

Device ID
Generic A/V Distribution Profile
Generic Access Profile
Generic Attribute Profile
Logical Link Control and Adaption Protocol
Multi-Channel Adaptation Protocol
RFCOMM
Security Manager Protocol
Service Discovery Protocol

*Internal Bluetooth Antenna*

**Table 20 – Internal Bluetooth Antenna Characteristics**

<b>Variant index</b>	All variants	
<b>Reference</b>	DPR-BTA-001:Req21v1	Absolute gain
	DPR-BTA-001:Req23v1	Antenna Efficiency
	DPR-BTA-001:Req25v1	Return Loss
<b>Connector and pin</b>	N/A, wireless with internal antenna. No external antenna foreseen.	
<b>Vehicle functions</b>	Telephony, Device connectivity	
<b>FIC level</b>	FIC B	
<b>Specification / version:</b>	Bluetooth 4.2	
<b>Availability:</b>	The HW design supports communication as specified for FSC A and FSC B for the IHU, see section ISO16750 - Environmental conditions.	
<b>Wake up:</b>	NA	
<b>Error Handling:</b>	No hardware/software related error handling	

**Notes:**

- DPR\_31845977 is referring to external antenna requirements.
- IHU4.0 uses an internal passive BT-antenna. For that most of the requirements are not applicable or have deviations.

- Function depends on position of IHU in the car and surrounding material free of sight of the internal antenna, which is responsibility of Volvo.
- Volvo and Aptiv agreed on meeting 8.12.2016 in Torslanda, that Aptiv provides free air measurements on bench and values of 3 requirements Gain, Efficiency and Return Loss of internal BT antenna:

**Table 21 – Bluetooth Antenna Parameters agreed**

Absolute Gain (max):	0...3dBi
Antenna Efficiency:	>25%
Return Loss:	< -5dB

**Table 22 – Bluetooth Characteristics**

	Comments	Min.	Typ.	Max.
Frequency Range		2402MHz	--	2480MHz
Output Power	Effective Isotropic Radiated Power (EIRP)			4dBm (2.5mW)
Antenna Gain <sup>1</sup>	Peak Gain of Internal Antenna	--	--	+1.77dBi
BR/EDR connection	secure	Yes		
Bandwidth		--	1MHz	--
Modulation	DQPSK; $\pi/4$ DQPSK; 8DPSK			
Mode	Bluetooth 4.2			
Distance to Persons		>20cm	--	--

**Note1:** The IHU 4.0 antenna is a microstrip antenna design in the Main Board PCB Layout, see Figure 19.

In Table 23 are present the pre-certifications existing for the Bluetooth used in the IHU 4.0.

**Table 23 – Bluetooth Pre-Certifications**

Name	Declaration ID	QDID
Bluetooth Chip	D023821	63708
Bluetooth Stack	D035890	97584

## Supported WLAN Functions

The product does not consists of a WLAN module.