

High-Speed Data Communication

LA302Z – 10 GHz Differential Limiting Amplifier

16-pin Plastic QFN Package

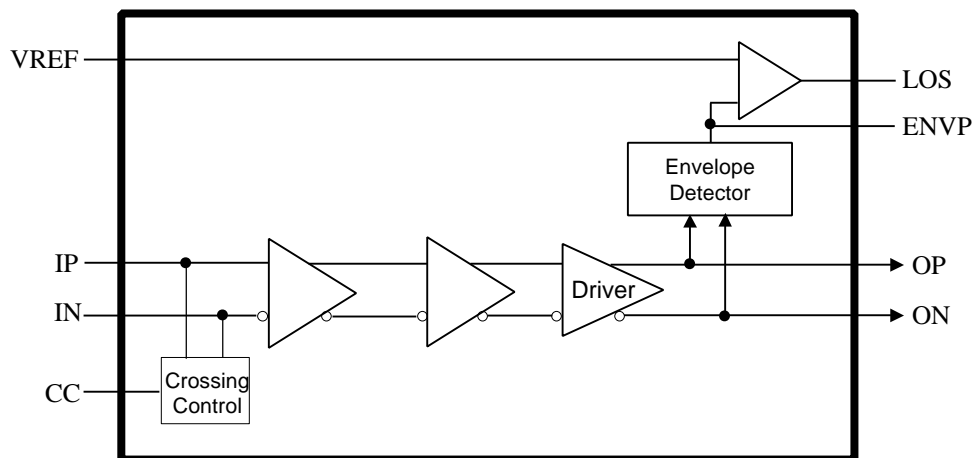
PRODUCT DESCRIPTION

The **LA302Z** is an ultra-broadband fully differential limiting amplifier designed for high-speed wide-band communication applications up to 10 Gb/s. The amplifier has an excellent input sensitivity of 2.5 mV_{pp} and a small-signal bandwidth of 10 GHz. Its wide bandwidth and high sensitivity ensure a low bit error rate in high-speed data communication. Its lost-of-signal detector can warn the receiver as the incoming signal is too small for a certain bit error rate. The device can be used as an input sensing amplifier, a repeater, and a wide-band single-ended-to-differential converter.

KEY FEATURES

- 37-dB gain
- 10 GHz bandwidth
- < 2.5 mV_{pp} single-ended/differential input sensitivity
- Differential 50-Ω inputs and outputs
- 750m-V_{pp} maximum differential output swing
- Lost-of-Signal (LOS) detector
- Output waveform envelope detector
- Output waveform crossing control
- Power consumption: 0.3 W with +5 V single power supply

BLOCK DIAGRAM



ELECTRICAL SPECIFICATIONSTesting Condition: $V_{CC} = 5\text{ V}$

Parameter	Symbol	Min	Typical	Max	Unit
Operating Temperature	T_o	-40	25	85	°C
Small-Signal Max Gain ¹	$G_{o,max}$	38	43		dB
Small-Signal 3-dB Bandwidth	$f_{3dB,max}$	8.3	10		GHz
Output Swing ¹ ($R_L=50\Omega$)		600	750		mV _{pp}
Worst Input Return Loss ²	RL_I	5		8	dB
Worst Output Return Loss ²	RL_O	3		7	dB
Output Rise Time ³	T_r	31		36	ps
Output Fall Time ³	T_f	22		26	ps
Output Overshoot			0		%
Output Jitter, RMS ⁴		1.2		1.6	ps
Sensitivity ⁵	V_{sen}		2.5		mV _{pp}
Output DC Offset ⁶	V_{off}		5	10	mV
Positive V_{CC} supply Voltage	V_{CC}	4.5	5	5.5	V
Positive V_{CC} supply Current	I_{total}	50	60	70	mA

¹ differential I/O² DC to f_{3dB} measured on an evaluation board with SMA connectors³ 20%~80%⁴ for Input 500 mVpp, single ended⁵ where bit error rate $< 10^{-12}$ with $2^{31}-1$ pseudo-random data⁶ measured with zero inputs

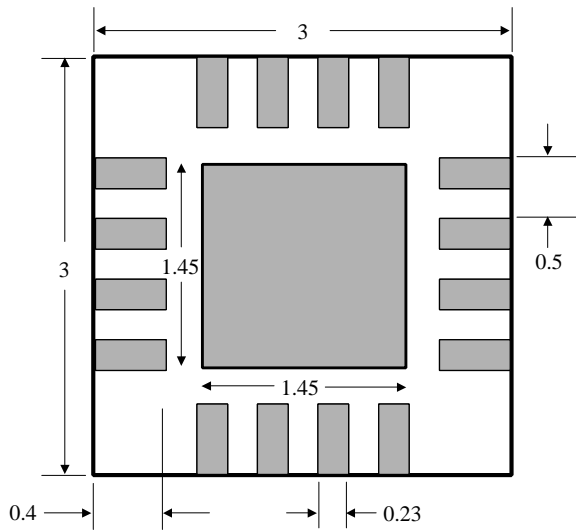
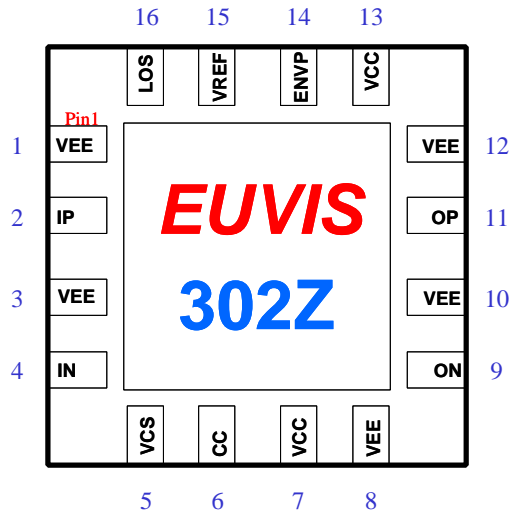
TERMINAL DESCRIPTION

Name	Function	I/O	Signal
VEE	Ground		DC
VCC	Power, +5 V		DC
IP	Data Input+	I	RF
IN	Data Input-	I	RF
CC	Output Crossing Control	I	DC
OP	Output +	O	RF
ON	Output -	O	RF
LOS	Lost-Of-Signal Detector	O	DC
VCS	VCS Generator Bypass	O	DC
ENVP	Output Swing Envelope	O	DC
VREF	Reference Voltage for LOS	I	DC

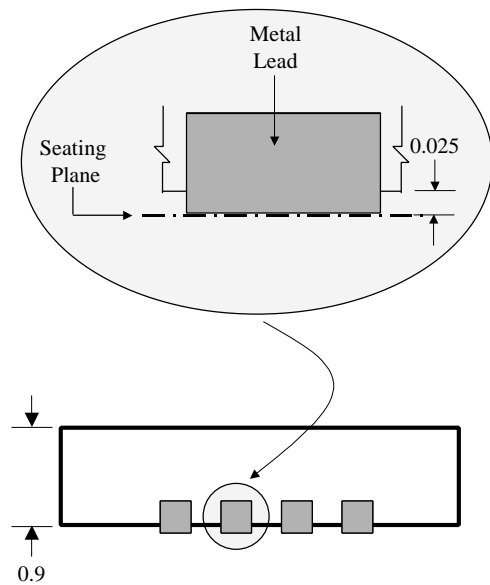
PIN ARRANGEMENTS AND PACKAGE INFORMATION

- Unit: mm
- Package Format: 16-pin QFN
- Package Size: 3 mm x 3 mm
- Pin Pitch: 0.5 mm

Top View

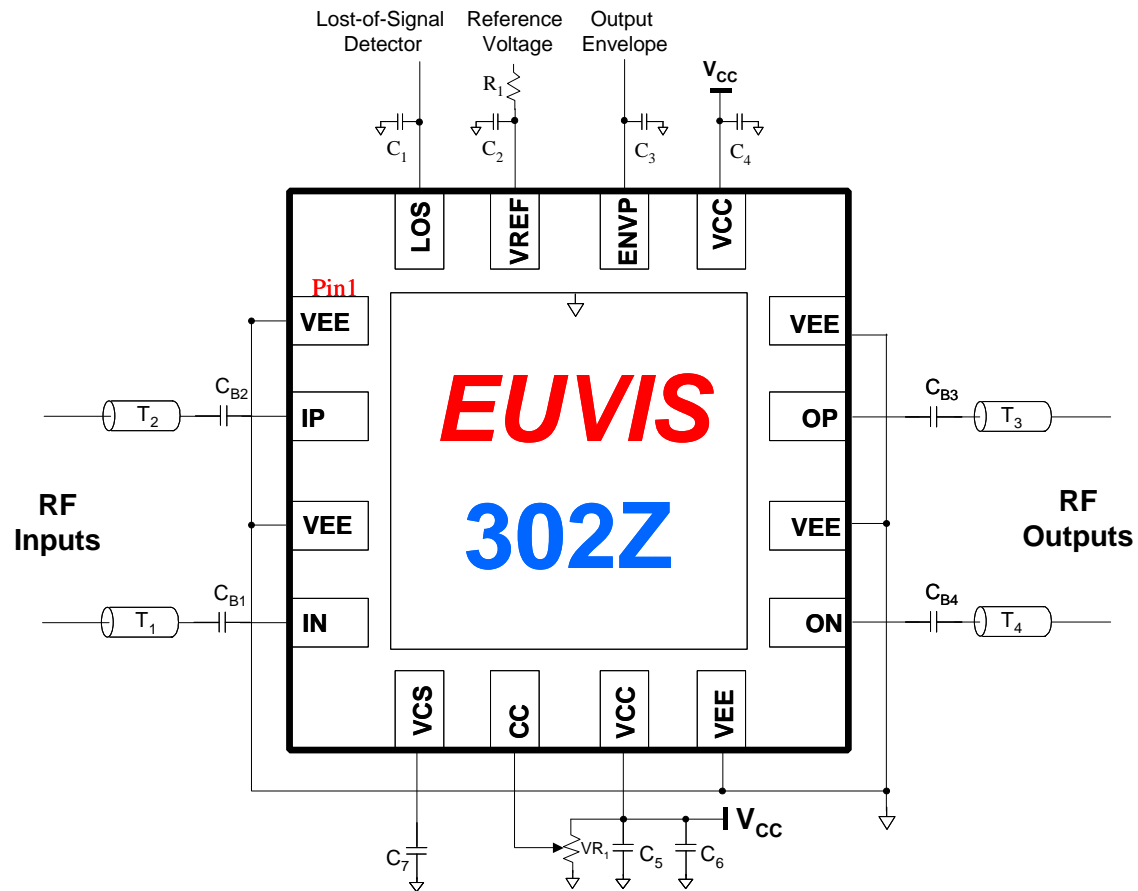


Bottom View



Side View

TYPICAL CONNECTION

**Notes:**

V_{CC} is +5 V

V_{EE} 's are connected to power supply and package ground

Center pad of package is connected to ground

$T_1 \sim T_4$: 50- Ω transmission lines

VR_1 : 50-k Ω potentiometer

R_1 : 1-k Ω surface-mount resistor

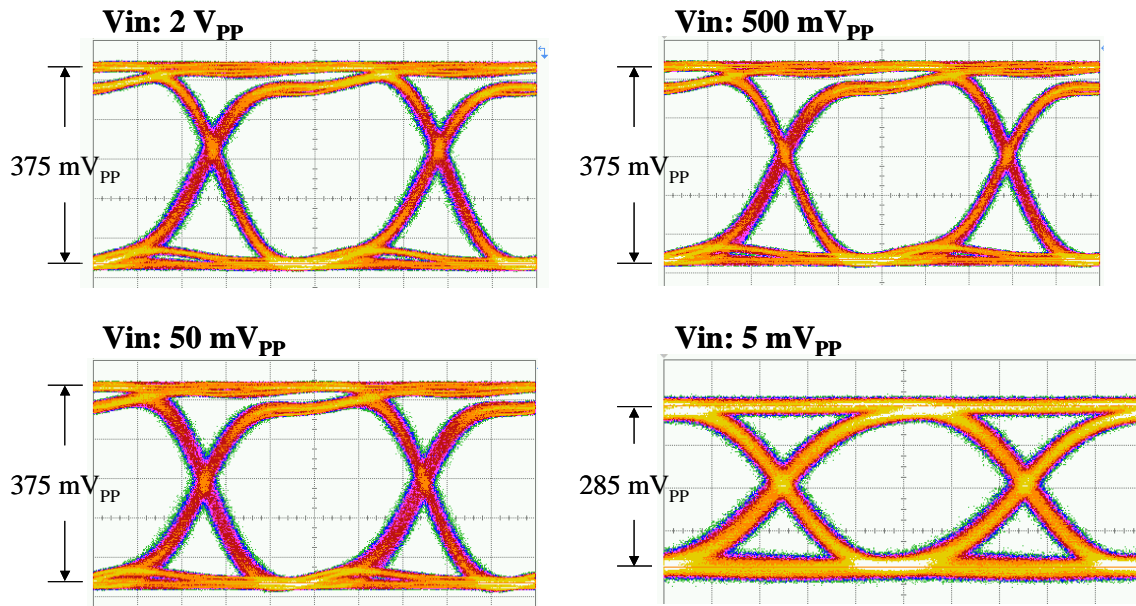
$C_1 \sim C_5$ and C_7 : 100-nF surface-mount capacitors

C_6 : 10- μ F capacitor

$C_{B1} \sim C_{B4}$: 100-nF by-pass surface-mount capacitors

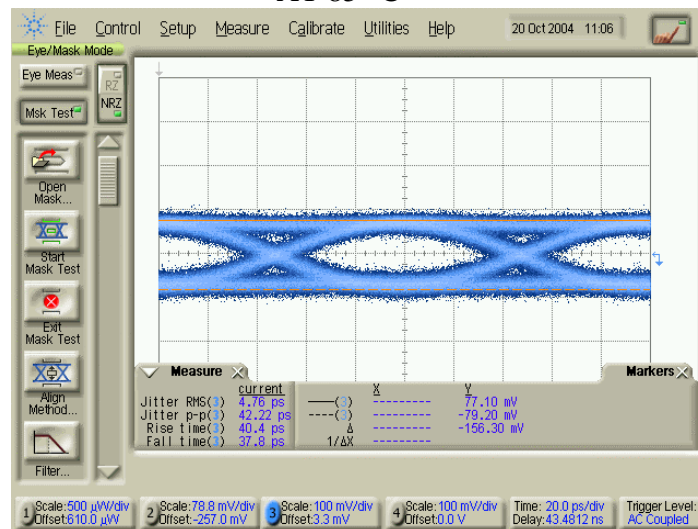
EYE DIAGRAM MEASUREMENT

The following figures show the typical eye diagrams with differential inputs of 2 V_{pp}, 500 mV_{pp}, 50 mV_{pp} and 5mV_{pp}. The measurements are with 10-Gb/s 2³¹-1 pseudo-random bit sequences.

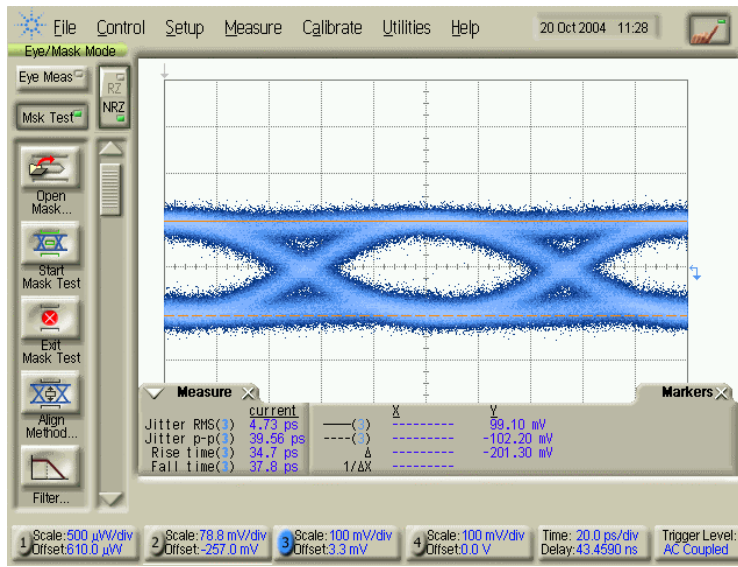


The minimum sensitivity is tested with a 2.5 mV_{pp} single-ended input at 85°C, 25°C and -40°C, respectively. The bit error rate (BER) is measured less than 10⁻¹² with 10-Gb/s 2³¹-1 pseudo-random bit sequences.

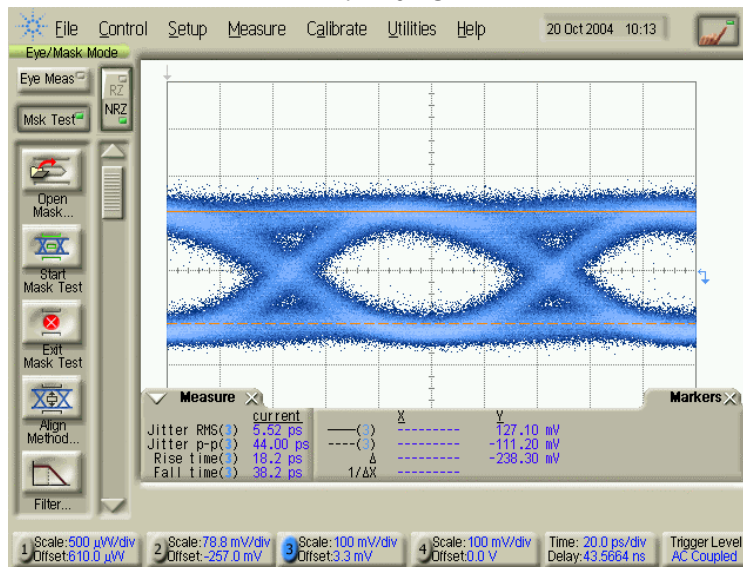
AT 85 °C



At 25°C



At -40°C



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