

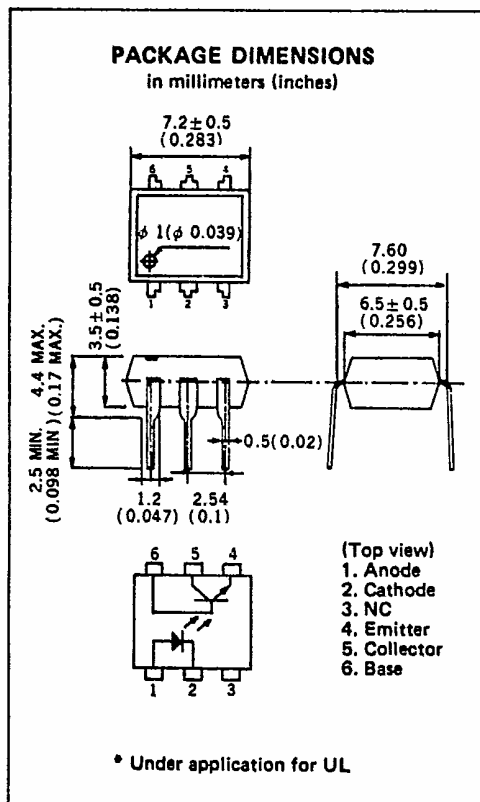
# PHOTO COUPLER PS2021

## 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.



### FEATURES

- Small package 7.2 x 6.5 x 3.5 mm
- High isolation voltage 4 000 V<sub>AC</sub> Rating
- High transfer ratio 50 % MIN.
- High speed switching  $t_r, t_f = 3 \mu\text{s}$  TYP.
- Economical, compact, Dual In-Line Plastic Package

### APPLICATIONS

- Interface circuit for various instrumentations, control equipments.
- Chopper circuits.
- Computer and peripheral manufactures.
- Pulse transformer.
- Data communication equipment.

### ABSOLUTE MAXIMUM RATINGS (T<sub>a</sub> = 25 °C)

#### Diode

Reverse Voltage	V <sub>R</sub>	5.0	V
Forward Current (DC)	I <sub>F</sub>	80	mA
Power Dissipation	P <sub>D</sub>	150	mW
Peak Forward Current (300 μs, 2 % duty cycle)	I <sub>F(peak)</sub>	3	A

#### Transistor

Collector to Emitter Voltage	V <sub>CEO</sub>	40	V
Collector to Base Voltage	V <sub>CB0</sub>	70	V
Emitter to Collector Voltage	V <sub>ECO</sub>	7	V
Collector Current	I <sub>C</sub>	100	mA
Power Dissipation	P <sub>C</sub>	150	mW
Isolation Voltage * 1	BV	4000	V <sub>AC</sub>
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C
Operating Temperature	T <sub>opt</sub>	-55 to +100	°C
Lead Temperature (Soldering 10 s)		260	°C
Total Power Dissipation	P <sub>T</sub>	250	mW

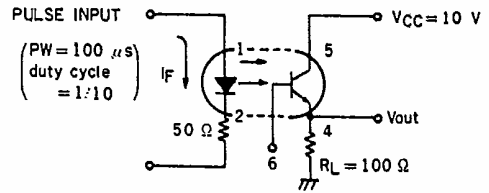
**ELECTRICAL CHARACTERISTICS (Ta = 25 °C)**

CHARACTERISTIC		SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Diode	Forward Voltage	V <sub>F</sub>		1.1	1.4	V	I <sub>F</sub> = 10 mA
	Forward Voltage	V <sub>F</sub>		1.2	1.5	V	I <sub>F</sub> = 50 mA
	Reverse Current	I <sub>R</sub>			10	μA	V <sub>R</sub> = 5 V
	Junction Capacitance	C		50		pF	V = 0, f = 1.0 MHz
Transistor	Collector to Emitter Dark Current	I <sub>CEO</sub>			50	nA	V <sub>CE</sub> = 10V, I <sub>F</sub> = 0
	DC Current Gain	h <sub>FE</sub>		700			I <sub>C</sub> = 2 mA, V <sub>CE</sub> = 5.0 V
	Collector to Emitter Breakdown Voltage	BV <sub>CEO</sub>	40	60		V	I <sub>C</sub> = 1 mA, I <sub>B</sub> = 0
	Collector to Base Breakdown Voltage	BV <sub>CBO</sub>	70	120		V	I <sub>C</sub> = 100 μA, I <sub>E</sub> = 0
	Emitter to Collector Breakdown Voltage	BV <sub>ECO</sub>	7	9		V	I <sub>E</sub> = 100 μA, I <sub>B</sub> = 0
Coupled	Current Transfer Ratio *2	CTR (I <sub>C</sub> /I <sub>F</sub> )	50			%	I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 5.0 V
	Collector Saturation Voltage	V <sub>CE (sat)</sub>			0.3	V	I <sub>F</sub> = 10 mA, I <sub>C</sub> = 2.0 mA
	Isolation Resistance	R <sub>1-2</sub>	10 <sup>11</sup>			Ω	V <sub>in-out</sub> = 1.0 kV
	Isolation Capacitance	C <sub>1-2</sub>		0.5		pF	V = 0, f = 1.0 MHz
	Rise Time *3	t <sub>r</sub>		3		μs	V <sub>CC</sub> = 10 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω
	Fall Time *3	t <sub>f</sub>		3		μs	V <sub>CC</sub> = 10 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω

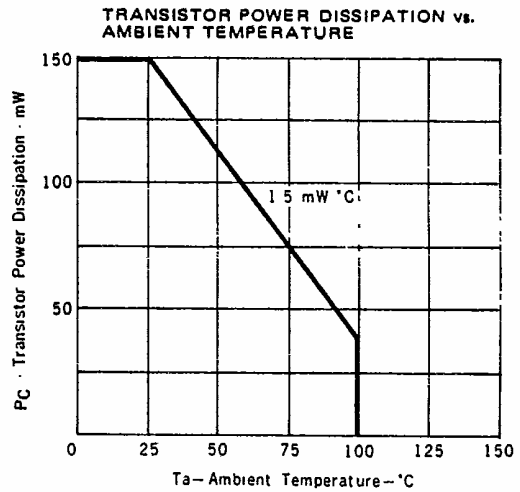
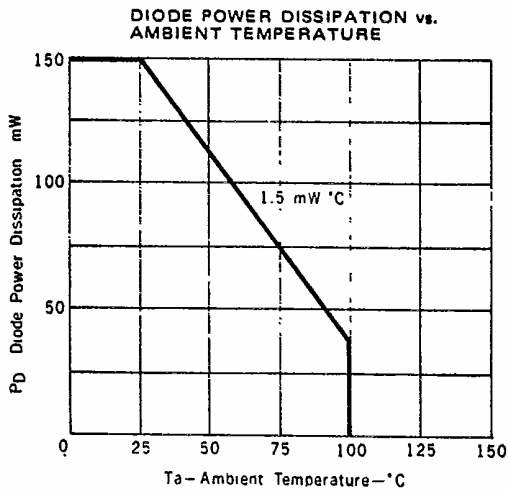
\* 1 Measuring Condition  
 DC or AC voltage for 1 minute at Ta = 25 °C,  
 RH = 60 %  
 Between input (pin No. 1, 2 and No. 3 Common)  
 and output (pin No. 4, 5 and No. 6 Common)

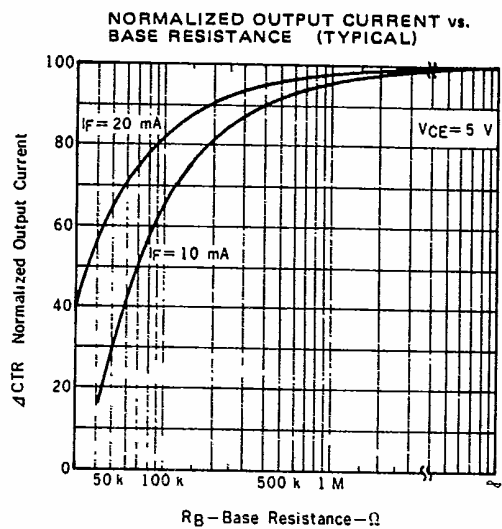
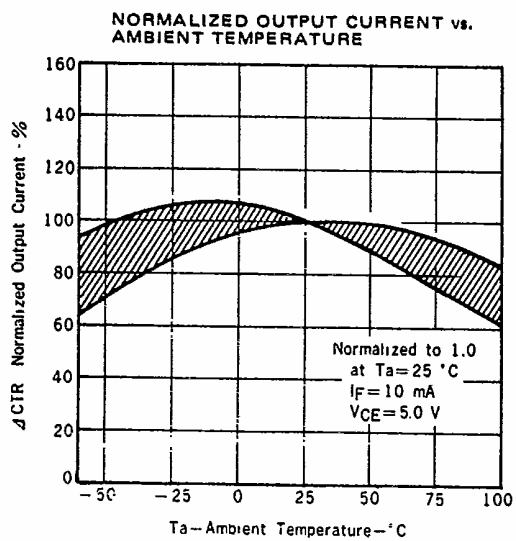
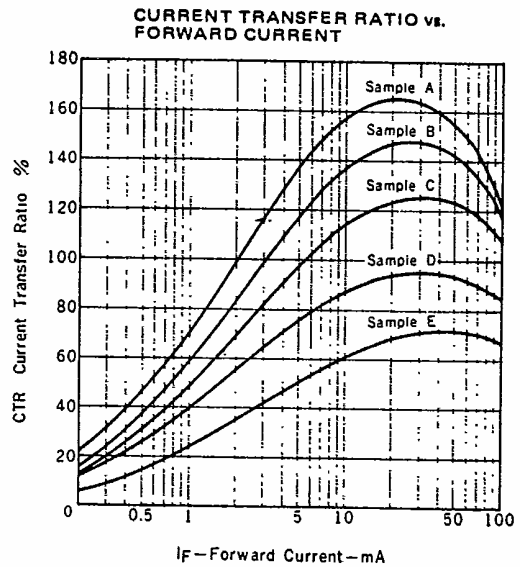
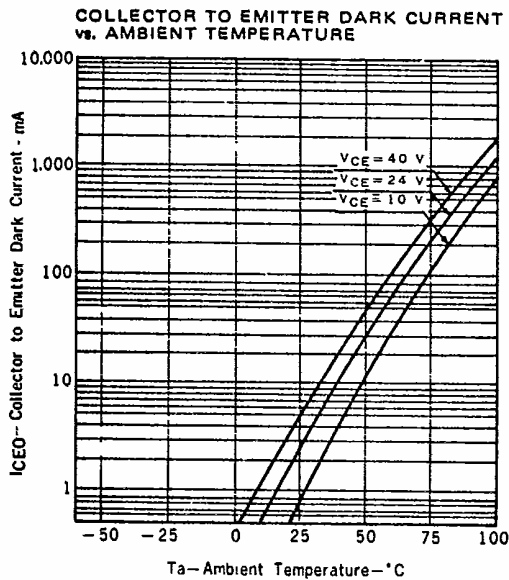
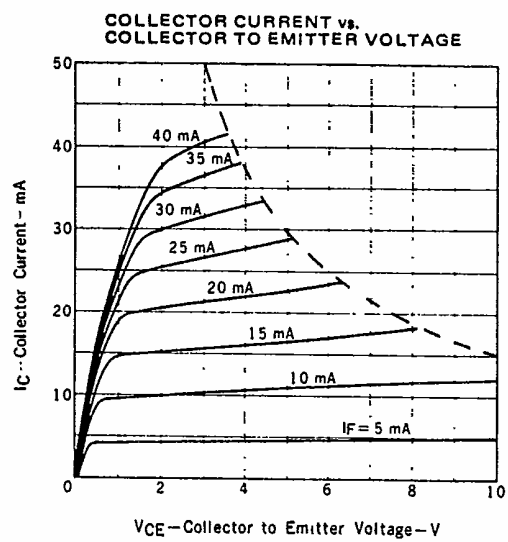
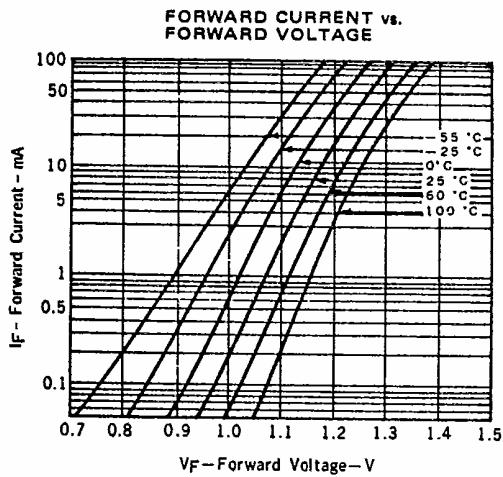
\* 2 CTR rank  
 K: 150 %~300 %  
 L: 90 %~180 %  
 M: 50 %~110 %

\* 3 Test Circuit for Switching Time

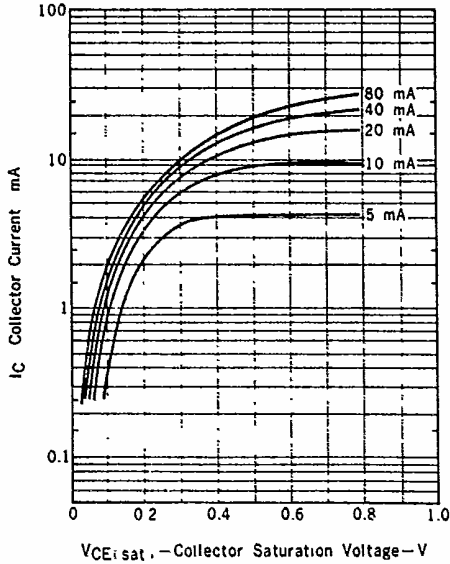


**TYPICAL CHARACTERISTICS (Ta = 25 °C)**

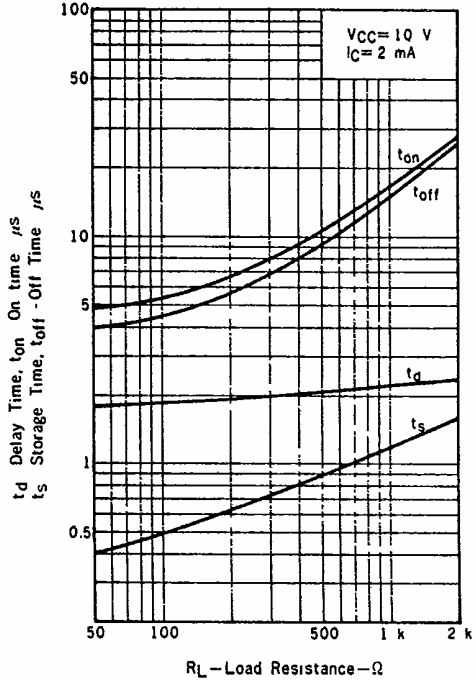




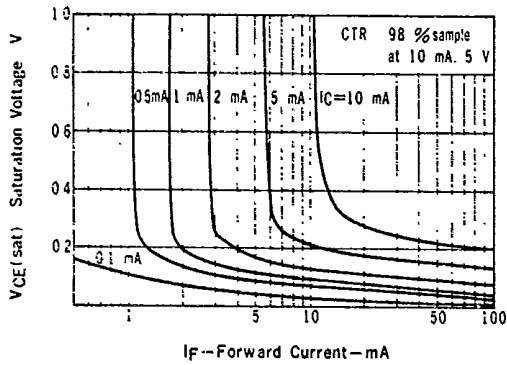
**COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE**



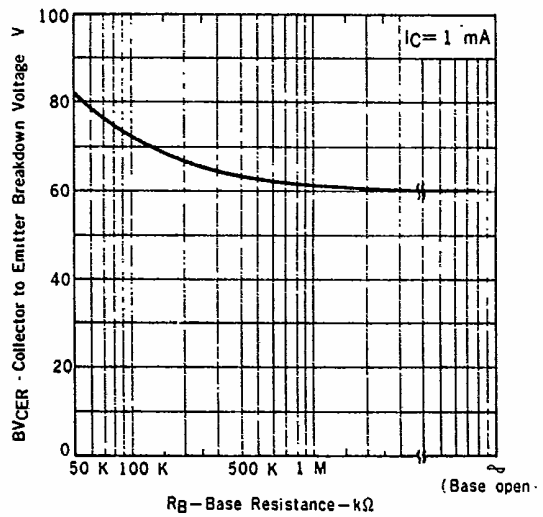
**SWITCHING TIME vs. LOAD RESISTANCE**



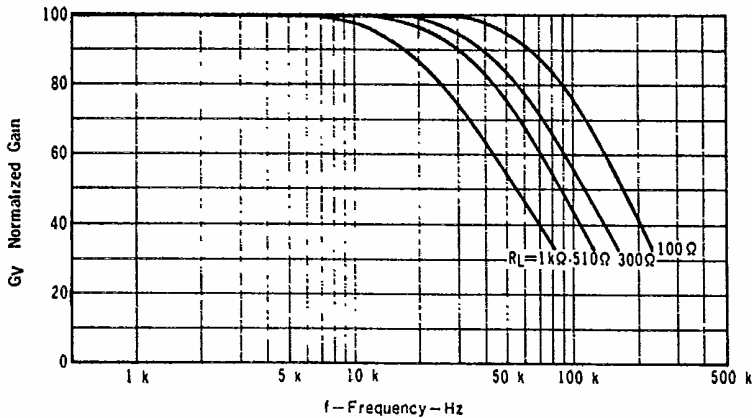
**SATURATION VOLTAGE vs. FORWARD CURRENT**



**COLLECTOR TO EMITTER BREAKDOWN VOLTAGE vs. BASE RESISTANCE**



**FREQUENCY RESPONSE**



**Nippon Electric Co., Ltd.**

NEC Building, 33-1, Shiba-Gochome, Minato-ku, Tokyo 108, Japan  
 Tel: Tokyo 454 - 1111  
 Telex Address: NECTOK J22686  
 Cable Address: MICROPHONE TOKYO

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