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FSA8008/FSA8008A

音频插孔检测和配置开关

特性

检测	附件插孔 3/4极音频插孔 按下发送/结束键	
功能	FSA8008	
	FSA8008A	敏感发送/结束按键的降低时序
开关类型	MIC	
V _{DD}	2.5 V 至 4.4 V	
V _{IO}	1.6至V _{DD}	
THD (MIC)	0.01% (典型值)	
ESD (空气间隙)	15 kV	
工作温度	-40°C至85°C	
封装	10-Lead UMLP	
	1.4 x 1.8 x 0.5 mm、0.4 mm 间距	
顶标	FSA8008	KC
	FSA8008A	KD
订购信息	FSA8008UMX	
	FSA8008AUMX	

说明

FSA8008/FSA8008A是用于3极或4极附件的音频插孔检测器和开关。除了检测之外，FSA8008同时带有集成式麦克风(MIC)开关，允许处理器来配置音频插孔。该架构的设计旨在允许常见的第三方耳机用于从手机、个人媒体播放器和便携式外围设备听音乐。

- 检测3极或4极音频插孔
- 可消除 MIC 偏压造成的音频插孔 Pop-n-Click 噪声。
- 检测音频插孔附件：
 - 标准耳机
 - 带麦克风的耳机
 - 发送/终止按键
- 集成了用于4极配置的麦克风(MIC)开关

相关资源

- [FSA8008/FSA8008A 演示板](#)

应用

- 3.5 mm 和 2.5 mm 音频插孔
- 移动电话，智能电话
- MP3 和 PMP

典型应用

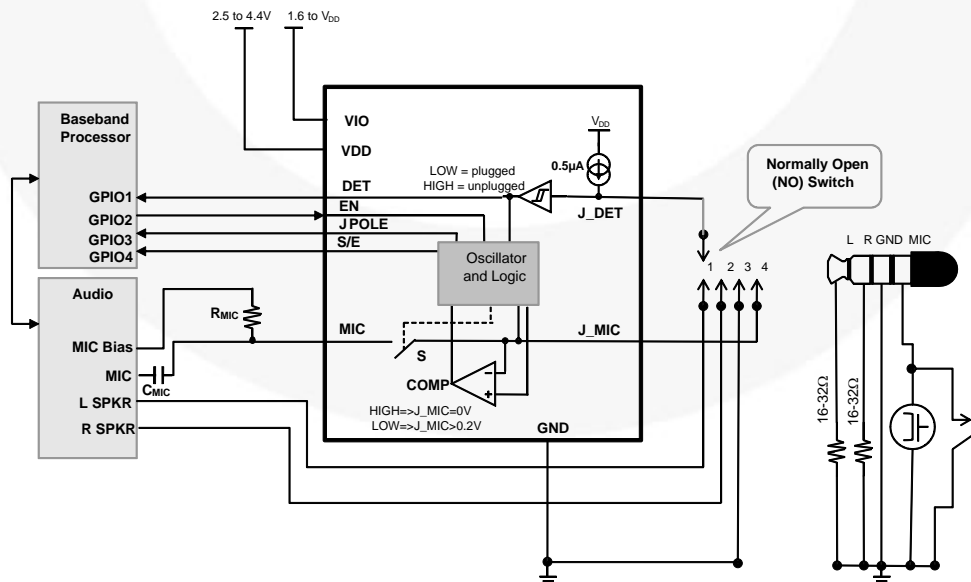


图1. 移动电话示例

引脚布局

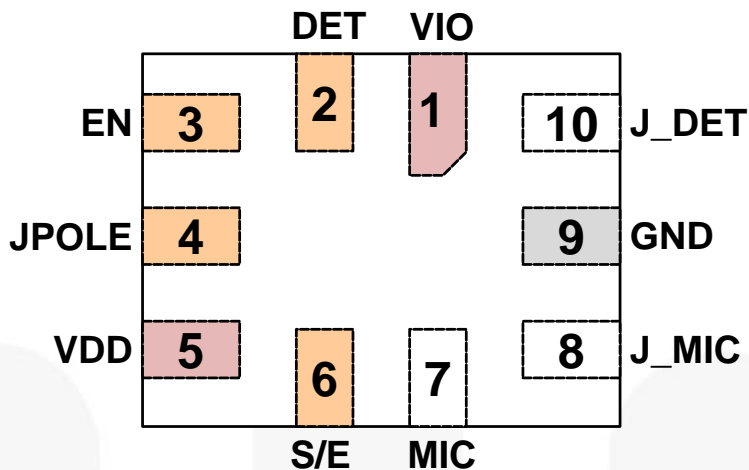


图2. 10 引脚 UMLP 引脚布局 (透视图)

引脚描述

名称	引脚号	类型	说明	功能
DET	2	输出	检测J_DET 引脚, 指示是否有附件插入音频插孔。	0 插入
				1 拔出
JPOLE	4	输出	指示是否有附件插入3 极或4 极插孔	0 4极插孔
				1 3 极插孔
S/E	6	输出	按下键时, 指示4极附件的SEND/END (发送/结束) 状态	0 无键按下
				1 按键
EN	3	输入	在J_MIC 和MIC 引脚之间控制内部麦克风切换	0 MIC / J_MIC 开关打开
				1 MIC / J_MIC 开关关闭
J_DET	10	输入	与机械开关绑定的音频插孔插座引脚的输入, 通常在音频插孔插入插座中时关闭	0 插入
				1 拔出
MIC	7	开关	麦克风开关路径, 进入麦克风前置放大器	见 EN 引脚
J_MIC	8	开关	麦克风开关路径, 连接至麦克风和SEND/END 键音频插孔	
VDD	5	功率	核心电源电压	
VIO	1	功率	基带I/O电源电压	
GND	9	接地	音频插孔和 PCB 接地	

注意:

- 0 = V_{OL} 或 V_{IL} ; 1 = V_{OH} 或 V_{IH}

功能框图

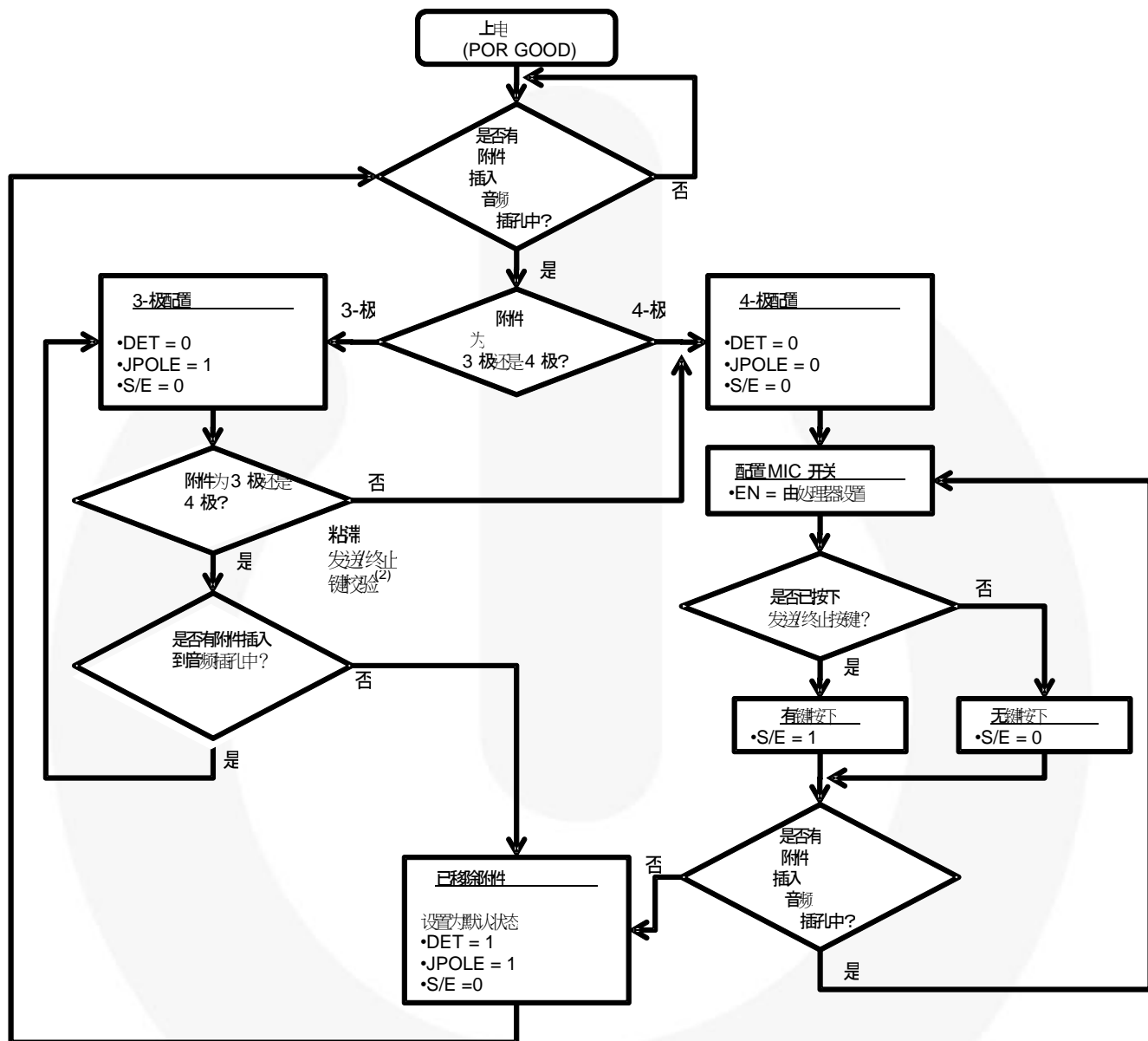


图3. 功能流程图

注意:

2. 只有 EN = H 时, FSA8008A 粘滞发送/终止键功能才可用。

表1. FSA8008 与 FSA8008A 粘滞发送/终止键

EN	FSA8008	FSA8008A
H	粘滞发送/终止键有效	粘滞发送/终止键有效
L	粘滞发送/终止键有效	粘滞发送/终止键禁用

表2. 电源正常和关闭期间的状态

状态说明	VDD	VIO	DET	EN	JPOLE	S/E	J-DET	MIC 开关
有效	1	1	有效					
关	0	0	1 (拔下)	3态	1 (3 极)	0 (未按)	H (拔下)	打开
	1	0						
	0	1						

表3. 检测过程中的 FSA8008 I/O 状态⁽³⁾

J_DET	J_MIC	EN	S/E		JPOLE		DET
			3 极	4 极	3 极	4 极	
0	1	1	0 (未按)	0 (未按)	0 (4 极)	0 (4 极)	0
0	0	0	0 (未按)	1 (按下)	1 (3 极)	0 (4 极)	0
0	1	0	0 (未按)	0 (未按)	0 (4 极) ⁽⁴⁾	0 (4 极)	0
0	0	1	0 (未按)	1 (按下)	1 (3 极)	0 (4 极)	0
1	X	X	0 (未按)	0 (未按)	1 (3 极)	1 (3 极)	1

注意:

- 初始插入后检测到的状态。
- FSA8008 和 FSA8008A 产品之间的差异。

表4. 检测过程中的 FSA8008A I/O 状态⁽⁵⁾

J_DET	J_MIC	EN	S/E		JPOLE		DET
			3 极	4 极	3 极	4 极	
0	1	1	0 (未按)	0 (未按)	0 (4 极)	0 (4 极)	0
0	0	0	0 (未按)	1 (按下)	1 (3 极)	0 (4 极)	0
0	1	0	0 (未按)	0 (未按)	1 (3 极) ⁽⁶⁾	0 (4 极)	0
0	0	1	0 (未按)	1 (按下)	1 (3 极)	0 (4 极)	0
1	X	X	0 (未按)	0 (未按)	1 (3 极)	1 (3 极)	1

注意:

- 初始插入后检测到的状态。
- FSA8008 和 FSA8008A 产品之间的差异。

绝对最大额定值

应力超过绝对最大额定值，可能会损坏设备。在超出推荐的工作条件的情况下，该器件可能无法正常运行或操作，且不建议让器件在这些条件下长期工作。此外，过度暴露在高于推荐的工作条件下，会影响器件的可靠性。绝对最大额定值仅是额定应力值。

符号	参数	最小值	最大值	单位	
V_{DD} & V_{IO}	来自电池的电源电压	-0.5	6.0	V	
V_{SW}	“S” 开关的开关 I/O 电压和除 J_DET 之外的所有输入电压	-0.5	$V_{DD}+0.5$	V	
V_{JD}	J_DET输入的输入电压	-1.5	$V_{DD}+0.5$	V	
I_{IK}	输入箝位二极管电流	-50		mA	
I_{SW}	开关输入/输出（连续）电流		50	mA	
T_{STG}	存储温度范围	-65	+150	°C	
T_J	最大结温		+150	°C	
T_L	引脚温度（焊接，10 秒）		+260	°C	
ESD	IEC 61000-4-2 系统ESD	空气式	15.0		kV
		接触式	8.0		
	JEDEC JESD22-A114, 人体模型	全部引脚	7.5		
		J_DET, J_MIC, V_{DD} , V_{IO}	12.0		
	JEDEC JESD22-C101, 带电设备模型	全部引脚	2.0		

注意：

8. 当测量输入与输出二极管电流额定值时，该输入与输出可能超出负额定值。

推荐工作条件

推荐的操作条件定义了器件的真实工作条件。指定推荐的工作条件，以确保设备的最佳性能达到数据表中的规格。飞兆半导体建议不要超过推荐工作条件，也不能按照绝对最大额定值进行设计。

符号	参数	最小值	最大值	单位
V_{DD}	电池电源电压	2.5	4.4	V
V_{IO}	并联 I/O 电源电压	1.6	V_{DD}	V
T_A	工作温度	-40	+85	°C

直流电气特性

若无其他说明, 所有典型值都在 $T_A = 25^\circ\text{C}$ 下测得。

MIC 开关

符号	参数	V_{DD} (V)	工作条件	$T_A = -40$ 至 $+85^\circ\text{C}$			单位
				最小值	典型值	最大值	
R_{ON}	MIC开关导通电阻	2.5	$I_{OUT} = 30\text{ mA},$ $V_{IN} = 2.0\text{ V}$		0.9	2.9	Ω
		2.8			0.8	2.5	
		3.8			0.6	2.0	
$R_{FLAT(ON)}$	导通阻抗平面度	2.5	$I_{OUT} = 30\text{ mA},$ $V_{IN} =$ 1.6、2.0、2.5		1.50		Ω
		2.8	$I_{OUT} = 30\text{ mA},$ $V_{IN} =$		0.70		
		3.8	1.6、2.0、2.8		0.25		
V_{IN}	开关输入电压范围	2.5 V 至 4.4 V		0		V_{DD}	V
C_{ON}	MIC 和 J_MIC 开关导通电容	3.8	$f = 1\text{ MHz}$		76		pF
C_{OFF}	MIC 和 J_MIC 开关关断电容	3.8	$f = 1\text{ MHz}$		24		pF

J_DET

符号	参数	V_{DD} (V)	工作条件	$T_A = -40$ 至 $+85^\circ\text{C}$			单位
				最小值	典型值	最大值	
J_DET_{AudioV}	J_DET引脚上的音频电压范围	2.5 V 至 4.4 V	DET = L	-1		1	V
J_DET_{Audiof}	J_DET 引脚上的音频频率	2.5 V 至 4.4 V	DET = L	20		20000	Hz
J_DET_{RGND}	检测接地电阻	2.5 V 至 4.4 V	音频插孔插入	0		500	$K\Omega$
J_DET_{HYS}	J_DET的滞环				100		mV

并联I/O

符号	参数	工作条件	$T_A = -40$ 至 $+85^\circ\text{C}$			单位
			最小值	典型值	最大值	
V_{IH}	输入高电平		$0.7 \times V_{IO}$		V_{IO}	V
V_{IL}	输入低电平				$0.3 \times V_{IO}$	V
V_{OH}	输出高电平	$I_{OH} = -100\ \mu\text{A}$	$0.8 \times V_{IO}$			V
V_{OL}	输出低电平	$I_{OL} = +100\ \mu\text{A}$			$0.2 \times V_{IO}$	V

直流电气特性 (续)若无其他说明, 所有典型值都在 $T_A = 25^\circ\text{C}$ 下测得。**比较器**

符号	参数	V_{DD} (V)	工作条件	$T_A = -40$ 至 $+85^\circ\text{C}$			单位
				最小值	典型值	最大值	
V_{COMP}	SEND/END 感应的比较器阈值	2.5-3.8	J_DET, EN = L		200		mV

电流

符号	参数	V_{DD} (V)	工作条件	$T_A = -40$ 至 $+85^\circ\text{C}$			单位
				最小值	典型值	最大值	
I_{OFF}	通过开关的电源关断漏电流	0	MIC 和 J_MIC 端口 $V_{IN} = 4.4\text{V}$			1.5	μA
I_{IN}	输入漏电流	0 V 到 4.4 V	输入 0 = 4.4 V			1	μA
$I_{CC-SLNA}$	无附件时的电池电源睡眠模式电流	2.5 V 至 4.4 V	睡眠模式下的静态电流 (EN = L)		1	3	μA
$I_{CC-SLWA}$	带附件时的电池电源睡眠模式电流	2.5 V 至 4.4 V	有效电流 (EN = L 和/或 DET = H)		15	25	μA

交流电气特性

若无其他说明, 所有典型值都在 $V_{CC}=3.3V$, $T_A=25^\circ C$ 下测得。

MIC 开关

符号	参数	V_{DD} (V)	工作条件	$T_A = -40$ 至 $+85^\circ C$			单位
				最小值	典型值	最大值	
THD	总谐波失真度	3.8	$R_T = 600 \Omega$, $V_{SW} = 0.5 V_{PP}$, $f = 20 \text{ Hz}$ 至 20 kHz , $V_{IN} = 2.0 \text{ V}$		0.01		%
O_{IRR}	关断隔离	3.8	$f = 20 \text{ kHz}$, $R_S = 32 \Omega$, $C_L = 0 \text{ pF}$, $R_T = 32 \Omega$		-90		dB

并联 I/O

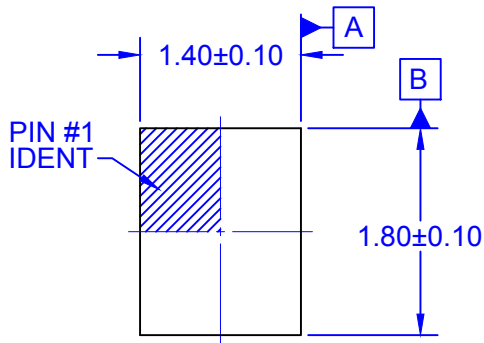
符号	参数	V_{DD} (V)	工作条件	$T_A = -40$ 至 $+85^\circ C$			单位
				最小值	典型值	最大值	
t_R , t_F	输出边缘速率 (DET, S/E, JPOLE)	2.5	$C_L = 5 \text{ pF}$, 20% 至 80%		19		ns
		3.8			15		
t_{POLL}	振荡器稳定时感应 按键的开关导通时间	2.5 V 至 4.4 V	FSA8008		15		ms
			FSA8008A		1		
t_{PER}	感应 SEND/END 按钮按下的 MIC 开关时间段	2.5 V 至 4.4 V	FSA8008		140		ms
			FSA8008A		10		
t_{DET-IN}	J-DET 从高电平变为低电平后的防反跳时间	2.5 V 至 4.4 V			422		ms
$t_{DET-REM}$	J-DET 从低电平变为高电平后的防反跳时间	2.5 V 至 4.4 V			30		μs
t_{DET}	感应 极或 极音频插孔插入时的检测超时	2.5 V 至 4.4 V	FSA8008		70		ms
			FSA8008A		4.5		
t_{KBK}	感应 SEND/END 按键/松开的反跳超时	2.5 V 至 4.4 V			27		ms

功率

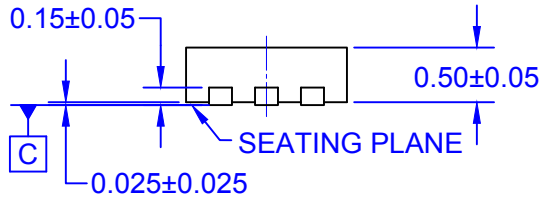
符号	参数	V_{DD} (V)	工作条件	$T_A = -40$ 至 $+85^\circ C$			单位
				最小值	典型值	最大值	
PSRR	电源抑制比	3.8	电源噪声 300 mV_{PP} , 测得 10/90%, $f = 217 \text{ Hz}$		-90		dB

订购信息

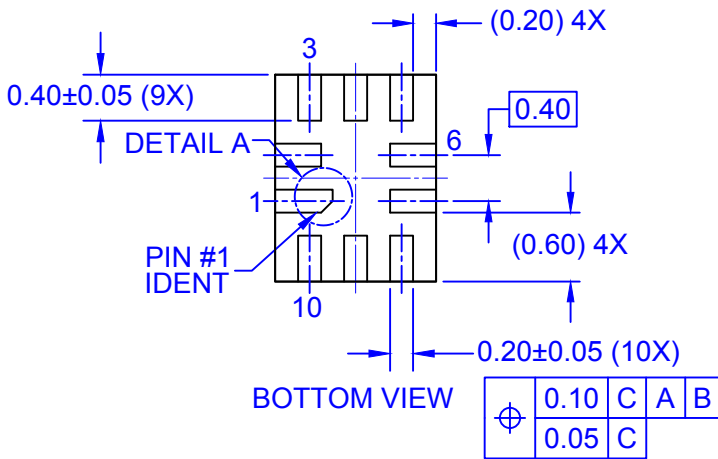
器件编号	工作温度范围	顶标	封装
FSA8008UMX	-40 至 $+85^\circ C$	KC	10 引脚, $1.4 \times 1.8 \times 0.55 \text{ mm}$, 0.4 mm 间距、薄模塑无铅封装 (UMLP)
FSA8008AUMX		KD	



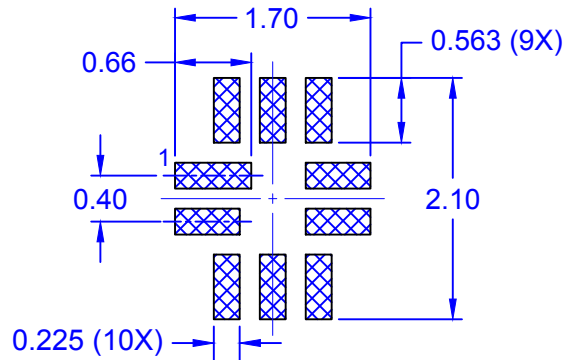
TOP VIEW



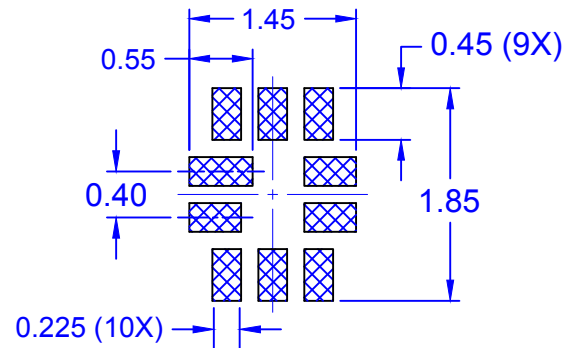
SIDE VIEW



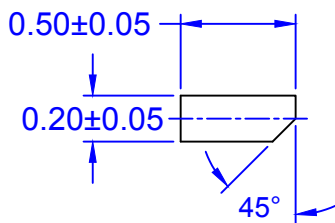
BOTTOM VIEW



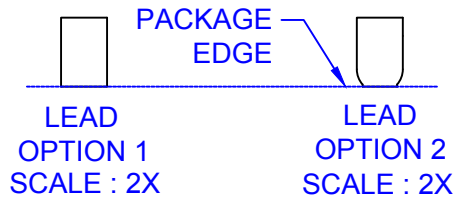
RECOMMENDED LAND PATTERN



OPTIONAL MINIMAL TOE LAND PATTERN



DETAIL A
SCALE : 2X



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