



具有旁路模式的杂音抑制器

MAX9892

概述

特性

MAX9892为音频咔嗒/噤噪声抑制器，适用于便携式多媒体设备。MAX9892工作于1.7V至3.6V电源，连接至现有系统的放大器输出，能够在上电和断电过程中提供对地的低阻通道。INL和INR输入能够接受 V_{DD} 至 V_{DD} 以下5.5V的电压摆幅。更多信息请参考设置电源电压部分。在上电和断电过程中瞬变电压被旁路至地，能够消除可闻的咔嗒/噤噪声。

- ◆ 无失真、咔嗒/噤噪声抑制
- ◆ 电源电流小于1 μ A
- ◆ 1.7V至3.6V单电源供电
- ◆ 微型封装

6焊球UCSP (1mm x 1.52mm x 0.6mm)封装
6引脚 μ DFN (2mm x 2mm x 0.75mm)封装

MAX9892具有两个低阻模拟开关，通过MUTE控制开关断开或闭合。正常工作时，开关断开，对输出信号没有影响。在放大器的启动和关断时，MAX9892开关闭合，将输出短路至地，从而抑制咔嗒/噤噪声，避免从耳机拉电流。

MAX9892采用6焊球UCSP (1mm x 1.52mm x 0.6mm)和6引脚 μ DFN (2mm x 2mm x 0.75mm)封装。MAX9892工作于-40°C至+85°C温度范围。

订购信息

PART	TEMP RANGE	PIN-PACKAGE
MAX9892ERT+	-40°C to +85°C	6 UCSP
MAX9892ELT+	-40°C to +85°C	6 μ DFN

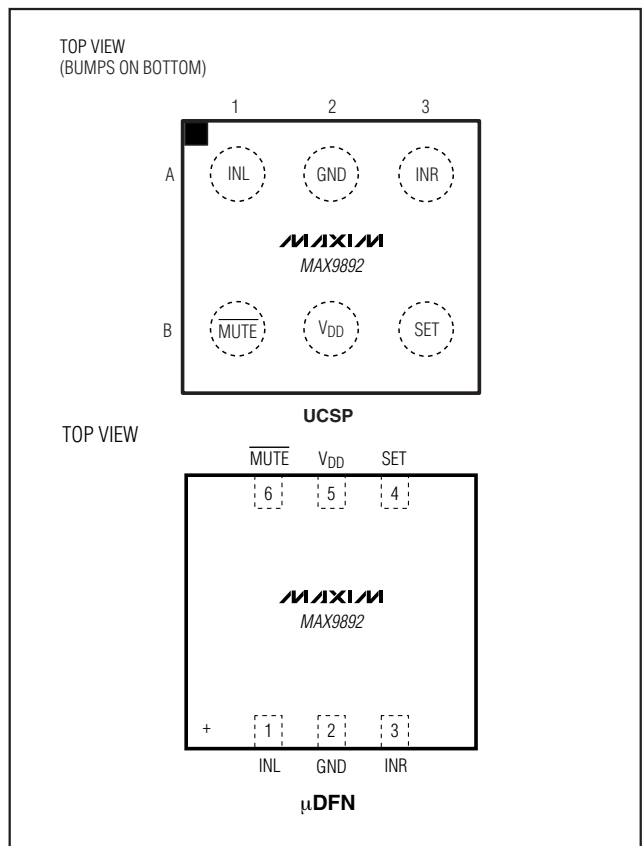
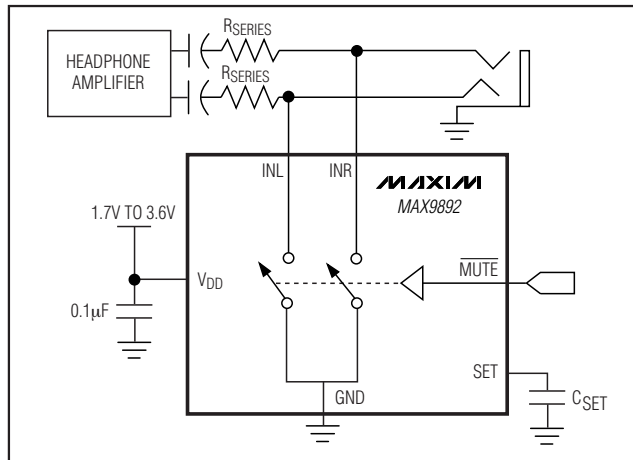
+表示无铅/符合RoHS标准的封装。

应用

引脚配置

- 移动电话
- 智能电话
- 移动网络设备
- 便携式游戏机控制台
- 便携式媒体播放器
- 笔记本电脑

典型工作电路



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ABSOLUTE MAXIMUM RATINGS

V_{DD} , \overline{MUTE} , SET to GND	-0.3V to +6V
INL, INR to GND	($V_{DD} - 6V$) to ($V_{DD} + 0.3V$)
Continuous Current In/Out of V_{DD}	30mA
Continuous Current In/Out of \overline{MUTE}	30mA
Continuous Current In/Out of SET	30mA
Continuous Current In/Out of INL, INR and GND	390mA
Continuous Power Dissipation ($T_A = +70^\circ\text{C}$)	
6-Bump UCSP (derate 3.9mW/ $^\circ\text{C}$ above $+70^\circ\text{C}$)	308.3mW
6-Pin μDFN (derate 4.5mW/ $^\circ\text{C}$ above $+70^\circ\text{C}$)	357.8mW

Operating Temperature Range	-40°C to +85°C
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (soldering, 10s)	+300°C
Bump Temperature (soldering)	
Reflow	+235°C

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

($V_{DD} = 3.0V$, $V_{GND} = 0$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted. Typical values are at $T_A = +25^\circ\text{C}$.) (Note 1)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage Range	V_{DD}	Guaranteed by R_{ON} test	1.7		5.5	V
Recommended Supply Voltage Range	V_{DD}	(Note 2)	1.7		3.6	V
Supply Current	I_{DD}	$V_{DD} = 5.5V$, $T_A = +25^\circ\text{C}$ (Note 3)		0.6	1	μA
Input Voltage Range	V_{IN}	Guaranteed by input leakage current test	$V_{DD} - 5.5V$		V_{DD}	V
Turn-On Time (Figure 1)	t_{ON}	Measured from $\overline{MUTE} = \text{GND}$ and input voltage settled to 90% of its final value		130		ns
Turn-Off Time (Figure 1)	t_{OFF}	$C_{SET} = 500\text{pF}$	4	10	17	ms
		$C_{SET} = 50\text{pF}$		1		
		$C_{SET} = 50\text{nF}$		1000		
Turn-On Time Resistor	R_{SET}	$C_{SET} = 500\text{pF}$	350	800	1300	k Ω
Switch On-Resistance	R_{ON}	$V_{DD} = 3.0V$		0.3		Ω
		$V_{DD} = 1.7V$			2	
		$V_{DD} = 5.5V$			1	
Click-and-Pop Reduction		$R_{SERIES} = 30\Omega$, $R_{LOAD} = 16\Omega$		35		dB
Input Leakage Current	I_{IN}	$T_A = +25^\circ\text{C}$	$V_{IN} = V_{DD} - 5.5V$, $V_{DD} = 1.7V$		± 1	μA
			$V_{IN} = V_{DD}$, $V_{DD} = 5.5V$		± 1	
\overline{MUTE} Leakage Current	$I_{\overline{MUTE}}$	$V_{DD} = 5.5V$, $V_{\overline{MUTE}} = 0$ or $5.5V$, $T_A = +25^\circ\text{C}$			± 1	μA
\overline{MUTE} Input-Voltage High	V_{IH}		1.5			V
\overline{MUTE} Input-Voltage Low	V_{IL}				0.4	V

Note 1: All devices are 100% production tested at $T_A = +25^\circ\text{C}$. All temperature limits are guaranteed by design.

Note 2: Operating within the recommended supply voltage range ensures that negative audio signals are not limited by the device. Supply voltages above the recommended supply voltage range may limit the headphone amplifier's maximum output voltage.

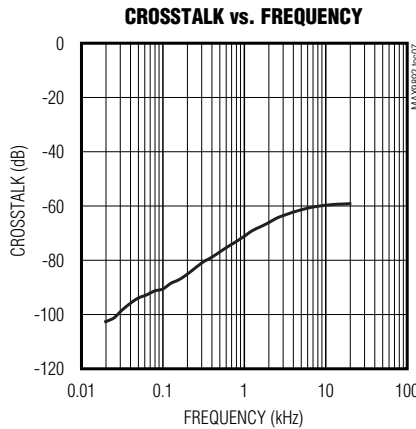
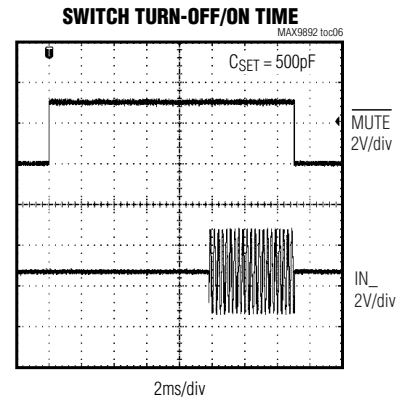
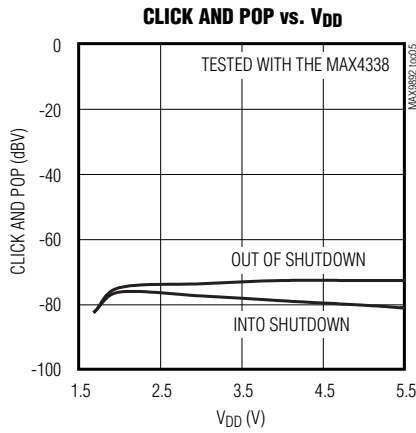
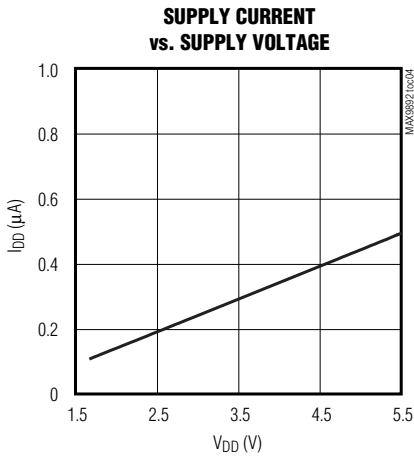
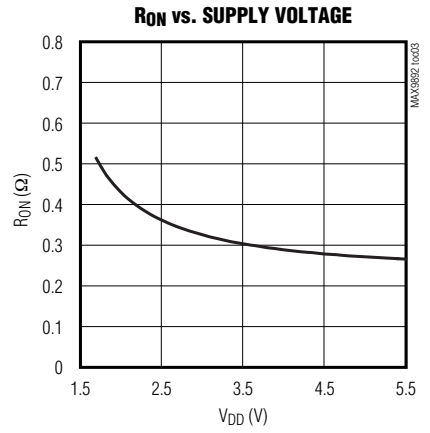
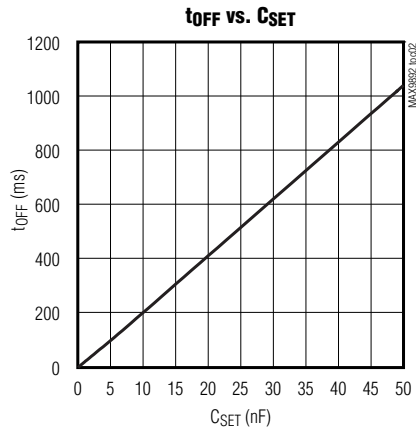
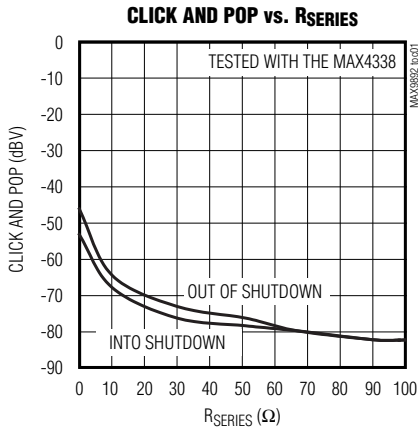
Note 3: Supply current is measured when switches are off.

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典型工作特性

($V_{DD} = 3.0V$, $V_{GND} = 0$, $T_A = +25^\circ C$, unless otherwise noted.)

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引脚说明

UCSP	μDFN	名称	功能
焊球	引脚		
A1	1	INL	左声道输入，INL连接在输出耦合电容和耳机插孔之间。
A2	2	GND	地。
A3	3	INR	右声道输入，INR连接在输出耦合电容和耳机插孔之间。
B1	6	$\overline{\text{MUTE}}$	低电平有效使能。
B2	5	VDD	电源。
B3	4	SET	关断时间设置。在SET和GND之间连接一个外部电容，用于设置开关关断延迟，详细信息请参考设置关断时间部分。

时序图

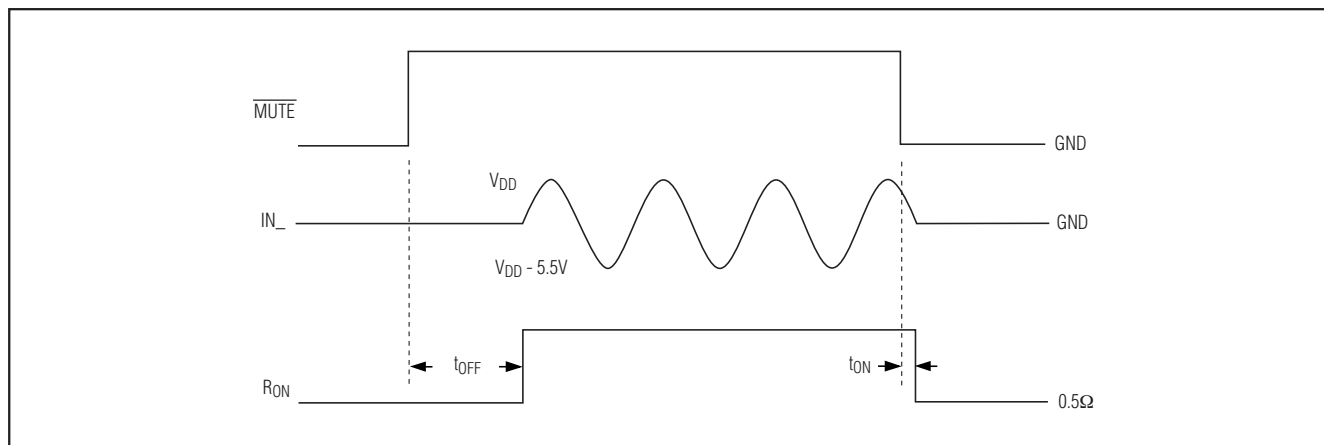


图1. 导通/关断时间

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详细说明

MAX9892为第二代咔嗒/噼噗声抑制器，设计用于传统的耳机放大器。MAX9892工作时，在隔直流电容的耳机侧增加一个对地的低阻电流通路。关断放大器时，驱动MUTE至低电平；使能放大器时，驱动MUTE至高电平。较短的导通时间能够使MAX9892开关在隔直流电容显著放电之前快速闭合，从而抑制放大器关断时的咔嗒/噼噗声。可调节的关断时间允许设置延时，以屏蔽放大器开启时的咔嗒/噼噗声。

设置关断时间

MAX9892具有SET输入，允许在1ms至1000ms范围内调节关断时间，以适应放大器启动时咔嗒/噼噗声的持续时间。外部电容决定了断开开关的延迟时间，计算公式如下：

$$t_{ON}(\text{ms}) = 0.02 \times C_{SET}(\text{pF})$$

当耳机放大器使能时，MAX9892在自动等待所设置的延迟时间后断开模拟开关。从而抑制放大器开启时的咔嗒/噼噗声。

应用信息

设置电源电压

MAX9892工作于1.7V至3.6V电源电压。INL和INR输入能够接受 V_{DD} 至 $V_{DD}-5.5V$ 的电压摆幅。加载到耳机的音频信号偏置在地电位，意味着信号摆幅的正负幅度相等。由于MAX9892负端输入电压限制在 $V_{DD}-5.5V$ ，须正确设置 V_{DD} 电压，以便开关断开时，放大器能够通过音频信号(图2)。

电阻分压器可按比例降低电源电压，如图3所示。电阻分压器可产生MAX9892的电源电压，从而允许负半周音频信号通过。当电阻分压器选用大电阻时，电源电流会影响电阻的使用。对于给定电源电压，在10kΩ至1MΩ之间选择 R_2 。采用下式计算 R_1 ：

$$R_1 = \frac{(V_{AMP} - V_{DD})}{I_2 + I_{DD}}$$

其中， V_{AMP} 为放大器的电源电压， I_2 为流过 R_2 的电流。对于以GND为参考的±2V信号，MAX9892电源可在2V至3.5V范围内设置。

选择串联电阻

如典型工作电路所示，串联电阻(R_{SERIES})对于获得最佳的噪声抑制非常关键。对于给定串联电阻下咔嗒/噼噗声抑制效果的详细信息，请参考典型工作特性中的Click and Pop vs. R_{SERIES} 关系曲线图。

布局注意事项

采用一只0.1μF电容将 V_{DD} 旁路至GND。0.1μF旁路电容应尽可能靠近 V_{DD} 放置。缩短GND与系统地层的引线长度，可确保器件的最佳性能。

经过验证的PCB布局请参考MAX9892评估板。

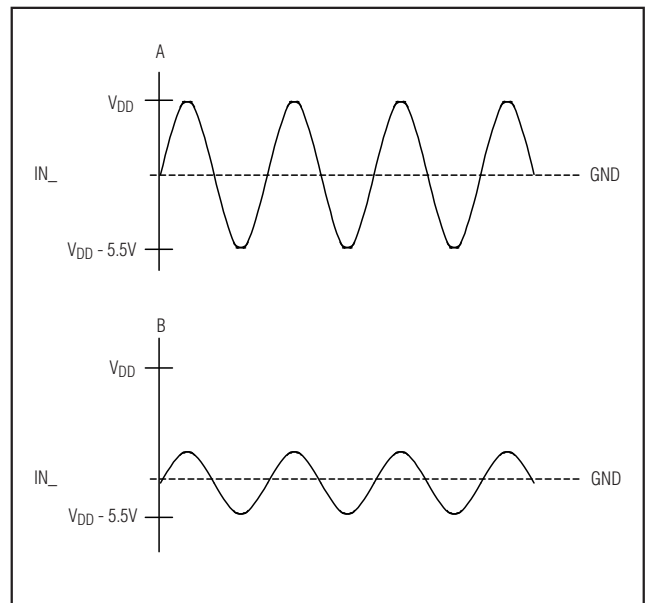


图2. 对于给定输入信号正确选择电源

A: 大信号电源电压；

B: 小信号电源电压

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UCSP应用信息

关于最新的UCSP结构、尺寸、载带信息、印刷电路板技术、焊球-焊盘布局、推荐的回流焊温度曲线以及最新的可靠性测试结果等，请参考www.maxim-ic.com.cn/ucsp的应用笔记1891：晶片级封装(WL-CSP)基础，MAX9892 PCB引脚布局请参考图4。

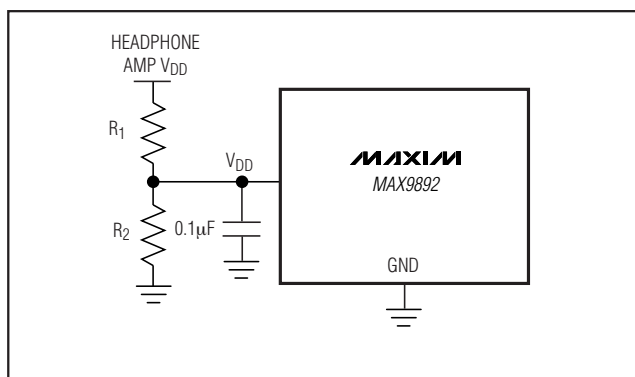


图3. 利用分压器降低电源电压

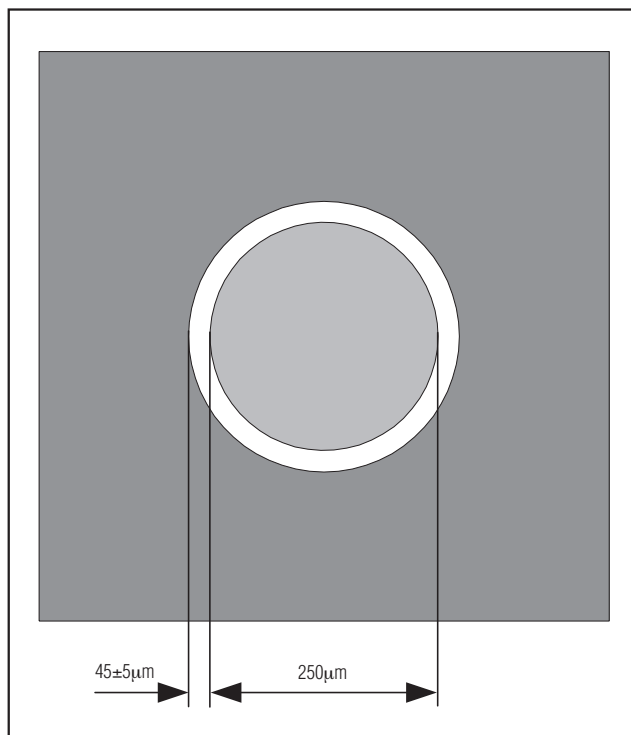


图4. 推荐的PCB引脚布局图

芯片信息

PROCESS: BiCMOS

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封装信息

如需最近的封装外形信息和焊盘布局, 请查询 www.maxim-ic.com.cn/packages.

MAX9892

封装类型	封装编码	文档编号
6 UCSP	R6-1A1+1	21-0228
6 μ DFN	L622-1	21-0164

TOP VIEW

COMMON DIMENSIONS	
A	0.64±0.05
A1	0.24±0.03
b	∅0.30 REF
D1	0.50 BASIC
E1	1.00 BASIC
e	0.50 BASIC
SD	0.25 BASIC
SE	0.00 BASIC

PKG. CODE	VARIABLE DIMENSIONS		DEPOPULATED BUMPS
	E	D	
R61A1+1	1.52±0.05	1.00±0.05	NONE
R61B1+1	1.57±0.05	1.05±0.05	NONE
R61C1+1	1.57±0.05	1.16±0.05	NONE

BOTTOM VIEW

SIDE VIEW

NOTES:

1. Terminal pitch is defined by terminal center to center value.
2. Outer dimension (D & E) is defined by center lines between scribe lines.
3. All dimensions in millimeters.
4. Marking shown is for package orientation reference only.
5. Tolerance is ± 0.02mm unless specified otherwise.
6. All dimensions apply to PbFree (+) package codes only.

TITLE:
PACKAGE OUTLINE
6 BUMPS, 2x3 ARRAY, UCSP (R) PKG.

APPROVAL	DOCUMENT CONTROL NO. 21-0228	REV. A	1/1
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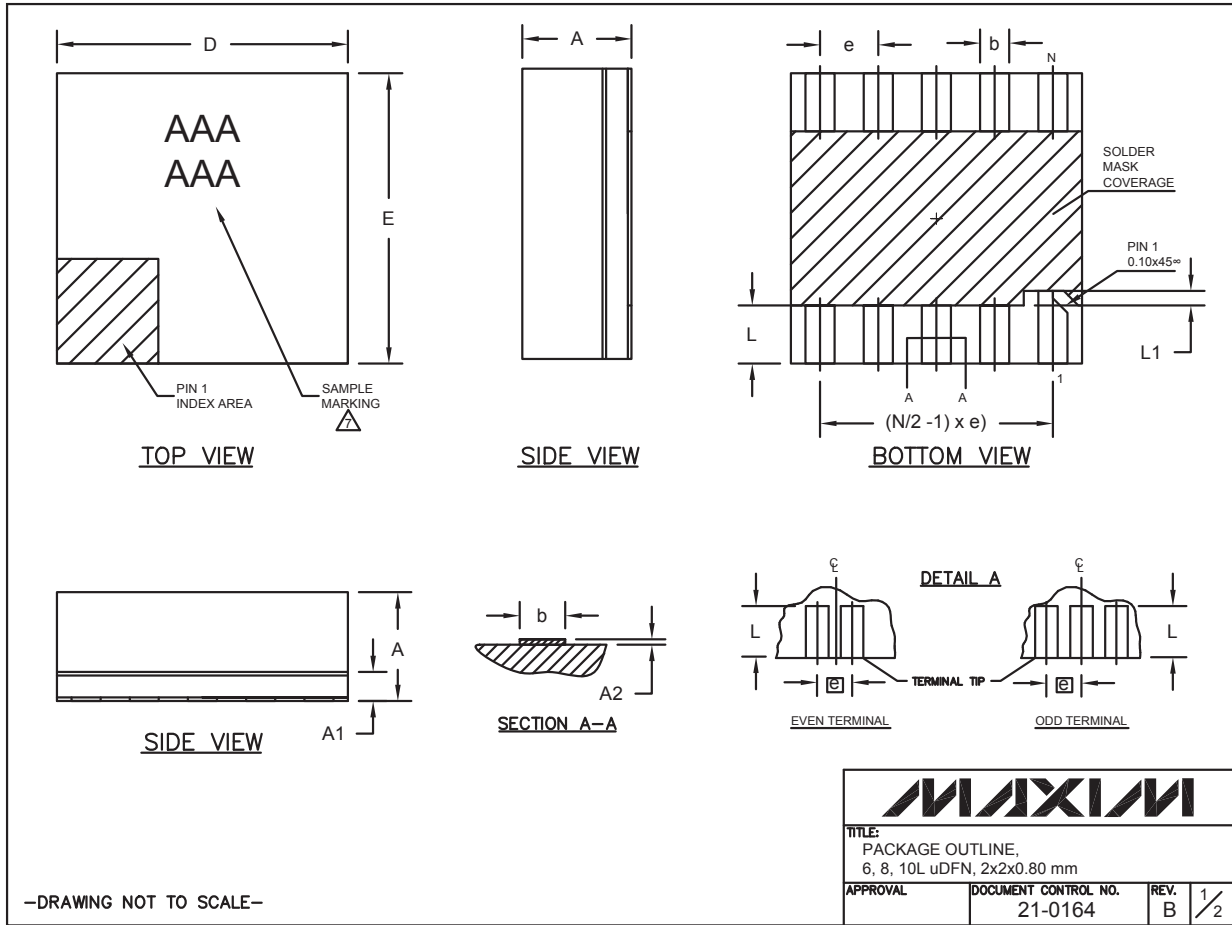
UCSP:EPS

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封装信息(续)

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封装信息(续)

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COMMON DIMENSIONS			
SYMBOL	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
A1	0.15	0.20	0.25
A2	0.020	0.025	0.035
D	1.95	2.00	2.05
E	1.95	2.00	2.05
L	0.30	0.40	0.50
L1	0.10 REF.		

PACKAGE VARIATIONS				
PKG. CODE	N	e	b	(N/2 -1) x e
L622-1	6	0.65 BSC	0.30±0.05	1.30 REF.
L822-1	8	0.50 BSC	0.25±0.05	1.50 REF.
L1022-1	10	0.40 BSC	0.20±0.03	1.60 REF.

NOTES:

1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES.
2. COPLANARITY SHALL NOT EXCEED 0.08mm.
3. WARPAGE SHALL NOT EXCEED 0.10mm.
4. PACKAGE LENGTH/PACKAGE WIDTH ARE CONSIDERED AS SPECIAL CHARACTERISTIC(S).
5. "N" IS THE TOTAL NUMBER OF LEADS.
6. NUMBER OF LEADS SHOWN ARE FOR REFERENCE ONLY.
7. MARKING IS FOR PACKAGE ORIENTATION REFERENCE ONLY.
8. ONLY 8L PACKAGE COMPLIES TO JEDEC MO252.
9. ALL DIMENSIONS APPLY TO BOTH LEADED (-) AND PbFREE (+) PACKAGE CODES.

—DRAWING NOT TO SCALE—

			
TITLE: PACKAGE OUTLINE, 6, 8, 10L uDFN, 2x2x0.80 mm			
APPROVAL	DOCUMENT CONTROL NO.	REV.	2/2
	21-0164	B	

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