FAIRCHILD
SEMICONDUCTOR®

Fairchild Optocoupler Overview

www.fairchildsemi.com

the power franchise™

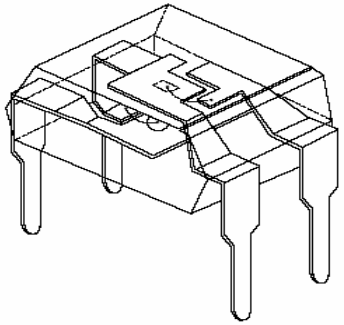
High Performance Optocouplers – recent releases

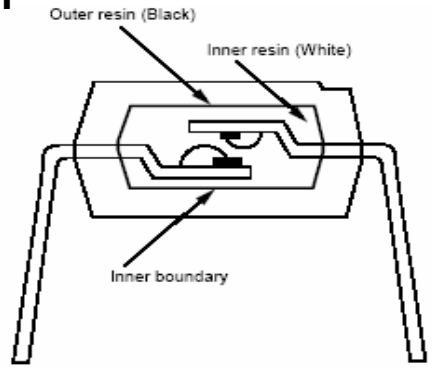
- Extension of existing 5V 8-pin DIP portfolio in 5-pin MFP and dual channel 8-pin SOP packages. These smaller packages optimize mounting density.

- Addition of 3.3V versions in single channel and dual channel 8-pin SOP and single channel 8-pin DIP. The 3.3V supply voltage specification reduces power consumption by 33%.

Optocoupler Constructions

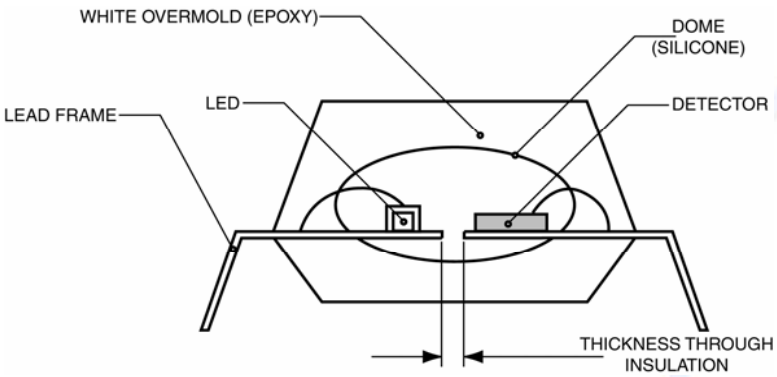
Over-Under Double Molding Construction





The drawing on the right shows the optocoupler in a light-tight epoxy resin housing, and a light-sensitive element with light-transmittable epoxy resin medium between them. A light signal emitted by the LED is transferred to the photosensitive detector via the internal resin medium. Both the housing resin and the internal resin have the same expansion coefficient. Namely, the optocoupler elements are molded twice with epoxy resin - this structure is referred to as a double molding structure

Coplanar Construction



Advantages

•Fixed isolation gap (thickness through insulation). So a consistent high input to output isolation voltage

• High Common Mode Noise Rejection (CMR). This construction eliminates the capacitive charge buildup that occurs in the over-under construction.

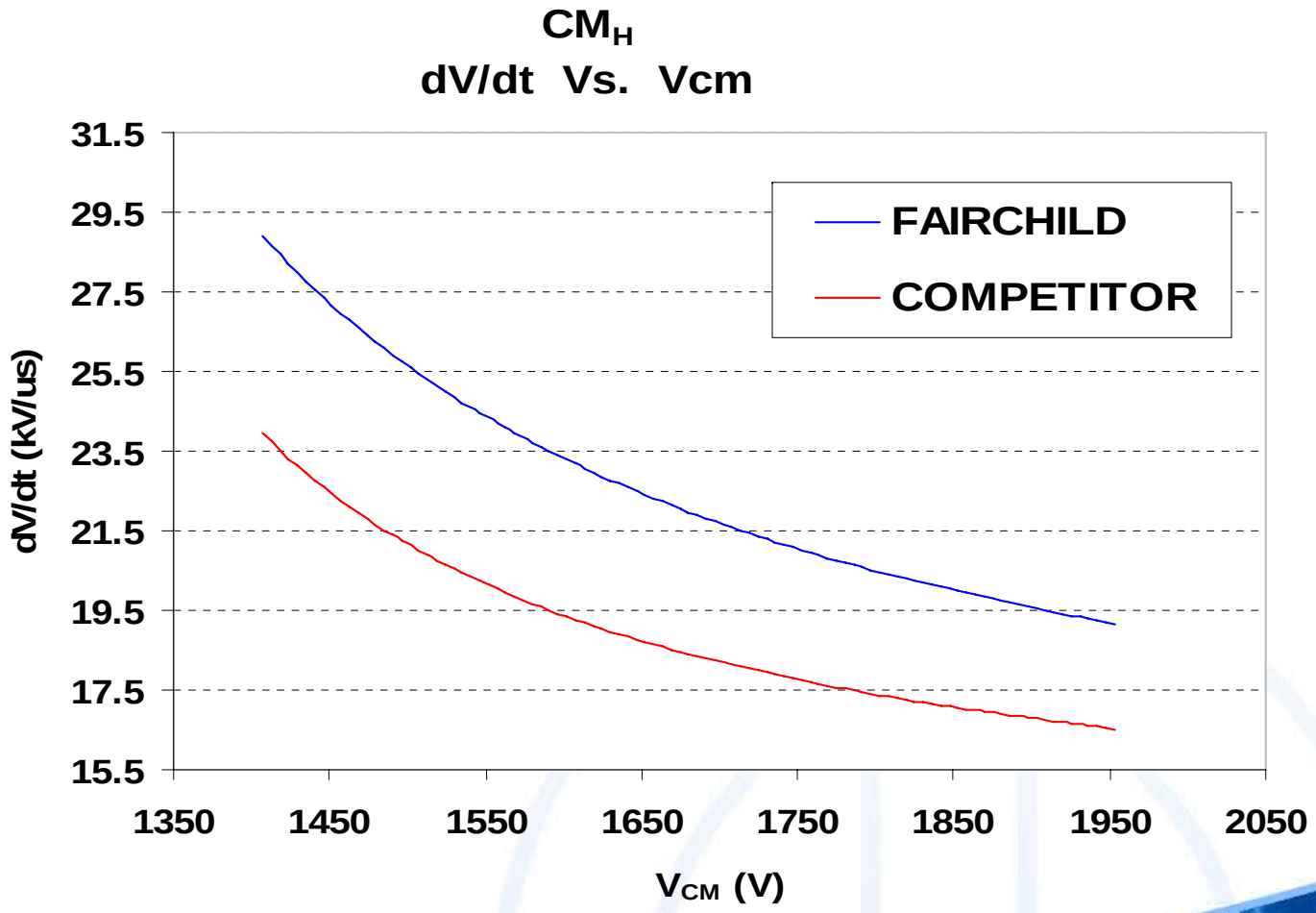
High Performance Optocouplers – detector chip capacitance

The detector chip capacitance has been reduced by decreasing the size of the chip through more efficient layout and improved light output of the LED source. In addition, a proprietary shielding method for the amplifier results in several orders of magnitude improvement over the shielding technique utilized in older generation high performance optocouplers. The shield is optically transmissive yet electrically conductive and acts to shunt surface charges to ground and eliminates the potential for latch-up.

High Performance Optocouplers – competitive advantage

Fairchild's new high performance optocouplers have a superior common mode transient immunity advantage over the market leader, Agilent. This 30% improvement vs. the competition is achieved through our coplanar packaging technology and proprietary shielding of the silicon detector chip.

High Performance Optocouplers – common mode high comparison



High Performance Optocouplers
– 3.3V high-speed transistor & high-gain darlington outputs

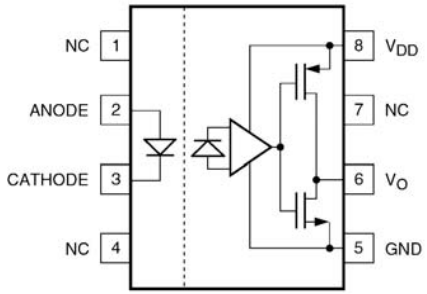
Part Number	CTR@ *1.6mA I_F, 16mA I_F (%)		V_{OL} (V)	I_{CCL} (µA)	CMR (kV/µS)	T_{PHL}/T_{PLH} (µS)	V_{ISO} (RMS) (V) 1 minute
	Min	Max	Max	Max	Min	Max	
FOD050L	15	50	0.3	200	5	1/1	2500
FOD053L	15	50	0.3	400	5	1/1	2500
FOD250L	15	50	0.3	200	5	1/1	5000
FOD0708L *	400	5000	0.3	150	1	30/90	2500
FOD0738L *	400	5000	0.3	300	1	30/90	2500
FOD270L* (under develop	400	7000	0.3	150	1	30/90	5000

High Performance Optocouplers
– 15 MBaud CMOS Logic Optocouplers

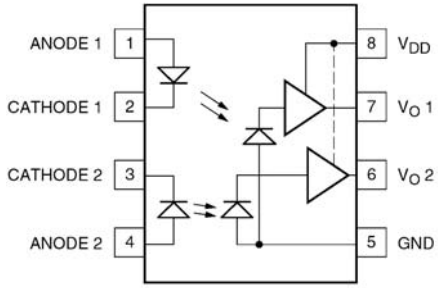
Product Features:

- Low power CMOS logic with push-pull output
- 15 MBaud bandwidth capability
  - 30 ns maximum pulse width distortion
  - 40 ns maximum propogation delay skew
- Excellent common mode rejection rating - (>50kV/us typical at 2000V common mode
- Guaranteed performance from -40°C to +100°C
- Compact 8-pin SOIC package
  - Single channel (FOD0708)
  - Dual channel (FOD0738)
- Double protection certification (UL) at 2500V(RMS) isolation rating
- Lead Free – Compatible with 260 °C reflow processes

High Performance Optocouplers
– 15 MBaud CMOS Logic Optocouplers



FOD0708



FOD0738

Specifications guaranteed between -40˚C to +100˚C

Part Number	I_{FT} (mA) Max	V_{OL} (V) Max	CM_H/CM_L (kV/µs) Min	PWD (ns) Max	T_{PHL}/T_{PLH} (ns) Max	V_{ISO} AC (RMS)
FOD0708	8.2	0.1	25	30	60/60	2.5kV
FOD0738 (under develop)	8.2	0.1	25	30	60/60	2.5kV

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Microcoupler

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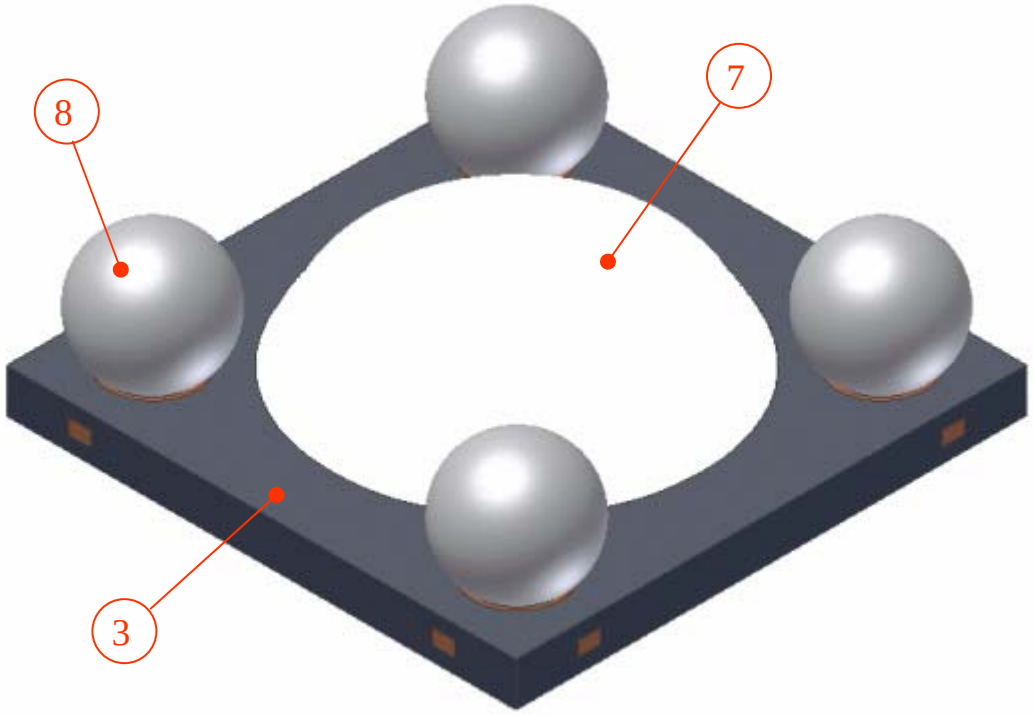
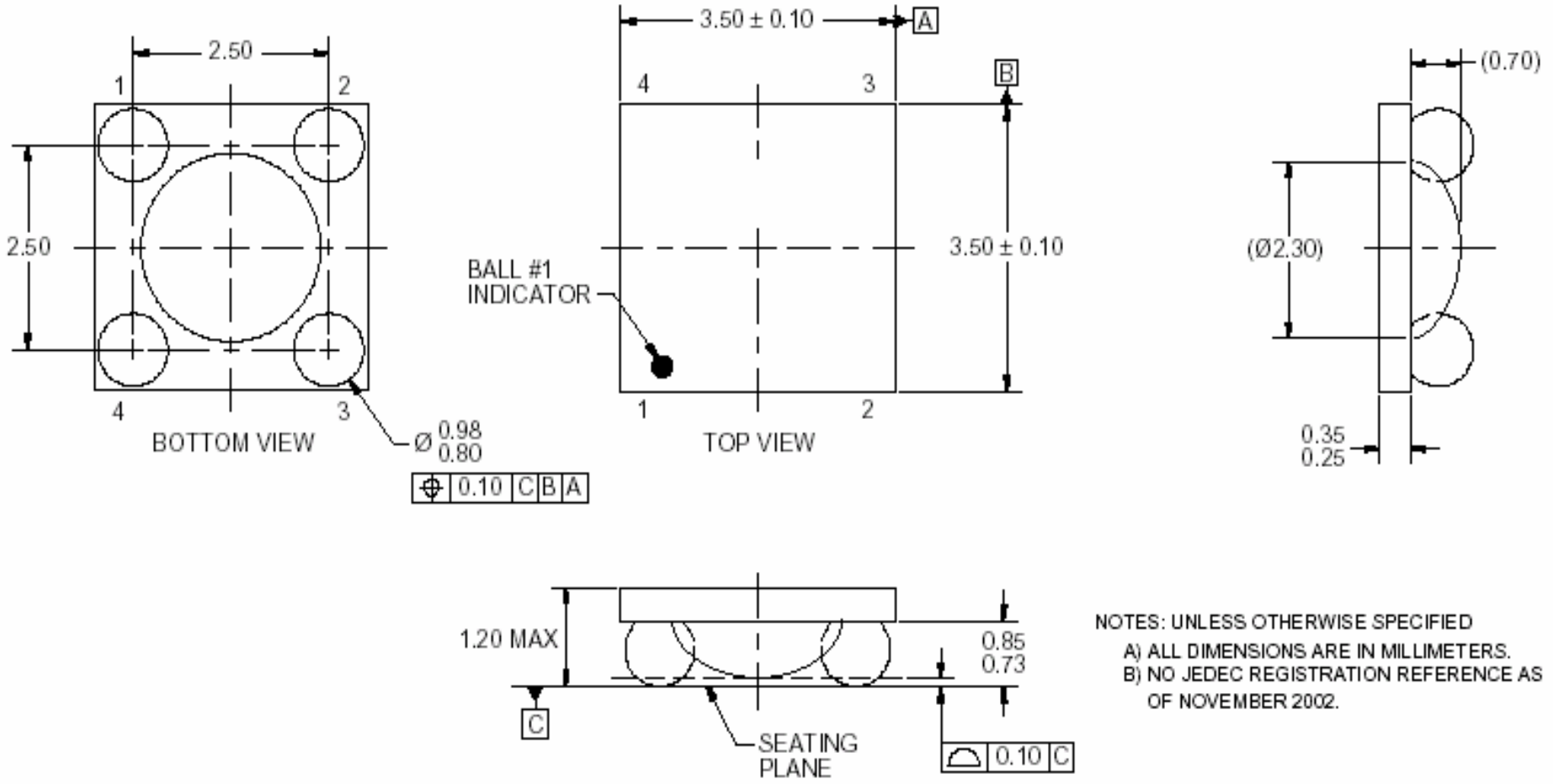
Single Channel MICROCOUPLER™ – Opaque Package Presentation

FODB10X



No.	PARTS
3	Premolded Leadframe Substrate
7	Glob Top/ Opaque Material
8	Solder balls

Single Channel MICROCOUPLER™ Package Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED

A) ALL DIMENSIONS ARE IN MILLIMETERS.

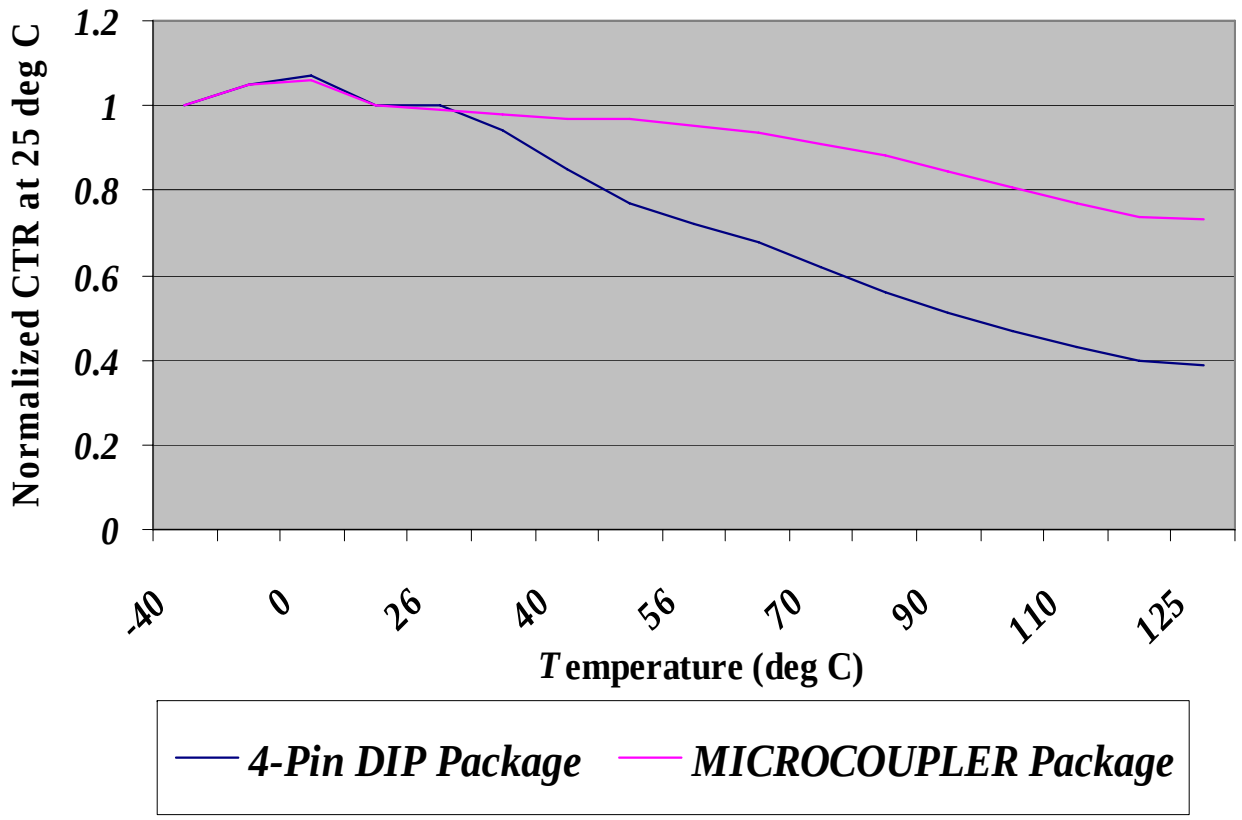
B) NO JEDEC REGISTRATION REFERENCE AS OF NOVEMBER 2002.

Single Channel MICROCOUPLER™ Package vs. Conventional 4-Pin Dip Package

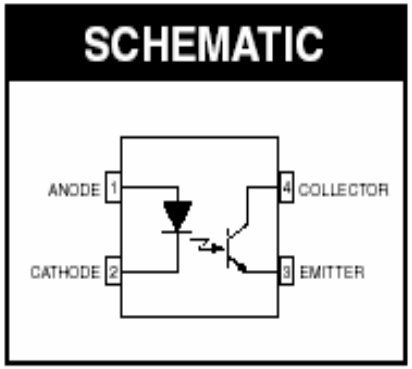
Advantages of the MICROCOUPLER™ Package

- **Improved CTR performance over temperature**
- **Wide operating temperature range as compared to conventional optocouplers**
- **Owing to its low profile, small volume and footprint, this package can further save on board real estate giving hardware designers more flexibility and allowing for overall systems cost savings**
- **High IR reflow soldering capability in lead free environments**

CTR Degradation from 25ºC to 125ºC for MICROCOUPLER™ vs 4-Pin DIP Package



Key Characteristics of the Single Channel MICROCOUPLER™



- Isolation Voltage, Viso: 2.5kVrms, 1 second
- High Current Transfer Ratio, CTR at low I_F
- Operating Temperature Range, Topr:
  - 40°C to +125°C
- High BVceo of 80V
- 1.20mm maximum standoff height
- Applicable to Pb-free IR reflow soldering profile:
  260°C peak (per JEDEC standard)

FOD3180 and FOD3181

Fairchild's New 0.5A and 2A High Speed MOSFET Gate Drive Optocouplers

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MOSFET Gate Drive Optocouplers

These devices represent a new addition to Fairchild's broad optocoupler portfolio. These MOSFET gate drive optocouplers compliment Fairchild's already strong offering in the discrete power MOSFET line of products. This offers Fairchild customers with one stop shopping from the logic control portion of the circuit to the isolated gate driver to the power MOSFET. This combined solution converts the mW to kW providing electrical isolation between the primary and secondary circuits.

High Performance Optocouplers
FOD3180/1 – 0.5A/2A output current, high speed IGBT/MOSFET gate driver optocoupler

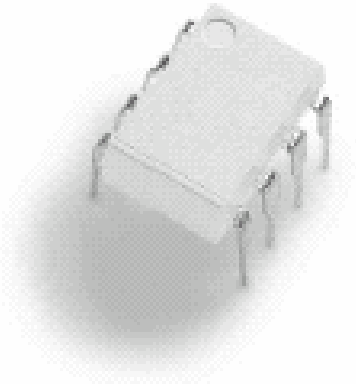
Target Applications: High frequency driving of power IGBT and MOSFETs used in Plasma Display Panels (PDPs), motor control inverter applications and high performance DC/DC converters

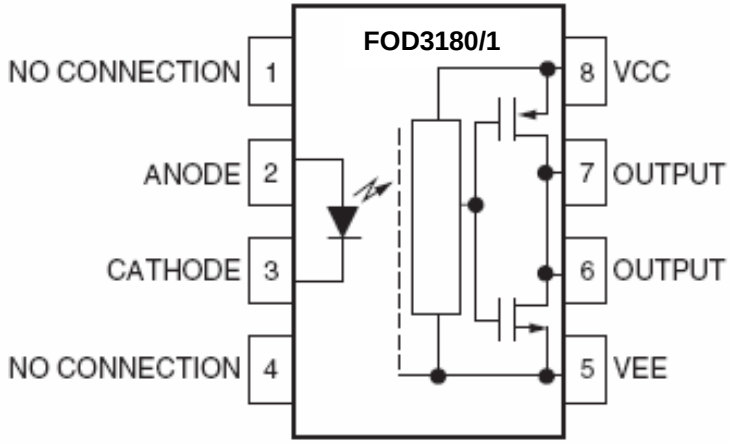
Key Features:

- 0.5A/2A minimum peak output current
- High speed response: 200ns max propagation delay over temperature range
- 250kHz maximum switching speed
- 20ns typ pulse width distortion
- Wide V_{CC} operating range: 10V to 20V
- Under voltage lockout protection (UVLO) with hysteresis

Product Overview

- New Optically Isolated MOSFET Drivers:
  - Wide Vcc operating voltage range of 10V to 20V
  - High output current capability:
    - FOD3180 – 2A
    - FOD3181 – 0.5A
  - 5000V isolation voltage rating
  - High speed response:
    - FOD3180 – 200ns maximum prop delay
    - FOD3181 – 500ns maximum prop delay





Key Specifications

Part Number	I_{FLH} * (mA)	I_{OL}/I_{OH} (A)	I_{CCH}/I_{CCL} (mA)	V_{UVLO+}/V_{UVLO-} (V)	CMR (kV/µS)	T_{PHL}/T_{PLH} (nS)	V_{ISO} AC (RMS)
	Max	Max	Max	Typ	Min	Max	
FOD3180	8	2	6/6	7.9/7.4	10	200/200	5kV
FOD3181	10	0.5	6/6	-/-	10	500/500	5kV

* Note – The maximum IF_{LH} is the highest LED current required to guarantee the device will switch to the 'on' state. When designing in the part, it is therefore recommended that an additional 20% to 50% be added to the maximum current rating spec to compensate for temperature and time degradation of the LED.

Cross Reference

Avago	Sharp	Toshiba	NEC	Vishay	Fairchild
HCPL-3180	---	TLP350	---	---	FOD3180
---	PC925LONSZ0F	TLP250	---	VO3150	FOD3181

Cross References

Avago (Agilent)	FCS	Toshiba	Vishay	Sharp	NEC
HCPL-0452	HCPL0452	-	-	-	-
HCPL-0453	HCPL0453	-	SFH6343T	-	-
HCPL-0500	HCPL0500	-	SFH6315T	-	-
HCPL-0501	HCPL0501	-	SFH6316T	-	PS8802-1
HCPL-050L	FOD050L	-	-	-	-
HCPL-0530	HCPL0530	-	-	-	-
HCPL-0531	HCPL0531	-	-	PC4D570NiP	-
HCPL-0534	HCPL0534	-	-	-	PS8802-2
HCPL-053L	FOD053L	-	-	-	-
HCPL-0600	HCPL0600	-	-	-	-
HCPL-0601	HCPL0601	-	-	-	-
HCPL-0611	HCPL0611	-	-	-	PS9817-1
HCPL-0630	HCPL0630	-	-	-	-
HCPL-0631	HCPL0631	-	-	-	-
HCPL-0661	HCPL0661	-	-	-	PS9817-2
HCPL-060L	FOD060L	-	-	-	PS9821-1
HCPL-063L	FOD063L	-	-	-	PS9821-2
HCPL-0700	HCPL0700	-	SFH6318T	-	-
HCPL-0701	HCPL0701	-	SFH6319T	-	-
HCPL-0708	FOD0708	-	-	-	PS9821-1
HCPL-0738	FOD0738	-	-	-	PS9821-2
HCPL-070L	FOD070L	-	-	-	-

Cross References (Conti')

Avago (Agilent)	FCS	Toshiba	Vishay	Sharp	NEC
HCPL-0730	HCPL0730	-	-	-	-
HCPL-0731	HCPL0731	-	-	-	-
HCPL-073L	FOD073L	-	-	-	-
HCPL-2200	FOD2200	TLP2200	SFH6700	-	-
HCPL-2502	HCPL2502	TLP651	-	-	-
HCPL-2503	HCPL-2503				
HCPL-250L	FOD250L	-	-	-	-
HCPL-2530	HCPL2530	TLP2530	SFH6325	PC9D17	-
HCPL-2531	HCPL2531	TLP2531	SFH6326	-	-
HCPL-2601	HCPL2601	TLP2601	-	-	-
HCPL-2611	HCPL2611	-	-	-	-
HCPL-2630	HCPL2630	TLP2630	-	PC9D10	-
HCPL-2631	HCPL2631	TLP2631	-	-	-
HCPL-260L	FOD260L	-	-	-	-
HCPL-270L	FOD270L				
HCPL-2730	HCPL2730	-	-	-	-
HCPL-2731	HCPL2731	-	-	-	-
HCPL-3700	HCPL3700	-	-	-	-
HCPL-4502	HCPL4502	TLP559	SFH6345	PC957L0NZ	PS8602
HCPL-4503	HCPL4503M	-	-	-	-
HCPL-M452	FODM452	TLP112(A)	-	PC457LONIP	-
HCPL-M453	FODM453	TLP114A(IGM)	-	PC457	PS8101-K
HCPL-3180	FOD3180	TLP350			
HCPL3180	FOD3181	TLP250	VO3150	PC925LONZ0F	