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# SPECIFICATION

**Panasonic**  
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PAN1026

Date: January 2012

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CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-1026-2400-102	REV. 0.2
SUBJECT	CLASS 2 BLUETOOTH LOW ENERGY SPP MODULE	PAGE	1 of 33
CUSTOMER'S CODE PAN1026	PANASONIC'S CODE ENW89837A3KF	DATE	07.01.2012

# Product Specification

Applicant / Manufacturer  
Hardware

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Germany

Applicant / Manufacturer  
Software

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Germany

Software Version

Please refer to chapter 20 / 21

By purchase of any of products described in this document the customer accepts the document's validity and declares their agreement and understanding of its contents and recommendations. Panasonic reserves the right to make changes as required without notification.

Power Electronics R&D Center Wireless Connectivity Panasonic Industrial Devices Europe GmbH	APPROVED genehmigt	CHECKED geprüft	DESIGNED erstellt
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## 1 SCOPE OF THIS DOCUMENT

This product specification applies to Panasonic's, Class 2, Bluetooth®<sup>1</sup> classic and low energy dual mode module, series number: PAN1026.

## 2 KEY FEATURES

- Bluetooth Classic and Low Energy Dual Mode 4.0
- Surface mount type 15.6 x 8.7 x 1.8 mm<sup>3</sup>
- Up to 4.0 dBm Tx power (typical) with transmit power control
- High sensitivity (-88 dBm typ.)
- Toshiba TC35661SBG-2xx Bluetooth Dual Mode SPP and GATT profiles inside
- No external components needed
- Fast Connection Setup in BLE mode
- Internal crystal oscillator (26MHz)
- Integrated shielding to resist EMI
- Manufactured in conformance with RoHS

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<sup>1</sup> Bluetooth is a registered trademark of the Bluetooth Special Interest Group.

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### 3 BLUETOOTH LOW ENERGY

Bluetooth Low Energy (BLE) is a part of Bluetooth Ver. 4.0, BT 4.0 covers both BLE as well as BT classic 2.1 and 3.0. If both are implemented in one device it is called dual mode. Dual mode chips implement the low energy specification and may consume just a fraction of the power of classic Bluetooth, allowing the short-range wireless standard to extend to coin cell battery applications. 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, computers or portable communication nodes.

Bluetooth Low Energy (BLE) is not backwards compatible with previous Bluetooth classic standards (2.1+EDR or 3.0). Dual mode Bluetooth 4.0 is backwards compatible but is not practical for low power devices but targeted to gateway products



### 4 APPLICATIONS FOR THE MODULE

#### All Embedded Wireless Applications

- Access Points
- Industrial Control
- Medical
- Scanners
- Wireless Sensors
- Low Power
- Proximity
- Smart Phone
- Access Points
- Temperature
- Wellness
- Sports

### 5 DESCRIPTION FOR THE MODULE

The PAN1026 is a short-range Class 2 BLE dual mode module for implementing Bluetooth functionality into various electronic devices. A block diagram can be found in chapter 8.

**Available now:** Bluetooth 2.1 SPP embedded.

**Available Q2/13:** Bluetooth 2.1 SPP embedded – Bluetooth 4.0 LE GATT/GAP will be available Q2/2013

All HW versions 05 and above will support Bluetooth 2.1 SPP embedded – Bluetooth 4.0 LE GATT/GAP. See chapter 15 about details for case marking.

Please contact your local sales office for further details on additional options and services:

[www.panasonic.com/rfmodules](http://www.panasonic.com/rfmodules) for the US,

[http://industrial.panasonic.com/eu/i/29606/wireless\\_modules/wireless\\_modules.html](http://industrial.panasonic.com/eu/i/29606/wireless_modules/wireless_modules.html) for EU

or write an e-mail to [wireless@eu.panasonic.com](mailto:wireless@eu.panasonic.com).

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## 6 DETAILED DESCRIPTION

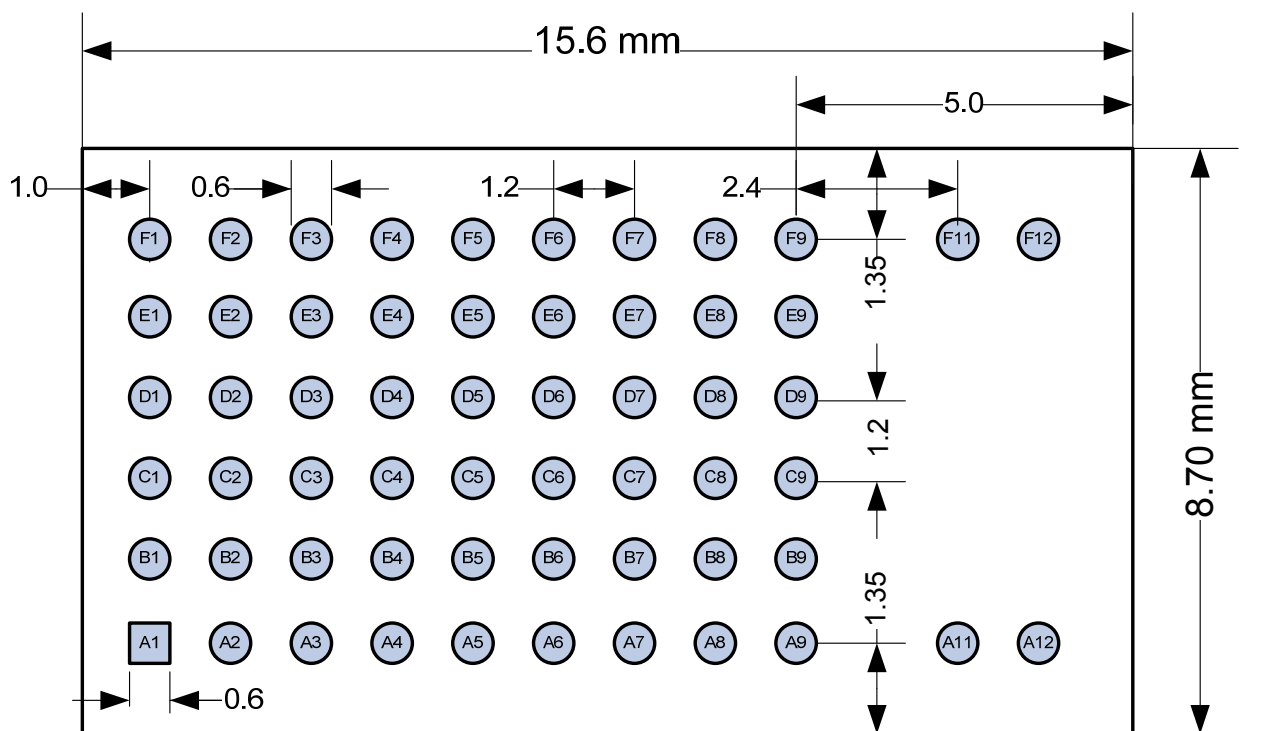
### 6.1 PAN1026 TERMINAL LAYOUT

Top view, Application PCB

	Pin	HW Function	After Reset	Input/OutPut (Internal Pull register)	After TCU MNG INIT_REQ	Input/OutPut (Internal Pull register)
USB	GPIO0	RequestWakeup	No function	Input(No Pull up)	RequestWakeup(Note1)	Input (No pull)
SLEEP	GPIO1	NotifyWakeup	No function	Input(Pull up)	NotifyWakeup (Note1)	OutPut (No pull)
Codec IF	GPIO2	PCMOUT	Not support	Input(Pull up)	Not support	Input(Pull up)
	GPIO3	PCMIN	Not support	Input(Pull up)	Not support	Input(Pull up)
	GPIO4	PCMCLK	Not support	Input(Pull up)	Not support	Input(Pull up)
	GPIO5	FSYNC	Not support	Input(Pull up)	Not support	Input(Pull up)
UART	GPIO6	UART TX	UART TX	OutPut(No pull)	UART TX	OutPut (No pull)
	GPIO7	UART RX	UART RX	Input(No pull)	UART RX	Input (No pull)
	GPIO8	UART RTS	UART RTS	OutPut(No pull)	UART RTS	OutPut (No pull)
	GPIO9	UART CTS	UART CTS	Input(No pull)	UART CTS	Input (No pull)
BT-WiFi CoEx	GPIO10	BtActivity	Not support	Input(Pull up)	Not support	Input(Pull up)
	GPIO11	BtState	Not support	Input(Pull up)	Not support	Input(Pull up)
	GPIO12	WiActivity	Not support	Input(Pull up)	Not support	Input(Pull up)
	GPIO13	BtinBand	Not support	Input(Pull up)	Not support	Input(Pull up)
I2C / SPI	GPIO14	I2C CLK / SPI CLK	No function	Input(Pull up)	I2C CLK / SPI CLK (Note2)	OutPut (No pull)
	GPIO15	I2C DATA / SPI DOUT	No function	Input(Pull up)	I2C DATA / SPI DOUT (Note2)	OutPut (No pull)
	GPIO16	SPI DIN	No function	Input(Pull up)	Not support	Input(Pull up)
	GPIO17	SPI CS0X	No function	Input(Pull up)	Not support	Input(Pull up)
	GPIO18	SPI CS1X	No function	Input(Pull up)	Not support	Input(Pull up)

(Note1) M2\_BTL\_SET\_DEEP\_SLEEP command control GPIO0 and GPIO1 for sleep function.

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## 6.2 PAN1026 TERMINAL DESCRIPTION

No	Pin Name	GPIO Number	Pin Type	Description
A1	GND		Ground Pin	Connect to Ground
A2	NC		NC	Not connected, leave open
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		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	NC		NC	Not connected, leave open
B2	BTS	GPIO 11		Not supported
B3	BTA	GPIO 10		Not supported
B4	NC		NC	Not connected, leave open
B5	NC		NC	Not connected, leave open
B6	NC		NC	Not connected, leave open
B7	NC		NC	Not connected, leave open



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No	Pin Name	GPIO Number	Pin Type	Description
B8	NC		NC	Not connected, leave open
B9	NC		NC	Not connected, leave open
C1	CS0X	GPIO 17		Not supported
C2	BTI	GPIO 13		Not supported
C3	WIA	GPIO 12		Not supported
C4	NC		NC	Not connected, leave open
C5	NC		NC	Not connected, leave open
C6	PCMCLK	GPIO 04	Digital I/O	PCM Clock
C7	FSYNC	GPIO 05	Digital I/O	PCM Synchronisation
C8	GND		Ground Pin	Connect to Ground
C9	GND		Ground Pin	Connect to Ground
D1	CS1X	GPIO 18		Not supported
D2	DIN	GPIO 16		Not supported
D3	GPIO1	GPIO 01	Digital I/O	Not supported
D4	USB*/GPIO0		Digital I/O	USB direct is not yet supported by the IC and therefore you can use this pin as normal GPIO0. If USB will be supported in the next revision, pin would be → Select USB (Connect to PIN E4) Check also [1]
D5	NC		NC	Not connected, leave open
D6	PCMIN	GPIO 03	Digital Input	PCM In Not supported
D7	GND		Ground Pin	Connect to Ground
D8	GND		Ground Pin	Connect to Ground
D9	ANT		RF - Signal	Antenna Pin (Not connected for standard version)
E1	SDA	GPIO 15	Digital I/O	I2C Interface (Only Internal) Connect to Testpin
E2	SCL	GPIO 14	Digital I/O	I2C Interface (Only Internal) Connect to Testpin
E3	VDD_USB		Power	USB direct is not yet supported by the IC and therefore put to GND. If USB will be supported in the next revision, connect to VCC. Check also [1]
E4	USB*			USB direct is not yet supported by the IC and therefore please left open. If USB will be supported in the next revision, pin would be → Select USB (Connect to PIN D4). Check also [1]
E5	CLKREQ		Digital Output	Active High once crystal frequency is stable
E6	UART RXD		Digital Input	UART RXD
E7	PCMOUT	GPIO 02	Digital Output	PCM Output
E8	GND		Ground Pin	Connect to Ground
E9	GND		Ground Pin	Connect to Ground
F1	GND		Ground Pin	Connect to Ground
F2	EEPROM_WP		Digital Input	Internal EEPROM Write Protect (Active High)
F3	USB_P		Digital I/O	USB direct is not yet supported by the IC and therefore put to GND. If USB will be supported in the next revision, pin would be → USB Data In/Out Check also [1]
F4	USB_M		Digital I/O	USB direct is not yet supported by the IC and therefore put to GND. If USB will be supported in the next revision, pin would be

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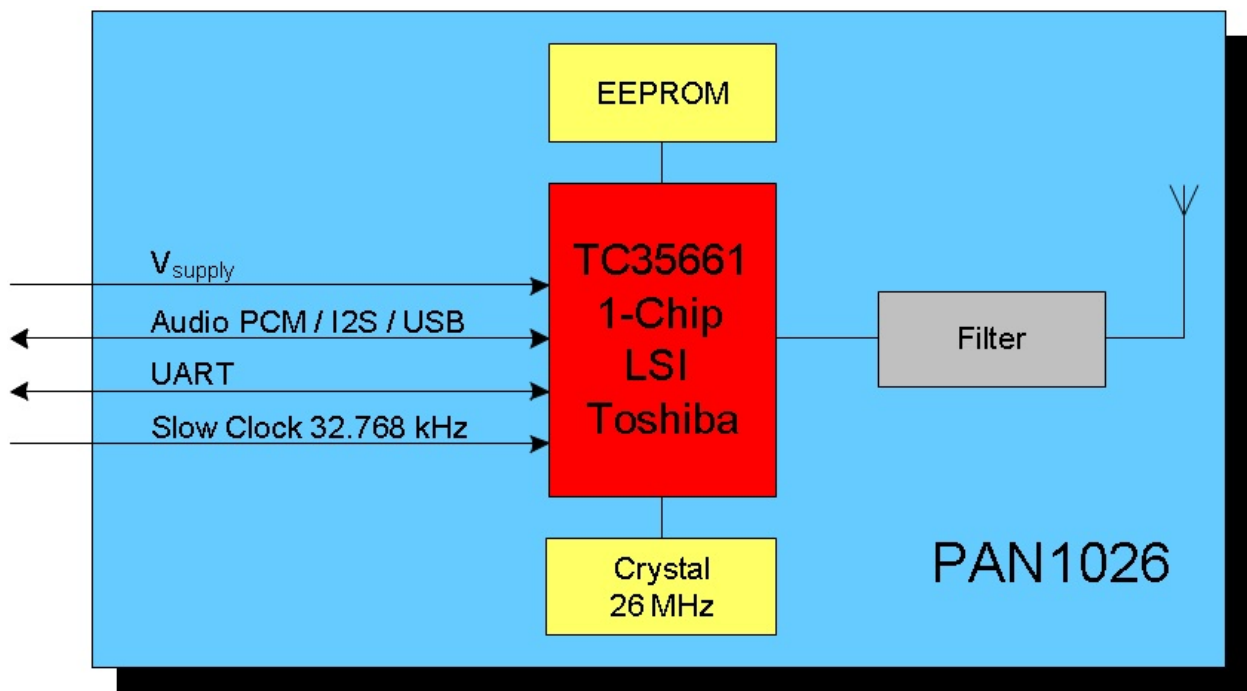
No	Pin Name	GPIO Number	Pin Type	Description
				→ USB Data In/Out Check also [1]
F5	UART CTS		Digital Input	UART CTS
F6	SLEEPCLK		Digital Input	Input Clock for 32.768KHz
F7	UARTTXD		Digital Output	UART TX
F8	UARTRTS		Digital Output	UART RTS
F9	GND		Ground Pin	Connect to Ground
F11	GND		Ground Pin	Connect to Ground
F12	GND		Ground Pin	Connect to Ground

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## 7 BLUETOOTH FEATURES

- Bluetooth 4.0 dual mode technology.
- Class 2 TX power w/o external PA, improving link robustness.
- Excellent link budget (up to 91 dB), enabling long-range applications.
- Embedded SPP- and BLE Gatt profiles

## 8 BLOCK DIAGRAM



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## 9 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

## 10 GENERAL DEVICE REQUIREMENTS AND OPERATION

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

### 10.1 ABSOLUTE MAXIMUM RATINGS

No	See <sup>2</sup>	Value	Unit
Ratings Over Operating Free-Air Temperature Range			
1	Voltage on any digital pin	-0.3 to VDD+0.3	V
2	Operating ambient temperature range	-40 to 85	°C
3	Storage temperature range	-40 to 125	°C
4	Bluetooth RF inputs	10	dBm
5	ESD: All pads, according to human-body model, JEDEC STD 22, method A114 According to charged-device model, JEDEC STD 22, method C101	1000 500	V

### 10.2 RECOMMENDED OPERATING CONDITIONS

No	Rating	Min	Typ	Max	Unit
1	Power supply voltage	1.7	1.8	1.9	V
1	Power supply voltage	2.7	3.3	3.6	V
2	Maximum ambient operating temperature		-40	85	°C

<sup>2</sup> 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.

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### 10.3 CURRENT CONSUMPTION

The current consumption is dependant on the user scenario and the setup and timing in the low power modes.

No	Characteristics	Condition	Min	Typ	Max	Unit
1	Idle Current	After reset was pulled down.		7.8		mA
2	During Connection	Sending 3-DH5 packets. Max. output power.		62		mA
3	During Connection	Sending DH5 packets. Max. output power.		62		mA
4	During Connection	Sending DH3 packets. Max. output power.		61		mA
5	During Connection	Sending DH1 packets. Max. output power.		55		mA

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## 11 BLUETOOTH RF PERFORMANCE

### 11.1 BLUETOOTH CHARACTERISTICS

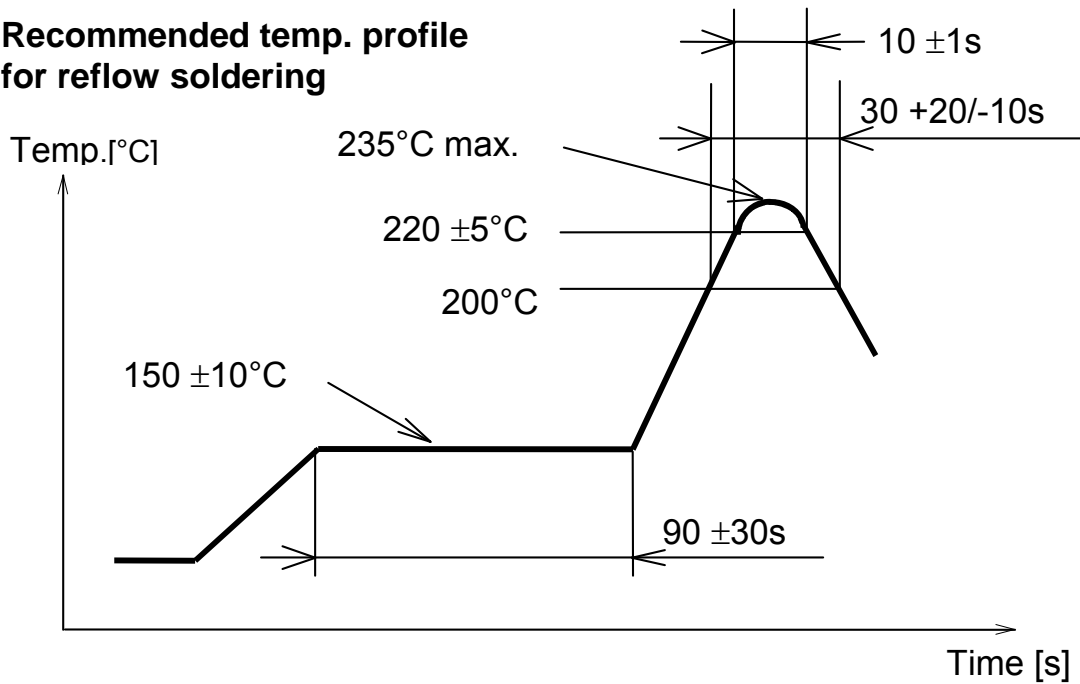
No	Characteristics	Condition	Min	Typ	Max	BT Spec	Unit
1	Operation frequency range		2402		2480		MHz
2	Channel spacing	BT-Classic/BLE		1/2			MHz
3	Output Power	Maximum setting, measured at dual ended 50ohm.		4			dBm
4	Sensitivity			-87			dBm

No	Characteristics	Condition	Typ	Max	Unit
1	Spurious emissions	Conducted measurement with a 50-Ω dual-ended load. Complies with EN 300 328, EN 300 440 class 2, FCC CFR47, Part 15 and ARIB STD-T-66	<-30		dBm

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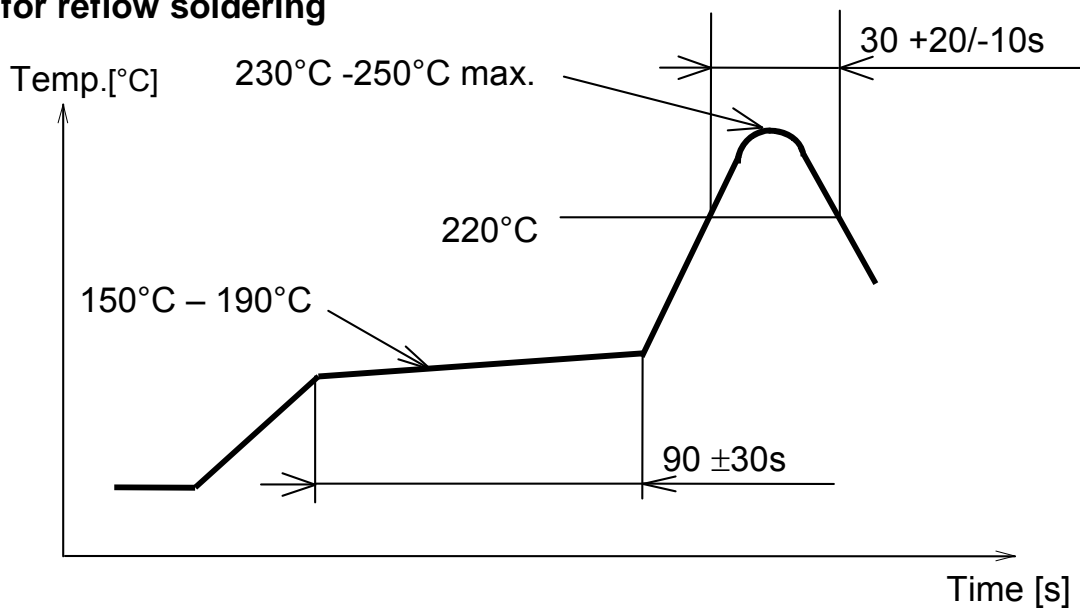
12 SOLDERING TEMPERATURE-TIME PROFILE (FOR REFLOW SOLDERING)  
12.1 FOR LEAD SOLDER

**Recommended temp. profile  
for reflow soldering**



12.2 FOR LEADFREE SOLDER

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

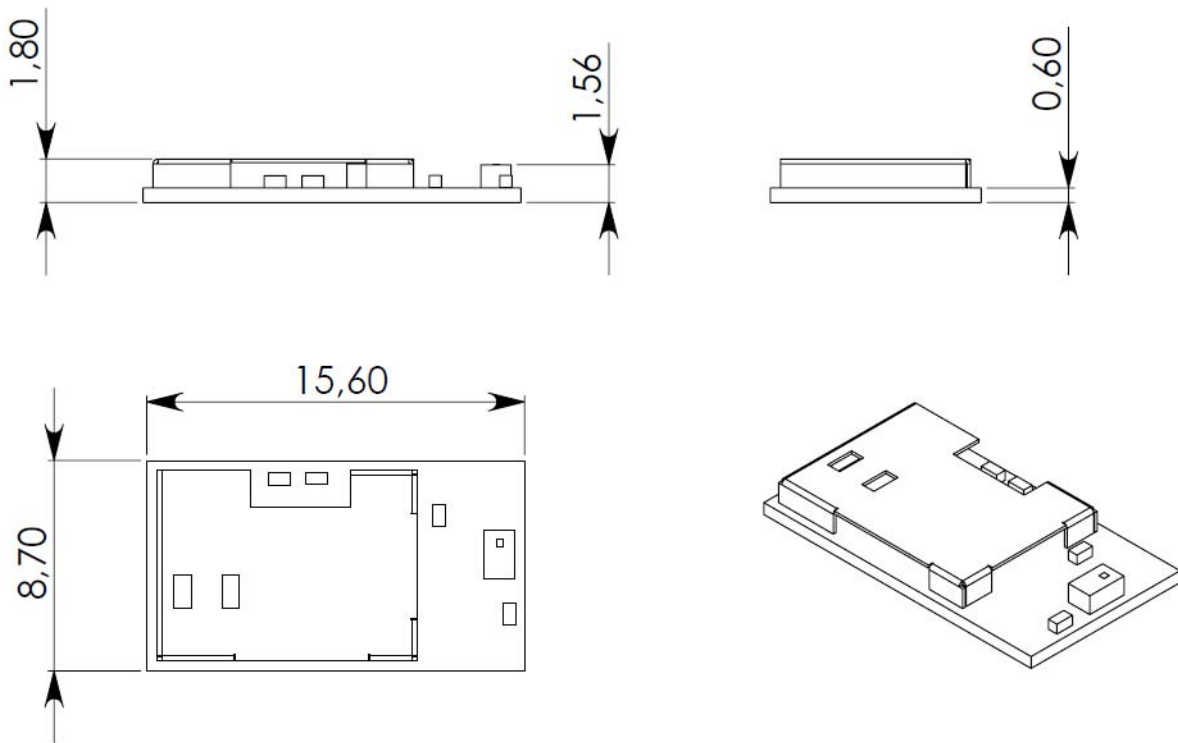


Reflow permissible cycle: 2  
Opposite side reflow is prohibited due to module weight.

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### 13 MODULE DIMENSION

No.	Item	Dimension	Tolerance	Remark
1	Width	8.70	$\pm 0.20$	
2	Length	15.60	$\pm 0.20$	
3	Height	1.80	$\pm 0.20$	With case

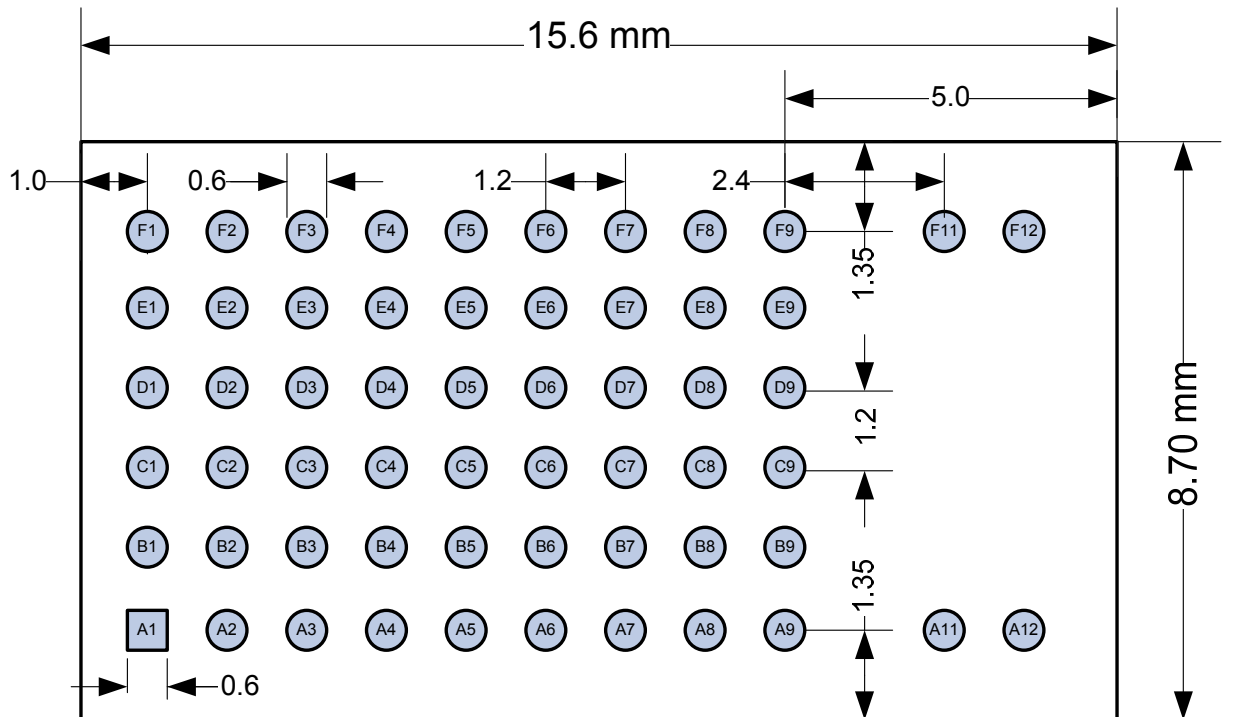




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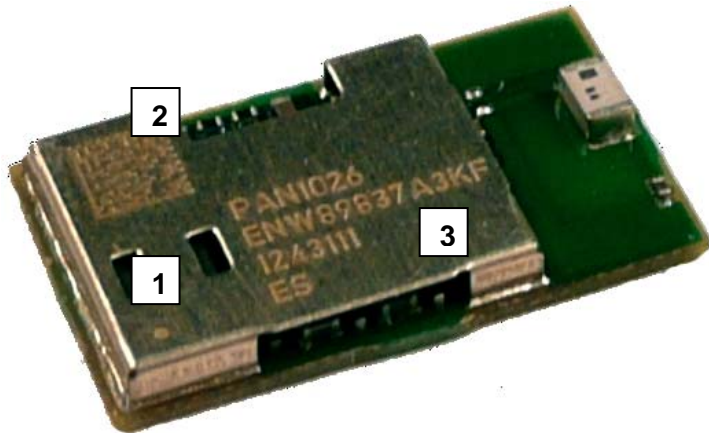
#### 14 PAN1026 FOOTPRINT OF THE MODULE

All dimensions are in millimeters.  
The outer dimensions have a tolerance of  $\pm 0.2\text{mm}$ .  
Top view, Application PCB



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## 15 CASE MARKING



No.	Remark
1	Marking for Pin 1 (Circle 0,15 mm)
2	2D-Code, for internal usage only and can be change without any notice
3	Marking definition see chapter 15.1

### 15.1 EXAMPLE FOR MARKING

P	A	N	1	0	2	6			H	W	/	S	W			
E	N	W	8	9	8	3	7	A	3	K	F					
Y	Y	W	W	D	L	L										
F	C	C	I	D	:		T	7	V	P	A	N	1	0		

### 15.2 MARKING DEFINITION

(1) Pin1 marking

(2) 2D code (Serial number)

(3) Marking:

PAN1026 (Model Name), HW/SW (Hardware/Software version)

ENW89837A3KF (Part Number, refer to chapter 20 Ordering Information)

Lot code (YearYear, WeekWeek, Day, LotLot)

ES (Engineering Sample marking)

## 16 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 12.2

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## 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 a) 20min. / cycle,1hrs. each of XYZ axis b) Freq.:30~100Hz, 6G 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.; 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.

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## 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.
- (10) For more details on LGA (Land Grid Array) soldering processes refer to the application note.

## 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 before 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.

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#### 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 Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, or NO<sub>X</sub>
  - 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 dual 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.

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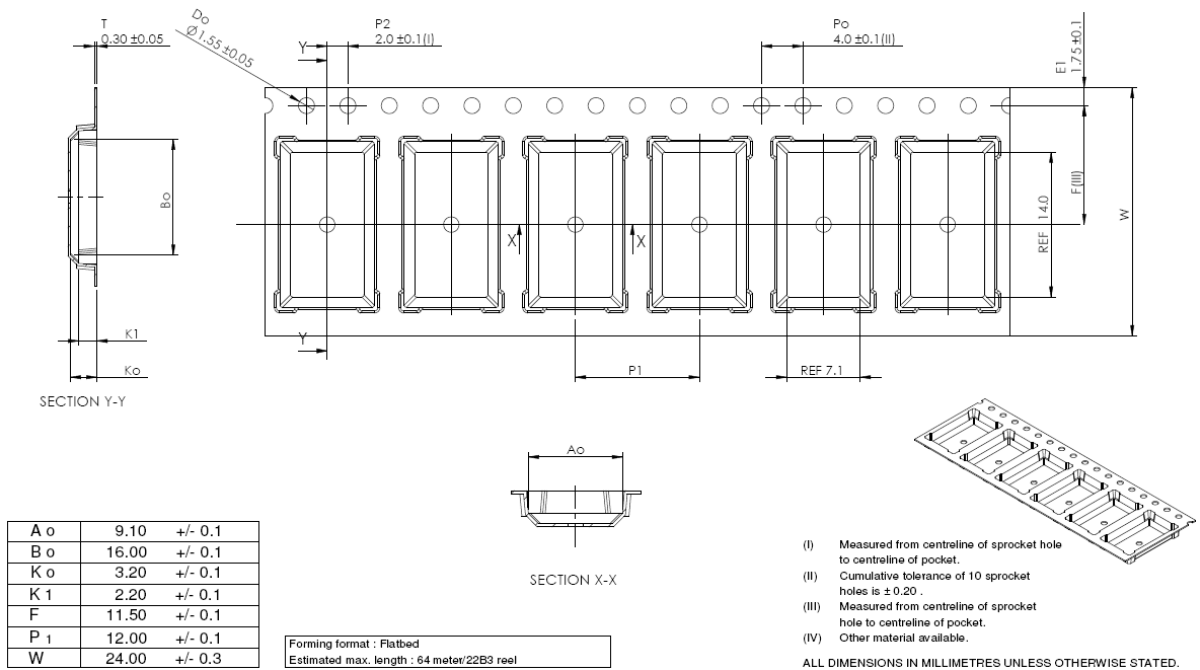
- In an environment with a high concentration of harmful gas (e.g. salty air, HCl, Cl<sub>2</sub>, SO<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, and NO<sub>x</sub>)
- (6) If an abnormal voltage is applied due to a problem occurring in other components or circuits, replace these products with new products 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.

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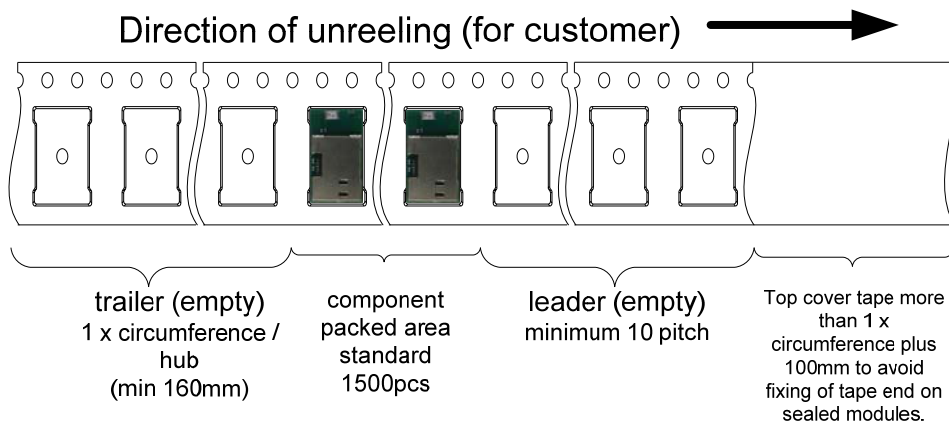
## 19 PACKAGING

If the product has mass production status, indicated in chapter 25, we will deliver the module in the package which are described below.

### 19.1 TAPE DIMENSION



### 19.2 PACKING IN TAPE

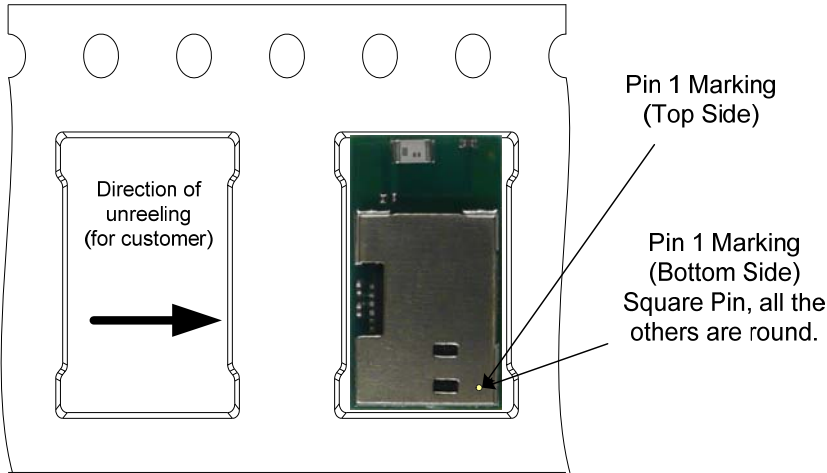


Empty spaces in component packed area shall be less than two per reel and those spaces shall not be consecutive.

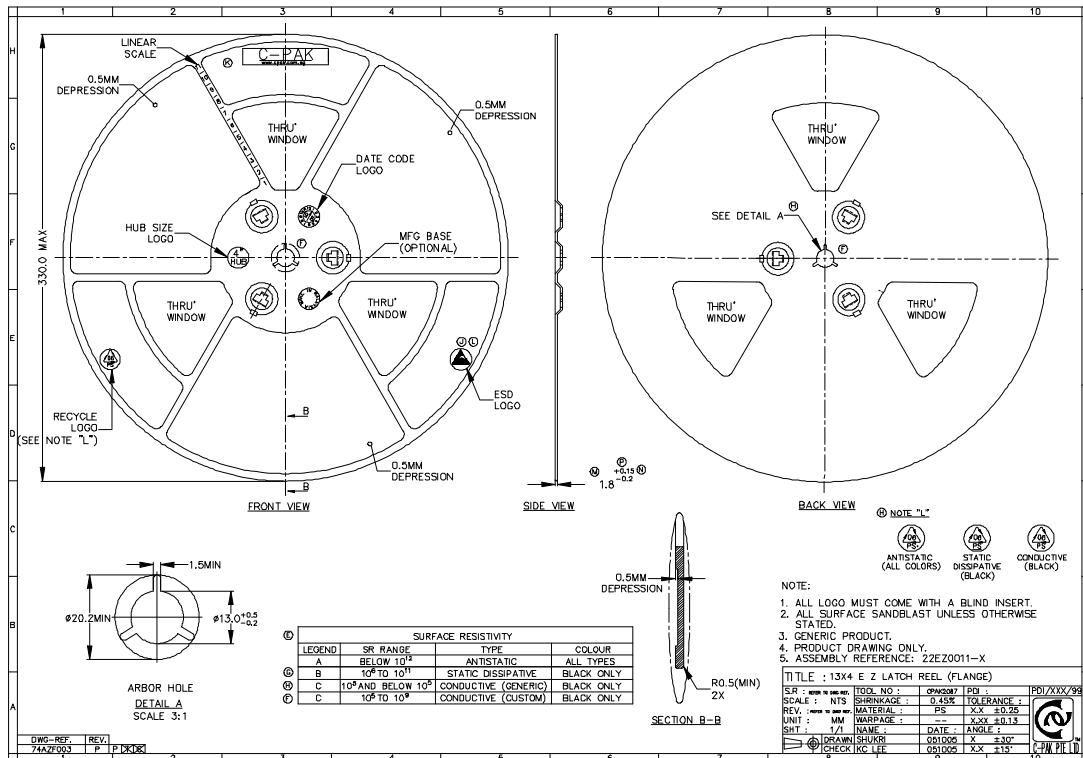
Top cover tape shall not be found on reel holes and shall not stick out from reel.

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### 19.3 COMPONENT DIRECTION



### 19.4 REEL DIMENSION

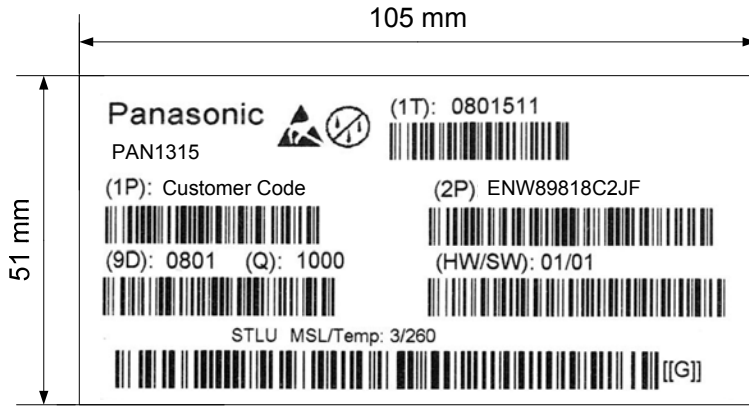




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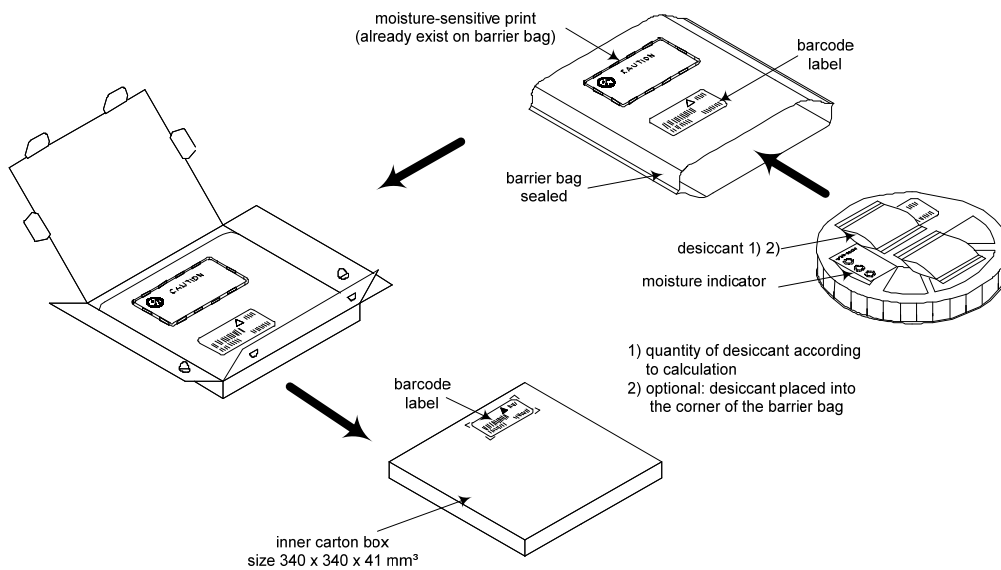
### 19.5 LABEL FOR PACKAGE

The picture shows an example from similar product.



(1T)	Lot code [YYWDDL]	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: ENW89837A3KF	
(9D)	Date code as [YYWW]	
(Q)	Quantity [XXXX], variable max. 1500	
(HW/SW)	Hardware /Software Release	
	Hardware01 Indicates the HW revision.	
	Software 01 Indicates the SW revision.	

### 19.6 TOTAL PACKAGE



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## 20 ORDERING INFORMATION

Ordering part number	Description	MOQ <sup>(1)</sup>
ENW89837A3KF <sup>(2)</sup>	PAN1026 CLASS 2 Bluetooth dual mode Module according BT-4.0. <i>Bluetooth®</i> smart ready device	1500

### Notes:

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

**Available now:** Bluetooth 2.1 SPP embedded.

**Available Q2/13:** Bluetooth 2.1 SPP embedded – Bluetooth 4.0 LE GATT/GAP will be available Q2/2013

All HW versions 05 and above will support Bluetooth 2.1 SPP embedded – Bluetooth 4.0 LE GATT/GAP.

See chapter 15 about details for case marking.

## 21 INFORMATION REGARDING SOFTWARE VERSIONS

The version number of the embedded software can be read out by an extended HCI command.

The extended HCI command class < HCI\_M2\_Message\_Get >" allows the reading of the firmware version. Pls refer to the extended HCI command list of TC35661 LSI.

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## 22 SOFTWARE

The module software offers both embedded Bluetooth HCI (Host Control Interface), extended HCI and TCU (Toshiba Control Unit) Command interfaces via the embedded UART interface

- a) HCI commands are standard according to Bluetooth standard specifications.
- b) Extended HCI commands are available for device control, such as RF control, BD\_ADDR control, firmware version control, embedded IO control, maintenance tasks etc. Please refer to the "Extension HCI Command Document".
- c) The PAN1026 includes the Bluetooth LSI TC35661 incorporating Bluetooth stack and SPP profile and BLE GATT profile. The profile application interface is described in the "SPP Command Interface Document" (about 14 commands) and the "Bluetooth Basic Management Command Interface Document" (about 46 commands). The related high level commands are called "TCU" commands.

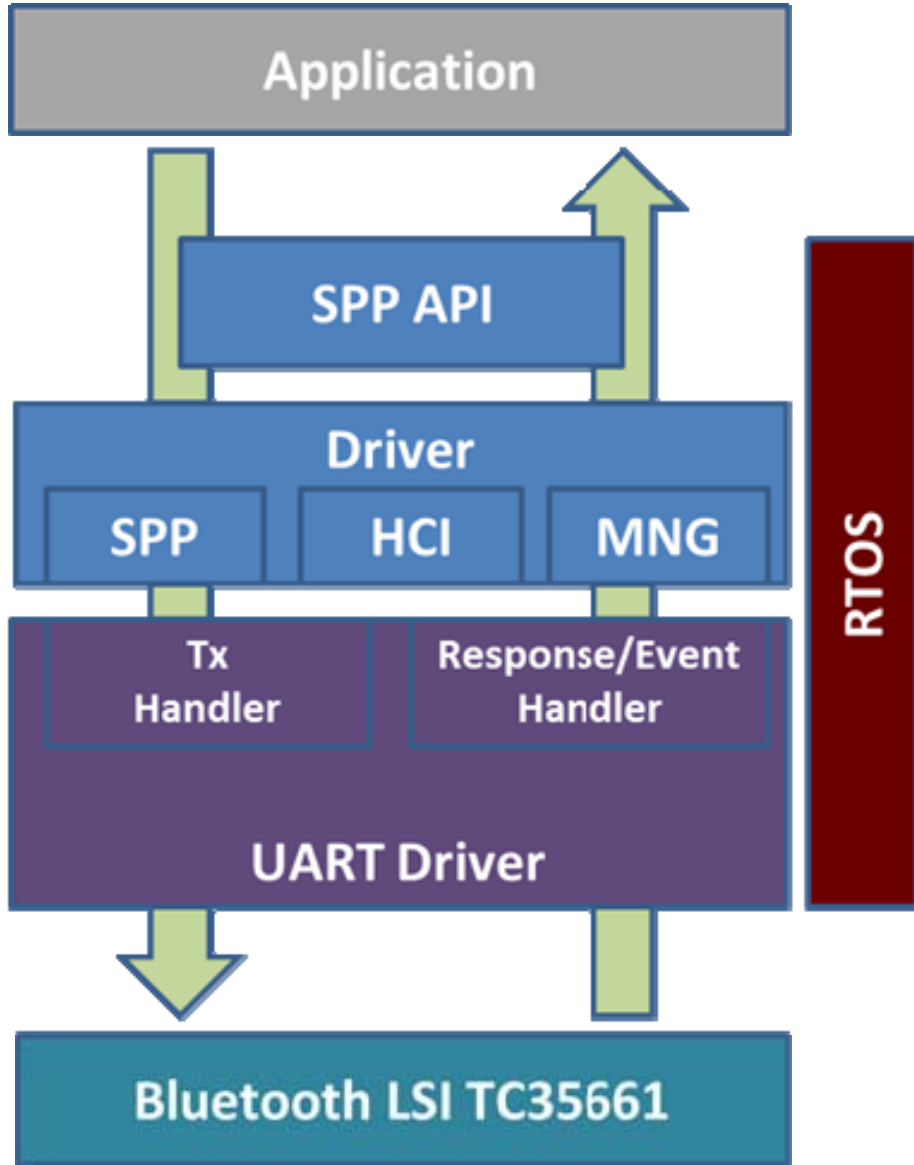
The "SPP Message Sequence Chart Document" and the "Bluetooth Management Message Sequence Chart Document" describe the logical and sequential procedure to use those commands.

- d) After RESET of the module, the module starts in HCI mode. The "Bluetooth LSI TC35661 Application Note" describes how to start the device and enter into "TCU" mode thereafter.
- e) The LSI Supplier (Toshiba) offers SPP drivers, that allows a further abstraction towards the application software including SPP programming examples. This is documented in the "BT SPP API Specification", the "BT SPP Driver Specification" and the "BT SPP Application Note". The "SPP API" offers a few high-level APIs for LSI initialization, connection setup and communication with a remote SPP device. The user has full control over all LSI features by utilizing the lower-level "SPP Drivers". The drivers take care for issuing commands and data to the LSI and they handle the responses from the TC36661. The "Application Note" includes a SPP programming example and shows the integration with a RTOS."

All documents are available on respective Panasonic or Toshiba websites.

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23 SOFTWARE BLOCK DIAGRAM



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## 24 ROHS AND REACH DECLARATION

Hereby we declare to our best present knowledge based on declaration of our suppliers that this product follows the latest official RoHS and REACH Directive.

### Panasonic

Panasonic Industrial Devices Slovakia s.r.o  
Oravicka 616, 028 01 TRSTENIA

Tel: +421(0)43 5303 200  
Fax: +421(0)43 5303 207



Dear Customer,

Date: 20.11.2012

*Panasonic Industrial Devices Slovakia s.r.o.*, guarantee that:

#### Directive 1907/2006 (REACH)

Substances from the candidate lists of so called "substances of very high concern" (SVHC) published by ECHA are regular monitored if SVHC substances are contained in our products above **0.1% (w/w)**.

Due to the high complexity of these substance investigations covering all of our global suppliers, this process required some time. We will provide you with all substance information regarding our products base on information collected from our suppliers.

*Panasonic Industrial Devices Slovakia s.r.o.* hereby declares that all products manufactured and delivered to your company have SVHC substances < **0.1% (w/w)**.

#### **SVHC Substances:**

SVHC Candidate list 1	(28/10/2008)	[15 Substances]
SVHC Candidate list 2	(13/01/2010)	[12 Substances]
SVHC Candidate list 2	(30/03/2010)	[1 Substance]
SVHC Candidate list 3	(18/06/2010)	[8 Substances]
SVHC Candidate list 4	(15/12/2010)	[8 Substances]
SVHC Candidate list 5	(20/06/2011)	[7 Substances]
SVHC Candidate list 6	(19/12/2011)	[20 Substances]
SVHC Candidate list 7	(18/06/2012)	[13 Substances]

#### Directive 2011/65/EC (RoHS)

We confirm that all products supplied to you including package do not contain 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.

Wireless Modules (ENW898series; ENW596series; ENWC9Aseries)

Create:	Kostalikova Alena	Check:	Firmentova Viera	Approval:	Kashiwaya Shinichi
EQ		QA&QC		Managing Director	

For the most updated one, please refer to [5].

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## 25 DATA SHEET STATUS

This data sheet contains the preliminary specification.

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

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

Use this URL to search for the most recent version of this data sheet: [PAN1026 Datasheet](#)

## 26 HISTORY FOR THIS DOCUMENT

Revision	Date	Modification / Remarks
0.1	November 2012	1 <sup>st</sup> preliminary version.
0.2	January 2013	Update chapter 24 with the latest declaration. Correct chapter 10.3 with the latest current values measured on the reference design. Made the description for the USB ports in chapter 6.2 more precised.

## 27 RELATED DOCUMENTS

For an update, please search in the suitable homepage.

- [1] PAN1026ETU Design-Guide (Release planned Q1/2013)
- [2] EasySPP Evaluation Software <http://pideu.panasonic.de/pdf/185ext.zip>
- [3] Semiconductor Website: <http://www.toshiba-components.com/bluetooth/index.html>
- [4] Application Note Land Grid Array  
<http://www.pideu.panasonic.de/pdf/184ext.pdf>
- [5] REACH and RoHS Certificate  
<http://www.pideu.panasonic.de/pdf/182ext2.jpg>

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## 28 GENERAL INFORMATION

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All rights reserved.

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 disclaims any liability for consequential and incidental damages.

In case of any questions, please contact your local sales partner or the related product manager.

## 29 REGULATORY INFORMATION

### 29.1 FCC NOTICE



The devices PAN1026, for details refer to Chapter 20, including the antennas, which are listed in 29.5, complies with Part 15 of the FCC Rules. The device meets the requirements for modular transmitter approval as detailed in FCC public Notice DA00-1407.transmitter 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.

### 29.2 CAUTION



The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Panasonic Industrial Devices Europe GmbH may void the user's authority to operate the equipment.

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 or more of the following measures:

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- 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

### 29.3 LABELING REQUIREMENTS



The Original Equipment Manufacturer (OEM) must ensure that FCC labeling requirements are met. This includes a clearly visible label on the outside of the OEM enclosure specifying the appropriate Panasonic FCC identifier for this product as well as the FCC Notice above. The FCC identifier are **FCC ID: T7VPAN10**. This FCC identifier is valid for all PAN1026 modules, for details, see the Chapter 20. Ordering Information.

In any case the end product must be labelled exterior with "Contains FCC ID: T7VPAN10"

### 29.4 ANTENNA WARNING



For the related part number of PAN1026 refer to Chapter 20. Ordering Information.

This devices are tested with a standard SMA connector and with the antennas listed below. When integrated in the OEMs product, these fixed antennas require installation preventing end-users from replacing them with non-approved antennas. Any antenna not in the following table must be tested to comply with FCC Section 15.203 for unique antenna connectors and Section 15.247 for emissions. The FCC identifier for this device with the antenna listed in item 1 are the same (FCC ID: T7VPAN10).

### 29.5 APPROVED ANTENNA LIST

Note: We are able to qualify your antenna and will add to this list as that process is completed.

Item	Part Number	Manufacturer	Frequency Band	Type	Gain (dBi)
2	LDA212G3110K	Murata	2.4GHz	Chip-Antenna	+0.9

### 29.6 RF EXPOSURE PAN1026



To comply with FCC RF Exposure requirements, the Original Equipment Manufacturer (OEM) must ensure that the approved antenna in the previous table must be installed.

The preceding statement must be included as a CAUTION statement in manuals for products operating with the approved antennas in the previous table to alert users on FCC RF Exposure compliance.

Any notification to the end user of installation or removal instructions about the integrated radio module is not allowed.

The radiated output power of PAN1026 with mounted ceramic antenna (**FCC ID: T7VPAN10**) is far below the FCC radio frequency exposure limits. Nevertheless, the PAN1026 shall be used in such a manner that the potential for human contact during normal operation is minimized.

End users may not be provided with the module installation instructions. OEM integrators and end users must be provided with transmitter operating conditions for satisfying RF exposure compliance.



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### 30 INDUSTRY CANADA CERTIFICATION

PAN1026 is licensed to meet the regulatory requirements of Industry Canada (IC),  
license: IC: 216Q-PAN10

Manufacturers of mobile, fixed or portable devices incorporating this module are advised to clarify any regulatory questions and ensure compliance for SAR and/or RF exposure limits. Users can obtain Canadian information on RF exposure and compliance from [www.ic.gc.ca](http://www.ic.gc.ca).

This device has been designed to operate with the antennas listed in Table 20 above, having a maximum gain of 0.9 dBi. Antennas not included in this list or having a gain greater than 0.9 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms. The antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Due to the model size the IC identifier is displayed in the installation instruction only and can not be displayed on the modules label due to the limited size (8.7x15.6mm).

#### 30.1 IC NOTICE



The devices PAN1026, for details refer to Chapter 20, including the antennas, which are listed in 29.5, complies with Canada RSS-GEN Rules. The device meets the requirements for modular transmitter approval as detailed in RSS-GEN. 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.

#### 30.2 LABELING REQUIREMENTS



The Original Equipment Manufacturer (OEM) must ensure that IC labeling requirements are met. This includes a clearly visible label on the outside of the OEM enclosure specifying the appropriate Panasonic IC identifier for this product as well as the IC Notice above. The IC identifier is 216Q-PAN10. This IC identifier is valid for all PAN1026 modules, for details, see the Chapter 20. Ordering Information.

In any case the end product must be labelled exterior with "Contains IC: 216Q-PAN10"

### 31 EUROPEAN R&TTE DECLARATION OF CONFORMITY

Hereby, Panasonic Industrial Devices Europe GmbH, declares that the Bluetooth module PAN1026 and their versions is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. As a result of the conformity assessment procedure described in Annex III of the Directive 1999/5/EC, the end-customer equipment should be labelled as follows:



PAN1026 and their versions in the specified reference design can be used in the following countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, The Netherlands, the United Kingdom, Switzerland, and Norway.

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### 32 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.

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