多模式电荷泵的压电探测器驱动器

特点

- 电源电压范围为 2.15V ~ 5.5V
- 2.5V 电源可驱动 $30V_{PP(Vo1-Vo2)}$ 电压输出
- 集成升压转换器可产生高达 15V 的电压
- 输入信号范围：20Hz to 10kHz
- 待机模式下无电压交叉输出
- 低电流消耗
- 自动待机和唤醒控制
- 可提供 QFN16 封装
- 短路保护电流小于 1mA
- 具有过温保护 欠压保护

应用

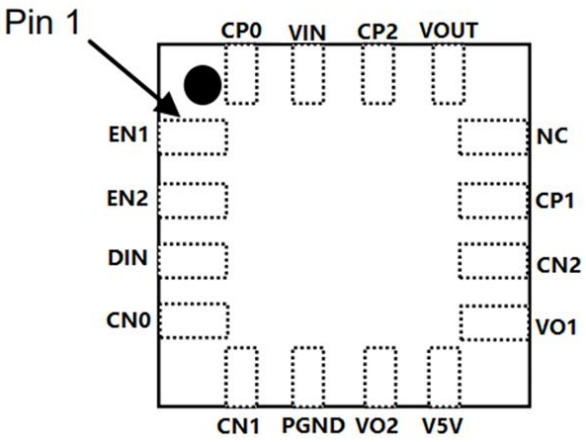
- 健康医疗系统
- 智能家居
- 智能穿戴手表
- 手持 GPS 设备
- PDA
- 安全设备
- 闹钟
- 蓝牙防丢器

描述

SD121 是一种用于压电测深仪的具有多模式电荷泵的开关驱动器。它可以从 2.5V 电源驱动高达 $30V_{pp}$ 的输出。为了调节压电发声器的音量，电荷泵可以在 1x、2x 或 3x 模式中操作。由于 SD121 具有待机功能，因此适用于电池应用。

SD121 包括内置的自动待机和唤醒功能，可保证更长的电池寿命。SD121 具有过热保护、输出短路保护电路及欠压保护。

封装 (QFN16)



QFN3*3_16

包装信息

型号	封装类型	包装数量	工作温度(° C)	标记	丝印
SD121	QFN16	5000	-40~85	SD121X XXX	SD121A: V5V output 5V SD121B: V5V output 4.5V

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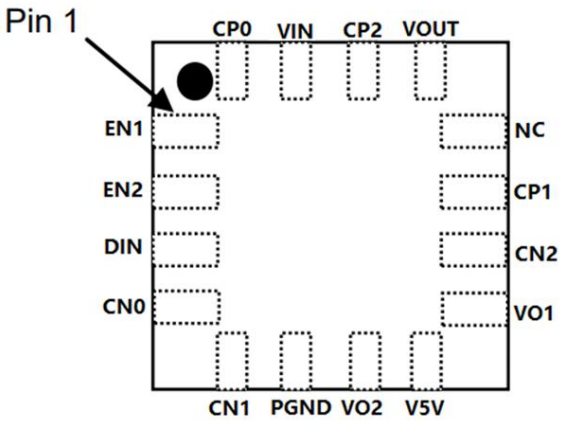
脚位图



QFN3*3_16

(1)G = 接地, I = 输入 t, O = 输出, P = 电源

管脚号	管脚类型	管脚名	管脚描述	
1	I	EN1	1	电荷泵模式选择 1
2	I	EN2	2	电荷泵模式选择 2
3	I	DIN	3	信号输入
4	O	CN0	4	初级倍压电容负极
5	O	CN1	5	倍压电容 1 负极
6	G	PGND	6	接地
7	O	VO2	7	高压驱动端 2
8	O	V5V	8	5V 初级倍压输出
9	O	VO1	9	高压驱动端 1
10	O	CN2	10	倍压电容 2 负极
11	O	CP1	11	倍压电容 1 正极
12	O	NC	12	无连接
13	O	VOUT	13	倍压输出
14	O	CP2	14	倍压电容 2 正极
15	P	VIN	15	电源输入
16	O	CP0	16	初级倍压电容正极

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最大额定参数(注1)

(@ T_A = +25° C, 除非另有说明)

符号	功能	额定值	单位
VIN	电源电压	-0.3 to 6.0	V
VOUT	输出电压	-0.3 to 16.5	V
VEN1	EN1 电压	-0.3 to V_{IN} +0.3	V
TA	自然冷却下的工作温度	-40 to +85	° C
T_J	半导体裸片的工作温度	-40 to +150	° C
TSTG	储存温度范围	-65 to +150	° C
ESD Rating	人体模式 HBM	±3	kV

注意:1.超出绝对最大额定值的应力可能会对设备造成永久性损害。我们不建议设备在超出建议的操作条件和其他任何条件下运行。长时间在绝对最大额定条件下可能会影响设备的可靠性。

建议的操作条件

(@ T_A = +25° C, 除非另有说明)

符号	功能	条件	最小值	最大值	单位
VIN	Supply Voltage	1x Mode, 2x Mode,3x Mode	2.15	5.5	V

热力特性

参数	符号	封装	最大值	单位
热阻(与环境的连接)	θ_{JA}	QFN16	35	°C/W
热阻(结到外壳)	θ_{JC}	QFN16	14	°C/W

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电气特性

(@T_A = +25° C, V_{IN} = 3.0V、V5V=4.55V, C_{PIEZO} = 22nF, f_{DIN} = 3 kHz, 除非另有说明)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	VOUT1	1x Mode	4.7	5（#1）	5.3	V
	VOUT2	2x Mode	9.3	10（#1）	10.6	V
	VOUT3	3x Mode (Note 2)	13.9	15（#1）	15.9	V
Operating Current 1	IDD11	1x Mode, C_{PIEZO} = No Load	—	0.6	—	mA
	IDD12	2x Mode, C_{PIEZO} = No Load	—	0.7	—	mA
	IDD13	3x Mode, C_{PIEZO} = No Load	—	1.3	—	mA
Operating Current 2	IDD21	1x Mode, Single-ended application	—	1.2	—	mA
	IDD22	2x Mode, Single-ended application	—	3.3	—	mA
	IDD23	3x Mode, Single-ended application	—	7.0	—	mA
Operating Current 3	IDD31	1x Mode, Differential application	—	3	—	mA
	IDD32	2x Mode, Differential application	—	11	—	mA
	IDD33	3x Mode, Differential application	—	32	—	mA
Shutdown Current	ISD	DIN = 0V	0	--	0.1	μA
Input Frequency	fIN	Rectangular pulse	20Hz	3	10	kHz
Oscillating Frequency	f_{OSC}	—	300	--	1200	kHz
VOUT Start Delay Time	t_{ON1}	1x Mode, From DIN signal High to 90% V_{OUT} steady state	—	2.3	—	ms
	t_{ON2}	2x Mode, From DIN signal High to 90% V_{OUT} steady state	—	2.3	—	ms
	t_{ON3}	3 x Mode From DIN signal High to 90% V_{OUT} steady state	—	2.3	—	ms
Shutdown Delay Time	t_{OFF}	DIN = H- > L	—	50	—	ms
Output Short-Circuit Current	ISC	—	—	1	—	mA
Control Terminal Voltage H	VIH	EN1, EN2, DIN pins	--	1.1	--	V
Control Terminal Voltage L	VIL	EN1, EN2,DIN pins	--	0.9	--	V
Control Terminal Current 1	IIH1	DIN = 3V	—	1.5	—	μA
Control Terminal Current 2	IIH2	V_{EN1} = 3V, DIN = 3V	—	1.5	—	μA
Control Terminal Current 3	IIH3	V_{EN1} = 3V, DIN = 0V	0	--	1	μA
UVLO				2.0		V

#1：2.0V <Vin<2.3V，则 1X Mode 电压为 2*Vin，其它模式相应倍增。另有 FT 修调中心值 5V 版本。

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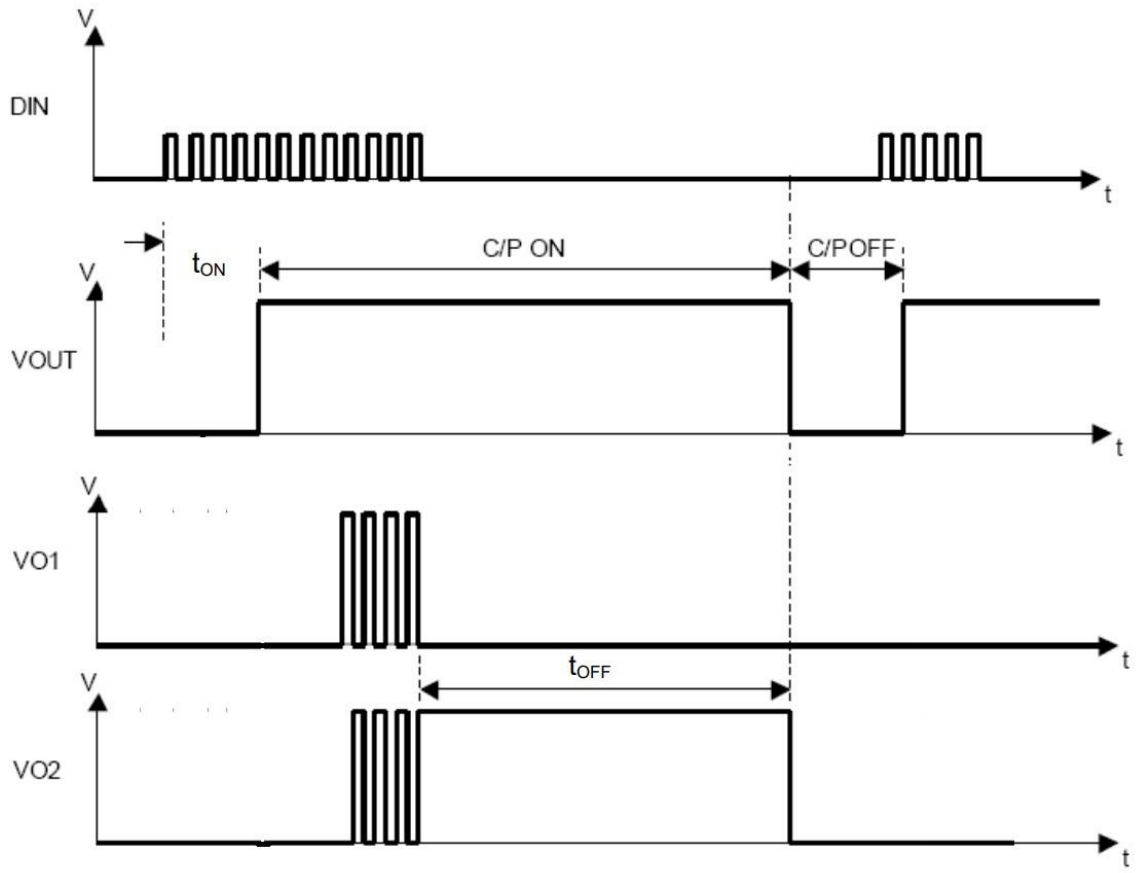
电荷泵模式设置

DIN	EN1	EN2	MODE
0	--	--	Shutdown Mode
1	0	1	1x Mode
1	1	0	2x Mode
1	1	1	3x Mode

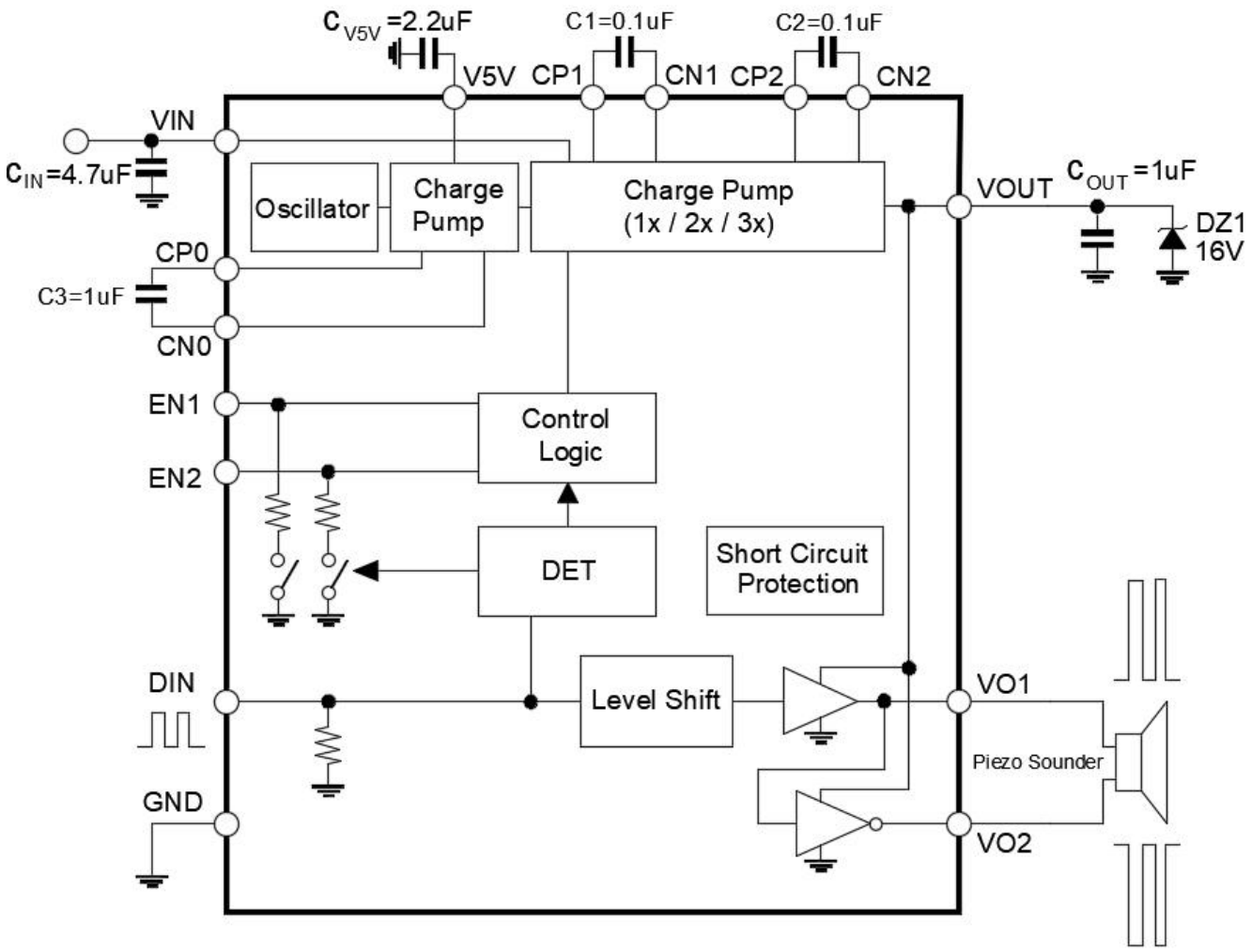
时序图 1：



备注：因 V5V 倍压需要时间,且 2.2uF 电容存储电荷有限，故 VO1、VO2 输出延时需 2.3mS 以上。

多模式电荷泵的压电探测器驱动器

应用电路 1

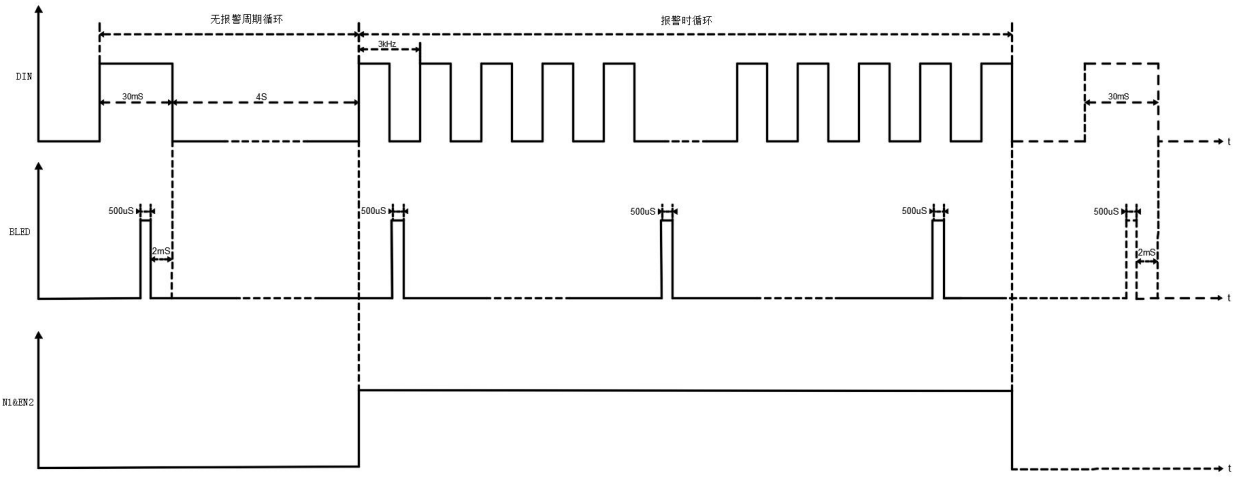


备注：1,电容参数须按应用图推荐值，PCB 走线尽量靠近相关 PIN。如有改动请联系我司。

2，钮扣电池因内阻较大，且低于 2.6V 后电量衰减严重且内阻更大，建议钮扣电池工作前电压 2.6V 以上，且带载驱动瞬间电压被拉低应在 2.15V 以上。

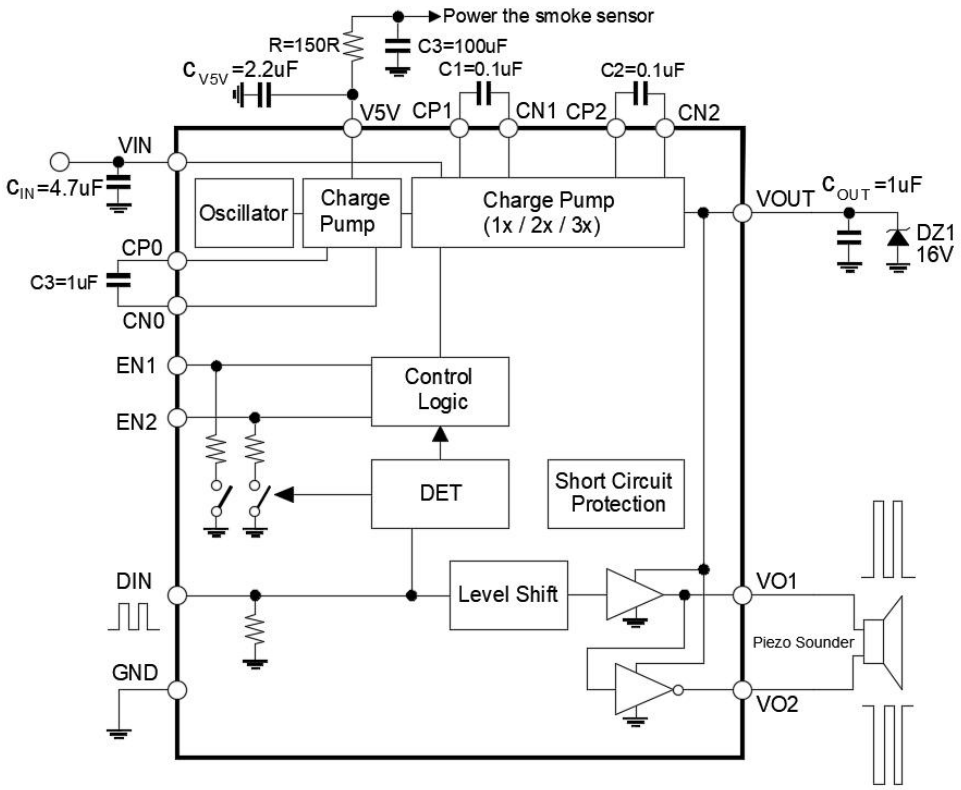
多模式电荷泵的压电探测器驱动器

时序图 2



烟感 LED 供电时序图

应用电路 2

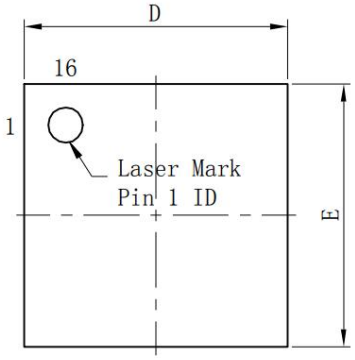


烟感 LED 供电应用图

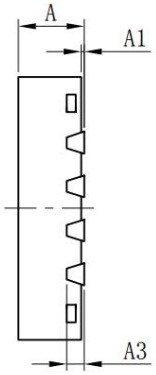
多模式电荷泵的压电探测器驱动器

封装信息

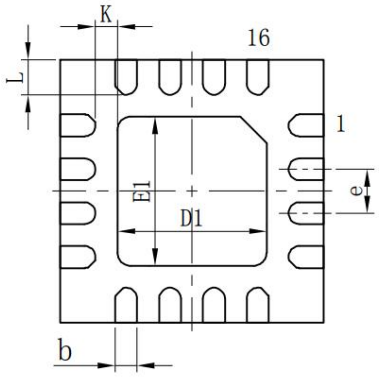
尺寸 / 标注	最小	标准	最大	尺寸 / 标注	最小	标准	最大
A	0.70	0.75	0.80	D1	1.60	1.70	1.80
A1	0.00	—	0.05	E1	1.60	1.70	1.80
A3		0.203REF		e		0.50TYP	
b	0.20	0.25	0.30	K	0.20	-	-
D	2.90	3.00	3.10	L	0.30	0.40	0.50
E	2.90	3.00	3.10				



Top View



Side View



Bottom View

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Revision history

Table 1.Document revision history

Date	Revision	Changes
2026/5/9	1.0	Initial release.

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