GigaDevice Semiconductor Inc.

GD30LD330x-EVAL 板
用户指南

1.0 版本

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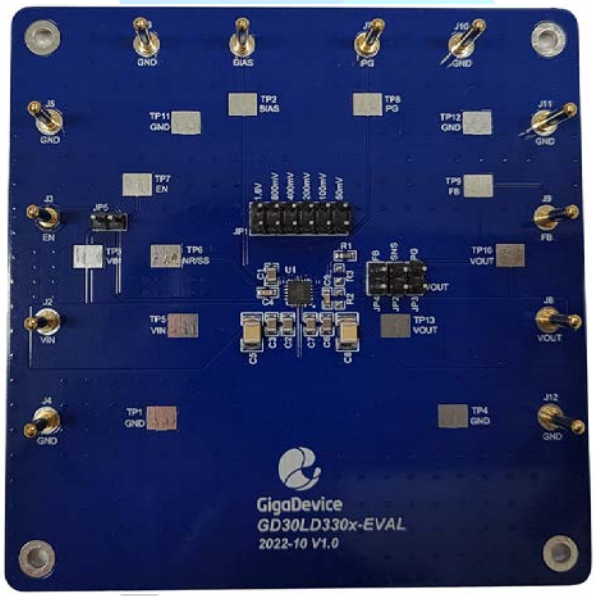
1. 简介

GigaDevice 的 GD30LD330x-EVAL 板可以帮助用户轻松完成对 GD30LD3300x 及 GD30LD3301x 线性稳压器功能和性能的评估。评估板配置包含有一个高精度、低噪声、高 PSRR 的线性稳压器，该稳压器能够实现以超低 VIN 至 VOUT 压差向负载提供高达 3A 的电流。为了稳定输出电压，GD30LD3300x 及 GD30LD3301x 应该选用并联 47uF（或更大）的输出电容。

GD30LD330X-EVAL 板特性：

- 兼容 GD30LD3300x 及 GD30LD3301x 线性稳压器在线评估
- 默认安装 GD30LD3301x
- 支持引脚选择输出模式
- 支持外部分压电阻输出模式
- 支持使能\禁用功能
- 支持软启动
- EVAL 板支持输出电流可达 3A

图 1-1 GD30LD330x-EVAL 板实物图



2. EVAL 板引脚分配

本节主要介绍 GD30LD330x-EVAL 板连接器、跳线及测试点的引脚分配。

2.1. 输入输出连接器说明

表 2-1 输入输出连接器

连接器	描述	EVAL
J1-BIAS	若输入电压 1.1V<VIN<1.4V，则 VBIAS 需要提供 3.0V~6.5V 电压为线性稳压器供电；若输入电压 VIN>1.4V，则不需要 VBIAS 额外供电	已安装
J2-VIN	输入电压连接器；将正极输入引线和接地引线连接至供电电源，并保持它们尽可能短以最小化输入电感	已安装
J3-EN	输入使能，使用跳线帽短接 VIN 和 EN（JP5）	已安装
J4-GND	输入 VIN 接地回路连接器	已安装
J5-GND	使能 EN 接地回路连接器	已安装
J6-GND	偏置 BIAS 接地回路连接器	已安装
J7-PG	PG 上拉电压选择器；EVAL 板设计可以通过跳线帽将 PG 上拉至 VOUT（JP3），也可以通过 PG 连接器上拉至外部电压	已安装
J8-VOUT	线性稳压器输出连接器	已安装
J9-FB	反馈电压输入连接器	已安装
J10-GND	电源良好 PG 接地回路连接器	已安装
J11-GND	反馈 FB 接地回路连接器	已安装
J12-GND	输出 VOUT 接地回路连接器	已安装

2.2. 跳线连接器说明

表 2-2 跳线连接器

连接器	描述	EVAL
JP1	输出电压可调连接器；线性稳压器输出电压大小可根据名称进行选择设置：50mV(25mV)、100mV(50mV)、200mV(100mV)、400mV(200mV)、800mV(400mV)和 1.6V(0.8V)。输出电压的增加与选择设置相关，GD30LD3300x 内部参考电压 0.5V，GD30LD3301x 内部参考电压 0.8V；悬空引脚对输出电压无影响；需要注意的是，括号内为 GD30LD3300x 的引脚选择模式电压大小。	已安装
JP2	输出电压检测连接器；当输出电压是由 JP1 跳线选择配置，则 JP2 需要跳线帽拉上至 VOUT；当输出电压是由外部分压电阻反馈决定，则 JP2 不需要连接	已安装

JP3	电源状态连接器	已安装
JP4	反馈连接器	已安装
JP5	输出使能连接器	已安装

2.3. 测试点说明

表 2-3 测试点

连接器	描述	EVAL
TP1	GND 测试点	已预留
TP2	BIAS 测试点	已预留
TP3	VIN 测试点	已预留
TP4	GND 测试点	已预留
TP5	VIN 测试点	已预留
TP6	NR/SS 测试点	已预留
TP7	EN 测试点	已预留
TP8	PG 测试点	已预留
TP9	FB 测试点	已预留
TP10	VOUT 测试点	已预留
TP11	GND 测试点	已预留
TP12	GND 测试点	已预留
TP13	VOUT 测试点	已预留

3. 入门指南

下面步骤描述了 GD30LD330x-EVAL 板的快速连接方式，以演示 EVAL 板评估线性稳压器的操作。有关其他更详细的说明，请参阅用户指南的其他部分。

3.1. 所需设备

1. 直流电源，0-24V/5A ；
2. 电子负载(3A Max)；
3. GD30LD330X-EVAL 板；
4. 万用表。

3.2. 快速连接

EVAL 板需要遵循以下连接关系：

1. 将输入和偏置电源设置 6.5V（Max），然后关闭电源；
2. 将输入电源的正极引线连接到 EVAL 板 J2 连接器的 VIN，将输入电源的负极引线连接到 EVAL 板 J4 连接器的 GND，并关闭输入电源；
3. 在连接器 J8-VOUT 和 J12-GND 之间连接一个 0A~3A 电子负载，然后关闭电子负载；
4. 浮动选择 JP5 使能或者禁用输出。

3.3. 操作指南

图 3-1 GD30LD330x-EVAL 板引脚选择模式输出 1.8V 连接操作示意图，展示如何将外部设备连接至 EVAL 板以及连接器的选择。

1. 使用跳线帽将 JP1-200mV、800mV 连接至 GND；
2. 使用跳线帽将 JP2-SNS 引脚连接至 VOUT；
3. 使用跳线帽将 JP5 的 EN 引脚连接至 VIN；
4. 打开电源及电子负载；
5. 根据测试目的改变相应的负载和输入电压。

图 3-1 GD30LD330x-EVAL板引脚选择模式输出1.8V连接操作示意图

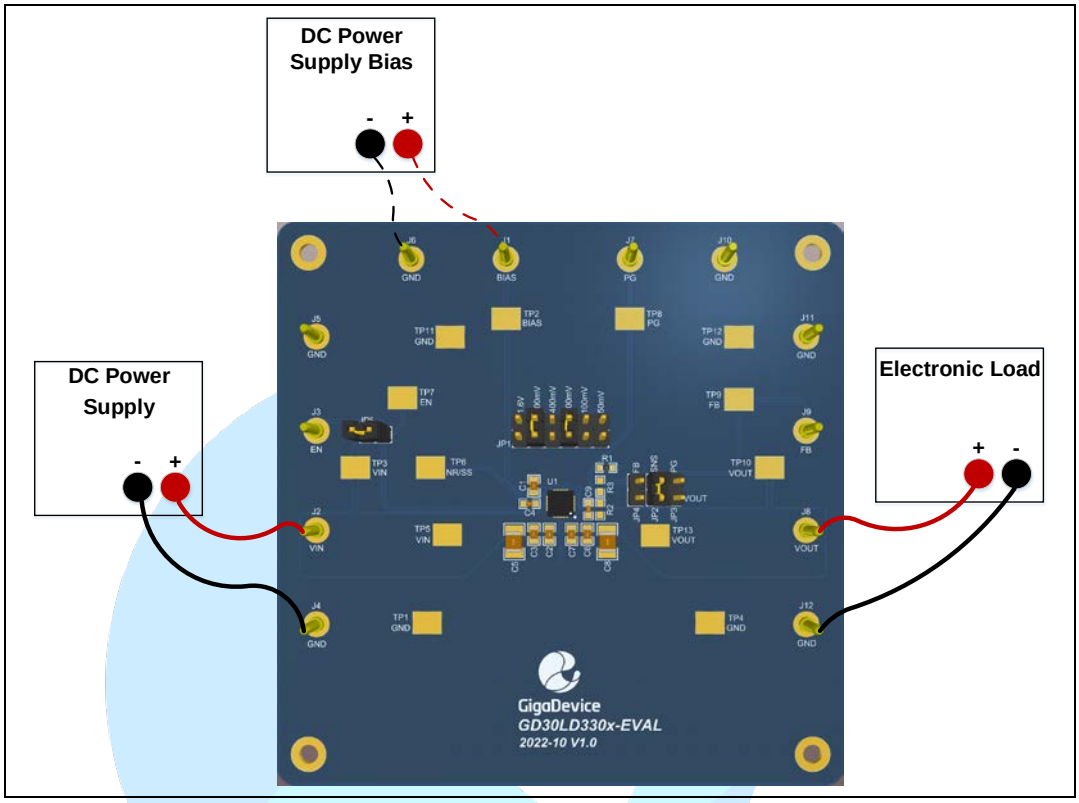
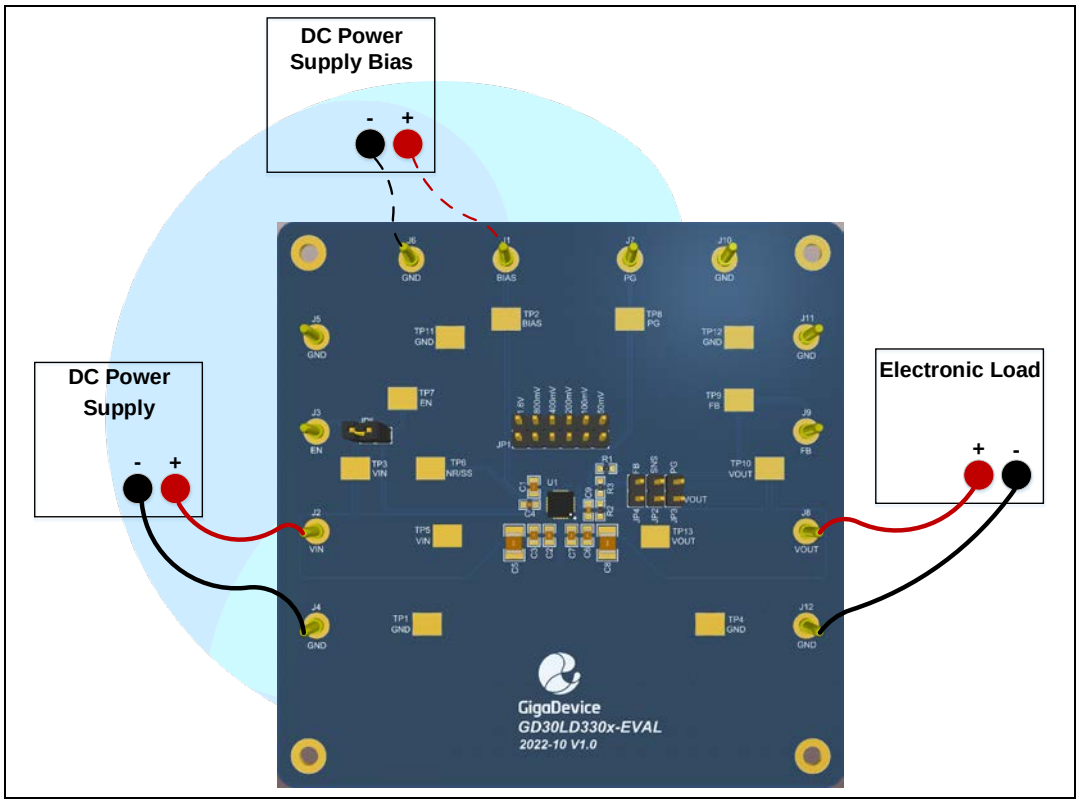


图 3-2 GD30LD330x-EVAL 板外部分压电阻模式输出连接操作示意图, 展示如何将外部设备连接至 EVAL 板以及连接器的选择。

1. 使用跳线帽将 JP5 的 EN 引脚连接至 VIN；
2. 选择 R2=12.1K、R3=9.76K，精度为 1%的贴片电阻；
3. 打开电源及电子负载；
4. 根据测试目的改变相应的负载和输入电压。

图 3-2 GD30LD330x-EVAL板外部分压电阻模式输出连接操作示意图



3.4. 引脚选择模式设置输出电压

线性稳压器可以选择性将引脚 5、6、7、9、10 及 11 短接至地，SNS 引脚连接至 V_{OUT}，无需外部电阻即可对输出电压大小进行配置。引脚 5、6、7、9、10 及 11 分别连接至内部电阻，每个引脚只有两个状态（接地或者悬空）。输出电压大小设置为内部参考电压（GD30LD3300x V_{FB}=0.5V；GD30LD3301x V_{FB}=0.8V），加上每个接地引脚的相应电压的累积。

$$V_{OUT} = V_{FB} + V_{PIN-SET}$$

3.4.1. GD30LD3300 引脚选择模式设置输出电压推荐配置

表 3-1 GD30LD3300 Adjusted VOUT by pin-setting

V_{FB} = 0.5V, SNS connect to V_{OUT}						
V_{OUT}(V)	25mV	50mV	100mV	200mV	400mV	0.8V
0.500	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN
0.525	GND	OPEN	OPEN	OPEN	OPEN	OPEN
0.550	OPEN	GND	OPEN	OPEN	OPEN	OPEN
0.575	GND	GND	OPEN	OPEN	OPEN	OPEN
0.600	OPEN	OPEN	GND	OPEN	OPEN	OPEN
0.625	GND	OPEN	GND	OPEN	OPEN	OPEN
0.650	OPEN	GND	GND	OPEN	OPEN	OPEN
0.675	GND	GND	GND	OPEN	OPEN	OPEN
0.700	OPEN	OPEN	OPEN	GND	OPEN	OPEN
0.725	GND	OPEN	OPEN	GND	OPEN	OPEN
0.750	OPEN	GND	OPEN	GND	OPEN	OPEN
0.775	GND	GND	OPEN	GND	OPEN	OPEN
0.800	OPEN	OPEN	GND	GND	OPEN	OPEN
0.825	GND	OPEN	GND	GND	OPEN	OPEN
0.850	OPEN	GND	GND	GND	OPEN	OPEN
0.875	GND	GND	GND	GND	OPEN	OPEN
0.900	OPEN	OPEN	OPEN	OPEN	GND	OPEN
0.925	GND	OPEN	OPEN	OPEN	GND	OPEN
0.950	OPEN	GND	OPEN	OPEN	GND	OPEN
0.975	GND	GND	OPEN	OPEN	GND	OPEN
1.000	OPEN	OPEN	GND	OPEN	GND	OPEN
1.025	GND	OPEN	GND	OPEN	GND	OPEN
1.050	OPEN	GND	GND	OPEN	GND	OPEN
1.075	GND	GND	GND	OPEN	GND	OPEN
1.100	OPEN	OPEN	OPEN	GND	GND	OPEN
1.125	GND	OPEN	OPEN	GND	GND	OPEN
1.150	OPEN	GND	OPEN	GND	GND	OPEN
1.175	GND	GND	OPEN	GND	GND	OPEN
1.200	OPEN	OPEN	GND	GND	GND	OPEN
1.225	GND	OPEN	GND	GND	GND	OPEN
1.250	OPEN	GND	GND	GND	GND	OPEN
1.275	GND	GND	GND	GND	GND	OPEN
1.300	OPEN	OPEN	OPEN	OPEN	OPEN	GND
1.325	GND	OPEN	OPEN	OPEN	OPEN	GND
1.350	OPEN	GND	OPEN	OPEN	OPEN	GND
1.375	GND	GND	OPEN	OPEN	OPEN	GND

V_{FB} = 0.5V, SNS connect to V_{OUT}						
V_{OUT}(V)	**25mV**	**50mV**	**100mV**	**200mV**	**400mV**	**0.8V**
1.400	OPEN	OPEN	GND	OPEN	OPEN	GND
1.425	GND	OPEN	GND	OPEN	OPEN	GND
1.450	OPEN	GND	GND	OPEN	OPEN	GND
1.475	GND	GND	GND	OPEN	OPEN	GND
1.500	OPEN	OPEN	OPEN	GND	OPEN	GND
1.525	GND	OPEN	OPEN	GND	OPEN	GND
1.550	OPEN	GND	OPEN	GND	OPEN	GND
1.575	GND	GND	OPEN	GND	OPEN	GND
1.600	OPEN	OPEN	GND	GND	OPEN	GND
1.625	GND	OPEN	GND	GND	OPEN	GND
1.650	OPEN	GND	GND	GND	OPEN	GND
1.675	GND	GND	GND	GND	OPEN	GND
1.700	OPEN	OPEN	OPEN	OPEN	GND	GND
1.725	GND	OPEN	OPEN	OPEN	GND	GND
1.750	OPEN	GND	OPEN	OPEN	GND	GND
1.775	GND	GND	OPEN	OPEN	GND	GND
1.800	OPEN	OPEN	GND	OPEN	GND	GND
1.825	GND	OPEN	GND	OPEN	GND	GND
1.850	OPEN	GND	GND	OPEN	GND	GND
1.875	GND	GND	GND	OPEN	GND	GND
1.900	OPEN	OPEN	OPEN	GND	GND	GND
1.925	GND	OPEN	OPEN	GND	GND	GND
1.950	OPEN	GND	OPEN	GND	GND	GND
1.975	GND	GND	OPEN	GND	GND	GND
2.000	OPEN	OPEN	GND	GND	GND	GND
2.025	GND	OPEN	GND	GND	GND	GND
2.050	OPEN	GND	GND	GND	GND	GND
2.075	GND	GND	GND	GND	GND	GND

3.4.2. GD30LD3301 引脚选择模式设置输出电压推荐配置

表 3-2 GD30LD3301 Adjusted VOUT by pin-setting

V_{FB} = 0.8 V, SNS connect to V_{OUT}						
V_{OUT}(V)	50mV	100mV	200mV	400mV	800mV	1.6V
0.80	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN
0.85	GND	OPEN	OPEN	OPEN	OPEN	OPEN
0.90	OPEN	GND	OPEN	OPEN	OPEN	OPEN
0.95	GND	GND	OPEN	OPEN	OPEN	OPEN
1.00	OPEN	OPEN	GND	OPEN	OPEN	OPEN
1.05	GND	OPEN	GND	OPEN	OPEN	OPEN
1.10	OPEN	GND	GND	OPEN	OPEN	OPEN
1.15	GND	GND	GND	OPEN	OPEN	OPEN
1.20	OPEN	OPEN	OPEN	GND	OPEN	OPEN
1.25	GND	OPEN	OPEN	GND	OPEN	OPEN
1.30	OPEN	GND	OPEN	GND	OPEN	OPEN
1.35	GND	GND	OPEN	GND	OPEN	OPEN
1.40	OPEN	OPEN	GND	GND	OPEN	OPEN
1.45	GND	OPEN	GND	GND	OPEN	OPEN
1.50	OPEN	GND	GND	GND	OPEN	OPEN
1.55	GND	GND	GND	GND	OPEN	OPEN
1.60	OPEN	OPEN	OPEN	OPEN	GND	OPEN
1.65	GND	OPEN	OPEN	OPEN	GND	OPEN
1.70	OPEN	GND	OPEN	OPEN	GND	OPEN
1.75	GND	GND	OPEN	OPEN	GND	OPEN
1.80	OPEN	OPEN	GND	OPEN	GND	OPEN
1.85	GND	OPEN	GND	OPEN	GND	OPEN
1.90	OPEN	GND	GND	OPEN	GND	OPEN
1.95	GND	GND	GND	OPEN	GND	OPEN
2.00	OPEN	OPEN	OPEN	GND	GND	OPEN
2.05	GND	OPEN	OPEN	GND	GND	OPEN
2.10	OPEN	GND	OPEN	GND	GND	OPEN
2.15	GND	GND	OPEN	GND	GND	OPEN
2.20	OPEN	OPEN	GND	GND	GND	OPEN
2.25	GND	OPEN	GND	GND	GND	OPEN
2.30	OPEN	GND	GND	GND	GND	OPEN
2.35	GND	GND	GND	GND	GND	OPEN
2.40	OPEN	OPEN	OPEN	OPEN	OPEN	GND
2.45	GND	OPEN	OPEN	OPEN	OPEN	GND
2.50	OPEN	GND	OPEN	OPEN	OPEN	GND
2.55	GND	GND	OPEN	OPEN	OPEN	GND

V_{FB} = 0.8 V, SNS connect to V_{OUT}						
V_{OUT}(V)	**50mV**	**100mV**	**200mV**	**400mV**	**800mV**	**1.6V**
2.60	OPEN	OPEN	GND	OPEN	OPEN	GND
2.65	GND	OPEN	GND	OPEN	OPEN	GND
2.70	OPEN	GND	GND	OPEN	OPEN	GND
2.75	GND	GND	GND	OPEN	OPEN	GND
2.80	OPEN	OPEN	OPEN	GND	OPEN	GND
2.85	GND	OPEN	OPEN	GND	OPEN	GND
2.90	OPEN	GND	OPEN	GND	OPEN	GND
2.95	GND	GND	OPEN	GND	OPEN	GND
3.00	OPEN	OPEN	GND	GND	OPEN	GND
3.05	GND	OPEN	GND	GND	OPEN	GND
3.10	OPEN	GND	GND	GND	OPEN	GND
3.15	GND	GND	GND	GND	OPEN	GND
3.20	OPEN	OPEN	OPEN	OPEN	GND	GND
3.25	GND	OPEN	OPEN	OPEN	GND	GND
3.30	OPEN	GND	OPEN	OPEN	GND	GND
3.35	GND	GND	OPEN	OPEN	GND	GND
3.40	OPEN	OPEN	GND	OPEN	GND	GND
3.45	GND	OPEN	GND	OPEN	GND	GND
3.50	OPEN	GND	GND	OPEN	GND	GND
3.55	GND	GND	GND	OPEN	GND	GND
3.60	OPEN	OPEN	OPEN	GND	GND	GND
3.65	GND	OPEN	OPEN	GND	GND	GND
3.70	OPEN	GND	OPEN	GND	GND	GND
3.75	GND	GND	OPEN	GND	GND	GND
3.80	OPEN	OPEN	GND	GND	GND	GND
3.85	GND	OPEN	GND	GND	GND	GND
3.90	OPEN	GND	GND	GND	GND	GND
3.95	GND	GND	GND	GND	GND	GND

3.5. 外部分压电阻模式设置输出电压

线性稳压器提供另一种配置输出电压大小的方式，即外部分压电阻模式，EVAL 板设置不同阻值的 R2 和 R3，具体输出电压计算公式如下：

$$V_{OUT} = V_{FB} \times \left(1 + \frac{R_2}{R_3}\right)$$

3.5.1. GD30LD3300 外部分压电阻设置输出电压推荐阻值选型

表 3-3 GD30LD3300 Adjusted VOUT by external feedback resistor

V_{OUT}(V)	External Feedback Resistor	
	R2(kΩ)	R3(kΩ)
0.5	0	NC
0.6	11	54.9
0.7	10.2	25.5
0.8	10.7	17.8
0.9	11	13.7
1.0	11	11
1.2	9.31	6.65
1.8	10.2	3.92
2.5	10.8	2.7
3.0	11	2.2
3.3	11.2	2
5.0	10.8	1.2
5.2	12.22	1.3

3.5.2. GD30LD3301 外部分压电阻设置输出电压推荐阻值选型

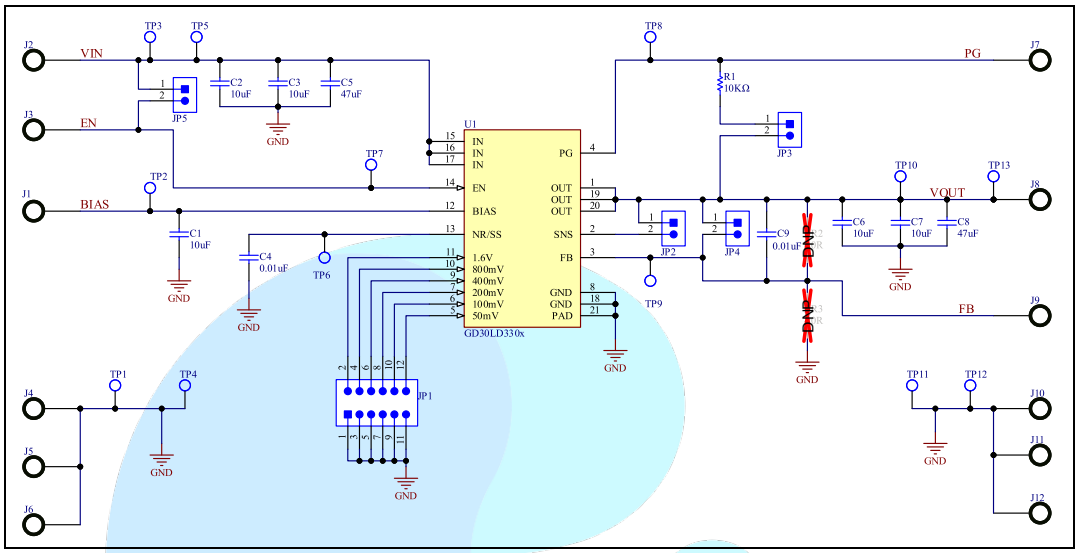
表 3-4 GD30LD3301 Adjusted VOUT by external feedback resistor

V_{OUT}(V)	External Feedback Resistor	
	R2 (kΩ)	R3(kΩ)
0.8	0	NC
0.9	12.1	97.6
1.00	12.1	48.7
1.10	12.1	32.4
1.20	12.1	24.3
1.50	12.1	13.7
1.80	12.1	9.76
1.90	12.1	8.87
2.50	12.1	5.76

2.85	12.1	4.75
3.00	12.1	4.42
3.30	12.1	3.83
3.60	12.1	3.48
4.5	12.1	2.61
5.00	12.1	2.32
5.2	12.1	2.2

4. 原理图

图 4-1 GD30LD330x-EVAL Schematic

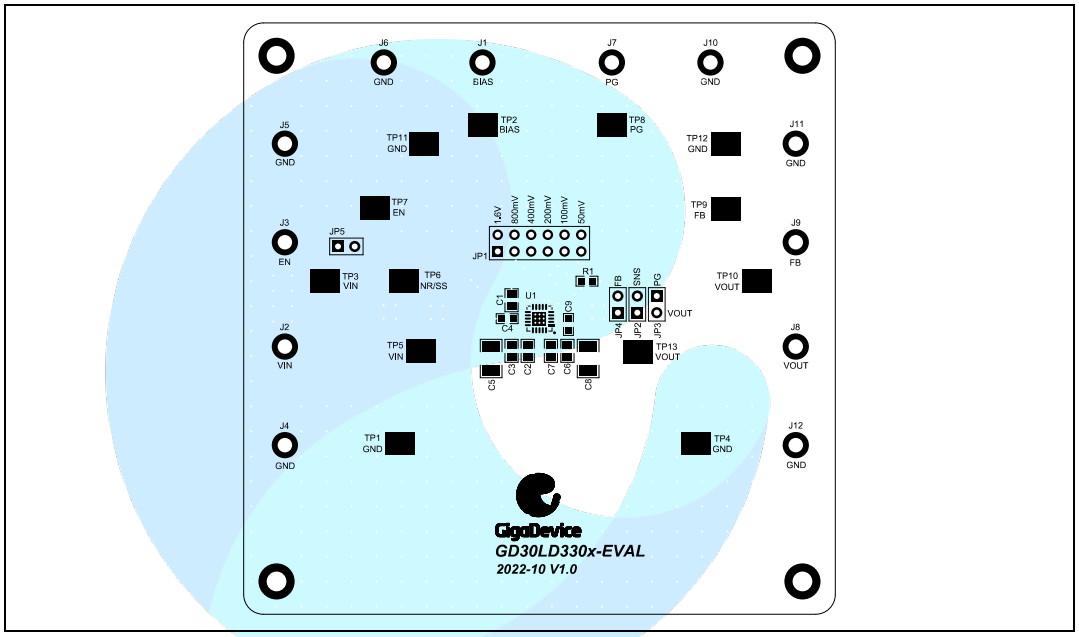


5. Board Layout

图 5-1 至*图 5-6* 展示了此 EVAL 板的 PCB 布局布线。

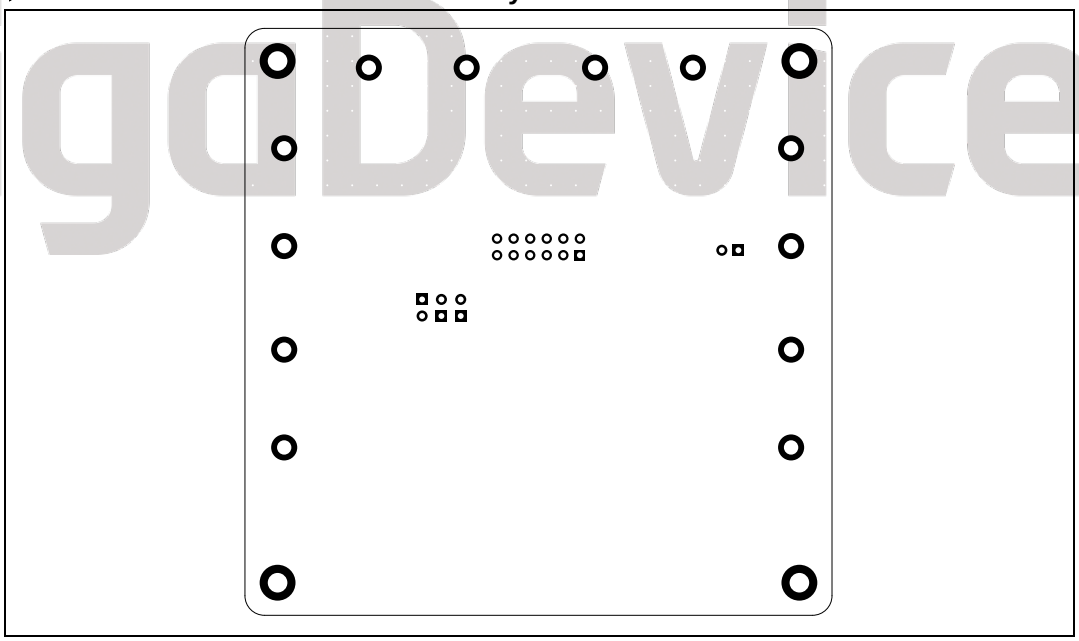
5.1. Top Overlay

图 5-1 GD30LD330x EVAL Top Overlay



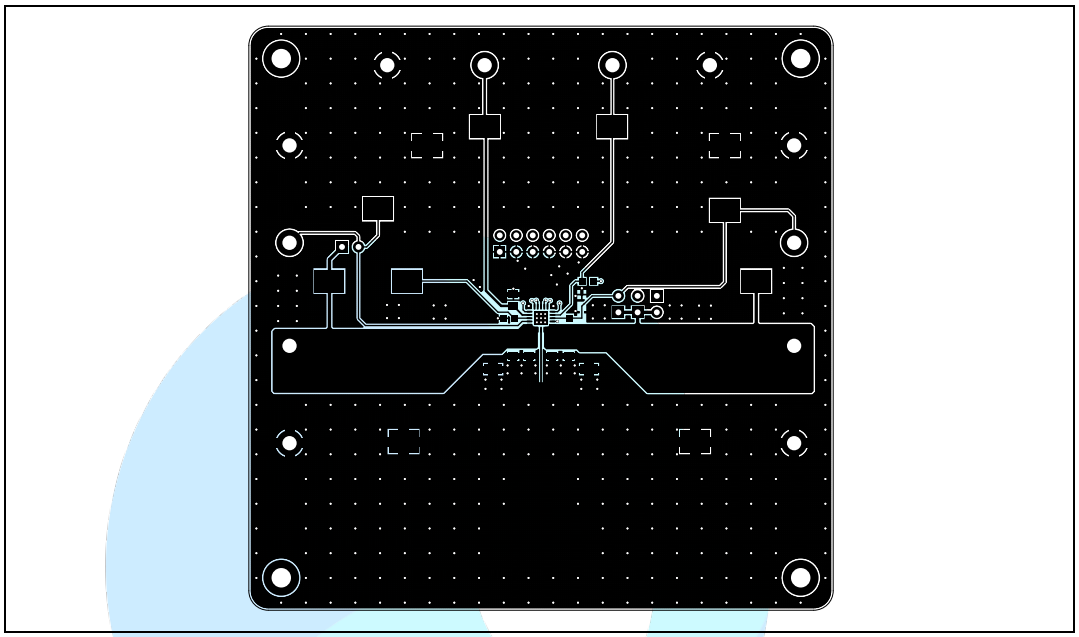
5.2. Bottom Overlay

图 5-2 GD30LD330x EVAL Bottom Overlay



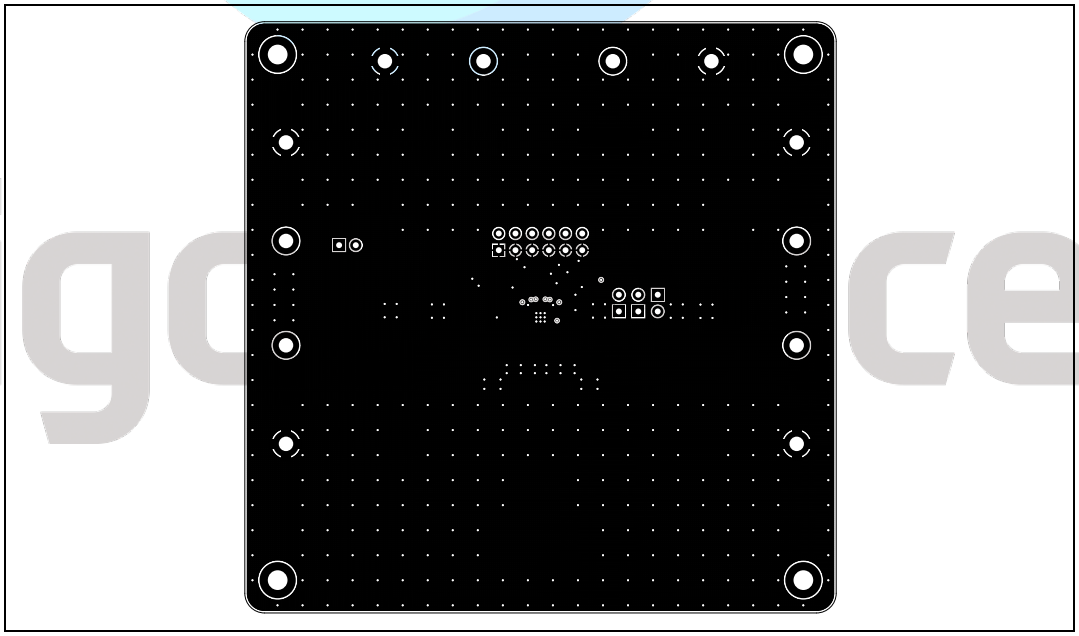
5.3. Top Layer

图 5-3 GD30LD330x EVAL Top Layer



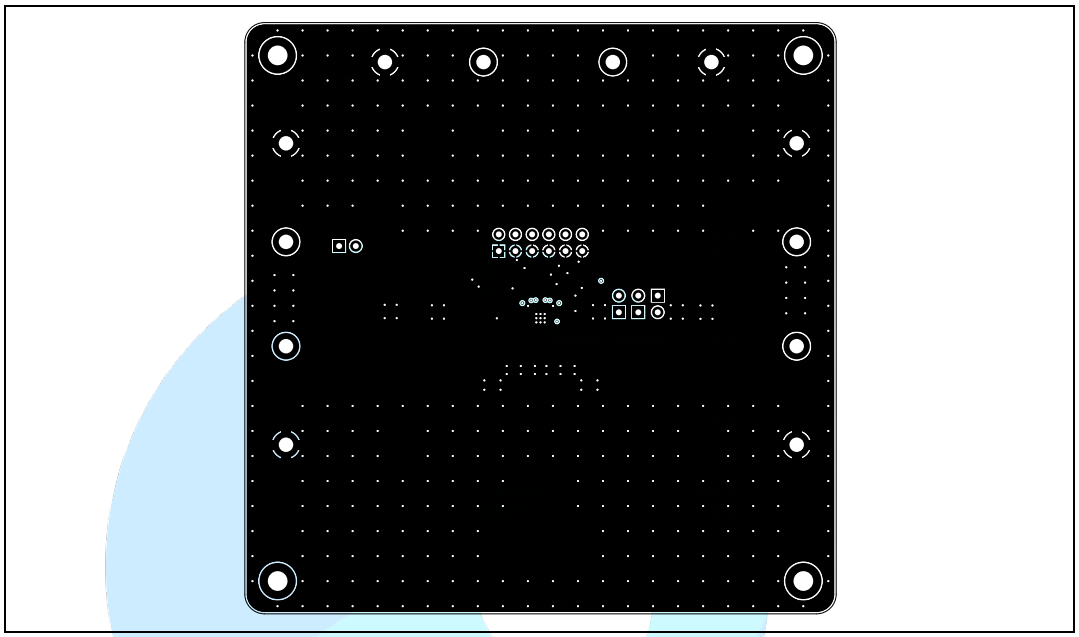
5.4. Layer2

图 5-4 GD30LD330x EVAL GND02



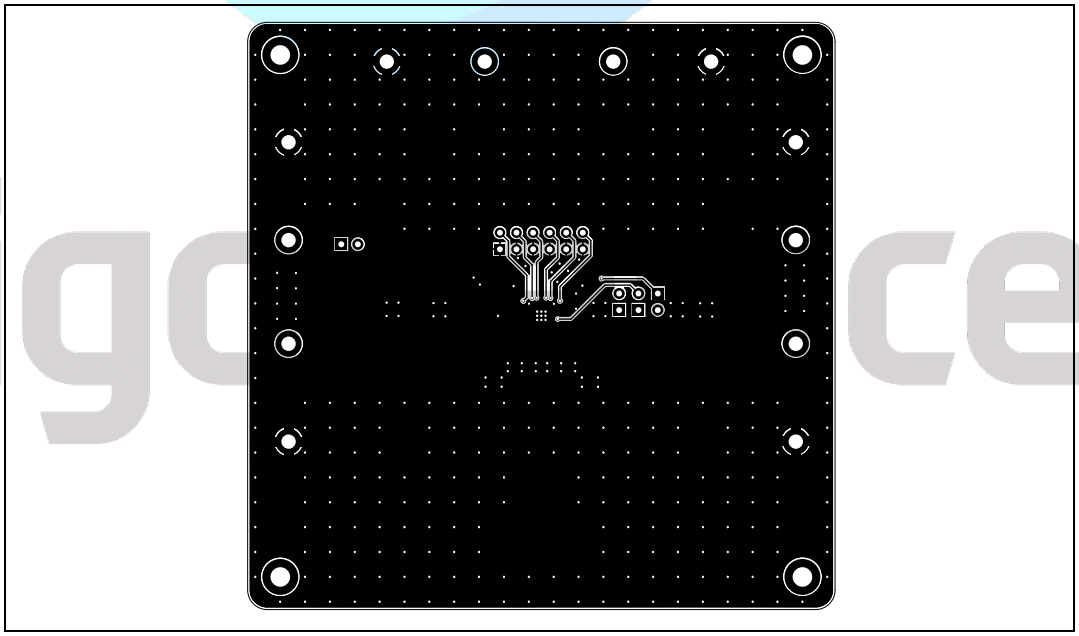
5.5. Layer3

图 5-5 GD30LD330x EVAL GND03



5.6. Bottom Layer

图 5-6 GD30LD330x EVAL Bottom Layer



6. 注意事项

- GD30LD330x-EVAL 兼容 GD30LD3300x 及 GD30LD3301x 两种线性稳压器的快速评估，EVAL 板默认安装 GD30LD3301x，如需评估 GD30LD3300x 请联系相关工作人员申请样片，以帮助您解决问题。

7. 版本历史

表 7-1 版本历史

版本号	Description	Date
1.0	初始发布版本	2022 年 11 月

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