



Evaluation of RF Exposure

Date: 9/11/2013
FCC ID: OWS-NIC411-3G

Part Number: 174-0395-00
Description: NIC 411-3G-0509
Frequency: 902 - 928 MHz FHSS, 2400-2483.5 FHSS, EGSM850, GSM1900

| | 900 MHz | 2400 MHz | EGSM850 | GSM1900 | |
|--------------------------------------|-------------|-------------|---------|-------------|---------------|
| Max RF Power | 30 | | 27 | 35 | 32 dBm |
| Source Based Time Average Correction | 0 | | 0 | -12 | -12 dB |
| Tx Antenna | 1.2 | | 5.6 | -1.2 | -1.9 dBi |
| EIRP | 31.2 | | 32.6 | 21.8 | 18.1 dBm |
| EIRP | 1318.256739 | 1819.700859 | | 151.3561248 | 64.5654229 mW |
| EIRP | 1.318256739 | 1.819700859 | | 0.151356125 | 0.064565423 W |
| MPE dist | | | 20 | | cm |

Equation 1 -
$$S = \frac{EIRP}{4\pi R^2}$$

Equation 2 -
$$R = \sqrt{\frac{EIRP}{4\pi S}}$$

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Appendix A: FCC Exposure Criteria, FCC Limits for Maximum Permissible Exposure (MPE)

| Radio | F(MHz) | Actual F, MHz | Limit | | Calculated | | | |
|----------|--------------|---------------|-------------------------|---------------------------|--------------------|--------------------|-------------------------|---------------------------|
| | | | $S_{max, occupational}$ | $S_{max, general public}$ | $S, mW/cm^2$ | $S, mW/cm^2$ | $R_{min, occupational}$ | $R_{min, general public}$ |
| | | | Controlled, Ave 6 min | Uncontrolled, Ave 30 min | @ 20cm dist | @ 20 cm dist | | |
| | | | mW/cm ² | mW/cm ² | mW/cm ² | mW/cm ² | cm | cm |
| | 0.3-1.34* | -- | 100 | 100 | -- | -- | -- | -- |
| | 1.34-30 | -- | 900/f ² | 180/f ² | -- | -- | -- | -- |
| | 30-300 | -- | 1 | 0.2 | -- | -- | -- | -- |
| 900FHSS | 300-1500 | 902 | 3.006666667 | 0.601333333 | 0.262258845 | 0.262258845 | 5.906802181 | 13.20801121 |
| EGSM850 | 300-1500 | 826.4 | 2.754666667 | 0.550933333 | 0.030111344 | 0.030111344 | 2.091031336 | 4.67568821 |
| 2400FHSS | 1500-100,000 | 2400.8 | 5 | 1 | 0.362017983 | 0.362017983 | 5.381583286 | 12.03358605 |
| GSM1900 | 1500-100,000 | 1852.4 | 5 | 1 | 0.012844883 | 0.012844883 | 1.013701446 | 2.266705341 |

* upper frequency range is 3 MHz for occupational limit

NOTE: For mobile or fixed location transmitters, minimum separation distance for FCC compliance is 20 cm, even if calculations indicate MPE distance is less

| | |
|------------------|---------------|
| % 900 MHz RFx | 43.61% |
| % EGSM850 RFx | 5.47% |
| % 2.4 GHz RFx | 36.20% |
| | |
| Total RFx | 85.28% |

| | |
|------------------|---------------|
| % 900 MHz RFx | 43.61% |
| % GSM1900 RFx | 1.28% |
| % 2.4 GHz RFx | 36.20% |
| | |
| Total RFx | 81.10% |



Evaluation of RF Exposure

Date: 7/19/2013
FCC ID: OWS-NIC411-3G

Part Number:
Description: NIC 411-3G-0512
Frequency: 902 - 928 MHz FHSS, 2400-2483.5 FHSS, EGSM850, GSM1900

| | 900 MHz | 2400 MHz | EGSM850 | GSM1900 | |
|--------------------------------------|-------------|-------------|---------|-------------|---------------|
| Max RF Power | 30 | | 24 | 35 | 32 dBm |
| Source Based Time Average Correction | 0 | | 0 | -12 | -12 dB |
| Tx Antenna | 3 | | 4 | 3.9 | 2.5 dBi |
| EIRP | 33 | | 28 | 26.9 | 22.5 dBm |
| EIRP | 1995.262315 | 630.9573445 | | 489.7788194 | 177.827941 mW |
| EIRP | 1.995262315 | 0.630957344 | | 0.489778819 | 0.177827941 W |
| MPE dist | | | 20 | | cm |

Equation 1 -
$$S = \frac{EIRP}{4\pi R^2}$$

Equation 2 -
$$R = \sqrt{\frac{EIRP}{4\pi S}}$$

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| | | | $S_{max, occupational}$ | $S_{max, general public}$ | $S, mW/cm^2$ | $S, mW/cm^2$ | $R_{min, occupational}$ | $R_{min, general public}$ |
| | | | Controlled, Ave 6 min | Uncontrolled, Ave 30 min | @ 20cm dist | @ 20 cm dist | | |
| | | | mW/cm ² | mW/cm ² | mW/cm ² | mW/cm ² | cm | cm |
| | 0.3-1.34* | -- | 100 | 100 | -- | -- | -- | -- |
| | 1.34-30 | -- | 900/f ² | 180/f ² | -- | -- | -- | -- |
| | 30-300 | -- | 1 | 0.2 | -- | -- | -- | -- |
| 900FHSS | 300-1500 | 902 | 3.006666667 | 0.601333333 | 0.396944825 | 0.396944825 | 7.266954259 | 16.24940371 |
| EGSM850 | 300-1500 | 826.4 | 2.754666667 | 0.550933333 | 0.0974384 | 0.0974384 | 3.761495452 | 8.410959529 |
| 2400FHSS | 1500-100,000 | 2400.8 | 5 | 1 | 0.125524975 | 0.125524975 | 3.168911173 | 7.085900799 |
| GSM1900 | 1500-100,000 | 1852.4 | 5 | 1 | 0.035377745 | 0.035377745 | 1.682325647 | 3.761794507 |

* upper frequency range is 3 MHz for occupational limit

NOTE: For mobile or fixed location transmitters, minimum separation distance for FCC compliance is 20 cm, even if calculations indicate MPE distance is less

| | |
|---------------|--------|
| % 900 MHz RFx | 66.01% |
| % EGSM850 RFx | 17.69% |
| % 2.4 GHz RFx | 12.55% |
| | |
| Total RFx | 96.25% |

| | |
|---------------|--------|
| % 900 MHz RFx | 66.01% |
| % GSM1900 RFx | 3.54% |
| % 2.4 GHz RFx | 12.55% |
| | |
| Total RFx | 82.10% |



Evaluation of RF Exposure

Date: 7/19/2013
FCC ID: OWS-NIC411-3G

Part Number:
Description: NIC 411-3G-0511
Frequency: 902 - 928 MHz FHSS, 2400-2483.5 FHSS, EGSM850, GSM1900

| | 900 MHz | 2400 MHz | EGSM850 | GSM1900 | |
|--------------------------------------|-------------|-------------|---------|-------------|---------------|
| Max RF Power | 30 | | 27 | 35 | 32 dBm |
| Source Based Time Average Correction | 0 | | 0 | -12 | -12 dB |
| Tx Antenna | 1.2 | | 5.6 | 3.9 | 2.5 dBi |
| EIRP | 31.2 | | 32.6 | 26.9 | 22.5 dBm |
| EIRP | 1318.256739 | 1819.700859 | | 489.7788194 | 177.827941 mW |
| EIRP | 1.318256739 | 1.819700859 | | 0.489778819 | 0.177827941 W |
| MPE dist | | | 20 | | cm |

Equation 1 -
$$S = \frac{EIRP}{4\pi R^2}$$

Equation 2 -
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|----------|--------------|---------------|-------------------------|---------------------------|--------------------|--------------------|-------------------------|---------------------------|
| | | | $S_{max, occupational}$ | $S_{max, general public}$ | $S, mW/cm^2$ | $S, mW/cm^2$ | $R_{min, occupational}$ | $R_{min, general public}$ |
| | | | Controlled, Ave 6 min | Uncontrolled, Ave 30 min | @ 20cm dist | @ 20 cm dist | | |
| | | | mW/cm ² | mW/cm ² | mW/cm ² | mW/cm ² | cm | cm |
| | 0.3-1.34* | -- | 100 | 100 | -- | -- | -- | -- |
| | 1.34-30 | -- | 900/f ² | 180/f ² | -- | -- | -- | -- |
| | 30-300 | -- | 1 | 0.2 | -- | -- | -- | -- |
| 900FHSS | 300-1500 | 902 | 3.006666667 | 0.601333333 | 0.262258845 | 0.262258845 | 5.906802181 | 13.20801121 |
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* upper frequency range is 3 MHz for occupational limit

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| | |
|---------------|--------|
| % 900 MHz RFx | 43.61% |
| % EGSM850 RFx | 17.69% |
| % 2.4 GHz RFx | 36.20% |
| | |
| Total RFx | 97.50% |

| | |
|---------------|--------|
| % 900 MHz RFx | 43.61% |
| % GSM1900 RFx | 3.54% |
| % 2.4 GHz RFx | 36.20% |
| | |
| Total RFx | 83.35% |



Evaluation of RF Exposure

Date: 7/19/2013
FCC ID: OWS-NIC411-3G

Part Number:
Description: NIC 411-3G-050A
Frequency: 902 - 928 MHz FHSS, 2400-2483.5 FHSS, EGSM850, GSM1900

| | 900 MHz | 2400 MHz | EGSM850 | GSM1900 | |
|--------------------------------------|-------------|-------------|---------|-------------|---------------|
| Max RF Power | 30 | | 24 | 35 | 32 dBm |
| Source Based Time Average Correction | 0 | | 0 | -12 | -12 dB |
| Tx Antenna | 3 | | 4 | -1.2 | -1.9 dBi |
| EIRP | 33 | | 28 | 21.8 | 18.1 dBm |
| EIRP | 1995.262315 | 630.9573445 | | 151.3561248 | 64.5654229 mW |
| EIRP | 1.995262315 | 0.630957344 | | 0.151356125 | 0.064565423 W |
| MPE dist | | | 20 | | cm |

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| | | | Controlled, Ave 6 min | Uncontrolled, Ave 30 min | @ 20cm dist | @ 20 cm dist | | |
| | | | mW/cm ² | mW/cm ² | mW/cm ² | mW/cm ² | cm | cm |
| | 0.3-1.34* | -- | 100 | 100 | -- | -- | -- | -- |
| | 1.34-30 | -- | 900/f ² | 180/f ² | -- | -- | -- | -- |
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* upper frequency range is 3 MHz for occupational limit

NOTE: For mobile or fixed location transmitters, minimum separation distance for FCC compliance is 20 cm, even if calculations indicate MPE distance is less

| | |
|---------------|--------|
| % 900 MHz RFx | 66.01% |
| % EGSM850 RFx | 5.47% |
| % 2.4 GHz RFx | 12.55% |
| | |
| Total RFx | 84.03% |

| | |
|---------------|--------|
| % 900 MHz RFx | 66.01% |
| % GSM1900 RFx | 1.28% |
| % 2.4 GHz RFx | 12.55% |
| | |
| Total RFx | 79.85% |

PHS8-P Specs

| Feature | Implementation |
|--|--|
| General | |
| Frequency bands | GSM/GPRS/EDGE: Quad band, 850/900/1800/1900MHz UMTS/HSPA+: Five band, 800/850/900/1900/2100MHz |
| GSM class | Small MS |
| Output power (according to Release 99) | Class 4 (+33dBm \pm 2dB) for EGSM850 Class 4 (+33dBm \pm 2dB) for EGSM900 Class 1 (+30dBm \pm 2dB) for GSM1800 Class 1 (+30dBm \pm 2dB) for GSM1900 Class E2 (+27dBm \pm 3dB) for GSM 850 8-PSK Class E2 (+27dBm \pm 3dB) for GSM 900 8-PSK Class E2 (+26dBm +3 /-4dB) for GSM 1800 8-PSK Class E2 (+26dBm +3 /-4dB) for GSM 1900 8-PSK Class 3 (+24dBm +1/-3dB) for UMTS 2100, WCDMA FDD BdI Class 3 (+24dBm +1/-3dB) for UMTS 1900,WCDMA FDD BdII Class 3 (+24dBm +1/-3dB) for UMTS 900, WCDMA FDD BdVIII Class 3 (+24dBm +1/-3dB) for UMTS 850, WCDMA FDD BdV Class 3 (+24dBm +1/-3dB) for UMTS 800, WCDMA FDD BdVI |

Antenna antenna gain for PHS8-P

| | Typical performance | Conditions |
|---|--|--|
| Peak gain | -1.2dBi @ 960 MHz -1.9dBi @ 1740 MHz | All data measured on Antenova's reference board, part number A10376-U1 Data given for the 824MHz-960MHz and 1710MHz - 1990MHz frequency ranges |
| Average gain (Linear) | -1.6dBi 824-960 MHz -2.4dBi 1710-1990 MHz | |
| Minimum efficiency 824-960 MHz 1710-217 MHz | >60% >50% | |
| Minimum Return Loss | 6.8 dB | |

NIC 410 sheet metal antenna gain (free space)

902 - 928 MHz: 0.5 - 1.2 dBi
2.4 - 2.4835 GHz: 3.7 - 5.6 dBi

WP WPANT30017-CA antenna gain

| Parameter | Antenna Performance | | |
|--|-----------------------|-----------------------|---------------------|
| | 860 – 880 MHz | 902 – 928 MHz | 2.4 – 2.5 GHz |
| Operating Frequency | 860 – 880 MHz | 902 – 928 MHz | 2.4 – 2.5 GHz |
| Recommended Impedance of the customer Radio Module[Ω] | 50 Ω | 50 Ω | 50 Ω |
| VSWR - Typical | <1.5:1 | <1.5:1 | <2.5:1 |
| Peak Gain [dBi] (Typical) | 3.5 dBi @ Horizon | 2.5 – 3 dBi @ Horizon | 3 – 4 dBi @ Horizon |
| Efficiency [%] (Typical) | ~ 80% | ~ 80% | ~ 70% |
| Polarization | Linear | | |
| Pattern | True-Omni Directional | | |
| Accepted Power [W] (Max) | 2 Watts | | |
| Lightning Protection | DC ground | | |