



Figure similar

SIMATIC S7-1500F, CPU Bundle consisting of: CPU 1518F-4 PN/DP MFP (6ES7518-4FX00-1AB0), including C/C++ Runtime and OPC UA Runtime license, 9 MB work memory for program and 60 MB for data, 1st interface: PROFINET IRT with 2-port switch, 2nd interface: PROFINET RT, 3rd interface: PROFINET basic services, 4th interface: PROFIBUS, 1 ns bit performance, SIMATIC Memory Card (min. 2 GB) required

General information	
Product type designation	CPU 1518F-4 PN/DP MFP
HW functional status	FS03
Firmware version	V2.9
Product function	
<ul style="list-style-type: none"> <li>I&amp;M data</li> </ul>	Yes; I&M0 to I&M3
<ul style="list-style-type: none"> <li>Isochronous mode</li> </ul>	Yes; Distributed and central; with minimum OB 6x cycle of 125 µs (distributed) and 1 ms (central)
Engineering with	
<ul style="list-style-type: none"> <li>STEP 7 TIA Portal configurable/integrated from version</li> </ul>	V17 (FW V2.9) / V15 (FW V2.5) or higher
Configuration control	
via dataset	Yes
Display	
Screen diagonal [cm]	6.1 cm
Control elements	
Number of keys	6
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	
<ul style="list-style-type: none"> <li>Mains/voltage failure stored energy time</li> </ul>	5 ms
<ul style="list-style-type: none"> <li>Repeat rate, min.</li> </ul>	1/s
Input current	
Current consumption (rated value)	1.7 A
Current consumption, max.	2 A
Inrush current, max.	2.7 A; Rated value
$I^2t$	0.02 A <sup>2</sup> ·s
Power	
Infeed power to the backplane bus	12 W
Power consumption from the backplane bus (balanced)	35 W
Power loss	
Power loss, typ.	29 W
Memory	
Number of slots for SIMATIC memory card	1
SIMATIC memory card required	Yes

<b>Work memory</b>	
<ul style="list-style-type: none"> <li>integrated (for program)</li> <li>integrated (for data)</li> <li>integrated (for CPU function library of CPU Runtime)</li> </ul>	9 Mbyte 60 Mbyte 50 Mbyte; Note: The "CPU function library of the CPU" are C/C++ blocks for the user program that were created using the SIMATIC ODK 1500S or Target 1500S.
<b>Working memory for additional functions</b>	
<ul style="list-style-type: none"> <li>Integrated (for C/C++ Runtime application)</li> <li>available (for Linux runtime application)</li> </ul>	512 Mbyte 1 Gbyte
<b>Load memory</b>	
<ul style="list-style-type: none"> <li>Plug-in (SIMATIC Memory Card), max.</li> </ul>	32 Gbyte; the memory card must have at least 2 GB of space on it
<b>Backup</b>	
<ul style="list-style-type: none"> <li>maintenance-free</li> </ul>	Yes
<b>CPU processing times</b>	
for bit operations, typ.	1 ns
for word operations, typ.	2 ns
for fixed point arithmetic, typ.	2 ns
for floating point arithmetic, typ.	6 ns
<b>CPU-blocks</b>	
Number of elements (total)	20 000; Blocks (OB, FB, FC, DB) and UDTs
<b>DB</b>	
<ul style="list-style-type: none"> <li>Number range</li> <li>Size, max.</li> </ul>	1 ... 60 999; subdivided into: number range that can be used by the user: 1 ... 59 999, and number range of DBs created via SFC 86: 60 000 ... 60 999 16 Mbyte; For DBs with absolute addressing, the max. size is 64 KB
<b>FB</b>	
<ul style="list-style-type: none"> <li>Number range</li> <li>Size, max.</li> </ul>	0 ... 65 535 1 Mbyte
<b>FC</b>	
<ul style="list-style-type: none"> <li>Number range</li> <li>Size, max.</li> </ul>	0 ... 65 535 1 Mbyte
<b>OB</b>	
<ul style="list-style-type: none"> <li>Size, max.</li> <li>Number of free cycle OBs</li> <li>Number of time alarm OBs</li> <li>Number of delay alarm OBs</li> <li>Number of cyclic interrupt OBs</li> <li>Number of process alarm OBs</li> <li>Number of DPV1 alarm OBs</li> <li>Number of isochronous mode OBs</li> <li>Number of technology synchronous alarm OBs</li> <li>Number of startup OBs</li> <li>Number of asynchronous error OBs</li> <li>Number of synchronous error OBs</li> <li>Number of diagnostic alarm OBs</li> </ul>	1 Mbyte 100 20 20 20; With Failsafe, two RTGs with one "Cyclic interrupt OB" or one "Free cycle OB" (F-OB) each are possible 50 3 3 2 100 4 2 1
<b>Nesting depth</b>	
<ul style="list-style-type: none"> <li>per priority class</li> </ul>	24
<b>Counters, timers and their retentivity</b>	
<b>S7 counter</b>	
<ul style="list-style-type: none"> <li>Number</li> </ul>	2 048
Retentivity	
— adjustable	Yes
<b>IEC counter</b>	
<ul style="list-style-type: none"> <li>Number</li> </ul>	Any (only limited by the main memory)
Retentivity	
— adjustable	Yes
<b>S7 times</b>	
<ul style="list-style-type: none"> <li>Number</li> </ul>	2 048
Retentivity	
— adjustable	Yes
<b>IEC timer</b>	
<ul style="list-style-type: none"> <li>Number</li> </ul>	Any (only limited by the main memory)
Retentivity	

— adjustable

Yes

## Data areas and their retentivity

Retentive data area (incl. timers, counters, flags), max.	768 kbyte; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 700 KB
Extended retentive data area (incl. timers, counters, flags), max.	20 Mbyte; When using PS 6 0W 24/48/60 V DC HF

### 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

## Address area

Number of IO modules	16 384; max. number of modules / submodules
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### 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) 32 kbyte; max. 32 KB via X1; max. 8 KB via X2 or X4
- Outputs (volume) 32 kbyte; max. 32 KB via X1; max. 8 KB via X2 or X4

#### 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	64; A distributed I/O system is characterized not only by the integration of distributed I/O via PROFINET or PROFIBUS communication modules, but also by the connection of I/O via AS-i master modules or links (e.g. IE/PB-Link)
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### Number of DP masters

- integrated 1
- Via CM 8; A maximum of 8 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total

### Number of IO Controllers

- integrated 2
- Via CM 8; A maximum of 8 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total

### Rack

- Modules per rack, max. 32; CPU + 31 modules
- 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
- in AS, master Yes
- in AS, slave Yes
- on Ethernet via NTP Yes

## Interfaces

Number of PROFINET interfaces	3
Number of PROFIBUS interfaces	1

## 1. Interface

### Interface types

<ul style="list-style-type: none"> <li>● RJ 45 (Ethernet)</li> <li>● Number of ports</li> <li>● integrated switch</li> </ul>	<p>Yes; X1</p> <p>2</p> <p>Yes</p>
<b>Protocols</b>	
<ul style="list-style-type: none"> <li>● IP protocol</li> <li>● PROFINET IO Controller</li> <li>● PROFINET IO Device</li> <li>● SIMATIC communication</li> <li>● Open IE communication</li> <li>● Web server</li> <li>● Media redundancy</li> </ul>	<p>Yes; IPv4</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes; Optionally also encrypted</p> <p>Yes</p> <p>Yes; MRP Automanager according to IEC 62439-2 Edition 2.0</p>
<b>PROFINET IO Controller</b>	
<b>Services</b>	
<ul style="list-style-type: none"> <li>— PG/OP communication</li> <li>— Isochronous mode</li> <li>— Direct data exchange</li> <li>— IRT</li> <li>— PROFIenergy</li> <li>— Prioritized startup</li> <li>— Number of connectable IO Devices, max.</li> <li>— Of which IO devices with IRT, max.</li> <li>— Number of connectable IO Devices for RT, max.</li> <li>— of which in line, max.</li> <li>— Number of IO Devices that can be simultaneously activated/deactivated, max.</li> <li>— Number of IO Devices per tool, max.</li> <li>— Updating times</li> </ul>	<p>Yes</p> <p>Yes</p> <p>Yes; Requirement: IRT and isochronous mode (MRPD optional)</p> <p>Yes</p> <p>Yes; per user program</p> <p>Yes; Max. 32 PROFINET devices</p> <p>512; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET</p> <p>64</p> <p>512</p> <p>512</p> <p>8; in total across all interfaces</p> <p>8</p> <p>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</p>
<b>Update time for IRT</b>	
<ul style="list-style-type: none"> <li>— for send cycle of 125 <math>\mu</math>s</li> <li>— for send cycle of 187.5 <math>\mu</math>s</li> <li>— for send cycle of 250 <math>\mu</math>s</li> <li>— for send cycle of 500 <math>\mu</math>s</li> <li>— for send cycle of 1 ms</li> <li>— for send cycle of 2 ms</li> <li>— for send cycle of 4 ms</li> <li>— With IRT and parameterization of "odd" send cycles</li> </ul>	<p>125 <math>\mu</math>s</p> <p>187.5 <math>\mu</math>s</p> <p>250 <math>\mu</math>s to 4 ms</p> <p>500 <math>\mu</math>s to 8 ms</p> <p>1 ms to 16 ms</p> <p>2 ms to 32 ms</p> <p>4 ms to 64 ms</p> <p>Update time = set "odd" send clock (any multiple of 125 <math>\mu</math>s: 375 <math>\mu</math>s, 625 <math>\mu</math>s ... 3 875 <math>\mu</math>s)</p>
<b>Update time for RT</b>	
<ul style="list-style-type: none"> <li>— for send cycle of 250 <math>\mu</math>s</li> <li>— for send cycle of 500 <math>\mu</math>s</li> <li>— for send cycle of 1 ms</li> <li>— for send cycle of 2 ms</li> <li>— for send cycle of 4 ms</li> </ul>	<p>250 <math>\mu</math>s to 128 ms</p> <p>500 <math>\mu</math>s to 256 ms</p> <p>1 ms to 512 ms</p> <p>2 ms to 512 ms</p> <p>4 ms to 512 ms</p>
<b>PROFINET IO Device</b>	
<b>Services</b>	
<ul style="list-style-type: none"> <li>— PG/OP communication</li> <li>— Isochronous mode</li> <li>— IRT</li> <li>— PROFIenergy</li> <li>— Shared device</li> <li>— Number of IO Controllers with shared device, max.</li> <li>— activation/deactivation of I-devices</li> <li>— Asset management record</li> </ul>	<p>Yes</p> <p>No</p> <p>Yes; Minimum send cycle of 250 <math>\mu</math>s</p> <p>Yes; per user program</p> <p>Yes</p> <p>4</p> <p>Yes; per user program</p> <p>Yes; per user program</p>
<b>2. Interface</b>	
<b>Interface types</b>	
<ul style="list-style-type: none"> <li>● RJ 45 (Ethernet)</li> <li>● Number of ports</li> <li>● integrated switch</li> </ul>	<p>Yes; X2</p> <p>1</p> <p>No</p>
<b>Protocols</b>	
<ul style="list-style-type: none"> <li>● IP protocol</li> </ul>	<p>Yes; IPv4</p>

• PROFINET IO Controller	Yes
• PROFINET IO Device	Yes
• SIMATIC communication	Yes
• Open IE communication	Yes; Optionally also encrypted
• Web server	Yes
• Media redundancy	No
<b>PROFINET IO Controller</b>	
Services	
— PG/OP communication	Yes
— Isochronous mode	No
— Direct data exchange	No
— IRT	No
— PROFlenergy	Yes; per user program
— Prioritized startup	No
— Number of connectable IO Devices, max.	128; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
— 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; 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 RT	
— for send cycle of 1 ms	1 ms to 512 ms
<b>PROFINET IO Device</b>	
Services	
— PG/OP communication	Yes
— Isochronous mode	No
— IRT	No
— PROFlenergy	Yes; per user program
— Prioritized startup	No
— Shared device	Yes
— Number of IO Controllers with shared device, max.	4
— activation/deactivation of I-devices	Yes; per user program
— Asset management record	Yes; per user program
<b>3. Interface</b>	
Interface types	
• RJ 45 (Ethernet)	Yes; X3
• Number of ports	1; C/C++ Runtime can also be reached via this port
• integrated switch	No
Protocols	
• IP protocol	Yes; IPv4
• PROFINET IO Controller	No
• PROFINET IO Device	No
• SIMATIC communication	Yes
• Open IE communication	Yes
• Web server	Yes
<b>4. Interface</b>	
Interface types	
• RS 485	Yes; X4
• Number of ports	1
Protocols	
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	No
• SIMATIC communication	Yes
<b>PROFIBUS DP master</b>	
• Number of connections, max.	48; for the integrated PROFIBUS DP interface
• Number of DP slaves, max.	125; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
Services	
— PG/OP communication	Yes

— Equidistance	Yes
— Isochronous mode	Yes
— Activation/deactivation of DP slaves	Yes

### Interface types

<b>RJ 45 (Ethernet)</b>	
• 100 Mbps	Yes
• 1000 Mbps	Yes; Only possible at the X3 interface of the CPU 1518
• Autonegotiation	Yes
• Autocrossing	Yes
• Industrial Ethernet status LED	Yes
<b>RS 485</b>	
• Transmission rate, max.	12 Mbit/s
<b>Protocols</b>	
PROFIsafe	Yes
<b>Number of connections</b>	
• Number of connections, max.	384; via integrated interfaces of the CPU and connected CPs / CMs
• Number of connections reserved for ES/HMI/web	10
• Number of connections via integrated interfaces	320
• Number of S7 routing paths	64; in total, only 16 S7-Routing connections are supported via PROFIBUS
<b>Redundancy mode</b>	
• H-Sync forwarding	Yes
<b>Media redundancy</b>	
— Media redundancy	only via 1st interface (X1)
— MRP	Yes; as MRP redundancy manager and/or MRP client
— MRP interconnection, supported	Yes; as ring node according to IEC 62439-2 Edition 2.0
— MRPD	Yes; Requirement: IRT
— Switchover time on line break, typ.	200 ms; For MRP, bumpless for MRPD
— Number of stations in the ring, max.	50
<b>SIMATIC communication</b>	
• 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)
<b>Open IE communication</b>	
• 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.	2 kbyte; 1 472 bytes for UDP broadcast
— UDP multicast	Yes; 128 multicast circuits (of which max. 5 via X1)
• DHCP	Yes
• DNS	Yes
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
• Encryption	Yes; Optional
<b>Web server</b>	
• HTTP	Yes; Standard and user pages
• HTTPS	Yes; Standard and user pages
<b>OPC UA</b>	
• Runtime license required	Yes; "Large" license required
• OPC UA Client	Yes
— Application authentication	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— User authentication	"anonymous" or by user name & password
— Number of connections, max.	40
— Number of nodes of the client interfaces, recommended max.	5 000

— Number of elements for one call of OPC-UA_NodeGetHandleList/OPC-UA_ReadList/C max.	300
— Number of elements for one call of OPC-UA_NameSpaceGetIndexList, max.	20
— Number of elements for one call of OPC-UA_MethodGetHandleList, max.	100
— Number of simultaneous calls of the client instructions for session management, per connection, max.	1
— Number of simultaneous calls of the client instructions for data access, per connection, max.	5
— Number of registerable nodes, max.	5 000
— Number of registerable method calls of OPC-UA_MethodCall, max.	100
— Number of inputs/outputs when calling OPC-UA_MethodCall, max.	20
● OPC UA Server	Yes; Data access (read, write, subscribe), method call, custom address space
— Application authentication	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— User authentication	"anonymous" or by user name & password
— GDS support (certificate management)	Yes
— Number of sessions, max.	64
— Number of accessible variables, max.	200 000
— Number of registerable nodes, max.	50 000
— Number of subscriptions per session, max.	20
— Sampling interval, min.	10 ms
— Publishing interval, min.	10 ms
— Number of server methods, max.	100
— Number of inputs/outputs per server method, max.	20
— Number of monitored items, recommended max.	10 000; for 1 s sampling interval and 1 s send interval
— Number of server interfaces, max.	10 of each "Server interfaces" / "Companion specification" type and 20 of the type "Reference namespace"
— Number of nodes for user-defined server interfaces, max.	30 000
● Alarms and Conditions	Yes
— Number of program alarms	100
— Number of alarms for system diagnostics	50
<b>Further protocols</b>	
● MODBUS	Yes; MODBUS TCP
<b>Isochronous mode</b>	
Equidistance	Yes
<b>S7 message functions</b>	
Number of login stations for message functions, max.	64
Program alarms	Yes
Number of configurable program messages, max.	10 000; Program messages are generated by the "Program_Alarm" block, ProDiag or GRAPH
Number of loadable program messages in RUN, max.	5 000
Number of simultaneously active program alarms	
● Number of program alarms	4 000
● Number of alarms for system diagnostics	1 000
● Number of alarms for motion technology objects	480
<b>Test commissioning functions</b>	
Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 10 engineering systems
Status block	Yes; Up to 16 simultaneously (in total across all ES clients)
Single step	No
Number of breakpoints	20
<b>Status/control</b>	
● Status/control variable	Yes; without fail-safe
● Variables	inputs/outputs, bit memories, DBs, peripheral I/Os (without fail-safe), times, counters
● Number of variables, max.	

— of which status variables, max.	200; per job
— of which control variables, max.	200; per job
<b>Forcing</b>	
• Forcing	Yes; without fail-safe
• Forcing, variables	peripheral inputs/outputs (without fail-safe)
• Number of variables, max.	200
<b>Diagnostic buffer</b>	
• present	Yes
• Number of entries, max.	3 200
— of which powerfail-proof	1 000
<b>Traces</b>	
• Number of configurable Traces	8; Up to 512 KB of data per trace are possible
<b>Interrupts/diagnostics/status information</b>	
<b>Diagnostics indication LED</b>	
• RUN/STOP LED	Yes
• ERROR LED	Yes
• MAINT LED	Yes
• Connection display LINK TX/RX	Yes
<b>Supported technology objects</b>	
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	15 360
• Required Motion Control resources	
— per speed-controlled axis	40
— per positioning axis	80
— per synchronous axis	160
— per external encoder	80
— per output cam	20
— per cam track	160
— per probe	40
• Positioning axis	
— Number of positioning axes at motion control cycle of 4 ms (typical value)	140
— Number of positioning axes at motion control cycle of 8 ms (typical value)	192
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
<b>Standards, approvals, certificates</b>	
<b>Highest safety class achievable in safety mode</b>	
• 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
<b>Ambient conditions</b>	
<b>Ambient temperature during operation</b>	
• horizontal installation, min.	0 °C
• horizontal installation, max.	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off
• vertical installation, min.	0 °C
• vertical installation, max.	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off
<b>Ambient temperature during storage/transportation</b>	
• min.	-40 °C
• max.	70 °C
<b>Altitude during operation relating to sea level</b>	
• Installation altitude above sea level, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual



configuration / header	
configuration / programming / header	
Programming language	
— LAD	Yes
— FBD	Yes
— STL	Yes
— SCL	Yes
— GRAPH	Yes
Know-how protection	
• User program protection/password protection	Yes
• Copy protection	Yes
• Block protection	Yes
Access protection	
• Password for display	Yes
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Complete protection	Yes
programming / cycle time monitoring / header	
• lower limit	adjustable minimum cycle time
• upper limit	adjustable maximum cycle time
Open Development interfaces	
• Size of ODK SO file, max.	9.8 Mbyte
Dimensions	
Width	175 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	2 117 g
<b>last modified:</b>	4/1/2022 