

## Engineering Development Model

# Frequency Synthesizer

# KSN-EDR108021SA

### Important Note

This model has been designed, built and tested in our engineering department. Performance data represents model capability. At present it is a non-catalog model. On request, we can supply a final specification sheet, part number and price/delivery information.



Please click "Back", and then click "Contact Us" for Applications support.

CASE STYLE : DK1042

| ELECTRICAL SPECIFICATIONS 50Ω, over -15°C to +75°C |              |         |      |        |
|----------------------------------------------------|--------------|---------|------|--------|
| Parameter                                          | Min.         | Typ.    | Max. | Units  |
| Frequency                                          | 850          |         | 850  | MHz    |
| Step size                                          |              | 10000   |      | kHz    |
| Settling Time                                      | Within ±1kHz | 200     |      | μsec   |
| Output Power                                       | -1           | +3      | +6   | dBm    |
| Phase Noise                                        |              |         |      |        |
| at 100 Hz offset                                   |              | -99     |      | dBc/Hz |
| at 1 kHz offset                                    |              | -111    | -105 | dBc/Hz |
| at 10 KHz offset                                   |              | -110    | -105 | dBc/Hz |
| at 100 KHz offset                                  |              | -125    | -119 | dBc/Hz |
| at 1000 kHz offset                                 |              | -156    | -150 | dBc/Hz |
| Integrated SSB Phase Noise                         |              | -62     |      | dBc    |
| Ref & Comp Spurious Suppression                    |              | -87     |      | dBc    |
| Non-Harm. Spurious Suppression                     |              | -90     |      | dBc    |
| Harmonic Suppression                               |              | -38     | -31  | dBc    |
| Supply voltage                                     | VCO          | 5       |      | V      |
|                                                    | PLL          | 3       |      | V      |
| Supply current                                     | VCO          | 42      | 50   | V      |
|                                                    | PLL          | 9       | 17   | V      |
| Reference In (External)                            | Frequency    | 10      |      | MHz    |
|                                                    | Amplitude    | 1       |      | Vp-p   |
|                                                    | Impedance    | 100     |      | kΩ     |
|                                                    | Ph. N @ 1kHz | -145    |      | dBc/Hz |
| Input Logic                                        | Logic high   | 1.4     | 3    | V      |
| Levels                                             | Logic Low    |         | 0.6  | V      |
| Digital Lock                                       | Locked       | 2.6     | 3    | V      |
| Detect                                             | Unlocked     |         | 0.4  | V      |
| Frequency Synthesizer PLL                          |              | ADF4106 |      |        |

| ABSOLUTE MAXIMUM RATINGS    |                |
|-----------------------------|----------------|
| Operating Temperature       | -40°C to 85°C  |
| Storage Temperature         | -55°C to 100°C |
| VCO Supply Voltage          | 6V             |
| PLL Supply Voltage          | 4V             |
| Reference Frequency voltage | 3.6Vp-p        |
| Data, Clock & LE levels     | 3.3V           |

Power On sequence: Vcc VCO followed by Vcc PLL  
Power Off sequence: Vcc PLL followed by Vcc VCO

| PIN CONNECTIONS |   |              |               |
|-----------------|---|--------------|---------------|
| RF OUT          | 3 | CLOCK        | 10            |
| VCC VCO         | 5 | DATA         | 11            |
| VCC PLL         | 1 | LATCH ENABLE | 12            |
| REF IN          | 7 | GROUND       | 2,4,6,8,13,14 |
| LOCK DETECT     | 9 |              |               |

### Notes

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Frequency Synthesizer

KSN-EDR108021SA

Typical Performance Data

| FREQ.<br>(MHz) | POWER OUTPUT<br>(dBm) |        |        | HARMONICS |        |        |        |        |        | VCO CURRENT<br>(mA) |        |        | PLL CURRENT<br>(mA) |        |       |
|----------------|-----------------------|--------|--------|-----------|--------|--------|--------|--------|--------|---------------------|--------|--------|---------------------|--------|-------|
|                |                       |        |        | (dBc)     |        |        |        |        |        |                     |        |        |                     |        |       |
|                | F2                    |        |        | F3        |        |        |        |        |        |                     |        |        |                     |        |       |
| -15 °C         | +25°C                 | +75 °C | -15 °C | +25°C     | +75 °C | -15 °C | +25°C  | +75 °C | -15 °C | +25°C               | +75 °C | -15 °C | +25°C               | +75 °C |       |
| 830            | 3.02                  | 3.00   | 3.04   | -33.10    | -34.66 | -37.21 | -48.67 | -48.52 | -49.22 | 41.21               | 42.51  | 43.65  | 8.21                | 9.01   | 10.14 |
| 840            | 2.94                  | 2.93   | 2.95   | -34.31    | -35.85 | -38.49 | -46.72 | -47.26 | -48.43 | 41.06               | 42.40  | 43.58  | 8.24                | 8.94   | 10.21 |
| 850            | 2.85                  | 2.84   | 2.86   | -36.74    | -38.41 | -41.39 | -46.10 | -46.94 | -48.09 | 40.90               | 42.26  | 43.48  | 8.27                | 9.01   | 10.28 |
| 860            | 2.75                  | 2.74   | 2.75   | -40.77    | -43.03 | -47.20 | -46.78 | -47.21 | -48.68 | 40.73               | 42.13  | 43.37  | 8.30                | 9.05   | 10.33 |
| 870            | 2.62                  | 2.58   | 2.60   | -45.59    | -49.68 | -55.66 | -46.42 | -47.32 | -48.43 | 40.58               | 42.00  | 43.26  | 8.33                | 9.08   | 10.39 |

| FREQ.<br>(MHz) | PHASE NOISE (dBc/Hz) |        |         |         |         |         |         |         |         |         |         |         |         |         |         |
|----------------|----------------------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|                | @ OFFSETS            |        |         |         |         |         |         |         |         |         |         |         |         |         |         |
|                | -15°C                |        |         |         |         | +25°C   |         |         |         |         | +75°C   |         |         |         |         |
|                | 100Hz                | 1kHz   | 10kHz   | 100kHz  | 1MHz    | 100Hz   | 1kHz    | 10kHz   | 100kHz  | 1MHz    | 100Hz   | 1kHz    | 10kHz   | 100kHz  | 1MHz    |
| 830            | -102.85              | -78.51 | -108.95 | -125.92 | -153.93 | -96.73  | -109.17 | -109.24 | -126.01 | -156.04 | -97.23  | -109.47 | -109.01 | -125.28 | -155.50 |
| 840            | -102.15              | -79.57 | -109.86 | -124.85 | -154.73 | -100.00 | -110.27 | -110.13 | -125.11 | -156.06 | -99.03  | -108.34 | -109.50 | -124.68 | -155.77 |
| 850            | -99.77               | -81.48 | -110.75 | -123.54 | -154.57 | -101.84 | -110.18 | -109.77 | -125.01 | -156.01 | -100.25 | -107.02 | -108.39 | -125.50 | -155.34 |
| 860            | -99.01               | -81.41 | -109.81 | -124.61 | -154.61 | -100.55 | -108.87 | -108.20 | -126.58 | -155.55 | -96.75  | -105.90 | -106.16 | -126.95 | -154.96 |
| 870            | -100.57              | -80.39 | -108.41 | -126.62 | -154.14 | -93.65  | -107.58 | -105.15 | -128.14 | -155.08 | -97.71  | -106.90 | -103.71 | -127.65 | -154.13 |

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## Typical Performance Data

| COMPARISON &<br>REFERENCE<br>SPURIOUS ORDER<br><br>n | COMPARISON & REFERENCE<br>SPURIOUS<br>@Fcarrier 830 MHz±<br>(n*Fcomparison)<br>(dBc) NOTE 1 |        |         | COMPARISON & REFERENCE<br>SPURIOUS<br>@Fcarrier 855 MHz±<br>(n*Fcomparison)<br>(dBc) NOTE 1 |        |        | COMPARISON & REFERENCE<br>SPURIOUS<br>@Fcarrier 870 MHz±<br>(n*Fcomparison)<br>(dBc) NOTE 1 |        |        |
|------------------------------------------------------|---------------------------------------------------------------------------------------------|--------|---------|---------------------------------------------------------------------------------------------|--------|--------|---------------------------------------------------------------------------------------------|--------|--------|
|                                                      | -15°C                                                                                       | +25°C  | +75°C   | -15°C                                                                                       | +25°C  | +75°C  | -15°C                                                                                       | +25°C  | +75°C  |
| -5                                                   | -95.71                                                                                      | -87.37 | -87.86  | -94.49                                                                                      | -88.35 | -86.17 | -99.21                                                                                      | -88.15 | -87.88 |
| -4                                                   | -98.34                                                                                      | -88.16 | -91.40  | -92.88                                                                                      | -87.92 | -87.24 | -95.88                                                                                      | -91.24 | -90.22 |
| -3                                                   | -99.05                                                                                      | -87.36 | -94.10  | -93.50                                                                                      | -87.83 | -88.48 | -96.14                                                                                      | -92.60 | -92.91 |
| -2                                                   | -94.36                                                                                      | -87.05 | -95.80  | -90.35                                                                                      | -87.78 | -89.73 | -93.86                                                                                      | -97.94 | -95.02 |
| -1                                                   | -88.63                                                                                      | -85.89 | -108.57 | -89.14                                                                                      | -89.94 | -95.16 | -102.04                                                                                     | -92.68 | -94.45 |
| 0 <sup>note 2</sup>                                  | -                                                                                           | -      | -       | -                                                                                           | -      | -      | -                                                                                           | -      | -      |
| +1                                                   | -86.88                                                                                      | -86.58 | -85.76  | -84.44                                                                                      | -83.54 | -85.90 | -94.81                                                                                      | -80.13 | -88.78 |
| +2                                                   | -85.51                                                                                      | -85.32 | -88.68  | -83.89                                                                                      | -82.55 | -85.64 | -90.42                                                                                      | -82.96 | -87.96 |
| +3                                                   | -85.41                                                                                      | -83.53 | -87.54  | -85.36                                                                                      | -82.52 | -85.34 | -86.93                                                                                      | -82.68 | -87.85 |
| +4                                                   | -84.10                                                                                      | -82.47 | -85.07  | -83.27                                                                                      | -81.03 | -84.01 | -85.43                                                                                      | -82.86 | -87.77 |
| +5                                                   | -86.25                                                                                      | -83.15 | -84.48  | -84.73                                                                                      | -81.50 | -84.46 | -85.74                                                                                      | -82.94 | -88.02 |

Note 1: Comparison & Reference frequency 10 MHz

Note 2: All spurs are referenced to carrier signal (n=0).

### Notes

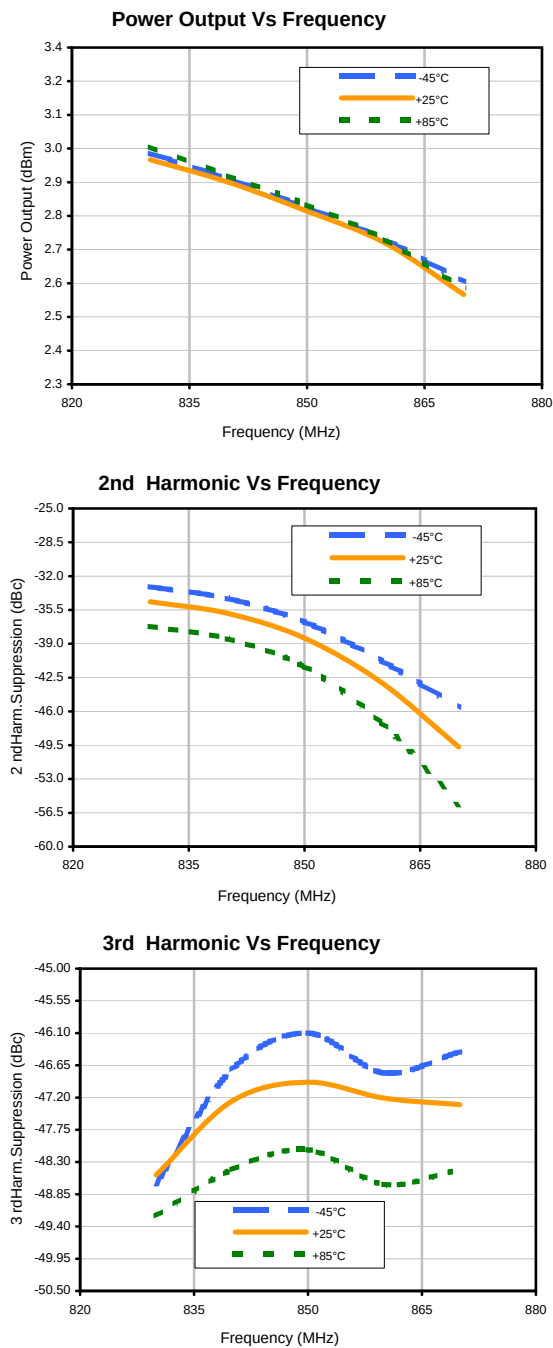
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Typical Performance Data



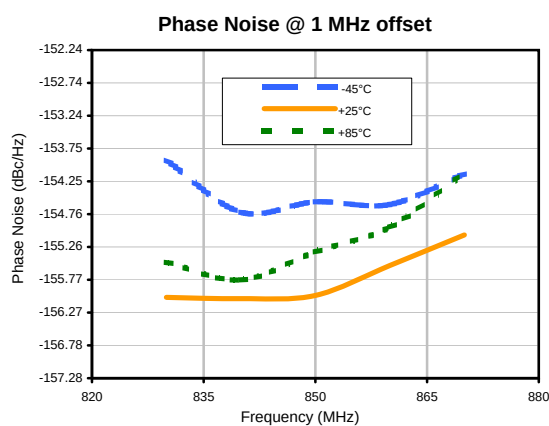
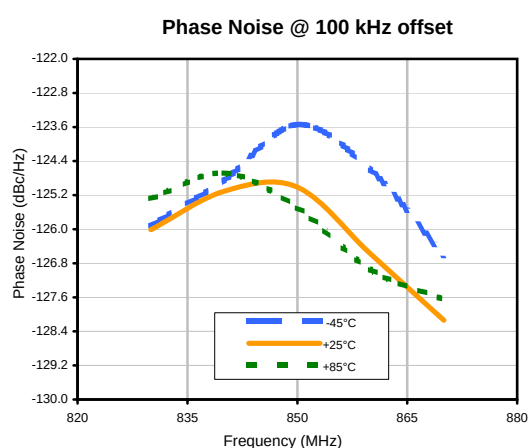
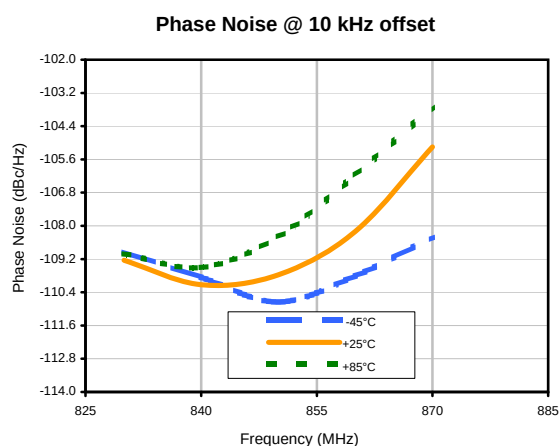
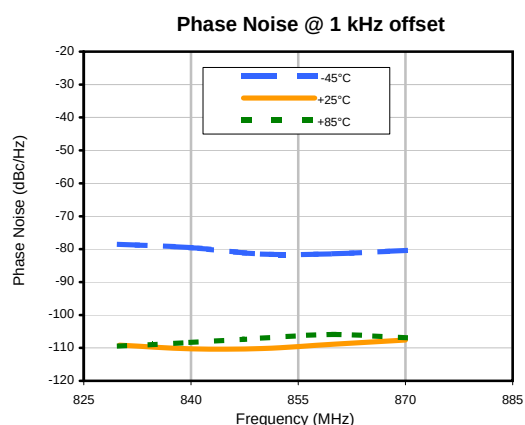
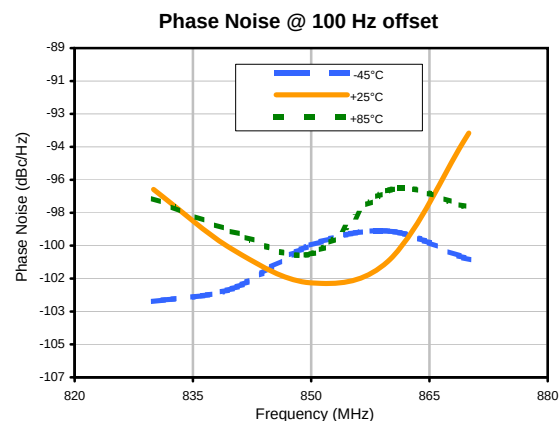
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### Notes

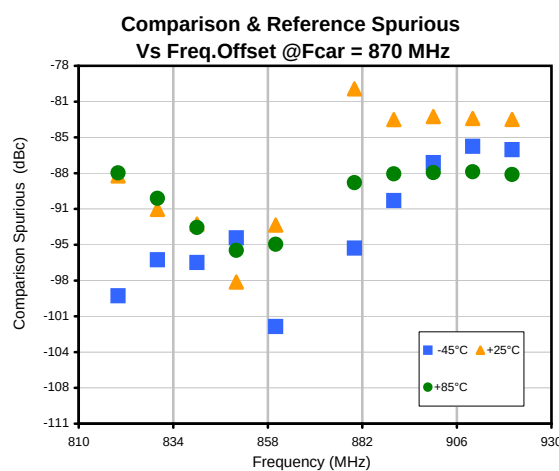
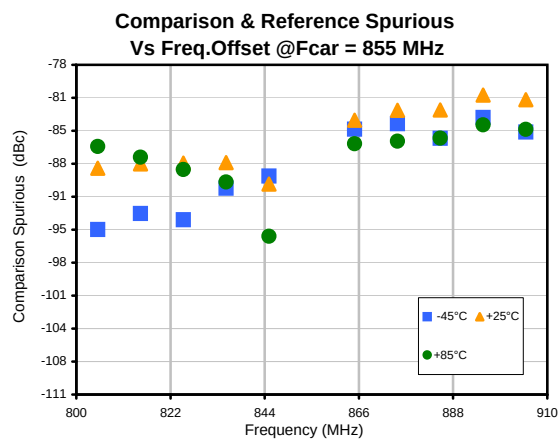
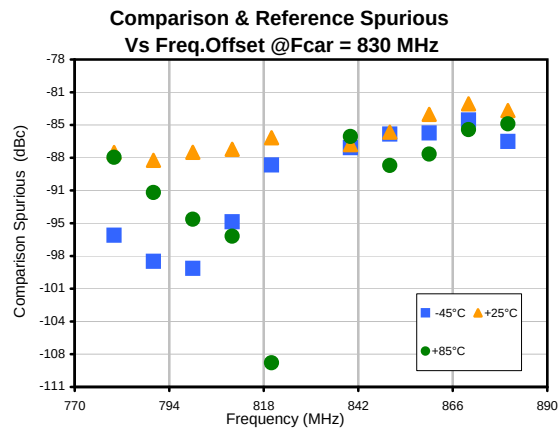
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# Frequency Synthesizer

## Typical Performance Data

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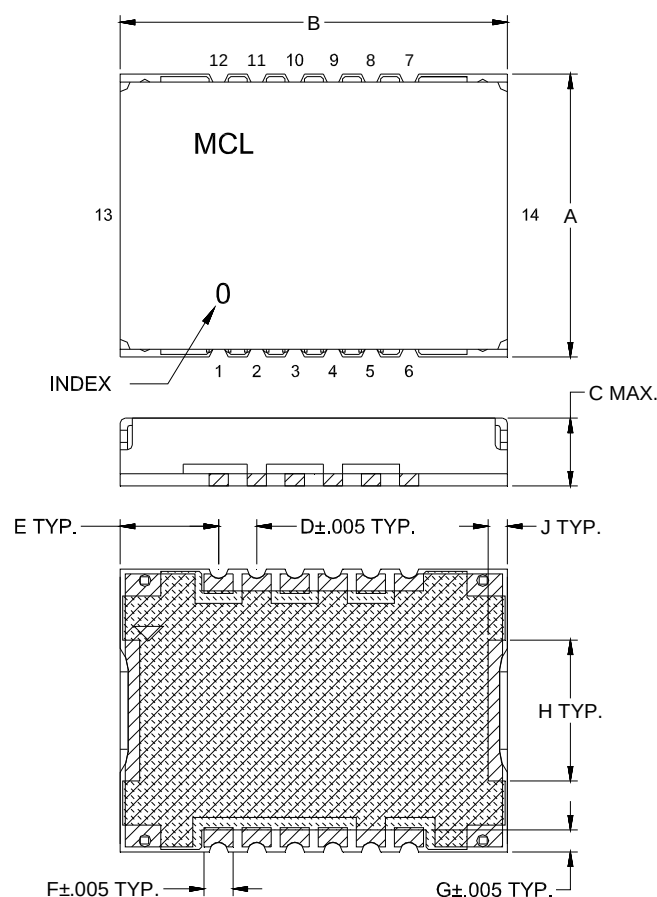


### Notes

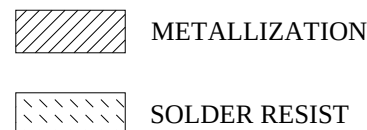
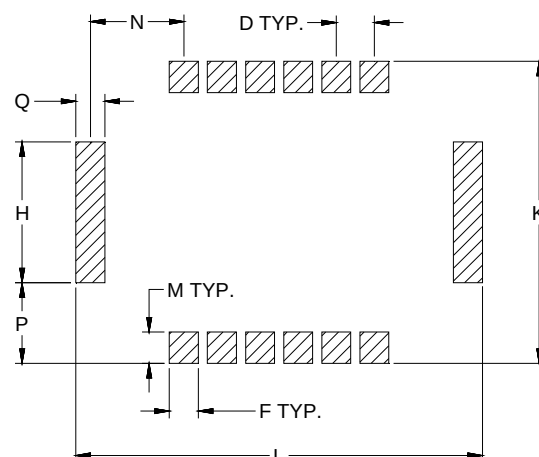
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### Outline Dimensions



### Suggested PCB Land Pattern



| CASE#  | A               | B               | C              | D              | E              | F              | G              | H              | J             | K               | L               | M              | N              | P              | Q              | WT. GRAM |
|--------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------|
| DK1042 | .584<br>(14.83) | .800<br>(20.32) | .154<br>(3.91) | .079<br>(2.01) | .203<br>(5.16) | .060<br>(1.52) | .045<br>(1.14) | .291<br>(7.39) | .039<br>(1.0) | .624<br>(15.85) | .840<br>(21.34) | .065<br>(1.65) | .193<br>(4.90) | .170<br>(4.32) | .060<br>(1.52) | 1.6      |

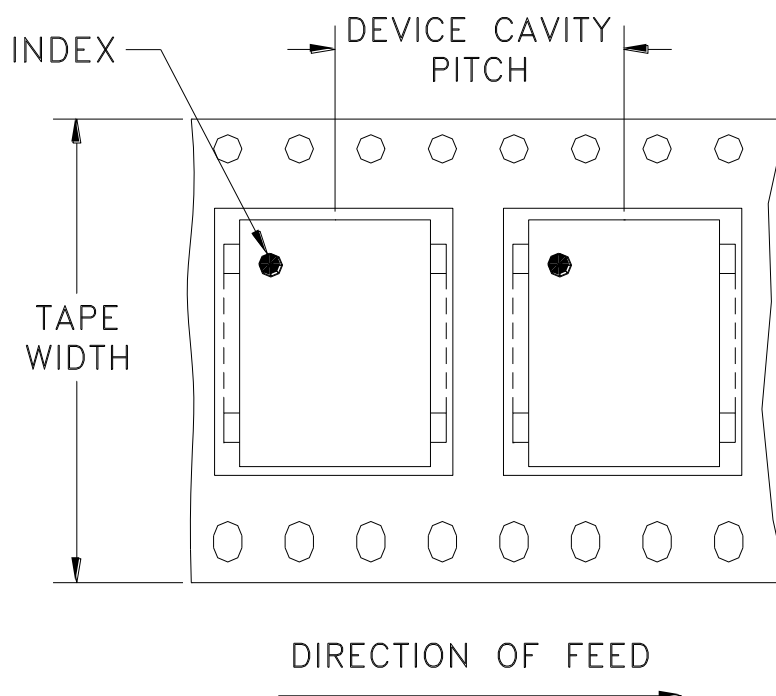
Dimensions are in inches (mm). Tolerances: 2PL. +/- .03; 3PL. +/- .015

### Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:  
For RoHS Case Styles: 2-5  $\mu$  inch (.05-.13 microns) Gold over 120-240  $\mu$  inch (3.05-6.10 microns) Nickel plate.  
All models, (+) suffix.

# Tape & Reel Packaging TR-F28

## DEVICE ORIENTATION IN T&R



| Tape Width,<br>mm | Device Cavity<br>Pitch, mm | Reel Size,<br>inches | Devices per Reel                    |     |
|-------------------|----------------------------|----------------------|-------------------------------------|-----|
| 32                | 20                         | 13                   | Small quantity standards (see note) | 20  |
|                   |                            |                      |                                     | 50  |
|                   |                            |                      |                                     | 100 |
|                   |                            |                      |                                     | 200 |
|                   |                            |                      | Standard                            | 500 |

Note: Please consult individual model data sheet to determine device per reel availability.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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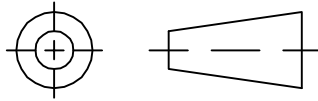
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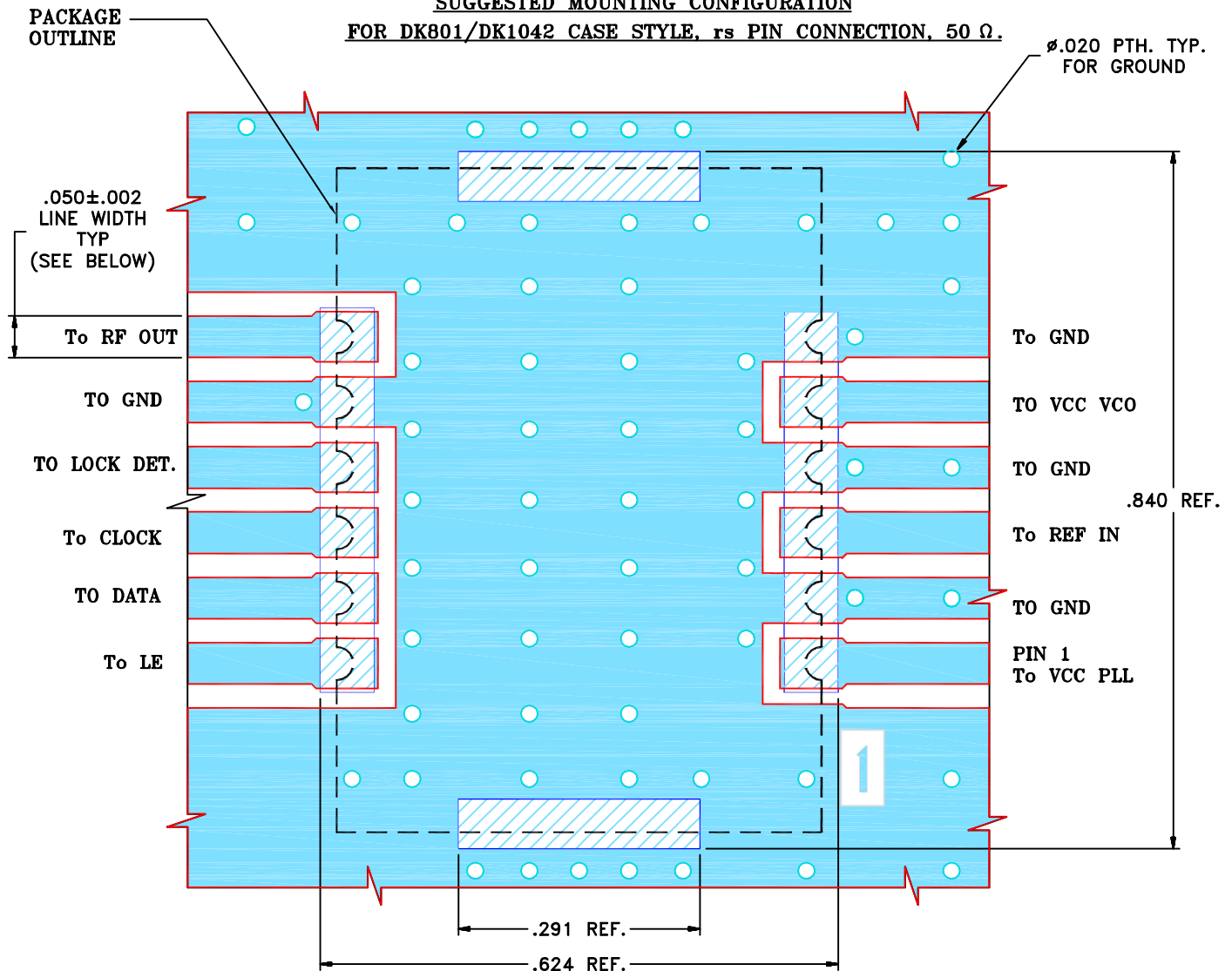
## THIRD ANGLE PROJECTION



## REVISIONS

| REV | ECN No. | DESCRIPTION                         | DATE  | DR | AUTH |
|-----|---------|-------------------------------------|-------|----|------|
| OR  | M108069 | NEW RELEASE                         | 11/06 | DK | HH   |
| A   | M110535 | MODIFY GROUND PADS                  | 03/07 | DK | HH   |
| B   | M126537 | DELETE CHIP COMP. & TABLE OF VALUES | 03/10 | DK | HH   |
| B   | R78979  | DELETE CHIP COMP. & TABLE OF VALUES | 03/10 | DK | HH   |

## SUGGESTED MOUNTING CONFIGURATION

FOR DK801/DK1042 CASE STYLE, rs PIN CONNECTION, 50  $\Omega$ . $\phi$ .020 PTH. TYP.  
FOR GROUND

## NOTES:

- TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS. .025"±.002". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

 DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

 DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

UNLESS OTHERWISE SPECIFIED

INITIALS

DATE

DIMENSIONS ARE IN INCHES

TOLERANCES ON:

2 PL DECIMALS ±

3 PL DECIMALS ± .005

ANGLES ±

FRACTIONS ±

DRAWN

DK (RAVON)

27 MAR 07

CHECKED

RZ (RAVON)

27 MAR 07

APPROVED

HH (RAVON)

27 MAR 07

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ASHEETA1.DWG REV:A DATE:01/12/95



Mini-Circuits®

13 Neptune Avenue  
Brooklyn NY 11235PL, rs ,DK801/DK1042, KSN  
TB-567+ (50  $\Omega$ )SIZE  
ACODE IDENT  
15542DRAWING NO:  
98-PL-249REV:  
B

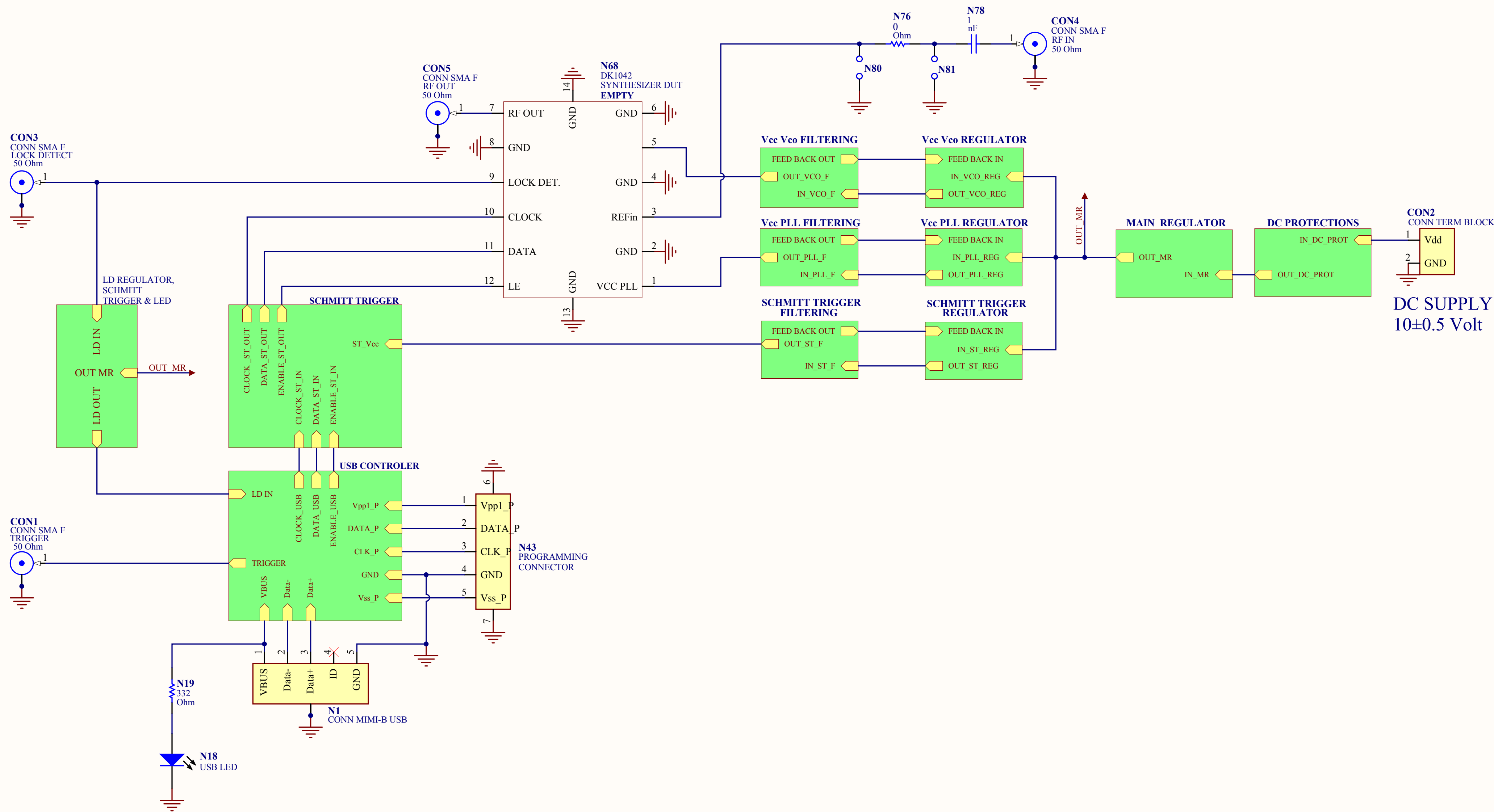
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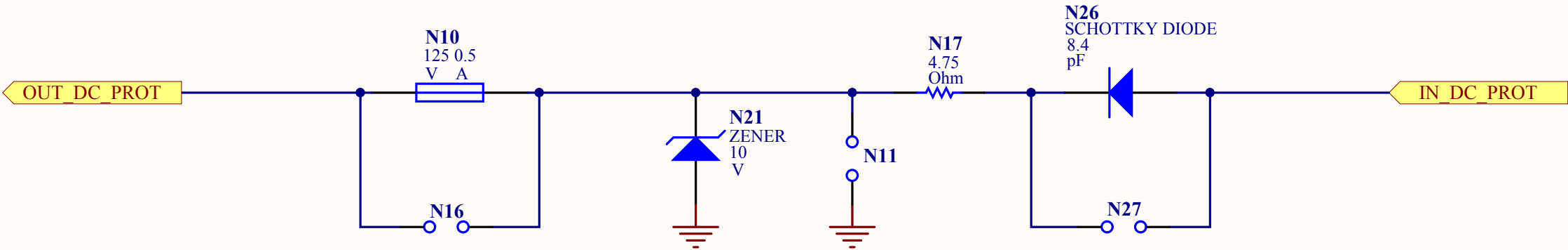
SHEET: 1 OF 1

# ELECTRICAL SCHEME-GENERAL

## (TB for KSN)

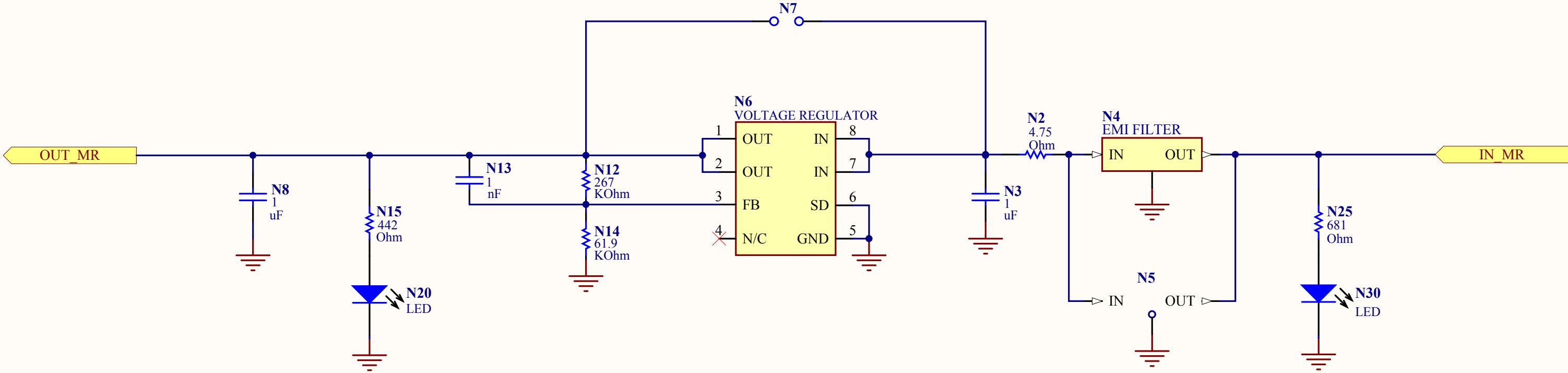


DC PROTECTIONS

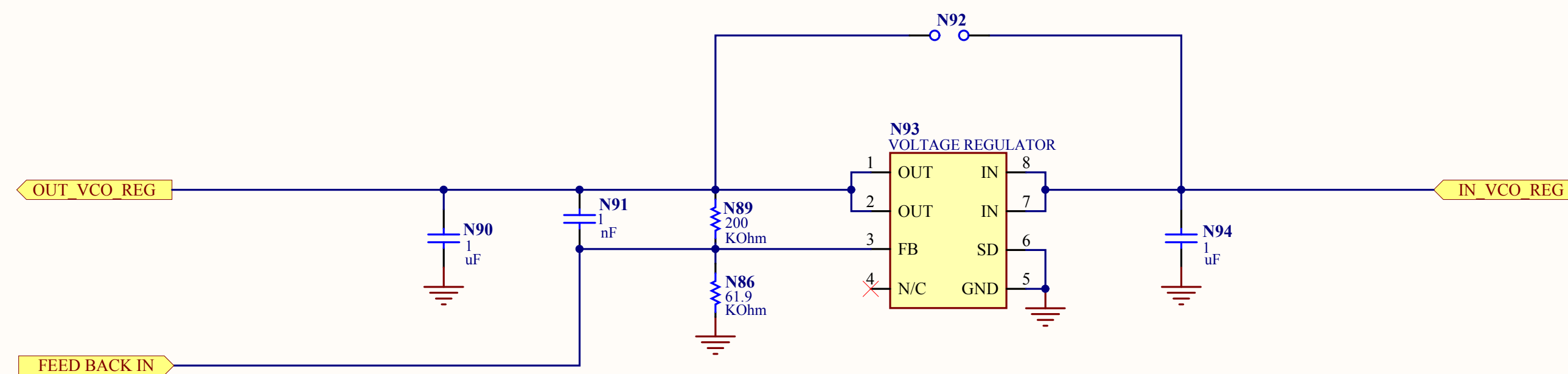




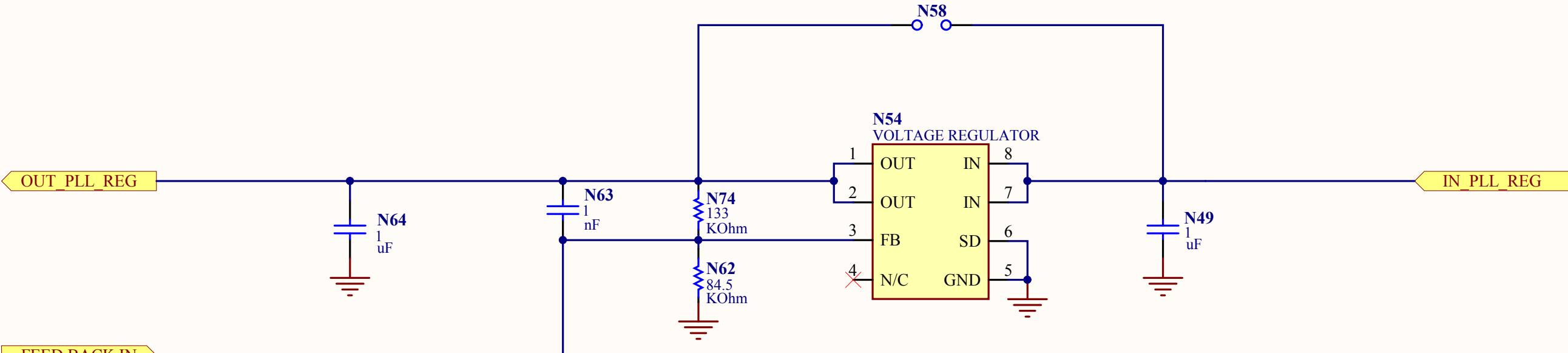
MAIN REGULATOR



## VCC VCO REGULATOR

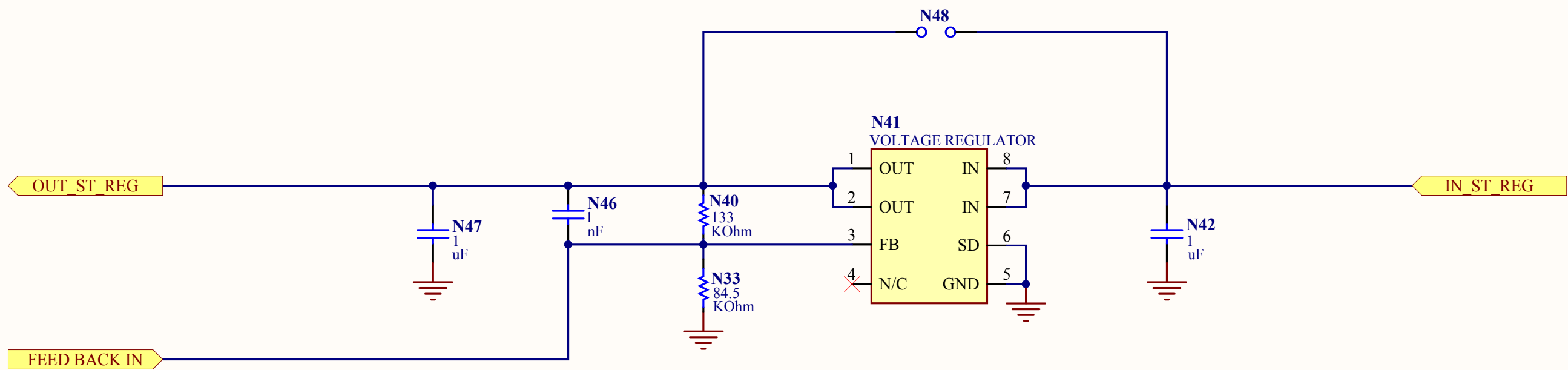


## VCC PLL REGULATOR

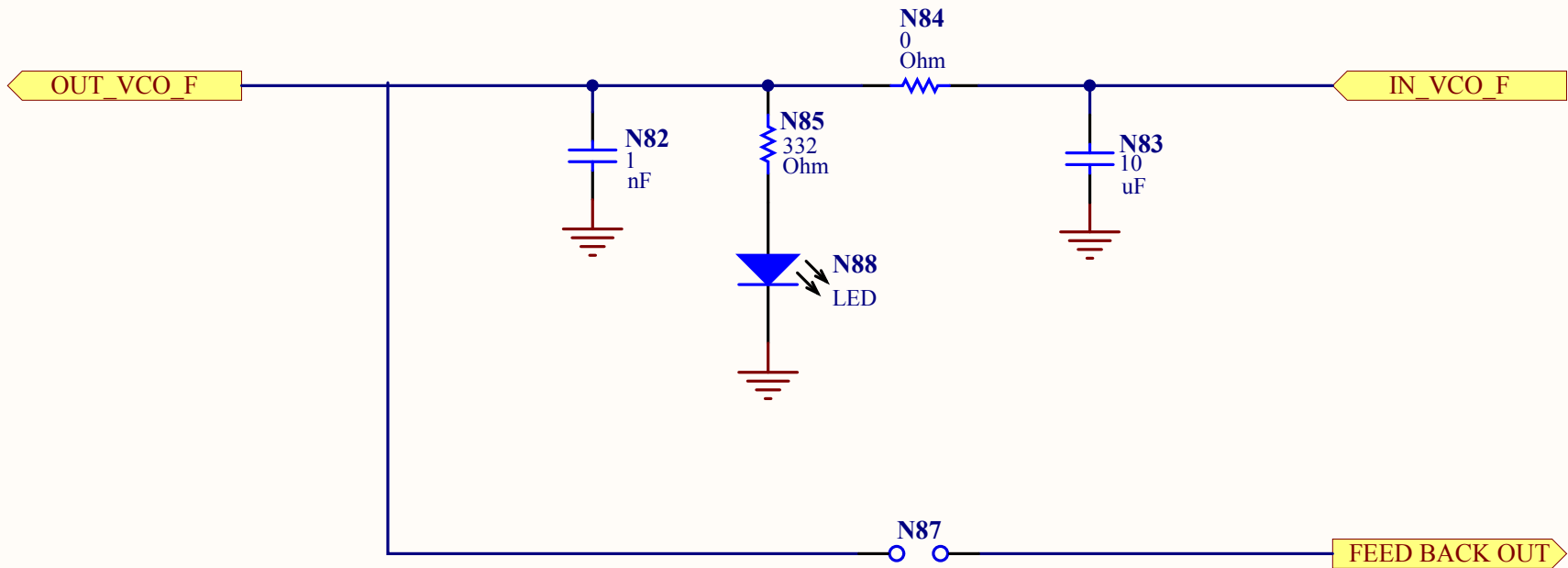




SCHMITT TRIGGER REGULATOR

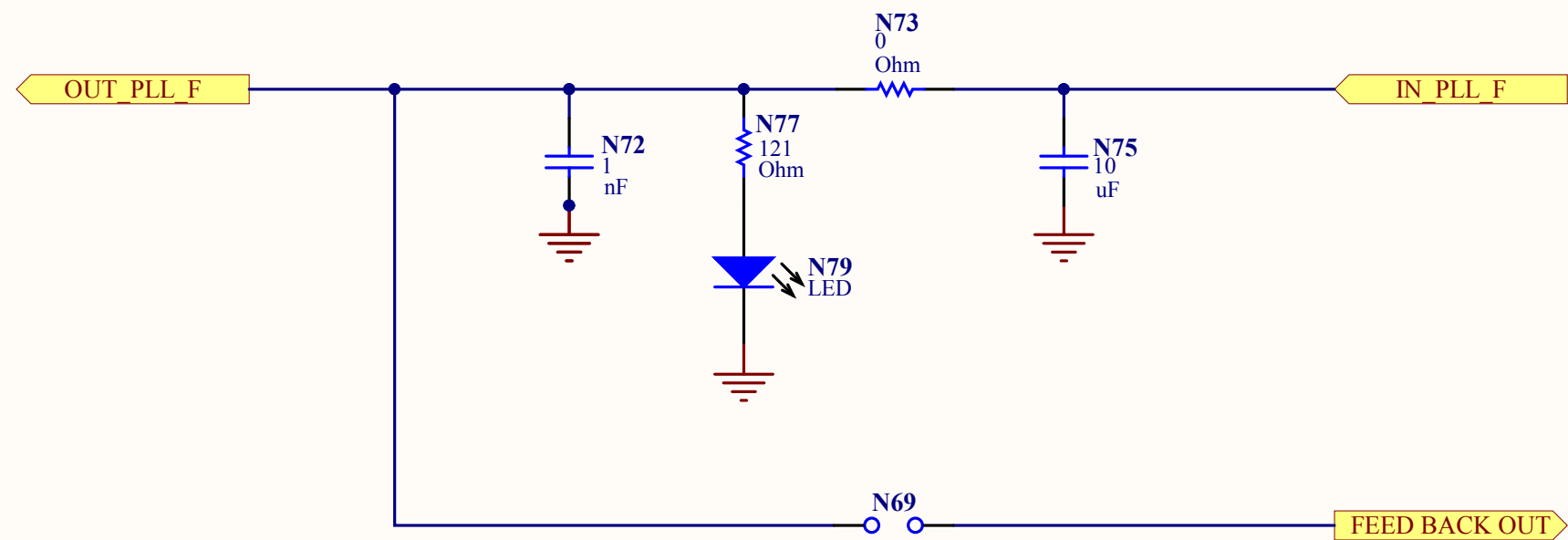


VCC VCO FILTERING

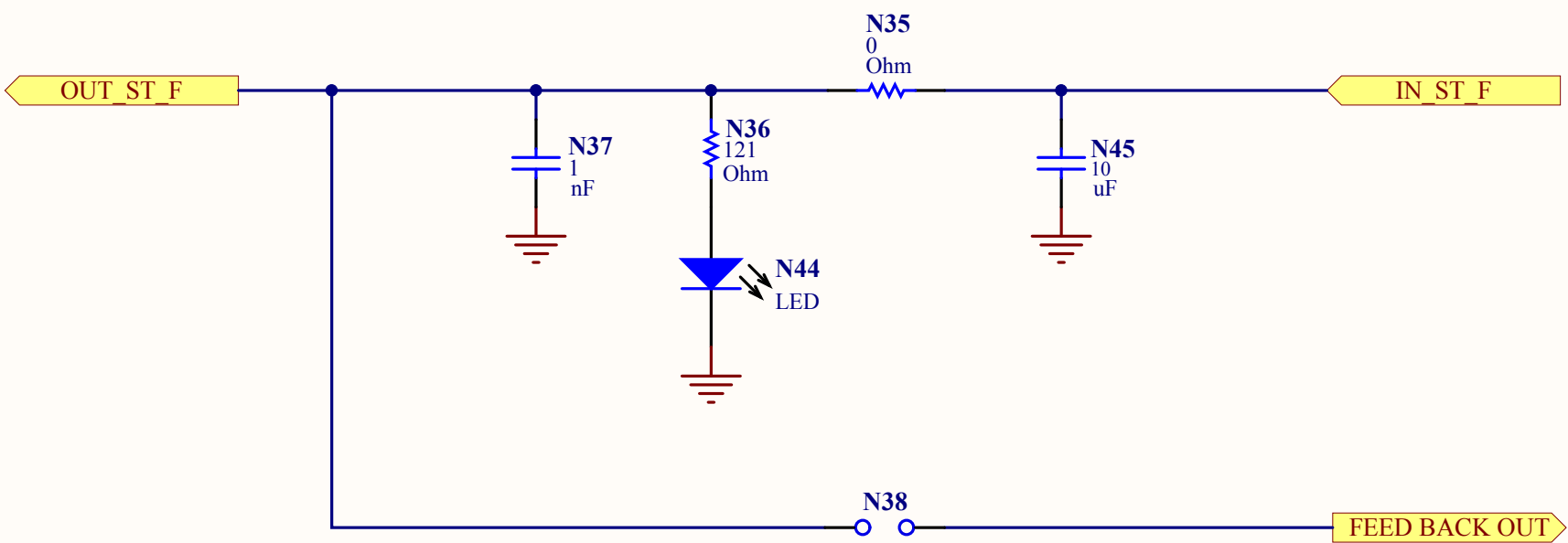




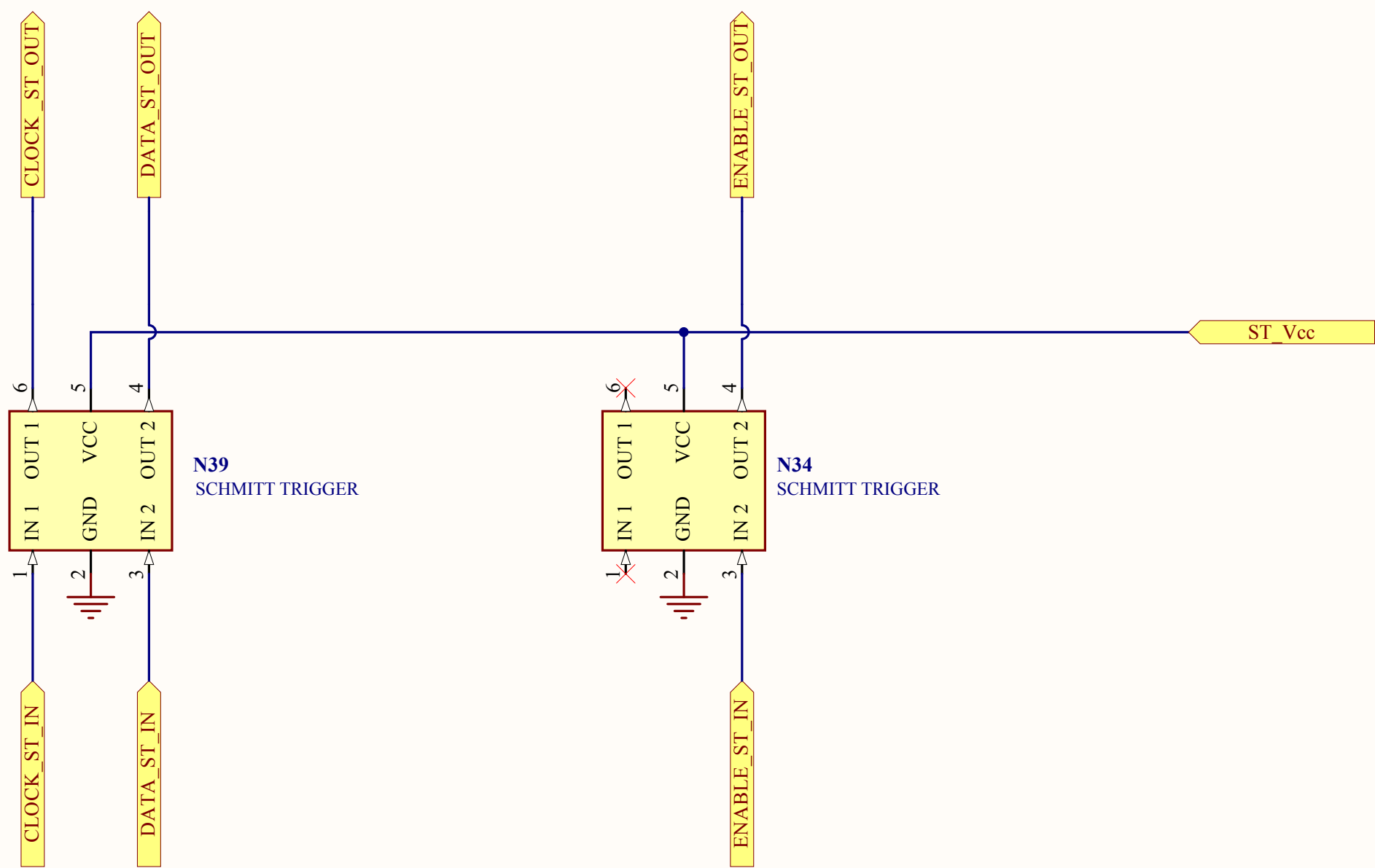
VCC PLL FILTERING



SCHMITT TRIGGER FILTERING

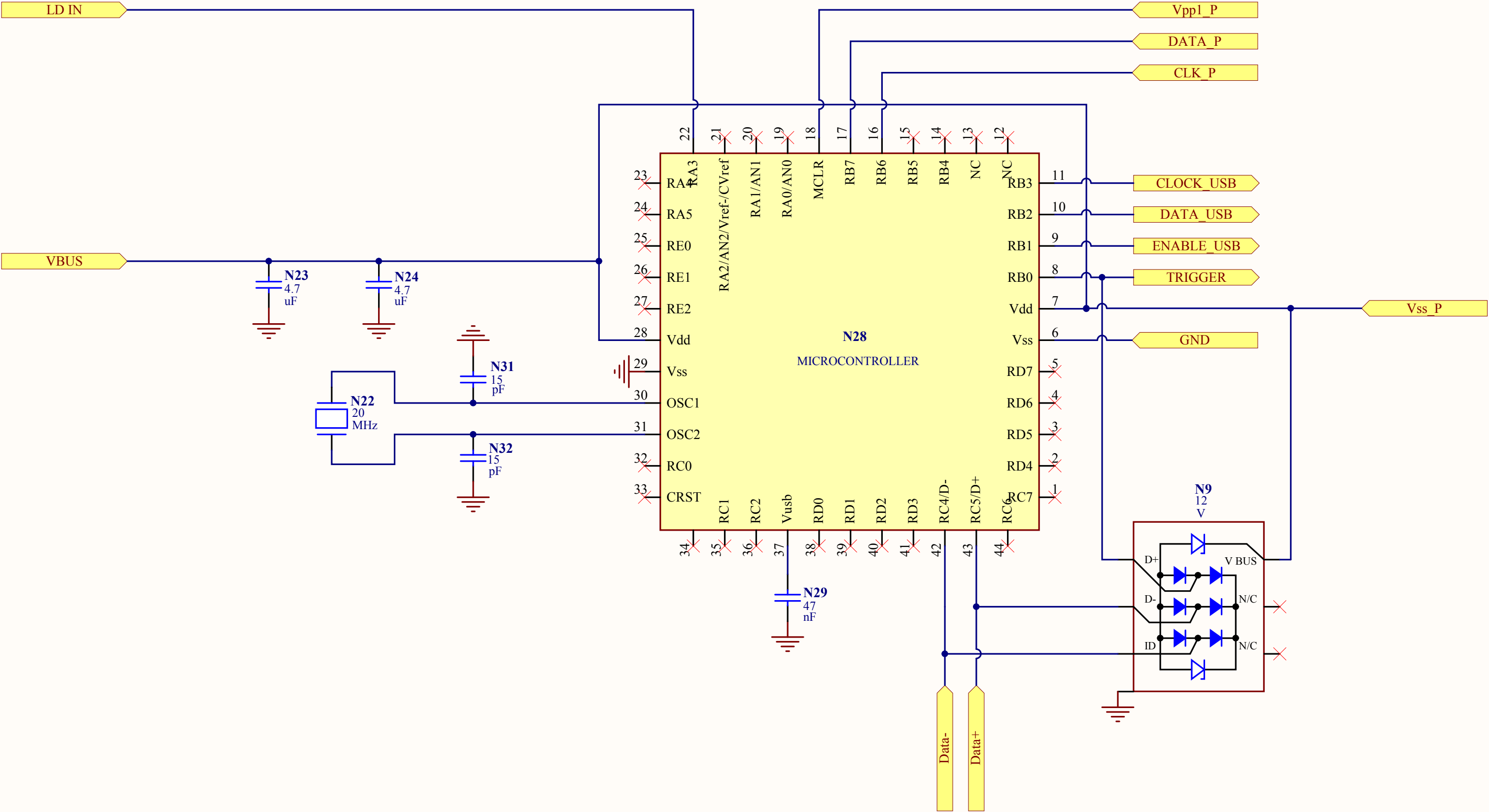


SCHMITT TRIGGER

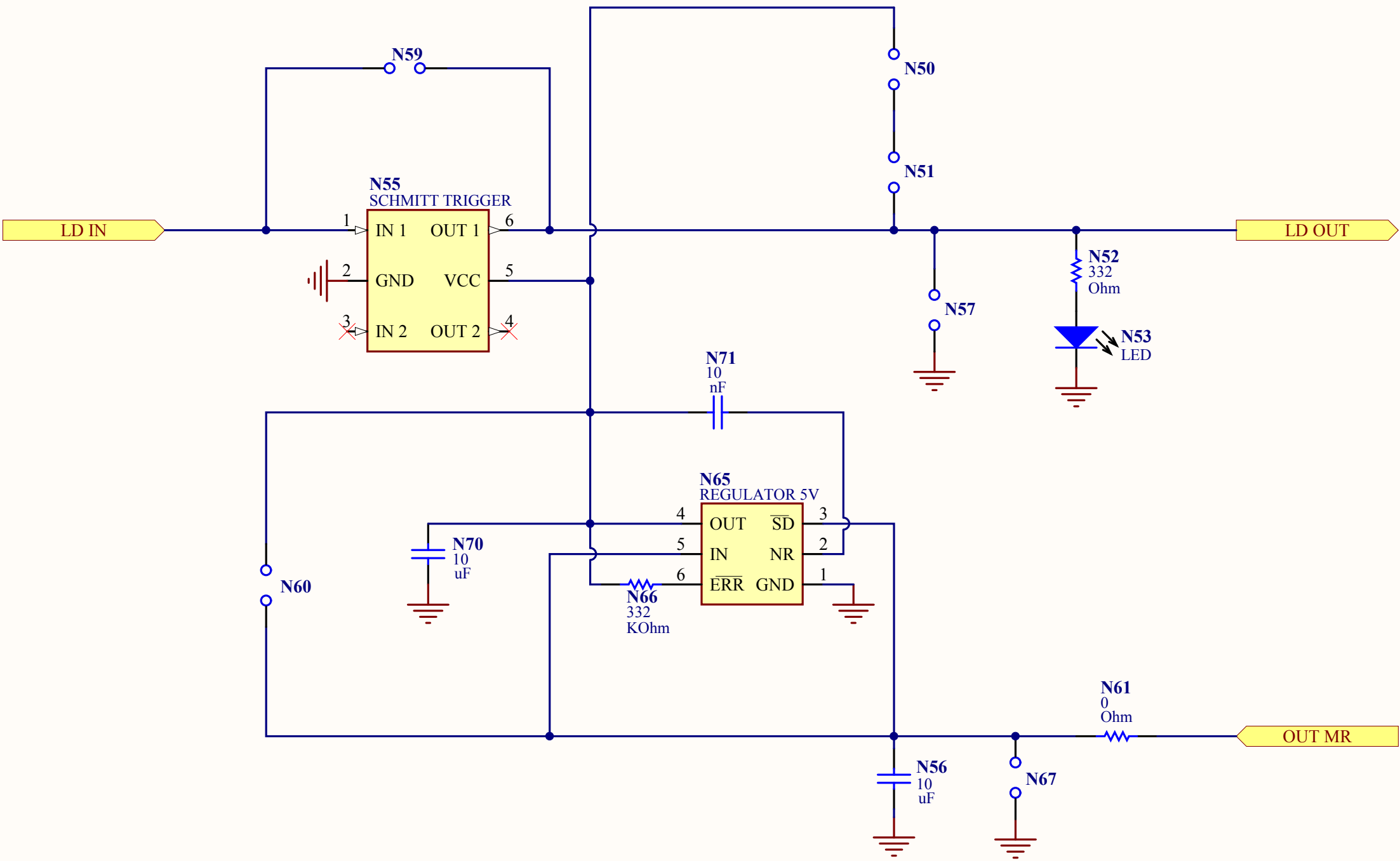




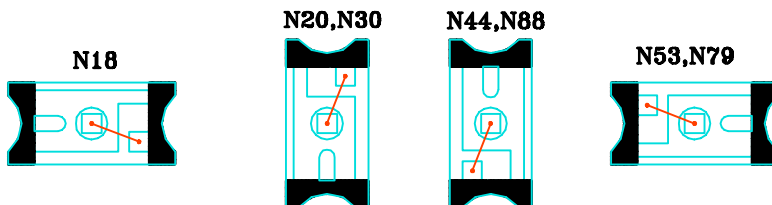
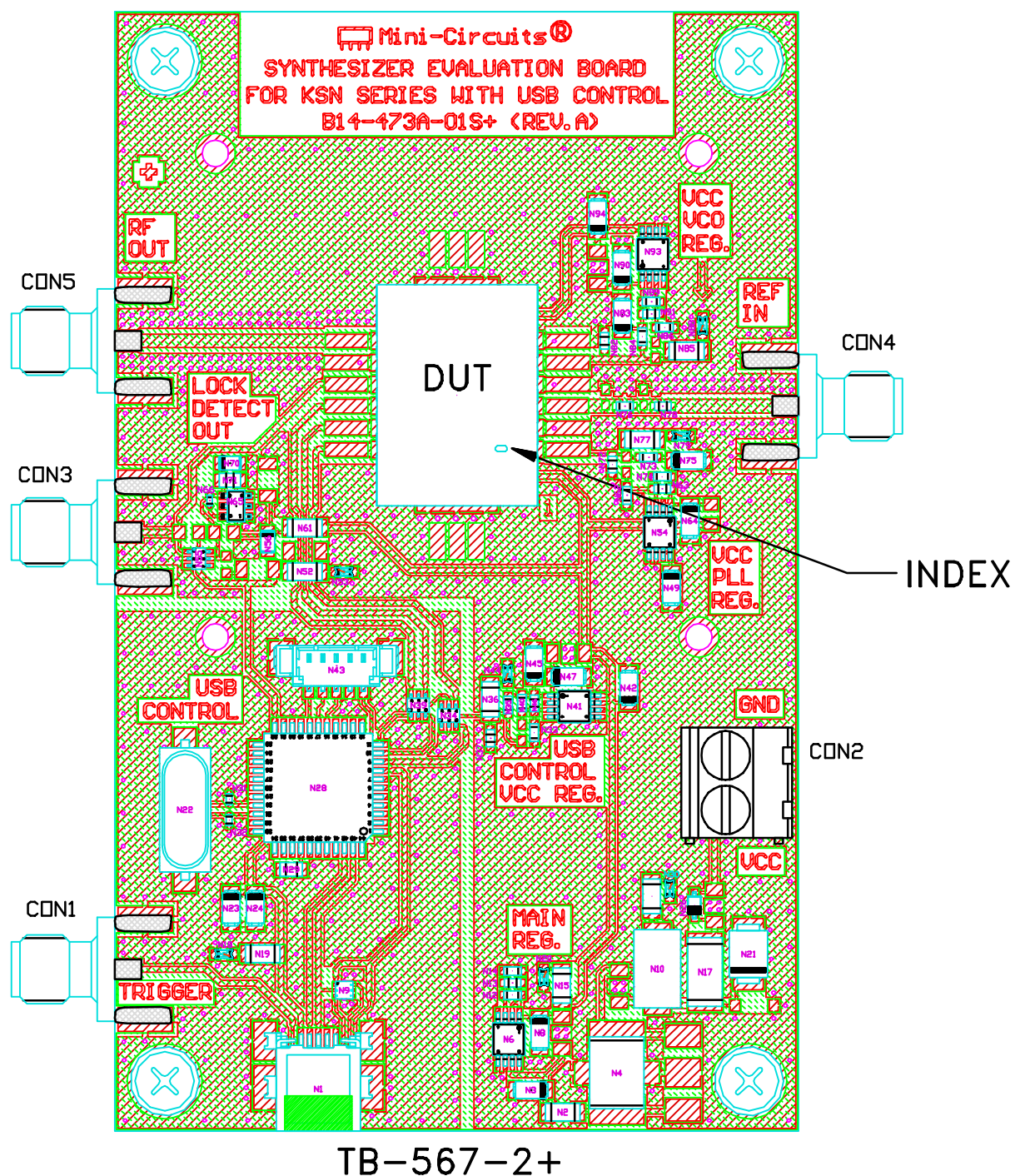
USB CONTROLER



LD REGULATOR SCHMITT TRIGGER AND LED



# Evaluation Board and Circuit



## NOTES:

1. SMA F JACK CONNECTORS.
2. PCB MATERIAL: FR4 OR EQUIVALENT, DIALECTRIC CONSTANT=4.7, DIALECTRIC THICKNESS=.059 INCH.



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| Specification                  | Test/Inspection Condition                                                                                                                                       | Reference/Spec                                                                                       |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Operating Temperature          | -40° to 85°C<br>Ambient Environment                                                                                                                             | Individual Model Data Sheet                                                                          |
| Storage Temperature            | -55° to 100° C<br>Ambient Environment                                                                                                                           | Individual Model Data Sheet                                                                          |
| Humidity                       | 90 to 95% RH, 240 hours, 50°C                                                                                                                                   | MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours |
| Thermal Shock                  | -55° to 100°C, 100 cycles                                                                                                                                       | MIL-STD-202, Method 107, Condition A-3, except +100°C                                                |
| Solder Reflow Heat             | Sn-Pb Eutectic Process: 225°C peak<br>Pb-Free Process, 245°C peak                                                                                               | J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1                                                        |
| Solderability                  | 10X Magnification                                                                                                                                               | J-STD-002, Para 4.2.5, Test S, 95% Coverage                                                          |
| Vibration (High Frequency)     | 20g peak, 20-2000 Hz, 4 times in each of three axes (total 12)                                                                                                  | MIL-STD-883, Method 2007.3, Condition A                                                              |
| Mechanical Shock               | 50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes                                                                                               | MIL-STD-202, Method 213, Condition A                                                                 |
| Marking Resistance to Solvents | Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C;<br>distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C | MIL-STD-202, Method 215                                                                              |