

RD-RD-KDS-SPEC-0052

MANUFACTURING SPECIFICATION FOR A xCMS DAQ ANALOG INPUT MODULE PCB

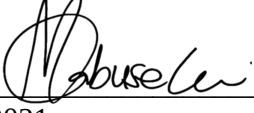
**TRANSNET ENGINEERING
KILNER PARK**

Technical Specialist:

Name & Surname: Mankoko Mabusela

Designation: Engineer

Contact Details: Mankoko.Mabusela@transnet.net

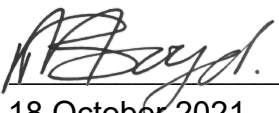
Signature: 
Date: 18/10/2021

Approved by:

Name & Surname: Michael Maseko

Designation: Principal Engineer

Contact Details: Michael.Maseko@transnet.net

Signature: 
Date: 18 October 2021

ASSEMBLY SPECIFICATION

Component Placement	Top and Bottom
Component Termination	Through Hole, Press-fit

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PCB SPECIFICATION

PCB Name	xCMS_DAQ_vA0
PCB Dimensions	170.5 mm x 170.5 mm
PCB Base Material	FR4
Number of Layers	6
Layer Stack Up Summary	See Figure 1
Nominal PCB Thickness	1.606mm
Solder Mask	Top and Bottom (Green)
Silkscreen/Legend/Identification	Top (White)
Routed Slot	-
PCB Finishing	ENIG (Electroless Nickel Gold)
Controlled Impedance Routing Tolerance	10%
Min Track Clearance	0.18mm
Min Track Width	0.2mm

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#	Name	Material	Type	Weight	Thickness	Dk
	Top Overlay		Overlay			
	Top Solder	Solder Resist	Solder Mask		0.05mm	3.5
1	Top Layer		Signal	1/2oz	0.015mm	
	Dielectric 1	FR-4	Core		0.238mm	4.2
2	Digital Power		Signal	1/2oz	0.03mm	
	Dielectric 3		Prepreg		0.175mm	4.2
3	+Analog Power		Signal	1/2oz	0.03mm	
	Dielectric 5		Core		0.33mm	4.2
4	_Analog Power		Signal	1/2oz	0.03mm	
	Dielectric 4		Prepreg		0.283mm	4.2
5	Grounds		Signal	1/2oz	0.03mm	
	Dielectric 2		Core		0.33mm	4.2
6	Bottom Layer		Signal	1/2oz	0.015mm	
	Bottom Solder	Solder Resist	Solder Mask		0.05mm	3.5
	Bottom Overlay		Overlay			

Figure 1: PCB Layer Stack Up Summary

COMPONENT SPECIFICATION

#	Quantity	Description	Package	Part Number
1	1	Aluminium Electrolytic Capacitors - Radial Leaded 220uF 100V 16x20	16x20mm	EKY-101ELL221ML2
2	16	Murata 0402 GRM 100nF Ceramic Multilayer Capacitor, 50 V dc, +85°C, X5R Dielectric, ±10% SMD	0402	GRM155R61H104KE19D

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3	69	TDK 100nF Multilayer Ceramic Capacitor MLCC 50 V $\pm 10\%$ X7R Dielectric CGA Series Max. Op. Temp. +125°C	0402	CGA2B3X7R1H104K050BB
4	32	TDK 1nF Multilayer Ceramic Capacitor MLCC 50 V dc $\pm 10\%$ X7R Dielectric 0402 Surface Mount Max. Op. Temp. +125°C	0402	C1005X7R1H102K050BA
5	3	AVX 1 μ F Multilayer Ceramic Capacitor (MLCC) 6.3 V dc $\pm 10\%$ X5R dielectric Standard max op. temp. +85°C	0402	04026D105KAT2A
6	2	TDK 10 μ F Multilayer Ceramic Capacitor (MLCC) 10 V dc $\pm 10\%$ X5R dielectric C max op. temp. +85°C	0603	C1608X5R1A106K080AC
7	3	Murata 0402 GRM 100nF Ceramic Multilayer Capacitor, 50 V dc, +125°C, X7R Dielectric, $\pm 20\%$ SMD	0402	GRM155R71H104ME14D
8	1	TDK 4.7 μ F Multilayer Ceramic Capacitor (MLCC) 10 V dc $\pm 20\%$ X7R dielectric C Surface Mount max op. temp. +125°C	0805	C2012X7R1A475M125AC
9	2	Murata 18pF Multilayer Ceramic Capacitor (MLCC) 50 V dc $\pm 5\%$ C0G dielectric GRM max op. temp. +125°C	0402	GRM1555C1H180JA01D
10	2	KEMET 560pF Multilayer Ceramic Capacitor MLCC 6.	0603	C0603C561J5GACTU
11	1	Murata 4.7 μ F Multilayer Ceramic Capacitor MLCC 16V dc $\pm 10\%$ X5R Dielectric 0603 SMD, Max. Temp. +85°C	0603	GRT188R61C475KE13D

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12	1	Murata 2.2μF Multilayer Ceramic Capacitor (MLCC) 10 V dc ±10% X7R dielectric GRM max op. temp. +125°C	0603	GRM188R71A225KE15D
13	1	TDK 2.2μF Multilayer Ceramic Capacitor MLCC 50 V dc ±10% X7R Dielectric 0805 Surface Mount Max. Op. Temp. +125°C	0805	C2012X7R1H225K125AC
14	1	TDK 10μF Multilayer Ceramic Capacitor (MLCC) 10 V dc ±10% X7R dielectric C max op. temp. +125°C	0805	C2012X7R1A106K125AC
15	2	Murata 1μF Multilayer Ceramic Capacitor (MLCC) 25 V dc ±10% X7R dielectric GRM max op. temp. +125°C	0603	GRM188R71E105KA12D
16	1	Murata 0805 (2012M) 4.7μF Multilayer Ceramic Capacitor MLCC 50V dc ±10% SMD GRM21BR61H475KE51L	0805	GRM21BR61H475KE51L
17	4	TDK 0805 47μF Multilayer Ceramic Capacitor MLCC 10V dc ±20% SMD C2012X5R1A476M125AC	0805	C2012X5R1A476M125AC
18	2	Murata 0603 (1608M) 2.2μF Multilayer Ceramic Capacitor MLCC 50V dc ±10% SMD GRM188R61H225KE11D	0603	GRM188R61H225KE11D
19	2	Murata 0603 GRM 100nF Ceramic Multilayer Capacitor, 100 V dc, +125°C, X8L Dielectric, ±10% SMD	0603	GCJ188L8EL104KA07D
20	1	Murata 0402 GRM 2.2uF Ceramic Multilayer Capacitor, 16 V dc, +125°C, X7T Dielectric, ±20% SMD	0402	GRM155D71C225ME11D

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21	2	Murata 0402 GRM 2.2uF Ceramic Multilayer Capacitor, 16 V dc, +125°C, X7T Dielectric, ±20% SMD	0402	GRM155D71C225ME11D
22	1	Murata 0402 GRM 2.2uF Ceramic Multilayer Capacitor, 16 V dc, +125°C, X7T Dielectric, ±20% SMD	0402	GRM155D71C225ME11D
23	1	Multilayer Ceramic Capacitors MLCC - SMD/SMT 0603 10VDC 4.7uF 20% X5R AEC- Q200	0603	LMK107BJ475MAHT
24	3	Multilayer Ceramic Capacitors MLCC - SMD/SMT 0402 0.1uF 16volts X7R 10%	0402	GCM155R71C104KA55D
25	1	heat-sink, thermal pad, 2 clamps		TEN-HS1
26	1	Harting, 37 Position D- Sub Plug, Male Pins Connector	D-37 Connector	09676377675
27	2	Harting 09675097675 (DB-9, Straight, Male)	DB-9, Straight	09675097675
28	1	Samtec FTSH Series, 1.27mm Pitch 20 Way 2 Row Straight Pin Header Pin 7 removed, Surface Mount, Solder Termination	Male PCB Socket with Shroud	FTSH-110-01-L-DV-007-K
29	8	Bourns SMAJ20CA, Bi- Directional TVS Diode, 400W, 2-Pin SMA	DO-214AC/SMA	SMAJ20CA
30	16	NXP PESD24VL2BT,215, Dual Bi-Directional TVS Diode, 200W, 3-Pin TO- 236AB	SOT-23	PESD24VL2BT
31	8	NXP BAV199E6327 Dual SMT Low Leakage Diode, Series, 85V 160mA, 3µs, 3-Pin TO-236AB	SOT95P230X117-3N	BAV199
32	2	TVS Diode Arrays 6 CH DIODE ARRAY	SOIC-8	SP723ABG

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33	4	Lumex SSL-LX3059IGW, T-1 (3mm) Bi-colour Green, Red/Green LED, 565 / 635 nm 3-Pin	T-1 (3mm)	SSL-LX3059IGW
34	1	Bourns CDSOT23- SM712, Dual Bi- Directional TVS Diode, 400W, 3-Pin SOT-23	SOT-23	CDSOT23-SM712
35	2	ON Semi MURS360T3G, SMT Switching Diode, 600V 4A, 75ns, 2-Pin DO-214AB	DO-214AB	MURS360T3G
36	7	Osram Opto LT QH9G- Q2S2-25-2Z4Y, CHIPLE 0402 Series Green LED, 540 nm 1006 (0402) Diffused, Rectangle Lens SMD package	0402	LT QH9G-Q2S2-25-2Z4Y
37	2	Zener Diodes 28 Volt 0.5W 5% AUTO	SOD-123-2	MMSZ5255B-HE3-08
38	1	5x20mm Slow Blow Glass Body Cartridge Fuse	218	0218.500MXP
39	2	Resettable Fuses - PTC 33V 1.8A SMD	MF-SM series	MF-SM185/33-2
40	1	5x20mm Slow Blow Glass Body Cartridge Fuse	218	0218.500MXP
41	1	Würth Elektronik Signal Filter (EMI Suppression), 1.6 x 0.8 x 0.8mm (0603), 1000Ω impedance at 100 MHz	0603	742792664
42	1	Fixed Inductor SMD Open-Frame power line inductor,	7 mm x 7.8 mm x 5 mm	RLS-686
43	2	Bourns SRR3818A-4R7Y ±30% Multilayer SMD Inductor, 1.9A dc 120mΩ Rdc	SMD	SRR3818A-4R7Y
44	1	Recom Power R-78E5.0- 1.0, Non-Isolated DC/DC Converters 8-28Vin 5V 1.0A	SIP 3	R-78E5.0-1.0
45	1	TRACO Power TEC 2- 2410WI, Isolated DC/DC	SIP 8	TEC 2-2410WI

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		Converters 2W 9-36Vin 3.3V 500mA		
46	1	LDO Voltage Regulators 40V 200mA LDO 3.3Vo	TSOT-25-5	ADP7142AUJZ3.3R7 ADP7142AUJZ-3.3-R7
47	1	Linear Voltage Regulators Negative 30V -200mA Low-Noise LDO	TSOT-25-5	ADP7182AUJZ-R7
48	1	Isolate DC/DC converter, +-15V, 60W	2"x1" Metal package	TEN60-2423WIN
49	8	Vishay 0.12 A Solid State Relay, PCB Mount MOSFET, 350 V Maximum Load Current Limit Protection	SMD-6	LH1540AAB
50	8	Bipolar Transistors - BJT SS GP XSTR SPCL TR, automotive grade	SOT-23	SBC817-40LT1G
51	8	Texas Instruments TS5A3159DBVT, Analogue SPDT Switch Single SPDT, 3 V, 5 V, 6- Pin SOT-23	SOT-23	TS5A3159
52	18	Fixed surface mounted 0603 0.1W Resistor; 10R	0603	CRCW060310R0FK
53	16	Panasonic ERA Series Thin Film Surface Mount Resistor 1206 Case 100Ω ±0.1% 0.25W ±25ppm/°C	1206	ERA8AEB101V
54	16	Panasonic E24 Series Thin Film Surface Mount Resistor 0603 Case 91kΩ ±0.1% 0.1W ±10ppm/°C	0603	ERA3ARB913V
55	8	Panasonic E24 Series Thin Film Surface Mount Resistor 0603 Case 20kΩ ±0.1% 0.1W ±10ppm/°C	0603	ERA3ARB203V
56	3	Vishay CRCW Series Thick Film Thick Film Surface Mount Fixed Resistor 0402 Case 3.6kΩ ±1% 0.063W ±100ppm/°C	0402	CRCW04023K60FKED

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57	1	Fixed surface mounted 0402 0.063W Resistor; 18K	0402	CRCW040218K0FK
58	16	Panasonic E96 Series Thin Film Surface Mount Resistor 0402 Case 49.9k Ω $\pm$ 0.1% 0.063W $\pm$ 25ppm/ $^{\circ}$ C	0402	ERA2AEB4992X
59	16	Fixed surface mounted 0402 0.063W Resistor; 1M	0402	CRCW04021M00JNED
60	13	Fixed surface mounted 0402 0.063W Resistor; 330R	0402	CRCW0402330RFK
61	13	Fixed surface mounted 0402 0.063W Resistor; 10K	0402	CRCW040210K0FK
62	23	Fixed surface mounted 0402 0.063W Resistor; 33K	0402	CRCW040233K0FK
63	1	Fixed surface mounted 0402 0.063W Resistor; 1K	0402	CRCW04021K00FK
64	1	Thick Film Surface Mount Fixed Resistor $\pm$ 1% - CRCW0402360RFKED	0402	CRCW0402360RFKED
65	8	Fixed surface mounted 0402 0.063W Resistor; 3K3	0402	CRCW04023K30FK
66	1	Fixed surface mounted 0402 0.063W Resistor; 3K9	0402	CRCW04023K90FK
67	1	Fixed surface mounted 0402 0.063W Resistor; 1K2	0402	CRCW04021K20FK
68	4	Fixed surface mounted 0402 0.063W Resistor; 100K	0402	CRCW0402100KFK
69	2	Fixed surface mounted 0603 0.1W Resistor; 100R	0603	CRCW0603100RFK
70	1	Fixed surface mounted 0402 0.063W Resistor; 820R	0402	CRCW0402820RFK

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71	1	Fixed surface mounted 0402 0.063W Resistor; 8K2	0402	CRCW04028K20FK
72	1	Fixed surface mounted 0603 0.1W Resistor; 180R	0603	CRCW0603180RFK
73	2	Fixed surface mounted 0402 0.063W Resistor; 2K2	0402	CRCW04022K20FK
74	1	Fixed surface mounted 0402 0.063W Resistor; 22K	0402	CRCW040222K0FK
75	1	Fixed surface mounted 0402 0.063W Resistor; 39K	0402	CRCW040239K0FK
76	1	Fixed surface mounted 0402 0.063W Resistor; 27K	0402	CRCW040227K0FK
77	1	Fixed surface mounted 0402 0.063W Resistor; 180K	0402	CRCW0402180KFK
78	2	Fixed surface mounted 0402 0.063W Resistor; 4K7	0402	CRCW04024K70FK
79	8	Wide Supply Range, Rail-to-Rail Output Instrumentation Amplifier	LFCSP-16 4x4mm	AD8426BCPZ-R7
80	1	Analog to Digital Converters - ADC JFET Quad Buffer AFE Sigma Delta ADC 8Diff/16SE Input	LFCSP-40	AD7173-8BCPZ
81	1	STMicroelectronics HTS221, Humidity and Temperature, HLGA-6L	HLGA-6L	HTS221
82	1	Arm® Cortex®-M7 32b MCU+FPU, 462DMIPS, up to 2MB Flash/ 512+16+4KB RAM, crypto, USB OTG HS/FS, 28 com IF, LCD, DSI	LQFP0	STM32F777VIT6

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83	1	Texas Instruments ISO1042, CAN Interface IC Isolated CAN Transceiver With 70-V Bus Fault Protection and Flexible Data Rate 16- SOIC -40 to 125	SOIC-16W	ISO1042BDWR
84	1	Ultralow Noise, LDO XFET Voltage References with Current Sink and Source	SOIC-8	ADR441BRZ-REEL7
85	1	Crystal 25MHz, ± 10 ppm, 4-Pin SMD, 5 x 3.2 x 1mm	3.2x5mm	QC5A25.0000F12B12
86	1	Hammond manufacturing, Diecast Aluminum Enclosures <i>1590 Series</i> , General Purpose, Wall- Mounting, Water-Tight, Black, Aluminium (Die-Cast Alloy)	188mmx188mmx67mm	1590FFBK

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