Jitter Optimized, Factory Programmable ±3ppm XO

ASGTX5 Series

ESD Sensitive

5.0 x 3.2 x 1.5 mm
RoHS/RoHS II Compliant
MSL = 1

Features

- Ultra-Low Jitter: 332 fs Typ RMS @ 156.25MHz
- Available with any frequency from 15MHz to 2,100MHz
- Factory programmable; samples available within 1-2 weeks
- Lowest in-class power consumption (75mA Typ LVDS)
- ±3.0ppm stability over -40 to +85ºC
- 3.3V, 2.5V, 1.8V V_{dd} supply voltage
- LVPECL, LVDS, HCSL, & CML differential output options
- Industry standard 5.0 x 3.2mm footprint

Applications

- Networking & communications
- 10G/40G/100G optical Ethernet
- RF systems, base stations (BTS)
- Datacenter
- PCI Express
- Test & measurement

Options and Part Identification [Note 5]

ASGTX5 ☐ ☐ ☐ ☐ ☐ — ☐ ☐

(1): Output
- P: LVPECL
- D: LVDS
- H: HCSL (*)
- M: CML

(*) Frequency range limited to: 15~700MHz

(2): V_{dd}
- A: 3.3V
- B: 2.5V
- C: 1.8V (*)

(*) Excluding LVDS & LVPECL

(3): TCXO/VCTCXO
- T: TCXO

(4): Stability over OTR
- D: ±2.50ppm over -20°C to +70°C
- F: ±3.00ppm over -40°C to +85°C

(5): OE Function
- 1: OE Pin 2; Active High
- 2: OE Pin 2; Active Low

(6): Output Frequency in MHz

Please specify the frequency in units of MHz out to **4 digit** accuracy after the decimal.
Example:
"156.2500"=156.25000MHz [Note 5]

(7): Packaging
- Blank: Bulk (*)
- T: Tape & Reel (1,000 units)
- T2: Tape & Reel (250 units)

(*) MOQ: 100 units

Part Number Example:

ASGTX5PATD1-156.2500T2

Note 5: Contact Abracon for non-standard part number configurations and/or requests with carrier frequency callouts up to 5 & 6 digit accuracy after the decimal.

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Electrical Characteristics

Parameters		Min.	Typ.	Max.	Unit	Notes
Frequency Range	LVPECL	15		2,100	MHz	Option "P"
	LVDS	15		2,100		Option "D"
	HCSL	15		700		Option "H"
	CML	15		2,100		Option "M"
Supply Voltage (V_{dd}) [Note 1]		2.97	3.30	3.63	V	Option "A"
		2.25	2.50	2.75		Option "B"
		1.71	1.80	1.89		Option "C"
Supply Current (I_{dd})	LVPECL		100	120	mA	Max @ 2,100MHz; 3.3V
	LVDS		75	90		Max @ 2,100MHz; 3.3V
	HCSL		80	100		Max @ 700MHz; 3.3V
	CML		70	85		Max @ 2,100MHz; 3.3V
Operating Temperature Range		-20		+70	°C	Option "D"
		-40		+85		Option "F"
Storage Temperature		-55		+150	°C	
Frequency Accuracy (Initial Set-Tolerance) [Note 2] at time of shipment (Pre-Reflow) @ +25°C ±3°C		-1.00		+1.00	ppm	Relative to carrier
Shift through Reflow Soldering		-1.00		+1.00	ppm	Relative to initial tolerance
Frequency Stability over Operating Temperature Range, relative to post reflow stabilized frequency		-2.5	< ±1.00	+2.5	ppm	Over -20°C to +70°C
		-3.0	< ±2.00	+3.0		Over -40°C to +85°C
Aging over first year @ +25°C±3°C		-1.00		+1.00	ppm	
Aging over 20 Year Product Life [Note 3]		-7.00		+7.00	ppm	
All-Inclusive Frequency Accuracy (Total Stability) over 20 Year Product Life [Note 3 & 4]		-11.50		+11.50	ppm	Over -20°C to +70°C
		-12.50		+12.50		Over -40°C to +85°C
Rise (Tr) / Fall (Tf) Time (20% to 80% $V_{peak\ to\ peak}$)				400	ps	
Duty Cycle		45		55	%	@ 50% V_{dd}
Powerup Time			< 5.0	10	ms	
Output Enable & Disable Control		0.7*(V_{dd})			V	Output Enable; or No Connect
				0.3*(V_{dd})		Output Disable; High Impedance
Output Enable Time				2.50	ms	70% of V_{dd} (min.) to enable output
Output Disable Time				10	µs	30% of V_{dd} (max) to disable output

Note 1: Supply Voltage (V_{dd}) = 1.8V option not available with LVPECL output
Note 2: Some non-standard carrier frequencies between 15MHz and 2.1GHz may not be able to meet the Initial Frequency Accuracy (Initial Set-Tolerance) at time of shipment (Pre-Reflow). Please contact Abracon for details.
Note 3: Relative to post reflow measured frequency @ +25°C ±3°C
Note 4: Includes temperature accuracy, shift through reflow, stability over operating temperature, load pulling, frequency pushing and aging over 20 years

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MSL = 1

Electrical Specifications Cont.

Parameters			Min.	Typ.	Max.	Unit	Notes
Output Disable Current Consumption	LVPECL			99		mA	Max @ 2,100MHz; 3.3V
	LVDS			74			Max @ 2,100MHz; 3.3V
	HCSL			79			Max @ 700MHz; 3.3V
	CML			69			Max @ 2,100MHz; 3.3V
Output High Voltage (V_{OH}) Output Low Voltage (V_{OL})	LVPECL	V_{OH}	V_{dd}-1.03		V_{dd}-0.6	V	50Ω to V_{dd}–2.0V or Thevenin equivalent
		V_{OL}	V_{dd}-1.85		V_{dd}-1.6		
	LVDS	V_{OH}		1.4	1.6		100Ω between OUT-P and OUT-N
		V_{OL}	0.9	1.1			
	HCSL	V_{OH}	0.66		1.15		50Ω to GND
		V_{OL}	0.0		0.15		
	CML	V_{OH}	V_{dd}-0.085		V_{dd}		50Ω to V_{dd}
		V_{OL}	V_{dd}-0.6		V_{dd}-0.32		

RMS Phase Jitter (12kHz -20MHz BW) | V_{dd}= 3.3V

Carrier F0 (MHz)	Min.	Typ.	Max.	Unit	Notes
15.00 to 50.00		< 500		fsec	All Differential Outputs: LVPECL, LVDS, HCSL & CML
51.00 to 1,200		< 350		fsec	
1,201 to 2,100		< 225		fsec	

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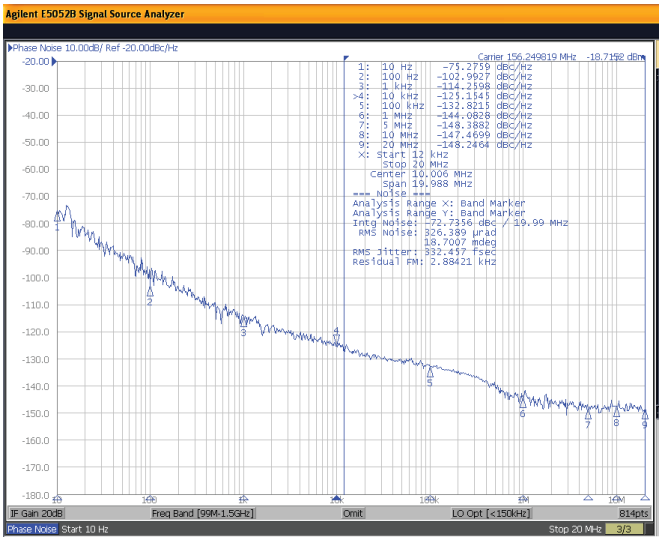
MSL = 1

Phase Noise Test Setup

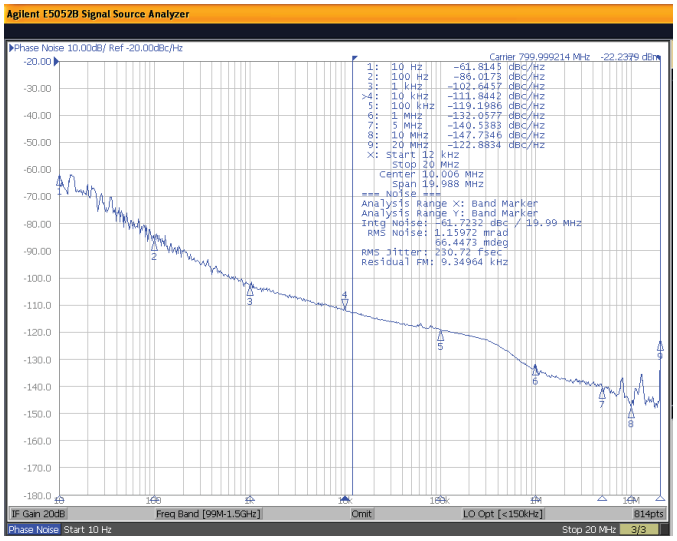
- Keysight E5052B Signal Source Analyzer
- Integration Bandwidth = 12kHz to 20MHz
- Spurious Activity (entire plot trace) = NOT Omitted (Normalized in dBc/Hz)
- Specifed Spur Omission Function = NOT Enabled
- IF Gain = 20dB
- Correlation = 5dB
- Average = 3

Representative Phase Noise Plots

F0=156.2500MHz | V_{dd}=3.3V | LVPECL
RMS Phase Jitter = 332 fsec



F=800.0000MHz | V_{dd}=3.3V | LVPECL
RMS Phase Jitter = 231 fsec



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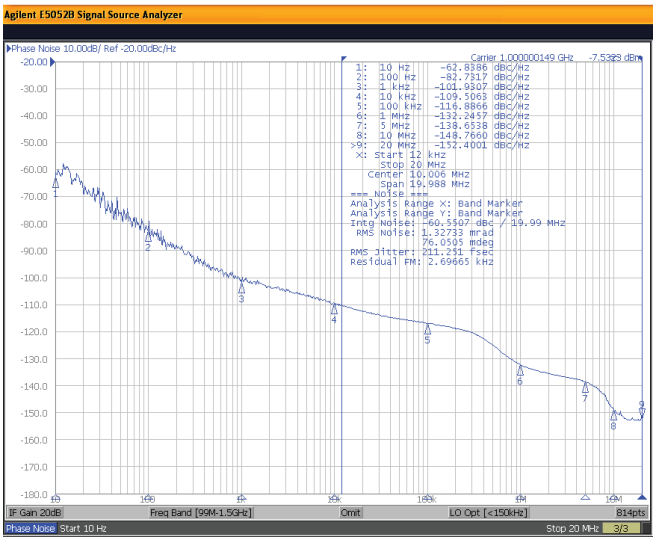
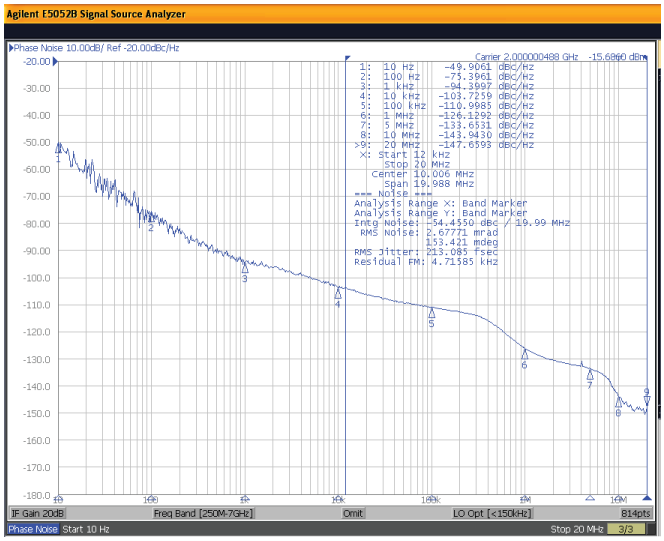
MSL = 1

Representative Phase Noise Plots

F0=1.0000GHz, V_{dd}=3.3V, LVPECL
RMS Phase Jitter = 211 fsec



F0=2.0000GHz, V_{dd}=3.3V, LVPECL
RMS Phase Jitter = 213 fsec



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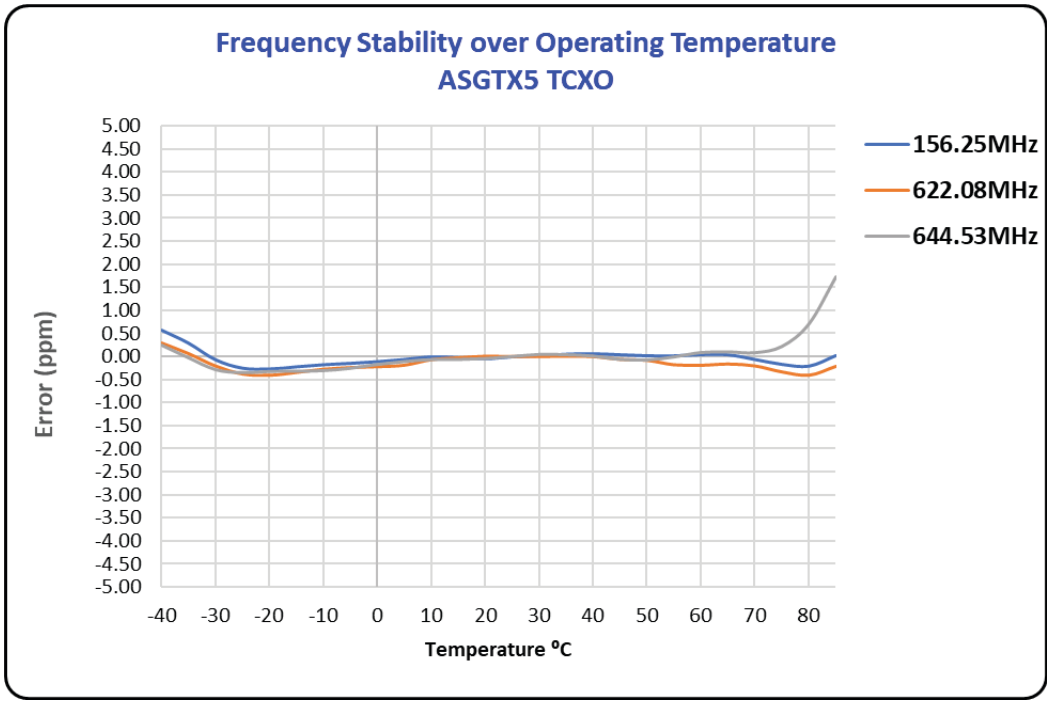
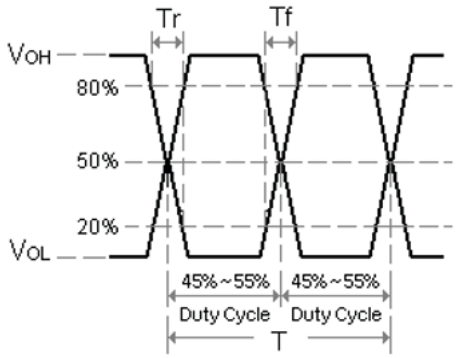
Typical Frequency vs. Temperature Characteristics



Differential Output Waveform



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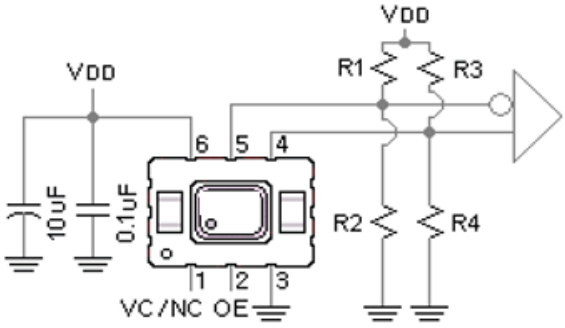
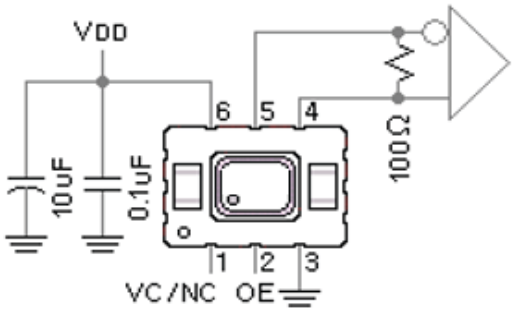
Recommended Test Circuit

LVPECL

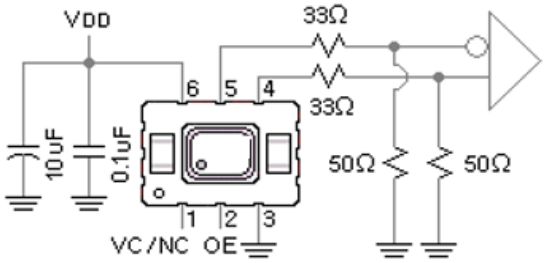


V_{dd}=3.3V: R1=R3=127Ω; R2=R4=82.5 Ω
V_{dd}=2.5V: R1=R3=250Ω; R2=R4=62.5 Ω

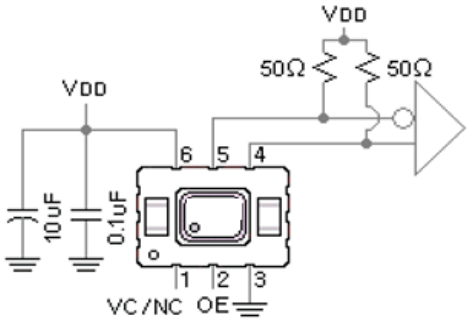
LVDS



HCSL



CML



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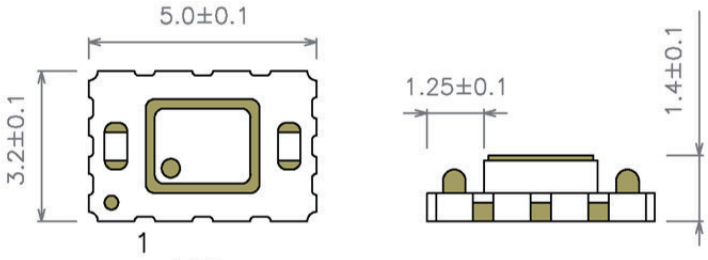
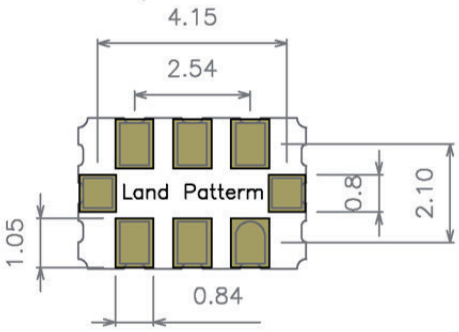
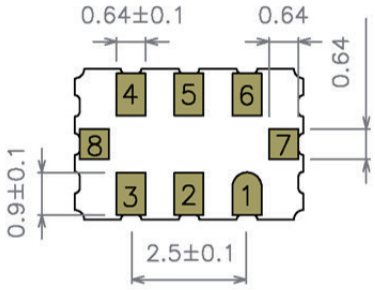
Mechanical Dimensions







Pin #	Function
# 1	No Connect (NC) {TCXO Configuration}
# 2	Output Enable / Disable (OE)
# 3	Ground
# 4	RF Output (Q)
# 5	RF Output Complimentary (Q')
# 6	Supply Voltage (V_{dd})
# 7	Do Not Connect (leave floating)
# 8	Do Not Connect (leave floating)

Option	OE pin functionality (Pin#2)
1	Output Enable Active HIGH
2	Output Enable Active LOW

Dimensions: inches [mm]

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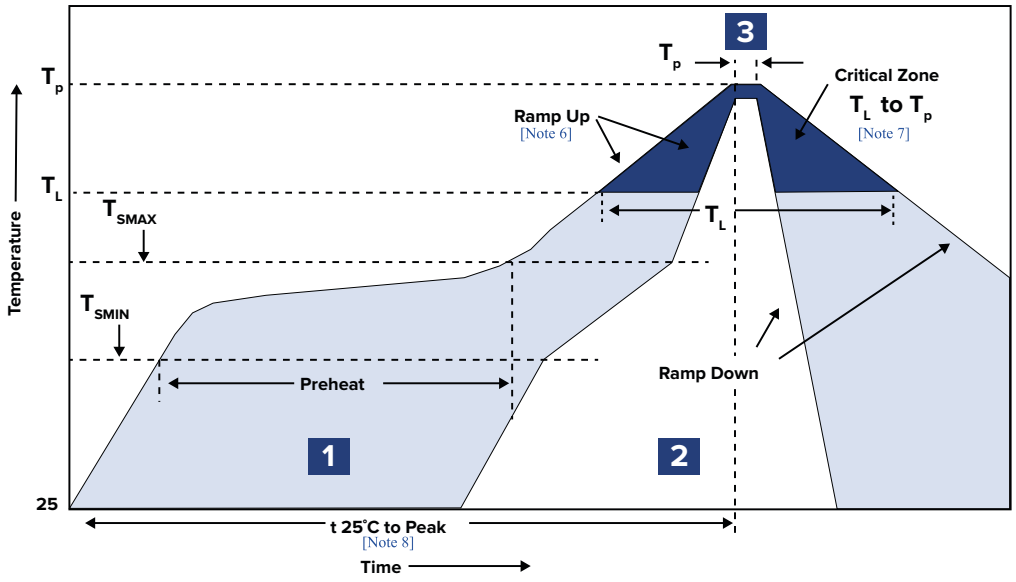
Recommended Reflow Profile [Note 9]



Zone	Description	Temperature	Time
1	Preheat / Soak	T_{SMIN} ~ T_{SMAX} 150°C ~ 200°C	60 ~ 180 sec.
2	Reflow	T_L 217°C	60 ~ 150 sec.
3	Peak heat	T_P 260°C±5°C	20 ~ 40 sec.

Note 6: Ramp Up Rate ($T_L \rightarrow T_P$) = 3°C / sec. MAX
Note 7: Ramp Down Rate ($T_P \rightarrow T_L$) = 6°C / sec. MAX
Note 8: Time 25°C to Peak Temperature (25°C $\rightarrow T_P$) = 8 minutes MAX

Can withstand 2 times reflow
All temperatures refer to topside of the package, measured on the package body surface below.

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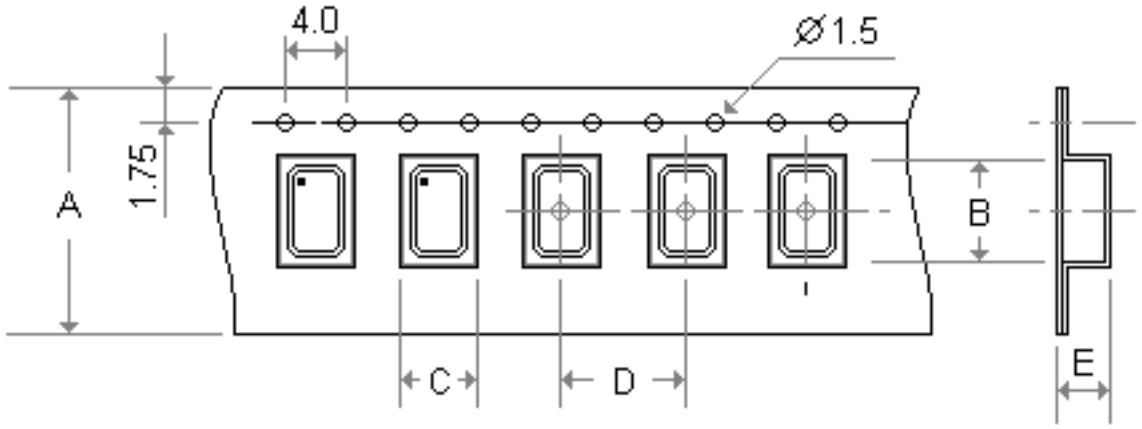
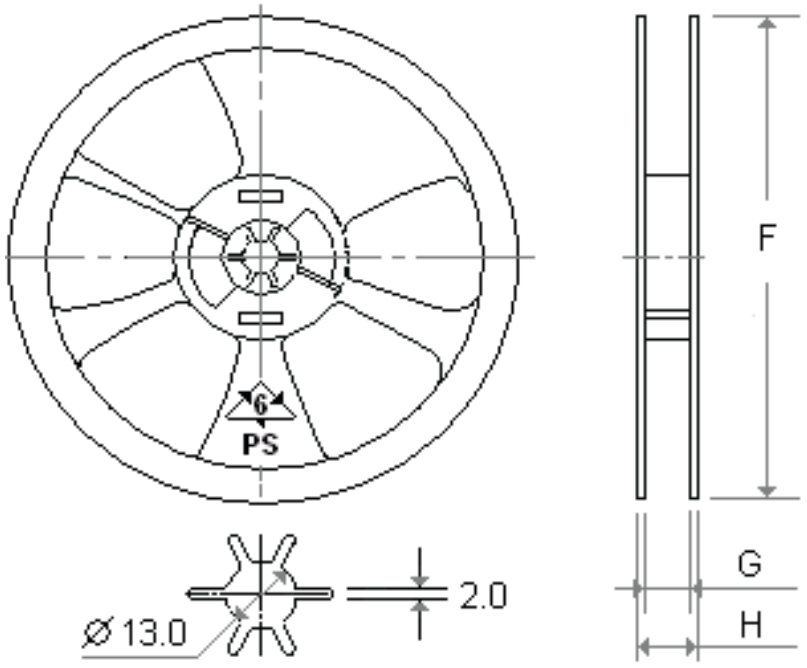
Packaging

Blank = Bulk (MOQ: 100 units)
T = Tape & Reel (1000 units/reel)
T2 = Tape & Reel (250 units/reel)

Feeding (PULL) Direction →



Tape Dimensions	
A	12.0
B	5.3
C	3.6
D	8.0
E	1.4
Reel Dimensions	
F	180.0
G	13.0
H	16.0



Dimensions: mm

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