

4NXX, H11BX, H11B255 Series

DIP6, DC Input, Photo Darlington Transistor Coupler

Description

The 4N29, 4N30, 4N31, 4N32, 4N33

H11B1, H11B2, H11B3, H11B255 series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon planar darlington phototransistor detector in a plastic DIP6 package with different lead forming options

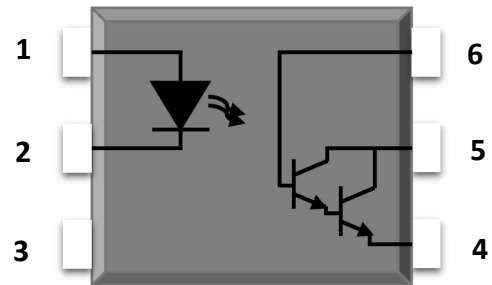
Features

- High isolation 5000 VRMS
- DC input with transistor output
- Operating temperature range - 55 °C to 110 °C
- RoHS & REACH Compliance
- MSL class 1

Applications

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

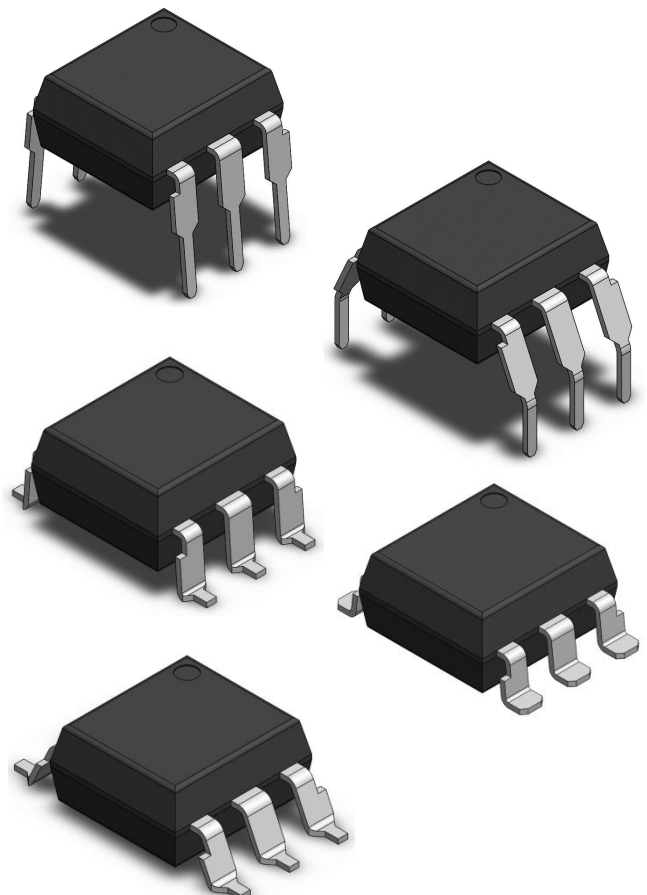
SCHEMATIC



PIN DEFINITION

1. Anode	6. Base
2. Cathode	5. Collector
3. NC	4. Emitter

PACKAGE OUTLINE



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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT	NOTE
INPUT				
Forward Current	I_F	60	mA	
Peak Forward Current($t=10\mu s$)	I_{FM}	1	A	1
Reverse Voltage	V_R	6	V	
Power Dissipation($T_A=25^\circ C$)	P_D	120	mW	
OUTPUT				
Collector - Emitter Voltage	V_{CEO}	55	V	
Collector-Base Breakdown Voltage	V_{CBO}	55	V	
Emitter - Collector Voltage	V_{ECO}	7	V	
Emitter-Base Breakdown Voltage	V_{EBO}	7	V	
Collector Current	I_C	150	mA	
Power Dissipation($T_A=25^\circ C$)	P_C	150	mW	
COMMON				
Total Power Dissipation	P_{tot}	200	mW	
Isolation Voltage	V_{iso}	5000	Vrms	2
Operating Temperature	T_{opr}	-55~+110	$^\circ C$	
Storage Temperature	T_{stg}	-55~+110	$^\circ C$	
Soldering Temperature	T_{sol}	260	$^\circ C$	

Note 1. AC For 1 Minute, R.H. = 40 ~ 60%

Note 2. For 10 seconds

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ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25°C

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	TEST CONDITION	NOTE
INPUT							
Forward Voltage	VF	/	-	1.24	1.4	V	IF=10mA
		H11B3	-	1.4	1.5	V	IF=50mA
Reverse Current	IR	-	-	10	μA	VR=6V	
Input Capacitance	Cin	-	50	-	pF	V=0, f=1kHz	
OUTPUT							
Collector Dark Current	ICEO	-	-	100	nA	VCE=10V	
Collector-Emitter Breakdown Voltage	BVCEO	55	-	-	V	IC=0.1mA	
Collector-Base Breakdown Voltage	BVCBO	55	-	-	V	IC=0.1mA	
Emitter-Collector Breakdown Voltage	BVECO	7	-	-	V	IE=0.1mA	

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TRANSFER CHARACTERISTICS								
Current Transfer Ratio	CTR	4N31	50	-	-	%	IF=10mA, VCE=10V	
		4N29,4N30	100	-	-			
		4N32,4N33	500	-	-			
		H11B1	500	-	-		IF=1mA, VCE=5V	
		H11B2	200	-	-			
		H11B3	100	-	-			
		H11B255	100	-	-		IF=10mA, VCE=5V	
Collector-Emitter Saturation Voltage	V _{CE(sat)}	4N29,4N30, 4N32,4N33	-	-	1.0	V	IF= 8mA, IC= 2mA	
		4N31	-	-	1.2		IF= 8mA, IC= 2mA	
		H11B1,H11B2 H11B3	-	-	1.0		IF= 1mA, IC= 1mA	
		H11B255	-	-	1.0		IF= 50mA, IC= 50mA	
Isolation Resistance		R _{IO}	10 ¹¹	-	-	Ω	V _{IO} =500Vdc.	
Floating Capacitance		C _{IO}	-	0.8	-	pF	V=0, f=1MHz	
Turn On Time	t _{on}	H11B1,H11B2 H11B3, H11B255	-	25	-	μs	IC= 10mA, VCC= 2V, RL= 100Ω	
		4N29,4N30, 4N31,4N32 4N33	-	-	5	μs	IC= 10mA, VCC= 2V, RL= 100Ω	
Turn Off Time	t _{off}	H11B1,H11B2 H11B3, H11B255	-	18	-	μs	IC= 10mA, VCC= 2V, RL= 100Ω	
		4N32,4N33	-	-	100	μs	IC= 10mA, VCC= 2V, RL= 100Ω	
		4N29,4N30, 4N31	-	-	40	μs		

CHARACTERISTIC CURVES

Fig.1 Forward Current vs. Ambient Temperature

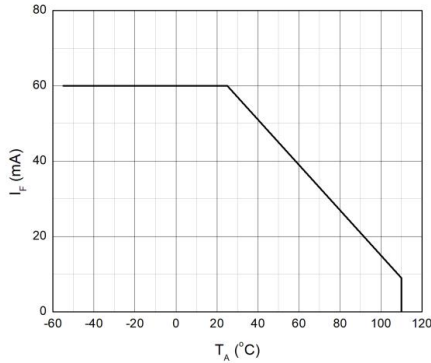


Fig.2 Collector Power Dissipation vs. Ambient Temperature

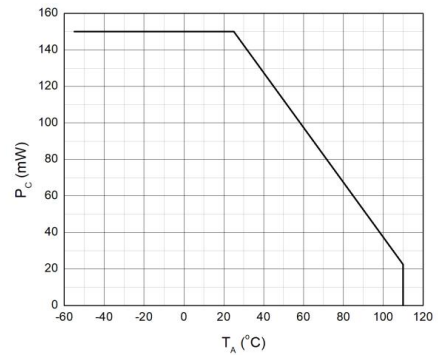


Fig.3 Forward Current vs. Forward Voltage

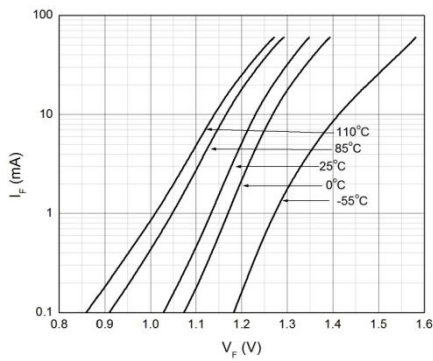


Fig.4 Collector Dark Current vs. Ambient Temperature

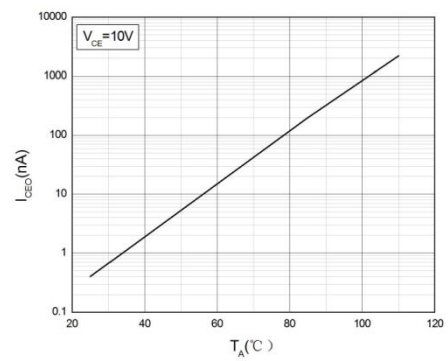


Fig.5 Collector Current vs. Collector-emitter Voltage

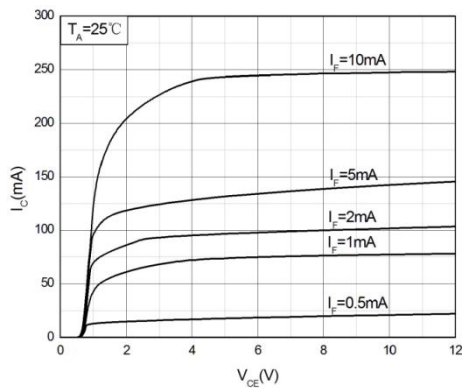
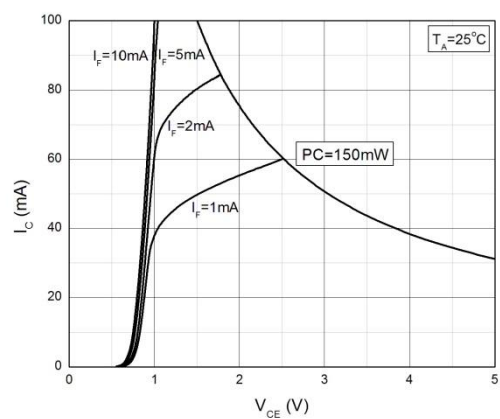


Fig.6 Collector Current vs. Collector-emitter Voltage



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CHARACTERISTIC CURVES

Fig.7 Normalized Current Transfer Ratio vs. Forward Current

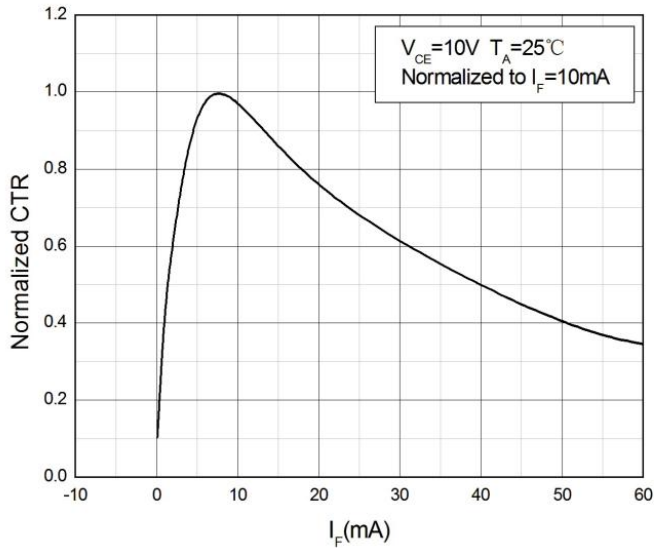


Fig.8 Normalized Current Transfer Ratio vs. Ambient Temperature

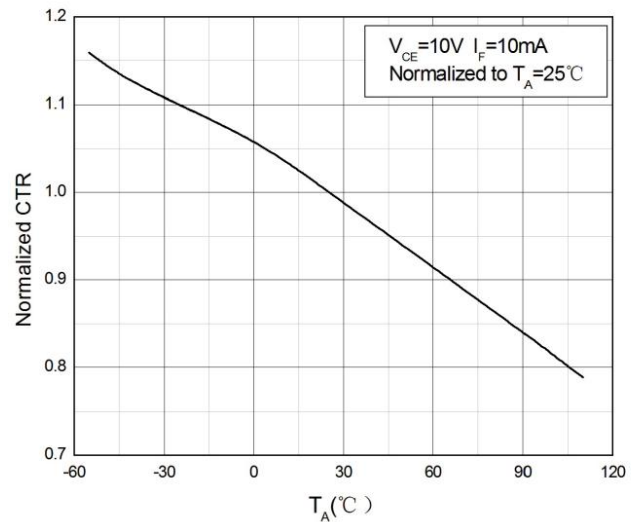


Fig.9 Collector-emitter Saturation Voltage vs. Ambient Temperature

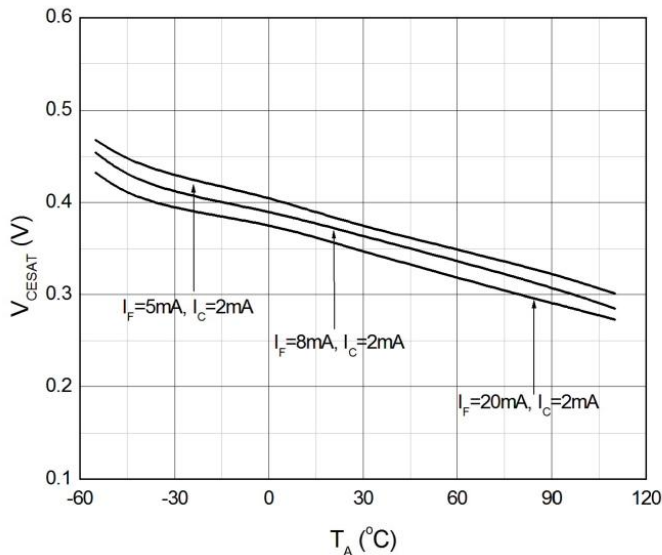
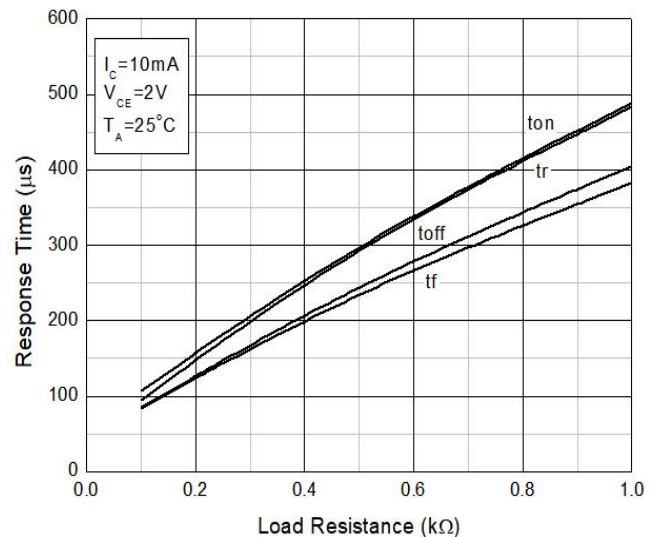


Fig.10 Switching Time vs. Load Resistance



TEST CIRCUITS

Fig.11 Test Circuits of Response Time

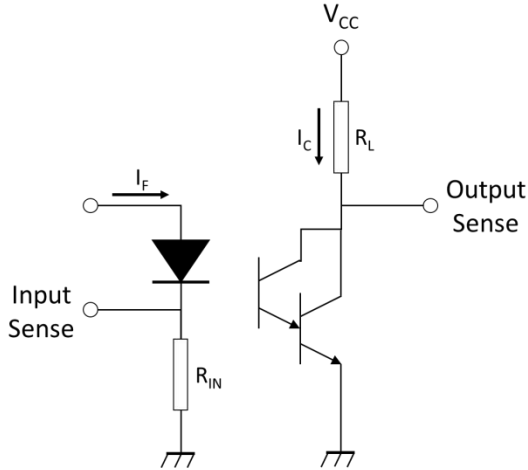


Fig.12 Curves of Response Time

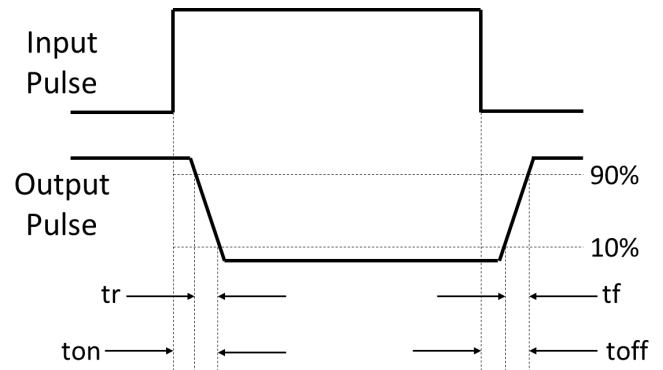
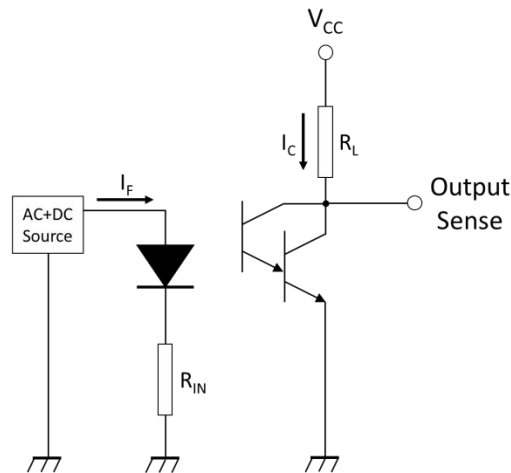


Fig.13 Test Circuits of Frequency Response

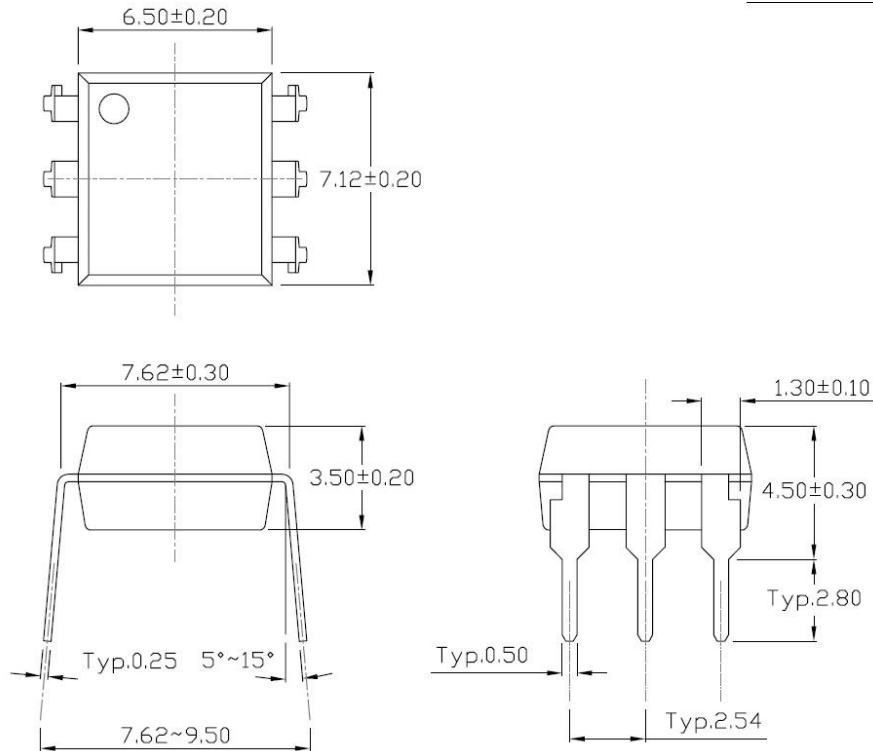


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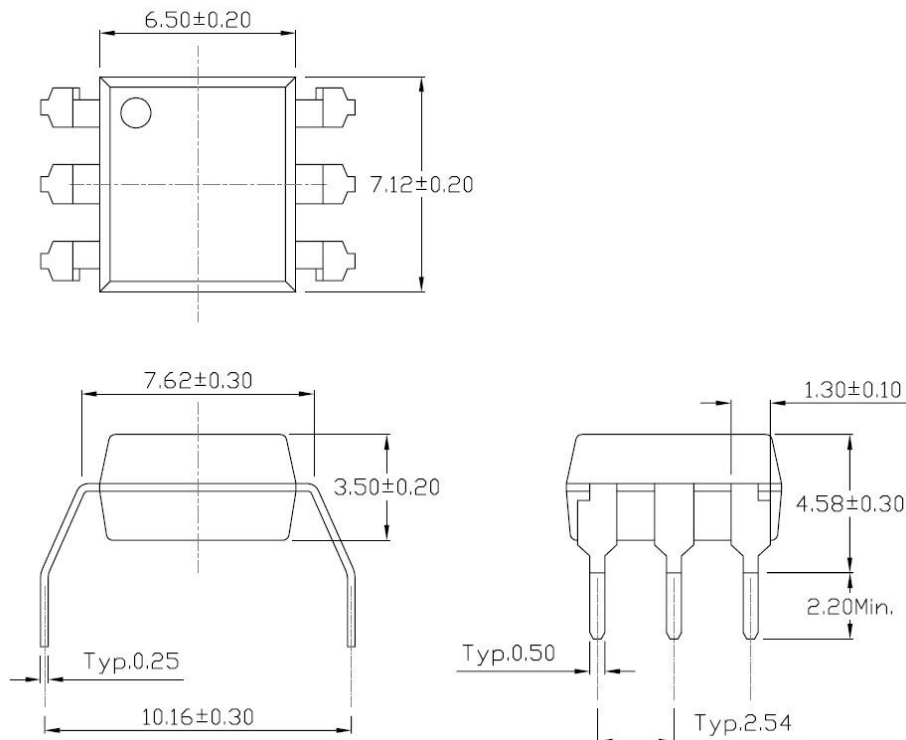
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PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Standard DIP – Through Hole (DIP Type)



Gullwing (400mil) Lead Forming – Through Hole (M Type)

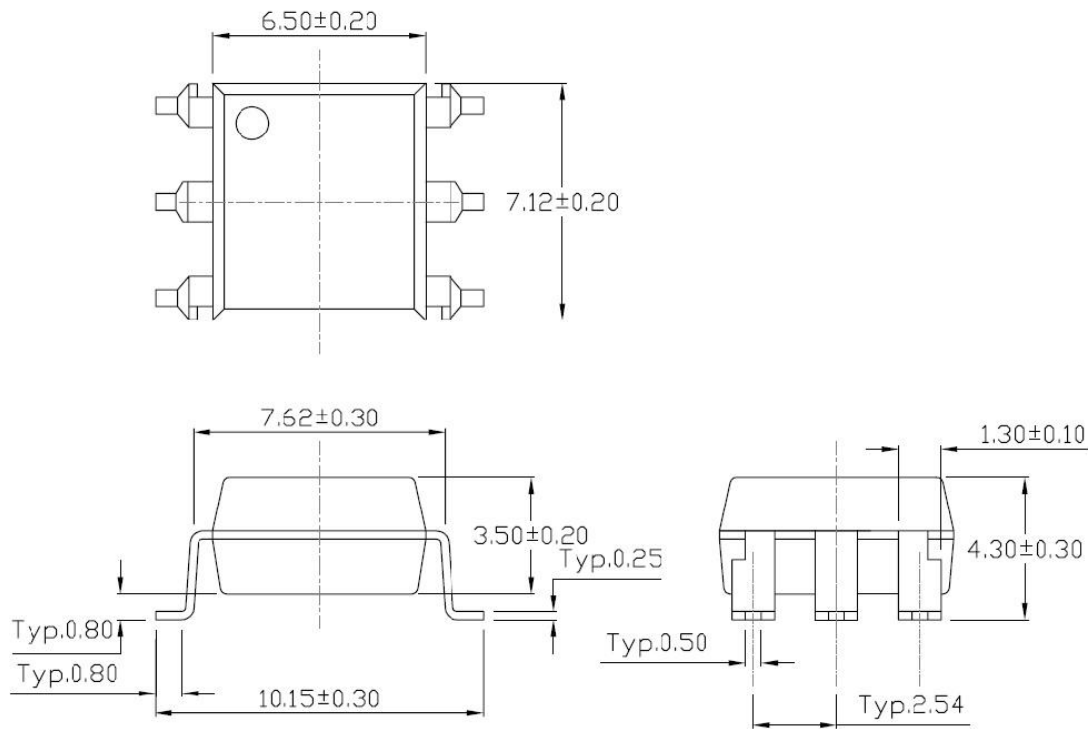


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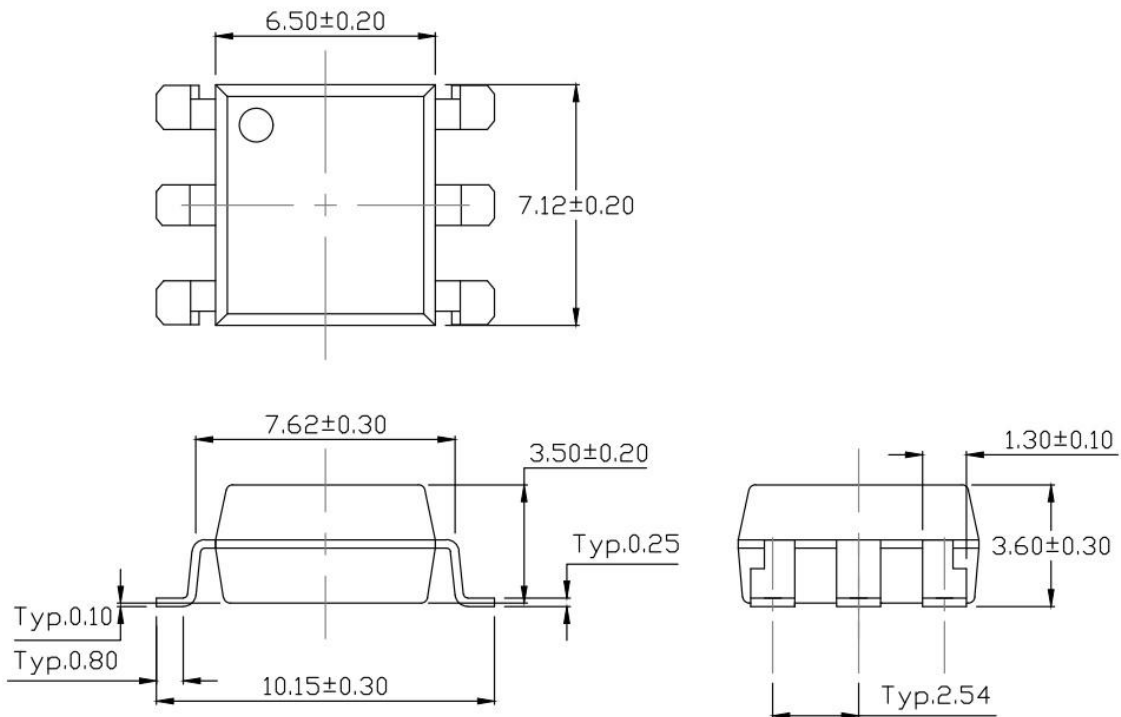
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PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Surface Mount Lead Forming (S Type)



Surface Mount (Low Profile) Lead Forming (SL Type)

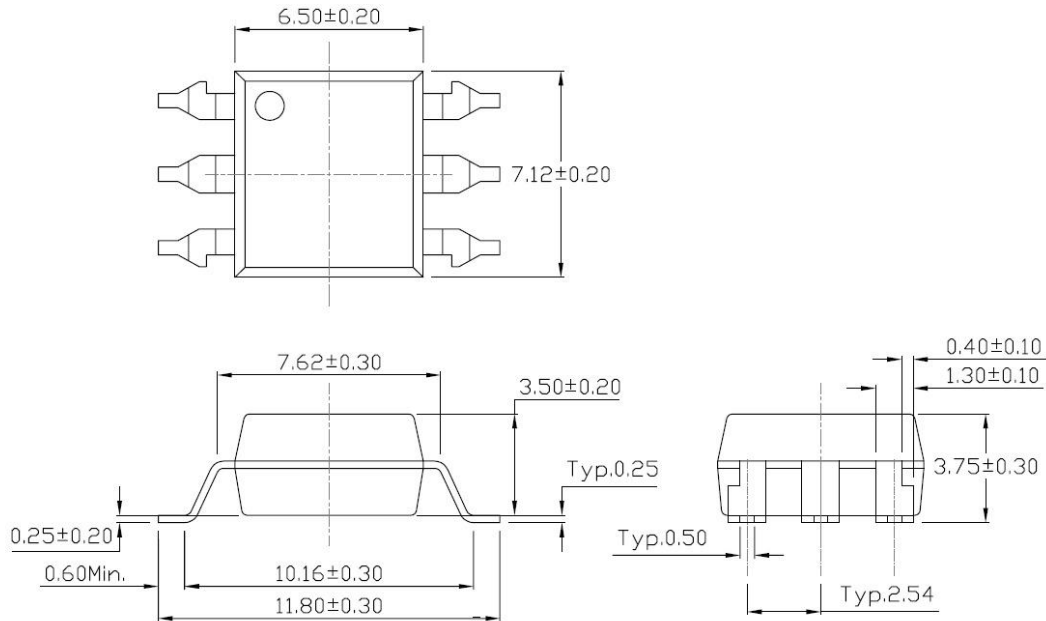


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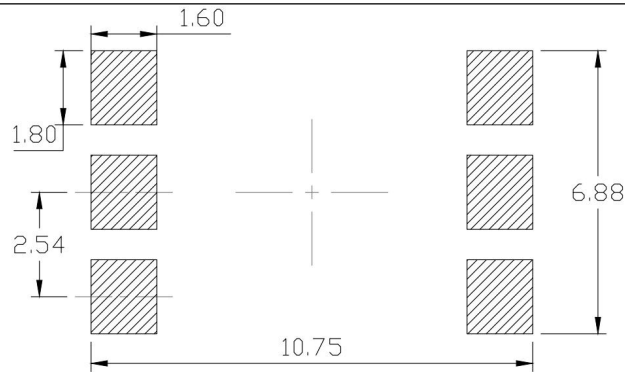
PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Surface Mount (Low Profile) Lead Forming (SLM Type)

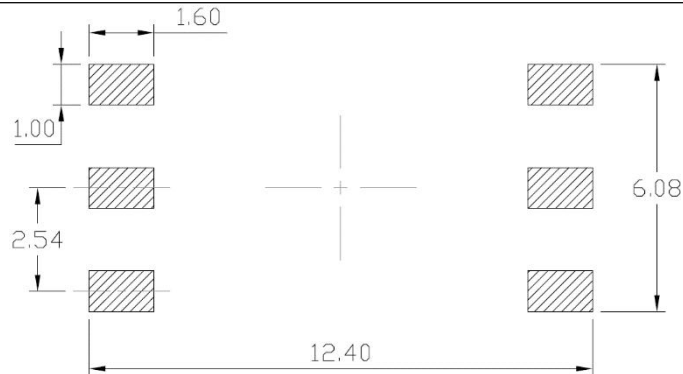


RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)

Surface Mount Lead Forming & Surface Mount (Low Profile) Lead Forming

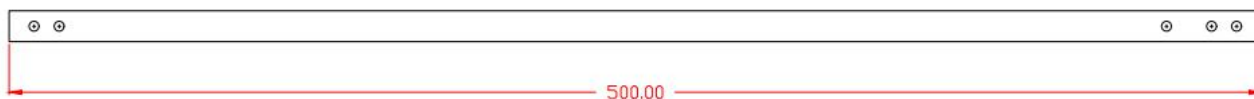
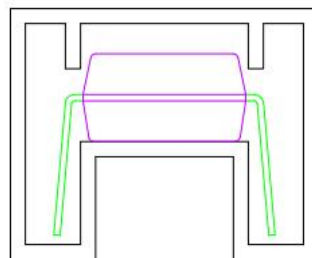
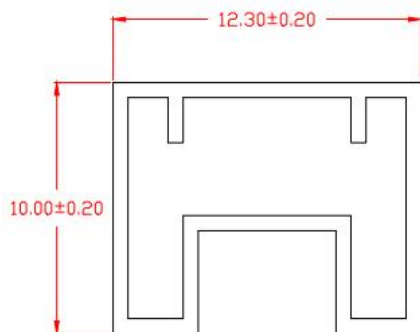


Surface Mount (Gullwing) Lead Forming

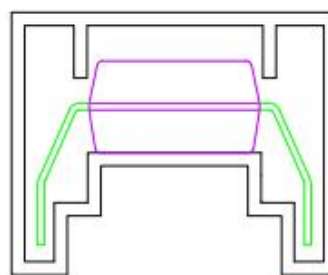
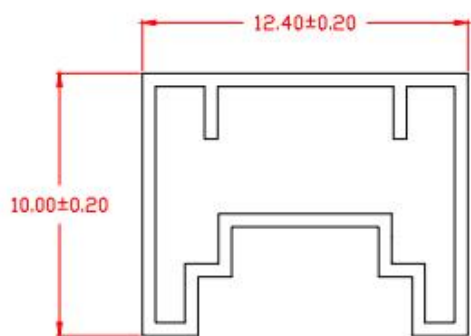


TUBE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Standard DIP



Option M

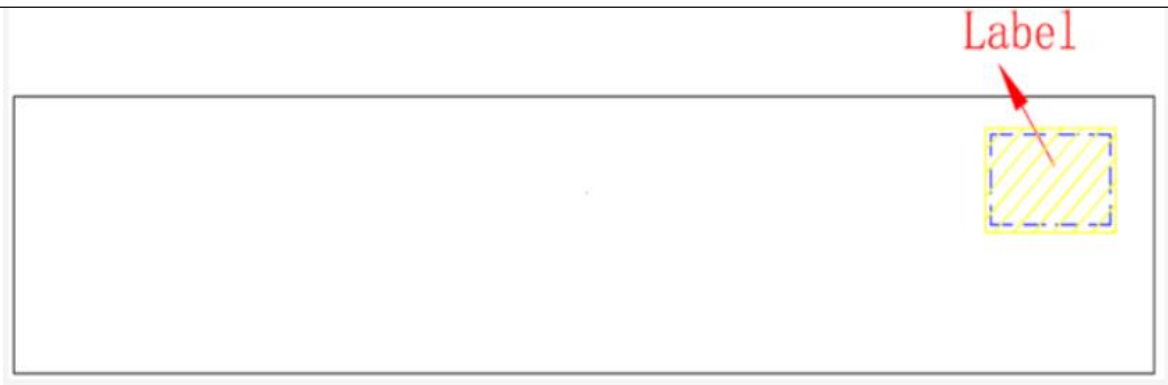


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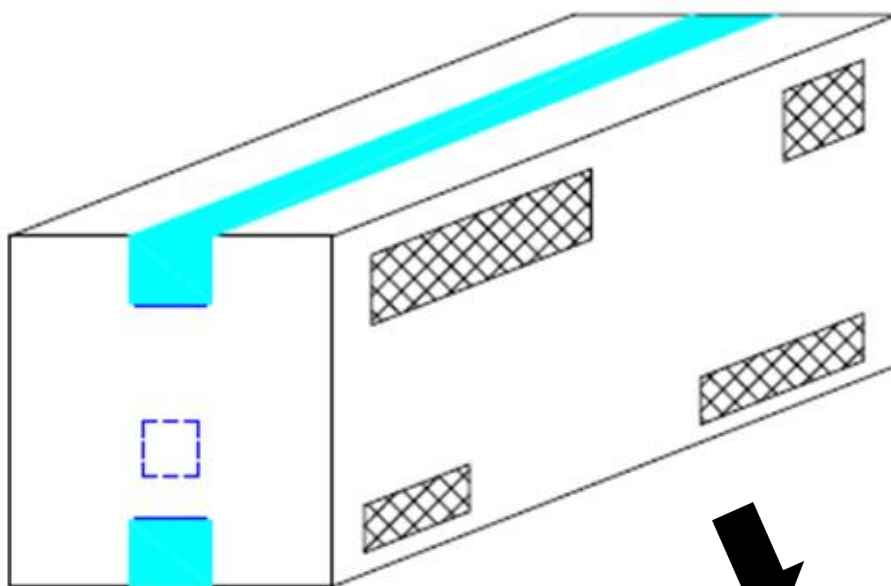
BOX SPECIFICATIONS (Tube Type)

Inner Box



L x W x H = 52.5cm x 10.7cm x 4.7cm

Outer Box



L x W x H = 53.5cm x 23.5cm x 25.5cm

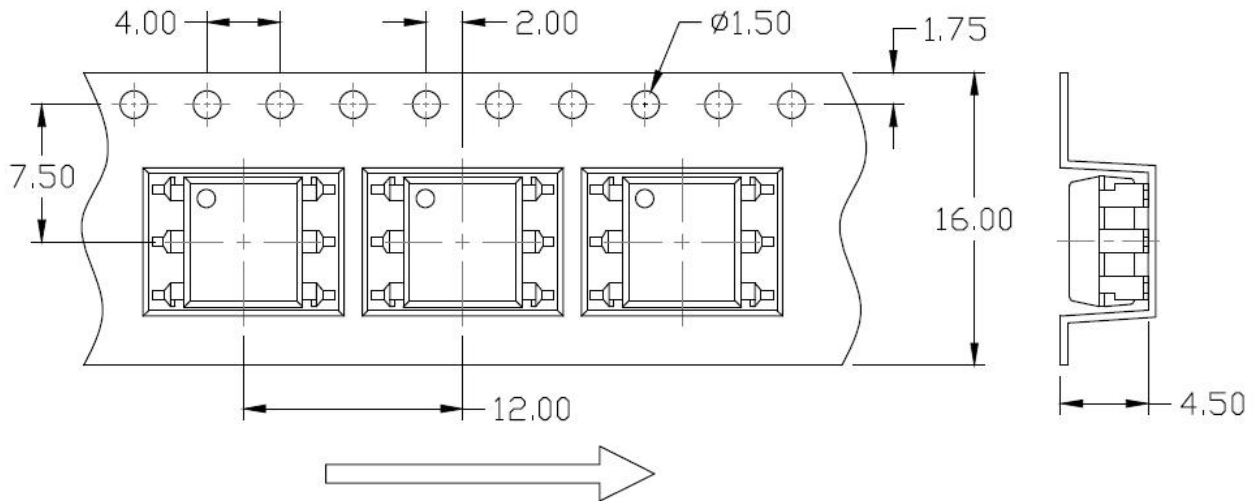


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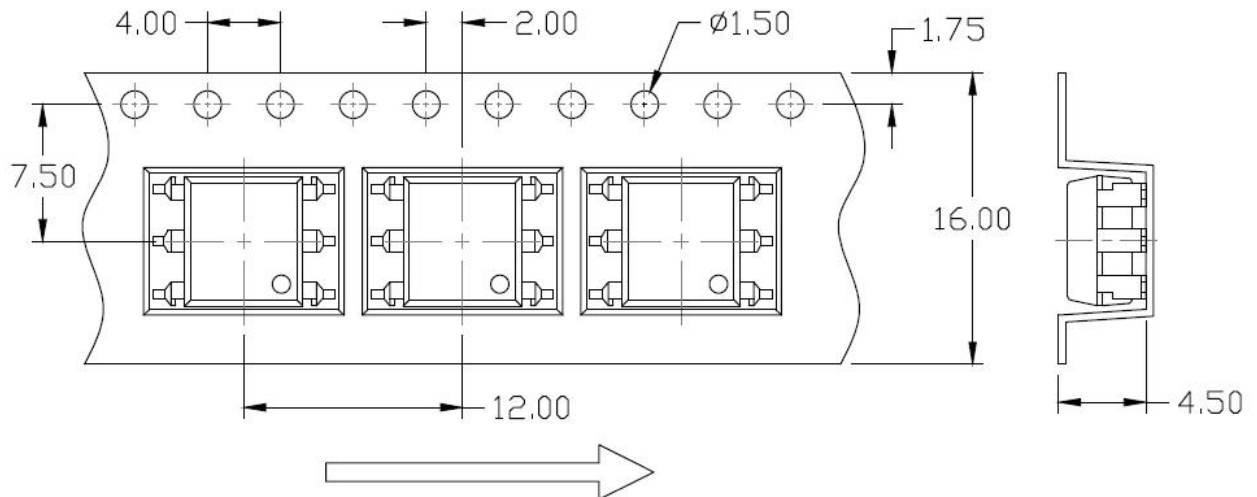
DIP6, DC Input, Photo Darlington Transistor Coupler

CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option S(T1)



Option S(T2)

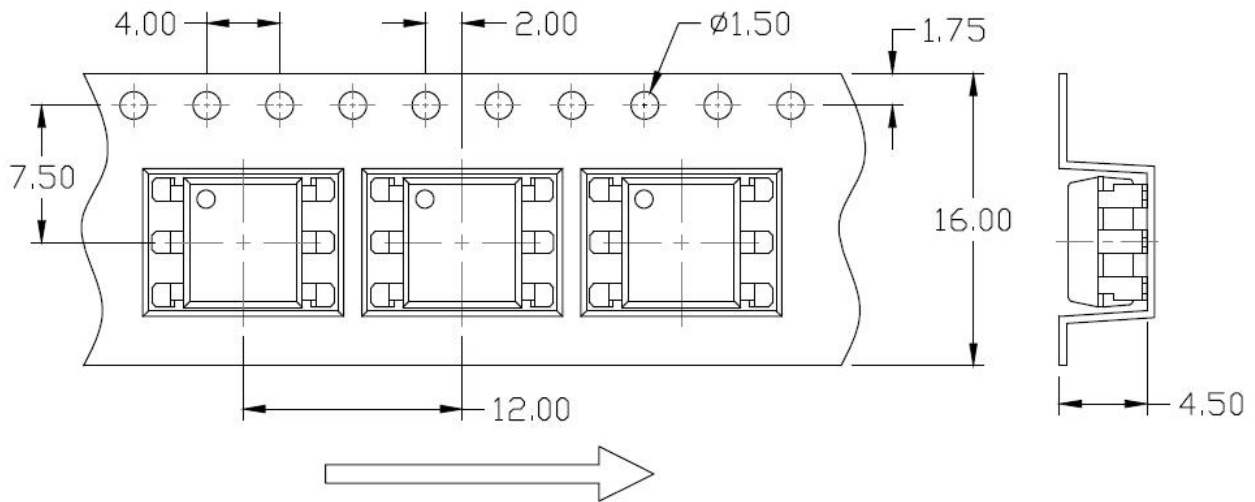


4NXX, H11BX, H11B255 Series

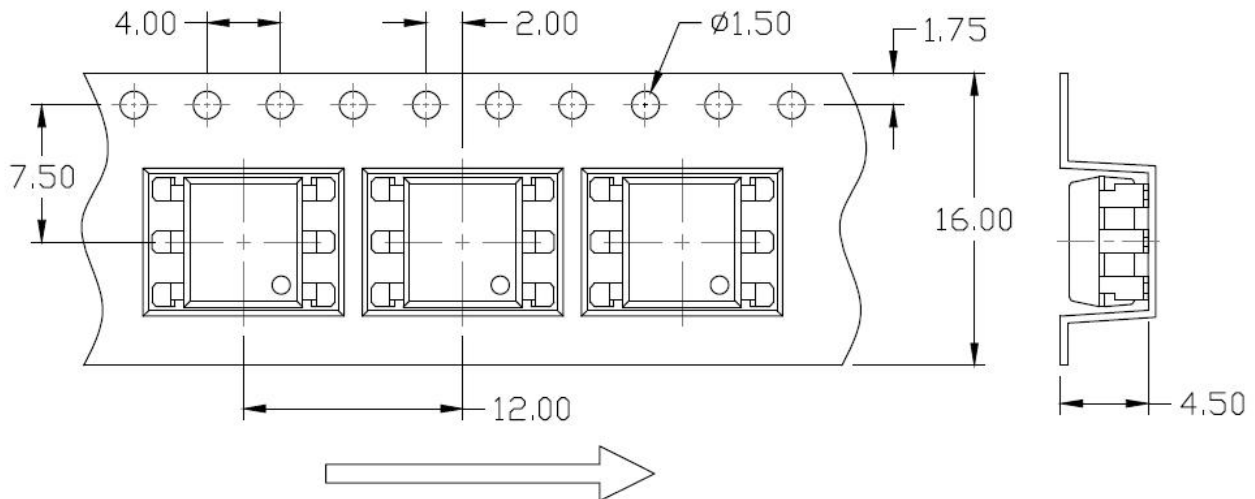
DIP6, DC Input, Photo Darlington Transistor Coupler

CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option SL(T1)



Option SL(T2)

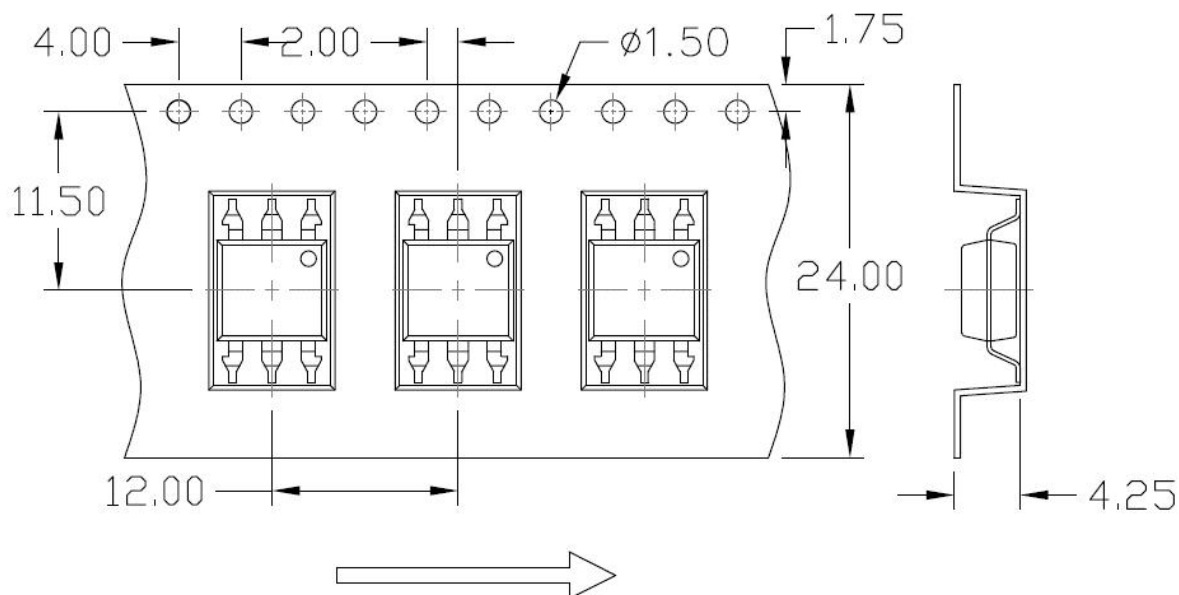


4NXX, H11BX, H11B255 Series

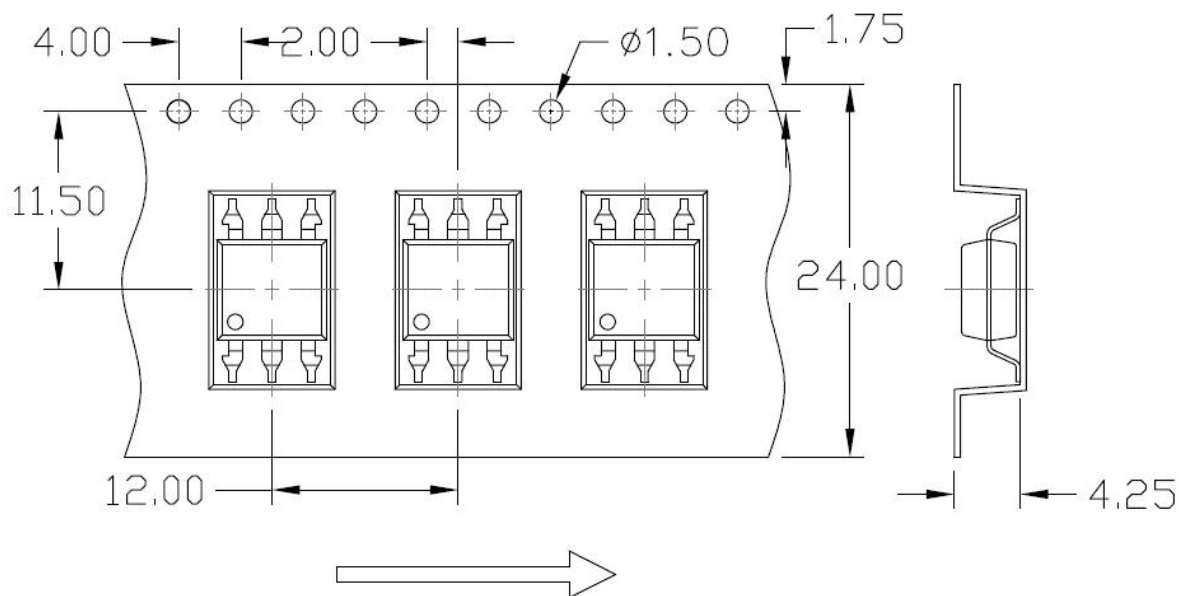
DIP6, DC Input, Photo Darlington Transistor Coupler

Carrier Tape Specifications (Dimensions in mm unless otherwise stated)

Option SLM(T1)



Option SLM(T2)

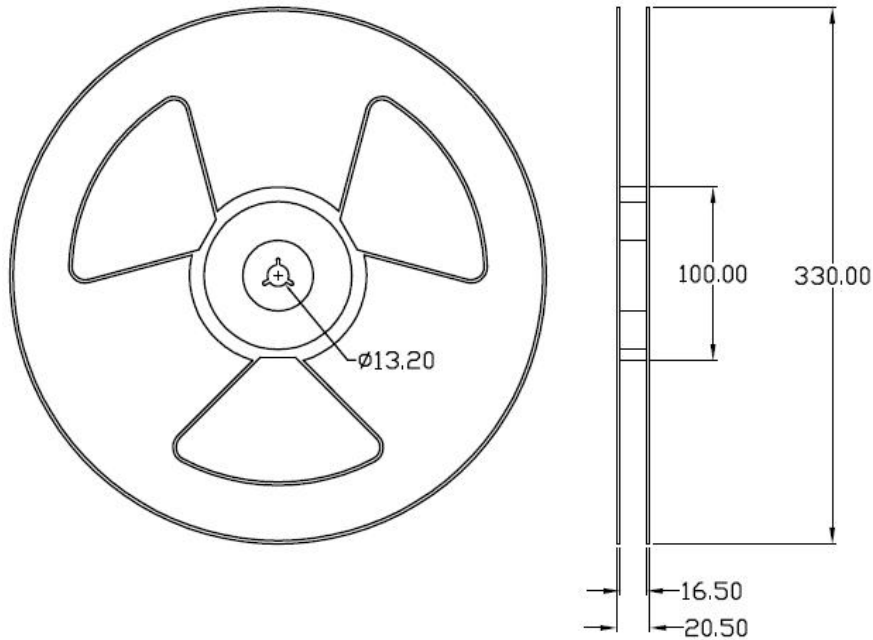


4NXX, H11BX, H11B255 Series

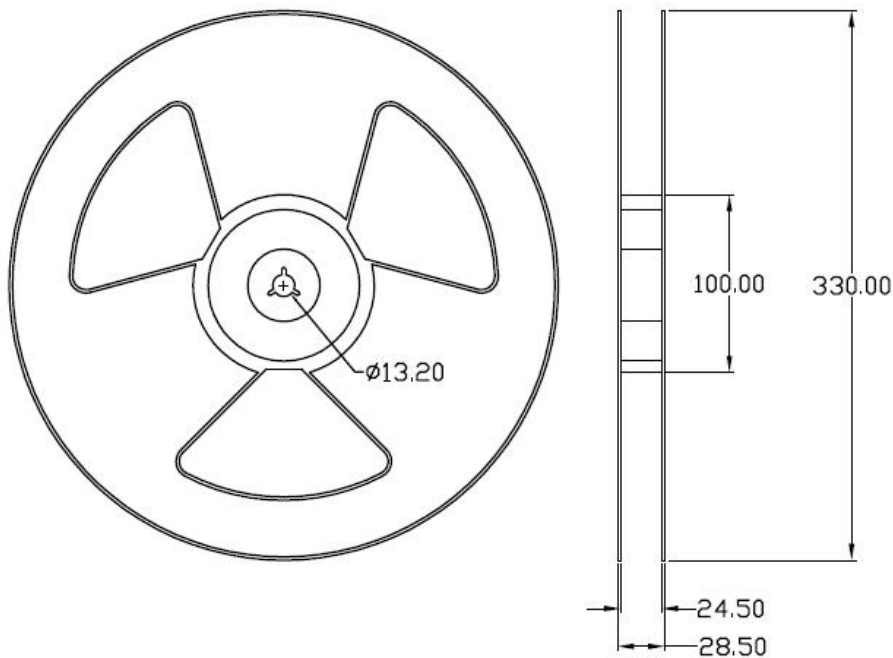
DIP6, DC Input, Photo Darlington Transistor Coupler

REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option S & Option SL



Option SLM

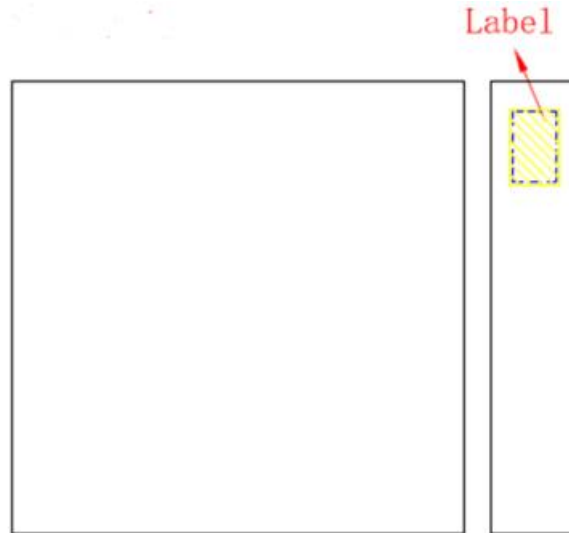


4NXX, H11BX, H11B255 Series

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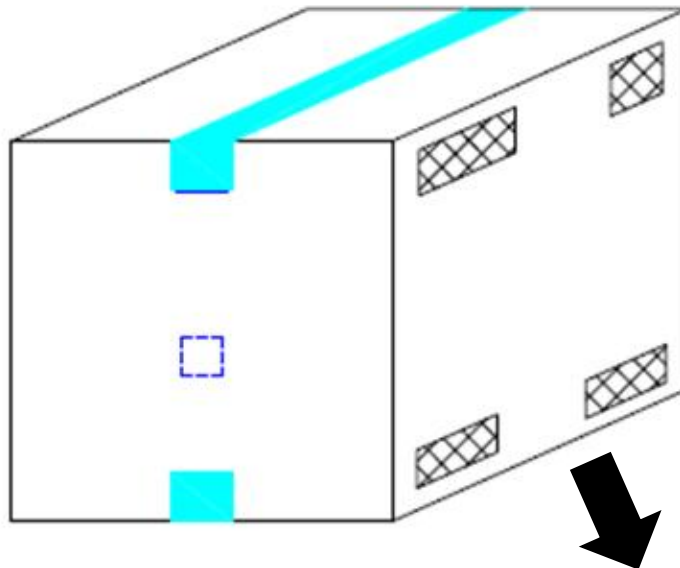
BOX SPECIFICATIONS (Reel Type)

Inner Box

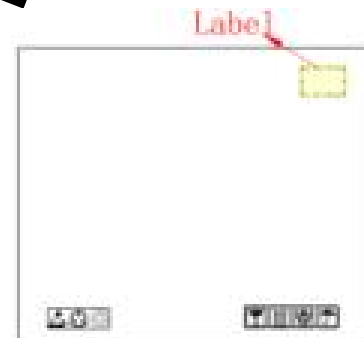


- L x W x H = 36cm x 36cm x 6.9cm

Outer Box



- Option1: L x W x H = 45cm x 38cm x 38cm
- Option2: L x W x H = 39cm x 38cm x 38cm

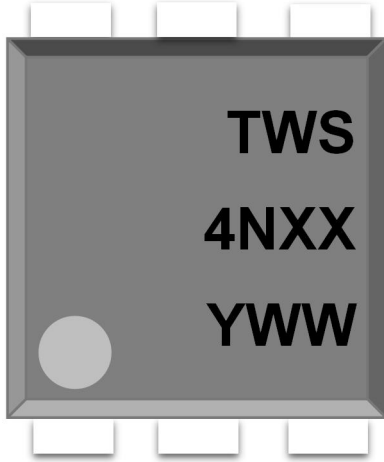


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ORDERING AND MARKING INFORMATION

MARKING INFORMATION



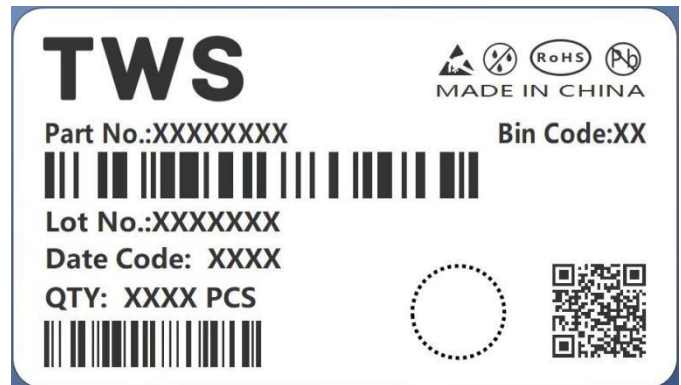
TWS : Company Abbr.
4NXX : Part Number & Rank
Y : Fiscal Year
WW : Work Week

ORDERING INFORMATION

4NXX(Y)(Z)-G

4NXX – Part Number
 (XX=29/30/31/32/33)
 Y – Lead Form Option (M/S/SL/None)
 Z – Tape and Reel Option (T1/T2)
 G – Green Option (G or None)

LABEL INFORMATION



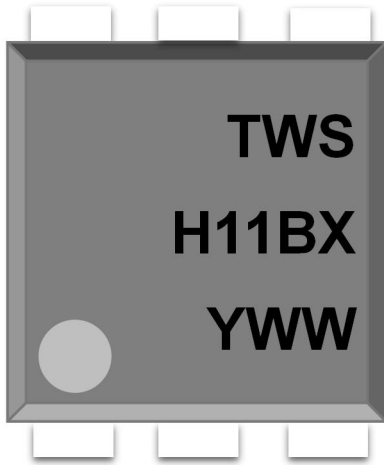
Packing Quantity

Option	Quantity	Quantity – Inner box	Quantity – Outer box
None	65 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 20.8k Units
M	65 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 20.8k Units
S(T1)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
S(T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SL(T1)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SL(T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SLM(T1)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SLM(T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units

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MARKING INFORMATION



TWS : Company Abbr.
H11BX : Part Number & Rank
Y : Fiscal Year
WW : Work Week

ORDERING INFORMATION

H11BX(Y)(Z)-G

H11BX/ – Part Number and Rank
(X=1/2/3/255)

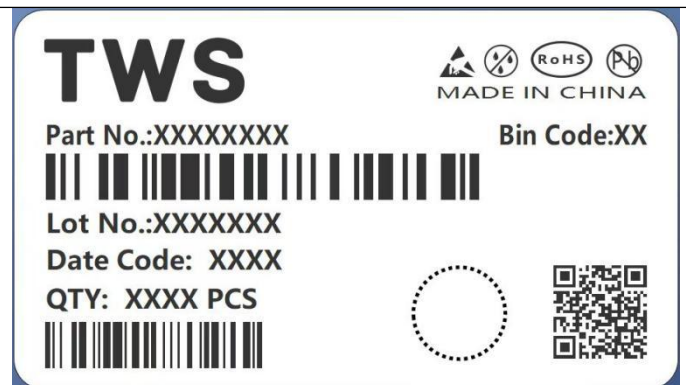
Y – Lead Form Option (M/S/SL/SLM/None)

Z – Tape and Reel Option (T1/T2)

G – Material Option

(G: Green, None: Non-Green)

LABEL INFORMATION



PACKING QUANTITY

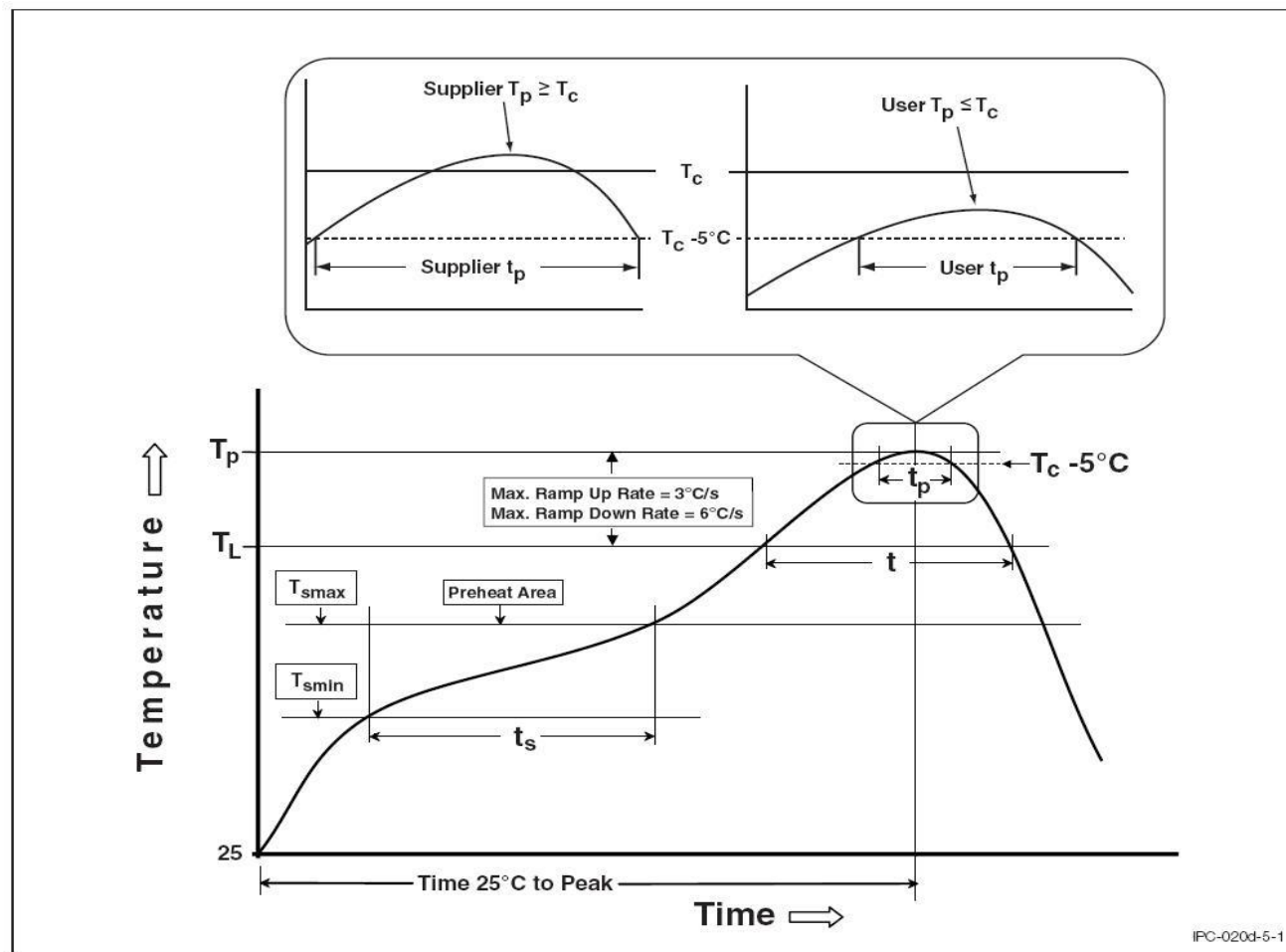
Option	Quantity	Quantity – Inner box	Quantity – Outer box
None	65 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 20.8k Units
M	65 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 20.8k Units
S(T1)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
S(T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SL(T1)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SL(T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SLM(T1)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SLM(T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units

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REFLOW INFORMATION

REFLOW PROFILE



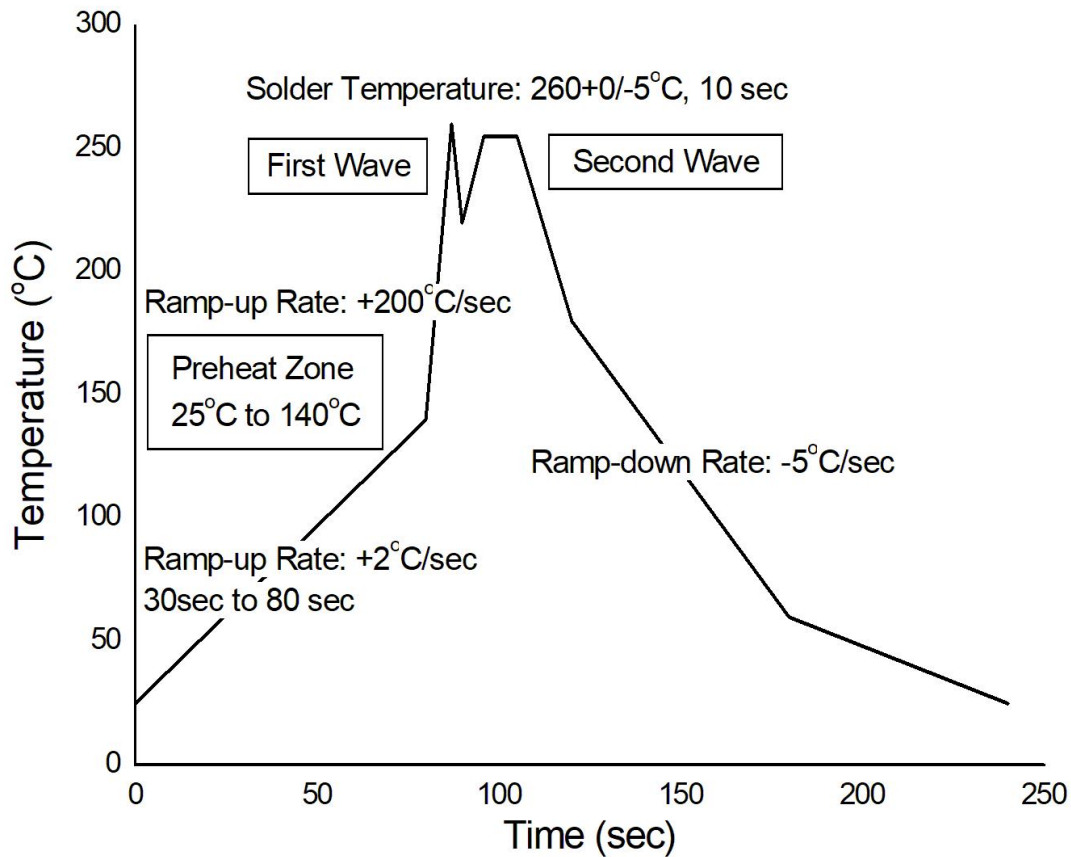
Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (T _{smin})	100	150°C
Temperature Max. (T _{smax})	150	200°C
Time (t _s) from (T _{smin} to T _{smax})	60-120 seconds	60-120 seconds
Ramp-up Rate (t _L to t _P)	3°C/second max.	3°C/second max.
Liquidous Temperature (T _L)	183°C	217°C
Time (t _L) Maintained Above (T _L)	60 – 150 seconds	60 – 150 seconds
Peak Body Package Temperature	235°C +0°C / -5°C	260°C +0°C / -5°C
Time (t _P) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate (T _P to T _L)	6°C/second max	6°C/second max
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

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TEMPERATURE PROFILE OF SOLDERING

WAVE SOLDERING (JESD22-A111 COMPLIANT)



HAND SOLDERING BY SOLDERING IRON

Soldering Temperature	$380 \pm 0/-5^\circ\text{C}$
Soldering Time	3 sec max.

- One time soldering is recommended for all soldering method.
- Do not solder more than three times for IR reflow soldering.

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- TWS is continually improving the quality, reliability, function and design. TWS reserves the right to make changes without further notices.
- The characteristic curves shown in this datasheet are representing typical performance which are not guaranteed.
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