UMH13NTH

Product Data Sheet - 24 Mar 2023

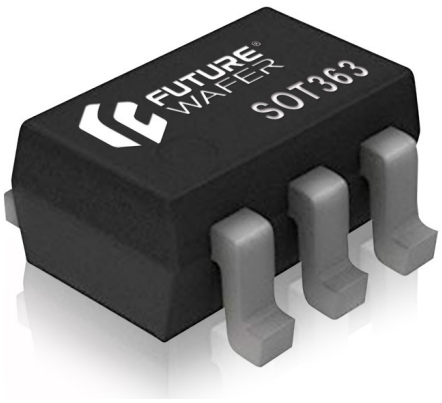
50V , R1 = 4.7 kΩ , R2 = 47 kΩ

NPN / NPN Digital Transistors

1. Product profile

1-1.General description

The UMH13NTH of digital transistors is designed to replace a single device and its external resistor bias network. The bias resistor transistor contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base− emitter resistor. The UMH eliminates these individual components by integrating them into a single device. The use of a UMH can reduce both system cost and board space.



SOT363

1-2. Features

- BV_{CC} > 50V
- I_C = 100mA high collector current
- Built-In bias resistors R_1 = 4.7KΩ,R_2 = 47KΩ
- Pair of PNP transistors that are intrinsically matched
- Simplifies circuit design
- Reduce board space
- Reduce component count

1-3. Applications

- Inverter
- Interface
- Driver

1-4. Mechanical characteristics

- Molded SOT-363 package
- Packing:tape and ree
- Flammability rating UL 94V-0
- Halogen free
- Moisture sensitivity levels (MSL): Level 1

2. Maximum ratings

Table 1. maximum ratings

Parameter	Symbol	Value	Units
Supply voltage	V_{CC}	50	V
Input voltage	V_{IN}	-10 to 40	
Output current	I_O	100	mA
Max. collector current	I_C		
Total power dissipation	P tot	150	mW
Junction temperature	T j	-55 to +150	°C
Storage temperature range	T stg	-55 to +150	

3. Electrical characteristics

Table 3. Electrical characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Units
Input voltage	V_{IN-OFF}	V_{CC} = 5V , I_O = 100uA	0.5	-	-	V
	V_{IN-On}	V_O = 0.3V , I_O = 5mA	-	-	1.3	
Output voltage	V_{O-ON}	I_O = 10mA , I_{IN} = 0.5mA	-	-	0.3	
Input current	I_{IN}	V_{IN} = 5.0V	-	-	1.8	mA
Output current	$I_{O(OFF)}$	V_{CC} = 50Vdc,V_I = 0V	-	-	0.5	uA

4. On characteristics

Table 5. On characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Units
DC current gain	h_{FE}	I_C = 10mA,V_O = 5V	80	-	-	-
Input resistance	R_1	-	3.29	4.7	6.11	KΩ
Resistance ratio	R_2 / R_1	-	8	10	12	-

5. Small signal characteristics

Table 6. small signal characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Units
Current gain bandwidth product	f_T	I_O = 5mA,V_{CE} = 10V,f=100MHz	-	250	-	MHz
Collector capacitance	C_C	V_{CB} = 10 V; I_E = ie = 0 A; f = 1 MHz	-	-	2.5	pF

6. Rating and characteristics curve

Fig. 1 Input voltage (off) characteristics

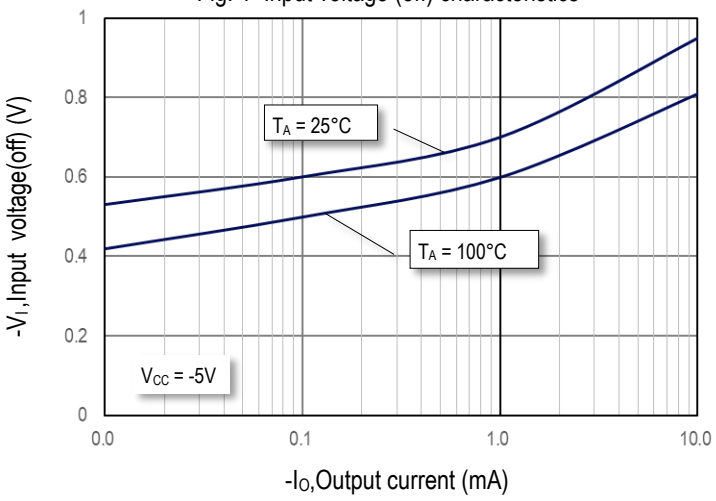


Fig. 2 Output voltage characteristics

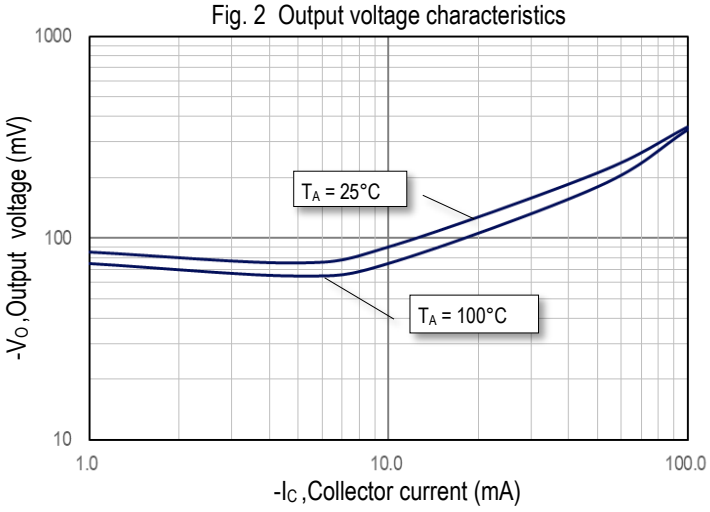


Fig. 3 Power derating curve

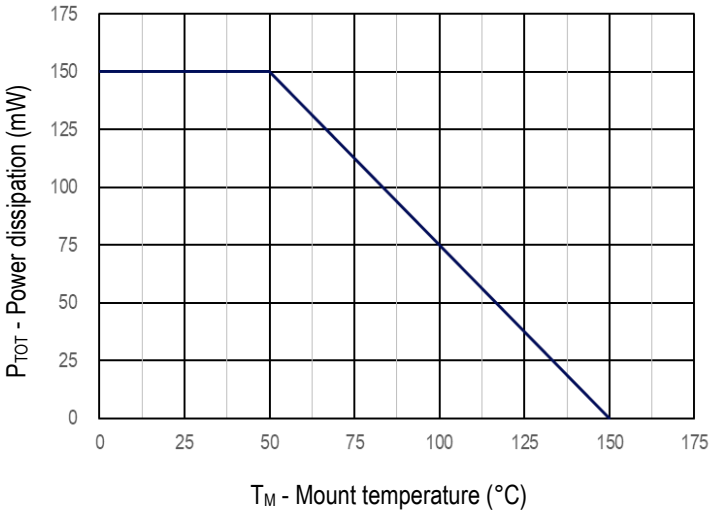


Fig. 4 DC Current gain vs output current

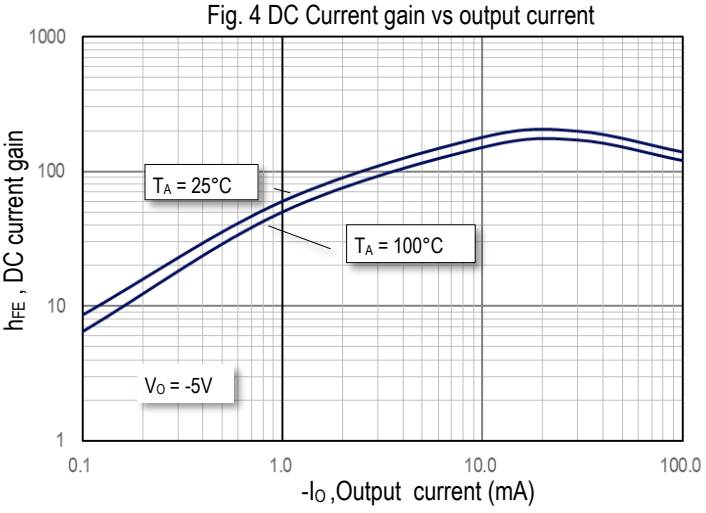


Fig. 5 Input voltage vs output current (On) characteristics

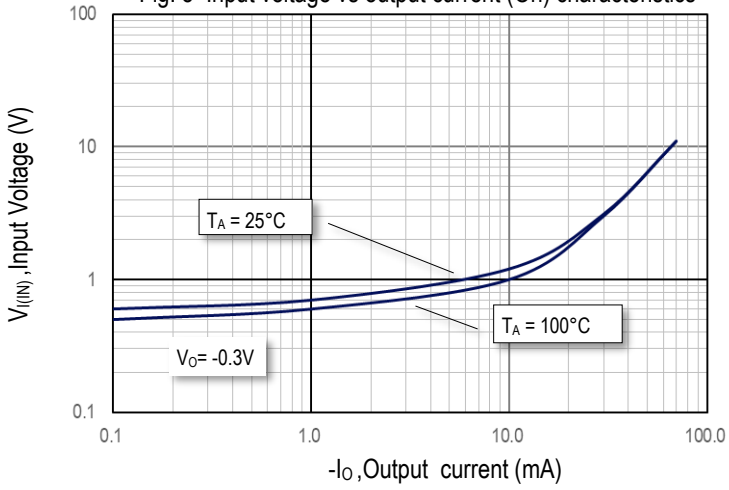
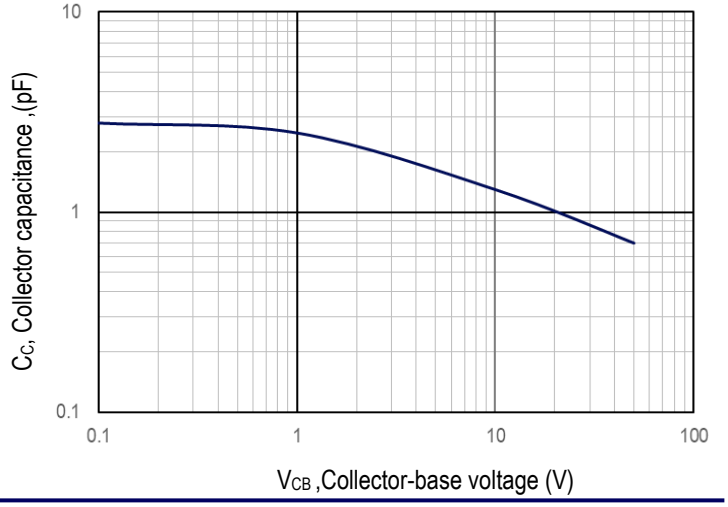


Fig. 6 Collector capacitance of collector-base voltage



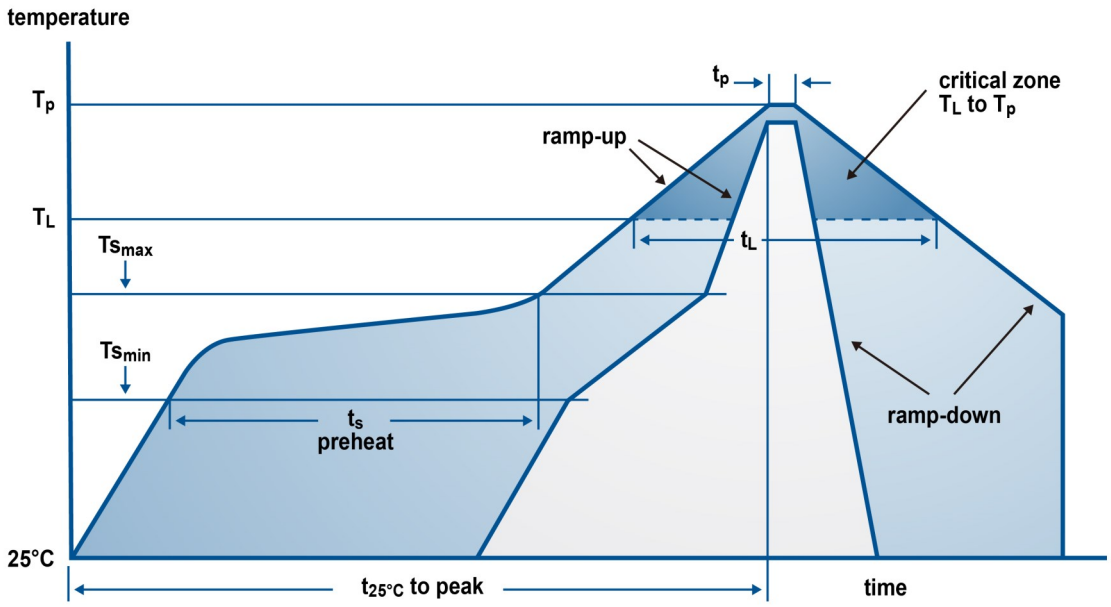
7. Recommended reflow soldering profile

7-1. Limiting value

The below temperature profile for moisture sensitivity characterization is based on the IPC/JEDEC joint industry standard: J-STD-020D-01.

Profile Feature	SnPb eutectic assembly	Pb-free assembly
Average ramp-up rate (Tsmax to Tp)	3 °C/s maximum	3 °C/s maximum
Preheat		
Temperature minimum (Tsmin)	100 °C	150 °C
Temperature maximum (Tsmax)	150 °C	200 °C
Time (tsmin to tsmax)	60 s to 120 s	60 s to 180 s
Time maintained above		
Temperature (TL)	183 °C	217 °C
Time (tL)	60 s to 150 s	60 s to 150 s
Peak/classificationtemperature(T)	235 °C	260 °C
Number of allowed reflow cycles	3	3
Time within 5 °C of actual peak temperature (tp)	10 s to 30 s	20 s to 40 s
Ramp-down rate	6 °C/s maximum	6 °C/s maximum
Time 25 °C to peak temperature	6 minutes maximum	8 minutes maximum

7-2. Reflow soldering profile



8. Package information

8-1. Dimension

Plastic surface-mounted package ; 6 Leads

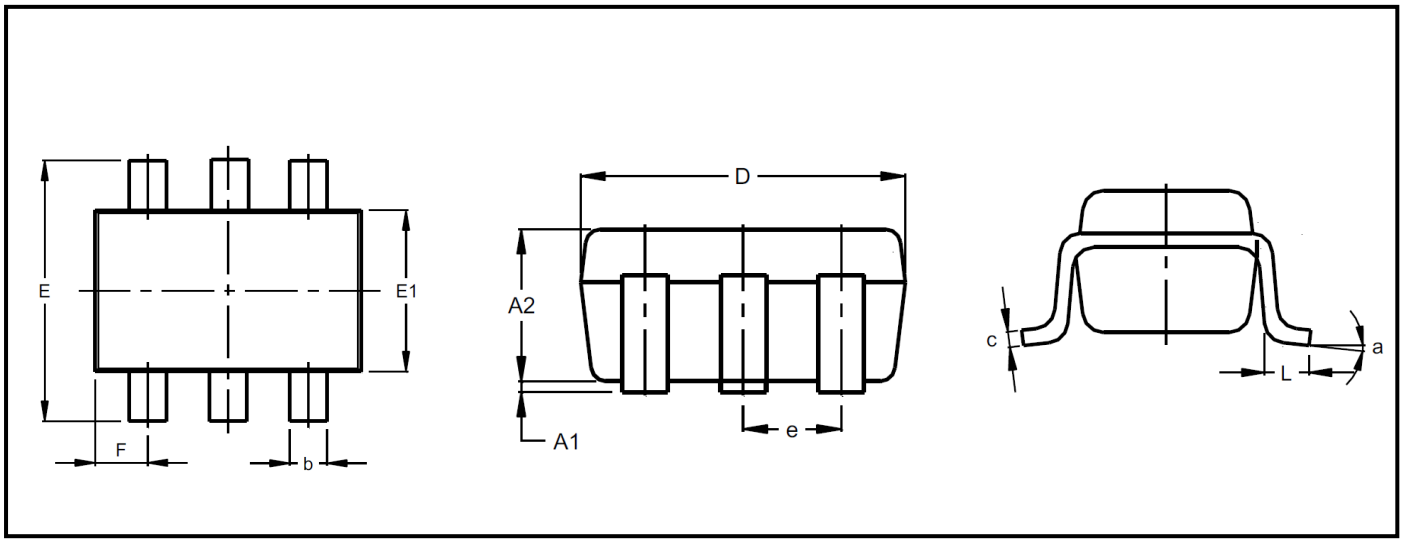


Table 7. Package summary

Dimension in mm

Dim	A1	A2	b	c	D	E	E1	e	F	L	a
Min	0.00	0.9	0.10	0.10	1.8	2.0	1.15	-	0.40	0.20	-
Typ	-	-	-	-	-	-	-	0.65	-	-	-
Max	0.10	1.0	0.30	0.22	2.2	2.2	1.35	-	0.45	0.40	8°

8-2. PCB Pad layout recommendation

Reflow soldering footprint for SOT-363

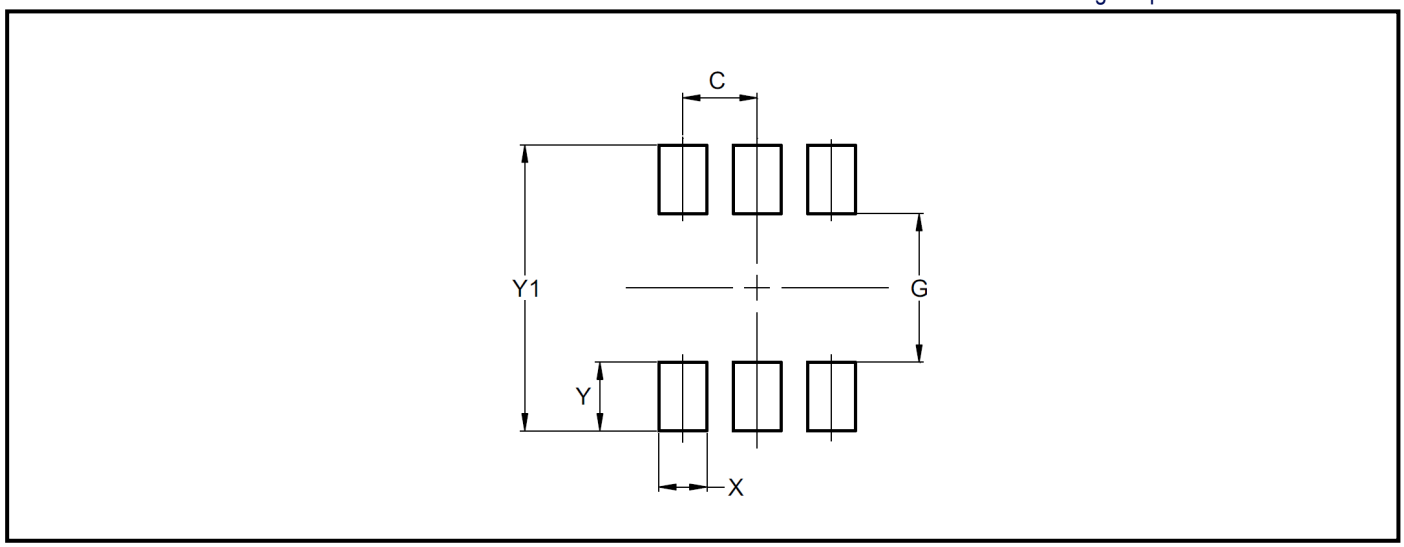


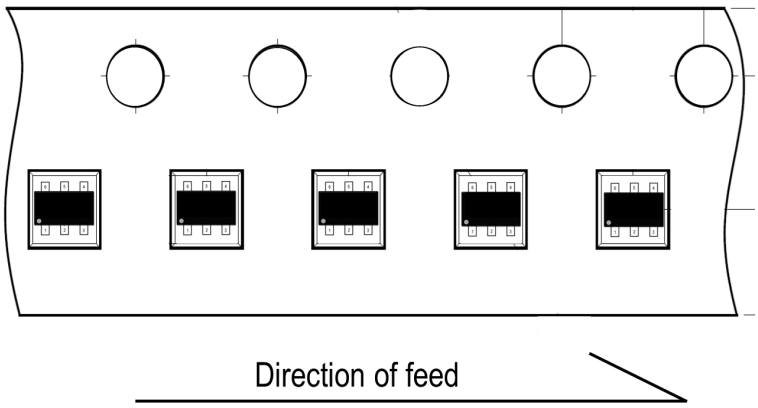
Table 8. layout summary

Dimension in mm

Dim	C	G	X	Y	Y1
Value	0.65	1.30	0.42	0.60	2.50

9. Packing

9-1. Taping and reel specification

Taping width	Tape orientation
8 mm	

9-2. Embossed carrier tape specification

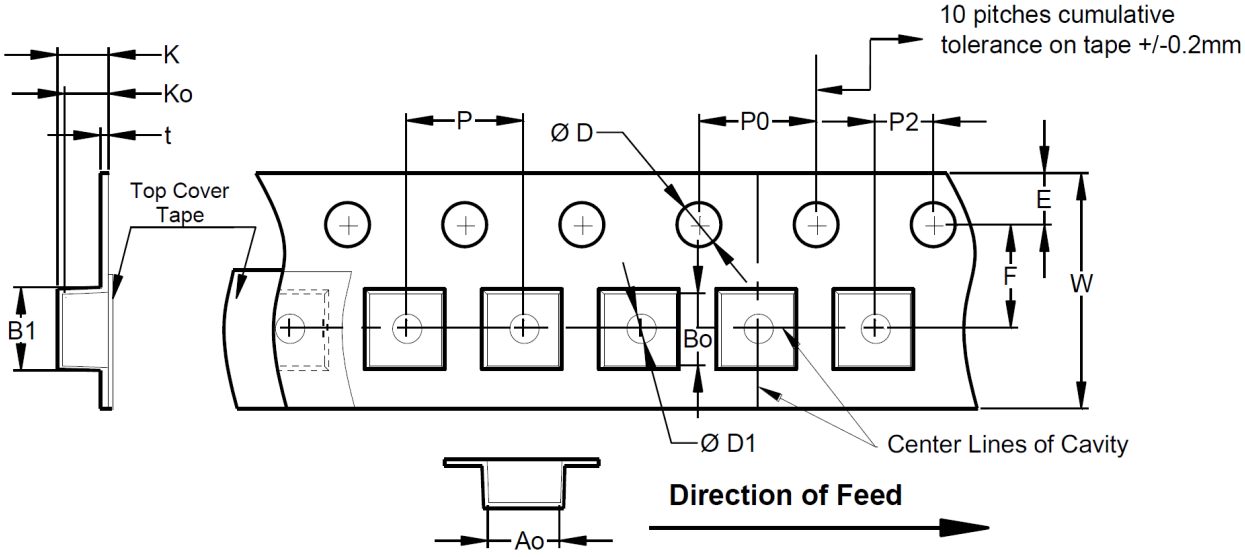


Table 9. tape summary

Dimension in mm

Dimension	W	B1	D	D1	E	F	K	P	P0	P2	t	W
Value	8 mm	4.5 Max	1.5+ 0.1/-0.0	0.35 Min.	1.75 ±0.10	3.5 ±0.05	2.4 Max.	4.0 ±0.10	4.0 ±0.10	2.0 ±0.05	0.4 Max.	8 ±0.3
A0 / B0 /	Determined by component size. The clearance between the component and the cavity must comply to the rotational and lateral movement requirement provided in figures in the “maximum component movement in tape pocket” section.											

10. Surface mount reel specification

10-1. Reel specification

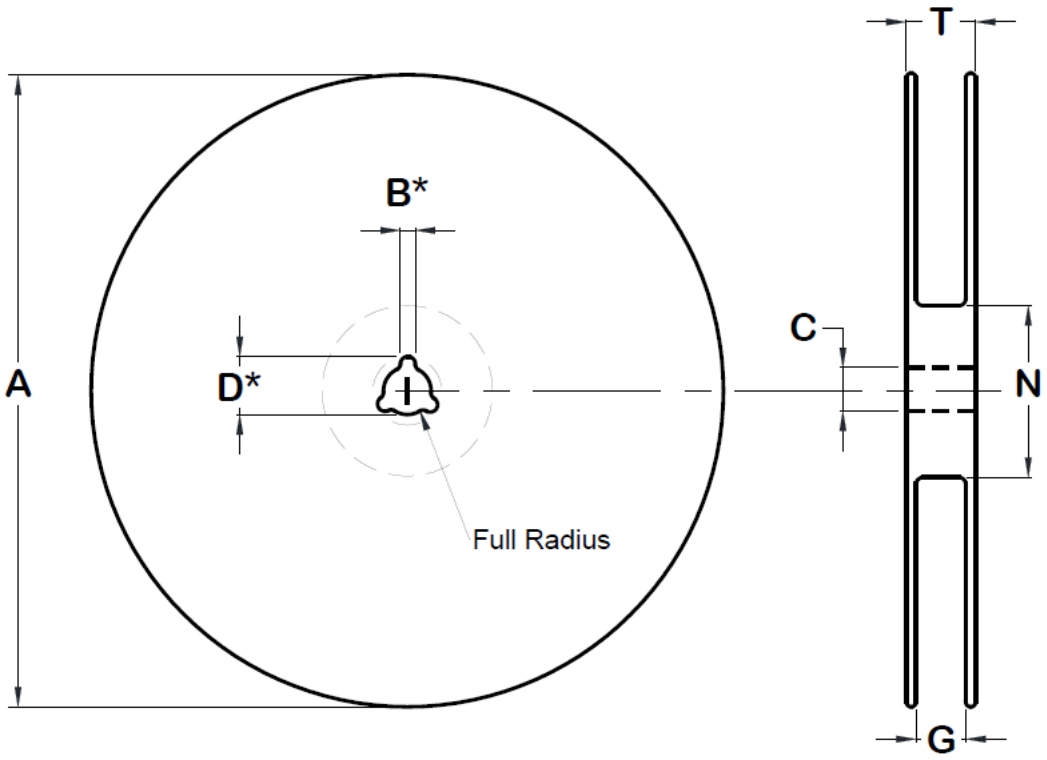
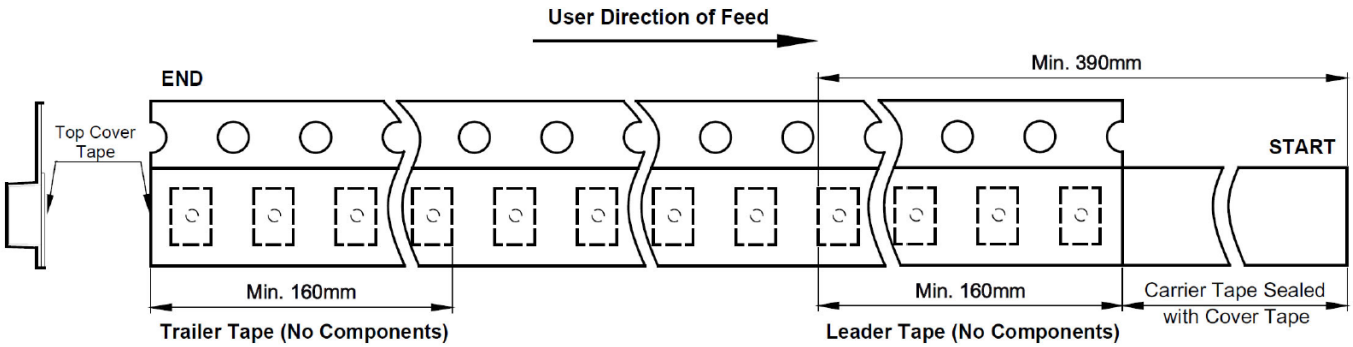


Table 10. Reel information

Unit : mm

Dimension	Tape width	Reel size	A	B	C	D	N	G	T
Value	8 mm	7”	178	2.0	13	20.5	55	8.4	14.4
			±2	+0.5-0	+0.5-0.2	±0.2	±5	+1.5/ -0.0	Max.

10-2. Tape leader and trailer specification



11. Ordering information

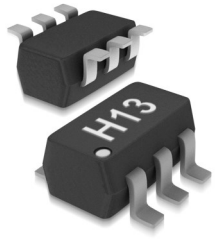
Table 11. Ordering information

Part number	Package name	Description	Packing
UMH13NTH	SOT-363	Plastic surface-mounted package; 6 leads	3,000 P_{CS} / 7" tape and reel

12. Marking information

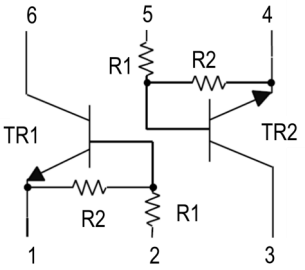
Table 12. Marking codes

Part number	Marking code
UMH13NTH	H13



13. Pinning information

Table 13. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E 1	Emitter 1		
2	B 1	Base 1		
3	C 2	Collector 2		
4	E 2	Emitter 2		
5	B 2	Base 2		
6	C 1	Collector 1		

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15. Revision history

Table 14. Revision history

Version	Document ID	Release date	Change notice	Basis
A	F51830W	03-Aug-2018	New develop	Market
4.0		24-Mar-2023	Update version	System

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