

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 (pending)
- SEMKO approval (pending)
- NEMKO approval (pending)
- DEMKO approval (pending)
- FIMKO approval (pending)
- CSA approval (pending)

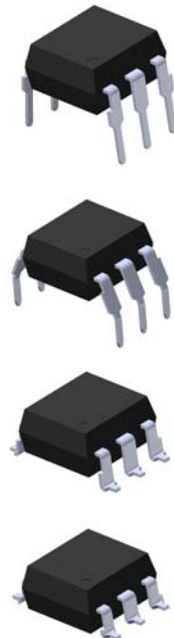
Description

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

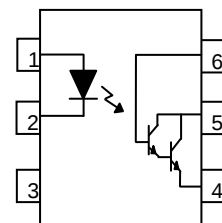
They are packaged in a 6-pin DIP package and available in wide-lead spacing and SMD option.

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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Absolute Maximum Ratings ($T_a=25^{\circ}\text{C}$)

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	60	mA
	Peak forward current ($t = 10\mu\text{s}$)	I_{FM}	1	A
	Reverse voltage	V_R	6	V
	Power dissipation	P_D	120	mW
Output	Power dissipation	P_C	150	mW
	Collector-Emitter voltage	V_{CEO}	55	V
	Collector-Base voltage	V_{CBO}	55	V
	Emitter-Collector voltage	V_{ECO}	7	V
	Emitter-Base voltage	V_{EBO}	7	V
Total power dissipation		P_{tot}	200	mW
Isolation voltage ^{*1}		V_{iso}	5000	V rms
Operating temperature		T_{opr}	-55~+100	$^{\circ}\text{C}$
Storage temperature		T_{stg}	-55~+125	$^{\circ}\text{C}$
Soldering temperature ^{*2}		T_{sol}	260	$^{\circ}\text{C}$

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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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	μA	$V_R = 6\text{V}$
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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Transfer Characteristics ($T_a=25^{\circ}\text{C}$ unless specified otherwise)

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
Current transfer ratio	4N32 4N33	CTR	500	-	-	%	$I_F = 10\text{mA}, V_{CE} = 10\text{V}$
	4N29 4N30		100				
	4N31		50	-	-		
	H11B1		500				$I_F = 1\text{mA}, V_{CE} = 5\text{V}$
	H11B2		200	-	-		
	H11B3		100				
	H11B255		100				$I_F = 10\text{mA}, V_{CE} = 5\text{V}$
	TIL113		300				$I_F = 10\text{mA}, V_{CE} = 1\text{V}$
Collector-emitter saturation voltage	4N29 4N30 4N32 4N33	$V_{CE(sat)}$	-	-	1.0	V	$I_F = 8\text{mA}, I_C = 2\text{mA}$
	4N31 TIL113		-	-	1.2		$I_F = 8\text{mA}, I_C = 2\text{mA}$
	H11B1 H11B2 H11B3		-	-	1.0		$I_F = 1\text{mA}, I_C = 1\text{mA}$
	H11B255				1.0		$I_F = 50\text{mA}, I_C = 50\text{mA}$
Isolation resistance		R_{IO}	10^{11}	-	-	Ω	$V_{IO} = 500\text{Vdc}$
Input-output capacitance		C_{IO}	-	0.8	-	pF	$V_{IO} = 0, f = 1\text{MHz}$



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

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

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Typical Performance Curves

Figure 1. Forward Current vs Forward Voltage

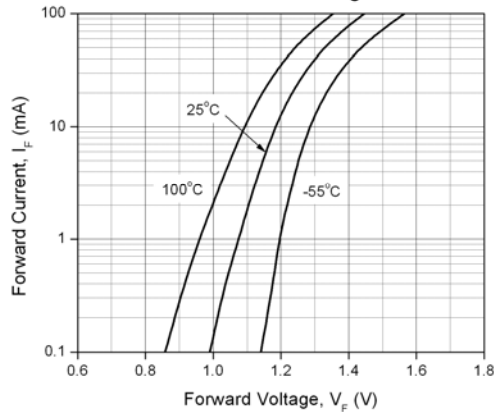


Figure 2. Current Transfer Ratio vs. Ambient Temperature

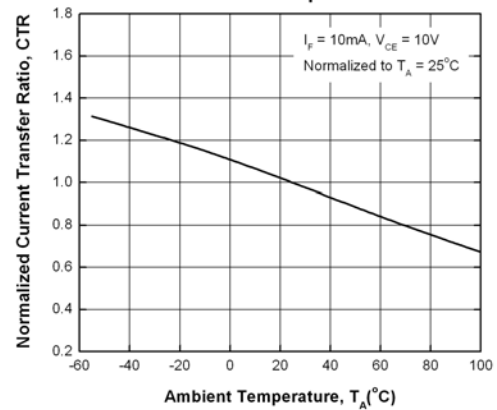


Figure 3. Normalized Current Transfer Ratio vs Forward Current

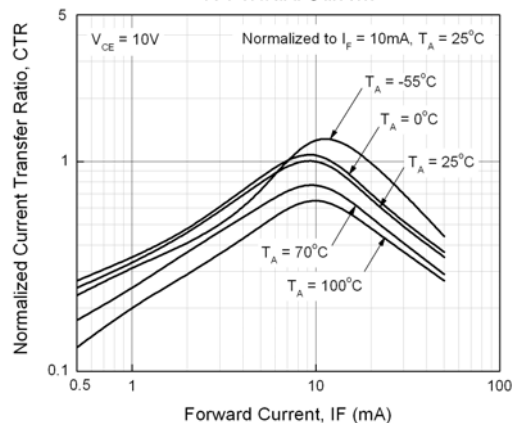


Figure 4. Collector Dark Current vs Ambient Temperature

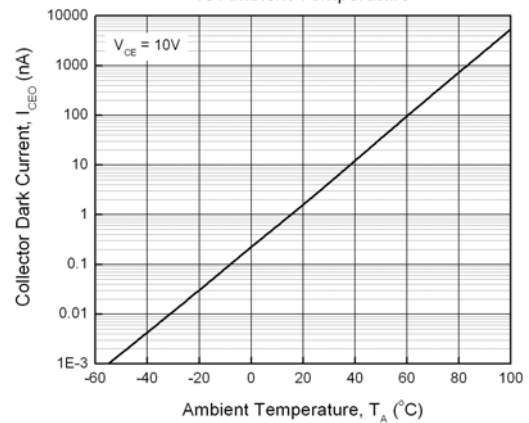


Figure 5. Turn-on Time vs Forward Current

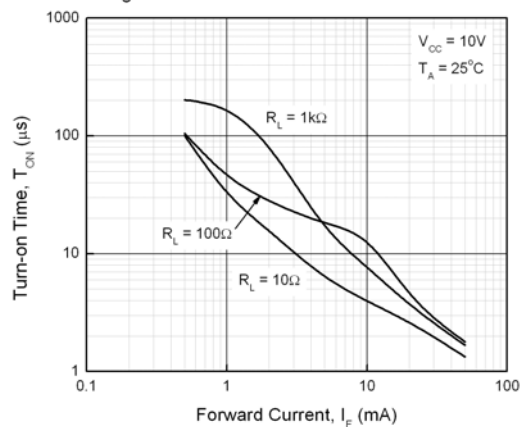
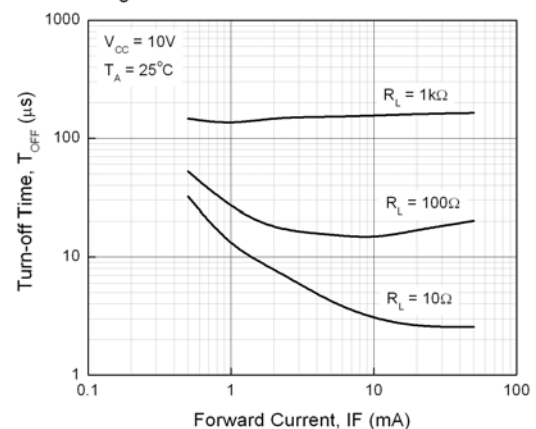


Figure 6. Turn-off Time vs Forward Current



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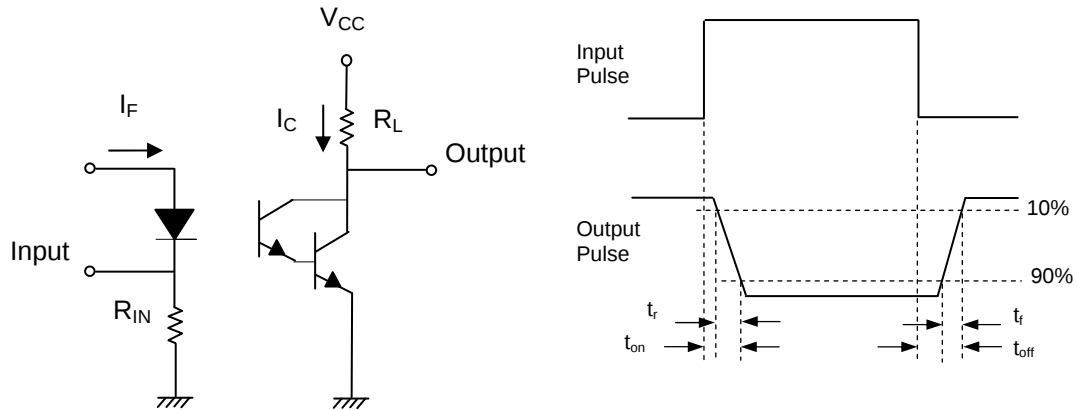


Figure 7. Switching Time Test Circuit & Waveforms

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)

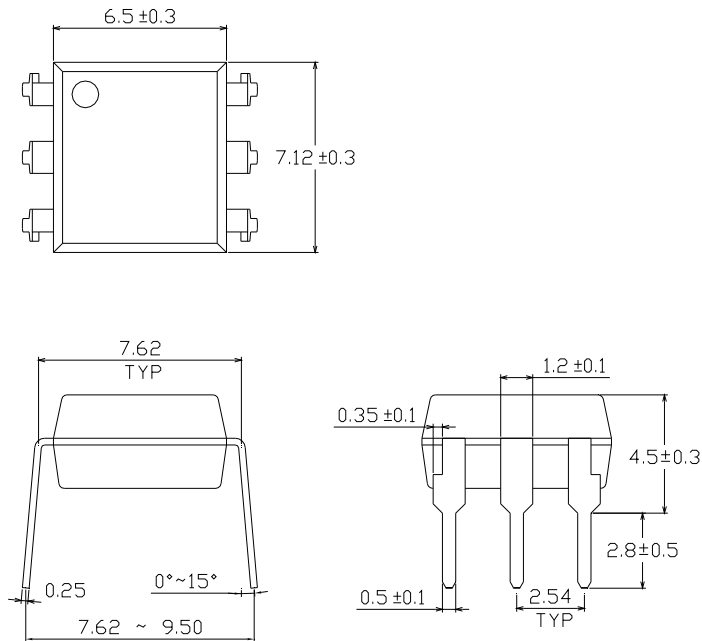
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead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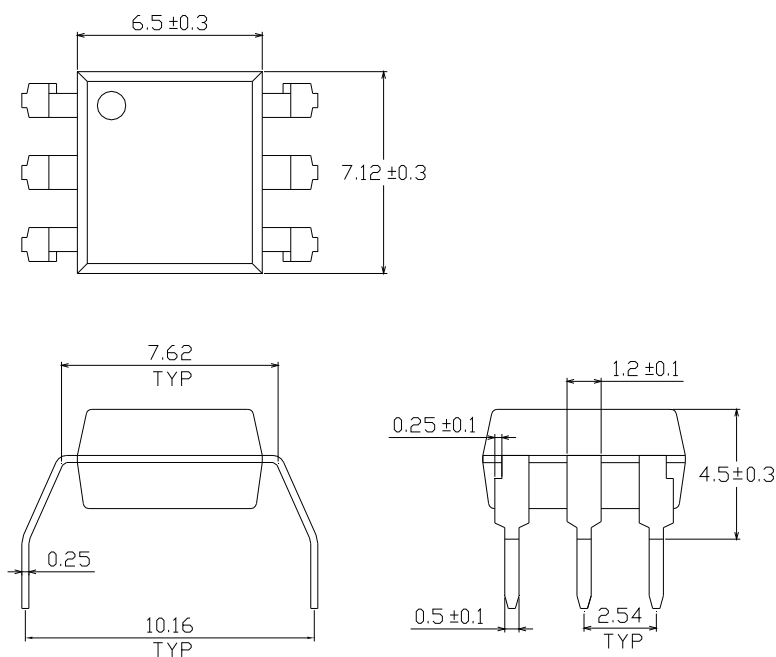
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Package Drawings (Dimensions in mm)

Standard DIP Type



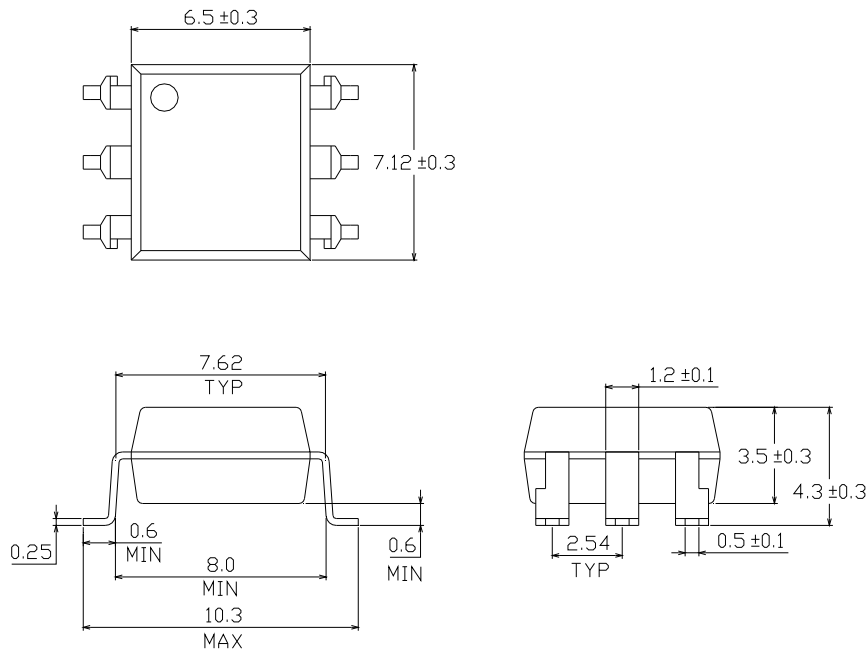
Option M Type



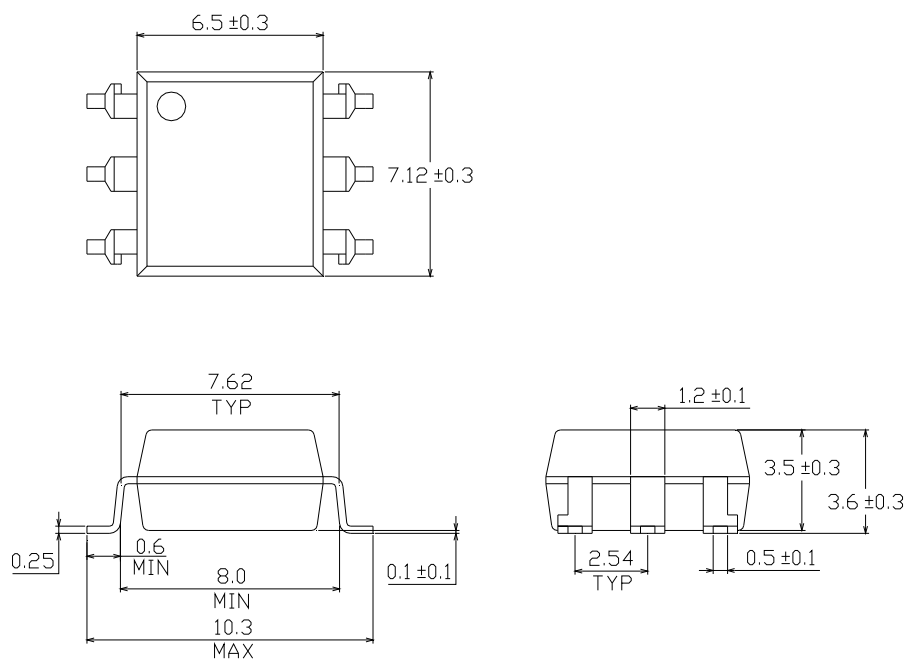
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Option S Type



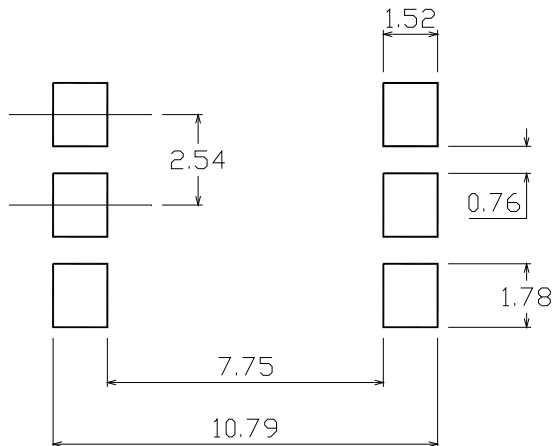
Option S1 Type



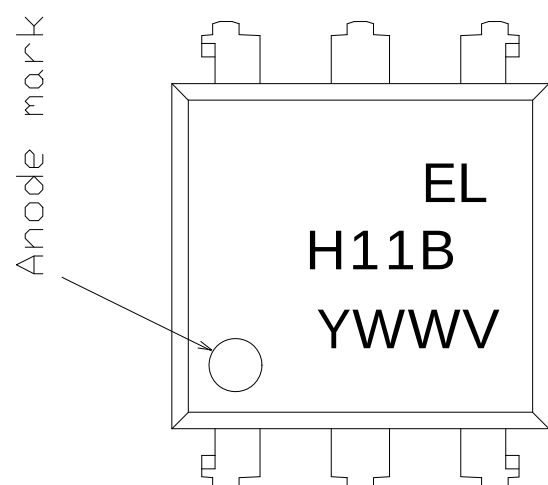
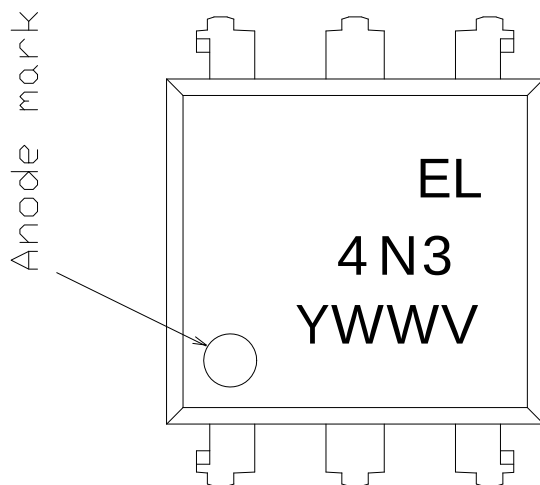
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Recommended pad layout for surface mount leadform



Device Marking



Notes

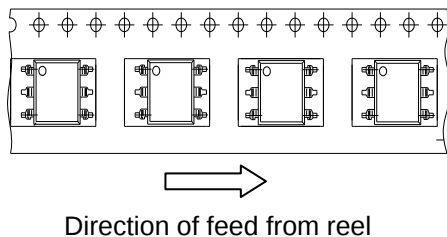
EL denotes Everlight
4N33 denotes Part Number
H11B1 denotes 1 digit Year code
Y denotes 2 digit Week code
WW denotes VDE safety (optional)
V

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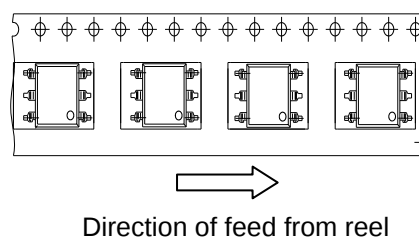
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Tape & Reel Packing Specifications

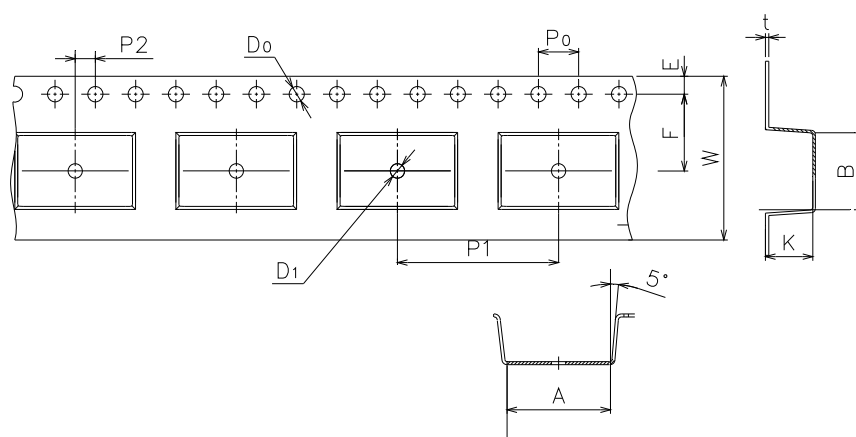
Option TA



Option TB



Tape dimensions



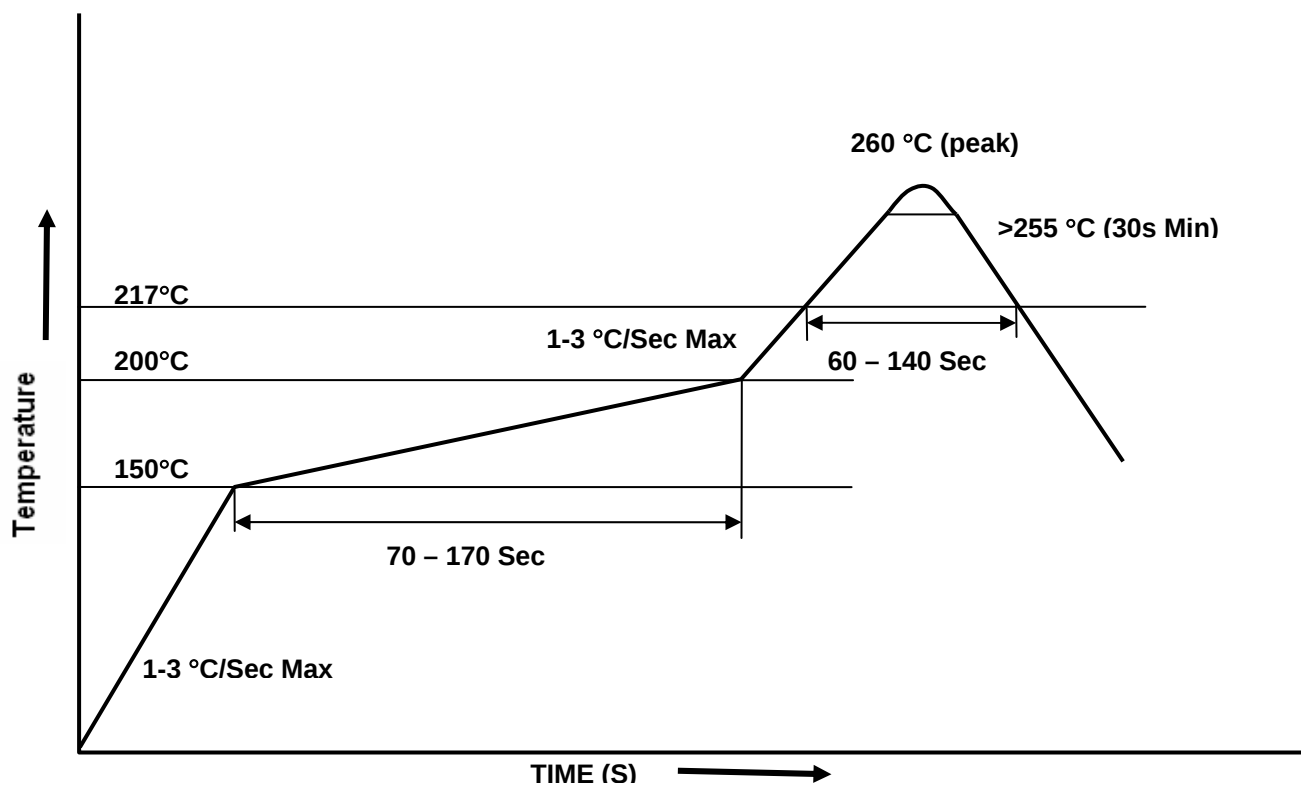
Dimension No.	A	B	D0	D1	E	F
Dimension (mm)	10.4±0.1	7.52±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1

Dimension No.	P0	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

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Solder Reflow Temperature Profile



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