

Enhancing the Coherence of Superconducting Quantum Bits with Electric Fields - Supplementary Material

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I. ADDITIONAL DATA

The following figures show the full data set acquired from the optimization routine at various qubit resonance frequencies.

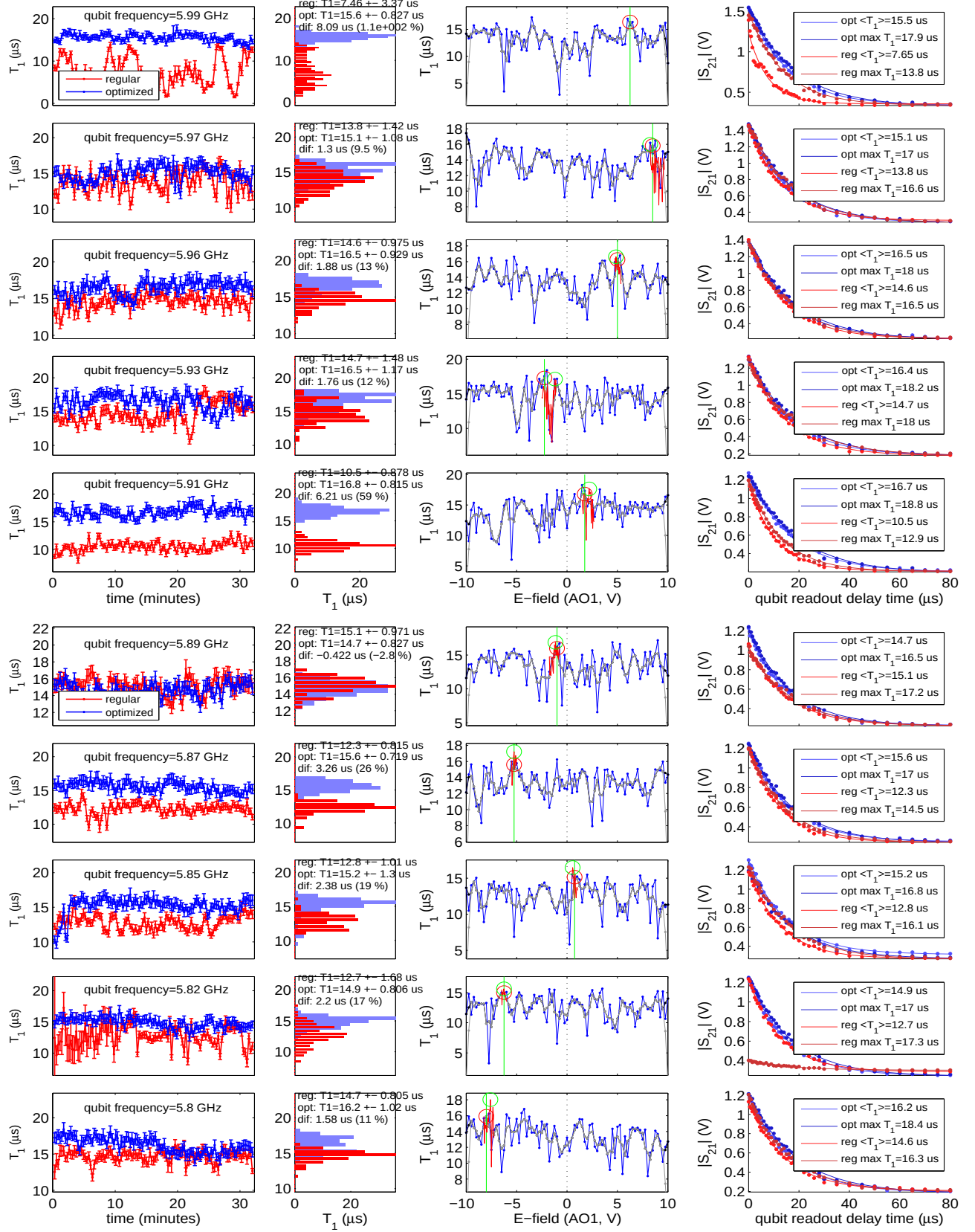


FIG. S1. Testing the optimization routine at various qubit frequencies (rows). **Column 1:** T_1 time measured for 30 minutes at zero E-field (red) and optimized E-field (blue). **Column 2:** Histograms of T_1 during 30 minutes for optimized (blue) and zero E-field (red). **Column 3:** T_1 vs. applied E-field to find the optimum E-field (red circle). Data obtained in the second pass is shown in red. **Column 4:** Examples of raw qubit decay curves showing a mean ($\langle T_1 \rangle$) and maximum ($\max T_1$) T_1 time acquired at optimized (blue) and zero (red) applied E-field.

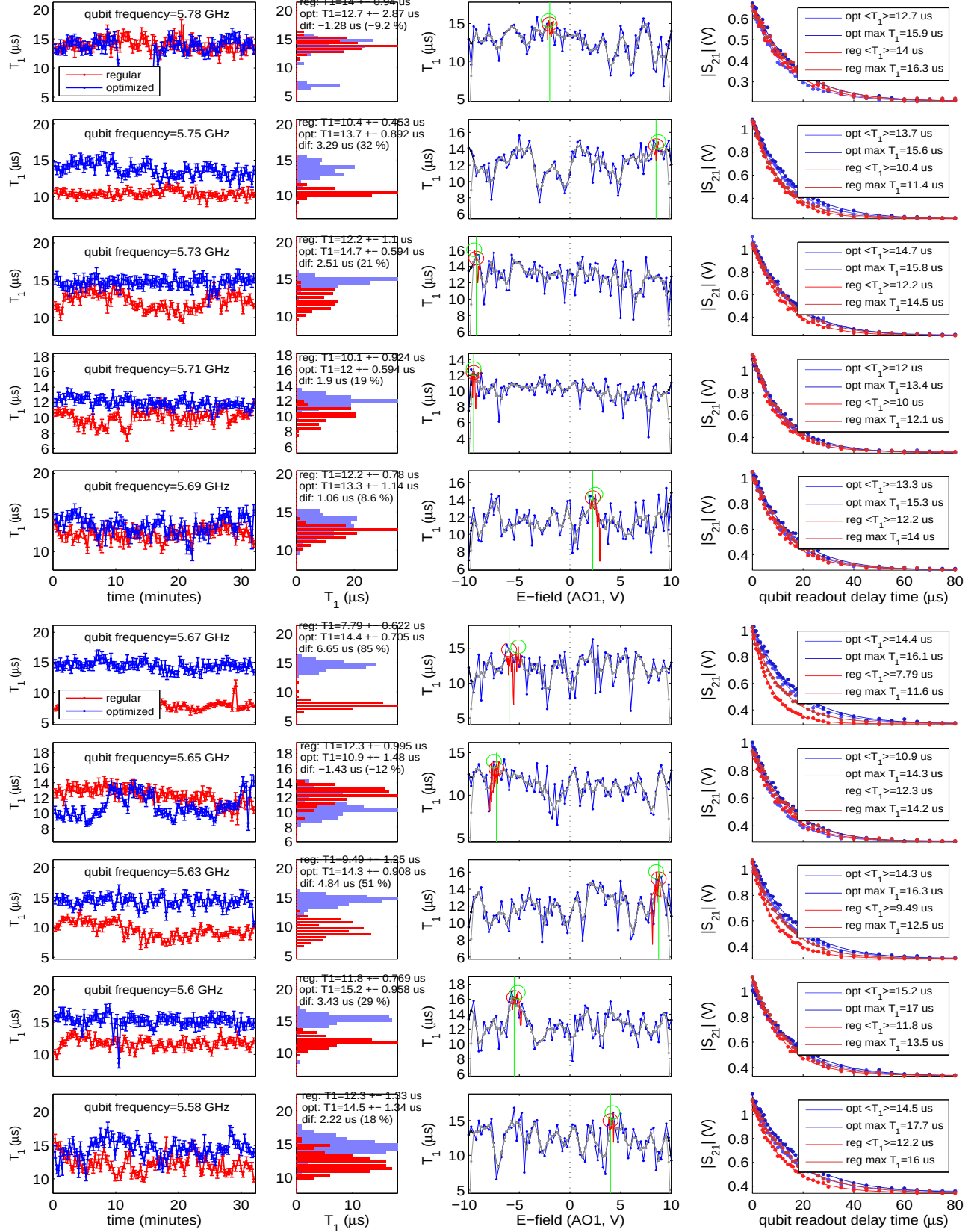


FIG. S2. Testing the optimization routine at various qubit frequencies (rows). **Column 1:** T_1 time measured for 30 minutes at zero E-field (red) and optimized E-field (blue). **Column 2:** Histograms of T_1 during 30 minutes for optimized (blue) and zero E-field (red). **Column 3:** T_1 vs. applied E-field to find the optimum E-field (red circle). Data obtained in the second pass is shown in red. **Column 4:** Examples of raw qubit decay curves showing a mean ($\langle T_1 \rangle$) and maximum (max) T_1 time acquired at optimized (blue) and zero (red) applied E-field.

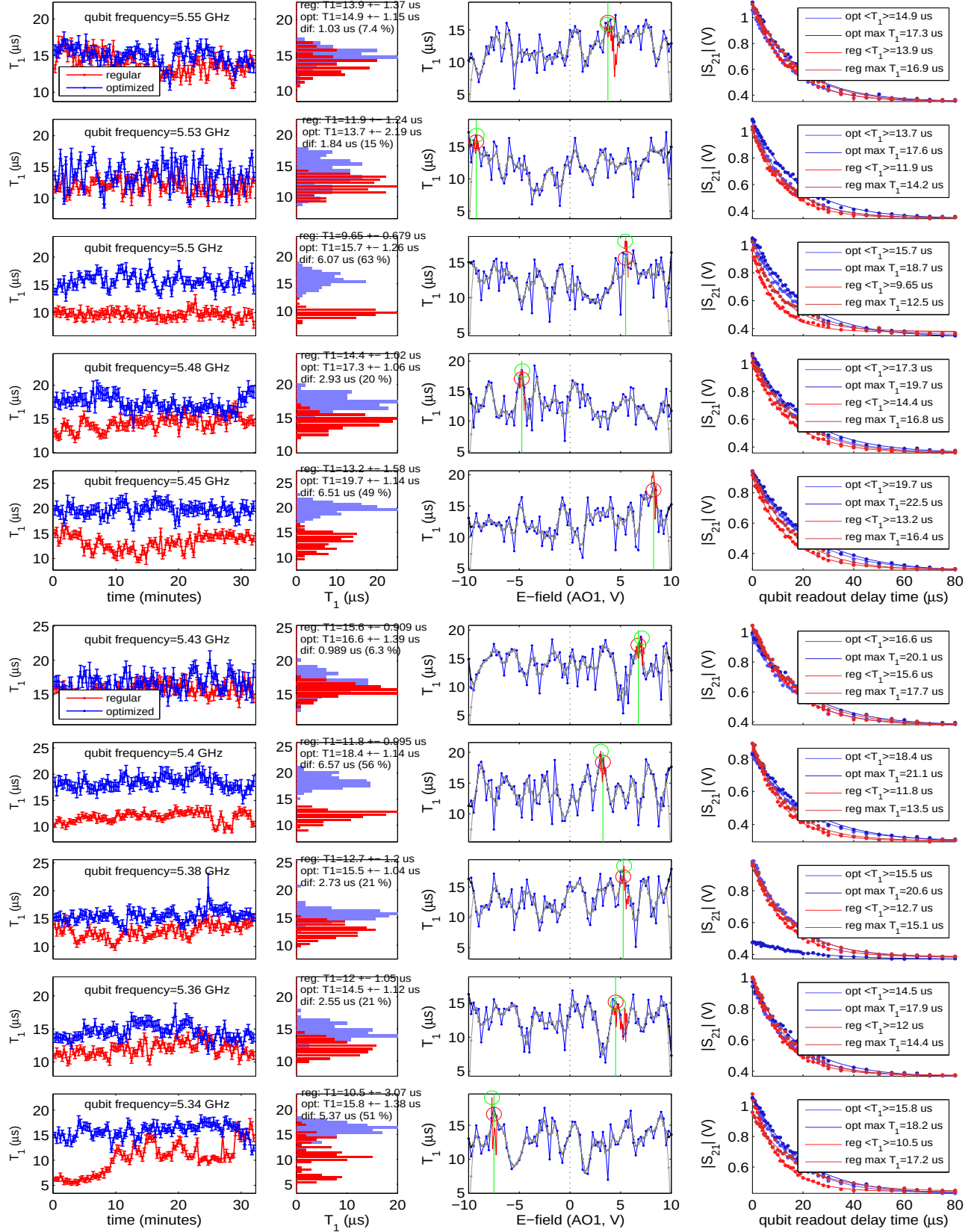


FIG. S3. Testing the optimization routine at various qubit frequencies (rows). **Column 1:** T_1 time measured for 30 minutes at zero E-field (red) and optimized E-field (blue). **Column 2:** Histograms of T_1 during 30 minutes for optimized (blue) and zero E-field (red). **Column 3:** T_1 vs. applied E-field to find the optimum E-field (red circle). Data obtained in the second pass is shown in red. **Column 4:** Examples of raw qubit decay curves showing a mean ($\langle T_1 \rangle$) and maximum (max) T_1 time acquired at optimized (blue) and zero (red) applied E-field.

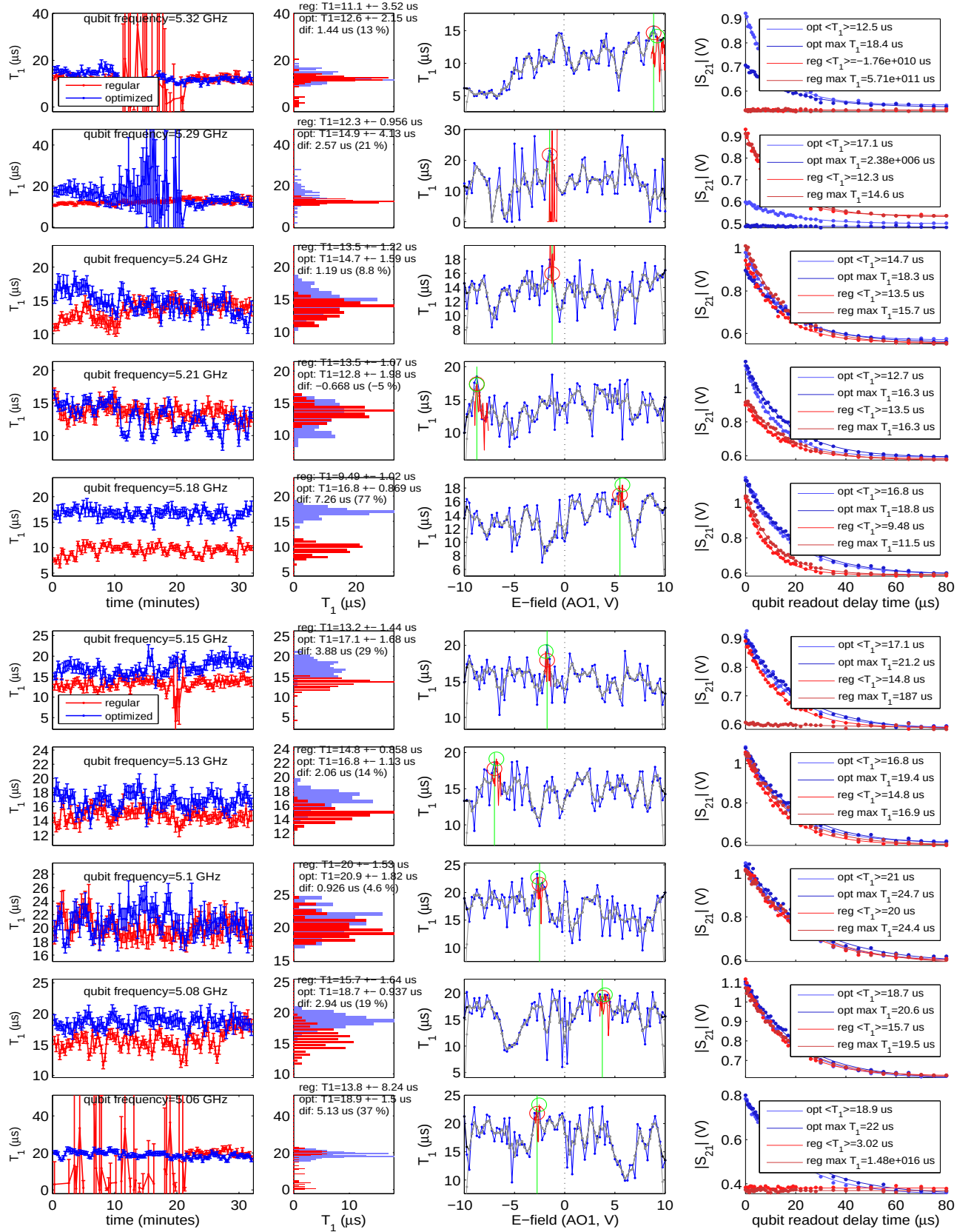


FIG. S4. Testing the optimization routine at various qubit frequencies (rows). **Column 1:** T_1 time measured for 30 minutes at zero E-field (red) and optimized E-field (blue). **Column 2:** Histograms of T_1 during 30 minutes for optimized (blue) and zero E-field (red). **Column 3:** T_1 vs. applied E-field to find the optimum E-field (red circle). Data obtained in the second pass is shown in red. **Column 4:** Examples of raw qubit decay curves showing a mean ($\langle T_1 \rangle$) and maximum (max) T_1 time acquired at optimized (blue) and zero (red) applied E-field.

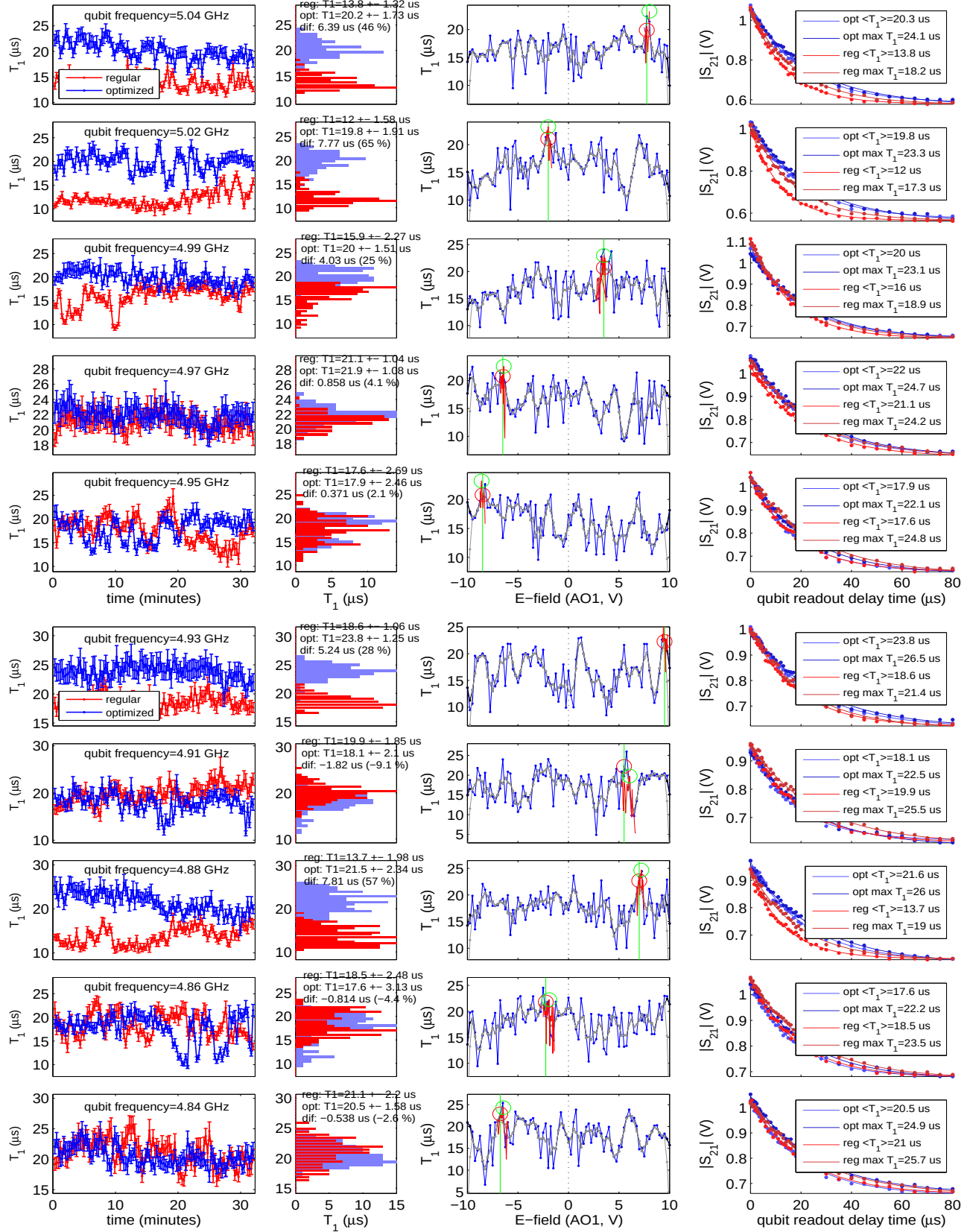


FIG. S5. Testing the optimization routine at various qubit frequencies (rows). **Column 1:** T_1 time measured for 30 minutes at zero E-field (red) and optimized E-field (blue). **Column 2:** Histograms of T_1 during 30 minutes for optimized (blue) and zero E-field (red). **Column 3:** T_1 vs. applied E-field to find the optimum E-field (red circle). Data obtained in the second pass is shown in red. **Column 4:** Examples of raw qubit decay curves showing a mean ($\langle T_1 \rangle$) and maximum (max) T_1 time acquired at optimized (blue) and zero (red) applied E-field.

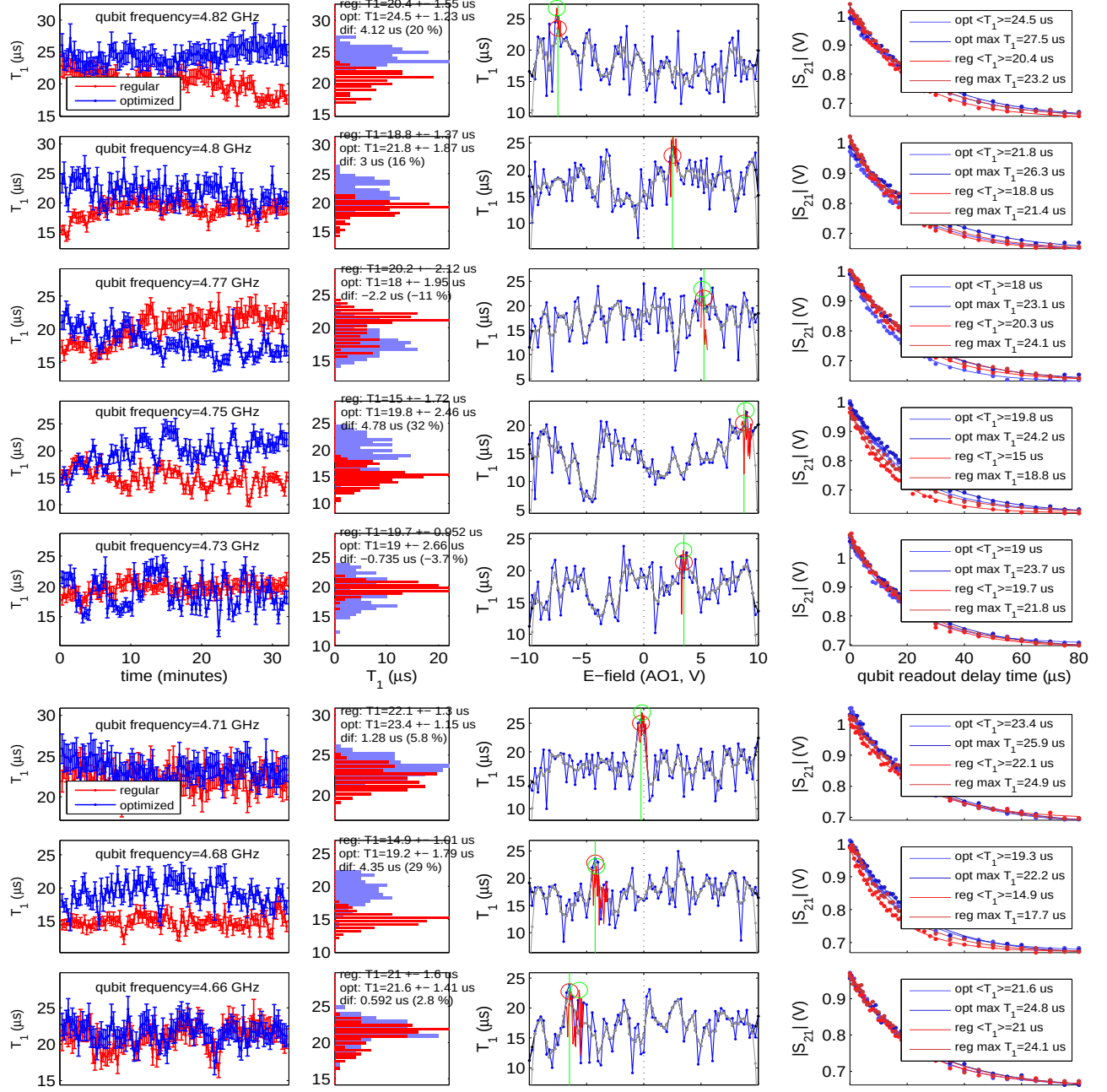


FIG. S6. Testing the optimization routine at various qubit frequencies (rows). **Column 1:** T_1 time measured for 30 minutes at zero E-field (red) and optimized E-field (blue). **Column 2:** Histograms of T_1 during 30 minutes for optimized (blue) and zero E-field (red). **Column 3:** T_1 vs. applied E-field to find the optimum E-field (red circle). Data obtained in the second pass is shown in red. **Column 4:** Examples of raw qubit decay curves showing a mean ($\langle T_1 \rangle$) and maximum (max) T_1 time acquired at optimized (blue) and zero (red) applied E-field.