

## Proper Termination of Unused Port Connections

Dale Wellborn

PMP Systems Power

The TPS2384 quad integrated power sourcing equipment (PSE) power manager controls four ports in a Power over Ethernet (PoE) system. The device operates in two modes: autonomous, and as a peripheral to a host (typically a microprocessor). In autonomous mode, the device detects and powers IEEE-compliant powered devices (PDs). Autonomous mode is ideal for small PSE systems – often referred to as SOHO [small office/home office] – where the number of powered ports is four or fewer. In such systems, the proper termination of unused (port) pins is essential to ensure correct device operation.

Table 1 documents the proper termination of unused (port) pins in a single-port PSE system; port 1 is the active port, whereas ports 2, 3, and 4 are unused ports. The choice of used and unused ports is arbitrary. In general, for an unused port, the P-pin is connected to V48, the N-pin is unconnected, the RET pin is connected to analog ground, and the CINT pin is connected to V3.3. Note: The connection of pins designated NIC (no internal connection) to analog ground improves the device's thermal characteristics and prevents noise injection from unused pins. Figure 1 is a typical single-port PSE system.

**Table 1. Proper Termination of Unused (Port) Pins in a Single-Port PSE System**

PIN	PIN DESIGNATION	PIN DESCRIPTION	CONNECTION
1–3	NIC		Analog ground
4	CINT1	Integration capacitor, port 1	0.027- $\mu$ F capacitor
5	RET1	48-V return, port 1	48-V return
6	N1	Negative, 48-V load, port 1	Port negative, 48-V load return
7	P1	Positive, 48-V load, port 1	Port positive, 48-V load sense
8, 9	NC		Analog ground
10	P2	Positive, 48-V load, port 2	48 V
11	N2	Positive, 48-V load, port 2	No connection
12	RET2	48-V return, port 2	Analog ground
13	CINT2	Integration capacitor, port 2	V 3.3 (pin 24)
14–19	NIC		Analog ground
20	INTB	Interrupt output	No connection
21	ALT_A/B	Alternate A/B select	<By design, 0 $\rightarrow$ no back-off timer, 1 $\rightarrow$ back-off timer >
22	WD_DIS	Watchdog disable select	<By design, 0 $\rightarrow$ watchdog enabled, 1 $\rightarrow$ watchdog disabled>
23	DG	Digital ground	Digital ground
24	V3.3	3.3-V logic supply	0. 1 $\mu$ F, CInt 2-4, PORB
25	SCL	I2C serial clock	Digital ground
26	SDA_I	I2C serial data in	Digital ground
27	SDA_O	I2C serial data out	No connection
28	A1	I2C device address select, bit 1	Digital ground
29	A2	I2C device address select, bit 2	Digital ground
30	A3	I2C device address select, bit 3	Digital ground
31	A4	I2C device address select, bit 4	Digital ground
32	A5	I2C device address select, bit 5	Digital ground
33–35	NIC		Analog ground
36	CINT3	Integration capacitor, port 3	V3.3 (pin 24)
37	RET3	48-V return, port 3	Analog ground

**Table 1. Proper Termination of Unused (Port) Pins in a Single-Port PSE System (continued)**

PIN	PIN DESIGNATION	PIN DESCRIPTION	CONNECTION
38	N3	Negative, 48-V load, port 3	No connection
39	P3	Positive, 48-V load, port 3	48 V
40, 41	NC		Analog ground
42	P4	Positive, 48-V load, port 4	48 V
43	N4	Negative, 48-V load, port 4	No connection
44	RET4	48-V return, port 4	Analog ground
45	CINT4	Integration capacitor, port 4	V3.3 (pin 24)
46–49	NIC		Analog ground
50	AC_HI	AC Disconnect output (HI)	No connection
51	AC_LO	AC Disconnect output (LO)	No connection
52	SYN	Clock input/output	No connection
53	CT	Clock capacitor/select	220 pF
54	V2.5	2.5-V reference supply	0.1 $\mu$ F
55	RBIAS	Bias set resistor	124 k $\Omega$
56	RG	Reference ground	Reference ground
57	AG1	Analog ground 1	Analog ground
58	V10	10-V analog supply	0.1 $\mu$ F
59	V6.3	6.3-V analog supply	0.1 $\mu$ F
60	V48	48-V supply	0.1 $\mu$ F, 48-V supply
61	AG2	Analog ground 2	Analog ground
62	PORB	Power-on reset	V3.3 (pin 24)
63	MS	Mode select	Digital ground
64	NIC		Analog ground
65	PwPd	Power Pad	Analog ground

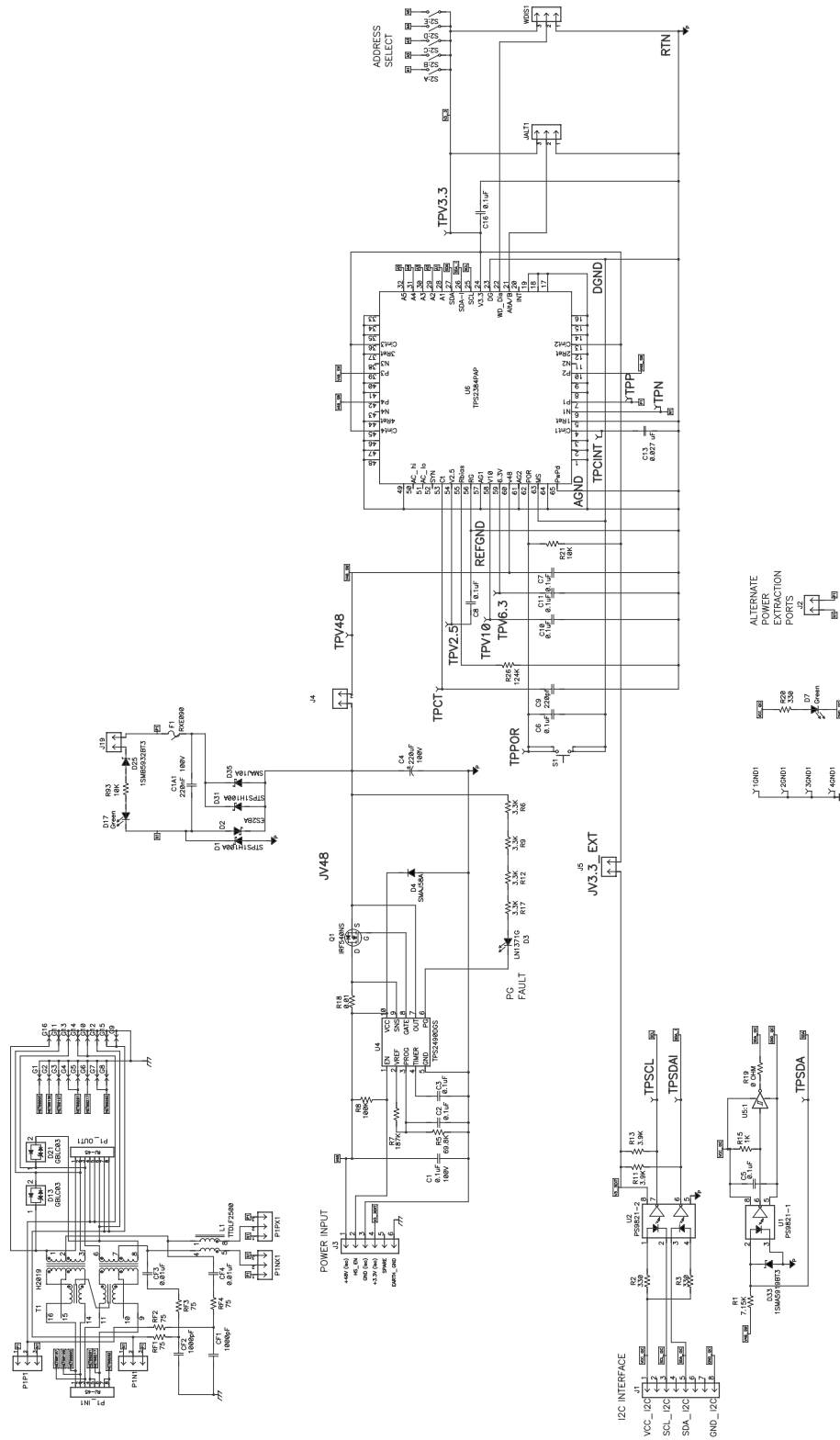


Figure 1. Typical Single-Port PSE System

Disclaimer: This design is for reference purposes only and illustrates the proper termination of unused device (port) pins in a one-port system. This system has been constructed and has been demonstrated to be operational. However, this design may be unsuitable for production and all operating environments.

**Reference:** *TPS2384 Quad Integrated Power Sourcing Equipment Power Manager* data sheet [SLUS634](#)

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

<b>Products</b>		<b>Applications</b>	
Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>	Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>	Automotive	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>	Broadband	<a href="http://www.ti.com/broadband">www.ti.com/broadband</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>	Digital Control	<a href="http://www.ti.com/digitalcontrol">www.ti.com/digitalcontrol</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>	Military	<a href="http://www.ti.com/military">www.ti.com/military</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>	Optical Networking	<a href="http://www.ti.com/opticalnetwork">www.ti.com/opticalnetwork</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>	Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Low Power Wireless	<a href="http://www.ti.com/lpw">www.ti.com/lpw</a>	Telephony	<a href="http://www.ti.com/telephony">www.ti.com/telephony</a>
		Video & Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>
		Wireless	<a href="http://www.ti.com/wireless">www.ti.com/wireless</a>

Mailing Address: Texas Instruments  
Post Office Box 655303 Dallas, Texas 75265