



**Al-Khawarizmi Institute of Computer Science
University of Engineering and Technology, Lahore**

PROCUREMENT OF EQUIPMENT

(FOR Basis)

Estimated Price Rs. 3.920 Million

TENDER PRICE - Rs. 200/-

Last date of submission: July 19th, 2021 till 09:30 AM

FOR OFFICE USE ONLY

Serial No. _____

Sold to:- M/S _____

Date of Sale _____ **Bank Challan No.** _____ **Date** _____



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TERMS AND CONDITIONS

OVERVIEW

KICS, UET, Lahore intends to purchase equipment for one of its Lab's HEC-TDF Project. The supplier will be responsible for delivery, installation wherever required in KICS, UET, LAHORE.

1. Proposal instructions (for BOQs in FOR)

- 1.1 Single stage two envelope bidding procedure shall be applied in response to the RFP (Request for proposal). Each bid envelop shall comprise one envelope containing, separately, financial proposal and technical proposal (if any) plus "legible documents". The financials of bids found technically non responsive shall be returned unopened to the respective bidders.
- 1.2 Responding organizations shall deliver two sealed copies "one original and one photo copy" of the "FINANCIAL & TECHNICAL PROPOSAL" till July 19th, 2021 up till 09:30 am, each copy being physically separate, bound, sealed and labeled. Proposals will not be accepted after the due time & date. Proposal shall be delivered at the address given below before time.

DIRECTOR KICS,
UNIVERSITY OF ENGINEERING AND TECHNOLOGY (UET),
LAHORE. PHONE: (042)-99250247

- 1.3 Proposals received after the submission deadline will not be entertained under any circumstances and will be returned unopened to the submitting vendor. It is the sole responsibility of the participating vendor to ensure that the proposals are delivered before the deadline.

Any queries regarding this proposal should be directed to the designated contact person listed below:

For General Details: Aqeel Muhammad Babar Manager Procurement & Admin Email: aqeel.babar@kics.edu.pk Contact Number # 042 99250247	For Technical Details: Muhammad Ali Senior Research Manager Email: m.ali@uet.edu.pk Contact # 0336-4178018
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- 1.4 Price should be mentioned on FOR basis.
- 1.5 The bidders are allowed to bid in partial. The equipment must be brand new and complete in all respects with original packing of manufacturer and strictly confirming to the given specifications.
- 1.6 The original Request for Proposal documents duly signed and officially sealed by the bidder must be submitted in whole with the proposals. Any conditional, ambiguous, incomplete, supplementary or revised offer after the opening of Bidding shall not be entertained.
- 1.7 Any overwriting/crossing, etc. appearing in the offer may be properly signed by the person signing the Bidding. All pages of the Bidding must be properly signed. Offer with any overwriting and discrepancy shall not be accepted in any circumstances.
- 1.8 Warranty for all equipment's, as approved by the manufacturers/suppliers, should not be less than one year.
- 1.9 A call deposit equal to 2% of the estimated bid price (**mentioned in the tender**) should be accompanying the bidding document as **Earnest Money** drawn in favor of **Treasurer UET, Lahore**. The bidding document shall not be considered without Earnest Money. Bank guarantee will not be accepted. The earnest money will be released after signing the Agreement.
- 1.10 The Successful Bidder's bill will deposit a total of 10% of the contract amount as **Performance Guarantee / Security Deposit**. The **Performance Guarantee / Security Deposit** will be returned after successful completion of Defect Liability/ Warranty Period, after repairing the defects in the equipment/ replacement found during the warranty period for FOC.
- 1.11 The Successful Bidder will deposit a blank stamp paper of value of 0.25% of the total offer/contract amount, purchased in the name of Director KICS (UET), Lahore.
- 1.12 Central Procurement Cell reserves the right to accept or reject all proposals by assigning any reason thereof.



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- 1.13 The quantity of an order may vary depending on the quoted prices and the allocated funds.
- 1.14 The decision of the committee will be a binding on all concerned and can be appealed in the grievance committee.
- 1.15 KICS, UET, Lahore reserves the right to modify the conditions / specifications of the Bidding Document with written intimation to all the participants those who have purchased the Bidding Documents.
- 1.16 Delivery period will be (30) days from the date of issuance of purchase order/supply order.
- 1.17 Delivery, Installation and Training (where mentioned) be completed according to the agreed upon schedule of works.
- 1.18 In case the Bidders fails to execute the contract strictly in accordance with the terms and conditions laid down in the contract, the Security Deposit shall be forfeited and the equipment will be purchased at his own risk and expenses.
- 1.19 The equipment will be inspected at KICS, UET, LAHORE, and may get rejected if not found in accordance to the stated specifications.
- 1.20 KICS, UET, Lahore reserves the right to claim compensation for the losses caused by delay in the delivery of equipment i.e., 1% of contract amount on weekly basis.
- 1.21 It is the sole responsibility of the vendor to comply with local, national and international laws.
- 1.22 Successful bidders may be asked to bring their supplies for demonstration and specification test in the KICS, UET, LAHORE, at their own expenses and risk.
- 1.23 Where reference is made to any specific national or international standards, equal or higher quality will also be acceptable. In case, your offer conforms to standards other than quoted in the Bidding inquiry you are required to submit the followings along with your bid.
 - One copy of those standards in English



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- Evidence that the standards used is recognized and authoritative to ensure equal or higher quality.

In case the bidder does not submit the required evidence and a copy of each of the standards, its Bid may not be considered.

- 1.24 In case any supplies/material is found not in conformity with the specifications provided in the Bidding, either on account of inferior quality, defective workmanship, faulty design, faulty packing or is short supplied, or wrongly supplied, the supplier will replace the same free of charges or pay the full cost of replacement.
- 1.25 The all proposals submitted will become the property of the University.
- 1.26 Possessing/Providing Dealership Certificate.

2. Evaluation Criteria

All bids shall be evaluated on technical and financial responsiveness.

Technical evaluation process may include, but not limited to the consideration of the following with respect to the functional requirements given ahead:

- 2.1. Technical specifications of proposed equipment's
- 2.2. Best warranty of the equipment

Financial Evaluation process may include, but not limited to the consideration of the following:

- 2.3 Quoted price
- 2.4 CDR (2% of estimated price mentioned in the tender)

3 Required Information

Bidders are required to include the following documents/information in their technical proposals (all documents should be duly signed and stamped)

- i. The Name and Address
- ii. Profile of company (Including Financial Profile)



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- iii. List of Previous/Current customer of related equipment's, with contact person and telephone/fax#
- iv. Detailed product information/brochures
- v. Detailed product warranty/guarantee information
- vi. Attested copy of National Tax Registration Certificate
- vii. Attested copy of Sales Tax Registration Certificate
- viii. Detailed backup support plan
- ix. Bank letter of financial standing
- x. An Affidavit on Rs.100/- Stamp paper that currently they are not black listed or debarred by any Government/Semi Government department to participate in bidding and to supply equipment. Failure to submit such affidavit may lead to disqualification.
- xi. Any additional information the bidder may like to furnish e.g. repair/maintenance workshop owned by supplier and other concerned facility
- xii. Dealership Certificate.

In addition to the above, the proposal must include the following in the order given below:

- i. Detailed equipment specifications, proposed quantities duly filled on the Performa attached with this document
- ii. Detailed project implementation schedule which includes the delivery of equipment
- iii. Terms and Conditions
- iv. Equipment prices (FOR) duly entered.
- v. Validity period of the quoted price, i.e. 60 days
- vi. Educational discounts if available/applied to the quoted price

4 Terms and Conditions (FOR Basis)

- 4.1 All prices should be in PAK rupees exclusive of Taxes. GST and /or other Tax amount where applicable should be mentioned in separate column(s) and the total given in a separate column.
- 4.2 All prices should be valid for at least 60 days. Withdrawal or any modification of the original offer within the validity period shall entitle KICS, UET. LAHORE to



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forfeit the earnest money in favor of the KICS, UET, LAHORE and/or putting a ban on the future inquires or taking any other suitable action against the bidder.

- 4.3 Delivery of the items will be free of charge at the KICS, UET, LAHORE during the office hours with a copy of delivery challan.
- 4.4 Items being ordered should be brand new and according to order specification from the current production and covered under normal warranty/guarantee etc. as mentioned in the proposal. Brochures of the product details must be attached.

Name of Vendor.....

Authorized person.....

Authorized Signature.....

Stamp.....

Office address.....

Tel No.....

Fax No.....

(The filled in Bidding Document should be forwarded to KICS, UET, Lahore with covering letter).



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DETAILED TECHNICAL SPECIFICATIONS **PROCUREMENT OF EQUIPMENT** **(FOR Basis) Equivalent OR Higher**

Sr#	Component Name	Estimated Cost (Million) PKR
1	Dry Batteries 200Ah x 16	0.56
2	Ac load for testing x 2	0.1
3	DC load for Testing x 2	0.1
4	Solar Panels x 20	0.3
5	Cable 100m x 4	0.08
6	Solar Micro Inverter Development Kit x 3	0.4
7	High Voltage Isolated Solar MPPT Developers Kit x 3	0.3
8	Piccolo-based Solar Explorer Development Kit x 3	0.2
9	Solar Explorer Development Kit with F28M35H52C MCU x 3	0.09
10	C2000™ Solar DC/AC Single Phase Inverter x 3	0.3
11	Solar panel Mounting Fixtures x 20	0.12
12	Solar Hybrid Inverter for testing purpose x 4	0.17
13	Misc Electronic Items x 4	0.2
14	Micro Controller development tools x 2	0.3
15	Manufacturing, assembling and Testing of Inverter x 4	0.7
Total Estimated Cost PKR (Million)		3.92



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DETAILED TECHNICAL SPECIFICATIONS **PROCUREMENT OF EQUIPMENT** **(FOR Basis) Equivalent OR Higher**

Sr#	Component Name	Estimated Cost (Million) PKR
1	<p style="text-align: center;"><u>Dry Batteries 200Ah x 16</u></p> <p>1. BMS Evaluation Board (Q-02) I2C Controlled 4.5A Single Cell USB / Adaptor Charger BQ24195EVM-193 by Texas Instrument or equivalent</p> <p>2. Evaluation Board (Q-02) 16 Cell Battery Monitor, Passive Cell Balancing</p> <p>3. Lead Acid Battery (Q-04) 12v , 100Ah, Drywell battery</p> <p>4. Li-ion Battery Cell (Q-04 Set) 4pcs of 3.2v, 90Ah LiFePO4</p> <p><u>Equivalent OR Higher</u></p>	0.56
2	<p style="text-align: center;"><u>Ac load for Testing x 2</u></p> <p>1. Variable power Supply (Q-01) Voltage range: up to 60VDC Current range: up to 18ADC</p> <p>2. Heating Load (Q-01) 15KW, variable with 500W step size, 240V</p> <p><u>Equivalent OR Higher</u></p>	0.1
3	<p style="text-align: center;"><u>DC load for Testing x 2</u></p> <p>1. DC power Supply (Q-01) Voltage range: up to 30VDC Current range: up to 10ADC</p> <p>2. DC load (Q-01) DC Electronic load up to 300W, 360V, 30Amp</p> <p><u>Equivalent OR Higher</u></p>	0.1



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Sr#	Component Name	Estimated Cost (Million) PKR
4	<p style="text-align: center;"><u>Solar Panels x 20</u></p> <p>1.Solar Panels (Q-10) Pmax > 255 Type: Silicon (Poly) approx. Vmax 37v Module Efficiency >=15.7% Warranty 10 years <u>Equivalent OR Higher</u></p>	0.3
5	<p style="text-align: center;"><u>Cable 100m x 4</u></p> <p><u>Equivalent OR Higher</u></p> <p>1. Cable-I (45meter) 6mm, single core, Flexible, 99.9% pure copper 2. Cable-II (45meter) 16mm, single core, Flexible, 99.9% pure copper 3. Cable-III (45meter) 35mm, single core, Flexible, 99.9% pure copper 4. Cable insulation Resistance Tester (Q-01) Testing Voltage: 500/1000/2500V Resistance: 0-20Gohm</p>	0.08
6	<p style="text-align: center;"><u>Solar Micro Inverter Development Kit x 3</u></p> <p style="text-align: center;"><u>Equivalent OR Higher</u></p> <p>1. Digital Oscilloscope (Q-01) Analog channel bandwidth: 100 MHz 4 Analog channels, 16 digital channels Real-time sample rate up to 1 GSa/s vertical scale range: 1 mV/div to 10 V/div Built-in dual-channel 25 MHz function/arbitrary waveform generator Interfaces: USB Host & Device 2. RLC Meter (Q-01) Resistance: 20 Ω to 10MΩ capacitance: 200 pf to 20 mF Inductance: 200 μH to 10KH Test Frequency: 100 Hz to 100 kHz</p>	0.4



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Sr#	Component Name	Estimated Cost (Million) PKR
7	<p style="text-align: center;"><u>High Voltage Isolated Solar MPPT Developers Kit x 3</u> <u>Equivalent OR Higher</u></p> <p>1. MPPT Developers Kit (Q-01) 200-300VDC Input up to 500Watts 400VDC Output 1:1 Resonant LLC for isolation 2 Phase DC/DC Boost for Maximum Power Point Tracking Onboard USB JTAG Emulation TMDSHVMPPTKIT by Texas instruments or Equivalent</p>	0.3
8	<p style="text-align: center;"><u>Piccolo-based Solar Explorer Development Kit x 3</u> <u>Equivalent OR Higher</u></p> <p>1. Piccolo-based Solar Explorer Development Kit (Q-01) 20VDC/ 50W Non-Isolated Design Built-in panel emulator Single switch DC/DC Boost for Maximum Power Point Tracking DC/DC SEPIC for MPPT and Battery Charging 36VDC Intermediary bus 24VAC Output Inverter stage Isolated USB JTAG built-in</p> <p>TMDSSOLARPEXPKIT by Texas Instruments or Equivalent</p>	0.2
9	<p style="text-align: center;"><u>Solar Explorer Development Kit with F28M35H52C MCU x 3</u> <u>Equivalent OR Higher</u></p> <p>1. Full Bridge Inverter Development Kit (Q-01) 350V DC Link, 2 kW Output Power IGBT Switches TB & Banana Input, Output Connectors DC Link Over Voltage Protection Direct Interface with Gate Drive Modules</p>	0.09



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Sr#	Component Name	Estimated Cost (Million) PKR
10	<p style="text-align: center;"><u>C2000™ Solar DC/AC Single Phase Inverter x 3</u> <u>Equivalent OR Higher</u></p> <p>1. Inverter Development Kit (Q-01) Single phase inverter development kit with voltage source and grid connected modes</p> <p>Software supported Voltage Source Inverter and Grid Connected Inverter Design Peak 98% efficiency in Voltage Source Mode and <4% THD in case of non-linear loads</p> <p>Input 380V DC, Output 220Vrms 50Hz or 110Vrms 60Hz and 600VA Max</p> <p>Including of: F28377D ISO Control Card TIDM-HV-1PH-DCAC Board USB Mini-B (5pin) Male to Standard-A Male 3 Hardware Files are in Digital Power SDK at solutions\tidm_hv_1ph_dcac</p> <p>TIEVM-HV-1PH-DCAC by Texas Instrument or equivalent</p> <p>2. HV Resonant LLC Developer's Kit (01) Full microcontroller-based control of resonant LLC half-bridge DC/DC converter 375-405V DC input, 12 DC output, 25A rated output (300W) >90% efficiency across wide load range with >93% peak efficiency Synchronous rectification support for increased power efficiency Zero voltage switching (ZVS) across entire load range for greater efficiency and reliability TMDSHVRESLLCKIT by Texas Instrument or equivalent</p>	0.3



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Sr#	Component Name	Estimated Cost (Million) PKR
11	<p style="text-align: center;"><u>Solar panel Mounting Fixtures x 20</u> <u>Equivalent OR Higher</u></p> <p>1. Mounting for Solar Panel(Q-15) 16AWG, Hot Dip Galvanized</p> <p>Tools for Solar Panel Mounting</p> <p>2. Drill Machine(Q-01) 1.5mm to 13mm Drill Capacity, Variable Speed, Lock-On Switch, Side Handle Drill bit Drill: bits (1mm-18mm)</p> <p>3. Table Drill(Q-01) 5-speed belt drive drill press with a maximum drilling depth of 50mm.</p> <p>4. Adjustable Wrench(Q-03) 6inch, 10inch, 15 Inch (1 each)</p> <p>5. Adjustable Wrench(Q-03) Wire size:2.5mm², 4mm², 6mm²(1 each)</p> <p>6. Wire cutter(Q-02) 160mm</p> <p>7. Wire Stripper (Q-02) 10 to 22 AWG</p> <p>8. Nose Plier(Q-01) Long Nose Type (160mm)</p> <p>9. Plier Flat(Q-02) Type(200mm,250mm)1 each</p> <p>10. Screw Driver(Q-03) Phillip/Cross Head Size: 8mmx200mm, Magnetic-Pick Tip</p> <p>11. Screw Driver(Q-03) Slot/Flat Head Size: 8mmx200mm, Magnetic-Pick Tip</p> <p>12. Combination Spanner Set(Q-01) Size: 6mm-25mm</p> <p>13. Screw Driver(Q-03) Slot/Flat Head Size: 8mmx200mm, Magnetic-Pick Tip</p>	0.12



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Sr#	Component Name	Estimated Cost (Million) PKR
	<p>14. Diagonal wire cutter(Q-02) 5-6inch for small gauge wires</p> <p>15. Air Blower(Q-01) Wind volume 2.8cbm/min Rated Voltage 230VAC</p> <p>16. Heavy Duty (Q-01) Tool Box Portable tool box with at least five drawers and adjustable divider</p>	
12	<p style="text-align: center;"><u>Solar Hybrid Inverter for testing purpose x 4</u> <u>Equivalent OR Higher</u></p> <p>1. Solar Hybrid Inverter for testing purpose (Q-01) Capacity: 3000VA Solar Inverter Type: Hybrid Inverter Input AC voltage Range: 170 to280VA Efficiency: 90% ~ 93% Battery Voltage: 24VDC Solar Charger Type: MPPT MPP Range:120-450 VDC Maximum Solar Charge Current: 80A</p> <p>2. Digital Logic Analyzer 4 channel with display (Q-01) Input: Channels: 4 Max. sampling rate: 100MHz Minimum capture pulse width: 10ns Input impedance: 1MΩ Output: Channels: 4 Mode: SPI, I2C, PWM 3V output channel: 1 Storage: 8MB USB flash disk memory Screen size: 2.8" Screen resolution: 320*240 Battery: 1 * lithium battery, 500mAh (included)</p> <p>3. Adjustable Current Voltage Analog Simulator (Q-01) Adjustable Current Voltage Analog Simulator 0-10V 4-20mA</p>	0.17



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Sr#	Component Name	Estimated Cost (Million) PKR
	Signal Generator Sources transmitter calibrator Active current output: range: 0-24 mA; Passive current output: range: 0-24 mA; Voltage output: range: 0-12 V Current input measurement: range: 0-24 mA Voltage input measurement: range: 0-30 V 4. Function Generator (Q-01) Up to 80MHz, Dula Channel, Digital pulse wave, dut y cycle, Offset adjustment Modulation type: AM, FM, PM, ASK, FSK, PSK, PWM	
13	<p style="text-align: center;"><u>Misc. Electronic Items x 4</u></p> <p style="text-align: center;"><u>Equivalent OR Higher</u></p> <p>1. IGBT-set-1(Q-12) 2MB150N or equivalent</p> <p>2. IGBT-set-2(Q-12) IGBT MODULE including of two switches (150A, 1200V)</p>	0.2



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Sr#	Component Name	Estimated Cost (Million) PKR
14	<p style="text-align: center;"><u>Micro Controller development tools x 2</u> <u>Equivalent OR Higher</u></p> <p>1. Logic Tester (Q-01) DTL, TTL and CMOS High Frequency Response Instant Indication Pulse Memory Function</p> <p>2. Digital Logic Analyser 16 channel (Q-01) Input channels number: 16 ·Max sampling rate: 100M ·Measurement bandwidth: 20M ·Min pulse width can be captured: 20ns ·Hardware memory size: 1Gbits ·Hardware sampling depth: 50M/channel ·Max compressed depth: 10G/channel ·Input voltage range: -50V ~ +50V ·Input impedance: 220KΩ, 12pF · Adjustable threshold voltage: -4V ~ +4V, step: 0.01V ·PWM channels number: 2 ·PWM frequency range: 0.1 ~ 20MHz</p> <p>3. Raspberry-pi 4 (Q-02) Raspberry Pi 4, 4GB Quad Core, 64Bit Wifi Package include of: Raspberry Pi 4 Model B 16GB Memory Card Pi4 Power Supply Pi4 Case Raspberry Pi 5 Inch HDMI LCD USB Touch</p> <p>4. Raspberry-pi 0 (Q-03) 1GHz single-core CPU 512MB RAM Mini HDMI port Micro USB OTG port</p>	0.3



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Sr#	Component Name	Estimated Cost (Million) PKR
	<p>Micro USB power HAT-compatible 40-pin header Composite video and reset headers CSI camera connector (v1.3 only)</p> <p>5. Raspberry-pi 3 (Q-02) Raspberry Pi 3 Model B+ <ul style="list-style-type: none"> • 1,2 GHz ARM Cortex-A53 Quad-Core-CPU • WLAN 802.11 b/g/n • LAN RJ45 10/100 Mbit </p> <p>6. Arduino (Q-05) Arduino Due AT91SAM3X8E ARM Cortex-M3 Board with Micro USB Cable</p> <p>7. STM32-A (Q-02) STM32f4 STM32f407 Discovery Kit Arm Cortex-M4 Development Board</p> <p>8. STM32-B (Q-02) STM Discovery Kit STM32F3 STM32F303VC With Programming</p> <p>9. Features Of ESP32 Development Board (Q-04) Low power dual-core 32-bit CPU, can also serve the application processor Up to 240MHz clock speed Summary computing power up to 600 DMIPS Built-in 520 KB SRAM, external 8MPSRAM Supports UART/SPI/I2C/PWM Support max 4Ω3W output Support LINE-IN and 2-way Mic input Support 3.7V Li-ion battery or up to 5V2A power input, support battery charging Support 64G SD card; 6 onboard buttons Embedded Lwip and FreeRTOS Supports STA/AP/STA+AP operation mode Support Smart Cong/AirKiss technology</p>	



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Sr#	Component Name	Estimated Cost (Million) PKR
	<p>Support secondary development</p> <p>10. ESP32-1 (Q-09) WROOM ESP32 Wi Based Microcontroller Development Board</p> <p>11. ESP32-2 (Q-09) ESP32 Wemos LoLin32 ESP32, WiFi + Bluetooth + LiPo battery</p> <p>12. Arduino Mega (Q-03) Arduino Mega2560 R3</p> <p>13. GSM Module (Q-08) Registered SIM800L GSM Module Micro Sim Card Board 1. Quad-band 850/900/1800/1900MHz 2. GPRS mobile station class B 3. Supports Real-Time Clock 4. Supply voltage range 3.4V ~ 4.4V 5. Supports A-GPS 6. Supports 3.0V to 5.0V logic level 7. Low power consumption, 1mA in sleep mode 8. Controlled by AT Command (3GPP TS 27.007, 27.005 and SIMCOM enhanced AT Commands).</p> <p>14. Ai-Thinker (Q-09) A9 development board Include 850,900,1800,1900MHZ Download 85.6Kbps Upload 42.8Kbps</p>	
15	<p><u>Manufacturing, assembling and Testing of Inverter x 4 Equivalent OR Higher</u></p> <p>1. 3 phase Power quality and harmonic Analyser for Testing of Inverter (Q-01) Measurements items Voltage, Current, Frequency, Active power, Reactive power, Apparent power, Active energy,</p>	0.7



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	<p>Reactive energy, Apparent energy, Power factor, Phase Advancing Condenser, Neutral current, Demand, Harmonics, Power Quality (Swell/Dip/Interrupt/Transient overvoltage, Inrush current, Unbalance rate. IEC flicker</p> <p>Other function Digital output, Analog DCV input function</p> <p>Voltage range upto 1000V $\pm 0.2\%$ rdg $\pm 0.2\%$ rng.</p> <p>Current range: 300/1000/3000 A $\pm 0.2\%$ rdg $\pm 0.2\%$ rng. + accuracy</p> <p>Active power $\pm 0.3\%$ rdg $\pm 0.2\%$ rng. + accuracy</p> <p>Safety Standard EN 61010-1 CAT IV 300 V, CAT III 600 V, CAT II 1000 V Pollution level 2EN 61010-2-030EN 61010-2-033EN 61010-031</p> <p>Measure Temporary Malfunction of Power Line</p> <ul style="list-style-type: none"> • Captures temporary malfunction phenomena of power line which causes malfunction or destruction of devices by types (Voltage swell, Voltage dip, Voltage interruption, • Measure and display graphs and list of up to the 50th Harmonic components of voltage, current and power for each phase and in total. Waveform • Measures, 1 minute flicker (Pst, 1 min), short flicker (Pst) and long flicker (Plt). Unbalance rate • Displays voltage and current unbalance rate on 3 phase wiring <p>Power Quality Measuring Function Capture temporary power line issues Capture continuous power line issues Leakage current measuring</p>	
	Estimated Total Cost (Millions) PKR	3.92