Semiconductors

UM10117

PIP212-12M demonstration board

Rev. 02 — 18 January 2005 User manual

Document information

Info	Content
Keywords	PIP212, demo board, evaluation board
Abstract	This document introduces and describes the features and operation of the PIP212-12M demonstration board.

PHILIPS

Revision history

Rev	Date	Description
02	20050118	Second version
01	20050113	Initial version

Contact information

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1. Product description

The PIP212-12M evaluation board contains a fully operational two-phase buck converter capable of accepting a nominal 12 V source supply and converting to an output voltage of between 0.8 V to 5 V at currents of up to 60 A.

The only connections required to evaluate the design are to connect the input to a power supply and the output to the load. The input pads and output pads are mirrored to the top and bottom of the board. Solder connections can be made either to the top or bottom of the board and is the recommended method for connecting to the input and output.

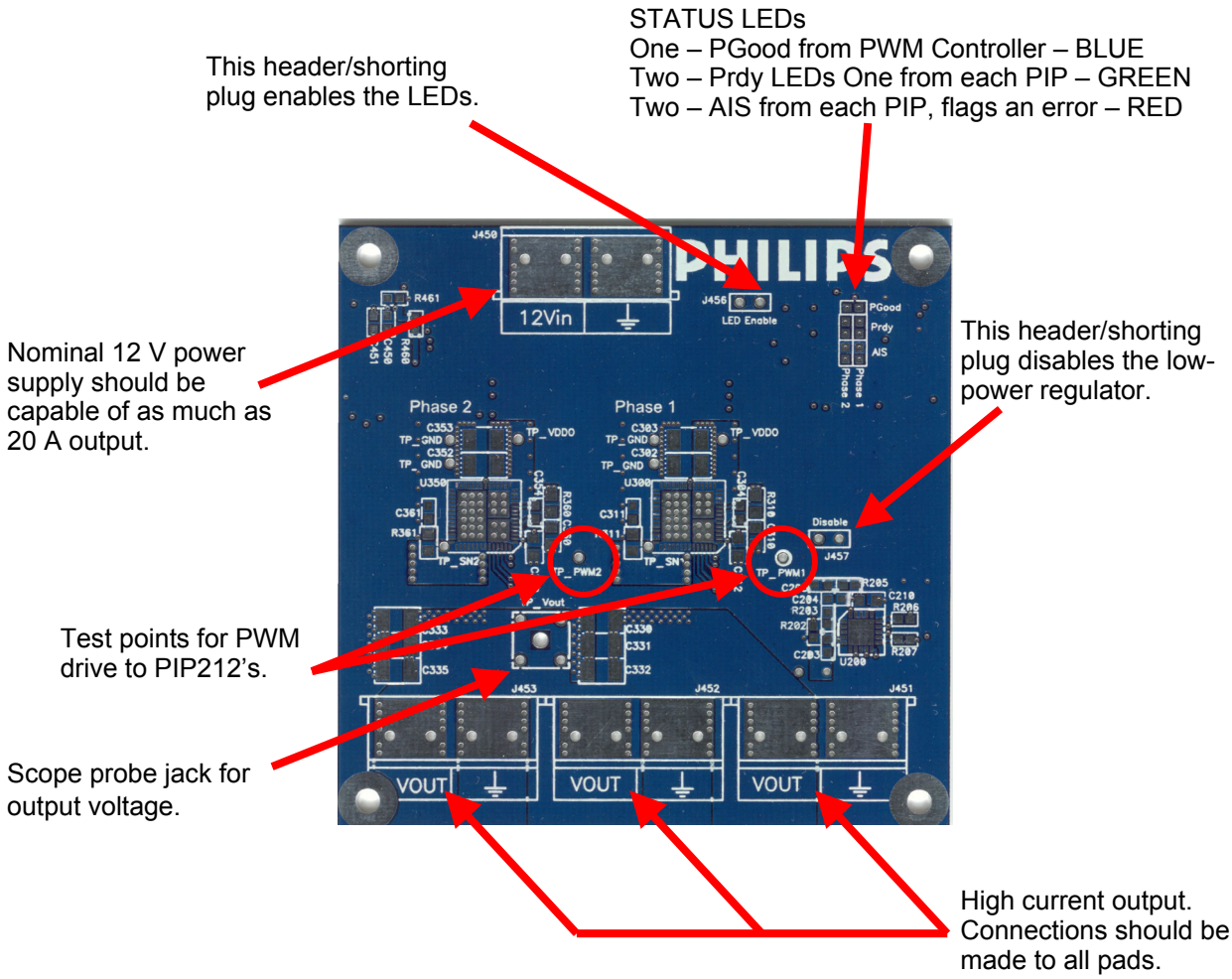
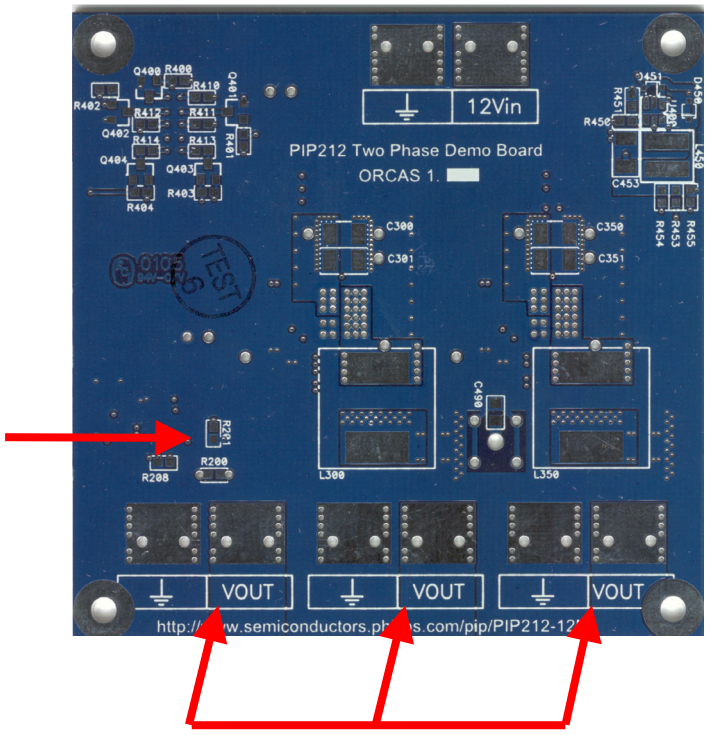


Fig 1. Top side of evaluation board

R201 controls the output voltage according to the following table:

V_{out}	R201
0.8 V	Open
1.0 V	40 kΩ
1.2 V	20 kΩ
1.3 V	16 kΩ
1.5 V	11.4 kΩ
1.8 V	8 kΩ
2.5 V	4.7 kΩ
3.3 V	3.2 kΩ



High current output. Connections should be made to all pads.

Fig 2. Bottom side of evaluation board

1.1 Operating options

The demo board contains a small onboard switching regulator to provide the $\mathbf{V_{DDG}}$ power to the PIP212-12M devices and the status LEDs. Although the regulator is efficient it does use a small amount of power, which can impact efficiency measurements made on the board. The option has been provided to disconnect the PIP212-12M devices from this regulator and allow the devices to supply their own $\mathbf{V_{DDG}}$ power via the built in $\mathbf{V_{DDG}}$ regulator internal to the PIP212 or allow $\mathbf{V_{DDG}}$ power to be provided from an external user supplied power supply. Additionally the LEDs consume power and can be disconnected minimizing the power drawn from the LEDs for "true" efficiency measurements. If the regulator is not used to provide power for the PIP212-12M devices and the LEDs it can be completely disabled as described below.

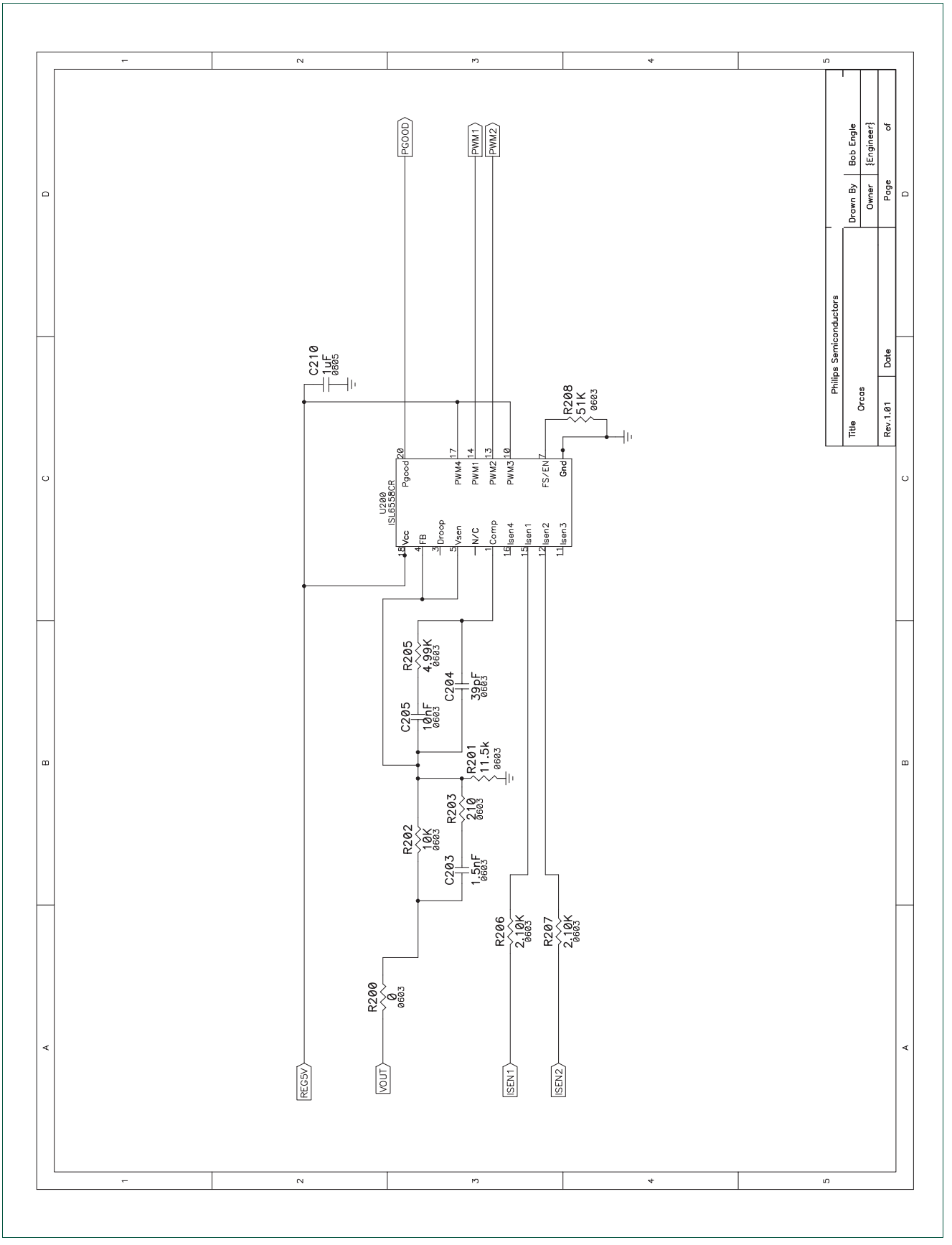
- **Disconnecting the PIP212-12M devices from the auxiliary V_{DDG} regulator:** To allow the PIP212-12M devices to generate and use their own internal $\mathbf{V_{DDG}}$ supply, the auxiliary $\mathbf{V_{DDG}}$ regulator can by disconnected from the PIPs by removing 0 Ω resistors, R453, R454 and R455. This operation will cause a slight increase in power dissipation of the PIP212-12M devices.
- **Supplying external V_{DDG} power:** The PIP212-12M devices must be disconnected from the auxiliary $\mathbf{V_{DDG}}$ regulator as above, except do not remove 0 Ω resistor, R455. Solder a wire to the bottom pads of R453 and R454 (closest to the PIPs) and another wire to a convenient ground point, such as a nearby TP_GND pad. Supply an

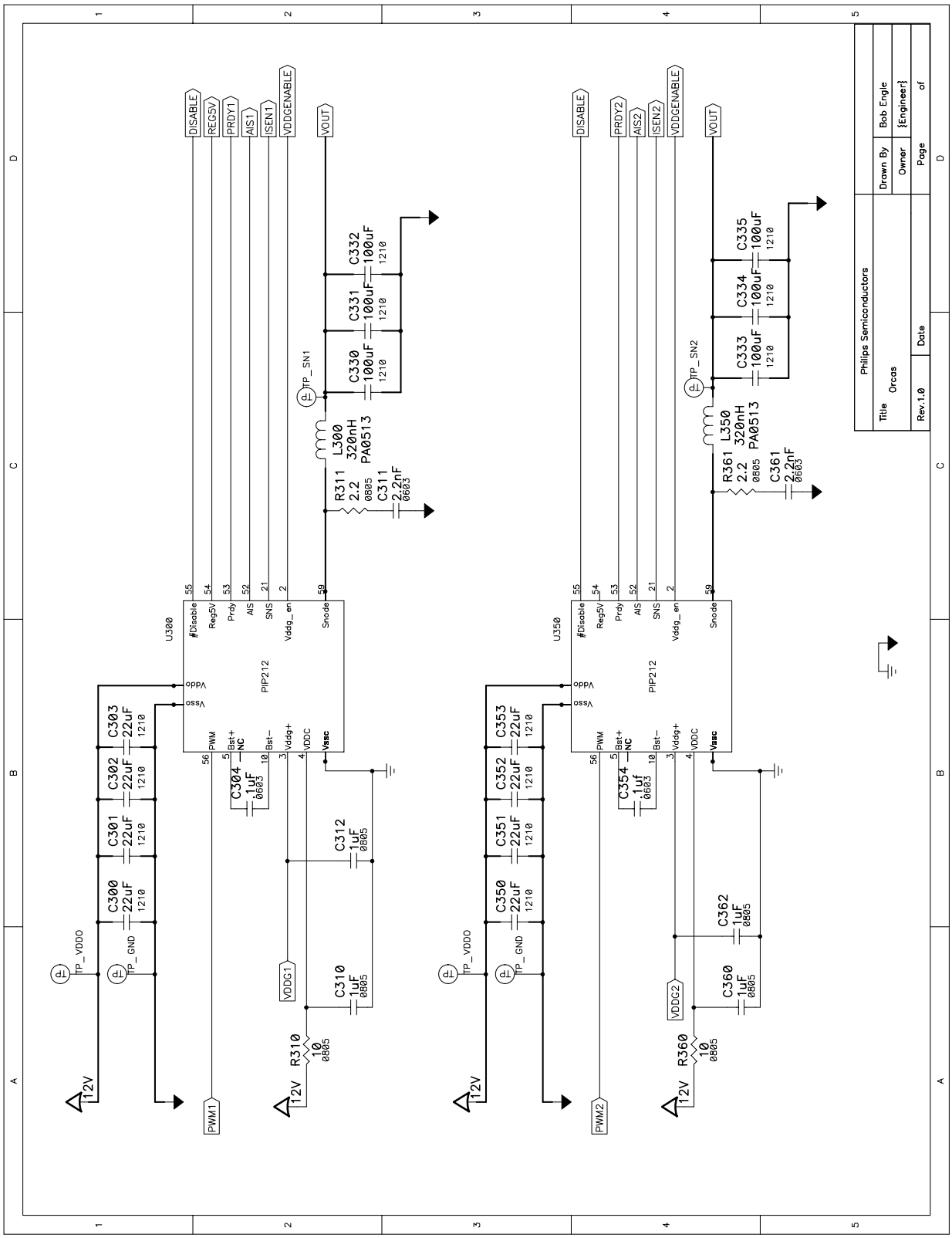
external positive voltage to the wire that goes to the resistor pads with the ground return to the TP_GND wire. Refer to the PIP212 data sheet for required $\mathbf{V_{DDG}}$ voltages needed to power the PIP212-12M devices.

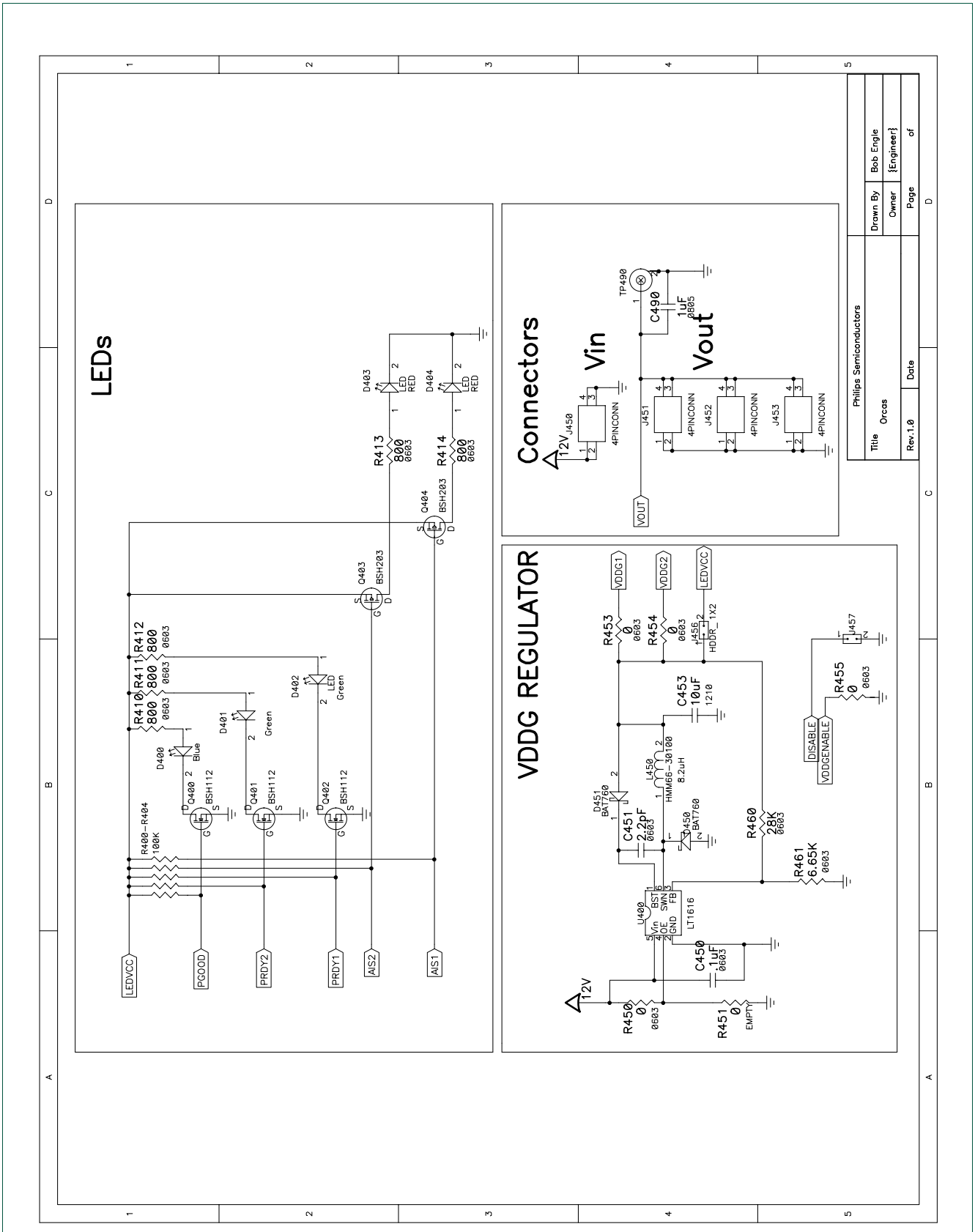
- **LED power saving:** This option will disconnect power from the LED circuits for more accurate efficiency measurements. To disable LED power, remove the shorting plug on J456, LED Enable.
- **To completely disable the auxiliary V_{DDG} regulator:** Disconnect the $\mathbf{V_{DDG}}$ regulator as above, and also remove R450, a 0 Ω resistor. Install a 0 Ω resistor in the position for R451. This will shutdown the auxiliary $\mathbf{V_{DDG}}$ regulator and will remove the small power requirement used by the $\mathbf{V_{DDG}}$ regulator for more accurate efficiency measurements.
- **PIP shutdown:** To put the PIPs into a shutdown or disabled state, install a shorting plug on J457. This will pull the signal line “Disable” to ground and will keep the PIPs off until the shorting plug is removed.

Table 1: Evaluation board Bill of Materials

Item	Qty	Value	Package	Tolerance	Rating	Manufacturer	Manufacturer P/N	Designation
1	1	1.5 nF	0603	+/-10 %	50 V			C203
2	1	39 pF	0603	+/-10 %	50 V			C204
3	1	2.2 pF	0603	+/-10 %	50 V			C451
4	2	2.2 nF	0603	+/-10 %	50 V			C311,C361
5	1	10 nF	0603	+/-10 %	50 V			C205
6	3	0.1 µF	0603	+/-10 %	50 V			C304,C354,C450
7	6	1 µF	0805	+/-10 %	16 V			C210,C310,C312,C360,C362,C490
8	1	10 µF	1210	+/-5 %	16 V	TDK	C3225Y5V1C106Z	C453
9	8	22 µF	1210	+80 % -20 %	16 V	TDK	C3225Y5V1C226Z	C300,C301,C302,C303,C350,C351,C352,C353
10	6	100 µF	1210	+/-20 %	6.3 V	Murata	GRM32ER60J107ME20	C330,C331,C332,C333,C334,C335
11	5	0	0603	+/-5 %				R200,R450,R453,R454,R455
12	1	210	0603	+/-1 %				R203
13	5	820	0603	+/-5 %				R410,R411,R412,R413,R414
14	2	2.1 kΩ	0603	+/-1 %				206,R207
15	5	100 kΩ	0603	+/-5 %				R400,R401,R402,R403,R404
16	1	10 kΩ	0603	+/-1 %				R202
17	1	11.5 kΩ	0603	+/-1 %				R201 (value changes vs output voltage)
18	1	28 kΩ	0603	+/-1 %				R460
19	1	4.99 kΩ	0603	+/-1 %				R205
20	1	51 kΩ	0603	+/-1 %				R208
21	1	6.65 kΩ	0603	+/-1 %				R461
22	2	2.2	0805	+/-5 %				R311,R361
23	2	10	0805	+/-5 %				R310,R360
24	2	A4	SOT323		5 A	Philips	BAT760	D450,D451
25	2	RED	0603		2.1 V	Lite-On	LTST-C090GKT	D403, D404
26	2	Green	0603		2.1 V	Lite-On	LTST-C190GKT	D401,D402
27	1	Blue	0603		3.8 V	Lite-On	LTST-C190UBKT	D400
28	1	10 µH		+/-20 %		BI	HM66-30100	L450
29	2	320 nH	.	+/-20 %		Pulse Engineering	PA0513.321	L300,L350
30	3		SOT23			Philips	BSH112	Q400,Q401,Q402
31	2		SOT23			Philips	BSH203	Q403,Q404
32	1		SOT23-6			Linear Technology	LT1616ES6	U400
33	1		5 x 5 QFN			Intersil	ISL6558CR	U200
34	2		8 x 8 MLF		12 V	Philips	PIP212-12M	U300,U350
35	4		4 POS		15 A / POS	Digikey	ED2227-ND	J450,J451,J452,J453
36	2		2 POS		0.025 pin header			J456, J457
37	1	TP_Vout				Tektronix	131-5031-00	TP490
38	1	0	EMPTY					R451







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3. Contents

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