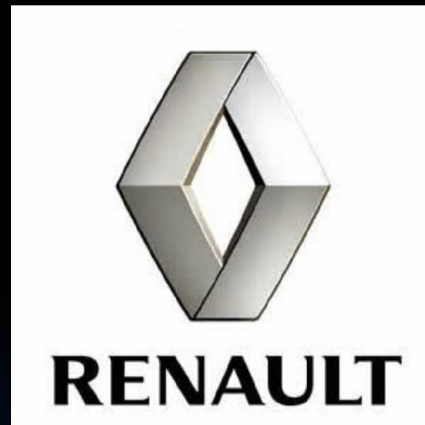
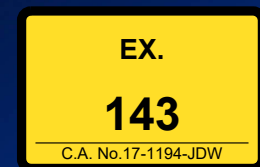


Delphi Data Connectivity

presentation to



7 October 2015



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Innovation for the Real World

Apple CarPlay™



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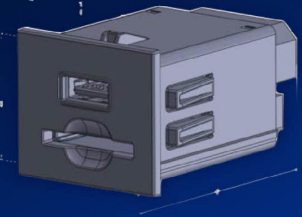
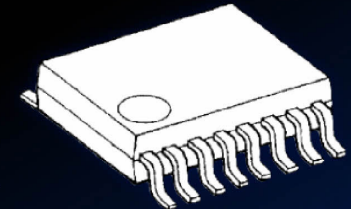
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ATTORNEYS' EYES ONLY

APTIV_00095178

How do we support CarPlay in Hubs and Media Modules?

- What differentiates us is our own ASIC to support Apple CarPlay™.
- This chip is designed for multi-port architecture with CarPlay™ support through unique bridging technology.
- A fully functional system of downstream ports is enabled with a single USB connection to head unit
- Any of downstream ports may host CarPlay™.
- While one of the ports is occupied with Apple CarPlay™ session, the rest of ports in the system stay active and may exchange data.
- No need for USB MUX switches that can cause USB eye diagram degradation.
- Our ASIC is in production with 2 OEMs currently, with 2 more OEMs planned for next year.



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Multiple Ways to Support Apple CarPlay

Option 1: Multiple USB Data Connections to Head Unit

Run two data paths from infotainment system to the Hub module.

Use MUX switches to route data lines in the Hub module, bypassing the hub for Carplay.

Option 2: “Flexconnect” Hub

Swap the hub upstream port with a downstream port for CarPlay™.

Single USB data connection to head unit. Requires MUX switches to route downstream ports to flexconnect port of hub.

Option 3: Delphi Dynamic Host Mode Hub

Includes a Bridge Device embedded in the USB Hub.

Single USB data connection to head unit. No MUX switches.

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Assessing Architecture Options

	Two USB Paths	Flexconnect	Delphi ASIC
Impact on USB eye pattern	Severe	Some	None
Carplay available on any USB port	Y	Y	Y
Other hub ports work during Carplay session	Y	N	Y
SD Card accessible during Carplay session	Y	N	Y
USB Audio available during Carplay session	Y	N	Y
Additional vehicle wiring	Y	N	N
OTG required in infotainment system	Y	Y	N
Custom driver required in infotainment system	N	Y	Y
Vehicle System Cost	Highest	Moderate	Lowest

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Delphi Dynamic Host Mode Hub Requires a Delphi Provided USB Device Driver in Head Unit

- Head Unit Device Driver has been implemented in Linux and QNX head units.
- Successful CarPlay™ system implementations have been made by multiple head unit suppliers using Linux, QNX, and Android with the Delphi Dual Role Hub and Driver.
- Delphi in house software resources available to assist OS and head unit providers in their implementation of the head unit Driver.
- Reference driver available from Unwired
 - Provided as GPLv2 Source code
 - Uses Gadget API
 - Tested with Kernels 3.8 and above
 - Uses multiple Vendor Specific Messages to role reverse the hub and encapsulate data

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What does Apple think of our approach to CarPlay™?

- Apple has seen our demonstration system and have been provided with technical information on it's function.
- Apple has stated they see no issues with the implementation.
- Apple has decided they do not want to get in the business of “endorsing” or approving subsystems of CarPlay™ systems.
- Delphi has the in house capability of running Apple MFi compliance tests to ensure we meet Apple specs.
- Delphi system has now passed Apple certification process at 3 OEMs.



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Delphi Dynamic Host Mode Hub Acceptance

- Delphi booked business using our ASIC exceeds 20 million units across 4 global OEMs with first launch in Q2 2105.
- Many major head unit suppliers (LG, Harman, Bosch, Continental, Panasonic and Delphi) are, or have, implementing specialized USB drivers in their head unit to support Delphi's Hub products per OEM requirements.

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