NEC
NEC Electronics Inc.

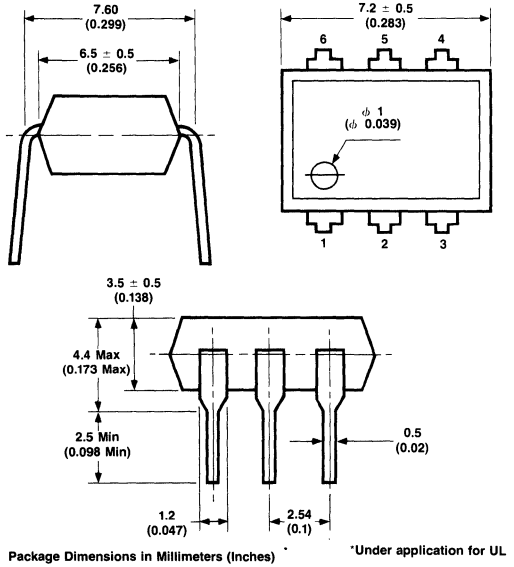
PS2021
PHOTO COUPLER
HIGH ISOLATION VOLTAGE
SINGLE TRANSISTOR

NEPOC SERIES

Description

The PS2021 is an optically coupled isolator containing a GaAs light emitting diode and an NPN silicon photo transistor.

Package Dimensions

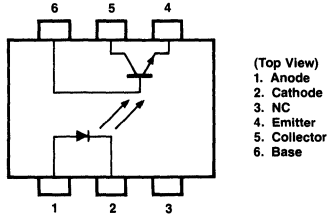


Package Dimensions in Millimeters (Inches)

*Under application for UL

83-000557A

Pin Connection



(Top View)
1. Anode
2. Cathode
3. NC
4. Emitter
5. Collector
6. Base

83-000385A

Features

- ☐ Small package: 7.2 × 6.5 × 3.5mm
- ☐ High isolation voltage: 4000V_{AC} rating
- ☐ High transfer ratio: 50% min
- ☐ High speed switching: t_r, t_f = 3μs typ
- ☐ Economical, compact, dual in-line plastic package

Applications

- ☐ Interface circuit for various instruments and control equipment
- ☐ Chopper circuits
- ☐ Computer and peripheral manufacture
- ☐ Pulse transformers
- ☐ Data communication equipment

Absolute Maximum Ratings

T_A = +25°C

Diode	
Reverse Voltage, V_R	5.0V
Forward Current (DC), I_F	80mA
Power Dissipation, P_D	150mW
Peak Forward Current(300μs, 2% duty cycle), $I_{F\ (peak)}$	3A
Transistor	
Collector to Emitter Voltage, V_{CEO}	40V
Collector to Base Voltage, V_{CBO}	70V
Emitter to Collector Voltage, V_{ECO}	7V
Collector Current, I_C	100mA
Power Dissipation, P_D	150mW
Isolation Voltage[1], BV	4000V_{AC}
Storage Temperature, T_{STG}	−55°C to +150°C
Operating Temperature, T_{OPT}	−55°C to +100°C
Lead Temperature (Soldering 10s)	260°C
Total Power Dissipation, P_T	250mW

5

Electrical Characteristics
T_A = +25°C

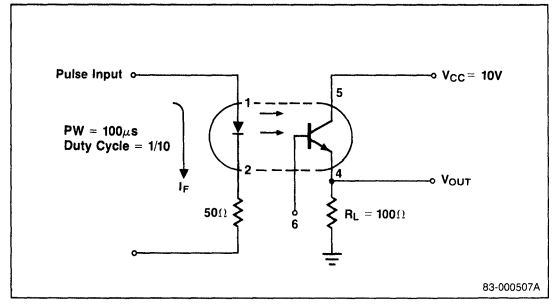
Parameter	Symbol	Limits Min	Typ	Max	Unit	Test Conditions
Diode						
Forward Voltage	V_F		1.1	1.4	V	I_F = 10mA
Forward Voltage	V_F		1.2	1.5	V	I_F = 50mA
Reverse Current	I_R			10	μA	V_R = 5V
Junction Capacitance	C		50		pF	V = 0, f = 1.0MHz
Transistor						
Collector to Emitter Dark Current	I_{CEO}			50	nA	V_{CE} = 10V, I_F = 0
DC Current Gain	h_{FE}		700			I_C = 2mA, V_{CE} = 5.0V
Collector to Emitter Breakdown Voltage	BV_{CEO}	40	60		V	I_C = 1mA, I_B = 0
Collector to Base Breakdown Voltage	BV_{CBO}	70	120		V	I_C = 100μA, I_E = 0
Emitter to Collector Breakdown Voltage	BV_{ECO}	7	9		V	I_E = 100μA, I_B = 0
Coupled						
Current Transfer Ratio[2]	CTR (I_C/I_F)	50			%	I_F = 10mA, V_{CE} = 5.0V
Collector Saturation Voltage	$V_{CE(sat)}$			0.3	V	I_F = 10mA, I_C = 2.0mA
Isolation Resistance	R_{1-2}	10^{11}			Ω	V_{IN-OUT} = 1.0kV
Isolation Capacitance	C_{1-2}		0.5		pF	V = 0, f = 1.0MHz
Rise Time[3]	t_r		3		μs	V_{CC} = 10V, I_C = 2mA, R_L = 100Ω
Fall Time[3]	t_f		3		μs	V_{CC} = 10V, I_C = 2mA, R_L = 100Ω

Notes: 1. Measuring Conditions: DC or AC voltage for 1 min at T_A = +25°C, RH = 60% between input (pins 1, 2, and 3 common) and output (pins 4, 5, and 6 common).

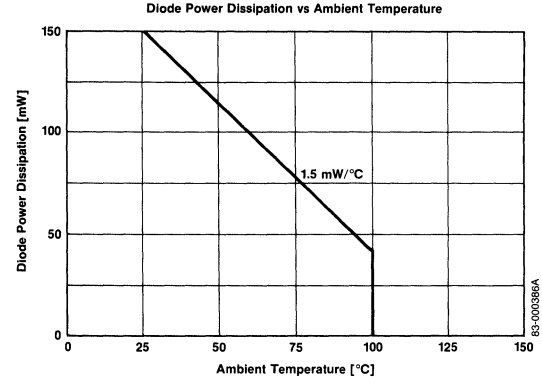
2. CTR rank: K: 150%~300%, L: 90%~180%, M: 50%~110%.

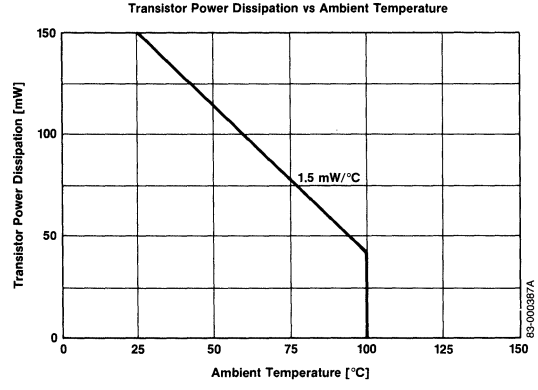
3. Test circuit for switching time.

Test circuit for switching time



Typical Characteristics
T_A = +25°C

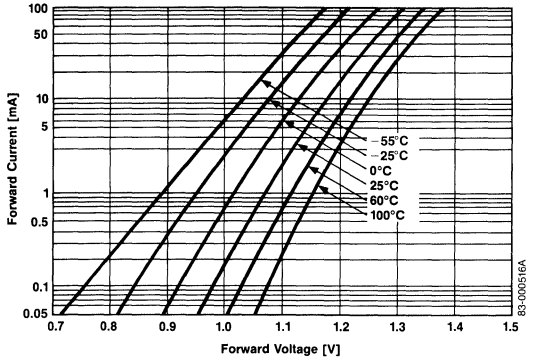




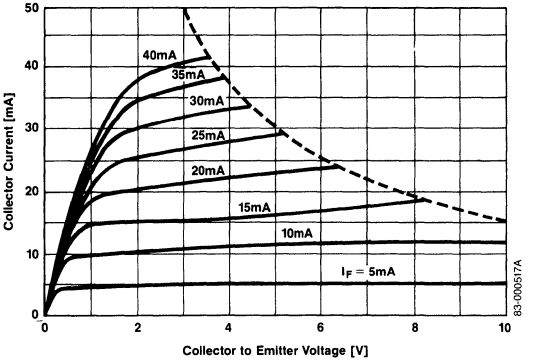
Typical Characteristics (cont)

T_A = +25°C

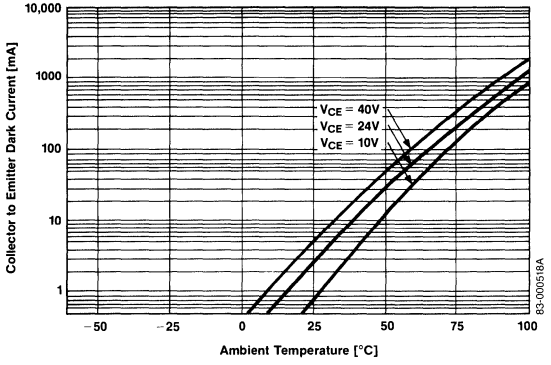
Forward Current vs Forward Voltage



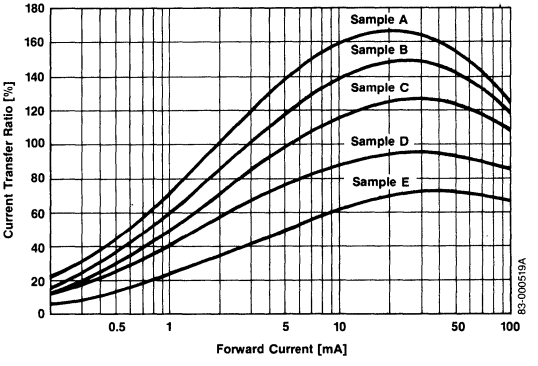
Collector Current vs Collector to Emitter Voltage



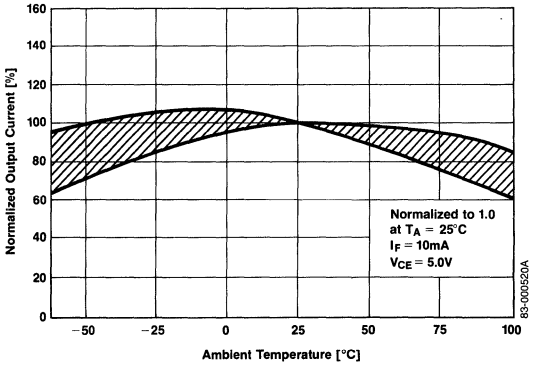
Collector to Emitter Dark Current vs Ambient Temperature



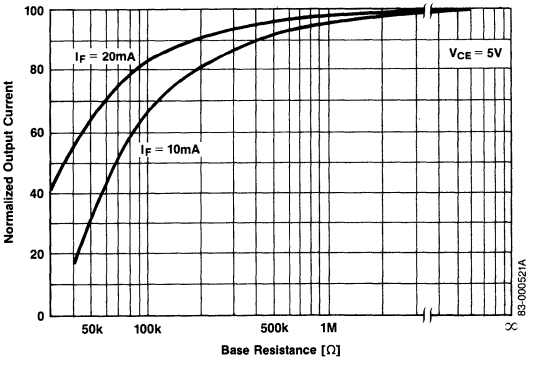
Current Transfer Ratio vs Forward Current



Normalized Output Current vs Ambient Temperature



Normalized Output Current vs Base Resistance (Typical)

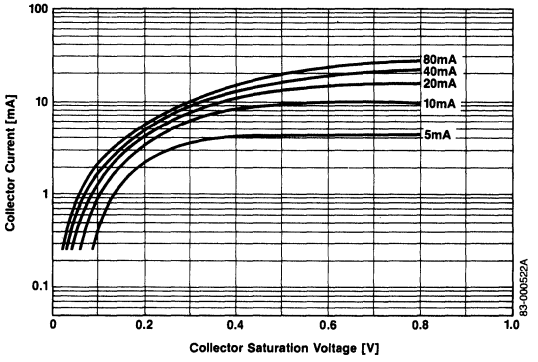


5

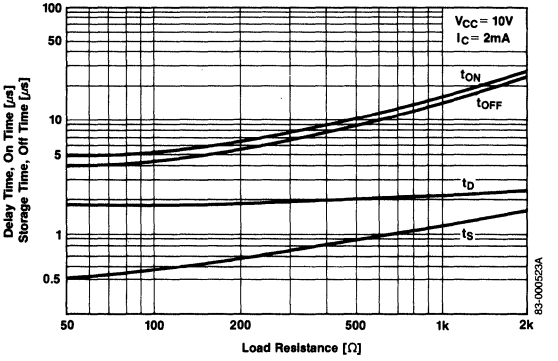
Typical Characteristics (cont)

$T_A = +25°C$

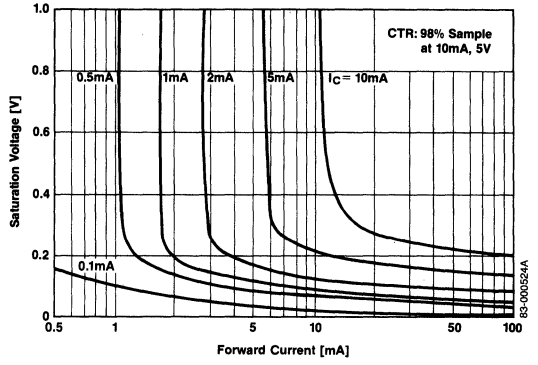
Collector Current vs Collector Saturation Voltage



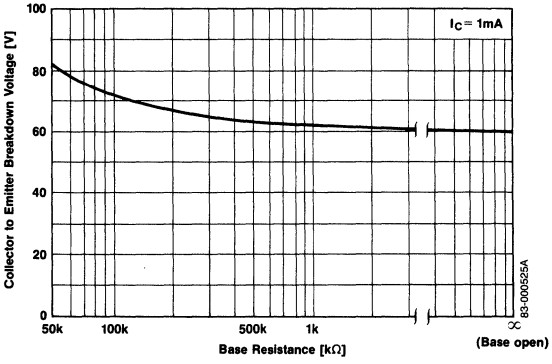
Switching Time vs Load Resistance



Saturation Voltage vs Forward Current



Collector to Emitter Breakdown Voltage vs Base Resistance



Frequency Response