PRODUCT FEATURES

- Operating data rate up to 25.78Gbps
- Up to 40km transmission distance
- High sensitivity APD photodiode and TIA
- Rate Adaptation
- LC single connector
- Hot pluggable 20pin connector
- power consumption

  Commercial: <1.5W

  Industrial: <1.8W
- Single +3.3V ±5% power supply
- Compliant with SFF-8472
- Fully RoHS Compliant
- Operating temperature range:

Commercial: 0°C to +70°C

Industrial: -40°C to +85°C

APPLICATIONS

- 25GE BASE-LR Ethernet
- CPRI Option 10/eCPRI

Ordering information

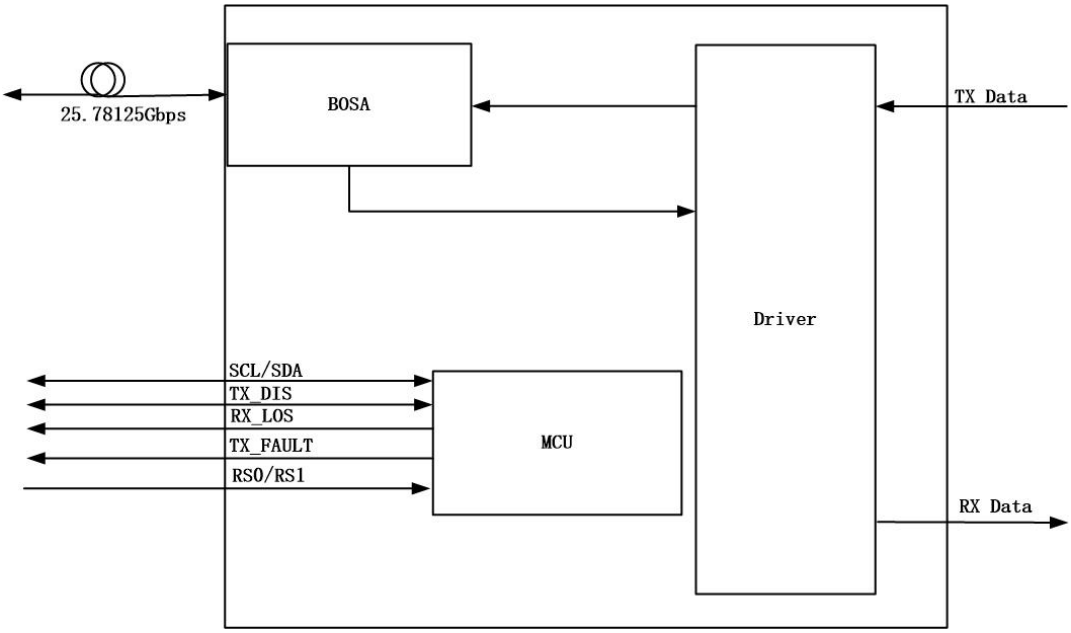
Part Number	Data Rate (Gb/s)	Media	Wavelength(nm)	Operating distance(km)	Temperature(℃)
IP-FFLK40B21C	25.78125	SMF	1270/1310	40	0 ~ 70
IP-FFLK40B12C	25.78125	SMF	1310/1270	40	0 ~ 70
IP-FFLK40B21I	25.78125	SMF	1270/1310	40	-40 ~ 85
IP-FFLK40B12I	25.78125	SMF	1310/1270	40	-40 ~ 85

Product Description

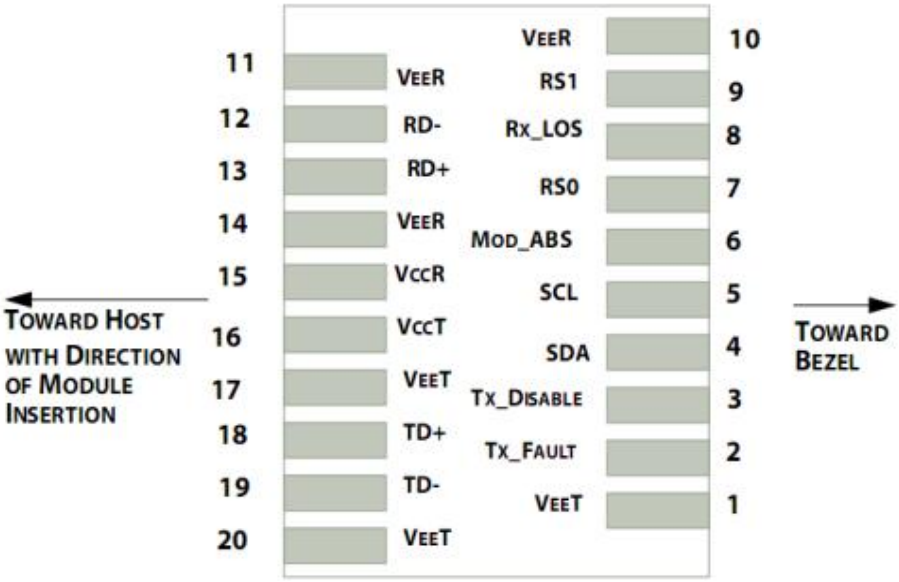
IP-FFLK20B21(12) transceiver is intended for 40km reach service from 24.33Gb/s to 25.78Gb/s BI-direction single mode high-speed communications equipment where low-cost, extraordinary performance and reliability are essential. It consumes low power, operates base on 3.3V DC power supply and is offered in the industrial temperature range. They are compliant with SFP28 MSA, SFF-8431 and SFF-8432.

The low jitter and low bit error rate optical assembly features a DML laser transmitter and APD/TIA receiver. It utilizes internal clock and data recovery (CDR) units on transmitter and the receiver chains for low jitter compliance. The differential AC coupled Tx and Rx data interfaces are CML compatible. The device is Class I laser safety compliant.

1. Block diagram



2. Pin Diagram



3. Pin Descriptions

Pin	Symbol	Name	Description
1,17,20	VeeT	Transmitter Signal Ground	Connected to signal ground on the host board.
2	TX Fault	Transmitter Fault Out (OC)	Module transmitter fault output.
3	TX Disable	Transmitter Disable In (LVTTL)	Module transmitter disable control.
4	SDA	Module Definition Identifiers	Serial ID with SFF 8472 Diagnostics Module Definition pins should be pulled up to Host Vcc with 10 kΩ resistors.
5	SCL		
6	MOD-ABS		
7	RS0	Receiver Rate Select (LVTTL) Transmitter Rate Select (LVTTL)	Rate select 0(Rx):Low=CDR Bypass ; High=CDR Select Rate select 1(Tx):Low=CDR Bypass ; High=CDR Select
9	RS1		
8	LOS	Loss of Signal Out (OC)	Receiver loss of signal.
10,11,14	VeeR	Receiver Signal Ground	Connected to signal ground on the host board.
12	RD-	Receiver Negative DATA Out (CML)	Receiver inverted data output, internally AC coupled and terminated
13	RD+	Receiver Positive DATA Out (CML)	Receiver non-inverted data output, internally AC coupled and terminated.
15	VccR	Receiver Power Supply	Receiver Power 3.3V Supply.
16	VccT	Transmitter Power Supply	Transmitter Power 3.3V Supply.
18	TD+	Transmitter Positive DATA In (CML)	Transmitter non-inverted data input, internally AC coupled and terminated.
19	TD-	Transmitter Negative DATA In (CML)	Transmitter inverted data Input, internally AC coupled and terminated.

4. Absolute Maximum Ratings

Parameter	Symbol	Min	Typical	Max	Unit	Note
Power Supply Voltage	Vcc	3.135	3.3	3.465	V	
Power Consumption				1.5	W	C-temp
				1.8	W	I-temp
Power Supply Current @ 3.3V	Icc			450	mA	C-temp
				545	mA	I-temp

5. Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Temperature	Tc	0		70	°C	C-temp
		-40		85	°C	I-temp
Power Supply Voltage	Vcc	3.14	3.3	3.46	V	
Bit Rate	BR		25.78		Gbps	
Bit Error Ratio	BER			$5*10^{-5}$		
Max Supported Link Length	L			40	km	

6. Electrical Ports Definition

Parameter	Symbol	Unit	Min	Typ	Max	Note
Transmitter						
Input Differential Impedance	R_{IN}	Ω		100		
Single-ended Data Input Swing	V_{IN}	mVp-p	90		450	
Transmit Disable Voltage	V_{DIS}	V	2		V_{CCHOST}	
Transmit Enable Voltage	V_{EN}	V	V_{EE}		V_{EE}+0.8	
Transmit Fault Assert Voltage	V_{FA}	V	2		V_{CCHOST}	

Transmit Fault De-Assert Voltage	V_{FDA}	V	V_{EE}		V_{EE}+0.4	
Receiver						
Single-ended Data Output Swing	V_{OD}	mVp-p	200		450	
LOS Fault	V_{LOSFT}	V	2		V_{CCHOST}	
LOS Normal	V_{LOSNR}	V	V_{EE}		V_{EE}+0.4	

7. Optical Characteristics (TA and Vcc= 3.14 to 3.46V)

Parameter		Symbol	Min	Typ	Max	Unit	Note
Transmitter							
Transmitter Laser Type			1270/1310nm DML				
Center Wavelength	IP-FFLK40B21	λ	1260	1270	1280	nm	
	IP-FFLK40B12	λ	1300	1310	1320	nm	
Average Output Power		Pav	0		6	dBm	
Spectral Width (-20dB)		Δλ			1	nm	
Extinction Ratio		ER	3.5			dB	
Side Mode Suppression Ratio		SMSR	30			dB	
Average Launch Power of OFF Transmitter		POFF			-30	dBm	
Relative Intensity Noise		RIN			-128	dB/Hz	
Receiver							
Receiver Type			APD/TIA				
Center Wavelength	IP-FFLK40B12	λC	1300	1310	1320	nm	
	IP-FFLK40B21	λC	1260	1270	1280	nm	
Receiver Sensitivity(OMA)		RSENSE			-19	dBm	1
Receiver Overload (OMA)		Pmax	-4			dBm	
Receiver Reflectance					-12	dB	
LOS Assert		LOSA	-35			dBm	
LOS De-Assert LOS		LOSD			-20	dBm	
LOS Hysteresis			0.5		6	dB	

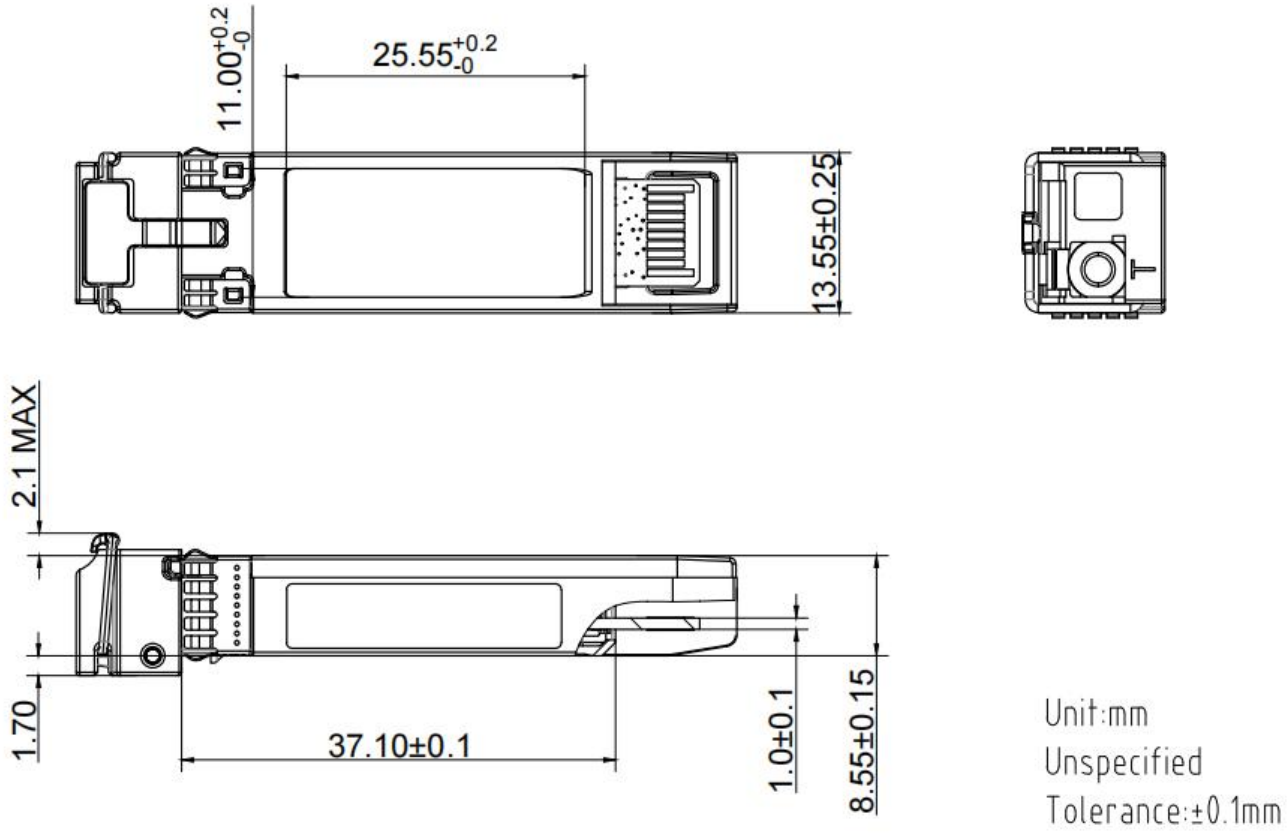
Note:

1. Measured at 25.78125Gb/s, ER>3.5dBm, PRBS 2^{31}-1 and BER better than or equal to 5E-5.

8. Digital Diagnostic Monitoring Accuracy

Parameter	Accuracy	Unit
Internally measured transceiver temperature	+/-3	deg.C
Internally measured transceiver supply voltage	+/-3	%
Measured Tx bias current	+/-10	%
Measured Tx output power	+/-3	dB
Measured Rx received average optical power	+/-3	dB

9. Mechanical Specifications



10. Contact Information

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11. Revision History

Version No.	Date	Description
1.0	Aug.20, 2023	Preliminary datasheet
1.1	Jun.30, 2024	Update contact information.