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°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(pk)	1.0	A
Reverse Voltage	V_R	6.0	V
LED Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	90 0.8	mW mW/°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°C Derate above 25°C	P_D	150 1.76	mW mW/°C

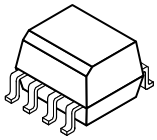
NOTE: Thickness through insulation between input and output is ≥ 0.5 mm.

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

MOC211
[CTR = 20% Min]
MOC212
[CTR = 50% Min]
MOC213
[CTR = 100% Min]

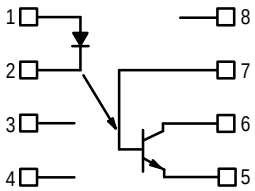
Motorola Preferred Devices

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

MAXIMUM RATINGS — continued (T_A = 25°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°C Derate above 25°C	P_D	250 2.94	mW mW/°C
Ambient Operating Temperature Range(3)	T_A	–55 to +100	°C
Storage Temperature Range(3)	T_{stg}	–55 to +150	°C
Lead Soldering Temperature (1/16″ from case, 10 sec. duration)	—	260	°C

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)(4)

Characteristic		Symbol	Min	Typ(4)	Max	Unit
INPUT LED						
Forward Voltage (I_F = 10 mA)		V_F	—	1.15	1.5	V
Reverse Leakage Current (V_R = 6.0 V)		I_R	—	0.1	100	μA
Capacitance		C	—	18	—	pF
OUTPUT TRANSISTOR						
Collector–Emitter Dark Current	(V_{CE} = 10 V, T_A = 25°C)	$I_{CEO}1$	—	1.0	50	nA
	(V_{CE} = 10 V, T_A = 100°C)	$I_{CEO}2$	—	1.0	—	μA
Collector–Emitter Breakdown Voltage (I_C = 100 μA)		$V_{(BR)CEO}$	30	90	—	V
Emitter–Collector Breakdown Voltage (I_E = 100 μA)		$V_{(BR)ECO}$	7.0	7.8	—	V
Collector–Emitter Capacitance (f = 1.0 MHz, V_{CE} = 0)		C_{CE}	—	7.0	—	pF
COUPLED						
Output Collector Current (I_F = 10 mA, V_{CE} = 10 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 mA, I_F = 10 mA)		$V_{CE(sat)}$	—	0.15	0.4	V
Turn–On Time (I_C = 2.0 mA, V_{CC} = 10 V, R_L = 100 Ω)		t_{on}	—	7.5	—	μs
Turn–Off Time (I_C = 2.0 mA, V_{CC} = 10 V, R_L = 100 Ω)		t_{off}	—	5.7	—	μs
Rise Time (I_C = 2.0 mA, V_{CC} = 10 V, R_L = 100 Ω)		t_r	—	3.2	—	μs
Fall Time (I_C = 2.0 mA, V_{CC} = 10 V, R_L = 100 Ω)		t_f	—	4.7	—	μs
Input–Output Isolation Voltage (f = 60 Hz, t = 1.0 sec.)(1,2)		V_{ISO}	3000	—	—	Vac(rms)
Isolation Resistance ($V_{I–O}$ = 500 V)(2)		R_{ISO}	10^{11}	—	—	Ω
Isolation Capacitance ($V_{I–O}$ = 0, f = 1.0 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 x 100%.

TYPICAL CHARACTERISTICS

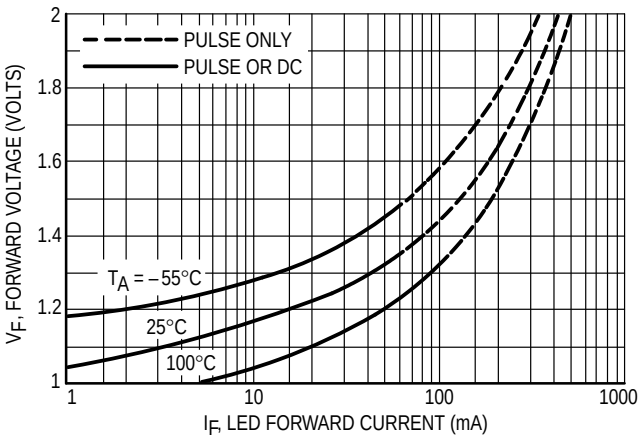


Figure 1. LED Forward Voltage versus Forward Current

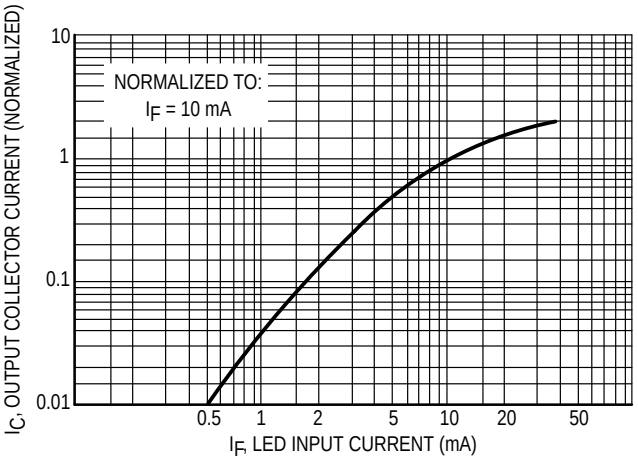


Figure 2. Output Current versus Input Current

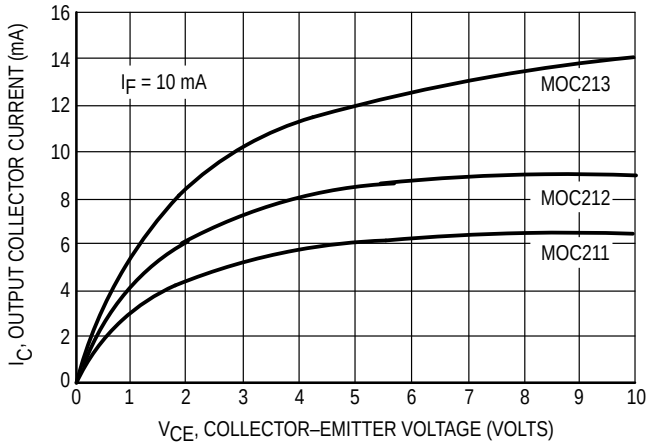


Figure 3. Output Current versus Collector–Emitter Voltage

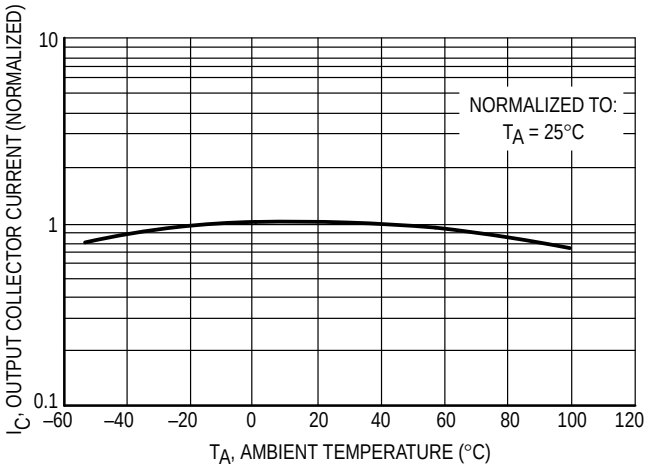


Figure 4. Output Current versus Ambient Temperature

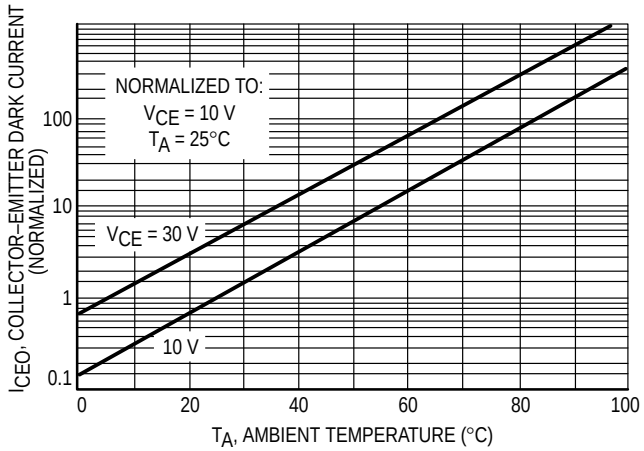


Figure 5. Dark Current versus Ambient Temperature

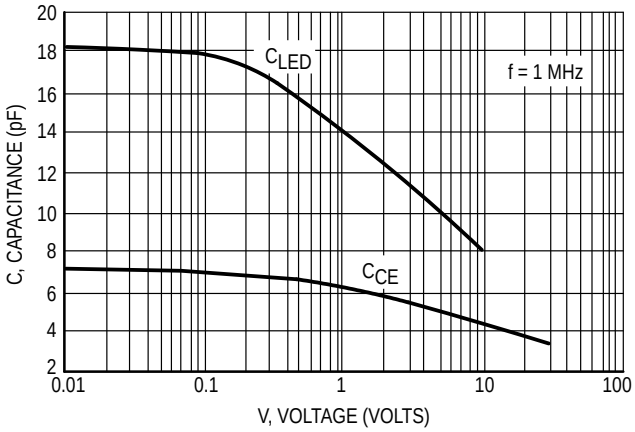
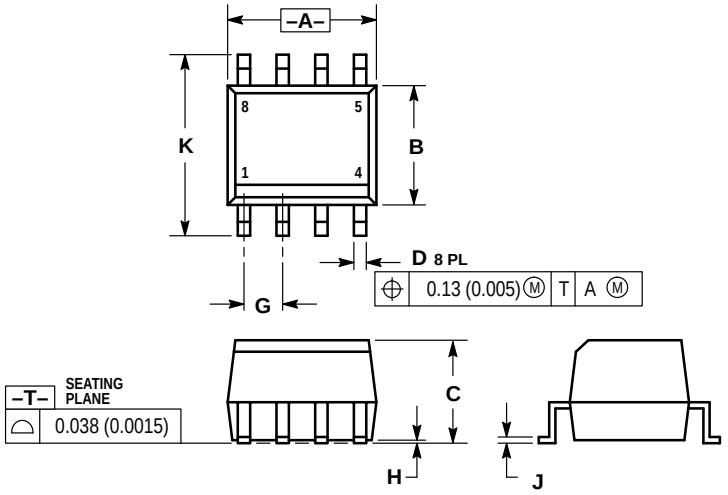


Figure 6. Capacitance versus Voltage

PACKAGE DIMENSIONS



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

	INCHES		MILLIMETERS	
DIM	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
2. CATHODE
3. NC
4. NC
5. EMITTER
6. COLLECTOR
7. BASE
8. NC

CASE 846–01
ISSUE B

How to reach us:
USA / EUROPE: Motorola Literature Distribution;
P.O. Box 20912; Phoenix, Arizona 85036. 1–800–441–2447

MFAX: RMFAX0@email.sps.mot.com – TOUCHTONE (602) 244–6609
INTERNET: http://Design–NET.com

JAPAN: Nippon Motorola Ltd.; Tatsumi–SPD–JLDC, Toshikatsu Otsuki,
6F Seibu–Butsuryu–Center, 3–14–2 Tatsumi Koto–Ku, Tokyo 135, Japan. 03–3521–8315

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852–26629298