1. SCOPE
Umfang

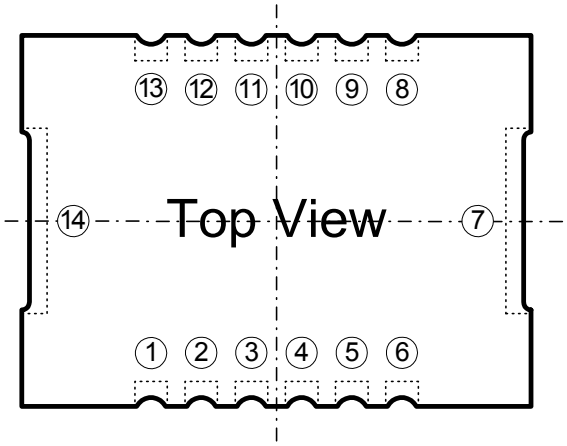
This product specification applies to the TRANSCEIVER MODULE ENW59604NC1.
The last 2 characters xx indicates the revision, the frequency version and the data rate.
The used transceiver is the CC1020 from the norwegian company Chipcon www.chipcon.com.
You can use this module in wideband and narrowband applcations.

Diese Produktionspezifikation bezieht sich auf das bidirektionale Funkmodul ENW59604NC1.
Die Endung xx bezieht sich auf die Version, die Frequenzvariante und die benötigte Datenrate.
Der verwendete Transceiver ist der CC1020 der norwegischen Firma Chipcon.
Dieses Modul können Sie als Schmalband- und als Breitbandvariante verwenden.

2. HISTORY FOR THIS DOCUMENT
Versionsverwaltung dieses Dokumentes

Revision Version	Date Datum	Modification / Remarks Änderungen / Bemerkungen
01	19.12.2003	Initial DRAFT version 01
02	13.02.2004	Adapt the notes to the newest datasheet version CC1020 (Rev. 1.4) from Chipcon
03	18.03.2004	Add Matsushita's code for all versions in chapter 22 ORDERING INFORMATION
04	25.03.2004	Change in chapter 22 ORDERING INFORMATION the suffix C1 with C2 and the other way

3. TERMINAL LAYOUT
Anschlußbelegung



Pin no.	Pin Name	Pin Type	Description
1	LOCK	analog output	Charge pump current output, The pin can also be used as PLL Lock indicator. Output is high when PLL is in lock.
2	GND	ground	ground connection (0Vdc)
3	ANT	antenna	single ended antenna connection
4	GND	ground	ground connection (0Vdc)
5	GND	ground	ground connection (0Vdc)
6	VCC	supply	Power supply +3Vdc
7	GND	ground	ground connection (0Vdc)
8	PSEL	digital input	Programming address latch enable for 3-wire bus. Internal pull-up.
9	PCLK	digital input	Programming clock for 3-wire bus
10	PDI	digital input	Programming data for 3-wire bus. Programming data input for write operation
11	PDO	digital output	Programming data for 3-wire bus. Programming data output for read operation
12	DCLK	digital output	Data clock for data in both receive and transmit mode
13	DIO	digital input/output	Data input/output. Data input in transmit mode. Data output in receive mode.
14	GND	ground	ground connection (0Vdc)

4. KEY PARTS LIST
Liste der Schlüsselkomponenten

Part Name Teilenummer	Material Material
P.W.Board Leiterplatte	Glass cloth epoxide resin with gold plating FR4 mit Goldauflage
Casing Deckel	Steel with solder plating Weißblech
ISM-IC part name ISM IC Name	CC1020 (Chipcon www.chipcon.com) All notes are based on datasheet Rev. 1.4 2003-11-18

5. TEST CONDITIONS
Meßbedingungen

Measurements shall be made under room temperature and humidity unless otherwise specified.
Messungen unter normalen Bedingungen, Abweichungen sind gesondert notiert.

Temperature	25 ± 10°C	Humidity	40 to 85%RH
Temperatur	25 ± 10°C	Luftfeuchtigkeit	40 to 85%RH

6. ABSOLUTE MAXIMUM RATINGS
Absolute Grenzwerte

No.	Item Punkt	Symbol Zeichen	Absolute Maximum Ratings Absolute Grenzwerte	Unit Einheit
1	Supply voltage Versorgungsspannung	V_{cc}	-0.3 to +5.0	V
2	Voltage on any pin Spannung an jedem Pin	V_{Pin}	-0.3 to Vcc+0.3	V
3	Storage temperature range Lagertemperatur	T_{stg}	-40 to +150	°C
4	Operating temperature range Betriebstemperatur	T_{op}	-40 to +85	°C
5	Input RF level Eingangs HF-Leistung	P_{max}	10	dBm
6	Lead temperature Löttemperatur	T_{Death}	tbd °C for t = tbd sec	°C
7	ESD on any pin ESD Festigkeit	V_{ESD}	max 200V (except Pin 2 max 50V) (Mil. Std. 883E 3015 Human Body Model)	V

7. ELECTRICAL REQUIREMENTS

Vcc = 3.0V, Tamb=Operating temp. range if nothing else stated

No Nr.	Item Punkt	Condition Bedingung	Limit / Grenzen Min	Typ	Max	Unit Einheit
1	Frequency Range Frequenzbereich	Programmable in 250Hz steps. Programmierbar in 250Hz Schritten	804		940	MHz
2	Load impedance Ausgangsimpedanz	Measured with network analyzer in the frequency range at antenna pin		50		Ω
3	Output return loss Ausgangsanpassung	Receive Mode to 50Ω load Transmit Mode to 50Ω load	-10 -10			dBm
4	Supply voltage Versorgungsspannung	The typical voltage is recommended Vcc at voltage pin	2,7	3,0	3,3	Vdc
5	Ripple on Vcc AC Anteil auf Vcc	Ripple frequency ≥200kHz Ripple frequency <200kHz			1,0 0,2	mVpp

8. ELECTRICAL CHARACTERISTICS

Vcc = 3.0V, Tamb=Operating temp. range if nothing else stated

No Nr.	Item Punkt	Condition Bedingung	Limit / Grenzen Min	Typ	Max	Unit Einheit
1	Frequency accuracy Frequenzgenauigkeit	Without software calibration, crystal specification ±10ppm (25°C)	-10		+10	kHz
2	Transmit data rate Sendedatenrate	for details → CC1020 (p4; p21, p27) → and chapter 22	1.8		153.6	kBaud
3	FSK separation Frequenzhub	for details →CC1020 (p4)	0		216	kHz
4	Max Output Power maximale Ausgangsleistung	Delivered to 50 Ω load, the output power is programmable → CC1020 p51 figure 33		+5		dBm
5	Receiver sensitivity Rx-Empfindlichkeit	for 76,8kBaud, ±38.4kHz separation, BER=10^{-3} → CC1020 p38 table 6		-100		dBm
6	Current consumption Stromverbrauch	Rx Mode (optimal Sensitivity)		19		mA
		Tx Mode at max output power	31		35	mA
		Power Down Mode (Oscillator off)		0,2	1,0	µA
7	Spurious level, except Harmonics Nebenaussendungen ohne Harmonische	Crystal Oscillator leakage/2 fc-(+)7.37MHz		-63	-57	dBm
8	Harmonics level Harmonische	2^{nd} (fc=868MHz) → 1736MHz		-44	-34	dBm
		3^{nd} (fc=868MHz) → 2604MHz		-56	-34	
		4^{th} (fc=868MHz) → 3472MHz		-67	-34	
9	RSSI dynamic range RSSI Bereich	this is an digital output signal → CC1020 p32f figure 20	-120		-55	dBm
10	RSSI accuracy RSSI Genauigkeit	this is an digital output signal → CC1020 p32		±3		dB
11	RSSI linearity RSSI Linearität	this is an digital output signal		±1		dB

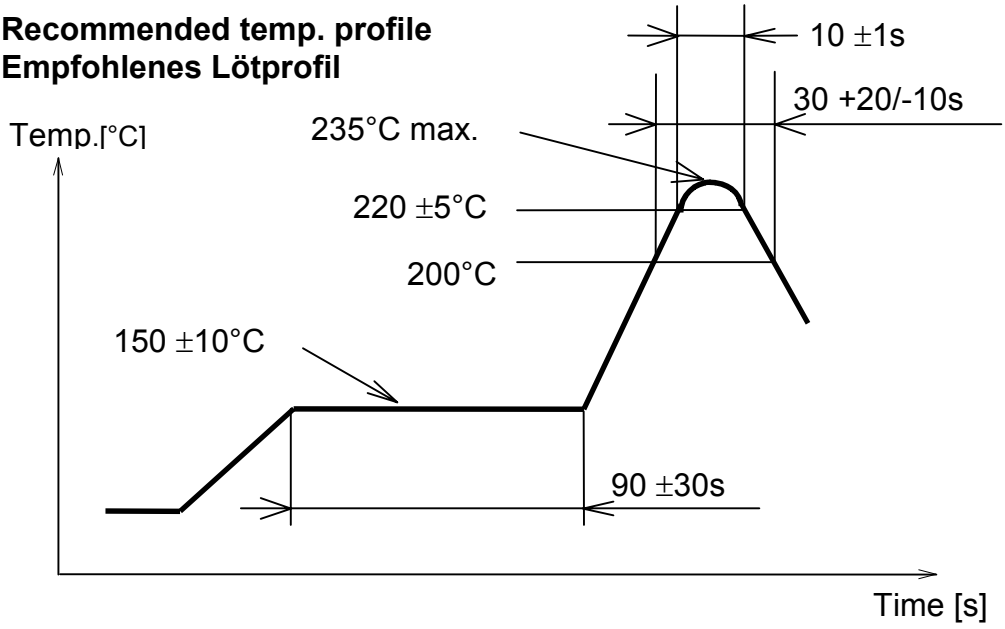
No Nr.	Item Punkt	Condition Bedingung	Limit / Grenzen Min | Typ | Max	Unit Einheit
12	Crystal frequency Quarzfrequenz	→ CC1020 p52	14,7456	MHz

9. MECHANICAL REQUIREMENT
Mechanische Anforderungen

No.	Item Punkt	Limit Grenzwerte	Condition Bedingung
1	Solderability Lötfähigkeit	More than 75% of the soldering area shall be coated by solder Mehr als 75% der Lötfläche soll mit Lötpaste bedeckt sein.	Reflow soldering with recommendable temperature profile
2	Resistance to soldering heat	It shall be satisfied electrical requirements and not be mechanical damage	240°C, 10s

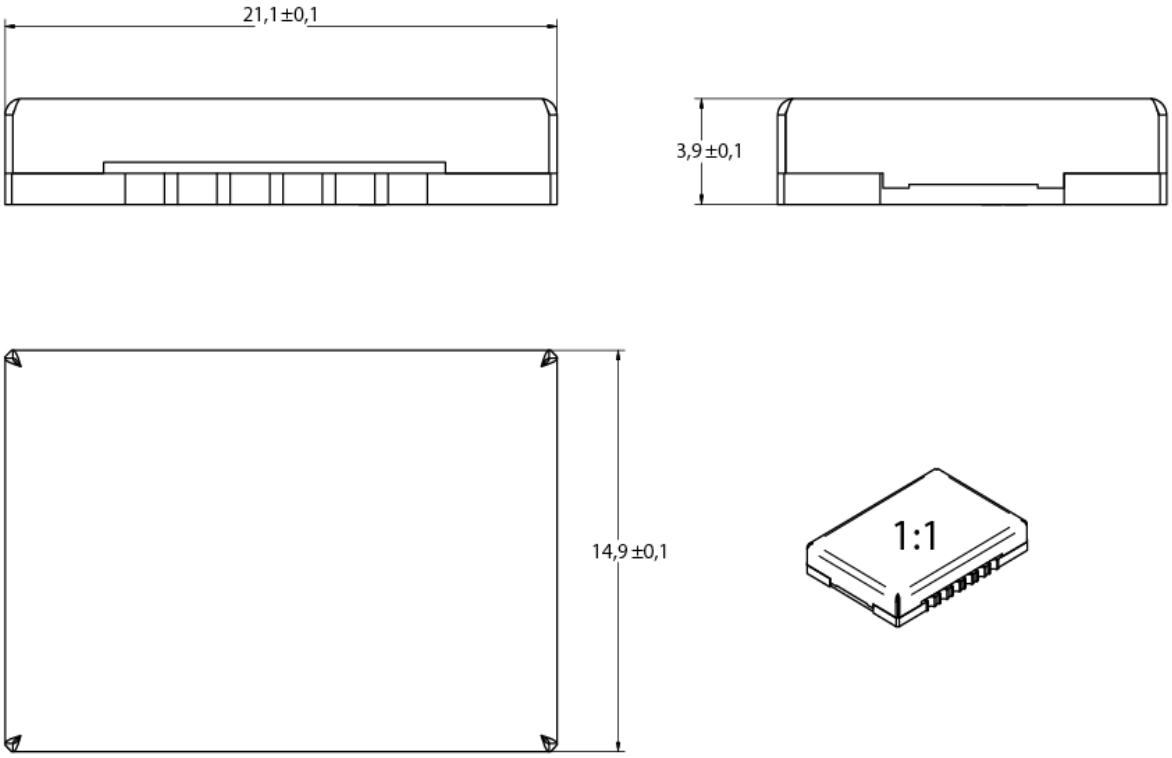
10. SOLDERING TEMPERATURE-TIME PROFILE (FOR REFLOW SOLDERING)
Temperatur-Zeit Profil für die Reflowlötung

Recommended temp. profile
Empfohlenes Lötprofil

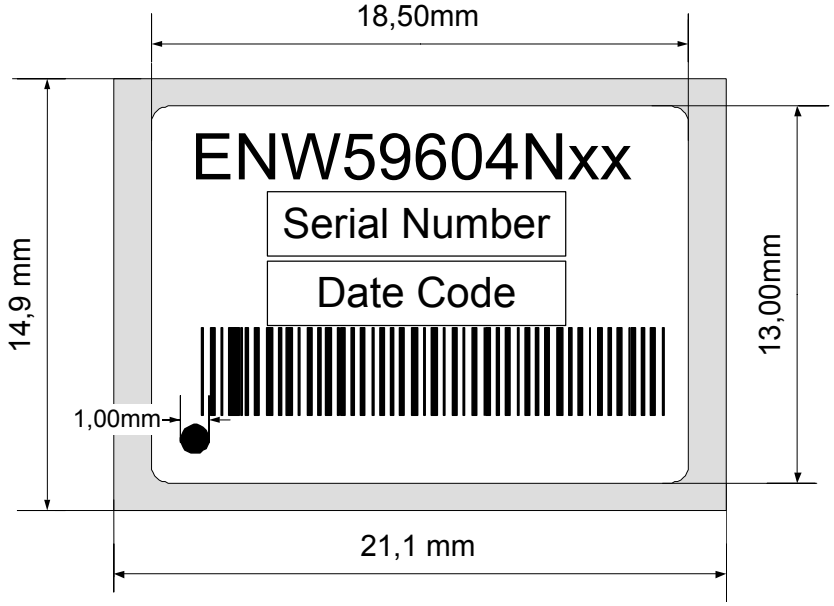


Reflow permissible cycle: 2
Zulässige Reflow Zyklen: 2
Opposite side reflow is prohibited due to module weight.
Überkopflötung ist nicht erlaubt

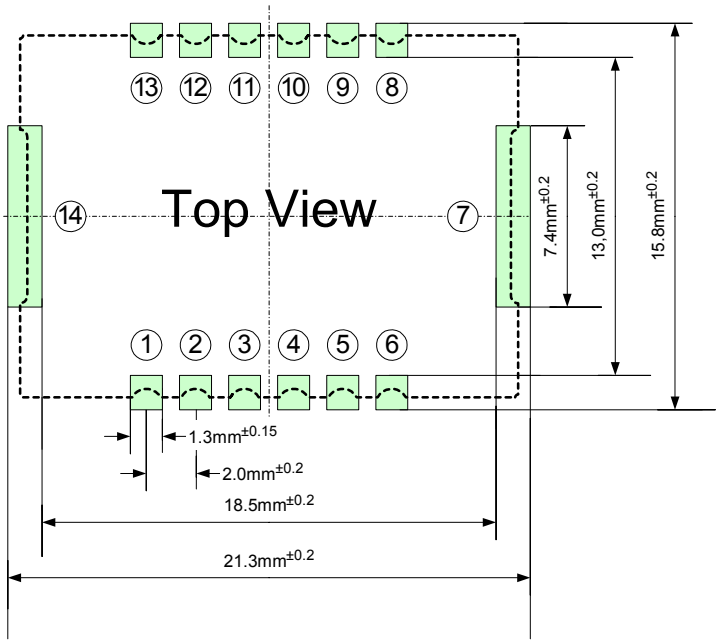
11. MODULE DRAWING
Mechanische Modulzeichnung



12. LABELLING DRAWING
Kennzeichnung des Modules durch Label



13. RECOMMENDED FOOT PATTERN
Empfohlenes Land Pattern



If you have no experience about the land pattern, this figure will help you. We recommend the same dimension for the solder paste screen. The solder screen thickness depends on your production standard.

14. RELIABILITY TESTS
Zuverlässigkeitstests

The measurement should be done after exposed to room temperature and humidity for 1hour.
Die Messungen sollten erst nach einer Stunde Lagerung unter normalen Bedingungen erfolgen.

No.	Item Punkt	Limit Grenzwerte	Condition Bedingung
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 the above	Dropped onto hard wood from height of 50cm for 3 times
3	Heat cycle test	the same as the above	-40°C for 30min. and +85°C for 30min.; each temperature 300 cycles
4	Moisture test	the same as the above	+60°C, 90% RH, 300h
5	Low temp. test	the same as the above	-40°C, 300h
6	High temp. test	the same as the above	+85°C, 300h

15. CONFIGURATION OVERVIEW
Übersicht zur allgemeinen Ansteuerung

See CHIPCON Datasheet CC1020 (rev. 1.4) 2003-11-18 page 17

16. CONFIGURATION SOFTWARE
Ansteuerungssoftware

See CHIPCON Datasheet CC1020 (rev. 1.4) 2003-11-18 page 17
For the first step please use the SmartRF® Studio Software from CHIPCON to learn more about the register settings.

17. MICROCONTROLLER INTERFACE
Schnittstelle zum Microcontroller

See CHIPCON Datasheet CC1020 (rev. 1.4) 2003-11-18 page 18ff

18. FREQUENCY PROGRAMMING
Frequenzprogrammierung

See CHIPCON Datasheet CC1020 (rev. 1.4) 2003-11-18 page 43f

19. APPLICATION GUIDELINES FOR USE IN EUROPEAN ISM BANDS
Applikationshinweise für die Benutzung des ISM Modules in Europa

The following documents will help you:

- CHIPCON Datasheet CC1020 (rev. 1.4) 2003-11-18
- CHIPCON Application Note AN001 SRD regulations for licence free transceiver operation
- Standards from the ETSI (European Telecommunication Standard Institute www.etsi.org for ISM Regulations ETSI EN300220-1 to 3.
- and of course, please ask the related product manager within Matsushita

20. CONFIGURATION REGISTERS
Konfigurierung der Registerinhalte

See CHIPCON Datasheet CC1020 (rev. 1.4) 2003-11-18 page 59ff

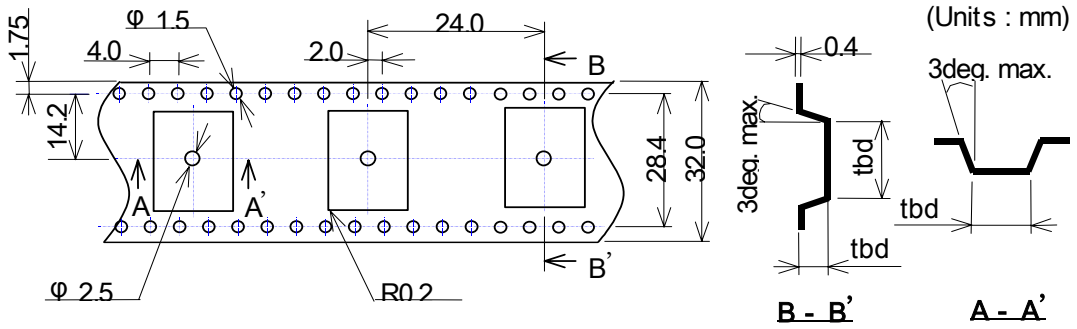
For optimal performance the following register should be set, if the register settings are not right, in some circumstances the module will lose their conformity to ETS300220.

- Rx_Match Register Fhex
- Tx_Match Register 0hex

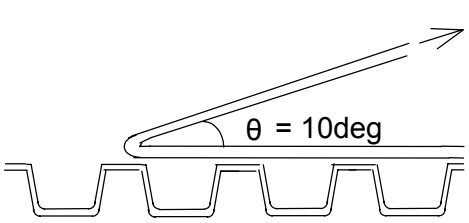
21. PACKAGING
Verpackung

21.1. EMBOSSED TAPE / BLISTERGURT

(1) Dimension of the tape / Abmessungen des Gurtes (EIAJ-tbd)



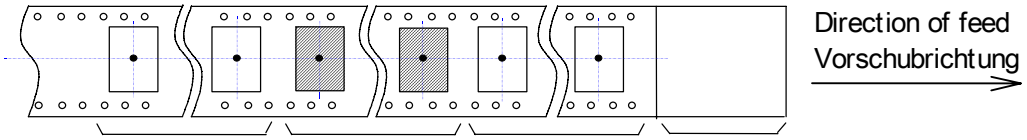
(2) Cover tape reel strength / Abzugskräfte Blistergurt Deckfolie



Speed = 300mm/min.

Cover tape reel strength
=0.098 ~ 0.68N (10 ~ 70

(3) Empty hollow / leere Taschen



Empty hollow more than 10 pitch Mehr als 10 leere Taschen	Component packed area Modulbereich	Empty hollow more than 10pitch Mehr als 10 leere Taschen	Top cover tape more than 200mm Deckfolie groesser als 200mm

Empty hollow in component packed area shall be less than two per reel and those hollows shall not be consecutive.
Es dürfen minimal 2 leere Taschen im Bereich der Komponenten vorhanden sein, diese dürfen aber nicht aufeinander folgen.

21.2. COMPONENT DIRECTION
Komponentenanordnung

Top cover tape shall not be found on reel holes and shall not stick out from reel.
Deckfolien darf nicht durch die Löcher der Spule und nicht außerhalb der Spule geführt werden.

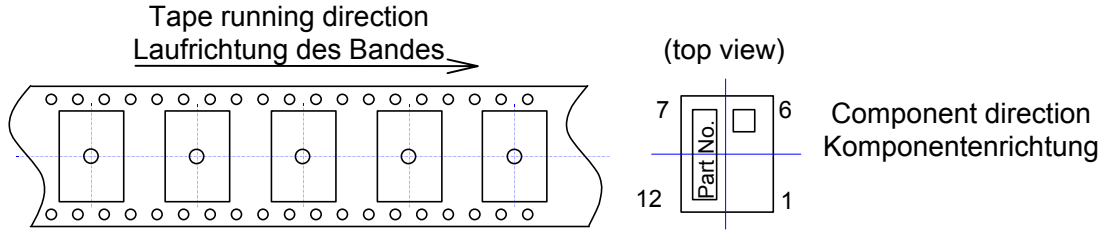


Figure 1

21.3. REEL DIMENSION
Abmaße der Rolle

(1) Quantity per reel : XXX pieces
Anzahl pro Rolle : XXX Stück
(2) Marking : Customer's part No. / Quantity / Lot No. and Our part# with bar-code shall be on the reel.
Kennzeichnung : Kundennummer / Anzahl / Losnummer und unsere Komponentennummer als Barcode wird auf die Rolle gedruckt

Refer to fig.2
Bezugnehmend zur Zeichnung 2

21.4. PACKAGE
Umverpackung

(1) Package box : 1 or 2 reel (depends on quantity)
Paketbox.: 1 oder 2 Rollen (abhängig von der Liefermenge)
(2) Marking : Customer's part No. / Quantity / Lot No. and Our part# with bar-code shall be on the package box.
Kennzeichnung : Kundennummer / Anzahl / Losnummer und unsere Komponentennummer als Barcode wird auf die Verpackung gedruckt

Refer to fig.2 and 3
Bezugnehmend zur Zeichnung 2 und 3

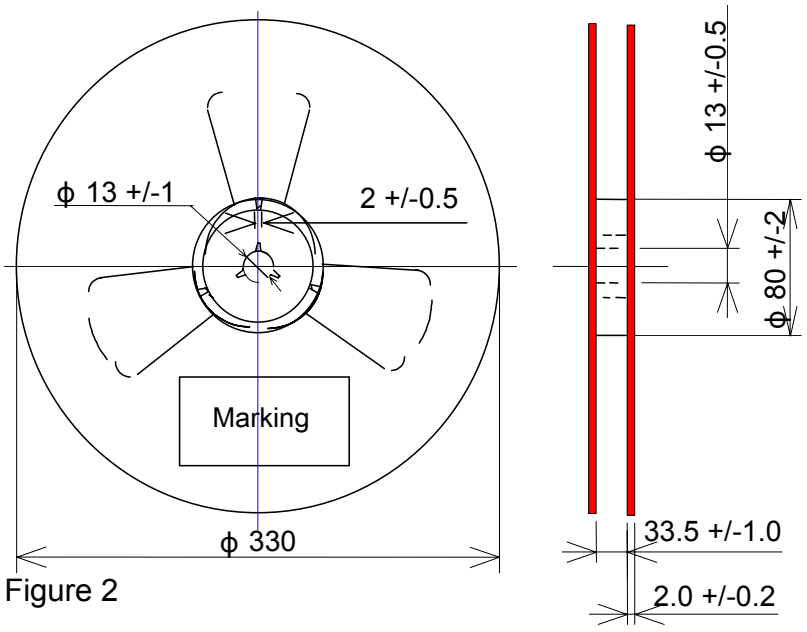


Figure 2

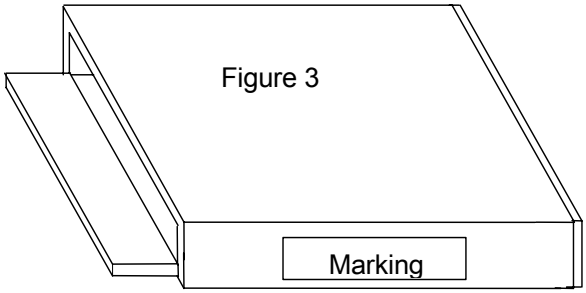


Figure 3

22. ORDERING INFORMATION
Bestellinformationen

Ordering part number	Description	MOQ
ENW5Z604NC1	Engineering Sample PAN2350, Version 868 MHz, Data Rate Up to 4.8 kBaud	1
ENW5Z604NC2	Engineering Sample PAN2350, Version 868 MHz, Data Rate 153,6 kBaud	1
ENW59604NC1	PAN2350, Version 868 MHz, Data Rate Up to 4.8 kBaud	tbd
ENW59604NC2	PAN2350, Version 868 MHz, Data Rate 153,6 kBaud	tbd

Other data rates (9,6 / 19,2 / 38,4 and 76,8 kBaud) and other frequencies (e.g. 433MHz, 915MHz) are also possible, please ask the related product manager within matsushita.

23. GENERAL INFORMATION
Allgemeine Informationen

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 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.

Waiver:
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.
Matsushita rejects any liability or product warranty for Engineering Samples. In particular, Matsushita waives 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.

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

24. LIFE SUPPORT POLICY
Politik für Lebenserhaltungssysteme

This Matsushita 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. Matsushita customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Matsushita for any damages resulting