# ISC1202
# 640 x 512, 15 µm SWIR ROIC

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Specification
September 17, 2013

INDIGO OPERATIONS DOCUMENT # 400-1202-09 VERSION 1.00

# Document Revision History

- **Version 1.00,  September 17, 2013**
  - Initial Release

# ISC1202 Specification and Requirements Review (1 of 6)

| ROIC PARAMETER | SPECIFICATION REQUIREMENT | COMMENTS |
|---|---|---|
| Array Configuration | 640 x 512 | |
| Pixel Pitch | 15 μm | |
| Input Polarity | P-on-N (Current Flows into Inputs) | InGaAs |
| Input Configuration | CTIA | |
| Detector Impedance ($R_0A_D$) at 250K | > $1.0x10^7$ (Ohm-$cm^2$) | Used for performance analysis, prediction and simulation |
| Detector Capacitance | ≤ 30 fF | Used for performance analysis, prediction and simulation |
| Temperature Of Operation | -50°C – 80°C | 223 K – 353 K |

# ISC1202 Specification and Requirements Review (2 of 6)

| ROIC PARAMETER | SPECIFICATION REQUIREMENT | COMMENTS |
|---|---|---|
| Input Biases | VDETCOM 1.8 V to 3.6 V<br>VPOSUC 3.6 V<br>VPOS 3.6 V<br>VPOSOUT 3.6 V<br>VPD 1.8 V<br>VOS 0 to 3.6 V<br>VOUTREF 3.3 V<br>VNEGUC 0.0 V<br>VNEG 0.0 V<br>VNEGOUT 0.0 V<br>VND 0.0 V | Detector Common<br>Analog Positive<br>Analog Positive<br>Output Positive<br>Digital Positive<br>Skimming Voltage<br>Analog Output Reference<br>Analog Negative<br>Analog Negative<br>Output Negative<br>Digital Negative |
| Input Clocks | Name Vhigh to Vlow<br>CLK VPD to VND<br>LSYNC VPD to VND<br>FSYNC VPD to VND<br>DATA VPD to VND<br>RESET_B VPD to VND | <br>Master Clock<br>Line Sync<br>Frame Sync<br>Mode Control<br>Master Reset (optional) |
| Input Clock Rise and Fall | 10% to 90% in 10 ns | |
| Outputs | Selectable 2, 4 or 8 with Reference Output | |
| Output Interface | $\geq$ 100 kOhms<br>$\leq$ 15 pF external capacitance | |
| Output Voltage Swing | 1.9 V $\pm$ 0.2 V<br>(Baseline ~3.25 V $\pm$ 0.1 V) | Typical Output Range |

# ISC1202 Specification and Requirements Review (3 of 6)

| ROIC PARAMETER | SPECIFICATION REQUIREMENT | COMMENTS |
|---|---|---|
| Power | 2 outputs ≤ 160 mW<br>4 outputs ≤ 180 mW<br>8 outputs ≤ 200 mW | |
| Control Register Functions | Input Skimming<br>Power Control<br>Integration Gain Select<br>Bandwidth Limiting Select<br>Integration / Read Out Mode<br>Invert / Revert<br>Anti-blooming<br>Fold-over protection<br>Window Size / Position<br>2, 4 or 8 Outputs<br>Reference Output Enable<br>Programmable Test I/O<br>Global Reset | |
| Programmable Test | Test row input<br>Vector Enable Test Function | |
| Detector Bias Adjust | Externally adjusted through VDETCOM voltage | |

# ISC1202 Specification and Requirements Review (4 of 6)

| ROIC PARAMETER | SPECIFICATION REQUIREMENT | | | | COMMENTS |
|---|---|---|---|---|---|
| Input Current<br>Min<br>Nominal<br>Max | 0.01 pA<br>1.00 pA<br>50 nA | | | | Simulation Range |
| Gain Control (μV/e-) | | Opt 1 | Opt 2 | Opt 3 | Target values |
| | Gain 00 | 32.9 | 46.2 | 99.9 | |
| | Gain 01 | 14.2 | 16.2 | 20.0 | |
| | Gain 1x | 1.37 | 1.39 | 1.33 | |
| Input Charge Handling (electrons) | | Opt 1 | Opt 2 | Opt 3 | Target values |
| | Gain 00 | 58k | 41k | 19k | |
| | Gain 01 | 135k | 118k | 96k | |
| | Gain 1x | 1.40M | 1.38M | 1.44M | |
| Noise Input Referred (electrons) | | Opt 1 | Opt 2 | Opt 3 | With CDS<br>Without Detector or System Noise |
| | Gain 00 | < 40 | < 35 | < 30 | |
| | Gain 01 | < 65 | < 60 | < 55 | |
| | Gain 1x | < 500 | < 500 | < 500 | |
| Transimpedance Non-Linearity | < ± 1.0% (0% to 10%)<br>< ± 0.5% (10% to 90%)<br>< ± 1.0% (90% to 100%) | | | | From least squares line fit |
| Minimum Integration Time | < 1 μs | | | | Circuit performance limited for shorter integration times |

# ISC1202 Specification and Requirements Review (5 of 6)

| ROIC PARAMETER | SPECIFICATION REQUIREMENT | COMMENTS |
|---|---|---|
| Column Output Order-2<br>Output A<br>Output B | <br>Column 0,2,…,638<br>Column 1,3,…,639 | Two Output Mode<br>Normal Readout Direction |
| Column Output Order-4<br>Output A<br>Output B<br>Output C<br>Output D | <br>Column 0,4,…,636<br>Column 1,5,…,637<br>Column 2,6,…,638<br>Column 3,7,…,639 | Four Output Mode<br>Normal Readout Direction |
| Column Output Order-8<br>Output A<br>….<br>Output H | <br>Column 0,8,…,632<br>…<br>Column 7,15,…,639 | Eight Output Mode<br>Normal Readout Direction |
| Invert / Revert | Reverse Order Of Rows / Columns | Select Using Control Register |

# ISC1202 Specification and Requirements Review (6 of 6)

| ROIC PARAMETER | SPECIFICATION REQUIREMENT | COMMENTS |
|---|---|---|
| Frame Rate | 2 outputs ≥ 60 FPS<br>4 outputs ≥ 120 FPS<br>8 outputs ≥ 240 FPS | Pixel Rate 18 MHz |
| Data Valid / Settling Time | Settle to 0.1% in ≤ 45 ns | 15 pF // 100 kΩ output load<br>Default power settings |
| Adjacent Pixel Crosstalk | < 0.39% at T = 300 K | |
| Non-Adjacent Pixel Crosstalk | < 0.1% at T = 300 K | |
| Minimum Window Size and Resolution | ≥ 8 columns x 4 rows<br>≥ 16 columns x 4 rows<br>≥ 32 columns x 4 rows | 2 Output Mode<br>4 Output Mode<br>8 Output Mode |
| Temperature Sensor | 0.75 V ± 0.05 V @ 300 K<br>Slope ≈ 2 mV/°C | Temp Pad |