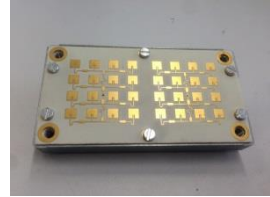


Datasheet

AGD-T7813-125 Issue '1' MC-133

Introduction

This document describes the AGD-T7813 modules Issue ,1'.
This module has the following features:



- Improved Ceramics Material (Temex E2036)
- RF-Transistor with higher gain
- Adjusted PCB Layout with tighter coupling for Resonator (lower loss)

Electrical Specification

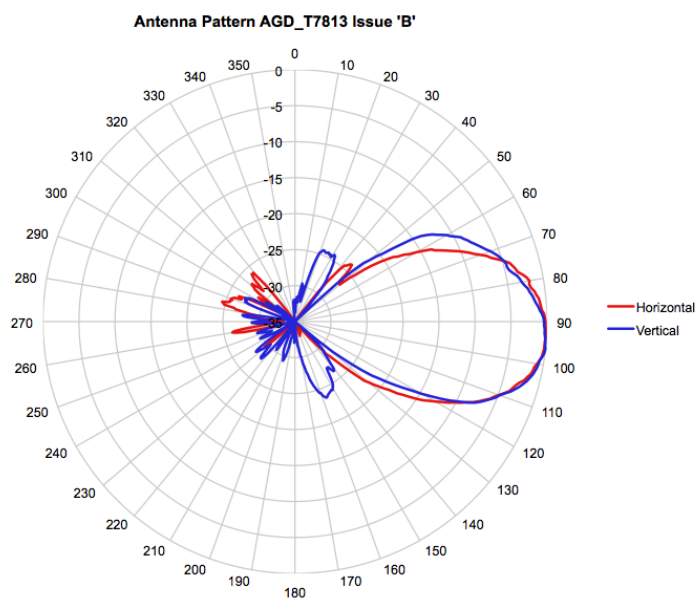
Parameter	Conditions / Notes	Symbol	Min	Typ	Max	Unit
Operating conditions						
Supply voltage		V_{cc}	3.15	3.3	6.0	V
Supply current	Module enabled	I_{cc1}	40	60	80	mA
	RF-Part disabled	I_{cc2}		5	10	mA
VCO input voltage		U_{vco}	0		5.5	V
VCO pin resistance	Internal pulldown 100k	R_{vco}		100k		Ω
Operating temperature		T_{op}	-20		+70	$^{\circ}C$
Storage temperature		T_{st}	-40		+85	$^{\circ}C$
Power down/Enable						
RF power down	Input tied high with pullup 100k	V_{IH1}	2.7		$V_{cc} + 0.3$	V
RF enable		V_{IL1}	-0.2		0.7	V
Minimum enable time	RF-part fully functional	t_{on}	5			μs
Maximum hold time	LP capacitor charge error < 10%	t_{off}			2	ms
Transmitter						
Transmitter frequency	$U_{vco} = 3.0V, T_{amb} = 25^{\circ}C$	f_{TX}	24.120	24.125	24.130	GHz
Frequency drift vs temp.	$V_{cc} = 3.3V, -20^{\circ}C \dots +70^{\circ}C$	Δf_{TX}		-0.27		MHz/ $^{\circ}C$
Frequency tuning range (VCO)	$U_{vco} = 1V \dots 5V$	Δf_{vco}	35	50	70	MHz
VCO sensitivity		S_{vco}		12.5		MHz/V
VCO Modulation Bandwidth	$\Delta f = 1MHz$	B_{VCO}	200			kHz
Output power	EIRP	P_{TX}	+13	+16	+20	dBm
Output power deviation	Full VCO tuning range	ΔP_{TX}			+/- 2	dBm
Spurious emission	According to ETSI 300 440	P_{spur}			-30	dBm
Receiver						
Antenna gain	$F_{TX} = 24.125GHz$	G_{Ant}		15		dBi
LNA gain	$F_{RX} = 24.125GHz$	G_{LNA}		9		dB
Mixer Conversion loss	$f_{IF} = 500Hz$	D_{mixer}		-2.0		dB
Receiver sensitivity	$f_{IF} = 500Hz, B = 1kHz, S/N = 6dB$	P_{RX}		-114		dBm
Overall sensitivity	$f_{IF} = 500Hz, B = 1kHz, S/N = 6dB$	D_{system}		-130		dBc

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Parameter	Conditions / Notes	Symbol	Min	Typ	Max	Unit
IF output						
IF output impedance		R_{IF}		100		Ω
IF Amplifier gain		G_{IF}		30		dB
I/Q amplitude balance	$f_{IF} = 500\text{Hz}$, $U_{IF} = 100\text{mV}_{pp}$	ΔU_{IF}		3		dB
I/Q phase shift	$f_{IF} = 500\text{Hz}$, $U_{IF} = 100\text{mV}_{pp}$	φ	70	90	110	$^\circ$
IF frequency range	-3dB Bandwidth	f_{IF_AC}	20		500k	Hz
IF noise voltage	$f_{IF} = 500\text{Hz}$	$U_{IFnoise}$	1.0	3.2	7.9	$\mu\text{V}/\sqrt{\text{Hz}}$
	$f_{IF} = 500\text{Hz}$	$U_{IFnoise}$	-120	-110	-102	dBV/Hz
IF output offset voltage	$V_{CC} = 3.3\text{V}$	U_{os_AC}	1.0	1.5	2.0	V
Supply rejection	Rejection supply pins to IF outputs, 1kHz	D_{supply}		26		dB
Antenna						
Horizontal -3dB beamwidth	E-Plane	W_{φ}	28	30	32	$^\circ$
Vertical -3dB beamwidth	H-Plane	W_{θ}	28	30	32	$^\circ$
Horiz. sidelobe suppression		D_{φ}	-20	-25		dB
Vert. sidelobe suppression		D_{θ}	-16	-20		dB
Body						
Outline Dimensions	connector left unconnected			35*65*17		mm^3
Weight				62		g
Connector				8		pins

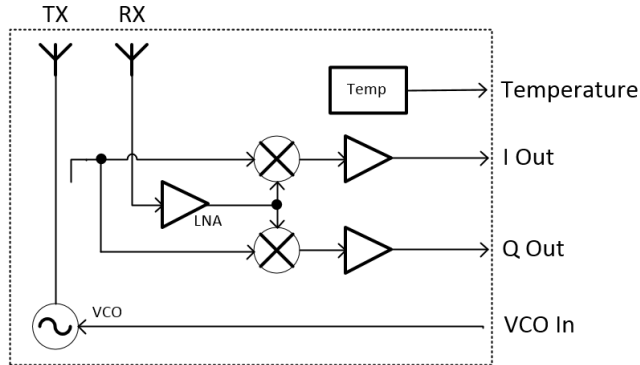
Antenna Pattern

Typical Antenna Pattern for one antenna (RX- or TX-side). Measured at 24.200GHz:

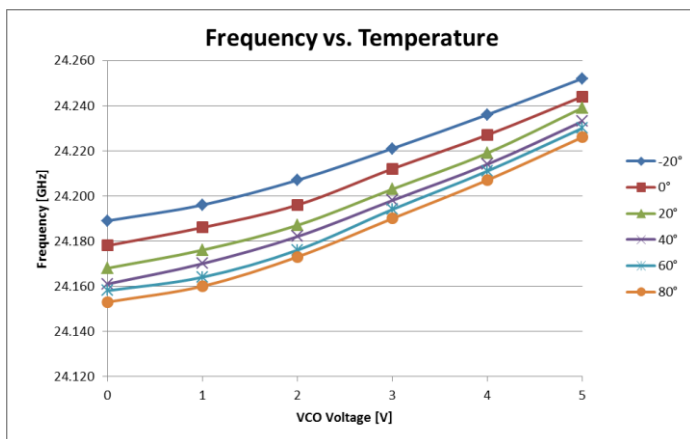


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Block diagram

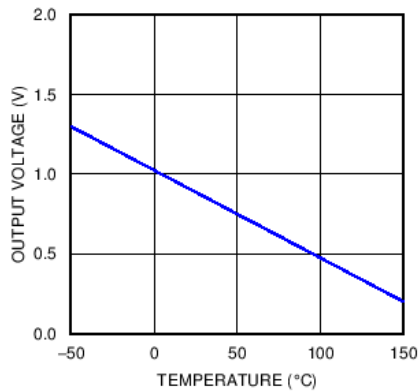


Frequency vs. VCO-Voltage and Temperature



Pin 8 voltage vs. Temperature

Output Voltage vs Temperature



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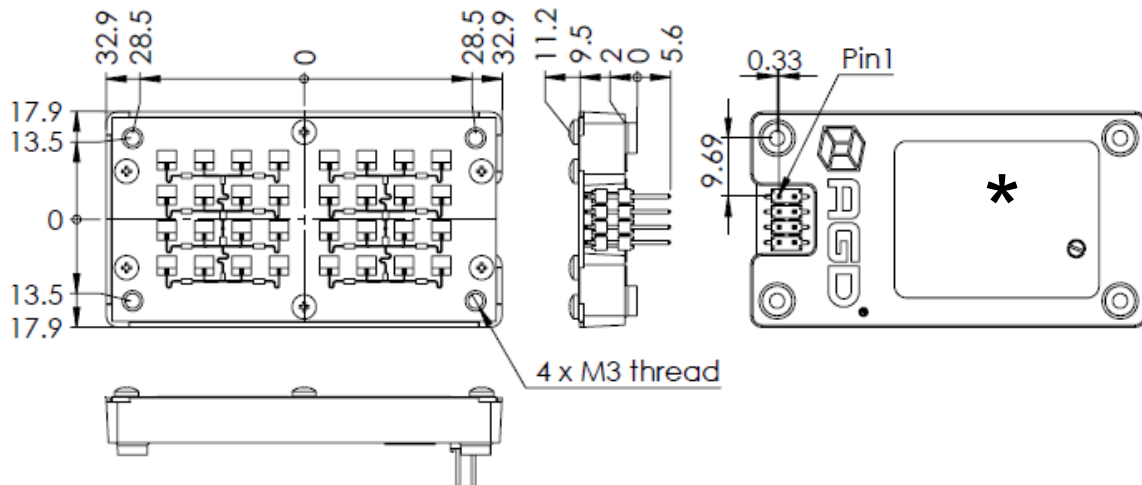
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Connector Pinout

On module side a Samtec HW-04-15-F-D-325-SM connector with the following pinout is used:

1:	/Enable	Enable/Disable RF-part. Connect to 0V for normal operation
2:	+3.3V	Power Supply. Connect to +3.3V (3.15V .. 6.0V)
3:	GND	Ground connection. Connect to 0V
4:	Q Out	Analog Output Q-Channel
5:	I Out	Analog Output I-Channel
6:	VCO	Frequency control input. A voltage between 1..5V adjusts TX Frequency by 0 .. 50MHz. Can be used for FSK or FMCW
7:	S&H	Sample&Hold Switch Analog Output. Leave it open or connect to +3.3V for normal operation
8:	Temp	Temperature Sensor output of LMT84 temperature sensor

Mechanical Drawing



FCC Labelling Information: (label to be placed into the recess position * shown in the mechanical drawing above)

FCC ID: WH3 -MC-133

AGD-T7813-125 (MC-133)

Frequency 24.125GHz

Issue 1

Serial No: in barcode or datamatrix format

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FCC Approval

This device complies with Part 15 of the FCC Rules.

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.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance such that the module should not be installed in equipment intended to be used within 20cm of the body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Changes or modifications not expressly approved by AGD SYSTEMS Ltd could void the user's authority to operate the equipment

Manufacturers of mobile or fixed devices incorporating MC-133 modules are authorized to use the FCC Grants of the MC-133 modules for their own final products according to the conditions referenced in these documents. In this case, the FCC label of the module shall be visible from the outside, or the host device shall bear a second label stating "Contains FCC ID: WH3-3-MC-133".

Document History

Author:	Léon Audergon, RFbeam Microwave GmbH, CH-9008 St. Gallen
Date:	August 25 th 2015
Version:	1.1
Changes:	I- and Q-outputs exchanged Different drawings added