GENERAL INSTRUMENT
Optoelectronics

OPTOCOUPLEUR
TIL 111 - PC 713 -

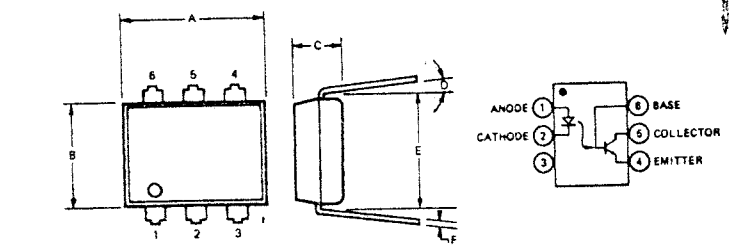
MCT2

PHOTOTRANSISTOR OPTOISOLATOR

PRODUCT DESCRIPTION

The MCT2 is a NPN silicon planar phototransistor optically coupled to a gallium arsenide diode. It is mounted in a six-lead plastic DIP package.

PACKAGE DIMENSIONS



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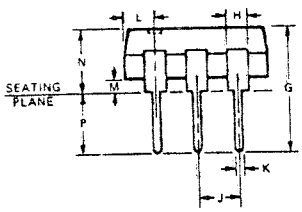


SYMBOL	INCH MAX.	MM. MAX.	NOTES
A	.365	9.27	
B	.270	6.73	
C	.130	3.18	
D	15°	15°	
E	.300 Ref	7.62 Ref	1
F	.014	0.36	
G	.325	8.26	
H	.070	1.78	
J	.110	2.79	
K	.022	0.56	
L	.085	2.16	2
M			3
N	.175	4.45	4
P			3

NOTES
1. Installed position of lead centers
2. Four places
3. Overall installed position
4. These measurements are made from the seating plane

PACKAGE MATERIALS
Leads – Tinned with 60/40 tin lead
Body – Silicone plastic

APPLICATIONS

- AC line/digital logic isolator
- Digital logic/digital logic isolator
- Telephone/telegraph line receiver
- Twisted pair line receiver
- High frequency power supply feedback control
- Relay contact monitor
- Power supply monitor

ABSOLUTE MAXIMUM RATINGS

Storage temperature −55°C to 150°C
Operating temperature −55°C to 100°C
Lead temperature (Soldering, 10 sec) 260°C

Input Diode
- Forward current . . . . . 60 mA
- Reverse voltage . . . . . 3.0 V
- Peak forward current (1 μs pulse, 300 pps) . . . . . 3.0 A
- Power dissipation at 25°C ambient . . . . 200 mW
- Derate linearly from 25°C . . . . . .2.6 mW/°C

Output Transistor
- Power dissipation at 25°C ambient . . . . .200 mW
- Derate linearly from 25°C . . . . . .2.6 mW/°C

Input to output voltage isolation . . . . 1500 volts DC

Total package power dissipation at 25°C ambient (LED plus detector) . . . . .250 mW
Derate linearly from 25°C . . . . . .3.3 mW/°C
Collector-Emitter Current (I_{CE}) . . . . . 50 mA

ELECTRO-OPTICAL CHARACTERISTICS (25°C Free Air Temperature Unless Otherwise Specified)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
Input Diode						
Forward Voltage	V_F		1.25	1.50	V	I_F = 20 mA
Reverse Breakdown Voltage	BV_R	3.0	25		V	I_R=10 μA
Junction Capacitance	C_J		50		pF	V_F=0V
Reverse Leakage Current	I_R		.01	10	μA	V_R=3.0 V
Output Transistor						
DC Forward Current Gain	h_{FE}		250			V_{CE}=5 V, I_C=100 μA
Collector To Emitter Breakdown Volt.	BV_{CEO}	30	85		V	I_C=1.0 mA, I_F=0
Collector To Base Breakdown Voltage	BV_{CBO}	70	165		V	I_C=10 μA
Emitter to Collector Breakdown Voltage	BV_{ECO}	7	14		V	I_E = 100 μA, I_F = 0
Collector To Emitter, Leakage Current	I_{CEO}		5	50	nA	V_{CE}=10 V, I_F=0
Collector To Base Leakage Current	I_{CBO}		0.1	20	nA	V_{CB}=10 V, I_F=0

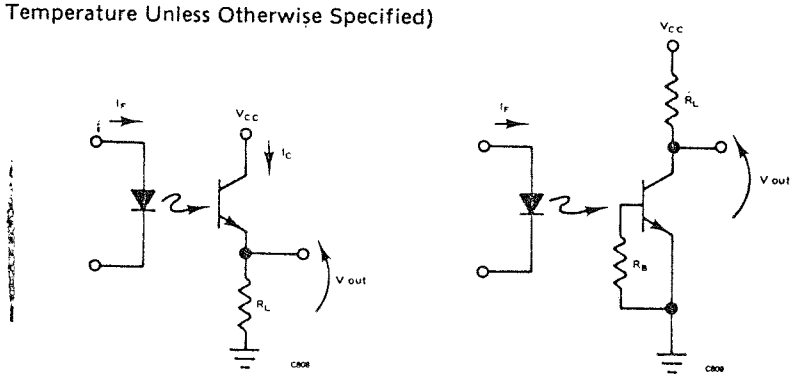
ELECTRO-OPTICAL CHARACTERISTICS (25°C Free Air Temperature Unless Otherwise Specified)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
Capacitance Collector To Emitter	C_{CEO}		8		pF	V_{CE}=0
Capacitance Collector To Base	C_{CBO}		20		pF	V_{CB}=10 V
Capacitance Emitter To Base	C_{EBO}		10		pF	V_{BE}=0
Coupled DC Collector Current Transfer Ratio	I_C/I_F	20	60		%	V_{CE}=10 V, I_F=10 mA, Note 1
DC Base Current Transfer Ratio	I_B/I_F		.35		%	V_{CB}=10 V, I_F=10 mA
Isolation Voltage		1500	2300		VDC	
		800			VRMS	f=60 Hz
Isolation Resistance		10^{11}	10^{12}		Ω	V_{I-O}=500 V
Isolation Capacitance			.5		pF	f=1MHz
Collector-Emitter, Saturation Voltage	V_{CE}(sat)		0.24	0.4	V	I_C = 2.0 mA, I_F = 16 mA
Bandwidth (see note 2)	B_W		150		KHz	I_C=2 mA, V_{CE}=10 V, R_L=100 Ω (Circuit No. 1)

SWITCHING TIMES			TYP.	UNITS	TEST CONDITIONS
Saturated					
t on (from 5 V to 0.8 V)		t_{on} (SAT)	10	μs	R_L=2 KΩ, I_F=15 mA, V_{CC}=5 V
t off (from SAT to 2.0 V)		t_{off} (SAT)	30		R_B=open (Circuit No. 2)
Saturated					
t on (from 5 V to 0.8 V)		t_{on} (SAT)	10	μs	R_L=2 KΩ, I_F=20 mA, V_{CC}=5 V
t off (from SAT to 2.0 V)		t_{off} (SAT)	27		R_B=100 KΩ (Circuit No. 2)
Non-Saturated					
Base	Rise Time	t_r	300	ns	R_L=1 KΩ, V_{CB}=10 V
	Fall Time	t_f	300	ns	

TYPICAL ELECTRO-OPTICAL CHARACTERISTIC CURVES

(25°C Free Air Temperature Unless Otherwise Specified)



Circuit 1 Circuit 2

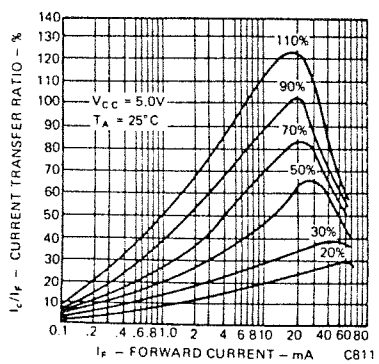


Fig. 1. Current Transfer Ratio vs. Forward Current

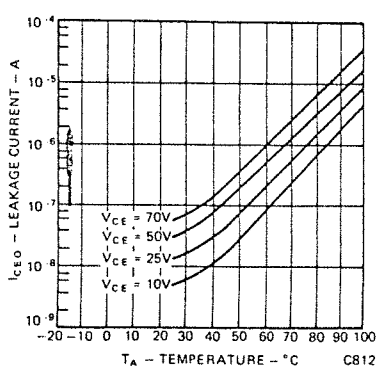


Fig. 2. Dark Current vs. Temperature

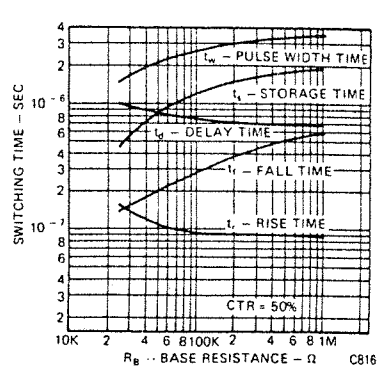


Fig. 3. Switching Time vs. Base Resistance

TYPICAL ELECTRO-OPTICAL CHARACTERISTIC CURVES
(25° C Free Air Temperature Unless Otherwise Specified)

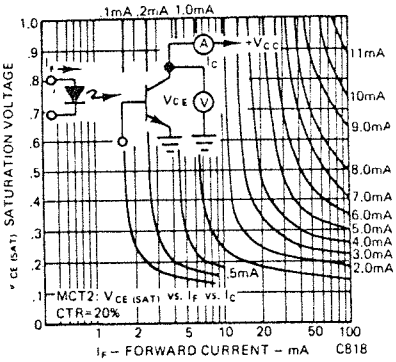


Fig. 4. Saturation Voltage vs. Forward Current

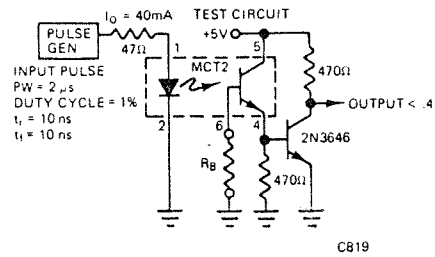


Fig. 5. Circuit for Figure 3

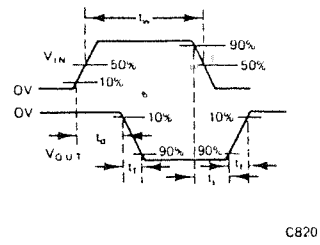


Fig. 6. Waveforms for Figure 3

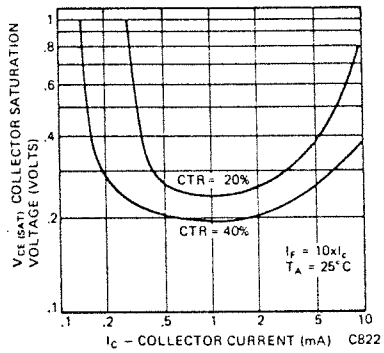


Fig. 7. Saturation Voltage vs. Collector Current

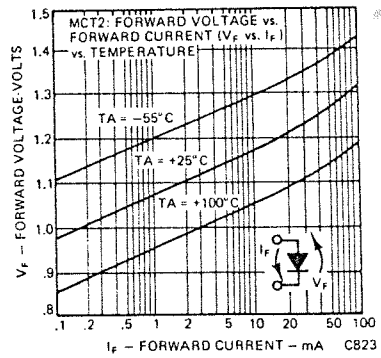


Fig. 8. Forward Voltage vs. Forward Current

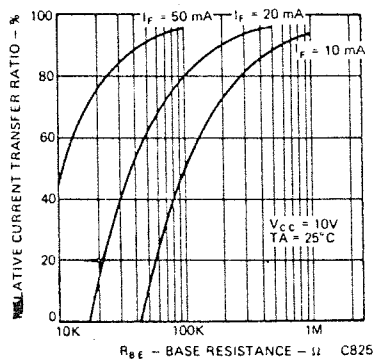


Fig. 9. Sensitivity vs. Base Resistance

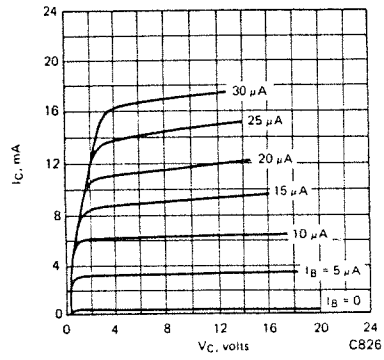


Fig. 10. Detector Typical h_{fe} Curves

NOTES

1. *The current transfer ratio (I_C/I_F) is the ratio of the detector collector current to the LED input current with V_{CE} at 10 volts.*
2. *The frequency at which i_c is 3 dB down from the 1 kHz value.*
3. *Rise time (t_r) is the time required for the collector current to increase from 10% of its final value, to 90%.*
   Fall time (t_f) is the time required for the collector current to decrease from 90% of its initial value, to 10%.