

Analog Watch Circuit

GENERAL DESCRIPTION

The SDL8236 (series) is an analog wristwatch circuit in CMOS silicon gate process. The circuit is designed for a 32,768Hz crystal oscillator analog watch that drives stepper motor. The output frequency can be set to 1Hz or 16Hz by

mask option. The pulse width can be selected from 3.9ms to 6.8ms in 0.98ms increment by mask option. It includes an on-chip voltage regulator for low power consumption and high stability.

FEATURES

- 32,768Hz crystal oscillator
- Single 1.5V battery operation
- Low power dissipation
- Reset function
- Output pulse width can be set from 3.9ms to 6.8ms in 0.98ms increments by mask option
- Output pulse frequency can be set to 1Hz or 16Hz by mask option

FUNCTION DESCRIPTION

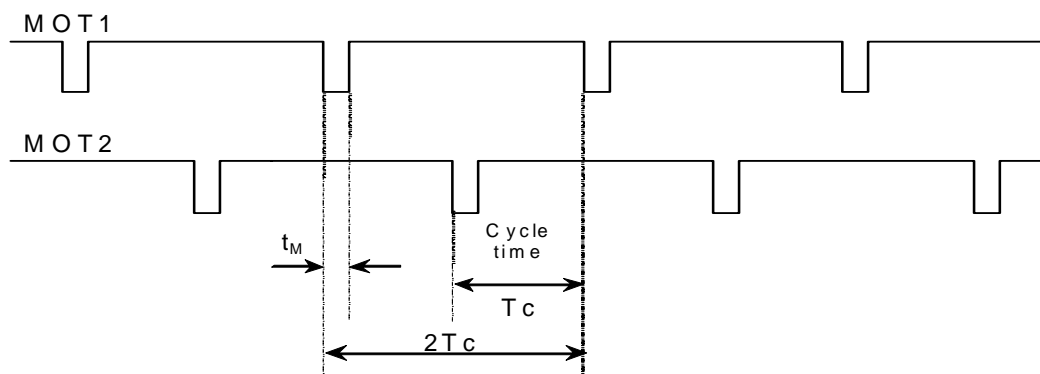
1. VOLTAGE REGULATOR

Negative supply voltage V_F controlled by the voltage regulator is supplied to the oscillator and the leading counter controlled by high frequency. This improves the stability of the oscillator and decreases the total power consumption.

2. MOTOR DRIVE OUTPUT

The HKA1498 contains two push-pull output buffers for driving bipolar stepping motor. The output cycle time and pulse width can be selected by mask option.

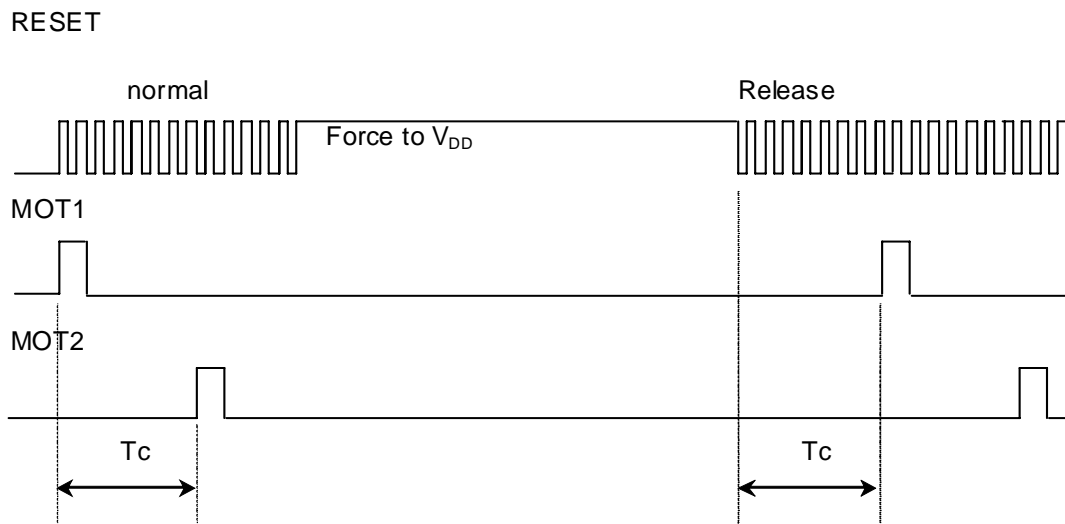
RESET open



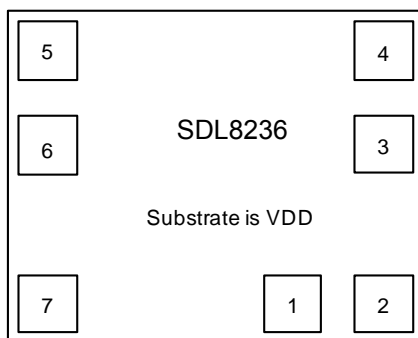
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3. RESET

A square wave of 512Hz can be measured on RESET pad in normal operation. When RESET pin is connected to V_{DD}, output pulses will be reset after a debounce time. The minimum debounce time is 4ms. When RESET is released from V_{DD}, the next motor pulse will appear after one cycle time.



BONDING DIAGRAM

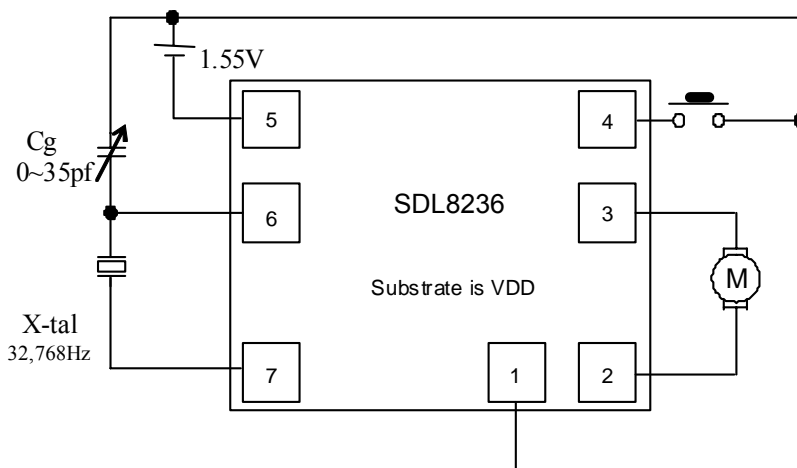


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PAD No.	PAD Name	X(μm)	Y(μm)	PADNo.	PAD Name	X(μm)	Y(μm)
1	V _{DD}	380	70	5	V _{SS}	70	410
2	MOT1	510	70	6	OSCI	70	280
3	MOT2	510	266	7	OSCO	70	70
4	RESET	510	410	--	-----	-----	----

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TYPICAL APPLICATION CIRCUIT



ELECTRICAL CHARACTERISTICS

($V_{DD}=1.55V$, $V_{SS}=0V$, $T_a=+25^{\circ}C$; unless otherwise specified)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Operating Voltage	V_{DD}		1.2	1.55	1.8	V
Supply Current	I_{DD}	HKA1498-15 No Load		230	350	nA
Voltage Between Motor Output	V_M	$R_L=2K\Omega$	± 1.4	± 1.5		V
Output Cycle time	T_C	Mask Option	1/16		1	s
Pulse Width	t_M	Mask Option	3.9		6.8	ms
REEST Output Frequency	F_{RE}	RESET as output		512		Hz
RESET Debounce Time	T_{RE}	RESET= V_{DD}	2	4		ms
Input Current After Debounce Time	I_R	RESET= V_{DD}	3	18	50	nA
Oscillator Start Up Voltage	V_{ST}		1.2			V
Oscillator Start Up Time	T_{ST}				2	sec
Oscillator Stability	$\Delta f/f$	$\Delta V_{SS}=100mV$		0.2	1	ppm
Oscillator Internal Capacitance	C_{int}	Mask Option	3		40	pF

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AVAILABLE TYPES

TYPE	Tc(s)	t _M (ms)	Internal caps (pf)		X-tal C _L (pf)	Suggested external cap C _g (pf)	Typical I _{dd} (μA)
			C _{in}	C _{out}			
1PA	1	5.9	2	15	8	15	0.23
1DA	1	4.9	2	15	8	15	0.23
1PM	1	5.9	15	14	8	0	0.23
1PM0	1	5.9	18	14	8	0	0.23
1KA	1	6.8	2	15	8	15	0.23
1PF	1	5.9	2	29	12.5	22	0.45
1DF	1	4.9	2	29	12.5	22	0.45
1CA	1	3.9	4	14	8	15	0.23
1PL	1	5.9	16	12	8	0	0.23
1PMD	1	5.9	20	16	8	0	0.23
1PMB	1	5.9	18	16	8	0	0.23
15	1	5.9	16	14	8	0	0.23
16	1	5.9	14	12	8	0	0.23
1PMA	1	5.9	16	15	8	0	0.23
1PW	1	5.9	8	8	8	0	0.25
1PM3	1	5.9	14	14	8	0	0.23
1PMH	1	5.9	20	20	12.5	0	0.30
15D	1	5.9	16	14	8	0	0.23
16D	1	5.9	14	12	8	0	0.23
28	1	5.9	14	11	8	0	0.23