# SUMMARY TEST DATA
# ON
# HADA-D2002

**Customer:**
**SO No:**
**Model No:** HADA-D2002
**Serial No:** PL49125/2442

**Tested By:** D. Weinrob
**Temperature:** +25 ° C
**Date:** 10/15/2024
**Drawing No:** 27620222 **Rev:** A1

| Test. Item No | PARAMETERS | SPECIFIED VALUE | TEST RESULTS | qa qc |
|---|---|---|---|---|
| 1 | Frequency Range: | 2.0 GHz – 18.0 GHz | **2.0 GHz – 18.0 GHz** **See Plot** | PMI QA3 |
| 2 | TSS: | -40 dBm Min @ -40°C to +85° | **-41 dBm** **See Plot** | |
| 3 | Frequency Flatness: | ±1.65 dB Max | **0.97 dB** **See Plot** | |
| 4 | Input / Output Characteristics: (93 Ω) | Y = 2150 + 50X [X: Input (dBm), Y: Output (mv)] | **Pass** | |
| 5 | Logging Accuracy | ±1.5 dB Max (@ +25°C, 10 GHz)* [-36 dBm ≤ INPUT ≤ +4 dBm] ±3.1 dB Max (Note) | **-0.04 dB / -0.70 dB** **1.40 dB / -1.66 dB** **See Plot** | |
| 6 | Log Linearity: | ±0.5 dB Max @ +25°C ±0.75 dB Max @ -40°C to +85°C | **0.28 dB / -0.42 dB** **0.58 dB / -0.61 dB** **See Plot** | |
| 7 | Maximum Input Power (CW): | +23 dBm | **Pass** | |
| 8 | Duty Cycle: | 100% | **Pass** | |
| 9 | Rise Time: | 30 ns Max (10% to 90%) | **20 ns** **See Plot** | |
| 10 | Fall Time: | 500 ns Max (@ Pulse width 100usec input) (90% to 10%) | **135 ns** **See Plot** | |
| 11 | DC Offset: (Input 50 Ω terminated): | +95 mV +55/-100 mV (@ -40°C to +85°C) | **71 mV @ +25°c** **11 mV @ -40°c** **99 mV @ +85°c** **See Plot** | |

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Email: sales@pmi-rf.com

# SUMMARY TEST DATA
# ON
# HADA-D2002

| | | | | |
|---|---|---|---|---|
| 12 | Input VSWR: | 3.0:1 Max<br>@ +23 dBm | **1.65:1**<br>**See Plot** | PMI QA3 |
| 13 | Propagation Delay: | 60 ns Max | **45 ns** | |
| 14 | Power Supply: | +12 ± 1VDC @ 125 mA Max<br>-12 ± 1VDC @ 75 mA Max | **+12 ± 1VDC @ 100 mA**<br>**-12 ± 1VDC @ 40 mA** | |
| 15 | Warm Up Time: | 2 Minutes Max | **2 Minutes** | |

*Notes: Includes Frequency Flatness. Input Power, Temperature Deviation and Deviation for DC Offset. The test shall be performed using RG-62 (or equivalent), 5 meter, 93±0.5 Ohms terminated.

**QA/QC Approval:** K. Klamm **Date:** 10-16-24

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Email: sales@pmi-rf.com

# SUMMARY TEST DATA
# ON
# HADA-D2002

LOG TRANSFER WITH FREQUENCY @ +25C
MODEL: HADA-D2002
SERIAL NO: PL49128
TESTED BY: D. Weinrob
DATE: 9/30/2024

GRAPH #1

PLANAR MONOLITHICS INDUSTRIES
4921 Robert J. Mathews Parkway Suit 1
El Dorado Hills, CA 95762
TEL: 916-542-1401 FAX: 916-265-2597
EMAIL: SALES@PMI-RF.COM

Output Voltage Offset= 0.071 Volts

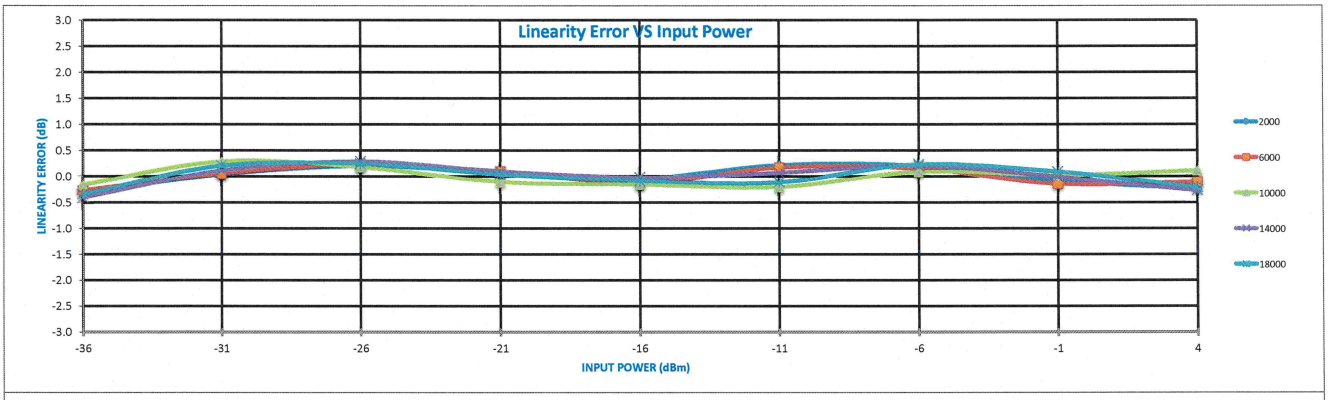
| Frequency | | | -36 | -31 | -26 | -21 | -16 | -11 | -6 | -1 | 4 | RF Input Power (dBm) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 GHz | INTERCEPT (mV) | 2161 | 384 | 645 | 898 | 1136 | 1375 | 1633 | 1877 | 2108 | 2345 | Measured Value (mV) | Error(dB) | |
| | SLOPE (mV/dB) | 49 | -15 | 2 | 10 | 3 | -3 | 10 | 10 | -4 | -12 | Error (mV) | MAX | MIN |
| | | | -0.30 | 0.03 | 0.20 | 0.06 | -0.06 | 0.21 | 0.19 | -0.09 | -0.25 | LINEARITY ERROR (dB) | 0.21 | -0.30 |
| | | | 0.68 | 0.90 | 0.96 | 0.72 | 0.50 | 0.66 | 0.54 | 0.16 | -0.10 | LOGGING ACCURACY (dB) | 0.96 | -0.10 |
| 6 GHz | INTERCEPT (mV) | 2184 | 405 | 666 | 920 | 1159 | 1393 | 1653 | 1897 | 2128 | 2375 | Measured Value (mV) | Error(dB) | |
| | SLOPE (mV/dB) | 49 | -14 | 2 | 11 | 5 | -7 | 8 | 7 | -7 | -5 | Error (mV) | MAX | MIN |
| | | | -0.28 | 0.04 | 0.22 | 0.10 | -0.13 | 0.17 | 0.14 | -0.15 | -0.11 | LINEARITY ERROR (dB) | 0.22 | -0.28 |
| | | | 1.10 | 1.32 | 1.40 | 1.18 | 0.86 | 1.06 | 0.94 | 0.56 | 0.50 | LOGGING ACCURACY (dB) | 1.40 | 0.50 |
| 10 GHz | INTERCEPT (mV) | 2141 | 315 | 590 | 837 | 1075 | 1325 | 1575 | 1842 | 2091 | 2348 | Measured Value (mV) | Error(dB) | |
| | SLOPE (mV/dB) | 50.5 | -8 | 14 | 9 | -6 | -8 | -11 | 4 | 1 | 5 | Error (mV) | MAX | MIN |
| | | | -0.17 | 0.28 | 0.17 | -0.11 | -0.16 | -0.21 | 0.08 | 0.01 | 0.10 | LINEARITY ERROR (dB) | 0.28 | -0.21 |
| | | | -0.70 | -0.20 | -0.26 | -0.50 | -0.50 | -0.50 | -0.16 | -0.18 | -0.04 | LOGGING ACCURACY (dB) | -0.04 | -0.70 |
| 14 GHz | INTERCEPT (mV) | 2133 | 359 | 628 | 880 | 1114 | 1352 | 1600 | 1850 | 2083 | 2314 | Measured Value (mV) | Error(dB) | |
| | SLOPE (mV/dB) | 48.7 | -20 | 5 | 14 | 4 | -1 | 3 | 10 | -1 | -13 | Error (mV) | MAX | MIN |
| | | | -0.42 | 0.11 | 0.28 | 0.09 | -0.03 | 0.06 | 0.20 | -0.02 | -0.28 | LINEARITY ERROR (dB) | 0.28 | -0.42 |
| | | | 0.18 | 0.56 | 0.60 | 0.28 | 0.04 | 0.00 | 0.00 | -0.34 | -0.72 | LOGGING ACCURACY (dB) | 0.60 | -0.72 |
| 18 GHz | INTERCEPT (mV) | 2120 | 338 | 610 | 857 | 1092 | 1331 | 1575 | 1837 | 2075 | 2306 | Measured Value (mV) | Error(dB) | |
| | SLOPE (mV/dB) | 49 | -17 | 10 | 12 | 2 | -5 | -6 | 11 | 4 | -10 | Error (mV) | MAX | MIN |
| | | | -0.35 | 0.20 | 0.24 | 0.03 | -0.10 | -0.12 | 0.22 | 0.08 | -0.21 | LINEARITY ERROR (dB) | 0.24 | -0.35 |
| | | | -0.24 | 0.20 | 0.14 | -0.16 | -0.38 | -0.50 | -0.26 | -0.50 | -0.88 | LOGGING ACCURACY (dB) | 0.20 | -0.88 |
| | Flatness +/- dB | | 0.914 | 0.772 | 0.843 | 0.853 | 0.690 | 0.792 | 0.609 | 0.538 | 0.701 | | | |
| | Max Video Output V | | 0.405 | 0.666 | 0.920 | 1.159 | 1.393 | 1.653 | 1.897 | 2.128 | 2.375 | | | |
| | Min Video Output V | | 0.315 | 0.590 | 0.837 | 1.075 | 1.325 | 1.575 | 1.837 | 2.075 | 2.306 | | | |

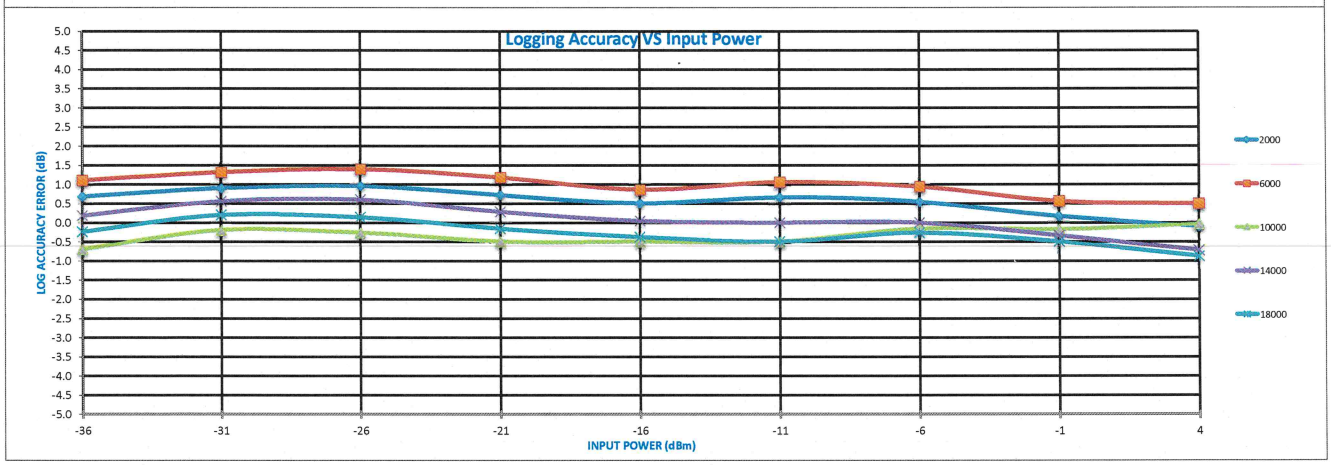
| Logging Linearity vs Frequency | Error(dB) | |
|---|---|---|
| | MAX | MIN |
| LOGGING LINEARITY ERROR (dB) | 0.28 | -0.42 |

| Logging Accuracy vs Frequency | Error(dB) | |
|---|---|---|
| | MAX | MIN |
| LOGGING ACCURACY ERROR (dB) | 1.40 | -0.88 |

# SUMMARY TEST DATA
# ON
# HADA-D2002

LOG TRANSFER WITH FREQUENCY @ +25C
MODEL: HADA-D2002
SERIAL NO: PL49128
TESTED BY: D. Weinrob

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Email: sales@pmi-rf.com

# SUMMARY TEST DATA
# ON
# HADA-D2002

LOG TRANSFER WITH FREQUENCY @ -40C
MODEL: HADA-D2002
SERIAL NO: PL49128
TESTED BY: D. Weinrob
DATE: 9/30/2024

PLANAR MONOLITHICS INDUSTRIES
4921 Robert J. Mathews Parkway Suit 1
El Dorado Hills, CA 95762
TEL: 916-542-1401 FAX: 916-265-2597
EMAIL: SALES@PMI-RF.COM

GRAPH #2

Output Voltage Offset= 0.011 Volts

| Frequency | | | -36 | -31 | -26 | -21 | -16 | -11 | -6 | -1 | 4 | RF Input Power (dBm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 GHz | INTERCEPT (mV) | 2144 | 382 | 630 | 886 | 1133 | 1368 | 1638 | 1873 | 2081 | 2314 | Measured Value (mV) |
| | SLOPE (mV/dB) | 48.5 | -15 | -9 | 4 | 8 | 1 | 28 | 20 | -14 | -24 | Error (mV) |
| | | | -0.30 | -0.19 | 0.08 | 0.17 | 0.02 | 0.58 | 0.42 | -0.29 | -0.49 | LINEARITY ERROR (dB) |
| | | | 0.64 | 0.60 | 0.72 | 0.66 | 0.36 | 0.76 | 0.46 | -0.38 | -0.72 | LOGGING ACCURACY (dB) |
| 6 GHz | INTERCEPT (mV) | 2166 | 403 | 652 | 906 | 1156 | 1386 | 1656 | 1892 | 2099 | 2345 | Measured Value (mV) |
| | SLOPE (mV/dB) | 48.6 | -13 | -7 | 4 | 11 | -2 | 25 | 18 | -18 | -15 | Error (mV) |
| | | | -0.27 | -0.15 | 0.08 | 0.22 | -0.05 | 0.51 | 0.36 | -0.38 | -0.32 | LINEARITY ERROR (dB) |
| | | | 1.06 | 1.04 | 1.12 | 1.12 | 0.72 | 1.12 | 0.84 | -0.02 | -0.10 | LOGGING ACCURACY (dB) |
| 10 GHz | INTERCEPT (mV) | 2123 | 308 | 574 | 829 | 1068 | 1315 | 1581 | 1839 | 2066 | 2314 | Measured Value (mV) |
| | SLOPE (mV/dB) | 50.1 | -11 | 4 | 9 | -3 | -7 | 9 | 16 | -7 | -10 | Error (mV) |
| | | | -0.23 | 0.08 | 0.17 | -0.06 | -0.13 | 0.18 | 0.33 | -0.14 | -0.19 | LINEARITY ERROR (dB) |
| | | | -0.84 | -0.52 | -0.42 | -0.64 | -0.70 | -0.38 | -0.22 | -0.68 | -0.72 | LOGGING ACCURACY (dB) |
| 14 GHz | INTERCEPT (mV) | 2122 | 362 | 616 | 873 | 1116 | 1347 | 1611 | 1852 | 2065 | 2289 | Measured Value (mV) |
| | SLOPE (mV/dB) | 48.4 | -19 | -6 | 9 | 10 | -1 | 21 | 21 | -8 | -26 | Error (mV) |
| | | | -0.39 | -0.13 | 0.18 | 0.20 | -0.02 | 0.44 | 0.42 | -0.17 | -0.54 | LINEARITY ERROR (dB) |
| | | | 0.24 | 0.32 | 0.46 | 0.32 | -0.06 | 0.22 | 0.04 | -0.70 | -1.22 | LOGGING ACCURACY (dB) |
| 18 GHz | INTERCEPT (mV) | 2100 | 327 | 588 | 841 | 1079 | 1315 | 1575 | 1829 | 2050 | 2272 | Measured Value (mV) |
| | SLOPE (mV/dB) | 48.8 | -17 | 0 | 9 | 3 | -5 | 11 | 22 | -1 | -23 | Error (mV) |
| | | | -0.34 | 0.01 | 0.19 | 0.07 | -0.09 | 0.24 | 0.44 | -0.03 | -0.48 | LINEARITY ERROR (dB) |
| | | | -0.46 | -0.24 | -0.18 | -0.42 | -0.70 | -0.50 | -0.42 | -1.00 | -1.56 | LOGGING ACCURACY (dB) |
| | Flatness +/- dB | | 0.972 | 0.798 | 0.788 | 0.900 | 0.726 | 0.829 | 0.644 | 0.501 | 0.747 | |
| | Max Video Output V | | 0.403 | 0.652 | 0.906 | 1.156 | 1.386 | 1.656 | 1.892 | 2.099 | 2.345 | |
| | Min Video Output V | | 0.308 | 0.574 | 0.829 | 1.068 | 1.315 | 1.575 | 1.829 | 2.050 | 2.272 | |

| Measured Value (mV) | Error(dB) | |
|---|---|---|
| Error (mV) | MAX | MIN |
| LINEARITY ERROR (dB) | 0.58 | -0.49 |
| LOGGING ACCURACY (dB) | 0.76 | -0.72 |

| Measured Value (mV) | Error(dB) | |
|---|---|---|
| Error (mV) | MAX | MIN |
| LINEARITY ERROR (dB) | 0.51 | -0.38 |
| LOGGING ACCURACY (dB) | 1.12 | -0.10 |

| Measured Value (mV) | Error(dB) | |
|---|---|---|
| Error (mV) | MAX | MIN |
| LINEARITY ERROR (dB) | 0.33 | -0.23 |
| LOGGING ACCURACY (dB) | -0.22 | -0.84 |

| Measured Value (mV) | Error(dB) | |
|---|---|---|
| Error (mV) | MAX | MIN |
| LINEARITY ERROR (dB) | 0.44 | -0.54 |
| LOGGING ACCURACY (dB) | 0.46 | -1.22 |

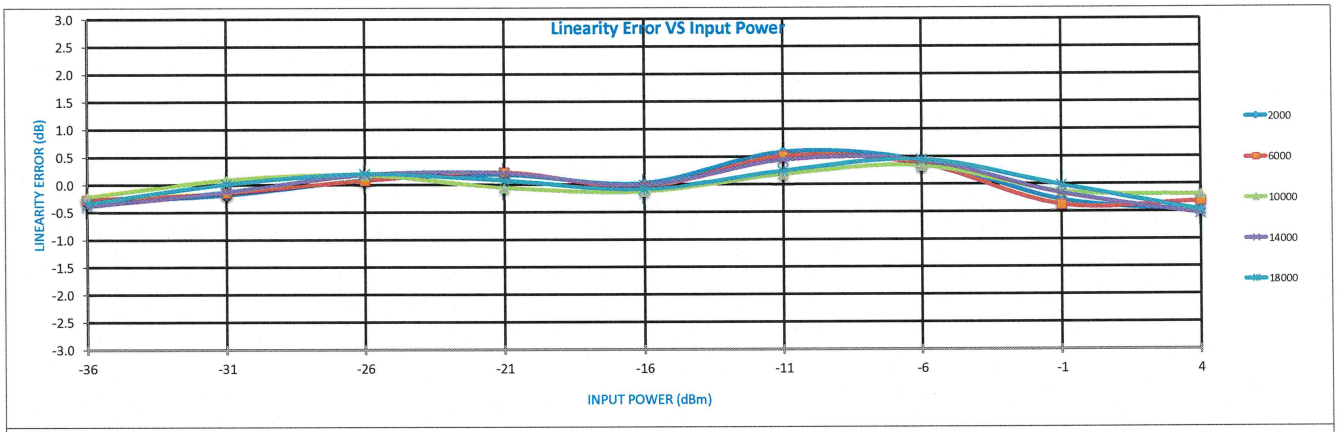
| Measured Value (mV) | Error(dB) | |
|---|---|---|
| Error (mV) | MAX | MIN |
| LINEARITY ERROR (dB) | 0.44 | -0.48 |
| LOGGING ACCURACY (dB) | -0.18 | -1.56 |

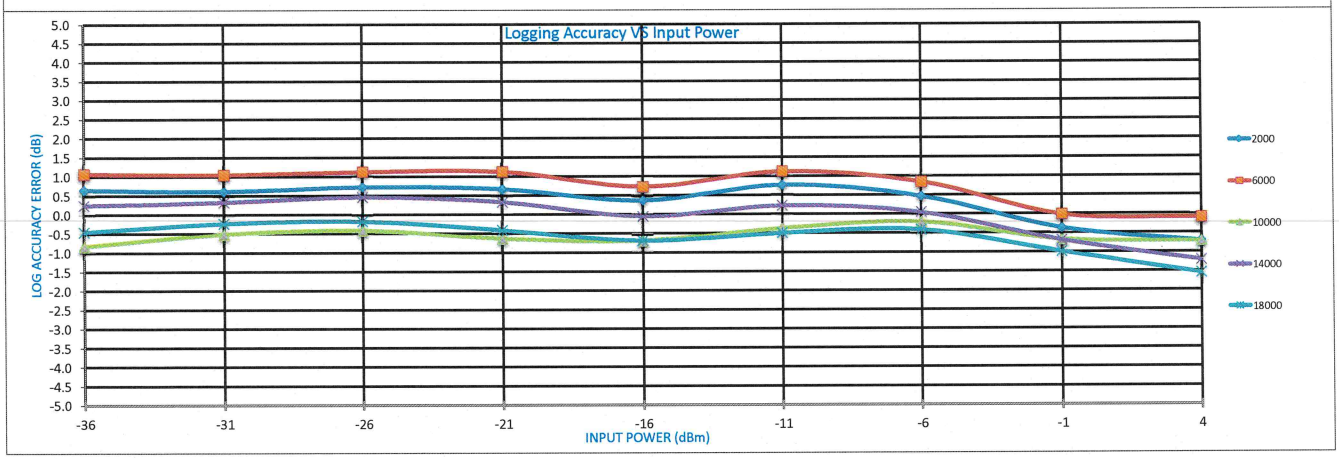
| Logging Linearity vs Frequency | Error(dB) | |
|---|---|---|
| | MAX | MIN |
| LOGGING LINEARITY ERROR (dB) | 0.58 | -0.54 |

| Logging Accuracy vs Frequency | Error(dB) | |
|---|---|---|
| | MAX | MIN |
| LOGGING ACCURACY ERROR (dB) | 1.12 | -1.56 |

# SUMMARY TEST DATA
# ON
# HADA-D2002

LOG TRANSFER WITH FREQUENCY @ -40C
MODEL: HADA-D2002
SERIAL NO: PL49128
TESTED BY: D. Weinrob

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Email: sales@pmi-rf.com

# SUMMARY TEST DATA
# ON
# HADA-D2002

LOG TRANSFER WITH FREQUENCY @ +85C
MODEL: HADA-D2002
SERIAL NO: PL49128
TESTED BY: D. Weinrob
DATE: 9/30/2024

GRAPH #3

PLANAR MONOLITHICS INDUSTRIES
4921 Robert J. Mathews Parkway Suit 1
El Dorado Hills, CA 95762
TEL: 916-542-1401 FAX: 916-265-2597
EMAIL: SALES@PMI-RF.COM

Output Voltage Offset= 0.099 Volts

| Frequency | | |
|---|---|---|
| 2 GHz | INTERCEPT (mV) | 2136 |
| | SLOPE (mV/dB) | 49.4 |
| 6 GHz | INTERCEPT (mV) | 2161 |
| | SLOPE (mV/dB) | 49.5 |
| 10 GHz | INTERCEPT (mV) | 2107 |
| | SLOPE (mV/dB) | 50.8 |
| 14 GHz | INTERCEPT (mV) | 2090 |
| | SLOPE (mV/dB) | 49 |
| 18 GHz | INTERCEPT (mV) | 2088 |
| | SLOPE (mV/dB) | 49.3 |

| RF Input Power (dBm) | -36 | -31 | -26 | -21 | -16 | -11 | -6 | -1 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| Measured Value (mV) | 352 | 618 | 860 | 1094 | 1340 | 1583 | 1840 | 2087 | 2342 |
| Error (mV) | -6 | 13 | 8 | -5 | -6 | -10 | 0 | 0 | 8 |
| LINEARITY ERROR (dB) | -0.13 | 0.25 | 0.15 | -0.11 | -0.13 | -0.21 | 0.00 | 0.00 | 0.16 |
| LOGGING ACCURACY (dB) | 0.04 | 0.36 | 0.20 | -0.12 | -0.20 | -0.34 | -0.20 | -0.26 | -0.16 |

| Error(dB) | MAX | MIN |
|---|---|---|
| LINEARITY ERROR (dB) | 0.25 | -0.21 |
| LOGGING ACCURACY (dB) | 0.36 | -0.34 |

| Measured Value (mV) | 374 | 639 | 884 | 1117 | 1358 | 1604 | 1861 | 2112 | 2372 |
|---|---|---|---|---|---|---|---|---|---|
| Error (mV) | -5 | 13 | 10 | -4 | -11 | -13 | -3 | 0 | 13 |
| LINEARITY ERROR (dB) | -0.10 | 0.25 | 0.20 | -0.09 | -0.22 | -0.25 | -0.06 | 0.01 | 0.26 |
| LOGGING ACCURACY (dB) | 0.48 | 0.78 | 0.68 | 0.34 | 0.16 | 0.08 | 0.22 | 0.24 | 0.44 |

| Error(dB) | MAX | MIN |
|---|---|---|
| LINEARITY ERROR (dB) | 0.26 | -0.25 |
| LOGGING ACCURACY (dB) | 0.78 | 0.08 |

| Measured Value (mV) | 288 | 550 | 789 | 1030 | 1279 | 1517 | 1796 | 2060 | 2339 |
|---|---|---|---|---|---|---|---|---|---|
| Error (mV) | 9 | 18 | 3 | -10 | -15 | -31 | -6 | 4 | 29 |
| LINEARITY ERROR (dB) | 0.19 | 0.35 | 0.05 | -0.20 | -0.30 | -0.61 | -0.12 | 0.08 | 0.57 |
| LOGGING ACCURACY (dB) | -1.24 | -1.00 | -1.22 | -1.40 | -1.42 | -1.66 | -1.08 | -0.80 | -0.22 |

| Error(dB) | MAX | MIN |
|---|---|---|
| LINEARITY ERROR (dB) | 0.57 | -0.61 |
| LOGGING ACCURACY (dB) | -0.22 | -1.66 |

| Measured Value (mV) | 319 | 586 | 826 | 1061 | 1303 | 1535 | 1797 | 2042 | 2295 |
|---|---|---|---|---|---|---|---|---|---|
| Error (mV) | -9 | 13 | 8 | -1 | -4 | -17 | 0 | 0 | 9 |
| LINEARITY ERROR (dB) | -0.18 | 0.27 | 0.17 | -0.03 | -0.08 | -0.35 | 0.01 | 0.01 | 0.18 |
| LOGGING ACCURACY (dB) | -0.62 | -0.28 | -0.48 | -0.78 | -0.94 | -1.30 | -1.06 | -1.16 | -1.10 |

| Error(dB) | MAX | MIN |
|---|---|---|
| LINEARITY ERROR (dB) | 0.27 | -0.35 |
| LOGGING ACCURACY (dB) | -0.28 | -1.30 |

| Measured Value (mV) | 309 | 576 | 812 | 1049 | 1289 | 1522 | 1794 | 2043 | 2297 |
|---|---|---|---|---|---|---|---|---|---|
| Error (mV) | -4 | 16 | 6 | -4 | -10 | -24 | 2 | 5 | 12 |
| LINEARITY ERROR (dB) | -0.08 | 0.33 | 0.12 | -0.07 | -0.20 | -0.48 | 0.04 | 0.09 | 0.24 |
| LOGGING ACCURACY (dB) | -0.82 | -0.48 | -0.76 | -1.02 | -1.22 | -1.56 | -1.12 | -1.14 | -1.06 |

| Error(dB) | MAX | MIN |
|---|---|---|
| LINEARITY ERROR (dB) | 0.33 | -0.48 |
| LOGGING ACCURACY (dB) | -0.48 | -1.56 |

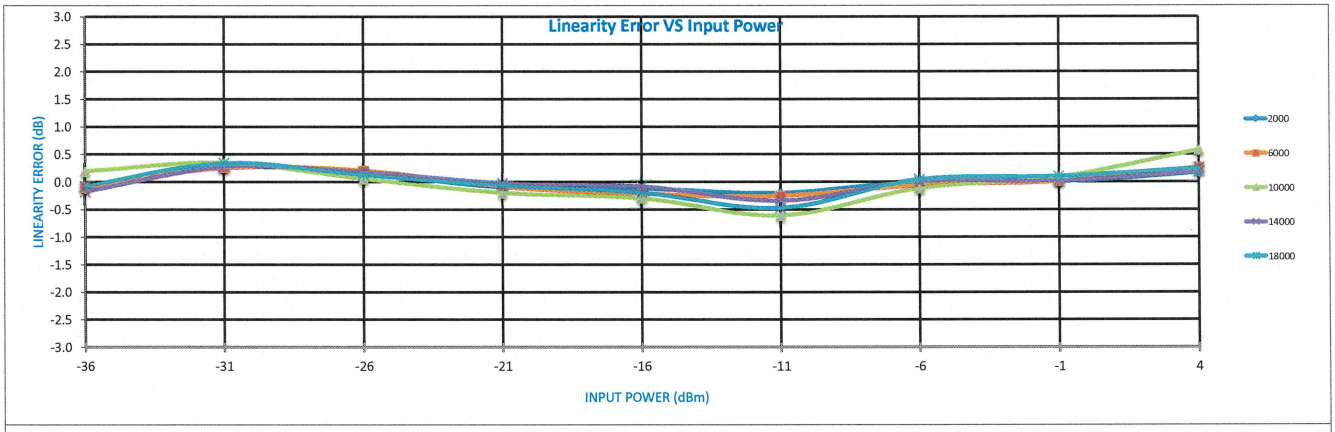
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Flatness +/- dB | 0.867 | 0.897 | 0.958 | 0.877 | 0.797 | 0.877 | 0.676 | 0.706 | 0.776 |
| Max Video Output V | 0.374 | 0.639 | 0.884 | 1.117 | 1.358 | 1.604 | 1.861 | 2.112 | 2.372 |
| Min Video Output V | 0.288 | 0.550 | 0.789 | 1.030 | 1.279 | 1.517 | 1.794 | 2.042 | 2.295 |

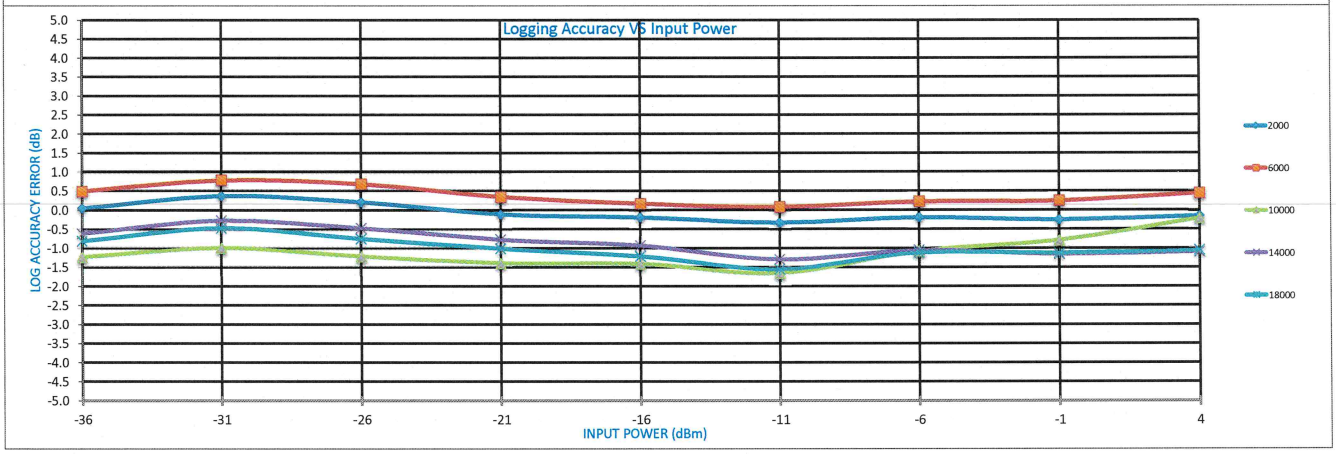
| Logging Linearity vs Frequency | Error(dB) | |
|---|---|---|
| | MAX | MIN |
| LOGGING LINEARITY ERROR (dB) | 0.57 | -0.61 |

| Logging Accuracy vs Frequency | Error(dB) | |
|---|---|---|
| | MAX | MIN |
| LOGGING ACCURACY ERROR (dB) | 0.78 | -1.66 |

# SUMMARY TEST DATA
# ON
# HADA-D2002

LOG TRANSFER WITH FREQUENCY @ +85C
MODEL: HADA-D2002
SERIAL NO: PL49128
TESTED BY: D. Weinrob

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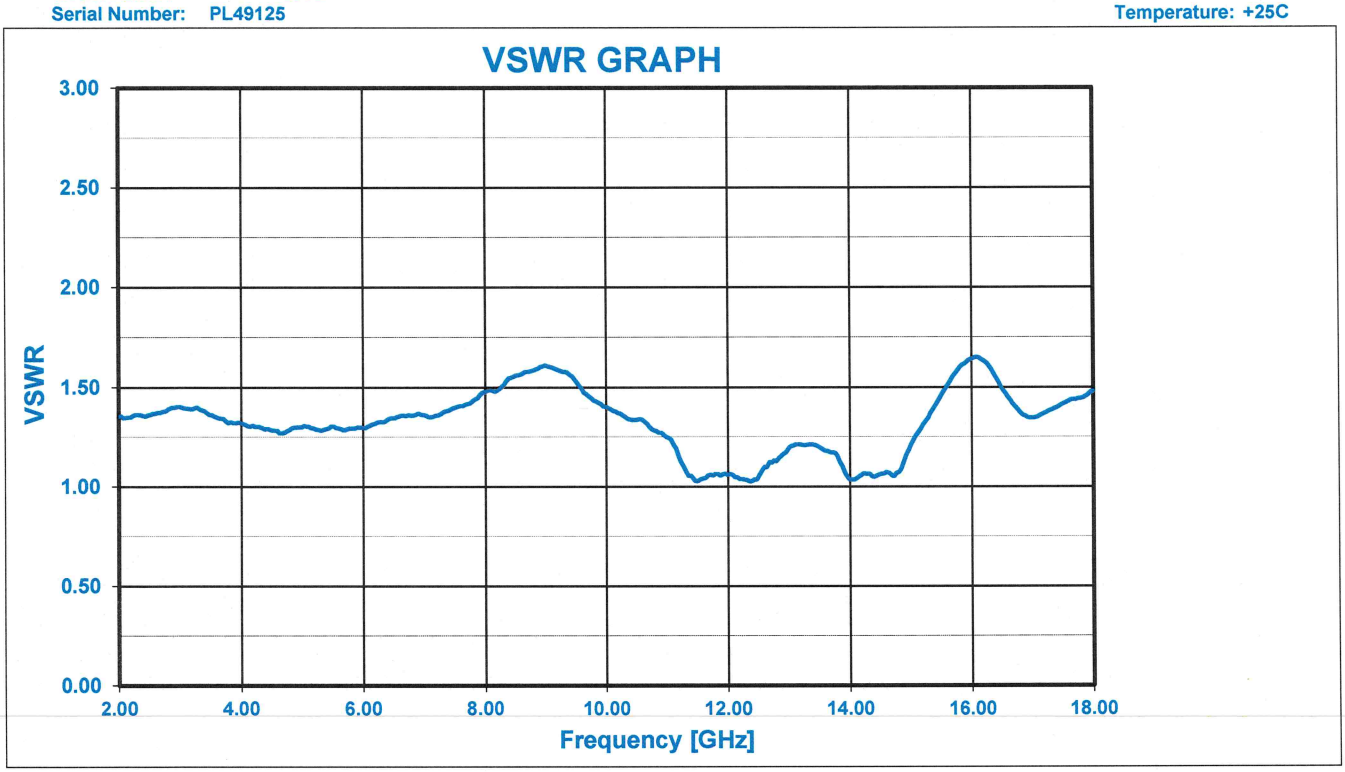
Email: sales@pmi-rf.com

# SUMMARY TEST DATA
# ON
# HADA-D2002

Model Number: HADA-D2002
Serial Number: PL49125

Temperature: +25C

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# SUMMARY TEST DATA
# ON
# HADA-D2002

TSS = -41 dBm


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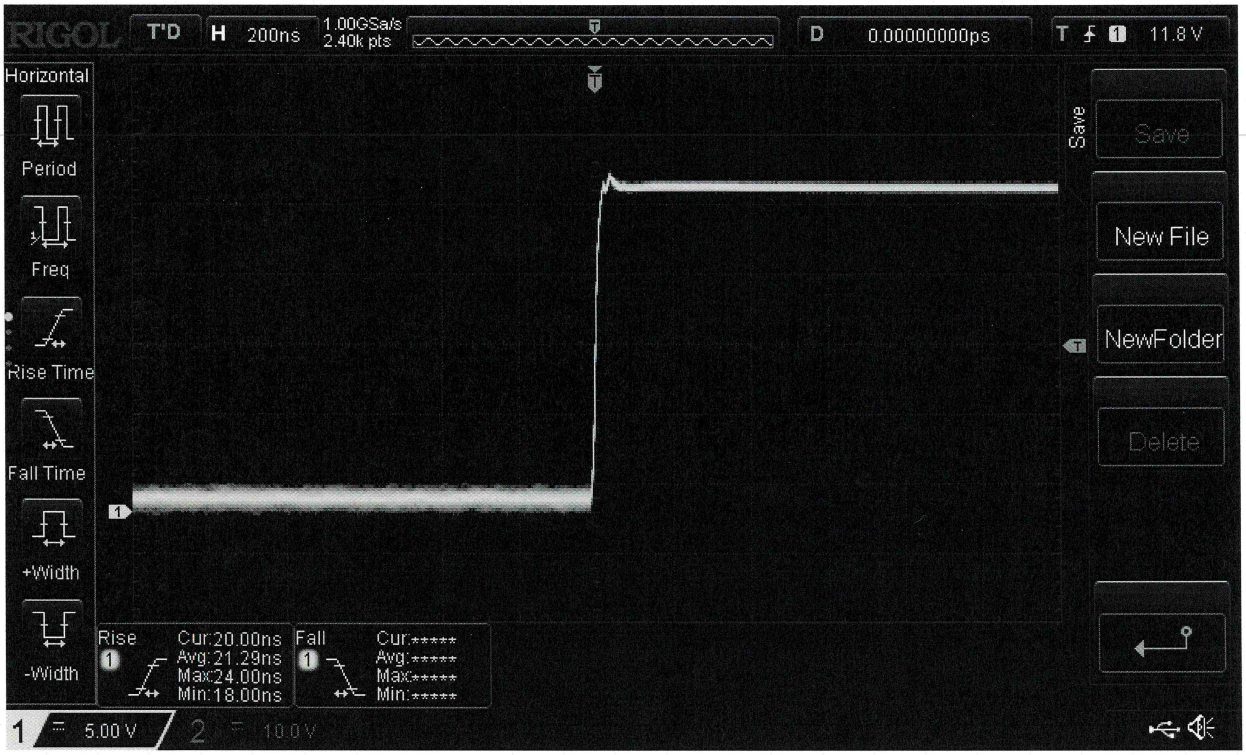
# SUMMARY TEST DATA
# ON
# HADA-D2002

Rise Time = 20 ns

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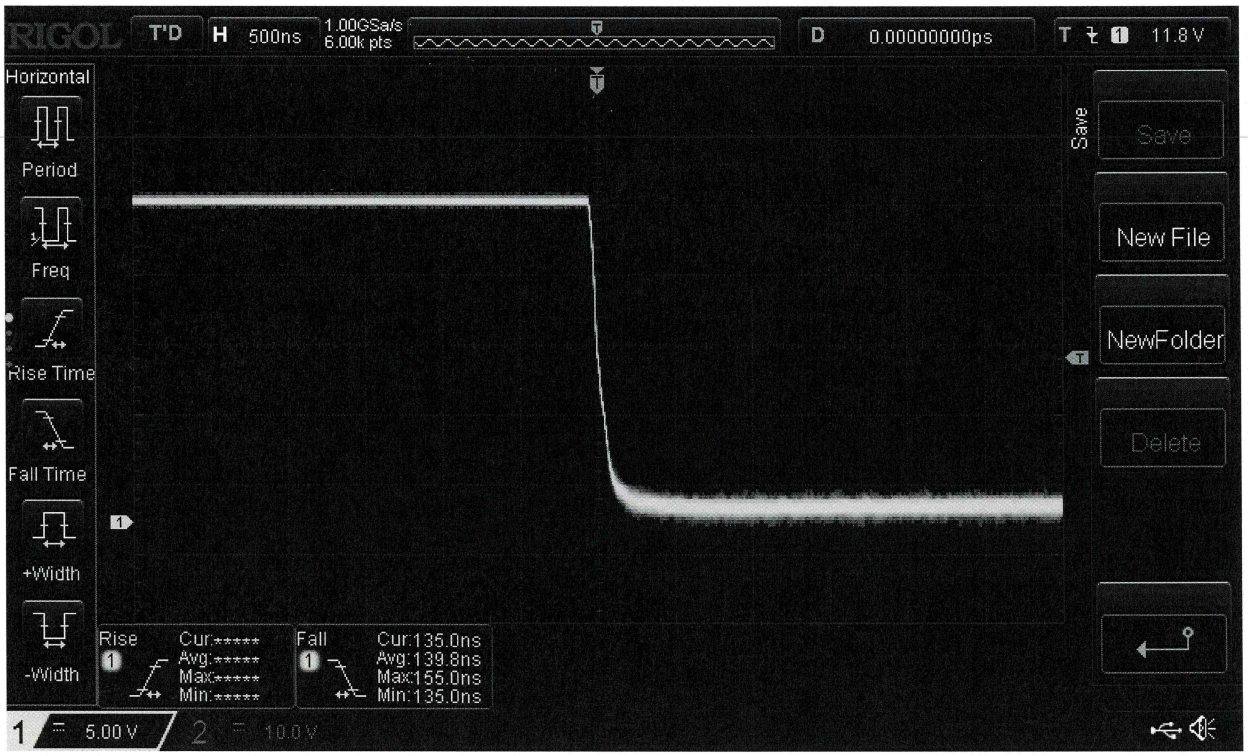
# SUMMARY TEST DATA
# ON
# HADA-D2002

Fall Time = 135 ns

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