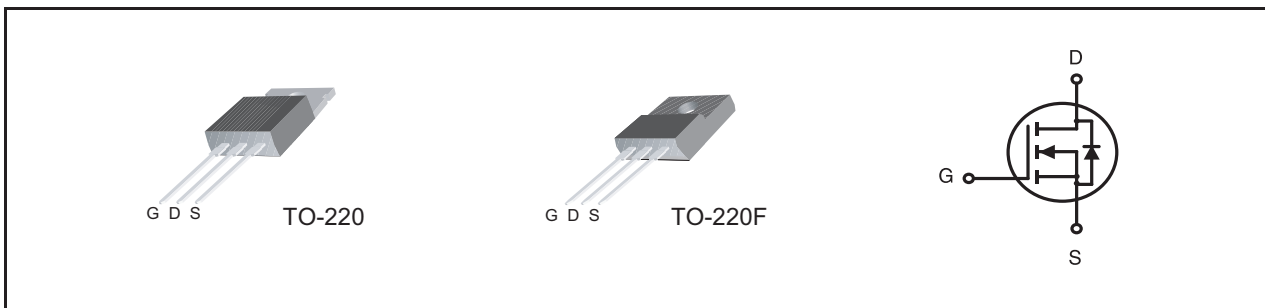


**500V N-Channel Planar MOSFET****PRODUCT SUMMARY**

V _{DSS}	I _D	R _{DS(ON)} (mΩ) Max
500V	13A	0.48 @ V _{GS} =10V, I _D =6.5A

FEATURES

- Fast Switching.
- 100% Avalanche Rated.

**ABSOLUTE MAXIMUM RATINGS (T_A=25°C unless otherwise noted)**

Symbol	Parameter	SDP13N50	SDF13N50	Units
V _{DSS}	Drain-Source Voltage	500		V
V _{GS}	Gate-Source Voltage	±30		V
I _D	Continuous Drain Current	T _C =25°C	13	13 *
		T _C =100°C	8	8 *
I _{DM}	Pulsed Drain Current, V _{GS} =10V ^a	52	52 *	A
E _{AS}	Single Pulse Avalanche Energy ^b	507		mJ
dv/dt	Peak Diode Recovery Energy ^c	4.5		V/ns
P _D	Power Dissipation	T _C =25°C	195	48
	Linear Derating Factor	T _C >25°C	1.56	0.39
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to 150		°C

* Drain current limited by maximum junction temperature

THERMAL CHARACTERISTICS

Symbol	Parameter	SDP13N50	SDF13N50	Units
R _{θJC}	Thermal Resistance, Junction-to-Case	1.8	3.5	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	62.5	62.5	°C/W

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ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	500			V
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I _D =250uA		0.5		V/°C
I _{DSS}	Drain-to-Source Leakage Current	V _{DS} =500V, V _{GS} =0V			20	uA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{DS} =0V, V _{GS} =30V			100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{DS} =0V, V _{GS} =-30V			-100	nA
ON CHARACTERISTICS						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	2.0		4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =6.5A ^d			0.48	ohm
g _{FS}	Forward Transconductance	V _{DS} =15V, I _D =6.5A ^d			20	S
DYNAMIC CHARACTERISTICS						
C _{ISS}	Input Capacitance	V _{DS} =25V, V _{GS} =0V f=1.0MHz		2224		pF
C _{OSS}	Output Capacitance			180		pF
C _{RSS}	Reverse Transfer Capacitance			17		pF
SWITCHING CHARACTERISTICS						
t _{D(on)}	Turn-On Delay Time	V _{DD} =250V I _D =13A R _G =10 ohm, R _D =19.2 ohm V _{GS} =10V ^d		17.1		ns
t _r	Turn-On Rise Time			32.3		ns
t _{D(off)}	Turn-Off Delay Time			46.5		ns
t _f	Turn-Off Fall Time			27.9		ns
Q _g	Total Gate Charge	V _{DS} =250V, I _D =13A, V _{GS} =10V ^d		40.2		nC
Q _{gs}	Gate-Source Charge			10.2		nC
Q _{gd}	Gate-Drain("Miller") Charge			15.1		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
I _S	Maximum Continuous Source Current(Body Diode)				13	A
I _{SM}	Maximum Pulsed Source Current(Body Diode)				52	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} =0V, I _S =6.5A ^d			1.5	V
Notes :						
a. Repetitive Rating : Pulse width limited by maximum junction temperature.						
b. V _{DD} =50V, starting T _J =25°C, L=6mH, R _G =25Ω, I _{AS} =13A						
c. I _{SD} ≤ 13A, di/dt ≤ 100A/us, V _{DD} ≤ V _{(BR)DSS} , T _J ≤ 150°C						
d. Pulse Test : Pulse width ≤ 300us, Duty cycle ≤ 2%.						

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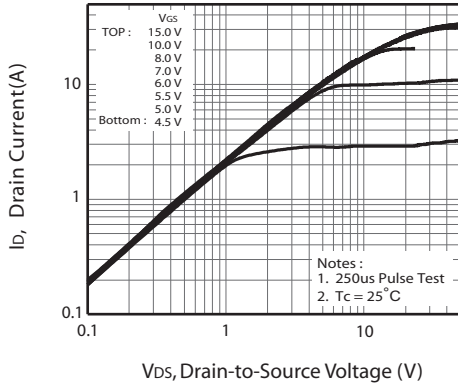


Figure 1. Output Characteristics

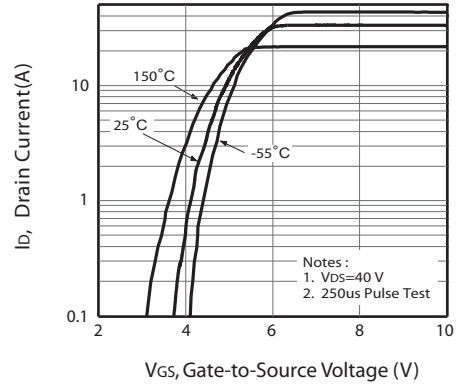


Figure 2. Transfer Characteristics

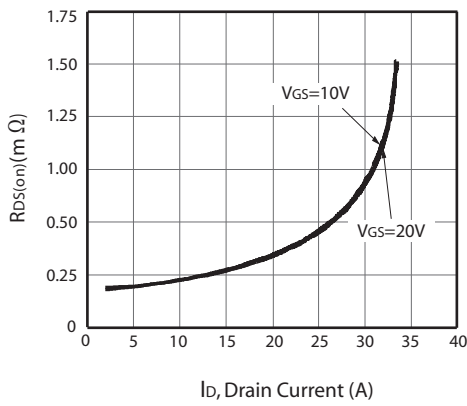


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

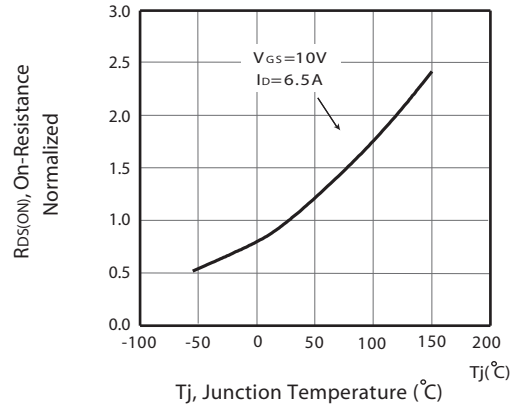


Figure 4. On-Resistance Variation with Drain Current and Temperature

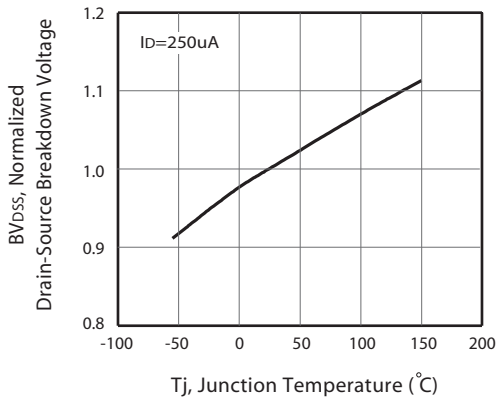


Figure 5. Breakdown Voltage Variation with Temperature

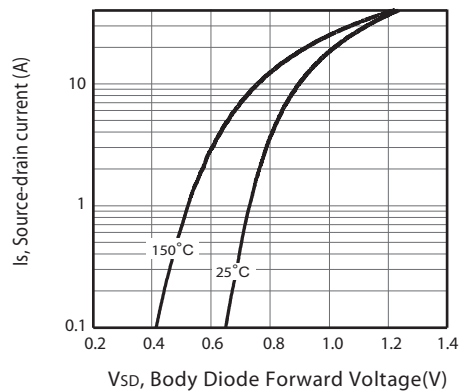


Figure 6. Body Diode Forward Voltage Variation with Source Current

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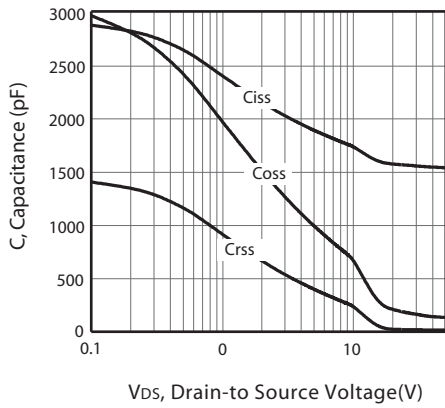


Figure 7. Capacitance

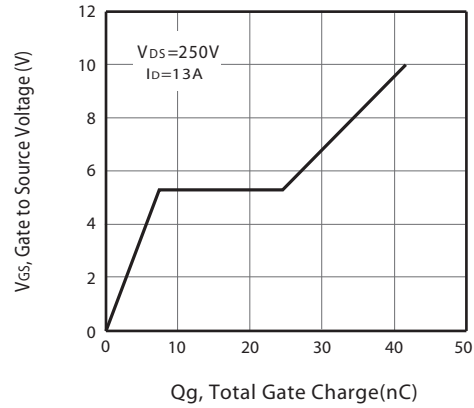


Figure 8. Gate Charge

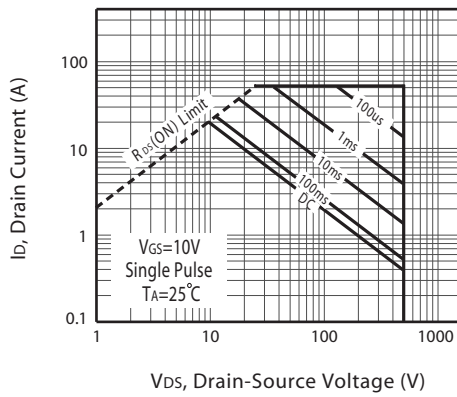


Figure 9. Maximum Safe Operating Area for SDP13N50

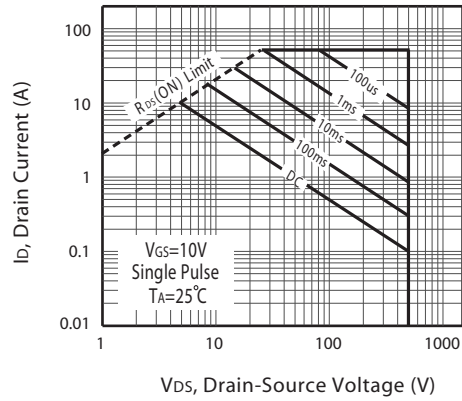
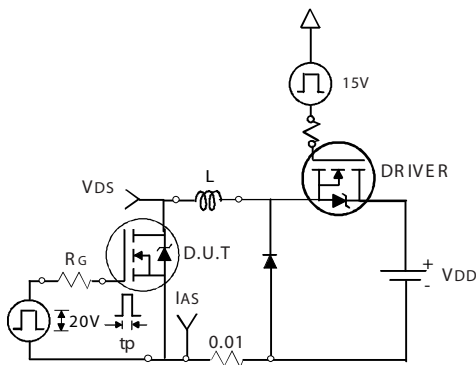
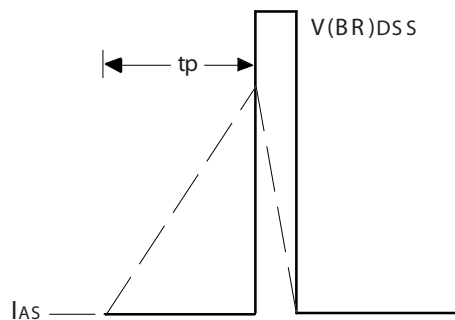


Figure 10. Maximum Safe Operating Area for SDF13N50



Unclamped Inductive Test Circuit
Figure 11a.



Unclamped Inductive Waveforms
Figure 11b.

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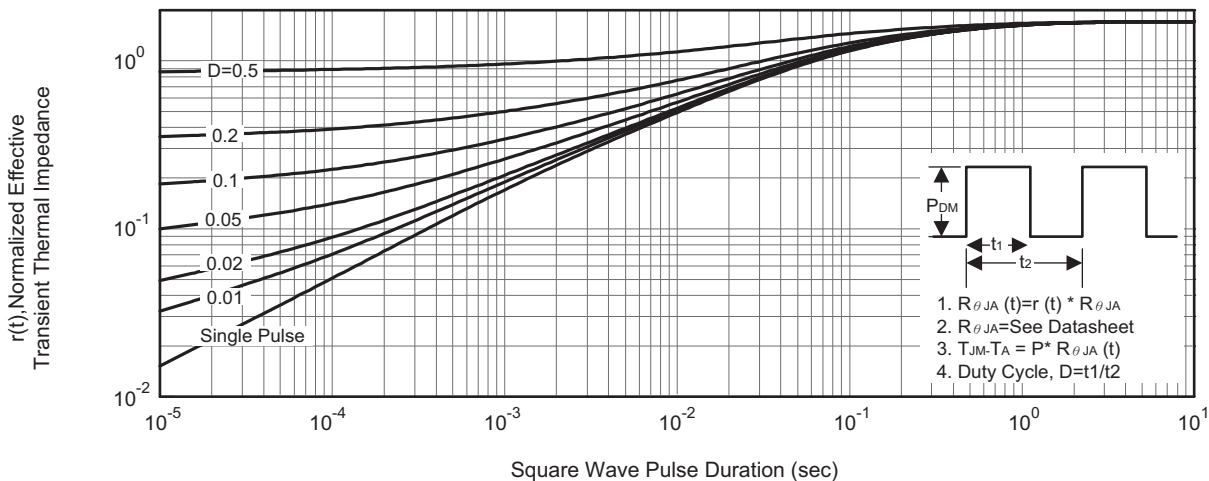


Figure 12.1 Normalized Thermal Transient Impedance Curve for SDP13N50

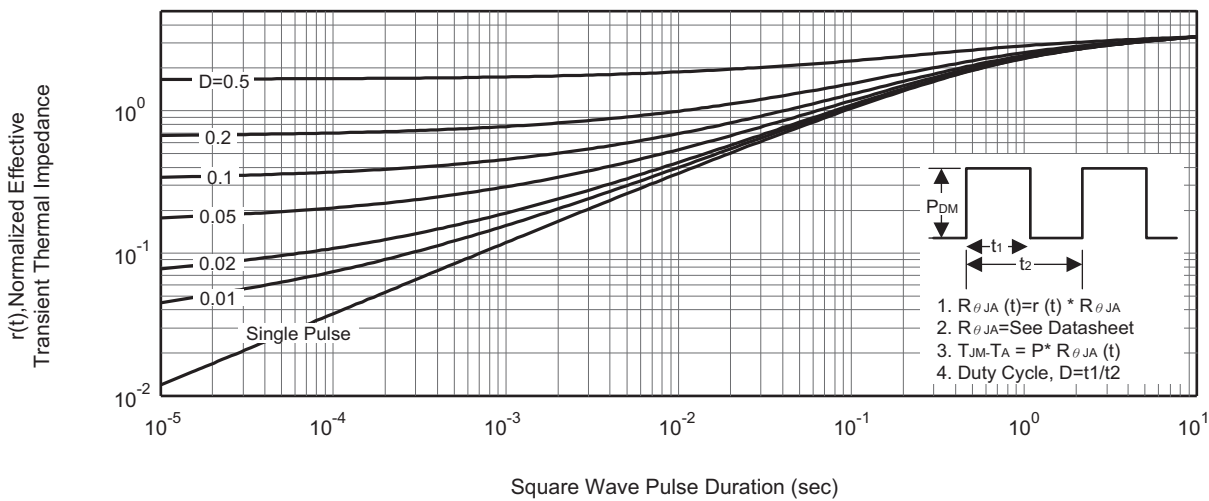
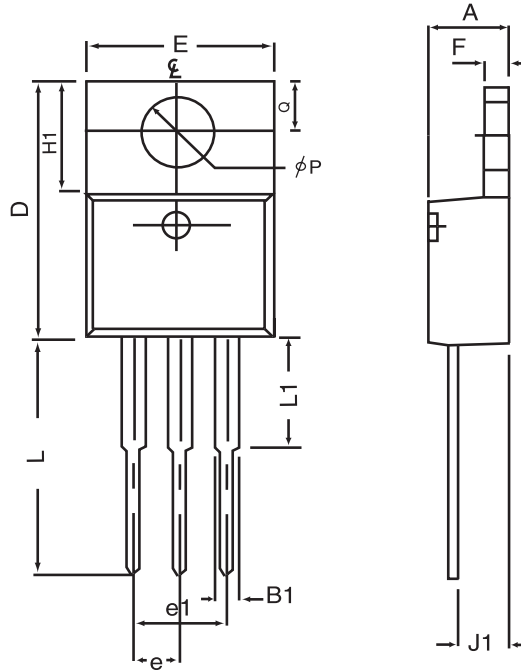


Figure 12.2 Normalized Thermal Transient Impedance Curve for SDF13N50

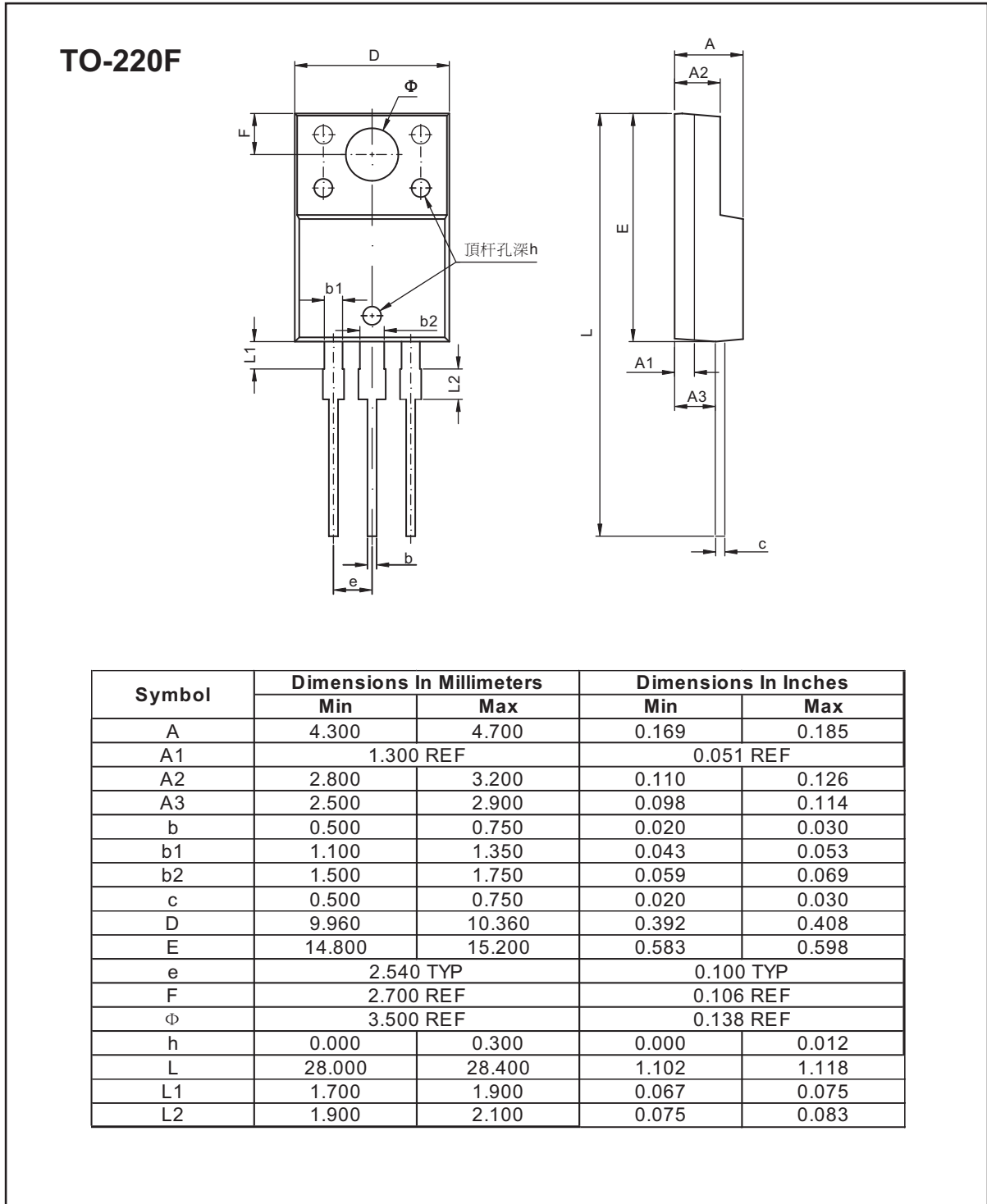
PACKAGE OUTLINE DIMENSIONS

TO-220



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.32	4.80	0.170	0.189
B1	1.27	1.65	0.050	0.630
D	14.6	16.00	0.575	0.610
E	9.70	10.41	0.382	0.410
e	2.34	2.74	0.092	0.108
e1	4.68	5.48	0.184	0.216
F	1.14	1.40	0.045	0.055
H1	5.97	6.73	0.235	0.265
J1	2.20	2.79	0.087	0.110
L	12.88	14.22	0.507	0.560
L1	3.00	6.35	0.120	0.250
φP	3.50	3.94	0.138	0.155
Q	2.54	3.05	0.100	0.120

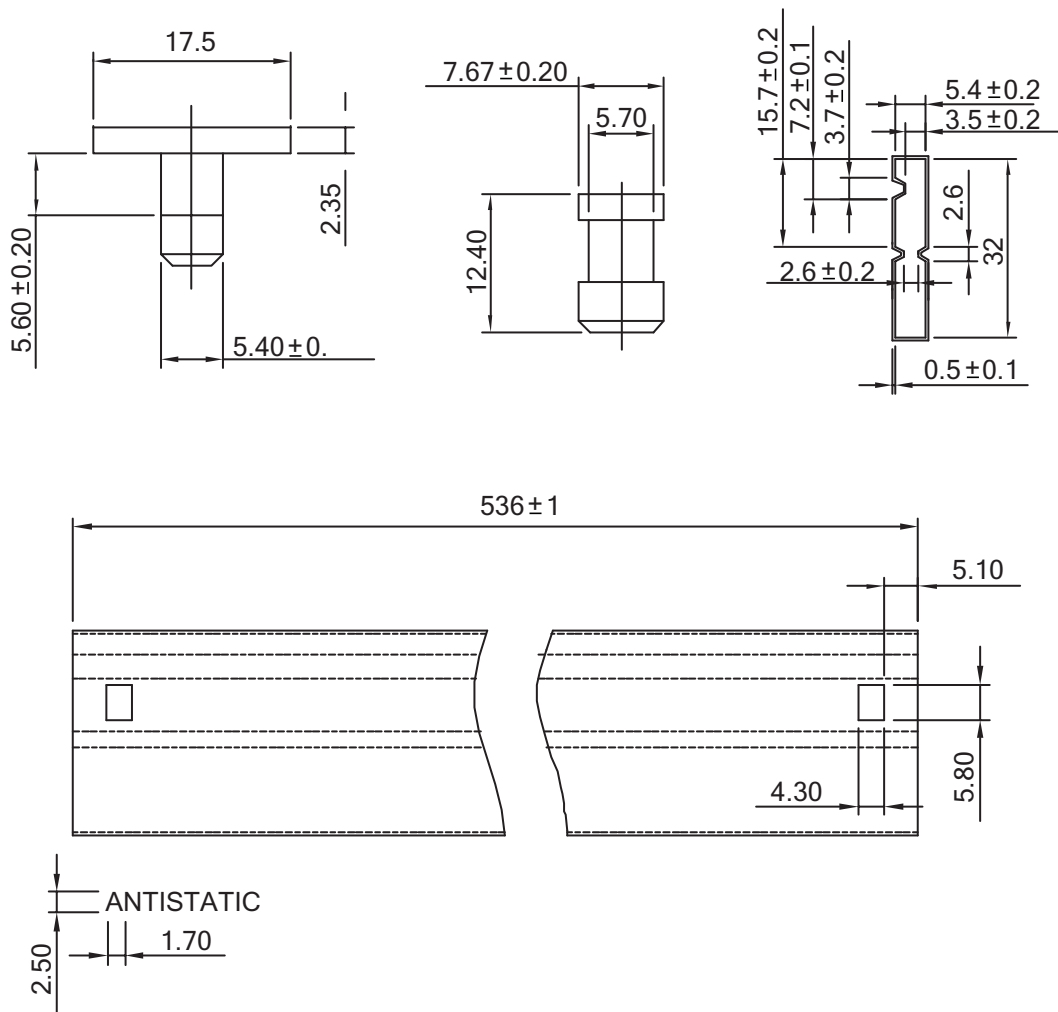
PACKAGE OUTLINE DIMENSIONS



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