

PS2801C-1, PS2801C-4

HIGH ISOLATION VOLTAGE SSOP PHOTOCOUPLER

R08DS0072EJ0402

Rev.4.02

Oct 11, 2019

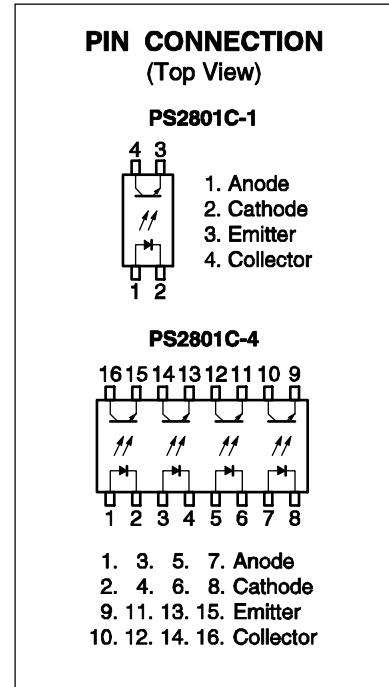
DESCRIPTION

These products are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor in a plastic SSOP for high density applications to realize an excellent cost performance.

This package has shield effect to cut off ambient light.

FEATURES

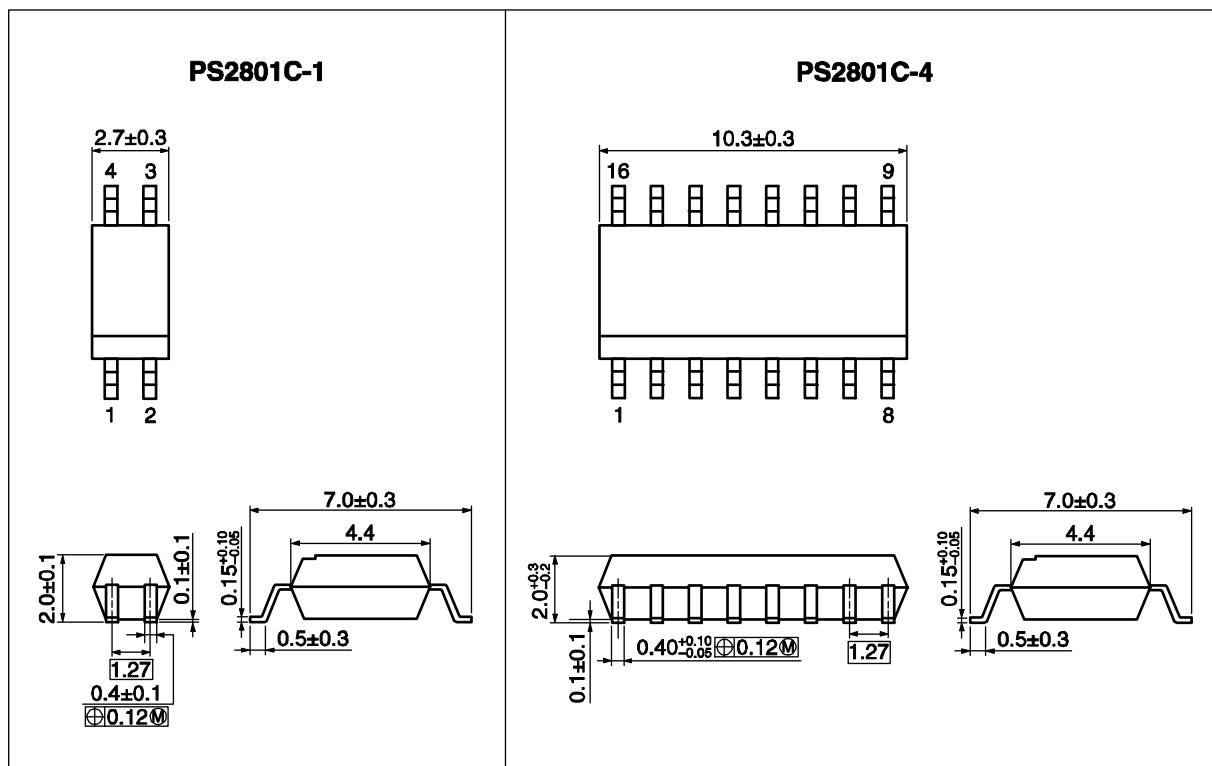
- High isolation voltage ($BV = 2\ 500\ V_{r.m.s.}$)
- Small and thin package (4, 16-pin SSOP, Pin pitch 1.27 mm)
- High collector to emitter voltage ($V_{CEO} : 80\ V$)
- Ordering number of tape product: PS2801C-1-F3, PS2801C-4-F3
- Pb-Free product
- Safety standards
 - UL approved: UL1577, Single protection
 - CSA approved: CAN/CSA-C22.2 No. 62368-1, Basic insulation
 - BSI approved: BS EN 62368-1, Basic/Supplementary insulation (PS2801C-1 only)
 - VDE approved: DIN EN 60747-5-5 (Option)



APPLICATIONS

- Programmable logic controllers
- Measuring instruments
- Power supply
- Hybrid IC

PACKAGE DIMENSIONS (UNIT: mm)



PHOTOCOUPLED CONSTRUCTION

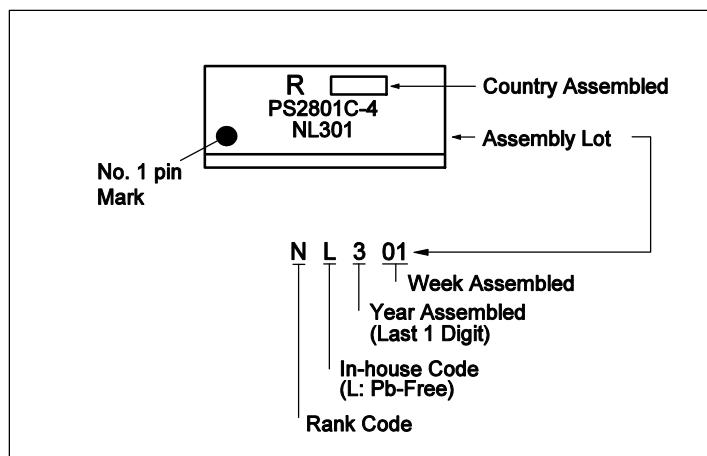
Parameter	Unit (MIN.)
Air Distance	4.5 mm
Creepage Distance	4.5 mm
Isolation Distance	0.1 mm

MARKING EXAMPLE

PS2801C-1

Made in Taiwan	<p>Company initial R1C 301</p> <p>Last 2 numbers of type No.: 1C</p> <p>Assembly Lot 301</p> <p>Week Assembled 01</p> <p>Year Assembled (Last 1 digit)</p>
Made in Japan	<p>R1C 301</p> <p>"□" (Square) :Made in Japan</p>

PS2801C-4



ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number ^{*1}	
PS2801C-1	PS2801C-1-A	Pb-Free	50 pcs (Tape 50 pcs cut)	Standard products (UL, CSA, BSI approved)	PS2801C-1	
PS2801C-1-F3	PS2801C-1-F3-A		Embossed Tape 3 500 pcs/reel			
PS2801C-4	PS2801C-4-A		10 pcs (Tape 10 pcs cut)	Standard products (UL, CSA approved)		
PS2801C-4-F3	PS2801C-4-F3-A		Embossed Tape 2 500 pcs/reel			
PS2801C-1-V	PS2801C-1-V-A		50 pcs (Tape 50 pcs cut)	UL, CSA, BSI, DIN EN 60747-5-5 approved		
PS2801C-1-V-F3	PS2801C-1-V-F3-A		Embossed Tape 3 500 pcs/reel			
PS2801C-4-V	PS2801C-4-V-A		10 pcs (Tape 10 pcs cut)	UL, CSA, DIN EN 60747-5-5 approved		
PS2801C-4-V-F3	PS2801C-4-V-F3-A		Embossed Tape 2 500 pcs/reel			

Note: *1. For the application of the Safety Standard, following part number should be used.

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

Parameter		Symbol	Ratings		Unit
			PS2801C-1	PS2801C-4	
Diode	Forward Current (DC)	I_F	30		mA/ch
	Reverse Voltage	V_R	6		V
	Power Dissipation Derating	$\Delta P_D/\text{°C}$	0.6	0.8	mW/°C
	Power Dissipation	P_D	60	80	mW/ch
	Peak Forward Current ^{*1}	I_{FP}	0.5		A/ch
Transistor	Collector to Emitter Voltage	V_{CEO}	80		V
	Emitter to Collector Voltage	V_{ECO}	5		V
	Collector Current	I_C	30		mA/ch
	Power Dissipation Derating	$\Delta P_C/\text{°C}$	1.2		mW/°C
	Power Dissipation	P_c	120		mW/ch
Isolation Voltage ^{*2}		BV	2 500		Vr.m.s.
Operating Ambient Temperature		T_A	−55 to +100		°C
Storage Temperature		T_{stg}	−55 to +150		°C

Notes: *1. PW = 100 μs , Duty Cycle = 1%

*2. AC voltage for 1 minute at $T_A = 25^\circ\text{C}$, RH = 60% between input and output.

Pins 1-2 shorted together, 3-4 shorted together (PS2801C-1).

Pins 1-8 shorted together, 9-16 shorted together (PS2801C-4).

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	$I_F = 5 \text{ mA}$		1.2	1.4	V
	Reverse Current	I_R	$V_R = 5 \text{ V}$			5	μA
	Terminal Capacitance	C_t	$V = 0 \text{ V}, f = 1.0 \text{ MHz}$		10		pF
Transistor	Collector to Emitter Dark Current	I_{CEO}	$V_{CE} = 80 \text{ V}, I_F = 0 \text{ mA}$			100	nA
Coupled	Current Transfer Ratio (I_C/I_F) *1	CTR	$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}$	50		400	%
	Collector Saturation Voltage	$V_{CE(\text{sat})}$	$I_F = 10 \text{ mA}, I_C = 2 \text{ mA}$		0.13	0.3	V
	Isolation Resistance	R_{I-O}	$V_{I-O} = 1.0 \text{ kV}_{\text{DC}}$	10^{11}			Ω
	Isolation Capacitance	C_{I-O}	$V = 0 \text{ V}, f = 1.0 \text{ MHz}$		0.4		pF
	Rise Time *2	t_r	$V_{CC} = 5 \text{ V}, I_C = 2 \text{ mA}, R_L = 100 \Omega$		5		μs
	Fall Time *2	t_f			7		
	Turn-on Time *2	t_{on}			10		
	Turn-off Time *2	t_{off}			7		

Notes: *1. CTR rank

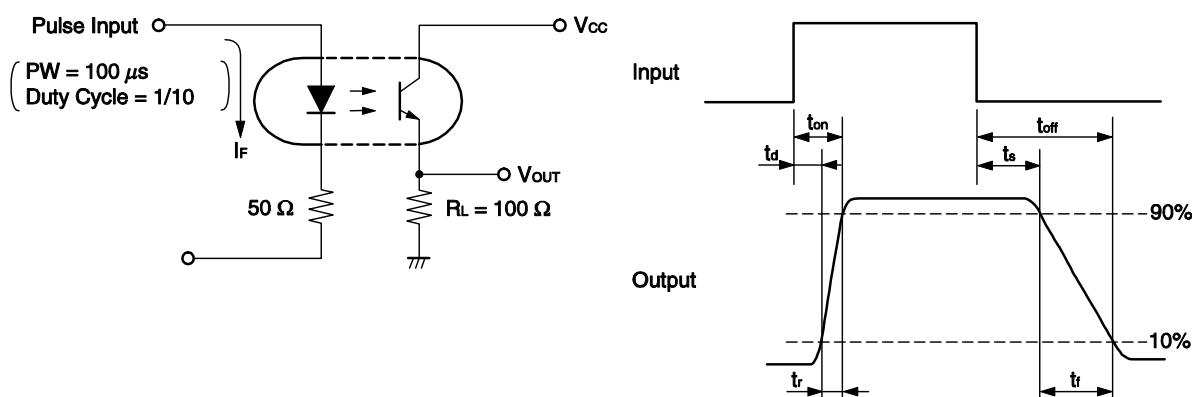
PS2801C-1

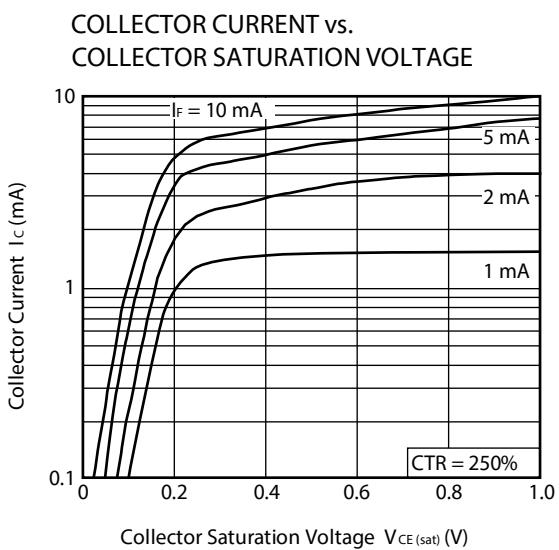
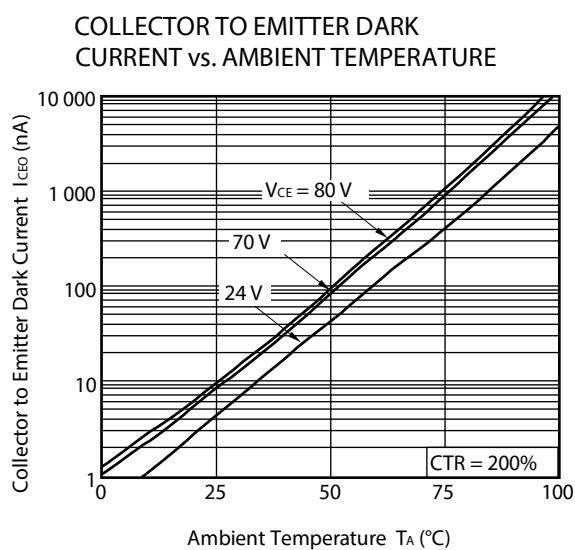
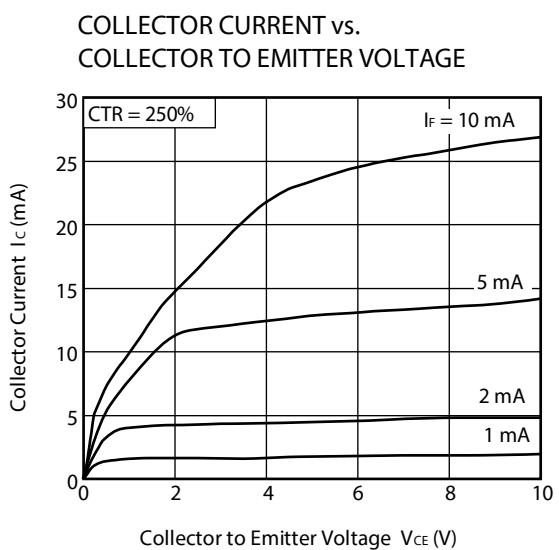
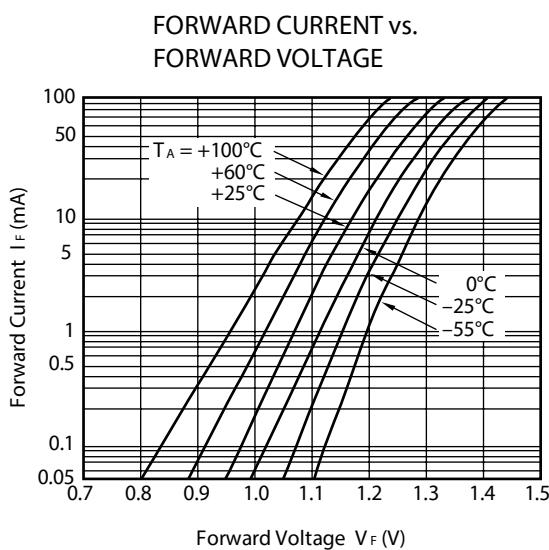
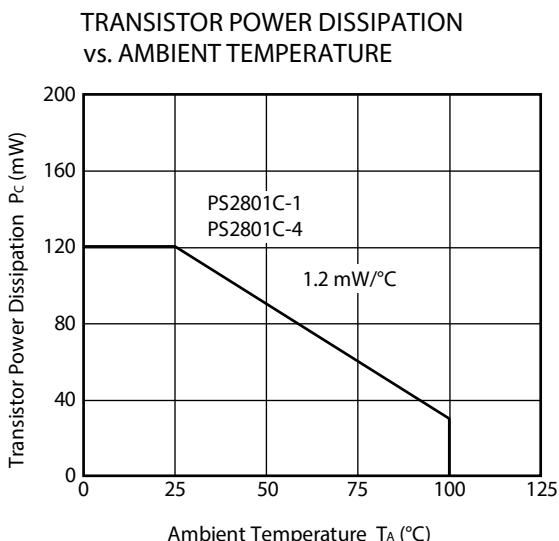
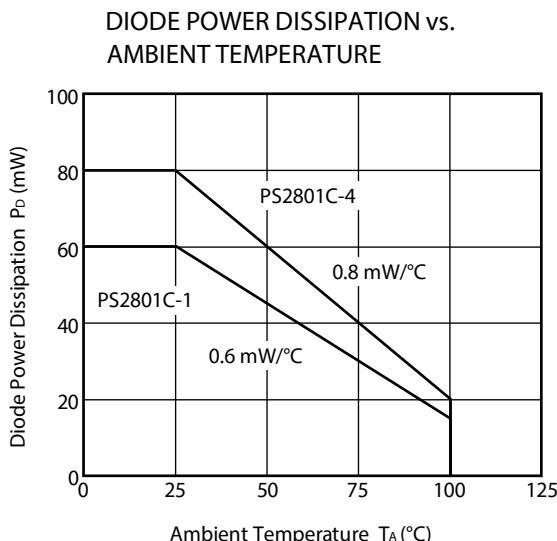
N : 50 to 400 (%)
P : 150 to 300 (%)
L : 100 to 300 (%)
M : 100 to 400 (%)

PS2801C-4

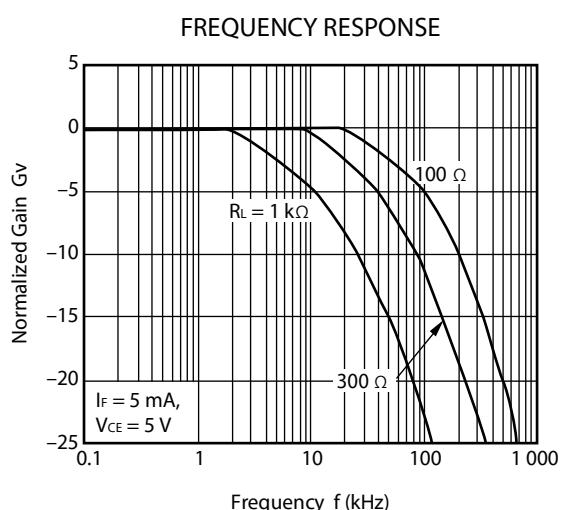
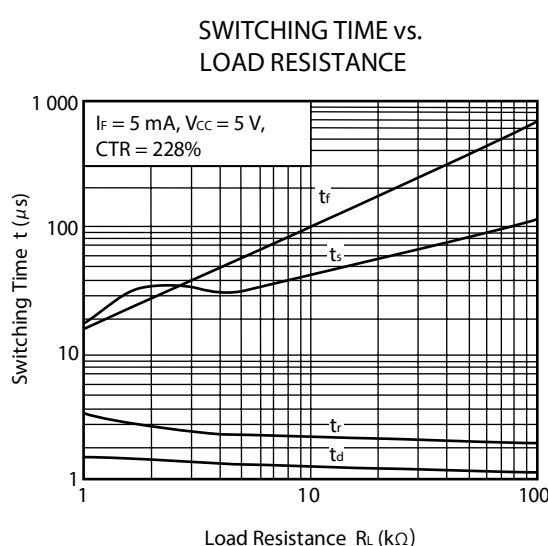
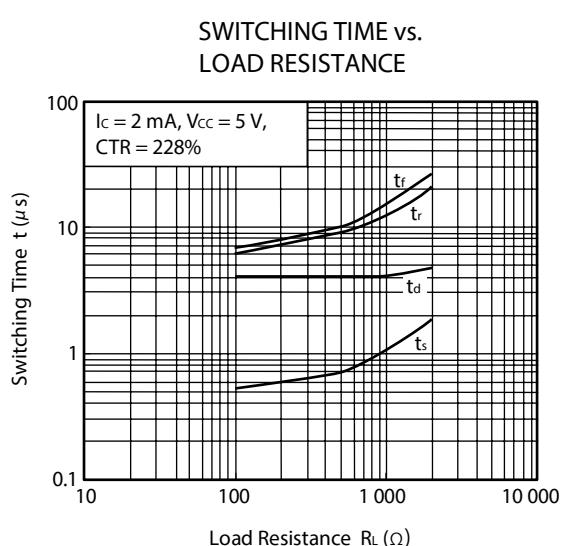
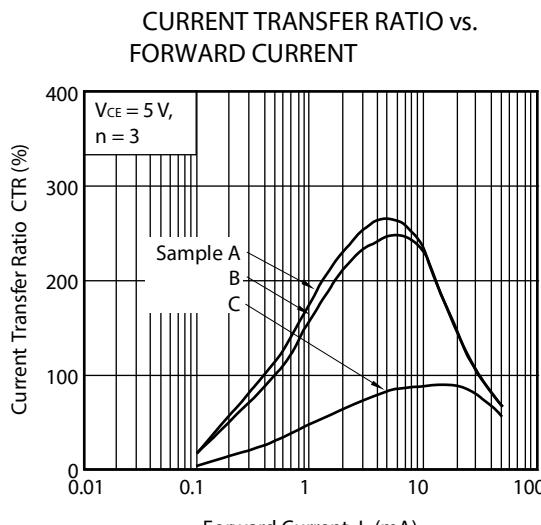
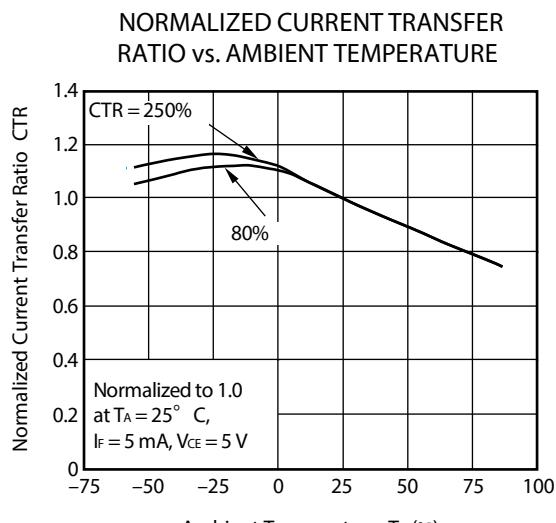
N : 50 to 400 (%)
M : 100 to 400 (%)

*2. Test circuit for switching time



TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

Remark The graphs indicate nominal characteristics.

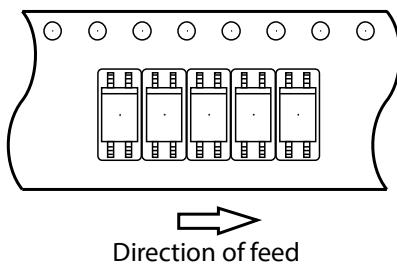


Remark The graphs indicate nominal characteristics.

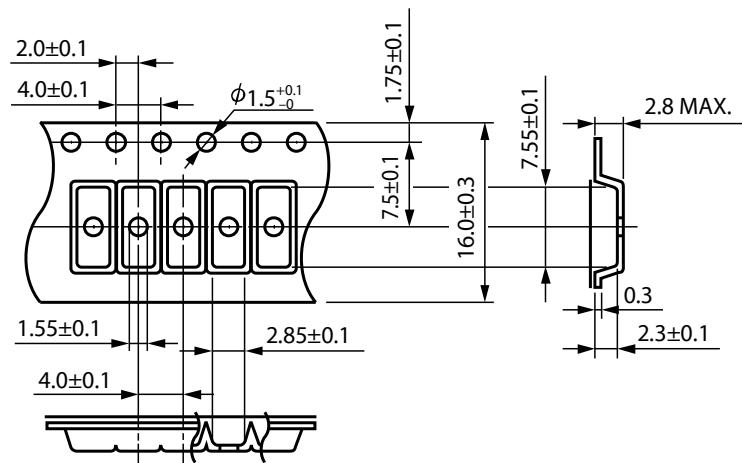
TAPING SPECIFICATIONS (UNIT: mm)

Tape Direction

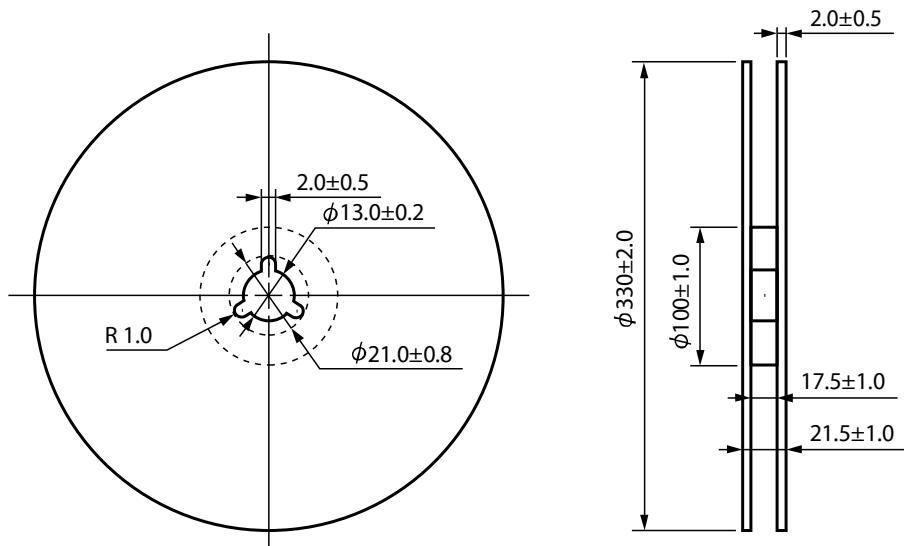
PS2801C-1-F3



Outline and Dimensions (Tape)

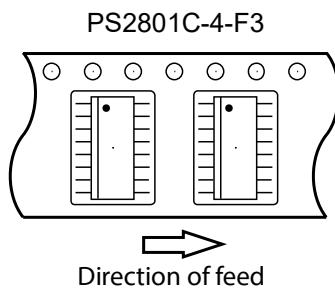


Outline and Dimensions (Reel)

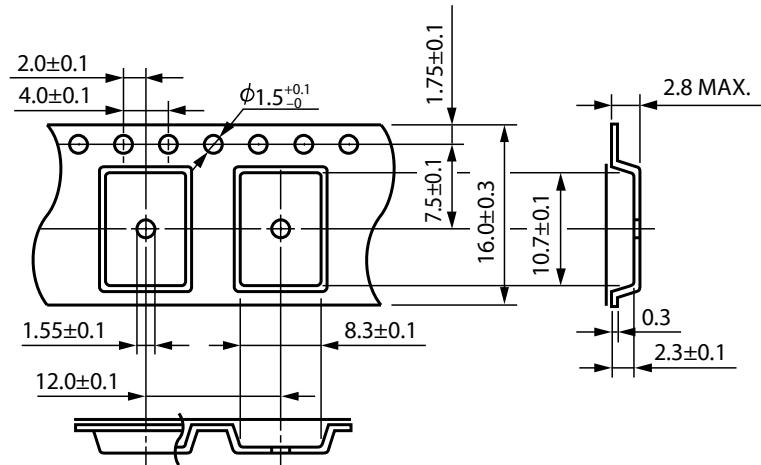


Packing: 3 500 pcs/reel

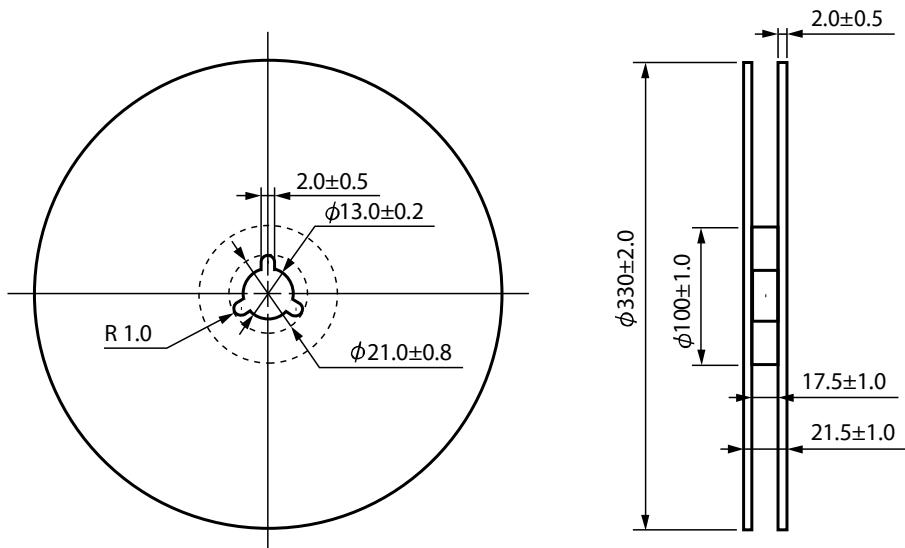
Tape Direction



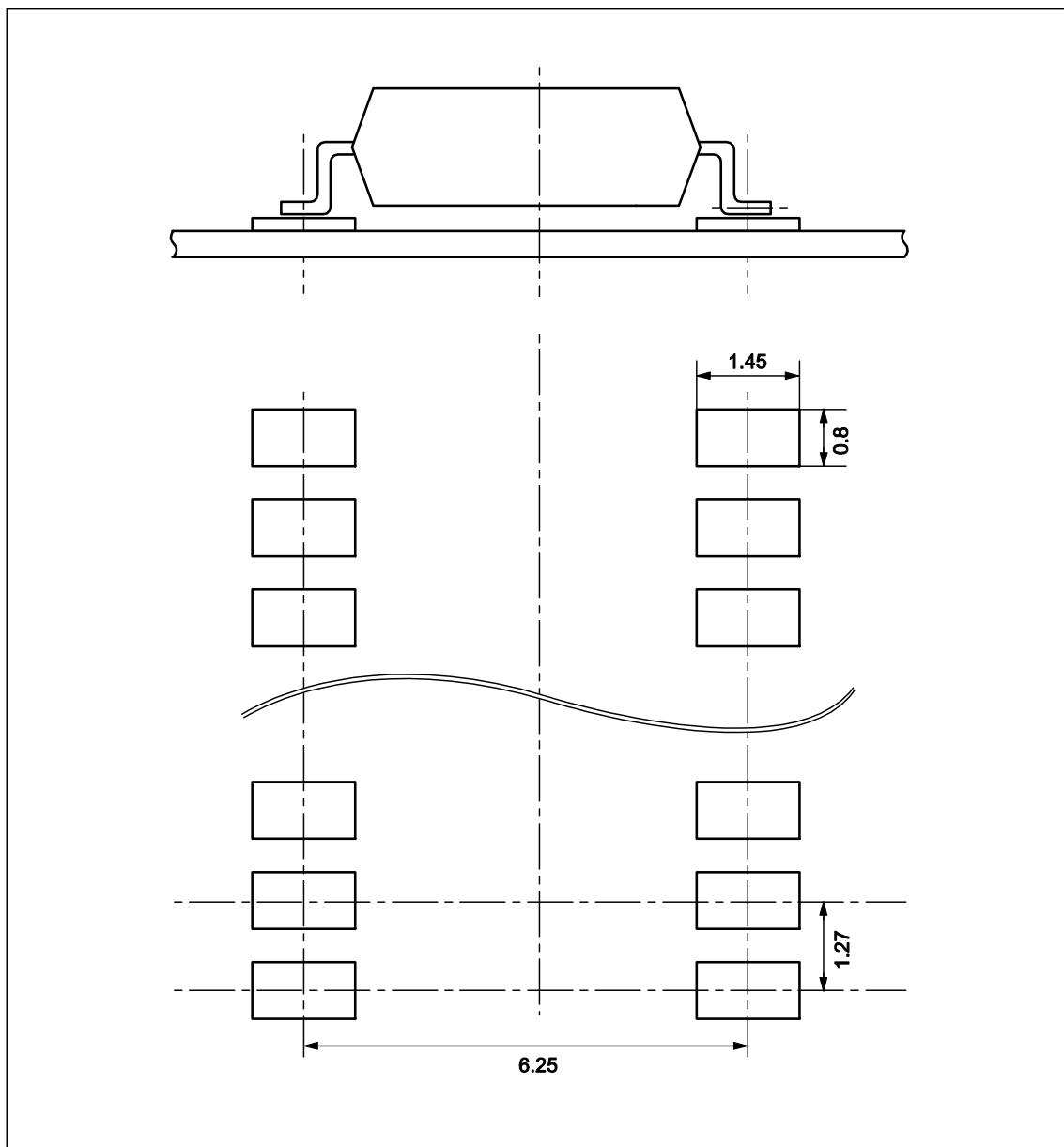
Outline and Dimensions (Tape)



Outline and Dimensions (Reel)



Packing: 2 500 pcs/reel

RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)

Remark All dimensions in this figure must be evaluated before use.

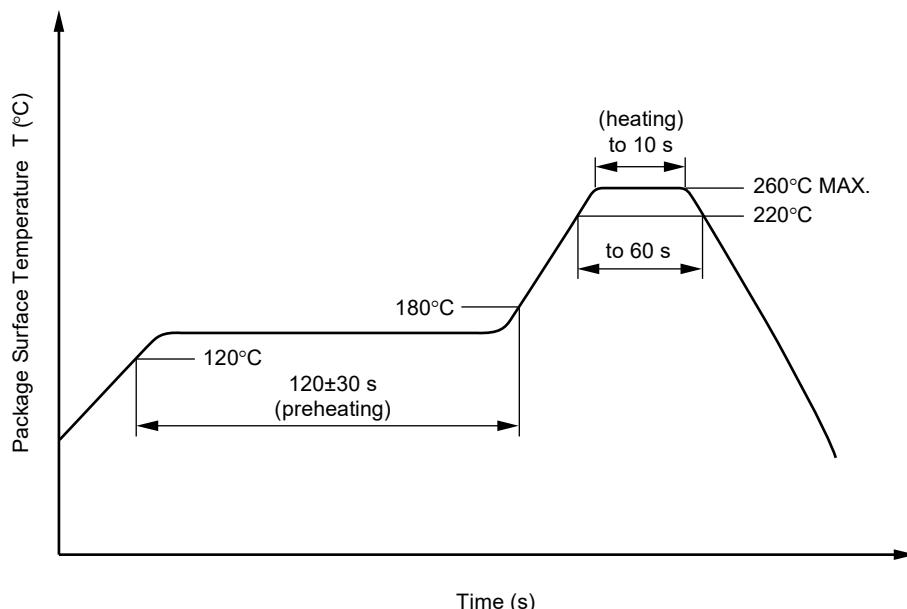
NOTES ON HANDLING

1. Recommended soldering conditions

(1) Infrared reflow soldering

• Peak reflow temperature	260°C or below (package surface temperature)
• Time of peak reflow temperature	10 seconds or less
• Time of temperature higher than 220°C	60 seconds or less
• Time to preheat temperature from 120 to 180°C	120±30 s
• 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



(2) Wave soldering

• Temperature	260°C or below (molten solder temperature)
• Time	10 seconds or less
• Preheating conditions	120°C or below (package surface temperature)
• Number of times	One (Allowed to be dipped in solder including plastic mold portion.)
• Flux	Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(3) Soldering by Soldering Iron

• Peak Temperature (lead part temperature)	350°C or below
• Time (each pins)	3 seconds or less
• Flux	Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

- (a) Soldering of leads should be made at the point 1.5 to 2.0 mm from the root of the lead
- (b) Please be sure that the temperature of the package would not be heated over 100°C

(4) Cautions

• Flux Cleaning

Avoid cleaning with Freon based or halogen-based (chlorinated etc.) solvents.

• Do not use fixing agents or coatings containing halogen-based substances.

2. Cautions regarding noise

Be aware that when voltage is applied suddenly between the photocoupler's input and output or between collector-emitters at startup, the output transistor may enter the on state, even if the voltage is within the absolute maximum ratings.

3. Measurement conditions of current transfer ratios (CTR), which differ according to photocoupler

Check the setting values before use, since the forward current conditions at CTR measurement differ according to product.

When using products other than at the specified forward current, the characteristics curves may differ from the standard curves due to CTR value variations or the like. This tendency may sometimes be obvious, especially below $I_F = 1$ mA.

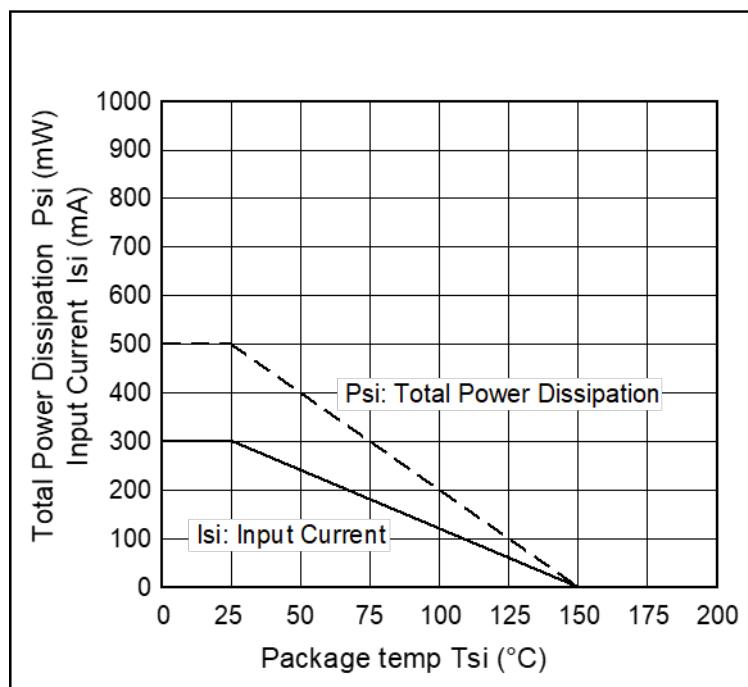
Therefore, check the characteristics under the actual operating conditions and thoroughly take variations or the like into consideration before use.

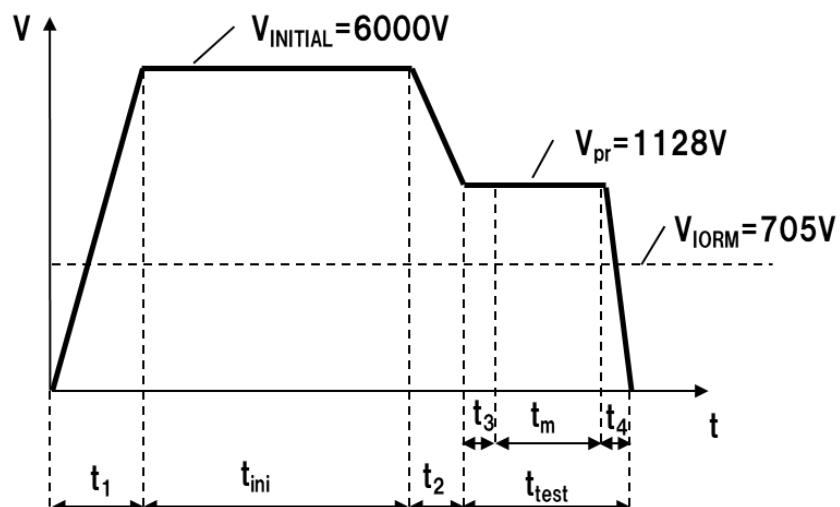
USAGE CAUTIONS

1. Protect against static electricity when handling.
2. Avoid storage at a high temperature and high humidity.

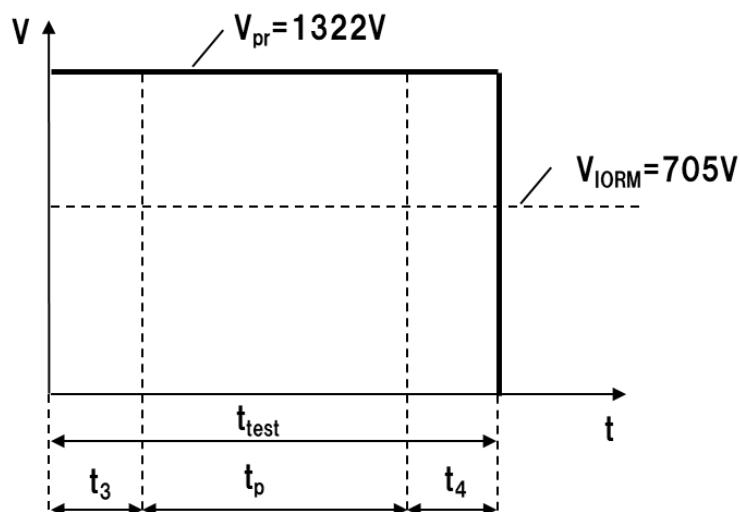
SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

Parameter	Symbol	Rating	Unit
Climatic test class (IEC 60068-1/DIN EN 60068-1)		55/100/21	
Dielectric strength maximum operating isolation voltage Test voltage (partial discharge test, procedure a for type test and random test) $U_{pr} = 1.6 \times U_{IORM}$, $P_d < 5 \text{ pC}$	U_{IORM} U_{pr}	705 1 128	V _{peak} V _{peak}
Test voltage (partial discharge test, procedure b for all devices) $U_{pr} = 1.875 \times U_{IORM}$, $P_d < 5 \text{ pC}$	U_{pr}	1 322	V _{peak}
Highest permissible overvoltage	U_{IOTM}	6 000	V _{peak}
Degree of pollution (IEC 60664-1/DIN EN 60664-1 (VDE 0110-1))		2	
Comparative tracking index (IEC 60112/DIN EN 60112 (VDE 0303-11))	CTI	175	
Material group (IEC 60664-1/DIN EN 60664-1 (VDE 0110-1))		III a	
Storage temperature range	T_{stg}	-55 to +150	°C
Operating temperature range	T_A	-55 to +100	°C
Isolation resistance, minimum value $V_{IO} = 500 \text{ V dc at } T_A = 25^\circ\text{C}$ $V_{IO} = 500 \text{ V dc at } T_A \text{ MAX. at least } 100^\circ\text{C}$	R _{is MIN.} R _{is MIN.}	10^{12} 10^{11}	Ω Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve) Package temperature Current (input current I_F , $\Psi_i = 0$) Power (output or total power dissipation) Isolation resistance $V_{IO} = 500 \text{ V dc at } T_A = T_{si}$	T_{si} I_{si} Ψ_i R _{is MIN.}	150 300 500 10^9	°C mA mW Ω

Dependence of maximum safety ratings with package temperature

Method a) Destructive Test, Type and Sample Test

$t_1, t_2 = 1 \text{ to } 10 \text{ sec}$
 $t_3, t_4 = 1 \text{ sec}$
 $t_m (\text{PARTIAL DISCHARGE}) = 10 \text{ sec}$
 $t_{test} = 12 \text{ sec}$
 $t_{ini} = 60 \text{ sec}$

Method b) Non-destructive Test, 100% Production Test

$t_3, t_4 = 0.1 \text{ sec}$
 $t_p (\text{PARTIAL DISCHARGE}) = 1.0 \text{ sec}$
 $t_{test} = 1.2 \text{ sec}$

Caution	<p>GaAs Products</p> <p>This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.</p> <ul style="list-style-type: none">• Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below.1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials.2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal.• Do not burn, destroy, cut, crush, or chemically dissolve the product.• Do not lick the product or in any way allow it to enter the mouth.
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Renesas Electronics Corporation

TOYOSU FORESIA, 3-2-24 Toyosu, Koto-ku, Tokyo 135-0061, Japan

Renesas Electronics America Inc.

1001 Murphy Ranch Road, Milpitas, CA 95035, U.S.A.

Tel: +1-408-432-8888, Fax: +1-408-434-5351

Renesas Electronics Canada Limited

9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3

Tel: +1-905-237-2004

Renesas Electronics Europe GmbH

Arcadiastrasse 10, 40472 Düsseldorf, Germany

Tel: +49-211-6503-0, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.

Room 101-T01, Floor 1, Building 7, Yard No. 7, 8th Street, Shangdi, Haidian District, Beijing 100085, China

Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.

Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai 200333, China

Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited

Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong

Tel: +852-2265-6688, Fax: +852 2886-9022

Renesas Electronics Taiwan Co., Ltd.

13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan

Tel: +886 2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.

80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949

Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.

Unit No 3A-1 Level 3A Tower 8 UOA Business Park, No 1 Jalan Pengaturcara U1/51A, Seksyen U1, 40150 Shah Alam, Selangor, Malaysia

Tel: +60-3-5022-1288, Fax: +60-3-5022-1290

Renesas Electronics India Pvt. Ltd.

No.777C, 100 Feet Road, HAL 2nd Stage, Indiranagar, Bangalore 560 038, India

Tel: +91-80-67208700

Renesas Electronics Korea Co., Ltd.

17F, KAMCO Yangjae Tower, 262, Gangnam-daero, Gangnam-gu, Seoul, 06265 Korea

Tel: +82-2-558-3737, Fax: +82-2-558-5338