

Ultra Low Phase Noise, Precision SC-cut HF OCXO in SMD Package



ESD Sensitive

14 x 21 x 7.5mm
Datasheet #1319A

Features

- SC-cut Crystal
- Ultra Low Phase Noise
- Sine Wave +15 dBm Output
- Extremely Small, Slim Package

Applications

- Instrumentation
- Radar
- High End Synthesizers
- Telecommunication Systems
- Data Communications

Absolute Maximum Ratings

Parameters	Symbol	Condition	Min	Typ	Max	Unit	Notes
Input Break Down Voltage	V _{cc}		-0.5		6.5	V	V _{cc} option 0
Storage Temperature Range	T _s		-55		85	°C	
Control Voltage	V _c		-1		10.5	V	

Electrical ⁽¹⁾

Parameters	Symbol	Condition	Min	Typ	Max	Unit	Notes
Frequency	F		80		120	MHz	
Frequency Stability	$\Delta F/F$	vs. Temp.		±50		ppb	See table below Note 2
		vs. Supply			2	ppb/5% change	
		vs. Load			2		
Aging		per day		5E-9		ppm	After 30 days of continuous operation
		per first year		5E-7			
		10 years			2.0		
Allan Deviation		.01s to 1s		5E-11			
SSB Phase Noise (at 100.000 MHz)	$\mathcal{L}(\Delta f)$	10 Hz		-95	-125	dBc/Hz	Grade "L"
		100 Hz			-158		
		1 kHz			-170		
		10 kHz			-178		Grade "P"
		100 Hz		-100	-130		
		1 kHz			-160		
		10 kHz			-172		Grade "U", Available with slope option "L"
		100 kHz			-178		
		10 Hz		-105	-135		
100 Hz			-162				
1 kHz			-175				
10 kHz			-180				
Retrace		After 30 minutes		±20		ppb	
G-sensitivity		Worst Direction			±0.5	ppb/G	
Supply Voltage		5V±5% 3.3V±5%	4.75 3.165	5.0 3.30	5.25 3.465	V	Option "0" Option A
Power Consumption	P	steady state, 25°C steady state, -40°C start-up		1.0 2.5 3.0	1.2 3.5	W	Still air

All parameters for 100.000 MHz



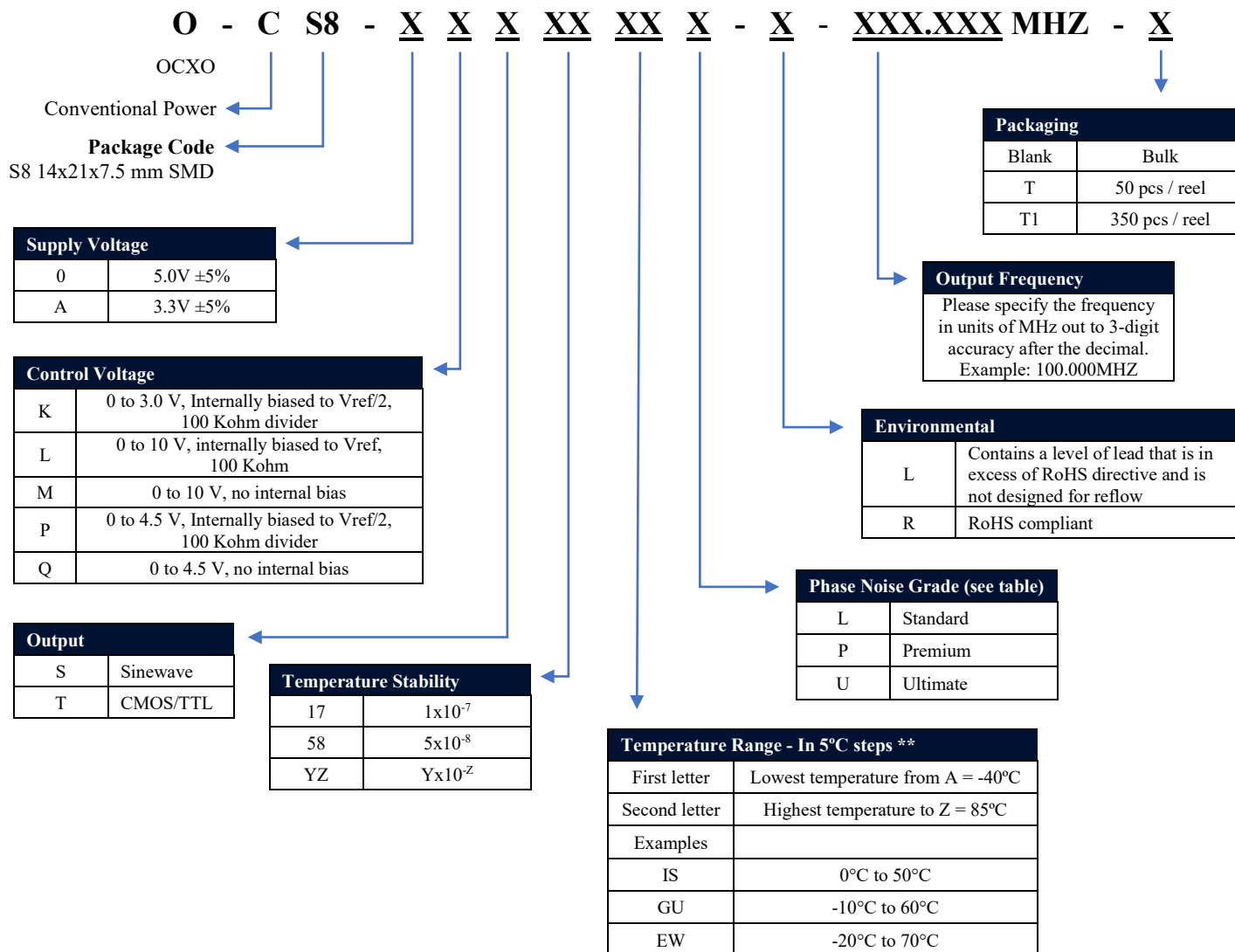
Electrical (cont.)

Parameters	Symbol	Condition	Min	Typ	Max	Unit	Notes
Spectral Purity, Sine Wave		Output power Subharmonics Spurious Harmonics	12	15 none -35	-80 -30	dBm dBc	Non-supply related
Output Waveform		Sine CMOS		Code S Code T			
Load		10KOhm//15pF (HCMOS/TTL), AC-coupled 50 Ohm (Sine Wave)					Output Code T Output Code S
Warm-up Time	τ	to 0.1ppm accuracy		3	5	minutes	
Logic 1 (CMOS)	Voh		0.7 Vref				Output Code T
Logic 0 (CMOS)	Vol				0.1 Vref	V	Output Code T
Control Voltage	Vc		0 0 0		10.0 4.5 3.0	V	Slope options "L", "M" Slope options "P", "Q" Slope option "K"
Input Impedance	Zin	At Vc Pin	10			Kohm	
Pull Range		from nominal F		± 2.5		ppm	
Absolute Pull Range	APR		± 0.5			ppm	
Deviation Slope		Monotonic, posit		0.7 1.3		ppm/V	Slope options "L", "M" Slope options "P", "Q"
Linearity			$\pm 10\%$			%	
Reference Voltage	Vref			N/A 4.5 3.0		V	Slope options "L", "M" Slope options "P", "Q" Vcc option A
Setability	Vc0	@25°C, Fnom.	4.0 1.75 1.2	5.0 2.25 1.5	6.0 2.75 1.8	V	Slope options "L", "M" Slope options "P", "Q" Slope option "K"
Modulation Bandwidth	Fm		DC		1	kHz	

Environmental and Mechanical

Parameter	Description
Operating Temperature Range	0 to 70°C Standard, Other options – see Chart below
Mechanical Shock	Per MIL-STD-202, 30G, 11ms
Thermal Shock	Per MIL-STD-883, Method 1011, Condition A
Vibration	Per MIL-STD-202, 5G to 2000 Hz
Operational Vibration	Phase noise under vibration to be verified by the customer
Seal	Only crystal resonator is hermetically sealed
Soldering Conditions	See MAX reflow profile below; The device may be reflowed once. Reflowing upside down is not allowed. Hand soldering is highly encouraged. NO CLEAN assembly is recommended.
Moisture Sensitivity Level (MSL)	Class 1

Creating a Part Number



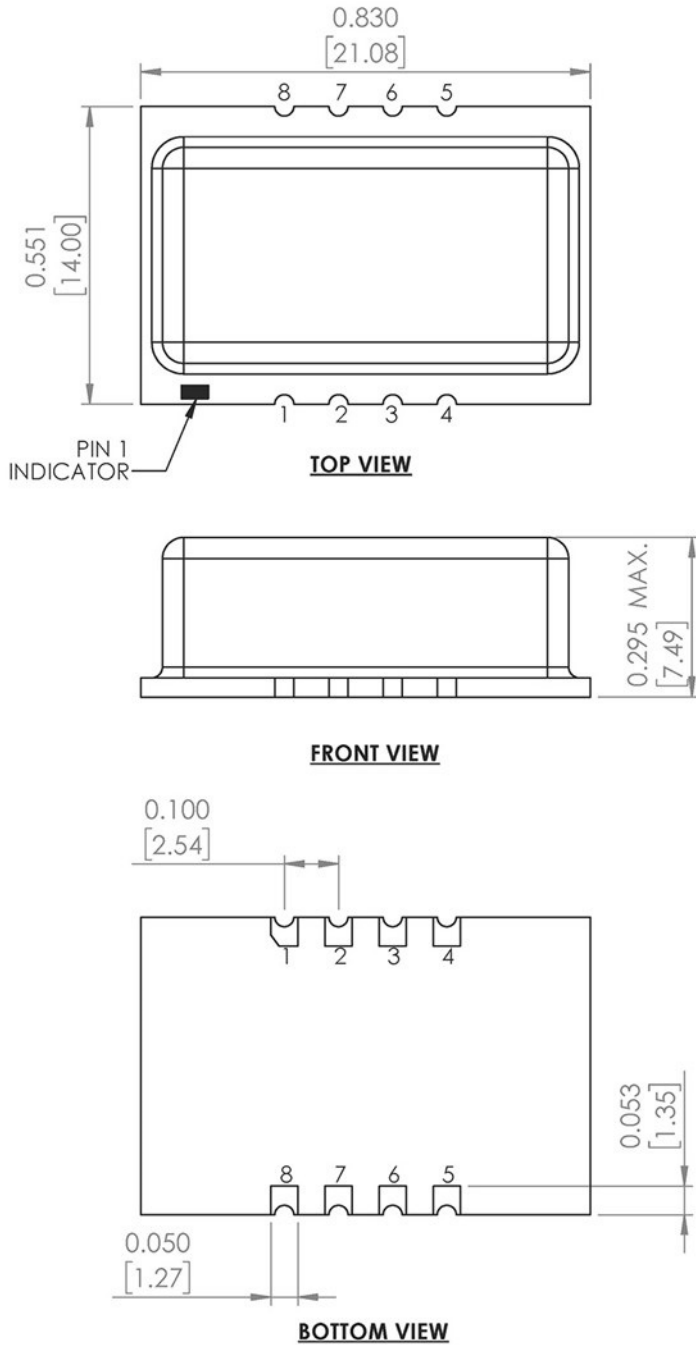
**Temperature Code Table

Letter	Temp °C	Letter	Temp °C	Letter	Temp °C	Letter	Temp °C	Letter	Temp °C	Letter	Temp °C
A	-40	F	-15	K	10	P	35	U	60	Z	85
B	-35	G	-10	L	15	Q	40	V	65		
C	-30	H	-5	M	20	R	45	W	70		
D	-25	I	0	N	25	S	50	X	75		
E	-20	J	5	O	30	T	55	Y	80		

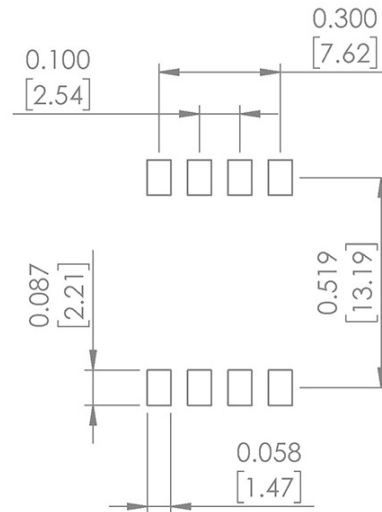
Notes:

1. Not all combinations are available – consult factory.
2. It's not recommended to over-specify stability over temperature performance: it significantly affects the cost.
3. Unless absolutely necessary do not specify highest operating temperature above 70°C.
4. All parameters, unless otherwise specified, are at nominal conditions, i.e.: T=25°C, Nominal Vcc & Nominal Load.
5. Part number string shall contain no spaces.

Mechanical Dimensions



Recommended Land Pattern



Pin #	Function
1	Supply Voltage (Vcc)
2	Ground
3	Ground
4	Output
5	Control Voltage (Vc)
6	Ground
7	Reference Voltage (Vref)
8	Ground

Dimensions: inches [mm]

Reflow Profile [JEDEC J-STD-020]

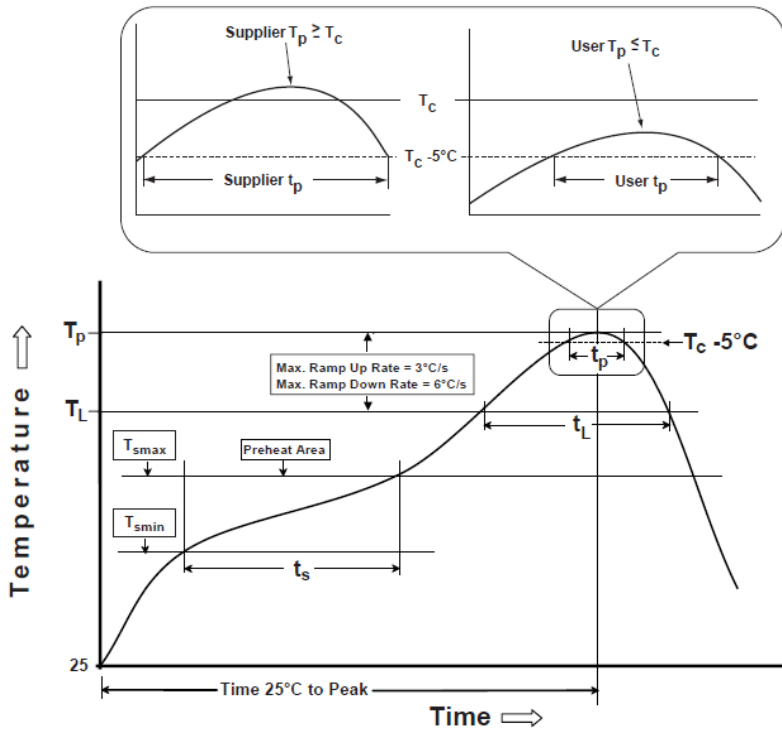


Table 1

SnPb Eutectic Process Classification Temperatures (T_c)		
Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	235°C	220°C
≥2.5 mm	220°C	220°C

Table 2

Pb-Free Process Classification Temperatures (T_c)			
Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ >2000
<1.6 mm	260°C	260°C	260°C
1.6 mm - 2.5 mm	260°C	250°C	245°C
>2.5 mm	250°C	245°C	245°C

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat / soak		
Temperature minimum (T_{smin})	100°C	150°C
Temperature maximum (T_{smax})	150°C	200°C
Time (T_{smin} to T_{smax}) (t_s)	60 - 120 sec.	60 - 120 sec.
Average ramp-up rate (T_{smax} to T_p)	3°C/sec. max	3°C/sec. max
Liquidous temperature (T_L)	183°C	217°C
Time at liquidous (t_L)	60 - 150 sec.	60 - 150 sec.
Peak package body temperature (T_p)*	see Table 1	see Table 2
Time (t_p)** within 5°C of the specified classification temperature (T_c)	20 sec.	30 sec.
Ramp-down rate (T_p to T_{smax})	6°C/sec. max	6°C/sec. max
Time 25°C to peak temperature	6 min. max	8 min. max
Reflow cycles	1 max	1 max

*Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.

**Tolerance for time at peak profile temperature (t_p) is defined as supplier minimum and a user maximum.

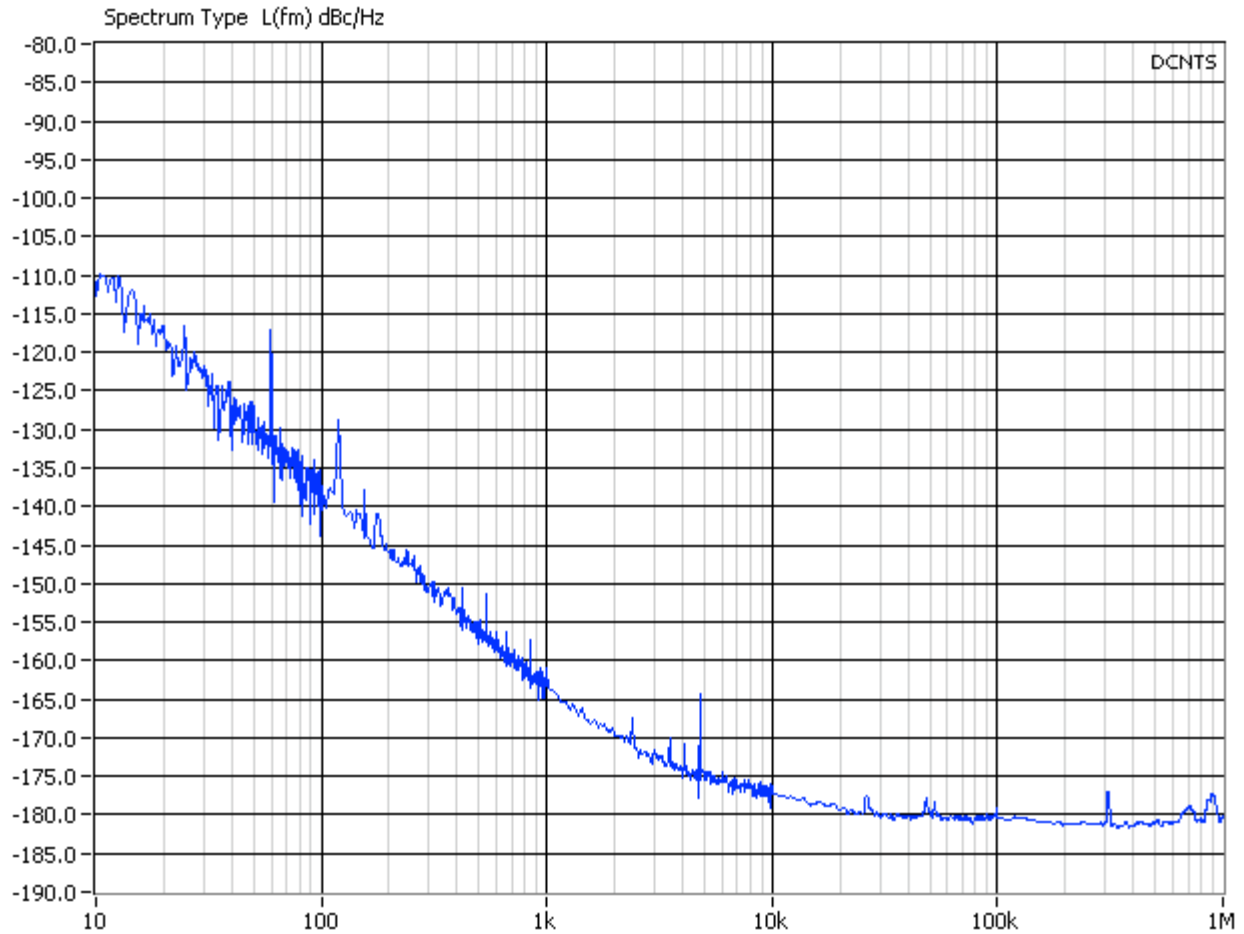
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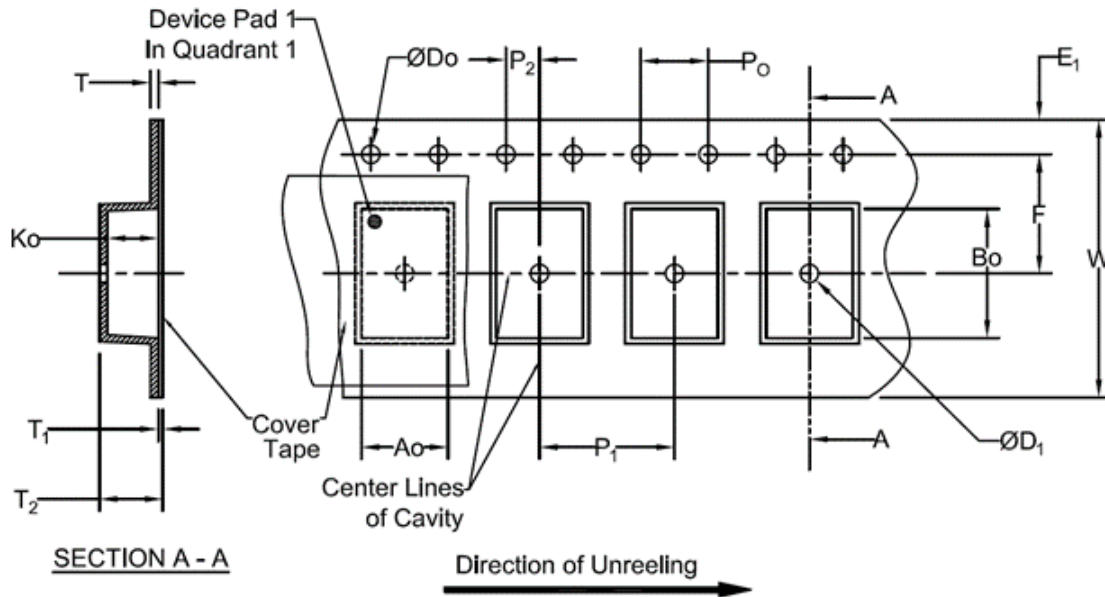
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Phase Noise Plot



Packaging



Tape Specifications (mm)							
Width	A ₀	B ₀	D ₀	D ₁ (Min)	E ₁	F	K ₀
32mm	*	*	1.5+0.1/-0.0	1.0	1.75±0.1	*	*

*Note: Compliant to EIA-481

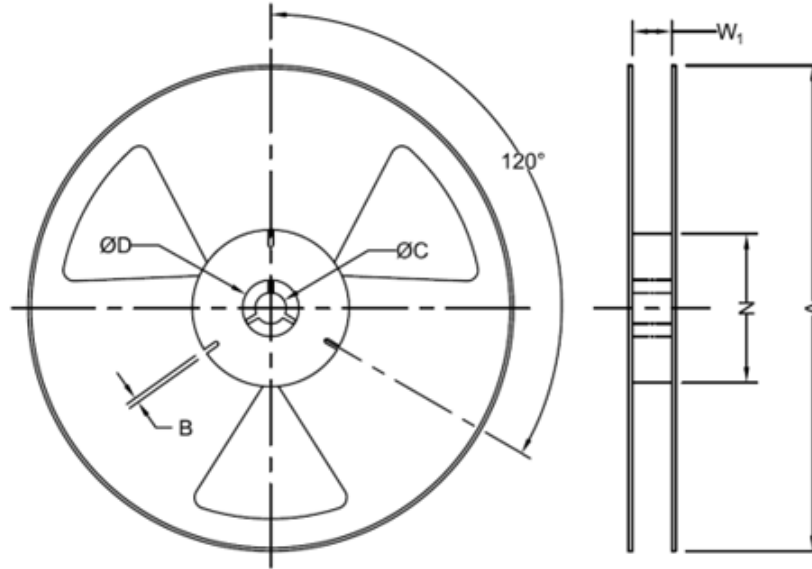
Tape Specifications (mm)							
Width	P ₁	P ₂	P ₀	T (Max)	T ₁ (Max)	T ₂ (Max)	W (Max)
32mm	20±0.1	*	4.0±0.1	0.6	0.1	*	32.0

Dimensions: mm

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Reel Specifications (mm)								
-	Width	Qty/Reel	A (Nom)	B (Min)	C (Min)	D (Min)	N (Min)	*W1
T	32mm	50	178	1.5	13.0+0.5/-0.2	20.2	100	32+3.4/-0.1
T1	32mm	350	330	1.5	13.0+0.5/-0.2	20.2	100	32+3.4/-0.1

*Note: Measured at Hub

Dimensions: mm

Revision P: 08/24/2023

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