

SHENZHEN TIBTRONIX TECHNOLOGY CO., LTD.

TSPLEG10D-Dxx

25Gb/s 10km DWDM Tunable SFP28 Transceiver
Hot Pluggable, Duplex LC, 50GHz ITU-T-T, DWDM Tunable&PIN, Single mode

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Shenzhen Tibtronix Technology Co., Ltd.

3/F,12th Building, Nangang 1st Industrial Park, Baimang Xili, Songbai Road, Nanshan District, Shenzhen, China

Tel: +86 755 23316583

Fax: +86 755 29810056

E-mail: sales@tibtronix.com

<http://www.tibtronix.com>

Features:

- ✧ Supports 25Gb/s bit rates
- ✧ Hot-Pluggable
- ✧ Duplex LC connector
- ✧ DWDM TUNABLE laser transmitter
- ✧ Pin photo-detector
- ✧ 50GHz ITU-T Grid, C Band
- ✧ SMF links up to 10km
- ✧ Power Supply :+3.3V
- ✧ Power consumption<2.5W
- ✧ Temperature Range: 0~ 70°C
- ✧ RoHS compliant

Applications:

- ✧ Fully Tunable50GHz DWDM SFP
- ✧ 25GBASE-LR Ethernet
- ✧ CPRI Option 10

Description:

TIBTRONIX' TSPLEG10D-T50 Small Form Factor 25Gb/s (SFP28) transceivers are compliant with the current SFP28 Multi-Source Agreement (MSA) Specification. The high performance cooled DWDM TUNABLE transmitter and high sensitivity PIN receiver provide superior performance 25G Ethernet applications up to 10km optical links.

The fully SFP28 compliant form factor provides hot pluggability, easy optical port upgrades and low EMI emission.

● Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	T_S	-40		+85	°C
Case Operating Temperature	T_A	0		70	°C
Maximum Supply Voltage	V _{CC}	-0.5		4	V
Relative Humidity	RH	0		85	%

● Electrical Characteristics ($T_{OP} = 0$ to 70 °C, V_{CC} = 3.135 to 3.465 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Supply Voltage	V _{CC}	3.135		3.465	V	
Supply Current	I _{CC}		350	450	mA	
Power Consumption	P			1.5	W	
Transmitter Section:						
Input differential impedance	R _{in}		100		Ω	1
Tx Input Single Ended DC Voltage Tolerance (Ref V _{eeT})	V	-0.3		4	V	
Differential input voltage swing	V _{in,pp}	300		1100	mV	
Transmit Disable Voltage	V _D	2		V _{CC}	V	2
Transmit Enable Voltage	V _{EN}	V _{ee}		V _{ee} +0.8	V	
Receiver Section:						
Single Ended Output Voltage Tolerance	V	-0.3		4	V	
Rx Output Diff Voltage	V _o	300		850	mV	
Rx Output Rise and Fall Time	Tr/Tf	30			ps	3
LOS Fault	V _{LOS fault}	2		V _{CCHOST}	V	4
LOS Normal	V _{LOS norm}	V _{ee}		V _{ee} +0.8	V	4

Note:

1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2. Into 100 ohms differential termination.
3. 20%~80%
4. LOS is an open collector output. Should be pulled up with 4.7k – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1. Maximum pull-up voltage is 5.5V.

● Optical Parameters(T_{OP} = 0 to 70°C, V_{CC} = 3.135 to 3.465 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Optical Wavelength-End Of Life	λ	X-100	X	X+100	pm	

Optical Wavelength-Beginning Of Life	λ	X-25	X	X+25	pm	
Average Optical Power	P_{avg}	-4		3	dBm	
Laser Off Power	P_{off}			-30	dBm	
Extinction Ratio	ER	3.5			dB	
Transmitter Dispersion Penalty	TDP			3.0	dB	
Relative Intensity Noise	Rin			-128	dB/Hz	1
Optical Return Loss Tolerance		20			dB	
Receiver Section:						
Center Wavelength	λ_r	1480		1565	nm	
Receiver Sensitivity	Sen			-12	dBm	2
Los Assert	LOS_A	-30		-	dBm	
Los Dessert	LOS_D			-15	dBm	
Los Hysteresis	LOS_H	0.5			dB	
Overload	Sat	0			dBm	3
Receiver Reflectance	Rrx			-12	dB	

Note:

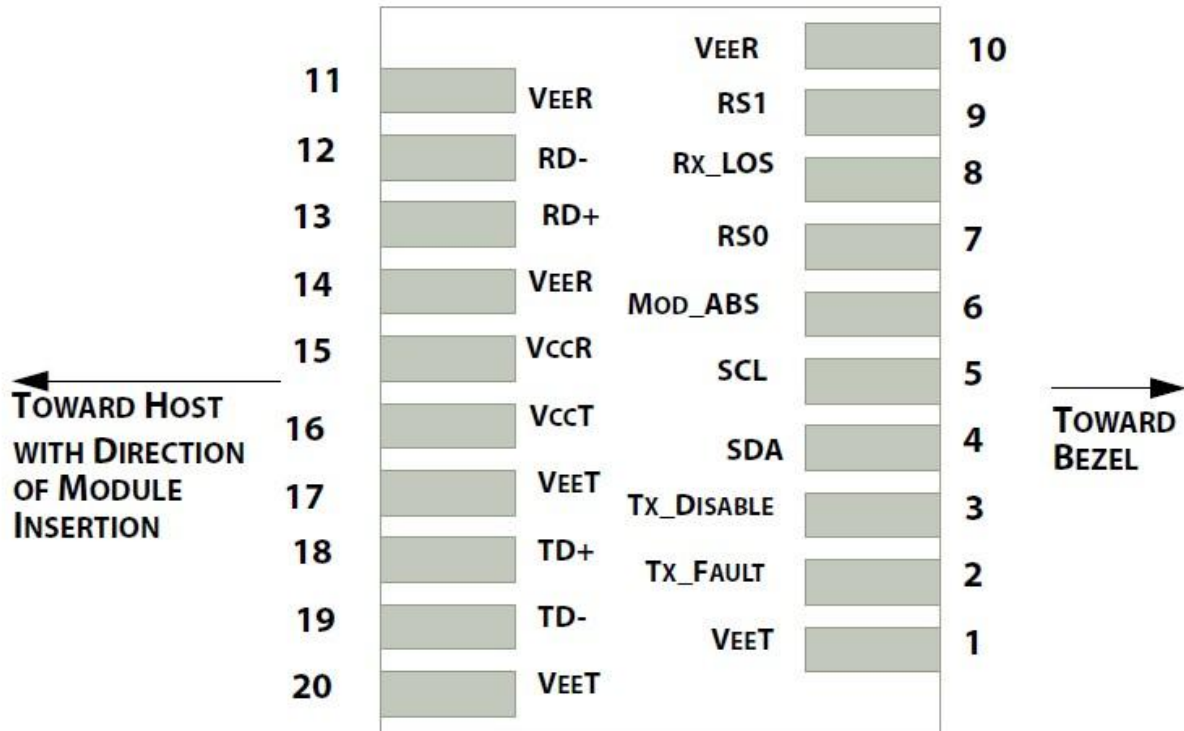
1. 12dB reflection.
2. For 25G-LR with FEC, receiver sensitivity is defined at 5E-5 BER level, not 10E-12 BER level.
3. Receiver overload specified in OMA and under the worst comprehensive stressed condition.

● Timing Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit
TX_Disable Assert Time	t_{off}			10	us
TX_Disable Negate Time	t_{on}			1	ms
Time to Initialize Include Reset of TX_FAULT	t_{int}			300	ms
TX_FAULT from Fault to Assertion	t_{fault}			100	us
TX_Disable Time to Start Reset	t_{reset}	10			us
Receiver Loss of Signal Assert Time	T_{A,RX_LOS}			100	us
Receiver Loss of Signal Deassert Time	T_{d,RX_LOS}			100	us
Rate-Select Chage Time	$t_{ratesel}$			10	us
Serial ID Clock Time	$t_{serial-clock}$			100	kHz

● Pin Assignment

Diagram of Host Board Connector Block Pin Numbers and Name



● Pin Function Definitions

PIN #	Name	Function	Notes
1	VeeT	Module transmitter ground	1
2	Tx Fault	Module transmitter fault	2
3	Tx Disable	Transmitter Disable; Turns off transmitter laser output	3
4	SDL	2 wire serial interface data input/output (SDA)	
5	SCL	2 wire serial interface clock input (SCL)	
6	MOD-ABS	Module Absent, connect to VeeR or VeeT in the module	2
7	RS0	Rate select0, optionally control SFP+ receiver. When high, input data rate >4.5Gb/ s; when low, input data rate <=4.5Gb/s	
8	LOS	Receiver Loss of Signal Indication	4
9	RS1	Rate select0, optionally control SFP+ transmitter. When high, input data rate >4.5Gb/s; when low, input data rate <=4.5Gb/s	
10	VeeR	Module receiver ground	1
11	VeeR	Module receiver ground	1
12	RD-	Receiver inverted data out put	
13	RD+	Receiver non-inverted data out put	
14	VeeR	Module receiver ground	1
15	VccR	Module receiver 3.3V supply	

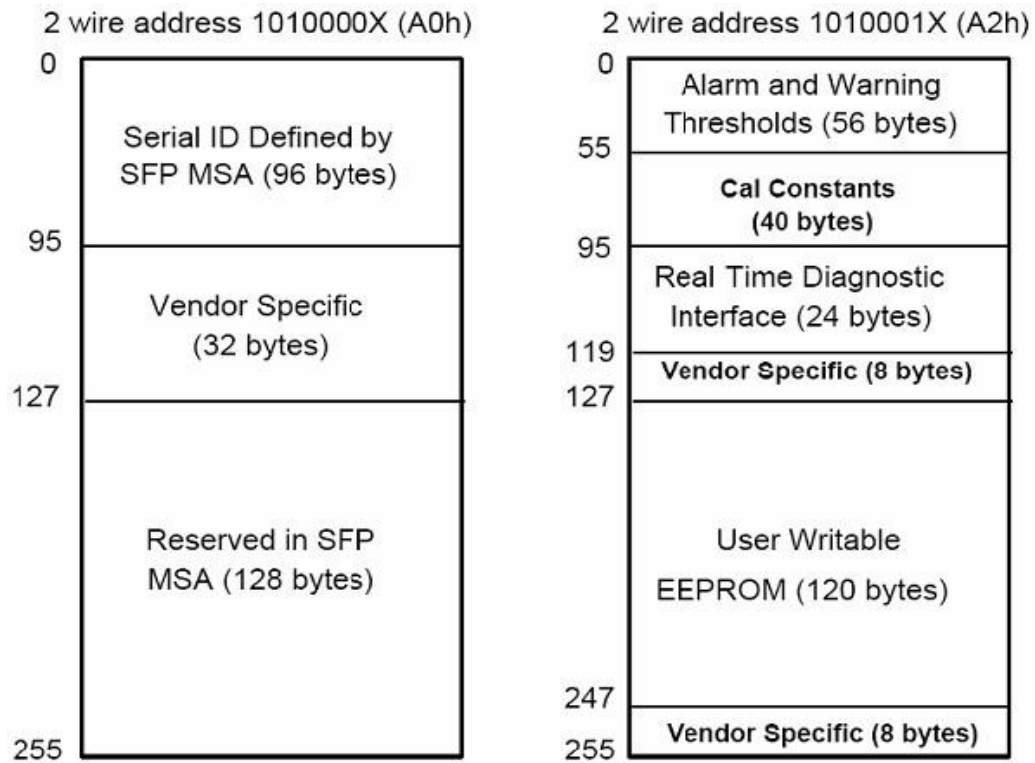
16	VccT	Module transmitter 3.3V supply	
17	VeeT	Module transmitter ground	1
18	TD+	Transmitter inverted data out put	
19	TD-	Transmitter non-inverted data out put	
20	VeeT	Module transmitter ground	1

Note:

- 1.The module ground pins shall be isolated from the module case.
- 2.This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.
- 3.This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.
- 4.This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.

● SFP Module EEPROM Information and Management

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP-8472. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I²C interface at address A0h and A2h. The memory is mapped in Table 1. Detailed ID information (A0h) is listed in Table 2. And the DDM specification at address A2h. For more details of the memory map and byte definitions, please refer to the SFF-8472, “Digital Diagnostic Monitoring Interface for Optical Transceivers”. The DDM parameters have been internally calibrated.

Table 1. Digital Diagnostic Memory Map (Specific Data Field Descriptions)**Table 2 - EEPROM Serial ID Memory Contents (A0h)**

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	10G Base-ZR
11	1	Encoding	64B/66B
12	1	BR, Nominal	Nominal baud rate, unit of 100Mbps
13-14	2	Reserved	(0000h)
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: TIBTRONIX
36	1	Reserved	

37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: "TSPLXG40D-T50" (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-62	3	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	TIBTRONIX's 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	TIBTRONIX specific date, read only
128-255	128	Reserved	Reserved for SFF-8079

● Digital Diagnostic Monitor Characteristics

Data Address	Parameter	Accuracy	Unit
96-97	Transceiver Internal Temperature	±3.0	°C
98-99	VCC3 Internal Supply Voltage	±3.0	%
100-101	Laser Bias Current	±10	%
102-103	Tx Output Power	±3.0	dB
104-105	Rx Input Power	±3.0	dB

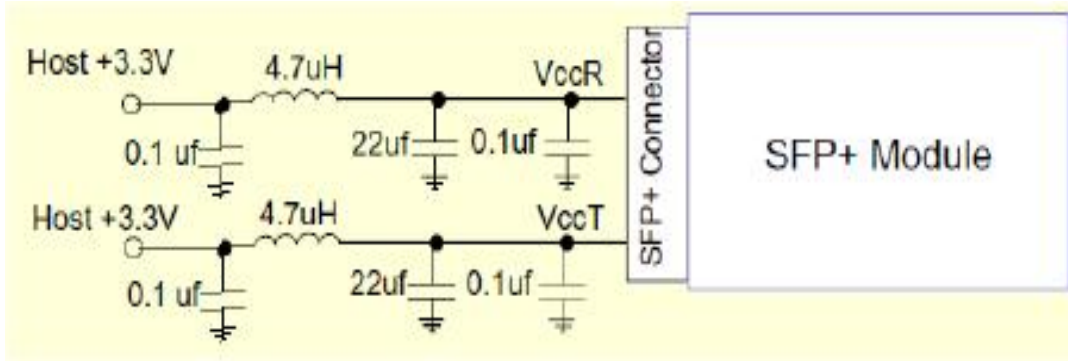
● Regulatory Compliance

The TSPLEG10D-Dxx complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

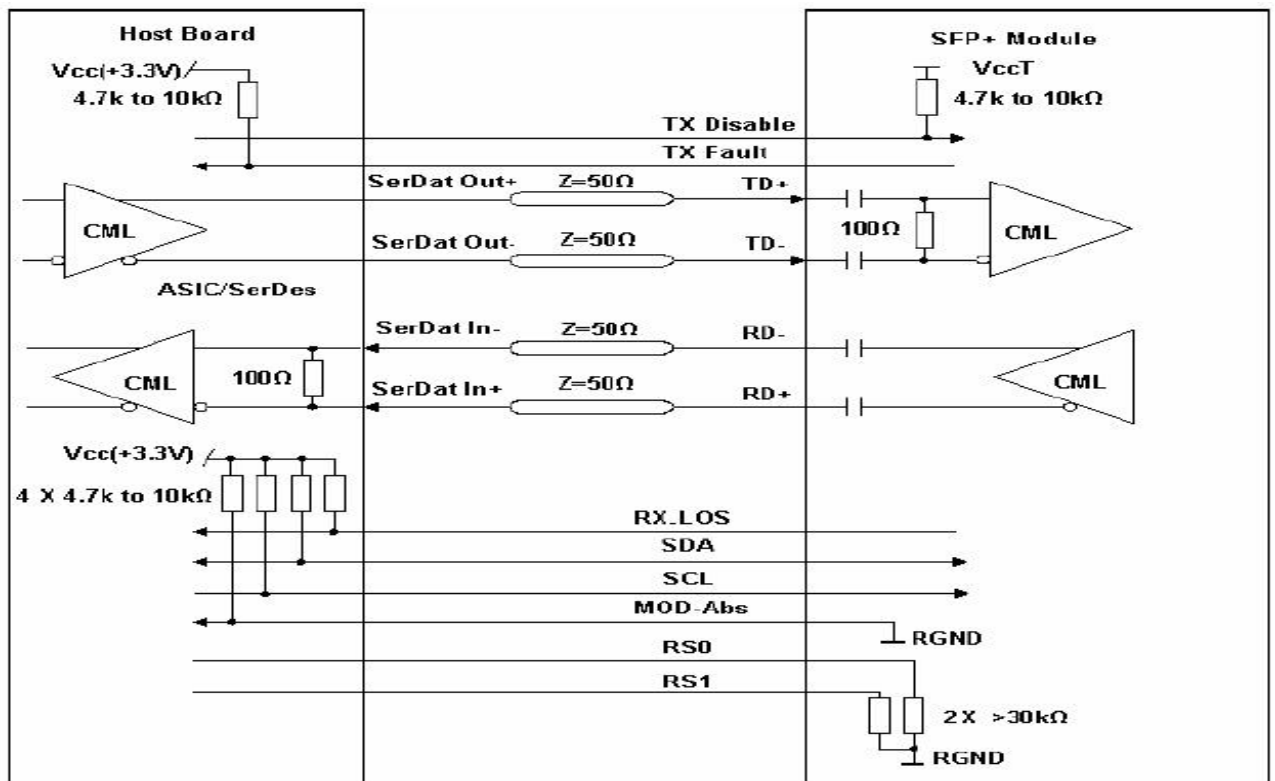
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000 V)
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B)	Compatible with standards

	VCCI Class B	
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 laser product.

● Recommended Circuit

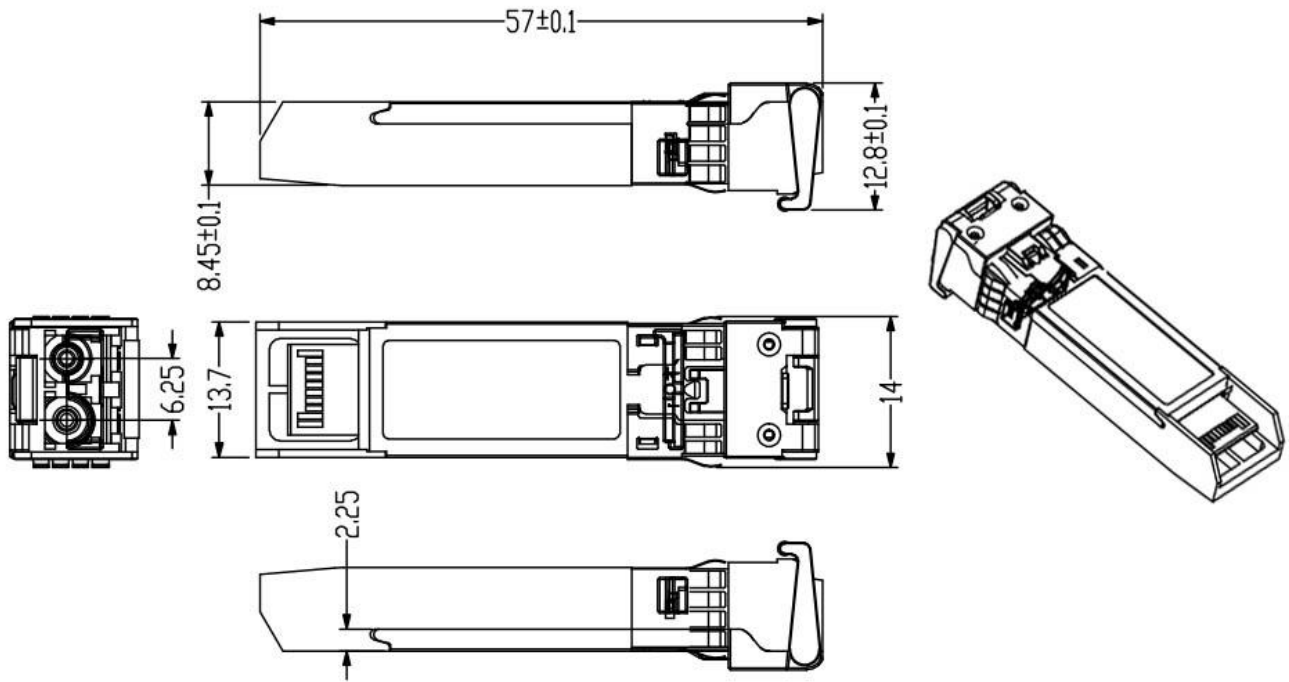


Recommended Host Board Power Supply Circuit



Recommended High-speed Interface Circuit

● Mechanical Dimensions



● Order Information:

TXPLEG10-T50

XX: 50GHz ITU-T Grid Wavelength

Frequency (THZ)	Central Wavelength(nm)	ITU Ch
196.15	1528.38	61.50
196.10	1528.77	61.00
196.05	1529.16	60.50
196.00	1529.55	60.00
195.95	1529.94	59.50
195.90	1530.33	59.00
195.85	1530.72	58.50
195.80	1531.12	58.00
195.75	1531.51	57.50
195.70	1531.90	57.00
195.65	1532.29	56.50
195.60	1532.68	56.00
195.55	1533.07	55.50
195.50	1533.47	55.00
195.45	1533.86	54.50
195.40	1534.25	54.00

195.35	1534.64	53.50
195.30	1535.04	53.00
195.25	1535.43	52.50
195.20	1535.82	52.00
195.15	1536.22	51.50
195.10	1536.61	51.00
195.05	1537.00	50.50
195.00	1537.40	50.00
194.95	1537.79	49.50
194.90	1538.19	49.00
194.85	1538.58	48.50
194.80	1538.98	48.00
194.75	1539.37	47.50
194.70	1539.77	47.00
194.65	1540.16	46.50
194.60	1540.56	46.00
194.55	1540.95	45.50
194.50	1541.35	45.00
194.45	1541.75	44.50
194.40	1542.14	44.00
194.35	1542.54	43.50
194.30	1542.94	43.00
194.25	1543.33	42.50
194.20	1543.73	42.00
194.15	1544.13	41.50
194.10	1544.53	41.00
194.05	1544.92	40.50
194.00	1545.32	40.00
193.95	1545.72	39.50
193.90	1546.12	39.00
193.85	1546.52	38.50
193.80	1546.92	38.00
193.75	1547.32	37.50
193.70	1547.72	37.00
193.65	1548.11	36.50
193.60	1548.51	36.00
193.55	1548.91	35.50

193.50	1549.32	35.00
193.45	1549.72	34.50
193.40	1550.12	34.00
193.35	1550.52	33.50
193.30	1550.92	33.00
193.25	1551.32	32.50
193.20	1551.72	32.00
193.15	1552.12	31.50
193.10	1552.52	31.00
193.05	1552.93	30.50
193.00	1553.33	30.00
192.95	1553.73	29.50
192.90	1554.13	29.00
192.85	1554.54	28.50
192.80	1554.94	28.00
192.75	1555.34	27.50
192.70	1555.75	27.00
192.65	1556.15	26.50
192.60	1556.55	26.00
192.55	1556.96	25.50
192.50	1557.36	25.00
192.45	1557.77	24.50
192.40	1558.17	24.00
192.35	1558.58	23.50
192.30	1558.98	23.00
192.25	1559.39	22.50
192.20	1559.79	22.00
192.15	1560.20	21.50
192.10	1560.61	21.00
192.05	1561.01	20.50
192.00	1561.42	20.00
191.95	1561.83	19.50
191.90	1562.23	19.00
191.85	1562.64	18.50
191.80	1563.05	18.00
191.75	1563.45	17.50
191.70	1563.86	17.00

191.65	1564.27	16.50
191.60	1564.68	16.00
191.55	1565.09	15.50
191.50	1565.50	15.00

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