

6.012 Design Problem Answer Sheet - Spring 2008

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Predicted Performance with 300 Ω Load

Differential-mode voltage gain, A_{vd} :	2×10^6
Common-mode voltage gain, A_{vc} :	0.00188
Common-mode rejection ratio, A_{vd}/A_{vc} :	1.07×10^9
Output resistance, R_{out} :	100 ohms
Output voltage swing, $ v_{OUT} _{max}$:	0.6V
Common-mode input voltage swing, $ v_{IC} _{max}$:	0.8V
DC power dissipation, $v_{OUT} = 0$:	1.013 mW
Differential input voltage to make $v_{OUT} = 0$:	0.337 μ V

Transistor	W/W_{min}	L/L_{min}	$ I_D $ [μ A]	$ V_{GS} $ [V]	$ V_{DS} $ [V]
Q1	8.00E+00	1	40	0.6	0.6
Q2	1.00E+00	2	40	0.9	0.9
Q3	1.00E+00	2	40	0.9	0.9
Q4	4.00E+00	1	40	0.6	0.6
Q5	1.00E+00	2	10	0.7	1.1
Q6	2.00E+00	1	10	0.6	0.6
Q7	2.00E+00	1	10	0.6	0.6
Q8	1.00E+00	2	10	0.7	0.7
Q9	8.00E+00	2	20	0.6	0.9
Q10	4.00E+00	2	10	0.6	1.5
Q11	4.00E+00	2	10	0.6	1.5
Q12	1.00E+00	2	5	0.6	0.6
Q13	1.00E+00	2	5	0.6	0.6
Q14	1.00E+00	2	5	0.6	0.6
Q15	1.00E+00	2	5	0.6	0.6
Q16	1.00E+00	1	5	0.6	0.1
Q17	1.00E+00	1	5	0.6	0.1
Q18	2.00E+00	2	5	0.6	0.5
Q19	2.00E+00	2	5	0.6	1.4
Q20	1.00E+00	2	5	0.6	2.3
Q21	1.00E+00	2	5	0.6	1.4
Q22	1.00E+00	2	5	0.6	0.1
Q23	1.00E+00	2	5	0.6	0.1
Q24	1.00E+00	2	5	0.6	2.1
Q25	1.00E+00	2	5	0.6	0.9
Q26	1.00E+00	2	2.5	0.6	0.9
Q27	1.00E+00	2	2.5	0.6	2.1
Q28	2.50E+01	1	250	0.6	1.5
Q29	5.00E+01	1	250	0.6	1.5