

Scope

The purpose of this document is to determine the reliability prediction according to the Telcordia 3 standard for the X2 products

In a HMI the display is normally the first thing that breaks and we therefore provide MTBF with and without the display.

Standards and Handbooks

- Telcordia Issue 3 (SR232), Reliability Prediction Procedure of Electronic Equipment (Issue 3 Jan. 2011)
- NPRD Non-electronic Parts Reliability Data 2011

Failure rate data source

The following references have been used in determining component failure rates:

- Telcordia 3 for electronic components
- NPRD; Display, touchscreen foil, Membrane Keyboard and all housing and mechanical parts.

Failure rate calculation

- The following conditions and factors have been applied:
- Component ambient temperature 25.0°C
- Environment GF
- Quality level II
- Upper Confidence Level 90
- Resistors rated below 1W have been given a default power ratio of: 20%
- All other component parameters have been given default ratios of: 50%
- All FET transistors have been deemed as: Switching
- An estimation of 1,000,000H has been used for the touchscreen foils.
- The documents, packaging, labels, consumables and the protection film have been deemed to have no effect on system reliability and therefore been given a failure rate of zero.
- Manufacturers lifetime data (L50) has been used for the LCD display, L50 does not indicate a complete failure of the device and therefore is not directly comparable with MTBF. L50 indicates the time for the display brightness to fall below 50% of its original brightness.

X2 pro

Product	MTBF @25C		MTBF @45C		MTBF @60C	
	Hours	Years	Hours	Years	Hours	Years
	X2 pro					
X2 pro 4	45 817	5	43 968	5	40 517	5
X2 pro 7	19 299	2	18 964	2	18 294	2
X2 pro 10	45 077	5	42 722	5	38 727	4
X2 pro 12	44 898	5	42 533	5	38 541	4
X2 pro 15	44 569	5	42 315	5	38 453	4

Product, excluding display	MTBF @25C		MTBF @45C		MTBF @60C	
	Hours	Years	Hours	Years	Hours	Years
	X2 pro					
X2 pro 4	547 672	63	364 452	42	213 628	24
X2 pro 7	550 807	63	366 260	42	214 457	24
X2 pro 10	457 813	52	293 482	34	171 777	20
X2 pro 12	439 971	50	284 824	33	168 167	19
X2 pro 15	410 349	47	275 307	31	166 502	19

X2 marine

	Product					
	MTBF @25C		MTBF @45C		MTBF @60C	
	Hours	Years	Hours	Years	Hours	Years
X2 marine						
X2 marine 7	43 796	5	39 561	5	32 895	4
X2 marine 7 HB	42 679	5	37 562	4	30 361	3
X2 marine 15	42 304	5	37 498	4	30 499	3
X2 marine 15 HB	42 304	5	37 498	4	30 499	3

	Product, excluding display					
	MTBF @25C		MTBF @45C		MTBF @60C	
	Hours	Years	Hours	Years	Hours	Years
X2 marine						
X2 marine 7	352 963	40	189 485	22	96 153	11
X2 marine 7 HB	291 471	33	150 991	17	77 299	9
X2 marine 15	274 855	31	149 964	17	78 202	9
X2 marine 15 HB	274 855	31	149 964	17	78 202	9

	Product					
	MTBF @25C		MTBF @45C		MTBF @60C	
	Hours	Years	Hours	Years	Hours	Years
X2 marine SC						
X2 marine 7 SC	43 291	5	38 889	4	32 201	4
X2 marine 7 HB SC	42 679	5	37 562	4	30 361	3
X2 marine 15 SC	41 920	5	36 945	4	29 918	3
X2 marine 15 HB SC	41 920	5	36 945	4	29 918	3

	Product, excluding display					
	MTBF @25C		MTBF @45C		MTBF @60C	
	Hours	Years	Hours	Years	Hours	Years
X2 marine SC						
X2 marine 7 SC	322 643	37	174 999	20	90 455	10
X2 marine 7 HB SC	291 471	33	150 991	17	77 299	9
X2 marine 15 SC	259 425	30	141 501	16	74 489	9
X2 marine 15 HB SC	259 425	30	141 501	16	74 489	9

X2 control

Product	MTBF @25C		MTBF @45C		MTBF @60C	
	Hours	Years	Hours	Years	Hours	Years
	X2 control					
X2 control 4	45 616	5	43 628	5	40 053	5
X2 control 7	19 263	2	18 901	2	18 199	2
X2 control 10	44 787	5	42 254	5	38 126	4
X2 control 12	44 610	5	42 070	5	37 945	4
X2 control 15	44 286	5	41 856	5	37 860	4

Product, excluding display	MTBF @25C		MTBF @45C		MTBF @60C	
	Hours	Years	Hours	Years	Hours	Years
	X2 control					
X2 control 4	520 218	59	342 327	39	201 332	23
X2 control 7	523 045	60	343 921	39	202 068	23
X2 control 10	429 579	49	272 738	31	160 539	18
X2 control 12	413 848	47	265 250	30	157 382	18
X2 control 15	387 525	44	256 989	29	155 935	18

X2 motion

Product	MTBF @25C		MTBF @45C		MTBF @60C	
	Hours	Years	Hours	Years	Hours	Years
	X2 motion					
X2 motion 4	45 616	5	43 628	5	40 053	5
X2 motion 7	19 263	2	18 901	2	18 199	2
X2 motion 10	44 787	5	42 254	5	38 126	4
X2 motion 12	44 610	5	42 070	5	37 945	4
X2 motion 15	44 286	5	41 856	5	37 860	4

Product, excluding display	MTBF @25C		MTBF @45C		MTBF @60C	
	Hours	Years	Hours	Years	Hours	Years
	X2 motion					
X2 motion 4	520 218	59	342 327	39	201 332	23
X2 motion 7	523 045	60	343 921	39	202 068	23
X2 motion 10	429 579	49	272 738	31	160 539	18
X2 motion 12	413 848	47	265 250	30	157 382	18
X2 motion 15	387 525	44	256 989	29	155 935	18