



# **CERTIFICATION TEST REPORT**

**Report Number. :** R12331248-E1

**Applicant :** PROCTOR & GAMBLE  
5299 SPRING GROVE AVENUE  
CINCINNATI, OH 45217, USA

**Model :** 558-1

**FCC ID :** 2AG9A41810

**EUT Description :** CELLULAR RAZOR BASE

**Test Standard(s) :** FCC CFR47 PART 22H, 24E

**Date Of Issue:**  
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**Prepared by:**  
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Revision History

Ver.	Issue Date	Revisions	Revised By
1	2019-01-25	Initial Release	Brian T. Kiewra

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# 1. ATTESTATION OF TEST RESULTS


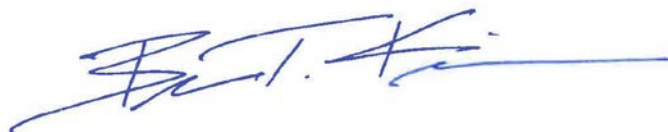
Applicant Name and Address	PROCTOR & GAMBLE 5299 SPRING GROVE AVENUE CINCINNATI, OH 45217, USA
Model	558-1
FCC ID	2AG9A41810
EUT Description	CELLULAR RAZOR BASE
Serial Number	B3-276
Date Tested	2018-11-16 to 2018-11-18
Applicable Standards	FCC CFR 47 Part 22H, 24E (22.913 (a) and 24.232(c) only)
Test Results	Compliant

Note: This report is for measuring radiated ERP/EIRP power only to check against RF path changes made to original module.

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. government.

Approved & Released For UL LLC Inc. By 	Prepared By: 
Jeffrey Moser Project Engineer/Operations Lead Consumer Technology Division UL LLC	Brian T. Kiewra Project Engineer Consumer Technology Division UL LLC

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, Part 22, Part 24, FCC KDB 971168 D01 v03r01, and ANSI C63.26:2015.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Drive, Research Triangle Park, North Carolina 27709, USA and 2800 Perimeter Park Dr., Suite B, Morrisville 27560, North Carolina, USA. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

12 Laboratory Dr.	2800 Perimeter Park Dr.
<input type="checkbox"/> Chamber A (ISED:2180C-1)	<input type="checkbox"/> Chamber North (ISED:2180C-3)
<input type="checkbox"/> Chamber C (ISED:2180C-2)	<input checked="" type="checkbox"/> Chamber South (ISED:2180C-4)

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. SAMPLE CALCULATION

#### **RADIATED EMISSIONS**

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)  
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

#### **MAINS CONDUCTED EMISSIONS**

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.  
 $36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

### 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
All emissions, radiated	$\pm 4.88 \text{ dB}$

Uncertainty figures are valid to a confidence level of 95%.

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a data logging razor handle and accompanying base station used for charging and data communication via a cellular connection.

### 5.2. MAXIMUM OUTPUT POWER (GSM)

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

FCC Part 22/24				
Band	Frequency Range(MHz)	Modulation	Radiated	
			AVG(dBm)	AVG(mW)
GSM850	824~849	GPRS	23.38	217.77
	824~849	EGPRS	18.39	69.02
GSM1900	1850~1910	GPRS	28.99	792.50
	1850~1910	EGPRS	25.11	324.34

### 5.1. MAXIMUM OUTPUT POWER (WCDMA)

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

FCC Part 22/24				
Band	Frequency Range(MHz)	Modulation	Radiated	
			AVG(dBm)	AVG(mW)
Band 5	824~849	Rel99	15.60	36.31
	824~849	HSDPA	14.99	31.55
Band 2	1850~1910	Rel99	23.07	202.77
	1850~1910	HSDPA	22.44	175.39

## 5.2. SOFTWARE AND FIRMWARE

Firmware installed in handle during testing was rev. 4.1.  
Firmware installed in base during testing was rev. 4.6.

## 5.3. MAXIMUM ANTENNA GAIN

Frequency Range (MHz)	Antenna Gain (dBi)
824 - 849	2
1850 - 1910	3.7

## 5.4. WORST-CASE CONFIGURATION AND MODE

The following modes should be considered as worst-case scenario for all other measurements.

Worst-case modes:

- GSM GPRS
- GSM EGPRS
- WCDMA REL 99
- WCDMA HSDPA

The EUT is intended to operate in only one configuration and radiated testing was performed in the intended orientation.



## 5.5. DESCRIPTION OF TEST SETUP

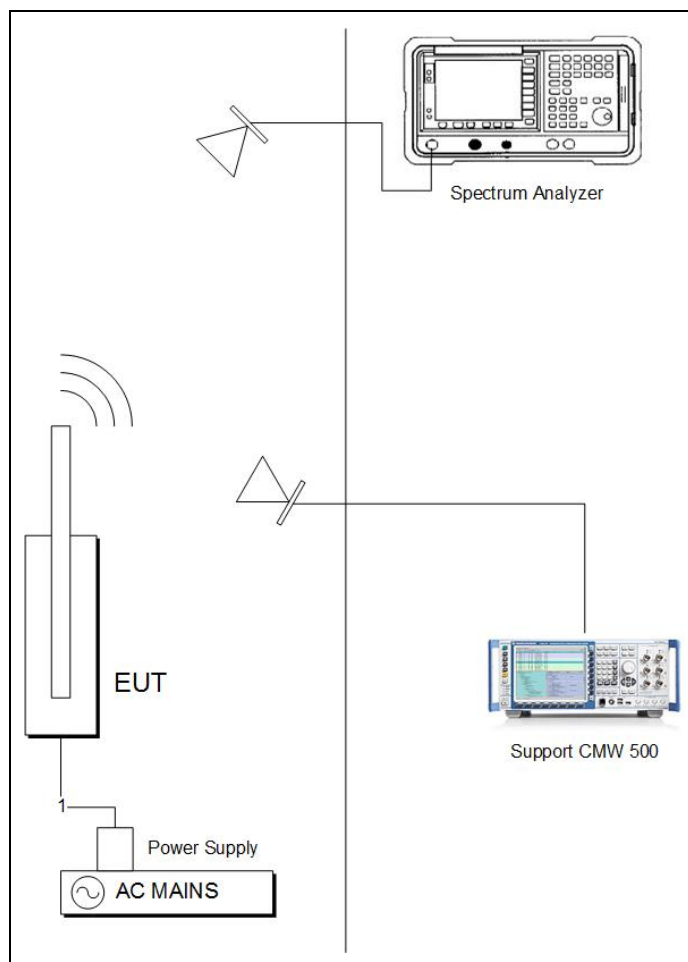
### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Power Supply	Braun	492-5214	150389-11	NA

### I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	Barrel	Unshielded	<3m	None

### SETUP DIAGRAM



## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - South Chamber)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	<b>30-1000 MHz</b>				
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2018-07-24	2019-07-24
	<b>1-18 GHz</b>				
AT0069	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2018-04-30	2019-04-30
	<b>Tuned Dipole</b>				
AT0016	Dipole Antenna, 400 to 1000 MHz	EMCO	3121C-DB--4	2018-09-12	2019-09-12
	<b>Gain-Loss Chains</b>				
S-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2018-05-20	2019-05-20
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2018-03-20	2019-03-20
	<b>Receiver &amp; Software</b>				
SA0026	Spectrum Analyzer	Agilent	N9030A	2018-03-20	2019-03-20
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	<b>Additional Equipment used</b>				
s/n 161024887	Environmental Meter	Fisher Scientific	15-077-963	2016-12-23	2018-12-23
SIG005	Signal Generator, 10MHz to 40GHz	Agilent	83640B	2018-08-21	2019-08-21
PWM005	Power Meter	Keysight	N1912A	2018-04-25	2019-04-25
PWS005	Power Sensor	Keysight	N1921A	2018-04-26	2019-04-26
T374	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	2018-07-05	2019-07-05

### NOTES:

- Equipment listed above that calibrated during the testing period was set for test after the calibration.
- Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

## 7. RADIATED TEST RESULTS

### 7.1. RADIATED POWER (ERP & EIRP)

#### RULE PART(S)

FCC: §2. 1046, §22. 913, §24. 232.

#### LIMITS

22.913 (a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

24.232 (c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13dB.

#### TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.2.17; PSA setting reference to 971168 D01 v03r01

For peak power measurement with a PSA:

a) Set the RBW  $\geq$  OBW; b) Set VBW  $\geq 3 \times$  RBW; c) Set span  $\geq 2 \times$  RBW; d) Sweep time = auto couple; e) Detector = peak; f) Ensure that the number of measurement points  $\geq$  span/RBW; g) Trace mode = max hold;

For average power measurement with a PSA:

a) Set span to at least 1.5 times the OBW; b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz; c) Set VBW  $\geq 3 \times$  RBW; d) Set number of points in sweep  $\geq 2 \times$  span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle  $\geq 98$ ; h) Use trigger to capture bursts If burst duty cycle  $< 98$ ; i) Trace average at least 100 traces in power averaging (i.e., RMS) mode. j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function.

## 7.1.1. GSM

Fundamental Substitution Measurement (Fc < 1GHz)									
UL LLC, Chamber S									
Company: P&G									
Project #: 12331248									
Date: 2018-11-18									
Test Engineer: 17051									
Configuration: Radio Cellular Razor Base (s/n B3-278)									
Mode: GSM850, GPRS									
<b>Test Equipment:</b>									
Substitution: Dipole antenna AT0016, cable CBL054, and signal-source SIG005									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch									
824.20	29.78	V	5.2	0.9	-1.25	23.38	38.5	-15.1	
824.20	25.14	H	5.2	0.9	-1.25	18.74	38.5	-19.7	
Mid Ch									
836.60	29.55	V	5.2	0.9	-1.20	23.15	38.5	-15.3	
836.60	25.27	H	5.2	0.9	-1.20	18.87	38.5	-19.6	
High Ch									
848.80	28.53	V	5.2	1.0	-1.15	22.13	38.5	-16.3	
848.80	25.75	H	5.2	1.0	-1.15	19.35	38.5	-19.1	
Rev: 11.02.2015									
Note: For Band 13/17 ERP limit is 34.77dBm. For Band 26 limit is 50dBm									

## GSM 850MHz GPRS

Fundamental Substitution Measurement (Fc < 1GHz)									
UL LLC, Chamber S									
Company: P&G									
Project #: 12331248									
Date: 2018-11-18									
Test Engineer: 17051									
Configuration: Radio Cellular Razor Base (s/n B3-278)									
Mode: GSM850, EGPRS									
<b>Test Equipment:</b>									
Substitution: Dipole antenna AT0016, cable CBL054, and signal-source SIG005									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch									
824.20	24.79	V	5.2	0.9	-1.25	18.39	38.5	-20.1	
824.20	20.14	H	5.2	0.9	-1.25	13.74	38.5	-24.7	
Mid Ch									
836.60	24.64	V	5.2	0.9	-1.20	18.24	38.5	-20.2	
836.60	20.32	H	5.2	0.9	-1.20	13.92	38.5	-24.5	
High Ch									
848.80	23.52	V	5.2	1.0	-1.15	17.12	38.5	-21.3	
848.80	20.77	H	5.2	1.0	-1.15	14.37	38.5	-24.1	
Rev: 11.02.2015									
Note: For Band 13/17 ERP limit is 34.77dBm. For Band 26 limit is 50dBm									

## GSM 850MHz EGPRS

Fundamental Substitution Measurement (Fc > 1GHz)									
UL LLC, Chamber S									
Company: P&G									
Project #: 12331248									
Date: 2018-11-16									
Test Engineer: 17051									
Configuration: Radio Cellular Razor Base (s/n B3-278)									
Mode: GPRS1900									
<b>Test Equipment:</b>									
Substitution: Horn antenna AT0078, cable CBL054, and signal-source SIG005									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes	
Low Ch									
1850.20	32.12	V	8.2	4.6	28.51	33.0	-4.5		
1850.20	28.79	H	8.2	4.6	25.18	33.0	-7.8		
Mid Ch									
1880.00	32.81	V	8.3	4.5	28.99	33.0	-4.0		
1880.00	30.67	H	8.3	4.5	26.85	33.0	-6.2		
High Ch									
1909.80	32.04	V	8.3	4.6	28.38	33.0	-4.6		
1909.80	30.51	H	8.3	4.6	26.85	33.0	-6.2		
Rev: 11.02.2015									
Note: For Band 4 EIRP limit is 30dBm									

## GSM 1900MHz GPRS

Fundamental Substitution Measurement (Fc > 1GHz)									
UL LLC, Chamber S									
Company: P&G									
Project #: 12331248									
Date: 2018-11-16									
Test Engineer: 17051									
Configuration: Radio Cellular Razor Base (s/n B3-278)									
Mode: EGPRS1900									
<b>Test Equipment:</b>									
Substitution: Horn antenna AT0078, cable CBL054, and signal-source SIG005									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes	
Low Ch									
1850.20	27.74	V	8.2	4.6	24.13	33.0	-8.9		
1850.20	24.48	H	8.2	4.6	20.87	33.0	-12.1		
Mid Ch									
1880.00	28.93	V	8.3	4.5	25.11	33.0	-7.9		
1880.00	26.79	H	8.3	4.5	22.97	33.0	-10.0		
High Ch									
1909.80	28.55	V	8.3	4.6	24.89	33.0	-8.1		
1909.80	26.90	H	8.3	4.6	23.24	33.0	-9.8		
Rev: 11.02.2015									
Note: For Band 4 EIRP limit is 30dBm									

## GSM 1900MHz EGPRS

## 7.1.2. WCDMA

Company: P&G Project #: 12331248 Date: 2018-11-17 Test Engineer: 17051 Configuration: Radio Cellular Razor Base (s/n B3-276) Mode: WCDMA5, REL99									
<b>Test Equipment:</b> Substitution: Dipole antenna AT0016, cable CBL054, and signal-source SIG005									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch									
826.40	22.00	V	5.2	0.9	-1.24	15.60	38.5	-22.9	
826.40	17.89	H	5.2	0.9	-1.24	11.49	38.5	-27.0	
Mid Ch									
836.60	21.50	V	5.2	0.9	-1.20	15.10	38.5	-23.4	
836.60	17.61	H	5.2	0.9	-1.20	11.21	38.5	-27.2	
High Ch									
846.60	21.21	V	5.2	1.0	-1.16	14.81	38.5	-23.6	
846.60	17.24	H	5.2	1.0	-1.16	10.84	38.5	-27.6	
Rev: 11.02.2015 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									

WCDMA BAND5 Rel99

Fundamental Substitution Measurement (Fc < 1GHz) UL LLC, Chamber S									
Company: P&G Project #: 12331248 Date: 2018-11-17 Test Engineer: 17051 Configuration: Radio Cellular Razor Base (s/n B3-276) Mode: WCDMA5, HSDPA									
<b>Test Equipment:</b> Substitution: Dipole antenna AT0016, cable CBL054, and signal-source SIG005									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch									
826.40	21.39	V	5.2	0.9	-1.24	14.99	38.5	-23.5	
826.40	17.39	H	5.2	0.9	-1.24	10.99	38.5	-27.5	
Mid Ch									
836.60	20.92	V	5.2	0.9	-1.20	14.52	38.5	-23.9	
836.60	16.96	H	5.2	0.9	-1.20	10.56	38.5	-27.9	
High Ch									
846.60	20.51	V	5.2	1.0	-1.16	14.11	38.5	-24.3	
846.60	16.66	H	5.2	1.0	-1.16	10.26	38.5	-28.2	
Rev: 11.02.2015 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									

WCDMA BAND5 HSDPA

Fundamental Substitution Measurement (Fc > 1GHz) UL LLC, Chamber S									
Company: P&G Project #: 12331248 Date: 2018-11-17 Test Engineer: 17051 Configuration: Radio Cellular Razor Base (s/n B3-276) Mode: WCDMA2, REL99									
<b>Test Equipment:</b> Substitution: Horn antenna AT0078, cable CBL054, and signal-source SIG005									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes	
Low Ch									
1852.40	26.34	V	8.2	4.6	22.71	33.0	-10.3		
1852.40	23.30	H	8.2	4.6	19.67	33.0	-13.3		
Mid Ch									
1880.00	26.89	V	8.3	4.5	23.07	33.0	-9.9		
1880.00	24.24	H	8.3	4.5	20.42	33.0	-12.6		
High Ch									
1907.60	25.46	V	8.3	4.6	21.79	33.0	-11.2		
1907.60	22.75	H	8.3	4.6	19.08	33.0	-13.9		
Rev: 11.02.2015 Note: For Band 4 EIRP limit is 30dBm									

WCDMA BAND2 Rel99

Fundamental Substitution Measurement (Fc > 1GHz) UL LLC, Chamber S									
Company: P&G Project #: 12331248 Date: 2018-11-17 Test Engineer: 17051 Configuration: Radio Cellular Razor Base (s/n B3-276) Mode: WCDMA2 HSDPA									
<b>Test Equipment:</b> Substitution: Horn antenna AT0078, cable CBL054, and signal-source SIG005									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes	
Low Ch									
1852.40	25.76	V	8.2	4.6	22.13	33.0	-10.9		
1852.40	22.78	H	8.2	4.6	19.15	33.0	-13.9		
Mid Ch									
1880.00	26.26	V	8.3	4.5	22.44	33.0	-10.6		
1880.00	23.70	H	8.3	4.5	19.88	33.0	-13.1		
High Ch									
1907.60	24.86	V	8.3	4.6	21.19	33.0	-11.8		
1907.60	22.28	H	8.3	4.6	18.61	33.0	-14.4		
Rev: 11.02.2015 Note: For Band 4 EIRP limit is 30dBm									

WCDMA BAND2 HSDPA

## END OF TEST REPORT