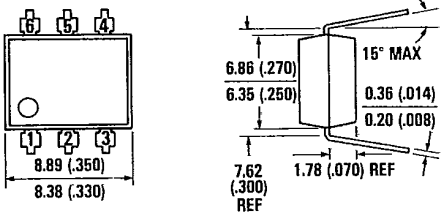
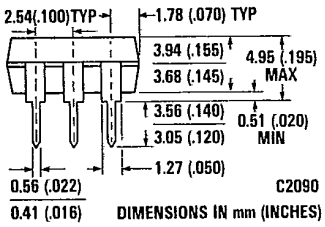
GENERAL INSTRUMENT

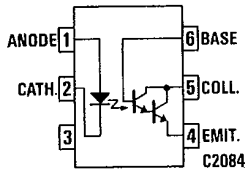
PHOTODARLINGTON OPTOCOUPLERS

MCA230
MCA231
MCA255

PACKAGE DIMENSIONS







Equivalent Circuit

DESCRIPTION

The MCA230, MCA231 and MCA255 are photodarlington optically coupled isolators. An infrared emitting diode coupled with a silicon photodarlington transistor. The device is supplied in a standard plastic six-pin dual-in-line package.

FEATURES

- High current transfer ratio
  MCA230/255 - 100% min.
  MCA231/ - 200% min.
- Underwriters Laboratory (UL) recognized file #E50151
- 55 volt BV_{CEO} for MCA255

APPLICATIONS

- Replace reed relays for 50 mA, 55 V DC loads
- Replace pulse transformers
- Form multiple contact, NO/NC relays
- Useful for telephone lines, SCR triggers, hospital monitoring systems, airborne systems, remote data gathering systems and remote control systems.
- Use a low-current alarm monitor for battery powered supplies.

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C Unless Otherwise Specified)

TOTAL PACKAGE

Storage temperature ..... -55°C to 150°C
Operating temperatue ..... -55°C to 100°C
Lead temperature (soldering, 10 sec.) ..... 260°C
Total package power dissipation at 25°C
(LED plus detector) ..... 260 mW
Derate linearly from 25°C ..... 3.5 mW/°C

DETECTOR

Power dissipation ..... 210 mW
Derate linearly from 25°C ..... 2.8 mW/°C
Collector-emitter breakdown voltage (BV_{CEO})
MCA230 ..... 30 V
MCA231 ..... 30 V
MCA255 ..... 55 V
Collector-base breakdown voltage (BV_{CBO})
MCA230 ..... 30 V
MCA231 ..... 30 V
MCA255 ..... 55 V
Emitter-collector breakdown voltage (BV_{ECO}) ..... 7 V

INPUT DIODE

Forward DC Current ..... 60 mA
Reverse voltage ..... 6 V
Peak forward current (1 μs pulse, 300 pps) ..... 3.0 A
Power dissipation ..... 135 mW
Derate linearly from 25°C ..... 1.8 mW/°C

MCA230 MCA231 MCA255

ELECTRO-OPTICAL CHARACTERISTICS (T_A = 25°C Unless Otherwise Specified)

	TRANSFER CHARACTERISTICS						
	CHARACTERISTIC	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNITS**	**TEST CONDITIONS**
DC	DC current transfer ratio (Collector-emitter)						
	MCA230, MCA255	CTR	100			%	I_F = 10 mA, V_{CE} = 5 V
	MCA231	CTR	200			%	I_F = 10 mA, V_{CE} = 5 V
	Saturation voltage						
	MCA230, MCA255	$V_{CE(SAT)}$			1.0	V	I_C = I_F = 50 mA
	MCA231	$V_{CE(SAT)}$			1.0	V	I_C = 2 mA, I_F = 1 mA
					1.0	V	I_C = 10 mA, I_F = 5 mA
					1.2	V	I_C = 50 mA, I_F = 10 mA
SWITCHING TIME	Non saturated						
	Turn-on time	t_{on}		10		µs	See switching time
	Turn-off time	t_{off}		100		µs	Test circuit (Fig. 7)
ISOLATION	Surge insulation voltage	V_{ISO}	3550			VDC	Relative humidity ≤ 50% T_A = +25°C, I_{I-O} ≤ 10 µA
			2500			VAC-rms	1 second
	Dielectric withstand test voltage	V_{ISO}	3150			VDC	Relative humidity ≤ 50% T_A = +25°C, I_{I-O} ≤ 10 µA
			2250			VAC-rms	1 minute
	Isolation resistance	R_{ISO}	10^{11}			ohms	V_{I-O} = 500 VDC, T_A = +25°C
	Package capacitance (input-output)	C_{ISO}		0.5		pF	f = 1 MHz

	INDIVIDUAL COMPONENT CHARACTERISTICS						
	CHARACTERISTIC	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNITS**	**TEST CONDITIONS**
INPUT DIODE	Forward voltage	V_F		1.2	1.50	V	I_F = 20 mA
	Forward voltage temp. coefficient			-1.8		mV/°C	
	Reverse voltage	V_R	3.0	25		V	I_R = 10 µA
	Junction capacitance	C_J		50		pF	V_F = 0V, f = 1 MHz
OUTPUT DETECTOR	Breakdown voltage						
	Collector to emitter						
	MCA230	BV_{CEO}	30			V	I_C = 100 µA, I_F = 0
	MCA231	BV_{CEO}	30			V	I_C = 100 µA, I_F = 0
	MCA255	BV_{CEO}	55			V	I_C = 100 µA, I_C = 0
	Collector to base						
	MCA230	BV_{CBO}	30			V	I_C = 10 µA, I_F = 0
	MCA231	BV_{CBO}	30			V	I_C = 10 µA, I_F = 0
	MCA255	BV_{CBO}	55			V	I_C = 10 µA, I_F = 0
	Emitter to base	BV_{EBO}	5			V	I_E = 10 µA, I_F = 0
	Collector dark current	I_{CEO}			100	nA	V_{CE} = 10 V, I_F = 0

TYPICAL ELECTRO-OPTICAL CHARACTERISTICS (T_A = 25°C Unless Otherwise Specified)

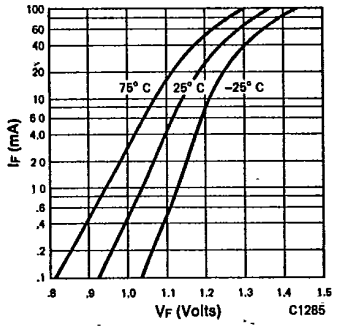


Fig. 1. Forward Voltage vs. Forward Current

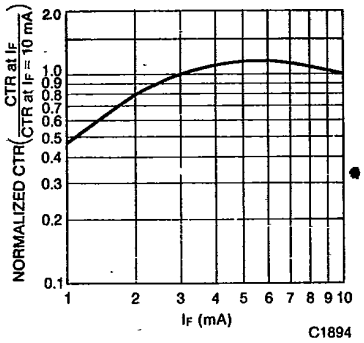


Fig. 2. Normalized CTR vs. I_F

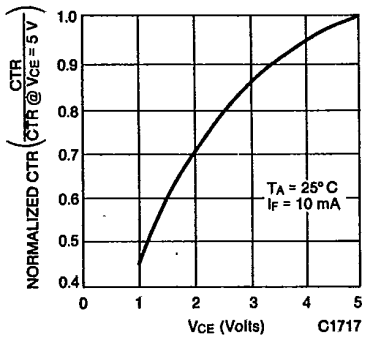


Fig. 3. Normalized CTR vs V_{CE}

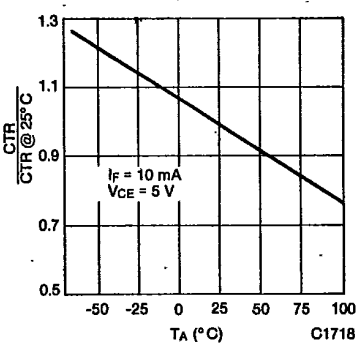


Fig. 4. Normalized CTR vs. Temperature

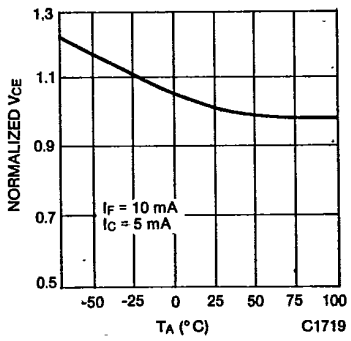


Fig. 5. Normalized V_{CE} vs. Temperature

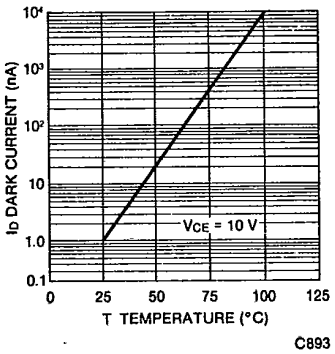
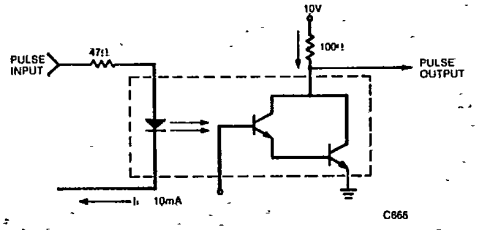


Fig. 6. Dark Current vs. Temperature



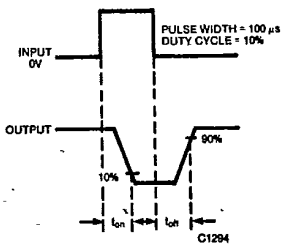


Fig. 7. Switching Time Test Circuit