

多模式电荷泵的压电探测器驱动器

特性

- 电源电压范围为 1.3V ~ 5.5V
- 1.3V 电源可驱动 18V_{pp} 电压输出
- 集成升压转换器可产生高达 16.5V 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 和 QFN12 封装
- 短路保护电流约 100mA
- 具有过温保护

应用

- 健康医疗系统
- 智能家居

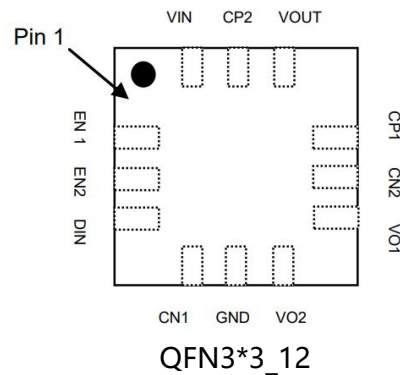
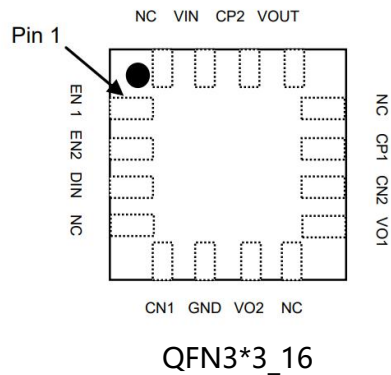
- 智能穿戴手表
- 手持 GPS 设备
- PDA
- 安全设备
- 闹钟
- 蓝牙防丢器

描述

SD116 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 1.3V 电源驱动高达 18V_{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 SD116 具有待机功能，因此适用于电池应用。

SD116 包括内置的自动待机和唤醒功能，可保证更长的电池寿命。SD116 具有过热保护和输出短路保护电路

封装 (QFN16 和 QFN12)



包装信息

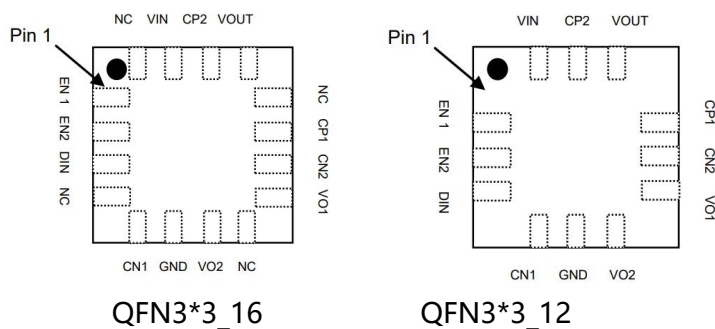
型号	封装类型	包装数量	工作温度(°C)	丝印
SD116	QFN16	7000	-40~85	SD116 XXX
SD116	QFN12	5000	-40~85	SD116 XXX

多模式电荷泵的压电探测器驱动器

丝印描述(QFN3*3_12)

第一行	SD116	Part Number
第二行	AXXX E.g A503	A 代表芯片厚度 0.75mm, xxx 的第一个 x 代表年份, 最后两个 xx 代表周数; 例如: A503 代表厚度 0.75mm, 生产于 2025 年第三周。
	PXXX E.g P503	P 代表 0.50mm 的芯片厚度, xxx 的第一个 x 代表年份, 最后两个 xx 代表周数; 例如: P503 代表厚度 0.50mm, 2025 年第三周生产。

脚位图



PIN 定义

管脚号		管脚名	管脚类型	管脚描述
QFN3*3_16	QFN2*2_12			
1	1	EN1	I	电荷泵模式选择 1
2	2	EN2	I	电荷泵模式选择 2
3	3	DIN	I	输入信号
4		NC	—	未连接
5	4	CN1	I	电容 1 负极
6	5	GND	G	接地
7	6	VO2	O	阳极输出
8		NC	—	未连接
9	7	VO1	O	阴极输出
10	8	CN2	I	电容 2 负极 I
11	9	CP1	I	电容 1 正极
12		NC	—	未连接
13	10	VOOUT	O	倍压输出
14	11	CP2	I	电容 2 正极
15	12	VIN	P	电源
16		NC	—	未连接

(1)G = 接地, I = 输入, 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
V _{IN}	电源电压	-0.3 to 6.0	V
V _{OUT}	输出电压	-0.3 to 16.5	V
V _{EN1}	EN1 电压	-0.3 to V _{IN} + 0.3	V
T _A	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
T _{STG}	储存温度范围	-65 to +150	°C

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。

建议的工作条件

(@ $T_A = +25^{\circ}\text{C}$, 除非另有说明)

符号	功能	条件	最小值	最大值	单位
V _{IN}	Supply Voltage	1x Mode, 2x Mode, 3x Mode	1.3	5.5	V

ESD 敏感性

HBM	Human Body Model	8	kV
MM	Machine Model	600	V
CDM	Charged Device Model	1	kV

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
热阻(与环境的连接)	θ_{JA}	QFN12L	68	°C/W
热阻(结到外壳)	θ_{JC}	QFN12L	25	°C/W

多模式电荷泵的压电探测器驱动器
电气特性

 (@ $T_A = +25^\circ\text{C}$, $V_{IN} = 3.0\text{V}$, $C_{PIEZO} = 30\text{nF}$, $f_{DIN} = 4\text{kHz}$, 除非另有说明)

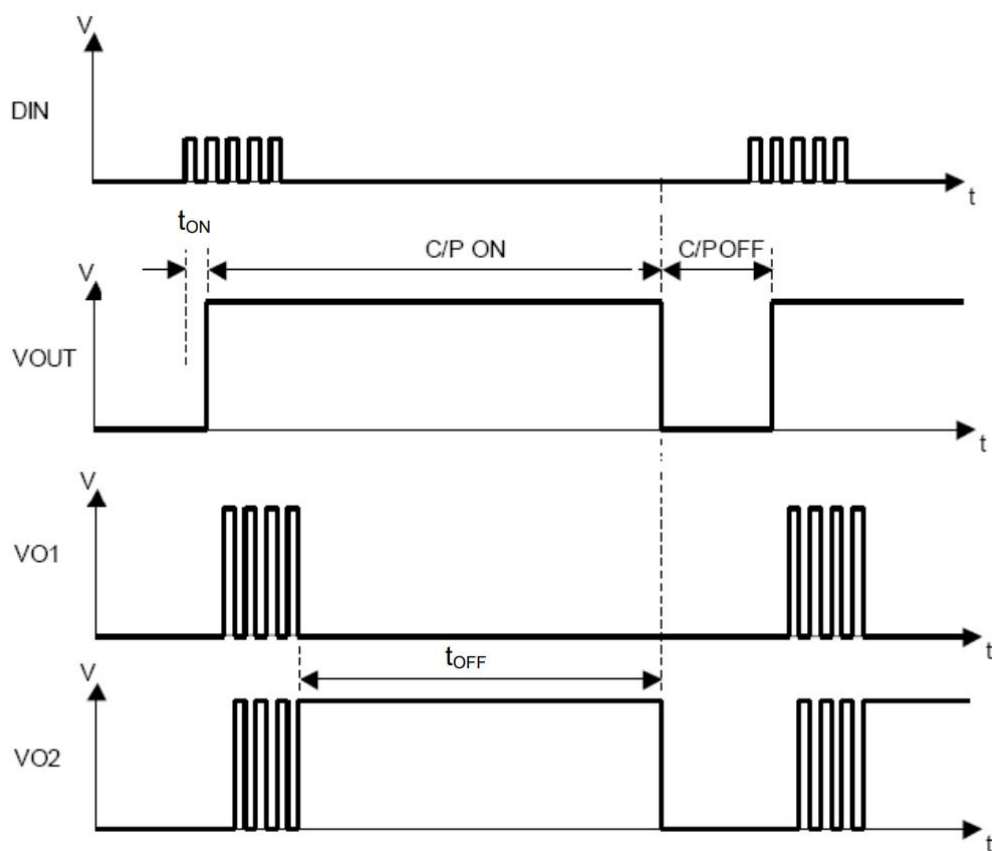
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	VOUT1	1x Mode	1.2	—	3	V
	VOUT2	2x Mode	5.2	—	6	V
	VOUT3	3x Mode (Note 2)	7.2	—	9.1	V
Operating Current 1	IDD11	1x Mode, $C_{PIEZO} = \text{No Load}$	—	105	—	μA
	IDD12	2x Mode, $C_{PIEZO} = \text{No Load}$	—	249	—	μA
	IDD13	3x Mode, $C_{PIEZO} = \text{No Load}$	—	354	—	μA
Operating Current 2	IDD21	1x Mode, Single-ended application	—	0.38	—	mA
	IDD22	2x Mode, Single-ended application	—	1.33	—	mA
	IDD23	3x Mode, Single-ended application	—	2.8	—	mA
Operating Current 3	IDD31	1x Mode, Differential application	—	1.1	—	mA
	IDD32	2x Mode, Differential application	—	4.46	—	mA
	IDD33	3x Mode, Differential application	—	9.83	—	mA
Shutdown Current	ISD	DIN = 0V	—	8	20	nA
Input Frequency	f_{IN}	Rectangular pulse	—	3	—	kHz
Oscillating Frequency	f_{OSC}	—	—	200	—	kHz
VOUT Start Delay Time	t_{ON1}	1x Mode, From DIN signal High to 90% V_{OUT} steady state	—	95	—	μs
	t_{ON2}	2x Mode, From DIN signal High to 90% V_{OUT} steady state	—	310	—	μs
	t_{ON3}	3 x Mode From DIN signal High to 90% V_{OUT} steady state	—	390	—	μs
Shutdown Delay Time	t_{OFF}	DIN = H -> L	—	42	—	ms
Output Short-Circuit Current	ISC	—	—	40	—	mA
Control Terminal Voltage H	VIH	EN1, EN2, DIN pins	$0.8 \cdot V_{IN}$	—	V_{IN}	V
Control Terminal Voltage L	VIL	EN1, EN2, DIN pins	0	—	$0.2 \cdot V_{IN}$	V
Control Terminal Current 1	IIH1	DIN = 3V	—	1.7	—	μA
Control Terminal Current 2	IIH2	$V_{EN1} = 3\text{V}$, DIN = 3V	—	1.7	—	μA
Control Terminal Current 3	IIH3	$V_{EN1} = 3\text{V}$, DIN = 0V	—	—	1	μA

多模式电荷泵的压电探测器驱动器

电荷泵模式设置

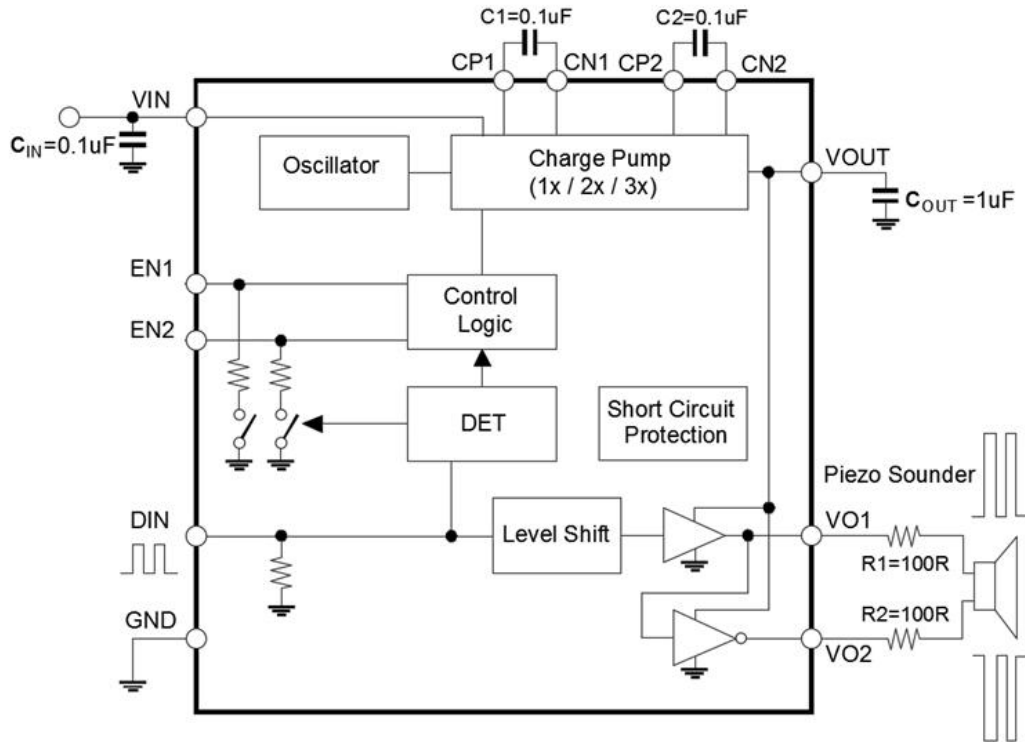
DIN	EN1	EN2	MODE
0	--	--	Shutdown Mode
1	0	0	Shutdown Mode
1	0	1	1x Mode
1	1	0	2x Mode
1	1	1	3x Mode

时序图



多模式电荷泵的压电探测器驱动器

应用电路

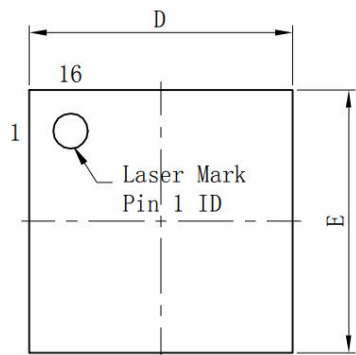


多模式电荷泵的压电探测器驱动器

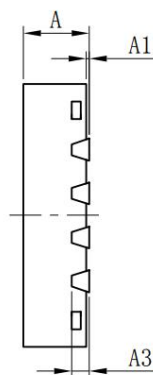
封装信息

封装信息(QFN3*3_16)

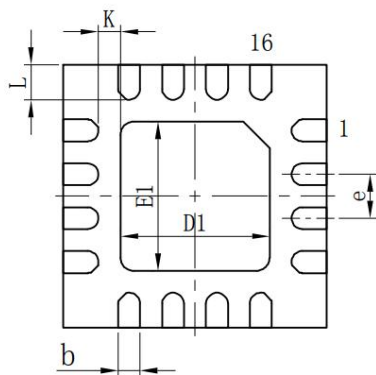
标注 \ 尺寸	最小	标准	最大	标注 \ 尺寸	最小	标准	最大
A	0.70	0.75	0.80	D1	1.60	1.70	1.80
A1	0.00	—	0.05	E1	1.60	1.70	1.80
A3	0.203REF			e	0.50TYP		
b	0.20	0.25	0.30	K	0.20	—	—
D	2.90	3.00	3.10	L	0.30	0.40	0.50
E	2.90	3.00	3.10				



Top View



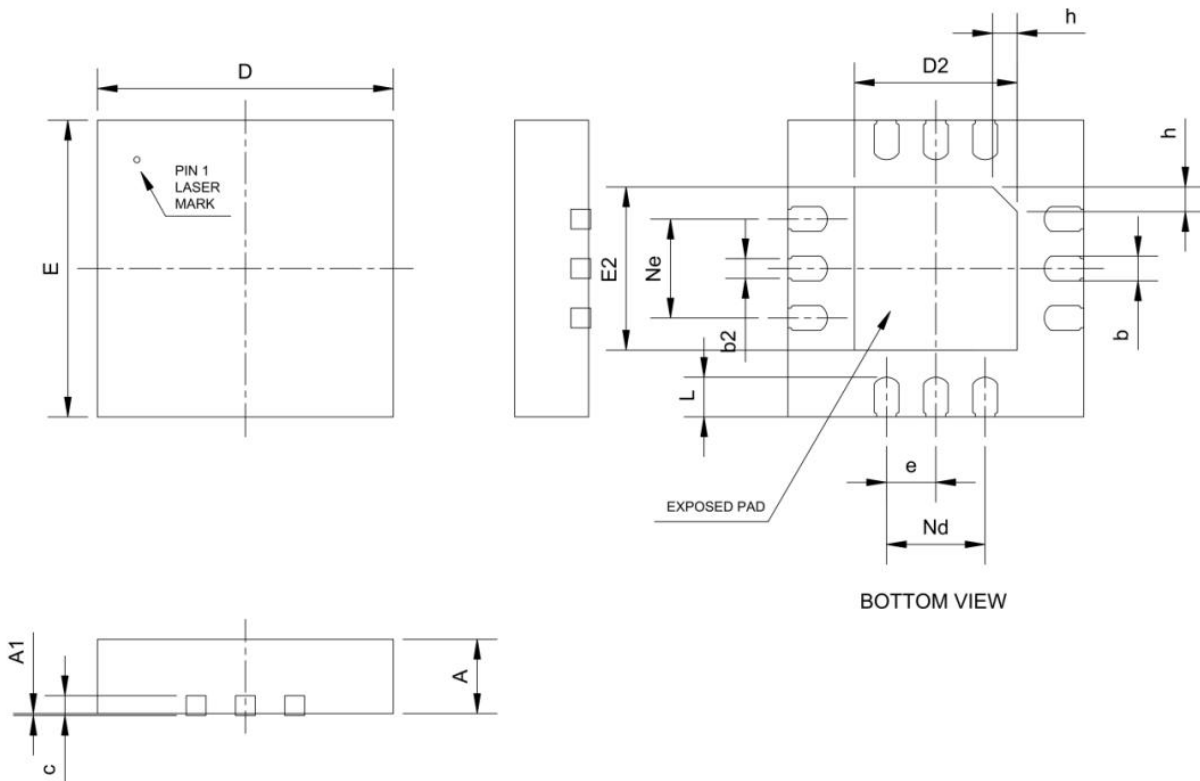
Side View



Bottom View

多模式电荷泵的压电探测器驱动器

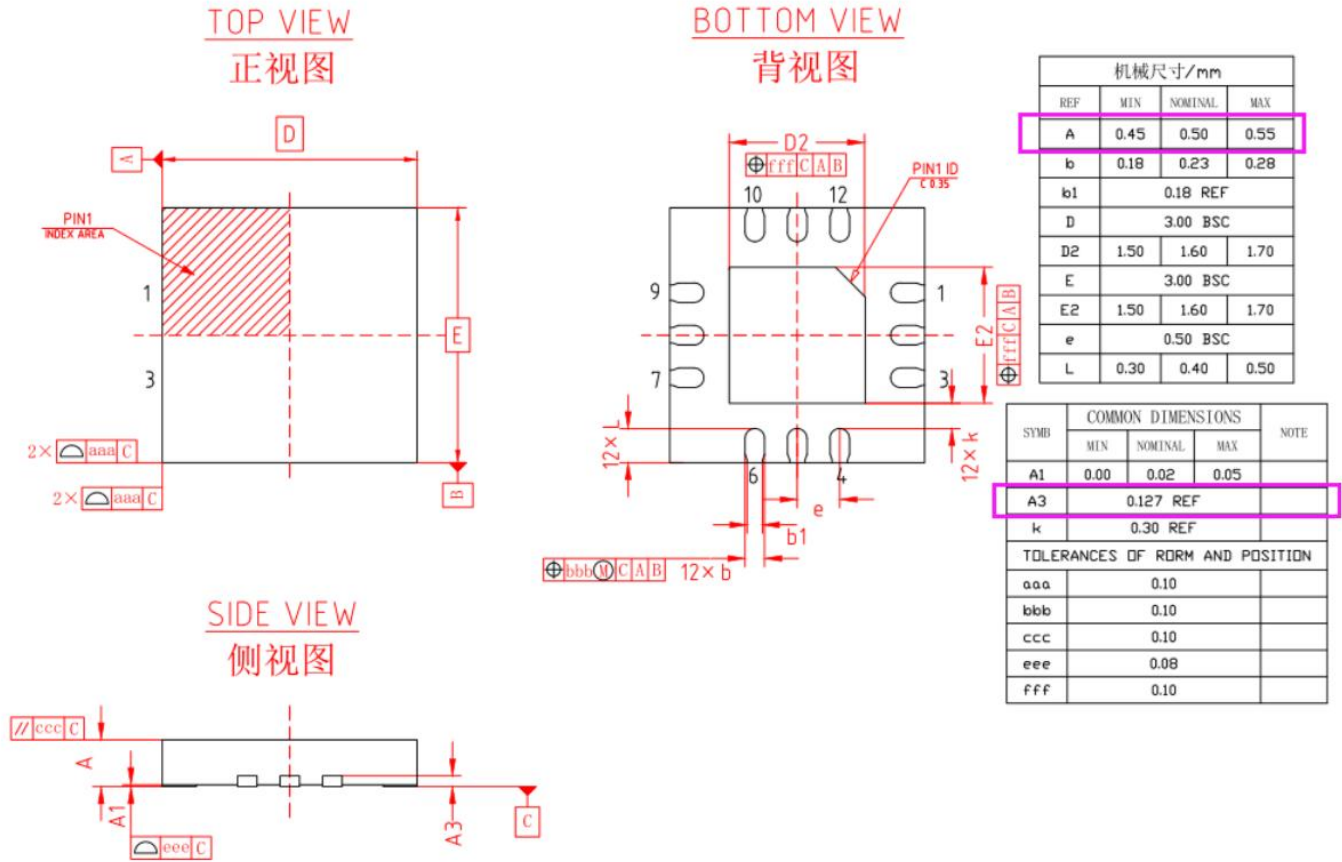
封装信息(QFN3*3_12)



Symbol	Min	Nom	Max	Unit
PACKAGE DIMENSIONS				
A	0.45	0.50	0.55	mm
A1	---	0.02	0.05	mm
b	0.20	0.25	0.30	mm
b2	0.15	0.20	0.25	mm
c	0.18	0.20	0.25	mm
D	2.90	3.00	3.10	mm
D2 (Exposed.pad)	1.55	1.65	1.75	mm
e	0.50 BSC			mm
Ne	1.00 BSC			mm
Nd	1.00 BSC			mm
E	2.90	3.00	3.10	mm
E2 (Exposed.pad)	1.55	1.65	1.75	mm
L	0.35	0.40	0.45	mm
h	0.20	0.25	0.30	mm

多模式电荷泵的压电探测器驱动器

封装信息(QFN3*3_12)



多模式电荷泵的压电探测器驱动器

Responsibility and Copyright Declaration

Shenzhen Semihigh 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 Semihigh Technology Co., Ltd. assumes no obligation for application assistance or customer product design. Customers are solely responsible for their use of Shenzhen Semihigh'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 Semihigh, they will be solely responsible for meeting all legal, regulatory, and safety requirements related to their products and the use of Semihigh 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 Semihigh and its agents due to the use of any Shenzhen Semihigh products in such critical applications.

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

Shenzhen Semihigh 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 Semihigh products, if there is a discrepancy or false content between the description of the product parameters and the parameters indicated by Shenzhen Semihigh, all express or implied authorizations related to Shenzhen Semihigh products will be lost, and this is an improper and fraudulent business behavior. Shenzhen Semihigh 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****Document revision history**

Data	Version	Changes
26-Aug-2018	Ver1.0	First issue
17-Mar-2025	Ver1.9	Update the ISD current