

# Engineering Development Model

## Frequency Synthesizer

DSN-EDR11168

### 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 : 99-01-1928

| ELECTRICAL SPECIFICATIONS 50Ω, over -30°C to +70°C |                                                                                                      |      |      |        |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------|------|------|--------|
| Parameter                                          | Min.                                                                                                 | Typ. | Max. | Units  |
| Frequency                                          | 1470                                                                                                 |      | 2095 | MHz    |
| Step size                                          |                                                                                                      | 100  |      | kHz    |
| Settling Time Within ±1kHz                         |                                                                                                      | 50   |      | msec   |
| Output Power                                       | +9                                                                                                   | +14  | +18  | dBm    |
| Phase Noise                                        |                                                                                                      |      |      |        |
| at 100 Hz offset                                   |                                                                                                      | -87  |      | dBc/Hz |
| at 1 kHz offset                                    |                                                                                                      | -94  |      | dBc/Hz |
| at 10 KHz offset                                   |                                                                                                      | -97  |      | dBc/Hz |
| at 100 KHz offset                                  |                                                                                                      | -118 | -112 | dBc/Hz |
| at 1000 kHz offset                                 |                                                                                                      | -140 | -134 | dBc/Hz |
| Integrated SSB Phase Noise                         |                                                                                                      | -51  |      | dBc    |
| Ref & Comp Spurious Suppression                    |                                                                                                      | -94  |      | dBc    |
| 0.5 Step size Spurious Suppression                 |                                                                                                      | -95  |      | dBc    |
| Non-Harm. Spurious Suppression                     |                                                                                                      | -90  |      | dBc    |
| Harmonic Suppression                               |                                                                                                      | -33  | -18  | dBc    |
| Supply voltage                                     | A-VCC                                                                                                | 5    |      | V      |
|                                                    | D-VCC                                                                                                | 5    |      | V      |
| Supply current                                     | A-VCC                                                                                                | 59   | 68   | V      |
|                                                    | D-VCC                                                                                                | 47   | 57   | V      |
| Reference In (External)                            | Frequency                                                                                            | 10   |      | MHz    |
|                                                    | Amplitude                                                                                            | 1    |      | Vp-p   |
|                                                    | Impedance                                                                                            | 100  |      | kΩ     |
|                                                    | Ph. N @ 1kHz                                                                                         | -145 |      | dBc/Hz |
| Input Logic Levels                                 | Logic high                                                                                           | 2    | 3.3  | V      |
|                                                    | Logic Low                                                                                            |      | 0.5  | V      |
| Digital Lock Detect                                | Locked                                                                                               | 1.4  | 3.3  | V      |
|                                                    | Unlocked                                                                                             |      | 0.4  | V      |
| Frequency Synthesizer PLL                          | Automatic startup at specified frequency (via internal microcontroller) & user programable (ADF4153) |      |      |        |

| ABSOLUTE MAXIMUM RATINGS    |                |
|-----------------------------|----------------|
| Operating Temperature       | -45°C to 85°C  |
| Storage Temperature         | -55°C to 100°C |
| A-VCC Supply Voltage        | 6V             |
| D-VCC Supply Voltage        | 6V             |
| Reference Frequency voltage | 3.6Vp-p        |
| Data, Clock & LE levels     | 3.6V           |

Power On sequence: A-VCC followed by D-VCC  
Power Off sequence: D-VCC followed by A-VCC

| PIN CONNECTIONS |    |              |                   |
|-----------------|----|--------------|-------------------|
| RF OUT          | 14 | CLOCK        | 5                 |
| A-VCC           | 16 | DATA         | 6                 |
| D-VCC           | 1  | LATCH ENABLE | 7                 |
| REF IN          | 8  | GROUND       | 2,3,9,10,12,13,15 |
| LOCK DETECT     | 4  |              |                   |

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## Typical Performance Data

| FREQ.<br>(MHz) | POWER OUTPUT<br>(dBm) |       |        | HARMONICS |        |        |        |        |        | A-VCC CURRENT<br>(mA) |       |       | D-VCC CURRENT<br>(mA) |       |       |
|----------------|-----------------------|-------|--------|-----------|--------|--------|--------|--------|--------|-----------------------|-------|-------|-----------------------|-------|-------|
|                |                       |       |        | (dBc)     |        |        |        |        |        |                       |       |       |                       |       |       |
|                | -30 °C                | +25°C | +70 °C | F2        |        |        | F3     |        |        |                       |       |       |                       |       |       |
| -30 °C         |                       |       |        | +25°C     | +70 °C | -30 °C | +25°C  | +70 °C |        |                       |       |       |                       |       |       |
| 1470.0         | 14.08                 | 14.04 | 14.17  | -18.69    | -20.84 | -23.47 | -42.77 | -43.84 | -45.94 | 56.57                 | 59.75 | 61.97 | 45.34                 | 48.03 | 51.30 |
| 1532.5         | 14.16                 | 14.08 | 14.19  | -20.46    | -22.80 | -25.63 | -43.75 | -44.48 | -47.62 | 56.45                 | 59.62 | 61.80 | 45.49                 | 48.19 | 51.45 |
| 1595.0         | 13.96                 | 13.84 | 13.91  | -22.84    | -24.97 | -27.95 | -45.76 | -47.24 | -51.22 | 56.30                 | 59.42 | 61.67 | 45.37                 | 48.07 | 51.34 |
| 1657.5         | 14.10                 | 13.93 | 13.90  | -25.07    | -26.76 | -29.75 | -53.04 | -54.56 | -60.05 | 56.17                 | 59.33 | 61.69 | 45.21                 | 47.89 | 50.89 |
| 1720.0         | 13.91                 | 13.69 | 13.50  | -27.78    | -29.13 | -31.85 | -59.89 | -62.28 | -62.56 | 55.83                 | 59.13 | 61.62 | 43.55                 | 46.13 | 49.30 |
| 1782.5         | 13.79                 | 13.61 | 13.38  | -31.09    | -31.66 | -34.51 | -66.82 | -62.78 | -64.16 | 55.77                 | 59.15 | 61.69 | 45.00                 | 47.68 | 50.94 |
| 1845.0         | 14.03                 | 13.79 | 13.45  | -34.29    | -34.18 | -36.57 | -65.36 | -64.25 | -70.50 | 55.58                 | 59.05 | 61.65 | 45.27                 | 47.95 | 51.23 |
| 1907.5         | 13.59                 | 13.38 | 13.01  | -36.92    | -37.22 | -38.72 | -61.70 | -63.18 | -72.00 | 55.35                 | 58.92 | 61.59 | 45.47                 | 48.19 | 51.48 |
| 1970.0         | 13.49                 | 13.28 | 12.88  | -40.05    | -41.07 | -41.61 | -59.01 | -55.81 | -59.69 | 55.16                 | 58.78 | 61.54 | 45.34                 | 48.06 | 51.35 |
| 2032.5         | 13.12                 | 12.91 | 12.52  | -42.18    | -43.76 | -44.90 | -53.13 | -49.38 | -51.05 | 54.94                 | 58.60 | 61.46 | 45.75                 | 48.52 | 51.87 |
| 2095.0         | 12.73                 | 12.59 | 12.20  | -44.46    | -48.10 | -52.17 | -49.36 | -45.30 | -47.08 | 54.62                 | 58.38 | 61.29 | 45.67                 | 48.43 | 51.77 |

| FREQ.<br>(MHz) | PHASE NOISE (dBc/Hz)<br>@ OFFSETS |        |        |         |         |        |        |        |         |         |        |        |        |         |         |
|----------------|-----------------------------------|--------|--------|---------|---------|--------|--------|--------|---------|---------|--------|--------|--------|---------|---------|
|                | -30 °C                            |        |        |         |         | +25°C  |        |        |         |         | +70 °C |        |        |         |         |
|                | 100Hz                             | 1kHz   | 10kHz  | 100kHz  | 1MHz    | 100Hz  | 1kHz   | 10kHz  | 100kHz  | 1MHz    | 100Hz  | 1kHz   | 10kHz  | 100kHz  | 1MHz    |
| 1470.0         | -85.23                            | -94.74 | -97.92 | -119.39 | -140.81 | -87.10 | -95.91 | -97.67 | -119.00 | -141.09 | -90.89 | -94.25 | -97.47 | -117.70 | -138.74 |
| 1532.5         | -87.50                            | -94.11 | -98.04 | -120.03 | -141.58 | -87.04 | -94.51 | -97.66 | -119.13 | -141.57 | -88.17 | -92.84 | -97.30 | -117.53 | -138.74 |
| 1595.0         | -84.62                            | -94.43 | -98.00 | -120.46 | -142.13 | -91.05 | -94.94 | -97.38 | -118.99 | -141.45 | -88.16 | -94.08 | -96.69 | -117.12 | -138.48 |
| 1657.5         | -82.22                            | -95.40 | -98.58 | -120.52 | -142.89 | -86.66 | -94.36 | -97.69 | -118.50 | -141.38 | -84.19 | -94.37 | -97.65 | -116.72 | -138.48 |
| 1720.0         | -84.25                            | -94.97 | -98.57 | -120.03 | -142.73 | -87.26 | -93.59 | -97.28 | -117.82 | -140.88 | -86.99 | -91.32 | -96.56 | -116.40 | -138.18 |
| 1782.5         | -86.84                            | -94.64 | -98.41 | -119.20 | -142.18 | -86.69 | -92.88 | -97.67 | -117.17 | -140.53 | -84.91 | -94.93 | -97.39 | -115.83 | -137.91 |
| 1845.0         | -84.95                            | -93.06 | -98.27 | -119.43 | -142.37 | -89.22 | -93.86 | -97.43 | -117.30 | -140.47 | -84.33 | -92.23 | -97.02 | -115.98 | -138.26 |
| 1907.5         | -82.93                            | -93.93 | -97.47 | -118.85 | -141.85 | -84.84 | -91.74 | -97.17 | -117.05 | -140.10 | -85.72 | -93.05 | -96.38 | -115.97 | -138.09 |
| 1970.0         | -84.15                            | -92.12 | -96.76 | -118.55 | -141.46 | -86.82 | -93.47 | -97.19 | -116.97 | -139.87 | -84.30 | -90.86 | -96.26 | -115.87 | -138.05 |
| 2032.5         | -83.77                            | -91.67 | -96.96 | -118.80 | -141.46 | -85.54 | -93.45 | -96.57 | -117.49 | -140.18 | -84.04 | -90.85 | -96.04 | -116.38 | -138.67 |
| 2095.0         | -82.34                            | -91.93 | -96.36 | -118.85 | -141.38 | -85.81 | -92.31 | -96.50 | -117.76 | -140.32 | -85.54 | -91.93 | -96.07 | -116.66 | -138.65 |

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*Typical Performance Data*

| COMPARISON<br>SPURIOUS ORDER | COMPARISON & REFERENCE<br>SPURIOUS<br>@Fcarrier 1470 MHz±<br>(n*Fcomparison)<br>(dBc) NOTE 1 |         |         | COMPARISON & REFERENCE<br>SPURIOUS<br>@Fcarrier 1782.5 MHz±<br>(n*Fcomparison)<br>(dBc) NOTE 1 |         |         | COMPARISON & REFERENCE<br>SPURIOUS<br>@Fcarrier 2095 MHz±<br>(n*Fcomparison)<br>(dBc) NOTE 1 |         |         |
|------------------------------|----------------------------------------------------------------------------------------------|---------|---------|------------------------------------------------------------------------------------------------|---------|---------|----------------------------------------------------------------------------------------------|---------|---------|
|                              | -30 °C                                                                                       | +25°C   | +70 °C  | -30 °C                                                                                         | +25°C   | +70 °C  | -30 °C                                                                                       | +25°C   | +70 °C  |
| -5                           | -94.19                                                                                       | -94.27  | -94.53  | -97.78                                                                                         | -106.95 | -112.11 | -91.47                                                                                       | -93.04  | -95.40  |
| -4                           | -72.62                                                                                       | -75.51  | -79.36  | -75.75                                                                                         | -88.65  | -90.73  | -74.31                                                                                       | -72.82  | -73.48  |
| -3                           | -94.80                                                                                       | -96.52  | -108.81 | -105.77                                                                                        | -114.78 | -118.85 | -97.10                                                                                       | -101.99 | -105.49 |
| -2                           | -79.40                                                                                       | -79.89  | -81.54  | -87.47                                                                                         | -87.64  | -84.36  | -92.30                                                                                       | -87.43  | -90.72  |
| -1                           | -103.40                                                                                      | -103.84 | -101.25 | -107.67                                                                                        | -118.32 | -113.33 | -87.29                                                                                       | -98.92  | -108.85 |
| 0 <sup>note 2</sup>          | -                                                                                            | -       | -       | -                                                                                              | -       | -       | -                                                                                            | -       | -       |
| +1                           | -99.17                                                                                       | -105.13 | -98.48  | -105.50                                                                                        | -109.81 | -106.79 | -92.76                                                                                       | -98.08  | -102.82 |
| +2                           | -78.42                                                                                       | -77.31  | -76.36  | -75.47                                                                                         | -75.35  | -74.51  | -78.46                                                                                       | -78.28  | -76.92  |
| +3                           | -94.18                                                                                       | -96.51  | -115.66 | -95.66                                                                                         | -101.77 | -108.45 | -94.10                                                                                       | -99.39  | -106.54 |
| +4                           | -73.20                                                                                       | -75.16  | -76.49  | -66.76                                                                                         | -71.00  | -72.54  | -71.39                                                                                       | -71.42  | -71.26  |
| +5                           | -96.63                                                                                       | -94.00  | -91.67  | -89.63                                                                                         | -97.49  | -101.46 | -91.94                                                                                       | -92.71  | -98.24  |

Note 1:Reference &amp; Comparison frequency 10 MHz

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

**Notes**

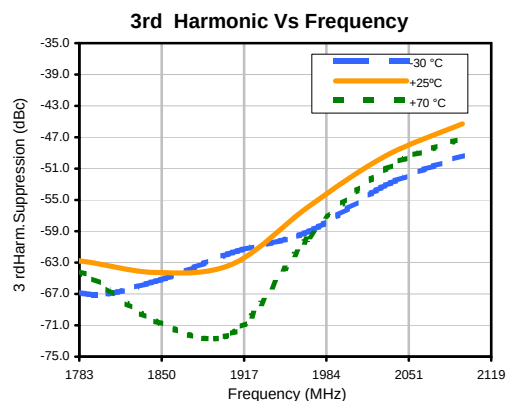
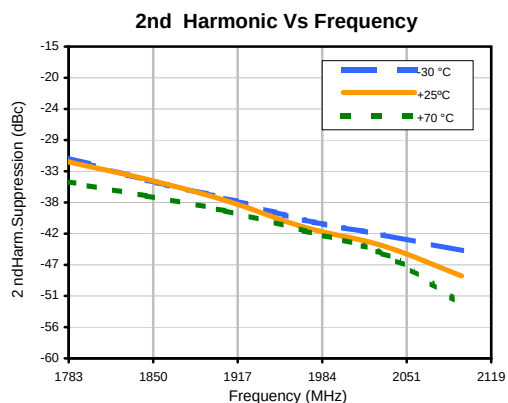
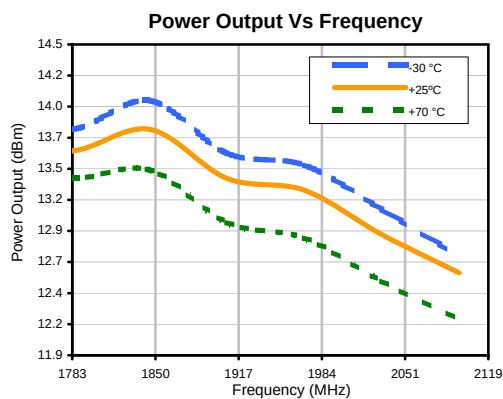
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## Typical Performance Data



### Notes

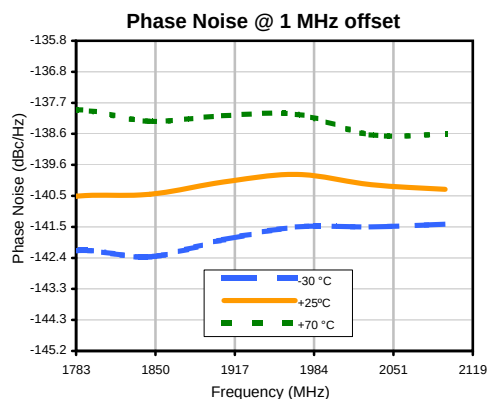
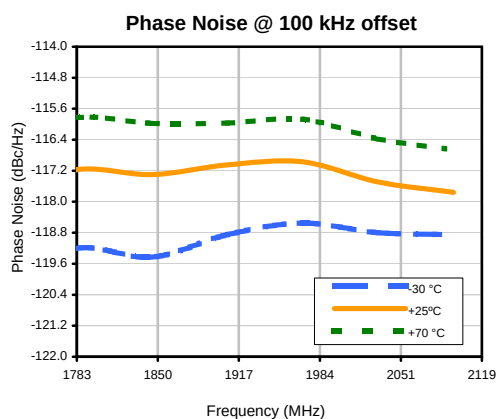
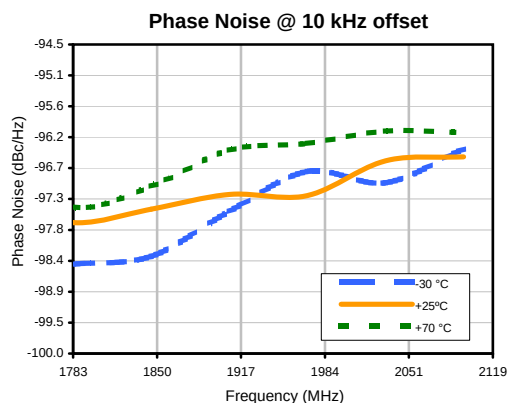
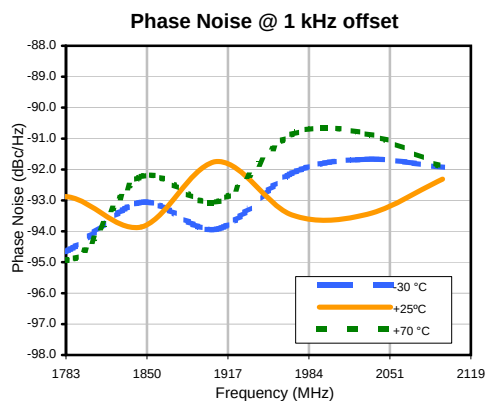
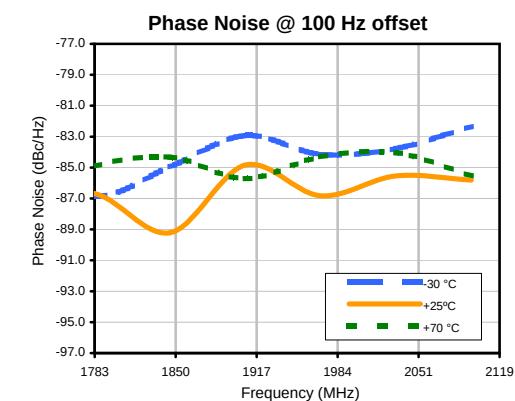
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### Notes

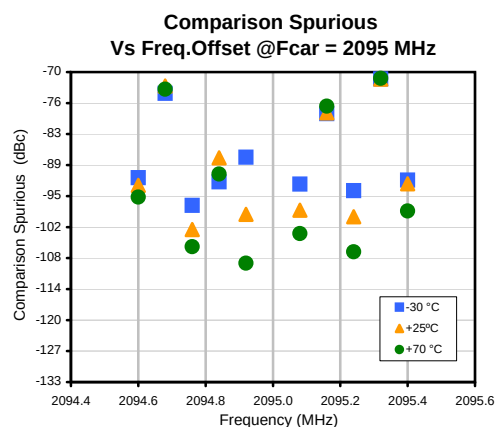
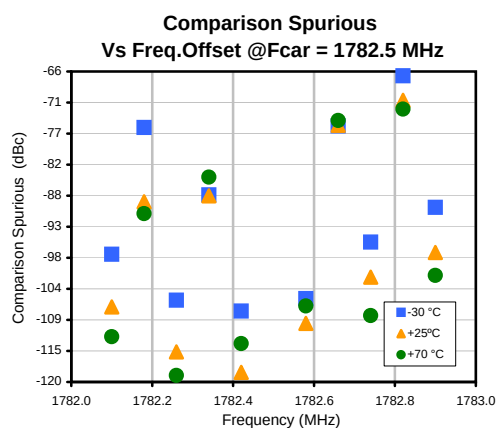
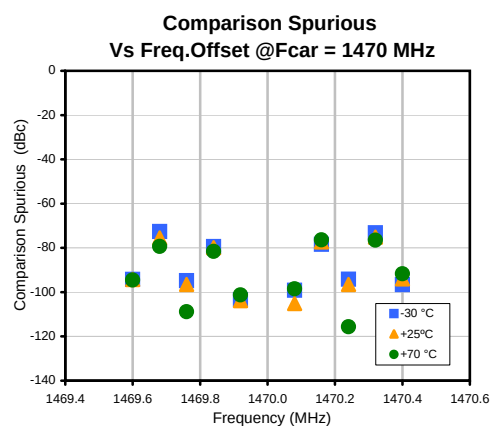
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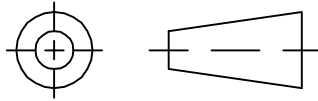


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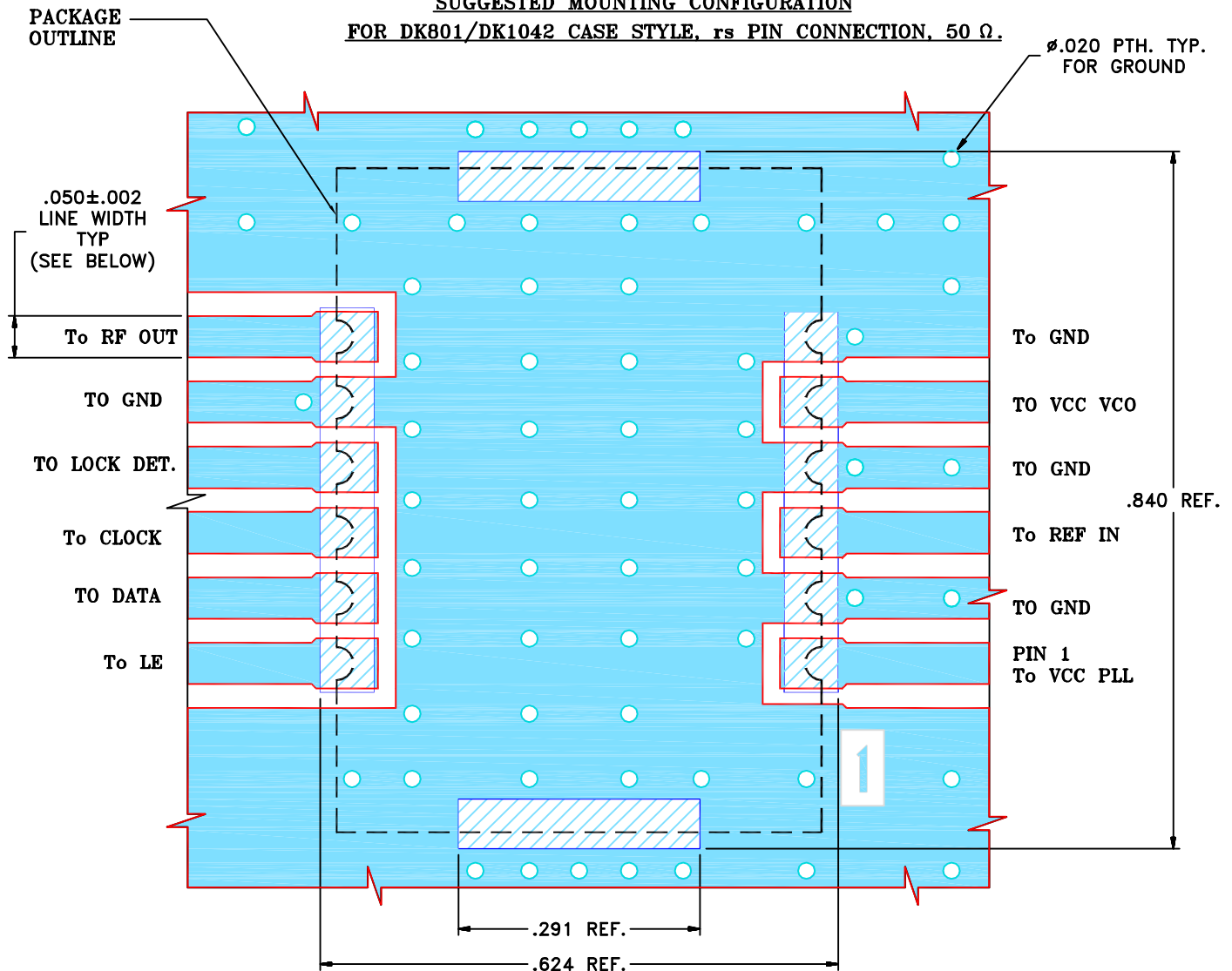
## THIRD ANGLE PROJECTION



## 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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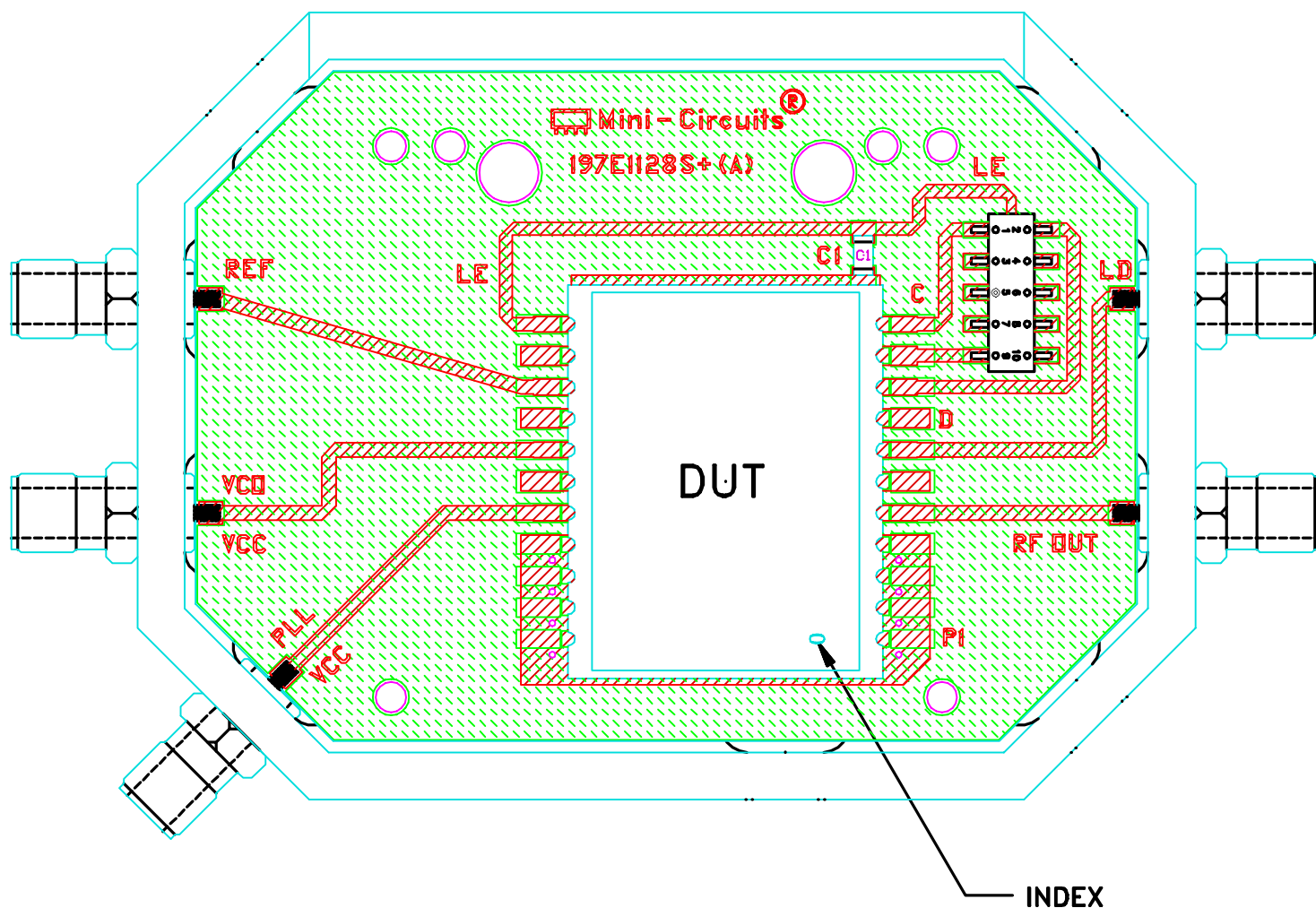
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ACODE IDENT  
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B

FILE: 98PL249

SCALE: 5:1

SHEET: 1 OF 1

# Evaluation Board and Circuit

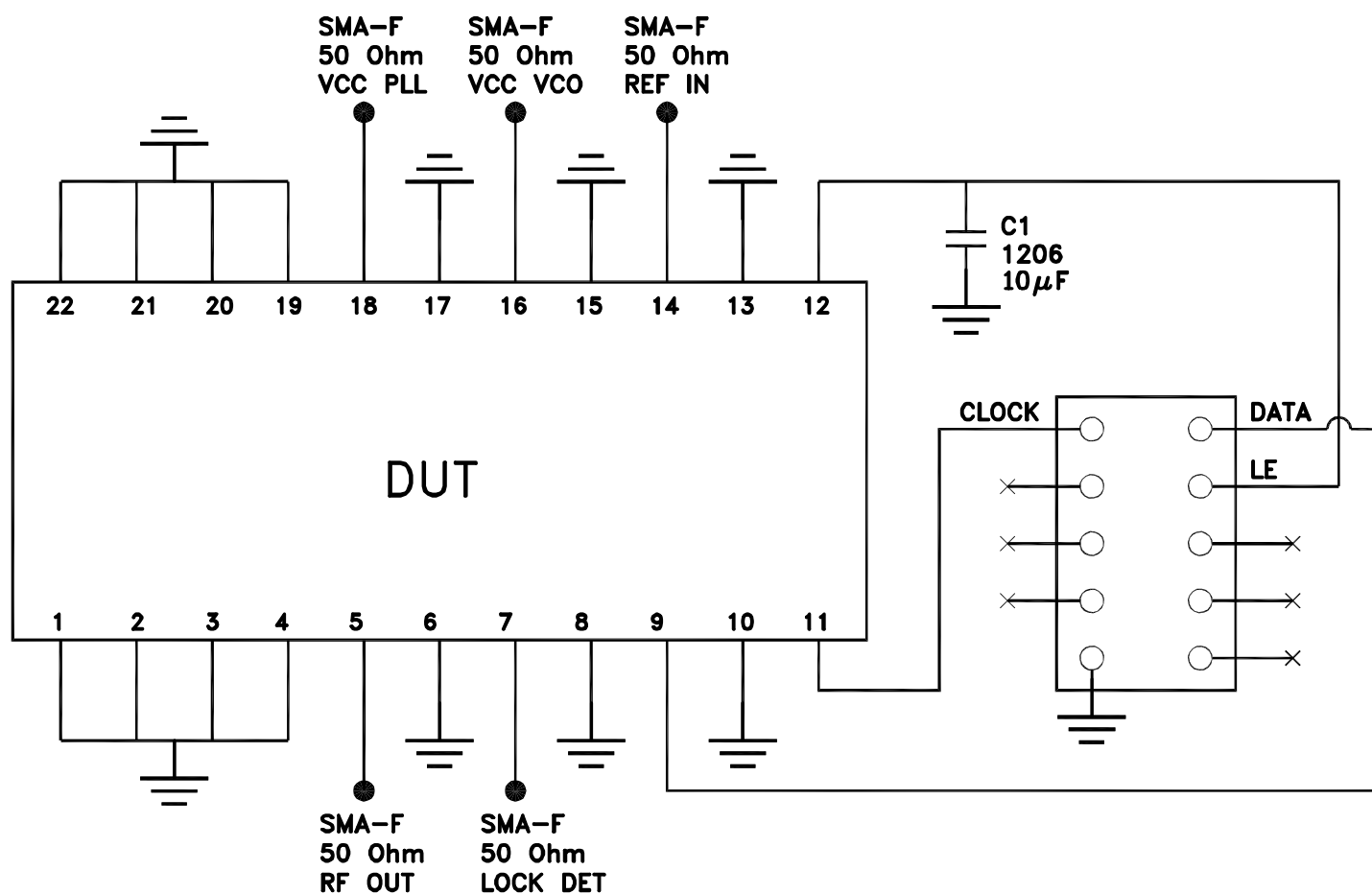


TB-553+

## NOTES:

1. SMA FEMALE CONNECTORS.
2. PCB MATERIAL: RO4350B OR EQUIVALENT, DIALECTRIC CONSTANT=3.5, DIALECTRIC THICKNESS=.020 INCH.





## TB-553+ Schematic Diagram



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          | -45° 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                                                                              |