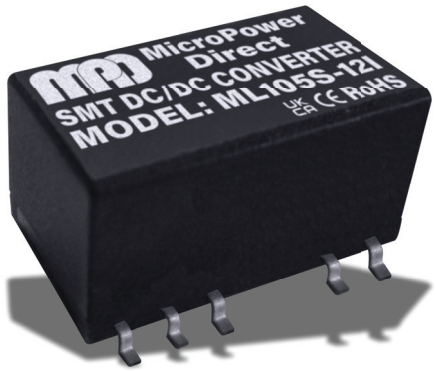
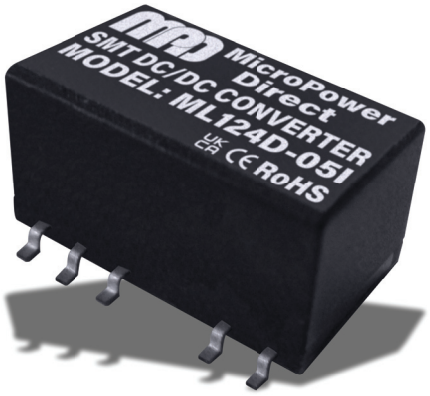
ML100I

Ultra-Miniature, 1W Single & Dual SMT DC/DC Converters





Key Features:

- 1W Output Power
- Ultra-Miniature SMT Case
- 3,000 VDC Isolation
- Single And Dual Outputs
- 5V, 12 & 24V Inputs
- -40°C to +85°C Operation
- 21 Standard Models
- 2.0 MH MTBF Minimum
- Available on Tape/Reel

CE

UKCA

RoHS

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Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Input

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Range	5 VDC Input	4.5	5.0	5.5	VDC
	12 VDC Input	10.8	12.0	13.2	
	24 VDC Input	21.6	24.0	26.4	
Input Filter	Capacitor				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Balance	Dual Outputs, Balanced Loads		±0.1	±1.0	%
Line Regulation	For Vin Change of 1%		±1.2	±1.5	%
Load Regulation, See Note 2	See Model Selection Guide				
Ripple & Noise (20 MHz)	See Note 3			100	mV P - P
Temperature Coefficient			±0.01	±0.02	%/°C
Output Short Circuit	Momentary (0.5 Sec.)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 Seconds	3,000			VDC
Isolation Resistance	500 VDC	10			GΩ
Isolation Capacitance	100 kHz, 1V		60	100	pF
Switching Frequency		50	100	150	kHz

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40	+25	+90	°C
Maximum Case Temperature	Case			+105	°C
Storage Temperature Range		-50		+125	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%

Physical

Case Size	See Mechanical Drawings (Page 4)
Case Material	Non-Conductive Black Plastic (UL94-V0)
Weight	See Mechanical Drawings (Page 4)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	2.0			MHours
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1		Level 2		

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	5 VDC Input			9.0	VDC
	12 VDC Input			18.0	
	24 VDC Input			30.0	
Peak Reflow Temperature				245	°C
Lead Temperature	1.5 mm From Case For 10 Sec.			260	°C

Caution: Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.

Model Selection Guide

Model Number	Input				Output			Load Regulation (%, Max)	Efficiency (%, Typ)	Output Capacitive Load (µF, Max)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full-Load	No-Load							
ML105S-03I	5	4.50 - 5.50	238	30	3.3	260	6.0	10	72	33	500
ML105S-05I	5	4.50 - 5.50	267	30	5.0	200	4.0	10	75	33	500
ML105S-12I	5	4.50 - 5.50	255	30	12.0	84	1.5	7	79	4.7	500
ML105S-15I	5	4.50 - 5.50	251	30	15.0	67	1.0	7	80	4.7	500
ML105D-05I	5	4.50 - 5.50	267	30	±5.0	±100	±2.0	10	75	10	500
ML105D-12I	5	4.50 - 5.50	255	30	±12.0	±42	±0.8	7	79	2.2	500
ML105D-15I	5	4.50 - 5.50	255	30	±15.0	±34	±0.7	7	80	2.2	500
ML112S-03I	12	10.8 - 13.2	98	15	3.3	260	6.0	10	73	33	200
ML112S-05I	12	10.8 - 13.2	110	15	5.0	200	4.0	8	76	33	200
ML112S-12I	12	10.8 - 13.2	105	15	12.0	84	1.5	5	80	4.7	200
ML112S-15I	12	10.8 - 13.2	103	15	15.0	67	1.0	5	81	4.7	200
ML112D-05I	12	10.8 - 13.2	110	15	±5.0	±100	±2.0	8	76	10	200
ML112D-12I	12	10.8 - 13.2	105	15	±12.0	±42	±0.8	5	80	2.2	200
ML112D-15I	12	10.8 - 13.2	106	15	±15.0	±34	±0.7	5	80	2.2	200
ML124S-03I	24	21.6 - 26.4	51	8	3.3	260	6.0	10	70	33	100
ML124S-05I	24	21.6 - 26.4	57	8	5.0	200	4.0	8	73	33	100
ML124S-12I	24	21.6 - 26.4	53	8	12.0	84	1.5	5	79	4.7	100
ML124S-15I	24	21.6 - 26.4	53	8	15.0	67	1.0	5	79	4.7	100
ML124D-05I	24	21.6 - 26.4	57	8	±5.0	±100	±2.0	8	73	10	100
ML124D-12I	24	21.6 - 26.4	53	8	±12.0	±42	±0.8	5	79	2.2	100
ML124D-15I	24	21.6 - 26.4	54	8	±15.0	±34	±0.7	5	79	2.2	100

Notes:

1. The specified maximum capacitive load is for each output.
2. Load regulation is measured for an output change of 20% to 100%.
3. When measuring output ripple, it is recommended that an external 0.33 µF ceramic capacitor be placed from each output to the common pin. For noise sensitive applications, the use of 3.3 µF capacitors will reduce the output ripple.
4. Operation at no-load will not damage these units. However, they may not meet all specifications.
5. The converter should be connected to a low ac-impedance source. An input source with a highly inductive impedance may affect the stability of the converter. In applications where the converter output loading is high and input power is supplied over long lines, it may be necessary to use a capacitor on the input to insure start-up.
   In this case, it is recommended that a low ESR (ESR <1.0Ω at 100 kHz) capacitor be mounted close to the converter. For 5V input units a 2.2 µF is recommended; a 1.0 µF; for 12V input units; and for 24V input models, a 0.47 µF.
6. Dual output units may be connected to provide a 10 VDC, 24 VDC or 30 VDC output. To do this, connect the load across the positive (+Vout) and negative (-Vout) outputs and float the output common.
7. It is recommended that a fuse be used on the input of a power supply for protection. See the table above for the correct rating.

MPD offers a wide variety of SMT mount DC/DC's. Product families range from 1W to 6W output power and offer a full range of features that include:

- Ultra-Miniature Size
- Tape/Reel Packaging
- Wide Temp Operation
- Up To 3 kV I/O Isolation
- Single & Dual Outputs
- Short Circuit Protection
- Low Cost

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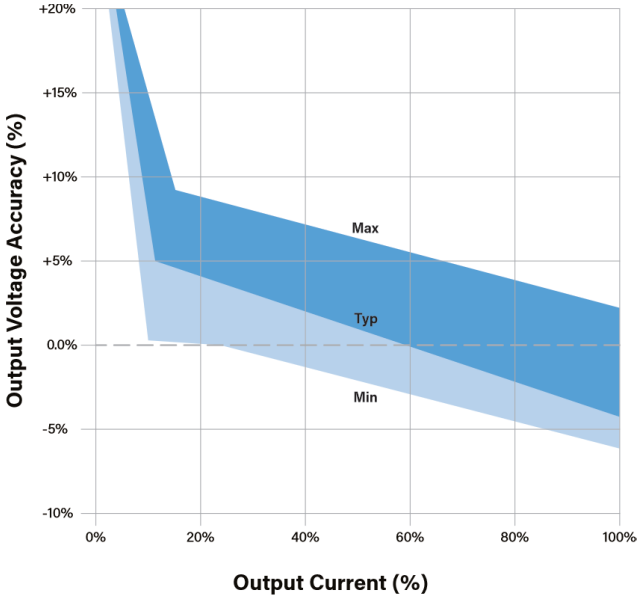
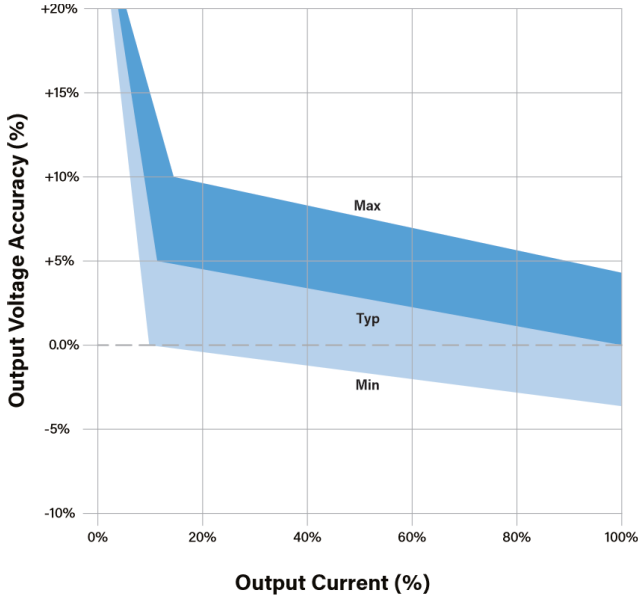
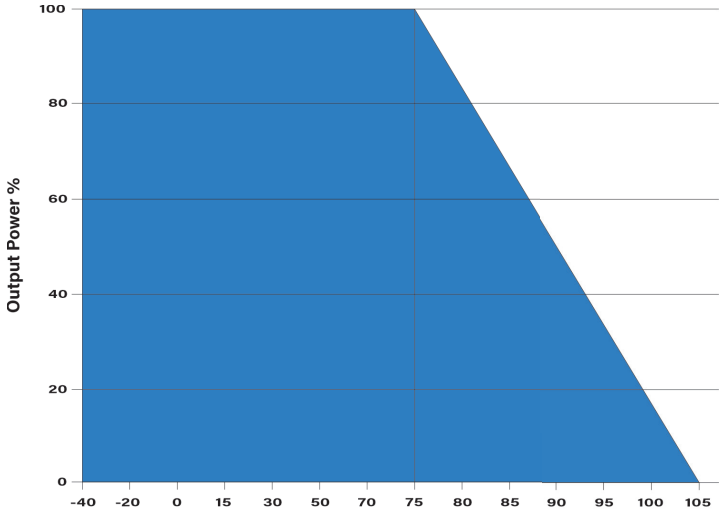
Output Voltage Tolerance: 3.3 & 5 VOUT Models



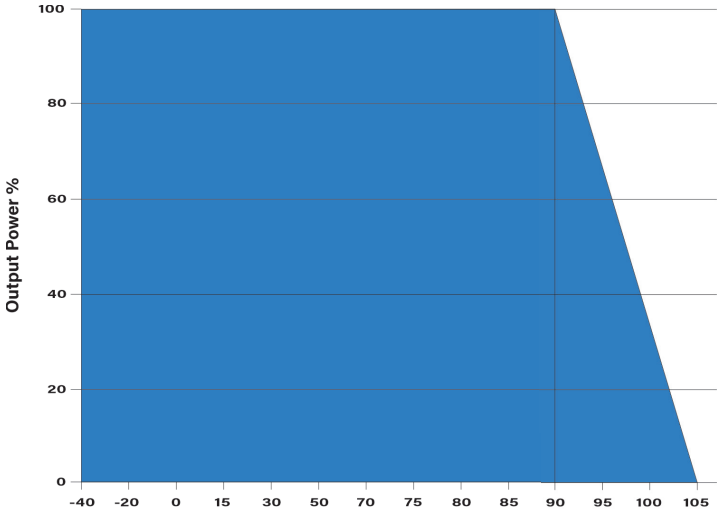
Output Voltage Tolerance: All Other Models



Derating Curve, Free Air (20 LFM)



Derating Curve, 400 LFM

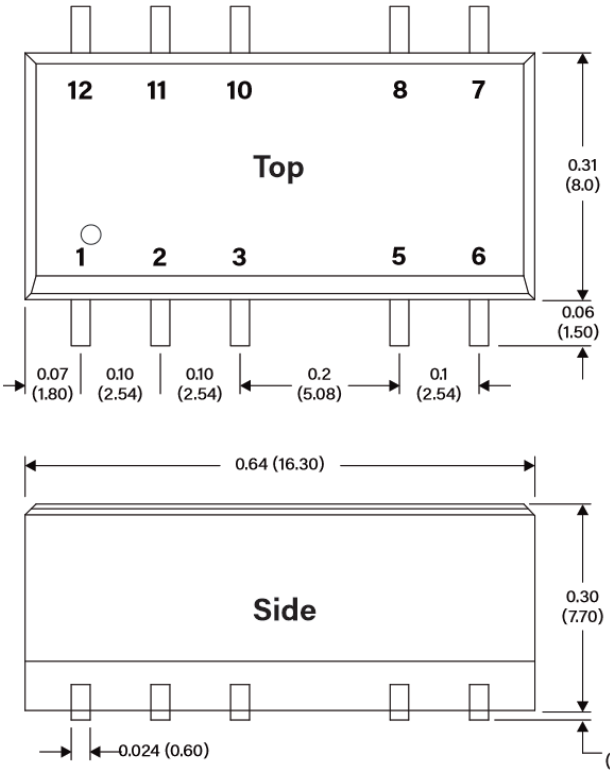


Typical Connection, 24 VIN Models

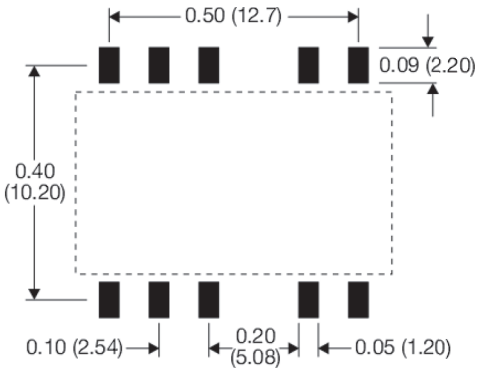
The diagram above illustrates a simple connection of the the **ML100I** series. The input capacitor (C1) will help to meet conducted emmissions requirements. The capacitor C2 will reduce output ripple and improve the converter stability over time and temperature. The recommended component values are given in the table at right.

VIN	C1	C2
5 VDC	2.2 µF/16V	1.0 µF/50V
12 VDC	1.0 µF/16V	1.0 µF/50V
24 VDC	0.47 µF/50V	1.0 µF/50V

Mechanical Dimensions



Board Layout



Pin Connections

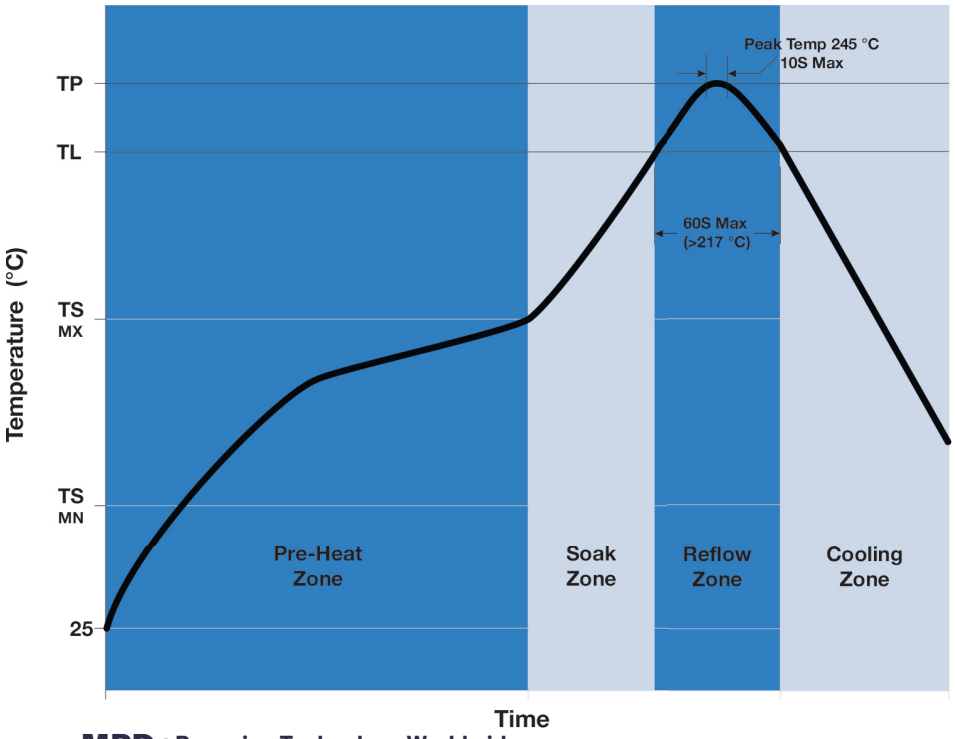
Pin	Single Output	Dual Output	Pin	Single Output	Dual Output
1	-VIN	-VIN	7	NC	NC
2	+VIN	+VIN	8	+VOUT	+VOUT
3	NC	NC	10	NC	NC
5	-VOUT	Common	11	NC	NC
6	NC	-VOUT	12	NC	NC

NC = Not for electrical connection

Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.01 (±0.25)
- Pin 1 is marked by a "dot" or indentation on the unit
- Weight = 0.07 Oz (2.06g)

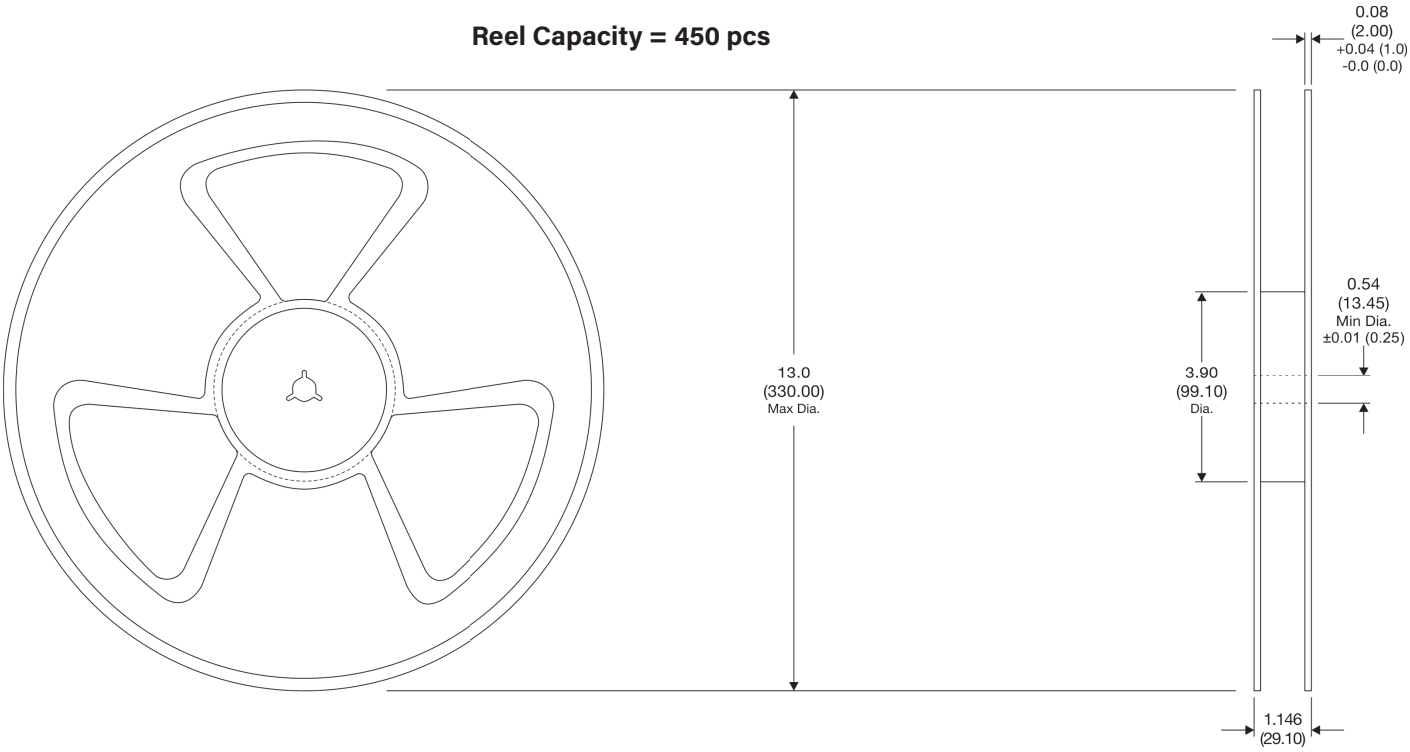
Reflow Solder Settings



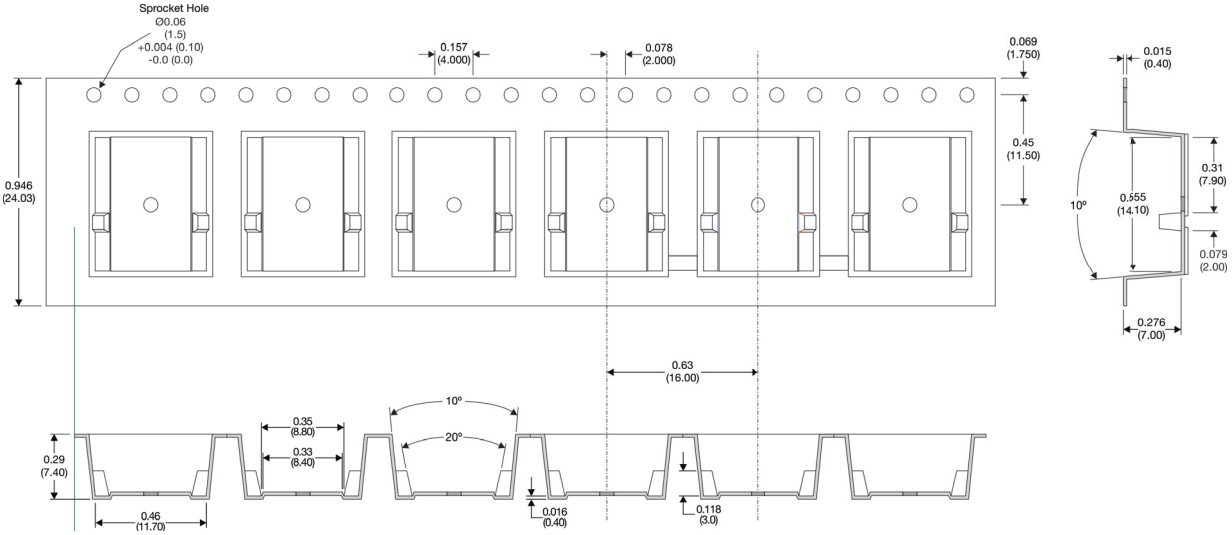
The **ML100** series is designed to meet the IPC/JEDEC standard J-STD-020D for reflow soldering. The recommended reflow settings are a peak temperature of 245°C for a maximum period (TPK) of 10S and a time above liquidous (TL) of ≤60 seconds at 217°C, as illustrated above. For more information, please contact the factory.

Reel Dimensions

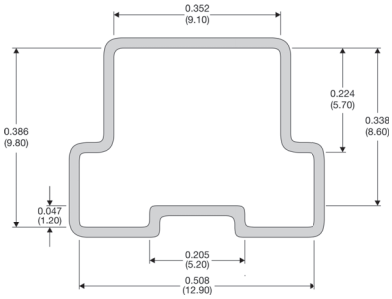
Reel Capacity = 450 pcs



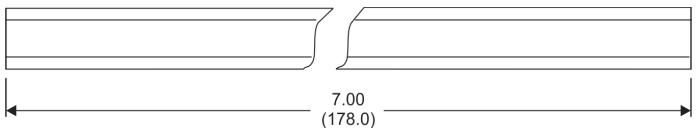
Tape Dimensions



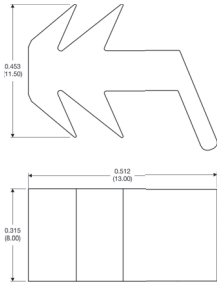
Tube Dimensions



Tube Capacity = 10 pcs



Tube Plug



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