Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.1
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	15 mm	
Scan resolution	dx, dy = 5 mm	
Frequency	2600 MHz ± 1 MHz	
Input power drift	< 0.05 dB	

Maximum Field values at 2600 MHz

E-field 15 mm above dipole surface	condition	**Interpolated maximum**
Maximum measured above high end	100 mW input power	86.3 V/m = 38.72 dBV/m
Maximum measured above low end	100 mW input power	85.4 V/m = 38.63 dBV/m
Averaged maximum above arm	100 mW input power	**85.8 V/m ± 12.8 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters

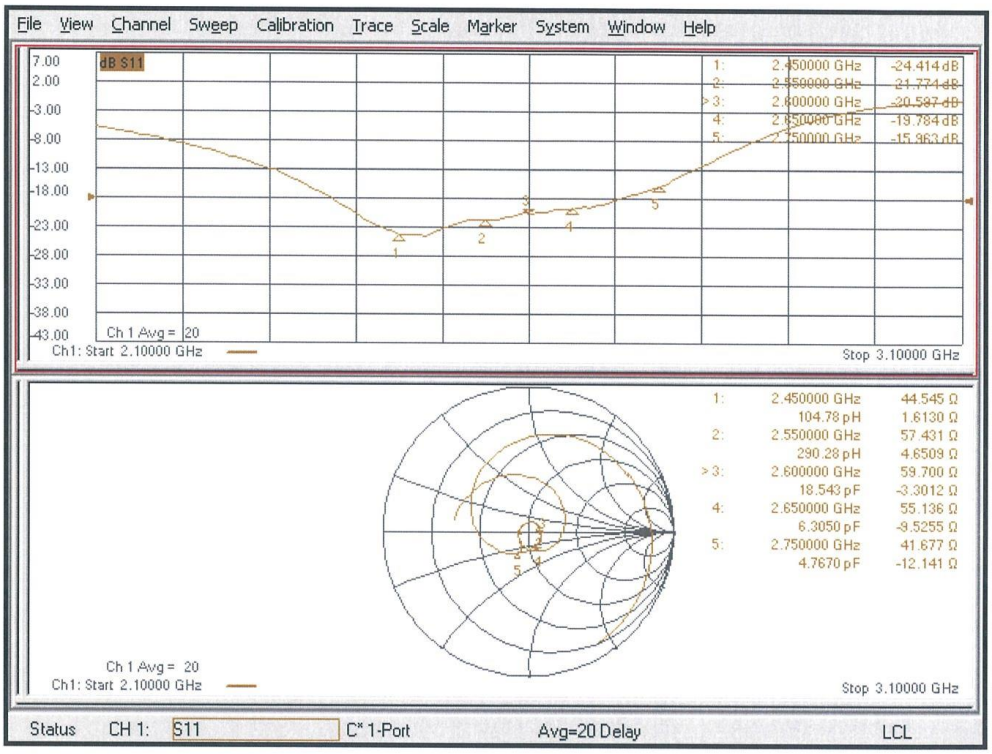
Frequency	**Return Loss**	**Impedance**
2450 MHz	24.4 dB	44.5 Ω + 1.6 jΩ
2550 MHz	21.8 dB	57.4 Ω + 4.7 jΩ
2600 MHz	20.6 dB	59.7 Ω - 3.3 jΩ
2650 MHz	19.8 dB	55.1 Ω - 9.5 jΩ
2750 MHz	16.0 dB	41.7 Ω - 12.1 jΩ

3.2 Antenna Design and Handling

The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.
The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.
Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

Impedance Measurement Plot



DASY5 E-field Result

Date: 22.08.2018

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 2600 MHz; Type: CD2600V3; Serial: CD2600V3 - SN: 1017

Communication System: UID 0 - CW ; Frequency: 2600 MHz
Medium parameters used: $\sigma = 0$ S/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

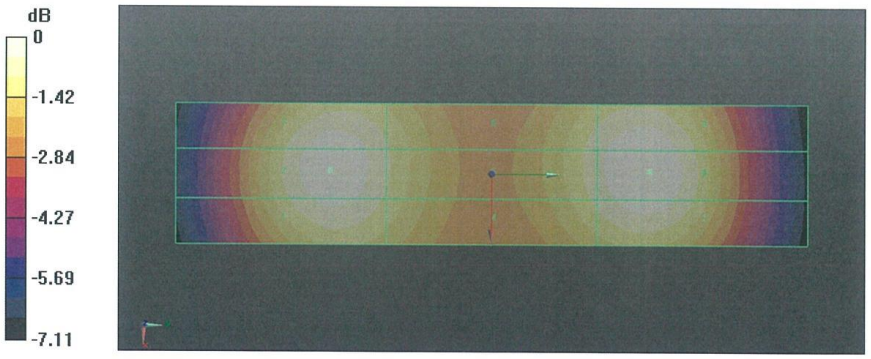
DASY52 Configuration:

- Probe: EF3DV3 - SN4013; ConvF(1, 1, 1) @ 2600 MHz; Calibrated: 05.03.2018
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 17.01.2018
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

Dipole E-Field measurement @ 2600MHz/E-Scan - 2600MHz d=15mm/Hearing Aid Compatibility Test (41x181x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 65.15 V/m; Power Drift = 0.00 dB
Applied MIF = 0.00 dB
RF audio interference level = 38.72 dBV/m
Emission category: M2

MIF scaled E-field

Grid 1 **M2** **38.38 dBV/m**	Grid 2 **M2** **38.62 dBV/m**	Grid 3 **M2** **38.53 dBV/m**
Grid 4 **M2** **37.9 dBV/m**	Grid 5 **M2** **38.12 dBV/m**	Grid 6 **M2** **38.07 dBV/m**
Grid 7 **M2** **38.5 dBV/m**	Grid 8 **M2** **38.72 dBV/m**	Grid 9 **M2** **38.63 dBV/m**



0 dB = 86.32 V/m = 38.72 dBV/m

ANNEX F SPOT CHECK

F.1 CONDUCTED OUTPUT POWER MEASUREMENT

GSM 850MHz	**Conducted Power (dBm)**
	Channel 251(848.8MHz)
	32.06
GSM 1900MHz	**Conducted Power(dBm)**
	Channel 661(1880MHz)
	30.19

F2 Validation Result

E-Field Scan						
Mode	**Frequency (MHz)**	**Input Power (mW)**	**Measured[1] Value(dBV/m)**	**Target[2] Value(dBV/m)**	**Deviation[3] (%)**	**Limit[4] (%)**
CW	835	100	40.98	40.91	0.81	±25
CW	1880	100	39.11	39.01	1.16	±25

F3 DUT MIF results

Measured MIF levels		
Band	Channel	Modulation interference factor (dB)
GSM 850	251	3.49
GSM 1900	661	3.48

F4 Measurement Results (E-Field)

Frequency		**Measured Value(dBV/m)**	**Power Drift (dB)**	**Category**
MHz	**Channel**			
GSM 850				
848.8	251	36.28	-0.04	**M4** (see Fig B.1)
GSM 1900				
1880	661	24.87	-0.05	**M4** (see Fig B.2)

F5 CONCLUSION

The HAC measurement indicates that the EUT complies with the HAC limits of the ANSIC63.19-2011. The total M-rating is **M4.**

F6 TEST PLOTS

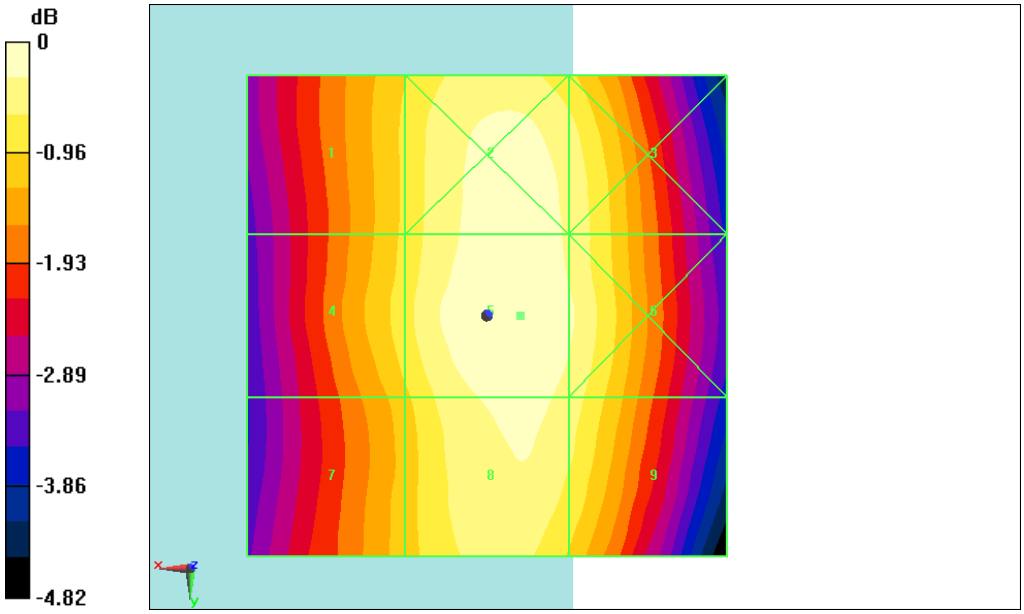
HAC RF E-Field GSM 850 High

Date: 2019-7-22

Electronics: DAE4 Sn1555
Medium: Air
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature: 22.0°C
Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3
Probe: EF3DV3 - SN4060;ConvF(1, 1, 1)
GSM850/E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 55.28 V/m; Power Drift = -0.04 dB
Applied MIF = 3.49 dB
RF audio interference level = 36.28 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 M4 35.41 dBV/m	Grid 2 M4 36.14 dBV/m	Grid 3 M4 35.91 dBV/m
Grid 4 M4 35.52 dBV/m	Grid 5 M4 36.28 dBV/m	Grid 6 M4 36.02 dBV/m
Grid 7 M4 35.24 dBV/m	Grid 8 M4 36.08 dBV/m	Grid 9 M4 35.83 dBV/m



0 dB = 65.15 V/m = 36.28 dBV/m

Fig F.1 HAC RF E-Field GSM 850 High

HAC RF E-Field GSM 1900 Middle

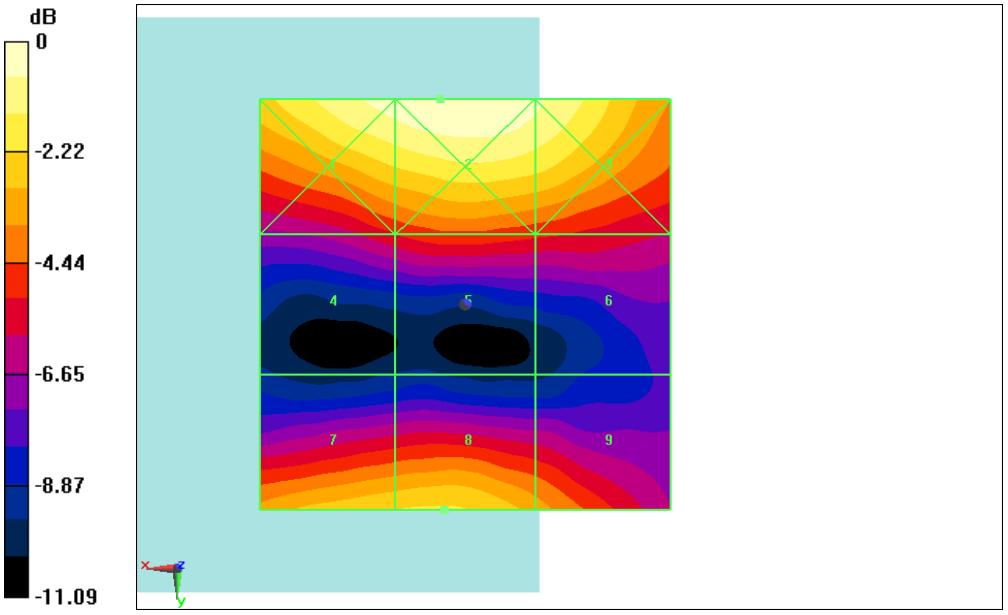
Date: 2019-7-22

Electronics: DAE4 Sn1555
Medium: Air
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Ambient Temperature: 22.0°C
Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Probe: EF3DV3 - SN4060;ConvF(1, 1, 1)

GSM1900/E Scan - ER3DV6 - 2011: 15 mm from Probe Center to the Device 2/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 6.183 V/m; Power Drift = -0.05 dB
Applied MIF = 3.48 dB
RF audio interference level = 24.87 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 M4 26.61 dBV/m	Grid 2 M4 26.96 dBV/m	Grid 3 M4 26.4 dBV/m
Grid 4 M4 21.76 dBV/m	Grid 5 M4 22.37 dBV/m	Grid 6 M4 21.99 dBV/m
Grid 7 M4 24.77 dBV/m	Grid 8 M4 24.87 dBV/m	Grid 9 M4 23.69 dBV/m



0 dB = 22.28 V/m = 26.96 dBV/m

Fig F.2 HAC RF E-Field GSM 1900 Middle

F7 SYSTEM VALIDATION RESULT

E SCAN of Dipole 835 MHz

Date: 2019-7-22

Electronics: DAE4 Sn1555

Medium: Air

Medium parameters used: σ = 0 mho/m, εr = 1; ρ = 1000 kg/m3

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Probe: EF3DV3 - SN4060;ConvF(1, 1, 1)

E Scan - measurement distance from the probe sensor center to CD835 Dipole = 15mm/Hearing Aid Compatibility Test (41x361x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 136.2 V/m; Power Drift = 0.09 dB

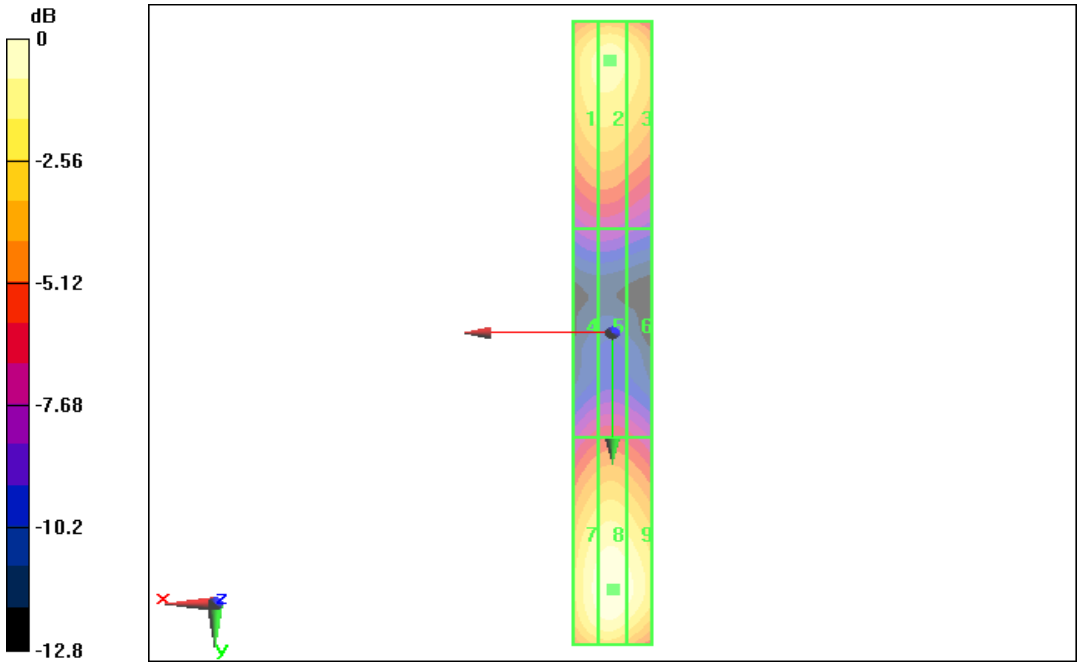
Applied MIF = 0.00 dB

RF audio interference level = 40.98 dBV/m

Emission category: M3

MIF scaled E-field

Grid 1 **M3** **40.56 dBV/m**	Grid 2 **M3** **40.98 dBV/m**	Grid 3 **M3** **40.91 dBV/m**
Grid 4 **M4** **35.79 dBV/m**	Grid 5 **M4** **36.12 dBV/m**	Grid 6 **M4** **36.12 dBV/m**
Grid 7 **M3** **40.74 dBV/m**	Grid 8 **M3** **41.14 dBV/m**	Grid 9 **M3** **41.05 dBV/m**

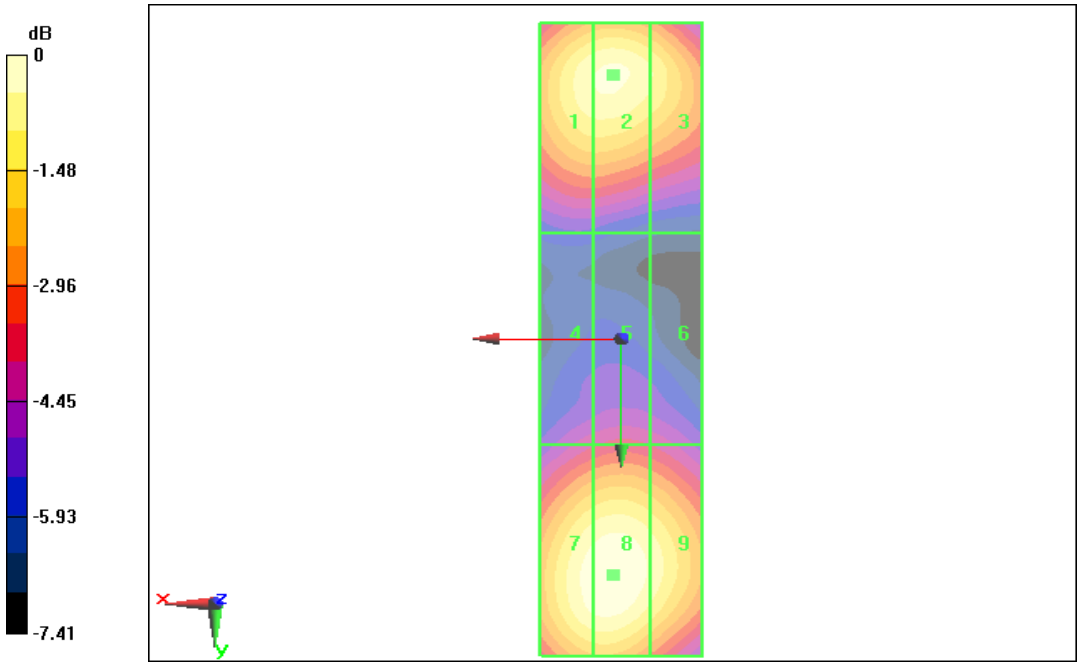


0 dB = 40.98 dBV/m

E SCAN of Dipole 1880 MHz
Date: 2019-7-22
Electronics: DAE4 Sn1555
Medium: Air
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1
Probe: EF3DV3 - SN4060;ConvF(1, 1, 1)
E Scan - measurement distance from the probe sensor center to CD1880 Dipole = 15mm/Hearing Aid Compatibility Test (41x181x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 153.2 V/m; Power Drift = 0.01 dB
Applied MIF = 0.00 dB
RF audio interference level = 39.11 dBV/m
Emission category: M2

MIF scaled E-field

Grid 1 **M2** **38.77 dBV/m**	Grid 2 **M2** **39.11 dBV/m**	Grid 3 **M2** **39.01 dBV/m**
Grid 4 **M2** **36.21 dBV/m**	Grid 5 **M2** **36.38 dBV/m**	Grid 6 **M2** **36.31 dBV/m**
Grid 7 **M2** **38.79 dBV/m**	Grid 8 **M2** **39.03 dBV/m**	Grid 9 **M2** **38.92 dBV/m**



0 dB = 39.11 dBV/m

The photos of HAC test are presented in the additional document:

Appendix to test report No.I19Z61056-SEM02/03

The photos of HAC test