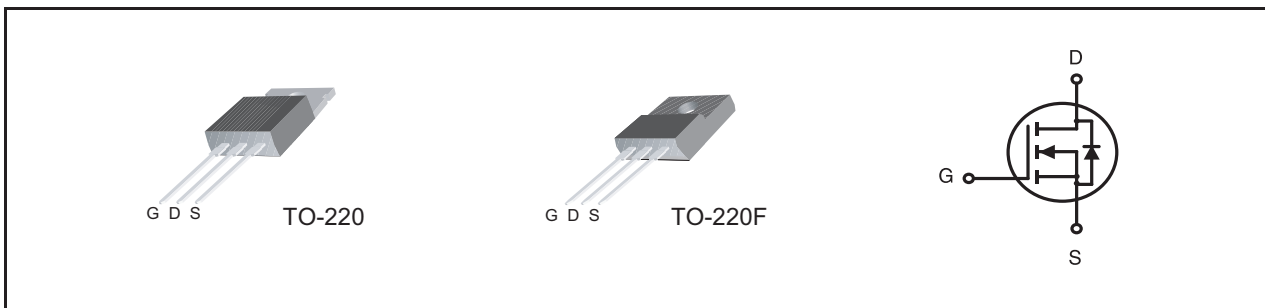


**600V N-Channel Planar MOSFET****PRODUCT SUMMARY**

V <sub>DSS</sub>	I <sub>D</sub>	R <sub>DS(ON)</sub> (mΩ) Max
600V	12A	0.55 @ V <sub>GS</sub> =10V, I <sub>D</sub> =6A

**FEATURES**

- Fast Switching.
- 100% Avalanche Rated.

**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C unless otherwise noted)**

Symbol	Parameter	SDP12N60	SDF12N60	Units	
V <sub>DSS</sub>	Drain-Source Voltage	600		V	
V <sub>GS</sub>	Gate-Source Voltage	±30		V	
I <sub>D</sub>	Continuous Drain Current	T <sub>C</sub> =25°C	12	12 *	A
		T <sub>C</sub> =100°C	7.6	7.6 *	A
I <sub>DM</sub>	Pulsed Drain Current, V <sub>GS</sub> =10V <sup>a</sup>	48	48 *	A	
E <sub>AS</sub>	Single Pulse Avalanche Energy <sup>b</sup>	763		mJ	
dv/dt	Peak Diode Recovery Energy <sup>c</sup>	4.5		V/ns	
P <sub>D</sub>	Power Dissipation	T <sub>C</sub> =25°C	223.2	52	W
	Linear Derating Factor	T <sub>C</sub> >25°C	1.786	0.417	W/°C
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range	-55 to 150		°C	

\* Drain current limited by maximum junction temperature

**THERMAL CHARACTERISTICS**

Symbol	Parameter	SDP12N60	SDF12N60	Units
R <sub>θ JC</sub>	Thermal Resistance, Junction-to-Case	0.56	2.4	°C/W
R <sub>θ JA</sub>	Thermal Resistance, Junction-to-Ambient	62.5	62.5	°C/W

# SDP/F12N60

Preliminary

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>OFF CHARACTERISTICS</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	600			V
ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =250uA		0.5		V/°C
I <sub>DSS</sub>	Drain-to-Source Leakage Current	V <sub>DS</sub> =600V, V <sub>GS</sub> =0V			20	uA
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	V <sub>DS</sub> =0V, V <sub>GS</sub> =30V			100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	V <sub>DS</sub> =0V, V <sub>GS</sub> =-30V			-100	nA
<b>ON CHARACTERISTICS</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	2.0		4.0	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =6A <sup>d</sup>			0.65	ohm
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =15V, I <sub>D</sub> =6A <sup>d</sup>			20	S
<b>DYNAMIC CHARACTERISTICS</b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V f=1.0MHz		1936		pF
C <sub>OSS</sub>	Output Capacitance			200.2		pF
C <sub>RSS</sub>	Reverse Transfer Capacitance			23.1		pF
<b>SWITCHING CHARACTERISTICS</b>						
t <sub>D(ON)</sub>	Turn-On Delay Time	V <sub>DD</sub> =300V I <sub>D</sub> =12A R <sub>G</sub> =10 ohm, R <sub>D</sub> =25 ohm V <sub>GS</sub> =10V <sup>d</sup>		33		ns
t <sub>r</sub>	Turn-On Rise Time			93.5		ns
t <sub>D(OFF)</sub>	Turn-Off Delay Time			154		ns
t <sub>f</sub>	Turn-Off Fall Time			99		ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =300V, I <sub>D</sub> =12A, V <sub>GS</sub> =10V <sup>d</sup>		52.8		nC
Q <sub>gs</sub>	Gate-Source Charge			9.35		nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge			23.1		nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>						
I <sub>S</sub>	Maximum Continuous Source Current(Body Diode)				12	A
I <sub>SM</sub>	Maximum Pulsed Source Current(Body Diode)				48	A
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =6A <sup>d</sup>			1.5	V

### Notes :

- Repetitive Rating : Pulse width limited by maximum junction temperature.
- V<sub>DD</sub>=50V, starting T<sub>J</sub>=25°C, L=10.6mH, R<sub>G</sub>=25Ω, I<sub>AS</sub>=12A
- I<sub>SD</sub> ≤ 12A, di/dt ≤ 100A/us, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ 150°C
- Pulse Test : Pulse width ≤ 300us, Duty cycle ≤ 2%.

Jul,22,2009

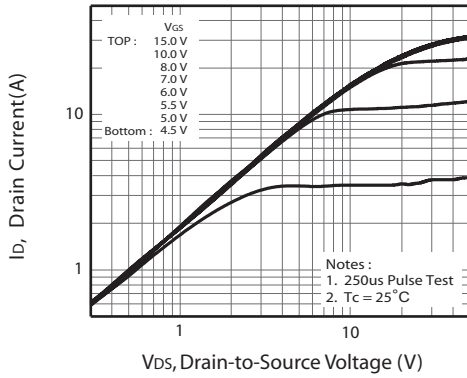


Figure 1. Output Characteristics

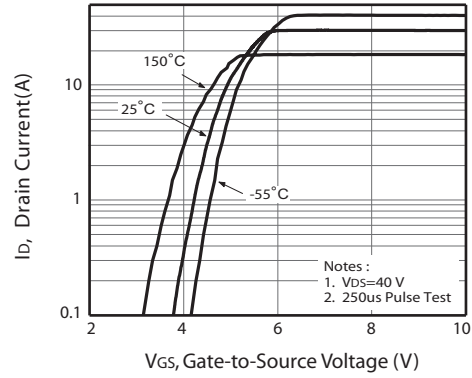


Figure 2. Transfer Characteristics

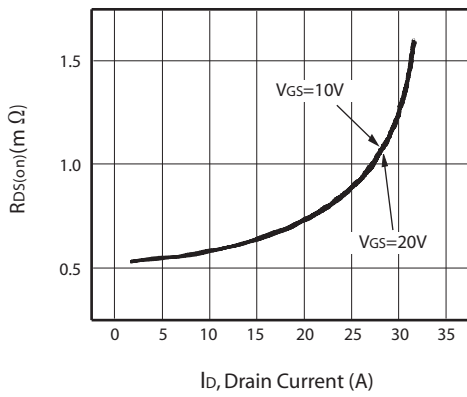


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

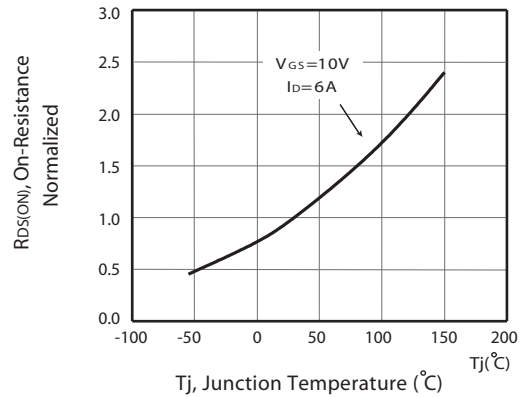


Figure 4. On-Resistance Variation with Drain Current and Temperature

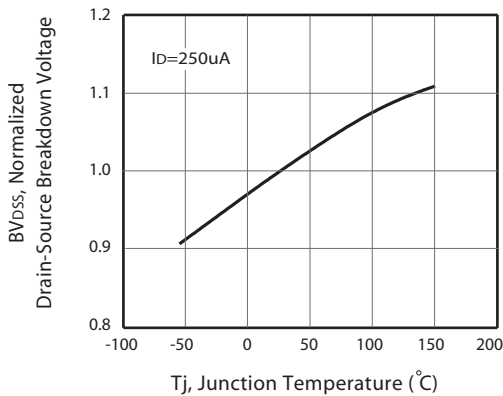


Figure 5. Breakdown Voltage Variation with Temperature

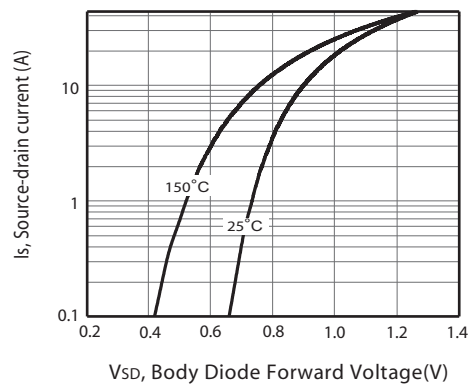
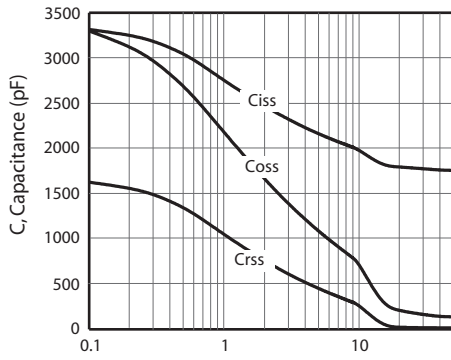


Figure 6. Body Diode Forward Voltage Variation with Source Current

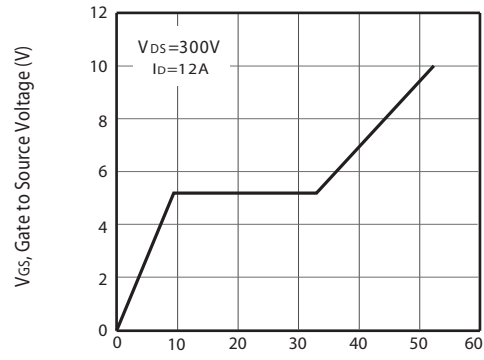
# SDP/F12N60

Preliminary



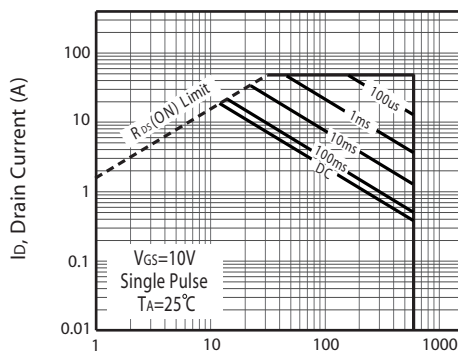
$V_{DS}$ , Drain-to Source Voltage (V)

Figure 7. Capacitance



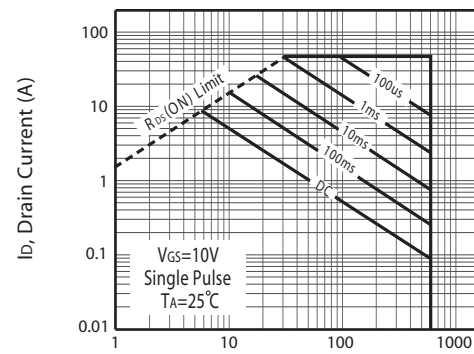
$Q_g$ , Total Gate Charge (nC)

Figure 8. Gate Charge



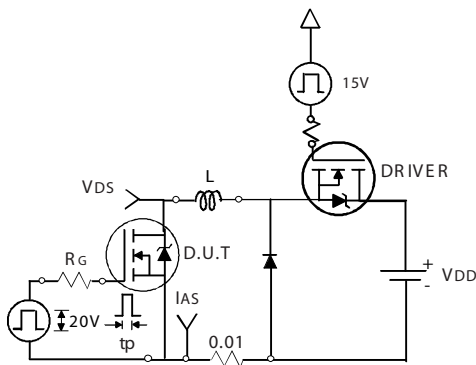
$V_{DS}$ , Drain-Source Voltage (V)

Figure 9. Maximum Safe Operating Area for SDP12N60



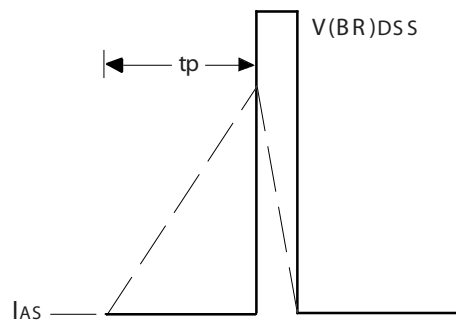
$V_{DS}$ , Drain-Source Voltage (V)

Figure 10. Maximum Safe Operating Area for SDF12N60



Unclamped Inductive Test Circuit

Figure 11a.



Unclamped Inductive Waveforms

Figure 11b.

Jul,22,2009

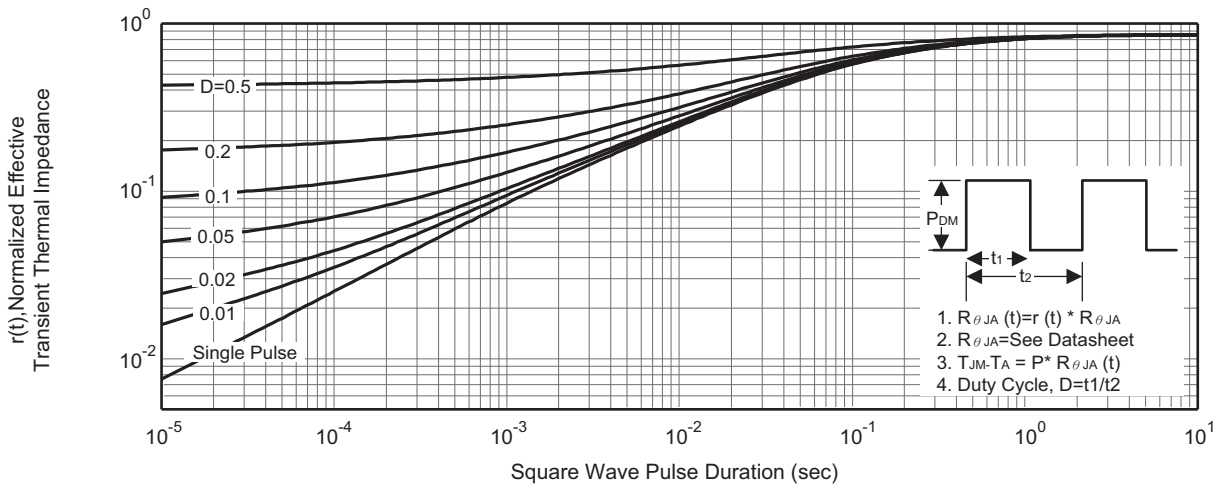


Figure 12.1 Normalized Thermal Transient Impedance Curve for SDP12N60

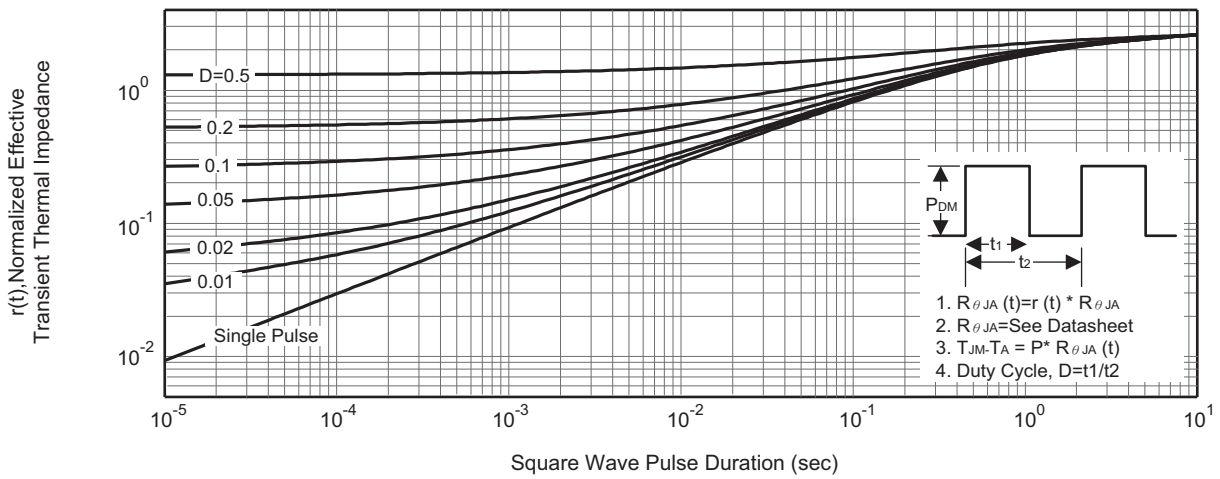
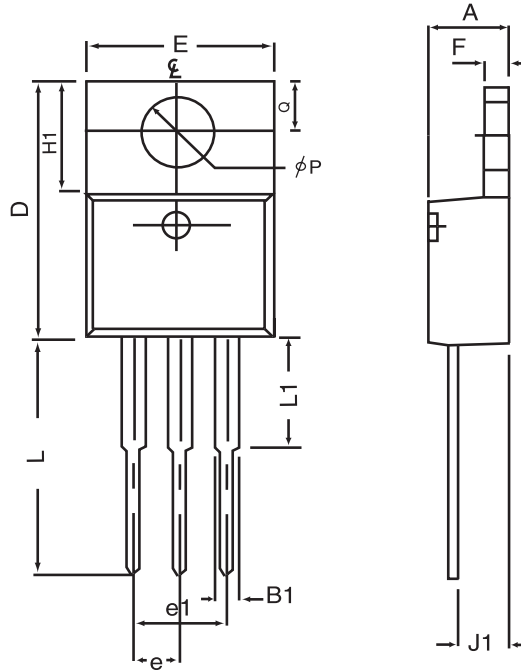


Figure 12.2 Normalized Thermal Transient Impedance Curve for SDF12N60

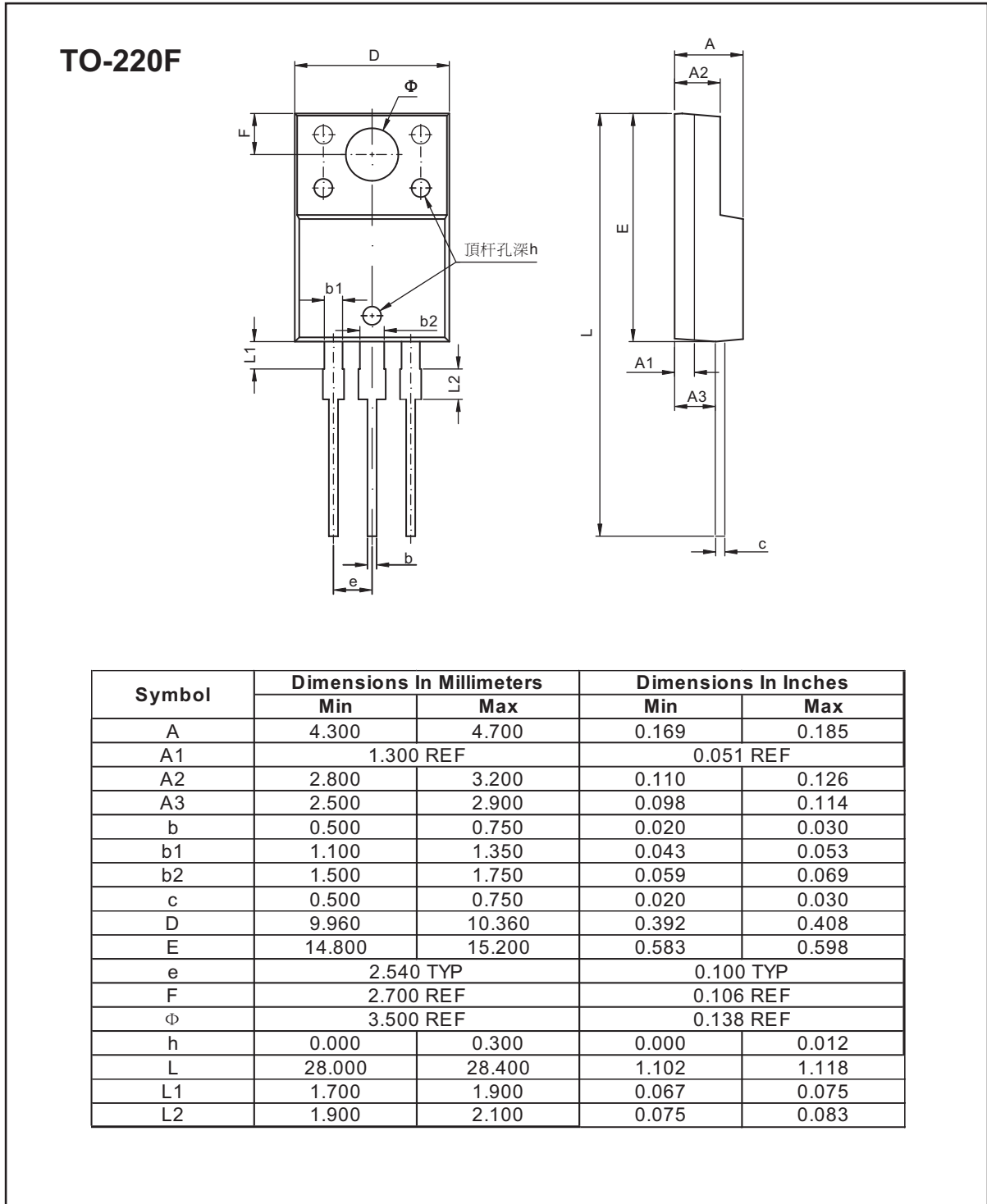
## PACKAGE OUTLINE DIMENSIONS

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

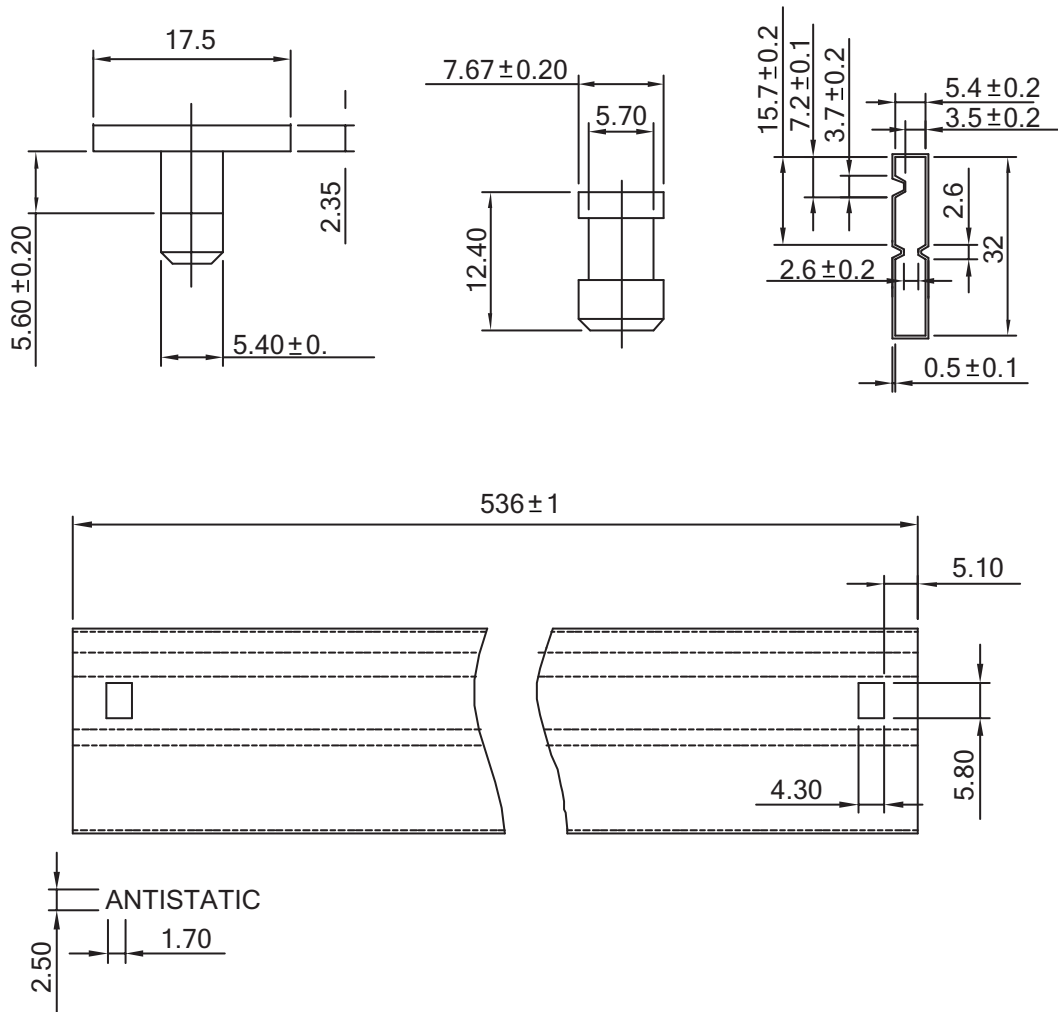
## PACKAGE OUTLINE DIMENSIONS



# SDP/F12N60

Preliminary

## TO-220/220F Tube



Jul,22,2009