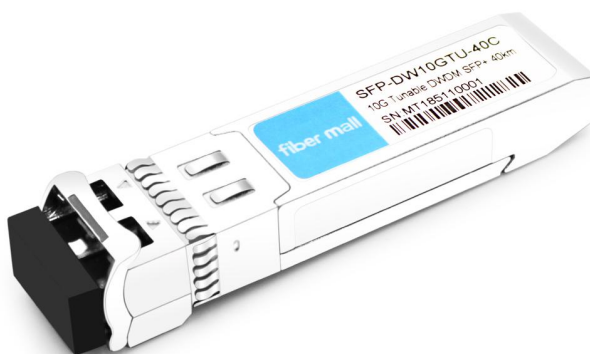


SFP-DW10GTU-40C

10Gbps DWDM Tunable SFP+ Transceiver, Single Mode, 40km Reach



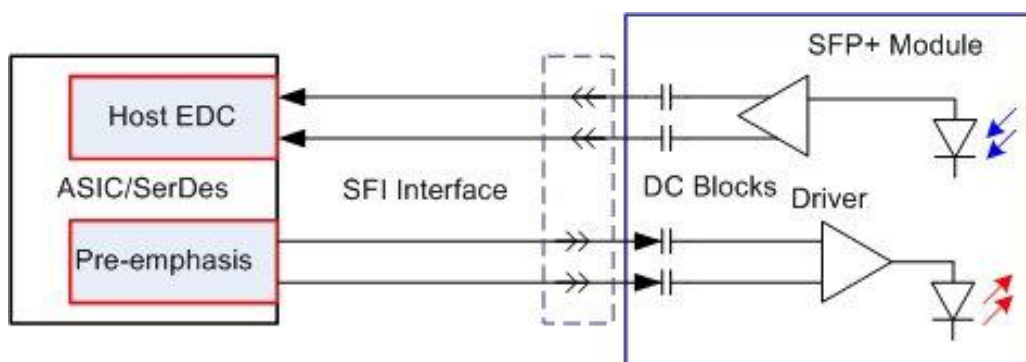
Product Features

- ❖ Power Dissipation : 2w max
- ❖ Temperature range : 0°C~70°C
- ❖ Up to 11.3Gb/s transmission
- ❖ -300 to +1450 Ps /nm Dispersion Tolerance
- ❖ SFP+ MSA compliant form factor connector
- ❖ Up to 40 km reach
- ❖ 50GHz ITU channel spacing (C-Band) with a wavelength locker

- ❖ I2C interface for diagnostic monitoring
- ❖ High performance PIN Receiver
- ❖ RoHS 6 Compliant

Applications

- ❖ DWDM 10Gb/s Ethernet 10Gb/s Fiber Channel
- ❖ DWDM 10Gb/s Ethernet 10Gb/s Fiber Channel w/FEC



Application in System

Description

The SFP-DW10GTU-40C series optical transceiver is a high performance and cost effective SFP+ transceiver modules designed for 10G SDH/SONET, 10G Ethernet DWDM fiber optic transmission applications, designed to support the full range of C-band ITU-T wavelengths data rates up to 11.3Gbs and distances up to 40km.

This transceiver contains both transmit and receive sections. An MZM, (C-band tunable laser with a wavelength locker) a laser driver and the supporting circuits constitute the transmit path while an PIN ROSA. A microcontroller handles the communications between the module and the host board as well as the control and monitoring functions for both transmit and receive sections. The transceiver module is fully compliant with the SFP MSA standard and can be hot-plugged into the 20-pin SFP connector on the host board. By limiting inrush currents, the device will not disturb the operations of the host board. The high-speed electrical interface is fully compliant with the SFI standard, providing transmission paths for the 10G signals.

Functional Description

The SFP-DW10GTU-40C series optical transceiver contains a duplex LC connector for the optical interface and a 20-pin connector for the electrical interface.

Transmitter Operation

The transceiver module receives 10Gb/s electrical data and convert it to an optical signal. The transmitter output can be turned off by TX disable signal at TX_DIS pin. When TX_DIS is asserted high, the transmitter is turned off.

Receiver Operation

The received optical signal is converted to serial electrical data signal. before sending out to the SFI channel (i.e. SFP connector and high speed signal traces). The RX_LOS signal indicates insufficient optical power for reliable signal reception at the receiver.

LOW Speed Signaling

SCL/SDA: Two wire serial interface clock and data line

Tx_fault: Output pin. When asserted high indicates that the module has detected a

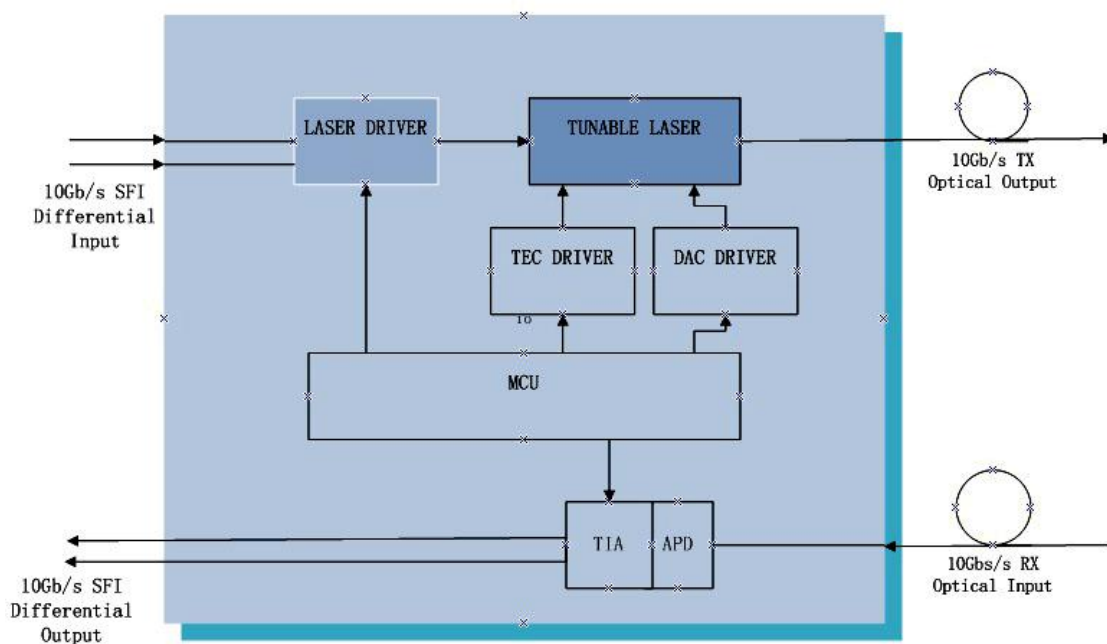
Transmitter fault condition related to laser operation or safety.

TX_Disable: Input pin. When asserted high or left open the transmitter output is turned off. When Tx_disable is asserted low or grounded the module transmitter is operating normally

RS0 and RS1: Input pin. Pulled low to VeeT with >100k resistors in the module. These pins are not used in this product.

Mod_ABS: Output pin. Asserted high when the SFP+ module is absent and is pulled low when the SFP+ module is inserted.

RX_LOS: Output pin. Asserted high when insufficient optical power for reliable signal reception is received.



Transceiver Block Diagram

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Note
Storage Temperature	Tst	-40	85	degC	
Relative Humidity (non-condensation)	RH	-	85	%	
Operating Case Temperature	Topc	0	70	degC	1
Supply Voltage	VCC	-0.5	3.6	V	
Voltage on LVTTTL Input	Vilvttl	-0.5	VCC3+0.5	V	
LVTTTL Output Current	Iolvttl	-	15	mA	
Receiver Input Optical Power (Average)	Mip	-	-7	dBm	2

Notes:

1. Ta: -10 to 60degC with 1.5m/s airflow with an additional heat sink.
2. PIN Receiver.

Recommended Operating Conditions & Power Supply Requirements

Parameter	Symbol	Min	Max	Unit
Operating Case Temperature	Topc	0	70	degC
Relative Humidity (non-condensing)	Rhop	-	85	%
Power Supply Voltage	VCC3	3.135	3.465	V
Power Supply current			577	mA
Total Power Consumption	Pd	-	2	W

Low Speed Control and Alarm Signals Electrical Interface

Parameter	Symbol	Min.	Max.	Unit	Conditions
Module Vcc	VccT, VccR	3.14	3.46	V	
Tx_Fault, Rx_LOS	V _{OL}	-0.3	0.40	V	At 0.7 mA ¹
	I _{OH} ¹	-50	37.5	μA	Measured with a 4.7 kΩ load pulled up to Vcc_Host where Vcc_Host_min < Vcc_host < Vcc_Host_max
Tx_Disable, RS0, RS1	V _{IL}	-0.3	0.8	V	
	V _{IH}	2.0	VccT + 0.3	V	
1. Positive values indicate current flowing into the module.					

Optical Interface

Parameter	Symbol	Min	Typical	Max	Unit	Note
Transmitter Optical Interface						
Operating Data Rate	-			11.30	Gb/s	1
Wavelength range (ITU Grid)	Λ	1528.77		1563.45	nm	
Transmitter Center Wavelength – EOL	λ_c	$\lambda_c - 2.5$	λ_c	$\lambda_c + 2.5$	GHz	
Transmitter Center Wavelength – BOL	λ_c	$\lambda_c - 1.5$	λ_c	$\lambda_c + 1.5$	GHz	
Crossing Ratio		40		60	%	
Center Wavelength Spacing			50		GHz	
SMSR	SMSR	35		-	dB	
Wavelength tuning (Warm)			0.5	2	s	
Average Output Power	Po	0		+4	dBm	2
Dispersion Penalty @9.95G	DP			2	dB	2
Dispersion Penalty @10.3G				2.5	db	
Dispersion Penalty @11.3G				3	db	
Disabled Power	Poff	-		-30	dBm	2
Extinction Ratio	ER	9.0	10	-	dB	2
Eye Mask 1(SONET/SDH)		GR-253-CORE/ITU-T G.691				2
Eye Mask 2 (10G Ethernet)		IEEE802.3ae				3
Spectral Width (-20dB from Peak)	FW20			0.2	nm	
RIN	RIN	-		-130	dB/Hz	
Receiver Optical Interface						
Operating Data Rate		8		11.30	Gb/s	1
Input Center Wavelength	Irc	1250		1620	nm	
Overload	Rovl	-20		-	dBm	
Minimum Sensitivity	Pmin	-	-	-16.4	dBm	2
LOS Assert	LOSA	-30			dBm	

LOS Deassert	LOSD			-22	dBm	
LOS Hysteresis	LOSH	0.5			dB	
Optical Path Penalty	PN	-		TBD	dB	1
Optical Return Loss	ORL	27		-	dB	
Jitter Tolerance	JTL	GR-253-CORE/ITU-T G.783				

Notes:

1. Data rate tolerance

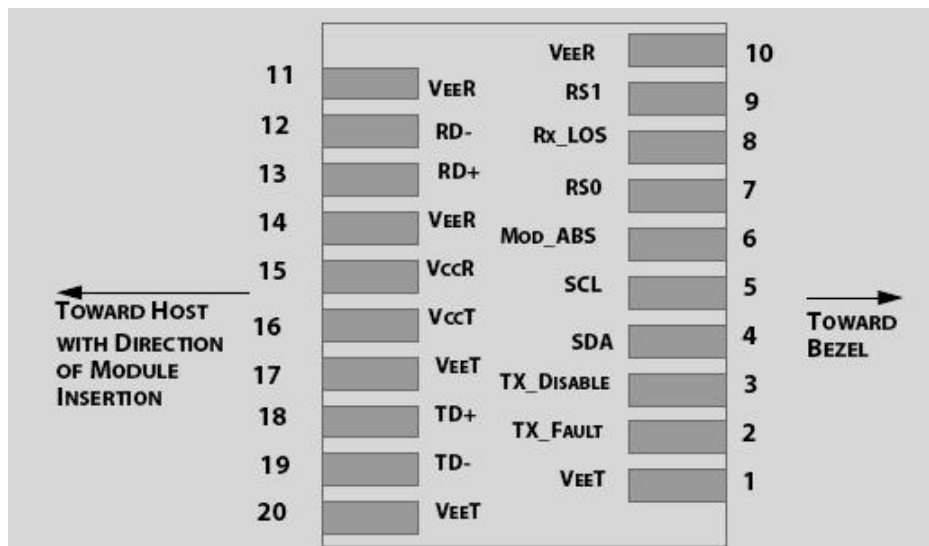
- IR-2/S-64.2b, 10GBASE-EW: typ. +/-20ppm ; -10GBASE-ER: typ. +/-100ppm

2. Measured at 9.95Gbps, Non-framed PRBS2^31-1, NRZ

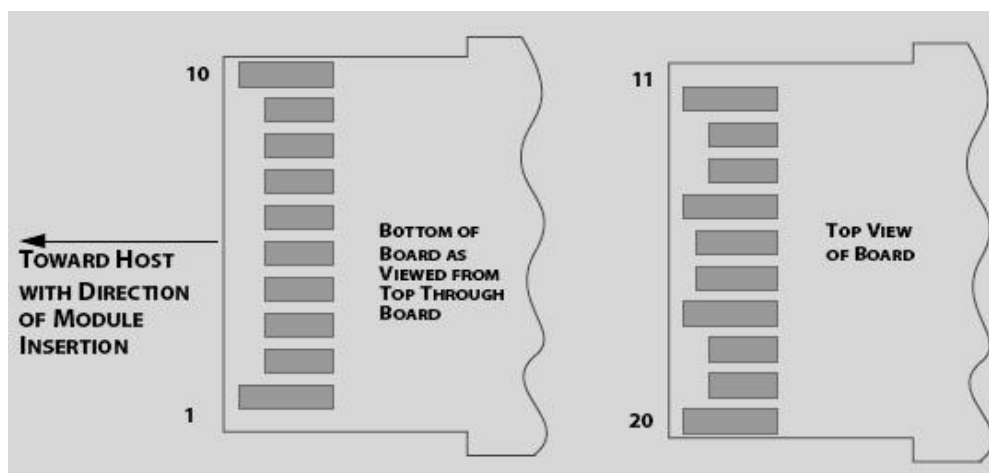
Digital Diagnostic Functions

Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	degC	Over operating temp
Laser power monitor absolute error	DMI_TX	-3	3	dB	
RX power monitor absolute error	DMI_RX	-3	3	dB	-1dBm to -23dBm range
Supply voltage monitor absolute error	DMI_VCC	-0.1	0.1	V	Full operating range
Bias current monitor	DMI_Ibias	-10%	10%	mA	

Pin Assignment and Pin Description



Module Interface to Host

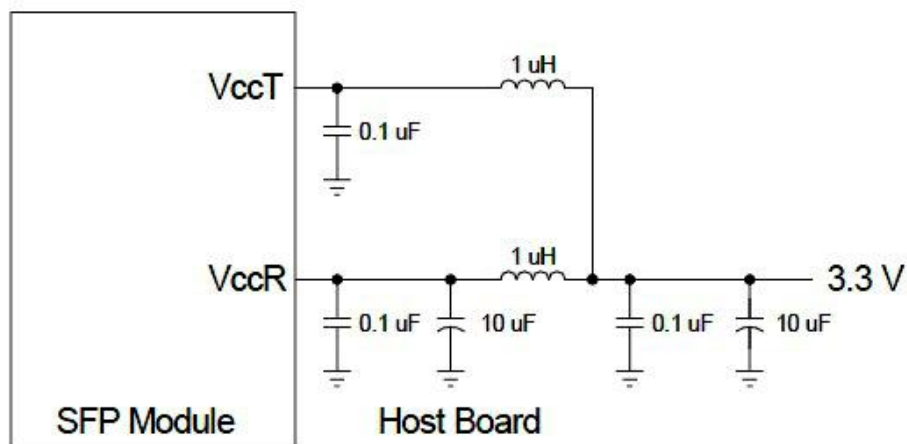


Module Contact Assignment

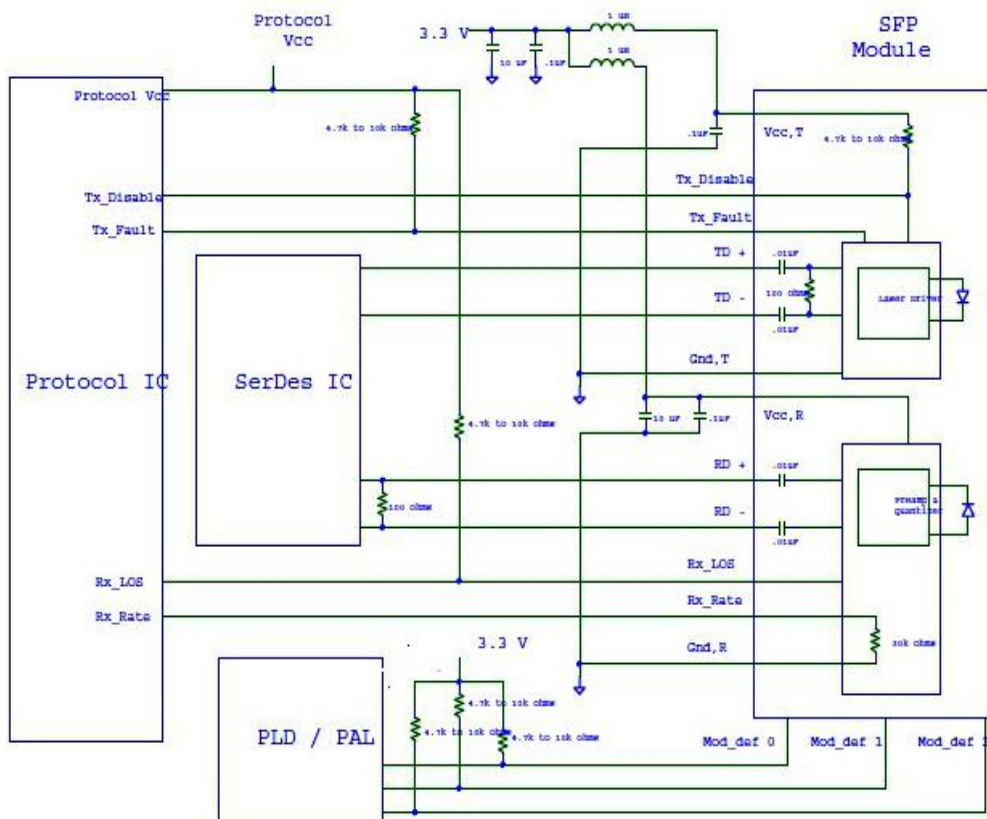
Pin Description

Pin#	Name	Logic	Description
1	VeeT		Module transmitter ground
2	TX_Fault	LVTTL-O	Module transmitter fault
3	Tx_Disable	LVTTL-I	Transmitter disable; When held high or left open transmitter laser source turned off
4	SDA	LVTTL-O/I	Two wire interface data line
5	SCL	LVTTL-I	Two wire interface clock
6	Mod_AbS		Indicates module is not present.
7	RS0	LVTTL_I	Rate select 0 (not used)
8	RX_LOS	RX_LOS	Receiver loss of signal indicator
9	RS1		Rate select 1(not used)
10	VeeR		Module receiver ground
11	VeeR		Module receiver ground
12	RD-	CML-O	Receiver inverted data output
13	RD+	CMLL-O	Receiver data output
14	VeeR		Module receiver ground.
15	VeeR		Module receiver ground.
16	VccT		Module Ground
17	VccT		Module transmitter ground.
18	TD+	CML-I	Transmitter data input
19	TD-	CML-I	Transmitter inverted data input
20	VeeT		Module transmitter ground

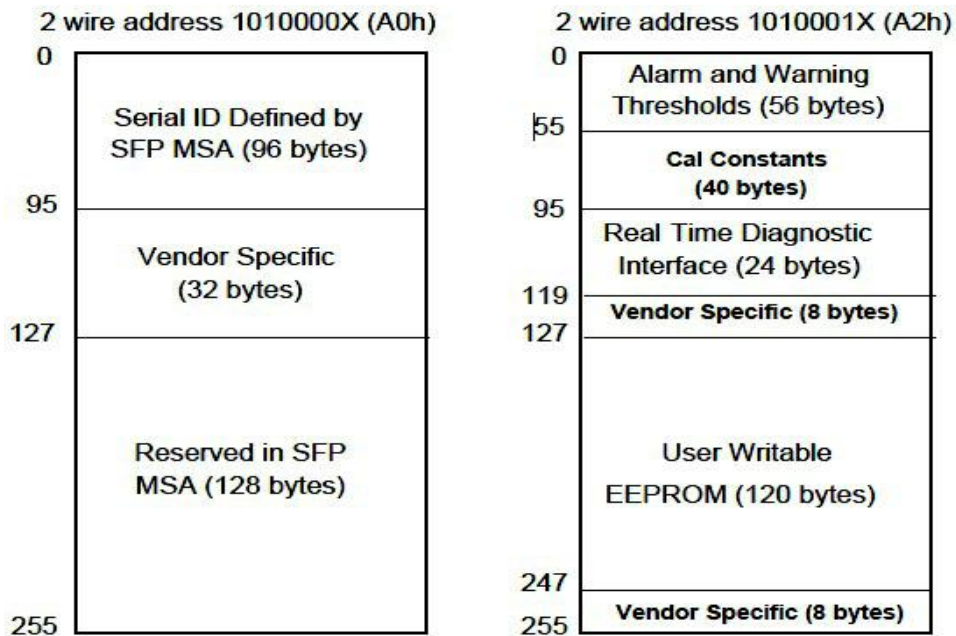
Recommended Power Supply Filter



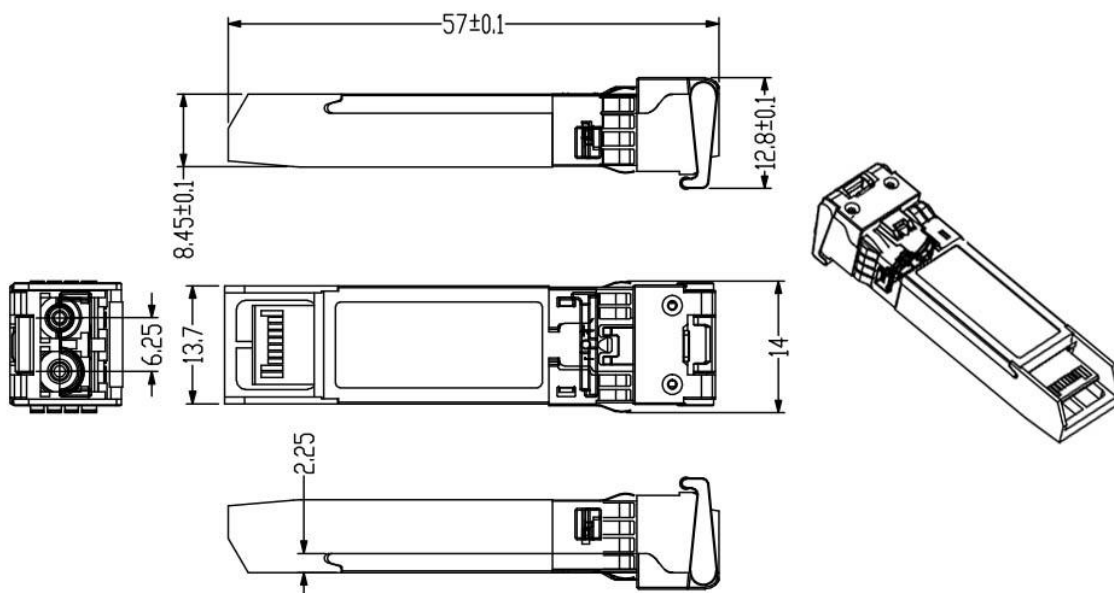
Recommended Electrical Interface to Host



MSA Compliant EEPROM Structure



Mechanical Dimensions



Ordering Information

Part Number	Product Description
SFP-DW10GTU-40C	10Gbps DWDM Tunable SFP+, LC, 40km, 0°C~+70°C, with DDM

Wavelength Information

Channel	Frequency(THz)	Wavelength (nm)	Full Band	Channel	Frequency(THz)	Wavelength (nm)	Full Band
13	191.75	1563.45	✓	57	193.95	1545.72	✓
14	191.80	1563.05	✓	58	194.00	1545.32	✓
15	191.85	1562.64	✓	59	194.05	1544.92	✓
16	191.90	1562.23	✓	60	194.10	1544.53	✓
17	191.95	1561.83	✓	61	194.15	1544.13	✓
18	192.00	1561.42	✓	62	194.20	1543.73	✓
19	192.05	1561.01	✓	63	194.25	1543.33	✓
20	192.10	1560.61	✓	64	194.30	1542.94	✓
21	192.15	1560.20	✓	65	194.35	1542.54	✓
22	192.20	1559.79	✓	66	194.40	1542.14	✓
23	192.25	1559.39	✓	67	194.45	1541.75	✓
24	192.30	1558.98	✓	68	194.50	1541.35	✓
25	192.35	1558.58	✓	69	194.55	1540.95	✓
26	192.40	1558.17	✓	70	194.60	1540.56	✓
27	192.45	1557.77	✓	71	194.65	1540.16	✓
28	192.50	1557.36	✓	72	194.70	1539.77	✓
29	192.55	1556.96	✓	73	194.75	1539.37	✓
30	192.60	1556.55	✓	74	194.80	1538.98	✓
31	192.65	1556.15	✓	75	194.85	1538.58	✓
32	192.70	1555.75	✓	76	194.90	1538.19	✓
33	192.75	1555.34	✓	77	194.95	1537.79	✓
34	192.80	1554.94	✓	78	195.00	1537.40	✓
35	192.85	1554.54	✓	79	195.05	1537.00	✓
36	192.90	1554.13	✓	80	195.10	1536.61	✓
37	192.95	1553.73	✓	81	195.15	1536.22	✓
38	193.00	1553.33	✓	82	195.20	1535.82	✓
39	193.05	1552.93	✓	83	195.25	1535.43	✓
40	193.10	1552.52	✓	84	195.30	1535.04	✓
41	193.15	1552.12	✓	85	195.35	1534.64	✓
42	193.20	1551.72	✓	86	195.40	1534.25	✓
43	193.25	1551.32	✓	87	195.45	1533.86	✓
44	193.30	1550.92	✓	88	195.50	1533.47	✓
45	193.35	1550.52	✓	89	195.55	1533.07	✓
46	193.40	1550.12	✓	90	195.60	1532.68	✓
47	193.45	1549.72	✓	91	195.65	1532.29	✓
48	193.50	1549.32	✓	92	195.70	1531.90	✓
49	193.55	1548.91	✓	93	195.75	1531.51	✓
50	193.60	1548.51	✓	94	195.80	1531.12	✓
51	193.65	1548.11	✓	95	195.85	1530.72	✓
52	193.70	1547.72	✓	96	195.90	1530.33	✓
53	193.75	1547.32	✓	97	195.95	1529.94	✓
54	193.80	1546.92	✓	98	196.00	1529.55	✓
55	193.85	1546.52	✓	99	196.05	1529.16	✓
56	193.90	1546.12	✓	100	196.10	1528.77	✓