
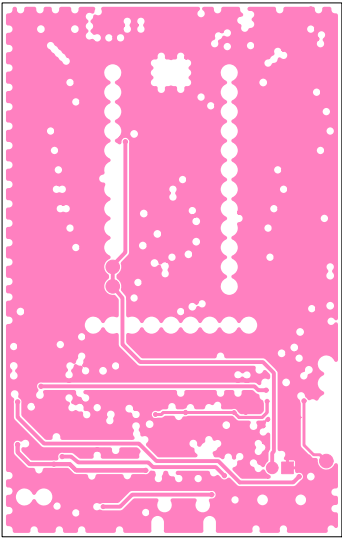


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| REV. | DESCRIPTION: | DATE: |
| 1.0 | ECN 25-2015 INITIAL RELEASE | 2/11/15 |
| 2.0 | ECN 69-2015 | 4/10/15 |
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|  | | LS RESEARCH | |
| | | WIRELESS PRODUCT DEVELOPMENT W86 N220 COMMERCE COURT CEDARBURG, WI 53012 PHONE: (262) 375-4400 FAX: (262) 375-4248 | |
| DRAWN BY: PCS | DATE: 2/11/15 | TITLE: SaBLE-x Dev. Board | |
| CHECKED BY: CMH | DATE: 2/11/15 | PROJECT:SaBLE-x Dev. Board- COPPER, LAYER 1, TOP | |
| APPROVED BY: JMB | DATE: 2/11/15 | SIZE: A | DRAWING NO: 750-00640 |
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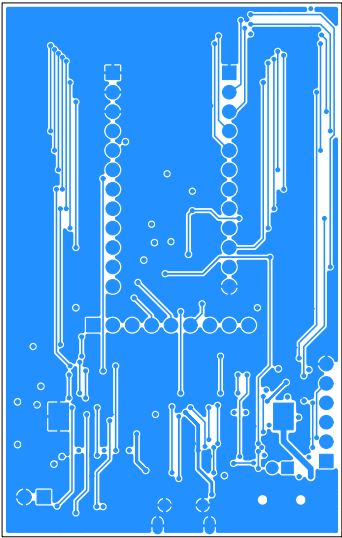


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| CHECKED BY: | CMH | DATE: | 2/11/15 | PROJECT: | SaBLE-x Dev. Board- COPPER LAYER 3 | | |
| APPROVED BY: | JMB | DATE: | 2/11/15 | SIZE: | A | DRAWING NO: | 750-00640 |
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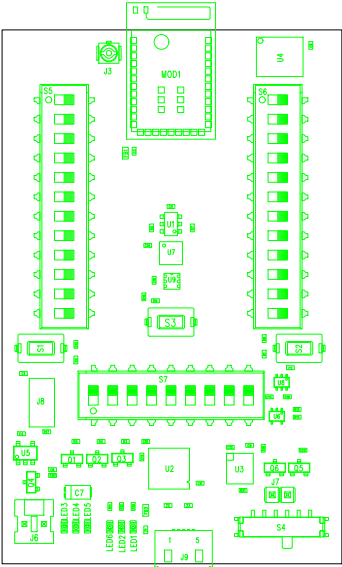


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| DRAWN BY: | PCS | DATE: | 2/11/15 | TITLE: | SaBLE-x Dev. Board | | |
| CHECKED BY: | CMH | DATE: | 2/11/15 | PROJECT: | SaBLE-x Dev. Board- COPPER, LAYER 4, BOTTOM | | |
| APPROVED BY: | JMB | DATE: | 2/11/15 | SIZE: | A | DRAWING NO: | 750-00640 |
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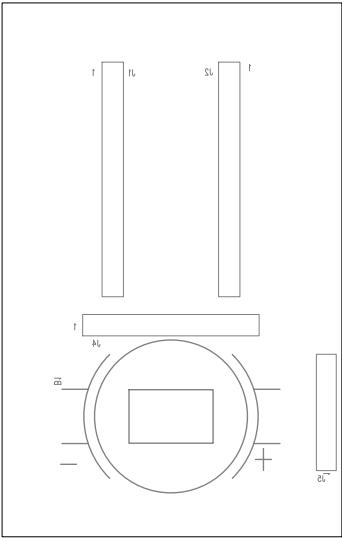
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| CHECKED BY: CMH | DATE: 2/11/15 | PROJECT:SaBLE-x Dev. Board- TOP ASSEMBLY |
| APPROVED BY: JMB | DATE: 2/11/15 | SIZE: A |
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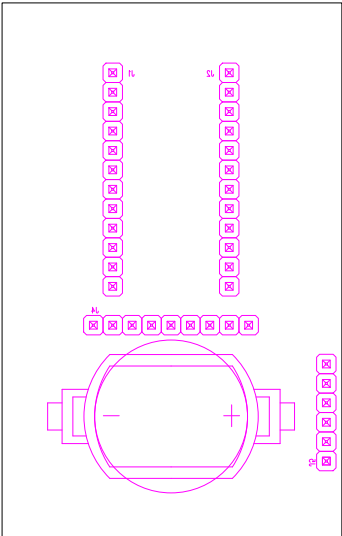




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| CHECKED BY: | CMH | DATE: | 2/11/15 | PROJECT: | SaBLE-x Dev. Board- BOTTOM SILKSCREEN | |
| APPROVED BY: | JMB | DATE: | 2/11/15 | SIZE: | A | DRAWING NO: |
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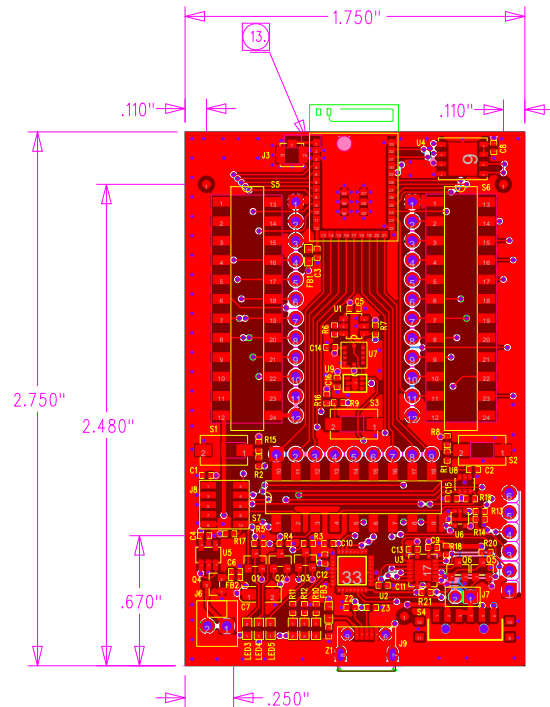




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| CHECKED BY: | CMH | DATE: | 2/11/15 | PROJECT: | SaBLE-x Dev. Board- ASSEMBLY DRAWING BOTTOM | | |
| APPROVED BY: | JMB | DATE: | 2/11/15 | SIZE: | A | DRAWING NO: | 750-00640 |
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DRILL CHART



ARTWORK/FABRICATION FILES

TOP - COPPER ROUTING - COPPER1.PHO
 LAYER 2 - GND PLANE - COPPER2.PHO
 LAYER 3 - POWER PLANE - COPPER3.PHO
 BOTTOM - COPPER ROUTING - COPPER4.PHO
 TOP SIDE SOLDERMASK - TOPMASK.PHO
 BOTTOM SIDE SOLDERMASK - BOTTOMMASK.PHO
 TOP SIDE SILK SCREEN - TOPSILK.PHO
 TOP SIDE SOLDER PASTE MASK - TOPPASTE.PHO
 NC DRILL FILE - NCDRILL.DRL

FABRICATION NOTES:

- BOARD FABRICATION AND QUALITY ACCEPTANCE PER IPC-6012B, CLASS 2. THESE DETAILED NOTES AND INSTRUCTIONS MAY SUPERSEDE IPC REQUIREMENTS.
- ALL BOARD DIMENSIONS IN INCHES. TOLERANCE = ± 0.004 " UNLESS NOTED OTHERWISE.
- MATERIAL - FR-4 GRADE GLASS EPOXY. LEAD-FREE COMPLIANT PER IPC-4101B/124 OR /126. CTE Z-AXIS EXPANSION $\leq 3.5\%$, $T_d > 320$ DEG C, $T_g > 140$ DEG C. MINIMUM FLAMMABILITY RATING UL 94V-0
- HOLE WALL PLATING OF 0.5 MILS MINIMUM FOR BURIED OR BLIND VIAS AND 0.7 MILS MINIMUM FOR THROUGH VIAS.
- FINISH-2-10uIN IMMERSION GOLD PLATING OVER 50-200uIN ELECTROLESS NICKEL (ENIG). EVERYWHERE EXCEPT EDGE FINGERS. NO EXPOSED BARE COPPER PERMITTED. EDGE FINGERS - 30uIN MINIMUM HARD GOLD, OVER 100uIN MINIMUM NICKEL PLATE, TOP AND BOTTOM SIDE.
- SOLDER MASK OVER BARE COPPER, LPI, PER IPC-SM-840, REGISTRATION ± 0.003 ", BLUE. NO COVERAGE ON SOLDER PADS PERMITTED.
- SILK SCREEN BOTH SIDES WITH WHITE EPOXY NON-CONDUCTIVE INK. SILKSCREEN SHOULD BE TRIMMED OFF ANY SOLDERED ENTITY.
- HOLE SIZE TOLERANCE = ± 0.003 " UNLESS NOTED OTHERWISE.
- HOLE CENTERS AND PAD CENTERS TO BE CONCENTRIC WITHIN 0.003"
- COPPER ADDITION (THIEVING, CROSSHATCH, ETC) IS NOT PERMITTED ON ANY LAYERS UNLESS OTHERWISE SPECIFIED. COPPER ADDITION IN BREAKAWAY AREAS FOR PANEL FORMS IS ACCEPTABLE.
- LAMINATION, STACKUP, COPPER PLATING, AND ETCHING TO BE CLOSELY MONITORED TO ENSURE PRODUCT MEETS DESIGN INTENT. NO CHANGES TO MATERIALS AND/OR GERBER FILES ARE PERMITTED WITHOUT WRITTEN APPROVAL.
- UL DATE/LOGO AND/OR VENDOR INFORMATION CAN BE IN SILKSCREEN NOMENCLATURE WHERE SPACE PERMITS, UNLESS OTHERWISE SPECIFIED. NO ADDITIONAL COPPER, LOGOS, OR TEXT OF ANY KIND IN COPPER LAYERS.
- CONTROLLED IMPEDANCE 13 mil WIDE MICROSTRIP TRACES ON SIGNAL LAYER 1 TO BE 50 OHMS $\pm 10\%$ REFERENCED TO LAYER 2 GROUND PLANE, WHEN MEASURED BY A TDR (TIME DOMAIN REFLECTOMETER) IN ACCORDANCE WITH IPC-2221 AND IPC-TM-650, METHOD 2.5.5.7. IMPEDANCE TESTING MAY BE PERFORMED AS PER A C=0 SAMPLING PLAN IN ACCORDANCE WITH IPC 6012B CLASS 2. DIELECTRIC THICKNESS AND/OR TRACE WIDTH MAY BE ADJUSTED TO MEET IMPEDANCE REQUIREMENTS.

| | |
|---------------------|--|
| 59.2 mil $\pm 10\%$ | ————— L1: TOP - COPPER 1.4 mil (1 OZ) |
| | ----- DIELECTRIC - FR-4 - 7.5 mil |
| | ————— L2: - COPPER .7 mil (.5 OZ) |
| | ----- DIELECTRIC - FR-4 - 40 mil |
| | ————— L3: - COPPER .7 mil (.5 OZ) |
| | ----- DIELECTRIC - FR-4 - 7.5 mil |
| | ————— L4: BOTTOM - COPPER 1.4 mil (1 OZ) |

Note: Material dielectric thickness may need to be adjusted to meet total thickness requirement.

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