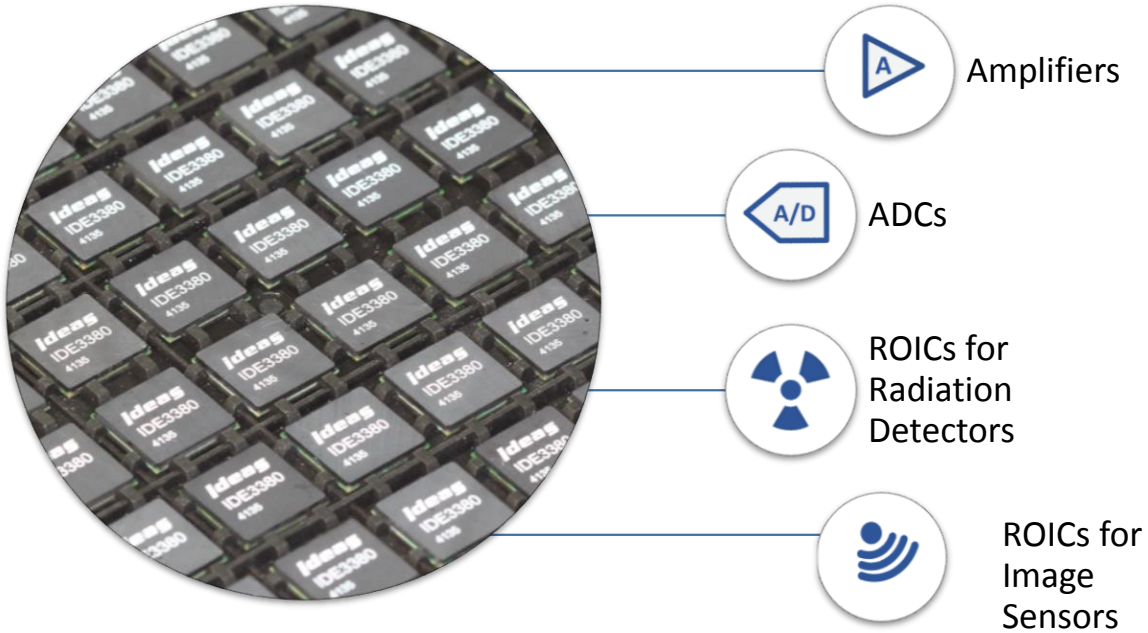
Integrated Circuits

IDEAS integrated circuits are designed for the readout of radiation detectors and image sensors. The circuits are available as bare dice or packaged chips, sold from stock and supplied on short notice. Although the ICs are application specific (ASIC) they are also suited for other applications. A development system, called Galao kit, is available for most circuits to accelerate new product developments.



IDEAS - Integrated Detector Electronics AS - is a fabless IC supplier based in Oslo, Norway. The company designs integrated circuits (ICs) and systems for radiation detection and imaging.

Please request information and prices via http://www.ideas.no/contact

Amplifiers

These are arrays of low-noise amplifiers (LNA) or charge sensing amplifiers (CSA), with track-and-hold (T&H) and multiplexed output (mux). These include the Viking Amplifiers (VA).

Circuit ID	Description and Restrictions	Application, Reference	Sensor/Detector (examples)
IDE1060 EARL	34 LNA, diff. in/out, 8 gain, 4.3nV/$\sqrt{\text{Hz}}$ at 10kHz, 20mW/LNA, 3.5V_{DD}, 77K to 20°C, 10.13140/RG.2.2.27382.65607	Infrared sensor and focal plane array readout, 10.1117/12.858063	MCT, HgCdTe
IDE1140	64 CSA (±200 fC, 6.5 µs), T&H, mux. output pulse height	Charged particle tracking, e.g., AMS, DAMPE 10.1016/j.nima.2008.05.015	Silicon (Si) strips
IDE1160	32 CSA (-5 pC to +13 pC, 2 µs), mux. output pulse height	Spectroscopy or calorimetry, e.g. DAMPE 10.1016/j.nima.2015.01.036	Photomultiplier (PMT)
IDE1162	32 CSA (±1.5 pC, 2 µs), T&H, mux. output pulse height	Charged particle tracking	Wire chamber, MWPC
IDE1163	32 CSA (±750 fC, 0.5 µs), T&H, mux. output pulse height	Charged particle tracking, e.g. BM@N	Wire chamber, MWPC
IDE1180 AMADEUS	16 CSA (prg. ±50, ±100, ±200, ±400 fC, 40 ns), with T&H, output for every amplifier	Spectroscopy, imaging, e.g. ultra-violet, neutron detectors, 10.1117/12.2058412	Micro-channel plate (MCP, GEM, RPC, MSGC, MWPC, TPC)
VASCM3	128 CSA (±1 pC to ±20 pC) switched current mode (SCM), 50 ns to ms integration time, correlated double sampling (CDS), dead time free readout, mux. output	Current mode x-ray readout, portal imaging, radiation dosimetry, 10.1016/j.nima.2004.03.079	Silicon, thin-film transistor (TFT) arrays, CZT, HgI
VA32HDR14.2	32 CSA (-2 pC to + 13 pC, 2 µs), T&H, mux. output pulse height	CALET	
VA32HDR14.3	32 CSA (-20 pC to + 8 pC, 2 µs), T&H, mux. output pulse height	Readout system for multi-anode PMT, e.g., ROSMAP	Multi-anode photomultiplier (MA-PMT)
VA2	128 CSA (±14 fC, 2 µs), T&H, mux. output pulse height, 10.1016/0168-9002(94)90140-6	Charged particle tracking, 10.1016/S0168-9002(02)01062-8	Silicon (Si) strips and pads

ADC – Analog-to-Digital Converters

These are analog-to-digital converters, with and without triple modular redundancy (TMR). The TMR increases the radiation tolerance. The ADCs are IDEAS intellectual property (IP) blocks and can be combined with other circuits.

Circuit ID	Description and Restrictions	Application, Reference	Sensor/Detector (examples)
TBD(1)	SAR, 12-bit, 2 Msps, 10.5 ENOB, 25 mW, TMR	Science, Space	SiPM/PMT with APOCAT
TBD(2)	SAR, 12-bit, 50 ksps, 11.5 ENOB, 1 mW, TMR	Science, Space	SiPM/PMT with SIPHRA
TBD(3)	Pipeline, 14-bit, 12 Msps, 13 ENOB, 250 mW, TMR	Science, Space	MCT with NIRCA Mk2
TBD(4)	Pipeline, 14-bit, 20 Msps, 350 mW	Image Sensors	MBA with MINC

ROICs for Radiation Detectors with Pulse Height Spectroscopy

These are arrays of charge sensitive amplifiers (CSA) with track and hold (T&H) and comparators to generate a trigger for the pulse height readout.

Circuit ID	Description and Restrictions	Application, Reference	Sensor/Detector
IDE3160	32 CSA (-5 pC to +13 pC, 2 µs), T&H, mux. output pulse height and one trigger	Spectroscopy or calorimetry, e.g., DAMPE 10.1016/j.nima.2015.01.036	Photomultiplier (PMT)
VATAGP7	128 CSA (±30 fC, 0.5 µs), T&H, mux. output pulse height and address	Charged particle tracking 10.1016/j.nima.2015.03.078	Si, hybrid photon detector (HPD), GEM
VATAGP8	128 CSA (±250 fC, 0.5 µs), T&H, mux. output pulse height and address	Charged particle tracking, neutron detector	Si, hybrid photon detector (HPD)
VATAGP9	256 CSA (±90 fC, 2 µs), T&H, mux. output pulse height and address	Charged particle tracking, e.g. AEGIS	Si strips and pads
IDE3421	128 CSA (prg. up to ±500 fC) with sampling pipeline, mux. output of sampled values and address, footnote 1.	Gamma spectroscopy, isotope identification, 10.1109/NSSMIC.2012.6551939, e.g., COBRA	CZT, CdTe, TlBr, Germanium
VATA64HDR16	64 CSA (-20 pC to +50 pC, 50 ns to 300 ns), T&H, mux. output pulse height and timing, 10.1109/NSSMIC.2010.5874056	Ring Image Cherenkov detectors (RICH), 10.1016/j.nuclphysbps.2011.04.049	Silicon photo multiplier (SiPM, MPPC)
VATA32P	32 CSA (23 fC, 3 comparators, digital logic pulse outputs	Small animal PET, 10.1016/j.nima.2007.03.018	CdTe
VATA211P	1024 CSA (-60 fC, 0.8 µs), 32×32 2d-pixel array (300-µm pitch) and 1 cathode readout, trigger on charge above threshold, 10.1109/NSSMIC.2008.4775162	CSTD – Compton Semiconductor Tracker Detector, 10.1109/NSSMIC.2008.4775195	CZT pixels
VATA241	64 CSA (+30 fC, 0.16 µs), CFD, 10.1109/NSSMIC.2011.6152602	Brain PET compatible with MRI, 10.1109/TNS.2011.2152856	APDs with monolithic LYSO
VATA450	64 CSA (±16 fC, 3 µs), T&H, 10-bit ADC in every channel, outputs digitized pulse height and trigger, Mikkelsen et al., AMICSA 2010, see footnote 1.	ASTRO-H, soft gamma-ray detector (SGD), arxiv.org/pdf/1010.4997.pdf	CZT, CdTe
VATA451	64 CSA (±1.6 fC, 3 µs), T&H, 10-bit ADC per channel, outputs digitized pulse height and trigger, footnote 1.	Focusing optics x-ray solar imager (FOXSI), 10.1109/TNS.2011.2154342	Silicon (Si), silicon drift detector (SDD)
VATA453	64 CSA (-320fC to +400fC, 4.5 µs), T&H, 10-bit ADC per channel, outputs digitized pulse height & trigger, footnote 1.	Gamma ray imager/polarimeter for solar flares (GRIPS), 10.1117/12.926450	Germanium (Ge)
VATA460	32 CSA (±95 fC, 2 µs), T&H, 10-bit ADC per channel, outputs digitized pulse height and trigger, footnote 1.	BepiColombo MMO, MPPE instrument, 10.1016/j.pss.2008.06.003	Silicon strips
VATA461	32 CSA (±5.5 fC, 3 µs), T&H, 10-bit ADC per channel, outputs digitized pulse height and trigger, footnote 1.	ASTRO-H, hard x-ray imager (HXI), 10.1016/j.nima.2014.05.127, 10.1117/12.2055629	CdTe, CZT
VATA462	32 CSA (±500 fC, 3 µs), T&H, 10-bit ADC per channel, outputs digitized pulse height and trigger, footnote 1.	ASTRO-H, GRB with BGO	Avalanche photodiodes (APD) with BGO scintillator
IDE4001T4	1 CSA (-6 fC to -30 pC, 2 µs), single channel analyzer (SCA)	Portable linear energy transfer spectrometer	Silicon

ROICs for Radiation Detectors w/ Timing, Counting and Spectroscopy

Arrays of charge sensitive amplifiers (CSA), current-mode input stages (CMIS), peak detectors (PD), track-and-hold (T&H) and comparators for timing, counting and data readout.

Circuit ID	Description and Restrictions	Application, Reference	Sensor/Detector
IDE3465	16 CSA (±2.6 pC, 1 µs, 0.25 µs) and 4 CSA (±26 pC, 1 µs, 0.25 µs), mux. output pulse height and trigger pulses from all inputs, footnote 1, 10.1109/NSSMIC.2013.6829764	Charged particle counting, radiation monitoring, space 10.1109/NSSMIC.2013.6829497	Silicon strips/pads/diodes, PMT, MWPC
IDE3466	32 CSA (+1 pC, 1 µs, 0.25 µs) and 4 CSA (+26 pC, 1 µs, 0.25 µs), with prg. single-channel analyzers and counters, track and hold, mux. output pulse height, 10.1117/12.2231901	Charged particle counting, radiation monitoring, space, JUICE mission Link: 10.4236/jamp.2016.42052	Silicon strips/pads/diodes
CA3	32/64 CSA (-5 fC) with programmable thresholds and counters, 10.1109/NSSMIC.2009.5401785	Energy resolved photon counting, line scanners 10.1088/0031-9155/53/15/002	CdTe, CZT
IDE4184	128 CSA (-12 fC, 0.5 µs), T&H, output pulse height and address, see Mikkelsen et al., AMICSA 2008	Gamma spectroscopy, imaging DOI: 10.1109/I2MTC.2012.6229184	Cadmium zinc telluride (CZT, CdTe)
IDE4281	12 CSA (-5 fC, 0.5 µs), T&H, outputs pulse height and address, 10.1109/NSSMIC.2013.6829763	Gamma spectroscopy, space 10.1117/12.409149	CZT, CdTe
IDE3380 SIPHRA	16 CMIS and CSA (-16nC, -8nC, -4nC, -400pC, +40pC, +4pC, +0.4pC, 0.2 µs to 1.6 µs), summing channel, current mode input stage, T&H, 12bit/50ksps SAR ADC, SPI, 10.13140/RG.2.1.1460.8882	GRIPS, LaBr/SiPM, spectroscopy, fibers, HERD	SiPM, MPPC, PMT, MA-PMT
IDE3381 APOCAT	16 CMIS/CSA (-0.8nC, -0.4nC, -0.2nC, -0.1nC, ±40pC, ±1pC, 50ns, 150ns, 300ns, 2µs), 4×22-bit counters/ch., PD, T&H, 12-bit/2Msps ADC, SPI	Array Photon Counters Above Threshold, ASO-S, 10.1117/12.2189062	SiPM, MPPC, PMT, MA-PMT

ROICs for Image Sensors

The following ICs have been designed for the readout of large area imaging arrays.

Circuit ID	Description and Restrictions	Application, Reference	Sensor/Detector
IDE8411 NIRCA	Near infrared readout controller ASIC (NIRCA), 4 × 12-bit, 2 Msps ADC, prg. gain and offsets, 8 digital inputs, prg. sequencer with 40 outputs, custom instruction set, 8 nested loops, ECC-RAM 10.1117/12.2223619, 10.1117/12.2055839	Engineering model, 10.1117/12.977964	CMOS image sensors, focal plane arrays, HgCdTe, MCT, PbS, InSb, InGaAs, HAWAII-2RG, NGP, micro-bolometers
IDE8420 NIRCA Mk2	NIRCA with 16 × 14-bit, 12 Msps ADC, 16 digital outputs, with IMEC's Design Against Radiation Effects (DARE)	Earth observation, astrophysics, space	
TBD MINC	VGA 640×480 pixels, 17-µm pitch, 14-bit dynamic range, 60 fps, windows, footnote 1	Hybrid image sensors, thermal infrared cameras	MBA – micro-bolometer arrays

Footnote 1: Territorial or commercial sales restrictions might apply.