



File E90700

Vol 2

Auth. Page 1

Issued: 1998-11-17

Revised: 2016-03-11

FOLLOW-UP SERVICE PROCEDURE  
(TYPE R)

COMPONENT - OPTICAL ISOLATORS  
(FPQU2,FPQU8)

Manufacturer: SEE ADDENDUM FOR MANUFACTURER LOCATIONS

642005 (Party Site)  
Applicant: FAIRCHILD SEMICONDUCTOR CORP  
(725625-001) 1272 Borregas Ave  
Sunnyvale CA 94089

642005 (Party Site)  
Recognized Company: SAME AS APPLICANT  
(725625-001)

This Follow-Up Service Procedure authorizes the above Manufacturer(s) to use the marking specified by UL LLC, or any authorized licensee of UL LLC, including the UL Contracting Party, only on products when constructed, tested and found to be in compliance with the requirements of this Follow-Up Service Procedure and in accordance with the terms of the applicable service agreement with UL Contracting Party and any applicable Service Terms. The UL Contracting Party for Follow-Up Services is listed on addendum to this Follow-Up Service Procedure ("UL Contracting Party"). UL Contracting Party and UL LLC are referred to jointly herein as "UL."

UL further defines responsibilities, duties and requirements for both Manufacturers and UL representatives in the document titled, "UL Mark Surveillance Requirements" that can be located at the following web-site: <http://www.ul.com/fus> and in the document titled "UL and Subscriber Responsibilities" that can be located at the following website: <http://www.ul.com/responsibilities>. Manufacturers without Internet access may obtain the current version of these documents from their local UL customer service representative or UL field representative. For assistance, or to obtain a paper copy of these documents or the applicable Service Terms, please contact UL's Customer Service at <http://ul.com/aboutul/locations/>, select a location and enter your request, or call the number listed for that location.

The Applicant, the specified Manufacturer(s) and any Recognized Company in this Follow-Up Service Procedure must agree to receive Follow-Up Services from UL Contracting Party. If your applicable agreement is a Global Services Agreement ("GSA") with an effective date of January 1, 2012 or later and this Follow-Up Service Procedure is issued on or after that effective date, the Applicant, the specified Manufacturer(s) and any Recognized Company will be bound to a Service Agreement for Follow-Up Services upon the earliest by any Subscriber of use of the prescribed UL Mark, acceptance of the factory inspection, or payment of the Follow-Up Service fees which will incorporate such GSA, this Follow-Up Service Procedure and the Follow-Up Service Terms which can be accessed by clicking here: <http://www.ul.com/contracts/Terms-After-12-31-2011>. In all other events, Follow-Up Services will be governed by and incorporate the terms of your applicable service agreement and this Follow-Up Service Procedure.

It is the responsibility of the Recognized Company to make sure that only the products meeting the aforementioned requirements bear the authorized Marks of UL LLC, or any authorized licensee of UL LLC.

This Follow-Up Service Procedure contains information for the use of the above Manufacturer(s) and representatives of UL and is not to be used for any other purpose. It is provided to the Manufacturer with the understanding that it will be returned upon request and is not to be copied in whole or in part.

This Follow-Up Service Procedure, and any subsequent revisions, is the property of UL and is not transferable. This Follow-Up Service Procedure contains confidential information for use only by the above named Manufacturer(s) and representatives of UL and is not to be used for any other purpose. It is provided to the Subscribers with the understanding that it is not to be copied, either wholly or in part unless specifically allowed, and that it will be returned to UL, upon request.

Capitalized terms used but not defined herein have the meanings set forth in the GSA and the applicable Service Terms or any other applicable UL service agreement.

UL shall not incur any obligation or liability for any loss, expense or damages, including incidental, consequential or punitive damages arising out of or in connection with the use or reliance upon this Follow-Up Service Procedure to anyone other than the above Manufacturer(s) as provided in the agreement between UL LLC or an authorized licensee of UL LLC, including UL Contracting Party, and the Manufacturer(s).

UL LLC has signed below solely in its capacity as the accredited entity to indicate that this Follow-Up Service Procedure is in compliance with the accreditation requirements.

Bruce A. Mahrenholz  
Director  
North American Certification Program

LOCATION

(153559-001) 560790 (Party Site)  
LITE-ON ELECTRONICS (THAILAND) CO LTD  
38/4 MOO 1 RANGSIT-ONGKARAK RD  
BUNGYEETOH  
TANYABURI  
PHATHUMTHANI 12130 THAILAND  
Factory ID: None  
UL Contracting Party for above site is: UL AG

Recognized Component Marking Data Page (RCMDP)

(FILE IMMEDIATELY AFTER AUTHORIZATION PAGE)

RECOGNIZED COMPONENT MARKING

Products Recognized under UL's Component Recognition Service are identified by marking elements consisting of:

1. The Recognized Company's identification specified in this document.
2. A catalog, model or other applicable product designation specified in the descriptive sections of this document.
3. The UL Recognized Component Mark shown below is optional unless required elsewhere in the Procedure.

Only those components, which actually bear the Marking, should be considered as being covered under the Recognition Program. The UL Listing or Classification Mark is not authorized for use on or in connection with Recognized Components.

Recognized Component Mark



Minimum size of the Recognized Component Mark is not specified as long as it is legible. Minimum height of the registered symbol ® shall be 3/64 inch but may be omitted if it is out of proportion to the Recognized Component Mark or not legible to the naked eye.

The manufacturer may reproduce the Mark electronically. Any decision regarding the acceptability of the manufacturer's Mark reproduction will be made at the Reviewing Office.

Recognized Component Marking Data Page (RCMDP)

(FILE IMMEDIATELY AFTER AUTHORIZATION PAGE)

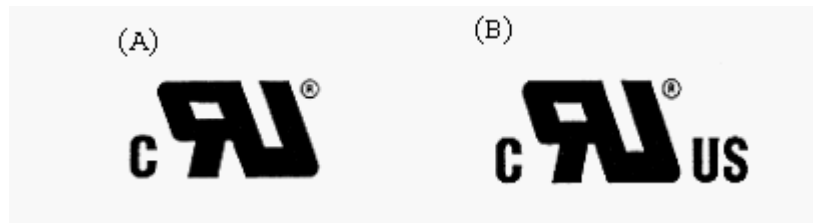
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1. The Recognized Company's identification specified in this document.
2. A catalog, model or other applicable product designation specified in the descriptive sections of this document.
3. The UL Recognized Component Mark shown below:
  - (A) Recognized only to Canadian safety requirements, or;
  - (B) Recognized to both U.S. and Canadian safety requirements.

Only those components, which actually bear the Marking, should be considered as being covered under the Recognition Program. The UL Listing or Classification Mark is not authorized for use on or in connection with Recognized Components.

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## INDEX

Cat. No	Section	Report Date
<p>USR - Double Protection Optical Isolators, Construction Code "Q", six-pin devices. Types H74C1, H74C2, MCA230, MCA231, MCA255, MCS2, MCS2400, MCT2, MCT2E, MCT26, MCT210, MCT271 through MCT275, MCT277, SOI-8, 107P10139, 107P10124, 374-0135, 385-0002, 480-1 through 480-4, 480-6, 162-18-0 through -8, 162-19-0 through -8, 326802, 335522, 404325, 1853010MTE, 12852153, 0355L1. Types 01S63, 01S63A, 01S67, 01S67A, TLP531, TLP532. Types 4N, CNX, CNY, H11, IL, MC, MOC, OPI, SCS, SOC, TIL.</p> <p>All may be followed by additional numbers and/or letters.</p>	1	11-17-98
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<p>Optical Isolators, Package Construction Code B, Eight-pin devices, Type FOD2711, FOD2711A, FOD2741A, FOD2741B, FOD2741C, FOD2200, FOD2743A, FOD2743B, FOD2743C, FOD250L, FOD270L, 6N135M, 6N136M, HCPL-2503M, HCPL-4503M, HCPL-4502, 6N138M, 6N139M, FOD2743A, FOD2743B, FOD2743C, 6N137M, HCPL2601M, , HCPL2611M, <b>HCPL3700M</b>, FOD260L,</p> <p>USR, CNR - Single Protection Optical Isolator, Package Construction Code B, Models FOD3120, FOD3150, FOD3180, FOD3182, FOD3184, FOD4506M, FOD8071, HCPL2530M, HCPL2531M, HCPL2630M, HCPL2631M, HCPL2730M, HCPL2731M, MID400M.</p> <p>All may be followed by additional numbers and/or letters.</p>	4	04-17-02

Cat. No	Section	Report Date
Optical Isolators, Package Construction Code S, Eight-pin devices, Type FOD27X2Y, HCPL-05XX, HCPL-04XX, HCPL-07XX, HCPL-06XX, MOCXX, MOC2XX, MOC2XX, FOD050L, FOD053L, HCPL-0530, HCPL-0531, <b>FOD070L</b> , HCPL-0453, <b>HCPL-0534</b> , FOD073L, HCPL-0730, HCPL-0731, HCPL0611, FOD060L, FOD0710, FOD0720, FOD072L, FOD0721 and FOD8001.  Optical Isolators, Package Construction Code S1, Eight-pin devices, Type FOD0738, HCPL0611, FOD060L, FOD063AL, FOD0710, FOD0720, FOD072L, FOD0721, FOD8001, and FOD8012.  "X" may be any number. "Y" may be A, B, C or D. All models may be followed by additional numbers and/or letters.	5	08-07-02
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USR, CNR - Single Protection, Optical Isolator, Models FOD8160, FOD8161, FOD8314, FOD8316, FOD8318, FOD8320, FOD8321, FOD8332, FOD8333, FOD8383, FOD8384, may be followed by additional numbers and/or letters.	9	2012-01-12

## MANUFACTURING AND PRODUCTION LINE TESTS

## TEST TO BE CONDUCTED BY MANUFACTURER:

## Dielectric Voltage-Withstand Test -

Each optical isolator shall withstand, as a routine production-line test, the application of a potential between the input and output terminals. For an optical isolator having an ac isolation voltage rating, the frequency of the applied potential shall be 40 - 70 Hz. A dc test potential shall be applied for an optical isolator having a dc rated dielectric insulation voltage. A dc potential equal to 1.414 times the specified 40 - 70 Hz potential may be used if an ac rated optical isolator has solid state components that may be damaged by an ac potential.

\* The production-line test potential shall be the rated dielectric insulation voltage for 60 seconds or 120 percent of the rated dielectric insulation voltage for one second.

The product may be in a heated or unheated condition for the test.



## TEST EQUIPMENT PROVIDED BY MANUFACTURER:

The test equipment for conducting the dielectric voltage-withstand test is to have the following features and characteristics:

- a) A means of indicating the test potential, in volts rms,
- b) A 40 - 70 Hz test potential that has:
  - 1) A sinusoidal waveform, and
  - 2) A peak value of the waveform that is not to be less than 1.3 and not more than 1.5 times the root-mean-square value.
- c) An automatic reject feature that rejects any unacceptable unit or an audible or visual indicator of electrical breakdown. If the indicator of breakdown is audible or visual, the indicator is to remain active until the test equipment is reset manually.

If the output of the test-equipment is less than 500 VA, the equipment is to include a voltmeter in the output circuit to indicate the test potential directly.

If the output of the test-equipment is 500 VA or larger, the test potential may be indicated:

- a) By a voltmeter in the primary circuit or in a tertiary-winding circuit,
- b) By a selector switch marked to indicate the test potential, or
- c) In the case of test equipment that has a single output potential, by a marking in a readily visible location to indicate the test potential. When marking is used without an indicating voltmeter, the equipment is to include a positive means, such as an indicator lamp, to indicate that the manual-reset switch actually resets following a dielectric breakdown.

Test equipment other than that described above may be used if found acceptable to accomplish the intended factory control.

GENERAL

PRODUCT COVERED:

Component-Optical Isolators.


**FACTORY LOCATION AND IDENTIFICATION:**

When more than one manufacturing location is indicated on the Authorization Page Addendum for the Procedure Volume, a factory identification code shall be assigned to identify each manufacturing facility. The absence of a factory identification code is an acceptable alternative for one of the manufacturers. The factory identification and associated manufacturing location are described in the Authorization Page.

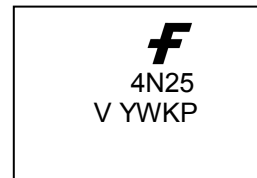
## MARKING:

USR - Recognized company name or trademark, and model designation provided on each unit.

CNR - Recognized company name or trademark, model designation, and the


Recognized Component Mark for Canada , provided on each unit **or the smallest shipping carton.**

**F** - Denotes Company Trademark.  
 4N25 - Denotes Designation Type.  
 V - Denotes VDE Approved Part.  
 XY - Denotes One or Two Digit Year Code.  
 WK - Denotes Two Digit Week Code.  
 P - Denotes Package Code.



Note: The space between the V and the Y may vary.

## TRADE NAME/TRADEMARK:

The following trade name or trademark, "Q" or "QTC" or , if any, may be used in lieu of the company name to identify Recognized Components covered by this procedure.

Note: Company Trademark can be located Above or Before the "Designation Type".

## RATINGS:

\*

**Specification Sheet - The rating information specified below shall appear in the manufacturer's specifications for the product and may be expressed in a tabular or graphic format:**

1. **Maximum power, a current, and voltage rating for both the photo-emitter (input) and the photo-sensor (output) circuits.**
2. **A dielectric isolation-voltage rating between input and output terminals, specified in volts rms or dc, as applicable.**
3. **The maximum operating ambient temperature, maximum junction temperature, and maximum storage temperature.**
4. **Derating specifications related to ambient temperatures.**

## GENERAL CONSTRUCTION:

Corrosion Protection - All ferrous parts are of corrosion resistant material or are plated or painted as corrosion protection.

# CERTIFICATE OF COMPLIANCE

**Certificate Number** 20140530-E90700  
**Report Reference** E90700-19981117  
**Issue Date** 2014-MAY-30

**Issued to:** FAIRCHILD SEMICONDUCTOR CORP  
3030 ORCHARD PKY  
SAN JOSE CA 95134


**This is to certify that representative samples of** COMPONENT – OPTICAL ISOLATORS  
SEE ADDENDUM

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

**Standard(s) for Safety:** UL 1577, Optical Isolators  
CSA Component Acceptance Service No. 5A  
"Component Acceptance Service for Optocouplers and Related Devices."

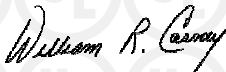
**Additional Information:** See the UL Online Certifications Directory at [www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Recognized Component Mark should be considered as being covered by UL's Recognition and Follow-Up Service.

The UL Recognized Component Mark generally consists of the manufacturer's identification and catalog number, model number or other product designation as specified under "Marking" for the particular Recognition as published in the appropriate UL Directory. As a supplementary means of identifying products that have been produced under UL's Component Recognition Program, UL's Recognized Component Mark: , may be used in conjunction with the required Recognized Marks. The Recognized Component Mark is required when specified in the UL Directory preceding the recognitions or under "Markings" for the individual recognitions.

Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to UL LLC.

Look for the UL Recognized Component Mark on the product.



William R. Carney, Director, North American Certification Programs

UL LLC

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# CERTIFICATE OF COMPLIANCE

**Certificate Number** 20140530-E90700  
**Report Reference** E90700-19981117  
**Issue Date** 2014-MAY-30

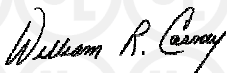
This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

USR – Double Protection Optical Isolators, Construction Code “Q”, six pin devices.

Types H74C1, H74C2, MCA230, MCA231, MCA255, MCS2, MCS2400, MCT2, MCT2E, MCT26, MCT210, MCT271 through MCT275, MCT277, SOI-8, 107P10139, 107P10124, 374-0135, 385-0002, 480-1 through 480-4, 480-6, 162 18-0 through -8, 162-19-0 through -8, 326802, 335522, 404325, 1853010MTE, 12852153, 0355L1. May be followed by additional numbers and/or letters.

Types 01S63, 01S63A, 01S67, 01S67A, TLP531, TLP532. May be followed by additional numbers and/or letters.

Types 4N, CNX, CNY, H11, IL, MC, OPI, SCS, SOC, TIL, may be followed by additional letters or numbers; Type MOC, may be followed by additional numbers and/or letters.



William R. Carney, Director, North American Certification Programs

UL LLC

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File E90700  
Project 98SC45471

November 17, 1998

REPORT  
ON  
COMPONENT - OPTICAL ISOLATORS

QT Optoelectronics  
Sunnyvale, California

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## DESCRIPTION

## PRODUCT COVERED:

\* **USR - Double Protection** Optical Isolators, Construction Code "Q", six-pin devices.

Types H74C1, H74C2, MCA230, MCA231, MCA255, MCS2, MCS2400, MCT2, MCT2E, MCT26, MCT210, MCT271 through MCT275, MCT277, SOI-8, 107P10139, 107P10124, 374-0135, 385-0002, 480-1 through 480-4, 480-6, 162-18-0 through -8, 162-19-0 through -8, 326802, 335522, 404325, 1853010MTE, 12852153, 0355L1. May be followed by additional numbers and/or letters.

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Types 4N, CNX, CNY, H11, IL, MC, OPI, SCS, SOC, TIL, may be followed by additional letters or numbers; Type MOC, may be followed by additional numbers and/or letters.

## GENERAL:

This device is a photo-coupled isolator consisting of a photo-emitter such as a light emitting diode, optically coupled to a photo detector such as a transistor. They are intended to be used in applications where the suitability of the combination has been determined by Underwriters Laboratories Inc. Only the insulation function for the rated dielectric insulation voltage between the input and output of the device has been investigated.

## RATINGS:

## Electrical Ratings for "Q" Package

Diode Current	Diode Power	Detector Power	Dielectric Voltage (V ac rms)	Double Protection Isolation Rating (V ac rms)	Max Operating Temp (°C)	Max Junction Temp (°C)	Max Storage Temp (°C)
80 mA	150 mW	150 mW	4170	3500	100	125	130

## ENGINEERING CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

These devices are optically coupled isolating switches with gallium arsenide light emitting diodes optically coupled to photo detectors. The solid state portion of these devices is encapsulated in a silicon or epoxy compound. The light emitting diode and detector are separated by an insulating window. Internal "chips" are provided with terminals molded into the enclosure.

Use - For use only in products where the acceptability of the combination is determined by Underwriters Laboratories Inc.

Conditions of Acceptability - Each device shall be reviewed with respect to the following conditions of acceptability:

1. The short circuit interrupting capacity, or behavior under short circuit conditions, has not been evaluated for these devices. Accordingly, the end-use circuit should contain suitable impedance to eliminate the end for such testing, or appropriate tests should be conducted.
2. The device shall be installed in compliance with the enclosure, mounting, spacings, and segregation requirements of the ultimate application. No spacings are specified for the device.
3. The outer surface temperature ratings recorded above shall be acceptable in the ultimate application.
4. The suitability of use when exposed to oil, chemicals and the like has not been determined by this investigation.
5. The suitability of the connections shall be determined in the end-use application.
6. The capability of the device to control a load has not been investigated.
7. The suitability of the device to be mounted over dead metal or metal of opposite polarity has not been investigated.
8. These devices are intended for factory wiring only.
9. **For single protection devices, the insulation to the case has not been evaluated. For double protection devices, the insulation to the case has been evaluated to the isolation voltage specified in the ratings table.**
10. **In addition to meeting single protection requirements, double protection optical isolators have also been investigated for use in up to 250 V, 50/60 Hz circuits in audio, video, and similar equipment in applications in which breakdown of the optical isolator may result in a risk of fire, electrical shock, or injury to persons.**



## CONSTRUCTION DETAILS:

The product shall be constructed in accordance with the following description.

All dimensions are approximate unless specified as "max" or "min".

The general design, shape and arrangement shall be as illustrated, except where variations are specifically described.

Corrosion Protection - All ferrous parts are of corrosion resistant material or are plated or painted as corrosion protection.

**Markings - Each device or the smallest shipping carton in which the device was shipped is marked with the company's name or "QTC" or "Q" or <sup>f</sup> above or before a 3 or 4 digit type designation. Below the type designation, there is a 3 or 4 digit date code which may be preceded by the factory code, see Sec. Gen., and is followed by a "Q" for the construction system.**

## PACKAGE CONSTRUCTION CODE "Q" - FIG. 1 (ILL.)

General - Fig. 1 illustrates cross-sectional view of Optical Isolator. Represents all models under package construction code Q.

- \*1. Over-mold - **Obsolete Effective 2014-08-22** - Epoxy: Vyncolit North America, Type E8436FR or E8436 FR-397 (Epoxy molding resin). **Min. 0.6 mm thick. Molded using an injection, compression, pultrusion, or transfer and match-metal die molding process.**

Alternate - **Obsolete Effective 2014-08-22** - Same as above, except R/C (QMFZ2), Kyocera Chemical Corp., Type KE-95K.

Alternate - Same as above, except R/C (QMFZ2), Kyocera Chemical Corp., Type KE-96A.

2. Dome - Silicon: Dow Corning, Type HIPEC Q3-6633 (room temperature vulcanizing). **Min. 0.5 mm through insulation. Molded using an injection, compression, pultrusion, or transfer and match-metal die molding process.**

3. Lead Frame - Stainless steel, plated steel, copper, silver, gold, nickel, aluminum, an alloy of the same, or an equivalent material.

Alternate - Same as above, except isolation gap 0.5 mm minimum. See ILLS. 1A, 1B and 1C for details.

# CERTIFICATE OF COMPLIANCE

**Certificate Number** 20140530-E90700  
**Report Reference** E90700-20010413  
**Issue Date** 2014-MAY-30

**Issued to:** FAIRCHILD SEMICONDUCTOR CORP  
3030 ORCHARD PKY  
SAN JOSE CA 95134



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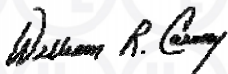
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Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to UL LLC.

Look for the UL Recognized Component Mark on the product.



William R. Carney, Director, North American Certification Programs  
UL LLC

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# CERTIFICATE OF COMPLIANCE

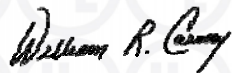
**Certificate Number** 20140530-E90700  
**Report Reference** E90700-20010413  
**Issue Date** 2014-MAY-30

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

USR, CNR - Single Protection Optical Isolators, Package Construction Code M, Models FODM452, FODM453, FODM8061, FODM611, FODM8071.

USR, CNR - Single Protection Optical Isolators, Models FODM8801 and FODM8811.

USR - Single Protection Optical Isolators, Package Construction Code M1, Models HMHA2801#, HMHA281# and HMHAA280#.



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File E90700  
Project 01SC02681

April 13, 2001

REPORT

ON

COMPONENT - OPTICAL ISOLATORS

Fairchild Semiconductor Corp.  
San Jose, California

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## DESCRIPTION

## PRODUCT COVERED:

\* USR, CNR - Single Protection Optical Isolators, **Package Construction Code M, Models FODM452, FODM453, FODM8061, FODM611, FODM8071.**

**USR, CNR - Single Protection Optical Isolators, Models FODM8801 and FODM8811.**

\* USR - Single Protection Optical Isolators, **Package Construction Code M1, Models HMHA2801#, HMHA281# and HMHAA280#,**

## GENERAL:

These devices are photocoupled isolators consisting of a photo-emitter such as a light emitting diode, optically coupled to a photo detector such as a transistor. They are intended to be used in applications where the suitability of the combination has been determined by Underwriters Laboratories Inc. Only the insulation function for the rated dielectric insulation voltage between the input and output of the device has been investigated.

Use - For use only in products where the acceptability of the combination is determined by Underwriters Laboratories Inc.

## Ratings:

<u>Package Code/ Models</u>	<u>Current (mA)</u>		<u>Power (mW)</u>		<u>Isolation Voltage</u>	<u>Max Operating</u>	<u>Max Junction</u>	<u>Max Storage</u>
	<u>Diode</u>	<u>Detector</u>	<u>Diode</u>	<u>Detector</u>		<u>Temperature (C)</u>	<u>Temperature (C)</u>	<u>Temperature (C)</u>
*								
*M/ FODM452, FODM453	50	80	70	150	3750	110	125	<b>125</b>
M1/ HMHA2801#, HMHA281#, HMHAA280#	50	50	60	150	3750	100	125	<b>125</b>
M/ FODM8061, FODM611	20	50	40	85	3750	110	125	<b>125</b>
M/ FODM8071	20	10	40	70	3750	110	125	<b>125</b>
<b>FODM8801, FODM8811</b>	<b>30</b>	<b>50</b>	<b>40</b>	<b>150</b>	<b>3750</b>	<b>125</b>	<b>150</b>	<b>150</b>

Ratings Continued:

\*

See table below for models covered under each package code.

Package Code	Device Type Number
*M	FODM452, FODM453, FODM8061, FODM611, FODM8071
M1	HMHA2801#, HMHA281#, HMHAA280#

# - May be followed by a letter from A to Z

## ENGINEERING CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

These devices are optically coupled isolating switches with light emitting diodes optically coupled to photo detectors. The solid state portion of these devices is encapsulated in a silicon or epoxy compound. The light emitting diode and detector are separated by an insulating window. Internal "chips" are provided with terminals molded into the enclosure.

Conditions of Acceptability - Each device shall be reviewed with respect to the following conditions of acceptability:

1. The capability of the device to control a load has not been investigated.
2. These devices should be installed in a suitable end product enclosure.
3. The maximum temperature on the case should not exceed the maximum operating temperature rating specified in the ratings table.
4. For single protection devices, the insulation to the case has not been evaluated. For double protection devices, the insulation to the case has been evaluated to the isolation voltage specified in the ratings table.
5. **In addition to meeting single protection requirements, double protection optical isolators have also been investigated for use in up to 250 V, 50/60 Hz circuits in audio, video, and similar equipment in applications in which breakdown of the optical isolator may result in a risk of fire, electrical shock, or injury to persons.**



## CONSTRUCTION DETAILS:

General - The product shall be constructed in accordance with the following description. All dimensions are approximate unless specified as "max" or "min".

The general design, shape and arrangement shall be as illustrated, except where variations are specifically described.

Corrosion Protection - All ferrous parts are of corrosion resistant material or are plated or painted as corrosion protection.

Markings - See Section General for Markings.

Model Differences - All models have identical insulation systems. The only difference is the leadframe design or the size of the IC devices.

Abbreviation - R/C - Recognized Component

Pin Connections - See ILLS. 4 and 4A for details.

Package Dimensions - See ILLS. 5 and 5A for details.

Leadframe Design - See ILLS. 3, 3A, 6, 6A, 7, 8, 8A, 9, 10, 11, and 12, for details.

For Engineering use only.

**See illustration 14 for package dimensions, leadframe design and pin connections for models type FODM8061, FODM611, FODM8071, FODM452 and FODM453.**

## PACKAGE CODE M - ILL. 1 (S0159843)

General - Represents all models except where variations are described below.

1. Lead Frame - Copper (Olin 194), copper-plated copper, copper-plated steel, Kovar, Alloy 42, tin-plated on outside of package. See ILL. 5 for package dimensions drawing.
2. LED - Emitter chip - GaAs, one or two provided.
3. Sensor - Silicon Phototransistor chip.
4. Wire - Gold.
5. Dome - Silicon: Dow Corning, Type HIPEC Q3-6633 (room temperature vulcanizing). Minimum internal isolation gap between emitter and detector is 0.5 mm. **Molded using an injection, compression, pultrusion, or transfer and match-metal die molding process.**
6. Overmold - R/C (QMFZ2), epoxy, type KE-96A by Kyocera Chemical Corp. (E43857). Min. 0.5 mm thick. For models FODM8061, FODM611, FODM8071, min. 0.25 mm thick. **Molded using an injection, compression, pultrusion, or transfer and match-metal die molding process.**

## PACKAGE CODE M1 - ILL. 1A

General - Models using construction code M1 are identical to models using construction code M, except as noted below.

1. Lead Frame - Copper (Olin 194), copper-plated copper, copper-plated steel, Kovar, Alloy 42, tin-plated on outside of package. See ILL. 5A for package dimensions drawing.

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Issued: 2001-04-13

Revised: 2014-05-27

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MODEL FODM8801

ILL. 15

General - Model FODM8801 represents models FODM8811, except as noted below.

1. Emitter - [LED] input.
2. Sensor - Silicon Phototransistor chip.
3. Lead Frame - Metal employed for current carrying parts shall be of stainless steel, silver, gold, copper, nickel, aluminum, an alloy of the same, or an equivalent material.
4. Bond Wire - Metal employed for current carrying parts shall be of stainless steel, silver, gold, copper, nickel, aluminum, an alloy of the same, or an equivalent material.
5. Dome - Silicon: Dow Corning, Type HIPEC Q3-6633 (room temperature vulcanizing). Minimum 0.5 mm through insulation spacing between the input and output circuits.
- \*6. Outermold - R/C (QMFZ2), epoxy, type KE-96A by Kyocera Chemical Corp. (E43857).

# CERTIFICATE OF COMPLIANCE

**Certificate Number** 20181219-E90700  
**Report Reference** E90700-20020417  
**Issue Date** 2018-DECEMBER-19

**Issued to:** FAIRCHILD SEMICONDUCTOR CORP  
1272 Borregas Ave  
Sunnyvale CA 94089

**This certificate confirms that representative samples of** COMPONENT - OPTICAL ISOLATORS  
See Addendum Page

Have been investigated by UL in accordance with the component requirements in the Standard(s) indicated on this Certificate. UL Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for installation in complete equipment submitted for investigation to UL LLC.


**Standard(s) for Safety:** Optical Isolators UL 1577 and CSA Component Acceptance Service No. 5A.

**Additional Information:** See the UL Online Certifications Directory at <https://iq.ulprospector.com> for additional information.

This *Certificate of Compliance* does not provide authorization to apply the UL Recognized Component Mark.

Only those products bearing the UL Recognized Component Mark should be considered as being UL Certified and covered under UL's Follow-Up Services.

Look for the UL Recognized Component Mark on the product.



Bruce Mahrenholz, Director North American Certification Program  
UL LLC

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# CERTIFICATE OF COMPLIANCE

**Certificate Number** 20181219-E90700  
**Report Reference** E90700-20020417  
**Issue Date** 2018-DECEMBER-19

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Single Protection Optical Isolator, Construction Code "B", Models 6N135, 6N136, 6N137, 6N138, 6N139, FOD250L, FOD260L, FOD270L, FOD2200, FOD2711, FOD2711A, FOD2741A, FOD2741B, FOD2741C, FOD2743A, FOD2743B, FOD2743C, FOD3120, FOD3125, FOD3150, FOD3180, FOD3182, FOD3184, FOD4506, FOD8071, MID400, HCPL-2503, HCPL2530, HCPL2531, HCPL2601, HCPL2611, HCPL2630, HCPL2631, HCPL2730, HCPL2731, HCPL3700, HCPL-4502, HCPL-4503.  
May be followed by additional numbers and/or letters.



Bruce Mahrenholz, Director North American Certification Program

UL LLC

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File E90700  
Project 02SC04973

April 17, 2002

REPORT  
ON  
COMPONENT - OPTICAL ISOLATORS

Fairchild Semiconductor Corp.  
San Jose, California

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## DESCRIPTION

## PRODUCT COVERED:

\* USR, CNR - Single Protection Optical Isolator, Construction Code "B", Models 6N135, 6N136, 6N137, 6N138, 6N139, FOD250L, FOD260L, FOD270L, FOD2200, FOD2711, FOD2711A, FOD2741A, FOD2741B, FOD2741C, FOD2743A, FOD2743B, FOD2743C, FOD3120, **FOD3125**, FOD3150, FOD3180, FOD3182, FOD3184, FOD4506, FOD8071, MID400, HCPL-2503, HCPL2530, HCPL2531, HCPL2601, HCPL2611, HCPL2630, HCPL2631, HCPL2730, HCPL2731, HCPL3700, HCPL-4502, HCPL-4503. May be followed by additional numbers and/or letters.

## RATINGS:

Model No.	Current, Ma		Power, Mw		Isolation Voltage (V Ac Rms)	Junction Temp. °C	Max	Max
	Diode	Detector	Diode	Detector			Operating Temp. °C	Storage Temp. °C
FOD2711, FOD2711A	20	50	145	85	5000	125	100	125
FOD2741A	20	50	145	85	5000	125	100	125
FOD2741B	20	50	145	85	5000	125	100	125
FOD2741C	20	50	145	85	5000	125	100	125
FOD250L	25	8	45	100	5000	125	100	125
FOD260L	20	50	40	85	5000	125	100	125
FOD270L	25	60	45	100	5000	125	100	125
6N135	25	8	45	100	5000	125	100	125
6N136	25	8	45	100	5000	125	100	125
6N137	20	50	40	85	5000	125	100	125
6N138	25	60	45	100	5000	125	100	125
6N139	25	60	45	100	5000	125	100	125
HCPL-2503	25	8	45	100	5000	125	100	125
HCPL-4502	25	8	45	100	5000	125	100	125
HCPL-4503	25	8	45	100	5000	125	100	125
FOD2743A	20	50	145	85	5000	125	100	125



## RATINGS (continued):

Model No.	Current, Ma		Power, Mw		Isolation	Junction	Max	Max
	Diode	Detector	Diode	Detector	Voltage (V Ac Rms)	Temp. °C	Operating Temp. °C	Storage Temp. °C
FOD2743B	20	50	145	85	5000	125	100	125
FOD2743C	20	50	145	85	5000	125	100	125
FOD2200	10	25	45	150	5000	125	85	125
HCPL2601	20	50	40	85	5000	125	100	125
HCPL2611	20	50	40	85	5000	125	100	125

Model	Current (Ma)		Power (Mw)		Isolation Voltage (AC)	Max Operating Temp (°C)	Max Junction Temp (°C)	Max Storage Temp (°C)
	Emitter	Sensor	Emitter	Sensor				
FOD3120	25	2500	45	250	5000	110	125	125
<b>FOD3125</b>	<b>25</b>	<b>2500#</b>	<b>45</b>	<b>250</b>	<b>5000</b>	<b>125</b>	<b>125</b>	<b>125</b>
FOD3150	25	800	45	250	5000	110	125	125
FOD3180	25	2500	45	250	5000	110	125	125
FOD3182	25	2500	45	250	5000	110	125	125
FOD3184	25	2500	45	250	5000	110	125	125
FOD4506, FOD8071	25	20	45	100	5000	110	125	125
HCPL2530, HCPL2531	30	45	20	75	5000	100	125	125
HCPL2630, HCPL2631	50	60	45	100	5000	100	125	125
HCPL2730, HCPL2731	50	60	45	100	5000	100	125	125
HCPL3700	50	30	230	250	5000	85	125	125
MID400	50	60	45	100	5000	100	125	125

# Note: This is client's declared peak value of the output current.

## ENGINEERING CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

These devices are optically coupled isolating switches consisting of a photo-emitter such as light emitting diodes optically coupled to photo detectors such as transistors. The solid state portion of these devices is encapsulated in a silicone or epoxy compound. The light emitting diode and detector are separated by an insulating window. Internal "chips" are provided with terminals molded into the enclosure. Only the insulation function for the rated Dielectric Insulation Voltage between the input and output of the device has been investigated.

Use - For use only in products where the acceptability of the combination is determined by Underwriters Laboratories Inc.

USR indicates that the optical isolators have been evaluated to the US Standard for Optical Isolators, UL 1577, 5<sup>th</sup> Edition.

CNR indicates that the optical isolators have been evaluated to the Canadian Standard for Optical Isolators, Component Acceptance Service No. 5A.

Conditions of Acceptability - Each device shall be reviewed with respect to the following conditions of acceptability:

1. The capability of the device to control a load has not been investigated.
2. These devices should be installed in a suitable end product enclosure.
3. The maximum temperature on the case should not exceed the maximum operating temperature rating specified in the ratings table.
4. For single protection devices, the insulation to the case has not been evaluated. For double protection devices, the insulation to the case has been evaluated to the isolation voltage specified in the ratings table.
5. In addition to meeting single protection requirements, double protection optical isolators have also been investigated for use in up to 250 V, 50/60 Hz circuits in audio, video, and similar equipment in applications in which breakdown of the optical isolator may result in a risk of fire, electrical shock, or injury to persons.

## CONSTRUCTION DETAILS:

General - The general design, shape and arrangement shall be as illustrated in the following descriptive pages and illustrations. All dimensions are approximate, unless specified as "maximum" or "minimum."

Corrosion Protection - All ferrous parts are of corrosion resistant material or are plated or painted as corrosion protection.

Markings - - Each component is marked with the company's name or "Q" or **f**, above or before the type designation. The package code will be specified after a four-digit date code. See the nomenclature below for more details. Markings may appear on the smallest shipping container.

Example device marking:

**f**  
250L  
VYYXXB

Nomenclature:

**f** or Q denotes Company logo.

2712: Denotes device type. The '250L' is the marking for the FOD250L device. The prefix 'FOD' will be ignored in the device marking.

YYXX: Denotes Date code,  
where YY = Two digit year code, Example: 03 indicates year 2003.  
XX = Two digit work week code

B: Denotes Package Code B

V: Optional - Denotes VDE 0884 approval mark

Specification Sheet - Specification sheet shall be available at the manufacturing facility and shall contain the following information in tabular or graphic format:

1. Maximum continuous power, a current and a voltage rating for both the photo-emitter and the photo-detector.
2. A dielectric insulation-voltage rating between input and output terminals. This should be the same as the isolation V ac in the ratings above.
3. The maximum operating temperature of the device case.
4. Derating specification related to ambient temperatures.

Model Differences - All models have identical insulation systems. The only difference is the leadframe design or the size of the IC devices. Models FOD2743A/B/C are identical to models FOD2741A/B/C except the orientation of the die inside the package is reversed.

Abbreviation - R/C = Recognized Component.  
Pin Connections - See ILL. 1, **1A** for details.

Package Dimensions - See ILLS. 2, 3 and 4, 5 for details.

Model FOD318X is identical to Model FOD2711A except for the leadframe design or the size of the IC devices.

Models FOD4506M and FOD8071 are using the same die. Model FOD8071 is intended to work on a 3.3 and 5V supply while FOD4506M is intended to work only on a 5V supply voltage.

## MODEL FOD2711A - FIG. 1

- \* General - FIG. 1 shows the wire bonding and coupling diagram and the cross sectional view of Model FOD2711, FOD2711A, FOD2780, FOD260L, FOD4506M, FOD8071, 6N137M, **HCPL2601M, HCPL2611M, and HCPL3700M**. This model represents all models except where variations are specifically described.
1. Lead Frame - Stainless steel, plated steel, copper, silver, gold, nickel, aluminum, an alloy of the same, or an equivalent material.
  2. Emitter - LED input.
  3. Detector - Bipolar output.
  5. Wire - Stainless steel, plated steel, copper, silver, gold, nickel, aluminum, an alloy of the same, or an equivalent material.
  6. Transparent Coat (Dome coat) - Silicone, Dow Corning, Type HIPEC Q3-6633. Minimum 0.5 mm through insulation thickness between input and the output circuits. Molded using an injection, compression, pultrusion, or transfer and match-metal die molding process.
  7. Overmold (Enclosure) - Epoxy, Vyncolit North America, Type E8436 FR-397. Molded using an injection, compression, pultrusion, or transfer and match-metal die molding process.
- Alternate - Same as above except, R/C (QMFZ2) Kyocera Chemical Corp., Type KE-96A.

## MODEL FOD3180

General - Also represents models FOD3120, FOD3150, FOD3182, FOD3184, HCPL2530M, HCPL2531M, HCPL2630M, HCPL2631M, HCPL2730M, HCPL2731M, **HCPL-4502, HCPL-4503M**, MID400M. Same as model FOD2711A, except as noted below.

3. Sensor - Triac output.
6. Transparent Coat (Dome coat) - Silicone, Dow Corning, Type HIPEC Q3-6633. Minimum 0.5 mm through insulation thickness between input and the output circuits. Molded using a high temperature and high pressure process.
7. Overmold (Enclosure) - R/C (QMFZ2), Kyocera Chemical Corp. (E43857), Epoxy, Type KE-96A. Molded using a high temperature and high pressure process.

# CERTIFICATE OF COMPLIANCE

**Certificate Number** 20150304-E90700  
**Report Reference** E90700-20020807  
**Issue Date** 2015-MARCH-04

**Issued to:** FAIRCHILD SEMICONDUCTOR CORP  
3030 ORCHARD PKY  
SAN JOSE CA 95134

**This is to certify that  
representative samples of**

**COMPONENT - OPTICAL ISOLATORS**

Single Protection Optical Isolators, Construction Code S and S1, eight-pin devices, Models as shown in the ratings Table. "X" may be any number. "Y" may be A, B, C or D. All models may be followed by additional numbers and/or letters

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

**Standard(s) for Safety:** UL 1577, Optical Isolators  
CSA Component Acceptance Service Notice No. 5,  
Component Acceptance Service for Optocouplers and  
Related Devices

**Additional Information:** See the UL Online Certifications Directory at  
[www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to UL LLC.

Look for the UL Certification Mark on the product.



Bruce Mahrenholz, Assistant Chief Engineer, Global Inspection and Field Services

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File E90700  
Project 02SC09316

August 7, 2002

REPORT

ON

COMPONENT - OPTICAL ISOLATORS

Fairchild Semiconductor Corp.  
San Jose, California

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## DESCRIPTION

## PRODUCT COVERED:

USR Component - Single Protection Optical Isolators, Construction Code S and S1, eight-pin devices, Models as shown in the ratings Table. "X" may be any number. "Y" may be A, B, C or D. All models may be followed by additional numbers and/or letters.

## RATINGS:

## MODELS UNDER PACKAGE CODE S

Model No.	EMITTER		DETECTOR		Isolation Voltage (V ac rms)	Junction Temp °C	Maximum Operating Temp. °C	Maximum Storage Temp. °C
	Current (mA)	Power (mW)	Current (mA)	Power (mW)				
FOD27X2Y	20	145	50	85	2500	125	125	125
HCPL-05XX	50	45	16	100	2500	125	125	125
HCPL-04XX	50	45	16	100	2500	125	125	125
HCPL-07XX	40	35	60	100	2500	125	125	125
HCPL-06XX	20	20	50	85	2500	125	125	125
MOC2XX	60	90	150	150	2500	125	125	150
MOCD2XX	60	90	150	150	2500	125	125	125
FOD050L	25	45	8	100	2500	125	100	125
FOD053L	25	45	8	100	2500	125	100	125
HCPL-0530	25	45	8	100	2500	125	100	125
HCPL-0531	25	45	8	100	2500	125	100	125
<b>HCPL-0534</b>	<b>25</b>	<b>45</b>	<b>8</b>	<b>100</b>	<b>2500</b>	<b>125</b>	<b>100</b>	<b>125</b>
HCPL-0453	25	45	8	100	2500	125	100	125
<b>FOD070L</b>	<b>25</b>	<b>45</b>	<b>60</b>	<b>100</b>	<b>2500</b>	<b>125</b>	<b>100</b>	<b>125</b>
FOD073L	25	45	60	100	2500	125	100	125
HCPL-0730	25	45	60	100	2500	125	100	125
HCPL-0731	25	45	60	100	2500	125	100	125
HCPL0611	20	50	40	85	2500	125	100	125
FOD060L	20	50	40	85	2500	125	100	125



**GENERAL:**

These devices are optically coupled isolating switches with gallium arsenide light emitting diodes optically coupled to photo detectors. The solid state portion of these devices is encapsulated in a silicon or epoxy compound. The light emitting diode and detector are separated by an insulating window. Internal "chips" are provided with terminals molded into the enclosure.

**TECHNICAL CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):**

Use - For use only in products where the acceptability of the combination is determined by Underwriters Laboratories Inc.

**USR indicates this product was investigated under the UL Standard for Safety for Optical Isolators, UL 1577, Fifth Edition.**

**CONDITIONS OF ACCEPTABILITY -**

Each device shall be reviewed with respect to the following conditions of acceptability:

1. The capability of the device to control a load has not been investigated.
2. These devices should be installed in a suitable end product enclosure.
3. The maximum junction temperature shall not be exceeded.
4. For single protection devices, the insulation to the case has not been evaluated. For double protection devices, the insulation to the case has been evaluated to the isolation voltage specified in the ratings table.
5. In addition to meeting single protection requirements, double protection optical isolators have also been investigated for use in up to 250 V, 50/60 Hz circuits in audio, video, and similar equipment in applications in which breakdown of the optical isolator may result in a risk of fire, electrical shock, or injury to persons.

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Issued: 2002-08-07  
Revised: 2015-03-03

THIS PAGE REPLACES PAGE 2

## CONSTRUCTION DETAILS:

General - The general design, shape and arrangement shall be as illustrated in the following descriptive pages and illustrations. All dimensions are approximate.

Markings - Each component is marked with the company's name or "Q" or **F**, above or before the type designation. The package code will be specified after a three-digit date code. See the nomenclature below for more details. Markings may appear on the smallest shipping container.

Example device marking:

**F**2712  
YXXS

Nomenclature:

**F** or Q denotes Company logo.

2712: Denotes device type. The '2712' is the marking for the FOD2712 device. The prefix 'FOD' will be ignored in the device marking. If the type number starts with a 0 then the 0 will be omitted from the marking. Example: For model FOD050L, the type number would be indicated in the device marking as **F**50L.

YXX: Denotes Date code,  
where Y = One digit year code, Example: 3 indicates year 2003.  
XX = Two digit week code

S: Denotes Package Code S

V: Optional - Denotes VDE 0884 approval mark

Specification Sheet - Specification sheet shall be available at the manufacturing facility and shall contain the following information in tabular or graphic format:

1. Device Pin Connections.
2. Maximum continuous power, a current and a voltage rating for both the photo-emitter and the photo-detector.
3. A dielectric insulation-voltage rating between input and output terminals. This should be the same as the isolation V ac in the ratings above.
4. The maximum operating temperature of the device case.
5. Derating specification related to ambient temperatures.

Model Differences - All models have identical insulation systems. The only difference is the lead-frame design or the size of the IC devices.

Abbreviation - R/C = Recognized Component.

\*

Package Dimensions - See ILL 1 for details.

\*

## MODEL MOCD2XX - ILL 2

General - ILL 2 shows the wire bonding and coupling diagram and the cross sectional view of Model MOCD2XX. This model represents all models, except where variations are specifically described.

1. Lead Frame - Stainless steel, plated steel, copper, silver, gold, nickel, aluminum, an alloy of the same, or an equivalent material.
2. Emitter -LED input.
3. Sensor - Bipolar transistor output.
4. Wire - Stainless steel, plated steel, copper, silver, gold, nickel, aluminum, an alloy of the same, or an equivalent material.
5. Error Amplifier - One provided. Silicon chip.
6. Transparent Coat (Dome) - Dow Corning, Type Hipec Q3-6633. Min. 0.5 mm through insulation.
7. Enclosure - Epoxy, Vyncolit North America, Type E8436FR or E8436 FR-397. Epoxy, molded without air pockets.

Alternate - Same as above, except R/C (QMFZ2), Kyocera Chemical, Type KE-96A.

## MODEL FOD27X2Y

General - This model also represents model MOC2XX. Same as Model MOCD2XX, except as specifically described below.

1. Lead Frame -Stainless steel, plated steel, copper, silver, gold, nickel, aluminum, an alloy of the same, or an equivalent material. See ILL 3 for details.6. Transparent Coat (Dome) - Dow Corning, Type Hipec Q3-6633. Min. 0.4 mm through insulation.

## Model FOD050L

General - This model also represents models **FOD070L**, HCPL-0453. Same as model MOCD2XX, except as specifically described below.

1. Lead Frame - Stainless steel, plated steel, copper, silver, gold, nickel, aluminum, an alloy of the same, or an equivalent material. See ILL 5 for details.

## Model FOD053L

General - This model also represents models FOD073L, HCPL-0530, HCPL-0531, **HCPL-0534**, HCPL-0730, HCPL-0731. Same as model MOCD2XX, except as specifically described below.

1. Lead Frame - Stainless steel, plated steel, copper, silver, gold, nickel, aluminum, an alloy of the same, or an equivalent material. See ILL 6 for details.

## Model HCPL0611

General - Same as model MOCD2XX except as noted below. This model also represents models FOD060L.

1. Lead Frame - Stainless steel, plated steel, copper, silver, gold, nickel, aluminum, an alloy of the same, or an equivalent material. See ILL 5 for details.
6. Transparent Coat (Dome) - Dow Corning, Type Hipec Q3-6633. Min. 0.4 mm through insulation.



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Model FOD0710

\* General - Same as model MOCD2XX except as noted below. This model also represents models FOD0720, FOD072L, FOD0721 and FOD8001.

1. Lead Frame - Stainless steel, plated steel, copper, silver, gold, nickel, aluminum, an alloy of the same, or an equivalent material. Isolation gap between Emitter (LED) and Detector (FET) is 0.5 mm minimum. See ILL 7 for details.
2. Emitter - LED input.
3. Detector - FET output.
4. Dome -Type HIPEC Q3-6633 by Dow Corning.
5. Enclosure - Type KE-96A by Kyocera Chemical Corp.
6. Wire - Stainless steel, plated steel, copper, silver, gold, nickel, aluminum, an alloy of the same, or an equivalent material.
7. Driver - Silicon driver chip.

Model FOD8012

1. Emitter - LED input.
2. Detector - FET Output.
3. Lead Frame - Metal employed for current carrying parts shall be of stainless steel, silver, gold, copper, nickel, aluminum, an alloy of the same, or an equivalent material.
4. Bond Wire - Metal employed for current carrying parts shall be of stainless steel, silver, gold, copper, nickel, aluminum, an alloy of the same, or an equivalent material.
5. Case (Outermold) - Epoxy molded resin, type KE-96A5 by Kyocera Chemical Corp. Molded using high temperature and high pressure process.
6. Window (Dome) - Epoxy molded resin, Type HIPEC Q3-6633 by Dow Corning. Minimum 0.47 mm through insulation spacing between the input and the output circuits. Molded using a high temperature and high pressure process.