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## CC947x Series Resistive Power Dividers (DC to 67 GHz)

### PRODUCT SUMMARY

The CC947x series are ultra-broadband 6 dB power Dividers that provide outstanding amplitude- and phase-symmetrical power division from DC to beyond 67 GHz.

This product is designed using a three-resistor network resulting in outputs that are nominally attenuated to 6 dB, and all ports are impedance-matched to 50 Ohms when the ports are terminated.

They are suitable for use in 112 Gbps PAM4 communications systems, high-speed analog-to-digital conversion, frequency response testing for differential devices, and many other applications.

### DEPLOYMENT NOTES

The ports of the CC947\* series are symmetrical and the device can be used in any direction.

### MODELS & OPTIONS

The following models are available:

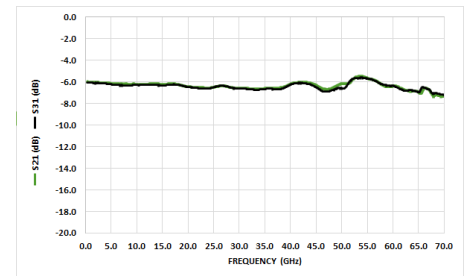
- CC9472, 26.5 GHz
- CC9474, 40 GHz
- CC9475, 50 GHz
- CC9477, 67 GHz

Bandwidth (-1.5 dB)	DC to 67 GHz
Insertion Loss (AC)	6 dB
Amplitude Match	$\pm 0.1$ dB See Fig. 1
Phase Match	$\pm 4^\circ$ , $f = 20$ GHz $\pm 8^\circ$ , $f = 40$ GHz See Fig. 4
Return Loss	$> 15$ dB, $f \leq 45$ GHz $> 10$ dB, $f > 45$ GHz See Fig. 2
Rise Time	5 ps
Insertion (Group) Delay	125 ps, all ports See Fig. 3
Max Input Power	+33 dBm
Impedance	$50 \Omega \pm 5\%$
Connectors	1.85 mm, 3x jack/female
Dimensions	0.69" (17.6 mm), center to end of each connector See Fig. 9
Temperature Limits	$-40^\circ$ to $+70^\circ$ C, operating
RoHS Compliant	Yes, assembled with lead-free solder
REACH Compliant	Yes
Warranty	1 year, see website

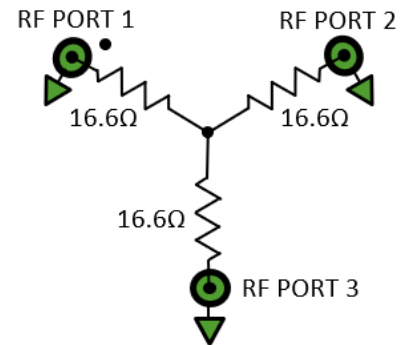
NOTE 1 - Unless otherwise noted, the specifications in this table are typical for Model Number CC9477. Full specifications for this and related models are available on Page 2 of this datasheet.



CC9477, standard con igation shown



Typical CC9477 Insertion Loss



CC947\* Schematic and Port Assignments

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## CC947x Full Specifications

Parameter	CC9472	CC9474	CC9475	CC9477	Comments
Upper Frequency Limit	26.5 GHz	40 GHz	50 GHz	67 GHz	1.5 dB guaranteed, relative to nominal insertion loss
Lower Frequency Limit	DC				
Insertion Loss (DC)	6.02 ± 0.11 dB				
Insertion Loss (AC) <i>See Fig. 1</i>	6 dB				Typical, nominal
Return Loss <i>See Fig. 2</i>	> 24 dB, f = 20 GHz	> 20 dB, f ≤ 30 GHz	> 20 dB, f ≤ 30 GHz > 15 dB, f > 30 GHz	> 15 dB, f ≤ 45 GHz > 10 dB, f > 45 GHz	Typical
Amplitude Match <i>See Fig. 1</i>	± 0.1 dB				Typical, between all ports
Phase Match <i>See Fig. 4</i>	± 4°, f = 20 GHz	± 4°, f = 20 GHz ± 8, f = 40 GHz	± 4°, f = 20 GHz ± 8, f = 40 GHz	± 4°, f = 20 GHz ± 8, f = 40 GHz	Typical, between all ports
Rise Time	17.5 ps	8.75 ps	7 ps	5.2 ps	Typical
Insertion (Group) Delay <i>See Fig. 3</i>	125 ps				Typical, all ports
Max Input Power	+33 dBm				
Impedance	50 Ω ± 5%				All ports
Connectors	SMA, 3x jack/female	2.92 mm, 3x jack/female	2.4 mm, 3x jack/female	1.85 mm, 3x jack/female	Plug/male connectors available upon request
Length and Width	0.69" 17.57 mm				From center to reference plane of each connector
Height	0.535" 13.59 mm				
Weight	14 g (0.49 oz.)				
Operating Temperature	-40° to +70° C				Case temperature
RoHS Compliant	Yes, assembled with lead-free solder				
REACH Compliant	Yes				
Warranty	1 year, repair or replacement; see website for details				

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## CC947\* Insertion and Return Loss

The CC9477 is matched to 50  $\Omega$  on all ports. Port 1 is specified with a dot on the label, and Ports 2 and 3 are matched.

Figure 1 shows the CC9477 insertion loss and amplitude match on Ports 2-3 to 70 GHz. Figure 2 shows return loss on all three ports of the same device to 70 GHz. Other models show similar performance within their respective specified bandwidths.

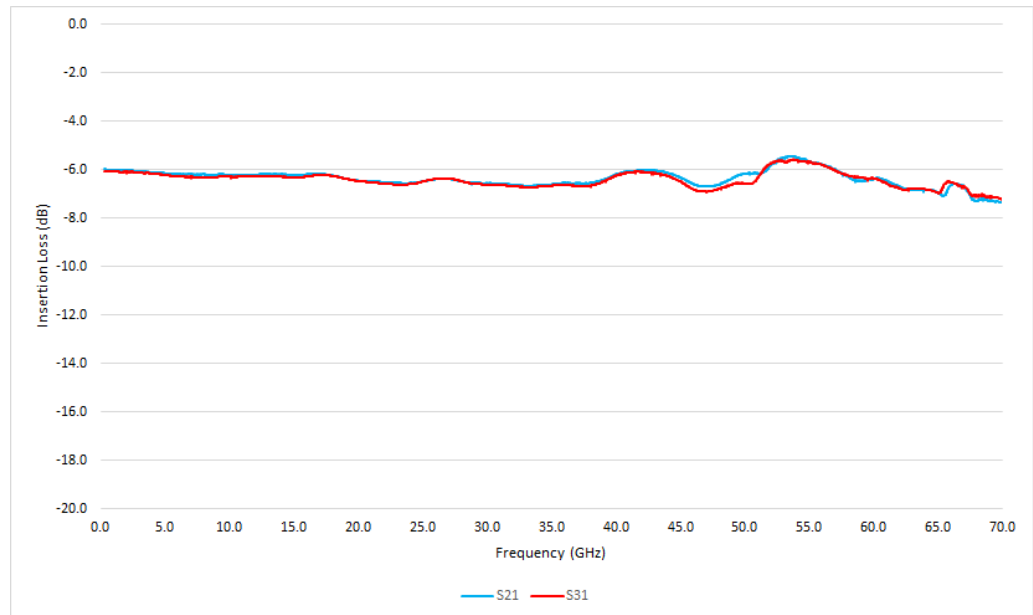


Figure 1: CC9477 Insertion Loss

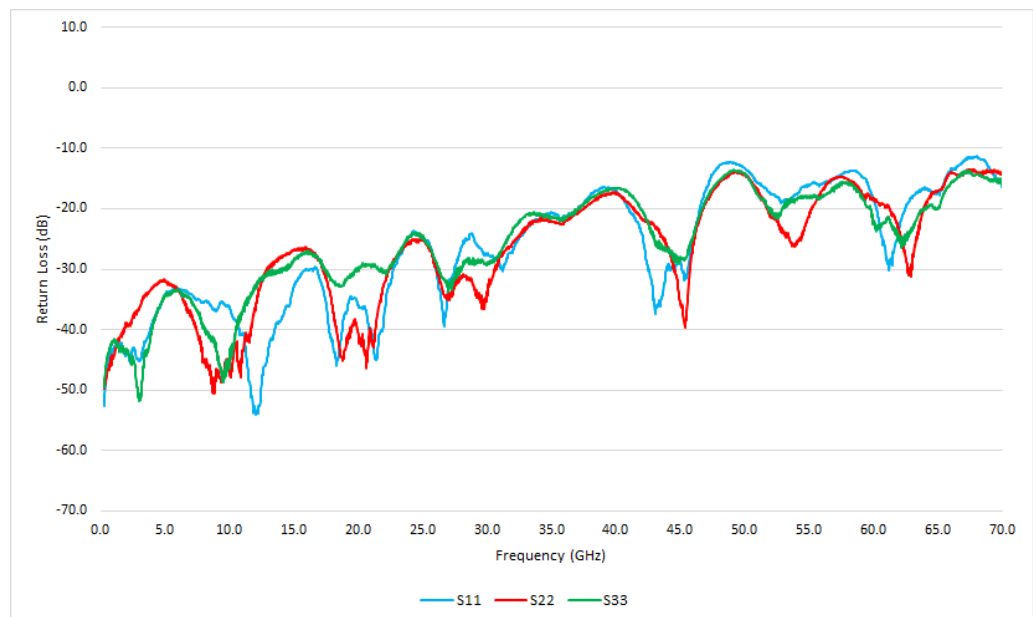


Figure 2: CC9477 Return Loss

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## CC947\* Group Delay and Phase Match

Figure 3 shows the typical group delay of an CC9477. The average slope of the phase mismatch, shown in Figure 4, is equal to the group delay mismatch. Other models show similar performance within respective specified bandwidths.

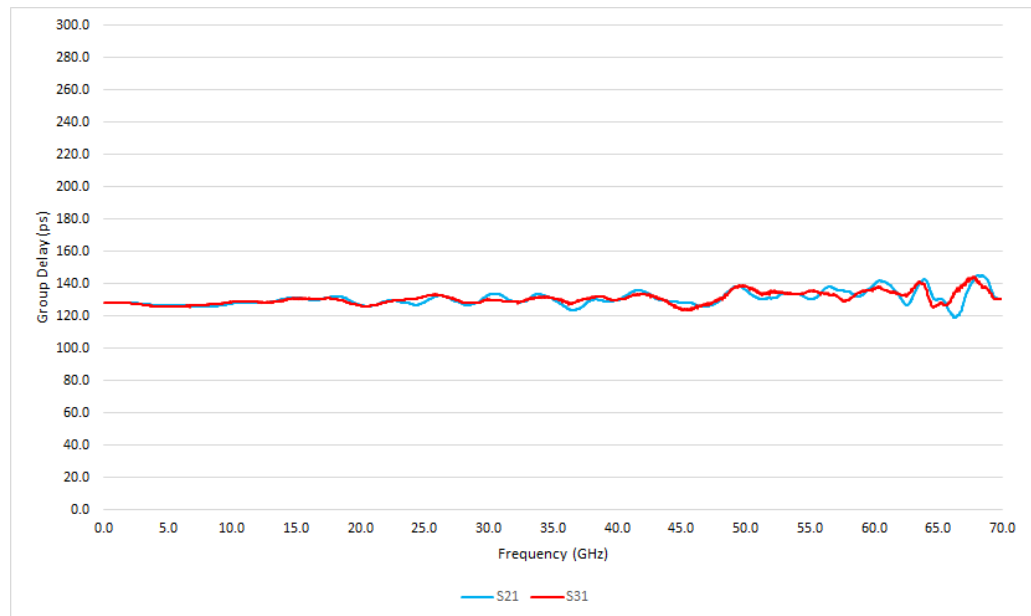


Figure 3: CC9477 Group Delay

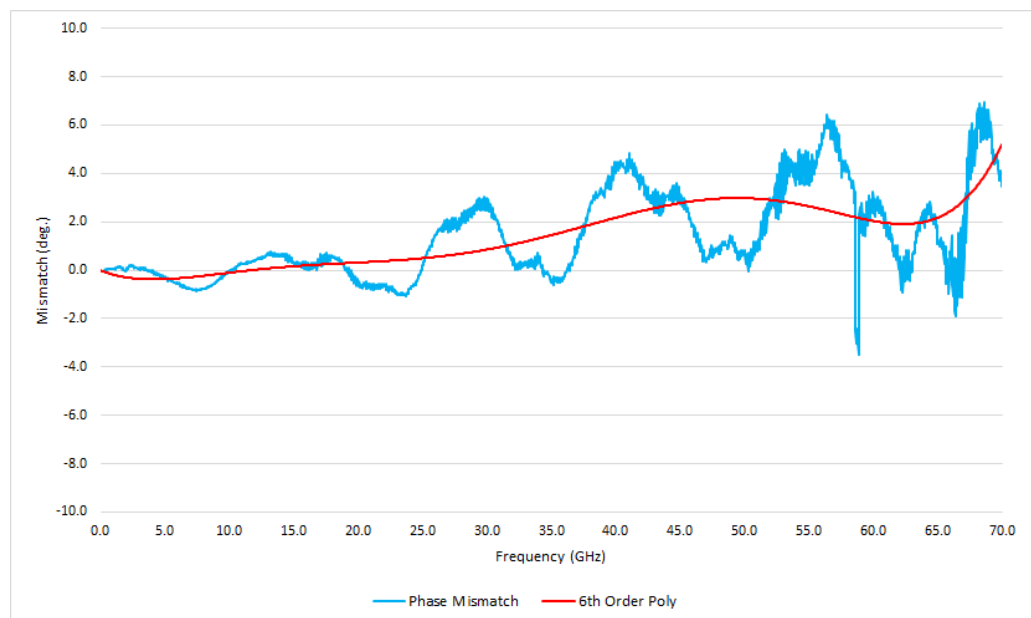


Figure 4: CC9477 Phase Mismatch

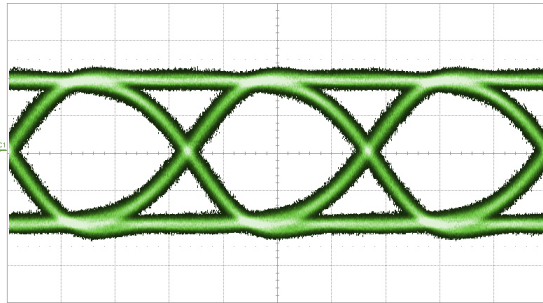
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## CC947\* Eye Diagrams

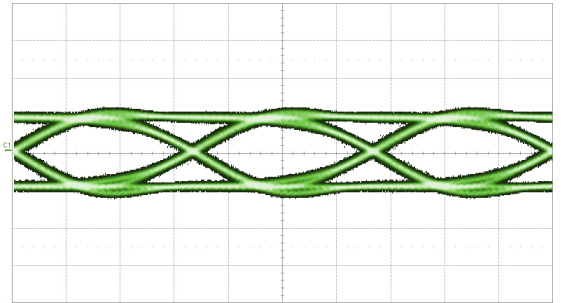
The eye diagrams in *Figures 5-1* show a 56 Gbps PRBS11 pattern passed through an cc9477.

*Figures 6-7* show a 112 Gbps PAM4 signal passed through the CC9477.

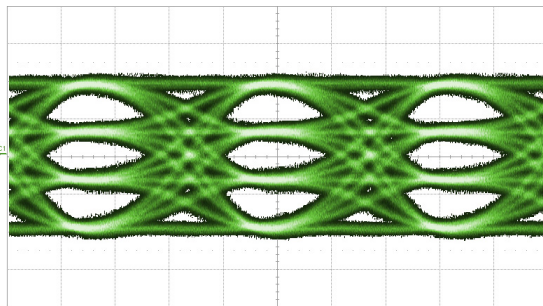
All plots are shown at 100 mV/div.



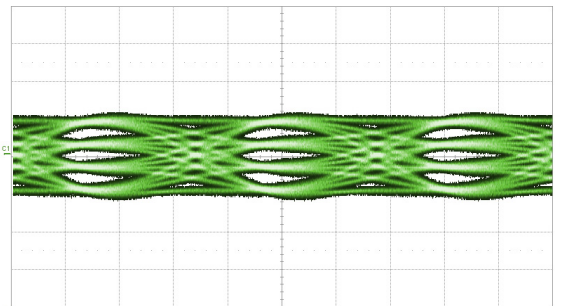
*Figure 9: CC9477 56 Gbps PRBS 11, RF Input*



*Figure 10: CC9477 56 Gbps PRBS 11, RF Output*



*Figure 11: CC9477 112 Gbps PAM4, RF Input*



*Figure 12: CC9477 112 Gbps PAM4, RF Output*

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## CC947\* Dimensional Drawing

Figure 9 shows a mechanical drawing of an CC9477. Unless otherwise noted, all units are shown in inches. Other models vary in length and width based on connectors.

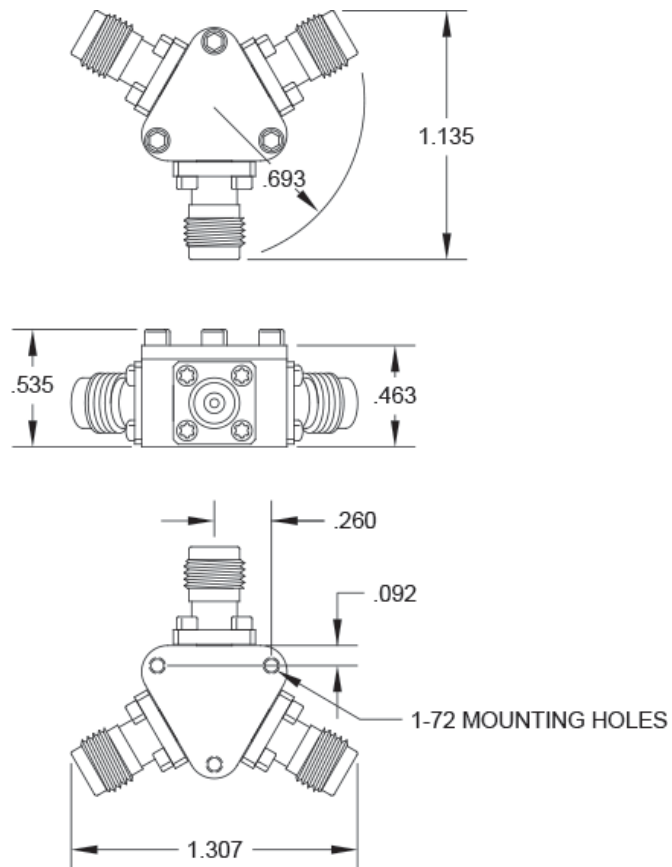


Figure 9: CC9477 Mechanical Drawing