

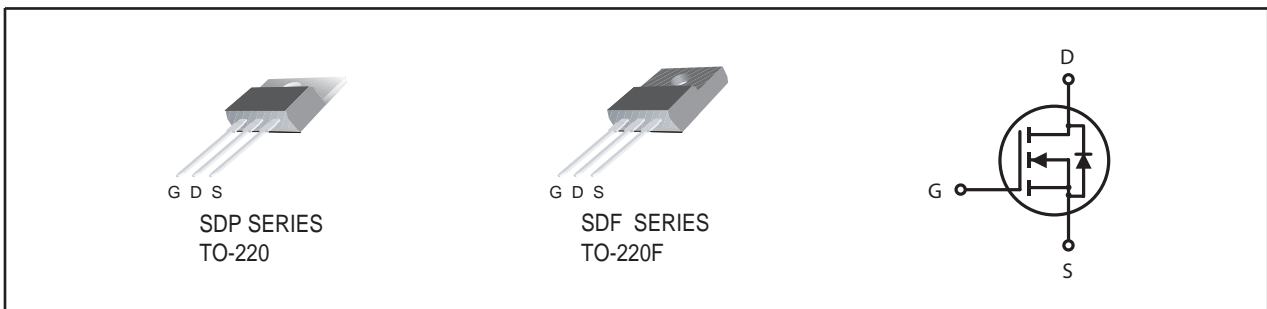


## N-Channel Enhancement Mode Field Effect Transistor

PRODUCT SUMMARY		
V <sub>DSS</sub>	I <sub>D</sub>	R <sub>DS(ON)</sub> (Ω) Typ
600V	10A	0.62 @ V <sub>GS</sub> =10V

### FEATURES

- Super high dense cell design for low R<sub>DS(ON)</sub>.
- Rugged and reliable.
- TO-220 and TO-220F Package.



### ORDERING INFORMATION

Ordering Code	Package	Marking Code	Delivery Mode	RoHS Status
SDP10N60HZ	TO-220	SDP10N60	Tube	Halogen Free
SDP10N60PZ	TO-220	10N60	Tube	Pb Free
SDF10N60HZ	TO-220F	SDF10N60	Tube	Halogen Free
SDF10N60PZ	TO-220F	10N60	Tube	Pb Free

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

Symbol	Parameter	SDP10N60	SDF10N60	Units	
V <sub>DS</sub>	Drain-Source Voltage	600		V	
V <sub>GS</sub>	Gate-Source Voltage	±30	±30	V	
I <sub>D</sub>	Drain Current-Continuous <sup>a</sup>	T <sub>C</sub> =25°C	10	10	A
		T <sub>C</sub> =100°C	6	6	A
I <sub>DM</sub>	-Pulsed <sup>a</sup>	40	40	A	
E <sub>AS</sub>	Single Pulse Avalanche Energy <sup>c</sup>	709		mJ	
P <sub>D</sub>	Maximum Power Dissipation	T <sub>C</sub> =25°C	162	52	W
		T <sub>C</sub> =100°C	65	21	W
T <sub>J</sub> , T <sub>STG</sub>	Operating Junction and Storage Temperature Range	-55 to 150		°C	

### THERMAL CHARACTERISTICS

R <sub>θJC</sub>	Thermal Resistance, Junction-to-Case	0.77	2.4	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient	62.5	62.5	°C/W

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>OFF CHARACTERISTICS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V , I <sub>D</sub> =250uA	600			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =480V , V <sub>GS</sub> =0V			1	uA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> = ±30V , V <sub>DS</sub> =0V			±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		4	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V , I <sub>D</sub> =5.0A		0.62	0.75	ohm
<b>DYNAMIC CHARACTERISTICS<sup>b</sup></b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V f=1.0MHz		1650		pF
C <sub>oss</sub>	Output Capacitance			165		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			18		pF
<b>SWITCHING CHARACTERISTICS<sup>b</sup></b>						
t <sub>D(ON)</sub>	Turn-On Delay Time	V <sub>DD</sub> =300V I <sub>D</sub> =1A R <sub>GEN</sub> = 25 ohm		25		ns
t <sub>r</sub>	Rise Time			70		ns
t <sub>D(OFF)</sub>	Turn-Off Delay Time			140		ns
t <sub>f</sub>	Fall Time			80		ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =480V, I <sub>D</sub> =1A, V <sub>GS</sub> =10V		48		nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =480V, I <sub>D</sub> =1A, V <sub>GS</sub> =10V		7.0		nC
Q <sub>gd</sub>	Gate-Drain Charge			18		nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>						
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =10A			1.4	V
<b>Notes</b>						
<p>a. Drain current limited by maximum junction temperature.</p> <p>b. Guaranteed by design, not subject to production testing.</p> <p>c. Starting T<sub>J</sub>=25°C, L=13mH, V<sub>DD</sub> = 50V.</p>						

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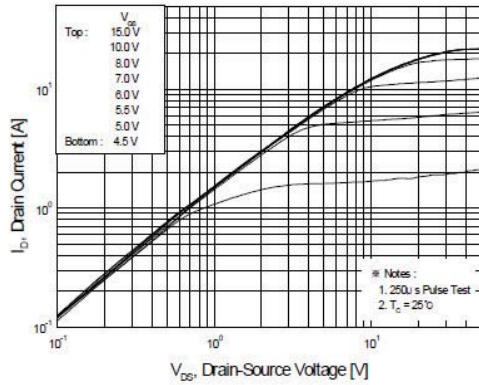


Figure 1. On-Region Characteristics

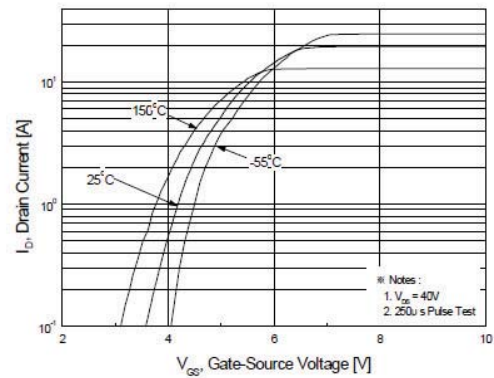


Figure 2. Transfer Characteristics

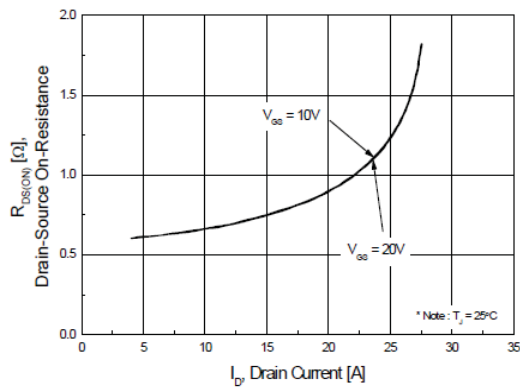


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

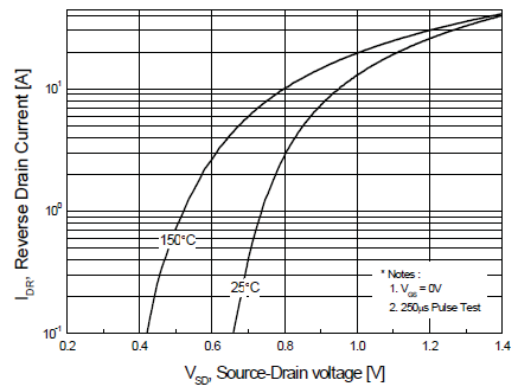


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

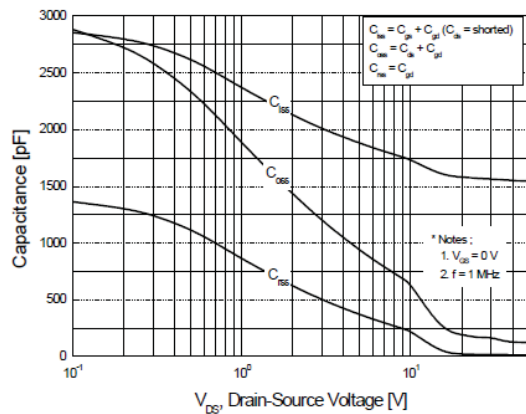


Figure 5. Capacitance Characteristics

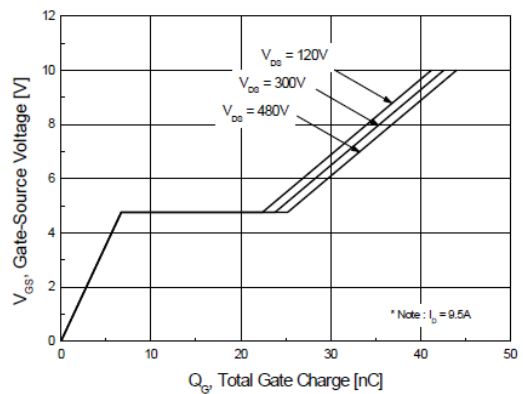


Figure 6. Gate Charge Characteristics

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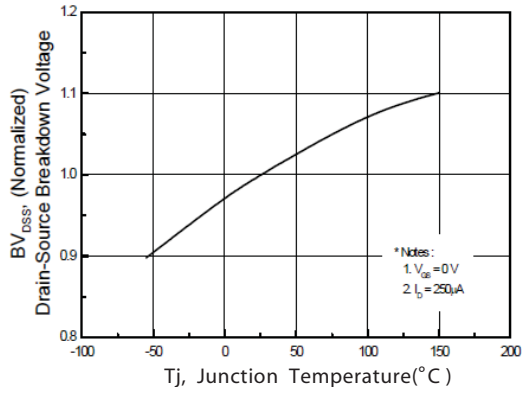


Figure 7. Breakdown Voltage Variation vs Temperature

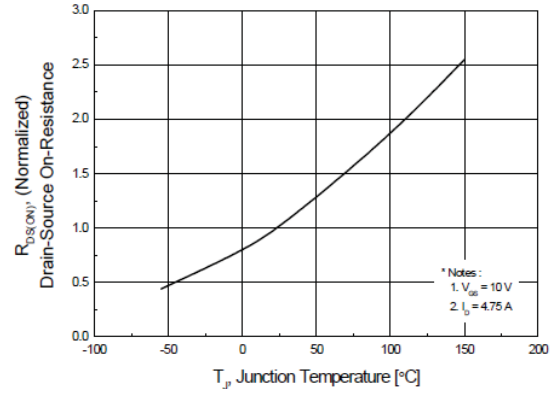


Figure 8. On-Resistance Variation vs Temperature

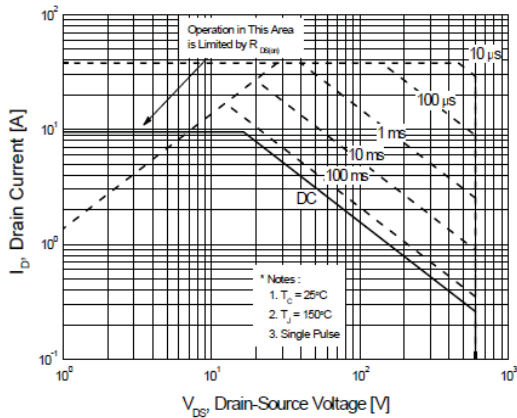


Figure 9-1. Maximum Safe Operating Area for TO220

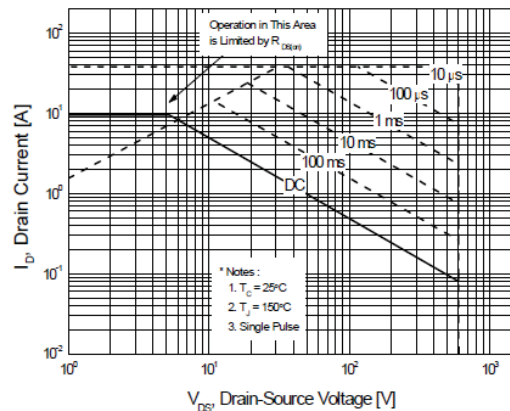


Figure 9-2. Maximum Safe Operating Area for TO220F

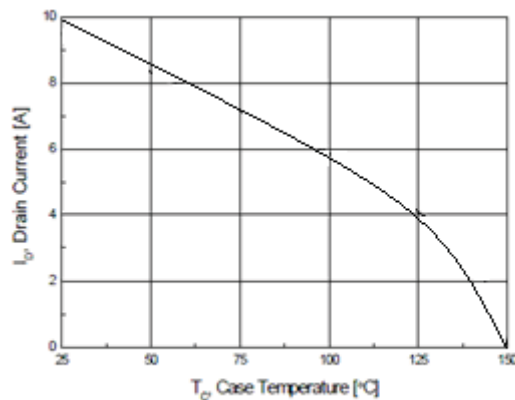


Figure 10. Maximum Drain Current vs Case Temperature

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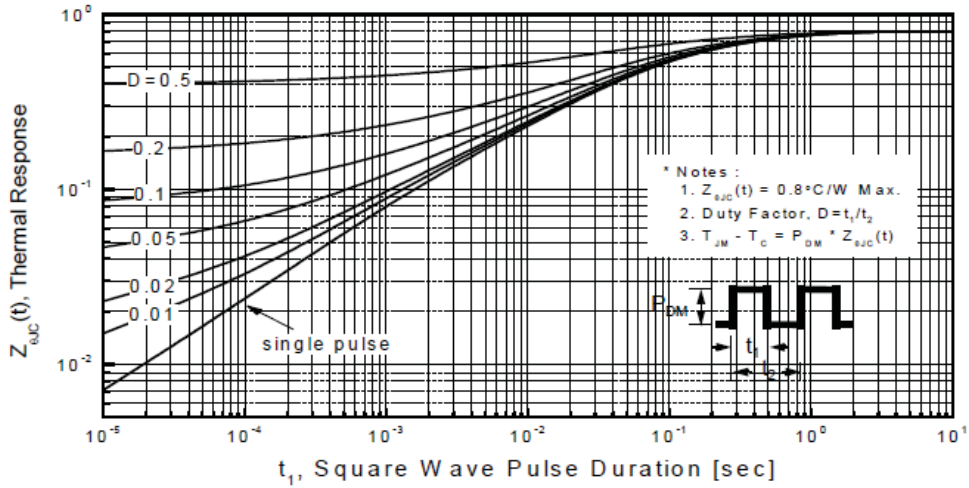


Figure 11-1. Transient Thermal Response Curve for TO220

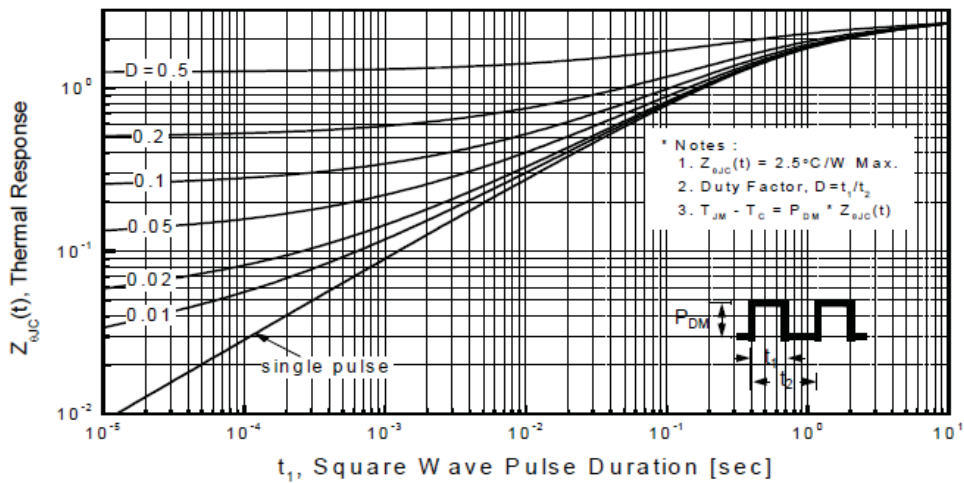


Figure 11-2. Transient Thermal Response Curve for TO220F

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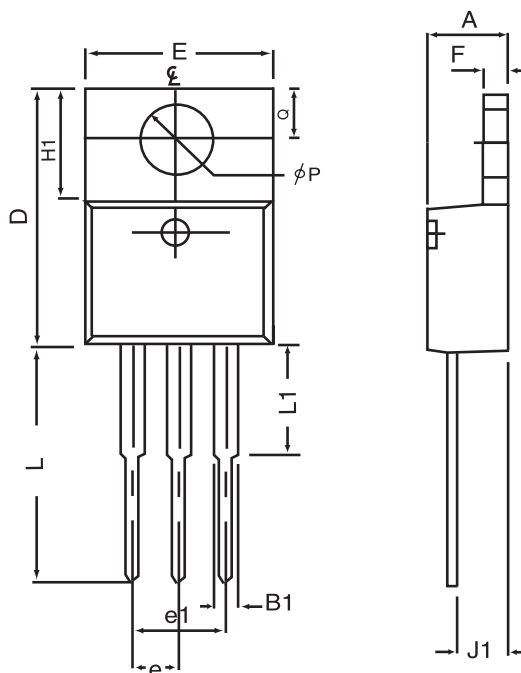
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### PACKAGE OUTLINE DIMENSIONS

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

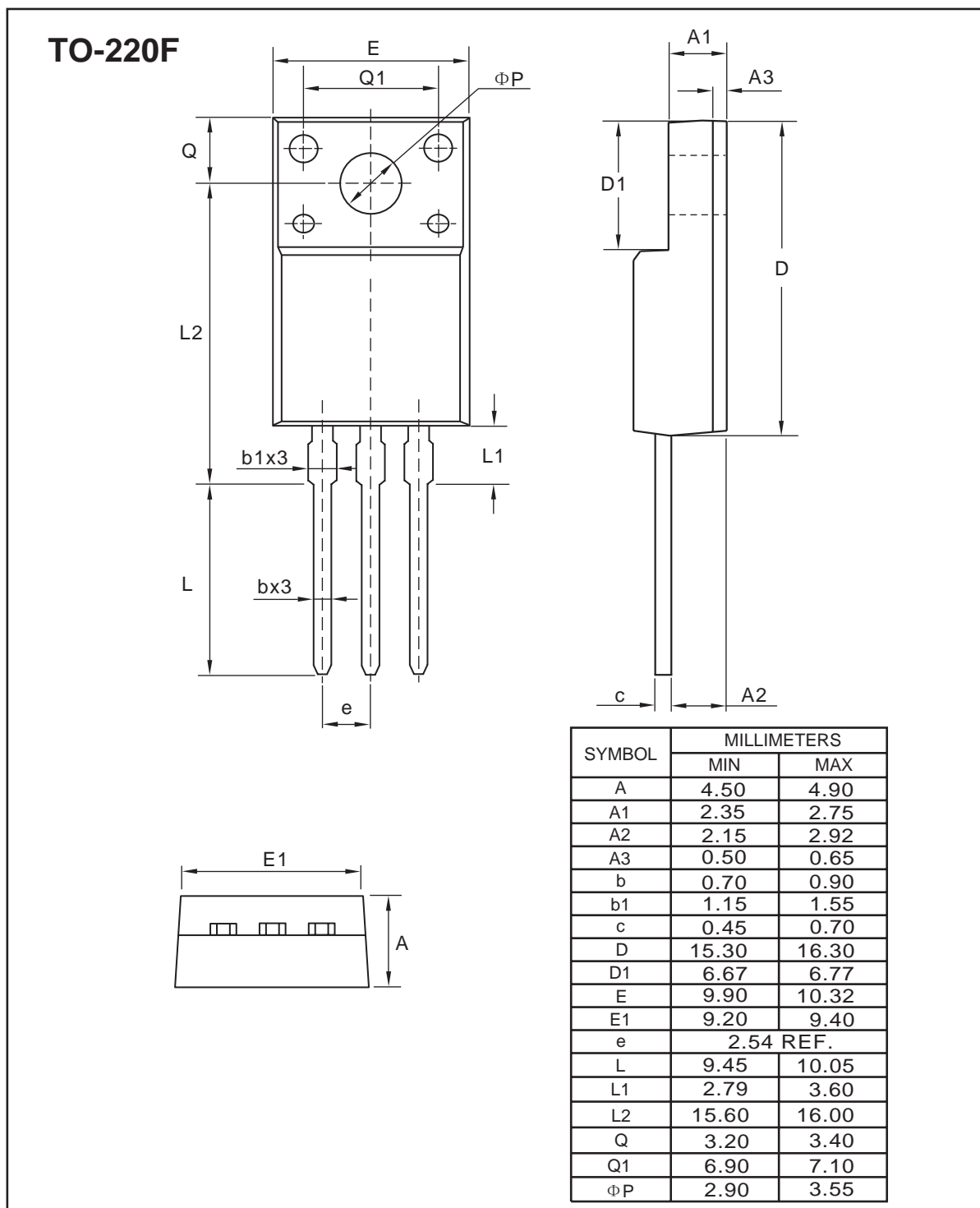
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### PACKAGE OUTLINE DIMENSIONS

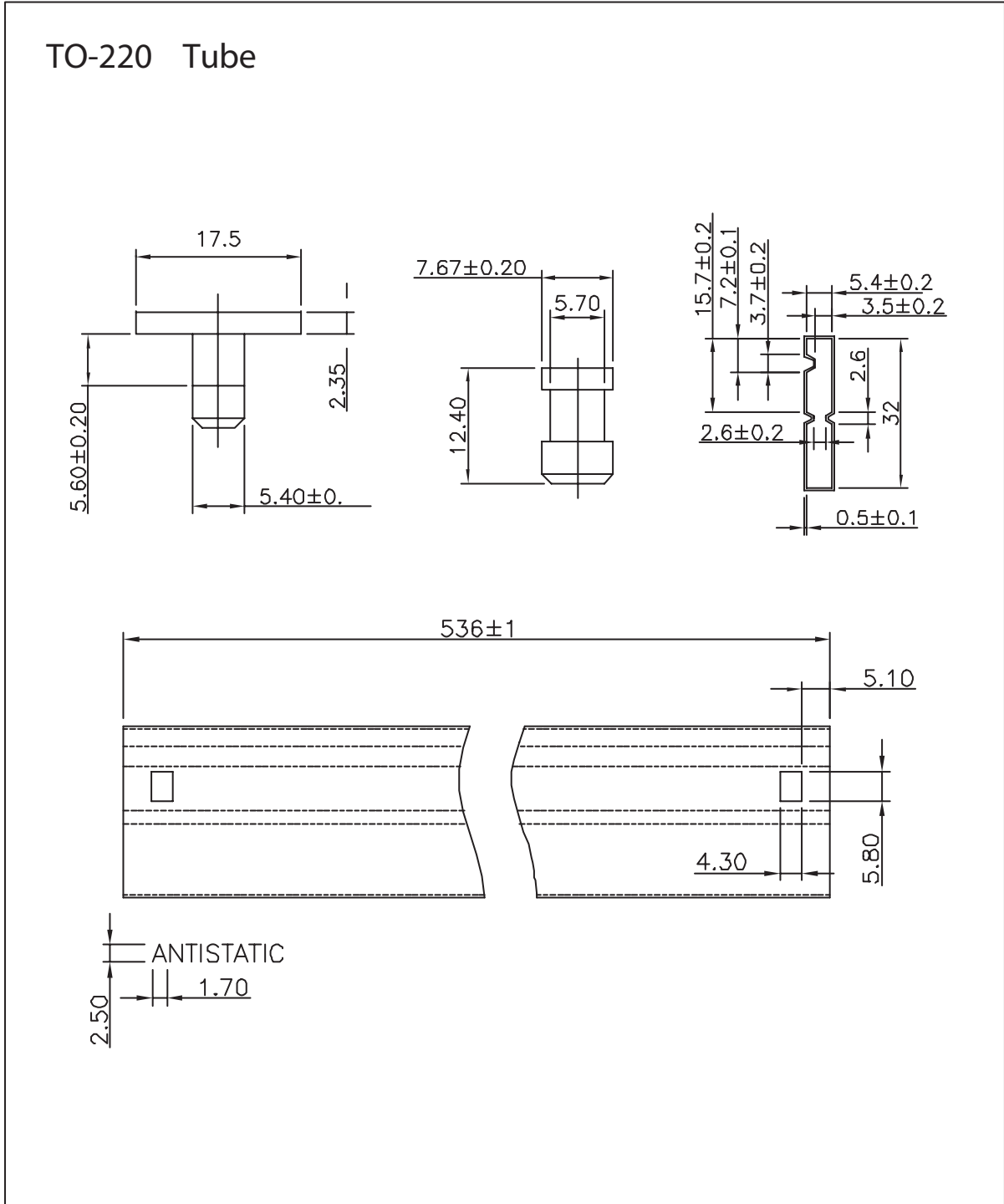


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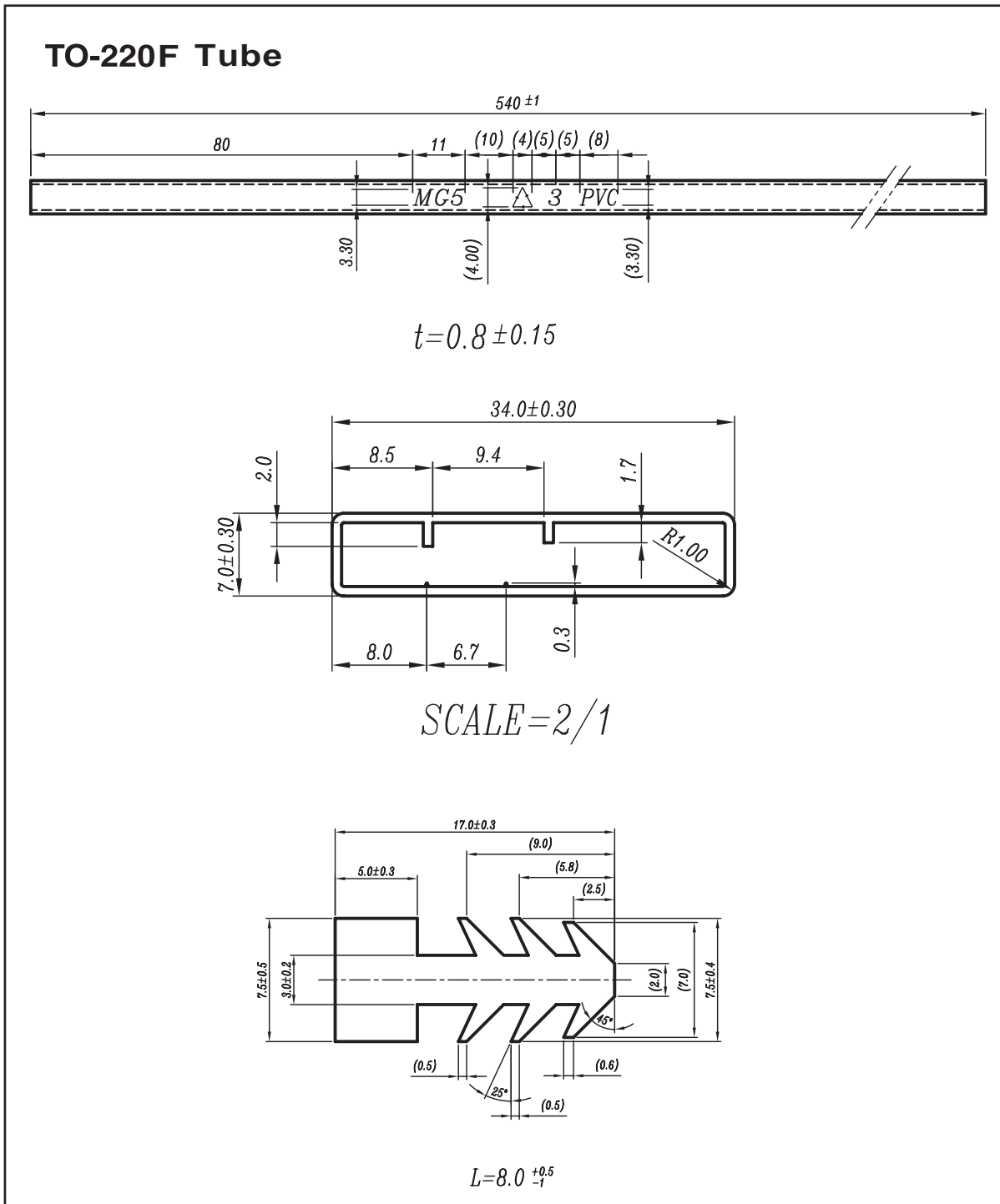
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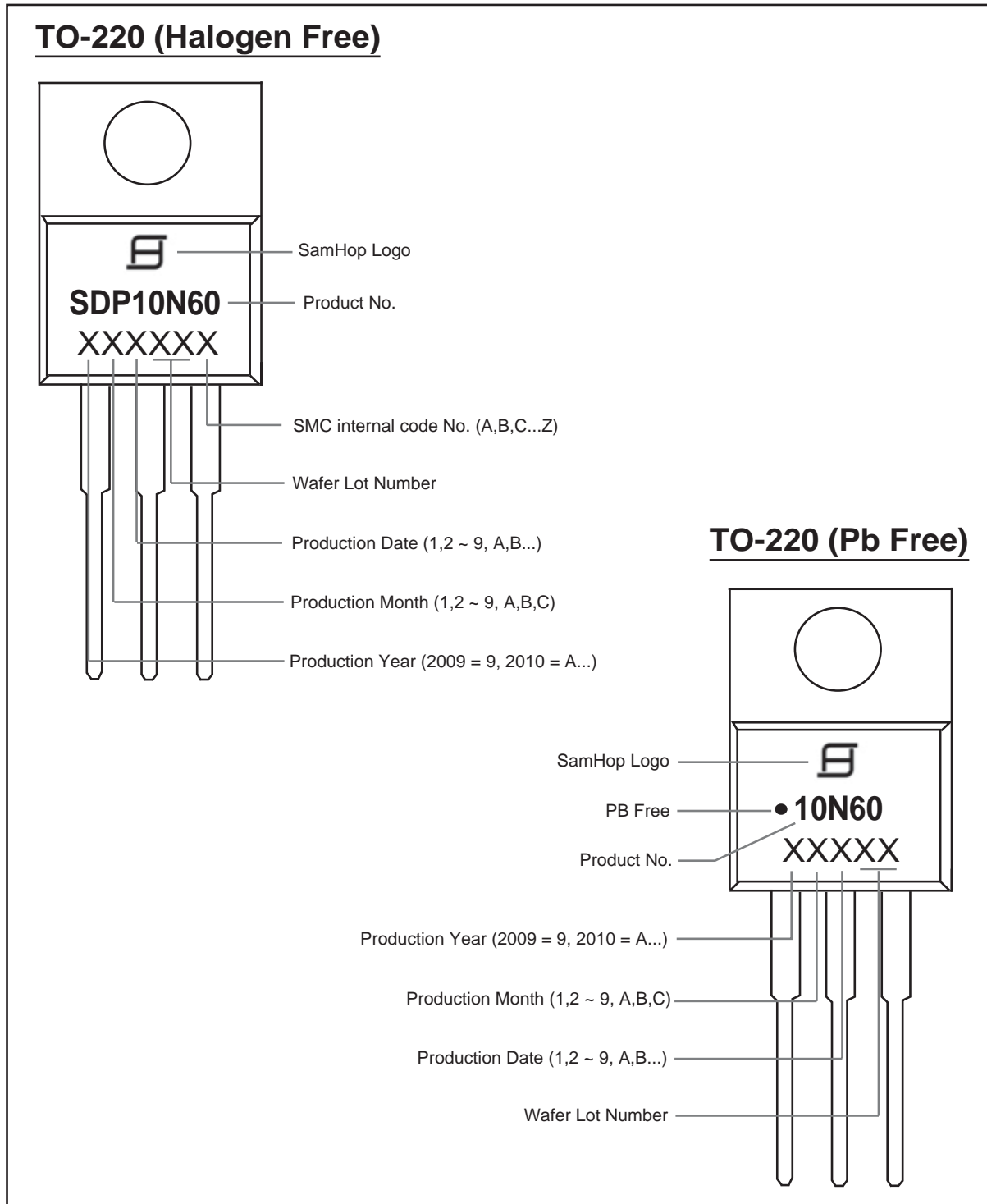
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## TOP MARKING DEFINITION



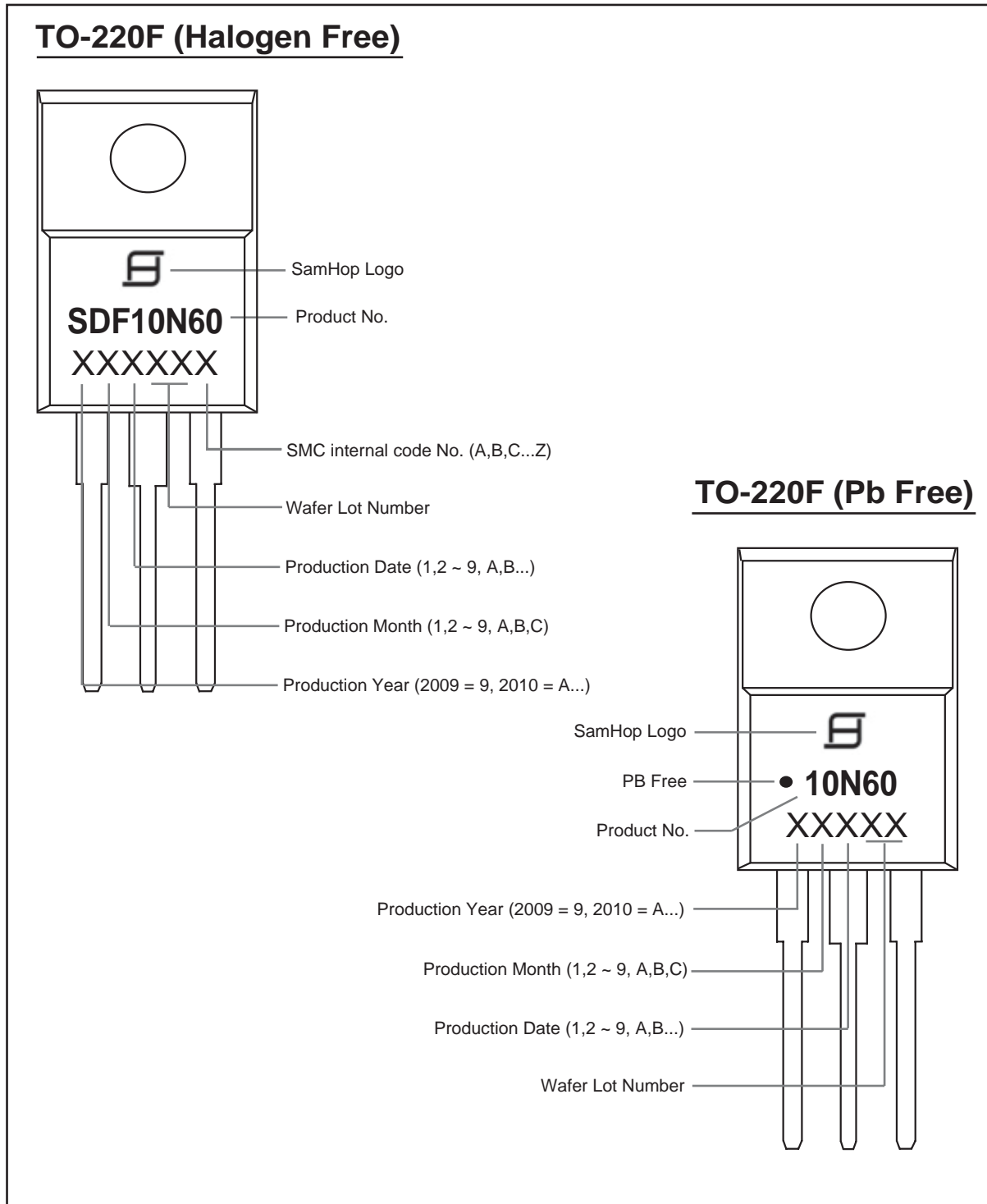
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