# Specification for Production

| | |
|---|---|
| Applicant / Manufacturer Hardware | Panasonic Electronic Devices Europe GmbH<br>Zeppelinstrasse 19<br>21337 Lüneburg<br>Germany |
| Applicant / Manufacturer Software | Please refer to chapter 20 Ordering Information |
| Software Version | Please refer to chapter 20 Ordering Information |

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# 1. SCOPE OF THIS DOCUMENT

This product specification applies to Panasonic's, Class 2, Bluetooth®[1] low energy single module, series number: PAN1720. Different versions of the PAN1720 are available (refer to chapter 20 Ordering Information).
The Bluetooth chip used is the CC2540 from Texas Instruments (http://www.ti.com/lit/ds/symlink/cc2540.pdf ).

# 2. KEY FEATURES

- Bluetooth Low Energy Single Mode 4.0
- Surface mount type 15.6 x 8.7 x 1.9 mm³
- Up to 4.0 dBm Tx power (typical) with transmit power control
- High sensitivity (-94 dBm typ.)
- Texas Instrument's CC2540 Single Chip BLE Solution inside
- High performance low power 8051 Microcontroller core
- No external components needed
- Fast Connection Setup
- Internal crystal oscillator (26MHz)
- Internal 32khz crystal oscillator for Sleep Timer
- Two powerful USARTs
- Powerful five channel DMA
- Battery Monitor and Temperature sensor
- Integrated shielding to resist EMI
- Manufactured in conformance with RoHS

Bluetooth Low Energy, part of Bluetooth Ver. 4.0, specifies two types of implementation: Single mode and dual mode. Single mode chips implement the low energy specification and consume just a fraction of the power of classic Bluetooth, allowing the short-range wireless standard to extend to coin cell battery applications for the first time. Dual mode chips combine low energy with the power of classic Bluetooth and are likely to become a de facto feature in almost all new Bluetooth enabled cellular phones and computers.

Note: Single mode Bluetooth 4.0 Low Energy is not backwards compatible with previous Bluetooth standards. Dual mode Bluetooth 4.0 Low Energy is backwards compatible but is not practical for low power devices but targeted to gateway products

.



[1] Bluetooth is a registered trademark of the Bluetooth Special Interest Group.

## 3. APPLICATIONS FOR THE MODULE

All Embedded Wireless Applications

- Access Points
- Industrial Control
- Medical
- Scanners
- Wireless Sensors
- Low Power
- Cable Replacement
- Personal Digital Assistants (PDAs)
- Access Points
- Computers and Peripherals
- Printer Adapters
- Printers

## 4. DESCRIPTION FOR THE MODULE

The PAN1720 is a short-range Class 2 BLE single mode module for implementing Bluetooth functionality into various electronic devices. A block diagram can be found in chapter 7.

The PAN1720 is a cost-effective, low-power, true system-on-chip (SoC) for Bluetooth low energy applications. It enables robust BLE master or slave nodes to be built with very low total bill-of-material costs. The PAN1720 combines an excellent RF transceiver with an industry-standard enhanced 8051 MCU, in-system programmable flash memory, 8-KB RAM, and many other powerful supporting features and peripherals. The PAN1720 is suitable for systems where very low power consumption is required. Very low-power sleep modes are available. Short transition times between operating modes further enable low power consumption.

Combined with the Bluetooth low energy protocol stack from Texas Instruments, the PAN1720 forms the market's most flexible and cost-effective single-mode Bluetooth low energy solution.

Also embedded Software solutions are available from other Panasonic software partners.

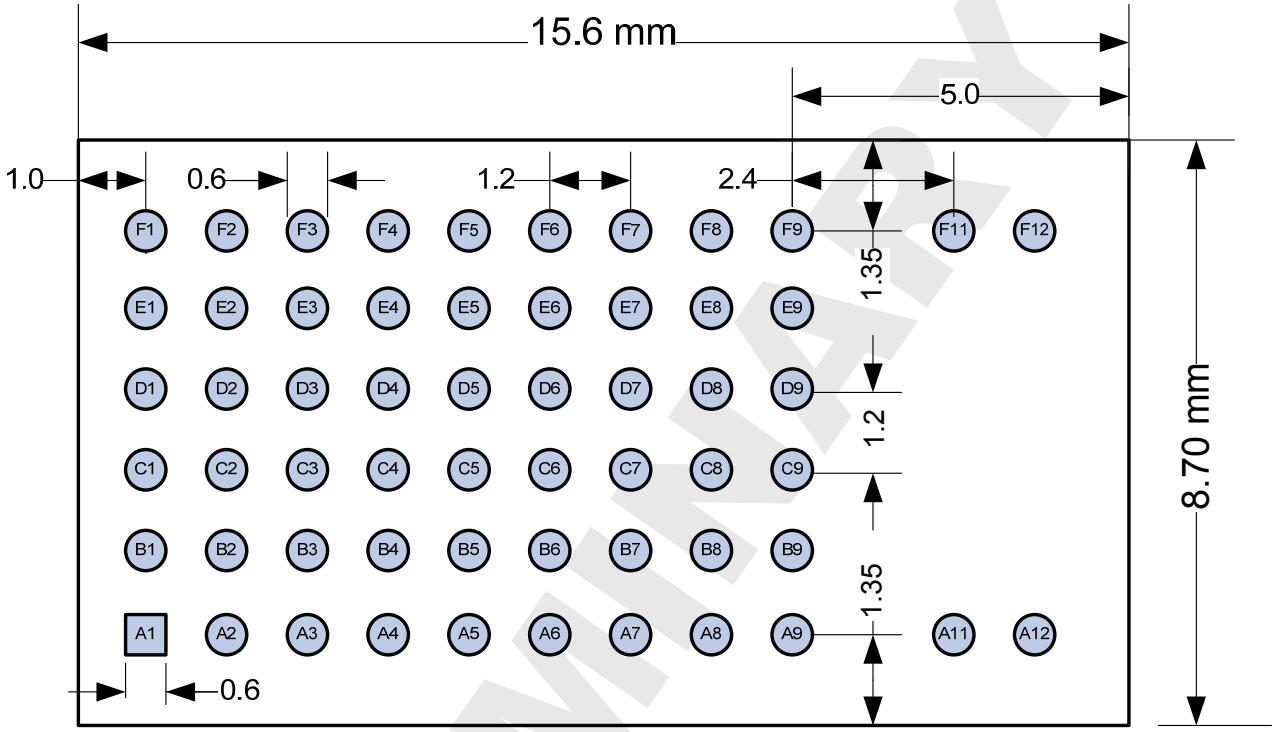
Please contact your local sales office for further details on additional options and services, by visiting

www.panasonic.com/rfmodules for the US,
http://industrial.panasonic.com/eu/i/29606/wireless_modules/wireless_modules.html for EU

or write an e-mail to wireless@eu.panasonic.com.

# 5. DETAILED DESCRIPTION

## 5.1. PAN1720 TERMINAL LAYOUT

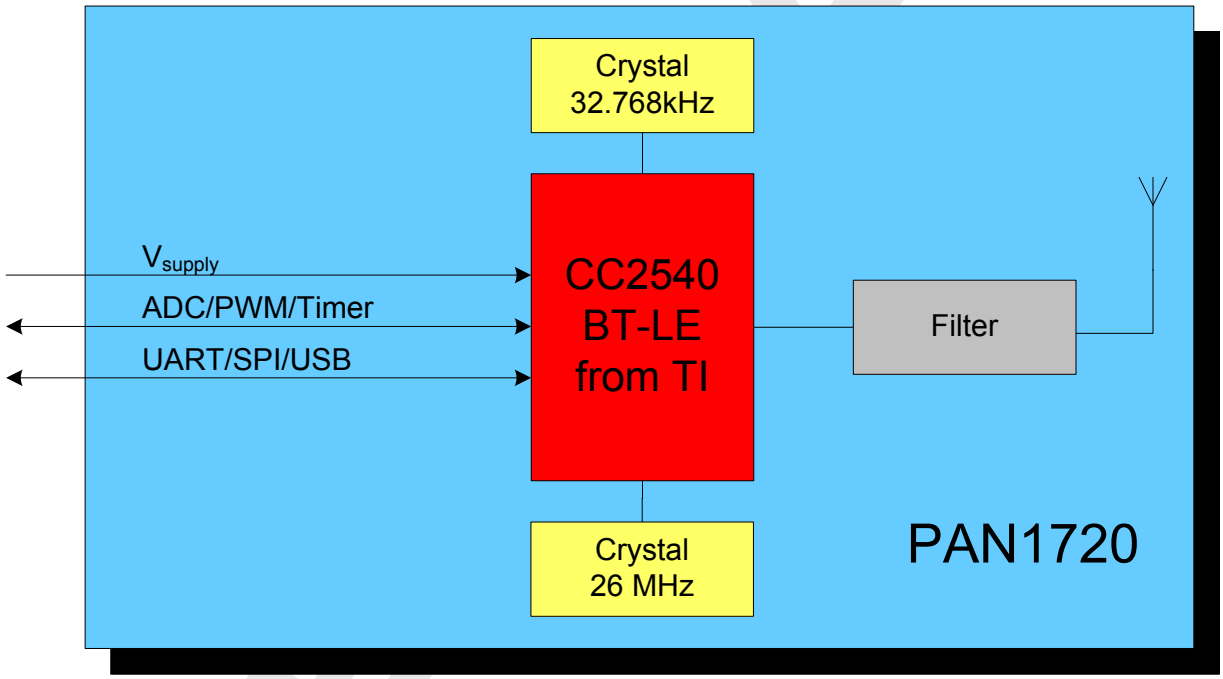


| No | Pin Name | Pin Type | Description |
|---|---|---|---|
| A1 | GND | Ground Pin | Connect to Ground |
| A2 | P1.0 | Digital I/O | Port 1.0 – 20mA drive capability |
| A3 | Reset | Digital Input | Reset, active-low |
| A4 | VCC | Power | 2V – 3.6V analog/digital power supply connection |
| A5 | VCC | Power | 2V – 3.6V analog/digital power supply connection |
| A6 | VCC | Power | 2V – 3.6V analog/digital power supply connection |
| A7 | GND | Ground Pin | Connect to Ground |
| A8 | NC | | Not Connected |
| A9 | GND | Ground Pin | Connect to Ground |
| A11 | GND | Ground Pin | Connect to Ground |
| A12 | GND | Ground Pin | Connect to Ground |
| B1 | P1.3 | Digital I/O | Port 1.3 |
| B2 | P1.2 | Digital I/O | Port 1.2 |
| B3 | P1.1 | Digital I/O | Port 1.1 – 20mA drive capability |
| B4 | P0.6 | Digital I/O | Port 0.6 |
| B5 | NC | | Not Connected |
| B6 | P0.1 | Digital I/O | Port 0.1 |
| B7 | P0.0 | Digital I/O | Port 0.0 |
| B8 | NC | | Not Connected |
| B9 | NC | | Not Connected |
| C1 | NC | | Not Connected |
| C2 | P1.4 | Digital I/O | Port 1.4 |
| C3 | P1.5 | Digital I/O | Port 1.5 |
| C4 | P0.7 | Digital I/O | Port 0.7 |
| C5 | NC | | Not Connected |
| C6 | NC | | Not Connected |
| C7 | NC | | Not Connected |
| C8 | GND | Ground Pin | Connect to Ground |
| C9 | GND | Ground Pin | Connect to Ground |
| D1 | DVDD_USB | Power (digital) | 2V – 3.6V digital power supply connection |
| D2 | USB_N | Digital I/O | USB N |
| D3 | USB_P | Digital I/O | USB P |
| D4 | NC | | Not Connected |
| D5 | NC | | Not Connected |
| D6 | NC | | Not Connected |
| D7 | GND | Ground Pin | Connect to Ground |
| D8 | GND | Ground Pin | Connect to Ground |
| D9 | NC | | Not Connected |
| E1 | P2.1/DD | Digital I/O | Port 2.1 / Programming Interface DD |
| E2 | P2.2/DC | Digital I/O | Port 2.2 / Programming Interface DC |
| E3 | DGND_USB | Ground Pin | Connect to Ground |
| E4 | NC | | Not Connected |
| E5 | NC | | Not Connected |
| E6 | P0.2/RX/MISO | Digital I/O | Port 0.2 / UART RX / SPI MISO |
| E7 | NC | | Not Connected |
| E8 | GND | Ground Pin | Connect to Ground |
| E9 | GND | Ground Pin | Connect to Ground |
| F1 | GND | Ground Pin | Connect to Ground |
| F2 | P1.6 | Digital I/O | Port 1.6 |
| F3 | P1.7 | Digital I/O | Port 1.7 |
| F4 | P2.0 | Digital I/O | Port 2.0 |
| F5 | P0.4/CTS/CS | Digital I/O | Port 0.4 / UART CTS / SPI CS |
| F6 | NC | | Not Connected |
| F7 | P0.3/TX/MOSI | Digital I/O | Port 0.3 / UART TX /SPI MOSI |
| F8 | P0.5/RTS/CLK | Digital I/O | Port 0.5 / UART RTS /SPI CLK |
| F9 | GND | Ground Pin | Connect to Ground |
| F11 | GND | Ground Pin | Connect to Ground |
| F12 | GND | Ground Pin | Connect to Ground |

## 6. BLUETOOTH FEATURES

- Bluetooth 4.0 single mode low energy technology.
- Class 2 TX power w/o external PA, improving link robustness.
- Excellent link budget (up to 96 dB), enabling long-range applications.
- Accurate digital received signal-strength indicator (RSSI)
- Integrates the new low power profiles and services
- Embedded BT-Stack available

## 7. BLOCK DIAGRAM



# 8. TEST CONDITIONS

Measurements shall be made under operating free-air temperature range unless otherwise specified.

| | |
|---|---|
| Temperature | 25 ± 10°C |
| Humidity | 40 to 85%RH |
| Supply Voltage | 3.3V |

# 9. GENERAL DEVICE REQUIREMENTS AND OPERATION

All specifications are over temperature and process, unless indicated otherwise.

## 9.1. ABSOLUTE MAXIMUM RATINGS

| No | See [2] | | Value | Unit |
|---|---|---|---|---|
| Ratings Over Operating Free-Air Temperature Range | | | | |
| 1 | Supply voltage | All supply pins must have the same voltage | –0.3 to 3.9 | V [3] |
| 2 | Voltage on any digital pin | | –0.3 to +0.3<br>>3,9 | V |
| 3 | Operating ambient temperature range | | –40 to 85 | °C |
| 4 | Storage temperature range | | –40 to 125 | °C |
| 5 | Bluetooth RF inputs | | 10 | dBm |
| 6 | ESD:<br>All pads, according to human-body model, JEDEC STD 22, method A114<br>According to charged-device model, JEDEC STD 22, method C101 | | Up to 2000<br>750 | V |

[2] Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

[3] Maximum allowed depends on accumulated time at that voltage: VDD_IN is defined in Reference schematics. When DC2DC supply is used, maximum voltage into MLDO_OUT and LDO_IN = 2.145 V.

## 9.2. RECOMMENDED OPERATING CONDITIONS

| No | Rating | Min | Max | Unit |
|---|---|---|---|---|
| 1 | Power supply voltage [4] | 2 | 3.6 | V |
| 2 | Maximum ambient operating temperature [5] | -40 | 85 | °C |

## 9.3. CURRENT CONSUMPTION

The current consumption is dependant on the user scenario and the setup and timing in the low power modes. The total power consumption can be optimized by adjusting the scan windows and intervals.

To calculate the battery lifetimes in your application please use this Tool:

[3]Battary Lifetime Calculator

Please refer for the different power modes to the chapter "Electrical Characteristics" in CC2540 Datasheet [2] for the latest information.

**ELECTRICAL CHARACTERISTICS**

Measured on Texas Instruments CC2540 EM reference design with $T_A$ = 25°C and VDD = 3 V

| PARAMETER | | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| $I_{core}$ | Core current consumption | Power mode 1. Digital regulator on; 16-MHz RCOSC and 32-MHz crystal oscillator off; 32.768-kHz XOSC, POR, BOD and sleep timer active; RAM and register retention | | 235 | | µA |
| | | Power mode 2. Digital regulator off; 16-MHz RCOSC and 32-MHz crystal oscillator off; 32.768-kHz XOSC, POR, and sleep timer active; RAM and register retention | | 0.9 | | |
| | | Power mode 3. Digital regulator off; no clocks; POR active; RAM and register retention | | 0.4 | | |
| | | Low MCU activity: 32-MHz XOSC running. No radio or peripherals. No flash access, no RAM access. | | 6.7 | | mA |
| $I_{peri}$ | Peripheral current consumption (Adds to core current $I_{core}$ for each peripheral unit activated) | Timer 1. Timer running, 32-MHz XOSC used | | 90 | | µA |
| | | Timer 2. Timer running, 32-MHz XOSC used | | 90 | | µA |
| | | Timer 3. Timer running, 32-MHz XOSC used | | 60 | | µA |
| | | Timer 4. Timer running, 32-MHz XOSC used | | 70 | | µA |
| | | Sleep timer, including 32.753-kHz RCOSC | | 0.6 | | µA |
| | | ADC, when converting | | 1.2 | | mA |

[4] Excluding 1.98 < VDD_IN < 2.2 V range – not allowed.

[5] The device can be reliably operated for 7 years at $T_{ambient}$ of 70°C, assuming 25% active mode and 75% sleep mode (15,400 cumulative active power-on hours).

# 10. BLUETOOTH RF PERFORMANCE (BT)

## 10.1. BLUETOOTH CHARACTERISTICS

| No | Characteristics | Condition | Min | Typ | Max | BT Spec | Unit |
|---|---|---|---|---|---|---|---|
| 1 | Operation frequency range | | 2402 | | 2480 | | MHz |
| 2 | Channel spacing | | | 2 | | | MHz |
| 3 | Output Power | Minimum setting, measured at single ended 50ohm. | | 4 | | | dBm |
| | | Maximum setting, measured at single ended 50ohm. | | -24 | | | dBm |
| 4 | Sensitivity, High Gain Mode | High-gain mode | | -93.0 | | -70 | dBm |
| | | Standard mode | | -92.5 | | -70 | |

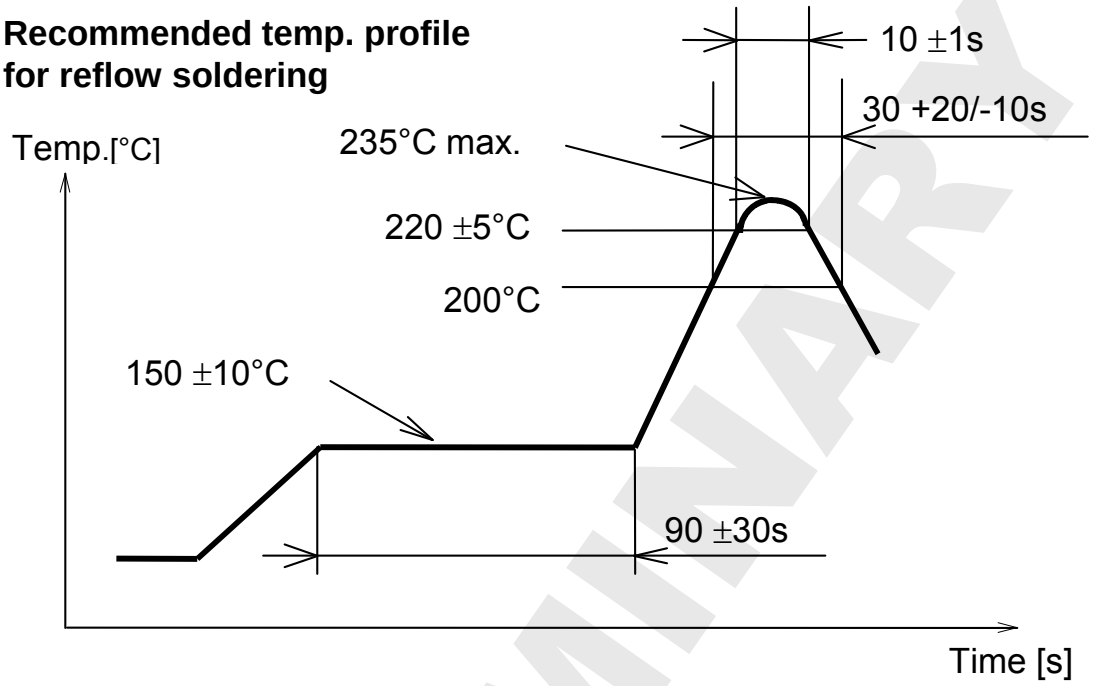
| No | Characteristics | Condition | Typ | Max | Unit |
|---|---|---|---|---|---|
| 1 | Spurious emissions | Conducted measurement with a 50-Ω single-ended load. Complies with EN 300 328, EN 300 440 class 2, FCC CFR47, Part 15 and ARIB STD-T-66 | | -41 | dBm |

The values are measured conducted. Therefore we expect even better suppression of the spurious emissions at customer application with antenna. Usual antennas have band pass filter characteristics.

## 11. SOLDERING TEMPERATURE-TIME PROFILE (FOR REFLOW SOLDERING)

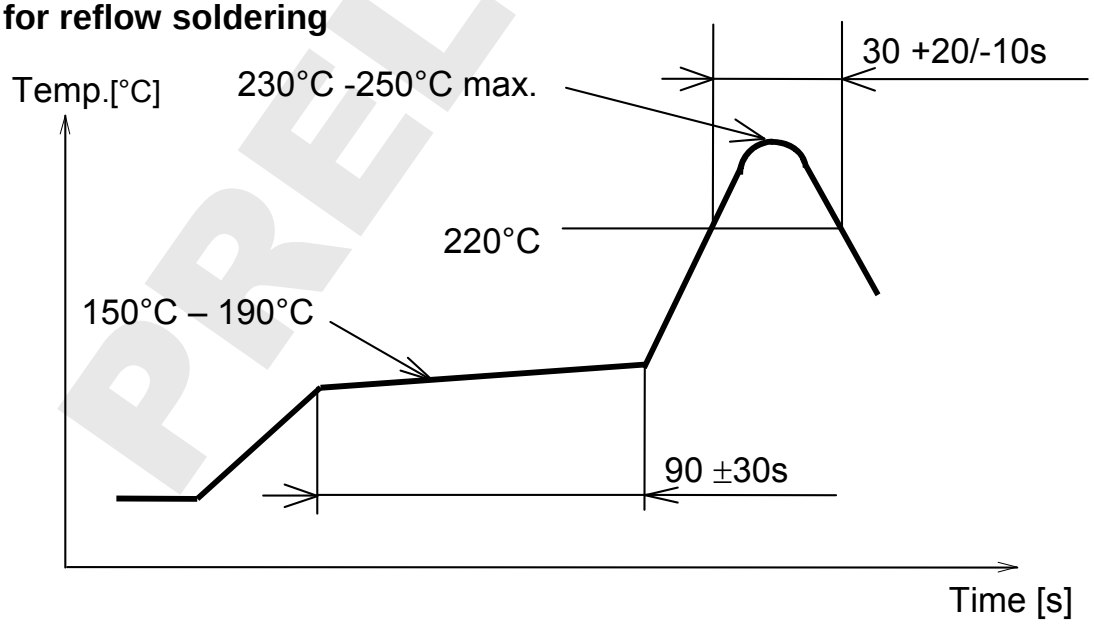
### 11.1. FOR LEAD SOLDER

**Recommended temp. profile for reflow soldering**




### 11.2. FOR LEADFREE SOLDER

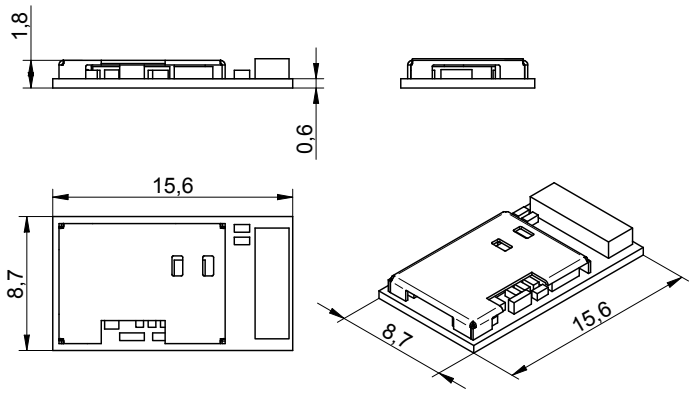
**Our used temp. profile for reflow soldering**




Reflow permissible cycle: 2
Opposite side reflow is prohibited due to module weight.

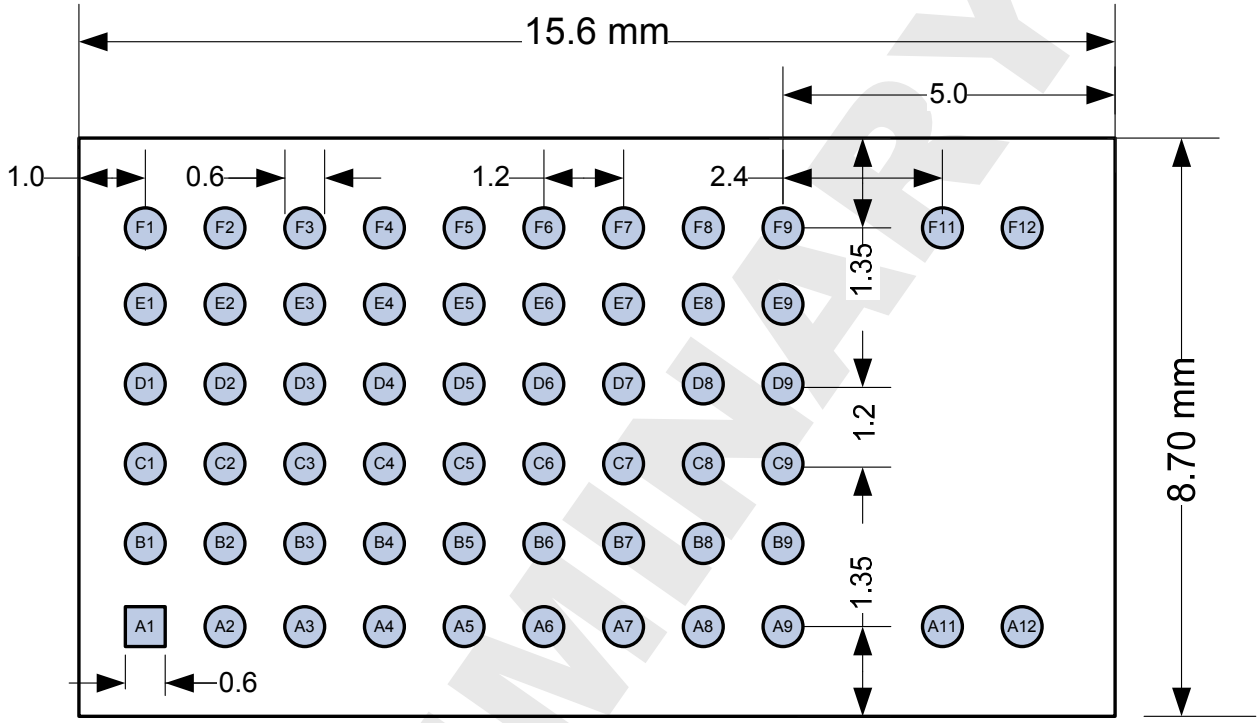
## 12. MODULE DIMENSION

| No. | Item | Dimension | Tolerance | Remark |
|---|---|---|---|---|
| 1 | Width | 8.70 | ± 0.20 | |
| 2 | Length | 15.60 | ± 0.20 | |
| 3 | Height | 1.80 | ± 0.20 | With case |

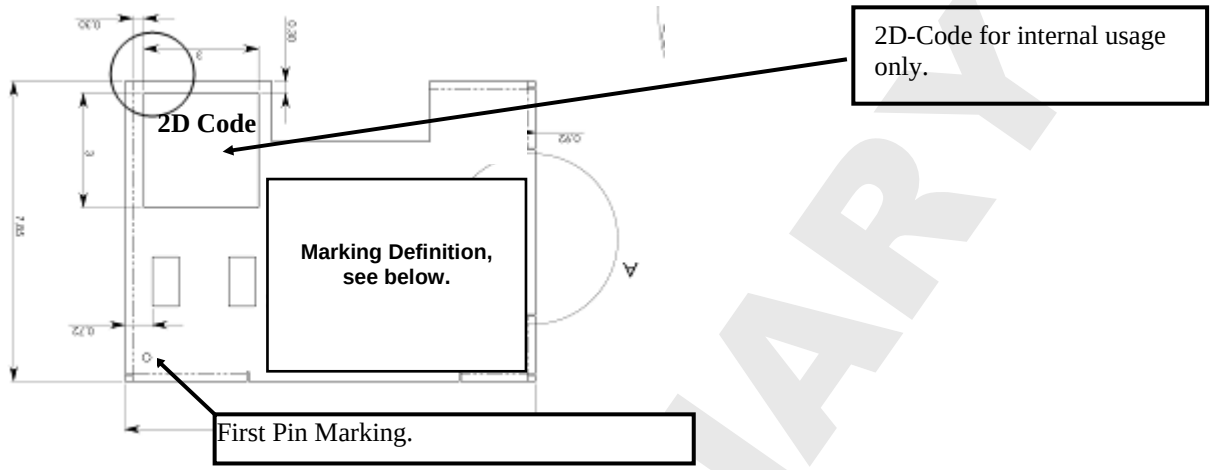


## 13. PAN1315 FOOTPRINT OF THE MODULE

All dimensions are in millimeters.
The outer dimensions have a tolerance of ± 0.2mm.



## 14. CASE MARKING




### 14.1. EXAMPLE FOR MARKING

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | A | N | 1 | 7 | 2 | 0 | | | x | y | / | a | b | | | |
| E | N | W | 8 | 9 | 8 | 2 | 0 | A | x | K | F | | | | | |
| Y | Y | W | W | D | L | L | | | | | | | | | | |
| E | S | | | | | | | | | | | | | | | |

### 14.2. MARKING DEFINITION

| | |
|---|---|
| PAN1720 | Fixed, marketing name. |
| xy | Variable, Hardware Version, for internal usage. |
| ab | Variable, Software Version, refer to PAN1720ETU Design-Guide [1] |
| ENW89820AxKF | Global Part Number, refer to chapter 20 Ordering Information. |
| YYWWDLL | Variable, production date code & line & lot number. |
| ES | Engineering Sample will be deleted for productive parts. |

## 15. MECHANICAL REQUIREMENTS

| No. | Item | Limit | Condition |
|---|---|---|---|
| 1 | Solderability | More than 75% of the soldering area shall be coated by solder | Reflow soldering with recommendable temperature profile |
| 2 | Resistance to soldering heat | It shall be satisfied electrical requirements and not be mechanical damage | See chapter 11.2 |

# 16. DEVELOPMENT OF APPLICATIONS

For development support please refer to PAN1720ETU Design-Guide

http://www.pedeu.panasonic.de/pdf/168ApplicationNote.pdf [1].

# 17. RELIABILITY TESTS

The measurement should be done after being exposed to room temperature and humidity for 1 hour.

| No. | Item | Limit | Condition |
|---|---|---|---|
| 1 | Vibration test | Electrical parameter should be in specification | a) Freq.:10~50Hz,Amplitude:1.5mm<br>a) 20min. / cycle,1hrs. each of XYZ axis<br>b) Freq.:30~100Hz, 6G<br>b) 20min. / cycle,1hrs. each of XYZ axis |
| 2 | Shock test | the same as above | Dropped onto hard wood from height of 50cm for 3 times |
| 3 | Heat cycle test | the same as above | -40°C for 30min. and +85°C for 30min.;<br>each temperature 300 cycles |
| 4 | Moisture test | the same as above | +60°C, 90% RH, 300h |
| 5 | Low temp. test | the same as above | -40°C, 300h |
| 6 | High temp. test | the same as above | +85°C, 300h |

# 18. CAUTIONS

Failure to follow the guidelines set forth in this document may result in degrading of the product's functions and damage to the product.

## 18.1. DESIGN NOTES

(1) Follow the conditions written in this specification, especially the control signals of this module.
(2) The supply voltage has to be free of AC ripple voltage (for example from a battery or a low noise regulator output). For noisy supply voltages, provide a decoupling circuit (for example a ferrite in series connection and a bypass capacitor to ground of at least 47uF directly at the module).
(3) This product should not be mechanically stressed when installed.
(4) Keep this product away from heat. Heat is the major cause of decreasing the life of these products.
(5) Avoid assembly and use of the target equipment in conditions where the products' temperature may exceed the maximum tolerance.
(6) The supply voltage should not be exceedingly high or reversed. It should not carry noise and/or spikes.
(7) Keep this product away from other high frequency circuits.

## 18.2. INSTALLATION NOTES

(1) Reflow soldering is possible twice based on the conditions in chapter 15. Set up the temperature at the soldering portion of this product according to this reflow profile.
(2) Carefully position the products so that their heat will not burn into printed circuit boards or affect the other components that are susceptible to heat.
(3) Carefully locate these products so that their temperatures will not increase due to the effects of heat generated by neighboring components.
(4) If a vinyl-covered wire comes into contact with the products, then the cover will melt and generate toxic gas, damaging the insulation. Never allow contact between the cover and these products to occur.
(5) This product should not be mechanically stressed or vibrated when reflowed.
(6) If you want to repair your board by hand soldering, please keep the conditions of this chapter.
(7) Do not wash this product.
(8) Refer to the recommended pattern when designing a board.
(9) Pressing on parts of the metal cover or fastening objects to the metal will cause damage to the unit.

## 18.3. USAGE CONDITIONS NOTES

(1) Take measures to protect the unit against static electricity.
If pulses or other transient loads (a large load applied in a short time) are applied to the products, check and evaluate their operation befor assembly on the final products.
(2) Do not use dropped products.
(3) Do not touch, damage or soil the pins.
(4) Follow the recommended condition ratings about the power supply applied to this product.
(5) Electrode peeling strength: Do not add pressure of more than 4.9N when soldered on PCB.
(6) Pressing on parts of the metal cover or fastening objects to the metal cover will cause damage.
(7) These products are intended for general purpose and standard use in general electronic equipment, such as home appliances, office equipment, information and communication equipment.

## 18.4. STORAGE NOTES

(1) The module should not be stressed mechanically during storage.
(2) Do not store these products in the following conditions or the performance characteristics of the product, such as RF performance will be adversely affected:
- Storage in salty air or in an environment with a high concentration of corrosive gas, such as Cl2, H2S, NH3, SO2, or NOX
- Storage in direct sunlight

- Storage in an environment where the temperature may be outside the range of 5°C to 35°C range, or where the humidity may be outside the 45 to 85% range.
- Storage of the products for more than one year after the date of delivery Storage period: Please check the adhesive strength of the embossed tape and soldering after 6 months of storage.

(3) Keep this product away from water, poisonous gas and corrosive gas.
(4) This product should not be stressed or shocked when transported.
(5) Follow the specification when stacking packed crates (max. 10).

## 18.5. SAFETY CAUTIONS

These specifications are intended to preserve the quality assurance of products and individual components.

Before use, check and evaluate the operation when mounted on your products. Abide by these specifications, without deviation when using the products. These products may short-circuit. If electrical shocks, smoke, fire, and/or accidents involving human life are anticipated when a short circuit occurs, then provide the following failsafe functions, as a minimum.

(1) Ensure the safety of the whole system by installing a protection circuit and a protection device.
(2) Ensure the safety of the whole system by installing a redundant circuit or another system to prevent a single fault causing an unsafe status.

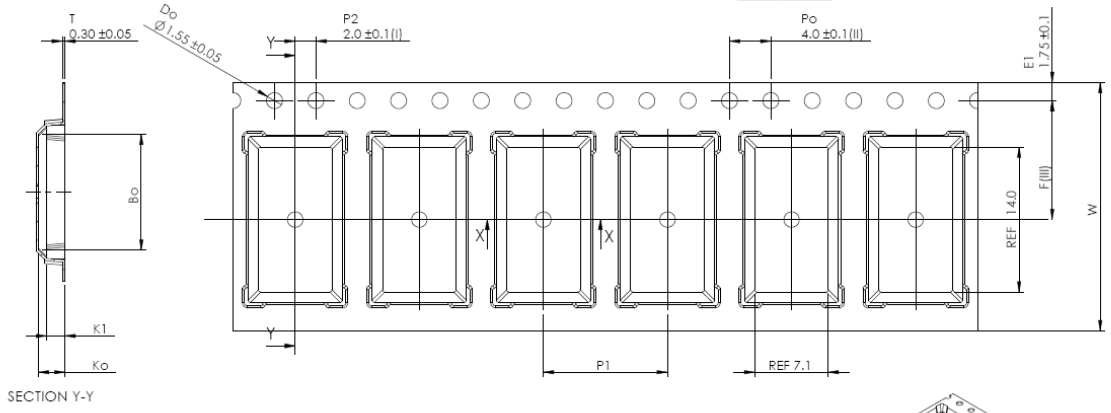
## 18.6. OTHER CAUTIONS

(1) This specification sheet is copyrighted. Please do not disclose it to a third party.
(2) Please do not use the products for other purposes than those listed.
(3) Be sure to provide an appropriate fail-safe function on your product to prevent an additional damage that may be caused by the abnormal function or the failure of the product.
(4) This product has been manufactured without any ozone chemical controlled under the Montreal Protocol.
(5) These products are not intended for other uses, other than under the special conditions shown below. Before using these products under such special conditions, check their performance and reliability under the said special conditions carefully to determine whether or not they can be used in such a manner.
   - In liquid, such as water, salt water, oil, alkali, or organic solvent, or in places where liquid may splash.
   - In direct sunlight, outdoors, or in a dusty environment
   - In an environment where condensation occurs.
   - In an environment with a high concentration of harmful gas (e.g. salty air, HCl, Cl2, SO2, H2S, NH3, and NOX)
(6) If an abnormal voltage is applied due to a problem occurring in other components or circuits, replace these products with new products because they may not be able to provide normal performance even if their electronic characteristics and appearances appear satisfactory.
(7) When you have any question or uncertainty, contact Panasonic.

# 19. PACKAGING

If the product has mass production status, indicated in chapter 22, we will deliver the module in the package which are described below.

## 19.1. TAPE DIMENSION



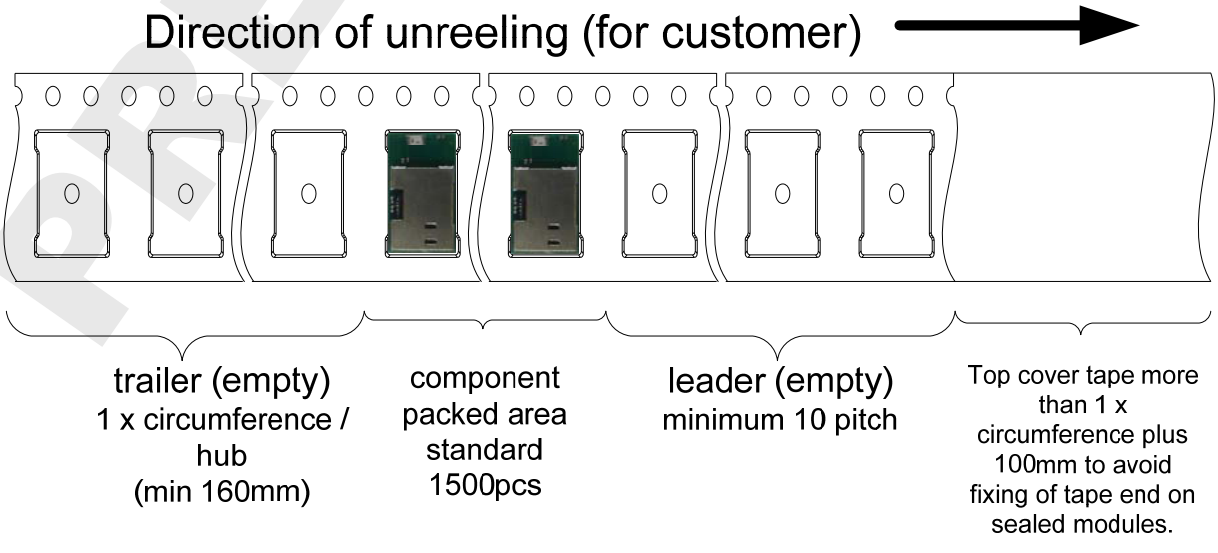

| | | |
|---|---|---|
| A o | 9.10 | +/- 0.1 |
| B o | 16.00 | +/- 0.1 |
| K o | 3.20 | +/- 0.1 |
| K 1 | 2.20 | +/- 0.1 |
| F | 11.50 | +/- 0.1 |
| P 1 | 12.00 | +/- 0.1 |
| W | 24.00 | +/- 0.3 |

Forming format : Flatbed
Estimated max. length : 64 meter/22B3 reel

(I) Measured from centreline of sprocket hole to centreline of pocket.
(II) Cumulative tolerance of 10 sprocket holes is ± 0.20 .
(III) Measured from centreline of sprocket hole to centreline of pocket.
(IV) Other material available.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.

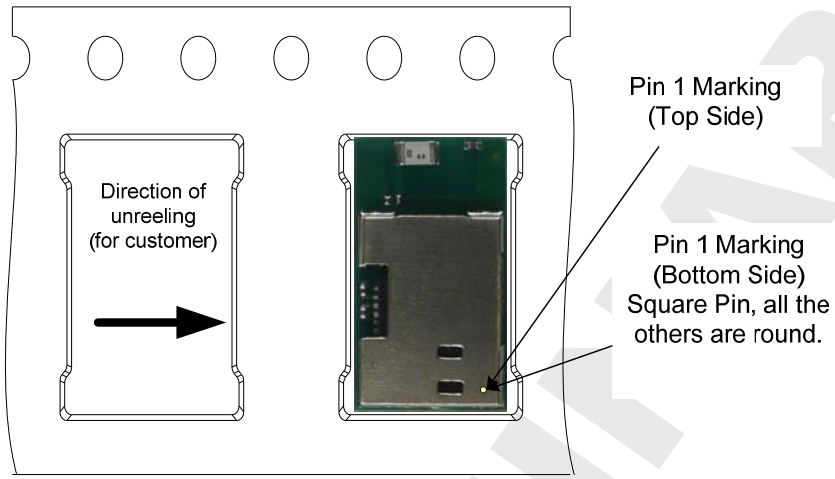
## 19.2. PACKING IN TAPE



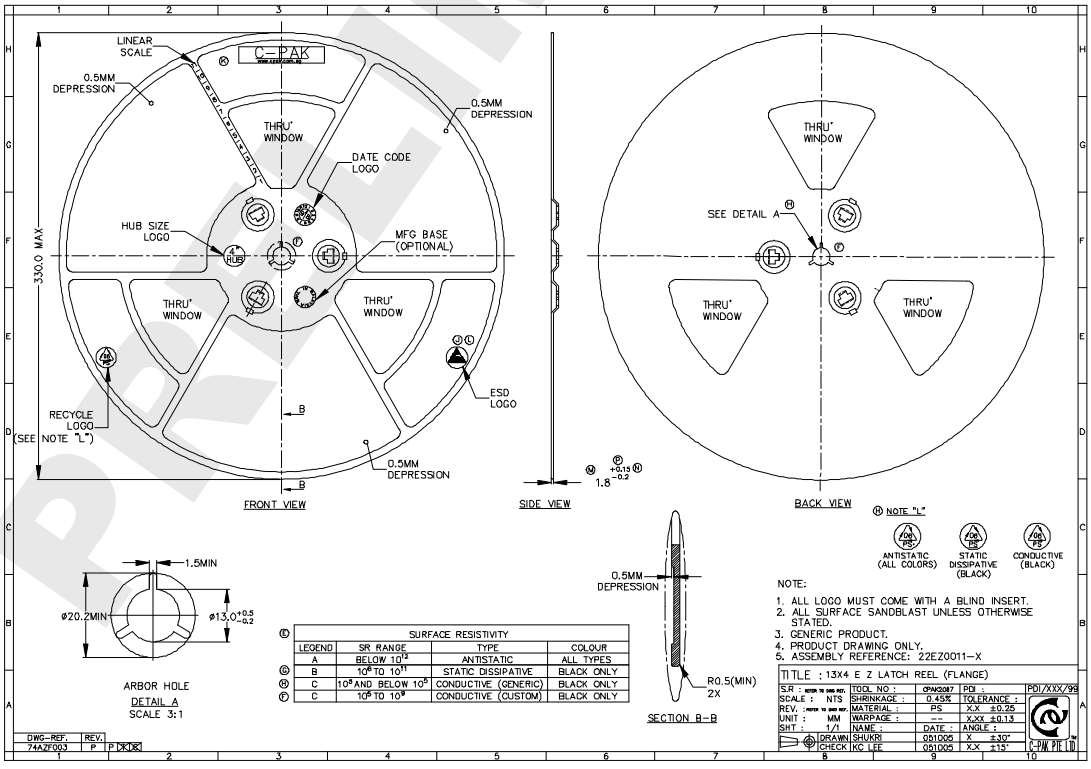
Empty spaces in component packed area shall be less than two per reel and those spaces shall not be consecutive.

Top cover tape shall not be found on reel holes and shall not stick out from reel.

## 19.3. COMPONENT DIRECTION

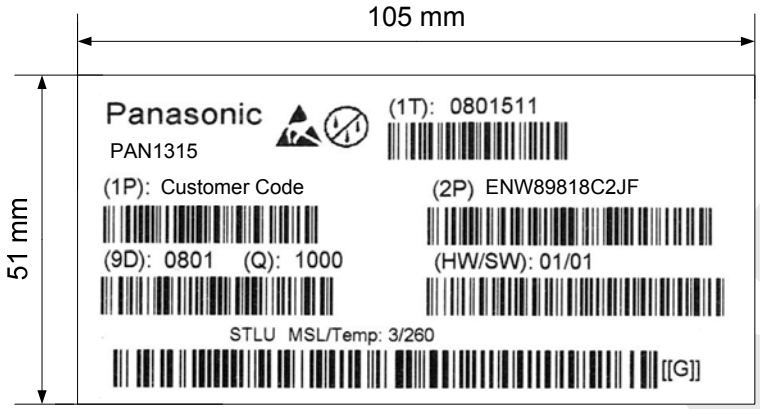



## 19.4. REEL DIMENSION



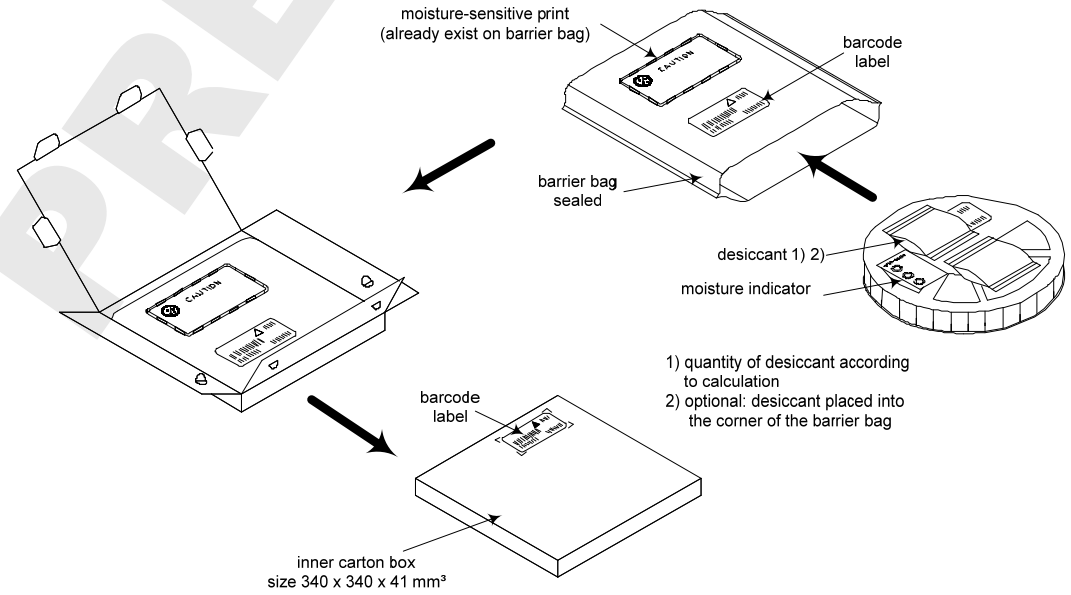
## 19.5. LABEL FOR PACKAGE

The picture shows an example from similar product.




| | | |
|---|---|---|
| (1T) | Lotcode [YYWWDLL] | Example from above: |
| | YY year | printed 08 |
| | WW normal calendar week | printed 01 |
| | D day | printed 5 (Friday) |
| | L line identifier, if more as one | printed 1 |
| | L lot identifier per day | printed 1 |
| (1P) | Customer Order Code, if any, otherwise company name will be printed | |
| (2P) | Panasonic Order Code: ENW89820AxKF | |
| (9D) | Date code as [YYWW] | |
| (Q) | Quantity [XXXX], variable max. 1500 | |
| (HW/SW) | Hardware /Software Release | |
| | Hardware 01 Indicates the HW revision. | |
| | Software 01 Indicates the SW revision. | |

## 19.6. TOTAL PACKAGE



## 20. ORDERING INFORMATION

| Ordering part number | Description | MOQ (1) |
|---|---|---|
| ENW89820A1KF (2) | PAN1720<br>CLASS 2 Bluetooth single mode Module according BT-4.0.<br>Bluetooth SMART | 1500 |
| ENW89820A3KF (3) | PAN1720<br>Same as above including BlueRadios BR-SPP FW version.<br>Bluetooth SMART | 1500 |

Notes:

(1) Abbreviation for Minimum Order Quantity (MOQ). The standard MOQ for mass production are 1500 pieces, fewer only on customer demand. Samples for evaluation can be delivered at any quantity via the distribution channels.

(2) Samples available

(3) Samples are available on customer demand

## 21. ROHS DECLARATION

Declaration of environmental compatibility for supplied products:

Hereby we declare to our best present knowledge based on declaration of our suppliers that this product do not contain by now the following substances which are banned by Directive 2002/95/EC (RoHS) or if contain a maximum concentration of 0,1% by weight in homogeneous materials for

- Lead and lead compounds
- Mercury and mercury compounds
- Chromium (VI)
- PBB (polybrominated biphenyl) category
- PBDE (polybrominated biphenyl ether) category

And a maximum concentration of 0,01% by weight in homogeneous materials for

- Cadmium and cadmium compounds

## 22. DATA SHEET STATUS

This data sheet contains the preliminary specification (PRELIMINARY).

Panasonic reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

Supplementary data will be published at a later date.

Please consult the most recently issued data sheet before initiating or completing a design.

## 23. HISTORY FOR THIS DOCUMENT

| Revision | Date | Modification / Remarks |
|---|---|---|
| 0.01 | November 2011 | 1st preliminary version. |
| | | |

## 24. RELATED DOCUMENTS

For an update, please search in the suitable homepage.

[1] PAN1720ETU Design-Guide

http://www.pedeu.panasonic.de/pdf/168ApplicationNote.pdf

[2] CC2540 Datasheet

http://www.ti.com/product/cc2540#technicaldocuments

[3] Battary Lifetime Calculator

http://focus.ti.com/general/docs/litabsmultiplefilelist.tsp?literatureNumber=swra347

## 25. GENERAL INFORMATION


This product description does not lodge the claim to be complete and free of mistakes.
Please contact the related product manager in every case.

If we deliver ES samples to the customer, these samples have the status Engineering Samples. This means, the design of this product is not yet concluded. Engineering Samples may be partially or fully functional, and there may be differences to be published Data Sheet.
Engineering Samples are not qualified and are not to be used for reliability testing or series production.

**Disclaimer:**
Customer acknowledges that samples may deviate from the Data Sheet and may bear defects due to their status of development and the lack of qualification mentioned above.
Panasonic rejects any liability or product warranty for Engineering Samples. In particular, Panasonic disclaims liability for damages caused by

- the use of the Engineering Sample other than for Evaluation Purposes, particularly the installation or integration in an other product to be sold by Customer,
- deviation or lapse in function of Engineering Sample,
- improper use of Engineering Samples.

Panasonic disclaimes any liability for consequential and incidental damages.
In case of any questions, please contact your local sales partner or the related product manager.

## 26. REGULATORY INFORMATION

### 26.1. FCC WARNING

This equipment is intended for use in a laboratory test environment only. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to subpart J of part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment in other environments may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

The PAN1720 FCC certification is in progress and should be qualified soon.

## 27. LIFE SUPPORT POLICY

This Panasonic product is not designed for use in life support appliances, devices, or systems where malfunction can reasonably be expected to result in a significant personal injury to the user, or as a critical component in any life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness. Panasonic customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Panasonic for any damages resulting.