DATA SHEET

NEC

PHOTOCOUPLER

PS8701

HIGH NOISE REDUCTION HIGH-SPEED ANALOG OUTPUT TYPE 5-PIN SOP PHOTOCOUPLER

DESCRIPTION

The PS8701 is an optically coupled isolator containing a GaAlAs LED on the light emitting diode (input side) and a PIN photodiode and a high-speed amplifier transistor on the output side on one chip.

This is a plastic SOP (Small Out-line Package) type for high density applications.

FEATURES

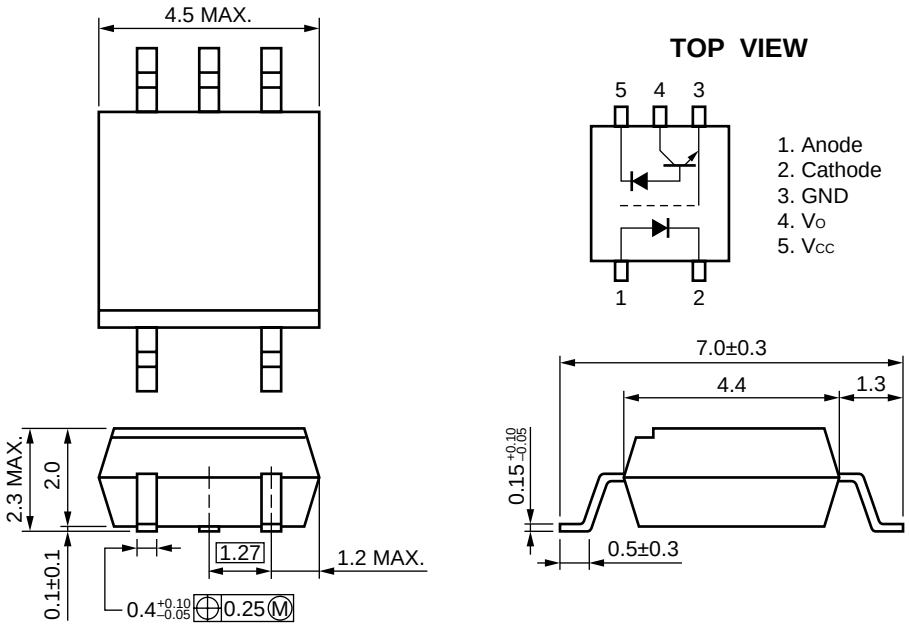
- High common mode transient immunity (C_{MH}, C_{ML} = ±10 kV/μs MIN.)
- High supply voltage (V_{CC} = 35 V)
- High isolation voltage (BV = 2 500 Vr.m.s.)
- High-speed response (t_{PHL} = 0.8 μs MAX., t_{PLH} = 1.2 μs MAX.)
- Taping product number (PS8701-E3, E4, F3, F4)

APPLICATIONS

- Computer and peripheral manufactures
- General purpose inverter
- Substitutions for relays and pulse transformers
- Power supply

PACKAGE DIMENSIONS

in millimeters



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

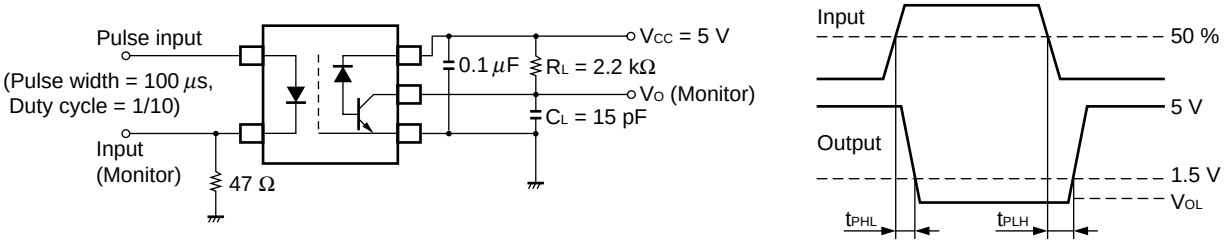
Parameter		Symbol	Ratings	Unit
Diode	Forward Current	I_F	25	mA
	Reverse Voltage	V_R	3.0	V
	Power Dissipation	P_D	45	mW
Detector	Supply Voltage	V_{CC}	35	V
	Output Voltage	V_O	35	V
	Output Current	I_O	8.0	mA
	Power Dissipation	P_C	100	mW
Isolation Voltage*1		BV	2 500	Vr.m.s.
Operating Ambient Temperature		T_A	–55 to +100	°C
Storage Temperature		T_{stg}	–55 to +125	°C

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

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

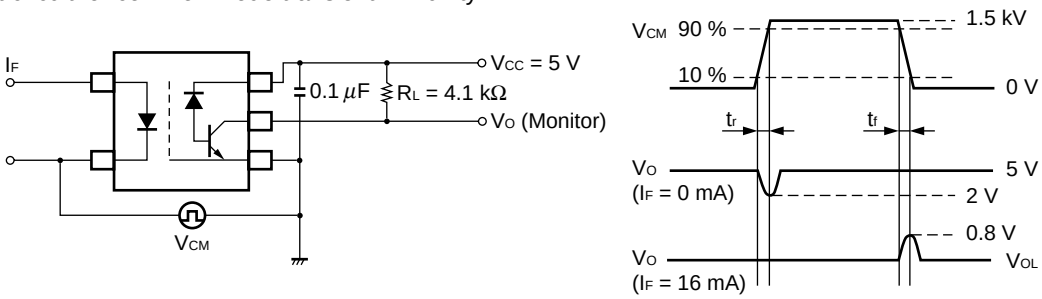
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = 16 mA		1.7	2.2	V
	Reverse Current	I_R	V_R = 3 V			10	μA
	Forward Voltage Temperature Coefficient	$\Delta V_F/\Delta T$	I_F = 16 mA		–1.6		mV/°C
	Terminal Capacitance	C_t	V = 0 V, f = 1 MHz		60		pF
Detector	High Level Output Current	I_{OH} (1)	I_F = 0 mA, V_{CC} = V_O = 5.5 V		3	500	nA
	High Level Output Current	I_{OH} (2)	I_F = 0 mA, V_{CC} = V_O = 30 V			100	μA
	Low Level Output Voltage	V_{OL}	I_F = 16 mA, V_{CC} = 4.5 V, I_O = 1.2 mA		0.1	0.4	V
	Low Level Supply Current	I_{CCL}	I_F = 16 mA, V_O = open, V_{CC} = 30 V		50		μA
	High Level Supply Current	I_{CCH}	I_F = 0 mA, V_O = open, V_{CC} = 30 V		0.01	2	
Coupled	Current Transfer Ratio	CTR	I_F = 16 mA, V_{CC} = 4.5 V, V_O = 0.4 V	15	20	35	%
	Isolation Resistance	R_{I-O}	V_{I-O} = 1 kV_{DC}, RH = 40 to 60 %	10^{11}			Ω
	Isolation Capacitance	C_{I-O}	V = 0 V, f = 1 MHz		0.4		pF
	Propagation Delay Time (H → L)*1	t_{PHL}	I_F = 16 mA, V_{CC} = 5 V, R_L = 2.2 kΩ, C_L = 15 pF		0.5	0.8	μs
	Propagation Delay Time (L → H)*1	t_{PLH}			0.6	1.2	
	Common Mode Transient Immunity at High Level Output*2	C_{MH}	I_F = 0 mA, V_{CC} = 5 V, R_L = 4.1 kΩ, V_{CM} = 1.5 kV	10			kV/μs
	Common Mode Transient Immunity at Low Level Output*2	C_{ML}	I_F = 16 mA, V_{CC} = 5 V, R_L = 4.1 kΩ, V_{CM} = 1.5 kV	–10			

***1** Test circuit for propagation delay time



C_L is approximately 15 pF which includes probe and stray wiring capacitance

***2** Test circuit for common mode transient immunity

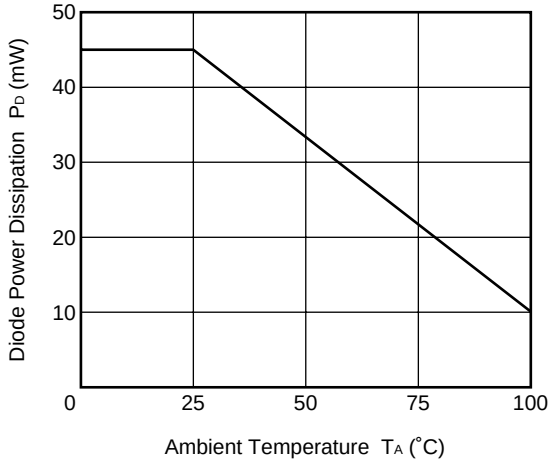


USAGE CAUTIONS

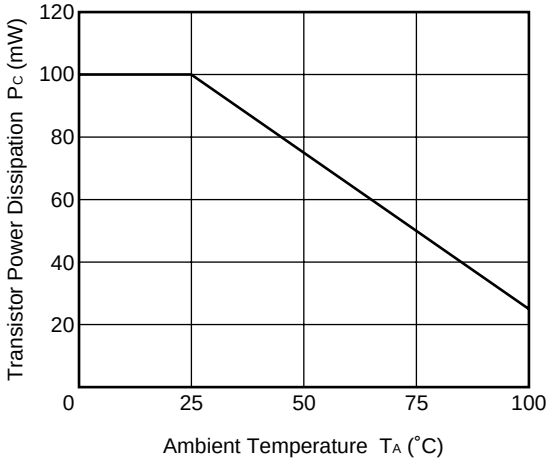
1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. By-pase capacitor of more than 0.1 μF is used between V_{CC} and GND near device.

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

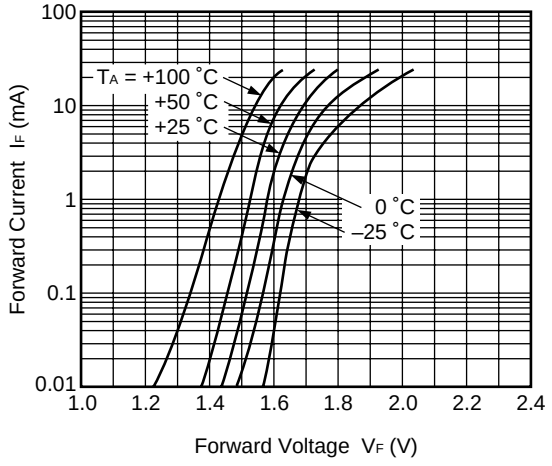
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



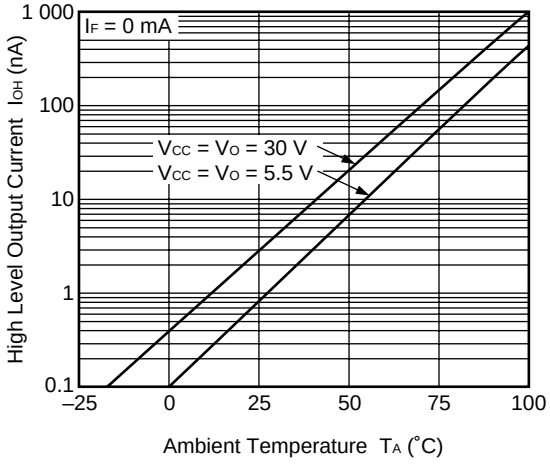
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



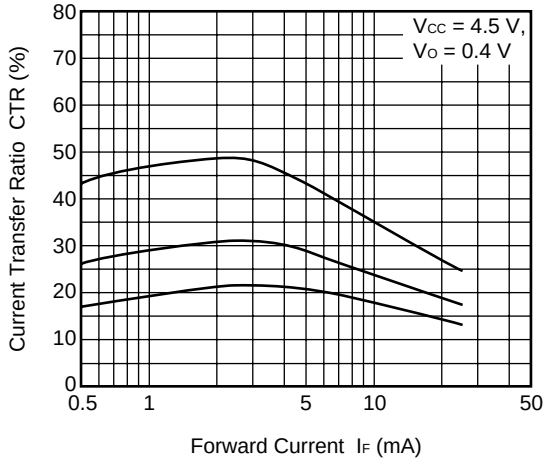
FORWARD CURRENT vs. FORWARD VOLTAGE



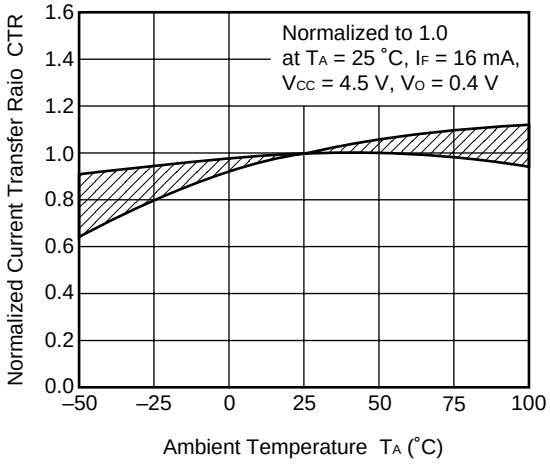
HIGH LEVEL OUTPUT CURRENT vs. AMBIENT TEMPERATURE



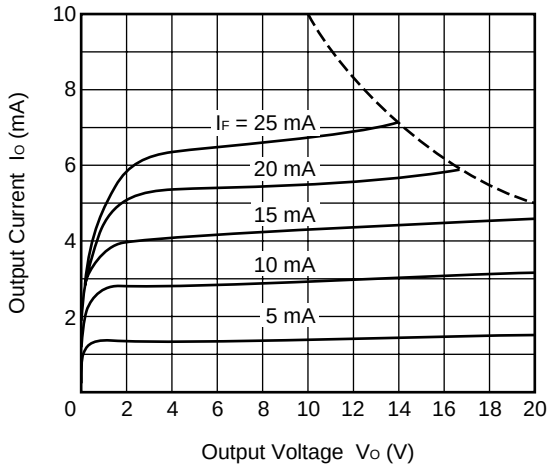
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



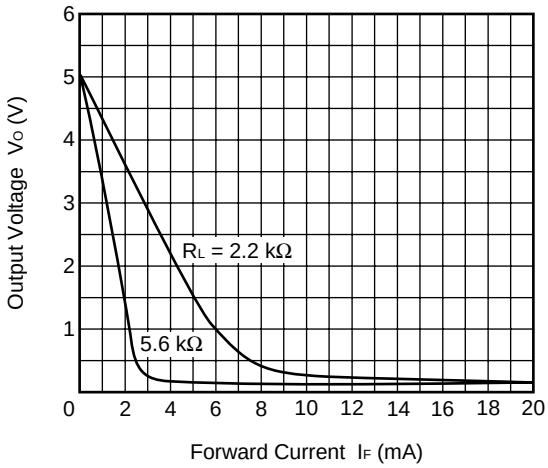
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



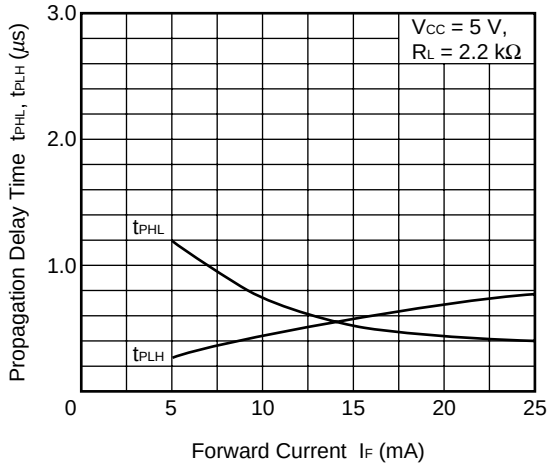
OUTPUT CURRENT vs.
OUTPUT VOLTAGE



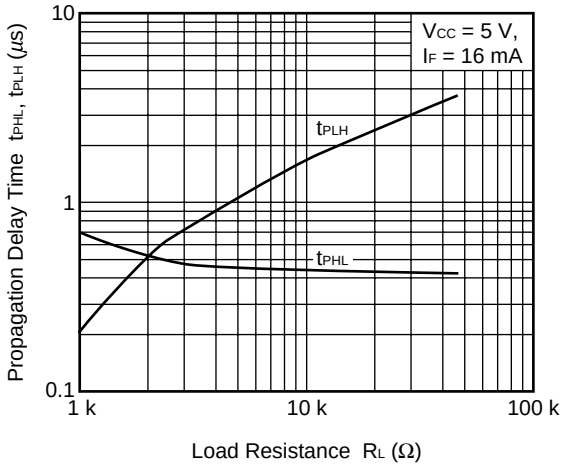
OUTPUT VOLTAGE vs.
FORWARD CURRENT



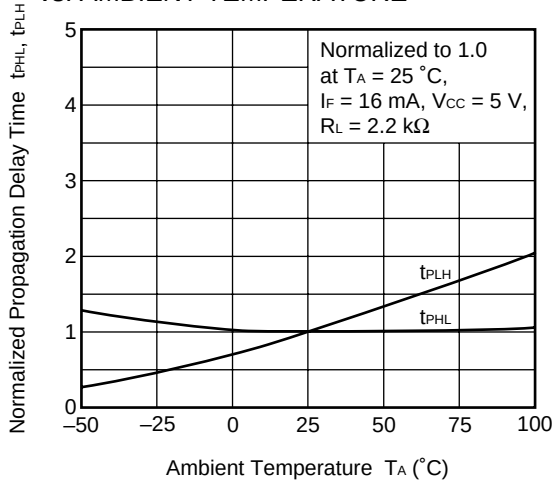
PROPAGATION DELAY TIME vs.
FORWARD CURRENT



PROPAGATION DELAY TIME vs.
LOAD RESISTANCE

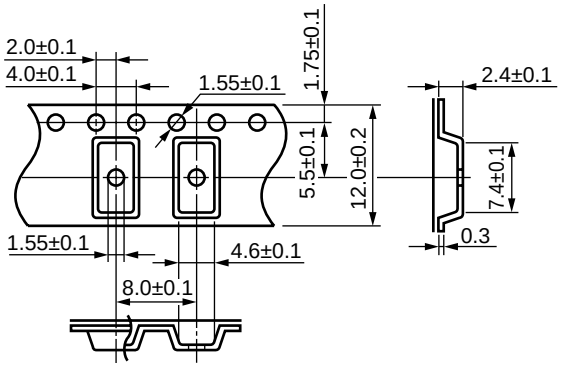


NORMALIZED PROPAGATION DELAY TIME
vs. AMBIENT TEMPERATURE

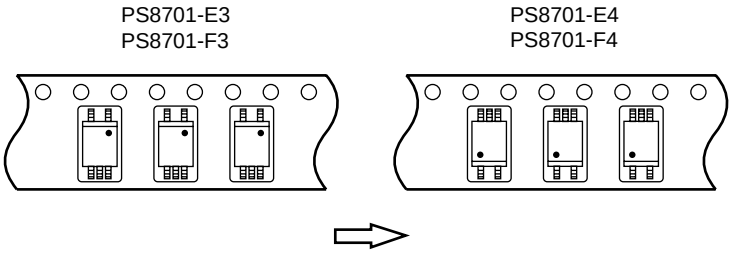


TAPING SPECIFICATIONS (in millimeters)

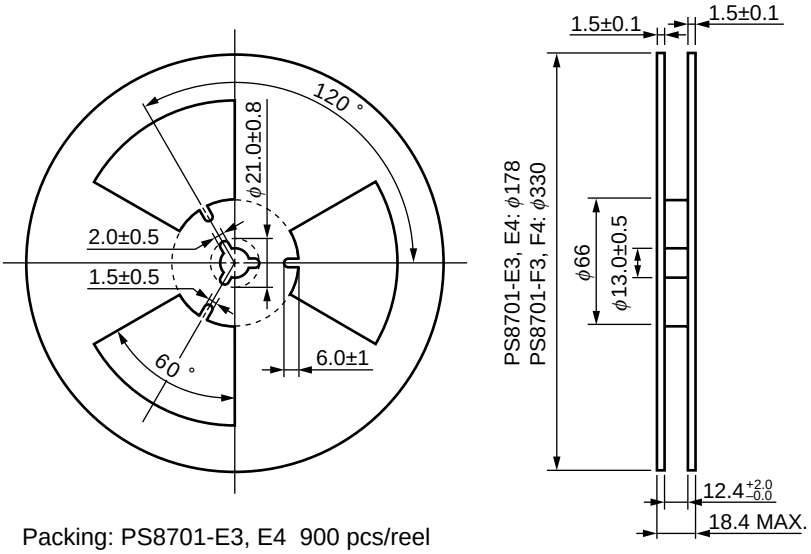
Outline and Dimensions (Tape)



Taping Direction



Outline and Dimensions (Reel)



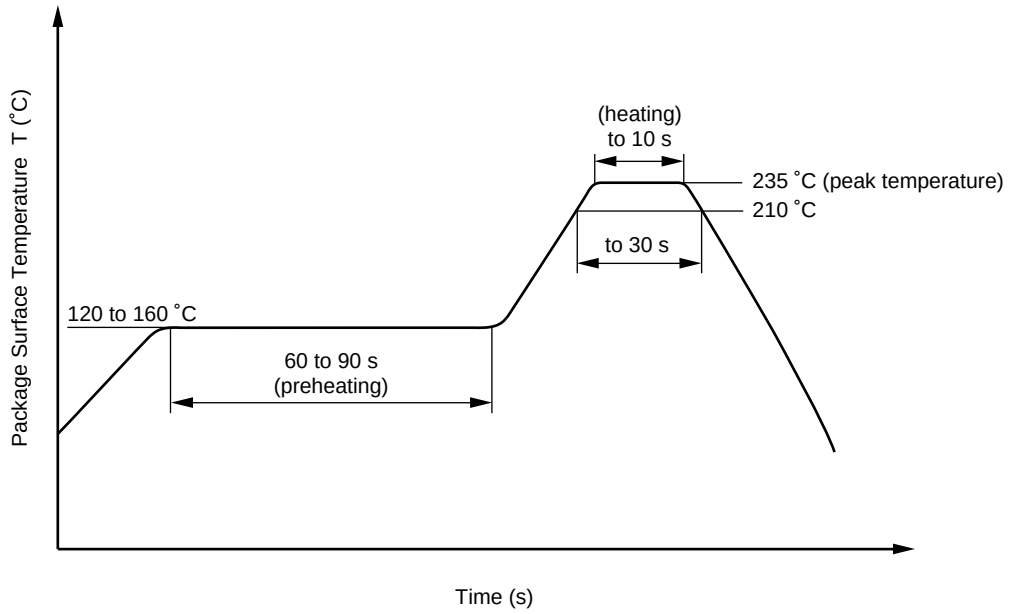
Packing: PS8701-E3, E4 900 pcs/reel
PS8701-F3, F4 3 500 pcs/reel

RECOMMENDED SOLDERING CONDITIONS

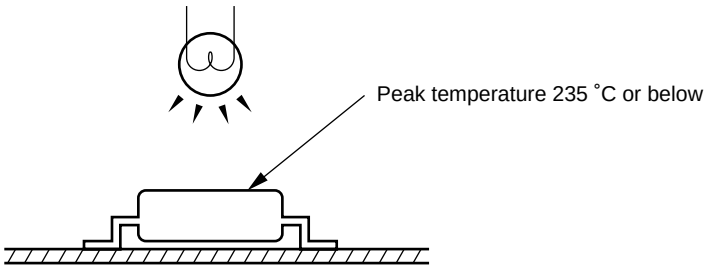
(1) Infrared reflow soldering

- Peak reflow temperature — 235 °C (package surface temperature)
- Time of temperature higher than 210 °C — 30 seconds or less
- 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



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



(2) Dip soldering

- Temperature — 260 °C or below (molten solder temperature)
- Time — 10 seconds or less
- Number of times — One
- Flux — Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

CAUTION

Within this device there exists GaAs (Gallium Arsenide) material which is a harmful substance if ingested. Please do not under any circumstances break the hermetic seal.

M4 96.5