

Description

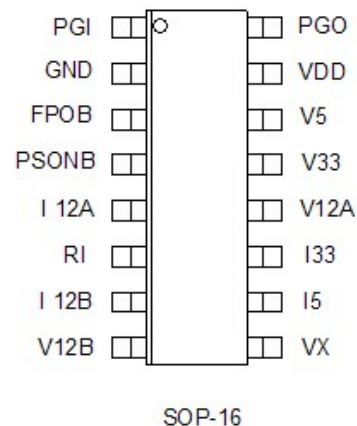
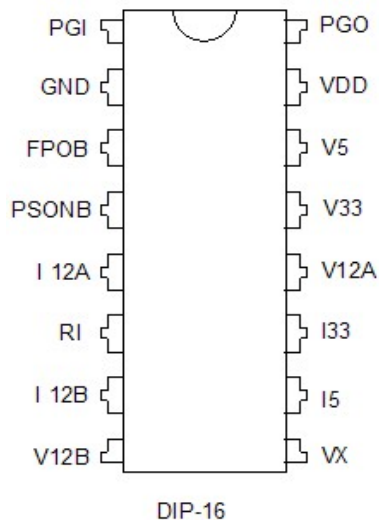
The EST.7627A is a PC switching power supply monitor with minimum external components. It provides protection circuits, power-good output (PGO), fault protection output (FPOB) and on/off control (PSONB). The over-voltage protection (OVP) and under-voltage protection (UVP) monitors V33, V5, V12A and V12B.

The over-current protection (OCP) monitors V33&I33, V5&I5, V12A&I12A and V12B&I12B. The VX pin provides an extra protection function. When an OV, UV, OC or VX condition is detected, the fault protection output (FPOB) is latched high and the power good output (PGO) go low. PSONB from low to high resets the latch. When OV, UV, OC, VX and PGI are all right, the power good output (PGO) will be issue. A built-in 4ms delay and 38ms debounce for PSONB turn off FPOB.

Features

- Over-voltage protection (OVP) for +3.3V, +5V, +12VA and +12VB supplies
- Under-voltage protection (UVP) for +3.3V, +5V, +12VA and +12VB supplies
- Over-current protection (OCP) for +3.3V, +5V, +12VA and +12VB supplies
- The VX pin provides an extra protection function.
- Fault protection output (FPOB) with open drain output
- Power good output (PGO) with open drain output
- 75ms UVP/OCP/VX delay time
- 300ms PGO delay time
- 38ms PSONB debounce time
- 14us OVP debounce time
- 60us UVP/VX debounce time
- 20ms OCP debounce time
- 73us PGI debounce time
- 4ms FPOB turn off delay time

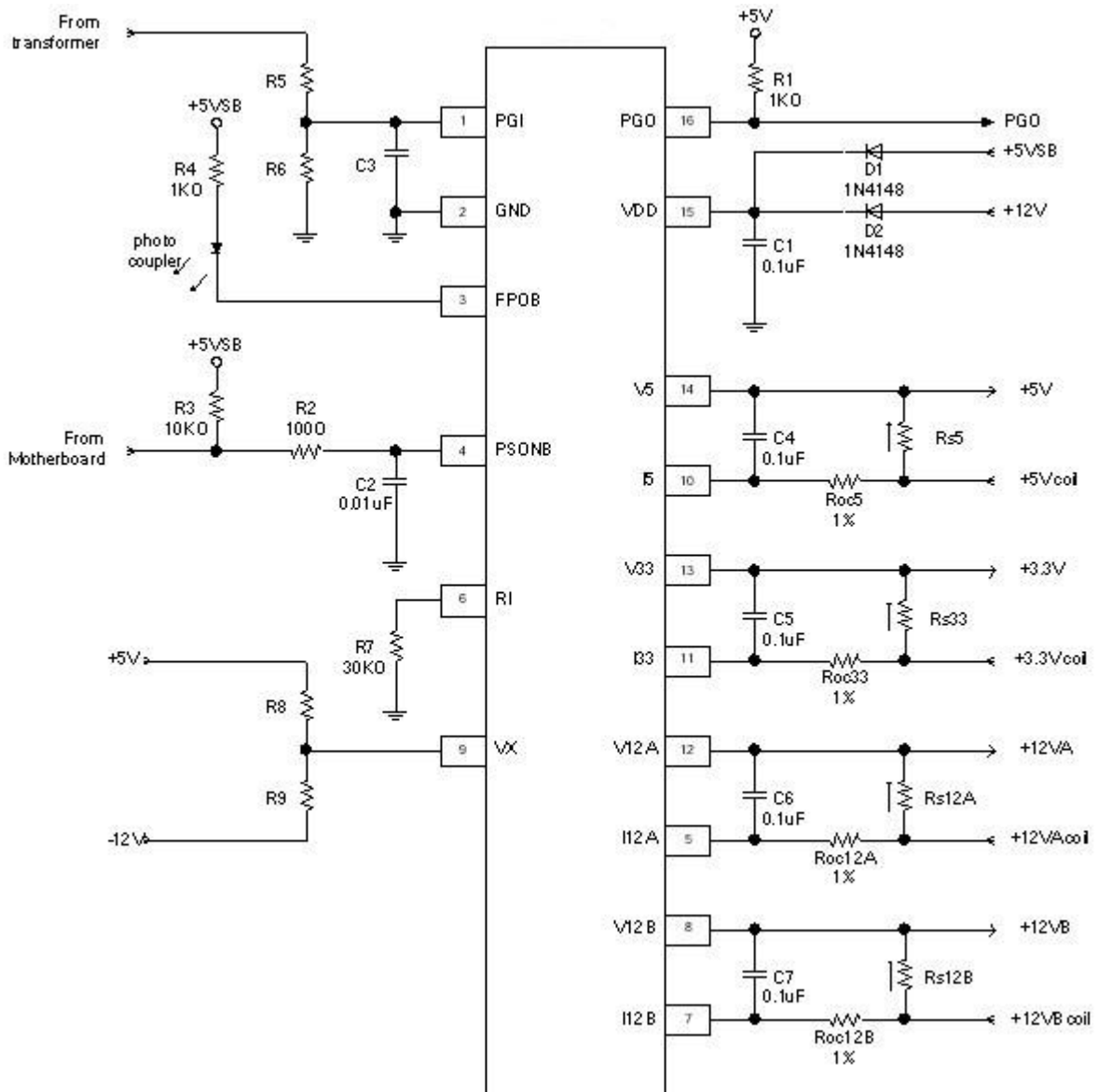
Pin Configuration (Top View)



Ordering Information

Order Number	Package Type	Packing	Top Marking	Note
EST.7627A	PDIP-16 (Pb-free)	Tube	EST.7627A	Green Package
EST.7627AS	SOP-16 (Pb-free)	Tube	EST.7627AS	Green Package
EST.7627ASR	SOP-16 (Pb-free)	Tape & Reel	EST.7627AS	Green Package

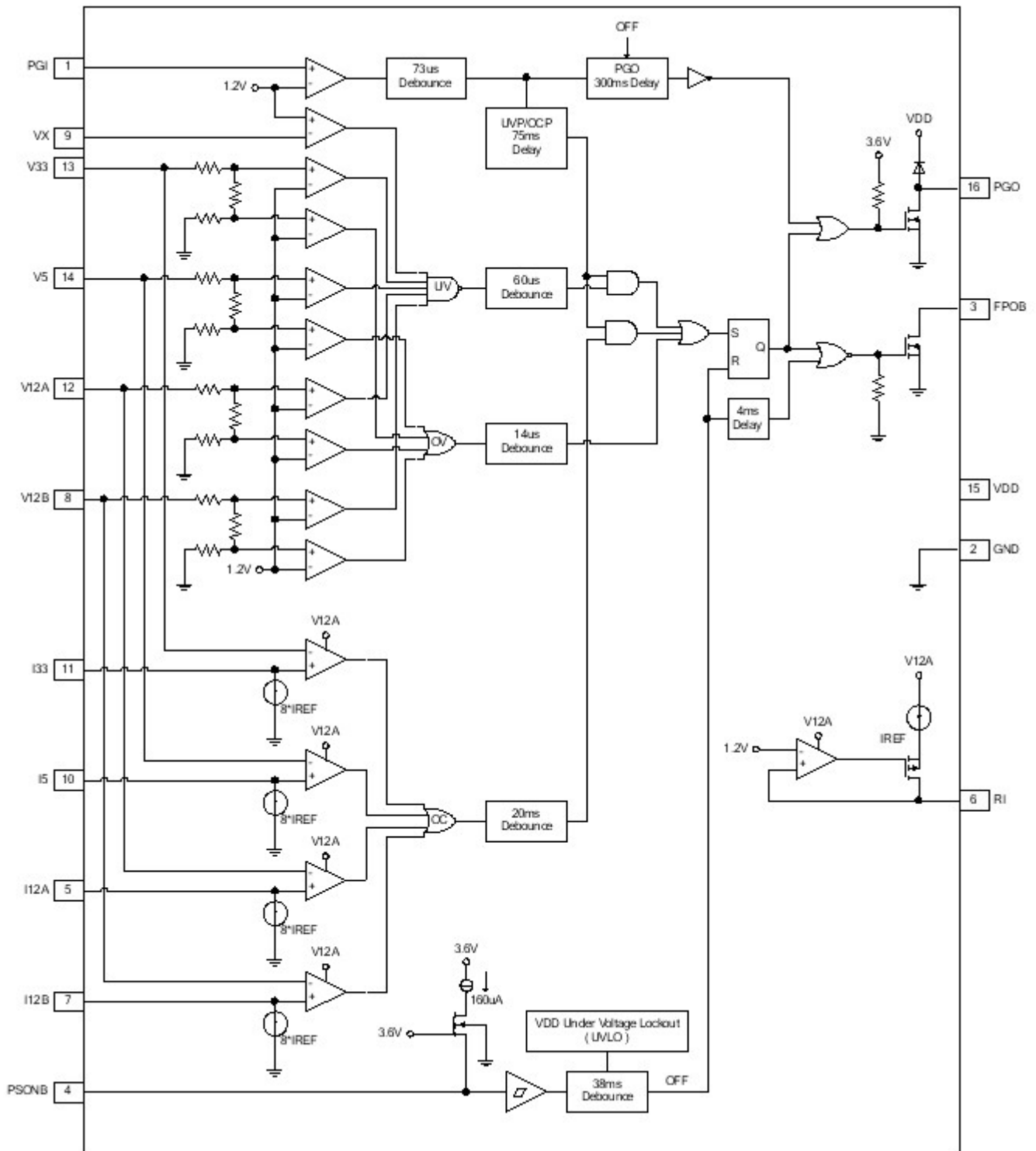
Typical Application Circuit



Pin Description

Pin Number	Pin Name	Function
1	PGI	AC power good input pin.
2	GND	Ground.
3	FPOB	Open drain output of the fault protection.
4	PSONB	ON/OFF control input pin.
5	I12A	+12VA over current protection sense input.
6	RI	Current sense adjustment input.
7	I12B	+12VB over current protection sense input.
8	V12B	+12VB input pin for OVP, UVP and OCP.
9	VX	Extra protection sense pin.
10	I5	+5V over current protection sense input.
11	I33	+3.3V over current protection sense input.
12	V12A	+12VA input pin for OVP, UVP and OCP.
13	V33	+3.3V input pin for OVP, UVP and OCP.
14	V5	+5V input pin for OVP, UVP and OCP.
15	VDD	Power supply.
16	PGO	Open drain output of power good signal.

Block Diagram



Absolute Maximum Ratings

Stresses above those listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Parameter	Symbol	Min.	Max.	Units
Supply Voltage	V _{DD} , V12A	-0.3	16	V
Supply Voltage Rising Time	V _{DD}	1	-	ms
Input Voltage	PGI, PSONB, V5, V33, VX	-0.3	7	V
	V12B	-0.3	16	V
	I5, I33, RI	-0.3	V12A + 0.3 (Max. 16V)	V
	I12A, I12B	-0.3	V12A + 0.6 (Max. 16V)	V
Output Voltage	FPOB	-0.3	16	V
	PGO	-0.3	V _{DD} + 0.3 (Max. 16V)	V
Operating Temperature Range		-40	85	°C
Storage Temperature Range		-65	150	°C
Soldering Temperature		-	260	°C

Electrical Characteristics (T_A=25°C, V_{DD} = 5V, unless otherwise noted.)

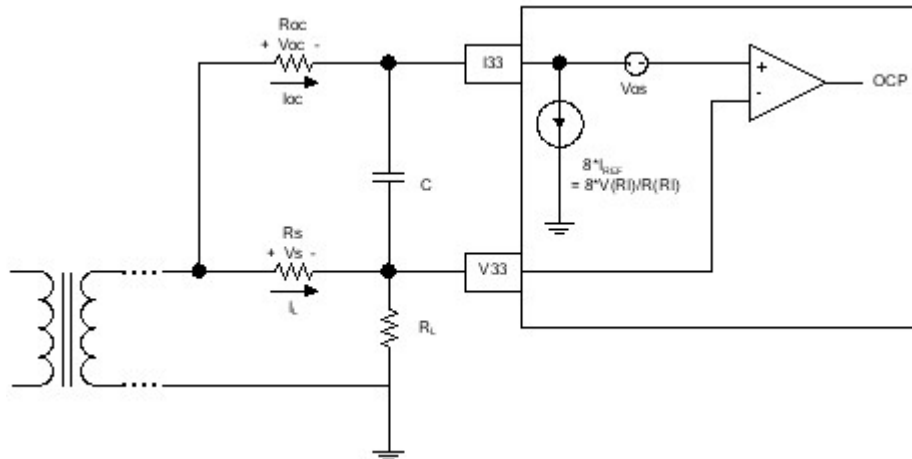
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
VDD Power Supply						
VDD Operating Voltage	V _{DD}		4	5	15	V
IDD Supply Current	I _{DD}	PSONB=5V	-	0.5	1	mA
VDD Start-up Voltage			-	3.4	3.6	V
VDD Under Voltage Lockout after Start-up			2.8	3.0	-	V
Over Voltage and Under Voltage Detection						
PGI Threshold Voltage	PGI		1.16	1.20	1.24	V
Over Voltage Threshold	V33		3.9	4.0	4.1	V
	V5		5.8	6.0	6.2	V
	V12A, V12B		13.5	13.85	14.2	V
	VX	Use UVP timing	1.16	1.20	1.24	V
Under Voltage Threshold	V33		2.65	2.8	2.95	V
	V5		4.1	4.3	4.47	V
	V12A, V12B		9.18	9.5	9.82	V
Temperature Coefficient of Voltage	TCV1		-0.02	-	0.02	%/°C
Over Current Protection (OCP)						
Input Offset Voltage of OCP Comparators	V _{os}		-3	0	3	mV
Output Voltage of RI pin	RI		1.16	1.20	1.24	V
Ratio of Pull-down Current to RI pin Sink Current	K		7.5	8	8.5	
Pull-down Current	I33, I5, I12A, I12B	RI=30KΩ	290	320	350	μA

Electrical Characteristics ($T_A=25^\circ\text{C}$, $V_{DD} = 5\text{V}$, unless otherwise noted.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output						
Low Level Output Voltage	$V_{OL (FPOB)}$	$I_{SINK}=20\text{mA}$	-	-	0.4	V
	$V_{OL (PGO)}$	$I_{SINK}=20\text{mA}$	-	-	0.4	V
Leakage Current of FPOB and PGO	I_{LKG}		-1	0	1	μA
PSOVB Control						
High Level Input Voltage	V_{IH}		1.8	1.55	-	V
Low Level Input Voltage	V_{IL}		-	1.25	1.0	V
Pull-up Current			60	160	260	μA
Timing						
PSOVB Debounce Time	t_{db1}		24	38	52	mS
OVP Debounce Time	t_{db2}		20	14	50	μS
UVP/VX Debounce Time	t_{db3}		47	60	100	μS
OCP Debounce Time	t_{db4}		15	20	25	mS
PGI Debounce Time	t_{db5}		47	73	100	μS
PGO Delay Time	t_{delay1}		200	300	400	mS
FPOB Turn-off Time (PGO to FPOB)	t_{delay2}		2	4	6	mS
UVP/OCP/VX Enable Delay Time	$t_{delay3-1}$	PGI < 1.2V typ.	Disable UVP/OCP check			
	$t_{delay3-2}$	PGI > 1.2V typ.	49	75	100	mS

Application Hints

Over Current Protection (OCP)



The Over-Current Protection (OCP) monitors V33&I33, V5&I5, V12A&I12A and V12B&I12B. When an over-current condition appears more than 20ms, the FPOB output goes high latch. Also, this fault condition will be latched until PSONB is toggled from low to high or VDD is removed.

The resistor of RI pin connected to ground will provide a precise current IREF for the OCP operation. The input offset voltage Vos of OCP comparators are typical 0mV. We suggest that the OCP sense voltage Vs is large than 100mV. And the capacitor C is used to avoid power on fail or dynamic load fail. We suggest C > 0.1uF.

As shown in above, the over current of IL is determined by Rs, Roc and Ioc.

$$I_{REF} = \frac{V(RI)}{R(RI)} \quad \dots\dots\dots(1)$$

$$I_{L_ocp} \times R_s = (I_{oc} \times R_{oc}) + V_{os}$$

$$\Rightarrow R_{oc} = \frac{[(I_{L_ocp} \times R_s) - V_{os}]}{8 \times I_{REF}} \quad \dots\dots\dots(2)$$

Following is an example on calculating Roc.

Let $I_{L_ocp}=20A$, $R_s=5m\Omega$, $V(RI)=1.2V$, $R(RI)=30K\Omega$, $V_{os}=0mv$

$$I_{REF} = \frac{V(RI)}{R(RI)} = \frac{1.2}{30K\Omega} = 40\mu A$$

$$R_{oc} = \frac{[(I_{L_ocp} \times R_s) - V_{os}]}{8 \times I_{REF}} = \frac{20A \times 5m\Omega - 0mv}{8 \times 40\mu A} = 312.5\Omega$$

The tolerance of parameter K, V(RI), R(RI), Roc and Rs would be proportioned to the tolerance of OCP current.

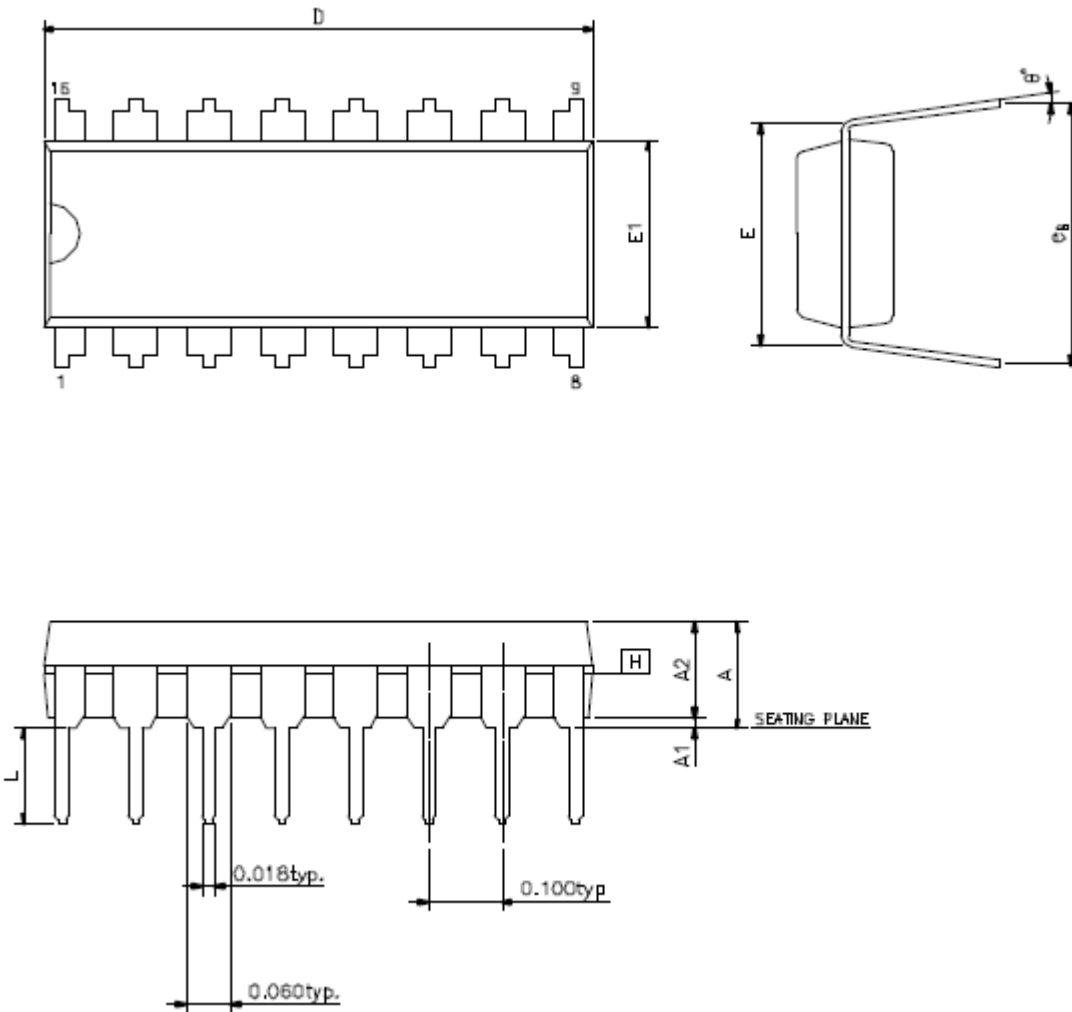
The ratio of $\frac{V_{os}}{(I_{L_ocp} \times R_s)}$ would be proportioned to the tolerance of OCP current.

Let $V_{os}=\pm 3mv$, $I_{L_ocp}=20A$, $R_s=5m\Omega$, then the tolerance of OCP current is $\pm 3mv / 100mv = \pm 3\%$

Package Outlines

Package Dimensions
PDIP-16 (300mil)

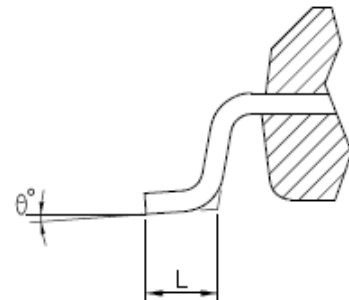
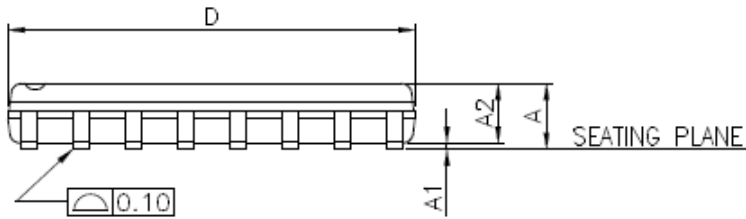
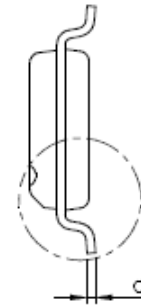
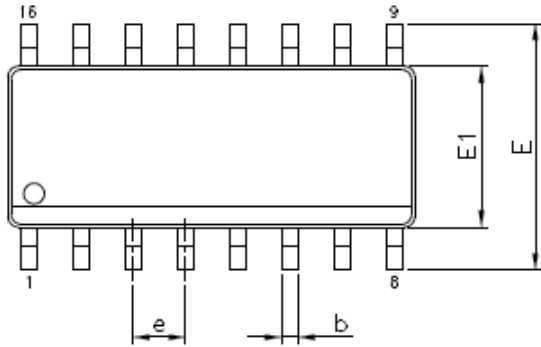
Plastic Dual In-line Package
UNIT : inch / mm



Symbols	Dimensions in inches			Dimensions in millimeters		
	MIN.	NOR.	MAX.	MIN.	NOR.	MAX.
A	---	---	0.215	---	---	5.461
A1	0.010	---	---	0.254	---	---
A2	0.120	0.133	0.145	3.048	3.378	3.683
D	0.730	0.755	0.780	18.542	19.177	19.812
E	0.300 BSC			7.620 BSC		
E1	0.240	0.253	0.265	6.096	6.426	6.731
L	0.110	0.133	0.155	2.794	3.378	3.937
eB	0.300	0.350	0.430	7.620	8.890	10.922
θ	0°	7°	15°	0°	7°	15°

Package Dimensions
SOP-16 (Standard)

Small Outline Package
UNIT : inch / mm



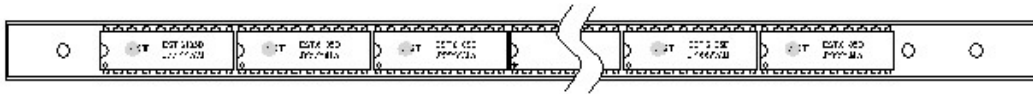
Symbols	Dimensions In inch		Dimensions In millimeters	
	Min.	Max.	Min.	Max.
A	-----	0.072	-----	1.837
A1	0.004	0.010	0.095	0.263
A2	0.047	-----	1.187	-----
b	0.012	0.021	0.294	0.535
c	0.004	0.010	0.095	0.263
D	0.390 BSC		9.900 BSC	
E	0.236 BSC		6.000 BSC	
E1	0.154 BSC		3.900 BSC	
e	0.050 BSC		1.270 BSC	
L	0.015	0.052	0.380	1.333
θ	0°	8°	0°	8°

Packing Information :

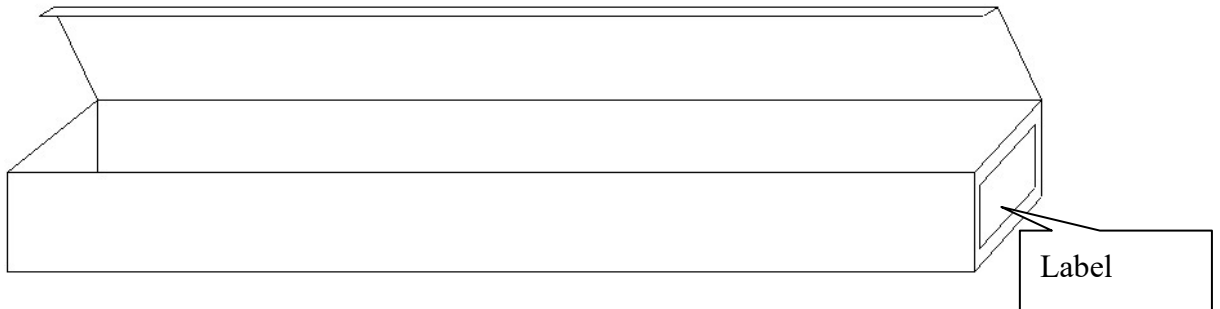
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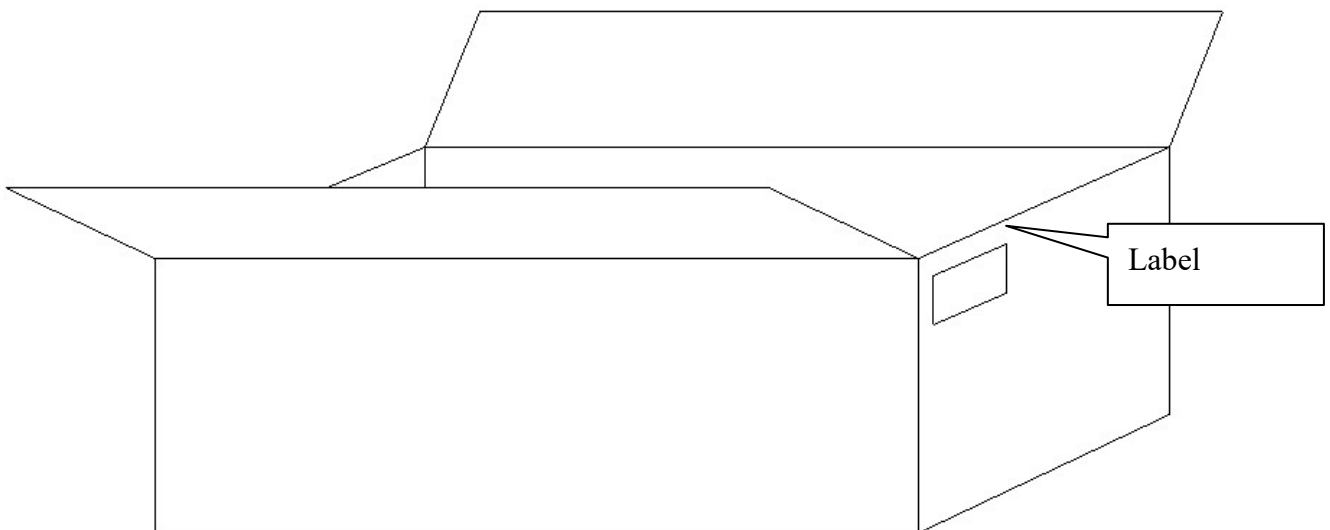
↓ 25Pcs / Tube



↓ 40Tube / Inner Box
(1,000Pcs / Inner Box)



↓ 10 Inner Boxes / Carton
(10,000Pcs / Carton)



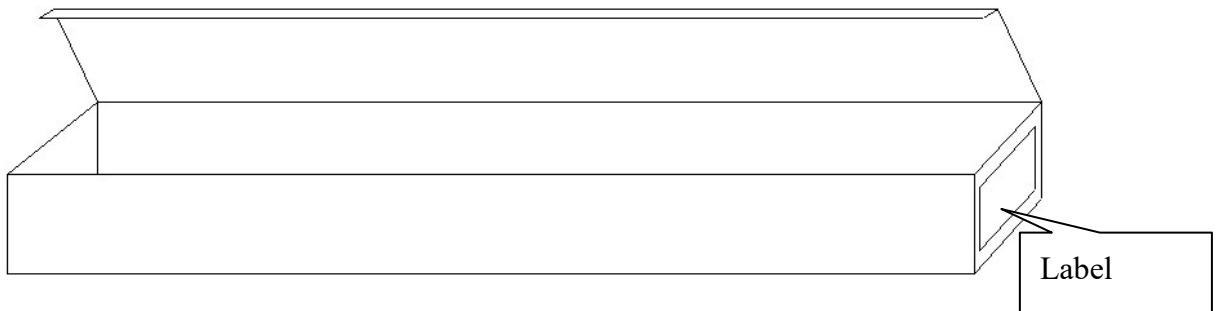
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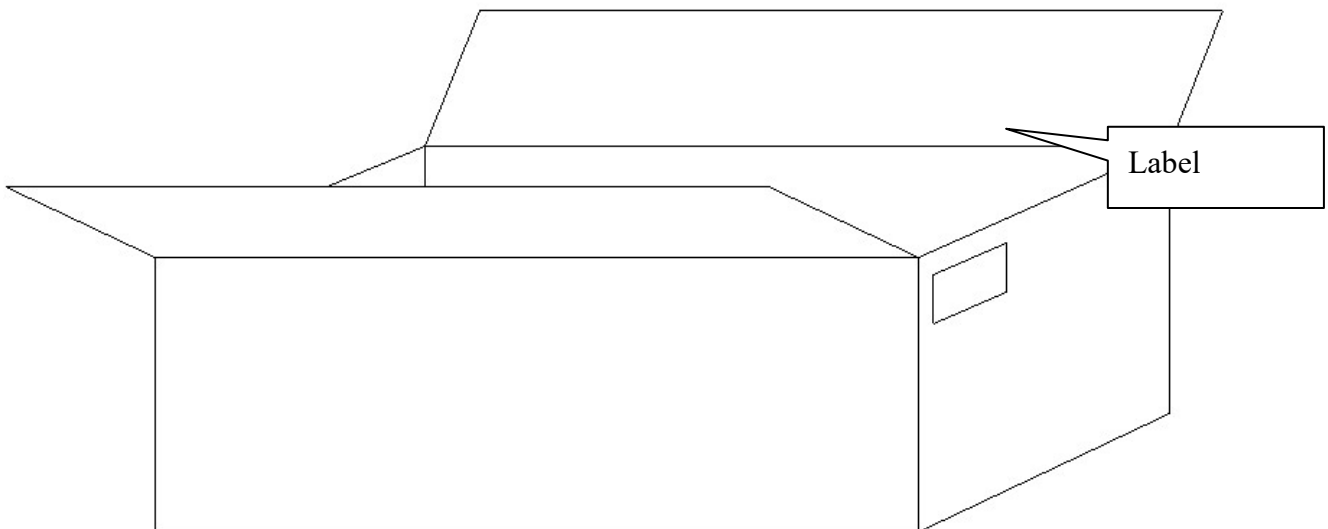
↓ 25Pcs / Tube



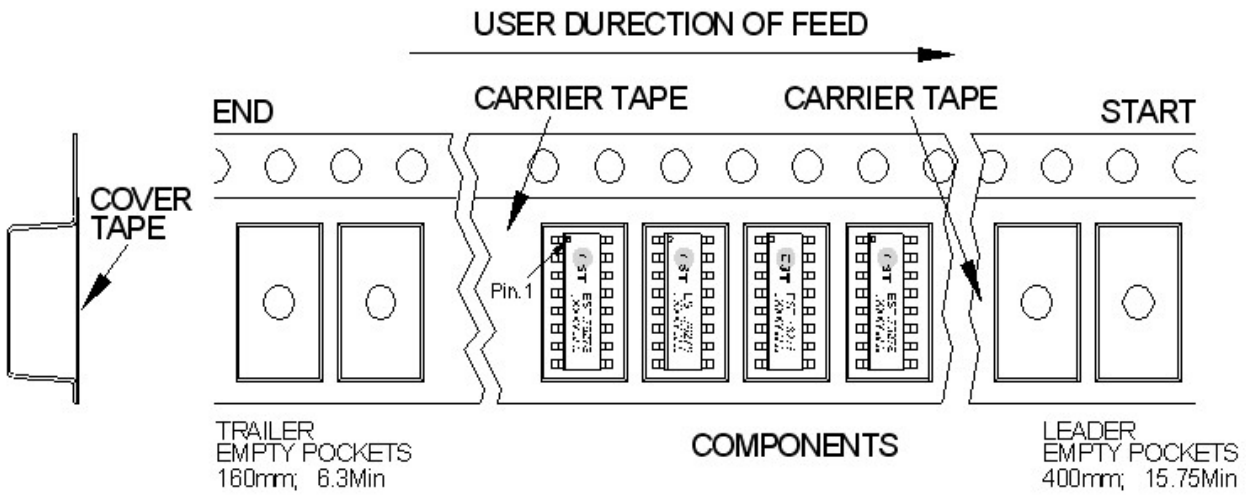
↓ 40Tube / Inner Box
(1,000Pcs / Inner Box)



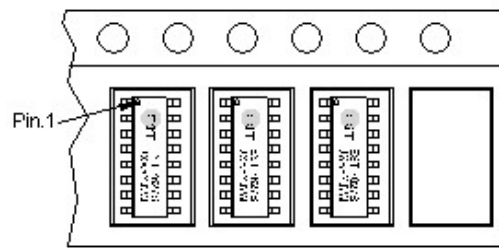
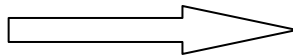
↓ 10 Inner Boxes / Carton
(10,000Pcs / Carton)



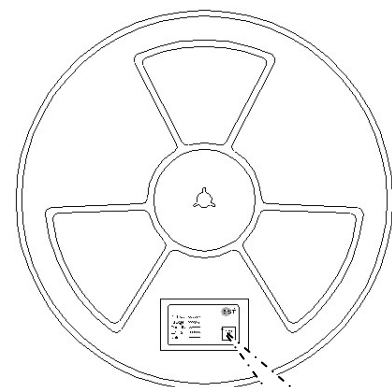
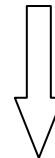
★SOP-16 tape & Reel:



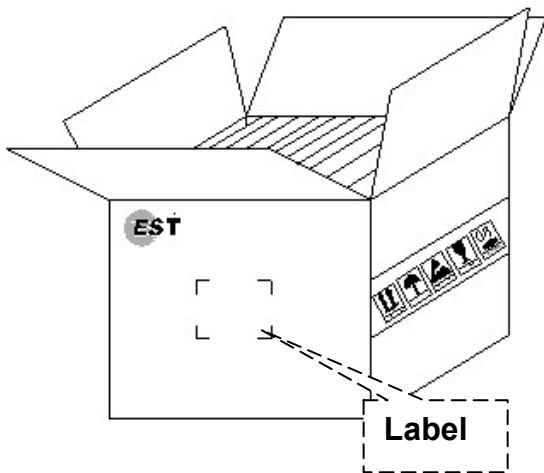
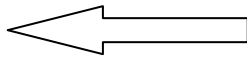
1Pc / device



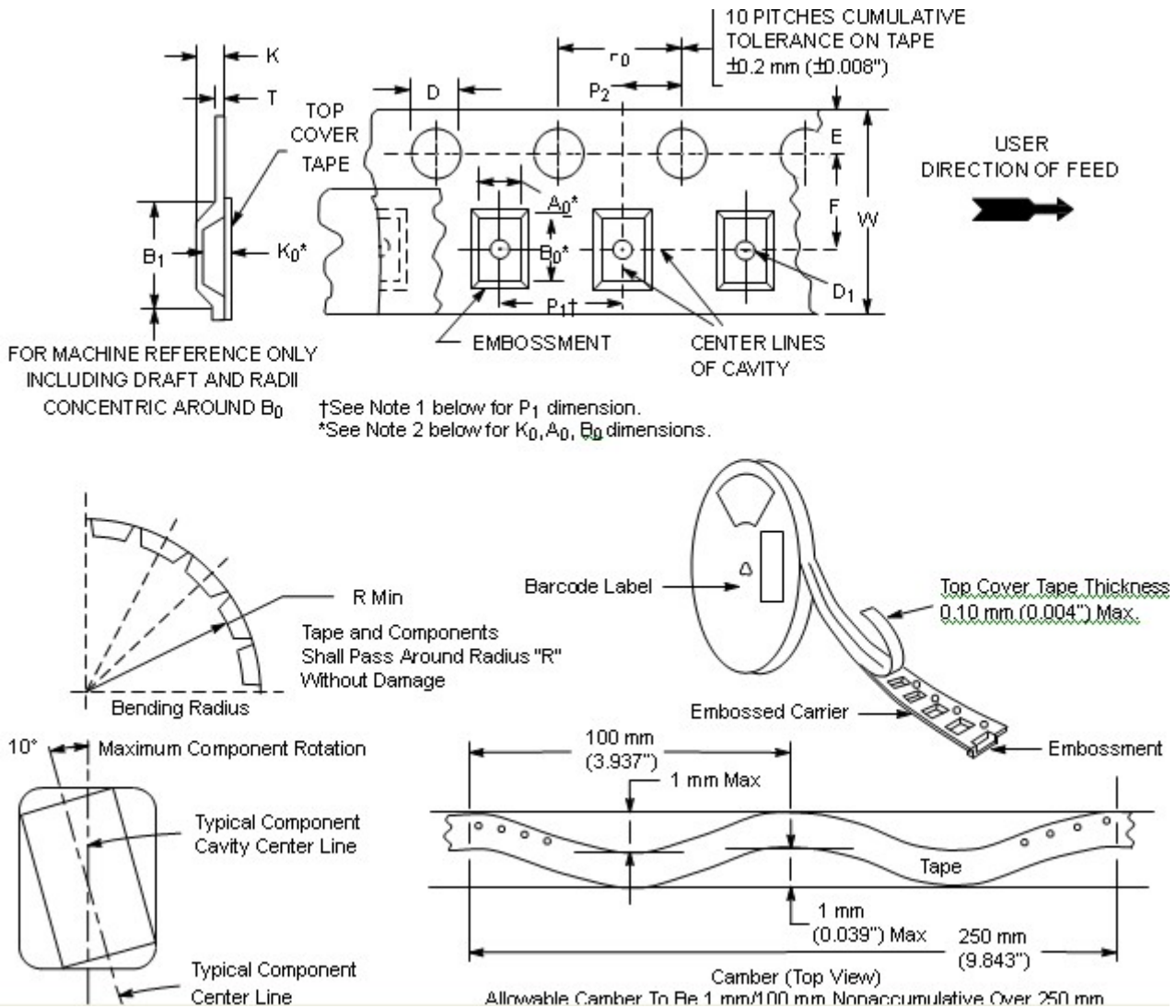
2,500 devices / Reel



12 Reel / Carton
(30,000Pcs / Carton)



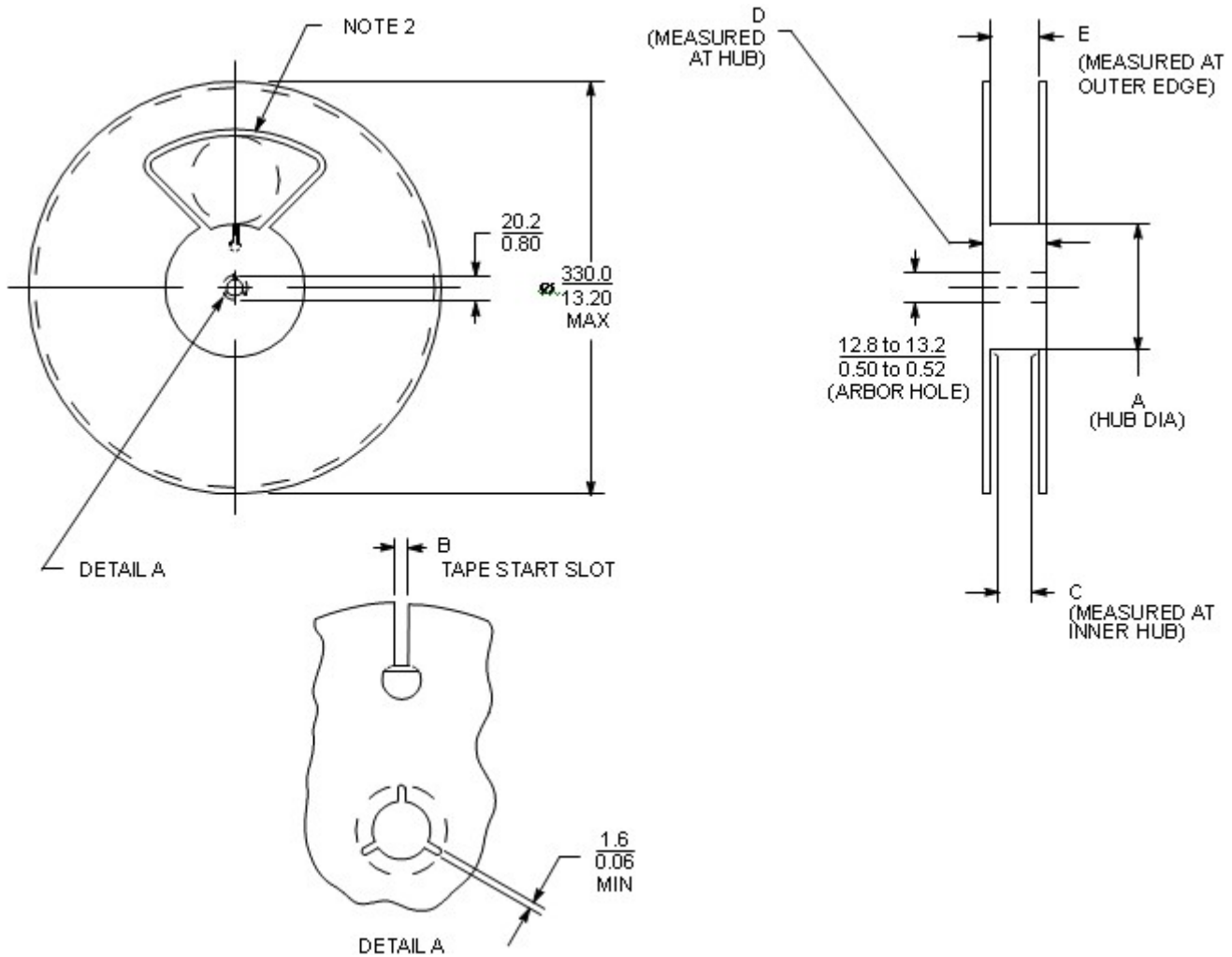
Embossed Tape and Reel Data Carrier Tape Specifications



DIMENSIONS

Tape	B ₁ Max (Note 1)	D	D ₁	E	F	K	P ₀	P ₂	R Min	T Max	W Max
8 mm	4.55 mm (0.1793)	1.5 ± 0.1 mm - 0.0 (0.059 +0.0043 - 0.0)	1.0 Min (0.0393) or 0.5 mm Min (0.0203)	1.75 ± 0.1 mm (0.069 ± 0.0043)	3.5 ± 0.05 mm (0.138 ± 0.0023)	2.4 mm Max (0.0943)	4.0 ± 0.1 mm (0.157 ± 0.0043)	2.0 ± 0.1 mm (0.079 ± 0.0023)	25 mm (0.983)	0.6 mm (0.0243)	8.3 mm (0.3273)
12 mm	8.2 mm (0.3233)		1.5 mm Min (0.0603)		5.5 ± 0.05 mm (0.217 ± 0.0023)	6.4 mm Max (0.2523)			30 mm (1.183)		12 ± 0.30 mm (0.470 ± 0.0123)
16 mm	12.1 mm (0.476")				7.5 ± 0.10 mm (0.295 ± 0.0043)	7.9 mm Max (0.3113)					16.3 mm (0.6423)
24 mm	20.1 mm (0.791)				11.5 ± 0.1 mm (0.453 ± 0.0043)	11.9 mm Max (0.4683)					24.3 mm (0.9573)

Reel Dimensions



Reel	Tape	A		B		C		D	E
		Min	Max	Min	Max	Min	Max		
178.0 (7.01)	16.0 (0.63)		50.0 (1.97)	6.5 (0.26)	7.5 (0.30)	16.4 (0.65)	18.4 (0.72)	22.4 (0.88)	19.4 (0.76)
330.0 (12.99)	12.0 (0.47)	178.0 (7.01)		4.5 (0.18)	5.5 (0.22)	12.4 (0.49)	14.4 (0.57)	18.4 (0.72)	15.4 (0.61)
330.0 (12.99)	56.0 (2.20)	150.0 (5.91)		10.0 (0.39)	11.0 (0.43)	56.4 (2.22)	58.4 (2.30)	62.4 (2.46)	59.4 (2.34)
330.0 (12.99)	44.0 (1.73)	100.0 (3.94)		10.0 (0.39)	11.0 (0.43)	44.4 (1.75)	46.4 (1.83)	62.4 (2.46)	47.4 (1.87)
330.0 (12.99)	32.0 (1.26)	100.0 (3.94)		10.0 (0.39)	11.0 (0.43)	32.4 (1.28)	34.4 (1.35)	38.4 (1.51)	35.4 (1.39)
330.0 (12.99)	24.0 (0.94)	60.0 (2.36)		9.5 (0.37)	10.5 (0.41)	24.4 (0.96)	26.4 (1.04)	30.4 (1.51)	27.4 (1.08)
330.0 (12.99)	16.0 (0.63)			6.5 (0.26)	7.5 (0.30)	16.4 (0.65)	18.4 (0.72)	22.4 (0.88)	19.4 (0.76)
330.0 (12.99)	12.0 (0.47)			4.5 (0.18)	5.5 (0.22)	12.4 (0.49)	14.4 (0.57)	18.4 (0.72)	15.4 (0.61)
330.0 (12.99)	8.0 (0.31)	50.0 (1.97)		2.5 (0.10)	3.5 (0.14)	8.4 (0.33)	9.9 (0.39)	14.4 (0.57)	10.9 (0.43)
178.0 (7.01)	12.0 (0.47)	50.0 (1.97)		4.5 (0.18)	5.5 (0.22)	12.4 (0.49)	14.4 (0.57)	18.4 (0.72)	15.4 (0.61)
178.0 (7.00)	8.0 (0.31)	50.0 (1.97)		2.5 (0.10)	3.5 (0.14)	8.4 (0.33)	9.9 (0.39)	14.4 (0.47)	10.9 (0.43)
330.0 (12.99)	8.0 (0.31)	50.0 (1.97)		4.0 (0.16)	5.0 (0.20)	8.4 (0.33)	9.9 (0.39)	14.4 (0.57)	10.9 (0.43)
178.0 (7.00)	8.0 (0.31)	50.0 (1.97)		4.0 (0.16)	5.0 (0.20)	8.4 (0.33)	9.9 (0.39)	14.4 (0.57)	10.9 (0.43)