NEC

PHOTOCOUPLER

PS2603,PS2604,PS2603L,PS2604L

HIGH ISOLATION VOLTAGE, HIGH CTR 6-PIN PHOTOCOUPLER

–NEPOC™ Series–

DESCRIPTION

The PS2603, PS2604, PS2603L, PS2604L are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon darington-connected phototransistor in a plastic DIP (Dual In-line Package).

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

FEATURES

- High Isolation voltage (BV = 5 000 Vr.m.s.)
- High-speed switching (t_r, t_f = 100 μs TYP.)
- High current transfer ratio (CTR = 2 000 % TYP.)
- UL approved: File No. E72422 (S)
- Ordering number of taping product: PS2603L-E3, E4, PS2604L-E3, E4

★ APPLICATIONS

- Power supply
- Telephone
- AC/DC line interface
- Electric home appliances

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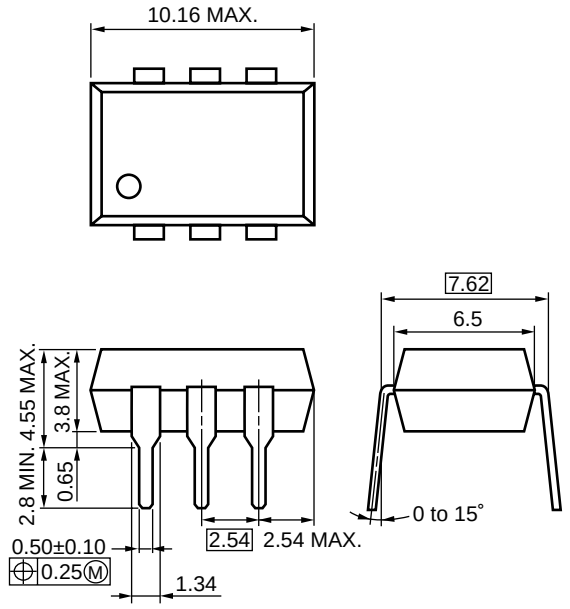
Printed in Japan

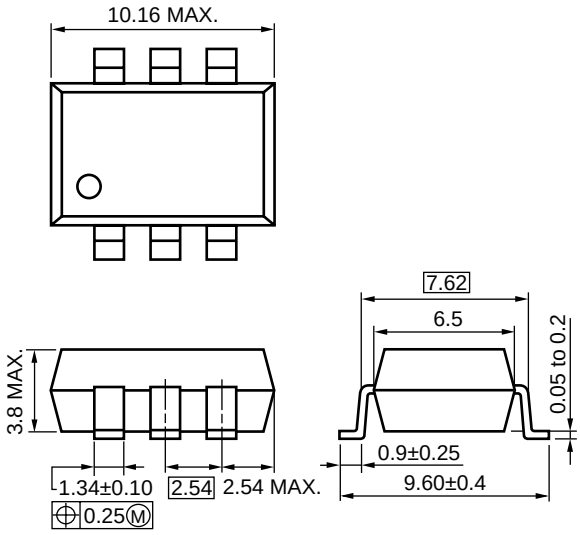
The mark ★ shows major revised points.

★ **PACKAGE DIMENSIONS (in millimeters)**

PS2603, PS2604
DIP type

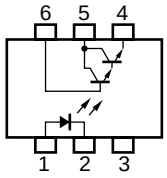


PS2603L, PS2604L
Lead bending type



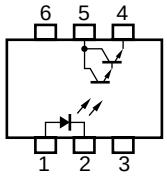
PIN CONNECTIONS (TOP VIEW)

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, unless otherwise specified)

Parameter		Symbol	Ratings	Unit
Diode	Forward Current (DC)	I_F	80	mA
	Reverse Voltage	V_R	6.0	V
	Power Dissipation Derating	ΔP_D/°C	1.5	mW/°C
	Power Dissipation	P_D	150	mW
	Peak Forward Current *1	I_{FP}	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
Isolation Voltage *2		BV	5 000	Vr.m.s.
Operating Ambient Temperature		T_A	–55 to +100	°C
Storage Temperature		T_{stg}	–55 to +150	°C

***1** PW = 100 μs, Duty Cycle = 1 %

***2** AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and output

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = 10 mA		1.1	1.4	V
	Reverse Current	I_R	V_R = 5 V			5.0	μA
	Terminal Capacitance	C_t	V = 0 V, f = 1.0 MHz		30		pF
Transistor	Collector to Emitter Dark Current	I_{CEO}	V_{CE} = 40 V, I_F = 0 mA			400	nA
	DC Current Gain *1	h_{FE}	I_C = 2 mA, V_{CE} = 5 V		180		
Coupled	Current Transfer Ratio (I_C/I_F) *2	CTR	I_F = 1 mA, V_{CE} = 2 V	200	2 000		%
	Collector Saturation Voltage	$V_{CE (sat)}$	I_F = 1 mA, I_C = 2 mA			1.0	V
	Isolation Resistance	R_{I-O}	V_{I-O} = 1.0 kV_{DC}	10^{11}			Ω
	Isolation Capacitance	C_{I-O}	V = 0 V, f = 1.0 MHz		0.6		pF
	Rise Time *3	t_r	V_{CC} = 5 V, I_C = 10 mA, R_L = 100 Ω		100		μs
	Fall Time *3	t_f			100		

***1** Second stage transistor (PS2603, PS2603L only)

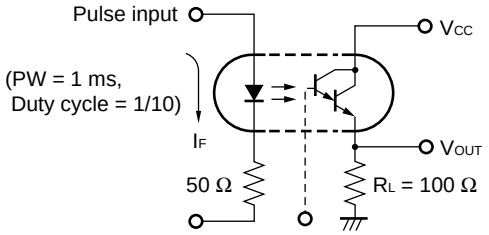
***2** CTR rank

K : 2 000 to (%)

L : 700 to 3 400 (%)

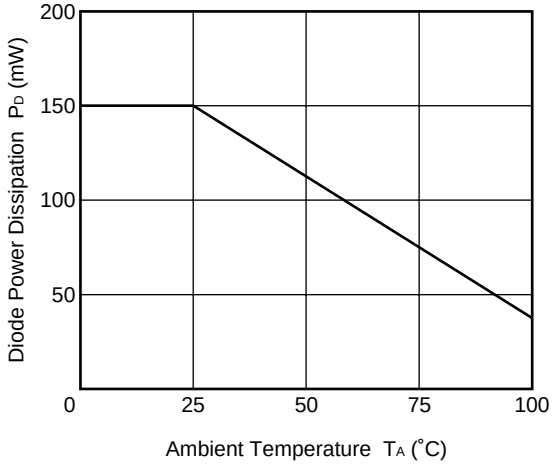
M : 200 to 1 000 (%)

***3** Test circuit for switching time

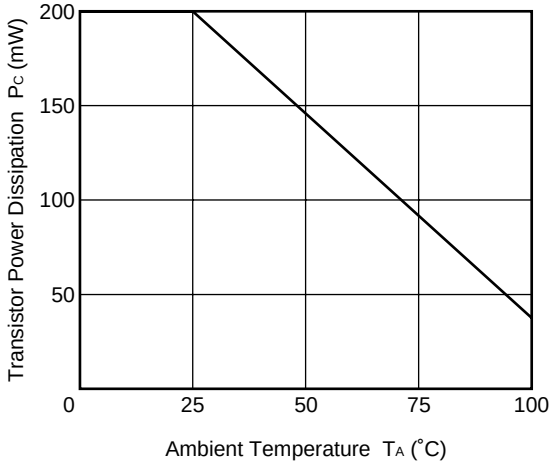


★ **TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)**

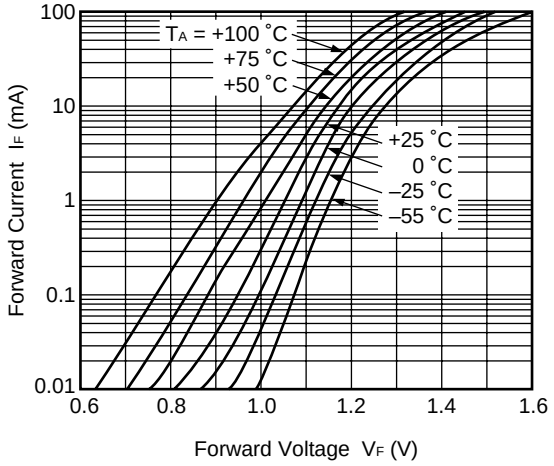
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



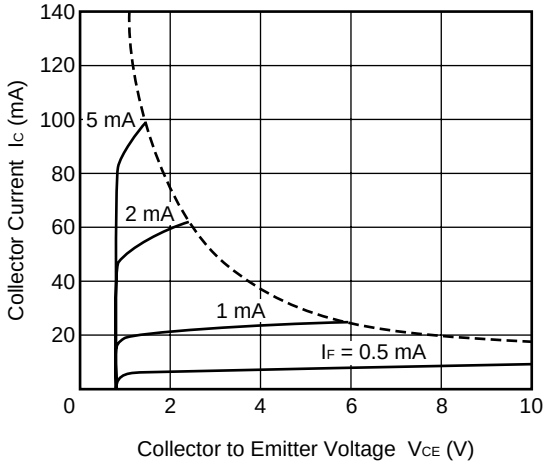
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



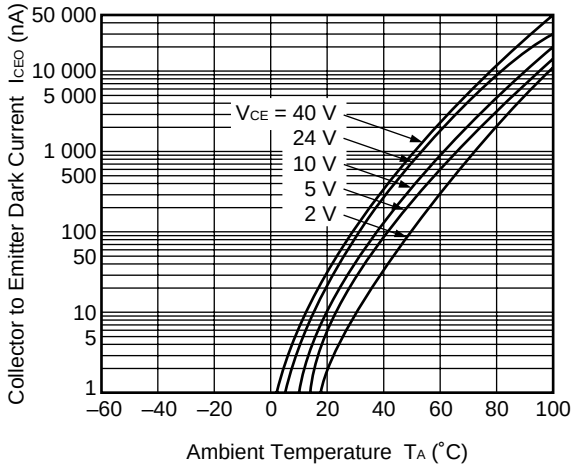
FORWARD CURRENT vs. FORWARD VOLTAGE



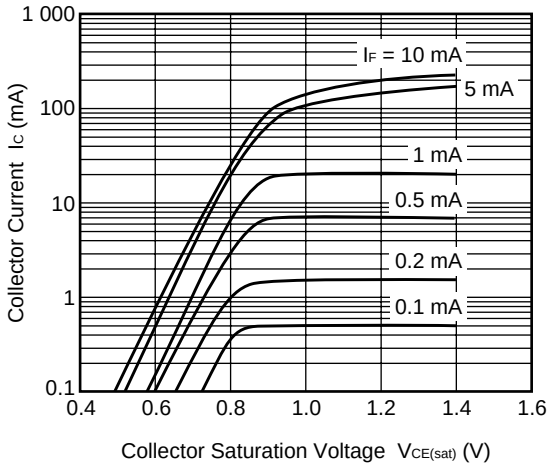
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



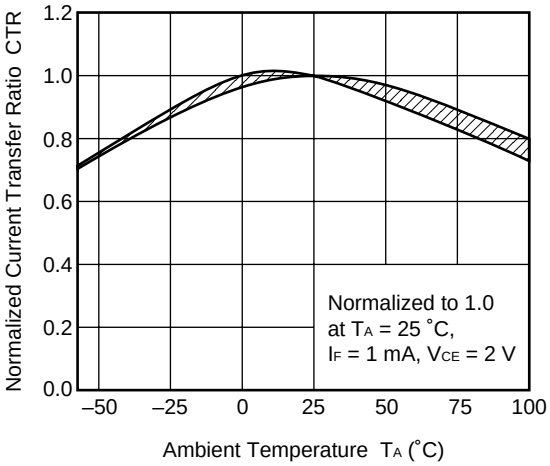
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



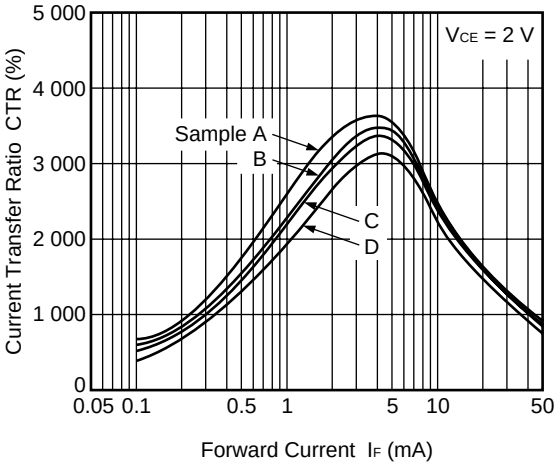
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



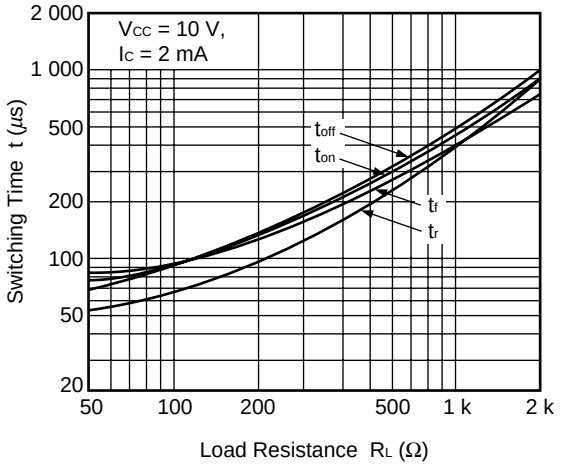
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



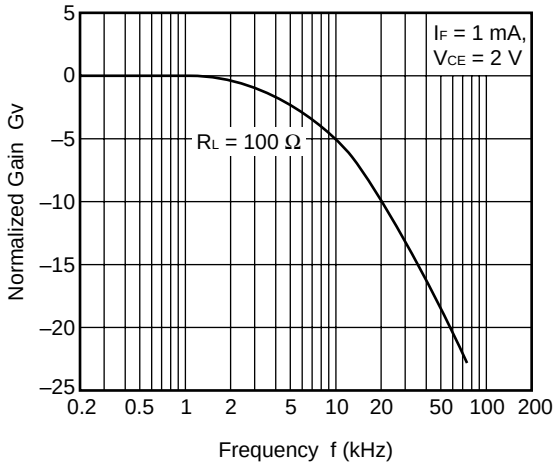
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



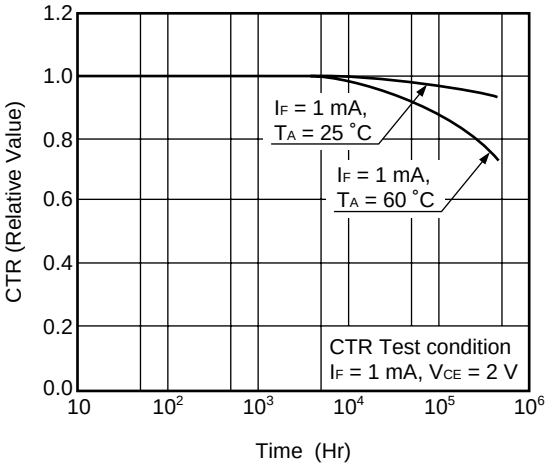
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



LONG TERM CTR DEGRADATION



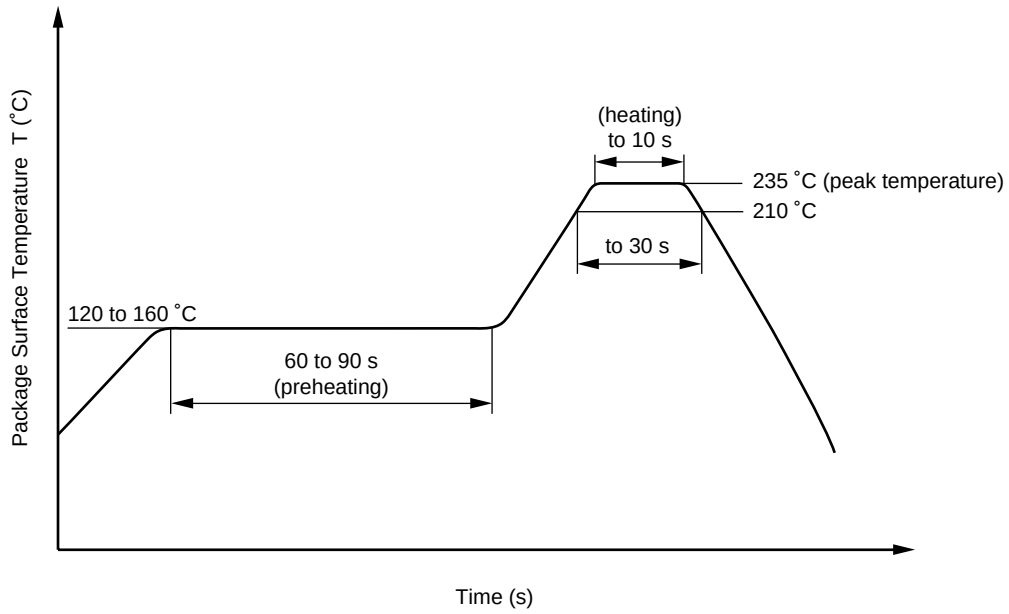
Remark The graphs indicate nominal characteristics.

RECOMMENDED SOLDERING CONDITIONS

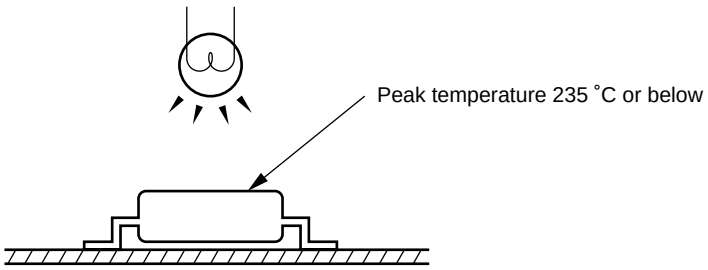
(1) Infrared reflow soldering

- Peak reflow temperature — 235 °C (package surface temperature)
- Time of temperature higher than 210 °C — 30 seconds or less
- Number of reflows — Three
- Flux — Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

Recommended Temperature Profile of Infrared Reflow



Caution Please avoid removing the residual flux by water after the first reflow process.



(2) Dip soldering

- Temperature — 260 °C or below (molten solder temperature)
- Time — 10 seconds or less
- Number of times — One
- Flux — Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

CAUTION

Within this device there exists GaAs (Gallium Arsenide) material which is a harmful substance if ingested. Please do not under any circumstances break the hermetic seal.

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