

10G BiDi SFP+ 80km Extended Optical Transceivers

GBP-xxxx192-E8N

Features

- Hot-pluggable SFP+ form factor
- Cooled EML transmitter and APD receiver
- Compliant with SFP+ MSA and CPRI specifications
- Data rate up to 11.3Gbps
- Reach up to 80km over G.652D SMF
- Power consumption < 1.8W (Typical 1.4W)
- Single LC receptacle
- Built-in digital diagnostic functions
- Operating case temperature range -20°C to +85°C
- 3.3V power supply voltage
- RoHS compliant (lead free)



Applications

- 10G Ethernet
- 10G CPRI
- SDH STM64
- SONET OC-192
- OTN OTU2e
- 10G Fibre Channel

Description

The Gigalight 10G BiDi SFP+ 80km extended optical transceivers (GBP-xxxx192-E8N) are designed for 10G Ethernet, 10G CPRI, SDH/SONET/OTN and 10G Fibre Channel links reach up to 80km on G.652D Single-Mode Fiber (SMF). The SFP+ modules are compliant with SFF-8431, SFF-8432 and SFF-8472. Each module includes a transmitter section and a receiver section. The transmitter section incorporates a cooled EML laser, and the receiver section consists of an APD integrated with TIA. The SFP+ module utilizes internal Clock/Data Recovery (CDR) units on transmitter and the receiver chains for SONET/SDH jitter compliance. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472, which allows real-time access to device operating parameters such as case temperature, laser bias current, transmitted optical power, received optical power and module supply voltage.

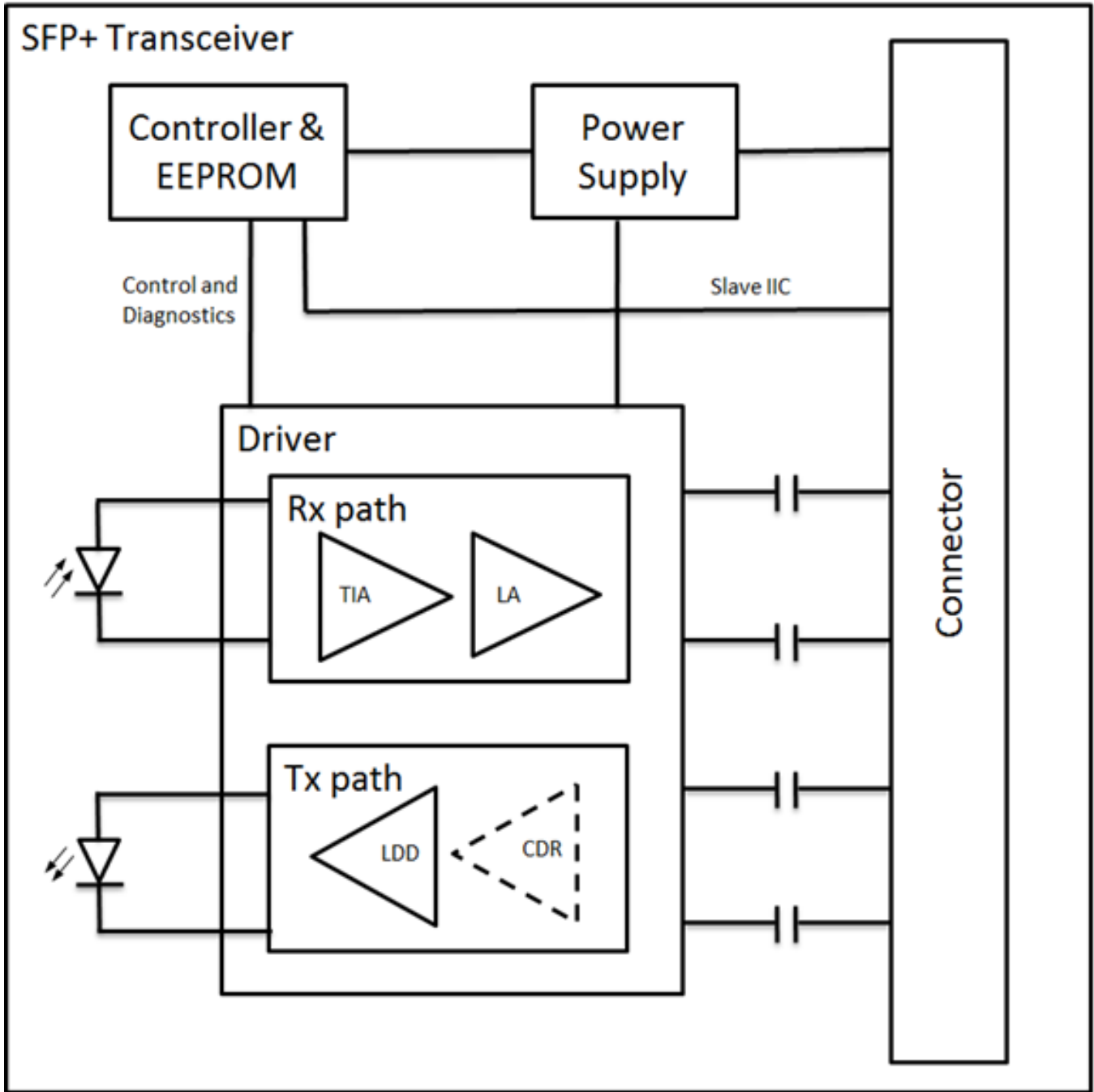


Figure 1. Module Block Diagram

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{cc}	-0.5	+3.8	V
Storage Temperature	T_{st}	-40	+85	°C
Relative Humidity	Rh	0	85	%
Max Link Length	L_{max}		80	km

Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Supply Voltage	V_{cc}	3.13	3.3	3.47	V
Supply current	I_{cc}	-	400	550	mA
Operating Case temperature	T_{ca}	-20	-	+85	°C
Module Power Dissipation	P_m	-	1.4	1.8	W

Transmitter Specifications – Optical

Parameter	Symbol	Min	Typical	Max	Unit
Optical Wavelength	λ_{c1} [1]	1480	1490	1500	nm
	λ_{c2} [2]	1540	1550	1560	nm
Average Optical Power	P_o	0	-	+4	dBm
Side Mode Suppression Ratio	SMSR	30	-	-	dB
Optical Transmit Power (disabled)	P_{off}	-	-	-30	dBm
Extinction Ratio	ER	8.2	-	-	dB
Relative Intensity Noise	RIN	-	-	-128	dB/Hz
Optical Return Loss Tolerance	Orl	-	-	21	dB

[1] Referred to GBP-4955192-E8N.

[2] Referred to GBP-5549192-E8N.

Receiver Specifications – Optical

Parameter	Symbol	Min	Typical	Max	Unit
Input Optical Wavelength	λ_{c1} [1]	1540	1550	1560	nm
	λ_{c2} [2]	1480	1490	1500	nm
Average receive power	P_{avg}	-24	-	-7	dBm
Maximum Input Power	$P_{overload}$	-7			dBm
Sensitivity (0km, 9.8~10.7G)	R_{sen1} [3]	-	-	-24	dBm
Sensitivity (80km, 9.8~10.7G)	R_{sen2} [3]			-22	dBm
Sensitivity (0km, 11.1~11.3G)	R_{sen1} [4]	-	-	-27	dBm
Sensitivity (80km, 11.1~11.3G)	R_{sen2} [4]			-24	dBm
Loss of Signal Asserted	LOS_A	-34	-	-	dBm

LOS De-Asserted	LOS _D	-	-	-24	dBm
LOS Hysteresis	LOS _H	0.5	-		dB

Notes:

[1] Referred to GBP-4955192-E8N.

[2] Referred to GBP-5549192-E8N.

 [3] Measured with worst ER=8.2dB, PRBS 2³¹-1, BER < 1E⁻¹².

 [4] Measured with worst ER=8.2dB, PRBS 2³¹-1, BER < 1E⁻⁶.

Transmitter Specifications – Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Bit Rate	BR	9.8304		11.3168	Gbps
Input differential impedance	R _{in}	-	100	-	Ω
Differential data Input	V _{tx,DIFF}	120	-	850	mV
Transmit Disable Voltage	V _D	2.0	-	V _{cc3} +0.3	V
Transmit Enable Voltage	V _{en}	0	-	+0.8	V
Transmit Disable Assert Time	V _n	-	-	100	us

Receiver Specifications – Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Bit Rate	BR	9.8304		11.3168	Gbps
Differential Output Swing	V _{out P-P}	350	-	850	mV
Output differential impedance	R _{out}	-	100	-	Ω
Rise/Fall Time	Tr / Tf	24	-	-	ps
Loss of Signal –Asserted	V _{OH}	2	-	V _{cc3} +0.3-	V
Loss of Signal –Negated	V _{OL}	0	-	+0.4	V

Digital Diagnostic Functions

Parameter	Symbol	Min.	Max	Unit	Notes
Accuracy					
Transceiver Temperature	DMI_Temp	-3	+3	°C	
TX Output optical power	DMI_TX	-2	+2	dB	
RX Input optical power	DMI_RX	-2	+2	dB	
Transceiver Supply voltage	DMI_VCC	-3%	+3%	V	
Bias current monitor	DMI_Ibias	-10%	10%	mA	
Dynamic Range					
Transceiver Temperature	DMI_Temp	-20	+85	°C	
TX Output optical power	DMI_TX	-1	+5	dBm	
RX Input optical power	DMI_RX	-28	-7	dBm	
Transceiver Supply voltage	DMI_VCC	3.0	3.6	V	
Bias current monitor	DMI_Ibias	0	120	mA	

Pin Descriptions

Pin	Symbol	Name/Description
1	VEET [1]	Transmitter Ground
2	Tx_FAULT [2]	Transmitter Fault
3	Tx_DIS [3]	Transmitter Disable. Laser output disabled on high or open
4	SDA [2]	2-wire Serial Interface Data Line
5	SCL [2]	2-wire Serial Interface Clock Line
6	MOD_ABS [4]	Module Absent. Grounded within the module
7	RS0 [5]	Rate Select 0
8	RX_LOS [2]	Loss of Signal indication. Logic 0 indicates normal operation
9	RS1 [5]	Rate Select 1
10	VEER [1]	Receiver Ground
11	VEER [1]	Receiver Ground
12	RD-	Receiver Inverted DATA out. AC Coupled
13	RD+	Receiver DATA out. AC Coupled
14	VEER [1]	Receiver Ground
15	VCCR	Receiver Power Supply
16	VCCT	Transmitter Power Supply
17	VEET [1]	Transmitter Ground
18	TD+	Transmitter DATA in. AC Coupled
19	TD-	Transmitter Inverted DATA in. AC Coupled
20	VEET [1]	Transmitter Ground

Notes:

[1] Module circuit ground is isolated from module chassis ground within the module.

[2] should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.

[3] Tx_Disable is an input contact with a 4.7kΩ to 10kΩ pullup to VccT inside the module.

[4] Mod_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc_Host with a resistor in the range 4.7kΩ to 10kΩ. Mod_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.

[5] RS0 and RS1 are module inputs and are pulled low to VeeT with > 30kΩ resistors in the module.

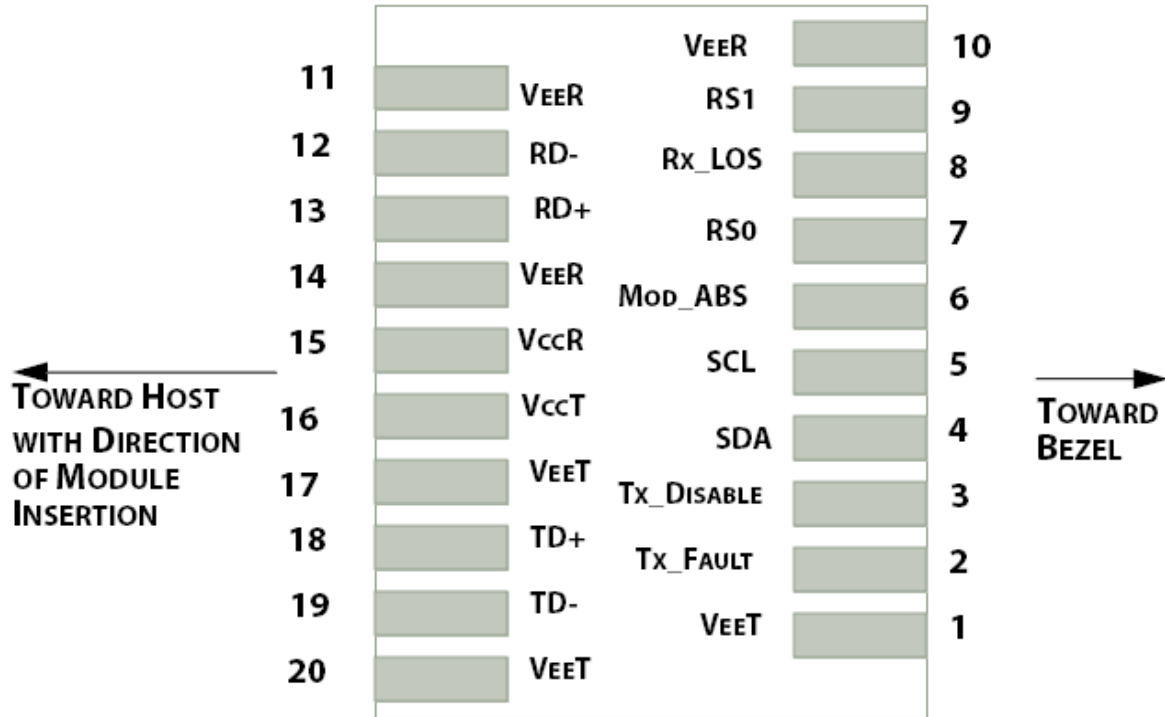


Figure 2. Electrical Pin-out Details

Host Board SFP+ Connector Recommendations

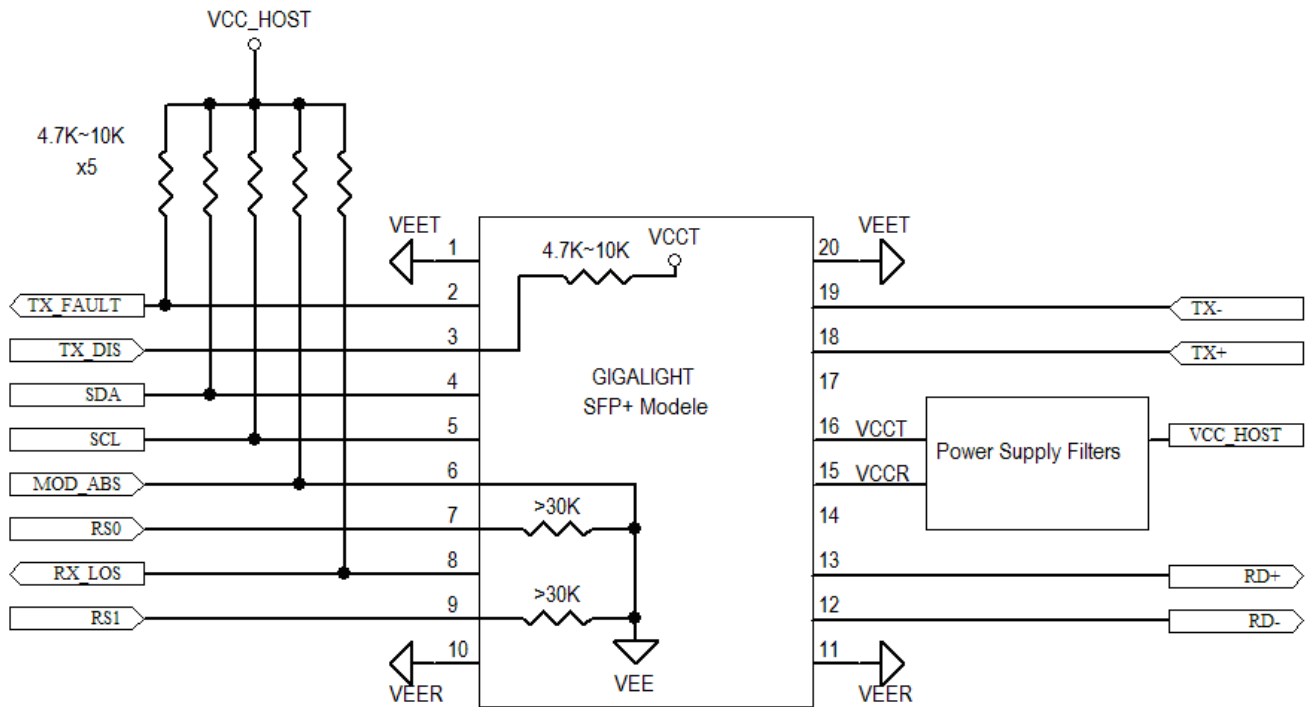


Figure 3. Host-Module Interface

Mechanical Dimensions

The Gigalight GBP-xxxx192-E8N SFP+ transceivers are compatible with the SFF-8432 specification for improved pluggable form factor, and shown here for reference purposes only. Bail color is Violet C for GBP-4955192-E8N and PANTONE 106C for GBP-5549192-E8N.

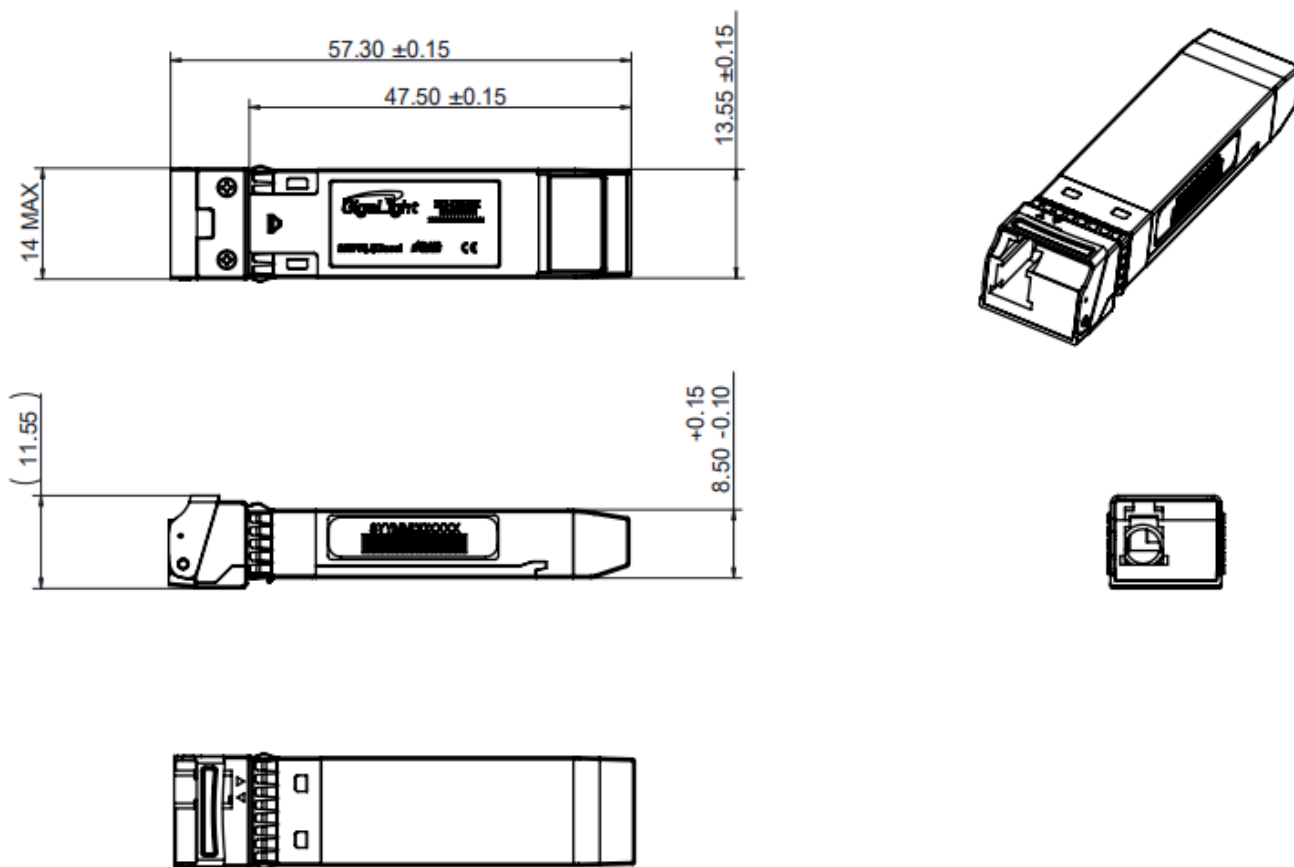


Figure 4. Mechanical Specifications

Regulatory Compliance

The GIGALIGHT SFP+ transceiver is designed to be Class I Laser safety compliant and is certified per the following standards:

Feature	Standard
Laser Safety	IEC 60825-1:2014 (Third Edition)
Environmental protection	2011/65/EU
CE EMC	EN55032:2015 EN55035:2017 EN61000-3-2:2014 EN61000-3-3:2013

FCC	FCC Part 15, Subpart B; ANSI C63.4-2014
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Ordering information

Part Number	Product Description
GBP-4955192-E8N	10G BiDi SFP+, 1490/1550nm, 80km, SMF, Single LC, -20°C to +85°C
GBP-5549192-E8N	10G BiDi SFP+, 1550/1490nm, 80km, SMF, Single LC, -20°C to +85°C

References

1. "Specifications for Enhanced Small Form Factor Pluggable Module SFP+", SFF-8431, Rev 4.1, July 6, 2009.
2. "Improved Pluggable Formfactor", SFF-8432, Rev 4.2, Apr 18, 2007
3. IEEE 802.3ae – 2002
4. "Diagnostic Monitoring Interface for Optical Transceivers" SFF-8472, Rev 10.3, Dec 1, 2007

Important Notice

Performance figures, data and any illustrative material provided in this data sheet are typical and must be specifically confirmed in writing by Gigalight before they become applicable to any particular order or contract. In accordance with the Gigalight policy of continuous improvement specifications may change without notice.

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Revision History

Revision	Date	Description
V0	Mar. 28,2019	Advance Release.