# Solutions of the Amanogawa Exercises

## RLC Parallel Circuit

| Resonance Frequency | Char. Imp. $\omega \cdot L$ | $\frac{1}{\omega \cdot L}$ [$\Omega^{-1}$] | R | L | C | $Q_0$ | $Q_l$ |
|---|---|---|---|---|---|---|---|
| 50 MHz | 32 Ω | 0.03125 | 10 kΩ | 101.9 nH | 99.4 pF | 312.5 | 1.55 |
| 11.6 kHz | 1000 Ω | 0.00100 | 10 kΩ | 13.7 mH | 13.7 nF | 10 | na |
| 20.0 MHz | 47 Ω | 0.02128 | 10 kΩ | 375.4 nH | 168.7 pF | 212 | 1.05 |
| 50 Hz | 320 Ω | 0.00312 | 10 kΩ | 1.019 H | 9.94 µF | 31.3 | na |
| 10 MHz | 3200 Ω | 0.00031 | 10 kΩ | 50.93 µH | 5.00 pF | 3.13 | na |

$$Q_0 = \frac{R}{\omega\, L}$$

## Modes in a Rectangular Waveguide

| a [m] | a/b | TE10 | | TE01 | | TE/TM11 | | TE20 | |
|---|---|---|---|---|---|---|---|---|---|
| | | $f_c$ [GHz] | $\lambda_c$[m] | $f_c$ [GHz] | $\lambda_c$[m] | $f_c$ [GHz] | $\lambda_c$[m] | $f_c$ [GHz | $\lambda_c$[m] |
| 0.08 | 1.25 | 1.875 | 0.16 | 2.344 | 0.128 | 3.0 | 0.1 | 3.75 | 0.08 |
| 0.1 | 1.67 | 1.5 | 0.2 | 2.505 | 0.12 | 2.92 | 0.103 | 3.0 | 0.1 |