


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
- 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 MOC211, 212 and 213 in Tape and Reel, add R2 suffix to device numbers:
R2 = 2500 units on 13" reel
- To obtain MOC211, 212 and 213 in quantities of 50 (shipped in sleeves) — No Suffix

Marking Information:

- MOC211 = 211
- MOC212 = 212
- MOC213 = 213

Applications:

- General Purpose Switching Circuits
- Interfacing and coupling systems of different potentials and impedances
- Regulation Feedback Circuits
- Monitor and Detection Circuits

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

Rating	Symbol	Value	Unit
INPUT LED			
Forward Current — Continuous	I_F	60	mA
Forward Current — Peak (PW = 100 μs , 120 pps)	$I_F(\text{pk})$	1.0	A
Reverse Voltage	V_R	6.0	V
LED Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	90 0.8	mW mW/ $^\circ\text{C}$
OUTPUT TRANSISTOR			
Collector-Emitter Voltage	V_{CEO}	30	V
Collector-Base Voltage	V_{CBO}	70	V
Emitter-Collector Voltage	V_{ECO}	7.0	V
Collector Current — Continuous	I_C	150	mA
Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	150 1.76	mW mW/ $^\circ\text{C}$

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

MOC211

[CTR = 20% Min]

MOC212

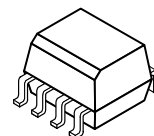
[CTR = 50% Min]

MOC213

[CTR = 100% Min]

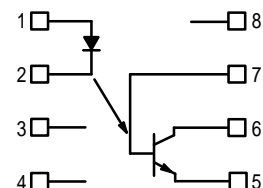
Motorola Preferred Devices

**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

MOC211 MOC212 MOC213

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

Rating	Symbol	Value	Unit
TOTAL DEVICE			
Input–Output Isolation Voltage ^(1,2) (60 Hz, 1.0 sec. duration)	V_{ISO}	3000	Vac(rms)
Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	250 2.94	mW mW/ $^\circ\text{C}$
Ambient Operating Temperature Range ⁽³⁾	T_A	–45 to +100	$^\circ\text{C}$
Storage Temperature Range ⁽³⁾	T_{stg}	–45 to +125	$^\circ\text{C}$
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)⁽⁴⁾

Characteristic	Symbol	Min	Typ ⁽⁴⁾	Max	Unit
INPUT LED					
Forward Voltage ($I_F = 10\text{ mA}$)	V_F	—	1.15	1.5	V
Reverse Leakage Current ($V_R = 6.0\text{ V}$)	I_R	—	0.1	100	μA
Capacitance	C	—	18	—	pF

OUTPUT TRANSISTOR

Collector–Emitter Dark Current ($V_{CE} = 10\text{ V}$, $T_A = 25^\circ\text{C}$) ($V_{CE} = 10\text{ V}$, $T_A = 100^\circ\text{C}$)	I_{CEO1}	—	1.0	50	nA
	I_{CEO2}	—	1.0	—	μA
Collector–Emitter Breakdown Voltage ($I_C = 100\text{ }\mu\text{A}$)	$V_{(BR)CEO}$	30	90	—	V
Emitter–Collector Breakdown Voltage ($I_E = 100\text{ }\mu\text{A}$)	$V_{(BR)ECO}$	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 ($I_F = 10\text{ mA}$, $V_{CE} = 10\text{ V}$)	MOC211 MOC212 MOC213	I_C (CTR) ⁽⁵⁾	2.0 (20) 5.0 (50) 10 (100)	6.5 (65) 9.0 (90) 14 (140)	— — —	mA (%)
Collector–Emitter Saturation Voltage ($I_C = 2.0\text{ mA}$, $I_F = 10\text{ mA}$)		$V_{CE(sat)}$	—	0.15	0.4	V
Turn–On Time ($I_C = 2.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\text{ }\Omega$)		t_{on}	—	7.5	—	μs
Turn–Off Time ($I_C = 2.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\text{ }\Omega$)		t_{off}	—	5.7	—	μs
Rise Time ($I_C = 2.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\text{ }\Omega$)		t_r	—	3.2	—	μs
Fall Time ($I_C = 2.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\text{ }\Omega$)		t_f	—	4.7	—	μs
Input–Output Isolation Voltage ($f = 60\text{ Hz}$, $t = 1.0\text{ sec.}$) ^(1,2)		V_{ISO}	3000	—	—	Vac(rms)
Isolation Resistance ($V_{I-O} = 500\text{ V}$) ⁽²⁾		R_{ISO}	10^{11}	—	—	Ω
Isolation Capacitance ($V_{I-O} = 0$, $f = 1.0\text{ MHz}$) ⁽²⁾		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) = $I_C/I_F \times 100\%$.

TYPICAL CHARACTERISTICS

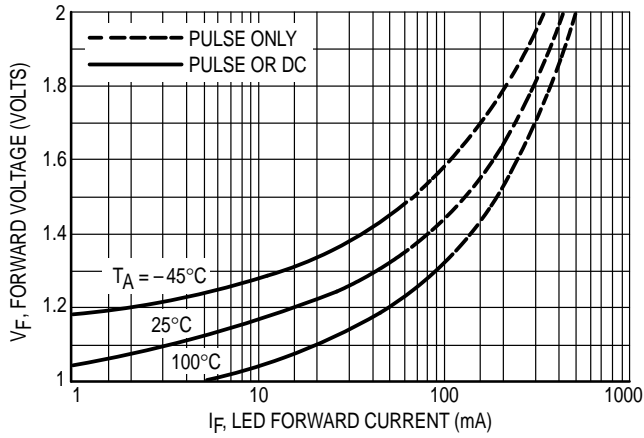


Figure 1. LED Forward Voltage versus Forward Current

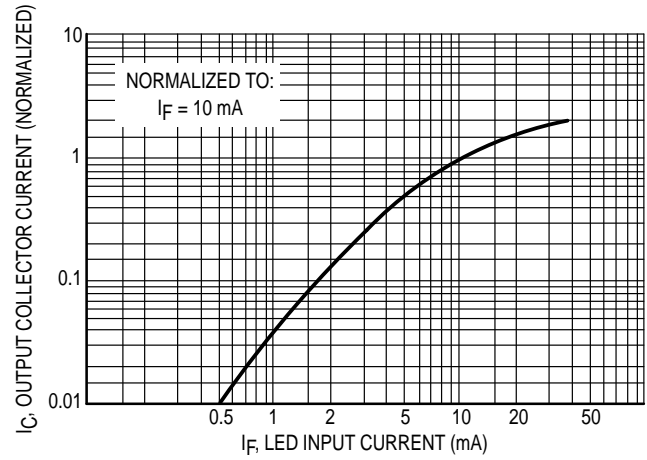


Figure 2. Output Current versus Input Current

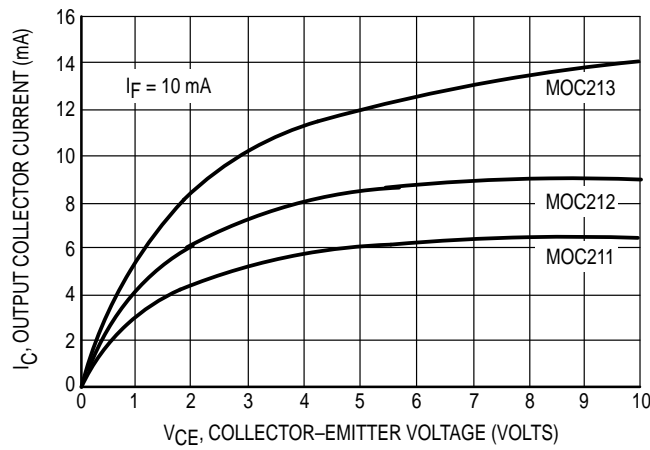


Figure 3. Output Current versus Collector-Emitter Voltage

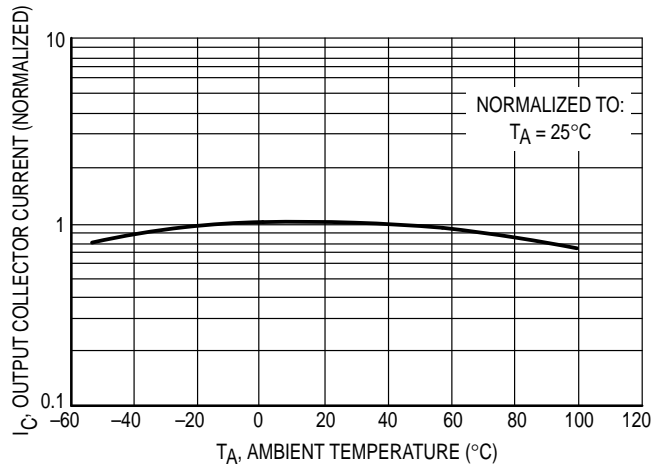


Figure 4. Output Current versus Ambient Temperature

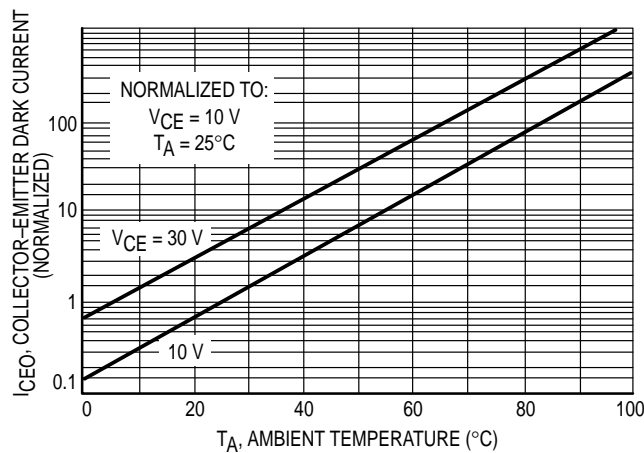


Figure 5. Dark Current versus Ambient Temperature

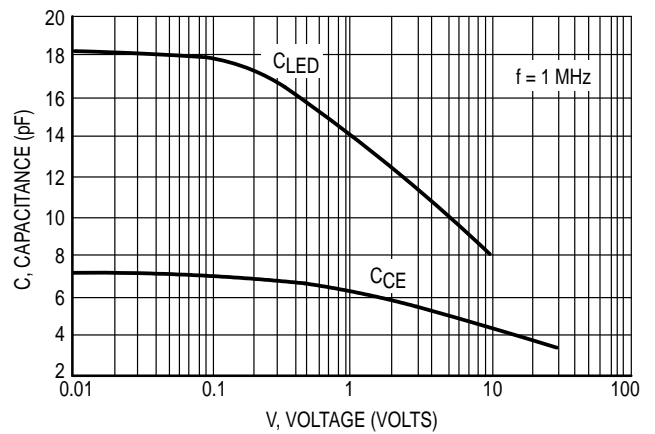
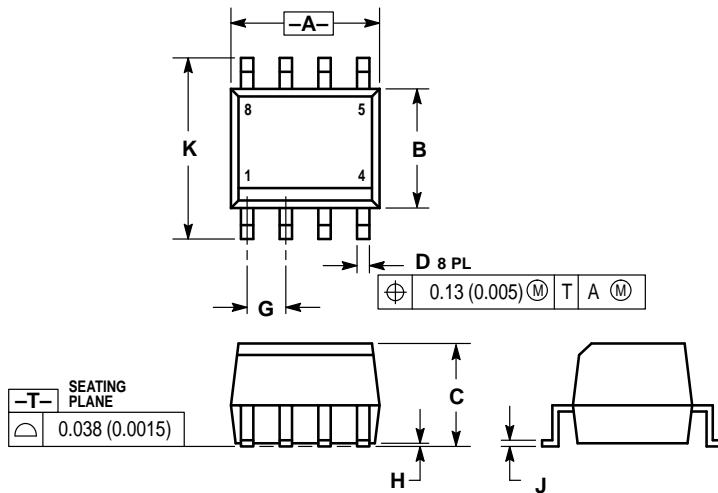


Figure 6. Capacitance versus Voltage

MOC211 MOC212 MOC213

PACKAGE DIMENSIONS



NOTES:


1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.182	0.202	4.63	5.13
B	0.144	0.164	3.66	4.16
C	0.123	0.143	3.13	3.63
D	0.011	0.021	0.28	0.53
G	0.050 BSC		1.27 BSC	
H	0.003	0.008	0.08	0.20
J	0.006	0.010	0.16	0.25
K	0.224	0.244	5.69	6.19

STYLE 1:

- PIN 1: ANODE
- CATHODE
- NC
- NC
- EMITTER
- COLLECTOR
- BASE
- NC

CASE 846-01
ISSUE E

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MOTOROLA



MOC211/D