Charge Sensitive Preamplifier CSA1N/2N

Description:

The preamplifier CSA1N/2N is a very low noise, medium bandwidth charge sensitive preamplifier in surface mount technology. Size is only 42 mm x 19 mm x 4 mm.
CSA1N is intended for use with low-capacitive detectors (up to about 100 pF), CSA2N for detectors with up to 1000 pF. A wide supply voltage range allows the user to adapt the supply to the required output swing and thus save power.
An input coupling capacitor is included, voltage rating up to 3 kV (to be specified with order). The internal feedback resistor is 1 GΩ, but may be reduced, if the detector is to be dc-coupled for special applications.
Power supply filters as well as a test input with voltage gain = - 1 are included.

Top View and Pinout:

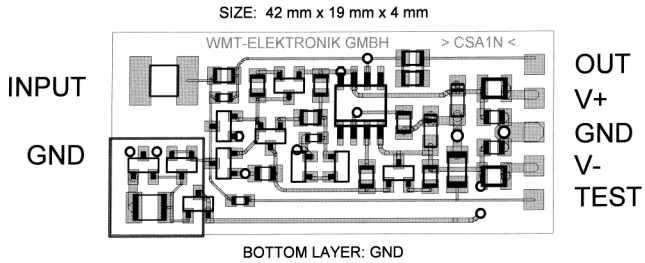

Fig. 1: Layout

Maximum Ratings:

Positive Power Supply:	+ 16V
Negative Power Supply:	- 16V
Output Current:	± 150 mA (pulse ≤ 10 µs), ± 80 mA (continous)
DC Input (behind the capacitor):	
Current:	± 10 mA (Observe limited voltage slope when the coupling capacitor is charged or discharged!)
Voltage:	+ 0.4V, - 0.6 V
Temperature Range:	0 ÷ 70 °C operating, - 40 ÷ +80 °C storage

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Technical Data (note)[1]**:**

Parameter	Conditions	CSA1N	CSA2N	Unit
DC Performance:				
Supply Voltage V^+		+ 6 ÷ + 15	+ 6 ÷ + 15	V
Supply Voltage V^-		- 4 ÷ - 15	- 4 ÷ - 15	V
Supply Current I^+	no signal, no load	11 ÷ 14	13 ÷ 16	mA
Supply Current I^-	no signal, no load	7 ÷ 9	7 ÷ 9	mA
DC Open-Loop Gain		76 min., 81 typ.	80 min., 85 typ	dB
Input Characteristic:				
Static Input Capacitance		15	30	pF
DC Input Current		10	20	pA
Test Input Resistance		50	50	**Ω**
Test Input Gain		- 1 ± 0.1	- 1 ± 0.1	
Output Characteristic:				
Output Resistance		50	50	**Ω**
Output Voltage Swing	R_L = 2 k**Ω**	V^- +2V to V^+ -2V	V^- +2V to V^+ -2V	
Output Voltage Swing	R_L = 50 **Ω**	$^1/_2$ (V^- +3.3V) to $^1/_2$ (V^- +3.3V)	$^1/_2$ (V^- +3.3V) to $^1/_2$ (V^- + 3.3V)	
Output DC-Voltage	no signal	- 0.6 ÷ - 0.1	- 0.6 ÷ - 0.1	V
Dynamic Performance:				
Gain-Bandwidth Product	Noise Gain ≥ 100)[2]	3	5	GHz
Risetime vs. Detector Capacitance		see fig. 2	see fig. 3	ns
Noise performance:				
Input Referred Noise Voltage Density		1.0	0.7	nV/√Hz
Noise Slope	T_{peak} = 2 µs	38	28	eV/pF
Noise Slope	T_{peak} = 6 µs	22	16	eV/pF
Input Current noise Density		1.8	2.5	fA/√Hz
Noise (FWHM) vs. Det. Capacitance		see fig. 4	see fig. 5	keV [Si]
Feedback Elements:				
Resistor R_F		1	1	G**Ω**
Capacitor C_F		0.6	0.6	pF
Decay Time Constant T_F		600	600	µs

Notes:

)[1] : Typical data @ 25°C, detector (for risetime and noise data measurements) substituted by onboard ceramic chip capacitor.

)[2] : Noise Gain = $(C_D + C_{IN} + C_F) / C_F$

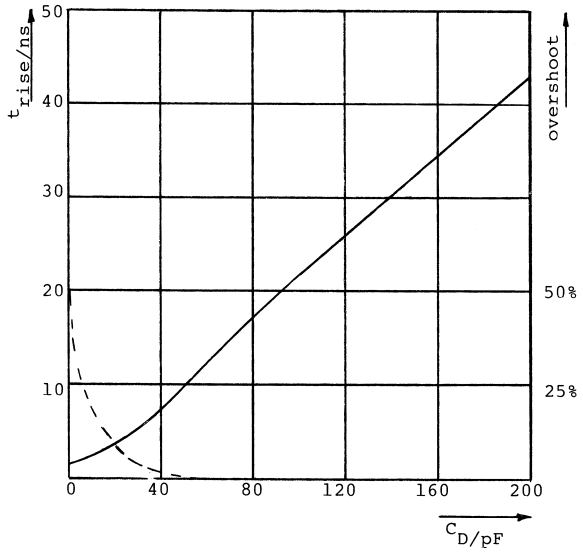

Fig. 2: **CSA1N** Risetime (solid line) and Overshoot (dotted line) vs. Detector Capacitance

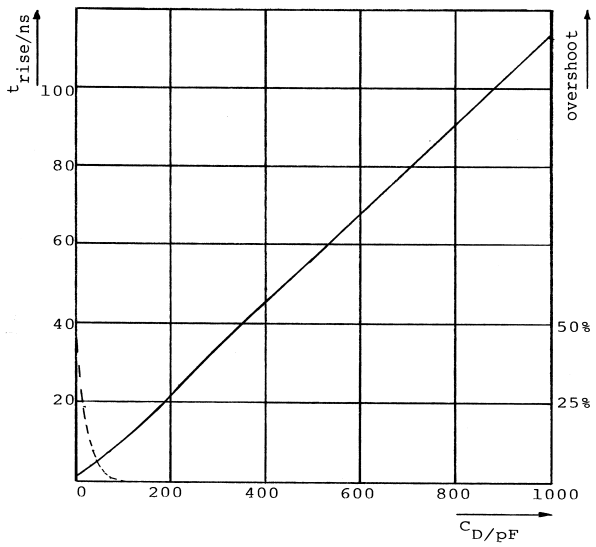

Fig. 3: **CSA2N** Risetime (solid line) and Overshoot (dotted line) vs. Detector Capacitance

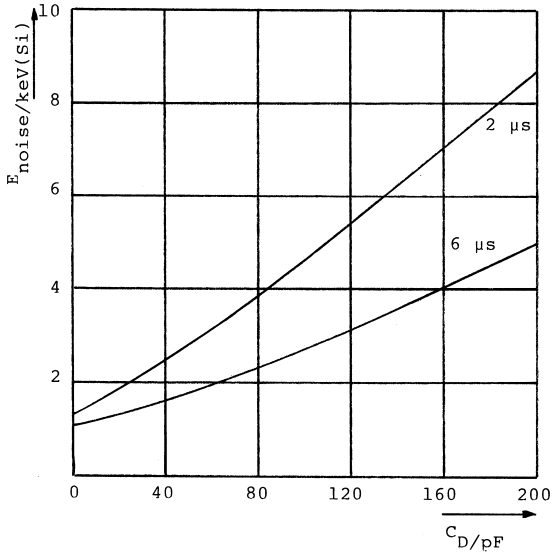

Fig. 4: **CSA1N** Energy Equivalent Output Noise (FWHM keV[Si]) vs. Detector Capacitance

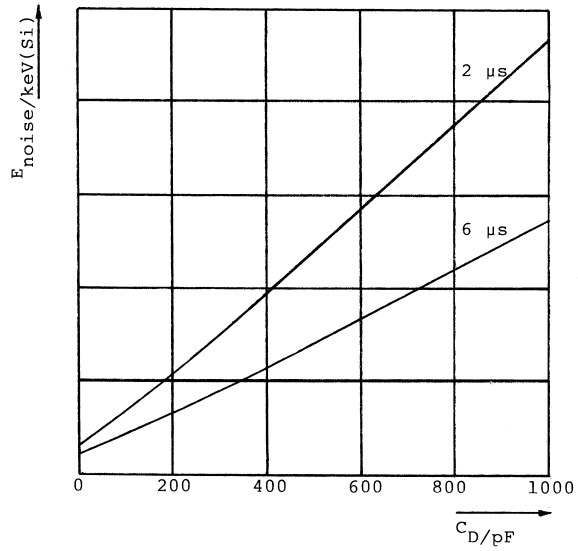

Fig. 5: **CSA2N** Energy Equivalent Output Noise (FWHM keV[Si]) vs. Detector Capacitance