

EEE 466 Analog Integrated Circuits and Design Laboratory Projects

Projects

1. Design a bandgap-reference-voltage generator.

Specification:

V_{REF}	0.9	V
Supply Current (max)	0.1	mA
Output voltage noise	0.2 (0.1Hz to 10Hz)	mVP-P
Output current capability	1	mA
Temperature Coefficient (-40°C ~125°C) (max)	50	ppm/°C
Input Voltage Range	2-5	V
Line Regulation	1	mV/V
Load Regulation	1	mV/mA

2. Design a Phase Shifter.

Specification:

Frequency Range	1-100	kHz
Phase Shift Range	0-90	Degree
Control Voltage	0-1	V
Supply Voltage	2-5	V

3. Design a Voltage Controlled Oscillator.

Specification:

Frequency	855 to 881	MHz
Supply Voltage	3-5	V
Supply Current (max)	50	mA
Tuning Voltage	0.4-2.4	V
Phase Noise ($f_{\text{OFFSET}} = 1\text{MHz}$)	-130	dBc/Hz
Output Power ($V_{\text{tune}} = 0.4\text{V}$)	-5	dBm

4. Design an 8:1 analog multiplexer.

Specification:

Supply Voltage	+/-3	V
Logic High Level	1.4	V
Logic Low Level	0	V
Input Capacitance (max)	50	pF
Charge Injection over the full signal swing range (max)	5	pC
Switching On time (t_{ON})(at $R_L = 1\text{k}\Omega$, $C_L = 10\text{pF}$) (max)	100	ns
Analog Signal Range	-2 to 2	V
Power Dissipation (max)	10	mW
On-Resistance	10	Ω
Bandwidth, -3 dB	1	MHz

5. Design an 1:8 analog de-multiplexer.

Specification:

Supply Voltage	+/-3	V
Logic High Level	1.4	V
Logic Low Level	0	V
Input Capacitance (max)	50	pF
Charge Injection over the full signal swing range (max)	5	pC
Switching On time (t_{ON}) (at $R_L = 1k\ \Omega$, $C_L = 10\ pF$) (max)	100	ns
Analog Signal Range	-2 to 2	V
Power Dissipation (max)	10	mW
On-Resistance	10	Ω
Bandwidth, 3 dB	1	MHz

6. Design an Instrumentation amplifier.

Specification:

Supply Voltage	3-5	V
Output Range	0 to $V_s - 0.3$	V
Slew Rate	0.1	V/ μs
Current - Input Bias	100	pA
Voltage - Input Offset	20	μV
-3db Bandwidth	100	kHz
Current - Supply	1	mA
Current - Output	50	mA
CMRR (at $G = 100$)	80	dB
Noise (at $G = 100$)	100	nV/ \sqrt{Hz}

7. Design a Low Drop Out Regulator.

Specification:

Supply Voltage	2-5	V
Output Voltage	1.8	V
Voltage Dropout (Max) @100 mA	100	mV
Current - Output	100	mA
Current - Quiescent	1	mA
PSRR @ 100Hz	70	dB
Load Regulation	1	mV/mA
Line Regulation	10	mV/V
Output Voltage Temperature Coefficient	200	ppm/°C

8. Design a Low Noise Operational Amplifier.

Specification:

Supply Voltage	2-5	V
Gain Bandwidth	1	MHz
Noise at 1kHz	10	nV/VHz
Current - Input Bias	10	pA
Voltage - Input Offset	100	μV
Current - Supply	1	mA
Current - Output	10	mA
CMRR (at 1kHz)	80	dB
PSRR (at 1 kHz)	70	dB

Deliverables:

Content	Review Date	Location
Update on Projects	3/9/2023 Week 13	VLSI Lab
Final Presentation	10/9/2023 Week 14	VLSI Lab
Report of Project	10/9/2023 Week 14	VLSI Lab