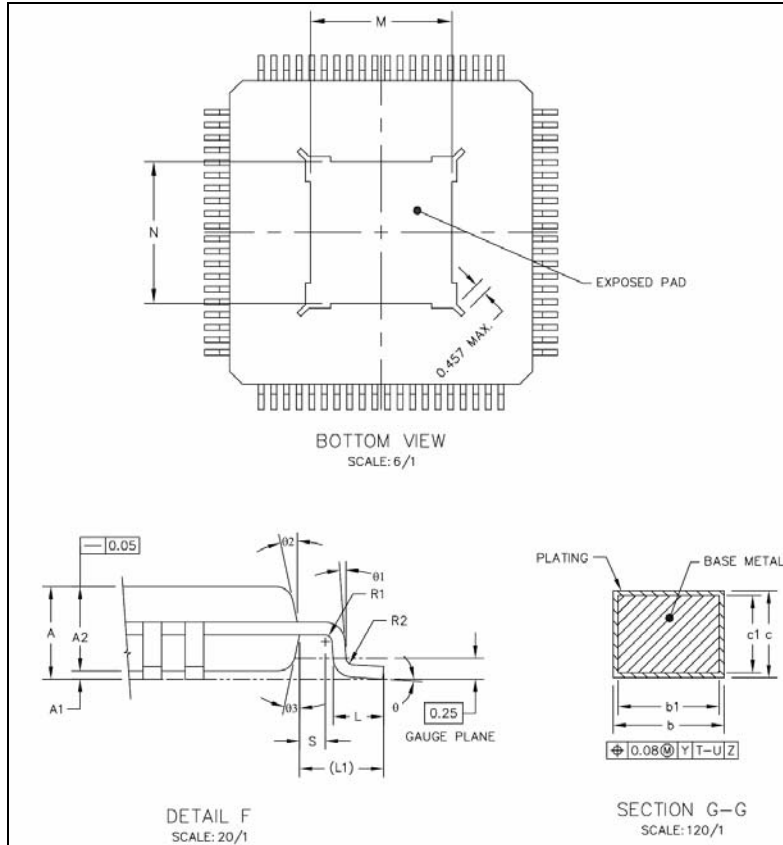




## Package Information

The PD69008 is packed in an 80-pin LQFP plastic package, 12 x 12 x 1.4 mm with exposed pad



NOTES:

- DATUMS T, U AND Z TO BE DETERMINED WHERE THE LEADS EXIT THE PLASTIC BODY AT DATUM PLANE H.
- DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25mm PER SIDE. DIMENSIONS D AND E ARE MAXIMUM PLASTIC BODY SIZE DIMENSIONS INCLUDING MOLD MISMATCH.
- DIMENSION b DOES NOT INCLUDE DAM BAR PROTRUSION. ALLOWABLE DAM BAR PROTRUSION SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED THE MAXIMUM b DIMENSION BY MORE THAN 0.08mm. DAM BAR CAN NOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN A PROTRUSION AND AN ADJACENT LEAD IS 0.07mm.

△ EXACT SHAPE OF EACH CORNER IS OPTION.

| DIM | MIN  | NOM     | MAX  | DIM | MIN  | NOM                      | MAX |
|-----|------|---------|------|-----|------|--------------------------|-----|
| A   | ---  | 1.2     |      | L1  |      | 1 REF                    |     |
| A1  | 0.05 | 0.15    |      | R1  | 0.08 | ---                      |     |
| A2  | 0.95 | 1       | 1.05 | R2  | 0.08 | 0.2                      |     |
| b   | 0.17 | 0.22    | 0.27 | S   | 0.2  | ---                      |     |
| b1  | 0.17 | 0.2     | 0.23 | θ   | 0°   | 7°                       |     |
| c   | 0.09 | 0.2     |      | θ1  | 0°   | ---                      |     |
| c1  | 0.09 | 0.16    |      | θ2  | 11°  | 13°                      |     |
| D   |      | 14 BSC  |      | θ3  | 11°  | 13°                      |     |
| D1  |      | 12 BSC  |      | M   | 5.5  | 5.6                      | 5.7 |
| e   |      | 0.5 BSC |      | N   | 5.5  | 5.6                      | 5.7 |
| E   |      | 14 BSC  |      |     |      |                          |     |
| E1  |      | 12 BSC  |      |     |      |                          |     |
| L   | 0.45 | 0.6     | 0.75 |     |      |                          |     |
|     |      |         |      |     | UNIT | DIMENSION AND TOLERANCES |     |
|     |      |         |      |     | MM   | ASME Y14.5M              |     |

Figure 1: PD69008 Package Description

## Maximum Ratings

|  |                                     |
|--|-------------------------------------|
| V <sub>main</sub> .....  | -0.3 to 80 V <sup>(1)</sup>         |
| DGND, AGND, QGND, SENSE_NEG.....   | -0.3 to 0.3 V <sup>(2)</sup>        |
| V <sub>PORT_POSx</sub> .....   | -0.3 to 80 V <sup>(1)</sup>         |
| V <sub>PORT_NEGx</sub> , REF_PORT_NEG.....   | -8.4 to 80V <sup>(1)</sup>          |
| V <sub>PORT_POSx</sub> - V <sub>PORT_NEGx</sub> .....  | -0.3 to 80 V <sup>(1)</sup>         |
| PORT_SENSEx .....  | -7.2 to 25 V <sup>(1)</sup>         |
| Gate_x.....  | -0.3 to 18 V                        |
| V <sub>CC2p5</sub> , ADC <sub>2p5</sub> .....  | -0.3 to 3 V                         |
| V <sub>PERI</sub> .....  | 4 V                                 |
| EXT_REG.....   | -0.3 to 6 V                         |
| I2CINI, ASICINI.....   | -0.3 to 3 V                         |
| MISO, MOSI, SCK, SCL, SDA, CLK, RESETN, CS_N, INTERRUPT, POWER_BANK[2..0], LSD, LSC, LSL, SDA_OUT..... | -0.3 to (V <sub>PERI</sub> + 0.3) V |
| ESD (Human Body Model).....  | -2 to 2 kV <sup>(3)</sup>           |
| Max junction temperature (T <sub>junc</sub> ).....   | +150 °C                             |
| Junction-ambient thermal resistance (θ <sub>JA</sub> ).....  | 30° C/W <sup>(4)</sup>              |
| Junction-case thermal resistance (θ <sub>JC</sub> ).....   | 10° C/W                             |
| Lead temperature (soldering, 10 s).....  | 260° C                              |
| Storage temperature.....   | -40° to +125° C                     |

**Notes:** "x" defines port numbers, 0 thru 3, inclusive.

<sup>(1)</sup> 80 V is the transient voltage that can be applied for 1 min max.

<sup>(2)</sup> Maximum value between grounds.

<sup>(3)</sup> ESD testing is performed in accordance with the Human Body Model (CZap = 100 pF, RZap = 1500 Ω).

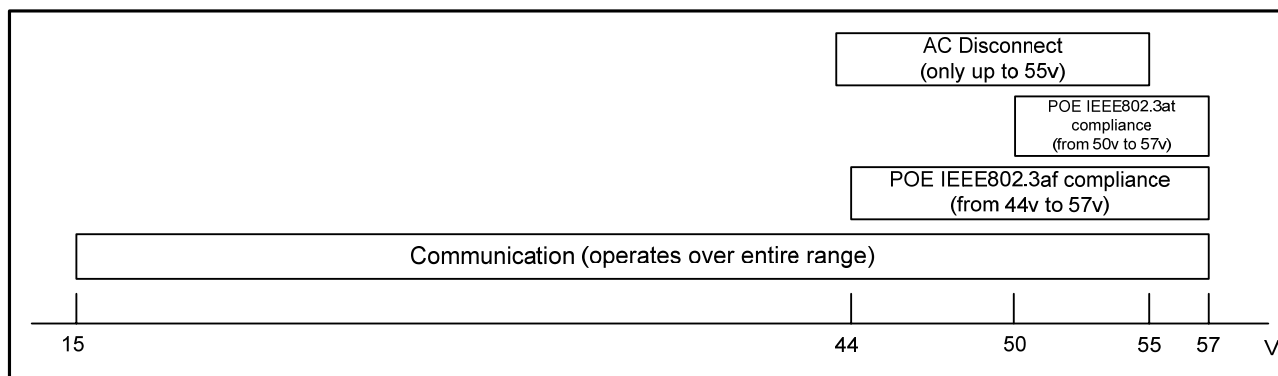
<sup>(4)</sup> with 4ML PCB – no air flow

Stresses beyond those listed above, may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods, may affect device reliability.

## Operating Conditions

| PARAMETER                                     | MIN.     | NOM.     | MAX.     | UNIT |
|---|----------|----------|----------|------|
| Operating temperature<br>At full load ambient | -40      |          | +85      | ° C  |
| Operational limitations (1)                   | 15 to 44 | 44 to 55 | 55 to 57 | V    |

(1) Operating functions depend on the input voltage, as shown in Figure 2.



**Figure 2: Operational Ranges**

## Electrical Characteristics

| <b>PIN NAME:</b>         | <ul style="list-style-type: none"> <li>• SCL</li> <li>• DISABLE_PORTS_N</li> </ul> |     |     |     |         |      |
|--------------------------|--|-----|-----|-----|---------|------|
| <b>PAD TYPE:</b>         | Schmitt Trigger CMOS input, TTL Level with no internal Res.                        |     |     |     |         |      |
| PARAMETER                | SYMBOL   | MIN | TYP | MAX | UNIT    | NOTE |
| High Level Input Voltage | $V_{IH}$   | 2.0 |     |     | V       |      |
| Low Level Input Voltage  | $V_{IL}$   |     |     | 0.8 | V       |      |
| Input Voltage Hysteresis |  | 0.3 |     |     | V       |      |
| Input High Current       | $I_{IH}$   | -1  |     | 1   | $\mu A$ |      |
| Input Low Current        | $I_{IL}$   | -1  |     | 1   | $\mu A$ |      |

| <b>PIN NAME:</b>          | <ul style="list-style-type: none"> <li>• LSD Multiplexed with GPIO_2</li> <li>• LSC Multiplexed with GPIO_3</li> <li>• POWER_GOOD0 Multiplexed with GPIO_0</li> <li>• POWER_GOOD1 Multiplexed with GPIO_1</li> <li>• POWER_GOOD2 Multiplexed with GPIO_4</li> </ul> |                |     |     |         |            |
|---------------------------|---|----------------|-----|-----|---------|------------|
| <b>PAD TYPE:</b>          | CMOS I/O, TTL Level with no internal pull up / pull down resistor, with Schmitt trigger Input   |                |     |     |         |            |
| PARAMETER                 | SYMBOL  | MIN            | TYP | MAX | UNIT    | NOTE       |
| High Level Input Voltage  | $V_{IH}$  | 2.0            |     |     | V       |            |
| Low Level Input Voltage   | $V_{IL}$  |                |     | 0.8 | V       |            |
| Input Voltage Hysteresis  |   | 0.3            |     |     | V       |            |
| Input High Current        | $I_{IH}$  | -1             |     | +1  | $\mu A$ |            |
| Input Low Current         | $I_{IL}$  | -1             |     | +1  | $\mu A$ |            |
| High Level Output Voltage |   | VPERI-<br>0.4V |     |     | V       | Iout=-2 mA |
| Low Level Output Voltage  |   |                |     | 0.4 | V       | Iout=2 mA  |

| <b>PIN NAME:</b>          | <ul style="list-style-type: none"> <li>• SCK</li> <li>• CS_N</li> <li>• MOSI</li> </ul> |                 |     |     |      |                          |
|---------------------------|---|-----------------|-----|-----|------|--------------------------|
| <b>PAD TYPE:</b>          | CMOS I/O, TTL Level with internal pull up current source, with Schmitt trigger Input    |                 |     |     |      |                          |
| PARAMETER                 | SYMBOL  | MIN             | TYP | MAX | UNIT | NOTE                     |
| High Level Input Voltage  | V <sub>IH</sub>   | 2.0             |     |     | V    |                          |
| Low Level Input Voltage   | V <sub>IL</sub>   |                 |     | 0.8 | V    |                          |
| Input Voltage Hysteresis  |   | 0.3             |     |     | V    |                          |
| Input High Current        | I <sub>IH</sub>   | -1              |     | +1  | μA   |                          |
| Input Low Current         | I <sub>IL</sub>   | -1              |     | +1  | μA   |                          |
| High Level Output Voltage |   | VPERI-<br>0.4 V |     |     | V    | I <sub>out</sub> = -2 mA |
| Low Level Output Voltage  |   |                 |     | 0.4 | V    | I <sub>out</sub> = 2 mA  |
| Pull up current           |   | 10              | 20  | 50  | uA   |                          |

| <b>PIN NAME:</b>          | <ul style="list-style-type: none"> <li>• MISO</li> </ul>                             |                |     |     |      |                          |
|---------------------------|--|----------------|-----|-----|------|--------------------------|
| <b>PAD TYPE:</b>          | CMOS I/O, TTL Level with internal pull up current source, with Schmitt trigger Input |                |     |     |      |                          |
| PARAMETER                 | SYMBOL   | MIN            | TYP | MAX | UNIT | NOTE                     |
| High Level Input Voltage  | V <sub>IH</sub>  | 2.0            |     |     | V    |                          |
| Low Level Input Voltage   | V <sub>IL</sub>  |                |     | 0.8 | V    |                          |
| Input Voltage Hysteresis  |  | 0.3            |     |     | V    |                          |
| Input High Current        | I <sub>IH</sub>  | -1             |     | +1  | μA   |                          |
| Input Low Current         | I <sub>IL</sub>  | -1             |     | +1  | μA   |                          |
| High Level Output Voltage |  | VPERI-<br>0.4V |     |     | V    | I <sub>out</sub> = -2 mA |
| Low Level Output Voltage  |  |                |     | 0.4 | V    | I <sub>out</sub> = 2 mA  |
| Pull down current         |  | 10             | 20  | 50  | uA   |                          |

|                          |   |            |            |            |             |                         |
|--------------------------|---|------------|------------|------------|-------------|-------------------------|
| <b>PIN NAME:</b>         | <ul style="list-style-type: none"> <li>• RESET_N</li> <li>• SDA</li> <li>• SDA_OUT Multiplexed with TEST_MODE</li> </ul>            |            |            |            |             |                         |
| <b>PAD TYPE:</b>         | Digital I/O – input/output open drain<br>CMOS Open Drain Output with Schmitt Trigger Input, TTL Level (external pull up res. Only)) |            |            |            |             |                         |
| <b>PARAMETER</b>         | <b>SYMBOL</b>   | <b>MIN</b> | <b>TYP</b> | <b>MAX</b> | <b>UNIT</b> | <b>NOTE</b>             |
| High Level Input Voltage | V <sub>IH</sub>   | 2.0        |            |            | V           |                         |
| Low Level Output Voltage | V <sub>OL</sub>   |            |            | 0.4        | V           | I <sub>out</sub> = 6 mA |
| Low Level Input Voltage  | V <sub>IL</sub>   |            |            | 0.8        | V           |                         |
| Input Voltage Hysteresis |   | 0.3        |            |            | V           |                         |
| OFF State Output Current |   | -1         |            | +1         | uA          |                         |

|                          |  |            |            |            |             |                         |
|--------------------------|--|------------|------------|------------|-------------|-------------------------|
| <b>PIN NAME:</b>         | <ul style="list-style-type: none"> <li>• CS_EEPROM &amp; LSL Multiplexed with INTERRUPT_N</li> </ul> |            |            |            |             |                         |
| <b>PAD TYPE:</b>         | CMOS Open Drain Output (external pull up res. Only))   |            |            |            |             |                         |
| <b>PARAMETER</b>         | <b>SYMBOL</b>  | <b>MIN</b> | <b>TYP</b> | <b>MAX</b> | <b>UNIT</b> | <b>NOTE</b>             |
| Low Level Output Voltage |  |            |            | 0.4        | V           | I <sub>out</sub> = 6 mA |
| OFF State Output Current |  | -1         |            | +1         | uA          |                         |

|                         |  |            |            |            |             |   |
|-------------------------|--|------------|------------|------------|-------------|---|
| <b>PIN NAME:</b>        | <ul style="list-style-type: none"> <li>• VPORT_NEGx</li> <li>• REF_PORT_NEG</li> </ul> |            |            |            |             |   |
| <b>PAD TYPE:</b>        | High Voltage Analog Pad  |            |            |            |             |   |
| <b>PARAMETER</b>        | <b>SYMBOL</b>  | <b>MIN</b> | <b>TYP</b> | <b>MAX</b> | <b>UNIT</b> | <b>NOTE</b>   |
| Pin Current Consumption |  | -10        |            | +10        | uA          | Port driver OFF, Vport differential measurement OFF, AC generator OFF |

|                              |                                 |            |            |            |             |                                  |
|------------------------------|---------------------------------|------------|------------|------------|-------------|----------------------------------|
| <b>PIN NAME:</b>             | • <b>PORT_SENSE<sub>x</sub></b> |            |            |            |             |                                  |
| <b>PAD TYPE:</b>             | Low Voltage Analog Pad          |            |            |            |             |                                  |
| <b>PARAMETER</b>             | <b>SYMBOL</b>                   | <b>MIN</b> | <b>TYP</b> | <b>MAX</b> | <b>UNIT</b> | <b>NOTE</b>                      |
| Operating Voltage            |                                 | 0          |            | 0.5        | V           | With external 0.5 Ohms 2% to GND |
| Internal Current Consumption |                                 |            |            | 20         | uA          |                                  |

|                            |  |            |            |            |             |             |
|----------------------------|--|------------|------------|------------|-------------|-------------|
| <b>PIN NAME:</b>           | • <b>VPORT_POS<sub>x</sub></b><br>• <b>VPORT_NEG<sub>x</sub></b> |            |            |            |             |             |
| <b>PAD TYPE:</b>           | High Voltage Analog Pad  |            |            |            |             |             |
| <b>PARAMETER</b>           | <b>SYMBOL</b>  | <b>MIN</b> | <b>TYP</b> | <b>MAX</b> | <b>UNIT</b> | <b>NOTE</b> |
| Operating Voltage (to GND) |  | 0          |            | 62         | V           |             |

|                           |                         |            |            |            |             |                |
|---------------------------|-------------------------|------------|------------|------------|-------------|----------------|
| <b>PIN NAME:</b>          | • <b>VMAIN</b>          |            |            |            |             |                |
| <b>PAD TYPE:</b>          | High Voltage Supply Pad |            |            |            |             |                |
| <b>PARAMETER</b>          | <b>SYMBOL</b>           | <b>MIN</b> | <b>TYP</b> | <b>MAX</b> | <b>UNIT</b> | <b>NOTE</b>    |
| Operating Voltage         |                         | 44         |            | 57         | V           |                |
| VMAIN Current Consumption |                         |            | 13.6       | 16         | mA          | Total on VMAIN |

|                                  |                 |            |            |            |             |             |
|----------------------------------|-----------------|------------|------------|------------|-------------|-------------|
| <b>PIN NAME:</b>                 | • <b>CP_OUT</b> |            |            |            |             |             |
| <b>PAD TYPE:</b>                 | Analog          |            |            |            |             |             |
| <b>PARAMETER</b>                 | <b>SYMBOL</b>   | <b>MIN</b> | <b>TYP</b> | <b>MAX</b> | <b>UNIT</b> | <b>NOTE</b> |
| Operating voltage                |                 | 44         |            | 68         | V           |             |
| Pin Internal Current Consumption |                 |            |            | 5          | mA          |             |

|                   |               |            |            |            |             |             |
|-------------------|---------------|------------|------------|------------|-------------|-------------|
| <b>PIN NAME:</b>  | • CP_IN       |            |            |            |             |             |
| <b>PAD TYPE:</b>  | Analog        |            |            |            |             |             |
| <b>PARAMETER</b>  | <b>SYMBOL</b> | <b>MIN</b> | <b>TYP</b> | <b>MAX</b> | <b>UNIT</b> | <b>NOTE</b> |
| Operating Voltage |               | 34         |            | 57         | V           |             |

|                                     |                                  |            |            |            |             |   |
|-------------------------------------|----------------------------------|------------|------------|------------|-------------|---|
| <b>PIN NAME:</b>                    | • ADC2p5, VCC2p5, VPERI, EXT_REG |            |            |            |             |   |
| <b>PAD TYPE:</b>                    | Analog                           |            |            |            |             |   |
| <b>PARAMETER</b>                    | <b>SYMBOL</b>                    | <b>MIN</b> | <b>TYP</b> | <b>MAX</b> | <b>UNIT</b> | <b>NOTE</b>                                 |
| ADC2p5 Output Voltage               |                                  | 2.45       |            | 2.55       | V           |   |
| ADC2p5 Internal Current Consumption |                                  |            |            | 6          | mA          | Recommended external cap. = 47 nF to 135 nF |
| VCC2p5 Output Voltage               |                                  | 2.37       |            | 2.62       | V           | Recommended external cap. = 47 nF to 135 nF |
| VPERI Output Voltage                |                                  | 3.10       |            | 3.5        | V           | Recommended external cap. = 1 uF to 4.7 uF  |
| VPERI External Current Load         |                                  |            |            | 6          | mA          | Without external NPN                        |
| EXT_REG Output Current              |                                  |            |            | 6          | mA          |   |

|                     |   |            |            |            |             |             |
|---------------------|---|------------|------------|------------|-------------|-------------|
| <b>PIN NAME:</b>    | • ASICINI, I2CINI<br>(max. capacitance between mode input to GND should NOT exceed 1nF) |            |            |            |             |             |
| <b>PAD TYPE:</b>    | Analog  |            |            |            |             |             |
| <b>PARAMETER</b>    | <b>SYMBOL</b>   | <b>MIN</b> | <b>TYP</b> | <b>MAX</b> | <b>UNIT</b> | <b>NOTE</b> |
| Operating Voltage   |   | 0          |            | ADC2p5     | V           |             |
| Current Consumption |   | -1         |            | +1         | uA          |             |

|                  |               |            |            |            |             |                                      |
|------------------|---------------|------------|------------|------------|-------------|--------------------------------------|
| <b>PIN NAME:</b> | • IREF        |            |            |            |             |                                      |
| <b>PAD TYPE:</b> | Analog        |            |            |            |             |                                      |
| <b>PARAMETER</b> | <b>SYMBOL</b> | <b>MIN</b> | <b>TYP</b> | <b>MAX</b> | <b>UNIT</b> | <b>NOTE</b>                          |
| Output Voltage   |               | 1.21       |            | 1.34       | V           | With external 24.9 K resistor to GND |



|                  |               |            |            |            |             |             |
|------------------|---------------|------------|------------|------------|-------------|-------------|
| <b>PIN NAME:</b> | • FET_Gx      |            |            |            |             |             |
| <b>PAD TYPE:</b> | Analog        |            |            |            |             |             |
| <b>PARAMETER</b> | <b>SYMBOL</b> | <b>MIN</b> | <b>TYP</b> | <b>MAX</b> | <b>UNIT</b> | <b>NOTE</b> |
| Output voltage   |               | 12         |            | 15         | V           |             |

### Dynamic Characteristics

The PD69008 utilizes three programmable current level thresholds ( $I_{min}$ ,  $I_{cut}$ ,  $I_{lim}$ ) and three timers ( $T_{min}$ ,  $T_{cut}$ ,  $T_{lim}$ ). Loads that dissipate more than  $I_{cut}$  for longer than  $T_{cut}$  are classified as 'overloads' and are automatically shutdown. Loads that consume  $I_{lim}$  current for more than  $T_{lim}$  are shutdown and classified as 'short circuit state'.

In cases where the PD69008 is configured to operate in DC-Disconnect mode, and the output current is below  $I_{min}$  for more than  $T_{min}$ , the PD is classified as 'no-load' and is shutdown. In cases where the PD69008 is configured to operate in AC-Disconnect mode, and the load's impedance is above a pre-defined impedance for more than  $T_{min}$ , the PD is classified as 'no-load' and is shutdown.

Automatic recovery from overload and no-load conditions is attempted every period of  $T_{OVLREC}$  and  $T_{UDLREC}$  (typically 5 and 1 seconds, respectively). Output power is limited to  $I_{lim}$ , which is a maximum peak current allowed at the port.

### AF Ports Parameters

| PARAMETER  | CONDITIONS   |  | MIN. | TYP. | MAX. | UNIT       |
|--|--|--|------|------|------|------------|
| Automatic recovery from overload shutdown        | $T_{OVLREC}$ value, measured from port shutdown (can be modified through control port) |  |      | 5    |      | s          |
| Automatic recovery from no-load shutdown         | $T_{UDLREC}$ value, measured from port shutdown (can be modified through control port) |  |      | 1    |      | s          |
| Cutoff timers accuracy                           | Typical accuracy of $T_{cut}$  |  | 4    | 2    | 0    | ms         |
| Inrush current                                   | $I_{Inrsh}$  | For $t=50$ ms, $C_{load}=180$ uF max.  | 400  |      | 450  | mA         |
| Output current operating range                   | $I_{port}$   | Continuous operation after startup period.   | 10   |      | 375  | mA         |
| Output power available, operating range          | $P_{port}$   | Continuous operation after startup period, at port output.   | 0.57 |      | 15.4 | W          |
| Off mode current                                 | $I_{min1}$   | Must disconnect for $t$ greater than $T_{UVL}$   | 0    |      | 5    | mA         |
|  | $I_{min2}$   | May or may not disconnect for $t$ greater than $T_{UVL}$   | 5    | 7.5  | 10   | mA         |
| PD power maintenance request drop-out time limit | $T_{PMDO}$   | Buffer period to handle transitions  | 300  |      | 400  | ms         |
| Over load current detection range                | $I_{cut}$  | Time limited to $T_{OVL}$  | 350  |      | 400  | mA         |
| Over load time limit                             | $T_{OVL}$  |  | 50   |      | 75   | ms         |
| Turn on rise time                                | $T_{rise}$   | From 10% to 90% of $V_{port}$ (Specified for PD load consisting of 100 uF capacitor in parallel to 200 $\Omega$ ). | 15   |      |      | us         |
| Turn off time                                    | $T_{off}$  | From $V_{port}$ to 2.8 Vdc   |      |      | 500  | ms         |
| Time Maintain Power Signature                    | $T_{MPS}$  | DC modulation time for dc disconnect   |      | 49   |      | ms         |
| AC disconnect impedance                          | $Z_{ac}$   |  | 27   | 600  | 2000 | K $\Omega$ |

**AT Ports Parameters**

| PARAMETER  | CONDITIONS  |  | MIN. | TYP. | MAX.  | UNIT |
|--|---|--|------|------|-------|------|
| Automatic recovery from overload shutdown        | T <sub>OVLREC</sub> value, measured from port shutdown (can be modified through control port) |  |      | 5    |       | s    |
| Automatic recovery from no-load shutdown         | T <sub>UDLREC</sub> value, measured from port shutdown (can be modified through control port) |  |      | 1    |       | s    |
| Cutoff timers accuracy                           | Typical accuracy of T <sub>cut</sub>  |  | 4    | 2    | 0     | ms   |
| Inrush current                                   | I <sub>Inrsh</sub>  | For t=50 ms, C <sub>load</sub> =180 uF max.  | 400  |      | 450   | mA   |
| Output current operating range                   | I <sub>port</sub>   | Continuous operation after startup period.   | 10   |      | 643   | mA   |
| Output power available, operating range          | P <sub>port</sub>   | Continuous operation after startup period, at port output.   | 0.57 |      | 36.25 | W    |
| Off mode current                                 | I <sub>min1</sub>   | Must disconnect for t greater than T <sub>UVL</sub>  | 0    |      | 5     | mA   |
|  | I <sub>min2</sub>   | May or may not disconnect for t greater than T <sub>UVL</sub>  | 5    | 7.5  | 10    | mA   |
| PD power maintenance request drop-out time limit | T <sub>PMDO</sub>   | Buffer period to handle transitions  | 300  |      | 400   | ms   |
| Over load current detection range                | I <sub>cut</sub>  | Time limited to T <sub>OVL</sub>   | 686  | 728  | 771   | mA   |
| Over load time limit                             | T <sub>OVL</sub>  |  | 50   |      | 75    | ms   |
| Turn on rise time                                | T <sub>rise</sub>   | From 10% to 90% of V <sub>port</sub><br>(Specified for PD load consisting of 100 uF capacitor in parallel to 200 Ω). | 15   |      |       | us   |
| Turn off time                                    | T <sub>off</sub>  | From V <sub>port</sub> to 2.8 Vdc  |      |      | 500   | ms   |
| Time Maintain Power Signature                    | TMPS  | DC modulation time for dc disconnect   |      | 49   |       | ms   |
| AC disconnect impedance                          | Z <sub>ac</sub>   |  | 27   | 600  | 2000  | KΩ   |

## Pin Description

| Pin | Pin Name [Package]                  | Pin Type      | Description  |
|-----|-------------------------------------|---------------|--|
| 0   | PAD                                 | Gnd           | Exposed pad connected to underside of die                    |
| 1   | VPORT_POS0                          | Analog I/O    | Port 0 positive input  |
| 2   | VPORT_POS1                          | Analog I/O    | Port 1 positive input  |
| 3   | VPORT_POS2                          | Analog I/O    | Port 2 positive input  |
| 4   | VPORT_POS3                          | Analog I/O    | Port 3 positive input  |
| 5   | VPORT_POS4                          | Analog I/O    | Port 4 positive input  |
| 6   | VPORT_POS5                          | Analog I/O    | Port 5 positive input  |
| 7   | VPORT_POS6                          | Analog I/O    | Port 6 positive input  |
| 8   | VPORT_POS7                          | Analog I/O    | Port 7 positive input  |
| 9   | NC                                  |               | Not Connected  |
| 10  | NC                                  |               | Not Connected  |
| 11  | NC                                  |               | Not Connected  |
| 12  | NC                                  |               | Not Connected  |
| 13  | CP_OUT                              | Analog I/O    | Charge Pump Output Pulse                                     |
| 14  | CP_IN                               | Supply        | Charge pump input  |
| 15  | VMAIN                               | Supply        | Main Voltage supply  |
| 16  | REF_PORT_NEG                        | Analog I/O    | Port negative reference                                      |
| 17  | DGND2                               | GND           | Digital ground   |
| 18  | POWER_GOOD0 MULTIPLEXED WITH GPIO_0 | Digital I/O   | Power supply monitoring Multiplexed with General purpose I/O |
| 19  | POWER_GOOD1 MULTIPLEXED WITH GPIO_1 | Digital I/O   | Power supply monitoring Multiplexed with General purpose I/O |
| 20  | POWER_GOOD2 MULTIPLEXED WITH GPIO_4 | Digital I/O   | Power supply monitoring Multiplexed with General purpose I/O |
| 21  | AGND1                               | GND           | Analog ground  |
| 22  | VPORT_NEG6                          | Analog I/O    | Port 6 negative voltage feeding                              |
| 23  | PORT_SENSE6                         | Analog I/O    | Channel current monitoring                                   |
| 24  | FET_G6                              | Analog I/O    | Port 6 – Gate control  |
| 25  | FET_G7                              | Analog I/O    | Port 7 – Gate control  |
| 26  | PORT_SENSE7                         | Analog I/O    | Channel current monitoring                                   |
| 27  | VPORT_NEG7                          | Analog I/O    | Port 7 negative voltage feeding                              |
| 28  | NC                                  |               | Not Connected  |
| 29  | NC                                  |               | Not Connected  |
| 30  | NC                                  |               | Not Connected  |
| 31  | NC                                  |               | Not Connected  |
| 32  | NC                                  |               | Not Connected  |
| 33  | NC                                  |               | Not Connected  |
| 34  | NC                                  |               | Not Connected  |
| 35  | NC                                  |               | Not Connected  |
| 36  | NC                                  |               | Not Connected  |
| 37  | NC                                  |               | Not Connected  |
| 38  | NC                                  |               | Not Connected  |
| 39  | NC                                  |               | Not Connected  |
| 40  | DGND1                               | GND           | Digital ground   |
| 41  | DISABLE_PORTS_N                     | Digital Input | Disable All Ports Power – Active Low                         |
| 42  | CS_N                                | Digital I/O   | SPI bus, Chip Select   |
| 43  | MISO                                | Digital I/O   | SPI bus, Master Data in/slave out                            |

| Pin | Pin Name [Package]                             | Pin Type                  | Description  |
|-----|--|---------------------------|--|
| 44  | MOSI   | Digital I/O               | SPI bus, Master Data out/slave in  |
| 45  | SCK  | Digital I/O               | SPI bus, Serial clock I/O  |
| 46  | SCL  | Digital Input             | I2C bus, Serial Clock Input  |
| 47  | SDA_OUT MULTIPLEXED WITH TEST_MODE             | Digital I/O               | Third pin in I <sup>2</sup> C protocol Test Mode Pin – Must be tied to VPERI with pull-up resistor if not used |
| 48  | SDA  | Digital I/O               | I2C bus, open drain  |
| 49  | RESET_N  | Digital I/O               | Active Low Reset I/O   |
| 50  | IREF   | Analog I/O                | Current reference  |
| 51  | ASICINI  | Analog Input              | Analog input for Asic initialization   |
| 52  | VCC2P5   | Internal Regulator        | Internal 2.5v source – not to be used for external devices   |
| 53  | I2CINI   | Analog Input              | Analog input for I2C initialization  |
| 54  | QGND   | GND                       | Quiet analog ground  |
| 55  | ADC2P5   | Internal reference        | ADC reference – not to be used for external devices  |
| 56  | EXT_REG  | Analog Out                | External regulation  |
| 57  | VPERI  | Analog Out                | Regulated 3.3v output voltage source for external devices  |
| 58  | CS_EEPROM_N & LSL MULTIPLEXED WITH INTERRUPT_N | Digital Output Open drain | SPI bus, EEPROM Chip Select & LED Stream Latch (if set) Multiplexed with interrupt out                         |
| 59  | LSD MULTIPLEXED WITH GPIO_2                    | Digital I/O               | LED Stream Data – data out Multiplexed with General purpose I/O  |
| 60  | LSC MUXED WITH GPIO_3                          | Digital I/O               | LED Stream CLK– CLK out Multiplexed with General purpose I/O   |
| 61  | SENSE_NEG                                      | Analog I/O                | Port sense reference   |
| 62  | AGND2  | GND                       | Analog ground  |
| 63  | VPORT_NEG0                                     | Analog I/O                | Port 0 negative voltage feeding  |
| 64  | PORT_SENSE0                                    | Analog I/O                | Channel current monitoring   |
| 65  | FET_G0   | Analog I/O                | Port 0 – Gate control  |
| 66  | FET_G1   | Analog I/O                | Port 1 – Gate control  |
| 67  | PORT_SENSE1                                    | Analog I/O                | Channel current monitoring   |
| 68  | VPORT_NEG1                                     | Analog I/O                | Port 1 negative voltage feeding  |
| 69  | VPORT_NEG2                                     | Analog I/O                | Port 2 negative voltage feeding  |
| 70  | PORT_SENSE2                                    | Analog I/O                | Channel current monitoring   |
| 71  | FET_G2   | Analog I/O                | Port 2 – Gate control  |
| 72  | FET_G3   | Analog I/O                | Port 3 – Gate control  |
| 73  | PORT_SENSE3                                    | Analog I/O                | Channel current monitoring   |
| 74  | VPORT_NEG3                                     | Analog I/O                | Port 3 negative voltage feeding  |
| 75  | VPORT_NEG4                                     | Analog I/O                | Port 4 negative voltage feeding  |
| 76  | PORT_SENSE4                                    | Analog I/O                | Channel current monitoring   |
| 77  | FET_G4   | Analog I/O                | Port 4 – Gate control  |
| 78  | FET_G5   | Analog I/O                | Port 5 – Gate control  |
| 79  | PORT_SENSE5                                    | Analog I/O                | Channel current monitoring   |
| 80  | VPORT_NEG5                                     | Analog I/O                | Port 5 negative voltage feeding  |

## Configuration Pins

There are two main configuration pins utilized in the PD69008 (as shown in Figure 3) which configure the operation mode of the chip and the communication addresses (SPI and I<sup>2</sup>C).

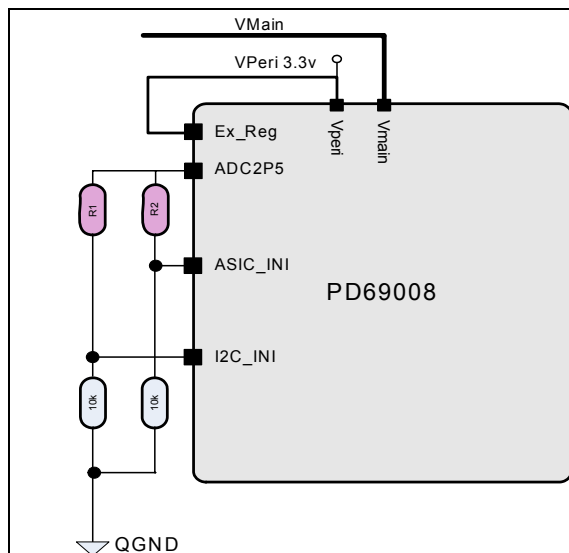


Figure 3: Electronic Connection of Configuration Pins

## Application information

The PD69008 can be integrated into a number of applications such as daughter boards, Ethernet switches or routers. Examples of such applications are described below:

Integrated directly into a switch: Facilitates entire PoE concept by including the IC(s) on the main switch's PCB.

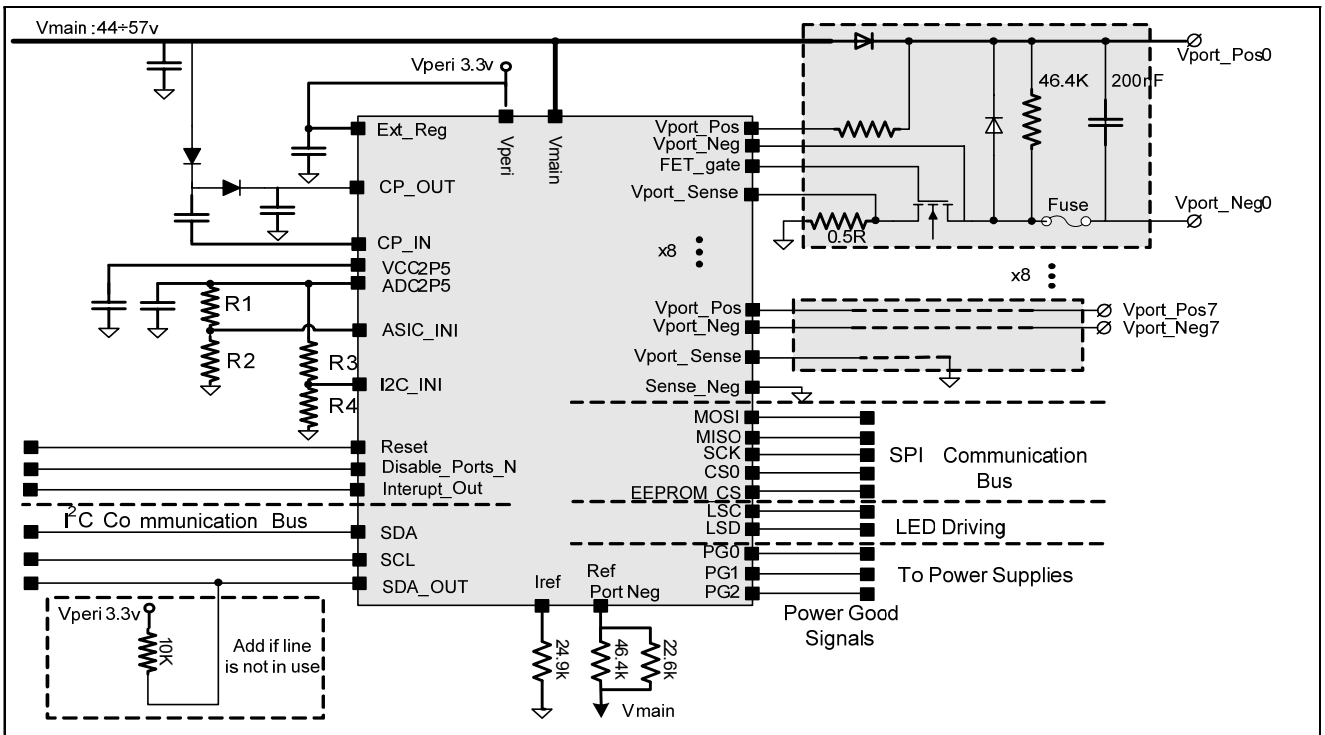
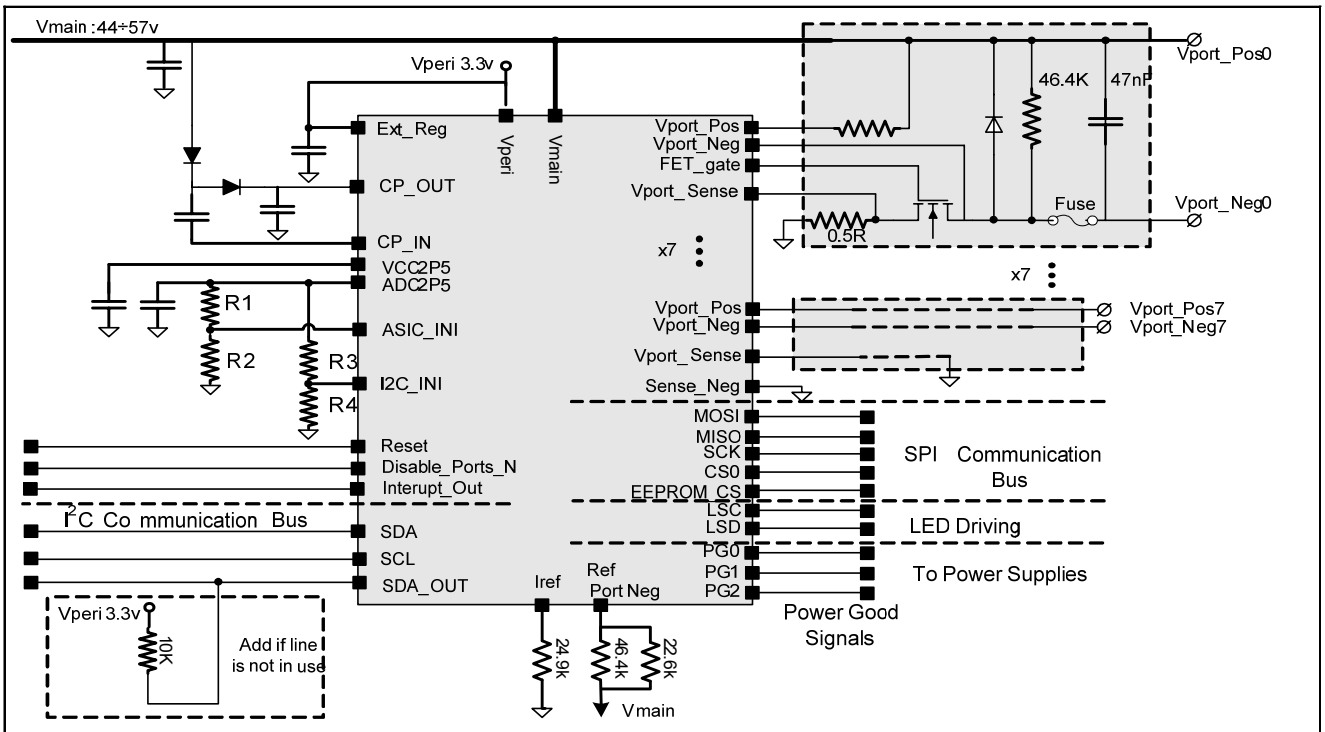
Daughter board add-on: The IC is integrated into a small dedicated PoE PCB, mounted on top of the switch's main PCB or into a DIMM module.

Integrated into an RJ45 connector: Saves space on the main board and creates small differences between the PoE and non-PoE versions of a switch.

Midspans: Stand-alone devices, installed between the Ethernet switch and the PDs (Powered Devices) such as telephones, cameras, wireless LANs, etc.

These Midspans include the PD69008 IC as a PoE control element, destined to inject power over the communication lines.

Figure 4 and Figure 5 provide examples of basic applications of the PD69008 in an AC Disconnect Mode and the DC Disconnect Mode:


**Figure 4: Basic Application with AC Disconnect Support**

**Figure 5: Basic Application with DC Disconnect Support**

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## Revision History

| Revision Level / Date | Para. Affected | Description                 |
|-----------------------|----------------|-----------------------------|
| 0.1 / 15 March 2009   | -              | Initial Preliminary Release |
| 1.0 / 25-Aug-09       |                | Release                     |

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