

Frequency Synthesizer

KSN-1590A-119+

50Ω 1567.5 to 1582.5 MHz

The Big Deal

- Fractional N synthesizer
- Low phase noise and spurious
- Robust design and construction
- Small size 0.80" x 0.58" x 0.24"



CASE STYLE: DK1171

Product Overview

The KSN-1590A-119+ is a Frequency Synthesizer, designed to operate from 1567.5 to 1582.5 MHz for CDMA cellular basestation application. The KSN-1590A-119+ is packaged in a metal case (size of 0.80" x 0.58" x 0.24") to shield against unwanted signals and noise.

Key Features

Feature	Advantages
Low phase noise and spurious: • Phase Noise: -109 dBc/Hz typ. @ 10 kHz offset • Step Size Spurious: -95 dBc typ. • Comparison Spurious: -90 dBc typ. • Reference Spurious: -90 dBc typ.	Low phase noise and spurious improve system EVM (Error Vector Magnitude).
Robust design and construction	To enhance the robustness of KSN-1590A-119+, 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 0.24"	The small size enables the KSN-1590A-119+ to be used in compact designs.



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50Ω 1567.5 to 1582.5 MHz

Features

- Fractional N synthesizer
- Integrated VCO + PLL
- Low phase noise and spurious
- Robust design and construction
- Low operating voltage (VCC VCO=+5V, VCC PLL=+3.3V)
- Small size 0.80" x 0.58" x 0.24"

Applications

- CDMA cellular basestation

General Description

The KSN-1590A-119+ is a Frequency Synthesizer, designed to operate from 1567.5 to 1582.5 MHz for CDMA cellular basestation application. The KSN-1590A-119+ is packaged in a metal case (size of 0.80" x 0.58" x 0.24") to shield against unwanted signals and noise. To enhance the robustness of KSN-1590A-119+, 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.



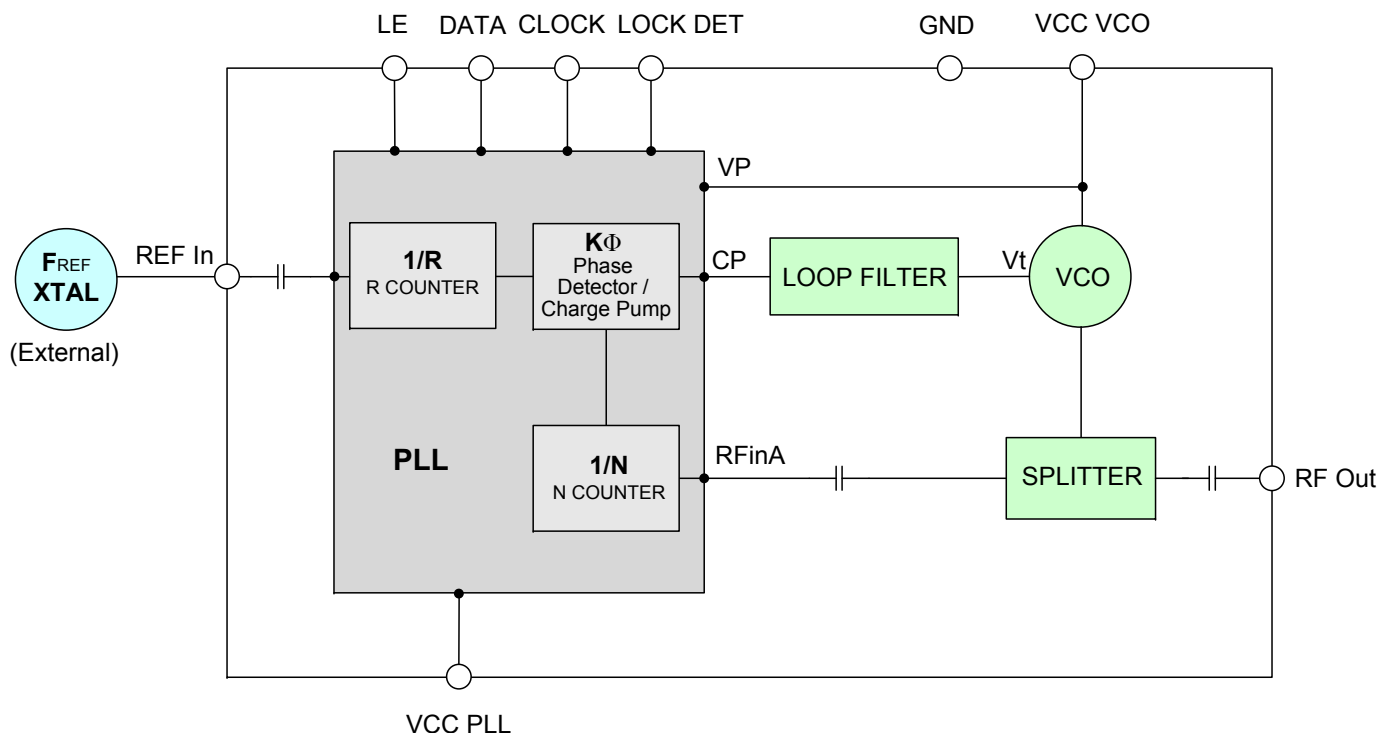
CASE STYLE: DK1171

PRICE: \$29.95 ea. QTY (1-9)

+ 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



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REV. OR
M126018
EDR-9790F1
KSN-1590A-119+
Category-A1
RAV
100318
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Electrical Specifications (over operating temperature -40°C to +85°C)

Parameters		Test Conditions	Min.	Typ.	Max.	Units
Frequency Range		-	1567.5	-	1582.5	MHz
Step Size		-	-	250	-	kHz
Comparison Frequency		-	-	30	-	MHz
Settling Time		Within ± 1 kHz	-	8	-	mSec
Output Power		-	-2.0	+1.7	+4.0	dBm
SSB Phase Noise	@ 100 Hz offset	-	-	-86	-	dBc/Hz
	@ 1 kHz offset	-	-	-95	-85	
	@ 10 kHz offset	-	-	-108	-105	
	@ 100 kHz offset	-	-	-135	-125	
	@ 1 MHz offset	-	-	-154	-137	
Step Size Spurious Suppression		Step Size 250 kHz	-	-95	-70	dBc
0.5 Step Size Spurious Suppression		0.5 Step Size 125 kHz	-	-87	-70	
Reference Spurious Suppression		Ref. Freq. 60 MHz	-	-90	-75	
Comparison Spurious Suppression		Comp. Freq. 30 MHz	-	-90	-70	
Non - Harmonic Spurious Suppression		-	-	-90	-	
Harmonic Suppression		-	-	-20	-13	dBc
VCO Supply Voltage		+5.00	4.75	5.00	5.25	V
PLL Supply Voltage		+3.30	3.15	3.30	3.45	
VCO Supply Current		-	-	26	35	mA
PLL Supply Current		-	-	17	25	
Reference Input (External)	Frequency	60 (square wave)	-	60	-	MHz
	Amplitude	1	-	1	-	V _{P-P}
	Input impedance	-	-	100	-	K Ω
	Phase Noise @ 1 kHz offset	-	-	-135	-	dBc/Hz
RF Output port Impedance		-	-	50	-	Ω
Input Logic Level	Input high voltage	-	2.80	-	-	V
	Input low voltage	-	-	-	0.60	V
Digital Lock Detect	Locked	-	2.75	-	3.45	V
	Unlocked	-	-	-	0.40	V
Frequency Synthesizer PLL		-	ADF4153			
PLL Programming		-	3-wire serial 3.3V CMOS			
Register Map @ 1582.5 MHz	R0_Register	-	(MSB) 1101000000101101000 (LSB)			
	R1_Register	-	(MSB) 100001000000111100001 (LSB)			
	R2_Register	-	(MSB) 1111100010 (LSB)			
	R3_Register	-	(MSB) 1111000111 (LSB)			

Absolute Maximum Ratings

Parameters	Ratings
VCO Supply Voltage	5.8V
PLL Supply Voltage	4.0V
VCO Supply Voltage to PLL Supply Voltage	-0.3V to +5.8V
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



Typical Performance Data

FREQUENCY (MHz)	POWER OUTPUT (dBm)			VCO CURRENT (mA)			PLL CURENT (mA)		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
1567.5	1.62	1.76	1.72	25.70	26.09	27.05	15.52	17.06	19.18
1569.0	1.61	1.76	1.72	25.71	26.09	27.05	15.49	16.82	19.02
1570.5	1.60	1.75	1.72	25.72	26.09	27.05	15.45	16.58	18.90
1572.0	1.60	1.75	1.72	25.72	26.10	27.06	15.53	17.08	19.62
1573.5	1.59	1.74	1.72	25.73	26.10	27.06	15.66	17.22	19.77
1575.0	1.59	1.74	1.72	25.73	26.11	27.07	15.75	17.32	19.50
1576.5	1.59	1.74	1.72	25.74	26.12	27.08	15.73	17.31	19.49
1578.0	1.58	1.74	1.72	25.75	26.12	27.09	15.72	17.30	19.50
1579.5	1.58	1.74	1.72	25.75	26.13	27.09	15.73	17.31	19.56
1581.0	1.58	1.74	1.72	25.76	26.14	27.10	15.74	17.32	19.57
1582.5	1.58	1.74	1.72	25.76	26.15	27.11	15.53	17.10	19.40

FREQUENCY (MHz)	HARMONICS (dBc)					
	F2			F3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
1567.5	-17.09	-20.21	-22.98	-40.00	-43.89	-44.13
1569.0	-17.13	-20.31	-23.00	-40.39	-44.05	-45.02
1570.5	-17.18	-20.32	-23.00	-40.79	-44.31	-44.99
1572.0	-17.19	-20.31	-23.01	-41.07	-44.52	-44.91
1573.5	-17.19	-20.30	-23.03	-41.31	-44.65	-44.72
1575.0	-17.21	-20.28	-23.04	-41.45	-44.77	-44.54
1576.5	-17.25	-20.29	-23.01	-41.43	-44.64	-44.89
1578.0	-17.30	-20.30	-22.99	-41.40	-44.50	-45.24
1579.5	-17.37	-20.35	-23.00	-41.49	-44.73	-45.30
1581.0	-17.45	-20.42	-23.04	-41.58	-45.13	-45.20
1582.5	-17.51	-20.45	-23.04	-41.76	-45.77	-45.88



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FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+25°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1567.5	-86.64	-94.21	-109.25	-135.21	-154.01
1569.0	-87.21	-94.71	-108.60	-134.87	-154.79
1570.5	-86.77	-94.45	-108.88	-135.00	-154.85
1572.0	-86.29	-94.35	-109.00	-135.15	-154.78
1573.5	-85.73	-94.54	-108.78	-135.38	-154.47
1575.0	-85.18	-94.74	-108.57	-135.60	-154.16
1576.5	-85.07	-95.31	-108.80	-135.25	-154.25
1578.0	-84.97	-95.89	-109.02	-134.90	-154.35
1579.5	-85.37	-95.67	-109.15	-134.84	-154.59
1581.0	-86.04	-95.07	-109.21	-134.94	-154.90
1582.5	-87.88	-94.28	-109.02	-135.59	-154.64

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	-45°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1567.5	-87.63	-95.60	-107.86	-135.29	-155.10
1569.0	-86.88	-95.78	-108.13	-135.35	-153.88
1570.5	-86.13	-95.96	-108.39	-135.41	-152.67
1572.0	-86.03	-96.25	-108.33	-135.48	-152.45
1573.5	-86.26	-96.59	-108.09	-135.55	-152.75
1575.0	-86.26	-96.77	-108.02	-135.51	-152.94
1576.5	-85.81	-96.63	-108.25	-135.25	-152.92
1578.0	-85.36	-96.48	-108.48	-134.98	-152.91
1579.5	-85.82	-96.89	-108.71	-135.18	-153.19
1581.0	-86.28	-97.30	-108.93	-135.38	-153.48
1582.5	-88.62	-96.28	-108.18	-135.67	-155.51

FREQUENCY (MHz)	PHASE NOISE (dBc/Hz) @ OFFSETS				
	+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz
1567.5	-86.45	-96.83	-108.39	-133.62	-154.14
1569.0	-85.29	-96.45	-108.12	-133.72	-153.98
1570.5	-84.86	-96.55	-108.07	-133.57	-153.83
1572.0	-84.88	-96.64	-108.05	-133.50	-153.81
1573.5	-85.76	-96.74	-108.09	-133.58	-154.06
1575.0	-86.65	-96.83	-108.12	-133.66	-154.32
1576.5	-87.43	-96.60	-108.22	-133.66	-154.47
1578.0	-88.21	-96.37	-108.32	-133.66	-154.63
1579.5	-87.77	-96.21	-108.51	-133.77	-154.70
1581.0	-86.71	-96.10	-108.76	-133.92	-154.74
1582.5	-89.21	-96.49	-108.72	-133.85	-154.49



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COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @ Fcarrier 1567.5MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @ Fcarrier 1575MHz+(n*Fcomparison) (dBc) note 1			COMPARISON SPURIOUS @ Fcarrier 1582.5MHz+(n*Fcomparison) (dBc) note 1		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-90.97	-97.23	-88.30	-90.97	-95.90	-89.03	-92.92	-97.55	-89.45
-4	-83.19	-84.17	-89.16	-89.85	-105.99	-90.97	-89.54	-101.14	-91.78
-3	-90.81	-88.26	-92.97	-90.71	-87.51	-93.36	-88.01	-86.65	-95.05
-2	-83.76	-97.35	-89.83	-84.04	-96.69	-88.96	-83.55	-95.51	-90.28
-1	-88.06	-91.57	-93.46	-88.53	-90.92	-92.98	-87.19	-90.14	-92.38
0 note 2	-	-	-	-	-	-	-	-	-
+1	-84.40	-99.13	-94.87	-86.25	-97.00	-94.03	-87.57	-95.86	-93.10
+2	-88.67	-97.66	-87.17	-90.06	-91.77	-87.08	-92.81	-93.50	-87.82
+3	-86.72	-97.36	-94.53	-89.12	-96.87	-93.64	-92.25	-97.39	-92.98
+4	-79.15	-81.53	-85.83	-86.64	-100.71	-89.35	-88.82	-93.36	-91.21
+5	-88.36	-101.78	-91.79	-89.04	-104.20	-93.64	-89.43	-116.38	-94.68

Note 1: Comparison frequency 30 MHz

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

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @ Fcarrier 1567.5MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @ Fcarrier 1575MHz+(n*Freference) (dBc) note 3			REFERENCE SPURIOUS @ Fcarrier 1582.5MHz+(n*Freference) (dBc) note 3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-93.15	-88.88	-99.86	-96.96	-90.03	-100.09	-92.95	-88.83	-103.00
-4	-85.93	-89.99	-100.59	-89.07	-91.22	-97.49	-88.61	-91.27	-95.42
-3	-82.21	-95.12	-100.45	-84.85	-94.50	-102.05	-85.97	-93.67	-99.00
-2	-90.74	-84.07	-88.80	-90.25	-106.42	-90.50	-90.36	-100.64	-91.08
-1	-81.27	-97.35	-88.97	-84.09	-96.77	-87.89	-83.47	-96.11	-89.19
0 note 4	-	-	-	-	-	-	-	-	-
+1	-85.48	-97.46	-87.02	-90.04	-91.78	-86.63	-92.89	-93.60	-87.35
+2	-82.98	-81.51	-86.07	-86.76	-100.92	-89.30	-88.88	-93.19	-90.44
+3	-90.30	-85.34	-97.04	-94.96	-87.08	-97.68	-95.95	-89.08	-97.38
+4	-94.22	-101.97	-102.81	-90.67	-98.32	-100.45	-89.74	-98.50	-98.78
+5	-90.36	-100.54	-109.16	-90.68	-99.73	-109.68	-89.59	-97.12	-109.43

Note 3: Reference frequency 60 MHz

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



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STEP SIZE SPURIOUS ORDER	0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 1567.5MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 1575MHz+(n*Fstep size) (dBc) note 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @Fcarrier 1582.5MHz+(n*Fstep size) (dBc) note 5		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5.0	-120.10	-117.13	-117.14	-107.14	-104.42	-117.21	-109.82	-112.51	-113.96
-4.5	-105.85	-107.98	-118.55	-105.17	-104.54	-119.03	-108.57	-109.86	-117.42
-4.0	-113.82	-111.31	-117.53	-102.08	-102.88	-116.28	-118.17	-111.18	-118.82
-3.5	-105.96	-101.52	-116.90	-99.95	-101.54	-115.70	-103.61	-117.06	-114.68
-3.0	-106.86	-104.43	-110.58	-107.70	-110.88	-112.50	-102.24	-110.76	-113.45
-2.5	-94.87	-100.78	-111.53	-101.19	-94.64	-109.47	-99.89	-108.57	-114.10
-2.0	-104.98	-113.60	-111.15	-103.47	-105.95	-108.77	-101.96	-112.23	-106.66
-1.5	-94.46	-107.07	-104.85	-96.06	-88.78	-106.70	-101.13	-100.88	-108.15
-1.0	-100.29	-94.11	-101.02	-101.92	-97.80	-97.26	-96.92	-95.78	-95.81
-0.5	-85.14	-84.78	-86.00	-79.53	-86.89	-87.97	-86.43	-85.14	-89.79
0 note 6	-	-	-	-	-	-	-	-	-
+0.5	-86.86	-89.50	-86.47	-75.81	-83.61	-85.41	-84.89	-84.61	-86.96
+1.0	-89.84	-96.19	-99.36	-100.13	-98.09	-99.11	-99.99	-97.57	-102.02
+1.5	-93.79	-107.45	-103.57	-100.89	-88.68	-99.01	-107.17	-103.07	-107.77
+2.0	-112.62	-106.92	-110.43	-102.34	-107.02	-104.17	-110.82	-111.91	-112.26
+2.5	-98.78	-101.16	-106.92	-105.26	-94.65	-105.76	-94.83	-109.66	-111.04
+3.0	-116.85	-105.03	-109.17	-114.71	-111.39	-116.87	-105.07	-104.61	-113.25
+3.5	-102.82	-102.25	-113.46	-101.62	-100.31	-110.01	-104.64	-112.64	-113.51
+4.0	-109.43	-118.65	-110.92	-112.39	-102.62	-112.88	-115.85	-109.52	-115.06
+4.5	-118.65	-111.51	-111.98	-106.47	-105.77	-113.27	-107.92	-109.06	-112.67
+5.0	-114.63	-108.14	-117.00	-108.23	-105.08	-107.29	-107.50	-117.18	-121.72

Note 5: Step size 250 kHz

Note 6: All spurs are referenced to carrier signal (n=0).



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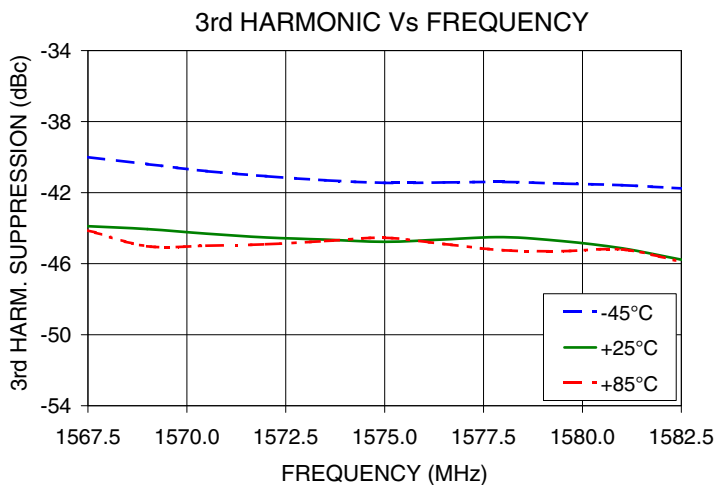
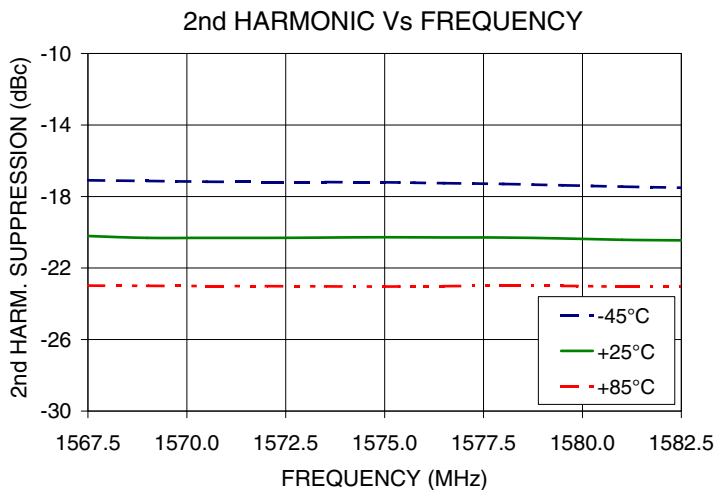
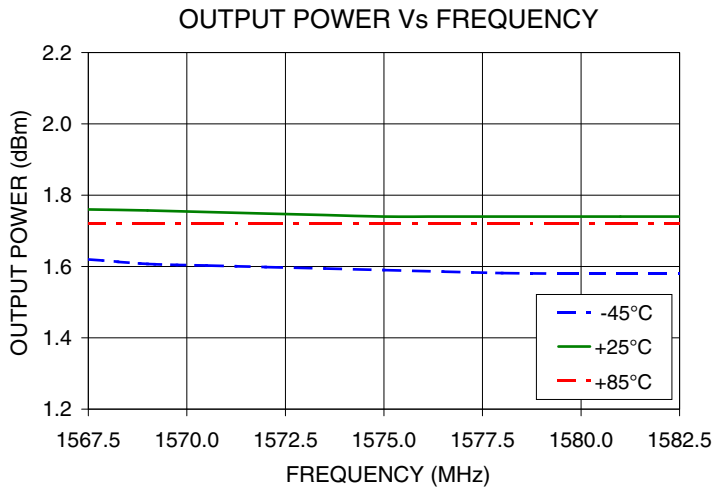


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Typical Performance Curves



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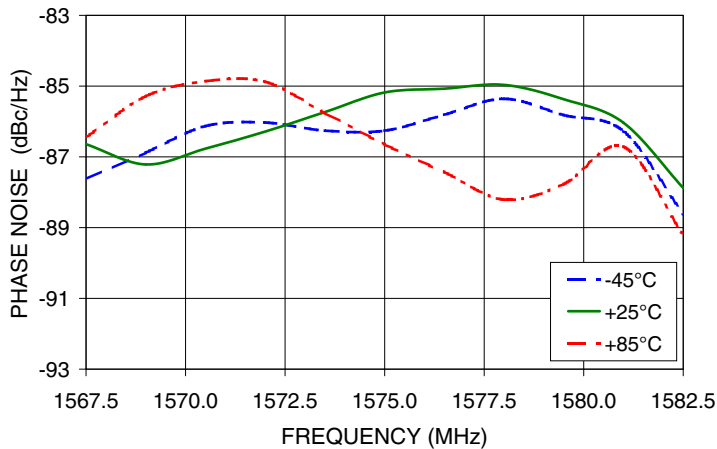


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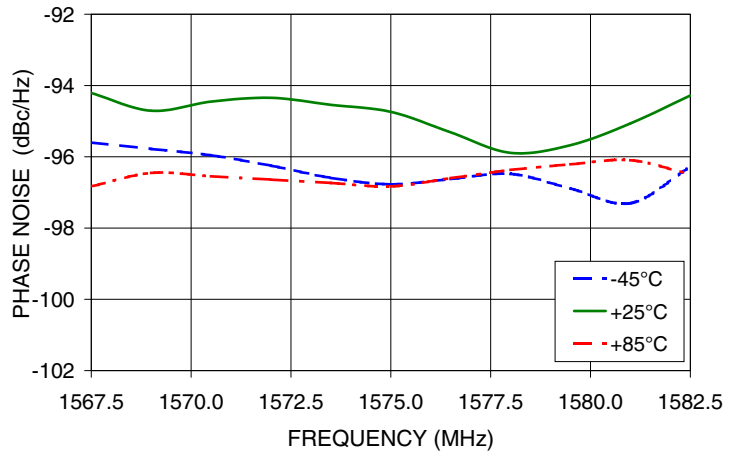


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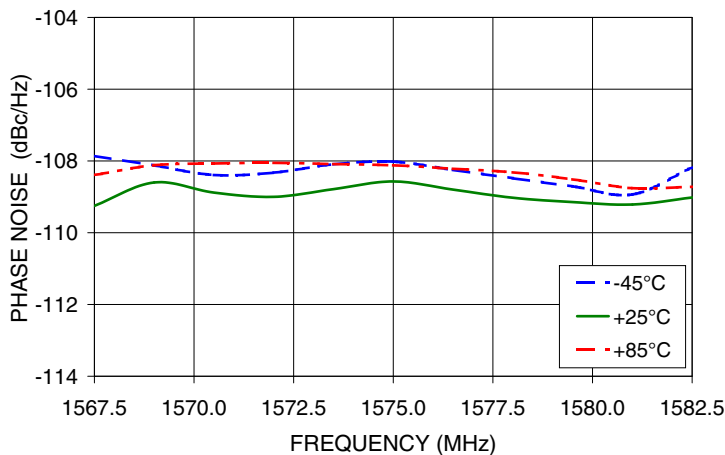
PHASE NOISE @ 100Hz offset



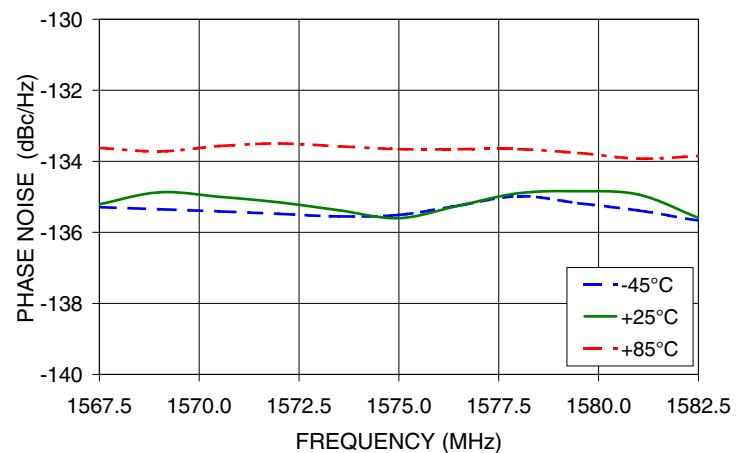
PHASE NOISE @ 1kHz offset



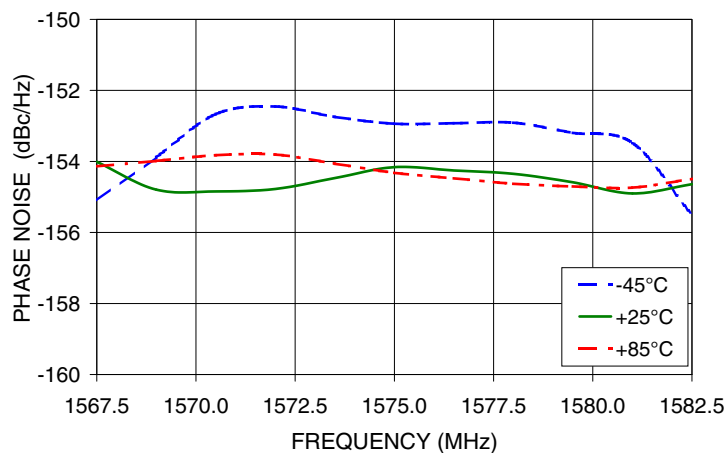
PHASE NOISE @ 10 kHz offset



PHASE NOISE @ 100 kHz offset



PHASE NOISE @ 1MHz offset



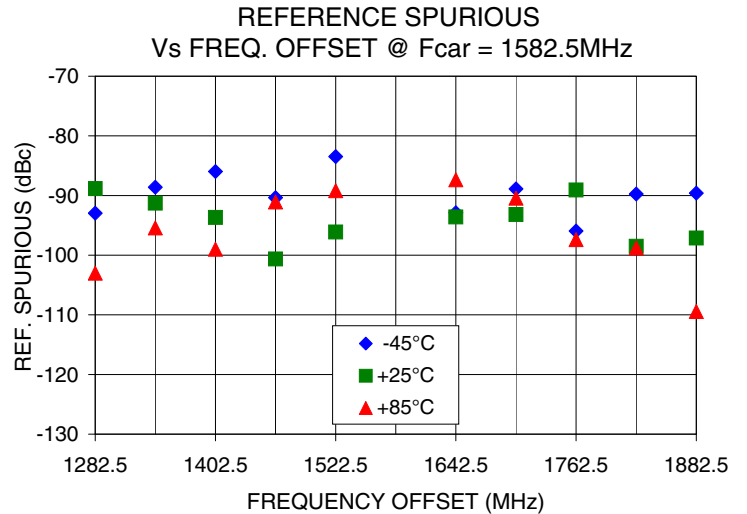
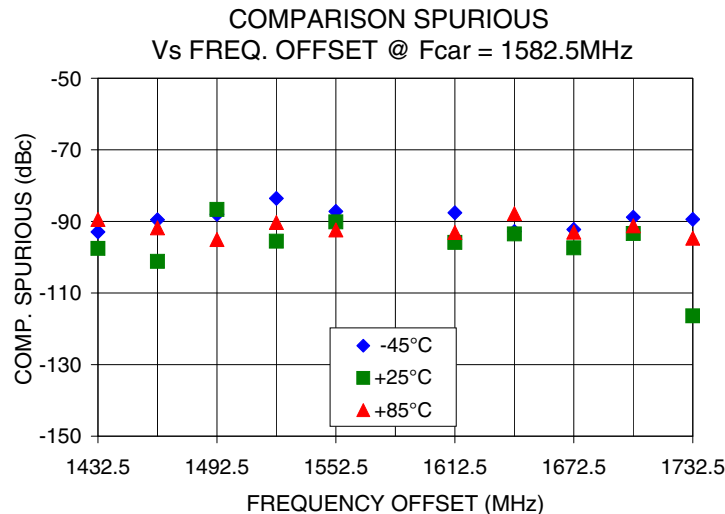
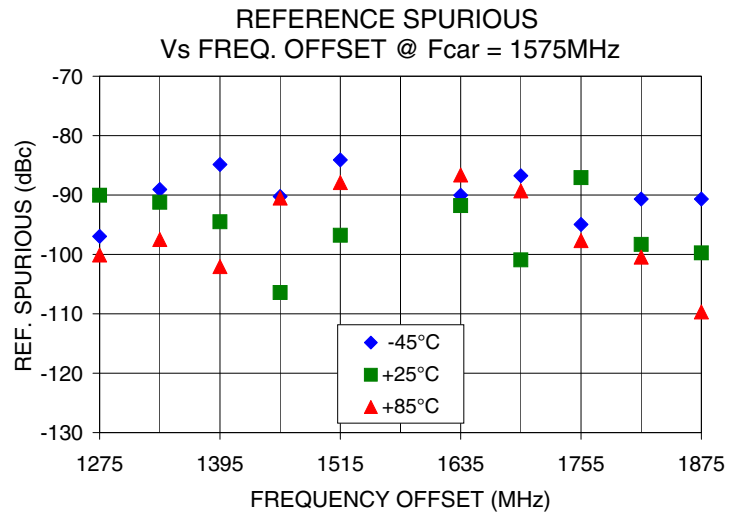
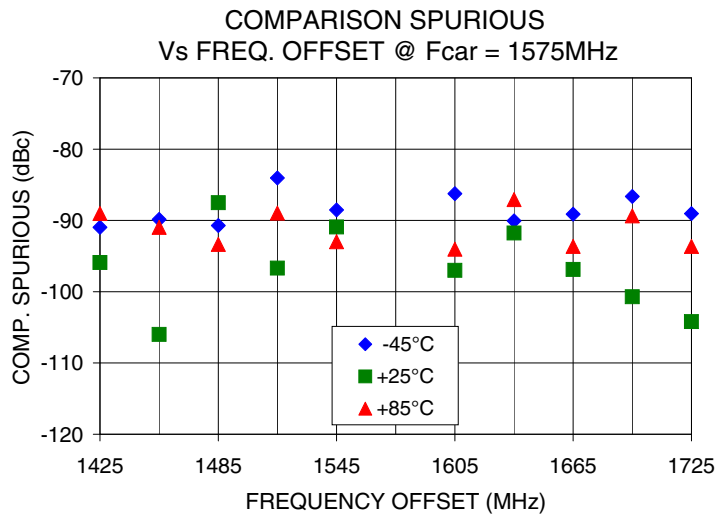
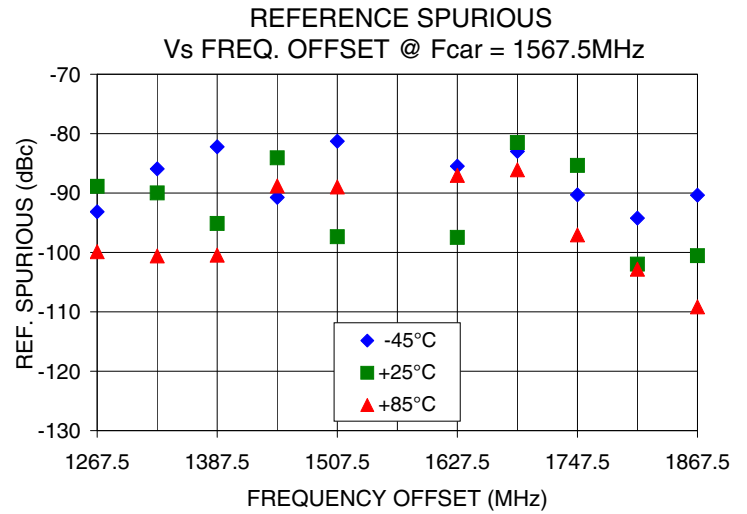
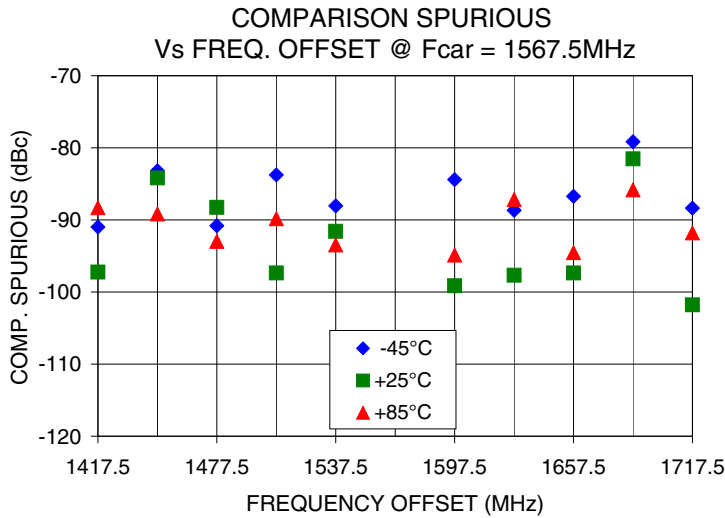
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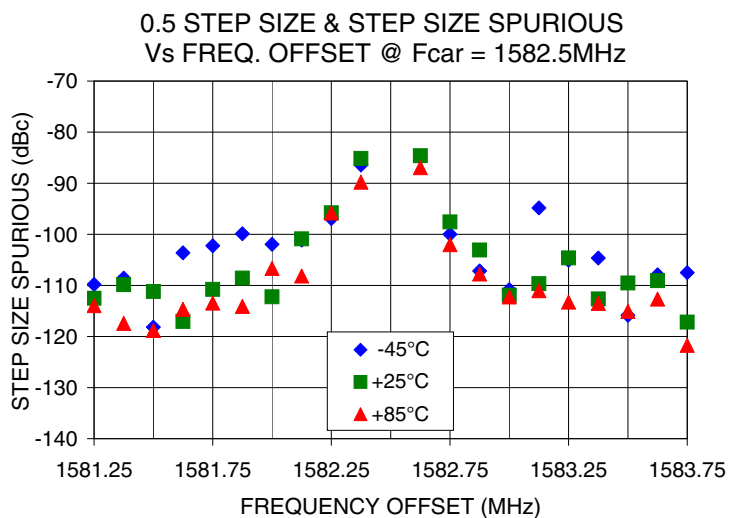
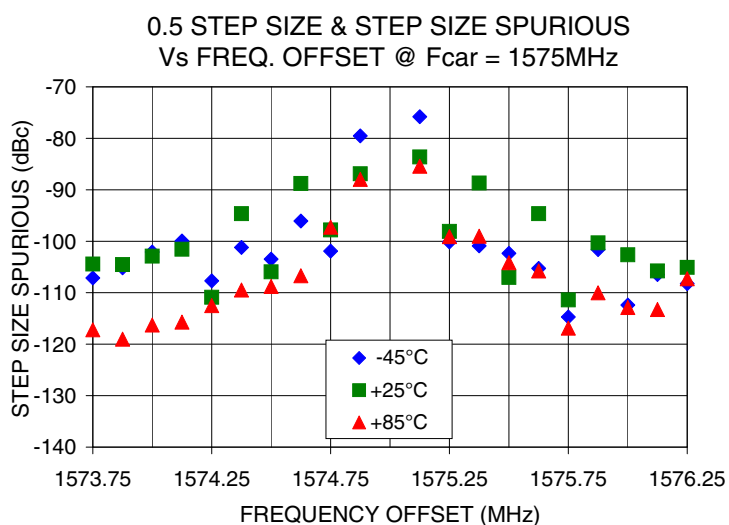
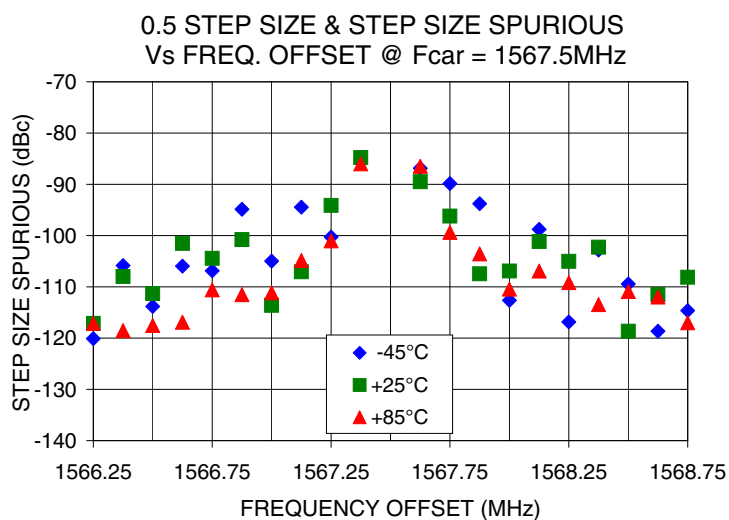
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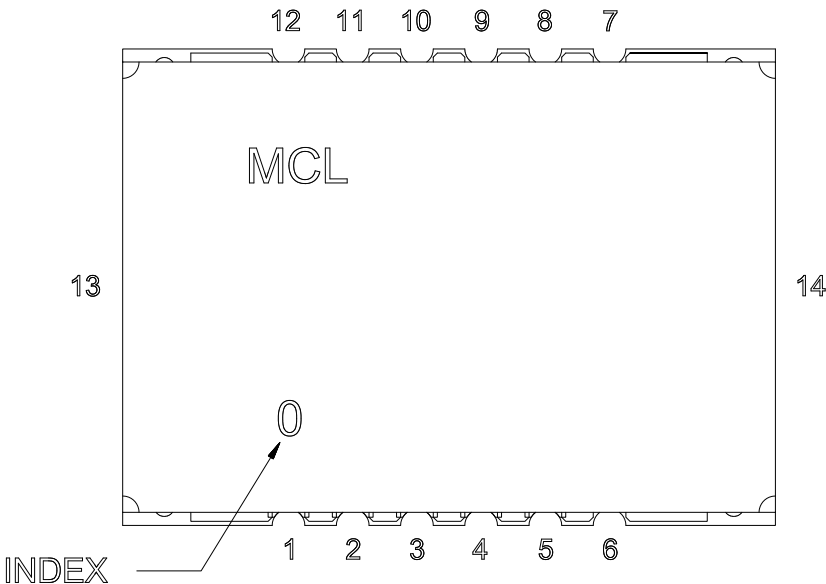


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Pin Configuration

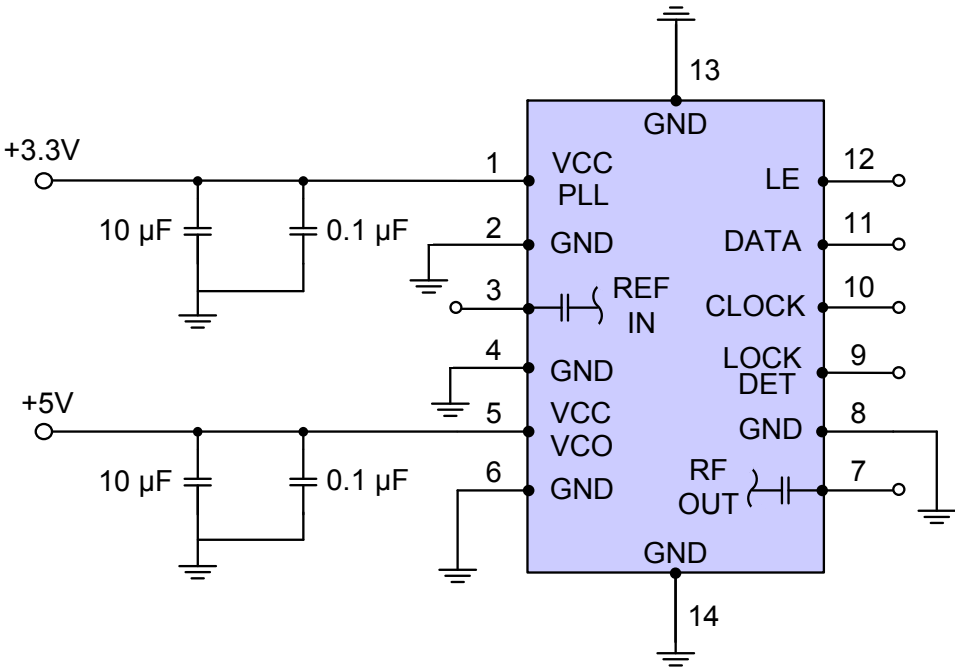


Pin Connection

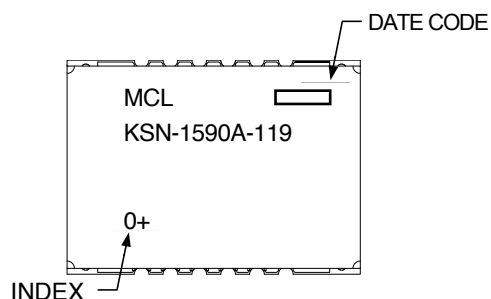
Pin Number	Function
1	VCC PLL
2	GND
3	REF IN
4	GND
5	VCC VCO
6	GND
7	RF OUT
8	GND
9	LOCK DET
10	CLOCK
11	DATA
12	LE
13	GND
14	GND

Recommended Application Circuit

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



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: DK1171

Tape & Reel: TR-F28

Suggested Layout for PCB Design: PL-249

Evaluation Board: TB-567-1+

Environment Ratings: ENV03T2



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Frequency Synthesizer

KSN-1590A-119+

Typical Performance Data

FREQ. (MHz)	POWER OUTPUT (dBm)			HARMONICS (dBc)						VCO CURRENT (mA)			PLL CURENT (mA)		
				F2			F3								
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
1567.50	1.62	1.76	1.72	-17.09	-20.21	-22.98	-40.00	-43.89	-44.13	25.70	26.09	27.05	15.52	17.06	19.18
1569.00	1.61	1.76	1.72	-17.13	-20.31	-23.00	-40.39	-44.05	-45.02	25.71	26.09	27.05	15.49	16.82	19.02
1570.50	1.60	1.75	1.72	-17.18	-20.32	-23.00	-40.79	-44.31	-44.99	25.72	26.09	27.05	15.45	16.58	18.90
1572.00	1.60	1.75	1.72	-17.19	-20.31	-23.01	-41.07	-44.52	-44.91	25.72	26.10	27.06	15.53	17.08	19.62
1573.50	1.59	1.74	1.72	-17.19	-20.30	-23.03	-41.31	-44.65	-44.72	25.73	26.10	27.06	15.66	17.22	19.77
1575.00	1.59	1.74	1.72	-17.21	-20.28	-23.04	-41.45	-44.77	-44.54	25.73	26.11	27.07	15.75	17.32	19.50
1576.50	1.59	1.74	1.72	-17.25	-20.29	-23.01	-41.43	-44.64	-44.89	25.74	26.12	27.08	15.73	17.31	19.49
1578.00	1.58	1.74	1.72	-17.30	-20.30	-22.99	-41.40	-44.50	-45.24	25.75	26.12	27.09	15.72	17.30	19.50
1579.50	1.58	1.74	1.72	-17.37	-20.35	-23.00	-41.49	-44.73	-45.30	25.75	26.13	27.09	15.73	17.31	19.56
1581.00	1.58	1.74	1.72	-17.45	-20.42	-23.04	-41.58	-45.13	-45.20	25.76	26.14	27.10	15.74	17.32	19.57
1582.50	1.58	1.74	1.72	-17.51	-20.45	-23.04	-41.76	-45.77	-45.88	25.76	26.15	27.11	15.53	17.10	19.40

FREQ. (MHz)	PHASE NOISE (dBc/Hz)														
	@ OFFSETS														
	-45°C					+25°C					+85°C				
	100Hz	1kHz	10kHz	100kHz	1MHz	100Hz	1kHz	10kHz	100kHz	1MHz	100Hz	1kHz	10kHz	100kHz	1MHz
1567.50	-87.63	-95.60	-107.86	-135.29	-155.10	-86.64	-94.21	-109.25	-135.21	-154.01	-86.45	-96.83	-108.39	-133.62	-154.14
1569.00	-86.88	-95.78	-108.13	-135.35	-153.88	-87.21	-94.71	-108.60	-134.87	-154.79	-85.29	-96.45	-108.12	-133.72	-153.98
1570.50	-86.13	-95.96	-108.39	-135.41	-152.67	-86.77	-94.45	-108.88	-135.00	-154.85	-84.86	-96.55	-108.07	-133.57	-153.83
1572.00	-86.03	-96.25	-108.33	-135.48	-152.45	-86.29	-94.35	-109.00	-135.15	-154.78	-84.88	-96.64	-108.05	-133.50	-153.81
1573.50	-86.26	-96.59	-108.09	-135.55	-152.75	-85.73	-94.54	-108.78	-135.38	-154.47	-85.76	-96.74	-108.09	-133.58	-154.06
1575.00	-86.26	-96.77	-108.02	-135.51	-152.94	-85.18	-94.74	-108.57	-135.60	-154.16	-86.65	-96.83	-108.12	-133.66	-154.32
1576.50	-85.81	-96.63	-108.25	-135.25	-152.92	-85.07	-95.31	-108.80	-135.25	-154.25	-87.43	-96.60	-108.22	-133.66	-154.47
1578.00	-85.36	-96.48	-108.48	-134.98	-152.91	-84.97	-95.89	-109.02	-134.90	-154.35	-88.21	-96.37	-108.32	-133.66	-154.63
1579.50	-85.82	-96.89	-108.71	-135.18	-153.19	-85.37	-95.67	-109.15	-134.84	-154.59	-87.77	-96.21	-108.51	-133.77	-154.70
1581.00	-86.28	-97.30	-108.93	-135.38	-153.48	-86.04	-95.07	-109.21	-134.94	-154.90	-86.71	-96.10	-108.76	-133.92	-154.74
1582.50	-88.62	-96.28	-108.18	-135.67	-155.51	-87.88	-94.28	-109.02	-135.59	-154.64	-89.21	-96.49	-108.72	-133.85	-154.49

REV. X1

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Typical Performance Data

COMPARISON SPURIOUS ORDER	COMPARISON SPURIOUS @Fcarrier 1567.5MHz± (n*Fcomparison) (dBc) NOTE 1			COMPARISON SPURIOUS @Fcarrier 1575MHz± (n*Fcomparison) (dBc) NOTE 1			COMPARISON SPURIOUS @Fcarrier 1582.5MHz± (n*Fcomparison) (dBc) NOTE 1		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-90.97	-97.23	-88.30	-90.97	-95.90	-89.03	-92.92	-97.55	-89.45
-4	-83.19	-84.17	-89.16	-89.85	-105.99	-90.97	-89.54	-101.14	-91.78
-3	-90.81	-88.26	-92.97	-90.71	-87.51	-93.36	-88.01	-86.65	-95.05
-2	-83.76	-97.35	-89.83	-84.04	-96.69	-88.96	-83.55	-95.51	-90.28
-1	-88.06	-91.57	-93.46	-88.53	-90.92	-92.98	-87.19	-90.14	-92.38
0 ^{note 2}	-	-	-	-	-	-	-	-	-
+1	-84.40	-99.13	-94.87	-86.25	-97.00	-94.03	-87.57	-95.86	-93.10
+2	-88.67	-97.66	-87.17	-90.06	-91.77	-87.08	-92.81	-93.50	-87.82
+3	-86.72	-97.36	-94.53	-89.12	-96.87	-93.64	-92.25	-97.39	-92.98
+4	-79.15	-81.53	-85.83	-86.64	-100.71	-89.35	-88.82	-93.36	-91.21
+5	-88.36	-101.78	-91.79	-89.04	-104.20	-93.64	-89.43	-116.38	-94.68

Note 1: Comparison frequency 30 MHz

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

REFERENCE SPURIOUS ORDER	REFERENCE SPURIOUS @Fcarrier 1567.5MHz± (n*Freference) (dBc) NOTE 3			REFERENCE SPURIOUS @Fcarrier 1575MHz± (n*Freference) (dBc) NOTE 3			REFERENCE SPURIOUS @Fcarrier 1582.5MHz± (n*Freference) (dBc) NOTE 3		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5	-93.15	-88.88	-99.86	-96.96	-90.03	-100.09	-92.95	-88.83	-103.00
-4	-85.93	-89.99	-100.59	-89.07	-91.22	-97.49	-88.61	-91.27	-95.42
-3	-82.21	-95.12	-100.45	-84.85	-94.50	-102.05	-85.97	-93.67	-99.00
-2	-90.74	-84.07	-88.80	-90.25	-106.42	-90.50	-90.36	-100.64	-91.08
-1	-81.27	-97.35	-88.97	-84.09	-96.77	-87.89	-83.47	-96.11	-89.19
0 ^{note 4}	-	-	-	-	-	-	-	-	-
+1	-85.48	-97.46	-87.02	-90.04	-91.78	-86.63	-92.89	-93.60	-87.35
+2	-82.98	-81.51	-86.07	-86.76	-100.92	-89.30	-88.88	-93.19	-90.44
+3	-90.30	-85.34	-97.04	-94.96	-87.08	-97.68	-95.95	-89.08	-97.38
+4	-94.22	-101.97	-102.81	-90.67	-98.32	-100.45	-89.74	-98.50	-98.78
+5	-90.36	-100.54	-109.16	-90.68	-99.73	-109.68	-89.59	-97.12	-109.43

Note 3: Reference frequency 60 MHz

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

Typical Performance Data

STEP SIZE SPURIOUS ORDER	0.5 STEP SIZE & STEP SIZE SPURIOUS @ Fcarrier 1567.5 MHz± (n*Fstep size) (dBc) NOTE 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @ Fcarrier 1575 MHz± (n*Fstep size) (dBc) NOTE 5			0.5 STEP SIZE & STEP SIZE SPURIOUS @ Fcarrier 1582.5 MHz± (n*Fstep size) (dBc) NOTE 5		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
-5.0	-120.10	-117.13	-117.14	-107.14	-104.42	-117.21	-109.82	-112.51	-113.96
-4.5	-105.85	-107.98	-118.55	-105.17	-104.54	-119.03	-108.57	-109.86	-117.42
-4.0	-113.82	-111.31	-117.53	-102.08	-102.88	-116.28	-118.17	-111.18	-118.82
-3.5	-105.96	-101.52	-116.90	-99.95	-101.54	-115.70	-103.61	-117.06	-114.68
-3.0	-106.86	-104.43	-110.58	-107.70	-110.88	-112.50	-102.24	-110.76	-113.45
-2.5	-94.87	-100.78	-111.53	-101.19	-94.64	-109.47	-99.89	-108.57	-114.10
-2.0	-104.98	-113.60	-111.15	-103.47	-105.95	-108.77	-101.96	-112.23	-106.66
-1.5	-94.46	-107.07	-104.85	-96.06	-88.78	-106.70	-101.13	-100.88	-108.15
-1.0	-100.29	-94.11	-101.02	-101.92	-97.80	-97.26	-96.92	-95.78	-95.81
-0.5	-85.14	-84.78	-86.00	-79.53	-86.89	-87.97	-86.43	-85.14	-89.79
0 ^{note 6}	-	-	-	-	-	-	-	-	-
+0.5	-86.86	-89.50	-86.47	-75.81	-83.61	-85.41	-84.89	-84.61	-86.96
+1.0	-89.84	-96.19	-99.36	-100.13	-98.09	-99.11	-99.99	-97.57	-102.02
+1.5	-93.79	-107.45	-103.57	-100.89	-88.68	-99.01	-107.17	-103.07	-107.77
+2.0	-112.62	-106.92	-110.43	-102.34	-107.02	-104.17	-110.82	-111.91	-112.26
+2.5	-98.78	-101.16	-106.92	-105.26	-94.65	-105.76	-94.83	-109.66	-111.04
+3.0	-116.85	-105.03	-109.17	-114.71	-111.39	-116.87	-105.07	-104.61	-113.25
+3.5	-102.82	-102.25	-113.46	-101.62	-100.31	-110.01	-104.64	-112.64	-113.51
+4.0	-109.43	-118.65	-110.92	-112.39	-102.62	-112.88	-115.85	-109.52	-115.06
+4.5	-118.65	-111.51	-111.98	-106.47	-105.77	-113.27	-107.92	-109.06	-112.67
+5.0	-114.63	-108.14	-117.00	-108.23	-105.08	-107.29	-107.50	-117.18	-121.72

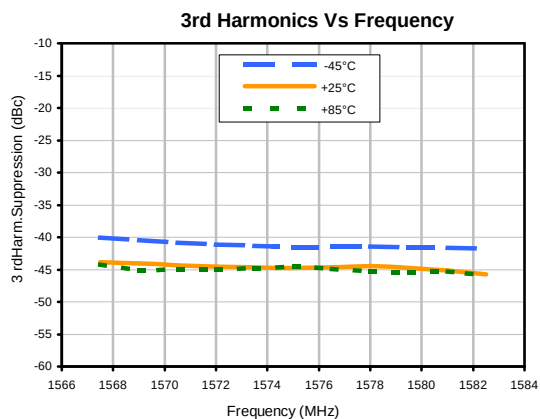
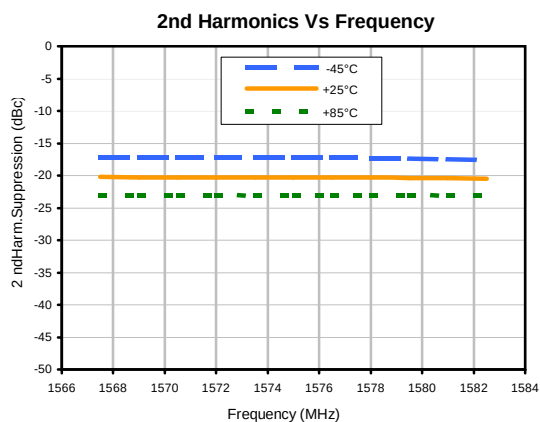
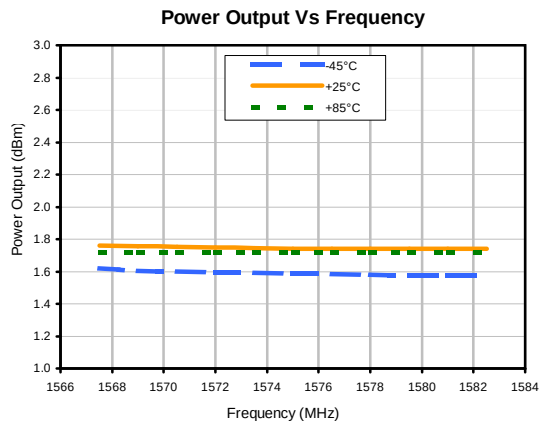
Note 5: Step size 250 kHz

Note 6: All spurs are referenced to carrier signal (n=0).

Frequency Synthesizer

Typical Performance Data

KSN-1590A-119+



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Patent Pending

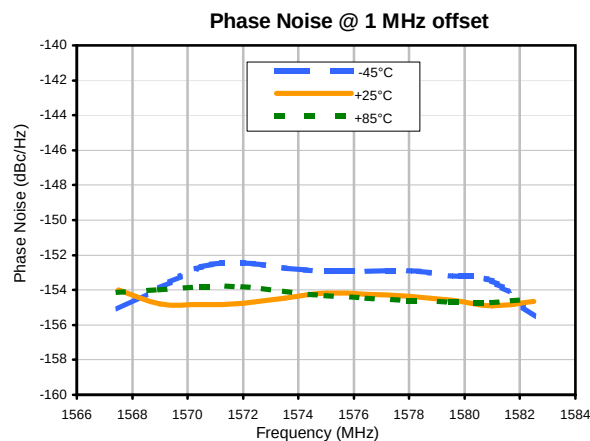
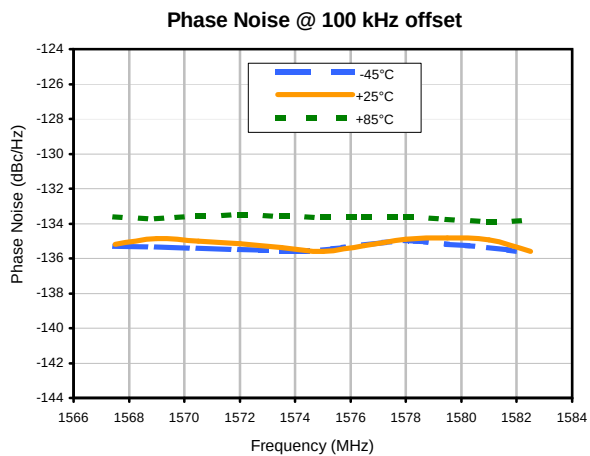
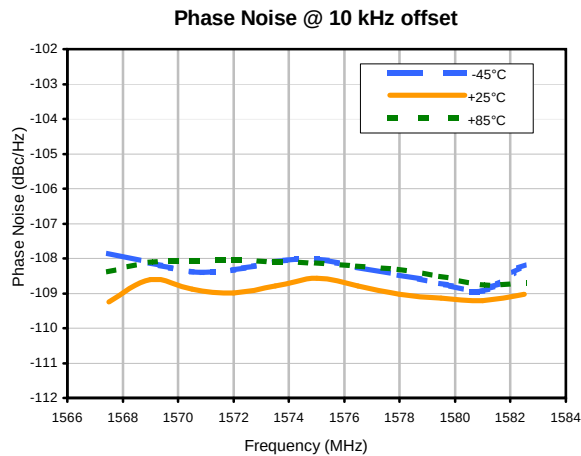
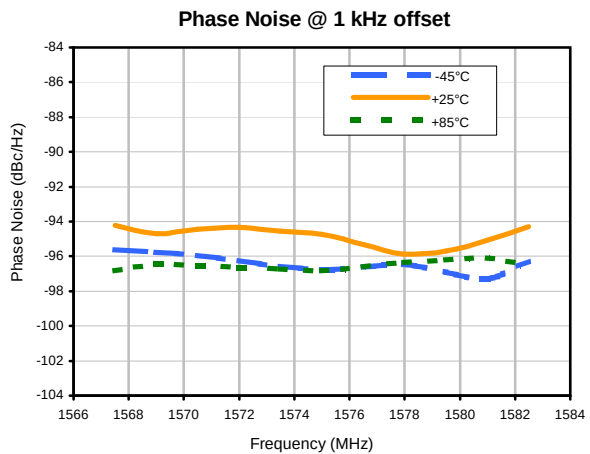
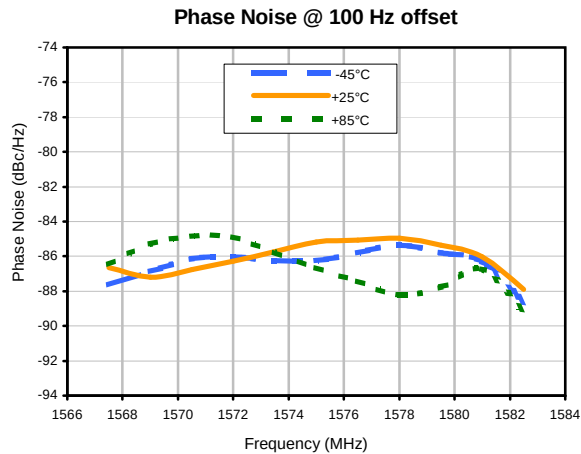
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Frequency Synthesizer

KSN-1590A-119+

Typical Performance Data



REV. X1
KSN-1590A-119+
091227
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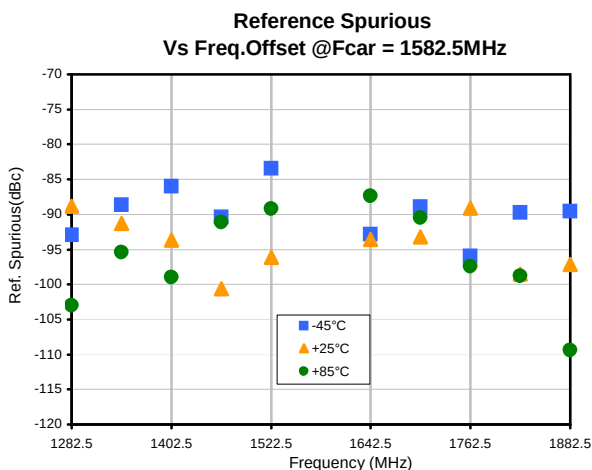
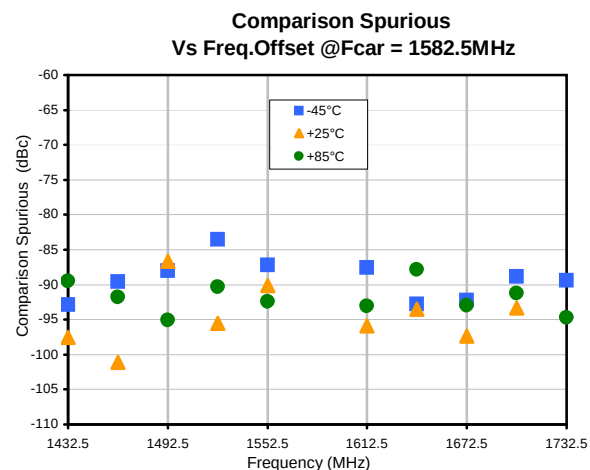
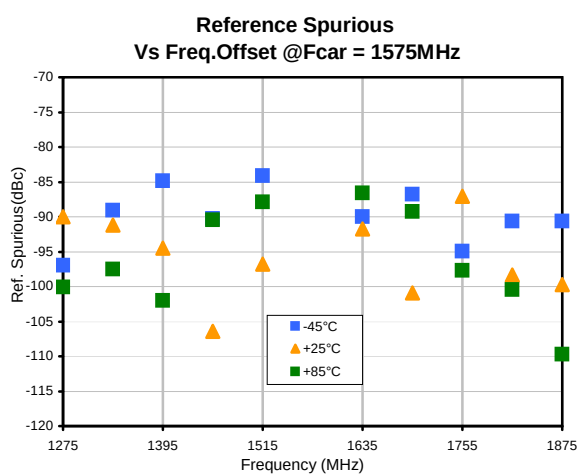
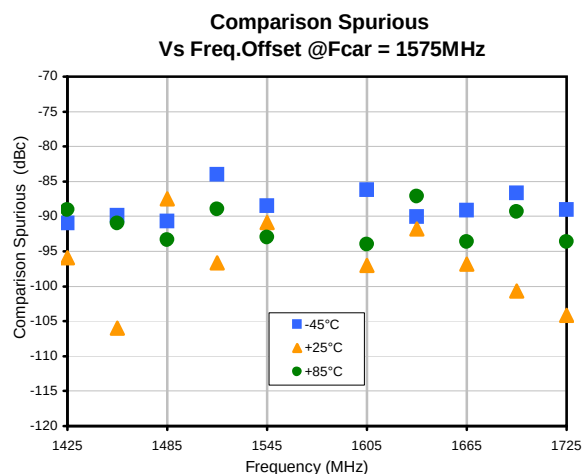
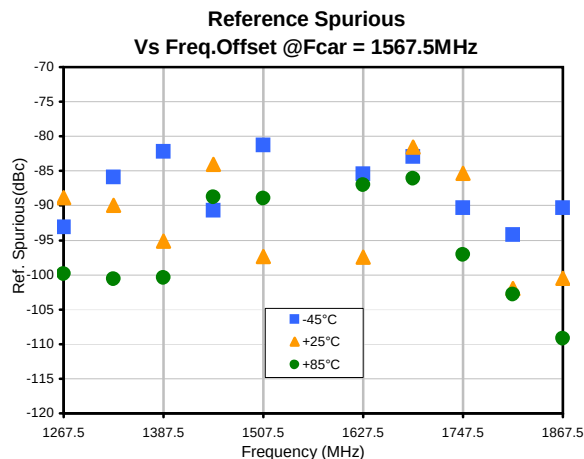
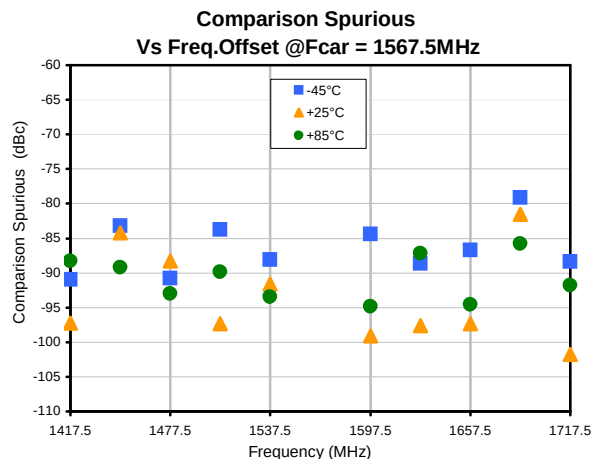
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Typical Performance Data



REV. X1

KSN-1590A-119+

091227

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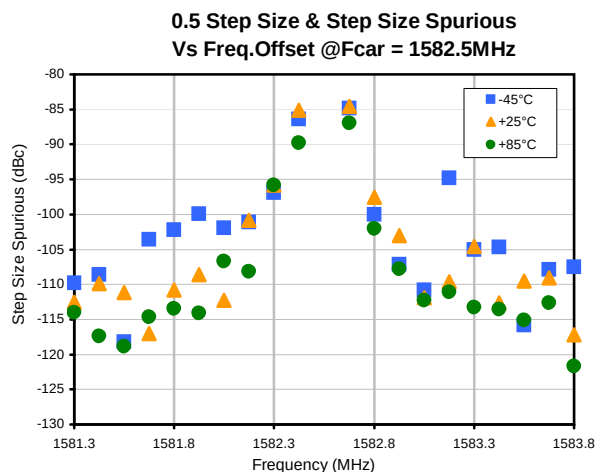
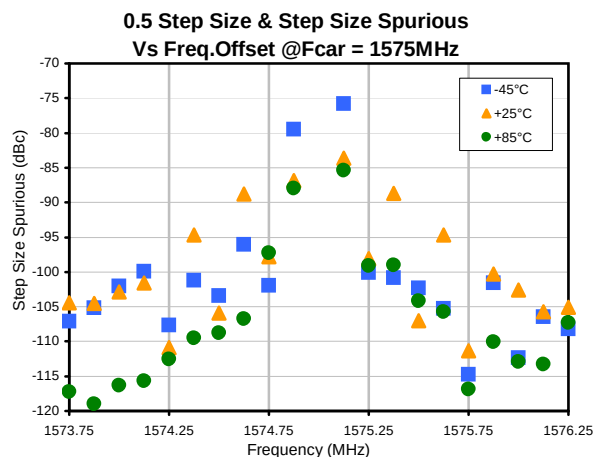
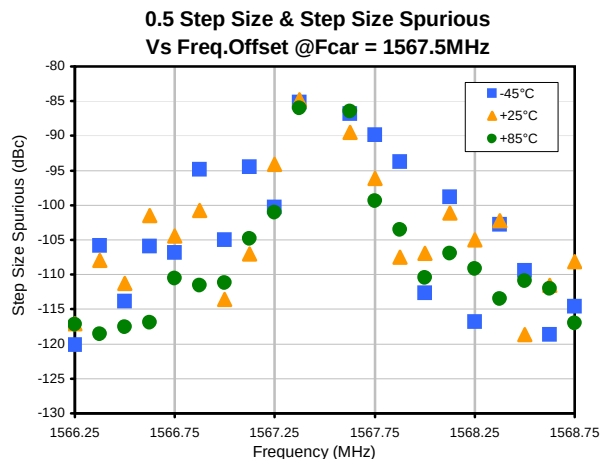
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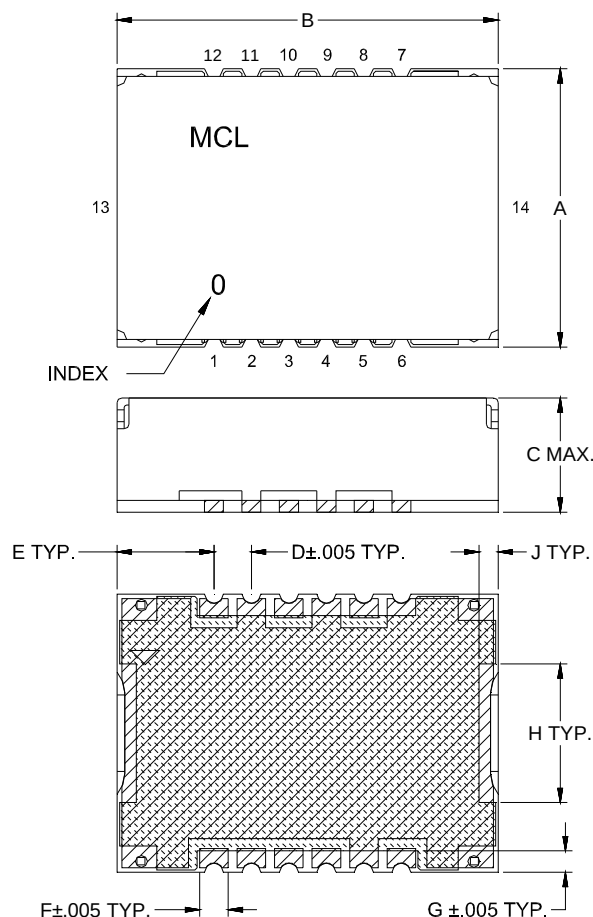


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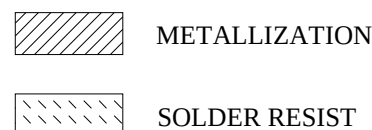
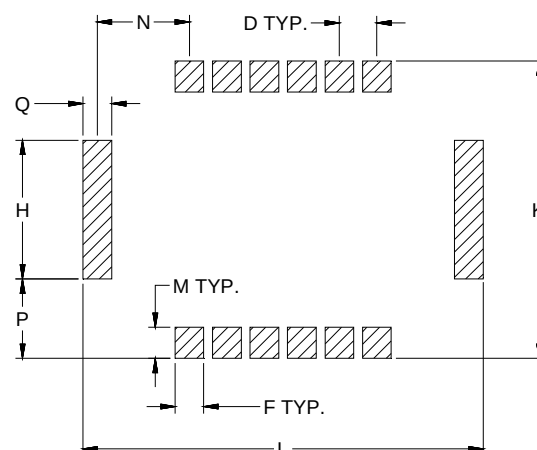


Outline Dimensions

DK1171



Suggested PCB Land Pattern



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	WT. GRAM
DK1171	.584 (14.83)	.800 (20.32)	.240 (6.10)	.079 (2.01)	.203 (5.16)	.060 (1.52)	.045 (1.14)	.291 (7.39)	.039 (1.0)	.624 (15.85)	.840 (21.34)	.065 (1.65)	.193 (4.90)	.170 (4.32)	.060 (1.52)	2.5

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 μ inch (.05-.13 microns) Gold over 120-240 μ inch (3.05-6.10 microns) Nickel plate.
All models, (+) suffix.



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

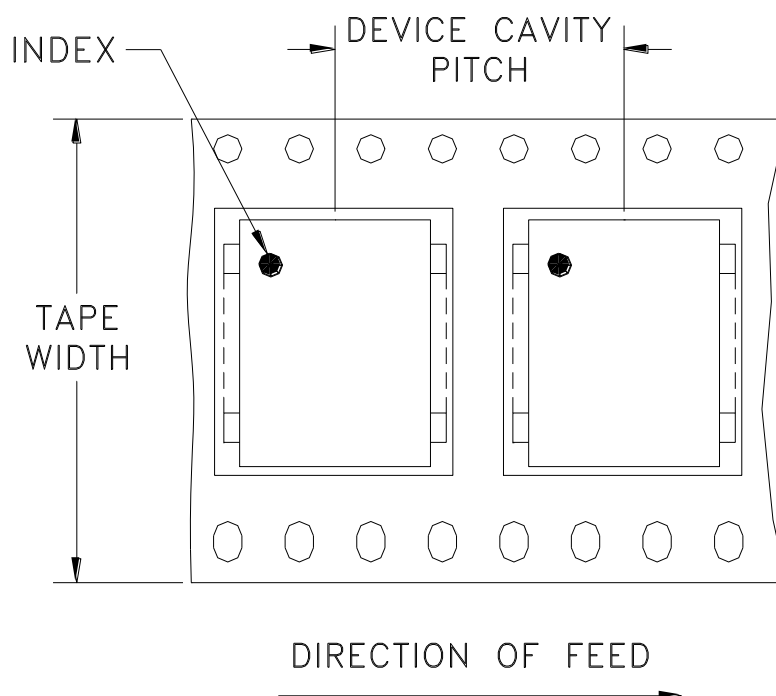
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Mini-Circuits ISO 9001 & ISO 14001 Certified

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



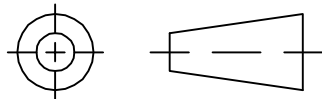
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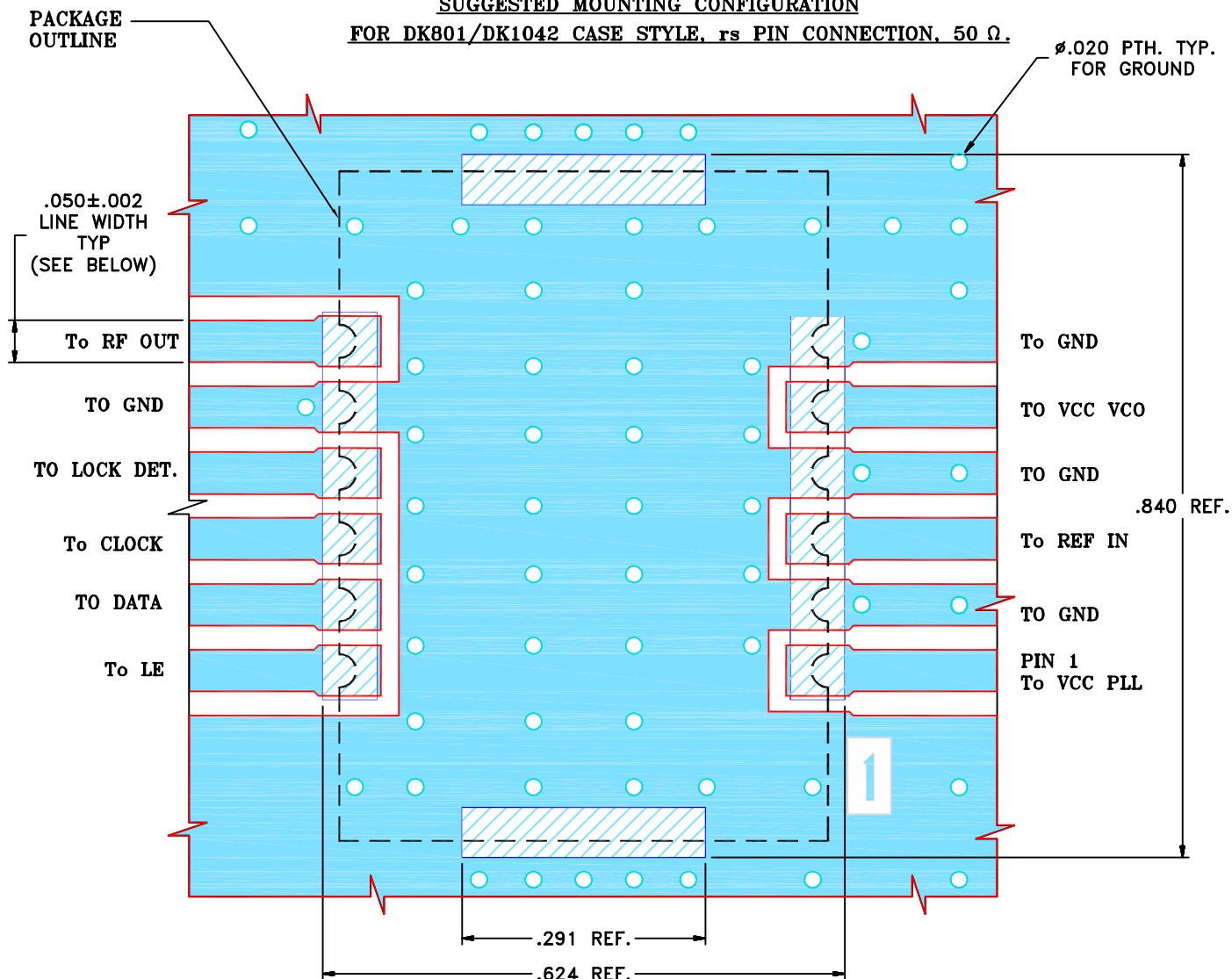
THIRD ANGLE PROJECTION



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 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

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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

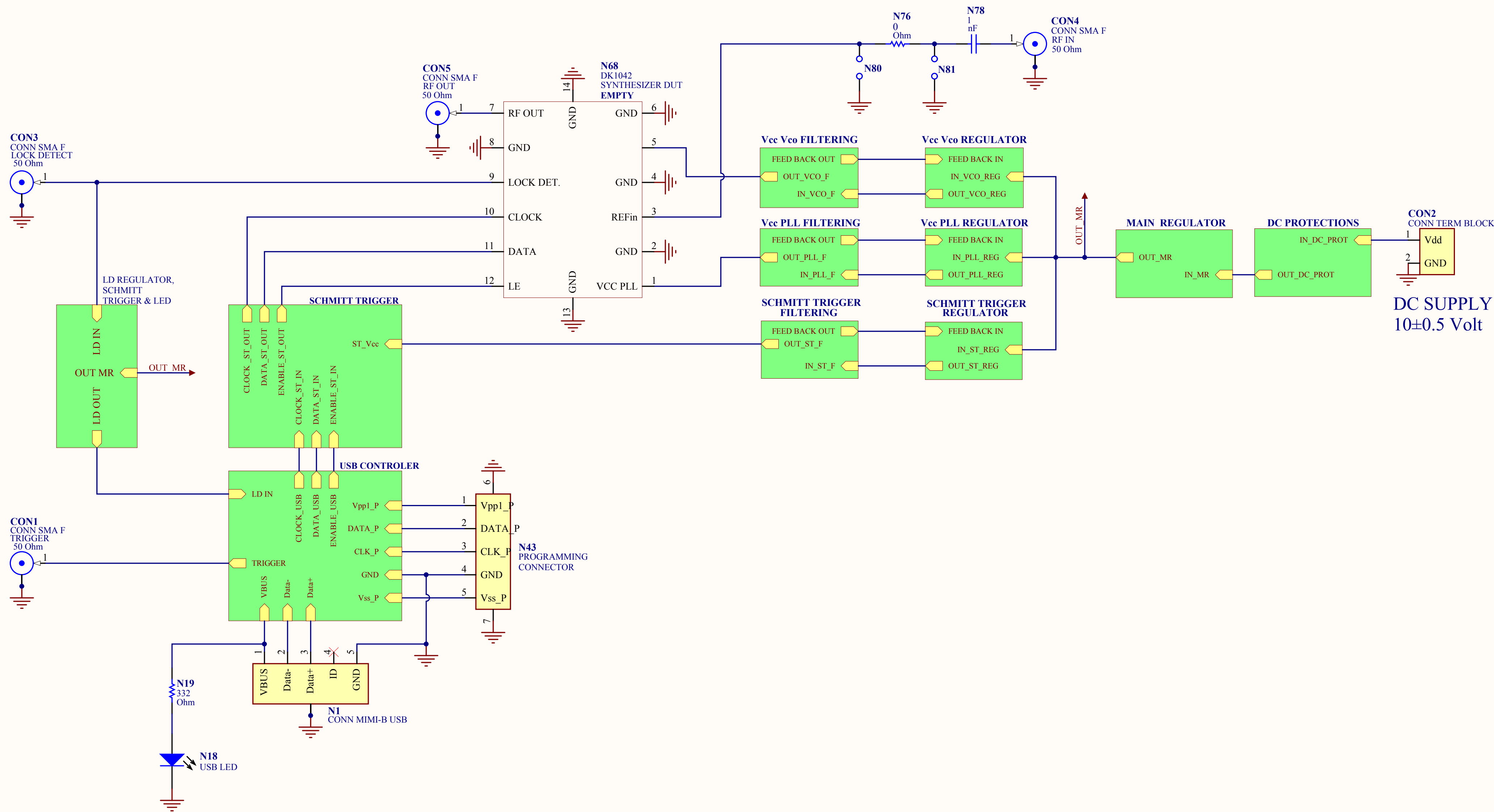
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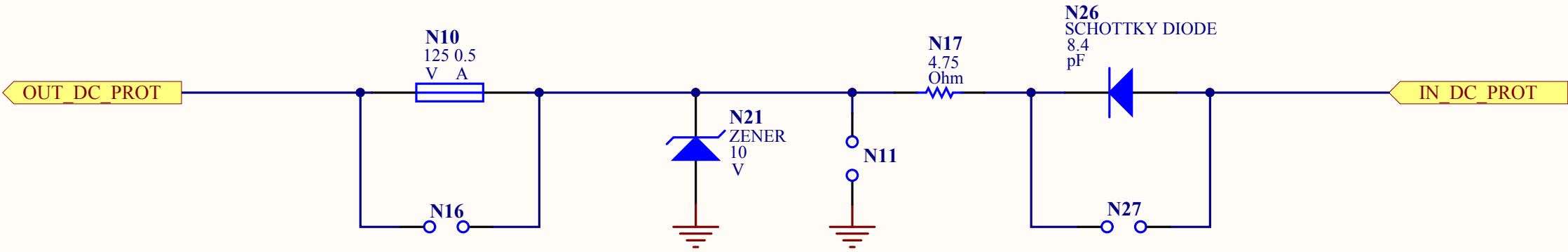
SHEET: 1 OF 1

ELECTRICAL SCHEME-GENERAL

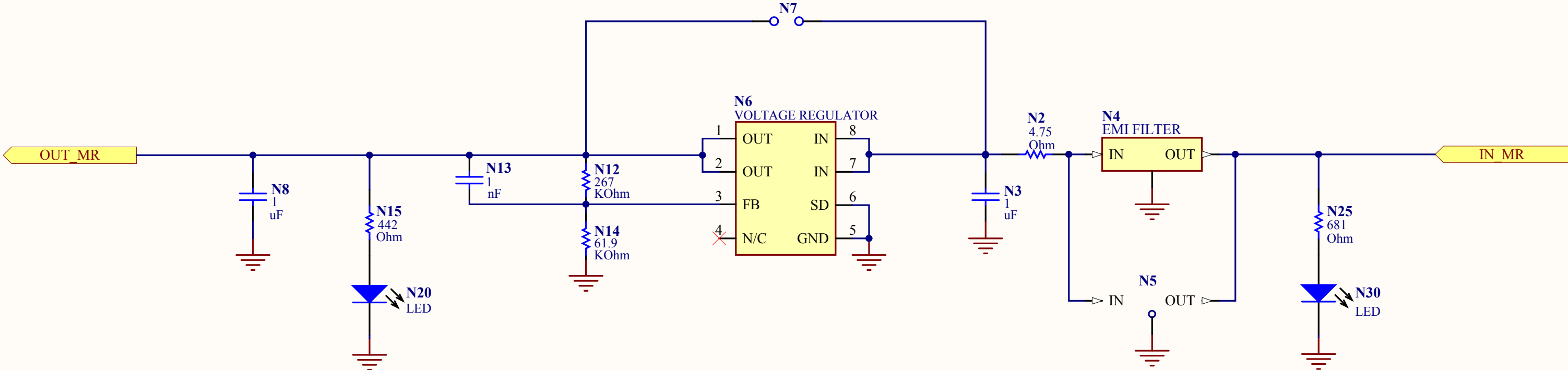
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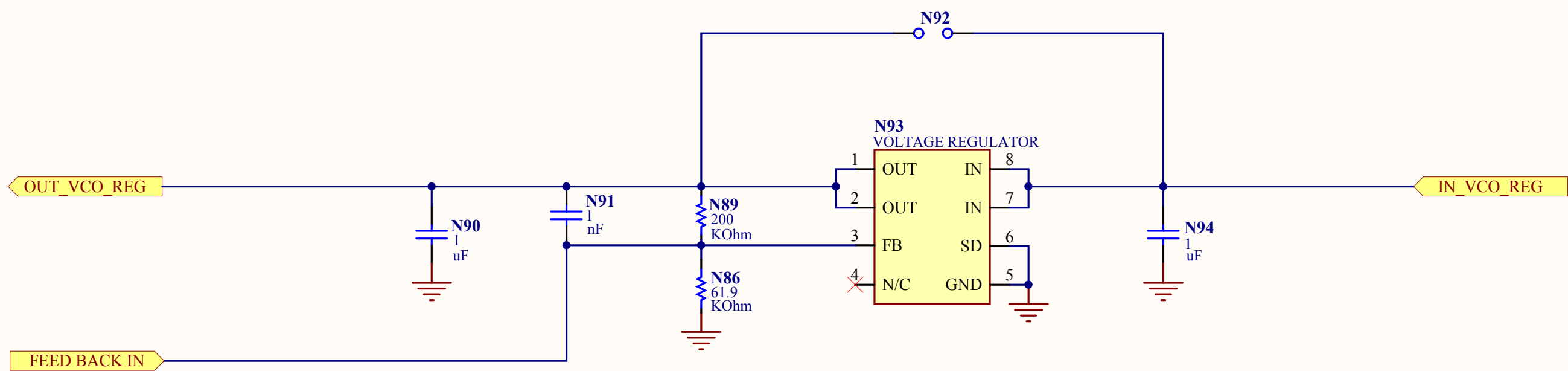
DC PROTECTIONS



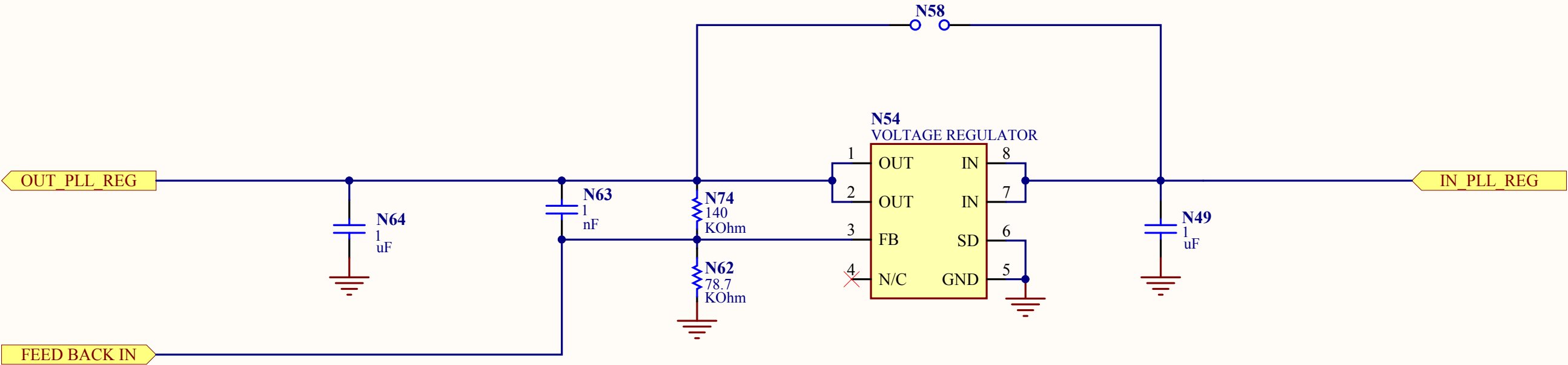
MAIN REGULATOR



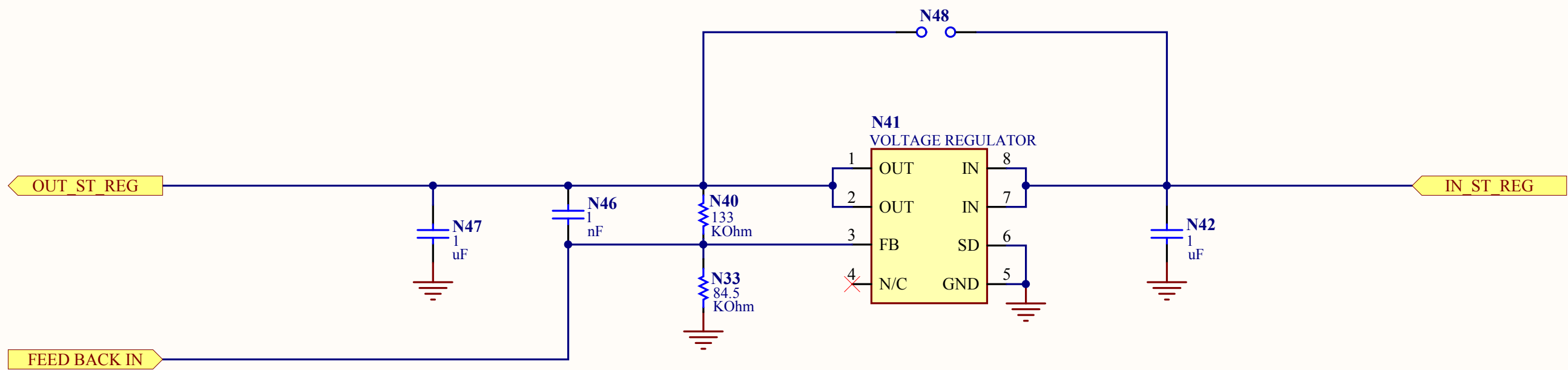
VCC VCO REGULATOR



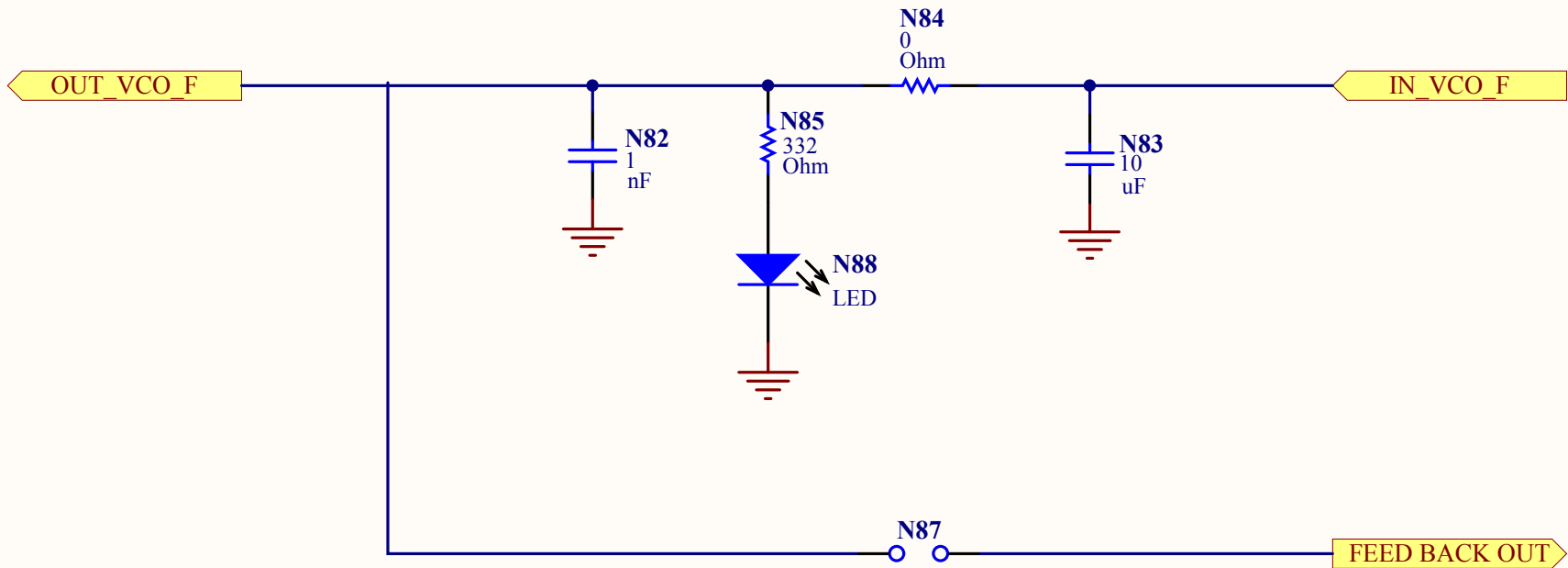
VCC PLL REGULATOR



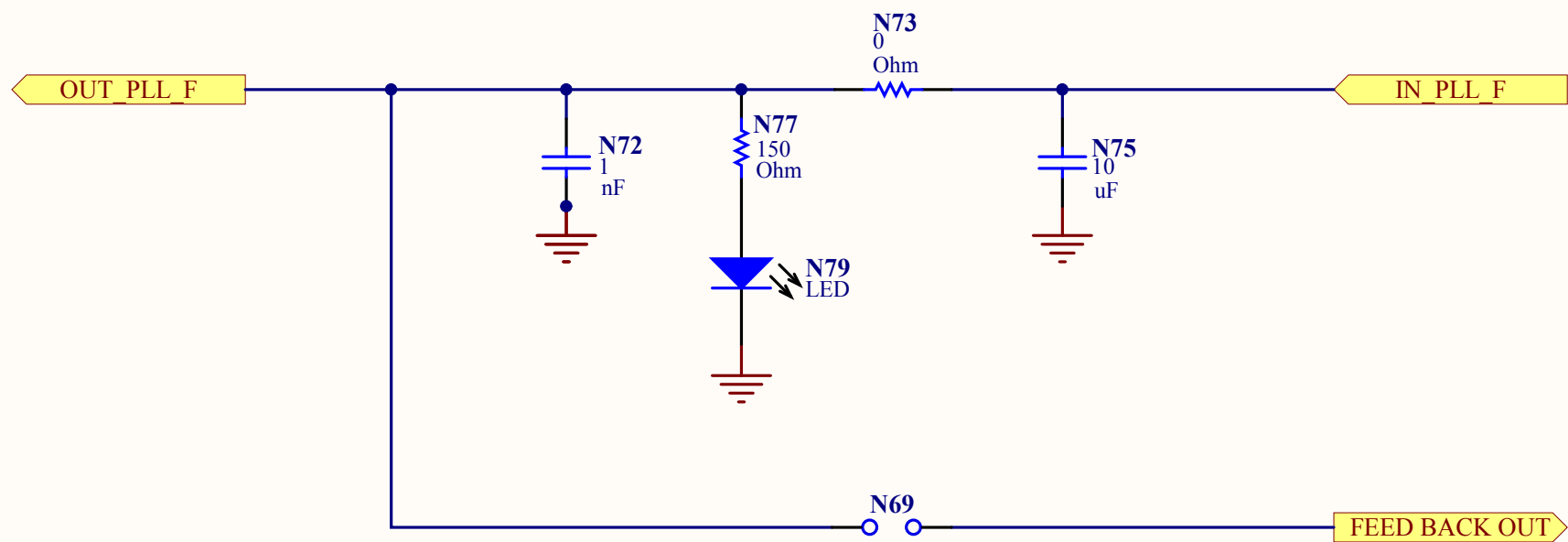
SCHMITT TRIGGER REGULATOR



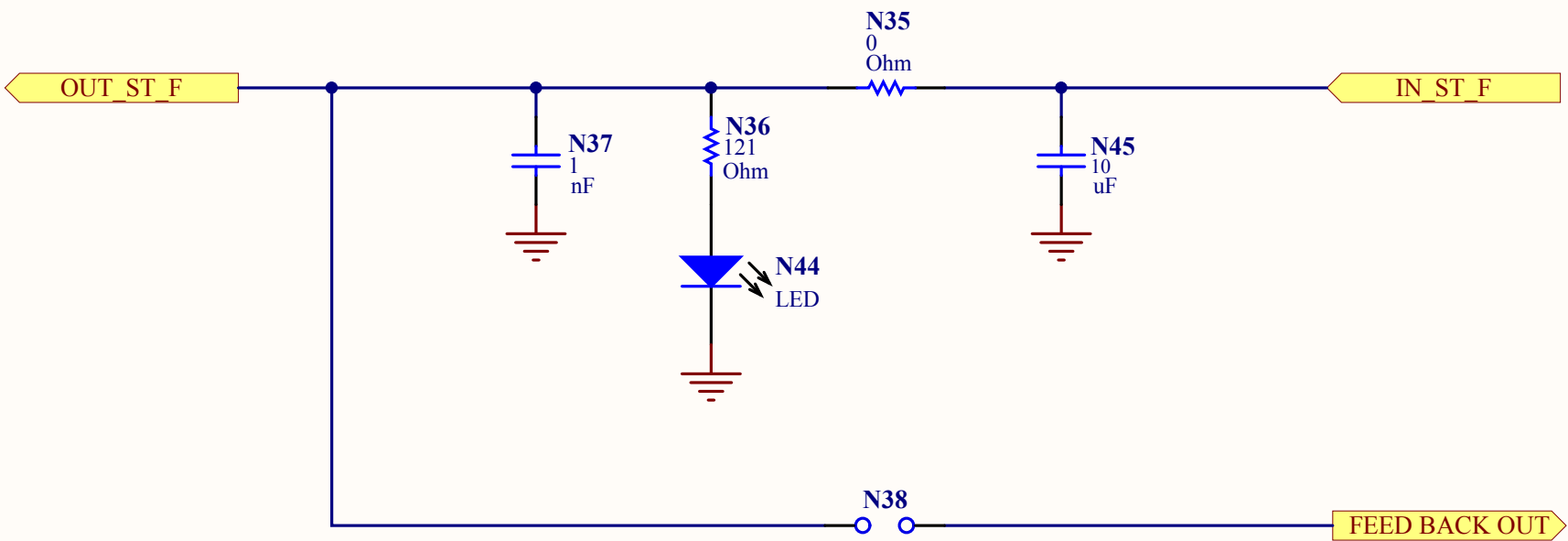
VCC VCO FILTERING



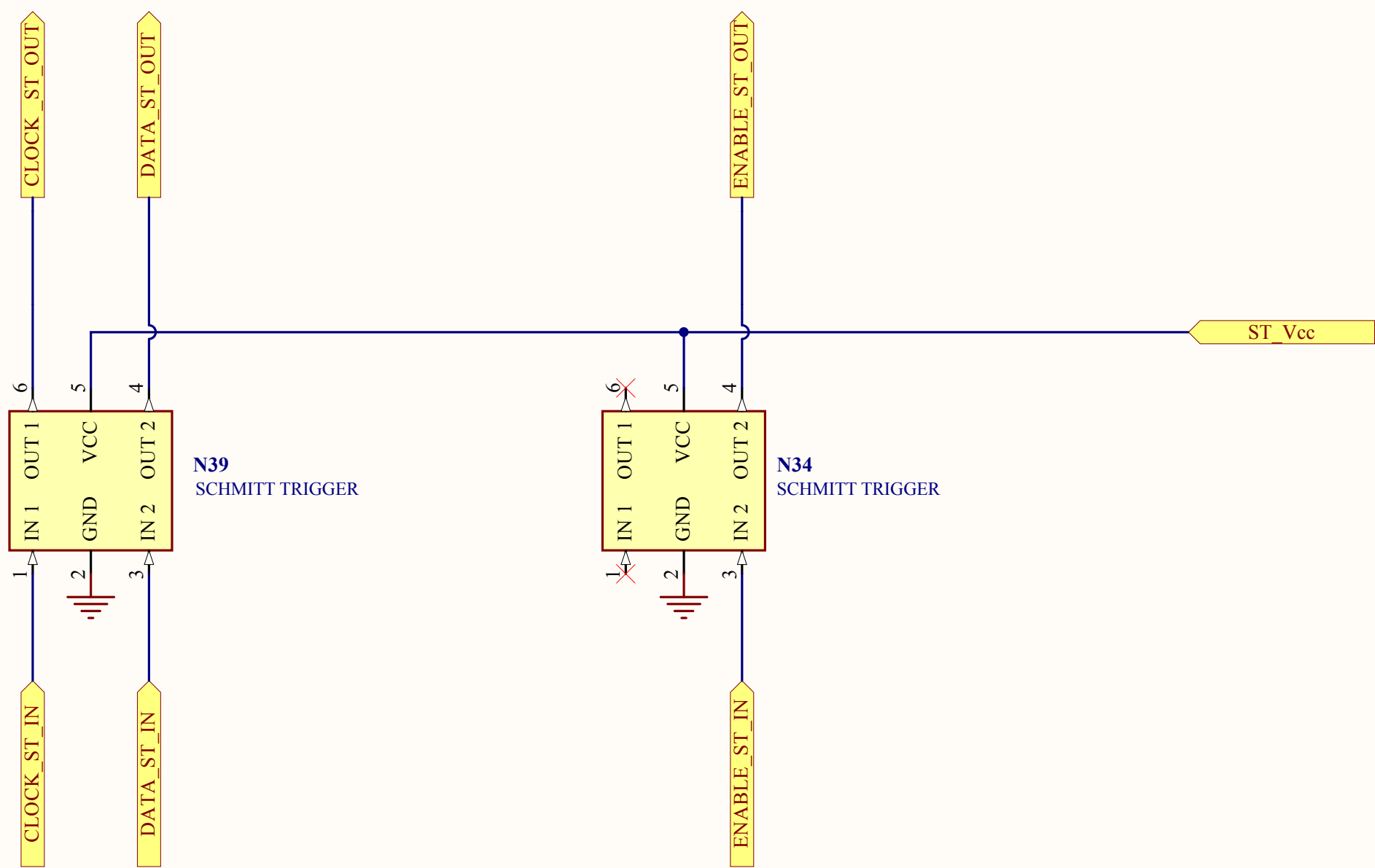
VCC PLL FILTERING



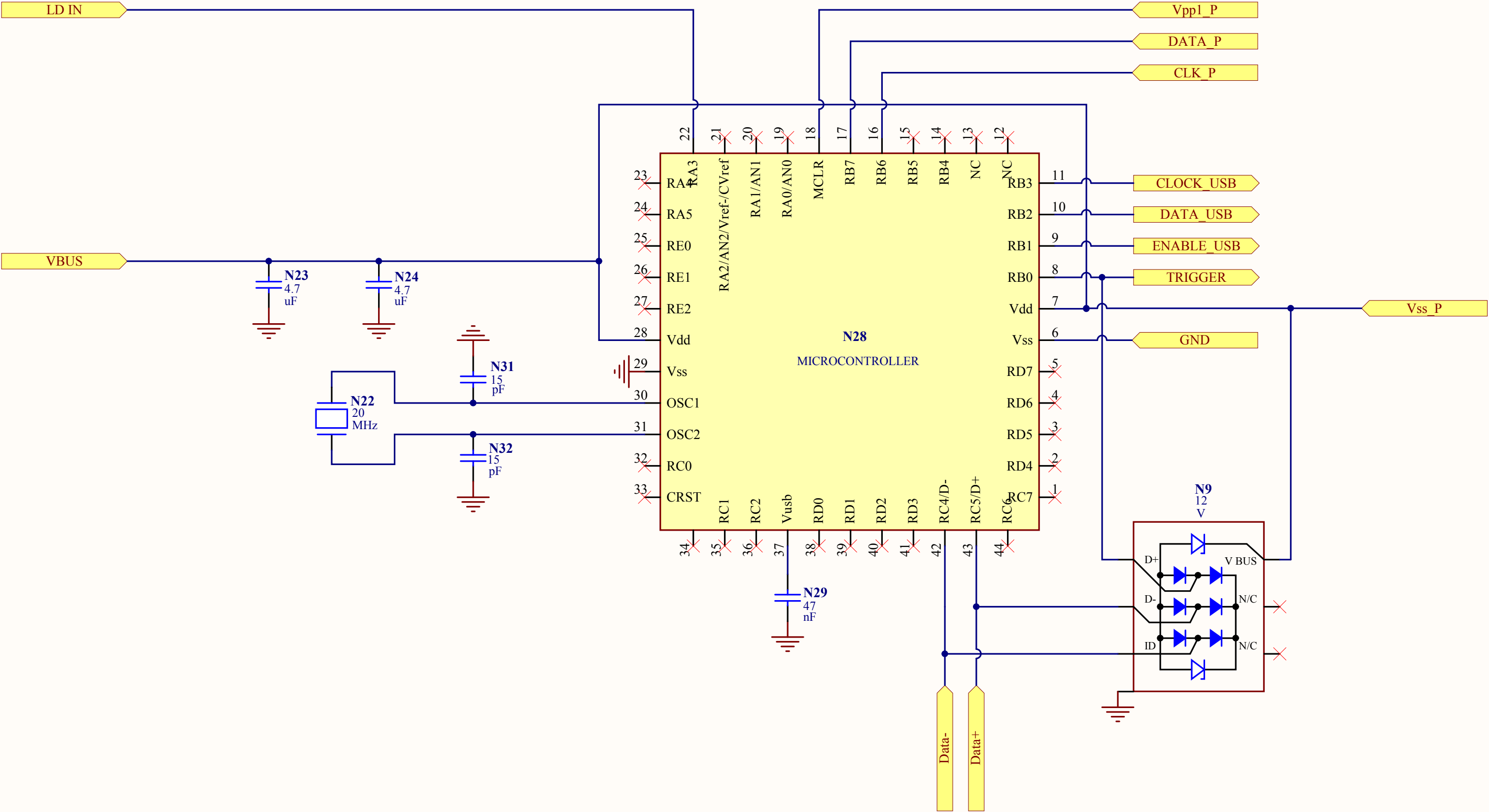
SCHMITT TRIGGER FILTERING



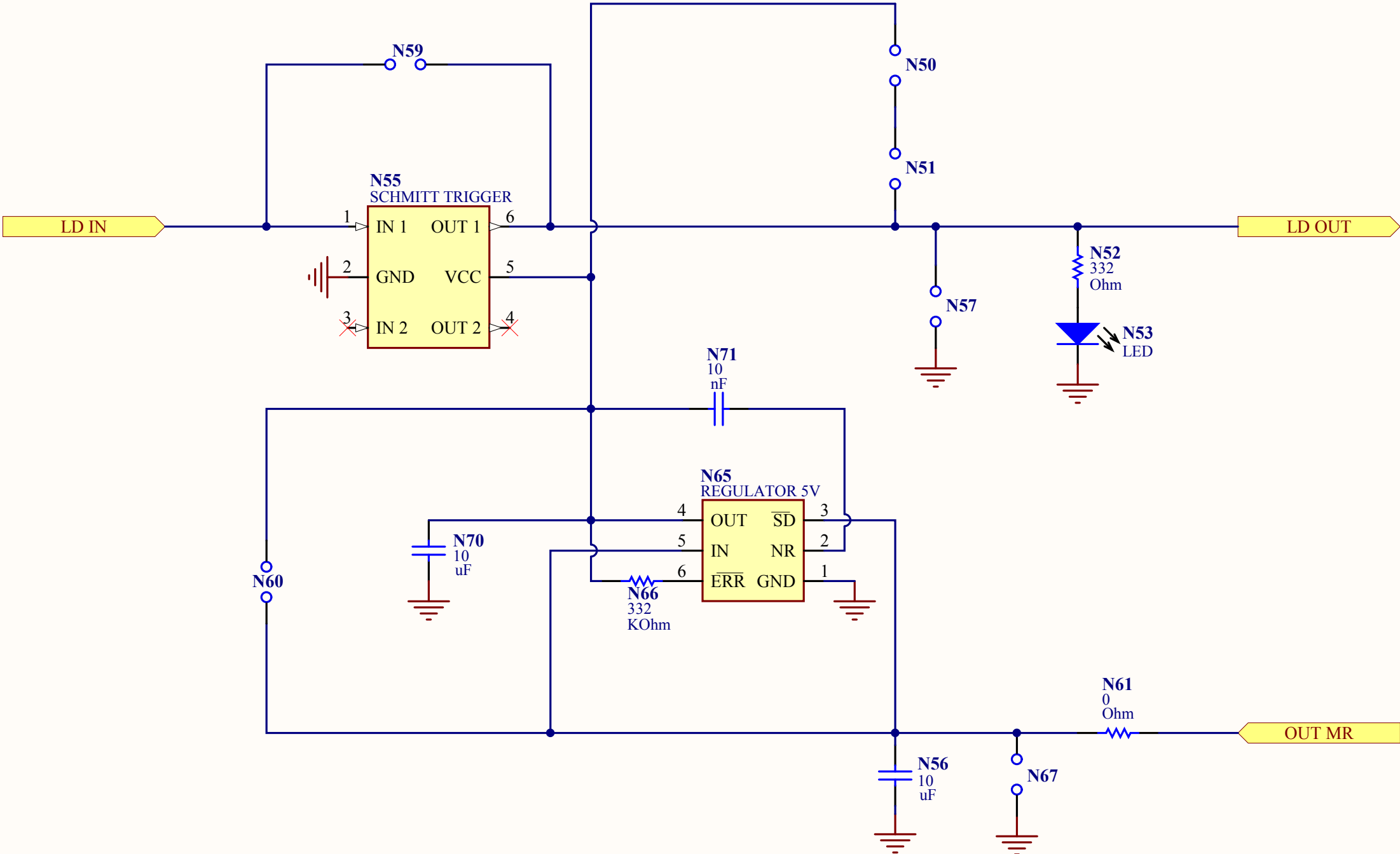
SCHMITT TRIGGER



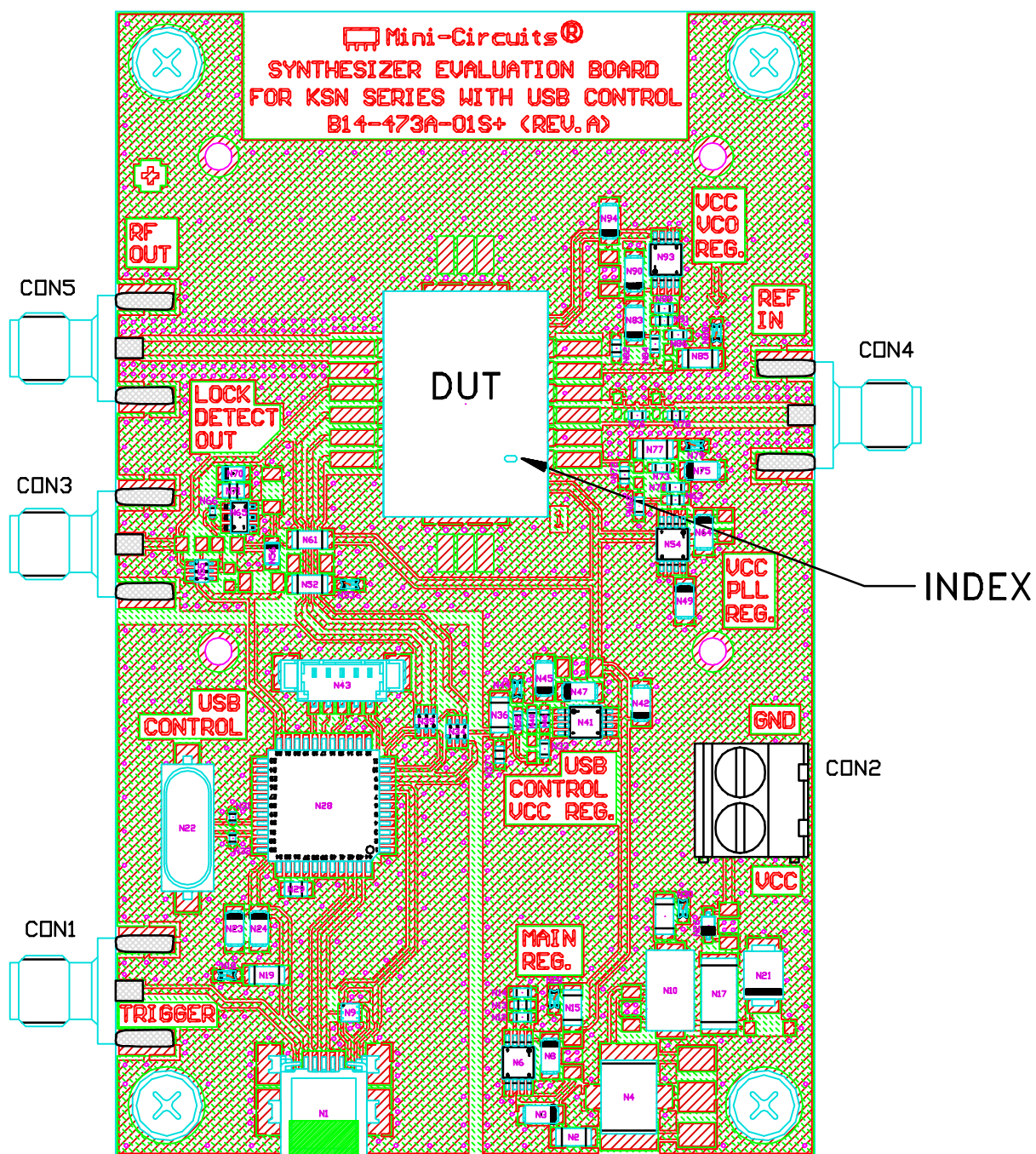
USB CONTROLER



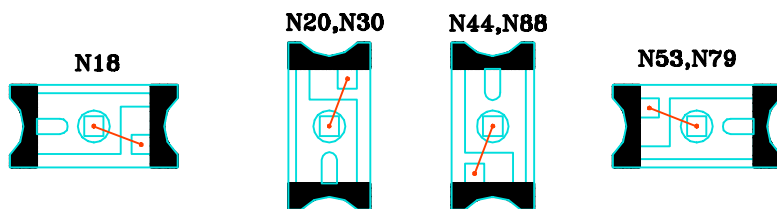
LD REGULATOR SCHMITT TRIGGER AND LED



Evaluation Board and Circuit



TB-567-1+



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