

Cellocator™ Handsfree Product Overview



Cellocator Division
Pointer Telocation Ltd.

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Version 1.6

Revised and Updated: October 29, 2014



POINTER



CELLOCATOR™ HANDSFREE Product Overview



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1 System Description

1.1 Overview

The Cellocator™ Handsfree module allows the driver to communicate with assistance representatives, and Control Center (CC) operators to follow developments in the driver cabin in the event that a one of the buttons designated for this function, has been pressed.

The Handsfree device allows for full duplex voice connectivity via microphone and speaker. The user may initiate, answer and disconnect calls via a service button. The destination of a call initiated hands-free is a predefined number. The driver may also initiate a panic call to a predefined number (control center) using the panic button. The Handsfree module also supports silent monitoring in which the CC can listen to the driver and to developments in the cabin with the speaker muted. A LED indicates the status of the call.

The Cellocator unit disconnects when the other party hangs up and may be programmed to answer automatically.

Note: The use of Pointer materials mentioned in this document, and their proper installation in accordance the instructions specified herein, is crucial to achieve suitable voice quality. Specifically, the specified shielded harnesses must be used.

Note: Initiating a call via the call service button might take up to 10 seconds before the appropriate telephone network tones are heard.

Note: Initiating a call via the distress button might take some time before the appropriate telephone network tones are heard. In order to shorten this interval, the number of distress messages which are normally sent before call initiation should be kept to the minimum possible.



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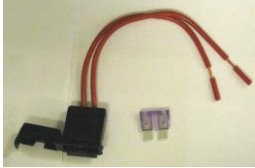
1.2 The Handsfree Module Kit

Part	Description	Picture
AR0188 Speaker		
AR0189 Microphone		
GH0350000-0010 Cellocator™ Handsfree module	The Handsfree module allows for full duplex voice communication.	
712-20016 Cellocator™ Handsfree Set	The set incorporates a microphone, a speakerphone and the Handsfree module.	
712-00090 Noise Filters	The noise filter package contains 100 noise filters. In some cases 2 filters are used for noise suppression.	
711-00196 Compact Harness	Optional harness that incorporates shielded voice wires for reducing the electrical noise generated by the vehicle. It also contains a panic button and a status LED.	
711-00197 370-50 Voice Harness	The optional dedicated voice harness for the Cellocator 370-50 incorporates shielded voice wires for reducing the electrical noise generated by the vehicle.	
711-20001 Distress Button	Optional service button used for initiating, answering and disconnecting voice calls. May be used also as panic button for the 370-50.	
711-00191 HF Adapter	An adapter for connecting the new Cellocator Handsfree Module to compact harness 711-00164 which was used for the previous Handsfree Module.	



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Fuse and Fuse housing PN 710-00001 PN 710-00002	3A Fuse and Fuse Housing for vehicle Installation.	
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1.3 General Description

This section explains the role of each component in providing full duplex voice services.

1.3.1 Handsfree Speaker

A 5W speaker is used. The speaker connects to the HF module, by means of a 1.78-meter cable and a proprietary two-pin jack.

1.3.2 Handsfree Microphone

The microphone is an omni-directional Electret Condenser Microphone with -42dB sensitivity and 48 dB signal-to-noise-ratio (SNR). The microphone is connected to the HF module by means of a 1.5-meter cable with a standard stereo jack.

1.3.3 Handsfree Module

The HF module relays the voice between the microphone, the speaker and the Cellocator unit utilizing an electronic circuit, including filters and a 3W amplifier.

The HF Module can be connected to a power supply of 9V to 32V. Its average power consumption is 650 mW and in standby mode it consumes 7.5 mA. The power feed to the Handsfree Module should be connected to the dedicated red wire of the Handsfree Module. It is recommended to connect the power of the Handsfree Module to the ignition switch allowing complete disconnection from power during parking without any current consumption. If the Handsfree Module is powered from the main vehicle's battery, it will consume the 7.5mA also during parking.

1.3.4 Noise Filters

The noise filters are optional and should be installed only in case that clipping noise is heard during silent periods between calls when the ignition is on. To eliminate that noise, the filters should be applied to the Cellocator unit power input and to the Cellocator unit ignition input.

To attach the filter to the Cellocator power input, connect the filter's single red wire to the vehicle battery, the filter's black wire to the harness ground wire and the filter's second red wire (next to the black wire) to the harness power wire.

To attach the filter to the Cellocator ignition input, connect the filter's single red wire to the vehicle ignition, the filter's black wire to the harness ground wire and the filter second red wire (next to the black wire) to the harness ignition wire.

Note: the noise filters are not supplied with the Handsfree kit and should be purchased separately.



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1.3.5 *The Harness*

The HF Module is connected to the Cellocator unit's power and voice outputs by means of HF harness with shielded voice wires. The shielded wires reduce the noise generated by the vehicle.

The Handsfree module can be supplied with two types of compatible harnesses:

- ◆ For Compact: the compact harness PN 711-00196
- ◆ For 370-50: THE 370-50 voice harness PN 711-00197

The compact harness (for Compact units) is the full installation harness that accommodates the Compact unit with all the peripheral devices including the Handsfree Module. It includes a special extension for the Handsfree connection.

The 370-50 voice harness is dedicated to voice only. The regular installation harness for the 370-50 unit is also required.

Both harnesses provide a pair of jacks to the Handsfree Module: SPK and MIC. They are plugged into the corresponding plugs of the Handsfree module.

The plugs connect the Audio In, Audio out and GND wires of the Handsfree module to the Cellocator unit.

The Handsfree extension of the compact harness also provides a dedicated power feed red wire, which should be connected to the power-in red wire of the Handsfree module via a fuse. The 370-50 voice harness does not provide such a wire.

1.3.6 *Cellocator Unit*

The Cellocator unit controls the transmission of the voice from the vehicle to the GSM network and vice versa. It converts the analog electronic signal to the GSM standard and vice versa. The Cellocator unit controls the voice characteristics like ringer volume, speaker volume and microphone gain. The Cellocator unit is also responsible for echo canceling, which is essential in full-duplex communication.

1.3.7 *Handsfree Adapter*

The Handsfree adapter is used to connect the Handsfree module in vehicles with already installed 711-00164 compact harness, allowing installation of the new Cellocator Handsfree to old installations.

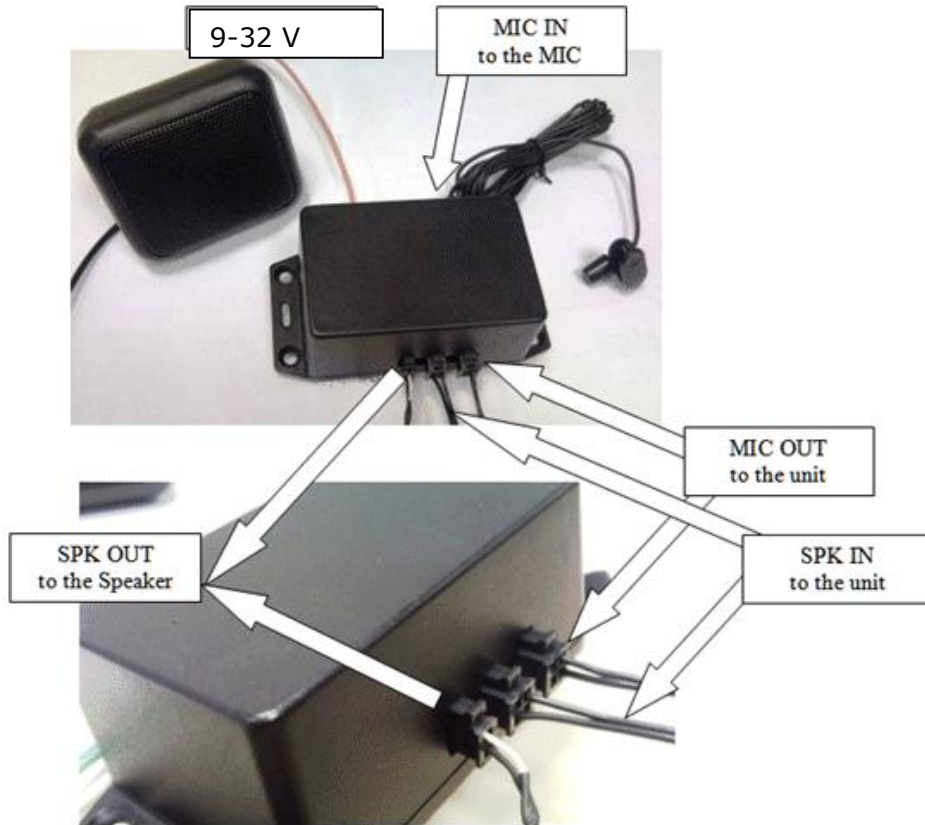
Note: the combination of 711-00164 compact harness and the Handsfree adapter does not guarantee voice quality. In order to guarantee voice quality the 711-00196 compact harness shall be used.



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1.3.8 Connection Scheme





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The following table specifies the connections:

Handsfree Module			Connected to			
Connector name	Pin no.	Pin description	Device	Connector name	Pin no.	Pin description
MIC IN			Microphone	Microphone jack		
SPK OUT			Speaker	Speaker jack		
MIC OUT	1	MIC+	Cellocator unit		10	Audio In
	2	unused				
	3	A. GND	Cellocator unit		19	Audio GND
	4	unused				
SPK IN	1	unused				
	2	S. GND	Cellocator unit		19	Audio GND
	3	SPKR -	Cellocator unit		9	Audio Out
	4	unused				
Power-In red wire			V+ , The power feed red wire of the compact harness			

1.4 Compatibility

The Compact Security, Compact Analog-Input and Compact 370-50 products do not support the additional voice service button and, therefore, do not support the manual answer and disconnect functions.

Full-duplex operation requires an appropriate cellular modem capable of controlling the voice characteristics and the echo cancelling operation. It also requires firmware which provides the necessary parameters to the modem.

To verify the compatibility of a certain Cellocator unit with the Handsfree Module, please contact your Pointer agent.



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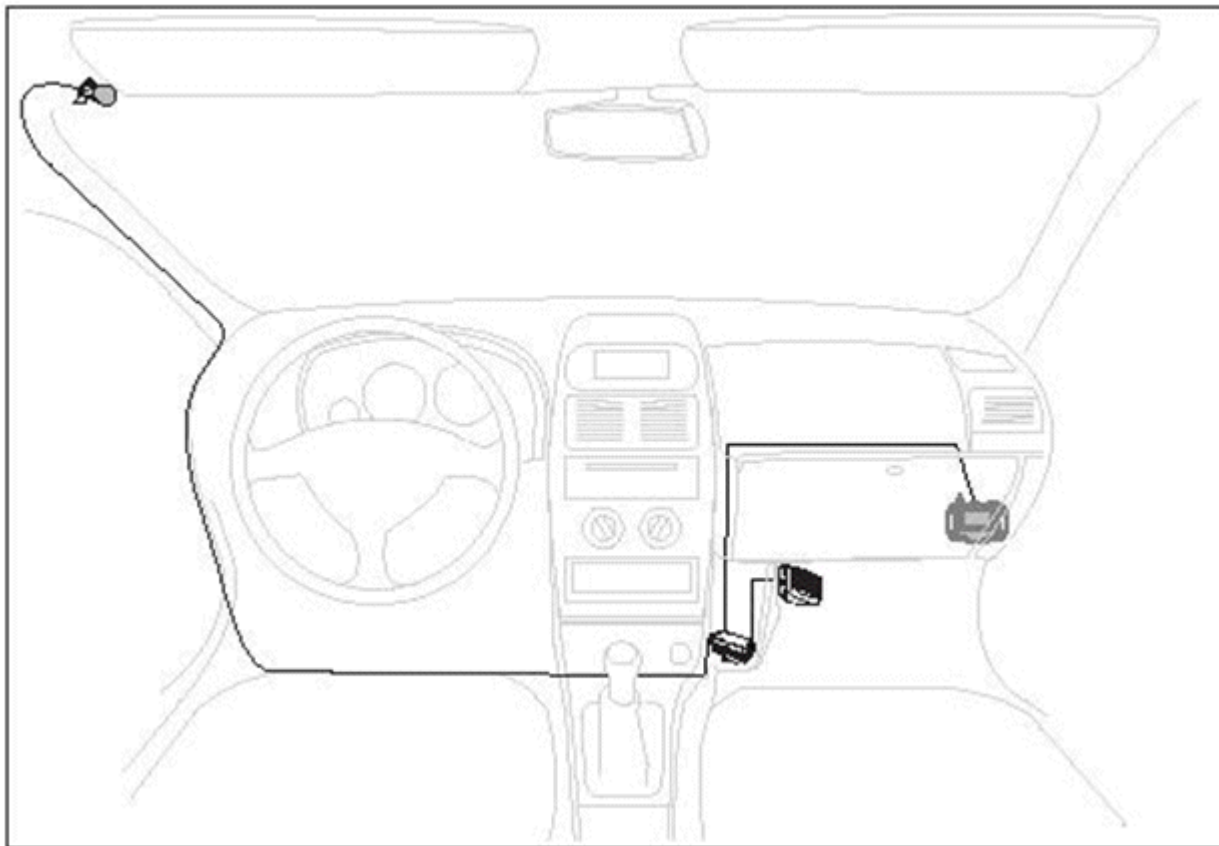
2 Installation

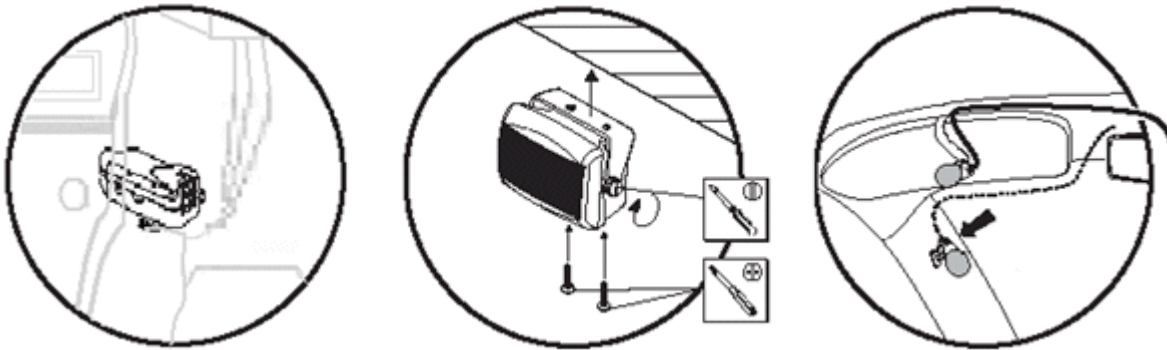
2.1 Safety Instructions

- ◆ Do not mount the device in a possible impact zone in the passenger area or in airbag unfolding area.
- ◆ Do not attempt to operate a defective product. If you find a defect, please contact Pointer Support.
- ◆ Attempts to repair the system by unqualified personnel can be dangerous to the user. Only qualified staff should be authorized to carry out inspections.
- ◆ Use only the supplied or an approved replacement antenna. Unauthorized antennas, modifications, or attachments could damage the device.
- ◆ Do not install the device in the area over the air bag compartment or in the air bag unfolding area. A device pushed by an inflating airbag may cause serious injury.

2.2 Installation Overview

In addition to the following, please also refer to the information provided in Section 1.3.8.





The HF Module interface is connected to the power source of the Cellocator Compact by means of the HF harness. The HF Module should be placed behind the Cellocator unit or at the side of the center console.

The HF Module can be attached to the vehicle using Velcro, an adhesive pad or a plastic restraint.

The speaker is connected to the Handsfree module by means of a speaker jack. It should be mounted at least 50cm away from the microphone and should not be pointed in the direction of the microphone. It should preferably be placed, out of sight, in the upper part of the front passenger's foot space, and secured with screws.

The unidirectional microphone is connected to the Handsfree module by means of a microphone jack. It can be installed using Velcro, or an adhesive pad provided with the product, on the door pillar or on the driver's sun visor.

2.3 Installation Tips

- ◆ The unit and the Handsfree Module should not be installed close together to prevent noise caused by GSM transmission.
- ◆ The filter's ground wires and the unit (harness) ground wire should be connected together and connected to the vehicle's ground.
- ◆ The microphone and speaker wires should be separated from the unit harness eliminating noise affects.
- ◆ Two noise filters should be available for each installation allowing noise suppression in special cases, as explained above.



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3 Technical Specifications

3.1 The Microphone

3.1.1 Mechanical Diagram



Cable length: 1.5m

Connector: Stereo Jack 3.5mm

3.1.2 Performance Specification

Test conditions($V_S=2.0V$ $R_L=2.2k\ \Omega$ $Temp=20\pm 2^\circ C$ $R.H=60\pm 5\%$)

Item	Symbol	Test Conditions	Min	Standard	Max	Unit
Sensitivity	S	f=1kHz,Pin=1Pa	-44	-42	-40	dB (0dB=1V/Pa)
Impedance	Z	f=1kHz,Pin=1Pa			2.2	k Ω
Directivity		Omni-directional				
Current Consumption	I				400	μA
Operation Voltage Range	U		1.0	2.0	10	V
S/N Ratio	S/N(A)	f=1kHz,Pin=1Pa A Curve	58			dB
Decreasing Voltage Characteristic	ΔS	f=1kHz,Pin=1Pa $V_S=2.0-1.5V$			-3	dB
Max.Input Sound Level	MISPL	f=1kHz Distortion<1%			114	dB



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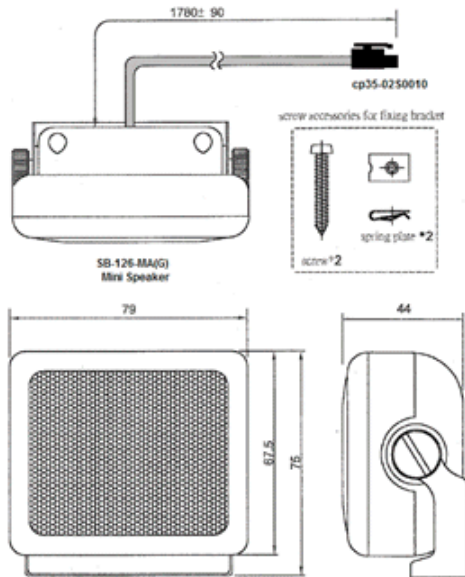
3.1.3 *Temperature range*

Operating range: -20°C to +70°C

Storage range -40°C to +85°C

3.2 **The Speaker**

3.2.1 *Mechanical Diagram*



Cable length: 1780mm

Connector: CP35-0250010. 2 pins jack.

3.2.2 *Temperature range*

Operating range: -20°C to +70°C

Storage range -40°C to +85°C



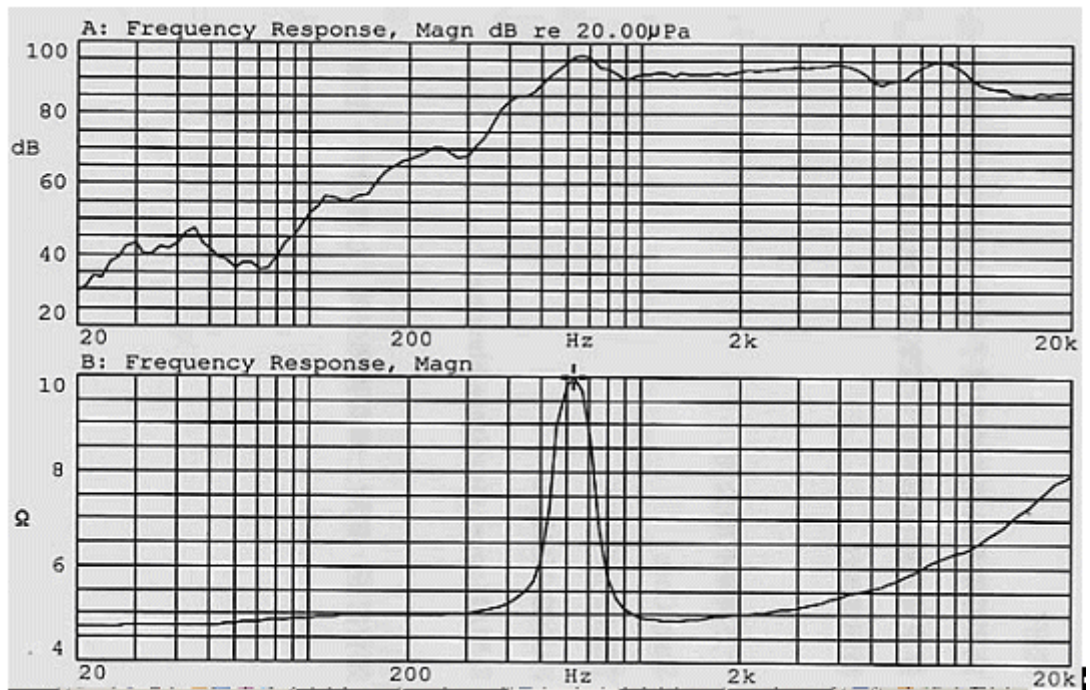
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3.2.3 Performance Specification

Test conditions($V_S=2.0V$ $R_L=2.2k\Omega$ $Temp=20\pm 2^\circ C$ $R.H=60\pm 5\%$)

Item	Symbol	Test Conditions	Min	Standard	Max	Unit
Sensitivity	S	f=1kHz, Pin=1Pa	-44	-42	-40	dB (0dB=1V/Pa)
Impedance	Z	f=1kHz, Pin=1Pa			2.2	k Ω
Directivity		Omni-directional				
Current Consumption	I				400	μA
Operation Voltage Range	U		1.0	2.0	10	V
S/N Ratio	S/N(A)	f=1kHz, Pin=1Pa A Curve	58			dB
Decreasing Voltage Characteristic	ΔS	f=1kHz, Pin=1Pa $V_S=2.0-1.5V$			-3	dB
Max.Input Sound Level	MISPL	f=1kHz Distortion<1%			114	dB



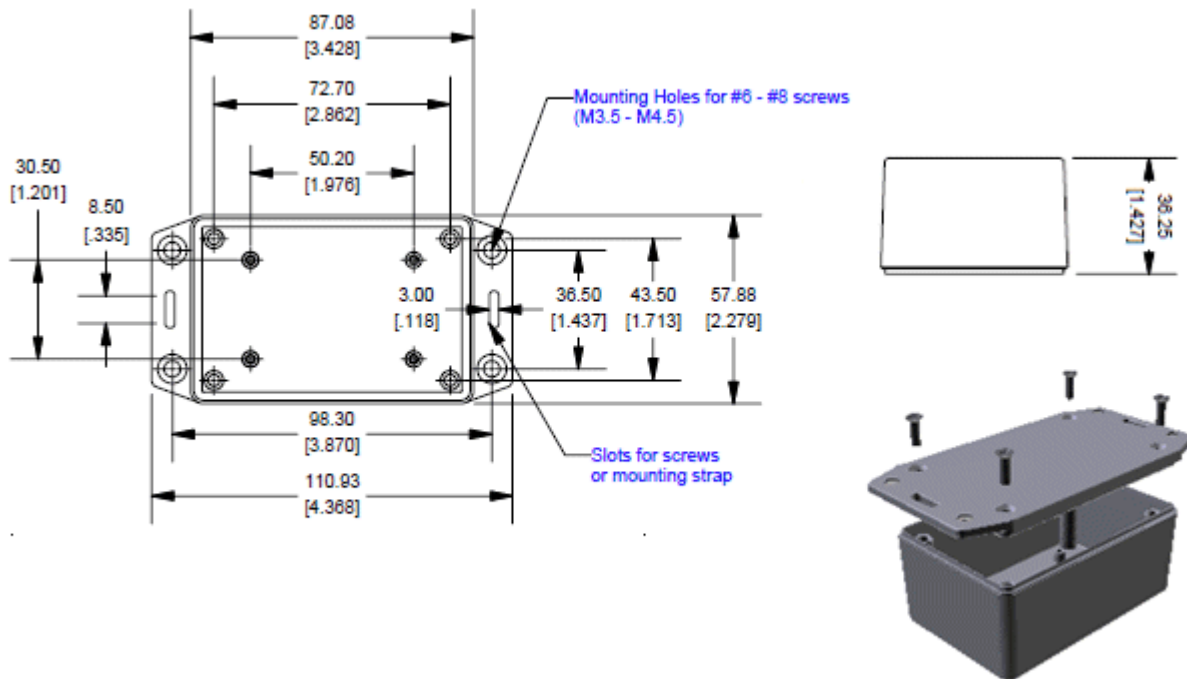


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3.3 The Handsfree Module

3.3.1 Mechanical Diagram



Provided with Power In cable

Color: red

Cable length: 1m

Connector: No

3.3.2 Connectors

The Handsfree module incorporates four plugs:

1. MIC IN – standard stereo plug for connecting the microphone.
2. SPK OUT – Two-pin plug to connect the speaker.
3. MIC OUT – Four-pin plug to connect to the Cellocator unit using the harness MIC jack.
4. SPK IN – Four-pin plug to connect to the Cellocator unit using the harness SPK jack.



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3.3.3 Performance Specification

3.3.3.1 Power Supply

6 V to 36 V Step-Down Swift™ Converter

System protected by overcurrent limiting, overvoltage protection, reverse voltage protection and thermal shutdown

Protection Specs

PARAMETER	MIN	TYP	MAX	UNIT
UNDERVOLTAGE LOCK OUT (UVLO)				
Start threshold voltage, UVLO		5.3	5.5	V
Hysteresis voltage, UVLO		330		mV
CURRENT LIMIT				
Current limit	4	5	6	A
Current limit hiccup time	13	16	20	ms
THERMAL SHUTDOWN				
Thermal shutdown trip point	135	162		°C
Thermal shutdown hysteresis		14		°C

3.3.3.2 Overvoltage Protection

Absolute Maximum Ratings* T_A = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
P _{PPM}	Peak Pulse Power Dissipation on 10/1000 μs waveform	1500	W
I _{PPM}	Peak Pulse Current on 10/1000 μs waveform	33	A
I _{FSM}	Non-repetitive Peak Forward Surge Current superimposed on rated load (JEDEC method) (Note 1)	200	A

Reverse Stand-off Voltage V _{RWM} (V)	Breakdown Voltage V _{BR} (V)		Test Current I _T (mA)	Clamping Voltage @I _{PPM} V _C (V)	Peak Pulse Current I _{PPM} (A)	Reverse Leakage @ V _{RWM} I _R (μA)**
	min	max				
28	31.1	34.4	1	45.4	33.0	5



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3.3.3.3 Reverse Voltage and Voltage Peaks Protection

MAXIMUM RATINGS

Rating	Symbol	MURS340T3	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	V_{RRM} V_{RWM} V_R	400	V
Average Rectified Forward Current	$I_{F(AV)}$	3.0 @ $T_L = 130^\circ\text{C}$ 4.0 @ $T_L = 115^\circ\text{C}$	A
Non-Repetitive Peak Surge Current (Surge applied at rated load conditions halfwave, single phase, 60 Hz)	I_{FSM}	75	A

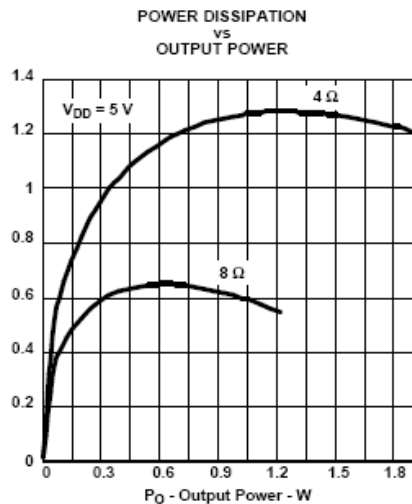
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

3.3.3.4 Current Consumption

- ◆ **Off:** Depends on installation type
- ◆ **Standby:** 7.5 mA
- ◆ **Ringing:** 35 mA
- ◆ **Conversation (Max):** 150 mA
- ◆ **Conversation (Average):** 20 mA
- ◆ **Average power consumption:** 650 mW

3.3.3.5 The Audio Amplifier

- ◆ 3.1 W Into 3Ω From a 5-V Supply at THD = 10% (Typ)
- ◆ Fast Startup With Minimal Pop
- ◆ Improved PSRR (-80 dB)
- ◆ Fully Differential Design Reduces RF Rectification
- ◆ -63 dB CMRR Eliminates Coupling Capacitors





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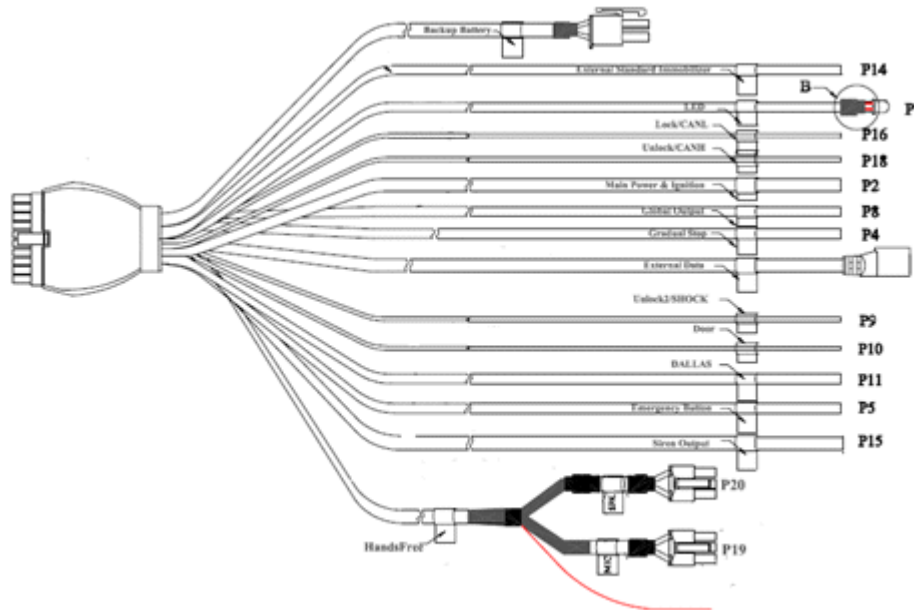
3.3.4 Temperature range

Operating range: -20°C to +70°C

Storage range -40°C to +85°C

3.4 The Harnesses

3.4.1 The Compact Harness (PN 711-00196)



3.4.2 The 370-50 Voice Harness (PN 711-00197)

