

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

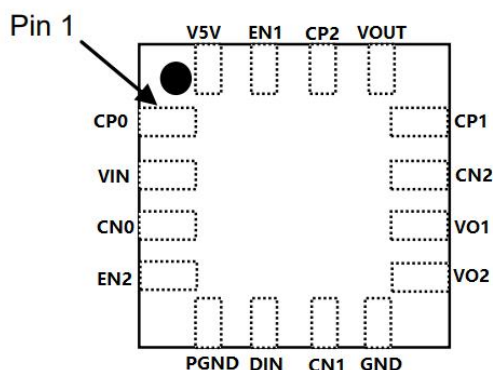
- 智能穿戴手表
- 手持 GPS 设备
- PDA
- 安全设备
- 闹钟
- 蓝牙防丢器

描述

SD118 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 SD118 具有待机功能，因此适用于电池应用。

SD118 包括内置的自动待机和唤醒功能，可保证更长的电池寿命。SD118 具有过热保护、输出短路保护电路及欠压保护。

封装 (QFN16)



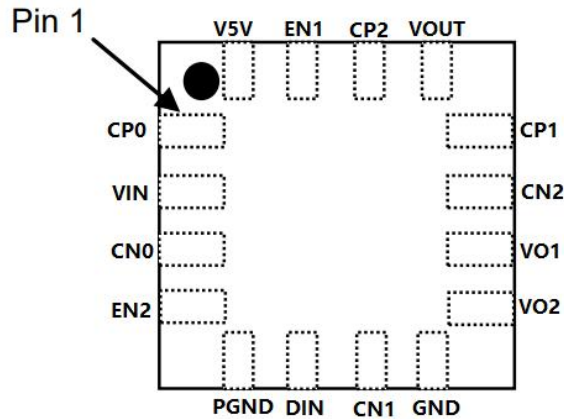
QFN3*3_16

包装信息

型号	封装类型	包装数量	工作温度(° C)	丝印
SD118	QFN16	5000	-40~85	SD118 XXX

多模式电荷泵的压电探测器驱动器

脚位图



QFN3*3_16

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

(1) G = 接地, I = 输入 t, O = 输出, P = 电源

多模式电荷泵的压电探测器驱动器

最大额定参数^(注1)

(@ $T_A = +25^{\circ}\text{C}$, 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	$^{\circ}\text{C}$
T_J	半导体裸片的工作温度	-40 to +150	$^{\circ}\text{C}$
TSTG	储存温度范围	-65 to +150	$^{\circ}\text{C}$
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

(@ $T_A = +25^{\circ}\text{C}$, 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	$^{\circ}\text{C}/\text{W}$
热阻(结到外壳)	θ_{JC}	QFN16	14	$^{\circ}\text{C}/\text{W}$

多模式电荷泵的压电探测器驱动器

电气特性

($T_A = +25^\circ\text{C}$, $V_{IN} = 3.0\text{V}$ 、 $V_{5V}=4.55\text{V}$, $C_{PIEZO} = 22\text{nF}$, $f_{DIN} = 3\text{kHz}$, 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, $C_{PIEZO} = \text{No Load}$	—	0.6	—	mA
	IDD12	2x Mode, $C_{PIEZO} = \text{No Load}$	—	0.7	—	mA
	IDD13	3x Mode, $C_{PIEZO} = \text{No Load}$	—	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	f_{IN}	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 $\rightarrow$ 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	$V_{EN1} = 3\text{V}$, DIN = 3V	—	1.5	—	μA
Control Terminal Current 3	IIH3	$V_{EN1} = 3\text{V}$, DIN = 0V	0	—	1	μA
UVLO				2.0		V

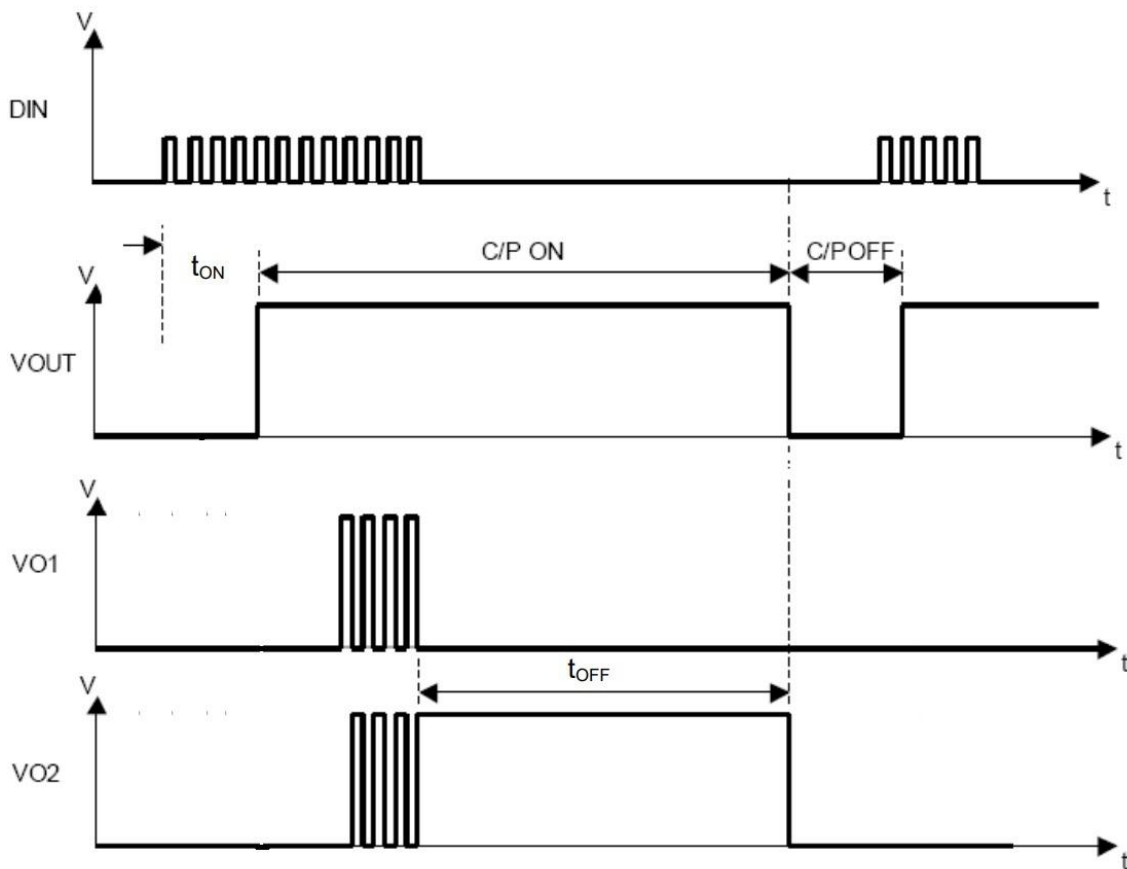
#1: $2.0\text{V} < V_{in} < 2.3\text{V}$, 则 1X Mode 电压为 $2 \times V_{in}$, 其它模式相应倍增。另有 FT 修调中心值 5V 版本。

多模式电荷泵的压电探测器驱动器

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

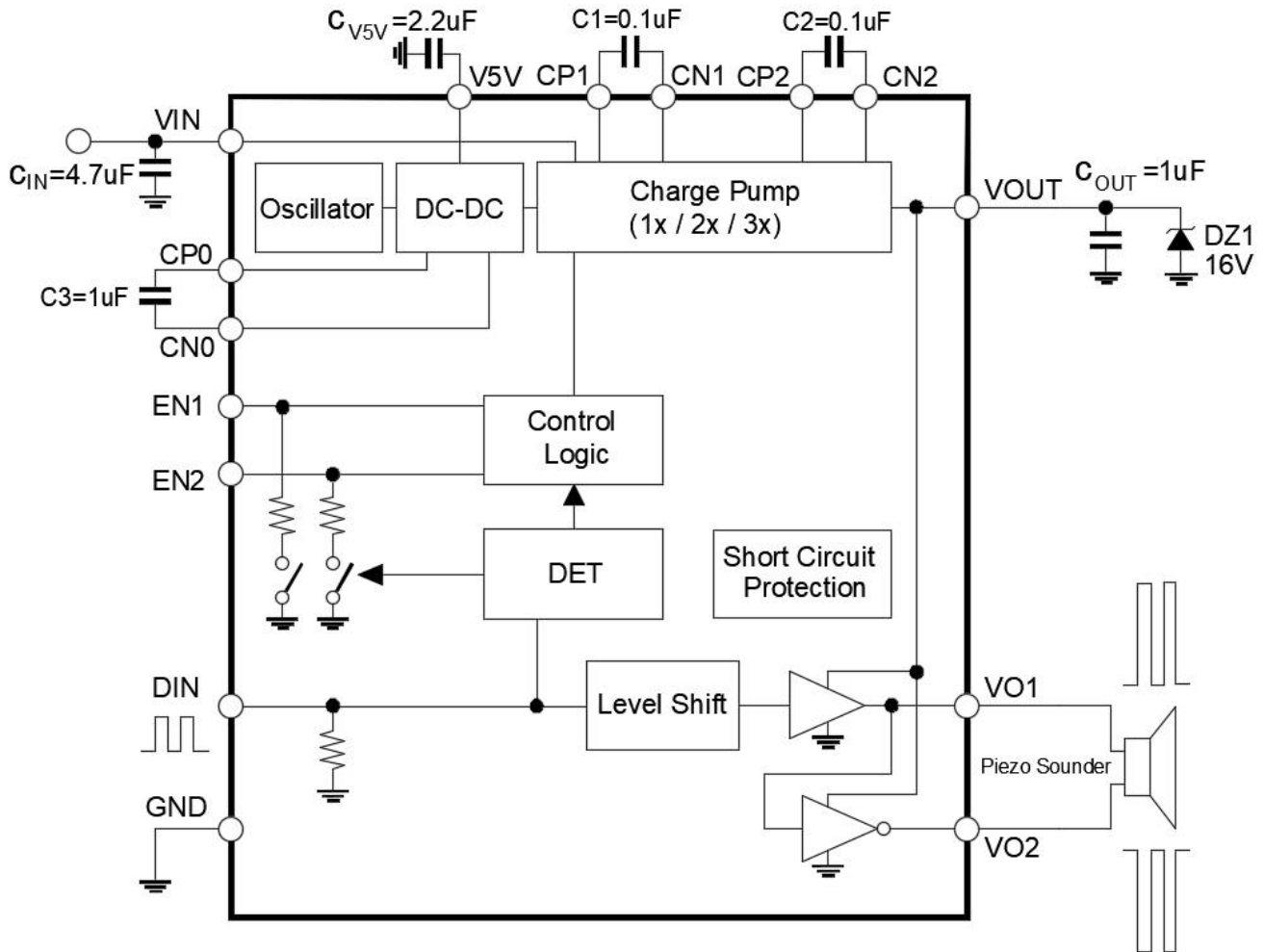
时序图 1:



备注：因 5V 倍压需要时间, 且 2.2 μ F 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: QFN3*3_16

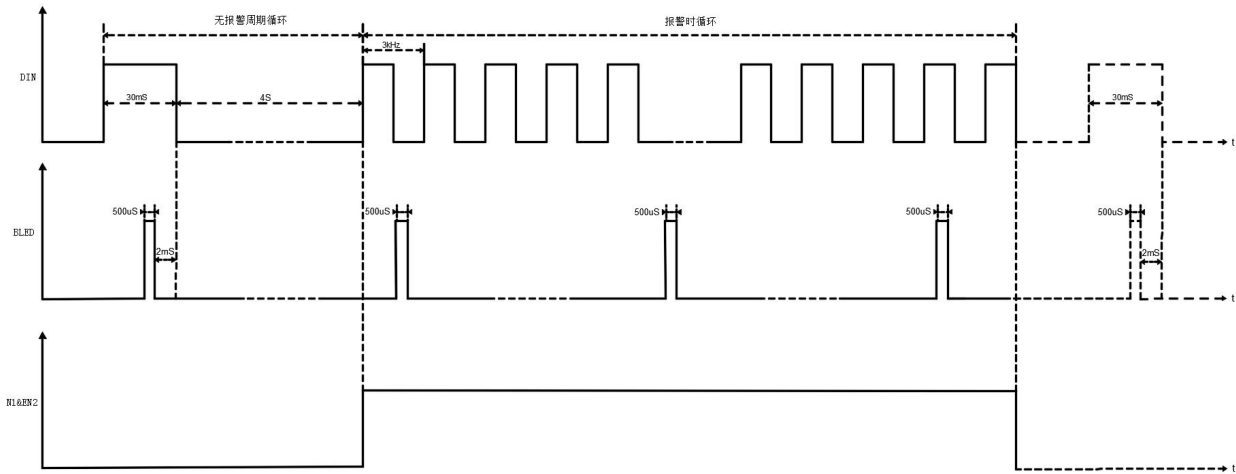


备注：1, 电容参数须按应用图推荐值，PCB 走线尽量靠近相关 PIN。如有改动请联系我司。

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

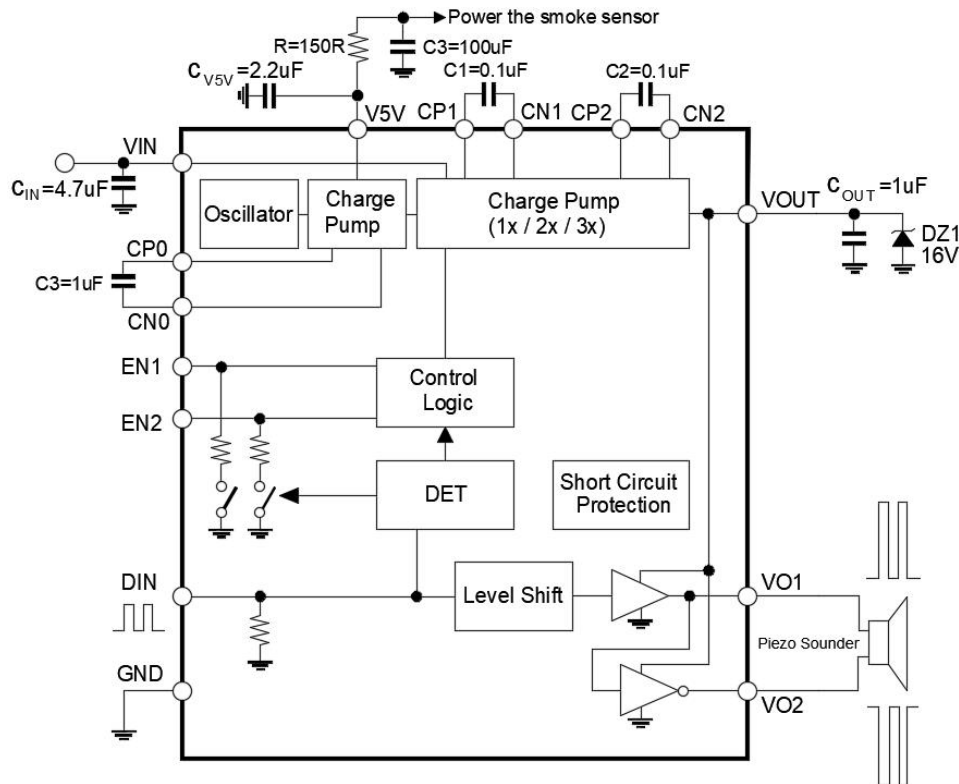
多模式电荷泵的压电探测器驱动器

时序图 2



烟感 LED 供电时序图

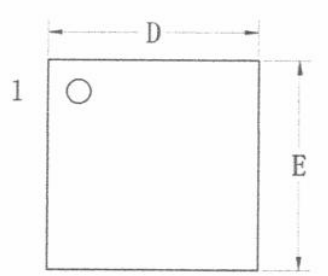
应用电路 2



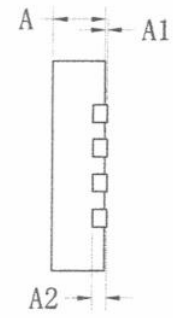
烟感 LED 供电应用图

多模式电荷泵的压电探测器驱动器

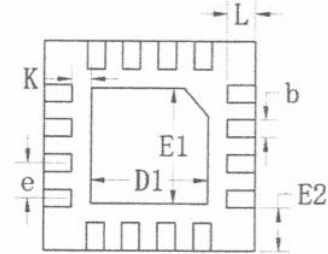
封装信息(QFN3*3_16 厚度 0.55MM)



Top View



Side View



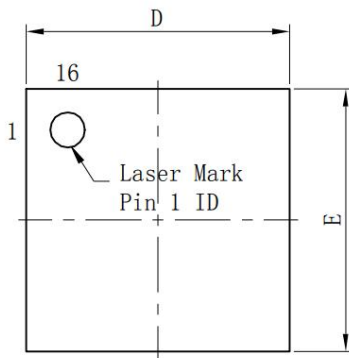
Bottom View

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.50	0.55	0.60
A1	0.00	—	0.05
A2	0.203 TYP		
b	20	0.25	0.30
D	2.95	3.00	3.05
D1	1.55	1.65	1.75
E	2.95	3.00	3.05
E1	1.55	1.65	1.75
E2	0.625 REF		
e	0.50 BSC		
K	0.275 REF		
L	0.35	0.40	0.45

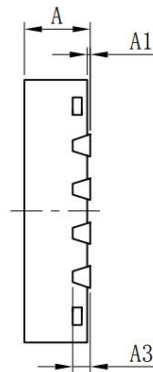
多模式电荷泵的压电探测器驱动器

封装信息(QFN3*3_16 厚度 0.75)

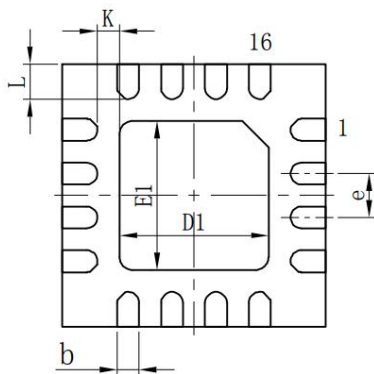
标注 \ 尺寸	最小	标准	最大	标注 \ 尺寸	最小	标准	最大
A	0.70	0.75	0.80	D1	1.60	1.70	1.80
A1	0.00	—	0.05	E1	1.60	1.70	1.80
A3	0.203REF			e	0.50TYP		
b	0.20	0.25	0.30	K	0.20	—	—
D	2.90	3.00	3.10	L	0.30	0.40	0.50
E	2.90	3.00	3.10				



Top View



Side View



Bottom View

多模式电荷泵的压电探测器驱动器

Responsibility and Copyright Declaration

Shenzhen SMH Technology Co., Ltd. has the right to make corrections, modifications, enhancements, improvements or other changes to the products and services provided. Customers should obtain the latest relevant information and verify whether this information is complete and up-to-date before placing an order. All products are sold in accordance with the sales terms and conditions provided during order confirmation.

Shenzhen SMH Technology Co., Ltd. assumes no obligation for application assistance or customer product design. Customers are solely responsible for their use of Shenzhen SMH's products and applications. To minimize risks associated with customer products and applications, customers should provide sufficient design and operational safety verification.

The customer acknowledges and agrees that although any application related information or support may still be provided by SMH, they will be solely responsible for meeting all legal, regulatory, and safety requirements related to their products and the use of SMH products in their applications. The customer declares and agrees that they possess all necessary professional skills and knowledge to develop and implement safety measures, foresee the dangerous consequences of faults, monitor faults and their consequences, reduce the probability of faults that may cause personal injury, and take appropriate remedial measures. The customer will fully compensate for any losses caused to Shenzhen SMH and its agents due to the use of any Shenzhen SMH products in such critical applications.

For the product manuals or data sheets of Shenzhen SMH, copying is only allowed without any tampering with the content and with relevant authorization, conditions, restrictions, and statements. Shenzhen SMH assumes no responsibility or obligation for such tampered documents. Copying third-party information may require additional restrictions.

Shenzhen SMH will update the content of this document from time to time. The actual parameters of the product may vary due to different models or other matters. This document does not serve as any express or implied warranty or authorization

When reselling Shenzhen SMH products, if there is a discrepancy or false content between the description of the product parameters and the parameters indicated by Shenzhen SMH, all express or implied authorizations related to Shenzhen SMH products will be lost, and this is an improper and fraudulent business behavior. Shenzhen SMH assumes no responsibility or obligation for any such false statements.

多模式电荷泵的压电探测器驱动器**Revision history****Table 1.Document revision history**

Date	Revision	Changes
11-Dec-2024	1.0	Initial release.
11-Dec-2024	1.1	Update the Characterization
14-Mar-25	1.2	Update the application diagram
20-Nov-25	1.5	Delete the QFN3*3_12 package
5-Jan-2026	1.6	Change the package thickness
11-May-2026	1.7	Add the Smoke sensor Application