiver



* Switch on ground: Start, Power on
Switch open or on V_{CC}: Stop, Stand-by

Application Information

The PCB has to be designed for RF conditions. To achieve a high selectivity the parasitic parallel capacitance of the X-tal resonator should be 1...1.5 pF.
For a trouble-free reception the capacitors on V_{CC2} and AP3 have to be arranged nearby the chip food prints.
The dimensioning of the antenna resonant resistance is a compromise between high signal voltage and low antenna noise voltage.
Q factor of antenna should be high for attenuation of interference signals. In the application circuit is R_{res} < 100 k; Q = 80.