NEC

PHOTOCOUPLERS

PS2603, PS2604, PS2603L, PS2604L

HIGH ISOLATION VOLTAGE DARLINGTON TRANSISTOR TYPE 6 PIN PHOTOCOUPLER

— NEPOC Series —

DESCRIPTION

PS2603, PS2604 and PS2603L, PS2604L are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon darlington-connected phototransistor.

PS2603, PS2604 are in a plastic DIP (Dual In-line Package).

PS2603L, PS2604L are lead bending type (Gull-wing) for surface mount.

PS2603, PS2603L have base pin and PS2604, PS2604L have no base pin.

FEATURES

- High isolation voltage (BV: 5 $kV_{r.m.s.}$ MIN.)
- High speed switching (t_r, t_f = 100 μs TYP.)
- Ultra High current transfer ratio (CTR: 2 000 % TYP.)
- UL recognized [File No. E72422(S)]
- Taping product name (PS2603L-E3, E4, PS2604L-E3, E4)

APPLICATIONS

Interface circuit for various instrumentations, control equipments.

- AC Line/Digital Logic ..... Isolate high voltage transient
- Digital Logic/Digital Logic ..... Eliminate spurious ground loops
- Twisted pair line receiver ..... Eliminate ground loop pick-up
- Telephone/Telegraph line receiver ..... Isolate high voltage transient
- High Frequency Power Supply Feedback Control ..... Maintain floating ground

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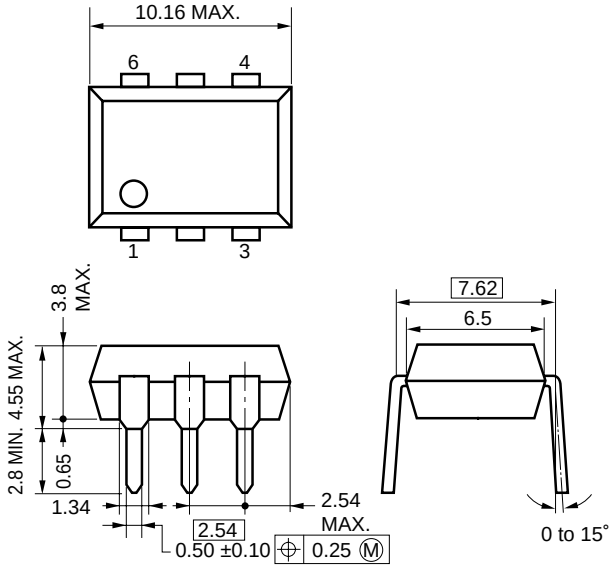
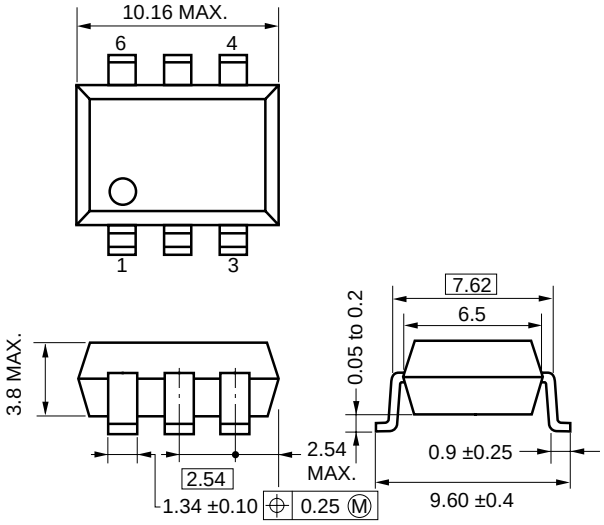
PACKAGE DIMENSIONS (in millimeters)

DIP (Dual In-line Package) **Lead Bending type (Gull-wing)**

PS2603, PS2604

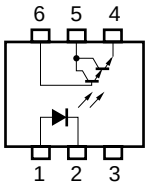


PS2603L, PS2604L



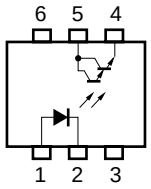
PIN CONNECTION (Top View)

PS2603, PS2603L



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

PS2604, PS2604L



1. Anode
2. Cathode
3. NC
4. Emitter
5. Collector
6. NC

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Diode			
Reverse Voltage	V_R	6	V
Forward Current (DC)	I_F	80	mA
Power Dissipation Derating	ΔP_D/°C	1.5	mW/°C
Power Dissipation	P_D	150	mW
Peak Forward Current (PW = 100 μs, Duty Cycle 1 %)	$I_{F(Peak)}$	1	A
Transistor			
Collector to Emitter Voltage	V_{CEO}	40	V
Emitter to Collector Voltage	V_{ECO}	6	V
Collector Current	I_C	200	mA
Power Dissipation Derating	ΔP_C/°C	2.0	mW/°C
Power Dissipation	P_C	200	mW
Coupled			
Isolation Voltage ***1)**	BV	5000	$V_{r.m.s.}$
Storage Temperature	T_{stg}	–55 to +150	°C
Operating Temperature	T_{opt}	–55 to +100	°C

***1)** AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input (Pin No. 1, 2, 3, Common) and output (Pin No. 4, 5, 6 Common).

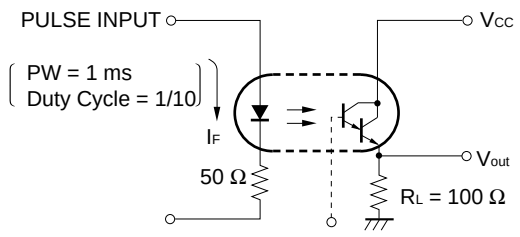
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC		SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Diode	Forward Voltage	V_F		1.1	1.4	V	I_F = 10 mA
	Reverse Current	I_R			5	μA	V_R = 5 V
	Junction Capacitance	C_t		30		pF	V = 0, f = 1.0 MHz
Transistor	Collector to Emitter Dark Current	I_{CEO}			400	nA	V_{CE} = 40 V, I_F = 0
	DC Current Gain***2)**	h_{FE}		180			I_C = 2 mA, V_{CE} = 5 V
Coupled	Current Transfer Ratio***3)**	CTR	200	2000		%	I_F = 1 mA, V_{CE} = 2 V
	Collector Saturation Voltage	$V_{CE(sat)}$			1.0	V	I_F = 1 mA, I_C = 2 mA
	Isolation Resistance	R_{1-2}	10^{11}			Ω	V_{in-out} = 1.0 kV
	Isolation Capacitance	C_{1-2}		0.6		pF	V = 0, f = 1.0 MHz
	Rise Time***4)**	t_r		100		μs	V_{CC} = 5 V, I_C = 10 mA, R_L = 100 Ω
	Fall Time***4)**	t_f		100		μs	V_{CC} = 5 V, I_C = 10 mA, R_L = 100 Ω

***2)** Second stage Transistor
(PS2603, PS2603L only)

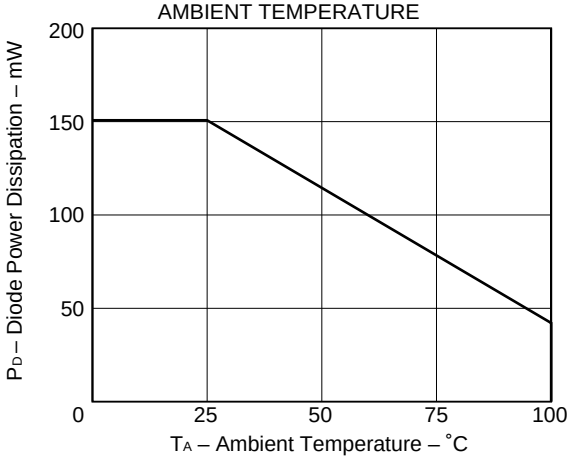
***3)** CTR rank
K : 2000 to (%)
L : 700 to 3400 (%)
M : 200 to 1000 (%)

***4)** Test Circuit for Switching Time

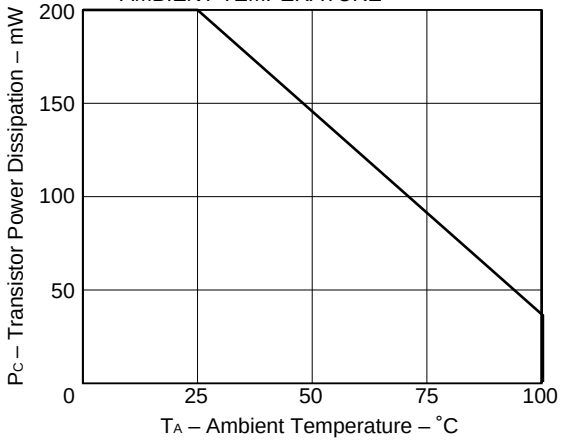


TYPICAL CHARACTERISTICS (T_A = 25 °C)

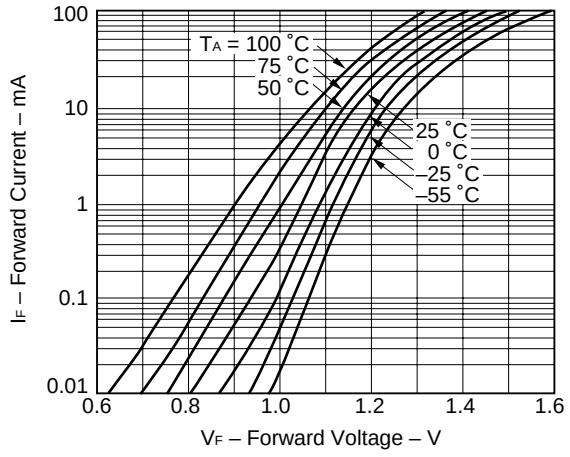
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



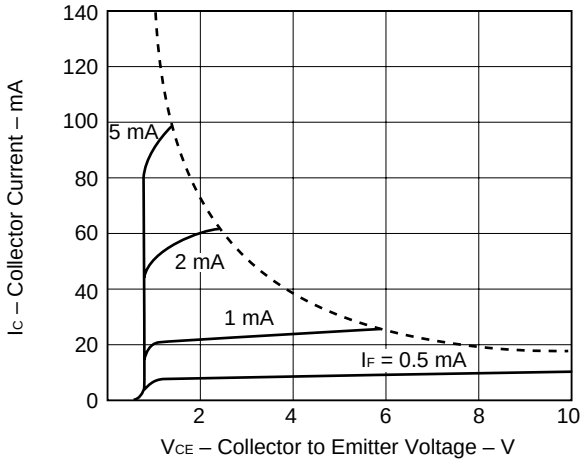
TRANSITOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



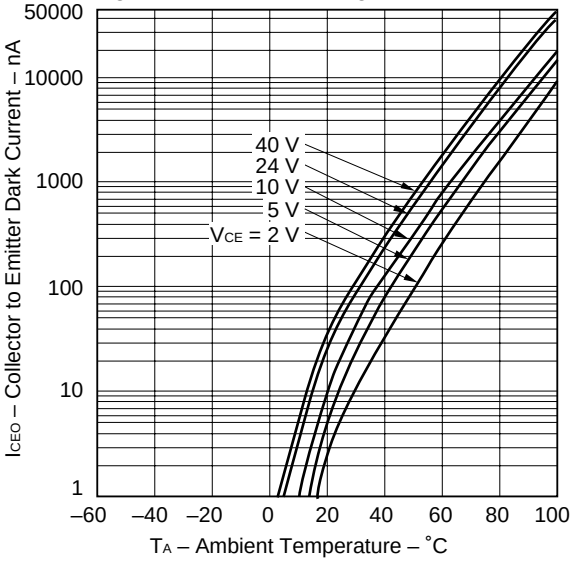
FORWARD CURRENT vs. FORWARD VOLTAGE



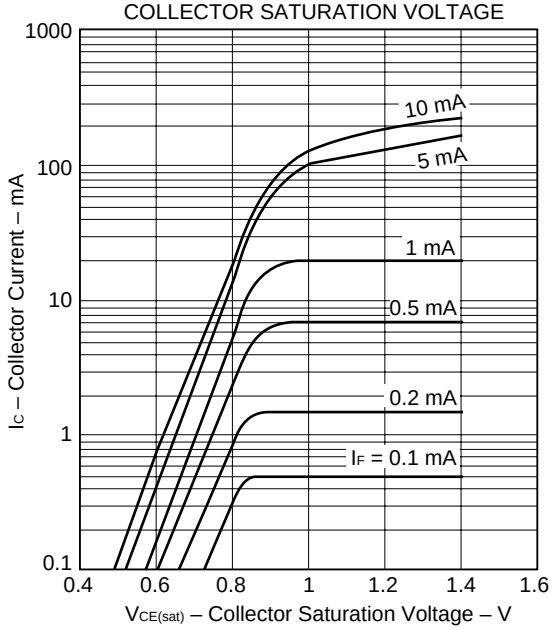
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



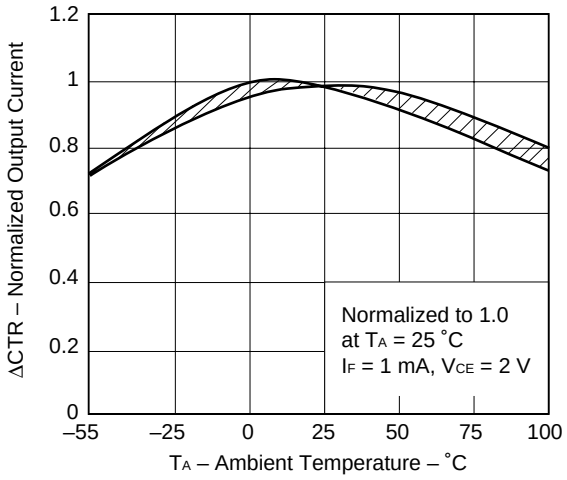
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



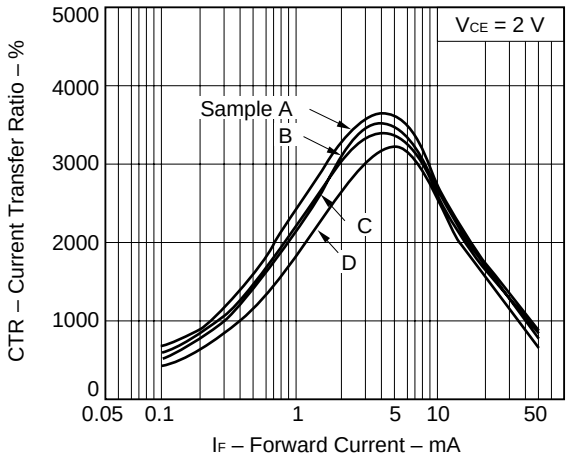
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



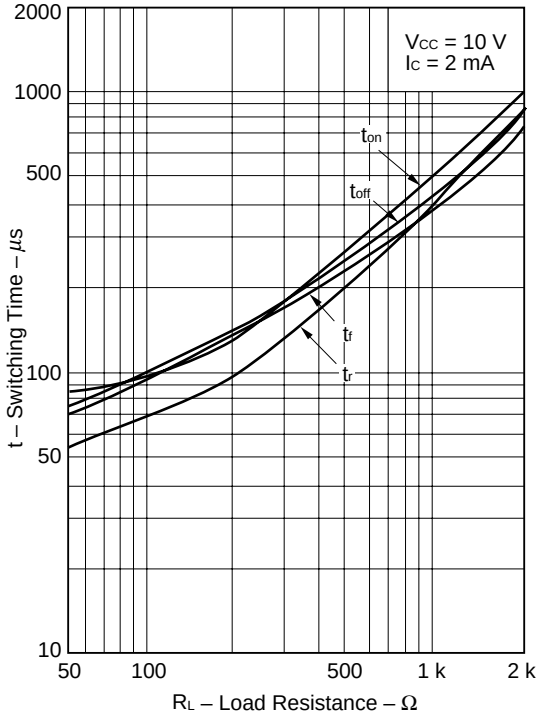
NORMALIZED OUTPUT CURRENT vs.
AMBIENT TEMPERATURE



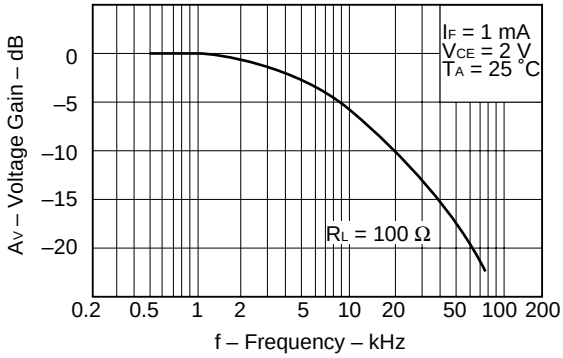
CURRENT TRANSFER RATIO (CTR) vs.
FORWARD CURRENT



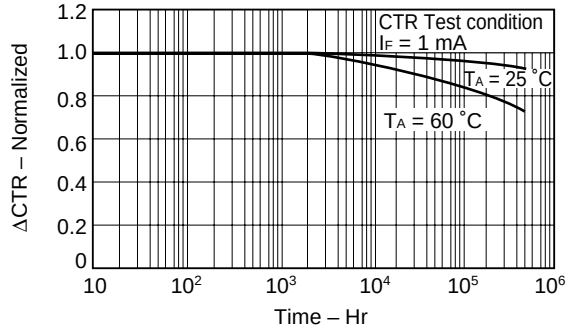
SWITCHING TIME vs.
LOAD RESISTANCE



FREQUENCY RESPONSE



CTR DEGRADATION



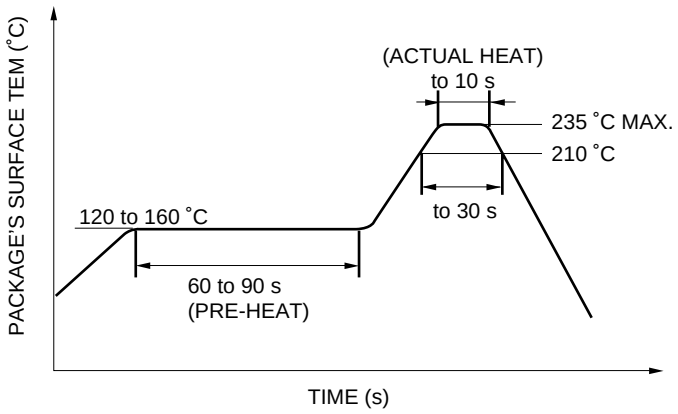
★ The measurement of TYPICAL CHARACTERISTICS are only for reference, not guaranteed.

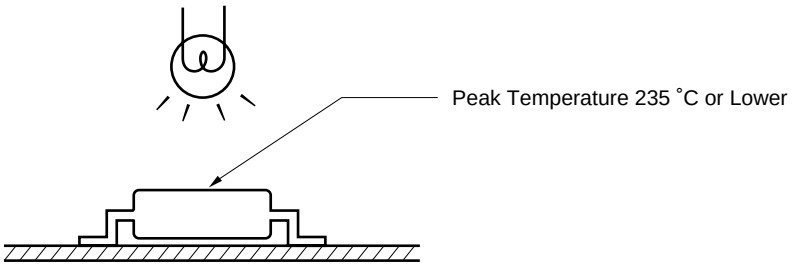
SOLDERING PRECAUTION

(1) Infrared reflow soldering

- Peak reflow temperature : 235 ˚C or below (Plastic surface temperature)
- Reflow time : 30 seconds or less
  (Time period during which the plastic surface temperature is 210 ˚C)
- Number of reflow processes : Three
- Flux : Rosin flux containing small amount of chlorine
  (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

INFRARED RAY REFLOW TEMPERATURE PROFILE





(2) Dip soldering

- Peak temperature : 260 ˚C or lower
- Time : 10 s or less
- Flux : Rosin-base flux

[MEMO]

Caution

The Great Care must be taken in dealing with the devices in this guide.
The reason is that the material of the devices is GaAs (Gallium Arsenide), which is designated as harmful substance according to the law concerned.
Keep the law concerned and so on, especially in case of removal.

M4 94.11