

Optoelectronic Devices

In Brief . . .

Motorola's families of optoelectronic components encompass red and infrared GaAs emitters and silicon detectors that are well matched for a variety of applications.

Optoisolators

Motorola's "Global" 6-Pin Dual In-line Package (DIP) devices use infrared emitting diodes that are optically coupled to a wide selection of output (Transistor, Darlington, Triac, and Schmitt trigger) silicon detectors. These devices are guaranteed to provide at least 7500 volts of isolation between the input and output and are 100% VISO tested. The entire line of Motorola 6-pin DIP packages are recognized by all major safety regulatory agencies including UL and VDE. This extensive line of regulatory approvals attest to their suitability for use under the most stringent conditions. Motorola also offers a line of SOIC-8 small outline, surface mount devices that are UL approved and ideally suited for high density applications.

POWER OPTO™ Isolators

The MOC2A60 series is the first member of the POWER OPTO™ Isolator family from Motorola. The MOC2A60 is a 2 Amp @ 40°C/600 Vac[pk]/Zero-Crossing/Optically Coupled Triac. This isolated AC output device is ruggedized to survive the harsh operating environments inherent in Industrial Controller applications. Additionally, the thermally optimized SIP package profile allows for high density stacking on 0.200" centers and can handle 2 Amps @ 40°C (Free-Air Rating) *without the need for heatsinks, thermal grease, etc.*

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Safety Regulatory Approvals for Motorola's "Global" Optoisolators

Motorola's entire line of 6-pin optoisolators are approved by all major safety regulatory agencies.

Safety Standard Approvals for 6-Pin Optoisolators



GlobalOptoisolator™

MOCXXXX

SOCXXXX









4NXXXXXX

H1XXXXXX

MCXXXXXX

TIXXXXXX

CNXXXXXX

| |  |  |  |  |  |  |  |  |
|----------|---|---|---|---|---|---|---|---|
| | VDE | UL | CSA | SETI | SEMKO | DEMKO | NEMKO | BABT |
| MOCXXXX | * (1) | * | * | * | * | * | * | * |
| SOCXXXX | * (1) | * | * | * | * | * | * | * |
| 4NXXXXXX | * (1) | * | * | * | * | * | * | * |
| H1XXXXXX | * (1) | * | * | * | * | * | * | * |
| MCXXXXXX | * (1) | * | * | * | * | * | * | * |
| TIXXXXXX | * (1) | * | * | * | * | * | * | * |
| CNXXXXXX | * (1) | * | * | * | * | * | * | * |

* = Approved

Regulatory Approval Certification Index

| Regulatory Agency | Certificate File Number |
|--------------------------|--------------------------|
| VDE(0883) | 41853 (expired 12/31/91) |
| VDE(0884) ⁽¹⁾ | 62054 (replaces VDE0883) |
| UL (isolation) | E54915 |
| UL (flammability) | E-8436 |
| CSA | CA93952 |
| FIMKO | 41990 |
| SEMKO | 9313138 |
| DEMKO | Approved per SEMKO |
| NEMKO | A99177 |
| BABT | CR/0117 |
| AUSTEL | 03 887 0711 |

Note: Motorola's 8-pin surface mount optocouplers are approved by UL only and have a guaranteed isolation voltage of 3000 Vac(rms).

All Motorola 6-pin optocouplers are 100% tested for isolation voltage and are guaranteed to 7500 Vac(peak).

UL Flammability Rating = 94VO (File number E-8436) for all optocouplers.

(1) VDE 0884 testing is an option; the suffix letter "V" must be added to the standard part number.

VDE Approved Optoisolators

VDE has approved Motorola's entire portfolio of 6-pin DIP optoisolators against their new components standard VDE 0884 which replaces VDE 0883. The VDE 0884 components standard requires additional electrical testing to a stringent isolation partial discharge test.

The VDE 0883 specification expired 12/31/91. Motorola optoisolators can now be ordered to comply with the VDE 0884 specification.

VDE approval is based on mechanical and electrical performance of the Motorola package, shown in Figure 3. This 6-Pin DIP package incorporates specially developed materials and assembly processes optimizing thermal and moisture stability while maintaining the high level of LED life and isolation voltage. All Motorola 6-pin DIP optoisolators are made in this package, and have these approvals.

VDE 0884 Component Standard (replaces VDE 0883)

Electrical ratings in this standard are:

Input-to-Output Voltage, 1 second

$V_{PR1} = 1.6 V_{IDRM}$, Partial Discharge < 5 picocoulombs,

$V_{PR1} = 1280 \text{ V(pk)}$

Maximum operating peak voltage, $V_{IDRM} = 800 \text{ V(pk)}$

Isolation resistance: $V_{I-O} = 500 \text{ Vdc}$, $10^{11} \Omega$, $T_A = 100^\circ\text{C}$.

Note: The isolation partial discharge test V_{PR1} , is performed after the completion of the high voltage withstand (hipot) tests.

VDE 0883 Component Standard (expired 12/31/91)

Electrical ratings in this standard were:

Isolation withstand voltages:

$3750 V_{RMS}$, 1 min, $T_A = 100^\circ\text{C}$

5300 Vdc , 1 min, $T_A = 100^\circ\text{C}$

Isolation surge withstand voltage:

10 kV per IEC 65, 50 discharges

Isolation resistance:

$10^{11} \Omega$, 500 Vdc, $T_A = 100^\circ\text{C}$

NOTE: **VDE 0884/8.87 testing is an option**; the suffix letter "V" must be added to the standard part number. (See below.)

Standard thru hole — MOC3063V

0.4" wide spaced leadform — MOC3063TV (to satisfy 8 mm spacing requirement)

Standard-profile surface mount — MOC3063SV

Tape and Reel for surface mount — MOC3063S/SR2V

Optoisolators, a block diagram of which is shown in Figure 1, are devices which contain at least one emitter, which is optically coupled to a photo-detector through some sort of an insulating medium. This arrangement permits the passage of information from one circuit, which contains the emitter, to the other circuit containing the detector.

Because this information is passed optically across an insulating gap, the transfer is one-way; that is, the detector cannot affect the input circuit. This is important because the emitter may be driven by a low voltage circuit utilizing an MPU or logic gates, while the output photo-detector may be part of a high voltage dc or even an ac load circuit. The optical isolation prevents interaction or even damage to the input circuit to be caused by the relatively hostile output circuit.

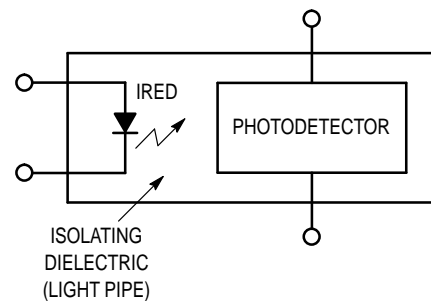


Figure 1. Block Diagram of Optoisolator

Various geometric designs have been used over the years for the internal light cavity between the emitter and detector. Motorola is the industry leader in isolation technology. All 6-pin optoisolators are guaranteed to meet or exceed 7500 Vac (pk) input-to-output isolation. See Figure 2.

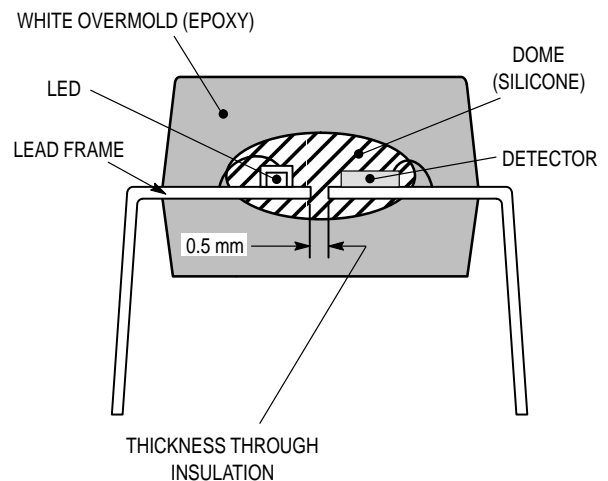


Figure 2. Geometric Design for Optoisolators

VDE Approved Optoisolators (continued)

Equipment Standards Compliance

With the approval of the Motorola package to these component standards, combined with its VDE approval ratings, a wide range of Equipment Standards are covered. The table below summarizes these Equipment Standard coverages.

Two levels of electrical interface, or insulation, are used:
1. Reinforced, or safe, insulation; 2. Basic insulation.

Reinforced Insulation (sometimes referred to as “safe” electrical isolation) is required in an optoisolator interfacing between a hazardous voltage circuit, like an ac line, and a **touchable safe extra low voltage (SELV)** circuit.

Basic Insulation is required in an optoisolator which interfaces between a hazardous voltage circuit and a **non-touchable, extra low voltage (ELV)** circuit.

The 6-pin DIP optoisolators are suitable for both levels of electrical interface. The smaller SOIC-8 optoisolators comply with basic Insulation standards only.

Mechanical ratings are shown in the table below.

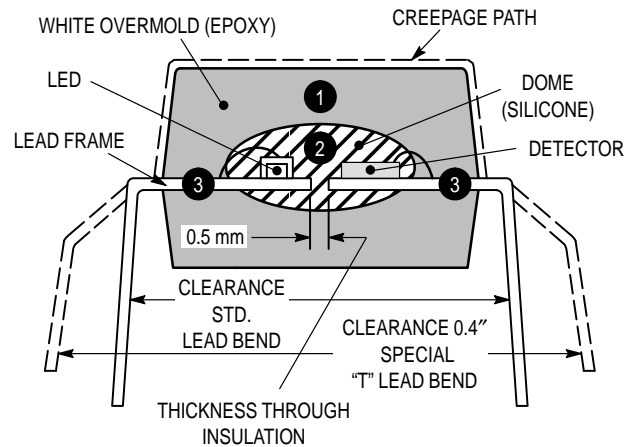


Figure 3. “DOME” Package

Examples for Safety Applications for Motorola VDE Approved Optoisolators

| Standard (2) | | Equipment | Requirements for reinforced (double) or safe insulation for equipment with an operating voltage up to 250 Vrms (line voltage to ELV or SELV interfaces) | | | | |
|---|---------|---|---|---------------|-------------------|---------------------|----------------------|
| VDE (5) | DIN IEC | | Creepage | Clearance (1) | Isolation Barrier | Dielectric Strength | Isolation Resistance |
| | | | [mm] | [mm] | [mm] | [kV RMS] | [Ω] |
| 0806 | 950 | Office Machines | 8.0 | 8.0 | 0.5 | 3.75 | 7×10^6 |
| 0805 | 950 | Data Processing | 8.0 | 8.0 | — | 3.75 | 7×10^6 |
| 0804 | — | Telecommunication | 8.0 | 8.0 | — | 2.5 | 2×10^6 |
| 0860 | 65 | Electrical Household | 6.0 | 6.0 | 0.4 | 3.0 (10)* | 4×10^6 |
| 0113 | 204 | Industrial Controls | 8.0 | 8.0 | — | 2.5 | 1×10^6 |
| 0160 | — | Power Installations with Electronic Equipment | 8.0 | 8.0 | — | 2.7 | 1×10^6 |
| 0832 | — | Traffic Light Controls | 8.0 | 8.0 | — | 2.5 | 4×10^6 |
| 0883 | — | Alarm Systems | 8.0 | 8.0 | — | 2.5 | 2×10^6 |
| 0831 | — | Electrical Signal System for Railroads | 8.0 | 8.0 | — | 2.0 | 2×10^6 |
| 0110 | — | General Std. for Electrical Equipment | 8.0 | 8.0 | — | 2.0 | — |
| 0883 | — | Optoisolator Component Standard (obsolete 12/31/91) | 8.5 | 8.3 (10) (1) | 0.5 | 3.75 (10)* | 10×10^{11} |
| 0884(4) | — | Optoisolator Component Standard (replaces VDE0883) | >7.5 | >7.5 | 0.5 | — | 10×10^{12} |
| VDE Rating for Motorola 6-pin DIP Optoisolators | | | | | | | |

All Motorola 6-pin DIP Optoisolators meet or exceed the requirements of above listed VDE and DIN IEC Standards.

* Impulse discharge withstand voltage.

(1) To satisfy 8.0 mm creepage path on a PC board Motorola offers a special lead bend of 0.4 inch on all 6-pin dual in-line optoisolators. Order by attaching “T” to the end of the Motorola part number.

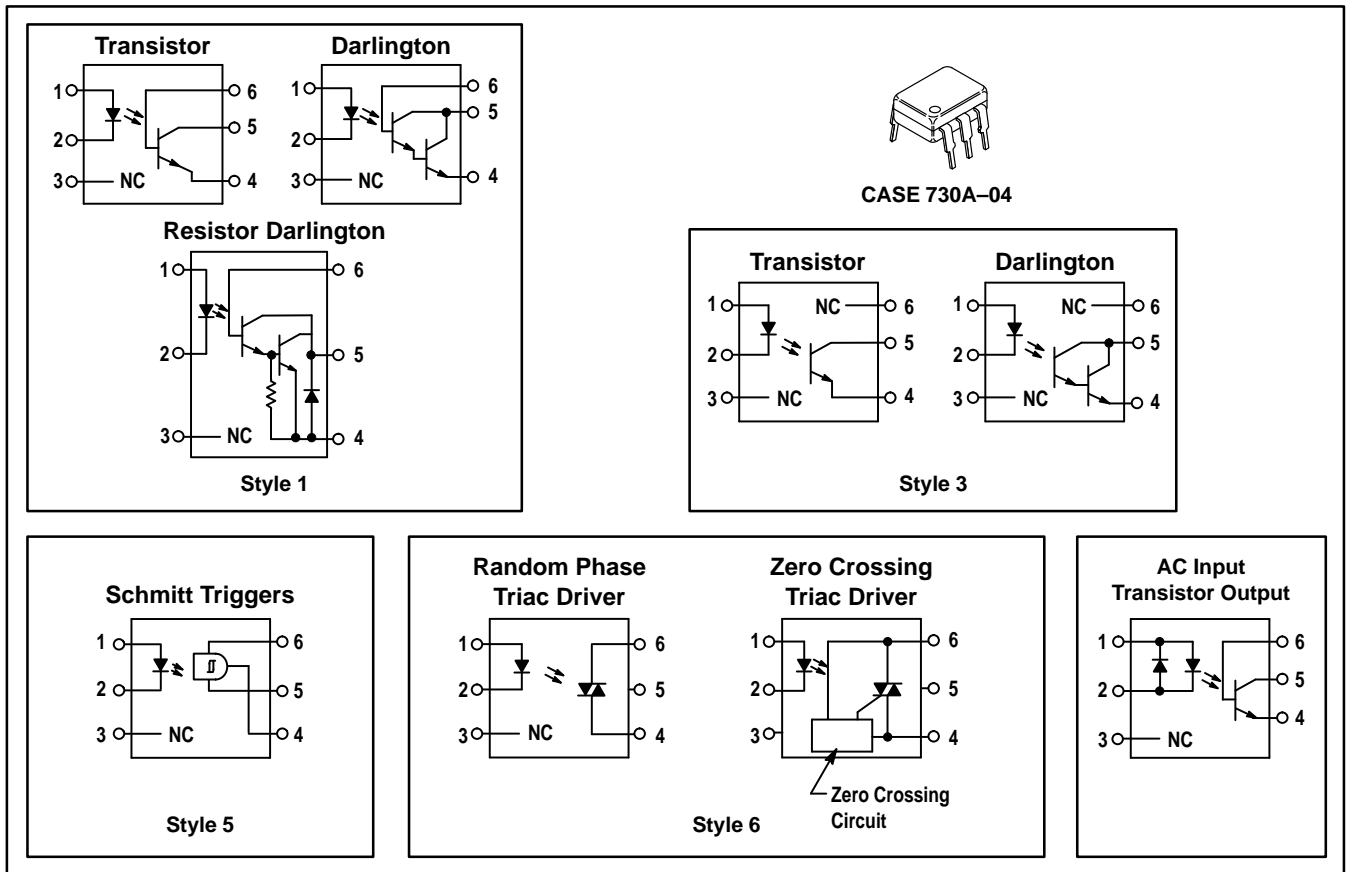
(2) VDE standards (translated into English language) and IEC standards can be ordered from the American National Standard Institute ANSI, 1430 Broadway, N.Y., N. Y. 10018, Sales Department, 212-642-4900.

(3) Creepage path distances are measured from lead to lead across the top, bottom and ends of the package body.

(4) VDE 0884 testing is an option; the suffix letter “V” must be added to the standard number.

(5) For more information regarding the use of VDE approved devices, refer to “VDE Circuit Board Layout Design Rules” in the Applications Information section.


Optoisolators 6-Pin DIP Varieties and Lead Form Options



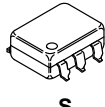
An optoisolator consists of a gallium arsenide infrared emitting diode, IRED, optically coupled to a monolithic silicon photodetector in a wide array of standard devices and encourages the use of special designs and selections for special applications. All Motorola optoisolators have V_{ISO} rating of 7500 Vac(pk), exceeding all other industry standard ratings.

Motorola offers global regulatory approvals, including UL, CSA, AUSTEL, NEMKO, BABT, SETI, SEMKO, and DEMKO. VDE⁽¹⁾ approved per standard 0884/8.87, with additional approvals to DIN IEC950 and IEC380/VDE 0806, IEC435/VDE 0805, IEC65/VDE 0860, VDE 110b, also covering all other standards with equal or less stringent requirements, including IEC204/VDE 0113, VDE 0160, VDE 0832, VDE 0833.

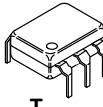
(1) VDE 0884/8.87 testing is an option; the suffix "V" must be added to the standard part number (see VDE Approved Optoisolators in Section 3).



**CASE
730A-04**



S
(S) CASE 730C-04
Surface-mountable
gull-wing option



T
(T) CASE 730D-05
Wide-spaced (0.400)
lead form option

Optoisolator
Lead Form Options:

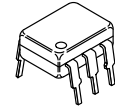
Most of Motorola's 6-pin, dual in-line optoisolators can be ordered in either a surface-mountable, gull-wing lead form or a wide-spaced 0.400" through-hole lead form, which is used to satisfy 8 mm PC board spacing requirements. **All available tape and reel and lead form options are available on designated prime devices. Please first reference "prime" device designation tables, prior to ordering!**

- Attach "S" to any Motorola 6-pin, dual in-line part number for surface-mountable, gull-wing lead form.
- Attach "T" to any Motorola 6-pin, dual in-line part number for wide-spaced 0.400" through-hole lead form.

Tape and Reel Options:

- Attach "SR2" suffix to any Motorola 6-pin, dual in-line part number for tape and reeled, surface-mountable, gull-wing lead form.

6-Pin Dual In-Line Package



CASE 730A-04

Table 1. Transistor Output

Pinout: 1–Anode, 2–Cathode, 3–N.C., 4–Emitter, 5–Collector, 6–Base (Style 1)

| Device | Current Transfer Ratio (CTR) | | | V _{CE(sat)} | | | t _r /t _f or t _{on} */t _{off} * Typ | | | | | V _{(BR)CEO} Volts Min | V _F | |
|----------------|------------------------------|---------------------------|--------------------------|----------------------|---------------------------|----------------------|---|---------------------------|--------------------------|---------------------|----------------------|--------------------------------------|----------------|---------------------------|
| | % Min | @ I _F mA | V _{CE} Volts | Volts Max | @ I _F mA | I _C mA | μs | @ I _C mA | V _{CC} Volts | R _L Ω | I _F mA | | Volts Max | @ I _F mA |
| TIL111 | 8 | 16 | 0.4 | 0.4 | 16 | 2 | 5/5 | 2 | 10 | 100 | | 30 | 1.4 | 16 |
| 4N27 | 10 | 10 | 10 | 0.5 | 50 | 2 | 1.2/1.3 | 10 | 10 | 100 | | 30 | 1.5 | 10 |
| 4N28 | 10 | 10 | 10 | 0.5 | 50 | 2 | 1.2/1.3 | 10 | 10 | 100 | | 30 | 1.5 | 10 |
| 4N38,A | 20 | 20 | 1 | 1 | 20 | 4 | 1.6/2.2 | 10 | 10 | 100 | | 80 | 1.5 | 10 |
| 4N25 | 20 | 10 | 10 | 0.5 | 50 | 2 | 1.2/1.3 | 10 | 10 | 100 | | 30 | 1.5 | 10 |
| 4N26 | 20 | 10 | 10 | 0.5 | 50 | 2 | 1.2/1.3 | 10 | 10 | 100 | | 30 | 1.5 | 10 |
| MCT2 | 20 | 10 | 10 | 0.4 | 16 | 2 | 1.2/1.3 | | 5 | 2k | 15 | 30 | 1.5 | 20 |
| MCT2E | 20 | 10 | 10 | 0.4 | 16 | 2 | 1.2/1.3 | 2 | 10 | 100 | | 30 | 1.5 | 20 |
| CNY17-1 | 40–80 | 10 | 5 | 0.4 | 10 | 2.5 | 1.6/2.3" | | 5 | 75 | 10 | 70 | 1.65 | 60 |
| MCT271 | 45–90 | 10 | 10 | 0.4 | 16 | 2 | 4.9*/4.5* | 2 | 5 | 100 | | 30 | 1.5 | 20 |
| MOC8100 | 50 | 1 | 5 | 0.5 | 1 | 0.1 | 3.8/5.6 | 2 | 10 | 100 | | 30 | 1.4 | 1 |
| H11A1 | 50 | 10 | 10 | 0.4 | 10 | 0.5 | 1.2/1.3 | 2 | 10 | 100 | | 30 | 1.5 | 10 |
| H11A550 | 50 | 10 | 10 | 0.4 | 20 | 2 | 5*/5* | 2 | 10 | 100 | | 30 | 1.5 | 10 |
| TIL117 | 50 | 10 | 10 | 0.4 | 10 | 0.5 | 5/5 | 2 | 10 | 100 | | 30 | 1.4 | 16 |
| SL5501 | 45–250 | 10 | 0.4 | 0.4 | 20 | 2 | 20*/50* | | 5 | 1k | 16 | 30 | 1.3 | 20 |
| CNY17-2 | 63–125 | 10 | 5 | 0.4 | 10 | 2.5 | 1.6/2.3 | | 5 | 75 | 10 | 70 | 1.65 | 60 |
| MCT275 | 70–210 | 10 | 10 | 0.4 | 16 | 2 | 4.5*/3.5* | 2 | 5 | 100 | | 80 | 1.5 | 20 |
| MCT272 | 75–150 | 10 | 10 | 0.4 | 16 | 2 | 6*/5.5* | 2 | 5 | 100 | | 30 | 1.5 | 20 |
| 4N35 | 100 | 10 | 10 | 0.3 | 10 | 0.5 | 3.2/4.7 | 2 | 10 | 100 | | 30 | 1.5 | 10 |
| 4N36 | 100 | 10 | 10 | 0.3 | 10 | 0.5 | 3.2/4.7 | 2 | 10 | 100 | | 30 | 1.5 | 10 |
| 4N37 | 100 | 10 | 10 | 0.3 | 10 | 0.5 | 3.2/4.7 | 2 | 10 | 100 | | 30 | 1.5 | 10 |
| CNY17-3 | 100–200 | 10 | 5 | 0.4 | 10 | 2.5 | 1.6/2.3 | | 5 | 75 | 10 | 70 | 1.65 | 60 |
| H11AV1 | 100–300 | 10 | 10 | 0.4 | 20 | 2 | 5*/4* | 2 | 10 | 100 | | 70 | 1.5 | 10 |
| H11AV2 | 50 | 10 | 10 | 0.4 | 20 | 2 | 5*/4* | 2 | 10 | 100 | | 70 | 1.5 | 10 |

Table 2. Transistor Output with No Base Connection

Pinout: 1–Anode, 2–Cathode, 3–N.C., 4–Emitter, 5–Collector, 6–Base (Style 3)

| | | | | | | | | | | | | | | |
|----------------|---------|----|----|-----|----|-----|---------|---|----|-----|--|----|-----|----|
| MOC8106 | 50–150 | 10 | 10 | 0.4 | 5 | 0.5 | 3.2/4.7 | 2 | 10 | 100 | | 70 | 1.5 | 10 |
| MOC8107 | 100–300 | 10 | 10 | 0.4 | 5 | 0.5 | 3.2/4.7 | 2 | 10 | 100 | | 70 | 1.5 | 10 |
| MOC8108 | 250–600 | 10 | 10 | 0.4 | 5 | 0.5 | 3.2/4.7 | 2 | 10 | 100 | | 70 | 1.5 | 10 |
| MOC8111 | 20 | 10 | 10 | 0.4 | 10 | 0.5 | 3.2/4.7 | 2 | 10 | 100 | | 30 | 1.5 | 10 |
| MOC8112 | 50 | 10 | 10 | 0.4 | 10 | 0.5 | 3.2/4.7 | 2 | 10 | 100 | | 30 | 1.5 | 10 |
| MOC8113 | 100 | 10 | 10 | 0.4 | 10 | 0.5 | 3.2/4.7 | 2 | 10 | 100 | | 30 | 1.5 | 10 |

Table 3. AC Input – Transistor Output

Pinout: 1–LED 1 Anode/LED 2 Cathode, 2–LED 1 Cathode/LED 2 Anode, 3–N.C., 4–Emitter, 5–Collector, 6–Base (Style 8)

| Device | Current Transfer Ratio (CTR) | | | V _{CE(sat)} | | | t _r /t _f or t _{on} */t _{off} * Typ | | | | | V _{(BR)CEO} Volts Min | V _F | |
|---------------|------------------------------|---------------------------|--------------------------|----------------------|---------------------------|----------------------|---|---------------------------|--------------------------|---------------------|----------------------|--------------------------------------|----------------|---------------------------|
| | % Min | @ I _F mA | V _{CE} Volts | Volts Max | @ I _F mA | I _C mA | μs | @ I _C mA | V _{CC} Volts | R _L Ω | I _F mA | | Volts Max | @ I _F mA |
| H11AA1 | 20 | ±10 | 10 | 0.4 | ±10 | 0.5 | | | | | | 30 | 1.5 | ±10 |
| H11AA2 | 10 | ±10 | 10 | 0.4 | ±10 | 0.5 | | | | | | 30 | 1.8 | ±10 |
| H11AA3 | 50 | ±10 | 10 | 0.4 | ±10 | 0.5 | | | | | | 30 | 1.5 | ±10 |
| H11AA4 | 100 | ±10 | 10 | 0.4 | ±10 | 0.5 | | | | | | 30 | 1.5 | ±10 |

Devices listed in bold, italic are Motorola preferred devices.

6-Pin Dual In-Line Package (continued)

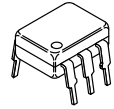


Table 4. Darlington Output

Pinout: 1–Anode, 2–Cathode, 3–N.C., 4–Emitter, 5–Collector, 6–Base (Style 1)

CASE 730A–04

| Device | Current Transfer Ratio (CTR) | | | VCE(sat) | | | tr/τf or ton*/toff* Typ | | | | | V(BR)CEO Volts Min | VF | |
|--------------|------------------------------|---------------|--------------|--------------|------------|----------|-------------------------|--------------|---------|----------|--------------|--------------------------|------------|----|
| | % Min | @ IF mA | VCE Volts | Volts Max | @ IF mA | IC mA | μs @ IC mA | VCC Volts | RL Ω | IF mA | Volts Max | | @ IF mA | |
| 4N31 | 50 | 10 | 10 | 1.2 | 8 | 2 | 0.6/17 | 50 | 10 | | 200 | 30 | 1.5 | 10 |
| 4N29,A | 100 | 10 | 10 | 1 | 8 | 2 | 0.6/17 | 50 | 10 | | 200 | 30 | 1.5 | 10 |
| 4N30 | 100 | 10 | 10 | 1 | 8 | 2 | 0.6/17 | 50 | 10 | | 200 | 30 | 1.5 | 10 |
| MCA231 | 200 | 1 | 1 | 1.2 | 10 | 50 | 80 | 10 | 10 | 100 | | 30 | 1.5 | 20 |
| TIL113 | 300 | 10 | 1.0 | 1 | 50 | 125 | 300 | 125 | 15 | 100 | | 30 | 1.5 | 10 |
| 4N32 | 500 | 10 | 10 | 1 | 8 | 2 | 0.6/45 | 50 | 10 | | 200 | 30 | 1.5 | 10 |
| 4N33 | 500 | 10 | 10 | 1 | 8 | 2 | 0.6/45 | 50 | 10 | | 200 | 30 | 1.5 | 10 |
| H11B1 | 500 | 1 | 5 | 1 | 1 | 1 | 1/2 | 10 | 10 | 100 | | 25 | 1.5 | 10 |
| MOC8080 | 500 | 10 | 5 | 1 | 1 | 1 | 1/2 | 10 | 10 | 100 | 5 | 55 | 1.5 | 10 |

Table 5. Darlington Output with No Base Connection

Pinout: 1–Anode, 2–Cathode, 3–N.C., 4–Emitter, 5–Collector, 6–N.C. (Style 3)

| | | | | | | | | | | | | | | |
|----------------|------|----|-----|---|----|----|-----|-----|----|-----|----|----|-----|----|
| MOC119 | 300 | 10 | 2 | 1 | 10 | 10 | 1/2 | 2.5 | 10 | 100 | | 30 | 1.5 | 10 |
| MOC8030 | 300 | 10 | 1.5 | | | | 1/2 | | 50 | 100 | 10 | 80 | 2 | 10 |
| MOC8020 | 500 | 10 | 5 | | | | 1/2 | | 50 | 100 | 10 | 50 | 2 | 10 |
| MOC8050 | 500 | 10 | 1.5 | | | | 1/2 | | 50 | 100 | 10 | 80 | 2 | 10 |
| MOC8021 | 1000 | 10 | 5 | | | | 1/2 | | 50 | 100 | 10 | 50 | 2 | 10 |

Table 6. Resistor Darlington Output

Pinout: 1–Anode, 2–Cathode, 3–N.C., 4–Emitter, 5–Collector, 6–Base (Style 1)

| | | | | | | | | | | | | | | |
|--------------|------|----|---|-----|----|----|-------|--|---|-----|----|-----|-----|----|
| H11G1 | 1000 | 10 | 1 | 1 | 1 | 1 | 5/100 | | 5 | 100 | 10 | 100 | 1.5 | 10 |
| H11G2 | 1000 | 10 | 1 | 1 | 1 | 1 | 5/100 | | 5 | 100 | 10 | 80 | 1.5 | 10 |
| H11G3 | 200 | 1 | 5 | 1.2 | 50 | 20 | 5/100 | | 5 | 100 | 10 | 55 | 1.5 | 10 |

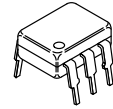
Table 7. High Voltage Transistor Output

Pinout: 1–Anode, 2–Cathode, 3–N.C., 4–Emitter, 5–Collector, 6–Base (Style 1)

| | | | | | | | | | | | | | | |
|----------------|----|----|----|-----|----|-----|-----|---|----|-----|--|-----|-----|----|
| MOC8204 | 20 | 10 | 10 | 0.4 | 10 | 0.5 | 5/5 | 2 | 10 | 100 | | 400 | 1.5 | 10 |
| H11D1 | 20 | 10 | 10 | 0.4 | 10 | 0.5 | 5/5 | 2 | 10 | 100 | | 300 | 1.5 | 10 |
| H11D2 | 20 | 10 | 10 | 0.4 | 10 | 0.5 | 5/5 | 2 | 10 | 100 | | 300 | 1.5 | 10 |

Devices listed in bold, italic are Motorola preferred devices.

6-Pin Dual In-Line Package (continued)



CASE 730A-04

Table 8. Triac Driver Output

Pinout: 1–Anode, 2–Cathode, 3–N.C., 4–Main Terminal, 5–Substrate, 6–Main Terminal (Style 6)

| Device | Peak Blocking Voltage Min | LED Trigger Current— I_{FT} ($V_{TM} = 3\text{ V}$) mA Max | Zero Crossing Inhibit Voltage (at rated I_{FT}) Volts Max | Operating Voltage Vac | dv/dt V/ μs Typ |
|----------------|------------------------------|--|--|--------------------------|---------------------------------|
| MOC3010 | 250 | 15 | — | 125 | 10 |
| MOC3011 | 250 | 10 | — | 125 | 10 |
| MOC3012 | 250 | 5 | — | 125 | 10 |
| MOC3021 | 400 | 15 | — | 125/280 | 10 |
| MOC3022 | 400 | 10 | — | 125/280 | 10 |
| MOC3023 | 400 | 5 | — | 125/280 | 10 |
| MOC3051 | 600 | 15 | — | 125/280 | 2000 |
| MOC3052 | 600 | 10 | — | 125/280 | 2000 |
| MOC3031 | 250 | 15 | 20 | 125 | 2000 |
| MOC3032 | 250 | 10 | 20 | 125 | 2000 |
| MOC3033 | 250 | 5 | 20 | 125 | 2000 |
| MOC3041 | 400 | 15 | 20 | 125/280 | 2000 |
| MOC3042 | 400 | 10 | 20 | 125/280 | 2000 |
| MOC3043 | 400 | 5 | 20 | 125/280 | 2000 |
| MOC3061 | 600 | 15 | 20 | 125/280 | 1500 |
| MOC3062 | 600 | 10 | 20 | 125/280 | 1500 |
| MOC3063 | 600 | 5 | 20 | 125/280 | 1500 |
| MOC3162 | 600 | 10 | 15 | 125/280 | 1000 |
| MOC3163 | 600 | 5 | 15 | 125/280 | 1000 |
| MOC3081 | 800 | 15 | 20 | 125/280/320 | 1500 |
| MOC3082 | 800 | 10 | 20 | 125/280/320 | 1500 |
| MOC3083 | 800 | 5 | 20 | 125/280/320 | 1500 |

Table 9. Schmitt Trigger Output

Pinout: 1–Anode, 2–Cathode, 3–N.C., 4–Output, 5–Ground, 6– V_{CC} (Style 5)

| Device | Threshold Current On mA Max | Threshold Current Off mA Min | $I_{F(off)}/I_{F(on)}$ | | V_{CC} | | t_r, t_f μs Typ |
|--------------|--------------------------------|---------------------------------|------------------------|-----|----------|-----|---------------------------------|
| | | | Min | Max | Min | Max | |
| H11L1 | 1.6 | 0.3 | 0.5 | 0.9 | 3 | 15 | 0.1 |
| H11L2 | 10 | 0.3 | 0.5 | 0.9 | 3 | 15 | 0.1 |
| MOC5007 | 1.6 | 0.3 | 0.5 | 0.9 | 3 | 15 | 0.1 |
| MOC5008 | 4 | 0.3 | 0.5 | 0.9 | 3 | 15 | 0.1 |
| MOC5009 | 10 | 0.3 | 0.5 | 0.9 | 3 | 15 | 0.1 |

Devices listed in bold, italic are Motorola preferred devices.

Small Outline — Surface Mount

CASE 846-01
SO-8 DEVICES

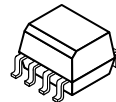


Table 10. Transistor Output

Pinout: 1–Anode, 2–Cathode, 3–N.C., 4–N.C., 5–Emitter, 6–Collector, 7–Base, 8–N.C. (Style 1)

| Device | Marking | Current Transfer Ratio (CTR) | | | $V_{CE(sat)}$ | | | t_r/t_f Typ | | | | $V_{(BR)CEO}$ Volts Min | V_F | | |
|-------------------------|---------|------------------------------|---------|-------------|---------------|--------------|---------|---------------|--------------------|-------------|-------------------|-------------------------------|-------------------|--------------|---------|
| | | % Min | @ mA | I_F mA | VCE Volts | Volts Max | @ mA | I_C mA | μs @ mA | I_C mA | V_{CC} Volts | | R_L Ω | Volts Max | @ mA |
| <i>MOC205,R2</i> | 205 | 40–80 | 10 | 10 | 10 | 0.4 | 10 | 2 | 1.6 | 2 | 10 | 100 | 70 | 1.5 | 10 |
| <i>MOC206,R2</i> | 206 | 63–125 | 10 | 10 | 10 | 0.4 | 10 | 2 | 1.6 | 2 | 10 | 100 | 70 | 1.5 | 10 |
| <i>MOC207,R2</i> | 207 | 100–200 | 10 | 10 | 10 | 0.4 | 10 | 2 | 1.6 | 2 | 10 | 100 | 70 | 1.5 | 10 |
| <i>MOC211,R2</i> | 211 | 20 | 10 | 10 | 10 | 0.4 | 10 | 2 | 3.2 | 2 | 10 | 100 | 30 | 1.5 | 10 |
| <i>MOC212,R2</i> | 212 | 50 | 10 | 10 | 10 | 0.4 | 10 | 2 | 3.2 | 2 | 10 | 100 | 30 | 1.5 | 10 |
| <i>MOC213,R2</i> | 213 | 100 | 10 | 10 | 10 | 0.4 | 10 | 2 | 3.2 | 2 | 10 | 100 | 30 | 1.5 | 10 |
| <i>MOC215,R2</i> | 215 | 20 | 1 | 5 | 5 | 0.4 | 1 | 0.1 | 3.2 | 2 | 10 | 100 | 30 | 1.3 | 1 |
| <i>MOC216,R2</i> | 216 | 50 | 1 | 5 | 5 | 0.4 | 1 | 0.1 | 3.2 | 2 | 10 | 100 | 30 | 1.3 | 1 |
| <i>MOC217,R2</i> | 217 | 100 | 1 | 5 | 5 | 0.4 | 1 | 0.1 | 3.2 | 2 | 10 | 100 | 30 | 1.3 | 1 |

Table 11. Darlington Output

Pinout: 1–Anode, 2–Cathode, 3–N.C., 4–N.C., 5–Emitter, 6–Collector, 7–Base, 8–N.C. (Style 1)

| | | | | | | | | | | | | | | |
|-------------------------|-----|-----|---|---|---|---|-----|---|---|----|-----|----|-----|---|
| <i>MOC223,R2</i> | 223 | 500 | 1 | 5 | 1 | 1 | 0.5 | 2 | 5 | 10 | 100 | 30 | 1.3 | 1 |
|-------------------------|-----|-----|---|---|---|---|-----|---|---|----|-----|----|-----|---|

All devices are shipped in tape and reel format. (See Tape and Reel Specifications Section for more information.)

Table 12. AC Input – Transistor Output (Single Channel) (Style 2)

| | | | | | | | | | | | | | | |
|-------------------------|-----|----|----------|----|-----|----------|-----|--|--|--|--|----|-----|----------|
| <i>MOC256,R2</i> | 256 | 20 | ± 10 | 10 | 0.4 | ± 10 | 0.5 | | | | | 30 | 1.5 | ± 10 |
|-------------------------|-----|----|----------|----|-----|----------|-----|--|--|--|--|----|-----|----------|

Table 13. Transistor Output (Dual Channel) (Style 3)

| | | | | | | | | | | | | | | |
|---------------------------|------|---------|----|----|-----|----|-----|-----|---|----|-----|----|-----|----|
| <i>M OCD207,R2</i> | D207 | 100–200 | 10 | 10 | 0.4 | 10 | 2 | 1.6 | 2 | 10 | 100 | 70 | 1.5 | 10 |
| <i>M OCD208,R2</i> | D208 | 45–125 | 10 | 10 | 0.4 | 10 | 2 | 1.6 | 2 | 10 | 100 | 70 | 1.5 | 10 |
| <i>M OCD211,R2</i> | D211 | 20 | 10 | 10 | 0.4 | 10 | 2 | 3.2 | 2 | 10 | 100 | 30 | 1.5 | 10 |
| <i>M OCD213,R2</i> | D213 | 100 | 10 | 10 | 0.4 | 10 | 2 | 3.2 | 2 | 10 | 100 | 70 | 1.5 | 10 |
| <i>M OCD217,R2</i> | D217 | 100 | 1 | 5 | 0.4 | 1 | 0.1 | 3.2 | 2 | 10 | 100 | 30 | 1.5 | 1 |

Table 14. Darlington Output (Dual Channel) (Style 3)

| | | | | | | | | | | | | | | |
|---------------------------|------|-----|---|---|---|---|-----|---|---|----|-----|----|-----|---|
| <i>M OCD223,R2</i> | D223 | 500 | 1 | 5 | 1 | 1 | 0.5 | 2 | 5 | 10 | 100 | 30 | 1.3 | 1 |
|---------------------------|------|-----|---|---|---|---|-----|---|---|----|-----|----|-----|---|

R2 devices are shipped in tape and reel format. (See Tape and Reel Specifications Section for more information.)

Devices listed in bold, italic are Motorola preferred devices.