GENERAL DESCRIPTION:

The EVB guide is a reference design allowing the user to evaluate the performance of the MSN12AD60-RUD. The MSN12AD60-RUD is a digital synchronous DC/DC power module. The digital controller, power MOSFETs and most of support components are integrated in one hybrid package.

The module is a dual phase digital synchronous buck with adaptive loop compensation, for point-of-load (POL) applications. The output can supply 0.6V to 1.8V, and can be configured and controlled via PMBus, with a single resistor, or through programming stored in the non-volatile memory (NVM). The control algorithm adapts to the application environment, on a cycle-by-cycle basis, optimizing performance, regardless of variation such as initial component tolerance, temperature, input voltage, output voltage and load characteristics (capacitive / inductive etc.). The module also integrates adaptive phase add and drop which can improves system loss by up to 30%.

EVB BOARD INFORMATION

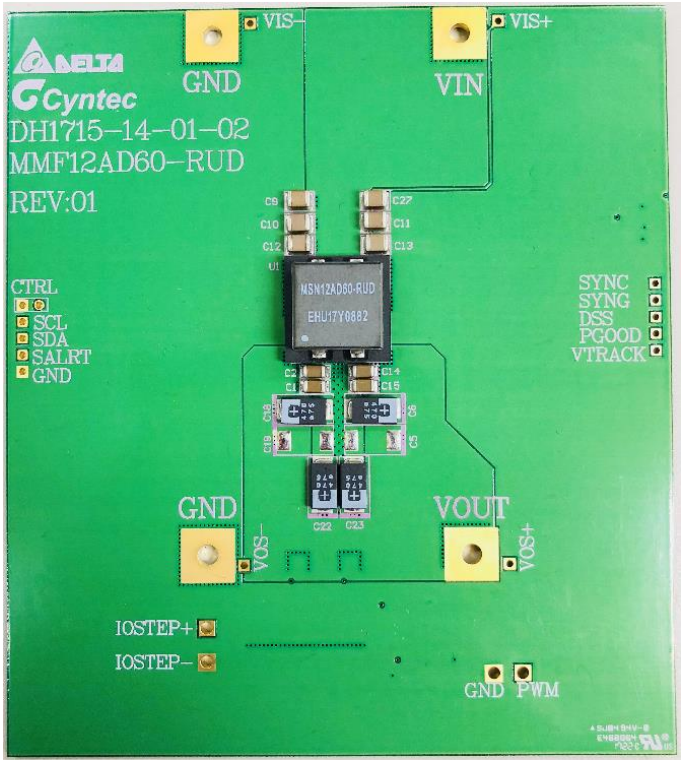


Figure 1: Evaluation Board

ELECTRICAL SPECIFICATION:

Parameters	Symbol	Value	Note
Input Voltage	VIN	8.0V~15.0V	
Output Voltage	VOUT	0.6V~1.8V	
Output Current	IOUT	60A	
Enable Voltage	EN	1.5V~3.3V	

TYPICAL PERFORMANCE CHARACTERISTICS: (VOUT=0.85V)

Conditions: T_A = 25 ºC,unless otherwise specified.
VIN=12V, VOUT=0.85V,Cin= 22uF/16V/1210×4, 4.7uF/25V/0805×2, Cout = 100uF/6.3V/1210×4, POSCAP 470uF/2.5V×4.
The output ripple and transient response measurement is short loop probing and 20MegHz bandwidth limited.
Test Board Information: 110mm×100mm×1.6mm, 4 layers.

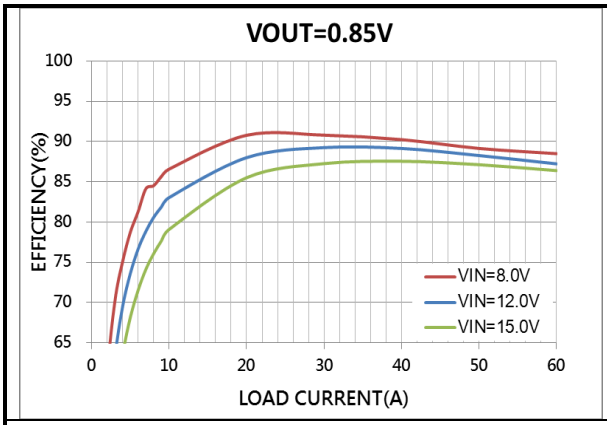


FIG.2 EFFICIENCY V.S. LOAD CURRENT (VIN=12V, VOUT=0.85V)

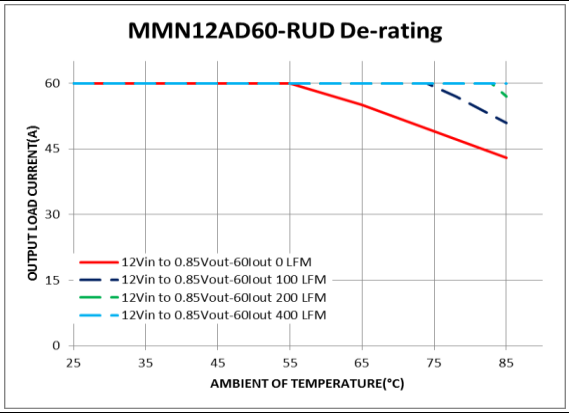


FIG.3 DE-RATING CURVE (VIN=12V, VOUT=0.85V)

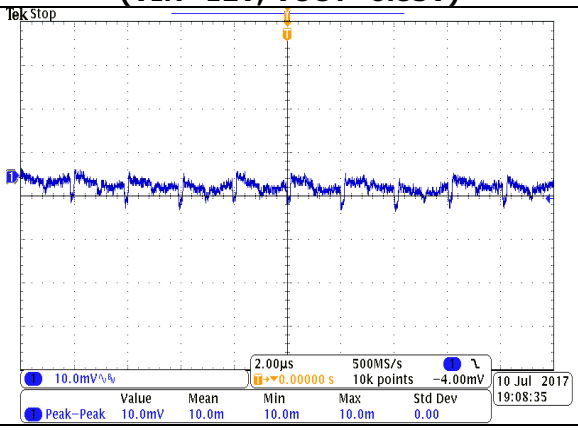


FIG.4 OUTPUT RIPPLE (12VIN, 0.85VOUT, IOUT=60A)

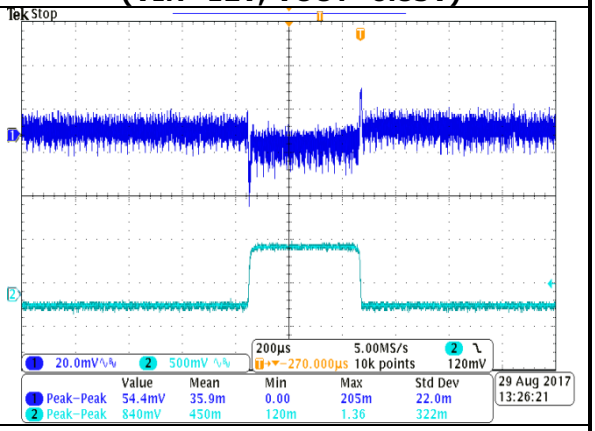


FIG.5 TRANSIENT RESPONSE

CONNECTION DIAGRAM:

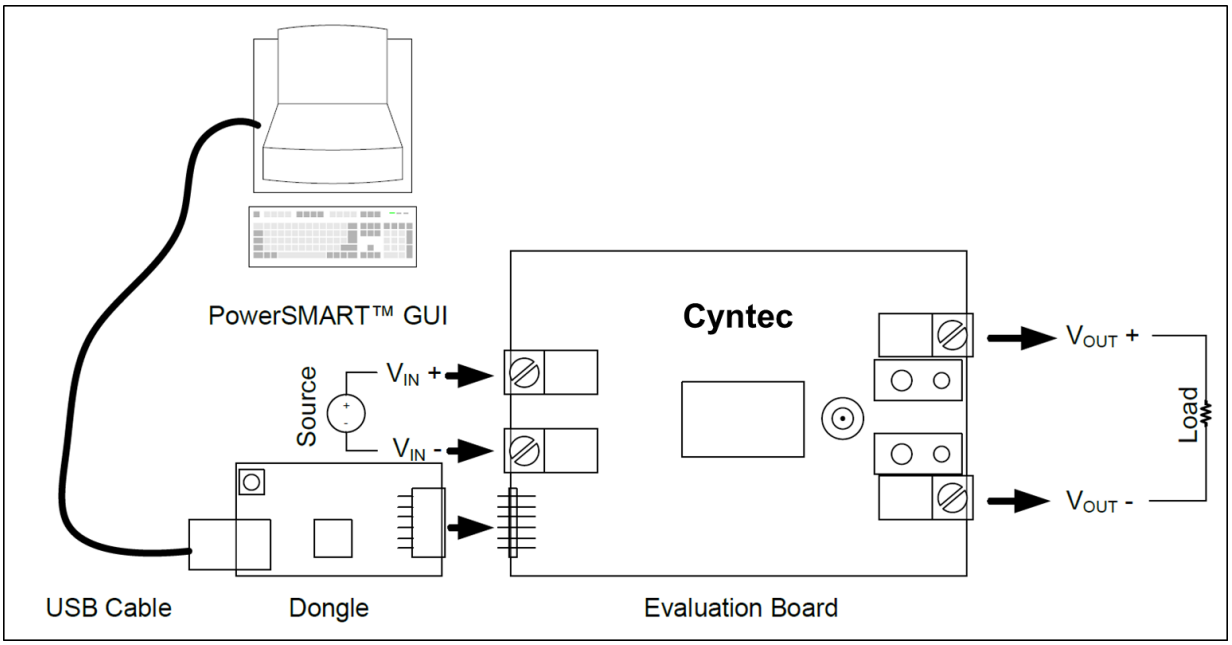


Figure 6: Connection Diagram

Connection Instructions

1. Connect all equipment as shown in Figure 2. The dongle is provided separately by Cyntec and is connected into pin header.
2. Be sure the input source is rated for more than the full power of the output.
3. Start the PowerSMART™ GUI from a host PC.
4. Power on the source input.
5. Turn device output on, and control parameters from the PowerSMART™ GUI.

POWERSMART™ DESIGN TOOL: GRAPHICAL USER INTERFACE:

PowerSMART is graphical user interface (GUI) based design tool. This interface allows the user to communicate with the digital control IC on the power supply via the user's computer. PowerSMART runs on the user's machine and exchanges information over a common USB connection. Cyntec evaluation boards are provided with a USB/I2C interface that allows the user to communicate with the control IC through its SMBus lines.

Using the design tool, the user is able to communicate with the Cyntec power module to receive/monitor information from the power supply and IC, as well as program settings to the controller. The user is able to view the power supply's status, input/output voltages, output current, phase current sharing, and fault conditions detected by the controller. More than 60 parameters (e.g., switching frequency, VOUT level, and protection and fault limits) may be configured and adjusted within the GUI environment.

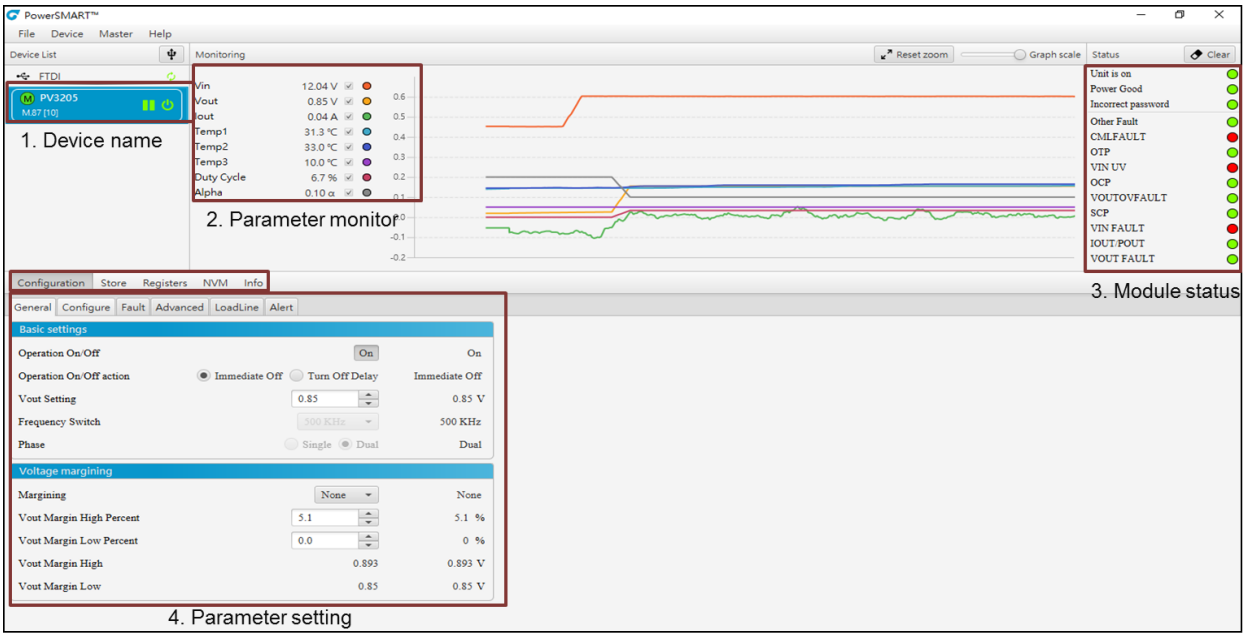


Figure 7: GUI Tool

REFERENCE DESIGN BOARD SCHEMATIC:

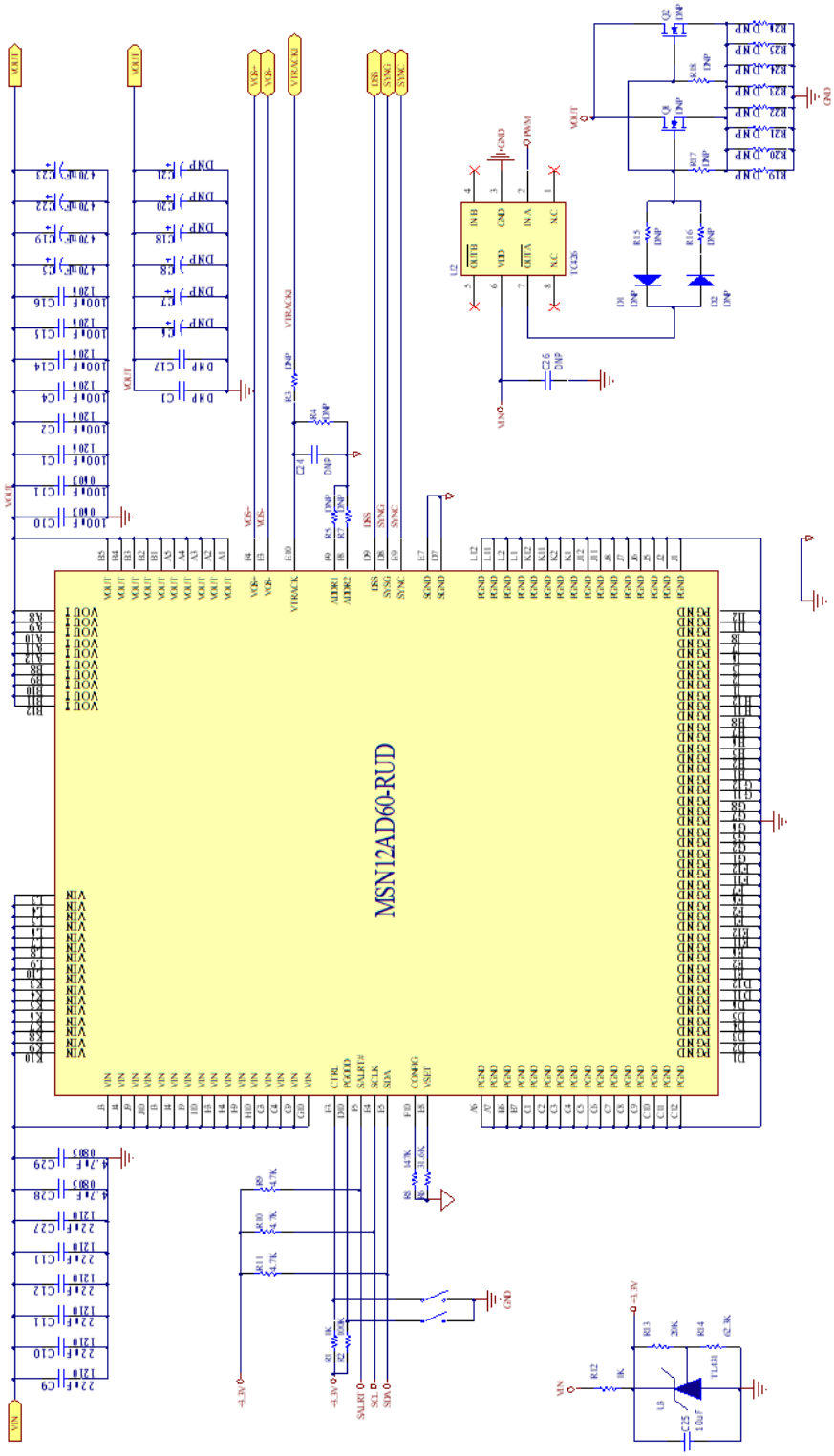
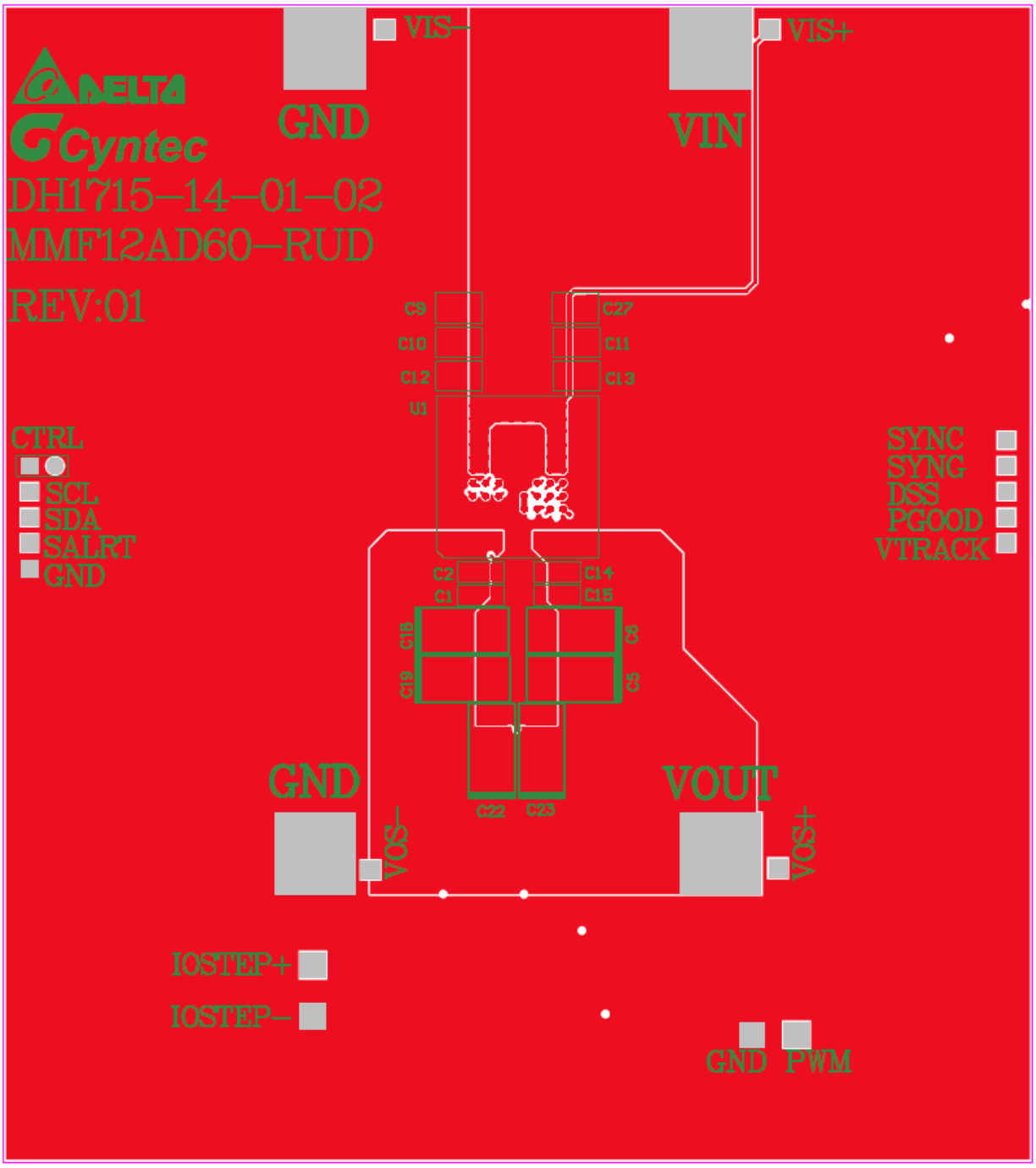
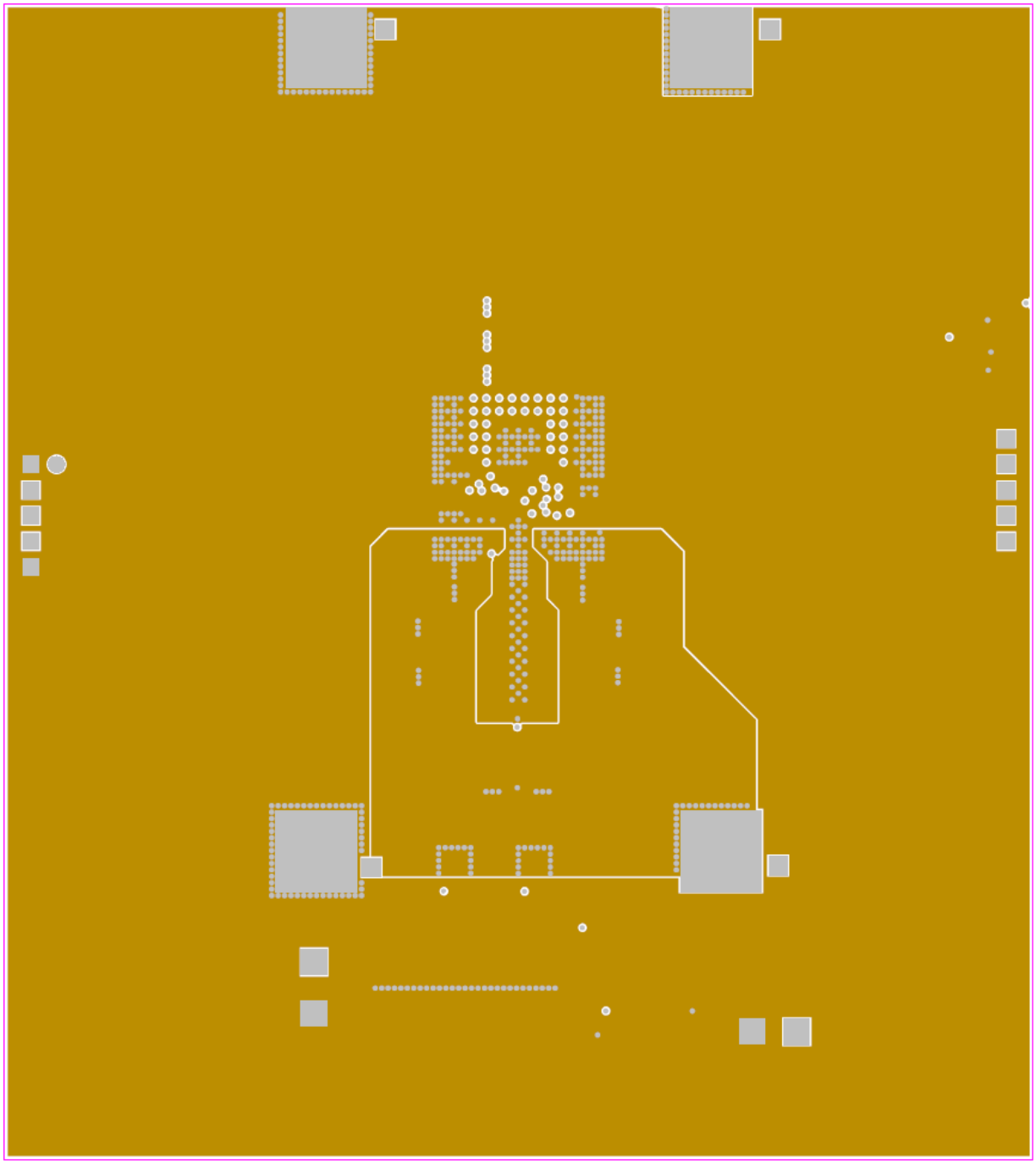


Figure 8: Reference Design Board Schematic

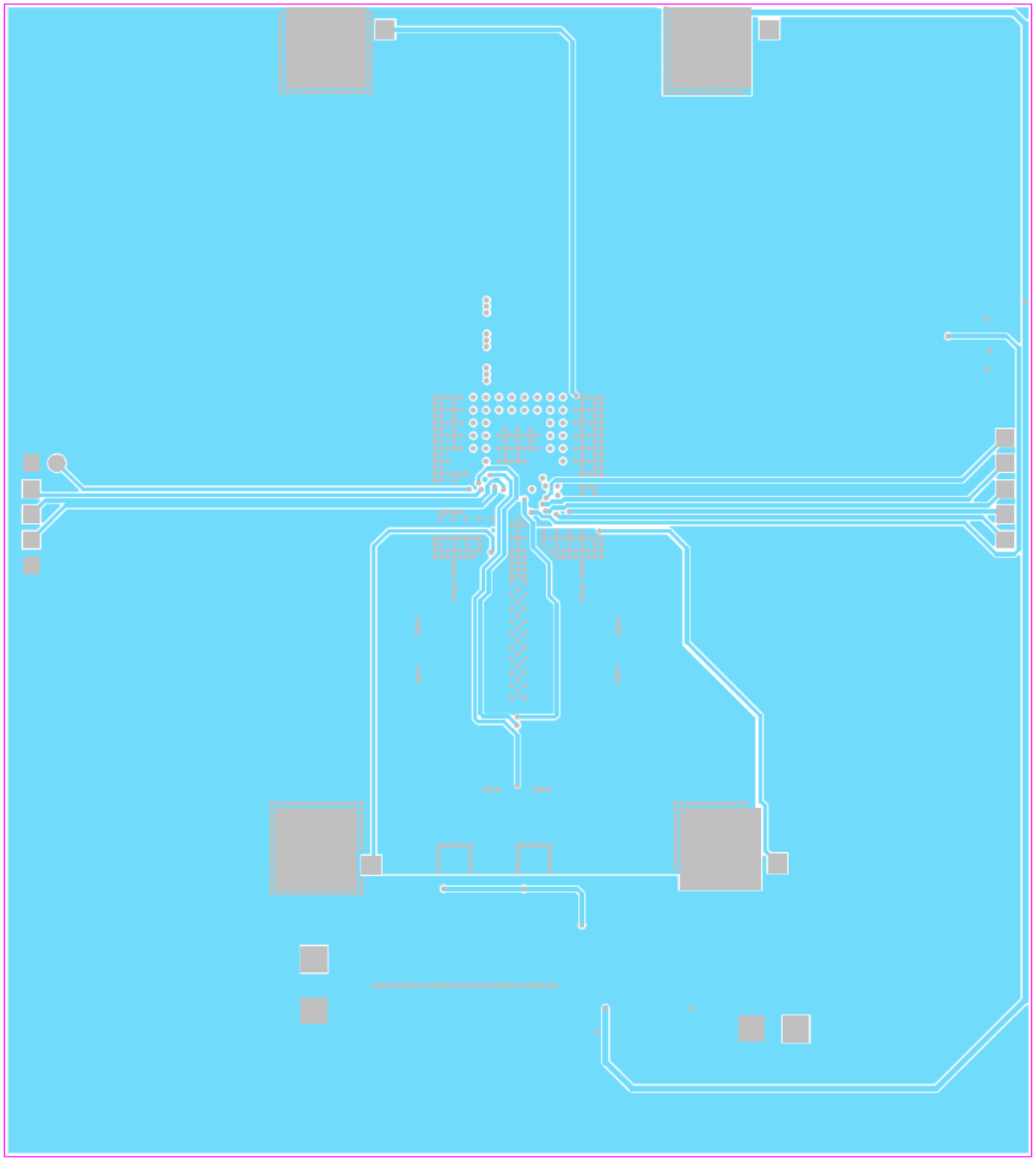
PRIENTED CIRCUIT BOARD LAYOUT:



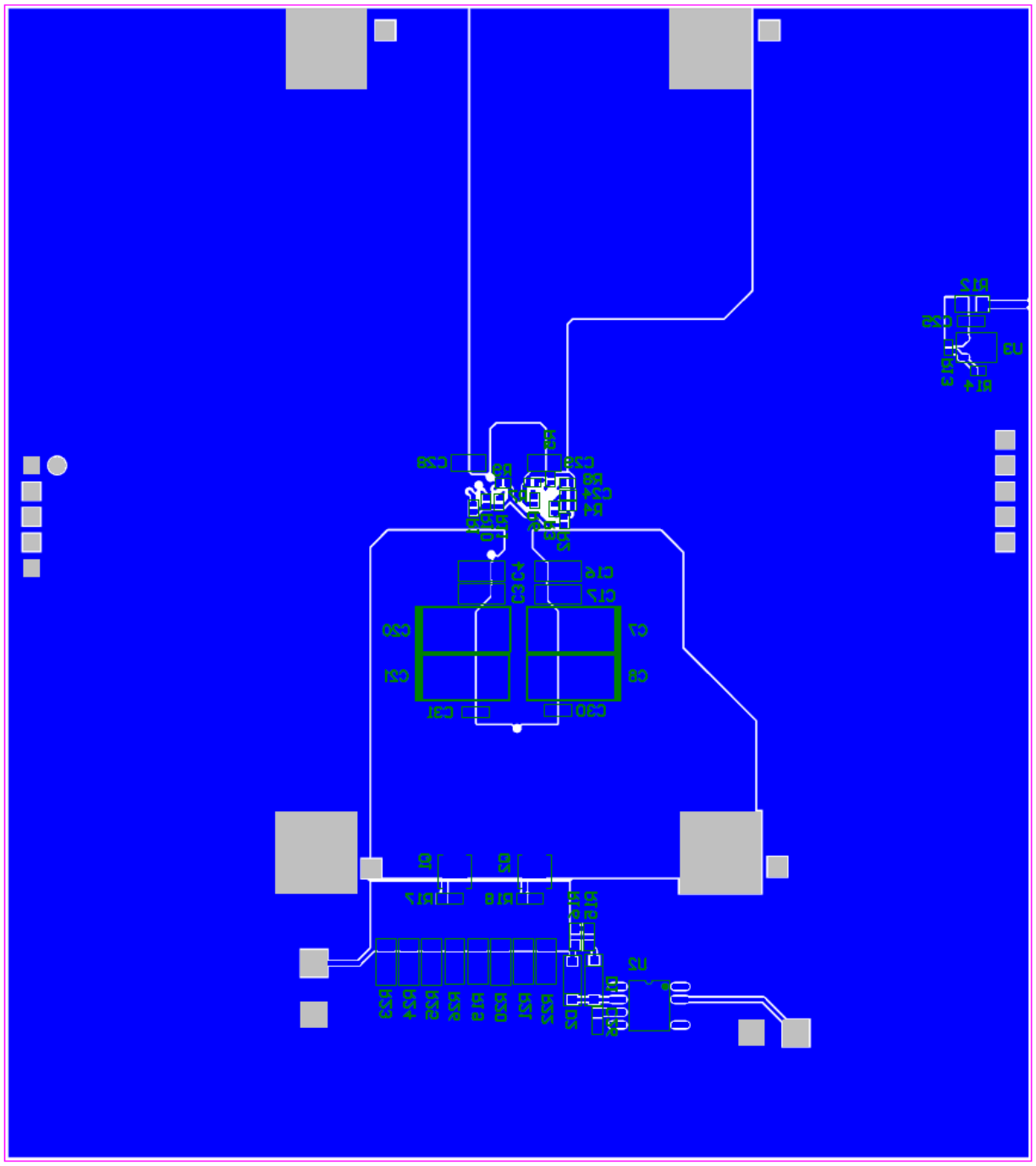
TOP Layer



Middle Layer 1



Middle Layer 2



Bottom Layer

BOM LIST:

COUNT	REF DES	DESCRIPTION	PART NUMBER	MFR
4	C1,C2,C14,C15,	MLCC,100uF/6.3V 1206 X5R	GRM31CR61A107ME05	Muruta
10	C3,C17,C6,C7,C8, C18,C20,C21,C24, C26	DNP	DNP	N.C.
4	C5,C19,C22,C23	POSCAP,470uF/2.5V	2R5TPE470M9	Pansonic
6	C9,C10,C11,C12, C13,C27	MLCC,22uF/25V 1210 X7R	GRM32ER71E226ME15	Muruta
1	C25	MLCC,10uF/6.3V 0603 X5R	GRM188R60J106ME47	Muruta
2	C28,C29	MLCC,4.7uF/25V 0805 X7R	GRM21BR71E475KA73	Muruta
2	C30,C31	MLCC 100nF/10V 0603 X7R	GRM188R71C104KA01	Muruta
1	R1	RES,1k 0402	RR0510S-102-FN	Cyntec
1	R2	RES,100k 0402	RR0510S-104-FN	Cyntec
16	R3,R4,R5,R7,R15, R16,R17,R18,R19, R20,R21,R22,R23 ,R24,R25,R26	RES,DNP	DNP	N.C.
1	R6	RES,31.6k 0402	RR0510S-3162-FN	Cyntec
1	R8	RES,147k 0402	RR0510S-1473-FN	Cyntec
3	R9,R10,R11	RES,4.7k 0402	RR0510S-472-FN	Cyntec
1	R12	RES,1k 0805	RC0805FR-071KL	Yageo
1	R13	RES,20k 0402	RR0510S-203-FN	Cyntec
1	R14	RES,62k 0402	RR0510S-623-FN	Cyntec
1	U1	IC,MSN12AD60-RUD	MSN12AD60-RUD	Cyntec
1	U2	DNP	DNP	N.C.
1	U3	IC,TL431	TL431	TSC
2	Q1,Q2	DNP	DNP	N.C
2	D1,D2	Diode	DNP	N.C

REVERSION HISTORY:

Date	Revision	Changes
2017.10.19	00	Issue initial preliminary EVB guide.
2018,03,28	01	Upgraded Vout Capacitors