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# Request for Proposal

**Procurement of the Satellite EMC Test Equipment  
for Lightning Induced Transient Susceptibility Test**



2017. 7. 24

Space Test Department  
Korea Aerospace Research Institute

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## **General Instruction to Bidders**

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## 1. Introduction

Korea Aerospace Research Institute (KARI) is a government funded research institute, engaged not only in developing aerospace-related technologies, but also in supporting a national aerospace development policy.

KARI has a satellite assembly, integration and test center (hereinafter referred to as “AITC”) for joint use by corporations and research institutes for the purpose of the effective development of domestic satellites. And basic facilities and equipment for satellite assembly and test have been supplied, installed and used.

KARI is desirous of procurement of the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test.

The purpose of this procurement is to install waveform generators set including generators, attenuator boxes, transformers, probes and extend modules, etc. to perform all test items defined in DO-160G section 22 (detailed requirements are defined Appendix B) and MIL-STD-461G CS117. These equipment will be installed in the medium EMC chamber (TH-4) in KARI site.

The main undertakings of this procurement are to perform factory and site acceptance tests, install, guarantee quality and training, etc. The Bidders shall submit the business showings of the installing the Test Equipment for Lightning Induced Transient Susceptibility. All the descriptions in this RFP are minimum requirements and the supplier can suggest the better one to improve the overall performance and cost. But in this case, the Proposal should clearly indicate the improvements from KARI’s requirements.

This RFP (Request for Proposal) explains the procedures to be taken by the Bidders seeking to respond to the RFP.

This RFP also details the requirements and terms and conditions for the procurement of the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test. This RFP consists of the following documents;

- (1) General Instruction to Bidders
- (2) Appendix A. General Terms and Conditions
- (3) Appendix B. Technical Specifications and Statement of Work

Bidders are requested to submit the Proposal in accordance with the guidelines and instructions as contained in the RFP.

Bidders’ Proposals shall include all data and/or information as requested by this RFP and all attachments hereto. All information contained in this RFP shall be treated as proprietary and confidential.

## 2. Qualification of Bidder

Bidder’s qualification for this bidding is as follows;

- (1) Bidders should have the history of manufacturing and delivery of the waveform generators set for lightning induced transient susceptibility test.
- (2) Bidders should show their experience of installation, operation, arranging, integration of waveform generators set for lightning induced transient susceptibility test to be installed in EMC test facility

※ The qualification of the Bidder is at KARI’s own discretion.

### 3. Bid Closing Date

Proposal is due **August 4, 2017 at 15:00PM**. If any part of the Proposal as required under this RFP is submitted after the stipulated closing time as above, the entire Proposal will not be accepted.

### 4. Submission of Proposal

The Proposal shall be hand-carried or sent via appropriate courier service to the following address :

Attn. : Mr. Won-Suk LEE  
Procurement Team  
Korea Aerospace Research Institute  
169-84 Gwahak-ro, Yuseong-gu,  
Daejeon 34133, Korea  
Tel : +82-42-860-2406  
Fax : +82-42-860-2666  
e-mail : wsl@kari.re.kr

Please use the following name and address for all correspondence with KARI concerning this RFP.

Correspondence for Contractual Matters :

Attn. : Mr. Won-Suk LEE  
Procurement Team  
Korea Aerospace Research Institute  
169-84 Gwahak-ro, Yuseong-gu  
Daejeon 34133, Korea  
Tel : +82-42-860-2406  
Fax : +82-42-860-2666  
e-mail : wsl@kari.re.kr

Correspondence for Technical Matters :

Attn. : Mr. Jae Woong JANG  
Space Test Department  
Korea Aerospace Research Institute  
169-84 Gwahak-ro, Yuseong-gu  
Daejeon 34133, Korea  
Tel : +82-42-860-2977  
Fax : +82-42-860-2234  
e-mail : jjw0302@kari.re.kr

Bidder shall specify in its Proposal, its single point of contact for KARI to communicate in conjunction with the RFP, Proposal, subsequent evaluation, etc. Bidder's information on the point of contact shall include the name, title/position, telephone no., facsimile no., and e-mail address.

Bidders are strictly requested to submit Proposals to KARI as follows :

- (1) Technical Proposal (including the commercial part) : one (1) original and five (5) copies
  - (2) Price Proposal : one (1) original
- ※ The Price Proposal shall be sealed and be submitted in a separate envelope.
  - ※ Two (2) sets of Electronic files (preferably in PDF format) of the Proposal shall be additionally submitted in the form of CD-ROM or memory stick.

The Technical Proposal consists of two (2) Volumes as follows;

- (1) Volume 1 : Heritage and Experience
- (2) Volume 2 : Technical Part

And Price Proposal is specified as the Volume 3

In the Volume 1, the Bidders shall describe following contents;

- (1) Company general information such as organization, financial status, etc.,
- (2) The heritages of manufacturing and delivery of the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test,
- (3) The specialized knowledge and technology on the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test,
- (4) The information of the point of contact including the name, the title, telephone number, fax number, and e-mail address, and
- (5) Export license statement for the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test.

In the Volume 2, the Bidders shall include the descriptions for the main terminologies and basic construction of the Volume 2 is as follows;

- (1) Review and opinion about the specifications requirements indicated by KARI,
- (2) The detailed description of functions and specifications,
- (3) Qualification of each part, materials, and equipment,
- (4) Qualification Management,
- (5) Delivery plan of items and installation plan,
- (6) Detailed contents and time schedule of pre-acceptance test and final acceptance test,
- (7) Detailed method of quality warranty and performance
- (8) Contents & plan of quality warranty
- (9) Training plan for operation and maintenance
- (10) Contents of technical support, and warranty and maintenance plan

In the Volume 3, the Bidders shall provide total bid value with the itemized price list and the price of the system shall be broken down.

## 5. Bid Schedule

The following schedule is a tentative milestone for the eventual Contract and may be changed at KARI's sole discretion:

- (1) RFP Release: T0
- (2) Bid Closing Date: T1 = T0 + 11 Days
- (3) Review of Proposal, Q&A, Evaluation and Expected Date of Contract : T2 = T1 + 1 Week

## 6. Validity of Proposal

Proposal shall be valid for three (3) months from the Bid Closing Date. It can be extended up to six (6) months with KARI's written notice.

## 7. Price Requirements

The price or rate proposed by Bidder shall be Firm and Fixed Price that is not subject to any price escalation, price change or increase of actual costs during the Contract period.

Any kinds of taxes and duties arising in connection with Bidder's work under the eventual Contract shall be Bidder's responsibility, except for the customs duties and VAT levied in Korea and the price shall be

inclusive of any cost or charge incurred due to delivery of any hardware, software, equipment, spare parts, and documentation to KARI or its designated point of delivery.

The currency quoted in the Price Proposal shall be expressed in CHF however, other currency is acceptable. In case of other currency, for the price evaluation, the 1<sup>st</sup> basic exchange rate noticed by KEB Hana Bank on price evaluation date shall be applied for the exchange rate for currency change.

And, the currency of the Contract could be Contractor's national currency within the CHF value of the budget announced for this bidding, if necessary. In such a case, the 1<sup>st</sup> basic exchange rate noticed by KEB Hana Bank on price evaluation date shall be applied for the exchange rate for currency change.

## 8. Bid Bond

Bidder shall establish a bid bond in favor of KARI no later than the Bid Closing Date and submit a certificate to KARI along with its Proposal. The total amount of the bid bond shall be at least five percent (5%) of the total bid value. The bond shall remain valid for three (3) months after the Bid Closing Date. The bid bond shall be in the form of a surety bond issued by the Seoul Guarantee Insurance Company or in the form of cash, bank guarantee, an irrevocable standby letter of credit established by first class bank and advised to KARI through "Woori bank" (Daejeon Branch at Moonye-ro 29, Dunsan-dong, Seo-gu, Daejeon, 35241 Korea, Tel.: +82-42-488-9704, Ext. 312 / Fax : +82-505-003-6200 / e-mail : 30904455@wooribank.com). The bond shall be available by KARI's request on the Seoul Guarantee Insurance Company or by KARI's draft at sight drawn on the bank, accompanied by the statement of KARI stating that;

- (a) Bidder has refused to enter into a Contract with the terms and conditions in the Request for Proposal, if any,
- (b) Bidder has hindered the fair bidding by fraud or misrepresentation, or
- (c) Bidder has withdrawn its Proposal after the Bid Closing Date.

The bid bond shall contain the substantial part of the terms and conditions of the bond, date of establishment, account, amount, payment terms, and date of expiry, etc. When the Contract is executed with Successful Bidder, the bid bond of Successful Bidder shall be amended to the performance bond of ten percent (10%) of the total Contract Price under the Contract as part thereof in accordance with the terms and conditions of the Contract.

The bid bonds except for that of the Successful Bidder will be released, upon the instructions of KARI, to unsuccessful Bidders, without interest, promptly after execution of the Contract between KARI and Successful Bidder. The bid bond of the Successful Bidder shall be likewise released only when KARI decides not to enter into a Contract after the selection of the Successful Bidder.

The bid bond is a critical requirement by Korean government regulation. Therefore, if any Bidder does not submit the bid bond then, such Bidder will be disqualified.

## 9. Questions and Modifications

Any questions as to the intent and clarity of the RFP may be submitted in writing to KARI's designees as specified in Section 4 "Submission of Proposal" by e-mail, fax or letter no later than five (5) days before the Bid Closing Date.

After the Bid Closing Date, Bidder shall not amend, modify, or supplement the Proposal, or submit any other documents to KARI, except with KARI's written request.

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KARI may ask each Bidder in writing for clarifications, amendments, revisions, or supplementation of the Proposal and any other documents submitted by Bidder at any time before the execution of the Contract. KARI may also ask each Bidder to submit and supply additional information or documents necessary for evaluation of the Proposal.

## **10. No Contractual Obligation**

This RFP shall not be interpreted as an offer for a Contract or any type of guarantee by KARI. It is KARI's sole discretion whether or not to allow the Contract award to any Bidder. KARI owes no responsibility or obligation to select the Contractor among Bidders.

This solicitation for the Proposal shall neither be construed to create an obligation on KARI to enter into a contractual instrument, nor shall it serve as a basis for any claim for reimbursement of costs for the effort to prepare, submit, amend, revise or supplement the Proposal, and other related documents expended by the Bidder regardless of whether or not the Bidder is successful in receiving an award as a result of the solicitation.

## **11. Acceptance and Rejection of Bids**

KARI reserves the right to reject any or all Proposal(s), to amend or reject the bidding process at any time prior to the award of the Contract without thereby incurring any liability to the affected Bidder(s), and KARI is not under any obligation to inform the affected Bidder(s) of the ground for its action.

## **12. Withdrawal of Proposal**

Bidder may withdraw its Proposal at any time before the Bid Closing Date. Withdrawal shall be made in writing, and shall be received by KARI before the Bid Closing Date.

## **13. Evaluation of Proposal**

The evaluation of the Proposals will be made by the KARI evaluation committee and the following evaluation process is for information only. The evaluation committee reserves the right to modify the evaluation process and criteria without any prior notification to Bidders.

During the Bid evaluation, KARI may send to Bidders a set of questions for clarification and request any supplement to the Proposals and the evaluation will be made based on the Proposal, the answers and the supplement received from Bidders.

The evaluation consists of two (2) steps of the technical part and bidding price part and, after the evaluation of technical part, the evaluation committee will select the Qualified Bidders and perform the bidding price evaluation for the selected Qualified Bidders. The total technical evaluation score is one hundred (100) points and Bidders, who get score exceeding eighty (80) points in technical part, will be selected as Qualified Bidders. And then, the Qualified Bidder, who proposes the lowest price among the Qualified Bidders, will be selected as the Successful Bidder.

The table 3 represents the evaluation factors and score for the technical part.

Table 3. Itemized list for technical evaluation.

Major Classification	Detailed Classification
Bidder's General Information (20)	<ul style="list-style-type: none"> <li>- Company General Information</li> <li>- History of delivery of Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test</li> </ul>
Performance & Specification (30)	<ul style="list-style-type: none"> <li>- Performance Capability of Requirements</li> <li>- Performance of Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test</li> <li>- Satisfaction of major specification</li> </ul>
Manufacturing & Installation (15)	<ul style="list-style-type: none"> <li>- Quality of Materials, Parts, Equipment, etc.</li> <li>- Quality Management Plan</li> <li>- Installation Plan</li> <li>- Delivery Plan for the Material, Equipment, Spare Parts</li> </ul>
Inspection & Acceptance Test (25)	<ul style="list-style-type: none"> <li>- Detailed contents and time schedule of pre-acceptance test and final acceptance test</li> <li>- Detailed method of quality warranty and performance</li> <li>- Contents &amp; plan of quality warranty</li> <li>- Supporting method and master plan for the Satellite EMC Test Equipment operation and maintenance</li> </ul>
Technical Support & Capability of Quality Warranty (10)	<ul style="list-style-type: none"> <li>- Contents of Technical Support</li> <li>- Operation Training for End Users</li> <li>- Capability of Quality Warranty and Maintenance</li> </ul>

## 14. Contract

The Contract will be effective subject to the KARI's approval thereof and the Appendix A "General Terms and Conditions" of this RFP is the Contract with the Successful Bidder.

## 15. Language and Measurement Unit

The Proposal, any documents submitted to KARI under the RFP, communication and the Contract shall be in English and measurements and quantities shall be in International System of Units.

## 16. Certificate and Government Approvals

Bidder shall receive any government approval and certificates (e.g. export licenses) in relevant countries necessary for Bidder's work for the RFP.

## 17. Confidentiality

There shall be no news releases, public announcements, denials or confirmation in connection with this RFP or Contract award without prior written approval of KARI.

All elements of the RFP shall be kept confidential, and shall not be intentionally disclosed by Bidder to third parties. All documentation submitted in response to this RFP shall be marked "COMMERCIALS-IN-CONFIDENCE" on the first page of each document.

All elements of the Proposal will be kept confidential, and will not be intentionally disclosed by KARI to third parties unless necessary to fulfill the objectives of the RFP.

## **18. Property of Proposal**

All documents submitted in response to the RFP shall become the property of KARI and will be retained by KARI.

## **19. Expenses**

Expenses incurred by Bidder in connection with the preparation, submittal, and any subsequent clarification of Proposal are for their own account and will not be reimbursed by KARI.

## **20. Governing Law**

This RFP and the Contract shall be construed in accordance with and governed by the laws of the Republic of Korea.

## **21. Arbitration**

Any disputes in relation to, and under the RFP and Contract shall be resolved through arbitration in Seoul, Korea, under the Rules of the Korean Commercial Arbitration Board.

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## **Appendix A. General Terms and Conditions**

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## Preamble

This Contract made and entered into this on August \_\_\_\_\_, 2017 by and between Korea Aerospace Research Institute (“KARI”), a Korean Government-funded research institution, established and operating under the laws of the Republic of Korea, with its principal office at 169-84 Gwahak-ro, Yuseong-gu, Daejeon, 34133 Korea, and [Name of Contractor] (“Contractor”) established under the law of [Nationality] with its principal office at [Address].

## Witnesseth

WHEREAS, KARI has undertaken the task of establishment of Satellite EMC Test Equipment.

WHEREAS, KARI would like to procure the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test and desires Contractor to provide the Satellite EMC Test Equipment including technical data, technical support and service as needed; and

WHEREAS, Contractor is willing to provide KARI with the Satellite EMC Test Equipment and necessary Services on the terms and conditions as set forth in this Contract;

NOW, THEREFORE, in consideration of the mutual covenants and premises, both Parties hereto have agreed to the following:

## Article 1. Definitions

The terms defined in this Article shall have the meaning described to them herein whenever they are used in this Contract, unless otherwise clearly indicated by the context.

- 1.1 “**Associates**” mean all individual or legal entities organized under public or private law, who shall act, directly or indirectly, on behalf of KARI or Contractor, or at the direction of either Party to this Contract to fulfill the obligations undertaken by such Party in this Contract, including, without limitation, the employees of each Party, their suppliers and Subcontractors.
- 1.2 “**Contract**” means this Contract for the procurement of Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test, including Appendices as attached hereto, and all amendments that may be agreed to by the Parties in accordance with the terms and conditions of this Contract.
- 1.3 “**Contractor**” means [Name of Contractor] as a Party to the Contract.
- 1.4 “**Deliverable Data**” means all information required to be delivered by Contractor, at its expense, to KARI under this Contract including, without limitation, data, information, reports, manual, documents, diagrams, drawings as well as graphs related to the Plate Roll Bending Machine.
- 1.5 “**Deliverable Items**” means the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test, software, rack and Deliverable Data that Contractor shall deliver to KARI under this Contract and any materials that Contractor may deliver to KARI on KARI’s request, including any additional data, information and spare parts, in the course of the provision of the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test.
- 1.6 “**EDC**” or “**Effective Date of the Contract**” means the date identified in Article 17 “Effectiveness of Contract”.
- 1.7 “**Force Majeure**” means any act of God, war, act or failure to act of any government in its sovereign capacity, fire, flood, earthquake, strike, epidemic, quarantine, embargo, nuclear incident, or any other event, unforeseeable and beyond the reasonable control without any fault by the Party or its Subcontractors relying upon the Force Majeure.
- 1.8 “**KARI**” means Korea Aerospace Research Institute as a Party to the Contract.
- 1.9 “**KARI Furnished Item**” means measurement equipment such as oscilloscope, RF cables, AC power of single phase 220V, which KARI shall provide to Contractor for the final acceptance tests at the site designated by KARI.
- 1.10 “**Party**” or “**Parties**” means KARI or Contractor, or both, in accordance with the context.
- 1.11 “**Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test**” means test to represent the induced effects of lightning to satellite units.
- 1.12 “**Services**” means all professional services and labor required to be provided including, without limitation, design, development, manufacture, research, analysis, integration, training, transportation, installation, test, and warranty.
- 1.13 “**Subcontract**” means any subcontract, including purchase orders and all similar forms of agreements at any tier under this Contract.
- 1.14 “**Subcontractor**” means a contractor under any Subcontract, including suppliers and vendors.
- 1.15 “**Third Party**” means any individual or legal entity other than the Parties and the Associates.

## Article 2. Contract Documents

- 2.1 This Contract shall comprise the following documents, as amended from time to time by written agreement by and between both Parties:
- a) PART 1: General Terms and Conditions
  - b) PART 2: Technical Specifications and Statement of Work
- 2.2 In the event of any inconsistency or discrepancy between or among the Contract documents as listed in Article 2.1 above, the Contract documents shall be applied in the decreasing order of precedence.

## Article 3. Scope of Works

- 3.1 In accordance with the requirements and scopes of work as set forth in this Contract including PART 2 thereto, Contractor shall provide the Deliverable Items.
- 3.2 Contractor shall, without any additional charge to KARI, provide KARI with such technical data, documentation and information as may be reasonably required by KARI to understand the output of the Contractor's work hereunder. Provided, however, that the Contractor has the right to refuse any data, document and information requirement if the Contractor considers it may prejudice the Contractor's intellectual property right.
- 3.3 Contractor shall hold a preliminary meeting for design review with KARI before fixing the manufacturing schedule and if any design change in the manufacturing process is required, the change shall be allowed by KARI in advance.
- 3.3 Contractor shall keep KARI informed with respect to the progress of the Plate Roll Bending Machine, and shall comply with instructions given by KARI, but this instruction should be mutually agreed in advance.
- 3.4 During pre-acceptance test or final acceptance test as set forth in Article 10 "Inspection and Acceptance", the Contractor shall carry out training for operator(s) to be designated by KARI.

## Article 4. Contract Price

- 4.1 For the full, satisfactory and timely performance of all obligations by Contractor in accordance with the provisions of this Contract, KARI shall pay to Contractor the Contract Price of **TBD CHF (CHF TBD)** in accordance with the terms of payment as specified in Article 5 "Terms of Payment".
- 4.2 The Contract Price as specified in Article 4.1 above shall be firm and fixed price that is not subject to any escalation or to any adjustment or revision by reason of the increase of actual costs incurred by Contractor in the performance of the work under this Contract.
- 4.3 The Contract Price as specified in Article 4.1 above shall be comprised of the following items;

Description		Price (CHF)
Deliverable Item		TBD
		TBD
		TBD
Total Sum		TBD

- 4.4 All banking charges incurred in Korea shall be borne by KARI, and those charges incurred outside Korea shall be borne by Contractor.

## Article 5. Terms of Payment

### 5.1 Payment Schedule

- 5.1.1 The Contract Price as specified in Article 4 “Contract Price” shall be paid in accordance with the following schedule:

No.	Payment Milestone	Payment Due Date	Percentage (%)	Amount (CHF)
1	The Receipt of P-bond (EDC + 1week)	EDC + 3 Weeks	20	TBD
2	Completion of Pre Acceptance Test (EDC + 14Weeks)	EDC + 16 Weeks	70	TBD
3	Completion of Final Acceptance at KARI’s site (EDC + 18 Weeks)	EDC + 20 Weeks	10	TBD
<b>Total</b>			<b>100</b>	TBD

### 5.2 Payment Procedure

- 5.2.1 All invoices to be submitted by Contractor under this Contract shall be in the original and two (2) copies signed by its authorized company official and shall be received by KARI two (2) weeks before the payment due dates as specified in Article 5.1 above or the completion date of payment milestone whichever becomes later. Each invoice shall clearly indicate the payment milestone related to the respective payment and shall be accompanied by supporting documents certifying the completion of the milestone event as set forth in Article 5.2.2 below.
- 5.2.2 All payments shall be made in **CHF** via wire transfer to a bank account as designated by Contractor in its invoices, by the payment due dates as stipulated in Article 5.1 above. Notwithstanding the foregoing sentence, if any payment milestone as set forth in Article 5.1 has not been accomplished for any reasons attributable to Contractor, KARI may, with an advance notice, suspend such payment due until both Parties agree that the delayed payment milestone has been accomplished.
- 5.2.3 Whenever the payment due date falls on Saturday, Sunday, KARI’s non-business day or a Korean legal holiday, the payment date shall be the following business day.

### 5.3 Deduction of Payment

- 5.3.1 In the event that KARI is entitled to receive any amount from the Contractor under the provisions of the Contract (e.g. liquidated damage, etc.), KARI may deduct such amount from any payment that may be or become due to the Contractor from KARI. If such amount exceeds to the residual payment amount, Contractor shall pay such amount within two (2) weeks after Contractor’s receipt of KARI’s written notice.
- 5.3.2 A prior written notice given by KARI accompanied with documents stating the amount due to KARI referred to in Article 5.3.1 shall be prima facie evidence of the matters stated herein.

## Article 6. Taxes

*KARI proprietary : The data/information contained in this document shall not be disclosed, disseminated or reproduced, in whole or in part, without the express prior written approval of KARI.*

- 6.1 In the event taxes are charged in Korea, KARI shall be fully responsible for payment of such taxes. Contractor shall be fully responsible for the payment of all applicable taxes imposed outside Korea including any customs duties and charges.
- 6.2 Neither Party shall be responsible for paying the customs duties, and related taxes, fee, or charges for the personnel and the personal effects of the other Party.
- 6.3 The Contractor shall further comply with instructions KARI may issue from time to time in order to facilitate any exemption or reductions from customs duties and other taxes that might be levied on KARI and shall impose the same obligations on the Subcontractor.

## **Article 7. Performance Bond**

- 7.1 Contractor shall establish a performance bond within one (1) week after EDC in favor of KARI in the value of ten percent (10 %) of the Contract Price, in the form of an irrevocable and unconditional standby letter of credit available by KARI's draft at sight.
- 7.2 The entire amount covered by the performance bond shall be payable to KARI on demand together with KARI's written statement to the effect:
  - (a) that there was a default of the Contractor in the performance of the Contract (including Subcontractor's default under the Subcontract), or
  - (b) that any amount KARI is entitled to receive from Contractor has not been paid by Contractor to KARI through any other means, or
  - (c) that this Contract was terminated by Contractor's breach as specified in Article 10.1.
- 7.3 The letter of credit shall be issued by first class international bank acceptable to KARI. The letter of credit shall be drawn in favor of KARI and advised through the Woori Bank (Address: Daejeon Branch at Moonye-ro 29, Dunsan-dong, Seo-gu, Daejeon, 35241 Korea, Tel.: +82-42-488-9704, Ext. 312 / Fax : +82-505-003-6200 / e-mail : 30904455@wooribank.com) and shall remain valid until the expiry date of warranty as set forth in Article 11. "Warranties". The letter of credit shall not be amended, modified or canceled without KARI's prior written consent.
- 7.4 It is hereby agreed between the Parties that payment from the performance bond under this Article shall not affect any other of KARI's rights, privileges, interests or remedies under this Contract or the applicable law.

## **Article 8. Delivery**

- 8.1 All delivery rules to be used in this Contract and all deliveries made are to be in accordance with **Incoterms 2010**.  
Such delivery shall be based on;
  - (a) The Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test shall be manufactured and tested as per Appendix A. "Technical Specification and Statement of Work".
  - (b) The Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test shall be witnessed or inspected by KARI and pre acceptance test at Contractor's site shall be completed as per Article 10. "Inspection and Acceptance" of this Contract.

- 8.2 Unless otherwise mutually agreed, Contractor shall make the Deliverable Item ready for shipment and the Deliverable Item shall be hand over to the KARI's Carrier or Forwarding Agent at the rule of **FCA TBD Airport** by the Delivery Date of **TBD, 2017(EDC+16 Weeks)** after the Contract as stated in the delivery schedule.
- 8.3 The date of each airway bill or clean on board bill of lading shall be construed as the date of each shipment and delivery date.
- 8.4 To obtain import certification, Contractor shall notify KARI by e-mail as set forth in Article 20 "Notices" or telefax (+82-42-860-2666) ten (10) calendar days prior to the shipment with the draft of commercial invoice and packing list specifying the number of boxes, name of Items, unit price, and size and volume of each container or box to be shipped. As soon as each shipment as provided for in this Article is made, Contractor shall send in care of ship's master two (2) copies each of the following shipping documents to KARI.
- (a) Airway bill or Clean on board bill of lading,
  - (b) Commercial invoice (including the Contractor's authorization no.),
  - (c) Packing list,
  - (d) Manufacturer's Inspection Report,
  - (e) Export license (if necessary),
  - (f) Certificate of Origin, and
  - (g) Quality Assurance Certificate.

## **Article 9. Delays in Performance**

- 9.1 Excusable Delay
- 9.1.1 Neither Party shall be responsible to the other Party for any delay in performing its obligations under this Contract due to any events of Force Majeure.
- 9.1.2 The Party whose performance of obligations hereunder has been affected by any events of Force Majeure shall notify the other Party within ten (10) working days thereafter by sending a detailed statement and sufficient evidence with respect thereto, and promptly of any subsequent change in the circumstances, if any. The affected Party shall exercise its best efforts under the circumstances to remove or remedy the events of Force Majeure and the effects thereof and resume full performance hereof as soon as possible.
- 9.1.3 Notwithstanding Article 9.1.1 above, any such delay that has not been notified to the other Party pursuant to Article 9.1.2 above shall not be excused for any reason whatsoever. Notwithstanding Article 9.1.1 above, any delay of performance of the affected Party falling due after any delay, failure or incompleteness in exercising the pertinent best efforts to remove or remedy the pertinent events of Force Majeure or the effects thereof pursuant to Article 9.1.2 shall not be excused for any reason whatsoever.
- 9.2 The Party who has received or was entitled to duly receive the notice of events of Force Majeure under Article 9.1.2 above may suspend performance of its obligations, which shall be due subsequent to such events of Force Majeure, until the other Party has effected such delayed performance to the full extent after and in view of such events of Force Majeure.
- 9.3 Non-Excusable Delay
- 9.3.1 In the event that, unless otherwise excused by virtue of this Contract or the governing or applicable law, Contractor delays the provision of the Satellite EMC Test Equipment for Lightning Induced

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Transient Susceptibility Test, Contractor shall be responsible for damages incurred by KARI as a result of such delay.

- 9.3.2 Contractor acknowledges and agrees that the timely provision of the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test as stipulated under this Contract is essential to KARI, and that such delay as provided for in Article 9.3.1 hereof may cause substantial financial loss or damage to KARI's right, interests and benefit, which may not be assessable or recoverable. Both Parties therefore specifically agree that in the event of such loss or damage caused by delay attributable to Contractor, its Subcontractor or any of its agents, Contractor shall pay KARI as liquidated damages zero point one five percent (0.15%) of Contract Price per delayed day of Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test starting after agreed grace period of ten (10) days has elapsed. If such delay does not exceed ten (10) days from the delivery date, the liquidated damages for such delay will be waived. In no case, however, shall the aggregate liquidated damages under this Contract for the delayed Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test exceed ten percent (10%) of the Contract Price; provided, however, that if the aggregate number of days of delay under this Article, excluding those days of delay excused by KARI in writing, should exceed sixty seven (67) days, KARI may terminate this Contract for Contractor's material breach.
- 9.4 This Article shall not affect other remedies, rights, privileges, interests, benefits of KARI under this Contract or the governing or applicable law. Contractor agrees that any right of KARI under this Article is not an alternative or substitute to other remedies, rights, privileges, or interests of KARI.
- 9.5 For the purpose of this Article, any action or omission of Contractor's Subcontractor, agent, or servant, *de facto* or *de jure*, shall be deemed to be Contractor's own.

## **Article 10. Inspection and Acceptance**

- 10.1 KARI shall have the right to carry out by itself or to appoint another qualified inspector for inspection of the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test and general progress during the manufacture, packing and preparation for shipment of the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test.
- 10.2 In the event that KARI desires to dispatch its inspector or its authorized inspector for inspection of the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test, Contractor shall make due arrangement for free access of the inspector to Contractor's workshops or Subcontractor's workshops at reasonable time. Each Party shall bear its own costs related to these inspections.
- 10.3 KARI shall be entitled to refuse to accept the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test partially or totally if the factory inspection (pre-acceptance test) as aforesaid in the Article 10.1 reveals that the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test is not in accordance with the Contract specifications, requirements or approved detailed descriptions, drawings and/or technical data involved. In such case, Contractor shall repair, replace or modify, free of charge, the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test in question to bring it into conformity with the Contract specifications, requirements or approved detailed descriptions, drawings and/or technical data, as aforesaid, and shall notify KARI when the same is ready for new inspection or test which shall be carried out under the same terms and conditions as the original inspection and pre acceptance test. Such re-inspection is welcomed by the Contractor, but the cost such as travel and accommodation expenses will be borne by KARI. Nevertheless, the failure of KARI to detect non-conformity with the Contract specifications, requirements or detailed descriptions, drawings and/or technical data during the inspection or test shall not relieve Contractor of any of its obligations under this Contract.

- 10.4 KARI shall make the final inspection (final acceptance test) upon the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test at the designated site by KARI at its expense according to the requirements of the inspection and acceptance procedure under this Contract. For the final inspection, KARI shall provide KARI Furnished Items to Contractor in time. The detailed schedule of such inspection shall be decided through mutual negotiation by the Parties.
- 10.5 In case of the failure to meet guaranteed operating specifications or if the tests reveal defective or faulty materials, design and/or workmanship attributable to Contractor and/or its Subcontractors, Contractor shall, at its own cost including airfreight, insurance, duties and taxes for customs clearance in Korea, promptly make all necessary redesign, supply and/or workmanship required to remedy such faults or defects in order to assure that the specifications are conformable to the requirements set forth in this Contract. Once the defects have been corrected, the tests shall be repeated as many times as necessary until the design specifications as aforesaid are into conformity. Costs incurred in connection with any repeated tests, whether direct or indirect, shall be borne by KARI. If there is any type of rework or extra work not attributable to the Contractor's failure, then the cost occurred will be quoted and be borne by KARI.

## **Article 11. Representations and Warranties**

- 11.1 Contractor represents and warrants to KARI that:
- a) Contractor shall provide the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test and Service in a timely and efficient manner and in accordance with the-state-of-art engineering and design industry standards and practices;
  - b) Each of its employees who are performing the Service shall be qualified and sufficiently experienced so as to provide the work competently, professionally and efficiently with the standards and practices as set forth in paragraph (a) above;
  - c) All Deliverable Items that Contractor shall provide under this Contract shall be free from all defects in workmanship and materials and shall comply with the specifications and requirements of this Contract;
  - d) Contractor shall have good title to all design, engineering or technical data or documents, and all material, and the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test provided to KARI, including, but not limited to, the Deliverable Items and Deliverable Data, free from any and all claims, demands, liens and encumbrances on title;
  - e) Neither part of the design, engineering or technical data or documents, and all material, and the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test provided to KARI, including, but not limited to, the Deliverable Items and Deliverable Data, when given and in the future, shall be the subject of any Third Party infringement claim or action; and
  - f) The warranty will not cover the damage or failure due to improper operation, lack of maintenance, unauthorized alteration, normal wear and tear, and abnormal use.
- 11.2 The warranty period hereof shall be twelve (12) months from the installation date of the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test at the designated site by KARI.

- 11.3 KARI shall notify Contractor and allow Contractor to access to the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test to assure proper handling and use under the warranty. Any action performed by Contractor under the terms of this warranty clause will not extend the warranty period.
- 11.4 Upon the receipt of written notification from KARI that Deliverable Item delivered by Contractor is defective of non-conforming, Contractor shall, for the period agreed by both Parties, immediately repair or replace, at Contractor's expense, such Deliverable Item so as to comply with the above warranties. The Contractor shall not be entitled to any additional costs incurred or to recover any damages suffered due to defect in the Deliverable Item or rejection of the Deliverable Item by KARI.

## **Article 12. Legal Compliance and Governmental Authorizations**

- 12.1 Contractor and its employees shall comply with all applicable legal requirements of any place in which any part of the work and Service under this Contract is to be done and with the legal requirements of public, municipal and other authorities in any way affecting or applicable to any work and Service performed by Contractor and its employees.
- 12.2 Unless otherwise provided for herein, Contractor shall, at its own expense, obtain any permits, licenses, approvals or certificates including any other requirements necessary for the export of Deliverable Item and for the performance of the work and Service under the Contract. Contractor shall perform the work and Service in accordance with the conditions of any applicable permits or licenses, approvals or certificates.
- 12.3 No Party shall be responsible in any way for direct or indirect consequences of any violation of law by the other Party, its Subcontractors or their officers, employees, agents or servants.
- 12.4 Contractor shall be responsible for obtaining all non-Korean governmental authorizations necessary for the performance of the Contractor's obligations hereunder in a timely manner.

## **Article 13. Non-Transfer and Use Assurances**

- 13.1 In case that any part of the Deliverable Items to be provided to KARI by Contractor under this Contract are subject to export control regimes of the exporting country for the purpose of non-proliferation of dual use articles and technology, KARI hereby assures and certifies that KARI will use the said articles and technical data only for peaceful purposes and, as an end user, except as specifically authorized by prior written approval of the relevant authorities of the exporting country, will not re-export, re-sell or otherwise dispose of the articles and technical data outside the Republic of Korea or to any Third Party. If requested by Contractor, KARI shall execute and issue to Contractor a non-transfer and end use certificate containing the said KARI's assurances.

## **Article 14. License and Ownership of Data and Information**

- 14.1 If any license or consent from Contractor or any Third Party is required to ensure KARI's right in this Article, Contractor shall grant and shall have such Third Party grant such license and consent to KARI.

- 14.2 Subject to Article 14.1 above, Contractor shall retain ownership rights in its prior existing standards, reference materials, drawings, and engineering tools, used in connection with the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test under this Contract.

## **Article 15. Suits for Infringement**

- 15.1 In the event that any suit, claim, action or proceeding against KARI and its Subcontractor arises from allegations that any proprietary rights to be provided by Contractor hereunder constitute infringement of any patent, copyright, trade secret, know-how, or any other proprietary right of any Third Party, Contractor shall defend KARI's and KARI Subcontractor's right, title and interest to the same against such suit, claim, action, or proceeding at Contractor's expense and shall hold KARI and KARI Subcontractor's harmless from any damages or losses of any kind including without limitation legal fees. If as a result of such suit, claim, action or proceeding, the proprietary rights or any part thereof is held to constitute an infringement and the use of said proprietary rights, or any part thereof, is enjoined, Contractor shall promptly, at its option and expense, either procure for KARI and KARI's Subcontractor the right to continue using said proprietary rights, or the part thereof, or replace the same with non-infringing proprietary rights acceptable to KARI.
- 15.2 The Contractor owns the intellectual property right of the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test and KARI and KARI Subcontractor shall not copy the design or allow any Third Party to copy the design for any purpose without prior written approval from the Contractor.

## **Article 16. Confidentiality**

- 16.1 Each Party agrees to keep secret and confidential all information obtained pursuant to this Contract from the other Party, which is designated as confidential by the other Party. The Parties agree to take all necessary precautions in a manner acceptable to the Party furnishing the confidential information in order to keep secret and confidential such information and to restrict its use outside and beyond the scope of this Contract; provided, however, that the above shall not apply to information which is or becomes part of the public domain or obtained from an independent source through no fault of the disclosing Party, nor shall the above restrict or prohibit the disclosure of such information to competent government authorities as is required to bring about the purposes intended by this Contract.
- 16.2 Any information derived from KARI's property in connection with this Contract, shall be kept secret and confidential and shall not, without the consent in writing of an authorized officer of KARI, be published or disclosed to any Third Party, or made use of by Contractor, except for the purpose of implementing this Contract.
- 16.3 The obligations undertaken by the Parties pursuant to this Article 16, shall survive termination of this Contract and shall remain in effect and be binding on the Parties for a period of five (5) years after the termination or expiration of this Contract except for such information as shall become part of the public domain or is received from an independent source through no fault of the Party wishing to disclose.
- 16.4 Contractor shall obtain the prior written approval of KARI concerning the content and timing of news releases, articles, brochures, advertisements, prepared speeches, and other information releases, proposed to be made by such party concerning this Contract or the work performed or to be performed hereunder. KARI shall be given a reasonable time to review the proposed text prior to the date scheduled for its release.

## **Article 17. Effectiveness of Contract**

- 17.1 The effective date of this Contract ("EDC") is the date the duly authorized representatives of the Parties have signed this Contract.
- 17.2 Any amendment to this Contract shall be effective upon signature by the duly authorized representatives of both Parties.

## **Article 18. Termination**

- 18.1 KARI may terminate this Contract upon written notice to Contractor:
- (a) if Contractor commits a material breach of any of its obligations under this Contract which shall not be remedied within thirty (30) days from the receipt of written notice by KARI requiring such breach to be remedied;
  - (b) if Contractor becomes incapable for a period of ninety (90) consecutive or aggregate days of performing any of its obligations under this Contract because of Force Majeure; or
  - (c) if Contractor or its creditors or any other eligible party shall file for its liquidation, bankruptcy, receivership, reorganization, dissolution or similar proceedings, or if Contractor is unable to pay any debts as they become due, has explicitly or implicitly suspended payment of any debts as they became due (except debts contested in good faith), or if Contractor's creditors have taken over its management, or if the relevant financial institutions have suspended Contractor's clearing house privileges.

In the event of such termination, Contractor shall return to KARI all materials, data and documentation provided by KARI, if any, at no cost to KARI, and the Contractor shall return to KARI all the amounts received from KARI up to the date of such termination.

In the event that this Contract is terminated pursuant to paragraphs (a) or (c) above, Contractor shall also pay ten percent (10%) of the Contract Price as specified in Article 4 "Contract Price" as termination charge.

- 18.2 KARI may terminate this Contract, in whole or in part, at any time for its convenience, upon reasonable prior written notice to Contractor. In case of such termination for convenience, Contractor shall be entitled to the amount paid and payable up to the date of such termination. In addition, KARI shall be entitled to the any products paid and products due as of the date of such termination.

## **Article 19. Resolution of Disputes and Governing Law**

- 19.1 In cases any controversy or claim arises out of or in relation to this Contract or with respect to a breach hereof, the Parties shall seek to resolve the matter amicably through discussions between themselves. In the event of any disagreement between KARI and Contractor about the interpretation of the provisions or definitions used in this Contract, the interpretation of KARI shall govern until and unless otherwise decided by arbitration conducted pursuant to the following provisions.
- 19.2 If the Parties cannot resolve such controversy or claim in accordance with Article 22.1 above, it shall be finally settled by arbitration under the rules of arbitration of the Korean Commercial Arbitration Board (KCAB) and the place of arbitration shall be Seoul in Korea. The proceedings shall be conducted in English. The award rendered by the board shall be final and binding on the Parties and may be entered in any court of competent jurisdiction for execution.

- 19.3 The validity, performance, construction, and effect of this Contract shall be governed by the laws of Korea.

## Article 20. Notice

- 20.1 All notices required or permitted to be given hereunder shall be made in writing, and shall be valid and sufficient if dispatched by registered airmail (postage prepaid), delivered personally, or sent by facsimile or e-mail to the following addresses:

- a) If to KARI : Korea Aerospace Research Institute  
169-84 Gwahak-ro, Yuseong-Gu  
Daejeon, 34133 Korea

Technical Matter  
Attn.: Mr. Jae Woong JANG  
Dep't: Space Test Department

Tel.: +82-42-860-2977  
Fax: +82-42-860-2234  
e-mail : jjw0302@kari.re.kr

Contract Matter  
Attn.: Mr. Won-Suk LEE  
Dep't: Procurement Team

Tel: +82-42-860-2406  
Fax: +82-42-860-2666  
e-mail : wsl@kari.re.kr

- b) If to Contractor : **Name of Contractor**  
**Address**

Technical Matter  
Attn.: **TBD**  
Dep't: **TBD**

Tel.: **TBD**  
Fax: **TBD**  
e-mail : **TBD**

Contract Matter  
Attn.: **TBD**  
Dep't: **TBD**

Tel: **TBD**  
Fax: **TBD**  
e-mail : **TBD**

- 20.2 Each Party may change its address for notice by notice given to the other Party in the manner set forth above.
- 20.3 Notices given as herein provided shall be considered effective seven (7) days after the registered postage pre-paid airmailing thereof or the day of actual receipt thereof, whichever occurs first, or on the day of personal delivery, or the day of sending if by facsimile or e-mail.

## Article 21. Miscellaneous

- 21.1 Assignment

This Contract and each and every covenant, term and condition hereof shall be binding upon and inure to the benefit of the Parties and their respective successors, and neither this Contract nor any rights and obligations hereunder shall be assignable or delegable directly or indirectly by any Party without the prior written consent of the other Party, which consent shall not be unreasonably withheld.

## 21.2 Language and Units

This Contract is executed in English and all documents, drawings, plans and any other writings as well as communication between the Parties shall be in English. Weight and measurement for deliverable documentation including Deliverable Data shall be recorded in units of metric system.

## 21.3 Entire Agreement

This Contract embodies the entire agreement between the Parties with respect to the subject matter hereof and supersedes and cancels any and all prior understandings or agreements, oral or written, in relation hereto, which may exist between the Parties. No oral explanation or oral information by any of the Parties shall alter the meaning or interpretation of this Contract.

## 21.4 Amendment

No amendment or change hereof or addition hereto shall be effective or binding on any of the Parties unless reduced to writing and executed by the respective duly authorized representatives of each of the Parties.

## 21.5 Subcontract

Each Party shall be fully responsible for the work of its Subcontractors under this Contract, and such subcontracting shall not relieve that Party of its obligation under this Contract.

## 21.6 Headings

The headings and titles in this Contract have been inserted for convenience of reference only and are not to be used in construing or interpreting this Contract.

## 21.7 Unenforceable Terms

If any term or provision of this Contract shall for any reason be invalid, illegal or unenforceable in any respect, this Contract shall be interpreted and construed as if such term or provision had never been included herein. Any remaining part of this Contract shall not be influenced by such ineffectiveness.

## 21.8 Non-Waiver

The failure or delay of any Party to require any performance by the other Party of any provision of, or of any right or obligation under this Contract, shall not constitute a waiver thereof, nor shall such affect that Party's right to thereafter require performance of such or any other provision, right or obligation.

## 21.9 Disclaimer of Agency

This Contract shall not be deemed to constitute any Party the agent of the other Party.

## 21.10 Time Limits

Unless otherwise indicated, any time limits to which this Contract binds Contractor or KARI shall be counted in calendar days from the day following that of the event marking the start of the time limit, and shall end on the last day of the period specified. When the last day of a time limit is a Saturday or Sunday, or a legal holiday in the country in which the particular contractual performance is required, such time limit shall be extended to the first working day following.

**IN WITNESS WHEREOF** this Contract has been issued in two (2) signed English originals of equivalent validity, executed on behalf of KARI and the Contractor by their respective persons authorized on that behalf.

**Korea Aerospace Research Institute**

**Name of Contractor**

**By :** \_\_\_\_\_

**By :** \_\_\_\_\_

**Name :** Dr. Gwang-Rae CHO

**Name :**

**Title :** President

**Title :**

## **Appendix B. Technical Specification & Statement of Work**

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## Technical Specification

### I. General

Waveform generators set for lightning induced transient susceptibility test will be installed in the medium EMC chamber(TH#4) in KARI.

This system is for Lightning Induced Transient Susceptibility in RTCA DO-160G Section 22 and MIL-STD-461G CS117. This test system shall be designed and almost complied in accordance with RTCA DO-160G Section 22.0 and MIL-STD-461G CS117.

All generator shall be powered by single phase 220V, 16A and weight of delivery for extension modules of WF2, WF3 and WF6 must be less than 1 kg.

Test system has an ability to test at least two (2) EUTs simultaneously in parallel and does not be allowed to include any ROHS material to harm user's health.

### II. Configuration of Goods

1. Generators : 2 sets
2. Coupling Devices : 1 set
3. System Accessories : 1 set
4. System Controller and Software : 1 set

### III. Detail Specification

#### 1. Generator set: 1 set

##### 1.1 Generator#1: 1 EA

Classification	Specification
WF1	- Rise Time: 6.4 $\mu$ s ( $\pm$ 20 %) - Half value time: 69 $\mu$ s ( $\pm$ 20 %) - Generator Setting Range: 20 A ~ 1800 A or wider - Generated level with Coupler: 20 A ~ 3180 A or wider
WF4	- Rise Time: 6.4 $\mu$ s ( $\pm$ 20 %) - Half value time: 69 $\mu$ s ( $\pm$ 20 %) - Generator output: 70 V ~ 1700 V / 340A for Pin/Ground Injection - Generated output with Coupler: FS 300~750 V SS 75 V~187.5 V or higher for cable induction test
WF5A	- Rise Time: 40 $\mu$ s ( $\pm$ 20%) - Half value time: 120 $\mu$ s ( $\pm$ 20%) - Generator Setting Range: 80A ~ 3000A or Wider - Generated level with Coupler: 80A ~ 10000A or Wider
WF5B	- Rise Time: 50 $\mu$ s ( $\pm$ 20%) - Half value time: 500 $\mu$ s ( $\pm$ 20%) - Generator Setting Range: 75A ~ 2000A or Wider - Generated level with Coupler: 75A ~ 5000A or Wider
Etc.	- Multiple stroke pattern as per DO-160G Section22 & User programmable

Note : WF means WaveForm

1.2 Generator#2: 1 EA

Classification	Specification
WF2	- Rise Time : 0.1 $\mu$ s ( $\pm$ 20%) - Tail time : 6.4 $\mu$ s ( $\pm$ 20%) - Generator output : 40V ~ 5000V or wider
WF3	- Frequency : 1 MHz ( $\pm$ 20%) - Damping : fifth amplitude 25% to 75% of largest peak - Setting Range : 80V ~ 5650V or Wider
WF3	- Frequency : 10 MHz ( $\pm$ 20%) - Damping : fifth amplitude 25% to 75% of largest peak - Setting Range : 80V ~ 4500V or Wider
WF6	- Rise Time : 0.25 $\mu$ s ( $\pm$ 20%) - Half value time : 4 $\mu$ s ( $\pm$ 20%) - Generator Setting Range : 5A ~ 160A or wider
Etc.	- Single Stroke, Multiple Stroke(user programmable), Multiple Burst

Note : WF means WaveForm

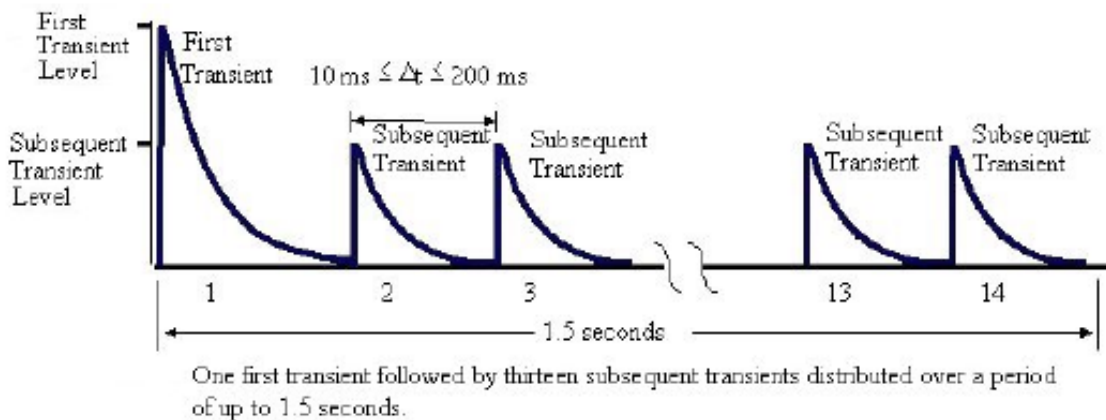
1.3 Waveform Definition

1.3.1 Waveform 1~ Waveform 6 Definition

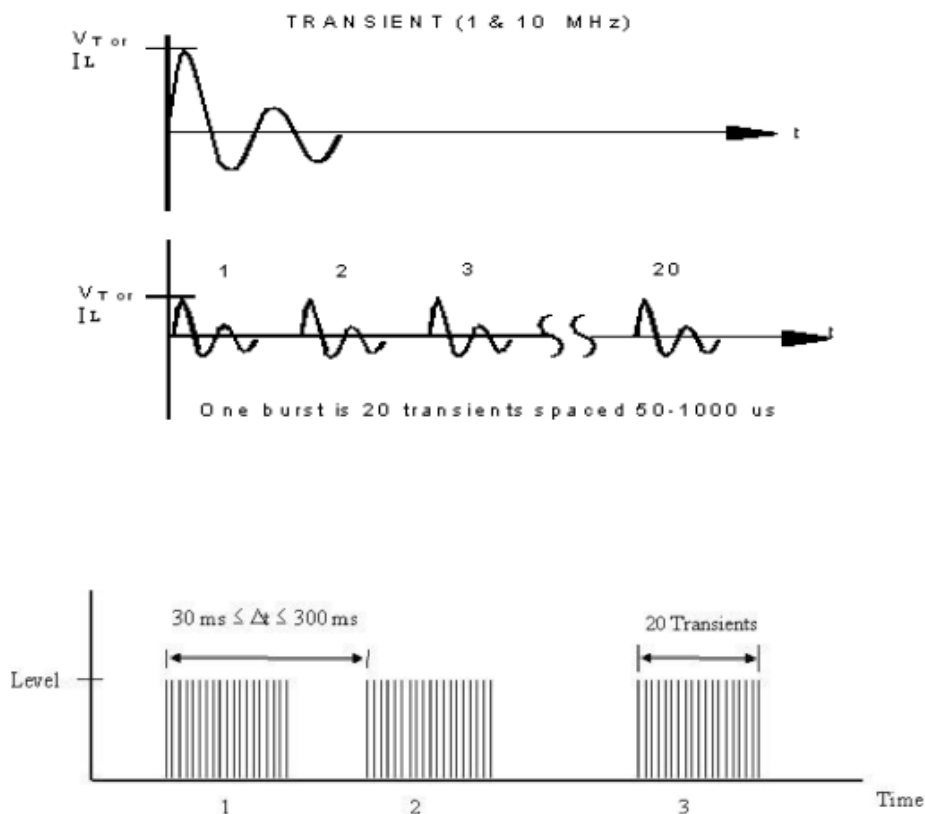
	Waveform 1(Current)	Waveform 2(Voltage)
Configuration	<p>Peak <math>i</math></p> <p><math>T1 = 6.4 \text{ microseconds } \pm 20\%</math> <math>T2 = 69 \text{ microseconds } \pm 20\%</math></p> <p>50%</p> <p>0 <math>T1</math> <math>T2</math> <math>t</math></p>	<p>Peak <math>v</math></p> <p><math>T1 = 100 \text{ nanoseconds maximum}</math> <math>T2 = 6.4 \text{ microseconds } \pm 20\%</math></p> <p>0 <math>T1</math> <math>T2</math> <math>t</math></p>
	Waveform 3(Current/Voltage)	Waveform 4(Voltage)
Configuration	<p>Largest Peak <math>v/i</math></p> <p>50%</p> <p>0 <math>t</math></p> <p>25% to 75% of Largest Peak</p>	<p>Peak <math>v</math></p> <p><math>T1 = 6.4 \text{ microseconds } \pm 20\%</math> <math>T2 = 69 \text{ microseconds } \pm 20\%</math></p> <p>50%</p> <p>0 <math>T1</math> <math>T2</math> <math>t</math></p>

Configuration	Waveform 5(Current/Voltage)	Waveform 6(Current)

### 1.3.2 Multiple Stroke Application



### 1.3.3 Multiple Burst Application



## 2. Coupling Devices

Classification	Specification
Coupling Device #1 (1ea)	- Current coupling for CI/GI test - Waveform application: WF1, WF5A, WF5B - Weight: < 60kg
Coupling Device #2 (1ea)	- Voltage coupling for CI test - Waveform application: WF4( CI up to L5), WF5A( CI up to L5), WF5B( CI up to L3) - Weight: < 200kg
Coupling Device #3 (1ea)	- Frequency Range: 10 kHz ~ 10MHz - Waveform application: WF2 & WF3 up to max. level 3200V - Weight: < 14kg
Coupling Device #4 (1ea)	- Frequency Range: 100 kHz ~ 10 MHz - Waveform application: WF2 & WF3 & WF6H - Aperture size: >7 X 7 cm - Weight: < 100kg

## 3. System Accessories

Classification	Specification
LISN (2ea)	- Comply to MIL-STD-461G CS117, DO-160G Section 22 - Frequency Range: 100 kHz ~ 30 MHz - Allowable line voltage : 250V/32A AC/DC
Sync-Adapter (1ea)	- Synchronization function with AC up to 400Hz for pin test

## 4. System Controller and Software

Classification	Specification
System Controller Set (1ea)	- Allowable line voltage : 250V/32A AC/DC
Test S/W (1set)	Generator Control S/W - perform single test - multiple tests in a sequence (at least 30 tests) - automatically generation of test report with DSO Screen dump
	Oscilloscope Control S/W - recall setting of DSO to PC - send the stored DSO setting in PC to Oscilloscope - automatic waveform capturing - automatic detecting to determine threshold of the generated level

## 5. Environment Conditions

### 5.1 Temperature condition

5.1.1 Ambient temperature : 0°C ~ 45°C

5.1.2 Storage temperature: -20°C ~ +85°C

5.2 Relative humidity : up to 95%

5.3 Location : normal laboratory environment

5.4 Operating altitude : up to 2000m above sea level

## 6 Acceptance Test

Following acceptance tests shall be performed for all delivered test systems.

### 6.1 Acceptance test procedure

6.1.1 Unpacking

6.1.2 Visual inspection

6.1.3 Installation of the Test systems in EMC chamber

6.1.4 Electricity connection

6.1.5 Oscilloscope, RF cables, probes, couplers, load and system accessories connection fitted for each test item.

6.1.6 System control line connection

6.1.7 Fill acceptance test results in the performance test report

### 6.2 Acceptance test items, level and methods

For all test items, Direct is Direct Injection, CI is Cable Induction, GI is Ground Injection, SS is Single Stroke, MS is Multi Stroke, MB is Multi Burst, L is Level, respectively. Detailed test specification and methods are defined in RTCA DO-160G Section 22 and MIL-STD-461G CS117.

#### 6.2.1 Waveform 1

Type	Injection	Event	L1	L2	L3	L4	L5
Cable Bundle	CI	SS	Yes	Yes	Yes	Yes	No
	CI	MS	Yes	Yes	Yes	Yes	Yes

#### 6.2.2 Waveform 2

Type	Injection	Event	L1	L2	L3	L4	L5
Cable Bundle	CI	SS	Yes	Yes	Yes	Yes	Yes
	CI	MS	Yes	Yes	Yes	Yes	Yes

#### 6.2.3 Waveform 3

Type	Injection	Event	L1	L2	L3	L4	L5
PIN	Direct	SS	Yes	Yes	Yes	Yes	Yes
Cable Bundle	CI	SS	Yes	Yes	Yes	Yes	Yes
	CI	MS	Yes	Yes	Yes	Yes	Yes
	CI	MB	Yes	Yes	Yes	Yes	Yes

6.2.4 Waveform 4

Type	Injection	Event	L1	L2	L3	L4	L5
PIN	Direct	SS	Yes	Yes	Yes	Yes	Yes
Cable Bundle	CI	SS	Yes	Yes	Yes	Yes	Yes
	CI	MS	Yes	Yes	Yes	Yes	Yes
	GI	SS	Yes	Yes	Yes	Yes	Yes
	GI	MS	Yes	Yes	Yes	Yes	Yes

6.2.5 Waveform 5A

Type	Injection	Event	L1	L2	L3	L4	L5
PIN	Direct	SS	Yes	Yes	Yes	Yes	Yes
Cable Bundle	CI	SS	Yes/Current				No
	CI	MS	Yes/Current				
	GI	SS	Yes	Yes	Yes	Yes	Yes
	GI	MS	Yes	Yes	Yes	Yes	Yes

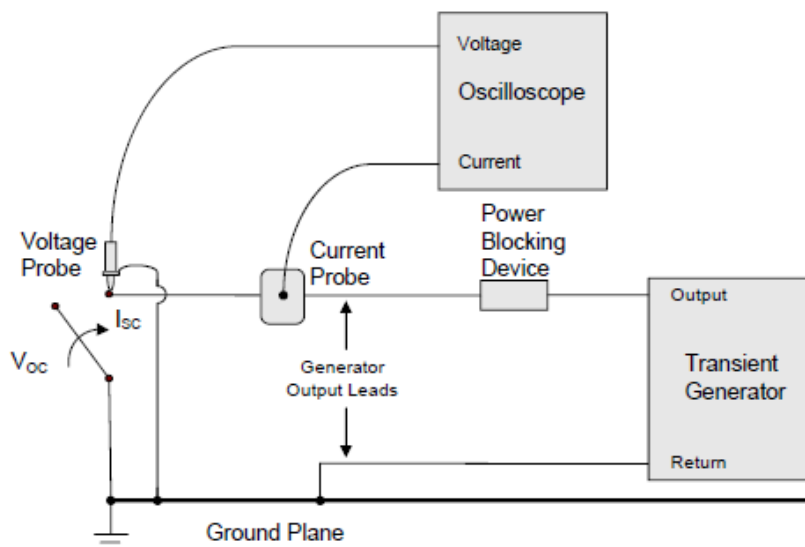
6.2.6 Waveform 6

Type	Injection	Event	L1	L2	L3	L4	L5
Cable Bundle	CI	MB	Yes	Yes	Yes	Yes	Yes

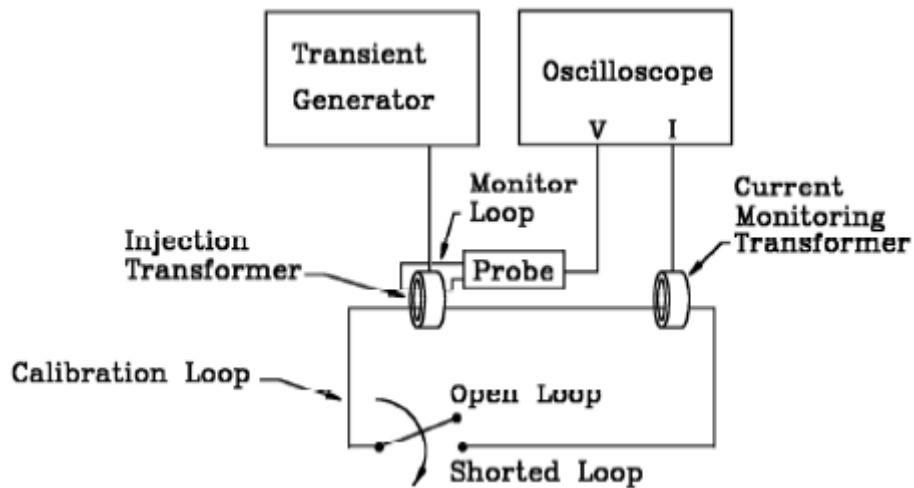
6.3 If needed by request of a purchaser, Factory Acceptance Test shall be performed in the place of production.

6.4 Verification Setup for Acceptance Test

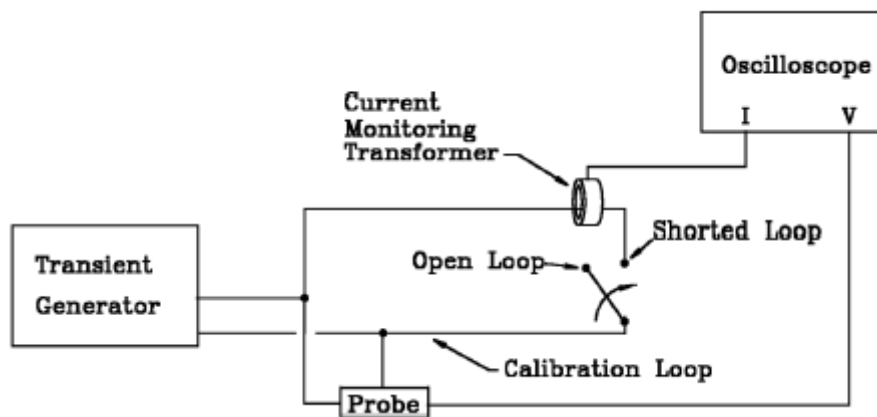
6.4.1 Pin Injection Calibration Setup, Signal Pins and Power Pins Direct Injection Method



## 6.4.2. Typical Generator Performance Verification Setup for Cable Induction Tests



## 6.4.3. Typical Generator Performance Verification Setup for Ground Injection Tests



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## Statement of Work

### 1. Overview

- (1) This Statement of Work (SOW) defines the tasks to be performed by the Contractor to provide Lightning Induced Transient Susceptibility Test Equipment. Along with this SOW, the Contractor shall perform all tasks necessary to completely install and successfully operate Lightning Induced Transient Susceptibility Test.
- (2) The main undertakings of the project are to perform factory and site acceptance tests, install, guarantee quality and training of test equipment, etc.
- (3) All the descriptions in this SOW are minimum requirements.

### 2. Procedures of the Work

The Contract shall be progressed with five (5) steps as follows:

- (1) Organization of waveform generators set including generators, attenuator boxes, transformers, probes and extend modules, etc.
- (2) Factory acceptance test & safety plan verification
- (3) Transportation
- (4) Installation at KARI
- (5) Final acceptance test at KARI according to supplied test procedure & previous test results

### 3. Scope of Work

The Contract is on turnkey base and the Contractor shall provide the work as follows;

- (1) Engineering work of the equipment,
- (2) Manufacture, assembly and turnkey delivery of the equipment,
- (3) Parts and particular instruments necessary to operate the equipment,
- (4) Installation work and acceptable test at Factory and KARI site,
- (5) Contract management, site operation, cooperation with KARI,
- (6) Basic principle, operation, warranty, maintenance, repair, safety and training for the equipment,
- (7) Relevant books and manuals, and
- (8) Other necessary matters required for acquiring and installing the equipment (including checking of AITC building interface and construction).

### 4. Work Schedule

The Contract shall submit the detailed work schedule and specially, the work schedule at KARI site shall be confirmed by KARI for avoiding overlap with KARI's other test schedules.

### 5. Quality Warranty

The Contractor should carry out all items described in the master plan for quality warranty of the proposal in order to guarantee the quality of the manufactured equipment.

- (1) The system shall be warranted for the duration of one (1) year from the date of definitive acceptance on the site against any operational faults. The date of acceptance is the date when the whole system is completely installed and its function is approved perfect in a written format by KARI or its representative.
- (2) The warranty covers the replacement of faulty parts, the labor required for repair, traveling cost, living fees and all associated necessary costs.

- (3) The contractor or A/S teams shall submit the written plan for repair within forty eight (48) hours after the reception of the notification of fault. The contractor or A/S teams shall completely finish the repair within thirty (30) days after the reception of the notification of fault.
- (4) For an urgent service during important testing period, the deadline for action is five (5) days from the reception of the notification of service. To meet the deadline of the urgent service, KARI will notify the contractor of the test start date and the period two (2) weeks before the test start date.

## **6. Training**

During or before final acceptance test, the Contractor should carry out training for operator(s) who is(are) going to be designated by KARI. Training and verification on delivery of Deliverable Items shall be provided with more than two (2) weeks by well experienced engineer who has dealt with more than (2) systems for more than five (5) years.

## **7. Delivery and Installation**

After completing the domestic installation by Contractor, the Contractor shall perform the test working of the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test (final acceptance test) with KARI's presence and demonstrate to KARI that there is no problem on the Equipment.

## **8. Documents for Submission in Delivery**

The following documents written in English should be submitted when the Satellite EMC Test Equipment for Lightning Induced Transient Susceptibility Test is delivered.

- (1) Calibration and verification data of delivery of items including WF1~WF6 and all possible test level
- (2) Operating manual