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Data sheet 6ES7510-1SJ00-0AB0



Spare part SIMATIC DP, CPU 1510SP F-1 PN for ET 200SP, Central processing unit with Work memory 150 KB for program and 750 KB for data, 1st interface, PROFINET IRT with 3-port switch, 72 ns bit performance, SIMATIC Memory Card required, BusAdapter required for Port 1 and 2

General information	
Product type designation	CPU 1510SP F-1 PN
HW functional status	FS01
Firmware version	V1.7
Product function	
● Isochronous mode	Yes; Only with PROFINET; with minimum OB 6x cycle of 625 µs
Engineering with	
● STEP 7 TIA Portal configurable/integrated from version	V13 SP1
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)	0.6 A
Inrush current, max.	4.7 A; Rated value
I^2t	0.14 $A^2 \cdot s$
Power	
Infeed power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	5.6 W
Storage	
Number of slots for SIMATIC memory card	1
SIMATIC memory card required	Yes
Work memory	
● integrated (for program)	150 kbyte
● integrated (for data)	750 kbyte
Load memory	
● Plug-in (SIMATIC Memory Card), max.	32 Gbyte
Backup	
● maintenance-free	Yes
CPU processing times	
for bit operations, typ.	72 ns

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for word operations, typ.	86 ns
for fixed point arithmetic, typ.	115 ns
for floating point arithmetic, typ.	461 ns
CPU-blocks	
Number of elements (total)	2 000; In addition to blocks such as DBs, FBs and FCs, UDTs, global constants, etc. are also regarded as elements
DB	
● Number range	1 ... 65 535
● Size, max.	750 kbyte; For non-optimized block accesses, the max. size of the DB is 64 KB
FB	
● Number range	1 ... 65 535
● Size, max.	150 kbyte
FC	
● Number range	1 ... 65 535
● Size, max.	150 kbyte
OB	
● Size, max.	150 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; With Failsafe, two RTGs with one "Cyclic interrupt OB" or one "Free cycle OB" (F-OB) each are possible
● 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	
— can be set	Yes
IEC counter	
● Number	Any (only limited by the main memory)
Retentivity	
— can be set	Yes
S7 timer	
● Number	2 048
Retentivity	
— can be set	Yes
IEC timer	
● Number	Any (only limited by the main memory)
Retentivity	
— can be set	Yes
Data areas and their retentivity	
Retentive data area (incl. timers, counters, flags), max.	128 kbyte; Available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 88 KB
Flag	
● Size, max.	16 kbyte
● Number of clock memories	8; 8 clock memory bit, grouped into one clock memory byte
Data blocks	
● Retentivity adjustable	Yes
● Retentivity preset	No
Local data	
● per priority class, max.	64 kbyte; max. 16 KB per block

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Address area	
Number of IO modules	1 024; max. number of modules / submodules
I/O address area	
● Inputs	32 kbyte; All inputs are in the process image
● Outputs	32 kbyte; All outputs are in the process image
per integrated IO subsystem	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
per CM/CP	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
Subprocess images	
● Number of subprocess images, max.	32
Hardware configuration	
Number of distributed IO systems	2
Number of DP masters	
● via CM	1
Number of IO Controllers	
● Integrated	1
● via CM	0
Rack	
● Modules per rack, max.	64; CPU + 64 modules + server module (mounting width max. 1 m)
● 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
● Backup time	6 wk; At 40 °C ambient temperature, typically
● Deviation per day, max.	10 s; Typ.: 2 s
Operating hours counter	
● Number	16
Clock synchronization	
● supported	Yes
● to DP, master	Yes; Via CM DP module
● on DP, device	Yes; Via CM DP module
● in AS, master	Yes
● in AS, device	Yes
● on Ethernet via NTP	Yes
Interfaces	
Number of PROFINET interfaces	1
Number of PROFIBUS interfaces	1; Via CM DP module
1. Interface	
Interface types	
● RJ 45 (Ethernet)	Yes; 1. integr. + 2. via BusAdapter BA 2x RJ45
● Number of ports	3
● integrated switch	Yes
Protocols	
● PROFINET IO Controller	Yes
● PROFINET IO device	Yes
● SIMATIC communication	Yes
● Open IE communication	Yes
● Web server	Yes
● Media redundancy	Yes
PROFINET IO Controller	
Services	
— PG/OP communication	Yes
— Isochronous mode	Yes

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— Direct data exchange	Yes; Requirement: IRT and isochronous mode (MRPD optional)
— IRT	Yes
— PROFIenergy	Yes
— Prioritized startup	Yes; Max. 32 PROFINET devices
— Number of connectable IO Devices, max.	64; In total, up to 189 distributed I/O devices can be connected via PROFIBUS or PROFINET
— Of which IO devices with IRT, max.	64
— Number of connectable IO Devices for RT, max.	64
— of which in line, max.	64
— Number of IO Devices that can be simultaneously activated/deactivated, max.	8; in total across all interfaces
— 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 250 µs	250 µs to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 625 µs of the isochronous OB is decisive
— for send cycle of 500 µs	500 µs to 8 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 625 µs of the isochronous OB is decisive
— 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: 375 µs, 625 µs ... 3 875 µs)
Update time for RT	
— for send cycle of 250 µs	250 µs to 128 ms
— 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
PROFINET IO Device	
Services	
— PG/OP communication	Yes
— Isochronous mode	No
— IRT	Yes
— PROFIenergy	Yes
— Shared device	Yes
— Number of IO Controllers with shared device, max.	4
2. Interface	
Interface types	
● RS 485	Yes; Via CM DP module
● Number of ports	1
Protocols	
● PROFIBUS DP master	Yes
● PROFIBUS DP device	Yes
● SIMATIC communication	Yes
PROFIBUS DP master	
● Number of connections, max.	48
● max. number of DP devices	125
Services	
— PG/OP communication	Yes
— Equidistance	No
— Isochronous mode	No
— activation/deactivation of DP devices	Yes
Interface types	
RJ 45 (Ethernet)	
● 100 Mbps	Yes
● Autonegotiation	Yes
● Autocrossing	Yes
● Industrial Ethernet status LED	Yes

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RS 485	
● Transmission rate, max.	12 Mbit/s
Protocols	
PROFIsafe	Yes
Number of connections	
● Number of connections, max.	64
● Number of connections reserved for ES/HMI/web	10
● Number of connections via integrated interfaces	64
● Number of S7 routing paths	16
Redundancy mode	
Media redundancy	
— Media redundancy	only via 1st interface (X1)
— MRP	Yes; as MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
— MRPD	Yes; Requirement: IRT
— Switchover time on line break, typ.	200 ms
— Number of stations in the ring, max.	50
SIMATIC communication	
● S7 routing	Yes
● Data record routing	Yes
● S7 communication, as server	Yes
● S7 communication, as client	Yes
● User data per job, max.	See online help (S7 communication, user data size)
Open IE communication	
● TCP/IP	Yes
— Data length, max.	64 kbyte
— several passive connections per port, supported	Yes
● ISO-on-TCP (RFC1006)	Yes
— Data length, max.	64 kbyte
● UDP	Yes
— Data length, max.	1 472 byte
● DHCP	No
● SNMP	Yes
● DCP	Yes
● LLDP	Yes
Web server	
● HTTP	Yes; Standard and user-defined pages
● HTTPS	Yes; Standard and user-defined pages
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.	5 000
Number of simultaneously active program alarms	
● Number of program alarms	300
● Number of alarms for system diagnostics	100
● Number of alarms for motion technology objects	80
Test commissioning functions	
Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 3 engineering systems
Status block	Yes; Up to 8 simultaneously (in total across all ES clients)
Single step	No
Status/control	
● Status/control variable	Yes
● Variables	Inputs, outputs, memory bits, DB, times, counters
● Number of variables, max.	
— of which status variables, max.	200; per job
— of which control variables, max.	200; per job
Forcing	

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● 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	500
Traces	
● Number of configurable Traces	4; Up to 512 KB of data per trace are possible
Interrupts/diagnostics/status information	
Diagnostics indication LED	
● RUN/STOP LED	Yes
● ERROR LED	Yes
● MAINT LED	Yes
● Monitoring of the supply voltage (PWR-LED)	Yes
● Connection display LINK TX/RX	Yes
Supported technology objects	
Motion Control	Yes
● Speed-controlled axis	
— Number of speed-controlled axes, max.	6; Max. number of speed-controlled axes (requirement: there must be no other motion technology objects created)
● Positioning axis	
— Number of positioning axes, max.	6; Max. number of positioning axes (requirement: there must be no other motion technology objects created)
● Synchronized axes (relative gear synchronization)	
— Number of axes, max.	3; Max. number of synchronous axes (requirement: there must be no other motion technology objects created)
● External encoders	
— Number of external encoders, max.	6; Max. number of external encoders (requirement: there must be no other motion technology objects created)
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	
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
Ambient conditions	
Ambient temperature during operation	
● horizontal installation, min.	0 °C
● horizontal installation, max.	60 °C
● vertical installation, min.	0 °C
● vertical installation, max.	50 °C
Configuration	
Programming	
Programming language	
— LAD	Yes; incl. failsafe
— FBD	Yes; incl. failsafe
— STL	Yes
— SCL	Yes
— GRAPH	Yes
Know-how protection	

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● User program protection/password protection	Yes
● Copy protection	Yes
● Block protection	Yes
Access protection	
● Protection level: Write protection	Yes; Specific write protection both for Standard and for Failsafe
● Protection level: Read/write protection	Yes
● Protection level: Complete protection	Yes
Cycle time monitoring	
● lower limit	adjustable minimum cycle time
● upper limit	adjustable maximum cycle time
Dimensions	
Width	100 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	310 g

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 | UL | Miscellaneous | EAC | China RoHS

For use in hazardous locations	Functional Saftey	Maritime application

UL | FM | TUEV | ABS | BUREAU VERITAS | DNV

Maritime application

LRS | NK / Nippon Kaiji Kyokai | RINA | RMRS | CCS (China Classification Society) | KR (Korean Register of Shipping)

Industrial Communication

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