used this to find r-trim
http://spicewebprd.vicorpower.com/apps/dcmTrimCalculator/Calculator.php
analysis also said that it would be 2.4A drawn on HV side

696108003002
Plastic fuse holder

Test with different values for RC filter

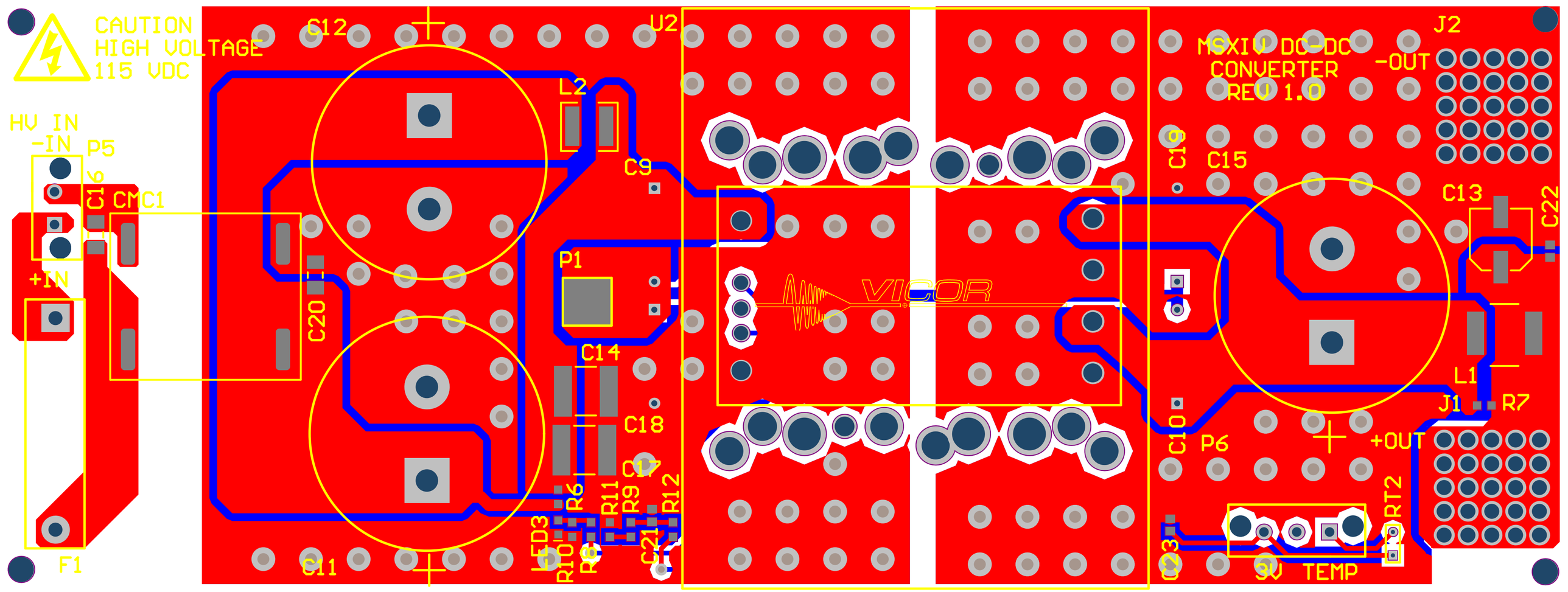
F1
FUSE 420VAC/DC 5X20 FA 8A
HV
5A
P5
1
2
UltraFit
HV Input
CMC1
C16
0.1µF
200V
±10%
1206 (3216 Metric)
C20
0.1µF
200V
±10%
1206 (3216 Metric)
C11
200V
±20%
1000µF
C12
200V
±20%
1000µF
R6
1 Ohms
0603
±5%
L2
±20%
1µH
5A
C14
1µF
200V
±10%
C17
1µF
200V
±10%
C9
Y5V (F)
X1, Y1
4700pF
C18
Y5V (F)
X1, Y1
4700pF
R12
0.0
1/4W
R9
10k
1/10W
R11
±5%
0603
5.6 kOhms
C21
0.1µF
50V
X7R
R8
330
1/10W
LED3
Green
2V
0603 (1608 Metric)
R10
1/10W
54.9k
U2
A1 +IN
B1 TR
C1 EN
D1 FT
E1 -IN
+OUT A'2
+OUT C'2
-OUT B'2
-OUT D'2
DCDC Converter Module
17A
25V
±20%
15000µF
C15
R7
1 Ohms
0603
±5%
L1
16A
±20%
820nH
C10
Y5V (F)
X1, Y1
4700pF
C19
Y5V (F)
X1, Y1
4700pF
only place if common mode noise is an issue and emi can be grounded to chassis body (check if current through chassis body passes safety regulations)
C13
4.7uF
50V
C22
10µF
25V
X5R
J1
1
TERM PWR ELEMENT SHANK M8 25PIN
J2
1
TERM PWR ELEMENT SHANK M8 25PIN
GND
HV_GND
EMI_GND
P1
5mm PAD
to go to chassis body ground
LDO_3V
DCDC_TEMP
C23
0.1µF
50V
X7R
RT2
10K NTC
490-8601-ND
P6
1
2
3
UltraFit
To Power Distribution

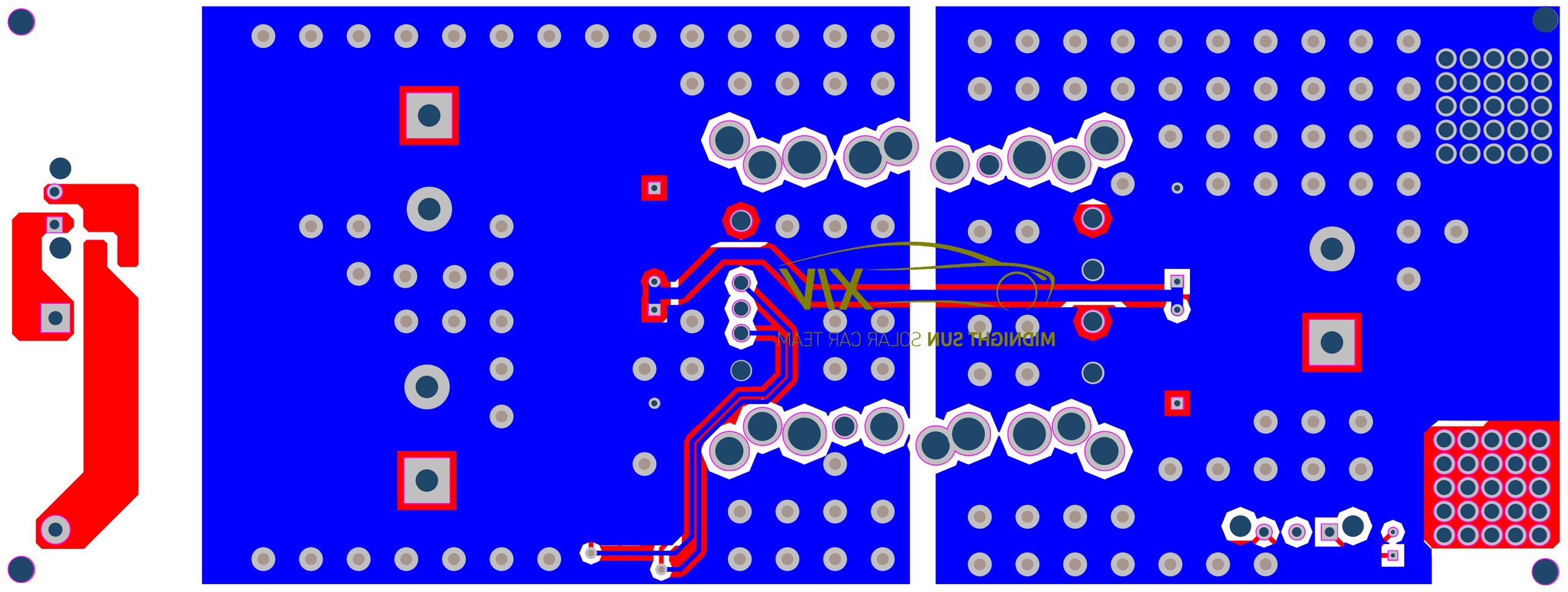
| | |
|---|---|
| PROJECT | MSXIV_DC-DC_Converter.PrjPcb |
| DOCUMENT | * |
| PART NUMBER | |
| VARIANT | [No Variations] |
| DRAWN BY | Aashmika Mali |
| REVISION | 2.0 |
| LAST MODIFIED | 2019-09-14 |
| SHEET | * OF * |

MIDNIGHT SUN

Engineering 5 - 1002
University of Waterloo
(519) 888-4567 x32978
hardware@uwmidsun.com

| Commer | Descripti | Designat | Footprint | LibRef | Quantity | Manufact | Manufact | Supplier | Supplier | Supplier | Supplier | Supplier | Supplier | Suppl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CAP CER | 4700pF ± | C9, C18 | CAP 470( | CAP CER | 2 | | | Digi-Key | | | 399-9517-1-ND | | | |
| CAP ALU | CAP RAD | C11, C12 | CAP ALU | CAP ALU | 2 | Cornell D | SLPX102 | Digi-Key | | | 338-1557-ND | | | |
| EEE-1HA | 4.7µF 50 | C13 | CAP ALU | CAP ALU | 1 | Panasoni | EEE-1HA | Digi-Key | | | PCE4304CT-ND | | | |
| CAP CER | 1µF ±10 | C14, C17 | CAP, 222 | CAP CER | 2 | | GRM55D | Digi-Key | | | 490-14683-1-ND | | | |
| CAP ALU | 15000µF | C15 | CAP ALU | CAP ALU | 1 | | | Digi-Key | | | 338-1470-ND | | | |
| CAP CER | CAP CER | C16, C20 | CAP, 120 | CAP CER | 2 | Manufact | 8853422 | Digi-Key | | | 732-12081-1-ND | | | |
| CAP CER | 0.10µF ± | C21, C23 | CAP, 060 | CAP CER | 2 | AVX Corp | 06035C1 | Digi-Key | | | 478-5052-1-ND | | | |
| CAP CER | 10µF ±2( | C22 | CAP, 060 | CAP CER | 1 | Murata E | GRM188 | Digi-Key | | | 490-7202-1-ND | | | |
| CM Chok | 2 Line Co | CMC1 | LCCI 50 ( | COMMON | 1 | Pulse Ele | P0353NL | Digi-Key | | | 553-1764-1-ND | | | |
| FUSE 42( | 8A 420V | F1 | FUSE 42( | FUSE 42( | 1 | | | Digi-Key | | | F6659-ND | | | |
| TERM PV | 25 Pin Sh | J1, J2 | TERM PV | TERM PV | 2 | Wurth El | 7460719 | Digi-Key | | | 732-3219-ND | | | |
| IND 820I | 820nH S | L1 | IND 820I | IND 820I | 1 | | | Digi-Key | | | XC2399CT-ND | | | |
| IND 1UH | 1µH Sem | L2 | IND 1UH | IND 1uH | 1 | Bourns I | SRN5040 | Digi-Key | | | SRN5040TA-1R0MCT-ND | | | |
| LED GRE | Green 57 | LED3 | LED_060 | LED GRE | 1 | | | Digi-Key | | | 732-4980-1-ND | | | |
| 5mm PA | 5x5mm | P1 | 5mm PAI | 5mm PAI | 1 | | | | | | | | | |
| CONN 2P | 2 Positio | P5 | CONN, 2 | CONN 2P | 1 | Molex, LL | 1722861 | Digi-Key | | | WM11673-ND | | | |
| CONN 3P | 3 Positio | P6 | CONN, 3 | CONN 3P | 1 | Molex, LL | 1722871 | Digi-Key | | | WM11702-ND | | | |
| RES 1 OH | RES SMD | R6, R7 | RES, 060 | RES 1 OH | 2 | Rohm Se | KTR03EZ | Digi-Key | | | RHM1.0AZCT-ND | | | |
| RES 330 | 330 Ohm | R8 | RES, 060 | RES 330 | 1 | | | Digi-Key | | | A129682TR-ND | | | |
| RES 10K | RES SMD | R9 | RES, 060 | RES 10K | 1 | Yageo | RC0603F | Digi-Key | | | 311-10.0KHRCT-ND | | | |
| RES 54.9 | 54.9k Oh | R10 | RES, 060 | RES 54.9 | 1 | | | Digi-Key | | | P54.9KHCT-ND | | | |
| RES 15.6 | 5.6 kOhr | R11 | RES, 060 | RES 5.6K | 1 | Yageo | RC0603J | Digi-Key | | | 311-5.6KGRCT-ND | | | |
| RES 0.0 ( | RES SMD | R12 | RES, 060 | RES 0.0 ( | 1 | Vishay D | CRCW06 | Digi-Key | | | 541-0.0SBCT-ND | | | |
| 10K NTC | NTC The | RT2 | NTC THE | NTC THE | 1 | | | Digi-Key | | | 490-8601-ND | | | |


CAUTION
HIGH VOLTAGE
115 VDC
HV IN
-IN
P5
+IN
C1
CMC1
F1
C12
C11
C20
U2
L2
C9
P1
C14
C18
C17
R6
R11
R9
R12
LED3
R10
R8
C21
MSXIV DC-DC
CONVERTER
REV 1.0
J2
-OUT
C16
C15
C13
C22
L1
J1
R7
P6
+OUT
C10
C23
RT2
3V
TEMP
VICOR


MIDNIGHT SUN SOLAR CAR TEAM

CAUTION
HIGH VOLTAGE
115 VDC
HV IN
-IN
P5
C16
CMC1
+IN
F1
U2
L2
C9
P1
C14
C18
C17
R6
R11
R9
R12
LED3
R10
R8
C21
MSXIV DC-DC
CONVERTER
REV 1.0
J2
-OUT
C19
C15
C22
C10
P6
+OUT
RT2
C23

# Electrical Rules Check Report

| Class | Document | Message |
|---|---|---|
| Warning | MSXIV_DC-DC_Converter.SchDoc | Off grid NetParameter at 9444.489mil,5600mil |
| | | |

# Design Rules Verification Report

Filename : C:\Users\Aashmika Mali\Documents\First Year\Midnight Sun\hardware\MSXII_

Warnings 0
Rule Violations 194

| Warnings | |
|---|---|
| Total | 0 |

| Rule Violations | |
|---|---|
| Clearance Constraint (Gap=10mil) (All),(All) | 2 |
| Clearance Constraint (Gap=5mil) (IsStitchingVia and InNet('HV_GND')),((IsVia and (Not IsStitchingVia)) Or IsPad) | 0 |
| Short-Circuit Constraint (Allowed=No) (All),(All) | 0 |
| Un-Routed Net Constraint ( (All) ) | 0 |
| Modified Polygon (Allow modified: No), (Allow shelved: No) | 0 |
| Width Constraint (Min=10mil) (Max=100mil) (Preferred=10mil) (All) | 0 |
| Power Plane Connect Rule(Relief Connect )(Expansion=20mil) (Conductor Width=10mil) (Air Gap=10mil) (Entries=4) | 0 |
| Hole Size Constraint (Min=1mil) (Max=100mil) (All) | 24 |
| Hole To Hole Clearance (Gap=10mil) (All),(All) | 55 |
| Minimum Solder Mask Sliver (Gap=10mil) (All),(All) | 89 |
| Silk To Solder Mask (Clearance=10mil) (IsPad),(All) | 22 |
| Silk to Silk (Clearance=10mil) (All),(All) | 2 |
| Net Antennae (Tolerance=0mil) (All) | 0 |
| Height Constraint (Min=0mil) (Max=1968.504mil) (Prefered=500mil) (All) | 0 |
| Total | 194 |

| Clearance Constraint (Gap=10mil) (All),(All) |
|---|
| Clearance Constraint: (24.922mil < 30mil) Between Pad P5-(253.15mil,1440.945mil) on Multi-Layer And Region (0 hole(s)) Top Layer |
| Clearance Constraint: (20.315mil < 30mil) Between Pad P5-(253.15mil,1775.591mil) on Multi-Layer And Region (0 hole(s)) Top Layer |

| Hole Size Constraint (Min=1mil) (Max=100mil) (All) |
|---|
| Hole Size Constraint: (106.299mil > 100mil) Pad Free-(6486.221mil,2401.575mil) on Multi-Layer Actual Hole Size = 106.299mi |
| Hole Size Constraint: (106.299mil > 100mil) Pad Free-(6486.221mil,78.74mil) on Multi-Layer Actual Hole Size = 106.299mi |
| Hole Size Constraint: (106.299mil > 100mil) Pad Free-(88.583mil,2391.732mil) on Multi-Layer Actual Hole Size = 106.299mi |
| Hole Size Constraint: (106.299mil > 100mil) Pad Free-(88.583mil,88.583mil) on Multi-Layer Actual Hole Size = 106.299mi |
| Hole Size Constraint: (118.11mil > 100mil) Pad U2-(3061.024mil,1893.701mil) on Multi-Layer Actual Hole Size = 118.11mi |
| Hole Size Constraint: (118.11mil > 100mil) Pad U2-(3061.024mil,586.614mil) on Multi-Layer Actual Hole Size = 118.11mi |
| Hole Size Constraint: (116.142mil > 100mil) Pad U2-(3200mil,1790.158mil) on Multi-Layer Actual Hole Size = 116.142mi |
| Hole Size Constraint: (116.142mil > 100mil) Pad U2-(3200mil,690.158mil) on Multi-Layer Actual Hole Size = 116.142mi |
| Hole Size Constraint: (122.047mil > 100mil) Pad U2-(3200mil,690.158mil) on Multi-Layer Actual Hole Size = 122.047mi |
| Hole Size Constraint: (137.795mil > 100mil) Pad U2-(3375.984mil,1822.047mil) on Multi-Layer Actual Hole Size = 137.795mi |
| Hole Size Constraint: (137.795mil > 100mil) Pad U2-(3375.984mil,1822.047mil) on Multi-Layer Actual Hole Size = 137.795mi |
| Hole Size Constraint: (137.795mil > 100mil) Pad U2-(3375.984mil,658.268mil) on Multi-Layer Actual Hole Size = 137.795mi |
| Hole Size Constraint: (137.795mil > 100mil) Pad U2-(3631.89mil,1822.047mil) on Multi-Layer Actual Hole Size = 137.795mi |
| Hole Size Constraint: (116.142mil > 100mil) Pad U2-(3710.63mil,690.158mil) on Multi-Layer Actual Hole Size = 116.142mi |
| Hole Size Constraint: (118.11mil > 100mil) Pad U2-(3769.685mil,1870.079mil) on Multi-Layer Actual Hole Size = 118.11mi |
| Hole Size Constraint: (118.11mil > 100mil) Pad U2-(3927.165mil,610.236mil) on Multi-Layer Actual Hole Size = 118.11mi |
| Hole Size Constraint: (116.142mil > 100mil) Pad U2-(3986.22mil,1790.158mil) on Multi-Layer Actual Hole Size = 116.142mi |
| Hole Size Constraint: (137.795mil > 100mil) Pad U2-(4064.961mil,658.268mil) on Multi-Layer Actual Hole Size = 137.795mi |
| Hole Size Constraint: (137.795mil > 100mil) Pad U2-(4320.866mil,1822.047mil) on Multi-Layer Actual Hole Size = 137.795mi |
| Hole Size Constraint: (137.795mil > 100mil) Pad U2-(4320.866mil,658.268mil) on Multi-Layer Actual Hole Size = 137.795mi |
| Hole Size Constraint: (116.142mil > 100mil) Pad U2-(4496.85mil,1790.158mil) on Multi-Layer Actual Hole Size = 116.142mi |
| Hole Size Constraint: (116.142mil > 100mil) Pad U2-(4496.85mil,690.158mil) on Multi-Layer Actual Hole Size = 116.142mi |
| Hole Size Constraint: (118.11mil > 100mil) Pad U2-(4635.827mil,1893.701mil) on Multi-Layer Actual Hole Size = 118.11mi |
| Hole Size Constraint: (118.11mil > 100mil) Pad U2-(4635.827mil,586.614mil) on Multi-Layer Actual Hole Size = 118.11mi |

| Hole To Hole Clearance (Gap=10mil) (All),(All) |
| --- |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Pad U2-(3200mil,690.158mil) on Multi-Layer And Pad U2-(3200mil,690.158mil) or |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Pad U2-(3375.984mil,1822.047mil) on Multi-Layer And Pad |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4112.5mil,110mil) from Top Layer to Bottom Layer And Via (4112.5mil,110mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4112.5mil,1110mil) from Top Layer to Bottom Layer And Via (4112.5mil,1110mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4112.5mil,1510mil) from Top Layer to Bottom Layer And Via (4112.5mil,1510mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4112.5mil,2110mil) from Top Layer to Bottom Layer And Via (4112.5mil,2110mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4112.5mil,2310mil) from Top Layer to Bottom Layer And Via (4112.5mil,2310mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4112.5mil,310mil) from Top Layer to Bottom Layer And Via (4112.5mil,310mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4112.5mil,910mil) from Top Layer to Bottom Layer And Via (4112.5mil,910mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4312.5mil,110mil) from Top Layer to Bottom Layer And Via (4312.5mil,110mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4312.5mil,1110mil) from Top Layer to Bottom Layer And Via (4312.5mil,1110mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4312.5mil,1510mil) from Top Layer to Bottom Layer And Via (4312.5mil,1510mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4312.5mil,2110mil) from Top Layer to Bottom Layer And Via (4312.5mil,2110mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4312.5mil,2310mil) from Top Layer to Bottom Layer And Via (4312.5mil,2310mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4312.5mil,310mil) from Top Layer to Bottom Layer And Via (4312.5mil,310mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4312.5mil,910mil) from Top Layer to Bottom Layer And Via (4312.5mil,910mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4512.5mil,110mil) from Top Layer to Bottom Layer And Via (4512.5mil,110mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4512.5mil,2110mil) from Top Layer to Bottom Layer And Via (4512.5mil,2110mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4512.5mil,2310mil) from Top Layer to Bottom Layer And Via (4512.5mil,2310mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4512.5mil,310mil) from Top Layer to Bottom Layer And Via (4512.5mil,310mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4712.5mil,110mil) from Top Layer to Bottom Layer And Via (4712.5mil,110mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4712.5mil,2110mil) from Top Layer to Bottom Layer And Via (4712.5mil,2110mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4712.5mil,2310mil) from Top Layer to Bottom Layer And Via (4712.5mil,2310mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4712.5mil,310mil) from Top Layer to Bottom Layer And Via (4712.5mil,310mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4912.5mil,110mil) from Top Layer to Bottom Layer And Via (4912.5mil,110mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4912.5mil,1910mil) from Top Layer to Bottom Layer And Via (4912.5mil,1910mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4912.5mil,2110mil) from Top Layer to Bottom Layer And Via (4912.5mil,2110mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4912.5mil,2310mil) from Top Layer to Bottom Layer And Via (4912.5mil,2310mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (4912.5mil,510mil) from Top Layer to Bottom Layer And Via (4912.5mil,510mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5112.5mil,110mil) from Top Layer to Bottom Layer And Via (5112.5mil,110mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5112.5mil,1910mil) from Top Layer to Bottom Layer And Via (5112.5mil,1910mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5112.5mil,2110mil) from Top Layer to Bottom Layer And Via (5112.5mil,2110mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5112.5mil,2310mil) from Top Layer to Bottom Layer And Via (5112.5mil,2310mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5312.5mil,1710mil) from Top Layer to Bottom Layer And Via (5312.5mil,1710mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5312.5mil,1910mil) from Top Layer to Bottom Layer And Via (5312.5mil,1910mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5312.5mil,2110mil) from Top Layer to Bottom Layer And Via (5312.5mil,2110mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5312.5mil,2310mil) from Top Layer to Bottom Layer And Via (5312.5mil,2310mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5312.5mil,710mil) from Top Layer to Bottom Layer And Via (5312.5mil,710mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5512.5mil,1710mil) from Top Layer to Bottom Layer And Via (5512.5mil,1710mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5512.5mil,1910mil) from Top Layer to Bottom Layer And Via (5512.5mil,1910mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5512.5mil,2110mil) from Top Layer to Bottom Layer And Via (5512.5mil,2110mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5512.5mil,2310mil) from Top Layer to Bottom Layer And Via (5512.5mil,2310mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5512.5mil,710mil) from Top Layer to Bottom Layer And Via (5512.5mil,710mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5712.5mil,1710mil) from Top Layer to Bottom Layer And Via (5712.5mil,1710mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5712.5mil,1910mil) from Top Layer to Bottom Layer And Via (5712.5mil,1910mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5712.5mil,2110mil) from Top Layer to Bottom Layer And Via (5712.5mil,2110mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5712.5mil,2310mil) from Top Layer to Bottom Layer And Via (5712.5mil,2310mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5712.5mil,510mil) from Top Layer to Bottom Layer And Via (5712.5mil,510mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5712.5mil,710mil) from Top Layer to Bottom Layer And Via (5712.5mil,710mil) from |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5912.5mil,1510mil) from Top Layer to Bottom Layer And Via (5912.5mil,1510mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5912.5mil,1710mil) from Top Layer to Bottom Layer And Via (5912.5mil,1710mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5912.5mil,1910mil) from Top Layer to Bottom Layer And Via (5912.5mil,1910mil) |

| Hole To Hole Clearance (Gap=10mil) (All),(All) |
| --- |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5912.5mil,2110mil) from Top Layer to Bottom Layer And Via (5912.5mil,2110mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (5912.5mil,2310mil) from Top Layer to Bottom Layer And Via (5912.5mil,2310mil) |
| Hole To Hole Clearance Constraint: (Collision < 10mil) Between Via (6112.5mil,1510mil) from Top Layer to Bottom Layer And Via (6112.5mil,1510mil) |

| Minimum Solder Mask Sliver (Gap=10mil) (All),(All) |
| --- |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6061.417mil,233.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6061.417mil,233.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6061.417mil,333.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6061.417mil,333.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6061.417mil,433.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6061.417mil,433.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6061.417mil,533.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6061.417mil,533.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6061.417mil,633.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6161.417mil,233.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6161.417mil,233.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6161.417mil,333.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6161.417mil,333.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6161.417mil,433.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6161.417mil,433.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6161.417mil,533.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6161.417mil,533.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6161.417mil,633.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6261.417mil,233.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6261.417mil,233.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6261.417mil,333.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6261.417mil,333.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6261.417mil,433.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6261.417mil,433.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6261.417mil,533.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6261.417mil,533.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6261.417mil,633.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6361.417mil,233.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6361.417mil,233.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6361.417mil,333.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6361.417mil,333.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6361.417mil,433.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6361.417mil,433.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6361.417mil,533.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6361.417mil,533.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6361.417mil,633.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6461.417mil,233.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6461.417mil,333.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6461.417mil,433.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J1-1(6461.417mil,533.071mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6069.685mil,1837.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6069.685mil,1837.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6069.685mil,1937.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6069.685mil,1937.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6069.685mil,2037.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6069.685mil,2037.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6069.685mil,2137.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6069.685mil,2137.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6069.685mil,2237.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6169.685mil,1837.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6169.685mil,1837.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6169.685mil,1937.402mil) on Multi-Layer And Pac |

| Minimum Solder Mask Sliver (Gap=10mil) (All),(All) |
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| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6169.685mil,1937.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6169.685mil,2037.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6169.685mil,2037.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6169.685mil,2137.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6169.685mil,2137.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6169.685mil,2237.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6269.685mil,1837.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6269.685mil,1837.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6269.685mil,1937.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6269.685mil,1937.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6269.685mil,2037.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6269.685mil,2037.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6269.685mil,2137.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6269.685mil,2137.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6269.685mil,2237.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6369.685mil,1837.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6369.685mil,1837.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6369.685mil,1937.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6369.685mil,1937.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6369.685mil,2037.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6369.685mil,2037.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6369.685mil,2137.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6369.685mil,2137.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6369.685mil,2237.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6469.685mil,1837.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6469.685mil,1937.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6469.685mil,2037.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (5.386mil < 10mil) Between Pad J2-1(6469.685mil,2137.402mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (6.45mil < 10mil) Between Pad U2-(3061.024mil,1893.701mil) on Multi-Layer And Pad U2-(3200mil,1790.158mil) |
| Minimum Solder Mask Sliver Constraint: (6.45mil < 10mil) Between Pad U2-(3061.024mil,586.614mil) on Multi-Layer And Pad U2-(3200mil,690.158mil) or |
| Minimum Solder Mask Sliver Constraint: (3.724mil < 10mil) Between Pad U2-(3200mil,1790.158mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (3.724mil < 10mil) Between Pad U2-(3200mil,1790.158mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (3.724mil < 10mil) Between Pad U2-(3200mil,690.158mil) on Multi-Layer And Pad U2-(3375.984mil,658.268mil) |
| Minimum Solder Mask Sliver Constraint: (3.724mil < 10mil) Between Pad U2-(4320.866mil,1822.047mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (3.724mil < 10mil) Between Pad U2-(4320.866mil,658.268mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (6.45mil < 10mil) Between Pad U2-(4496.85mil,1790.158mil) on Multi-Layer And Pac |
| Minimum Solder Mask Sliver Constraint: (6.45mil < 10mil) Between Pad U2-(4496.85mil,690.158mil) on Multi-Layer And Pad U2-(4635.827mil,586.614mil) |

| Silk To Solder Mask (Clearance=10mil) (IsPad),(All) |
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| Silk To Solder Mask Clearance Constraint: (7.874mil < 10mil) Between Pad C13-1(6299.213mil,1360.236mil) on Top Layer And Track |
| Silk To Solder Mask Clearance Constraint: (7.874mil < 10mil) Between Pad C13-1(6299.213mil,1360.236mil) on Top Layer And Track |
| Silk To Solder Mask Clearance Constraint: (7.874mil < 10mil) Between Pad C13-2(6299.213mil,1592.52mil) on Top Layer And Track |
| Silk To Solder Mask Clearance Constraint: (7.874mil < 10mil) Between Pad C13-2(6299.213mil,1592.52mil) on Top Layer And Track |
| Silk To Solder Mask Clearance Constraint: (7.604mil < 10mil) Between Pad C21-1(2736.22mil,288.386mil) on Top Layer And Text "C21' |
| Silk To Solder Mask Clearance Constraint: (8.213mil < 10mil) Between Pad LED3-2(2342.52mil,236.22mil) on Top Layer And Track |
| Silk To Solder Mask Clearance Constraint: (Collision < 10mil) Between Pad P1-1(2464.567mil,1212.598mil) on Top Layer And Track |
| Silk To Solder Mask Clearance Constraint: (Collision < 10mil) Between Pad P1-1(2464.567mil,1212.598mil) on Top Layer And Track |
| Silk To Solder Mask Clearance Constraint: (Collision < 10mil) Between Pad P1-1(2464.567mil,1212.598mil) on Top Layer And Track |
| Silk To Solder Mask Clearance Constraint: (Collision < 10mil) Between Pad P1-1(2464.567mil,1212.598mil) on Top Layer And Track |
| Silk To Solder Mask Clearance Constraint: (6.811mil < 10mil) Between Pad RT2-1(5846.457mil,147.638mil) on Multi-Layer And Track |
| Silk To Solder Mask Clearance Constraint: (6.811mil < 10mil) Between Pad RT2-1(5846.457mil,147.638mil) on Multi-Layer And Track |
| Silk To Solder Mask Clearance Constraint: (6.811mil < 10mil) Between Pad RT2-1(5846.457mil,147.638mil) on Multi-Layer And Track |
| Silk To Solder Mask Clearance Constraint: (9.941mil < 10mil) Between Pad RT2-2(5846.457mil,246.063mil) on Multi-Layer And Track |
| Silk To Solder Mask Clearance Constraint: (9.359mil < 10mil) Between Pad RT2-2(5846.457mil,246.063mil) on Multi-Layer And Track |
| Silk To Solder Mask Clearance Constraint: (9.941mil < 10mil) Between Pad RT2-2(5846.457mil,246.063mil) on Multi-Layer And Track |
| Silk To Solder Mask Clearance Constraint: (9.655mil < 10mil) Between Pad U2-(3200mil,1790.158mil) on Multi-Layer And Track |
| Silk To Solder Mask Clearance Constraint: (8.646mil < 10mil) Between Pad U2-(3200mil,690.158mil) on Multi-Layer And Track |
| Silk To Solder Mask Clearance Constraint: (8.646mil < 10mil) Between Pad U2-(3710.63mil,690.158mil) on Multi-Layer And Track |
| Silk To Solder Mask Clearance Constraint: (9.655mil < 10mil) Between Pad U2-(3986.22mil,1790.158mil) on Multi-Layer And Track |
| Silk To Solder Mask Clearance Constraint: (9.655mil < 10mil) Between Pad U2-(4496.85mil,1790.158mil) on Multi-Layer And Track |
| Silk To Solder Mask Clearance Constraint: (8.646mil < 10mil) Between Pad U2-(4496.85mil,690.158mil) on Multi-Layer And Track |

| Silk to Silk (Clearance=10mil) (All),(All) |
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| Silk To Silk Clearance Constraint: (6.385mil < 10mil) Between Arc (1791.339mil,659.449mil) on Top Overlay And Text "+" (1899.606mil,9.842mil) on Top |
| Silk To Silk Clearance Constraint: (9.685mil < 10mil) Between Text "R12" (2844.488mil,334.646mil) on Top Overlay And Track |