

PYLON ELECTRONICS INC.

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STATEMENT OF MEASUREMENT CAPABILITIES

FOREWORD

The following is a summarized list of measurement parameters available at this location. For measurement parameters not shown in this list, please contact customer service for technical support. We can support your calibration requirement from another Pylon laboratory or from our network of qualified sub-contractors.

For a list of Pylon Ottawa's ISO/IEC 17205 accredited parameters, please refer to our ISO/IEC 17025 accreditation certificate and scope.

ELECTRICAL

DC/LOW FREQUENCY

Measured Quantity	Units	Range	Best Measurement Uncertainty ±	Capability
DC Voltage	Volts (V)	1µV to 10KV	-	Generate
		1µV to 200mV	0.00072%	Measure
		100mV to 2V	0.00038%	Measure
		2.0V to 1KV	0.00045%	Measure
		1KV to 10KV	1%	
		10 Volt Reference Standard	1 ppm	Measure
DC Current	Amperes (A)	0A to 100A	-	Generate
		0A to 100A	0.01%	Measure
		100A to 1000A	0.25%	Measure
Resistance Four Terminal	Resistance (Ω)	0.001 to 0.1	0.0210%	Measure
		0.1 to 1	0.0008%	Measure
		1	0.0005%	Measure
		1 to 1M	0.0003%	Measure
		1M to 10M	0.0006%	Measure
		10M to 100M	0.0030%	Measure
Two Terminal up to 1000 Volts	-	100M to 1T	1%	Measure
		1T to 10T	2%	Measure
Capacitance Fixed Standards	Farads (F)	10pF to 1.0µF	-	Generate
		1000pF @ 1KHz	0.002%	Measure
Variable	-	5pF to 1150pF	-	Generate
		0.01pF to 1.2µF	0.01%	Measure
		Up to 0.2F	3%	Measure
Inductance Fixed Standards	Henries (H)	1mH to 10mH		Generate
		10µH to 100µH	1%	Measure
		100µH to 1mH	0.1%	Measure
		1mH to 100mH	0.028%	Measure
		100mH to 10H	0.1%	Measure

DC/LOW FREQUENCY (Continued)

Measured Quantity	Units	Range	Best Measurement Uncertainty ±	Capability
AC Voltage	Volts (V)	1mV (10Hz to 50KHz) (50KHz to 1.2MHz)	≤0.038% ≤0.110%	Measure
		10mV (10Hz to 50KHz) (50KHz to 1.2MHz)	≤0.024% ≤0.099%	Measure
		100mV (10Hz to 50KHz) (50KHz to 1.2MHz)	≤0.019% ≤0.099%	Measure
		1V (10Hz to 50KHz) (50KHz to 1.2MHz)	≤0.004% ≤0.059%	Measure
		10V (10Hz to 50KHz) (50KHz to 1.2MHz)	≤0.004% ≤0.056%	Measure
		100V (10Hz to 50KHz) (50KHz to 200KHz)	≤0.004% ≤0.024%	Measure
		1000V (10Hz to 30KHz)	≤0.008%	Measure
		700V (30KHz to 100KHz)	≤0.035%	Measure
		1mV to 1000V (5Hz to 1MHz)	-	Generate
Differential DC/AC Voltage	Volts (V)	7000Vp (5000Vrms) (DC to 70 MHz)	2%	Measure

DC/LOW FREQUENCY (Continued)

Measured Quantity	Units	Range	Best Measurement Uncertainty ±	Capability
AC Current	Amperes (A)	10µA to 20A	-	<i>Generate</i>
		10µA (50Hz to 1KHz)	0.08%	<i>Measure</i>
		100µA (10Hz to 5KHz) (5KHz to 30KHz)	≤0.016% ≤0.090%	<i>Measure</i> <i>Measure</i>
		1mA (10Hz to 5KHz) (5KHz to 30KHz)	≤0.014% ≤0.090%	<i>Measure</i> <i>Measure</i>
		10mA to 100mA (10Hz to 5KHz) (5KHz to 50KHz) (50KHz to 100KHz)	≤0.022% 0.03% 0.05%	<i>Measure</i> <i>Measure</i> <i>Measure</i>
		1A (10Hz to 5KHz) (5KHz to 50KHz) (50KHz to 100KHz)	≤0.035% 0.03% 0.05%	<i>Measure</i> <i>Measure</i> <i>Measure</i>
		1A to 5A (5Hz to 20KHz) (20KHz to 50KHz) (50KHz to 100KHz)	0.02% 0.03% 0.05%	<i>Measure</i> <i>Measure</i> <i>Measure</i>
		5A to 20A (5Hz to 20KHz) (20KHz to 50KHz)	0.03% 0.05%	<i>Measure</i> <i>Measure</i>
		20A to 400A (60Hz)	0.50%	<i>Measure</i>

DC/LOW FREQUENCY (Continued)

Measured Quantity	Units	Range	Best Measurement Uncertainty ±	Capability
Ratio, AC	ACV	-0.0111111 to 1.111111 (50Hz to 1KHz) (1KHz to 5KHz) (5KHz to 10KHz)	2 ppm 15 ppm 60 ppm	Ratio Ratio Ratio
Ratio, DC	DCV	0 to 1.0	0.2 ppm	Ratio
Low Frequency	(db)	40 Vpk-pk (1µHz to 100KHz)	0.1db	Generate
Frequency	Hz	1mHz to 18.0GHz	3×10^{-7} to 2×10^{-9}	Measure
Time Base Standard	Hz	1, 5, and 10MHz	1×10^{-12}	Measure
Time	Seconds	10 to 10^4 sec	0.001 sec	Measure
Phase Angle 0 Degrees to 360 Degrees, 1Hz to 100KHz	Degrees (°)	Equal Amplitude 50mV to 120V (1Hz to 1KHz) (1KHz to 6.25KHz) (6.25KHz to 50KHz) (50KHz to 100KHz) Amplitude Ratio=500 50mV to 100V (1Hz to 1KHz) (1KHz to 6.25KHz) (6.25KHz to 50KHz) (50KHz to 100KHz) Amplitude 100V to 120V (1Hz to 1KHz) (1KHz to 6.25KHz) (6.25KHz to 50KHz)	0.005° 0.005° 0.010° 0.020° 0.030° 0.060° 0.090° 0.240° 0.060° 0.120° 0.180° 0.600°	Measure/ Generate

DC/LOW FREQUENCY (Continued)

Measured Quantity	Units	Range	Best Measurement Uncertainty ±	Capability
Magnetism Fixed Standards	Gauss	500 gauss 2000 gauss	0.04% 0.04%	Measure
PH Simulation	PH	4.00 7.00 10.00	0.01 0.01 0.02	Generate
Electrical Conductivity	Siemens/ meter	84µS/cm 1413µS/cm 12880µS/cm	0.5%	Generate
Video Generator	Return Loss	0 to 5 MHz	>46dB	Measure
	Hum Rejection	Fast	>24dB	
		Slow	<1dB	
	Residual Noise Level	0 to 5 MHz	Better than -80 dB with respect to 0.714 Vp-p active video	
Anti-aliasing filter attenuation	7.16 MHz (NTSC)	>35dB		
	8.86 MHz (PAL)	>40dB		

RF/MICROWAVE FREQUENCY

Measured Quantity	Units	Range	Best Measurement Uncertainty ±	Capability
RF/Microwave Power (50 OHM)	Watts (W)	up to 200W (30MHz, 100MHz, 300MHz, 400MHz, 500MHz)	1.25%	Generate
	(dbm)	+19dbm (500KHz to 512MHz)	N/A	Generate
		+13dbm (512MHz to 1024MHz)	N/A	Generate
		+12dbm (10MHz to 20GHz)	N/A	Generate
		+2.5dbm (20GHz to 50GHz)	N/A	Measure
		0dbm (50MHz)	2.4%	Measure
		-30dbm to +20dbm (100KHz to 4GHz)	3.3%	Measure
		-70dbm to -30dbm (10MHz to 18GHz)	2.4%	Measure
		-30dbm to +20dbm (10MHz to 18GHz)	2.0%	Measure
		(18GHz to 26.5GHz)	3.9%	Measure
		(26.5GHz to 40GHz)	4.2%	
Pulse Power	Watts (W)	5KW (950 to 1220MHz)	0.85db	Measure
		5KW < 2350MHz	0.2%	Generate
		4KW < 3100MHz	0.2%	Generate
		500W @ 6100MHz	0.2%	Generate

RF/MICROWAVE FREQUENCY (Continued)

Measured Quantity	Units	Range	Best Measurement Uncertainty ±	Capability
Attenuation 600 OHM	(db)	0 to 111db 0.1db steps (DC to 1MHz)	0.02db ±0.25%	<i>Generate</i>
Attenuation 50 OHM	(db)	0 to 110db (DC to 18GHz)	4%	<i>Generate</i>
		0 to 100db (DC to 1 KHz)	1.0db	<i>Measure</i>
		0 to 80db (1KHz to 2.5MHz)	0.3db	<i>Measure</i>
		0 to 127dbm (2.5MHz to 1300 MHz)	0.05db +0.25/10db	<i>Measure</i>
		0 to 70dbm (1300MHz to 18GHz)	0.02db +0.02/10db	<i>Measure</i>
		70 to 85 dbm (1300 MHz to 18GHz)	0.05db +0.02/10db	<i>Measure</i>
		85 to 95 dbm (1300MHz to 18GHz)	0.10db +0.02/10db	<i>Measure</i>
		95 to 100 dbm (1300MHz to 18GHz)	0.20db +0.02/10db	<i>Measure</i>
		100 to 110 dbm (1300MHz to 18GHz)	0.6db	<i>Measure</i>

RF/MICROWAVE FREQUENCY (Continued)

Measured Quantity	Units	Range	Best Measurement Uncertainty ±	Capability
Return Loss (50 OHM) Type "N" connector	(db)	5 MHz to 18 GHz		Measure
Return Loss (50 OHM) Type "A" connector		2 GHz to 18 GHz	Directivity >35db	Measure
Return Loss (50 OHM) Type "K/SMA" connector		10 MHz to 40 GHz		Measure
(50 OHM) Airline Bridge	(db)	Test Port Connectors		
Directivity		K male & Female (up to 40 GHz)	> 45db Directivity	Measure
		APC (up to 18 GHz)	> 45db Directivity	Measure
		N female (up to 18 GHz)	> 45db Directivity	Measure
TDR Length (Ethernet)	meters	50m	±0.05m	Measure

PHYSICAL PROPERTIES

PHYSICAL/DIMENSIONAL

Measured Quantity	Units	Range	Best Measurement Uncertainty ±
Gauge Blocks Length	Inches mm	0.010" to 1" 1" to 4" 0.5 to 25mm 25 to 100mm	4 μinch (4 + 1L)μin 0.1μm (0.1+0.025L)μm L=length in UOM
Length Standards	Inches mm	to 12" 12" to 32" to 300mm 300 to 800mm	20 μinch Consult Lab 0.0005mm Consult Lab
External Dimensions External Measurements	Inches mm	Up to 12" Up to 300mm	20 μinch 0.0005mm
Thread Gauge Plugs		12" to 48" 300 to 1200mm	Consult Lab.
		48 to 4tpi	Consult Lab.
Internal Dimensions Cylindrical Ring Gauges	Inches mm	Up to 5.0" Up to 125mm	20 μinch 0.0005mm
Internal Measurements		5.0" to 12" 125 to 300mm	Consult Lab.
		Up to 48" Up to 1200mm	Consult Lab.
Straightness	Inches/mm	Consult Lab.	50 μin / 0.0013mm
Surface Plate	Inches/mm	Consult Lab.	Grade "A" for most common sizes.
Parallels	Inches/mm	-	50 μin / 0.0013mm
Indicator dial	Inches/mm	up to 12" Up to 300mm	25 μinch 0.0006mm

PHYSICAL/DIMENSIONAL (Continued)

Measured Quantity	Units	Range	Best Measurement Uncertainty \pm
Calipers, Micrometers Outside Inside Depth	Inches mm	Up to 48" Up to 1200mm Up to 48" Up to 1200mm Up to 48" Up to 1200mm	$(44 + 2L)\mu\text{in}$ $(0.0011 + 0.05L)\mu\text{m}$ L = length of measurement in UOM
Hardness Testers Rockwell	Rockwell units	HRB 60 HRC 30,60,90	1 unit
Flatness	Inches mm	Area covered by 10" diameter optical flat	$5.0\mu\text{in}$ $0.13\mu\text{m}$
Acoustics Sensitivity	Decibels (db)	Microphone 1/8" to 1" 250Hz	0.17db
Acceleration	pC/ms ⁻²	10Hz to 5KHz	2.6%
Load Cells Compression and Tension	Lbs (kg)	1000 (500) 5000 (2200) 20000 (9000) 50000 (22000) 60000 (37500)	0.1% F.S. " " " "
Torque	-	0.5 to 215inoz 36gcm to 15.5kgcm 10inlb to 5000 ftlb 1.0 to 575 kgcm	0.3% of Indicated Reading 0.05% of Indicated Reading
Tensiometer	Lbs (kg)	up to 600Lb(300kg)	Consult Lab.

PHYSICAL/DIMENSIONAL (Continued)

Measured Quantity	Units	Range	Best Measurement Uncertainty ±
Balance and scales	Lbs grams	To 500Lbs To 500Kg	Class "S" Mass Comparison
¹ Mass Imperial	Lbs	1/16 oz. to 70 lbs	Class 'Q'
Metric	grams	5 mg to 32 Kg	Class 'Q'

1 Better class available for specific mass values. Consult lab.

THERMAL/ENVIRONMENTAL/PRESSURE

Measured Quantity	Units	Range	Best Measurement Uncertainty ±
Temperature	Celsius °C (°F)		
Triple Point of Water		0.01°C (32.018°F)	0.0005°C (0.0009°F)
Thermometry		-50 to 660°C (-58 to 1220°F)	0.012°C at 0 °C 0.033°C at 420 °C 0.046°C at 600 °C
PRT Probe		-200 to 661°C (-328 to 1221.8°F)	0.006°C at -200°C (0.0108°F at -328°F) 0.006°C at 0°C (0.0108°F at -32°F) 0.015°C at 420°C (0.027°F at 788°F) 0.022°C at 661°C (0.0396°F at 1221.8°F)
Infrared Thermometry		-30°C to 650°C (-22°F to 1202°F)	-10°C to 0°C:±2.0°C -30°C to -10°C:±3.0°C ±1.0 °C or ±1.0% of reading, whichever is greater
Humidity – %RH	%RH	Ambient Condition	2.0% of IV*

THERMAL/ENVIRONMENTAL/PRESSURE (Continued)

Measured Quantity	Units	Range	Best Measurement Uncertainty ±
Pressure			
Absolute Pressure (air)		0.3 to 15 psia 2 to 105kPa	0.02% of IV*
Gauge Pressure (air)		0.3 to 50 psig 2 to 345kPa	0.02% of IV*
Gauge Pressure (air)		15 to 500 psig 105 to 3450kPa	0.02% of IV*
Gauge Pressure (air)		0 to 10000 psig 0 to 70000kPa	0.05% of IV*
Gauge Pressure (oil)		0 to 15000 psig 2 to 103000kPa	0.02% of IV* * Indicated Value

FIBER OPTICS

FIBER OPTICS

Measured Quantity	Units	Range	Best Measurement Uncertainty	Capability
Wavelength	λ	LASER 1600.600 nm 1520 – 1570 nm 1310.000 nm	N/A	Generate
		LED 850 nm 1300 nm	N/A	Generate
		LASER 1250 -1625 nm	± 1.5 pm	Measure
		LED 1250 -1310 nm	± 1.5 pm	Measure
Power	dBm	LASER 850 – 1600 nm	>10 dBm	Generate
		LED 850 nm 1300 nm	> -17 dBm	Generate
		LASER 800 – 1650 nm (+27 dBm–40 dBm)	$\pm 2.5\%$	Measure
		LED 800 – 1300 nm (+10 dBm–40 dBm)	$\pm 2.5\%$	Measure
Attenuation	dB	LASER - 1600 nm	(0 to -40 dB) $\pm 2.5\%$ (-40 to -90 dB) ± 0.1 dB	Generate
		LASER 1310 nm (-40 dB) 1550 nm (-40 dB)	$\pm 2.5\%$	Measure
Length	Meters	15000 m	± 3 m	Generate