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## Data sheet 6ES7677-2SB42-0GM0



Figure similar

SIMATIC ET 200SP Open Controller, CPU 1515SP PC2 F + HMI 2048PT, 8 GB RAM (basic device 6ES7677-2DB40-0AA0), 128 GB CFast with Windows 10 IoT Enterprise LTSC 2019 64-bit, S7-1500 Failsafe Software Controller CPU 1505SP F V2x and WinCC Runtime Advanced V17 preinstalled, with 2048 PowerTags license; interfaces: 1x slot CFast, 1x slot SD/MMC, 1x connection for ET 200SP BusAdapter PROFINET, 1x 10/100/1000 Mbps Ethernet, 2x USB 3.0, 2x USB 2.0, 1x DisplayPort; documentation on CFast,

| | |
|---|---|
| **General information** | |
| Product type designation | CPU 1515SP PC2 F |
| HW functional status | from FS04 |
| Firmware version | V21.9 |
| Engineering with | |
| ● STEP 7 TIA Portal configurable/integrated from version | V17 |
| Installed software | |
| ● Visualization | WinCC Runtime Advanced V17 |
| ● Control | S7-1500 Software Controller CPU 1505SP F |
| **Configuration control** | |
| via dataset | Yes |
| **Control elements** | |
| Mode selector switch | 1 |
| **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 |
| Mains buffering | |
| ● Mains/voltage failure stored energy time | 5 ms |
| **Input current** | |
| Current consumption (rated value) | 1.8 A; Full processor load, incl. ET 200SP modules and using USB |
| Current consumption (in no-load operation), typ. | 0.5 A |
| Current consumption, max. | 2.9 A |
| $I^2t$ | 0.426 $A^2 \cdot s$; with starting current inrush |
| **Power** | |
| Active power input, max. | 55 W; incl. ET 200SP modules and using USB |
| Infeed power to the backplane bus | 8.75 W |
| **Power loss** | |
| Power loss, typ. | 15 W; without ET 200SP modules and without using USB |
| **Processor** | |
| Processor type | Intel Atom E3940, 1.6 GHz, 4 cores |
| **Storage** | |
| Type of memory | DDR3L |
| Main memory | 8 GB RAM |
| CFast memory card | Yes; 128 GB flash memory |
| SIMATIC memory card required | No |
| Work memory | |


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|---|---|
| ● integrated (for program) | 1.5 Mbyte |
| ● integrated (for data) | 5 Mbyte |
| ● integrated (for CPU function library of CPU Runtime) | 20 Mbyte |
| Load memory | |
| ● integrated (on PC mass storage) | 320 Mbyte |
| Backup | |
| ● with UPS | Yes; all memory areas declared retentive |
| ● with non-volatile memory | Yes |
| **CPU-blocks** | |
| Number of elements (total) | 6 000; In addition to blocks such as DBs, FBs and FCs, UDTs, global constants, etc. are also regarded as elements |
| DB | |
| ● Number, max. | 5 999; Number range: 1 to 65535 |
| ● Size, max. | 5 Mbyte |
| FB | |
| ● Number, max. | 5 998; Number range: 1 to 65535 |
| ● Size, max. | 1 024 kbyte |
| FC | |
| ● Number, max. | 5 999; Number range: 1 to 65535 |
| ● Size, max. | 1 024 kbyte |
| OB | |
| ● Size, max. | 1 024 kbyte |
| ● Number of free cycle OBs | 100 |
| ● Number of time alarm OBs | 20 |
| ● Number of delay alarm OBs | 20 |
| ● Number of cyclic interrupt OBs | 20 |
| ● Number of process alarm OBs | 50 |
| ● Number of DPV1 alarm OBs | 3 |
| ● Number of isochronous mode OBs | 1 |
| ● Number of technology synchronous alarm OBs | 2 |
| ● Number of startup OBs | 100 |
| ● Number of asynchronous error OBs | 4 |
| ● Number of synchronous error OBs | 2 |
| ● Number of diagnostic alarm OBs | 1 |
| Nesting depth | |
| ● per priority class | 24; Up to 8 possible for F-blocks |
| **Counters, timers and their retentivity** | |
| S7 counter | |
| ● Number | 2 048 |
| Retentivity | |
| — adjustable | Yes |
| IEC counter | |
| ● Number | Any (only limited by the main memory) |
| Retentivity | |
| — adjustable | Yes |
| S7 timer | |
| ● Number | 2 048 |
| Retentivity | |
| — adjustable | Yes |
| IEC timer | |
| ● Number | Any (only limited by the main memory) |
| Retentivity | |
| — adjustable | Yes |
| **Data areas and their retentivity** | |
| Retentive data area (incl. timers, counters, flags), max. | 410 kbyte; For storage in NVRAM; for storage in mass storage 5 242 020 bytes |
| Flag | |
| ● Size, max. | 16 kbyte |
| ● Number of clock memories | 8; 8 clock memory bit, grouped into one clock memory byte |
| Data blocks | |


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|---|---|
| ● Retentivity adjustable | Yes |
| ● Retentivity preset | No |
| Local data | |
| ● per priority class, max. | 64 kbyte; max. 16 KB per block |
| **Address area** | |
| Number of IO modules | 8 192 |
| I/O address area | |
| ● Inputs | 32 kbyte; All inputs are in the process image |
| ● Outputs | 32 kbyte; All outputs are in the process image |
| Subprocess images | |
| ● Number of subprocess images, max. | 32 |
| **Hardware configuration** | |
| Integrated power supply | Yes |
| Number of distributed IO systems | 20 |
| Number of DP masters | |
| ● Via CM | 1 |
| Number of IO Controllers | |
| ● via PC interfaces | 1 |
| Rack | |
| ● Modules per rack, max. | 64; CPU 1515SP PC + 64 modules + server module |
| ● Quantity of operable ET 200SP modules, max. | 64 |
| ● Quantity of operable ET 200AL modules, max. | 16 |
| ● Number of lines, max. | 1 |
| PtP CM | |
| ● Number of PtP CMs | the number of connectable PtP CMs is only limited by the number of available slots |
| **Time of day** | |
| Clock | |
| ● Type | Hardware clock |
| ● Hardware clock (real-time) | Yes; Resolution: 1 s |
| ● Backup time | 6 wk; At 40 °C ambient temperature, typically |
| ● Deviation per day, max. | 10 s; Typ.: 2 s |
| Clock synchronization | |
| ● supported | Yes |
| ● to DP, master | Yes |
| ● on Ethernet via NTP | Yes |
| ● on Windows clock, device | Yes |
| **Interfaces** | |
| Number of industrial Ethernet interfaces | 2 |
| Number of PROFINET interfaces | 1 |
| Number of PROFIBUS interfaces | 1 |
| Number of RS 485 interfaces | 1; Via CM DP module |
| Number of USB interfaces | 4; 2x USB 2.0, 2x USB 3.0 on front side |
| Number of SD card slots | 1 |
| Video interfaces | |
| ● Graphics interface | 1x DisplayPort |
| **1. Interface** | |
| Interface type | PROFINET |
| automatic detection of transmission rate | Yes |
| Autonegotiation | Yes |
| Autocrossing | Yes |
| Number of connections | 88 |
| Interface types | |
| ● RJ 45 (Ethernet) | Yes; Via BusAdapter BA 2x RJ45 |
| — Transmission rate, max. | 100 Mbit/s |
| — Industrial Ethernet status LED | Yes |
| ● Number of ports | 2 |
| ● integrated switch | Yes |
| ● BusAdapter (PROFINET) | Yes; compatible BusAdapters: BA 2x RJ45, BA 2x M12, BA 2x FC, BA 2x LC, |


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|---|---|
| | BA LC/RJ45, BA LC/FC, BA 2x SCRJ, BA SCRJ/RJ45, BA SCRJ/FC, |
| Protocols | |
| ● IP protocol | Yes; IPv4 |
| ● PROFINET IO Controller | Yes |
| ● PROFINET IO Device | Yes |
| ● SIMATIC communication | Yes |
| ● Open IE communication | Yes; Optionally also encrypted |
| ● Web server | Yes |
| PROFINET IO Controller | |
| Services | |
| — Isochronous mode | Yes |
| — shortest clock pulse | 500 µs |
| — IRT | Yes |
| — Dynamic Frame Packing (DFP) | No |
| — PROFIenergy | Yes |
| — Prioritized startup | Yes; max. 32 PROFINET devices; if you want to use the "Prioritized startup" functionality in STEP 7 for the PROFINET interface of the CPU, the CPU and the device must be separated by means of a switch (e.g. SCALANCE X205) |
| — Number of connectable IO Devices, max. | 128 |
| — Of which IO devices with IRT, max. | 64 |
| — of which in line, max. | 64 |
| — Number of connectable IO Devices for RT, max. | 128 |
| — of which in line, max. | 128 |
| — Number of IO Devices that can be simultaneously activated/deactivated, max. | 8 |
| — IO Devices changing during operation (partner ports), supported | Yes |
| — Number of IO Devices per tool, max. | 8 |
| — Updating times | The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data |
| Update time for IRT | |
| — for send cycle of 500 µs | 500 µs to 8 ms |
| — for send cycle of 1 ms | 1 ms to 16 ms |
| — for send cycle of 2 ms | 2 ms to 32 ms |
| — for send cycle of 4 ms | 4 ms to 64 ms |
| — With IRT and parameterization of "odd" send cycles | Update time = set "odd" send clock (any multiple of 125 µs: 625 µs ... 3 875 µs) minimum cycle time start from 500 µs |
| Update time for RT | |
| — for send cycle of 500 µs | 500 µs to 256 ms |
| — for send cycle of 1 ms | 1 ms to 512 ms |
| — for send cycle of 2 ms | 2 ms to 512 ms |
| — for send cycle of 4 ms | 4 ms to 512 ms |
| Address area | |
| — Inputs, max. | 8 kbyte |
| — Outputs, max. | 8 kbyte |
| PROFINET IO Device | |
| Services | |
| — Isochronous mode | No |
| — shortest clock pulse | 500 µs |
| — IRT | Yes |
| — Dynamic Frame Packing (DFP) | No |
| — PROFIenergy | Yes |
| — Prioritized startup | Yes |
| — Shared device | Yes |
| — Number of IO Controllers with shared device, max. | 4 |
| — Asset management record | Yes |
| **2. Interface** | |
| Interface type | Integrated Ethernet interface |
| automatic detection of transmission rate | Yes |
| Autonegotiation | Yes |


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|---|---|
| Autocrossing | Yes |
| Interface types | |
| ● RJ 45 (Ethernet) | Yes; Integrated |
| — Transmission rate, max. | 1 000 Mbit/s |
| — Industrial Ethernet status LED | No |
| ● Number of ports | 1 |
| **3. Interface** | |
| Interface type | PROFIBUS with CM DP |
| Number of connections | 44 |
| Interface types | |
| ● RS 485 | Yes |
| Protocols | |
| ● PROFIBUS DP master | Yes |
| ● PROFIBUS DP device | Yes |
| ● SIMATIC communication | Yes |
| PROFIBUS DP master | |
| ● max. number of DP devices | 125 |
| Services | |
| — Equidistance | No |
| — Isochronous mode | No |
| Address area | |
| — Inputs, max. | 8 kbyte |
| — Outputs, max. | 8 kbyte |
| **Interface types** | |
| RS 485 | |
| ● Transmission rate, max. | 12 Mbit/s |
| **Protocols** | |
| PROFIsafe | Yes |
| Number of connections | |
| ● Number of connections, max. | 88 |
| ● Number of connections reserved for ES/HMI/web | 10 |
| ● Number of S7 routing paths | 16 |
| Redundancy mode | |
| ● PROFINET system redundancy (S2) | No |
| ● PROFINET system redundancy (R1) | No |
| Media redundancy | |
| — MRP | Yes |
| — MRP interconnection, supported | Yes |
| — MRPD | Yes |
| — Switchover time on line break, typ. | 200 ms |
| — Number of stations in the ring, max. | 50 |
| SIMATIC communication | |
| ● PG/OP communication | Yes |
| ● S7 routing | Yes |
| ● S7 communication, as server | Yes |
| ● S7 communication, as client | Yes |
| ● User data per job, max. | 64 kbyte; BSEND/BRCV: 64 KB; PUT/GET: 960 bytes |
| Open IE communication | |
| ● TCP/IP | Yes |
| — Data length, max. | 64 kbyte |
| ● ISO-on-TCP (RFC1006) | Yes |
| — Data length, max. | 64 kbyte |
| ● UDP | Yes |
| — Data length, max. | 2 048 byte |
| ● SNMP | Yes |
| ● DCP | Yes |
| ● LLDP | Yes |
| Web server | |
| ● HTTP | Yes; Via Windows and PROFINET interface |


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|---|---|
| ● HTTPS | Yes; Via Windows and PROFINET interface |
| OPC UA | |
| ● Runtime license required | Yes; "Small" license required |
| ● OPC UA Client | Yes; From SW CPU 1505SP V2.6 |
| ● OPC UA Server | Yes; Data access (read, write, subscribe), runtime license required |
| — Application authentication | Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 |
| — Security policies | Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 |
| — User authentication | Yes; "anonymous" or by user name & password |
| Further protocols | |
| ● MODBUS | Yes; MODBUS TCP |
| **S7 message functions** | |
| Number of login stations for message functions, max. | 32 |
| Program alarms | Yes |
| Number of configurable program messages, max. | 10 000 |
| Number of simultaneously active program alarms | 1 000 |
| ● Number of program alarms | 1 000 |
| ● Number of alarms for system diagnostics | 200 |
| ● Number of alarms for motion technology objects | 160 |
| **Test commissioning functions** | |
| Joint commission (Team Engineering) | Yes; Parallel online access possible for up to 8 engineering systems |
| Status block | Yes; up to 8 simultaneously |
| Single step | No |
| Number of breakpoints | 8 |
| Status/control | |
| ● Status/control variable | Yes |
| ● Variables | Inputs, outputs, memory bits, DB, times, counters |
| ● Number of variables, max. | |
| — of which status variables, max. | 200 |
| — of which control variables, max. | 200 |
| Forcing | |
| ● Forcing | Yes |
| ● Forcing, variables | Inputs, outputs |
| ● Number of variables, max. | 200 |
| Diagnostic buffer | |
| ● present | Yes |
| ● Number of entries, max. | 1 000 |
| — of which powerfail-proof | 300 |
| Traces | |
| ● Number of configurable Traces | 4 |
| ● Memory size per trace, max. | 512 kbyte |
| **Interrupts/diagnostics/status information** | |
| Diagnostics indication LED | |
| ● RUN/STOP LED | Yes |
| ● ERROR LED | Yes |
| ● MAINT LED | Yes |
| **Supported technology objects** | |
| Motion Control | Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool |
| ● Number of available Motion Control resources for technology objects | 2 400 |
| ● Required Motion Control resources | |
| — per speed-controlled axis | 40; per axis |
| — per positioning axis | 80; per axis |
| — per synchronous axis | 160; per axis |
| — per external encoder | 80; per external encoder |
| — per output cam | 20; per cam |
| — per cam track | 160; per cam track |
| — per probe | 40; per probe |


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|---|---|
| ● Positioning axis | |
| — Number of positioning axes at motion control cycle of 4 ms (typical value) | 15 |
| — Number of positioning axes at motion control cycle of 8 ms (typical value) | 30 |
| Controller | |
| ● PID_Compact | Yes; Universal PID controller with integrated optimization |
| ● PID_3Step | Yes; PID controller with integrated optimization for valves |
| ● PID-Temp | Yes; PID controller with integrated optimization for temperature |
| Counting and measuring | |
| ● High-speed counter | Yes |
| **Standards, approvals, certificates** | |
| CE mark | Yes |
| CSA approval | Yes |
| cULus | Yes |
| FM approval | Yes |
| RCM (formerly C-TICK) | Yes |
| Ecological footprint | |
| ● environmental product declaration | Yes |
| Global warming potential | |
| — global warming potential, (total) [CO2 eq] | 432 kg |
| — global warming potential, (during production) [CO2 eq] | 73.8 kg |
| — global warming potential, (during operation) [CO2 eq] | 365 kg |
| — global warming potential, (after end of life cycle) [CO2 eq] | -6.71 kg |
| Highest safety class achievable in safety mode | |
| ● Performance level according to ISO 13849-1 | PLe |
| ● SIL acc. to IEC 61508 | SIL 3 |
| Probability of failure (for service life of 20 years and repair time of 100 hours) | |
| — Low demand mode: PFDavg in accordance with SIL3 | < 2.00E-05 |
| — High demand/continuous mode: PFH in accordance with SIL3 | < 1.00E-09 1/h |
| **Ambient conditions** | |
| Ambient temperature during operation | |
| ● min. | -20 °C |
| ● horizontal installation, min. | -20 °C |
| ● horizontal installation, max. | 60 °C; from 55°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card max. 10% load; SD card not used |
| ● vertical installation, min. | -20 °C |
| ● vertical installation, max. | 50 °C; from 45°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card and SD card; max. 10% load |
| Ambient temperature during storage/transportation | |
| ● min. | -40 °C |
| ● max. | 70 °C |
| Vibrations | |
| ● Operation, tested according to IEC 60068-2-6 | Yes |
| ● Transport, tested acc. to IEC 60068-2-6 | Yes |
| Shock testing | |
| ● tested according to IEC 60068-2-6 | Yes |
| ● tested according to IEC 60068-2-27 | Yes |
| ● tested according to IEC 60068-2-29 | Yes |
| ● Storage/transport, tested acc. to IEC 60068-2-27 | Yes |
| **Operating systems** | |
| pre-installed operating system | Windows 10 IoT Enterprise 2019 LTSC, 64 bit, MUI |
| **Configuration** | |
| Programming | |
| Programming language | |
| — LAD | Yes; incl. failsafe |


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|---|---|
| — FBD | Yes; incl. failsafe |
| — STL | Yes |
| — SCL | Yes |
| — CFC | No |
| — GRAPH | Yes |
| Know-how protection | |
| ● User program protection/password protection | Yes |
| ● Copy protection | Yes |
| ● Block protection | Yes |
| Access protection | |
| ● protection of confidential configuration data | Yes |
| ● Protection level: Write protection | Yes |
| ● Protection level: Read/write protection | Yes |
| ● Protection level: Write protection for Failsafe | Yes |
| ● Protection level: Complete protection | Yes |
| Cycle time monitoring | |
| ● lower limit | adjustable minimum cycle time |
| ● upper limit | adjustable maximum cycle time |
| Open Development interfaces | |
| ● Size of ODK SO file, max. | 5.8 Mbyte |
| **Peripherals/Options** | |
| SD card | Optionally for additional mass storage |
| **Dimensions** | |
| Width | 160 mm |
| Height | 117 mm |
| Depth | 75 mm |
| **Weights** | |
| Weight, approx. | 0.83 kg |

**Classifications**

| | Version | Classification |
|---|---|---|
| eClass | 16 | 27-24-26-07 |
| eClass | 14 | 27-24-26-07 |
| eClass | 12 | 27-24-26-07 |
| eClass | 9.1 | 27-24-26-07 |
| eClass | 9 | 27-24-26-07 |
| eClass | 8 | 27-24-26-07 |
| eClass | 7.1 | 27-24-26-07 |
| eClass | 6 | 27-24-26-07 |
| ETIM | 10 | EC001603 |
| ETIM | 9 | EC001603 |
| ETIM | 8 | EC001603 |
| ETIM | 7 | EC001603 |
| IDEA | 4 | 3565 |
| UNSPSC | 15 | 32-15-17-05 |

**Approvals / Certificates**

**General Product Approval**

Miscellaneous | Manufacturer Declaration | Miscellaneous | RCM | EAC | China RoHS

| General Product Approval | Functional Saftey | Maritime application | Environment |
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**last modified:** 5/21/2026


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