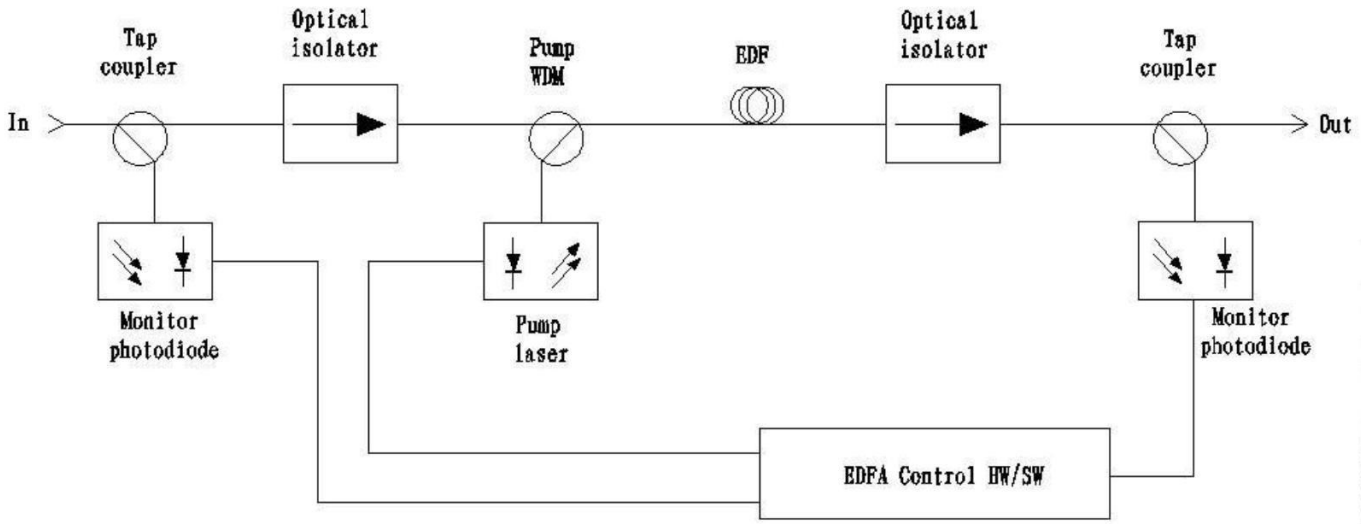
# SEM1550 Series EDFA Module

## I.Features: :

1.Adopts JDSU or Oclaro pump laser.
2.Adopts OFS fiber.
3.SMT production process to assure small size and low power consumption ,but high stability
4.Micro monitor PCB
5.Output adjustable(-4~+0.5)
6.Max outputs 23dBm(single pump laser).

## II. Diagram




## IV: Pin Assignment

| PIN # | Name | Description | Note |
|---|---|---|---|
| 1 | +5V | +5V Power supply | |
| 2 | +5V | +5V Power supply | |
| 3 | +5V | +5V Power supply | |
| 4 | +5V | +5V Power supply | |
| 5 | Reserve | No Connection | |
| 6 | Reserve | No Connection | |
| 7 | Tcase_alarm | Alarm=High@case temperature exceeding its upper limit; Output | |
| 8 | Lop_alarm | Loss of output power alarm, Alarm=High@output power below its lower limit; Output | |
| 9 | L_pump_alarm | Alarm=High@either pump current exceeding its upper limit; Output | |

| | | | |
|---|---|---|---|
| 10 | T_pump_alarm | Alarm=High@either pump temperature exceeding its upper limit; Output | |
| 11 | Reset | Reset=Low; Normal=High | |
| 12 | +5V | +5V ower supply | |
| 13 | GND | Ground | |
| 14 | GND | Ground | |
| 15 | GND | Ground | |
| 16 | GND | Ground | |
| 17 | GND | Ground | |
| 18 | RS232-TX | 9600 baud rate; Output | |
| 19 | LOS_alarm | Loss of input signal alarm, Alarm=High@input power below the setting lower limit; Output | |
| 20 | Reserve | No Connection | |
| 21 | EN_DIS | EN=High@all pumps are on; EN=Low@all pumps are off; Input | |
| 22 | RX232-RX | 9600 baud rate; input | |
| 23 | Reserve | No Connection | |
| 24 | +5V | +5V ower supply | |
| 25 | GND | Ground | |
| 26 | GND | Ground | |

# V Parameters

| Items | Parameters |
|---|---|
| Model | 1550-14~23 |
| Output (dBm) | 14~23 |
| Input (dBm) | -10～10 |
| Wavelength (nm) | 1530～1560 |
| Output Adjustable Range (dBm) | UP0.5, down -4.0 |
| Output Stability (dB) | ≤0.2 |
| Polarization Sensitivity (dB) | ＜0.2 |
| Polarization Dispersion (PS) | ＜0.5 |
| Optical Return Loss (dB) | ≥45 |
| Fiber Connetor | FC/APC、SC/APC |
| Noise Figure (dB) | ＜5（0dBm input） |
| Power Consumption (W) | 12W |
| Power Supply (V) | +5V( External 95-250V) |
| Working Temp (℃) | -20～+60 |
| Weight (Kg) | 0.25 |

# VI:Software Function: :

## 1 Firmware Command Set

**Port Configuration**

The EDFA is set at the baud rate of 9600 bps, 8 data bits, no parity, and 1 stop bit.

**Command Syntax**

The list shows the commands, which are sent to EDFA and the response, which would be received.

**1. Set AGC Gain**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Set Gain of AGC | 65H + Byte1 | 55H | 1 bytes followed |

**2. Set APC Power**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Set Power of APC | 66H + Byte1 | 55H | 1 bytes followed |

Unsigned, Power range <=23.0dBm, Step = 0.2dB

Byte1 = Power*10/2

**3. Set Case Temperature High alarm threshold**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Set Case Temperature limit | 69H + Byte1 | 55H | 1 bytes followed |

Unsigned, High Temperature set range：25 to +85 ℃, Step = 1℃

Byte1 = Temperature

**4. Set input low alarm threshold**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Set Input Low limit | 6AH + 1 Byte1 | 55H | 1 bytes followed |

Signed, Set range: -12.5dBm to 12.5dBm, Step : 0.1dB

Byte1 = Actual Value *10

**5. Set input high alarm threshold**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Set Input High limit | 6BH + Byte1 | 55H | 1 bytes followed |

Signed, Set Range -12.5dBm to 12.5dBm, Step : 0.1dB

Byte1 = Actual Value *10

**6. Set output low alarm threshold**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Set Output Low limit | 6CH + Byte1 | 55H | 1 bytes followed |

Unsigned, Set Range：0dBm to 25.5dBm, Step : 0.1dB

Byte1 = real Value *10

**7. Set input output high alarm threshold**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Set Output High limit | 6DH + Byte1 | 55H | 1 bytes followed |

Unsigned, Set Range：0dBm to 25.5dBm, Step : 0.1dB

Byte1 = real Value *10

**8. Set operation mode: AGC/APC/ACC**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Set AGC/APC/ACC | 71H + Byte1 | 55H | 1 bytes followed |

Byte1：0x03 :ACC, 0x02 : APC, 0x01: AGC

**9. Set alarm enable or disable mask**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Set Alarm Mask | 80H + Byte1-mask + Byte2-mask | 55H | 2 bytes followed |

“1” =masked (i.e. alarm disabled)

“0” =enable alarm

**Byte1-mask:**

| Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
|---|---|---|---|---|---|---|---|
| TEC_2 high | TEC_1 high | I2 high | I1 high | Output high | Output low | Input high | Input low |

**Byte2-mask:**

| Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
|---|---|---|---|---|---|---|---|
| reserved | reserved | reserved | reserved | reserved | reserved | reserved | Case T high |

TEC_2 high：Pump2 TEC current high alarm

TEC_1 high：Pump1 TEC current high alarm

I2 high：Pump2 bias current high alarm

I1 high：Pump1 bias current high alarm

Output high ：Output power high alarm

Output low：Output power low alarm
Input high：Input power high alarm
Input low：Input power low alarm
Case T high：Case Temperature High Alarm

**10. Restore Manufacture Default**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Restore Manufacture Default | 90H | 55H | |

Default: Rated power on APC mode：

| | | |
|---|---|---|
| APC/ACC | APC | / |
| Laser ON/OFF | ON | / |
| Output Optical power | OPT_type | dBm |
| Input Low Alarm | -5 | dBm |
| Input High Alarm | 10 | dBm |
| Output Low Alarm | OPT_type-4 | dBm |
| Output High Alarm | OPT_type+1 | dBm |
| Module Temperature High Alarm | 65 | ℃ |
| TEC Current High Alarm | 1.3 | A |
| Laser Temperature High Alarm | 35 | ℃ |
| set Alarm Mask | (00 00) | enable |

OPT_type: the EDFA-module specified power-level

**11. Set input power offset**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Set input power offset | A0H + Byte1 + Byte2 | 55H | 2 bytes followed |

Signed, Offset = (Byte2*256+Byte1)/10, Step : 0.1dB

**12. Set output power offset**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Set output power offset | A1H + Byte1 + Byte2 | 55H | 2 bytes followed |

Signed, Offset = (Byte2*256+Byte1)/10, Step : 0.1dB

**13. Set Pump1 bias current on ACC mode**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Set Pump1 bias current | 67H + Byte1 + Byte2 | 55H | 2 bytes followed |

Unsigned, Bias Current = (Byte2*256+Byte1), Step: 1mA

**14. Set Pump1 current high alarm threshold**

| Function | Command | Acknowledge | Comments |
|---|---|---|---|

| | ( PC to EDFA Module ) | ( EDFA Module to PC ) | |
|---|---|---|---|
| Set Pump1 current high alarm threshold | 68H + Byte1 + Byte2 | 55H | 2 bytes followed |

Unsigned, Actual Value = ( Byte2*256+Byte1), Step : 1mA

**17. Shut down Pump**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Shut down Pump | 82H | 55H | |

Notes: Enable when external switch enable

**18. On Pump**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| On Pump | 83H | 55H | |

Notes: Enable when external switch enable

**19. Read Pump1 Temperature**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Read Pump1 Temperature | 87H | 55H + Byte1 | 1 bytes followed |

Signed, Byte1=Actual Value , Unit : 1℃

**21. Read TEC1 current**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Read TEC1 current | 89H | 55H + L-Bytes + H-Bytes | 2 bytes followed |

Signed, TEC current = H-Bytes*256+ L-Bytes, Unit :1mA

**23. Read Pump1 Power**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Read Pump1 Power | A2H | 55H + L-Bytes + H-Bytes | 2 bytes followed |

Unsigned, Pump Power = (H-Bytes*256+ L-Bytes)/10, Unit :1mW

**25. Read whole data module status**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Read whole data module status | 79H | 55H + Byte1 + Byte2 + Byte3 + Byte4 + Byte5 + Byte6 + Byte7 + Byte8 | 8 bytes followed |

Byte1：Input Power L-Bytes

Byte2：Input Power H-Bytes

Byte3：Output Power L-Bytes

Byte4：Output Power H-Bytes

Byte5：Pump1 Current L-Bytes

Byte6：Pump1 Current H-Bytes

Byte7：Pump2 Current L-Bytes

Byte8：Pump21 Current H-Bytes

Input Power , Output Power : Signed number , formula → power = (H-Bytes*256+L-Bytes)/10

Pmp-1 Current , Pmp-2 Current : Unsigned number , formula → current = (H-Bytes*256+L-Bytes)

**26. Read setting parameter**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Read setting parameter | 7AH | 55H + Byte1 + Byte2 + Byte3 + Byte4 + Byte5 + Byte6 + Byte7 + Byte8 + Byte9 + Byte10 + Byte11 + Byte12 + Byte13 + Byte14 + Byte15 + Byte16+ Byte17 | 17 bytes followed |

| | Byte | Description | Command | Sequence |
|---|---|---|---|---|
| Byte1 | Pump-1 H limit low | Pump 1 alarm current low byte | 68 | 14 |
| Byte2 | Pump-1 H limit high | Pump 1 alarm current high byte | 68 | 14 |
| Byte3 | Pump-2 H limit low | Pump 2 alarm current low byte | 85 | 16 |
| Byte4 | Pump-2 H limit high | Pump 2 alarm current high byte | 85 | 16 |
| Byte5 | Case_T limit | Case Temperature alarm H limit | 69 | 3 |
| Byte6 | Input L limit | Input alarm low limit | 6A | 4 |
| Byte7 | Input H limit | Input alarm high limit | 6B | 5 |
| Byte8 | Output L limit | output alarm low limit | 6c | 6 |
| Byte9 | Output H limit | output alarm high limit | 6d | 7 |
| Byte10 | NC | | | |
| Byte11 | NC | | | |
| Byte12 | C_POWER_L | Power of APC low byte | 66 | 2 |
| Byte13 | C_POWER_H | Power of APC high byte | 66 | 2 |
| Byte14 | C_I1_H | operation Current 1 of ACC low byte | 67 | 13 |
| Byte15 | C_I1_H | operation Current 1 of ACC high byte | 67 | 13 |
| Byte16 | C_I2_H | operation Current2 of ACC low byte | 68 | 15 |
| Byte17 | C_I1_H | operation Current 2 of ACC high byte | 68 | 15 |

**27. Read operation mode**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Read operation mode | 7BH | 55H + Byte1 + Byte2 + Byte3 | 3 bytes followed |

Byte1 :Type TYP = TYP (Type Power) * 5*2/10, e.g. Type power =22, It's 22dBm EDFA, so TYP is 0x6E

Byte2：0x03: ACC， 0x02 : APC， 0x01: AGC

Byte3：Pump numbers

**28. Read firmware version**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Read firmware version | 7CH | 55H + Byte1 | 1 bytes followed |

Byte1：Actual Version =Version Data / 10

**29. Read alarm bit**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Read alarm bit | 7DH | 55H + Byte1 + Byte2 | 2 bytes followed |

**Byte1:**

| Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
|---|---|---|---|---|---|---|---|
| TEC_2 high | TEC_1 high | I2 high | I1 high | Output high | Output low | Input high | Input low |

**Byte2:**

| Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
|---|---|---|---|---|---|---|---|
| reserved | reserved | reserved | reserved | reserved | reserved | reserved | Case T high |

0：OK

1：Alarm

**30. Read alarm enable**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Read alarm bit | 81H | 55H + Mask1 + Mask2 | 2 bytes followed |

**31. Read case temperature**

| Function | Command ( PC to EDFA Module ) | Acknowledge ( EDFA Module to PC ) | Comments |
|---|---|---|---|
| Read alarm bit | 86H | 55H + Byte1 | 1 bytes followed |

Byte1：Actual Version = Actual Value / Unit=℃