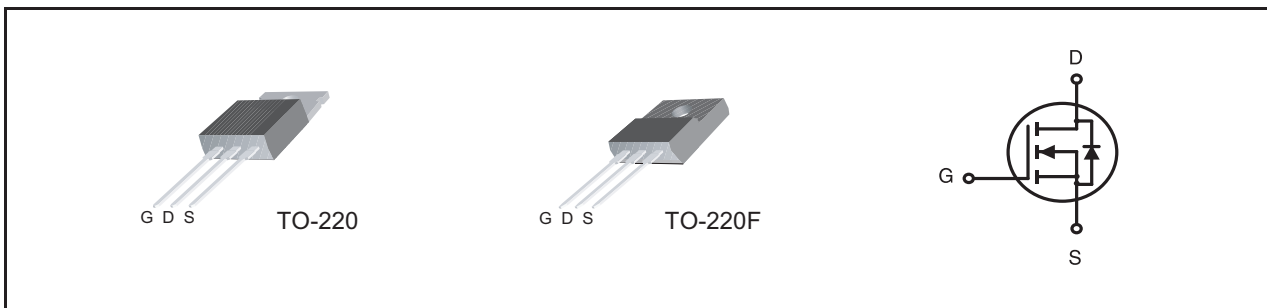


**600V N-Channel Planar MOSFET****PRODUCT SUMMARY**

V <sub>DSS</sub>	I <sub>D</sub>	R <sub>DS(ON)</sub> (mΩ) Max
600V	4.5A	2.5 @ V <sub>GS</sub> =10V, I <sub>D</sub> =2.25A

**FEATURES**

- Fast Switching.
- 100% Avalanche Rated.

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

Symbol	Parameter	SDP04N60	SDF04N60	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	4.5	4.5 *	A
		T <sub>C</sub> =100°C	2.7	2.7 *	A
I <sub>DM</sub>	Pulsed Drain Current, V <sub>GS</sub> =10V <sup>a</sup>	18	18 *	A	
E <sub>AS</sub>	Single Pulse Avalanche Energy <sup>b</sup>	200		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	114	33	W
	Linear Derating Factor	T <sub>C</sub> >25°C	0.91	0.26	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	SDP04N60	SDF04N60	Units
R <sub>θ JC</sub>	Thermal Resistance, Junction-to-Case	1.1	3.8	°C/W
R <sub>θ JA</sub>	Thermal Resistance, Junction-to-Ambient	62.5	62.5	°C/W

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## 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> =250μA	600			V
ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =250μA		0.6		V/°C
I <sub>DSS</sub>	Drain-to-Source Leakage Current	V <sub>DS</sub> =600V, V <sub>GS</sub> =0V			20	μA
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> =250μA	2.0		4.0	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =2.25A <sup>d</sup>			2.5	ohm
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =15V, I <sub>D</sub> =2.25A <sup>d</sup>			10	S
<b>DYNAMIC CHARACTERISTICS</b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V f=1.0MHz		515		pF
C <sub>OSS</sub>	Output Capacitance			55		pF
C <sub>RSS</sub>	Reverse Transfer Capacitance			6.5		pF
<b>SWITCHING CHARACTERISTICS</b>						
t <sub>D(ON)</sub>	Turn-On Delay Time	V <sub>DD</sub> =300V I <sub>D</sub> =4.5A R <sub>G</sub> =10 ohm, R <sub>D</sub> =66.7 ohm V <sub>GS</sub> =10V <sup>d</sup>		10		ns
t <sub>r</sub>	Turn-On Rise Time			42		ns
t <sub>D(OFF)</sub>	Turn-Off Delay Time			38		ns
t <sub>f</sub>	Turn-Off Fall Time			46		ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =300V, I <sub>D</sub> =4.5A, V <sub>GS</sub> =10V <sup>d</sup>		15		nC
Q <sub>gs</sub>	Gate-Source Charge			2.5		nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge			6.6		nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>						
I <sub>S</sub>	Maximum Continuous Source Current(Body Diode)				4.5	A
I <sub>SM</sub>	Maximum Pulsed Source Current(Body Diode)				18	A
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =2.25A <sup>d</sup>			1.5	V
<b>Notes :</b>						
a. Repetitive Rating : Pulse width limited by maximum junction temperature.						
b. V <sub>DD</sub> =50V, starting T <sub>J</sub> =25°C, L=20mH, R <sub>G</sub> =25Ω, I <sub>AS</sub> =4.5A						
c. I <sub>SD</sub> ≤ 4.5A, di/dt ≤ 100A/μs, V <sub>DD</sub> ≤ V <sub>(BR)DSS</sub> , T <sub>J</sub> ≤ 150°C						
d. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.						

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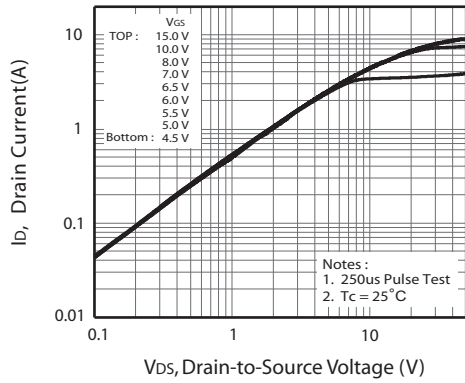


Figure 1. Output Characteristics

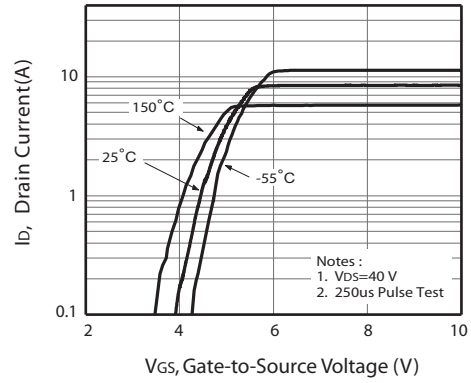


Figure 2. Transfer Characteristics

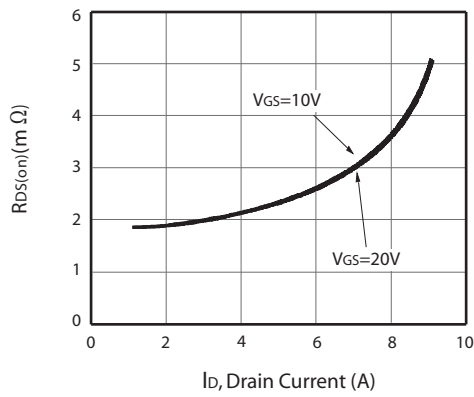


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

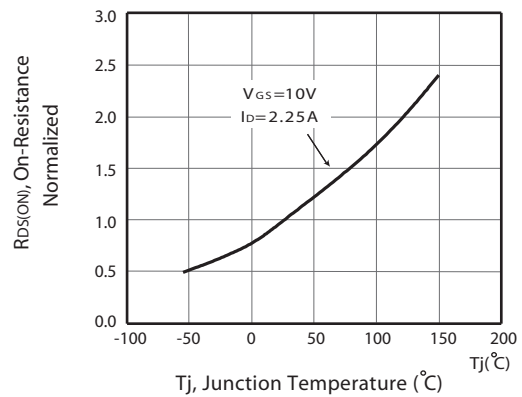


Figure 4. On-Resistance Variation with Drain Current and Temperature

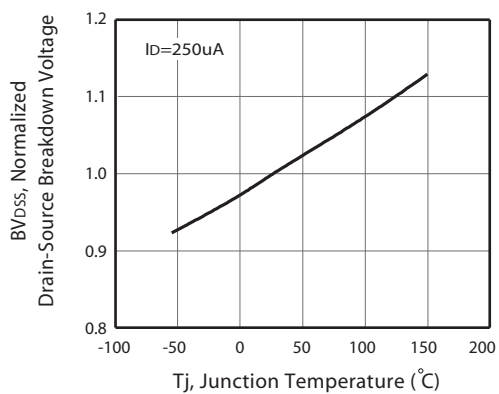


Figure 5. Breakdown Voltage Variation with Temperature

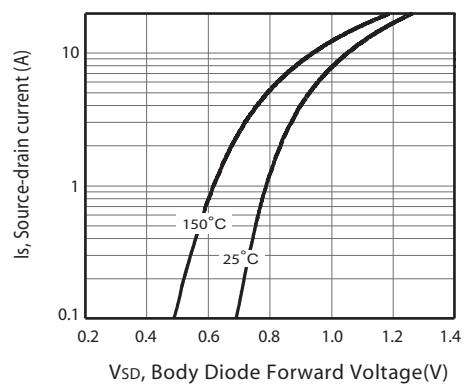


Figure 6. Body Diode Forward Voltage Variation with Source Current

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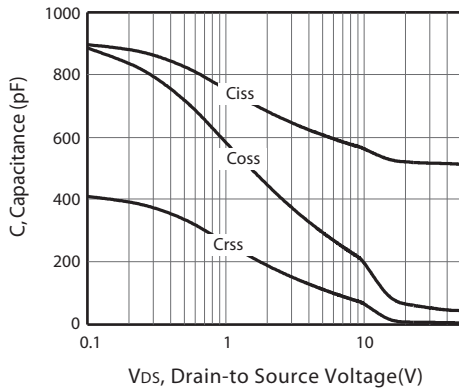


Figure 7. Capacitance

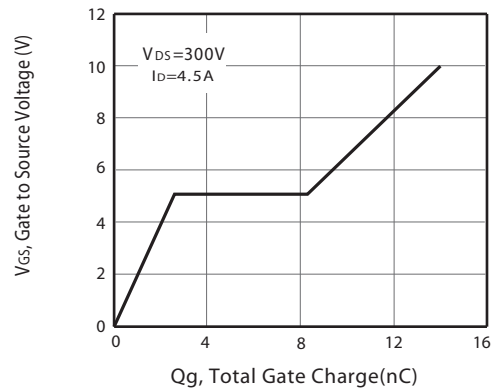


Figure 8. Gate Charge

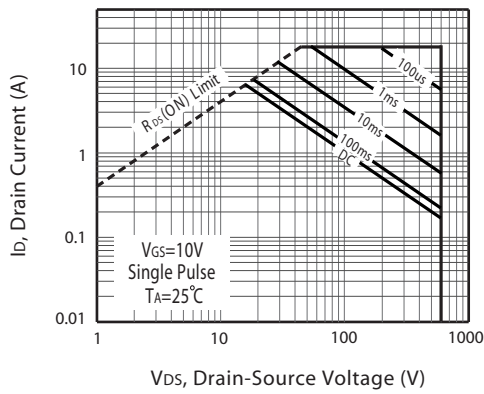


Figure 9. Maximum Safe Operating Area for SDP04N60

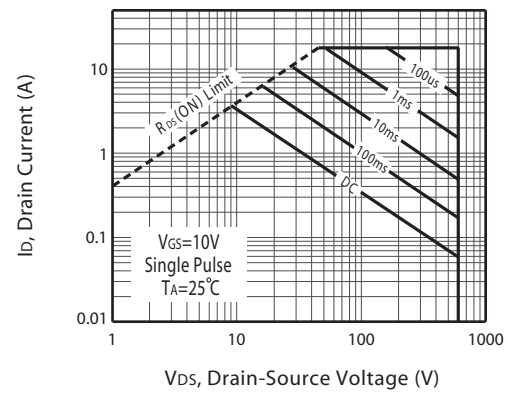
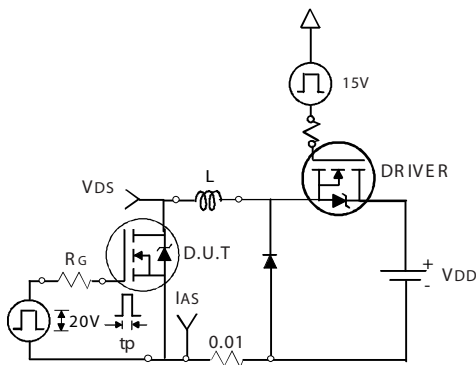
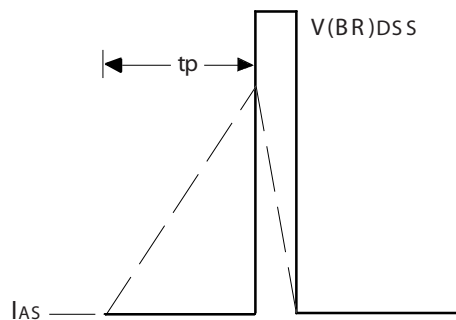


Figure 10. Maximum Safe Operating Area for SDF04N60



Unclamped Inductive Test Circuit  
Figure 11a.



Unclamped Inductive Waveforms  
Figure 11b.

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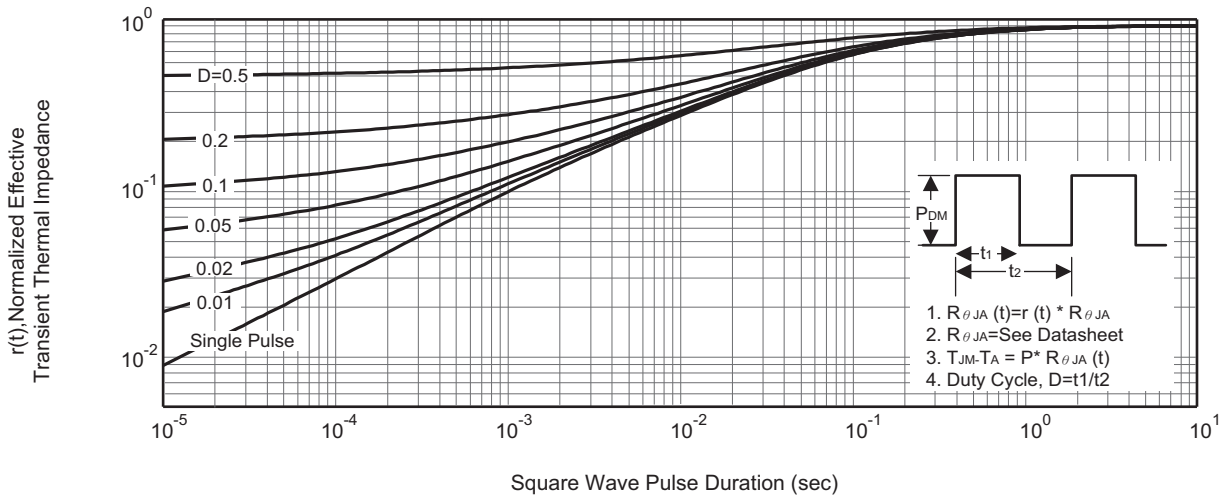


Figure 12.1 Normalized Thermal Transient Impedance Curve for SDP04N60

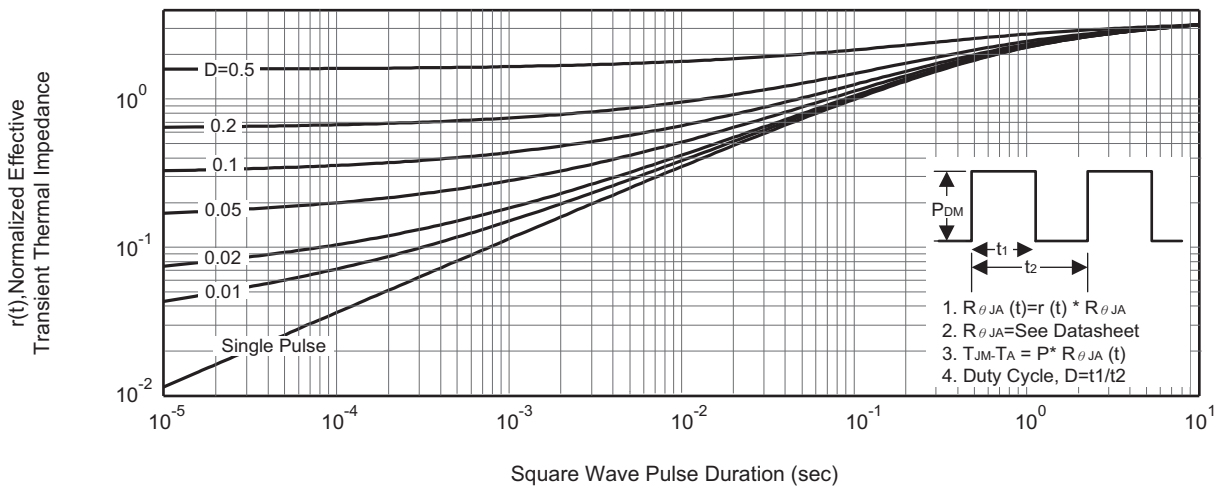
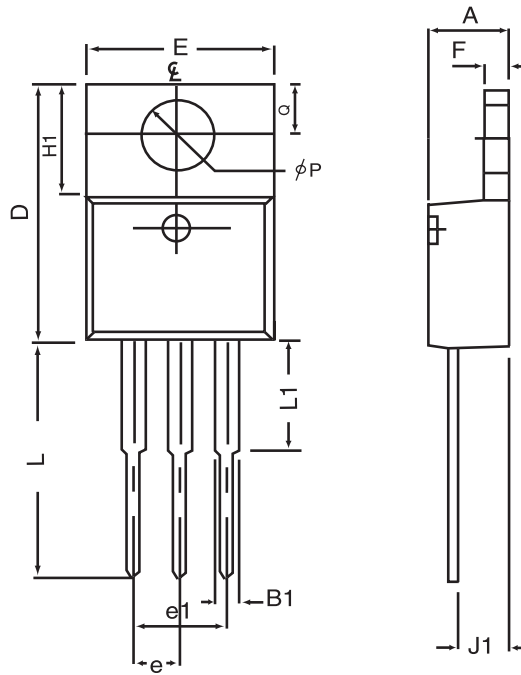


Figure 12.2 Normalized Thermal Transient Impedance Curve for SDF04N60

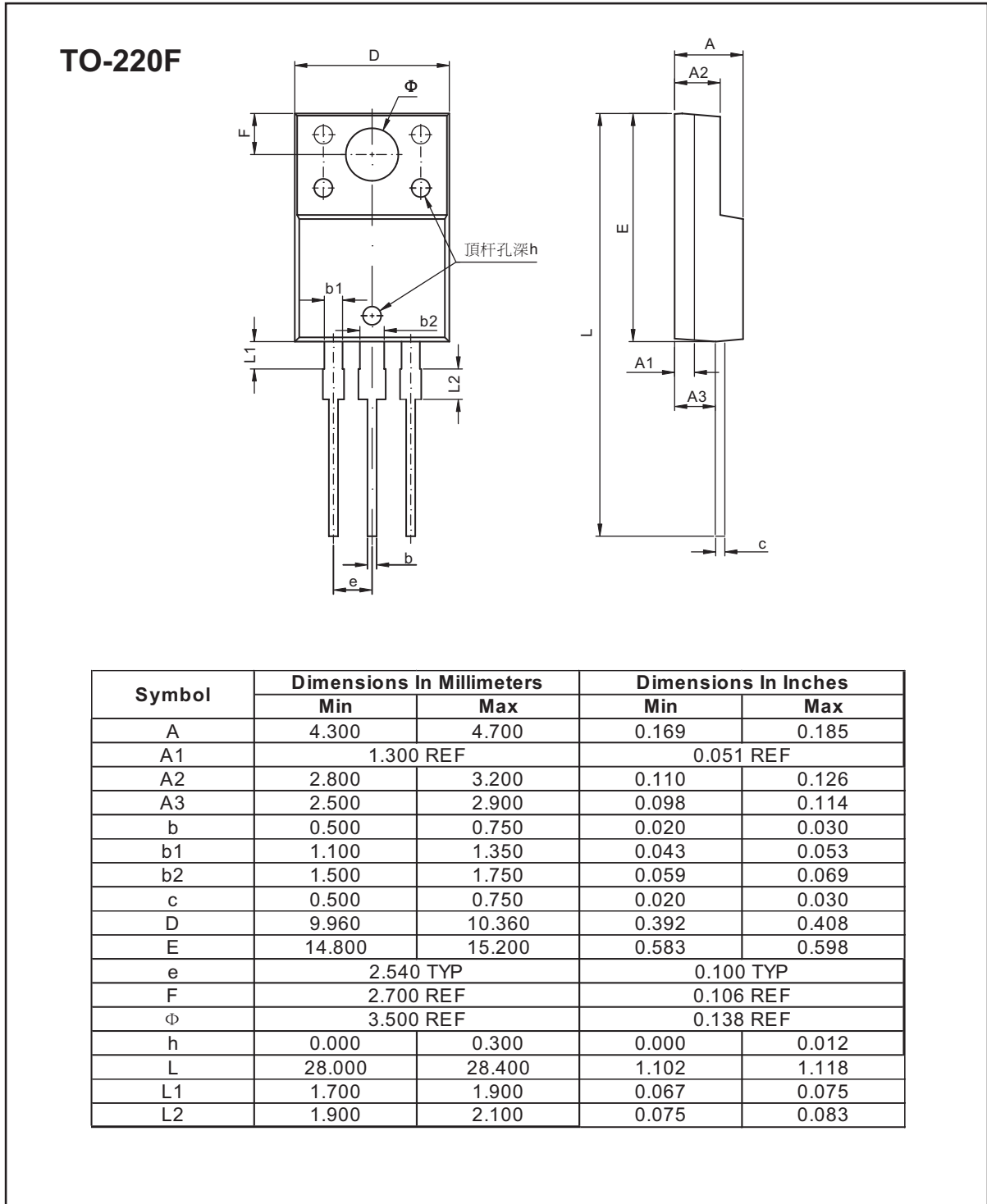
## PACKAGE OUTLINE DIMENSIONS

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
phi P	3.50	3.94	0.138	0.155
Q	2.54	3.05	0.100	0.120

## PACKAGE OUTLINE DIMENSIONS



## TO-220/220F Tube

