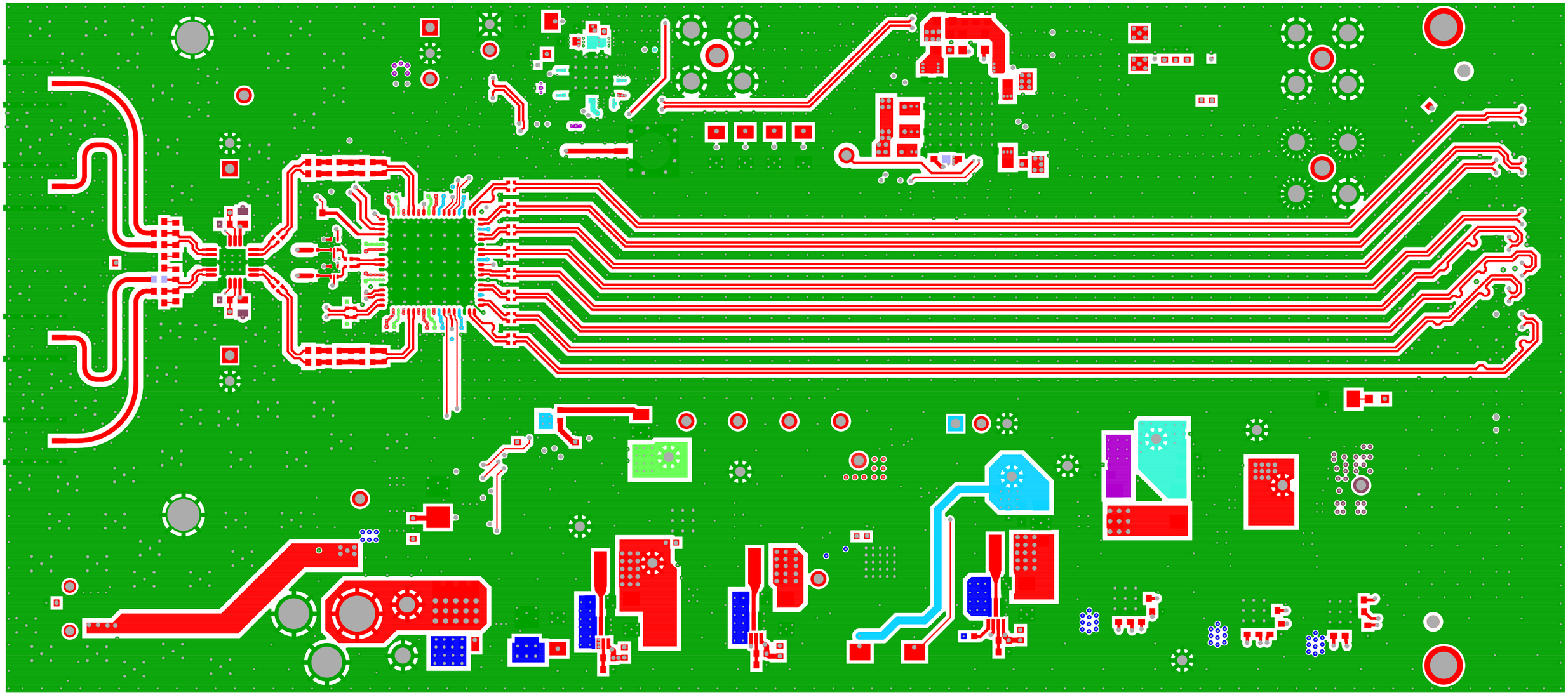
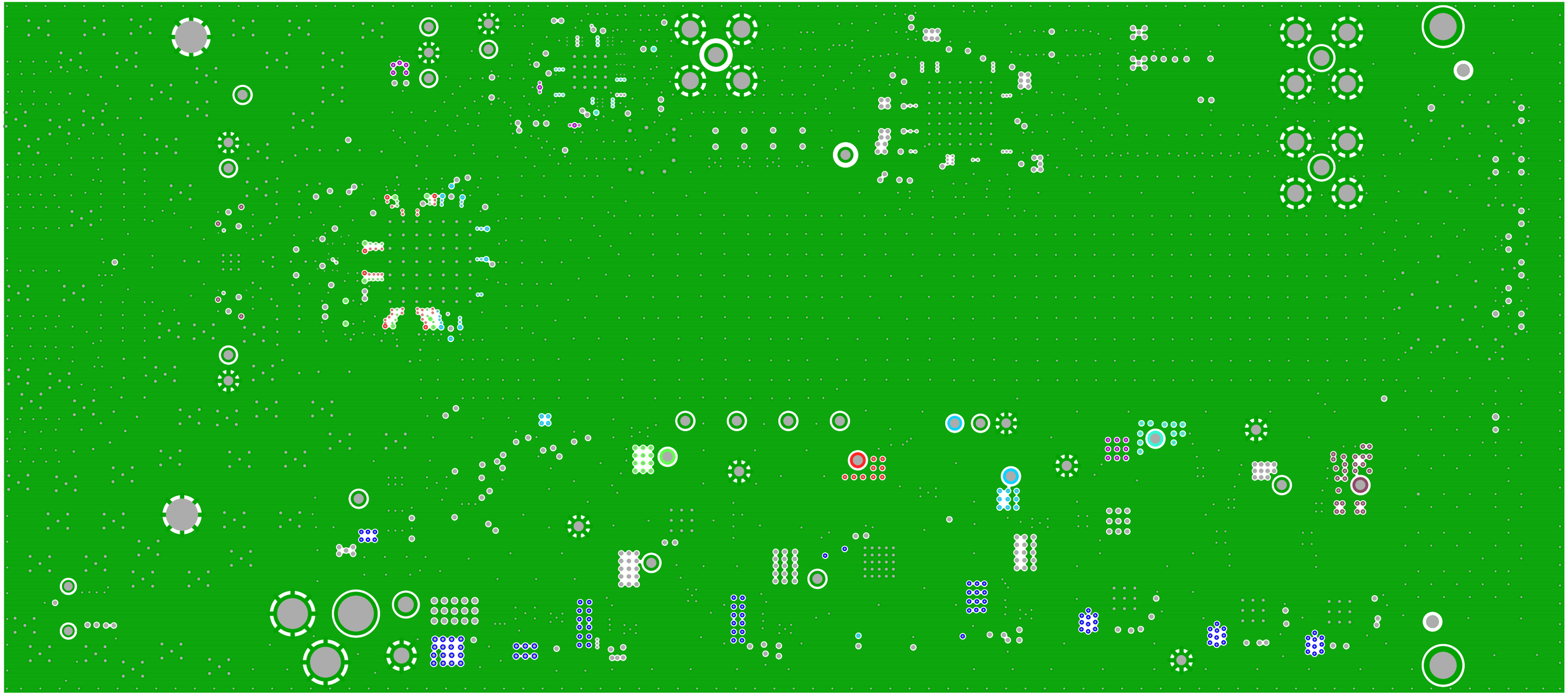


TIDA-01016

TEXAS INSTRUMENTS, INC.
TSW32RF45EVM HSP-013
PCB REV E1

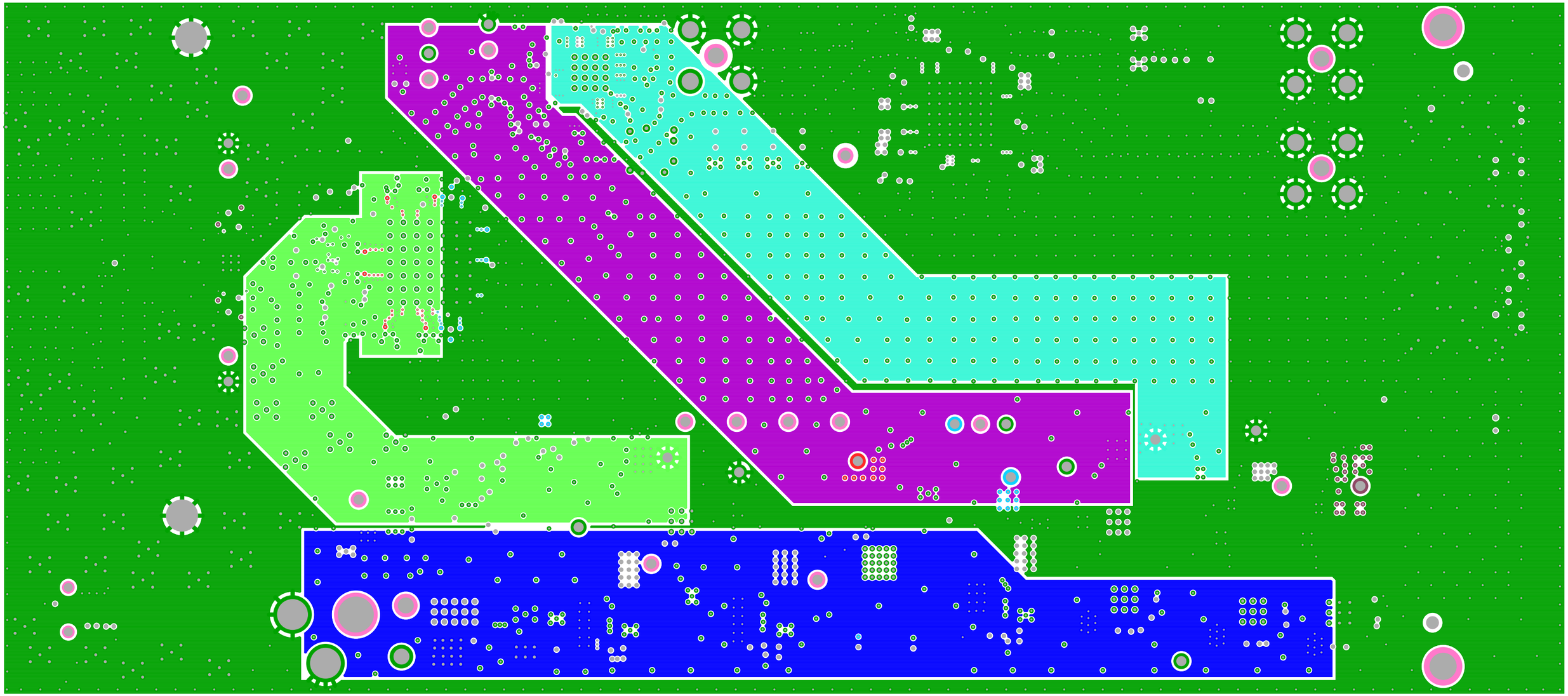
LAYER 1 (TOP SIDE)



TIDA-01016

TEXAS INSTRUMENTS, INC.
TSW32RF45EVM HSP-013
PCB REV E1

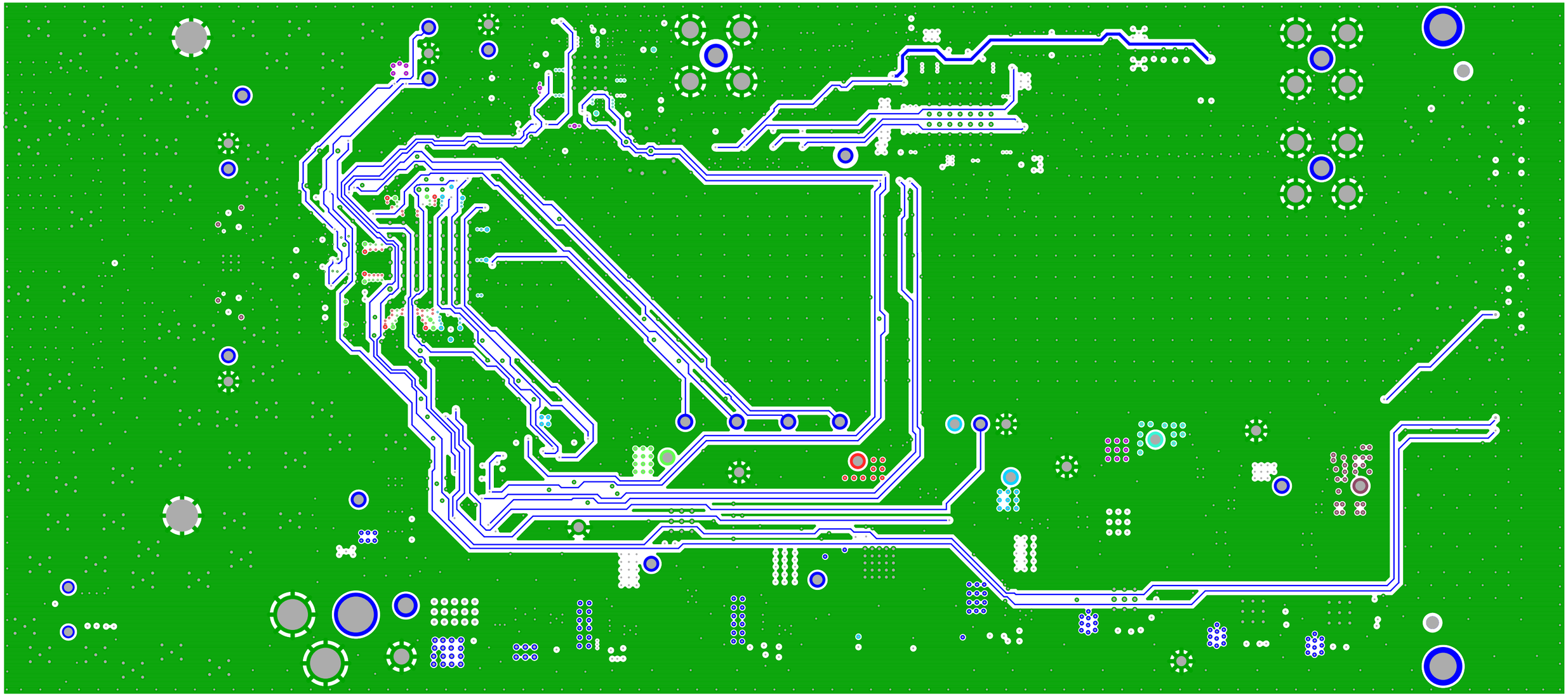
LAYER 2 - GND



TIDA-01016

TEXAS INSTRUMENTS, INC.
TSW32RF45EVM HSP-013
PCB REV E1

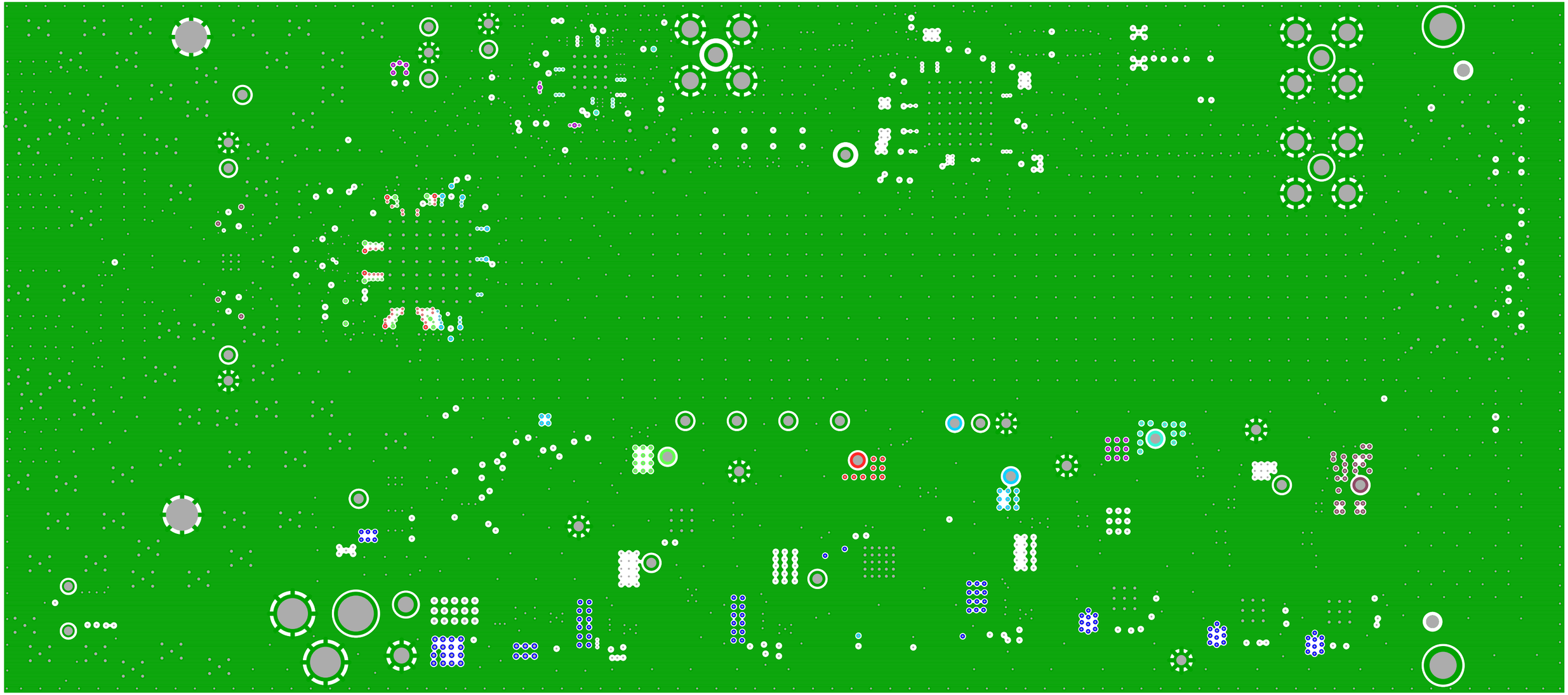
LAYER 3 - POWER



**TIDA-01016**

TEXAS INSTRUMENTS, INC.
TSW32RF45EVM HSP-013
PCB REV E1

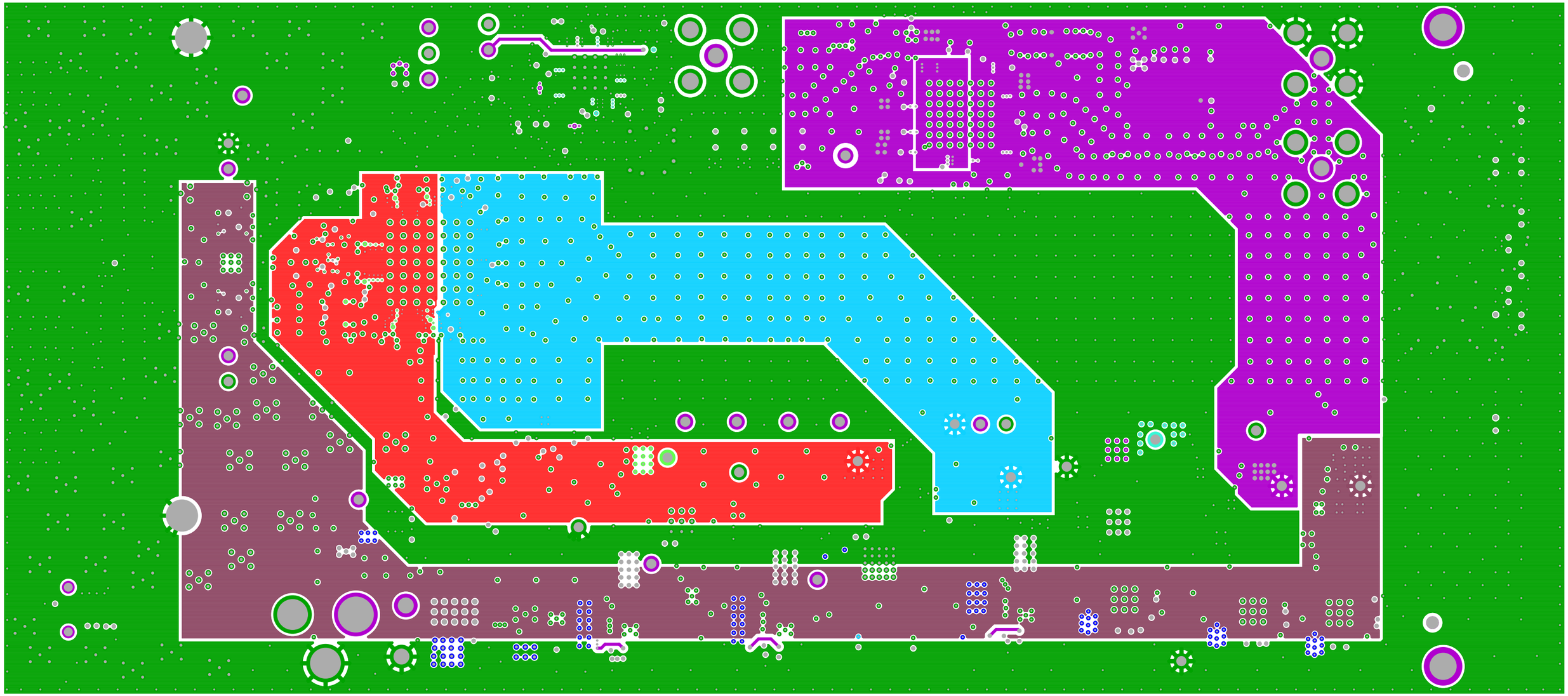
LAYER 4 - GND



TIDA-01016

TEXAS INSTRUMENTS, INC.
TSW32RF45EVM HSP-013
PCB REV E1

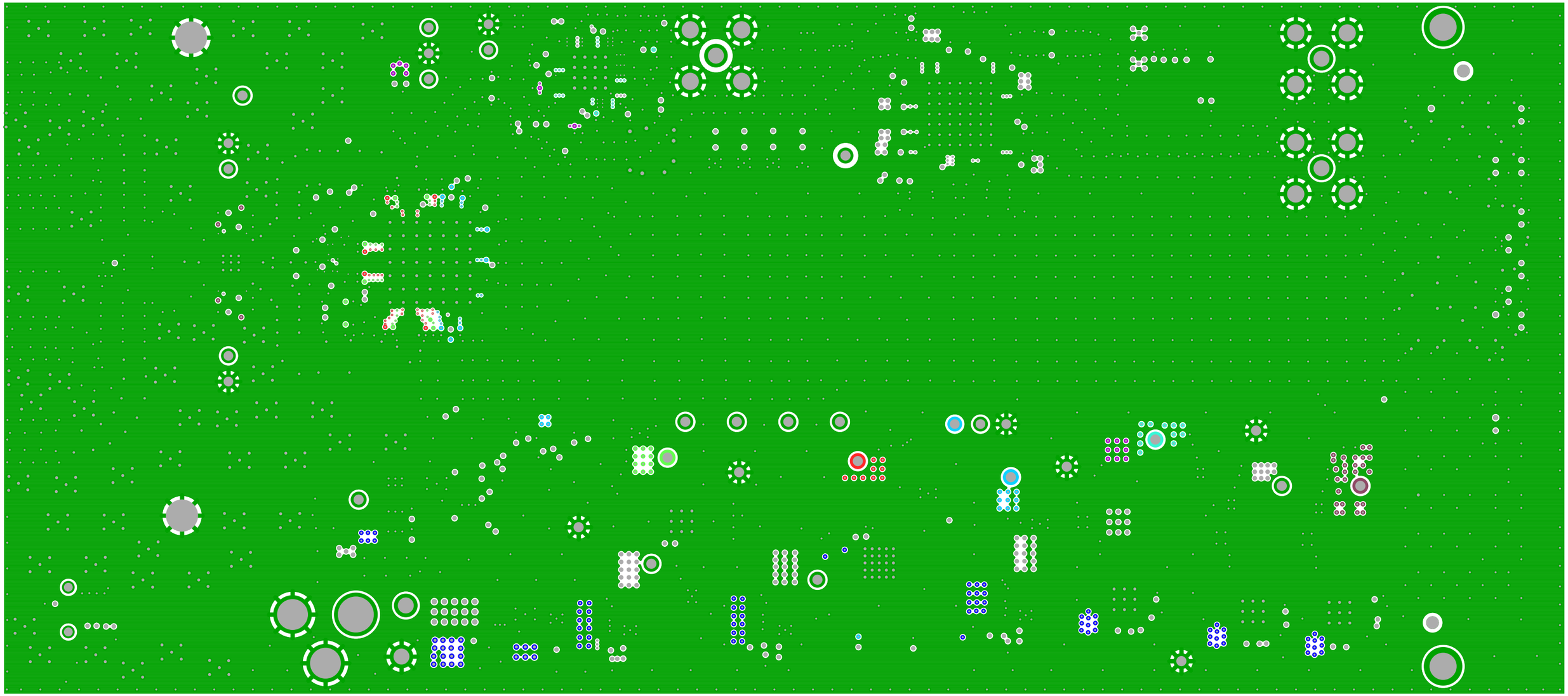
LAYER 5 - GND



TIDA-01016

TEXAS INSTRUMENTS, INC.
TSW32RF45EVM HSP-013
PCB REV E1

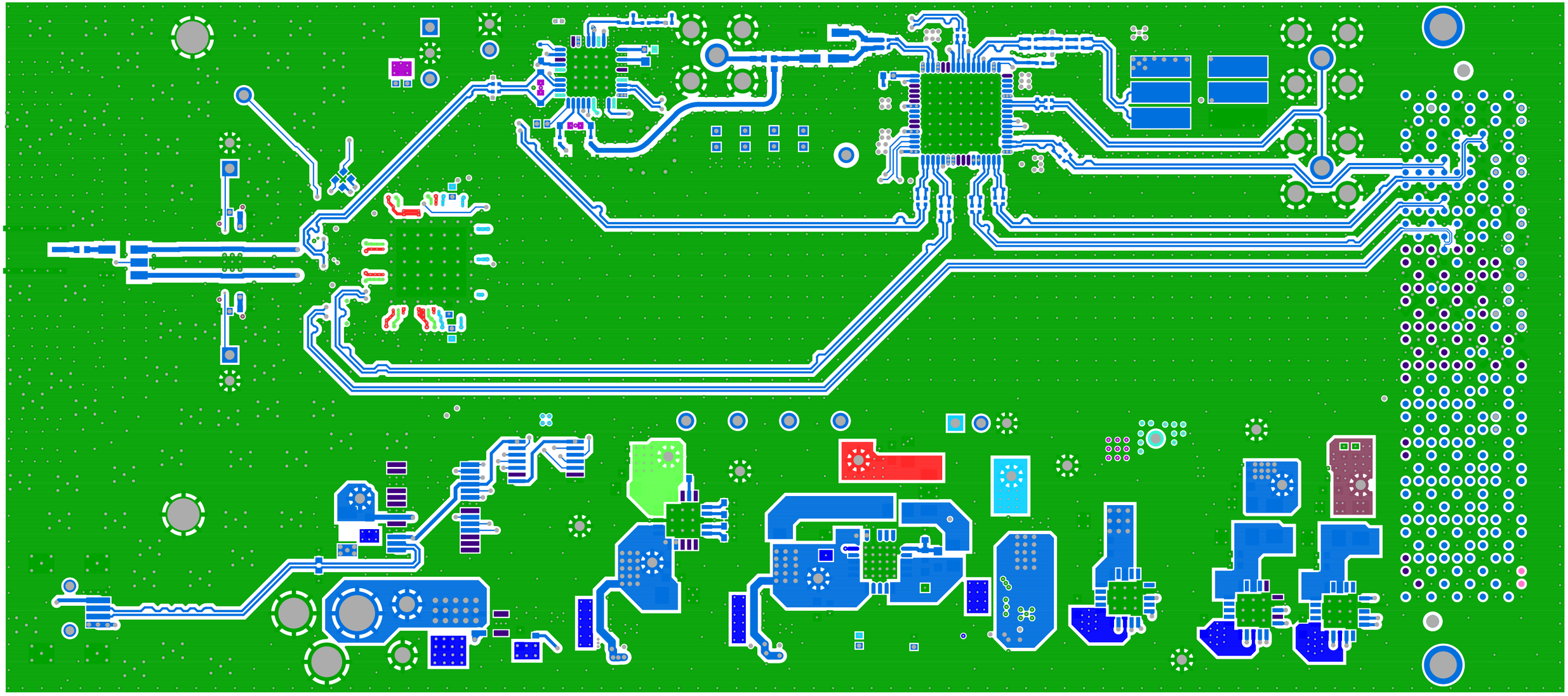
LAYER 6 - POWER/SIGNAL



TIDA-01016

TEXAS INSTRUMENTS, INC.
TSW32RF45EVM HSP-013
PCB REV E1

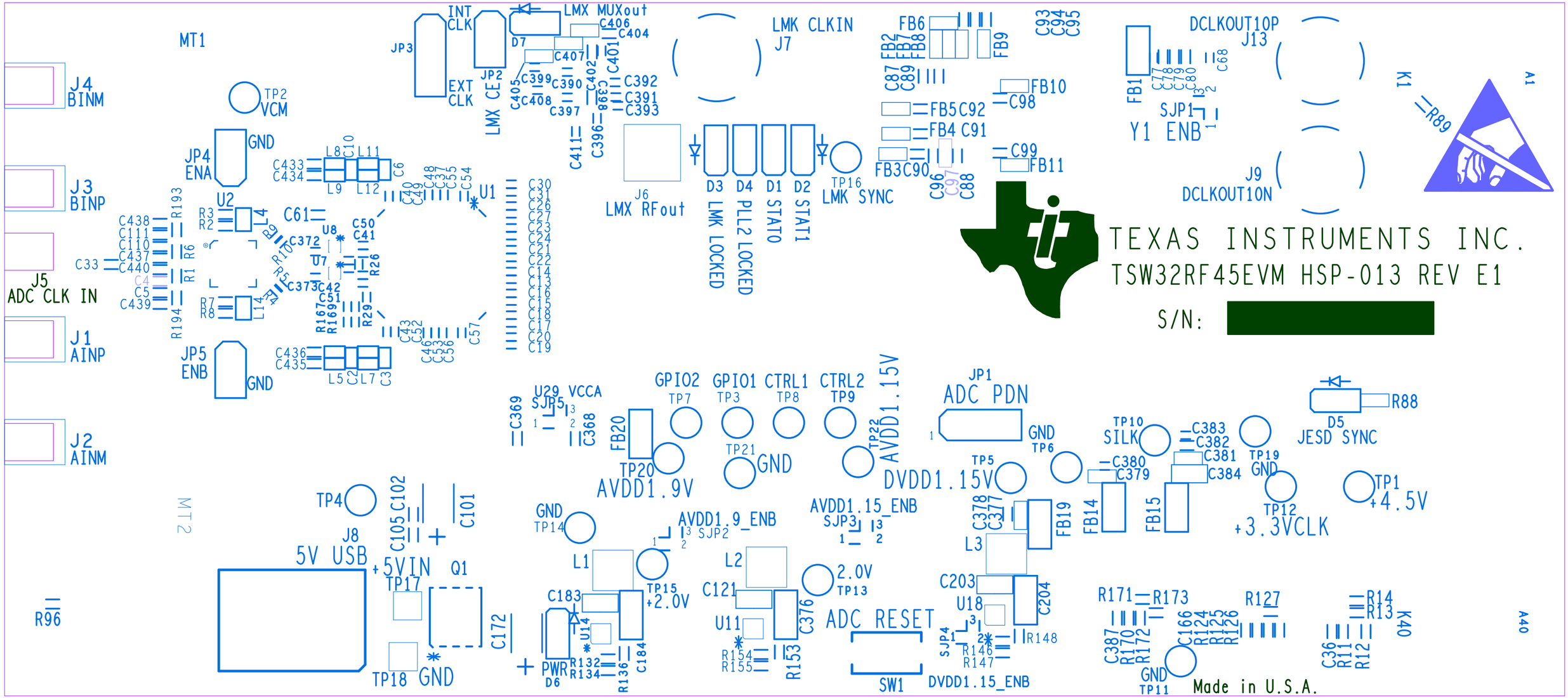
LAYER 7 - GROUND



TIDA-01016

TEXAS INSTRUMENTS, INC.
TSW32RF45EVM HSP-013
PCB REV E1

LAYER 8 (BOTTOM SIDE)




# TIDA-01016

TEXAS INSTRUMENTS, INC.
TSW32RF45EVM HSP-013
PCB REV E1

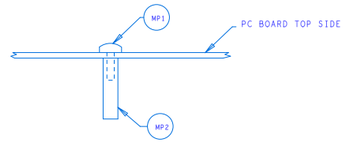
SILKSCREEN TOP

THIS DRAWING IS INTENDED TO HELP IN THE ASSEMBLY OF THE DESIGN.

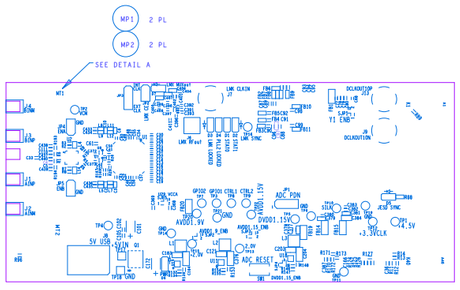
1. REFER TO ODB++ FILE FOR SPECIFIC COMPONENT LOCATION INFORMATION.
2. USE WATER SOLUBLE FLUX DURING BOARD ASSEMBLY.
   ASSEMBLY MUST BE RoHS COMPLIANT AND LEAD FREE.
3. ATTACH HEAT SINK USING THERMALLY CONDUCTIVE GLUE.
4. IPC-A-610 / ACCEPTABILITY OF ELECTRONIC ASSEMBLIES, CLASS2, CURRENT REVISION.

REVISIONS

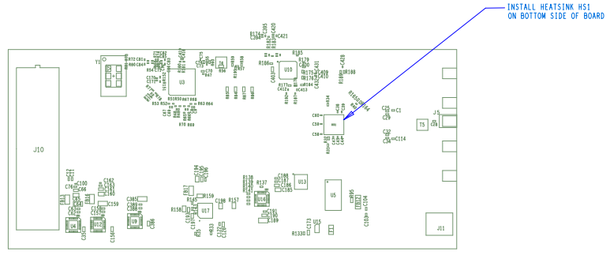
| ZONE | LTR | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|---|
| | | | | |




DETAIL A (SIDE VIEW) - NO SCALE
INSTALL SPACERS (YY) AND SCREWS (XX) AS SHOWN.



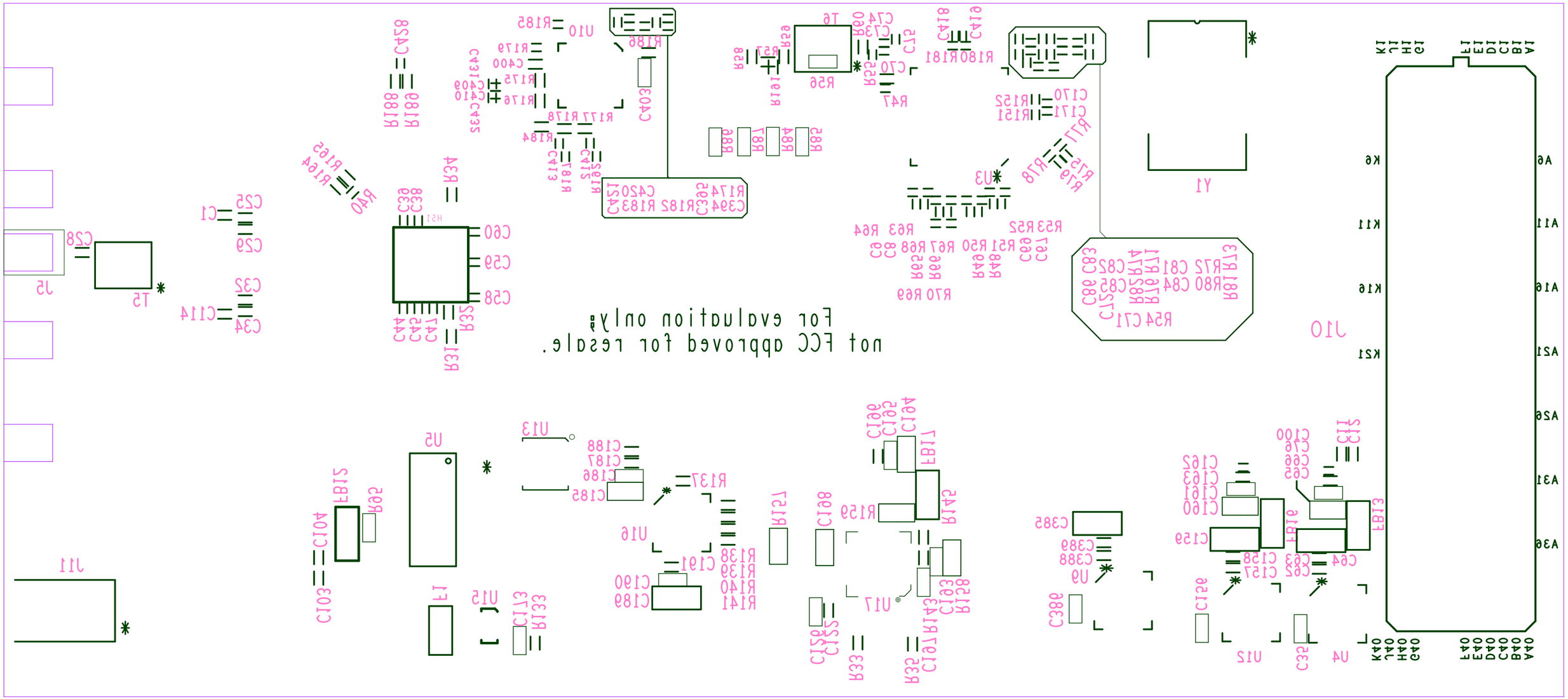

TOP VIEW




BOTTOM VIEW

# TIDA-01016

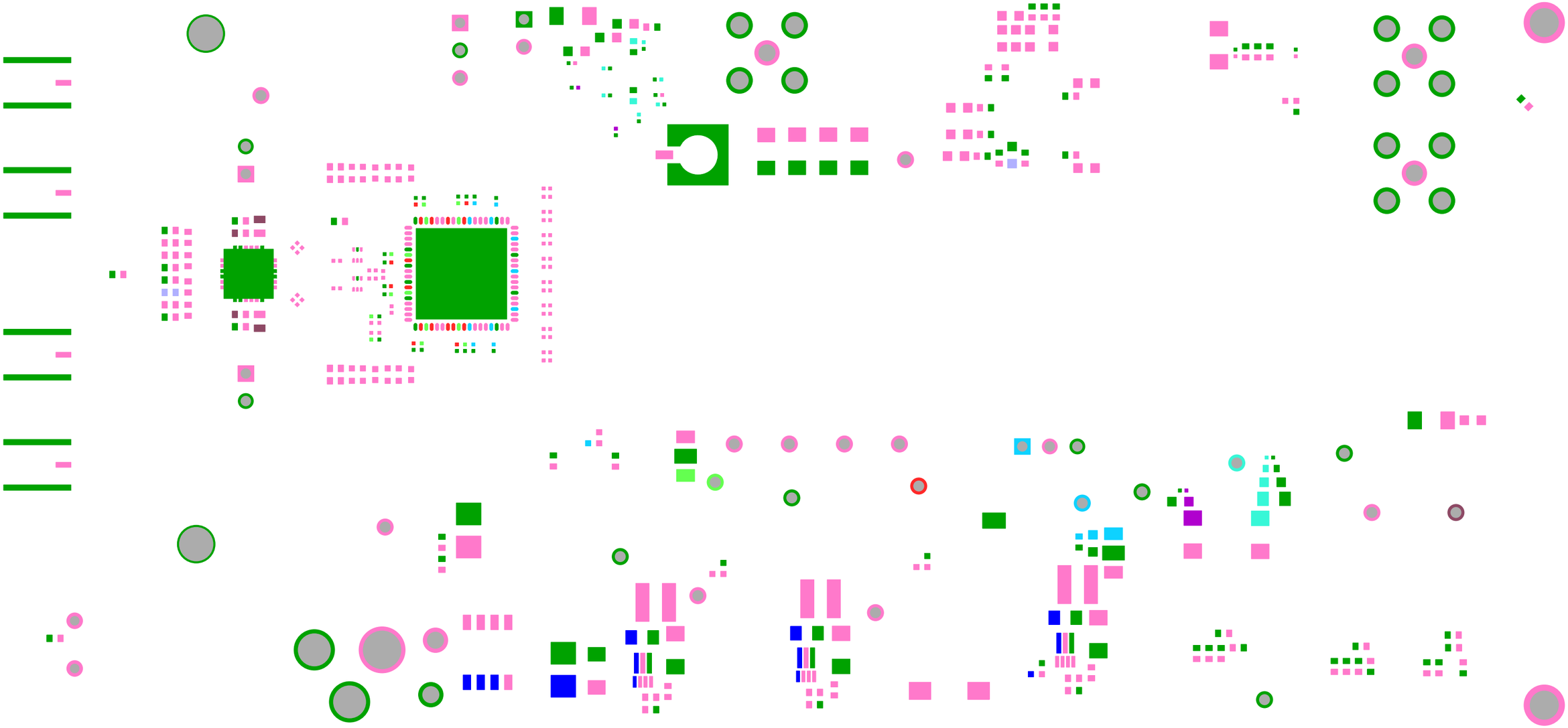
| | | |
|---|---|---|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS +/- DECIMALS .XX +/-.01 .XXX +/-.005 ANGLES +/- | CONTRACT NO. | TEXAS INSTRUMENTS INC. |
| | APPROVALS / DATE | ASSEMBLY DRAWING TSW32RF45 HSP-013 |
| | DRAWN JV SMITH 03-18-16 | |
| MATERIAL SEE NOTE 5 | ENGR R. PRENTICE 03-18-16 | |
| FINISH SEE NOTES 7, 8, 9 | | SIZE B / CODE IDENT NO. / DRAWING NO. / REV. E1 |
| DO NOT SCALE DRAWING | | SCALE NONE / SHEET 1 OF 1 |




# TIDA-01016

TEXAS INSTRUMENTS, INC.
TSW32RF45EVM HSP-013
PCB REV E1

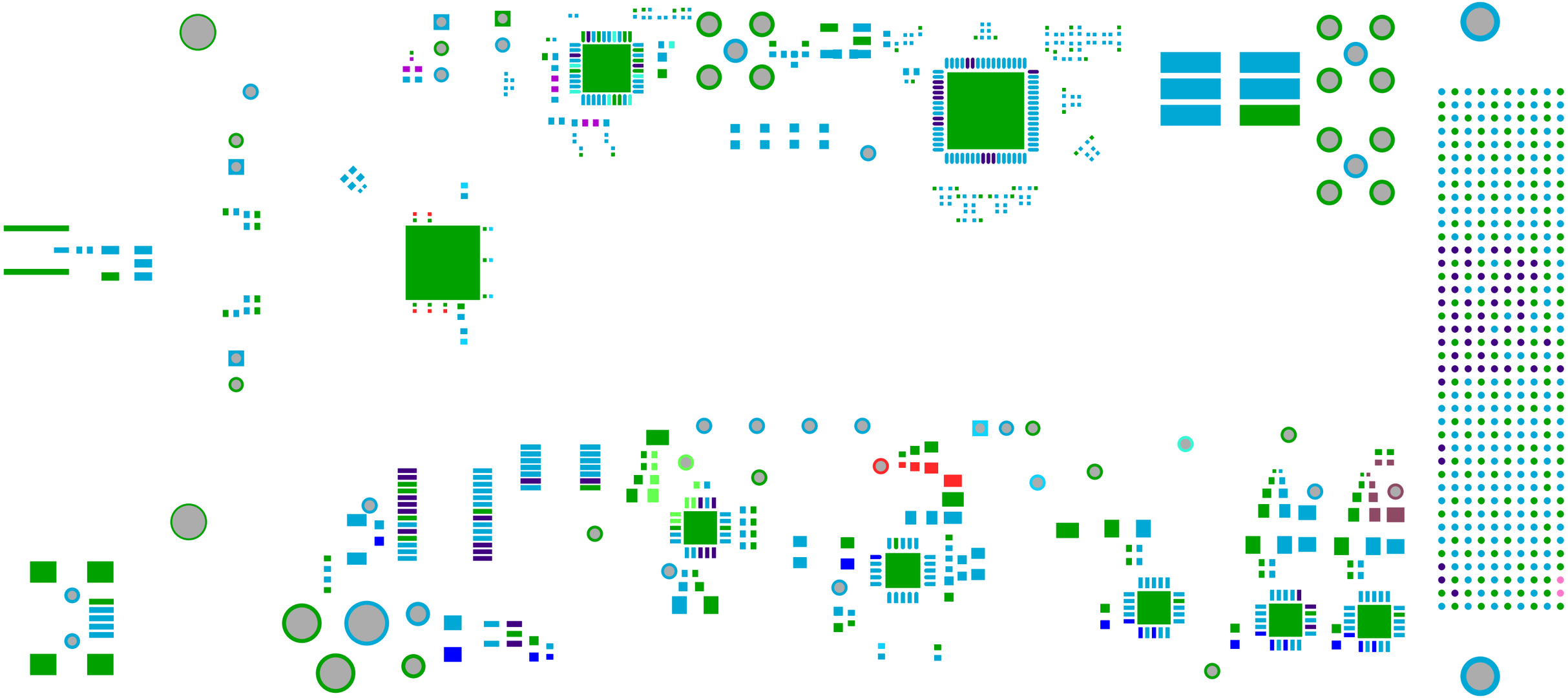
SILKSCREEN BOTTOM



TIDA-01016

TEXAS INSTRUMENTS, INC.
TSW32RF45EVM HSP-013
PCB REV E1

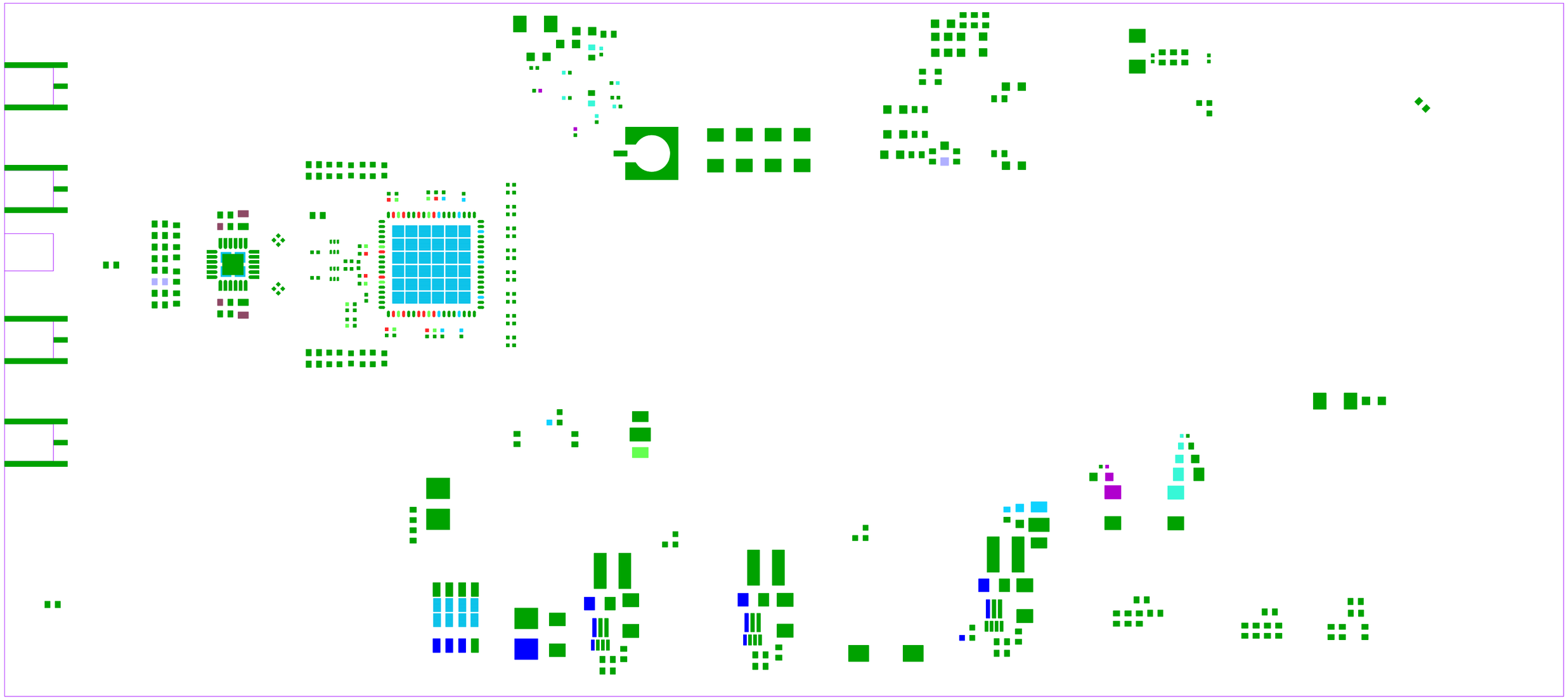
SOLDERMASK TOP



TIDA-01016

TEXAS INSTRUMENTS, INC.
TSW32RF45EVM HSP-013
PCB REV E1

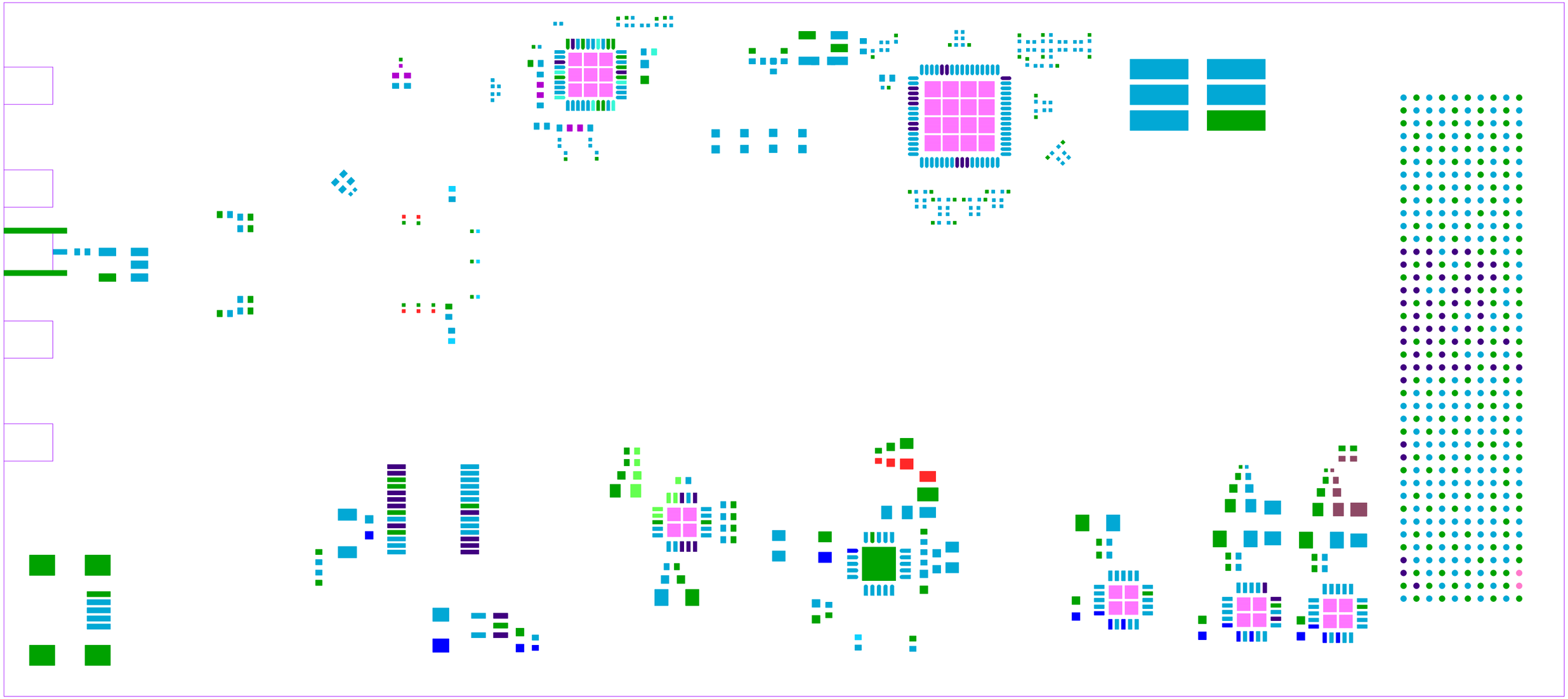
SOLDERMASK BOTTOM



TIDA-01016

TEXAS INSTRUMENTS, INC.
TSW32RF45EVM HSP-013
PCB REV E1

PASTEMASK TOP



TIDA-01016

TEXAS INSTRUMENTS, INC.
TSW32RF45EVM HSP-013
PCB REV E1

PASTEMASK BOTTOM

Attach heat sink
using thermally
conductive glue.



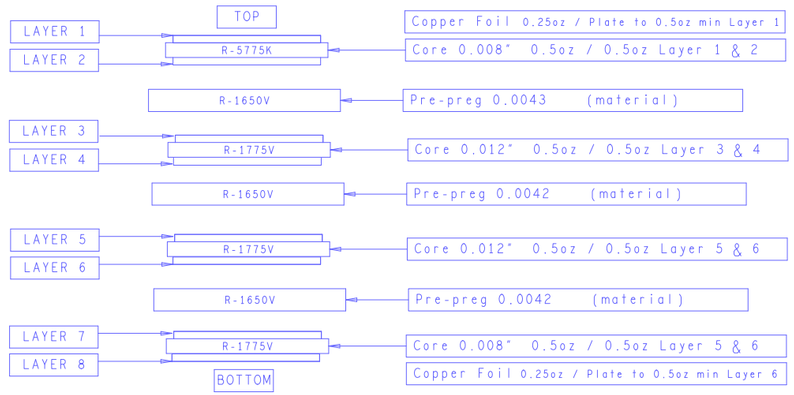

TIDA-01016

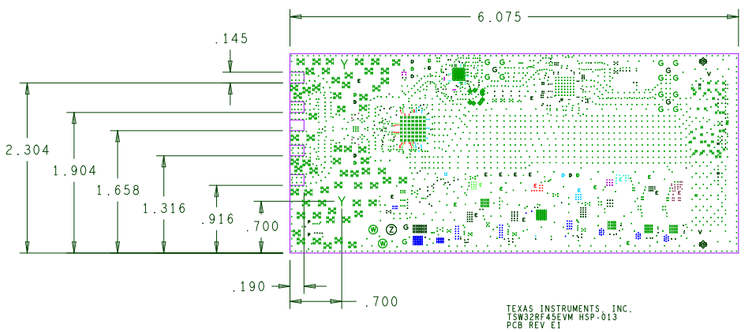
UNLESS OTHERWISE SPECIFIED, ALL NOTES ARE APPLICABLE.

1. APPLICATION DESIGN, MANUFACTURING AND INSPECTION DOCUMENTS.
   IPC-2221A & IPC-2222 / DESIGN STANDARD FOR RIGID PRINTED CIRCUIT BOARDS AND RIGID PRINTED BOARD ASSEMBLIES.
   IPC-6012B / QUALIFICATION AND PERFORMANCE SPECIFICATION FOR RIGID PRINTED BOARD, CLASS 2, CURRENT REVISION.
   IPC-A-600G / ACCEPTABILITY OF PRINTED BOARDS, CLASS 2, CURRENT REVISION.
2. VIA 8 & 10MIL SIZES APPLY AFTER PLATING. TOLERANCE TO BE +.003/-.010.
   HOLE SIZE APPLY AFTER PLATING. TOLERANCE TO BE +/-.003.
3. REGISTRATION TOLERANCE: ARTWORK +/- .002.
   ALL HOLE CENTERS +/-.005 FROM DIMENSION DATUM.
4. MINIMUM COPPER WALL THICKNESS SHALL BE .001 INCH.
   FOR ALL PLATED THROUGH HOLES. BREAKOUT NOT ALLOWED.
5. PROCESS AND MATERIAL MUST CONFORM TO UL 796. MATERIAL MUST MEET OR EXCEED UL FLAMMABILITY RATING 94V-0.
   MATERIAL: MULTI-LAYER (SEE DETAIL 'A')
   SEE LAYER STACKUP FOR ALL PRE-PREG & CORE THICKNESSES, COPPER OZ AND MATERIAL. FINISHED BOARD THICKNESS: .060+/- 10%
6. MANUFACTURE'S UL MARKING, FLAMMABILITY RATING, LOGO AND DATE CODE TO BE PLACED IN SILKSCREEN ON BOTTOM SIDE OF THE BOARD.
7. SMOBC/IMMERSION GOLD: 2 - 8 uIN OVER 118-236 uIN NICKEL PLATING.
8. SOLDERMASK BOTH SIDES USING TAIYO (OR EQUIVALENT)
   COLOR = RED (0.001 TO 002" THICK OVER METAL.
9. SILKSCREEN BOTH SIDES USING WHITE NPI LEADFREE.
   REGISTRATION TOLERANCE TO BE +/-.005.
   INK IS NOT ALLOWED ON EXPOSED PLATED AREA.
10. P.C. BOARD TO BE FREE OF DIRT, OIL, FINGER PRINTS, ETC.
11. BOARD WARPAGE: WARP AND TWIST SHALL NOT EXCEED .007 INCH PER INCH MEASURED AT ANY LOCATION OR DIRECTION ON THE BOARD.
12. BOARD MUST BE 100% ELECTRICALLY TESTED TO ENSURE NO SHORTS OR OPEN CIRCUITS AT 20V.
13. ALL OUTER LAYERS USING A 19MIL TRACE WIDTH SHALL BE 50 OHMS SINGLE ENDED +/- 10%.
14. 9MIL TRACE WIDTH AND 6MIL SPACING ON TOP SIDE OF BOARD SHALL BE 100 OHMS DIFFERENTIAL +/- 10%.
    8MIL TRACE WIDTH AND 6MIL SPACING ON BOTTOM SIDE OF BOARD SHALL BE 100 OHMS DIFFERENTIAL +/- 10%.
15. MINIMUM COPPER CONDUCTOR WIDTH IS: 4MIL.
    MINIMUM COPPER CONDUCTOR SPACING IS: 3.5MIL.
16. ALL INNER LAYER UNCONNECTED PADS SHALL BE REMOVED.
17. PWB MUST BE ROHS COMPLIANT AND SURVIVE LEAD FREE ASSEMBLY, MAX REFLOW OF 260 DEGREES C (6 PASSES).
18. ALL THROUGH VIAS TO BE FILLED WITH NON-CONDUCTIVE MATERIAL. FILLED VIAS TO BE PLATED AFTER PLUGGING TO PRESENT FLAT SURFACE TO DEVICE. NO POTHOLES.

REVISIONS

| ZONE | LTR | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|---|
| | | | | |




| DRILL CHART: TOP to BOTTOM | | | |
|---|---|---|---|
| ALL UNITS ARE IN MILS | | | |
| FIGURE | SIZE | PLATED | QTY |
| · | 6.0 | PLATED | 175 |
| · | 8.0 | PLATED | 2207 |
| · | 10.0 | PLATED | 139 |
| - | 12.0 | PLATED | 511 |
| ⊕ | 13.0 | PLATED | 16 |
| ◆ | 15.0 | PLATED | 8 |
| ▫ | 38.0 | PLATED | 12 |
| ‹ | 40.0 | PLATED | 20 |
| G | 62.0 | PLATED | 5 |
| G | 67.0 | PLATED | 12 |
| ✥ | 106.0 | PLATED | 2 |
| Ⓦ | 120.0 | PLATED | 2 |
| Y | 125.0 | PLATED | 2 |
| Ⓩ | 140.0 | PLATED | 1 |
| • | 35.0 | NON-PLATED | 2 |
| v | 50.0 | NON-PLATED | 2 |

# TIDA-01016

| | | |
|---|---|---|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES<br>TOLERANCES ARE:<br>FRACTIONS DECIMALS ANGLES<br>+/- .XX +/-.01 +/-<br>.XXX +/-.005 | CONTRACT NO. | TEXAS INSTRUMENTS INC. |
| MATERIAL<br>SEE NOTE 5 | APPROVALS / DATE<br>DRAWN JV SMITH 03-18-16<br>ENG R. PRENTICE 03-18-16 | FABRICATION DRAWING<br>TSW32RF45 HSP-013 |
| FINISH<br>SEE NOTE 7, 8, 9 | | SIZE D · CODE IDENT NO. · DRAWING NO. · REV. E1 |
| DO NOT SCALE DRAWING | | SCALE NONE · SHEET 1 OF 1 |

## IMPORTANT NOTICE FOR TI REFERENCE DESIGNS

Texas Instruments Incorporated ('TI") reference designs are solely intended to assist designers ("Designer(s)") who are developing systems that incorporate TI products. TI has not conducted any testing other than that specifically described in the published documentation for a particular reference design.

TI's provision of reference designs and any other technical, applications or design advice, quality characterization, reliability data or other information or services does not expand or otherwise alter TI's applicable published warranties or warranty disclaimers for TI products, and no additional obligations or liabilities arise from TI providing such reference designs or other items.

TI reserves the right to make corrections, enhancements, improvements and other changes to its reference designs and other items.

Designer understands and agrees that Designer remains responsible for using its independent analysis, evaluation and judgment in designing Designer's systems and products, and has full and exclusive responsibility to assure the safety of its products and compliance of its products (and of all TI products used in or for such Designer's products) with all applicable regulations, laws and other applicable requirements. Designer represents that, with respect to its applications, it has all the necessary expertise to create and implement safeguards that (1) anticipate dangerous consequences of failures, (2) monitor failures and their consequences, and (3) lessen the likelihood of failures that might cause harm and take appropriate actions. Designer agrees that prior to using or distributing any systems that include TI products, Designer will thoroughly test such systems and the functionality of such TI products as used in such systems. Designer may not use any TI products in life-critical medical equipment unless authorized officers of the parties have executed a special contract specifically governing such use. Life-critical medical equipment is medical equipment where failure of such equipment would cause serious bodily injury or death (e.g., life support, pacemakers, defibrillators, heart pumps, neurostimulators, and implantables). Such equipment includes, without limitation, all medical devices identified by the U.S. Food and Drug Administration as Class III devices and equivalent classifications outside the U.S.

Designers are authorized to use, copy and modify any individual TI reference design only in connection with the development of end products that include the TI product(s) identified in that reference design. HOWEVER, NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE TO ANY OTHER TI INTELLECTUAL PROPERTY RIGHT, AND NO LICENSE TO ANY TECHNOLOGY OR INTELLECTUAL PROPERTY RIGHT OF TI OR ANY THIRD PARTY IS GRANTED HEREIN, including but not limited to any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services, or a warranty or endorsement thereof. Use of the reference design or other items described above may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

TI REFERENCE DESIGNS AND OTHER ITEMS DESCRIBED ABOVE ARE PROVIDED "AS IS" AND WITH ALL FAULTS. TI DISCLAIMS ALL OTHER WARRANTIES OR REPRESENTATIONS, EXPRESS OR IMPLIED, REGARDING THE REFERENCE DESIGNS OR USE OF THE REFERENCE DESIGNS, INCLUDING BUT NOT LIMITED TO ACCURACY OR COMPLETENESS, TITLE, ANY EPIDEMIC FAILURE WARRANTY AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

TI SHALL NOT BE LIABLE FOR AND SHALL NOT DEFEND OR INDEMNIFY DESIGNERS AGAINST ANY CLAIM, INCLUDING BUT NOT LIMITED TO ANY INFRINGEMENT CLAIM THAT RELATES TO OR IS BASED ON ANY COMBINATION OF PRODUCTS AS DESCRIBED IN A TI REFERENCE DESIGN OR OTHERWISE. IN NO EVENT SHALL TI BE LIABLE FOR ANY ACTUAL, DIRECT, SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF THE REFERENCE DESIGNS OR USE OF THE REFERENCE DESIGNS, AND REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

TI's standard terms of sale for semiconductor products (http://www.ti.com/sc/docs/stdterms.htm) apply to the sale of packaged integrated circuit products. Additional terms may apply to the use or sale of other types of TI products and services.

Designer will fully indemnify TI and its representatives against any damages, costs, losses, and/or liabilities arising out of Designer's non-compliance with the terms and provisions of this Notice.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265