

PS2653, PS2654, PS2653L2, PS2654L4

LONG CREEPAGE TYPE HIGH ISOLATION VOLTAGE
6 PIN PHOTOCOUPLER

DESCRIPTION

PS2653, PS2654 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon darlington-connected photo-transistor in a plastic DIP (Dual In-line Package).

PS2653 has base pin and PS2654 has no base pin.

Creepage distance and clearance of leads are over 8 millimeters.

PS2653L2, PS2654L2 are surface mount type.

FEATURES

- High isolation voltage (BV: 5 kV_{r.m.s.} MIN.)
- Long creepage and clearance distance (8 mm MIN.)
- High collector to emitter voltage (V_{CEO}: 40 V MIN.)
- High speed switching (t_r = t_f = 100 μs TYP.)
- High current transfer ratio (CTR: 2 000 % TYP.)
- 6 pin Dual In-line Package
- Taping is available
- UL recognized (No. E72422(S))
- BS415, BS7002 recognized (No. 7250)
- SEMKO recognized (SS4410165) No. 9317144
- NEMKO recognized (NEK-HD195S6) No. A21409
- DEMKO recognized (Section 101, 137) No. 300535
- SETI recognized (E69-89) No. 167265-08
- VDE0884 recognized option

ORDERING INFORMATION

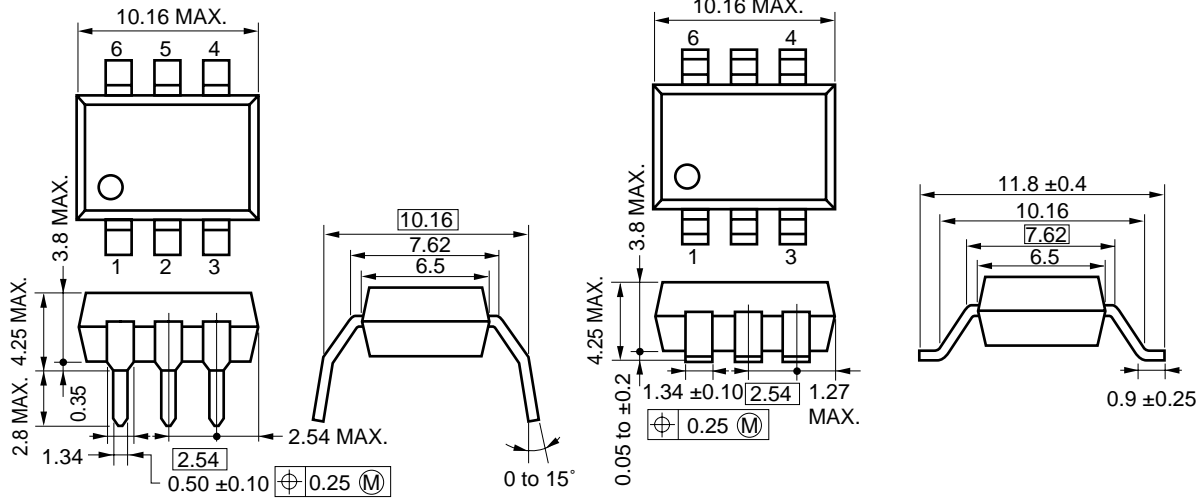
PART NUMBER	PACKAGE	SAFETY STANDARD APPROVAL
PS2653 PS2654	6 pin DIP 6 pin DIP	Normal specification products <ul style="list-style-type: none"> • UL Approved • BSI Approved • SEMKO Approved • NEMKO Approved • DEMKO Approved • SETI Approved
PS2653L2 PS2654L2	6 pin DIP, lead bending type 6 pin DIP, lead bending type	
PS2653-V PS2654-V	6 pin DIP 6 pin DIP	VDE0884 specification products (Option) <ul style="list-style-type: none"> • VDE Approved • UL Approved • BSI Approved • SEMKO Approved • NEMKO Approved • DEMKO Approved • SETI Approved
PS2653L2-V PS2654L2-V	6 pin DIP, lead bending type 6 pin DIP, lead bending type	

PACKAGE DIMENSIONS

(Unit: mm)

PS2653
PS2654

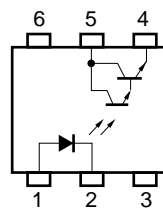
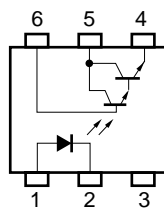
PS2653L2
PS2654L2



PIN CONNECTION (Top View)

PS2653
PS2653L2

PS2654
PS2654L2



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

- 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	1.5	mW/°C
Power Dissipation	P _C	200	mW

Coupled

Isolation Voltage *1	BV	5 000	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).

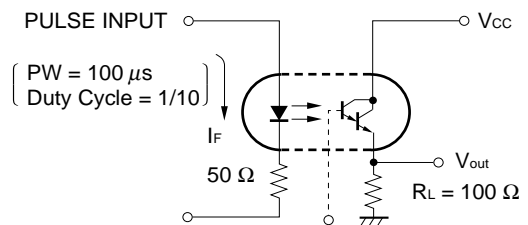
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

PARAMETER		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 = 5 mA, V _{CE} = 2 V
Coupled	Current Transfer Ratio*3	CTR	200	2 000		%	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	

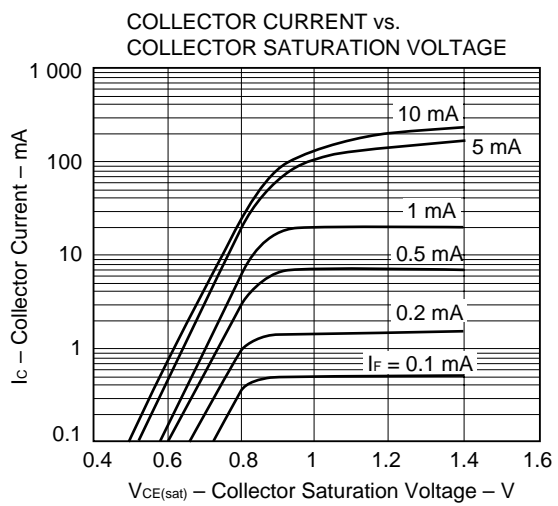
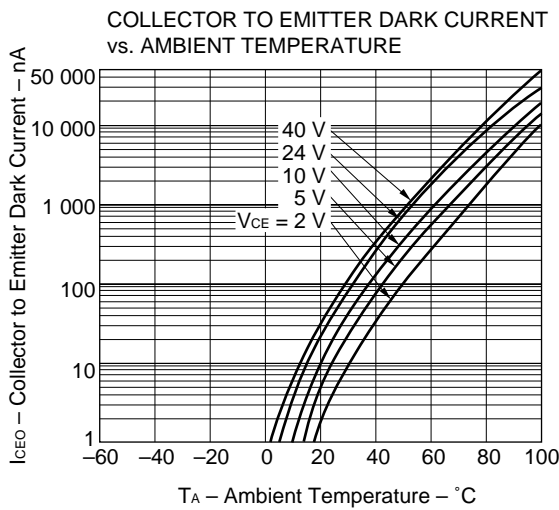
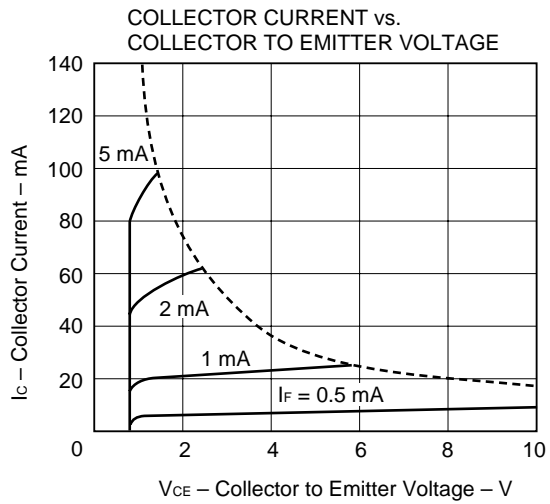
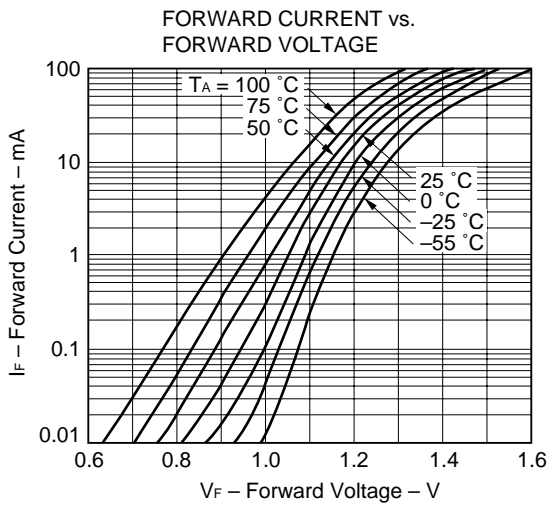
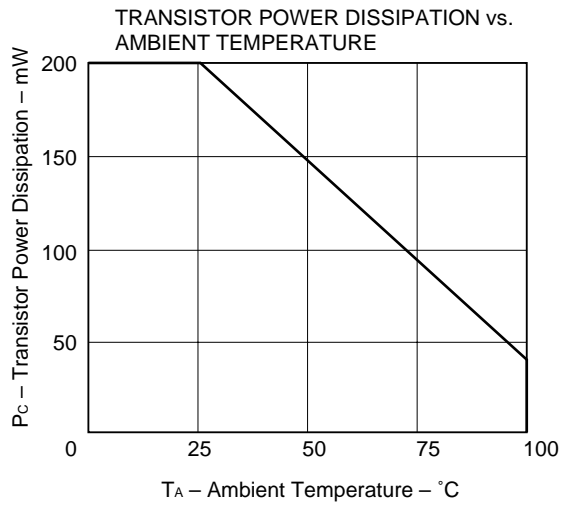
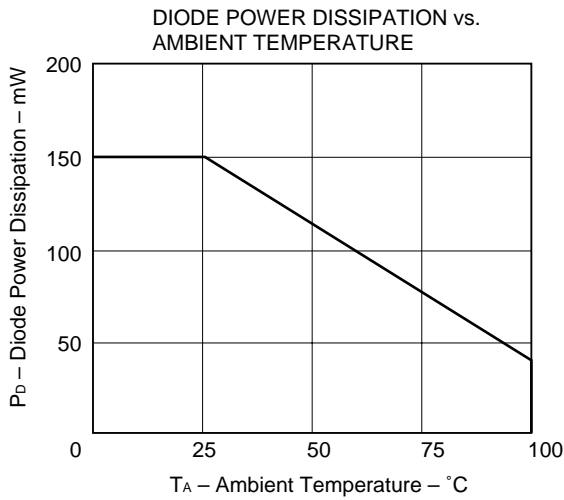
*2 Second Stage Transistor
(PS2653, PS2653L2 only)

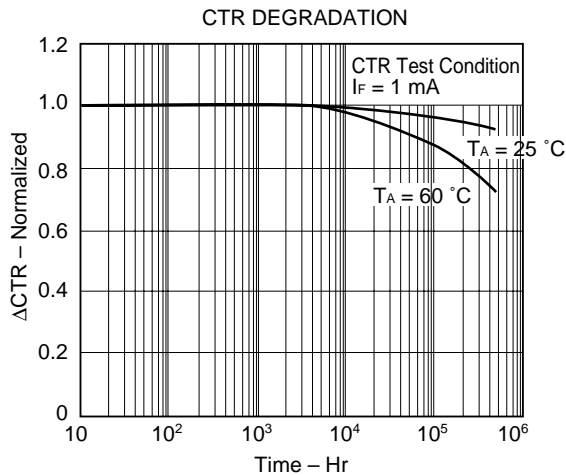
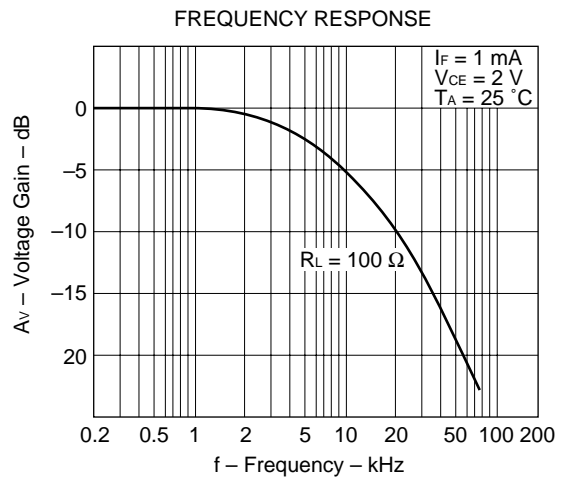
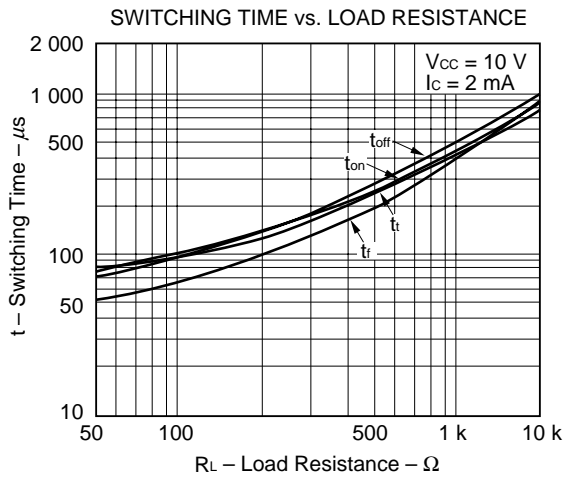
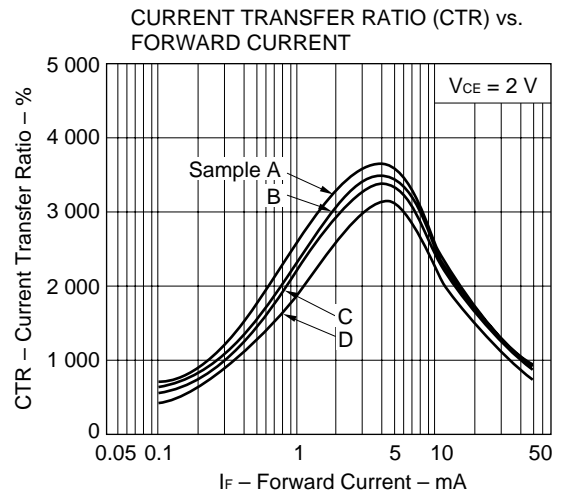
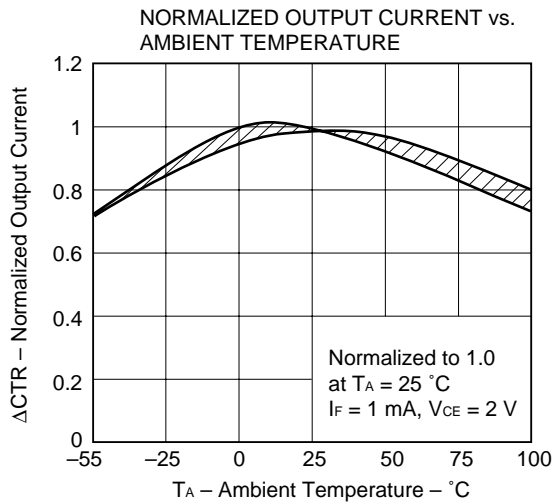
*3 CTR rank
K: 2 300 to (%)
L: 700 to 3 400 (%)
M: 200 to 1 000 (%)

*4 Test Circuit for Switching Time



TYPICAL CHARACTERISTICS (T_A = 25 °C)





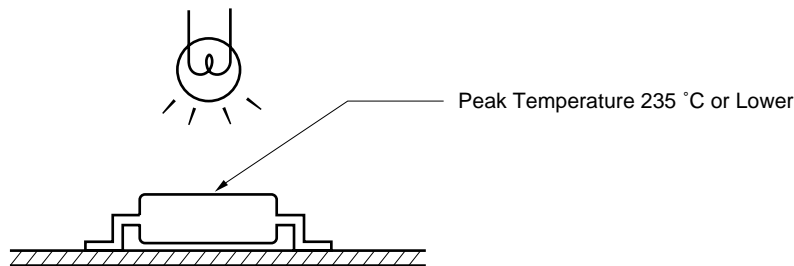
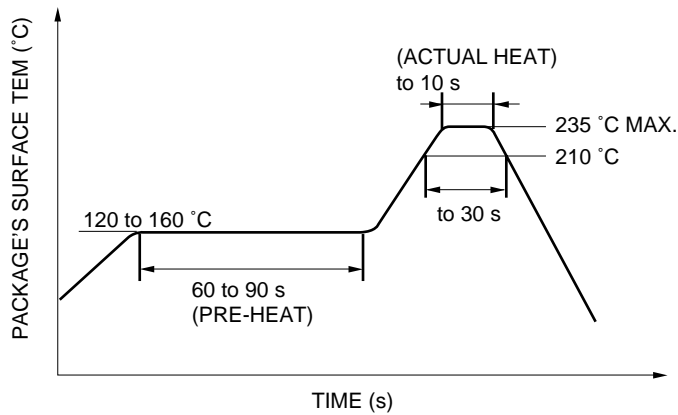
* The measurement of TYPICAL CHARACTERISTICS are only for reference, not guaranteed.

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

SPECIFICATION OF VDE MARKS LICENSE DOCUMENT (VDE0884)

PARAMETER	SYMBOL	SPECK	UNIT
Application classification (DIN VDE 0109 Table. 1) for rated line voltages $\leq 300 V_{eff}$ for rated line voltages $\leq 600 V_{eff}$		IV III	
Climatic test class (DIN IEC 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}	8 000	V_{peak}
Degree of pollution (DIN VDE 0109)		2	
Clearance distance		> 8.0	mm
Creepage distance ¹⁾		>8.0	mm
Comparative tracking index (DIN IEC 112/VDE 0303 part 1)	CTI	175	
Material group (DIN VDE 0109)		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	T_{si}	175	Cel
Current (input current IF, Psi = 0)	I_{si}	400	mA
Power (output or total power dissipation)	P_{si}	700	mW
Isolation resistance $U_{IO} = 500 V DC$ at 175 Cel (T_{si})	Ris min	10^9	ohm

1) If a printed circuit is incorporated, the creepage distance and clearance may be reduced below this value (e.g. at a standard distance between soldering eye centers of 7.5 mm). If this is not permissible, the user shall take suitable measures.

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.**

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Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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Anti-radioactive design is not implemented in this product.