

# Composite Optical Power Utility for Lane Based Cards

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## Introduction

This document describes the usage of utility which doubles up as a handy calculator/conversion utility that is required for Optical Professionals, who specially deal with DWDM/Photonic technologies.

## Snapshot of Utility

4x/10x Lanes-Composite Optical Power Calculation Utility

4x 10x

Lane Power (dBm)

Composite Power (dBm)

Lane 1

Lane 2

Lane 3

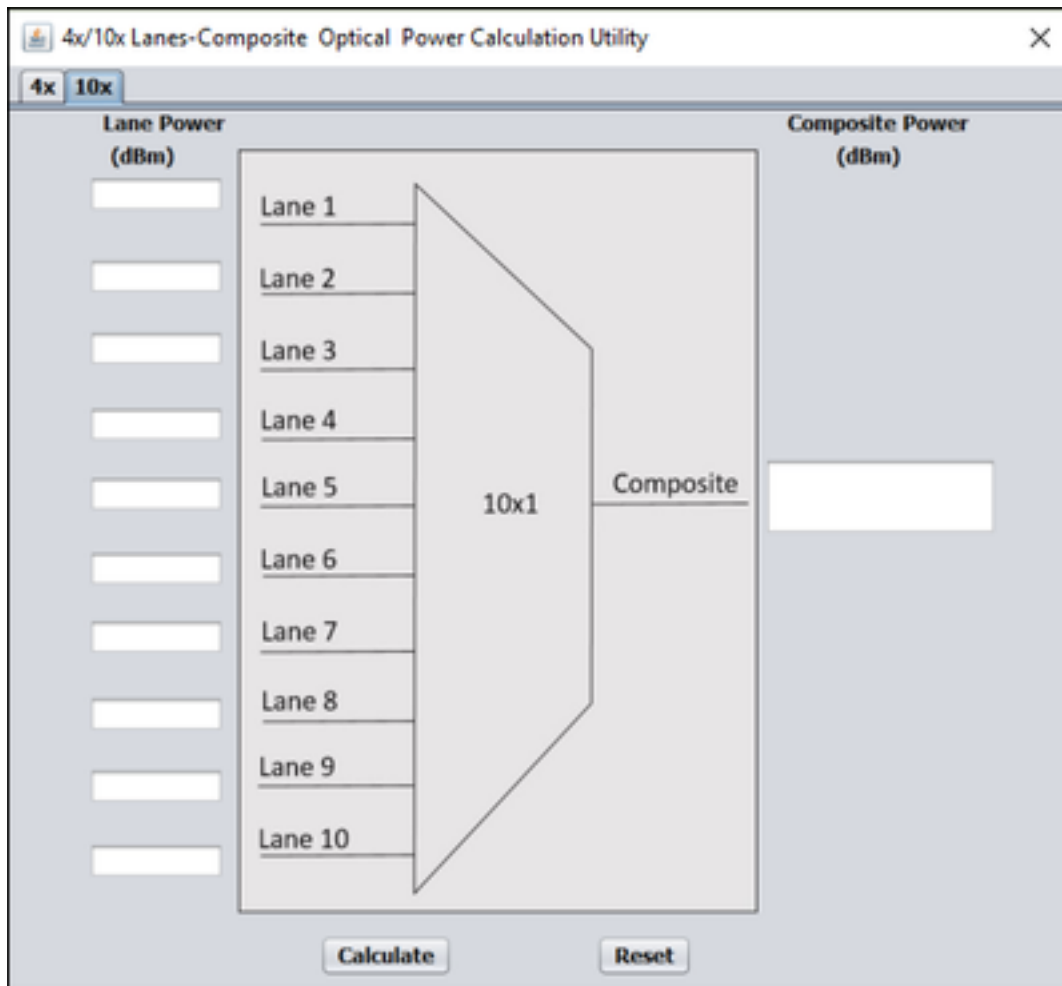
Lane 4

4x1

Composite

Calculate Reset

4 Lanes



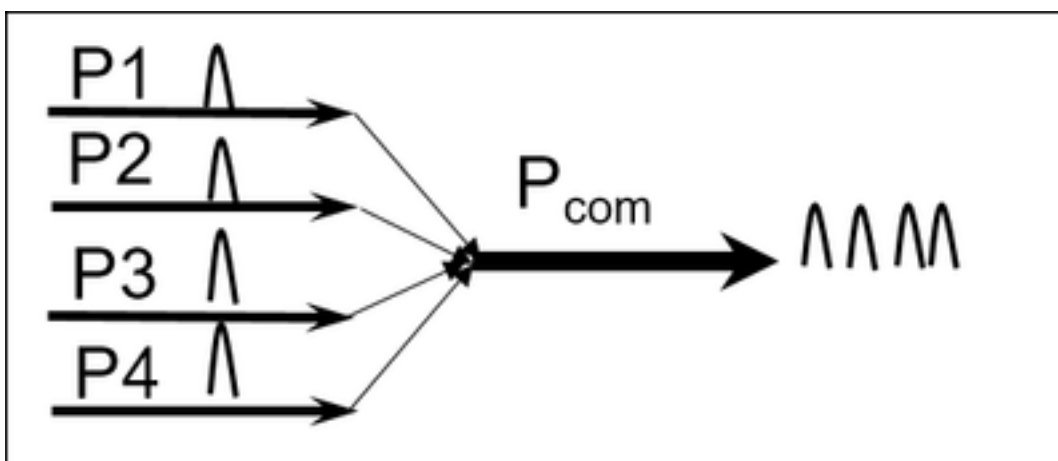
## Features Supported

4x and 10x Lane Composite Optical Power Calculation.

It is always easy to calculate values that are based on fixed formulas but it is always tedious when it involves multiple conversion and considerations.

For example:

In a Dense Wavelength Division Multiplexing (DWDM) system, whenever the per channel input power is same for all channels, you can directly feed values in the formula and get the composite power as shown. Consider a DWDM system with four channel.



When each channel has different power at input then the Composite Power formula looks like this:

$$P_{com} \text{ (mW)} = P1 \text{ (mW)} + P2 \text{ (mW)} + P3 \text{ (mW)} + P4 \text{ (mW)}$$

Now assume,  $P1=P2=P3=P4=P_{per-ch}$ .

Then formula is simple and easy to calculate as:

$$P_{com} \text{ (dBm)} = P_{per-ch} \text{ (dBm)} + 10 \log(4)$$

dB and dBm relation for reference.

The decibel watt or dBW is a unit for the measurement of the strength of an optical signal expressed in decibels relative to one watt. It is used because of its capability to express both very large and very small values of optical power in a short range of number: e.g. 1 milliwatt = 30 dBW, 1 watt = 0 dBW, 10 watts = 10 dBW, 100 watts = 20 dBW, and 1,000,000 W = 60 dBW. Generally, you don't use dBW in very often but use in Raman and other high power lasers.

This is the example of dB addition and subtraction relation:

$\text{dBW} \pm \text{dB} = \text{dBW}$
$\text{dBm} \pm \text{dB} = \text{dBm}$
$\text{dBW} - \text{dBW} = \text{dB}$
$\text{dBm} - \text{dBm} = \text{dB}$

This utility is intended for Composite power calculation for High Speed data rate modules which has lane powers like for data rate 40 Gbps and x100Gbps.e.g. for CFP and CPAK..

$$40\text{Gbps} = 4 \times 10\text{Gbps}$$

$$100\text{Gbps} = 10 \times 10\text{Gbps}$$

Calculation for 4x Lane's Composite Power.

Enter the lane powers that are shown on four lanes of the CPAK module shown in the snapshot and click on **Calculate** in order to get composite lane powers on client port as shown in the image.

Current Values						
Historical PM						
Param	Port 1-1 (ONEHUNDRED_...	Port 2 (Trunk)	Port CPAK 1-1 (OTL)	Port CPAK 1-2 (OTL)	Port CPAK 1-3 (OTL)	Port CPAK 1-4 (OTL)
Laser Bias (%)	0	0	0	0	0	0
RX Optical Pwr (dBm)	2.3	0.9	-3.9	-3.7	-3.8	-3.6

4x/10x Lanes-Composite Optical Power Calculation Utility

4x 10x

Lane Power (dBm)

Composite Power (dBm)

Lane 1: -3.9

Lane 2: -3.7

Lane 3: -3.8

Lane 4: -3.6

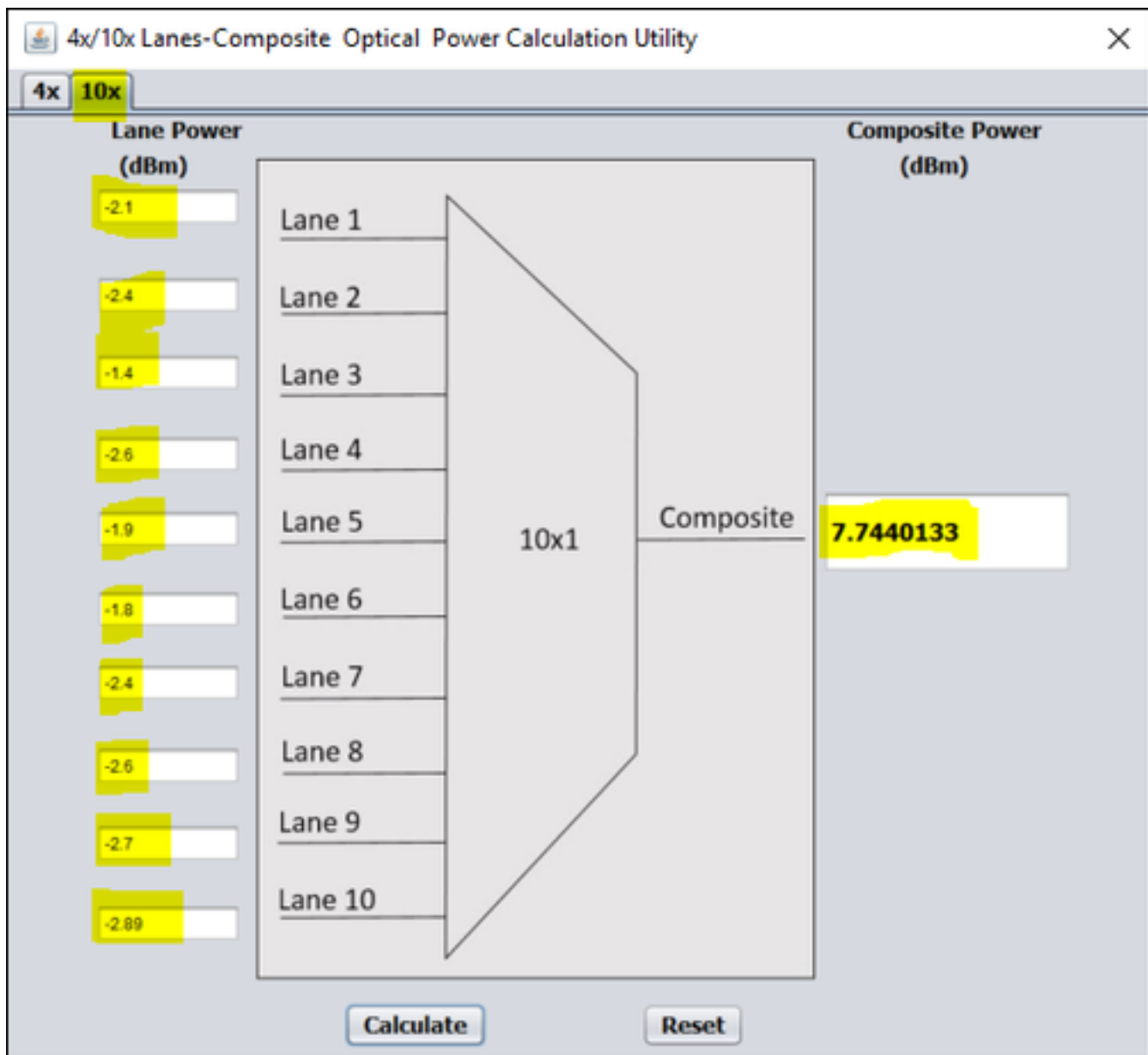
4x1

Composite: 2.272039

Calculate Reset

Calculation for 10x Lane's composite power.

Enter the retrieved lane powers values of a module and press Calculate option to get composite lane powers on client port.



## Related Information

- Download Utility from: <https://cisco.app.box.com/folder/40365594456>
- [Technical Support & Documentation - Cisco Systems](#)