

## Simplifying Pressure Calculation using MPL115A with simple Microprocessors

(See Freescale Semiconductor Application Note AN3785, Page 18)

The line *siPcomp* = etc has a typo that causes the calculation to fail due to a wrong cast. Working from *lt3* it is possible to do the arithmetic using just shifts and adds (32-bit integer). *lt3* is 8192 (13 bits shifted left) too large so the conversion equation is:

$$pressure = \frac{65 \times lt3}{1023 \times 8192} + 50 = \frac{65 \times lt3 + 50 \times 1023 \times 8192}{1023 \times 8192}$$

Add rounding:

$$pressure = \frac{65 \times lt3 + 101 \times 1023 \times 4096}{2046 \times 4096}$$

Multiply top and bottom by 1024/1023 to make the denominator a binary power:

$$pressure = \frac{65 \times lt3 \times \frac{1024}{1023} + 101 \times 1023 \times 4096 \times \frac{1024}{1023}}{2046 \times 4096 \times \frac{1024}{1023}}$$

$$pressure = \frac{65 \times lt3 \times \frac{1024}{1023} + 101 \times 1024 \times 4096}{2048 \times 4096}$$

Substitute 1025/1025 for 1024/1023 (0.95 PPM less than required value):

$$pressure = \frac{65 \times lt3 \times \frac{1025}{1024} + 101 \times 1024 \times 4096}{2048 \times 4096} = \frac{65 \times lt3 \times \frac{1025}{1024} + 423624704}{8388608}$$

Algorithm:

$lt3 = lt3 + (lt3 \ll 6)$	Multiply <i>lt3</i> by 65
$lt3 = lt3 + (lt3 \gg 10)$	Add <i>lt3</i> /1024 to give <i>lt3</i> *1025/1024
$lt3 = (lt3 + 423624704) \gg 23$	Final Rounded Result in kPa

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