UPGRADING FROM ZY2160 TO dPWER DP8160 POLs

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INTRODUCTION

Customers that have integrated ZY2160 No-Bus POLs sometimes experience stability problems. These are due to the limited transient load capabilities of ZY2160 applications. The next generation technology DP8160 dPOLs are a very attractive solution. This note addresses how one customer made the leap with a relatively simple solution.

USAGE

Pin and signal names are in ARIEL UC.

THE NO-BUS TO BUS CONUNDRUM

No-Bus parts are virtually identical in the makeup of component parts. The key differences between Bus and No-Bus versions of Power-One POLs lie in the use of configuration pins. Key connections such as PG, OK, SD, IBV, VOUT and Ground are the same. Repurposing the secondary connections is generally rather easy, typically a matter of changing which jumpers are installed, and possibly modifying the Enable input connect.

The most important difference is that Bus parts require a DPM connected to SD and OK, and a No-Bus part does not. With no DPM, the ability to adjust for application needs is somewhat limited. Bus parts can be custom configured for a wider range of application demands.

So, the key obstacle in changing from No-Bus to Bus parts is that there is no provision for adding a DPM to the customer's board. Conversion requires adding a DPM and its support components, but altering the application board to do this is generally a very expensive and time consuming.

Here is a comparison of the pin functions for the two products:

Table 1 Module Pinout Comparison

PIN	ZY2160 NAME	NOTES	DP8160
1	TRIM		ADDR0
2	NC	No Pin	No Pin
3	OK		
4	PG		
5	SYNC		SD
6	CS		
7	GND		
8	GND		
9	**EN**		**ADDR1**
10	Vs-		
11	Vs+		
12	Vi+		
13	Vi+		
14	MARGIN		ADDR2
15	CCA	Compensation Sel	ADDR3
16	IM		ADDR4
17	GND		
18	Vo+		
19	GND		
20	Vo+		
21	GND		
22	Vo+		
23	GND		
24	Vo+		

Note that pin 9 has a conflict. To convert this footprint to the new module, the function of the signal to this pin has to change; it must be either high or low, but must not change after the DPM comes out of reset.

A SIMPLE SOLUTION

A simple solution for one customer was to design and build a small, very thin circuit board that installs between the POLs and the application board. This board adds the necessary additional circuitry to support replacing the ZY2160 No-Bus POLs with DP8160 modules.

ADVANTAGES

The advantages of installing the adapter board are this:

- No change in application board layout.
- More rugged power system.
- Invisible change to the application board - you have to look at the hardware to know it is present.
- Additional output and input filter capacitors to cope with any problematic load.
- Older application boards can be repaired with the new solution.
- With any future layout revision, the conversion provides a proven solution to integrate into the new lay-out.

DISADVANTAGES

- Adapter PCB raises the height clearance of the POL modules by about 32 mils.
- Some clear board area under and around the module footprint is required.
- Minimum module pin protrusion through the existing hole (15mils).

THE IMPLEMENTATION

The actual adapter footprint was about 70 x 40 mm. The size and shape of the board was dictated by needing to fit under three different ZY2180 modules. In one case a hole was included (disguised in the schematic as a mounting hole) to allow for a fuse chip that had to be left on the board.

Included in the adapter was a DPM, a regulator to supply VDD from IBV for the POL, some minor support resistors and capacitors, indicators for VDD, PG and OK status and a connector for programming the DPM. Further, sites were added to provide additional bulk filter capacitors to deal with suspected load transients and provide some input damping.

Of the five No-Bus POLs on the board, four were arranged in pairs that shared two distinct bus loads for a total of 3 voltage buses. The paired devices' SDC, CS and OK lines were interconnected so one adapter was installed for each of the pairs, and one for the remaining POL to bring the adapter count to three. (Note - If all of the POLs had been connected to the same SD line, one adapter would have been sufficient.)

Figure 1 shows the schematic drawn up for the adapter. This design is something of a Cadillac as in addition to sporting status indicator LEDs, it provided an LED that flashes when the DPM sends out a word on the SD Bus, and an optional external reference voltage as well as trim resistors to calibrate for high accuracy in IBV monitoring.

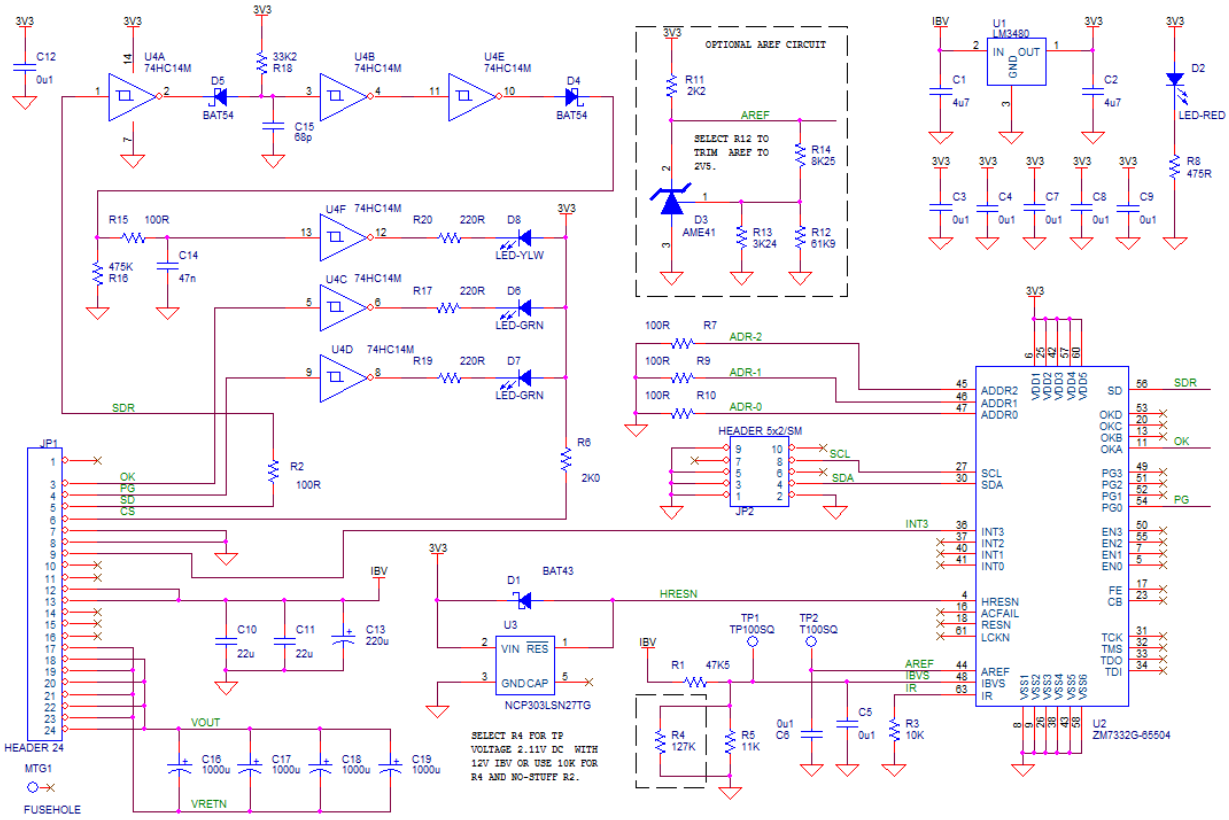
Were the indicators needed? No. All of the LEDs and the driver IC (a hex Schmidt Trigger inverter) are there to make debugging easier in manufacturing, but strictly speaking they could be left off.

The same can be said for the external reference (which the customer elected not to use) and the IBV sense trim (which was also not loaded.) They were added as "just in case" and there was enough room for the small additional board space. Note that the I2C connector was added for configuration in manufacturing. It is surface mount to avoid any leads penetrating through the board. A 10 pin connector was chosen to make hand assembling prototypes of the adapter much easier and cheaper. Any suitable connector that is surface mount would have worked.

The resolution of the conflict on pin 9, which was an enable from a CPLD, was resolved by reconfiguring the output from the CPLD to the pin to always be a tri-state output.

For convenience ADDR4 was set high on one of each DP8160 and low on its mate. The required using a ZM7332-65504 as the DPM. If the address range could have been limited to 0-7, the less expensive ZM7308-65502 would have been a cheaper part to use.

Figure 1 - DP8160 Adapter Schematic



RESULTS

Prototype adapters were assembled and then soldered to the new POLs before the POLs were installed on the application board. This subassembly approach eliminated potential problems getting the adapter through hole connections to solder when the application board goes through wave solder. Retro-fitting existing boards can make use of this approach.

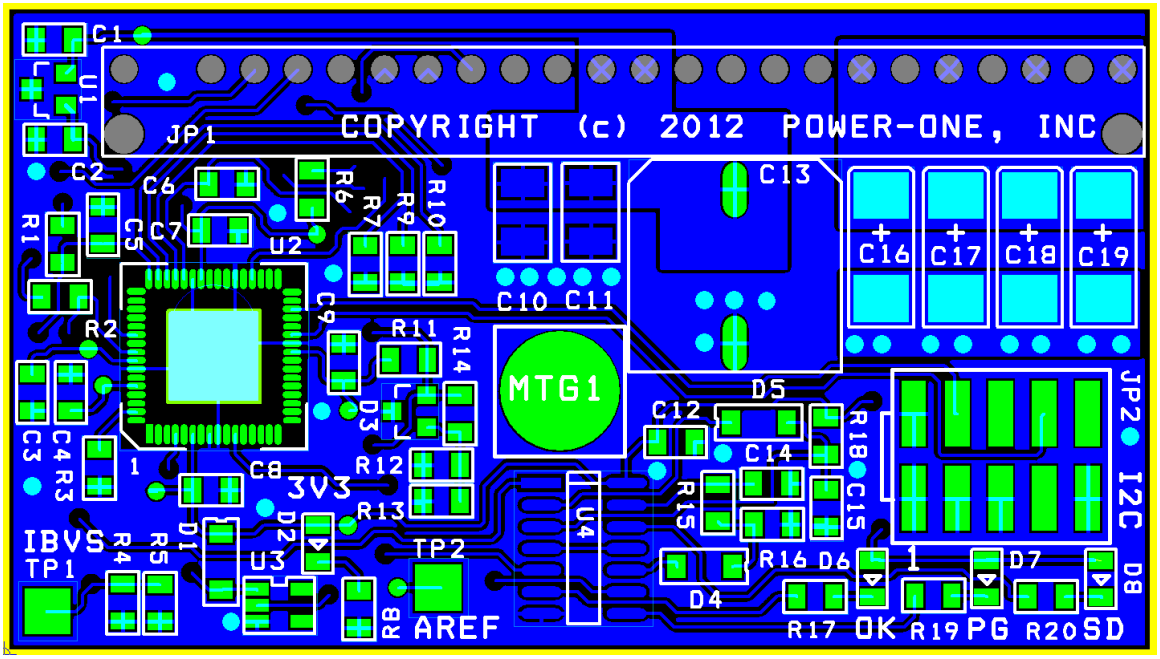
The application board was powered up and the DPM was configured to program each of the POLs with their application specific configurations. Testing of each POL confirmed compensation was optimal for each POL with its new load filter.

CONCLUSION

The presence of sufficient board space around the original POL modules allowed adding an in-line adapter that permitted successfully switching from the original modules which had limited flexibility to the new product without requiring a re-spin of an expensive application board. The solution is also suitable for retrofitting the new solution into boards already built.

APPENDIX

Figure 2 - Top Side Adapter Layout



All components are available through Digi-Key. The Gerber files and schematic were licensed to the customer at no cost so the customer could build or modify as future needs may require.