



ISC0404
Standard 1k x 1k, 16 Output
ROIC

Specification
and Requirements



Release History

- **Version 100** – November 21, 2006 - Initial Release





ISC0404 Specification and Requirements Review (1 of 5)

ROIC PARAMETER	SPECIFICATION REQUIREMENT	COMMENTS
Array Configuration	1024 x 1024	
Pixel Pitch in Columns (1024)	18um	
Pixel Pitch in Rows (1024)	18um	
Input Polarity	P-on-N (Current Flows into Inputs)	InSb, InGaAs, HCT
Input Configuration		Direct Injection (DI)
Core Multiplexing Configuration		Voltage Mode
Detector Impedance (RoAd) at 77K	$> 1 \times 10^4$ (Ohm-cm ²)	Used for Performance Analysis, Prediction and Simulation
Detector Capacitance	≤ 0.1 pF	Used for Performance Analysis, Prediction and Simulation
Temperature of Operation	77K	All Requirements Specified for 77K. Room Temperature Operation Will Have Reduced Performance.





ISC0404 Specification and Requirements Review (2 of 5)

ROIC PARAMETER	SPECIFICATION REQUIREMENT	COMMENTS												
Input Biases	VPOS 3.6V VPOSD 3.6V VPOSOUT 2.6 – 3.6V VPD 2.6 – 3.6V VNEG 0.0V VNEGOUT 0.0V VND 0.0V VOUTREF 0.2V-0.4V	Analog Positive Level Shifter Positive Output Positive (2.6V for minimum power) Digital Positive (2.6V for minimum power) Note: VPD voltage should = VPOSOUT Analog Negative Output Negative Digital Negative Analog Reference (VOUTREF = 0.3V) (Optional: Internal or external reference)												
Input Clocks	<table border="1"> <thead> <tr> <th>Name</th> <th>Vhigh to Vlow</th> </tr> </thead> <tbody> <tr> <td>CLK</td> <td>VPD to VND</td> </tr> <tr> <td>LSYNC</td> <td>VPD to VND</td> </tr> <tr> <td>FSYNC</td> <td>VPD to VND</td> </tr> <tr> <td>DATA</td> <td>VPD to VND</td> </tr> <tr> <td>RESET_B</td> <td>VPD to VND</td> </tr> </tbody> </table>	Name	Vhigh to Vlow	CLK	VPD to VND	LSYNC	VPD to VND	FSYNC	VPD to VND	DATA	VPD to VND	RESET_B	VPD to VND	Master Clock Line Sync Frame Sync (Integ. Control) Mode Control Master Reset (optional)
Name	Vhigh to Vlow													
CLK	VPD to VND													
LSYNC	VPD to VND													
FSYNC	VPD to VND													
DATA	VPD to VND													
RESET_B	VPD to VND													
Input Clock Rise and Fall	10% to 90% in 10nS													
Outputs	Selectable 4, 8 or 16 with Reference Output													
Output Interface	$\geq 100k$ Ohms ≤ 18 pF	18pF includes capacitive load up to and including wire-bond to ROIC pad												
Output Voltage Swing	$2.0V \pm 0.2V$ (Baseline ~ $0.3V \pm 0.1V$)	Default settings: ~ $1.8V \pm 0.2V$ typical output range at 300K ~ $2.0V \pm 0.2V$ typical output range at 77K												





ISC0404 Specification and Requirements Review (3 of 5)

ROIC PARAMETER	SPECIFICATION REQUIREMENT	COMMENTS
Power (12.5MHz output data rate)	4 Outputs \leq 60 mW 8 Outputs \leq 100 mW 16 Outputs \leq 150 mW	
Control Register Functions	Programmable Test I/O Anti-Blooming Control Power Control Master Current Detector Bias Adj. Invert/Revert Windowing (programmable size and position) 4, 8 or 16 Outputs Integration Mode (ITR, IWR, NDRO) Reference Output Enable Global Reset	
Programmable Test	Test Row Input Unit Cell Test Injection VET Circuit	
Detector Bias Adjust	-100mV to 500mV Adjustment @ nominal current (1nA)	7 bit bias control





ISC0404 Specification and Requirements Review (4 of 5)

ROIC PARAMETER	SPECIFICATION REQUIREMENT	COMMENTS
Input Current Nominal	≈ 0.5 nA	Used for simulations
Input Charge Handling	Option 1: ≥ 10 x 10 ⁶ carriers Option 2: 2 ± 0.5 x 10 ⁶ carriers	
Non-Linearity	< ± 0.5% from least squares line fit	Output Voltage vs. Tint Max Dev. from least squares fit over 10% to 80% of full range
Noise	≤ -85dB of Full Well (Input Referred) At Maximum Readout Rate	Without Detector or System Noise
Column Output Order-4 Output A : Output D	Column 0,4,...,1020 : Column 3,7,...,1023	Four Output Mode Normal Readout Direction
Column Output Order-8 Output A : Output H	Column 0,8,...,1016 : Column 7,15,...,1023	Eight Output Mode Normal Readout Direction
Column Output Order-16 Output A : Output P	Column 0,16,...,1008 : Column 15,31,...,1023	Sixteen Output Mode Normal Readout Direction





ISC0404 Specification and Requirements Review (5 of 5)

ROIC PARAMETER	SPECIFICATION REQUIREMENT	COMMENTS
Invert / Revert	Reverse Order of Rows and/or Columns	Select using Control Register
Temperature Sensor	0.7V ± 0.05V @ 300K 1.070V ± 0.05V at 77K	Test/Temp Pad
Full Frame Rate Pixel Rate 12.5MHz	4 Output ≥ 30 FPS 8 Output ≥ 60 FPS 16 Output ≥ 120 FPS	
Data Valid / Settling Time	Settle to 0.1% @ T=77K in ≤ 55ns Settle to 1.3% @ T=300K in ≤ 55ns	18pF // 100kΩ load Default power settings
Adjacent ROIC Pixel Crosstalk	< 0.1% @ T=77K < 0.9% @ T=300K	
Non-Adjacent ROIC Pixel Crosstalk	< 0.1% @ T=77K < 0.9% @ T=300K	
Minimum Window Size and Resolution	≥ 16 columns x 8 Rows ≥ 32 columns x 8 Rows ≥ 64 columns x 8 Rows	4 Output Mode 8 Output Mode 16 Output Mode
Die Size	21.0 mm x 23.0 mm (TBD)	Non-stitched

