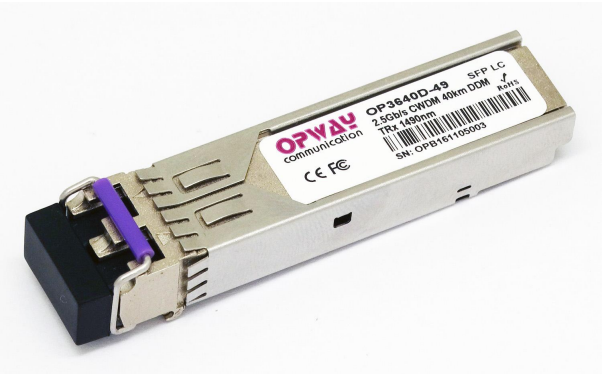

- ✧ RoHS compliant and Lead Free
- ✧ Up to 40km on 9/125μm SMF
- ✧ Single +3.3V Power Supply
- ✧ Low power dissipation
- ✧ operating temperature range: 0°C to 70°C

Features:

- ✧ Up to 2.5Gb/s Data Links
- ✧ Hot-Pluggable
- ✧ CWDM DFB laser transmitter
- ✧ Duplex LC connector

Applications:

- ✧ SDH STM-16
- ✧ SONET OC-48
- ✧ 2x Fiber Channel
- ✧ Other Optical Link

Description:

OP3640D-XX Transceiver is a high performance, cost effective module which have a Duplex LC optics interface. Standard AC coupled CML for high speed signal and LVTTL control and monitor signals.

The receiver section uses a PIN receiver and the transmitter uses CWDM DFB laser, up to 16dB link budge ensure this module STM-16/OC-48 40km application.

● Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	T_S	-40		85	°C
Supply Voltage	$V_{CC}T, R$	-0.5		4	V
Relative Humidity	RH	0		85	%
Case Operating Temperature	Tc	0		70	°C

● Recommended Operating Environment

Parameter	Symbol	Min.	Typical	Max.	Unit
Case Operating Temperature	Tc	0		70	°C
Supply Voltage	$V_{CCT, R}$	3.0		3.6	V

● Electrical Characteristics (T_{OP} = 0 to 70 °C, VCC = 3.0 to 3.60 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Supply Voltage	Vcc	3.0	3.30	3.60	V	
Supply Current	Icc			300	mA	
Transmitter Section:						

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Input differential impedance	R_{in}	90	100	110	Ω	1
Single ended data input swing	$V_{in\ PP}$	200		1200	mVp-p	
Transmit Disable Voltage	V_D	Vcc – 1.3		Vcc	V	2
Transmit Enable Voltage	V_{EN}	Vee		Vee+ 0.8	V	
Transmit Disable Assert Time	$T_{dessert}$			10	us	
Receiver Section:						
Single ended data output swing	Vout,pp	300		1000	mv	3
Data output rise time	t_r			260	ps	4
Data output fall time	t_f			260	ps	4
LOS Fault	$V_{losfault}$	Vcc – 0.5		V_{CC_host}	V	5
LOS Normal	$V_{los\ norm}$	V_{ee}		V_{ee}+0.5	V	5
Power Supply Rejection	PSR	100			mVpp	6
Total Generated Receiver Jitter (peak to peak)	J_{RX}p-p			0.07	UI	
Total Generated Receiver Jitter (rms)	J_{RX}rms			0.007	UI	

Note:

1. AC coupled.
2. Or open circuit.
3. Into 100 ohm differential termination.
4. 20 – 80 %
5. LOS is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
6. All transceiver specifications are compliant with a power supply sinusoidal modulation of 20 Hz to 1.5MHz up to specified value applied through the power supply filtering network shown on page 23 of the Small Form-factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 14, 2000.

● Optical Parameters(T_{OP} = 0 to 70 °C, V_{CC} = 3.00 to 3.60 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Center Wavelength	λ_c	λ_c -6.5	λ	λ_c +6.5	nm	1
Spectral Width(-20dB)	σ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Output Power	P_{out}	-2		+3	dBm	2
Optical Rise/Fall Time	t_r / t_f			260	ps	3
Extinction Ratio	ER	9			dB	
Total Generated Transmitter Jitter (peak to peak)	J_{TX}p-p			0.07	UI	
Total Generated Transmitter Jitter (rms)	J_{TX}rms			0.007	UI	
Eye Mask for Optical Output	Compliant with Eye Mask Defined in IEEE 802.3 standard					
Receiver Section:						
Optical Input Wavelength	λ_c	1260		1620	nm	
RX Sensitivity	Sen			-18	dBm	4.5
Receiver Overload	P_{ol}	0			dBm	4.5
RX_LOS Assert	LOS_A	-35			dBm	

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RX_LOS Deassert	LOS_D			-19	dBm	
RX_LOS Hysteresis	LOS_H	0.5		4	dB	
General Specifications						
Data Rate	BR	2125		2500	Mb/s	
Bit Error Rate	BER			10^{-12}		
Max. Supported Link Length on 50/125μm MMF@2.5Gb/s	LMAX			40	km	6
Total System Budget	LB	16			dB	7

Note

1. Also specified to meet curves in FC-PI 13.0 Figures 18 and 19, which allow trade-off between wavelength spectral width.
2. Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.
3. Unfiltered, 20-80%. Complies with IEEE 802.3 (Gig. E), FC 1x and 2x eye masks when filtered.
4. Measured with conformance signals defined in FC-PI 13.0 specifications.
5. Measured with PRBS 2^7 -1at 10^{-12} BER
6. Dispersion limited per FC-PI Rev. 13
7. .Attenuation of 0.25 dB/km is used for the link length calculations. Distances are indicative only. Please refer to the Optical Specifications in Table IV to calculate a more accurate link budget based on specific conditions in your application.

● Block Diagram of Transceiver:

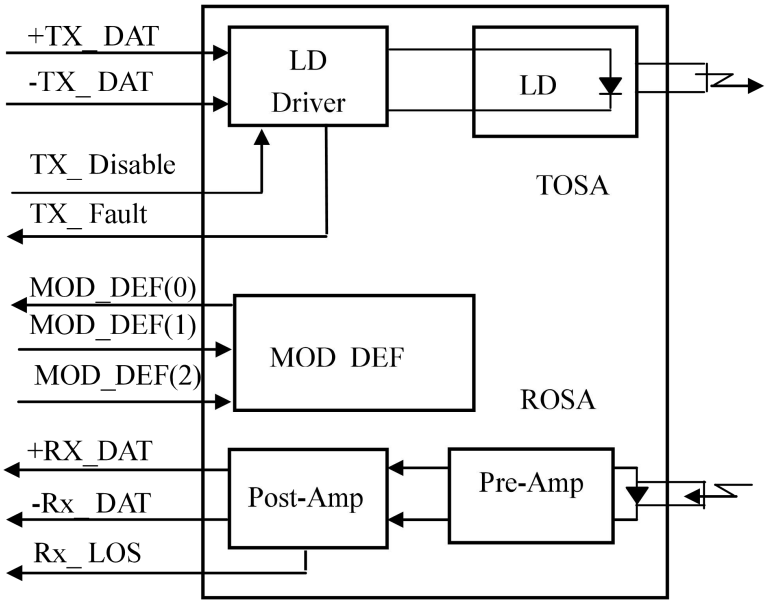

Figure1: Block Diagram

Pin Assignment:

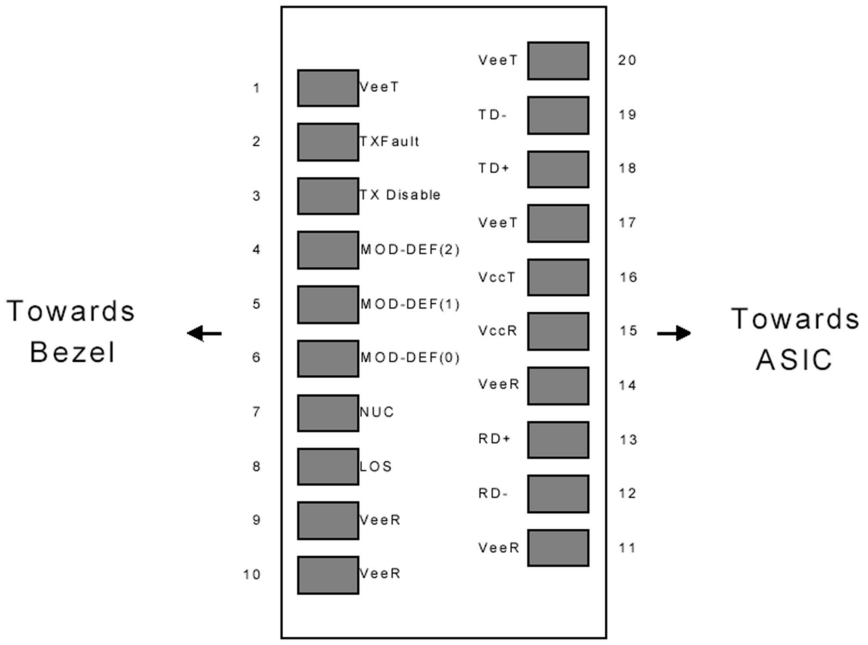

Figure2:Diagram of Host Board Connector Block Pin Numbers and Names

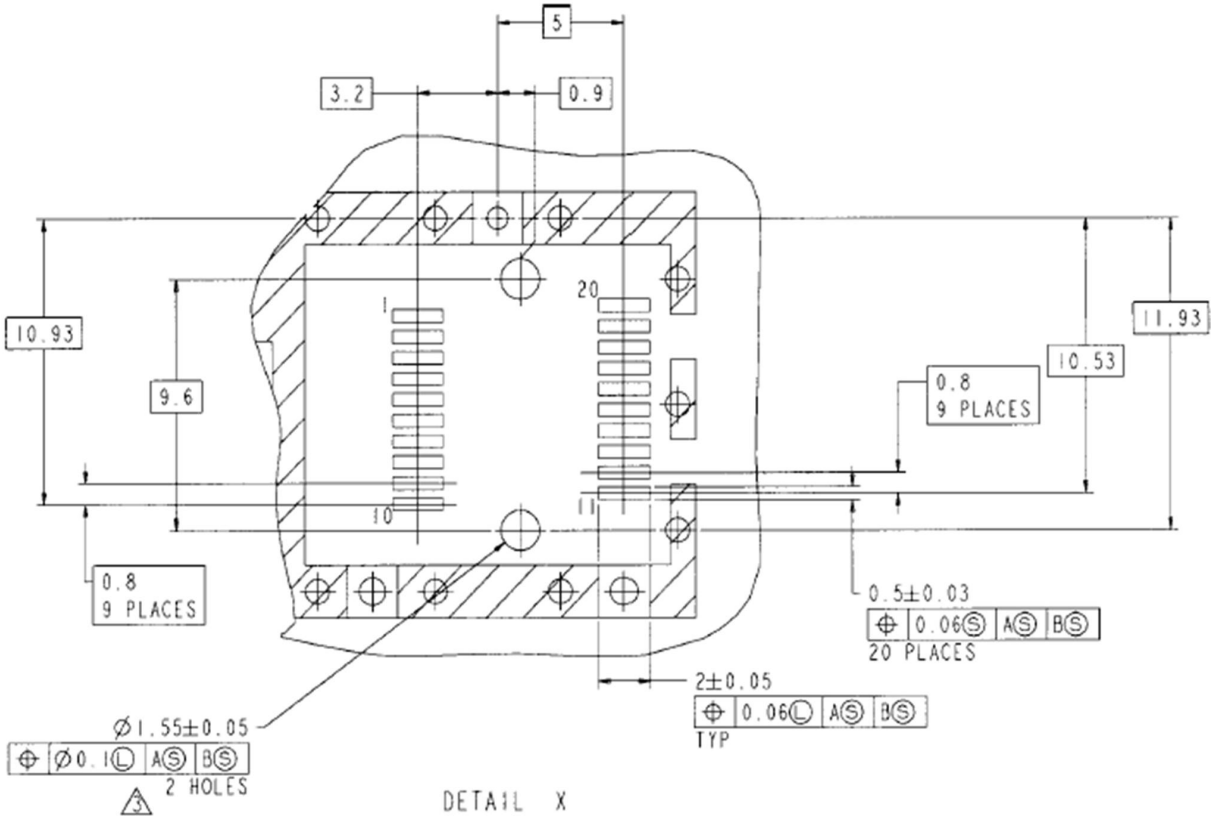

Figure 3. SFP Host Board Mechanical Layout

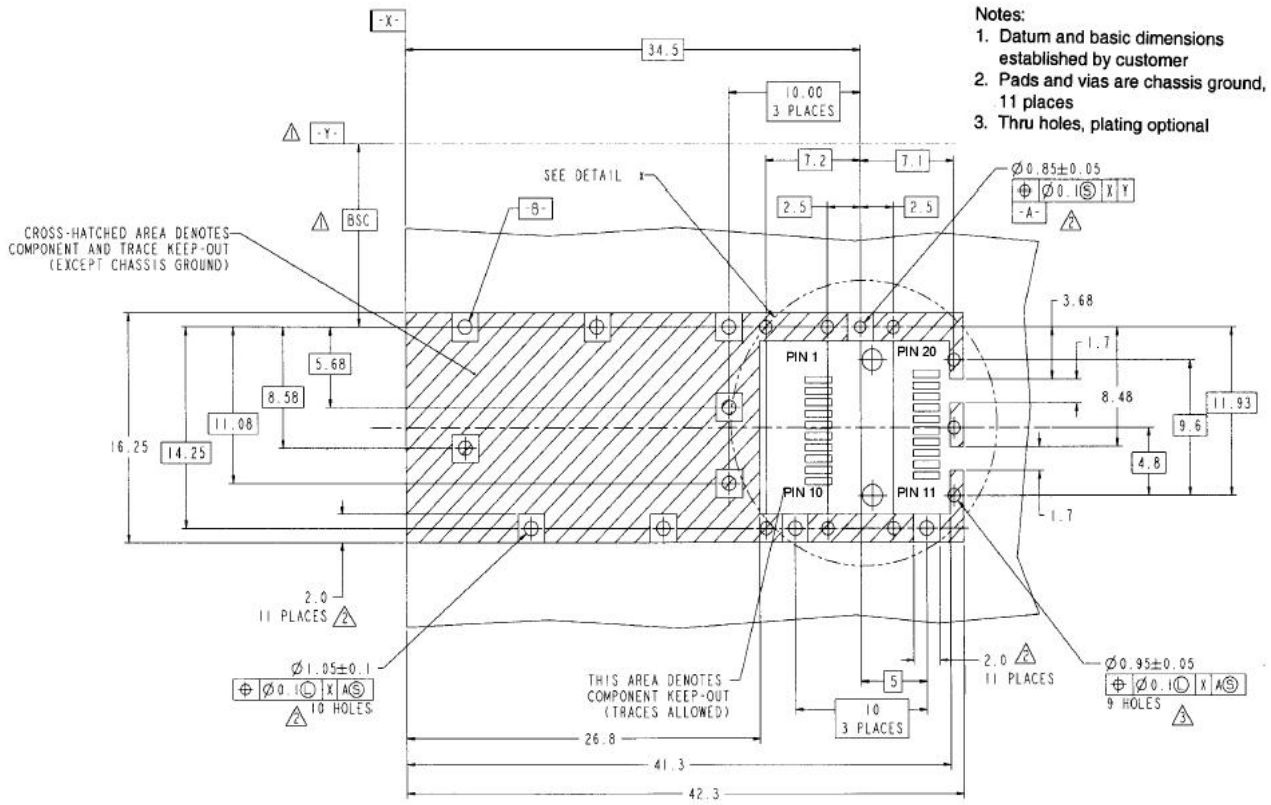

Figure 4. SFP Host Board Mechanical Layout(Cont)

- **Pin Description:**

Pin No	Name	Function	Plug Seq	Notes
1	VeeT	Transmitter Ground	**1**	**1**
2	TX Fault	Transmitter Fault Indication	**3**	
3	TX Disable	Transmitter Disable	**3**	2
4	MOD-DEF2	Module Definition	**2**	3
5	MOD-DEF1	Module Definition 1	**3**	3
6	MOD-DEF0	Module Definition 0	**3**	3
7	Rate Select	Not Connected	**3**	**4**
8	LOS	Loss of Signal	**3**	5
9	VeeR	Receiver Ground	**1**	**1**
10	VeeR	Receiver Ground	**1**	**1**
11	VeeR	Receiver Ground		**1**
12	RD-	Inv. Received Data Out	**3**	**6**
13	RD+	Received Data Out	**3**	**6**
14	VeeR	Receiver Ground	**3**	**1**
15	VccR	Receiver Power	**2**	**1**
16	VccT	Transmitter Power	**2**	
17	VeeT	Transmitter Ground	**1**	
18	TD+	Transmit Data In	**3**	6
19	TD-	Inv. Transmit In	**3**	6
20	VeeT	Transmitter Ground	**1**	

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3. Should be pulled up with 4.7k - 10 kohms on host board to a voltage between 2.0V and 3.6V.MOD_DEF(0) pulls line low to indicate module is plugged in.

4. Rate select is not used
5. LOS is open collector output. Should be pulled up with 4.7k – 10 kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
6. AC Coupled

Recommended Circuit:

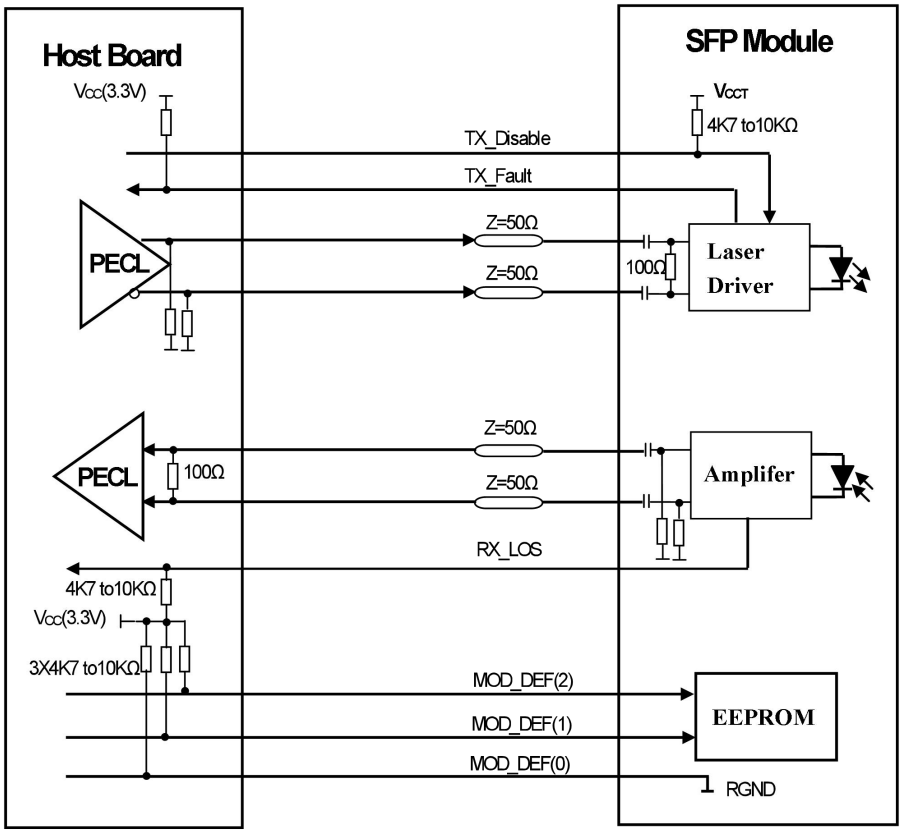

Figure 5. SFP Host Recommended Circuit

Serial ID Memory Contents:

Data Address	Length (Byte)	Name of Length	Description and Contents
Base ID Fields			
0	1	Identifier	Type of Serial transceiver (03h=SFP)
1	1	Reserved	Extended identifier of type serial transceiver (04h)
2	1	Connector	Code of optical connector type (07=LC)
3-10	8	Transceiver	SONET & Fiber Channel
11	1	Encoding	SONET Scrambled
12	1	BR,Nominal	Nominal baud rate, unit of 100Mbps
13	1	Reserved	(0000h)
14	1	Length(9um,km)	Link length supported for 9/125um fiber, units of km
15	1	Length(9um)	Link length supported for 9/125um fiber, units of 100m
16	1	Length(50um)	Link length supported for 50/125um fiber, units of 10m
17	1	Length(62.5um)	Link length supported for 62.5/125um fiber, units of 10m
18	1	Length(Copper)	Link length supported for copper, units of meters
19	1	Reserved	

20-35	16	Vendor Name	SFP vendor name:
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: “OPXXXXXX” (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-61	2	Wavelength	Laser wavelength
62	1	Reserved	
63	1	CCID	Least significant byte of sum of data in address 0-62
Extended ID Fields			
64-65	2	Option	Indicates which optical SFP signals are implemented(001Ah = LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %
68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	Manufacturing date code
92-94	3	Reserved	
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
Vendor Specific ID Fields			
96-127	32	Readable	Vendor specific date, read only

● Mechanical Dimensions:

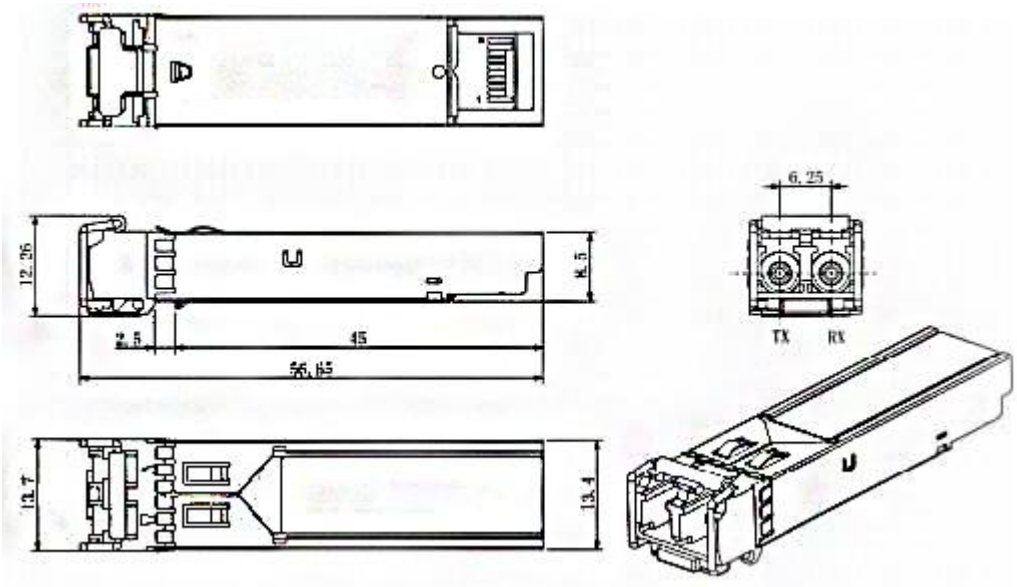

Figure 6. Mechanical Drawing

Note: In the Part No. of OP3640D-XX, XX stands for wavelength, such as:
27: for 1271nm, 29: for 1291nm, 31: for 1311nm, 33: for 1331nm, 35: for 1351nm, 37: for 1371nm, 39: for 1391nm, 41: for 1411nm, 43: for 1431nm, 45: for 1451nm, 47: for 1471nm, 49: for 1491nm, 51: for 1511nm, 53: for 1531nm, 55: for 1551nm, 57: for 1571nm, 59: for 1591nm, 61: for 1611nm.

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