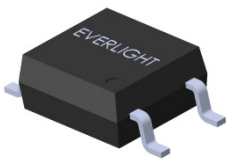




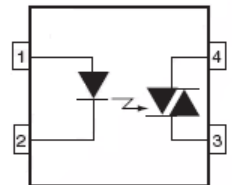
# THE DATASHEET OF ELM3023(TA)



### 4 PIN SOP RANDOM-PHASE TRIAC PHOTOCOUPLER ELM302X, ELM305X Series



Schematic



Pin Configuration

1. Anode
2. Cathode
3. Terminal
4. Terminal

#### Features:

- Peak breakdown voltage
  - 400V: ELM302X
  - 600V: ELM305X
- High isolation voltage between input and output (Viso=3750 V rms)
- Compact dual-in-line package
- Pb free and RoHS compliant.
- UL approved (No. E214129)
- VDE approved (No.132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved

#### Description

The ELM302X series and ELM305X series are optically isolated triac driver devices. These devices contain a GaAs infrared emitting diode and a light activated silicon bilateral switch, which functions like a triac.

They are designed for interfacing between electronic controls and power triacs to control resistive and inductive loads for 115 to 240 VAC operations.

#### Applications

- Solenoid/valve controls
- Lamp ballasts
- Static AC power switch
- Interfacing microprocessors to 115 to 240Vac peripherals
- Incandescent lamp dimmers
- Temperature controls
- Motor controls

**Absolute Maximum Ratings (Ta=25°C)**

Parameter		Symbol	Rating	Unit
Input	Forward current	$I_F$	60	mA
	Reverse voltage	$V_R$	6	V
	Power Dissipation	$P_D$	100	mW
Output	Off-state Output Terminal Voltage	ELM302X $V_{DRM}$	400	V
		ELM305X	600	
	On state RMS current	$I_{T(RMS)}$	70	mA(RMS)
	Peak Repetitive Surge Current	$I_{TSM}$	1	A
	Power dissipation	$P_C$	300	mW
Total power dissipation		$P_{TOT}$	200	mW
Isolation voltage <sup>*1</sup>		$V_{ISO}$	3750	Vrms
Operating temperature		$T_{OPR}$	-40~+110	°C
Storage temperature		$T_{STG}$	-55~+150	°C
Soldering Temperature <sup>*2</sup>		$T_{SOL}$	260	°C

Notes:

\*1 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.

\*2 For 10 seconds

**Electro-Optical Characteristics (Ta=25°C unless specified otherwise)**

**Input**

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Forward Voltage	V <sub>F</sub>	-	1.2	1.5	V	I <sub>F</sub> = 10mA
Reverse Leakage current	I <sub>R</sub>	-	-	10	μA	V <sub>R</sub> = 6V

**Output**

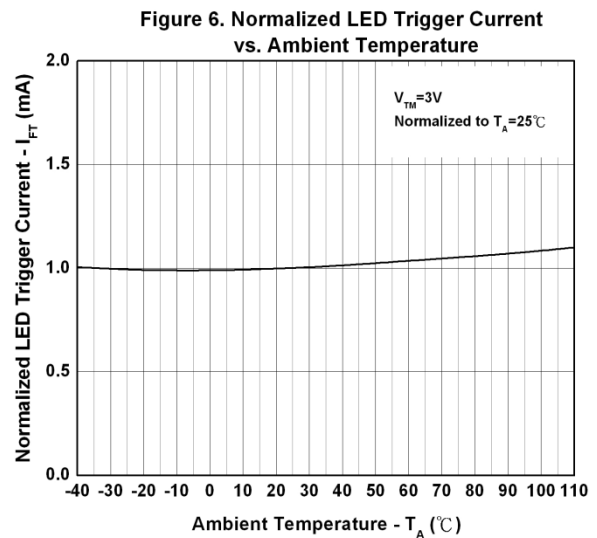
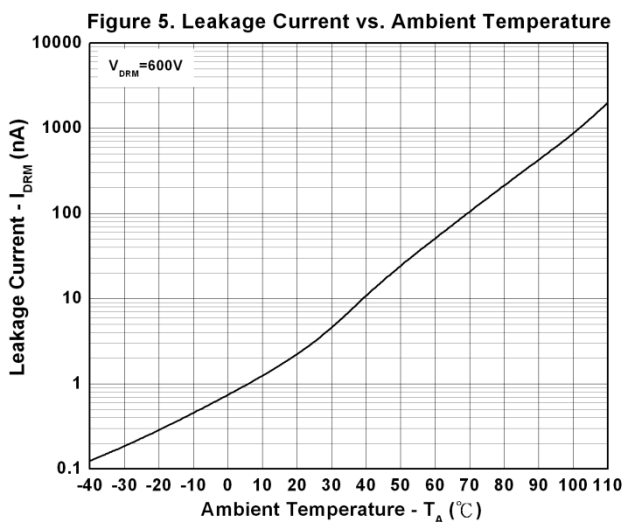
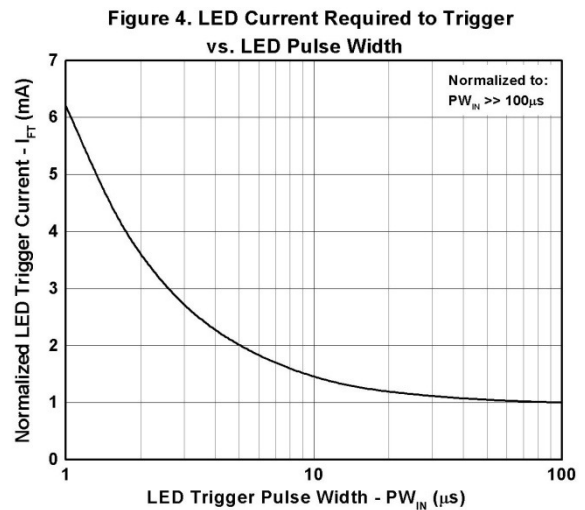
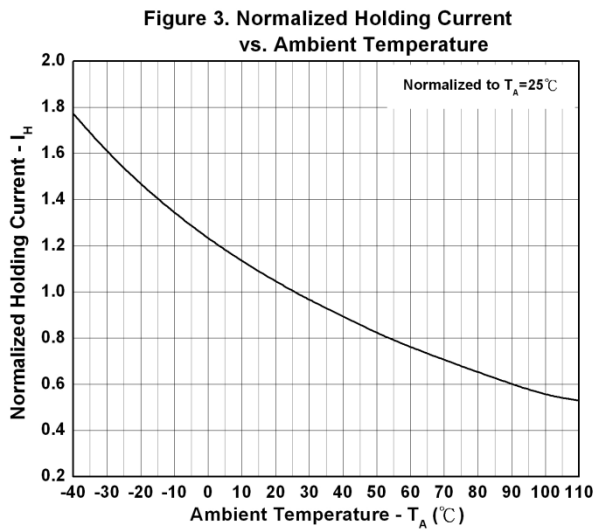
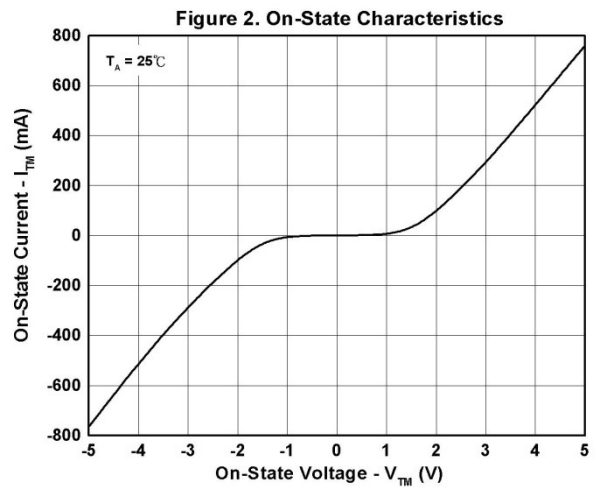
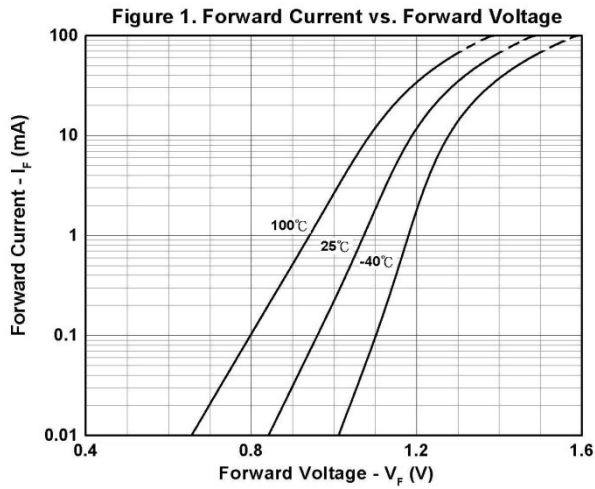
Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Peak Blocking Current	I <sub>DRM</sub>	-	-	100	nA	V <sub>DRM</sub> = Rated V <sub>DRM</sub> I <sub>F</sub> = 0mA
Peak On-state Voltage	V <sub>TM</sub>	-	-	2.5	V	I <sub>TM</sub> =100mA peak, I <sub>F</sub> =Rated I <sub>FT</sub>
Critical Rate of Rise off-state Voltage	ELM302X	-	10	-	V/μs	I <sub>F</sub> =0mA, Figure 8
	ELM305X	1000	-	-		

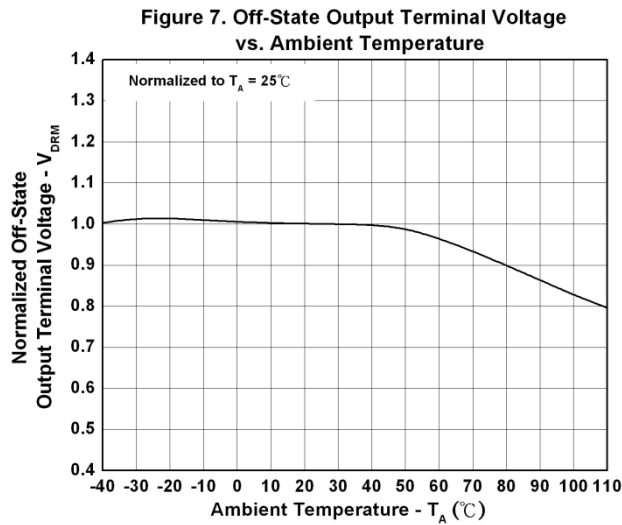
**Transfer Characteristics**

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
LED Trigger Current	3022 3052	-	-	10	mA	Main terminal Voltage=3V
	3023 3053	-	-	5		
	3024 3054	-	-	3		
Holding Current	I <sub>H</sub>	-	3	5	mA	
Turn-on time	T <sub>on</sub>	-	-	100	μS	V <sub>D</sub> =6V, R <sub>L</sub> =100ohm, I <sub>F</sub> =20mA

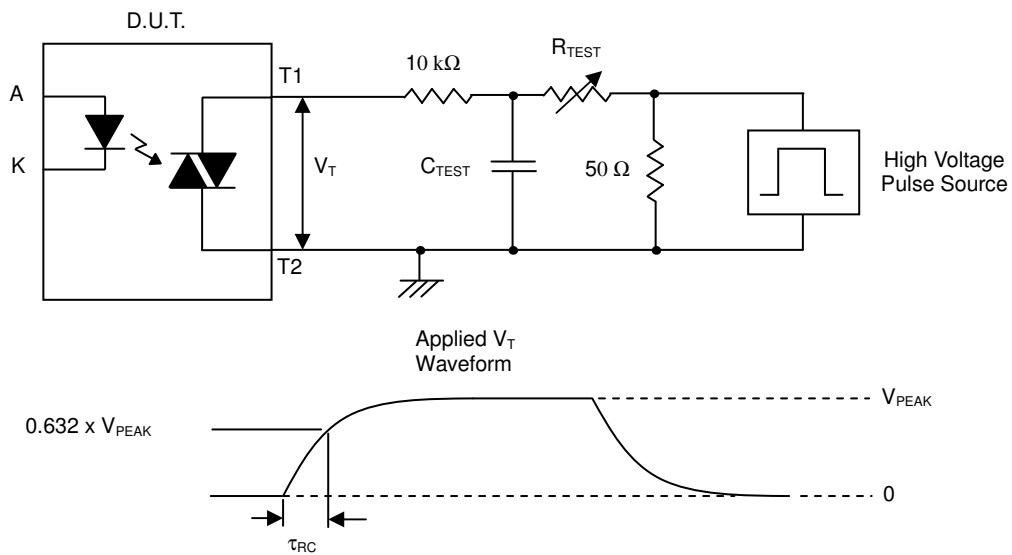
\* Typical values at T<sub>a</sub> = 25°C

Typical Electro-Optical Characteristics Curves





**Figure 8. Static dv/dt Test Circuit & Waveform**



**Measurement Method**

The high voltage pulse is set to the required  $V_{PEAK}$  value and applied to the D.U.T. output side through the RC circuit above. LED current is not applied. The waveform  $V_T$  is monitored using a x100 scope probe. By varying  $R_{TEST}$ , the  $dv/dt$  (slope) is increased, until the D.U.T. is observed to trigger (waveform collapses). The  $dv/dt$  is then decreased until the D.U.T. stops triggering. At this point,  $\tau_{RC}$  is recorded and the  $dv/dt$  calculated.

$$dv/dt = \frac{0.632 \times V_{PEAK}}{\tau_{RC}}$$

For example,  $V_{PEAK} = 400V$  for EL302X series. The  $dv/dt$  value is calculated as follows:

$$dv/dt = \frac{0.63 \times 400}{\tau_{RC}} = \frac{252}{\tau_{RC}}$$

## Order Information

### Part Number

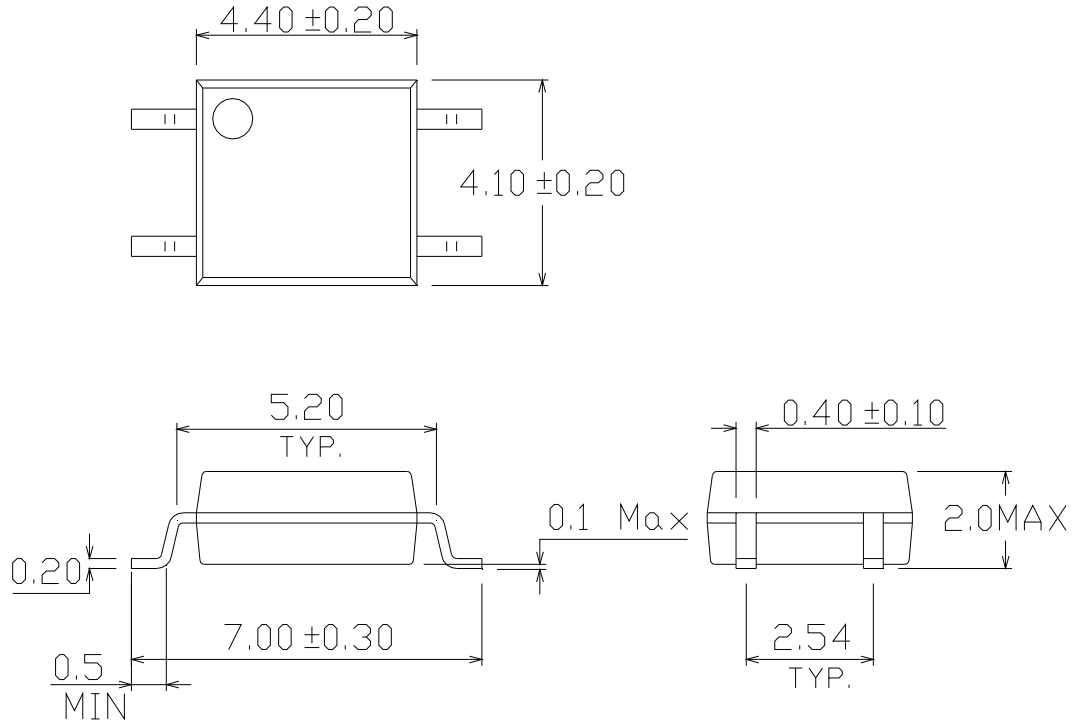
**ELM302X(Z)-V**  
or **ELM305X(Z)-V**

### Note

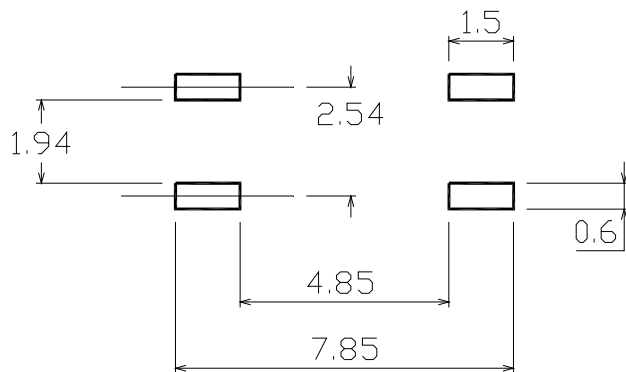
- X = Part No. (2,3 or 4)
- Z = Tape and reel option (TA, TB or none).
- V = VDE safety approved (optional)

Option	Description	Packing quantity
None	Standard	100 units per tube
None	Standard + VDE safety optional	100 units per tube
(TA)	TA tape & reel option	3000 units per reel
(TB)	TB tape & reel option	3000 units per reel
(TA)-V	TA tape & reel option + VDE safety optional	3000 units per reel
(TB)-V	TB tape & reel option + VDE safety optional	3000 units per reel

**Package Dimension (Dimensions in mm)**



**Recommended pad layout for surface mount leadform**



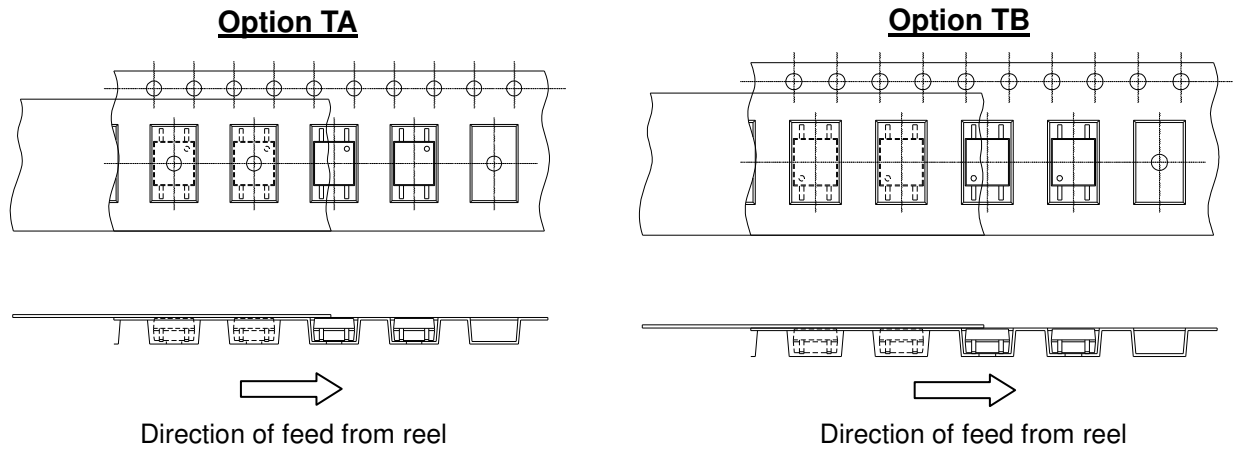
## Device Marking



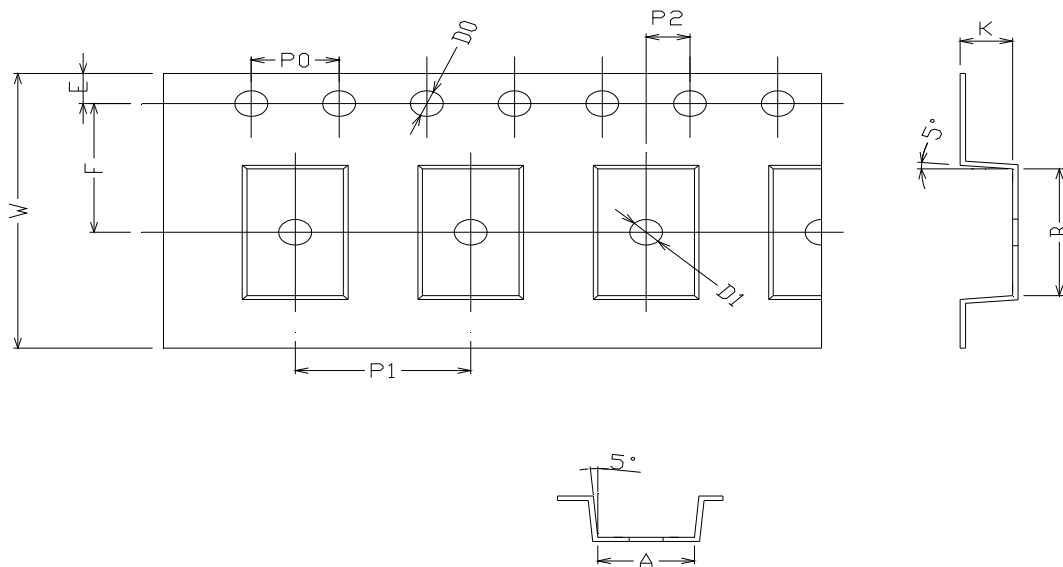
## Notes

EL	denotes Everlight
M3054	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE safety option (optional)

**Tape & Reel Packing Specifications**



**Tape dimensions**



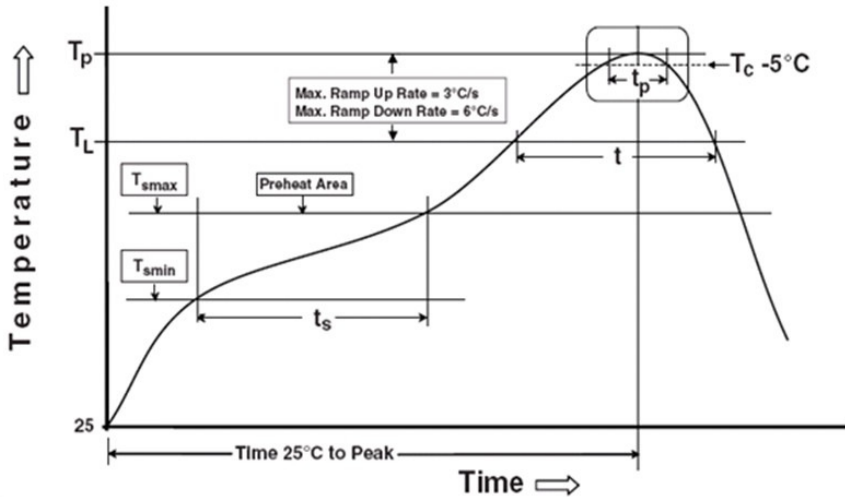
Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	4.4 ± 0.1	7.4 ± 0.1	1.5 + 0.1/-0	1.5 ± 0.1	1.75 ± 0.1	7.5 ± 0.1

Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0 ± 0.15	8.0 ± 0.1	2.0 ± 0.1	0.25 ± 0.03	16.0 ± 0.2	2.4 ± 0.1

**Precautions for Use**

1. Soldering Condition

1.1 (A) Maximum Body Case Temperature Profile for evaluation of Reflow Profile



Note:

Reference: IPC/JEDEC J-STD-020D

**Preheat**

Temperature min ( $T_{smin}$ )	150 °C
Temperature max ( $T_{smax}$ )	200 °C
Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	60-120 seconds
Average ramp-up rate ( $T_{smax}$ to $T_p$ )	3 °C/second max

**Other**



Liquidus Temperature ( $T_L$ )	217 °C
Time above Liquidus Temperature ( $t_L$ )	60-100 sec
Peak Temperature ( $T_p$ )	260 °C
Time within 5 °C of Actual Peak Temperature: $T_p - 5^\circ\text{C}$	30 s
Ramp- Down Rate from Peak Temperature	6 °C /second max.
Time 25 °C to peak temperature	8 minutes max.
Reflow times	3 times

## **DISCLAIMER**

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