**APPENDICES**

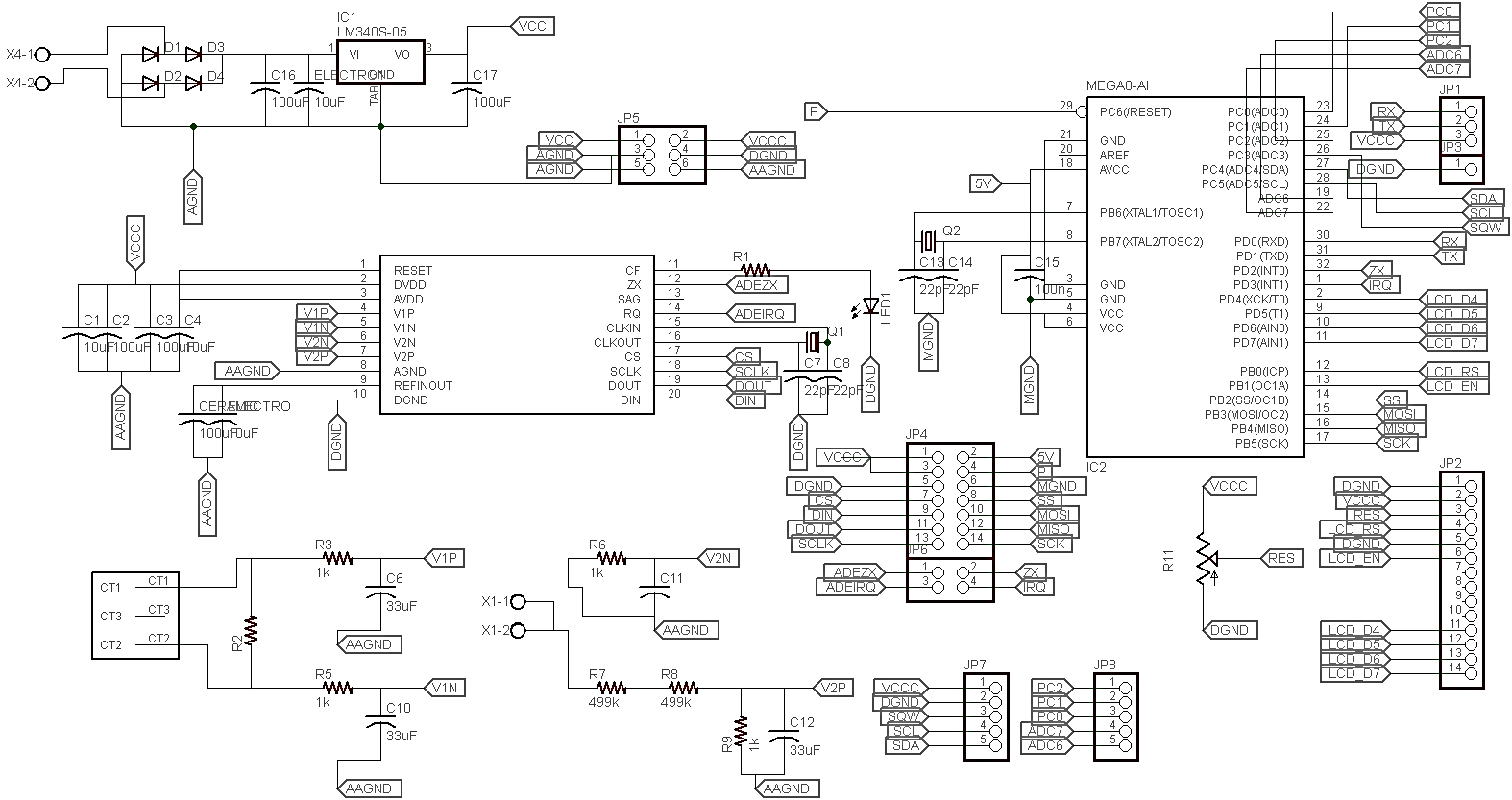
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**APPENDIX A**

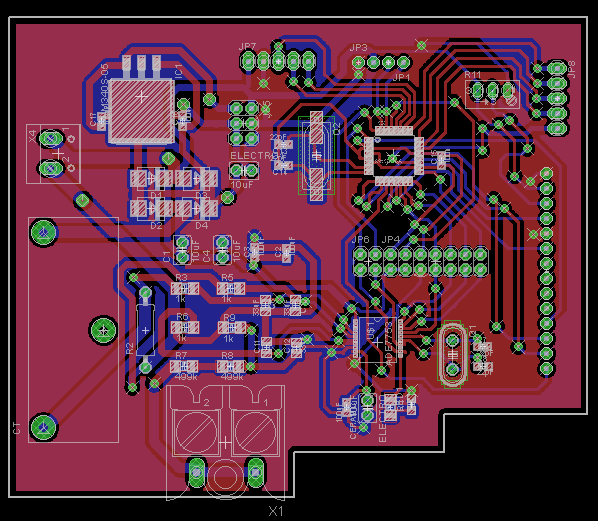
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**Schematic Diagram and PCB Layout**

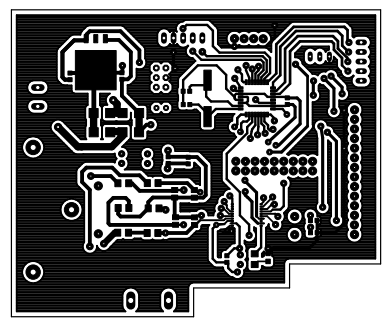
**Appendix A.1 Schematic**

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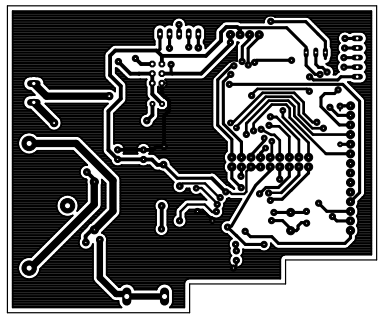
**Appendix A.2 Double Sided PCB Layout**

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**Appendix A.3 Top Side of the PCB**

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**Appendix A.4 Bottom Side of the PCB**

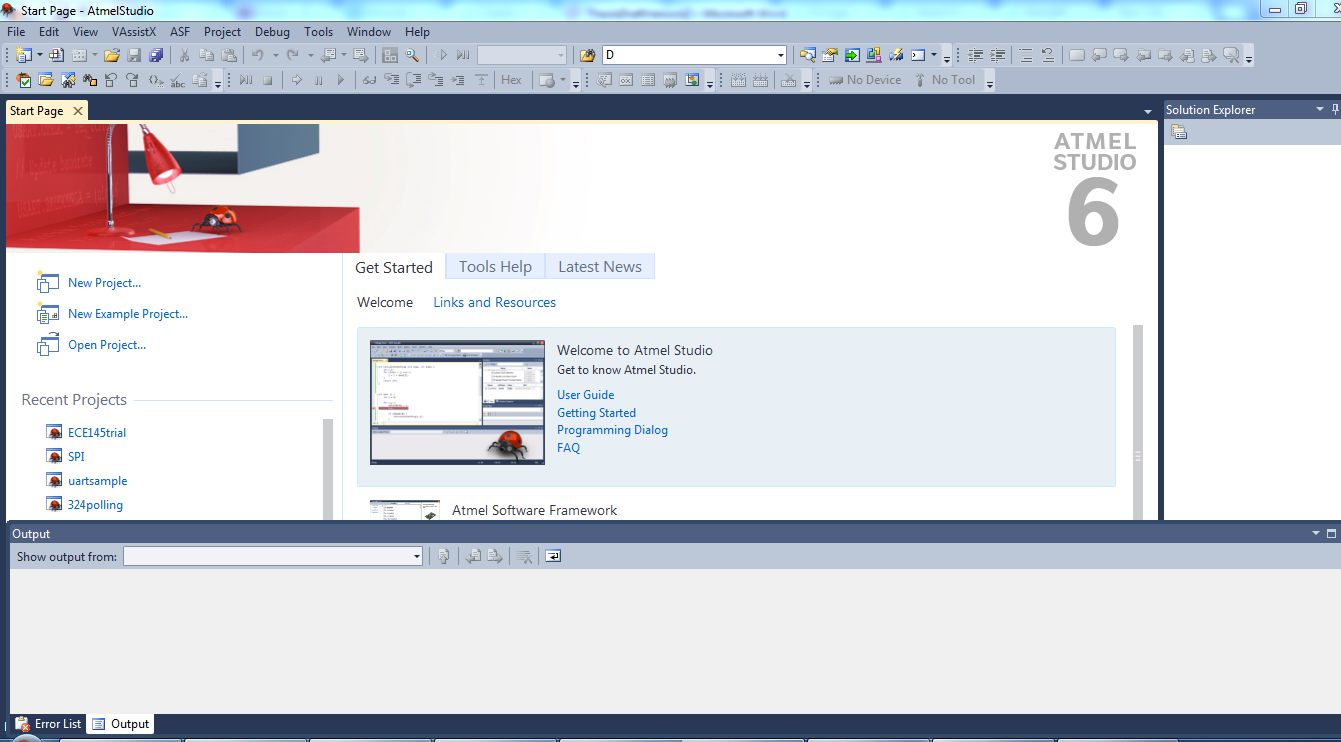
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**APPENDIX B**

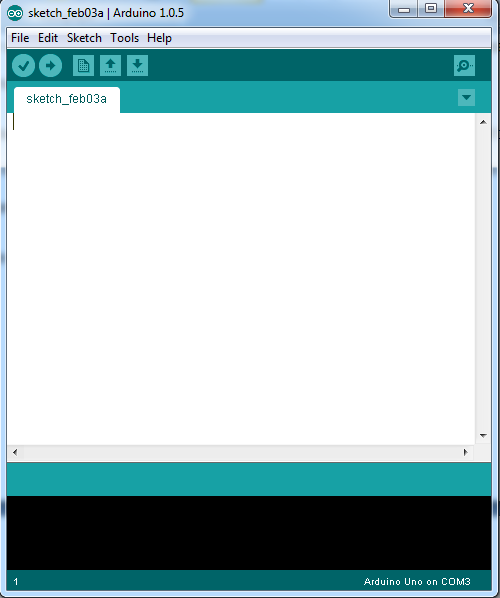
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**Snapshots of IDEs Used In This Study**

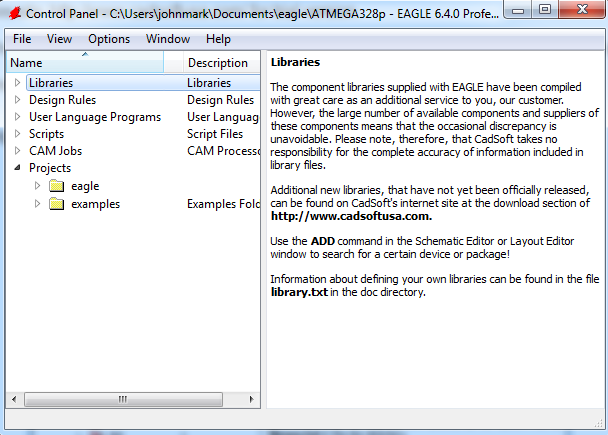
**B.1 Atmel Studio**



**B.2 Arduino IDE**



**B.3 EagleCad**

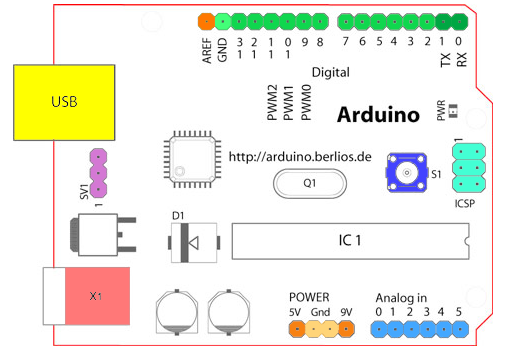


**APPENDIX C**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Arduino UNO Board**

**C.1 Arduino Board Pin Assignments**

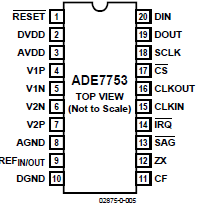


**APPENDIX D**

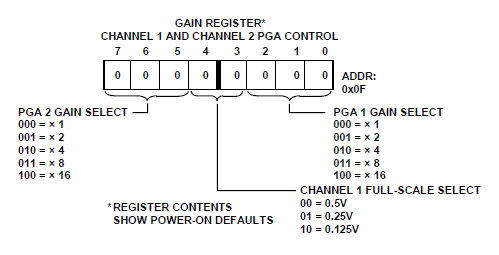
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**Pin Configurations and Theory of Operation of Components**

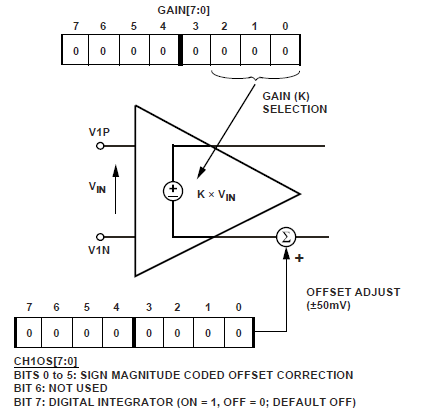
**D.1 ADE7753**



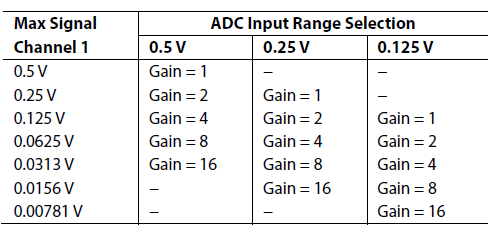
**D.2 Analog Gain Register – ADE7753**



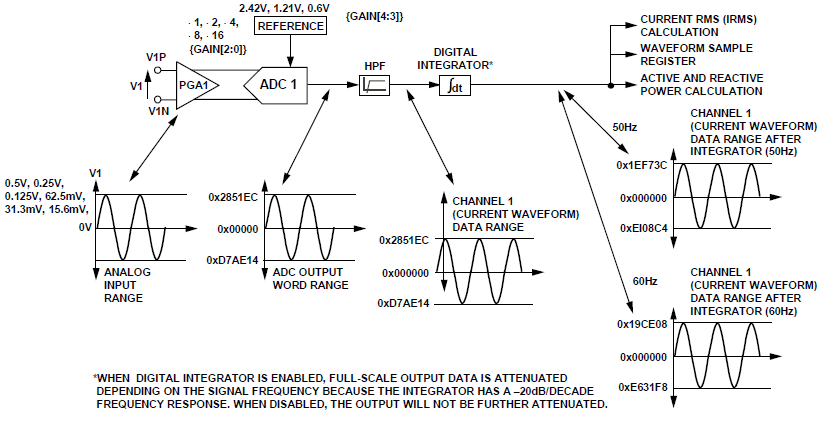
**D.3 PGA –ADE7753**



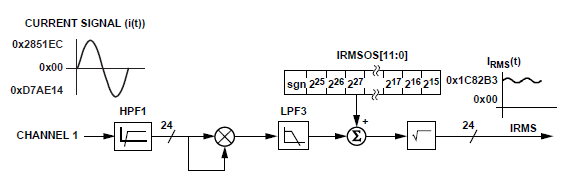
**D.4 Maximum Signal – ADE7753**



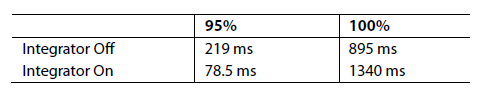
**D.5 ADC –ADE7753**



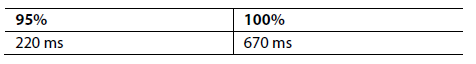
**D.6 RMS Signal Processing – ADE7753**



**D.7 Settling Time –ADE7753**

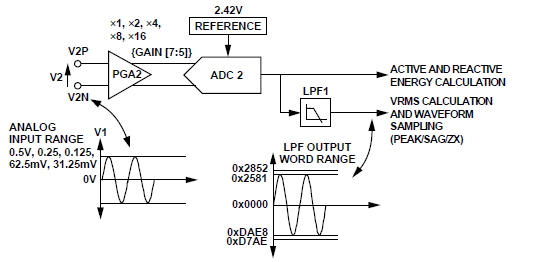


Settling Time for the IRMS Measurement

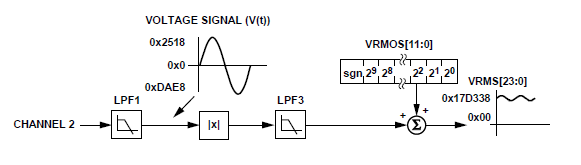


Settling Time for the VRMS Measurement

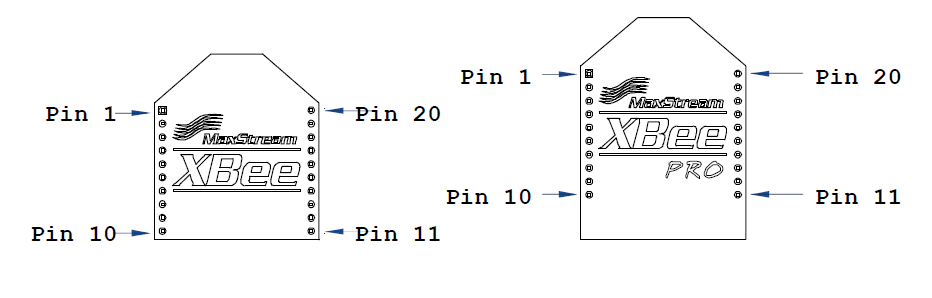
**D.8 ADC in Channel 2 –ADE7753**

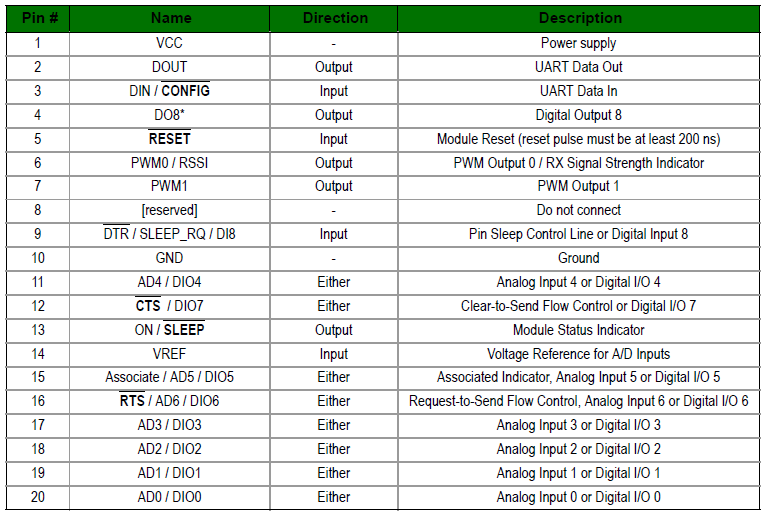


**D.9 Channel 2 RMS Processing – ADE7753**

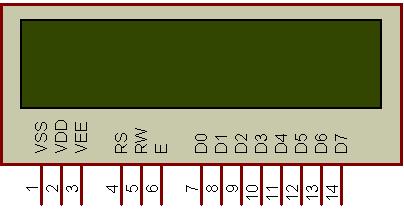


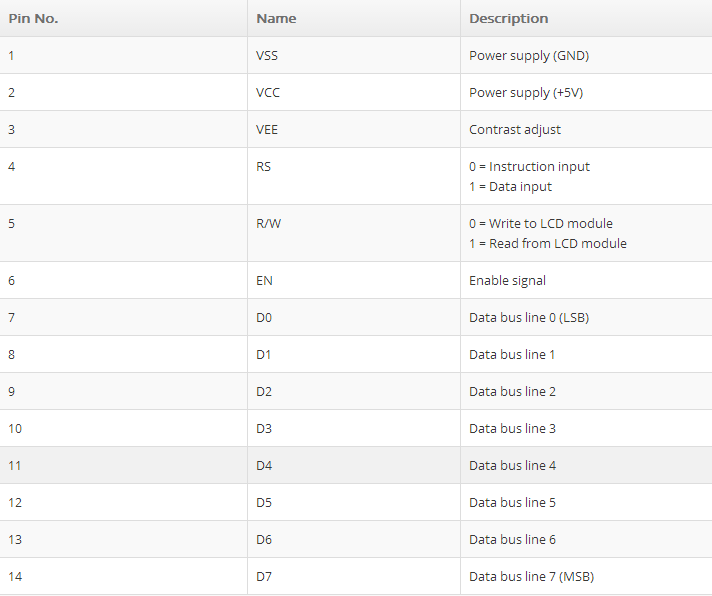
**D.10 Xbee Pro Pin Configurations**





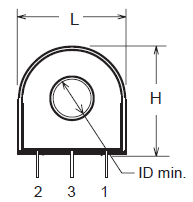
**D.11** Character LCD type pin diagram and pin configurations

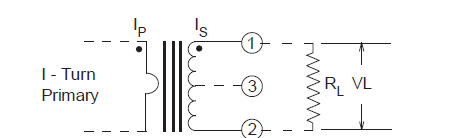




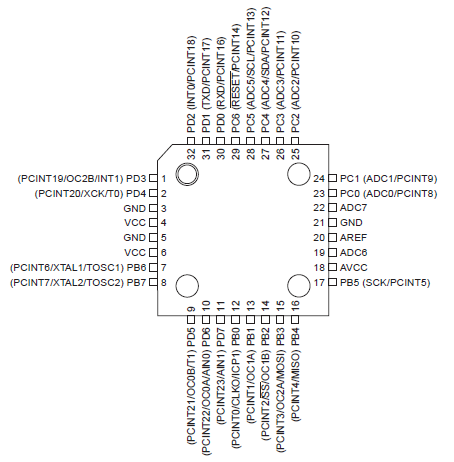
**D.12 AC1150 Current Transformer and Schematic Diagram**







**D.13 TQFP (Thin Quad Flat Package) Pin Assignments of ATMEGA328p**

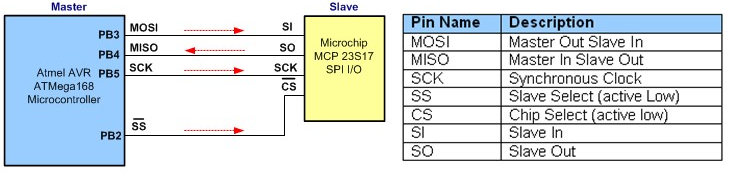


**APPENDIX E**

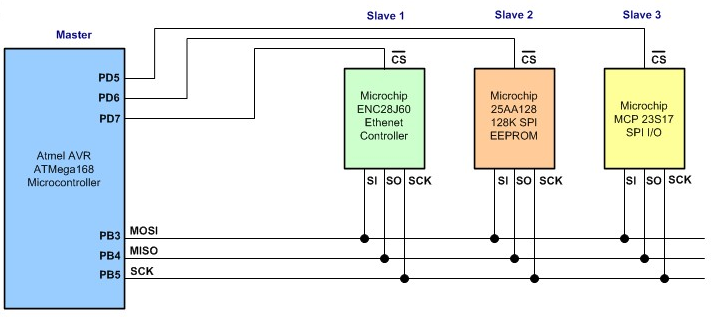
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**Master-Slave Relationship**

**E.1 SPI Connection from Master to Slave**

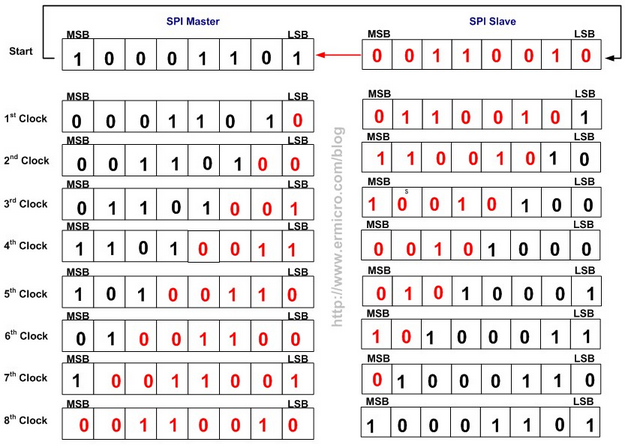


Typical SPI Master and SPI Slave Device Connection



Typical SPI Master and Multiple SPI Slave Device Connection

**E.2 SPI Transfer Diagram**



**APPENDIX F**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Apparatus Used**

**F.1 CA8220 Power Analyzer**

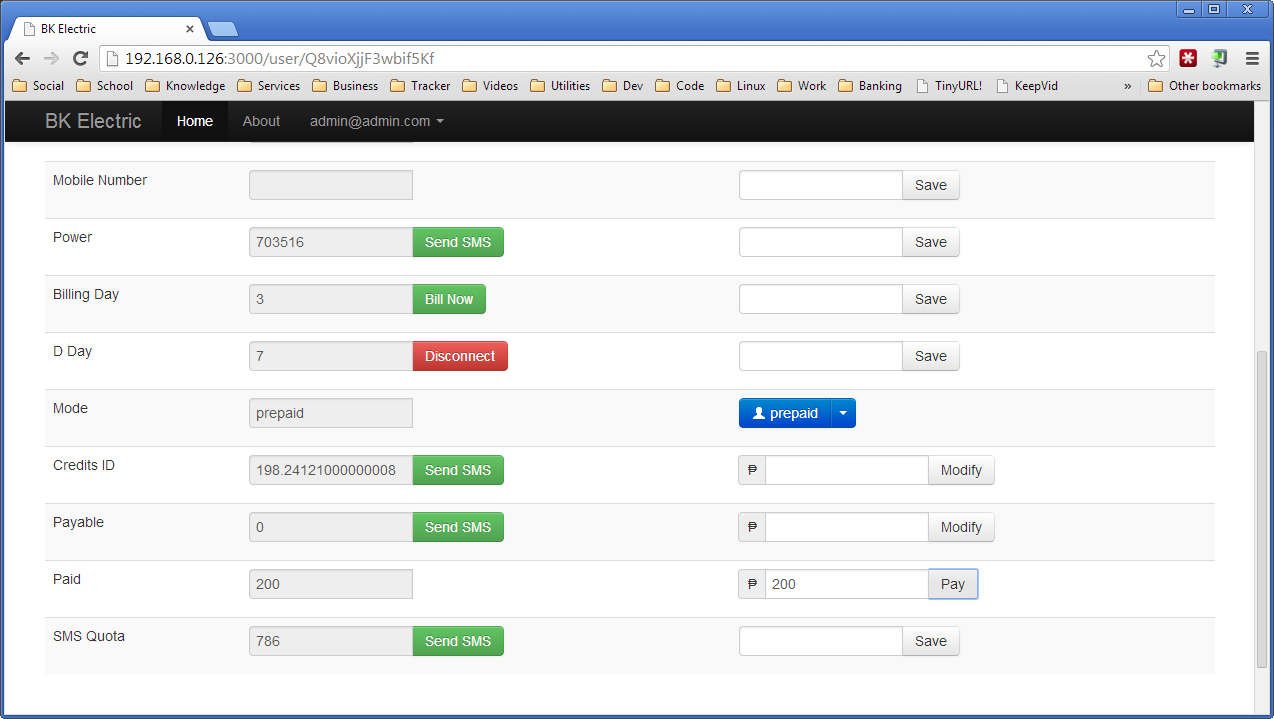
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**APPENDIX G**

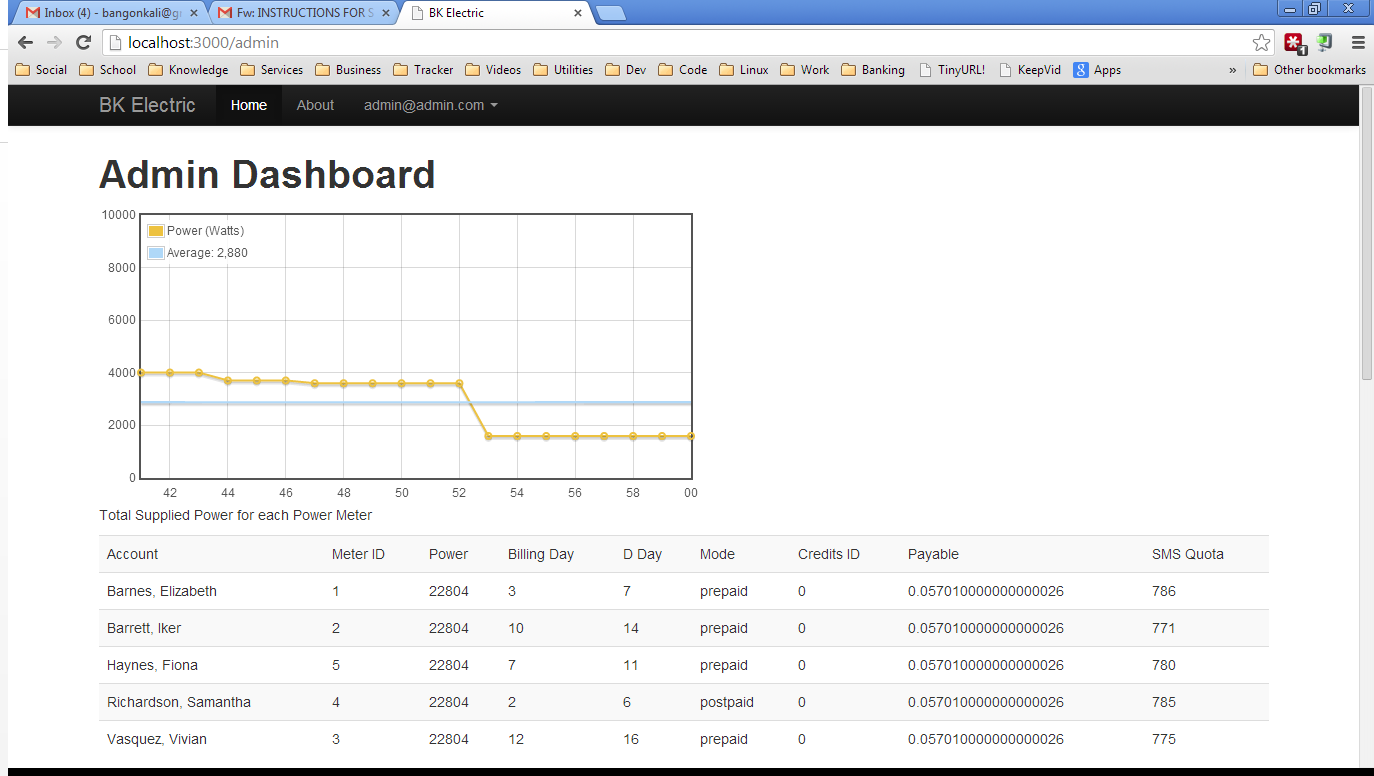
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**Software Development**

**Appendix G.1 Billing Options**



**Appendix G.2 User Options**



**APPENDIX H**

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**Source Codes, Datasheet and Demo Videos (Inside the Compact Disc)**