

Table C2. SUMMARY OF 406MHz BEACON TEST RESULTS

| PARAMETERS TO BE MEASURED DURING TESTS | RANGE OF SPECIFICATION | UNITS     | TEST RESULTS                  |                               |                               | COMMENTS       |
|----------------------------------------|------------------------|-----------|-------------------------------|-------------------------------|-------------------------------|----------------|
|                                        |                        |           | T <sub>min</sub><br>(-20 ° C) | T <sub>amb</sub><br>( 20 ° C) | T <sub>max</sub><br>( 55 ° C) |                |
| 1. POWER OUTPUT                        |                        |           |                               |                               |                               |                |
| • Transmitter power output             | 35 - 39                | dBm       | 36.09                         | 36.12                         | 36.20                         |                |
| • power output rise time               | <5                     | ms        | 0.15                          | 0.15                          | 0.15                          |                |
| • power output 1 ms before burst       | must be <-10 dBm       | ✓         | ✓                             | ✓                             | ✓                             |                |
| 2. DIGITAL MESSAGE                     |                        |           |                               |                               |                               |                |
| • bit sync                             | 15 bits "1"            | ✓         | ✓                             | ✓                             | ✓                             |                |
| • frame sync                           | 9 bits (000101111)     | ✓         | ✓                             | ✓                             | ✓                             |                |
| • format flag                          | 1 bit                  | data bit  | 1                             | 1                             | 1                             |                |
| • protocol flag                        | 1 bit                  | data bit  | 0                             | 0                             | 0                             |                |
| • Identification/position data         | 59 bits                | ✓         | ✓                             | ✓                             | ✓                             |                |
| • BCH code                             | 21 bits                | ✓         | ✓                             | ✓                             | ✓                             |                |
| • emerg. code/nat. use/supplem. data   | 6 bits                 | data bits | 110101                        | 110101                        | 110101                        |                |
| • additional data/BCH (if applicable)  | 32 bits                | ✓         | ✓                             | ✓                             | ✓                             | External GPS   |
| • position error (if applicable)       | < 5                    | km        | N/A                           | N/A                           | N/A                           | RCVR dependent |

| PARAMETERS TO BE MEASURED DURING TESTS        | RANGE OF SPECIFICATION | UNITS     | TEST RESULTS           |                        |                        | COMMENTS |
|-----------------------------------------------|------------------------|-----------|------------------------|------------------------|------------------------|----------|
|                                               |                        |           | $T_{min}$<br>(-20 °C)  | $T_{amb}$<br>(20 °C)   | $T_{max}$<br>(55 °C)   |          |
| 3. DIGITAL MESSAGE GENERATOR                  |                        |           |                        |                        |                        |          |
| • repetition rate**:<br>minimum $T_R$         | 47.5                   | seconds   | 48.3                   | 48.5                   | 48.3                   |          |
| • maximum $T_R$                               | 52.5                   | seconds   | 51.7                   | 51.4                   | 51.8                   |          |
| • bit rate:<br>minimum $f_b$                  | 396                    | bits/sec. | 399.4                  | 399.4                  | 399.4                  |          |
| • maximum $f_b$                               | 404                    | bits/sec. | 399.5                  | 399.5                  | 399.5                  |          |
| • total transmission time:<br>short message = | 435.6 – 444.4          | ms        | N/A                    | N/A                    | N/A                    |          |
| • long message (optional) =                   | 514.8 – 525.2          | ms        | 520.9 min<br>520.9 max | 521.0 min<br>521.1 max | 521.2 min<br>521.2 max |          |
| • unmodulated carrier<br>minimum $T_1$        | 158.4                  | ms        | 159.1                  | 159.2                  | 159.3                  |          |
| • maximum $T_1$                               | 161.6                  | ms        | 159.1                  | 159.2                  | 159.3                  |          |
| • first burst delay                           | >47.5                  | seconds   | 64.0                   | 66.0                   | 66.0                   |          |

| PARAMETERS TO BE MEASURED DURING TESTS     | RANGE OF SPECIFICATION                        | UNITS   | TEST RESULTS                 |                             |                             | COMMENTS |
|--------------------------------------------|-----------------------------------------------|---------|------------------------------|-----------------------------|-----------------------------|----------|
|                                            |                                               |         | T <sub>min</sub><br>(-20 °C) | T <sub>amb</sub><br>(20 °C) | T <sub>max</sub><br>(55 °C) |          |
| 4. MODULATION                              |                                               |         |                              |                             |                             |          |
| • Biphase-L                                |                                               | ✓       | ✓                            | ✓                           | ✓                           |          |
| • rise time                                | 50 – 250                                      | μs      | 128.2                        | 127.6                       | 136.3                       |          |
| • fall time                                | 50 – 250                                      | μs      | 123.8                        | 123.8                       | 124.5                       |          |
| • phase deviation: positive                | +(1.0 to 1.2)                                 | radians | 1.04                         | 1.16                        | 1.12                        |          |
| • phase deviation: negative                | -(1.0 to 1.2)                                 | radians | -1.12                        | -1.18                       | -1.16                       |          |
| • symmetry measurement                     | ≤0.05                                         | ✓       | ✓                            | ✓                           | ✓                           |          |
| 5. 406 MHz TRANSMITTED FREQUENCY           |                                               |         |                              |                             |                             |          |
| • nominal value                            | 406.023 – 406.027 or<br>406.027 – 406.029***) | MHz     | 406.025211                   | 406.025213                  | 406.025295                  |          |
| • short-term stability                     | ≤2 x 10 <sup>-9</sup>                         | /100ms  | 2.4 x 10 <sup>-10</sup>      | 1.97 x 10 <sup>-10</sup>    | 1.35 x 10 <sup>-10</sup>    |          |
| • medium-term stability<br>- slope         | (-1 to +1) x 10 <sup>-9</sup>                 | /minute | -2.6 x 10 <sup>-11</sup>     | -9.18 x 10 <sup>-11</sup>   | -1.18 x 10 <sup>-10</sup>   |          |
| - residual frequency variation             | ≤3 x 10 <sup>-9</sup>                         |         | 3.5 x 10 <sup>-10</sup>      | 5.27 x 10 <sup>-10</sup>    | 2.53 x 10 <sup>-10</sup>    |          |
| 6. SPURIOUS EMISSIONS***<br>(into 50 ohms) |                                               |         |                              |                             |                             |          |
| • in-band (406.0 – 406.1 MHz)              | see spurious emission<br>mask in C/S T.001    | ✓       | ✓                            | ✓                           | ✓                           |          |

| PARAMETERS TO BE MEASURED DURING TESTS                                                          | RANGE OF SPECIFICATION                        | UNITS   | TEST RESULTS                 |                             |                             | COMMENTS |
|-------------------------------------------------------------------------------------------------|-----------------------------------------------|---------|------------------------------|-----------------------------|-----------------------------|----------|
|                                                                                                 |                                               |         | T <sub>min</sub><br>(-20 °C) | T <sub>amb</sub><br>(20 °C) | T <sub>max</sub><br>(55 °C) |          |
| 7. 406 MHz VSWR CHECK<br>after open circuit, short circuit, then<br>while VSWR is 3:1, measure: |                                               |         |                              |                             |                             |          |
| • nominal transmitted frequency                                                                 | 406.023 – 406.027 or<br>406.027 – 406.029***) | MHz     | 406.025211                   | 406.025214                  | 406.025295                  |          |
| Modulation:                                                                                     |                                               |         |                              |                             |                             |          |
| • rise time                                                                                     | 50 – 250                                      | μs      | 128.2                        | 130.2                       | 136.3                       |          |
| • fall time                                                                                     | 50 – 250                                      | μs      | 123.8                        | 122.5                       | 124.5                       |          |
| • phase deviation: positive                                                                     | ±(1.0 to 1.2)                                 | radians | 1.04                         | 1.16                        | 1.12                        |          |
| • phase deviation: negative                                                                     | -(1.0 to 1.2)                                 | radians | -1.12                        | -1.18                       | -1.16                       |          |
| • symmetry measurement                                                                          | ≤0.05                                         | ✓       | ✓                            | ✓                           | ✓                           |          |
| • digital message                                                                               | must be correct                               | ✓       | ✓                            | ✓                           | ✓                           |          |

| PARAMETERS TO BE MEASURED DURING TESTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RANGE OF SPECIFICATION                                                                                                                                                               | UNITS                                                       | TEST RESULTS                                                                                                                                                 | COMMENTS                                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| <p>8. SELF-TEST MODE (if applicable)</p> <ul style="list-style-type: none"> <li>frame sync</li> <li>format flag</li> <li>single radiated burst</li> <li>default position data (if applicable)</li> <li>description provided</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                               | <p>9 bits (011010000)</p> <p>1/0</p> <p>≤440/520 (+1%)</p> <p>must be correct</p>                                                                                                    | <p>✓</p> <p>bit</p> <p>ms</p> <p>✓</p> <p>✓</p>             | <p>✓</p> <p>1</p> <p>441.0</p> <p>✓</p> <p>✓</p>                                                                                                             |                                                                  |
| <p>9. THERMAL SHOCK **** (30° C change)</p> <ul style="list-style-type: none"> <li>Soak temperature</li> <li>Measurement temperature</li> </ul> <p>The following parameters are to be met within 15 minutes of beacon turn on and maintained for 2 hours:</p> <ul style="list-style-type: none"> <li>transmitted frequency: <ul style="list-style-type: none"> <li>nominal value</li> <li>short-term stability:</li> <li>medium-term stability: <ul style="list-style-type: none"> <li>- slope</li> <li>- residual frequency variation</li> </ul> </li> <li>transmitter power output</li> <li>digital message</li> </ul> </li> </ul> | <p>406.023 – 406.027 or 406.027 – 406.029****)</p> <p>≤2 x 10<sup>-9</sup></p> <p>(-1 to +1) x 10<sup>-9</sup></p> <p>≤3 x 10<sup>-9</sup></p> <p>35 - 39</p> <p>must be correct</p> | <p>MHz</p> <p>/100ms</p> <p>/minute</p> <p>dBm</p> <p>✓</p> | <p>406.025230</p> <p>2.5 x 10<sup>-10</sup></p> <p>-1.0 x 10<sup>-10</sup> to 2.0 x 10<sup>-10</sup></p> <p>4.0 x 10<sup>-10</sup></p> <p>36.09</p> <p>✓</p> | <p>T<sub>soak</sub> = -20 °C</p> <p>T<sub>meas</sub> = 10 °C</p> |

| PARAMETERS TO BE MEASURED DURING TESTS                                                                                                                                                                                                                                                                                                                                                                                                                                                   | RANGE OF SPECIFICATION                                                                                                                                                              | UNITS                                             | TEST RESULTS                                                                                                                                                                     | COMMENTS |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 10. OPERATING LIFETIME AT MINIMUM TEMPERATURE**** <ul style="list-style-type: none"> <li>• duration</li> <li>• transmitted frequency:               <ul style="list-style-type: none"> <li>• nominal value</li> <li>• short-term stability:</li> <li>• medium-term stability:                   <ul style="list-style-type: none"> <li>- slope</li> <li>- residual frequency variation</li> </ul> </li> <li>• transmitter power output</li> <li>• digital message</li> </ul> </li> </ul> | >24<br><br>406.023 – 406.027 or<br>406.027 – 406.029***<br>$\leq 2 \times 10^{-9}$<br>$(-1 \text{ to } +1) \times 10^{-9}$<br>$\leq 3 \times 10^{-9}$<br>35 - 39<br>must be correct | hours<br><br>MHz<br>/100ms<br>/minute<br>dBm<br>✓ | 24 hours at $T_{min} = -20^{\circ}\text{C}$<br><br>406.025240<br>$3.0 \times 10^{-10}$<br>$-1.0 \times 10^{-10}$ to $2.0 \times 10^{-10}$<br>$7.0 \times 10^{-10}$<br>36.61<br>✓ |          |
| 11. TEMPERATURE GRADIENT****<br>(5° C/hr) <ul style="list-style-type: none"> <li>• transmitted frequency:               <ul style="list-style-type: none"> <li>• nominal value</li> <li>• short-term stability:</li> <li>• medium-term stability:                   <ul style="list-style-type: none"> <li>- slope</li> <li>- residual frequency variation</li> </ul> </li> <li>• transmitter power output</li> <li>• digital message</li> </ul> </li> </ul>                             | 406.023 – 406.027 or<br>406.027 – 406.029***<br>$\leq 2 \times 10^{-9}$<br>$(-1 \text{ to } +1) \times 10^{-9}$<br>$\leq 3 \times 10^{-9}$<br>35 - 39<br>must be correct            | MHz<br>/100ms<br>/minute<br>dBm<br>✓              | 406.025220<br>$3.2 \times 10^{-10}$<br>$-3.0 \times 10^{-10}$ to $8.0 \times 10^{-10}$<br>$1.5 \times 10^{-9}$<br>36.02 to 36.43<br>✓                                            |          |

| PARAMETERS TO BE MEASURED DURING TESTS                                                   | RANGE OF SPECIFICATION                     | UNITS   | TEST RESULTS | COMMENTS                     |
|------------------------------------------------------------------------------------------|--------------------------------------------|---------|--------------|------------------------------|
| 12. LONG-TERM FREQUENCY STABILITY                                                        | 406.20 – 406.030 or<br>406.23 – 406.30***) | MHz     | ✓            | See TAB E of original packet |
| • data provided                                                                          |                                            | ✓       |              |                              |
| 13. PROTECTION AGAINST CONTINUOUS TRANSMISSION                                           | ≤45                                        | seconds | ✓            | See TAB E of original packet |
| • description provided                                                                   |                                            | ✓       |              |                              |
| 14. SATELLITE QUALITATIVE TESTS****                                                      | successfully located by satellites/LUT     | ✓       | ✓            |                              |
| • results provided                                                                       |                                            | ✓       |              |                              |
| 15. ANTENNA CHARACTERISTICS                                                              | linear or RHCP                             | ✓       | ✓            |                              |
| • polarization                                                                           | ≤ 1.5                                      | ✓       | N/A          |                              |
| • VSWR                                                                                   | ≤ 20                                       | watts   | 4.498        |                              |
| • ERP <sub>max</sub> EOL                                                                 | ≥ 1.6                                      | watts   | 1.074        |                              |
| • ERP <sub>min</sub> EOL                                                                 | ≤ 3                                        | dB      | 2.17         |                              |
| • azimuth gain variation at 40° elevation angle                                          |                                            |         |              |                              |
| 16. BEACON CODING SOFTWARE                                                               | must be correct (attach to report)         | ✓       | ✓            |                              |
| • sample message provided for each coding option of the applicable coding protocol types | must be correct (attach to report)         | ✓       | ✓            |                              |
| • sample message provided, if applicable, with encoded positions at least 5 km apart     |                                            |         |              |                              |

