INDIAN INSTITUTE OF TECHNOLOGY MADRAS
Chennai 600 036

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V. Sathyanarayanan
Senior Manager (Project Purchase)

Ref: ELE/RADA/002/2018
Date: 16.11.2018

Open Tender No: ELE/RADA/002/2018

Due Date: 07.12. 2018, 3pm

Pre-Bid meeting: - Not required.

Technical Bid opening meeting on 07.12. 2018, 4 PM at Department of Electrical Engineering, IIT-Madras.

Dear Sir/Madam,

On behalf of the Indian Institute of Technology Madras, offers are invited for **"The fabrication, BOM procurement and population of a PCB (5 units)"** conforming to the specifications given in Annexure I.

Vendor who can fabricate multilayer Rogers and assemble the board need to respond to the tender please.

Instructions to the Bidder

I. **Preparation of Bids: -** The tenders should be submitted under two-bid system (i.e.) Technical bid and Financial bid.

II. **Delivery of the tender: -** The tender shall be sent to the addresses mentioned below, either by post or by courier so as to reach our office before the due date and time specified in our schedule. The offer/bid can also be dropped in the tender box on or before the due date and time specified in the schedule.
The tender box is kept in the office of the:

Senior Manager,
Project Purchase,
IC & SR Building 2nd floor,
I.I.T. Madras,
Chennai – 600 036.

III. **Opening of the tender:** - The offer/bids will be opened by a committee duly constituted for this purpose. The technical bids will be opened first and will be examined by a technical committee which will decide the suitability of the bids as per our specifications and requirements. All bidders will be invited for opening of technical bids. With respect to opening the financial bid, only technically qualified bidders will be called.

IV. **Prices:** - The price should be quoted in net per unit (after breakup) and must include all packing and delivery charges to **Department of Electrical Engineering.** The offer/bid should be exclusive of taxes and duties. The percentage of tax & duties should be clearly indicated separately. IIT Madras is eligible for concessional GST and relevant certificate will be issued, if applicable.

In case of import supply, the price should be quoted without custom duty. IIT Madras is exempted from levy of IGST on Imports and eligible for concessional custom duty (not exceeding 5%) and the price should be quoted on EX-WORKS and CIP basis indicating the mode of shipment.

V. **Agency Commission**: - Agency commission, if any, will be paid to the Indian agents in rupees after receipt of the equipment and its satisfactory installation. Agency Commission will not be paid in foreign currency under any circumstances. The details should be explicitly shown in the tender document even in the case of 'Nil' commission. The tenderer should indicate the percentage of agency commission to be paid to the Indian agent. The foreign Principal should indicate the percentage of payment and it should be included in the basic price quoted originally (if any)..

VI. **Terms of Delivery**: - The item should be supplied to the **Departments of Electrical Engineering, IIT Madras** as per the Purchase Order. In case of import supply, the item should be delivered at the cost of the supplier to our Institution. The Installation/Commissioning should be completed as specified in our important conditions.

VII. **Technical Bid Opening:** The technical bid will be opened on 07.12. 2018 at 4 p.m. at the **Department of Electrical Engineering, IIT-Madras** and the financial bids of those tenders who are technically qualified will be opened on the same/later date under intimation to them.

VIII. **IIT Madras** reserves the full right to accept / reject any tender at any stage without assigning any reason.

Yours sincerely,

V. Sathyanarayanan
Senior Manager (Project Purchase)
IC&SR Building, I.I.T. Madras,
Chennai – 600 036.

SCHEDULE

Important Conditions of the tender

1. The due date for the submission of the tender is **07.12.2018, 3 pm.**

   The offers / bids should be submitted in two bids systems (i.e.) Technical bid and financial bid. The Technical bid should consist of all technical details / specifications only. The Financial bid should indicate item-wise price for each item and it should contain all Commercial Terms and Conditions including Taxes, transportation, packing & forwarding, installation, guarantee, payment terms, pricing terms etc. The Technical bid and financial bid should be put in separate covers and sealed. Both the sealed covers should be put in a bigger cover. The Open Tender for supply of **"RRH PCB Fabrication"** should be written on the left side of the Outer bigger cover and sealed.

2. **EMD: -** The **EMD in the form of account payee DD for 2% value of the item in favor of Registrar IIT Madras should be enclosed in the cover containing financial bid.** Any offer not accompanied with the EMD shall be rejected summarily as non-responsive.

   The EMD of the unsuccessful bidders shall be returned within 30 days of the end of the bid validity period. The same shall be forfeited, if the tenderers withdraw their offer after the opening during the bid validity period. The Institute shall not be liable for payment of any interest on EMD. EMD is exempted for Micro and Small Enterprises (MSE) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME).

   When no local agent, the foreign vendor can submit demand draft equal to 2% or wire transfer the amount to our account as detailed in the attachment (Annexure II) and enclose the proof with the financial bid.

3. **Performance Security: -** The successful bidder should submit Performance Security for an amount of 5% of the value of the contract/supply. The Performance Security may be furnished in the form of an Account Payee DD, FD Receipt from the commercial bank, Bank Guarantee from any nationalized bank in India. **The performance security should be furnished within 21 days from the delivery of the purchase order.**

   Performance Security in the form of Bank Guarantee:- Incase the successful bidder wishes to submit Performance Security in the form of Bank Guarantee, the Bank Guarantee should be routed through the Beneficiary Bank to the end user bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee from a Nationalized Bank of India.
   The Bank Guarantee should remain valid for a period of sixty days beyond the date of completion of all contractual obligations of the supplier including the warranty obligations.

4. **Indian agent:** If an Indian agent is involved, the following documents must be enclosed:
   Foreign principal's proforma invoice indicating the commission payable to the Indian Agent and nature of after-sales service to be rendered by the Indian Agent.
   - ✓ Copy of the agency agreement with the foreign principal and the precise relationship between them and their mutual interest in the business.

5. The offer/bids should be sent only for a machine that is available in the market and supplied to a number of customers. A list of customers in India and abroad with details must accompany the quotations. Quotations for a prototype machine will not be accepted.

6. Original catalogue (not any photocopy) as applicable of the quoted model duly signed by the principals must accompany the quotation in the Technical bid. No prices should ever be included in the Technical bid.

7. Documentary proof :
   a. **Please indicate prior FPGA boards (or similar complexity of at least 22 layers) that you have fabricated. Vendors without prior experience (of at least 5 prior boards of similar complexity will be disqualified.**
   b. **Firm should be existed for at least 10 years**
   c. **Explicitly indicate the Fab details, where the board will be fabricated.**
   d. **Explicitly indicate the details, where the board will be assembled.**

8. **Validity:** Validity of Quotation not less than 90 days from the due date of tender.

9. **Delivery Schedule**: - The tenderer should indicate clearly the time required for delivery of the item. In case there is any deviation in the delivery schedule, liquidated damages clause will be enforced or penalty for the delayed supply period will be levied.
   Normally the delivery should be in 8 weeks from date of PO (or as specified in Annexure 1 whichever is earlier). If there is delay, the penalty will be @1% per week of delay subject to a max of 10% of the value of purchase order and if the delay is more than 10 weeks, the PO would be cancelled and liquidated damages will be enforced.

10. **Risk Purchase Clause**:- In the event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from other sources on the total risk of the supplier under risk purchase clause.

11. **Advance Payment:** No advance payment is generally admissible. In case of specific percentage of advance payment is required, the Foreign Vendor has to submit a Bank Guarantee equal to the amount of advance payment and it should be routed through the Beneficiary Bank to the end user Bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee through a Nationalized Bank of India.

12. **On-site Installation**: - The equipment or machinery has to be installed or commissioned by the successful bidder within 15 to 20 days from the date of receipt of the item at site of IIT Madras (as applicable).

13. **Late offer**: - The offers received after the due date and time will not be considered. The Institute shall not be responsible for the late receipt of Tender on account of Postal, Courier or any other delay.

14. **Acceptance and Rejection**: - I.I.T. Madras has the right to accept the whole or any part of the Tender or portion of the quantity offered or reject it in full without assigning any reason.

15. **Do not quote the optional items or additional items unless otherwise mentioned in the Tender documents / Specifications.**

16. **Disputes and Jurisdiction**:

Settlement of Disputes: Any dispute, controversy or claim arising out of or in connection with this PO including any question regarding its existence, validity, breach or termination, shall in the first instance be attempted to be resolved amicably by both the Parties. If attempts for such amicable resolution fails or no decision is reached within 30 days whichever is earlier, then such disputes shall be settled by arbitration in accordance with the Arbitration and Conciliation Act, 1996. Unless the Parties agree on a sole arbitrator, within 30 days from the receipt of a written request by one Party from the other Party to so agree, the arbitral panel shall comprise of three arbitrators. In that event, the supplier will nominate one arbitrator and the Project Coordinator of IITM shall nominate on arbitrator. The Dean IC&SR will nominate the Presiding Arbitrator of the arbitral tribunal. The arbitration proceeding shall be carried out in English language. The cost of arbitration and fees of the arbitrator(s) shall be shared equally by the Parties. The seat of arbitration shall be at IC&SR IIT Madras, Chennai.

a. **The Applicable Law:** This Purchase Order shall be construed, Interpreted and governed by the Laws of India, Court at Chennai shall have exclusive jurisdiction subject to the arbitration clause.
b. Any legal disputes arising out of any breach of contact pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Chennai in Tamil Nadu.

20. All Amendments, time extension, clarifications etc., will be uploaded on the website only and will not be published in newspapers. Bidders should regularly visit the above website to keep themselves updated. No extension in the bid due date/ time shall be considered on account of delay in receipt of any document by mail.

Acknowledgement: - It is hereby acknowledged that the tenderer has gone through all the conditions mentioned above and agrees to abide by them.

SIGNATURE OF TENDERER
ALONG WITH SEAL OF THE
COMPANY WITH DATE

Annexure I

Technical Specifications

a. **Please indicate prior FPGA boards (or similar complexity of at least 22 layers) that you have fabricated. Vendors without prior experience (of at least 5 prior boards) of similar complexity will be disqualified. Documentary evidence of the same should be provided.**
b. **Firm should have existed for at least 10 years**
c. **Explicitly indicate the Fab details and its technical capabilities, where the board will be fabricated.**
d. **Explicitly indicate the Fab details and its technical capabilities, where the board will be assembled.**

There are two stages in the whole process.

Stage 1: PCB fabrication: At the end of Stage1, the firm should provide us with a report on the PCBs that were fabricated and proceed with the assembly only after technical approval by the IITM team.

Stage 2: BOM procurement and PCB assembly.

The PCB Fabrication cost, BOM cost and Assembly cost should be separated and be explicitly mentioned.

Total turn-over time from the receipt of PO: 5 weeks.

5 Boards should be fabricated

The technical details of the PCB Fabrication, BOM and PCB assembly are provided below.

PCB Fabrication

Please provide a compliance table for the following stating Yes/No. The fab details have to be provided.

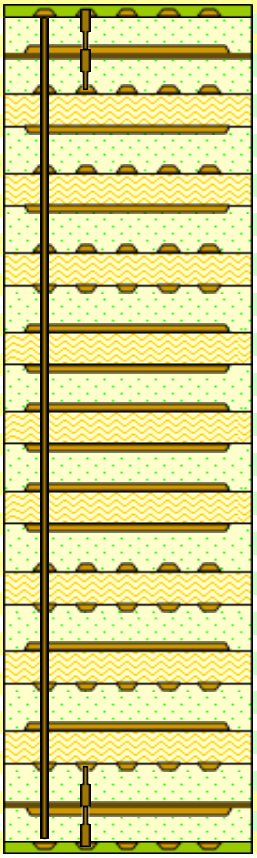
Fabrication Time	**2 Weeks**
No. of layers	22
Via Technology	Layers 1-2, 2-3, 20-21 and 21-22, 6 mils laser vias on 10 mil pad. Layer 1 to 22, 8 mils Mechanical vias
Material(Specify clearly whether High Tg or Normal Tg)	Megtron-6

Impedance control (Yes/No) Mention tolerance	Yes
Board thickness (1.6mm/2.4mm/3.2mm/ any other) Mention Tolerance	97 Mils
Copper finish (35 microns/70 microns/ any other)	6 Layers-1 Oz and, others 0.5 Oz
Min. finished hole dia (mil)	8 Mil Mech and 6 Mil Laser vias
Min. trace width (mil)	3.1 Mils
Min. spacing (mil)	3.5
Min. Annular ring (mil)	5 Mils
Gold tabs if any (quantity)	No
Board finish(Hot Air Levelled/ Electroless Ni-Au / Hard Gold / any other)	Enig
PCB Dimension in Inch	12 X 12 inch
Via hole filling at BGA required ? (YES/NO)	Yes, for Laser vias on Pad
PCB Quantity	**5**
Delivery time (4 weeks/14 working days/7 working days/4-5 working days)	10 and 15 days
Metal core board ?	No
Mil Grade ?	No
Whether Group B Test Report required ?	No
Solder Mask Colour	Green
Silkscreen Colour	White
RoHS Complaint	Yes
UL Logo Required	Yes
Back Drilling Required ?	No
RF VIAS	Yes (Require conductive filling)

Stack up requirements of the board (Material and Stack up cannot be changed)

Customer Req Thk:	98+/-9.8 mils Measured: Over mask on plated copper

Layer	Cu Thick. (mils)	Cu Foil wt (oz)	DK	Lam. Thick. (mils)	Description
1	1.75	.375 oz			Foil .375 oz
			3.34	3.41	Prepreg Megtron6 1078(68) 18.25Gx24.25
2	0.65	.375 oz			Foil .375 oz
			3.24	3.64	Prepreg Megtron6 1078(72) 18.25Gx24.25
3	0.60	0.5 oz			
			3.42	3.00	Core Megtron6 3.00mils 1078 0.5 oz / 0.5 oz HVLP 18.25Gx24.25
4	0.60	0.5 oz			
			3.24	3.49	Prepreg Megtron6 1078(72) 18.25Gx24.25
5	0.60	0.5 oz			
			3.58	5.00	Core Megtron6 5.00mils 2x1078 0.5 oz / 0.5 oz HVLP 18.25Gx24.25
6	0.60	0.5 oz			
			3.24	3.49	Prepreg Megtron6 1078(72) 18.25Gx24.25
7	0.60	0.5 oz			
			3.64	3.90	Core Megtron6 3.90mils 3313 0.5 oz / 0.5 oz HVLP 18.25Gx24.25
8	0.60	0.5 oz			
			3.25	3.97	Prepreg Megtron6 1035(70)/1035(70) 18.25Gx24.25
9	1.20	1 oz			
			3.42	3.00	Core Megtron6 3.00mils 1078 0.5 oz / 1 oz HVLP 18.25Gx24.25
10	0.60	0.5 oz			
			3.21	4.20	Prepreg Megtron6 1078(75) 18.25Gx24.25
11	1.20	1 oz			
			3.42	3.00	Core Megtron6 3.00mils 1078 1 oz / 1 oz HVLP 18.25Gx24.25
12	1.20	1 oz			
			3.21	4.20	Prepreg Megtron6 1078(75) 18.25Gx24.25
13	0.60	0.5 oz			
			3.42	3.00	Core Megtron6 3.00mils 1078 0.5 oz / 1 oz HVLP 18.25Gx24.25
14	1.20	1 oz			
			3.25	3.97	Prepreg Megtron6 1035(70)/1035(70) 18.25Gx24.25
15	0.60	0.5 oz			
			3.64	3.90	Core Megtron6 3.90mils 3313 0.5 oz / 0.5 oz HVLP 18.25Gx24.25
16	0.60	0.5 oz			
			3.24	3.49	Prepreg Megtron6 1078(72) 18.25Gx24.25
17	0.60	0.5 oz			
			3.58	5.00	Core Megtron6 5.00mils 2x1078 0.5 oz / 0.5 oz HVLP 18.25Gx24.25
18	0.60	0.5 oz			
			3.24	3.49	Prepreg Megtron6 1078(72) 18.25Gx24.25
19	0.60	0.5 oz			
			3.42	3.00	Core Megtron6 3.00mils 1078 0.5 oz / 0.5 oz HVLP 18.25Gx24.25
20	0.60	0.5 oz			
			3.24	3.64	Prepreg Megtron6 1078(72) 18.25Gx24.25
21	0.65	.375 oz			Foil .375 oz
			3.34	3.41	Prepreg Megtron6 1078(68) 18.25Gx24.25
22	1.75	.375 oz			Foil .375 oz



91.71	Thickness over Laminate
95.21	Thickness over Copper
96.21	Thickness over Soldermask

Drill Table

Start Layer	End Layer	Drill Type	Plate Type	Via Fill	Drill Size (min)	Drill Depth	Pad Size(min)	Stacked Vias
1	22	Mech	PTH	--	10.00	92.01	20.00	
21	20	Laser	Micro Via	CuVF_Button Pattern	6.00	4.09	10.00	Y
22	21	Laser	Micro Via	CuVF_Button Pattern	6.00	3.86	10.00	Y
1	2	Laser	Micro Via	CuVF_Button Pattern	6.00	3.86	10.00	Y
2	3	Laser	Micro Via	CuVF_Button Pattern	6.00	4.09	10.00	Y

Impedance Table

Layer	Structure Type	Coated Microstrip	Target Impedance (ohms)	Impedance Tolerance (ohms)	Target Linewidth (mils)	Edge Coupled Pitch * (mils)	Reference Layers	Modelled Linewidth (mils)	Modelled Impedance (ohms)	CoPlaner Space (mils)
1	Edge Coupled Differential	Yes	80.00	+/-8	5.90	10.00	(2)	6.00	80.23	
1	Edge Coupled Differential	Yes	100.00	+/-10	4.00	10.00	(2)	4.25	99.22	
1	Single Ended	Yes	50.00	+/-5	5.70	0.00	(2)	6.00	50.05	
1	Edge Coupled Differential	Yes	90.00	+/-9	4.90	10.00	(2)	5.00	90.62	
1	Single Ended	Yes	40.00	+/-4	8.60	0.00	(2)	9.00	40.34	

3	Single Ended	---	40.00	+/-4	5.00	0.00	(2, 4)	5.00	40.27	
3	Edge Coupled Differential	---	80.00	+/-8	4.80	11.00	(2, 4)	5.00	78.81	
3	Single Ended	---	50.00	+/-5	3.20	0.00	(2, 4)	3.50	49.40	
3	Edge Coupled Differential	---	90.00	+/-9	3.80	11.00	(2, 4)	4.00	90.41	
3	Edge Coupled Differential	---	100.00	+/-10	3.10	11.00	(2, 4)	3.25	101.42	
5	Edge Coupled Differential	---	100.00	+/-10	3.90	10.00	(4, 6)	4.00	98.85	
5	Edge Coupled Differential	---	90.00	+/-9	4.70	10.00	(4, 6)	4.75	89.25	
5	Edge Coupled Differential	---	80.00	+/-8	5.60	10.00	(4, 6)	5.50	80.95	
5	Single Ended	---	50.00	+/-5	4.30	0.00	(4, 6)	4.25	50.22	
5	Single Ended	---	40.00	+/-4	6.30	0.00	(4, 6)	6.25	40.25	
7	Single Ended	---	40.00	+/-4	6.70	0.00	(6, 9)	7.50	40.57	
7	Edge Coupled Differential	---	100.00	+/-10	4.10	10.00	(6, 9)	4.50	98.89	
7	Edge Coupled Differential	---	90.00	+/-9	4.90	10.00	(6, 9)	5.25	89.86	
7	Edge Coupled Differential	---	80.00	+/-8	5.80	10.00	(6, 9)	6.25	79.28	
7	Single Ended	---	50.00	+/-5	4.50	0.00	(6, 9)	5.25	49.85	
16	Edge Coupled Differential	---	100.00	+/-10	4.10	10.00	(17, 14)	4.50	98.89	
16	Single Ended	---	50.00	+/-5	4.50	0.00	(17, 14)	5.25	49.85	
16	Edge Coupled Differential	---	90.00	+/-9	4.90	10.00	(17, 14)	5.25	89.86	
16	Single Ended	---	40.00	+/-4	6.70	0.00	(17, 14)	7.50	40.57	
16	Edge Coupled Differential	---	80.00	+/-8	5.80	10.00	(17, 14)	6.25	79.28	
18	Single Ended	---	50.00	+/-5	4.30	0.00	(19, 17)	4.25	50.22	
18	Edge Coupled Differential	---	100.00	+/-10	3.90	10.00	(19, 17)	4.00	98.85	
18	Single Ended	---	40.00	+/-4	6.30	0.00	(19, 17)	6.25	40.25	
18	Edge Coupled Differential	---	80.00	+/-8	5.60	10.00	(19, 17)	5.50	80.95	
18	Edge Coupled Differential	---	90.00	+/-9	4.70	10.00	(19, 17)	4.75	89.25	
20	Edge Coupled Differential	---	90.00	+/-9	3.80	11.00	(21, 19)	4.00	90.41	
20	Edge Coupled Differential	---	80.00	+/-8	4.80	11.00	(21, 19)	5.00	78.81	
20	Single Ended	---	50.00	+/-5	3.20	0.00	(21, 19)	3.50	49.40	
20	Single Ended	---	40.00	+/-4	5.00	0.00	(21, 19)	5.00	40.27	
20	Edge Coupled Differential	---	100.00	+/-10	3.10	11.00	(21, 19)	3.25	101.42	
22	Edge Coupled Differential	Yes	90.00	+/-9	4.90	10.00	(21)	5.00	90.62	
22	Edge Coupled Differential	Yes	80.00	+/-8	5.90	10.00	(21)	6.00	80.23	
22	Single Ended	Yes	40.00	+/-4	8.60	0.00	(21)	9.00	40.34	
22	Single Ended	Yes	50.00	+/-5	5.70	0.00	(21)	6.00	50.05	
22	Edge Coupled Differential	Yes	100.00	+/-10	4.00	10.00	(21)	4.25	99.22	

* Edge Coupled Pitch is measured from the center line of one differential trace to the center line of the other.

* This stack-up was created using estimated copper area percentages. (25% signal, 50% mix, 75% plane).

Process Plating Info
Final Assembly - 1/22 = Pattern Plate
Sub Assembly - 2/21 = Pattern Plate

The Gerber files will be provided once the PO is generated.

Assembly

1. **We require 5 boards to be populated.**
2. The FPGA's required for the board will be provide by us. The rest of the BOM (as below) has to **be procured by the vendor for 5 boards.**
3. Time: 3 weeks.

1	No Of comps	4000
2	No of BGAs	14
3	Maximum pin count—	1760, 1 mm BGA
4	Minimum BGA pitch	0.5 mm
5	Total No of points to be soldered (no of Pins)	18000
6	PTH pins	400
7	Both side assembly	Yes
8	Board Size-	12 X 12 Inch
9	Board Thickness	97 Mils
10	No of Layers	22
11	Qty-	5 Nos

X-Ray verification of BGA required and the test results should be provided.

BOM

Bill of Materials

The following BOM is only for ONE RRH board

We can share the excel sheet of the BOM on email request (**rganti@ee.iitm.ac.in**).

Item	Quantity	Reference	Part	MANUFACURER PART NUMBER	PCB Footprint	Manufacturer
195	4	R871,R946,R950,R955	56K	RMCF0402JT56K0	RESC1005X40N_E	Stackpole Electronics Inc.
196	4	R872,R935,R936,R969	14K	RMCF0402FT14K0	RESC1005X40N_E	Stackpole Electronics Inc.
129	4	R5,R7,R600,R602	20.5K 1%	RMCF0402FT20K5	RESC1005X40N_D	Stackpole Electronics Inc.
136	2	R34	68E	RC0402FR-0720RL	RESC1005X40N_C	Yageo
162	1	R312	38.3K	RC0402FR-0738K3L	RESC1005X40N_C	Yageo
172	3	R428,R815,R831	45.3K	RC0402FR-0745K3L	RESC1005X40N_C	Yageo
260	34	Z1,Z2,Z3,Z4,Z5,Z6,Z7,Z8,Z9,Z10,Z11,Z12,Z13,Z14,Z15,Z16,Z17,Z18,Z19,Z20,Z21,Z22,Z		RC0603FR-070RL	RESC1608X55N_A	YAGEO

		23,Z24,Z25,Z26,Z27,Z28				
143	1	R64	200K	RMCF0805JT200K	RESC2012X65N_SEM	Stackpole Electronics Inc.
140	43	R47,R48,R232,R233,R264,R271,R277,R278,R304,R310,R641,R642,R667,R668,R699,R706,R712,R713	1.00K	RC1005F102CS	RESC1005X40N_C	Samsung Electro-Mechanics
191	4	R857,R919,R986,R1048	22.1K,1%	AC0402FR-0722K1	RESC1005X37N_A	Yageo
144	35	R65,R66,R67,R68,R273,R306,R380,R381,R382,R383,R384,R385,R388,R389,R392,R409,R412,R433,R437,R512,R515,R708,R766,R767,R768,R769,R770,R771,R774,R775,R778,R795,R798,R819,R823	220R	RC0603FR-07220RL	RESC1608X55N_A	Yageo
104	64	L112,L113,L115,L116,L117,L119,L124,L126,L127,L128,L131,L132,L134,L139,L140,L142,L143,L145,L146,L148,L149,L151,L156,L158,L159,L161,L162,L164,L165,L167,L172,L174,L175,L177,L178,L180,L181,L183,L188,L190,L191,L193,L194,L196,L197,L199,L204,L206,L207,L209,L210,L212,L213,L215,L220,L222,L223,L225,L226,L228,L229,L231,L236,L238	1.3nH	ERJ-1GN0R00C	RESC0603X26N	tdk
126	328	R2,R229,R230,R597,R664,R665	DNP	ERJ-2GE0R00X	RESC1005X40N_C	Panasonic Electronic Components
128	2	R4,R599	DNP DNP	ERJ-2GEJ102X	RESC1005X40N_PEC	Panasonic Electronic Components
194	8	R864,R865,R928,R929,R992,R993,R1056,R1057	47K DNI	ERJ-2GEJ103X	RESC1005X40N	Panasonic Electronic Components
165	56	R327,R751	DNI(10K)	ERJ-2GEJ103X	RESC1005X40N	Panasonic Electronic Components
114	2	RADDR2,RADDR5	11k	ERJ-2GEJ113X	RESC1005X40N_D	Panasonic Electronic Components
206	2	R1098,R1101	2.00K 1/10W	ERJ-2GEJ202X	RESC1005X40N_PEC	Panasonic Electronic Components
132	12	R17,R18,R51,R52,R56,R57,R861,R925,R989,R1053,R5297,R5298	2K	ERJ-2GEJ202X	RESC1005X40N_PEC	Panasonic Electronic Components
170	2	R414,R800	3.9k	ERJ-2GEJ392X	RESC1005X40N_PEC	Panasonic Electronic Components
133	2	R25,R619	4.70M 1/10W 5%	ERJ-2GEJ475X	RESC1005X40N_PEC	Panasonic Electronic Components
164	2	R322,R748	51K	ERJ-2GEJ513X	RESC1005X40N_B	Panasonic Electronic

						Components
52	8	C1319,C1320,C1444,C1445, C1569,C1570,C1694,C1695	TBD0402 DNI	CL05B104KO5NN NC	CAPC1005X55N	Samsung Electro- Mechanics
2	516	C1,C3,C7,C8,C18,C19,C23,C 24,C25,C26,C27,C30,C34,C1 07,C108,C109,C110,C111,C1 12,C117,C118,C119,C120,C1 21,C133,C139,C140,C141,C1 42,C143,C144,C145,C146,C1 47,C148,C149,C150,C157,C1 59,C176,C185,C186,C187,C1 94,C196,C322,C325,C327,C3 29,C331,C332,C368,C369,C3 73,C383,C404,C405,C406,C4 07,C415,C435,C436,C437,C4 38,C439,C440,C542,C543,C5 45,C575,C579,C582,C585,C5 92,C595,C602,C605,C607,C6 09,C625,C627,C628,C629,C6 30,C631,C632,C633,C634,C6 38,C639,C640,C641,C642,C6 43,C644,C645,C646,C647,C6 48,C649,C650,C651,C652,C6 53,C654,C657,C658,C659,C6 61,C662,C663,C664,C665,C6 66,C667,C706,C707,C708,C7 09,C711,C713,C715,C717,C7 18,C720,C724,C725,C727,C7 31,C734,C737,C739,C740,C7 41,C742,C743,C746,C753,C7 56,C763,C764,C765,C766,C7 67,C768,C773,C774,C775,C7 76,C777,C789,C795,C796,C7 97,C798,C799,C800,C801,C8 02,C803,C804,C805,C806,C8 15,C832,C841,C842,C843,C8 47,C850,C852,C854,C856,C8 87,C891,C894,C897,C904,C9 07,C914,C917,C919,C921,C9 23,C949,C953,C956,C966,C9 68,C1004,C1005,C1009,C10 19,C1040,C1041,C1042,C10 43,C1051,C1070,C1077,C10 80,C1087,C1090,C1092,C10 94,C1096,C1263,C1264,C12 65,C1266,C1271,C1272,C12 73,C1274,C1275,C1276,C12 77,C1278,C1279,C1280,C12 81,C1282,C1283,C1284,C12 85,C1286,C1287,C1288,C12 89,C1290,C1300,C1306,C13 07,C1311,C1323,C1325,C13 33,C1335,C1336,C1341,C13 45,C1349,C1352,C1355,C13 62,C1365,C1372,C1375,C13 77,C1379,C1381,C1383,C13 84,C1388,C1389,C1390,C13 91,C1396,C1397,C1398,C13	0.1uF 25V	CL05A104KA5NN NC	CAPC1005X55N	Samsung Electro- Mechanics

		99,C1400,C1401,C1402,C14 03,C1404,C1405,C1406,C14 07,C1408,C1409,C1410,C14 11,C1412,C1413,C1414,C14 15,C1422,C1431,C1432,C14 36,C1449,C1451,C1458,C14 60,C1461,C1466,C1470,C14 74,C1477,C1480,C1487,C14 90,C1497,C1500,C1502,C15 04,C1506,C1508,C1509,C15 50,C1556,C1557,C1561,C15 74,C1576,C1583,C1585,C15 86,C1591,C1595,C1599,C16 02,C1605,C1612,C1615,C16 22,C1625,C1627,C1629,C16 31,C1633,C1634,C1674,C16 81,C1682,C1686,C1698,C17 00,C1708,C1710,C1711,C17 16,C1720,C1724,C1727,C17 30,C1737,C1740,C1747,C17 50,C1752,C1754,C1756,C17 58,C1759,C1767,C1768,C38 52,C3854,C3856,C3857,C38 59,C3860,C3861,C3862,C38 74,C3884,C3889,C3890,C38 91,C3892,C3908,C3909,C39 10,C3911,C3912,C3913,C39 14,C3915,C3916,C3917,C39 18,C3919,C3920,C3921,C39 22,C3923,C3924,C3925,C39 26,C3927,C3928,C3929,C39 30,C3931,C3932,C3933,C39 34,C3935,C3936,C3937,C39 38,C3939,C3940,C3941,C39 42,C3943,C3944,C3945,C39 46,C3947,C3948,C3949,C39 50,C3951,C3952,C3953,C39 54,C3955,C3956,C3957,C39 58,C3959,C3960,C3961,C39 62,C3963,C3964,C3965,C39 66,C3967,C3968,C3969,C39 70,C3971,C3972,C3973,C39 74,C3975,C3976,C3977,C39 78,C3979,C3980,C3981,C39 82,C3983,C3984,C3985,C39 86,C3987,C3988,C3989,C39 90,C3991,C3992,C3993,C39 94,C3995,C3996,C3997,C39 98,C3999,C4000,C4001,C40 02,C4003,C4004,C4005,C40 06,C4007,C4008,C4009,C40 10,C4011,C4012,C4013,C40 14,C4015,C4016,C4017,C40 18,C4019,C4020,C4021,C40 22,C4023,C4024,C4025,C40 26,C4027,C4028,C4029,C40 30,C4031,C4032,C4033,C40 34,C4035,C4037,C4115,C67				

		0,C673,C674,C675,C677,C680,C681,C682,C684				
161	47	R286,R289,R290,R293,R294,R295,R311,R721,R724,R725,R728,R729,R730	100	ERJ-2RKF1000X	RESC1005X40N	Panasonic Electronic Components
119	13	RPU5,RPU8,R415,R459,R476,R478,R480,R499,R509,R511,R514,R545,R801	1k	ERJ-2RKF1001X	RESC1005X40N_B	Panasonic Electronic Components
113	166	RADDR1,RADDR4,R267,R323,R332,R335,R336,R340,R341,R342,R343,R344,R345,R351,R386,R387,R390,R391,R410,R411,R421,R434,R435,R448,R451,R457,R462,R468,R484,R485,R490,R503,R506,R552,R553,R556,R564,R566,R567,R570,R571,R572,R573,R574,R575,R576,R578,R581,R702,R739,R752,R753,R754,R755,R756,R757,R763,R772,R773,R776,R777,R796,R797,R807,R820,R821,R827,R828,R832,R833,R851,R852,R855,R859,R866,R869,R881,R884,R915,R916,R921,R923,R930,R933,R943,R948,R970,R971,R972,R983,R988,R994,R997,R1008,R1012,R1050,R1052,R1058,R1061,R1062,R1072,R1076,R3653,R4253,R5281,R5282,R5283,R5284,R5285,R5286,R5287,R5288,R5293,R5294,R5295,R5296	10k	ERJ-2RKF1002X	RESC1005X40N_B	Panasonic Electronic Components
188	2	R837,R907	10.2K	ERJ-2RKF1022X	RESC1005X40N_PEC	Panasonic Electronic Components
192	4	R860,R924,R982	10.7K,DNI	ERJ-2RKF1072X	RESC1005X40N_PEC	Panasonic Electronic Components
155	12	R269,R270,R399,R400,R419,R420,R704,R705,R785,R786,R805,R806	10	ERJ-2RKF10R0X	RESC1005X40N_PEC	Panasonic Electronic Components
158	2	R279,R714	115K	ERJ-2RKF1153X	RESC1005X40N_PEC	Panasonic Electronic Components
187	2	R829,R834	121K	ERJ-2RKF1213X	RESC1005X40N_PEC	Panasonic Electronic Components
169	2	R403,R789	124k	ERJ-2RKF1243X	RESC1005X40N_PEC	Panasonic Electronic Components
157	3	R276,R308,R711	12.7K	ERJ-2RKF1272X	RESC1005X40N_PEC	Panasonic Electronic Components
204	4	R1022,R1122,R1134,R1154	130K	ERJ-2RKF1303X	RESC1005X40N_B	Panasonic Electronic Components
156	3	R274,R307,R709	1.33K	ERJ-2RKF1331X	RESC1005X40N_B	Panasonic

						Electronic Components
159	3	R280,R313,R715	140K	ERJ-2RKF1403X	RESC1005X40N_PEC	Panasonic Electronic Components
209	8	R5254,R5255,R5256,R5257,R5258,R5259,R5260,R5261	14.3 1%	ERJ-2RKF1432X	RESC1005X40N_D	Panasonic Electronic Components
203	4	R1021,R1107,R1132,R1152	150K	ERJ-2RKF1503X	RESC1005X40N_B	Panasonic Electronic Components
123	4	RVSET3,RVSET4,RVSET6,RVSET1	17.8k	ERJ-2RKF1782X	RESC1005X40N_D	Panasonic Electronic Components
190	8	R847,R850,R911,R914	200	ERJ-2RKF2000X	RESC1005X40N	Panasonic Electronic Components
186	11	R826,R830,R835,R868,R877,R932,R941,R996,R1005,R1060,R1069	20K	ERJ-2RKF2002X	resc1005x40n_b	Panasonic Electronic Components
142	76	R54,R62,R71,R72,R73,R74,R78,R192,R210,R651,R652,R846,R891,R973,R975,R976,R978,R979,R985,R999,R1010,R5326,R5327,R5328	22	ERJ-2RKF22R0X	RESC1005X40N	Panasonic Electronic Components
121	2	RUVLO1,RUVLO2	23.7k	ERJ-2RKF2372X	RESC1005X40N_D	Panasonic Electronic Components
139	6	R46,R50,R234,R640,R644,R669	240	ERJ-2RKF2400X	RESC1005X40N_B	Panasonic Electronic Components
137	12	R37,R38,R39,R631,R632,R633	261 1/10W 1%	ERJ-2RKF2610X	RESC1005X40N_PEC	Panasonic Electronic Components
116	7	RFREQ1,RFREQ3,RFREQ4,RFREQ6,R281,R314,R716	26.1K	ERJ-2RKF2612X	RESC1005X40N_D	Panasonic Electronic Components
200	4	R883,R947,R1011,R1075	27.4K DNI	ERJ-2RKF2742X	RESC1005X40N_PEC	Panasonic Electronic Components
117	2	RFREQ2,RFREQ5	28.7k	ERJ-2RKF2872X	RESC1005X40N_D	Panasonic Electronic Components
177	1	R446	30.1K	ERJ-2RKF3012X	RESC1005X40N_PEC	Panasonic Electronic Components
166	32	R346,R347,R348,R349,R350,R352,R758,R759,R760,R761,R762,R764,R5289,R5290,R5291,R5302,R5303,R5304,R5305,R5306,R5307,R5308,R5309,R5310,R5311,R5312,R5313,R5314,R5315,R5316,R5317,R5318	30	ERJ-2RKF30R0X	RESC1005X40N_B	Panasonic Electronic Components
122	2	RVSET2,RVSET5	31.6k	ERJ-2RKF3162X	RESC1005X40N_PEC	Panasonic Electronic Components
176	1	R445	316k	ERJ-2RKF3163X	RESC1005X40N_PE	Panasonic

					C	Electronic Components
152	4	R260,R261,R695,R696	36	ERJ-2RKF36R0X	RESC1005X40N_B	Panasonic Electronic Components
199	2	R878,R942	37.4K,DNI	ERJ-2RKF3742X	RESC1005X40N_PEC	Panasonic Electronic Components
197	6	R874,R882,R908,R922,R1006,R1070	37.4K	ERJ-2RKF3742X	RESC1005X40N_PEC	Panasonic Electronic Components
151	50	R235,R236,R237,R238,R239,R240,R241,R242,R243,R244,R245,R246,R247,R248,R249,R250,R251,R252,R253,R254,R255,R256,R257,R258,R259,R670,R671,R672,R673,R674,R675,R676,R677,R678,R679,R680,R681,R682,R683,R684,R685,R686,R687,R688,R689,R690,R691,R692,R693,R694	39.2	ERJ-2RKF39R2X	RESC1005X40N_B	Panasonic Electronic Components
175	1	R444	44.2K	ERJ-2RKF4122X	RESC1005X40N_PEC	Panasonic Electronic Components
160	2	R282,R717	40.2K	ERJ-2RKF4222X	RESC1005X40N_PEC	Panasonic Electronic Components
193	8	R862,R926,R990,R1036,R1054,R1097,R1131,R1151	43.2k	ERJ-2RKF4322X	RESC1005X40N_PEC	Panasonic Electronic Components
124	86	Rpu3,Rpu4,R19,R20,R21,R22,R23,R24,R36,R53,R55,R58,R59,R60,R61,R84,R207,R266,R275,R309,R449,R465,R481,R496,R550,R555,R582,R583,R584,R585,R586,R589,R590,R591,R595,R613,R615,R616,R617,R618,R646,R649,R701,R710,R5274,R5275,R5276,R5277,R5299,R5301,R11,R12,R13,R14,R15,R16,R41,R226,R227,R263,R296,R297,R298,R299,R300,R301,R302,R303,R606,R607,R608,R609,R610,R611,R635,R661,R662,R698,R731,R732,R733,R734,R735,R736,R737,R738	4.7K	ERJ-2RKF4701X	RESC1005X40N	Panasonic Electronic Components
135	14	R30,R31,R32,R33,R44,R45,R624,R625,R626,R627,R638,R639	499 1/10W 1%	ERJ-2RKF4990X	RESC1005X40N_PEC	Panasonic Electronic Components
163	16	R315,R316,R317,R318,R319,R320,R321,R324,R740,R741,R742,R743,R744,R745,R746,R747	49K9	ERJ-2RKF4992X	RESC1005X40N	Panasonic Electronic Components
181	1	R541	6.04K_1%	ERJ-2RKF6041X	RESC1005X40N	Panasonic Electronic Components
147	4	R190,R844,R1003,R1066	6.34K	ERJ-2RKF6341X	RESC1005X40N_PE	Panasonic

					C	Electronic Components
167	2	R394,R780	6.65k	ERJ-2RKF6651X	RESC1005X40N_PEC	Panasonic Electronic Components
120	2	RSS1,RSS2	68.1k	ERJ-2RKF6812X	RESC1005X40N_D	Panasonic Electronic Components
150	4	R225,R231,R660,R666	8.06K	ERJ-2RKF8061X	RESC1005X40N_B	Panasonic Electronic Components
202	8	R1020,R1083,R1124,R1126,R1129,R1130,R1149,R1150	8.666K	ERJ-2RKF8661X	RESC1005X40N	Panasonic Electronic Components
171	2	R426,R812	90.9k	ERJ-2RKF9092X	RESC1005X40N_PEC	Panasonic Electronic Components
10	8	C20,C163,C198,C386,C416,C819,C1023,C1052	100pF	C0402C101J5RAC7867	CAPC1005X55N	KEMET
13	155	C87,C88,C89,C90,C91,C92,C93,C94,C95,C96,C97,C98,C99,C100,C101,C102,C103,C104,C113,C313,C314,C315,C316,C318,C319,C320,C321,C546,C547,C548,C549,C550,C551,C552,C553,C554,C555,C669,C671,C678,C683,C685,C690,C693,C696,C699,C701,C704,C757,C758,C759,C760,C761,C762,C769,C957,C958,C959,C960,C962,C963,C964,C965,C1299,C1310,C1317,C1318,C1327,C1329,C1424,C1435,C1442,C1443,C1452,C1454,C1547,C1560,C1567,C1568,C1577,C1672,C1685,C1692,C1693,C1702,C4039,C4040,C4041,C4042,C4043,C4044,C4045,C4046,C4047,C4048,C4049,C4050,C4051,C4052,C4053,C4054,C4055,C4056,C4059,C4060,C4061,C4062,C4063,C4064,C4065,C4066,C4067,C4068,C4069,C4070,C4071,C4072,C4073,C4074	0.01uF	GCM155R71H103JA55D	CAPC1005X55N	Murata Electronics North America
29	2	C380,C1016	56pF	GCM1555C1H560JA16D	CAPC1005X55N	Murata Electronics North America
49	2	C1267,C1392	180pF	C0402C181J5GACTU	CAPC1005X55N	KEMET
22	18	C170,C178,C825,C834,C1269,C1394	1000pF	C0603C102J5RACTU	capc1608x87n	KEMET
99	8	L54,L67,L68,L82,L96,L83,L104,L105	1.8KOHM @100MEGHZ	BK1005LM182-T	INDC1005X55N_TY	Taiyo Yuden
35	2	C418,C1054	470pF	GCM1555C1H471JA16D	CAPC1005X55N	Murata Electronics North

						America
61	2	FB9,FB32	MMZ1005S121CT000	MMZ1005S121CT000	FB_MPZ1005S121ETD25	TDK
9	4	C16,C17,C732,C733	22pF 50V	06035C220JAT2A	CAPC1608X90N	AVX Corporation
94	4	L43,L57,L71,L85	120OHM	BLM18KG121TN1D	INDC1608X75N	Murata Electronics North America
95	12	L45,L47,L50,L59,L61,L64,L73,L75,L78,L87,L89,L92	470OHM	BLM18KG471SN1D	INDC1608X95N_B	Murata Electronics North America
89	12	L11,L12,L13,L14,L15,L16,L17,L18	420R, 100MHz	BLM21PG221SN1D	indc2012x105n	Murata Electronics North America
87	2	L9,L40	1K@100MHz	BLM15BD102SN1D	INDC1005X55N	Murata Electronics North America
98	9	L52,L66	420HM AT 100MEGHZ	FBMJ2125HS420-T	indc2012x105n	Taiyo Yuden
30	6	C381,C382,C419,C1017,C1018,C1055	OPEN	C0603C100K3GACTU	CAPC1608X87N	KEMET
125	2	R1,R596	1.00K 1%	RCA04021K00FKEDHP	RESC1005X40N_VISHAY	Vishay Dale
97	4	L51,L65,L79,L93	30OHM	BLM15AX300SN1D	fb_blm15ag100sn1	Murata Electronics North America
201	4	R887,R951,R1015,R1079	0.47	ERJ-3RQJR47V	RESC1608X55N_PEC	Panasonic Electronic Components
109	11	Q4,Q5,Q6,Q7,Q11,Q12,Q13,Q14,Q21,Q22,Q23	MMBT3904	MMBT3904	SOT95P240X130N	ON Semiconductor
115	44	RPFM1,RFCO1,RDCM1,RCS1,RCCM1,RASCR1,RPFM2,RFCO2,RDCM2,RCS2,RCCM2,RASCR2,RPU6,RPU7,RPU9,RPU10,R395,R396,R401,R404,R405,R416,R417,R422,R424,R427,R429,R432,R438,R439,R781,R782,R787,R790,R791,R802,R803,R808,R810,R813,R814,R818,R824,R825	OPEN	MCT06030C1002FP500	RESC1609X55N	Vishay Beyschlag
81	4	L1,L2,L33,L34	INDUCTOR	HZ0805E601R-10	INDC2012X110N_A	Laird-Signal Integrity Products
179	2	R455,R487	12.1K, 1%	RT0402DRE0712K1L	RESC1005X35N	Yageo
23	64	C225,C226,C227,C228,C229,C230,C231,C232,C266,C267,C268,C269,C270,C271,C272,C273,C287,C288,C289,C290,C291,C292,C293,C294,C308,C309,C310,C311,C312,C432,C433,C434,C454,C455,C456,C457,C458,C459,C460,C461,C483,C484,C485,C486,C487,C488,C489,C490,C504,C505,C506,C507,C508,C509,C510,C511,C533,C534,C535,C536,C537,C538,C539,C540	0.47uF	GRM188R70J474KA01	CAPC1608X90N_B	Murata Electronics North America

45	1	C738	33PF 50V	GJM1555C1H330JB01D	CAPC1005X55N_A	Murata Electronics North America
189	4	R845,R886,R909,R938	21.5K	ERJ-PB3B2152V	RESC1608X55N_PEC	Panasonic Electronic Components
131	4	R9,R10,R604,R605	100 1%	ESR01MZPJ101	RESC1005x40N_A	Rohm Semiconductor
59	3	D18,D19,D20	1N4148X-TP	1N4148X-TP	SODFL1608X77N	Micro Commercial Co
58	3	D9,D12,D30	MMSZ4680T1G	MMSZ4680T1G	DIOM5436X247N	ON Semiconductor
101	9	L81,L100,L101,L102,L103,L107,L108,L55,L99	1.8KOHM AT 100MEGHZ	BLM15HD182SN1D	INDC1005X55N	Murata Electronics North America
28	14	C358,C359,C360,C391,C392,C422,C423,C994,C995,C996,C1027,C1028,C1058,C1059	1000uF	UPW0J101MDD1TD	CAPPRD200W50D550H1250B	Nichicon
84	4	L5,L6,L36,L37	10uH	LBC2016T100K	INDC2016X180N	Taiyo Yuden
21	2	C167,C823	0.022UF	C0402C223J3RAC7867	CAPC1005X55N	KEMET
55	38	D1,D2,D3,D4,D7,D10,D13,D14,D15,D16,D17,D22,D23,D24,D25,D28,D31,D32,D33,D34,D35,D36,D37,D39,D40,D41,D42,D44,D45,D47,D49,D50,D51,D52,D54,D55,D56,D58	LED	SML-LX0603GW-TR	LEDC1608X70N	Lumex Opto/Components Inc.
56	5	D5,D6,D21,D26,D27	BAT54T1G	BAT54T1G	SOD3716X135N	ON Semiconductor
146	17	R189,R853,R867,R880,R900,R917,R931,R945,R964,R984,R995,R1004,R1007,R1045,R1059,R1071,R1092	0.1	ERJ-2BWFR100X	RESC1005X40N_D	Panasonic Electronic Components
112	1	Q20	BSS138	BSS138	SOT95P240X120-3N	ON Semiconductor
20	3	C164,C199,C820	2.2uF	C1005X5R1V225M050BC	CAPC1005X65N	KEMET
248	2	U92,U101	NC7WZ16P6X	NC7WZ16P6X	SOT65P210X110-6N_B	ON Semiconductor
57	3	D8,D11,D29	MBRS240LT3G	MBRS240LT3G	DIOM5436X247N	ON Semiconductor
223	17	U12,U18,U29,U34,U35,U41,U42,U62,U70,U75,U76,U82,U83,U106,U109,U110,U114	SN74LVC1G17DRYR	SN74LVC1G17DRYR	SON50P100X145X60-6N_TI	Texas Instruments
60	4	D38,D43,D48,D53	S2A-TP	S2A-TP	DIOM5436X315N	Micro Commercial Co
108	4	Q1,Q2,Q8,Q9	NDS331N	NDS331N	sot95p240x120-3n	ON Semiconductor
148	4	R191,R856,R905,R910	8.76k	TNPW06038K76BEEA	RESC1608X55N	vishay
36	8	C424,C425,C1029,C1030,C1060,C1061,C393,C394	680uF	UWT0J681MNL1GS	CAPAE830X1080N	Nichicon
27	4	C345,C374,C981,C1010	470uF	UWT1C471MNL1GS	CAPAE830X1080N	Nichicon
14	8	C125,C126,C130,C131,C781,C782,C786,C787	0.068uF	C0603C683J4RACTU	CAPC1608X87N	KEMET

26	4	C338,C342,C974,C978	220nF	C0603C224J3RAC7867	CAPC1608X87N	KEMET
3	10	C4,C721	2700pF 50V	C0402C272J5RAC7867	CAPC1005X55N	KEMET
17	3	C156,C193,C812	0.15uF	0603ZC154JAT2A	CAPC1608X90N_D	AVX Corporation
4	14	C5,C123,C124,C128,C129,C719,C722,C779,C780,C784,C785,C1270,C1395,C2	0.47uF 10V	C0603C474J4RACTU	CAPC1608X87N	KEMET
53	1	C1764	1uF 16V	C0603X105J4RAC7867	CAPC1608X95N_C	KEMET
44	7	C688,C689,C692,C695,C698,C700,C703	1 uF	C0603X105J9RAC7867	capc1608x95n	KEMET
68	2	J11,J41	SBH11-PBPC-D05-ST-BK	SBH11-PBPC-D05-ST-BK	SULLINS_SBH11-PBPC-D05-ST-BK	sullins
54	2	DS1,DS2	HSMF-C155	HSMF-C155	LED_HSMF-C157	Broadcom Limited
257	2	Y1,Y4	32.768 kHz	MC-306 32.7680K-A0	XTAL_MC-306327680K-A0	ROHS
11	166	C28,C29,C31,C32,C43,C44,C45,C46,C50,C54,C60,C66,C68,C70,C72,C74,C77,C78,C79,C82,C83,C84,C114,C115,C116,C122,C127,C132,C134,C135,C136,C137,C155,C166,C168,C177,C191,C200,C201,C202,C205,C206,C207,C209,C211,C217,C218,C219,C220,C221,C222,C223,C224,C234,C236,C237,C238,C239,C240,C241,C242,C243,C244,C245,C246,C247,C248,C249,C250,C251,C252,C258,C259,C260,C261,C262,C263,C264,C265,C279,C280,C281,C282,C283,C284,C285,C286,C300,C301,C302,C303,C304,C305,C306,C307,C323,C387,C388,C446,C447,C448,C449,C450,C451,C452,C453,C462,C463,C464,C465,C466,C467,C468,C469,C475,C476,C477,C478,C479,C480,C481,C482,C496,C497,C498,C499,C500,C501,C502,C503,C512,C513,C514,C515,C516,C517,C518,C519,C525,C526,C527,C528,C529,C530,C531,C532,C544,C613,C770,C771,C772,C778,C783,C788,C790,C791,C792,C793,C822,C824,C833,C967,C1024,C1025,C1253,C1261	4.7uF	C0805C475J9RACAUTO	CAPC2012X140N_A	KEMET
247	6	U90,U91,U98,U99,U107,U115	NC7WV125K8X	NC7WV125K8X	SOP50P310X90-8N_FC	ON Semiconductor
212	4	SW2,SW3,SW5,SW6	TL3301EF100QG	TL3301EF100QG	SW_TL3301EF100QG	E-Switch
218	8	U5,U6,U7,U55,U56,U88,U108,U116	SN74AVC1T45	SN74AVC1T45DCKR	sot65p210x110-6n	TEXAS INSTRUMENTS

16	201	C154,C165,C192,C317,C337, C339,C340,C341,C343,C344, C372,C420,C558,C559,C563, C564,C567,C569,C570,C576, C580,C583,C586,C588,C593, C596,C600,C603,C606,C608, C626,C637,C655,C728,C735, C744,C747,C749,C754,C809, C810,C821,C845,C848,C851, C853,C857,C863,C864,C866, C867,C870,C871,C872,C879, C880,C884,C885,C888,C892, C895,C898,C900,C905,C908, C912,C915,C918,C920,C924, C931,C932,C933,C934,C938, C939,C943,C944,C945,C950, C954,C961,C973,C975,C976, C977,C979,C980,C1008,C10 68,C1071,C1073,C1078,C10 81,C1085,C1088,C1091,C10 93,C1097,C1104,C1105,C11 06,C1107,C1111,C1112,C11 16,C1117,C1118,C1295,C12 96,C1326,C1334,C1337,C13 38,C1339,C1342,C1346,C13 50,C1353,C1356,C1358,C13 63,C1366,C1370,C1373,C13 76,C1378,C1382,C1385,C13 86,C1387,C1393,C1420,C14 23,C1450,C1459,C1462,C14 63,C1464,C1467,C1471,C14 75,C1478,C1481,C1483,C14 88,C1491,C1495,C1498,C15 01,C1503,C1507,C1510,C15 11,C1512,C1545,C1546,C15 75,C1584,C1587,C1588,C15 89,C1592,C1596,C1600,C16 03,C1606,C1608,C1613,C16 16,C1620,C1623,C1626,C16 28,C1632,C1635,C1636,C16 37,C1670,C1671,C1701,C17 09,C1712,C1713,C1714,C17 17,C1721,C1725,C1728,C17 31,C1733,C1738,C1741,C17 45,C1748,C1751,C1753,C17 57,C1760,C1761,C1762	1uF	C1210C105J5RACTU	CAPC3225X170N	KEMET
75	2	J24,J32	HEADER 3	22112032	MOLEX_22-11-2032	molex
173	2	R430,R816	50k	PTN0805E5002BST1	RESC2013X84N	Vishay
24	7	C324,C326,C328,C330,C1056,C1268,C1765	1uF 25V	12063C105JAT2A	CAPC3216X178N	AVX Corporation
110	4	Q15,Q16,Q17,Q18	SIA906EDJ-T1-GE3	SIA906EDJ-T1-GE3	SON65P205X205X80-8N	Vishay
15	49	C151,C152,C188,C189,C346, C347,C348,C349,C350,C351, C367,C377,C378,C379,C389, C390,C408,C614,C710,C712,	22uF	CL32B226KAJNFNE	CAPC3225X280N_KEMET	KEMET

		C714,C716,C807,C808,C982, C983,C984,C985,C986,C987, C1003,C1013,C1014,C1015, C1022,C1026,C1044,C1322, C1447,C1572,C1697,C3894, C3895,C3896,C3897,C3901, C3902,C3903,C3904				
130	2	R8,R603	4.70K 1%	RHC2512FT4K70	RESC6332X70N	Stackpole Electronics Inc.
251	1	U105	PCA9306TDCURQ1	PCA9306TDCURQ1	VSSOP50P310X90-8N	Texas Instruments
12	6	C49,C53,C76,C81,C86,C204	47uF	C3225X6S0J476M250AC	CAPC6050X550N	TDK
41	3	C636,C656,C660	22uF 6.3V	C1210C226K9RACAUTO	CAPC3225X280N_KEMET	KEMET
210	52	R5330,R5331,R5332,R5333, R5334,R5335,R5336,R5337, R5338,R5339,R5340,R5341, R5342,R5343,R5344,R5345, R5346,R5347,R5348,R5349, R5350,R5351,R5352,R5353, R5354,R5355,R5356,R5357, R5358,R5359,R5360,R5361, R5362,R5363,R5364,R5365, R5366,R5367,R5368,R5369, R5370,R5371,R5372,R5373, R5374,R5375,R5376,R5377, R5378,R5379,R5380,R5381	3600BL14M100	3600BL14M100	FIL_3600BL14M050	Johanson Technology Inc.
259	1	Y3	50 MHz	ABM10W-50.0000MHZ-4-D1X-T3	OSCCC200X250X60-4N_A	ABRACON
226	4	U15,U16,U64,U65	TPS51200DRCT	TPS51200DRCT	SON50P310X310X100-11N	Texas Instruments
239	1	U45	TLV62568ADRLR	TLV62568ADRLR	SOTFL50P160X60-6N_A	Texas Instruments
39	56	C577,C578,C590,C597,C598, C599,C729,C730,C751,C811, C813,C844,C889,C890,C902, C909,C910,C911,C951,C952, C1075,C1082,C1083,C1084, C1343,C1344,C1347,C1348, C1360,C1367,C1368,C1369, C1468,C1469,C1472,C1473, C1485,C1492,C1493,C1494, C1593,C1594,C1597,C1598, C1610,C1617,C1618,C1619, C1718,C1719,C1722,C1723, C1735,C1742,C1743,C1744	220uF	GRM31CR60J227ME11L	CAPC3216X190N_A	Murata Electronics North America
111	1	Q19	FDMC7672	FDMC7672	MOSFET_FDMC8878	FAIRCHILD
74	1	J21	UE75-A20-6000T	UE75-A20-6000T	AMPHENOL_UE75-A20-6000T_IITM	Amphenol Commercial Products
8	74	C14,C15,C21,C22,C39,C40,C41,C42,C47,C48,C51,C52,C55,C56,C57,C58,C59,C61,C62, C63,C64,C65,C67,C69,C71,C73,C75,C80,C85,C203,C208,	100uF	C3216X6S0G107M160AC	CAPC7866X950N	TDK

		C210,C212,C213,C214,C215,C216,C233,C235,C253,C254,C255,C256,C257,C274,C275,C276,C277,C278,C295,C296,C297,C298,C299,C441,C442,C443,C444,C445,C470,C471,C472,C473,C474,C491,C492,C493,C494,C495,C520,C521,C522,C523,C524				
258	1	Y2	48 MHz	7M48072002	OSCCC250X320X80-4N	TXC
82	2	L3,L35	1.15UH	SRP1238A-1R2M	IND_SRP1238A-5R6M	Bourns Inc.
96	8	L48,L49,L62,L63,L76,L77,L90,L91	6.8uH	SRP5030T-6R8M	INDM5752X300N_A	Bourns Inc.
216	2	U2,U52	REF3012	REF3012AIDBZT	SOT95P237X112-3N_TI	Texas Instruments
228	4	U20,U21,U22,U23	TCA9555RTWR	TCA9555RTWR	QFN50P400X400X80-25N_E	Texas Instruments
67	2	J8,J29	DDR4_SO-DIMM_SHIELDED	2309410-1	TE_2309410-1	TE CONNECTIVITY
42	2	C668,C686	470uF	EEF-HX0D471R4	CAPAE830X1080N	Panasonic
77	1	J43	HEADER 5X2	39281103	MOLEX_39281103	molex
102	3	L97,L106,L110	1.5uH	XEL4020-152ME	IND_XAL4020-102ME	Coilcraft
235	2	U37,U78	ISL80136IBEAJZ	ISL80136IBEAJZ	SOIC127P602X168-9N_A	RENESAS
211	2	SW1	SDA04H1SBD	SDA04H1SBD	SW_SDA04H1SBD	C&K
72	1	J18	878321420	878321420	BERG_2X7	molex
91	4	L23,L24,L25,L26	1uH	XAL4020-102ME	IND_XAL4020-102ME	Coilcraft
93	3	L41,L42,L53	1.5uH	XAL4020-152ME	IND_XAL4020-102ME	Coilcraft
88	9	L10,L44,L46,L58,L60,L72,L74,L86,L88	2.2uH	XAL4020-222ME	IND_XAL4020-102ME	Coilcraft
222	6	U11,U32,U39,U60,U74,U80	0.005 or 5mOHMS	LVK25R005FER	RES_LVK25R002DER_IITM	ohmite
233	2	U33,U73	ISL85003FRZ-T7A	ISL85003FRZ-T7A	SON50P300X400X90-13N	RENESAS
92	6	L27,L28,L29,L30,L31,L32	4.7uH	XAL4030-472ME	IND_XAL4030-472MEC	Coilcraft
225	2	U14,U63	MAX15027ATB+T	MAX15027	DFN50P300X300X80-11N	Maxim Integrated
254	4	U119,U127,U133,U136	TPS62136	TPS62136	VQFNP200X300X100-11N	Texas Instruments
238	1	U44	TPS7A7002DDAR	TPS7A7002DDAR	SOIC127P600X170-9N_TI	Texas Instruments
230	2	U26,U67	TMP464AIRGTT	TMP464AIRGTT	VQFN50P300X300X100-17N_TI	Texas Instruments
5	203	C6,C153,C171,C172,C173,C174,C175,C180,C181,C182,C183,C184,C190,C352,C353,C354,C370,C371,C384,C402,C403,C411,C413,C430,C541,C5	10uF	C1206C106J4RACTU	CAPC3216X180N	KEMET

		56,C560,C561,C562,C565,C566,C568,C571,C574,C581,C584,C587,C589,C591,C594,C601,C604,C610,C611,C612,C676,C679,C687,C691,C694,C697,C702,C723,C726,C736,C745,C748,C750,C752,C755,C827,C828,C829,C830,C831,C836,C837,C838,C839,C840,C846,C849,C855,C859,C860,C861,C862,C865,C868,C869,C875,C877,C878,C882,C883,C886,C893,C896,C899,C901,C903,C906,C913,C916,C922,C927,C928,C929,C930,C935,C936,C937,C941,C942,C947,C948,C955,C988,C989,C990,C1006,C1007,C1020,C1038,C1039,C1046,C1048,C1066,C1069,C1072,C1074,C1076,C1079,C1086,C1089,C1095,C1100,C1101,C1102,C1103,C1108,C1109,C1110,C1114,C1115,C1120,C1297,C1301,C1308,C1312,C1328,C1332,C1340,C1351,C1354,C1357,C1359,C1361,C1364,C1371,C1374,C1380,C1421,C1426,C1433,C1437,C1453,C1457,C1465,C1476,C1479,C1482,C1484,C1486,C1489,C1496,C1499,C1505,C1548,C1551,C1558,C1562,C1582,C1590,C1601,C1604,C1607,C1609,C1611,C1614,C1621,C1624,C1630,C1673,C1676,C1683,C1687,C1707,C1715,C1726,C1729,C1732,C1734,C1736,C1739,C1746,C1749,C1755,C1763,C3873,C3883,C3893,C4036				
69	2	J12,J30	5747844-4	5747844-4	TE_5747844-4	TE CONNECTIVITY
236	2	U40,U81	ISL85415	ISL85415	SON50P300X400X100-13N	RENESAS
221	6	U10,U31,U38,U59,U72,U79	INA226AIDGSR	INA226AIDGSR	VSSOP50P490X110-10N	Texas Instruments
1	2	CN1,CN2	DM3AT-SF-PEJM5	DM3AT-SF-PEJM5	HIROSE_DM3AT-SF-PEJM5	Hirose Electric Co Ltd
85	2	L7,L38	3.3uH	74439344033	IND_74439344033	Wurth Electronics Inc.
231	4	U27,U28,U68,U69	LTC2801CDE#TRPBF	LTC2801CDE#TRPBF	DFN50P300X400X80-13N	Linear Technology/Analog Devices
244	2	U85,U86	TPS568215RNNR	TPS568215RNNR	VQFN50P360X360X100-18N	Texas Instruments
219	2	U8,U57	MAX16025	MAX16025	WQFN65P400X400X80-17N_A	Maxim Integrated
256	1	SMA1	SMA	CONSMA001-		Linx Technologies

			Connector	SMD-G		Inc.
86	2	L8,L39	22uH	7443551221	WURTH_7443551470	Wurth Electronics Inc.
240	2	U46,U47	KSZ9031RNXIC	KSZ9031RNXIC	QFN50P700X700X90-49N_A	Microchip Technology
213	1	SW7	1101M2S3AQE2	1101M2S3AQE2	SW_1101M2S3AQE2	C&K
31	3	C385,C1021,C1766	330uF	JMK325ABJ337MM-P	CAPC3225X280N_C	Taiyo Yuden
80	4	J66,J67,J68,J69	105405-1110	105405-1110	MOLEX_105405-1110	MOLEX
252	4	U117,U123,U132,U138	ADM7154ACPZ-1.8	ADM7154ACPZ-1.8	SON50P300X300X85-11N	Analog Devices Inc.
224	3	U13,U17,U61	MAX15303AA00+CM	MAX15303AA00+CM	QFN50P600X600X80-41N	Maxim Integrated
6	2	C9,C33	680uF	T530X687M006ATE018	CAPAE830X1080N	Kemet
32	82	C398,C399,C400,C401,C409,C410,C572,C615,C621,C874,C946,C1034,C1035,C1036,C1037,C1045,C1047,C1119,C1249,C1257,C1291,C1292,C1294,C1302,C1303,C1304,C1313,C1314,C1315,C1321,C1416,C1417,C1419,C1427,C1428,C1429,C1438,C1439,C1440,C1446,C1541,C1542,C1544,C1552,C1553,C1554,C1563,C1564,C1565,C1571,C1666,C1667,C1669,C1677,C1678,C1679,C1688,C1689,C1690,C1696,C3755,C3756,C3757,C3758,C3759,C3760,C3761,C3762,C3765,C3766,C3767,C3768,C3865,C3872,C3882,C3888,C3898,C3899,C3900,C3905,C3906,C3907	47uF	C2220C476M4R2CAUTO	CAPC6050X550N	KEMET
73	2	J19,J20	RJMG2012211A0FR	RJMG2012211A0FR	AMPHENOL_RJMG2012211A0FR	Amphenol Commercial Products
19	57	C160,C161,C162,C169,C179,C197,C355,C356,C357,C361,C362,C363,C364,C365,C366,C375,C376,C395,C396,C397,C421,C426,C427,C428,C429,C816,C817,C818,C826,C835,C991,C992,C993,C997,C998,C999,C1000,C1001,C1002,C1011,C1012,C1031,C1032,C1033,C1057,C1062,C1063,C1064,C1065,C1324,C1331,C1448,C1456,C1573,C1581,C1699,C1706	100uF	KTJ250B107M76BFT00	CAPC7866X950N	United Chemi-Con
253	4	U118,U126,U134,U139	ADP7158ACPZ	ADP7158ACPZ-3.3	SON50P300X300X85-11N	Analog Devices Inc.
246	2	U89,U100	ADG3304SRU-EP	ADG3304SRU-EP	TSSOP65P640X120-14N_A	Analog Devices
217	4	U3,U4,U53,U54	S25FS512S	S25FS512SDSMFV	SOIC127P1032X26	Cypress

			DSMFV013	013	5-16N	Semiconductor Corp
255	8	U124,U125,U128,U129,U130,U131,U135,U140	ADP1763ACPZ	ADP1763ACPZ	QFN50P300X300X80-17N_T175	Analog Devices Inc.
249	4	U93,U102,U111,U120	ADP5054ACPZ	ADP5054ACPZ	LFCSP50P700X700X80-49N	Analog Devices Inc.
241	1	U48	KSZ9897RTXI	KSZ9897RTXI	QFP40P1600X1600X120-129N	Microchip Technology
245	2	U87,U97	AD9528BCPZ	AD9528BCPZ	QFN50P1000X1000X100-73N_AD	analog device
229	2	U24,U25	SI5341-A-D-GM	SI5341-A-D-GM	QFN50P900X900X95-65N	Silicon Labs
242	1	U49	MAX24288ETK+	MAX24288ETK+	TQFN40P800X800X80-69N	Microsemi Corporation
237	2	U43,U84	ZL9010MIRZ	ZL9010MIRZ	MODULE_ZL9010M	RENESAS
234	2	U36,U77	ZL9101M	ZL9101MAIRZ	PQFN130P1500X1500X370-21N	RENESAS
264	1		RS232-to-USB	US232R-100-BULK		
71	4	J14,J15,J16,J17	HDAF-15-18.0-S-13-2-P	HDAF-15-18.0-S-13-1	SAMTEC_HDAF-15-08P0-S-13-2-TR	samtec
243	1	U50	768710006	768710006	MOLEX_768710006	Molex, LLC
220	2	U9,U58	MT40A256M16GE-075E	MT40A256M16GE-075E	FBGA96C80P9X16_900X1400X120	Micron Technology
232	2	U30,U71	ISL8272MAIRZ	ISL8272MAIRZ	MODULE_ISL8272MAIRZ	RENESAS
263	2		SODIMM memory module	A4G04QA8BLPBSE		
227	2	U19,U66	SFEM064GB1EA1TO-I-HG-111-STD	SFEM064GB1EA1TO-I-HG-111-STD	BGA153N50P14X14_1150X1300X100	Swissbit
262	1		Power Adapter	DTM300PW120D1		
7	8	C10,C11,C12,C13,C35,C36,C37,C38	470uF	EEF-HX0D471R4 or EEFGX0D471R	CAPMP7343X200N_PEC	Panasonic
141	2	R49,R643	49.9	RMCF0603JT49R9	RESC1608X55N_A	Stackpole Electronics Inc.
83	1	L4	3.9uH	SRU1038-3R8Y	TBD	
78	3	J44,J45,J46	HEADER 10X2	HEADER 10X2	HEADER_10X2_IITM	
79	2	J47,J48	HEADER 2	HEADER 2	BERG_1X2	
64	2	J3,J42	HEADER 3X2	HEADER 3X2	HEADER_3X2_IITM	
51	8	C1309,C1316,C1434,C1441,C1559,C1566,C1684,C1691	0.0033uF	C0603C332K5GACTU	CAPC1514X145N	AVX Corporation
34	2	C417,C1053	92nF	GRM31C5C1H913JA01L	CAPC4532X279N	AVX Corporation
250	8	U94,U95,U103,U104,U112,U113,U121,U122	ADRV9009BBCZ	ADRV9009BBCZ	BGA196C80P14X14_1200X1200X130	Analog device
	2		QSFP module	FTL410QE4C		Finisar

Annexure II

CENTRE FOR INDUSTRIAL CONSULTANCY & SPONSORED RESEARCH (IC&SR)
INDIAN INSTITUTE OF TECHNOLOGY MADRAS
CHENNAI 600 036

B NAGARAJAN
JOINT REGISTRAR (IC & SR)

Project Accounts
July 22, 2016

TO WHOMSOEVER IT MAY CONCERN

In connection with project, **US currency may be transferred to CANARA BANK, IIT - MADRAS Branch** with the following details.

FOR TRANSFER OF CURRENCY US DOLLAR

Please Credit in USD **(THROUGH)**

JP MORGAN CHASE, NEW YORK
SWIFT CODE: CHASUS33

For Credit to

USD ACCOUNT No: 001-1395969, of CANARA BANK INTERNATIONAL DIVISION MUMBAI

For Further Credit to

ACCOUNT NO: **2722101001741 of IIT Chennai – Swift Code: CNRBINBBIIT OF THE REGISTRAR, IIT, MADRAS**

JOINT REGISTRAR (IC & SR) i/c
संयुक्त कुलसचिव (आई.सी. एवं एस.आर.)
JOINT REGISTRAR (IC & SR)
आई.आई.टी. मद्रास
I.I.T. MADRAS

This is to certify that the particulars furnished are correct.

For Canara Bank

Senior Manager
Canara Bank - IIT Madras branch

Senior Manager
Canara Bank - Chennai - 36

CANARA BANK * IIT CHENNAI *

एस.अरवींदन
S.ARAVINDAN
वरिष्ठ प्रबंधक Senior Manager
स.अ.सं.S.P.No.31649

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