



EMC Test Data

Client:	Malema Engineering Corp	Job Number:	JD100260
Product	CPFM-8100 Series Coriolis Mass Flow Meter	T-Log Number:	T100387
System Configuration:		Project Manager:	Deepa Shetty
Contact:	Claus Knudsen	Project Coordinator:	
Emissions Standard(s):	EN 61326 - 1 :2013	Class:	A
Immunity Standard(s):	EN 61326 - 1 :2013	Environment:	Industrial

EMC Test Data

For The

Malema Engineering Corp

Product

CPFM-8100 Series Coriolis Mass Flow Meter

Date of Last Test: 1/14/2016



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Emissions Standard(s):	EN 61326 - 1 :2013	Project Coordinator:	Enter PC's name on cover
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		Environment:	Industrial

EUT INFORMATION

General Description

The EUT is a mass flow meter that is designed to measure mass. Since the EUT would be placed on a tabletop during operation, the EUT was treated as tabletop equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 24VDC Volts , 0.15 Amps.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Malema	CELE-81XX-N1S203NSX-XXX	Mass flow meter	2015121281000001	

Highest EUT Internal Source

The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes. In some cases, the highest internal source determines the frequency range of test for radiated emissions. The highest internal source of the EUT was declared as: 25, 300 and 150 MHz

Other EUT Details

The following EUT details should be noted:

EUT Enclosure

The EUT enclosure is primarily constructed of Metal. It measures approximately 18 cm wide by 11 cm deep by 4 cm high.



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Detailed EUT Photograph (Front View)



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Detailed EUT Photograph (Rear View)

Modification History

Mod. #	Test	Date	Modification
1			No modifications were made to the EUT during testing.
2			
3			

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.



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Test Configuration # 2

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Malema	CSEN-8115-6B22G0XX-XXX	Coriolis Mass Flow Meter	4AD28D000000000C1	

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Powerizer	24VDC 10Ah	NiMh Battery pack	TBD	
Malema	CE Test equip	current loop monitor, Dig.out. Monitor	1	

Cabling and Ports (EUT)

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
P1	CE Test equipment	Gray 12 conductor	Shielded	30.0
P2	Coriolis flow sesnor	White 12 conductor	Shielded	3m
Ground	Ground	1 Wire	Unshielded	1.5m

Cabling and Ports (Additional on Support Equipment)

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Power (Flow Monitor)	Battery pack	red/black 2 conductor	unshielded	1.5

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EUT Operation During Emissions Tests

During emissions testing the EUT was operating normally. To monitor the current loop output and the digital output an offset in the calculated flowrate was introduced.

EUT Operation During Immunity Tests

During immunity testing the EUT was operating normally. To monitor the current loop output and the digital output an offset in the calculated flowrate was introduced.

Performance Criteria for Immunity Tests

Criterion A:

During and after testing the EUT shall continue to communicate between EUT and flow rate monitor and EUT loop back indication not being interrupted. Flow rate monitor needs to stay within 1% of initial setting.

Criterion B:

During application of the transient test, degradation of performance including _____ is allowed provided that the EUT self-recovers to normal operation after testing without any operator intervention.

Criterion C:

Loss of function is allowed provided that normal operation can be restored by _____.



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		Environment:	Industrial

Electrical Fast Transient/Burst (EFT/B) (EN 61000-4-4)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 1/14/2016 19:08 Config. Used: 2
 Test Engineer: Ryan Woods Config Change: None
 Test Location: Fremont EMC Lab #2 EUT Voltage: Battery

General Test Configuration (EN 61000-4-4)

- *The EUT and all cables to the EUT were located on an insulating support 10 cm above a ground reference plane
- *The distance between any coupling devices and the EUT was 0.5 m (-0m /+0.1m) for tabletop equipment testing

Ambient Conditions:

Temperature: 23 °C
 Rel. Humidity: 34 %

Summary of Results

Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
1	P1DC Power/ Signal	± 2 kV	± 2 kV	B	A / Pass	
	P2 Signal at Transmitter	± 1 kV	± 2 kV		A / Pass	
	P2 Signal at Sensor	± 1 kV	± 2 kV		A / Pass	

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

IO Port tested at ± 2 kV per customer request.



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		Environment:	Industrial

Run #1: EFT/B Testing
Test Method: EN 61000-4-4

Test Parameters	
Waveform: 5 ns / 50 ns	Burst Period: 300 ms
Repetition Frequency: 5 kHz	Burst Width: 15 ms

Applied Location	Positive Polarity				Negative Polarity			
	(kV)				(kV)			
Power Line	Level 1	Level 2	Level 3	Level 4	Level 1	Level 2	Level 3	Level 4
DC Power Port(s)	0.5	1.0	2.0	4.0	0.5	1.0	2.0	4.0
DC + Signal	X	X	X	N/A	X	X	X	N/A
I/O Port	Level 1	Level 2	Level 3	Level 4	Level 1	Level 2	Level 3	Level 4
	0.25	0.5	1.0	2.0	0.25	0.5	1.0	2.0
P2 (at Transmitter)	X	X	X	N/A	X	X	X	N/A
P2 (at Sensor)	X	X	X	N/A	X	X	X	N/A

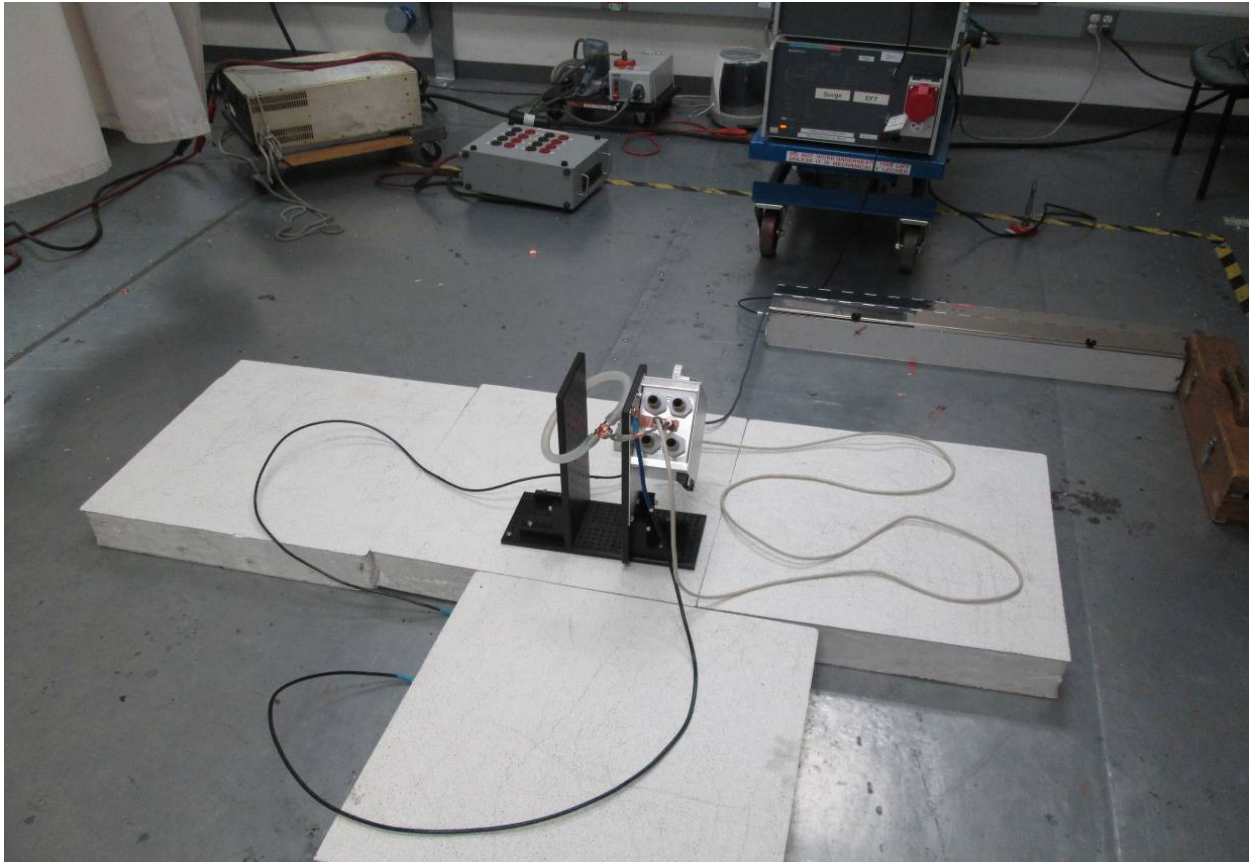
Note: An "X" indicates that the unit continued to operate as intended. The communication between EUT and flow rate monitor continued and EUT loop back indication was not interrupted.

The following interface ports were not tested:

Port(s)	Reason
Temp Port	The ports are intended to connect to cables less than 3m in length and the product standard only requires the test to be performed on cables exceeding 3m in length.

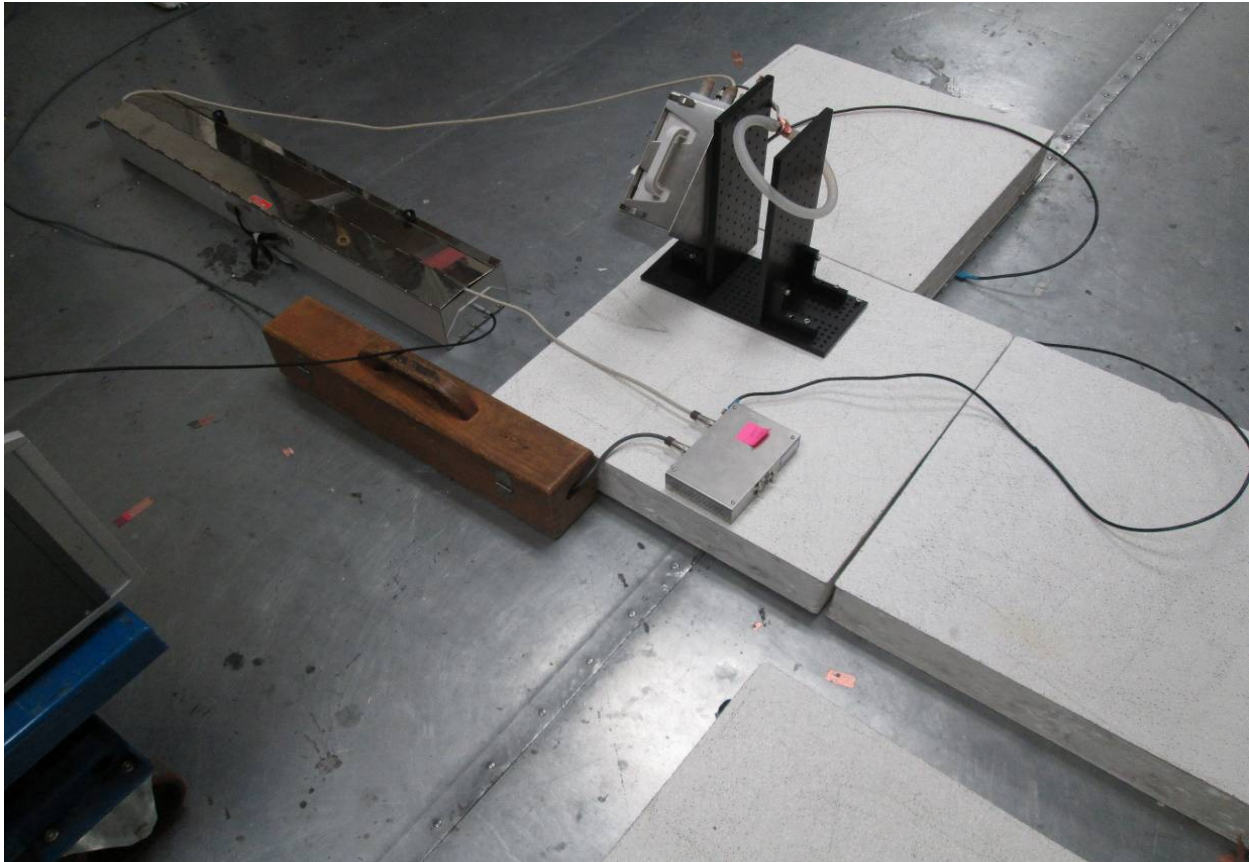
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		Environment:	Industrial

Test Configuration Photograph #1
(Electrical Fast Transient/Burst, EN 61000-4-4)



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Test Configuration Photograph #2
(Electrical Fast Transient/Burst, EN 61000-4-4)





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Radiated Immunity (EN 61000-4-3)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 1/14/2016 Config. Used: 2
 Test Engineer: Mehran Birgani Config Change: -
 Ryan Woods
 Test Location: Fremont Chamber #1 EUT Voltage: Battery

General Test Configuration

The EUT and all local support equipment were located on a turntable in an anechoic chamber. All remote support equipment was located outside the chamber. Interface cabling to the remote support equipment was routed along the floor and, where possible, passed through ferrite clamps at the exit point from the chamber. Unless otherwise noted, the "right side" of the EUT is considered the side on the right when standing behind the EUT and the "left side" of the EUT is considered the side on the left when standing behind the EUT.

Ambient Conditions: Temperature: 15-18 °C
 Rel. Humidity: 30-35 %

Summary of Results-Radiated Immunity

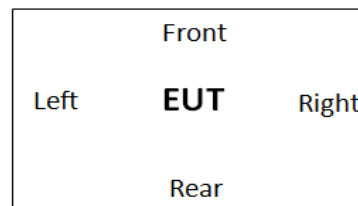
Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
EN 61326-1:2013 requirements						
1	Enclosure	80-1000 MHz 1kHz 80% AM 10 V/m	80-1000 MHz 1kHz 80% AM 10 V/m	A	A / Pass	10V/m for Industrial
		1.4GHz-2.0GHz 1kHz 80% AM 3 V/m	1.4GHz-2.0GHz 1kHz 80% AM 3 V/m			3V/m for Industrial
		2.0GHz-2.7GHz 1kHz 80% AM 1 V/m	2.0-2.7 GHz 1kHz 80% AM 3 V/m			1V/m for Industrial

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.





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Run #1: Radiated Immunity, 80 - 2700 MHz (EN61000-4-3)

Frequency:	80-1000 MHz	1.4-2.0 GHz	2.0-2.7 GHz
Step Size:	1 %	1 %	1 %
Dwell time:	2874 ms	2874 ms	2874 ms
Field Uniformity:	1.5m x 1.5m	1.0m x 1.0m	1.0m x 1.0m
Test Distance:	2.5	2.0	2.0

Modulation Details	
Modulating Frequency:	1 kHz
Modulation:	AM
Depth / Deviation:	80%

Frequency Range (MHz)	Level V/m	Front		Left Side		Rear		Right		Top		Bottom	
		Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.
80-1000	10	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
1400-2000	3	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
2000-2700	3	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A

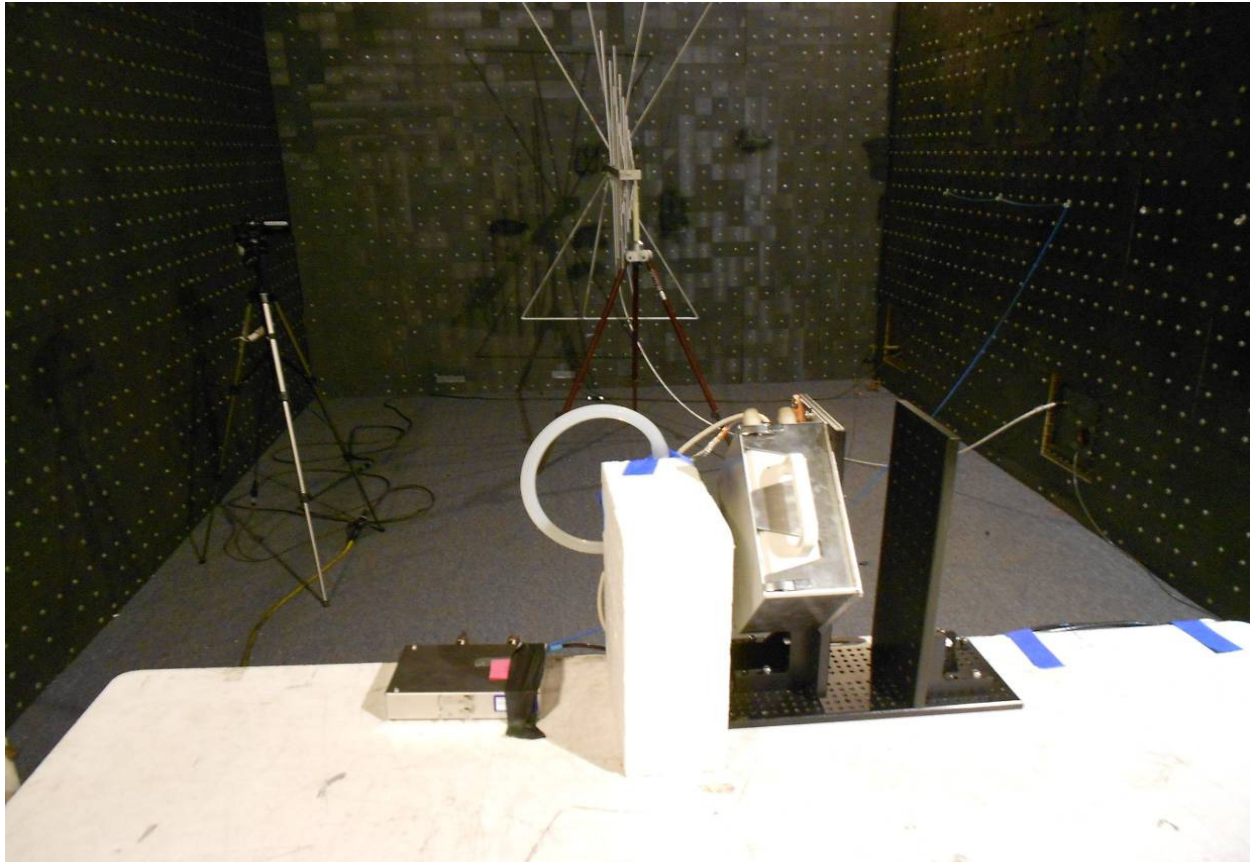
The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH1\Current\... were used:

- tip 2.5m from field 1.5m high 80 MHz - 1000 MHz H 10Vm.crf
- tip 2.5m from field 1.5m high 80 MHz - 1000 MHz V 10Vm.crf
- Face of horn 2m to UFA, 1.3m high 1-4.2GHz H 3Vm.crf
- Face of horn 2m to UFA, 1.3m high 1-4.2GHz V 3Vm.crf

Note: An "X" indicates that the unit continued to operate as intended. The communication between EUT and flow rate monitor continued and EUT loop back indication was not interrupted.

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**Test Configuration Photograph #1
(Radiated Immunity, EN 61000-4-3)**



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**Test Configuration Photograph #2
(Radiated Immunity, EN 61000-4-3)**

