



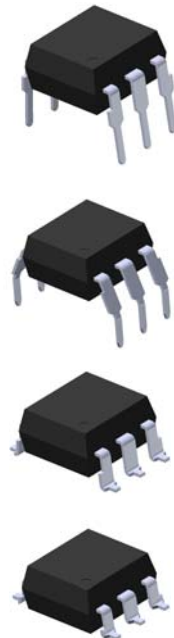
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# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

**TIL113**  
**4NXX Series**  
**H11BX Series**

## Features:

- 4NXX series: 4N29, 4N30, 4N31, 4N32, 4N33
- H11BX series: H11B1, H11B2, H11B3, H11B255
- High isolation voltage between input and output (Viso=5000 V rms )
- Creepage distance >7.62 mm
- Meets or exceeds all JEDEC registered specifications
- Pb free and RoHS compliant.
- UL approved (No. E214129)
- VDE approval (No.132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CSA approved (No. 2007798)



## Description

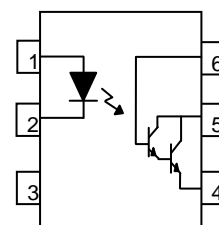
The TIL113, 4NXX and H11BX series of devices each consist of an infrared emitting diode optically coupled to a photo darlington detector.

They are packaged in a 6-pin DIP package and available in wide-lead spacing and SMD option.

## Applications

- Low power logic circuits
- Telecommunications equipment
- Portable electronics
- Interfacing coupling systems of different potentials and impedances

## Schematic



## Pin Configuration

1. Anode
2. Cathode
3. No Connection
4. Emitter
5. Collector
6. Base



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## TIL113 4NXX Series H11BX Series

### Absolute Maximum Ratings (T<sub>a</sub>=25°C)

Parameter		Symbol	Rating	Unit
Input	Forward current	I <sub>F</sub>	60	mA
	Peak forward current (t = 10μs)	I <sub>FM</sub>	1	A
	Reverse voltage	V <sub>R</sub>	6	V
	Power dissipation No derating needed	P <sub>D</sub>	120	mW
			3.8	mW/°C
Output	Power dissipation No derating needed	P <sub>C</sub>	150	mW
			6.5	mW/°C
	Collector-Emitter voltage	V <sub>CEO</sub>	55	V
	Collector-Base voltage	V <sub>CBO</sub>	55	V
	Emitter-Collector voltage	V <sub>ECO</sub>	7	V
	Emitter-Base voltage	V <sub>EBO</sub>	7	V
Total power dissipation		P <sub>tot</sub>	200	mW
Isolation voltage *1		V <sub>iso</sub>	5000	V rms
Operating temperature		T <sub>opr</sub>	-55~+100	°C
Storage temperature		T <sub>stg</sub>	-55~+125	°C
Soldering temperature *2		T <sub>sol</sub>	260	°C

#### Notes

\*1 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2 & 3 are shorted together, and pins 4, 5 & 6 are shorted together.

\*2 For 10 seconds.



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## 6 PIN PHOTODARLINGTON PHOTOCOUPLER

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### Electrical Characteristics ( $T_a=25^{\circ}\text{C}$ unless specified otherwise)

#### Input

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Forward voltage	$V_F$	-	1.2	1.5	V	$I_F = 10\text{mA}$ $I_F = 50\text{mA}$ for H11B3
Reverse current	$I_R$	-	-	10	$\mu\text{A}$	$V_R = 6\text{V}$
Input capacitance	$C_{in}$	-	50	-	pF	$V = 0, f = 1\text{MHz}$

#### Output

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Collector-Emitter dark current	$I_{CEO}$	-	-	100	nA	$V_{CE} = 10\text{V}$
Collector-Emitter breakdown voltage	$BV_{CEO}$	55	-	-	V	$I_C = 1\text{mA}$
Collector-Base breakdown voltage	$BV_{CBO}$	55	-	-	V	$I_C = 0.1\text{mA}$
Emitter-Collector breakdown voltage	$BV_{ECO}$	7	-	-	V	$I_E = 0.1\text{mA}$

\* Typical values at  $T_a = 25^{\circ}\text{C}$



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# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

**TIL113**  
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## Transfer Characteristics (T<sub>a</sub>=25°C unless specified otherwise)

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
Current transfer ratio	4N32 4N33	CTR	500	-	-	%	I <sub>F</sub> = 10mA , V <sub>CE</sub> = 10V
	4N29 4N30		100	-	-		
	4N31		50	-	-		
	H11B1		500	-	-		
	H11B2		200	-	-		I <sub>F</sub> = 1mA , V <sub>CE</sub> = 5V
	H11B3		100	-	-		
	H11B255		100	-	-		
	TIL113		300	-	-		
Collector-emitter saturation voltage	4N29 4N30 4N32 4N33	V <sub>CE(sat)</sub>	-	-	1.0	V	I <sub>F</sub> = 8mA , I <sub>C</sub> = 2mA
	4N31 TIL113		-	-	1.2		I <sub>F</sub> = 8mA , I <sub>C</sub> = 2mA
	H11B1 H11B2 H11B3		-	-	1.0		I <sub>F</sub> = 1mA , I <sub>C</sub> = 1mA
	H11B255		-	-	1.0		I <sub>F</sub> = 50mA , I <sub>C</sub> = 50mA
Isolation resistance		R <sub>IO</sub>	10 <sup>11</sup>	-	-	Ω	V <sub>IO</sub> = 500Vdc
Input-output capacitance		C <sub>IO</sub>	-	0.8	-	pF	V <sub>IO</sub> = 0, f = 1MHz



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# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

# TIL113 4NXX Series H11BX Series

## Transfer Characteristics

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
Turn-on time	H11B1 H11B2 H11B3 H11B255	Ton	-	25	-	μs	$V_{CC} = 10V, I_F = 10mA,$ $R_L = 100\Omega$
	4N29 4N30 4N31 4N32 4N33 TIL113		-	-	5		$V_{CC} = 10V, I_C = 50mA,$ $I_F = 200mA$
Turn-off time	H11B1 H11B2 H11B3 H11B255	Toff	-	18	-	μs	$V_{CC} = 10V, I_F = 10mA,$ $R_L = 100\Omega$
	4N32 4N33 TIL113		-	-	100		$V_{CC} = 10V, I_C = 50mA,$ $I_F = 200mA$
	4N29 4N30 4N31		-	-	40		

\* Typical values at  $T_a = 25^\circ C$

**Typical Performance Curves**

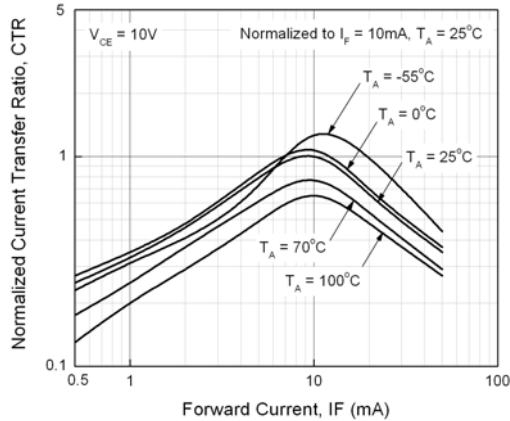
**Figure 1. Forward Current vs Forward Voltage**



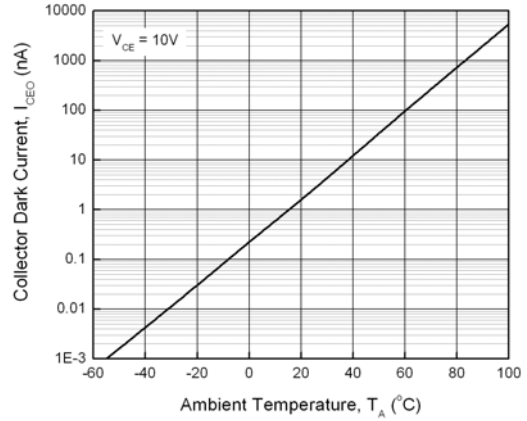
**Figure 2. Current Transfer Ratio vs. Ambient Temperature**



**Figure 3. Normalized Current Transfer Ratio vs Forward Current**



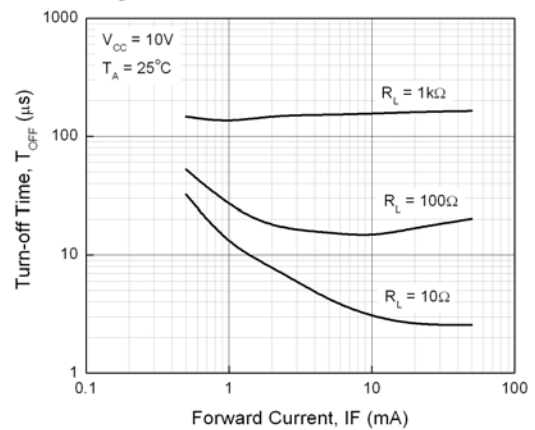
**Figure 4. Collector Dark Current vs Ambient Temperature**



**Figure 5. Turn-on Time vs Forward Current**

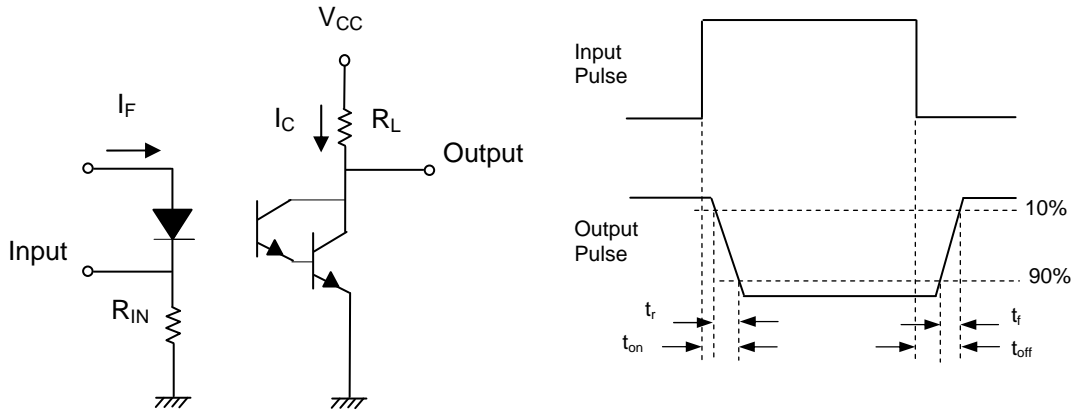


**Figure 6. Turn-off Time vs Forward Current**



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**Figure 7. Switching Time Test Circuit & Waveforms**

**Order Information**

**Part Number**

**4NXXY(Z)-V**  
or **H11BXY(Z)-V**  
or **TIL113Y(Z)-V**

**Note**

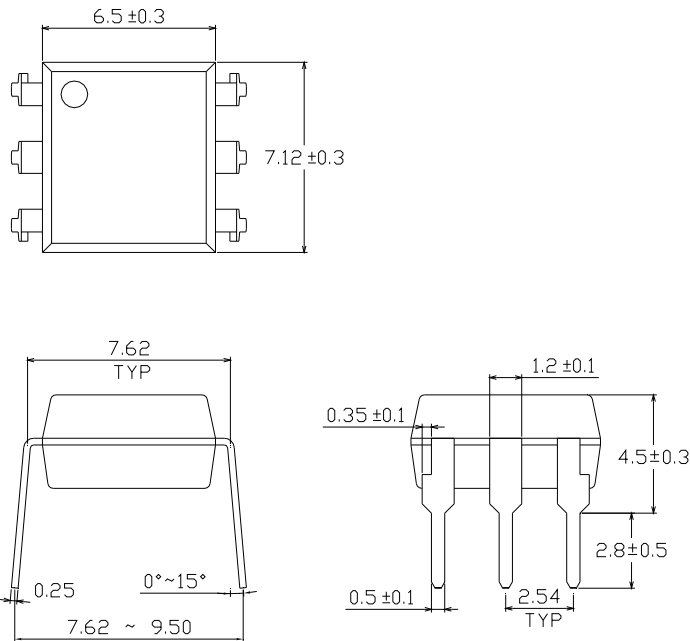
- XX = Part No. for 4NX series (29, 30, 31, 32 or 33)
- X = Part No. for H11BX series (1, 2, 3 or 255)
- Y = Lead form option (S, S1, M or none)
- Z = Tape and reel option (TA, TB or none).
- V = VDE safety (optional)

Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead form (low profile) + TA tape & reel option	1000 units per reel
S1 (TB)	Surface mount lead form (low profile) + TB tape & reel option	1000 units per reel

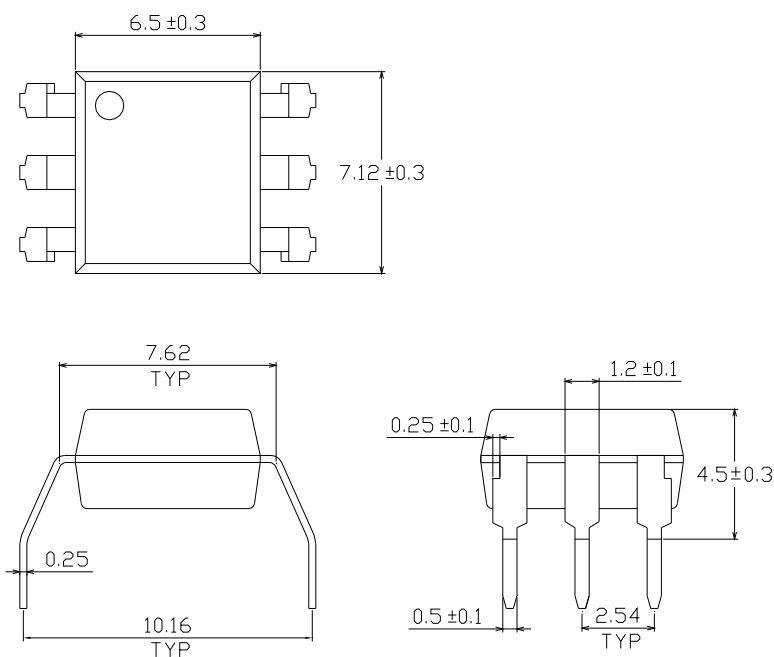
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**Package Drawings**  
(Dimensions in mm)

**Standard DIP Type**



**Option M Type**

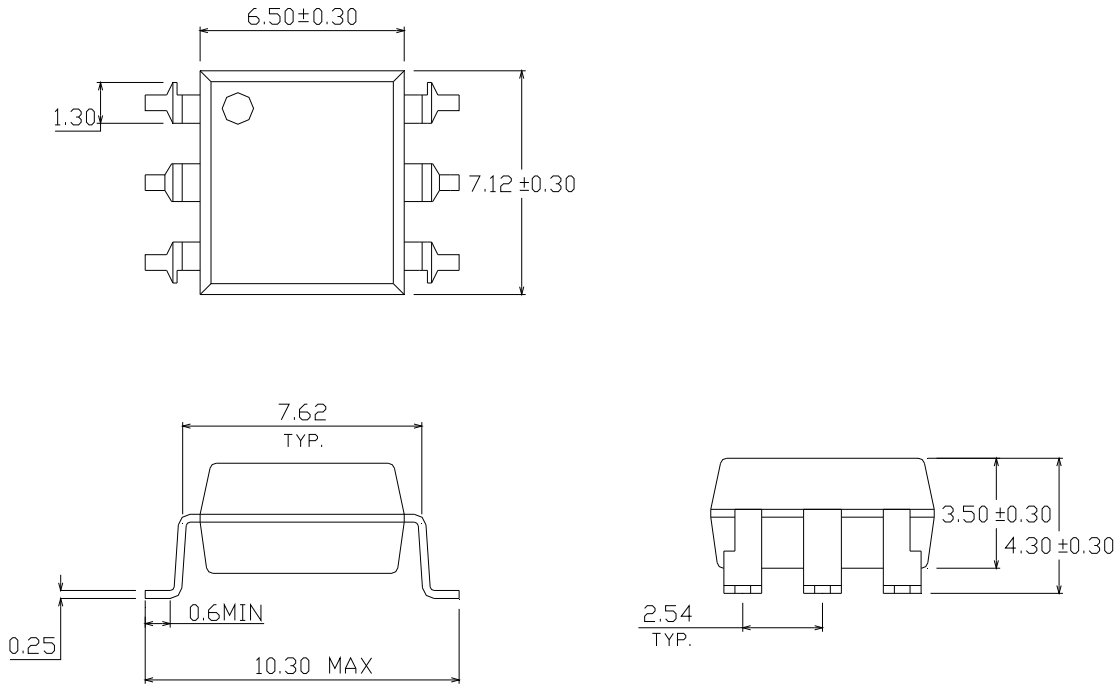




# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

**TIL113**  
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## Option S Type



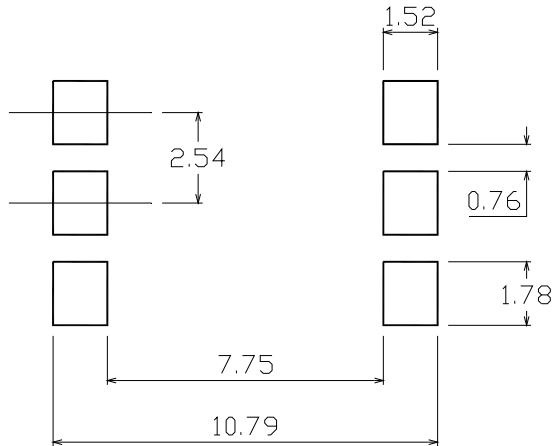
## Option S1 Type



# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

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Recommended pad layout for surface mount leadform



## Device Marking



## Notes

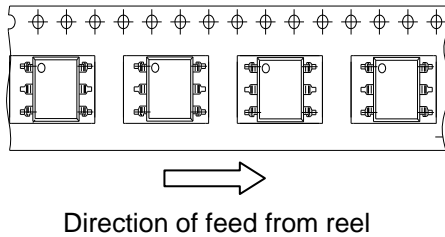
- EL denotes Everlight
- 4N33 denotes Part Number
- H11B1 denotes Part Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE safety (optional)

# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

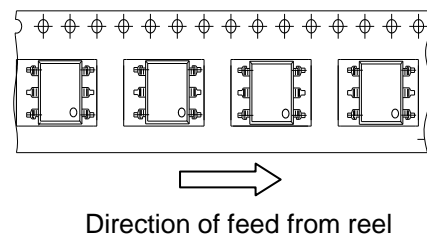
**TIL113**  
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## Tape & Reel Packing Specifications

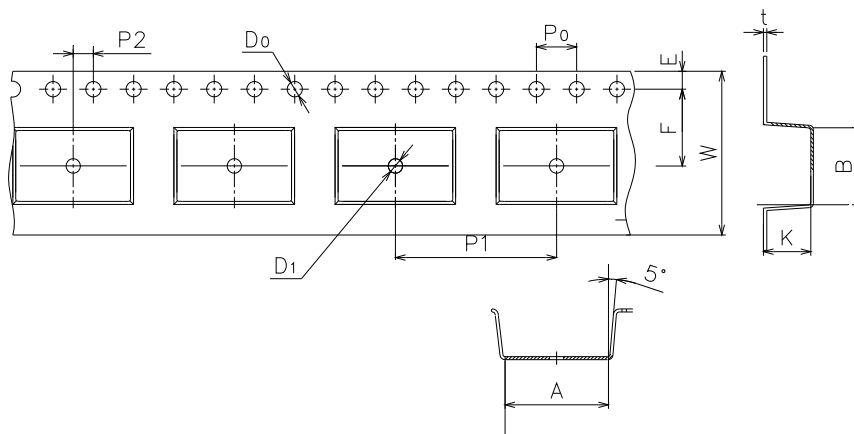
**Option TA**



**Option TB**



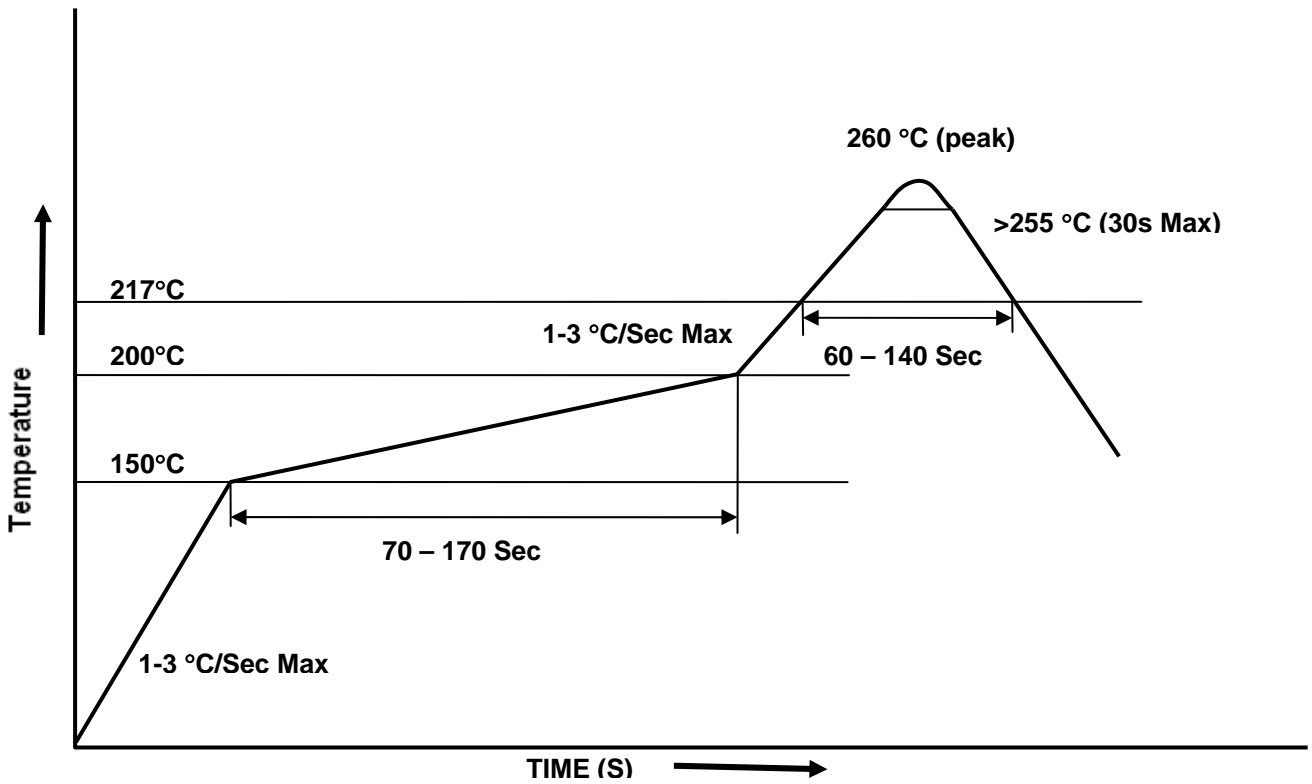
## Tape dimensions



Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	10.4±0.1	7.52±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1

Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0±0.15	16.0±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1

**Solder Reflow Temperature Profile**





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