



Cellular Support Agreement
CSA Service Packages



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Code: CSA.10**Title:** Cellular Antenna Feasibility Study**Deliverables:** Report and interactive technical support**Item:**

- Test and/or simulate different antenna technologies, topologies and material
- Antennas will be tested in different locations / positions
- Selection of the best solution will be based on overall performance and project targets (price, certification, performance etc)

Time: 3 weeks**Code: CSA.20****Title:** Cellular Device Passive Mode Antenna Testing**Deliverables:** Report**Item:**

- Antenna installed on a customer device prototype board, with extra antenna prototypes
- Matching Circuit Diagram and documentation of values if relevant (or cable routing diagram, antenna position/ mounting etc.)
- Final antenna position and integration method
- Return Loss, VSWR, Average Gain, Efficiency, Peak Gain, Radiation Patterns
- Documented performance measurements

Time: 1 Week**Code: CSA.21****Title:** Antenna Passive Implementation Optimization/Matching & ECC Measurements**Deliverables:** Report**Item:**

- Antenna installed on a customer device prototype board, with extra antenna prototypes
- Matching Circuit Diagram and documentation of values if relevant (or cable routing diagram, antenna position/mounting etc.)
- Final antenna position and integration method
- Return Loss, VSWR, Average Gain, Efficiency, Peak Gain, Radiation Patterns, ECC
- Documented performance measurements

Time: 1 Week**Code: CSA.30****Title:** Cellular Device Active Mode Testing - TRP**Deliverables:** Report**Item:**

- Test in Taoglas 3D anechoic chamber – Full CTIA/PTCRB TRP (850/1900MHz) USA channel analysis.
- EU channels optional.
- If fail consult with sales for custom solution

Time: 2 days

Code: CSA.30L**Title:** Cellular Device Active Mode Testing - TRP**Deliverables:** Report**Variables:** CSA.30L.1 - LTE Device Active Mode Testing - TRP (North America)
CSA.30L.2 - LTE With Backup Device Active Mode Testing - (North America)
CSA.30L.3 - LTE Device Active Mode Testing - TRP (Global)**Item:**

- Test in Taoglas 3D anechoic chamber - Full CTIA/PTCRB TRP 2 Cellular & 2 LTE Bands (by Carrier) USA channel analysis.
- EU channels optional.
- If fail consult with sales for custom solution

Time: 1-3 Weeks**Code: CSA.31****Title:** Cellular Device Active Mode Testing - TIS**Deliverables:** Report**Item:**

- Test in Taoglas 3D anechoic chamber - Full CTIA/PTCRB TIS (850/1900MHz) USA channel analysis
- EU channels optional
- If fail consult with Noise Control Division

Time: 2 days**Code: CSA.31L****Title:** LTE Device Active Mode Device Testing - TIS**Deliverables:** Report**Variables:** CSA.31L.1 - LTE Device Active Mode Testing - TIS (North America)
CSA.31L.2 - LTE With Backup Device Active Mode Testing - TIS (North America)
CSA.31L.3 - LTE Device Active Mode Testing - TIS (Global)**Item:**

- Test in Taoglas 3D anechoic chamber - Full CTIA/PTCRB TIS 2 Cellular & 2 LTE Bands (by Carrier) USA channel analysis
- EU channels optional
- If fail consult with Noise Control Division

Time: 1 week**Code: CSA.32****Title:** Cellular Device Radiated Spurious Emissions Testing for PTCRB**Deliverables:** Report**Item:**

- Test in 3D RSE anechoic chamber Full CTIA/PTCRB RSE-Traffic Mode Analysis (Global frequencies required)
- Test in 3D RSE anechoic chamber Full CTIA/PTCRB RSE-Idle Mode Analysis (Global frequencies required).
- If fail consult with Noise Control Division

Time: 1 week

Code: CSA.32L**Title:** LTE Device Radiated Spurious Emissions Testing for PTCRB**Deliverables:** Report**Item:**

- Test in 3D RSE anechoic chamber Full CTIA/PTCRB RSE-Traffic Mode Analysis (Global frequencies required)
- Test in 3D RSE anechoic chamber Full CTIA/PTCRB RSE-Idle Mode Analysis (Global frequencies required).
- If fail consult with Noise Control Division

Time: 2 weeks**Code: CSA.33****Title:** Cellular Device Radiated Spurious Emissions Testing for Europe**Deliverables:** Report**Item:**

- Test in 3D RSE anechoic chamber Full RSE-Traffic Mode Analysis per EN301511 compliant to R&TTE.
- Test in 3D RSE anechoic chamber Full RSE-Idle Mode Analysis per EN301511 compliant to R&TTE.
- If fail consult with Noise Control Division

Time: 1 week**Code: CSA.33L****Title:** LTE Radiated Spurious Emissions Testing for Europe**Deliverables:** RSE Compliance Report**Item:**

- Test in anechoic chamber Active-mode RSE test per EN 301 511
- Test in anechoic chamber Idle-mode RSE test per EN 301 511
- If fail consult with Noise Control Division

Time: 2-3 weeks**Code: CSA.34****Title:** Cellular Device Radiated Spurious Emissions Pre-Testing for Europe**Deliverables:** RSE Compliance Report**Item:**

- Test in anechoic chamber Active-mode RSE test per EN 301 511
- If fail consult with Noise Control Division

Time: 1 week

Code: CSA.36**Title:** LTE Only Device Active Mode Testing- TRP (2 Bands)**Deliverables:** Report**Item:**

- Test in Taoglas 3D anechoic chamber - Single-carrier, Two-band TRP channel analysis

Time: 1 week**Code: CSA.37****Title:** LTE Only Device Active Mode Testing- TIS (2 bands)**Deliverables:** Report**Item:**

- Test in Taoglas 3D anechoic chamber - Single-carrier, Two-band TIS channel analysis

Time: 1 week**Code: CSA.50****Title:** Custom Cellular Antenna Design**Deliverables:** Report and prototypes

Variables: CSA.50.1 - Custom Cellular Antenna Design (North America)-Embedded Flex/Metal/PCB
CSA.50.2 - Custom Cellular Antenna Design (North America)-Existing Embedded Ceramic
CSA.50.3 - Custom Cellular Antenna Design (North America)-New Form Factor Embedded Ceramic
CSA.50.4 - Custom Cellular Antenna Design (North America)-Embedded MIMO LTE - M2M
CSA.50.5 - Custom Cellular Antenna Design (North America)-Embedded MIMO LTE - Consumer Electronics
CSA.50.6 - Custom Cellular Antenna Design (North America)-Existing External Antenna
CSA.50.7 - Custom Cellular Antenna Design (North America)-New Form Factor External Antenna

Item:

- Test and/or simulate different antenna technologies, topologies and material
- Antennas will be tested in different locations / positions
Selection of the best solution will be based on overall performance and project targets (price, certification, performance etc)
- Device transmit strength optimization in 3d anechoic RF test chamber
- Active device impedance mismatch-check and correction if required
- 5 custom antenna prototypes
- Mechanical Drawing
- Final antenna position and integration method
Return Loss, VSWR, Average Gain, Efficiency, Peak Gain, Radiation Patterns, TRP measurements

Time: 6-8 weeks

Code: CSA.51**Title:** Custom Cellular Antenna Design Regional**Deliverables:** Report and prototypes**Variables:** CSA.51.1 - Custom Cellular Antenna Design Regional (excl. North America)-Embedded Flex/Metal/PCB
CSA.51.2 - Custom Cellular Antenna Design Regional (excl. North America)-Existing Embedded Ceramic
CSA.51.3 - Custom Cellular Antenna Design Regional (excl. North America)-New Form Factor Embedded Ceramic
CSA.51.4 - Custom Cellular Antenna Design Regional (excl. North America)-Embedded MIMO LTE
CSA.51.5 - Custom Cellular Antenna Design Regional (excl. North America)-Existing External Antenna
CSA.51.6 - Custom Cellular Antenna Design Regional (excl. North America)-New Form Factor External Antenna**Time:** 6-8 weeks**Code: CSA.70****Title:** Cellular RSE and TIS Mitigation Analysis**Deliverables:** Report of Tests Done Modified Copy of Hardware if possible**Item:**

- Detailed analysis of implemented hardware and all design files
- Reproduce problem with callbox and anechoic chamber
- Interference Frequency Analysis
- Interactive mitigation experiments to existing hardware
- Report of experiments, results and recommended changes

Time: 3-9 weeks**Code: CSA.71****Title:** RF Interference Mitigation for Audio**Deliverables:** Report**Item:**

- Detailed analysis of implemented hardware and all design files
- Report with recommended changes for long term design fix
- Addition of RF shielding material on prototypes to attempt short term fix

Time: 1 week