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TECHNICAL FILE

FOR

CHRYSLER LP_MDD MICROWAVE SENSOR

CEL P/N: 902939

1.0 Introduction

This is a Technical File for CHRYSLER LP MDD Microwave sensor electronics supplied by CEL to CHRYSLER.

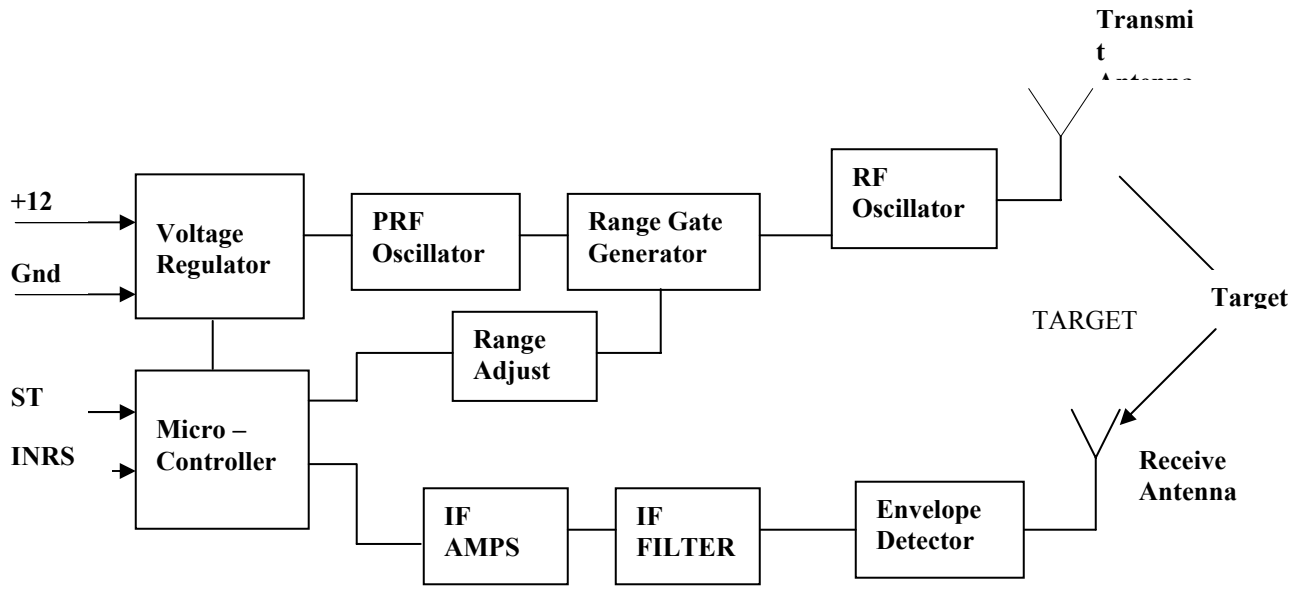
1.1 Theory of Operation

The vehicle passenger compartment protection system operates as a microwave based motion detection sensor. The sensor detects motion within a set surveillance hemisphere and an alarm signal is sent to the Ground Module.

The sensor works on the Doppler principle. The transmit antenna transmits an electro-magnetic field into the vehicle. The receive antenna accepts reflections from moving targets and the resulting signals are filtered and amplified before being sent to the microcontroller for evaluation.
The range is adjustable in software. Thus, the range can always be adjusted to fill the vehicle interior, in relation to the shortest distance between the LP_MDD sensor and the windscreen or vehicle roof (the limits of the vehicle passenger compartment). In this way, a hemispherical field is generated within the vehicle as the area to be monitored. If a large enough change in analog signal amplitude occurs, an analysis of the signal evaluation is started. The microcontroller contains a software algorithm that determines if the signal is a genuine movement or a spurious signal.

If this analysis detects significant characteristics of a movement, an alarm is issued to the ground module via the INRS wire line.

MICROWAVE BLOCK DIAGRAM:



1.2 Operating Modes and influencing factors

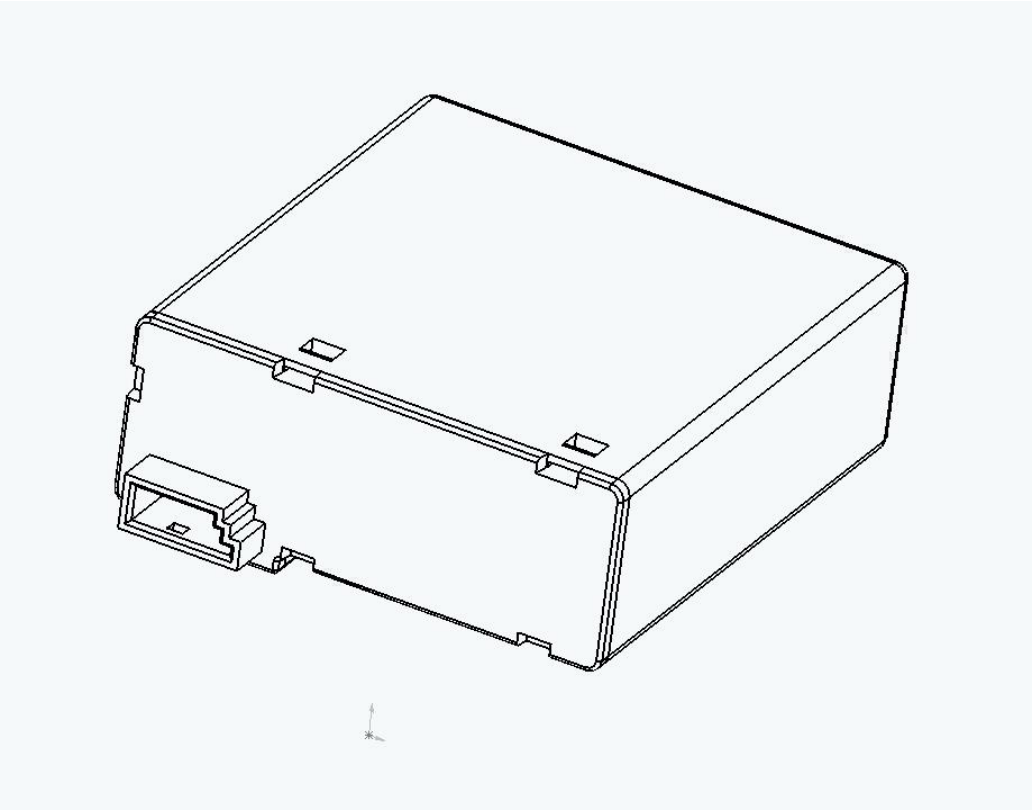
In its non-sensitized condition, the SDR module is set to Sleep-Mode. When sensitized, it is woken by an interrupt on the ST line. The sensitization period for the SDR module, to full functionality, is 30 seconds. The complete alarm system is likewise ready for operation 30 seconds after sensitization of the DWA (anti-theft warning system).

The SDR module operates in impulse mode : that is, like a radar impulse system. An impulse is emitted for a brief period and the reflected signal received is amplified and evaluated. Because the module operates with a very low transmission output, more powerful external frequencies can connect with the receiver side of the device and cause false alarms. The reflected signal is checked in parallel with a suitable EMC protection switching unit and any foreign frequencies are filtered out.

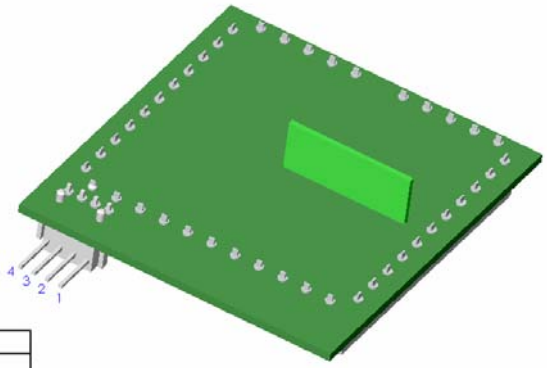
Any real movement in the detection area is recognized by a change in the reflection sample. The module emits a pulsed signal and delays this in accordance with the detection range required. This delayed impulse then controls the receiver section. Only after this delay time is the receiver section opened for a short period, when an associated signal pattern is stored. In reality, the detection range corresponds with a spherical "shell" having a width of ca. 5cm. The signal is stored in terms of amplitude and pattern and is compared with the next signal which is received.

1.3 Physical Construction

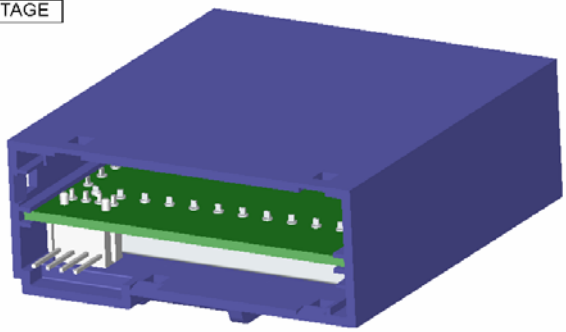
Housing:



LENGTH: 70mm, WIDTH: 63mm, HEIGHT: 29.5mm



PIN NO	DESCRIPTION
1	GND
2	ST: ARM/DISARM
3	INRS: ALARM OUT
4	VBATT: SUPPLY VOLTAGE



PCB: Two layer, Board material FR4
Layer 1: Components and signal tracks
Layer 2: Ground plane

Connector Detail:

- 4 way Amp part Number: 4-1393472-9.

Table 1 – Microwave Sensor ECU Connector Pin Detail

Title	Pin	Function
Ground	1	Ground
ST	2	Sensor Arm/Disarm signal
INRS	3	Alarm Out signal
VBAT	4	Power Supply (Battery)

1.4 ESC Part Number(s)

CEL Part No.: 902939

1.5 ESC Manufacturers:

CEL
Dunmore Road,
Tuam,
Co. Galway,
Ireland
Tel: +353 93 25128

2.0 EMC Requirements Analysis

2.1 Critical Interface Signals

Pin	Signal Name	Signal Description	Voltage / Current Level	Frequency	%Duty Cycle
1	GND	Ground	0V	DC	N/A
2	ST	Sensor Arm/Disarm signal	9V – 16V 1mA	DC	N/A
3	INRS	Alarm out signal	9V – 16V / 1mA	DC	N/A
4	VBAT	Power Supply	9V – 16V / 5mA	DC	N/A

User interfaces:

2.2 Potential Sources of Emissions

Signal Source Description	Voltage/Current Level	Frequency	% Duty Cycle (range)	Other
Resonator	3V	4MHz	50%	

3.0 Mode Descriptions

Mode	VBAT	ST Input	INRS (Output)
Armed	+12V	0V	12V (1 sec 0V on Alarm)
Disarmed	+12V	12V	12V

Mode Armed:
In this Mode the ST Input to the Microwave sensor is pulled to ground which 'Arms' the sensor ie. if movement is detected then the INRS (alarm) output is activated (by pulling the INRS output to ground for 1 second).

Mode Disarmed:
In this Mode the ST Input to the Microwave sensor is pulled to VBat which 'Disarms' the sensor ie. the sensor is turned OFF and so should not react to any movements.