

MCA230, MCA231, MCA255



DESCRIPTION

The MCA230, MCA231 and MCA255 series optocoupler consists of an infrared emitting diode optically coupled to an NPN silicon photodarlington transistor in a space efficient dual in line package.

FEATURES

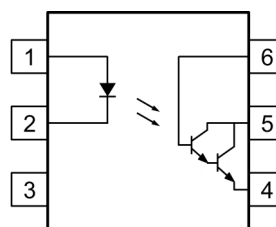
- High AC Isolation voltage 5000V_{RMS}
- High Current Transfer Ratio
- Pb Free and RoHS Compliant
- UL Approval E91231

APPLICATIONS

- Computer Terminals
- Industrial System Controllers
- Measuring Instruments
- Signal Transmission between Systems of Different Potentials and Impedances

ORDER INFORMATION

- Add G after PN for 10mm lead spacing
- Add SM after PN for Surface Mount
- Add SMT&R after PN for Surface Mount Tape & Reel



- | | |
|---|-----------|
| 1 | Anode |
| 2 | Cathode |
| 3 | NC |
| 4 | Emitter |
| 5 | Collector |
| 6 | Base |

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Stresses exceeding the absolute maximum ratings can cause permanent damage to the device. Exposure to absolute maximum ratings for long periods of time can adversely affect reliability.

Input

Forward Current	60mA
Peak Forward Current (1μs, pulse)	1A
Reverse Voltage	6V
Power dissipation	120mW
Power Dissipation Derating Factor (No Derating up to T _A = 100°C)	3.8mW/°C

Output

Collector to Emitter Voltage V _{CEO}	
MCA230, MCA231	30V
MCA255	55V
Collector to Base Voltage V _{CBO}	
MCA230, MCA231	30V
MCA255	55V
Emitter to Collector Voltage V _{ECO}	7V
Emitter to Base Voltage V _{EBO}	7V
Power Dissipation	150mW
Power Dissipation Derating Factor (No Derating up to T _A = 80°C)	6.5mW/°C

Total Package

Total Power Dissipation	200mW
Isolation Voltage	5000V _{RMS}
Operating Temperature	-55 to 100 °C
Storage Temperature	-55 to 125 °C
Lead Soldering Temperature (10s)	260°C

ISOCOM COMPONENTS 2004 LTD

Unit 25B, Park View Road West, Park View Industrial Estate
 Hartlepool, Cleveland, TS25 1PE, United Kingdom
 Tel : +44 (0)1429 863 609 Fax : +44 (0)1429 863 581
 e-mail : sales@isocom.co.uk
<http://www.isocom.com>

ISOCOM COMPONENTS ASIA LTD

Hong Kong Office
 Block A, 8/F, Wah Hing Industrial Mansions
 36 Tai Yau Street, San Po Kong, Kowloon, Hong Kong
 Tel : +852 2995 9217 Fax : +852 8161 6292
 e-mail : sales@isocom.com.hk

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ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise specified)

INPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Forward Voltage	V_F	$I_F = 10\text{mA}$		1.2	1.5	V
Reverse Current	I_R	$V_R = 6\text{V}$			10	μA
Input Capacitance	C_{in}	$V_F = 0\text{V}$, $f = 1\text{MHz}$		50		pF

OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector-Emitter Breakdown Voltage	BV_{CEO}	$I_C = 1\text{mA}$, $I_F = 0\text{mA}$ MCA230, MCA231 MCA255	30 55			V
Emitter-Collector Breakdown Voltage	BV_{CBO}	$I_C = 0.1\text{mA}$, $I_F = 0\text{mA}$ MCA230, MCA231 MCA255	30 55			V
Emitter-Base Breakdown Voltage	BV_{ECO}	$I_E = 0.1\text{mA}$	7			V
Collector-Emitter Dark Current	I_{CEO}	$V_{CE} = 10\text{V}$, $I_F = 0\text{mA}$			100	nA

COUPLED

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Current transfer ratio	CTR	$I_F = 10\text{mA}$, $V_{CE} = 5\text{V}$ MCA230, MCA255 MCA231	100 200			%
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	MCA230, MCA255 $I_F = 50\text{mA}$, $I_C = 50\text{mA}$ MCA231 $I_F = 1\text{mA}$, $I_C = 2\text{mA}$ $I_F = 5\text{mA}$, $I_C = 10\text{mA}$ $I_F = 10\text{mA}$, $I_C = 50\text{mA}$			1.0 1.0 1.0 1.2	V
Input-Output Capacitance	C_{IO}	$V_{IO} = 0\text{V}$, $f = 1\text{MHz}$		0.8		pF

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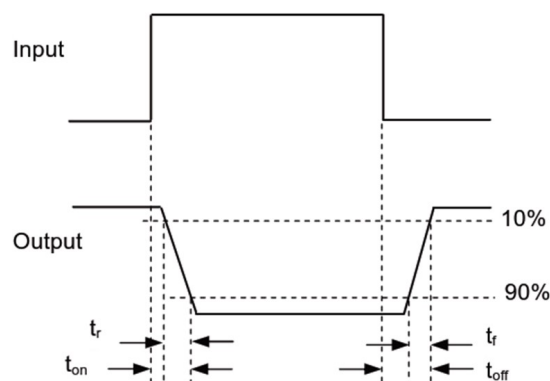
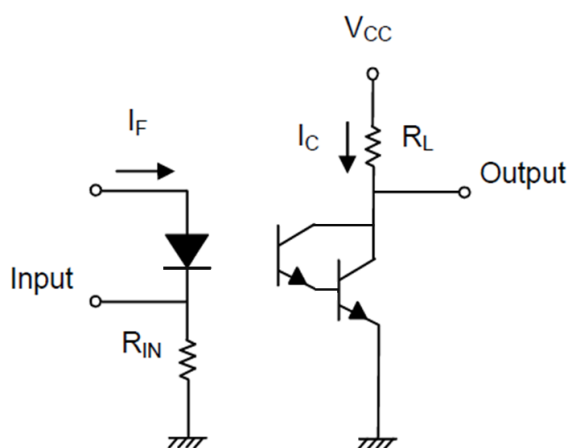
SWITCHING

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Output Turn On Time	t_{ON}	$V_{CC} = 10\text{V}$, $I_F = 10\text{mA}$ $R_L = 100\Omega$		25		μs
Output Turn Off Time	t_{OFF}			18		μs

ISOLATION

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Isolation Voltage	V_{ISO}	R.H. = 40% to 60%, $t = 1 \text{ min}$ Note 1	5000			V_{RMS}
Isolation Resistance	R_{I-O}	$V_{I-O} = 500\text{VDC}$ R.H. = 40% to 60% Note 1	10^{11}			Ω

Note 1 : Measured with input leads shorted together and output leads shorted together.



Switching Time Test Circuit and Waveforms



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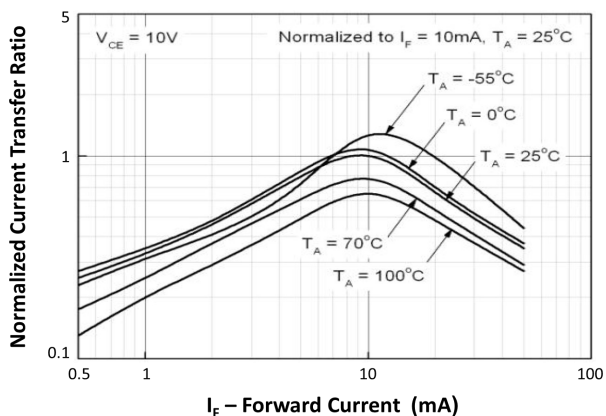


Fig 1 Normalized Current Transfer Ratio vs Forward Current

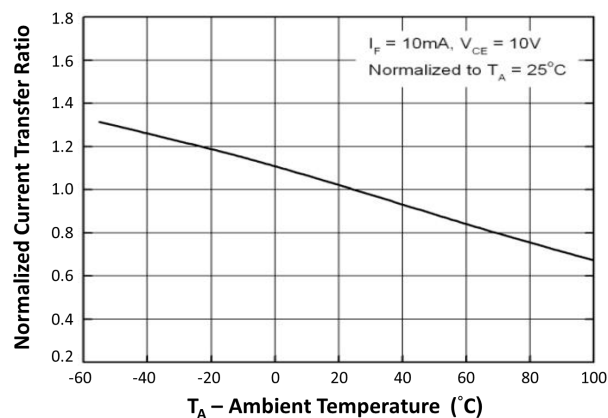


Fig 2 Normalized Current Transfer Ratio vs Ambient Temperature

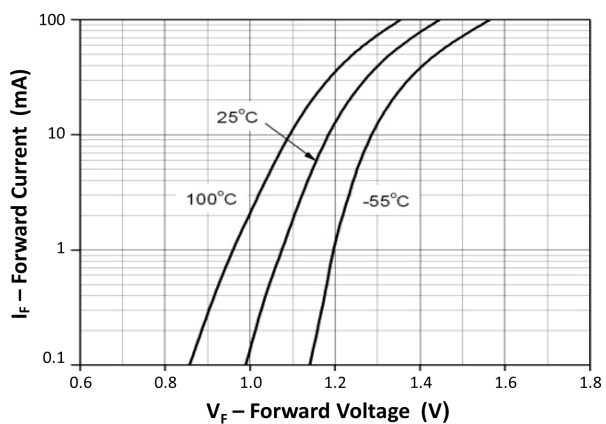


Fig 3 Forward Current vs Forward Voltage

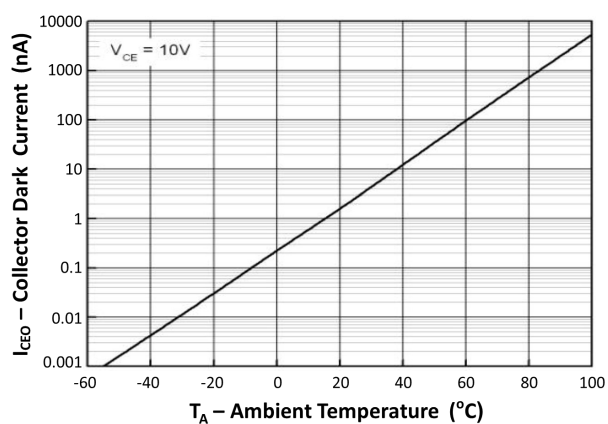


Fig 4 Collector Dark Current vs Ambient Temperature

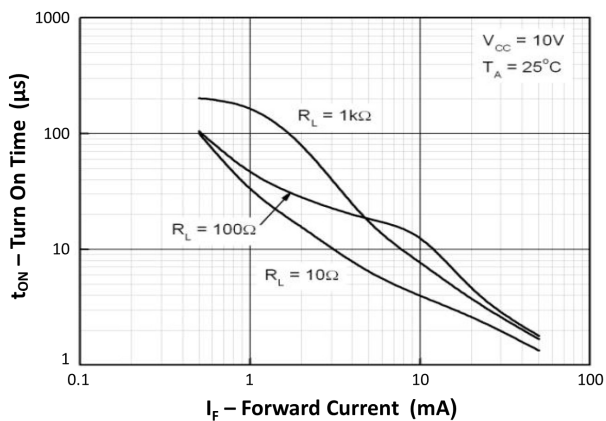


Fig 5 Turn On Time vs Forward Current

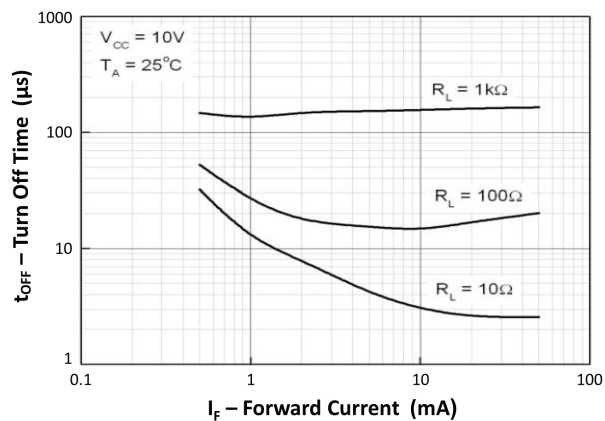


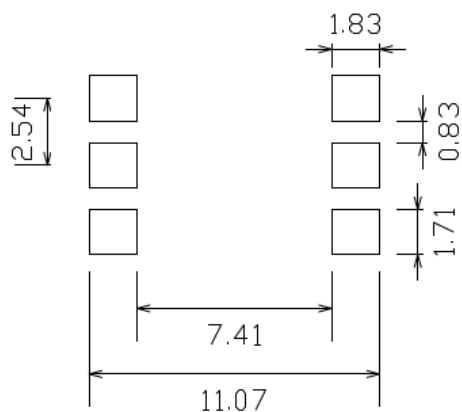
Fig 6 Turn Off Time vs Forward Current

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ORDER INFORMATION

MCA230, MCA231, MCA255			
After PN	PN	Description	Packing quantity
None	MCA230, MCA231, MCA255	Standard DIP6	65 pcs per tube
G	MCA230G, MCA231G, MCA255G	10mm Lead Spacing	65 pcs per tube
SM	MCA230SM, MCA231SM, MCA255SM	Surface Mount	65 pcs per tube
SMT&R	MCA230SMT&R, MCA231SMT&R, MCA255SMT&R	Surface Mount Tape and Reel	1000 pcs per reel

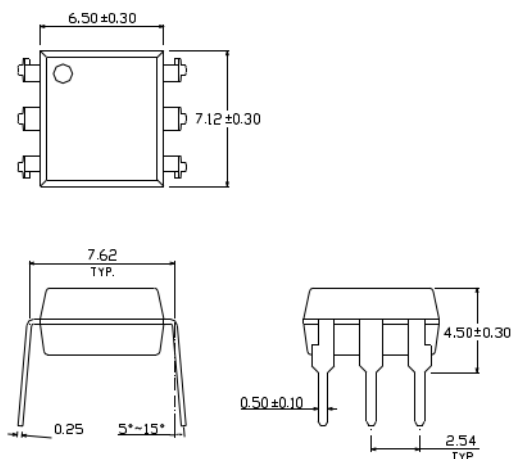
RECOMMENDED PAD LAYOUT FOR SMD (mm)



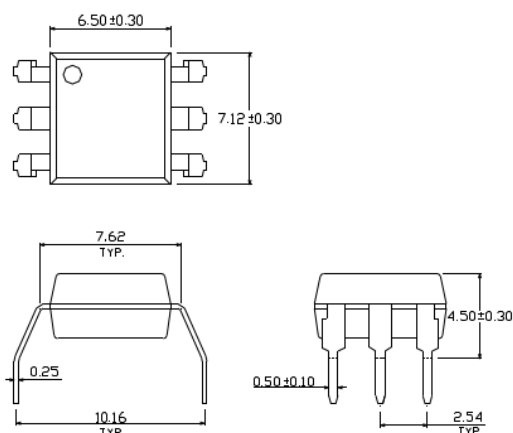
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PACKAGE DIMENSIONS (mm)

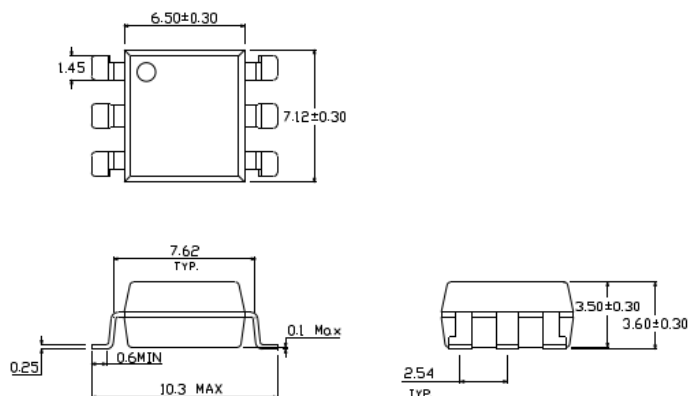
DIP



G Form



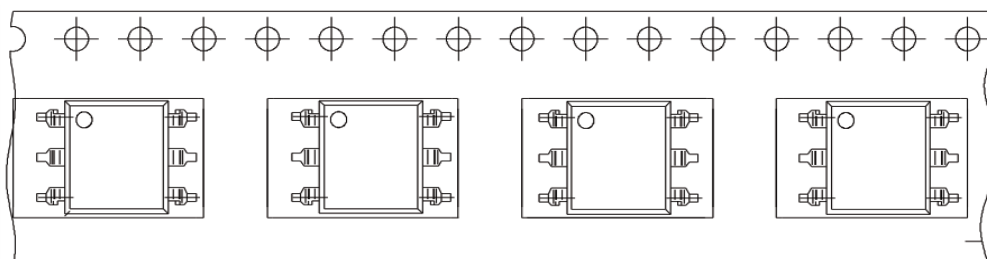
Surface Mount



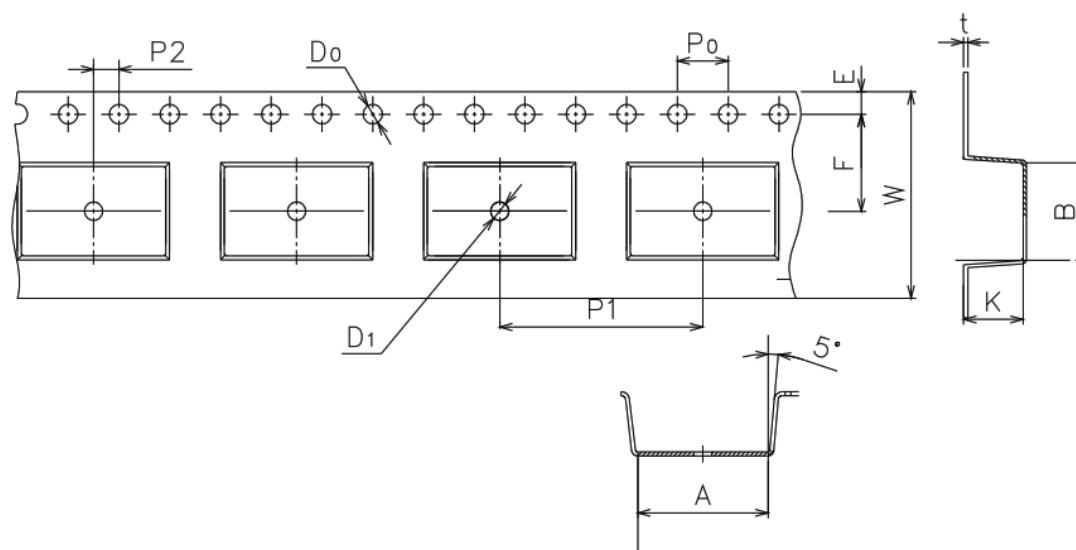
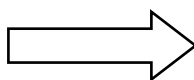


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TAPE AND REEL PACKAGING



Direction of Feed from Reel



Dimension No.	A	B	D ₀	D ₁	E	F
Dimension(mm)	10.8±0.1	7.55±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1
Dimension No.	P ₀	P ₁	P ₂	t	W	K
Dimension (mm)	4.0±0.15	12±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1

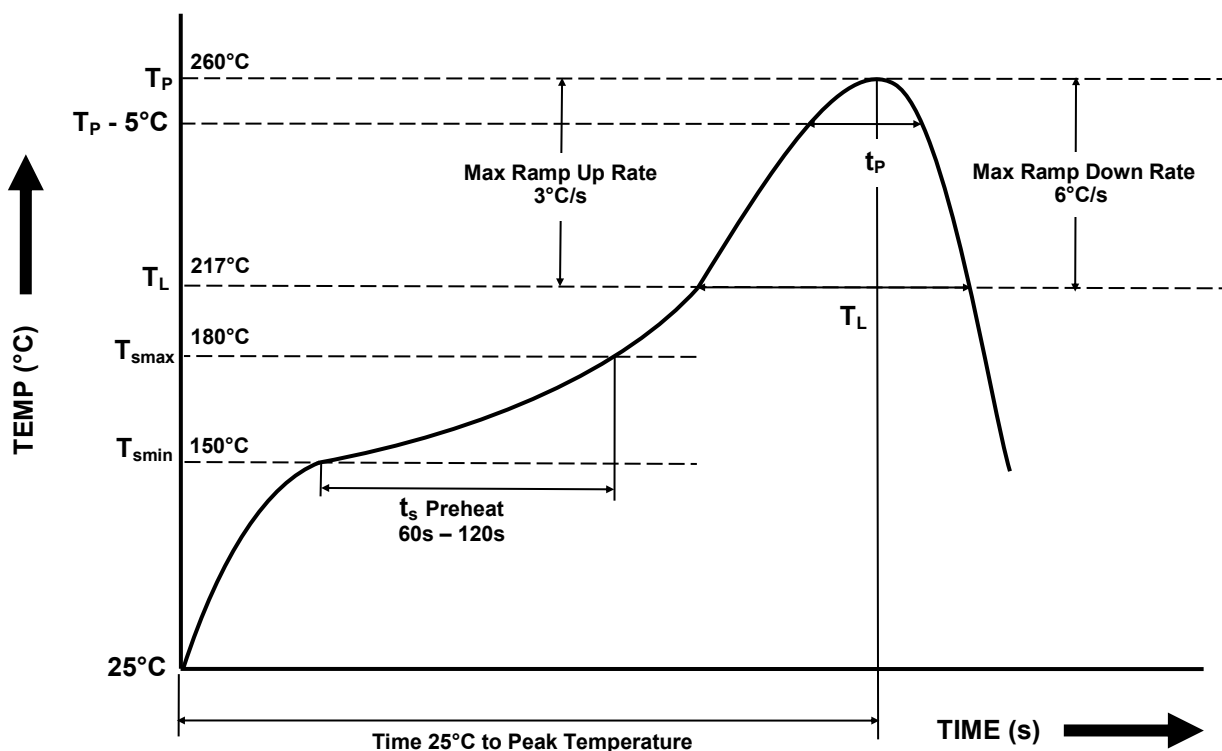


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IR REFLOW SOLDERING TEMPERATURE PROFILE

One Time Reflow Soldering is Recommended.

Do not immerse device body in solder paste.



Profile Details	Conditions
Preheat - Min Temperature (T_{smin}) - Max Temperature (T_{smax}) - Time T_{smin} to T_{smax} (t_s)	150°C 180°C 60s - 120s
Soldering Zone - Peak Temperature (T_P) - Liquidous Temperature (T_L) - Time within 5°C of Actual Peak Temperature ($T_P - 5^\circ\text{C}$) - Time maintained above T_L (t_L) - Ramp Up Rate (T_L to T_P) - Ramp Down Rate (T_P to T_L)	260°C 217°C 20s 60s 3°C/s max 3 - 6°C/s
Average Ramp Up Rate (T_{smax} to T_P)	3°C/s max
Time 25°C to Peak Temperature	8 minutes max

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