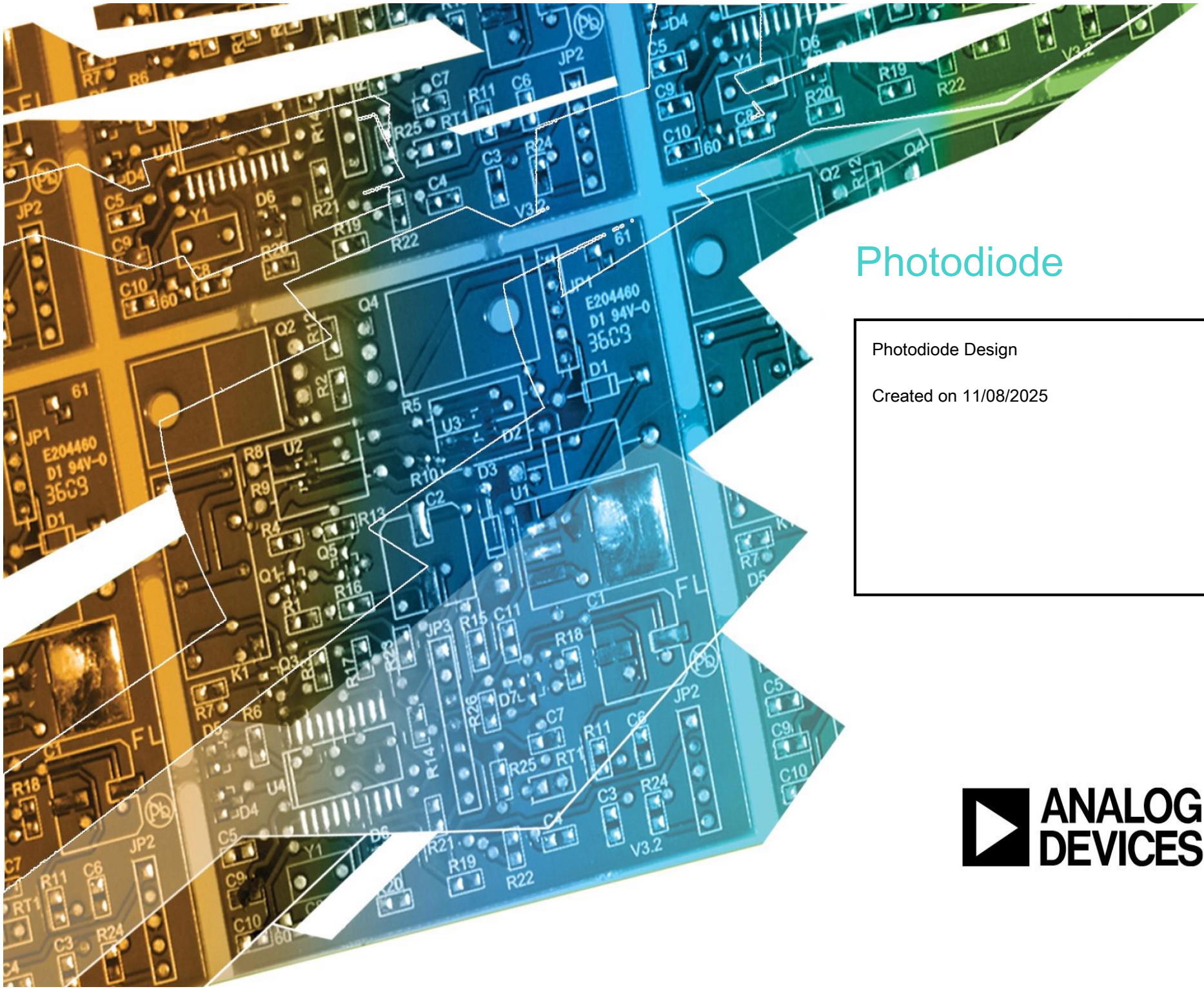


Photodiode

Photodiode Design

Created on 11/08/2025

ANALOG DEVICES

Photodiode Design Report

Design Parameters Entered by User

Reverse Voltage (Vr): 5 V

Photodiode Bias: Negative

Capacitance (Cd): 25 pF

Shunt Resistance (Rsh): 5 GΩ

Peak Current (Ip): 4 µA

Q: 0.675

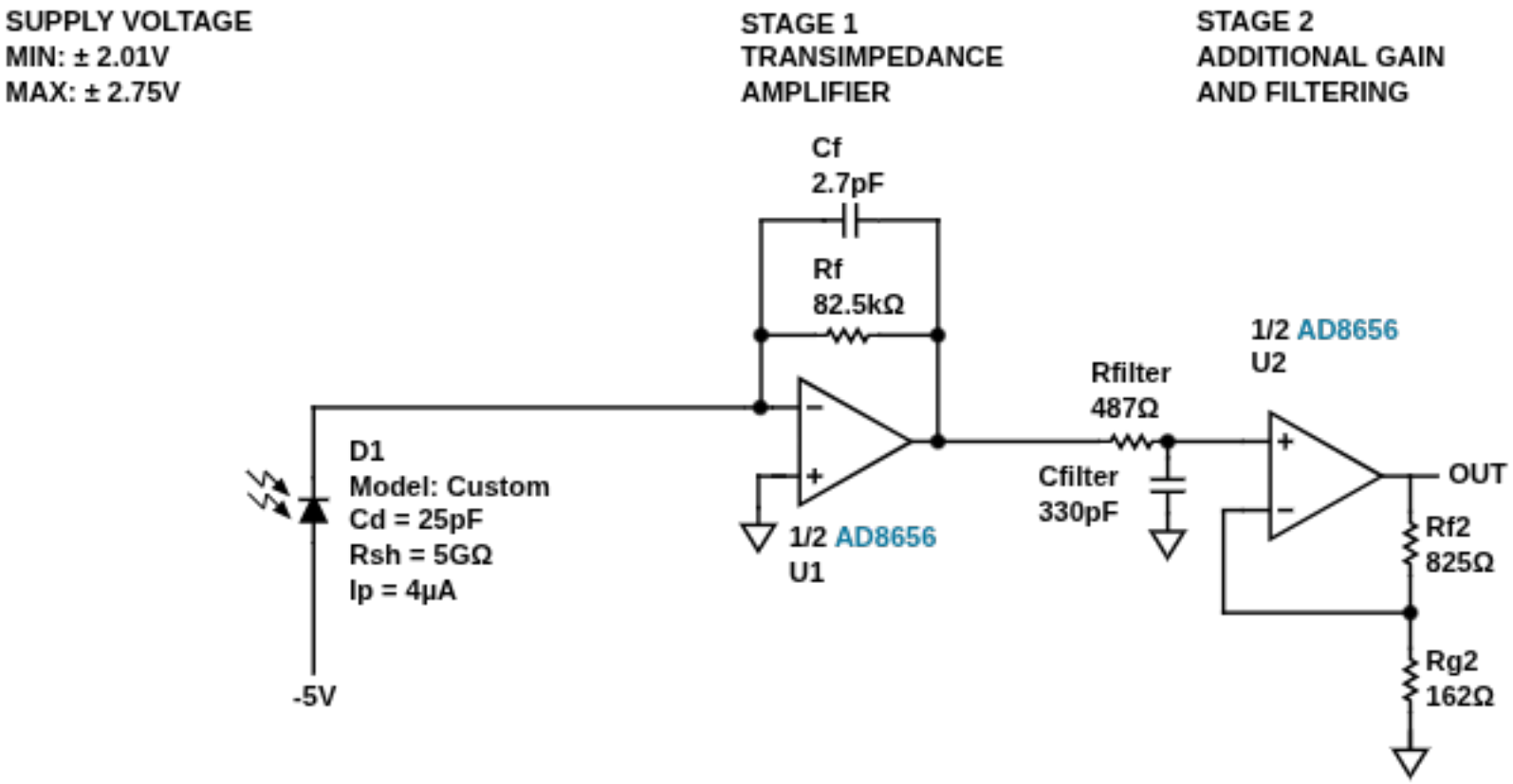
Peak Voltage (Vp): 2 V

Requested Bandwidth: 1 MHz

Sensor: Custom

Stage: Two Stages

Circuit

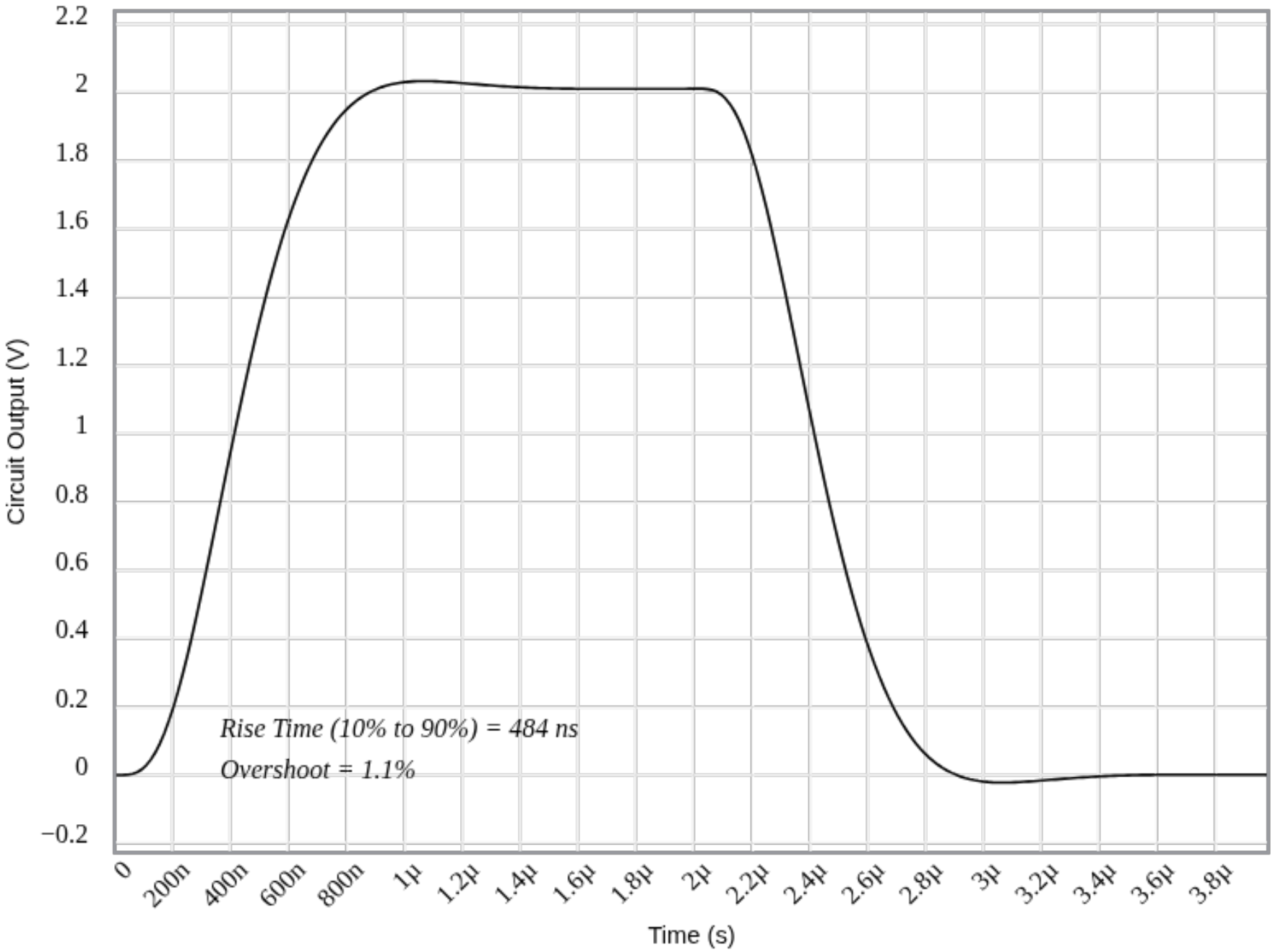


BYPASS CAPACITORS

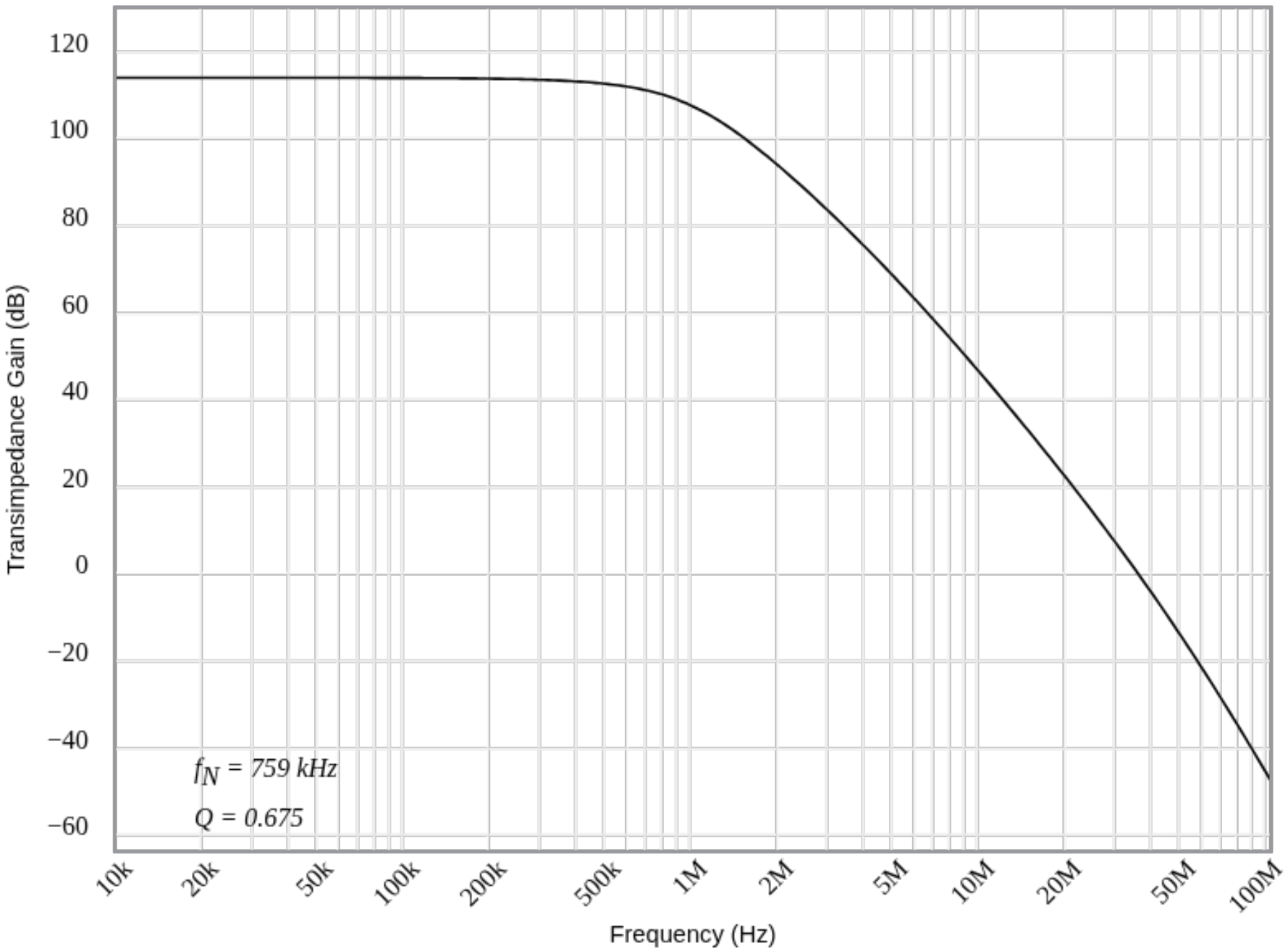
Bill of Materials

Quantity	Reference Designator	Value	Package	Material	Tolerance
1	Rf	82.5 k	0603	Thin Film	0.5%
1	Rg2	162	0603	Thin Film	0.5%
1	Rf2	825	0603	Thin Film	0.5%
1	Rfilter	487	0603	Thin Film	0.5%
1	Cf	2.7 pF	0603	C0G	5%
1	Cfilter	330 pF	0603	C0G	5%
4	Cbp+,Cbp-,Cbp2+,Cbp2-	100 nF	0603	X7R	20%
2	Ctant+,Ctant-	10 µF	6032	tantalum	20%
2	U1,U2	AD8656	SOIC		
1	D1	Custom			

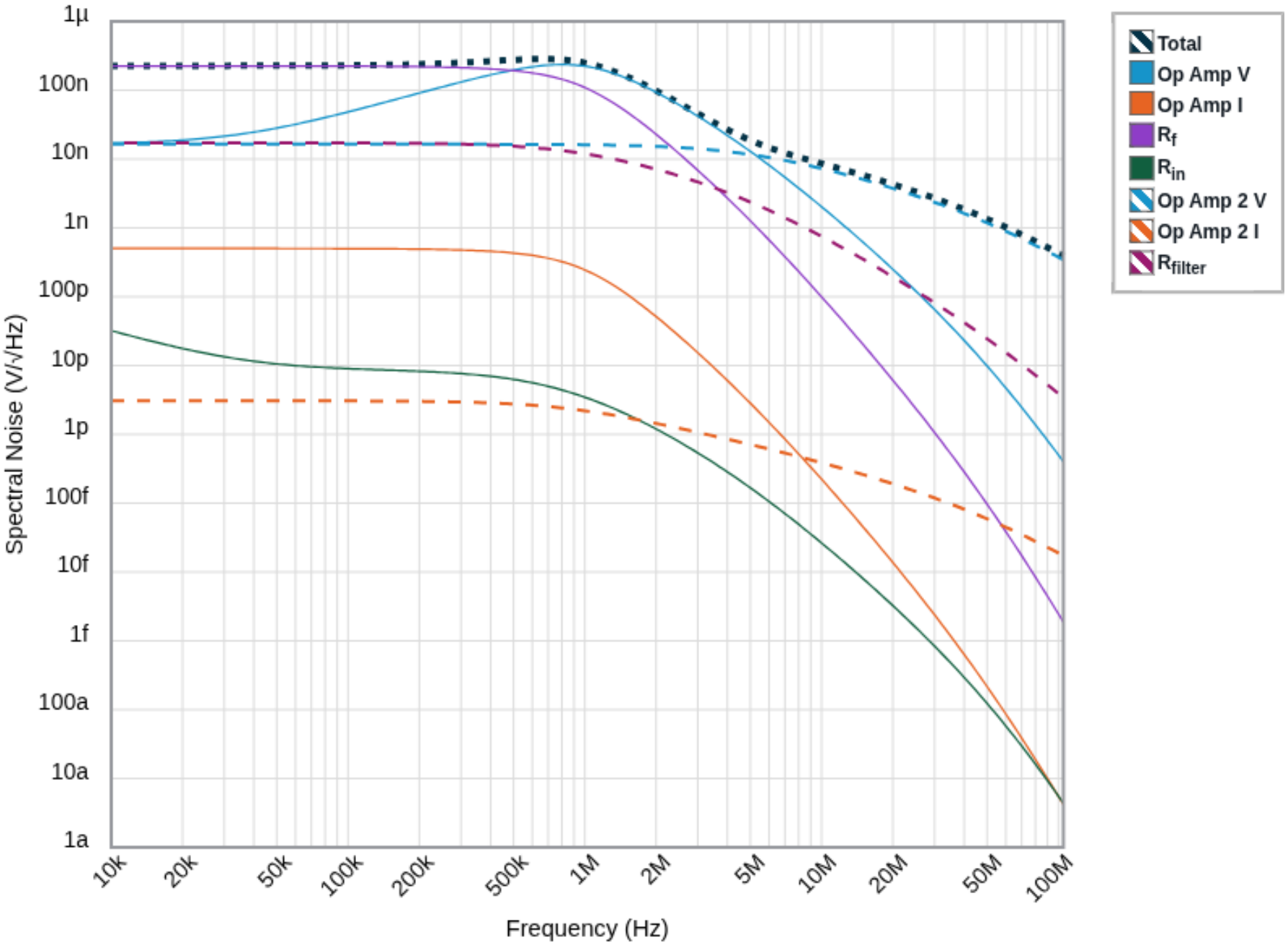
Pulse Response



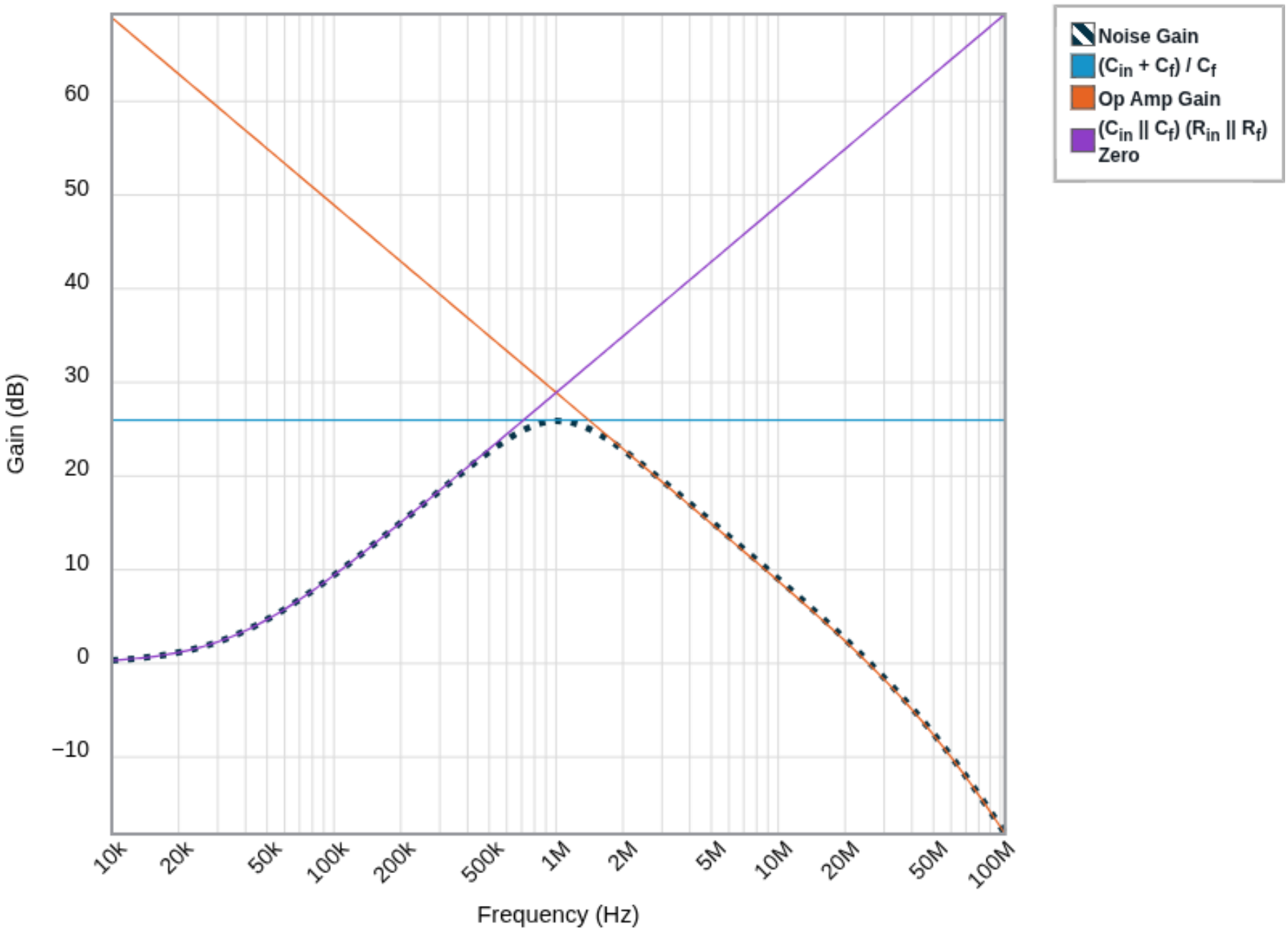
Frequency Response



Spectral Noise Density



Noise Gain


Noise Gain
(Cin + Cf) / Cf
Op Amp Gain
(Cin || Cf) (Rin || Rf) Zero
Gain (dB)
60
50
40
30
20
10
0
−10
10k
20k
50k
100k
200k
500k
1M
2M
5M
10M
20M
50M
100M
Frequency (Hz)

SNR

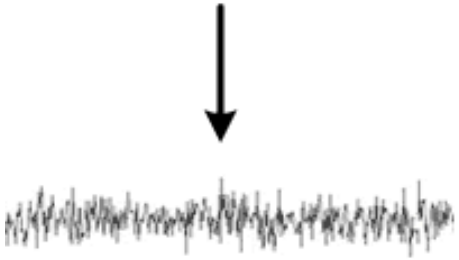
Peak Signal

Photodiode Current: 4 µA

Output Voltage: 2 V

SNR = 66.8 dB

ENOB = 10.8 bits



Minimum Signal (Noise Floor)

Referred to Input: 648 pA rms

Referred to Output: 324 µV rms

Noise Contributors (V rms)

Stage 1		Stage 2	
Op Amp Voltage	253 µ	Op Amp Voltage	44.1 µ
Op Amp Current	437 n	Op Amp Current	4.03 n
R_F	195 µ	R_F	9.89 µ
R_{IN}	7.48 n	R_G	22.3 µ
		R_{FILTER}	19.6 µ
Stage 1 Total	319 µ	Stage 2 Total	54.1 µ

Total Noise: 324 µV rms

All noise referred to output
1/f and tail current noise not modeled.