


## Small Outline Optoisolators Transistor Output (Low Input Current)

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
- Low LED Input Current Required, for Easier Logic Interfacing
- Standard SOIC-8 Footprint, with 0.050" Lead Spacing
- Shipped in Tape and Reel, which Conforms to EIA Standard RS481A
- Compatible with Dual Wave, Vapor Phase and IR Reflow Soldering
- High Input-Output Isolation of 3000 Vac (rms) Guaranteed
- UL Recognized  File #E54915

### Ordering Information:

- To obtain MOC215, 216, 217 in Tape and Reel, add R2 suffix to device numbers:  
 R2 = 2500 units on 13" reel
- To obtain MOC215, 216, 217 in quantities of 50 (shipped in sleeves) — No Suffix

### Marking Information:

- MOC215 = 215
- MOC216 = 216
- MOC217 = 217

### Applications:

- Low power Logic Circuits
- Interfacing and coupling systems of different potentials and impedances
- Telecommunications equipment
- Portable electronics

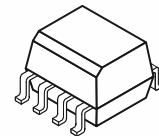
### MAXIMUM RATINGS (T<sub>A</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
<b>INPUT LED</b>			
Forward Current — Continuous	I <sub>F</sub>	60	mA
Forward Current — Peak (PW = 100 μs, 120 pps)	I <sub>F(pk)</sub>	1.0	A
Reverse Voltage	V <sub>R</sub>	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
<b>OUTPUT TRANSISTOR</b>			
Collector-Emitter Voltage	V <sub>CEO</sub>	30	V
Collector-Base Voltage	V <sub>CB0</sub>	70	V
Emitter-Collector Voltage	V <sub>ECO</sub>	7.0	V
Collector Current — Continuous	I <sub>C</sub>	150	mA
Detector Power Dissipation @ T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>	150 1.76	mW mW/°C

**MOC215**  
 [CTR = 20% Min]  
**MOC216**  
 [CTR = 50% Min]  
**MOC217**  
 [CTR = 100% Min]

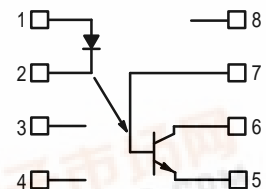
Motorola Preferred Devices

**SMALL OUTLINE  
 OPTOISOLATORS  
 TRANSISTOR OUTPUT**



**CASE 846-01, STYLE 1  
 PLASTIC**

### SCHEMATIC



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

NOTE: Thickness through insulation between input and output is ≥ 0.5 mm.

Preferred devices are Motorola recommended choices for future use and best overall value.

# MOC215 MOC216 MOC217

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

Rating	Symbol	Value	Unit
<b>TOTAL DEVICE</b>			
Input–Output Isolation Voltage <sup>(1,2)</sup> (60 Hz, 1.0 sec. duration)	$V_{ISO}$	3000	Vac(rms)
Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	250 2.94	mW mW/ $^\circ\text{C}$
Ambient Operating Temperature Range <sup>(3)</sup>	$T_A$	-55 to +100	$^\circ\text{C}$
Storage Temperature Range <sup>(3)</sup>	$T_{stg}$	-55 to +150	$^\circ\text{C}$
Lead Soldering Temperature (1/16" from case, 10 sec. duration)	—	260	$^\circ\text{C}$

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)<sup>(4)</sup>

Characteristic	Symbol	Min	Typ <sup>(4)</sup>	Max	Unit
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## INPUT LED

Forward Voltage ( $I_F = 1.0\text{ mA}$ )	$V_F$	—	1.05	1.3	V
Reverse Leakage Current ( $V_R = 6.0\text{ V}$ )	$I_R$	—	0.1	100	$\mu\text{A}$
Capacitance	$C$	—	18	—	pF

## OUTPUT TRANSISTOR

Collector–Emitter Dark Current ( $V_{CE} = 5.0\text{ V}$ , $T_A = 25^\circ\text{C}$ ) ( $V_{CE} = 5.0\text{ V}$ , $T_A = 100^\circ\text{C}$ )	$I_{CEO1}$	—	1.0	50	nA
	$I_{CEO2}$	—	1.0	—	$\mu\text{A}$
Collector–Emitter Breakdown Voltage ( $I_C = 100\ \mu\text{A}$ )	$V_{(BR)CEO}$	30	90	—	V
Emitter–Collector Breakdown Voltage ( $I_E = 100\ \mu\text{A}$ )	$V_{(BR)ECO}$	7.0	7.8	—	V
Collector–Emitter Capacitance ( $f = 1.0\text{ MHz}$ , $V_{CE} = 0$ )	$C_{CE}$	—	7.0	—	pF

## COUPLED

Output Collector Current ( $I_F = 1.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )	MOC215 MOC216 MOC217	$I_C$ (CTR) <sup>(5)</sup>	200 (20) 500 (50) 1.0 (100)	500(50) 800 (80) 1.3 (130)	— — —	$\mu\text{A}$ (%) $\mu\text{A}$ (%) mA (%)
Collector–Emitter Saturation Voltage ( $I_C = 100\ \mu\text{A}$ , $I_F = 1.0\text{ mA}$ )		$V_{CE(sat)}$	—	0.35	0.4	V
Turn–On Time ( $I_C = 2.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$ )		$t_{on}$	—	7.5	—	$\mu\text{s}$
Turn–Off Time ( $I_C = 2.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$ )		$t_{off}$	—	5.7	—	$\mu\text{s}$
Rise Time ( $I_C = 2.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$ )		$t_r$	—	3.2	—	$\mu\text{s}$
Fall Time ( $I_C = 2.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$ )		$t_f$	—	4.7	—	$\mu\text{s}$
Input–Output Isolation Voltage ( $f = 60\text{ Hz}$ , $t = 1.0\text{ sec.}$ ) <sup>(1,2)</sup>		$V_{ISO}$	3000	—	—	Vac(rms)
Isolation Resistance ( $V_{I-O} = 500\text{ V}$ ) <sup>(2)</sup>		$R_{ISO}$	$10^{11}$	—	—	$\Omega$
Isolation Capacitance ( $V_{I-O} = 0$ , $f = 1.0\text{ MHz}$ ) <sup>(2)</sup>		$C_{ISO}$	—	0.2	—	pF

1. Input–Output Isolation Voltage,  $V_{ISO}$ , 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) =  $I_C/I_F \times 100\%$ .

# MOC215 MOC216 MOC217

## TYPICAL CHARACTERISTICS

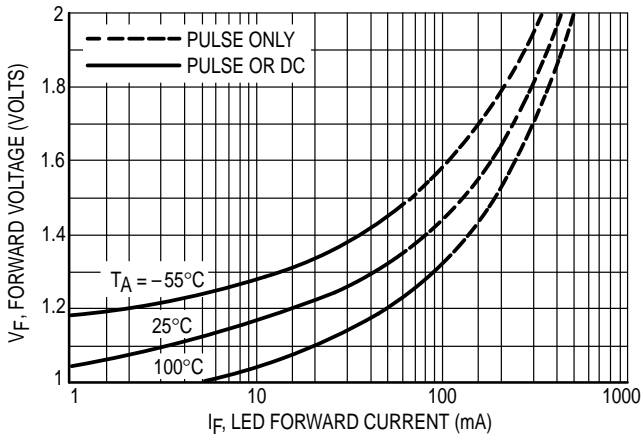


Figure 1. LED Forward Voltage versus Forward Current

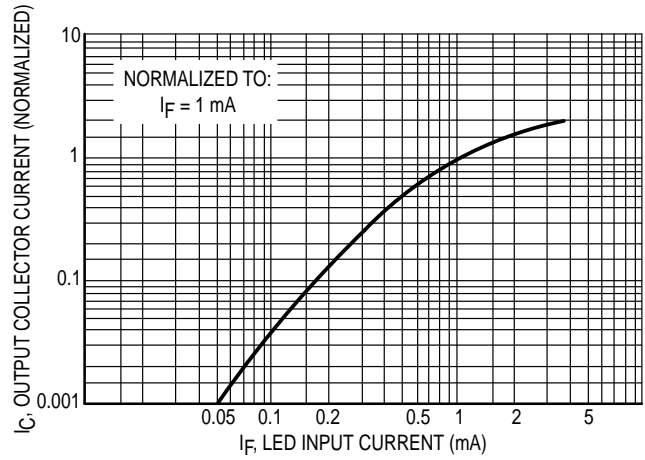


Figure 2. Output Current versus Input Current

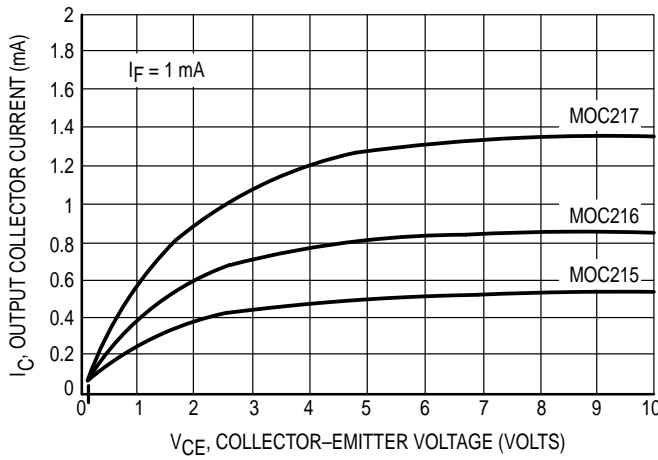


Figure 3. Output Current versus Collector-Emitter Voltage

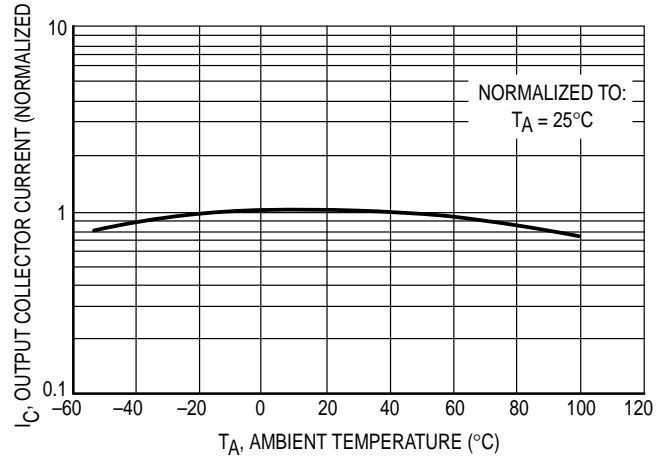


Figure 4. Output Current versus Ambient Temperature

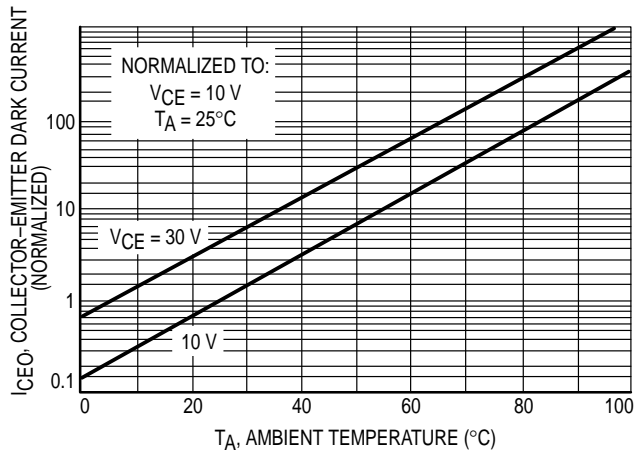


Figure 5. Dark Current versus Ambient Temperature

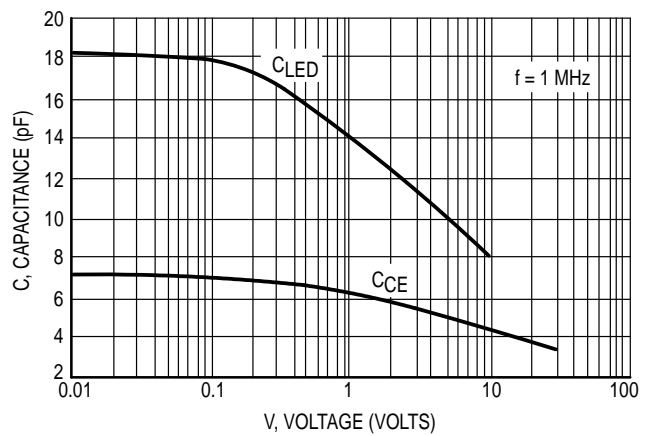
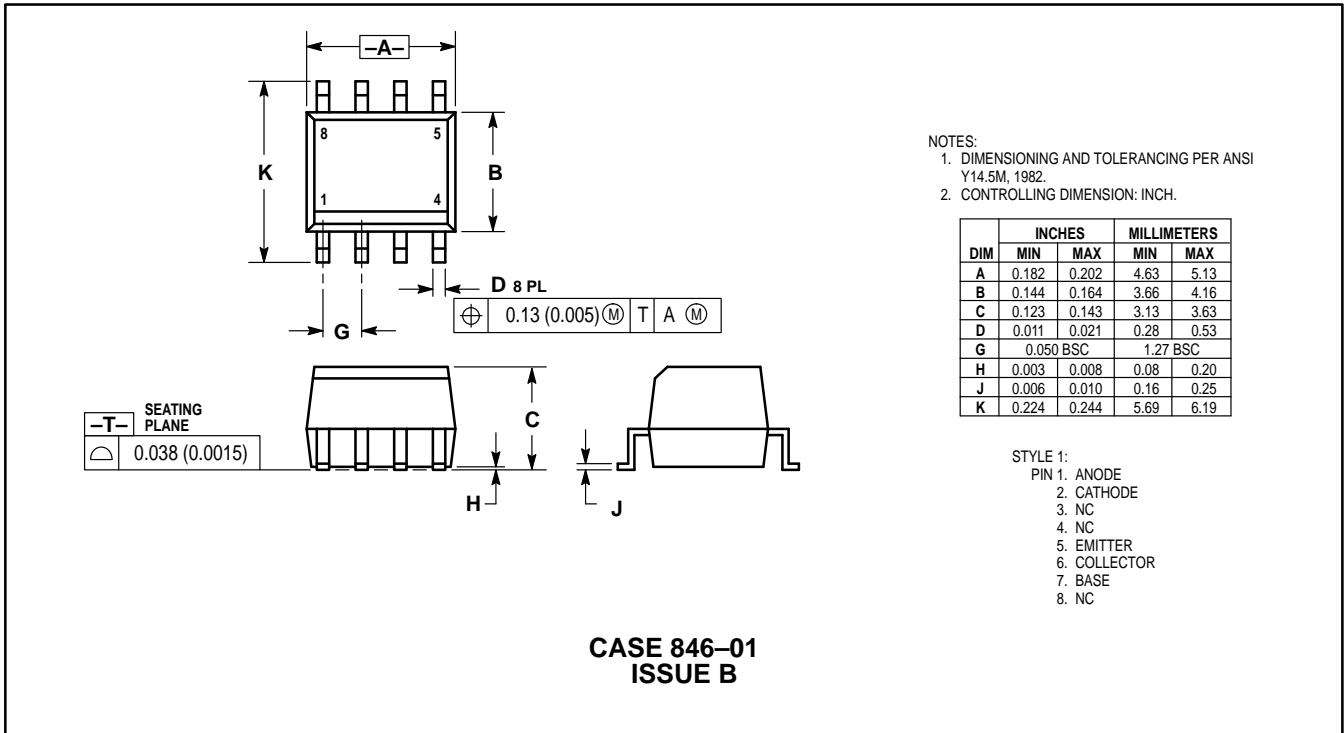


Figure 6. Capacitance versus Voltage

# MOC215 MOC216 MOC217

## PACKAGE DIMENSIONS



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