

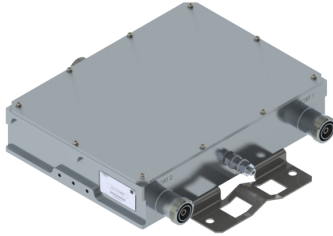


Filters & Combiners

DATA SHEET

Outdoor Low Loss Diplexer

LLC-1721-FTU-15-x



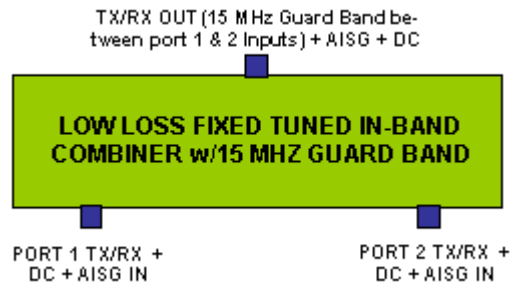
- Low Loss Combining
- Full Transmit and Receive Combining
- Typ. 0.3 dB Insertion Loss
- Includes AWS-3 Spectrum
- AISG 2.0 compliant
- High Reliability Design
- High Power Handling
- Excellent Filter Response
- Temperature Stable
- Fully Passive
- Low Intermodulation
- Optional Wall Mount Kit Available

Overview

CCI's AWS In-Band Low Loss Diplexer with a 15 MHz Guard Band combines two AWS Base Station sub-band outputs 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 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 In-Band Diplexer allows the combining of any two 20 MHz segments in the AWS Tx and Rx Bands separated by a 15 MHz Guard Band. An efficient, low loss, low PIM, high power quadruplexer combines the band specific Tx/Rx signals at the common port. The 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 is housed in a fully weatherproof IP68 immersion proof enclosure, with IP68 immersion proof connectors suited for long-life masthead mounting. The unit provides protection against lightning strikes via a multi-stage surge protection circuit.





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SPECIFICATIONS

Outdoor Low Loss Diplexer

LLC-1721-FTU-15-x

Electrical

LLC-1721-FTU-15-A2B2	Ports	Frequency(MHz)	Specification	
Return Loss	TX/RX Out	1710 - 1715	18 dB min., 20 dB typ.	
		1730 - 1750	18 dB min., 20 dB typ.	
		2110 - 2115	18 dB min., 20 dB typ.	
		2130 - 2150	18 dB min., 20 dB typ.	
	Port 1	1710 - 1715	18 dB min., 20 dB typ.	
		2110 - 2115	18 dB min., 20 dB typ.	
	Port 2	1730 - 1750	18 dB min., 20 dB typ.	
		2130 - 2150	18 dB min., 20 dB typ.	
	Insertion Loss	TX/RX Out to Port 1	1710 - 1715	0.3 dB typ., 0.65 dB max. @ band edge
			2110 - 2115	0.3 dB typ., 0.65 dB max. @ band edge
		TX/RX Out to Port 2	1730 - 1750	0.3 dB typ., 0.65 dB max. @ band edge
			2130 - 2150	0.3 dB typ., 0.65 dB max. @ band edge
LLC-1721-FTU-15-B1C	Ports	Frequency(MHz)	Specification	
Return Loss	TX/RX Out	1710 - 1720	18 dB min., 20 dB typ.	
		1735 - 1755	18 dB min., 20 dB typ.	
		2110 - 2120	18 dB min., 20 dB typ.	
		2135 - 2155	18 dB min., 20 dB typ.	
	Port 1	1710 - 1720	18 dB min., 20 dB typ.	
		2110 - 2120	18 dB min., 20 dB typ.	
	Port 2	1735 - 1755	18 dB min., 20 dB typ.	
		2135 - 2155	18 dB min., 20 dB typ.	
	Insertion Loss	TX/RX Out to Port 1	1710 - 1720	0.3 dB typ., 0.65 dB max. @ band edge
			2110 - 2120	0.3 dB typ., 0.65 dB max. @ band edge
		TX/RX Out to Port 2	1735 - 1755	0.3 dB typ., 0.65 dB max. @ band edge
			2135 - 2155	0.3 dB typ., 0.65 dB max. @ band edge
Attenuation	TX/RX Out to Port 1	1735 - 1755	≥ 25 dB typ.	
		2135 - 2155	≥ 25 dB typ.	
	TX/RX Out to Port 2	1710 - 1720	≥ 25 dB typ.	
		2110 - 2120	≥ 25 dB typ.	
Isolation	Port 1 to Port 2	1710 - 1720	≥ 25 dB typ.	
		1735 - 1755	≥ 25 dB typ.	
		2110 - 2120	≥ 25 dB typ.	
		2135 - 2155	≥ 25 dB typ.	



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LLC-1721-FTU-15-x

LLC-1721-FTU-15-B2D	Ports	Frequency(MHz)	Specification	
Return Loss	TX/RX Out	1710 - 1725	18 dB min., 20 dB typ.	
		1740 - 1760	18 dB min., 20 dB typ.	
		2110 - 2125	18 dB min., 20 dB typ.	
		2140 - 2160	18 dB min., 20 dB typ.	
	Port 1	1710 - 1725	18 dB min., 20 dB typ.	
		2110 - 2125	18 dB min., 20 dB typ.	
	Port 2	1740 - 1760	18 dB min., 20 dB typ.	
		2140 - 2160	18 dB min., 20 dB typ.	
	Insertion Loss	TX/RX Out to Port 1	1710 - 1725	0.3 dB typ., 0.65 dB max. @ band edge
			2110 - 2125	0.3 dB typ., 0.65 dB max. @ band edge
		TX/RX Out to Port 2	1740 - 1760	0.3 dB typ., 0.65 dB max. @ band edge
			2140 - 2160	0.3 dB typ., 0.65 dB max. @ band edge
Attenuation		TX/RX Out to Port 1	1740 - 1760	≥ 25 dB typ.
			2140 - 2160	≥ 25 dB typ.
	TX/RX Out to Port 2	1710 - 1725	≥ 25 dB typ.	
		2110 - 2125	≥ 25 dB typ.	
Isolation	Port 1 to Port 2	1710 - 1725	≥ 35 dB typ.	
		1740 - 1760	≥ 25 dB typ.	
		2110 - 2125	≥ 25 dB typ.	
		2140 - 2160	≥ 25 dB typ.	
LLC-1721-FTU-15-CE	Ports	Frequency(MHz)	Specification	
Return Loss	TX/RX Out	1710 - 1730	18 dB min., 20 dB typ.	
		1745 - 1765	18 dB min., 20 dB typ.	
		2110 - 2130	18 dB min., 20 dB typ.	
		2145 - 2165	18 dB min., 20 dB typ.	
	Port 1	1710 - 1730	18 dB min., 20 dB typ.	
		2110 - 2130	18 dB min., 20 dB typ.	
	Port 2	1745 - 1765	18 dB min., 20 dB typ.	
		2145 - 2165	18 dB min., 20 dB typ.	
	Insertion Loss	TX/RX Out to Port 1	1710 - 1730	0.3 dB typ., 0.65 dB max. @ band edge
			2110 - 2130	0.3 dB typ., 0.65 dB max. @ band edge
		TX/RX Out to Port 2	1745 - 1765	0.3 dB typ., 0.65 dB max. @ band edge
			2145 - 2165	0.3 dB typ., 0.65 dB max. @ band edge
Attenuation	TX/RX Out to Port 1	1745 - 1765	≥ 25 dB typ.	
		2145 - 2165	≥ 25 dB typ.	
	TX/RX Out to Port 2	1710 - 1730	≥ 25 dB typ.	
		2110 - 2130	≥ 25 dB typ.	
Isolation	Port 1 to Port 2	1710 - 1730	≥ 25 dB typ.	
		1744 - 1764	≥ 25 dB typ.	
		2110 - 2130	≥ 25 dB typ.	
		2145 - 2165	≥ 25 dB typ.	



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LLC-1721-FTU-15-x

LLC-1721-FTU-15-DF1	Ports	Frequency(MHz)	Specification	
Return Loss	TX/RX Out	1715 - 1735	18 dB min., 20 dB typ.	
		1750 - 1770	18 dB min., 20 dB typ.	
		2115 - 2135	18 dB min., 20 dB typ.	
		2150 - 2170	18 dB min., 20 dB typ.	
	Port 1	1715 - 1735	18 dB min., 20 dB typ.	
		2115 - 2135	18 dB min., 20 dB typ.	
	Port 2	1750 - 1770	18 dB min., 20 dB typ.	
		2150 - 2170	18 dB min., 20 dB typ.	
	Insertion Loss	TX/RX Out to Port 1	1715 - 1735	0.3 dB typ., 0.65 dB max. @ band edge
			2115 - 2135	0.3 dB typ., 0.65 dB max. @ band edge
		TX/RX Out to Port 2	1750 - 1770	0.3 dB typ., 0.65 dB max. @ band edge
			2150 - 2170	0.3 dB typ., 0.65 dB max. @ band edge
Attenuation		TX/RX Out to Port 1	1750 - 1770	≥ 25 dB typ.
			2150 - 2170	≥ 25 dB typ.
	TX/RX Out to Port 2	1715 - 1735	≥ 25 dB typ.	
		2115 - 2135	≥ 25 dB typ.	
Isolation	Port 1 to Port 2	1715 - 1735	≥ 25 dB typ.	
		1750 - 1770	≥ 25 dB typ.	
		2115 - 2135	≥ 25 dB typ.	
		2150 - 2170	≥ 25 dB typ.	
LLC-1721-FTU-15-EF2	Ports	Frequency(MHz)	Specification	
Return Loss	TX/RX Out	1720 - 1740	18 dB min., 20 dB typ.	
		1755 - 1775	18 dB min., 20 dB typ.	
		2120 - 2140	18 dB min., 20 dB typ.	
		2155 - 2175	18 dB min., 20 dB typ.	
	Port 1	1720 - 1740	18 dB min., 20 dB typ.	
		2120 - 2140	18 dB min., 20 dB typ.	
	Port 2	1755 - 1775	18 dB min., 20 dB typ.	
		2155 - 2175	18 dB min., 20 dB typ.	
	Insertion Loss	TX/RX Out to Port 1	1720 - 1740	0.3 dB typ., 0.65 dB max. @ band edge
			2120 - 2140	0.3 dB typ., 0.65 dB max. @ band edge
		TX/RX Out to Port 2	1755 - 1775	0.3 dB typ., 0.65 dB max. @ band edge
			2155 - 2175	0.3 dB typ., 0.65 dB max. @ band edge
Attenuation	TX/RX Out to Port 1	1755 - 1775	≥ 25 dB typ.	
		2155 - 2175	≥ 25 dB typ.	
	TX/RX Out to Port 2	1720 - 1740	≥ 25 dB typ.	
		2120 - 2140	≥ 25 dB typ.	
Isolation	Port 1 to Port 2	1720 - 1740	≥ 25 dB typ.	
		1755 - 1775	≥ 25 dB typ.	
		2120 - 2140	≥ 25 dB typ.	
		2155 - 2175	≥ 25 dB typ.	



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SPECIFICATIONS

Outdoor Low Loss Diplexer

LLC-1721-FTU-15-x

LLC-1721-FTU-15-F1G	Ports	Frequency(MHz)	Specification	
Return Loss	TX/RX Out	1725 - 1745	18 dB min., 20 dB typ.	
		1760 - 1780	18 dB min., 20 dB typ.	
		2125 - 2145	18 dB min., 20 dB typ.	
		2160 - 2180	18 dB min., 20 dB typ.	
	Port 1	1725 - 1745	18 dB min., 20 dB typ.	
		2125 - 2145	18 dB min., 20 dB typ.	
	Port 2	1760 - 1780	18 dB min., 20 dB typ.	
		2160 - 2180	18 dB min., 20 dB typ.	
	Insertion Loss	TX/RX Out to Port 1	1725 - 1745	0.3 dB typ., 0.65 dB max. @ band edge
			2125 - 2145	0.3 dB typ., 0.65 dB max. @ band edge
		TX/RX Out to Port 2	1760 - 1780	0.3 dB typ., 0.65 dB max. @ band edge
			2160 - 2180	0.3 dB typ., 0.65 dB max. @ band edge
Attenuation		TX/RX Out to Port 1	1760 - 1780	≥ 25 dB typ.
			2160 - 2180	≥ 25 dB typ.
	TX/RX Out to Port 2	1725 - 1745	≥ 25 dB typ.	
		2125 - 2145	≥ 25 dB typ.	
Isolation	Port 1 to Port 2	1725 - 1745	≥ 25 dB typ.	
		1760 - 1780	≥ 25 dB typ.	
		2135 - 2145	≥ 25 dB typ.	
		2160 - 2180	≥ 25 dB typ.	
LLC-1721-FTU-15-F2H	Ports	Frequency(MHz)	Specification	
Return Loss	TX/RX Out	1730 - 1750	18 dB min., 20 dB typ.	
		1765 - 1780	18 dB min., 20 dB typ.	
		2130 - 2150	18 dB min., 20 dB typ.	
		2165 - 2180	18 dB min., 20 dB typ.	
	Port 1	1730 - 1750	18 dB min., 20 dB typ.	
		2130 - 2150	18 dB min., 20 dB typ.	
	Port 2	1765 - 1780	18 dB min., 20 dB typ.	
		2165 - 2180	18 dB min., 20 dB typ.	
	Insertion Loss	TX/RX Out to Port 1	1730 - 1750	0.3 dB typ., 0.65 dB max. @ band edge
			2130 - 2150	0.3 dB typ., 0.65 dB max. @ band edge
		TX/RX Out to Port 2	1765 - 1780	0.3 dB typ., 0.65 dB max. @ band edge
			2165 - 2180	0.3 dB typ., 0.65 dB max. @ band edge
Attenuation		TX/RX Out to Port 1	1765 - 1780	≥ 25 dB typ.
			2165 - 2180	≥ 25 dB typ.
	TX/RX Out to Port 2	1730 - 1750	≥ 25 dB typ.	
		2130 - 2150	≥ 25 dB typ.	
Isolation	Port 1 to Port 2	1730 - 1750	≥ 25 dB typ.	
		1765 - 1780	≥ 25 dB typ.	
		2130 - 2150	≥ 25 dB typ.	
		2165 - 2180	≥ 25 dB typ.	



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SPECIFICATIONS

Outdoor Low Loss Diplexer

LLC-1721-FTU-15-x

LLC-1721-FTU-15-GI	Ports	Frequency(MHz)	Specification	
Return Loss	TX/RX Out	1735 - 1755	18 dB min., 20 dB typ.	
		1770 - 1780	18 dB min., 20 dB typ.	
		2135 - 2155	18 dB min., 20 dB typ.	
		2170 - 2180	18 dB min., 20 dB typ.	
	Port 1	1735 - 1755	18 dB min., 20 dB typ.	
		2135 - 2155	18 dB min., 20 dB typ.	
	Port 2	1770 - 1780	18 dB min., 20 dB typ.	
		2170 - 2180	18 dB min., 20 dB typ.	
	Insertion Loss	TX/RX Out to Port 1	1735 - 1755	0.3 dB typ., 0.65 dB max. @ band edge
			2135 - 2155	0.3 dB typ., 0.65 dB max. @ band edge
		TX/RX Out to Port 2	1770 - 1780	0.3 dB typ., 0.65 dB max. @ band edge
			2170 - 2180	0.3 dB typ., 0.65 dB max. @ band edge
Attenuation		TX/RX Out to Port 1	1770 - 1780	≥ 25 dB typ.
			2170 - 2180	≥ 25 dB typ.
	TX/RX Out to Port 2	1735 - 1755	≥ 25 dB typ.	
		2135 - 2155	≥ 25 dB typ.	
Isolation	Port 1 to Port 2	1735 - 1755	≥ 25 dB typ.	
		1770 - 1780	≥ 25 dB typ.	
		2135 - 2155	≥ 25 dB typ.	
		2170 - 2180	≥ 25 dB typ.	
LLC-1721-FTU-15-HJ1	Ports	Frequency(MHz)	Specification	
Return Loss	TX/RX Out	1740 - 1760	18 dB min., 20 dB typ.	
		1775 - 1780	18 dB min., 20 dB typ.	
		2140 - 2160	18 dB min., 20 dB typ.	
		2175 - 2180	18 dB min., 20 dB typ.	
	Port 1	1740 - 1760	18 dB min., 20 dB typ.	
		2140 - 2160	18 dB min., 20 dB typ.	
	Port 2	1775 - 1780	18 dB min., 20 dB typ.	
		2175 - 2180	18 dB min., 20 dB typ.	
	Insertion Loss	TX/RX Out to Port 1	1740 - 1760	0.3 dB typ., 0.65 dB max. @ band edge
			2140 - 2160	0.3 dB typ., 0.65 dB max. @ band edge
		TX/RX Out to Port 2	1775 - 1780	0.3 dB typ., 0.65 dB max. @ band edge
			2175 - 2180	0.3 dB typ., 0.65 dB max. @ band edge
Attenuation		TX/RX Out to Port 1	1775 - 1780	≥ 25 dB typ.
			2175 - 2180	≥ 25 dB typ.
	TX/RX Out to Port 2	1740 - 1760	≥ 25 dB typ.	
		2140 - 2160	≥ 25 dB typ.	
Isolation	Port 1 to Port 2	1740 - 1760	≥ 25 dB typ.	
		1775 - 1780	≥ 25 dB typ.	
		2140 - 2160	≥ 25 dB typ.	
		2175 - 2180	≥ 25 dB typ.	



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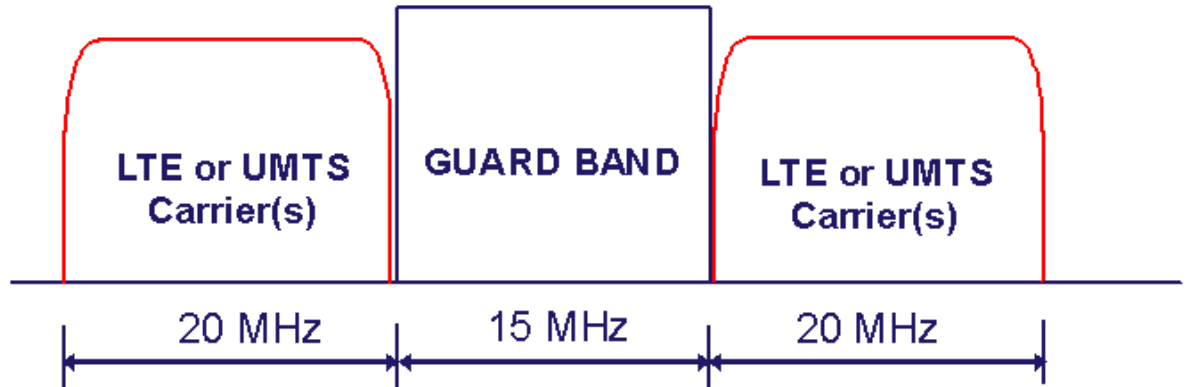
SPECIFICATIONS

Outdoor Low Loss Diplexer

LLC-1721-FTU-15-x

General Characteristics	
Impedance	50 ohms
Guard Band	15 MHz
Group Delay	65 nS
Continuous Average Power	200 W max. (all ports)
Peak Envelope Power	2 kW max. (all ports)
Intermodulation Performance(all ports)	<-117 dBm (-160 dBc) typical (2 x +43 dBm tones) all bands
DC Pass-Through	Self detecting*
AISG Pass-Through	Follows detected DC*

*If DC is detected for ANT-Tx1/Rx1, then AISG is passed-through as well, and DC is blocked for ANT-Tx2/Rx2 path, and vice versa



AWS 15 MHz Guard Band Low Loss Diplexer Typical Applications for UMTS & LTE

Environmental

Operating Temperature	-40 °C to +65 °C
Relative Humidity	5% to 100%
Enclosure	IP67 (Unit Body), IP68 (Connector)
MTBF	>500,000 hours
Lightning Protection	8/20us, ±20KA max, 10 strikes, per IEC61000-4-5



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SPECIFICATIONS

Outdoor Low Loss Diplexer

LLC-1721-FTU-15-x

Mechanical

Connectors	3 x 7-16 DIN female
Dimensions (Single - body only)(HxWxD)	7.87 x 10.63 x 2.36 in. (200 x 270 x 59.9 mm)
Dimensions (Single incl. - bkt. & conn.)(HxWxD)	11.50 x 10.63 x 2.99 in. (292 x 270 x 75.9 mm)
Dimensions (Dual - body only)(HxWxD)	7.87 x 11.14 x 4.92 in. (200 x 282.9 x 124.9 mm)
Dimensions (Dual - incl. bkt. & conn.)(HxWxD)	11.50 x 11.14 x 5.65 in. (292 x 282.9 x 140.9 mm)
Weight	11 lbs (5.0 kg)
Mounting	Pole/Wall mounting bracket

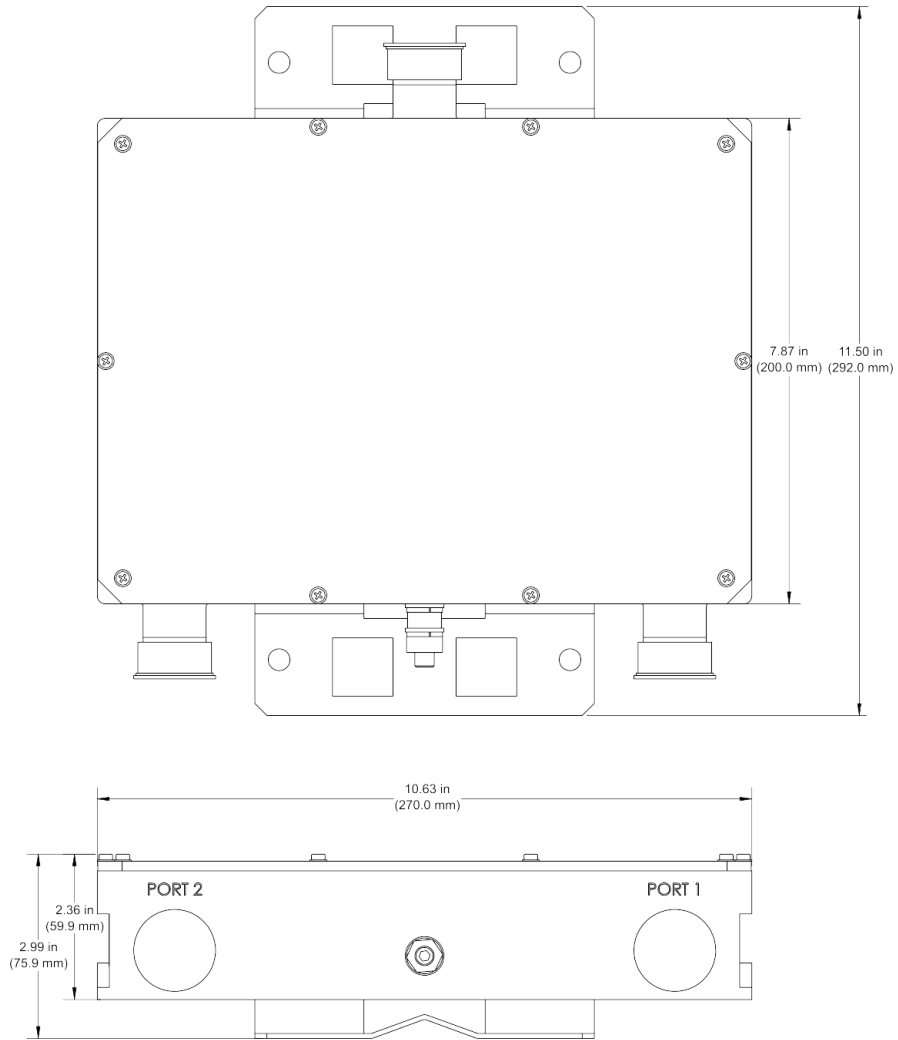


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SPECIFICATIONS

Outdoor Low Loss Diplexer

LLC-1721-FTU-15-x



AWS 15 MHz Guard Band Low Loss Diplexer Outline Drawing

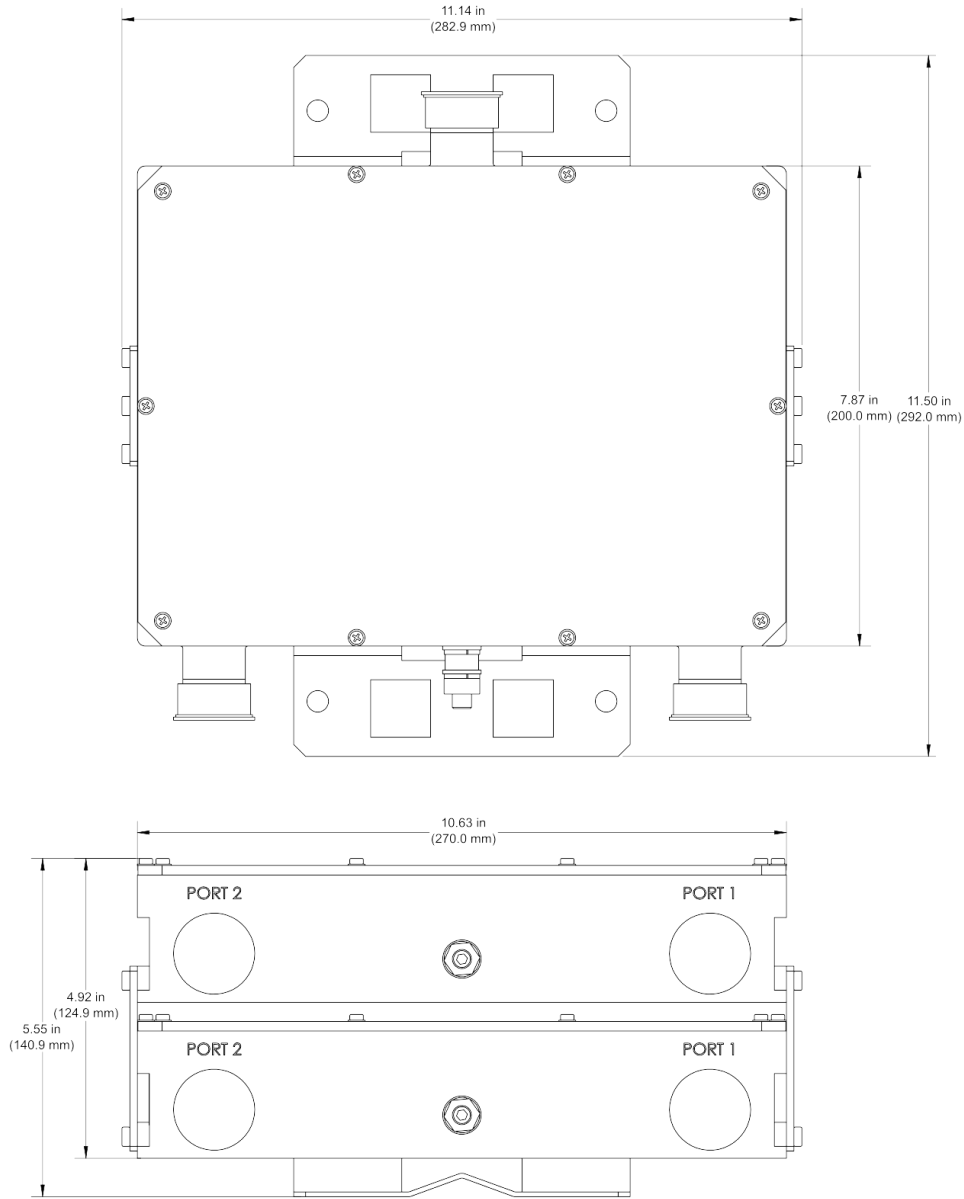


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SPECIFICATIONS

Outdoor Low Loss Diplexer

LLC-1721-FTU-15-x



AWS 15 MHz Guard Band Dual Low Loss Diplexer Outline Drawing



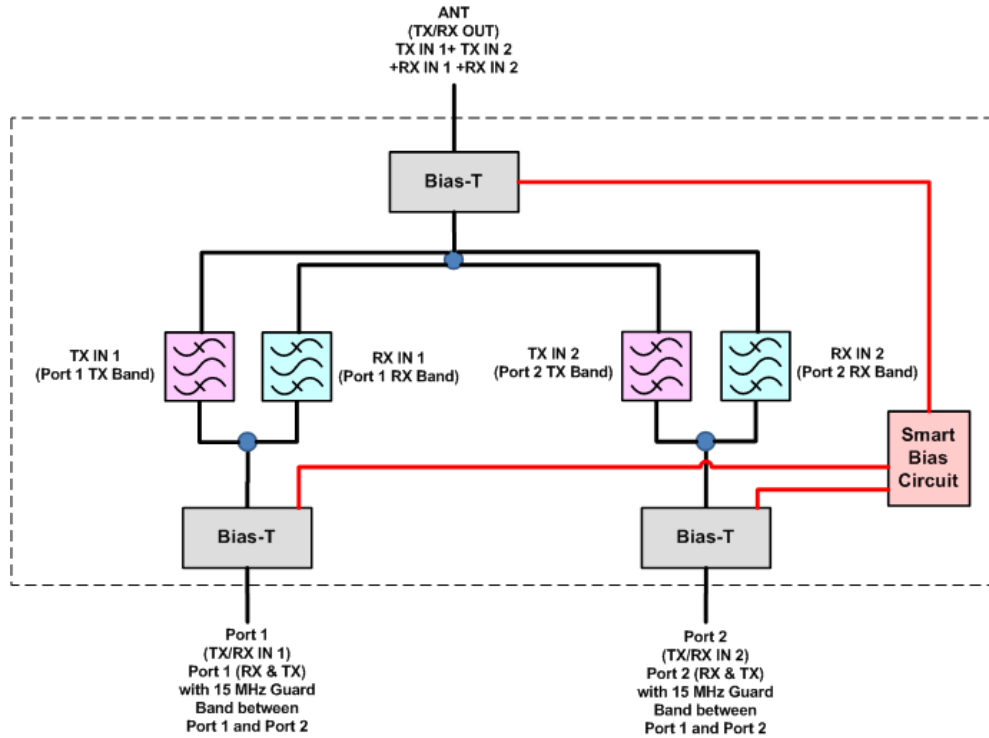
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SPECIFICATIONS

Outdoor Low Loss Diplexer

LLC-1721-FTU-15-x

Block Diagram



AWS 15 MHz Guard Band Low Loss Diplexer Detailed Block Diagram



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ORDERING

Outdoor Low Loss Diplexer

LLC-1721-FTU-15-x

Parts & Accessories

Model Number	Description	Guard Band	Port 1 Band	Port 2 Band
LLC-1721-FTU-15-A2B2	AWS In-Band Low Loss Diplexer with 15 MHz Guard Band with bracket	A2, B1, B2	A1	C, D, E, F1
LLC-1721-FTU-15-A2B2-D	AWS In-Band Dual Low Loss Diplexer with 15 MHz Guard Band with bracket	A2, B1, B2	A1	C, D, E, F1
LLC-1721-FTU-15-B1C	AWS In-Band Low Loss Diplexer with 15 MHz Guard Band with bracket	B1, B2, C	A1, A2	D, E, F1, F2
LLC-1721-FTU-15-B1C-D	AWS In-Band Dual Low Loss Diplexer with 15 MHz Guard Band with bracket	B1, B2, C	A1, A2	D, E, F1, F2
LLC-1721-FTU-15-B2D	AWS In-Band Low Loss Diplexer with 15 MHz Guard Band with bracket	B2, C, D	A1, A2, B1	E, F1, F2, G
LLC-1721-FTU-15-B2D-D	AWS In-Band Dual Low Loss Diplexer with 15 MHz Guard Band with bracket	B2, C, D	A1, A2, B1	E, F1, F2, G
LLC-1721-FTU-15-CE	AWS In-Band Low Loss Diplexer with 15 MHz Guard Band with bracket	C, D, E	A1, A2, B1, B2	F1, F2, G, H
LLC-1721-FTU-15-CE-D	AWS In-Band Dual Low Loss Diplexer with 15 MHz Guard Band with bracket	C, D, E	A1, A2, B1, B2	F1, F2, G, H
LLC-1721-FTU-15-DF1	AWS In-Band Low Loss Diplexer with 15 MHz Guard Band with bracket	D, E, F1	A2, B1, B2, C	F2, G, H, I
LLC-1721-FTU-15-DF1-D	AWS In-Band Dual Low Loss Diplexer with 15 MHz Guard Band with bracket	D, E, F1	A2, B1, B2, C	F2, G, H, I
LLC-1721-FTU-15-EF2	AWS In-Band Low Loss Diplexer with 15 MHz Guard Band with bracket	E, F1, F2	B1, B2, C, D	G, H, I, J1
LLC-1721-FTU-15-EF2-D	AWS In-Band Dual Low Loss Diplexer with 15 MHz Guard Band with bracket	E, F1, F2	B1, B2, C, D	G, H, I, J1
LLC-1721-FTU-15-F1G	AWS In-Band Low Loss Diplexer with 15 MHz Guard Band with bracket	F1, F2, G	B2, C, D, E	H, I, J1, J2
LLC-1721-FTU-15-F1G-D	AWS In-Band Dual Low Loss Diplexer with 15 MHz Guard Band with bracket	F1, F2, G	B2, C, D, E	H, I, J1, J2
LLC-1721-FTU-15-F2H	AWS In-Band Low Loss Diplexer with 15 MHz Guard Band with bracket	F2, G, H	C, D, E, F1	I, J1, J2
LLC-1721-FTU-15-F2H-D	AWS In-Band Dual Low Loss Diplexer with 15 MHz Guard Band with bracket	F2, G, H	C, D, E, F1	I, J1, J2
LLC-1721-FTU-15-GI	AWS In-Band Low Loss Diplexer with 15 MHz Guard Band with bracket	G, H, I	D, E, F1, F2	J1, J2
LLC-1721-FTU-15-GI-D	AWS In-Band Dual Low Loss Diplexer with 15 MHz Guard Band with bracket	G, H, I	D, E, F1, F2	J1, J2
LLC-1721-FTU-15-HJ1	AWS In-Band Low Loss Diplexer with 15 MHz Guard Band with bracket	H, I, J1	E, F1, F2, G	J2
LLC-1721-FTU-15-HJ1-D	AWS In-Band Dual Low Loss Diplexer with 15 MHz Guard Band with bracket	H, I, J1	E, F1, F2, G	J2



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STANDARDS &
CERTIFICATIONS

Outdoor Low Loss Diplexer

LLC-1721-FTU-15-x

Certifications

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

