SIEMENS

## Data sheet 6ES7412-1XJ07-0AB0

SIMATIC S7-400, CPU 412-1 Central processing unit with: Work memory 512 KB, (256 KB code, 256 KB data), interface MPI/DP 12 Mbit/s,

| | |
|---|---|
| **General information** | |
| Product type designation | CPU 412-1 |
| HW functional status | 01 |
| Firmware version | V7.0 |
| Product function | |
| ● Isochronous mode | Yes; For PROFIBUS only |
| Engineering with | |
| ● Programming package | STEP 7 V5.4 or higher with HSP 261 |
| **CiR - Configuration in RUN** | |
| CiR synchronization time, basic load | 100 ms |
| CiR synchronization time, time per I/O byte | 30 µs |
| **Supply voltage** | |
| Rated value (DC) | Power supply via system power supply |
| **Input current** | |
| from backplane bus 5 V DC, typ. | 0.7 A |
| from backplane bus 5 V DC, max. | 0.8 A |
| from backplane bus 24 V DC, max. | 150 mA; 150 mA per DP interface |
| from interface 5 V DC, max. | 90 mA; At the DP interface |
| **Power loss** | |
| Power loss, typ. | 3.5 W |
| Power loss, max. | 4 W |
| **Memory** | |
| Type of memory | RAM |
| Work memory | |
| ● integrated | 512 kbyte |
| ● integrated (for program) | 256 kbyte |
| ● integrated (for data) | 256 kbyte |
| ● expandable | No |
| Load memory | |
| ● expandable FEPROM | Yes; with Memory Card (FLASH) |
| ● expandable FEPROM, max. | 64 Mbyte |
| ● integrated RAM, max. | 512 kbyte |
| ● expandable RAM | Yes; with Memory Card (RAM) |
| ● expandable RAM, max. | 64 Mbyte |
| Backup | |
| ● present | Yes |
| ● with battery | Yes; all data |
| ● without battery | No |
| **Battery** | |
| Backup battery | |

| | |
|---|---|
| ● Backup current, typ. | 180 µA; up to 40 °C |
| ● Backup current, max. | 850 µA |
| ● Backup time, max. | Dealt with in the module data manual with the secondary conditions and the factors of influence |
| ● Feeding of external backup voltage to CPU | 5 V DC to 15 V DC |
| **CPU processing times** | |
| for bit operations, typ. | 31.25 ns |
| for word operations, typ. | 31.25 ns |
| for fixed point arithmetic, typ. | 31.25 ns |
| for floating point arithmetic, typ. | 62.5 ns |
| **CPU-blocks** | |
| DB | |
| ● Number, max. | 3 000; Number range: 1 to 16000 |
| ● Size, max. | 64 kbyte |
| FB | |
| ● Number, max. | 1 500; Number range: 0 to 7999 |
| ● Size, max. | 64 kbyte |
| FC | |
| ● Number, max. | 1 500; Number range: 0 to 7999 |
| ● Size, max. | 64 kbyte |
| OB | |
| ● Number, max. | see instruction list |
| ● Size, max. | 64 kbyte |
| ● Number of free cycle OBs | 1; OB 1 |
| ● Number of time alarm OBs | 2; OB 10, 11 |
| ● Number of delay alarm OBs | 2; OB 20, 21 |
| ● Number of cyclic interrupt OBs | 2; OB 32, 35 (shortest cycle that can be set = 500 µs) |
| ● Number of process alarm OBs | 2; OB 40, 41 |
| ● Number of DPV1 alarm OBs | 3; OB 55-57 |
| ● Number of isochronous mode OBs | 2; OB 61-62 |
| ● Number of multicomputing OBs | 1; OB 60 |
| ● Number of background OBs | 1; OB 90 |
| ● Number of startup OBs | 3; OB 100-102 |
| ● Number of asynchronous error OBs | 9; OB 80-88 |
| ● Number of synchronous error OBs | 2; OB 121, 122 |
| Nesting depth | |
| ● per priority class | 24 |
| ● additional within an error OB | 1 |
| **Counters, timers and their retentivity** | |
| S7 counter | |
| ● Number | 2 048 |
| Retentivity | |
| — adjustable | Yes |
| — lower limit | 0 |
| — upper limit | 2 047 |
| — preset | Z 0 to Z 7 |
| Counting range | |
| — lower limit | 0 |
| — upper limit | 999 |
| IEC counter | |
| ● present | Yes |
| ● Type | SFB |
| ● Number | Unlimited (limited only by RAM capacity) |
| S7 times | |
| ● Number | 2 048 |
| Retentivity | |
| — adjustable | Yes |
| — lower limit | 0 |
| — upper limit | 2 047 |
| — preset | No times retentive |
| Time range | |

| | |
|---|---|
| — lower limit | 10 ms |
| — upper limit | 9 990 s |
| IEC timer | |
| ● present | Yes |
| ● Type | SFB |
| ● Number | Unlimited (limited only by RAM capacity) |
| **Data areas and their retentivity** | |
| Retentive data area (incl. timers, counters, flags), max. | Total working and load memory (with backup battery) |
| Flag | |
| ● Size, max. | 4 kbyte; Size of bit memory address area |
| ● Retentivity available | Yes |
| ● Retentivity preset | MB 0 to MB 15 |
| ● Number of clock memories | 8; in 1 memory byte |
| Local data | |
| ● adjustable, max. | 8 kbyte |
| ● preset | 4 kbyte |
| **Address area** | |
| I/O address area | |
| ● Inputs | 4 kbyte |
| ● Outputs | 4 kbyte |
| Process image | |
| ● Inputs, adjustable | 4 kbyte |
| ● Outputs, adjustable | 4 kbyte |
| ● Inputs, default | 128 byte |
| ● Outputs, default | 128 byte |
| ● consistent data, max. | 244 byte |
| ● Access to consistent data in process image | Yes |
| Subprocess images | |
| ● Number of subprocess images, max. | 15 |
| Digital channels | |
| ● Inputs | 32 768 |
| — of which central | 32 768 |
| ● Outputs | 32 768 |
| — of which central | 32 768 |
| Analog channels | |
| ● Inputs | 2 048 |
| — of which central | 2 048 |
| ● Outputs | 2 048 |
| — of which central | 2 048 |
| **Hardware configuration** | |
| Number of expansion units, max. | 21 |
| connectable OPs | 47 |
| Multicomputing | Yes; 4 CPUs max. (with UR1 or UR2) |
| Interface modules | |
| ● Number of connectable IMs (total), max. | 6 |
| ● Number of connectable IM 460s, max. | 6 |
| ● Number of connectable IM 463s, max. | 4; IM 463-2 |
| Number of DP masters | |
| ● integrated | 1 |
| ● via CP | 10; CP 443-5 Extended |
| ● via IM 467 | 4 |
| ● Mixed mode IM + CP permitted | No; IM 467 cannot be used jointly with CP 443-5 Ext. or CP 443-1 in PROFINET IO mode |
| ● via interface module | 0 |
| ● Number of pluggable S5 modules (via adapter capsule in central device), max. | 6 |
| Number of IO Controllers | |
| ● integrated | 0 |
| ● via CP | 4; Max. 4 in the central controller; no mixed operation of different CP 443-1 types in PROFINET IO mode |
| Number of operable FMs and CPs (recommended) | |

| | |
|---|---|
| ● FM | Limited by number of slots and number of connections |
| ● CP, PtP | CP 440: Limited by number of slots; CP 441: Limited by number of slots and number of connections |
| ● PROFIBUS and Ethernet CPs | 14; In total max. 10 CPs as DP master and PROFINET controller, of which up to 10 IMs or CPs as DP master and up to 4 CPs as PROFINET controller |
| Slots | |
| ● required slots | 1 |
| **Time of day** | |
| Clock | |
| ● Hardware clock (real-time) | Yes |
| ● retentive and synchronizable | Yes |
| ● Resolution | 1 ms |
| ● Deviation per day (buffered), max. | 1.7 s; Power off |
| ● Deviation per day (unbuffered), max. | 8.6 s; For power On |
| Operating hours counter | |
| ● Number | 16 |
| ● Number/Number range | 0 to 15 |
| ● Range of values | SFCs 2, 3 and 4: 0 to 32767 hours SFC 101: 0 to 2^31 - 1 hours |
| ● Granularity | 1 h |
| ● retentive | Yes |
| Clock synchronization | |
| ● supported | Yes |
| ● to MPI, master | Yes |
| ● to MPI, slave | Yes |
| ● to DP, master | Yes |
| ● to DP, slave | Yes |
| ● in AS, master | Yes |
| ● in AS, slave | Yes |
| ● on Ethernet via NTP | No; Via CP |
| ● to IF 964 DP | No |
| Time difference in system when synchronizing via | |
| ● MPI, max. | 200 ms |
| **Interfaces** | |
| Interfaces/bus type | 1 x MPI/PROFIBUS DP |
| Number of RS 485 interfaces | 1; Combined MPI / PROFIBUS DP |
| **1. Interface** | |
| Interface type | MPI/PROFIBUS DP |
| Isolated | Yes |
| Interface types | |
| ● RS 485 | Yes |
| ● Output current of the interface, max. | 150 mA |
| Protocols | |
| ● MPI | Yes |
| ● PROFIBUS DP master | Yes |
| ● PROFIBUS DP slave | Yes |
| MPI | |
| ● Number of connections | 32; If a diagnostics repeater is used on the line, the number of connection resources on the line is reduced by 1 |
| ● Transmission rate, max. | 12 Mbit/s |
| Services | |
| — PG/OP communication | Yes |
| — Routing | Yes |
| — Global data communication | Yes |
| — S7 basic communication | Yes |
| — S7 communication | Yes |
| — S7 communication, as client | Yes |
| — S7 communication, as server | Yes |
| PROFIBUS DP master | |
| ● Number of connections, max. | 16; If a diagnostics repeater is used on the line, the number of connection resources on the line is reduced by 1 |
| ● Transmission rate, max. | 12 Mbit/s |
| ● Number of DP slaves, max. | 32 |

| | |
|---|---|
| Services | |
| — PG/OP communication | Yes |
| — Routing | Yes; S7 routing |
| — Global data communication | No |
| — S7 basic communication | Yes |
| — S7 communication | Yes |
| — S7 communication, as client | Yes |
| — S7 communication, as server | Yes |
| — Equidistance | Yes |
| — Isochronous mode | Yes |
| — SYNC/FREEZE | Yes |
| — Activation/deactivation of DP slaves | Yes |
| — Direct data exchange (slave-to-slave communication) | Yes |
| — DPV1 | Yes |
| Address area | |
| — Inputs, max. | 2 kbyte |
| — Outputs, max. | 2 kbyte |
| User data per DP slave | |
| — User data per DP slave, max. | 244 byte |
| — Inputs, max. | 244 byte |
| — Outputs, max. | 244 byte |
| — Slots, max. | 244 |
| — per slot, max. | 128 byte |
| PROFIBUS DP slave | |
| ● Number of connections | 16 |
| ● GSD file | http://support.automation.siemens.com/WW/view/en/113652 |
| ● Transmission rate, max. | 12 Mbit/s |
| ● automatic baud rate search | No |
| ● Address area, max. | 32; Virtual slots |
| ● User data per address area, max. | 32 byte |
| — of which consistent, max. | 32 byte |
| Services | |
| — PG/OP communication | Yes; with interface active |
| — Routing | Yes; with interface active |
| — Global data communication | No |
| — S7 basic communication | No |
| — S7 communication | Yes |
| — S7 communication, as client | Yes |
| — S7 communication, as server | Yes |
| — Direct data exchange (slave-to-slave communication) | No |
| — DPV1 | No |
| Transfer memory | |
| — Inputs | 244 byte |
| — Outputs | 244 byte |
| **Protocols** | |
| Open IE communication | |
| ● ISO-on-TCP (RFC1006) | Via CP 443-1 Adv. and loadable FB |
| — Data length, max. | 1 452 bytes via CP 443-1 Adv. |
| Web server | |
| ● supported | No |
| **Isochronous mode** | |
| Equidistance | Yes |
| Number of DP masters with isochronous mode | 1 |
| User data per isochronous slave, max. | 244 byte |
| shortest clock pulse | 1.5 ms; 0.5 ms without use of SFC 126, 127 |
| max. cycle | 32 ms |
| **communication functions / header** | |
| PG/OP communication | Yes |
| ● Number of connectable OPs without message processing | 47 |

| | |
|---|---|
| ● Number of connectable OPs with message processing | 47; When using Alarm_S/SQ and Alarm_D/DQ |
| Data record routing | Yes |
| Global data communication | |
| ● supported | Yes |
| ● Number of GD loops, max. | 8 |
| ● Number of GD packets, transmitter, max. | 8 |
| ● Number of GD packets, receiver, max. | 16 |
| ● Size of GD packets, max. | 54 byte |
| ● Size of GD packet (of which consistent), max. | 1 variable |
| S7 basic communication | |
| ● supported | Yes |
| ● User data per job, max. | 76 byte |
| ● User data per job (of which consistent), max. | 1 variable |
| S7 communication | |
| ● supported | Yes |
| ● as server | Yes |
| ● as client | Yes |
| ● User data per job, max. | 64 kbyte |
| ● User data per job (of which consistent), max. | 462 byte |
| S5 compatible communication | |
| ● supported | Yes; Via FC AG_SEND and AG_RECV, max. via 10 CP 443-1 or 443-5 |
| ● User data per job, max. | 8 kbyte |
| ● User data per job (of which consistent), max. | 240 byte |
| ● Number of simultaneous AG-SEND/AG-RECV orders per CPU, max. | 24/24 |
| Standard communication (FMS) | |
| ● supported | Yes; Via CP and loadable FB |
| Number of connections | |
| ● overall | 48 |
| ● usable for PG communication | 47 |
| — reserved for PG communication | 1 |
| — adjustable for PG communication, max. | 0 |
| ● usable for OP communication | 47 |
| — reserved for OP communication | 1 |
| — adjustable for OP communication, max. | 0 |
| ● usable for S7 basic communication | 46 |
| — reserved for S7 basic communication | 0 |
| — adjustable for S7 basic communication, max. | 0 |
| ● usable for S7 communication | 46 |
| — reserved for S7 communication | 0 |
| — adjustable for S7 communication, max. | 0 |
| ● usable for routing | 23 |
| — reserved for routing | 0 |
| — adjustable for routing, max. | 0 |
| **S7 message functions** | |
| Number of login stations for message functions, max. | 47; Max. 47 with Alarm_S/SQ and Alarm_D/DQ (OPs); max. 8 with Alarm, Alarm_8, Alarm_8P, Notify and Notify_8 (e.g. WinCC) |
| Symbol-related messages | Yes |
| SCAN procedure | Yes |
| Program alarms | Yes |
| Process diagnostic messages | Yes |
| simultaneously active Alarm-S blocks, max. | 250; Simultaneously active alarm_S/SQ blocks or alarm_D/DQ blocks |
| Alarm 8-blocks | Yes |
| ● Number of instances for alarm 8 and S7 communication blocks, max. | 300 |
| ● preset, max. | 150 |
| Process control messages | Yes |
| Number of archives that can log on simultaneously (SFB 37 AR_SEND) | 4 |
| Number of messages | |
| ● overall, max. | 256 |
| ● in 100 ms grid, max. | 0 |

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| ● in 500 ms grid, max. | 256 |
| ● in 1000 ms grid, max. | 256 |
| Number of additional values | |
| ● with 100 ms grid, max. | 0 |
| ● with 500, 1000 ms grid, max. | 1 |
| **Test commissioning functions** | |
| Status block | Yes; Up to 16 simultaneously |
| Single step | Yes |
| Number of breakpoints | 16 |
| Status/control | |
| ● Status/control variable | Yes; Up to 16 variable tables |
| ● Variables | Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters |
| ● Number of variables, max. | 70; Status/control |
| Forcing | |
| ● Forcing | Yes |
| ● Forcing, variables | Inputs/outputs, bit memories, distributed I/Os |
| ● Number of variables, max. | 64 |
| Diagnostic buffer | |
| ● present | Yes |
| ● Number of entries, max. | 3 200 |
| — adjustable | Yes |
| — preset | 120 |
| Service data | |
| ● can be read out | Yes |
| **Standards, approvals, certificates** | |
| CE mark | Yes |
| CSA approval | Yes |
| UL approval | Yes |
| cULus | Yes |
| FM approval | Yes |
| RCM (formerly C-TICK) | Yes |
| KC approval | Yes |
| EAC (formerly Gost-R) | Yes |
| Use in hazardous areas | |
| ● ATEX | ATEX II 3G Ex nA IIC T4 Gc |
| **Ambient conditions** | |
| Ambient temperature during operation | |
| ● min. | 0 °C |
| ● max. | 60 °C |
| **configuration / header** | |
| Configuration software | |
| ● STEP 7 | Yes |
| configuration / programming / header | |
| ● Command set | see instruction list |
| ● Nesting levels | 7 |
| ● Access to consistent data in process image | Yes |
| ● System functions (SFC) | see instruction list |
| ● System function blocks (SFB) | see instruction list |
| Programming language | |
| — LAD | Yes |
| — FBD | Yes |
| — STL | Yes |
| — SCL | Yes |
| — CFC | Yes |
| — GRAPH | Yes |
| — HiGraph® | Yes |
| configuration / programming / number of simultaneously active SFC / header | |
| — number of simultaneously active system functions (SFC) / with DPSYC_FR | 2; SFC 11; per interface |
| — number of simultaneously active system functions (SFC) / with D_ACT_DP | 8; SFC 12; per interface |

| | |
|---|---|
| — RD_REC | 8; SFC 59; per interface |
| — WR_REC | 8; SFC 58; per interface |
| — WR_PARM | 8; SFC 55; per interface |
| — PARM_MOD | 1; SFC 57; per interface |
| — WR_DPARM | 2; SFC 56; per interface |
| — DPNRM_DG | 8; SFC 13; per interface |
| — RDSYSST | 8; SFC 51 |
| — DP_TOPOL | 1; SFC 103; per interface |
| configuration / programming / number of simultaneously active SFB / header | |
| — RDREC | 8; SFB 52; per interface, but not more than 32 across all external interfaces |
| — WRREC | 8; SFB 53; per interface, but not more than 32 across all external interfaces |
| Know-how protection | |
| ● User program protection/password protection | Yes |
| ● Block encryption | Yes; With S7 block Privacy |
| **Dimensions** | |
| Width | 25 mm |
| Height | 290 mm |
| Depth | 219 mm |
| **Weights** | |
| Weight, approx. | 700 g |

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