

Johnson Controls, Inc.  
Automotive Systems Group  
One Prince Center  
Holland, MI 49423



November 18, 2004

Federal Communication Commission  
Equipment Approval Services, P.O. Box 358315  
Pittsburgh, PA 15251-5315  
Attention: Authorization & Evaluation Division

RE: Application for Vehicle Level Certification of Johnson Controls Transmitter under 47 CFR 15.231.  
FCC ID: CB2ACTLHL3

To whom it may concern,

The materials in this report pertain to a Class II permissive change to the Johnson Controls Homelink® model ACTLHL3. This model was originally certified as a stand-alone module in July of 2003 (EA494510). Later that year the power settings were changed and the model was tested at the vehicle-level in an Acura TL automobile EA504983, August 2003). Per our agreement with the FCC for this test methodology a separate Class II change was filed for use of this model in an additional automobile, the Acura MDX (EA471316). This report covers further changes to power settings for this model; testing is again done at the vehicle level at a 10m distance and is specific to the Acura TL automobile. A separate Class II change will be filed shortly for the Acura MDX automobile.

Johnson Controls Interiors has invested considerable resources into developing our Homelink ® products. For this reason we respectfully request that the following items be held as confidential.

- Circuit Block Diagrams
- Theory of Operation
- Schematics

The Federal Communications Commission will be notified, in writing of any changes in the software/programming of this device that could affect its RF characteristics.

Please do not hesitate to contact me with any questions you may have regarding this report. As always we look forward to your timely response.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeremy P. Bos". The signature is fluid and cursive, with the first name "Jeremy" being the most prominent part.

**Jeremy P. Bos**

Lead Engineer (EMC/RF)

Johnson Controls Interiors.

Tel: (616)394-6076/Fax: (616)394-6100

Email: [Jeremy.bos@jci.com](mailto:Jeremy.bos@jci.com)

**Summary of vehicle level testing incorporated into a Class II permissive change:**

The Johnson Controls Universal Garage Door Opener (UGDO hereafter) is designed for permanent installation into an automobile. Once installed it is designed to take the place of an original transmitter. The fixed position and mounting of the UGDO provides about 10dB attenuation. Per the attached correspondence, Prince Corporation (now Johnson Controls) sought to remedy this handicap by way of a vehicle level certification. Under this agreement, Johnson Controls is allowed to adjust output power of the transmitter to account for the attenuation introduced by the vehicle. The vehicle is then tested as a DUT on an FCC approved site to ensure that the overall emission is below the prescribed limit. Additionally, spurious emissions must remain below the limit when the UGDO is tested normally per ANSI C63.4-1992. In short, the fundamental is allowed to exceed the limit as long as it is below the limit once installed into the intended vehicle. In contrast, the harmonics must remain below the limit as normally tested. This certification is intended to apply to a specific vehicle model.



**FEDERAL COMMUNICATIONS COMMISSION**  
Equipment Authorization Division, Application Processing Branch  
7435 Oakland Mills Road, Columbia, MD 21046  
Telephone: (301) 725-1585, ext 230 Fax: (301) 344-2050  
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**DATE:** 111497  
**FROM:** Gregory M. Czumak  
**REFERENCE:** your letter dated September 15, 1997  
**NO. OF PAGES:** one  
**TO:** Terry Mahn  
**ORGANIZATION:** Fish & Richardson

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Dear Terry:

This is in response to your letter dated September 15, 1997. Please excuse the delay. The test and reporting procedure for the Prince Universal Garage Door Opener (UGDO), as outlined in your letter to me dated August 19, 1997, and modified in your letter dated September 15, 1997, is acceptable.

Please include copies of those letters, as well as a copy of this confirmation, in any applications which Prince files in which they make use of the referenced procedure. Please note that this procedure is applicable only to Prince Corporation and their UGDO product. Any changes to the referenced procedure must be approved by the FCC prior to implementation.

If you have additional questions on this subject, please do not hesitate to contact me by fax, phone or e-mail.

**RECEIVED**

NOV 14 1997

FISH & RICHARDSON P.C.  
WASHINGTON, D.C.

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September 15, 1997

Mr. Greg Czumak  
Electronics Engineer  
FCC Laboratories  
7435 Oakland Mills Rd.  
Columbia, MD 21046

Re: Our File 05238/002001

Dear Greg:

Per our recent discussion, this will confirm Prince's understanding of, and agreement with, the minor changes you requested to our letter of August 19, 1997. These were as follows:


In paragraph 4a, the phrase "Class II changes" shall be replaced with "in-vehicle output level adjustments."

Regarding paragraph 6, you and I agreed that Prince can avail itself of the following measurement options: (1) Prince will not be required to measure harmonic emissions "on-site" provided a Class II filing is submitted to the Commission for each vehicle model (but not classes within the same model line) tested; or (2) Prince can measure the harmonics "on-site" and make a Class I/II determination (and filing, as required) for each model tested.

Finally, we would like to note, for the record, that all references to the University of Michigan test site are meant to be applicable to any FCC-listed test site. This will give Prince the flexibility to use other FCC-listed sites (including its own site) to perform the "baseline" measurements on the UGDO.

I trust this completes this matter and that you will provide a written confirmation of the same. Thank you again for your patience and cooperation in this matter.

Very truly yours,

  
Terry G. Mahn

/seg

cc: Paul Duckworth, Prince Corporation  
Ed Gibbons, FCC-Ret.

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August 19, 1997

Mr. Greg Czumak  
Electronics Engineer  
FCC Laboratories  
7435 Oakland Mills Rd.  
Columbia, MD 21046

Re: Our File 05238/00200

Dear Greg:

This is to follow up our meeting at the FCC Labs on June 3, 1997, attended by you, Ed Gibbons, Paul Duckworth of Prince Corporation and me. The purpose of the meeting was to develop an updated test procedure for the Prince universal garage door opener (UGDO) to accommodate the various types of automobiles in which the device is now being factory-installed.

In previous correspondence, Ed set forth the basic test procedures for measuring the UGDO on an open area test site. Ed advised Prince that, historically, "in vehicle" testing for garage door openers had never been authorized by the Commission due to the wide variations in vehicle shielding and the mobility of battery-powered door openers. For this reason, Prince's UGDO was required to follow the traditional door opener test procedures notwithstanding its "fixed" location inside of vehicles. In addition, the UGDO was required to be tested with a representative wiring harness to simulate possible antenna effects.

As explained during our meeting, the UGDO, when factory-installed, is typically located in overhead consoles or vanity-pack visors which are often located high up in the vehicle's metal structure, where RF shielding is the most severe. Prince estimates that its UGDO incurs a 5 to 10 dB signal loss compared to that measured on a test site. To compensate for this attenuation, and thereby restore lost operating range, vehicle manufactures have had to devise a number of passive enhancements to direct the UGDO's signal away from the vehicle's shielding. Such practice, however, is both time consuming and expensive for Prince as well as for the vehicle manufactures; moreover, what it accomplishes -- restored signal strength -- could just as easily be accomplished by making a slight adjustment in the UGDO's test procedures.

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As Paul also mentioned during our meeting, the UGDO is currently featured in over 60 automobile models as original equipment or in upgrade packages. Leading garage door opener manufacturers have begun to standardize on the UGDO technology and it is now being integrated with other wireless home security offerings. For the technology to continue to be cost effective for the driving public, however, Prince must find a way to reduce the considerable expense that goes into the tailoring of custom passive designs for every vehicle installation.

You and Ed agreed that Prince's goal could be achieved without compromising the integrity of the Commission's measurement process or increasing the risk of spectrum interference. The following procedures, therefore, were agreed to by the Commission for all future certifications and permissive changes for Prince's UGDO products:

1. All testing is to be conducted at FCC-listed sites.
2. Prince will obtain a single certification for its UGDO design; all models within each vehicle manufacturer's product line will be Class I or Class II permissive changes to Prince's certified UGDO as described in the procedures that follow.
3. Prince currently has two board-level variations of the UGDO for which the RF sections are essentially identical; initial testing will confirm which of the two boards exhibits the "worst case"; the other board will then be considered to be a Class I permissive change:
4. . a. Initial testing on the UGDO at the University of Michigan test labs will be conducted at three frequencies (low, middle and high) over the device's operating range and on three duty cycles (low, middle and high); to accommodate future Class II changes, the fundamental emissions at each tested frequency will be permitted to exceed the limits of Rule 15.231 by an amount, to be determined by Prince but estimated to be 10 dB, provided all harmonic and restricted band emissions are within FCC limits as set forth in Rule 15.231 at the selected fundamental levels; this will establish the certification "baseline" for the UGDO such that only funda-

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mental emissions testing will need to be performed in vehicles tested "on site" at an FCC-listed facility.

- b. All modifications to Prince's board design will be tested at the Michigan site under the procedures set forth above; the fundamental emission level will be adjusted so as NOT to exceed the level measured in the original "baseline" report, and Prince will ensure that all harmonics are within the Rule 15.231 limits. If all harmonics are at or below the original levels the modification will be considered a Class I change and nothing further will need to be done. However, if any harmonics are above the original "baseline" (but still within the limits), Prince will conduct an "on site" test in one vehicle and file a Class II change report to the original certification (see ¶6 below) with the FCC -- the filed test report consisting of the new "baseline" test plus the "on site" test. Testing in all vehicle models will not be required for modifications tested in this manner.
5. For each automobile manufacturer, every model in the manufacturer's product line will be tested "on site" with the UGDO installed and operating at three frequencies (low, middle and high). As used here, "on site" refers to the testing of an actual vehicle, with UGDO installed, on a turntable at a listed site; only fundamental emissions will need to be measured "on-site" since compliance of the harmonics and restricted bands has already been confirmed by open field measurements of the UGDO at the Michigan labs; in order to maximize the field strength levels outside the vehicle Prince will be allowed to adjust the fundamental level at any given duty cycle (via digital coding of the UGDO) within the <sup>frequency and</sup> duty cycle range determined in Step 4 above provided the measured fundamental level does not exceed the Rule 15.231 limits. When adjusting the UGDO fundamental level, the maximum level established in Step 4 will not be exceeded in any case.



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6. Prince will submit to the FCC labs, the "baseline" test report from the University of Michigan labs along with the "on site" test report from a selected vehicle model, the combination of which will form the certification application to the FCC for the UGDO; all other vehicle models from each manufacturer (but not different versions or classes within the same model line) will be tested "on site" in the same manner with the results evaluated by Prince under the permissive change rules as either Class I or Class II changes, with any Class II permissive changes filed with the FCC as required under the Part 2 Rules.

I trust this accurately sets forth the test procedures upon which we agreed. If you have any comments or corrections to the foregoing, please contact me immediately. I look forward to your written concurrence in this matter.

Very truly yours,



Terry G. Mahn

/seg

cc: Ed Gibbons, FCC-Ret.  
Paul Duckworth, Prince Corporation

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