DASY/EASY - Parameters of Probe: EX3DV4 - SN:3954

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	41.9	0.89	10.98	10.98	10.98	0.37	0.82	± 12.0 %
835	41.5	0.90	10.52	10.52	10.52	0.16	1.42	± 12.0 %
900	41.5	0.97	10.35	10.35	10.35	0.36	0.83	± 12.0 %
1750	40.1	1.37	8.58	8.58	8.58	0.31	0.81	± 12.0 %
1900	40.0	1.40	8.32	8.32	8.32	0.17	1.27	± 12.0 %
2000	40.0	1.40	8.23	8.23	8.23	0.22	1.11	± 12.0 %
2300	39.5	1.67	7.88	7.88	7.88	0.21	1.15	± 12.0 %
2450	39.2	1.80	7.44	7.44	7.44	0.30	0.94	± 12.0 %
2600	39.0	1.96	7.27	7.27	7.27	0.27	1.13	± 12.0 %
3500	37.9	2.91	7.10	7.10	7.10	0.30	1.20	± 13.1 %
5250	35.9	4.71	5.08	5.08	5.08	0.35	1.80	± 13.1 %
5600	35.5	5.07	4.70	4.70	4.70	0.40	1.80	± 13.1 %
5750	35.4	5.22	4.69	4.69	4.69	0.45	1.80	± 13.1 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3954

Calibration Parameter Determined in Body Tissue Simulating Media

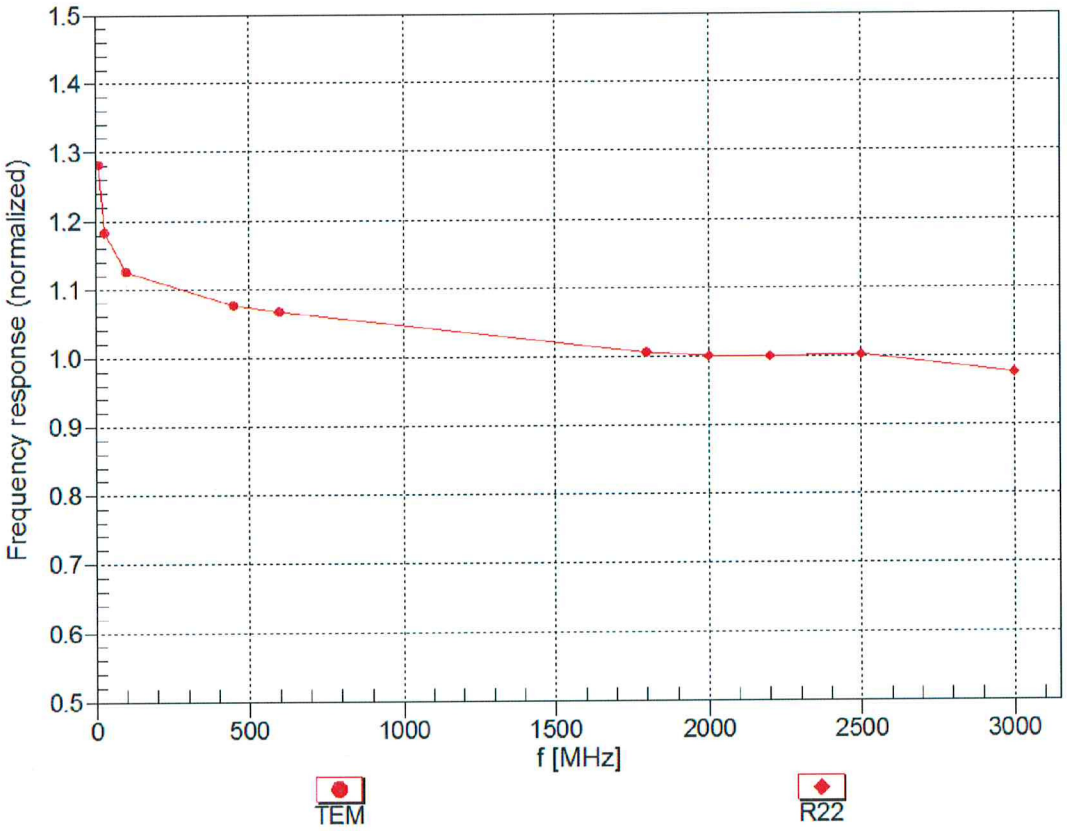
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	55.5	0.96	10.54	10.54	10.54	0.41	0.80	± 12.0 %
835	55.2	0.97	10.32	10.32	10.32	0.24	1.09	± 12.0 %
1750	53.4	1.49	8.32	8.32	8.32	0.34	0.80	± 12.0 %
1900	53.3	1.52	8.01	8.01	8.01	0.40	0.80	± 12.0 %
2300	52.9	1.81	7.80	7.80	7.80	0.43	0.84	± 12.0 %
2450	52.7	1.95	7.55	7.55	7.55	0.47	0.80	± 12.0 %
2600	52.5	2.16	7.05	7.05	7.05	0.40	0.91	± 12.0 %
3500	51.3	3.31	6.75	6.75	6.75	0.30	1.20	± 13.1 %
5250	48.9	5.36	4.50	4.50	4.50	0.45	1.90	± 13.1 %
5600	48.5	5.77	3.92	3.92	3.92	0.50	1.90	± 13.1 %
5750	48.3	5.94	4.05	4.05	4.05	0.55	1.90	± 13.1 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

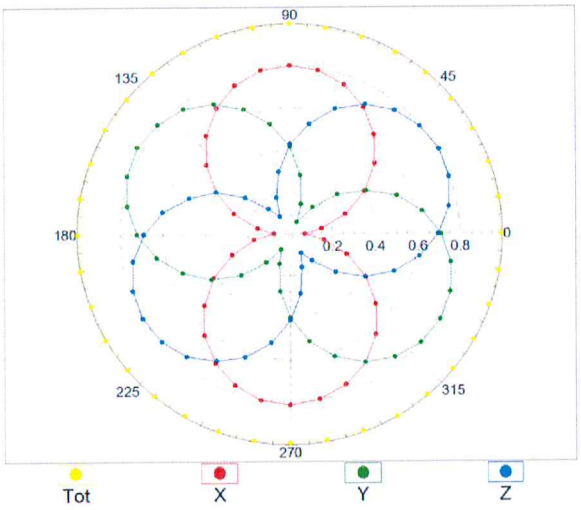
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



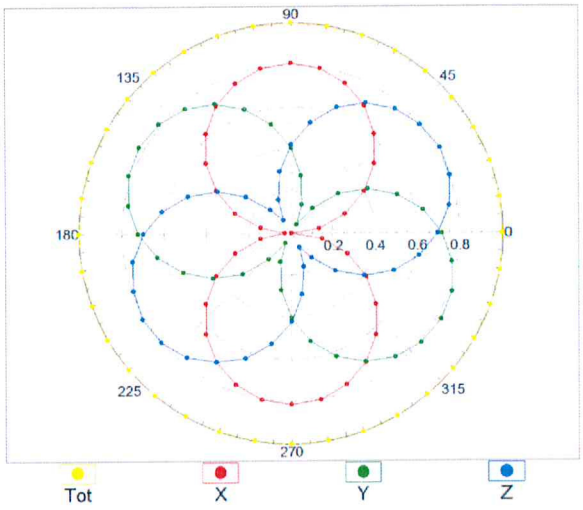
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

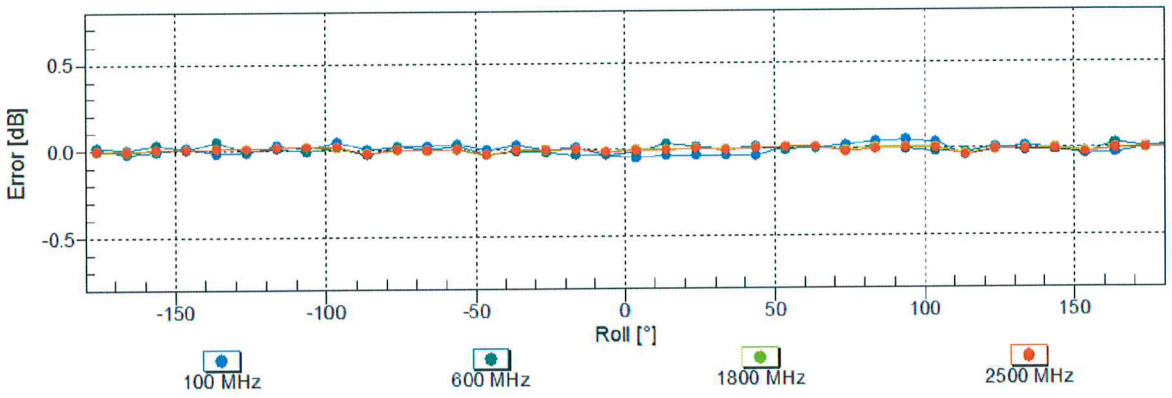
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



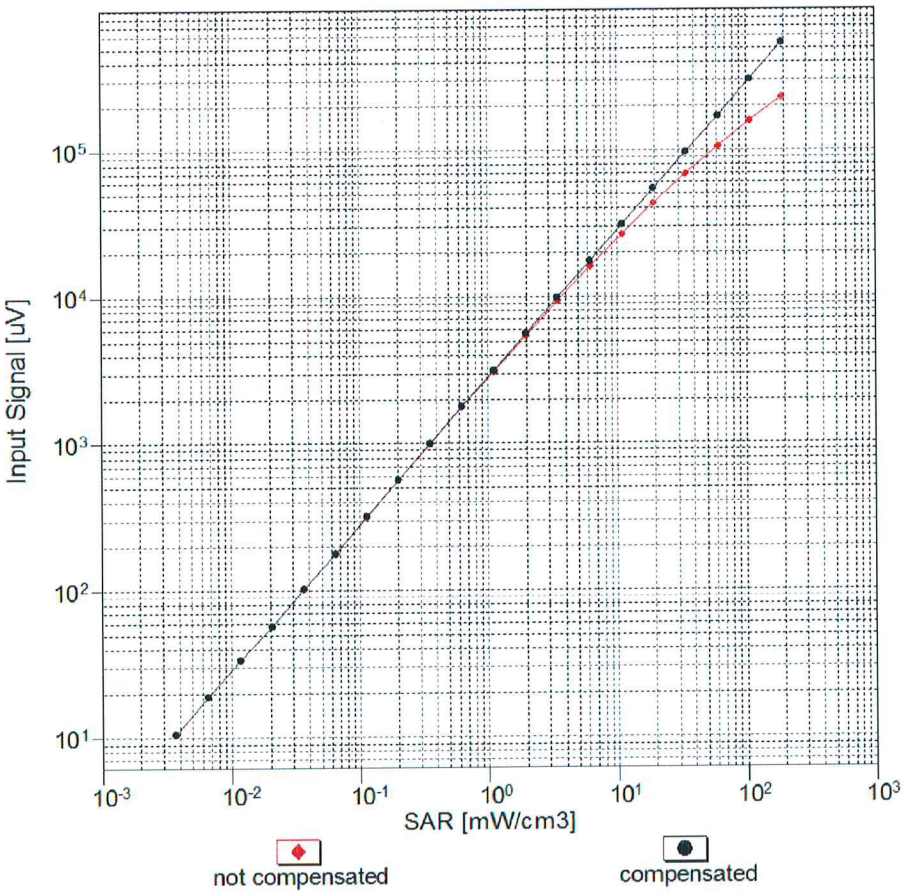
f=1800 MHz,R22

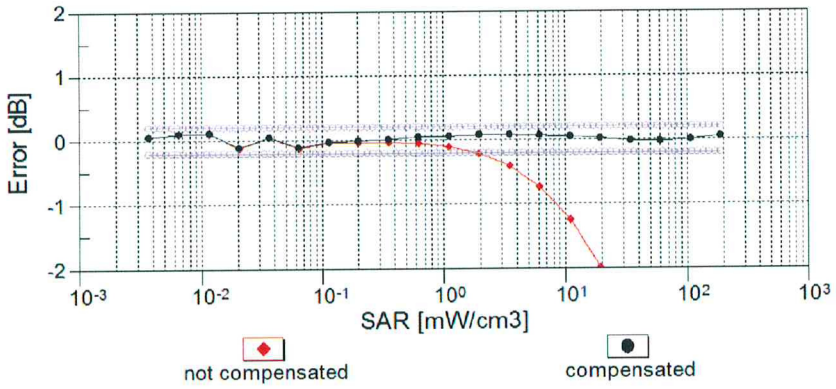




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f_{eval}= 1900 MHz)

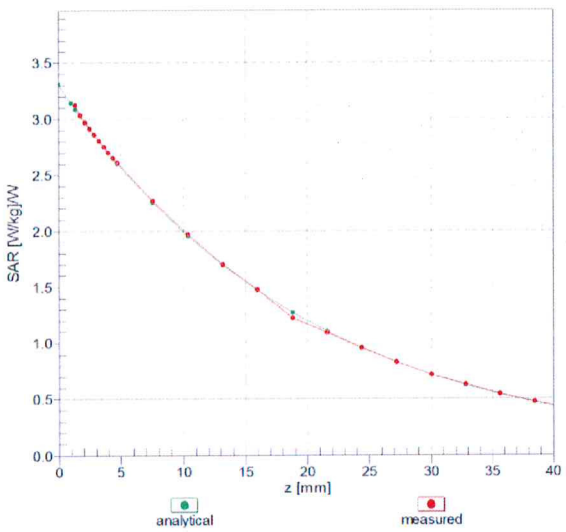




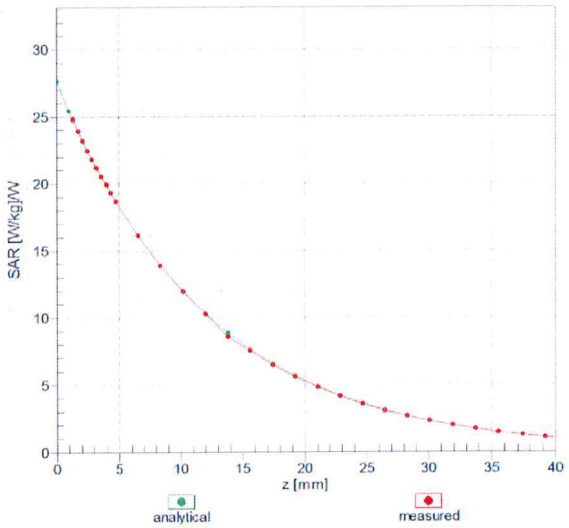
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

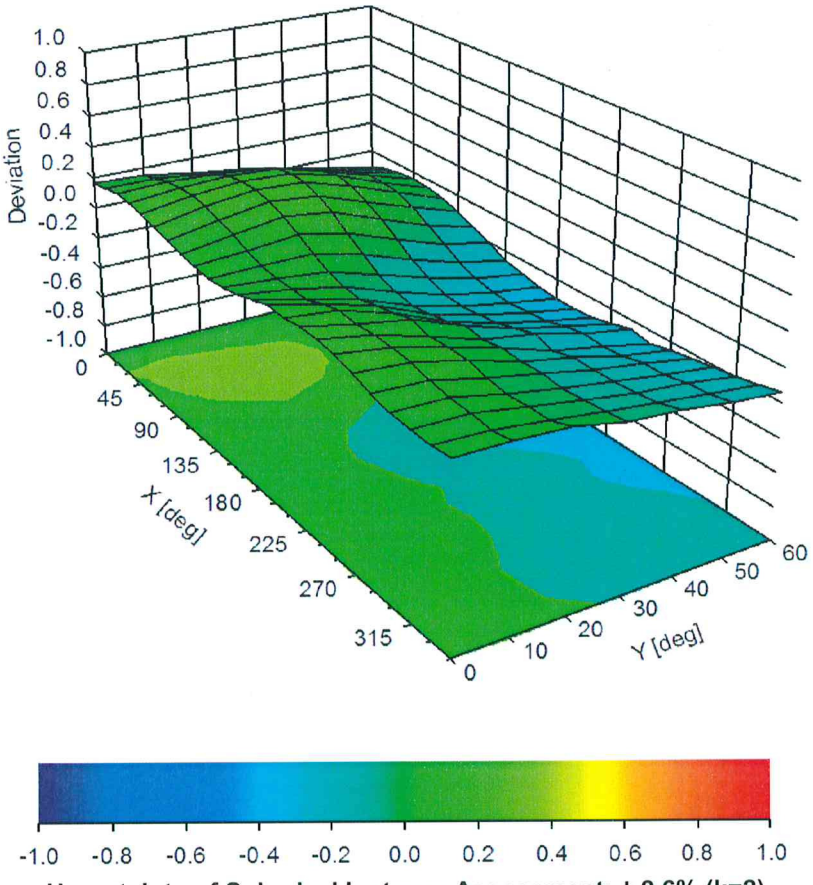


f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3954

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	73.7
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Appendix E. Product Equality Declaration

HMD Global Oy

Tel:

Date:

Product Equality Declaration

We, HMD Global Oy declares on our sole responsibility for the product as below:

Certification information					
SKU	Row	LatAm	Row	LatAm	APAC
Number of SIM's supported	SKU1 SS	SKU2 SS	SKU1 DS	SKU2 DS	SKU1 SS/DS
Model Name	TA-1020	TA-1028	TA-1032	TA-1038	TA-1020/ TA-1032

The differences between Row, Latam, APAC as below:

■ RF section

1. Antenna pattern and matching has no difference

2. Frequency band difference

•Radio Functionality Matrix -Same Row indicates Signal Path is Shared among SKUs					
Bands / Model	SKU1-SS TA-1020	SKU1-DS TA-1032	SKU2-SS TA-1028	SKU2-DS TA-1038	Remark
GSM 850	V	V	V	V	No difference
GSM 900	V	V	V	V	No difference
GSM 1800	V	V	V	V	No difference
GSM 1900	V	V	V	V	No difference
LTE 1	V	V	X	X	No difference
LTE 2	X	X	V	V	U3404 for SKU1 SMT is B40 DRX SAW; U3404 for SKU2 is B2DRX SAW
LTE 3	V	V	V	V	No difference
LTE 4	X	X	V	V	U3304 Only for W_B4 Tx/PRX; LTE B4 TX/PRX
LTE 5	V	V	X	X	U3408 only for SKU1 LTE B5 DRX
LTE 7	V	V	V	V	No difference
LTE 8	V	V	X	X	Z3404 only for SKU1 LTE band8 DRX
LTE 12	X	X	V	V	U3311 SMT is different， SKU1 SMT is the Duplexer of B20， SKU2 SMT is the Duplexer of B12/B17.
LTE 17	X	X	V	V	U3311 SMT is different， SKU1 SMT is the Duplexer of B20， SKU2 SMT is the Duplexer of B12/B17.
LTE 20	V	V	X	X	U3311 SMT is different， SKU1 SMT is the Duplexer of B20， SKU2 SMT is the Duplexer of B12/B17
LTE 28	V	V	V	V	NUL3336 SMT is different for SKU1& SKU2.
LTE 38	V	V	V	V	No difference
LTE 40	V	V	X	X	U3404 SKU1 SMT is the DRX SAW of LTE B40， SKU2 SMT is the DRX of LTE B2; U3202 is only for SKU1Tx/PRx of LTE B40.
WCDMA 1	V	V	V	V	No difference
WCDMA 2	V	V	V	V	No difference
WCDMA 4	X	X	V	V	U3304 Only for W_B4 Tx/PRX;LTE B4 TX/PRX
WCDMA 5	V	V	V	V	No difference
WCDMA 8	V	V	V	V	No difference
WLAN 2.4GHz	V	V	V	V	No difference
WLAN 5GHz	V	V	V	V	No difference
Bluetooth	V	V	V	V	No difference
NFC	V	V	V	V	No difference

3. Board difference

		SKU1-SS TA-1020	SKU1-DS TA-1032	SKU2-SS TA-1028	SKU2-DS TA-1038
WWAN	IC (MT6169)	No difference			
	Component on PCB	No difference			
	Antenna 1	No difference			
BT	IC (MT6625LN)	No difference			
		No difference			
	Component on PCB	No difference			
	Antenna	No difference			
WLAN 2.4GHz	IC (MT6625LN)	No difference			
	Component on PCB	No difference			
	Antenna	No difference			
WLAN 5GHz	IC (MT6625LN)	No difference			
	Component on PCB	No difference			
	Antenna	No difference			
NFC	IC MT6605	No difference			
	Component on PCB	No difference			
	Antenna	No difference			
E-compass	IC	No difference			
	Component on PCB	No difference			
SAR cap Sensor	IC	No difference			
	Component on PCB	No difference			

■ **SW section**

There is no different for SW design. Only the UI will show different model name.

■ **Mechanical section**

There is only one different for the structure of SIM Card. For hardware system design is the same.

SKU	SKU1-SS TA-1020	SKU1-DS TA-1032	SKU2-SS TA-1028	SKU2-DS TA-1038	Remark
SIM Slot	Single SIM	Dual SIM	Single SIM	Dual SIM	NA

Except listings above, the others are all the same.

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E-Mail: evon.lee@hmdglobal.com

Appendix F. Reference Report

Please refer to Sporton report number FA711304-01 which is issued separately.