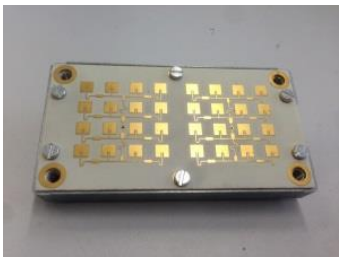
Datasheet
AGD-T7813-125 (MC-133)

Introduction

This document describes the AGD-T7813 modules Issue ‚2' (MC-133).
This module has the following features:

- Reduced 48GHz radiation to conform with regulations
- Reduced 100kHz crosstalk



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	°C
Storage temperature		T_{st}	-40		+85	°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°C	f_{TX}	24.120	24.125	24.130	GHz
Frequency drift vs temp.	V_{cc}=3.3V, -20°C .. +70°C	Δf_{TX}		-0.27		MHz/°C
Frequency tuning range (VCO)	U_{VCO}= 1V .. 5V	Δf_{vco}	35	50	70	MHz
VCO sensitivity		S_{vco}		12.5		MHz/V
VCO Modulation Bandwidth	Δf=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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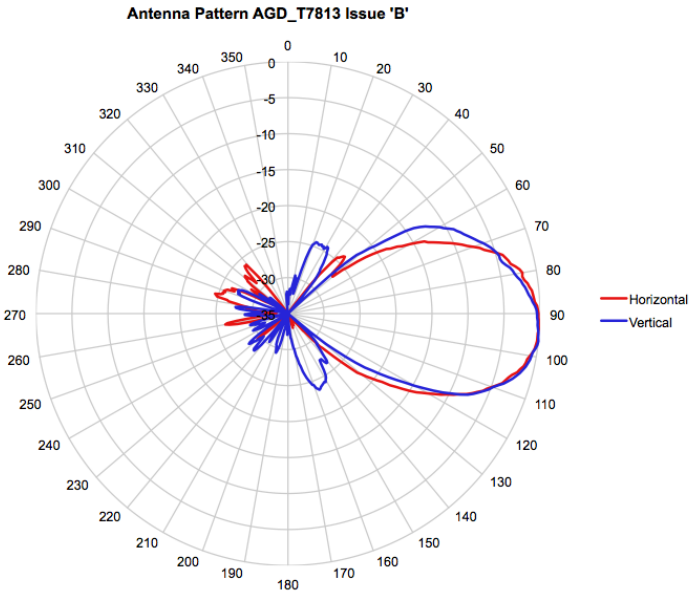
Parameter	Conditions / Notes	Symbol	Min	Typ	Max	Unit
IF output						
IF output impedance		R_{IF}		100		Ω
IF Amplifier gain		G_{IF}		30		dB
I/Q amplitude balance	f_{IF} =500Hz, U_{IF}=100mV$_{pp}$	ΔU_{IF}		3		dB
I/Q phase shift	f_{IF} =500Hz, U_{IF}=100mV$_{pp}$	φ	70	90	110	°
IF frequency range	-3dB Bandwidth	f_{IF_AC}	20		500k	Hz
IF noise voltage	f_{IF} =500Hz	$U_{IFnoise}$	1.0	3.2	7.9	µV/√Hz
	f_{IF} =500Hz	$U_{IFnoise}$	-120	-110	-102	dBV/Hz
IF output offset voltage	V_{cc} = 3.3V	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	°
Vertical -3dB beamwidth	H-Plane	W_{ϑ}	28	30	32	°
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 24.125GHz:



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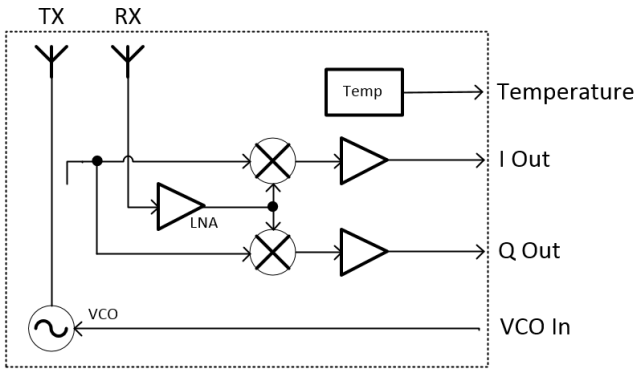
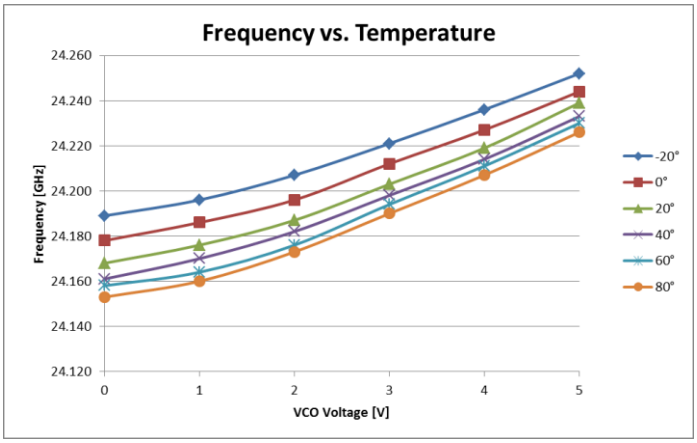
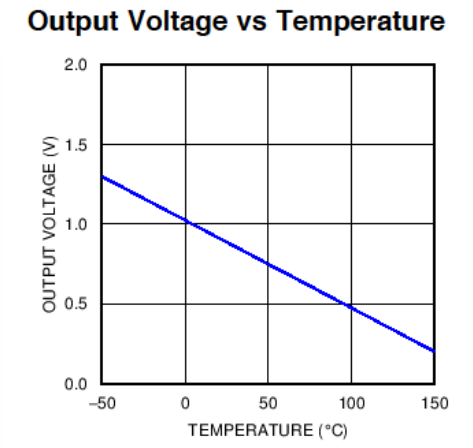
Block diagram



Frequency vs. VCO-Voltage and Temperature



Pin 8 voltage vs. Temperature



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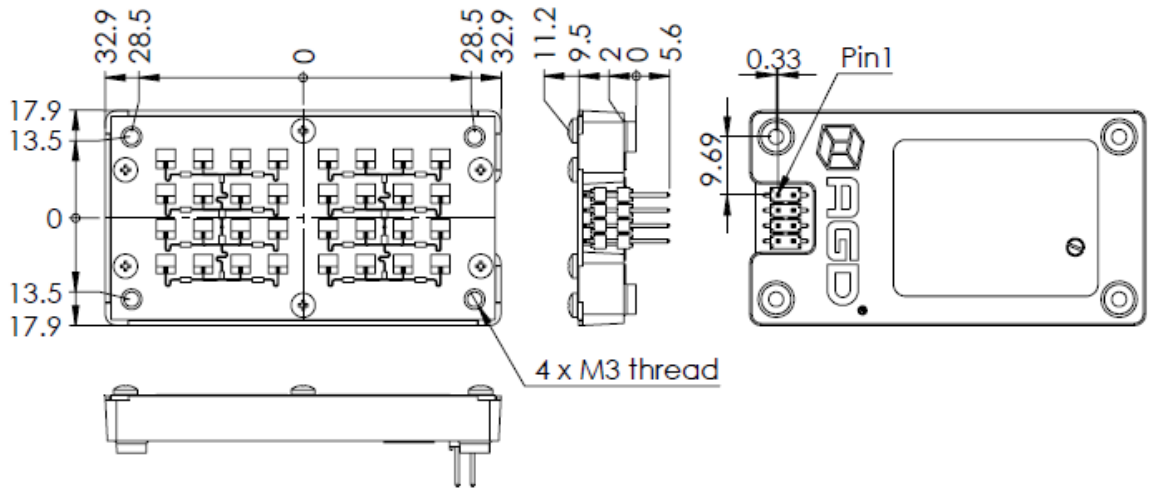
Connector Pinout

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



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Integrators Information

United States (FCC)

This module has been granted modular approval for fixed and/or mobile applications. The modular approval allows the end user to integrate the module into a finished product without obtaining subsequent and separate FCC approvals for intentional radiation, provided no changes or modifications are made to the module circuitry. Changes or modifications could void the user's authority to operate the equipment. The end user must comply with all of the instructions provided by the Grantee, which indicate installation and/or operating conditions necessary for compliance. The finished product is required to comply with all applicable FCC equipment authorizations regulations, requirements and equipment functions not associated with the transmitter module portion.

Note
Modification to this product will void the users' authority to operate this equipment.

Warning
The OEM integrator is responsible for the final compliance of the end product with this integrated modular approved transmitter module. This includes measurements with the RF module integrated and activated as defined in KDB 996369 and if applicable appropriate equipment authorizations as defined in §15.101.

Labelling and user information requirements

If the label of the module is not visible from the outside of the end product, it must include the following texts on the label of the host product:

FCC: Contains FCC ID: WH3-MC-133-2

In addition to marking the product with the appropriate ID's, the end product shall bear the following statement in a conspicuous location on the label or alternatively in the user manual:

> 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.

RF Exposure

This module is approved for installation into fixed and/or mobile host platforms and must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter guidelines. End users must be provided with transmitter operating conditions for satisfying RF Exposure compliance.

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Document History

Author:	Léon Audergon, RFbeam Microwave GmbH, CH-9008 St. Gallen
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Version:	1.3
Changes:	Additional Text for FCC approval

Author:	Ueli Giger, RFbeam Microwave GmbH, CH-9016 St. Gallen
Date:	March 18th 2020
Version:	1.4
Changes:	Changed Text for FCC approval