

**Tested By: Jay Copti****Date: 09/18/2013****ASC (WFS) Style Detector Measured Parameters**

All transimpedance measurements are referred to plane of the physical output connector and include the effect of the voltage divider created by the 50  $\Omega$  termination. All notch rejection ratios are relative to the magnitude of the transimpedance at the respective RF detection center frequency of the given RF output port. The notation, Q1 to Q4 refers to the specific quadrant of a four section (Quad) diode.

| <b>Unit identification</b>                      | <b>Value</b> |
|---|--------------|
| Photodetector serial number                     | S1300635     |
| Detector schematic D# and revision              | D1101614-v4  |
| Diode element manufacturer<br>and serial number | N/A          |

| <b>DC Parameters</b>                         | <b>Value</b> |
|--|--------------|
| Quiescent DC current (amps at +18 VDC)       | 170.01 mA    |
| Quiescent DC current (amps at -18 VDC)       | 239.01 mA    |
| PD bias regulator output voltage (VDC)       | 5.05 VDC     |
| RF opamp positive voltage regulator (VDC)    | 5.84 VDC     |
| RF opamp negative voltage regulator (VDC)    | -6.05 VDC    |
| Audio opamp positive voltage regulator (VDC) | 14.76 VDC    |
| Audio opamp negative voltage regulator (VDC) | -15.31 VDC   |

| <b>DC readout transimpedance<br/>(<math>\Omega</math> at differential output)</b> | <b>Value</b> |
|---|--------------|
| Q1  | 998 $\Omega$ |
| Q2  | 998 $\Omega$ |
| Q3  | 997 $\Omega$ |
| Q4  | 997 $\Omega$ |

| <b>Global RF parameters</b>                | <b>Value</b>  |
|--|---------------|
| RF detection center frequency (MHz), f low | 36 MHz        |
| RF detection center frequency (MHz), f hi  | 45 MHz        |
| Notch frequencies (MHz) used in design     | 9, 90, 90 MHz |

| <b>Q1 RF notch parameters</b>   | <b>Value</b> |
|---------------------------------|--------------|
| Measured DC photocurrent (mA)   | 0.728 mA     |
| f low, Rejection (dB) at notch1 | -58.1 dB     |
| f low, Rejection (dB) at notch2 | N/A          |
| f low, Rejection (dB) at notch3 | -53.6 dB     |
| f low, Rejection (dB) at notch4 | -53.6 dB     |
| f low, to f hi rejection        | -37.8 dB     |
| f hi, Rejection (dB) at notch1  | -60.1 dB     |
| f hi, Rejection (dB) at notch2  | N/A          |
| f hi, Rejection (dB) at notch3  | -51.0 dB     |
| f hi, Rejection (dB) at notch4  | -51.0 dB     |
| f hi, to f low rejection        | -25.3 dB     |

| <b>Q2 RF notch parameters</b>   | <b>Value</b> |
|---------------------------------|--------------|
| Measured DC photocurrent (mA)   | 0.326 mA     |
| f low, Rejection (dB) at notch1 | -58.0 dB     |
| f low, Rejection (dB) at notch2 | N/A          |
| f low, Rejection (dB) at notch3 | -48.2 dB     |
| f low, Rejection (dB) at notch4 | -48.2 dB     |
| f low, to f hi rejection        | -39.7 dB     |
| f hi, Rejection (dB) at notch1  | -60.5 dB     |
| f hi, Rejection (dB) at notch2  | N/A          |
| f hi, Rejection (dB) at notch3  | -45.6 dB     |
| f hi, Rejection (dB) at notch4  | -45.6 dB     |
| f hi, to f low rejection        | -24.5 dB     |

| <b>Q3 RF notch parameters</b>   | <b>Value</b> |
|---------------------------------|--------------|
| Measured DC photocurrent (mA)   | 0.555 mA     |
| f low, Rejection (dB) at notch1 | -57.8 dB     |
| f low, Rejection (dB) at notch2 | N/A          |
| f low, Rejection (dB) at notch3 | -53.7 dB     |
| f low, Rejection (dB) at notch4 | -53.7 dB     |
| f low, to f hi rejection        | -38.5 dB     |
| f hi, Rejection (dB) at notch1  | -60.2 dB     |
| f hi, Rejection (dB) at notch2  | N/A          |
| f hi, Rejection (dB) at notch3  | -51.0 dB     |
| f hi, Rejection (dB) at notch4  | -51.0 dB     |
| f hi, to f low rejection        | -23.2 dB     |

| <b>Q4 RF notch parameters</b>   | <b>Value</b> |
|---------------------------------|--------------|
| Measured DC photocurrent (mA)   | 0.176 mA     |
| f low, Rejection (dB) at notch1 | -60.7 dB     |
| f low, Rejection (dB) at notch2 | N/A          |
| f low, Rejection (dB) at notch3 | -45.3 dB     |
| f low, Rejection (dB) at notch4 | -45.3 dB     |
| f low, to f hi rejection        | -45.5 dB     |
| f hi, Rejection (dB) at notch1  | -64.0 dB     |
| f hi, Rejection (dB) at notch2  | N/A          |
| f hi, Rejection (dB) at notch3  | -33.5 dB     |
| f hi, Rejection (dB) at notch4  | -44.5 dB     |
| f hi, to f low rejection        | -44.5 dB     |

| <b>Q1 RF transimpedance</b>          | <b>Value</b>                           |
|--------------------------------------|--|
| Photocurrent from Calibrator (mA)    | <b>9.50 mA ( LO ) / 9.43 mA ( HI )</b> |
| Transimpedance ( $\Omega$ ) at f low | 810 $\Omega$                           |
| Transimpedance ( $\Omega$ ) at f hi  | 707 $\Omega$                           |

| <b>Q2 RF transimpedance</b>          | <b>Value</b>                           |
|--------------------------------------|--|
| Photocurrent from Calibrator (mA)    | <b>9.60 mA ( LO ) / 9.32 mA ( HI )</b> |
| Transimpedance ( $\Omega$ ) at f low | 828 $\Omega$                           |
| Transimpedance ( $\Omega$ ) at f hi  | 718 $\Omega$                           |

| <b>Q3 RF transimpedance</b>          | <b>Value</b>                            |
|--------------------------------------|---|
| Photocurrent from Calibrator (mA)    | <b>9.55 mA ( LO ) / 10.80 mA ( HI )</b> |
| Transimpedance ( $\Omega$ ) at f low | 872 $\Omega$                            |
| Transimpedance ( $\Omega$ ) at f hi  | 732 $\Omega$                            |

| <b>Q4 RF transimpedance</b>          | <b>Value</b>                           |
|--------------------------------------|--|
| Photocurrent from Calibrator (mA)    | <b>9.53 mA ( LO ) / 9.85 mA ( HI )</b> |
| Transimpedance ( $\Omega$ ) at f low | 891 $\Omega$                           |
| Transimpedance ( $\Omega$ ) at f hi  | 766 $\Omega$                           |

| <b>Q1 Shot-noise limited input sensitivity</b>                                       | <b>Value</b>  |         |
|--|---------------|---------|
| f low (mA)   | 2.16 mA       |         |
| Dark Noise / Preamp Gain. For actual PD output noise, subtract RF preamplifier gain. | -120.0 dBm/Hz | 20.4 dB |
| f hi (mA)  | 2.71 mA       |         |
| Dark Noise / Preamp Gain. For actual PD output noise, subtract RF preamplifier gain. | -120.2 dBm/Hz | 20.4 dB |

| <b>Q2 Shot-noise limited input sensitivity</b>                                       | <b>Value</b>  |         |
|--|---------------|---------|
| f low (mA)   | 2.07 mA       |         |
| Dark Noise / Preamp Gain. For actual PD output noise, subtract RF preamplifier gain. | -120.0 dBm/Hz | 20.4 dB |
| f hi (mA)  | 2.45 mA       |         |
| Dark Noise / Preamp Gain. For actual PD output noise, subtract RF preamplifier gain. | -120.5 dBm/Hz | 20.4 dB |

| <b>Q3 Shot-noise limited input sensitivity</b>                                       | <b>Value</b>  |         |
|--|---------------|---------|
| f low (mA)   | 1.74 mA       |         |
| Dark Noise / Preamp Gain. For actual PD output noise, subtract RF preamplifier gain. | -120.3 dBm/Hz | 20.4 dB |
| f hi (mA)  | 2.53 mA       |         |
| Dark Noise / Preamp Gain. For actual PD output noise, subtract RF preamplifier gain. | -120.2 dBm/Hz | 20.4 dB |

| <b>Q4 Shot-noise limited input sensitivity</b>                                       | <b>Value</b>  |         |
|--|---------------|---------|
| f low (mA)   | 1.79 mA       |         |
| Dark Noise / Preamp Gain. For actual PD output noise, subtract RF preamplifier gain. | -120.0 dBm/Hz | 20.4 dB |
| f hi (mA)  | 2.31 mA       |         |
| Dark Noise / Preamp Gain. For actual PD output noise, subtract RF preamplifier gain. | -120.2 dBm/Hz | 20.4 dB |

| <b>Q1 test input transconductance</b> | <b>Value</b> | <b>dB Test In To RF Out</b> |
|---------------------------------------|--------------|-----------------------------|
| f low (mA/V)                          | 0.27 mA/V    | -13.0 dB                    |
| f hi (mA/V)                           | 0.45 mA/V    | -9.8 dB                     |

| <b>Q2 test input transconductance</b> | <b>Value</b> | <b>dB Test In To RF Out</b> |
|---------------------------------------|--------------|-----------------------------|
| f low (mA/V)                          | 0.24 mA/V    | -13.7 dB                    |
| f hi (mA/V)                           | 0.28 mA/V    | -10.7 dB                    |

| <b>Q3 test input transconductance</b> | <b>Value</b> | <b>dB Test In To RF Out</b> |
|---------------------------------------|--------------|-----------------------------|
| f low (mA/V)                          | 0.23 mA/V    | -13.8 dB                    |
| f hi (mA/V)                           | 0.40 mA/V    | -10.5 dB                    |

| <b>Q4 test input transconductance</b> | <b>Value</b> | <b>dB Test In To RF Out</b> |
|---------------------------------------|--------------|-----------------------------|
| f low (mA/V)                          | 0.24 mA/V    | -13.3 dB                    |
| f hi (mA/V)                           | 0.40 mA/V    | -10.2 dB                    |