

Description

The RSTP40PT15D uses **Super Trench** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

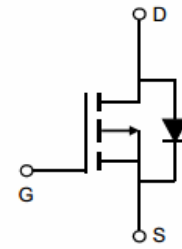
General Features

- $V_{DS} = -40V, I_D = -150A$
 $R_{DS(ON)} = 2.8m\Omega$ (typical) @ $V_{GS} = -10V$
 $R_{DS(ON)} = 3.8m\Omega$ (typical) @ $V_{GS} = -4.5V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating
- 100% UIS tested

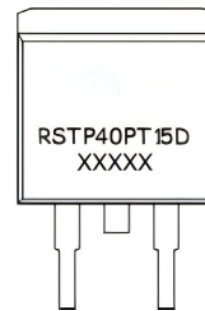
Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

100% UIS TESTED!
100% ΔV_{ds} TESTED!



Schematic Diagram



Marking and pin assignment



TO-263-2L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
RSTP40PT15D	RSTP40PT15D	TO-263-2L	-	-	-

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-150	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D (100^\circ C)$	-120	A
Pulsed Drain Current	I_{DM}	-600	A
Maximum Power Dissipation	P_D	250	W
Derating factor		1.67	W/ $^\circ C$
Single pulse avalanche energy ^(Note 5)	E_{AS}	1345	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

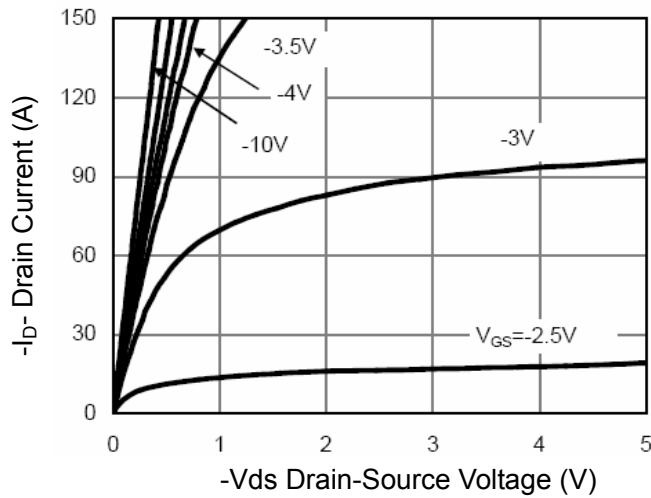
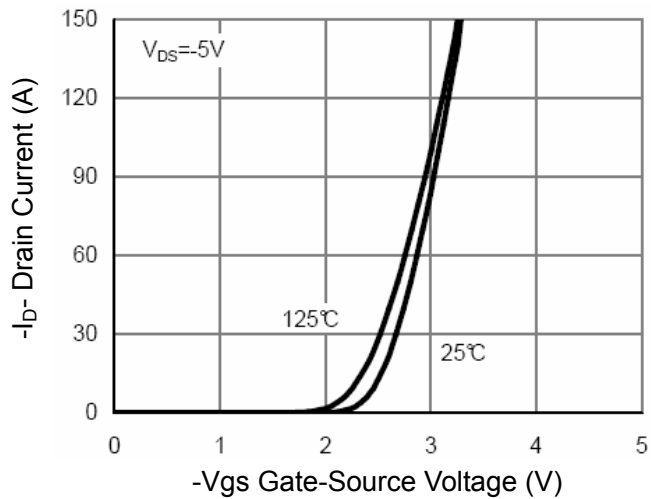
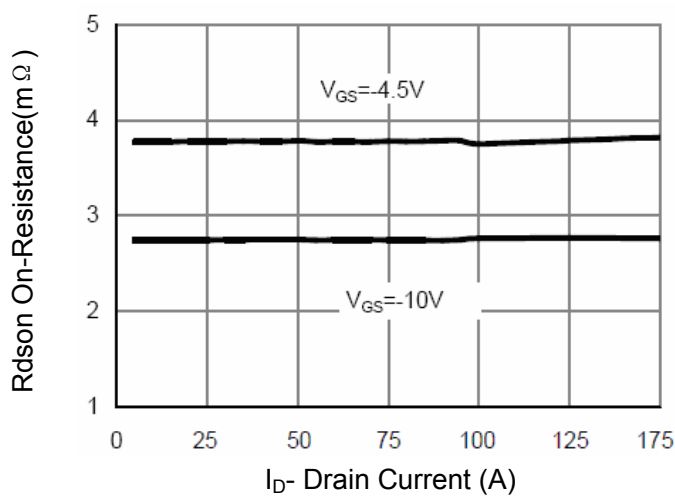
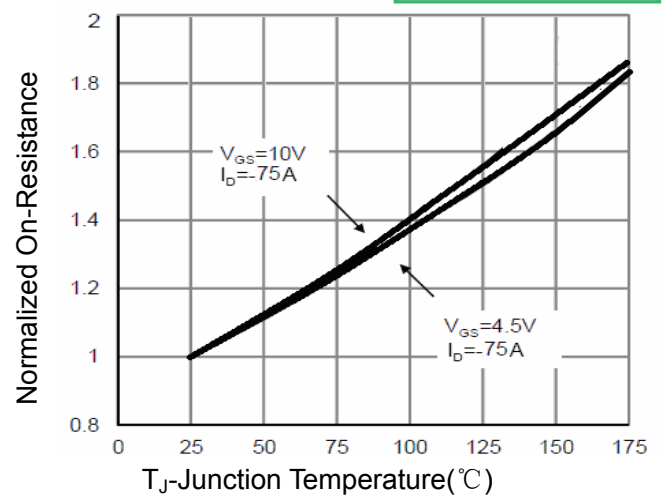
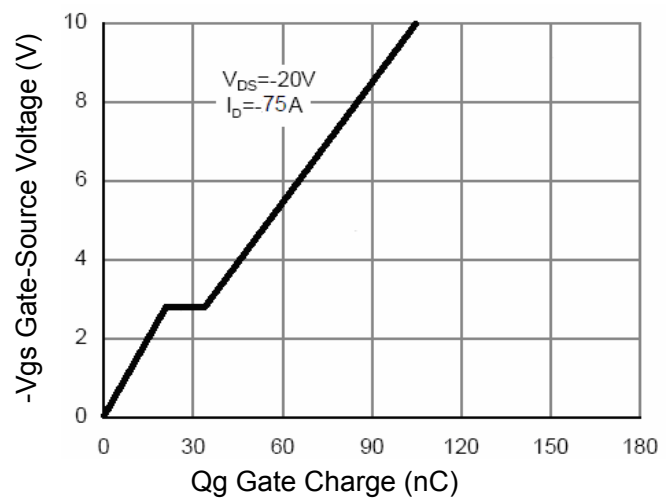
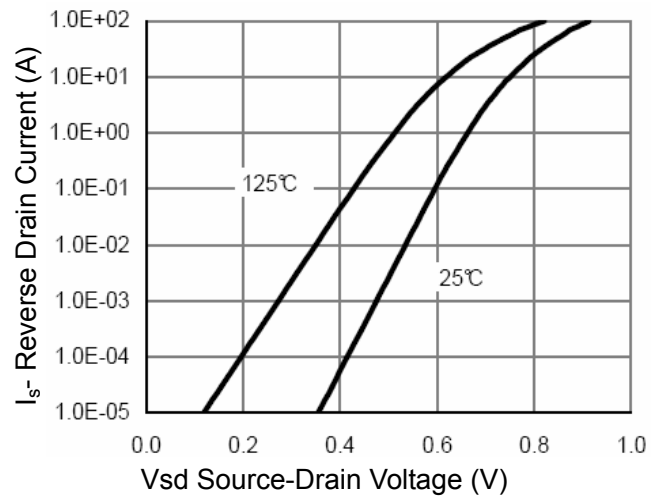
Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	0.6	$^{\circ}\text{C/W}$
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Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =-250μA	-40		-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-40V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-0.8	-1.2	-1.8	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-75A	-	2.8	3.4	mΩ
		V _{GS} =-4.5V, I _D =-75A	-	3.8	4.6	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-75A	-	30	-	S
Dynamic Characteristics ^(Note4)						
Input Capacitance	C _{iss}	V _{DS} =-20V, V _{GS} =0V, F=1.0MHz	-	8940	-	PF
Output Capacitance	C _{oss}		-	1900	-	PF
Reverse Transfer Capacitance	C _{rss}		-	45	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-20V, I _D =-75A V _{GS} =-10V, R _G =1.6Ω	-	18	-	nS
Turn-on Rise Time	t _r		-	13	-	nS
Turn-Off Delay Time	t _{d(off)}		-	90	-	nS
Turn-Off Fall Time	t _f		-	15	-	nS
Total Gate Charge	Q _g	V _{DS} =-20V, I _D =-75A, V _{GS} =-10V	-	104.4	-	nC
Gate-Source Charge	Q _{gs}		-	20.8		nC
Gate-Drain Charge	Q _{gd}		-	13.5		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V, I _S =-75A	-		-1.2	V
Diode Forward Current ^(Note 2)	I _S		-	-	-150	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F =-75A	-		35	nS
Reverse Recovery Charge	Q _{rr}	di/dt = 100A/μs ^(Note3)	-		85	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition : $T_J=25^{\circ}\text{C}, V_{DD}=-20V, V_G=-10V, L=0.5\text{mH}, R_g=25\Omega$

Pb Free Product
Typical Electrical and Thermal Characteristics

Figure 1 Output Characteristics

Figure 2 Transfer Characteristics

Figure 3 Rdson- Drain Current

Figure 4 Rdson-Junction Temperature

Figure 5 Gate Charge

Figure 6 Source- Drain Diode Forward

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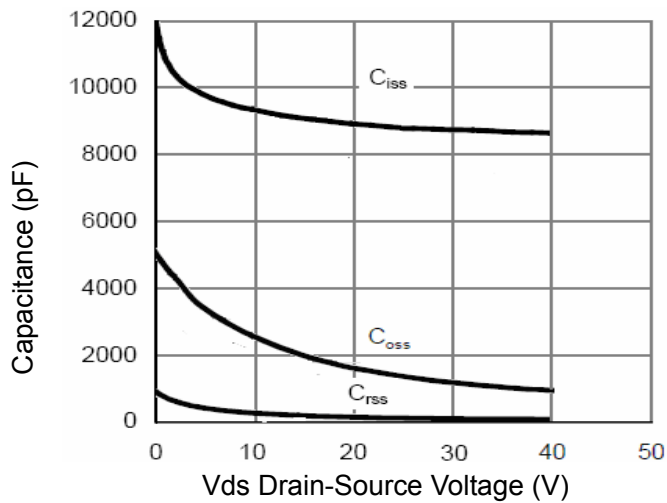


Figure 7 Capacitance vs Vds

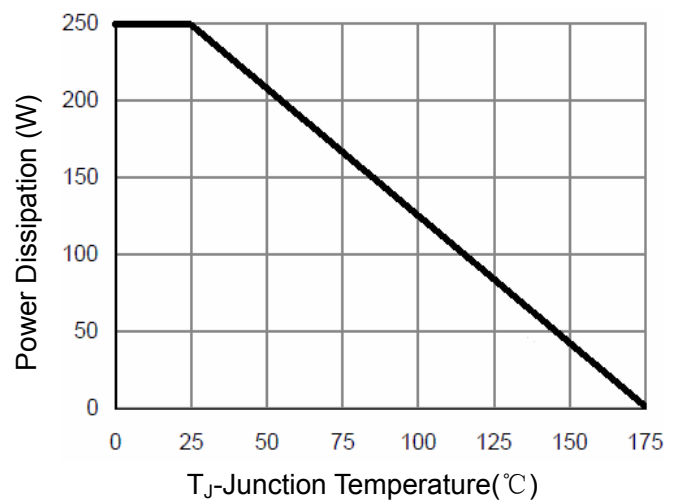


Figure 9 Power De-rating

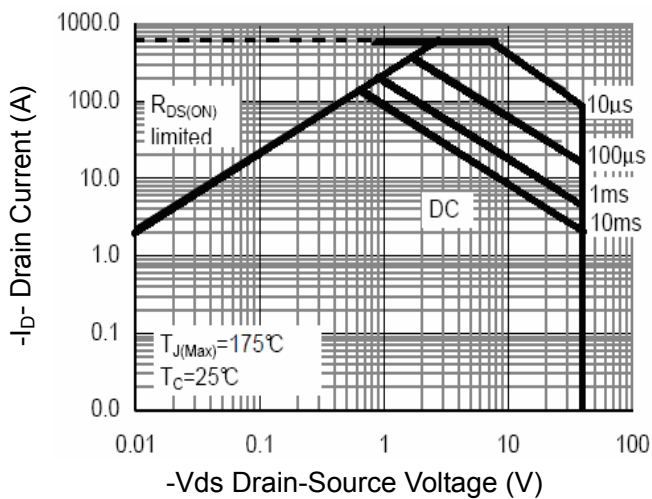


Figure 8 Safe Operation Area

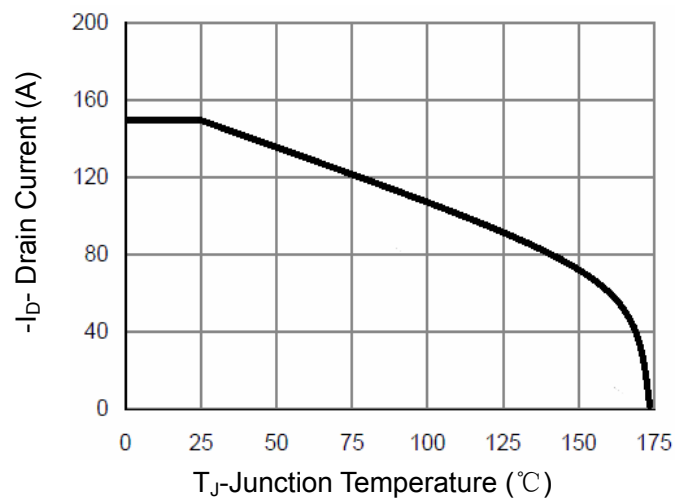


Figure 10 Current De-rating

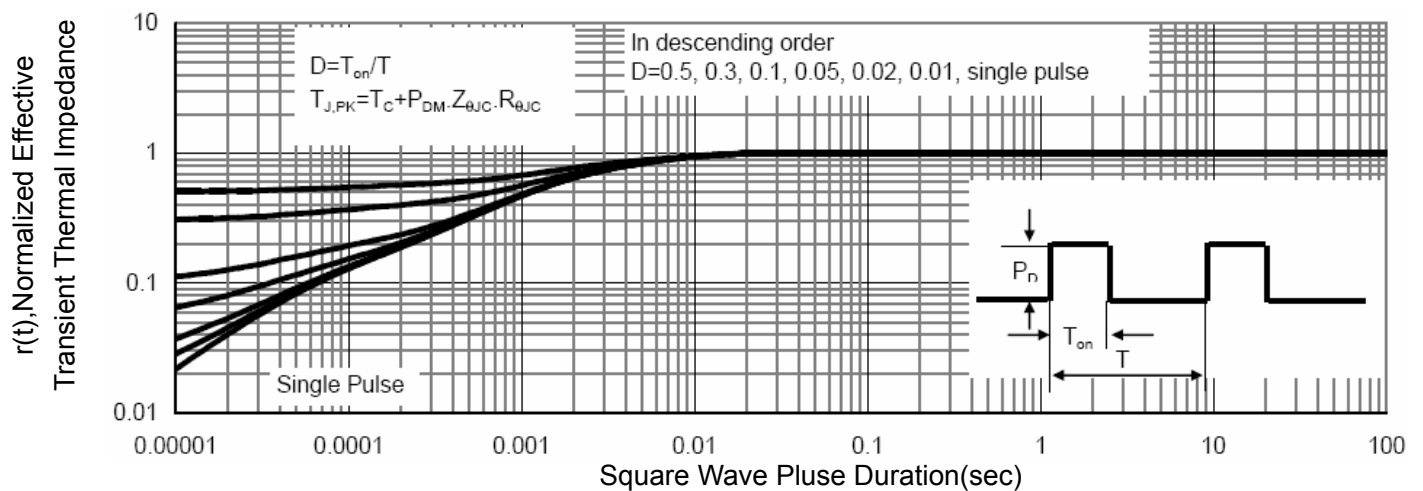
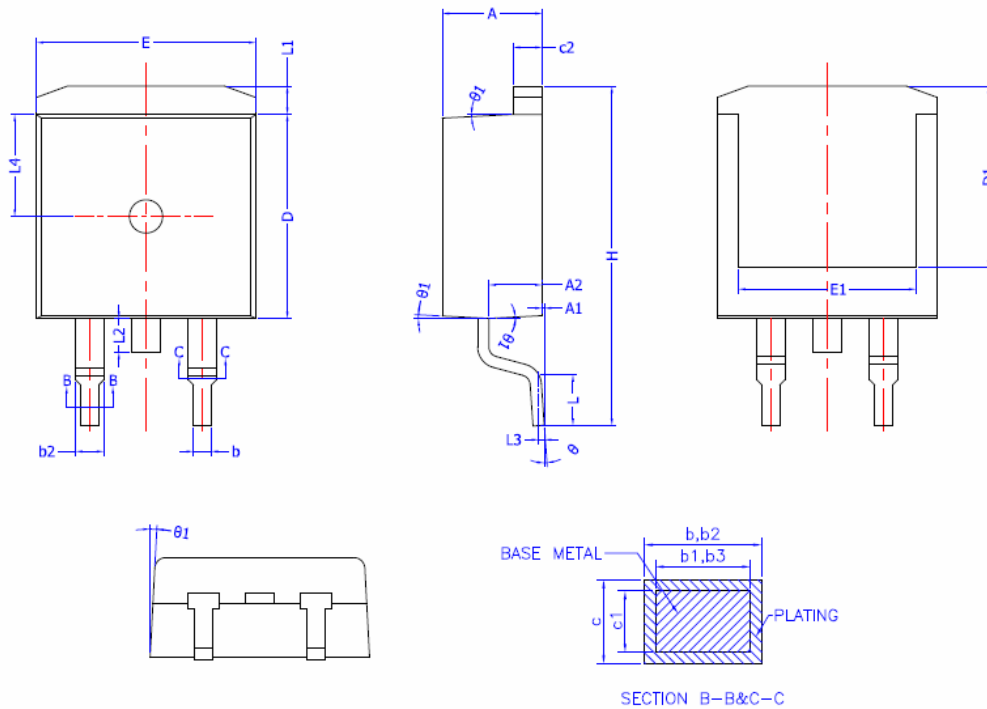


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-263-2L Package Information

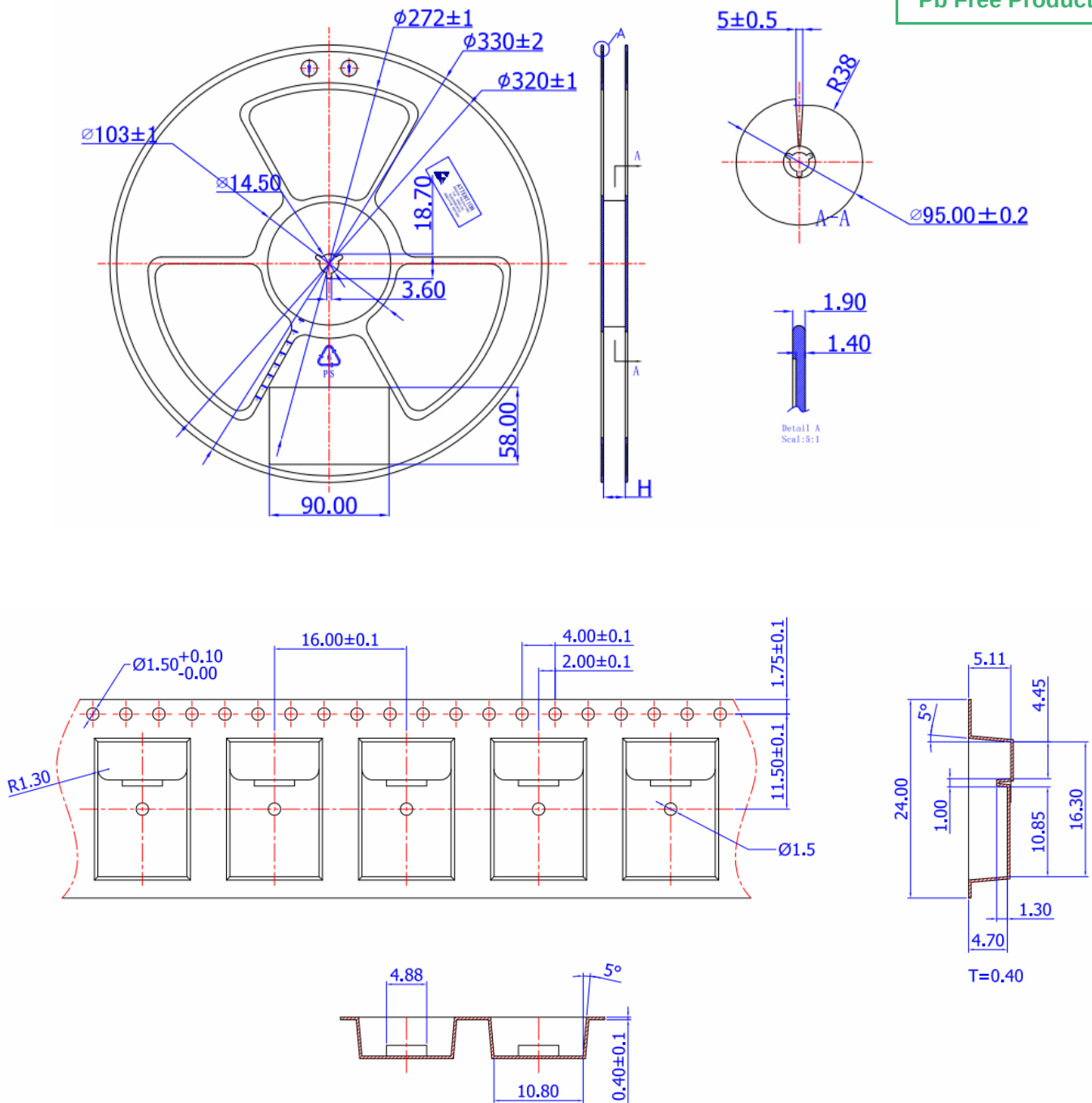
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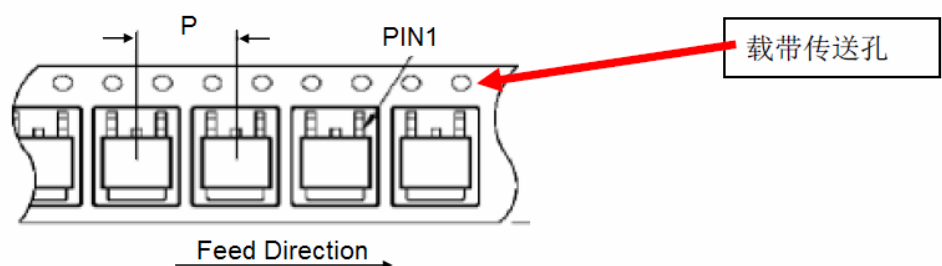
COMMON DIMENSIONS (UNITS OF MEASURE =MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	0	0.10	0.25
A2	2.20	2.40	2.60
b	0.76	—	0.89
b1	0.75	0.80	0.85
b2	1.23	—	1.37
b3	1.22	1.27	1.32
c	0.47	—	0.60
c1	0.46	0.51	0.56
c2	1.25	1.30	1.35
D	9.10	9.20	9.30
D1	8.00	—	—
E	9.80	9.90	10.00
E1	7.80	—	—
e	2.54 BSC		
H	14.90	15.30	15.70
L	2.00	2.30	2.60
L1	1.17	1.27	1.40
L2	—	—	1.75
L3	0.25BSC		
L4	4.60 REF		
θ	0°	—	8°
θ1	1°	3°	5°

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注：产品编入卷盘中时，产品第一支脚(PIN 1)方向朝向载带传送孔。如下图所示。



焊盘

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