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Data sheet 6ES7212-1AF50-0XB0

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Figure similar

SIMATIC S7-1200 G2: failsafe compact CPU 1212FC DC/DC/DC; power supply: DC 20.4-28.8 V DC; onboard I/O: 8x DI 24 V DC; 6x DO 24 V DC; memory: program 200 KB data: 500 KB, retentivity: 20 KB

General information	
Product type designation	CPU 1212FC DC/DC/DC
Firmware version	V4.1
● FW update possible	Yes
Product function	
● I&M data	Yes; I&M0 to I&M3
● Isochronous mode	Yes; For PROFINET only
● SysLog	Yes
Engineering with	
● Programming package	STEP 7 V21 or higher
Supply voltage	
Rated value (DC)	
● 24 V DC	Yes
permissible range, lower limit (DC)	20.4 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Input current	
Current consumption (rated value)	125 mA; CPU only
Current consumption, max.	700 mA; CPU with all expansion modules
Inrush current, max.	12 A; at 28.8 V DC
I^2t	0.5 $A^2 \cdot s$
Output current	
for backplane bus (5 V DC), max.	1 000 mA; Max. 5 V DC for SM and CM
Encoder supply	
24 V encoder supply	
● 24 V	Yes; L+ minus 4 V DC min.
● Short-circuit protection	Yes
● Output current, max.	300 mA
Power loss	
Power loss, typ.	3 W
Storage	
Work memory	
● integrated	700 kbyte
● integrated (for program)	200 kbyte
● integrated (for data)	500 kbyte

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Load memory	
● integrated	8 Mbyte
● Plug-in (SIMATIC Memory Card), max.	32 Gbyte; with SIMATIC memory card
Backup	
● present	Yes
● maintenance-free	Yes
● without battery	Yes
CPU processing times	
for bit operations, typ.	37 ns; / instruction
for word operations, typ.	30 ns; / instruction
for floating point arithmetic, typ.	74 ns; / instruction
CPU-blocks	
Number of elements (total)	4 000; Blocks (OB, FB, FC, DB) and UDTs
OB	
● 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 minimum OB 3x cycle of 1 ms
● Number of process alarm OBs	50
● Number of DPV1 alarm OBs	3
● Number of isochronous mode OBs	1
● Number of startup OBs	100
● Number of asynchronous error OBs	4
● Number of synchronous error OBs	2
● Number of diagnostic alarm OBs	1
Data areas and their retentivity	
Retentive data area (incl. timers, counters, flags), max.	20 kbyte
Flag	
● Size, max.	8 kbyte; Size of bit memory address area
Local data	
● per priority class, max.	64 kbyte; max. 16 KB per block
Address area	
I/O address area	
● Inputs	1 kbyte; All inputs are in the process image
● Outputs	1 kbyte; All outputs are in the process image
Process image	
● Inputs, adjustable	1 kbyte
● Outputs, adjustable	1 kbyte
Hardware configuration	
Number of modules per system, max.	6
● number of expansion boards (SB, CB, BB)	1
● number of signal modules (SM)	6; depends on the number of CMs
● number of communications modules (CM)	3
Time of day	
Clock	
● Hardware clock (real-time)	Yes
● Backup time	480 h; Typical
● Deviation per day, max.	2 s; at 25 °C
Clock synchronization	
● on Ethernet via NTP	Yes
Digital inputs	
Number of digital inputs	8; Integrated
● of which inputs usable for technological functions	8; HSC (High Speed Counting)
Sourcing/sinking input	Yes
Number of simultaneously controllable inputs	
all mounting positions	
— up to 40 °C, max.	8
Input voltage	

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● Rated value (DC)	24 V
● for signal "0"	5 V DC or 0.5 mA
● for signal "1"	15 V DC at 2.5 mA
Input delay (for rated value of input voltage)	
for standard inputs	
— parameterizable	0.1 / 0.2 / 0.4 / 0.8 / 1.6 / 3.2 / 6.4 / 10.0 / 12.8 / 20.0 µs; 0.05 / 0.1 / 0.2 / 0.4 / 0.8 / 1.6 / 3.2 / 6.4 / 10.0 / 12.8 / 20.0 ms
— at "0" to "1", min.	0.1 µs
— at "0" to "1", max.	20 µs
for interrupt inputs	
— Parameterizable	Yes
for technological functions	
— parameterizable	single phase: 6 HSCs @ 100 kHz & 2 standard @ 30 kHz, quadrature phase: 6 HSCs @ 80 kHz & 2 standard @ 20 kHz
Cable length	
● shielded, max.	500 m; 50 m for technological functions
● unshielded, max.	300 m; for technological functions: No
Digital outputs	
Number of digital outputs	6; 20 kHz or 100 kHz
● of which high-speed outputs	4; 100 kHz (Qa.0 - Qa.3)
Limitation of inductive shutdown voltage to	L+ (-40 V)
Switching capacity of the outputs	
● with resistive load, max.	0.5 A
● on lamp load, max.	5 W
Output voltage	
● for signal "0", max.	0.1 V; with 10 kOhm load
● for signal "1", min.	20 V
Output current	
● for signal "1" rated value	0.5 A
● for signal "0" residual current, max.	10 µA
Output delay with resistive load	
● "0" to "1", max.	1 µs; of the pulse outputs (Q a.0 to Q a.3), max. 1.0 µs; of the standard outputs (Qa.4 to Qa.5), max. 50 µs;
● "1" to "0", max.	3 µs; of the pulse outputs (Q a.0 to Q a.3), max. 3.0 µs; of the standard outputs (Qa.4 to Qa.5), max. 200 µs;
Switching frequency	
● of the pulse outputs, with resistive load, max.	100 kHz; 100 kHz max. (Qa.0 - Qa.3), 20 kHz max. (Qa.4 - Qa.5)
Relay outputs	
● Number of relay outputs	0
Cable length	
● shielded, max.	500 m
● unshielded, max.	150 m
Analog inputs	
Number of analog inputs	0
Analog outputs	
Number of analog outputs	0
Encoder	
Connectable encoders	
● 2-wire sensor	Yes
Interfaces	
Number of PROFINET interfaces	1
1. Interface	
Interface type	PROFINET
Isolated	Yes
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Interface types	
● RJ 45 (Ethernet)	Yes; X1
— Transmission rate, max.	100 Mbit/s

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● Number of ports	2
● integrated switch	Yes
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
● Media redundancy	Yes
PROFINET IO Controller	
● Transmission rate, max.	100 Mbit/s
Services	
— PG/OP communication	Yes; encryption with TLS V1.3 pre-selected
— Isochronous mode	Yes
— IRT	Yes
— Dynamic Frame Packing (DFP)	Yes
— PROFIenergy	Yes; per user program
— Prioritized startup	Yes
— Number of IO devices with prioritized startup, max.	16
— Number of connectable IO Devices, max.	31
— Of which IO devices with IRT, max.	31
— Number of connectable IO Devices for RT, max.	31
— of which in line, max.	31
— Number of IO Devices that can be simultaneously activated/deactivated, max.	8
— Updating time	The minimum value of the update time also depends on the communication component set for PROFINET IO, on the number of IO devices and the quantity of configured user data.
Update time for IRT	
— 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
Update time for RT	
— 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; encryption with TLS V1.3 pre-selected
— Isochronous mode	No
— IRT	Yes
— Dynamic Frame Packing (DFP)	No
— PROFIenergy	Yes; per user program
— Prioritized startup	Yes
— Shared device	Yes
— Number of IO Controllers with shared device, max.	2
— Asset management record	Yes
Protocols	
Supports protocol for PROFINET IO	Yes
PROFIsafe	Yes
PROFIBUS	No
OPC UA	Yes; OPC UA Server
AS-Interface	No
Protocols (Ethernet)	
● TCP/IP	Yes
● DHCP	Yes
● SNMP	Yes
● DCP	Yes
● LLDP	Yes

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Number of connections	
● Number of connections, max.	128; 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	88
● Number of S7 routing paths	16
Redundancy mode	
● PROFINET system redundancy (S2)	No
● PROFINET system redundancy (R1)	No
Media redundancy	
— MRP	Yes; as MRP redundancy manager and/or MRP client
— MRP interconnection, supported	Yes
— MRPD	Yes; Requirement: IRT
— Number of stations in the ring, max.	50
SIMATIC communication	
● PG/OP communication	Yes; encryption with TLS V1.3 pre-selected
● S7 routing	Yes
● S7 communication, as server	Yes
● S7 communication, as client	Yes; only PUT/GET
● 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.	2 kbyte; 1 472 bytes for UDP broadcast
● DHCP	Yes
● DNS	Yes
● SNMP	Yes
● DCP	Yes
● LLDP	Yes
● Encryption	Yes; Optional
Web server	
● supported	Yes
● HTTPS	Yes
● web API	Yes
— Number of sessions, max.	30
— HTTP request body, max.	131 072 byte
● User-defined websites	Yes
OPC UA	
● Runtime license required	Yes; "Basic" license required
● OPC UA Server	Yes; data access (read, write, subscribe), method call, runtime license required
— Application authentication	Yes
— Security policies	available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256, Aes128Sha256RsaOaep, Aes256Sha256RsaPss
— User authentication	Yes; "anonymous" or by user name & password
— Number of sessions, max.	10
— Number of subscriptions per session, max.	5
— Sampling interval, min.	100 ms
— Publishing interval, min.	200 ms
— Number of server methods, max.	20
— Number of monitored items, recommended max.	1 000
— Number of server interfaces, max.	2
— Number of nodes for user-defined server interfaces, max.	2 000
Further protocols	
● MODBUS	Yes; MODBUS RTU/TCP
Communication functions	

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S7 communication	
● supported	Yes
● as server	Yes
● as client	Yes
● User data per job, max.	See online help (S7 communication, user data size)
Number of connections	
● overall	PG Connections: 4 reserved; HMI Connections: 4 reserved / 82 max; S7 Connections: 78 max; Open User Connections: 78 max; Web Connections: 2 reserved / 80 max; Total Connections: 10 reserved / 88 max
S7 message functions	
Number of login stations for message functions, max.	32
number of subscriptions, max.	250
number of tags/attributes for subscriptions, max.	2 000
Program alarms	Yes
Number of configurable program messages, max.	5 000
Number of loadable program messages in RUN, max.	2 500
Number of simultaneously active program alarms	
● Number of program alarms	600
● Number of alarms for system diagnostics	100
● Number of alarms for motion technology objects	160
Test commissioning functions	
Status block	Yes; Up to 8 simultaneously (in total across all ES clients)
Single step	No
Profiling	Yes
Status/control	
● Status/control variable	Yes
● Variables	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
● Number of variables, max.	
— of which status variables, max.	200; per job
— of which control variables, max.	200; per job
Forcing	
● Forcing	Yes
● Forcing, variables	Peripheral inputs/outputs
● Number of variables, max.	200
Diagnostic buffer	
● present	Yes
● Number of entries, max.	500
— of which powerfail-proof	100
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
● Number of available Motion Control resources for technology objects	800
● 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
● Number of available Extended Motion Control resources for technology objects	40

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● Required Extended Motion Control resources	
— per cam (1 000 points and 50 segments)	2
— for each set of kinematics	30
● kinematics functions	
— kinematics with up to 4 interpolating axes	Yes
— kinematics with 5 or more interpolating axes	No
— user-defined kinematics	No
— SIMATIC Safe Kinematics	No
● Positioning axis	
— Number of positioning axes at motion control cycle of 4 ms (typical value)	10
— Number of positioning axes at motion control cycle of 8 ms (typical value)	10
Integrated Functions	
Counter	Yes
● Number of counters	8
● Counting frequency, max.	100 kHz; Ia.0 to Ia.5: 100 kHz (80 kHz in quadrature mode), Ia.6 to Ia.7: 30 kHz (20 kHz in quadrature mode)
Frequency measurement	Yes
controlled positioning	Yes
Number of position-controlled positioning axes, max.	8
Number of positioning axes via pulse-direction interface	Up to 4 with SB 1222
PID controller	Yes
Number of pulse outputs	8; individually assigned to CPU and Signal Board
Limit frequency (pulse)	100 kHz
Potential separation	
Potential separation digital inputs	
● Potential separation digital inputs	Yes; field side to logic: 707 V DC (type test)
● between the channels	No
● Number of potential groups	1
Potential separation digital outputs	
● Potential separation digital outputs	Yes
● between the channels	No
● Number of potential groups	1
EMC	
Interference immunity against discharge of static electricity	
● Interference immunity against discharge of static electricity acc. to IEC 61000-4-2	Yes
— Test voltage at air discharge	8 kV
— Test voltage at contact discharge	6 kV
Interference immunity to cable-borne interference	
● Interference immunity on supply lines acc. to IEC 61000-4-4	Yes
● Interference immunity on signal cables acc. to IEC 61000-4-4	Yes
Interference immunity against voltage surge	
● Interference immunity on supply lines acc. to IEC 61000-4-5	Yes
Interference immunity against conducted variable disturbance induced by high-frequency fields	
● Interference immunity against high-frequency radiation acc. to IEC 61000-4-6	Yes
Emission of radio interference acc. to EN 55 011	
● Limit class A, for use in industrial areas	Yes; Group 1
● Limit class B, for use in residential areas	Yes; When appropriate measures are used to ensure compliance with the limits for Class B according to EN 55011
Degree and class of protection	
IP degree of protection	IP20
Standards, approvals, certificates	
Siemens Eco Profile (SEP)	Siemens EcoTech
CE mark	Yes
UL approval	Yes

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cULus	Yes
FM approval	No
RCM (formerly C-TICK)	Yes
KC approval	Yes
Marine approval	Yes
Ecological footprint	
● environmental product declaration	Yes; type 2 acc. to ISO 14021
Global warming potential	
— global warming potential, (total) [CO2 eq]	61.1 kg
— global warming potential, (during production) [CO2 eq]	12.4 kg
— global warming potential, (during operation) [CO2 eq]	49.2 kg
— global warming potential, (after end of life cycle) [CO2 eq]	-0.63 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 up to an operational altitude of 3 000 m or < 2.00E-09 at an operating altitude greater than 3 000 m up to 5 000 m
Security	
PROFINET Security Class	1
signed firmware update	Yes
Secure Boot	Yes
Ambient conditions	
Free fall	
● Fall height, max.	0.3 m; five times, in product package
Ambient temperature during operation	
● min.	-20 °C; No condensation
● max.	40 °C; at max. voltages and max. specifications
● horizontal installation, min.	-20 °C; No condensation
● horizontal installation, max.	60 °C; at rated voltages, 50 % of max. specification and alternate IO active
● vertical installation, min.	-20 °C; No condensation
● vertical installation, max.	50 °C; at rated voltages, 50 % of max. specification and alternate IO active
Ambient temperature during storage/transportation	
● min.	-40 °C
● max.	70 °C
Air pressure acc. to IEC 60068-2-13	
● Operation, min.	540 hPa
● Operation, max.	1 140 hPa
● Storage/transport, min.	540 hPa
● Storage/transport, max.	1 140 hPa
Altitude during operation relating to sea level	
● Installation altitude, min.	-1 000 m
● Installation altitude, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Relative humidity	
● Operation, max.	95 %; no condensation
Vibrations	
● Vibration resistance during operation acc. to IEC 60068-2-6	3.5 mm from 5 - 8.4 Hz, 1g from 8.4 - 150 Hz
● Operation, tested according to IEC 60068-2-6	Yes
Shock testing	
● tested according to IEC 60068-2-27	Yes; IEC 68, Part 2-27 half-sine: strength of the shock 15 g (peak value), duration 11 ms
Pollutant concentrations	
● SO2 at RH < 60% without condensation	S02: < 0.5 ppm; H2S: < 0.1 ppm; RH < 60 % condensation-free
Configuration	
Programming	

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Programming language	
— LAD	Yes; incl. failsafe
— FBD	Yes; incl. failsafe
— SCL	Yes
Know-how protection	
● User program protection/password protection	Yes
● Copy protection	No
● 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
● User administration	Yes; device-wide and centralized
● Number of users	100
● Number of groups	100
● Number of roles	50
Cycle time monitoring	
● adjustable	Yes
Dimensions	
Width	70 mm
Height	125 mm
Depth	100 mm
Weights	
Weight, approx.	319 g

Classifications

	Version	Classification
eClass	16	27-24-22-07
eClass	14	27-24-22-07
eClass	12	27-24-22-07
eClass	9.1	27-24-22-07
eClass	9	27-24-22-07
eClass	8	27-24-22-07
eClass	7.1	27-24-22-07
eClass	6	27-24-22-07
ETIM	10	EC000236
ETIM	9	EC000236
ETIM	8	EC000236
ETIM	7	EC000236

Approvals / Certificates

General Product Approval






Miscellaneous

Manufacturer Declaration



General Product Approval



TUEV

China RoHS

Manufacturer Declaration





EMV	**For use in hazardous locations**

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	Miscellaneous	IECEx	UL	CCC-Ex	CCC-Ex

Functional Saftey					Test Certificates
Type Examination Certificate	TUEV	Type Examination Certificate	CE EG-Konf.	UKCA	CE EG-Konf.

Test Certificates	Maritime application				
UKCA	ABS	BUREAU VERITAS	DNV	Lloyd's Register LRS	NK / Nippon Kaiji Kyokai

Maritime application		Environment		Industrial Communication
RINA	KR (Korean Register of Shipping)	EPD	Siemens EcoTech	PROFINET

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