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# DEDFA Turn-up process / tips

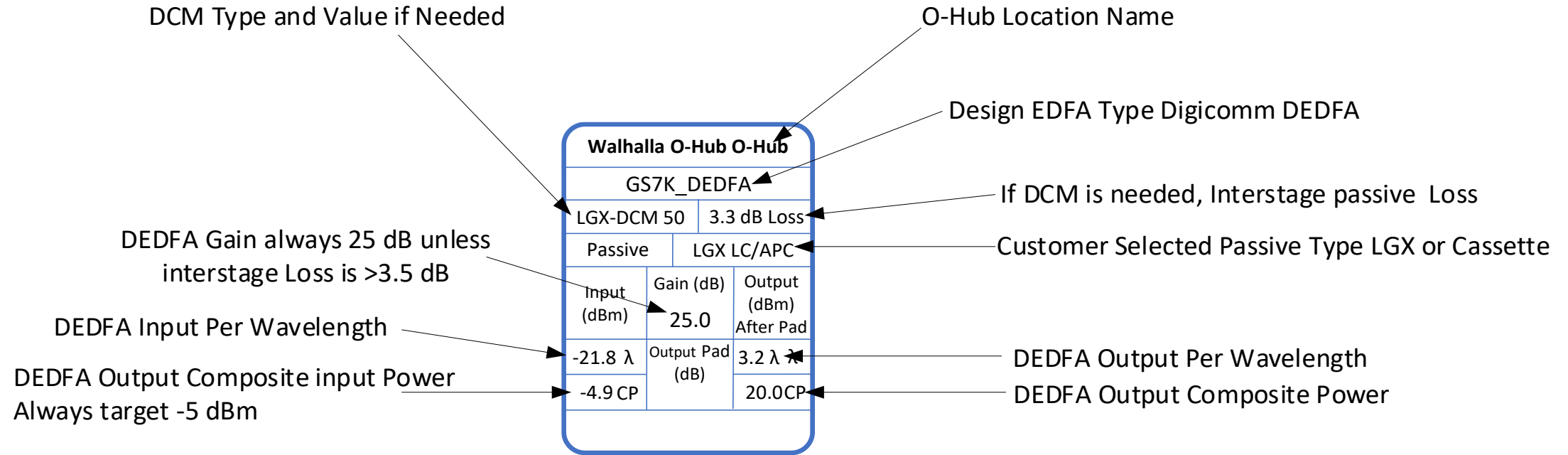
# D-EDFA OVERVIEW

## Features:

- Plugs into existing Cisco O-Hub Housings (two slots wide)
- 25 dB of Gain
- Input power range down to -30dBm
- Optical Test Points on the Input and Output of the EDFA
- The ability to place external Dispersion Compensation Modules in between the two stages of the amplifier (through the use of mid-stage access connectors)
- A second stage AGC that accounts for up to 3.5dB of DCM insertion loss assuring the full 25dB of gain with DCMs up to 50km
- Extended Wavelength Range of 1525nm to 1565nm (ITU 16 to ITU 63; 48 $\lambda$ 's)
- Exceptional flatness across entire wavelength range
- Low Noise Figure for improved OSNR
- Wide Operating Temperature Range
- Local monitoring via craft interface with a new control module
- Remote monitoring via optical connection with a new control module



# EDFA Design Tombstone Detail (Blue Downstream/Red Upstream)



- Maximum Distance from the Primary to the 1<sup>st</sup> DEDFA should not exceed 78 km @ 0.23 dB / km
- Maximum distance between DEDFA's should not exceed 108 km @ 0.23 dB / km
- Recommend DCM's in Low loss LGX form factor (LGX Mounting Cabinet Required)
- If O-Hub DEDFA Monitoring is required with the DEDFA located by the Mux use ITU 62 from the Mux/D-Mux looped back into the O-Hub controller module
- If O-Hub Monitoring is required on very long links where 2 or 3 DEDFA's are required in series. OADM's are needed to drop off the wavelength chosen for monitoring on the downstream. It is recommended that the OADM be placed in the DEDFA interstage access.
- Monitoring on the Upstream requiring an OADM. OADM should be added on the EDFA input. Transceiver doesn't have a high enough output to match the other wavelengths on the Network if inserted in the interstage.
- To Calculate Optical Signal's OSNR:  $OSNR = 57 + Pin - NF$  (DEDFA NF = 5.5 dB)

## Installation Procedure:

### With Mid-Stage DCM:

Step 1: Remove the 6" bend insensitive fiber jumper (if installed) and connect the fibers to/from the DCM to the DCM-I and DCM-O ports. Make sure the connectors are clean.

Step 2: Plug in the optical attenuator (if required) and output fiber to the "OUT" port . Make sure all connectors are clean.

Step 3: Connect the input fiber to "IN" port of the unit.

The Test points for the input and output use LC/APC connectors and are -20dB.

**CAUTION: The EDFA has a muting feature that turns off the output power of the EDFA if there is no input power present. ALWAYS connect the output to the EDFA first to avoid burning the output connector.**



# Using DC Voltage Test Points

- In the absence of an optical power meter, the EDFA has DC voltage Test Points to measure EDFA Input, Output and Gain. The below chart shows the voltage to optical power conversion:
- Three Bicolored (Red/Green) LED's are provided.
- Low will trigger a Red LED
- Proper DEDFA operation optical levels will trigger a Green LED

The below table is based on DEDFA optimal setup with optimal optical inputs and outputs based on a 48 wavelenght design =< 3.5 dB midstage loss.

| # active Wavelengths | DEDFA Input Per λ (dBm) | DEDFA Composit Input (dBm) | DEDFA input TP (VDC) | Input + 25 dB Gain = output (dBm) | DEDFA Output TP (VDC) | DEDFA Gain (dB)  | EDFA Gain TP (VDC) |
|----------------------|-------------------------|----------------------------|----------------------|-----------------------------------|-----------------------|------------------|--------------------|
| 1                    | -21.8                   | -21.8                      | 1.2                  | 3.2                               | 2.4                   | 25               | 0.43               |
| 2                    | -21.8                   | -18.79                     | 1.35                 | 6.21                              | 2.55                  | 25               | 0.43               |
| 3                    | -21.8                   | -17.03                     | 1.44                 | 7.97                              | 2.64                  | 25               | 0.43               |
| 4                    | -21.8                   | -15.78                     | 1.5                  | 9.22                              | 2.7                   | 25               | 0.43               |
| 5                    | -21.8                   | -14.81                     | 1.55                 | 10.19                             | 2.75                  | 25               | 0.43               |
| 6                    | -21.8                   | -14.02                     | 1.59                 | 10.98                             | 2.79                  | 25               | 0.43               |
| 7                    | -21.8                   | -13.35                     | 1.62                 | 11.65                             | 2.82                  | 25               | 0.43               |
| 8                    | -21.8                   | -12.77                     | 1.65                 | 12.23                             | 2.85                  | 25               | 0.43               |
| 9                    | -21.8                   | -12.26                     | 1.68                 | 12.74                             | 2.88                  | 25               | 0.43               |
| 10                   | -21.8                   | -11.8                      | 1.7                  | 13.2                              | 2.9                   | 25               | 0.43               |
| 11                   | -21.8                   | -11.39                     | 1.72                 | 13.61                             | 2.92                  | 25               | 0.43               |
| 12                   | -21.8                   | -11.01                     | 1.74                 | 13.99                             | 2.94                  | 25               | 0.43               |
| 13                   | -21.8                   | -10.66                     | 1.76                 | 14.34                             | 2.96                  | 25               | 0.43               |
| 14                   | -21.8                   | -10.34                     | 1.77                 | 14.66                             | 2.97                  | 25               | 0.43               |
| 15                   | -21.8                   | -10.04                     | 1.79                 | 14.96                             | 2.99                  | 25               | 0.43               |
| 16                   | -21.8                   | -9.76                      | 1.8                  | 15.24                             | 3                     | 25               | 0.43               |
| 17                   | -21.8                   | -9.5                       | 1.81                 | 15.5                              | 3.01                  | 25               | 0.43               |
| 18                   | -21.8                   | -9.25                      | 1.83                 | 15.75                             | 3.03                  | 25               | 0.43               |
| 19                   | -21.8                   | -9.01                      | 1.84                 | 15.99                             | 3.04                  | 25               | 0.43               |
| 20                   | -21.8                   | -8.79                      | 1.85                 | 16.21                             | 3.05                  | 25               | 0.43               |
| 21                   | -21.8                   | -8.58                      | 1.86                 | 16.42                             | 3.06                  | 25               | 0.43               |
| 22                   | -21.8                   | -8.38                      | 1.87                 | 16.62                             | 3.07                  | 25               | 0.43               |
| 23                   | -21.8                   | -8.18                      | 1.88                 | 16.82                             | 3.08                  | 25               | 0.43               |
| 24                   | -21.8                   | -8                         | 1.89                 | 17                                | 3.09                  | 25               | 0.43               |
| 25                   | -21.8                   | -7.82                      | 1.9                  | 17.18                             | 3.1                   | 25               | 0.43               |
| 26                   | -21.8                   | -7.65                      | 1.91                 | 17.35                             | 3.11                  | 25               | 0.43               |
| 27                   | -21.8                   | -7.49                      | 1.92                 | 17.51                             | 3.12                  | 25               | 0.43               |
| 28                   | -21.8                   | -7.33                      | 1.92                 | 17.67                             | 3.12                  | 25               | 0.43               |
| 29                   | -21.8                   | -7.18                      | 1.93                 | 17.82                             | 3.13                  | 25               | 0.43               |
| 30                   | -21.8                   | -7.03                      | 1.94                 | 17.97                             | 3.14                  | 25               | 0.43               |
| 31                   | -21.8                   | -6.89                      | 1.95                 | 18.11                             | 3.15                  | 25               | 0.43               |
| 32                   | -21.8                   | -6.75                      | 1.95                 | 18.25                             | 3.15                  | 25               | 0.43               |
| 33                   | -21.8                   | -6.61                      | 1.96                 | 18.39                             | 3.16                  | 25 <td>0.43</td> | 0.43               |
| 34                   | -21.8                   | -6.49                      | 1.97                 | 18.51                             | 3.17                  | 25               | 0.43               |
| 35                   | -21.8                   | -6.36                      | 1.97                 | 18.64                             | 3.17                  | 25               | 0.43               |
| 36                   | -21.8                   | -6.24                      | 1.98                 | 18.76                             | 3.18                  | 25               | 0.43               |
| 37                   | -21.8                   | -6.12                      | 1.98                 | 18.88                             | 3.18                  | 25               | 0.43               |
| 38                   | -21.8                   | -6                         | 1.99                 | 19                                | 3.19                  | 25               | 0.43               |
| 39                   | -21.8                   | -5.89                      | 2                    | 19.11                             | 3.2                   | 25               | 0.43               |
| 40                   | -21.8                   | -5.78                      | 2                    | 19.22                             | 3.2                   | 25               | 0.43               |
| 41                   | -21.8                   | -5.67                      | 2.01                 | 19.33                             | 3.21                  | 25               | 0.43               |
| 42                   | -21.8                   | -5.57                      | 2.01                 | 19.43                             | 3.21                  | 25               | 0.43               |
| 43                   | -21.8                   | -5.47                      | 2.02                 | 19.53                             | 3.22                  | 25               | 0.43               |
| 44                   | -21.8                   | -5.37                      | 2.02                 | 19.63                             | 3.22                  | 25               | 0.43               |
| 45                   | -21.8                   | -5.27                      | 2.03                 | 19.73                             | 3.23                  | 25               | 0.43               |
| 46                   | -21.8                   | -5.17                      | 2.03                 | 19.83                             | 3.23                  | 25               | 0.43               |
| 47                   | -21.8                   | -5.08                      | 2.04                 | 19.92                             | 3.24                  | 25               | 0.43               |
| 48                   | -21.8                   | -4.99                      | 2.04                 | 20.01                             | 3.24                  | 25               | 0.43               |
| Alarms = Red LED     |                         | -29                        | 0.84 (LED Alarm)     | -5                                | 2.04                  | 25               | 0.3 (LED Alarm)    |



*Thank you for your time!*

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