



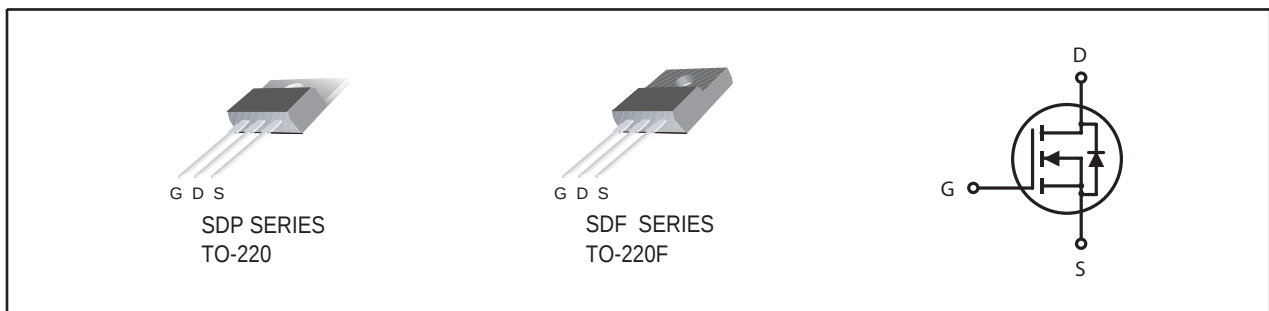
N-Channel Enhancement Mode Field Effect Transistor

PRODUCT SUMMARY

V _{DSS}	I _D	R _{DS(ON)} (Ω) Typ
500V	5A	1.35 @ V _{GS} =10V

FEATURES

- Super high dense cell design for low R_{DS(ON)}.
- Rugged and reliable.
- TO-220 and TO-220F Package.



ORDERING INFORMATION

Ordering Code	Package	Marking Code	Delivery Mode	RoHS Status
SDP05N50HZ	TO-220	SDP05N50	Tube	Halogen Free
SDP05N50PZ	TO-220	05N50	Tube	Pb Free
SDF05N50HZ	TO-220F	SDF05N50	Tube	Halogen Free
SDF05N50PZ	TO-220F	05N50	Tube	Pb Free

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

Symbol	Parameter	SDP05N50	SDF05N50	Units
V _{DS}	Drain-Source Voltage	500		V
V _{GS}	Gate-Source Voltage	±30	±30	V
I _D	Drain Current-Continuous ^a	T _C =25°C	5.0	A
		T _C =100°C	3.5	A
I _{DM}	-Pulsed ^a	15	15	A
E _{AS}	Single Pulse Avalanche Energy ^c	40		mJ
P _D	Maximum Power Dissipation	T _C =25°C	83	W
		T _C =100°C	42	W
T _J , T _{STG}	Operating Junction and Storage Temperature Range	-55 to 175		°C

THERMAL CHARACTERISTICS

R _{θJC}	Thermal Resistance, Junction-to-Case	1.8	5.4	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	62.5	62.5	°C/W

SDP05N50

SDF05N50

Ver 2.3

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =250uA	500			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =400V , V _{GS} =0V			1	uA
I _{GSS}	Gate-Body Leakage Current	V _{GS} = ±20V , V _{DS} =0V			±100	nA
ON CHARACTERISTICS						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	2	3	4	V
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =10V , I _D =2.5A		1.35	1.7	ohm
g _{FS}	Forward Transconductance	V _{DS} =20V , I _D =2.5A		2.9		S
DYNAMIC CHARACTERISTICS [°]						
C _{ISS}	Input Capacitance	V _{DS} =25V,V _{GS} =0V f=1.0MHz		545		pF
C _{OSS}	Output Capacitance			64		pF
C _{RSS}	Reverse Transfer Capacitance			12		pF
SWITCHING CHARACTERISTICS [°]						
t _{D(ON)}	Turn-On Delay Time	V _{DD} =250V I _D =1A V _{GS} =10V R _{GEN} =25 ohm		22		ns
t _r	Rise Time			15.5		ns
t _{D(OFF)}	Turn-Off Delay Time			23		ns
t _f	Fall Time			10		ns
Q _g	Total Gate Charge	V _{DS} =250V,I _D =1A,V _{GS} =10V		11		nC
Q _{gs}	Gate-Source Charge	V _{DS} =250V,I _D =1A, V _{GS} =10V		2.4		nC
Q _{gd}	Gate-Drain Charge			4.4		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
V _{SD}	Diode Forward Voltage	V _{GS} =0V,I _S =2A		0.79	1.4	V
Notes						
a.Drain current limited by maximum junction temperatrue.						
b.Guaranteed by design, not subject to production testing.						
c.Starting T _J =25 [°] C,L=5mH,V _{DD} = 50V.(See Figure12)						

Dec,24,2013

SDP05N50

SDF05N50

Ver 2.3

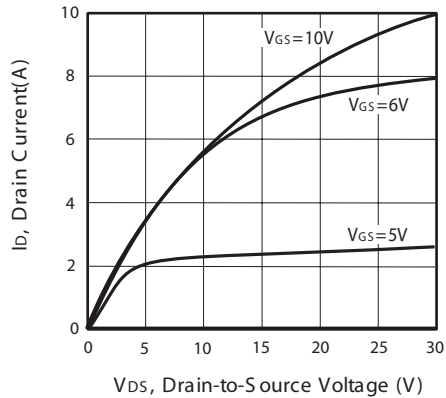


Figure 1. Output Characteristics

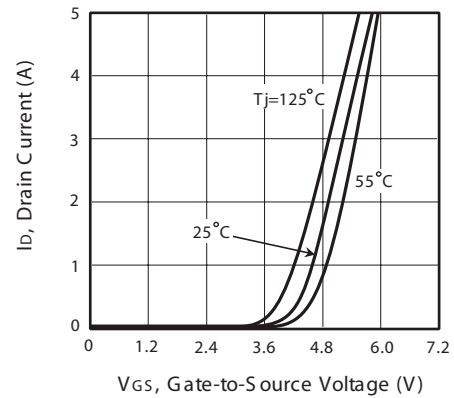


Figure 2. Transfer Characteristics

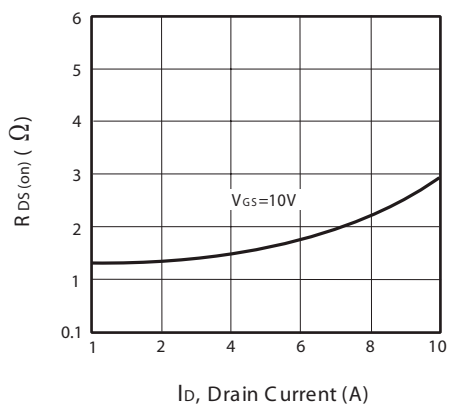


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

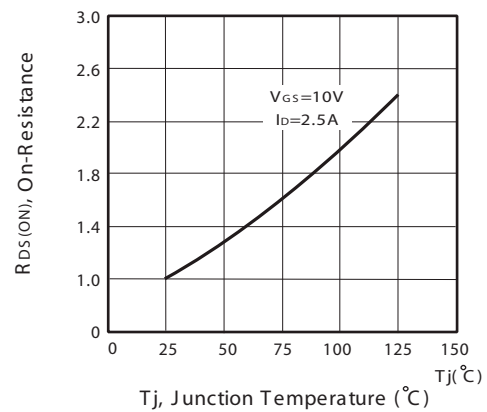


Figure 4. On-Resistance Variation with Drain Current and Temperature

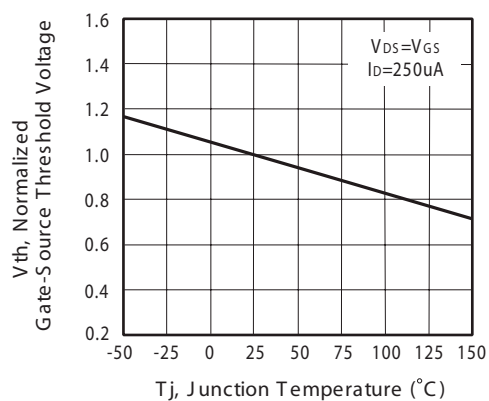


Figure 5. Gate Threshold Variation with Temperature

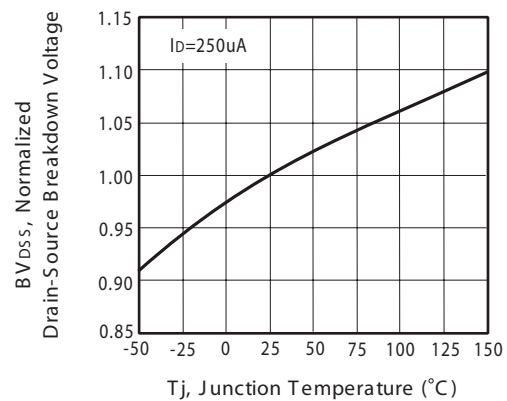


Figure 6. Breakdown Voltage Variation with Temperature

Dec,24,2013

SDP05N50

SDF05N50

Ver 2.3

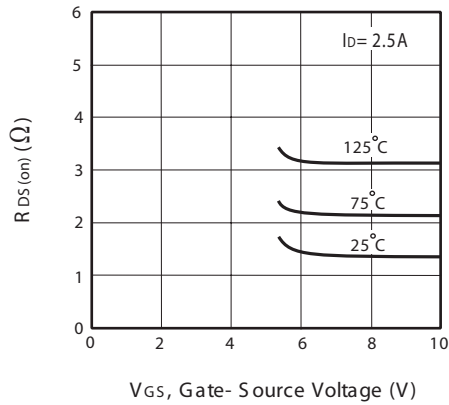


Figure 7. On-Resistance vs. Gate-Source Voltage

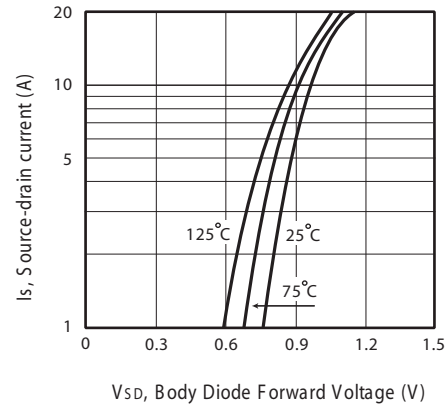


Figure 8. Body Diode Forward Voltage Variation with Source Current

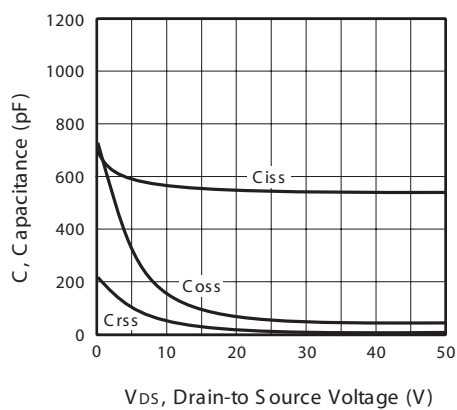


Figure 9. Capacitance

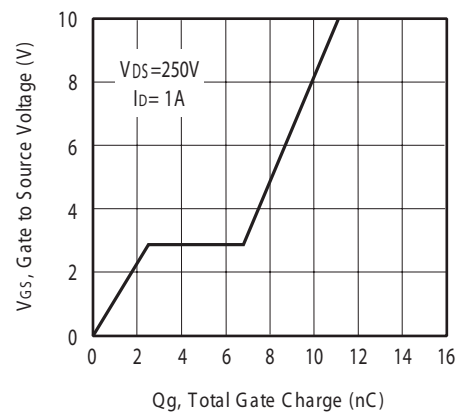


Figure 10. Gate Charge

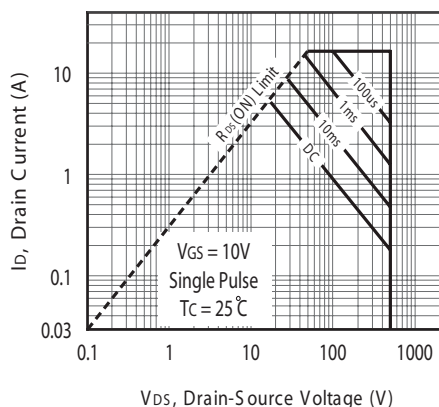


Figure 11a. Maximum Safe Operating Area for SDP05N50

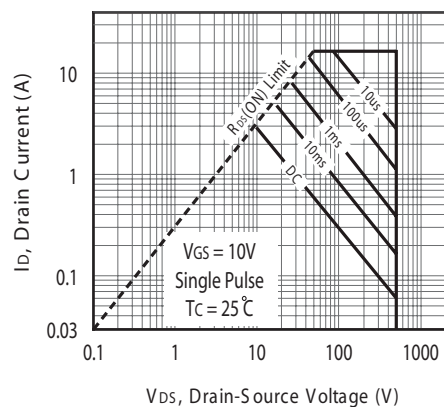


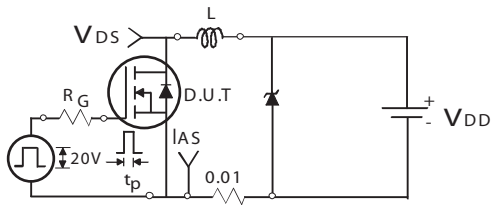
Figure 11a. Maximum Safe Operating Area for SDF05N50

Dec,24,2013

SDP05N50

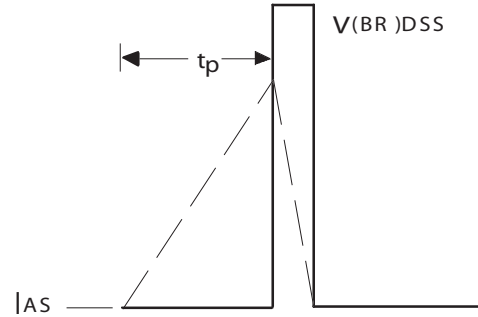
SDF05N50

Ver 2.3



Unclamped Inductive Test Circuit

Figure 12a.



Unclamped Inductive Waveforms

Figure 12b.

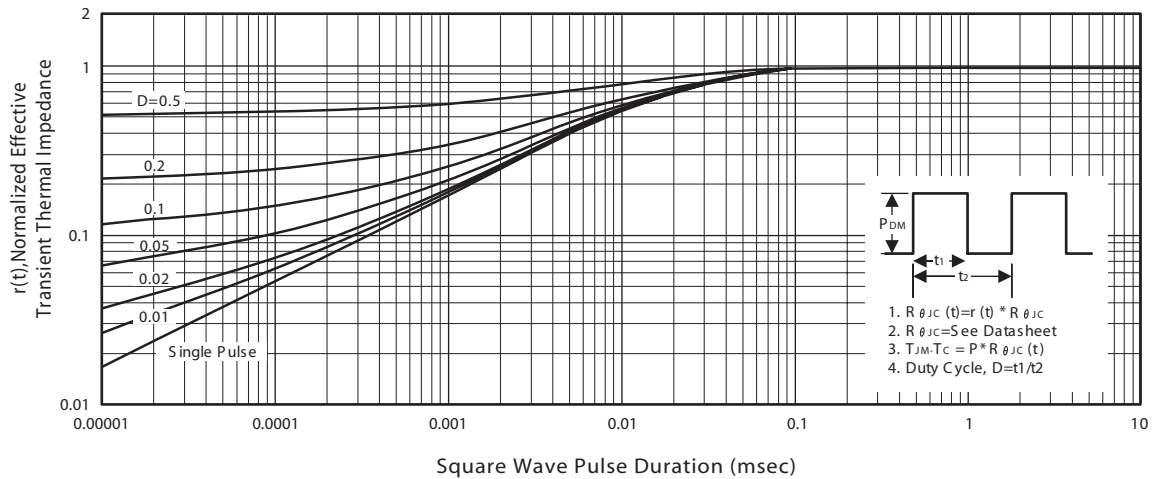


Figure 13a. Normalized Thermal Transient Impedance Curve for SDP05N50

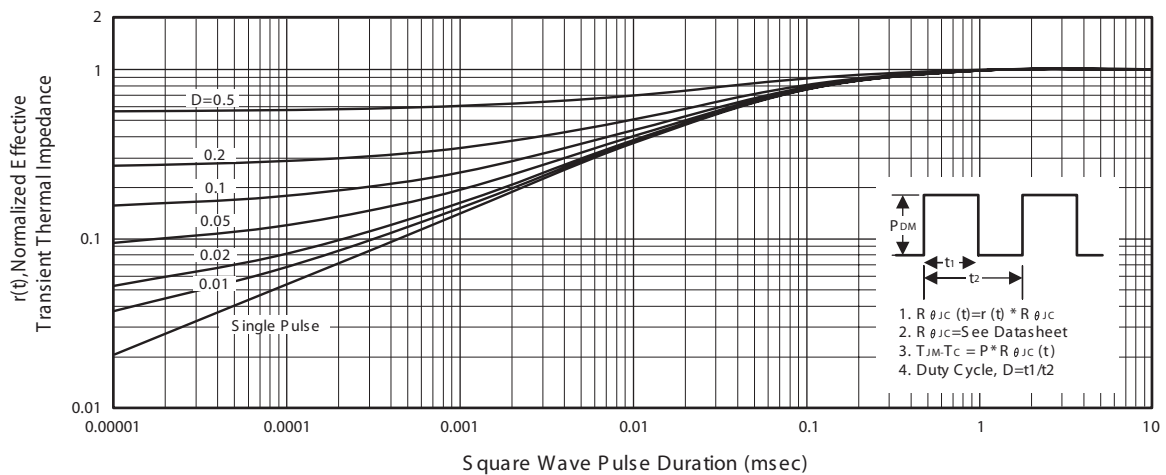


Figure 13b. Normalized Thermal Transient Impedance Curve for SDF05N50

Dec,24,2013

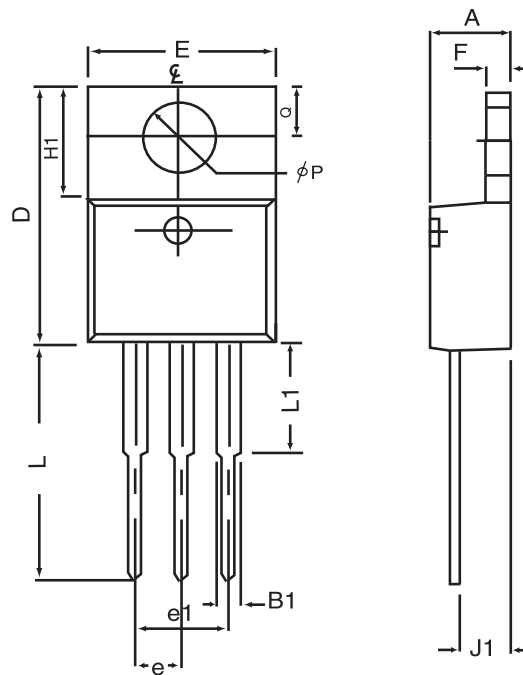
SDP05N50

SDF05N50

Ver 2.3

PACKAGE OUTLINE DIMENSIONS

TO-220



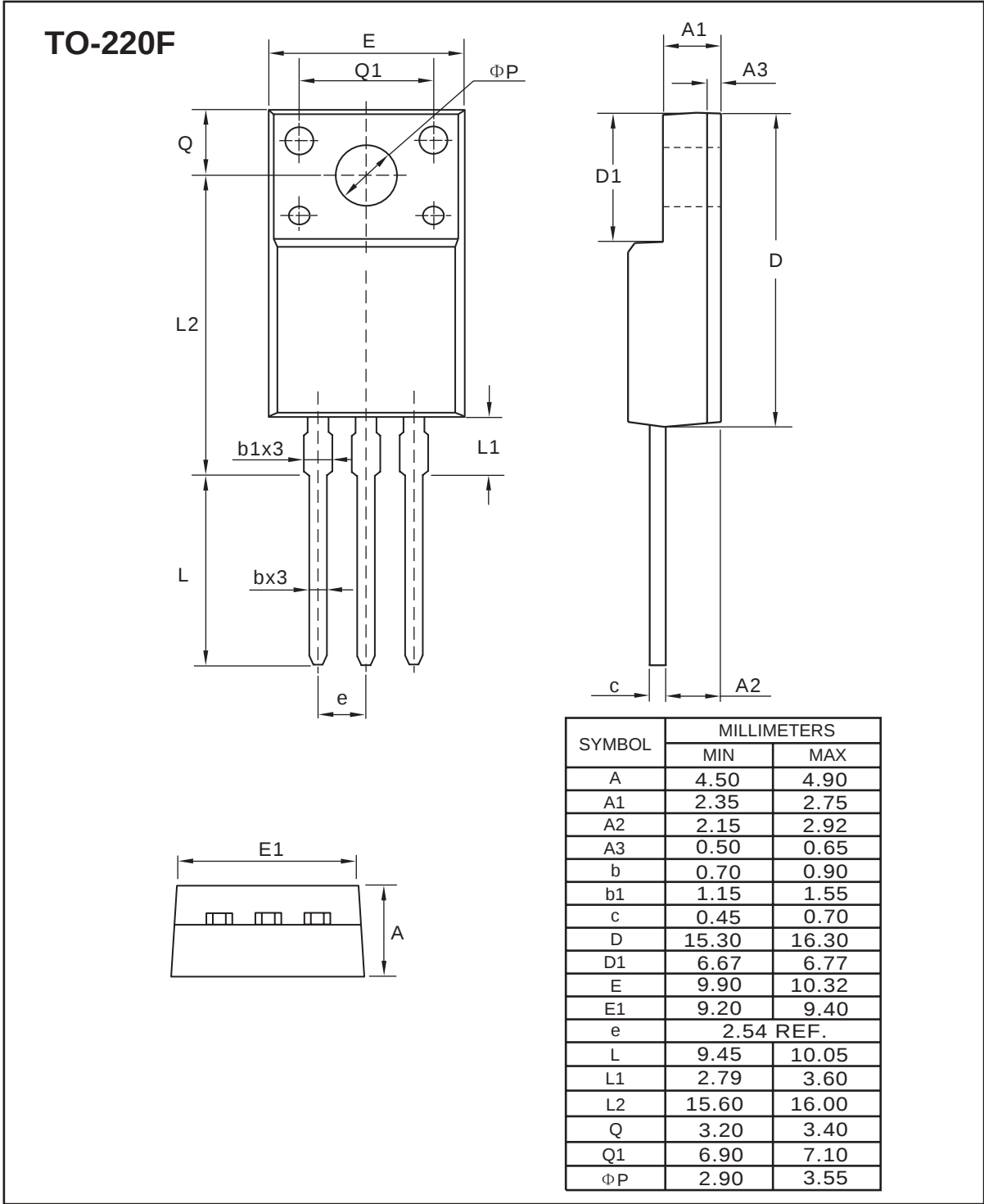
SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.32	4.80	0.170	0.189
B1	1.27	1.65	0.050	0.630
D	14.6	16.00	0.575	0.610
E	9.70	10.41	0.382	0.410
e	2.34	2.74	0.092	0.108
e1	4.68	5.48	0.184	0.216
F	1.14	1.40	0.045	0.055
H1	5.97	6.73	0.235	0.265
J1	2.20	2.79	0.087	0.110
L	12.88	14.22	0.507	0.560
L1	3.00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

Dec,24,2013

SDP05N50
SDF05N50

Ver 2.3

PACKAGE OUTLINE DIMENSIONS



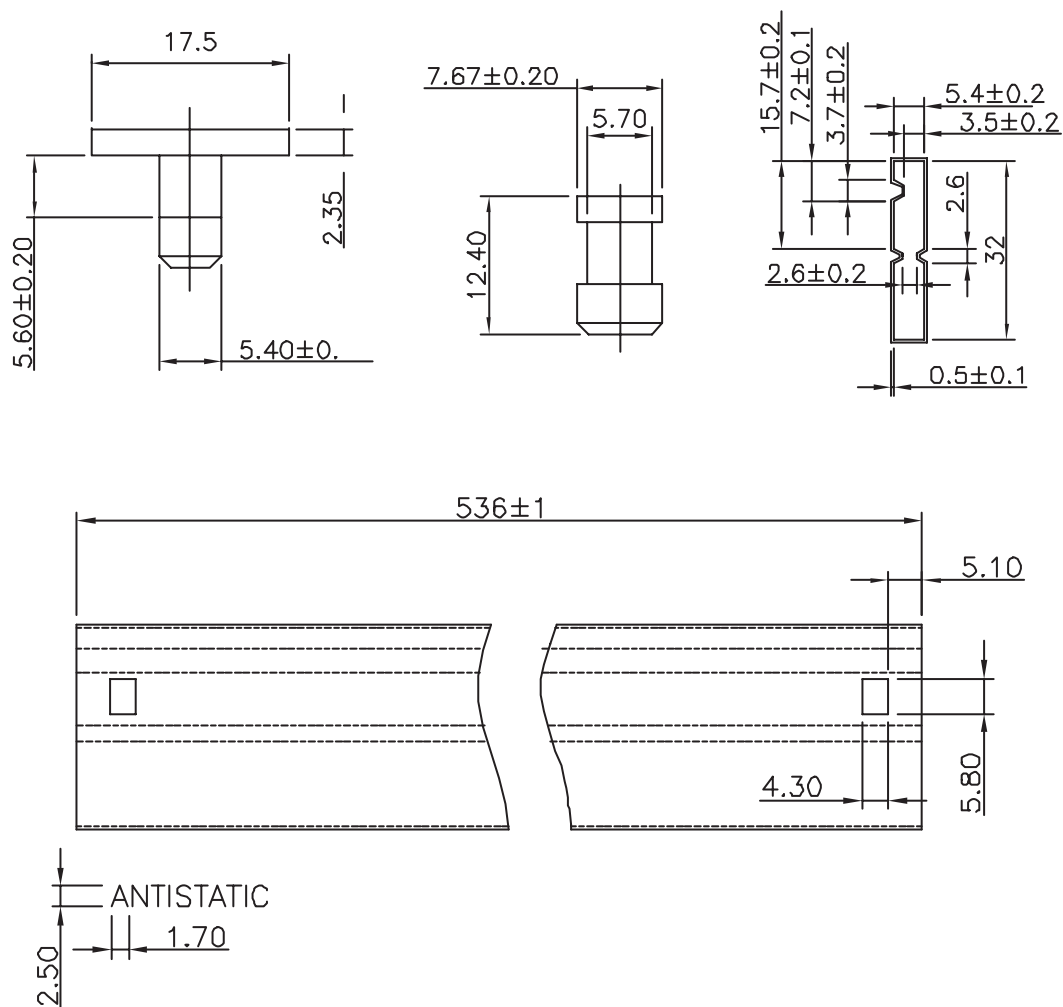
Dec,24,2013

SDP05N50

SDF05N50

Ver 2.3

TO-220 Tube

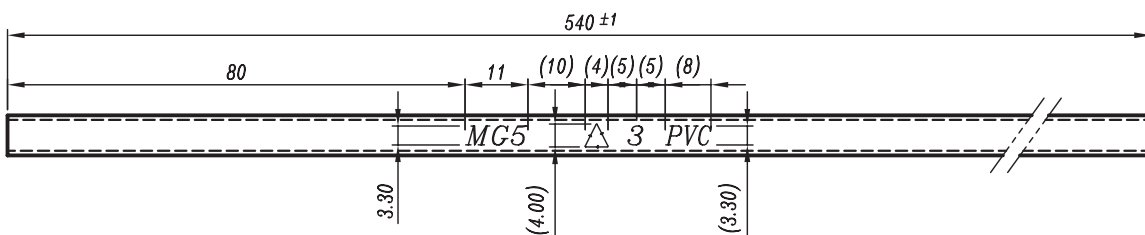


Dec,24,2013

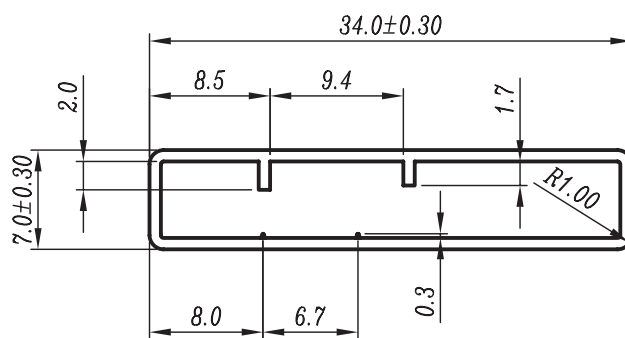
SDP05N50
SDF05N50

Ver 2.3

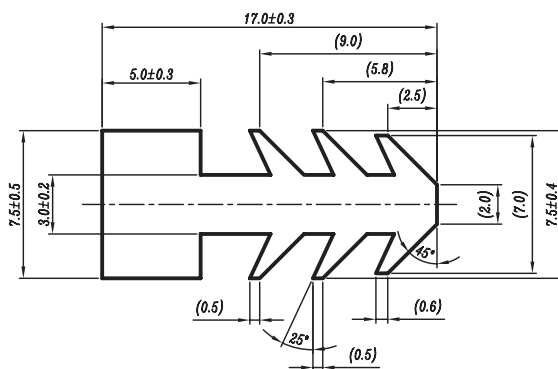
TO-220F Tube



$$t=0.8 \pm 0.15$$



SCALE=2/1



$$L=8.0^{+0.5}_{-1}$$

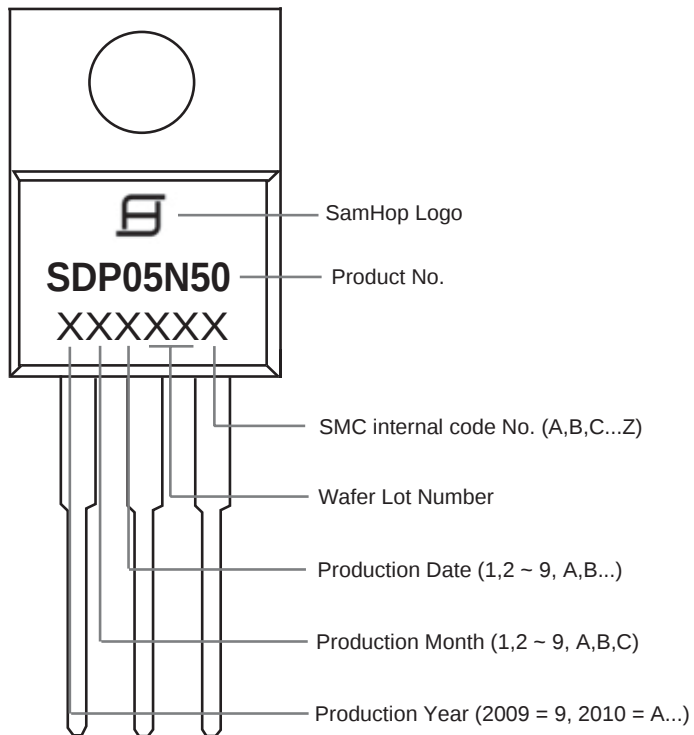
SDP05N50

SDF05N50

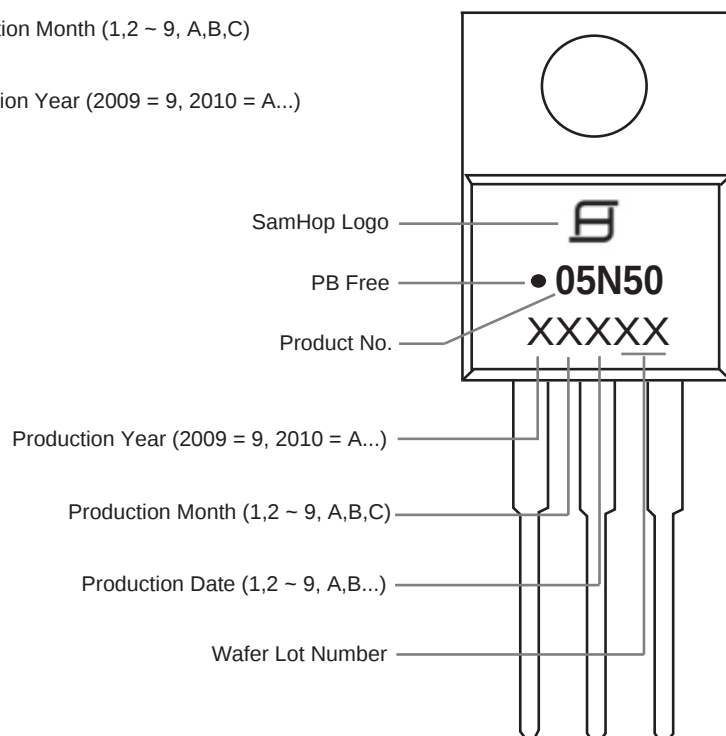
Ver 2.3

TOP MARKING DEFINITION

TO-220 (Halogen Free)



TO-220 (Pb Free)



Dec,24,2013

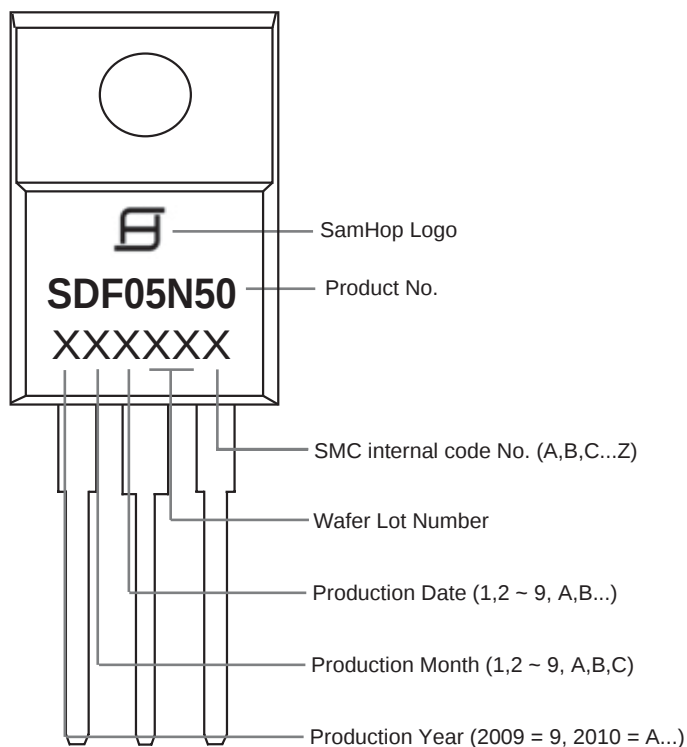
SDP05N50

SDF05N50

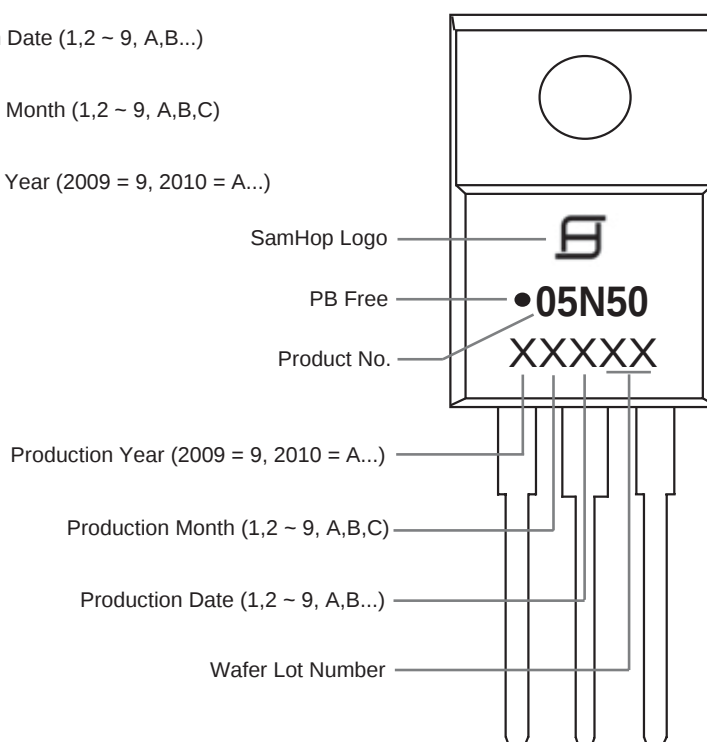
Ver 2.3

TOP MARKING DEFINITION

TO-220F (Halogen Free)



TO-220F (Pb Free)



Dec,24,2013