HK357x (White)

4-Pin SOP Phototransistor Optocouplers

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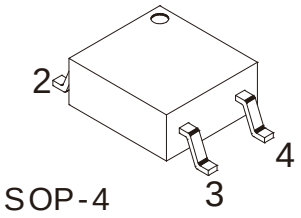
CRM ICBG

Description

The HK357x are optically coupled isolators containing an infrared light emitting diode and an NPN silicon phototransistor. They are packaged in a 4-pin small outline package (SOP-4).

Features

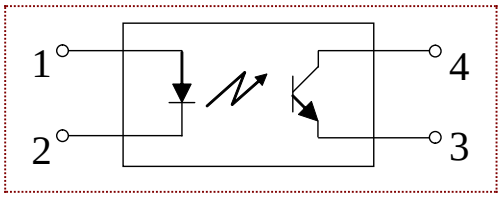
- Current transfer ratio (CTR) : MIN. 50% @ I_F=5mA, V_{CE}=5V
- High isolation voltage between input and output (Viso=3750 Vrms)
- Minimum BV_{CEO} of 80V guaranteed
- UL approved
- VDE approved



Applications

- Feedback circuit in power supply
- Programmable controllers
- Telecommunication equipments

Block Diagram and Package



Pin Configuration
1 Anode
2 Cathode
3 Emitter
4 Collector

Absolute Maximum Ratings (T_A=25°C)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	50	mA
	Peak Forward Current (1μs, pulse)	I_{FP}	1	A
	Reverse Voltage	V_R	6	V
	Power Dissipation	P_D	70	mW
Output	Collector Power Dissipation	P_C	150	mW
	Collector Current	I_C	50	mA
	Collector-Emitter Voltage	V_{CEO}	80	V
	Emitter-Collector Voltage	V_{ECO}	7	V
Total Power Dissipation		Ptot	200	mW
Isolation Voltage *		Viso	3750	Vrms
Operating Temperature		Topr	-55~+110	℃
Storage Temperature		Tstg	-55~+125	℃
Soldering Temperature **		Tsol	260	℃

* AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2 are shorted together, and pins 3, 4 are shorted together.
** For 10 seconds

HK357x (White)

4-Pin SOP Phototransistor Optocouplers

Electro-optical Characteristics (T_A=25°C)

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit
Input	Forward Voltage	V_F	I_F=20mA	-	1.2	1.4	V
	Reverse Current	I_R	V_R=4V	-	-	10	μA
	Input Capacitance	C_{in}	V=0, f=1kHz	-	30	250	pF
Output	Collector Dark Current	I_{CEO}	V_{CE}=20V, I_F=0	-	-	100	nA
	Collector-Emitter Breakdown Voltage	BV_{CEO}	I_C=0.1mA, I_F=0	80	-	-	V
	Emitter-Collector Breakdown Voltage	BV_{ECO}	I_E=10μA, I_F=0	7	-	-	V
Transfer Characteristics	Current Transfer Ratio *	CTR	I_F=5mA ,V_{CE}=5V	50	-	600	%
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_F=20mA, I_C=1mA	-	0.1	0.2	V
	Isolation Resistance	R_{ISO}	DC500V, 40~60%R.H.	$5x10^{10}$	-	-	Ω
	Floating Capacitance	Cf	V=0, f=1MHz	-	0.6	1.0	pF
	Rise Time	Tr	V_{CE}=10V, I_C=2mA, R_L=100Ω	-	3	18	μs
	Fall Time	Tf	V_{CE}=10V, I_C=2mA, R_L=100Ω	-	4	18	μs

* CTR=I_C/I_F x 100%

Rank Table of CTR

CTR Classification						
A	**B**	**C**	**D**	**E**	**F**	**-**
80~160	130~260	200~400	300~600	100~200	150~300	50~600

HK357x (White)

4-Pin SOP Phototransistor Optocouplers

Typical Performance Curves

Fig.1 Forward Current vs. Forward Voltage

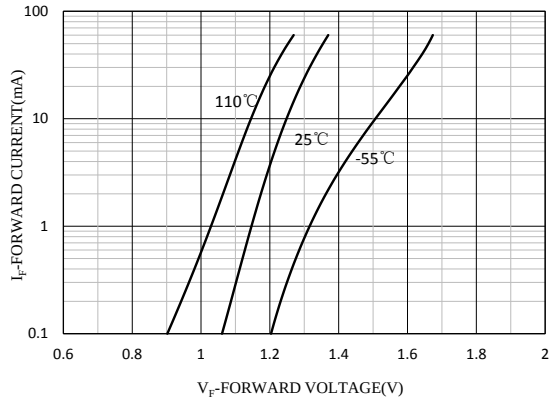


Fig.2 Normalized CTR vs. Forward Current

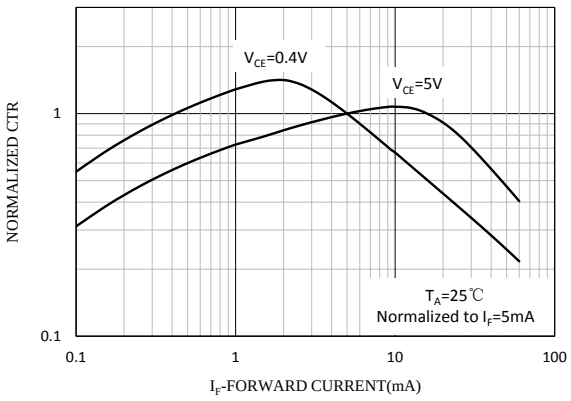


Fig.3 Normalized CTR vs. Ambient Temperature

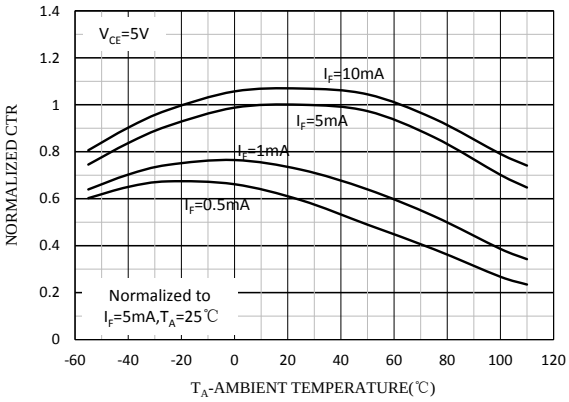


Fig.4 Normalized CTR vs. Ambient Temperature

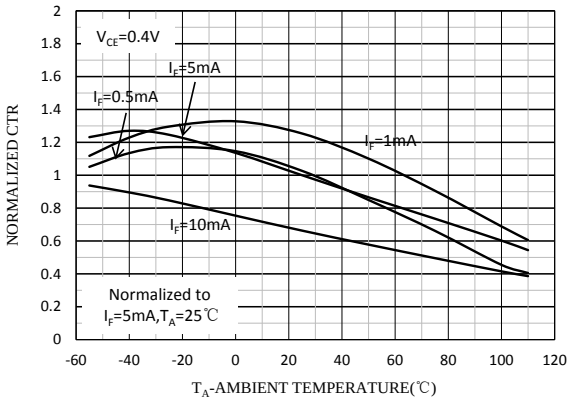


Fig.5 Collector-emitter Current vs. Collector-emitter Voltage

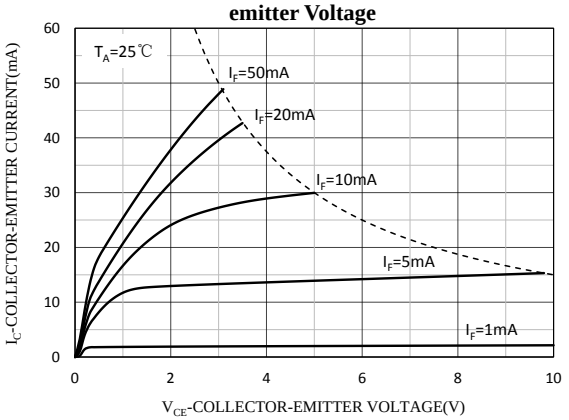
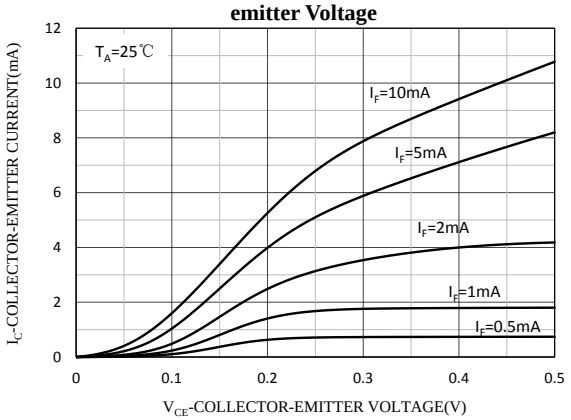


Fig.6 Collector-emitter Current vs. Collector-emitter Voltage



HK357x (White)

4-Pin SOP Phototransistor Optocouplers

Fig.7 Normalized Collector Current vs. Forward Current

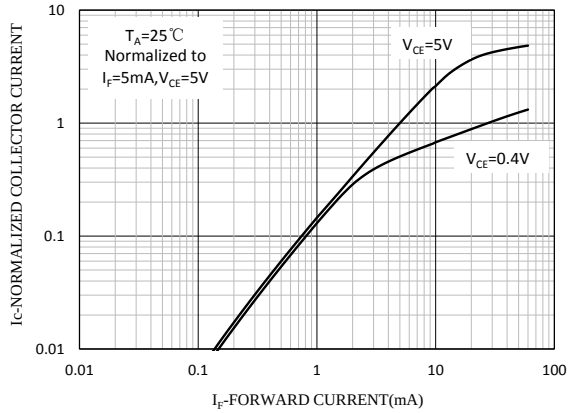


Fig.8 Collector Dark Current vs. Ambient Temperature

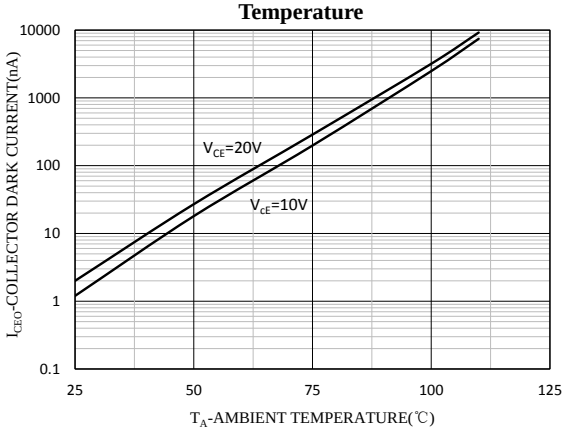


Fig.9 Collector-emitter Saturation Voltage vs. Ambient Temperature

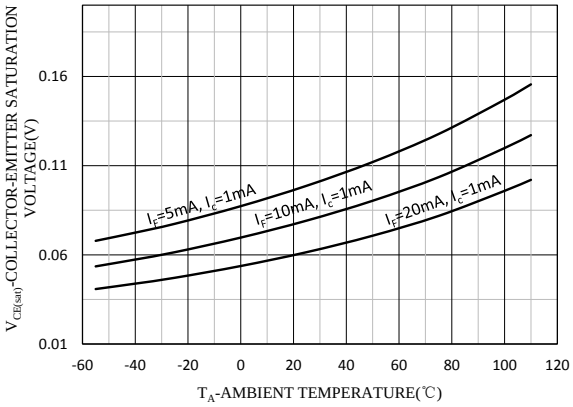


Fig.10 Collector-emitter Saturation Voltage vs. Forward Voltage

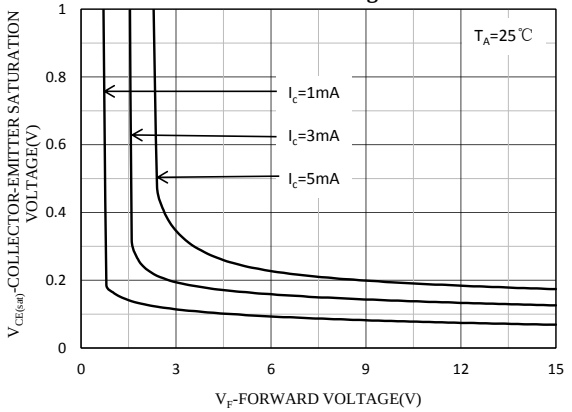


Fig.11 Switch Time vs. Load Resistance

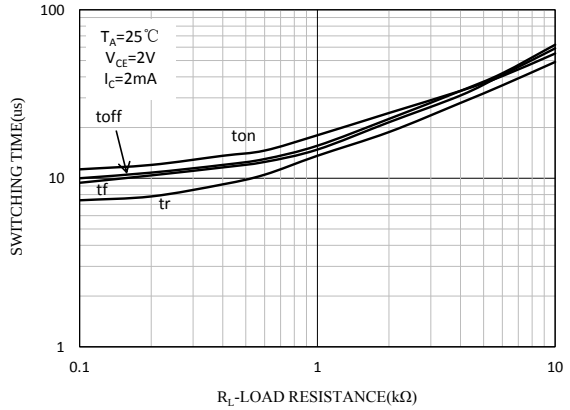
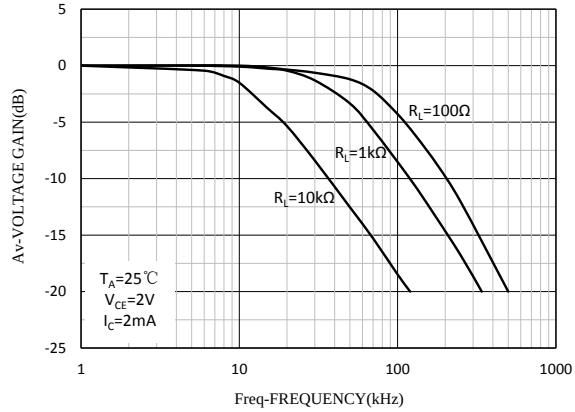


Fig.12 Frequency Response



Test Circuits

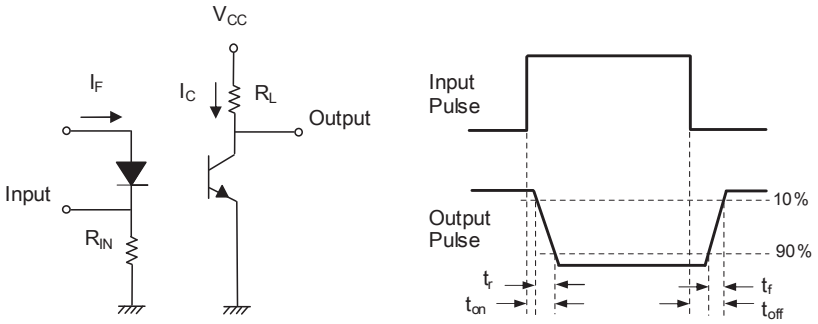
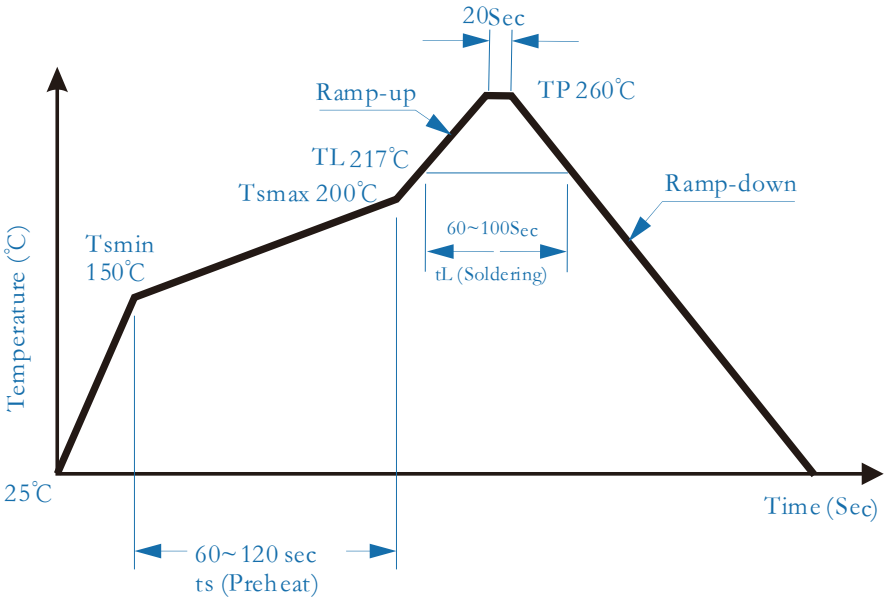


Fig.13 Switching Time Test Circuit and Waveforms

Solder Reflow Profile

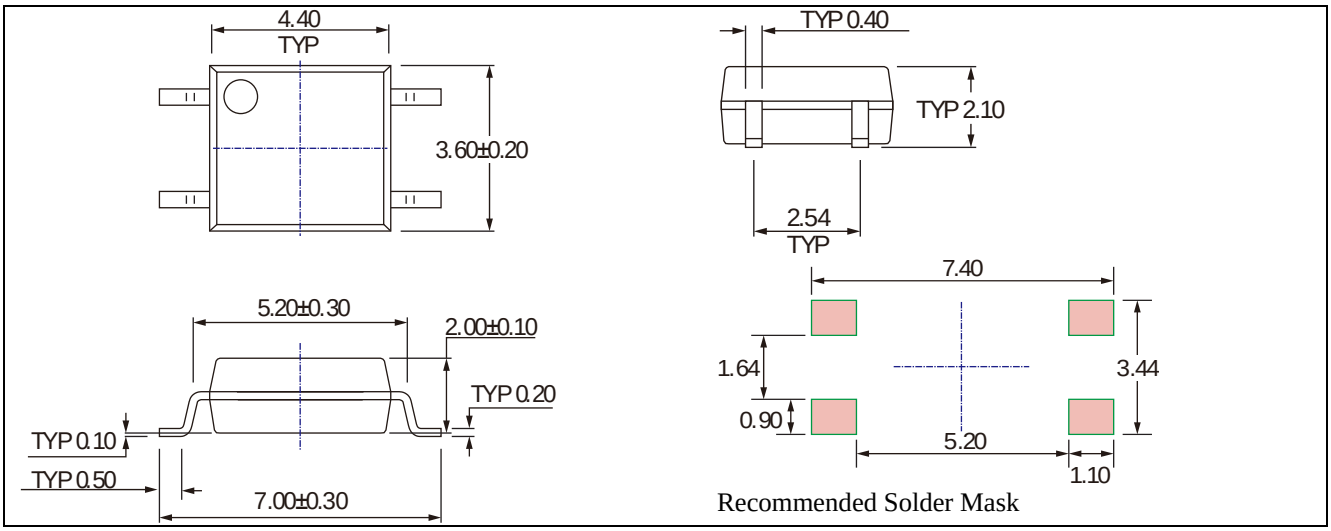


HK357x (White)

4-Pin SOP Phototransistor Optocouplers

Outline Dimensions

Unit: mm



SOP-4

Marking

HK
357x
VYYWW

- "x" denotes the classification A, B, C, D, E, F or none
- "V" denotes VDE approved or none
- "YY" denotes YEAR; "WW" denotes WEEK

Order Code

HK357x(Z)-GV U

HK = Company Brand Mark
x = CTR Classification (A, B, C, D, E, F or none)
Z = Tape & Reel Option (T1 or T2)
G = Epoxy (G = halogen-free, none = with halogen)
V = VDE approved or none
U = Factory Code (T, etc)

For example,

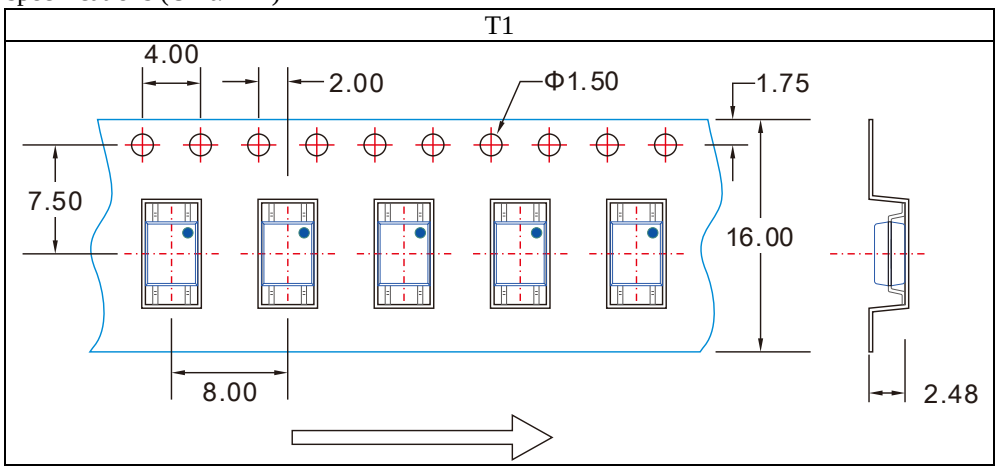
Order Code	Description	Main Marking
HK357A(T1)-GV T	Classification A, T1 packing, Halogen-free, VDE approved, by T factory	HK357A
HK357(T2) T	Classification in Full Range, T2 packing, Halogen, by T factory	HK357
HK357B(T2)-GV T	Classification B, T2 packing, Halogen-free, VDE approved, by T factory	HK357B

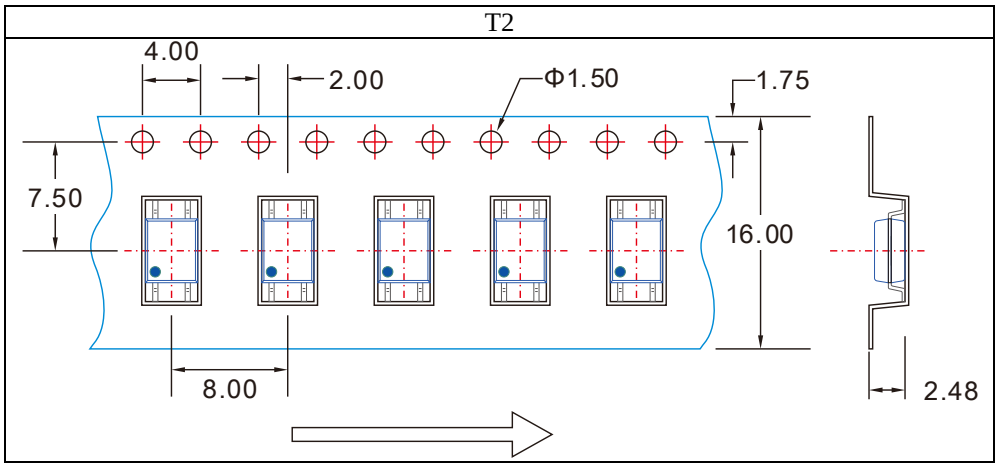
HK357x (White)

4-Pin SOP Phototransistor Optocouplers

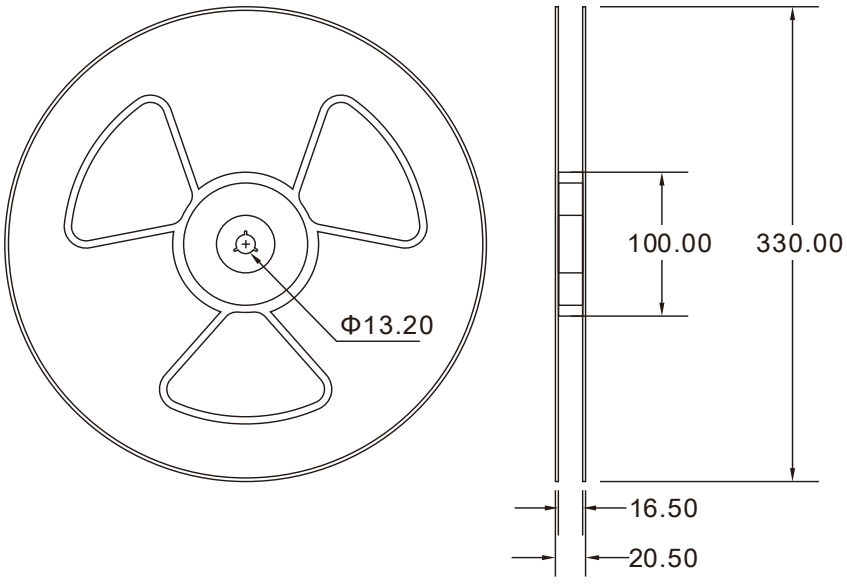
Packing

■ Carrier tape specifications (Unit: mm)

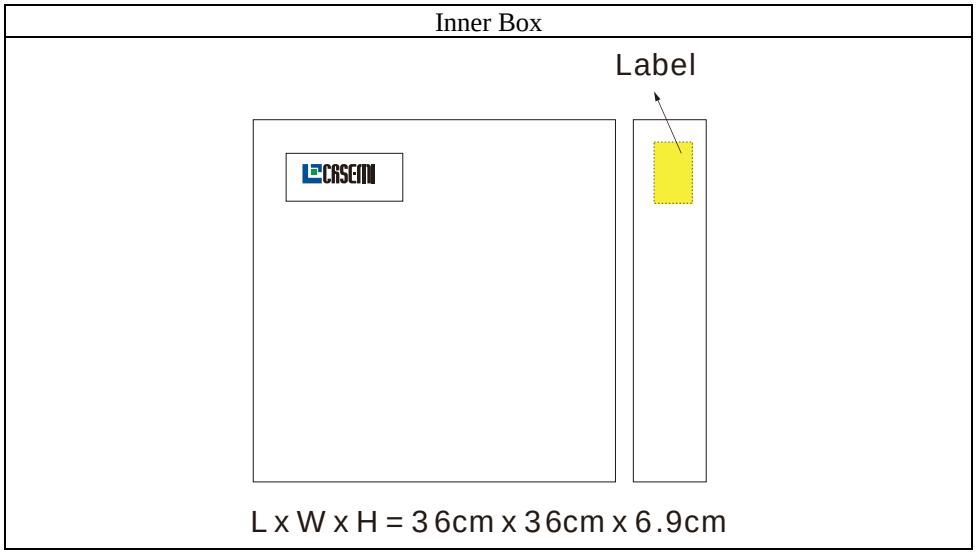


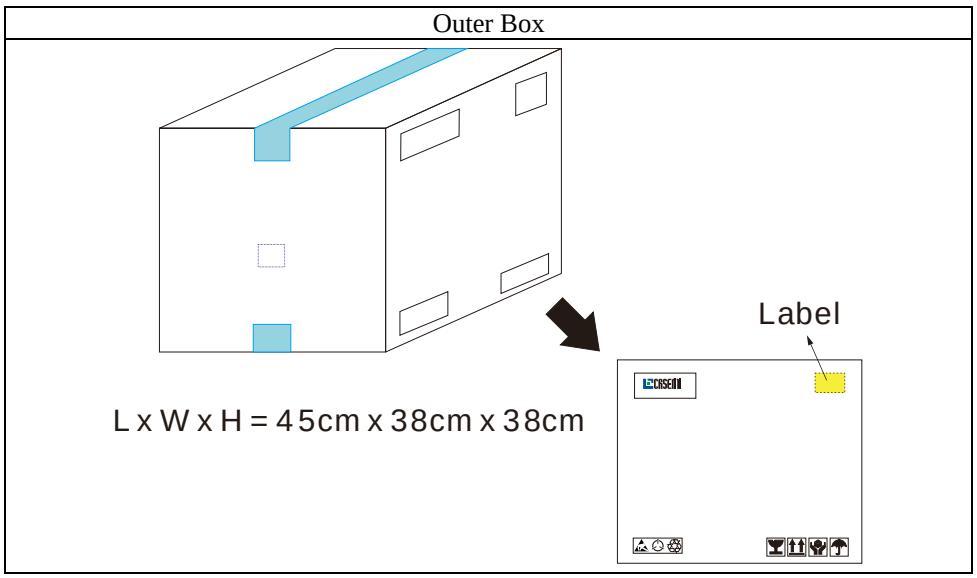


■ Reel dimensions (Unit: mm)



Box Specifications





Packing Quantity

Option	Quantity	Quantity – Inner box	Quantity – Outer box
T1	3000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 45k Units
T2	3000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 45k Units

Label Information

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4-Pin SOP Phototransistor Optocouplers

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