

DHUM-E997 User Manual

● **Revision History**

| Version | Change history | Date |
|---------|-----------------|-----------|
| V1.0 | Initial version | 2018/6/11 |

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1. Product Introduction

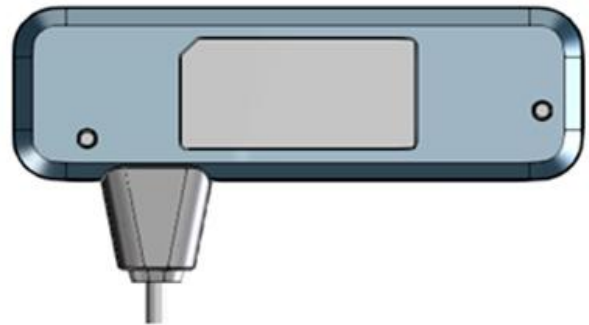
DHUM-E997 is an 802.11 a/b/g/n/ac WLAN/Bluetooth 4.2 LE combo module based on Marvell 88W8997 chipset solution.

1-1. Features

- IEEE802.11n a/b/g/n/ac with data rates from MCS0-15 in 20MHz/40MHz/80MHz channels
- Bluetooth BDR/EDR/LE (Low Energy), Class I
- Wireless LAN/Bluetooth coexistence (BCA) protocol support
- Power-down control
- Wake on Bluetooth
- Low power consumption

1-2. Interfaces and Power supply

- Wireless LAN / Bluetooth RF interface
- 5V input supply voltage requested for analog/digital/RF
- Type A USB connector



1-3. Operation method

Plug the USB connector into customer's TV USB port and start to use.

2. Product Photo

Top Side

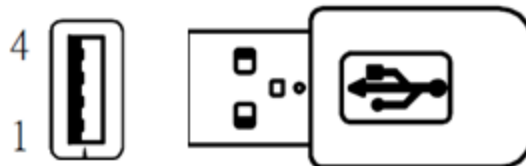


Bottom Side



3. Pin Assignment

| Pin | Pin Define | Description |
|-----|------------|------------------------------------|
| 1 | +5V_IN | 5V Power Supply |
| 2 | USB_DM | USB Serial Different Data-Negative |
| 3 | USB_DP | USB Serial Different Data-Positive |
| 4 | GND | Ground |



4. Product Specification

4-1. Absolute Maximum Ratings

| Symbol (Board level) | Description | Max. | Units |
|-------------------------|------------------------------------|------|-------|
| 5V | 5V Power Supply | 5.5 | V |
| USB_DM | USB Serial Different Data-Negative | 3.63 | V |
| USB_DP | USB Serial Different Data-Positive | 3.63 | V |

4-2. Recommended Operating Conditions

| Symbol (Board level) | Description | Min. | Typ. | Max. | Units |
|-------------------------|------------------------------------|------|------|------|-------|
| 5V | 5V Power Supply | 4.5 | 5 | 5.5 | V |
| USB_DM | USB Serial Different Data-Negative | GND | GND | GND | V |
| USB_DP | USB Serial Different Data-Positive | 0.54 | 0.6 | 0.66 | V |

4-3. WIFI Portion

| Item | Key specifications |
|--------------------------|---|
| Main chipset | Marvell 88W8997 |
| TX/RX | 2T2R |
| Frequency range | 2.412 ~ 2.462GHz, 5.15GHz ~ 5.35GHz, 5.47GHz ~ 5.85GHz |
| Modulation technique | <ul style="list-style-type: none"> ➤ 802.11 a/b/g DSSS (DBPSK, DQPSK, CCK) OFDM (BPSK, QPSK, 16-QAM, 64-QAM) DSSS (Direct Sequence Spread Spectrum) with DBPSK (Differential Binary Phase Shift Keying 1Mbps), DQPSK (Differential Quaternary Phase Shift Keying 2Mbps), and CCK (Complementary Code Keying 5.5&11Mbps), and OFDM (Orthogonal Frequency Division Multiplexing with BPSK for 6,9Mbps、QPSK for 12,18Mbps、 16QAM for 24,36Mbps、64QAM for 48,54Mbps) ➤ 802.11n a/g OFDM (BPSK, QPSK, 16-QAM, 64-QAM) ➤ 802.11 ac OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM) |
| Host interface | ➤ USB 2.0 |
| Power consumption @25 °C | |

| | | Description | AVG | MAX | Units |
|--|-------|--------------------|-----|-----|-------|
| | | Driver Disabled | 25 | 25 | mA |
| | | Idle(unassociated) | 0 | 2 | mA |
| | | Idle(associated) | 7 | 60 | mA |
| | | | | | |
| | 11AC | NSS2 MCS9 TX | 400 | 450 | mA |
| | | NSS2 MCS9 RX | 190 | 230 | mA |
| | | NSS2 MCS0 TX | 450 | 500 | mA |
| | | NSS2 MCS0 RX | 250 | 280 | mA |
| | 11AGN | 11AN MCS15 TX | 270 | 300 | mA |
| | | 11AN MCS15 RX | 170 | 190 | mA |
| | | 11GN MCS15 TX | 400 | 450 | mA |
| | | 11GN MCS15 RX | 130 | 150 | mA |
| | | 11AN MCS7 TX | 260 | 300 | mA |
| | | 11AN MCS7 RX | 170 | 190 | mA |
| | | 11GN MCS7 TX | 400 | 450 | mA |
| 11GN MCS7 RX | | 130 | 150 | mA | |
| <p>※The maximum current consumption would be impacted by radiation environment and the driver mechanism.</p> <p>※This spec is reference spec, if system can't keep this spec, customer needs to measure by themselves.</p> | | | | | |

| | | | | | | | | | |
|---|-------------------|-------------|------------|-----------|-----------|-----------|-----------|----------|----------|
| Output power (for each chain; tolerance +1.5/-1.5 dB) | ➤ 802.11a | | | | | | | | |
| | Test Frequencies | 6-12_Target | 18_Target | 24_Target | 36_Target | 48_Target | 54_Target | | |
| | 5180 | 14 | 14 | 14 | 14 | 14 | 14 | | |
| | 5320 | 14 | 14 | 14 | 14 | 14 | 14 | | |
| | 5500 | 14 | 14 | 14 | 14 | 14 | 14 | | |
| | 5600 | 14 | 14 | 14 | 14 | 14 | 14 | | |
| | 5700 | 14 | 14 | 14 | 14 | 14 | 14 | | |
| | 5825 | 14 | 14 | 14 | 14 | 14 | 14 | | |
| | ➤ 802.11b | | | | | | | | |
| | Test Frequencies | 1/2_Target | 5.5_Target | 11_Target | | | | | |
| | 2412 | 15 | 15 | 15 | | | | | |
| | 2472 | 15 | 15 | 15 | | | | | |
| | 2484 | 15 | 15 | 15 | | | | | |
| | ➤ 802.11g | | | | | | | | |
| | Test Frequencies | 6-12_Target | 18_Target | 24_Target | 36_Target | 48_Target | 54_Target | | |
| | 2412 | 14 | 14 | 14 | 14 | 14 | 14 | | |
| | 2442 | 14 | 14 | 14 | 14 | 14 | 14 | | |
| | 2472 | 14 | 14 | 14 | 14 | 14 | 14 | | |
| | ➤ 802.11n | | | | | | | | |
| | Freq. Range: HT20 | | | | | | | | |
| | Test Freq | MCS 0/8 | MCS 1/9 | MCS 2/10 | MCS 3/11 | MCS 4/12 | MCS 5/13 | MCS 6/14 | MCS 7/15 |
| | 5180 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| | 5240 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| | 5320 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| | 5500 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| | 5700 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| | 5745 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| | 5825 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| | Freq. Range: HT40 | | | | | | | | |
| | Test Freq | MCS 0/8 | MCS 1/9 | MCS 2/10 | MCS 3/11 | MCS 4/12 | MCS 5/13 | MCS 6/14 | MCS 7/15 |
| | 5190 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | 5230 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | 5270 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | 5510 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | 5670 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | 5755 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | 5795 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Freq. Range: HT20 | | | | | | | | |
| | Test Freq | MCS 0/8 | MCS 1/9 | MCS 2/10 | MCS 3/11 | MCS 4/12 | MCS 5/13 | MCS 6/14 | MCS 7/15 |
| | 2412 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| | 2437 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| | 2472 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| | Freq. Range: HT40 | | | | | | | | |
| | Test Freq | MCS 0/8 | MCS 1/9 | MCS 2/10 | MCS 3/11 | MCS 4/12 | MCS 5/13 | MCS 6/14 | MCS 7/15 |
| | 2412 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| 2437 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | |
| 2472 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | |
| ➤ 802.11ac | | | | | | | | | |
| Freq. Range: VHT20 | | | | | | | | | |
| Test Freq | MCS 0 | MCS 1 | MCS 2 | MCS 3 | MCS 4 | MCS 5 | MCS 6 | MCS 7 | MCS 8 |
| 5180 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| 5240 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |

| | | | | | | | | | | | | |
|-------------|--------------------|--------------------------|---------------|-----------|-----------|---------------------|---------------------|-------------------|-------------------|-------|-------|--|
| | 5320 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | | |
| | 5500 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | | |
| | 5700 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | | |
| | 5745 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | | |
| | 5825 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | | |
| | Freq. Range: VHT40 | | | | | | | | | | | |
| | Test Freq | MCS 0 | MCS 1 | MCS 2 | MCS 3 | MCS 4 | MCS 5 | MCS 6 | MCS 7 | MCS 8 | MCS 9 | |
| | 5210 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| | 5290 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| | 5530 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| | 5610 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| | 5690 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| | 5775 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| | Freq. Range: VHT80 | | | | | | | | | | | |
| | Test Freq | MCS 0 | MCS 1 | MCS 2 | MCS 3 | MCS 4 | MCS 5 | MCS 6 | MCS 7 | MCS 8 | MCS 9 | |
| | 5210 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | |
| | 5290 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | |
| | 5530 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | |
| | 5610 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | |
| | 5690 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | |
| | 5775 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | |
| Sensitivity | ➤ 802.11a | | | | | | | | | | | |
| | | Modulation | | Code Rate | | IEEE Spec (1Rx dBm) | | Typical (1Rx dBm) | | | | |
| | | BPSK | | 1/2 | | -82 | | -89 | | | | |
| | | BPSK | | 3/4 | | -81 | | -88 | | | | |
| | | QPSK | | 1/2 | | -79 | | -87 | | | | |
| | | QPSK | | 3/4 | | -77 | | -85 | | | | |
| | | 16-QAM | | 1/2 | | -74 | | -82 | | | | |
| | | 16-QAM | | 3/4 | | -70 | | -78 | | | | |
| | | 64-QAM | | 2/3 | | -66 | | -74 | | | | |
| | | 64-QAM | | 3/4 | | -65 | | -72 | | | | |
| | | ➤ 802.11b | | | | | | | | | | |
| | | | Modulation | | Code Rate | | IEEE Spec (1Rx dBm) | | Typical (1Rx dBm) | | | |
| | | | DBPSK | | | | not specified | | -97 | | | |
| | | | DQPSK | | | | not specified | | -93 | | | |
| | | | CCK | | | | not specified | | -89 | | | |
| | | ➤ 802.11g | | | | | | | | | | |
| | | | Modulation | | Code Rate | | IEEE Spec (1Rx dBm) | | Typical (1Rx dBm) | | | |
| | | | BPSK | | 1/2 | | -82 | | -89 | | | |
| | | | BPSK | | 3/4 | | -81 | | -88 | | | |
| | | | QPSK | | 1/2 | | -79 | | -86 | | | |
| | | | QPSK | | 3/4 | | -77 | | -84 | | | |
| | | | 16-QAM | | 1/2 | | -74 | | -81 | | | |
| | | | 16-QAM | | 3/4 | | -70 | | -78 | | | |
| | | | 64-QAM | | 2/3 | | -66 | | -74 | | | |
| | | | 64-QAM | | 3/4 | | -65 | | -73 | | | |
| | | ➤ 802.11ng (HT20) | | | | | | | | | | |
| | | | Modulation | | Code Rate | | IEEE Spec (1Rx dBm) | | Typical (1Rx dBm) | | | |
| | | | (MCS0) BPSK | | 1/2 | | -82 | | -90 | | | |
| | | | (MCS1) QPSK | | 1/2 | | -79 | | -87 | | | |
| | | | (MCS2) QPSK | | 3/4 | | -77 | | -85 | | | |
| | | | (MCS3) 16-QAM | | 1/2 | | -74 | | -82 | | | |
| | | | (MCS4) 16-QAM | | 3/4 | | -70 | | -80 | | | |
| | | (MCS5) 64-QAM | | 2/3 | | -66 | | -75 | | | | |

| | | | | |
|----------------------------|---|-----------|---------------------|-------------------|
| | (MCS6) 64-QAM | 3/4 | -65 | -73 |
| | (MCS7) 64-QAM | 5/6 | -64 | -70 |
| | (HT40) | | | |
| | Modulation | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
| | (MCS0) BPSK | 1/2 | -79 | -88 |
| | (MCS1) QPSK | 1/2 | -76 | -86 |
| | (MCS2) QPSK | 3/4 | -74 | -84 |
| | (MCS3) 16-QAM | 1/2 | -71 | -81 |
| | (MCS4) 16-QAM | 3/4 | -67 | -78 |
| | (MCS5) 64-QAM | 2/3 | -63 | -74 |
| | (MCS6) 64-QAM | 3/4 | -62 | -70 |
| | (MCS7) 64-QAM | 5/6 | -61 | -68 |
| | > 802.11na (HT20) | | | |
| | Modulation | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
| | (MCS0) BPSK | 1/2 | -82 | -89 |
| | (MCS1) QPSK | 1/2 | -79 | -86 |
| | (MCS2) QPSK | 3/4 | -77 | -84 |
| | (MCS3) 16-QAM | 1/2 | -74 | -82 |
| | (MCS4) 16-QAM | 3/4 | -70 | -79 |
| | (MCS5) 64-QAM | 2/3 | -66 | -74 |
| | (MCS6) 64-QAM | 3/4 | -65 | -73 |
| | (MCS7) 64-QAM | 5/6 | -64 | -70 |
| | (HT40) | | | |
| | Modulation | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
| | (MCS0) BPSK | 1/2 | -79 | -86 |
| | (MCS1) QPSK | 1/2 | -76 | -84 |
| | (MCS2) QPSK | 3/4 | -74 | -82 |
| | (MCS3) 16-QAM | 1/2 | -71 | -80 |
| | (MCS4) 16-QAM | 3/4 | -67 | -77 |
| | (MCS5) 64-QAM | 2/3 | -63 | -72 |
| | (MCS6) 64-QAM | 3/4 | -62 | -71 |
| | (MCS7) 64-QAM | 5/6 | -61 | -68 |
| | > 802.11ac (HT80) | | | |
| | Modulation | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
| | (MCS0) BPSK | 1/2 | -76 | -83 |
| | (MCS1) QPSK | 1/2 | -73 | -80 |
| | (MCS2) QPSK | 3/4 | -71 | -78 |
| | (MCS3) 16-QAM | 1/2 | -68 | -75 |
| | (MCS4) 16-QAM | 3/4 | -64 | -72 |
| | (MCS5) 64-QAM | 2/3 | -60 | -71 |
| | (MCS6) 64-QAM | 3/4 | -59 | -64 |
| | (MCS7) 64-QAM | 5/6 | -58 | -64 |
| | (MCS8) 256-QAM | 3/4 | -53 | -61 |
| | (MCS9) 256-QAM | 5/6 | -51 | -59 |
| Transmit spectrum mask | For transmitted spectral mask for 11b shall be less than -50dBm for $22\text{MHz} < f < fc + 22\text{MHz}$. For transmitted spectral mask for 11g shall be less than -40dBm for $fc - 30\text{MHz} < f < fc + 30\text{MHz}$. For transmitted spectral mask for 11n 20MHz shall be less than -45dBm for $fc - 30\text{MHz} < f < fc + 30\text{MHz}$. For transmitted spectral mask for 11n 40MHz shall be less than -45dBm for $fc - 60\text{MHz} < f < fc + 60\text{MHz}$. | | | |
| Transmit spectrum flatness | For 802.11g the average energy of the constellations in each of spectral lines -16..-1 and +1..+16 will deviate no more than +/- 2dB from their average energy. For 802.11n 40MHz mode, the average energy of the constellations in each of spectral lines -42..-2 and +2..+42 will deviate no more than +/- 2dB from their average energy. The transmitted spectral flatness should be within +/- 4dB. | | | |

| | |
|---|---|
| Transmit center frequency tolerance | The transmitted center frequency tolerance shall be ± 20 ppm maximum. |
| Carrier suppression | <p>802.11a: The leakage of the center frequency component shall not exceed -15 dB relative to overall transmitted power or, equivalently, +2 dB relative to the average energy of the rest of the sub-carriers.</p> <p>802.11b: The RF carrier suppression, measured at the channel center frequency, shall be at least 15 dB below the peak SIN(x)/x power spectrum.</p> <p>802.11g: The leakage of the center frequency component shall not exceed -15 dB relative to overall transmitted power or, equivalently, +2 dB relative to the average energy of the rest of the sub-carriers.</p> <p>802.11n: For all 20 MHz modes of transmission The leakage of the center frequency component shall not exceed -15 dB relative to overall transmitted power or, equivalently, +2 dB relative to the average energy of the rest of the sub-carriers. For all 40 MHz modes of transmission The center frequency leakage shall not exceed -18 dB relative to overall transmitted power, or, equivalently, +2 dB relative to the average energy of the rest of the sub-carriers.</p> |
| Transmit power on ramp and power down ramp time | <ul style="list-style-type: none"> ➤ The transmitting power-on ramp for 10% to 90% of maximum power m shall be no greater than 2 μs. ➤ The transmitting power-down ramp for 90% to 10% of maximum power shall be no greater than 2 μs. |
| Receiver maximum input level | <ul style="list-style-type: none"> ➤ 802.11a Modulation Code Rate IEEE Spec (1Rx dBm) >-30 ➤ 802.11b Modulation Code Rate IEEE Spec (1Rx dBm) DBPSK >-10 DQPSK >-10 CCK >-10 ➤ 802.11g Modulation Code Rate IEEE Spec (1Rx dBm) >-20 ➤ 802.11na Modulation Code Rate IEEE Spec (1Rx dBm) >-30 ➤ 802.11ng Modulation Code Rate IEEE Spec (1Rx dBm) >-20 ➤ 802.11ac Modulation Code Rate IEEE Spec (1Rx dBm) >-30 |
| PCB dimension | ➤ 51.45+/-0.15.mm x 40.00+/-0.15mm x 1.0+/-0.1mm 4L FR4 |
| Transfer data rate | <ul style="list-style-type: none"> ➤ 802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps ➤ 802.11b: 1, 2, 5.5, 11Mbps ➤ 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps ➤ 802.11n: @800GI(400GI) <ul style="list-style-type: none"> ● 20MHz BW <ul style="list-style-type: none"> ▪ 1 Nss: 65(72.2) Mbps maximal |

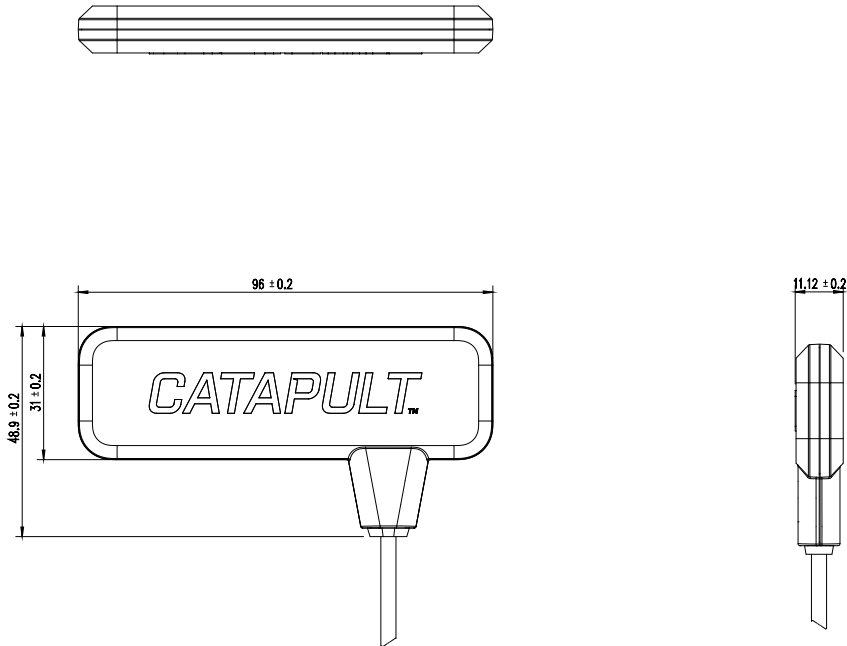
| | |
|-----------------------|---|
| | <ul style="list-style-type: none"> ▪ 2 Nss: 130(144.444) Mbps maximal ● 40MHz BW <ul style="list-style-type: none"> ▪ 1 Nss: 135(150) Mbps maximal ▪ 2 Nss: 270(300) Mbps maximal ➢ 802.11ac: @800GI(400GI) <ul style="list-style-type: none"> ● 80MHz BW <ul style="list-style-type: none"> ▪ 1 Nss: 390(433.3) Mbps maximal ▪ 2 Nss: 780(866.7) Mbps maximal |
| Security | WEP, WPA ,WPA2 ,AES, TKIP |
| Operation temperature | -10° ~ 60° C |
| Storage temperature | - 35° ~ 70° C ,R.H:90% (non-condensing) |
| Antenna | ➢ 2 PIFA printed ANTs |

4-4.BT Portion

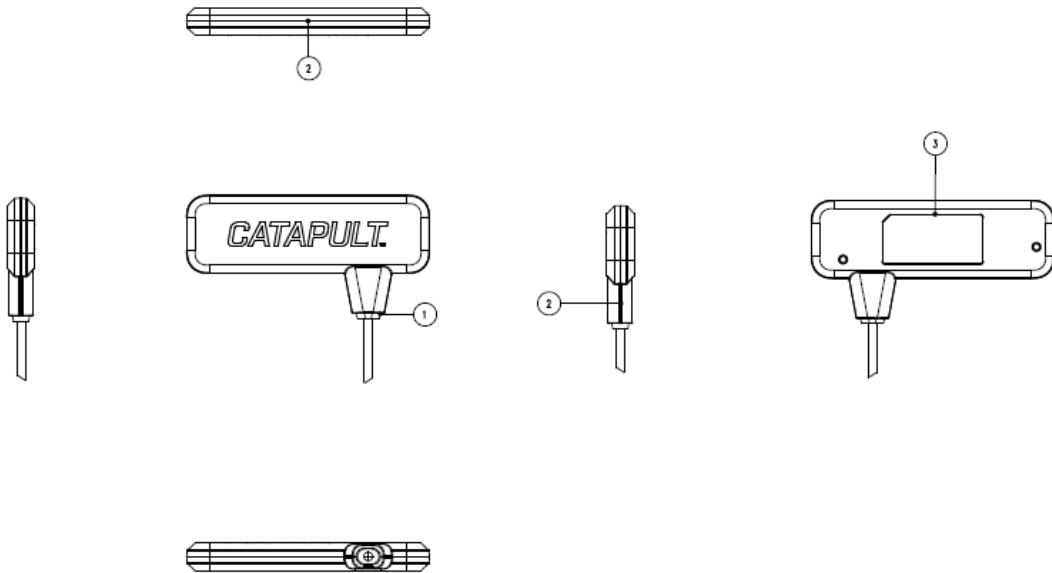
| Item | Key specifications | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|-------------|----------|----------|----------------------|----|----|-------------|----|----|--------------------------|----|----|-----------------|----|----|-----------------------------|----|----|-------------------------------|----|----|-------------------------------|----|----|
| Main chipset | ➢ Marvell 88W8997 | | | | | | | | | | | | | | | | | | | | | | | | |
| Compliance | ➢ Bluetooth 4.2 LE | | | | | | | | | | | | | | | | | | | | | | | | |
| Frequency range | ➢ 2400 ~ 2483.5MHz | | | | | | | | | | | | | | | | | | | | | | | | |
| Initial carrier frequency tolerance | ➢ +/- 40kHz (typical) | | | | | | | | | | | | | | | | | | | | | | | | |
| Modulation technique | ➢ Frequency hopping, 1600 hops/sec | | | | | | | | | | | | | | | | | | | | | | | | |
| Channel spacing | ➢ 1MHz | | | | | | | | | | | | | | | | | | | | | | | | |
| Channels support | ➢ 79 channels | | | | | | | | | | | | | | | | | | | | | | | | |
| Power consumption @25° C | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Description</th> <th>Avg (mA)</th> <th>Max (mA)</th> </tr> </thead> <tbody> <tr> <td>BLE Tx peak (@10dBm)</td> <td style="text-align: center;">43</td> <td style="text-align: center;">56</td> </tr> <tr> <td>BLE Rx peak</td> <td style="text-align: center;">29</td> <td style="text-align: center;">36</td> </tr> <tr> <td>SCO HV3 Tx peak (@10dBm)</td> <td style="text-align: center;">46</td> <td style="text-align: center;">57</td> </tr> <tr> <td>SCO HV3 Rx peak</td> <td style="text-align: center;">27</td> <td style="text-align: center;">36</td> </tr> <tr> <td>ACL DH1 average (data pump)</td> <td style="text-align: center;">24</td> <td style="text-align: center;">29</td> </tr> <tr> <td>ACL 2-DH3 average (data pump)</td> <td style="text-align: center;">27</td> <td style="text-align: center;">34</td> </tr> <tr> <td>ACL 3-DH5 average (data pump)</td> <td style="text-align: center;">29</td> <td style="text-align: center;">36</td> </tr> </tbody> </table> | Description | Avg (mA) | Max (mA) | BLE Tx peak (@10dBm) | 43 | 56 | BLE Rx peak | 29 | 36 | SCO HV3 Tx peak (@10dBm) | 46 | 57 | SCO HV3 Rx peak | 27 | 36 | ACL DH1 average (data pump) | 24 | 29 | ACL 2-DH3 average (data pump) | 27 | 34 | ACL 3-DH5 average (data pump) | 29 | 36 |
| | Description | Avg (mA) | Max (mA) | | | | | | | | | | | | | | | | | | | | | | |
| | BLE Tx peak (@10dBm) | 43 | 56 | | | | | | | | | | | | | | | | | | | | | | |
| | BLE Rx peak | 29 | 36 | | | | | | | | | | | | | | | | | | | | | | |
| | SCO HV3 Tx peak (@10dBm) | 46 | 57 | | | | | | | | | | | | | | | | | | | | | | |
| | SCO HV3 Rx peak | 27 | 36 | | | | | | | | | | | | | | | | | | | | | | |
| | ACL DH1 average (data pump) | 24 | 29 | | | | | | | | | | | | | | | | | | | | | | |
| | ACL 2-DH3 average (data pump) | 27 | 34 | | | | | | | | | | | | | | | | | | | | | | |
| | ACL 3-DH5 average (data pump) | 29 | 36 | | | | | | | | | | | | | | | | | | | | | | |
| Note : ※The maximum current consumption would be impacted by radiation environment and the driver mechanism. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Output power (dBm) | ➢ Output Power0~10dBm (Class I Device) | | | | | | | | | | | | | | | | | | | | | | | | |
| Sensitivity | ➢ -80 dBm (typ.) for pi/4-DQPSK, 0.1%BER | | | | | | | | | | | | | | | | | | | | | | | | |
| Operation temperature | ➢ -10° ~ 60° C | | | | | | | | | | | | | | | | | | | | | | | | |
| Storage temperature | ➢ -35° ~ 70° C , R.H. : 90% (non-condensing) | | | | | | | | | | | | | | | | | | | | | | | | |
| Antenna | ➢ PIFA printed ANT | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |

5. Product Outline

5-1.Outline Drawing



5-2.Gap Tolerance Definition



| Item | Gap | OFFSET | Notes |
|------|-----------|--------|------------------|
| 1 | 0 ± 0.1 | - | SR Cable、T/C、B/C |
| 2 | 0.2 ± 0.1 | - | T/C、B/C |
| 3 | 0.3 ± 0.2 | - | Label、B/C |

6. USB Cable Information

| | | | | |
|--------------|------------|---------------------|--------------------|---|
| CUSTOMER:260 | CUST. P/N: | 文件编号:WJ-EN-工程图-2186 | WJ P/N:WG260100072 | DRW NO:USB2.0 A公 to HSG -2186G SAMPLE NO.:SQ26017499-A |
|--------------|------------|---------------------|--------------------|---|

| NO | PART NO. | MATERIAL LIST | QTY | UNIT | 重点备注 |
|----|------------------------|--|-----|------|----------|
| ① | GAJ11031002C | USB A公 短形一體式 白膠芯 | 1 | PCS | |
| ② | GDA22000045 | 端子-TU1211TPO-A | 4 | PCS | |
| ③ | GAQ10110002 | HSG: TU1211HNO-1*10KP | 1 | PCS | |
| ④ | CB2DG00A A11AJ0920Y | 28#/1P+28#/2C+T OD:3.5mm COLOR:黑色 L=460mm | 1 | PCS | 注1:±30mm |
| ⑤ | GCA50000003 | PVC料 黑色 50P 模号:8-1619 | 5 | G | |
| ⑥ | OCB00110001 | PE料 内模:SMUB7904M02F01 | 2 | G | |
| ⑦ | GCA50000003 | SR 50P 黑色PVC料 模號: KMSR0137W01 | 3 | G | |
| ⑧ | GEB02000001 | 黑色有鐵絲扎帶 L=90mm | 1 | PCS | |

注:所有材料均符合RoHS要求

测试条件:
 1>.成品100%做导通测试;
 2>.绝缘阻抗:≥10MΩ/DC 200V;
 3>.接触阻抗:≤5Ω/DC 200V;
 4>.延迟时间:0.1sec.

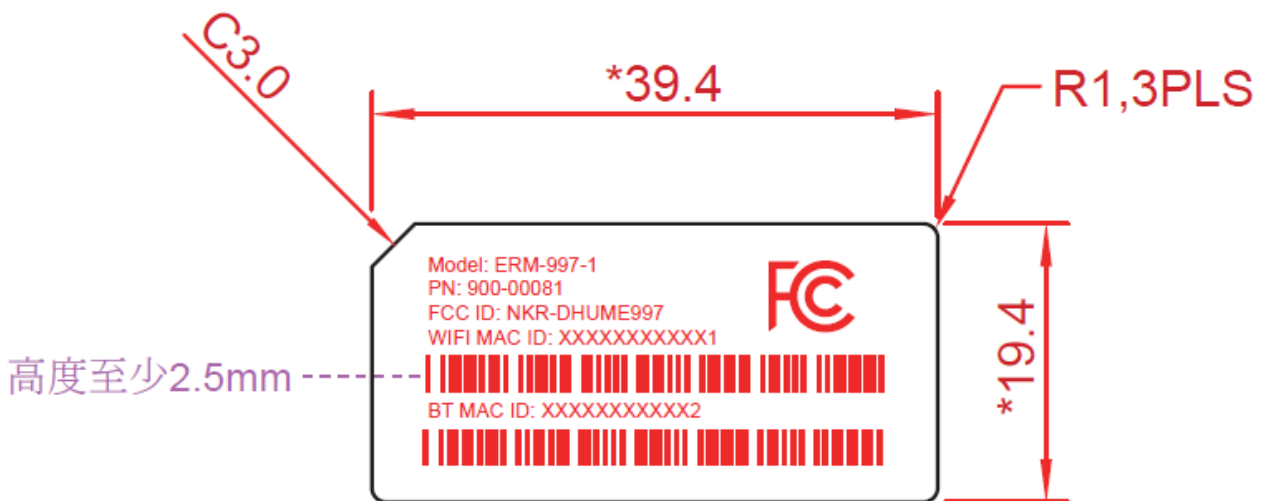
包装示意图
 135±10mm
 45±5mm
 包装方式: 圓形繞線,上3下2圈,USB網尾盡量靠近繞線圈.

CIRCUITS:
 P1 P2
 紅 1 ———— 10 紅
 白 2 ———— 9 白
 綠 3 ———— 8 綠
 黑 4 ———— 7 黑

WELLFORCE ELECTRONIC CO.,LTD
 TEL: 886-02-2906-6803 FAX: 886-02-2906-6805

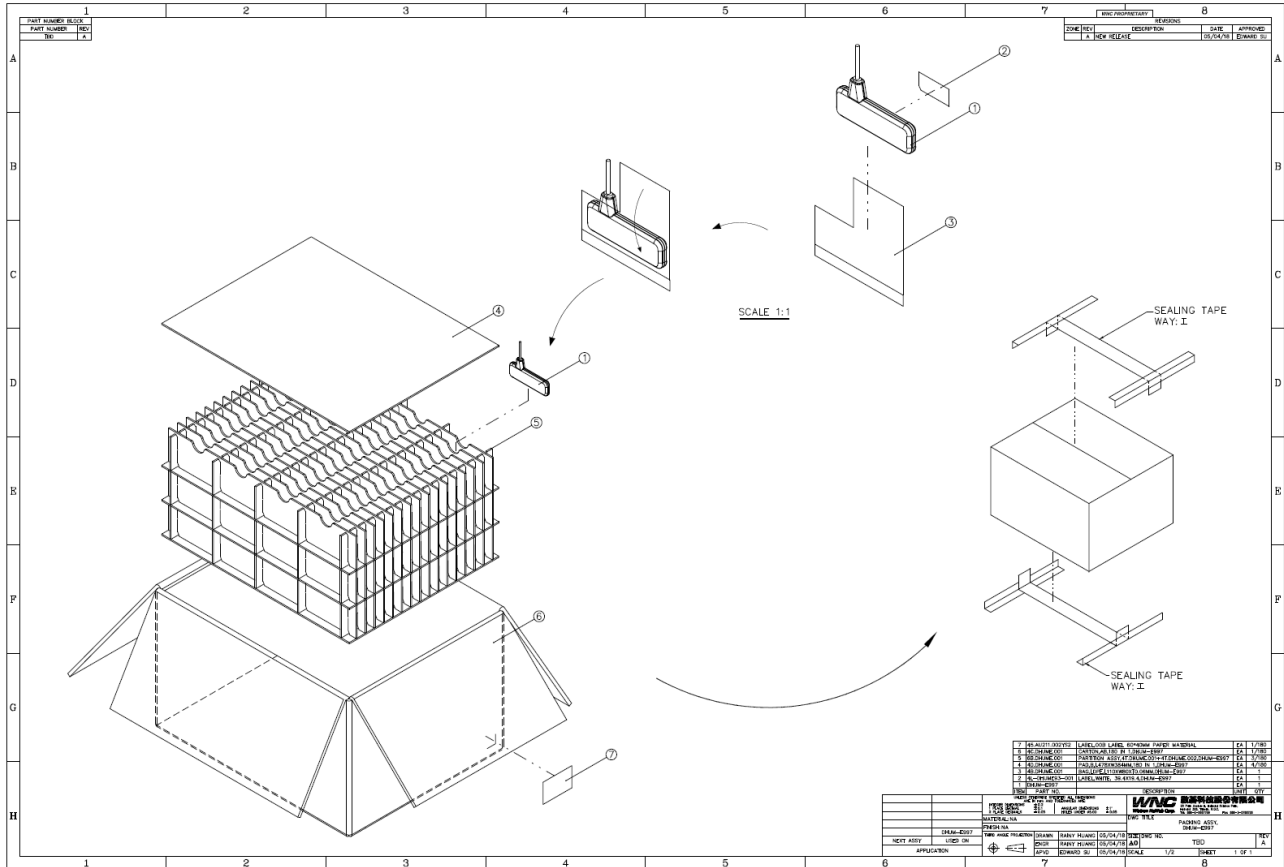
| | | | | |
|----------|-------|---------|-------|-----------------|
| APPROVED | P. M. | CHECKED | DRAWN | 發行单位:工程 |
| | | | 劉先鋒 | REVISIONS:1.2 |
| | | | | UNIT:mm |
| | | | | DATE:2018.01.30 |

7. Label Design Form

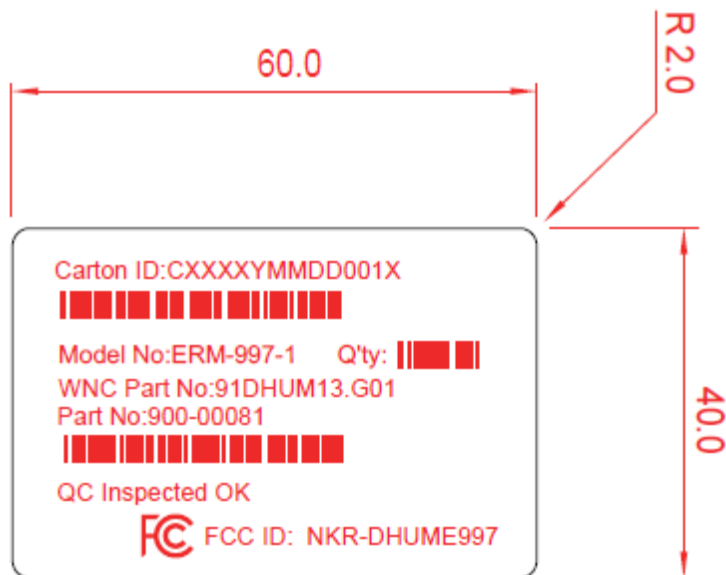


Note: MAC and barcode contents are variables. Each module has different MAC address.

8. Package Information



9. Carton Label



Federal Communication Commission Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.