# APPLICATION NOTE

## *REPLACEMENT PART REFERENCE GUIDE, DAT-31R5-PN+:* AN-70-010

ORIGINAL PART: DAT-31R5-PN+
REPLACEMENT PART: DAT-31R5A-PN+

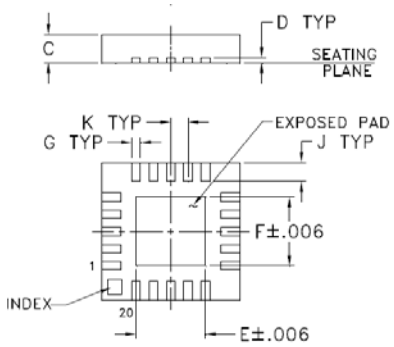
*Replacement Part has been judged by Mini-Circuits Engineering as a suitable replacement to Original Part*[a]



## MECHANICAL DIMENSIONS, TERMINATION FINISH & PCB LAND PATTERN

**ORIGINAL PART: DAT-31R5-PN+**

**Case Style: DG983-1**



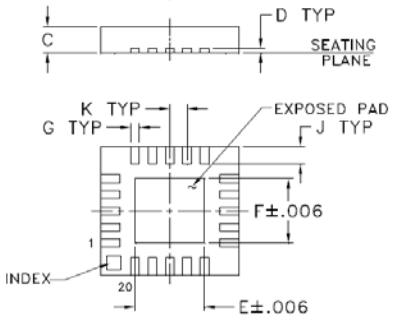

**Inches (mm)**

| C | E | F | G |
|---|---|---|---|
| .035 (0.90) | .081 (2.06) | .081 (2.06) | .010 (0.25) |

Termination Finish: Tin

**REPLACEMENT PART: DAT-31R5A-PN+**

**Case Style: DG983-2 (minor dimensional changes as below)**



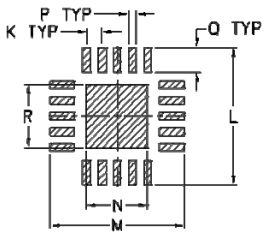

**inches (mm)**

| C | E | F | G |
|---|---|---|---|
| .033 (0.85) | .085 (2.15) | .085 (2.15) | .009 (0.23) |

**Note: Dimensions not shown are same as that in DG983-1**

Termination Finish: NiPdAu

**Suggested PCB Land Pattern**




| K | L | M | N | P | Q | R |
|---|---|---|---|---|---|---|
| .020 (0.50) | .177 (4.50) | .177 (4.50) | .081 (2.06) | .010 (0.25) | .032 (0.81) | .081 (2.06) |

Notes:
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## CONCLUSION:

1) **FORM-FIT-FUNCTIONAL COMPATIBLE**[a]:
Replacement part is Form, Fit compatible.Following is a summary of changes/improvements:

| Parameter | | | DAT-31R5-PN+ (Original Part) | DAT-31R5A-PN+ (Replacement Part) |
|---|---|---|---|---|
| Frequency (GHz) | | | DC-2.4 | DC-4 |
| $V_{DD}$(V) | | | +2.7 to +3.3 | +2.3 to +3.6, usable to +5.2V |
| $V_{SS}$(V) | | | -3.3 min to -2.7 max | -3.6 min to -3.2 max |
| Control input High (V) | | | 0.7$V_{DD}$ to $V_{DD}$ | +1.17 to +3.6 |
| Control input Low (V) | | | 0 to 0.3$V_{DD}$ | -0.3 to +0.6 |
| $I_{DD}$ (µA) | | | 100 µA max. During turn-on and transition between attenuation states, device may draw up to 2mA. | 100 µA max. |
| $I_{SS}$ (µA) | | | 100 max | 40 max |
| Control Current (µA) | | | 1 max | 1 max, except 30µA typ for C0.5, C16, PUP1 and 2µA typ. for LE at +3.6V |
| Attenuation accuracy | Step (dB) | Freq (GHz) | Spec max | Spec max |
| | 8 | 1-2.4 | 0.25 | 0.5 |
| | | 2.4-4 | Not Specified | 0.8 |
| | 16 | 1-2.4 | 0.3 | 0.7 |
| | | 2.4-4 | Not Specified | 1.45 |
| VSWR (:1) (1-2.4 GHz) | | | 1.5 max | 1.6 Max |
| Power-UP: PUP1,PUP2=1 & LE=0 | | | 31dB | 31.5dB |
| Operating Temperature (°C) | | | -40 to 85 | -40 to 105 |
| Storage Temperature(°C) | | | -55 to 100 | -65 to 150 |
| ESD (HBM) | | | Pass 500V | Pass 1500V |
| Max Operating Power | | | Not Specified | From 10 kHz to 50 MHz per Figure 1 (in Model Data Sheet) and +24 dBm above 50 MHz |
| Absolute Max input Power (dBm) | | | +24 | +30 |

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**2) TYPICAL PERFORMANCE COMPARISON[a]:**

| Parameter | Frequency (GHz) | Original Part DAT-31R5-PN+ | Replacement Part DAT-31R5A-PN+ |
|---|---|---|---|
| | | Average | Average |
| I.Loss(dB) | 0.01 to 1 | 1.42 | 1.20 |
| | 1 to 2.4 | 1.77 | 1.46 |
| | 2.4 to 4 | 2.99 | 2.16 |
| Step Accuracy 0.5 dB Step (+/-dB) | 0.01 to 1 | 0.02 | 0.03 |
| | 1 to 2.4 | 0.01 | 0.04 |
| | 2.4 to 4 | 0.06 | 0.04 |
| Step Accuracy 1.0 dB Step (dB) | 0.01 to 1 | 0.00 | 0.03 |
| | 1 to 2.4 | 0.00 | 0.04 |
| | 2.4 to 4 | 0.01 | 0.04 |
| Step Accuracy 2.0 dB Step (dB) | 0.01 to 1 | 0.02 | 0.03 |
| | 1 to 2.4 | 0.06 | 0.05 |
| | 2.4 to 4 | 0.10 | 0.07 |
| Step Accuracy 4.0 dB Step (dB) | 0.01 to 1 | 0.02 | 0.03 |
| | 1 to 2.4 | 0.03 | 0.07 |
| | 2.4 to 4 | 0.00 | 0.10 |
| Step Accuracy 8.0 dB Step (dB) | 0.01 to 1 | 0.08 | 0.02 |
| | 1 to 2.4 | 0.08 | 0.13 |
| | 2.4 to 4 | 0.10 | 0.37 |
| Step Accuracy 16 dB Step (dB) | 0.01 to 1 | 0.10 | 0.06 |
| | 1 to 2.4 | 0.08 | 0.23 |
| | 2.4 to 4 | 0.08 | 0.43 |
| Step Accuracy 31.5 dB Step (dB) | 0.01 to 1 | 0.28 | 0.11 |
| | 1 to 2.4 | 0.88 | 0.18 |
| | 2.2 to 4 | 1.86 | 1.46 |
| Input R.Loss (dB) | 0.01 to 1 | 17.0 | 18.2 |
| | 1 to 2.4 | 19.3 | 18.5 |
| | 2.2 to 4 | 18.8 | 18.2 |
| Output R.Loss (dB) | 0.01 to 1 | 17.4 | 18.7 |
| | 1 to 2.4 | 18.94 | 18.7 |
| | 2.2 to 4 | 18.5 | 17.8 |



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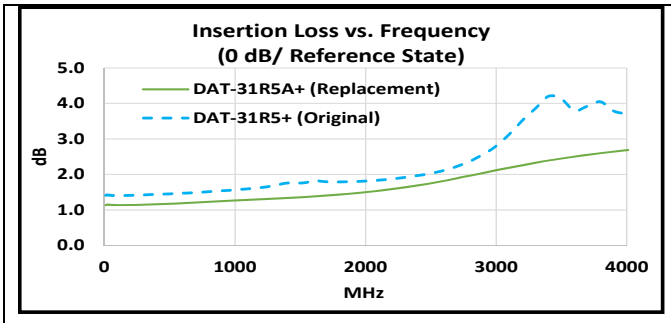
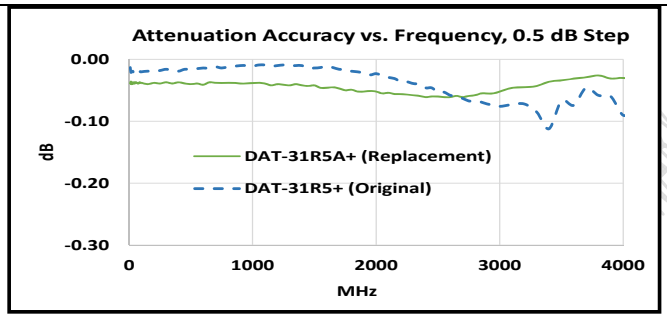
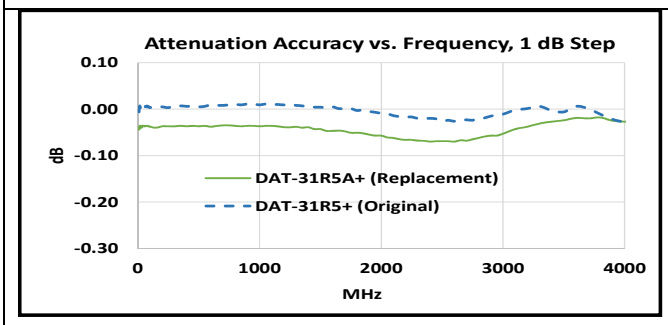
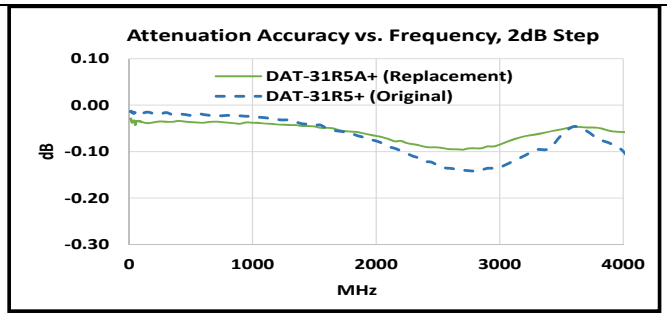
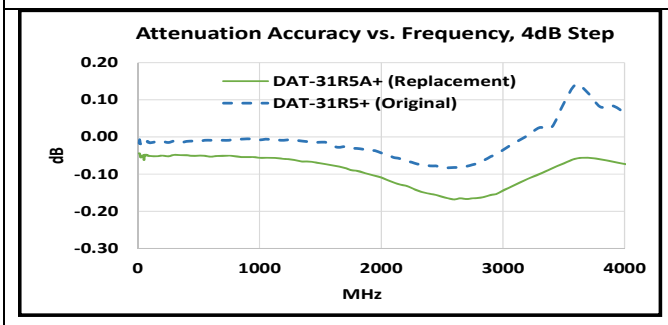
## 3) COMPARISON PERFORMANCE CURVES[a] (TYPICAL):

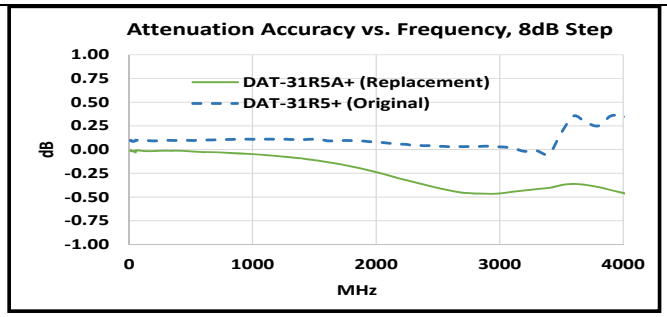


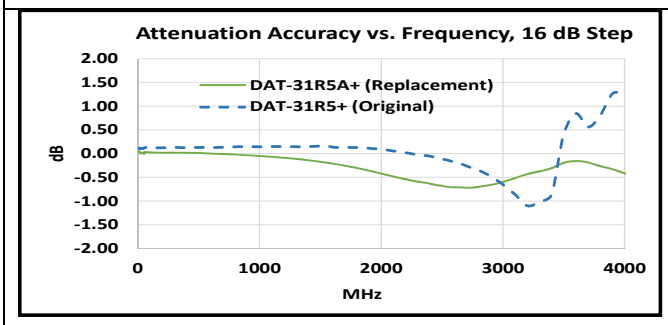



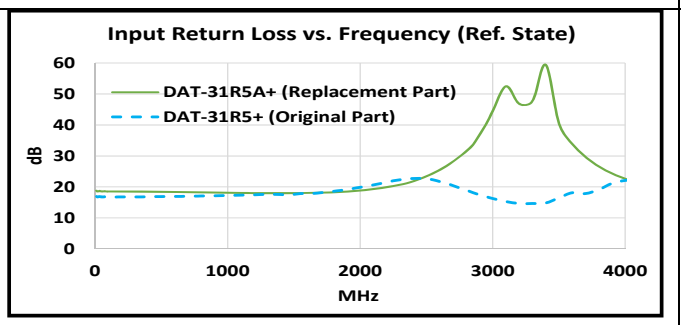




Note: DAT-31R5+ is same as DAT-31R5-PN+ and
DAT-31R5A+is same as DAT-31R5A-PN+

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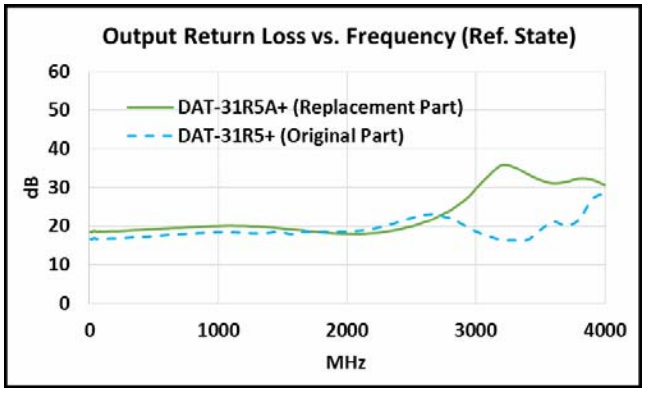
## 4) COMPARISON PERFORMANCE CURVES[a](TYPICAL) (Continued):



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