

# nVidia

# Purpose

Describe the settings needed to run in nVidia mode

Target audience:

Design engineers that have some experience with digital power and nVidia needs as the explanations focus on settings in XDPE12xxx and XDPE 14xxx family of controllers.

# nVIDIA PWM VID Overview

A pulse width modulated I/O that controls the Voltage Regulator VID set point (output voltage) by modulating the duty cycle of the signal sent

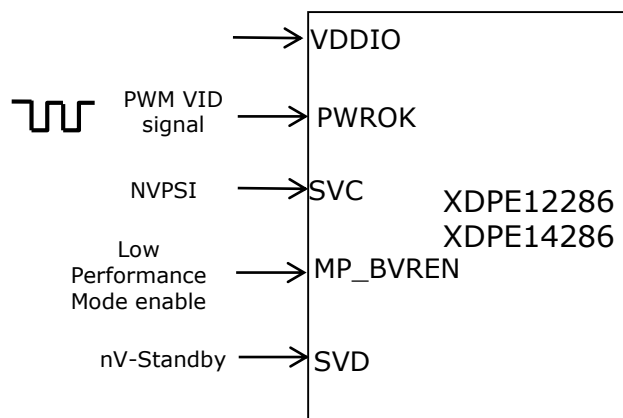
- PWM VID functionality applies to Loop 0 only
- An optional method of control is to digitize an analog voltage (VAUX) and generate an output voltage proportional to this input.

PWM VID implementation allows for

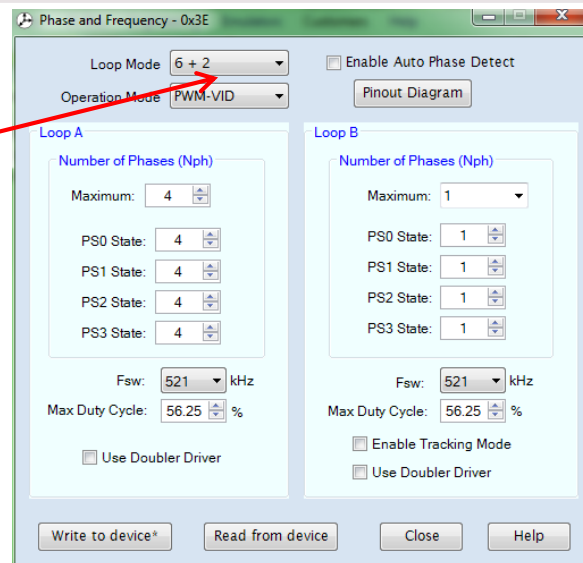
- Wider range of VID set points using a single I/O pin
- VID target change can be communicated in a single cycle
- PSI entry/exit is instantly communicated

# nVidia PWM VID connections

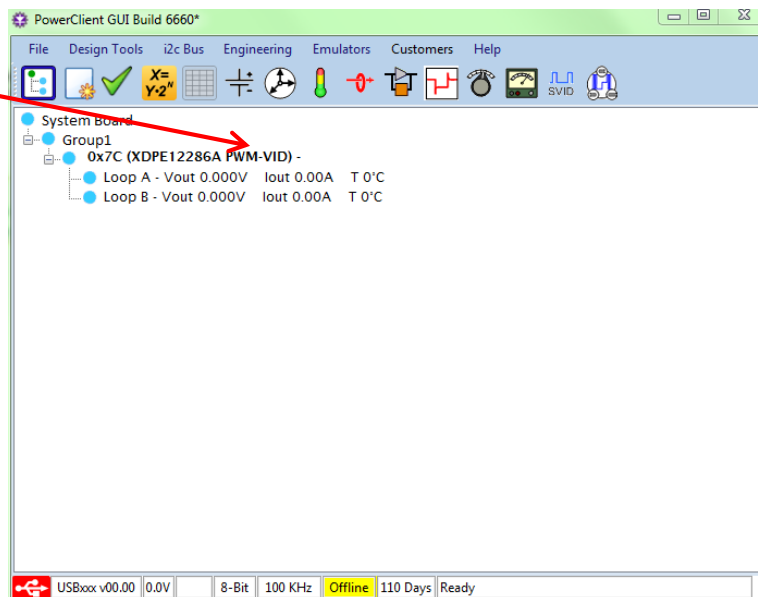
In nVidia PWM mode some pins get a new function in parts that do support the PWM-VID function



# Select nVidia mode



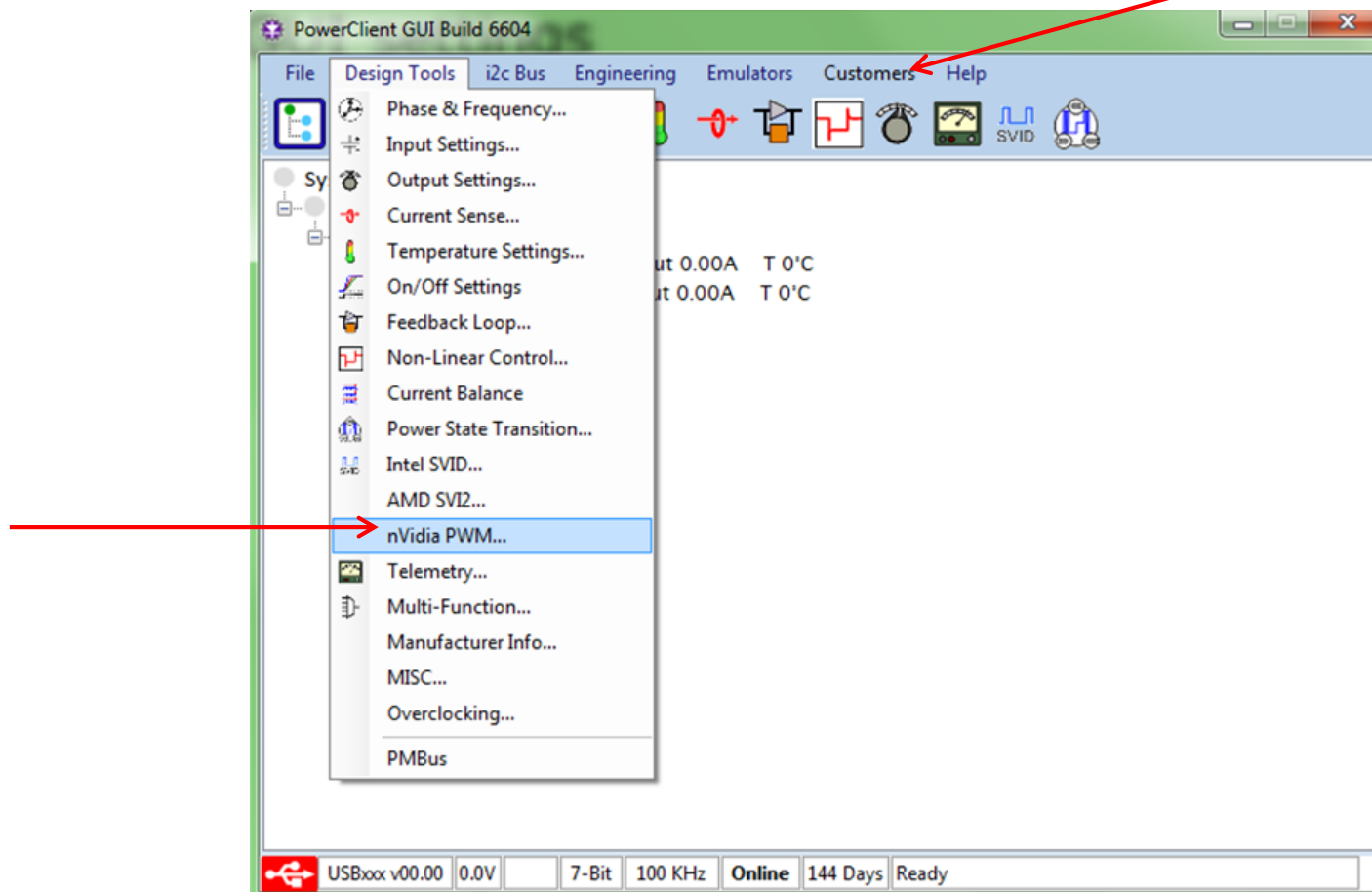
Select the PWM-VID to enter nVidia mode



The selected mode is visible after the component name

# Find nVidia settings in GUI

You may need a password to activate the nVidia settings. Enter it in the Customers tab  
Ask your Infineon FAE if you do not have a password.



# GUI settings

I2C (Disabled)  
or PWM VID  
control of Vout  
(=Enabled)

Start up with  
Vboot or the value  
set by the PWM  
signal.

If PWM signal  
comes later then  
starting with Vboot  
and as soon PWM  
signal is applied  
the voltage will  
change to the  
voltage set by the  
PWM

Vboot voltage

Standby voltage

The screenshot shows the 'nVidia PWM - 0x7C' GUI. Key settings include:

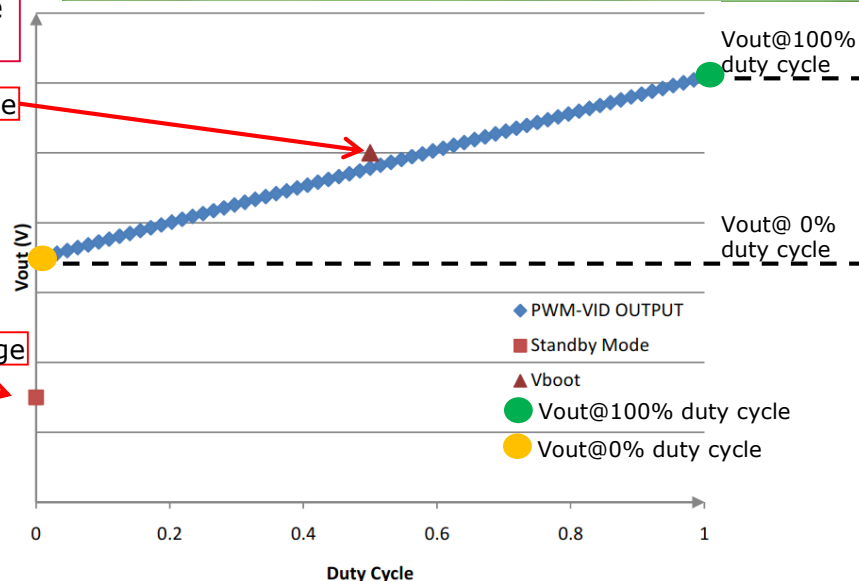
- Dynamic Voltage Control:** Set to 'Enabled - PWM VID'.
- Vout (duty Cycle = 100%):** 4.99000 V
- Vout (duty Cycle = 0%):** 1.15000 V
- Vout in Standby Mode:** 0.67000 V
- Pin Assignment:** A button to configure pin connections.
- Low Performance Mode:** Includes a checkbox for 'Enable Low Performance Mode', a 'Pin Selection' dropdown (currently 'N/A'), and phase counts for Loop A (4) and Loop B (1).
- Basic Vout Setting:** Contains settings for Loop A (Vboot: 0 V, Slew Rate: 19 mV/us) and Loop B (Vboot: 2.74 V, Slew Rate: 10 mV/us), along with a 'Change Setting' button.
- Buttons:** 'Write to device', 'Read from device', 'Close', and 'Help'.

Tick box to enable  
nVidia Low  
Performance Mode

Select which pin  
will act as the  
enable for Low  
Performance Mode

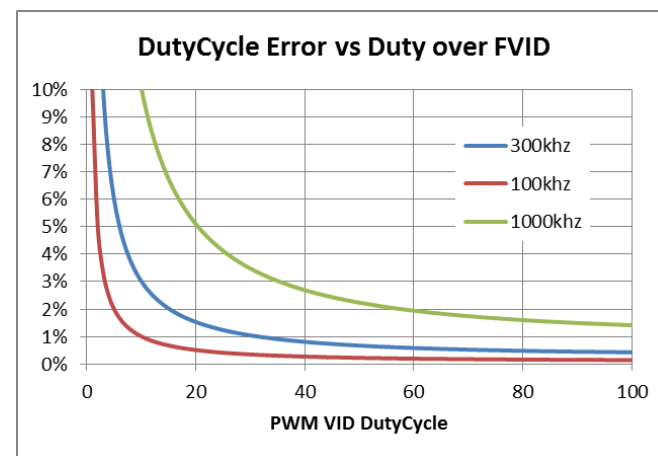
Select number of  
phases when in  
Low Performance  
Mode

**Pin Assignments**  
Will show what  
pins to connect the  
signals too.



# Sierra Digital Solution

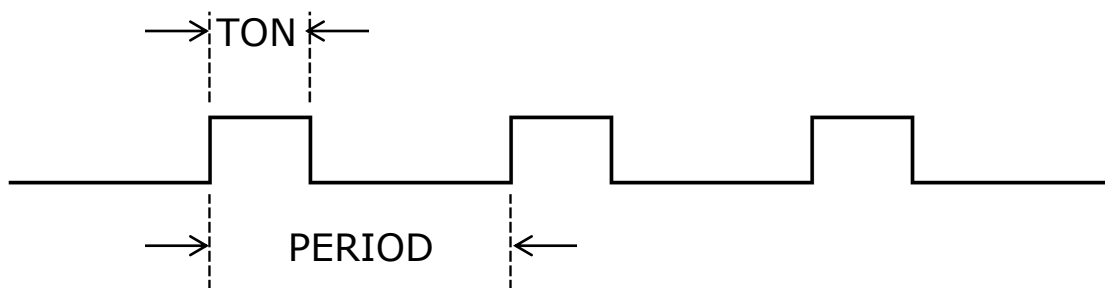
- › Digital NVPWM connect directly to the SVD pin
- › Signal digitized by 100MHz clock (10ns resolution)
  - Typical FVID 300kHz
  - Usable FVID range 100kHz  $\leftrightarrow$  3MHz
- › Digital offset can be added via I2C





# Digital PWMVID Measurement

- › The dutycycle is calculated as the quotient of the ON time of the NVPWM over the PERIOD of the signal.
  - ON time is measured from the rising edge to the falling edge of the NVPWM
  - PERIOD is measured from a rising edge to the next rising edge



- › The calculation is updated on every rising edge of NVPWM
- › A continuous moving average of 4 dutycycles calculations is used to set the target voltage

# Digital Solution Equations

- ›  $\text{Duty} = \text{Ton} / \text{Period}$
- ›  $\text{Vout} = \text{vout\_vid\_vmin} + \text{duty} \cdot \text{pwm\_vid\_slope}$ 
  - $\text{pwm\_vid\_slope} = (\text{Vmax} - \text{Vmin}) / (5\text{mV}(\text{VIDtable}))$  per 100% duty cycle change

## Other notes

- › The SVC pin is used for the NVPSI function. Pulling the pin low would set the VR to a low power state

# nVidia PWM... Slewrates

- › Digital solution
  - the slewrate can be set in the Output Settings window. The fast slew rate setting is used.

# Revision History

- › 2.0: Added XDPE142xx information