



MS ISO/IEC 17025

# *Certificate of Accreditation*

No: SAMM 176

Valid until: 17 September 2011

This is to certify that

**SIME-SIRIM TECHNOLOGIES SDN BHD  
SENAI, JOHOR  
MALAYSIA**

(FIELDS OF CALIBRATION: ELECTRICAL, TEMPERATURE, MASS,  
PRESSURE, FORCE & DIMENSIONAL)

has been granted accreditation in respect of the scope of accreditation described in the SCHEDULE attached, subject to the terms and conditions governing the *Skim Akreditasi Makmal Malaysia* (SAMM), the Laboratory Accreditation Scheme of Malaysia.

Laboratories accredited under SAMM meet the requirements of MS ISO/IEC 17025 'General requirements for the competence of testing and calibration laboratories'. This Malaysian Standard is identical with ISO/IEC 17025 published by the International Organization for Standardization (ISO).

*"This laboratory is accredited in accordance with recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communique dated 18 June 2005)"*



**(RIDZWAN KASIM)**

for the Director General  
Department of Standards Malaysia  
Date of issue: 20 November 2008



## Schedule

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**LABORATORY LOCATION :** SIME-SIRIM TECHNOLOGIES SDN BHD  
(Permanent laboratory) BANGUNAN SIRIM BERHAD  
NO. 3, JALAN TEKNOLOGI 5  
TAMAN TEKNOLOGI JOHOR  
81400 SENAI, JOHOR  
MALAYSIA

The standard used for assessment of this laboratory is MS ISO/IEC 17025:2005

### FIELD OF CALIBRATION : ELECTRICAL MEASUREMENTS

### SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
1. Multimeters Indicating Meters DC Voltage	0 mV to 300 mV	1.67 $\mu$ V
	300 mV to 450 mV	2.6 $\mu$ V
	450 mV to 1.5 V	20.3 $\mu$ V
	1.5 V to 3 V	25 $\mu$ V
	3 V to 4.5 V	180 $\mu$ V
	4.5 V to 30 V	300 $\mu$ V
	30 V to 45 V	1.8 mV
	45 V to 300 V	3.0 mV
	300 V to 330 V	3.1 mV
	330 V to 1000 V	5.3 mV
Resistance	0 $\Omega$ to 0.1 $\Omega$	39 $\mu\Omega$
	0.1 $\Omega$ to 1 $\Omega$	40 $\mu\Omega$
	1 $\Omega$ to 10 $\Omega$	1.1 m $\Omega$
	10 $\Omega$ to 30 $\Omega$	0.35 m $\Omega$
	30 $\Omega$ to 38 $\Omega$	1.3 m $\Omega$
	38 $\Omega$ to 45 $\Omega$	0.5 m $\Omega$
	45 $\Omega$ to 100 $\Omega$	1.7 m $\Omega$
	100 $\Omega$ to 190 $\Omega$	1.7 m $\Omega$
	190 $\Omega$ to 380 $\Omega$	11.2 m $\Omega$
	380 $\Omega$ to 450 $\Omega$	4.0 m $\Omega$
	0.45 k $\Omega$ to 1 k $\Omega$	7.8 m $\Omega$
	1 k $\Omega$ to 1.9 k $\Omega$	13.3 m $\Omega$
	1.9 k $\Omega$ to 1.95 k $\Omega$	13.4 m $\Omega$
	1.95 k $\Omega$ to 3.8 k $\Omega$	33.5 m $\Omega$
	3.8 k $\Omega$ to 4.5 k $\Omega$	39.7 m $\Omega$

\* The uncertainties are based on an estimated confidence probability of not less than 95% unless otherwise stated.



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#### SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
1. Multimeters Indicating Meters		
Resistance (continued)	4.5 k $\Omega$ to 10 k $\Omega$	190 m $\Omega$
	10 k $\Omega$ to 19 k $\Omega$	150 m $\Omega$
	19 k $\Omega$ to 38 k $\Omega$	450 m $\Omega$
	38 k $\Omega$ to 45 k $\Omega$	1.8 $\Omega$
	45 k $\Omega$ to 60 k $\Omega$	1.2 $\Omega$
	60 k $\Omega$ to 100 k $\Omega$	2.6 $\Omega$
	100 k $\Omega$ to 300 k $\Omega$	5.6 $\Omega$
	300 k $\Omega$ to 380 k $\Omega$	6.7 $\Omega$
	380 k $\Omega$ to 450 k $\Omega$	18.1 $\Omega$
	450 k $\Omega$ to 600 k $\Omega$	18.2 $\Omega$
	0.6 M $\Omega$ to 1 M $\Omega$	32.3 $\Omega$
	1 M $\Omega$ to 3 M $\Omega$	88.2 $\Omega$
	3 M $\Omega$ to 3.8 M $\Omega$	104 $\Omega$
	3.8 M $\Omega$ to 10 M $\Omega$	1.7 k $\Omega$
	10 M $\Omega$ to 30 M $\Omega$	4.2 k $\Omega$
	30 M $\Omega$ to 80 M $\Omega$	10.4 k $\Omega$
	80 M $\Omega$ to 100 M $\Omega$	12.7 k $\Omega$
DC Current	0 $\mu$ A to 300 $\mu$ A	20.6 nA
	300 $\mu$ A to 450 $\mu$ A	80 nA
	450 $\mu$ A to 3 mA	209 nA
	3 mA to 4.5 mA	803 nA
	4.5 mA to 30 mA	2.1 $\mu$ A
	30 mA to 45 mA	10.2 $\mu$ A
	45 mA to 300 mA	25 $\mu$ A
	300 mA to 3 A	344 $\mu$ A
	3 A to 10 A	872 $\mu$ A





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#### SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
1. Multimeters Indicating Meters AC Voltage	0 V to 0.3 V range	
	40 Hz	28 $\mu$ V
	1 kHz	28 $\mu$ V
	3 kHz	28 $\mu$ V
	10 kHz	28 $\mu$ V
	30 kHz	28 $\mu$ V
	50 kHz	38 $\mu$ V
	100 kHz	41 $\mu$ V
	0.3 V to 3 V range	
	40 Hz	279 $\mu$ V
	1 kHz	279 $\mu$ V
	3 kHz	279 $\mu$ V
	10 kHz	279 $\mu$ V
	30 kHz	285 $\mu$ V
	50 kHz	370 $\mu$ V
	100 kHz	388 $\mu$ V
	3 V to 30 V range	
	40 Hz	3.6 mV
	1 kHz	3.4 mV
	3 kHz	3.4 mV
	10 kHz	3.4 mV
	30 kHz	3.4 mV
	50 kHz	4.9 mV
	100 kHz	5.7 mV
	30 V to 100 V range	
	40 Hz	6.3 mV
	1 kHz	5.4 mV
	3 kHz	5.4 mV
	10 kHz	5.4 mV
	30 kHz	5.7 mV
	50 kHz	7.4 mV
	100 kHz	10.5 mV





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#### SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
1. Multimeters Indicating Meters		
AC Voltage (continued)	100 V to 300 V range	
	40 Hz	37 mV
	100 Hz	37 mV
	200 Hz	37 mV
	3 kHz	38.5 mV
	10 kHz	38.5 mV
	30 kHz	47.3 mV
	300 V to 330 V range	
	30 kHz	47.3 mV
	330 V to 500 V range	
	20 kHz	49.5 mV
	500 V to 750 V range	
	40 Hz	55.2 mV
	100 Hz	55.2 mV
	200 Hz	55.2 mV
	3 kHz	58.8 mV
	10 kHz	58.8 mV
AC Current	0 mA to 0.3 mA	
	40 Hz	64.4 nA
	110 Hz	64.4 nA
	3 kHz	75.9 nA
	10 kHz	132 nA
	20 kHz	137 nA
	30 kHz	152 nA
	0.3 mA to 3 mA	
	40 Hz	635 nA
	110 Hz	635 nA
	3 kHz	741 nA
	10 kHz	1.3 $\mu$ A
	20 kHz	1.4 $\mu$ A
	30 kHz	1.5 $\mu$ A





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### FIELD OF CALIBRATION : ELECTRICAL MEASUREMENTS

#### SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
1. Multimeters Indicating Meters AC Current (continued)	3 mA to 30 mA	
	40 Hz	6.4 $\mu$ A
	110 Hz	6.4 $\mu$ A
	3 kHz	7.4 $\mu$ A
	10 kHz	13.1 $\mu$ A
	20 kHz	13.6 $\mu$ A
	30 kHz	15.2 $\mu$ A
	30 mA to 0.3 A	
	40 Hz	70 $\mu$ A
	110 Hz	70 $\mu$ A
	3 kHz	88 $\mu$ A
	10 kHz	114 $\mu$ A
	20 kHz	121 $\mu$ A
	30 kHz	141 $\mu$ A
	0.3 A to 3 A	
	40 Hz	606 $\mu$ A
	110 Hz	606 $\mu$ A
	3 kHz	624 $\mu$ A
	10 kHz	1.4 mA
	3 A to 10 A	
	40 Hz	1.8 mA
	110 Hz	1.8 mA
	3 kHz	2.3 mA
	10 kHz	5.7 mA
2. Resistance Meters Mode Generate.	0 $\Omega$ to 0.001 $\Omega$	0.1 m $\Omega$
	0.001 $\Omega$ to 0.01 $\Omega$	0.1 m $\Omega$
	0.01 $\Omega$ to 0.1 $\Omega$	0.1 m $\Omega$
	0.1 $\Omega$ to 1 $\Omega$	0.1 m $\Omega$
	1 $\Omega$ to 10 $\Omega$	1 m $\Omega$
	10 $\Omega$ to 100 $\Omega$	2 m $\Omega$
	100 $\Omega$ to 1 k $\Omega$	10 m $\Omega$
	1 k $\Omega$ to 10 k $\Omega$	40 m $\Omega$
	10 k $\Omega$ to 100 k $\Omega$	400 m $\Omega$
	100 k $\Omega$ to 1 M $\Omega$	20 $\Omega$
	1 M $\Omega$ to 10 M $\Omega$	1 k $\Omega$





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#### SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
3. DC Resistors	Measure (direct measurement for resistance boxes)	
	0 $\Omega$ to 10 $\Omega$	323 $\mu\Omega$
	10 $\Omega$ to 100 $\Omega$	2 m $\Omega$
	100 $\Omega$ to 1 k $\Omega$	14.7 m $\Omega$
	1 k $\Omega$ to 10 k $\Omega$	138 m $\Omega$
	10 k $\Omega$ to 100 k $\Omega$	1.6 $\Omega$
	100 k $\Omega$ to 1 M $\Omega$	23 $\Omega$
	1 M $\Omega$ to 10 M $\Omega$	451 $\Omega$
	10 M $\Omega$ to 100 M $\Omega$	13 k $\Omega$
	Measure (Standard Resistors)	
	0 $\Omega$ to 1 $\Omega$	323 $\mu\Omega$
	1 $\Omega$ to 10 $\Omega$	2 m $\Omega$
	10 $\Omega$ to 10 k $\Omega$	138 m $\Omega$
4. Insulation Tester (Max. Voltage 1000 V)	10 k $\Omega$ to 100 k $\Omega$	1.03 $\Omega$
	100 k $\Omega$ to 1000 k $\Omega$	10 $\Omega$
	1000 k $\Omega$ to 10 M $\Omega$	550 $\Omega$
	10 M $\Omega$ to 100 M $\Omega$	10 k $\Omega$
	100 M $\Omega$ to 1000 M $\Omega$	120 k $\Omega$
	1000 M $\Omega$ to 10 G $\Omega$	10 M $\Omega$
5. Multifunction Calibrators (Generate)		
DC Voltage	0 mV to 100 mV	1.7 $\mu$ V
	100 mV to 1 V	9 $\mu$ V
	1 V to 10 V	9 $\mu$ V
	10 V to 100 V	1 mV
	100 V to 1000 V	11.4 mV
Resistance	0 $\Omega$ to 10 $\Omega$	323 $\mu\Omega$
	10 $\Omega$ to 100 $\Omega$	2 m $\Omega$
	100 $\Omega$ to 1 k $\Omega$	14.7 m $\Omega$
	1 k $\Omega$ to 10 k $\Omega$	138 m $\Omega$
	10 k $\Omega$ to 100 k $\Omega$	1.6 $\Omega$
	100 k $\Omega$ to 1 M $\Omega$	23 $\Omega$
	1 M $\Omega$ to 10 M $\Omega$	451 $\Omega$





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#### SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
5. Multifunction Calibrators (Generate) (continued)		
DC Current	0 $\mu$ A to 100 $\mu$ A	15.7 nA
	100 $\mu$ A to 1 mA	68.6 nA
	1 mA to 10 mA	686 nA
	10 mA to 100 mA	7.8 $\mu$ A
	100 mA to 1 A	123 $\mu$ A
AC Voltage	100 mV to 10 V	
	40 Hz to 1 kHz	20.6 $\mu$ V
	1 kHz to 20 kHz	20.6 $\mu$ V
	50 kHz to 100 kHz	118 $\mu$ V
	300 kHz to 1 MHz	451 $\mu$ V
	10 V to 100 V	
	40 Hz to 1 kHz	902 $\mu$ V
	100 V to 700 V	
	40 Hz to 1 kHz	9.8 mV
	AC Current At 1 kHz	
	0 to 100 $\mu$ A	35.3 nA
	100 $\mu$ A to 1 mA	196 nA
	1 mA to 10 mA	2 $\mu$ A
	10 mA to 100 mA	22 $\mu$ A
	100 mA to 1 A	775 $\mu$ A
6. High Voltage Meters/ Testers	Measure: (with probes)	
	DC V : 0 - 40 kV	8 V
	AC V : 0 - 28 kV (peak ac at 50 Hz)	90 V
	Measure: (direct)	
	DC V : 0 - 20 kV	3 V
	AC V : 0 - 20 kV at 50 Hz	48 V
	Generate:	
	DC V : 0 - 10 kV	6 V
	AC V : 0 - 10 kV at 50 Hz	47 V





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#### SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
7. Clamp Meters	DC Current	
	0 A to $\pm 10$ A	1.75 mA
	(up to 1000 A via multi-turn coil – 10 & 50 Turn Coil )	
	AC Current	
	0 A to $\pm 10$ A	1.8 mA
	40 Hz to 440 Hz	
	(up to 1000 A via multi-turn coil – 10 & 50 Turn Coil )	
	AC Current	
	10 A to 20 A	1.8 mA
	40 Hz to 110 Hz	
8. Withstanding / Insulation Voltage Testers	Measure: (direct)	
	DC V: 0 kV to 20 kV	3 V
	AC V: 0 kV to 20 kV at 50 Hz	47 V
	Resistance (Generate)	
	10 k $\Omega$ to 100 k $\Omega$	1.03 $\Omega$
	100 k $\Omega$ to 1000 k $\Omega$	10 $\Omega$
	1000 k $\Omega$ to 1 M $\Omega$	550 $\Omega$
	1 M $\Omega$ to 10 M $\Omega$	10 k $\Omega$
	10 M $\Omega$ to 100 M $\Omega$	120 k $\Omega$
	100 M $\Omega$ to 10 G $\Omega$	10 M $\Omega$
	Cut off Current (AC Current)	
	0 mA to 0.5 mA	10 $\mu$ A
	0.5 mA to 1.0 mA	10 $\mu$ A
	1.0 mA to 2.0 mA	30 $\mu$ A
	2.0 mA to 5.0 mA	60 $\mu$ A
	5.0 mA to 10.0 mA	110 $\mu$ A
	Timing (Measure)	
	0 sec to 30sec	30 msec
	30 sec to 1 min	30 msec
	1 min to 5 min	30 msec
	5 min to 10 min	220 msec
	10 min to 15 min	570 msec
	10 min to 25 min	570 msec



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#### SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
9. Function Generators / Audio Generators	Frequency Generate DC 0 MHz to 60 MHz	0.3 kHz
	Measure 0 MHz to 200 MHz	1 Hz.
10. Oscilloscope	Amplitude	
	100 V	0.98 $\mu$ V
	50 V	0.98 $\mu$ V
	20 V	0.98 $\mu$ V
	10 V	1.32 $\mu$ V
	5 V	2.78 $\mu$ V
	2 V	5.17 $\mu$ V
	1 V	9.69 $\mu$ V
	0.5 V	24 $\mu$ V
	0.2 V	49 $\mu$ V
	0.1 V	170 $\mu$ V
	10 mV	378 $\mu$ V
	1 mV	712 $\mu$ V
	Sweep	
	0.1 $\mu$ s	433 ps
	0.2 $\mu$ s	935 ps
	0.5 $\mu$ s	2 ns
	1 $\mu$ s	4 ns
	2 $\mu$ s	9 ns
	5 $\mu$ s	22 ns
	10 $\mu$ s	61 ns
	20 $\mu$ s	86 ns
	50 $\mu$ s	202 ns
	0.1 ms	418 ns





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#### SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
10. Oscilloscope (continued)	Sweep	
	0.2 ms	818 ns
	0.5 ms	2 $\mu$ s
	1 ms	3 $\mu$ s
	2 ms	8 $\mu$ s
	5 ms	20 $\mu$ s
	10 ms	40 $\mu$ s
	20 ms	80 $\mu$ s
	50 ms	199 $\mu$ s
	0.1 s	413 $\mu$ s
	0.2 s	924 $\mu$ s
	0.5 s	2 ms
	1 s	5 ms
	2 s	10 ms
	5 s	20 ms
	Bandwidth	
	0.25 MHz to 250 MHz	12 kHz
11. LCR Meters.		
A. Measuring Instruments.		
i) Inductance:	Frequency Range: 100 Hz to 1 kHz	
	100 $\mu$ H to 1000 $\mu$ H	70 nH
	1 mH to 10 mH	570 nH
	10 mH to 100 mH	10 $\mu$ H
	100 mH to 1000 mH	60 $\mu$ H
	1 H to 10 H	560 $\mu$ H
ii) Capacitance:	Frequency Range: 100 Hz to 1 kHz	
	1 pF to 10 pF	0.007 pF
	10 pF to 100 pF	0.02 pF
	100 pF to 1000 pF	0.07 pF
	1000 pF to 10000 pF	0.6 pF
	10 nF to 100 nF	10 pF
	100 nF to 1000 nF	60 pF



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#### SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
12. Universal Counters.		
i) Frequency:	60 MHz to 2 GHz	2.5 kHz
ii) Level:	+ 7 dBm to -70 dBm	1.5 dBm
13. Current Source.		
i) DC Current:	0 A to 2 A 0 A to 10 A	200 $\mu$ A 3 mA
ii) AC Current to 1 kHz:	0 A to 2 A 0 A to 10 A	1 mA 21 mA
iii) AC Current 1 to 5 kHz:	0 A to 10 A	22 mA
iv) AC Current 5 to 10 kHz:	0 A to 2 A	1 mA

Note : dBm is measured relative to 1 mW





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<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
14. DC Current (Source)	0 A to 20 A 0 A to 100 A	3 mA 3 mA
15. AC Current @ 50 Hz to 1 kHz (Source)	0 A to 20 A 0 A to 100 A	21 mA 34 mA
16. Time	0 sec. to 10 sec. 0 sec. to 100 sec. 0 sec. to 1000 sec. 0 sec. to 10000 sec. 0 min. to 100 min. 0 min. to 1000 min. 0 hr. to 24 hr.	130 msec. 130 msec. 160 msec. 610 msec. 610 msec. 3.43 sec. 4.92 sec.
17. Frequency (Source)	200 MHz to 3 GHz	1 Hz
18. Bandwidth For Oscilloscope	250 MHz to 1 GHz	520 kHz

#### Signatory:

1. Gurdeep Singh a/l Gurdial Singh IC No.: 731022-01-5529



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SITE CALIBRATION – CATEGORY 1

SCOPE OF ACCREDITATION:

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
1. Multimeters / Indicating Instruments		
a. DC Voltage	0 mV to 3.2 V	26 $\mu$ V
	3.2 V to 320 V	2.8 mV
	320 V to 1050 V	94 mV
b. AC Voltage		
	10 Hz to 3 kHz	
	0 mV to 10 mV	440 $\mu$ V
	10 mV to 32 mV	120 $\mu$ V
	32 mV to 320 mV	170 $\mu$ V
	0.32 V to 3.2 V	1.7 mV
	3.2 V to 32 V	17 mV
	32 V to 105 V	55 mV
	40 Hz to 100 Hz	
	105 V to 320 V	210 mV
	320 V to 800 V	520 mV
	800 V to 1000 V	740 mV
	100 Hz to 1 kHz	
	105 V to 320 V	210 mV
	320 V to 800 V	530 mV
	800 V to 1000 V	740 mV
	1 kHz to 3 kHz	
	105 V to 320 V	310 mV
	320 V to 800 V	800 mV
	800 V to 1000 V	1.1 V
	3 kHz to 10 kHz	
	0 mV to 10 mV	580 $\mu$ V
	10 mV to 32 mV	160 $\mu$ V
	32 mV to 320 mV	170 $\mu$ V
	0.32 V to 3.2 V	1.7 mV
	3.2 V to 32 V	25 mV
	32 V to 105 V	81 mV
	105 V to 320 V	330 mV
	320 V to 800 V	840 mV
	800 V to 1000 V	1.2 V





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SITE CALIBRATION – CATEGORY 1

SCOPE OF ACCREDITATION:

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
1. Multimeters / Indicating Instruments		
b. AC Voltage(continue)		
	10 kHz to 30 kHz	
	0 to 10 mV	1.1 mV
	10 mV to 32 mV	0.29 mV
	32 mV to 320 mV	0.27 mV
	0.32 V to 3.2 V	2.7 mV
	3.2 V to 32 V	34 mV
	32 V to 105 V	110 mV
	10 kHz to 20 kHz	
	105 V to 320 V	490 mV
	320 V to 800 V	1.3 V
	800 V to 1000 V	1.8 V
	30 kHz to 50 kHz	
	0 to 10 mV	2.2 mV
	10 mV to 32 mV	0.58 mV
	32 mV to 320 mV	0.43 mV
	0.32 V to 3.2 V	4.3 V
	3.2 V to 32 V	65 mV
	32 V to 105 V	210 mV
	20 kHz to 30 kHz	
	105 V to 320 V	620 mV
	320 V to 800 V	1.6 V
	10 kHz to 20 kHz	
	320 V to 800 V	1.8 V
	50 kHz to 100 kHz	
	0 to 10 mV	5.8 mV
	10 mV to 32 mV	1.5 mV
	32 mV to 320 mV	1 mV
	0.32 V to 3.2 V	10 mV
	3.2 V to 32 V	160 mV
	32 V to 105 V	530 mV



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SITE CALIBRATION – CATEGORY 1

SCOPE OF ACCREDITATION:

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
1. Multimeters / Indicating Instruments		
c. DC Current	0 to 320 $\mu$ A	63 nA
	mA to 3.2 mA	600 nA
	3.2 mA to 32 mA	6.1 $\mu$ A
	32 mA to 320 mA	69 $\mu$ A
	0.32 A to 3.2 A	2.3 mA
	3.2 A to 10.5 A	7.6 mA
	10.5 A to 20 A	18 mA
d. AC Current	10 Hz to 3 kHz	
	0 to 32 $\mu$ A	1.1 $\mu$ A
	32 $\mu$ A to 320 $\mu$ A	0.59 $\mu$ A
	0.32 mA to 3.2 mA	2.9 $\mu$ A
	3.2 mA to 32 mA	29 $\mu$ A
	32 mA to 320 mA	330 $\mu$ A
	0.32 A to 3.2 A	4.2 mA
	3.2 A to 10.5 A	27 mA
	10.5 A to 20 A	53 mA
	3 kHz to 10 kHz	
	0 to 32 $\mu$ A	2.1 $\mu$ A
	32 $\mu$ A to 320 $\mu$ A	1.1 $\mu$ A
	0.32 mA to 3.2 mA	4.3 $\mu$ A
	3.2 mA to 32 mA	43 mA
	32 mA to 320 mA	0.42 mA
	0.32 A to 3.2 A	12 mA
	3.2 A to 10.5 A	71 mA
	10.5 A to 20 A	140 mA
	10 kHz to 20 kHz	
	0 to 32 $\mu$ A	6.9 $\mu$ A
	32 $\mu$ A to 320 $\mu$ A	3.0 $\mu$ A
	0.32 mA to 3.2 mA	9.5 $\mu$ A
	3.2 mA to 32 mA	0.087 mA
	32 mA to 320 mA	0.8 mA
	20 kHz to 30 kHz	
	0 to 32 $\mu$ A	11 $\mu$ A
	32 $\mu$ A to 320 $\mu$ A	4.3 $\mu$ A
	0.32 mA to 3.2 mA	0.012 mA
	3.2 mA to 32 mA	0.12 mA
	32 mA to 320 mA	1.1 mA





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FIELD OF CALIBRATION: ELECTRICAL

SITE CALIBRATION – CATEGORY 1

SCOPE OF ACCREDITATION:

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
1. Multimeters / Indicating Instruments		
e. Resistance		
	0 to 40 $\Omega$	23 m $\Omega$
	40 $\Omega$ to 400 $\Omega$	91 m $\Omega$
	0.4 k $\Omega$ to 4 k $\Omega$	770 m $\Omega$
	4 k $\Omega$ to 40 k $\Omega$	7.7 $\Omega$
	40 k $\Omega$ to 400 k $\Omega$	91 $\Omega$
	0.4 M $\Omega$ to 4 M $\Omega$	1 k $\Omega$
	4 M $\Omega$ to 40 M $\Omega$	25 k $\Omega$
	40 M $\Omega$ to 400 M $\Omega$	320 k $\Omega$
f. Frequency		
	0.5 Hz to 320 Hz	1.1 mHz
	0.00050 kHz to 1 kHz	30 mHz
	1.00001 kHz to 3.2 kHz	91 mHz
	0.0005 kHz to 32 kHz	910 mHz
	0.001 kHz to 320 kHz	1.4 Hz
	0.00001 MHz to 3.2 MHz	91 Hz
	0.0001 MHz to 10 MHz	300 kHz
g. Capacitance		
	0.5 nF to 4 nF	31 pF
	4 nF to 40 nF	170 pF
	40 nF to 400 nF	1.5 nF
	400 nF to 4 $\mu$ F	22 nF
	4 $\mu$ F to 40 $\mu$ F	240 nF
	40 $\mu$ F to 400 $\mu$ F	2.4 $\mu$ F
	400 $\mu$ F to 4 mF	24 $\mu$ F
	4 mF to 40 mF	520 $\mu$ F

Signatory:

1. Gurdeep Singh a/l Gurdial Singh

IC No.: 731022-01-5529



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**FIELD OF CALIBRATION: ELECTRICAL**

**SITE CALIBRATION – CATEGORY 1**

**SCOPE OF ACCREDITATION:**

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
2. High Voltage Measurement		
(High Voltage Testers / Puncture Testers / Spark Testers)		
DC Voltage	0 kV to 2 kV	1 V
	2 kV to 5 kV	7 V
	5 kV to 10 kV	9 V
	10 kV to 15 kV	11 V
	15 kV to 20 kV	14 V
AC Voltage	<u>20 Hz to 100 Hz</u>	
	0 kV to 2 kV	4 V
	2 kV to 5 kV	34 V
	5 kV to 10 kV	45 V
	10 kV to 15 kV	57 V
	15 kV to 20 kV	68 V
CutOff Current AC Current	<u>40 Hz to 1 kHz</u>	
	0 mA to 0.5 mA	0.03 mA
	0.5 mA to 1 mA	0.04 mA
	1 mA to 2 mA	0.05 mA
	2 mA to 5 mA	0.11 mA
	5 mA to 10 mA	0.18 mA

**Signatory:**

**1. Gurdeep Singh a/l Gurdial Singh**

**IC No.: 731022-01-5529**





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FIELD OF CALIBRATION: ELECTRICAL

SITE CALIBRATION – CATEGORY 1

SCOPE OF ACCREDITATION:

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
3. Measuring Instruments	Up to 1000 Vmax.	
Resistance	100 $\Omega$ to 1 k $\Omega$	110 m $\Omega$
	1 k $\Omega$ to 10 k $\Omega$	620 m $\Omega$
	10 k $\Omega$ to 100 k $\Omega$	10 $\Omega$
	100 k $\Omega$ to 1000 k $\Omega$	110 $\Omega$
	1000 k $\Omega$ to 10 M $\Omega$	1.2 k $\Omega$
	10 M $\Omega$ to 100 M $\Omega$	20 k $\Omega$
	100 M $\Omega$ to 1000 M $\Omega$	230 k $\Omega$
	1000 M $\Omega$ to 10 G $\Omega$	110 M $\Omega$
4. Source Instruments		
a. DC Voltage	0 mV to 100 mV	1.8 $\mu$ V
	100 mV to 1 V	9.4 $\mu$ V
	1 V to 10 V	200 $\mu$ V
	10 V to 100 V	1.2 mV
	100 V to 1000 V	12 mV
b. DC Current	0 mA to 10 mA	8 $\mu$ A
	10 mA to 100 mA	63 $\mu$ A
	100 mA to 1000 mA	1.3mA
	1 A to 3 A	5 mA
	3 A to 20 A	5.3 mA
	20 A to 100 A	18 mA



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FIELD OF CALIBRATION: ELECTRICAL

SITE CALIBRATION – CATEGORY 1

SCOPE OF ACCREDITATION:

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
Source Instruments (Con't)		
c. AC Voltage	0 mV to 10 mV (40 Hz to 1 kHz)	4.0 $\mu$ V
	100 mV to 10 V (40 Hz to 1 kHz)	1.0 mV
	10 V to 100 V (40 Hz to 1 kHz)	25 mV
	100 V to 1000 V (40 Hz to 1 kHz)	480 mV
d. AC Current	0 A to 1 A (10 Hz to 5 kHz)	2 mA
	1 A to 3 A (10 Hz to 5 kHz)	7.2 mA
	3 A to 20 A (10 Hz to 1 kHz)	23 mA
	20 A to 100 A (10 Hz to 1 kHz)	110 mA

Signatory:

1. Gurdeep Singh a/l Gurdial Singh

IC No.: 731022-01-5529





## Schedule

Issue date: 20 November 2008  
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### FIELD OF CALIBRATION : DIMENSIONAL MEASUREMENTS

#### SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
Micrometer	25mm travers for micrometer frames: 0.001 mm to 50 mm 50 mm to 100 mm	1 $\mu$ m 2 $\mu$ m
Caliper	0.50 mm to 300 mm 300 mm to 500 mm 500 mm to 600 mm	9 $\mu$ m 15 $\mu$ m 18 $\mu$ m
Caliper Checker (outside measurement only)	20 mm to 300 mm 300 mm to 450 mm	4 $\mu$ m 6 $\mu$ m
Calibration Tester	0.001 mm to 25 mm	1.4 $\mu$ m
Dial / Digimatic Indicator	0.001 mm to 50 mm 50 mm to 100 mm	1 $\mu$ m 2 $\mu$ m
Dial Test Indicator	0.001 mm to 1 mm	1 $\mu$ m
Dial / Dial Gauge	0.001 mm to 50 mm 50 mm to 100 mm	1 $\mu$ m 2 $\mu$ m
Feeler Gauge	0.005 mm to 2 mm	1.4 $\mu$ m
Pin Gauge (Diameter only )	0.2 mm to 40 mm	2.8 $\mu$ m
Standard Rod	5 mm to 150 mm 150 mm to 300 mm 300 mm to 450 mm	3 $\mu$ m 5 $\mu$ m 7 $\mu$ m
Depth Gauge	0.001 mm to 300 mm	5 $\mu$ m

#### Signatory:

1. Murali a/l Subramaniam

IC No.: 660315-10-5047



## Schedule

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### FIELD OF CALIBRATION :TEMPERATURE

### SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
Liquid-in-glass Thermometer (Total immersion)	- 30 °C to 250°C	0.2 °C
Digital Thermometer with probe	- 30 °C to 250°C	0.3 °C
Temperature Indicating Instruments (By Electrical Simulation)	Type K -200 °C to 1300 °C	0.4 °C
	Type J -200 °C to 1200 °C	0.4 °C
	Type T -200 °C to 400°C	0.4 °C
	Type E -200 °C to 1000 °C	0.4 °C
	Type R 0°C to 1700 °C	1.2 °C
	Type S 0°C to 1700 °C	0.7 °C
Mechanical Thermometer	- 30 °C to 250°C	0.6 °C

### Signatory:

1. Zaidi Bin Borham

IC No.: 780121-01-7299





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### FIELD OF CALIBRATION :TEMPERATURE

### SITE CALIBRATION – CATEGORY 1

### SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
Temperature indicating Instrument (by electrical simulation)	Type K -200°C to 1300°C	0.4 °C
	Type J -200°C to 1200°C	0.4 °C
	Type T -200°C to 400°C	0.4 °C
	Type E -200°C to 1000°C	0.4 °C
	Type R 0°C to 1700°C	1.2 °C
	Type S 0°C to 1700°C	0.7 °C
	PT 100 -200°C to 800°C	0.4 °C
Temperature Controlled Enclosure	-20 °C to 0 °C	1.4 °C
	0 °C to 250 °C	1.1 °C

### Signatory:

1. Zaidi Bin Borham

IC No.: 780121-01-7299



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FIELD OF CALIBRATION : MASS

SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
Standard Weight	1 mg	0.010 mg
	2 mg	0.010 mg
	5 mg	0.010 mg
	10 mg	0.011 mg
	20 mg	0.012 mg
	50 mg	0.014 mg
	100 mg	0.016 mg
	200 mg	0.019 mg
	500 mg	0.022 mg
	1 g	0.027 mg
	2 g	0.033 mg
	5 g	0.040 mg
	10 g	0.053 mg
	20 g	0.066 mg
	50 g	0.085 mg
	100 g	0.14 mg
	200 g	0.26 mg
	500 g	0.65 mg
Standard Weight	1 kg	0.10 g
	2 kg	0.12 g
	5 kg	0.21 g
	10 kg	0.38 g
	20 kg	0.74 g
	25 kg	0.93 g

Signatory:

1. Murali a/l Subramaniam

IC No.: 660315-10-5047





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FIELD OF CALIBRATION : MASS

SITE CALIBRATION – CATEGORY 1

SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
Analytical Balance	1 mg to 200 g	0.1 mg
Mechanical / Electronic Balance	1 mg to 500 g	0.8 mg
	500 g to 1 kg	1.5 mg
	1 kg to 10 kg	15 mg
	10 kg to 20 kg	90 mg
	20 kg to 100 kg	14 g
	100 kg to 200 kg	21 g
	200 kg to 500 kg	37 g
	500 kg to 1000 kg	62 g
	1000 kg to 2000 kg	150 g

Signatory:

1. Murali a/l Subramaniam

IC No.: 660315-10-5047



## Schedule

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FIELD OF CALIBRATION : FORCE

SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
Tension Gauge / Push Pull Gauge / Digital Force Gauge	1 mgf to 1 kgf 1 kgf to 5 kgf 5 kgf to 20 kgf 20 kgf to 50 kgf 50 kgf to 100 kgf	6 mgf 23 mgf 110 mgf 9 gf 14 gf

Signatory:

1. Murali a/l Subramaniam

IC No.: 660315-10-5047

FIELD OF CALIBRATION : FORCE

SITE CALIBRATION – CATEGORY 1

SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
Universal Testing Machine & Load Cell (Compression Mode)	0 kgf to 100 kgf 101 kgf to 1000 kgf 1001 kgf to 5000 kgf 5001 kgf to 30000 kgf 10001 kgf to 60000 kgf 60001 kgf to 180000 kgf	0.01 kgf 0.1 kgf 3 kgf 50 kgf 31 kgf 202 kgf

Signatory:

1. Murali a/l Subramaniam

IC No.: 660315-10-5047



## Schedule

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### FIELD OF CALIBRATION : PRESSURE

#### SCOPE OF ACCREDITATION :

<u>Instrument calibrated/ Measurement parameter</u>	<u>Range</u>	<u>Best measurement capability expressed as an uncertainty (<math>\pm</math>)*</u>
Pressure Indicating Instruments	0 psi to 800 psi (Low pressure)	0.015 % reading
	800 psi to 16000 psi (High pressure)	0.03 % of reading

#### Signatory:

1. Murali a/l Subramaniam

IC No.: 660315-10-5047

