MODEL HX2410

CW to CMOS Conversion Amplifier

ULTRA LOW JITTER

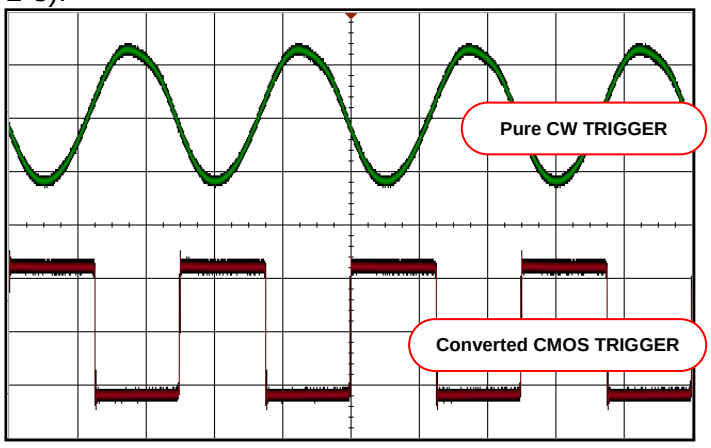
- **Convert Sinusoid (CW) to CMOS Logic**
- **Reduce effects of Trigger Jitter**
- **Increase Oscilloscope Accuracy**
- **Trigger Frequency: 5MHz to 500MHz**
- **Integrated Ultra Low Noise Bias Network**

SUMMARY

The **HX2410 CW to CMOS Conversion Amplifier** is intended for use as a peripheral component in precision oscilloscope test applications. The HX2410 eliminates trigger induced jitter that is caused by the low slew rate of low frequency sinusoidal (CW) trigger signals, ultimately resulting in inaccurate oscilloscope measurements. The proprietary architecture maintains the integrity of an ultra low phase noise sinusoidal (CW) signal while converting it to a CMOS Logic level exhibiting the absolute lowest jitter available (see Figures 2-3).

Holzworth products are 100% final performance tested for phase noise (jitter) verification.

The **HX2410 CW to CMOS Conversion Amplifier** is also available with Holzworth's multi-channel RF Synthesizer products as an integrated option. Inquire directly with Holzworth Instrumentation or a Sales Representative for more information.



SPECIFICATIONS [2]

Parameter	MIN	TYP	MAX	Units	Comments
Input Frequency Range	5		500	MHz	
Input Power Range	0		12	dBm	Minimum varies with frequency. See Fig. 4
Output Impedance		50		ohms	
Output Amplitude (no-load)		5		V_{P-P}	
Output Amplitude (50 ohm)		2.5		V_{P-P}	
Additive Phase Noise		-160		dBc/Hz	100MHz, 10kHz Offset, P_{IN}=+10dBm
RMS Phase Jitter 10Hz to 100Hz 20kHz to 20MHz		 5 6		 fs fs	 100MHz, P_{IN}=+9dBm 100MHz, P_{IN}=+9dBm
Rise Time / Fall Time (T_r/T_f)		900		ps	10% - 90% (500MHz Oscilloscope)
DC Voltage Supply	7		12	V_{DC}	SMB Connector
Form Factor (L x W x H)	1.75in x 1.5in x 0.5in, not including SMA/SMB connectors				

[1] Final performance verification at 100MHz, P_{IN}=+10dBm

[2] Specifications are subject to change per the discretion of Holzworth Instrumentation, Inc.

RoHS Compliant

OSCILLOSCOPE PERFORMANCE IMPROVEMENT

Even the highest performing oscilloscopes are subject to trigger jitter that is caused by the low slew rate of low frequency sinusoidal (CW) trigger signals, ultimately resulting in inaccurate oscilloscope measurements. The Figure 1 block diagram outlines the test system setup for the data presented in Figures 2 and 3.

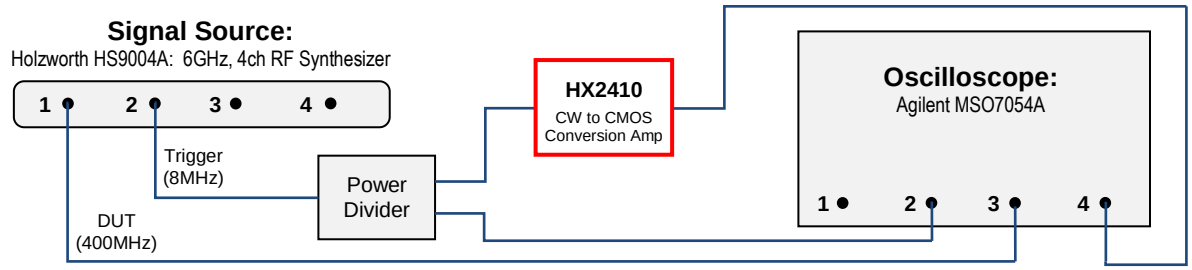


Figure 1: Test Setup for Demonstration of Trigger Jitter Improvement

The data included here demonstrates improved oscilloscope measurement performance achieved via the implementation of an **HX2410 CW to CMOS Conversion Amplifier** to convert a highly stable, yet slow edged sinusoidal trigger signal to a CMOS Logic signal.

Figure 2 demonstrates the perceived jitter of a measured DUT signal when using an 8MHz CW trigger signal. Even though the sinusoidal trigger signal exhibits extremely low jitter, the displayed jitter in the DUT measurement is due to oscilloscope trigger jitter and is not representative of actual DUT performance.

In comparison, Figure 3 shows the elimination of trigger induced jitter by converting the same 8MHz sinusoid to a fast rising edge. Using **HX2410 CW to CMOS Conversion Amplifier** reduces trigger jitter, allowing for actual DUT performance to be observed.

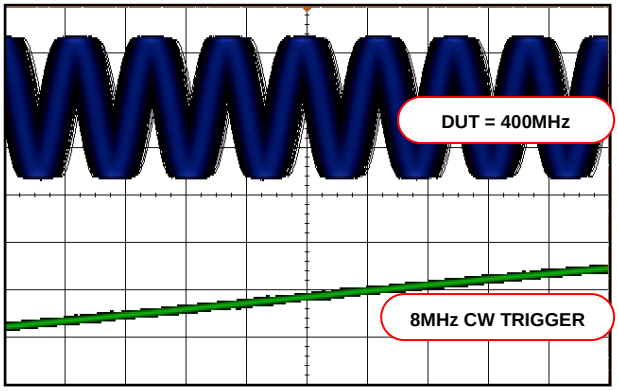


Figure 2: Undesired Sinusoidal Trigger Jitter
(DUT [ch3]: 400MHz; Trigger [ch2]: +8dBm, 8MHz, No HX2410)

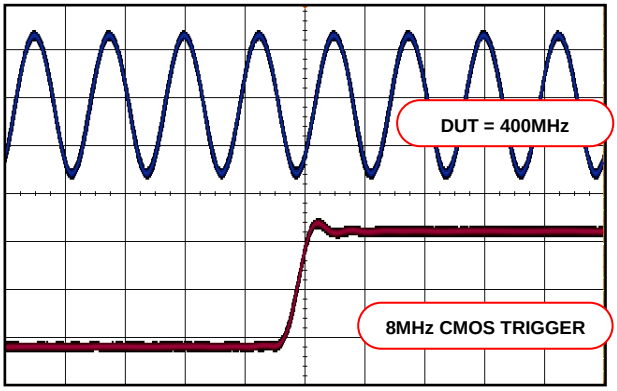


Figure 3: HX2410 Reduction of Trigger Jitter
(DUT [ch3]: 400MHz; Trigger [ch4]: +8dBm, 8MHz into HX2410)

FINAL NOTE: The RF Synthesizer used to generate the 8MHz trigger and the DUT signal is Holzworth model HS9004A, which exhibits industry leading phase noise/jitter performance. The phase jitter of the HS9004A RF Synthesizer exhibits less than 60fs of jitter at 8MHz. As shown in Figure 2, the purest sinusoidal trigger signal can still induce jitter due to low slew rates at the trigger threshold.

HX2410 PERFORMANCE DATA

The HX2410 requires more input power as the frequency increases. Figure 4 below shows the minimum power input versus frequency.

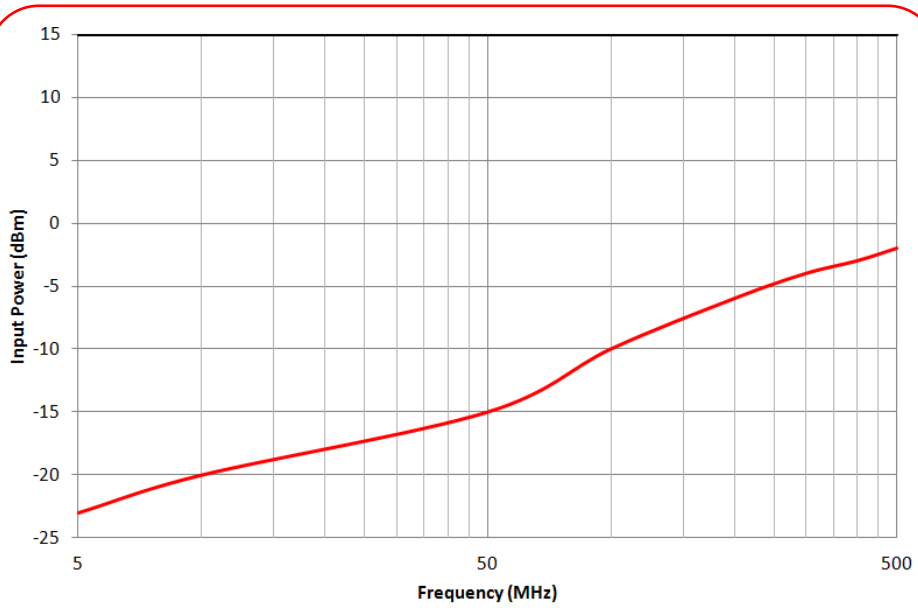


Figure 4: HX2410 Input Power Sensitivity

Figure 5 plots the typical phase noise performance at 100MHz over a range of input power levels.

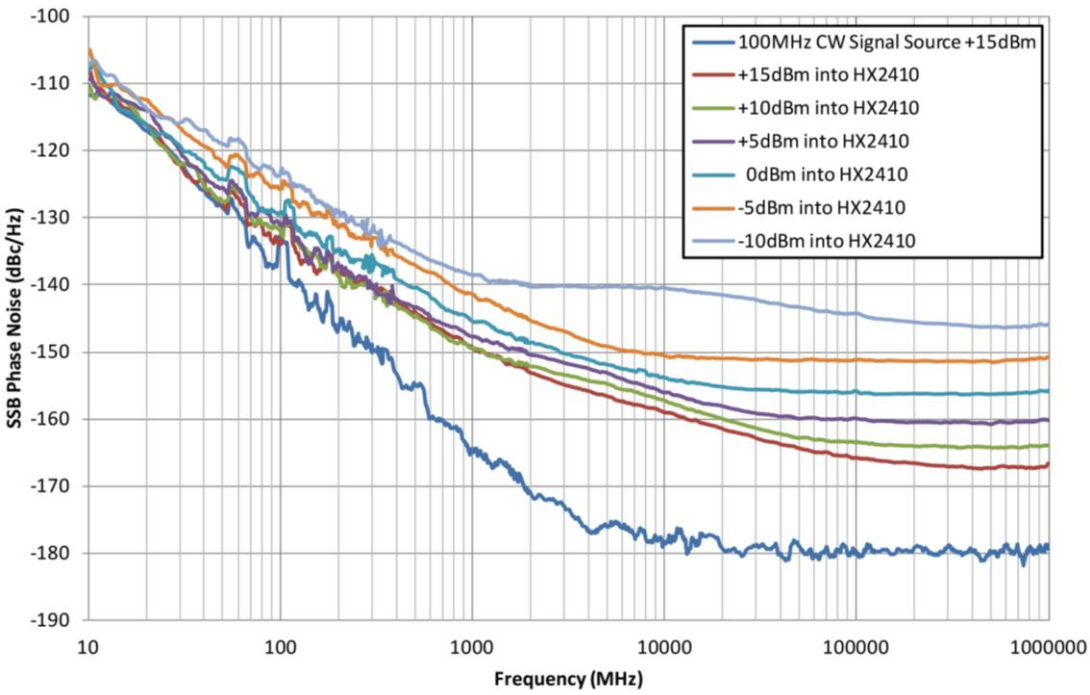
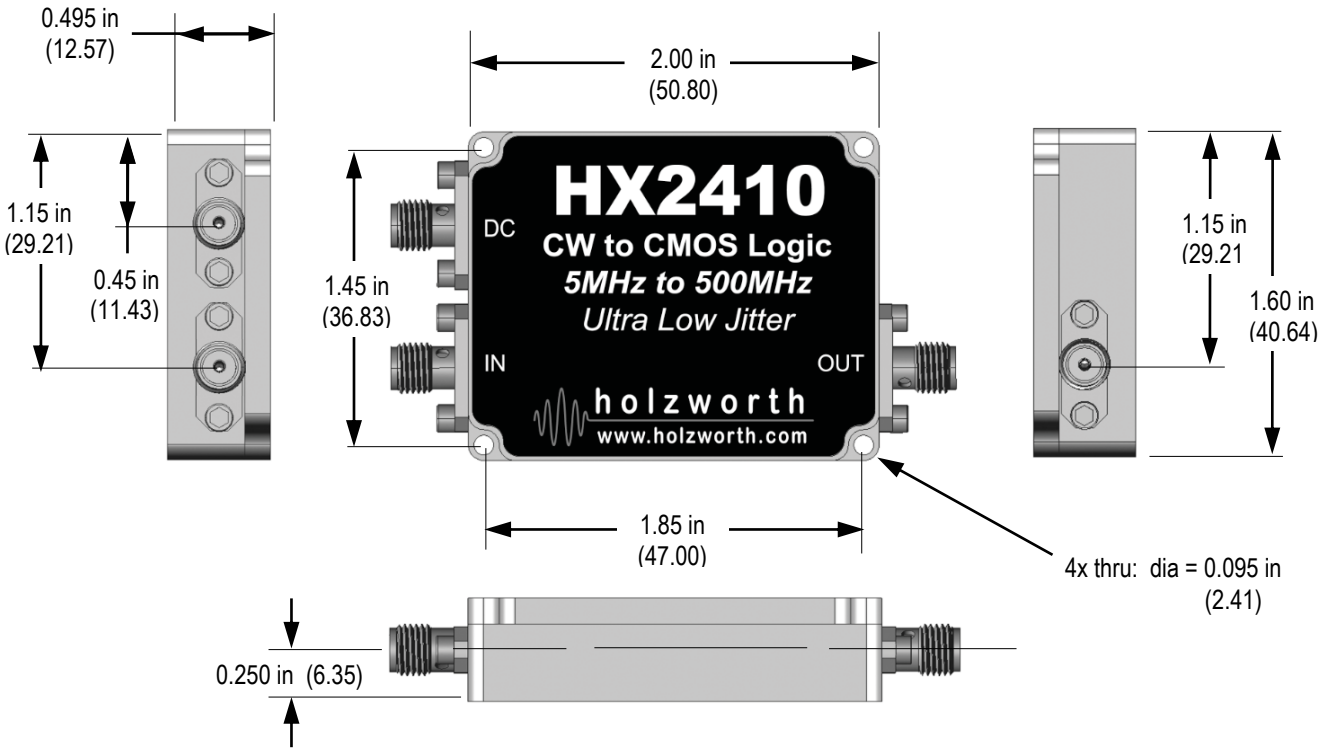
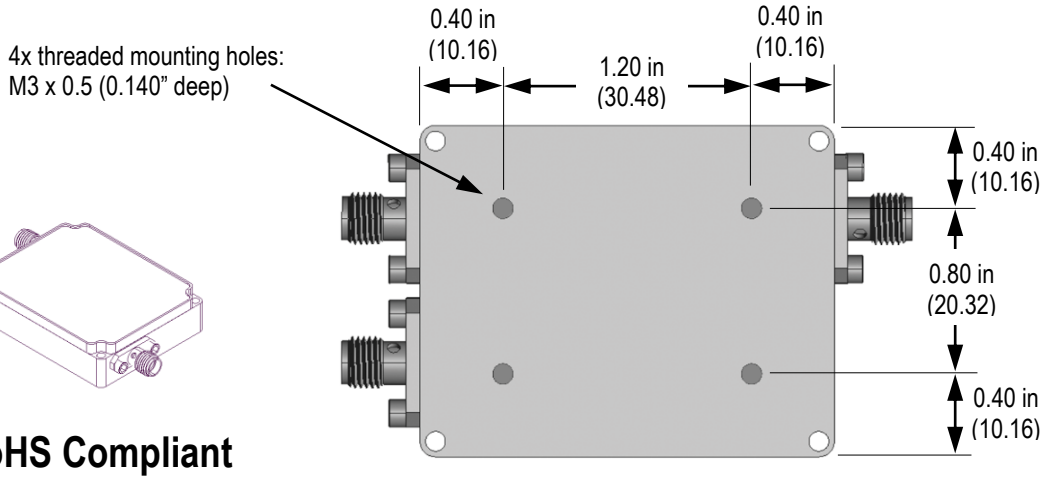


Figure 5: HX2410 Input Power Phase Noise Comparison With 100MHz CW Source

MECHANICAL

The HX2410 CW to CMOS Conversion Amplifier comes in a compact, shielded housing complete with mounting holes for ease of system integration into various applications. Mechanical dimensions are listed in both inches and (mm). Tolerances are to within ±0.010 inches.





RoHS Compliant

WARRANTY

All Holzworth amplifiers come with a 1 year 100% product warranty covering manufacturing defects. All product repairs and maintenance must be performed by Holzworth Instrumentation. Holzworth reserves the right to invalidate the warranty for any product that has been tampered with or used improperly. Refer to Holzworth Terms & Conditions of Sales for more details.