RV1S2752Q

R08DS0189EJ0200
Rev.2.00
Mar 09, 2023

AUTOMOTIVE HIGH ISOLATION VOLTAGE, 4-PIN SOP (SO4) PHOTOCOUPLER

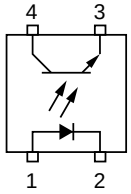
DESCRIPTION

The RV1S2752Q is an optically coupled isolator containing an AlGaAs LED and an NPN silicon phototransistor. The package is a small outline package (SOP) type and has a shield effect to cut the ambient light. The RV1S2752Q features high isolation voltage and wide operating temperature (−40 to +135 °C), which is suitable for automotive application.

FEATURES

- Operating ambient temperature (T_A = −40 to +135 °C)
- High isolation voltage (BV = 3 750 Vr.m.s.)
- Small package (SO4)
- Pb-free product
- AEC-Q100 (Grade 1: T_A = −40 to +125 °C) compliant
- Safety standard
- • UL : UL1577, Double protection

PIN CONNECTION
(Top View)



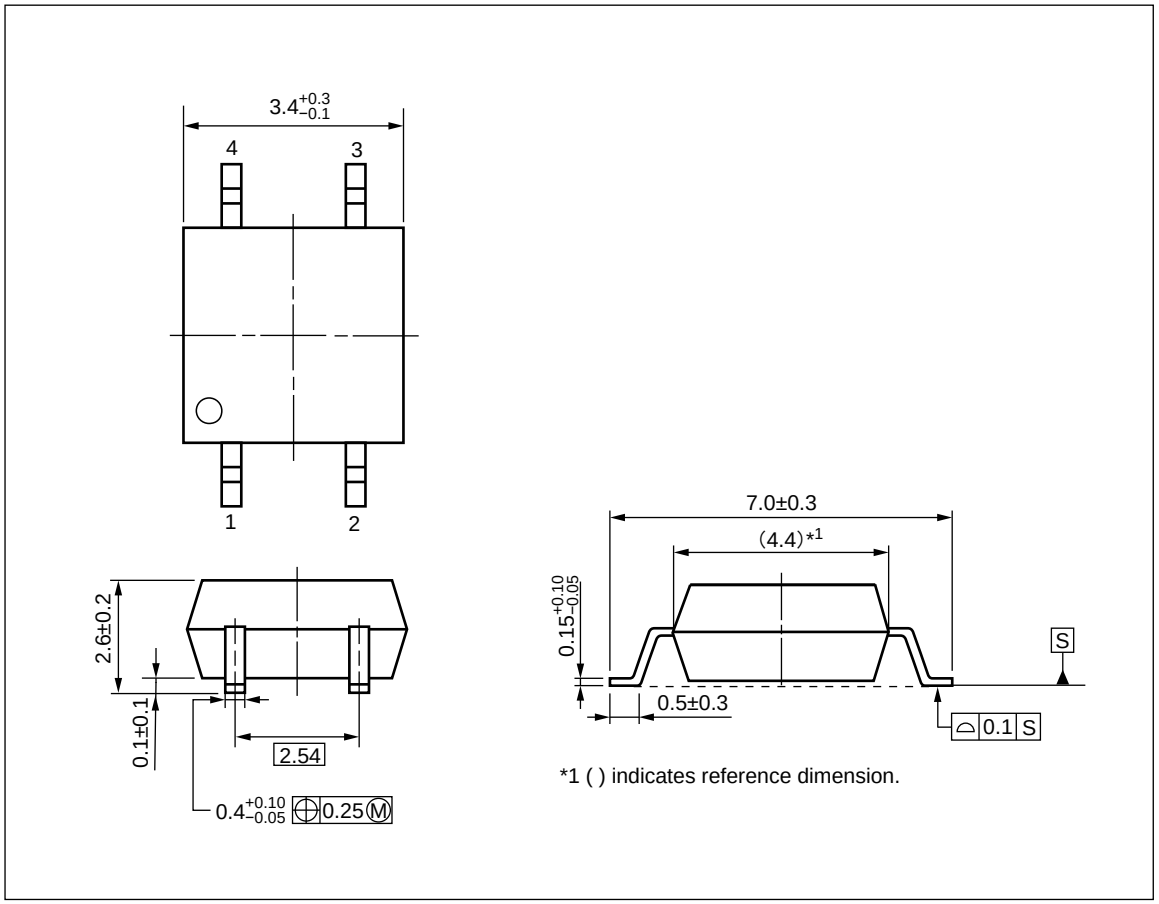
1. Anode
2. Cathode
3. Emitter
4. Collector

APPLICATIONS

• Consumer vehicles

Start of mass production
Feb.2020

PACKAGE DIMENSIONS (UNIT: mm)

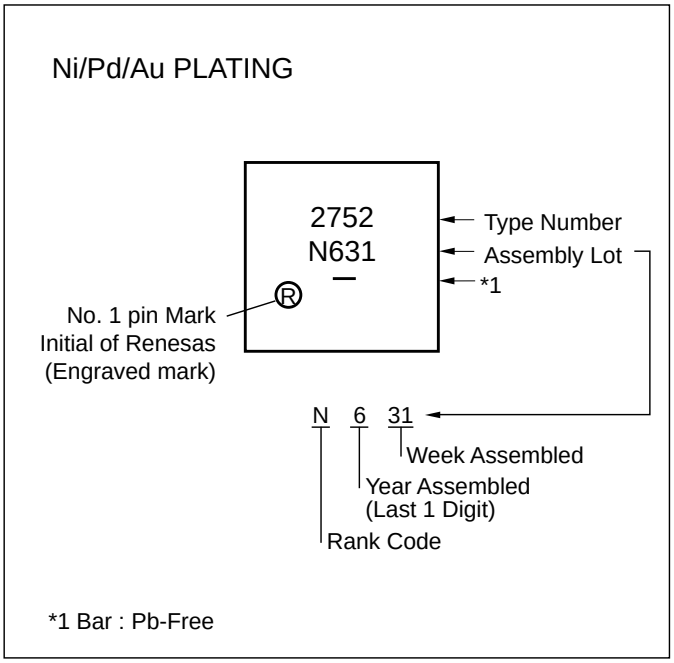


Weight：0.08 g (TYP.)

PHOTOCOUPLER CONSTRUCTION

Parameter	MIN.
Air Distance	4.2 mm
Creepage Distance	4.2 mm
Isolation Distance	0.2 mm

MARKING EXAMPLE



ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number *1
RV1S2752QKCSP-1000N	RV1S2752QKCSP-1000N#SC0	Pb-Free (Ni/Pd/Au)	Embossed Tape 20 pcs	Standard Products (UL Approved)	RV1S2752Q
	RV1S2752QKCSP-1000N#KC0		Embossed Tape 2 500 pcs/reel		

. Notes: *1. For the application of the safety standard, the following part number should be used.

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise specified)

Parameter		Symbol	Ratings	Unit
Diode	Forward Current*1	I_F	25	mA
	Reverse Voltage	V_R	5	V
	Power Dissipation*2	P_D	50	mW
	Peak Forward Current*3	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	50	mA
	Power Dissipation*4	P_C	150	mW
Isolation Voltage*5		BV	3 750	Vr.m.s.
Operating Ambient Temperature		T_A	–40 to +135	°C
Storage Temperature		T_{stg}	–55 to +150	°C

***1** Reduced at a rate of 0.5 mA/°C above T_A = 115 °C.

***2** Reduced at a rate of 1.0 mW/°C above T_A = 115 °C.

***3** PW = 100 µs, Duty Cycle = 1 %

***4** Reduced at a rate of 1.2 mW/°C above T_A = 25 °C.

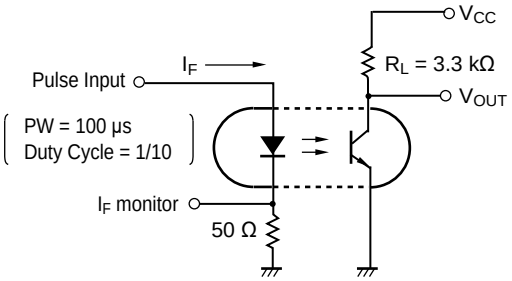
***5** AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and output.
Pins 1-2 shorted together, 3-4 shorted together.

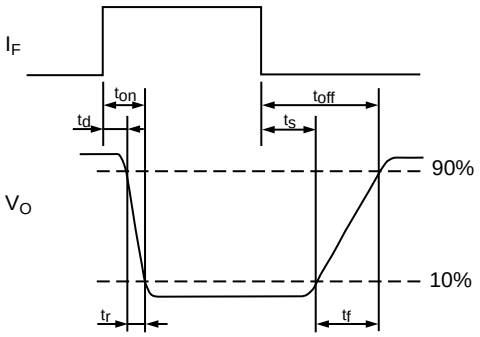
ELECTRICAL CHARACTERISTICS (T_A = - 40 to + 135 °C, unless otherwise specified)

Parameter		Symbol	Conditions	MIN.	TYP.*1	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = 10 mA	1.18	1.65	1.98	V
	Reverse Current	I_R	V_R = 3 V			100	μA
	Terminal Capacitance	C_t	V = 0 V, f = 1 MHz, T_A = 25 °C		30		pF
Transistor	Collector to Emitter Dark Current	I_{CEO}	V_{CE} = 5.5 V			65	μA
Coupled	Current Transfer Ratio (I_C/I_F)	CTR	I_F = 2 mA, V_{CE} = 5 V, T_A = 25 °C	200	500	850	%
			I_F = 2 mA, V_{CE} = 5 V	65			
	Collector Saturation Voltage	$V_{CE\ (sat)}$	I_F = 2 mA, I_C = 1.5 mA			0.3	V
	Isolation Resistance	R_{I-O}	V_{I-O} = 500 V_{DC}, RH = 40 ~ 60 %,	10^{10}			Ω
	Isolation Capacitance	C_{I-O}	V = 0 V, f = 1 MHz		0.4	1.0	pF
	Turn-on Time *2	t_{on}	V_{CC} = 5 V, I_F = 2 mA, R_L = 3.3 kΩ		10	100	μs
	Turn-off Time *2	t_{off}	C_L = 15 pF		150	300	
	Rise Time *2	t_r			8		
	Fall Time *2	t_f			120		
	Storage Time *2	t_s				200	

***1** Typical values at T_A = 25 °C

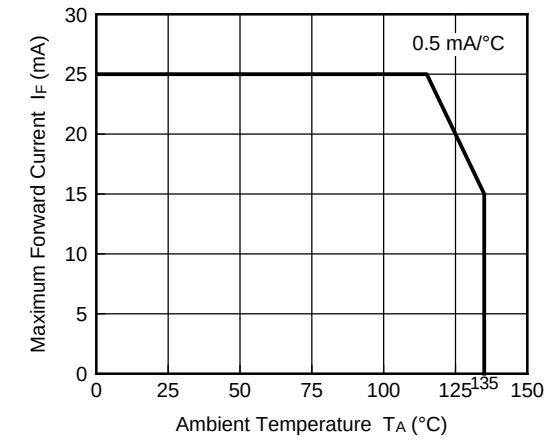
***2** Test circuit for switching time



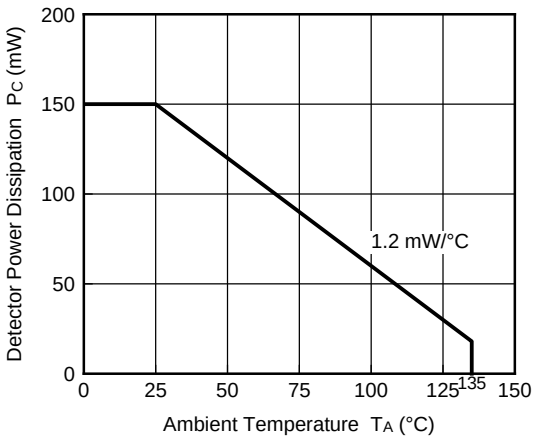


TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)

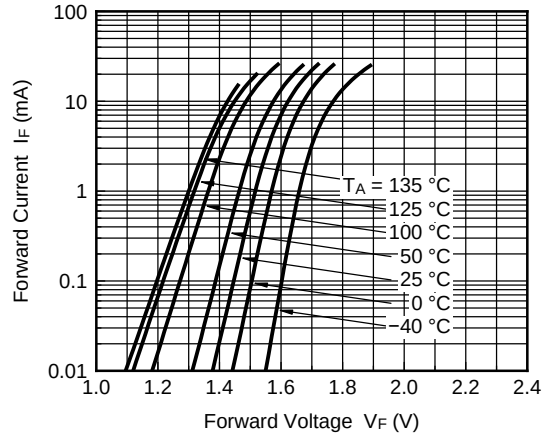
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



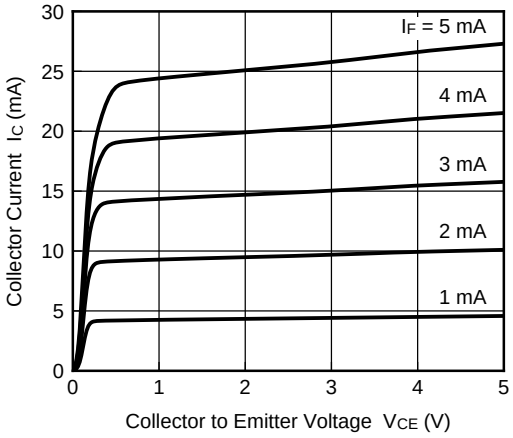
DETECTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



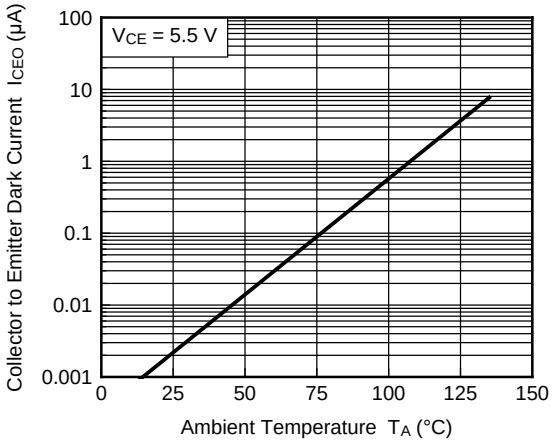
FORWARD CURRENT vs. FORWARD VOLTAGE



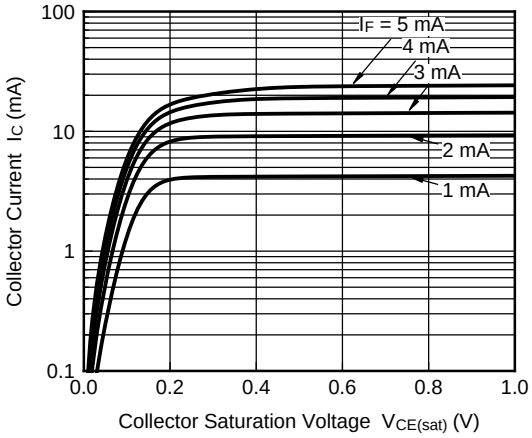
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

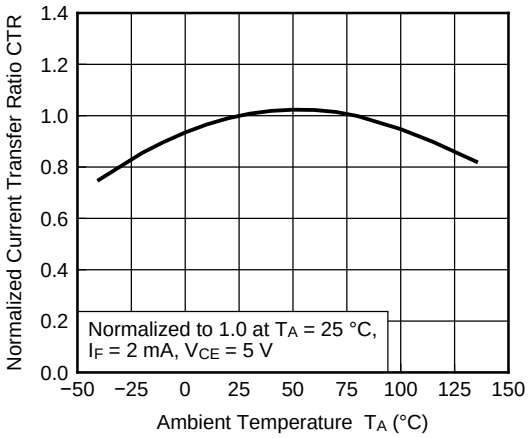


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

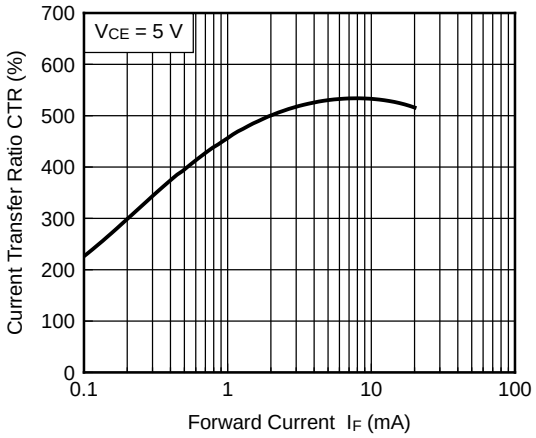


Remark The graphs indicate nominal characteristics.

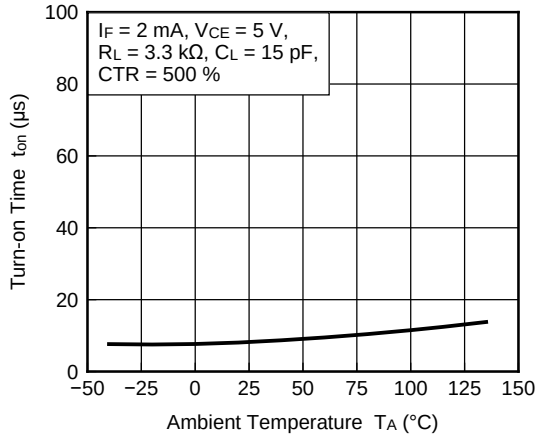
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



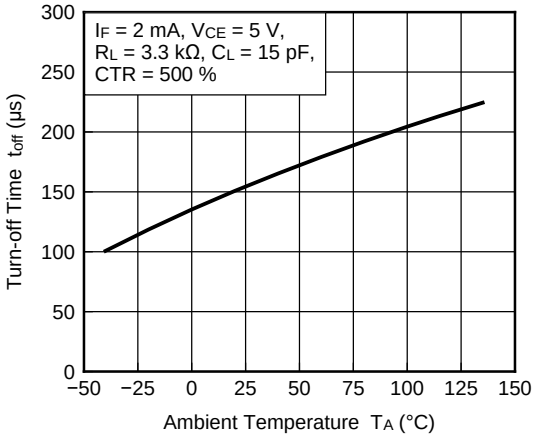
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



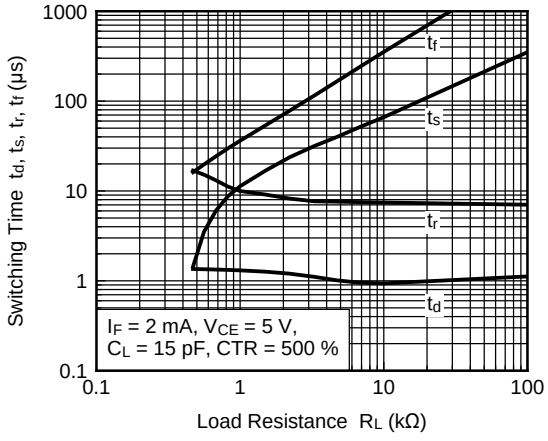
TURN-ON TIME vs. AMBIENT TEMPERATURE



TURN-OFF TIME vs. AMBIENT TEMPERATURE



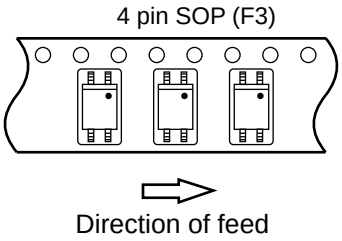
SWITCHING TIME vs. LOAD RESISTANCE



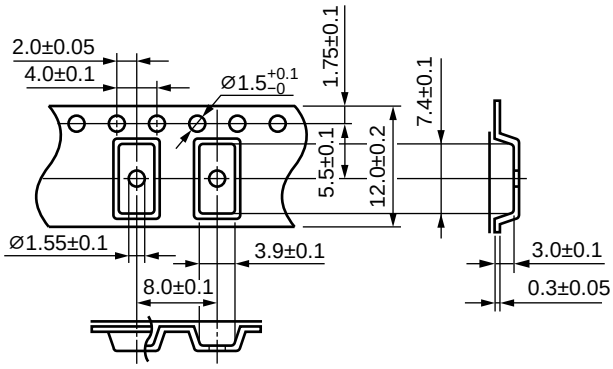
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

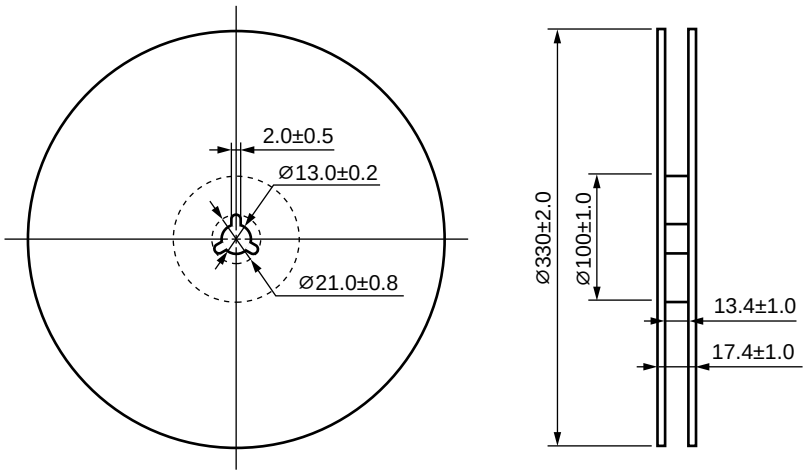
Tape Direction



Outline and Dimensions (Tape)

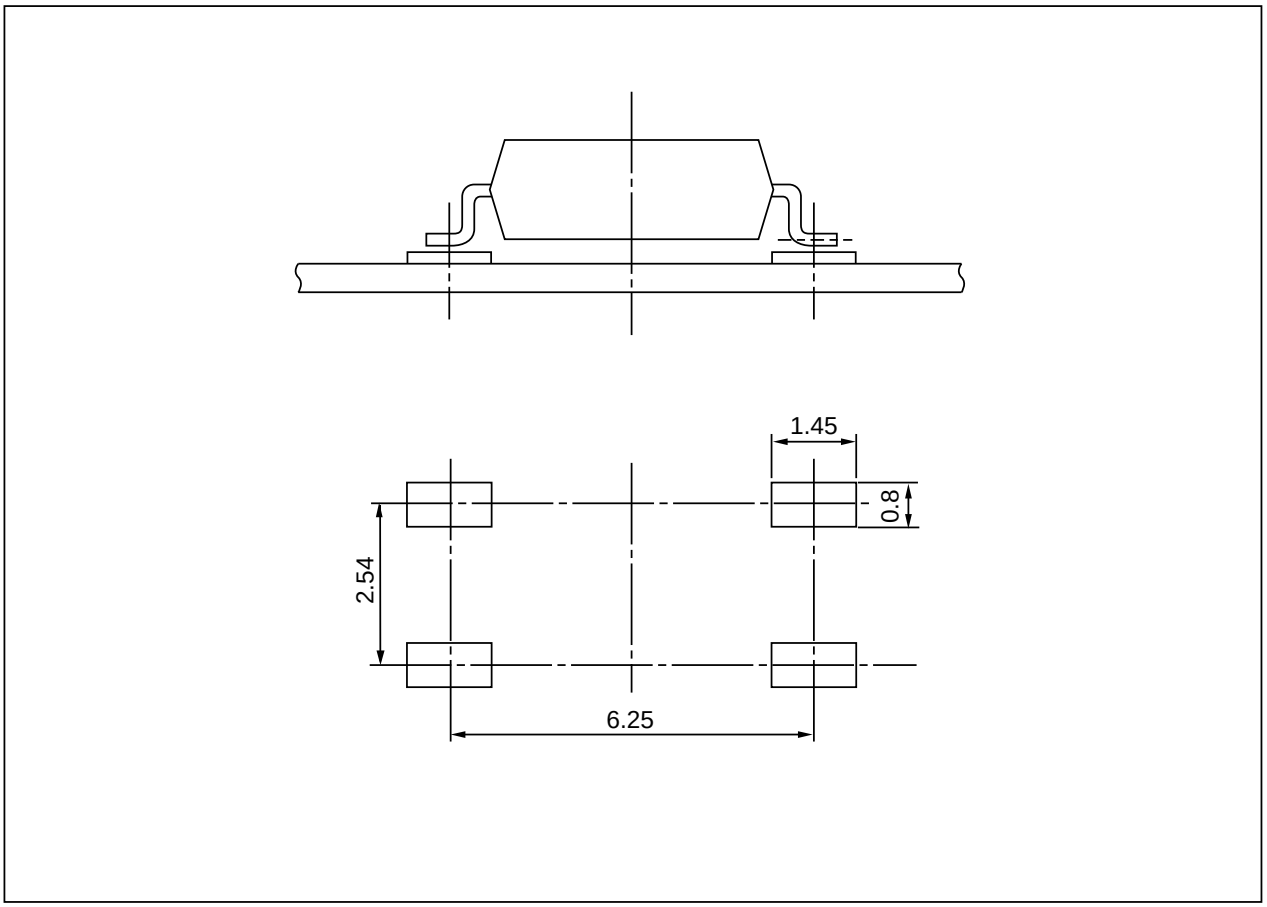


Outline and Dimensions (Reel)



Packing: 2 500 pcs/reel

RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



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

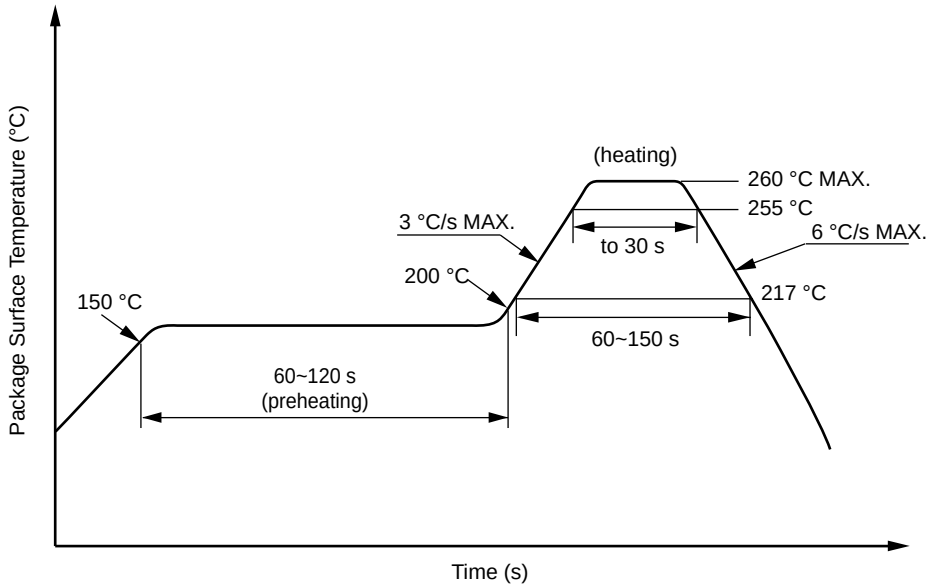
NOTES ON HANDLING

1. Recommended soldering conditions

(1) Infrared reflow soldering

- Peak reflow temperature — 260 °C or below (package surface temperature)
- Time of peak reflow temperature -5 °C (255 °C) — 30 s or less
- Time of temperature higher than 217 °C — 60 ~ 150 s
- Time to preheat temperature from 150 to 200 °C — 60 ~ 120 s
- Number of reflows — 3
- 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



JEDEC J-STD-020E compliant soldering conditions

(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 (per one side) — 3 s or less
- Flux — Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)
- Place — 1.5 to 2.0 mm or more away from the root of the lead

(4) Cautions

- Flux cleaning — Avoid cleaning with Freon- or halogen-based (chlorinated etc.) solvents.
- Fixing/Coating — Do not use fixing agents or coatings containing halogen-based substances.

USAGE CAUTIONS

1. Be aware that when voltage is applied suddenly between the photocoupler's input and output or between the collector and the emitter at startup, the output transistor may enter the on state, even if the voltage is within the absolute maximum ratings.
2. Protect against static electricity when handling.
3. Avoid storage at a high temperature and high humidity.

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