

## CLEARSY Safety Platform SAFETY COMPUTER BOARD

TECHNICAL DOCUMENT CLEARSY

Safety computer board



# Safety computer board

## SYSTEM DESCRIPTION

The safety computer board is a small single board computer intended to be used as a modular component for the realization of safety critical systems. For deployment the vital computer board can be attached to a mother board through micro pitch 1.27mm directly soldered or mounted on a connector. The mother board usually contains all the vital and non-vital interfaces with the other equipment.

As the Clearsy Safety platform's calculator, the safety computer board includes all the hardware and software required to achieve a level of safety compatible with a SIL4 level for the management of interfaces and the realization of calculation in line with product performance.

## GENERAL

NAME	Safety computer board (CS0)
SAFETY LEVEL	- SIL4 according to CENELEC EN50128-EN50129
MCU CHIPSET	PIC32MX795F512L (from Microchip)
MCU INTERNAL PERIPHERALS AVAILABLE	<ul style="list-style-type: none"><li>- 13x Analog inputs</li><li>- 19x Change notification Inputs</li><li>- 5x Capture inputs</li><li>- 6x Outputs Compare</li><li>- 5x External Interrupt pins</li><li>- 63x Bidirectional I/O ports</li><li>- 2x Input ports</li><li>- 4x UARTs</li><li>- 2x SPIs</li><li>- 4x I<sup>2</sup>Cs</li><li>- 2x Comparators</li><li>- 1x Parallel Master Port</li><li>- 1x USB</li><li>- 2x CAN</li><li>- 1x Ethernet (RMII interface)</li></ul>
OPERATING TEMPERATURE	-40°C/+85°C
ENVIRONMENTAL (EMC/EMI)	Qualification to be performed on the final integrated product.
ENVIRONMENTAL	RoHS and Reach compliant
ENVIRONMENTAL (VIBRATION/SHOCK)	Ready against EN50125-3 – final qualification to be performed on the integrated hardware

## MECHANICAL

OVERALL DIMENSION	72.5 x 45 x 12 mm
MOUNTING HOLE	4 x M3
WEIGHT OF THE MODULE	20 g

## ABSOLUTE RATINGS

Name	Min	Typ	Max	Unit
Voltage for the system	3	3.3	3.6	Volt DC

## POWER CONSUMPTION

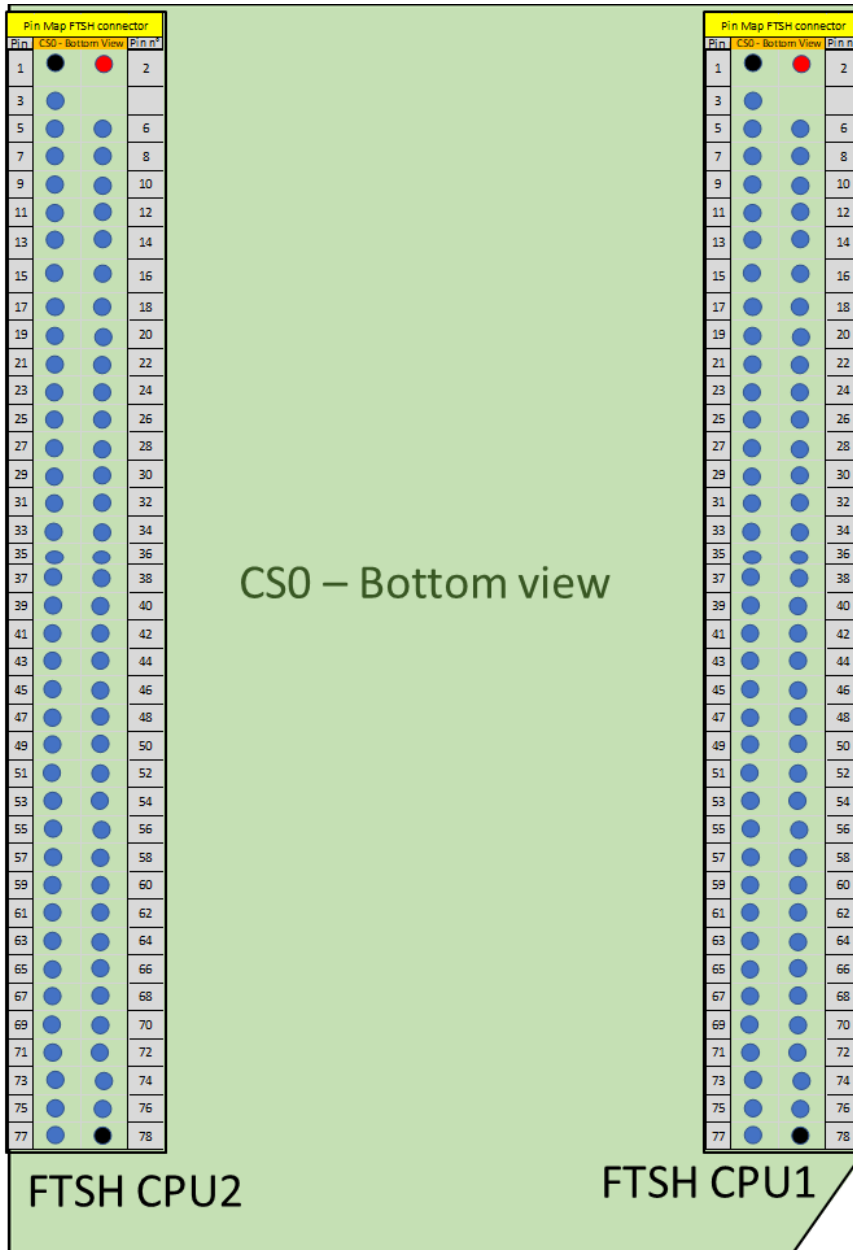
Name	Min	Typ	Max	Unit
Power consumption of the vital computer board	-	-	2	Watt

## EXTERNAL CONNECTIONS

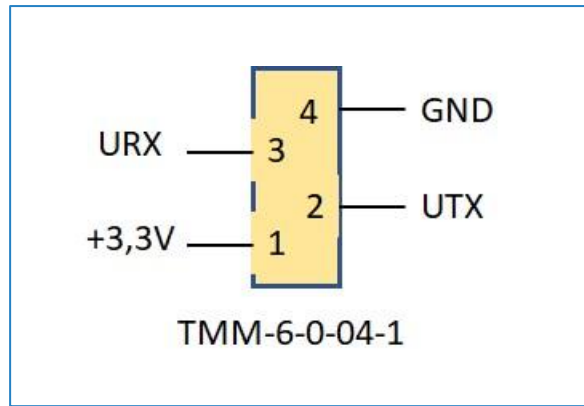
PROGRAMMING	MicroChip TCP2030 footprint connector
MAINTENANCE LINK	Serial link by default on Pin 36 and 37 of FTSH connector
CONNECTION WITH THE MOTHERBOARD	FTSH connector

LOGGING CAPABILITY	1Kbits non-volatile memory per PIC (EEPROM)
MTBF (FIDES BASED) 40°C	>= 12 x 10 <sup>6</sup> h
MAINTENANCE LINK	Serial link by default
CONNECTION WITH THE MOTHERBOARD	FTSH Connector

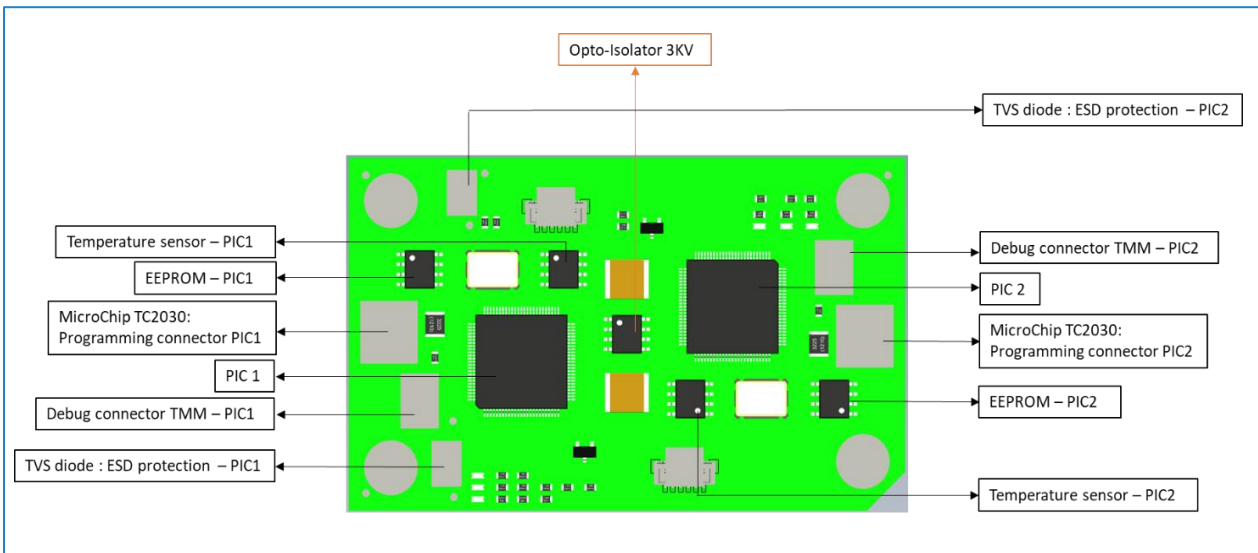
PIN MAP FTSH CONNECTOR



PIC pin number	Pin Name	Pin n°	CSO bottom view	Pin n°	Pin Name	PIC pin number
15,31,36,4 5,65,75	GND	1		2	DC POWER 3V3	2,16,30,3 7,46,54,5 5,62,86
N/A	Write Protect EEPROM	3		4	EMPTY	N/A
1	AERXERR/RG15 (ETHERNET ERR)	5		6	(Parallel Master port) PMD5/RE5	3
4	PMD6/RE6 (Parallel Master Port)	7		8	(Parallel Maser Port) PMD7/RE7	5
7	T3CK/AC2TX/RC2 (Alternate CAN2) (Timer clk 3)	9		10	(Alternate CAN2) (Timer clk 4) T4CK/AC2RX/RC3	8
9	T5CK/SDI1/RC4 (SPI1) (Timer clk5)	11		12	(Collision ETHERNET, UART6, SPI2) ECOL/SCK2/U6TX/U3RTS/PMA5/CN8/RG6	10
11	ECRS/SDA4/SDI2/U3RX/PMA4/CN9/RG7 (UART3, SPI2)	13		14	(data valid receiver ETHERNET, UART3, I <sup>2</sup> C4, SPI2) ERXDV/AERXDV/ECRSRV/ECRSRV/AECRSRV/SCL4/SDO 2/U3TX/PMA3/CN10/RG8	12
14	CN11/RG9/U3CTS/U6RX/SS2/PMA2/ERXCLK/EREFCLK/A ERXCLK/AEREDCLK (ETHERNET,PMP2, SPI2, UART6)	15		16	(JTAG test mode) TMS/RA0	17
18	AERXD0/INT1/RE8 (Ethernet0)	17		18	(Ethernet1) AERXD1/INT2/RE9	19
20	AN5/C1IN+/Vbuson/CN7/RB5 (Comparator1, USB)	19		20	(Comparator1) AN4/C1IN-/CN6/RB4	21
22	AN3/C2IN+/CN5/RB3 (Comparator2)	21		22	(Comparator2) AN2/C2IN-/CN4/RB2	23
24	PGEC1/AN1/CN3/RB1	23		24	(AN divider bridge for PIC id not mounted) PGED1/ANO/CN2/RB0	25
28	Vref-/CVref-/AERXD2/PMA7/RA9 (Comparator, PMP, ETHERNET alternate2)	25		26	(Comparator, PMP, ETHERNET Alternate3) Vref+/CVref+/AERXD3/PMA6/RA10	29
32	AN8/C1OUT/RB8 (Comparator1)	27		28	(comparator2) AN9/C2OUT/RB9	33
34	AN10/CVrefout/PMA13/RB10 (Comparator, PMP)	29		30	(PMP, ETHERNET) AN11/ERXERR/AETXERR/PMA12/RB11	35
38	TCK/RA1 (JTAG)	31		32	(PMP, ETHERNET0) AN12/ERXD0/AECRS/PMA11/RB12	41
42	AN13/ERXD1/AECOL/PMA10/RB13 (ETHERNET1, PMP10)	33		34	(ETHERNET3, PMP) AN14/ERXD2/AETXD3/PMALH/PMA1/RB14	43
44	AN15/ERXD3/AETXD2/OCFB/PMALH/PMA0/CN12/RB15 (ETHERNET3, PMP0)	35		36	(UART4 Connector TMM-6-0-04-1 not mounted) AETXD0/SS3/U4RX/U1CTS/CN20/RD14	47
48	AETXD1/SCK3/U4TX/U1RTS/CN21/RD15 (UART4 Connector TMM-6-0-04-1 not mounted; SPI3 CLK, ETHERNET Alternate1)	37		38	(UART2, I <sup>2</sup> C5, SPI4, SPI5) SDA5/SDI4/U2RX/PMA9/CN17/RF4	49
50	SCL5/SD04/U2TX/PMA8/CN18/RF5 (UART2, I <sup>2</sup> C5, SPI4, SPI5)	39		40	(USB) USBID/RF3	51
52	SDA3/SDI3/U1RX/RF2 (UART1, I <sup>2</sup> C3, SPI3)	41		42	(UART1, I <sup>2</sup> C3, SPI3) SCL3/SDO3/U1TX/RF8	53
56	D-/RG3 (USB)	43		44	(USB) D+/RG2	57
60	TDI/RA4 (JTAG)	45		46	(JTAG) TDO/RA5	61
66	AETXCLK/SCL1/INT3/RA14 (I <sup>2</sup> C1, ETHERNET Alternate clk)	47		48	(I <sup>2</sup> C1, ETHERNET alternate) AETXEN/SDA1/INT4/RA15	67
68	RTCC/EMDIO/AEMDIO/IC1/RD8 (ETHERNET, time alarm)	49		50	(SPI1) SS1/IC2/RD9	69
70	SCK1/IC3/PMCS2/PMA15/RD10 (SPI1, PMP15)	51		52	(ETHERNET, PMP) EMDC/AEMDC/IC4/PMCS1/PMA14/RD11	71
72	SDO1/OC1/INT0/RD0 (SPI1)	53		54	(LOWER POWER OSCILLATOR) SOSCI/CN1/RC13	73
74	SOSCO/T1CK/CN0/RC14 (LOW Power Oscillator)	55		56	OC2/RD1	76
77	OC3/RD2	57		58	OC4/RD3	78
79	ETXD2/IC5/PMD12/RD12 (ETHERNET2, PMP12)	59		60	(ETHERNET3, PMP13) ETXD3/PMD13/CN19/RD13	80
81	OC5/PMWR/CN13/RD4	61		62	(PMP) PMRD/CN14/RD5	82
83	ETXEN/PMD14/CN15/RD6 (ETHERNET, PMP14)	63		64	(ETHERNET TX CLK) ETXCLK/PMD15/CN16/RD7	84
87	C1RX/ETXD1/PMD11/RF0 (CAN1, ETHERNET1)	65		66	(CAN1, ETHERNET0) C1TX/ETXD0/PMD10/RF1	88
89	C2TX/ETXERR/PMD9/RG1 (CAN2, ETHERNET ERR)	67		68	(CAN2, PMP8) C2RX/PMD8/RG0	90
91	TRCLK/RA6	69		70	TRD3/RA7	92
94	PMD1/RE1	71		72	TRD2/RG14	95
96	TRD1/RG12	73		74	TRD0/RG13	97
98	PMD2/RE2	75		76	(PMP3) PMD3/RE3	99
100	PMD4/RE4	77		78	GND	15,31,36, 45,65,75



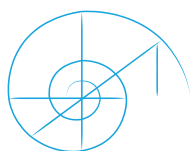
BOARD OVERVIEW



■ Figure 1: CSO BOARD LAYOUT OVERVIEW

# CLEARSY

Safety Solutions Designer



320 AVENUE ARCHIMEDE - LES PLEIADES III BAT A  
13100 AIX-EN-PROVENCE - FRANCE

Tél. +33 (0)4 42 37 12 70 - Fax : +33 (0)4 42 37 12 71  
[contact@clearsy.com](mailto:contact@clearsy.com) | [www.clearsy.com](http://www.clearsy.com)