

Frequency Synthesizer

KSN-1850A-219+

50Ω 1540 to 1800 MHz

The Big Deal

- Low phase noise and spurious
- Robust design and construction
- Small size 0.80" x 0.58" x 0.15"



CASE STYLE: DK801

Product Overview

The KSN-1850A-219+ is a Frequency Synthesizer, designed to operate from 1540 to 1800 MHz for cellular infrastructure application. The KSN-1850A-219+ is packaged in a metal case (size of 0.80" x 0.58" x 0.15") to shield against unwanted signals and noise.

Key Features

Feature	Advantages
Low phase noise and spurious: • Phase Noise: -93 dBc/Hz typ. @ 10 kHz offset • Comparison Spurious: -74 dBc typ. • Reference Spurious: -110 dBc typ.	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of KSN-1850A-219+, each internal component is secured to the substrate with chip bonder, thereby eliminating the risk of tombstoning during subsequent solder reflow operations by the customer.
Small size, 0.80" x 0.58" x 0.15"	The small size enables the KSN-1850A-219+ to be used in compact designs.



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCStore/terms.jsp.

50Ω 1540 to 1800 MHz

Features

- Integrated VCO + PLL
- Low phase noise and spurious
- Robust design and construction
- Low operating voltage (VCC VCO=+5V, VCC PLL=+5V)
- Small size 0.80" x 0.58" x 0.15"

Applications

- Cellular infrastructure

General Description

The KSN-1850A-219+ is a Frequency Synthesizer, designed to operate from 1540 to 1800 MHz for cellular infrastructure application. The KSN-1850A-219+ is packaged in a metal case (size of 0.80" x 0.58" x 0.15") to shield against unwanted signals and noise. To enhance the robustness of KSN-1850A-219+, each internal component is secured to the substrate with chip bonder, thereby eliminating the risk of tombstoning during subsequent solder reflow operations by the customer.

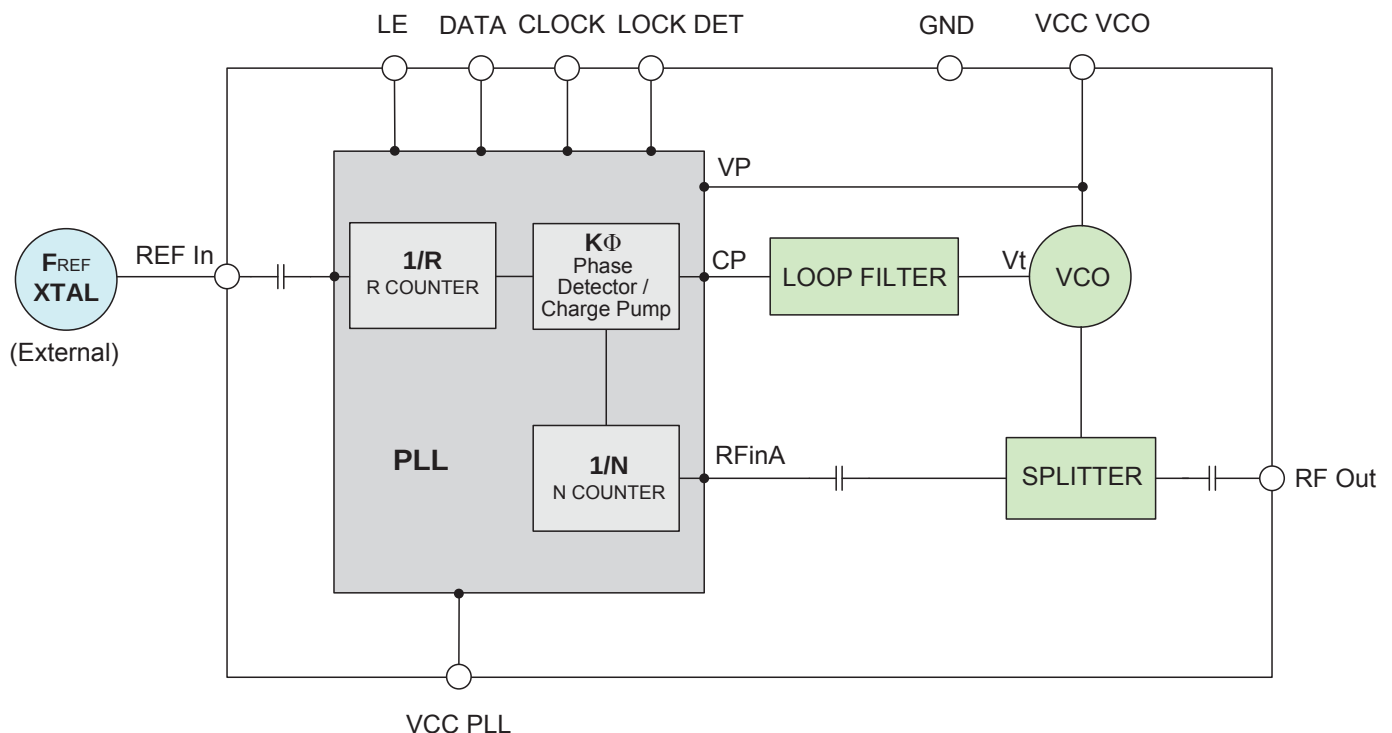


CASE STYLE: DK801

+ RoHS compliant in accordance with EU Directive (2002/95/EC)

The +Suffix has been added in order to identify RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications.

Simplified Schematic



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.

Electrical Specifications (over operating temperature -30°C to +80°C)

Parameters	Test Conditions	Min.	Typ.	Max.	Units
Frequency Range	-	1540	-	1800	MHz
Step Size	-	-	50	-	kHz
Settling Time	Within ± 1 kHz	-	30	-	mSec
Output Power	-	+3.5	+6.0	+8.5	dBm
SSB Phase Noise	@ 100 Hz offset	-	-55	-	dBc/Hz
	@ 1 kHz offset	-	-63	-56	
	@ 10 kHz offset	-	-93	-86	
	@ 100 kHz offset	-	-115	-108	
	@ 1 MHz offset	-	-135	-129	
Reference Spurious Suppression	Ref. Freq. 14.4 MHz	-	-110	-90	dBc
Comparison Spurious Suppression	Step Size 50 kHz	-	-74	-60	
Non - Harmonic Spurious Suppression	-	-	-90	-	
Harmonic Suppression	-	-	-40	-18	
VCO Supply Voltage	+5.00	+4.75	+5.00	+5.25	V
PLL Supply Voltage	+5.00	+4.75	+5.00	+5.25	
VCO Supply Current	-	-	21	27	mA
PLL Supply Current	-	-	12	19	
Reference Input (External)	Frequency	14.4 (square wave)	-	14.4	MHz
	Amplitude	1	-	1	V _{P-P}
	Input impedance	-	-	100	K Ω
	Phase Noise @ 1 kHz offset	-	-	-130	dBc/Hz
RF Output port Impedance	-	-	50	-	Ω
Input Logic Level	Input high voltage	-	4.20	-	V
	Input low voltage	-	-	0.95	V
Digital Lock Detect	Locked	-	4.35	-	V
	Unlocked	-	-	0.40	V
Frequency Synthesizer PLL	-	ADF4113			
PLL Programming	-	3-wire serial 5V CMOS			
Register Map @ 1800 MHz	F_Register	-	(MSB) 100111111000000010010010 (LSB)		
	N_Register	-	(MSB) 001001000110010100000001 (LSB)		
	R_Register	-	(MSB) 000100000000010010000000 (LSB)		

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage	5.8V
PLL Supply Voltage	5.8V
VCO Supply Voltage to PLL Supply Voltage	-0.3V to +5.5V
Reference Frequency Voltage	-0.3Vmin, VCC PLL +0.3Vmax
Data, Clock, LE Levels	-0.3Vmin, VCC PLL +0.3Vmax
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +100°C

Permanent damage may occur if any of these limits are exceeded



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.

NON-CATALOG

Frequency Synthesizer

KSN-1850A-219+

Typical Performance Data

FREQUENCY (MHz)	POWER OUTPUT (dBm)			VCO CURRENT (mA)			PLL CURENT (mA)		
	-35°C	+25°C	+85°C	-35°C	+25°C	+85°C	-35°C	+25°C	+85°C
1540	6.40	6.62	6.07	20.48	22.30	22.94	9.65	11.85	13.45
1556	6.32	6.55	6.02	20.51	22.29	22.93	9.68	11.88	13.47
1592	6.28	6.53	6.02	20.42	22.20	22.87	9.73	11.90	13.49
1628	6.08	6.34	5.84	20.44	22.18	22.86	9.76	11.93	13.52
1664	6.07	6.34	5.84	20.37	22.10	22.81	9.78	11.95	13.53
1670	6.05	6.33	5.83	20.36	22.09	22.80	9.79	11.96	13.54
1700	5.96	6.25	5.76	20.31	22.02	22.77	9.81	11.98	13.56
1736	5.98	6.25	5.80	20.35	22.05	22.81	9.82	11.99	13.58
1772	5.91	6.19	5.75	20.16	21.89	22.72	9.85	12.02	13.61
1800	5.82	6.10	5.69	20.19	21.93	22.76	9.86	12.03	13.61

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-35°C	+25°C	+85°C	-35°C	+25°C	+85°C
1540	-22.91	-26.19	-31.31	-42.21	-42.39	-45.08
1556	-24.66	-28.03	-33.23	-42.13	-42.15	-45.38
1592	-28.61	-32.23	-37.54	-42.43	-42.13	-46.91
1628	-33.84	-37.94	-43.19	-41.49	-41.41	-47.25
1664	-40.99	-45.97	-50.86	-40.28	-39.60	-46.85
1670	-42.58	-46.57	-50.73	-40.07	-39.42	-46.54
1700	-50.51	-49.58	-50.06	-39.00	-38.49	-44.98
1736	-44.36	-44.93	-48.19	-37.17	-35.81	-43.32
1772	-40.86	-41.75	-45.25	-35.21	-34.84	-41.82
1800	-39.88	-40.69	-44.52	-34.41	-33.32	-40.59



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCStore/terms.jsp.

NON-CATALOG

Frequency Synthesizer

KSN-1850A-219+

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1540	-55.33	-64.38	-93.04	-112.29	-134.64
1556	-56.91	-62.99	-93.40	-114.15	-135.19
1592	-56.40	-64.66	-94.44	-114.84	-135.31
1628	-54.40	-64.75	-94.18	-115.13	-135.83
1664	-55.70	-64.18	-93.97	-115.70	-136.08
1670	-55.24	-64.19	-93.79	-115.38	-135.99
1700	-52.95	-64.23	-92.90	-113.78	-135.53
1736	-56.57	-63.91	-94.51	-116.18	-136.71
1772	-54.53	-60.41	-92.72	-114.03	-135.50
1800	-55.27	-62.96	-93.49	-115.35	-135.98

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	-35°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1540	-61.33	-66.45	-94.22	-115.67	-135.05
1556	-59.74	-63.50	-94.52	-116.01	-135.70
1592	-57.52	-65.31	-94.05	-115.71	-135.85
1628	-60.11	-66.20	-95.26	-114.74	-136.33
1664	-55.40	-63.89	-94.12	-116.18	-136.48
1670	-55.49	-64.05	-93.99	-116.09	-136.31
1700	-55.92	-64.83	-93.32	-115.62	-135.43
1736	-55.34	-63.30	-95.07	-116.98	-137.24
1772	-53.52	-63.82	-93.44	-115.25	-135.90
1800	-55.02	-64.05	-93.92	-116.04	-136.02

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1540	-59.32	-63.26	-90.68	-112.07	-132.80
1556	-60.29	-63.20	-92.11	-112.47	-133.38
1592	-58.34	-62.96	-91.72	-112.35	-133.35
1628	-57.30	-63.71	-92.24	-112.21	-133.99
1664	-60.32	-62.77	-91.89	-112.56	-134.12
1670	-60.07	-62.68	-91.83	-112.35	-134.06
1700	-58.84	-62.22	-91.53	-111.28	-133.75
1736	-55.36	-63.73	-93.44	-114.56	-135.04
1772	-52.31	-61.88	-91.25	-113.61	-133.91
1800	-53.71	-62.15	-91.58	-114.10	-134.35



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCStore/terms.jsp.

COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @ Fcarrier 1540MHz+(n*Freference) (dBc) note 1			COMPARISON SPURIOUS @ Fcarrier 1670MHz+(n*Freference) (dBc) note 1			COMPARISON SPURIOUS @ Fcarrier 1800MHz+(n*Freference) (dBc) note 1		
	-35°C	+25°C	+85°C	-35°C	+25°C	+85°C	-35°C	+25°C	+85°C
-5	-84.46	-88.68	-92.99	-85.69	-87.24	-98.94	-89.43	-98.07	-97.91
-4	-82.83	-89.40	-90.67	-84.12	-86.92	-93.44	-92.19	-87.83	-94.98
-3	-81.85	-85.44	-89.14	-80.58	-81.75	-90.57	-85.93	-87.14	-84.98
-2	-75.69	-81.78	-85.91	-76.31	-78.57	-84.50	-81.35	-80.85	-84.32
-1	-71.24	-71.22	-81.14	-70.67	-71.50	-79.93	-77.24	-77.34	-77.22
0 ^{note 2}	-	-	-	-	-	-	-	-	-
+1	-71.44	-72.35	-79.65	-72.01	-74.36	-80.87	-78.90	-77.89	-76.18
+2	-75.54	-81.88	-85.67	-75.58	-78.55	-84.76	-82.73	-86.00	-82.37
+3	-81.92	-82.10	-90.06	-80.44	-82.63	-88.18	-89.28	-83.88	-86.24
+4	-82.77	-89.21	-92.32	-84.68	-86.40	-92.24	-92.13	-93.87	-91.82
+5	-84.49	-89.59	-94.93	-86.15	-88.74	-99.08	-91.24	-95.81	-98.01

Note 1: Comparison frequency 50 kHz

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

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @ Fcarrier 1540MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @ Fcarrier 1670MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @ Fcarrier 1800MHz+(n*Freference) (dBc) note 3		
	-35°C	+25°C	+85°C	-35°C	+25°C	+85°C	-35°C	+25°C	+85°C
-5	-127.60	-132.06	-129.45	-129.52	-130.09	-128.83	-131.89	-120.53	-129.22
-4	-121.53	-122.75	-121.88	-116.90	-118.66	-117.63	-120.68	-120.14	-115.56
-3	-132.31	-130.91	-128.69	-130.38	-131.84	-128.25	-130.46	-123.38	-124.45
-2	-125.40	-127.15	-126.09	-119.90	-123.33	-123.49	-121.02	-120.04	-119.09
-1	-114.93	-112.97	-111.94	-112.19	-111.82	-110.41	-109.21	-109.44	-109.60
0 ^{note 4}	-	-	-	-	-	-	-	-	-
+1	-111.86	-112.47	-111.68	-112.37	-110.12	-109.82	-108.86	-107.64	-108.32
+2	-123.14	-123.58	-125.87	-118.25	-121.02	-122.96	-122.09	-120.85	-118.97
+3	-132.74	-126.13	-132.12	-132.58	-132.72	-128.87	-129.94	-126.53	-132.78
+4	-118.72	-120.10	-120.34	-118.23	-119.27	-120.24	-120.66	-117.39	-115.45
+5	-127.72	-128.54	-129.35	-127.72	-129.74	-129.68	-129.39	-124.85	-126.99

Note 3: Reference frequency 14.4 MHz

Note 4: All spurs are referenced to carrier signal (n=0).



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

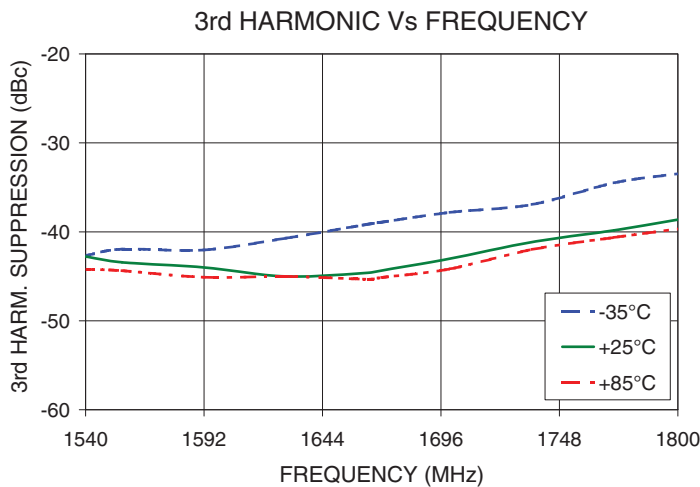
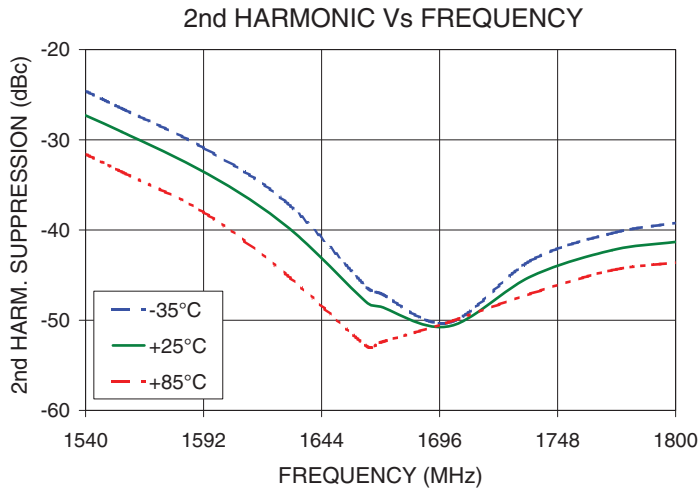
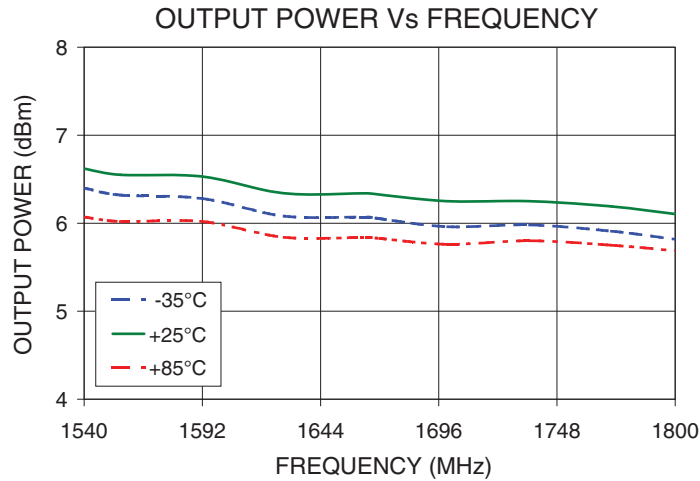


The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCStore/terms.jsp.

Typical Performance Curves



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

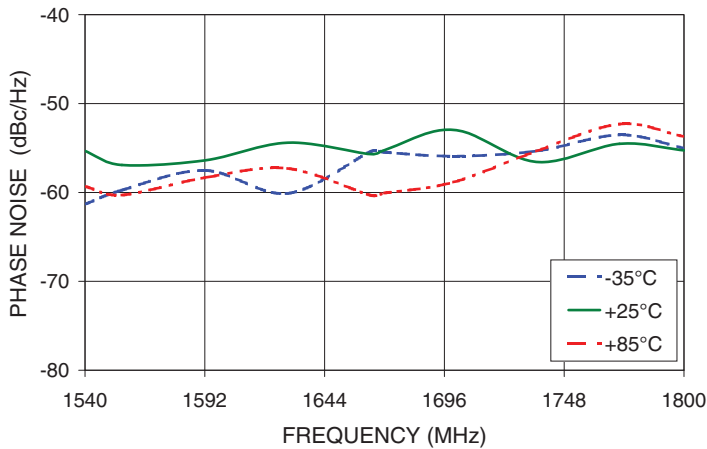


The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see

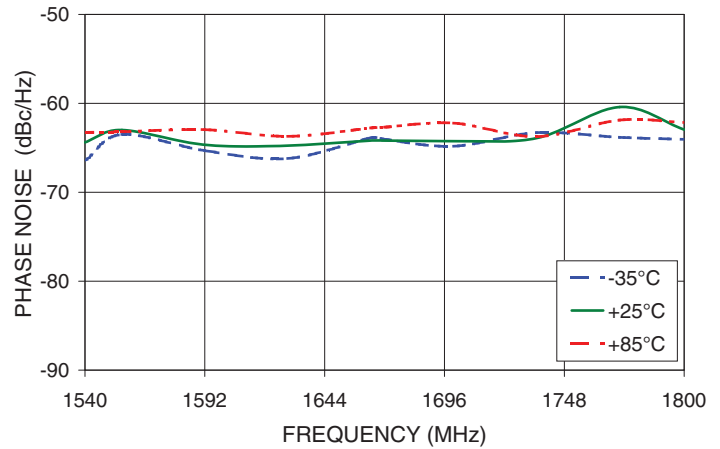


Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCStore/terms.jsp.

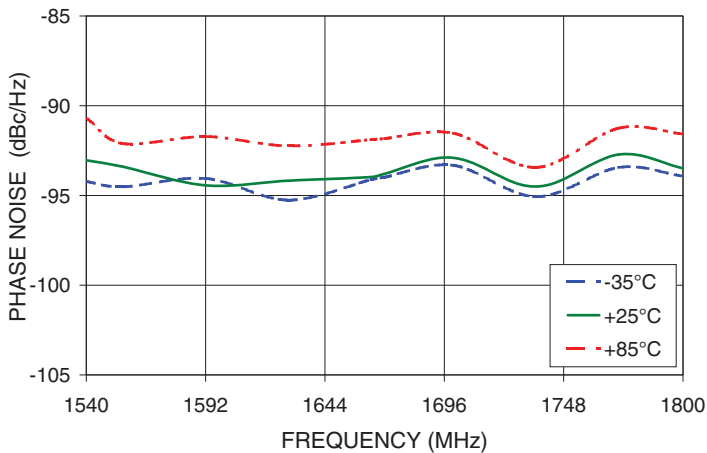
PHASE NOISE @ 100Hz offset



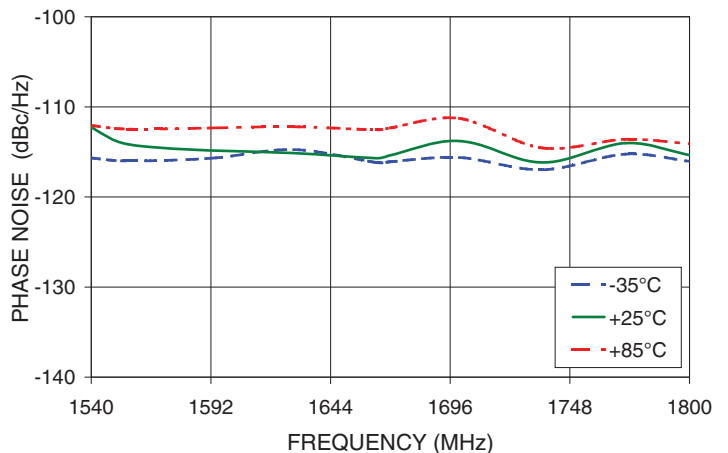
PHASE NOISE @ 1kHz offset



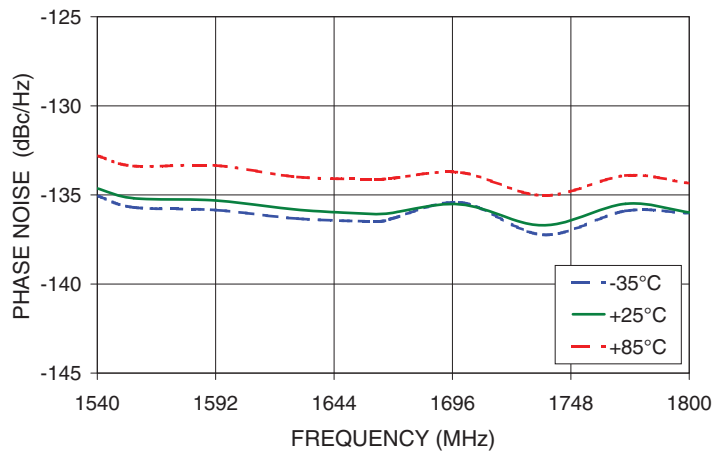
PHASE NOISE @ 10kHz offset



PHASE NOISE @ 100kHz offset



PHASE NOISE @ 1MHz offset



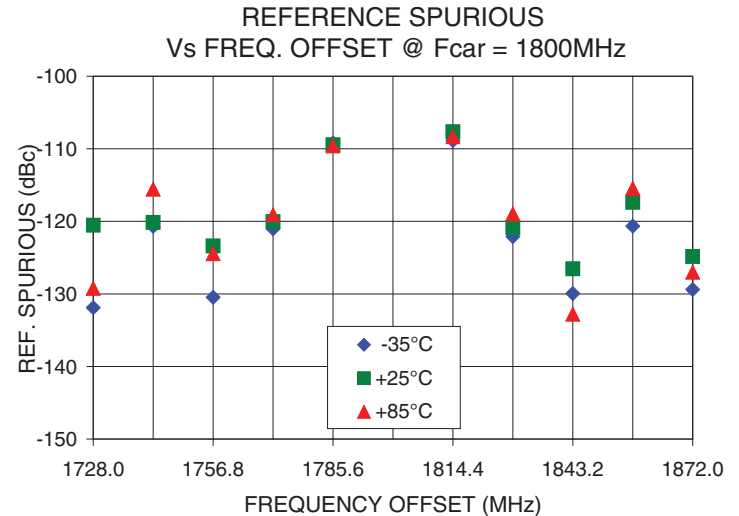
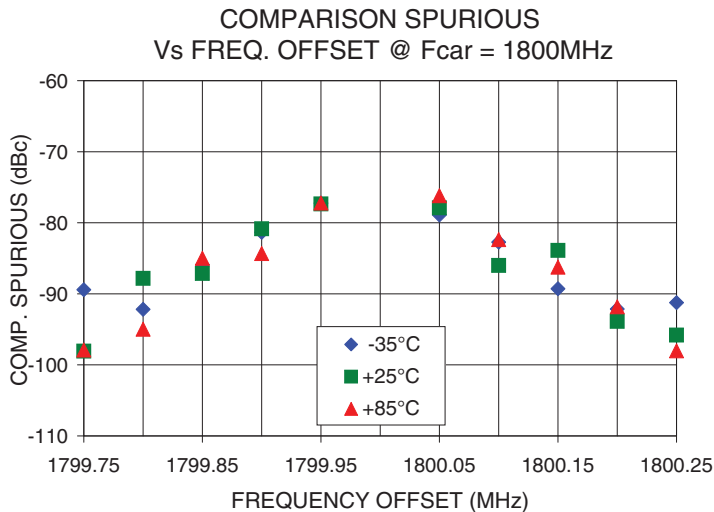
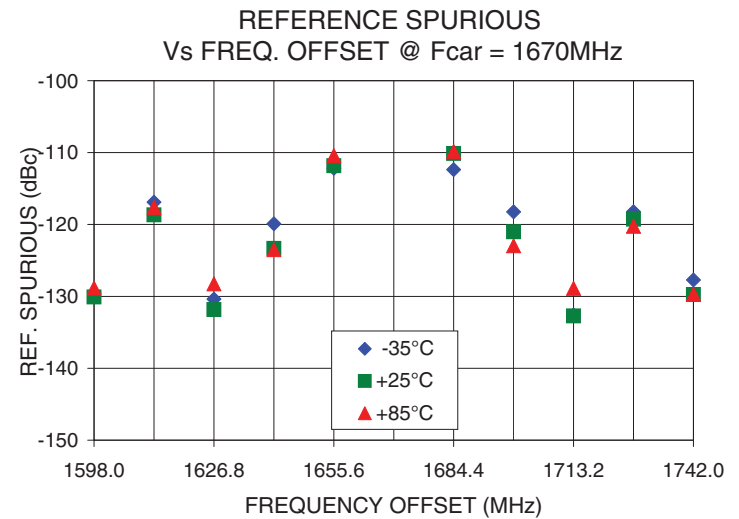
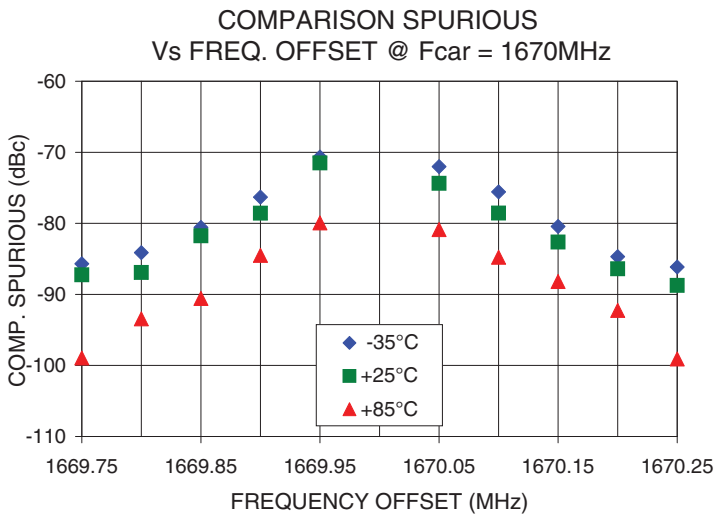
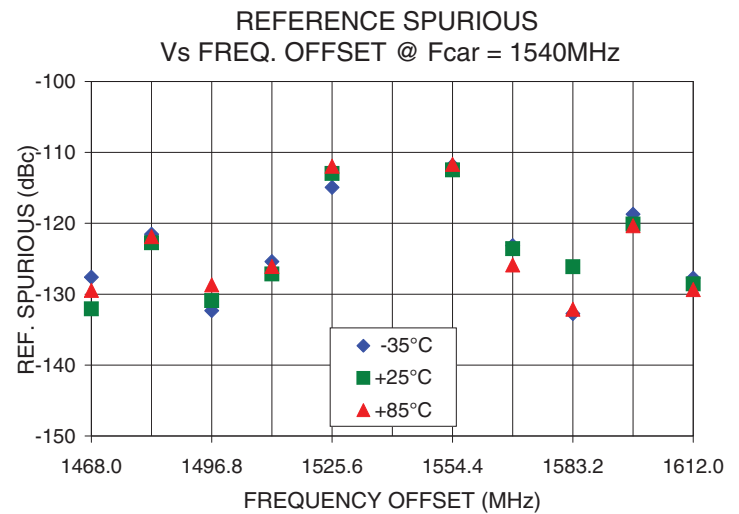
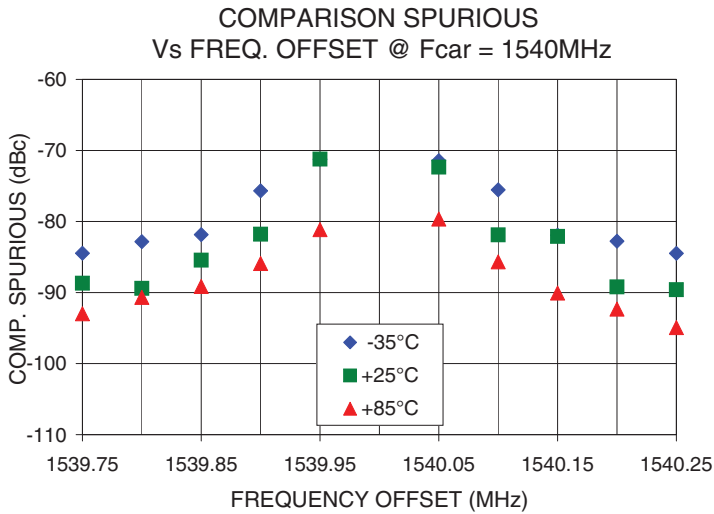
IF/Rf MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCStore/terms.jsp.

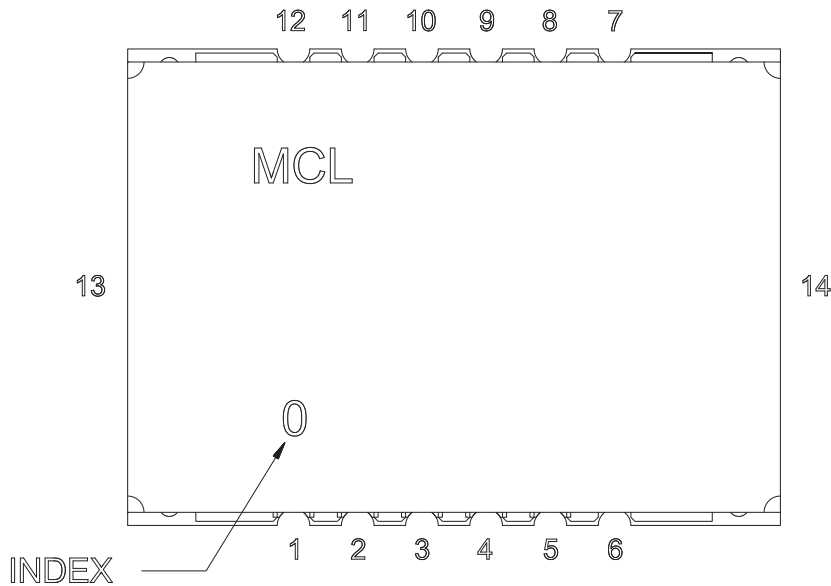


IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.

Pin Configuration

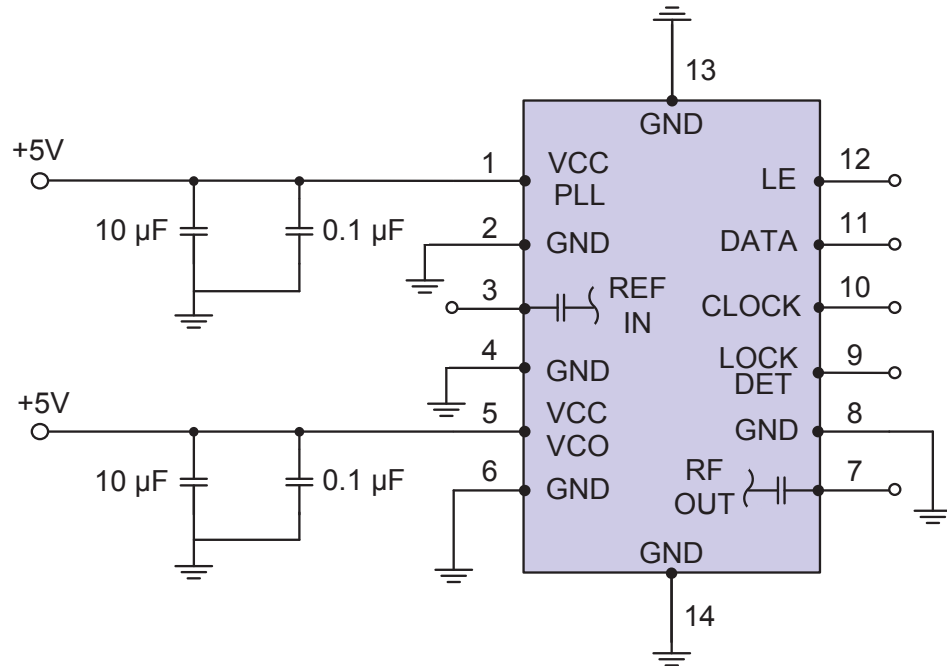


Pin Connection

Pin Number	Function
1	VCC PLL
2	GND
3	REF IN
4	GND
5	VCC VCO
6	GND
7	RF OUT
8	GND
9	LOCK DET
10	CLOCK
11	DATA
12	LE
13	GND
14	GND

Recommended Application Circuit

Note: REF IN and RF OUT ports are internally AC coupled.



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

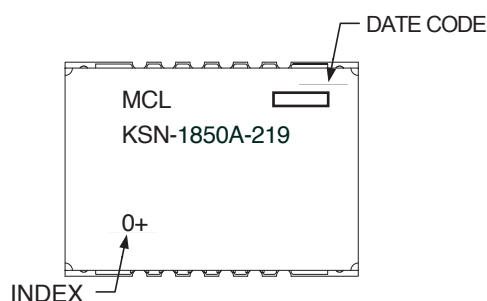


The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCStore/terms.jsp.

Device Marking



Additional Detailed Technical Information

Additional information is available on our web site. To access this information enter the model number on our web site home page.

Case Style: DK801

Tape & Reel: TR-F28

Suggested Layout for PCB Design: PL-249

Evaluation Board: TB-567+

Environment Ratings: ENV03T2



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.

Frequency Synthesizer

KSN-1850A-219+

Typical Performance Data

FREQ. (MHz)	POWER OUTPUT (dBm)			HARMONICS (dBc)						VCO CURRENT (mA)			PLL CURRENT (mA)		
				F2			F3								
	-35°C	+25°C	+85°C	-35°C	+25°C	+85°C	-35°C	+25°C	+85°C	-35°C	+25°C	+85°C	-35°C	+25°C	+85°C
1540	6.40	6.62	6.07	-22.91	-26.19	-31.31	-42.21	-42.39	-45.08	20.48	22.30	22.94	9.65	11.85	13.45
1556	6.32	6.55	6.02	-24.66	-28.03	-33.23	-42.13	-42.15	-45.38	20.51	22.29	22.93	9.68	11.88	13.47
1592	6.28	6.53	6.02	-28.61	-32.23	-37.54	-42.43	-42.13	-46.91	20.42	22.20	22.87	9.73	11.90	13.49
1628	6.08	6.34	5.84	-33.84	-37.94	-43.19	-41.49	-41.41	-47.25	20.44	22.18	22.86	9.76	11.93	13.52
1664	6.07	6.34	5.84	-40.99	-45.97	-50.86	-40.28	-39.60	-46.85	20.37	22.10	22.81	9.78	11.95	13.53
1670	6.05	6.33	5.83	-42.58	-46.57	-50.73	-40.07	-39.42	-46.54	20.36	22.09	22.80	9.79	11.96	13.54
1700	5.96	6.25	5.76	-50.51	-49.58	-50.06	-39.00	-38.49	-44.98	20.31	22.02	22.77	9.81	11.98	13.56
1736	5.98	6.25	5.80	-44.36	-44.93	-48.19	-37.17	-35.81	-43.32	20.35	22.05	22.81	9.82	11.99	13.58
1772	5.91	6.19	5.75	-40.86	-41.75	-45.25	-35.21	-34.84	-41.82	20.16	21.89	22.72	9.85	12.02	13.61
1800	5.82	6.10	5.69	-39.88	-40.69	-44.52	-34.41	-33.32	-40.59	20.19	21.93	22.76	9.86	12.03	13.61

FREQ. (MHz)	PHASE NOISE (dBc/Hz)														
	@ OFFSETS														
	-35°C					+25°C					+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz	100Hz	1kHz	10kHz	100kHz	1MHz	100Hz	1kHz	10kHz	100kHz	1MHz
1540	-61.33	-66.45	-94.22	-115.67	-135.05	-55.33	-64.38	-93.04	-112.29	-134.64	-59.32	-63.26	-90.68	-112.07	-132.80
1556	-59.74	-63.50	-94.52	-116.01	-135.70	-56.91	-62.99	-93.40	-114.15	-135.19	-60.29	-63.20	-92.11	-112.47	-133.38
1592	-57.52	-65.31	-94.05	-115.71	-135.85	-56.40	-64.66	-94.44	-114.84	-135.31	-58.34	-62.96	-91.72	-112.35	-133.35
1628	-60.11	-66.20	-95.26	-114.74	-136.33	-54.40	-64.75	-94.18	-115.13	-135.83	-57.30	-63.71	-92.24	-112.21	-133.99
1664	-55.40	-63.89	-94.12	-116.18	-136.48	-55.70	-64.18	-93.97	-115.70	-136.08	-60.32	-62.77	-91.89	-112.56	-134.12
1670	-55.49	-64.05	-93.99	-116.09	-136.31	-55.24	-64.19	-93.79	-115.38	-135.99	-60.07	-62.68	-91.83	-112.35	-134.06
1700	-55.92	-64.83	-93.32	-115.62	-135.43	-52.95	-64.23	-92.90	-113.78	-135.53	-58.84	-62.22	-91.53	-111.28	-133.75
1736	-55.34	-63.30	-95.07	-116.98	-137.24	-56.57	-63.91	-94.51	-116.18	-136.71	-55.36	-63.73	-93.44	-114.56	-135.04
1772	-53.52	-63.82	-93.44	-115.25	-135.90	-54.53	-60.41	-92.72	-114.03	-135.50	-52.31	-61.88	-91.25	-113.61	-133.91
1800	-55.02	-64.05	-93.92	-116.04	-136.02	-55.27	-62.96	-93.49	-115.35	-135.98	-53.71	-62.15	-91.58	-114.10	-134.35

REV. X2

KSN-1850A-219+

101227

Page 1 of 2



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Typical Performance Data

COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 1540MHz± (n*Fcomparison) (dBc) NOTE 1			COMPARISON SPURIOUS @Fcarrier 1670MHz± (n*Fcomparison) (dBc) NOTE 1			COMPARISON SPURIOUS @Fcarrier 1800MHz± (n*Fcomparison) (dBc) NOTE 1		
	-35°C	+25°C	+85°C	-35°C	+25°C	+85°C	-35°C	+25°C	+85°C
-5	-84.46	-88.68	-92.99	-85.69	-87.24	-98.94	-89.43	-98.07	-97.91
-4	-82.83	-89.40	-90.67	-84.12	-86.92	-93.44	-92.19	-87.83	-94.98
-3	-81.85	-85.44	-89.14	-80.58	-81.75	-90.57	-85.93	-87.14	-84.98
-2	-75.69	-81.78	-85.91	-76.31	-78.57	-84.50	-81.35	-80.85	-84.32
-1	-71.24	-71.22	-81.14	-70.67	-71.50	-79.93	-77.24	-77.34	-77.22
0 ^{note 2}	-	-	-	-	-	-	-	-	-
+1	-71.44	-72.35	-79.65	-72.01	-74.36	-80.87	-78.90	-77.89	-76.18
+2	-75.54	-81.88	-85.67	-75.58	-78.55	-84.76	-82.73	-86.00	-82.37
+3	-81.92	-82.10	-90.06	-80.44	-82.63	-88.18	-89.28	-83.88	-86.24
+4	-82.77	-89.21	-92.32	-84.68	-86.40	-92.24	-92.13	-93.87	-91.82
+5	-84.49	-89.59	-94.93	-86.15	-88.74	-99.08	-91.24	-95.81	-98.01

Note 1: Comparison frequency 50 kHz

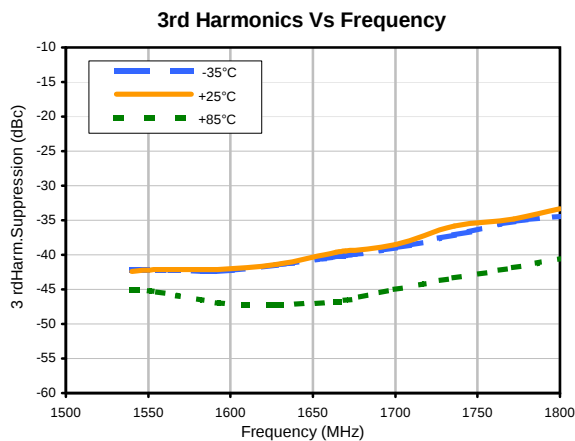
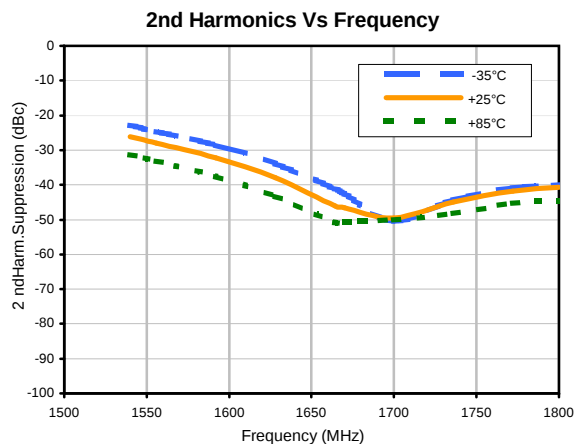
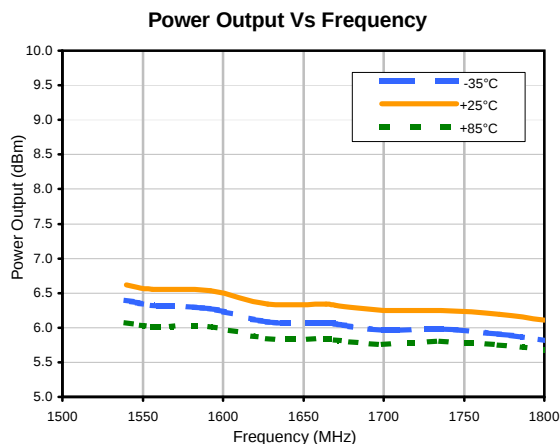
Note 2: All spurs are referenced to carrier signal (n=0).

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 1540MHz± (n*Freference) (dBc) NOTE 3			REFERENCE SPURIOUS @Fcarrier 1670MHz± (n*Freference) (dBc) NOTE 3			REFERENCE SPURIOUS @Fcarrier 1800MHz± (n*Freference) (dBc) NOTE 3		
	-35°C	+25°C	+85°C	-35°C	+25°C	+85°C	-35°C	+25°C	+85°C
-5	-127.60	-132.06	-129.45	-129.52	-130.09	-128.83	-131.89	-120.53	-129.22
-4	-121.53	-122.75	-121.88	-116.90	-118.66	-117.63	-120.68	-120.14	-115.56
-3	-132.31	-130.91	-128.69	-130.38	-131.84	-128.25	-130.46	-123.38	-124.45
-2	-125.40	-127.15	-126.09	-119.90	-123.33	-123.49	-121.02	-120.04	-119.09
-1	-114.93	-112.97	-111.94	-112.19	-111.82	-110.41	-109.21	-109.44	-109.60
0 ^{note 4}	-	-	-	-	-	-	-	-	-
+1	-111.86	-112.47	-111.68	-112.37	-110.12	-109.82	-108.86	-107.64	-108.32
+2	-123.14	-123.58	-125.87	-118.25	-121.02	-122.96	-122.09	-120.85	-118.97
+3	-132.74	-126.13	-132.12	-132.58	-132.72	-128.87	-129.94	-126.53	-132.78
+4	-118.72	-120.10	-120.34	-118.23	-119.27	-120.24	-120.66	-117.39	-115.45
+5	-127.72	-128.54	-129.35	-127.72	-129.74	-129.68	-129.39	-124.85	-126.99

Note 3: Reference frequency 14.4 MHz

Note 4: All spurs are referenced to carrier signal (n=0).

Typical Performance Data

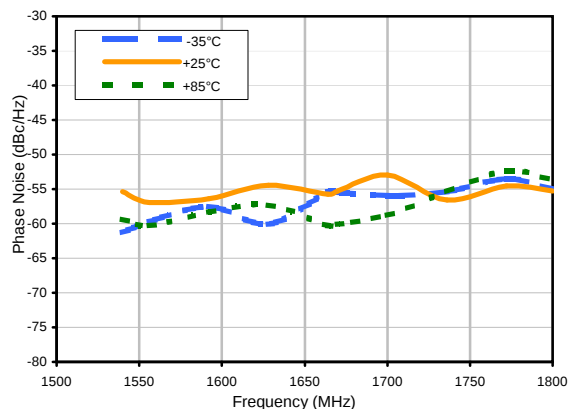


Frequency Synthesizer

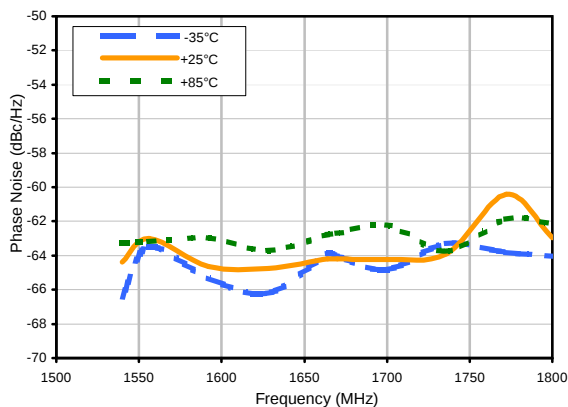
KSN-1850A-219+

Typical Performance Data

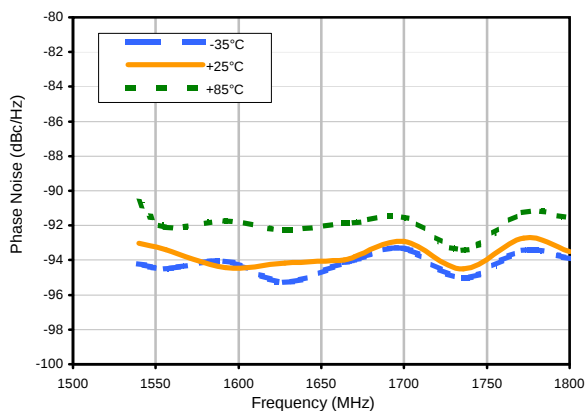
Phase Noise @ 100 Hz offset



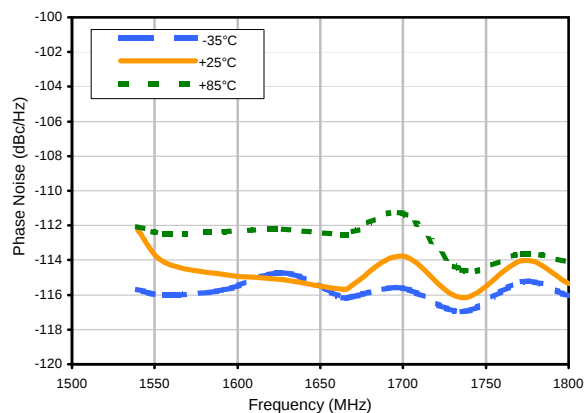
Phase Noise @ 1 kHz offset



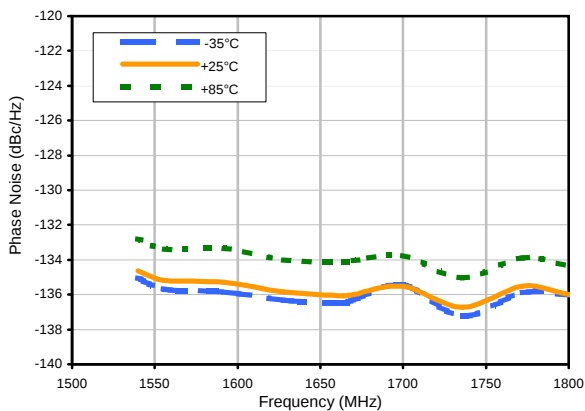
Phase Noise @ 10 kHz offset



Phase Noise @ 100 kHz offset



Phase Noise @ 1 MHz offset



REV. X2
KSN-1850A-219+
101227
Page 2 of 3

Mini-Circuits®

IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



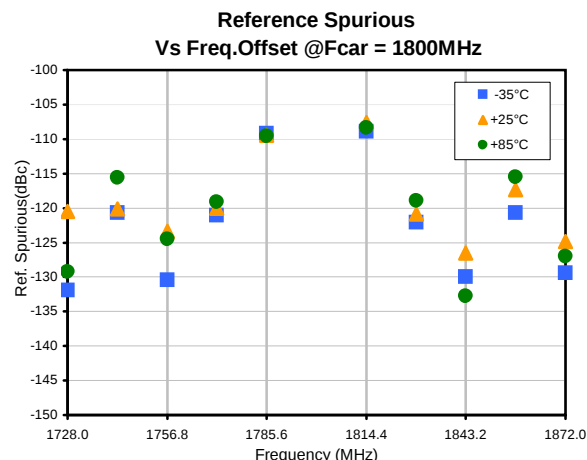
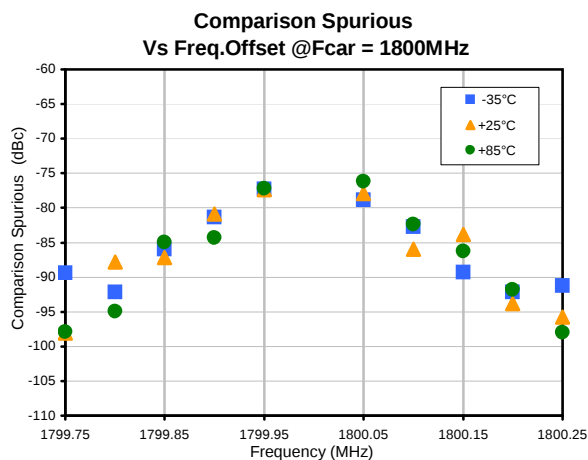
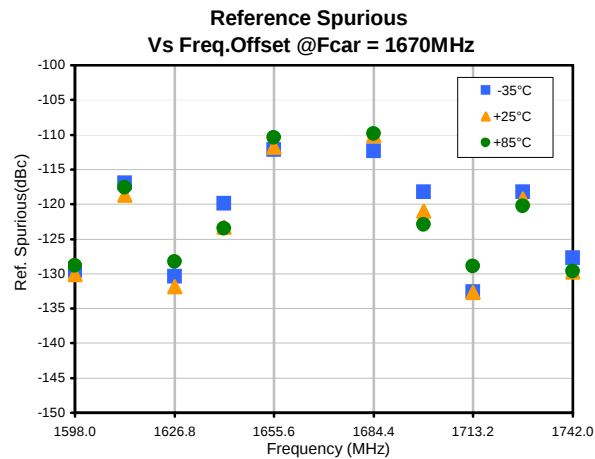
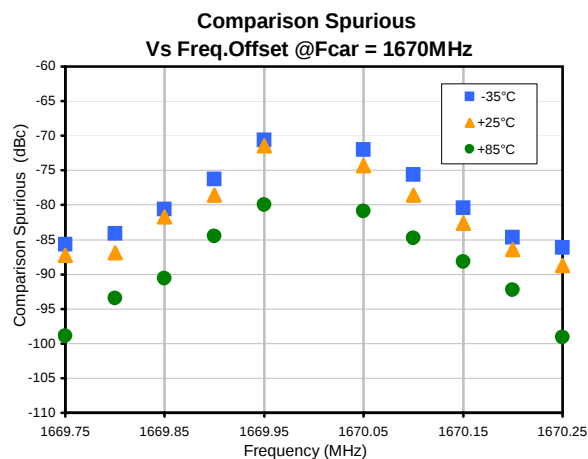
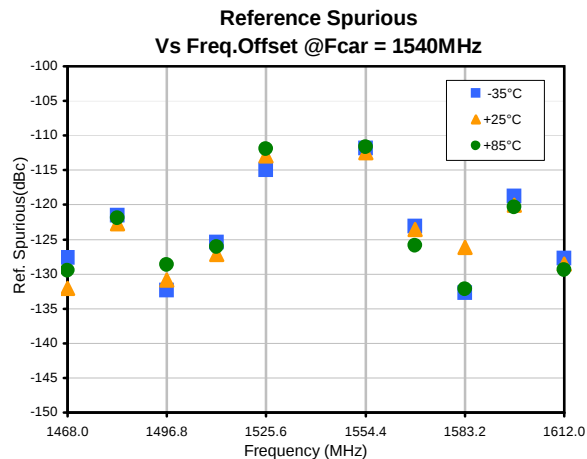
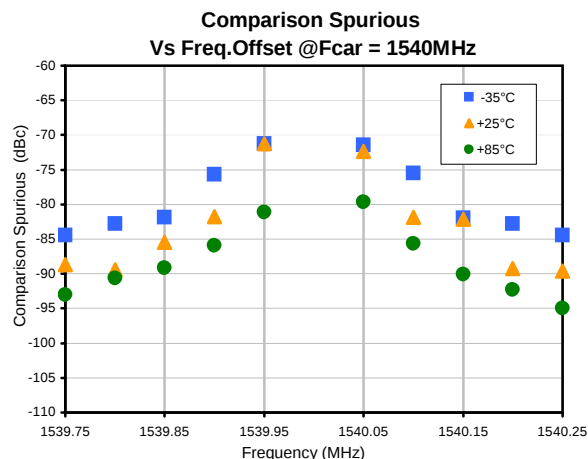
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Frequency Synthesizer

KSN-1850A-219+

Typical Performance Data



REV. X2
KSN-1850A-219+
101227
Page 3 of 3



Mini-Circuits®

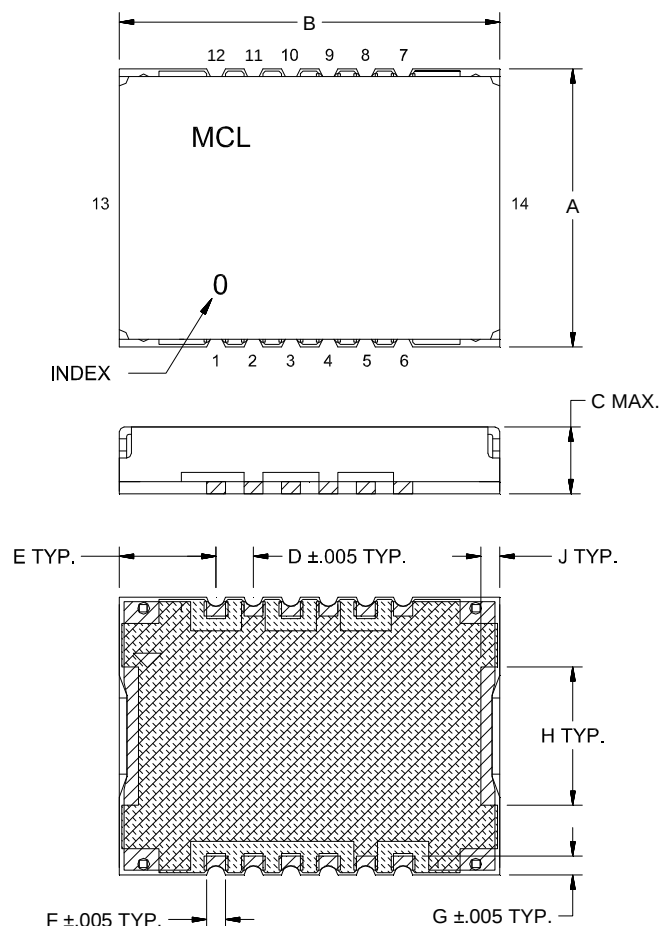
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED • RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

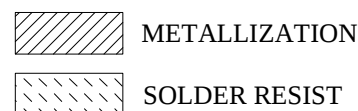
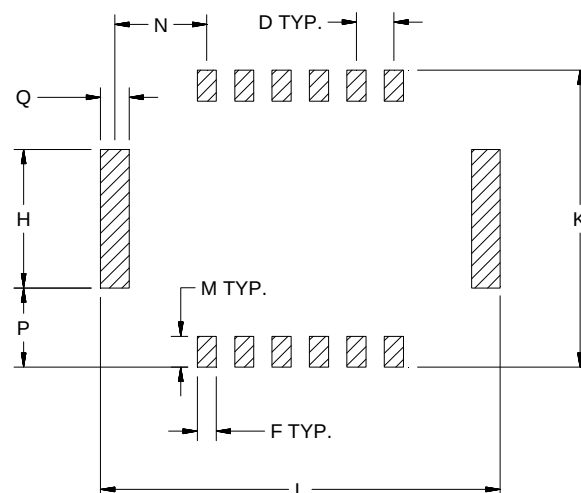
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Outline Dimensions



Suggested PCB Land Pattern



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	WT. GRAM
DK801	.584 (14.83)	.800 (20.32)	.154 (3.91)	.079 (2.01)	.203 (5.16)	.040 (1.02)	.040 (1.02)	.291 (7.39)	.039 (1.0)	.624 (15.85)	.840 (21.34)	.060 (1.52)	.193 (4.90)	.170 (4.32)	.060 (1.52)	1.6

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

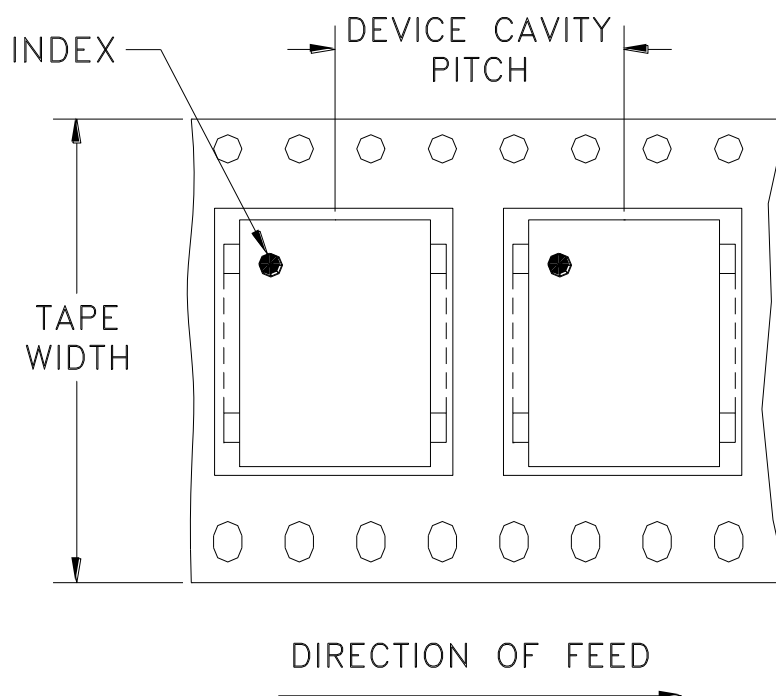
Notes:

1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. Termination finish:

For RoHS Case Styles: 2-5 μ inch (.05-.13 microns) Gold over 120-240 μ inch (3.05-6.10 microns) Nickel plate.
All models, (+) suffix.

Tape & Reel Packaging TR-F28

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, 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.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf



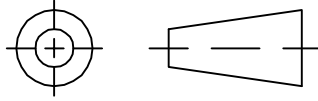
INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

Mini-Circuits ISO 9001 & ISO 14001 Certified

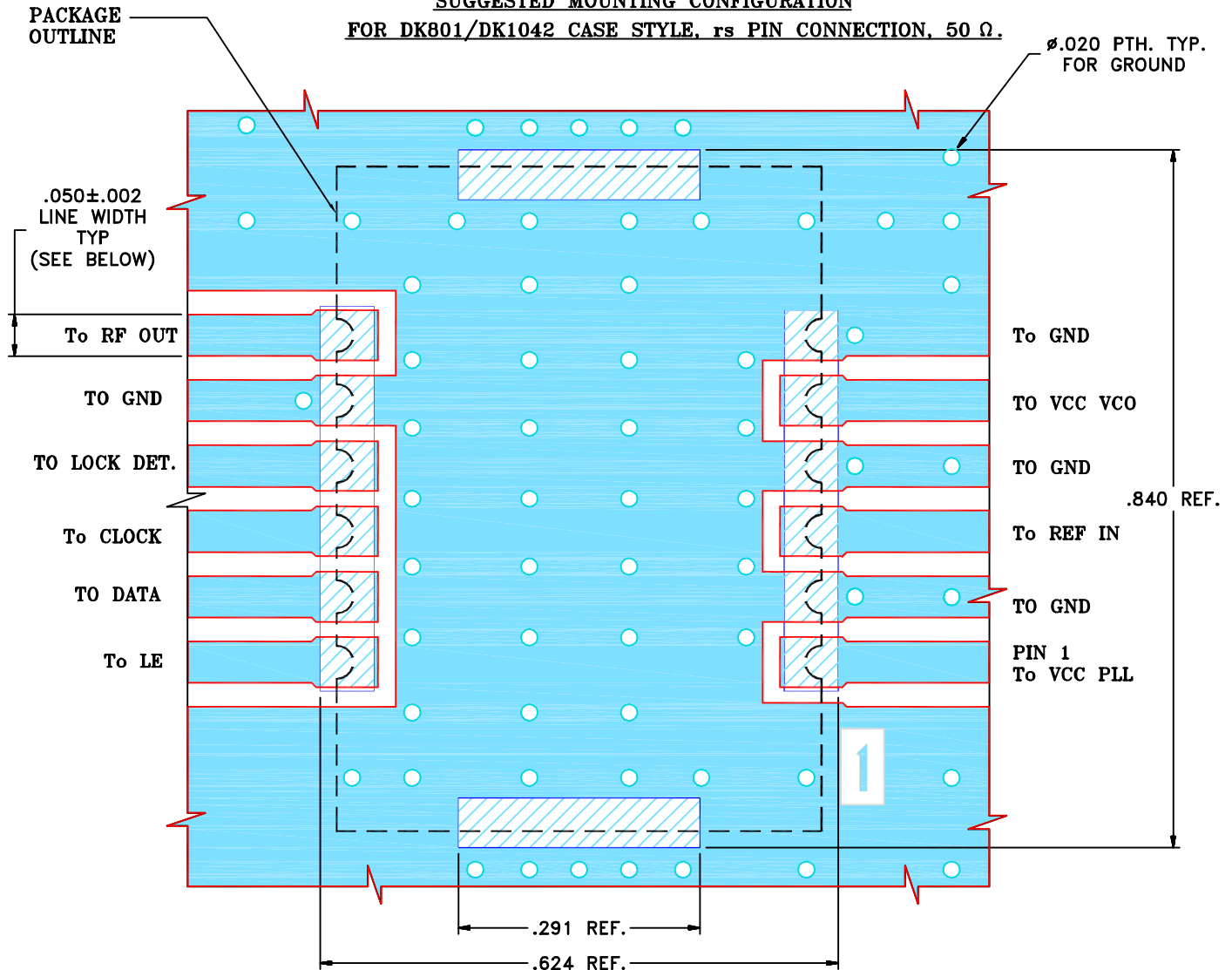
THIRD ANGLE PROJECTION



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 Ω . ϕ .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

Mini-Circuits®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE, MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

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


Mini-Circuits® 13 Neptune Avenue
Brooklyn NY 11235

PL, rs ,DK801/DK1042, KSN
TB-567+ (50 Ω)

SIZE
A

CODE IDENT
15542

DRAWING NO:
98-PL-249

REV:
B

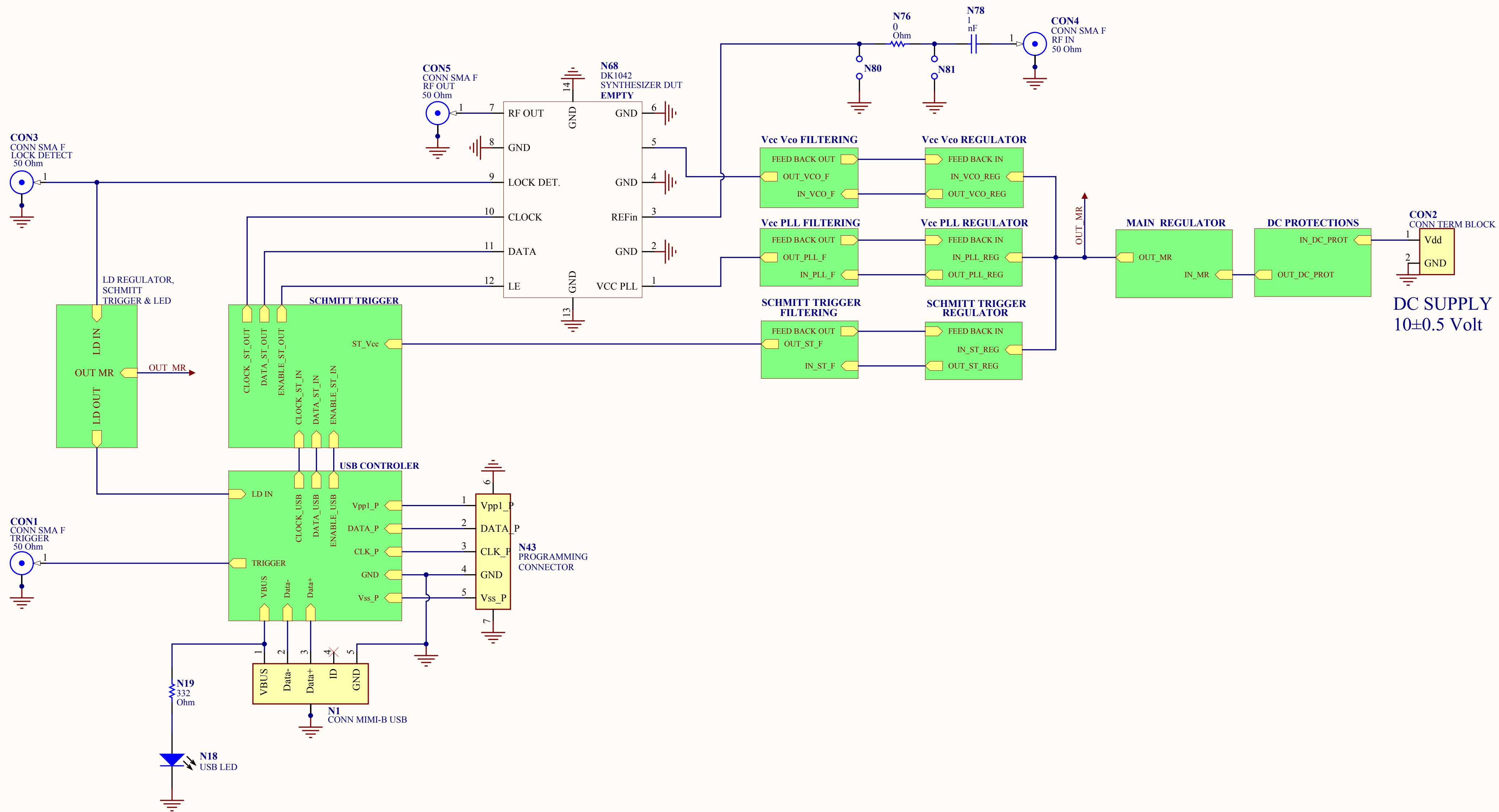
FILE: 98PL249

SCALE: 5:1

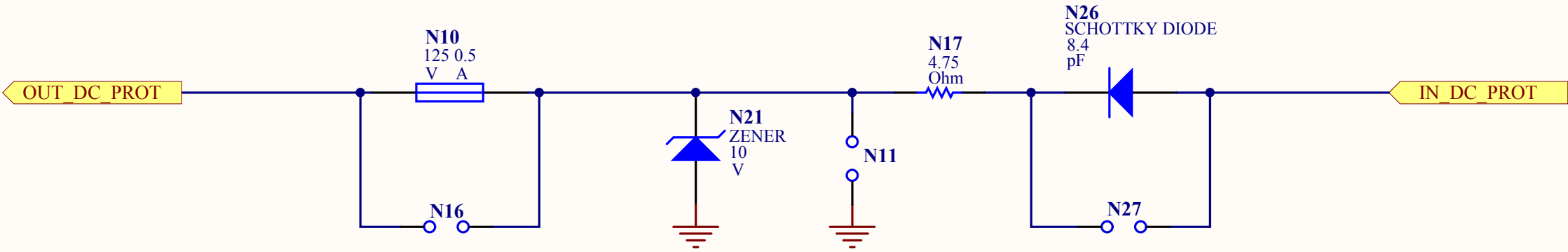
SHEET: 1 OF 1

ELECTRICAL SCHEME-GENERAL

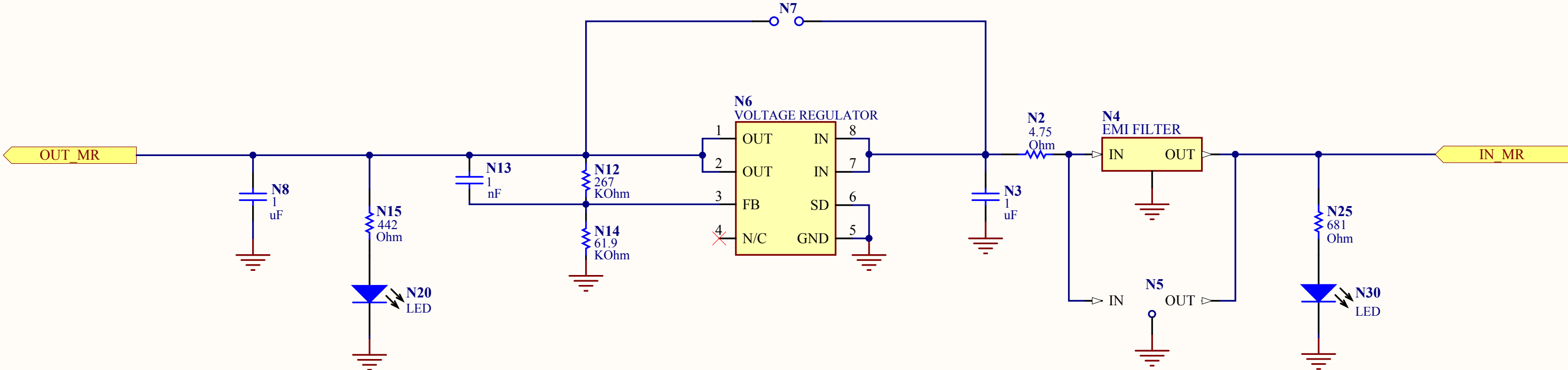
(TB for KSN)



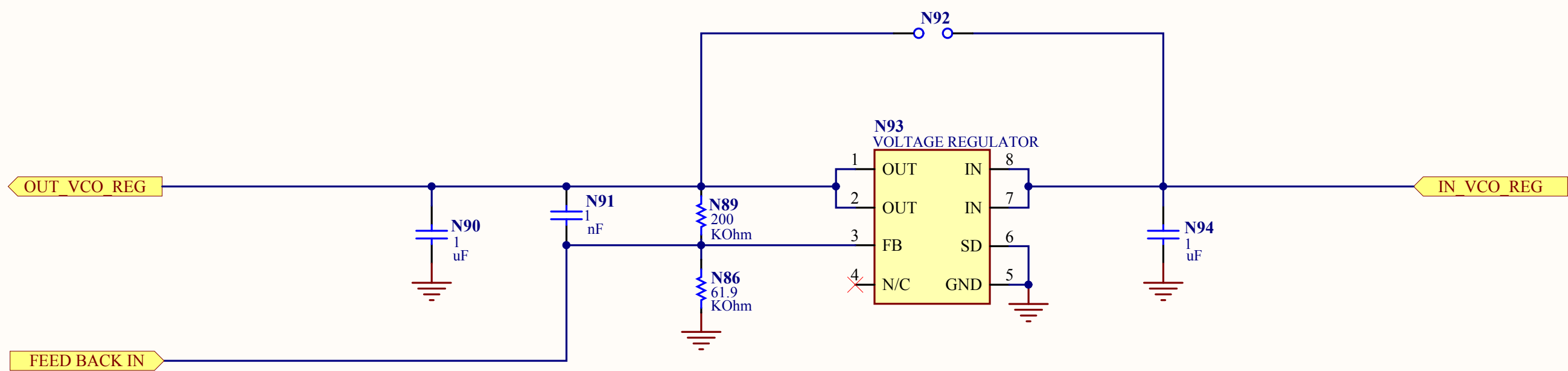
DC PROTECTIONS



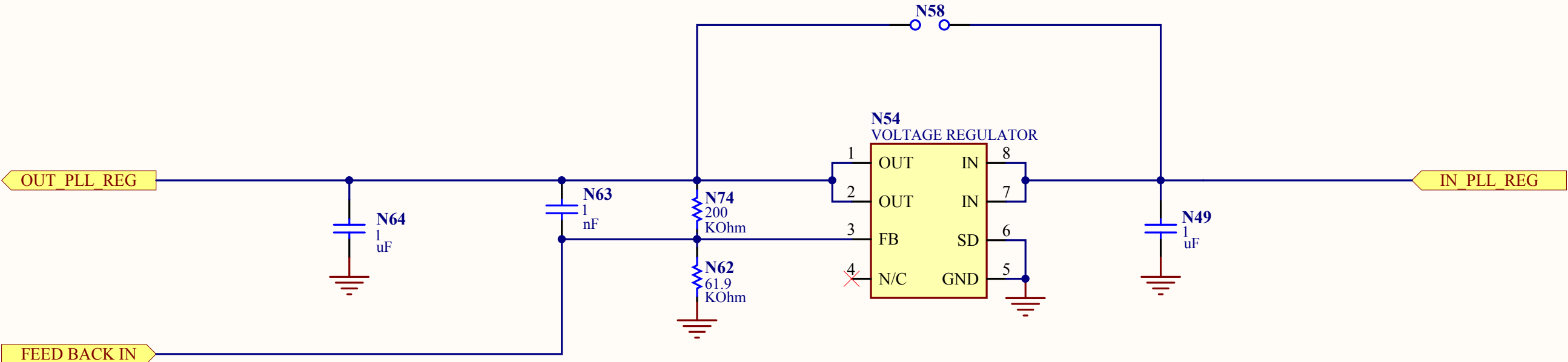
MAIN REGULATOR



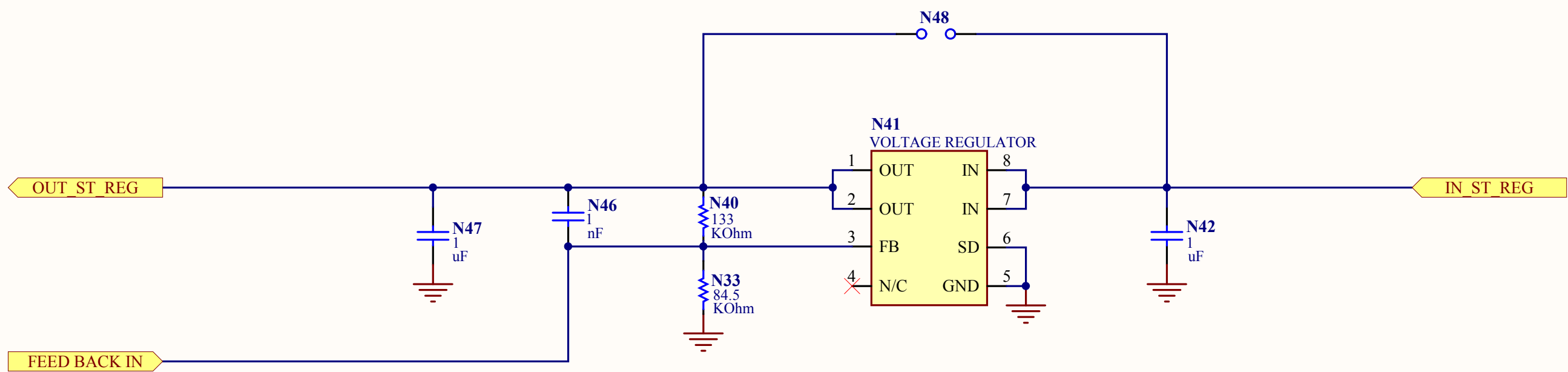
VCC VCO REGULATOR



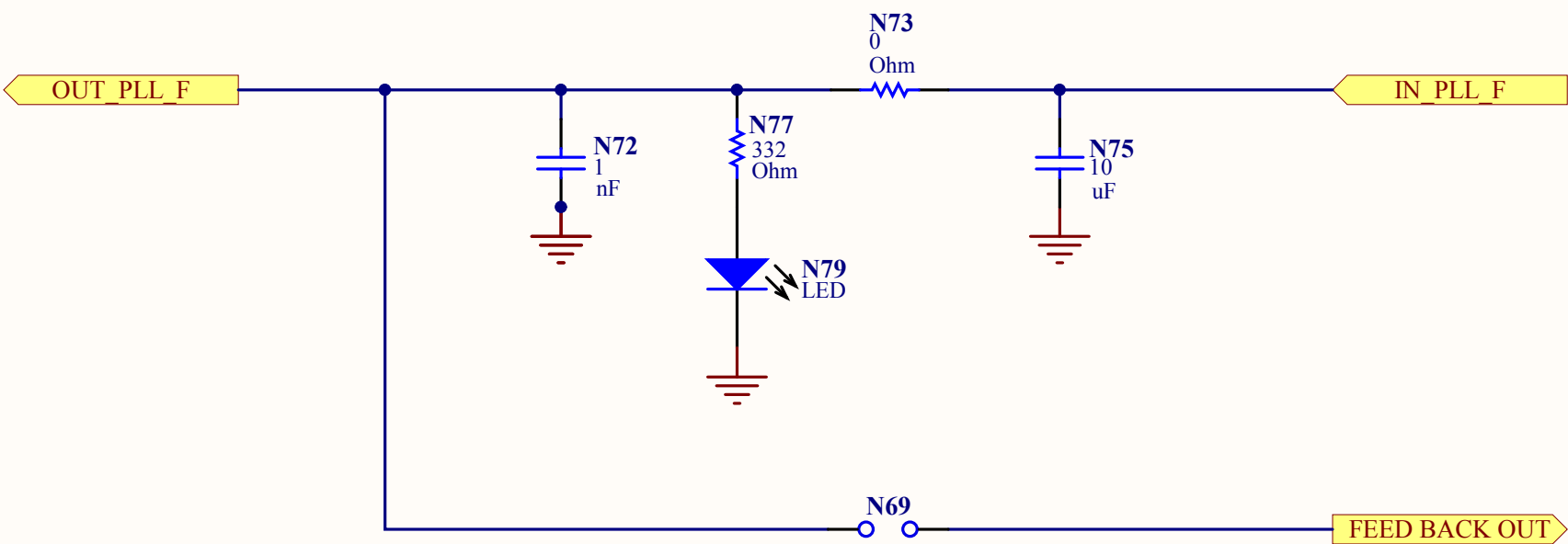
VCC PLL REGULATOR



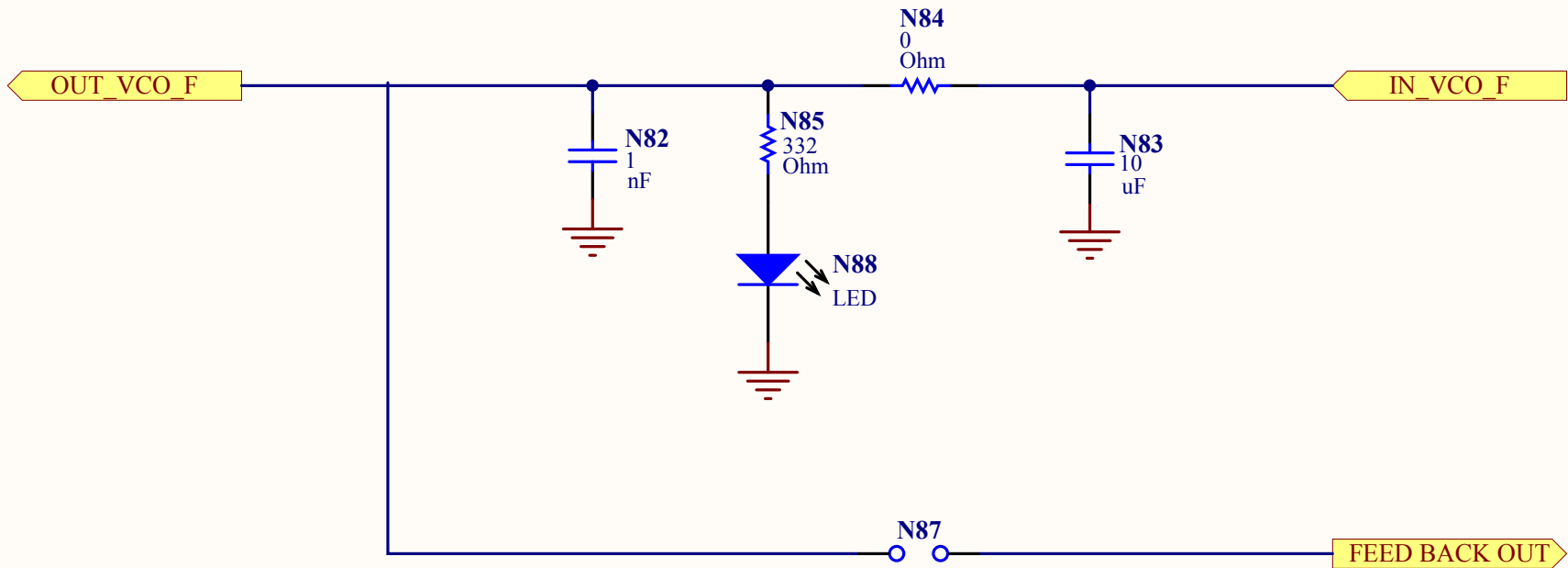
SCHMITT TRIGGER REGULATOR



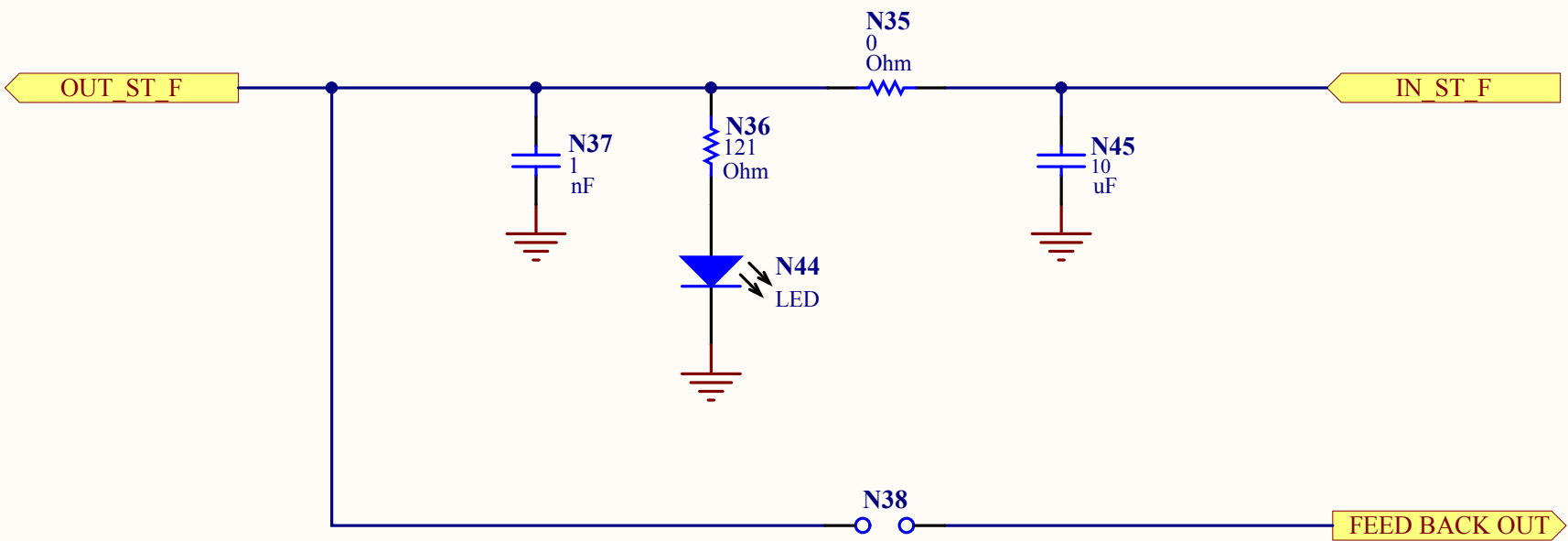
VCC PLL FILTERING



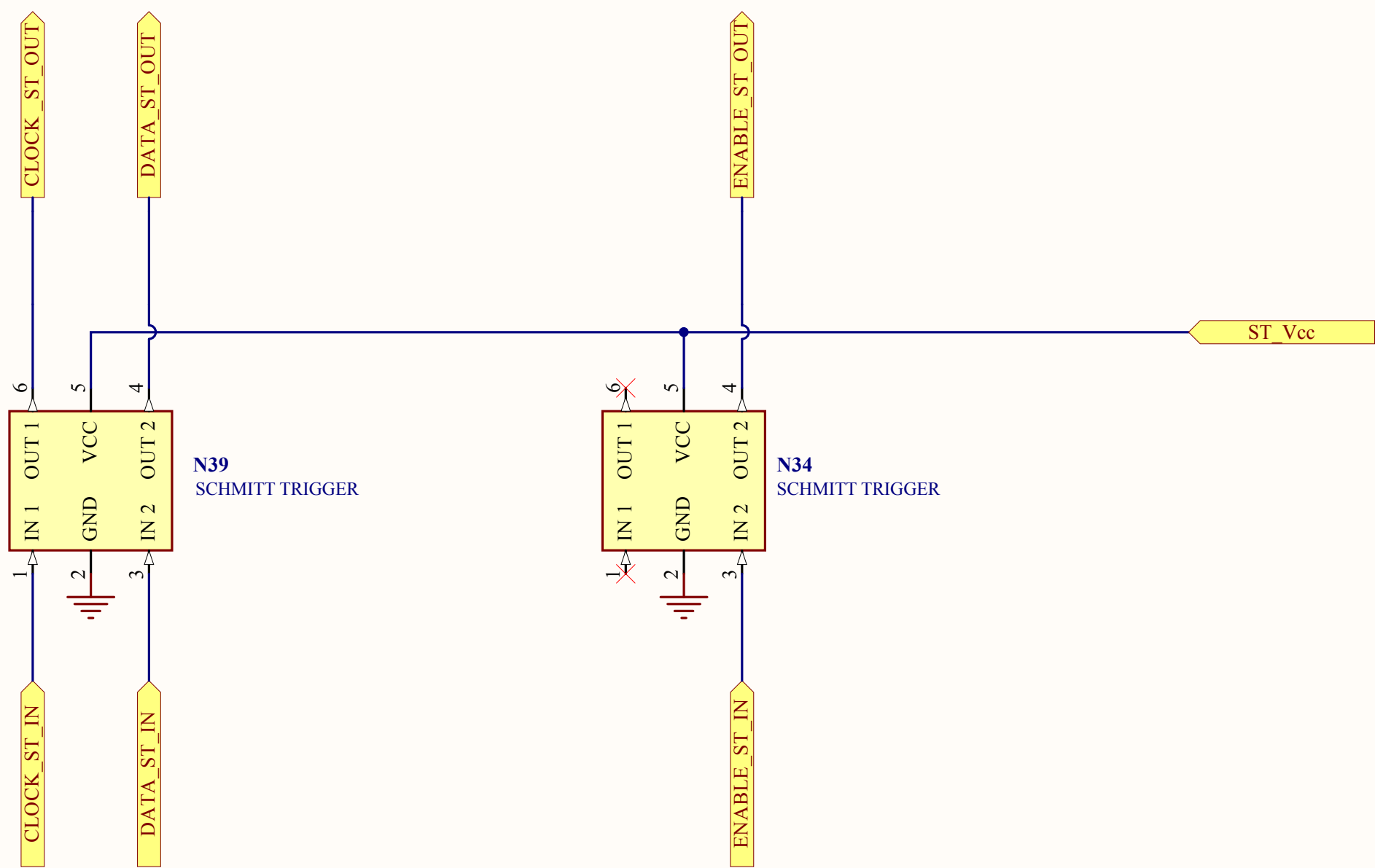
VCC VCO FILTERING



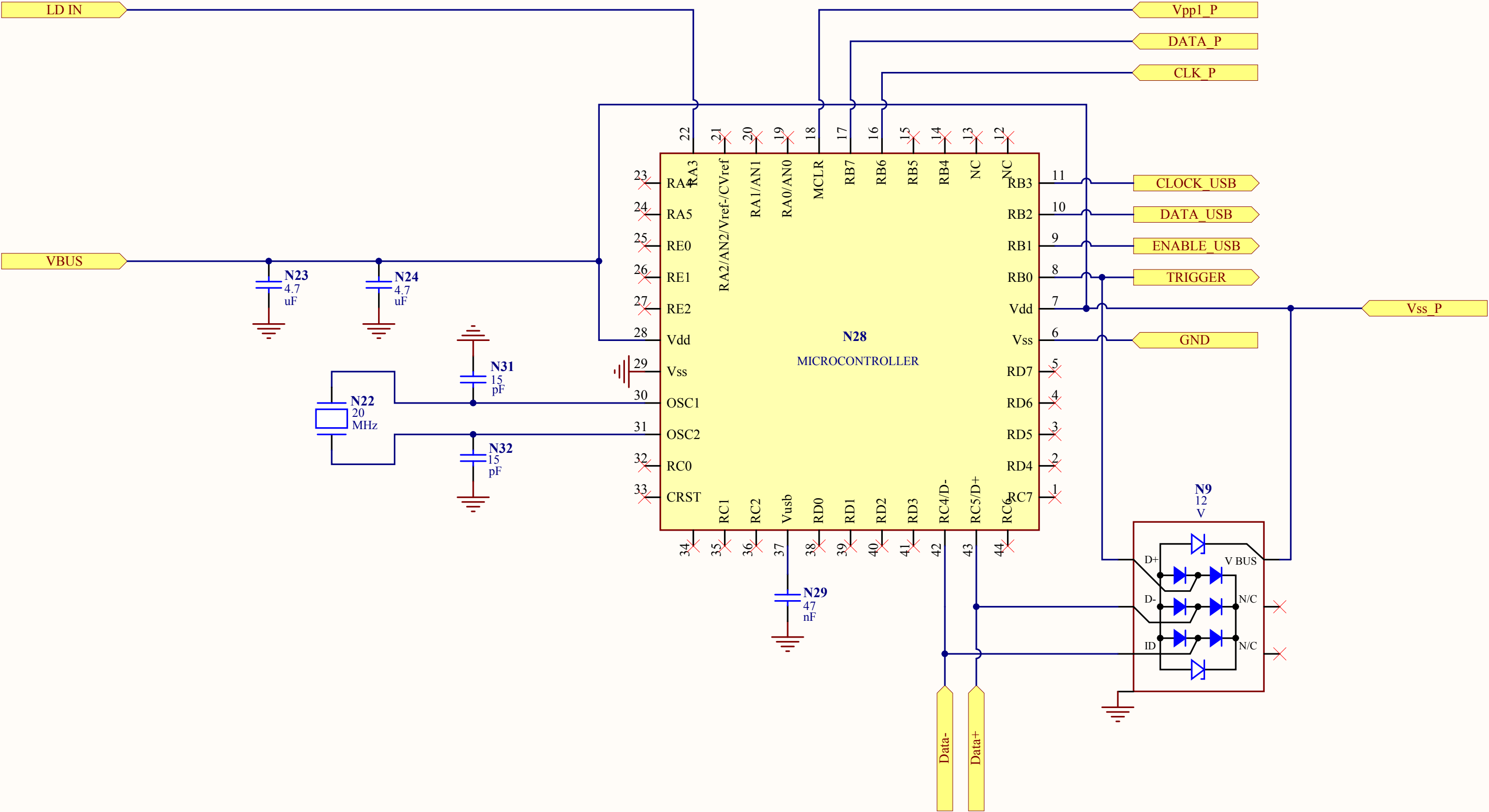
SCHMITT TRIGGER FILTERING



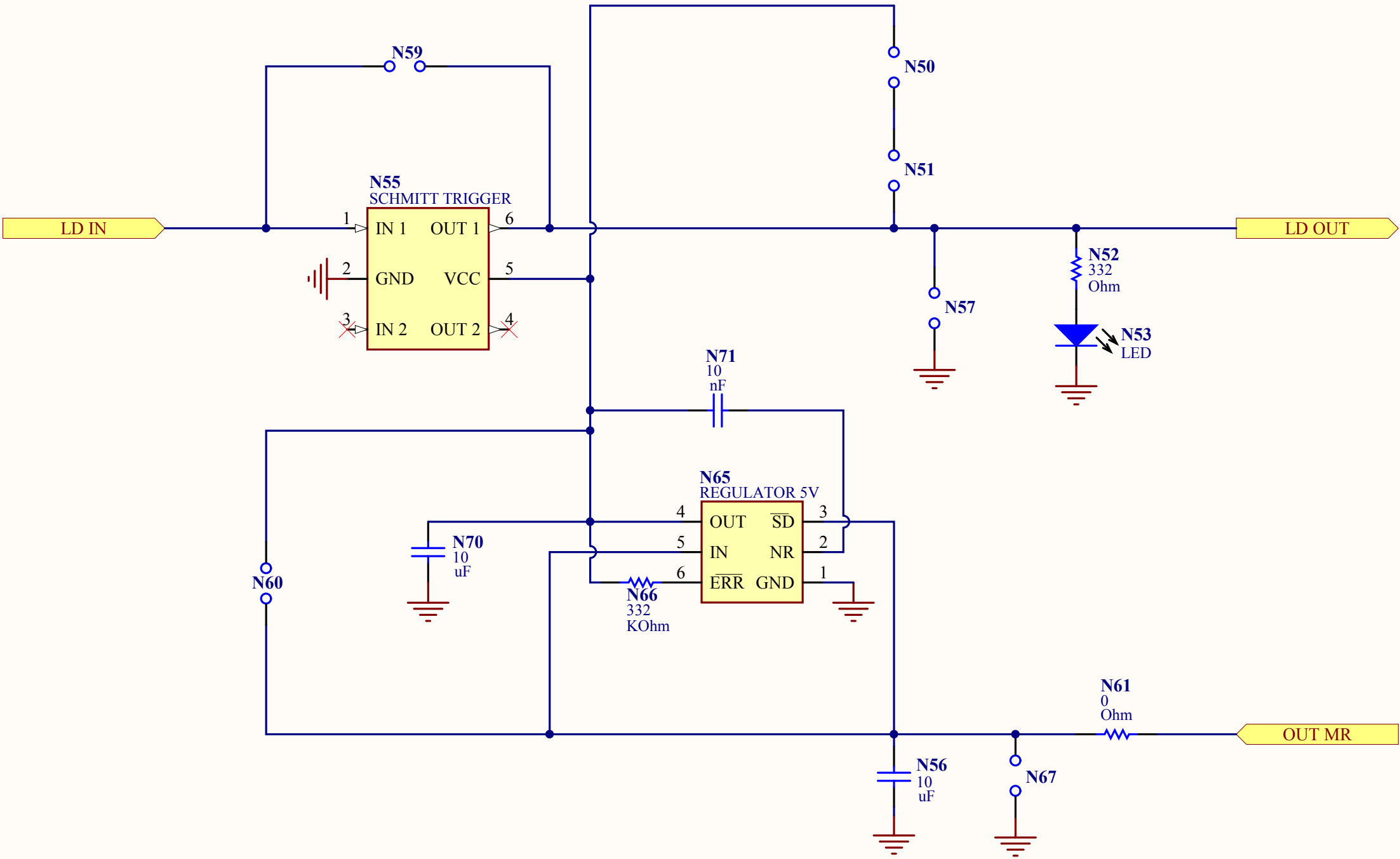
SCHMITT TRIGGER



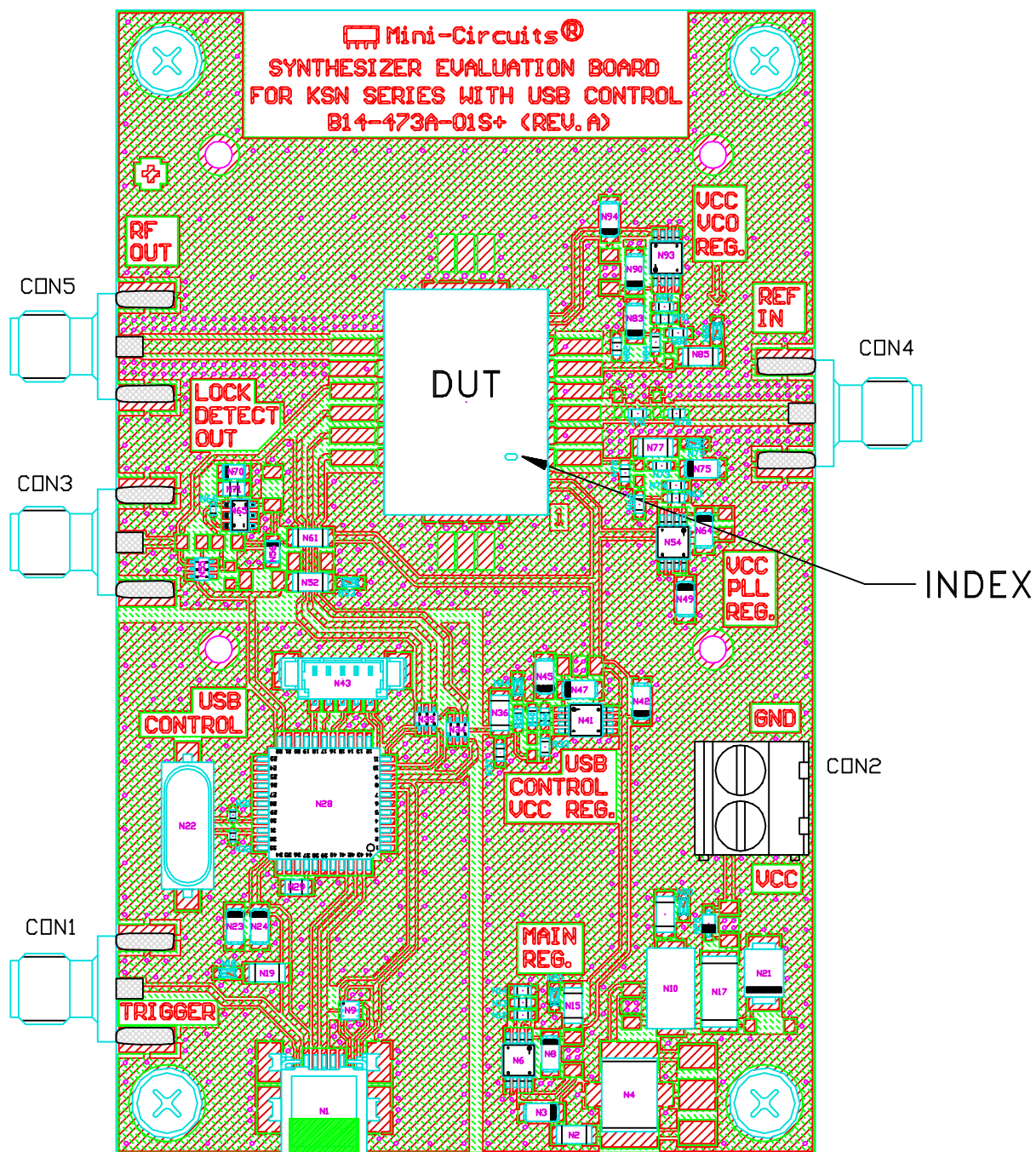
USB CONTROLER



LD REGULATOR SCHMITT TRIGGER AND LED



Evaluation Board and Circuit



TB-567+

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 Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C 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 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; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215