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## Data sheet 6AG2531-7NF10-4AB0

SIPLUS S7-1500 AI 8xU/I HS TX rail based on 6ES7531-7NF10-0AB0 with conformal coating, -40…+70 °C, OT4 with ST1/2 (+85 °C for 10 minutes), analog input module 16-bit resolution, accuracy 0.3%, 8 channels in groups of 8, common mode voltage 10 V; diagnostics; hardware interrupts 8 channels in 0.0625 ms including infeed element, shielding bracket and shield terminal

| | |
|---|---|
| **General information** | |
| Product type designation | AI 8xU/I HS |
| Firmware version | |
| ● FW update possible | Yes |
| based on | 6ES7531-7NF10-0AB0 |
| Product function | |
| ● I&M data | Yes; I&M0 to I&M3 |
| ● Isochronous mode | Yes |
| ● Prioritized startup | Yes |
| ● Measuring range scalable | No |
| ● Scalable measured values | No |
| ● Adjustment of measuring range | No |
| Engineering with | |
| ● STEP 7 TIA Portal configurable/integrated from version | see entry ID: 109746275 |
| Operating mode | |
| ● Oversampling | Yes |
| ● MSI | Yes |
| **CiR - Configuration in RUN** | |
| Reparameterization possible in RUN | Yes |
| Calibration possible in RUN | Yes |
| **Supply voltage** | |
| Rated value (DC) | 24 V |
| permissible range, lower limit (DC) | 19.2 V |
| permissible range, upper limit (DC) | 28.8 V |
| Reverse polarity protection | Yes |
| **Input current** | |
| Current consumption, max. | 240 mA; with 24 V DC supply |
| **Encoder supply** | |
| 24 V encoder supply | |
| ● Short-circuit protection | Yes |
| ● Output current, max. | 20 mA; Max. 47 mA per channel for a duration < 10 s |
| **Power** | |
| Power consumption from the backplane bus | 1.15 W |
| **Power loss** | |
| Power loss, typ. | 3.4 W |
| **Analog inputs** | |
| Number of analog inputs | 8; > +60 °C max. 4x ±20 mA or 4x ±10 V permissible |
| ● For current measurement | 8 |
| ● For voltage measurement | 8 |
| permissible input voltage for voltage input (destruction limit), max. | 28.8 V |
| permissible input current for current input (destruction limit), max. | 40 mA |
| Input ranges (rated values), voltages | |
| ● 0 to +5 V | No |
| ● 0 to +10 V | No |
| ● 1 V to 5 V | Yes |


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| | |
|---|---|
| — Input resistance (1 V to 5 V) | 50 kΩ |
| ● -10 V to +10 V | Yes |
| — Input resistance (-10 V to +10 V) | 100 kΩ |
| ● -2.5 V to +2.5 V | No |
| ● -25 mV to +25 mV | No |
| ● -250 mV to +250 mV | No |
| ● -5 V to +5 V | Yes |
| — Input resistance (-5 V to +5 V) | 50 kΩ |
| ● -50 mV to +50 mV | No |
| ● -500 mV to +500 mV | No |
| ● -80 mV to +80 mV | No |
| Input ranges (rated values), currents | |
| ● 0 to 20 mA | Yes |
| — Input resistance (0 to 20 mA) | 41 Ω; Plus approx. 42 ohms for overvoltage protection by PTC |
| ● -20 mA to +20 mA | Yes |
| — Input resistance (-20 mA to +20 mA) | 41 Ω; Plus approx. 42 ohms for overvoltage protection by PTC |
| ● 4 mA to 20 mA | Yes |
| — Input resistance (4 mA to 20 mA) | 41 Ω; Plus approx. 42 ohms for overvoltage protection by PTC |
| Input ranges (rated values), thermocouples | |
| ● type B | No |
| ● type C | No |
| ● Type E | No |
| ● Type J | No |
| ● Type K | No |
| ● Type L | No |
| ● Type N | No |
| ● Type R | No |
| ● Type S | No |
| ● Type T | No |
| ● Type TXK/TXK(L) to GOST | No |
| Input ranges (rated values), resistance thermometer | |
| ● Cu 10 | No |
| ● Cu 10 according to GOST | No |
| ● Cu 50 | No |
| ● Cu 50 according to GOST | No |
| ● Cu 100 | No |
| ● Cu 100 according to GOST | No |
| ● Ni 10 | No |
| ● Ni 10 according to GOST | No |
| ● Ni 100 | No |
| ● Ni 100 according to GOST | No |
| ● Ni 1000 | No |
| ● Ni 1000 according to GOST | No |
| ● LG-Ni 1000 | No |
| ● Ni 120 | No |
| ● Ni 120 according to GOST | No |
| ● Ni 200 | No |
| ● Ni 200 according to GOST | No |
| ● Ni 500 | No |
| ● Ni 500 according to GOST | No |
| ● Pt 10 | No |
| ● Pt 10 according to GOST | No |
| ● Pt 50 | No |
| ● Pt 50 according to GOST | No |
| ● Pt 100 | No |
| ● Pt 100 according to GOST | No |
| ● Pt 1000 | No |
| ● Pt 1000 according to GOST | No |
| ● Pt 200 | No |


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| | |
|---|---|
| ● Pt 200 according to GOST | No |
| ● Pt 500 | No |
| ● Pt 500 according to GOST | No |
| Input ranges (rated values), resistors | |
| ● 0 to 150 ohms | No |
| ● 0 to 300 ohms | No |
| ● 0 to 600 ohms | No |
| ● 0 to 3000 ohms | No |
| ● 0 to 6000 ohms | No |
| ● PTC | No |
| Cable length | |
| ● shielded, max. | 800 m |
| **Analog value generation for the inputs** | |
| Integration and conversion time/resolution per channel | |
| ● Resolution with overrange (bit including sign), max. | 16 bit |
| ● Basic execution time of the module (all channels released) | 62.5 µs; independent of number of activated channels |
| Smoothing of measured values | |
| ● Parameterizable | Yes |
| ● Step: None | Yes |
| ● Step: low | Yes |
| ● Step: Medium | Yes |
| ● Step: High | Yes |
| **Encoder** | |
| Connection of signal encoders | |
| ● for voltage measurement | Yes |
| ● for current measurement as 2-wire transducer | Yes |
| — Burden of 2-wire transmitter, max. | 820 Ω |
| ● for current measurement as 4-wire transducer | Yes |
| ● for resistance measurement with two-wire connection | No |
| ● for resistance measurement with three-wire connection | No |
| ● for resistance measurement with four-wire connection | No |
| **Errors/accuracies** | |
| Linearity error (relative to input range), (+/-) | 0.02 % |
| Temperature error (relative to input range), (+/-) | 0.005 %/K |
| Crosstalk between the inputs, max. | -60 dB |
| Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) | 0.02 % |
| Operational error limit in overall temperature range | |
| ● Voltage, relative to input range, (+/-) | 0.6 % |
| ● Current, relative to input range, (+/-) | 0.6 % |
| Basic error limit (operational limit at 25 °C) | |
| ● Voltage, relative to input range, (+/-) | 0.2 % |
| ● Current, relative to input range, (+/-) | 0.2 % |
| Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference frequency | |
| ● Common mode voltage, max. | 10 V |
| ● Common mode interference, min. | 50 dB at 400 Hz; 60 dB at 60 / 50 / 10 Hz |
| **Isochronous mode** | |
| Filtering and processing time (TCI), min. | 80 µs |
| Bus cycle time (TDP), min. | 250 µs |
| **Interrupts/diagnostics/status information** | |
| Diagnostics function | Yes |
| Alarms | |
| ● Diagnostic alarm | Yes |
| ● Limit value alarm | Yes; two upper and two lower limit values in each case |
| Diagnoses | |
| ● Monitoring the supply voltage | Yes |
| ● Wire break | Yes; only for 1 ... 5 V and 4 ... 20 mA |
| ● Overflow/Underflow | Yes |


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|---|---|
| Diagnostics indication LED | |
| ● RUN LED | Yes; green LED |
| ● ERROR LED | Yes; red LED |
| ● Monitoring of the supply voltage (PWR-LED) | Yes; green LED |
| ● Channel status display | Yes; green LED |
| ● for channel diagnostics | Yes; red LED |
| ● for module diagnostics | Yes; red LED |
| **Potential separation** | |
| Potential separation channels | |
| ● between the channels | No |
| ● between the channels, in groups of | 8 |
| ● between the channels and backplane bus | Yes |
| ● between the channels and the power supply of the electronics | Yes |
| **Permissible potential difference** | |
| between the inputs (UCM) | 20 V DC |
| Between the inputs and MANA (UCM) | 10 V DC |
| **Isolation** | |
| Isolation tested with | 750 V DC (type test) and according to EN 50155 (routine test) |
| **Standards, approvals, certificates** | |
| Ecological footprint | |
| ● environmental product declaration | Yes |
| Global warming potential | |
| — global warming potential, (total) [CO2 eq] | 38.6 kg |
| — global warming potential, (during production) [CO2 eq] | 14.4 kg |
| — global warming potential, (during operation) [CO2 eq] | 24.6 kg |
| — global warming potential, (after end of life cycle) [CO2 eq] | -0.44 kg |
| Railway application | |
| ● EN 50121-3-2 | Yes; EMC for rail vehicles |
| ● EN 50121-4 | Yes; EMC for signal and telecommunications systems |
| ● EN 50121-5 | Yes; EMC for fixed installations and railway power supply equipment |
| ● EN 50124-1 | Yes; Railway applications - overvoltage category OV2; pollution degree PD2; rated surge voltage UNi = 0.5 kV; UNm = 24 V DC |
| ● EN 50125-1 | Yes; Rail vehicles - see ambient conditions |
| ● EN 50125-2 | Yes; Stationary electrical equipment - see ambient conditions |
| ● EN 50125-3 | Yes; Signal and telecommunications systems - see ambient conditions; vibrations and shocks: Application point outside of tracks (1 m to 3 m away from track) |
| ● EN 50155 | Yes; Rail vehicles - temperature class OT4, ST1/ST2, horizontal mounting position |
| ● EN 61373 | Yes; Rail vehicles - vibrations and shocks: Category 1 Class A/B |
| ● Fire protection acc. to EN 45545-2 | Yes; For proof of conformity, see Service & Support |
| **Security** | |
| signed firmware update | No |
| data integrity | No |
| **Ambient conditions** | |
| Ambient temperature during operation | |
| ● horizontal installation, min. | -40 °C; = Tmin (incl. condensation/frost) |
| ● horizontal installation, max. | 70 °C; = Tmax; +85 °C for 10 min (OT4, ST1/ST2 acc. to EN 50155) |
| ● vertical installation, min. | -40 °C; = Tmin |
| ● vertical installation, max. | 40 °C; = Tmax |
| Altitude during operation relating to sea level | |
| ● Installation altitude above sea level, max. | 2 000 m |
| ● Ambient air temperature-barometric pressure-altitude | Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m) |
| Relative humidity | |
| ● With condensation, tested in accordance with IEC 60068-2-38, max. | 100 %; RH incl. condensation / frost (no commissioning in bedewed state), horizontal installation |
| Resistance | |


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|---|---|
| Coolants and lubricants | |
| — Resistant to commercially available coolants and lubricants | Yes; Incl. diesel and oil droplets in the air |
| Use in stationary industrial systems | |
| — to biologically active substances according to EN 60721-3-3 | Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request |
| — to chemically active substances according to EN 60721-3-3 | Yes; Class 3C4 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); * |
| — to mechanically active substances according to EN 60721-3-3 | Yes; Class 3S4 incl. sand, dust, * |
| Use on land craft, rail vehicles and special-purpose vehicles | |
| — to biologically active substances according to EN 60721-3-5 | Yes; Class 5B2 mold, fungus and dry rot spores (with the exception of fauna); Class 5B3 on request |
| — to chemically active substances according to EN 60721-3-5 | Yes; Class 5C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); * |
| — to mechanically active substances according to EN 60721-3-5 | Yes; Class 5S3 incl. sand, dust; * |
| Usage in industrial process technology | |
| — Against chemically active substances acc. to EN 60654-4 | Yes; Class 3 (excluding trichlorethylene) |
| — Environmental conditions for process, measuring and control systems acc. to ANSI/ISA-71.04 | Yes; Level GX group A/B (excluding trichlorethylene; harmful gas concentrations up to the limits of EN 60721-3-3 class 3C4 permissible); level LC3 (salt spray) and level LB3 (oil) |
| Remark | |
| — Note regarding classification of environmental conditions acc. to EN 60721, EN 60654-4 and ANSI/ISA-71.04 | * The supplied plug covers must remain in place over the unused interfaces during operation! |
| Conformal coating | |
| ● Coatings for printed circuit board assemblies acc. to EN 61086 | Yes; Class 2 for high reliability |
| ● Protection against fouling acc. to EN 60664-3 | Yes; Type 1 protection |
| ● Electronic equipment on rolling stock acc. to EN 50155 | Yes; Class PC2 protective coating acc. to EN 50155:2017 |
| ● Military testing according to MIL-I-46058C, Amendment 7 | Yes; Discoloration of coating possible during service life |
| ● Qualification and Performance of Electrical Insulating Compound for Printed Board Assemblies according to IPC-CC-830A | Yes; Conformal coating, Class A |
| **Dimensions** | |
| Width | 35 mm |
| Height | 147 mm |
| Depth | 129 mm |
| **Weights** | |
| Weight, approx. | 300 g |
| **Other** | |
| Note: | for use in railway applications, also observe the product information "SIPLUS extreme RAIL" A5E37661960A, Online Support article 109736776 |

**Classifications**

| | Version | Classification |
|---|---|---|
| eClass | 16 | 27-24-22-01 |
| eClass | 14 | 27-24-22-01 |
| eClass | 12 | 27-24-22-01 |
| eClass | 9.1 | 27-24-22-01 |
| eClass | 9 | 27-24-22-01 |
| eClass | 8 | 27-24-22-01 |
| eClass | 7.1 | 27-24-22-01 |
| eClass | 6 | 27-24-22-01 |
| ETIM | 10 | EC001420 |
| ETIM | 9 | EC001420 |
| ETIM | 8 | EC001420 |
| ETIM | 7 | EC001420 |
| IDEA | 4 | 3562 |
| UNSPSC | 15 | 32-15-17-05 |


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## Approvals / Certificates

### General Product Approval

Manufacturer Declaration

China RoHS

| General Product Approval | | | EMV | Railway | Environment |
|---|---|---|---|---|---|
| China RoHS | | | | Confirmation | |

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