

Nanopower Op Amp CO detector at



Feb. 2014



Jérôme D'AGOSTINO | Tel: +33 476 584 357 | Mobile: +33 637 175 436
Analog and Audio Systems Division | AMERICAs-EMEA Product Marketing
jerome.d'agostino@st.com

Application target

Carbon Monoxide Alarm

2

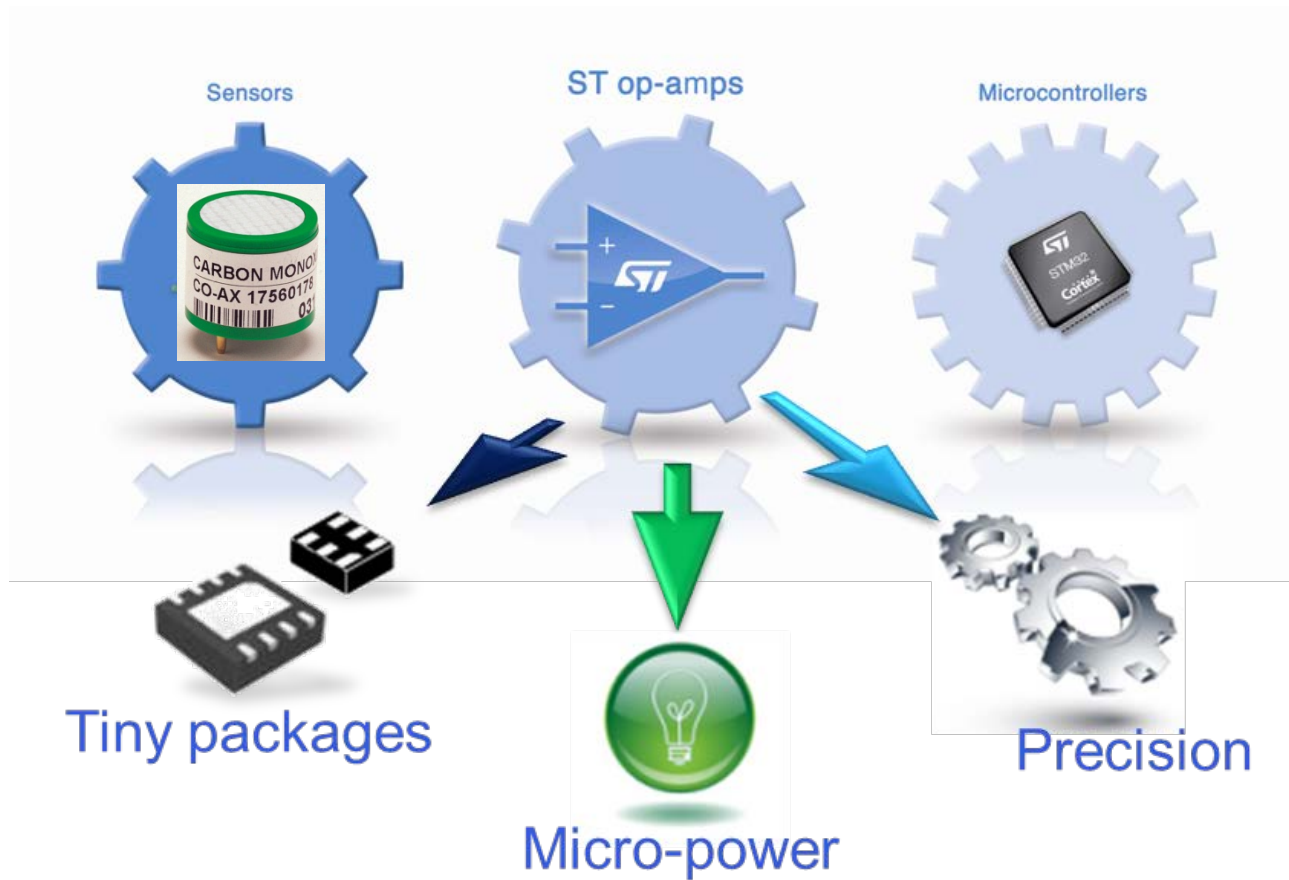


Kidde: Carbon Monoxide Alarms

The leading cause of accidental poisoning deaths in North America, Carbon Monoxide (CO) is odorless, tasteless and invisible – it's a silent killer. The only safe way to know if carbon monoxide is present is to install carbon monoxide detectors (alarms) on every level of your home and in sleeping areas. Kidde has been making CO alarms with electrochemical sensing technology for years. All of Kidde's CO alarm products – from basic units to premium CO alarms – include the company's patented Nighthawk™ electrochemical CO sensor.

Op Amp in the signal chain

3

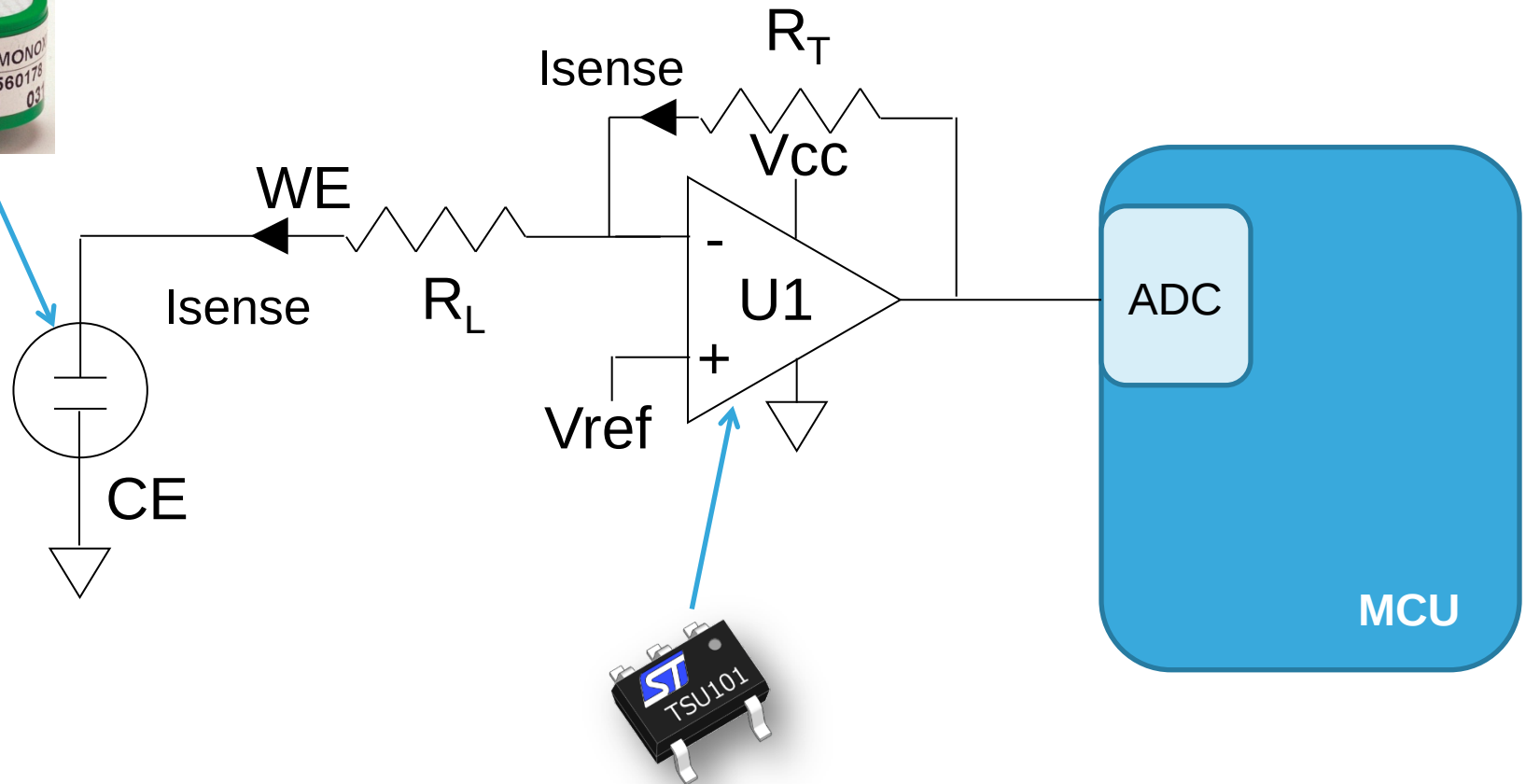


Signal conditioning chain

2 electrodes sensor topology with CO sensor

4

Electrochemical
sensor

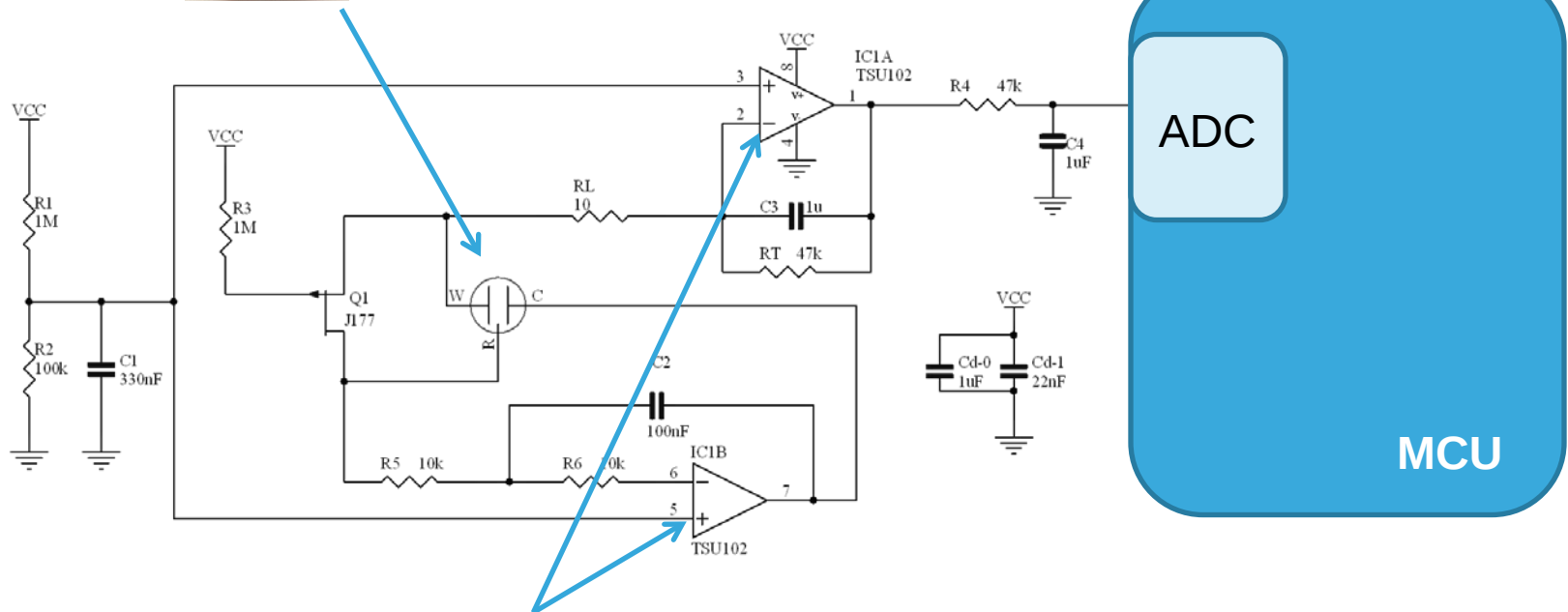


Signal conditioning chain

3 electrodes sensor topology with CO sensor

5

Electrochemical
sensor



DFN8 2x2 (TSU102)

or



MiniSO8 (TSU102)

TSU101 TSU102 TSU104

nano power amplifiers

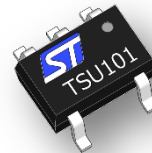
6

Key features

- Sub micro ampere current consumption: 580 nA typ / Amplifier
- Low input bias current: 5 pA max
- Low supply voltage: 1.5 V - 5.5 V
- Unity gain stable
- Rail-to-rail input and output
- Gain bandwidth product: 8 kHz typ

Main benefits

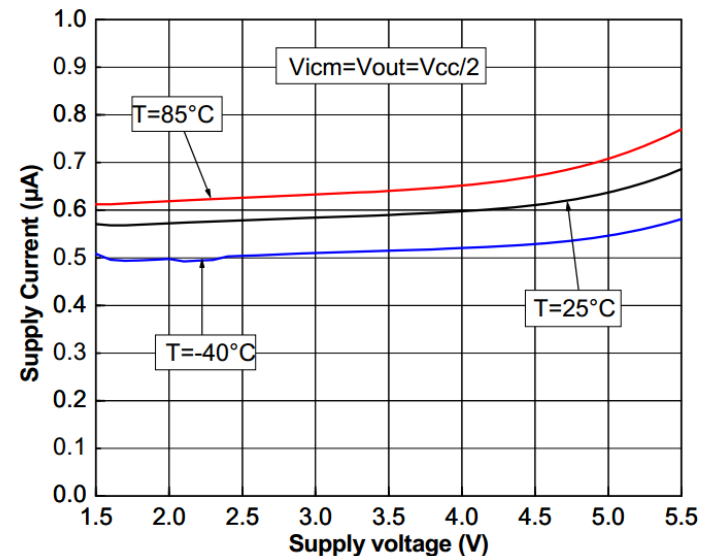
- 42 years of typical equivalent lifetime (TSU101) supplied by a 220 mA.h coin type Lithium battery
- Tolerance to power supply transient drops



DFN8 2x2 (TSU102)



MiniSO8 (TSU102)



TSU101 vs. Competitors

7

			ST	TI		Microchip
	Conditions	Units	TSU101	LPV521	OPA369	MCP6041
Type			Unity gain stable	Unity gain stable	Unity gain stable	Unity gain stable
Input / Output			Rail to Rail	Rail to Rail	Rail to Rail	Rail to Rail
Vcc range		V	1.5 to 5.5	1.6 to 5.5	1.8 to 5.5	1.4 to 6.0
Temp. range		°C	-40 to +85	-40 to +125	-40 to +85	-40 to +125
Vio	Max 25°C Max. @ T	mV	3 3.4	1 1.2	0.750 1	3 Not guaranteed
Iib	Max 25°C Max. @ T	pA	5 30	1 50	50 -	100 pA @ 85°C 5000 pA @ 125°C
GBP	Typ. 25°C	kHz	8	6.2	12	14
SR	Typ. 25°C	V / ms	3	2.4	5	3
Current consumption	Vcc (V) Typ. 25°C Max. 25°C Max. T Vcc (V) Typ. 25°C Max. 25°C Max. T	nA	1.8V 580 750 800 5V 650 850 950	1.8V 472 600 850 5V 475 600 870	1.8 to 5.5V 800 1200 1450	1.4 to 5.5V 600 1000 Not guaranteed
Noise	Typ. 25°C	nV/√Hz	225 @ 1kHz	280 @ 1kHz	290 @ 1kHz	170 @ 1kHz
Packages			SC70-5 / SOT23-5	SC70-5	SC70-5	SOT23-5

TSU102 vs. MCP6042 & MCP6442

8

			ST	Microchip
	Conditions	Units	TSU102	MCP6042
Type			Unity gain stable	Unity gain stable
Input / Output			Rail to Rail	Rail to Rail
Vcc range		V	1.5 to 5.5	1.4 to 6.0
Temp. range		°C	-40 to +85	-40 to +125
Vio	Max 25°C Max. @ T	mV	3 3.4	3 Not guaranteed
I _{ib}	Max 25°C Max. @ T	pA	5 30 -	- 100 (85°C) 5000 (125°C)
GBP	Typ. 25°C	kHz	8	14
SR	Typ. 25°C	V / ms	3	3
Current consumption (per Amplifier)	Vcc (V) Typ. 25°C Max. 25°C Max. T Vcc (V) Typ. 25°C Max. 25°C Max. T	nA	1.8V 580 750 800 5V 650 850 950	1.4 to 6.0 600 1000 Not guaranteed
Noise	Typ. 25°C	nV/√Hz	225 @ 1kHz	170 @ 1kHz
Packages			MiniSO8 / DFN8 2x2	DIP8 / SO8 / MiniSO8

UTC is using... nanopower Op Amps

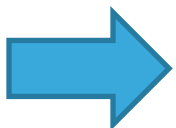
9

UTC BOM Extraction (Sept 2013)

Part_Number	Part_Description	OEM_Name	OEM_Part_Numbe	Projected_C	UOM	COMMENTS
5881-0023	IC, OP-AMP, OPA369 (810-3308)	TEXAS INSTRUMENTS	OPA369AIDCKR	3,731,094	EACH	TSU101ICT
5881-0015	IC MCP 6042-I/P MICROCHIP AMP DIP	MICROCHIP	MCP6042-I/PAAA	1,960,980	EACH	TSU102IST (no PDIP)
5881-0021	IC, OP-AMP, 8-PIN, MCP6042, SOIC, ROHS (810-2599)	MICROCHIP	MCP6042T-I/SN	703,039	EACH	TSU102IST
5881-0001R	OPAMP,LPV521,PKG 5-PIN SC-70,ROHS	TEXAS INSTRUMENTS	LPV521MGX/NOPB	625,866	EACH	TSU101ICT (NANOPOWER)



Is the branch in UTC to step in for
nanopower Op Amp.



Target application

Carbone Monoxyde Alarms