DESCRIPTION

OS1000 is a highly integrated power management solution designed for wearable applications that require efficient and low quiescent current operation. OS1000 contains a linear Li+ battery charge management block, two low quiescent buck regulators and 2 low quiescent low dropout linear regulators. The linear battery charger supports power path, JEITA thermal safety monitoring, step charge profiles and multiple safety timers. The buck converters support DVS modes through either I2C communication or dedicated pins to switch between voltages.

OS1000 contains support functions including an extremely low current off or “shelf” mode, support for a power button and 4 GPIO pins which can be assigned alternate functions. OS1000 also contains an 8bit ADC to allow the system to directly read the battery thermistor value and a “direct mode” which is used during customer system testing.

BENEFITS and FEATURES

- Li+ Battery Charge Management
  - -5.5 to +20V Input Protection
  - User configurable Step Charge
  - JEITA thermal protection
  - Pre and Fast charge safety timers
  - Power Path
- Two Low Iq Buck Converters
  - 300mA @ 0.5V to 3.0V
  - DVS capable thru I2C or GPIO
  - <500nA Iq with no load
- Two Low Iq LDO Regulators
  - Optional Load Switch mode
  - 100mA @ 0.9V to 3.3V
  - <500nA Iq with no load

APPLICATIONS

- Wearable Devices
- Medical Wearables
- TWS hearables
- IOT Devices

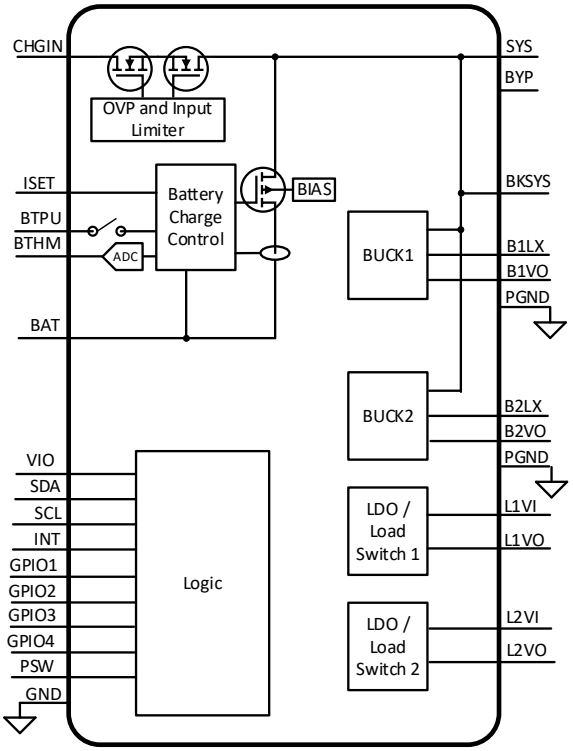


Table of Contents

Description 3
Features 3
USB Control and Configuration 3
Battery Simulator 3
Configuration Jumpers and Switches 3
Schematics 4
PCB Layout 7
Top Layer 7
Inner Layer 1 8
Inner Layer 2 9
Bottom Layer 10

Description

The OS1000EVAL board is designed to demonstrate all the functions of the OS1000 PMIC. It is designed to be powered and controlled from one USB type-C connector simplifying equipment requirements. For advanced operation, the OS1000EVAL board may be powered from external power supplies and the I2C bus may be connected to an external I2C master for control.

Features

USB Control and Configuration

The OS1000EVAL board has an on board FTDI USB to I2C converter which allows the PC based Orca Semi OS1000 GUI software to read and write to all the internal registers which control and configure all operation modes. Download the OS1000 GUI software from the OS1000 product page at orcasemi.com.

Battery Simulator

The OS1000EVAL board contains a basic electronic load which can be used to simulate a battery allowing demonstration of the battery charging functions. Potentiometer RV3 is used to set the voltage of the battery simulator and allows the user to see all the states of the charging function as they manually "sweep" the voltage across the expected voltage range of a typical Li+ battery.

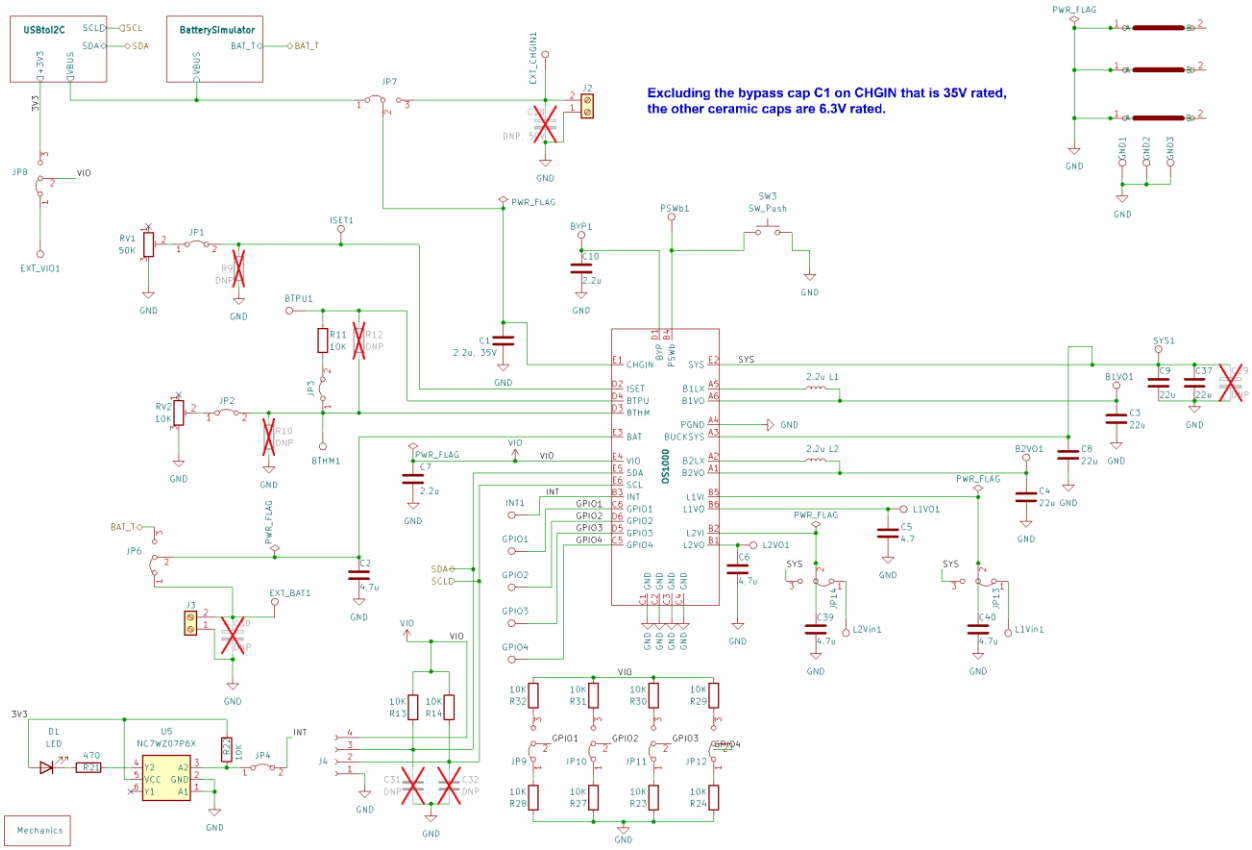
Configuration Jumpers and Switches

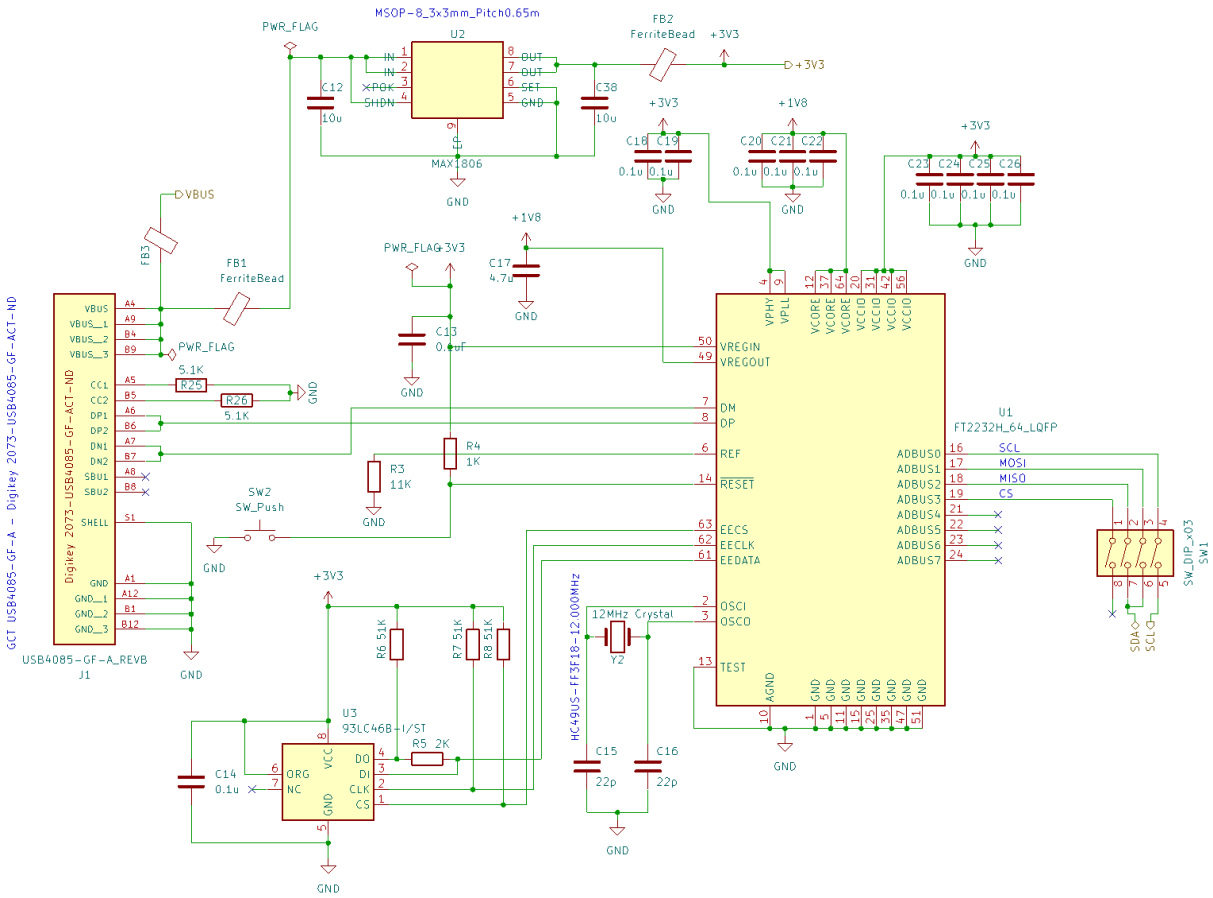
The OS1000EVAL board has many configuration jumpers that set operation modes. These jumpers, their functions and recommended default settings are shown below.

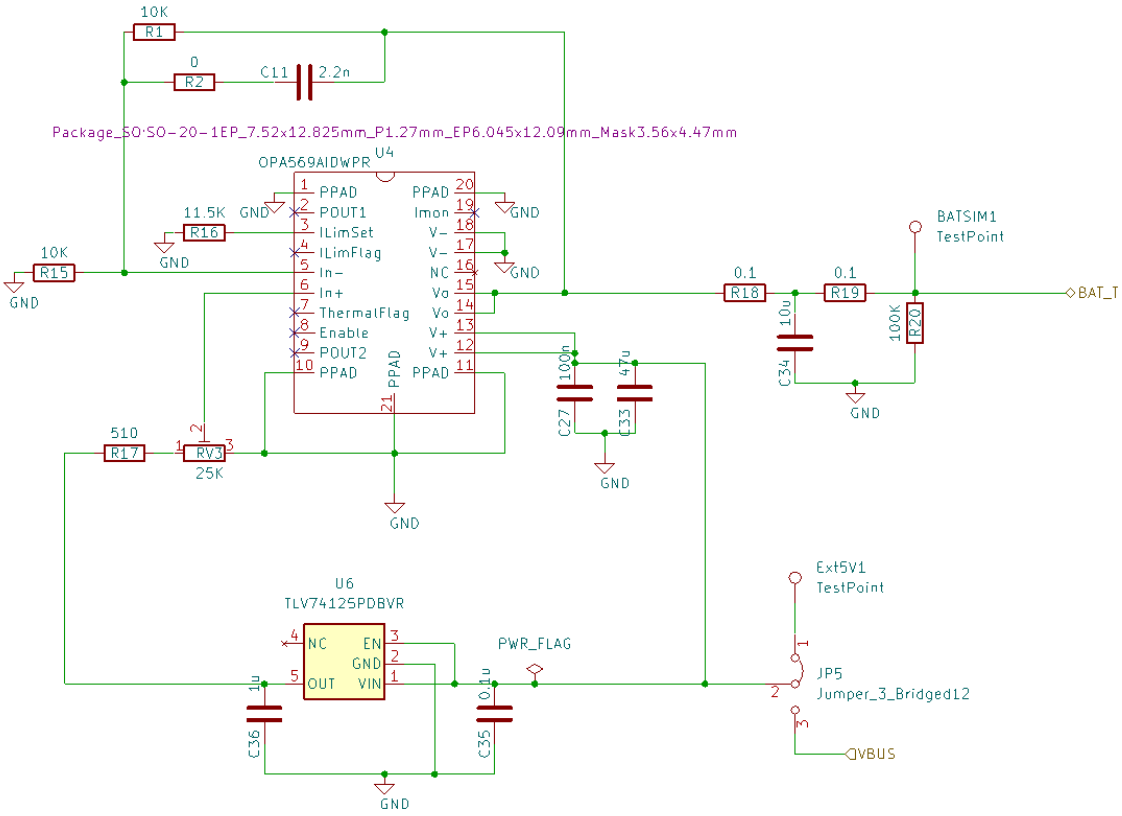
Jumper	Function	Default
JP1	Select onboard ISET resistor (Potentiometer RV1)	Closed
JP2	Select onboard battery thermistor model (Potentiometer RV2)	Closed
JP3	Connect 10K pullup resistor between BTPU and BTHM	Closed
JP4	Connect LED driver to INT pin	Closed
JP5	Connect Battery Simulator power source to external source (1-2) or USB-C VBUS (2-3)	2-3
JP6	Connect BAT pin to external source (1-2) or Battery Simulator (2-3)	2-3
JP7	Connect CHGIN pin to USB-C VBUS (1-2) or external source (2-3)	1-2
JP8	Connect VIO pin to external source (1-2) or 3.3V from USBtoI2C converter (2-3)	2-3
JP9	Connect GPIO1 pin to GND (1-2) or VIO (2-3) or leave open	Open
JP10	Connect GPIO2 pin to GND (1-2) or VIO (2-3) or leave open	Open
JP11	Connect GPIO3 pin to GND (1-2) or VIO (2-3) or leave open	Open
JP12	Connect GPIO4 pin to GND (1-2) or VIO (2-3) or leave open	Open
JP13	Connect L1VI to external source (1-2) or SYS (2-3)	2-3
JP14	Connect L2VI to external source (1-2) or SYS (2-3)	2-3

Switch	Function	Default
SW1	4 position DIP switch to connect USBtoI2C converter to SCL and SDA pins	All Closed
SW2	Reset USBtoI2C converter	Open
SW3	Momentary push button to connect PSWB pin to GND	Open

Schematics

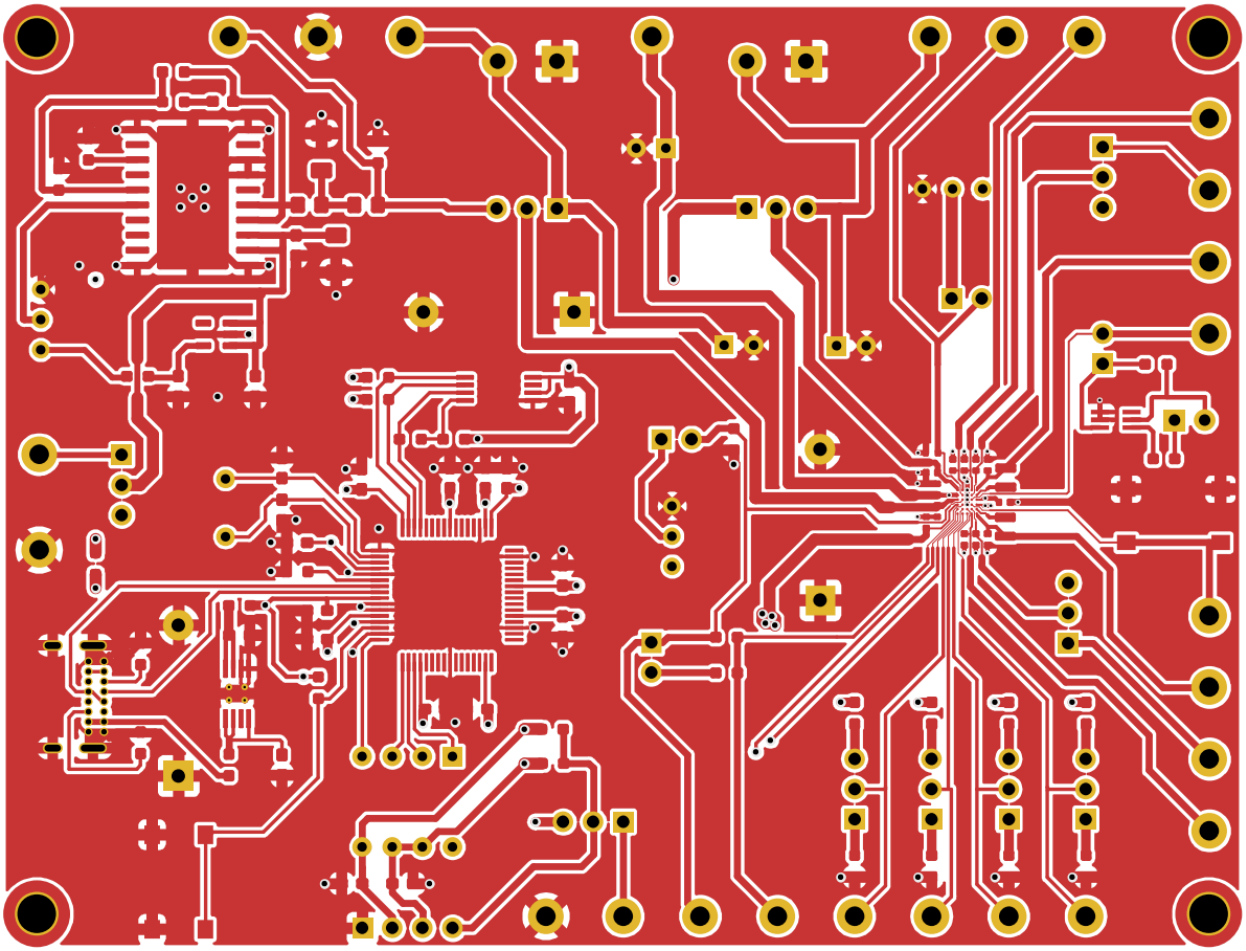

Excluding the bypass cap C1 on CHGIN that is 35V rated,
the other ceramic caps are 6.3V rated.
USBtoI2C
BatterySimulator
OS1000
Mechanics


MSOP-8_3x3mm_Pitch0.65m
U2
MAX1806
PWR_FLAG
FB2
FerriteBead
+3V3
C12
10u
C38
10u
C18
C19
0.1u
0.1u
C20
C21
C22
+1V8
C23
C24
C25
C26
VBUS
FB3
FB1
FerriteBead
PWR_FLAG
C17
4.7u
C13
0.1uF
GCT USB4085-GF-A - Digikey 2073-USB4085-GF-ACT-ND
Digikey 2073-USB4085-GF-ACT-ND
USB4085-GF-A_REVB
J1
5.1K
R25
R26
5.1K
R4
1K
R3
11K
SW2
SW_Push
U1
FT2232H_64_LQFP
SCL
MOSI
MISO
CS
SDA
SCL
SW_DIP_x03
SW1
R6 51K
R7 51K
R8 51K
U3
93LC46B-I/ST
R5 2K
C14
0.1u
12MHz Crystal
Y2
C15
22p
C16
22p
HC49US-FF3F18-12.000MHz
GND

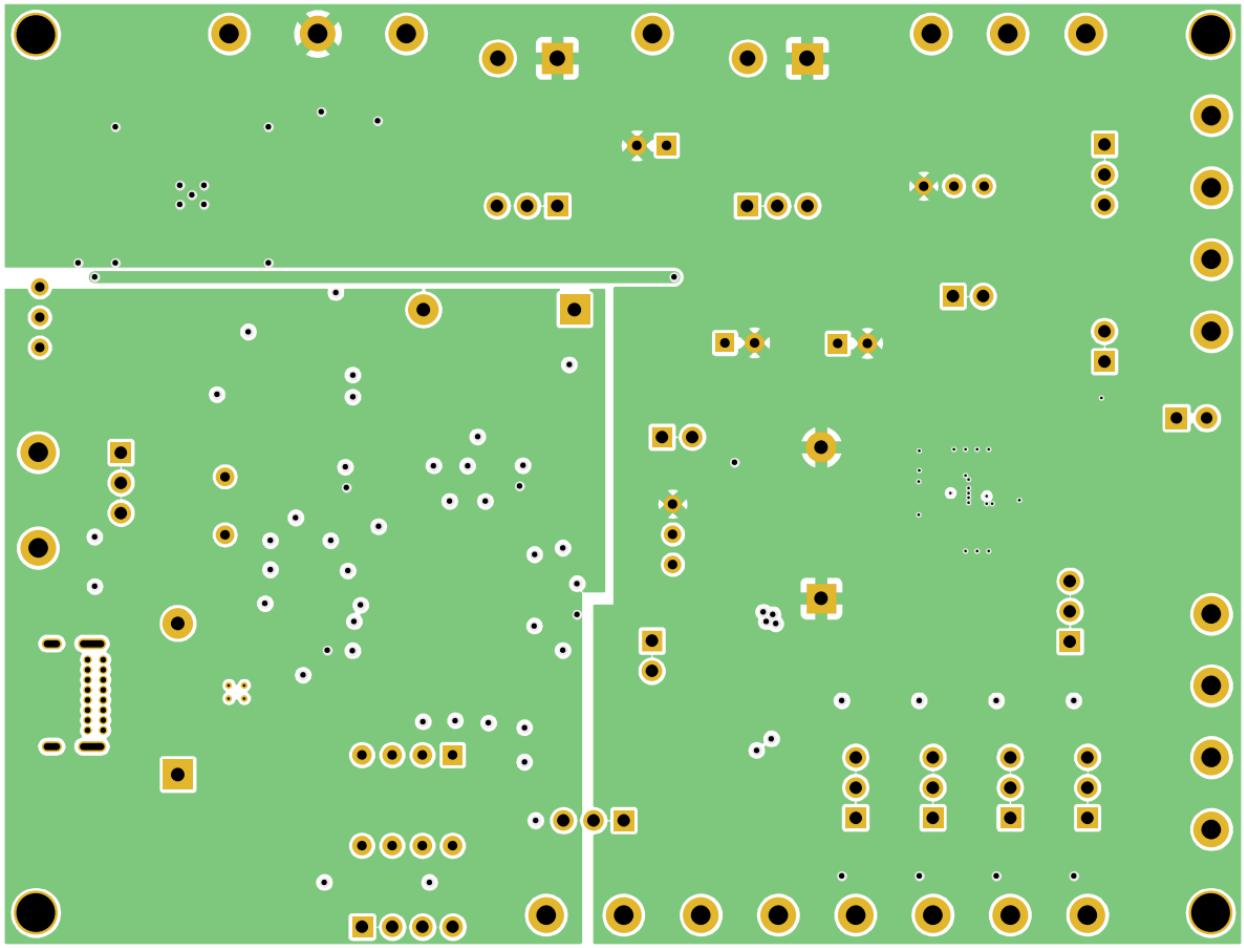

10K
R1
0
R2
C11
2.2n
Package_SO:SO-20-1EP_7.52x12.825mm_P1.27mm_EP6.045x12.09mm_Mask3.56x4.47mm
OPA569AIDWPR
U4
PPAD
POUT1
ILimSet
ILimFlag
In-
In+
ThermalFlag
Enable
POUT2
PPAD
Imon
V-
V-
NC
Vo
Vo
V+
V+
PPAD
11.5K
R16
GND
10K
R15
0.1
R18
0.1
R19
BATSIM1
TestPoint
BAT_T
10u
C34
100K
R20
100n
C27
47u
C33
510
R17
RV3
25K
U6
TLV74125PDBVR
NC
GND
OUT
EN
GND
VIN
PWR_FLAG
Ext5V1
TestPoint
JP5
Jumper_3_Bridged12
VBUS
1u
C36
0.1u
C35

PCB Layout

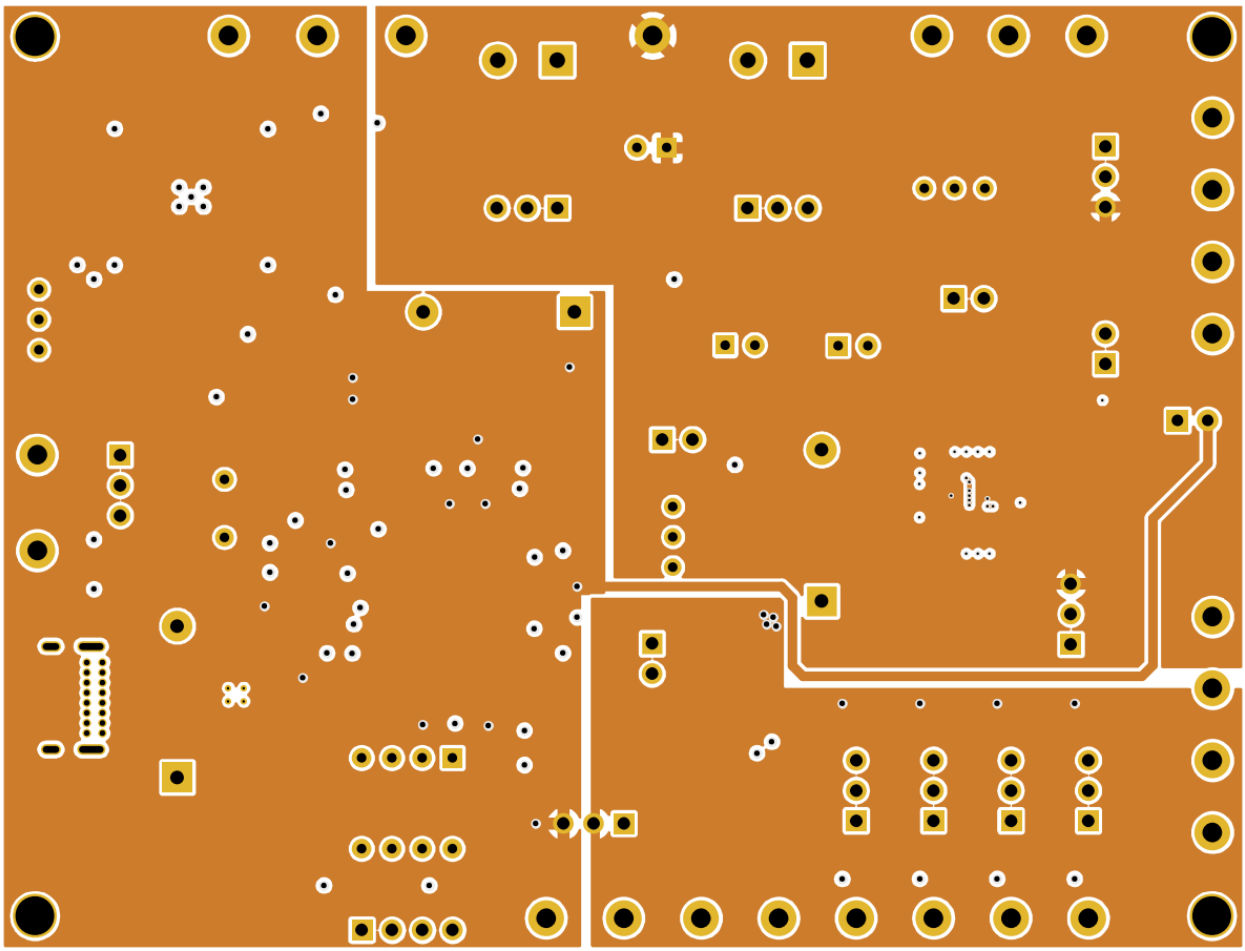
Top Layer



Inner Layer 1



Inner Layer 2



Bottom Layer