FM RDS tranceiver component FMT6N

***confidential** information* ***preliminary** specification*

INTRODUCTION

The GNS *FMT6N* macro component combines FM/RDS TMC receiver together with a FM audio transmitter.
It is an ideal component for navigation applications that want to benefit of both, TMC traffic information and car audio sound for navigation advices and mp3.
FM transmitter is controlled over the same hardware & software interface as the TMC receiver, so the migrating from FM4 or FM6 to FMT6N will be just some commands in Nav application.

A software development kit (SDK) containing complete API functions for various O/S is also available from GNS for the software integration.
The GNS API is implemented in most portable dynamic navigation SW-products on the market, so units using *FMT6N* will work with a minimum Software extension for the transmitting functions after update of the API.

"N" type is the EMI -improved version of FMT6.

FEATURES

- complete FM/RDS receiver & FM audio transmitter module
- miniature sized (26 * 15 *3.1 mm) typ
- *GNS protocol 3.5* [1)] enabled, allows GPS/RDS/transmitter combined data over single UART.
- host computer (PDA / Notebook / embedded / phones) software API available for TMC & transmitter application integration
- only one single power supply (2.9V..3.4V)
- integrated voltage regulator for alternative power supply (3.4.. 14V)
- low power consumption 125mW
- serial TTL/CMOS interface (3.3V)
- universal RAW RDS output
- high quality stereo audio output
- selectable frequency for transmission
- digital compression circuit for high average modulation
- high quality audio

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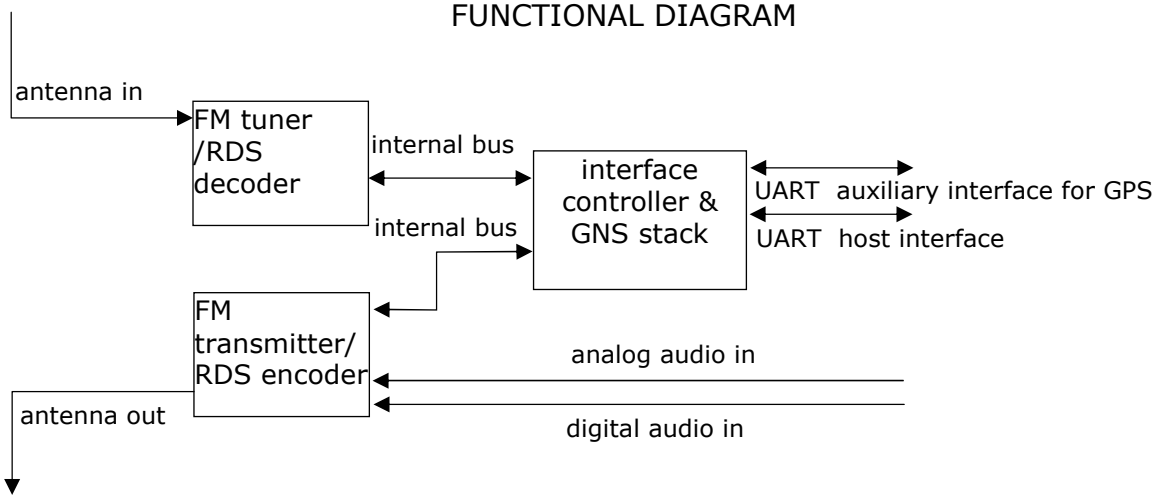
- RDS capability on transmitter section to indicate your device on car radio equipment display via RDS PS
- programmable PS String (8byte)

FUNCTIONAL DIAGRAM



APPLICATIONS

- in-vehicle equipment for RDS TMC
- high quality navigation with high quality audio for navigation advice and mp3
- dynamic navigation

revision history			
V0.00	Apr 12 2007	P.Skaliks	initial objective
V0.01	May 29 2007	M.Heinzel	Footprint
V0.02	Jun 4 2007	P.Skaliks	technical spec
V0.10	Nov 12 2007	P.Skaliks	preliminary
V0.60	Nov 20 2007	P.Skaliks	added: power supply options
V0.70	Jan 29 2008	P.Skaliks	corrected : comment in electrical data :pin #
V0.90	Feb 20 2008	P.Skaliks	data completed
V0.91	Nov 10 2008	P.Skaliks	N version

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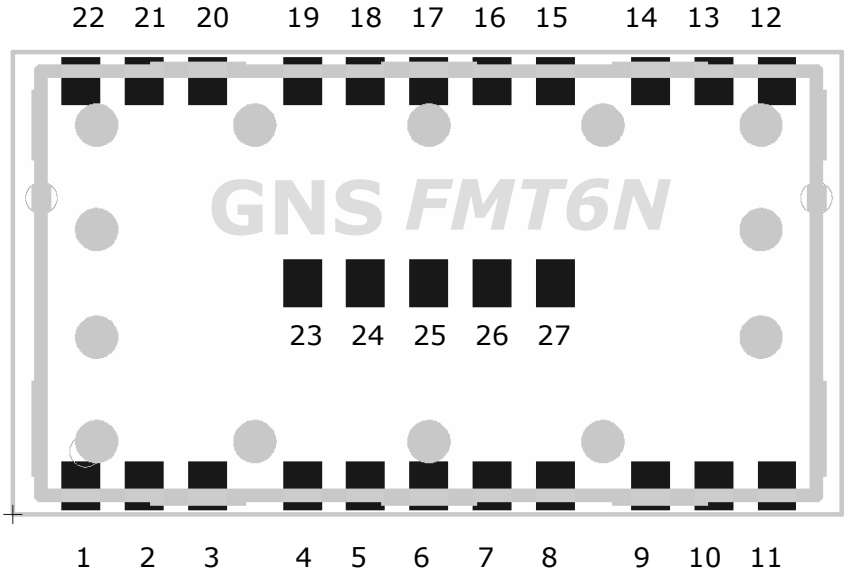
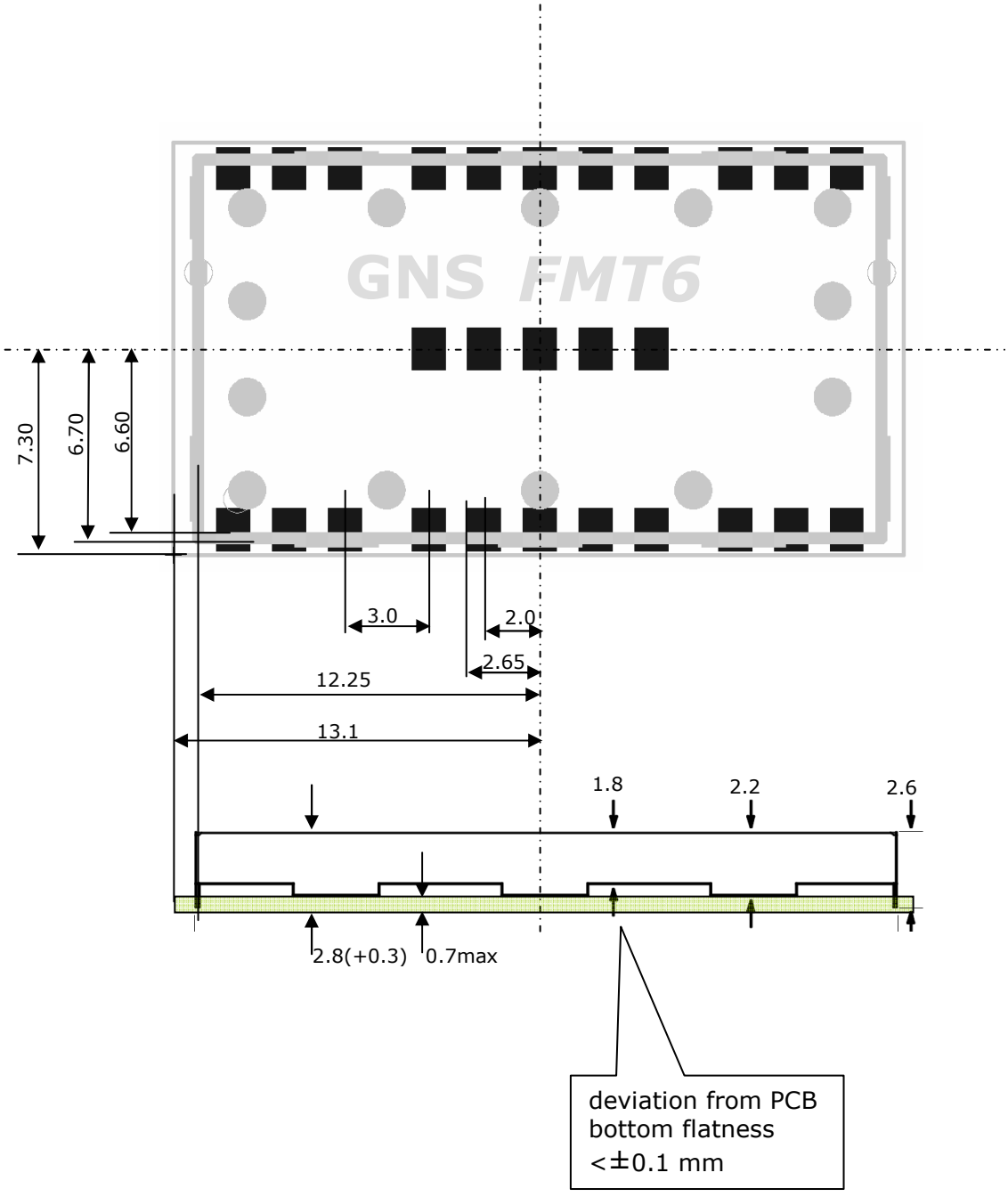
DEVICE PINOUT DIAGRAM

TOP VIEW



NO	NAME	GROUP	DESCRIPTION
1	RF Gnd	FM antenna input	RF Ground Receiver
2	RF in		RF input Receiver
3	RF Gnd		RF Ground Receiver
4	Gnd	gnd	Common Ground
5	RXD2	serial UART I/O to/from GPS	Serial Data from GPS module
6	TXD2		Serial Data to GPS module
7	TxD	serial UART host connection	Serial Data Out
8	RxD		Serial Data In
9	3V3	power	power supply
10	5V		alternative power supply
11	Gnd	gnd	Common Ground
12	RF Gnd	RF out (transmitter)	RF Ground Transmitter
13	RF out		Transmitter RF output
14	RF Gnd		RF Ground Transmitter
15	AFin Left	analog audio input	Left analog audio in
16	AFin Right		Right analog audio in
17	DIN	digital audio input	Digital Data Input
18	DFS		Digital Frame Sync. Input
19	DCLK		Digital Bit Sync. Input Clock
20	Gnd	gnd	Common Ground
21	AF outLeft	analog audio out	Left audio output
22	AF outRight		Right audio output
23	internal		test pin, do not connect
24	internal		test pin, do not connect
25	internal		test pin, do not connect
26	internal		test pin, do not connect
27	internal		test pin, do not connect

PHYSICAL DIMENSIONS



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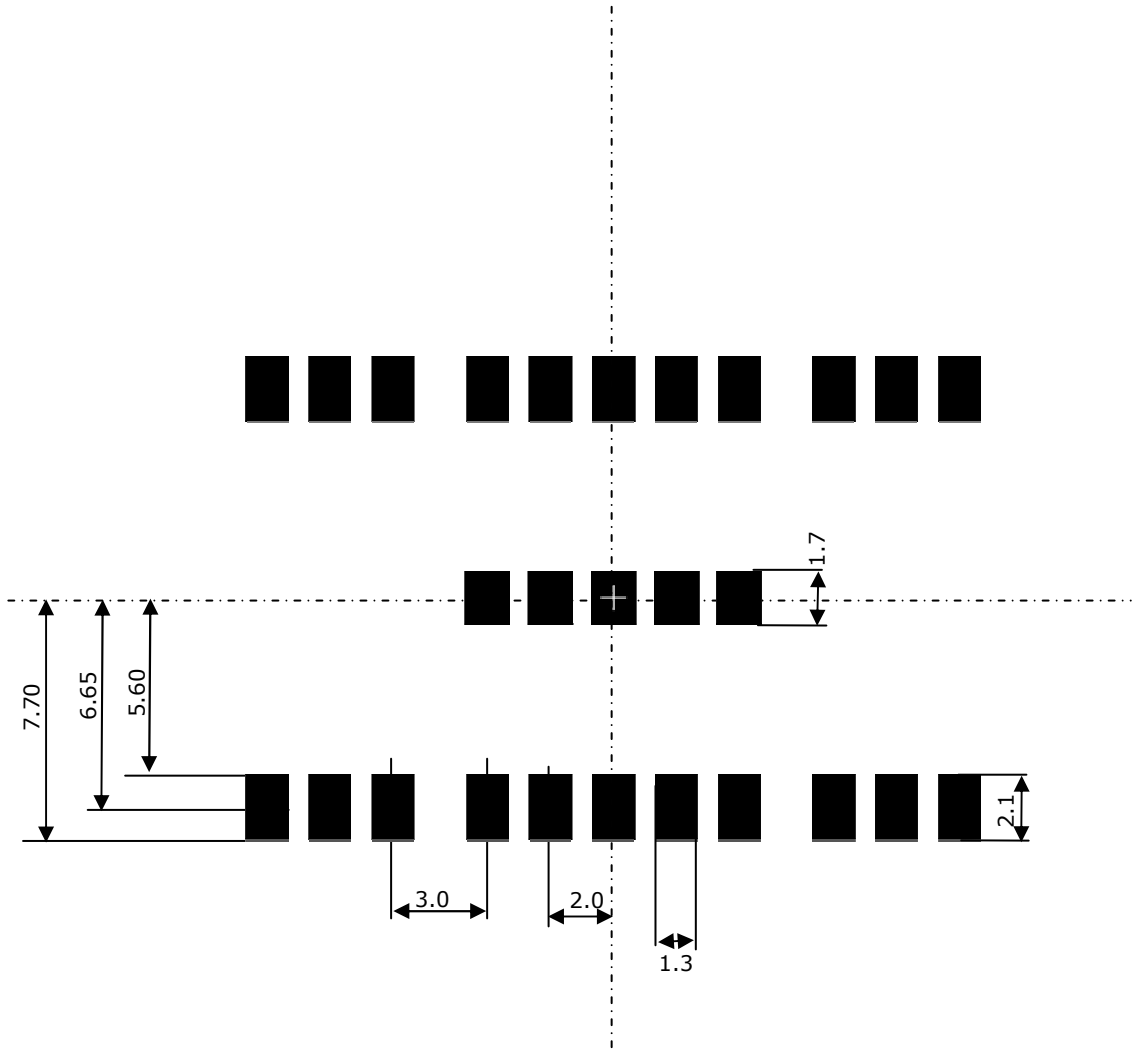
RECOMMENDED PAD LAYOUT



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confidential information ***preliminary*** *specification*

ELECTRICAL SPECIFICATION

absolute maximum ratings		
ambient	Storage	- 45..+100°C
	operational	- 20..+85°C
power supply voltage	Pin 9 (3.3V in)	3.6V DC
power supply voltage	Pin 10 (5V in)	14V DC

quick reference data		
	SMD small-sized combi macro module for FM TMC / transmit applications	
Weight	2 g tbd	
	typical	
ambient temperature	Non condensing	-20°C...+85°C
power supply , power requirements	Vcc @ pin 9	2.9V … 3.6V DC / <56mA
alternative power supply , power requirements	Vcc @pin 10	3.4V … 14V DC / <56mA
Type	Digital-Synthesizer tuner, integrated R(B)DS processor , DSP processing , all freq. programmable transmitter circuit	

general					
	min	**typ**	**max**	**unit**	**note**
Size	26.*14.5*2.8	26.2*14.8*2.8	26.4*14.8*3.1	mm^3	
Weight	-	2	-	g	
supply voltage Vcc	2.9	3.0	3.6	V	Vcc @ pin 9
supply voltage Vcc	3.4	5.0	14	V	**alternative** Vcc @ pin 10
supply current	-	48	56	mA	
Module setup delay time after power up	-	-	500	ms	Host software should wait before issueing first command
low level input voltage	-0.3	-	0.3xVcc	V	pin 5,8,17,18,19 serial CMOS Vcc=3.3V
high level input voltage	0.7xVcc	-	Vcc+0.3	V	pin 5,8,17,18,19 serial CMOS Vcc=3.3V
low level output voltage	0.0	-	0.6	V	pin 6,7 serial CMOS Vcc=3.3V,Io=8mA
high level output voltage	Vcc-0.7	-	Vcc	V	pin 6,7 serial CMOS Vcc=3.3V,Io=-3mA
baud rate host interface	38000	38400	38800	bit / sec	
baud rate GPS interface	-	4800	-	bit / sec	9600 programmable
serial settings		8N1noP			

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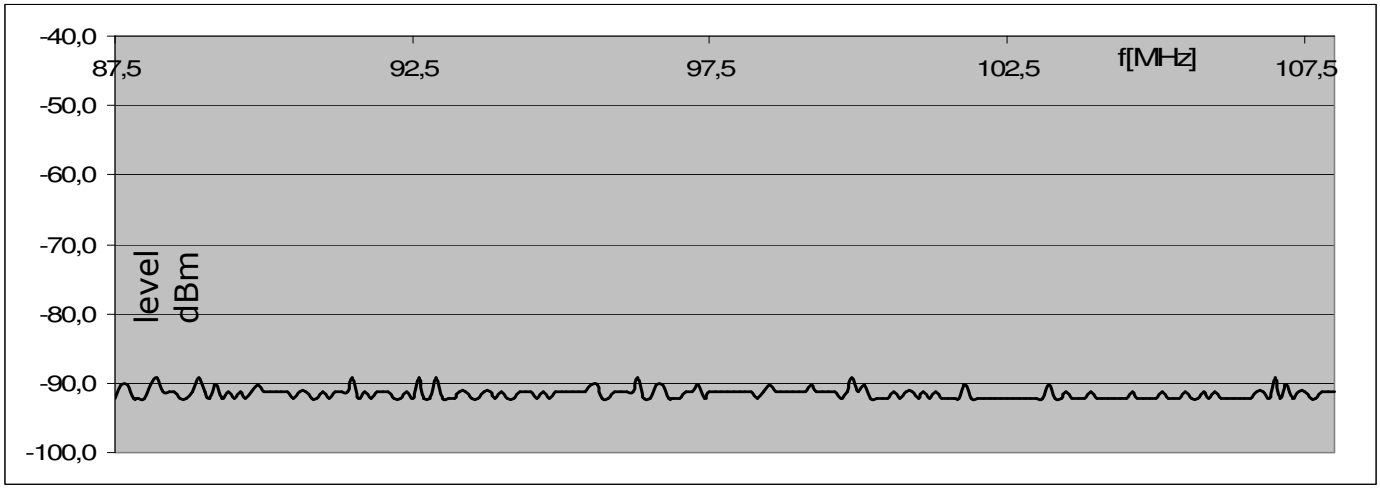
tuner section					
DC input voltage RFi	-	-	6	V	pin 2 Rfi
RFinput resistance	-	50	-	Ohms	pin 2 Rfi
AF output voltage	55	66	70	mV	RMS pins 21,22
AF output resistance	-	-	10	kOhms	pins 21,22
AF THD	-	0.4	-	%	300Hz..15kHz
sensitivity audio	-	2.5	-	uV	(S+N)/N =26dB
sensitivity RDS	-	-90	-	dBm	for 50% RDS Group quality
frequency range	87.5	-	108.0	MHz	
frequency grid	-	100	-	kHz	
AF (S+N) / N	55	60	-	dB	Vrf=1mV

transmitter section					
AF input range	-	636	-	mVpk	for audio modulation =67.5kHz
AFinput resistance	-	50k	-	Ohms	
digital input					3-wire interface I2S
digital input samplerate	32	44.1	48	kHz	configureable
frequency range	87.5		108.0	MHz	
frequency accuracy	-3.5	-	+3.5	kHz	
frequency grid	-	100	-	kHz	
transmit voltage accuracy	-2.5	-	+2.5	dB	@ 102..115dBuV
RF output power	-	50	-	nW	according to regulations , adjustable over interface
AF frequency response	30	-	15000	Hz	
AF THD		0.1	0.5	%	
AF channel seperation	30	35	-	dB	@1kHz

RECEIVER PERFORMANCE DIAGRAM

RF sensitivity vs frequency (RDS quality = 50% RDS groups, RDS mod = 2.7%, Pilot = 9%)



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ESD SPECIFICATION

esd data				
	min	**unit**	**pins**	**reference**
human body model	2000	V	5..10,17..19	JESD22-A114-B / C=100pF, R=1k5
machine model	200	V	5..10,17..19	JESD22-A115-A / C=200pF, R=0r
human body model	2000	V	2,13,15,16,21,22	JESD22-A114 / C=100pF, R=1k5
machine model	250	V	2,13,15,16,21,22	JESD22-C101

ORDERING INFORMATION

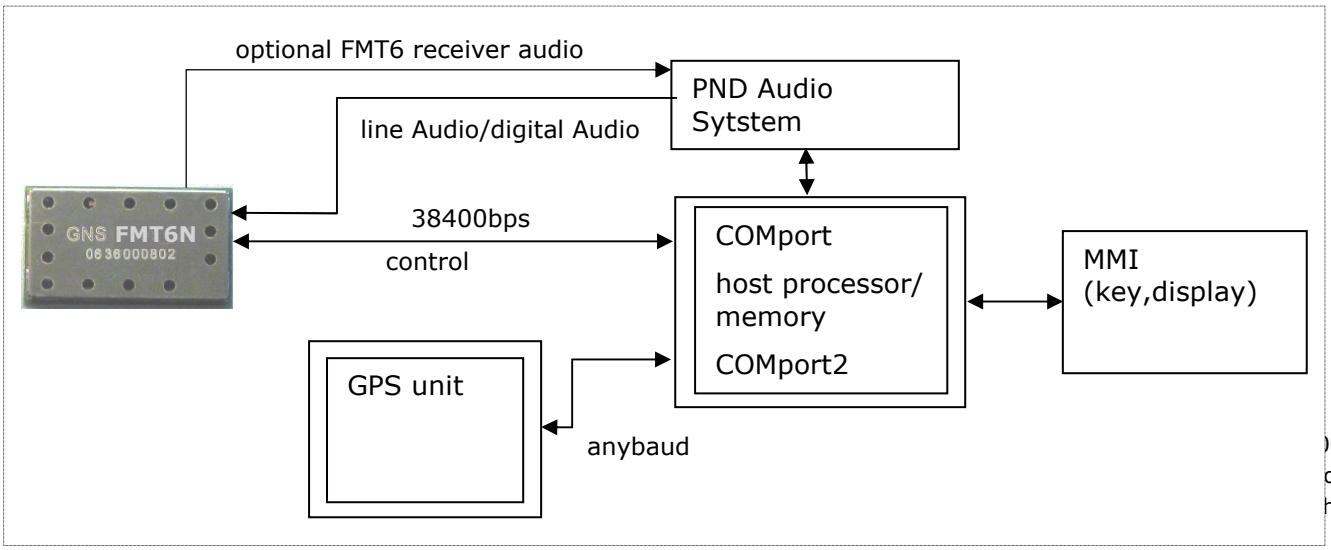
type	**part#**	**description**
FMT6N-001	4037735103757	GNS TMC and FMRDS transmitting combined transceiver module

APPLICATION NOTES

FMT6N has been designed to enable portable navigation systems to operate dynamically by the use of RDS-TMC traffic information. Two different typical application configurations can be used. Transmitter allows to use car FM receiver for audio output from PND.
please refer to application note AN FMT47077 for further implementation information

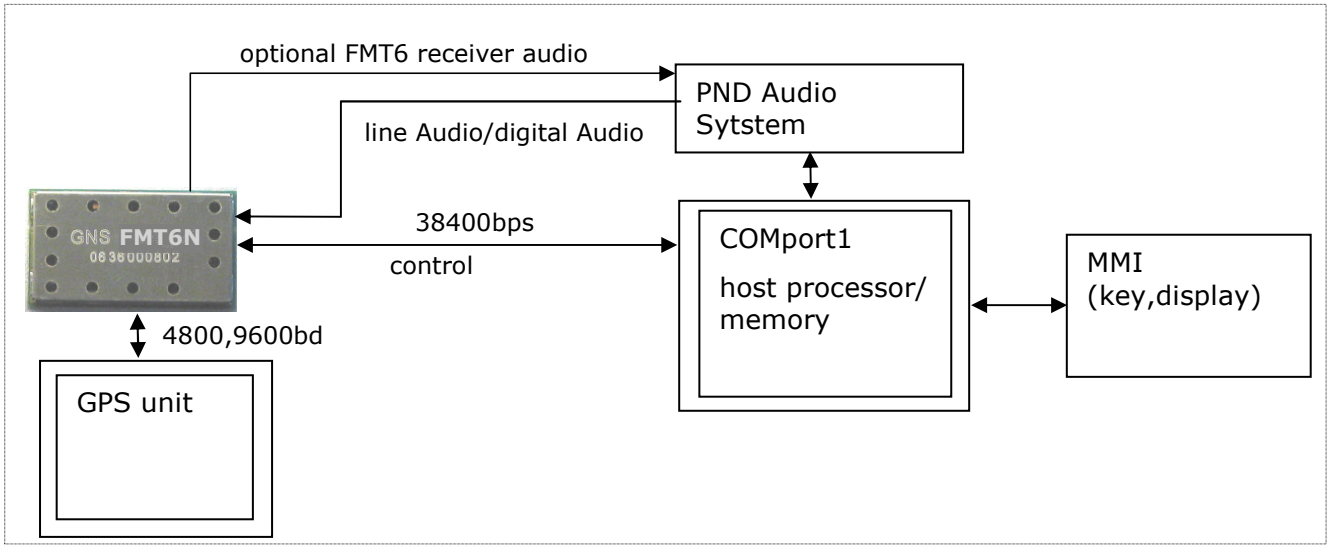
1. TWO- SERIAL- PORT CONFIGURATION

for example:
stand-alone portable Navigation equipment or PND with integrated GPS receiver



2. SINGLE - SERIAL- PORT CONFIGURATION (WITH GNS 3.5 PROTOCOL [1)])

for example: stand alone Navigation with only one available serial port.



STARTUP TIMING

Due to internal circuitry self test and firmware initialization, *Module setup delay time after power up* as specified under electrical data has to be respected by driving software. Delay time has to be kept after power has stabilized before issueing the first command.
Especially in case of software controlled power supply for FMT6N , you should take care to implement a delay in software.

RECOMMENDED PCB DESIGN

see application note AN FMT47077

MATERIAL INFORMATION

complies to ROHS standard
ROHS documentations are available on request
contact surface : gold over nickel

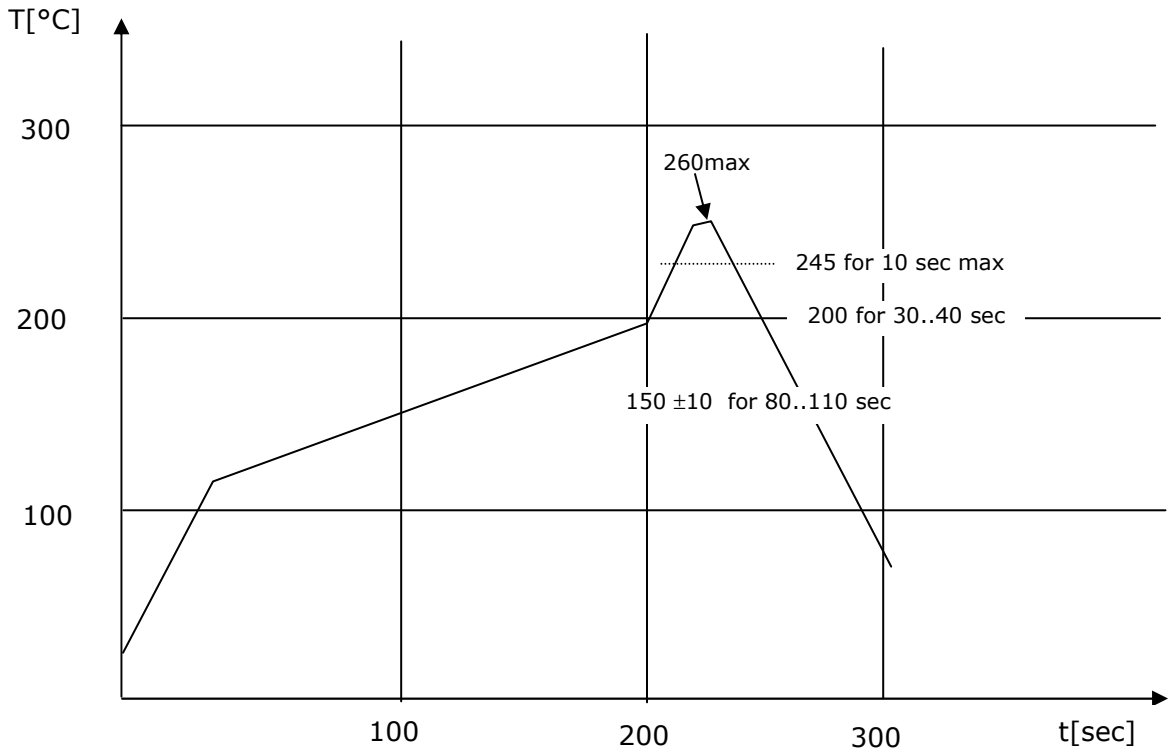
SHIELD MATERIAL INFORMATION

"German Silver " , CuNi18Zn27
Cu: 53.5..56.5%
Ni : 16.5..19.5%
Zn : 24..30%
thickness :0.2mm

MSL (MOISTURE SENSITIVITY LEVEL) INFORMATION

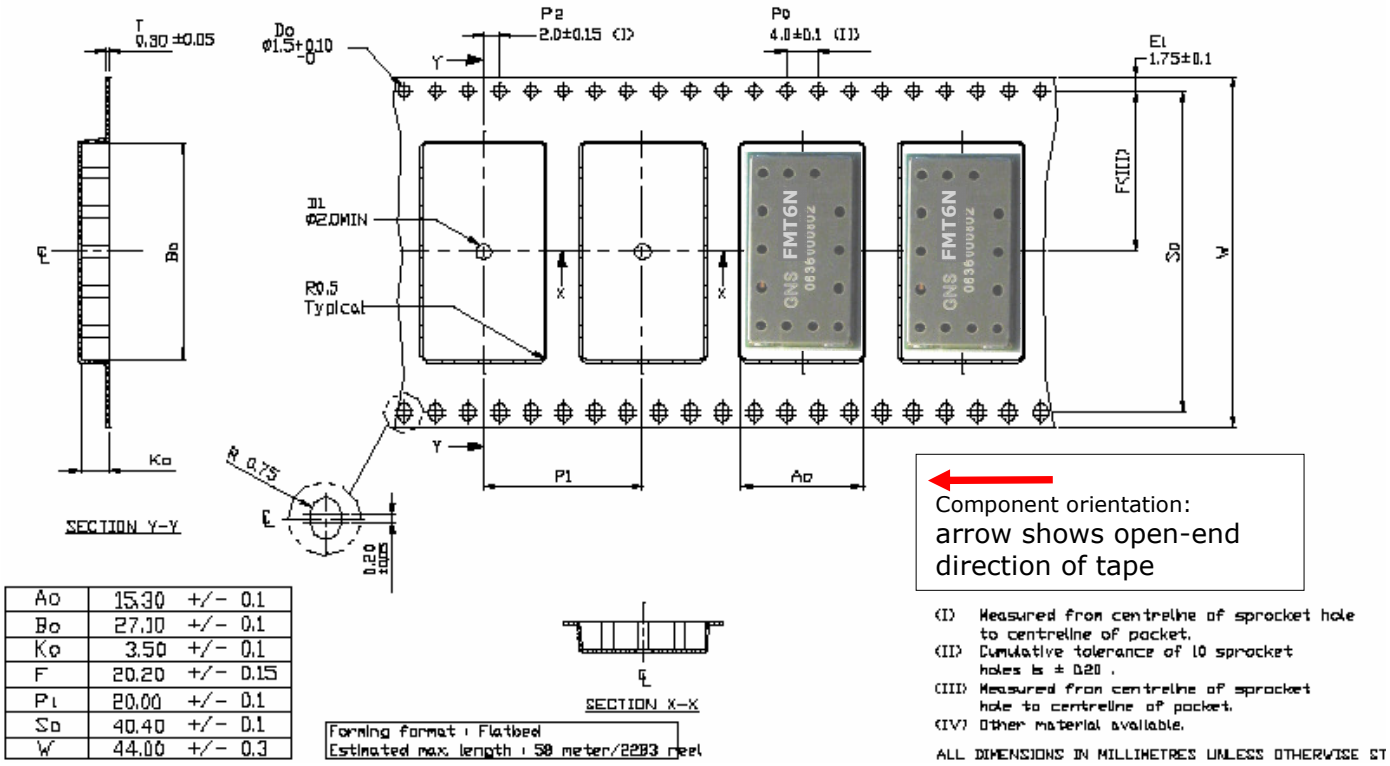
FMT6N is classified to be MSL class 3. floor time should be limited to 7 days, storage time less than 6 month in original packaging.
MSL is defined to avoid corrosion, chip cracking effect are not expected.

RECOMMANDED SOLDERING REFLOW PROFILE



Note:
1. FMT6N should be soldered in upright soldering position. In case of head-over soldering, please prevent shielding / FM6-Module from falling down.
2. Do never exceed maximum peak temperature

TAPE INFORMATION

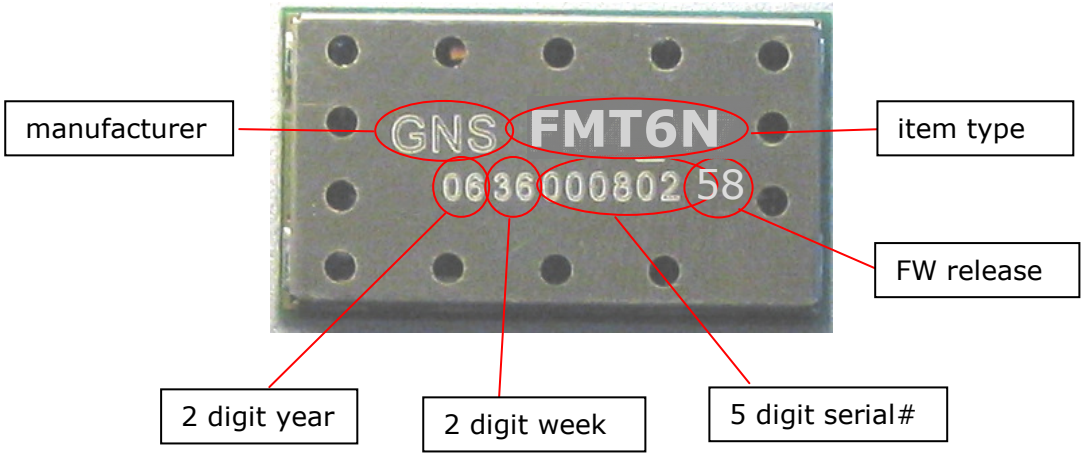


Ao	15.30	+/- 0.1
Bo	27.10	+/- 0.1
Ko	3.50	+/- 0.1
F	20.20	+/- 0.15
P1	20.00	+/- 0.1
So	40.40	+/- 0.1
W	44.00	+/- 0.3

Forming format : Flatbed
Estimated max. length : 50 meter/2283 reel

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

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE ST



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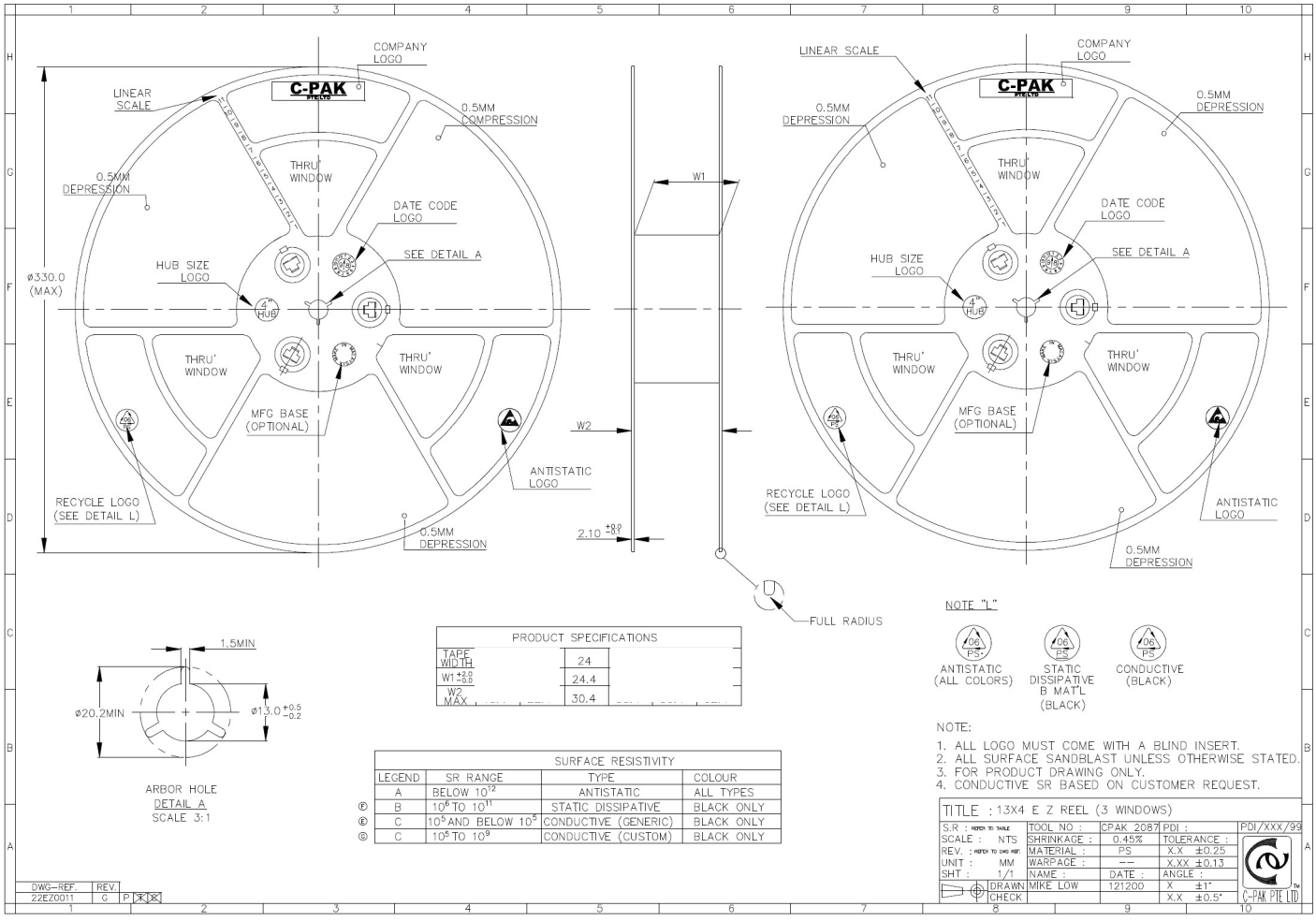
REEL INFORMATION



no. of devices : 800 pcs / reel

ENVIRONMENTAL INFORMATION

This product is free of environmental hazardous substances and complies to 2002/95/EC. (RoHS directive).

FIRMWARE RELEASE INFORMATION

This product is equipped with firmware V58.

APPLICATION NOTE INFORMATION

- application note *AN FMT47077* is available on request.
- EVB and EVB manual *FMT6N_EVB_V100* is available on request

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