Xinger® Products

Bo Jensen, Product Line Manager
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Deep RF experience
Compact footprints
Integration
Problem solving
Innovative technology

Anaren®
What'll we think of next?®

Technology differentiators

- All our Xinger® components are made using PCB material

- Material has a lower dk compared to ceramics, and offers:
  - Superior RF performance
    - Lower insertion loss
    - Tighter amplitude and phase balance
  - Less part – to – part variation:
    - Insertion Loss
    - Amplitude Balance
    - Phase Balance

- CTE matches PCB materials components are mounted on, which makes it more reliable when subjected to temperature cycling

- With the use of Xinger components, customers can use a low cost material as their main PCB, as the Xinger components offer high performance where you need it.

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Product families

- We offer a full line of:
  - 90 degree Hybrids
  - 5, 6, 10, 20 & 30 dB Directional Couplers
  - 180 degree Balun Transformers
  - 2- and 3-way Wilkinson Power dividers
  - RF/DC & RF/RF Crossovers (“microwave White-out”)
- Frequencies from 200MHz to 6GHz
- Power levels up to 400Watt
- Please check our website www.anaren.com for a complete list of components and detailed specifications.

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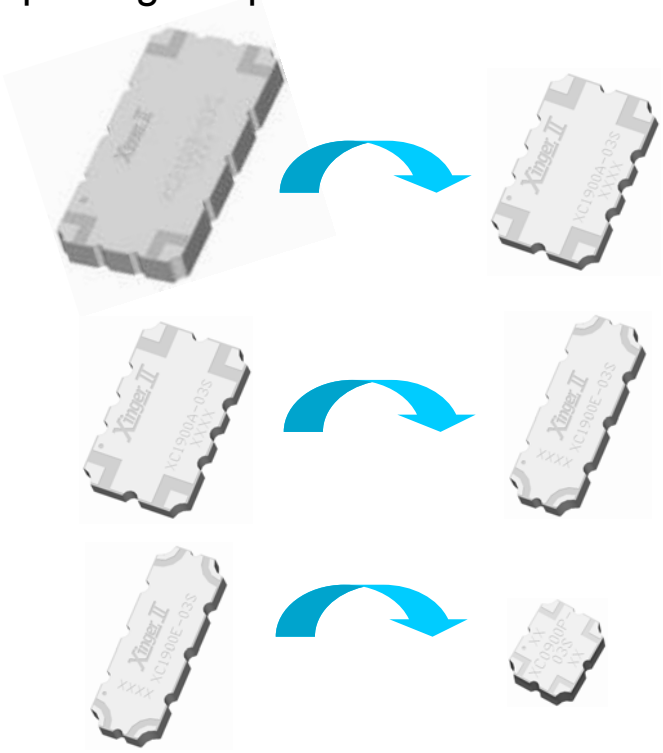
Xinger® road map

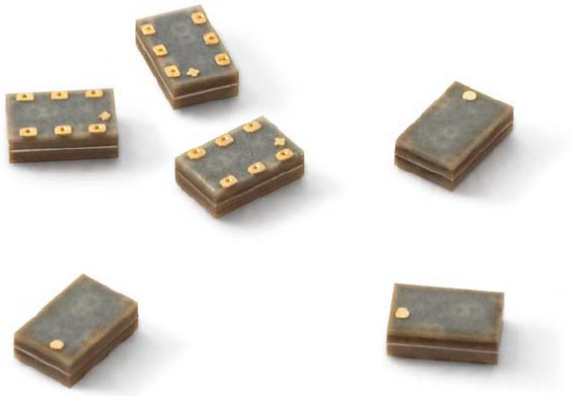
Size Reduction for given power

- Maintain package sizes
- Continue to increase power handling
- Smaller package will replace larger package requirements



Small 0805 Xinger

- 3dBs & Power Dividers
- Xinger 'quality' specs
- Softboard material
- All major commercial bands



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XingerIII® Hybrids

NEW

Part Number	Low Freq (GHz)	High Freq (GHz)	Insertion Loss	Amp Bal.	Power [CW]	Phase Balance	Return Loss	Isolation	Size (inch)	Size (mm)
X3C07P1-03S	0.600	0.900	0.20	±0.25	130	90 ±4.0	23	23	0.25 x 0.20	6.35 x 5.08
	0.695	0.805	0.17	±0.17	130	90 ±2.0	25	25		
	0.731	0.881	0.20	±0.25	130	90 ±4.0	23	25		
X3C09P1-03S	0.800	1.000	0.22	±0.25	90	90 ±4.0	23	23	0.25 x 0.20	6.35 x 5.08
	0.869	0.894	0.14	±0.14	110	90 ±2.0	25	25		
	0.925	0.960	0.14	±0.14	110	90 ±2.0	25	25		
X3C09P2-03S	0.800	1.000	0.20	±0.22	187	90 ±4.0	23	23	0.25 x 0.20	6.35 x 5.08
	0.869	0.894	0.12	±0.14	187	90 ±2.0	25	25		
	0.925	0.960	0.12	±0.14	187	90 ±2.0	25	25		
X3C19P1-03S	1.400	1.500	0.15	±0.5	90	90 ±4.0	18	20	0.25 x 0.20	6.35 x 5.08
	1.700	2.000	0.22	±0.22	90	90 ±4.0	23	23		
	1.805	1.880	0.12	±0.10	110	90 ±2.0	25	25		
	1.930	1.990	0.12	±0.10	110	90 ±2.0	25	25		
X3C19P2-03S	1.700	2.000	0.22	±0.22	176	90 ±4.0	20	23	0.25 x 0.20	6.35 x 5.08
	1.805	1.880	0.12	±0.10	176	90 ±2.0	25	25		
	1.930	1.990	0.12	±0.10	176	90 ±2.0	25	25		
X3C21P1-03S	2.000	2.300	0.22	±0.22	90	90 ±4.0	23	23	0.25 x 0.20	6.35 x 5.08
	2.110	2.170	0.12	±0.12	110	90 ±2.0	25	25		
	2.300	2.400	0.25	±0.25	110	90 ±4.0	17	18		
X3C21P2-03S	2.000	2.300	0.22	±0.22	172	90 ±4.0	23	23	0.25 x 0.20	6.35 x 5.08
	2.110	2.170	0.12	±0.10	172	90 ±2.0	25	25		
X3C26P1-03S	2.300	2.400	0.14	±0.18	100	90 ±3.0	23	23	0.25 x 0.20	6.35 x 5.08
	2.300	2.700	0.18	±0.20	90	90 ±4.0	23	23		

XingerIII® Directionals

NEW

Part Number	Low Freq (GHz)	High Freq (GHz)	Mean Coupling	Insertion Loss	Power [CW]	Return Loss	Directivity	Size (inch)	Size (mm)
X3C08E2-20S	0.731	0.881	20.0 ±0.50	0.05	225	23	22	0.56 x 0.20	14.22 x 5.08
X3C09E2-20S	0.700	0.800	20.0 ±0.75	0.05	225	20	20	0.56 x 0.20	14.22 x 5.08
	0.800	1.000	20.0 ±1.0	0.075	225	20	20		
	0.869	0.894	20.0 ±0.60	0.05	225	20	23		
	0.925	0.960	20.0 ±0.60	0.05	225	20	23		
X3C09P2-30S	0.700	0.800	30.4. ±1.5	0.10	225	20	20	0.25 x 0.20	6.35 x 5.08
	0.800	1.000	30.2 ±1.5	0.10	225	23	20		
	0.869	0.894	30.0 ±1.5	0.075	225	25	20		
	0.925	0.960	30.0 ±1.5	0.075	225	25	20		
X3C19E2-20S	1.400	2.700	20.3 ±1.0	0.10	225	20	20	0.56 x 0.20	14.22 x 5.08
	1.805	1.880	20.2 ±0.6	0.05	225	25	25		
	1.930	1.990	20.0 ±0.6	0.05	225	25	25		
	2.110	2.170	20.0 ±0.6	0.05	225	25	25		
X3C19P2-30S	1.400	2.700	30.4.±1.5	0.10	200	20	20	0.25 x 0.20	6.35 x 5.08
	1.805	1.880	30.0 ±1.5	0.075	200	25	20		
	1.930	1.990	30.0 ±1.5	0.075	200	25	20		
	2.110	2.170	30.2 ±1.5	0.10	200	25	20		
X3C26P1-30S	2.300	2.900	30.0 ±1.0	0.10	200	20	20	0.25 x 0.20	6.35 x 5.08
	2.500	2.700	30.0 ±0.8	0.05	200	25	22		

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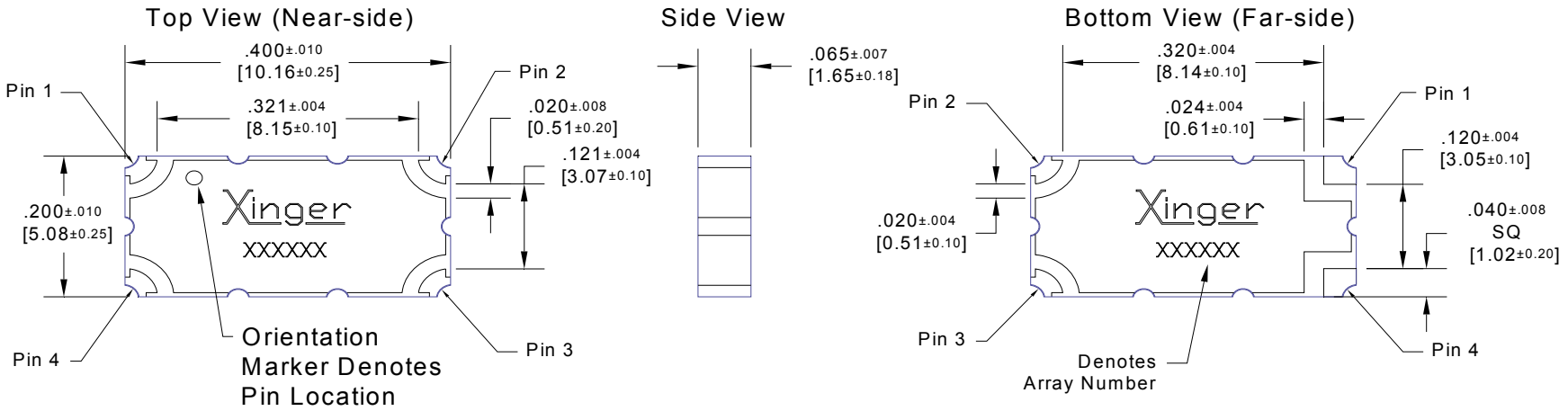
Xinger® 2ns Delay line

NEW



Typical Performance

Parameters	Typical Performance	Frequency
Group Delay	2 ns	0.3-2.7GHZ
Return Loss	17 dB	0.3-2.7GHZ
Insertion Loss	1.3 dB	1GHz
Insertion Loss	2 dB	2GHz
Insertion Loss	2.5 dB	2.7GHz

Pin Configuration

	Pin 1	Pin 2	Pin 3	Pin 4
Configuration 1	Input	Do Not Connect	Do Not Connect	Output
Configuration 2	Output	Do Not Connect	Do Not Connect	Input

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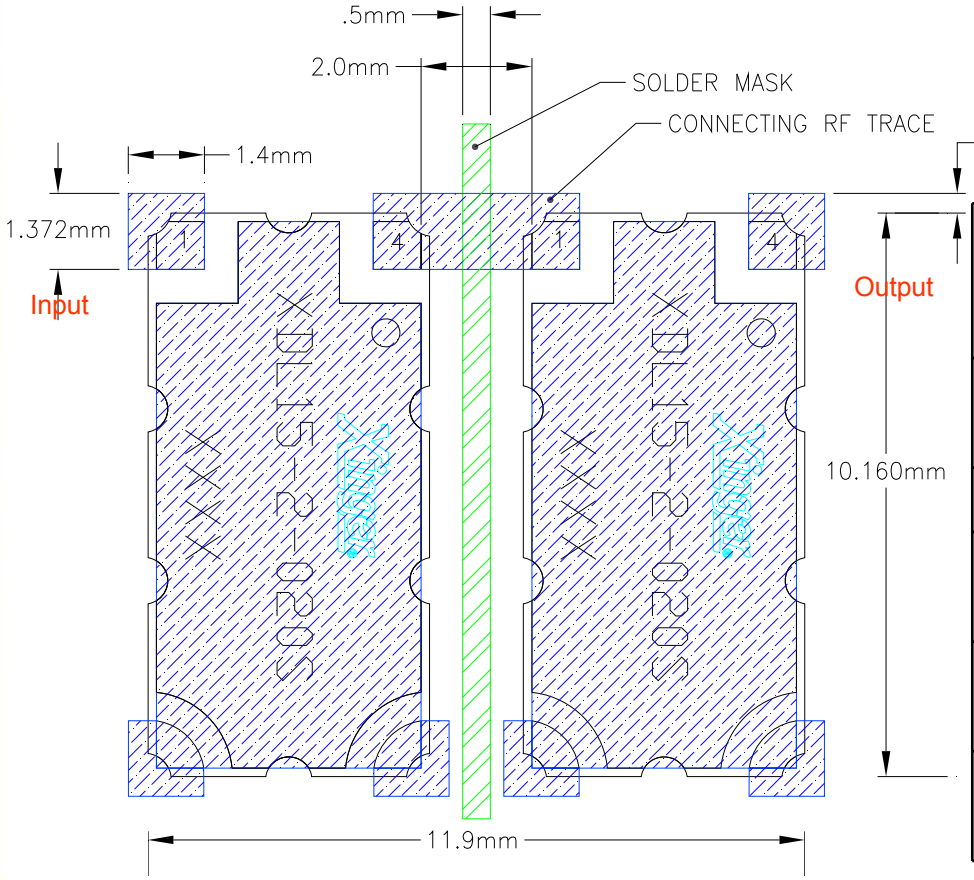
Xinger® 2x2ns Delay line



Parameters	Typical Performance	Frequency
Group Delay	4 ns	0.3-2.7GHZ
Return Loss	15 dB	0.3-2.7GHZ
Insertion Loss	2.6 dB	1GHz
Insertion Loss	4 dB	2GHz
Insertion Loss	5.2 dB	2.7GHz

Similarly for 6ns, use 3 x 2ns.

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Availability

Xinger Hybrids

Part Number	Size (inch)	Size (mm)	Prototypes	Final Design / Pre Production	Mass Production
X3C07P1-03S	0.25 x 0.20	6.35 x 5.08	Now	Now	Now
X3C09P1-03S	0.25 x 0.20	6.35 x 5.08	Now	Now	Now
X3C09P2-03S	0.25 x 0.20	6.35 x 5.08	Now	Now	Now
X3C19P1-03S	0.25 x 0.20	6.35 x 5.08	Now	Now	Now
X3C19P2-03S	0.25 x 0.20	6.35 x 5.08	Now	Now	Now
X3C21P1-03S	0.25 x 0.20	6.35 x 5.08	Now	Now	Now
X3C21P2-03S	0.25 x 0.20	6.35 x 5.08	June 11	July 11	Aug 11
X3C26P1-03S	0.25 x 0.20	6.35 x 5.08	June 11	July 11	Aug 11

Xinger Directionals

Part Number	Size (inch)	Size (mm)	Prototypes	Final Design / Pre Production	Mass Production
X3C08E2-20S	0.56 x 0.20	14.22 x 5.08	June 11	Aug 11	Sep 11
X3C09E2-20S	0.56 x 0.20	14.22 x 5.08	Now	Now	Now
X3C09P2-30S	0.25 x 0.20	6.35 x 5.08	Now	Now	Now
X3C19E2-20S	0.56 x 0.20	14.22 x 5.08	Now	Now	Now
X3C19P2-30S	0.25 x 0.20	6.35 x 5.08	June 11	Aug 11	Sep 11
X3C26P1-30S	0.25 x 0.20	6.35 x 5.08	June 11	Aug 11	Sep 11

Doherty Components

Bo Jensen, Product Line Manager
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Deep RF experience
Compact footprints
Integration
Problem solving
Innovative technology

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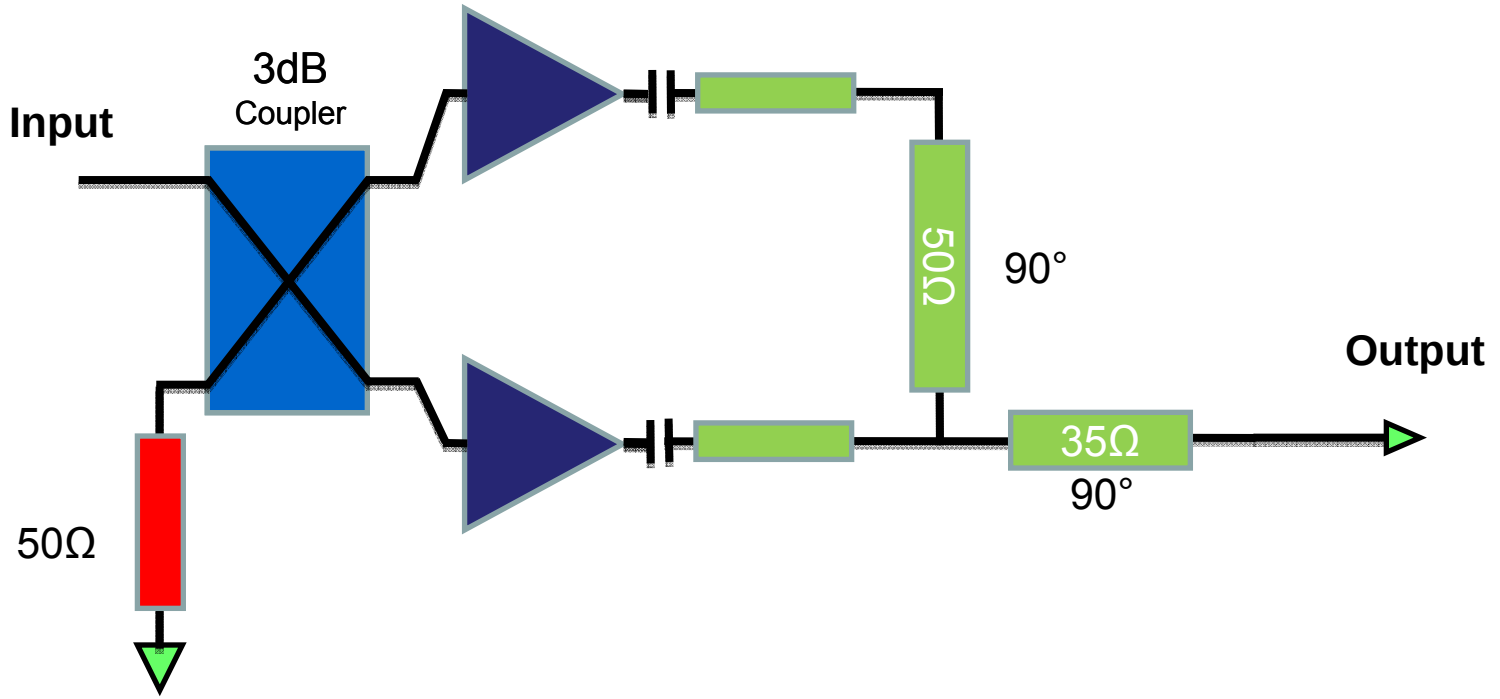
Typ. Doherty PA Config.

NEW



Note: Depending on the gain of the transistors, the splitter might be a 2.5-6dB coupler. Most typical 3dB or 5dB.

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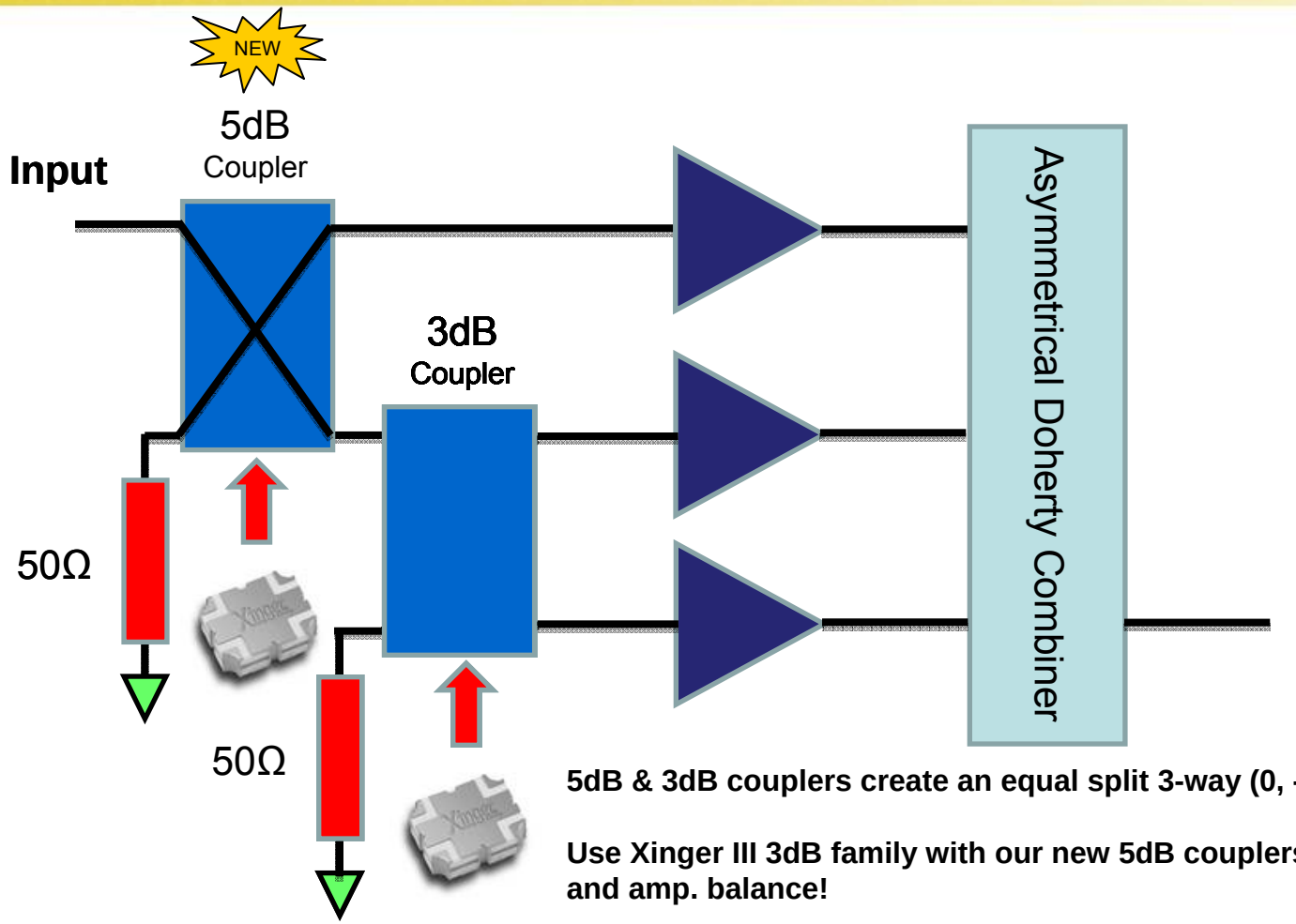
5dBs for Asym. Doherty Splitters

NEW



5dB & 3dB couplers create an equal split 3-way (0, -90, -180 deg.)

Use Xinger III 3dB family with our new 5dB couplers, for best phase and amp. balance!

Note: Some people prefer to use Wilkinson power dividers and 90 deg transmission lines instead, so we also offer in-phase power dividers!

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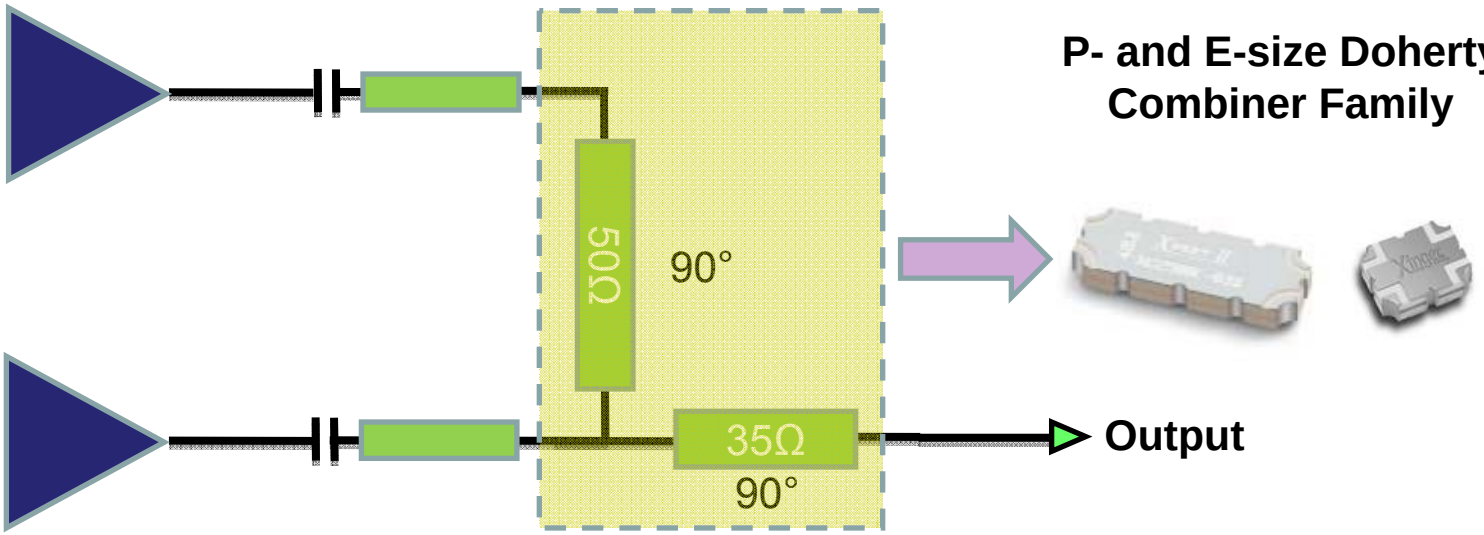
Doherty Output Combiners

NEW



P- and E-size Doherty Combiner Family

Narrowband E-size Doherty Combiners in bands from 700MHz to 2200MHz (200W CW max.)

Narrowband P-size Doherty Combiners in bands from 1800MHz to 2500MHz (50W CW max.)

Note: The “really attractive” wideband 700-1000MHz and 1800-2200MHz Doherty Combiners are in development (expected to be released late CY2011)

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Doherty Combiner Ins. Loss

Fc	Xinger Doherty Combiner Ins. Loss	RO4350 Ins. Loss (w. ENIG Plating)
940MHz	0.12dB (E-size)	0.11dB
1960MHz	0.10dB (E-size) 0.13dB (P-size)	0.10dB
2145MHz	0.10dB (E-size) 0.13dB (P-size)	0.10dB

Fc	Xinger Doherty Combiner Ins. Loss	FR4 Ins. Loss (w. ENIG Plating)
940MHz	0.12dB (E-size)	0.179dB
1960MHz	0.10dB (E-size) 0.13dB (P-size)	0.169dB
2145MHz	0.10dB (E-size) 0.13dB (P-size)	0.168dB

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Anaren Proprietary And Confidential Information

Xinger® 5dB Couplers

NEW

Part Number	Low Freq (GHz)	High Freq (GHz)	Mean Coupling	Insertion Loss	Power [CW]	Phase Balance	Return Loss	Directivity	Size (inch)	Size (mm)
X3C07P1-05S	0.600	0.900	5.0 ±0.3	0.20	70	90±4	23	23	0.25 x 0.20	6.35 x 5.08
	0.695	0.805	5.0 ±0.2	0.15	70	90±2	25	25		
X3C09P1-05S	0.800	1.000	5.0 ±0.3	0.20	70	90±4	23	23	0.25 x 0.20	6.35 x 5.08
	0.869	0.894	5.0 ±0.2	0.15	70	90±2	25	25		
	0.925	0.960	5.0 ±0.2	0.15	70	90±2	25	25		
X3C19P1-05S	1.700	2.000	5.0 ±0.3	0.15	70	90±4	20	20	0.25 x 0.20	6.35 x 5.08
	1.805	1.880	5.0 ±0.2	0.13	70	90±2	25	25		
	1.930	1.990	5.0 ±0.2	0.14	70	90±2	25	25		
X3C21P1-05S	2.000	2.300	5.0 ±0.3	0.15	60	90±4	20	20	0.25 x 0.20	6.35 x 5.08
	2.110	2.170	5.0 ±0.2	0.13	60	90±2	25	25		
X3C25P1-05S	2.300	2.700	5.0 ±0.3	0.18	70	90±4	20	20	0.25 x 0.20	6.35 x 5.08
	2.300	2.400	5.0 ±0.2	0.14	70	90±4	23	23		
	2.630	2.655	5.0 ±0.2	0.17	70	90±4	23	23		

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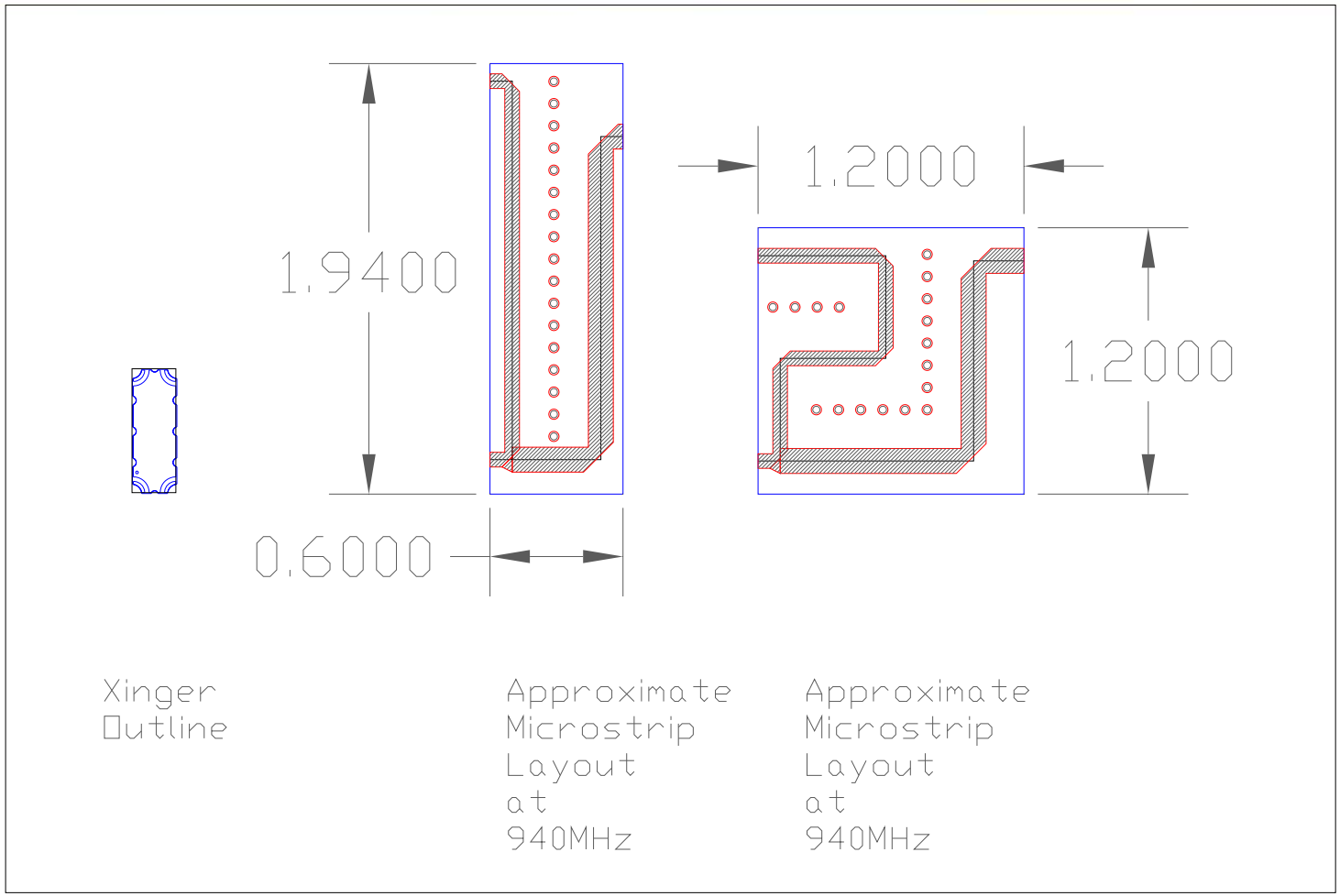
940MHz Doherty Combiner (RO4350)

Size comparison for 940MHz



The Xinger's 0.112 sq. inch is less than 1/10th the size of the best case printed layout.

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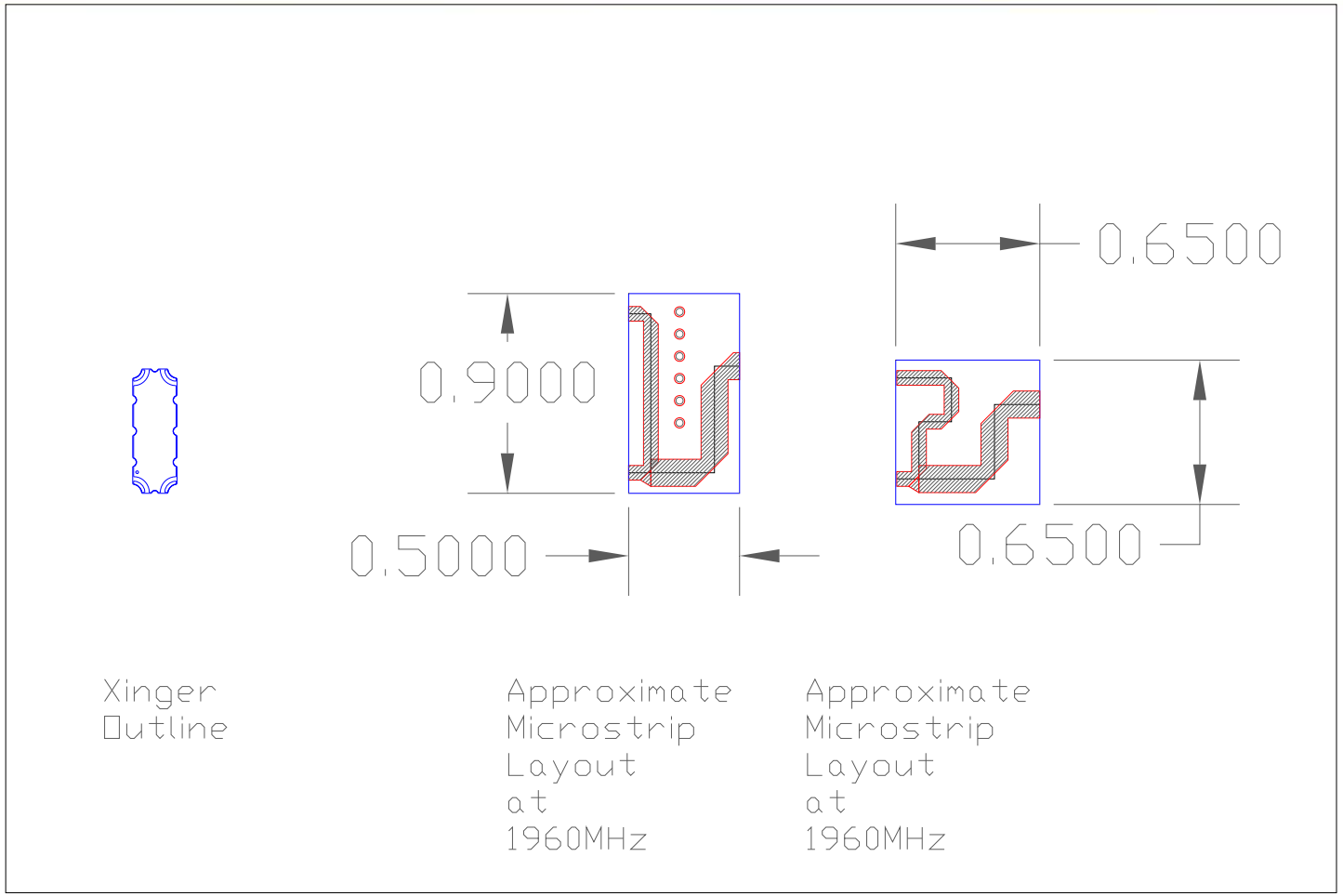
1960MHz Doherty Combiner (RO4350)

Size comparison for 1960MHz



The Xinger's 0.112 sq. inch is approximately 1/4th the size of the best case printed layout.

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Xinger® Doherty Combiners

NEW

Preliminary - in development

Part number	Freq [MHz]	Size [mm]	Size [in]	IL [dB]	RL [dB]	Phase Balance [deg]	Amp Balance [deg]	IL low [dB]	RL low [dB]	Port Ext [deg]	Power
X3DC07E2S	728-768	14.22 x 5.08	0.56 x 0.20	0.15	20	90 +/- 3.0	±0.12	0.25	20	0	200*
X3DC08E2S	869-894	14.22 x 5.08	0.56 x 0.20	0.15	20	90 +/- 3.0	±0.12	0.25	20	3	200*
X3DC09E2S	925-960	14.22 x 5.08	0.56 x 0.20	0.15	20	90 +/- 3.0	±0.12	0.25	20	3	200*
X3DC18E2S	1805-1880	14.22 x 5.08	0.56 x 0.20	0.15	20	90 +/- 3.0	±0.12	0.2	20	7	200*
X3DC19E2S	1930-1990	14.22 x 5.08	0.56 x 0.20	0.15	20	90 +/- 3.0	±0.12	0.2	20	9	200*
X3DC21E2S	2110-2170	14.22 x 5.08	0.56 x 0.20	0.15	20	90 +/- 3.0	±0.12	0.2	20	8	200*
X3DC19P1S	1700-2000	6.35 x 5.08	0.25 x 0.20	0.2	22	89±4.0	±0.2	0.36	12	8	50*
	1805-1880			0.17	25	88±4.0	±0.14	0.28	18		50*
	1930-1990			0.2	25	94±4.0	±0.2	0.32	17		50*
	1880-1920			0.17	25	90±4.0	±0.15	0.27	25		50*

* Estimated based on simulation and preliminary measurements, final results not available yet

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Availability

NEW

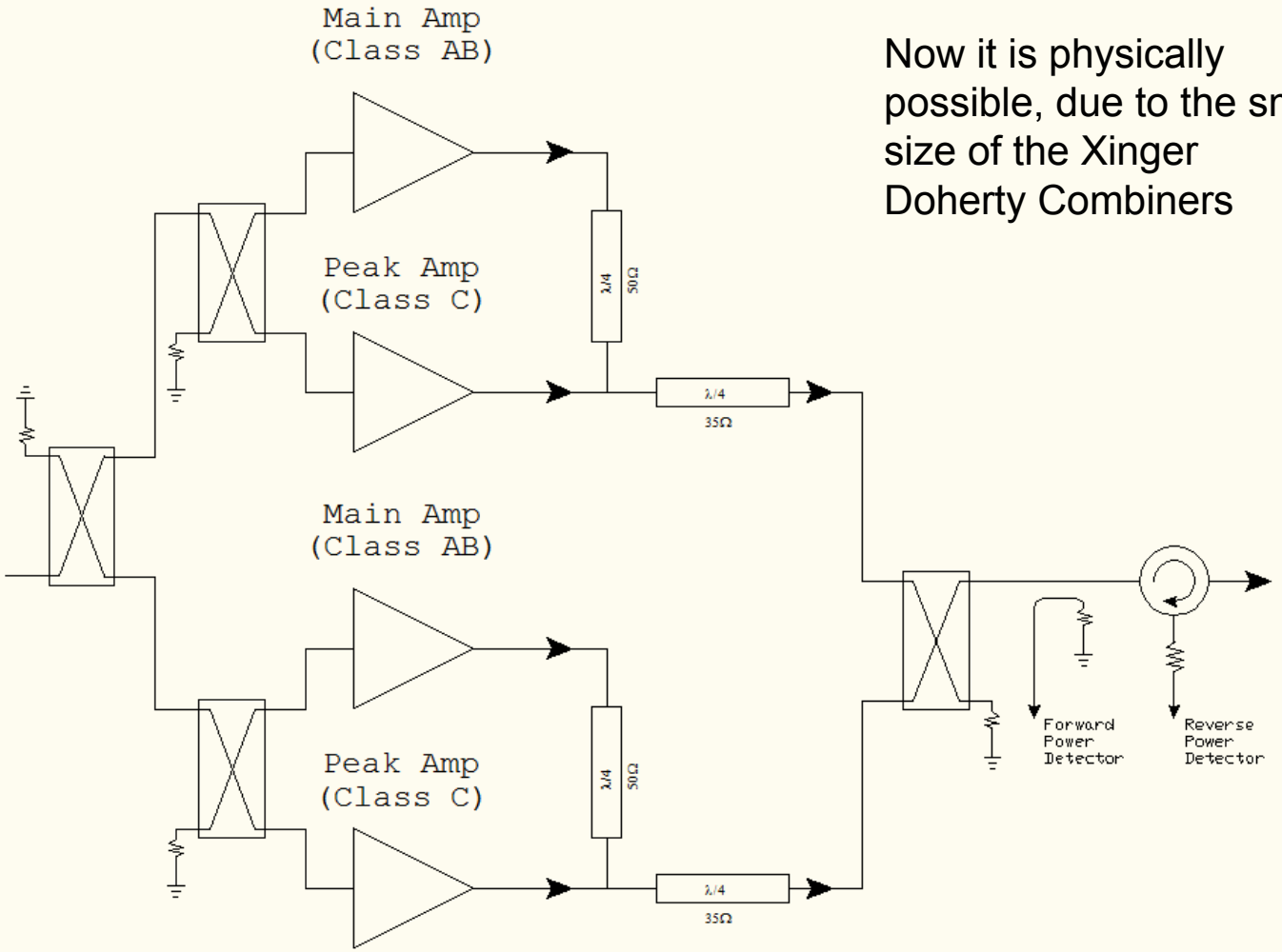
Xinger 5dB Directionals

Part Number	Size (inch)	Size (mm)	Prototypes	Final Design / Pre Production	Mass Production
X3C07P1-05S	0.25 x 0.20	6.35 x 5.08	June 11	Aug 11	Sep 11
X3C09P1-05S	0.25 x 0.20	6.35 x 5.08	June 11	Aug 11	Sep 11
X3C19P1-05S	0.25 x 0.20	6.35 x 5.08	June 11	Aug 11	Sep 11
X3C21P1-05S	0.25 x 0.20	6.35 x 5.08	Now	Now	Sep 11
X3C25P1-05S	0.25 x 0.20	6.35 x 5.08	Now	Now	Sep 11

Xinger Doherty Combiners

Part number	Size [in]	Size [mm]	Prototypes	Final Design / Pre Production	Mass Production
X3DC07E2S	0.56 x 0.20	14.22 x 5.08	June 11	Aug 11	6 weeks lead time from order
X3DC08E2S	0.56 x 0.20	14.22 x 5.08	Now	Now	
X3DC09E2S	0.56 x 0.20	14.22 x 5.08	June 11	July 11	
X3DC18E2S	0.56 x 0.20	14.22 x 5.08	Now	Now	
X3DC19E2S	0.56 x 0.20	14.22 x 5.08	Now	Now	
X3DC21E2S	0.56 x 0.20	14.22 x 5.08	July 11	Sep 11	
X3DC19P1S	0.25 x 0.20	6.35 x 5.08	Now	July 11	

Balanced/Dual-Doherty PA?



Now it is physically possible, due to the small size of the Xinger Doherty Combiners

- Not proven yet, but we believe it offers:
- Better stability and repeatability.

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Doherty Combiner value proposition

• The Xinger®-brand Doherty Combiners offer significant size reductions compared to printed Doherty Combiners, with equivalent or better insertion loss.

• Additional benefit of the Xinger solution is a more common footprint can be utilized for all frequency bands from 700MHz and up.

• New topologies are now possible, like “Dual/balanced Doherty”, due to the small footprint of Xinger solution.

• With Xinger Doherty Combiners now available, you can use Xingers for all post-transistor functions, allowing you to convert high cost PCB material to low cost FR4-types, without sacrificing performance (IL).