



財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate of Accreditation

(Certificate No: LN0688-230717)

This is to certify that

National Measurement Laboratory R. O. C.
National Measurement Laboratory R. O. C.
(Electricity, Magnetism, Photometry and Radiometry, Dimension)
No.321, Kuang Fu Rd, Sec. 2 Hsinchu, Taiwan (R.O.C.)

is accredited in respect of laboratory

Accreditation Criteria : ISO/IEC 17025: 2017; CNS 17025: 2018

Accreditation Number : N0688

Originally Accredited : October 15, 2000

Effective Period : October 15, 2019 to October 14, 2024

Accredited Scope : Calibration Field, see described in the Appendix

Specific Accreditation Program : Accreditation Program for National Metrology Institutes



Scan to verify

Ching-Chang Lien

Ching-Chang Lien
President, Taiwan Accreditation Foundation
July 17, 2023

Accreditation Number : N0688

Laboratory Head : LIN, Tzeng-Yow

Length

calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA1001 Long Gauge Blocks (ISO 3650, CNS 8092) (Steel)	Long Gauge Blocks/ KOBAL/26088	instrument calibration technique for long gauge block standard-using precision long gauge block measurement (Document No.: 07-3-95-0033)	100	mm	1000	mm		$[67^2 + (365L)^2]^{0.5}$ nominal length L in m	nm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA1001 Long Gauge Blocks (ISO 3650, CNS 8092) (Steel)	Long Gauge Blocks/ KOBAL/1008M	instrument calibration technique for long gauge block by comparator (Document No.: 07-3-84-0105)	100	mm	600	mm		$[84^2 + (735L)^2]^{0.5}$ nominal length L in m	nm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA1001 Gauge Blocks (ISO 3650/ 122 pieces, CNS 8092/ 122 pieces) (Steel, Ceramic, Chromium carbide, Tungsten carbide)	Gauge Blocks/ PTW/ B-1 & B18	instrument calibration technique for gauge blocks by Federal 130B-24 comparator (Document No.: 07-3-86-0034)	0.5	mm	100	mm	Steel	$[39^2 + (0.5L)^2]^{0.5}$ nominal length L in mm	nm
			0.5	mm	100	mm	Ceramic	$[39^2 + (0.6L)^2]^{0.5}$ nominal length L in mm	nm
			0.5	mm	100	mm	Chromium carbide	$[40^2 + (0.8L)^2]^{0.5}$ nominal length L in mm	nm
			0.5	mm	100	mm	Tungsten carbide	$[40^2 + (1.9L)^2]^{0.5}$ nominal length L in mm	nm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA1001 Gauge Blocks (ISO 3650, CNS 8092) (Steel)	Red stabilized laser/ Melles Griot/ 25-STP-912-249	instrument calibration technique for gauge blocks-gauge block interferometer (Document No.: 07-3-93-0141)	0.5	mm	100	mm		$[23^2 + (0.30L)^2]^{0.5}$ nominal length L in mm	nm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA1002 Pin Gauges	Pin Gauge/GSG	instrument calibration technique for pin gauges (Document No.: 07-3-95-0050)	1	mm	20	mm		$[0.22^2 + (0.013D)^2]^{0.5}$ external diameter D in mm	μm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA1002 Plug Gauges	Plug Gauge/ GSG/ 20 & ETALON/ 50	instrument calibration technique for plug gauge-use of labmaster universal measuring system (Document No.: 07-3-95-0132)	20	mm	100	mm		$1.98 \times [0.135^2 + (0.00137L)^2]^{0.5}$ external diameter L in mm	μm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA1003 Ring Gauges	Ring Gauge/ Cary/ 12 & VK/ 50 & VK/100	instrument calibration technique for setting ring gauge-use of labmaster universal measuring system (Document No.: 07-3-90-0138)	4	mm	200	mm		$1.99 \times [0.135^2 + (0.00137L)^2]^{0.5}$ internal diameter L in mm	μm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA1004 Step Gauge, Caliper Checker	Laser Interferometer/ HP/5517A	instrument calibration technique for step gauge (Document No.: 07-3-A5-0193)	10	mm	1010	mm		$1.97 \times [0.29^2 + (4.03 \times 10^{-7}L)^2]^{0.5}$, L in mm	μm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA1011 Step Height Standards	Frequency stabilized He-Ne lasers/ Melles Griot/ 05-STP-901	instrument calibration technique for step height standard-optical method (Document No.: 07-3-93-0010)	0.01	μm	3	μm		$[3^2 + (1.2D)^2]^{0.5}$ step height D in μm	nm
			> 3	μm	100	μm		$[9.5^2 + (3.6D)^2]^{0.5}$ step height D in μm	nm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA1011 Step Height Standards	Step Height Standards/ Taylor Hobson/ 112-557	instrument calibration technique for step height standard-stylus method (Document No.: 07-3-92-0097)	0.01	μm	50	μm		$[5^2 + (3.2D)^2]^{0.5}$ step height D in μm	nm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA1012 Electronic Distance Meters, Total Stations	Rubidium clock/ Datum/8040A	instrument calibration technique for the geodetic length measuring instruments (Document No.: 07-3-81-0007)	0.000	km	0.432	km	resolution: 0.1 mm	$[0.8^2 + (0.4L)^2]^{0.5}$ L in km	mm
			0.000	km	0.432	km	resolution: 1.0 mm	$[1.0^2 + (0.4L)^2]^{0.5}$ L in km	mm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
Calibration Site: 1.Hsinchu National Standard Baseline									
KA1018 Stabilized Lasers	Rubidium clock/ Stanford Research Systems/ FS 725	instrument calibration technique for iodine stabilized He-Ne lasers (Document No.: 07-3-A1-0124)	633	nm	633	nm	474 THz	0.002	fm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA1018 Stabilized Lasers	Iodine stabilized He-Ne lasers/ CMS/ NML & Winters/ NML	instrument calibration technique for frequency stabilized lasers (Document No.: 07-3-85-0051)	633	nm	633	nm	474 THz	0.03	fm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA1020 Laser Interferometers	Laser Interferometers/ HP/5519A	instrument calibration technique for laser interferometers (Document No.: 07-3-90-0056)	0.1	m	10	m	With air sensors	$[62^2 + (120L)^2]^{0.5} L$ in m	nm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA1021 Global Positioning System Receivers	Rubidium clock/ Datum/8040A	instrument calibration technique for GPS static and kinematic positioning calibration system (Document No.: 07-3-91-0086)	≤ 50	m	≤ 50	m	(1) Static Relative Positioning (a) super short distance	5.1	mm
			≤ 25	km	≤ 25	km	(1) Static Relative Positioning (b) mid-distance	19	mm



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA1021 Global Positioning System Receivers	Rubidium clock/ Datum/8040A	instrument calibration technique for GPS static and kinematic positioning calibration system (Document No.: 07-3-91-0086)	≤ 50	m	≤ 50	m	(2) Dynamic Relative Positioning (c) super short distance	5.1	mm
							(3) Absolute positioning	35	mm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA1022 Standard Particle	Polystyrene Sphere/ NIST 1963a, NIST 1691, Thermo 3500A	instrument calibration technique for nanoparticale size-differential mobility analysis (Document No.: 07-3-97-1826)	20	nm	250	nm	Particle Size Polystyrene Sphere, Diameter D	0.021D + 0.115, D in nm	nm
			> 250	nm	< 350	nm	Particle Size Polystyrene Sphere, Diameter D	0.012D, D in nm	nm
			350	nm	500	nm	Particle Size Polystyrene Sphere, Diameter D	0.022D + 2.027, D in nm	nm
Approval Signatory: LIN, Fang-Hsin; CHANG, Ching-Hsuan; CHEN, Sheng-Jui; FU, Wei-En									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA1022 Standard Particle	Standard gold particle/ NIST/8011/8012/8013	instrument calibration technique for scanning electron microscope system-standard particle size (Document No.: 07-3-A0-2415)	10	nm	< 30	nm	Particle Size	1.5	nm
			30	nm	60	nm	Particle Size	5.4	nm
Approval Signatory: LIN, Fang-Hsin; CHANG, Ching-Hsuan; CHEN, Sheng-Jui; FU, Wei-En									
KA1022 Standard Particle	Dynamic light scattering/ Malvern/ Zetasizer Nano ZS/ Scattering angle at 173°	instrument calibration technique for nanoparticles size-dynamic light scattering (Document No.: 07-3-94-0104)	20	nm	20	nm	Particle Size Polystyrene Sphere 20 nm to 1000 nm	0.8	nm
			> 20	nm	50	nm	Particle Size Polystyrene Sphere 20 nm to 1000 nm	1.8	nm
			> 50	nm	100	nm	Particle Size Polystyrene Sphere 20 nm to 1000 nm	3.3	nm
			> 100	nm	200	nm	Particle Size Polystyrene Sphere 20 nm to 1000 nm	6.4	nm
			> 200	nm	300	nm	Particle Size Polystyrene Sphere 20 nm to 1000 nm	9.8	nm
			> 300	nm	500	nm	Particle Size Polystyrene Sphere 20 nm to 1000 nm	17	nm
			> 500	nm	800	nm	Particle Size Polystyrene Sphere 20 nm to 1000 nm	26	nm



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA1022 Standard Particle	Dynamic light scattering/ Malvern/ Zetasizer Nano ZS/ Scattering angle at 173°	instrument calibration technique for nanoparticles size-dynamic light scattering (Document No.: 07-3-94-0104)	> 800	nm	1000	nm	Particle Size Polystyrene Sphere 20 nm to 1000 nm	34	nm
Approval Signatory: LIN, Fang-Hsin; CHANG, Ching-Hsuan; CHEN, Sheng-Jui; FU, Wei-En									
KA2001 Standard Rules	Laser Interferometers/ KEYSIGHT/5517C	instrument calibration technique for line scale standards (Document No.: 07-3-84-0055)	0.01	mm	1000	mm		$[29.6^2 + (0.126L)^2]^{0.5}$ line spacing L in mm	nm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA2002 Standard Tapes, Steel Tapes	Laser Interferometers/ Agilent/5519A	instrument calibration technique for scale tapes (Document No.: 07-3-A5-0037)	0.001	m	10	m		$[16.9^2 + (2.9L)^2]^{0.5}$ line spacing L in m	μm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA2013 Bar Coded Invar Steel Levelling Staffs	Laser Interferometers/ Agilent/5519A	instrument calibration technique for scale tapes (Document No.: 07-3-A5-0037)	0.1	m	3	m		$[11.2^2 + (2.6L)^2]^{0.5}$ line spacing L in m	μm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA2014 1-D Grating: Pitch	Pitch Standards/ Ted Pella/70-1DUTC	instrument calibration technique for scanning electron microscope measurement system-pitch (Document No.: 07-3-A0-2414)	70	nm	< 700	nm		0.29	nm
			700	nm	1000	nm		2.9	nm
Approval Signatory: LIN, Fang-Hsin; CHANG, Ching-Hsuan; CHEN, Sheng-Jui; FU, Wei-En									
KA2014 1-D Grating: Pitch	Laser Interferometer/ Renishaw/ RLU10-A3-A3	instrument calibration technique for pitch standard calibration system by metrological AFM (Document No.: 07-3-A3-0267)	50	nm	25	μm		0.14	nm
Approval Signatory: LIN, Fang-Hsin; CHANG, Ching-Hsuan; CHEN, Sheng-Jui; FU, Wei-En									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA2014 1-D Grating: Pitch	He-Ne laser/ Melles Griot/ 25LGR193-249	instrument calibration technique for pitch standards by laser diffractometer (Document No.: 07-3-93-0067)	280	nm	300	nm		0.008	nm
			> 300	nm	700	nm		0.030	nm
			> 700	nm	10000	nm		6.4	nm
Approval Signatory: LIN, Fang-Hsin; CHANG, Ching-Hsuan; CHEN, Sheng-Jui; FU, Wei-En									
KA3001 Angle Gauge Blocks	Angle Gauge Blocks/ Starrett/AG16.LM	instrument calibration technique for angle blocks (Document No.: 07-3-76-0068)	1	"	45	°		0.45	"
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA3002 Cylindrical Squares, Squares	Principle of reversal technique	instrument calibration technique for squares (absolute method) (Document No.: 07-3-91-0170)	1	mm	600	mm		0.32 (0.93 μm/600 mm)	"
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA3004 Precision Indexing Tables	Precision Polygons/Starrett/OP-12 & OP-18 & Polygons/CSSC/—	instrument calibration technique for indexing tables (Document No.: 07-3-91-0026)	0.1	°	360	°		0.20	"
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA3005 Polygons	Circle closure	instrument calibration technique for polygons (Document No.: 07-3-86-0023)	3	face	72	face		0.15	"
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA3007 Optical Theodolites, Electronic Theodolites, Total Stations	Precision Indexing Tables/AA GAGE/2921487	instrument calibration technique for geodetic angle-measuring instruments (Document No.: 07-3-85-0085)	0	°	360	°		0.8	"
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA3016 Electronic Levels	Small angle generator/Hilger & Watts/TA48	instrument calibration technique for electronic level (Document No.: 07-3-81-0006)	-6	'	6	'	resolution: 0.2"	0.5	"
			-1	°	1	°	resolution: 1"	1.3	"
			-1	°	1	°	resolution: 2"	2.0	"
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA4001 Roughness Standards	Step Height Standards/Taylor Hobson/112-557	instrument calibration technique for surface roughness standard specimen (Document No.: 07-3-76-0064)	0.01	μm	20	μm	Average parameters, Ra and Rq	$[5^2 + (13R)^2]^{0.5}$ R in μm	nm
			0.01	μm	20	μm	Average parameters, Rmax, Rt and Rz	$[20^2 + (13R)^2]^{0.5}$ R in μm	nm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA4004 Roundness Standards	Gauge blocks/Mahr/--	instrument calibration technique for roundness standard (Document No.: 07-3-76-0019)	0.01	μm	2	μm		15	nm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA4004 Roundness Standards	Flick Standard/ Taylor Hobson	instrument calibration technique for roundness standard-rotating pick-up type (Document No.: 07-3-98-3024)	0.01	μm	2	μm		$[5.0^2 + (67R)^2]^{0.5}$ R in μm	nm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA4008 Coordinate Measuring Machine (On-site calibration included)	LaserTRACER/ eTALON	instrument calibration technique for coordinate measuring machine (Document No.: 07-3-A4-0118)	200	mm	10000	mm		$1.97 \times [0.21^2 + (6.4 \times 10^{-7} L)^2]^{0.5}$, L in mm	μm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									
KA4009 Film Thickness Standards	Goniometer/ PANalytical/ X'PERT PRO	instrument calibration technique of thin film calibration by X-ray reflector (Document No.: 07-3-95-0199)	1.5	nm	200	nm		0.02	nm
Approval Signatory: LIN, Fang-Hsin; CHANG, Ching-Hsuan; CHEN, Sheng-Jui; FU, Wei-En									
Calibration Site: .No.195, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan (R.O.C.)									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA4009 Film Thickness Standards	Spectroscopic Ellipsometer/ HORIBA Jobin Yvon/ 300 Auto	instrument calibration technique for thin film measurement system by spectroscopic ellipsometer (Document No.: 07-3-91-0007)	1.5	nm	1000	nm		0.10	nm
Approval Signatory: LIN, Fang-Hsin; CHANG, Ching-Hsuan; CHEN, Sheng-Jui; FU, Wei-En									
Calibration Site: No.195, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan (R.O.C.)									
KA4010 Grid Plate: Grid Point Coordinates and Pitch	Standard Rules/ Mitutoyo/02ATL102	instrument calibration technique for two-dimensional optical image-based standard (Document No.: 07-3-98-5558)	10×10	μm	1.0×1.0	mm	2-D (under Field of View)	$[0.36^2 + (0.00166L)^2]^{0.5}$, L in mm	μm
			1	mm	400	mm	1-D	$[0.36^2 + (0.00166L)^2]^{0.5}$, L in mm	μm
			10×10	μm	400×400	mm	2-D (with Machine Motion)	$[0.77^2 + (0.00166L)^2]^{0.5}$, L in mm	μm
Approval Signatory: CHANG, Ming-Wei; CHANG, Kuo-Ming; CHEN, Wen-Jen; TSAI, Chin-Lung									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KA4099 Specific Surface Area of Standard Particle	Specific Surface Area Analyzer/ Micrometrics/ ASAP2020	instrument calibration technique for nanoparticle size measurement system- calibration of specific surface area by gas adsorption BET method (Document No.: 07-3-A3-0184)	3	m ² /g	100	m ² /g	gas adsorption-BETmethod	2.8 (relative)	%
			> 100	m ² /g	600	m ² /g	gas adsorption-BETmethod	2.1 (relative)	%
Approval Signatory: LIN, Fang-Hsin; CHANG, Ching-Hsuan; CHEN, Sheng-Jui; FU, Wei-En									

Electricity

calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF1001 DC voltage source DC voltage meter	Datron 4910	instrument calibration technique for DC voltage system (Document No.: 07-3-76-0088)	1	mV	1	mV		0.7	mV/V
			10	mV	10	mV		0.07	mV/V
			100	mV	100	mV		7	μV/V
			1	V	1	V		0.8	μV/V
			10	V	10	V		0.4	μV/V
			100	V	100	V		0.7	μV/V



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF1001 DC voltage source DC voltage meter	Datron 4910	instrument calibration technique for DC voltage system (Document No.: 07-3-76-0088)	1000	V	1000	V		6	μV/V
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KF1001 DC voltage standard cell	Fluke 732A, 732B	instrument calibration technique for DC 1 V-10 V system (Document No.: 07-3-82-0001)	1	V	1	V		0.3	μV/V
			1.018	V	1.018	V		0.3	μV/V
			10	V	10	V		0.3	μV/V
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KF1002 DC (low) current source DC (low) current meter	KEITHLEY 6517A, ESI SR1050	instrument calibration technique for DC low current system (Document No.: 07-3-84-0109)	10	pA	10	pA		0.9	mA/A
			100	pA	100	pA		0.47	mA/A
			1	nA	1	nA		0.26	mA/A
			10	nA	10	nA		0.21	mA/A
			100	nA	100	nA		0.21	mA/A
			1	μA	1	μA		0.21	mA/A
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF1002 DC current shunt DC current meter DC current source	Guildline 9211A	instrument calibration technique for DC middle-range current system (Document No.: 07-3-86-0036)	10	μA	10	μA		24	μA/A
			100	μA	100	μA		20	μA/A
			1	mA	1	mA		20	μA/A
			10	mA	10	mA		20	μA/A
			100	mA	100	mA		20	μA/A
			1	A	1	A		22	μA/A
			2	A	2	A		29	μA/A
			5	A	5	A		27	μA/A
			10	A	10	A		27	μA/A
			20	A	20	A		61	μA/A
			50	A	50	A		58	μA/A
			100	A	100	A		58	μA/A
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KF1003 DC high voltage source DC high voltage meter DC high voltage divider	EIS PARK	instrument calibration technique for DC high voltage system (Document No.: 07-3-76-0081)	1	kV	200	kV		0.1	mV/V
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF1004 DC current shunt DC current meter DC current source	H.TINSLEY 4638	instrument calibration technique for DC high current system (Document No.: 07-3-86-0056)	300	A	300	A		0.36	mA/A
			500	A	500	A		0.36	mA/A
			1000	A	1000	A		0.36	mA/A
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KF1011 thermal voltage converter (TVC) , micropotentiometer (μ pot) , AC voltage source, AC voltage meter	NML TVC NML μpot	instrument calibration technique for AC-DC voltage transfer (Document No.: 07-3-81-0014)	0.2	V	0.2	V	@ 20 Hz	37	μV/V
			0.2	V	0.2	V	@ 40 Hz	75	μV/V
			0.2	V	0.2	V	@ 60 Hz	42	μV/V
			0.2	V	0.2	V	@ 1 kHz	27	μV/V
			0.2	V	0.2	V	@ 10 kHz	25	μV/V
			0.2	V	0.2	V	@ 30 kHz	35	μV/V
			0.2	V	0.2	V	@ 100 kHz	71	μV/V
			0.2	V	0.2	V	@ 300 kHz	65	μV/V
			0.2	V	0.2	V	@ 500 kHz	80	μV/V
			0.2	V	0.2	V	@ 800 kHz	89	μV/V
			0.2	V	0.2	V	@ 1 MHz	82	μV/V
			0.5	V	0.5	V	@ 20 Hz	16	μV/V
			0.5	V	0.5	V	@ 40 Hz to 1 kHz	11	μV/V
			0.5	V	0.5	V	@ 10 kHz	10	μV/V
			0.5	V	0.5	V	@ 30 kHz	11	μV/V
			0.5	V	0.5	V	@ 100 kHz	15	μV/V
			0.5	V	0.5	V	@ 300 kHz	27	μV/V
			0.5	V	0.5	V	@ 500 kHz	42	μV/V
			0.5	V	0.5	V	@ 800 kHz	53	μV/V



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF1011 thermal voltage converter (TVC) , micropotentiometer (μ pot) , AC voltage source, AC voltage meter	NML TVC NML μ pot	instrument calibration technique for AC-DC voltage transfer (Document No.: 07-3-81-0014)	0.5	V	0.5	V	@ 1 MHz	64	μ V/V
			1	V	1	V	@ 20 Hz	13	μ V/V
			1	V	1	V	@ 40 Hz	9	μ V/V
			1	V	1	V	@ 60 Hz	8	μ V/V
			1	V	1	V	@ 1 kHz	9	μ V/V
			1	V	1	V	@ 10 kHz to 30 kHz	8	μ V/V
			1	V	1	V	@ 100 kHz	12	μ V/V
			1	V	1	V	@ 300 kHz	23	μ V/V
			1	V	1	V	@ 500 kHz	37	μ V/V
			1	V	1	V	@ 800 kHz	47	μ V/V
			1	V	1	V	@ 1 MHz	58	μ V/V
			2	V	2	V	@ 20 Hz	11	μ V/V
			2	V	2	V	@ 40 Hz to 60 Hz	5	μ V/V
			2	V	2	V	@ 1 kHz to 30 kHz	4	μ V/V
			2	V	2	V	@ 100 kHz	8	μ V/V
			2	V	2	V	@ 300 kHz	18	μ V/V
			2	V	2	V	@ 500 kHz	30	μ V/V
			2	V	2	V	@ 800 kHz	40	μ V/V
			2	V	2	V	@ 1 MHz	50	μ V/V
			4	V	4	V	@ 20 Hz	13	μ V/V
			4	V	4	V	@ 40 Hz to 60 Hz	9	μ V/V
			4	V	4	V	@ 1 kHz to 30 kHz	8	μ V/V
			4	V	4	V	@ 100 kHz	12	μ V/V
			4	V	4	V	@ 300 kHz	23	μ V/V
			4	V	4	V	@ 500 kHz	37	μ V/V



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF1011 thermal voltage converter (TVC) , micropotentiometer (μ pot) , AC voltage source, AC voltage meter	NML TVC NML μ pot	instrument calibration technique for AC-DC voltage transfer (Document No.: 07-3-81-0014)	4	V	4	V	@ 800 kHz	47	μ V/V
			4	V	4	V	@ 1 MHz	58	μ V/V
			10	V	10	V	@ 20 Hz	19	μ V/V
			10	V	10	V	@ 40 Hz to 30 kHz	12	μ V/V
			10	V	10	V	@ 100 kHz	17	μ V/V
			10	V	10	V	@ 300 kHz	31	μ V/V
			10	V	10	V	@ 500 kHz	46	μ V/V
			10	V	10	V	@ 800 kHz	58	μ V/V
			10	V	10	V	@ 1 MHz	70	μ V/V
			20	V	20	V	@ 20 Hz	21	μ V/V
			20	V	20	V	@ 40 Hz to 60 Hz	15	μ V/V
			20	V	20	V	@ 1 kHz	14	μ V/V
			20	V	20	V	@ 10 kHz to 30 kHz	15	μ V/V
			20	V	20	V	@ 100 kHz	19	μ V/V
			20	V	20	V	@ 300 kHz	34	μ V/V
			20	V	20	V	@ 500 kHz	51	μ V/V
			20	V	20	V	@ 800 kHz	63	μ V/V
			20	V	20	V	@ 1 MHz	76	μ V/V
			40	V	40	V	@ 20 Hz	24	μ V/V
			40	V	40	V	@ 40 Hz to 30 kHz	17	μ V/V
			40	V	40	V	@ 100 kHz	20	μ V/V
			40	V	40	V	@ 300 kHz	37	μ V/V
			100	V	100	V	@ 20 Hz	30	μ V/V
			100	V	100	V	@ 40 Hz to 30 kHz	22	μ V/V
			100	V	100	V	@ 100 kHz	29	μ V/V



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF1011 thermal voltage converter (TVC) , micropotentiometer (μ pot) , AC voltage source, AC voltage meter	NML TVC NML μ pot	instrument calibration technique for AC-DC voltage transfer (Document No.: 07-3-81-0014)	200	V	400	V	@ 20 Hz	45	μ V/V
			200	V	400	V	@ 40 Hz to 30 kHz	36	μ V/V
			200	V	400	V	@ 100 kHz	51	μ V/V
			500	V	1000	V	@ 20 Hz	60	μ V/V
			500	V	1000	V	@ 40 Hz to 10 kHz	52	μ V/V
			500	V	1000	V	@ 30 kHz	59	μ V/V
			100	mV	100	mV	@ 20 Hz	47	μ V/V
			100	mV	100	mV	@ 40 Hz	80	μ V/V
			100	mV	100	mV	@ 60 Hz	51	μ V/V
			100	mV	100	mV	@ 1 kHz	40	μ V/V
			100	mV	100	mV	@ 10 kHz	38	μ V/V
			100	mV	100	mV	@ 30 kHz	45	μ V/V
			100	mV	100	mV	@ 100 kHz	83	μ V/V
			100	mV	100	mV	@ 300 kHz	77	μ V/V
			100	mV	100	mV	@ 500 kHz	98	μ V/V
			100	mV	100	mV	@ 800 kHz to 1 MHz	0.12	mV/V
			50	mV	50	mV	@ 20 Hz	55	μ V/V
			50	mV	50	mV	@ 40 Hz	85	μ V/V
			50	mV	50	mV	@ 60 Hz	58	μ V/V
			50	mV	50	mV	@ 1 kHz	49	μ V/V
			50	mV	50	mV	@ 10 kHz	48	μ V/V
			50	mV	50	mV	@ 30 kHz	53	μ V/V
			50	mV	50	mV	@ 100 kHz	93	μ V/V
			50	mV	50	mV	@ 300 kHz	88	μ V/V
			50	mV	50	mV	@ 500 kHz	0.12	mV/V



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF1011 thermal voltage converter (TVC) , micropotentiometer (μ pot) , AC voltage source, AC voltage meter	NML TVC NML μ pot	instrument calibration technique for AC-DC voltage transfer (Document No.: 07-3-81-0014)	50	mV	50	mV	@ 800 kHz	0.14	mV/V
			50	mV	50	mV	@ 1 MHz	0.15	mV/V
			20	mV	20	mV	@ 20 Hz	79	μ V/V
			20	mV	20	mV	@ 40 Hz	0.11	mV/V
			20	mV	20	mV	@ 60 Hz	81	μ V/V
			20	mV	20	mV	@ 1 kHz	75	μ V/V
			20	mV	20	mV	@ 10 kHz	74	μ V/V
			20	mV	20	mV	@ 30 kHz	78	μ V/V
			20	mV	20	mV	@ 100 kHz	0.12	mV/V
			20	mV	20	mV	@ 300 kHz	0.13	mV/V
			20	mV	20	mV	@ 500 kHz	0.16	mV/V
			20	mV	20	mV	@ 800 kHz	0.20	mV/V
			20	mV	20	mV	@ 1 MHz	0.25	mV/V
			10	mV	10	mV	@ 20 Hz	97	μ V/V
			10	mV	10	mV	@ 40 Hz	0.12	mV/V
			10	mV	10	mV	@ 60 Hz	99	μ V/V
			10	mV	10	mV	@ 1 kHz	94	μ V/V
			10	mV	10	mV	@ 10 kHz	93	μ V/V
			10	mV	10	mV	@ 30 kHz	96	μ V/V
			10	mV	10	mV	@ 100 kHz	0.14	mV/V
			10	mV	10	mV	@ 300 kHz	0.15	mV/V
			10	mV	10	mV	@ 500 kHz	0.20	mV/V
			10	mV	10	mV	@ 800 kHz	0.25	mV/V
			10	mV	10	mV	@ 1 MHz	0.32	mV/V
			5	mV	5	mV	@ 20 Hz	0.12	mV/V



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF1011 thermal voltage converter (TVC) , micropotentiometer (μ pot) , AC voltage source, AC voltage meter	NML TVC NML μ pot	instrument calibration technique for AC-DC voltage transfer (Document No.: 07-3-81-0014)	5	mV	5	mV	@ 40 Hz	0.14	mV/V
			5	mV	5	mV	@ 60 Hz	0.12	mV/V
			5	mV	5	mV	@ 1 kHz to 10 kHz	0.11	mV/V
			5	mV	5	mV	@ 30 kHz	0.12	mV/V
			5	mV	5	mV	@ 100 kHz	0.16	mV/V
			5	mV	5	mV	@ 300 kHz	0.18	mV/V
			5	mV	5	mV	@ 500 kHz	0.23	mV/V
			5	mV	5	mV	@ 800 kHz	0.28	mV/V
			5	mV	5	mV	@ 1 MHz	0.40	mV/V
			2	mV	2	mV	@ 20 Hz	0.13	mV/V
			2	mV	2	mV	@ 40 Hz	0.15	mV/V
			2	mV	2	mV	@ 60 Hz to 30 kHz	0.13	mV/V
			2	mV	2	mV	@ 100 kHz	0.18	mV/V
			2	mV	2	mV	@ 300 kHz	0.20	mV/V
			2	mV	2	mV	@ 500 kHz	0.26	mV/V
			2	mV	2	mV	@ 800 kHz	0.32	mV/V
			2	mV	2	mV	@ 1 MHz	0.45	mV/V
			1	mV	1	mV	@ 20 Hz	0.17	mV/V
			1	mV	1	mV	@ 40 Hz	0.18	mV/V
			1	mV	1	mV	@ 60 Hz	0.16	mV/V
			1	mV	1	mV	@ 1 kHz to 30 kHz	0.17	mV/V
			1	mV	1	mV	@ 100 kHz	0.20	mV/V
			1	mV	1	mV	@ 300 kHz	0.23	mV/V
			1	mV	1	mV	@ 500 kHz	0.29	mV/V
			1	mV	1	mV	@ 800 kHz	0.36	mV/V



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF1011 thermal voltage converter (TVC) , micropotentiometer (μ pot) , AC voltage source, AC voltage meter	NML TVC NML μpot	instrument calibration technique for AC-DC voltage transfer (Document No.: 07-3-81-0014)	1	mV	1	mV	@ 1 MHz	0.50	mV/V
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KF1012 AC current source AC transconductance amplifier AC current meter AC current shunt	Fluke A40B/ Fluke 5790B	instrument calibration technique for AC current measurement system (Document No.: 07-3-A6-0095)	100	μA	< 300	μA	@ 20 Hz to 10 kHz	0.12	mA/A
			300	μA	100	A	@ 20 Hz to 10 kHz	0.07	mA/A
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KF1012 thermal current converter, AC current shunt, AC current source, AC current meter	NML 101, 115, 129, PTB/ IPHT 227	instrument calibration technique for AC-DC current transfer system (Document No.: 07-3-78-0026)	1	mA	2.5	mA	@ 20 Hz to 10 kHz	18	μA/A
			1	mA	2.5	mA	@ 20 kHz	24	μA/A
			1	mA	2.5	mA	@ 50 kHz	40	μA/A
			1	mA	2.5	mA	@ 100 kHz	50	μA/A
			5	mA	5	mA	@ 20 Hz to 10 kHz	15	μA/A
			5	mA	5	mA	@ 20 kHz	20	μA/A
			5	mA	5	mA	@ 50 kHz	26	μA/A



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF1012 thermal current converter, AC current shunt, AC current source, AC current meter	NML 101, 115, 129, PTB/IPHT 227	instrument calibration technique for AC-DC current transfer system (Document No.: 07-3-78-0026)	5	mA	5	mA	@ 100 kHz	40	μA/A
			10	mA	10	mA	@ 20 Hz to 10 kHz	11	μA/A
			10	mA	10	mA	@ 20 kHz	15	μA/A
			10	mA	10	mA	@ 50 kHz	19	μA/A
			10	mA	10	mA	@ 100 kHz	24	μA/A
			20	mA	20	mA	@ 20 Hz to 10 kHz	15	μA/A
			20	mA	20	mA	@ 20 kHz	20	μA/A
			20	mA	20	mA	@ 50 kHz	26	μA/A
			20	mA	20	mA	@ 100 kHz	40	μA/A
			30	mA	30	mA	@ 20 Hz to 10 kHz	18	μA/A
			30	mA	30	mA	@ 20 kHz	24	μA/A
			30	mA	30	mA	@ 50 kHz	40	μA/A
			30	mA	30	mA	@ 100 kHz	50	μA/A
			50	mA	50	mA	@ 20 Hz to 10 kHz	22	μA/A
			50	mA	50	mA	@ 20 kHz	28	μA/A
			50	mA	50	mA	@ 50 kHz	40	μA/A
			50	mA	50	mA	@ 100 kHz	50	μA/A
			100	mA	100	mA	@ 20 Hz to 10 kHz	24	μA/A
			100	mA	100	mA	@ 20 kHz	40	μA/A
			100	mA	100	mA	@ 50 kHz	50	μA/A
			100	mA	100	mA	@ 100 kHz	60	μA/A
			200	mA	200	mA	@ 20 Hz to 10 kHz	26	μA/A
			200	mA	200	mA	@ 20 kHz	40	μA/A
			200	mA	200	mA	@ 50 kHz	50	μA/A
			200	mA	200	mA	@ 100 kHz	60	μA/A



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF1012 thermal current converter, AC current shunt, AC current source, AC current meter	NML 101, 115, 129, PTB/IPHT 227	instrument calibration technique for AC-DC current transfer system (Document No.: 07-3-78-0026)	300	mA	300	mA	@ 20 Hz to 10 kHz	28	μA/A
			300	mA	300	mA	@ 20 kHz	40	μA/A
			300	mA	300	mA	@ 50 kHz	50	μA/A
			300	mA	300	mA	@ 100 kHz	70	μA/A
			500	mA	500	mA	@ 20 Hz to 10 kHz	30	μA/A
			500	mA	500	mA	@ 20 kHz	50	μA/A
			500	mA	500	mA	@ 50 kHz	60	μA/A
			500	mA	500	mA	@ 100 kHz	70	μA/A
			1	A	1	A	@ 20 Hz to 10 kHz	40	μA/A
			1	A	1	A	@ 20 kHz	50	μA/A
			1	A	1	A	@ 50 kHz	60	μA/A
			1	A	1	A	@ 100 kHz	80	μA/A
			2	A	2	A	@ 20 Hz to 10 kHz	40	μA/A
			2	A	2	A	@ 20 kHz	50	μA/A
			2	A	2	A	@ 50 kHz	70	μA/A
			2	A	2	A	@ 100 kHz	80	μA/A
			3	A	3	A	@ 20 Hz to 10 kHz	40	μA/A
			3	A	3	A	@ 20 kHz	60	μA/A
			3	A	3	A	@ 50 kHz	70	μA/A
			3	A	3	A	@ 100 kHz	90	μA/A
			5	A	5	A	@ 20 Hz to 10 kHz	50	μA/A
			5	A	5	A	@ 20 kHz	60	μA/A
			5	A	5	A	@ 50 kHz	80	μA/A
			5	A	5	A	@ 100 kHz	0.10	mA/A
			10	A	10	A	@ 20 Hz to 10 kHz	50	μA/A



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF1012 thermal current converter, AC current shunt, AC current source, AC current meter	NML 101, 115, 129, PTB/IPHT 227	instrument calibration technique for AC-DC current transfer system (Document No.: 07-3-78-0026)	10	A	10	A	@ 20 kHz	70	μA/A
			10	A	10	A	@ 50 kHz	80	μA/A
			10	A	10	A	@ 100 kHz	0.11	mA/A
			20	A	20	A	@ 20 Hz to 10 kHz	60	μA/A
			20	A	20	A	@ 20 kHz	70	μA/A
			20	A	20	A	@ 50 kHz	90	μA/A
			20	A	20	A	@ 100 kHz	0.12	mA/A
			500	μA	500	μA	@ 20 Hz to 1 kHz	40	μA/A
			500	μA	500	μA	@ 5 kHz	40	μA/A
			500	μA	500	μA	@ 10 kHz	50	μA/A
			200	μA	200	μA	@ 20 Hz to 1 kHz	40	μA/A
			200	μA	200	μA	@ 5 kHz	40	μA/A
			200	μA	200	μA	@ 10 kHz	60	μA/A
			100	μA	100	μA	@ 20 Hz to 1 kHz	40	μA/A
			100	μA	100	μA	@ 5 kHz	50	μA/A
			100	μA	100	μA	@ 10 kHz	60	μA/A
			50	μA	50	μA	@ 20 Hz to 1 kHz	40	μA/A
			50	μA	50	μA	@ 5 kHz	50	μA/A
			50	μA	50	μA	@ 10 kHz	70	μA/A
			20	μA	20	μA	@ 20 Hz	60	μA/A
			20	μA	20	μA	@ 40 Hz to 1 kHz	50	μA/A
			20	μA	20	μA	@ 5 kHz	70	μA/A
			20	μA	20	μA	@ 10 kHz	90	μA/A
			10	μA	10	μA	@ 20 Hz	70	μA/A
			10	μA	10	μA	@ 40 Hz to 1 kHz	60	μA/A



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF1012 thermal current converter, AC current shunt, AC current source, AC current meter	NML 101, 115, 129, PTB/ IPHT 227	instrument calibration technique for AC-DC current transfer system (Document No.: 07-3-78-0026)	10	μA	10	μA	@ 5 kHz	0.11	mA/A
			10	μA	10	μA	@ 10 kHz	0.25	mA/A
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KF1015 DC voltage standard digital voltage meter	Josephson chip	instrument calibration technique for programmable josephson voltage measurement system (Document No.: 07-3-A1-0079)	10	V	10	V		98	nV
			1.018	V	1.018	V		50	nV
			1	V	1	V		50	nV
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF1016 current transformer AC current coil integrator current shunt	Tettex-4764	instrument calibration technique for current transformer measurement system (Document No.: 07-3-76-0083)	5	A	5000	A	primary current 5 A to 5000 A, secondary current 1 A, 5 A (@ frequency 60 Hz) – ratio error	7.0E-05	
			5	A	5000	A	primary current 5 A to 5000 A, secondary current 1 A, 5 A (@ frequency 60 Hz) – phase angle error	24	μrad
			5	A	5000	A	primary current 5 A to 5000 A, secondary current 1 A, 5 A (@ frequency 60 Hz) -voltage	0.29	mV/V
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KF1017 potential transformer AC high voltage meter AC high voltage attenuator voltage instrument transformer test system	Tettex 4829	instrument calibration technique for potential transformer measurement system (Document No.: 07-3-76-0084)	1	kV	100	kV	primary voltage 1 kV to 100 kV, secondary voltage 10 V to 240 V (@ frequency 60 Hz) -ratio error	8.2E-05	
			1	kV	100	kV	primary voltage 1 kV to 100 kV, secondary voltage 10 V to 240 V (@ frequency 60 Hz) – phase angle error	60	μrad
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF2001 single-phase ac power source, single-phase ac power meter, single-phase ac watt converter, three-phase ac power source, three-phase ac power meter	Radian RD-33-373	instrument calibration technique for single-phase AC electrical power measurement system (Document No.: 07-3-A3-0312) , instrument calibration technique for three-phase AC electrical power measurement system (Document No.: 07-3-A4-0146)	1.1	W	4.8	W	(1) single-phase active power: voltage (110, 120, 220, 240, 480) V; current 0.01 A; power factor 1; frequency (50, 60) Hz	0.21	mW/W
			0.55	W	2.4	W	(1) single-phase active power: voltage (110, 120, 220, 240, 480) V; current 0.01 A; power factor 0.5 Lead/Lag; frequency (50, 60) Hz	0.41	mW/W
			11	W	38.4	kW	(1) single-phase active power: voltage (110, 120, 220, 240, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 1; frequency (50, 60) Hz	70	μW/W
			5.5	W	19.2	kW	(1) single-phase active power: voltage (110, 120, 220, 240, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 0.5 Lead/Lag; frequency (50, 60) Hz	0.14	mW/W
			1.1	var	4.8	var	(2) single-phase reactive power: voltage (110, 120, 220, 240, 480) V; current 0.01 A; power factor 0 Lead/Lag; frequency (50, 60) Hz	0.21	mvar/var



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF2001 single-phase ac power source, single-phase ac power meter, single-phase ac watt converter, three-phase ac power source, three-phase ac power meter	Radian RD-33-373	instrument calibration technique for single-phase AC electrical power measurement system (Document No.: 07-3-A3-0312) , instrument calibration technique for three-phase AC electrical power measurement system (Document No.: 07-3-A4-0146)	0.55	var	2.4	var	(2) single-phase reactive power: voltage (110, 120, 220, 240, 480) V; current 0.01 A; power factor 0.866 Lead/Lag; frequency (50, 60) Hz	0.41	mvar/var
			11	var	38.4	kvar	(2) single-phase reactive power: voltage (110, 120 , 220, 240, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 0 Lead/Lag; frequency (50, 60) Hz	70	μvar/var
			5.5	var	19.2	kvar	(2) single-phase reactive power: voltage (110, 120, 220, 240, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 0.866 Lead/Lag; frequency (50, 60) Hz	0.14	mvar/var
			2.2	V	22	V	(3) voltage harmonic: fundamental voltage (110, 220) V; hamonic-to-fundamental ratio (2, 10) %; fundamental frequency (50, 60) Hz; harmonic number 2, 3, 5, 10	0.31	mV/V



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF2001 single-phase ac power source, single-phase ac power meter, single-phase ac watt converter, three-phase ac power source, three-phase ac power meter	Radian RD-33-373	instrument calibration technique for single-phase AC electrical power measurement system (Document No.: 07-3-A3-0312) , instrument calibration technique for three-phase AC electrical power measurement system (Document No.: 07-3-A4-0146)	2.2	V	22	V	(3) voltage harmonic: fundamental voltage (110, 220) V; hamonic-to-fundamental ratio (2, 10) %; fundamental frequency (50, 60) Hz; harmonic number 20, 30, 40, 50, 64	0.63	mV/V
			0.02	A	1	A	(4) current harmonic: fundamental current (1, 2, 5, 10) A; hamonic-to-fundamental ratio (2, 10) %; fundamental frequency (50, 60) Hz; harmonic number 2, 3, 5, 10	0.24	mA/A
			0.02	A	1	A	(4) current harmonic: fundamental current (1, 2, 5, 10) A; hamonic-to-fundamental ratio (2, 10) %; fundamental frequency (50, 60) Hz; harmonic number 20, 30, 40, 50, 64	0.48	mA/A
			3.3	W	14.4	W	(1) three-phase active power: voltage (110, 220, 480) V; current 0.01 A; power factor 1; frequency (50, 60) Hz	0.21	mW/W



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF2001 single-phase ac power source, single-phase ac power meter, single-phase ac watt converter, three-phase ac power source, three-phase ac power meter	Radian RD-33-373	instrument calibration technique for single-phase AC electrical power measurement system (Document No.: 07-3-A3-0312) , instrument calibration technique for three-phase AC electrical power measurement system (Document No.: 07-3-A4-0146)	1.65	W	7.2	W	(1) three-phase active power: voltage (110, 220, 480) V; current 0.01 A; power factor 0.5 Lead/Lag; frequency (50, 60) Hz	0.41	mW/W
			33	W	115.2	kW	(1) three-phase active power: voltage (110, 220, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 1; frequency (50, 60) Hz	70	μW/W
			16.5	W	57.6	kW	(1) three-phase active power: voltage (110, 220, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 0.5 Lead/Lag; frequency (50, 60) Hz	0.14	mW/W
			3.3	var	14.4	var	(2) three-phase reactive power: voltage (110, 220, 480) V; current 0.01 A; power factor 0 Lead/Lag; frequency (50, 60) Hz	0.21	mvar/var
			1.65	var	7.2	var	(2) three-phase reactive power: voltage (110, 220, 480) V; current 0.01 A; power factor 0.866 Lead/Lag; frequency (50, 60) Hz	0.41	mvar/var



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF2001 single-phase ac power source, single-phase ac power meter, single-phase ac watt converter, three-phase ac power source, three-phase ac power meter	Radian RD-33-373	instrument calibration technique for single-phase AC electrical power measurement system (Document No.: 07-3-A3-0312) ,	33	var	115.2	kvar	(2) three-phase reactive power: voltage (110, 220, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 0 Lead/Lag; frequency (50, 60) Hz	70	μvar/var
		instrument calibration technique for three-phase AC electrical power measurement system (Document No.: 07-3-A4-0146)	16.5	var	57.6	kvar	(2) three-phase reactive power: voltage (110, 220, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 0.866 Lead/Lag; frequency (50, 60) Hz	0.14	mvar/var
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF2002 single-phase ac energy meter, single-phase ac watthour converter, three-phase ac energy meter	Radian RD-33-373	instrument calibration technique for single-phase AC electrical energy measurement system (Document No.: 07-3-A3-0313) , instrument calibration technique for three-phase AC electrical energy measurement system (Document No.: 07-3-A4-0148)	0.037	Wh	0.16	Wh	(1) single-phase active energy: voltage (110, 120 , 220, 240, 480) V; current 0.01 A; power factor 1; frequency (50, 60) Hz; time 2 min	0.24	mWh/Wh
			0.018	Wh	0.08	Wh	(1) single-phase active energy: voltage (110, 120 , 220, 240, 480) V; current 0.01 A; power factor 0.5 Lead/Lag; frequency (50, 60) Hz; time 2 min	0.47	mWh/Wh
			0.367	Wh	1.28	kWh	(1) single-phase active energy: voltage (110, 120 , 220, 240, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 1; frequency (50, 60) Hz; time 2 min	0.10	mWh/Wh
			0.183	Wh	640	Wh	(1) single-phase active energy: voltage (110, 120 , 220, 240, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 0.5 Lead/Lag; frequency (50, 60) Hz; time 2 min	0.19	mWh/Wh
			0.037	varh	0.16	varh	(2) single-phase reactive energy: voltage (110, 120 , 220, 240, 480) V; current 0.01 A; power factor 0 Lead/Lag; frequency (50, 60) Hz; time 2 min	0.24	mvarh/varh



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF2002 single-phase ac energy meter, single-phase ac watthour converter, three-phase ac energy meter	Radian RD-33-373	instrument calibration technique for single-phase AC electrical energy measurement system (Document No.: 07-3-A3-0313) , instrument calibration technique for three-phase AC electrical energy measurement system (Document No.: 07-3-A4-0148)	0.018	varh	0.08	varh	(2) single-phase reactive energy: voltage (110, 120 , 220, 240, 480) V; current 0.01 A; power factor 0.866 Lead/Lag; frequency (50, 60) Hz; time 2 min	0.47	mvarh/varh
			0.367	varh	1.28	kvarh	(2) single-phase reactive energy: voltage (110, 120 , 220, 240, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 0 Lead/Lag; frequency (50, 60) Hz; time 2 min	0.10	mvarh/varh
			0.183	varh	640	varh	(2) single-phase reactive energy: voltage (110, 120 , 220, 240, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 0.866 Lead/Lag; frequency (50, 60) Hz; time 2 min	0.19	mvarh/varh
			0.11	Wh	0.48	Wh	(1) three-phase active energy: voltage (110, 220, 480) V; current 0.01 A; power factor 1; frequency (50, 60) Hz; time 2 min	0.24	mWh/Wh
			0.055	Wh	0.24	Wh	(1) three-phase active energy: voltage (110, 220, 480) V; current 0.01 A; power factor 0.5 Lead/Lag; frequency (50, 60) Hz; time 2 min	0.47	mWh/Wh



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF2002 single-phase ac energy meter, single-phase ac watt-hour converter, three-phase ac energy meter	Radian RD-33-373	instrument calibration technique for single-phase AC electrical energy measurement system (Document No.: 07-3-A3-0313), instrument calibration technique for three-phase AC electrical energy measurement system (Document No.: 07-3-A4-0148)	1.1	Wh	3.84	kWh	(1) three-phase active energy: voltage (110, 220, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 1; frequency (50, 60) Hz; time 2 min	0.10	mWh/Wh
			0.55	Wh	1.92	kWh	(1) three-phase active energy: voltage (110, 220, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 0.5 Lead/Lag; frequency (50, 60) Hz; time 2 min	0.19	mWh/Wh
			0.11	varh	0.48	varh	(2) three-phase reactive energy: voltage (110, 220, 480) V; current 0.01 A; power factor 0 Lead/Lag; frequency (50, 60) Hz; time 2 min	0.24	mvarh/varh
			0.055	varh	0.24	varh	(2) three-phase reactive energy: voltage (110, 220, 480) V; current 0.01 A; power factor 0.866 Lead/Lag; frequency (50, 60) Hz; time 2 min	0.47	mvarh/varh
			1.1	varh	3.84	kvarh	(2) three-phase reactive energy: voltage (110, 220, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 0 Lead/Lag; frequency (50, 60) Hz; time 2 min	0.10	mvarh/varh



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF2002 single-phase ac energy meter, single-phase ac watthour converter, three-phase ac energy meter	Radian RD-33-373	instrument calibration technique for single-phase AC electrical energy measurement system (Document No.: 07-3-A3-0313) , instrument calibration technique for three-phase AC electrical energy measurement system (Document No.: 07-3-A4-0148)	0.55	varh	1.92	kvarh	(2) three-phase reactive energy: voltage (110, 220, 480) V; current (0.1, 1, 5, 10, 50, 80) A; power factor 0.866 Lead/Lag; frequency (50, 60) Hz; time 2 min	0.19	mvarh/varh
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KF2003 phase meter phase generator	Clarke Hess/5500	instrument calibration technique for phase angle measurement system (Document No.: 07-3-76-0085)	90	°	90	°	@ voltage 5 V (@ 60 Hz, 400 Hz, 1 kHz, 10 kHz, 50 kHz)	0.02	°
			180	°	180	°	@ voltage 5 V (@ 60 Hz, 400 Hz, 1 kHz, 10 kHz, 50 kHz)	0.02	°
			180	°	180	°	@ voltage 50 V (60 Hz, 400 Hz)	0.02	°
			180	°	180	°	@ voltage 100 V (60 Hz, 400 Hz)	0.02	°
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF3001 DC high resistor DC high resistance meter multimeter calibrator decade resistor	Guildline 9330, MI 4310HR	instrument calibration technique for direct high resistance system (Document No.: 07-3-76-0086)	1	MΩ	1	MΩ		9	μΩ/Ω
			10	MΩ	10	MΩ		11	μΩ/Ω
			100	MΩ	100	MΩ		15	μΩ/Ω
			1	GΩ	1	GΩ		17	μΩ/Ω
			10	GΩ	10	GΩ		31	μΩ/Ω
			100	GΩ	100	GΩ		33	μΩ/Ω
			1	TΩ	1	TΩ		73	μΩ/Ω
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KF3001 DC standard resistor	Quantized Hall Resistance	instrument calibration technique for quantum hall resistance standard (Document No.: 07-3-89-0053)	1	kΩ	1	kΩ		0.06	μΩ/Ω
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF3001 DC standard resistor multimeter calibrator decade resistor	LN4221, LN4222, LN4223, TETTEX 3220KD, LN4210, LN4214, Tinsley 5685A, Tinsley 5685B, Guildline 9330	instrument calibration technique for direct resistance system (Document No.: 07-3-84-0042)	0.1	mΩ	0.1	mΩ	@ < 100 A	0.7	μΩ/Ω
			0.1	mΩ	0.1	mΩ	@ 100 A to 1000 A	35	μΩ/Ω
			0.001	Ω	0.001	Ω		2.7	μΩ/Ω
			0.01	Ω	0.01	Ω		0.7	μΩ/Ω
			0.1	Ω	0.1	Ω		0.7	μΩ/Ω
			1	Ω	1	Ω		0.16	μΩ/Ω
			10	Ω	10	Ω		0.16	μΩ/Ω
			100	Ω	100	Ω		0.16	μΩ/Ω
			1	kΩ	1	kΩ		0.15	μΩ/Ω
			10	kΩ	10	kΩ		0.15	μΩ/Ω
			100	kΩ	100	kΩ		0.18	μΩ/Ω
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KF3002 standard inductor LCR meter	GR 1482-B, GR 1482-E, GR 1482-H, GR 1482-L, GR 1482-P, GR 1482-T	instrument calibration technique for standard inductance system (Document No.: 07-3-76-0090)	100	μH	100	μH	@ frequency 100 Hz	1.2	mH/H
			1	mH	1	mH	@ frequency 100 Hz	0.22	mH/H
			10	mH	10	mH	@ frequency 100 Hz	0.22	mH/H
			100	mH	100	mH	@ frequency 100 Hz	0.22	mH/H
			1	H	1	H	@ frequency 100 Hz	0.22	mH/H
			10	H	10	H	@ frequency 100 Hz	0.22	mH/H
			100	μH	100	μH	@ frequency 1 kHz	1.2	mH/H
			1	mH	1	mH	@ frequency 1 kHz	0.22	mH/H
			10	mH	10	mH	@ frequency 1 kHz	0.22	mH/H
			100	mH	100	mH	@ frequency 1 kHz	0.22	mH/H
			1	H	1	H	@ frequency 1 kHz	0.52	mH/H



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF3002 standard inductor LCR meter	GR 1482-B, GR 1482-E, GR 1482-H, GR 1482-L, GR 1482-P, GR 1482-T	instrument calibration technique for standard inductance system (Document No.: 07-3-76-0090)	10	H	10	H	@ frequency 1 kHz	2.0	mH/H
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KF3003 standard capacitor, capacitance bridge, LCR meter	GR 1404-A	instrument calibration technique for standard capacitance-traced to resistance standard (Document No.: 07-3-93-0054)	1	pF	1	pF	@ frequency 1000 Hz	0.58	μF/F
			10	pF	10	pF	@ frequency 1000 Hz	0.55	μF/F
			100	pF	100	pF	@ frequency 1000 Hz	0.56	μF/F
			1000	pF	1000	pF	@ frequency 1000 Hz	0.56	μF/F
			1	pF	1	pF	@ frequency 1592 Hz	0.25	μF/F
			10	pF	10	pF	@ frequency 1592 Hz	0.22	μF/F
			100	pF	100	pF	@ frequency 1592 Hz	0.21	μF/F
			1000	pF	1000	pF	@ frequency 1592 Hz	0.20	μF/F
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KF3003 standard capacitor, capacitance bridge, LCR meter	AH 11A, GR 1404A	instrument calibration technique for standard capacitance system-1 kHz capacitance standard (Document No.: 07-3-84-0076)	0.001	μF	0.001	μF	@ frequency 1 kHz two-terminal	0.56	mF/F
			0.01	μF	0.01	μF	@ frequency 1 kHz two-terminal	60	μF/F
			0.1	μF	0.1	μF	@ frequency 1 kHz two-terminal	30	μF/F
			1	μF	1	μF	@ frequency 1 kHz two-terminal	70	μF/F
			1	pF	1	pF	@ frequency 1 kHz three-terminal	2	μF/F
			10	pF	10	pF	@ frequency 1 kHz three-terminal	0.9	μF/F
			100	pF	100	pF	@ frequency 1 kHz three-terminal	0.7	μF/F
			1000	pF	1000	pF	@ frequency 1 kHz three-terminal	1.2	μF/F
			1	pF	1	pF	@ frequency 1 kHz four-terminal-pair	30	μF/F
			10	pF	10	pF	@ frequency 1 kHz four-terminal-pair	30	μF/F
			100	pF	100	pF	@ frequency 1 kHz four-terminal-pair	30	μF/F
			1000	pF	1000	pF	@ frequency 1 kHz four-terminal-pair	30	μF/F
			0.01	μF	0.01	μF	@ frequency 1 kHz four-terminal-pair	30	μF/F
			0.1	μF	0.1	μF	@ frequency 1 kHz four-terminal-pair	30	μF/F
1	μF	1	μF	@ frequency 1 kHz four-terminal-pair	70	μF/F			
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KF3006 silicon sheet resistance standards	Guildline 9330, HP 34420A	instrument calibration technique for sheet resistance system (Document No.: 07-3-90-0055)	0.15	Ω	4000	Ω		0.46	%
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
Calibration Site: .No.195, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan (R.O.C.)									



Electromagnetics

calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG1001 microwave power meter	HP8478B/HP11683	instrument calibration technique for microwave power meter (Document No.: 07-3-80-0009)	1	mW	1	mW	Power Reference: Frequency 50 MHz	0.51	%
			-25	dBm	20	dBm	Power Range	0.28	%
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KG1001 microwave power sensor	HP8478B	instrument calibration technique for microwave power sensor (Document No.: 07-3-82-0093)	0.8		1		Thermistor Mount: Power 1 mW Frequency 10 MHz	1.7	%
			0.8		1		Thermistor Mount: Power 1 mW Frequency 50 MHz	1.2	%
			0.8		1		Thermistor Mount: Power 1 mW Frequency 51 MHz to 4 GHz	1.5	%
			0.8		1		Thermistor Mount: Power 1 mW Frequency 4001 MHz to 8 GHz	1.8	%
			0.8		1		Thermistor Mount: Power 1 mW Frequency 8001 MHz to 18 GHz	2.6	%



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG1001 microwave power sensor	HP8478B	instrument calibration technique for microwave power sensor (Document No.: 07-3-82-0093)	0.8		1		Power Sensor: Power 1 mW Frequency 10 MHz	1.7	%
			0.8		1		Power Sensor: Power 1 mW Frequency 50 MHz	1.3	%
			0.8		1		Power Sensor: Power 1 mW Frequency 51 MHz to 4 GHz	1.6	%
			0.8		1		Power Sensor: Power 1 mW Frequency 4001 MHz to 8 GHz	1.8	%
			0.8		1		Power Sensor: Power 1 mW Frequency 8001 MHz to 18 GHz	2.6	%
			0.8		1		Power Sensor with 30 dB Pad: Power 1 μ W Frequency 10 MHz	2.0	%
			0.8		1		Power Sensor with 30 dB Pad: Power 1 μ W Frequency 50 MHz	1.7	%
			0.8		1		Power Sensor with 30 dB Pad: Power 1 μ W Frequency 51 MHz to 4 GHz	1.9	%



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG1001 microwave power sensor	HP8478B	instrument calibration technique for microwave power sensor (Document No.: 07-3-82-0093)	0.8		1		Power Sensor with 30 dB Pad: Power 1 μW Frequency 4001 MHz to 8 GHz	2.1	%
			0.8		1		Power Sensor with 30 dB Pad: Power 1 μW Frequency 8001 MHz to 18 GHz	3.0	%
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KG1002 short circuit, open circuit, load, mismatch, air line, attenuator, component	HP/85055-60003 HP/85055-60004 HP/85053-60001 HP/85053-60002	instrument calibration technique for network devices with microwave S-parameters and impedance system (Document No.: 07-3-80-0076)	0		1		Reflection Coefficient Type N: @ 10 MHz to 500 MHz	0.0054 (linear)	
			0	°	180	°	Reflection Coefficient Type N: @ 10 MHz to 500 MHz	1.0	°
			0		1		Reflection Coefficient Type N: @ > 500 MHz to 2 GHz	0.0054 (linear)	
			0	°	180	°	Reflection Coefficient Type N: @ > 500 MHz to 2 GHz	1.0	°
			0		1		Reflection Coefficient Type N: @ > 2 GHz to 18 GHz	0.0058 (linear)	
			0	°	180	°	Reflection Coefficient Type N: @ > 2 GHz to 18 GHz	1.1	°
			0		1		Reflection Coefficient 3.5 mm: @ 10 MHz to 45 MHz	0.0048 (linear)	
			0	°	180	°	Reflection Coefficient 3.5 mm: @ 10 MHz to 45 MHz	1.1	°



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG1002 short circuit, open circuit, load, mismatch, air line, attenuator, component	HP/85055-60003	instrument calibration technique for network devices with microwave S-parameters and impedance system (Document No.: 07-3-80-0076)	0		1		Reflection Coefficient 3.5 mm: @ > 45 MHz to 2 GHz	0.0048 (linear)	
	HP/85055-60004		0	°	180	°	Reflection Coefficient 3.5 mm: @ > 45 MHz to 2 GHz	1.1	°
	HP/85053-60001		0		1		Reflection Coefficient 3.5 mm: @ > 2 GHz to 20 GHz	0.0080 (linear)	
	HP/85053-60002		0	°	180	°	Reflection Coefficient 3.5 mm: @ > 2 GHz to 20 GHz	2.3	°
			0		1		Reflection Coefficient 3.5 mm: @ > 20 GHz to 26.5 GHz	0.0084 (linear)	
			0	°	180	°	Reflection Coefficient 3.5 mm: @ > 20 GHz to 26.5 GHz	2.4	°
			0		1		Reflection Coefficient 2.92 mm: @ 45 MHz to 2 GHz	0.018 (linear)	
			0	°	180	°	Reflection Coefficient 2.92 mm: @ 45 MHz to 2 GHz	2.9	°
			0		1		Reflection Coefficient 2.92 mm: @ > 2 GHz to 26.5 GHz	0.009 (linear)	
			0	°	180	°	Reflection Coefficient 2.92 mm: @ > 2 GHz to 26.5 GHz	1.6	°
			0		1		Reflection Coefficient 2.92 mm: @ > 26.5 GHz to 40 GHz	0.018 (linear)	
			0	°	180	°	Reflection Coefficient 2.92 mm: @ > 26.5 GHz to 40 GHz	2.9	°



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG1002 short circuit, open circuit, load, mismatch, air line, attenuator, component	HP/85055-60003 HP/85055-60004 HP/85053-60001 HP/85053-60002	instrument calibration technique for network devices with microwave S-parameters and impedance system (Document No.: 07-3-80-0076)	> -20	dB	0	dB	Transmission Coefficient Type N: @ 10 MHz to 500 MHz	0.048	dB
			0	°	180	°	Transmission Coefficient Type N: @ 10 MHz to 500 MHz	0.4	°
			> -40	dB	-20	dB	Transmission Coefficient Type N: @ 10 MHz to 500 MHz	0.049	dB
			0	°	180	°	Transmission Coefficient Type N: @ 10 MHz to 500 MHz	0.4	°
			-60	dB	-40	dB	Transmission Coefficient Type N: @ 10 MHz to 500 MHz	0.059	dB
			0	°	180	°	Transmission Coefficient Type N: @ 10 MHz to 500 MHz	0.4	°
			> -20	dB	0	dB	Transmission Coefficient Type N: @ > 500 MHz to 2 GHz	0.048	dB
			0	°	180	°	Transmission Coefficient Type N: @ > 500 MHz to 2 GHz	0.4	°
			> -40	dB	-20	dB	Transmission Coefficient Type N: @ > 500 MHz to 2 GHz	0.049	dB
			0	°	180	°	Transmission Coefficient Type N: @ > 500 MHz to 2 GHz	0.4	°
			-60	dB	-40	dB	Transmission Coefficient Type N: @ > 500 MHz to 2 GHz	0.059	dB
			0	°	180	°	Transmission Coefficient Type N: @ > 500 MHz to 2 GHz	0.5	°



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG1002 short circuit, open circuit, load, mismatch, air line, attenuator, component	HP/85055-60003 HP/85055-60004 HP/85053-60001 HP/85053-60002	instrument calibration technique for network devices with microwave S-parameters and impedance system (Document No.: 07-3-80-0076)	> -20	dB	0	dB	Transmission Coefficient Type N: @ > 2 GHz to 18 GHz	0.025	dB
			0	°	180	°	Transmission Coefficient Type N: @ > 2 GHz to 18 GHz	1.1	°
			> -40	dB	-20	dB	Transmission Coefficient Type N: @ > 2 GHz to 18 GHz	0.025	dB
			0	°	180	°	Transmission Coefficient Type N: @ > 2 GHz to 18 GHz	1.4	°
			-60	dB	-40	dB	Transmission Coefficient Type N: @ > 2 GHz to 18 GHz	0.025	dB
			0	°	180	°	Transmission Coefficient Type N: @ > 2 GHz to 18 GHz	1.6	°
			> -20	dB	0	dB	Transmission Coefficient 3.5 mm: @ 10 MHz to 45 MHz	0.11	dB
			0	°	180	°	Transmission Coefficient 3.5 mm: @ 10 MHz to 45 MHz	0.7	°
			> -40	dB	-20	dB	Transmission Coefficient 3.5 mm: @ 10 MHz to 45 MHz	0.14	dB
			0	°	180	°	Transmission Coefficient 3.5 mm: @ 10 MHz to 45 MHz	0.9	°
			-60	dB	-40	dB	Transmission Coefficient 3.5 mm: @ 10 MHz to 45 MHz	0.22	dB
			0	°	180	°	Transmission Coefficient 3.5 mm: @ 10 MHz to 45 MHz	1.4	°



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG1002 short circuit, open circuit, load, mismatch, air line, attenuator, component	HP/85055-60003 HP/85055-60004 HP/85053-60001 HP/85053-60002	instrument calibration technique for network devices with microwave S-parameters and impedance system (Document No.: 07-3-80-0076)	> -20	dB	0	dB	Transmission Coefficient 3.5 mm: @ > 45 MHz to 2 GHz	0.068	dB
			0	°	180	°	Transmission Coefficient 3.5 mm: @ > 45 MHz to 2 GHz	0.5	°
			> -40	dB	-20	dB	Transmission Coefficient 3.5 mm: @ > 45 MHz to 2 GHz	0.11	dB
			0	°	180	°	Transmission Coefficient 3.5 mm: @ > 45 MHz to 2 GHz	0.8	°
			-60	dB	-40	dB	Transmission Coefficient 3.5 mm: @ > 45 MHz to 2 GHz	0.26	dB
			0	°	180	°	Transmission Coefficient 3.5 mm: @ > 45 MHz to 2 GHz	1.7	°
			> -20	dB	0	dB	Transmission Coefficient 3.5 mm: @ > 2 GHz to 20 GHz	0.17	dB
			0	°	180	°	Transmission Coefficient 3.5 mm: @ > 2 GHz to 20 GHz	1.0	°
			> -40	dB	-20	dB	Transmission Coefficient 3.5 mm: @ > 2 GHz to 20 GHz	0.21	dB
			0	°	180	°	Transmission Coefficient 3.5 mm: @ > 2 GHz to 20 GHz	1.4	°
			-60	dB	-40	dB	Transmission Coefficient 3.5 mm: @ > 2 GHz to 20 GHz	0.23	dB
			0	°	180	°	Transmission Coefficient 3.5 mm: @ > 2 GHz to 20 GHz	1.6	°



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG1002 short circuit, open circuit, load, mismatch, air line, attenuator, component	HP/85055-60003 HP/85055-60004 HP/85053-60001 HP/85053-60002	instrument calibration technique for network devices with microwave S-parameters and impedance system (Document No.: 07-3-80-0076)	> -20	dB	0	dB	Transmission Coefficient 3.5 mm: @ > 20 GHz to 26.5 GHz	0.20	dB
			0	°	180	°	Transmission Coefficient 3.5 mm: @ > 20 GHz to 26.5 GHz	1.3	°
			> -40	dB	-20	dB	Transmission Coefficient 3.5 mm: @ > 20 GHz to 26.5 GHz	0.25	dB
			0	°	180	°	Transmission Coefficient 3.5 mm: @ > 20 GHz to 26.5 GHz	1.6	°
			-60	dB	-40	dB	Transmission Coefficient 3.5 mm: @ > 20 GHz to 26.5 GHz	0.28	dB
			0	°	180	°	Transmission Coefficient 3.5 mm: @ > 20 GHz to 26.5 GHz	1.8	°
			> -20	dB	0	dB	Transmission Coefficient 2.92 mm: @ 45 MHz to 2 GHz	0.11	dB
			0	°	180	°	Transmission Coefficient 2.92 mm: @ 45 MHz to 2 GHz	0.8	°
			> -40	dB	-20	dB	Transmission Coefficient 2.92 mm: @ 45 MHz to 2 GHz	0.11	dB
			0	°	180	°	Transmission Coefficient 2.92 mm: @ 45 MHz to 2 GHz	0.8	°
			-60	dB	-40	dB	Transmission Coefficient 2.92 mm: @ 45 MHz to 2 GHz	0.13	dB
			0	°	180	°	Transmission Coefficient 2.92 mm: @ 45 MHz to 2 GHz	0.9	°



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG1002 short circuit, open circuit, load, mismatch, air line, attenuator, component	HP/85055-60003	instrument calibration technique for network devices with microwave S-parameters and impedance system (Document No.: 07-3-80-0076)	> -20	dB	0	dB	Transmission Coefficient 2.92 mm: @ > 2 GHz to 26.5 GHz	0.047	dB
	HP/85055-60004		0	°	180	°	Transmission Coefficient 2.92 mm: @ > 2 GHz to 26.5 GHz	2.4	°
	HP/85053-60001		> -40	dB	-20	dB	Transmission Coefficient 2.92 mm: @ > 2 GHz to 26.5 GHz	0.047	dB
	HP/85053-60002		0	°	180	°	Transmission Coefficient 2.92 mm: @ > 2 GHz to 26.5 GHz	2.4	°
			-60	dB	-40	dB	Transmission Coefficient 2.92 mm: @ > 2 GHz to 26.5 GHz	0.047	dB
			0	°	180	°	Transmission Coefficient 2.92 mm: @ > 2 GHz to 26.5 GHz	2.4	°
			> -20	dB	0	dB	Transmission Coefficient 2.92 mm: @ > 26.5 GHz to 40 GHz	0.093	dB
			0	°	180	°	Transmission Coefficient 2.92 mm: @ > 26.5 GHz to 40 GHz	3.6	°
			> -40	dB	-20	dB	Transmission Coefficient 2.92 mm: @ > 26.5 GHz to 40 GHz	0.093	dB
			0	°	180	°	Transmission Coefficient 2.92 mm: @ > 26.5 GHz to 40 GHz	3.7	°
			-60	dB	-40	dB	Transmission Coefficient 2.92 mm: @ > 26.5 GHz to 40 GHz	0.093	dB
			0	°	180	°	Transmission Coefficient 2.92 mm: @ > 26.5 GHz to 40 GHz	5.2	°
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG1005 elctromagnetic field strength meter	AR TC 3020A/ AR TC 1510A	instrument calibration technique for electromagnetic field strength meter by using tem cell filed strength measurement system (Document No.: 07-3-84-0121)	1	V/m	200	V/m	electric field @ 100 kHz to 500 MHz	0.77	dB
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KG1005 elctromagnetic field strength meter, microwave leakage meter	Narda EF1891/ NBM-550, SchwarzBeck BBHA9120E/ BBHA9120B	instrument calibration technique for anechoic chamber electromagnetic field strength measurement system (Document No.: 07-3-84-0125)	1	V/m	100	V/m	electric field @ 0.5 GHz to 0.55 GHz	0.85	dB
			1	V/m	100	V/m	electric field @ > 0.55 GHz to 1 GHz	0.71	dB
			1	V/m	200	V/m	electric field@ > 1 GHz to 8 GHz	0.68	dB
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG2001 search coils	Agilent/34970A, SRS/SR620	instrument calibration technique for search coils (Document No.: 07-3-83-0049)	0.001	m²	1	m²	area-turns:	0.27	%
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KG2001 fluxmeter	Agilent/34970A, SRS/SR620	instrument calibration technique for magnetic fluxmeter (Document No.: 07-3-81-0017)	0.0001	Wb	0.001	Wb		0.15	%
			> 0.001	Wb	1	Wb		0.16	%
			> 1	Wb	2	Wb		0.13	%
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KG2002 gaussmeter, magnetometer, std. reference magnet	HP 3457A	instrument calibration technique for AC magnetic field (50 Hz to 1000 Hz) calibration system (Document No.: 07-3-97-1288)	0.5	μT	1	μT	magnetic flux density @ 50 Hz	0.62	%
			> 1	μT	3	μT	magnetic flux density @ 50 Hz	0.44	%
			> 3	μT	5	μT	magnetic flux density @ 50 Hz	0.42	%
			> 5	μT	10	μT	magnetic flux density @ 50 Hz	0.18	%
			> 10	μT	30	μT	magnetic flux density @ 50 Hz	0.50	%
			> 30	μT	50	μT	magnetic flux density @ 50 Hz	0.44	%
			0.5	μT	1	μT	magnetic flux density @ 51 Hz to 100 Hz	0.53	%
			> 1	μT	3	μT	magnetic flux density @ 51 Hz to 100 Hz	0.19	%
			> 3	μT	5	μT	magnetic flux density @ 51 Hz to 100 Hz	0.32	%



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG2002 gaussmeter, magnetometer, std. reference magnet	HP 3457A	instrument calibration technique for AC magnetic field (50 Hz to 1000 Hz) calibration system (Document No.: 07-3-97-1288)	> 5	μT	10	μT	magnetic flux density @ 51 Hz to 100 Hz	0.27	%
			> 10	μT	30	μT	magnetic flux density @ 51 Hz to 100 Hz	0.27	%
			> 30	μT	50	μT	magnetic flux density @ 51 Hz to 100 Hz	0.28	%
			0.5	μT	1	μT	magnetic flux density @ 101 Hz to 300 Hz	0.34	%
			> 1	μT	3	μT	magnetic flux density @ 101 Hz to 300 Hz	0.27	%
			> 3	μT	5	μT	magnetic flux density @ 101 Hz to 300 Hz	0.32	%
			0.5	μT	1	μT	magnetic flux density @ 301 Hz to 1000 Hz	0.26	%
			> 1	μT	3	μT	magnetic flux density @ 301 Hz to 1000 Hz	0.44	%
			> 3	μT	5	μT	magnetic flux density @ 301 Hz to 1000 Hz	0.30	%
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG2002 gaussmeter, magnetometer, std. reference magnet	HP 34970A	instrument calibration technique for low magnetic field (1 μT to 1 mT) system (Document No.: 07-3-84-0081)	1	μT	5	μT	magnetic flux density	0.74	%
			> 5	μT	10	μT	magnetic flux density	0.43	%
			> 10	μT	30	μT	magnetic flux density	0.40	%
			> 30	μT	50	μT	magnetic flux density	0.44	%
			> 50	μT	100	μT	magnetic flux density	0.35	%
			> 100	μT	150	μT	magnetic flux density	0.50	%
			> 150	μT	300	μT	magnetic flux density	0.40	%
			> 300	μT	500	μT	magnetic flux density	0.36	%
		> 500	μT	1000	μT	magnetic flux density	0.35	%	
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KG2002 gaussmeter, magnetometer, std. reference magnet	HP 34970A	instrument calibration technique for low magnetic field (1 mT to 50 mT) calibration system (Document No.: 07-3-81-0011)	1	mT	50	mT	magnetic flux density	0.38	%
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KG2002 gaussmeter, magnetometer, std. reference magnet	SRS/SR620	instrument calibration technique for gaussmeter (Document No.: 07-3-86-0071)	0.05	T	1.5	T	magnetic flux density	0.01	%
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG2002 gaussmeter, magnetometer, std. reference magnet	SRS/SR620	instrument calibration technique for standard reference magnet (Document No.: 07-3-81-0021)	0.05	T	1.5	T	magnetic flux density	0.01	%
Approval Signatory: HSU, Jimmy Chun-Ming; CHEN, Shih-Fang; LAO, Ray-Rong									
KG3001 illuminance meter	CMS/ V (λ) W02	instrument calibration technique for illuminance meter of absolute radiometer system (Document No.: 07-3-80-0086)	25	lx	100	lx		0.81	%
			> 100	lx	1500	lx		1.1	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3002 luminance meter	Optronic Laboratories/ 455-6-2	instrument calibration technique for luminance meter/luminance colorimeter of spectroradiometric system (Document No.: 07-3-80-0085)	5	cd/m ²	50000	cd/m ²		1.6	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3003 tungsten lamp	CSIR AR-1100	instrument calibration technique for absolute radiometer system (Document No.: 07-3-83-0023)	70	cd	10000	cd		0.72	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3003 tungsten lamp	CMS/ V (λ) W02	instrument calibration technique for illuminance meter of absolute radiometer system (Document No.: 07-3-80-0086)	25	cd	1500	cd		0.77	%
			> 1500	cd	90000	cd		1.2	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3005 filter	Cary 5000	instrument calibration technique for transmittance of spectral spectrophotometric system (Document No.: 07-3-95-0053)	1	%	< 10	%	Spectral Transmittance, wavelength: 200 nm to 800 nm	0.06	%
			10	%	100	%	Spectral Transmittance, wavelength: 200 nm to 800 nm	0.21	%
			1	%	< 10	%	Transmittance	0.05	%
			10	%	100	%	Transmittance	0.20	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3006 Spectrally-neutral material	Cary 5000	instrument calibration technique in the specular reflectance of spectrophotometric system (Document No.: 07-3-93-0232)	1	%	100	%	wavelength: 250 nm to 2500 nm	0.14	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3006 Reflecting material	BRDF	instrument calibration technique for spectral scattering measurement system (Document No.: 07-3-96-0191)	0	°	0	°	Spectral radiance factor, wavelength: 380 nm to 800 nm	0.0056	
			-45	°	< 0	°	Spectral radiance factor, wavelength: 380 nm to 800 nm	0.0058	
			> 0	°	45	°	Spectral radiance factor, wavelength: 380 nm to 800 nm	0.0058	
			-60	°	<-45	°	Spectral radiance factor, wavelength: 380 nm to 800 nm	0.0059	
			> 45	°	60	°	Spectral radiance factor, wavelength: 380 nm to 800 nm	0.0059	
			> 10				@ (0°: 45°a) , Radiance factor	0.16	
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3008 silicon photodiode	L1/CRYORAD/900109	instrument calibration technique for spectral radiant power responsivity of absolute cryogenic radiometer system (Document No.: 07-3-94-0034)	280	nm	< 290	nm		3.1	%



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3008 silicon photodiode	L1/CRYORAD/900109	instrument calibration technique for spectral radiant power responsivity of absolute cryogenic radiometer system (Document No.: 07-3-94-0034)	290	nm	< 300	nm		2.7	%
			300	nm	< 480	nm		0.59	%
			480	nm	1030	nm		0.38	%
			> 1030	nm	1100	nm		0.56	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3008 silicon photodiode	CMS/Si R01	instrument calibration technique for photodetector spectral responsivity of spectroradiometric system (Document No.: 07-3-91-0088)	300	nm	< 410	nm	Relative Spectral Responsivity	2.0	%
			410	nm	< 480	nm	Relative Spectral Responsivity	0.87	%
			480	nm	< 930	nm	Relative Spectral Responsivity	0.58	%
			930	nm	1100	nm	Relative Spectral Responsivity	1.1	%
			300	nm	< 380	nm	Spectral Responsivity	1.8	%
			380	nm	< 540	nm	Spectral Responsivity	0.98	%
			540	nm	< 930	nm	Spectral Responsivity	0.44	%
			930	nm	< 1050	nm	Spectral Responsivity	0.81	%
			1050	nm	1100	nm	Spectral Responsivity	1.9	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model		document name /no.	minimum value	units	maximum value	units	explanation	value
KG3008 V (λ) photodiode	CMS/ V (λ) R01	instrument calibration technique for photodetector spectral responsivity of spectroradiometric system (Document No.: 07-3-91-0088)	380	nm	< 440	nm	Relative Spectral Responsivity	0.0010	
			440	nm	< 500	nm	Relative Spectral Responsivity	0.0040	
			500	nm	< 610	nm	Relative Spectral Responsivity	0.0068	
			610	nm	< 660	nm	Relative Spectral Responsivity	0.0049	
			660	nm	< 710	nm	Relative Spectral Responsivity	0.0016	
			710	nm	780	nm	Relative Spectral Responsivity	0.0003	
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3008 germanium photodiode	L1/ CRYORAD/ 900109	instrument calibration technique for spectral radiant power responsivity of absolute cryogenic radiometer system (Document No.: 07-3-94-0034)	800	nm	< 900	nm		2.1	%
			900	nm	1540	nm		0.36	%
			> 1540	nm	1700	nm		0.44	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3008 germanium photodiode, InGaAs detector	CMS/GE/ITEG1	instrument calibration technique for photodetector spectral responsivity of spectroradiometric system (Document No.: 07-3-91-0088)	800	nm	< 870	nm	Spectral Responsivity	3.2	%
			870	nm	< 1590	nm	Spectral Responsivity	1.2	%
			1590	nm	1650	nm	Spectral Responsivity	1.7	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3009 optical fiber power meter	ILXLightwave/FPM-8210/82103608/821A030F	instrument calibration technique for optical fiber power meter of absolute radiometer system (Document No.: 07-3-95-0051)	1	μW	1	mW	wavelength: 1310 nm	0.9	%
			1	μW	1	mW	wavelength: 1550 nm	0.9	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3014 Reflecting material		instrument calibration technique for spectral scattering measurment system (Document No.: 07-3-96-0191)	(0, 0)		(1, 1)		(x, y) 0°: 45°a	(0.0003, 0.0004)	
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3014 white plate, color plate	OPAL GLASS GA90, FZ90, AE95/ Spectralon 7A11E-4258/ Sphere-Optics SG3049/CCSII Series II AB95	instrument calibration technique in the 0°: 45°a geometry of spectrophotometric system (Document No.: 07-3-93-0202)	(0, 0)		(1, 1)		(x, y) white plate 0°: 45°a	(0.0003, 0.0004)	
			(0, 0)		(1, 1)		(x, y) color plate 0°: 45°a, red	(0.0007, 0.0004)	
			(0, 0)		(1, 1)		(x, y) color plate 0°: 45°a, green	(0.0006, 0.0005)	
			(0, 0)		(1, 1)		(x, y) color plate 0°: 45°a, blue	(0.0004, 0.0006)	
			> 1				CIELAB L* white plate 0°: 45°a	0.15	
			> 1				CIELAB L* color plate 0°: 45°a, red	0.24	
			> 1				CIELAB L* color plate 0°: 45°a, green	0.21	
			> 1				CIELAB L* color plate 0°: 45°a, blue	0.29	
			(-500, -200)		(500, 200)		(a*, b*) white plate 0°: 45°a	(0.20, 0.19)	
			(-500, -200)		(500, 200)		(a*, b*) color plate 0°: 45°a, red	(0.63, 0.72)	
			(-500, -200)		(500, 200)		(a*, b*) color plate 0°: 45°a, green	(0.57, 0.44)	
			(-500, -200)		(500, 200)		(a*, b*) color plate 0°: 45°a, blue	(0.97, 0.97)	
			> 1				radiance factor, white plate 0°: 45°a	0.34	



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3014 white plate, color plate	OPAL GLASS GA90, FZ90, AE95/ Spectralon 7A11E-4258/ Sphere-Optics SG3049/CCSII Series II AB95	instrument calibration technique in the 0°: 45°a geometry of spectrophotometric system (Document No.: 07-3-93-0202)	> 0.01				spectral radiance factor, white plate 0°: 45°a, wavelength: 380 nm to 780 nm	0.0069	
			> 1				radiance factor, color plate 0°: 45°a, red	0.18	
			> 1				radiance factor, color plate 0°: 45°a, green	0.20	
			> 1				radiance factor, color plate 0°: 45°a, blue	0.18	
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3014 white plate, color plate	OPAL GLASS GA90, FZ90, AE95/ Spectralon 7A11E-4258/ Sphere-Optics SG3049/CCSII Series II AB95	instrument calibration technique for color standard in the de: 8° geometry of spectrophotometric system (Document No.: 07-3-84-0150)	(0, 0)		(1, 1)		(x, y) white plate de: 8°	(0.0002, 0.0003)	
			(0, 0)		(1, 1)		(x, y) color plate de: 8°, red	(0.0028, 0.0024)	
			(0, 0)		(1, 1)		(x, y) color plate de: 8°, green	(0.0007, 0.0005)	
			(0, 0)		(1, 1)		(x, y) color plate de: 8°, blue	(0.0007, 0.0007)	
			1		100		CIELAB L* white plate de: 8°	0.14	
			1		100		CIELAB L* color plate de: 8°, red	0.20	
			1		100		CIELAB L* color plate de: 8°, green	0.17	
			1		100		CIELAB L* color plate de: 8°, blue	0.30	
			(-500, -200)		(500, 200)		(a*, b*) white plate de: 8°	(0.11, 0.09)	
			(-500, -200)		(500, 200)		(a*, b*) color plate de: 8°, red	(0.42, 0.51)	



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3014 white plate, color plate	OPAL GLASS GA90, FZ90, AE95/ Spectralon 7A11E-4258/ Sphere-Optics SG3049/CCSII Series II AB95	instrument calibration technique for color standard in the de: 8° geometry of spectrophotometric system (Document No.: 07-3-84-0150)	(-500, -200)		(500, 200)		(a*, b*) color plate de: 8°, green	(0.38, 0.36)	
			(-500, -200)		(500, 200)		(a*, b*) color plate de: 8°, blue	(0.73, 0.59)	
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3014 white plate	OPAL GLASS GA90, FZ90, AE95/ Spectralon 7A11E-4258/ Sphere-Optics SG3049	instrument calibration technique for white standard in the 0°: de and 8°: de geometry of spectrophotometric system (Document No.: 07-3-82-0064)	(0, 0)		(1, 1)		(x, y) white plate 0°: de	(0.0002, 0.0002)	
			1		100		CIELAB L* white plate 0°: de	0.14	
			(-500, -200)		(500, 200)		(a*, b*) white plate 0°: de	(0.10, 0.08)	
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3015 Spectral radiant flux lamp	NPL FEL/BN-9101-482	instrument calibration technique for standard lamp of total spectral radiant flux system (Document No.: 07-3-A1-0073)	(0, 0)		(0.9, 0.9)		(x, y)	(0.0008, 0.0006)	
			(0, 0)		(0.62, 0.39)		(u, v)	(0.0006, 0.0003)	
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3015 spectroradiometer	Sphere Optics/LR-6-Z, Optronic Laboratories/455-6-2	instrument calibration technique for spectroradiometer of spectroradiometric system (Document No.: 07-3-91-0087)	(0, 0)		(0.9, 0.9)		(x, y)	(0.0011, 0.0009)	
			(0, 0)		(0.62, 0.39)		(u, v)	(0.0004, 0.0004)	
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3015 tungsten-based source	KONICA MINOLTA/CS-2000	instrument calibration technique for spectral radiance standard lamp of spectroradiometric system (Document No.: 07-3-89-0074)	(0, 0)		(0.9, 0.9)		(x, y)	(0.0011, 0.0009)	
			(0, 0)		(0.62, 0.39)		(u, v)	(0.0004, 0.0004)	
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3015 luminance colorimeter	Optronic Laboratories/ 455-6-2	instrument calibration technique for luminance meter/ luminance colorimeter of spectroradiometric system (Document No.: 07-3-80-0085)	(0, 0)		(0.9, 0.9)		(x, y)	(0.0011, 0.0009)	
			(0, 0)		(0.62, 0.39)		(u, v)	(0.0004, 0.0004)	
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3015 LEDs	OSRAM/ 64743 1000W/ IW08	instrument calibration technique for LED spectroradiometric spectrum (Document No.: 07-3-95-0130)	(0, 0)		(0.9, 0.9)		(x, y) white light	(0.0047, 0.0055)	
			(0, 0)		(0.9, 0.9)		(x, y) red light	(0.0039, 0.0032)	
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
Calibration Site: No.30, Daxue Rd., East Dist., Hsinchu City 300, Taiwan (R.O.C.)									
KG3015 illuminance meter, tungsten lamp	CMS/ V (λ) W02	instrument calibration technique for illuminance meter of absolute radiometer system (Document No.: 07-3-80-0086)	(0, 0)		(0.9, 0.9)		(x, y)	(0.0012, 0.0007)	
			(0, 0)		(0.9, 0.9)		(u, v)	(0.0008, 0.0003)	
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3017 white plate, color plate	OPAL GLASS GA90, FZ90, AE95/ Spectralon 7A11E-4258/ Sphere-Optics SG3049/CCSII Series II AB95	instrument calibration technique for color standard in the de: 8° geometry of spectrophotometric system (Document No.: 07-3-84-0150)	1		100		reflectance factor, white plate de: 8°	0.16	
			0.01		1		spectral reflectance factor, white plate de: 8°, wavelength: 400 nm to 750 nm	0.0030	
			1		100		reflectance factor, color plate de: 8°, red	0.18	
			1		100		reflectance factor, color plate de: 8°, green	0.18	
			1		100		reflectance factor, color plate de: 8°, blue	0.17	
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3017 white plate	OPAL GLASS GA90, FZ90, AE95/ Spectralon 7A11E-4258/ Sphere-Optics SG3049	instrument calibration technique for white standard in the 0°: de and 8°: de geometry of spectrophotometric system (Document No.: 07-3-82-0064)	1		100		reflectance factor, white plate 0°: de	0.16	
			0.01		1		spectral reflectance factor, white plate 0°: de, wavelength: 380 nm to 780 nm	0.0032	
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3018 Spectral radiant flux lamp	NPL FEL/BN-9101-482	instrument calibration technique for standard lamp of total spectral radiant flux system (Document No.: 07-3-A1-0073)	2800	K	3400	K		15	K
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3018 spectroradiometer	Sphere Optics/ LR-6-Z, Optronic Laboratories/ 455-6-2	instrument calibration technique for spectroradiometer of spectroradiometric system (Document No.: 07-3-91-0087)	2500	K	3200	K		8	K
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3018 tungsten-based source	KONICA MINOLTA/ CS-2000	instrument calibration technique for spectral radiance standard lamp of spectroradiometric system (Document No.: 07-3-89-0074)	2500	K	3200	K		8	K
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3018 luminance colorimeter	Optronic Laboratories/ 455-6-2	instrument calibration technique for luminance meter/luminance colorimeter of spectroradiometric system (Document No.: 07-3-80-0085)	2500	K	3200	K		8	K
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3018 illuminance meter, tungsten lamp	CMS/ V (λ) W02	instrument calibration technique for illuminance meter of absolute radiometer system (Document No.: 07-3-80-0086)	2500	K	3200	K		29	K
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3020 general detector or optical power meters	CSIR AR-1100	instrument calibration technique of absolute radiometer system (Document No.: 07-3-83-0023)	6	μW	100	mW	wavelength: 300 nm to 9000 nm, radiant power responsivity, visible range	0.30	%
			6	μW	100	mW	wavelength: 300 nm to 9000 nm, radiant power responsivity, other range	0.54	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3021 general detector	CSIR AR-1100	instrument calibration technique of absolute radiometer system (Document No.: 07-3-83-0023)	70	lx	10000	lx	illuminance absolute responsivity	0.68	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3021 power meter or irradiance meter	CSIR AR-1100	instrument calibration technique for radiant power of absolute radiometer system (Document No.: 07-3-85-0069)	50	$\mu\text{W}/\text{cm}^2$	150	mW/cm^2	250 nm $\leq$ wavelength < 300 nm, irradiance meter, wide band light source	5.5	%
			50	$\mu\text{W}/\text{cm}^2$	150	mW/cm^2	300 nm $\leq$ wavelength $\leq$ 3000 nm, irradiance meter, wide band light source	3.0	%
			50	$\mu\text{W}/\text{cm}^2$	150	mW/cm^2	250 nm $\leq$ wavelength < 350 nm, irradiance meter, narrow band light source	6.2	%
			50	$\mu\text{W}/\text{cm}^2$	150	mW/cm^2	350 nm $\leq$ wavelength $\leq$ 500 nm, irradiance meter, narrow band light source	4.2	%
			50	$\mu\text{W}/\text{cm}^2$	150	mW/cm^2	500 nm < wavelength $\leq$ 3000 nm, irradiance meter, narrow band light source	3.3	%



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3021 power meter or irradiance meter	CSIR AR-1100	instrument calibration technique for radiant power of absolute radiometer system (Document No.: 07-3-85-0069)	50	μW/cm²	150	mW/cm²	250 nm ≤ wavelength < 300 nm, irradiance of light source, wide band light source	5.4	%
			50	μW/cm²	150	mW/cm²	300 nm ≤ wavelength ≤ 3000 nm, irradiance of light source, wide band light source	2.9	%
			50	μW/cm²	150	mW/cm²	250 nm ≤ wavelength < 350 nm, irradiance of light source, narrow band light source	6.2	%
			50	μW/cm²	150	mW/cm²	350 nm ≤ wavelength ≤ 500 nm, irradiance of light source, narrow band light source	4.2	%
			50	μW/cm²	150	mW/cm²	500 nm < wavelength ≤ 3000 nm, irradiance of light source, narrow band light source	3.3	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3022 spectroradiometer	Sphere Optics/ LR-6-Z, Optronic Laboratories/ 455-6-2	instrument calibration technique for spectroradiometer of spectroradiometric system (Document No.: 07-3-91-0087)	2	$\mu\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	2	$\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	$380\text{ nm} \leq \text{wavelength} < 390\text{ nm}$	3.8	%
			2	$\mu\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	2	$\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	$390\text{ nm} \leq \text{wavelength} < 420\text{ nm}$	2.8	%
			2	$\mu\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	2	$\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	$420\text{ nm} \leq \text{wavelength} < 530\text{ nm}$	1.9	%
			2	$\mu\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	2	$\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	$530\text{ nm} \leq \text{wavelength} \leq 780\text{ nm}$	1.4	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3022 tungsten-based source	KONICA MINOLTA/ CS-2000	instrument calibration technique for spectral radiance standard lamp of spectroradiometric system (Document No.: 07-3-89-0074)	2	$\mu\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	2	$\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	$380\text{ nm} \leq \text{wavelength} < 390\text{ nm}$	3.8	%
			2	$\mu\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	2	$\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	$390\text{ nm} \leq \text{wavelength} < 420\text{ nm}$	2.8	%
			2	$\mu\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	2	$\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	$420\text{ nm} \leq \text{wavelength} < 530\text{ nm}$	1.9	%
			2	$\mu\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	2	$\text{W}/(\text{nm}\cdot\text{sr}\cdot\text{m}^2)$	$530\text{ nm} \leq \text{wavelength} \leq 780\text{ nm}$	1.4	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3023 tungsten lamp	Gooch & Housego/OL-FEL-U, GE/EHD 500	instrument calibration technique for spectral irradiance standard lamp of spectroradiometric system (Document No.: 07-3-80-0004)	0.01	mW/(m ² ·nm)	240	mW/(m ² ·nm)	250 nm ≤ wavelength ≤ 260 nm	3.2	%
			0.01	mW/(m ² ·nm)	240	mW/(m ² ·nm)	270 nm ≤ wavelength ≤ 510 nm	2.3	%
			0.01	mW/(m ² ·nm)	240	mW/(m ² ·nm)	520 nm ≤ wavelength ≤ 1100 nm	1.2	%
			0.01	mW/(m ² ·nm)	240	mW/(m ² ·nm)	1110 nm ≤ wavelength ≤ 1400 nm	1.5	%
			0.01	mW/(m ² ·nm)	240	mW/(m ² ·nm)	1410 nm ≤ wavelength ≤ 2310 nm	2.0	%
			0.01	mW/(m ² ·nm)	240	mW/(m ² ·nm)	2320 nm ≤ wavelength ≤ 2480 nm	2.6	%
			0.01	mW/(m ² ·nm)	240	mW/(m ² ·nm)	2490 nm ≤ wavelength ≤ 2500 nm	4.7	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3024 spectroradiometer	Sphere Optics/ LR-6-Z, Optronic Laboratories/ 455-6-2	instrument calibration technique for spectroradiometer of spectroradiometric system (Document No.: 07-3-91-0087)	5	cd/m ²	50000	cd/m ²		1.4	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3024 tungsten-based source	KONICA MINOLTA/ CS-2000	instrument calibration technique for spectralradiance standard lamp of spectroradiometric system (Document No.: 07-3-89-0074)	5	cd/m ²	50000	cd/m ²		1.6	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3025 Spectral radiant flux lamp	NPL FEL/BN-9101-482	instrument calibration technique for standard lamp of total spectral radiant flux system (Document No.: 07-3-A1-0073)	700	lm	7000	lm	total luminous flux	1.1	%
			0.5	mW/nm	150	mW/nm	350 nm ≤ wavelength < 370 nm, spectral radiant flux	2.7	%
			0.5	mW/nm	150	mW/nm	370 nm ≤ wavelength ≤ 830 nm, spectral radiant flux	1.5	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3025 luminous flux standard lamp	OSRAM/50W/NLR01	instrument calibration technique for luminous flux standard lamp of luminous flux system -3 m integrating sphere (Document No.: 07-3-A5-0128)	1	lm	20000	lm		1.0	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
Calibration Site: No.30, Daxue Rd., East Dist., Hsinchu City 300, Taiwan (R.O.C.)									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3025 LEDs	OSRAM/50W/NLR01	instrument calibration technique for LED total luminous flux (Document No.: 07-3-95-0107)	0.04	lm	800	lm	red light	3.4	%
			0.04	lm	800	lm	green light	3.4	%
			0.04	lm	800	lm	blue light	3.4	%
			0.04	lm	800	lm	white light	3.4	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
Calibration Site: No.30, Daxue Rd., East Dist., Hsinchu City 300, Taiwan (R.O.C.)									
KG3026 optical power meter, light source	CSIR AR-1100	instrument calibration technique for radiant power of absolute radiometer system (Document No.: 07-3-85-0069)	50	μW	150	mW	optical power meter	4.1	%
			50	μW	150	mW	light source	4.1	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3026 general detector, optical power meters	CSIR AR-1100	instrument calibration technique for absolute radiometer system (Document No.: 07-3-83-0023)	6	μW	100	mW	wavelength: 300 nm to 9000 nm, radiant power, visible range	0.28	%
			6	μW	100	mW	wavelength: 300 nm to 9000 nm, radiant power, other range	0.52	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3026 laser or monochromator source	L1/ CRYORAD/ 900109	instrument calibration technique for optical power by absolute cryogenic radiometer system (Document No.: 07-3-93-0196)	10	nW	1.0	mW	wavelength: 200 nm to 5000 nm, laser source	0.028	%
			10	nW	1.0	mW	wavelength: 200 nm to 5000 nm, monochromator source	0.16	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3027 gloss standard plate	BYK GARDNER (20, 60, 85)	instrument calibration technique for gloss standard plate of luminous flux system (Document No.: 07-3-84-0185)	10	GU	100	GU	High-gloss (20°)	0.7	GU
			10	GU	100	GU	High-gloss (60°)	0.6	GU
			10	GU	100	GU	High-gloss (85°)	0.5	GU
			10	GU	100	GU	Semi-gloss (20°)	1.2	GU
			10	GU	100	GU	Semi-gloss (60°)	0.9	GU
			10	GU	100	GU	Semi-gloss (85°)	1.9	GU
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3099 transmittance haze plate	Haze system O08	instrument calibration technique for transmittance haze standard (Document No.: 07-3-96-0035)	0	%	< 2	%	ASTM D 1003, JIS K 7105	0.05	%
			2	%	< 7	%	ASTM D 1003, JIS K 7105	0.13	%
			7	%	< 15	%	ASTM D 1003, JIS K 7105	0.19	%
			15	%	< 25	%	ASTM D 1003, JIS K 7105	0.39	%
			25	%	< 35	%	ASTM D 1003, JIS K 7105	0.53	%
			35	%	< 40	%	ASTM D 1003, JIS K 7105	0.64	%
			0	%	< 2	%	ISO 13468, JIS K 7361	0.16	%



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3099 transmittance haze plate	Haze system O08	instrument calibration technique for transmittance haze standard (Document No.: 07-3-96-0035)	2	%	< 7	%	ISO 13468, JIS K 7361	0.23	%
			7	%	< 15	%	ISO 13468, JIS K 7361	0.27	%
			15	%	< 25	%	ISO 13468, JIS K 7361	0.41	%
			25	%	< 35	%	ISO 13468, JIS K 7361	0.58	%
			35	%	< 40	%	ISO 13468, JIS K 7361	0.64	%
			0	%	< 2	%	ISO 14782, JIS K 7136	0.04	%
			2	%	< 7	%	ISO 14782, JIS K 7136	0.13	%
			7	%	< 15	%	ISO 14782, JIS K 7136	0.19	%
			15	%	< 25	%	ISO 14782, JIS K 7136	0.36	%
			25	%	< 35	%	ISO 14782, JIS K 7136	0.52	%
			35	%	< 40	%	ISO 14782, JIS K 7136	0.59	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
KG3099 LEDs	OSRAM/ 64743 1000W/ IW08	instrument calibration technique for LED spectroradiometric spectrum (Document No.: 07-3-95-0130)	380	nm	780	nm	dominant wavelength	1.1	nm
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
Calibration Site: No.30, Daxue Rd., East Dist., Hsinchu City 300, Taiwan (R.O.C.)									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3099 LEDs	OSRAM/ 64743 1000W/ IW08	instrument calibration technique for LED spectroradiometric spectrum (Document No.: 07-3-95-0130)	410	nm	< 422	nm	spectroradiometric spectrum, white light	23	%
			422	nm	< 445	nm	spectroradiometric spectrum, white light	6.3	%
			445	nm	< 479	nm	spectroradiometric spectrum, white light	4.6	%
			479	nm	< 489	nm	spectroradiometric spectrum, white light	4.6	%
			489	nm	< 606	nm	spectroradiometric spectrum, white light	4.4	%
			606	nm	< 649	nm	spectroradiometric spectrum, white light	4.4	%
			649	nm	< 664	nm	spectroradiometric spectrum, white light	5.4	%
			664	nm	< 714	nm	spectroradiometric spectrum, white light	7.8	%
			714	nm	< 772	nm	spectroradiometric spectrum, white light	22	%
			772	nm	780	nm	spectroradiometric spectrum, white light	39	%
			565	nm	< 593	nm	spectroradiometric spectrum, red light	25	%
			593	nm	< 608	nm	spectroradiometric spectrum, red light	8.2	%
			608	nm	< 635	nm	spectroradiometric spectrum, red light	7.9	%
			635	nm	< 651	nm	spectroradiometric spectrum, red light	8.5	%
			651	nm	< 671	nm	spectroradiometric spectrum, red light	11	%
			671	nm	675	nm	spectroradiometric spectrum, red light	15	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
Calibration Site: No.30, Daxue Rd., East Dist., Hsinchu City 300, Taiwan (R.O.C.)									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KG3099 LEDs	CSIR AR-1100	instrument calibration technique for LED averaged luminous intensity (Document No.: 07-3-95-0108)	10	mcd	10000	mcd	averaged luminous intensity, red light, peak wavelength (633 ± 30) nm	1.7	%
			10	mcd	10000	mcd	averaged luminous intensity, green light, peak wavelength (520 ± 30) nm	1.7	%
			10	mcd	10000	mcd	averaged luminous intensity, blue light, peak wavelength (460 ± 30) nm	1.7	%
			10	mcd	10000	mcd	averaged luminous intensity, white light	1.7	%
Approval Signatory: WU, Kuei-Neng; Chuang, Yi-Chen; CHEN, Chemg-Hsien									
Calibration Site: No.30, Daxue Rd., East Dist., Hsinchu City 300, Taiwan (R.O.C.)									

Note: Smallest uncertainty represents an expanded uncertainty using a coverage factor approximately 95 % level of confidence.
(Null Below)

