

# **Small Outline Optoisolators**

# **Transistor Output**

These devices consist of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon phototransistor detector, in a surface mountable, small outline, plastic package. They are ideally suited for high density applications, and eliminate the need for through–the–board mounting.

- Convenient Plastic SOIC-8 Surface Mountable Package Style
- Closely Matched Current Transfer Ratios
- • Minimum V(BR)CEO of 70 Volts Guaranteed
- Standard SOIC–8 Footprint, with 0.050" Lead Spacing
- Compatible with Dual Wave, Vapor Phase and IR Reflow Soldering
- High Input-Output Isolation of 3000 Vac (rms) Guaranteed
- • UL Recognized File #E90700, Volume 2

#### **Ordering Information:**

- To obtain MOC205, 206, 207, 208 in Tape and Reel, add R2 suffix to device numbers: R2 = 2500 units on 13" reel
- To obtain MOC205, 206, 207, 208 in quantities of 50 (shipped in sleeves) No Suffix

#### **Marking Information:**

- • MOC205 = 205
- MOC206 = 206
- MOC207 = 207
- • MOC208 = 208

#### Applications:

- Feedback Control Circuits
- Interfacing and coupling systems of different potentials and impedances
- · General Purpose Switching Circuits

Detector Power Dissipation @ TA = 25°C

Derate above 25°C

• Monitor and Detection Circuits

#### **MAXIMUM RATINGS** ( $T_{\Delta} = 25^{\circ}$ C unless otherwise noted)

Rating	Symbol	Value	Unit
NPUT LED			
Forward Current — Continuous	ΙF	60	mA
Forward Current — Peak (PW = 100 μs, 120 pps)	I <sub>F</sub> (pk)	1.0	А
Reverse Voltage	VR	6.0	V
LED Power Dissipation @ T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>	90 0.8	mW mW/°C
OUTPUT TRANSISTOR			
Collector–Emitter Voltage	VCEO	70	V
Collector–Base Voltage	V <sub>СВО</sub>	70	V
Emitter-Collector Voltage	VECO	7.0	V
Collector Current — Continuous	lС	150	mA

PD

150

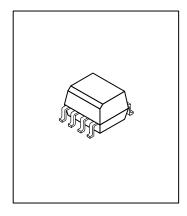
1.76

mW

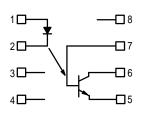
mW/°C

# MOC205 MOC206 MOC207 MOC208

SMALL OUTLINE OPTOISOLATORS TRANSISTOR OUTPUT







- 1. LED ANODE
- 2. LED CATHODE
- 3. NO CONNECTION
- 4. NO CONNECTION
- 5. EMITTER
- 6. COLLECTOR
- 7. BASE
- 8. NO CONNECTION



# MOC205, MOC206, MOC207, MOC208

0.2

3000

1011

Vac(rms)

Ω

#### **MAXIMUM RATINGS** — continued ( $T_A = 25^{\circ}C$ unless otherwise noted)

Rating			Symbol	Va	lue	Unit
OTAL DEVICE						
Input-Output Isolation Voltage <sup>(1,2)</sup> (60 Hz, 1.0 sec. duration)	2)		VISO	30	000	Vac(rms)
Total Device Power Dissipation @ Derate above 25°C	2 T <sub>A</sub> = 25°C		PD		50 .94	mW mW/°C
Ambient Operating Temperature F	Range(3)		TA	-45 to	o +100	°C
Storage Temperature Range(3)			T <sub>stg</sub>	-45 to	o +125	°C
Lead Soldering Temperature (1/16	6" from case, 10 sec. duration)		_	2	60	°C
ELECTRICAL CHARACTERIS	TICS (T <sub>A</sub> = 25°C unless otherwis	e noted) <sup>(4)</sup>			_	
Charac	teristic	Symbol	Min	Typ <sup>(4)</sup>	Max	Unit
NPUT LED		•	•		•	•
Forward Voltage (I <sub>F</sub> = 10 mA)		٧ <sub>F</sub>	_	1.15	1.5	V
Reverse Leakage Current (V <sub>R</sub> = 6	6.0 V)	IR	_	0.1	100	μΑ
Capacitance		С	_	18	_	pF
OUTPUT TRANSISTOR						
Collector-Emitter Dark Current	$(V_{CE} = 10 \text{ V}, T_{A} = 25^{\circ}\text{C})$	I <sub>CEO</sub> 1	_	1.0	50	nA
	$(V_{CE} = 10 \text{ V}, T_{A} = 100^{\circ}\text{C})$	I <sub>CEO</sub> 2	_	1.0	_	μΑ
Collector-Emitter Breakdown Volt	tage (I <sub>C</sub> = 100 μA)	V <sub>(BR)</sub> CEO	70	120	_	V
Emitter-Collector Breakdown Volt	tage (I <sub>E</sub> = 100 μA)	V(BR)ECO	7.0	7.8	_	V
Collector-Emitter Capacitance (f	= 1.0 MHz, V <sub>CE</sub> = 0)	C <sub>CE</sub>		7.0	_	pF
COUPLED						
Output Collector Current (I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 10 V)	MOC205 MOC206 MOC207 MOC208	I <sub>C</sub> (CTR) <sup>(5)</sup>	4.0 (40) 6.3 (63) 10 (100) 4.0 (40)	6.0 (60) 9.4 (94) 15 (150) 8.0 (80)	8.0 (80) 12.5 (125) 20 (200) 12.5 (125)	mA (%)
Collector–Emitter Saturation Voltage (I <sub>C</sub> = 2.0 mA, I <sub>F</sub> = 10 mA)		V <sub>CE(sat)</sub>	_	0.15	0.4	V
Turn–On Time (I <sub>C</sub> = 2.0 mA, $V_{CC}$ = 10 V, $R_L$ = 100 $\Omega$ )		ton	_	3.0	_	μs
Turn-Off Time (I <sub>C</sub> = 2.0 mA, V <sub>CC</sub>	; = 10 V, R <sub>L</sub> = 100 Ω)	<sup>t</sup> off	_	2.8		μs
Rise Time ( $I_C = 2.0 \text{ mA}, V_{CC} = 1$	0 V, R <sub>L</sub> = 100 Ω)	t <sub>r</sub>	_	1.6	_	μs
Fall Time ( $I_C = 2.0 \text{ mA}$ , $V_{CC} = 10$	V, R <sub>L</sub> = 100 Ω)	t <sub>f</sub>		2.2	_	μs
	(4.0)				1	

Viso

**RISO** 

CISO

- 1. Input–Output Isolation Voltage,  $V_{\mbox{\scriptsize ISO}}$ , is an internal device dielectric breakdown rating.
- 2. For this test, pins 1 and 2 are common, and pins 5, 6 and 7 are common.
- 3. Refer to Quality and Reliability Section in Opto Data Book for information on test conditions.
- 4. Always design to the specified minimum/maximum electrical limits (where applicable).
- 5. Current Transfer Ratio (CTR) = I<sub>C</sub>/I<sub>F</sub> x 100%.

Isolation Capacitance  $(V_{I-O} = 0, f = 1.0 \text{ MHz})(2)$ 

Isolation Resistance  $(V_{I-O} = 500 \text{ V})(2)$ 

Input–Output Isolation Voltage (f = 60 Hz, t = 1.0 sec.)(1,2)

# MOC205, MOC206, MOC207, MOC208

#### **TYPICAL CHARACTERISTICS**

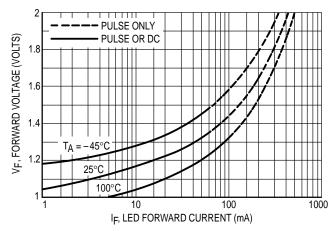
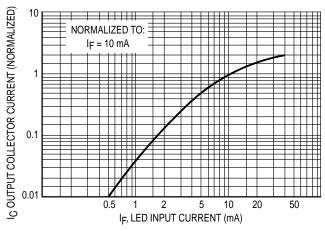


Figure 1. LED Forward Voltage versus Forward Current



**Figure 2. Output Current versus Input Current** 

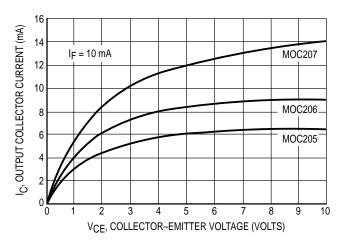


Figure 3. Output Current versus Collector–Emitter Voltage

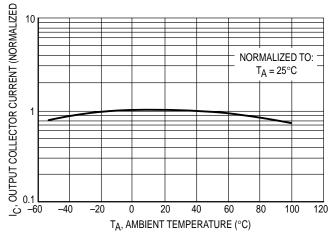


Figure 4. Output Current versus Ambient Temperature

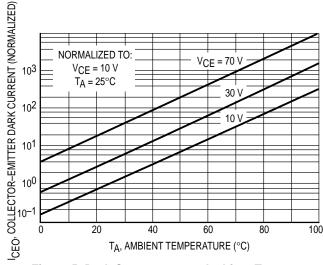


Figure 5. Dark Current versus Ambient Temperature

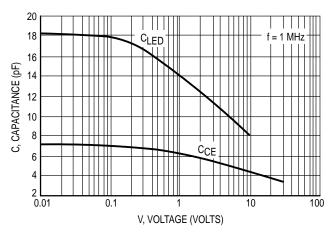
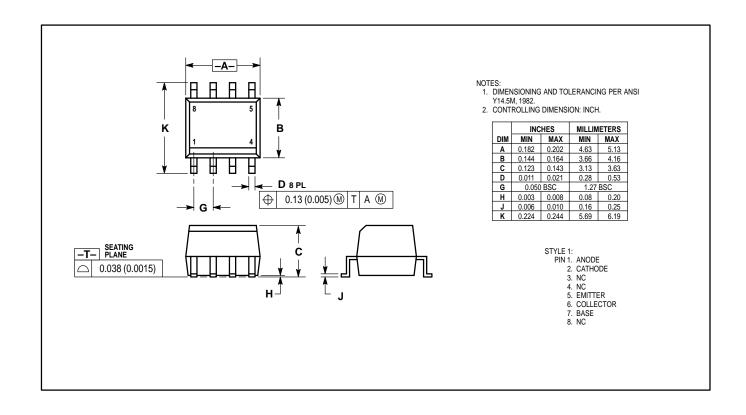


Figure 6. Capacitance versus Voltage



# MOC205, MOC206, MOC207, MOC208





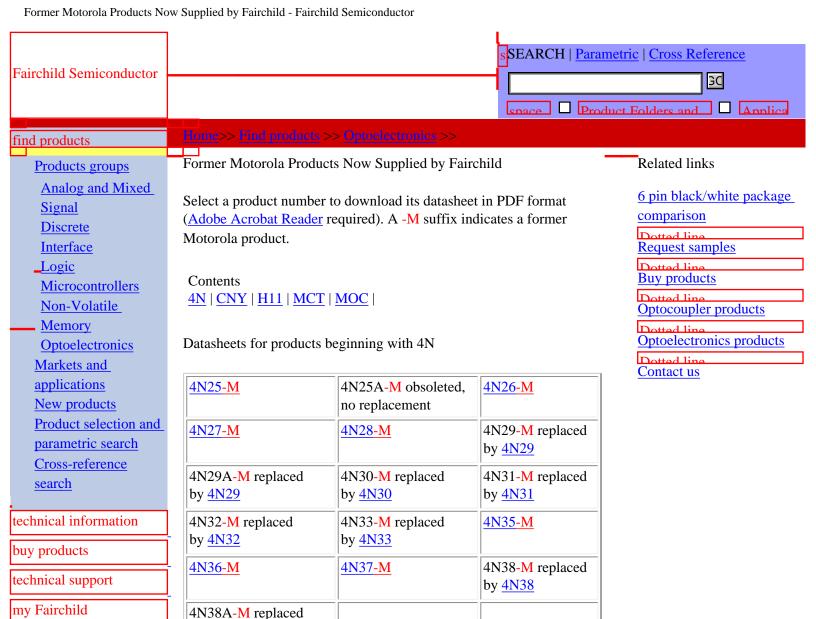
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- A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



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Datasheets for products beginning with CNY

<u>CNY17-1-M</u>	<u>CNY17-2-M</u>	<u>CNY17-3-M</u>

back to top

٠

Datasheets for products beginning with H11

<u>H11A1-M</u>	H11AA1-M replaced by H11AA1	H11AA2-M replaced by H11AA2

H11AA3-M replaced by H11AA3	H11AA4-M replaced by H11AA4	<u>H11AV1-M</u>
H11AV1A-M	H11AV2-M	H11AV2A-M
H11B1-M replaced by H11B1	H11B3-M replaced by H11B3	H11D1-M replaced by H11D1
H11D2-M replaced by H11D2	H11G1-M replaced by H11G1	H11G2-M replaced by H11G2
H11G3-M replaced by H11G3	H11L1-M	H11L2-M
<u>H11L3-M</u>		

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# Datasheets for products beginning with MCT

MCT2-M	MCT2E-M	

### back to top

٠

# Datasheets for products beginning with MOC

MOC205-M	MOC206-M	MOC207-M
MOC208-M	MOC211-M	MOC212-M
<u>MOC213-M</u>	MOC215-M	MOC216-M
MOC217-M	MOC223-M	MOC256-M
MOC3010-M	MOC3011-M	MOC3012-M
MOC3020-M	MOC3021-M	MOC3022-M
MOC3023-M	MOC3031-M	MOC3032-M
MOC3033-M	MOC3041-M	MOC3042-M
MOC3043-M	MOC3051-M	MOC3052-M
MOC3061-M	MOC3062-M	MOC3063-M
MOC3081-M	MOC3081-M	MOC3083-M
MOC3162-M	MOC3163-M	MOC5007-M
MOC5008-M	MOC5009-M	MOC8030-M replaced by MOC8030

Former Motorola Products Now Supplied by Fairchild - Fairchild Semiconductor

MOC8050-M replaced by MOC8050	MOC8080-M replaced by MOC8080	MOC8100-M
MOC8204-M replaced by MOC8204	MOCD207-M	MOCD208-M
MOCD211-M	MOCD213-M	MOCD217-M
MOCD223-M		

back to top

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-Last updated: March 19, 2002



- Feedback control circuits
- Interfacing and coupling systems of different potentials and impedances
- General purpose switching circuits
- Monitor and detection circuits

#### Ordering information

The following options can be ordered with this part:

Option	Order Entry Identifier	Description
R1	R1	Surface-Mount Lead Bend Tape and Reel (500-pc reel)
R2	R2	Surface-Mount Lead Bend Tape and Reel (2500-pc reel)

#### back to top

### Product status/pricing/packaging

Product	Product status	Pricing*	Package type	Leads	Packing method
MOC206-M	Full Production	\$0.264	SOIC	8	RAIL
MOC206R1-M	Full Production	\$0.273	SOIC	8	TAPE REEL
MOC206R2-M	Full Production	\$0.273	SOIC	8	TAPE REEL

<sup>\* 1,000</sup> piece Budgetary Pricing

#### back to top

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Cetificate		Agency	
<u>8460,8461</u> (171 K)	BSI	British Standards Institution	
<u>136616</u> (161 K)	VDE	VDE Pruf-und Zertifizierungsinstitut	
E90700, Vol. 2 (254 K)	UL	Underwriters Laboratories Inc.	

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#### back to top

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MOC207-M	Full Production	\$0.264	SOIC	8	RAIL
MOC207R1-M	Full Production	\$0.273	SOIC	8	TAPE REEL
MOC207R2-M	Full Production	\$0.273	SOIC	8	TAPE REEL

<sup>\* 1,000</sup> piece Budgetary Pricing

#### back to top

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<u>136616</u> (161 K)	VDE	VDE Pruf-und Zertifizierungsinstitut	
E90700, Vol. 2 (254 K)	UL	Underwriters Laboratories Inc.	

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R2	R2	Surface-Mount Lead Bend Tape and Reel (2500-pc reel)	

#### back to top

### Product status/pricing/packaging

Product	Product status	Pricing*	Package type	Leads	Packing method
MOC208-M	Full Production	\$0.264	SOIC	8	RAIL
MOC208R1-M	Full Production	\$0.273	SOIC	8	TAPE REEL
MOC208R2-M	Full Production	\$0.273	SOIC	8	TAPE REEL

<sup>\* 1,000</sup> piece Budgetary Pricing

#### back to top

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#### back to top

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MOC205-M	Full Production	\$0.264	SOIC	8	RAIL
MOC205R1-M	Full Production	\$0.273	SOIC	8	TAPE REEL
MOC205R2-M	Full Production	\$0.273	SOIC	8	TAPE REEL

<sup>\* 1,000</sup> piece Budgetary Pricing

#### back to top

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