UM10117

PIP212-12M demonstration board

Rev. 03 — 15 February 2007 **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.

Revision history

Rev	Date	Description
03	20070215	The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. Legal texts have been adapted to the new company name where appropriate. Removed all AIS functions.
02	20050118	Second version
01	20050113	Initial version

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1. Introduction

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.

2. Evaluation board

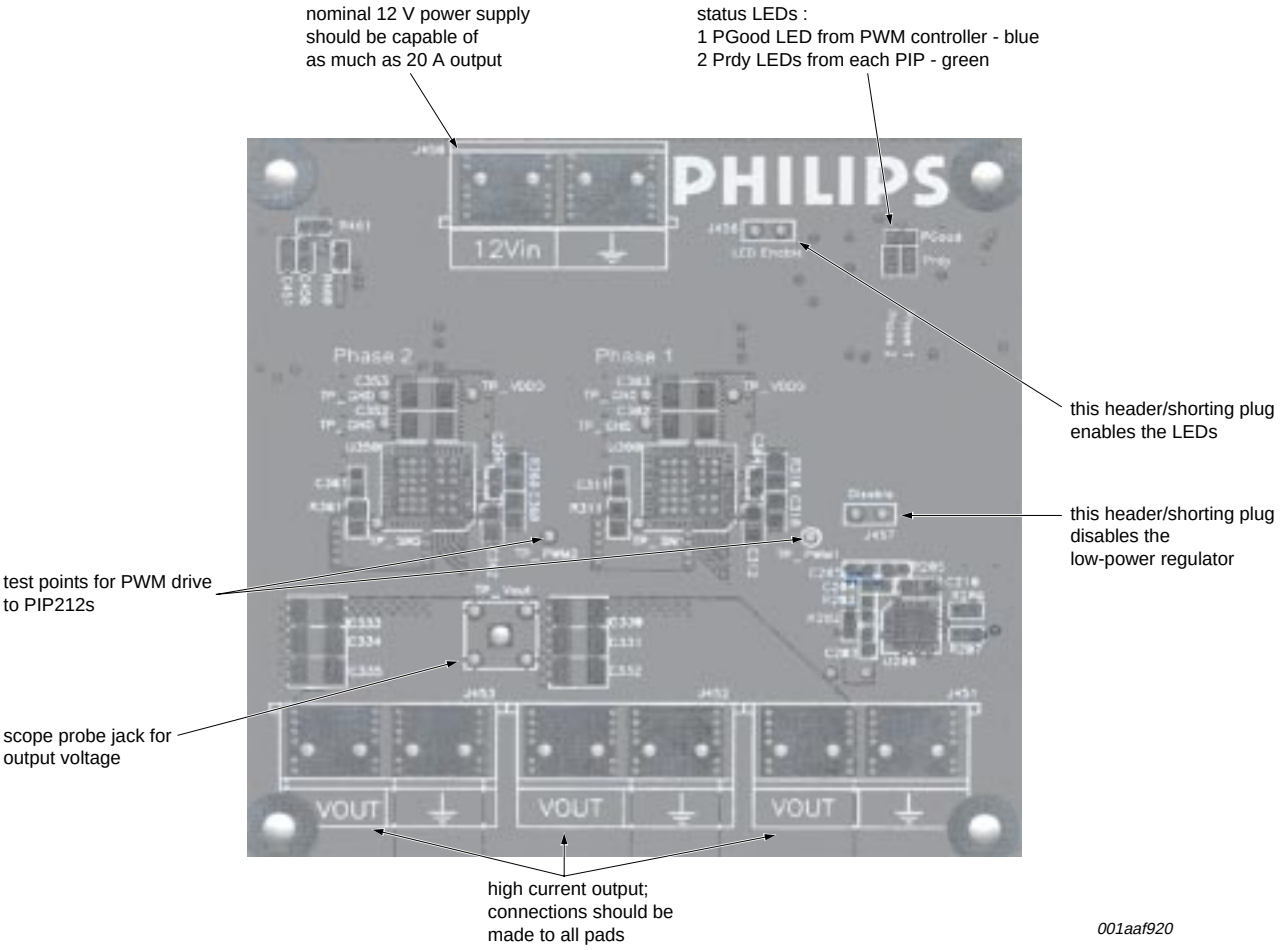
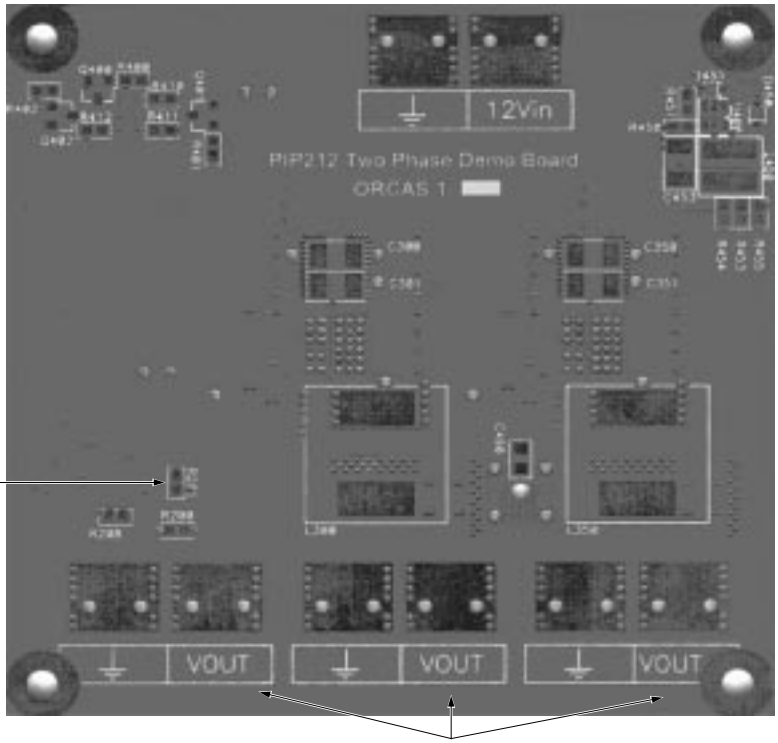


Fig 1. Evaluation board - top side



V_O	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

Fig 2. Evaluation board - bottom side

3. Operating options

The demo board contains a small on-board switching regulator to provide the 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 V_{DDG} power via the built-in V_{DDG} regulator internal to the PIP212-12M or allow 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:

- Disconnecting the PIP212-12M devices from the auxiliary V_{DDG} regulator.

  To allow the PIP212-12M devices to generate and use their own internal V_{DDG} supply, the auxiliary V_{DDG} regulator can by disconnected from the PIP212-12Ms 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.

Disconnect the PIP212-12Ms from the auxiliary V_{DDG} regulator, except do not remove resistor R455 (0 Ω). Solder a wire to the bottom pads of R453 and R454 (closest to the PIP212-12Ms) 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 *PIP212-12M data sheet* for required V_{DDG} voltages needed to power the 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 PIP212-12Ms from the auxiliary V_{DDG} regulator and also remove resistor R450 (0 Ω). Install a 0 Ω resistor in the position for R451. This will shutdown the auxiliary V_{DDG} regulator and will remove the small power requirement used by the V_{DDG} regulator for more accurate efficiency measurements.

- PIP212-12M shutdown.

  To put the PIP212-12Ms 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 PIP212-12Ms off until the shorting plug is removed.

4. BOM

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	GRM32ER60J107 ME20	C330, C331, C332, C333, C334, C335
11	5	0 Ω	0603					R200, R450, R453, R454, R455
12	1	210 Ω	0603	±1 %				R203
13	3	820 Ω	0603	±5 %				R410, R411, R412
14	2	2.1 kΩ	0603	±1 %				R206, R207
15	3	100 kΩ	0603	±5 %				R400, R401, R402
16	1	10 kΩ	0603	±1 %				R202
17	1	11.5 kΩ	0603	±1 %				R201[1]
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 Ω	0805	±5 %				R311, R361
23	2	10 Ω	0805	±5 %				R310, R360
24	2	A4	SOD323		5 A	NXP Semiconductors	BAT760	D450, D451
25	2	green	0603		2.1 V	Lite-On	LTST-C190GKT	D401, D402
26	1	blue	0603		3.8 V	Lite-On	LTST-C190UBKT	D400
27	1	10 µH		±20 %		BI	HM66-30100	L450
28	2	320 nH		±20 %		Pulse Engineering	PA0513.321	L300, L360
29	3		SOT23			NXP Semiconductors	BSH112	Q400, Q401, Q402
30	1		SOT23-6			Linear Technology	LT1616ES6	U400
31	1		5x5 QFN			Intersil	ISL6558CR	U200
32	2		8x8 MLF		12 V	NXP Semiconductors	PIP212-12M	U300, U350
33	4		4 POS		15 A/pos	Digikey	ED2227-ND	J450, J451, J452, J453

Table 1. Evaluation board bill of materials *…continued*

Item	Qty	Value	Package	Tolerance	Rating	Manufacturer	Manufacturer P/N	Designation
34	2		2 POS		0.025 pin header			J456, J457
35	1		TP_Vout			Tektronix	131-5031-00	TP490
36	1	0 Ω	empty					R451

[1] Value changes versus output voltage.

5. Schematics

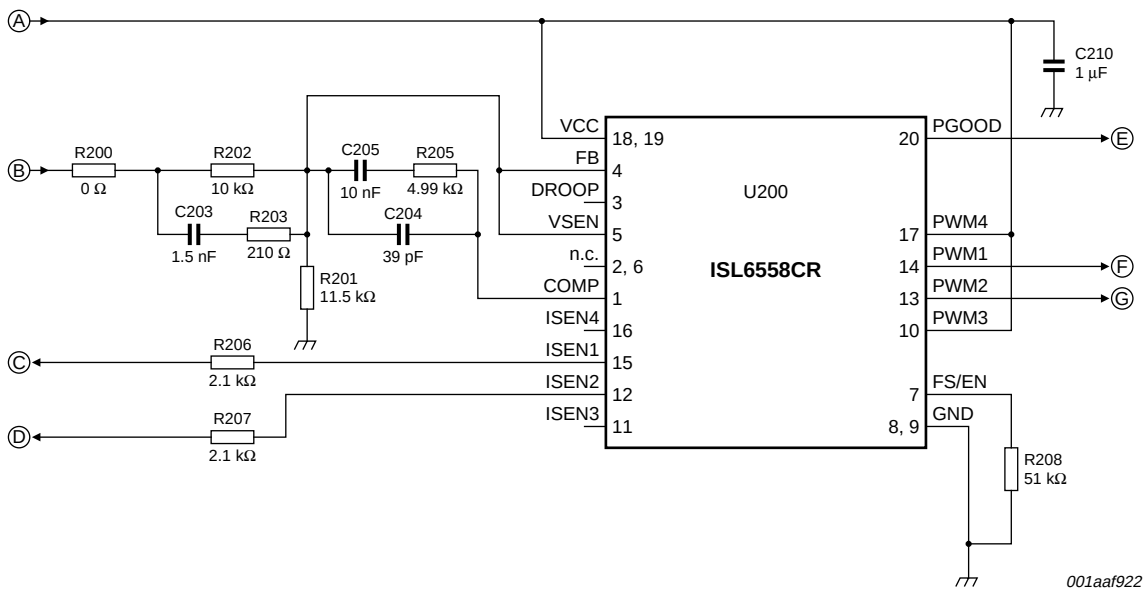


Fig 3. Circuit diagram PWM

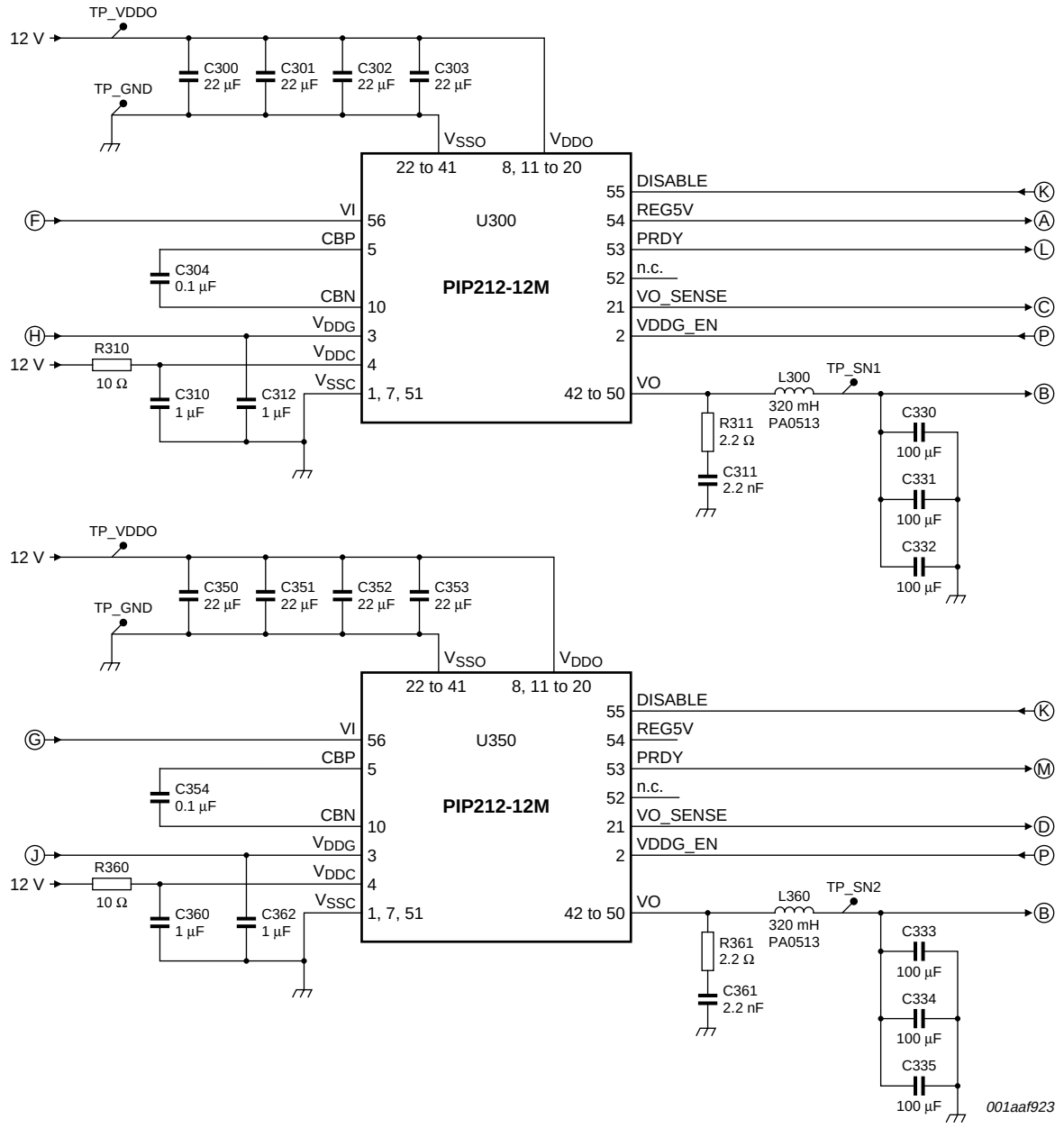


Fig 4. Circuit diagram PIP212-12M

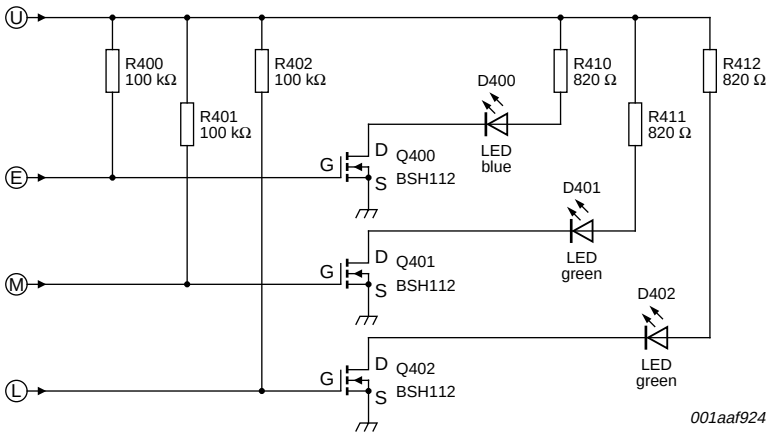


Fig 5. Circuit diagram LEDs

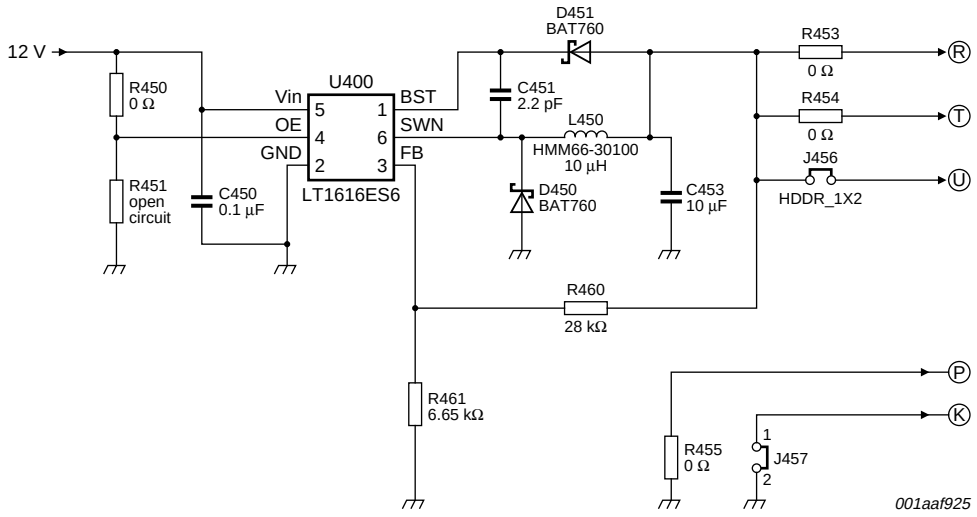


Fig 6. Circuit diagram V_{DDG} regulator

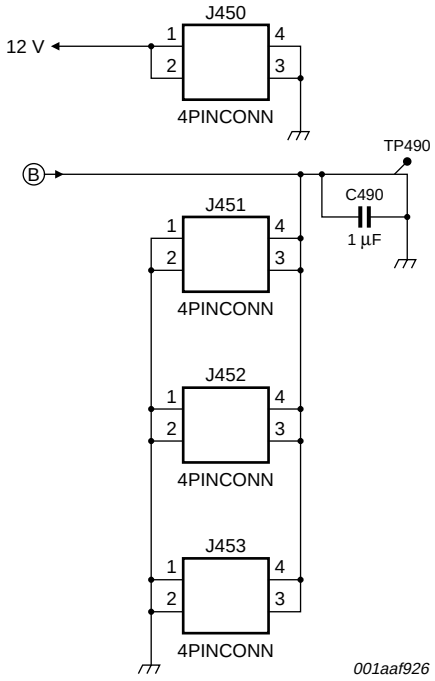


Fig 7. Circuit diagram connectors

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