Filters & Combiners
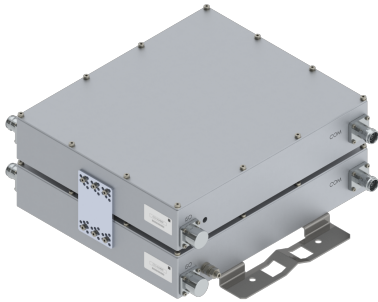
AWS In-Band Low Loss Diplexer

IBO-21Zff-x-yy

- Combines two adjacent AWS band base station outputs onto a common port with no additional guard band
- Full AWS band support including AWS-3
- High power 200 W per input port with low insertion loss of < 1.0 dB typical
- Low intermodulation with isolation of >30 dB port to port
- Compact outdoor same band diplexer available in twin and single configurations
- AISG 2.0 compliant DC/AISG pass through on any input port with Smart Bias-T
- High reliability of >500K Hours MTBF and multi-strike lightning protection
- Fully passive same band combiner with excellent temperature stable filter response

Overview

CCI's AWS same band low loss diplexer with a "0" MHz guard band combines two base station sub-band outputs, any combination CDMA, UMTS and/or LTE, onto a single feeder without the insertion loss normally associated with hybrid combiners. The unit is fully passive and delivers a matched low insertion loss solution for the sharing of common feeder lines and antennas. The unit is completely passive and provides automatic routing of DC and AISG signals from the individual input ports to the common port. The unit is housed in a weatherproof outdoor enclosure suitable for tower mount application.

Technical Description:

This low loss diplexer allows the TX/RX combining of any 5, 10 or 15 MHz segment in the AWS TX and RX Bands separated by a "0" MHz Guard Band. Complementary Bandpass/Bandstop filters maintain good isolation while minimizing insertion loss. Transmit paths are fully isolated from Receive paths to prevent intermodulation products. The fully weatherproof tower mount unit incorporates a unique intelligent Bias-T architecture which passes the DC and AISG carrier frequency from any of the input ports to the common port while blocking the DC and AISG signals from being re-injected into the other input ports. The tower mount unit consists of multiple band-pass filters which are all housed in a fully weatherproof IP67 immersion proof enclosure, with IP67 rated connectors suited for long-life masthead mounting. The same band diplexer is available in a twin or single configuration and provides protection against lightning strikes via a multi-stage surge protection circuit. The RF ports can be configured with either DIN 7-16 or 4.3-10 connectors. CCI filter and combiner products are designed and produced to ISO 9001 certification standards for reliability and quality at our state-of-the-art engineering and manufacturing facilities.

DS-IBO21ZFFXYY-V1.0-180901

SPECIFICATIONS

AWS In-Band Low Loss Diplexer

IBO-21Zff-x-yy

Electrical

RF Parameters	Ports	Frequency (MHz)	Specification
Return Loss	All Ports	1710 - 1780	20 dB typical, 18 dB minimum
		2110 - 2180	20 dB typical, 18 dB minimum
Insertion Loss	Port 1 (5 Mhz Pass Band) to COMMON	See 5 MHz Frequency Chart	< 1.0 dB typical < 1.5 dB maximum @ band edge
	Port 1 (10 MHz Pass Band) to COMMON	See 10 MHz Frequency Chart	< 0.8 dB typical < 1.3 dB maximum @ band edge
	Port 1 (15 MHz Pass Band) to COMMON	See 15 MHz Frequency Chart	< 0.7 dB typical < 1.2 dB maximum @ band edge
	Port 2 (Stop Band) to COMMON	1710 - 1780/ 2110 - 2180 Excluding pass band	<0.5 dB typical < 1.5 dB maximum @ band edge
Isolation	Port 1 to Port 2	1710 - 1780	≥ 30 dB typical
		2110 - 2180	≥ 30 dB typical

5 MHz Bandpass Models	Pass Band Blocks	Pass Band RX/TX (MHz)
IBO-21ZA1-x-yy	AWS A1 Block	1710 - 1715/2110 - 2115
IBO-21ZA2-x-yy	AWS A2 Block	1715 - 1720/2115 - 2120
IBO-21ZB1-x-yy	AWS B1 Block	1720 - 1725/2120 - 2125
IBO-21ZB2-x-yy	AWS B2 Block	1725 - 1730/2125 - 2130
IBO-21ZC-x-yy	AWS C Block	1730 - 1735/2130 - 2135
IBO-21ZD-x-yy	AWS D Block	1735 - 1740/2135 - 2140
IBO-21ZE-x-yy	AWS E Block	1740 - 1745/2140 - 2145
IBO-21ZF1-x-yy	AWS F1 Block	1745 - 1750/2145 - 2150
IBO-21ZF2-x-yy	AWS F2 Block	1750 - 1755/2150 - 2155
IBO-21ZG-x-yy	AWS G Block	1755 - 1760/2155 - 2160
IBO-21ZH-x-yy	AWS H Block	1760 - 1765/2160 - 2165
IBO-21ZI-x-yy	AWS I Block	1765 - 1770/2165 - 2170
IBO-21ZJ1-x-yy	AWS J1 Block	1770 - 1775/2170 - 2175
IBO-21ZJ2-x-yy	AWS J2 Block	1775 - 1780/2175 - 2180

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SPECIFICATIONS

AWS In-Band Low Loss Diplexer

IBO-21Zff-x-yy

10 MHz Bandpass Models	Pass Band Blocks	Pass Band RX/TX (MHz)
IBO-21ZA1A2-x-yy	AWS A1 & A2 Blocks	1710 - 1720/2110 - 2120
IBO-21ZA2B1-x-yy	AWS A2 & B1 Blocks	1715 - 1725/2115 - 2125
IBO-21ZB1B2-x-yy	AWS B1 & B2 Blocks	1720 - 1730/2120 - 2130
IBO-21ZB2C-x-yy	AWS B2 & C Blocks	1725 - 1735/2125 - 2135
IBO-21ZCD-x-yy	AWS C & D Blocks	1730 - 1740/2130 - 2140
IBO-21ZDE-x-yy	AWS D & E Blocks	1735 - 1745/2135 - 2145
IBO-21ZEF1-x-yy	AWS E & F1 Blocks	1740 - 1750/2140 - 2150
IBO-21ZF1F2-x-yy	AWS F1 & F2 Blocks	1745 - 1755/2145 - 2155
IBO-21ZF2G-x-yy	AWS F2 & G Blocks	1750 - 1760/2150 - 2160
IBO-21ZGH-x-yy	AWS G & H Blocks	1755 - 1765/2155 - 2165
IBO-21ZHI-x-yy	AWS H & I Blocks	1760 - 1770/2160 - 2170
IBO-21ZIJ1-x-yy	AWS I & J1 Blocks	1765 - 1775/2165 - 2175
IBO-21ZJ1J2-x-yy	AWS J1 & J2 Blocks	1770 - 1780/2170 - 2180

15 MHz Bandpass Models	Pass Band Blocks	Band RX/TX (MHz)
IBO-21ZA1B1-x-yy	AWS A1 through B1 Blocks	1710 - 1725/2110 - 2125
IBO-21ZA2B2-x-yy	AWS A2 through B2 Blocks	1715 - 1730/2115 - 2130
IBO-21ZB1C-x-yy	AWS B1 through C Blocks	1720 - 1735/2120 - 2135
IBO-21ZB2D-x-yy	AWS B2 through D Blocks	1725 - 1740/2125 - 2140
IBO-21ZCE-x-yy	AWS C through E Blocks	1730 - 1745/2130 - 2145
IBO-21ZDF1-x-yy	AWS D through F1 Blocks	1735 - 1750/2135 - 2150
IBO-21ZEF2-x-yy	AWS E through F2 Blocks	1740 - 1755/2140 - 2155
IBO-21ZF1G-x-yy	AWS F1 through G Blocks	1745 - 1760/2145 - 2160
IBO-21ZF2H-x-yy	AWS F2 through H Blocks	1750 - 1765/2150 - 2165
IBO-21ZGI-x-yy	AWS G through I Blocks	1755 - 1770/2155 - 2170
IBO-21ZHJ1-x-yy	AWS H through J1 Blocks	1760 - 1775/2160 - 2175
IBO-21ZIJ2-x-yy	AWS I through J2 Blocks	1765 - 1780/2165 - 2180

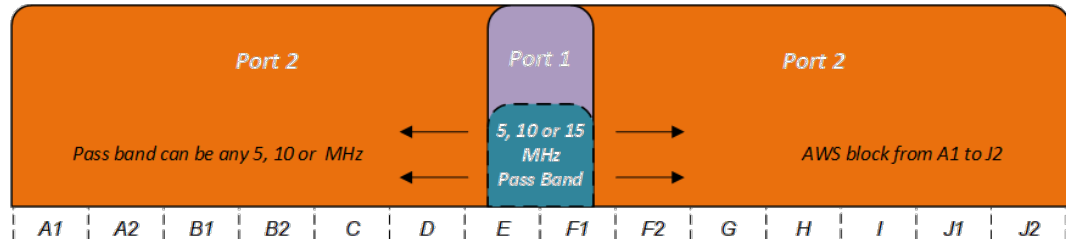| General Characteristics	
Impedance	50 ohms
Guard Band	No additional guard band required beyond the buillt in guard band for UMTS and/or LTE (5 MHz or greater)
Port 1 EVM (UMTS)	<5% Over 3.84 MHz Channel
Port 2 EVM (LTE)	<1.0% (Per TS36.104)
Continuous Average Power	200 W max. (all ports)
Peak Envelope Power	2 kW max. (all ports)
Intermodulation Performance	<-117 dBm (-160 dBc) typical (2 x +43 dBm tones) all bands
DC/AISG Pass	3A/AISG signal (2.176 MHz) per AISG 2.0
DC/AISG Smart Bias-T	Auto senses DC/AISG voltage and passes either port to COMMON

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AWS In-Band Low Loss Diplexer   IBO-21Zff-x-yy

AWS Zero Guard Band Combiner

				Port 1								

Port 2

Pass band can be any 5, 10 or MHz

5, 10 or 15 MHz Pass Band

Port 2

AWS block from A1 to J2

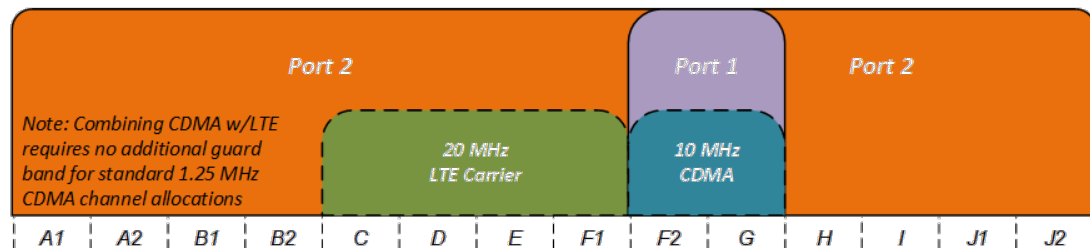| A1 | A2 | B1 | B2 | C | D | E | F1 | F2 | G | H | I | J1 | J2 |

IBO-21Zff-x-yy covers the full AWS band and allows band pass at any 5, 10 or 15 MHz block from A1 to J2

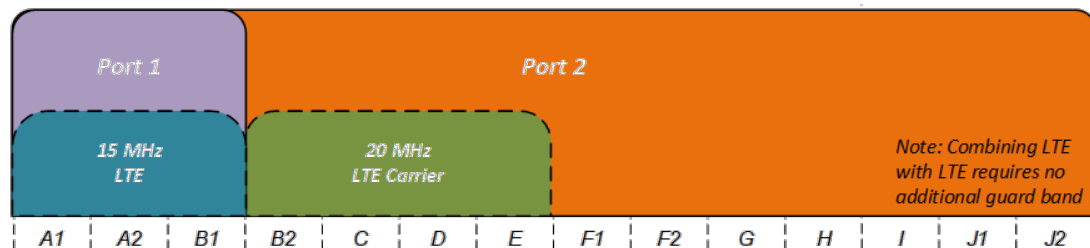**AWS Blocks C-F2 Sample Band Plan with a C Block Pass Band for 5 MHz of UMTS**

Port 2

Port 1

Port 2

5 MHz UMTS

20 MHz LTE Carrier

Note: Combining UMTS with LTE requires no additional guard band

| A1 | A2 | B1 | B2 | C | D | E | F1 | F2 | G | H | I | J1 | J2 |
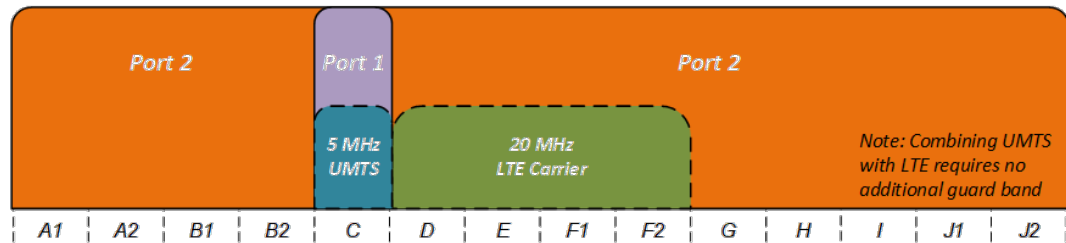
IBO-21ZC-S-T2 covers the full AWS band and allows 5 MHz band pass at AWS C block

AWS Blocks C-G Sample Band Plan with Blocks F2-G as Pass Band for 10 MHz of CDMA

Port 2

Port 1

Port 2

Note: Combining CDMA w/LTE requires no additional guard band for standard 1.25 MHz CDMA channel allocations

20 MHz LTE Carrier

10 MHz CDMA

| A1 | A2 | B1 | B2 | C | D | E | F1 | F2 | G | H | I | J1 | J2 |

IBO-21ZF2G-0-T2 covers the full AWS band and allows 10 MHz band pass at AWS F2 & G blocks

AWS Blocks A1-E Sample Band Plan with Blocks A1-B1 as Pass Band for 15 MHz of LTE

Port 1

Port 2

15 MHz LTE

20 MHz LTE Carrier

Note: Combining LTE with LTE requires no additional guard band

| A1 | A2 | B1 | B2 | C | D | E | F1 | F2 | G | H | I | J1 | J2 |

IBO-21ZA1B1-0-T2 covers the full AWS band and allows 15 MHz band pass at AWS A1-B1 blocks

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Filters & Combiners

AWS In-Band Low Loss Diplexer

IBO-21Zff-x-yy

Environmental

Operating Temperature	-40˚C to +65˚C
Relative Humidity	5% to 100%
Enclosure	IP67 (Unit Body), IP67 (Connector)
MTBF	>500,000 hours
Lightning Protection	8/20us, $\pm$10KA max, 10 strikes, per IEC61000-4-5

Mechanical

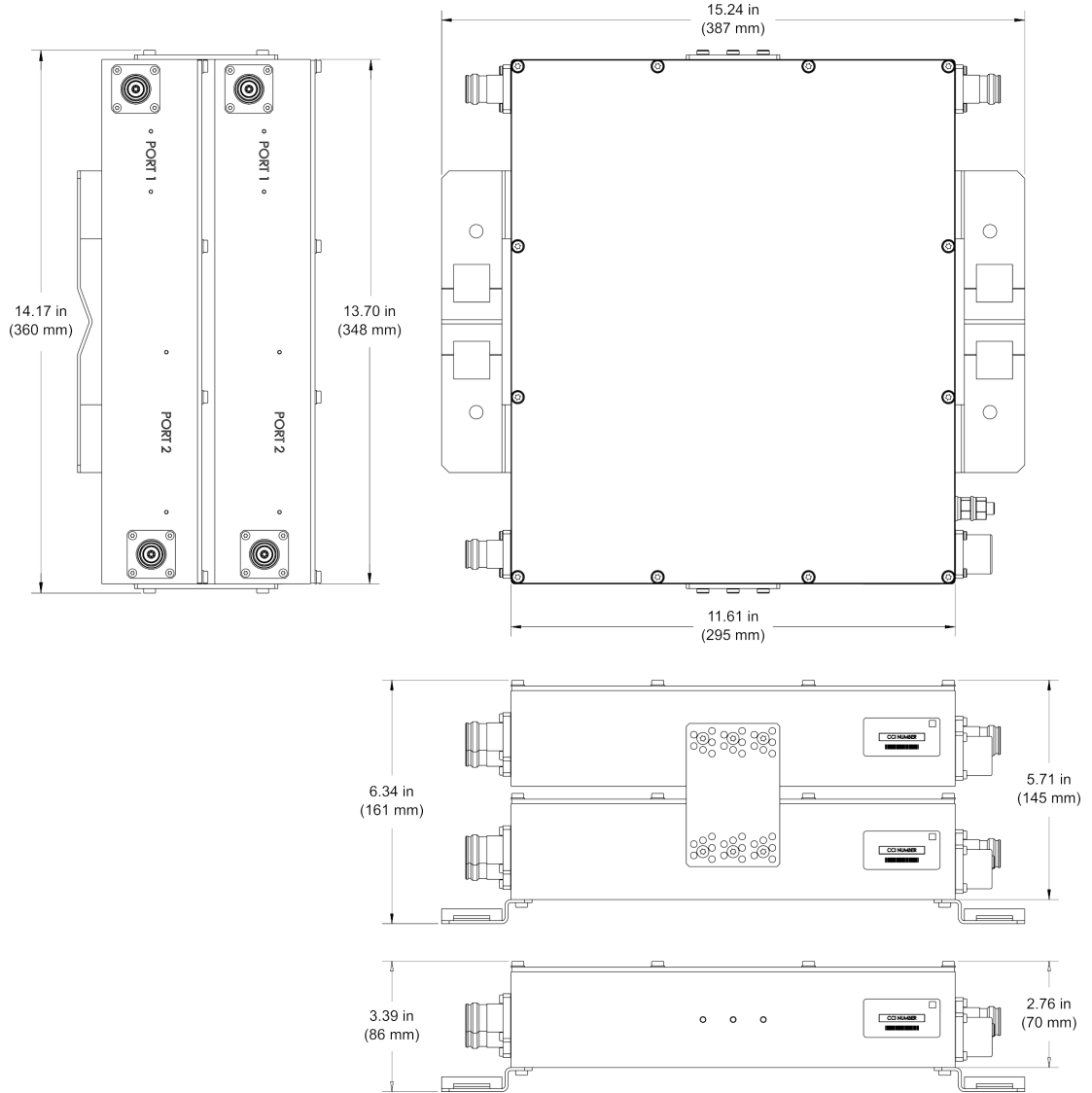| Model	Single	Twin
Connectors	3 × 7-16 DIN female or 3 × 4.3-10 female	6 × 7-16 DIN female or 6 × 4.3-10 female
Dimensions w/Bracket	13.70 × 15.24 × 3.39 in. (348.0 × 387.0× 86.0 mm)	14.17 × 15.24 × 6.34 in. (360.0 × 387.0 × 161.0 mm)
Housing Dimensions	13.70× 11.61 × 2.76 in. (348.0 × 295.0 × 70.0 mm)	14.17 × 11.61 × 5.71 in. (360.0 × 295.0 × 145.0 mm)
Weight	23.7 lbs (10.7 kg)	47.1 lbs (21.1 kg)
Frontal Wind Load	348.8 N @150km/hour	348.8 N @150km/hour
Lateral Wind Load	67.1 N @150km/hour	134.3 N @150km/hour

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AWS In-Band Low Loss Diplexer

IBO-21Zff-x-yy

15.24 in
(387 mm)

14.17 in
(360 mm)

13.70 in
(348 mm)

PORT 1

PORT 1

PORT 2

PORT 2

11.61 in
(295 mm)

6.34 in
(161 mm)

5.71 in
(145 mm)

CCI NUMBER

CCI NUMBER

3.39 in
(86 mm)

2.76 in
(70 mm)

CCI NUMBER

AWS In-Band Low Loss Diplexer Outline Drawing

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AWS In-Band Low Loss Diplexer

Block Diagram

COMMON
TX: 2110 - 2180 MHz
RX: 1710 - 1780 MHz

Bias-T

TX/RX
(5Pass Band)

TX/RX
(Stop Band)

Bias-T

Bias-T

Diode
OR

Port 1 (Pass Band)
TX/RX
5, 10 or 15 MHz

Port 2 (Stop Band)
TX: 2110 - 2180 MHz
RX: 1710 - 1780 MHz
Excluding Pass Band
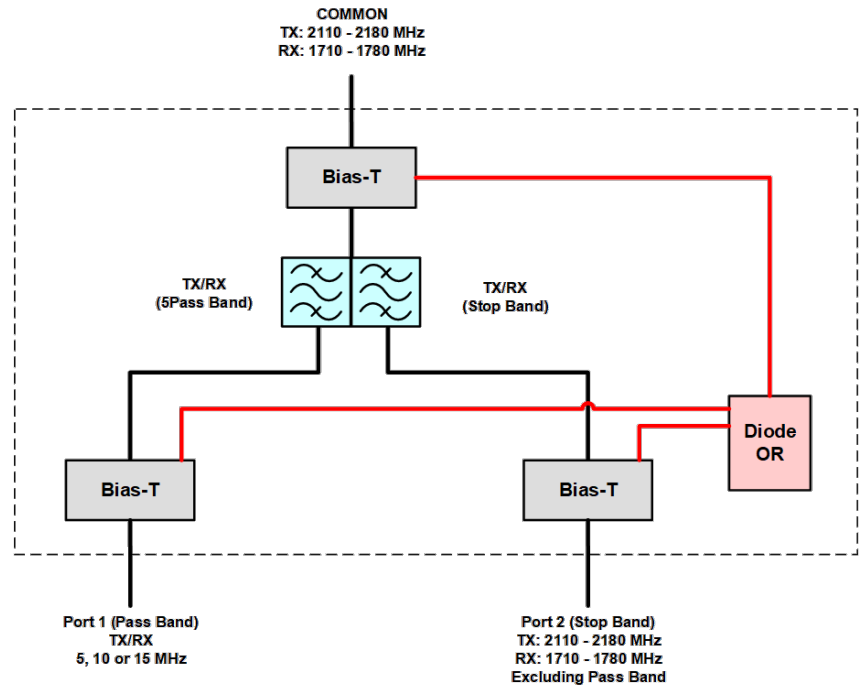
AWS In-Band Low Loss Diplexer Block Diagram (e.g. IBO-21ZA1-x-xx)

DS-IBO21ZFFXYY-V1.0-180901

![CCI logo]

ORDERING

AWS In-Band Low Loss Diplexer

IBO-21Zff-x-yy

Parts & Accessories

5 MHz Bandpass Models	Description
IBO-21ZA1-x-yy	AWS Same Band Diplexer, pass band A1 Block
IBO-21ZA2-x-yy	AWS Same Band Diplexer, pass band A2 Block
IBO-21ZB1-x-yy	AWS Same Band Diplexer, pass band B1 Block
IBO-21ZB2-x-yy	AWS Same Band Diplexer, pass band B2 Block
IBO-21ZC-x-yy	AWS Same Band Diplexer, pass band C Block
IBO-21ZD-x-yy	AWS Same Band Diplexer, pass band D Block
IBO-21ZE-x-yy	AWS Same Band Diplexer, pass band E Block
IBO-21ZF1-x-yy	AWS Same Band Diplexer, pass band F1 Block
IBO-21ZF2-x-yy	AWS Same Band Diplexer, pass band F2 Block
IBO-21ZG-x-yy	AWS Same Band Diplexer, pass band G Block
IBO-21ZH-x-yy	AWS Same Band Diplexer, pass band H Block
IBO-21ZI-x-yy	AWS Same Band Diplexer, pass band I Block
IBO-21ZJ1-x-yy	AWS Same Band Diplexer, pass band J1 Block
IBO-21ZJ2-x-yy	AWS Same Band Diplexer, pass band J2 Block

10 MHz Bandpass Models	Description
IBO-21ZA1A2-x-yy	AWS Same Band Diplexer, pass band A1-A2 Blocks
IBO-21ZA2B1-x-yy	AWS Same Band Diplexer, pass band A2-B1 Blocks
IBO-21ZB1B2-x-yy	AWS Same Band Diplexer, pass band B1-B2 Blocks
IBO-21ZB2C-x-yy	AWS Same Band Diplexer, pass band B2-C Blocks
IBO-21ZCD-x-yy	AWS Same Band Diplexer, pass band C-D Blocks
IBO-21ZDE-x-yy	AWS Same Band Diplexer, pass band D-E Blocks
IBO-21ZEF1-x-yy	AWS Same Band Diplexer, pass band E-F1 Blocks
IBO-21ZF1F2-x-yy	AWS Same Band Diplexer, pass band F1-F2 Blocks
IBO-21ZF2G-x-yy	AWS Same Band Diplexer, pass band F2-G Blocks
IBO-21ZGH-x-yy	AWS Same Band Diplexer, pass band G-H Blocks
IBO-21ZHI-x-yy	AWS Same Band Diplexer, pass band H-I Blocks
IBO-21ZIJ1-x-yy	AWS Same Band Diplexer, pass band I-J1 Blocks
IBO-21ZJ1J2-x-yy	AWS Same Band Diplexer, pass band J1-J2 Blocks

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AWS In-Band Low Loss Diplexer

15 MHz Bandpass Models	Description
IBO-21ZA1B1-x-yy	AWS Same Band Diplexer, pass band A1-B1 Blocks
IBO-21ZA2B2-x-yy	AWS Same Band Diplexer, pass band A2-B2 Blocks
IBO-21ZB1C-x-yy	AWS Same Band Diplexer, pass band B1-C Blocks
IBO-21ZB2D-x-yy	AWS Same Band Diplexer, pass band B2-D Blocks
IBO-21ZCE-x-yy	AWS Same Band Diplexer, pass band C-E Blocks
IBO-21ZDF1-x-yy	AWS Same Band Diplexer, pass band D-F1 Blocks
IBO-21ZEF2-x-yy	AWS Same Band Diplexer, pass band E-F2 Blocks
IBO-21ZF1G-x-yy	AWS Same Band Diplexer, pass band F1-G Blocks
IBO-21ZF2H-x-yy	AWS Same Band Diplexer, pass band F2-H Blocks
IBO-21ZGI-x-yy	AWS Same Band Diplexer, pass band G-I Blocks
IBO-21ZHJ1-x-yy	AWS Same Band Diplexer, pass band H-J1 Blocks
IBO-21ZIJ2-x-yy	AWS Same Band Diplexer, pass band I-J2 Blocks

Ordering Options (-x)	Description
-0	No DC/AISG Pass through and No DC Block
-S	Smart Bias-T DC/AISG Pass through on either port

Ordering Options (-yy)	Description
-T2	Twin Diplexer with 4.3-10 connectors
-T1	Twin Diplexer with 7-16 DIN connectors
-S2	Single Diplexer with 4.3-10 connectors
-S1	Single Diplexer with 7-16 DIN connectors

DS-IBO21ZFFXYY-V1.0-180901

STANDARDS & CERTIFICATIONS

AWS In-Band Low Loss Diplexer

IBO-21Zff-x-yy

Standards & Compliance

Safety	EN 60950-1, UL 60950-1
Emission	EN 55022
Immunity	EN 55024
Environmental	IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-5, IEC 60068-2-6, IEC-60068-2-11, IEC 60068-2-14, IEC 60068-2-18, IEC 60068-2-27, IEC 60068-2-29, IEC 60068-02-30, IEC 60068-2-52, IEC 60068-2-64, IEC61000-4-5, GR-63-CORE 4.3.1, EN 60529 IP67, IP68

Certifications

Antenna Interface Standards Group (AISG), Federal Communication Commission (FCC) Part 15 Class B, CE, CSA US, ISO 9001

Communication Components Inc.

EXTENDING WIRELESS PERFORMANCE

DS-IBO21ZFFXYY-V1.0-180901