Microwaves module
5464
p.n. 4M5464XXX

Product Specification

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Prepared By Project Leader:	Marco Menegolo

Approved By Technical Manager Gabriele Demaria

General Manager: Serafino Memmola

I Upgrading Notes

Revision	Date	Paragraph	Reason for change
0.0	*07.03.02*	-	Basic release
1.0	*20.12.02*	1.3.4	Added "Movement Detector" description
1.1	*10.02.03*	3	Update Mechanical Specification
1.2	*07.05.03*	-	Added Software Interface Specification reference document

Software Interface Specification Document:
"ss_irue1 V4_9x7 arbeit.doc"

II Abstract

This document describes the functional characteristic of the microwaves module 5464.
The module 5464 is a volumetric sensor designed to detect intrusion into the passengers compartment of vehicles. It works on the doppler effect caused by moving objects inside the vehicle.
The 5464 complies with the European normative.

III Document overview

In chapter 1 a *General specification, normative and general function* is reported.
In the chapter 2 there are the *Input/Output specifications,* while in the section 3 the main *mechanical characteristics* are listed.

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SUMMARY

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1   GENERAL DESCRIPTION

1.1   General Notes

The following specifications is referred to the Delta Elettronica microwaves module 5464 (p.n. 4M5464xxx) designed for Porsche alarm system.

Product:	Functions:
microwaves module	• serial communication to the Alarm Central Unit • set and unset state in response to the Alarm Central Unit command; • automatic setting as Slave when it connected to the Master • generates an alarm condition when an intrusion is detected; • the sensitivity is selected depending on the car model; • temperature sensitivity compensation.

TABLE 1.1: FUNCTIONS OF THE MICROWAVES 5464

1.2   General Specifications

Nominal rated operating voltage:	+12 V DC
Operating voltage range:	+9 to + 16 V DC
Maximum overvoltage:	+ 24 V DC for 1 minute
Reverse voltage:	- 18 V DC for 1 minute
Maximum operating temperature:	+ 85 °C
Minimum operating temperature:	− 40 °C
Current consumption: - Unset state	< 3 mA (at +12 V DC)
- Set state	< 8 mA (at +12 V DC)
ERP:	< 1 mW CW
Operating frequency:	2450 Mhz +/- 5 Mhz (-10 to +55° C)
Spurious emission in Frequency band: 41 to 68 Mhz 87.5 to 118 Mhz 162 to 230 Mhz 470 to 862 Mhz up to 1 Ghz All frequency > 1 Ghz	 < 4 nW < 4 nW < 4 nW < 4 nW < 250 nW < 1μW

TABLE 1.2: GENERAL SPECIFICATION OF THE MICROWAVES 5464

The Microwaves 5464 complies with the following normative:

IEC 68-2-1	Test A: Cold
	Severity level:
	   -Temperature: -40 ± 2 ºC
	   -Duration: 16 hrs

IEC 68-2-2	Test Bb: Dry heat
	Severity level:
	   -Temperature: $+85\pm2$ ºC
	   -Duration: 16 hrs

IEC 68-2-38	Test Z/AD: Composite temperature/humidity cyclic test:
	Severity level:
	   -Upper temperature: $+65\pm2$ ºC
	   -Lower temperature: -10 ± 2 ºC
	   -Humidity at upper temperature: 93 ± 3% RH
	   -Number of cold cycles 5
	   -Total number of cycles 10
	Note: the cold sub cycles shall be introduced after the 2nd, 4th, 8th and 9th main cycles.

EN 60529	Specification for degrees of protection provided by enclosure (IP code) Severity level: IPX4

IEC 68-2-6	Test Fc and guidance: Vibration (sinusoidal)
	Severity level:
	   -Frequency range:10 to 15.6 Hz 15.77 to 500 Hz
	    -Acceleration: 5 g
	   -Displacement: 5 mm
	   -Log sweep rate: 1 oct/min
	   -Number of axis: 3
	   -Cycles per axis: 20

IEC 68-2-29	Test Eb and guidance: Bump
	Severity level:
	   -Amplitude: 40 g
	   -Duration: 6 ms
	   -Directions: 3 (orthogonal)
	   -Number of bumps per direction: 1000

ISO/TR 10605/E	Electrostatic discharge Direct contact: ±8 KV Air discharge: ±15 KV
ISO 7637-1	Electrical disturbance by conduction and coupling Supply lines Severity level: -Table A.1 - Test level IV (max.)

ISO 7637-3	Electrical disturbance by conduction and coupling Lines other than supply lines Severity level: -Table A.1 - Test level IV (max.)	

ISO/DIS11452-4	Part 4: Bulk current injection (BCI)
	Severity level:
	    -Frequency band:
	
	    -Modulation:
	
	    -Current:
	    -Dwell time:
		1÷10 MHz in 1 MHz steps
		10÷200 MHz in 2 MHz steps
		a) No modulation
		b) 1 KHz 80% AM sinewave
		50 mA
		2s

ISO/DIS11452-2	Electromagnetic fields-radiated energy
	Severity level:
	    -Frequency band
	steps
	    -Modulation:
	
	    -Field strength:
	    -Number of axis:
	    -Dwell time:
		200÷1000 MHz in 20 MHz
		
		a) No modulation
		b) 1 KHz 80% AM sinewave
		50 V/m
		2
		2 s

IEC 817	Impact test
	Severity level:
	    -Impact test:
	    -Number of impacts per point: 3
		0.5 J

TABLE 1.3: SUMMARY OF NORMATIVES COMPLIED BY MICROWAVES 5464

The Microwaves 5464 complies with the following requirements:

Thatcham	"*The British insurance industry's criteria for vehicle security system evaluation passengers cars.*" Issue 2 - January 1996
Thatcham	"*Performance test specifications electronic alarm and immobilizer systems*". Issue 2 - June 1996
UPEA	"*Prescription pour les installations de protection des vehicles automobiles contre le vol.*" "*VV3-Systemes elettroniques complementaires d'alarme.*"
EUROPEAN DIRECTIVE 94/54/EC	

TABLE 1.4: SUMMARY OF INSURANCE REQUIREMENTS

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1.3   General function

The basic principle used in the 5464 to detect intrusion is the doppler effect. The microwaves reflection, caused by moving objects inside the vehicle toward to the module, generates an electrical signal proportional to the movement, this signal is monitored by a microcontroller, that generates an alarm condition when the doppler signal exceeds the alarm threshold for a given time.

Timing, set and unset condition, temperature compensation and other functions, are supervised by a microcontroller and the main parameters are stored in eeprom.

1.3.1 Master and Slave configuration

To guarantee the maximum covering it is possible to install one or two 5464 module depending on the car model, this information is provided during the installation by an electronic control unit (diagnostic device or alarm control unit), the module store in eeprom this data.

The module linked to the alarm central unit is the Master, it receives the main commands and it controls the Slave, the Slave set automatically the configuration and the sensibility.

1.3.2 State of the module

The 5464 has two different state, the change into the two state depends on the Alarm Central Unit message.

Set: the module actives the RF transmission and the doppler signal control, an intrusion into the passengers compartment of vehicle generates an alarm condition.

Unset: the module is disactive, no alarm condition is generated, only the serial line communication is monitored.

1.3.3 Inhibition time

The module is inhibited and no volumetric alarm is generated for 10 second after the activation by the "set command" at the end of this period the module is ready to detect intrusion.

1.3.4 Movement Detector

The bit 6 of the response byte must be used as movement detection for 10s after the *Inhibition time* of the IRU (10s).

During this time the bit 6 is set to 1 if a movement is detected. The bit is automatically reset at the end of the 10s (when the IRU goes in the ACTIVE STATUS).

1.3.5 Alarm time

If an intrusion is detected the module generates a "volumetric alarm", in this condition the alarm output is active in compliance whit the Hella specifications EE-324/EE-323 dated 25.11.2002 .

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1.3.6 Detection performance

The 5464 responds to start/stop motion of the standard target moving toward the module. The speed range of start/stop motion is between 0.2 and 2 m/s, and the module does not respond to movement shorter than 0.2s.
The sensitivity is selected by eeprom parameters.

1.3.7 Standard target

Definition of standard target:
a mild steel plate measuring 150x150x1.5 mm covered with rubber skin.

1.3.8 Temperature compensation

To maintain a constant sensitivity in the temperature range, the microcontroller checks the temperature sensor, that gives an output voltage proportional to the temperature using that values the microcontrolloer adjusts the alarm threshold.

1.3.9 Communication protocol

In compliance whit Hella specifications EE-324/EE-323 dated 25.11.2002.

1.3.10 Diagnostic mode

The diagnostic mode is used only in production test, the module goes in this condition after the power on if it receives a break on the serial line (Com 1).

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2   INPUT / OUTPUT SPECIFICATIONS

The abbreviations used are as follows:

Pin   Connector - pin number
Des   Input/Output description
Type   P=Power I=Input O=Output
Act   Active input level
Lo   Maximum input voltage for low level
Hi   Minimum input voltage for high level
Ipk   Peak load current
Vdrop   Maximum voltage drop across the switch element
x   Not applicable

The specifications are listed in the following Table:

Pin	Des	Type	Act	Lo	Hi	Vdrop	Ipk
J01-1	+30 (power supply)	P	x	x	x	x	15mA
J01-2	Gnd	P	x	x	x	x	15mA
J01-3	Com 1	I/O	L	0,25 Vbatt	0,75 Vbatt	1V	20mA
J01-4	Com 2	I/O	L	1,5V	9V	1V	20mA

TABLE 2.1: INPUT /OUTPUT SPECIFICATIONS

Input/Output functions:

+30 (Power supply)	Positive voltage to the Microwaves 5464.
GND	Ground reference to the Microwaves 5464
Com 1	Serial link with the central unit
Com 2	Serial link with the slave module

TABLE 2.2: INPUT/ OUTPUT FUNCTIONS

3   MECHANICAL SPECIFICATIONS

The 5464 can be fixed into the passengers compartment of vehicle using the special clips.

Dimensions:	61 x 63 x 15 mm
Weight:	35g
Material :	>ABS<
Connector	AMP MQS 4 90°

TABLE 3.1: MECHANICAL SPECIFICATIONS

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