

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	1 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

Product Specification

Applicant / Manufacturer
Hardware

Panasonic Industrial Devices Europe GmbH
Zeppelinstrasse 19
21337 Lüneburg
Germany

Applicant / Manufacturer
Software

Please refer to chapter 23 Ordering Information

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	CHECKED	DESIGNED
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CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	2 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

TABLE OF CONTENTS

1.	Key Features.....	4
2.	Applications for the Module.....	4
3.	Description for the Module.....	4
4.	Scope of this Document.....	5
5.	History for this Document.....	5
6.	Terminal Layout.....	6
7.	Block Diagram.....	8
	7.1. PAN2580-868MHz.....	8
	7.2. PAN2580-915MHz.....	8
8.	Key Parts List.....	9
9.	Test Conditions.....	9
10.	Absolute Maximum Ratings.....	9
11.	Operating Conditions.....	10
12.	DC electrical characteristics.....	10
13.	A/D converter Characteristics.....	11
14.	AC Electrical Characteristics.....	12
15.	Soldering Temperature - Time Profile for reflow soldering.....	13
	15.1. For lead solder.....	13
	15.2. For lead free solder.....	13
16.	Module Dimensions.....	14
	16.1. SMD Module PAN2580 / ENW59625xxxF.....	14
	16.2. Pin Header Module PAN2580ETU / ENW59635xxxF.....	14
17.	FootPrint of the Module.....	15
	17.1. SMD Module PAN2580 / ENW59625xxxF.....	15
	17.2. PIN HEADER MODULE PAN2580ETU / ENW59635xxxF.....	16
18.	Recommended Land Pattern.....	17
	18.1. SMD Module PAN2580 / ENW59625xxxF.....	17
	18.2. Pin Header Module PAN2580ETU / ENW59635xxxF.....	18
19.	Laser marking.....	19
20.	Reliability Tests.....	20
21.	Cautions.....	20
	21.1. Design Notes.....	20
	21.2. Installation Notes.....	21
	21.3. Usage Conditions Notes.....	21
	21.4. Storage Notes.....	21
	21.5. Safety Cautions.....	22
	21.6. Other cautions.....	22
22.	Packaging of SMD Module PAN2580 ENW59625xxxF.....	23
	22.1. Tape Dimension.....	23

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	3 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

22.2. Packing in Tape	23
22.3. Component direction.....	24
22.4. Reel Dimension	24
22.5. Label for Package.....	25
22.6. Total Packing Handling.....	26
22.7. Cover tape reel strength	26
23. Ordering Information	27
24. RoHS Declaration	28
25. Data Sheet Status	28
26. Regulatory Information.....	28
26.1. FCC Notice	28
26.2. Caution	28
26.3. Labeling Requirements.....	29
26.4. Antenna Warning	29
26.5. Approved Antenna List	29
26.6. RF Exposure PAN2580	30
27. Industry Canada Certification.....	30
28. European R&TTE Declaration of Conformity	30
29. Related Documents.....	31
30. General Information	31
31. Life Support Policy	32

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	4 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

1. KEY FEATURES

- Available as small size SMD device (29.8mm x 19.0mm x 2.7mm) or ETU (Easy to use) with pin header (33.9 x 33.9 x 7.3mm)
- 868MHz (Europe) or 915MHz (USA)
- 3 antenna options: Single port 50Ω, ceramic antenna or plug
- 250 kbps RF raw data rate (150kbps with SNAP®)
- Low power modes for increased battery life
- High sensitivity: -97dBm typ. @ 150kbps & 1% Packet Error Rate
- +18 dBm @ 915MHz or +13 dBm @ 868 MHz max. P_{out}
- programmable over a 20 dB range
- Low supply voltage (2.7 V to 3.6 V, 3.0 V typ.)
- Operating temperature range -40°C to +85°C
- 192k total Flash with 64k used by SNAP® core, 64k free for uploadable SNAPpy scripts, and 64k reserved.
- 1 UART with HW Flow Control for control or transparent data
- 19 GPIOs and up to 18 A/D inputs with 10 Bit ADC for fast and easy conversion from analog inputs -such as temperature, pressure and fluid levels- to digital values.
- GFSK Modulation with FHSS (Spreading Method) when using SNAP®, otherwise also FSK and OOK is possible
- Mesh (SNAP®) Mesh networking Topology
- Manufactured in conformance with RoHS

2. APPLICATIONS FOR THE MODULE

- Automatic Meter Reading
- Inventory management, Factory- and home automation
- Wireless Sensor Networks, e.g. Lighting Control
- Monitoring (environmental, patient or fitness)

3. DESCRIPTION FOR THE MODULE

The PAN2580 module is a short range, low power, 868MHZ or 915MHz ISM band transceiver which includes a complete 802.15.4 physical layer (PHY). It is designed for the IEEE 802.15.4 wireless standard. Using an appropriate microcontroller (MCU) with reference oscillator provides a cost effective solution for short range data links and networks.

The PAN2580 use the MCU with integrated Transceiver Si100x from Silicon Labs

It comes pre-loaded with the Synapse SNAP® mesh network operating system.

Please contact your local sales office for further details on additional options and services, by visiting www.panasonic.com/rfmodules or write an e-mail to wireless@eu.panasonic.com.

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	5 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

4. SCOPE OF THIS DOCUMENT

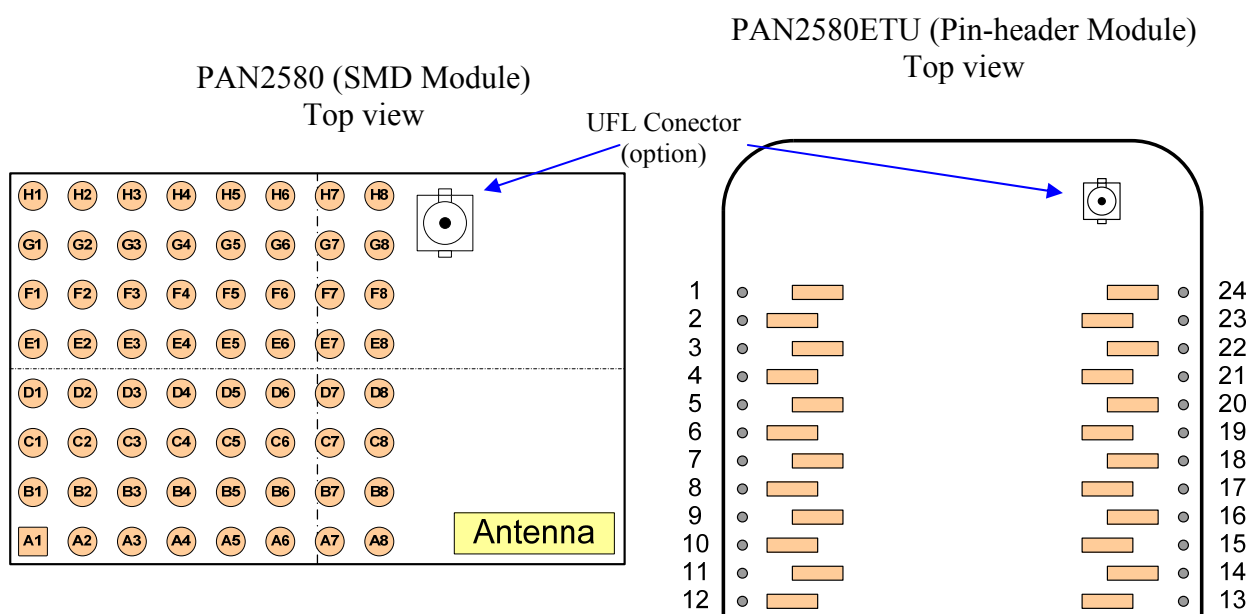
This product specification applies to Panasonic's 802.15.4 Modem PAN2580 // ENW59625xxxF. Different versions of the PAN2580 are available (refer to chapter 23).

5. HISTORY FOR THIS DOCUMENT

Revision	Date	Modification / Remarks
1.0	07.09.2011	Initial draft version
1.1	15.11.2012	Add Pin-Header Module PAN4580ETU

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	6 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

6. TERMINAL LAYOUT



Pin No. PAN2580	Pin No. PAN4580ETU	Pin Name	SNAPpy IO ¹	Description
A1, A8, B8, C8, D8, F8, G8, H1, H8	1, 24	GND		DC Power supply, 0V
A2, A3	21	VCC		DC Power supply, typical 3V (2.7 ~ 3.6V)
A4	3	P2.2	11	GPIO_1, ADC18, I2C SCL
A5	4	P2.3	12	GPIO_2, ADC19
A6	16	P1.6	(7)	Not Available, Do Not Connect (used for access to the onboard external memory)
A7	14	P1.7	(8)	Not Available, Do Not Connect (used for access to the onboard external memory)
B4	2	P2.1	10	GPIO_0, ADC17, I2C SDA
B5	5	P2.4	13	GPIO_3, ADC20
B6	15	P1.5	(6)	Not Available, Do Not Connect (used for access to the onboard external memory)
B7	13	P2.0	(9)	Not Available, Do Not Connect (used for access to the onboard external memory)
C4	20	ANT_A	18	GPIO_18 (Output Only)
C5	12	P0.2_XTAL1	1	GPIO_10, ADC2, UART0 RTS Input

¹ When using SNAP® Software by Synapse Wireless, Inc.

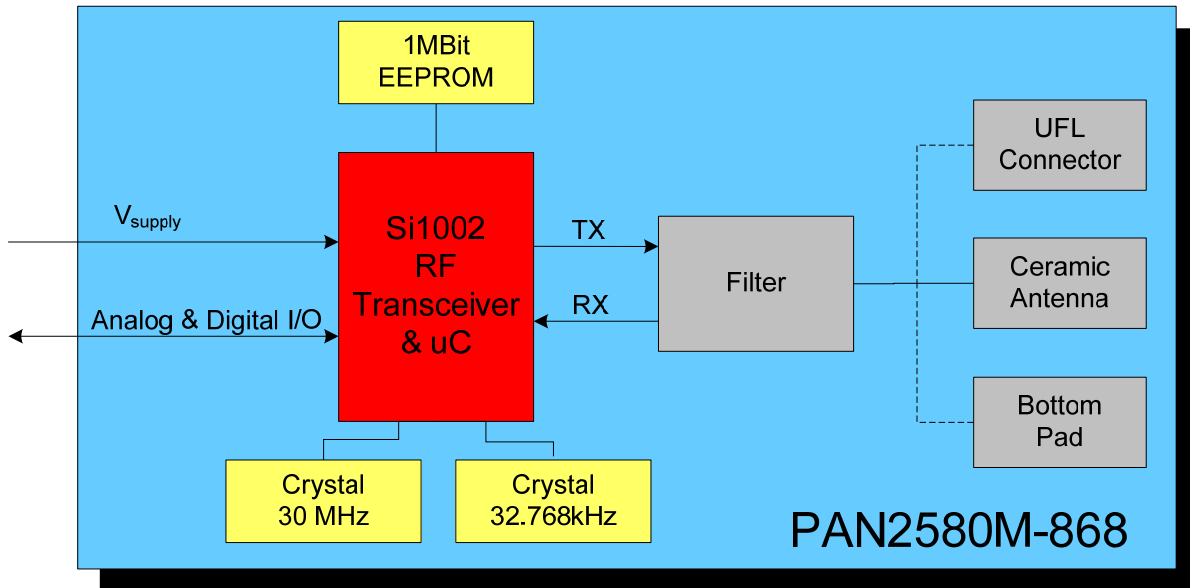
CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	7 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

Pin No. PAN2580	Pin No. PAN4580ETU	Pin Name	SNAPpy IO ¹	Description
E3	19	GPIO_0	17	GPIO_0 (General Purpose I/O)
E8		RF IN/OUT		EZRadioPRO peripheral transmit RF output / input pin (only ENW59625CxxF, other modules NC)
F4	8	P0.0_VREF	0	GPIO_6, ADC0, Interrupt, External Voltage Reference, SPI MISO
G2	6	P2.5	14	GPIO_4, ADC21, SPI MOSI
G3	11	P0.3_XTAL1	2	GPIO_9, ADC3, UART0 CTS Output
G4	9	P0.5_RX	4	GPIO_7, ADC5, Interrupt, UART0 Rx Data Input
G5	17	P=0.6_CNVSTR	5	GPIO_15, ADC6, External "Start Conversion" for ADC0
H2	18	P2.7_C2D	16	GPIO_16 (limited drive strength as it is routed through a 1Kohm resistor. The signal driven from (or to) GPIO16 can also be read, or driven, on pin H6, the debug pin.
H3	7	P2.6	15	GPIO_5, ADC22, SPI SCLK
H4	10	P0.4_TX	3	GPIO_8, ADC4, Interrupt, UART0 Tx Data Output
H5	23	RESET#_C2D		Module Reset, Active Low
H6	22	P2.7_C2D		Background Debug Communications
B1, B2, B3, C1, C2, C3, C6, C7, D1, D2, D3, D4, D5, D6, D7, E1, E2, E4, E5, E6, E7, F1, F2, F3, F5, F6, F7, G1, G6, G7, H7		NC		-

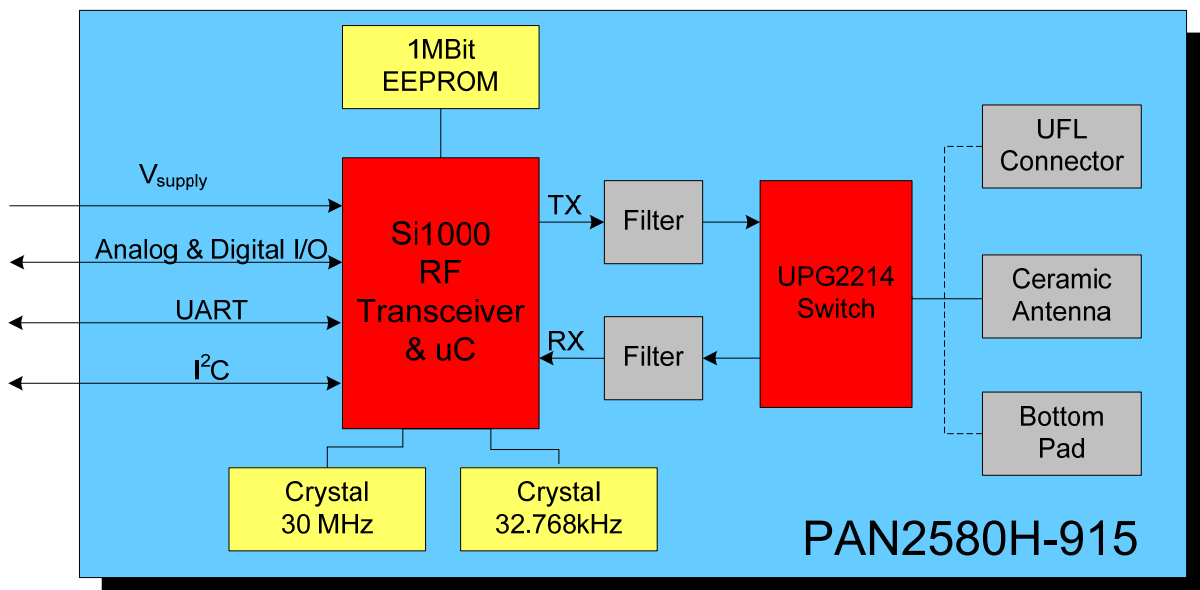
CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	8 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

7. BLOCK DIAGRAM

7.1. PAN2580-868MHZ (ENW59625xxCF, ENW59635xxCF)



7.2. PAN2580-915MHZ (ENW59625xxDF, ENW59635xxDF)



CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	9 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

8. KEY PARTS LIST

Part Name	Material
P.W.Board	Glass cloth epoxide resin with gold plating
Casing	Material: C7521, thickness 0.15mm
IC part name	SI1000 (ENW596x5xxDF) or SI1002 (ENW596x5xxCF) SiLabs, www.silabs.com

9. TEST CONDITIONS

Measurements are made under room temperature and humidity unless otherwise specified.

Temperature	25 ± 10°C
Humidity	40 to 85%RH
Supply voltage	3.0V

10. ABSOLUTE MAXIMUM RATINGS

The maximum ratings may not be exceeded under any circumstances, not even momentarily and individually, as permanent damage to the module will result.

No.	Item	Symbol	Absolute Maximum Ratings	Unit
1	Ambient Temperature under Bias	T _{op}	-40 to +85	°C
2	Storage Temperature	T _{stg}	-40 to +85	°C
3	Supply voltage ⁽¹⁾	V _{CC}	-0.3 to +3.6	Vdc
4	Voltage on any Px.x I/O Pin or RST with Respect to GND	V _{in}	-0.3 to V _{CC} +0.5	Vdc
5	Maximum Total Current through all Px.x Pins	I _{in}	200	mA
6	ESD on any pin except for optional pins E8 (RF in/out) and UFL connector. Human Body Model (HBM)	V _{THHBM1}	±2	kV
7	ESD on optional pins E8 (RF in/out) and UFL connector. Human Body Model (HBM)	V _{THHBM2}	±1	kV
8	Surface Mount Solder Reflow Temperature	T _{Death}	Please refer to chapter 15.2.	

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	10 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

No.	Item	Symbol	Absolute Maximum Ratings	Unit
9	Moisture Sensitivity Level	MSL	4 (72 hours)	

Notes:

- (1) The supply voltage must be free of AC ripple voltage (for example from a battery or a low noise regulator output). For noisy supply voltages, please provide a decoupling circuit (for example a ferrite in series connection and a blocking capacitor to ground).

11. OPERATING CONDITIONS

No.	Item	Condition / Remark	Symbol	Value			Unit
				Min	Typ	Max	
1	Supply voltage	The typical value is recommended	V_{CC}	2.7	3.0	3.6	Vdc
2.1	RF Frequency 915MHz	Input / Output	f_{RF}	902.0		927.6	MHz
2.2	RF Frequency 868MHz ⁽³⁾	Input / Output	f_{RF}	868.1		868.5	MHz
3	Logic Low Level Input Voltage		V_{IL}	0		0.6	V
4	Logic High Level Input Voltage		V_{IH}	$V_{CC}-0.6$		-	V
5	Operating temperature range		T_{op}	-40		+85	°C

12. DC ELECTRICAL CHARACTERISTICS

Assume $V_{CC} = 3.0V$, $T_{amb} = 25^{\circ}C$ if nothing else stated

No.	Item	Condition / Remark	Symbol	Value			Unit
				Min	Typ	Max	
1	Current consumption in transmit mode	ENW596x5xxCF (868MHz)	I_{CCT}	-	48	65	mA
		ENW596x5xxDF (915MHz)			80	100	
2	Current consumption in receive mode	ENW596x5xxCF (868MHz)	I_{CCR}	-	25	33	mA
		ENW596x5xxDF (915MHz)			25	33	
3	Current consumption in sleep mode ⁽²⁾ .	ENW596x5xxCF (868MHz)	I_{CCSM}	-	1.5	-	μA
		ENW596x5xxDF (915MHz)					

Notes:

- (2) For sleep-mode settings refer to the SNAP Reference Manual [3]
(3) In case, when SNAP Software from Synapse is used. Please ask the relevant Product Manager in your region, in case you want to address a different band.

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	11 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

13. A/D CONVERTER CHARACTERISTICS

No.	Item	Condition / Remark	Value			Unit
			Min	Typ	Max	
DC Accuracy						
1	Resolution		10			bits
2	Integral Nonlinearity		-	±0.5	±1	LSB
3	Differential Nonlinearity	Guaranteed Monotonic	-	±0.5	±1	LSB
4	Offset Error		-	±<1	±2	LSB
5	Full Scale Error		-	±1	±2.5	LSB
Dynamic performance (10 kHz sine-wave single-ended input, 1 dB below Full Scale, 300 kps)						
6	Signal-to-Noise Plus Distortion		54	58	-	dB
7	Signal-to-Distortion		-	73	-	dB
8	Spurious-Free Dynamic Range		-	75	-	dB
Conversion Rate						
9	SAR Conversion Clock		-	-	7.33	MHz
10	Conversion Time in SAR Clocks	10-bit Mode	13	-	-	clocks
		8-bit Mode	11	-	-	
11	Track/Hold Acquisition Time		1.5	-	-	µs
12	Throughput Rate		-	-	300	kps
Analog Inputs						
13	ADC Input Voltage Range	Single Ended (AIN+ – GND)	0	-	V _{REF}	V
14	Absolute Pin Voltage with respect to GND	Single Ended	0	-	V _{CC}	V
15	Sampling Capacitance	1x Gain	-	30	-	pF
		0.5x Gain	-	28	-	
16	Input Multiplexer Impedance		-	5	-	kΩ
Power Specifications						
17	Power Supply Current (VDD supplied to ADC0)	Conversion Mode (300 kps)	-	800	-	µA
		Tracking Mode (0 kps)	-	680	-	
18	Power Supply Rejection	Internal High Speed VREF	-	67	-	dB
		External VREF	-	74	-	

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	12 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

14. AC ELECTRICAL CHARACTERISTICS

No.	Receiver	Conditions	Limit			Unit
			Min	Typ	Max	
1.1	RX Sensitivity	1% Packet Error Rate (PER), -85dBm required by [1]	-92	-95	-	dBm
1.2		Wireless M-Bus Mode T1, T2 ⁽⁴⁾		-101		
1.4		Wireless M-Bus Mode S1, S2 ⁽⁴⁾		-104		
2	Saturation	maximum input level	-	5	-	dBm
3	Frequency Error Tolerance	AFC on, 1% PER	-	-	±70	kHz
4	Spurious Emissions		-	-	-54	dBm
5	Image Rejection	Rejection at the image frequency. IF=937 kHz	-	-30	-	dB
6	RSSI Resolution		-	±0.5	-	dB
7	±1-Ch Offset Selectivity	Desired Ref Signal 3 dB above sensitivity, BER < 0.1%. Interferer and desired modulated with 40 kbps ΔF = 20 kHz GFSK with BT = 0.5, channel spacing = 150 kHz	-	-31	-	dB
8	±2-Ch Offset Selectivity		-	-35	-	dB
9	≥±3-Ch Offset Selectivity		-	-40	-	dB
10	Blocking at 1 MHz Offset	Desired Ref Signal 3 dB above sensitivity. Interferer and desired modulated with 40 kbps ΔF = 20 kHz GFSK with BT = 0.5	-	-52	-	dB
11	Blocking at 4 MHz Offset		-	-56	-	dB
12	Blocking at 8 MHz Offset		-	-63	-	dB

No.	Transmitter	Conditions	Limit			Unit
			Min	Typ	Max	
1	Output Power (max)	ENW596x5xxCF (868MHz)	15	18	22	dBm
		ENW596x5xxDF (915MHz)	9	13	16	dBm
2	Power Control Range		-	19	-	dB
3	Over the Air Data Rate	Fixed by Synapse Software	-	250	-	kbps
4	2 nd harmonic	maximum output power	-	-50	-35	dBm
5	3 rd harmonic	maximum output power	-	-44	-35	dBm
6	Spurious Emissions <1GHz	POUT = 11 dBm	-	-	-54	dBm
7	Spurious Emissions >1GHz	excluding harmonics	-	-	-54	dBm

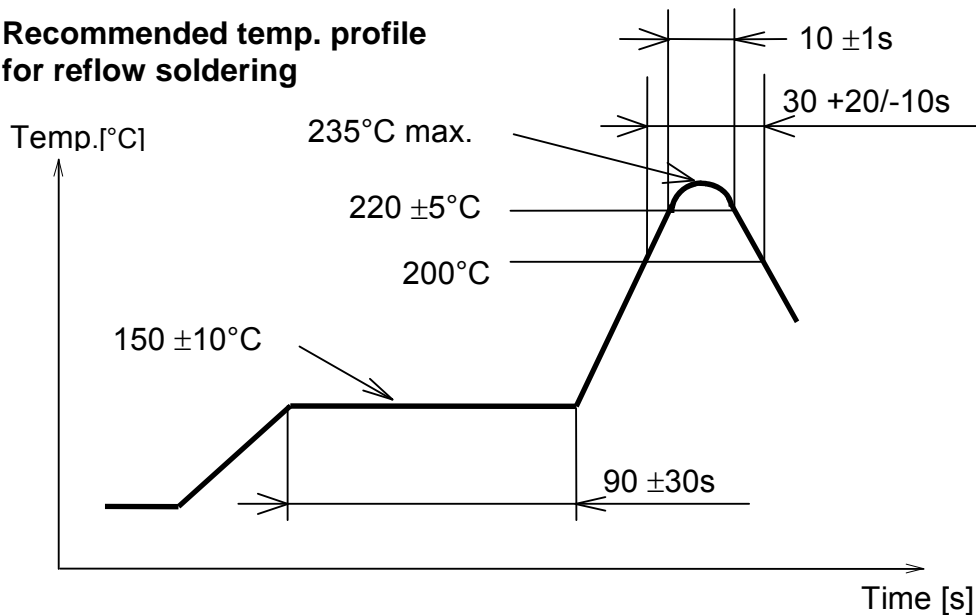
(4) When using Wireless M-Bus software, only for ENW596x5xxCF (868MHz)

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	13 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

15. SOLDERING TEMPERATURE - TIME PROFILE FOR REFLOW SOLDERING
(only SMD Module PAN2580 / ENW59625xxxF)

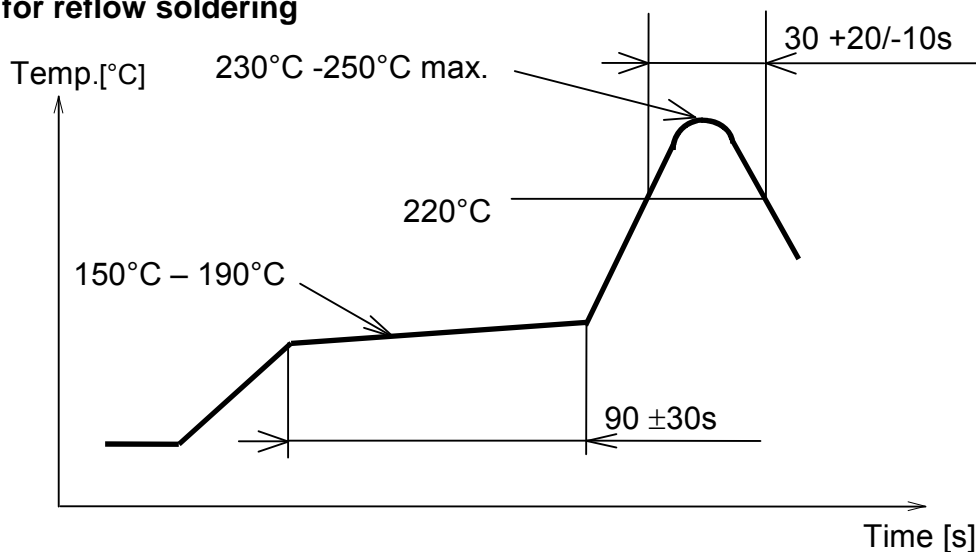
15.1. FOR LEAD SOLDER

**Recommended temp. profile
for reflow soldering**



15.2. FOR LEAD FREE SOLDER

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



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

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	14 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

16. MODULE DIMENSIONS

16.1. SMD MODULE PAN2580 / ENW59625XXXXF

Item	Dimension	Tolerance	Remark
Width	19.00	± 0.25	
Lenght	29.80	± 0.25	
Height	2.55	± 0.25	With case

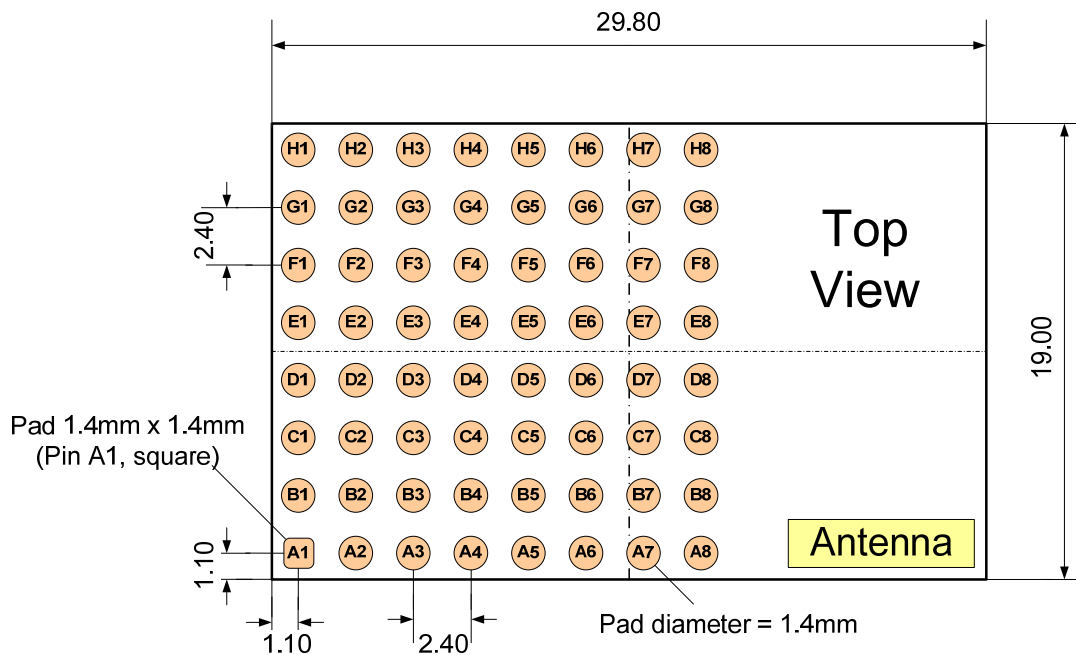
16.2. PIN HEADER MODULE PAN2580ETU / ENW59635XXXXF

Item	Dimension	Tolerance	Remark
Width	33.86	± 0.25	
Lenght	33.86	± 0.25	
Height	7.31	± 0.25	With pin-header

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	15 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

17. FOOTPRINT OF THE MODULE

17.1. SMD MODULE PAN2580 / ENW59625XXXF



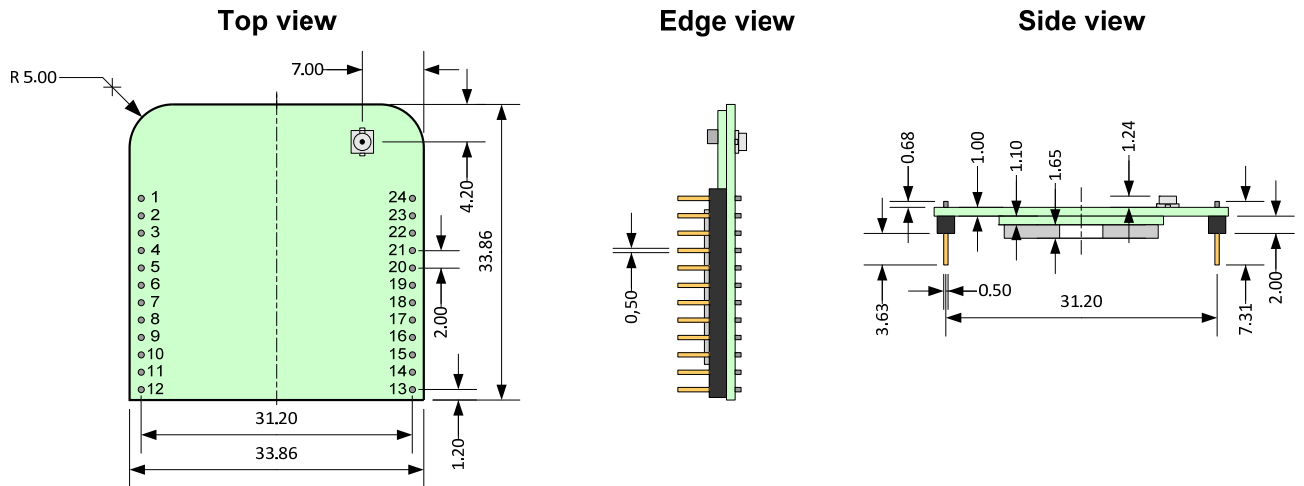
All dimensions are in millimeters.
The outer dimensions have a tolerance of ± 0.25 mm.

Mechanical Requirements

Item	Limit	Condition
Solderability	More than 75% of the soldering area shall be coated by solder	Reflow soldering with recommendable temperature profile

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	16 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

17.2. PIN HEADER MODULE PAN2580ETU / ENW59635XXXF

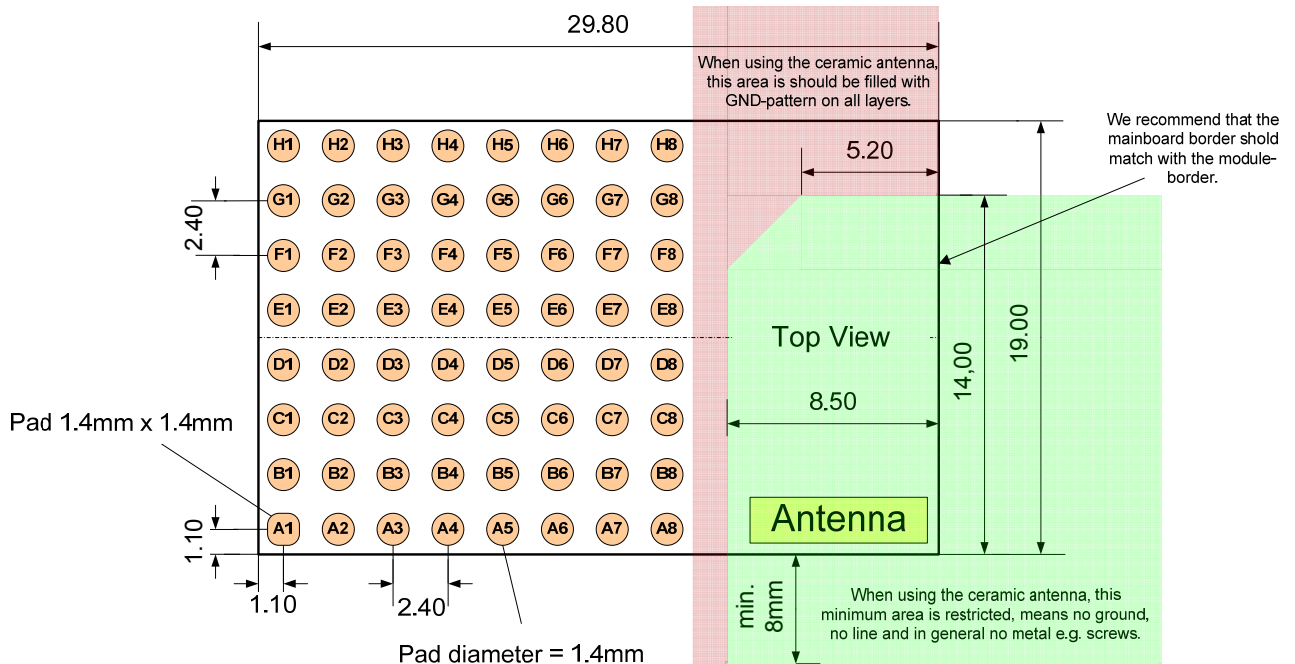


All dimensions are in millimeters.
The outer dimensions have a tolerance of $\pm 0.25\text{mm}$.

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	17 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

18. RECOMMENDED LAND PATTERN

18.1. SMD MODULE PAN2580 / ENW59625XXXF



Dimensions in millimeters.

The land pattern dimensions above are meant to serve only as a guid. This information is provided without any legal liability.

For the footprint it is recommended to use the same pad-size like the module footprint. Please refer to chapter 17. Foot Print of the Module.

Also for the solder paste screen we recommend to use the same pad-size like for the module. Solder paste screen cutouts (with slightly different dimensions) might be optimum depending on your soldering process. For example, the chosen solder paste screen thickness might have an effect. The solder screen thickness depends on your production standard. We recommend 100µm to 120µm.

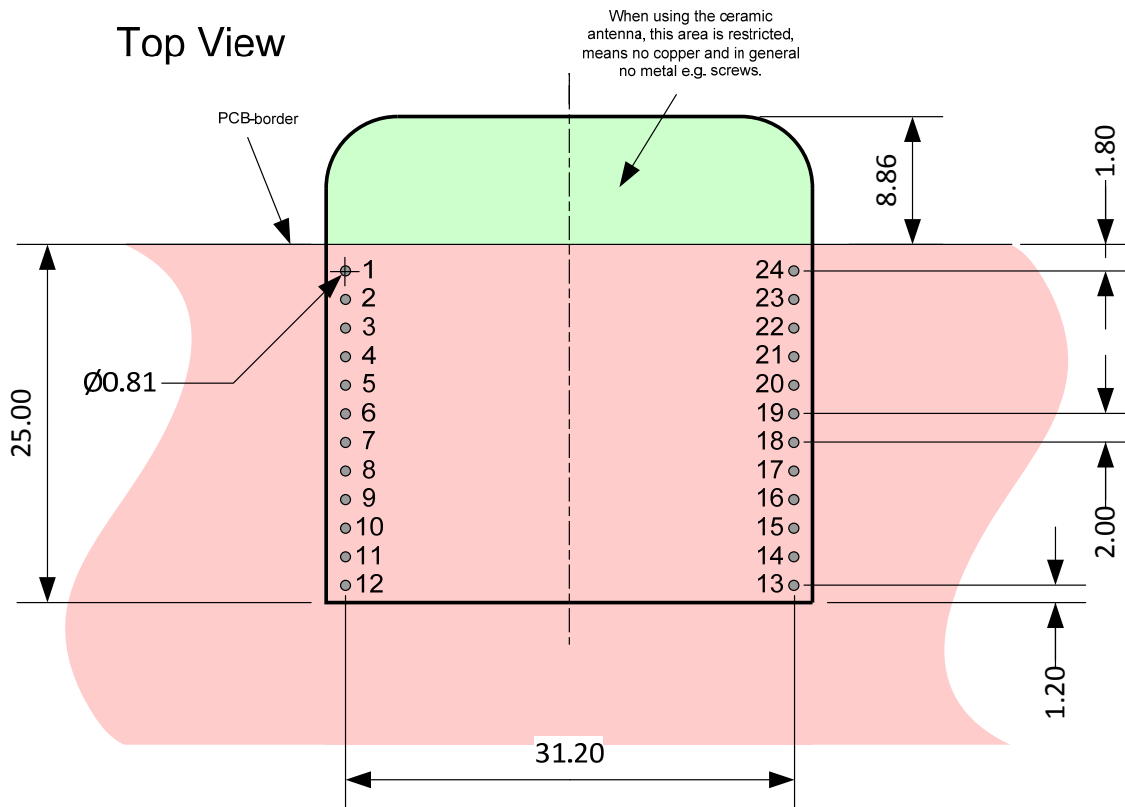
When using the antenna pad version, place the antenna on the edge of your carrier board (if allowable).

If you have any questions on these points, please contact your local Panasonic representative.

Before releasing the layout, we recommend to sent the schematic and layout for final check to wireless@eu.panasonic.com.

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	18 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

18.2. PIN HEADER MODULE PAN2580ETU / ENW59635XXXF



Dimensions in millimeters.

The land pattern dimensions above are meant to serve only as a guid. This information is provided without any legal liability.

When using a module with an embedded antenna, for optimum RF performance, place the antenna on the edge of your application PCB

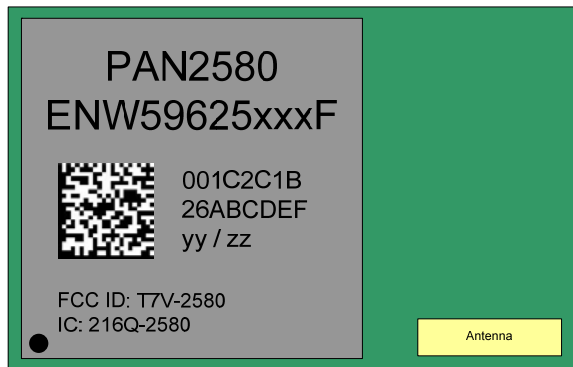
If you have any questions on these points, please contact your local Panasonic representative.

Schematics and layouts may be sent to wireless@eu.panasonic.com for final review.

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	19 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

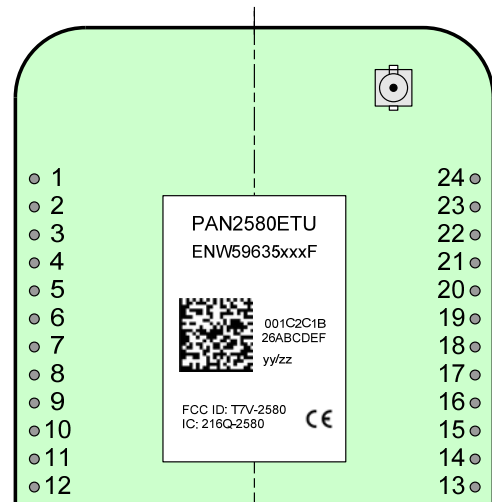
19. LASER MARKING

SMD Module
PAN2580 / ENW59625xxxF



Top View

Pin header Module
PAN2580ETU / ENW59635xxxF



Top View

The 2D-Barcode contains the following information separated by a semicolon:

Value	Description
Date-code	Date code in the format Year - Calender Week - Day of Week – Line - Lot [YYWWDLL]
MAC-adress	Last 8 digits of the MAC-adress
59625xxx	Ordering number [8 signs; without the first 3 digits (ENW) and the last digit (F), please refer also to chapter 23]
yyzz	The identifier for the hardware release [2 signs, here yy] and the software release [2 signs, here zz]

The point on the marking (below left) is the identifier for pin 1 of the module.

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	20 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

20. RELIABILITY TESTS

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

No.	Item	Limit	Condition
1	Heat-shock-resistance test	Electrical parameter should be in specification	Temperature: 125°C to -50°C Voltage: off Period: 500cycles Temp. Cycle: -50°C and +125°C each 7min.
2	Humidity load life test	the same as above	Temperature: +85°C Humidity: 85% Period: 500hrs Voltage: on
3	Vibration test	the same as above	Vibration Ampl.: 1.5mm Vibr. Freq.: 10~55~10Hz (total 1min.) Directions: X; Y; Z each 1hrs
4	ESD test	the same as above	Regarding JEDEC JESD-22a114D each contact with 100pF, 1.5kOhm min. 1kV (Human Body Model HBM)
5	MSL test	the same as above	Pre conditioning: Temperature: +85°C Humidity: 85°C Period: 96hrs Soldering condition: Peak: 260°C for ~10s, 2 times

21. CAUTIONS

Failure to do so may result in degrading of the product's functions and damage to the product.

21.1. DESIGN NOTES

- (1) Please 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 blocking capacitor to ground of at least 47uF directly at the module).
- (3) This product should not be mechanically stressed when installed.
- (4) Heat is the major cause of shortening the life of these products. Please keep this product away from heat.
Avoid assembly and use of the target equipment in conditions where the products' temperature may exceed the maximum tolerance.
- (5) The supply voltage should not be exceedingly high or reversed. It should not carry noise and/or spikes.
- (6) Please keep this product away from other high frequency circuits.

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	21 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

21.2. INSTALLATION NOTES

- (1) Reflow soldering is possible twice based on the conditions in chapter 15. Please 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) Please do not wash this product.
- (8) Please 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.

21.3. USAGE CONDITIONS NOTES

- (1) Please 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) Please do not use dropped products.
- (3) Please do not touch, damage or place dirt on the pins.
- (4) Please 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.

21.4. STORAGE NOTES

- (1) The module may 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:
- (3) Storage in salty air or in an environment with a high concentration of corrosive gas, such as Cl₂, H₂S, NH₃, SO₂, or NO_x
- (4) Storage in direct sunlight
- (5) 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.
- (6) Storage of the products for more than one year after the date of delivery at your

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	22 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

- company if the avoidance all the above conditions (1) to (3) have been met.
- (7) Storage period: Please check the adhesive strength of the embossed tape and soldering after 6 months of storage.
 - (8) Please keep this product away from water, poisonous gas and corrosive gas.
 - (9) This product should not be stressed or shocked when transported.
 - (10) Please follow the specification when stacking packed crates (max. 10).

21.5. 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.

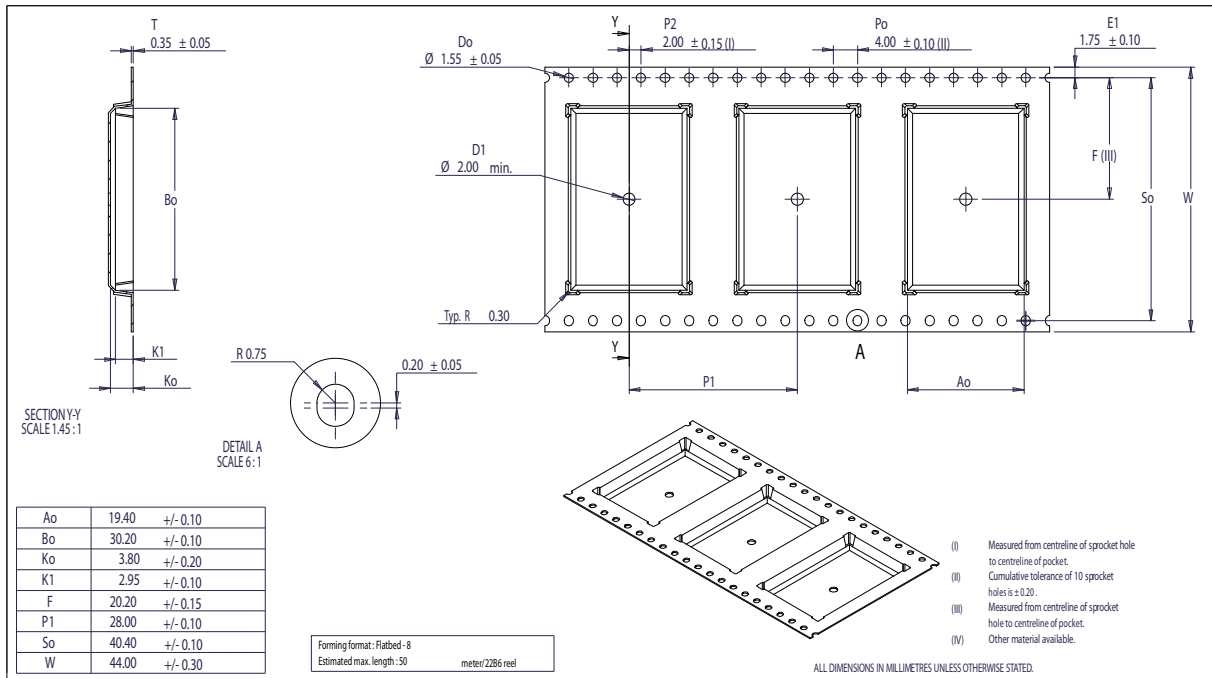
21.6. OTHER CAUTIONS

- (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 not been manufactured with 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.
- (6) In liquid, such as water, salt water, oil, alkali, or organic solvent, or in places where liquid may splash.
- (7) In direct sunlight, outdoors, or in a dusty environment
- (8) In an environment where condensation occurs.
- (9) In an environment with a high concentration of harmful gas (e.g. salty air, HCl, Cl₂, SO₂, H₂S, NH₃, and NO_x)
- (10) 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.
- (11) When you have any question or uncertainty, both of you and Panasonic sincerely cope with it.

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	23 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

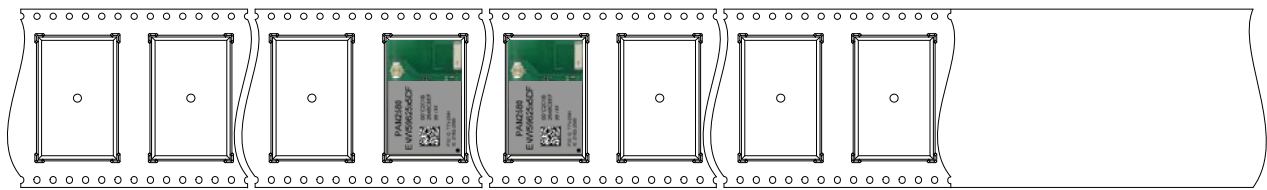
22. PACKAGING OF SMD MODULE PAN2580 ENW59625XXXF

22.1. TAPE DIMENSION



22.2. PACKING IN TAPE

Direction of unreeling (for customer) →



trailer (empty)
1 x circumference /hub
(min 160mm)

component packed area
standard
500pcs

leader (empty)
minimum 10 pitch

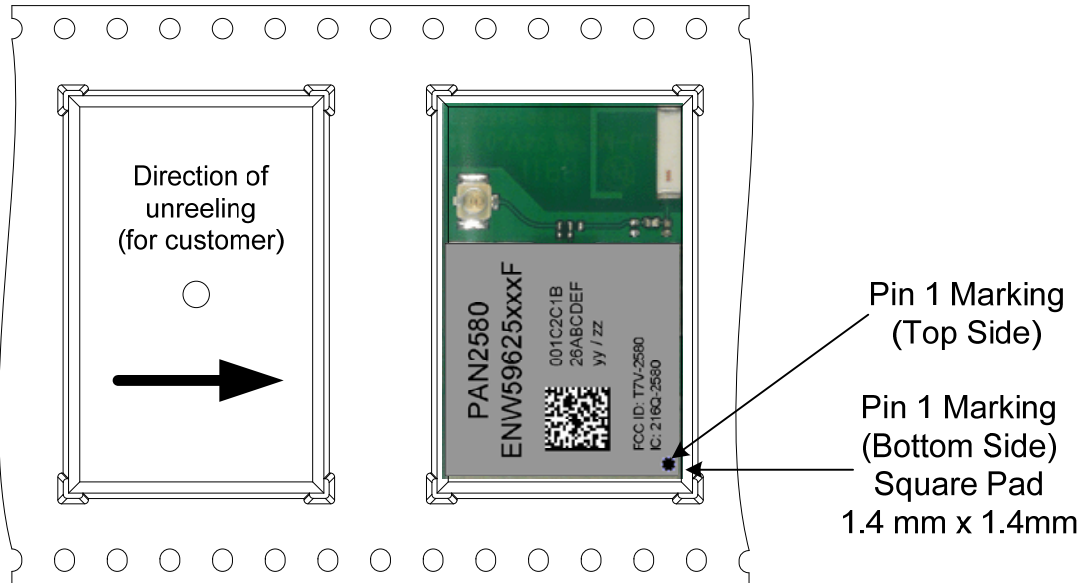
Top cover tape more than 1 x circumference plus 100mm to avoid fixing of tape end on sealed modules.

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.

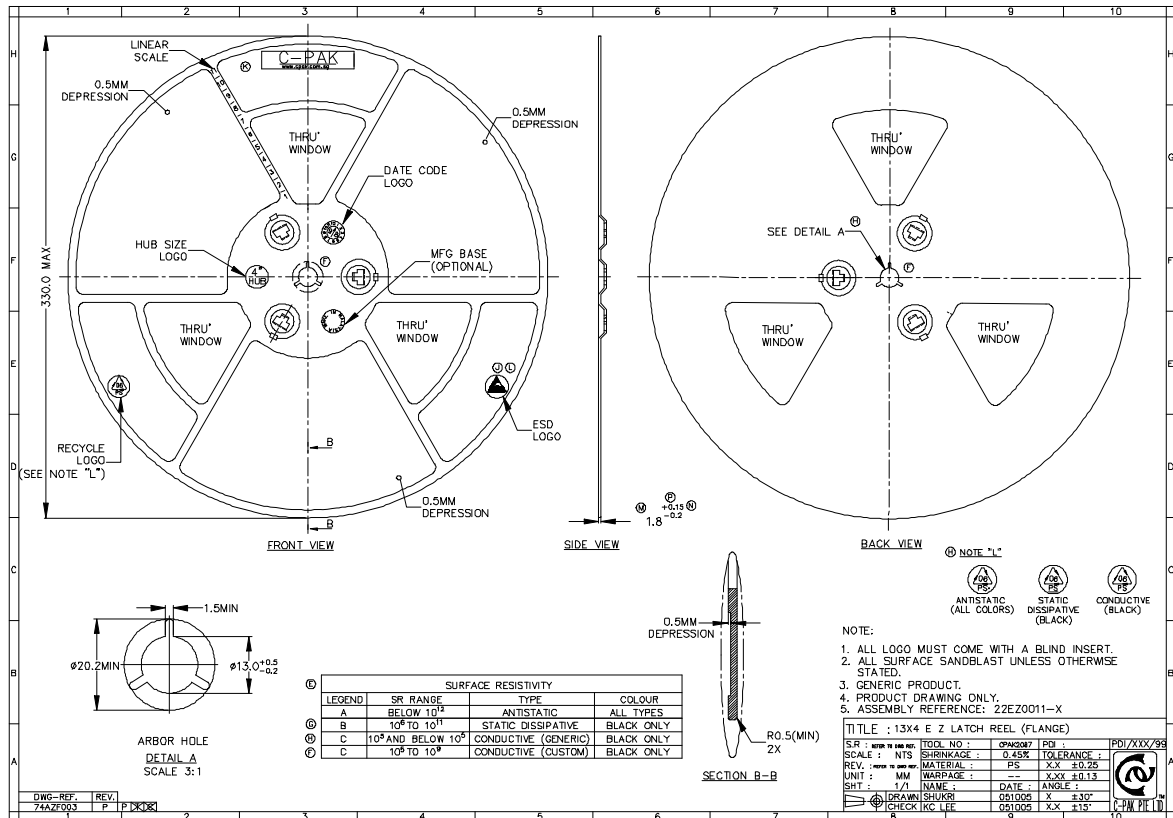
CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	24 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

22.3. COMPONENT DIRECTION



Please refer also to chapter 18. Labeling Drawing

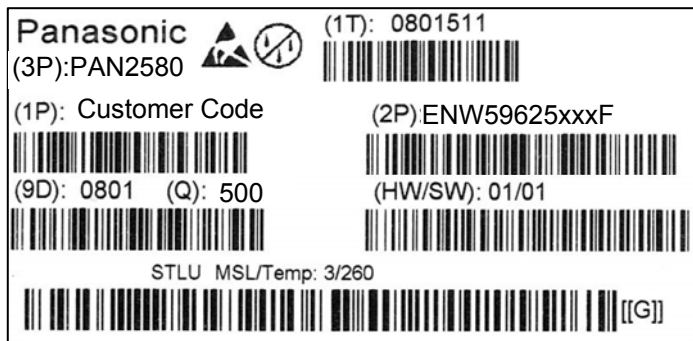
22.4. REEL DIMENSION



CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	25 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

22.5.LABEL FOR PACKAGE

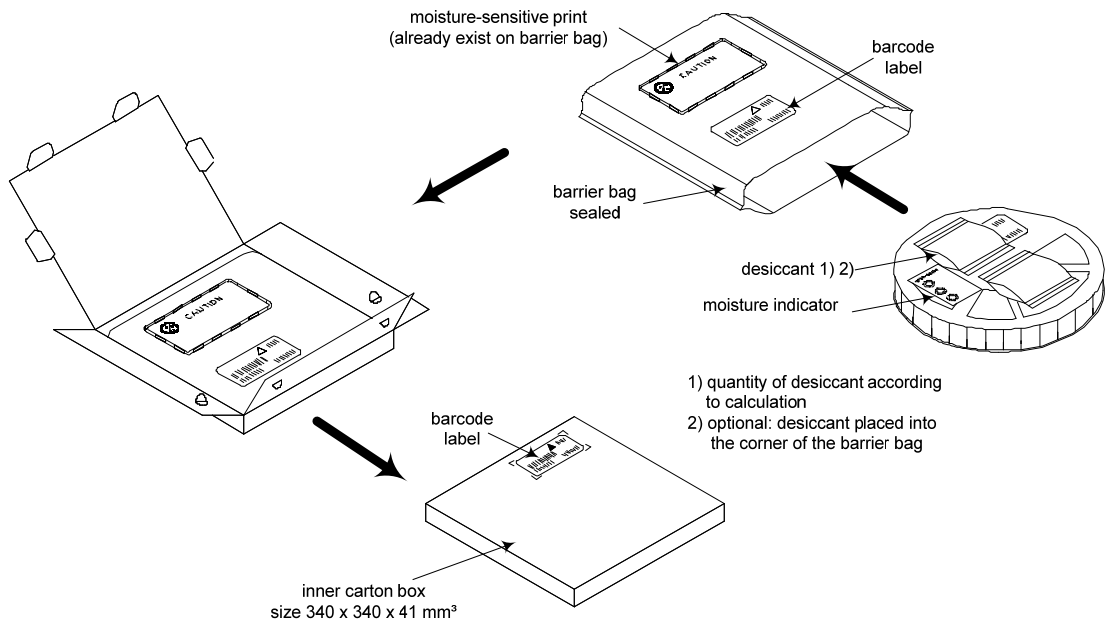
The label below shows only an example.



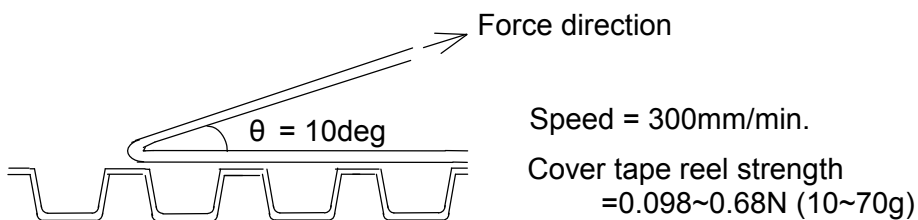
(1T):	Lotcode [YYWWDLL]	
	YY	year
	WW	normal calendar week
	D	day
	L	line identifier, if more as one
	L	lot identifier per day
(1P)	Customer Order Code, if any, otherwise put company name on it.	
(2P)	Panasonic Part Number, please refer to chapter 23 Ordering Information	
(3P)	Module type	
(9D)	Datecode as [2xYear, 2xMonth, 2xDay]	
(Q)	Quantity [XXXX], variable	
(HW/SW)	Hardware /Software Release identifier	
[[G]]	Identifier that the product is RoHS conform, please refer to chapter 24.	

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	26 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

22.6. TOTAL PACKING HANDLING



22.7. COVER TAPE REEL STRENGTH



CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	27 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

23. ORDERING INFORMATION

No.	Ordering part number	Module-Type	Connection-Type	Frequency	Output Power	RF-output	Software
1	ENW59625A1CF	PAN2580M-868A	SMD	868MHz	13dBm	Ceramic Antenna	no ⁽⁵⁾
2	ENW59625A5CF	PAN2580M-868A	SMD	868MHz	13dBm	Ceramic Antenna	SNAP ⁽⁶⁾
3	ENW59625B1CF	PAN2580M-868B	SMD	868MHz	13dBm	UFL-Connector	no ⁽⁵⁾
4	ENW59625B5CF	PAN2580M-868B	SMD	868MHz	13dBm	UFL-Connector	SNAP ⁽⁶⁾
5	ENW59625C1CF	PAN2580M-868C	SMD	868MHz	13dBm	Output-Pin	no ⁽⁵⁾
6	ENW59625C5CF	PAN2580M-868C	SMD	868MHz	13dBm	Output-Pin	SNAP ⁽⁶⁾
7	ENW59625A1DF	PAN2580H-915A	SMD	915MHz	18dBm	Ceramic Antenna	no ⁽⁵⁾
8	ENW59625A5DF	PAN2580H-915A	SMD	915MHz	18dBm	Ceramic Antenna	SNAP ⁽⁶⁾
9	ENW59625B1DF	PAN2580H-915B	SMD	915MHz	18dBm	UFL-Connector	no ⁽⁵⁾
10	ENW59625B5DF	PAN2580H-915B	SMD	915MHz	18dBm	UFL-Connector	SNAP ⁽⁶⁾
11	ENW59625C1DF	PAN2580H-915C	SMD	915MHz	18dBm	Output-Pin	no ⁽⁵⁾
12	ENW59625C5DF	PAN2580H-915C	SMD	915MHz	18dBm	Output-Pin	SNAP ⁽⁶⁾
13	ENW59635A1CF	PAN2580ETU8MA	Pin-Header	868MHz	13dBm	Ceramic Antenna	no ⁽⁵⁾
14	ENW59635A5CF	PAN2580ETU8MA	Pin-Header	868MHz	13dBm	Ceramic Antenna	SNAP ⁽⁶⁾
15	ENW59635B1CF	PAN2580ETU8MB	Pin-Header	868MHz	13dBm	UFL-Connector	no ⁽⁵⁾
16	ENW59635B5CF	PAN2580ETU8MB	Pin-Header	868MHz	13dBm	UFL-Connector	SNAP ⁽⁶⁾
17	ENW59635A1DF	PAN2580ETU9HA	Pin-Header	915MHz	18dBm	Ceramic Antenna	no ⁽⁵⁾
18	ENW59635A5DF	PAN2580ETU9HA	Pin-Header	915MHz	18dBm	Ceramic Antenna	SNAP ⁽⁶⁾
19	ENW59635B1DF	PAN2580ETU9HB	Pin-Header	915MHz	18dBm	UFL-Connector	no ⁽⁵⁾
20	ENW59635B5DF	PAN2580ETU9HB	Pin-Header	915MHz	18dBm	UFL-Connector	SNAP ⁽⁶⁾

(5) Without software. 64kbyte (SI100x) + 128kbyte (EEprom) of free In-System Flash Memory

(6) Synapse SNAP software included, please refer also to [3]. 192kbyte Flash Memory, with 64kbyte used by SNAP core, 64kbyte free for uploadable SNAPpy scripts and 64k reserved.

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	28 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

24. 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 does not contain the following substances which are banned by Directive 2002/95/EC (RoHS) or contains 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

25. DATA SHEET STATUS

This data sheet contains data from the PRELIMINARY specification. Supplementary data will be published at a later date. Panasonic Electronic Devices Europe GmbH reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.

Please consult the most recently issued data sheet before initiating or completing a design. If there is an update, please download under: [PAN2580 Latest Data Sheet!](#)

26. REGULATORY INFORMATION

26.1. FCC NOTICE



The device PAN2580, including the ceramic antenna (ENW59625AxDF) and also the SMD type (ENW59625CxDF), including with the antennas, which are listed in 26.5, 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.

26.2. 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 Electronic 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

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	29 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

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:

- 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

26.3. LABELING REQUIREMENTS



The Original Equipment Manufacturer (OEM) must ensure that FCC labeling requirements are met. This includes a clearly visible label (laser marking) 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 is **FCC ID: T7V-2580**.

In any case end product must be labelled exterior with "Contains FCC ID: T7V-2580"

26.4. ANTENNA WARNING



The related part number for this device is ENW59625BxDF (PAN2580 with U.FL connector) and ENW59625CxDF (PAN2580 with SMD pad). For details, please see the chapter 23. Ordering Information. This device is 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: T7V-2580).

26.5. 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	Average Gain
1	0915AT43A0026	Johanson	902 – 928 MHz	ceramic chip antenna	-4dBi
2	TB2-900D-MMCX		890 – 960 MHz	external dedicated	+2dBi

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	30 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

26.6. RF EXPOSURE PAN2580



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 PAN2580 with mounted ceramic antenna (FCC ID: T7V-2580) is below the FCC radio frequency exposure limits. Nevertheless, the PAN2580 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.

27. INDUSTRY CANADA CERTIFICATION

PAN2580 is licensed to meet the regulatory requirements of Industry Canada (IC), license: IC: 216Q-2580

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.

This device has been designed to operate with the antennas listed in Table 26.5 above. Antennas not included in this list 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.

28. EUROPEAN R&TTE DECLARATION OF CONFORMITY

Hereby, Panasonic Electronic Devices Europe GmbH, declares that the module PAN2580 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:



PAN2580 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.

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	31 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

29. RELATED DOCUMENTS

For an update, please search in the suitable homepage.

- [1] IEEE Standard 802.15.4 –2003 Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (LR-WPANS)
- [2] Technical Datasheet Si1000/1/2/3/4/5 Rev. 1.0 9/10
You can download the latest datasheet from the SiLabs homepage [here](#).
- [3] Manual to the Evaluation Kit from Synapse, which fits to module hardware from Panasonic [Downloads: SNAP® Reference Manual [Updated 10/2/2008](#); SNAP Hardware Technical Manual [Updated 10/2/2008](#)]
Each new release from Synapse, will be posted [here](#). Be sure to be registered free under <http://forums.synapse-wireless.com>.

30. GENERAL INFORMATION

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All rights reserved.

This product description does not claim to be complete and free of mistakes.

Please contact the related product manager with any errata inquiries.

If we deliver samples to the customer, these samples have the status Engineering Samples. This means, the design of this product is not yet completed. Engineering Samples may be partially or fully functional, and there may be differences published in the 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 Electronic Devices Europe GmbH disclaims any liability or product warranty for Engineering Samples. In particular, Panasonic Electronic Devices Europe GmbH 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 Electronic Devices Europe GmbH disclaims any liability for consequential and incidental damages. In case of any questions, please contact your local sales partner or the related product manager.

CLASSIFICATION	PRODUCT SPECIFICATION	No. DS-PAN2580-102	REV. 1.1
SUBJECT	802.15.4-MODEM	PAGE	32 of 32
CUSTOMER'S CODE PAN2580 / PAN2580ETU	PANASONIC'S CODE ENW59625xxxF / ENW59635xxxF	DATE	15.11.2012

31. LIFE SUPPORT POLICY

This Panasonic Electronic Devices Europe GmbH 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. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Panasonic Electronic Devices Europe GmbH for any damages resulting.