NEC

PHOTO COUPLERS
PS2532 -1, -2, -4
PS2532L-1, -2, -4

HIGH COLLECTOR TO EMITTER VOLTAGE DARLINGTON TRANSISTOR TYPE MULTI PHOTO COUPLER SERIES

– NEPOC SERIES –

DESCRIPTION

PS2532-1, -2, -4 and PS2532L-1, -2, -4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon darlington connected photo transistor.

PS2532-1, -2, -4 are in a plastic DIP (Dual In-line Package) and PS2532L-1, -2, -4 are lead bending type (Gull-wing) for surface mount.

FEATURES

- High isolation voltage
  5 000 $V_{r.m.s.}$: normal speck products
  3 750 $V_{r.m.s.}$: VDE0884 speck products (option*)
- High collector to emitter voltage (V_{CEO}: 300 V MIN.)
- Ultra High current transfer ratio (CTR: 1 500 % MIN.)
- High speed switching (t_r, t_f = 100 μs TYP.)
- Taping Product name (PS2532L-1-E3, E4, F3, F4)
  (PS2532L-2-E3, E4)
- UL recognized [File No. E72422 (S)]
- VDE0884 recognized (option)

APPLICATIONS

- AC Line/Digital Line
- Telephone/Telegraph Receiver
- FAX

ORDERING INFORMATION

ORDER CODE	PACKAGE	SAFETY STANDARD APPROVAL
PS2532-1 PS2532-2 PS2532-4	4 pin DIP 8 pin DIP 16 pin DIP	Normal specks products • UL Approved
PS2532L-1 PS2532L-2 PS2532L-4	4 pin DIP (Lead bending type) 8 pin DIP (Lead bending type) 16 pin DIP (Lead bending type)	
PS2532L1-1, PS2532L2-1 PS2532L1-2, PS2532L2-2	Lead bending type 4 pin DIP (for long distance) 8 pin DIP (for long distance)	
PS2532-1-V PS2532-2-V PS2532-4-V	4 pin DIP 8 pin DIP 16 pin DIP	VDE0884 specks products • VDE Approved
PS2532L-1-V PS2532L-2-V PS2532L-4-V	4 pin DIP (Lead bending type) 8 pin DIP (Lead bending type) 16 pin DIP (Lead bending type)	
PS2532L1-1-V, PS2532L2-1-V PS2532L1-2-V, PS2532L2-2-V	Lead bending type 4 pin DIP (for long distance) 8 pin DIP (for long distance)	

Document No. P11434EJ3V0DS00 (3rd editon)
Date Published November 1996 P
Printed in Japan

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

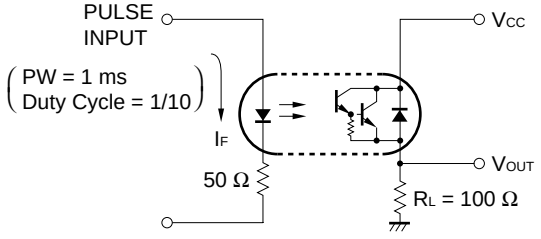
		(PS2532-1) (PS2532L-1)	(PS2532-2, -4) (PS2532L-2, -4)	
Diode				
Reverse Voltage	V_R	6	6	V
Forward Current (DC)	I_F	80	80	mA
Power Dissipation Derating	ΔP_D/°C	1.5	1.2	mW/°C
Power Dissipation	P_D	150	120	mW/Channel
Peak Forward Current (PW = 100 μs, Duty Cycle 1 %)	$I_{F(Peak)}$	1	1	A
Transistor				
Collector to Emitter Voltage	V_{CEO}	300	300	V
Emitter to Collector Voltage	V_{ECO}	0.6	0.6	V
Power Dissipation Derating	ΔP_C/°C	3.0	2.4	mW/°C
Collector Current	I_C	150	150	mA
Power Dissipation	P_C	300	240	mW/Channel
Coupled				
Isolation Voltage*1 (Normal Speck Products)	BV	5 000		$V_{r.m.s.}$
Isolation Voltage*1 (VDE0884 Speck Products)	BV	3 750		$V_{r.m.s.}$
Storage Temperature	T_{stg}	–55 to +150		°C
Operating Temperature	T_{opt}	–55 to +100		°C
Lead Temperature (Soldering 10 s)	T_{sol}	260		°C

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

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

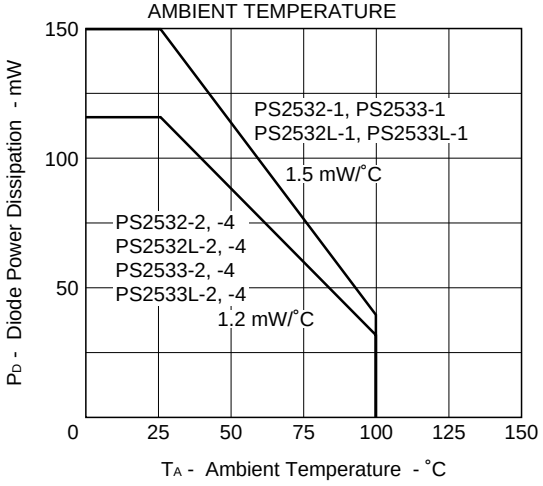
CHARACTERISTIC		SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Diode	Forward Voltage	V_F		1.15	1.4	V	I_F = 10 mA
	Reverse Current	I_R			5	μA	V_R = 5 V
	Junction Capacitance	C		30		pF	V = 0, f = 1.0 MHz
Transistor	Collector to Emitter Dark Current	I_{CEO}			400	nA	V_{CE} = 300 V, I_F = 0
Coupled	Current Transfer Ratio	CTR	1 500	4 000	6 500	%	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_{DC}
	Isolation Capacitance	C_{1-2}		0.6		pF	V = 0, f = 1.0 MHz
	Rise Time*2	t_r		100		μs	V_{CC} = 5 V, I_C = 10 mA
	Fall Time*2	t_f		100		μs	V_{CC} = 5 V, I_C = 10 mA

***2** Test Circuit for Switching Time

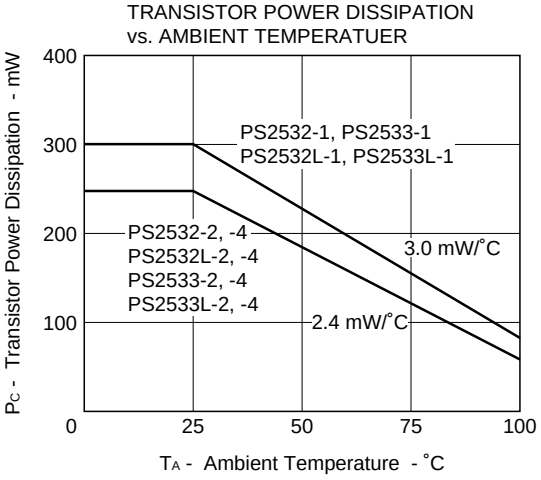


TYPICAL CHARACTERISTICS (T_A = 25 °C)

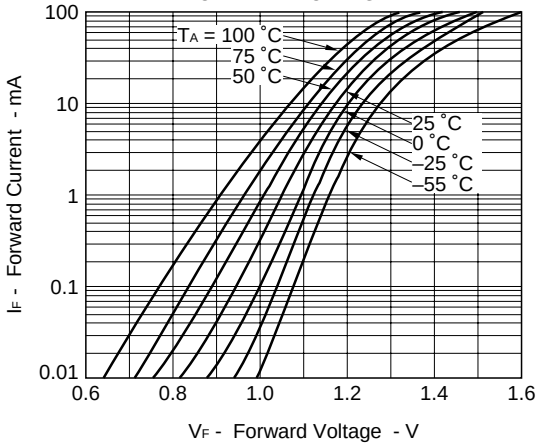
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



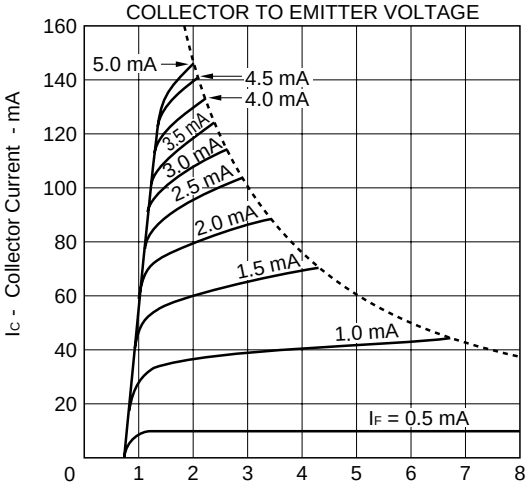
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATUER



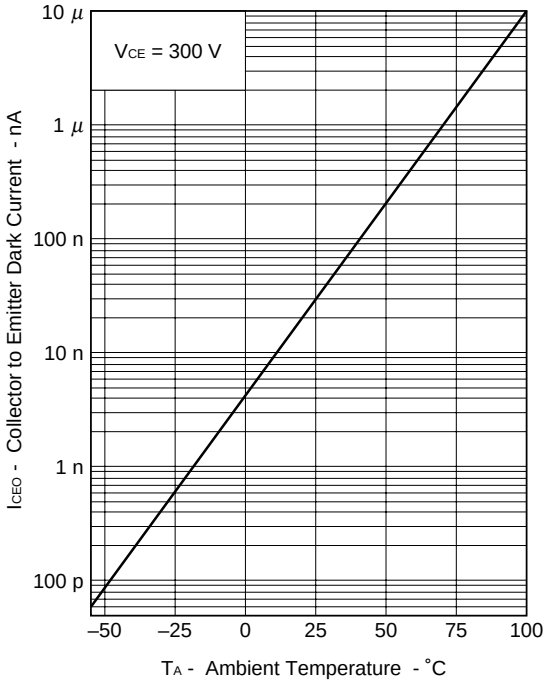
FORWARD CURRENT vs. FORWARD VOLTAGE



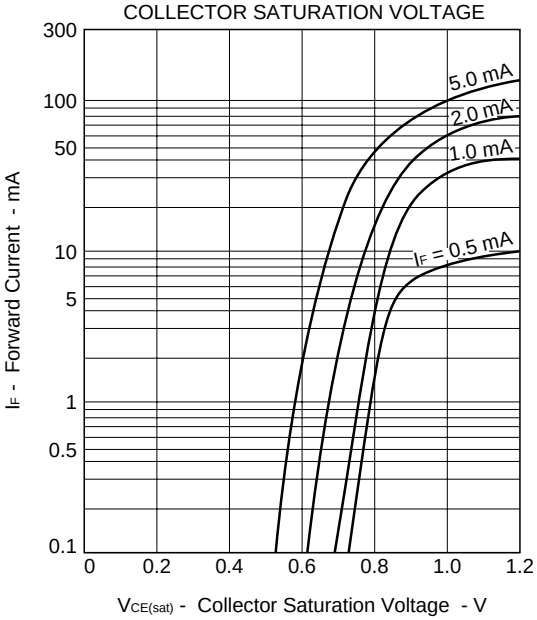
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



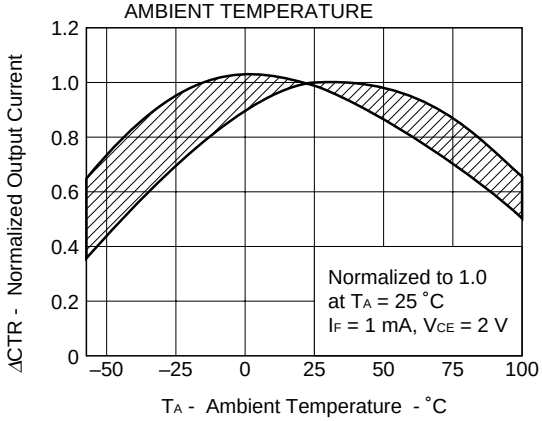
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



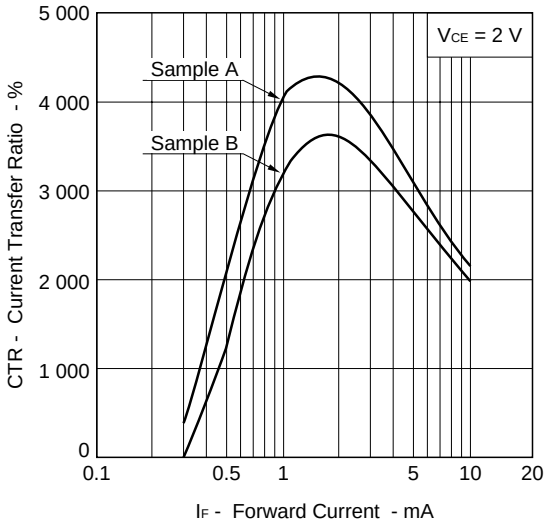
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



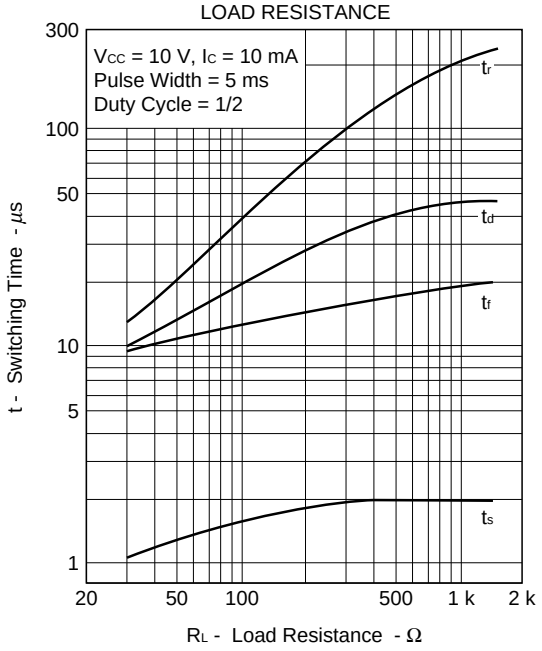
NORMALIZED OUTPUT CURRENT vs.
AMBIENT TEMPERATURE



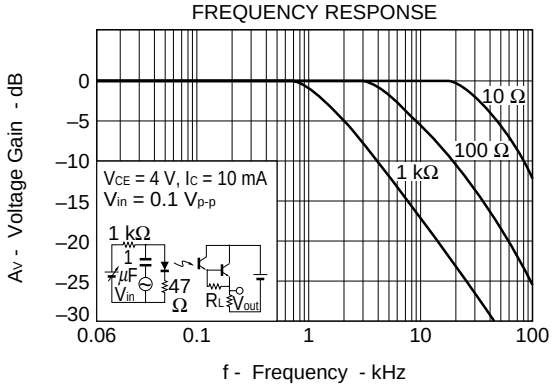
CURRENT TRANSFER RATIO (CTR)
vs. FORWARD CURRENT



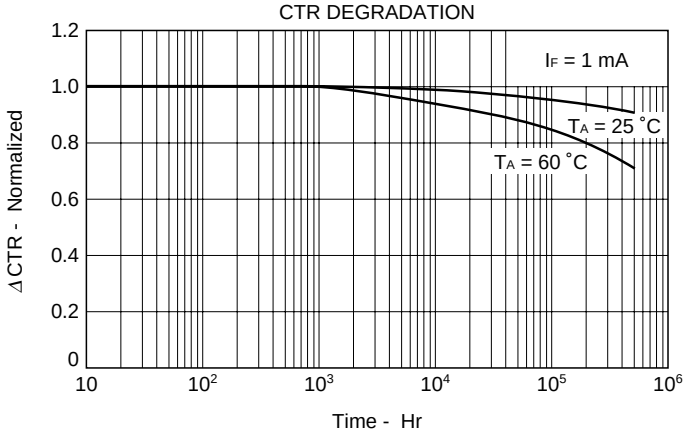
SWITCHING TIME vs.
LOAD RESISTANCE



FREQUENCY RESPONSE



CTR DEGRADATION

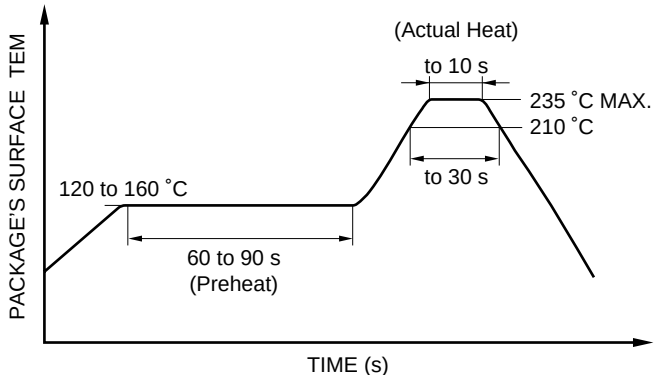


SOLDERING PRECAUTION

(1) Infrared reflow soldering

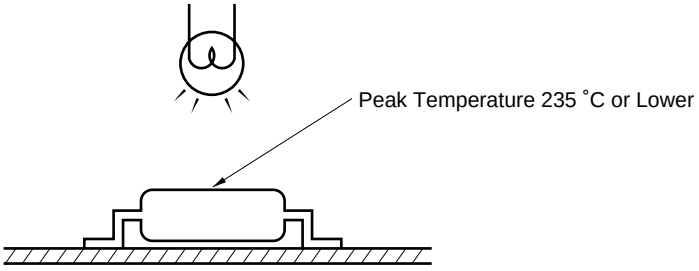
- Peak temperature : 235 °C or lower (plastic surface)
- Time : 30 s or less
  (Time during plastic surface temperature overs 210 °C)
- No. of reflow times: They
- Flux : Rosin-base flux

INFRARED RAY REFLOW TEMPERATURE PROFILE



<NOTES>

Please avoid to be removed the residual flux by water after the first reflow processes.



(2) Dip soldering

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

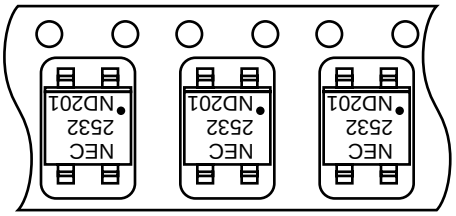
SPECIFICATION OF VDE MARKS LICENSE DOCUMENT (VDE0884)

PARAMETER	SYMBOL	SPECK	UNIT
Application classification (DIN VDE0109) for rated line voltages ≤ 300 V_{eff} for rated line voltages ≤ 600 V_{eff}		 IV III	
Climatic test class (DIN 68 Teil 1/09.80)		55/100/21	
Dielectric strength maximum operating isolation voltage. Test voltage (partial discharge, test procedure a for type test and random test) $U_{pr} = 1.2 \times U_{IORM}$, Pd < 5 pC	 U_{IORM} U_{pr}	 890 1 068	 V_{peak} V_{peak}
Test voltage (partial discharge, test procedure b for random test) $U_{pr} = 1.6 \times U_{IORM}$, Pd < 5 pC	U_{pr}	1 424	V_{peak}
Highest permissible overvoltage	U_{TR}	6 000	V_{peak}
Degree of pollution (DIN VDE0109)		2	
Clearance distance		> 7.0	mm
Creepage distance		> 7.0	mm
Comparative tracking index (DIN IEC 112/VDE0303 part 1)	CTI	175	
Material group (DIN VDE0109)		IIIa	
Storage temperature range	T_{stg}	–55 to +150	Cel
Operating temperature range	T_{amb}	–55 to +100	Cel
Isolation resistance, minimum value U_{IO} = 500 V dc at 25 Cel U_{IO} = 500 V dc at $T_{amp\ maximum}$ at least 100 Cel	 Ris min Ris min	 10^{12} 10^{11}	 ohm ohm
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve) Package temperature Current (input current IF, Psi = 0) Power (output or total power dissipation) Isolation resistance U_{IO} = 500 V dc at 175 Cel (Tsi)	 Tsi Isi Psi Ris min	 175 400 700 10^{9}	 Cel mA mW ohm

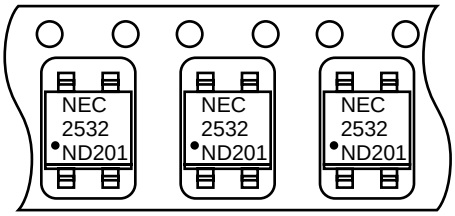
- **4 PIN DIP Type (Lead bending; –1 channel) Taping**

1. TAPING DIRECTION

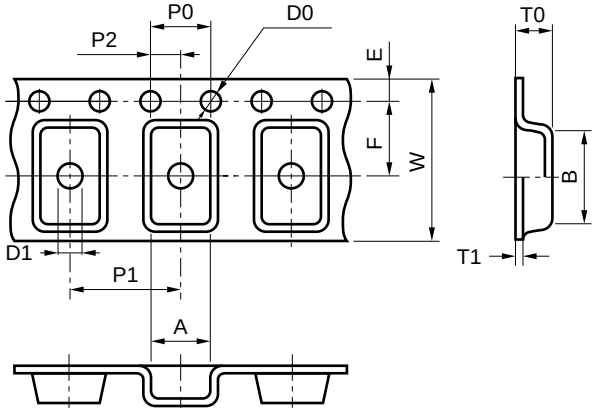
PS2532L-1-E3, F3



PS2532L-1-E4, F4



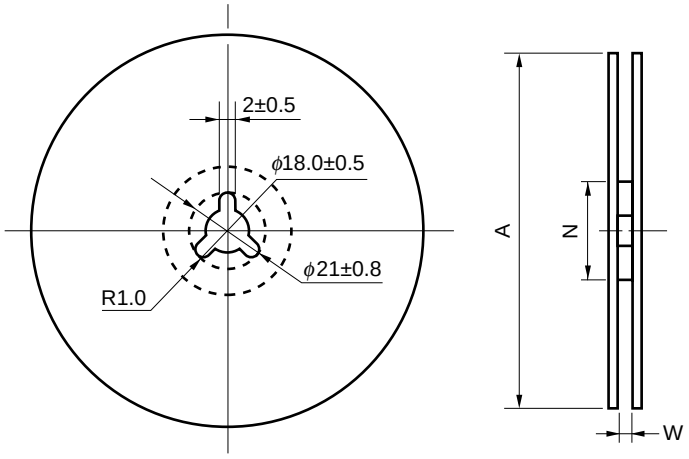
2. OUTLINE AND DIMENSIONS (;TYPE)



Unit: mm

SYMBOL	RATINGS
A	5.6 ± 0.1
B	10.3 ± 0.1
D0	1.55 ± 0.1
D1	1.55 ± 0.1
E	1.75 ± 0.1
F	7.5 ± 0.1
P0	4 ± 0.1
P1	8 ± 0.1
P2	2 ± 0.1
T0	4.3 ± 0.2
T1	0.3
W	16 ± 0.3

3. OUTLINE AND DIMENSIONS (;REEL)



Unit: mm

SYMBOL	RATINGS	
A	E3, E4	F3, F4
	φ250	φ330
N	φ80 ± 5.0	
W	$16.4^{+2.0}_{-0}$	

4. PACKING

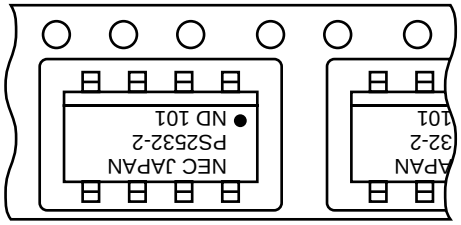
E3, E4; 1 000 pieces/reel

F3, F4; 2 000 pieces/reel

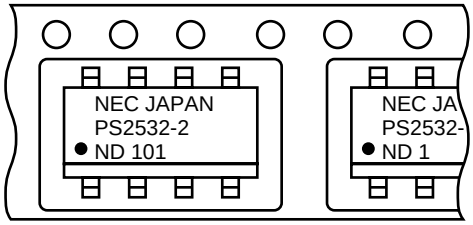
• **8 PIN DIP Type (Lead bending; –2 channel) Taping**

1. TAPING DIRECTION

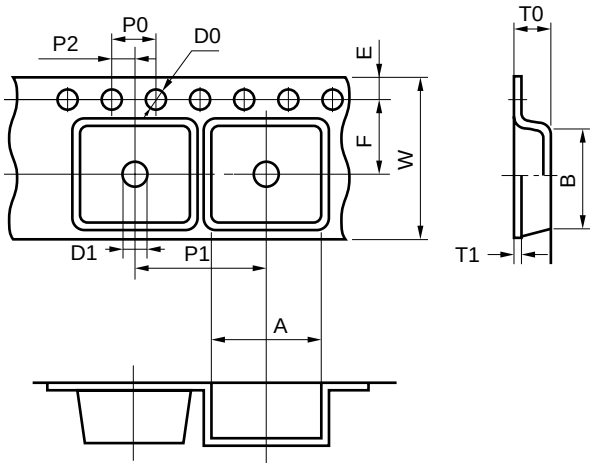
PS2532L-2-E3



PS2532L-2-E4



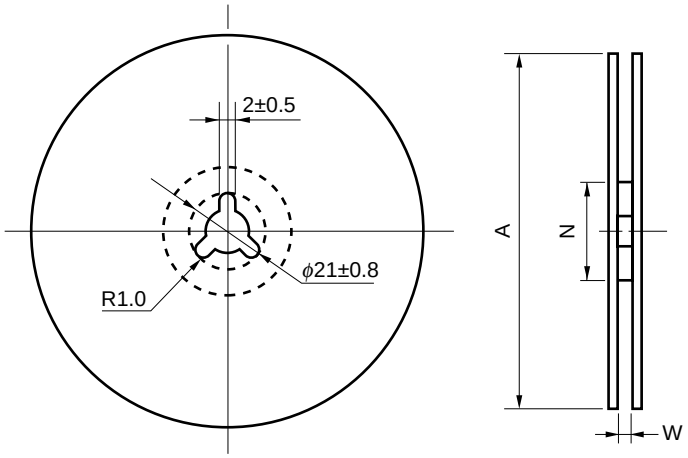
2. OUTLINE AND DIMENSIONS (;TYPE)



Unit: mm

SYMBOL	RATINGS
A	10.7 ± 0.1
B	10.3 ± 0.1
D0	1.55 ± 0.1
D1	1.55 ± 0.1
E	1.75 ± 0.1
F	7.5 ± 0.1
P0	4.0 ± 0.1
P1	12.0 ± 0.1
P2	2.0 ± 0.1
T0	4.3 ± 0.2
T1	0.3
W	16 ± 0.3

3. OUTLINE AND DIMENSIONS (;REEL)



Unit: mm

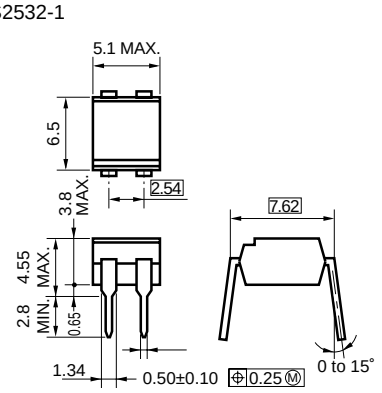
SYMBOL	RATINGS
A	330
N	80 ± 5.0
W	$16.4^{+2.0}_{-0}$

4. PACKING

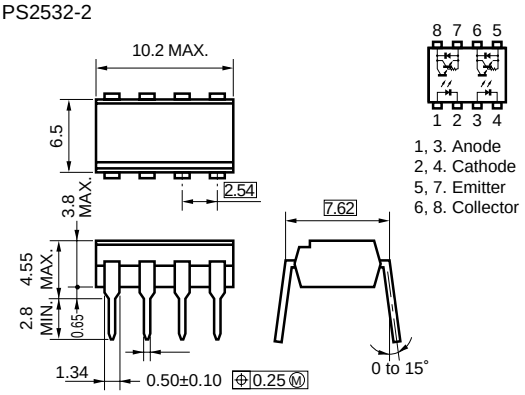
E3, E4; 1 000 pieces/reel

PACKAGE DIMENSIONS (Unit: mm) **DIP (Dual In-line Package)**

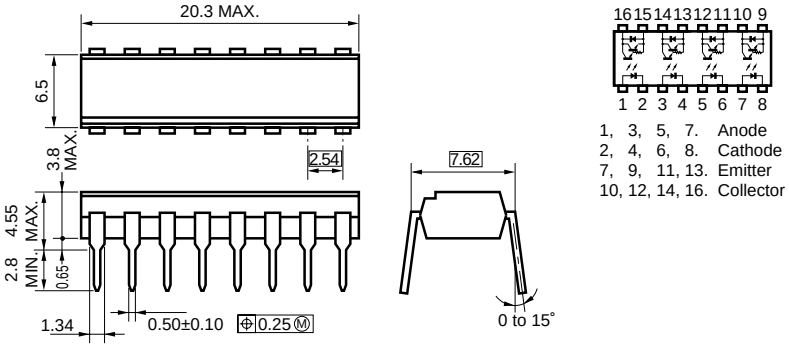
PS2532-1



PS2532-2

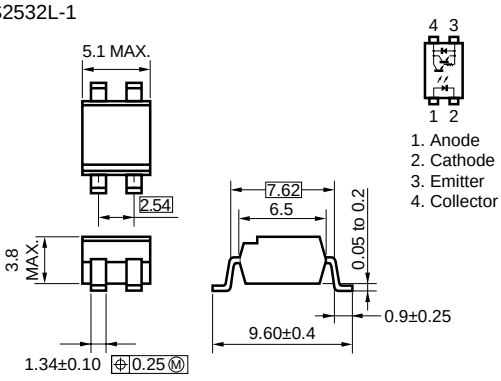


PS2532-4

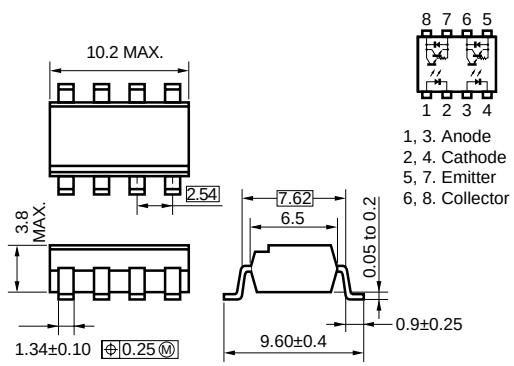


PACKAGE DIMENSIONS (Unit: mm) **Lead Bending type (Gull-wing)**

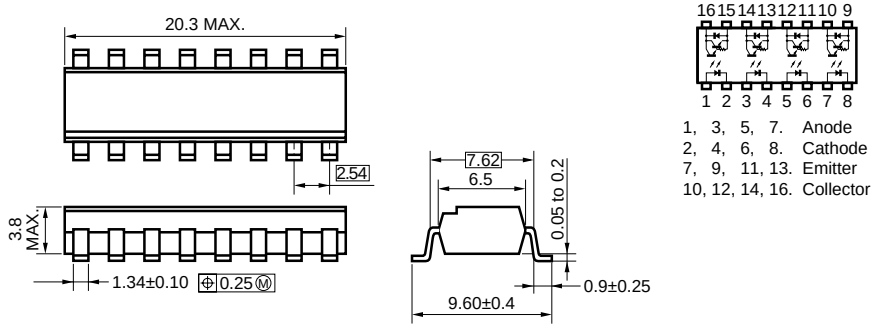
PS2532L-1



PS2532L-2

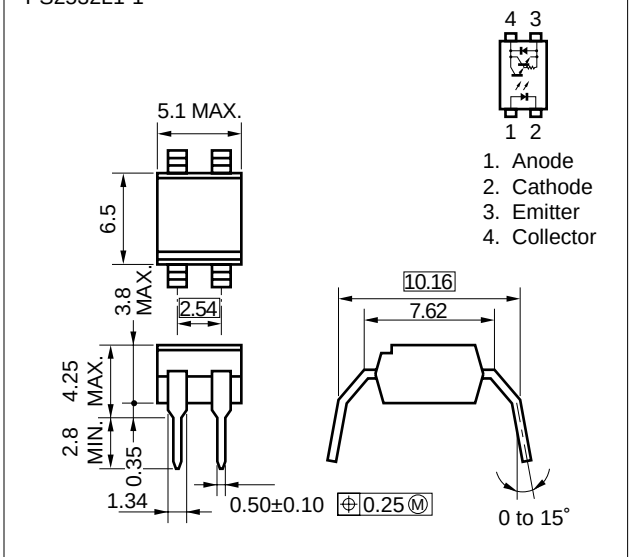


PS2532L-4

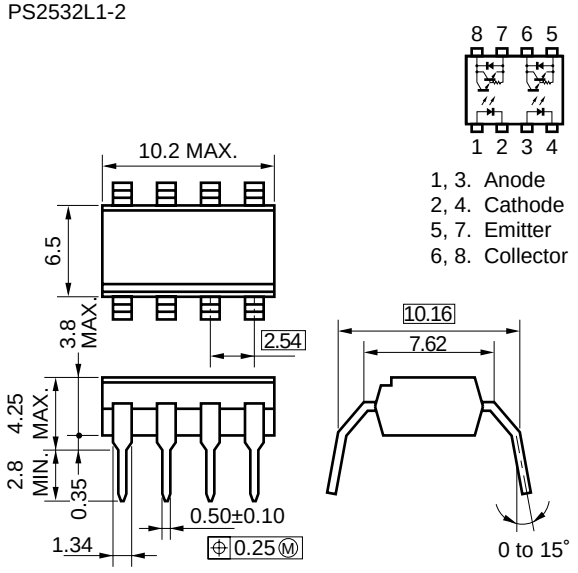


PACKAGE DIMENSIONS (Unit: mm) **Lead bending type (for Long distance)**

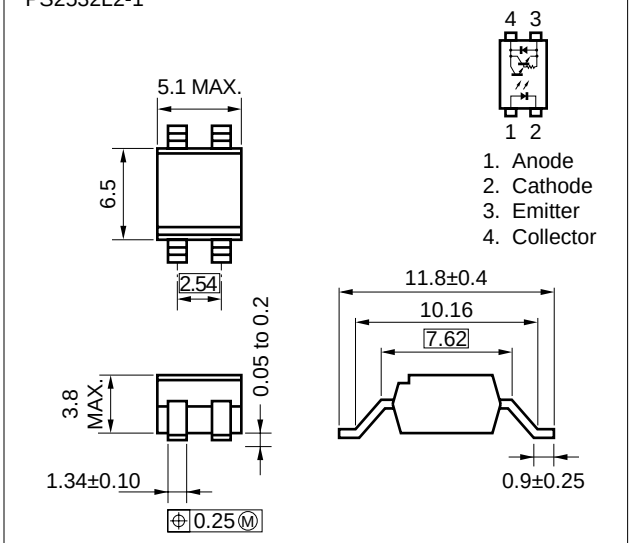
PS2532L1-1



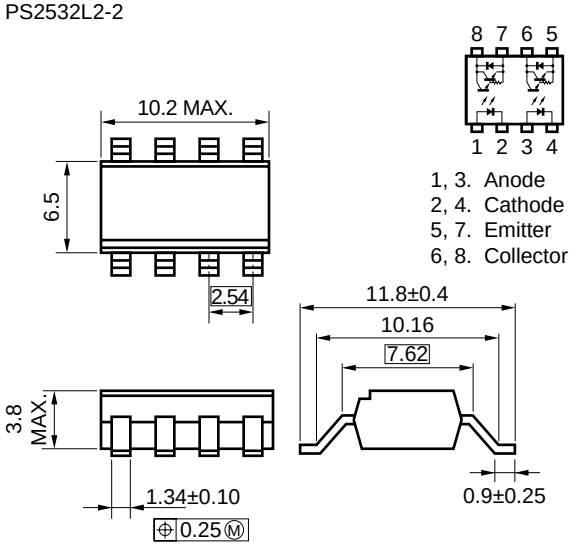
PS2532L1-2



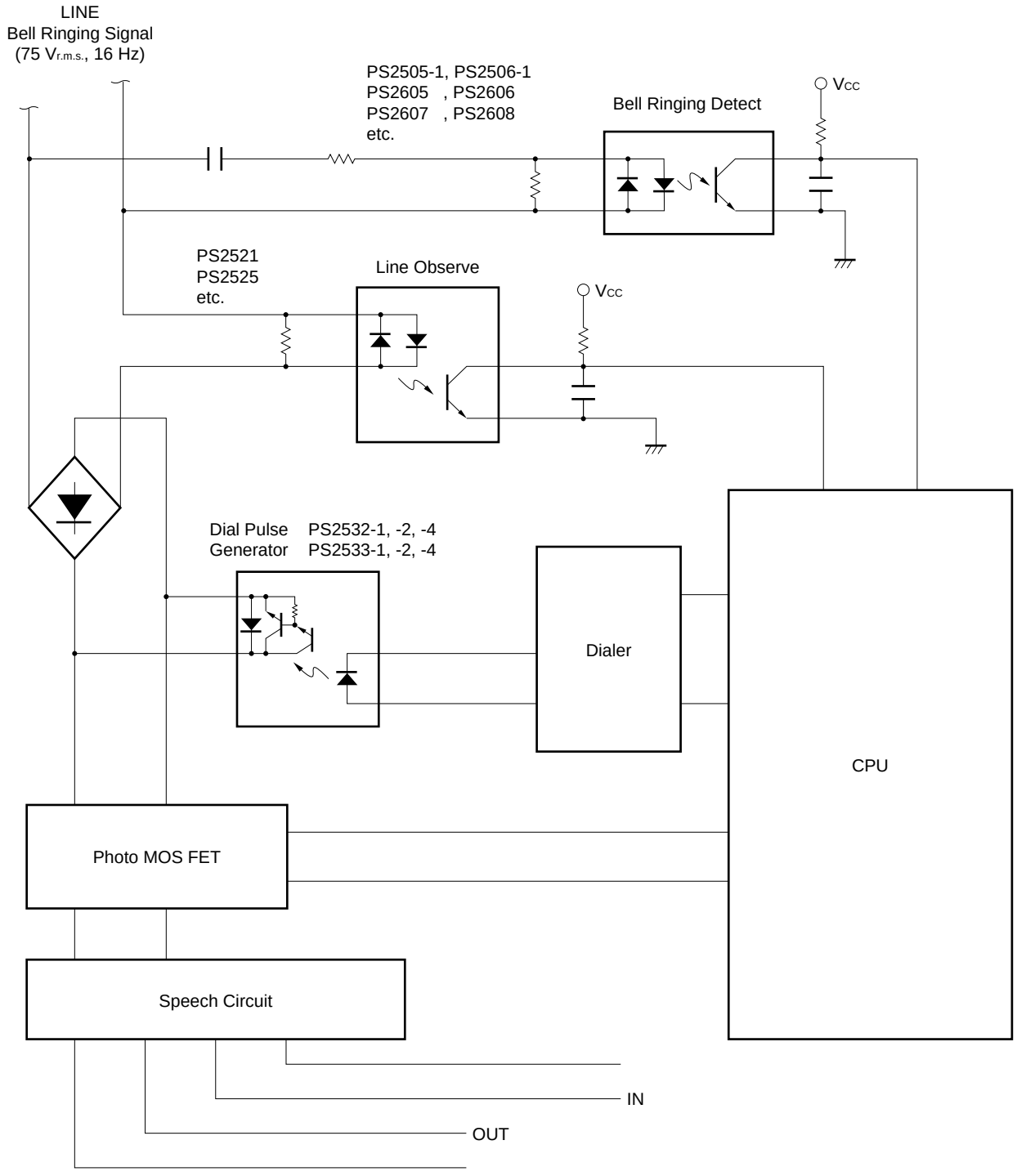
PS2532L2-1



PS2532L2-2



APPLICATION FOR TELEPHONE (EXAMPLE)



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 96.5