

VCC\_IO

GND

CSN

SCK

SDI

SDO

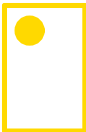
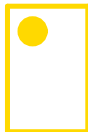
DIAGO

DIAG1

DRV\_ENN

STEP

DIR



TMC2160\_B0B  
V1.0

GND VS

B2

B1

A2

A1

GND

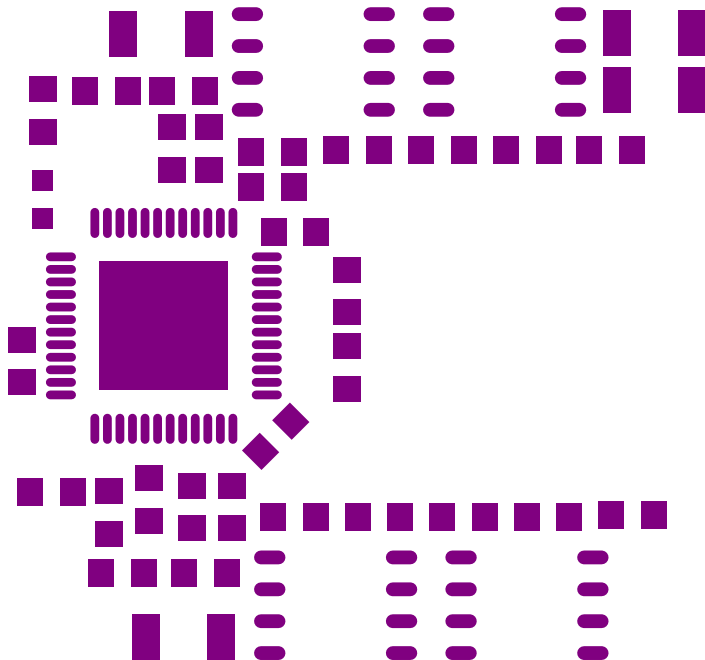
GND

DCIN

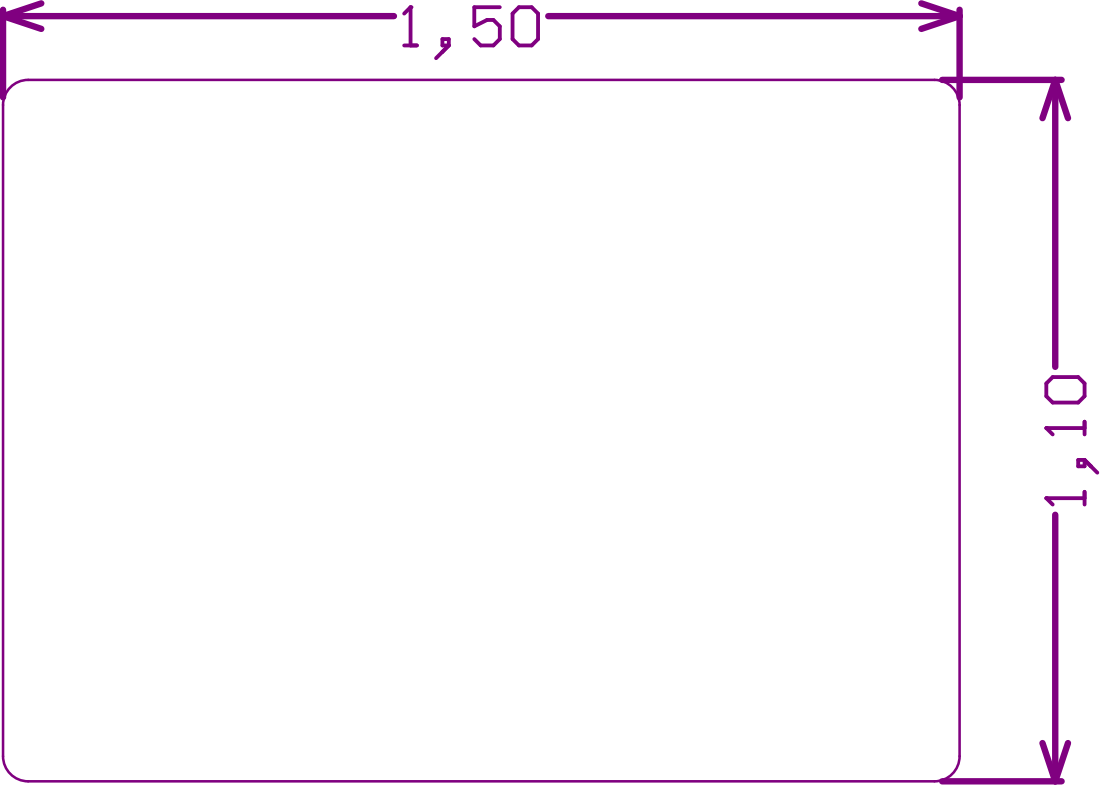
DCEN

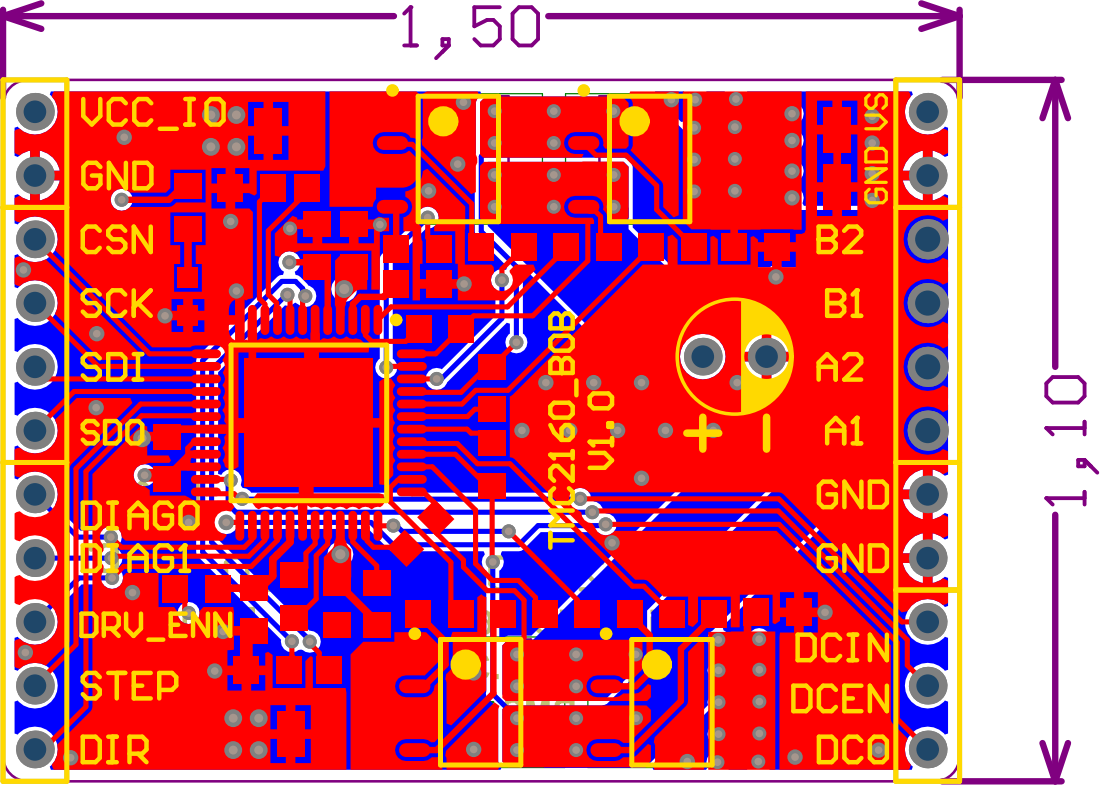
DCO

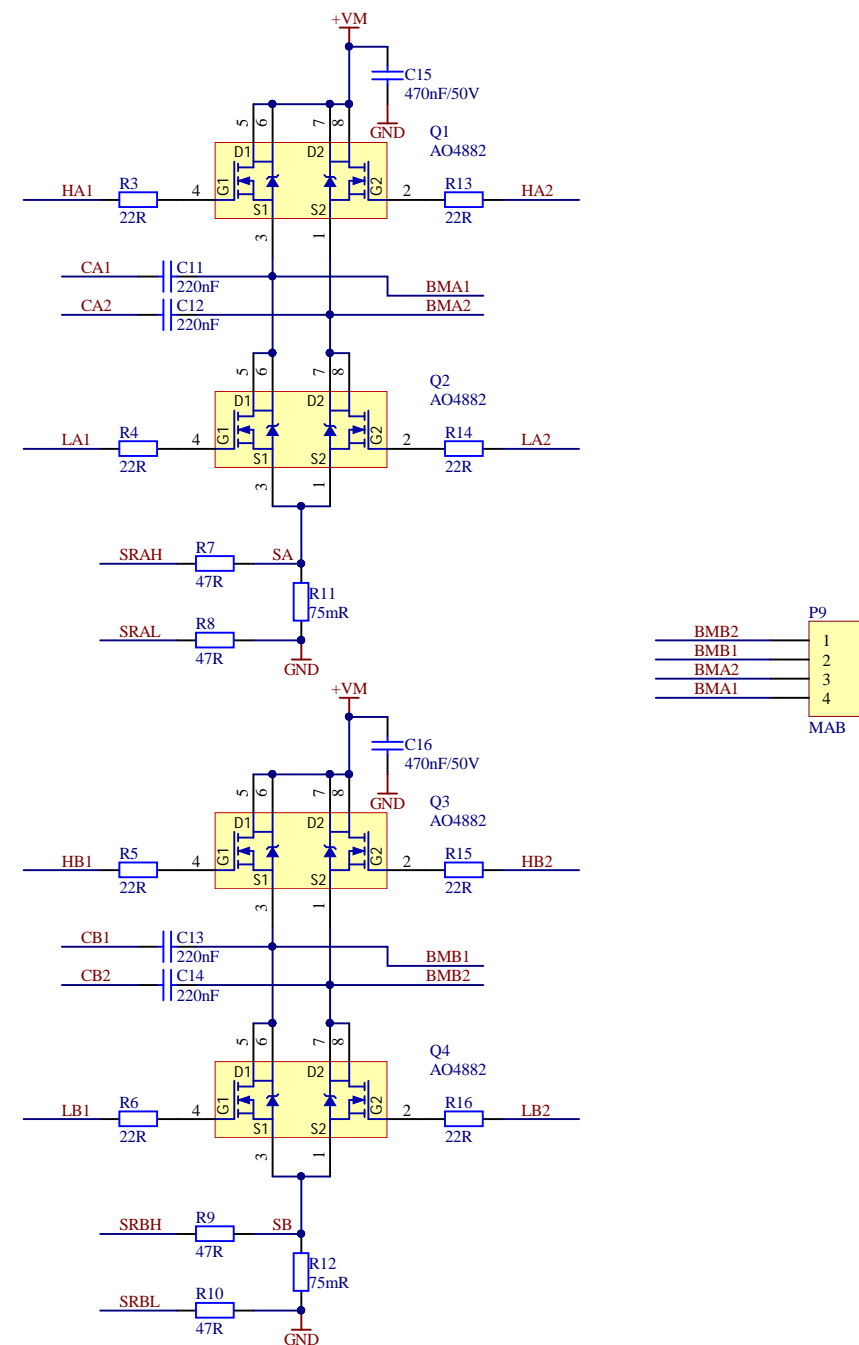
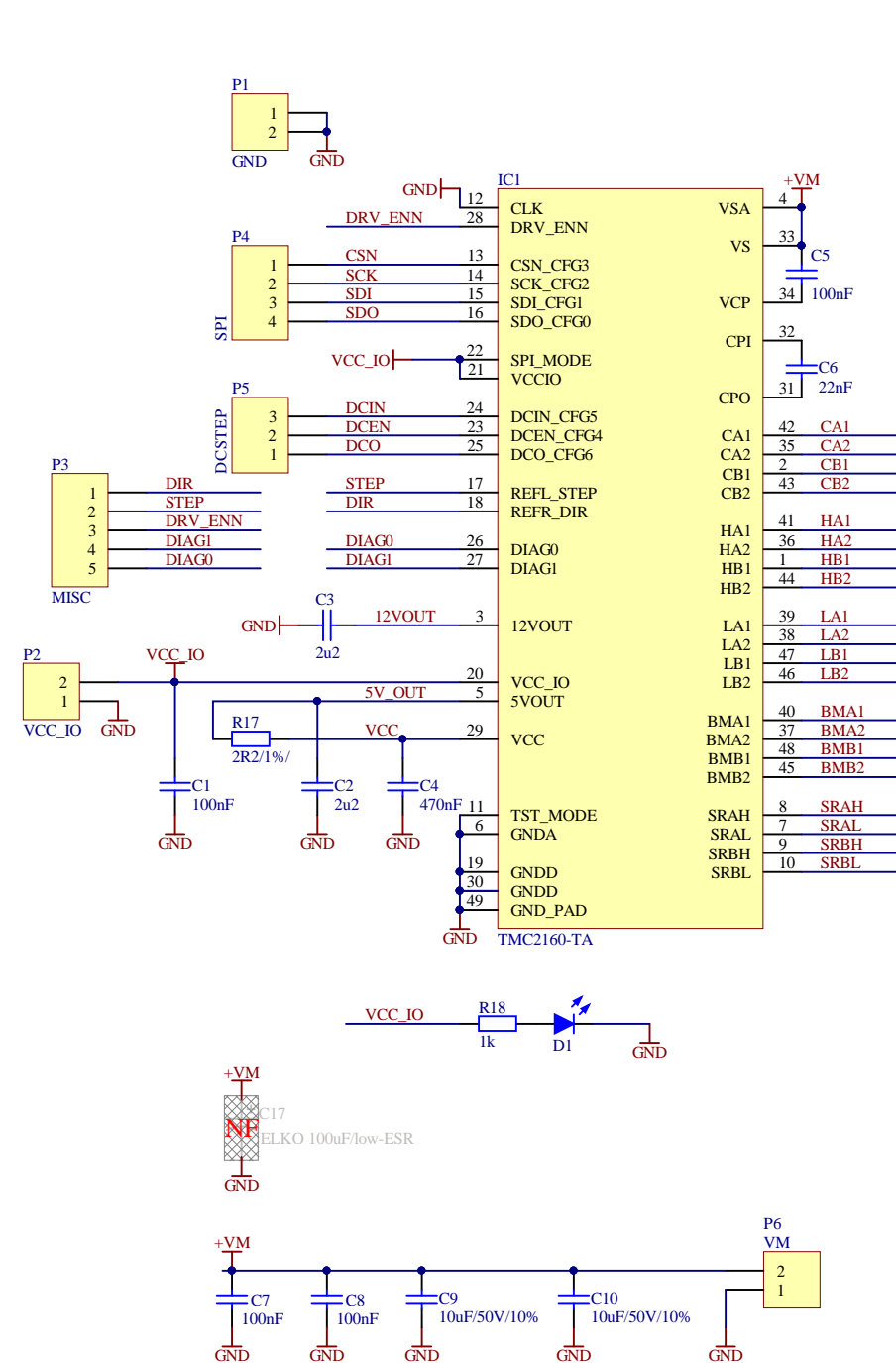
|      |                   |         |
|------|-------------------|---------|
| VS   |                   | VCC_IO  |
| GND  |                   | GND     |
| B2   |                   | CSN     |
| B1   |                   | SCK     |
| A2   |                   | SDI     |
| A1   |                   | SDO     |
| GND  |                   | DIAGO   |
| GND  | TMC2160_BOB V1.0  | DIAG1   |
| DCIN | Chip: TMC2160-TA  | DRV_ENN |
| DCEN | VSupply: 9...36V  | STEP    |
| DCO  | Iphase, RMS: 2.8A | DIR     |







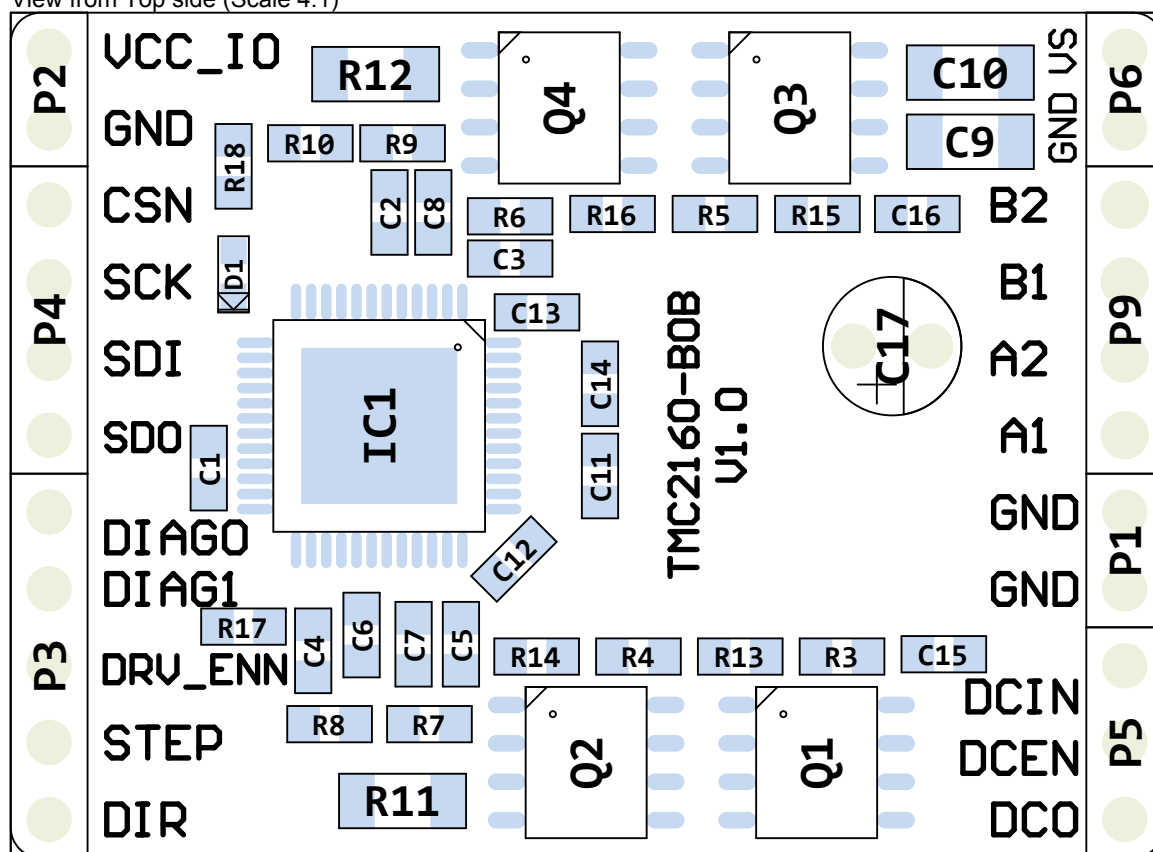




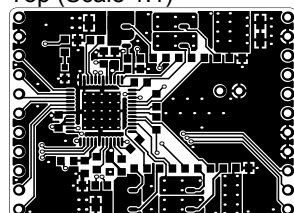
|                             |  |                        |
|-----------------------------|--|------------------------|
| Title<br><i>TMC2160_BOB</i> |  |                        |
| Size<br>A3                  | Number   | Revision<br><i>1.0</i> |
| Date:<br>File:              | 15.06.2018<br>C:\Users\...[TMC2160_BOB_V1_0.SchDoc | Sheet<br>Drawn By: of  |

|                      |   |                 |   |                      |  |  |            |        |                 |       |            |          |       |                               |           |   |
|----------------------|---|-----------------|---|----------------------|--|--|------------|--------|-----------------|-------|------------|----------|-------|-------------------------------|-----------|---|
| 1                    | 2   | 3               | 4   |                      |  |  |            |        |                 |       |            |          |       |                               |           |   |
| A                    | <div>ChangeLog</div> <div>V1.0 - Initial design</div> |                 |   | A                    |  |  |            |        |                 |       |            |          |       |                               |           |   |
| B                    |   |                 |   | B                    |  |  |            |        |                 |       |            |          |       |                               |           |   |
| C                    |   |                 |   | C                    |  |  |            |        |                 |       |            |          |       |                               |           |   |
| D                    |   |                 | <table><tr><td colspan="3">Title<br/>TMC2160_BOB</td></tr><tr><td>Size<br/>A4</td><td>Number</td><td>Revision<br/>1.0</td></tr><tr><td>Date:</td><td>15.06.2018</td><td>Sheet of</td></tr><tr><td>File:</td><td>C:\Users\...\ChangeLog.SchDoc</td><td>Drawn By:</td></tr></table> | Title<br>TMC2160_BOB |  |  | Size<br>A4 | Number | Revision<br>1.0 | Date: | 15.06.2018 | Sheet of | File: | C:\Users\...\ChangeLog.SchDoc | Drawn By: | D |
| Title<br>TMC2160_BOB |   |                 |   |                      |  |  |            |        |                 |       |            |          |       |                               |           |   |
| Size<br>A4           | Number  | Revision<br>1.0 |   |                      |  |  |            |        |                 |       |            |          |       |                               |           |   |
| Date:                | 15.06.2018  | Sheet of        |   |                      |  |  |            |        |                 |       |            |          |       |                               |           |   |
| File:                | C:\Users\...\ChangeLog.SchDoc                         | Drawn By:       |   |                      |  |  |            |        |                 |       |            |          |       |                               |           |   |
| 1                    | 2   | 3               | 4   |                      |  |  |            |        |                 |       |            |          |       |                               |           |   |

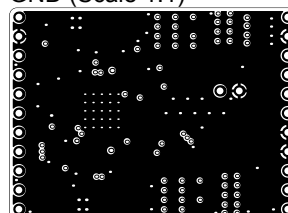
View from Top side (Scale 4:1)



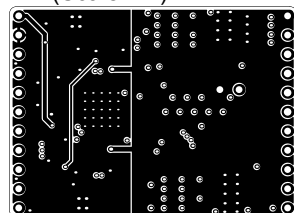
Top (Scale 1:1)



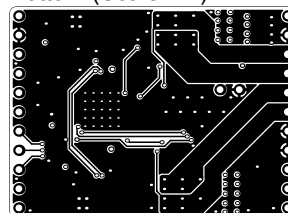
GND (Scale 1:1)



VM (Scale 1:1)



Bottom (Scale 1:1)



Title: TMC2160\_BOB

Version: 1.0

Date: 15.06.2018 Time: 9:32 9:32



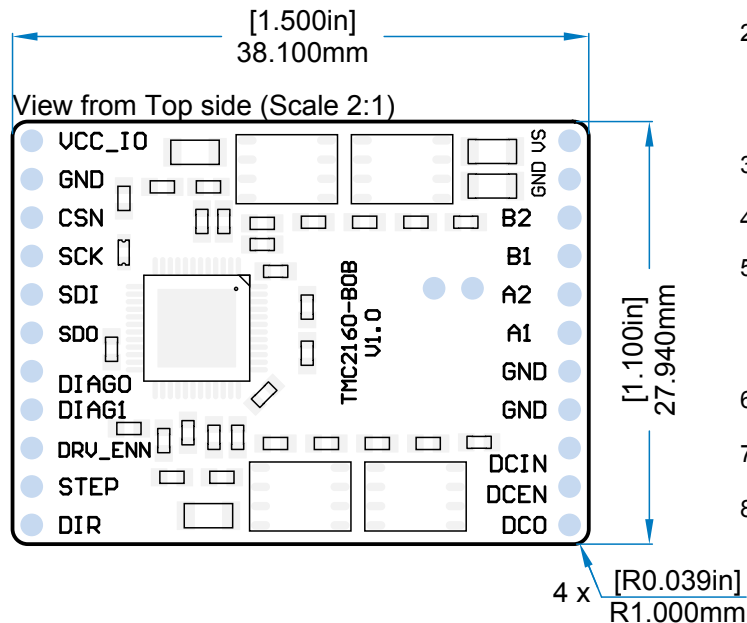
## Layer Stack Legend

| Material         | Layer          | Thickness          | Dielectric Material | Type        | Gerber |
|------------------|----------------|--------------------|---------------------|-------------|--------|
|                  | Top Paste      |                    |                     | Paste Mask  | GTP    |
|                  | Top Overlay    |                    |                     | Legend      | GTO    |
| Surface Material | Top Solder     | 0.010mm(0.400mil)  | Solder Resist       | Solder Mask | GTS    |
| Copper           | Top            | 0.018mm(0.689mil)  |                     | Signal      | GTL    |
| Core             |                | 0.254mm(10.000mil) | FR-4                | Dielectric  |        |
| Copper           | GND            | 0.035mm(1.378mil)  |                     | Signal      | G1     |
| Prepreg          |                | 1.000mm(39.370mil) | FR-4                | Dielectric  |        |
| Copper           | VM             | 0.035mm(1.378mil)  |                     | Signal      | G2     |
| Core             |                | 0.254mm(10.000mil) | FR-4                | Dielectric  |        |
| Copper           | Bottom         | 0.018mm(0.689mil)  |                     | Signal      | GBL    |
| Surface Material | Bottom Solder  | 0.010mm(0.400mil)  | Solder Resist       | Solder Mask | GBS    |
|                  | Bottom Overlay |                    |                     | Legend      | GBO    |
|                  | Bottom Paste   |                    |                     | Paste Mask  | GBP    |

Total thickness: 1.633mm(64.304mil)

### Notes:

1. MATERIAL : FR-4-2 NATURAL EPOXY/FIBERGLASS
2. APPLY SOLDERMASK ON BOTH SIDES  
COLOR: WHITE  
FABRICATOR SHALL MAKE NECESSARY MODIFICATIONS TO SOLDERMASK PHOTO PLOT FILES FOR OPTIMAL SOLDERMASK COVERAGE BETWEEN FINE PITCH COMPONENT LEADS.
3. FINISH ALL EXPOSED COPPER SURFACES WITH IMMERSION GOLD.
4. HOLE SIZES APPLY AFTER PLATING.
5. APPLY SILKSCREEN TO BOTH SIDES  
COLOR: BLACK  
FABRICATOR SHALL MAKE NECESSARY MODIFICATIONS TO LEGEND PHOTO PLOT FILES TO ENSURE NO LEGEND INK COVERS ANY COMPONENT PAD OR VIA PAD.
6. MODIFIED PHOTO PLOT FILES ARE TO BE RETURNED BEFORE ORDER DELIVERED.
7. ALL PRINTED CIRCUITBOARD NETS SHALL BE ELECTRICALLY TESTED FOR OPENS AND SHORTS.
8. FABRICATION OF PCB TO COMPLY WITH IPC-A-600 CLASS II . CURRENT REVISION.



Title: TMC2160\_BOB

Version: 1.0

Date: 15.06.2018 Time: 9:32 9:32



# BOM

Project: TMC2160\_BOB

Version: 1.0

Date: 15.06.2018

| #        | Quantity | MPN                 | Comment                            | Designator                         | Footprint                          | Description   | Note | MF                               |    |
|----------|----------|---------------------|------------------------------------|------------------------------------|------------------------------------|---|------|----------------------------------|----|
| 1        | 4        | MC0603F104M500CT    | 100nF                              | C1, C5, C7, C8                     | C0603                              | Ceramic capacitor   |      | Multicomp, [NoParam]             |    |
| 2        | 2        | GRM188R61E225KA12D  | 2u2                                | C2, C3                             | C0603                              | SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric], 2.2 µF, 25 V, ± 10%, X5R, GRM Series  |      | MURATA                           |    |
| 3        | 1        | MC0603X474K160CT    | 470nF                              | C4                                 | C0603                              | Ceramic capacitor   |      | Multicomp                        |    |
| 4        | 1        | MC0603B223K500CT    | 22nF                               | C6                                 | C0603                              | Ceramic capacitor   |      | Multicomp                        |    |
| 5        | 2        | GRM31CR61H106MA12L  | 10uF/50V/10%                       | C9, C10                            | C1206                              | SMD Multilayer Ceramic Capacitor, 1206 [3216 Metric], 10 µF, 50 V, ± 20%, X5R, GRM Series   |      | MURATA                           |    |
| 6        | 4        | GCM188R71H224KA64D  | 220nF                              | C11, C12, C13, C14                 | C0603                              | SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric], 0.22 µF, 50 V, ± 10%, X7R, GCM Series |      | MURATA                           |    |
| 7        | 2        | C1608X7R1H474K080AC | 470nF/50V                          | C15, C16                           | C0603                              | SMD Multilayer Ceramic Capacitor, 0603 [1608 Metric], 0.47 µF, 50 V, ± 10%, X7R, C Series   |      | TDK                              |    |
| 8        | 1        | LTST-C191TBKT-5A    | LED, Blue, SMD, 20mA, 2.8V, 465 nm | D1                                 | LED_0603                           | LED, Blue, SMD, 20mA, 2.8V, 465 nm  |      | Lite-On                          |    |
| 9        | 1        | TMC2160- TA         | TMC2160-TA                         | IC1                                | TMC5160_TSQFP50P900X900X120_HS-49L |   |      | TRINAMIC                         |    |
| 10       | 4        | AO4882              | AO4882                             | Q1, Q2, Q3, Q4                     | SOP127P600X170-8L                  | Mosfet Array 2 N-Channel (Dual) 40V 8A 2W Surface Mount 8-SOIC                              |      | Alpha & Omega Semiconductor Inc. |    |
| 11       | 8        | MCWR06X22R0FTLV     | 22R / 100mW / 1%                   | R3, R4, R5, R6, R13, R14, R15, R16 | R0603                              | SMD Chip Resistor, Thick Film, 22 ohm, 50 V, 0603 [1608 Metric], 100 mW, ± 1%, MCWR Series  |      | MULTICOMP                        |    |
| 12       | 4        | MCSR06X47R0FTL      | 47R / / 1%                         | R7, R8, R9, R10                    | R0603                              | SMD Chip Resistor, Ceramic, 47 ohm, 75 V, 0603 [1608 Metric], 100 mW, ± 1%, MCSR 06 Series  |      | MULTICOMP                        |    |
| 13       | 2        | ERJ-8BWFR075V       | 75mR                               | R11, R12                           | R1206                              | SMD Chip Resistor, Thick Film, Current Sense Resistors - SMD 1W 0.075ohm 1%                 |      | Panasonic Electronic Components  |    |
| 14       | 1        | MC0063W060312R2     | 2R2/1%/                            | R17                                | R0603                              | Resistor  |      | Multicomp                        |    |
| 15       | 1        | MC0063W060311K      | 1k                                 | R18                                | R0603                              | 1 kohm, 50 V, 0603 [1608 Metric], 63 mW, ± 1%, MC Series                                    |      | MULTICOMP                        |    |
| Approved |          |                     | Notes                              |                                    |                                    |   |      |                                  | 45 |

