

Request For Proposal

RF Power Amplifiers Set for GK2 System EMC Test

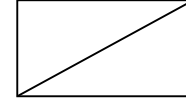


May 2016

Space Test Department
Korea Aerospace Research Institute

169-84 Gwahakro, Yuseung-gu, Daejeon, 34133, KOREA
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Request For Proposal
for



RF Power Amplifiers Set for GK2 System EMC Test

IMPORTANT

1. This RFP should be kept in confidentiality and should neither be copied nor distributed to the third parties.
2. The questions and opinions on this RFP can be asked or suggested to Korea Aerospace Research Institute before submission of the proposal.
3. This RFP shall be legal bind after the contract is awarded unless the bidder explicitly expresses the differences from the RFP in the compliance sheet.

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I. Overview

1. Overview of the project

- 1.1. Korea Aerospace Research Institute (hereinafter referred to as "KARI") is located at Daeduk Research Complex, 140 km south of Seoul.
- 1.2. 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.
- 1.3. The purpose of this project is to install RF power amplifier systems, remote control panel, relating cable lines and Bi-directional couplers installed in amplifier room of the Large EMC chamber(LEMC).
- 1.4. The main undertakings of the project are to perform factory and site acceptance tests, install, guarantee quality and training, etc.
- 1.5. The supply should submit the business showings of the installing the power amplifier & control system.
- 1.6. 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.

2. Procedures of the project

2.1. The project shall be proceeded with five parts as follows:

2.1.1. Organization of power amplifiers, external directional couplers, control panel and accessories including waveguides.

2.1.2. Factory acceptance test & safety plan verification

2.1.3. Transportation

2.1.4. Installation at KARI

2.1.5. Final acceptance test at KARI according to supplied test procedure & previous test results

2.2. The participants shall submit the detailed work schedule for article

2.2.1. Specially, the work schedule at KARI shall be confirmed by KARI for avoiding overlap with KARI's other test schedules.

2.3. The format of proposal

2.3.1. The participants shall submit 6 copies of a detailed proposal and a price proposal to KARI according to the format and contents satisfying the requirements stipulated in this RFP.

2.3.2. The compliance sheet with the requirement of this RFP shall certainly be included in the proposal.

Table 1. Statement of Compliance Format

RFP Sections	Descriptions	Proposal Sections	Compliance Status	Remarks
RFP section	Title or contents	Proposal section and page number	C: Fully comply NC: Not comply PC: Partial comply	Key performance, summary shall be Described

2.3.3. The price Proposal shall be submitted to KARI in a separate envelope.

2.3.4. The participants shall make out a proposal with their own writing.

2.3.5. The language shall be English or Korean.

2.4. The proposal shall be delivered to KARI before the due date for submission.

2.5. All proposals and documents submitted shall become the property of KARI.

3. Requisites of participants

3.1. The participants shall provide the introduction of the company about general organization, and company's resources including financial status.

3.2. The participants shall have experience of installation, operation, arranging, integration of power amplifiers(which are equal or more power amplifiers in this proposal) to be installed in EMC chamber.

4. Scope of the contract

4.1. The project is on turnkey base and the proposal shall include the following;

4.1.1. Engineering work of the equipment

4.1.2. Manufacture, assembly and turnkey delivery of the equipment

- 4.1.3. Parts and particular instruments necessary to operate the equipment
- 4.1.4. Installation work and acceptance test at factory & KARI site
- 4.1.5. Project management, site operation, cooperation with KARI
- 4.1.6. Basic principle, operation, warranty, maintenance, repair, safety and training for the equipment
- 4.1.7. Relevant books and manuals
- 4.1.8. Other necessary matters required for acquiring and installing the equipment (including checking of AITC building interface and construction)

5. Warranty

- 5.1. The system shall be warranted for a duration of 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.
- 5.2. The warranty covers the replacement of faulty parts, the labor required for repair, traveling cost, living fees and all associated necessary costs.
- 5.3. The contractor or A/S teams shall submit the written plan for repair within 48 hours after the reception of the notification of fault. The contractor or A/S teams shall completely finish the repair within 30 days after the reception of the notification of fault.

- 5.4. For an urgent service during important testing period, the deadline for action is 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 2 weeks before the test start date. The contractor shall stand by the A/S crews at contractor's convenient place during the test period (up to 4 weeks).The contractor shall include a plan for these requirements in the proposal.
- 5.5. To meet these requirements, the contractor shall propose a detailed plan for the prompt repair in the proposal. The detailed information (location, number of crews, resume, phone and FAX numbers, e-mail address, etc.) of the A/S teams shall be shown in the proposal and shall be approved by KARI.

6. Product supply schedule

The contractor shall meet the key points schedule as below;

(The supply schedule can be adjusted based on the building construction schedule in KARI)

Items	Key Points Schedule
RF Power amplifiers set	<ul style="list-style-type: none"> - Arrival at KARI : before the end of December 2016 - Installation & Finish site acceptance : before the end of February 2017

II. TECHNICAL REQUIREMENTS

1. General

Power amplifiers will be installed in amplifier room of Large EMC chamber(LEMC, TH#11) in KARI as shown in Figure 2.1 & 2.2.

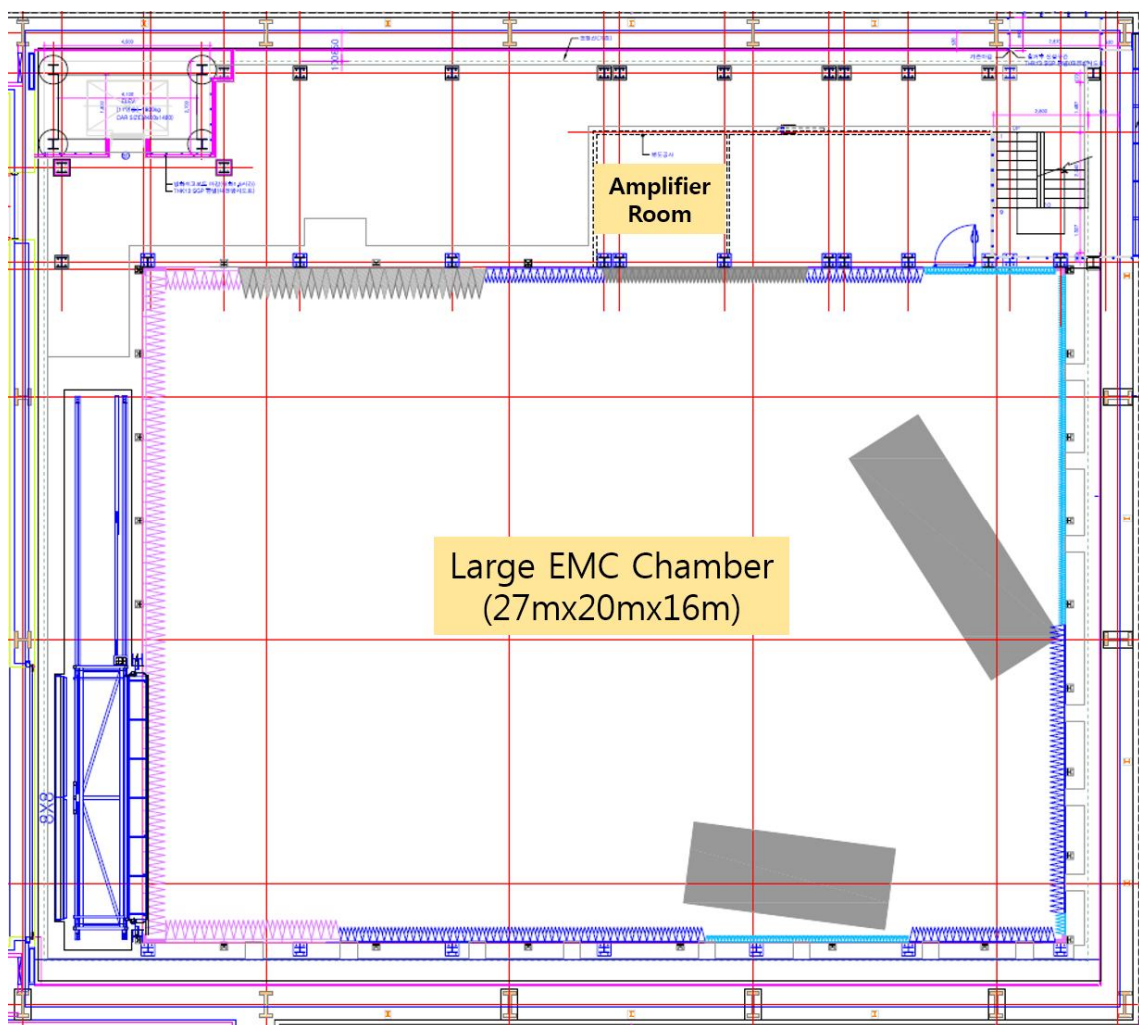


Fig. 2.1 Expected amplifier position in EMC chamber of KARI

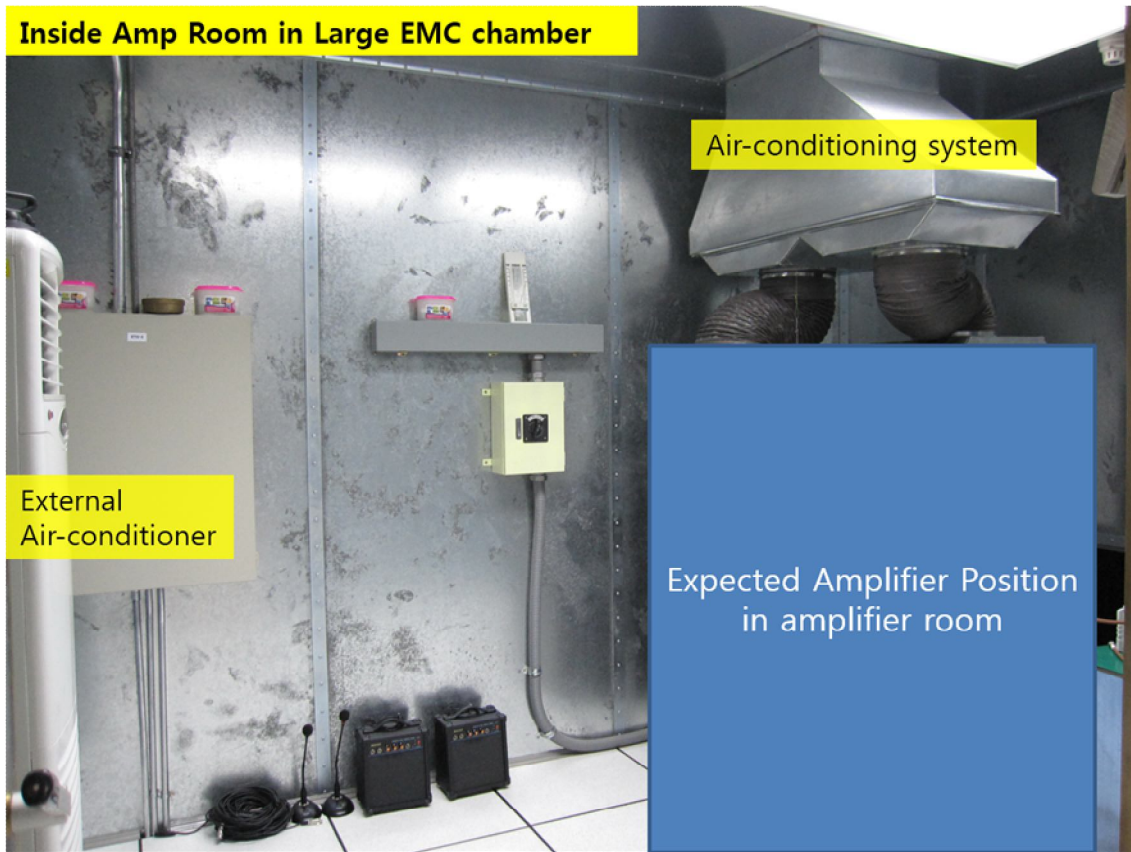


Fig. 2.2 Power amplifier configuration example in Amplifier room

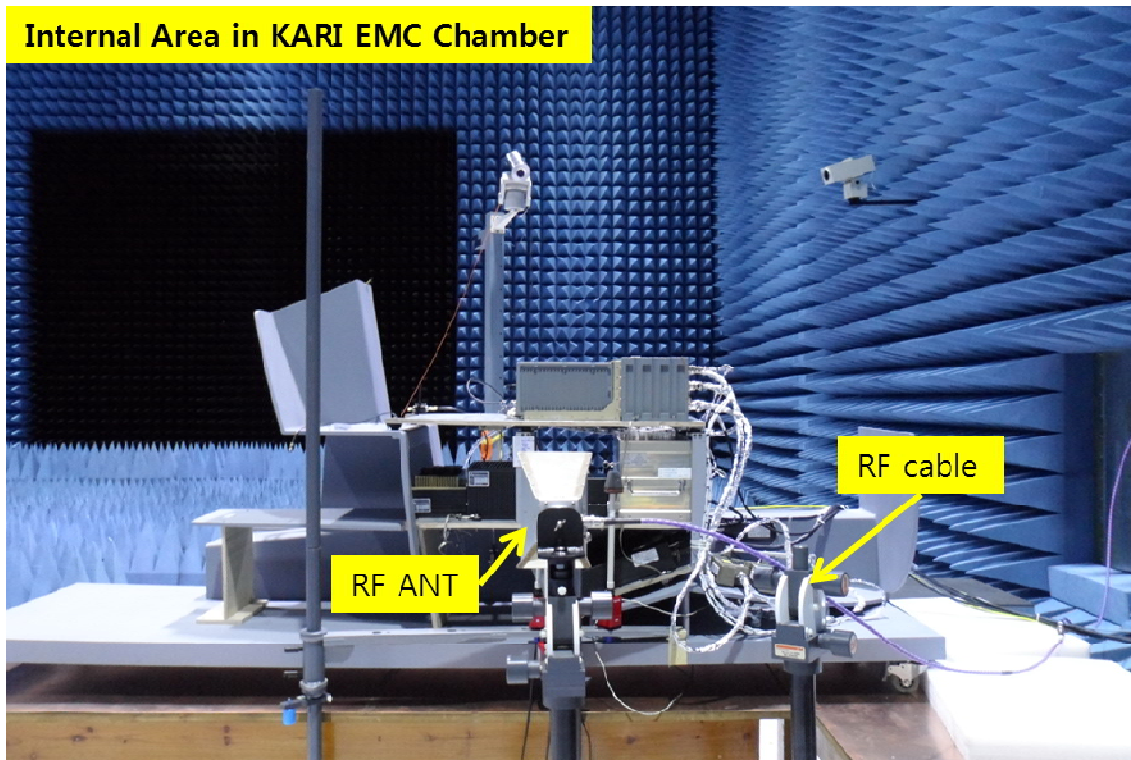


Fig. 2.3 RF connection in EMC chamber(example)

2. DETAIL SPECIFICATION

(1) System concept

- A. Modular "construction system" enables individual combinations with almost unlimited flexibility
- B. Platform concept allows compact system dimensions for customized configurations
- C. Integral overall system design
- D. RF adapted design
- E. Rugged mechanical design

- F. Required to efficient cooling
- G. Flexible remote control : TTL, IEEE 488.2, RS-232C, USB and LAN TCP/IP
- H. MIL-Standard based system design in correspondence with instrument safety regulations (VDE, CE)

(2) Environment condition

- A. Temperature condition
 - i. Ambient temperature : 0°C ~ 45°C
 - ii. Storage temperature: -20°C ~ +85°C
- B. Relative humidity : up to 95%
- C. Location : normal laboratory environment
- D. Operating altitude : up to 2000m above sea level

(3) Composition

A. RF Power amplifiers

Power amplifiers are composed by following items. Six amplifiers cover frequency ranges of 4 kHz ~ 18 GHz. Output power for each amplifiers is described in Table 3.1.

Table 3.1 RF Power amplifiers set

Equipment	Operating Frequency	Output Power ^{Note1)}	Remark
AMP 1	4 kHz ~ 400 MHz	More than 150 W ^{Note2)}	RS/CS test
AMP 2	10 kHz ~ 200 MHz	More than 5,000 W ^{Note3)}	Radiated susceptibility test
AMP 3	200 MHz ~ 1 GHz	More than 1,200 W	Radiated susceptibility test
AMP 4	1 GHz ~ 2.5 GHz	More than 250 W	Radiated susceptibility test
AMP 5	2 GHz ~ 8 GHz	More than 250 W	Radiated susceptibility test
AMP 6	8 GHz ~ 18 GHz	More than 250 W	Radiated susceptibility test

Note1) All output power mean output power @ 1dB compression point over the operating frequency range

Note2) 60W (4kHz – 9kHz), 150W (9kHz – 400MHz)

Note3) 5,000W(9kHz – 100MHz) / 4,000W(100MHz – 220MHz)

B. External directional coupler

Directional coupler can be used to monitor fwd/rev power in output port of power amplifier. Power Handling Capability for each couplers is described in Table 3.2.

Table 3.2 External direction couplers

Equipment	Operating Frequency	Power Handling Capability
Coupler 1	4 kHz ~ 400 MHz	More than 150 W
Coupler 2	10 kHz ~ 200 MHz	More than 5,000 W
Coupler 3	200 MHz ~ 1 GHz	More than 1,200 W

Coupler 4	1 GHz ~ 2.5 GHz	More than 250 W
Coupler 5	2 GHz ~ 8 GHz	More than 250 W
Coupler 6	8 GHz ~ 18 GHz	More than 250 W

C. RF Power Amplifier System Technical Specifications and Acceptance Test Reports

D. Accessories

- i. RF cable from AMP2 output to Access Panel (1ea)
- ii. RF cable from AMP3 output to Access Panel (1ea)
- iii. Waveguide adapter(WRD 750 to Precision N) for AMP6
1ea
- iv. Movable Rack for easily handling of AMP4, AMP5, AMP6
- v. Controlling Units(2ea) for monitoring & handling RF Power amplifier set

(4) Electrical Specification

A. Power amplifiers

Delivered power amplifiers should have performances more than defined value in table 4.1 and 4.2.

Table 4.1 Electrical specification in low frequency power amplifiers

Item	Specification		
	AMP1	AMP2	AMP3

Frequency Range	4kHz – 400MHz	9kHz~220MHz	200MHz~1000MHz
Output Power	More than 150W at 1dB compression point over the operating frequency range ^{note1)}	More than 5,000W/4,000W at 1dB compression point over the operating frequency range ^{note2)}	More than 1,200W at 1dB compression point over the operating frequency range
Gain	47.8 dB (4kHz – 9kHz) 51.8 dB (9kHz – 400MHz)	minimum 67 dB	minimum 60 dB
Harmonics	20dBc for 2nd harmonic 20dBc for 3rd harmonic	20dBc for 2nd harmonic 20dBc for 3rd harmonic	20dBc for 2nd harmonic 20dBc for 3rd harmonic
Line Power		Less than 35 kVA	12.5 kVA
Spurious (at PN)	-50 dBc typical (excluding harmonics)	-60 dBc typical (excluding harmonics)	-50 dBc typical (excluding harmonics)
Class of Operation	A-linear or AB-linear	A-linear	A-linear or AB-linear
Overdrive Protection	up to +10 dBm for no damage	up to +10 dBm for no damage	up to +10 dBm for no damage
Input Impedance	50 Ohm nominal	50 Ohm nominal	50 Ohm nominal
Output Impedance	50 Ohm nominal	50 Ohm nominal	50 Ohm nominal
Input VSWR	<2:1 maximum	<2:1 maximum	<2:1 maximum
Load VSWR	2:1 maximum	6:1 maximum without foldback	2:1 maximum
RF Input	N(female)	N(female)	N(female)

RF Output	N(female)	EIA 1 5/8-f, standard on rear panel	7-16-f, standard on rear panel
Main Supply Power	200 – 264 V AC ± 10% / 47-63Hz	3 × 380V AC, 60Hz	3 × 380V AC, 60Hz

Note1) 60W (4kHz – 9kHz), 150W (9kHz – 400MHz)

Note2) 5000W(9kHz – 100MHz) / 4000W(100 – 220MHz)

Table 4.2 Electrical specification in high frequency power amplifiers

Item	Specification		
	AMP 4	AMP 5	AMP 6
Frequency Range	1 GHz~2.5 GHz	2 GHz~8 GHz	8 GHz~18 GHz
Output Power	More than 250 W at 1 dB compression point over the operating frequency range	More than 250 W at 1 dB compression point over the operating frequency range	More than 250 W at 1 dB compression point over the operating frequency range
Gain	62 dB ± 7.5 dB	62 dB ± 7.5 dB	62 dB ± 7.5 dB
Harmonics	4 dBc for 2nd harmonic 12 dBc for 3rd harmonic	1 dBc for 2nd harmonic 5 dBc for 3rd harmonic	8 dBc for 2nd harmonic 20 dBc for 3rd harmonic
Line Power	3000 VA	3000 VA	1500 VA
Spurious (at PN)	-50 dBc typical (excluding harmonics)	-50 dBc typical (excluding harmonics)	-50 dBc typical (excluding harmonics)
Class of Operation	A-linear	A-linear	A-linear
Overdrive	up to +10 dBm for no	up to +10 dBm for no	up to +10 dBm for no

Protection	damage	damge	damage
Input Impedance	50 Ohm nominal	50 Ohm nominal	50 Ohm nominal
Output Impedance	50 Ohm nominal	50 Ohm nominal	50 Ohm nominal
Input VSWR	<2:1 typical	<2:1 typical	<2:1 typical
Load VSWR	2:1 maximum	2:1 maximum	2:1 maximum
RF Input	N(female)	N(female)	N(female)
RF Output	N(female)	N(female)	WRD 750
Main Supply Power	200~264 VAC /47~63 Hz	200~264 VAC /47~63 Hz	200~264 VAC /47~63 Hz

B. Directional Coupler

Delivered directional couplers should have performances more than defined value in Table 4.3 and 4.4

Table 4.3 Electrical specification in low-frequency directional coupler

Item	Directional Coupler Specification		
	Coupler 1	Coupler 2	Coupler 3
Frequency range	4 kHz to 400 MHz	9 kHz to 200MHz	80 MHz to 1,000 MHz
Power handling capability	200 W	5,000 W	1,500 W
Coupling	40 dB \pm 0.5 dB	60 dB \pm 1.0 dB	50 dB \pm 0.3 dB
Insertion loss	<0.5 dB	<0.1 dB	<0.1 dB

Ripple	±1 dB	±1 dB	±0.5 dB
VSWR(max.)	1.25 : 1	1.3 : 1	1.1 : 1
RF interface	N(female)	EIA 1 5/8"	7-16(female)

Table 4.4 Electrical specification in high-frequency directional coupler

Item	Directional Coupler Specification		
	Coupler 4	Coupler 5	Coupler 6
Frequency range	1 GHz~4 GHz	2 GHz~8 GHz	8 GHz~18 GHz
Power handling capability	More than 500 W	More than 500 W	More than 500 W
Coupling	50 dB ± 1 dB	50 dB ± 1 dB	50 dB ± 1 dB
Insertion loss	<0.2 dB	<0.2 dB	<0.2 dB
VSWR(max.)	1.3:1	1.3:1	1.1:1
Ripple	± 1.0 dB	± 1.0 dB	± 1.0 dB
RF interface	N type	N-type	WRD W/G connector

C. RF Accessories

- RF cable from AMP2 output to Access Panel (1ea)
- RF cable from AMP3 output to Access Panel (1ea)
- Waveguide adapter(WRD 750 to Precision N) for AMP6
1ea
- Movable Rack for easily handling of AMP4, AMP5, AMP6
- Controlling Units(2ea) for monitoring & handling RF
Power amplifier set

(5) RF Power amplifier system structure

- A. Power stage
 - D/C Bias supply power source
- B. Control stage
 - Diagnostic function
- C. Driver module
 - Amplifier stage to drive high-power
- D. Final stage
 - Including output combiner

(6) RF characteristics

- A. System parameters specified at rated output power (harmonic distortion, spurious, power consumption etc.)
- B. Standard operating range up to +45°C without degradation
- C. Isolation of all individual RF transistors for optimum protection against extreme mismatch and for providing a fault tolerant system layout
- D. VSWR optimized PIN-diode switches for optimum RF matching
- E. Reliable continuous operation without degradation including +45°C

(7) Power supply

- A. Distributed design supporting a fault tolerant concept allows continued operation with degraded performance
- B. Individual power drains for all output transistors
 - i. Ideal supply conditions (individual sense lines)
 - ii. Separate current and voltage limiting
 - iii. Protection of output transistors against extreme mismatch
- C. Enhanced efficiency for reduced source power requirements
- D. Optimum supply and perfect protection of amplifier stages

(8) Mechanical design

- A. RF modules milled from solid
 - i. RF shielding
 - ii. heat dissipation
 - iii. RF grounding
- B. Massive base plates
 - i. thermal sources (transistors and load resistors) are directly soldered onto massive base plates
- C. All metal parts protected by surface passivation
 - i. protection from oxidation (corrosion)
 - ii. excellent long term system stability
 - iii. perfect system grounding

- D. Compact and rugged mechanical design for mobile applications (ground, seaborne and airborne)

(9) Cooling System Design

- A. Standard air cooling
 - i. special high efficiency heat sinks with double side assembling
 - ii. highly efficient straight air flow
 - iii. compact system layout
- B. External Heat Exchangers convection cooling up to +50°C
 - i. no high capacity required for conventional air condition
 - ii. less power consumption
 - iii. compact size (compared to compression type)
- C. Optimum system cooling to ensure high reliability and extended lifetime

(10)Acceptance Test and Training

Following acceptance test shall be performed for all delivered amplifiers.

- A. Acceptance inspection
 - i. Unpacking
 - ii. Visual inspection
 - iii. Installation of the Amplifier in EMC chamber

- iv. Electricity connection
- v. RF cable connection
- vi. After attaching Dummy load which is provided by vendor, output power check
- vii. Remote control line connection
- viii. Fill acceptance test results in the performance test report sheet of appendix

B. Acceptance test items and methods

- i. Electricity Availability
 - (a) KARI input power : single phase 200 V~220 V AC, 60Hz
AND 3 phases 380V AC, 60Hz
 - (b) Confirm Power amplifier operation availability with KARI electrical source
- ii. Visual inspection
 - (a) Rack size considering amplifier room
 - (b) Exterior damage
 - (c) Shape availability
 - (d) Mobility through wheels
 - (e) Internal air circulation panel
 - (f) Physical interface of RF input/output port
- iii. VSWR

For each power amplifier, VSWR of input/output ports shall be less than 2:1.

VSWR	AMP1	AMP2	AMP3	AMP4	AMP5	AMP6
Input	<2:1	<2:1	<2:1	<2:1	<2:1	<2:1
Output	<2:1	<6:1 without foldback	<2:1	<2:1	<2:1	<2:1

iv. Input overload

- (a) Check of damage or not input power of 10 dBm for sampling frequency
- (b) Sampling frequency means selection of frequency more than 1 point for frequency range of 100 MHz

v. Remote control interface

- (a) Check the remote control availability using GPIB interface module (production of KARI)
- (b) Function of Power ON/OFF, HV ON/OFF should be implemented using remote control

vi. Check of Output power

- (a) Output power linear region(@1 dB compression) of power amplifiers shall be more than following specification.

	AMP1	AMP2	AMP3	AMP4	AMP5	AMP6
Output power	>150W ^{Note1)}	>5,000W ^{Note2)}	>1,200W	>250W		

Note1) 60W (4kHz – 9kHz), 150W (9kHz – 400MHz)

Note2) 5000W(9kHz – 100MHz) / 4000W(100 – 220MHz)

(b) Sampling frequency means selection of frequency more than 1 point for frequency range of 100 MHz

vii. Check of gain

(a) Gain of power amplifiers shall be more than following specification.

	AMP1	AMP2	AMP3	AMP4	AMP5	AMP6
Gain	>47.8dB	>67dB	>60dB	>54dB	>54dB	>54dB

(b) Sampling frequency means selection of frequency more than 1 point for frequency range of 100MHz

viii. Check of harmonic

(a) Spurious(excluding harmonics) of power amplifiers shall be more than following specification.

	AMP1	AMP2	AMP3	AMP4	AMP5	AMP6
Spurious	<-50dB	<-60dB	<-50dB	<-50dB	<-50dB	<-50dB

(b) Sampling frequency means selection of frequency more than 1 point for frequency range of 100MHz

ix. Durability

- (a) After the power amplifier is operating during 2 hours, technical performance should be maintained.
- (b) Technical performance includes as follows :
 - Transducer gain
 - Output power
 - Harmonic

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

III. Bidder Instruction

1.1. Qualification of Bidders

- (1) Bidder shall have experience of installation, operation, arranging, integration of power amplifiers(which are equal or more power amplifiers in this proposal) to be installed in EMC chamber.
- (2) The qualifying statement for above requirements and support materials shall be included in the Proposal.
- (3) Bidder shall be in possession of all the necessary licenses, in effect as of the Bid Closing Date, required for the development of RF Power amplifier as described in this RFP.

1.2. Submittal of Proposal

The proposal shall be hand-carried or sent via appropriate express courier to KARI personnel or his designee within the Bid Closing Date and Time. A deputy shall submit the power of attorney and a copy of his identification.

1.2.1. Number of copies

The Proposal should be made in six (6) copies of technical proposal and one (1) of price proposal in English. In case of any discrepancies between the Proposals, the original hardcopy shall prevail.

1.2.2. Bid closing date

The closing time for the Proposal is June 07, 2016 14:00 local time. If any part of the Proposal as required under this RFP is submitted after the stipulated closing time, the entire Proposal will be deemed late. KARI in its absolute discretion may exclude any late from further consideration.

1.2.3. Point of contact

Besides the Proposal submission, the point of contact for all communications for technical matters shall be

Mr. Jae-Woong JANG
Space Test Division
Korea Aerospace Research Institute (KARI)
169-84 Gwahakro, Yuseong-Gu

Daejeon, 34133, Korea
Tel : +82-42-860-2977
Fax: +82-42-860-2234
E-mail : jjw0302@kari.re.kr

The communication between KARI and prospective Bidders for contractual matters (Terms and Conditions) shall be controlled through the following designee:

Mr. Jung-Nam CHO
Senior Administrator of Procurement Team
Korea Aerospace Research Institute (KARI)
169-84 Gwahakro, Yuseong-Gu
Daejeon, 34133, Korea
Tel : +82-42-860-2613
Fax: +82-42-860-2666
E-mail : jncho@kari.re.kr

Bidder's information on the points of contact shall include the name, title/position, telephone number, E-mail address, and facsimile number.

1.2.4. Information on the evaluation

The evaluation of the Proposals will be performed by the evaluation committee in KARI. The following evaluation guidelines are for information only, and the evaluation committee reserves the right to modify the guidelines without any prior notification to Bidders.

Principles of evaluation are as follows;

- (1) Subject to an initial review of the Proposal, KARI may send to Bidders a set of questions for clarification and supplementation to the Proposal, and the evaluation will be made based on the Proposal and the answers received from Bidders.
- (2) The evaluation will be performed for the technical part of the proposal first, and the price proposal will be evaluated considering the quality of proposed technology and work package contents.
- (3) The evaluation committee may select a few best qualified and compliant Proposals and may request the selected Bidders to submit

the best and final Proposal including cost adjustments to the items needed for normalization of the work to be performed and the specifications to be achieved.

- (4) The evaluation will be based on the baseline work scope. Any optional propositions will be evaluated separately.
- (5) The result of the evaluation is at the proposal evaluation committee's discretion based on the evaluation process and any Bidders shall not raise any objection regarding proposal evaluation committee's decision thereupon.

1.3. Validity of Proposal

Proposal shall be valid for three (3) months from the Bid closing date and upon KARI's request, shall be extended for another three (3) months.

1.4. Bid Bond

1.4.1. Amount of Bid Bond

Bidder shall establish a bid bond in favor of KARI not later than the Bid Closing Date and submit the certificate to KARI along with this Proposal. The total amount of the bid bond shall be at least five (5) percent of the total bidding price. The bid bond shall remain valid for three (3) months, and if the Bid validity is extended as per Section 1.3, the bid bond shall also be extended accordingly.

1.4.2. Bid Bond Establishment Method

The bid bond in Section 1.4.1 hereinabove shall be issued by the Seoul Guarantee Insurance Company in the form of a surety bond or by first class international bank in the form of an irrevocable letter of credit and advised through "Woori Bank" (Daejeon Branch at 29 Munye-ro, Seo-gu, Daejeon, 35241 Korea, Tel: +82-42-488-9704, Ext. 312 / Fax:+82-505-003-0759). 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 with the statement of KARI stating that Bidder has refused to enter into a Contract with the terms and conditions in the RFP as amended, if any, that Bidder has hindered the fair bidding by fraud or misrepresentation, or that 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.

1.4.3. Bid Bond Return

The bid bonds will be released upon the instructions of KARI, without interest, promptly after KARI's selection of the Successful Bidder.

1.4.4. Contractor's Bid Bond

When the Contract is executed, the bid bond shall be released upon the instructions of KARI to the Contractor, without interest, promptly after the Contractor shall established a performance bond in favor of KARI.

1.5. Questions and Modifications

Any questions as to the intent and clarity of the RFP may be asked to KARI's point of contact as specified in Section 1.2.3 by E-mail, fax or letter before the Bid Closing Date.

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

KARI may ask, in writing, questions as to the intent and clarity of the Proposal to Bidders or request the Bidders to provide supplementary information or data.

1.6. 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 Bidder regardless of whether or not Bidder is successful in receiving an award as a result of the solicitation.

1.7. Acceptance/Rejection of Bids

KARI reserves the right to accept or reject any Bidding, and to amend the Bidding process and reject all Biddings 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.

1.8. Selection of Successful Bidder

The Successful Bidder will be selected by the evaluation committee among the Bidders subject to the evaluation of the Proposals.

1.9. Contract

The Contract period for the Development and Procurement of the RF Power amplifiers Set for Large EMC Test Facilities will be from EDC to the installation and Site Acceptance.

The Terms and Conditions as presented in Chapter IV. of this RFP is the baseline requirement for the Contract negotiation, and will be the basis of the Contract.

1.10. Language and Measurement Unit

The Proposal and any documents submitted to KARI under this RFP and communication and the Contract language shall be in English or Korean.

"Système Internationale" (SI, hereafter) units shall be used for measurements and quantities in the Proposal and all the accompanying documents.

1.11. Pricing Requirements

Any price or rate proposed by Bidder shall be firm and fixed, not subject to change for a price escalation for the entire period of the Contract.

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

The price shall be inclusive of any cost or charge incurred due to delivery of any equipment, hardware, software or documentation to KARI or its designated point of delivery.

1.12. Certificate and Government Approvals

Bidders shall receive the government approval and certificates (e.g. E/L) in relevant countries, necessary for Bidder's work for the Development and Procurement of the RF Power amplifiers Set. Bidder's ability and plan to get such approval and certificates shall be submitted to KARI, together with any appropriate assurance letters from the relevant governments, in the proposal.

1.13. Confidentiality

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

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 RFP shall be kept confidential, and shall not be intentionally disclosed by Bidder to the third parties.

1.14. 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.

1.15. Property of Proposal

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

1.16. Expenses

Expenses incurred by Bidders in connection with the preparation, submittal, and any subsequent clarification or negotiation activities are for their own account and will not be reimbursed by KARI.

1.17. Governing Law

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

1.18. Arbitration

Any disputes in relation to, and under the RFP and the Contract shall be

resolved through arbitration in Seoul, Korea, under the Rules of the Korean Commercial Arbitration Board.

IV. General Terms and Conditions

Preamble

This Contract is made on _____, 2016 by and between Korea Aerospace Research Institute (“KARI”) established under the law of the Republic of Korea with its principal office at 169-84 Gwahakro, Yuseong-gu, Daejeon 34133 Korea, and _____ (“Contractor”) established under the law of _____ with its principal office at _____.

Witnesseth

WHEREAS, KARI has a satellite assembly, integration and test center (hereinafter referred to as ‘AITC’) for the purpose of the effective development of domestic satellites;

WHEREAS, KARI plans to install RF power amplifier systems, remote control panel, relating cable lines and bi-directional couplers in amplifier room of the Large EMC chamber; and

WHEREAS, Contractor has first-hand experience of this field and is willing to developing, supplying and installing the RF Power amplifiers Set to KARI.

NOW THEREFORE, in consideration of the premises and the mutual covenants hereinafter contained, KARI and Contractor have agreed as follows:

Article 1. Definition

In this Contract, the following words and phrases shall have the meanings as indicated below, unless the context wherein they are used clearly indicates another meaning:

- 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 **AITC** means satellite assembly, integration and test center in KARI.
- 1.3 **Contract** means this Contract for the delivery of the RF Power amplifiers Set, including Appendices as attached hereto, and all amendments that may be subsequently agreed to by the Parties in accordance with the terms and conditions of this Contract.
- 1.4 **Contractor** means _____.
- 1.5 **Contract Price** means the amount of Contract. If there is any change in Contract Price due to any reason, then the Contract Price means current total amount of Contract.
- 1.6 **Deliverable Data** means any technical data as enlisted in Appendix B-1 "Statement of Work" that Contractor shall deliver to KARI and any related data thereof under this Contract.
- 1.7 **Deliverable (Delivery) Item(s)** means the RF Power amplifiers Set, and information as enlisted in Appendix B-1 "Statement of Work" that Contractor shall deliver to KARI.
- 1.8 **EDC** means the Effective Date of this Contract.

- 1.9 **EMC** means is the branch of electrical engineering concerned with the unintentional generation, propagation and reception of electromagnetic energy which may cause unwanted effects such as electromagnetic interference or even physical damage in operational equipment.
- 1.10 **Event(s) of Force Majeure** means any act of God, war, whether or not declared, act or failure to act of any government in its sovereign capacity, fire, earthquake, flood, epidemic, quarantine, nuclear incident, or any other act beyond the reasonable control and without the fault of either Party or its Subcontractors.
- 1.11 **Factory Acceptance** means KARI's pre-shipment inspection or audit including the testing activities for Deliverable Item at Contractor's facility.
- 1.12 **KARI** means Korea Aerospace Research Institute.
- 1.13 **Party** or **Parties** means KARI or Contractor, or both, according to the context.
- 1.14 **Site Acceptance** means final acceptance by KARI of the Deliverable Item at KARI site in accordance with Article 13 " Inspection and Site Acceptance".
- 1.15 **Subcontract** means any subcontract, including purchase orders and all similar forms of agreements at any tier under this Contract.
- 1.16 **Subcontractor** means a contractor under any Subcontract including suppliers and vendor.
- 1.17 **Third Party(ies)** means any individual or legal entity other than the Associates and the Parties.
- 1.18 **Work(s)** means whole or any part of the work, but not limited to review meeting, delivery, installation, test, training, warranty and maintenance, to be executed by a Contractor in accordance with this Contract.

Article 2. Objective

- 2.1 The objective of this Contract is to procure the qualified the RF Power amplifiers Set through the effort of the Contractor. To accomplish this objective, Contractor shall perform all the Works under this Contract required for design, manufacture, qualification, test, installation, training, warranty and maintenance as well as the delivery of Deliverable Item to meet the requirements and specification of this Contract.

Article 3. Contract Documents

- 3.1 This Contract shall comprise the following documents, as amended from time to time by written agreement by and between both Parties:

[A] Terms and Conditions

[B] Appendices

B-1. Statement of Work

B-2. Performance test report

- 3.2 In the event of any inconsistency or discrepancy between or among the Contract documents as listed in Article 3.1 above, the Contract documents shall be applied in the decreasing order (from [A] to B-2) of precedence.
- 3.3 In the event of any dispute or difference between the Parties in the interpretation of this Contract as a result of the application of the Appendices as specified in Article 3.1, Contractor's Proposal dated _____ submitted to KARI in anticipation of this Contract in response to KARI's Request for Proposal dated _____ shall be used as a reference document to identify and clarify the intention and understanding of the Parties as contemplated in this Contract, and both Parties shall in good faith seek an agreement or a compromise acceptable to both Parties without modification or amendment to this Contract.

Article 4. Responsibilities of the Parties

4.1 Responsibilities of KARI

4.1.1 KARI shall make a payment to Contractor in accordance with Article 6 “Terms of Payment”.

4.1.2 In accordance with Appendix B-1 “Statement of Work”, KARI shall provide any reasonable support including facilities, equipment and information in order for Contractor to fulfill the installation of the RF Power amplifiers Set at KARI site.

4.1.3 KARI shall provide reasonable cooperation and support in order for Contractor to obtain any government approval.

4.2 Responsibilities of Contractor

4.2.1 Contractor shall have all responsibilities for the development, delivery and installation of the RF Power amplifiers Set to KARI in a timely manner as required and defined under this Contract without any charges to KARI.

4.2.2 Contractor shall provide all Work including the installation, training, warranty and maintenance and technical support required and stated under this Contract to KARI.

4.2.3 Contractor shall obtain any government approval including the export license to provide KARI with the RF Power amplifiers Set.

Article 5. Contract Price

5.1 For the full, satisfactory and timely performance of the Work by the Contractor in accordance with the provisions of the Contract, KARI hereby agrees to pay to the Contractor _____ Euros/USD (TBD), in accordance with the terms of payment as stipulated in Article 6 “Terms

of Payment”.

- 5.2 The Contract Price as specified in Article 5.1 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, unless otherwise agreed to by both Parties under Article 21 “Changes”.
- 5.3 The Contract Price as specified in Article 5.1 above shall be comprised of the following items.

Items	Qty	Price (€/USD)
PWR AMP1 (150W, 4k~400M) with coupler	1	
PWR AMP2 (5000W, 10k~200M) with coupler	1	
PWR AMP3 (1200W, 200M~1G) with coupler	1	
PWR AMP4 (250W, 1G~2.5G) with coupler	1	
PWR AMP5 (250W, 2G~8G) with coupler	1	
PWR AMP6 (250W, 8G~18G) with coupler	1	
Total	6	

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

Article 6. Terms of Payment

6.1 Payment Schedule

- 6.1.1 Payment shall be executed after the establishment of performance bond in accordance with Article 7 “Performance Bond”.
- 6.1.2 KARI shall pay to Contractor the Contract Price as stipulated in Article 5.1 in accordance with the following schedule:

No.	Payment milestone	Payment due	Payment	Percentage of

	(in Month)	date	(USD/€)	Contract Price (%)
1	EDC	EDC+ 1M		
2	DR (EDC+ M)	EDC+ M		
3	TRR (EDC+ M)	EDC+ M		
4	FAR (EDC+ M)	EDC+ M		
5	SAR (EDC+ M)	EDC+ M		
Total				100 %

- * “EDC” means the Effective Date of this Contract in accordance with Article 23.1 “Effective Date of Contract”.
- * “DR” means the Design Review.
- * “TRR” means the Test Readiness Review at Contractor site.
- * “FAR” means the Factory Acceptance Review at Contractor site.
- * “SAR” means the Site Acceptance Review at KARI site.

6.2 Billing Procedure

6.2.1 All invoices Contractor submits for payment shall be in duplicate signed by an authorized company official and received by KARI at least thirty (30) days before the payment due dates as specified in Article 6.1.

6.2.2 All payments shall be made in US dollars/Euros by telegraphic transfer to the bank account as designated by Contractor in its invoices, by the payment due dates as stipulated in Article 6.1, but or not later than thirty (30) days after KARI's receipt of Contractor's invoices whichever becomes later.

6.3 Suspension of Payment

6.3.1 Notwithstanding any provisions of this Contract, if any payment milestone as set forth in Article 6.1.2 has not been accomplished for any reasons attributable to Contractor, KARI may, with an advance notice, suspend all payments due until both Parties agree that the delayed payment milestone has been accomplished.

- 6.3.2 In the event of KARI's suspension of payment under Article 6.3, Contractor shall nevertheless continue to perform its obligations under this Contract regardless of whether KARI is entitled to suspend the payment.
- 6.4 Deduction of Payment
- 6.4.1 All losses, costs, charges, damages and expenses which KARI incurs or sustains by reason of any act, default or omission of the Contractor in the performance of the Contract and any other amounts which KARI is entitled to receive from the Contractor may be deducted from any payment that may be or become due to the Contractor from KARI.
- 6.4.2 A prior written notice given by KARI accompanied with documents stating the amount due to KARI referred to in Article 6.4.1 and the reason of deduction shall be prima facie evidence of the matters stated herein.

Article 7. Performance Bond

- 7.1 Contractor shall establish a performance bond within three (3) weeks 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 the performance of the Delivery Item accepted by KARI pursuant to the Article 13 "Inspection and Site Acceptance" falls

below the warranted level specified by the Contract and as far as no remedy is brought by Contractor, or

- (d) that this Contract was terminated by Contractor's breach as specified in Article 19.2.

Whenever any amount has been withdrawn by KARI due to such cases of (a), (b) and (c) as above, performance bond shall be replenished.

- 7.3 The letter of credit shall be issued by the Seoul Guarantee Insurance Company in the form of a surety bond or 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 (Daejeon Branch at 29 Munye-ro, Seo-gu, Daejeon, 35241 Korea, Tel: +82-42-488-9704, (Ext. 312)/ Fax: +82-505-003-0759) and shall remain valid until the end of warranty expiration. 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 7 shall not affect any other KARI's rights, privileges, interests or remedies under this Contract or the applicable law.

Article 8. Deliveries

8.1 General

- 8.1.1 Contractor shall deliver Deliverable Item in accordance with the defined schedule and method as set forth in Appendix B-1 "Statement of Work".
- 8.1.2 Contractor agrees that delivery or provision of time and place under this Contract, whether specifically provided for or not, or in subsequent amendments thereto, are of the essence of this Contract.
- 8.1.3 Contractor shall be responsible for all applicable taxes imposed outside Korea including any customs duties and charges of any nature

levied on Deliverable Item, spare parts, spare materials, tools, consumables and ancillary equipment as well as any charges associated with the transportation.

8.2 Delivery to KARI

8.2.1 Contractor shall deliver Deliverable Item under the rule of FCA TBD airport (Free Carrier in accordance with the Incoterms 2010) in accordance with the delivery schedule of this Contract.

8.2.2 To obtain import certification, Contractor shall notify KARI by e-mail (address is "jjw0302@kari.re.kr" for Mr. Jae-woong JANG and "jncho@kari.re.kr" for Mr. Jung-Nam CHO) fourteen (14) calendar days prior to each shipment with one set of proforma 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 one (1) copy of the following shipping documents to KARI by e-mail;

- (a) Clean on board vessel bill of lading/or airway bill of lading,
- (b) Commercial invoice,
- (c) Packing list,
- (d) Weight and measurement list,
- (e) Manufacturer's Inspection Report,
- (f) Certificate of Origin (if possible), and
- (g) Export License (if any).

Article 9. Delay

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) 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 hereof, any such delay that has not been notified to the other Party or any delay of performance of the affected Party falling due after 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 hereof shall not be excused for any reason whatsoever.

9.1.4 The Party who has received or is entitled to duly receive the notice of Events of Force Majeure under Article 9.1.2 hereof 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.

9.2 Non-Excusable Delay

9.2.1 In the event that, unless otherwise excused by virtue of this Contract, any reason attributable to KARI or the governing or applicable law, Contactor delays the provision or delivery of Deliverable Items as stipulated under this Contract, Contractor shall pay for damages as defined in the Article 9.2.2 to KARI as a result of such delay.

9.2.2 Contractor acknowledges and agrees that the timely provision or delivery of the Deliverable Item as stipulated under this Contract or its performance of other obligations under this Contract is essential to KARI, and that such delay as provided for in Article 9.2.1 hereof may cause substantial financial loss or damage to KARI's rights, interests, privileges and benefits, 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 day of such delay. In no case, however, shall the aggregated liquidated damages exceed ten percent (10%) of Contract Price. It is also agreed by both Parties that KARI shall be entitled to terminate this Contract for Contractor's breach, only if the aggregated liquidated damages under this Article, excluding those days of delay excused by KARI in writing, exceeds ten percent (10%) of the Contract Price.

- 9.2.3 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, and that Contractor's correction of such defect or non-conformity under this Article does not relieve Contractor from any liability to KARI which may arise under this Contract of the governing or applicable law as a result of such defect or non-conformity.
- 9.2.4 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. Taxes and Duties

- 10.1 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.
- 10.2 Neither Party shall be responsible for paying the customs duties, and related taxes, fees, or charges for the personnel and the personal belongings of the other Party.

- 10.3 The Contractor shall further comply with instructions KARI may issue from time to time in order to facilitate any exemptions or reductions from customs duties and other taxes that might be levied on KARI and shall impose the same obligations on its Subcontractors.

Article 11. Intellectual Property

- 11.1 KARI shall own and have a right to use, without any obligation, all the Deliverable Items provided by Contractor in its performing this Contract. Contractor shall take all necessary precautions so that all the Deliverable Items supplied hereunder shall be free from infringement of any patent, design patent, trademark, utility model or any other industrial property right, copyright, license or any other right thereunder of any Third Party.
- 11.2 In the event that any Party other than Contractor claims or threatens to claim infringement by KARI with respect to such use of the Deliverable Items, Contractor shall defend, hold harmless, and indemnify KARI from such infringement claims.
- 11.3 This Article will survive the completion of the Contract, any termination, cancellation or expiration of the Contract in any manner whatsoever.

Article 12. Factory Acceptance

- 12.1 The Factory Acceptance of the RF Power amplifiers Set shall occur only after:
- (a) all specified tests to be performed by the Contractor under the Contract for the RF Power amplifiers Set have been completed in accordance with the Contract; and
 - (b) the Contractor has demonstrated to KARI that the RF Power amplifiers Set meet the specifications and requirements in this Contract; and

- (c) all Works and conditions under the Contract to be fulfilled by the Contractor prior to the shipment of the RF Power amplifiers Set have been met,

in which case KARI shall accept, in writing, the RF Power amplifiers Set subject to the provisions set forth below.

- 12.2 Subject to the conditions as set forth in Article 12.1 above, a Factory Acceptance of the RF Power amplifiers Set shall be occurred in accordance with Appendix B-1 "Statement of Work". If KARI determines that the RF Power amplifiers Set is unacceptable, it shall notify the Contractor, in writing, the reasons therefore.
- 12.3 If the RF Power amplifiers Set is determined to be unacceptable, Contractor shall, at its expense, promptly repair or replace the RF Power amplifiers Set so that it shall comply with the Contract specifications and requirements, and Contractor shall hold the additional FAR of such repaired or replaced the RF Power amplifiers Set for KARI's confirmation. The Contractor shall present to KARI the root cause and the result of such repair or replacement. Such repaired or replaced the RF Power amplifiers Set shall be accepted in accordance with the requirements of Article 12.1.
- 12.4 For the Factory Acceptance, KARI, at all times during the performance of this Contract, shall have the right to do the following activities at the Contractor's facilities or other relevant facilities under this Contract;
- (a) Access the Items, testing activities and data, related to, used for, prepared or generated in connection with this Contract, and
 - (b) Witness all qualification and acceptance testing of the Deliverable Items to be delivered or provided under this Contract including all tests used for the purpose of demonstrating qualification.
- 12.5 Contractor shall make such data and documentation, equipment and facilities available to KARI upon KARI's request and KARI's selection for such purposes. Contractor shall deliver copies of design and test

data and other technical data, excluding financial data, required to evaluate technical problems or non-performance that may occur during the performance of this Contract. Such documentation and data shall also be available for KARI to make copies thereof.

Article 13. Inspection and Site Acceptance

- 13.1 KARI shall carry out inspection of the Deliverable Item within thirty (30) days after delivery to KARI. In the event that KARI discovers that any Deliverable Item provided or delivered pursuant to Article 8 "Deliveries" are defective or non-conformity during the inspection, KARI shall promptly notify Contractor thereof and provided that such defect or non-conformity is not attributable to KARI, Contractor shall promptly remedy such defect or non-conformity and retest. In addition, if remedying such defect or non-conformity would substantially delay as compared to the period required to complete such substitution, Contractor shall promptly provide substitute Items. Upon the remedy of such defect or non-conformity that the requirements of this Contract are satisfied in all respects or upon the provision of substitute Items, Contractor shall notify KARI of the details of the remedy undertaken by Contractor.
- 13.2 The Site Acceptance of the RF Power amplifiers Set shall occur only after:
- (a) the Contractor shall successfully install the RF Power amplifiers Set at Large EMC Test Facilities in KARI; and
 - (b) the performance of the RF Power amplifiers Set after such installation under the Contract shall meet the specifications and requirements in this Contract; and
 - (c) all Works and conditions under the Contract to be fulfilled by the Contractor have been met,

in which case KARI shall finally accept, in writing, the RF Power amplifiers Set subject to the provisions set forth below.

- 13.3 Subject to the conditions as set forth in Article 13.1 above, the Site Acceptance of the RF Power amplifiers Set shall be occurred only when the inspection has successfully completed at KARI site in accordance with Appendix B-1 "Statement of Work". After Site Acceptance, KARI's authorized representative shall notify the result of Site Acceptance in writing. If KARI determines that the RF Power amplifiers Set is unacceptable, it shall notify the Contractor, in writing, the reasons therefore. If such written Site Acceptance letter is not given to Contractor, within thirty (30) days after Site Acceptance of Deliverable Item, the Deliverable Item shall be deemed to have been accepted by KARI.
- 13.4 If the RF Power amplifiers Set is determined to be unacceptable, both Parties shall jointly investigate the root cause and if the root cause is attributable to the Deliverable Item, then it shall be considered as non-delivery and Contractor shall, at its expense, promptly repair or replace the RF Power amplifiers Set so that it shall comply with the Contract specifications and requirements. Such repaired or replaced Item shall be accepted in accordance with the requirements of Article 13.1 and 13.2.
- 13.5 The Parties agree that the acceptance of the Deliverable Item under this Article shall not be interpreted or construed to mean that such Item is free of all defects and conform in all respects with the requirements of this Contract, and Contractor shall not be entitled to any additional costs incurred or to recover any damages suffered due to defects in the Item or KARI's rejection of the Item.

Article 14. Spare Parts and Erection Tools

- 14.1 Contractor shall provide KARI with all list and delivery time of spare parts/erection tools for KARI's use for consumable and five (5) years of operation as per the Scope of supplies specified in Contract Specifications.

- 14.2 Contractor shall guarantee that spare parts/erection tools can be made available for ten(10) years.

Article 15. Indemnification

- 15.1 Contractor shall indemnify and hold KARI, its officers, agents, servants, employees, subsidiaries, successors, and assignees, or any of them, harmless from any and all loss, damage, liability or expense resulting from damage to all tangible property and injuries including death, to all persons, in the circumstances caused by its act or omission in the performance of the Work, and shall pay all expenses, including reasonable attorneys' fees, and satisfy all judgments as may be incurred by or rendered against them, or any of them.

Article 16. Licenses, Clearances and Permits

- 16.1 Unless otherwise specified in this Contract, each Party is responsible for obtaining all government approvals from any government authority which has jurisdiction and authority to require such approvals, including, but not limited to, licenses, visas, and permits necessary to carry out such Party's obligations in accordance with this Contract. KARI is responsible for obtaining any necessary Korean government approvals, and Contractor is responsible for all other government approvals.
- 16.2 The Parties shall cooperate and provide each other, upon request of and without cost to the other Party, all reasonable and necessary assistance in obtaining any and all governmental approvals, which they respectively are required to obtain pursuant to this Contract.
- 16.3 Each Party shall be solely responsible for any expenses incurred in obtaining the approvals, which are required under this Article. The Parties shall provide to each other, upon request of and without cost to

the other Party, suitable documents or other reasonable evidence to show that they have obtained any and all governmental approvals, which they respectively are required to obtain pursuant to this Contract.

Article 17. Confidentiality

- 17.1 Each Party shall confidentially treat all documents, data, materials and information supplied by one to the other, and shall not disclose the above to any Third Party, and shall not use the above for any other purpose than for the performance of this Contract without prior written consent from the other Party. However, this Confidentiality obligation shall not be apply to the information which is made available to the general public.

Article 18. Warranty and Maintenance

- 18.1 Any patent, utility, design, copyright, technical know-how and any other type of intellectual property used by Contractor, its Subcontractors, servants, or agents, or delivered or provided to KARI directly or indirectly in connection with this Contract shall be free of any infringement actions by any Third Party claiming its rights or interests with regard thereto in disposing with in accordance with this Contract.
- 18.2 The Deliverable Item and its installation supplied and performed by Contractor or its Subcontractors hereunder shall be in good working order and free from all defects in workmanship and materials and shall comply with the requirements of this Contract. Warranty period for the Deliverable Item shall be one (1) year from the date of successful Site Acceptance.
- 18.3 Upon the receipt of written notification from KARI that the Deliverable Item delivered by Contractor or its Subcontractors is defective or non-confirming, the Contractor shall repair or replace, at Contractor's

option and its own expense, such Deliverable Item so as to comply with the above warranties.

- 18.4 The Contractor shall not be entitled to any additional costs (for instance, the cost for the repair or replacement of faulty parts at its option, the labor cost required for repair, traveling cost, per diem and all associated necessary costs) incurred or to recover any damages suffered due to defect in the Deliverable Item or rejection of the Deliverable Item by KARI.
- 18.5 Contractor shall submit the written plan for repair within forty eight (48) hours after the reception of KARI's notification of fault and shall completely finish the repair within thirty (30) days after the receipt of KARI's written notification of fault.
- 18.6 For an urgent service during any important test period using the RF Power Amplifiers Set, The remedy of warranty is five (5) days from the receipt of KARI's written notification of service. To meet the deadline of the urgent service, KARI will notify Contractor of the test start date and the period two (2) weeks prior to the test start date. Contractor shall stand by the A/S crews at Contractor's convenient place during the test period (up to four (4) weeks). Contractor shall include a plan for these requirements.
- 18.7 Both Parties acknowledge that the breach of a warranty may result in serious damages to KARI's right, interests, privileges, and benefits, de facto or de jure, or loss of KARI's profits. If a breach of warranty has not been cured within thirty (30) days from the date of KARI's written notification to Contractor of such breach, Contractor shall pay all the damages to KARI due to the breach of any warranty.
- 18.8 The right and remedies provided under this Article 18 are in addition to any other rights or remedies available to KARI under the Contract or applicable laws.

Article 19. Termination

19.1 Termination for Events of Force Majeure

19.1.1 In the event that the excusable delay under Article 9 “Delay” exceeds three (3) months for any single Events of Force Majeure or six (6) months in the aggregate for all Events of Force Majeure, KARI, at its sole discretion, may declare frustration of this Contract, and terminate the whole or any part of this Contract by sending a three (3) days prior notice to the Contractor.

19.1.2 In the event that the Contract is terminated for Events of Force Majeure, Contractor shall be entitled to the payments received and payments due as of the date of termination, in which case Contractor shall return fifty percent (50%) of the amount paid by KARI under this Contract. KARI shall return the Deliverable Items to Contractor. And, Contractor shall return all of the KARI furnished items in its original configuration.

19.2 Termination for Breach

19.2.1 KARI may, by written notice to the Contractor, terminate the whole or any part of the Contract, if any of the following circumstances occurs;

- (a) Contractor fails to deliver any Deliverable Item under Contract in accordance with the delivery schedule; or
- (b) Contractor fails to perform any Work under this Contract or fails to progress with the Work in a manner which satisfies KARI that Contractor will perform the Contract within the time specified and in accordance with the terms of the Contract; or
- (c) Contractor fails to remedy any or all defects and non-conformity on the Deliverable Item in accordance with Article 13.

19.2.2 In the event of the circumstances in Article 19.2.1, KARI may notify the Contractor and may suspend any further performance of its obligation under this Contract. If the Contractor fails, within ten (10) days from the dispatch of the notice, to produce and notify KARI of

reasonable evidence of its intent and ability to effect due performance of the obligation in breach within thirty (30) days from due dispatch of written notice, then KARI may terminate this Contract with three (3) days' prior notice of termination.

- 19.2.3 In the event this Contract is terminated for Contractor's breach, the Contractor shall return all the amounts paid by KARI under the Contract and also pay the termination charge of ten percent (10%) of the total Contract Price. KARI shall return the Deliverable Item to Contractor, if any.

19.3 Termination for Special Circumstances

- 19.3.1 Either Party may terminate this Contract anytime upon or after due dispatch of notice of such effect, without any other conditions, in the event that the other Party falls within any of the following categories:

- (a) the other Party has fallen bankrupt or insolvent;
- (b) the other Party passed a resolution for its reorganization (bankruptcy related), dissolution, liquidation or winding-up; or
- (c) a court order for proceedings for the bankruptcy, reorganization (bankruptcy related), dissolution or winding-up of the other Party has been applied for by any person and such application has not been dismissed within sixty (60) days.

- 19.3.2 In the event this Contract is terminated by Article 19.3.1 above, each Party shall effect the restitution to the other Party of whatever is provided, delivered, or paid to it in the same manner and types as such provision, delivery or payment was made.

19.4 Termination for Convenience

- 19.4.1 KARI may terminate this Contract, in whole or in part, for its convenience, with thirty (30) days' prior written notice to Contractor. In case of such termination for convenience, Contractor is entitled to receive payment due which Contractor has already done in

accordance with Article 6.1.2 within thirty (30) days from the date of termination and KARI shall release performance bond at the same time.

Article 20. Resolution of Disputes and Governing Law

- 20.1 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.
- 20.2 If the Parties cannot resolve such controversy or claim in accordance with Article 20.1 above, it shall be finally settled by arbitration in Seoul, Korea, before the Korean Commercial Arbitration Board in accordance with its rules. 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.
- 20.3 The validity, performance, construction, and effect of this Contract shall be governed by the laws of Korea.

Article 21. Changes

- 21.1 Changes Requested by KARI
- 21.1.1 Any changes requested by KARI during the performance of this Contract, within the general scope of this Contract, which would add or delete Work, affect the design of Work, change the method of shipment or packing, place or time of delivery, duration of Contract, or would affect any other requirement of this Contract, shall be

submitted in writing to Contractor. Contractor shall respond to any changes KARI requested in writing within thirty (30) days after receipt of such request. If such change requested by KARI causes an increase or decrease in the Contract Price and/or an impact of schedule, Contractor shall submit to KARI at the time the response to the requested change is submitted, the details of such increase or decrease.

- 21.1.2 KARI shall notify Contractor in writing, within thirty (30) days after receipt of Contractor's response, whether it agrees with and accepts Contractor's response. If KARI agrees with and accepts Contractor's response, an amendment to the Contract reflecting such change, Contract Price and/or schedule adjustment, if any, shall be issued, and Contractor shall proceed with the performance of the Contract as changed. Contractor shall provide updated information that reflects the final agreed price of the change, if KARI requests. In the event the Parties are unable to agree on a change requested by KARI or price adjustment, if any, or both, Contractor shall proceed with the performance of the Contract as unchanged.

21.2 Changes Requested by Contractor

- 21.2.1 Any changes requested by Contractor during the performance of this Contract, within the general scope of this Contract, that would add or delete Work, affect the design of Work, change the method of shipment or packing, place or time of delivery, duration of Contract, or would affect any other requirement of this Contract, shall be submitted in writing to KARI thirty (30) days prior to the proposed date of the change. If such change requested by Contractor causes an increase or decrease in the Contract Price, Contractor shall submit to KARI at the time the requested change is submitted, the details of such increase or decrease.
- 21.2.2 KARI shall notify Contractor in writing within thirty (30) days after receipt of the requested change and Contract Price adjustment, if any, whether or not it agrees with and accepts such change. If KARI

agrees with and accepts change requested by Contractor, an amendment to the Contract reflecting such change, and Contract Price adjustment, if any, shall be issued, and Contractor shall proceed with the performance of the Contract as changed. Contractor shall provide updated information which reflects the final agreed price of the change, if KARI requests. In the event the Parties are unable to reach an agreement on a change requested by Contractor, or Contract Price adjustment, if any, or both, Contractor shall proceed with the performance of the Contract as unchanged.

Article 22. Notices

22.1 All notices, requests, demands, approvals, reports, invoices, and other correspondence to be provided pursuant to this Contract shall be in writing and shall be deemed to have been duly given to the Party to be notified: (i) on the date of delivery if delivered in person, (ii) on the date of dispatch if by facsimile, telex or e-mail, or (iii) on the date of receipt if by registered airmail or overnight courier.

All notices shall be addressed to the appropriate Party at its address as follows:

For KARI: **Korea Aerospace Research Institute**
169-84 Gwahangno, Yuseong-gu, Daejeon 34133, Korea

Commercial matters
Mr. Jung-Nam CHO

Tel: +82-42-860-2613
Fax: +82-42-860-2666
E-mail: jncho@kari.re.kr

Technical matters
Mr. Jae-Woong JANG

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

For Contractor: **[Company]**
[Address]

Commercial matters

Technical matters

[Name]

[Name]

Tel: +

Tel: +

Fax: +

Fax: +

E-mail:

E-mail:

- 22.2 Each Party may change its address for notice by notice given to the other Party in the manner set forth above. And any notices given as provided herein 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, telex or e-mail.

Article 23. Miscellaneous

23.1 Effective Date of the Contract

The effective date of this Contract ("EDC") is the date on which the duly authorized representatives of both Parties have signed this Contract, and any amendment to this Contract shall be effective only upon signature by the authorized representatives of both Parties.

23.2 Entire Agreement

This Contract embodies the entire agreements of 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.

23.3 Assignability

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 either Party without the prior written consent of the other Party.

23.4 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.

23.5 Non-waiver

The failure or delay of any Party to require 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.

23.6 Disclaimer of Agency

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

23.7 Headings

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

23.8 Language and Unit

All documents, drawings, plans and other writings as well as communications between both Parties under this Contract shall be in English and measurements and quantities for Deliverable Data shall be recorded in units of Système Internationale.

23.9 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.

23.10 Subcontractors

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.

Appendix B-2. Performance test report (example)

(This sheet can be modified fitably by supplier.)

Model : _____ Serial No. : _____

Test conditions :

Network : _____ V _____ Hz

Temperature : _____ °C

Input-VSWR < 2:1 Instrument Safety

Input Overload +10dBm max. Remote control interface

IEEE interface RS 232 interface

Gain / Output Power / Spurious Measurement Sheet

Frequency (MHz)	Pin dBm	Pout dBm	Harmonics		Spurious dBc	Gain dB	Monitor output	
			2 nd (dBc)	3 rd (dBc)			dB	dB