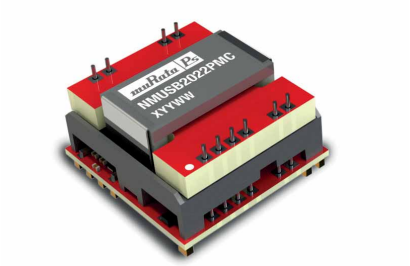
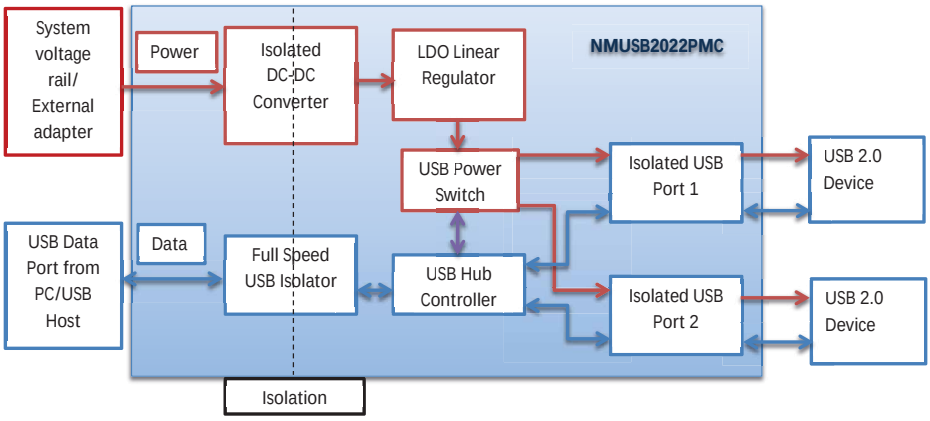
NMUSB2022PMC

2 MOPP Powered Dual Port USB Data Isolator





FEATURES

- Isolated dual powered USB 2.0 compliant
- Surface mount module
- One upstream port, two isolated downstream ports
- Automatic switching between low (1.5Mbps) and full speed (12Mbps)
- Full 500mA available from isolated ports
- 4kVAC Isolation Voltage 'Hi Pot Test'
- UL60950 recognition pending
- ANSI/AAMI ES60601-1 2 MOPP/2 MOOPs recognition pending
- Industrial temperature range -40°C to +85°C
- Short Circuit/overload protected USB ports
- Power surge notification
- Patents Pending
- 3D Model available

SELECTION GUIDE

Order Code[1]	**NMUSB2022PMC**

PRODUCT OVERVIEW

The NMUSB2022PMC is a surface mount module which conveniently provides dual port USB data isolation from a single upstream port with full power (500mA) available from each downstream port. Isolation provides effective breaking of ground loops and immunity to EMI in harsh environments as found in industrial and medical applications. Full speed (12Mbps) and low speed (1.5Mbps) are supported with automatic switching. Input power of 5V is provided by an external 'adapter' or system voltage rail.

For full details go to www.murata-ps.com/rohs

1. Components are supplied in tape and reel packaging, please refer to package specification section. Orderable part numbers are NMUSB2022PMC-R7 (23 pieces per reel), or NMUSB2022PMC-R13 (92 pieces per reel).

All specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified.

DC-DC CHARACTERISTICS

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation	4.5	5	5.5	V
Current (hub inactive)	5V input		70		mA
Current (hub active) 0% load	5V input		110		mA
Current 100% load	5V input		1.3		A
Input reflected ripple current	5V input		26		mA

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Downstream voltages	5V output	4.75	5	5.25	V
Transient response	Peak deviation (0-50-0% & 50-100-50% swing)	-5		+3	$\%V_{out}$
	Settling time	40		400	µs

MODULE CHARACTERISTICS

TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Operation	See derating curve	-40		85	°C
Storage		-55		125	
Product temperature rise above ambient	100% Load, Nom V_{IN}, Still Air (measured on transformer core)		30	32	

ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Production tested for 1 second	4000			VAC
	Qualification tested for 1 minute	4000			
Resistance	Viso = 1kVDC	1			GΩ

GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Leakage current	250 VAC 50Hz			1.3	µA
Common mode transient immunity		25			kV/ µs
MTTF	Calculated using MIL-HDBK-217 FN2 calculation model with nominal input voltage at full load, 25°C ambient temperature		600		kHrs
	Calculated using Telecordia SR-332 calculation model with nominal input voltage at full load, 25°C ambient temperature		3300		kHrs

ABSOLUTE MAXIMUM RATINGS

Parameter	Conditions	Value
Short-circuit protection	Downstream USB 5V	Continuous
Input voltage	Upstream USB 5V supply	5.5V

TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

Murata Power Solutions NMUSB2022PMC data isolator is 100% production tested at 4kVAC for 1 second and qualification tested at 4kVAC for 1 minute.

The NMUSB2022PMC series is pending recognised by Underwriters Laboratory to 250 Vrms Reinforced Insulation.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

SAFETY APPROVAL

ANSI/AAMI ES60601-1

The NMUSB2022PMC is pending recognition to ANSI/AAMI ES60601-1 and provides 2 MOPP (Means Of Patient Protection) and 2 MOOP (Means Of Operator Protection) based upon a working voltage of 250 Vrms max, between Primary and Secondary.

UL 60950

The NMUSB2022PMC series is pending recognition by Underwriters Laboratory (UL) to UL 60950 for reinforced insulation to a working voltage of 250Vrms. UL file number E151252 applies.

FUSING

The NMUSB2022PMC series of converters are not internally fused so to meet the requirements of UL an anti-surge input line fuse should always be used with ratings as defined below.

NMUSB2022PMC - 2.5A (125Vdc rated)

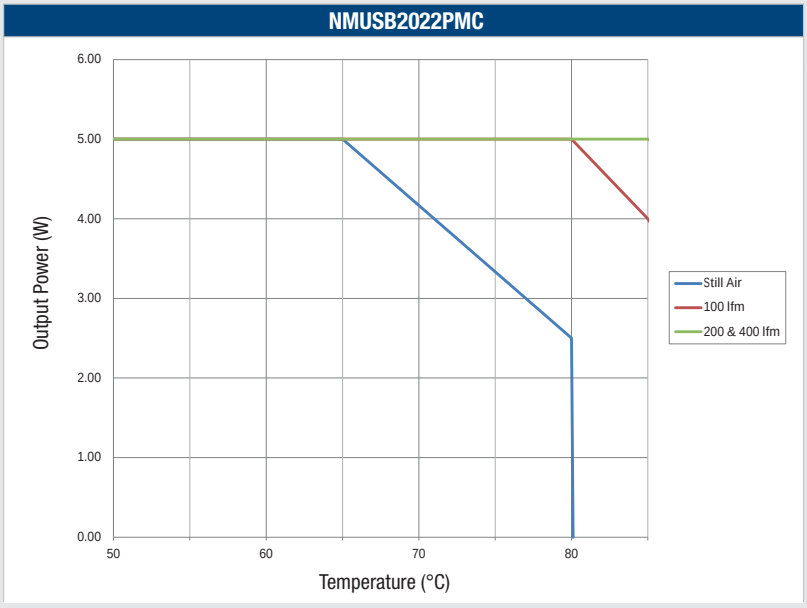
All fuses should be UL recognised and rated to at least the maximum allowable DC input voltage.

RoHS COMPLIANCE, MSL AND PSL INFORMATION

RoHS COMPLIANT

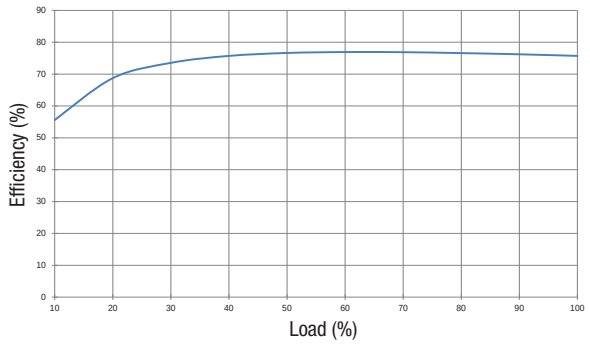
NMUSB2022PMC is compatible with RoHS soldering systems with a peak reflow solder temperature of 245ºC as per J-STD-020D.1. The pin termination finish on this product series is Gold with Nickel Pre-plate. The series is backward compatible with Sn/Pb soldering systems. The product has a Moisture Sensitivity Level (MSL) 3.

TEMPERATURE DERATING GRAPH



EFFICIENCY GRAPH

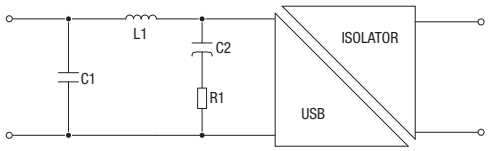
NMUSB2022PMC



EMC FILTERING AND SPECTRA

FILTERING

The following table shows the additional input capacitor and input inductor typically required to meet EN 55022 Curve B Quasi-Peak EMC limit, as shown in the following plots. The following plots show positive and negative quasi peak and CISPR22 Average Limit B (green line) and CISPR22 Quasi Peak Limit B (pink line) adherence limits.

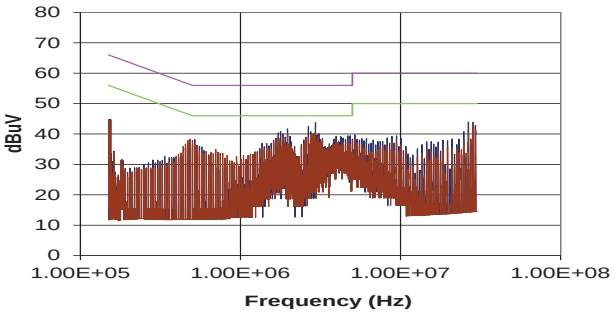


C1 Ceramic capacitor

C2 Electrolytic capacitor

TO MEET CURVE B				
Part Number	C1	L1	C2	R1
NMUSB2022PMC	10µF	10µH	470µF	0.5Ω

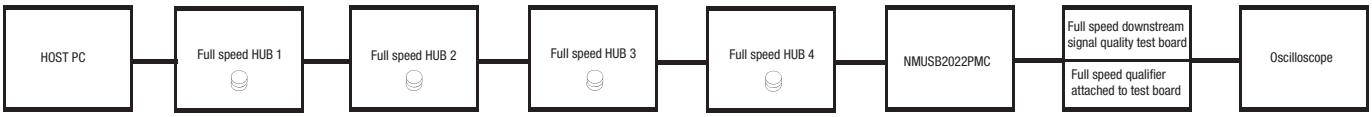
NMUSB2022PMC



APPLICATION NOTES

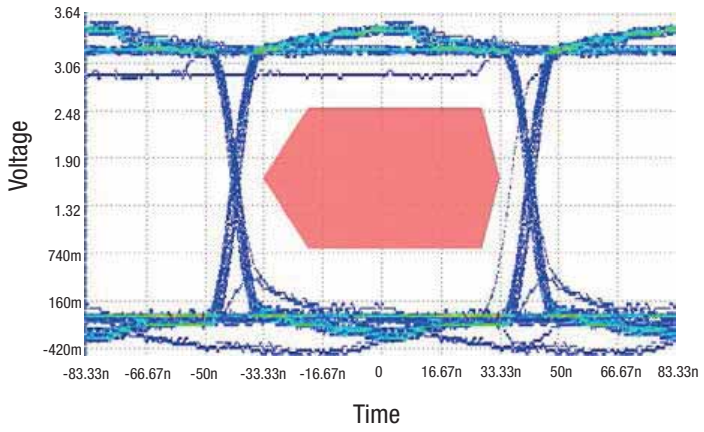
NMUSB2022PMC is equivalent to one USB hub for dynamic characteristics, verified by the setup in the figure below for worst case USB specification of 5 cascaded hubs. The host PC counts as one hub.

Equipment	Use
Tektronix DPO5034B Scope	Signal Qualification
Scope Firmware 7.2.0 Build 4	
TekExpress USB2 1.0.0.65	
Framework version 3.0.1.51	
Tektronix TPP0500 500MHZ 300V CATII 3.9pF probes	
Thurlby PL320	Power Supply for NMUSB2022PMC
HP Elite Desk 800G F6X32ET~ABU	Remote From
HP Compaq DC5800	Remote Into
Keithley 2000 DMM	Vin Measurement
Keithley 2000 DMM	Iin Measurement
Pro Signal PS11116 5M Certified USB cables	USB Cabling
Newlink USB 4-Port Hubs	USB Hubs
Integral “Splash Black” USB flash drive (8GB)	Full Speed Qualifier
HP 672652-001	Mouse for Port 1
Logitech 810-003656	Mouse for Port 2
TektronixUSB test fixture TDSUSBF	Test Fixture



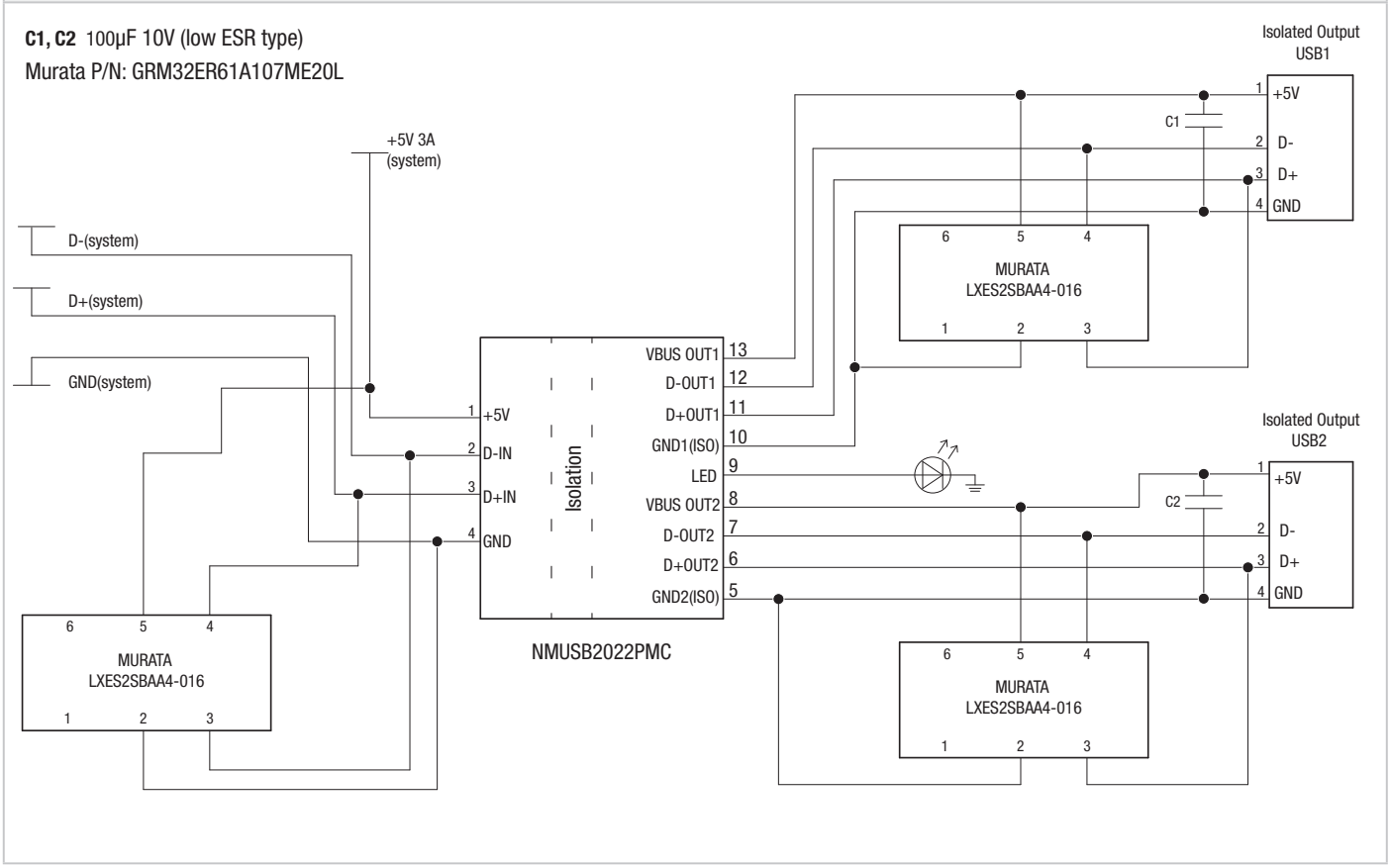
Typical Eye Diagram:

The ‘eye’ diagram is an indication of adequate data quality after the worst case of five cascaded USB hubs.



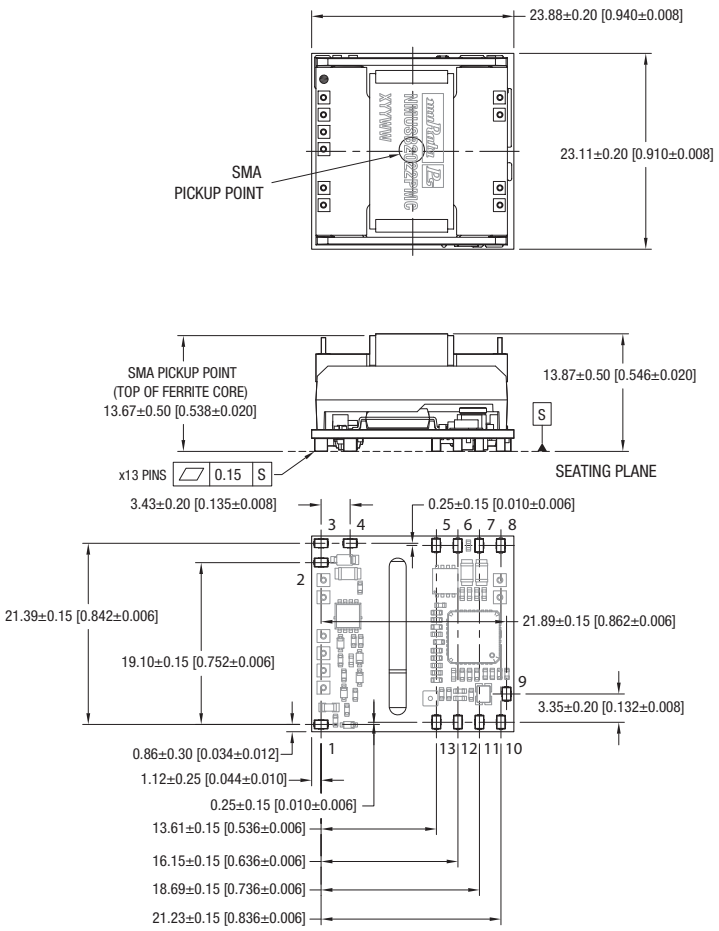
APPLICATION NOTES

Typical Implementation:



PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS



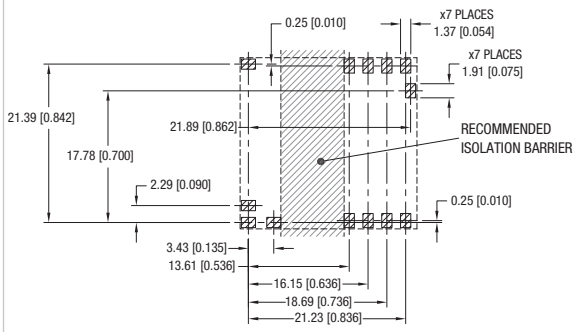
All dimensions in mm (inches), Controlling dimensions is mm.
Components shown for reference only.

Weight: 11 g

PIN CONNECTIONS

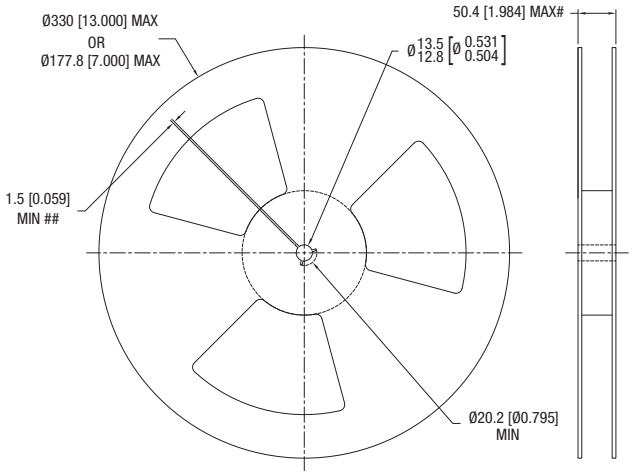
Pin	Function
1	+5V (UPSTREAM)
2	D-IN
3	D+IN
4	GND (UPSTREAM)
5	GND2 (DOWNSTREAM)
6	D+OUT2
7	D-OUT2
8	VBUS OUT2
9	LED PIN
10	GND1 (DOWNSTREAM)
11	D+OUT1
12	D-OUT1
13	VBUS OUT1

RECOMMENDED FOOTPRINT DETAILS



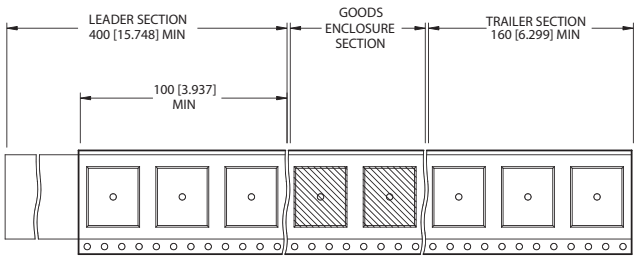
TAPE & REEL SPECIFICATIONS

REEL OUTLINE DIMENSIONS



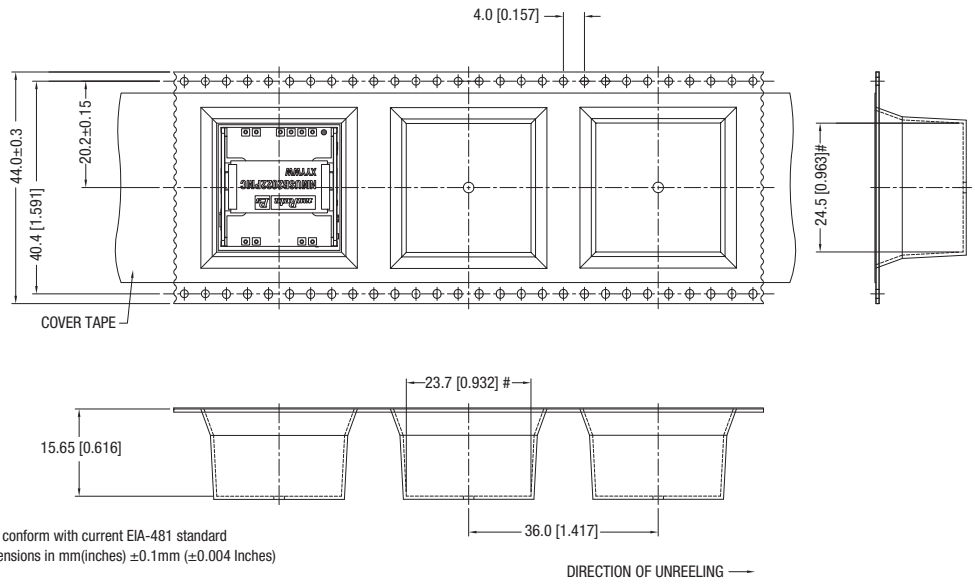
Tape & Reel specifications shall conform with current EIA-481 standard
Unless otherwise stated all dimensions in mm(inches)
Controlling dimension is mm
Measured at hub
Six equi-spaced slots on 180mm/7" reel

REEL PACKAGING DETAILS



Carrier tape pockets shown are illustrative only - Refer to carrier tape diagram for actual pocket details.
Reel Quantity: 7" - 23 or 13" - 92

TAPE OUTLINE DIMENSIONS



Tape & Reel specifications shall conform with current EIA-481 standard
Unless otherwise stated all dimensions in mm(inches) ±0.1mm (±0.004 Inches)
Controlling dimension is mm
Components shall be orientated within the carrier tape as indicated
Measured on a plane 0.3mm above the bottom pocket