



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

## Certificate of Accreditation

(Certificate No : L0025-240228)

This is to certify that

### Taiwan Testing and Certification Center Calibration Laboratory

No.8, Ln. 29, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)

is accredited in respect of laboratory

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

**Accreditation Number** : 0025

**Originally Accredited** : June 01, 1991

**Effective Period** : July 10, 2022 to July 09, 2025

**Accredited Scope** : Calibration Field, see described in the Appendix



Scan to verify

*Yi-Ling Chen*

Yi-Ling Chen  
President, Taiwan Accreditation Foundation  
February 28, 2024

Accreditation Number : 0025

Laboratory Head : MOU, Wan-Chau

## 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 Gauge Block (CNS 112 pcs, steel, ceramics, 1.6 mm, 1.7 mm, 1.8 mm, 1.9 mm, 30 mm, 60 mm, tungsten carbide, chromium carbide )	Gauge Block Set MITUTOYO /516-937-60 (K level) MITUTOYO/00 level	In-house method: Gauge Block Calibration Procedure (Document No.: B00-CD-099)	0.5	mm	10	mm	steel	0.08	µm
			10.5	mm	25	mm	steel	0.10	µm
			30	mm	50	mm	steel	0.13	µm
			60	mm	100	mm	steel	0.23	µm
			0.5	mm	10	mm	ceramics	0.08	µm
			10.5	mm	25	mm	ceramics	0.11	µm
			30	mm	50	mm	ceramics	0.17	µm
			60	mm	100	mm	ceramics	0.31	µm
			0.5	mm	10	mm	tungsten carbide	0.14	µm
			10.5	mm	25	mm	tungsten carbide	0.30	µm
			30	mm	50	mm	tungsten carbide	0.58	µm
			60	mm	100	mm	tungsten carbide	1.2	µm
			0.5	mm	10	mm	chromium carbide	0.09	µm
			10.5	mm	25	mm	chromium carbide	0.15	µm
30	mm	50	mm	chromium carbide	0.27	µm			
60	mm	100	mm	chromium carbide	0.51	µm			
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta; LU, Chin-Tang									



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
KA2003 Caliper (Digimatic, Dial, Vernier)	Caliper Checker MITUTOYO/ B706-12.044	In-house method: Caliper Calibration Procedure (Document No.: B00-CD-036)	0	mm	300	mm	Digimatic Caliper (Outside) (Resolution: 0.01 mm)	0.02	mm
			0	mm	250	mm	Digimatic Caliper (Inside) (Resolution: 0.01 mm)	0.02	mm
			0	mm	200	mm	Dial Caliper (Outside) (Resolution: 0.01 mm)	0.02	mm
			0	mm	150	mm	Dial Caliper (Inside) (Resolution: 0.01 mm)	0.02	mm
			0	mm	300	mm	Dial Caliper (Outside) (Resolution: 0.02 mm)	0.03	mm
			0	mm	250	mm	Dial Caliper (Inside) (Resolution: 0.02 mm)	0.03	mm
			0	mm	600	mm	Vernier Caliper (Outside) (Resolution: 0.02 mm)	0.03	mm
			0	mm	600	mm	Vernier Caliper (Inside) (Resolution: 0.02 mm)	0.03	mm
			0	mm	600	mm	Vernier Caliper (Outside) (Resolution: 0.05 mm)	0.06	mm
			0	mm	600	mm	Vernier Caliper (Inside) (Resolution: 0.05 mm)	0.06	mm
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta; LU, Chin-Tang									
KA2005 Outside Micrometer (Digimatic, Numeric, Vernier, Graduation)	Gauge Block Set MITUTOYO/ 516-937-60 (K Level)	In-house method: Outside Micrometer Calibration Proceduer (Document No.: B00-CD-104)	0	mm	25	mm	Digimatic (resolution: 0.001 mm)	0.002	mm
			0	mm	25	mm	Numeric (resolution: 0.001 mm)	0.002	mm
			0	mm	25	mm	Vernier (resolution: 0.001 mm)	0.002	mm
			0	mm	25	mm	Graduation (resolution: 0.01 mm)	0.01	mm
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta; LU, Chin-Tang									



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
KA2010 Dial Indicator Digimatic Indicator	Precision Setting Gauge FMS/764004	In-house method: Dial Indicator Calibration Procedure (Document No.: B00-CD-113)	0	mm	5	mm	Dial (resolution: 0.001 mm)	0.003	mm
			0	mm	30	mm	Dial (resolution: 0.01 mm)	0.02	mm
			0	mm	25	mm	Digimatic (resolution: 0.001 mm)	0.010	mm
			0	mm	25	mm	Digimatic (resolution: 0.01 mm)	0.02	mm
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta; LU, Chin-Tang									

## Vibration &amp; Acoustics

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
KB1001 Accelerometer	Accelerometer Calibration System (PCB 396C11 /301A11/482A23)	In-house method: Accelerometer Calibration Procedure (Document No.: B00-CD-428)		V/ (m/s <sup>2</sup> )		V/ (m/s <sup>2</sup> )	Voltage Sensitivity: @ (5 to 10) Hz, 10 m/s <sup>2</sup>	2.2	%
				V/ (m/s <sup>2</sup> )		V/ (m/s <sup>2</sup> )	Voltage Sensitivity: @ (>10 to 30) Hz, 10 m/s <sup>2</sup>	1.7	%
				V/ (m/s <sup>2</sup> )		V/ (m/s <sup>2</sup> )	Voltage Sensitivity: @ (> 30 to 1000) Hz, 10 m/s <sup>2</sup>	1.7	%
				V/ (m/s <sup>2</sup> )		V/ (m/s <sup>2</sup> )	Voltage Sensitivity: @ (> 1000 to 10000) Hz, 10 m/s <sup>2</sup>	2.6	%
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta									



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
KB2001 Microphone	1/2"Microphone B&K 4190 /B&K 4192	In-house method: Calibration Procudure for Sound Pressure Sensitivity of Microphone (Document No.: B00-CD-520)	-40	dB re 1 V/Pa	-24	dB re 1 V/Pa	31.5 Hz to 40 Hz	0.24	dB
			-40	dB re 1 V/Pa	-24	dB re 1 V/Pa	50 Hz to 2000 Hz	0.22	dB
			-40	dB re 1 V/Pa	-24	dB re 1 V/Pa	2500 Hz to 5000 Hz	0.23	dB
			-40	dB re 1 V/Pa	-24	dB re 1 V/Pa	6300 Hz to 16000 Hz	0.41	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta									
KB2002 Pistonphone	Pistonphone B&K/4220	In-house method: Pistonphone Calibration procedure (Document No.: B00-CD-096)	124	dB re 20 $\mu$ Pa	124	dB re 20 $\mu$ Pa	(@250 Hz)	0.2	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta									
KB2003 Sound Level Calibrator	Sound Level Calibrator /B&K 4231	In-house method: Sound Level Calibrator Calibration Procedure (Documeet: B00-CD-440)	94	dB re 20 $\mu$ Pa	94	dB re 20 $\mu$ Pa	(@1000 Hz)	0.2	dB
			114	dB re 20 $\mu$ Pa	114	dB re 20 $\mu$ Pa	(@1000 Hz)	0.2	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta									



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
KB2004 Sound Level Meter	Multifunction Acoustic Calibrator B&K 4226	In-house method: Calibration Procedure for Sound Pressure Level of Sound Level Meter (Document No.: B00-CD-175)	94	dB (reference 20 $\mu$ Pa)	94	dB (reference 20 $\mu$ Pa)	Frequency 31.5 Hz	0.4	dB
			94	dB (reference 20 $\mu$ Pa)	94	dB (reference 20 $\mu$ Pa)	Frequency 63 Hz	0.4	dB
			94	dB (reference 20 $\mu$ Pa)	94	dB (reference 20 $\mu$ Pa)	Frequency 125 Hz	0.4	dB
			94	dB (reference 20 $\mu$ Pa)	94	dB (reference 20 $\mu$ Pa)	Frequency 250 Hz	0.4	dB
			94	dB (reference 20 $\mu$ Pa)	94	dB (reference 20 $\mu$ Pa)	Frequency 500 Hz	0.4	dB
			94	dB (reference 20 $\mu$ Pa)	94	dB (reference 20 $\mu$ Pa)	Frequency 1 kHz	0.3	dB
			94	dB (reference 20 $\mu$ Pa)	94	dB (reference 20 $\mu$ Pa)	Frequency 2 kHz	0.4	dB
			94	dB (reference 20 $\mu$ Pa)	94	dB (reference 20 $\mu$ Pa)	Frequency 4 kHz	0.4	dB
			94	dB (reference 20 $\mu$ Pa)	94	dB (reference 20 $\mu$ Pa)	Frequency 8 kHz	0.4	dB
			94	dB (reference 20 $\mu$ Pa)	94	dB (reference 20 $\mu$ Pa)	Frequency 12.5 kHz	0.7	dB
			94	dB (reference 20 $\mu$ Pa)	94	dB (reference 20 $\mu$ Pa)	Frequency 16 kHz	0.7	dB
			114	dB (reference 20 $\mu$ Pa)	114	dB (reference 20 $\mu$ Pa)	Frequency 31.5 Hz	0.4	dB
			114	dB (reference 20 $\mu$ Pa)	114	dB (reference 20 $\mu$ Pa)	Frequency 63 Hz	0.4	dB
			114	dB (reference 20 $\mu$ Pa)	114	dB (reference 20 $\mu$ Pa)	Frequency 125 Hz	0.4	dB
			114	dB (reference 20 $\mu$ Pa)	114	dB (reference 20 $\mu$ Pa)	Frequency 250 Hz	0.4	dB



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
KB2004 Sound Level Meter	Multifunction Acoustic Calibrator B&K 4226	In-house method: Calibration Procedure for Sound Pressure Level of Sound Level Meter (Document No.: B00-CD-175)	114	dB (reference 20 $\mu$ Pa)	114	dB (reference 20 $\mu$ Pa)	Frequency 500 Hz	0.4	dB
			114	dB (reference 20 $\mu$ Pa)	114	dB (reference 20 $\mu$ Pa)	Frequency 1 kHz	0.3	dB
			114	dB (reference 20 $\mu$ Pa)	114	dB (reference 20 $\mu$ Pa)	Frequency 2 kHz	0.4	dB
			114	dB (reference 20 $\mu$ Pa)	114	dB (reference 20 $\mu$ Pa)	Frequency 4 kHz	0.4	dB
			114	dB (reference 20 $\mu$ Pa)	114	dB (reference 20 $\mu$ Pa)	Frequency 8 kHz	0.4	dB
			114	dB (reference 20 $\mu$ Pa)	114	dB (reference 20 $\mu$ Pa)	Frequency 12.5 kHz	0.7	dB
			114	dB (reference 20 $\mu$ Pa)	114	dB (reference 20 $\mu$ Pa)	Frequency 16 kHz	0.7	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; LI, Ming-Ta									
KB2004 sound Level Meter	Pistonphone B&K4220 /Sound Level Calibrator B&K 4231	In-house method: sound level meter calibration procedure (Document No.: B00-CD-175)	124	dB re 20 $\mu$ Pa	124	dB re 20 $\mu$ Pa	(@250 Hz)	0.2	dB
			94	dB re 20 $\mu$ Pa	94	dB re 20 $\mu$ Pa	(@1000 Hz)	0.2	dB
			114	dB re 20 $\mu$ Pa	114	dB re 20 $\mu$ Pa	(@1000 Hz)	0.2	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta									



## Mass/Force

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
KC1001 (Stainless, brass, cast iron)	Standard Weight METTLER /1 mg to 1 kg (E <sub>2</sub> ) METTLER /2 kg (E <sub>2</sub> ) SARTORIUS /5 kg (E <sub>2</sub> ) SARTORIUS /10 kg (E <sub>2</sub> ) SARTORIUS /20 kg (E <sub>2</sub> )	In-house method: Weight (1 mg~2 g) Calibration Procedure (Document No.: B00-CD-220) In-house method: Weight (5 g~50 g) Calibration Procedure (Document No.: B00-CD-221) In-house method: Weight (100 g~2000 g) Calibration Procedure (Document No.: B00-CD-222) In-house method: Weight (5 kg~20 kg) Calibration Procedure (Document No.: B00-CD-223)	1	mg	1	mg	Stainless	0.0011	mg
			2	mg	2	mg	Stainless	0.0014	mg
			5	mg	5	mg	Stainless	0.0014	mg
			10	mg	10	mg	Stainless	0.0012	mg
			20	mg	20	mg	Stainless	0.0014	mg
			50	mg	50	mg	Stainless	0.0017	mg
			100	mg	100	mg	Stainless	0.0020	mg
			200	mg	200	mg	Stainless	0.0026	mg
			500	mg	500	mg	Stainless	0.0021	mg
			1	g	1	g	Stainless	0.0035	mg
			2	g	2	g	Stainless	0.0055	mg
			5	g	5	g	Stainless	0.013	mg
			10	g	10	g	Stainless	0.011	mg
			20	g	20	g	Stainless	0.015	mg
			50	g	50	g	Stainless	0.031	mg
			100	g	100	g	Stainless	0.4	mg
			200	g	200	g	Stainless	0.4	mg
			500	g	500	g	Stainless	0.4	mg
			1	kg	1	kg	Stainless	0.5	mg
			2	kg	2	kg	Stainless	2.1	mg
			5	kg	5	kg	Stainless	40	mg
			10	kg	10	kg	Stainless	40	mg
			20	kg	20	kg	Stainless	50	mg
1	g	1	g	brass	0.0035	mg			
2	g	2	g	brass	0.0055	mg			
5	g	5	g	brass	0.013	mg			
10	g	10	g	brass	0.012	mg			
20	g	20	g	brass	0.019	mg			





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
KC1001 (Stainless, brass, cast iron)	Standard Weight METTLER /1 mg to 1 kg (E <sub>2</sub> ) METTLER /2 kg (E <sub>2</sub> ) SARTORIUS /5 kg (E <sub>2</sub> ) SARTORIUS /10 kg (E <sub>2</sub> ) SARTORIUS /20 kg (E <sub>2</sub> )	In-house method: Weight (1 mg~2 g) Calibration Procedure (Document No.: B00-CD-220) In-house method: Weight (5 g~50 g) Calibration Procedure (Document No.: B00-CD-221) In-house method: Weight (100 g~2000 g) Calibration Procedure (Document No.: B00-CD-222) In-house method: Weight (5 kg~20 kg) Calibration Procedure (Document No.: B00-CD-223)	50	g	50	g	brass	0.041	Mg
			100	g	100	g	brass	0.4	mg
			200	g	200	g	brass	0.4	mg
			500	g	500	g	brass	0.5	mg
			1	kg	1	kg	brass	0.7	mg
			2	kg	2	kg	brass	2.3	mg
			5	kg	5	kg	brass	40	mg
			10	kg	10	kg	brass	40	mg
			20	kg	20	kg	brass	50	mg
			1	kg	1	kg	cast iron	0.7	mg
			2	kg	2	kg	cast iron	2.2	mg
			5	kg	5	kg	cast iron	40	mg
			10	kg	10	kg	cast iron	40	mg
20	kg	20	kg	cast iron	50	mg			
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta; LU, Chin-Tang									
KC1002 Electronic Balance (on-site calibration included)	Standard Weight/ METTLER 1 mg to 2 kg (E <sub>2</sub> ) SARTORIUS 5 kg (E <sub>2</sub> ) SARTORIUS 10 kg (E <sub>2</sub> ) SARTORIUS 20 kg (E <sub>2</sub> )	In-house method: Electronic Balance Calibration Procedure (Document No.: B00-CD-037)	100	mg	200	g	(resolution: 0.1 mg)	0.5	mg
			100	mg	200	g	(resolution: 1 mg)	3	mg
			100	mg	200	g	(resolution: 5 mg)	15	mg
			1	g	6	kg	(resolution: 0.01 g)	0.05	g
			1	g	6	kg	(resolution: 0.05 g)	0.15	g
			1	g	6	kg	(resolution: 0.1 g)	0.3	g
			1	g	6	kg	(resolution: 0.2 g)	0.6	g
1	g	6	kg	(resolution: 0.5 g)	1.5	g			



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
KC1002 Electronic Balance (on-site calibration included)	Standard Weight/ METTLER 1 mg to 2 kg (E2) SARTORIUS 5 kg (E2) SARTORIUS 10 kg (E2) SARTORIUS 20 kg (E2)	In-house method: Electronic Balance Calibration Procedure (Document No.: B00-CD-037)	0.01	kg	30	kg	(resolution: 1 g)	2	G
			0.01	kg	30	kg	(resolution: 2 g)	4	g
			1	kg	150	kg	(resolution: 5 g)	10	g
			1	kg	150	kg	(resolution: 10 g)	20	g
			1	kg	150	kg	(resolution: 20 g)	40	g
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta; LU, Chin-Tang									
KC2004 Push-Pull Gauge	Load Cell (NTS LRM-1KN /ALGOL HF-E)	In-house method: Push-Pull Gauge Calibration Procedure (Document No.: B00-CD-423)	9.8 (1)	N (kgf)	490 (50)	N (kgf)	Push (analog)	2.4 (0.24)	N (kgf)
			9.8 (1)	N (kgf)	490 (50)	N (kgf)	Pull (analog)	2.4 (0.24)	N (kgf)
			9.8 (1)	N (kgf)	490 (50)	N (kgf)	Push (digital)	0.8 (0.08)	N (kgf)
			9.8 (1)	N (kgf)	490 (50)	N (kgf)	Pull (digital)	0.8 (0.08)	N (kgf)
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta; LU, Chin-Tang									
KC2099 Spring Hammer	Spring Impact Hammer PTL/F42.2	In-house method: Spring Impact Hammer Calibration Procedure (Document No.: B00-CD-327)	0.2	J	0.2	J		0.070	J
			0.35	J	0.35	J		0.070	J
			0.5	J	0.5	J		0.070	J
			0.7	J	0.7	J		0.070	J
			1.0	J	1.0	J		0.070	J
			2.0	J	2.0	J		0.090	J
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta; LU, Chin-Tang									



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
KC4001 Torque Wrench	Torque Calibrator/ NORBAR/50025.ETS NORBAR/50026.ETS NORBAR/50027.ETS NORBAR/50028.ETS NORBAR/50596.LOG NORBAR/50703.LOG	In-house method: Torque Wrench Calibration Procedure (Document No.: B00-CD-398)	1	N m	5	N m	(C.W)	3.4	%
			1	N m	5	N m	(C.C.W)	3.7	%
			5	N m	20	N m	(C.W)	0.85	%
			5	N m	20	N m	(C.C.W)	0.99	%
			20	N m	100	N m	(C.W)	0.75	%
			20	N m	100	N m	(C.C.W)	0.75	%
			100	N m	300	N m	(C.W)	2.8	%
			100	N m	300	N m	(C.C.W)	2.8	%
			300	N m	500	N m	(C.W)	1.4	%
			300	N m	500	N m	(C.C.W)	1.5	%
			500	N m	1500	N m	(C.W)	0.99	%
			500	N m	1500	N m	(C.C.W)	0.85	%

Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta

## Pressure/Vacuum

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
KD1004 Pressure Gauge (Oil Pressure type) (on-site calibration included)	Digital Pressure Gauge /DRUCK/DPI 104	In-house method: Pressure Gauge (Oil Pressure type) Calibration Procedure (Document No.: B00-CD-218)	490.3	kPa	4903.3	kPa	(digital, gage pressure)	12	kPa
			>4903.3	kPa	19613.3	kPa	(digital, gage pressure)	18	kPa
			>19613.3	kPa	39226.6	kPa	(digital, gage pressure)	30	kPa
			>39226.6	kPa	58839.9	kPa	(digital, gage pressure)	49	kPa
			490.3	kPa	4903.3	kPa	(analog, gage pressure)	9.8	kPa
			>4903.3	kPa	58839.9	kPa	(analog, gage pressure)	72	kPa

Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta



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
KD1004 Pressure Gauge (Air pressure type) (on-site calibration included)	Pressure Controller/Calibrator DHI/PPC3-2M-A2Ms	In-house method: Pressure Gauge (Air Pressure type) Calibration Procedure (Document No.: B00-CD-217)	0	kPa	400	kPa	(digital, gage pressure)	0.3	kPa
			>400	kPa	1962	kPa	(digital, gage pressure) )	0.3	kPa
			0	kPa	1000	kPa	(analog, gage pressure) )	1.3	kPa
			>1000	kPa	1962	kPa	(analog, gage pressure) )	1.7	kPa
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; LI, Ming-Ta									

## Temperature/Humidity

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
KE1002 Platinum Resistance Thermometer	Platinum Resistance Thermometer CHINO/R800-2	In-house method: Platinum Resistance Thermometer Calibration Procedure (Document No.: B00-CD-103)	-50	°C	400	°C		0.048	°C
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; TSAI, Wei-Shiun; LI, Ming-Ta; HSIEH, Chao-Ming									



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
KE1002 Platinum Resistance Thermometer (On-site calibration included)	Platinum Resistance Thermometer /HART/1502A	In-house method: Platinum Resistance Thermometer Calibration Procedure (On-site calibration included) (Document No.: B00-CD-452)	-30	°C	120	°C		0.09	°C
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; TSAI, Wei-Shiun; LI, Ming-Ta; HSIEH, Chao-Ming									
KE1005 Thermocouple Thermometer	Standard Platinum Resistance Thermometer HART/1502A/5627-12	In-house method: Thermocouple Thermometer Calibration Procedure (Document No.: B00-CD-410)	-50	°C	400	°C		0.85	°C
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; TSAI, Wei-Shiun; LI, Ming-Ta; HSIEH, Chao-Ming									
KE1008 Indicator of J type Thermometer (On-site Calibration Included)	Thermocouple Simulation Calibrator ECTRON/1140A	In-house method: Thermometer Simulation Calibration Procedures (Document No.: B00-CD-317)	-200	°C	1000	°C	J type (OUT)	0.20	°C
			-200	°C	1000	°C	J type (IN)	0.20	°C
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; TSAI, Wei-Shiun; LI, Ming-Ta; HSIEH, Chao-Ming									
KE1008 Indicator of K type Thermometer (On-site Calibration Included)	Thermocouple Simulation Calibrator ECTRON/1140A	In-house method: Thermometer Simulation Calibration Procedures (Document No.: B00-CD-317)	-200	°C	1000	°C	K type (OUT)	0.20	°C
			-200	°C	1000	°C	K type (IN)	0.20	°C
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; TSAI, Wei-Shiun; LI, Ming-Ta; HSIEH, Chao-Ming									



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
KE1008 Indicator of T type Thermometer (on-site Calibration Included)	Thermocouple Simulation Calibrator ECTRON/1140A	In-house method: Thermometer Simulation Calibration Procedures (Document No.: B00-CD-317)	-200	°C	400	°C	T type (OUT)	0.20	°C
			-200	°C	400	°C	T type (IN)	0.20	°C
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; TSAI, Wei-Shiun; LI, Ming-Ta; HSIEH, Chao-Ming									
KE1011 Sensor/Indicator of Oven Temperature Controlled Chamber (On-site Calibration Included)	Mobilecorder YOKOGAWA MV230-1-2-2-1D	In-house method: Oven Temperature Controlled Chamber Calibration Procedure (Document No.: B00-CD-382)	-65	°C	100	°C		0.65	°C
			>100	°C	200	°C		2.0	°C
			>200	°C	350	°C		2.6	°C
			>350	°C	500	°C		3.3	°C
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; TSAI, Wei-Shiun; LI, Ming-Ta; HSIEH, Chao-Ming									
KE2001 Thermometer /Hygrometer	Hygromer ROTRONIC/HP22	In-house method: Thermometer/Hygrometer Calibration Procedure (Document No.: B00-CD-358)	10.0	°C	50.0	°C	Temperature @50 %R.H.	0.59	°C
			30	%	90	%	Relative humidity @20 °C & 23 °C	2.2	%
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; TSAI, Wei-Shiun; LI, Ming-Ta; HSIEH, Chao-Ming									
KE2001 Hygrometer	RH systems /Dew Point 473	In-house method: Two Pressure and Temperature Humidity Generator of Measurement and Calibration Procedure (Document No.: B00-CD-476)	10	°C	50	°C	Dry Temp. @ (11 to 95) %R.H.	0.20	°C
			11	%	95	%	Relative Humidity @ (10 to 50) °C	0.91	%
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; TSAI, Wei-Shiun; LI, Ming-Ta; HSIEH, Chao-Ming									



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
KE2005 Temperature/Humidity Controlled Chamber (o\On-site Calibration Included)	Mobilecorder YOKOGAWA MV230-1-2-2-1D	In-house method: Temperature/Humidity Controlled Chamber Calibration Procedure (Document No.: B00-CD-387)	-70	°C	100	°C		0.39	°C
			20	%	98	%	Relative humidity @ 20 °C to 90 °C	3.5	%
Approval Signatory: MOU, Wan-Chau; CHEN, Cheng-Nan; HUANG, Chun-Chi; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									

## 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
KF1001 DC Volt Source DC Volt Meter (On-Site Calibration)	Calibrator FLUKE/5700A Selfcal Digital Multimeter WAVETEK 1281	In-house method: DC Voltage Calibration Procedure (Document No.: B00-CD-052)	1	mV	1	mV		1.1	mV/V
			10	mV	10	mV		0.11	mV/V
			100	mV	100	mV		16	μV/V
			1	V	1	V		9.0	μV/V
			10	V	10	V		7.4	μV/V
			100	V	100	V		12	μV/V
			1000	V	1000	V		14	μV/V
			1	mV	10	mV		1.2	mV/V
			10	mV	100	mV		0.12	mV/V
			100	mV	1000	V		31	μV/V
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; TSAI, Wei-Shiun; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									



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 Insulation Resistance Meter (Volt) (On-site Calibration Included)	High Voltage Meter Vitretek 4700	In-house method: Insulation Meter Calibration Procedure (Document No.: B00-CD-374)	100	V	1000	V		0.56	mV/V
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									
KF1002 DC Amper Source DC Amper Meter (On-Site Calibration)	Calibrator FLUKE/5700A Selfcal Digital Multimeter WAVETEK 1281	In-house method: DC Current Calibration Procedure (Document No.: B00-CD-055)	10	μA	10	μA		0.86	mA/A
			100	μA	100	μA		0.14	mA/A
			1	mA	1	mA		0.14	mA/A
			10	mA	10	mA		0.13	mA/A
			100	mA	100	mA		0.13	mA/A
			1	A	1	A		0.25	mA/A
			10	μA	100	μA		0.87	mA/A
			>100	μA	100	mA		0.15	mA/A
			>100	mA	1	A		0.26	mA/A
Approval Signatory: MOU, Wan-Chau; KUO, Yung-Shan; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									
KF1003 DC High Voltage Source DC High Voltmeter (On-site Calibration Included)	High Voltage Digital Meter TAMA /TDV- 20ADMS Highvolt Meter WALLIS /DVM100/20	In-house method: DC High Voltage Calibration Procedure (Document No.: B00-CD-427)	1	kV	10	kV		24	mV/V
			>10	kV	40	kV		6.0	mV/V
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									





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 High Current Meter DC High Current Source DC Current Shunt DC Current Converter (On-Site Calibration)	Active Shunt BALLANTINE 1625A/Transconductance Amplifier BALLANTINE 1620A Selfcal Digital Multimeter WAVETEK 1281	In-house method: DC High Current Calibration Procedure (Document No.: B00-CD-438)	0.5	A	0.5	A	DC Current Shunt/Transconductance	0.18	mV/V
			1	A	1	A	DC Current Shunt/Transconductance	0.13	mV/V
			10	A	10	A	DC Current Shunt/Transconductance	0.13	mV/V
			100	A	100	A	DC Current Shunt/Transconductance	0.21	mV/V
			0.5	A	0.5	A	DC High Current Meter (Source)	1.2	mA/A
			1	A	1	A	DC High Current Meter (Source)	0.70	mA/A
			10	A	10	A	DC High Current Meter (Source)	0.70	mA/A
			100	A	100	A	DC High Current Meter (Source)	0.48	mA/A
			0.5	A	100	A	DC Current Shunt/Transconductance	0.22	mV/V
			0.5	A	100	A	DC High Current Meter (Source)	1.8	mA/A
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									
KF1011 AC Volt Source AC Volt Meter	Calibrator FLUKE/5700A Selfcal Digital Multimeter WAVETEK 1281	In-house method: AC Voltage Calibration Procedure (Document No.: B00-CD-053)	100	mV	100	mV	(@ 50 Hz)	0.27	mV/V
			1	V	1	V	(@ 50 Hz)	0.19	mV/V
			10	V	10	V	(@ 50 Hz)	0.29	mV/V
			100	V	100	V	(@ 50 Hz)	0.20	mV/V
			1000	V	1000	V	(@ 50 Hz)	0.21	mV/V
			100	mV	100	mV	(@ 60 Hz)	0.27	mV/V
			1	V	1	V	(@ 60 Hz)	0.19	mV/V
			10	V	10	V	(@ 60 Hz)	0.29	mV/V
			100	V	100	V	(@ 60 Hz)	0.20	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 AC Volt Source AC Volt Meter	Calibrator FLUKE/5700A Selfcal Digital Multimeter WAVETEK 1281	In-house method: AC Voltage Calibration Procedure (Document No.: B00-CD-053)	1000	V	1000	V	(@ 60 Hz)	0.21	mV/V
			100	mV	100	mV	(@ 1 kHz)	0.26	mV/V
			1	V	1	V	(@ 1 kHz)	0.17	mV/V
			10	V	10	V	(@ 1 kHz)	0.27	mV/V
			100	V	100	V	(@ 1 kHz)	0.17	mV/V
			1000	V	1000	V	(@ 1 kHz)	0.21	mV/V
			1	V	1	V	(@ 10 kHz)	1.4	mV/V
			1	V	1	V	(@ 100 kHz)	1.3	mV/V
			100	mV	1	V	(@ 50 Hz)	0.28	mV/V
			>1	V	1000	V	(@ 50 Hz)	0.30	mV/V
			100	mV	1	V	(@ 60 Hz)	0.28	mV/V
			>1	V	1000	V	(@ 60 Hz)	0.30	mV/V
			100	mV	1	V	(@ 1 kHz)	0.28	mV/V
			>1	V	1000	V	(@ 1 kHz)	0.30	mV/V
Approval Signatory: MOU, Wan-Chau; KUO, Yung-Shan; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									
KF1012 AC Amper Source AC Amper Meter (On-Site Calibration)	Calibrator FLUKE/5700A Selfcal Digital Multimeter WAVETEK 1281	In-house method: AC Current Calibration Procedure (Document No.: B00-CD-056)	0.1	mA	0.1	mA	(@ 50 Hz)	0.82	mA/A
			1	mA	1	mA	(@ 50 Hz)	0.70	mA/A
			10	mA	10	mA	(@ 50 Hz)	0.70	mA/A
			100	mA	100	mA	(@ 50 Hz)	0.70	mA/A
			1	A	1	A	(@ 50 Hz)	1.4	mA/A
			0.1	mA	0.1	mA	(@ 60 Hz)	0.81	mA/A
			1	mA	1	mA	(@ 60 Hz)	0.70	mA/A
			10	mA	10	mA	(@ 60 Hz)	0.70	mA/A
			100	mA	100	mA	(@ 60 Hz)	0.70	mA/A
			1	A	1	A	(@ 60 Hz)	1.4	mA/A
			0.1	mA	0.1	mA	(@ 1 kHz)	0.81	mA/A
			1	mA	1	mA	(@ 1 kHz)	0.70	mA/A
			10	mA	10	mA	(@ 1 kHz)	0.70	mA/A
			100	mA	100	mA	(@ 1 kHz)	0.70	mA/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 AC Amper Source AC Amper Meter (On-Site Calibration)	Calibrator FLUKE/5700A Selfcal Digital Multimeter WAVETEK 1281	In-house method: AC Current Calibration Procedure (Document No.: B00-CD-056)	1	A	1	A	(@1 kHz)	1.4	mA/A
			0.1	mA	1	mA	(@50 Hz)	0.82	mA/A
			1	mA	100	mA	(@50 Hz)	0.71	mA/A
			100	mA	1	A	(@50 Hz)	1.4	mA/A
			0.1	mA	1	mA	(@60 Hz)	0.82	mA/A
			1	mA	100	mA	(@60 Hz)	0.71	mA/A
			100	mA	1	A	(@60 Hz)	1.4	mA/A
			0.1	mA	1	mA	(@1 kHz)	0.82	mA/A
			1	mA	100	mA	(@1 kHz)	0.71	mA/A
			100	mA	1	A	(@1 kHz)	1.4	mA/A
Approval Signatory: MOU, Wan-Chau; KUO, Yung-Shan; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									
KF1013 AC High Voltage Source (On-site Calibration Included) AC High Voltmeter (On-site Calibration Included)	High Voltage Digital Meter TAMA /TDV-20ADMS & Vitrek /4700	In-house method: AC High Voltage Calibration Procedure (Document: B00-CD-426)	1	kV	10	kV	(@60 Hz)	24	mV/V
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									
KF1014 AC High Current Meter AC High Current Source AC Current Shunt AC Current Converter	Active Shunt BALLANTINE 1625A /Transconductance Amplifier BALLANTINE 1620A Selfcal Digital Multimeter WAVETEK 1281	In-house method: AC High Current Calibration Procedure (Document No.: B00-CD-439)	0.5	A	0.5	A	AC Current Shunt/Transconductance (@50 Hz)	1.2	mV/V
			1	A	1	A	AC Current Shunt/Transconductance (@50 Hz)	1.2	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
KF1014 AC High Current Meter AC High Current Source AC Current Shunt AC Current Converter	Active Shunt BALLANTINE 1625A /Transconductance Amplifier BALLANTINE 1620A Selfcal Digital Multimeter WAVETEK 1281	In-house method: AC High Current Calibration Procedure (Document No.: B00-CD-439)	10	A	10	A	AC Current Shunt/Transconductance (@50 Hz) nductance Amplifier (@50 Hz)	1.2	mV/V
			20	A	20	A	AC Current Shunt/Transconductance (@50 Hz)	1.2	mV/V
			0.5	A	0.5	A	AC Current Shunt/Transconductance (@60 Hz)	1.3	mV/V
			1	A	1	A	AC Current Shunt/Transconductance (@60 Hz)	1.3	mV/V
			10	A	10	A	AC Current Shunt/Transconductance (@60 Hz)	1.3	mV/V
			20	A	20	A	AC Current Shunt/Transconductance (@60 Hz)	1.2	mV/V
			100	A	100	A	AC Current Shunt/Transconductance (@60 Hz)	1.3	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
KF1014 AC High Current Meter AC High Current Source AC Current Shunt AC Current Converter	Active Shunt BALLANTINE 1625A /Transconductance Amplifier BALLANTINE 1620A Selfcal Digital Multimeter WAVETEK 1281	In-house method: AC High Current Calibration Procedure (Document No.: B00-CD-439)	0.5	A	0.5	A	AC Current Shunt/Transconductance (@1 kHz)	1.2	mV/V
			1	A	1	A	AC Current Shunt/Transconductance (@1 kHz)	1.3	mV/V
			10	A	10	A	AC Current Shunt/Transconductance (@1 kHz)	1.2	mV/V
			20	A	20	A	AC Current Shunt/Transconductance (@1 kHz)	1.2	mV/V
			0.5	A	0.5	A	AC High Current Meter (Souce) (@50 Hz)	6.6	mA/A
			1	A	1	A	AC High Current Meter (Souce) (@50 Hz)	4.2	mA/A
			10	A	10	A	AC High Current Meter (Souce) (@50 Hz)	4.2	mA/A
			20	A	20	A	AC High Current Meter (Souce) (@50 Hz)	3.0	mA/A
			0.5	A	0.5	A	AC High Current Meter (Souce) (@60 Hz)	6.6	mA/A
			1	A	1	A	AC High Current Meter (Souce) (@60 Hz)	4.2	mA/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
KF1014 AC High Current Meter AC High Current Source AC Current Shunt AC Current Converter	Active Shunt BALLANTINE 1625A /Transconductance Amplifier BALLANTINE 1620A Selfcal Digital Multimeter WAVETEK 1281	In-house method: AC High Current Calibration Procedure (Document No.: B00-CD-439)	10	A	10	A	AC High Current Meter (Souce) (@60 Hz)	4.2	mA/A
			20	A	20	A	AC High Current Meter (Souce) (@60 Hz)	3.0	mA/A
			100	A	100	A	AC High Current Meter (Souce) (@60 Hz)	3.0	mA/A
			0.5	A	0.5	A	AC High Current Meter (Souce) (@1 kHz)	6.6	mA/A
			1	A	1	A	AC High Current Meter (Souce) (@1 kHz)	4.2	mA/A
			10	A	10	A	AC High Current Meter (Souce) (@1 kHz)	4.2	mA/A
			20	A	20	A	AC High Current Meter (Souce) (@1 kHz)	3.0	mA/A
			0.5	A	20	A	AC Current Shunt/Transconductance (@50 Hz)	1.3	mV/V
			0.5	A	100	A	AC Current Shunt/Transconductance (@60 Hz)	1.9	mV/V
			0.5	A	20	A	AC Current Shunt/Transconductance (@1 kHz)	1.4	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
KF1014 AC High Current Meter AC High Current Source AC Current Shunt AC Current Converter	Active Shunt BALLANTINE 1625A /Transconductance Amplifier BALLANTINE 1620A Selfcal Digital Multimeter WAVETEK 1281	In-house method: AC High Current Calibration Procedure (Document No.: B00-CD-439)	0.5	A	20	A	AC High Current Meter (Souce) (@50 Hz)	6.6	mA/A
			0.5	A	100	A	AC High Current Meter (Souce) (@60 Hz)	6.6	mA/A
			0.5	A	20	A	AC High Current Meter (Souce) (@1 kHz)	6.6	mA/A
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									
KF1018 Inductive AC Current source Inductive AC Current Meter (on-site calibration included)	Calibrator FLUKE/9100A 10-and 50-Turn current coils FLUKE/Option 200 Clamp Current Meter PROSyS/CP 1010	In-house method: Induced AC Current Calibration Procedure (Document No.: B00-CD-500)	10	A	200	A	Inductive AC Current source (@ 60 Hz)	14	mA/A
			200	A	900	A	Inductive AC Current source (@ 60 Hz)	12	mA/A
			10	A	200	A	Inductive AC Current Meter (@ 60 Hz)	17	mA/A
			200	A	900	A	Inductive AC Current Meter (@ 60 Hz)	15	mA/A
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta									
KF1018 Inductive DC Current source Inductive DC Current Meter (on-site calibration included)	Calibrator FLUKE/9100A 10-and 50-Turn current coils FLUKE/Option 200 Clamp Current Meter PROSyS/CP 1010	In-house method: Induced DC Current Calibration Procedure (Document No.: B00-CD-501)	10	A	200	A	Inductive DC Current source	15	mA/A
			200	A	900	A	Inductive DC Current source	12	mA/A
			10	A	200	A	DC Turn current coils	12	mA/A
			200	A	900	A	Inductive DC Current Meter	7.0	mA/A
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta									



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
KF1018 Inductive ammeter, hook meter, current probe, current loop (on-site calibration included)	Calibrator (FLUKE/5700A) Transconductance Amplifier (BALLANTINE/1620) Digital Phosphor Oscilloscope (Tektronix/DPO5104B)	In-house method: Standard operating procedures for inductive current correction system (0.5 A to 20 A) (Document No.: B00-CD-549)	0.5	A	20	A	Inductive ammeter (meter) calibration @ DC	2.1	mA/A
			0.5	A	20	A	Inductive ammeter (meter) calibration @ 50 Hz	2.7	mA/A
			0.5	A	20	A	Inductive ammeter (meter) calibration @ 60 Hz	2.7	mA/A
			0.5	A	20	A	Inductive ammeter (meter) calibration @ 1 kHz	2.7	mA/A
			0.5	A	20	A	Inductive current-voltage conversion correction @ DC	0.21	%
			0.5	A	20	A	Inductive current-voltage conversion correction @ 50 Hz	0.28	%
			0.5	A	20	A	Inductive current-voltage conversion correction @ 60 Hz	0.28	%
			0.5	A	20	A	Inductive current-voltage conversion correction @ 1 kHz	0.31	%
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta									
KF1020 Turn-Ratio Test Set (on-site calibration included)	Standard Potential Transformer /RAYTECH/ST-105	In-house method: Turn Ratio Calibration Procedure (Document No.: B00-CD-544)	1		1		(8 V, 40 V, 80 V) @60 Hz	0.20	%
			10		10		(8 V, 40 V, 80 V) @60 Hz	0.20	%
			100		100		(8 V, 40 V, 80 V) @60 Hz	0.20	%
			1000		1000		(8 V, 40 V, 80 V) @60 Hz	0.20	%
			10000		10000		(8 V, 40 V, 80 V) @60 Hz	0.50	%
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									





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
KF1021 AC Turn current coils (on-site calibration included)	Calibrator FLUKE/9100A 10-and 50-Turn current coils FLUKE/Option 200 Clamp Current Meter PROSyS/CP 1010	In-house method: Induced AC Current Calibration Procedure (Document No.: B00-CD-500)	10	turn coil	10	turn coil	AC Turn current coils (@ 60 Hz)	18	mA/A
			50	turn coil	50	turn coil	AC Turn current coils (@ 60 Hz)	17	mA/A
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta									
KF1021 DC Turn current coils (on-site calibration included)	Calibrator FLUKE/9100A 10-and 50-Turn current coils FLUKE/Option 200 Clamp Current Meter PROSyS/CP 1010	In-house method: Induced DC Current Calibration Procedure (Document No.: B00-CD-501)	10	turn coil	10	turn coil	DC Turn current coils	15	mA/A
			50	turn coil	50	turn coil	DC Turn current coils	12	mA/A
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta									
KF2001 Single-phase AC Power Meter (On-Site Calibration)	Power Standard (FLUKE 6100A)	In-house method: AC Electrical Power meter Calibration System Procedure (Document No.: B00-CD-418)	110	W	110	W	(110 V/1 A/PF: 1) /60Hz	0.46	mW/W
			55	W	55	W	(110 V/1 A/PF: 0.5 Lead) /60Hz	0.48	mW/W
			55	W	55	W	(110 V/1 A/PF: 0.5 Lag) /60Hz	0.48	mW/W
			550	W	550	W	(110 V/5 A/PF: 1) /60Hz	0.47	mW/W
			275	W	275	W	(110 V/5 A/PF: 0.5 Lead) /60Hz	0.52	mW/W
			275	W	275	W	(110 V/5 A/PF: 0.5 Lag) /60Hz	0.53	mW/W
			1100	W	1100	W	(110 V/10 A/PF: 1) /60Hz	0.54	mW/W
			550	W	550	W	(110 V/10 A/PF: 0.5 Lead) /60Hz	0.61	mW/W
			550	W	550	W	(110 V/10 A/PF: 0.5 Lag) /60Hz	0.61	mW/W
			120	W	120	W	(120 V/1 A/PF: 1) /60Hz	0.47	mW/W
			60	W	60	W	(120 V/1 A/PF: 0.5 Lead) /60Hz	0.49	mW/W
			60	W	60	W	(120 V/1 A/PF: 0.5 Lag) /60Hz	0.48	mW/W
600	W	600	W	(120 V/5 A/PF: 1) /60Hz	0.48	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 Meter (On-Site Calibration)	Power Standard (FLUKE 6100A)	In-house method: AC Electrical Power meter Calibration System Procedure (Document No.: B00-CD-418)	300	W	300	W	(120 V/5 A/PF: 0.5 Lead) /60Hz	0.53	mW/W
			300	W	300	W	(120 V/5 A/PF: 0.5 Lag) /60Hz	0.52	mW/W
			1200	W	1200	W	(120 V/10 A/PF: 1) /60Hz	0.54	mW/W
			600	W	600	W	(120 V/10 A/PF: 0.5 Lead) /60Hz	0.61	mW/W
			600	W	600	W	(120 V/10 A/PF: 0.5 Lag) /60Hz	0.61	mW/W
			220	W	220	W	(220 V/1 A/PF: 1) /60Hz	0.47	mW/W
			110	W	110	W	(220 V/1 A/PF: 0.5 Lead) /60Hz	0.52	mW/W
			110	W	110	W	(220 V/1 A/PF: 0.5 Lag) /60Hz	0.49	mW/W
			1100	W	1100	W	(220 V/5 A/PF: 1) /60Hz	0.53	mW/W
			550	W	550	W	(220 V/5 A/PF: 0.5 Lead) /60Hz	0.55	mW/W
			550	W	550	W	(220 V/5 A/PF: 0.5 Lag) /60Hz	0.55	mW/W
			2200	W	2200	W	(220 V/10 A/PF: 1) /60Hz	0.57	mW/W
			1100	W	1100	W	(220 V/10 A/PF: 0.5 Lead) /60Hz	0.63	mW/W
			1100	W	1100	W	(220 V/10 A/PF: 0.5 Lag) /60Hz	0.62	mW/W
			240	W	240	W	(240 V/1 A/PF: 1) /60Hz	0.51	mW/W
			120	W	120	W	(240 V/1 A/PF: 0.5 Lead) /60Hz	0.52	mW/W
			120	W	120	W	(240 V/1 A/PF: 0.5 Lag) /60Hz	0.51	mW/W
			1200	W	1200	W	(240 V/5 A/PF: 1) /60Hz	0.60	mW/W
			600	W	600	W	(240 V/5 A/PF: 0.5 Lead) /60Hz	0.55	mW/W
			600	W	600	W	(240 V/5 A/PF: 0.5 Lag) /60Hz	0.55	mW/W
2400	W	2400	W	(240 V/10 A/PF: 1) /60Hz	0.58	mW/W			
1200	W	1200	W	(240 V/10 A/PF: 0.5 Lead) /60Hz	0.62	mW/W			
1200	W	1200	W	(240 V/10 A/PF: 0.5 Lag) /60Hz	0.63	mW/W			
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									



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 Insulation Meter (Resistance) (On-site Calibration Included)	High Resistance Decade Substituter IET HRRS-B-5-1M	In-house method: Insulation Meter Calibration Procedure (Document No.: B00-CD-374)	1	MΩ	1	MΩ	Test Voltage (100 to 1000) V	0.14	mΩ/Ω
			10	MΩ	10	MΩ	Test Voltage (100 to 1000) V	0.39	mΩ/Ω
			100	MΩ	100	MΩ	Test Voltage (100 to 1000) V	0.38	mΩ/Ω
			1	GΩ	1	GΩ	Test Voltage (100 to 1000) V	1.3	mΩ/Ω
			10	GΩ	10	GΩ	Test Voltage (100 to 1000) V	1.3	mΩ/Ω
			100	GΩ	100	GΩ	Test Voltage (100 to 1000) V	4.1	mΩ/Ω
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									
KF3001 Resistance Meter Resistor (On-site calibration included)	High Precision Automatic Inspection and Test Unit (BURSTER/2304 (BURSTER/1240-0.0001/ YEW/2792/1 mΩ/ YEW/2792/10 mΩ/ BURSTER/1284-0.1/ GUILDLINE/9330/ FLUKE/742A-10/ FLUKE/742A-100/ FLUKE/742A-1k/ GUILDLINE/9330)	In-house method: Standard Operating Procedure for Resistance Calibration System (Document No.: B00-CD-453)	100	μΩ	100	μΩ	Resistance Meter	0.11	mΩ/Ω
			1	mΩ	1	mΩ	Resistance Meter	0.35	mΩ/Ω
			10	mΩ	10	mΩ	Resistance Meter	0.18	mΩ/Ω
			100	mΩ	100	mΩ	Resistance Meter	87	μΩ/Ω
			1	Ω	1	Ω	Resistance Meter	9.2	μΩ/Ω
			10	Ω	10	Ω	Resistance Meter	16	μΩ/Ω
			100	Ω	100	Ω	Resistance Meter	13	μΩ/Ω
			1	kΩ	1	kΩ	Resistance Meter	13	μΩ/Ω
			10	kΩ	10	kΩ	Resistance Meter	9.1	μΩ/Ω
			100	μΩ	100	μΩ	Resistor	0.79	mΩ/Ω
			1	mΩ	1	mΩ	Resistor	0.66	mΩ/Ω
			10	mΩ	10	mΩ	Resistor	0.63	mΩ/Ω
			100	mΩ	100	mΩ	Resistor	0.61	mΩ/Ω
			1	Ω	1	Ω	Resistor	0.59	mΩ/Ω
			10	Ω	10	Ω	Resistor	0.59	mΩ/Ω
			100	Ω	100	Ω	Resistor	0.58	mΩ/Ω
1	kΩ	1	kΩ	Resistor	0.58	mΩ/Ω			
10	kΩ	10	kΩ	Resistor	0.58	mΩ/Ω			
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									



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 Resistor (Resistance Source) Ohmmeter (Resistance Meter) (On-Site Calibration)	Calibrator FLUKE/5700A Selfcal Digital Multimeter WAVETEK 1281	In-house method: Resistance Calibration Procedure (Document No.: B00-CD-057)	1	$\Omega$	1	$\Omega$	Resistor (Resistance Source)	0.07	m $\Omega$ / $\Omega$
			10	$\Omega$	10	$\Omega$	Resistor (Resistance Source)	29	$\mu\Omega$ / $\Omega$
			100	$\Omega$	100	$\Omega$	Resistor (Resistance Source)	21	$\mu\Omega$ / $\Omega$
			1	k $\Omega$	1	k $\Omega$	Resistor (Resistance Source)	17	$\mu\Omega$ / $\Omega$
			10	k $\Omega$	10	k $\Omega$	Resistor (Resistance Source)	17	$\mu\Omega$ / $\Omega$
			100	k $\Omega$	100	k $\Omega$	Resistor (Resistance Source)	17	$\mu\Omega$ / $\Omega$
			1	M $\Omega$	1	M $\Omega$	Resistor (Resistance Source)	27	$\mu\Omega$ / $\Omega$
			10	M $\Omega$	10	M $\Omega$	Resistor (Resistance Source)	62	$\mu\Omega$ / $\Omega$
			100	M $\Omega$	100	M $\Omega$	Resistor (Resistance Source)	0.61	m $\Omega$ / $\Omega$
			1	$\Omega$	1	$\Omega$	Ohmmeter (Resistance Meter)	0.15	m $\Omega$ / $\Omega$
			10	$\Omega$	10	$\Omega$	Ohmmeter (Resistance Meter)	43	$\mu\Omega$ / $\Omega$
			100	$\Omega$	100	$\Omega$	Ohmmeter (Resistance Meter)	26	$\mu\Omega$ / $\Omega$
			1	k $\Omega$	1	k $\Omega$	Ohmmeter (Resistance Meter)	20	$\mu\Omega$ / $\Omega$
			10	k $\Omega$	10	k $\Omega$	Ohmmeter (Resistance Meter)	19	$\mu\Omega$ / $\Omega$
			100	k $\Omega$	100	k $\Omega$	Ohmmeter (Resistance Meter)	22	$\mu\Omega$ / $\Omega$
1	M $\Omega$	1	M $\Omega$	Ohmmeter (Resistance Meter)	32	$\mu\Omega$ / $\Omega$			
10	M $\Omega$	10	M $\Omega$	Ohmmeter (Resistance Meter)	63	$\mu\Omega$ / $\Omega$			
100	M $\Omega$	100	M $\Omega$	Ohmmeter (Resistance Meter)	0.18	m $\Omega$ / $\Omega$			
Approval Signatory: MOU, Wan-Chau; KUO, Yung-Shan; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									
KF3002 Inductance Meter /Bridge /Inductor	Standard Self-Inductor ANDO/RS-102 ANDO/RS-104 ANDO/RS-106 ANDO/RS-108 ANDO/RS-110	In-house method: Inductance Calibration System Procedure (Document No.: B00-CD-054)	100	$\mu$ H	100	$\mu$ H	@ (100 Hz)	1.5	mH/H
			1	mH	1	mH	@ (100 Hz)	0.49	mH/H
			10	mH	10	mH	@ (100 Hz)	0.42	mH/H
			100	mH	100	mH	@ (100 Hz)	0.42	mH/H
			1	H	1	H	@ (100 Hz)	0.42	mH/H
			100	$\mu$ H	100	$\mu$ H	@ (1 kHz)	1.3	mH/H
			1	mH	1	mH	@ (1 kHz)	0.43	mH/H
			10	mH	10	mH	@ (1 kHz)	0.34	mH/H
			100	mH	100	mH	@ (1 kHz)	0.34	mH/H
			1	H	1	H	@ (1 kHz)	0.65	mH/H
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									



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 Capacitance Meter/Bridge /Capacitor	1 KHz Ultra-Precision Capacitance Bridge AH/2500A Reference Standard Capacitor GR/1404-A Reference Standard Capacitor GR/1404-A Reference Standard Capacitor GR/1404-B Reference Standard Capacitor GR/1404-C Reference Standard Capacitor GR/1404-C	In-house method: Capacitance Calibration System Procedure (Document No.: B00-CD-051)	10	pF	10	pF	(@ 1 kHz)	37	μF/F
			100	pF	100	pF	(@ 1 kHz)	37	μF/F
			1000	pF	1000	pF	(@ 1 kHz)	37	μF/F
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									
KF3004 50 Ω Impedance	Calibration Kit/HP 85032B S/N: 3217A08037	In-house method: Calibration Procedure for 50 Ω Impedance (Document No.: B00-CD-357)	300	kHz	300	MHz		2.6	%
			9	kHz	300	kHz		3.8	%
Approval Signatory: MOU, Wan-Chau; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									
KF4001 Oscilloscope	Calibrator (FLUKE 9100) Power Meter&Power Sensor (HP E4419B&HP 8482A)	In-house method: Oscilloscope Calibration Procedure (Document No.: B00-CD-420)	10	mV	100	V	Vertical Gain Check (pk-to-pk) (@Square wave, 1 kHz, 1 MΩ)	0.40	%
			10	mV	3	V	Vertical Gain Check (pk-to-pk) (@Square wave, 1 kHz, 50 Ω)	0.40	%
			10	mV	100	V	Vertical Gain Check (pk-to-pk) (@Sine wave, 1 kHz, 1 MΩ)	0.40	%
			10	mV	3	V	Vertical Gain Check (pk-to-pk) (@Sine wave, 1 kHz, 50 Ω)	0.40	%



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
KF4001 Oscilloscope	Calibrator (FLUKE 9100) Power Meter & Power Sensor (HP E4419B & HP 8482A)	In-house method: Oscilloscope Calibration Procedure (Document No.: B00-CD-420)	2	ns	5	s	Sweep Timebase Check	0.21	%
			10	MHz	4	GHz	Frequency Response Check (@ 0 dBm or 1.000 mW)	3.6	%
			50	MHz	50	MHz	Frequency Response Check (@ 0 dBm or 1.000 mW)	3.5	%
			100	MHz	100	MHz	Frequency Response Check (@ 0 dBm or 1.000 mW)	3.6	%
			500	MHz	500	MHz	Frequency Response Check (@ 0 dBm or 1.000 mW)	3.6	%
			1	GHz	1	GHz	Frequency Response Check (@ 0 dBm or 1.000 mW)	3.6	%
			2	GHz	2	GHz	Frequency Response Check (@ 0 dBm or 1.000 mW)	3.6	%
			3	GHz	3	GHz	Frequency Response Check (@ 0 dBm or 1.000 mW)	3.6	%
			4	GHz	4	GHz	Frequency Response Check (@ 0 dBm or 1.000 mW)	3.6	%
Approval Signatory: MOU, Wan-Chau; KUO, Yung-Shan; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									
KF4008 Spectrum (Signal) Analyzer	Rubidium Atomic Frequency Standard WAVETEK 909 & Universal Counter AGILENT 53152A & Power Sensor AGILENT 8487A & POWER SPLITTER AGILENT 11667C & Signal Generator KEYSIGHT E8257D	In-house method: Spectrum Analyzer Calibration 100 kHz to 50 GHz Procedure (Document No.: B00-CD-142 )	1.5	GHz	45	GHz	Frequency Count	5.2 x 10 <sup>-8</sup>	
			1.5	GHz	1.5	GHz	Frequency Readout (1MHz)	1.2 x 10 <sup>-6</sup>	
			1.5	GHz	1.5	GHz	Frequency Readout (10 MHz)	1.2 x 10 <sup>-5</sup>	
			1.5	GHz	1.5	GHz	Frequency Readout (20 MHz)	1.2 x 10 <sup>-5</sup>	
			1.5	GHz	1.5	GHz	Frequency Readout (50 MHz)	1.2 x 10 <sup>-5</sup>	
			1.5	GHz	1.5	GHz	Frequency Readout (100 MHz)	1.2 x 10 <sup>-4</sup>	
			1.5	GHz	1.5	GHz	Frequency Readout (1 GHz)	1.2 x 10 <sup>-3</sup>	
			4	GHz	4	GHz	Frequency Readout (1 MHz)	1.2 x 10 <sup>-6</sup>	
			4	GHz	4	GHz	Frequency Readout (10 MHz)	1.2 x 10 <sup>-5</sup>	
			4	GHz	4	GHz	Frequency Readout (20 MHz)	1.2 x 10 <sup>-5</sup>	
			4	GHz	4	GHz	Frequency Readout (50 MHz)	1.2 x 10 <sup>-5</sup>	



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
KF4008 Spectrum (Signal) Analyzer	Rubidium Atomic Frequency Standard WAVETEK 909 & Universal Counter AGILENT 53152A & Power Sensor AGILENT 8487A & POWER SPLITTER AGILENT 11667C & Signal Generator KEYSIGHT E8257D	In-house method: Spectrum Analyzer Calibration 100 kHz to 50 GHz Procedure (Document No.: B00-CD-142 )	4	GHz	4	GHz	Frequency Readout (100 MHz)	1.2 x 10 <sup>-4</sup>	
			4	GHz	4	GHz	Frequency Readout (1 GHz)	1.2 x 10 <sup>-3</sup>	
			9	GHz	9	GHz	Frequency Readout (1 MHz)	1.2 x 10 <sup>-6</sup>	
			9	GHz	9	GHz	Frequency Readout (10 MHz)	1.2 x 10 <sup>-5</sup>	
			9	GHz	9	GHz	Frequency Readout (20 MHz)	1.2 x 10 <sup>-5</sup>	
			9	GHz	9	GHz	Frequency Readout (50 MHz)	1.2 x 10 <sup>-5</sup>	
			9	GHz	9	GHz	Frequency Readout (100 MHz)	1.2 x 10 <sup>-4</sup>	
			9	GHz	9	GHz	Frequency Readout (1 GHz)	1.2 x 10 <sup>-3</sup>	
			16	GHz	16	GHz	Frequency Readout (1 MHz)	1.2 x 10 <sup>-6</sup>	
			16	GHz	16	GHz	Frequency Readout (10 MHz, 20 MHz, 50 MHz)	1.2 x 10 <sup>-5</sup>	
			16	GHz	16	GHz	Frequency Readout (100 MHz)	1.2 x 10 <sup>-4</sup>	
			16	GHz	16	GHz	Frequency Readout (1 GHz)	1.2 x 10 <sup>-3</sup>	
			21	GHz	21	GHz	Frequency Readout (1 MHz)	1.2 x 10 <sup>-6</sup>	
			21	GHz	21	GHz	Frequency Readout (10 MHz, 20 MHz, 50 MHz)	1.2 x 10 <sup>-5</sup>	
			21	GHz	21	GHz	Frequency Readout (100 MHz)	1.2 x 10 <sup>-4</sup>	
			21	GHz	21	GHz	Frequency Readout (1 GHz)	1.2 x 10 <sup>-3</sup>	



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
KF4008 Spectrum (Signal) Analyzer	Rubidium Atomic Frequency Standard WAVETEK 909 & Universal Counter AGILENT 53152A & Power Sensor AGILENT 8487A & POWER SPLITTER AGILENT 11667C & Signal Generator KEYSIGHT E8257D	In-house method: Spectrum Analyzer Calibration 100 kHz to 50 GHz Procedure (Document No.: B00-CD-142 )	29	GHz	29	GHz	Frequency Readout (1 MHz)	1.2 x 10 <sup>-6</sup>	
			29	GHz	29	GHz	Frequency Readout (10 MHz, 20 MHz, 50 MHz)	1.2 x 10 <sup>-5</sup>	
			29	GHz	29	GHz	frequency Readout (100 MHz)	1.2 x 10 <sup>-4</sup>	
			29	GHz	29	GHz	frequency Readout (1 GHz)	1.2 x 10 <sup>-3</sup>	
			35	GHz	35	GHz	frequency Readout (1 MHz)	1.2 x 10 <sup>-6</sup>	
			35	GHz	35	GHz	frequency Readout (10 MHz, 20 MHz, 50 MHz)	1.2 x 10 <sup>-5</sup>	
			35	GHz	35	GHz	frequency Readout (100 MHz)	1.2 x 10 <sup>-4</sup>	
			35	GHz	35	GHz	frequency Readout (1 GHz)	1.2 x 10 <sup>-3</sup>	
			1	kHz	10	GHz	Frequency Span	0.15	%
			2021.4	MHz	2021.4	MHz	2 GHz Image Multiple and Out- of Band Respnses	0.86	dB
			2621.4	MHz	2621.4	MHz	2 GHz Image Multiple and Out- of Band Respnses	0.86	dB
			2321.4	MHz	2321.4	MHz	2 GHz Image Multiple and Out- of Band Respnses	0.86	dB
			2600.0	MHz	2600.0	MHz	2 GHz Image Multiple and Out- of Band Respnses	0.86	dB
7910.7	MHz	7910.7	MHz	2 GHz Image Multiple and Out- of Band Respnses	0.86	dB			
9821.4	MHz	9821.4	MHz	2 GHz Image Multiple and Out- of Band Respnses	0.86	dB			





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
KF4008 Spectrum (Signal) Analyzer	Rubidium Atomic Frequency Standard WAVETEK 909 & Universal Counter AGILENT 53152A & Power Sensor AGILENT 8487A & POWER SPLITTER AGILENT 11667C & Signal Generator KEYSIGHT E8257D	In-house method: Spectrum Analyzer Calibration 100 kHz to 50 GHz Procedure (Document No.: B00-CD-142 )	4021.4	MHz	4021.4	MHz	4 GHz Image Multiple and Out- of Band Respsnes	0.84	dB
			4621.4	MHz	4621.4	MHz	4 GHz Image Multiple and Out- of Band Respsnes	0.84	dB
			4321.4	MHz	4321.4	MHz	4 GHz Image Multiple and Out- of Band Respsnes	0.84	dB
			4600.0	MHz	4600.0	MHz	4 GHz Image Multiple and Out- of Band Respsnes	0.84	dB
			8310.7	MHz	8310.7	MHz	4 GHz Image Multiple and Out- of Band Respsnes	0.84	dB
			8932.1	MHz	8932.1	MHz	4 GHz Image Multiple and Out- of Band Respsnes	0.84	dB
			9021.4	MHz	9021.4	MHz	9 GHz Image Multiple and Out- of Band Respsnes	0.90	dB
			9621.4	MHz	9621.4	MHz	9 GHz Image Multiple and Out- of Band Respsnes	0.90	dB
			9321.4	MHz	9321.4	MHz	9 GHz Image Multiple and Out- of Band Respsnes	0.90	dB
			9600.0	MHz	9600.0	MHz	9 GHz Image Multiple and Out- of Band Respsnes	0.90	dB
			18310.7	MHz	18310.7	MHz	9 GHz Image Multiple and Out- of Band Respsnes	0.90	dB
			18932.1	MHz	18932.1	MHz	9 GHz Image Multiple and Out- of Band Respsnes	0.90	dB
			15021.4	MHz	15021.4	MHz	15 GHz Image Multiple and Out- of Band Respsnes	0.94	dB
			15621.4	MHz	15621.4	MHz	15 GHz Image Multiple and Out- of Band Respsnes	0.94	dB
			22655.35	MHz	22655.35	MHz	15 GHz Image Multiple and Out- of Band Respsnes	0.94	dB
23276.75	MHz	23276.75	MHz	15 GHz Image Multiple and Out- of Band Respsnes	0.94	dB			



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
KF4008 Spectrum (Signal) Analyzer	Rubidium Atomic Frequency Standard WAVETEK 909 & Universal Counter AGILENT 53152A & Power Sensor AGILENT 8487A & POWER SPLITTER AGILENT 11667C & Signal Generator KEYSIGHT E8257D	In-house method: Spectrum Analyzer Calibration 100 kHz to 50 GHz Procedure (Document No.: B00-CD-142 )	7344.65	MHz	7344.65	MHz	15 GHz Image Multiple and Out- of Band Respsnes	0.94	dB
			7966.05	MHz	7966.05	MHz	15 GHz Image Multiple and Out- of Band Respsnes	0.94	dB
			20021.4	MHz	20021.4	MHz	20 GHz Image Multiple and Out- of Band Respsnes	0.94	dB
			20621.4	MHz	20621.4	MHz	20 GHz Image Multiple and Out- of Band Respsnes	0.92	dB
			1543.725	MHz	1543.725	MHz	20 GHz Image Multiple and Out- of Band Respsnes	0.92	dB
			25699.075	MHz	25699.075	MHz	20 GHz Image Multiple and Out- of Band Respsnes	0.92	dB
			9844.65	MHz	9844.65	MHz	20 GHz Image Multiple and Out- of Band Respsnes	0.92	dB
			10466.05	MHz	10466.05	MHz	20 GHz Image Multiple and Out- of Band Respsnes	0.92	dB
			28378.6	MHz	28378.6	MHz	29 GHz Image Multiple and Out- of Band Respsnes	1.1	dB
			28978.6	MHz	28978.6	MHz	29 GHz Image Multiple and Out- of Band Respsnes	1.1	dB
			24450.925	MHz	24450.925	MHz	29 GHz Image Multiple and Out- of Band Respsnes	1.1	dB
			28700.0	MHz	28700.0	MHz	29 GHz Image Multiple and Out- of Band Respsnes	1.1	dB
			16455.35	MHz	16455.35	MHz	29 GHz Image Multiple and Out- of Band Respsnes	1.1	dB
			35272.325	MHz	35272.325	MHz	29 GHz Image Multiple and Out- of Band Respsnes	1.1	dB
35021.4	MHz	35021.4	MHz	35 GHz Image Multiple and Out- of Band Respsnes	1.1	dB			
35621.4	MHz	35621.4	MHz	35 GHz Image Multiple and Out- of Band Respsnes	1.1	dB			



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
KF4008 Spectrum (Signal) Analyzer	Rubidium Atomic Frequency Standard WAVETEK 909 & Universal Counter AGILENT 53152A & Power Sensor AGILENT 8487A & POWER SPLITTER AGILENT 11667C & Signal Generator KEYSIGHT E8257D	In-house method: Spectrum Analyzer Calibration 100 kHz to 50 GHz Procedure (Document No.: B00-CD-142 )	33093.725	MHz	33093.725	MHz	35 GHz Image Multiple and Out- of Band Respsnes	1.1	dB
			35321.4	MHz	35321.4	MHz	35 GHz Image Multiple and Out- of Band Respsnes	1.1	dB
			8744.538	MHz	8744.538	MHz	35 GHz Image Multiple and Out- of Band Respsnes	1.1	dB
			15544.65	MHz	15544.65	MHz	35 GHz Image Multiple and Out- of Band Respsnes	1.1	dB
			45021.4	MHz	45021.4	MHz	45 GHz Image Multiple and Out- of Band Respsnes	1.3	dB
			45621.4	MHz	45621.4	MHz	45 GHz Image Multiple and Out- of Band Respsnes	1.3	dB
			34479.888	MHz	34479.888	MHz	45 GHz Image Multiple and Out- of Band Respsnes	1.3	dB
			40593.725	MHz	40593.725	MHz	45 GHz Image Multiple and Out- of Band Respsnes	1.3	dB
			8316.975	MHz	8316.975	MHz	45 GHz Image Multiple and Out- of Band Respsnes	1.3	dB
			20544.65	MHz	20544.65	MHz	45 GHz Image Multiple and Out- of Band Respsnes	1.3	dB
			45	GHz	45	GHz	Frequency Readout (1 MHz)	$1.2 \times 10^{-6}$	
			45	GHz	45	GHz	Frequency Readout (10 MHz, 20 MHz, 50 MHz)	$1.2 \times 10^{-5}$	
			45	GHz	45	GHz	Frequency Readout (100 MHz)	$1.2 \times 10^{-4}$	
			45	GHz	45	GHz	Frequency Readout (1 GHz)	$1.2 \times 10^{-3}$	
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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
KF4012 Signal Generator /Signal Source of Analyzer /Signal Source of Communications Test Set	Universal Counter HP 53132A & AGILENT 53152A & Rubidium Atomic Frequency Standard WAVETEK 909 & Power Sensor R&S NRP-Z56 & AGILENT E9304A Power Meter HP E4419B & Measuring Receiver R&S FSMR50	In-house method: 100 kHz to 50 GHz Signal Generator Calibration Procudue (Document No.: B00-CD-369)	10	MHz	10	MHz	Reference Frequency	8.1 E-10	
			9	kHz	46	GHz	Frequency	8.1 E-10	
			9	kHz	100	kHz	Output Lever Frequency Response (@0 dBm)	0.19	dB
			100	kHz	100	MHz	Output Lever Frequency Response (@0 dBm)	0.11	dB
			100	MHz	1	GHz	Output Lever Frequency Response (@0 dBm)	0.10	dB
			1	GHz	10	GHz	Output Lever Frequency Response (@0 dBm)	0.13	dB
			10	GHz	20	GHz	Output Lever Frequency Response (@0 dBm)	0.16	dB
			20	GHz	30	GHz	Output Lever Frequency Response (@0 dBm)	0.22	dB
			30	GHz	40	GHz	Output Lever Frequency Response (@0 dBm)	0.25	dB
			40	GHz	50	GHz	Output Lever Frequency Response (@0 dBm)	0.36	dB
			-110	dBm	10	dBm	Output Lever Linearity (@ 100 kHz to 2 GHz)	0.64	dB
			-110	dBm	10	dBm	Output Lever Linearity (@2 GHz to 10 GHz)	0.65	dB
			-110	dBm	10	dBm	Output Lever Linearity (@ 10 GHz to 20 GHz)	0.68	dB
			-110	dBm	10	dBm	Output Lever Linearity (@20 GHz to 30 GHz)	0.80	dB
			-110	dBm	10	dBm	Output Lever Linearity (@30 GHz to 40 GHz)	0.85	dB
-110	dBm	10	dBm	Output Lever Linearity (@40 GHz to 50 GHz)	1.1	dB			



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
KF4012 Signal Generator /Signal Source of Analyzer /Signal Source of Communications Test Set	Universal Counter HP 53132A & AGILENT 53152A & Rubidium Atomic Frequency Standard WAVETEK 909 & Power Sensor R&S NRP-Z56 & AGILENT E9304A Power Meter HP E4419B & Measuring Receiver R&S FSMR50	In-house method: 100 kHz to 50 GHz Signal Generator Calibration Proceudue (Document No.: B00-CD-369)	100	kHz	3.6	GHz	Harmonic Accuracy (@0 dBm)	0.69	dB
			3.6	GHz	8	GHz	Harmonic Accuracy (@0 dBm)	1.3	dB
			8	GHz	20	GHz	Harmonic Accuracy (@0 dBm)	1.9	dB
			1	%	100	%	AM Modulation Depth @Frequency 100 kHz to 6 GHz; Modulation Frequency 1 kHz and 400 Hz	3.7	%
			1	%	100	%	AM Modulation Depth @Frequency 6 GHz to 20 GHz; Modulation Frequency 1 kHz and 400 Hz	4.8	%
			1	kHz	100	kHz	FM Modulation Depth @Frequency 100 kHz to 6 GHz; Modulation Frequency 1 kHz and 400 Hz	5.3	%
			1	kHz	100	kHz	FM Modulation Depth @Frequency 6 GHz to 20 GHz; Modulation Frequency 1 kHz and 400 Hz	6.1	%
			100	MHz	100	MHz	AM Modulation 30 %, Modulation Frequency 400 Hz and 1 kHz	0.012	Hz



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
KF4012 Signal Generator /Signal Source of Analyzer /Signal Source of Communications Test Set	Universal Counter HP 53132A & AGILENT 53152A & Rubidium Atomic Frequency Standard WAVETEK 909 & Power Sensor R&S NRP-Z56 & AGILENT E9304A Power Meter HP E4419B & Measuring Receiver R&S FSMR50	In-house method: 100 kHz to 50 GHz Signal Generator Calibration Procedure (Document No.: B00-CD-369)	100	MHz	100	MHz	Distortion Harmonic	0.12	%
			100	MHz	100	MHz	FM Modulation 75 kHz, Modulation Frequency 400 Hz and 1 kHz	0.012	Hz
			100	MHz	100	MHz	Distortion Harmonic	0.12	%

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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
KF4014 Digital LCR measuring instrument (on-site calibration included)	1.Frequency standard parts: Rubidium Atomic Frequency Standard WAVETEK/909 Universal Counter H.P./HP 5334B 2.Resistance standard parts: Four-Terminal Pair Resistor Set AGILENT /42030A 3.Capacitor standard parts: Standard Air Capacitor Set HP/16380A Standard Air Capacitor Set HP/16380C 4.Inductance standard parts: Standard Self-Inductor ANDO RS-102 Standard Self-Inductor ANDO RS-104 Standard Self-Inductor ANDO RS-106 Standard Self-Inductor ANDO RS-108 Standard Self-Inductor ANDO RS-110	In-house method: Digital LCR Measuring Instrument Standard Operating Procedure Book (Document No.: B00-CD-548)	20	Hz	1	MHz	1. Frequency	$2.5 \times 10^{-6}$	
			1	MHz	13	MHz	1. Frequency	$1.2 \times 10^{-7}$	
			10	$\Omega$	10	$\Omega$	2. Resistance - Rs @1 MHz	1.5	m $\Omega$ / $\Omega$
			10	$\Omega$	10	$\Omega$	2. Resistance - Rs @2 MHz	1.9	m $\Omega$ / $\Omega$
			10	$\Omega$	10	$\Omega$	2. Resistance - Rs @3 MHz	2.6	m $\Omega$ / $\Omega$
			10	$\Omega$	10	$\Omega$	2. Resistance - Rs @4 MHz	3.2	m $\Omega$ / $\Omega$
			10	$\Omega$	10	$\Omega$	2. Resistance - Rs @5 MHz	5.1	m $\Omega$ / $\Omega$
			10	$\Omega$	10	$\Omega$	2. Resistance - Rs @10 MHz	13	m $\Omega$ / $\Omega$
			10	$\Omega$	10	$\Omega$	2. Resistance - Rs @13 MHz	19	m $\Omega$ / $\Omega$
			100	$\Omega$	100	$\Omega$	2. Resistance - Rs @1 MHz	1.5	m $\Omega$ / $\Omega$
			100	$\Omega$	100	$\Omega$	2. Resistance - Rs @2 MHz	1.5	m $\Omega$ / $\Omega$
			100	$\Omega$	100	$\Omega$	2. Resistance - Rs @3 MHz	1.9	m $\Omega$ / $\Omega$
			100	$\Omega$	100	$\Omega$	2. Resistance - Rs @4 MHz	1.9	m $\Omega$ / $\Omega$
			100	$\Omega$	100	$\Omega$	2. Resistance - Rs @5 MHz	2.5	m $\Omega$ / $\Omega$
			100	$\Omega$	100	$\Omega$	2. Resistance - Rs @10 MHz	6.5	m $\Omega$ / $\Omega$
			100	$\Omega$	100	$\Omega$	2. Resistance - Rs @13 MHz	9.1	m $\Omega$ / $\Omega$
			1	k $\Omega$	1	k $\Omega$	2. Resistance - Rp @100 kHz	1.5	m $\Omega$ / $\Omega$
			1	k $\Omega$	1	k $\Omega$	2. Resistance - Rp @1 MHz	1.0	m $\Omega$ / $\Omega$
			1	k $\Omega$	1	k $\Omega$	2. Resistance - Rp @2 MHz	1.3	m $\Omega$ / $\Omega$
			1	k $\Omega$	1	k $\Omega$	2. Resistance - Rp @3 MHz	1.3	m $\Omega$ / $\Omega$
			1	k $\Omega$	1	k $\Omega$	2. Resistance - Rp @4 MHz	1.9	m $\Omega$ / $\Omega$
			1	k $\Omega$	1	k $\Omega$	2. Resistance - Rp @5 MHz	1.9	m $\Omega$ / $\Omega$
			1	k $\Omega$	1	k $\Omega$	2. Resistance - Rp @10 MHz	5.3	m $\Omega$ / $\Omega$
1	k $\Omega$	1	k $\Omega$	2. Resistance - Rp @13 MHz	8.0	m $\Omega$ / $\Omega$			
10	k $\Omega$	10	k $\Omega$	2. Resistance - Rp @100 kHz	1.0	m $\Omega$ / $\Omega$			
10	k $\Omega$	10	k $\Omega$	2. Resistance - Rp @1 MHz	1.0	m $\Omega$ / $\Omega$			
100	k $\Omega$	100	k $\Omega$	2. Resistance - Rp @100 kHz	1.0	m $\Omega$ / $\Omega$			
100	k $\Omega$	100	k $\Omega$	2. Resistance - Rp @1 MHz	1.5	m $\Omega$ / $\Omega$			
1	pF	1	pF	3. Capacitance @ 1 kHz	1.3	mF/F			
1	pF	1	pF	3. Capacitance @ 1 MHz	1.2	mF/F			
1	pF	1	pF	3. Capacitance @ 2 MHz	1.3	mF/F			



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
KF4014 Digital LCR measuring instrument (on-site calibration included)	1.Frequency standard parts: Rubidium Atomic Frequency Standard WAVETEK /909 Universal Counter H.P./HP 5334B 2.Resistance standard parts: Four-Terminal Pair Resistor Set AGILENT /42030A 3.Capacitor standard parts: Standard Air Capacitor Set HP/16380A Standard Air Capacitor Set HP/16380C 4.Inductance standard parts: Standard Self-Inductor ANDO RS-102 Standard Self-Inductor ANDO RS-104 Standard Self-Inductor ANDO RS-106 Standard Self-Inductor ANDO RS-108 Standard Self-Inductor ANDO RS-110	In-house method: Digital LCR Measuring Instrument Standard Operating Procedure Book (Document No.: B00-CD-548)	1	pF	1	pF	3. Capacitance @ 3 MHz	1.3	mF/F
			1	pF	1	pF	3. Capacitance @ 4 MHz	1.4	mF/F
			1	pF	1	pF	3. Capacitance @ 5 MHz	1.6	mF/F
			1	pF	1	pF	3. Capacitance @ 10 MHz	2.8	mF/F
			1	pF	1	pF	3. Capacitance @ 13 MHz	3.9	mF/F
			1	pF	1	pF	3. Capacitance @ 1 kHz to 13 MHz	4.9	mF/F
			10	pF	10	pF	3. Capacitance @ 1 kHz	1.3	mF/F
			10	pF	10	pF	3. Capacitance @ 1 MHz	1.3	mF/F
			10	pF	10	pF	3. Capacitance @ 2 MHz	1.3	mF/F
			10	pF	10	pF	3. Capacitance @ 3 MHz	1.3	mF/F
			10	pF	10	pF	3. Capacitance @ 4 MHz	1.3	mF/F
			10	pF	10	pF	3. Capacitance @ 5 MHz	1.3	mF/F
			10	pF	10	pF	3. Capacitance @ 10 MHz	1.3	mF/F
			10	pF	10	pF	3. Capacitance @ 13 MHz	1.3	mF/F
			10	pF	10	pF	3. Capacitance @ 1 kHz to @ 13 MHz	1.3	mF/F
			100	pF	100	pF	3. Capacitance @ 1 kHz	1.3	mF/F
			100	pF	100	pF	3. Capacitance @ 1 MHz	1.3	mF/F
			100	pF	100	pF	3. Capacitance @ 2 MHz	1.3	mF/F
			100	pF	100	pF	3. Capacitance @ 3 MHz	1.3	mF/F
			100	pF	100	pF	3. Capacitance @ 4 MHz	1.3	mF/F
			100	pF	100	pF	3. Capacitance @ 5 MHz	1.3	mF/F
			100	pF	100	pF	3. Capacitance @ 10 MHz	1.3	mF/F
			100	pF	100	pF	3. Capacitance @ 13 MHz	1.4	mF/F
100	pF	100	pF	3. Capacitance @ 1 kHz to @ 13 MHz	1.5	mF/F			
1000	pF	1000	pF	3. Capacitance @ 1 kHz	1.3	mF/F			
1000	pF	1000	pF	3. Capacitance @ 1 MHz	1.3	mF/F			
1000	pF	1000	pF	3. Capacitance @ 2 MHz	1.3	mF/F			
1000	pF	1000	pF	3. Capacitance @ 3 MHz	1.3	mF/F			
1000	pF	1000	pF	3. Capacitance @ 4 MHz	1.4	mF/F			
1000	pF	1000	pF	3. Capacitance @ 5 MHz	1.4	mF/F			
1000	pF	1000	pF	3. Capacitance @ 10 MHz	2.3	mF/F			





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
KF4014 Digital LCR measuring instrument (on-site calibration included)	1.Frequency standard parts: Rubidium Atomic Frequency Standard WAVETEK /909 Universal Counter H.P./HP 5334B 2.Resistance standard parts: Four-Terminal Pair Resistor Set AGILENT /42030A 3.Capacitor standard parts: Standard Air Capacitor Set HP/16380A Standard Air Capacitor Set HP/16380C 4.Inductance standard parts: Standard Self-Inductor ANDO RS-102 Standard Self-Inductor ANDO RS-104 Standard Self-Inductor ANDO RS-106 Standard Self-Inductor ANDO RS-108 Standard Self-Inductor ANDO RS-110	In-house method: Digital LCR Measuring Instrument Standard Operating Procedure Book (Document No.: B00-CD-548)	1000	pF	1000	pF	3. Capacitance @ 13 MHz	3.1	mF/F
			1000	pF	1000	pF	3. Capacitance @ 1 kHz to 13 MHz	7.0	mF/F
			0.01	μF	0.01	μF	3. Capacitance @ 120 Hz	1.2	mF/F
			0.01	μF	0.01	μF	3. Capacitance @ 1 kHz	1.2	mF/F
			0.01	μF	0.01	μF	3. Capacitance @ 10 kHz	1.2	mF/F
			0.01	μF	0.01	μF	3. Capacitance @ 100 kHz	1.2	mF/F
			0.1	μF	0.1	μF	3. Capacitance @ 120 Hz	1.2	mF/F
			0.1	μF	0.1	μF	3. Capacitance @ 1 kHz	1.2	mF/F
			0.1	μF	0.1	μF	3. Capacitance @ 10 kHz	1.2	mF/F
			0.1	μF	0.1	μF	3. Capacitance @ 100 kHz	1.2	mF/F
			0.1	μF	0.1	μF	3. Capacitance @ 100 Hz to 120 kHz	1.3	mF/F
			1	μF	1	μF	3. Capacitance @ 120 Hz	1.2	mF/F
			1	μF	1	μF	3. Capacitance @ 1 kHz	1.2	mF/F
			1	μF	1	μF	3. Capacitance @ 10 kHz	1.2	mF/F
			1	μF	1	μF	3. Capacitance @ 100 kHz	1.3	mF/F
			1	μF	1	μF	3. Capacitance @ 120 Hz to 100 kHz	3.2	mF/F
			100	μH	100	μH	4. Inductance @ 100 Hz	3.3	mH/H
			100	μH	100	μH	4. Inductance @ 1 kHz	3.3	mH/H
			1	mH	1	mH	4. Inductance @ 100 Hz	1.2	mH/H
			1	mH	1	mH	4. Inductance @ 1 kHz	1.2	mH/H
10	mH	10	mH	4. Inductance @ 100 Hz	1.2	mH/H			
10	mH	10	mH	4. Inductance @ 1 kHz	1.2	mH/H			
100	mH	100	mH	4. Inductance @ 100 Hz	1.2	mH/H			
100	mH	100	mH	4. Inductance @ 1 kHz	1.2	mH/H			
1	H	1	H	4. Inductance @ 100 Hz	1.2	mH/H			
1	H	1	H	4. Inductance @ 1 kHz	1.3	mH/H			
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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
KF5003 Electrostatic Discharge Simulator, ESD	1. Oscilloscope /Tektronix/DPO7354 2.High voltage meter /Brandenburg/149-04 3.ESD Pulse target width attenuator and cable/TESEQ/MD103	In-house method: ESD Calibration Procedure (Document No.: B00-CD-258) Ref. IEC 61000-4-2, ISO 10605	±7.5	A	±112.5	A	Contact Discharge Current Waveform Check at ± (2.0, 4.0, 6.0, 8.0, 15.0, 20.0, 25.0, 30.0) kV: Current Peak	5.7	%
			2	A	60	A	Contact Discharge Current Waveform Check at ± (2.0, 4.0, 6.0, 8.0, 15.0, 20.0, 25.0, 30.0) kV: Current at 30 ns to 130 ns	6.0	%
			±0.3	A	±8.25	A	Contact Discharge Current Waveform Check at ± (2.0, 4.0, 6.0, 8.0, 15.0, 20.0, 25.0, 30.0) kV: Current at 180 ns to 800 ns	11	%
			0.6	ns	1.0	ns	Contact Discharge Current Waveform Check at ± (2.0, 4.0, 6.0, 8.0, 15.0, 20.0, 25.0, 30.0) kV: Rise Time	3.6	%
			±2.0	kV	±2.0	kV	Discharge Voltage Accuracy Check	1.3	%
			±4.0	kV	±4.0	kV	Discharge Voltage Accuracy Check	1.3	%
			±6.0	kV	±6.0	kV	Discharge Voltage Accuracy Check	1.3	%
			±8.0	kV	±8.0	kV	Discharge Voltage Accuracy Check	1.3	%



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
KF5003 Electrostatic Discharge Simulator, ESD	1. Oscilloscope /Tektronix/DPO7354 2.High voltage meter /Brandenburg/149-04 3.ESD Pulse target width attenuator and cable/TESEQ/MD103	In-house method: ESD Calibration Procedure (Document No.: B00-CD-258) Ref. IEC 61000-4-2, ISO 10605	±10.0	kV	±10.0	kV	Discharge Voltage Accuracy Check	1.3	%
			±15.0	kV	±15.0	kV	Discharge Voltage Accuracy Check	1.3	%
			±20.0	kV	±20.0	kV	Discharge Voltage Accuracy Check	1.3	%
			±25.0	kV	±25.0	kV	Discharge Voltage Accuracy Check	1.3	%
			±30.0	kV	±30.0	kV	Discharge Voltage Accuracy Check	1.3	%

Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta

KF5003 ESD Calibration Target	ENA Network Analyzer /Agilent/E5071C Selfcal Digital Multimeter /WAVETEK/1281 Programmable Power Supply /KEITHLEY /2200-60-2	In-house method: ESD Calibration Target calibration procedure (Document No.: B00-CD-511)	0.047	Ω	0.21	Ω	Target Transfer Impedance: (1) Target + 20 dB + 6 dB + 6 dB; (2) Target + 20 dB + 6 dB; (3) Target + 20 dB	0.24	%
			1.9	Ω	2.1	Ω	Target DC Input Impedance	0.44	%
			40	dB	60	dB	Insertion Loss: 100 kHz to 4 GHz	0.33	dB

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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
KF5011 AC Voltage Current Harmonics & Flicker Harmonics & Flicker Correction (on-site calibration included)	Harmonics & Flicker calibrator /CNS /HFC-III Digital Multimeters /Keithley/2000 Digital Multimeters /Keithley/2700 Current Shunt /Load/CNS /SH100A Oscilloscope /Tektronix /DPO 5104B Load/CNS /LL-45 High Voltage Differential Probe Tektronix /THDP0100 Universal Power Analyzer /VOLTECH /PM6000 Inrush Current Measurement Device /EM Test /CA PFS	In-house method: AC Voltage Current Harmonics & Flicker Harmonics & Flicker Correction procedure of travel school (Document No.: B00-CD-527) Reference: IEC 61000-3-2: 2014 /IEC 61000-3-3: 2017 /IEC 61000-3-11: 2017 /IEC 61000-3-12: 2017 /IEC 61000-4-11: 2020 /IEC 61000-4-13: 2015 /IEC 61000-4-28: 2000	230	V	230	V	AC voltage measurement under @ 230 V/50 Hz/16 A/IEC 61000-3-2: 2014/IEC 61000-3-3: 2017	0.17	%
			0.5	A	16	A	AC current measurement under @ 230 V/50 Hz/16 A/IEC 61000-3-2: 2014/IEC 61000-3-3: 2017	0.37	%
			219	V	242	V	AC voltage measurement @ 230 V/50 Hz/above 16 A /IEC 61000-3-12: 2017 /IEC 61000-3-11: 2017	0.32	%
			5	A	50	A	AC current measurement @ 230 V/50 Hz/above 16 A /IEC 61000-3-12: 2017 /IEC 61000-3-11: 2017	0.42	%
			219	V	242	V	AC voltage Flicker measurement @230 V/50 Hz (7CPM, 39CPM, 110CPM, 1052CP, 1620CPM) IEC 61000-3-3: 2017	0.87	%
			0.001	A	16	A	AC voltage Flicker measurement @230 V/50 Hz (7CPM, 39CPM, 110CPM, 1052CP, 1620CPM) IEC 61000-3-3: 2017	0.87	%
			225	V	235	V	AC current Harmonic measurement @ 230 V/50 Hz (ClassA, ClassB, ClassC, ClassD) IEC 61000-3-2: 2014	0.41	%



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
KF5011 AC Voltage Current Harmonics & Flicker Harmonics & Flicker Correction (on-site calibration included)	Harmonics & Flicker calibrator /CNS /HFC-III Digital Multimeters /Keithley/2000 Digital Multimeters /Keithley/2700 Current Shunt /Load/CNS /SH100A Oscilloscope /Tektronix /DPO 5104B Load/CNS /LL-45 High Voltage Differential ProbeTektronix /THDP0100 Universal Power Analyzer /VOLTECH /PM6000 Inrush Current Measurement Device /EM Test /CA PFS	In-house method: AC Voltage Current Harmonics & Flicker Harmonics & Flicker Correction procedure of travel school (Document No.: B00-CD-527) Reference: IEC 61000-3-2: 2014 /IEC 61000-3-3: 2017 /IEC 61000-3-11: 2017 /IEC 61000-3-12: 2017 /IEC 61000-4-11: 2020 /IEC 61000-4-13: 2015 /IEC 61000-4-28: 2000	0.001	A	16	A	AC current Harmonic measurement @ 230 V/50 Hz (ClassA, ClassB, ClassC, ClassD) IEC 61000-3-2: 2014	0.49	%
			20	V	235	V	Dip Voltage Pattern @ 230 V/50 Hz (10 % to 100 %) IEC 61000-4-11: 2020	0.26	%
			1	μs	5	μs	Dip Voltage Rise time and fall time measured in sag mode @ 230 V/50 Hz (10 % to 100 %) IEC 61000-4-11: 2020	5.2	%
			20	A	1000	A	Dip Voltage Measurement of inrush current measured in sag mode @ 230 V/50 Hz (10 % to 100 %) IEC 61000-4-11: 2020	6.6	%
			45	Hz	400	Hz	Measurement of Frequency in sag mode @ 230 V IEC 61000-4-28: 2000	0.02	%
			0	%	10	%	AC Source Harmonics voltage measurement (IEC 61000-4-13: 2015)	0.34	%
			Approval Signatory: MOU, Wan-Chau; CHEN, Yi-Ren; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta						



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
KF5012 Vehicle Simulation Tester (on-site calibration included)	Voltage Probe /PMK /PHV 1000-RO Digital Phosphor Tektronix /DPO7354C Oscilloscope Verification kit /TESEQ AG /INA 5530 50 Ω and 1 kΩ Verification Load for Automotive /TESEQ AG /INA 5511-VK Precision High Power Resistance Load/VGT/TR-116 Digit Precision Multimeter /FLUKE/8846A Digital Phosphor Tektronix /DPO7254C Oscilloscope	In-house method: Vehicle Simulation Tester for On-Site Calibration Procedure (Document No.: B00-CD-508) Ref.: ISO 7637-2 ISO 7637-3 ISO 16750-2 Jaso D001-94	-30	V	-660	V	Pulse 1, Voltage (with/without load) , ISO 7637-2 (2004-06 & 2011-03) 12 V & 24 V System	2.1	%
			0.5	μs	3	μs	Pulse 1, Rise time, ISO 7637-2 (2004-06 & 2011-03) 12 V & 24 V System	5.6	%
			800	μs	2400	μs	Pulse 1, Duration time, ISO 7637-2 (2004-06 & 2011-03) 12 V & 24 V System	5.6	%
			15	V	220	V	Pulse 2a, Voltage (with/without load) , ISO 7637-2 (2004-06 & 2011-03) 12 V & 24 V System	2.1	%
			0.5	μs	1	μs	Pulse 2a, Rise time, ISO 7637-2 (2004-06 & 2011-03) 12 V & 24 V System	5.6	%
			9.6	μs	60	μs	Pulse 2a, Duration time, ISO 7637-2 (2004-06 & 2011-03) 12 V & 24 V System	5.6	%
			9	V	22	V	Pulse 2b, Voltage (with/without load) , ISO 7637-2 (2004-06 & 2011-03) 12 V & 24 V System	2.1	%
			0.5	ms	1.5	ms	Pulse 2b, Rise time, ISO 7637-2 (2004-06 & 2011-03) 12 V & 24 V System	5.6	%
			1.6	s	2.4	s	Pulse 2b, Duration time, ISO 7637-2 (2004-06 & 2011-03) 12 V & 24 V System	5.6	%



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
KF5012 Vehicle Simulation Tester (on-site calibration included)	Voltage Probe /PMK /PHV 1000-RO Digital Phosphor Tektronix /DPO7354C Oscilloscope Verification kit /TESEQ AG /INA 5530 50 Ω and 1 kΩ Verification Load for Automotive /TESEQ AG /INA 5511-VK Precision High Power Resistance Load/VGT/TR-116 Digit Precision Multimeter /FLUKE/8846A Digital Phosphor Tektronix /DPO7254C Oscilloscope	In-house method: Vehicle Simulation Tester for On-Site Calibration Procedure (Document No.: B00-CD-508) Ref.: ISO 7637-2 ISO 7637-3 ISO 16750-2 Jaso D001-94	±10	V	±660	V	Pulse 3a/3b, Voltage (with/without load) , ISO 7637-2 (2004-06 & 2011-03) 12 V&24 V System /ISO 7637-3 (2007-07 & 2016-07) 12 V	2.0	%
			3.5	ns	6.5	ns	Pulse 3a/3b, Rise time, ISO 7637-2 (2004-06 & 2011-03) 12 V & 24 V System /ISO 7637-3 (2007-07 & 2016-07) 12 V & 24 V & 42 V System	5.3	%
			105	ns	195	ns	Pulse 3a/3b, Duration time, ISO 7637-2 (2004-06 & 2011-03) 12 V & 24 V System /ISO 7637-3 (2007-07 & 2016-07) 12 V & 24 V & 42 V System	5.6	%
			-2	V	-18	V	Pulse 4, Voltage (with/without load) , ISO 7637-2 (2004-06) 12 V&24 V System	2.1	%
			4.5	ms	22	s	Pulse 4, Duration time, ISO 7637-2 (2004-06) 12 V&24 V System	5.7	%
			20	V	202	V	Pulse 5a, Voltage (with/without load) , ISO 7637-2 (2004) & ISO 16750-2 (2010-02&2012-11) 12 V&24 V System	2.1	%



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
KF5012 Vehicle Simulation Tester (on-site calibration included)	Voltage Probe /PMK /PHV 1000-RO Digital Phosphor Tektronix /DPO7354C Oscilloscope Verification kit /TESEQ AG /INA 5530 50 Ω and 1 kΩ Verification Load for Automotive /TESEQ AG /INA 5511-VK Precision High Power Resistance Load/VGT/TR-116 Digit Precision Multimeter /FLUKE/8846A Digital Phosphor Tektronix /DPO7254C Oscilloscope	In-house method: Vehicle Simulation Tester for On-Site Calibration Procedure (Document No.: B00-CD-508) Ref.: ISO 7637-2 ISO 7637-3 ISO 16750-2 Jaso D001-94	5	ms	10	ms	Pulse 5a, Rise time, ISO 7637-2 (2004) & ISO 16750-2 (2010-02&2012-11) 12 V&24 V System	5.6	%
			32	ms	480	ms	Pulse 5a, Duration time, ISO 7637-2 (2004) & ISO 16750-2 (2010-02&2012-11) 12 V&24 V System	5.6	%
			20	V	202	V	Pulse 5b, Voltage (with/without load) , ISO 7637-2 (2004) & ISO 16750-2 (2010-02&2012-11) 12 V&24 V System	2.1	%
			5	ms	10	ms	Pulse 5b, Rise time, ISO 7637-2 (2004) &ISO 16750-2 (2010-02&2012-11) 12 V&24 V System	5.6	%
			32	ms	480	ms	Pulse 5b, Duration time, ISO 7637-2 (2004) & ISO 16750-2 (2010-02&2012-11) 12 V&24 V System	5.6	%
			±22	V	±300	V	Pulse Jaso, Voltage (with/without load) , Jaso D001-94 (1994) 12 V&24 V System	2.1	%
			0.1	μs	1	μs	Pulse Jaso, Rise time, Jaso D001-94 (1994) 12 V&24 V System	5.6	%





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
KF5012 Vehicle Simulation Tester (on-site calibration included)	Voltage Probe /PMK /PHV 1000-RO Digital Phosphor Tektronix /DPO7354C Oscilloscope	In-house method: Vehicle Simulation Tester for On-Site Calibration Procedure (Document No.: B00-CD-508) Ref.: ISO 7637-2 ISO 7637-3 ISO 16750-2 Jaso D001-94	2	μs	480	ms	Pulse Jaso, Duration time, Jaso D001-94 (1994) 12 V&24 V System	5.6	%
	Verification kit /TESEQ AG /INA 5530 50 Ω and 1 kΩ Verification Load for Automotive /TESEQ AG /INA 5511-VK Precision High Power Resistance Load/VGT/TR-116		1	A	33	A	DC Current Measurement	0.42	%
	Digit Precision Multimeter /FLUKE/8846A Digital Phosphor Tektronix /DPO7254C Oscilloscope		0	V	±10	V	DC Voltage Measurement	0.14	%
			10	V	60	V	DC Voltage Measurement	0.14	%
Approval Signatory: MOU, Wan-Chau; CHANG, Shuo-Ren									



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
KF5013 ring wave tester and CDN tester (on-site calibration included)	Digital Phosphor Oscilloscope /Tektronix /DPO 7354 High Voltage Differential Probe /Tektronix/P5210 High Voltage Differential Probe/Tektronix /THDP0100 Current Monitor /Pearson /101	In-house method: Customized ring wave and CDN tester calibration procedure (Document No.: B00-CD-543) (refer to IEC 61000-4-12)	± 0.45	kV	± 6.6	kV	Open Circuit Output Voltage Waveform Check: Peak Voltage	3.8	%
			± 0.25	kV	± 5.0	kV	Open Circuit Output Voltage Waveform Check: Peak Voltage 2nd pk	4.0	%
			± 0.15	kV	± 4.0	kV	Open Circuit Output Voltage Waveform Check: Peak Voltage 3rd pk	4.0	%
			± 0.05	kV	± 3.0	kV	Open Circuit Output Voltage Waveform Check: Peak Voltage 4th pk	4.0	%
			0.35	μs	0.65	μs	Open Circuit Output Voltage Waveform Check: Peak Voltage Rise Time	2.4	%
			9.0	μs	11.0	μs	Open Circuit Output Voltage Waveform Check: Peak Voltage Oscillation Frequency Time	1.0	%
			15	A	550	A	Short Circuit Output Current Waveform Check: Peak Current Ipeak	2.3	%
					<1.0	μs	Short Circuit Output Current Waveform Check: Peak Current Rise Time	2.1	%
Approval Signatory: MOU, Wan-Chau; CHANG, Shuo-Ren									



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
KF5018 Line Impedance Stabilization Network	Calibration Kit/HP 85032B S/N: 3217A08037	In-house method: Calibration for LISN (Document No.: B00-CD-199) Ref. CISPR-16-1-2, ANSI C63.4 and CISPR 25	9	kHz	200	MHz	Insertion Loss Impedance	0.2	dB
			9	kHz	200	MHz	Impedance	2.5	%
			9	kHz	200	MHz	Impedance phase	2.4	deg
			9	kHz	200	MHz	Isolation	1.2	dB
Approval Signatory: MOU, Wan-Chau; CHANG, Antony; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming									
KF5019 Couple and Decouple Network	Calibration Kit/HP 85032B S/N: 3217A08037	In-house method: Calibration Procedure for CDN (Document No.: B00-CD-234) CISPR-16-1-2 IEC 61000 4-6	150	kHz	230	MHz	Insertion Loss	0.2	dB
			150	kHz	230	MHz	Coupling Factor	0.2	dB
			150	kHz	230	MHz	Impedance	1.9	%
Approval Signatory: MOU, Wan-Chau; CHANG, Antony; CHANG, Shuo-Ren; LI, Ming-Ta									
KF5020 EFT/Burst Tester (on-site calibration included)	Oscilloscope Tektronix /DPO7254 Haefely/PAT50 Haefely/PAT1000 TESEQ/INA 265B/INA 266A	In-house method: EFT/Burst Tester Calibration Procedure (Document NO.: B00-CD-227) In-house method: EFT/Burst Tester Outside Calibration Procedure (Document NO.: B00-CD-535) Ref. IEC 61000-4-4	±0.225	kV	±4.4	kV	Voltage Waveform Check: Peak Voltage (1k Ω/50 Ω)	5.4	%
			15	ns	150	ns	Voltage Waveform Check: Impulse Duration (1 kΩ/50 Ω)	3.4	%
			3.5	ns	6.5	ns	Voltage Waveform Check: Rise time of One Pulse (1 kΩ/50 Ω)	3.4	%
			0.60	ms	0.90	ms	Burst Duration Check	3.1	%
			12	ms	18	ms	Burst Duration Check	3.1	%
			240	ms	360	ms	Burst period or frequency Check (3 Hz)	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
KF5020 EFT/Burst Tester (on-site calibration included)	Oscilloscope Tektronix /DPO7254 Haefely/PAT50 Haefely/PAT1000 TESEQ/INA 265B/INA 266A	In-house method: EFT/Burst Tester Calibration Procedure (Document NO.: B00-CD-227) In-house method: EFT/Burst Tester Outside Calibration Procedure (Document NO.: B00-CD-535) Ref. IEC 61000-4-4	2.0	kHz	3.0	kHz	Repetition Rate Check	3.1	%
			4.0	kHz	6.0	kHz	Repetition Rate Check	3.1	%
			80	kHz	120	kHz	Repetition Rate Check	3.1	%
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta									
KF5021 Surge Tester (on-site calibration included)	Oscilloscope /Tektronix /DPO 7254 Tektronix/P5210 Tektronix /THD 0100 Pearson/101	In-house method: Surge Tester Calibration Procedure (Document No.: B00-CD-402) In-house method: Burst Tester Outside Calibration Procedure (Document No.: B00-CD-534) Ref. IEC 61000-4-5, 2nd, 2005-11; Ed3, 2017-8	±0.45	kV	±6.6	kV	Open Circuit Output Voltage Waveform Check: Peak Voltage 1.2/50 $\mu$ s waveform	4.0	%
			±0.45	kV	±6.6	kV	Open Circuit Output Voltage Waveform Check: Peak Voltage 10/700 $\mu$ s waveform	4.0	%
			0.84	$\mu$ s	1.56	$\mu$ s	Open Circuit Output Voltage Waveform Check: Front Time 1.2/50 $\mu$ s Waveform (2 $\Omega$ )	3.9	%
			1.75	$\mu$ s	3.25	$\mu$ s	Open Circuit Output Voltage Waveform Check: Front Time 1.2/50 $\mu$ s Waveform; L-PE, N-PE (12 $\Omega$ )	3.9	%
			7.0	$\mu$ s	13.0	$\mu$ s	Open Circuit Output Voltage Waveform Check: Front Time 10/700 $\mu$ s Waveform	3.9	%



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
KF5021 Surge Tester (on-site calibration included)	Oscilloscope /Tektronix /DPO 7254 Tektronix/P5210 Tektronix /THD 0100 Pearson/101	In-house method: Surge Tester Calibration Procedure (Document No.: B00-CD-402) In-house method: Burst Tester Outside Calibration Procedure (Document No.: B00-CD-534) Ref. IEC 61000-4-5, 2nd, 2005-11; Ed3, 2017-8	0.84	μs	1.56	μs	Open Circuit Output Voltage Waveform Check: Front Time CDN 1.2/50 μs Waveform	3.9	%
			5.6	μs	10.4	μs	Open Circuit Output Voltage Waveform Check: Front Time CDN 10/700 μs Waveform	3.9	%
			40	μs	60	μs	Open Circuit Output Voltage Waveform Check: Duration Time Check 1.2/50 μs Waveform (2 Ω)	3.6	%
			25	μs	60	μs	Open Circuit Output Voltage Waveform Check: Duration Time Check 1.2/50 μs Waveform; L-PE, N-PE (12 Ω)	3.6	%
			560	μs	840	μs	Open Circuit Output Voltage Waveform Check: Duration Time Check 10/700 μs Waveform	3.6	%
			25	μs	60	μs	Open Circuit Output Voltage Waveform Check: Duration Time Check CDN 1.2/50 μs Waveform; L-PE, N-PE (12 Ω)	3.6	%
			29.4	μs	54.6	μs	Open Circuit Output Voltage Waveform Check: Duration Time Check CDN 1.2/50 μs Waveform	3.6	%
			175	μs	325	μs	Open Circuit Output Voltage Waveform Check: Duration Time Check CDN 10/700 μs Waveform	3.6	%
			±10	A	±3000	A	Short Circuit Output Current Waveform Check: Peak Current 1.2/50 μs; 10/700 μs Waveform	2.6	%
			6.4	μs	9.6	μs	Short Circuit Output Current Waveform Check: Front Time Check 1.2/50 μs Waveform (2 Ω)	2.4	%



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
KF5021 Surge Tester (on-site calibration included)	Oscilloscope /Tektronix /DPO 7254 Tektronix/P5210 Tektronix /THD 0100 Pearson/101	In-house method: Surge Tester Calibration Procedure (Document No.: B00-CD-402) In-house method: Burst Tester Outside Calibration Procedure (Document No.: B00-CD-534) Ref. IEC 61000-4-5, 2nd, 2005-11; Ed3, 2017-8	1.75	μs	3.25	μs	Short Circuit Output Current Waveform Check: Front Time Check 1.2/50 μs Waveform; L-PE, N-PE (12 Ω)	2.4	%
			4.0	μs	6.0	μs	Short Circuit Output Current Waveform Check: Front Time Check 10/700 μs Waveform	2.4	%
			1.05	μs	1.95	μs	Short Circuit Output Current Waveform Check: Front Time Check CDN 1.2/50 μs Waveform	2.4	%
			2.24	μs	4.16	μs	Short Circuit Output Current Waveform Check: Front Time Check CDN 10/700 μs Waveform	2.4	%
			16	μs	24	μs	Short Circuit Output Current Waveform Check: Duration Time Check CDN 1.2/50 μs Waveform (2 Ω)	2.3	%
			17.5	μs	32.5	μs	Short Circuit Output Current Waveform Check: Duration Time Check CDN 1.2/50 μs Waveform; L-PE, N-PE (12 Ω)	2.3	%
			256	μs	384	μs	Short Circuit Output Current Waveform Check: Duration Time Check CDN 10/700 μs Waveform	2.3	%
			31.5	μs	58.5	μs	Short Circuit Output Current Waveform Check: Duration Time Check CDN 1.2/50 μs Waveform	2.3	%
			175	μs	325	μs	Short Circuit Output Current Waveform Check: Duration Time Check CDN 10/700 μs Waveform	2.3	%
			- 10	deg	10	deg	Surge Impulse on the Phase of EUT AC Power (Surge Phase Shifting)	1.1	deg



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
KF5021 Surge Tester (on-site calibration included)	Oscilloscope /Tektronix /DPO 7254 Tektronix/P5210 Tektronix /THD 0100 Pearson/101	In-house method: Surge Tester Calibration Procedure (Document No.: B00-CD-402) In-house method: Burst Tester Outside Calibration Procedure (Document No.: B00-CD-534) Ref. IEC 61000-4-5, 2nd, 2005-11; Ed3, 2017-8	80	deg	100	deg	Surge Impulse on the Phase of EUT AC Power (Surge Phase Shifting)	1.1	deg
			170	deg	190	deg	Surge Impulse on the Phase of EUT AC Power (Surge Phase Shifting)	1.1	deg
			260	deg	280	deg	Surge Impulse on the Phase of EUT AC Power (Surge Phase Shifting)	1.1	deg
Approval Signatory: MOU, Wan-Chau; CHANG, Shuo-Ren; LI, Ming-Ta									



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
KF5021 Surge tester and CDN tester (on-site calibration included)	Digital Phosphor Oscilloscope /Tektronix /DPO 7354 Differential HV Probe/Tektronix /P5210 High Voltage Differential Probe/Tektronix /THDP0100 High Voltage Differential Probe /CIC Research /DP20-20K-LVC Current Monitor /Pearson /101	In-house method: Customized calibration procedure for Surge tester and CDN tester (Document No.: B00-CD-402) (refer to IEC 61000-4-5)	± 5.4	kV	± 16.5	kV	Open Circuit Output Voltage Waveform Check: Peak Voltage	2.4	%
			0.84	µs	1.56	µs	Open Circuit Output Voltage Waveform Check: Peak Voltage Rise time (L-N)	2.5	%
			1.75	µs	3.25	µs	Open Circuit Output Voltage Waveform Check: Peak Voltage Rise time (L-N) ; L-PE/N-PE	2.5	%
			7	µs	13	µs	Open Circuit Output Voltage Waveform Check: Peak Voltage Rise time (L-N)	2.5	%
			0.84	µs	1.56	µs	Open Circuit Output Voltage Waveform Check: Peak Voltage Rise time 1.2/50 µs Waveform	2.5	%
			5.6	µs	10.4	µs	Open Circuit Output Voltage Waveform Check: Peak Voltage Rise time 10/700 µs Waveform	2.5	%
			40	µs	60	µs	Open Circuit Output Voltage Waveform Check: Peak Voltage Duration time (L-N)	2.0	%
			25	µs	60	µs	Open Circuit Output Voltage Waveform Check: Peak Voltage Duration time 1.2/50 µs Waveform; L-PE, N-PE	2.0	%
			560	µs	840	µs	Open Circuit Output Voltage Waveform Check: Peak Voltage Duration time 10/700 µs Waveform	2.0	%
			25	µs	60	µs	Open Circuit Output Voltage Waveform Check: Peak Voltage Duration time 1.2/50 µs Waveform; L-PE, N-PE	2.0	%





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
KF5021 Surge tester and CDN tester (on-site calibration included)	Digital Phosphor Oscilloscope /Tektronix /DPO 7354 Differential HV Probe/Tektronix /P5210 High Voltage Differential Probe/Tektronix /THDP0100 High Voltage Differential Probe /CIC Research /DP20-20K-LVC Current Monitor /Pearson/101	In-house method: Customized calibration procedure for Surge tester and CDN tester (Document No.: B00-CD-402) (refer to IEC 61000-4-5)	175	μs	325	μs	Open Circuit Output Voltage Waveform Check: Peak Voltage Duration time 10/700 μs Waveform	2.0	%
			±450	A	±8250	A	Short Circuit Output Current Waveform Check: Peak Current 1.2/50 μs; 10/700 μs Waveform	2.3	%
			6.4	μs	9.6	μs	Short Circuit Output Current Waveform Check: Peak Current Rise time 1.2/50 μs Waveform	2.4	%
			1.75	μs	3.25	μs	Short Circuit Output Current Waveform Check: Peak Current Rise time 1.2/50 μs Waveform; L-PE, N-PE	2.4	%
			16	μs	24	μs	Short Circuit Output Current Waveform Check: Peak Current Duration time 1.2/50 μs Waveform (2 Ω)	2.5	%
			17.5	μs	32.5	μs	Short Circuit Output Current Waveform Check: CDN Peak Current Duration time 1.2/50 μs Waveform; L-PE, N-PE (12 Ω)	2.5	%
Approval Signatory: MOU, Wan-Chau; CHANG, Shuo-Ren; LI, Ming-Ta									



## 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	Power Meter & Sensor HP/438A HP/E4419B AGILENT/8482A AGILENT/8481A	In-house method: Microwave Power Sensor Calibration Procedure (Document No.: B00-CD-270)	100	kHz	300	kHz	(0 dBm@1 mw)	3.7	%
			>300	kHz	5	MHz	(0 dBm@1 mw)	2.2	%
			>5	MHz	30	MHz	(0 dBm@1 mw)	3.2	%
			>30	MHz	2	GHz	(0 dBm@1 mw)	2.7	%
			>2	GHz	4	GHz	(0 dBm@1 mw)	3.0	%
			>4	GHz	8	GHz	(0 dBm@1 mw)	3.3	%
			>8	GHz	12	GHz	(0 dBm@1 mw)	3.5	%
			>12	GHz	18	GHz	(0 dBm@1 mw)	5.4	%
Approval Signatory: MOU, Wan-Chau; KUO, Yung-Shan; CHANG, Shuo-Ren; LI, Ming-Ta									
KG1001 Microwave Power Meter	Range Calibrator (HP 11683A) ; EPM Power Meter (HP E4419B) ; Power Sensor (AGILENT 8482A)	In-house method: Microwave Power Meter Calibration Procedure (Document No.: B00-CD-241)	3	$\mu$ W	100	mW	Instrument Accuracy	0.40	%
			1	mW	1	mW	Power ref.: 50 MHz (0.00 dBm)	2.2	%
Approval Signatory: MOU, Wan-Chau; CHANG, Shuo-Ren; LI, Ming-Ta									



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 RF Power Meter and Power Sensor	1. Calibration kit power standard R&S NRPC18 & Power Meter R&S NRP2 & PSG Analog Signal Generator AGILENT E8257D & Signal Generator R&S SMB 100A 2. RF step Attenuator R&S RSG & EPM-P Series Power Meter AGILENT E4419B & CW Power Sensor AGILENT E4412A 3. Power Meter HP 438A & Power Sensor AGILENT 8482A 4. S-Parameter Network Analyzer AGILENT 8722ES ENA Series Network Analyzer AGILENT E5071C Calibration kit AGILENT 85054D	In-house method: RF Power Meter and Sensor Calibration Procedure (Document No.: B00-CD-458)	1	mW	1	mW	Power Level, Calibration Factor (@9 kHz to 18 GHz)	3.6	%
			10	mW	10	mW	Power Level, Calibration Factor (@9 kHz to 18 GHz)	3.6	%
			10	dBm	-30	dBm	Power Linearity @50 MHz	0.19	dB
			-30	dBm	-50	dBm	Power Linearity @50 MHz	0.26	dB
			10	dBm	-30	dBm	Power Linearity @500 MHz & 1 GHz	0.19	dB
			-30	dBm	-50	dBm	Power Linearity @500 MHz & 1 GHz	0.31	dB
			50	MHz	50	MHz	Power Ref.: 1.0 mW (0.0 dBm)	2.2	%
			1	GHz	1	GHz	Power Ref.: 1.0 mW (0.0 dBm)	2.6	%
			9	KHz	4	GHz	VSWR Measurement	0.21	dB
4	GHz	18	GHz	VSWR Measurement	0.36	dB			
Approval Signatory: MOU, Wan-Chau; CHANG, Shuo-Ren; LI, Ming-Ta									



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 Directional coupler	Vector Network Analyzer/ROHDE & SCHWARZ/ZNB 8 Calibration Kit/AGILENT/85054D	In-house method: Correction procedure for reflection coefficient and transmission coefficient of directional coupler (Document No.: B00-CD-518)	-65	dB	5	dB	Insertion Loss (0.1 MHz to 6 GHz)	0.59	dB
			-35	dB	5	dB	VSWR (0.1 MHz to 6 GHz)	0.59	dB
			-65	dB	5	dB	Coupling (0.1 MHz to 6 GHz)	0.60	dB
			-65	dB	5	dB	Directivity (0.1 MHz to 6 GHz)	0.74	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Yi-Ren; CHANG, Shuo-Ren; LI, Ming-Ta									
KG1004 50 Ω Cable (On-site calibration included)	Signal Generator (R&S/SMB 100A) Power Meter (Agilent/E4416A) Power Sensor (Agilent/E9304A) Attenuator (Agilent/8491AA 6dB)	In-house method: 50 ohm Coaxial Cable Site Calibration Procedure (Document No.: B00-CD-348)	0	dB	20	dB	Insertion Loss (Frequency: 9 kHz to 3 GHz)	0.28	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Yi-Ren; CHANG, Shuo-Ren; LI, Ming-Ta									
KG1004 Preamplifier & Coaxial attenuator (coaxial cable & power splitter & divider & matching pad)	Network Analyzer HP 8753D HP Network Analyzer N type calibration kits Model: 85032B S/N: 3217A08037	In-house method: Preamplifier & Coaxial attenuator transmission coefficient calibration procedure (Document No.: B00-CD-388)	0	dB	-10	dB		0.22	dB
			-10	dB	-20	dB		0.22	dB
			-20	dB	-30	dB		0.22	dB
			-30	dB	-40	dB		0.23	dB
			-40	dB	-50	dB		0.24	dB
			0	dB	10	dB		0.22	dB
			10	dB	20	dB		0.22	dB
			20	dB	30	dB		0.22	dB
30	dB	40	dB		0.22	dB			
40	dB	50	dB		0.24	dB			



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
KG1004 Preamplifier & Coaxial attenuator (coaxial cable & power splitter & divider & matching pad)	Network Analyzer HP 8753D HP Network Analyzer N type calibration kits Model: 85032B S/N: 3217A08037	In-house method: Preamplifier & Coaxial attenuator transmission coefficient calibration procedure (Document No.: B00-CD-388)	0	dB	-10	dB		0.31	dB
			-10	dB	-20	dB		0.31	dB
			-20	dB	-30	dB		0.31	dB
			-30	dB	-40	dB		0.33	dB
			-40	dB	-50	dB		0.38	dB
			0	dB	10	dB		0.29	dB
			10	dB	20	dB		0.29	dB
			20	dB	30	dB		0.29	dB
			30	dB	40	dB		0.30	dB
40	dB	50	dB		0.34	dB			
Approval Signatory: MOU, Wan-Chau; CHEN, Yi-Ren; CHANG, Shuo-Ren; LI, Ming-Ta									
KG1004 Preamplifier & Coaxial attenuator (coaxial cable & power splitter & divider & matching pad)	S-Parameter Network Analyzer AGILENT 8722ES 10 MHz to 50 GHz PNA Network Analyzer KEYSIGHT N5225B HP Network Analyzer 2.4 mm type calibration kits Model: 85056A S/N: 3101A02413	In-house method: Preamplifier & Coaxial attenuator transmission coefficient calibration procedure (Document No.: B00-CD-388)	0	dB	-10	dB	Transmission Coefficient (Frequency: 0.5 GHz to 20 GHz)	0.3	dB
			-10	dB	-20	dB	Transmission Coefficient (Frequency: 0.5 GHz to 20 GHz)	0.31	dB
			-20	dB	-30	dB	Transmission Coefficient (Frequency: 0.5 GHz to 20 GHz)	0.32	dB
			-30	dB	-40	dB	Transmission Coefficient (Frequency: 0.5 GHz to 20 GHz)	0.35	dB
			-40	dB	-50	dB	Transmission Coefficient (Frequency: 0.5 GHz to 20 GHz)	0.45	dB
			0	dB	10	dB	Transmission Coefficient (Frequency: 0.5 GHz to 20 GHz)	0.31	dB
			10	dB	20	dB	Transmission Coefficient (Frequency: 0.5 GHz to 20 GHz)	0.32	dB
			20	dB	30	dB	Transmission Coefficient (Frequency: 0.5 GHz to 20 GHz)	0.32	dB
			30	dB	40	dB	Transmission Coefficient (Frequency: 0.5 GHz to 20 GHz)	0.33	dB



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
KG1004 Preamplifier & Coaxial attenuator (coaxial cable & power splitter & divider & matching pad)	S-Parameter Network Analyzer AGILENT 8722ES 10 MHz to 50 GHz PNA Network Analyzer KEYSIGHT N5225B HP Network Analyzer 2.4 mm type calibration kits Model: 85056A S/N: 3101A02413	In-house method: Preamplifier & Coaxial attenuator transmission coefficient calibration procedure (Document No.: B00-CD-388)	40	dB	50	dB	Transmission Coefficient (Frequency: 0.5 GHz to 20 GHz)	0.34	dB
			0	dB	-10	dB	Transmission Coefficient (Frequency: 20 GHz to 40 GHz)	0.46	dB
			-10	dB	-20	dB	Transmission Coefficient (Frequency: 20 GHz to 40 GHz)	0.46	dB
			-20	dB	-30	dB	Transmission Coefficient (Frequency: 20 GHz to 40 GHz)	0.48	dB
			-30	dB	-40	dB	Transmission Coefficient (Frequency: 20 GHz to 40 GHz)	0.52	dB
			-40	dB	-50	dB	Transmission Coefficient (Frequency: 20 GHz to 40 GHz)	0.67	dB
			0	dB	10	dB	Transmission Coefficient (Frequency: 20 GHz to 40 GHz)	0.47	dB
			10	dB	20	dB	Transmission Coefficient (Frequency: 20 GHz to 40 GHz)	0.47	dB
			20	dB	30	dB	Transmission Coefficient (Frequency: 20 GHz to 40 GHz)	0.48	dB
			30	dB	40	dB	Transmission Coefficient (Frequency: 20 GHz to 40 GHz)	0.49	dB
			40	dB	50	dB	Transmission Coefficient (Frequency: 20 GHz to 40 GHz)	0.52	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Yi-Ren; CHANG, Shuo-Ren; LI, Ming-Ta									



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
KG1004 RF Current Probe	Network Analyzer (Agilent/E5071C) Attenuator (Agilent/8491A 10dB) Calibration Kit (HP/85032B) Calibration Fixture (FCC/FCC-MPCF-3-F-65)	In-house method: Calibration procedure for RF Current Probe (Document No.: B00-CD-478) Refer to: MIL-STD-461F CISPR 16-1-2 CISPR 25	0	dB	60	dB	Current Probe Correction Factor (Frequency: 10 kHz to 1 GHz)	0.70	dB
Approval Signatory: MOU, Wan-Chau; CHANG, Antony; CHANG, Shuo-Ren; LI, Ming-Ta									
KG1004 Calibration Fixture	Network Analyzer (Agilent/E5071C) Attenuator (Agilent/8491A 10dB) Calibration Kit (HP/85032B) Calibration Fixture (FCC/FCC-MPCF-3-F-65)	In-house method: RF Current Probe Fixture Calibration Procedure (Document No.: B00-CD-479)	0	dB	20	dB	Insertion Loss, (Frequency: 10 kHz to 1 GHz)	0.68	dB
			10	kHz	1	GHz	Frequency, VSWR	0.66	dB
Approval Signatory: MOU, Wan-Chau; CHANG, Antony; CHANG, Shuo-Ren; LI, Ming-Ta									
KG1006 Rod Antenna	Vector Network Analyzer R&S ZNB8	In-house method: Calibration procedure for Rod Antenna in accordance with vehicle regulations (Document No.: B00-CD-445) Ref. IEEE ANSI C63.5-2006/2017, ECSM (Equivalent Capacitance Substitution Method)	9	KHz	30	MHz		0.5	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Yi-Ren; CHANG, Shuo-Ren; LI, Ming-Ta									



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
KG1006 Double Ridged Horn Antenna	ETS-LINDGREN 3116 PNA NETWORK ANALYZER KEYSIGHT N5225B	Standard Site Method -SSM (ANSI C 63.5-2017) / In-house method: Calibration Procedure of Horn Antenna by Three Antenna Method (Document No.: B00-CD-232)	18	GHz	40	GHz	Antenna Factor/Antenna Gain; test distance: 1m, 3 m	1.4	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Yi-Ren; CHANG, Shuo-Ren; LI, Ming-Ta									
KG1006 HORN ANTENNA (Three Antenna Method)	S Parameter Network Analyzer AGILENT 8722ES 10 MHz to 50 GHz PNA Network Analyzer KEYSIGHT N5225B HORN ANTENNA EMCO/3115	In-house method: Calibration Procedure of Horn Antenna by Three Antenna Method (Document No.: B00-CD-232) ANSI C63.5-2006 /ANSI C63.5-2017	1	GHz	18	GHz	test distance: 3 m, Gain/Antenna Factor	0.9	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Yi-Ren; CHANG, Shuo-Ren; LI, Ming-Ta									
KG1006 HORN ANTENNA (Reference Antenna Method RAM)	HORN ANTENNA ECMO 3116	In-house method: 18 GHz to 40 GHz horn antenna calibration procedure (Document No.: B00-CD-399)	18	GHz	40	GHz	step 0.5 GHz, test distance: 1 m, Gain/Antenna Factor	1.5	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Yi-Ren; CHANG, Shuo-Ren; LI, Ming-Ta									





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
KG1006 Symmetry and VSWR of Hybrid Antenna	Calibration Kits/ HP 85032B	In-house method: Symmetry and VSWR of Hybrid Antenna calibration procedure (Document No.: B00-CD-506) (According to ANSI C 63.5-2006/2017)	30	MHz	300	MHz	Symmetry/3m & 10 m	0.34	dB
			30	MHz	1000	MHz	VSWR	0.15	
Approval Signatory: MOU, Wan-Chau; CHEN, Yi-Ren; CHANG, Shuo-Ren; LI, Ming-Ta									
Calibration Site: 1.NO.149, CHANG-AN RD., SIJHIH CITY, NEW TAIPEI CITY									
KG1006 Loop Antenna	Loop Antenna ETS-LINDGREA/6512	In-house method: Calibration procedure for Loop Antenna (9 kHz ~ 30 MHz) (Document No.: B00-CD-414) /Reference Antenna Method	9	kHz	30	MHz	Test Distance: 1 m	1	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Yi-Ren; CHANG, Shuo-Ren; LI, Ming-Ta									
KG1006 Double Ridged Horn Antenna	Double Ridged Horn Antenna EMCO/3115	In-house method: Calibration procedure for Antenna Factor and Gain Calibration of Horn Antennas from 1 GHz to 18 GHz Using SAE-ARP 958 (Document No.: B00-CD-462 )	1	GHz	18	GHz	Frequency (@ step 0.5 GHz) Test Distance: 1 m Gain/Antenna Factor)	1	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Yi-Ren; CHANG, Shuo-Ren; LI, Ming-Ta									



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
KG1006 Biconical Antenna & Log Periodic Dipole Antenna	Biconical Antenna SCHWARZBECK /9106 (VHBB9124) Log Periodic Dipole Antenna /SCHWARZBECK /UHALP 9108A1	In-house method: Dual antenna factor calibration procedue (Document No.: B00-CD-310) Ref. ANSI C63.5-2017 (Include GSCF)	30	MHz	1	GHz	Horizontal Polarzation /TX antenna height: 1 m & 2 m and Vertical Polarzation/TX antenna height: 1 m & 1.5 m @ 3 m	0.9	dB
			30	MHz	1	GHz	Horizontal Polarzation /TX antenna height: 1 m & 2 m and Vertical Polarzation/TX antenna height: 1 m & 1.5 m @ 10 m	1	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Yi-Ren; CHANG, Shuo-Ren; LI, Ming-Ta									
Calibration Site: 1.NO.149, CHANG-AN RD., SIJHIH CITY, NEW TAIPEI CITY									
KG1006 BICONICAL ANTENNA & LPDA	BICONICAL ANTENNA & LPDA /SAE ARP 958 BICONICAL ANTENNA /SCHWARZBECK /9106 (VHBB9124) Log Periodic Dipole Antenna SCHWARZBECK /UHALP 9108A1	In-house method: SAE-ARP 958 30 MHz to 1 GHz Broadband Antenna Calibration Procedure (Document No.: B00-CD-430)	30	MHz	1000	MHz	@ 1 m	0.7	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Yi-Ren; CHANG, Shuo-Ren; LI, Ming-Ta									
Calibration Site: 1.NO.149, CHANG-AN RD., SIJHIH CITY, NEW TAIPEI CITY									



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
KG1006 Bi-Log Antenna Biconical Antenna LPDA	Biconical Antenna SCHWARZBECK /9106 (VHBB9124) LPDA SCHWARZBECK /UHALP 9108A1 Bi-Log Antenna TESEQ CBL6112 D Network Analyzer HP 8753D Vector Network Analyzer ROHDE & SCHWARZ ZNB 8	In-house method: 30 MHz to 2 GHz broadband antenna calibration procedure (Document No.: B00-CD-373) Ref. ANSI C63.5-1998/2006/2017	30	MHz	2	GHz	test distance: 3 m, 10 m /Antenna Factor	1	dB
Approval Signatory: MOU, Wan-Chau; CHEN, Yi-Ren; CHANG, Shuo-Ren; LI, Ming-Ta									
Calibration Site: 1.NO.149, CHANG-AN RD., SIJHIH CITY, NEW TAIPEI CITY									
KG1099 Absorbing Clamp	RF Step Attenuator R&S RSG & Synthesizer Signal Generator ANRITSU MG3642A & Spectrum Analyzer HP 8591E	In-house method: Absorbing Clamp calibration procedure (Document No.: B00-CD-421) Ref. CISPR 16-1-3	30	MHz	1000	MHz	(Insertion Loss)	2.7	dB
Approval Signatory: MOU, Wan-Chau; CHANG, Antony; CHANG, Shuo-Ren; LI, Ming-Ta									



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
KG1099 Impedance Stabilization Network	Network Analyzer ILENT/E5071C & Calibration Kit /HP/85032B AGILENT/E5071C & Calibration Kit /HP/85032B Calibration Kit /TESEQ/CAS ISN & IEC 61000 4-6	In-house method: Calibration procedure for Impedance Stabilization Network (Document No.: B00-CD-468) Ref. CISPR-16-1-2 CISPR 22 IEC 61000 4-6	130	ohm	170	ohm	Impedance Frequency @ (150 kHz to 30MHz)	2.1	%
			-20	°	20	°	Phase Angle Frequency @ (150 kHz to 30MHz)	1.5	°
			8.5	dB	10.5	dB	Voltage Division Factor Frequency@ (150 kHz to 30 MHz)	0.36	dB
			<70	dB	<70	dB	Disturbance Isolation Frequency @ (150 kHz to 30 MHz)	0.8	dB
			>70	dB	>70	dB	Disturbance Isolation Frequency @ (150 kHz to 30 MHz)	2.5	dB
			40	dB	55	dB	Longitudinal Conversion Loss (LCL) : (Frequency) @ (150 kHz to 30 MHz) @ cat.3	0.8	dB
			50	dB	65	dB	Longitudinal Conversion Loss (LCL) : Frequency @ (150 kHz to 30 MHz) @ cat.5	1	dB
			60	dB	75	dB	Longitudinal Conversion Loss (LCL) : Frequency @ (150 kHz to 30 MHz) @ cat.6	1.1	dB
			150	kHz	100	MHz	Transmission Frequency @ 150 kHz to 100 MHz	1.7	dB



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
KG1099 Impedance Stabilization Network	Network Analyzer ILENT/E5071C & Calibration Kit /HP/85032B AGILENT/E5071C & Calibration Kit /HP/85032B Calibration Kit /TESEQ/CAS ISN & IEC 61000 4-6	In-house method: Calibration procedure for Impedance Stabilization Network (Document No.: B00-CD-468) Ref. CISPR-16-1-2 CISPR 22 IEC 61000 4-6	<70	dB	<70	dB	Crosstalk Frequency @1 MHz to 100 MHz	2	dB
			>70	dB	>70	dB	Crosstalk Frequency @1 MHz to 100 MHz	4.9	dB

Approval Signatory: MOU, Wan-Chau; CHANG, Antony; CHANG, Shuo-Ren; LI, Ming-Ta



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
KG1099 EMI Test Receiver & Spectrum Analyzer & Signal Analyzer	Signal Generator/AGILENT /83650B/E8257D & Rubidium Atomic Frequency Standard /WAVETEK 909 & RF Step Attenuator /R&S/RSG & EPM Series Power Meter /AGILENT/E4419B & Universal Counter /AGILENT 53132A & Power Sensor/AGILENT /E9304A/8481A/8481A /8485A/8487A & Calibration Kit /HP/85032B /AGILENT/85056A Power Splitter /AGILENT 11667C & EMI Calibration Pulse Generator/IGUU 2916 & Network Analyzer /AGILENT/8722ES	In-house method: EMI Test Receiver & Spectrum Analyzer calibration procedure (Document No.: B00-CD-376) Ref. CISPR-16-1-1; ANSI 63.4	10	MHz	10	MHz	Frequency Reference Accuracy	3.5 x 10 <sup>-8</sup>	
			11	MHz	11	MHz	EMI Test Receiver Immunity to Interference Check 1st IF Image frequency Rejection	1.4	dB
			100	MHz	100	MHz	EMI Test Receiver Immunity to Interference Check 1st IF Image frequency Rejection	1.4	dB
			1701	MHz	1701	MHz	EMI Test Receiver Immunity to Interference Check 1st IF Image frequency Rejection	1.4	dB
			2999	MHz	2999	MHz	EMI Test Receiver Immunity to Interference Check 1st IF Image frequency Rejection	1.6	dB
			100	MHz	100	MHz	EMI Test Receiver Immunity to Interference Check 2nd IF Image frequency Rejection	1.4	dB
			3700	MHz	3700	MHz	EMI Test Receiver Immunity to Interference Check 2nd IF Image frequency Rejection	1.7	dB
			5000	MHz	5000	MHz	EMI Test Receiver Immunity to Interference Check 2nd IF Image frequency Rejection	1.7	dB
			7999	MHz	7999	MHz	EMI Test Receiver Immunity to Interference Check 2nd IF Image frequency Rejection	1.6	dB
			26000	MHz	26000	MHz	EMI Test Receiver Immunity to Interference Check 2nd IF Image frequency Rejection	1.7	dB



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
KG1099 EMI Test Receiver & Spectrum Analyzer & Signal Analyzer	Signal Generator/AGILENT /83650B/E8257D & Rubidium Atomic Frequency Standard /WAVETEK 909 & RF Step Attenuator /R&S/RSG & EPM Series Power Meter /AGILENT/E4419B & Universal Counter /AGILENT 53132A & Power Sensor/AGILENT /E9304A/8481A/8481A /8485A/8487A & Calibration Kit /HP/85032B /AGILENT/85056A Power Splitter /AGILENT 11667C & EMI Calibration Pulse Generator/IGUU 2916 & Network Analyzer /AGILENT/8722ES	In-house method: EMI Test Receiver & Spectrum Analyzer calibration procedure (Document No.: B00-CD-376) Ref. CISPR-16-1-1; ANSI 63.4	35000	MHz	35000	MHz	EMI Test Receiver Immunity to Interference Check 2nd IF Image frequency Rejection	1.7	dB
			100	MHz	100	MHz	EMI Test Receiver Immunity to Interference Check 3rd IF Image frequency Rejection	1.4	dB
			4500	MHz	4500	MHz	EMI Test Receiver Immunity to Interference Check 3rd IF Image frequency Rejection	1.5	dB
			11	MHz	11	MHz	EMI Test Receiver Immunity to Interference Check 1st IF rejection	1.3	dB
			100	MHz	100	MHz	EMI Test Receiver Immunity to Interference Check 1st IF rejection	1.4	dB
			1701	MHz	1701	MHz	EMI Test Receiver Immunity to Interference Check 1st IF rejection	1.5	dB
			2999	MHz	2999	MHz	EMI Test Receiver Immunity to Interference Check 1st IF rejection	1.7	dB
			100	MHz	100	MHz	EMI Test Receiver Immunity to Interference Check 2nd IF rejection	1.4	dB
			4500	MHz	4500	MHz	EMI Test Receiver Immunity to Interference Check 2nd IF rejection	1.6	dB
			28	MHz	28	MHz	Non-Linearities Check Third-Order Intercept Point	1.4	dB



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
KG1099 EMI Test Receiver & Spectrum Analyzer & Signal Analyzer	Signal Generator /AGILENT /83650B/E8257D & Rubidium Atomic Frequency Standard /WAVETEK 909 & RF Step Attenuator /R&S/RSG & EPM Series Power Meter /AGILENT/E4419B & Universal Counter /AGILENT 53132A & Power Sensor/AGILENT /E9304A/8481A/8481A /8485A/8487A & Calibration Kit /HP/85032B /AGILENT/85056A Power Splitter /AGILENT 11667C & EMI Calibration Pulse Generator/IGUU 2916 & Network Analyzer /AGILENT/8722ES	In-house method: EMI Test Receiver & Spectrum Analyzer calibration procedure (Document No.: B00-CD-376) Ref. CISPR-16-1-1; ANSI 63.4	106	MHz	106	MHz	Non-Linearities Check Third-Order Intercept Point	1.4	dB
			261	MHz	261	MHz	Non-Linearities Check Third-Order Intercept Point	1.6	dB
			640	MHz	640	MHz	Non-Linearities Check Third-Order Intercept Point	1.4	dB
			1000	MHz	1000	MHz	Non-Linearities Check Third-Order Intercept Point	1.4	dB
			1700	MHz	1700	MHz	Non-Linearities Check Third-Order Intercept Point	1.4	dB
			2500	MHz	2500	MHz	Non-Linearities Check Third-Order Intercept Point	1.6	dB
			3590	MHz	3590	MHz	Non-Linearities Check Third-Order Intercept Point	1.6	dB
			4001	MHz	4001	MHz	Non-Linearities Check Third-Order Intercept Point	1.6	dB
			5001	MHz	5001	MHz	Non-Linearities Check Third-Order Intercept Point	1.6	dB
			7999	MHz	7999	MHz	Non-Linearities Check Third-Order Intercept Point	1.6	dB
			12000	MHz	12000	MHz	Non-Linearities Check Third-Order Intercept Point	1.6	dB
			20000	MHz	20000	MHz	Non-Linearities Check Third-Order Intercept Point	1.8	dB
26000	MHz	26000	MHz	Non-Linearities Check Third-Order Intercept Point	2.0	dB			
32000	MHz	32000	MHz	Non-Linearities Check Third-Order Intercept Point	2.0	dB			





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
KG1099 EMI Test Receiver & Spectrum Analyzer & Signal Analyzer	Signal Generator /AGILENT /83650B/E8257D & Rubidium Atomic Frequency Standard /WAVETEK 909 & RF Step Attenuator /R&S/RSG & EPM Series Power Meter /AGILENT/E4419B & Universal Counter /AGILENT 53132A & Power Sensor/AGILENT /E9304A/8481A/8481A /8485A/8487A & Calibration Kit /HP/85032B /AGILENT/85056A Power Splitter /AGILENT 11667C & EMI Calibration Pulse Generator/IGUU 2916 & Network Analyzer /AGILENT/8722ES	In-house method: EMI Test Receiver & Spectrum Analyzer calibration procedure (Document No.: B00-CD-376) Ref. CISPR-16-1-1; ANSI 63.4	38000	MHz	38000	MHz	Non-Linearities Check Third-Order Intercept Point	2.0	dB
			28	MHz	28	MHz	Non-Linearities Check Second-Order Harmonic Distortion	1.2	dB
			106	MHz	106	MHz	Non-Linearities Check Second-Order Harmonic Distortion	1.2	dB
			261	MHz	261	MHz	Non-Linearities Check Second-Order Harmonic Distortion	1.2	dB
			640	MHz	640	MHz	Non-Linearities Check Second-Order Harmonic Distortion	1.2	dB
			1000	MHz	1000	MHz	Non-Linearities Check Second-Order Harmonic Distortion	1.2	dB
			1490	MHz	1490	MHz	Non-Linearities Check Second-Order Harmonic Distortion	1.3	dB
			1700	MHz	1700	MHz	Non-Linearities Check Second-Order Harmonic Distortion	1.3	dB
			100	Hz	10	MHz	IF Filters Check (a) Bandwidth Switching Level Accuracy (@3 dB)	0.32	dB
			200	Hz	1	MHz	IF Filters Check (a) Bandwidth Switching Level Accuracy (@6 dB)	0.32	dB
			1	Hz	3	kHz	IF Filters Check (a) Bandwidth Switching Level Accuracy (@FFT 3 dB)	0.32	dB
			100	Hz	10	MHz	IF Filters Check (b) Bandwidth Accuracy (@3 dB)	4.4	%
			200	Hz	1	MHz	IF Filters Check (b) Bandwidth Accuracy (@6 dB)	4.4	%
200	Hz	200	Hz	IF Filters Check (b) Bandwidth Accuracy (@1.5 dB)	4.4	%			



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
KG1099 EMI Test Receiver & Spectrum Analyzer & Signal Analyzer	Signal Generator /AGILENT /83650B/E8257D & Rubidium Atomic Frequency Standard /WAVETEK 909 & RF Step Attenuator /R&S/RSG & EPM Series Power Meter /AGILENT/E4419B & Universal Counter /AGILENT 53132A & Power Sensor/AGILENT /E9304A/8481A/8481A /8485A/8487A & Calibration Kit /HP/85032B /AGILENT/85056A Power Splitter /AGILENT 11667C & EMI Calibration Pulse Generator/IGUU 2916 & Network Analyzer /AGILENT/8722ES	In-house method: EMI Test Receiver & Spectrum Analyzer calibration procedure (Document No.: B00-CD-376) Ref. CISPR-16-1-1; ANSI 63.4	9	kHz	9	kHz	IF Filters Check (b) Bandwidth Accuracy (@1.5 dB)	4.4	%
			120	kHz	120	kHz	IF Filters Check (b) Bandwidth Accuracy (@1.5 dB)	4.4	%
			200	Hz	200	Hz	IF Filters Check (b) Bandwidth Accuracy (@20 dB)	4.4	%
			9	kHz	9	kHz	IF Filters Check (b) Bandwidth Accuracy (@20 dB)	4.4	%
			120	kHz	120	kHz	IF Filters Check (b) Bandwidth Accuracy (@20 dB)	4.4	%
			100	Hz	10	MHz	IF Filters Check (c) Shape Factor Check (@3 dB)	6.5	%
			200	Hz	1	MHz	IF Filters Check (c) Shape Factor Check (@6 dB)	6.5	%
			9	kHz	1	GHz	Noise Display Check	0.76	dB
			1	GHz	3	GHz	Noise Display Check	0.88	dB
45	MHz	3.6	GHz	Noise Display Check (2.4 mm)	0.88	dB			



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
KG1099 EMI Test Receiver & Spectrum Analyzer & Signal Analyzer	Signal Generator /AGILENT /83650B/E8257D & Rubidium Atomic Frequency Standard /WAVETEK 909 & RF Step Attenuator /R&S/RSG & EPM Series Power Meter /AGILENT/E4419B & Universal Counter /AGILENT 53132A & Power Sensor/AGILENT /E9304A/8481A/8481A /8485A/8487A & Calibration Kit /HP/85032B /AGILENT/85056A Power Splitter /AGILENT 11667C & EMI Calibration Pulse Generator/IGUU 2916 & Network Analyzer /AGILENT/8722ES	In-house method: EMI Test Receiver & Spectrum Analyzer calibration procedure (Document No.: B00-CD-376) Ref. CISPR-16-1-1; ANSI 63.4	3.5	GHz	34.5	GHz	Noise Display Check (2.4 mm)	0.90	dB
			34.5	GHz	50	GHz	Noise Display Check (2.4 mm)	0.96	dB
			10	dB	10	dB	Level and Frequency Response Check 100 kHz to 3 GHz	0.64	dB
			20	dB	20	dB	Level and Frequency Response Check 100 kHz to 3 GHz	0.64	dB
			40	dB	40	dB	Level and Frequency Response Check 100 kHz to 3 GHz	0.64	dB
			10	dB	10	dB	Level and Frequency Response Check 100 kHz to 3 GHz	0.64	dB
			10	dB	10	dB	Level and Frequency Response Check 3 GHz to 18 GHz	0.70	dB
			10	dB	10	dB	Level and Frequency Response Check 18 GHz to 26.5 GHz	0.98	dB
			10	dB	10	dB	Level and Frequency Response Check 26.5 GHz to 50 GHz	1.3	dB
			10	dB	-40	dB	Display Linearity Check (a) 128 MHz (RBW: 300 Hz)	0.64	dB
			-40	dB	-80	dB	Display Linearity Check (a) 128 MHz (RBW: 300 Hz)	0.64	dB
			10	dB	-40	dB	Display Linearity Check (a) 128 MHz (RBW: 300 Hz)	0.64	dB
			-40	dB	-60	dB	Display Linearity Check (a) 128 MHz (RBW: 300 Hz)	0.64	dB
			10	dB	-40	dB	Display Linearity Check (b) 50 MHz (RBW: 300 Hz)	0.64	dB
-40	dB	-80	dB	Display Linearity Check (b) 50 MHz (RBW: 300 Hz)	0.66	dB			
10	dB	-40	dB	Display Linearity Check (b) 50 MHz (RBW: 300 Hz)	0.64	dB			



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
KG1099 EMI Test Receiver & Spectrum Analyzer & Signal Analyzer	Signal Generator /AGILENT /83650B/E8257D & Rubidium Atomic Frequency Standard /WAVETEK 909 & RF Step Attenuator /R&S/RSG & EPM Series Power Meter /AGILENT/E4419B & Universal Counter /AGILENT 53132A & Power Sensor/AGILENT /E9304A/8481A/8481A /8485A/8487A & Calibration Kit /HP/85032B /AGILENT/85056A Power Splitter /AGILENT 11667C & EMI Calibration Pulse Generator/IGUU 2916 & Network Analyzer /AGILENT/8722ES	In-house method: EMI Test Receiver & Spectrum Analyzer calibration procedure (Document No.: B00-CD-376) Ref. CISPR-16-1-1; ANSI 63.4	-40	dB	-60	dB	Display Linearity Check (b) 50 MHz (RBW: 300 Hz)	0.64	dB
			10	dB	-40	dB	Display Linearity Check (c) 10 MHz (RBW: 300 Hz)	0.64	dB
			-40	dB	-80	dB	Display Linearity Check (c) 10 MHz (RBW: 300 Hz)	0.66	dB
			10	dB	-40	dB	Display Linearity Check (c) 10 MHz (RBW: 300 Hz)	0.64	dB
			-40	dB	-60	dB	Display Linearity Check (c) 10 MHz (RBW: 300 Hz)	0.64	dB
			-10	dB	60	dB	RF Attenuator Check (a) 128 MHz	0.36	dB
			-10	dB	60	dB	RF Attenuator Check (b) 50 MHz	0.36	dB
			-10	dB	60	dB	RF Attenuator Check (c) 10 MHz	0.36	dB
			10	dB	-50	dB	Reference Level Switching Check (a) 128 MHz	0.36	dB
			10	dB	-50	dB	Reference Level Switching Check (b) 50 MHz	0.36	dB
			10	dB	-50	dB	Reference Level Switching Check (c) 10 MHz	0.36	dB
			9	kHz	150	kHz	Pulses Level and Pulses Frequency (Bandwidth A)	0.88	dB
			150	kHz	30	MHz	Pulses Level and Pulses Frequency (Bandwidth B)	0.90	dB
30	MHz	1000	MHz	Pulses Level and Pulses Frequency (Bandwidth C/D)	0.94	dB			



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
KG1099 EMI Test Receiver & Spectrum Analyzer & Signal Analyzer	Signal Generator /AGILENT/83650B /E8257D & Rubidium Atomic Frequency Standard /WAVETEK 909 & RF Step Attenuator /R&S/RSG & EPM Series Power Meter /AGILENT /E4419B & Universal Counter /AGILENT 53132A & Power Sensor /AGILENT/E9304A /8481A/8481A /8485A/8487A & Calibration Kit /HP/85032B /AGILENT/85056A Power Splitter /AGILENT 11667C & EMI Calibration Pulse Generator/IGUU 2916 & Network Analyzer /AGILENT/8722ES	In-house method: EMI Test Receiver & Spectrum Analyzer calibration procedure (Document No.: B00-CD-376) Ref. CISPR-16-1-1; ANSI 63.4	100	Hz	100	Hz	Phase Noise Check (-96 dB)	0.94	dB
			1	KHz	1	KHz	Phase Noise Check (-105 dB)	0.94	dB
			10	KHz	10	KHz	Phase Noise Check (-113 dB)	0.98	dB
			100	KHz	100	KHz	Phase Noise Check (-117 dB)	0.98	dB
			1	MHz	1	MHz	Phase Noise Check (-124 dB)	1.1	dB
			100	KHz	100	KHz	Sine Wave Detector Check	0.86	dB
			1	MHz	1	MHz	Sine Wave Detector Check	0.86	dB
			10	MHz	10	MHz	Sine Wave Detector Check	0.86	dB
			100	MHz	100	MHz	Sine Wave Detector Check	0.86	dB
			9	KHz	100	MHz	VSWR Measurement	0.19	dB
100	KHz	20	GHz	VSWR Measurement	0.34	dB			
20	GHz	40	GHz	VSWR Measurement	0.66	dB			

Approval Signatory: MOU, Wan-Chau; CHANG, Antony; CHANG, Shuo-Ren; LI, Ming-Ta; HSIEH, Chao-Ming



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
KG3001 Lux Meter or Illuminance Meter	Standard Light Source/( 25 to 190 ) lx OSRAM/64458AX/(190 to 1500) lx -/1000W	In-house method: Lux Meter or Illuminanc Meter Calibration Procedure (Document No.: B00-CD-294)	25	lx	190	lx		1.8	%
			>190	lx	1500	lx		2.3	%
Approval Signatory: SHIH, Wen-Chi; MOU, Wan-Chau; CHANG, Shuo-Ren; LI, Ming-Ta									
KG3025 Standard lamp	standard lamp NIST Sylvania 75Q/CL-28V; PTB Sylvania 59675, 12 V/50 W	Measurement with an integraing sphere: In-house method: luminous flux and Spectral Radiant Flux calibration procedure (B00-CD-489)	250	lm	4500	lm		2.1	%
Approval Signatory: SHIH, Wen-Chi; MOU, Wan-Chau; LI, Ming-Ta; HSIEH, Chao-Ming									



## Chemical

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
KI3000 Hydrometer	Hydrometer/ PRECISION DIN 12791 SERIE L50 series	In-house method: B00-CD-208	0.8000		1.5000			0.0015	
Approval Signatory: SHIH, Wen-Chi; MOU, Wan-Chau; HUANG, Chun-Chi; LI, Ming-Ta									
KI4000 Mixture Gas Cylinders (CO+CO <sub>2</sub> + C <sub>3</sub> H <sub>8</sub> )	1. (CO+CO <sub>2</sub> + C <sub>3</sub> H <sub>8</sub> ) Mixture Gas Certified 2.GC/Agilent 7890B	In-house method: Calibration Procedure for Mixture gas of GC~ (Document No.: B00-CD-524)	3980	μmol/mol	42260	μmol/mol	CO	0.8	%
			50000	μmol/mol	144400	μmol/mol	CO <sub>2</sub>	0.7	%
			181.9	μmol/ mol	3252	μmol/mol	C <sub>3</sub> H <sub>8</sub>	0.8	%
Approval Signatory: SHIH, Wen-Chi; MOU, Wan-Chau; LI, Ming-Ta									
KI4000 Standard Gas (Carbon monoxide)	1.CO in Air 2.GAS ANALYZER /ABB AO2020	In-house method: Calibration Procedure for Mixture gas (Document No.: B00-CD-551)	34.2	μmol/mol	188.9	μmol/mol	CO in Air	2.2	%
Approval Signatory: SHIH, Wen-Chi; MOU, Wan-Chau; LI, Ming-Ta									
KI4000 Standard Gas (C <sub>2</sub> H <sub>5</sub> OH, Acetone)	1.C <sub>2</sub> H <sub>5</sub> OH in Air Acetone in Air 2.GC/Agilent 7890B	In-house method: Calibration Procedure for Mixture gas (Document No.: B00-CD-503)	20	μmol/mol	70	μmol/mol	C <sub>2</sub> H <sub>5</sub> OH in Air	2.5	%
			80	μmol/mol	1100	μmol/mol	C <sub>2</sub> H <sub>5</sub> OH in Air	0.7	%
			40	μmol/mol	230	μmol/mol	Acetone in Air	2.2	%
Approval Signatory: SHIH, Wen-Chi; MOU, Wan-Chau; LI, Ming-Ta									



## Time And Frequency

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
KJ0100 Stopwatch Timer (on-site calibration included)	Rubidium Atomic Frequency Standard (WAVETEK/909) Universal Counter (HP/5334B) Stop Watch (CASIO/HS-70W) Function/Arbitrary Waveform Gen. (AGILENT/33250A) Quartz Watch/Clock Analyzer (SIGMOTEK/QWA-5A) Rubidium Atomic Frequency Standard (SRS/FS-725)	In-house method: Standard operating procedures for stopwatch and timer calibration system (Document No.: B00-CD-555 )	1	s	24	hour	Totalize Method	0.11	s
			32768	Hz	32768	Hz	Time Base Method (@32768 Hz)	$1.1 \times 10^{-6}$	
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; LI, Ming-Ta									
KJ0200 Standard Frequency Generator, Univer Counter	Rubidium Frequency Standard WAVETEK/909	In-house method: (Document No.: B00-CD-233)	5	MHz	5	MHz		$5.0 \times 10^{-10}$	
			10	MHz	10	MHz		$5.0 \times 10^{-10}$	
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; CHANG, Shuo-Ren; LI, Ming-Ta									





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
KJ0300 Non-contact Tachometer Flicker Speedometer Contact Tachometer Rotary Motor (Include presence correction)	Rubidium Frequency Standard (WAVETEK/909) Function/Arbitrary Waveform Gen. (AGILENT/33250A) Tachometer (ONOSOKKI/LG-9200) Tachometer (RS/RM-1501) RPM Calibrator (SHIHLIN/SDE-010A2) Tachometer Light Source B00-#1	In-house method: Standard Operating Procedures for Tachometer /Stroboscope /Rotary Motor Calibration System (Document No.: B00-CD-477)	0.6	rpm	600	rpm	Non-contact tachometer /digital stroboscope	0.06	rpm
			600	rpm	12000	rpm	Non-contact tachometer /digital stroboscope	1.3	rpm
			12000	rpm	114000	rpm	Non-contact tachometer /digital stroboscope	10	rpm
			100	rpm	6000	rpm	Contact Tachometer /Rotary Motor	2.2	rpm
Approval Signatory: MOU, Wan-Chau; CHENG, Chung-Ching; LI, Ming-Ta; HSIEH, Chao-Ming									

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

