

# Annex: Product Specification of Equipment Under Test

| Product Specification   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| Brand Name              | NOKIA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Model Name              | TA-1028                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| GSM Operating Band(s)   | GSM 850/1900 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| GPRS Multi-Slot Class   | GPRS Class 12, EGPRS Class 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| WCDMA Operating Band(s) | FDD Band 2 / 4 / 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| WCDMA Release, Category | HSDPA Rel. 8, Cat. 24 / HSUPA Rel. 6, Cat. 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| LTE Operating Band(s)   | FDD Band 2, Bandwidth: 1.4 M/3 M/5 M/10 M/15 M/20 M<br>FDD Band 4, Bandwidth: 1.4 M/3 M/5 M/10 M/15 M/20 M<br>FDD Band 7, Bandwidth: 5 M/10 M/15 M/20 M<br>FDD Band 12, Bandwidth: 1.4 M/3 M/5 M/10 M<br>FDD Band 17, Bandwidth: 5 M/10 M<br>TDD Band 38, Bandwidth: 5 M/10 M/15 M/20 M                                                                                                                                                                                                                                                                                                                                             |
| LTE Release, Category   | Rel. 9, Cat. 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Wi-Fi Specification     | 802.11b/g/n HT20<br>802.11a/n HT20/HT40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Bluetooth Version       | Bluetooth BR/EDR/LE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| NFC                     | Type A/B/F                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Antenna Type / Gain     | <b>GSM: IFA Antenna</b><br>GSM 850: -0.63 dBi<br>GSM 1900: 3.04 dBi<br><b>WCDMA: IFA Antenna</b><br>FDD Band 2: 3.04 dBi<br>FDD Band 4: 2.65 dBi<br>FDD Band 5: -0.63 dBi<br><b>LTE: IFA Antenna</b><br>FDD Band 2: 3.04 dBi<br>FDD Band 4: 2.65 dBi<br>FDD Band 7: 1.90 dBi<br>FDD Band 12: -1.14 dBi<br>FDD Band 17: -0.18 dBi<br>TDD Band 38: 1.22 dBi<br><b>WLAN: Loop Antenna</b><br>2400~2483.5MHz: 0.75 dBi<br>5150~5250MHz: -2.10 dBi<br>5250~5350MHz: -2.10 dBi<br>5470~5725MHz: -2.30 dBi<br>5725~5850MHz: -2.30 dBi<br><b>Bluetooth: Loop Antenna</b> / 0.75 dBi<br><b>GPS: Loop Antenna</b><br><b>NFC: Loop Antenna</b> |
| Type of Modulation      | GSM / GPRS: GMSK<br>EGPRS: GMSK for MCS 0 ~ 4 & 8PSK for MCS5 ~9<br>WCDMA: QPSK (Uplink)<br>HSDPA: 64QAM (Downlink) / HSUPA : QPSK (Uplink)<br>LTE: QPSK / 16QAM<br>Bluetooth: GFSK, $\pi/4$ -DQPSK, 8-DPSK<br>WLAN 802.11b: DSSS (DBPSK / DQPSK / CCK)<br>WLAN 802.11a/g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM)<br>GPS: BPSK<br>NFC : ASK                                                                                                                                                                                                                                                                                           |

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| <b>Transmitter Frequency Range</b> | GSM850: 824.2 MHz ~ 848.8 MHz<br>GSM1900: 1850.2 MHz ~ 1909.8 MHz<br>WCDMA Band 2: 1852.4 MHz ~ 1907.6 MHz<br>WCDMA Band 4: 1712.4 MHz ~ 1752.6 MHz<br>WCDMA Band 5: 826.4 MHz ~ 846.6 MHz<br>LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz<br>LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz<br>LTE Band 7 : 2502.5 MHz ~ 2567.5 MHz<br>LTE Band 12 : 699.7 MHz ~ 715.3 MHz<br>LTE Band 17 : 706.5 MHz ~ 713.5 MHz<br>LTE Band 38 : 2572.5 MHz ~ 2617.5 MHz<br>WLAN 802.11b/g/n: 2412 MHz ~ 2462 MHz<br>WLAN 802.11a/n: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz;<br>5500 MHz ~ 5700 MHz; 5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 MHz<br>NFC : 13.56 MHz                     |
| <b>Receiver Frequency Range</b>    | GSM850: 869.2 MHz ~ 893.8 MHz<br>GSM1900: 1930.2 MHz ~ 1989.8 MHz<br>WCDMA Band 2: 1932.4 MHz ~ 1987.6 MHz<br>WCDMA Band 4: 2112.4 MHz ~ 2152.6 MHz<br>WCDMA Band 5: 871.4 MHz ~ 891.6 MHz<br>LTE Band 2 : 1930.7 MHz ~ 1989.3 MHz<br>LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz<br>LTE Band 7 : 2622.5 MHz ~ 2687.5 MHz<br>LTE Band 12 : 729.7 MHz ~ 745.3 MHz<br>LTE Band 17 : 736.5 MHz ~ 743.5 MHz<br>LTE Band 38 : 2572.5 MHz ~ 2617.5 MHz<br>WLAN 802.11b/g/n: 2412 MHz ~ 2462 MHz<br>WLAN 802.11a/n: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz;<br>5500 MHz ~ 5700 MHz; 5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 MHz<br>GPS: 1.57542 GHz<br>NFC : 13.56 MHz |

Note: The WLAN operation in 5600 MHz ~ 5650 MHz is notched.