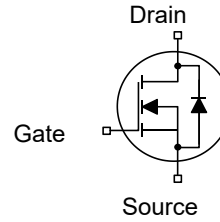




Description

WLP40N20 is high voltage MOSFET family based on advanced planar stripe DMOS technology. This advanced MOSFET family has optimized on-state resistance, and also provides superior switching performance and higher avalanche energy strength. This device family is suitable for high efficiency switch mode power supplies.

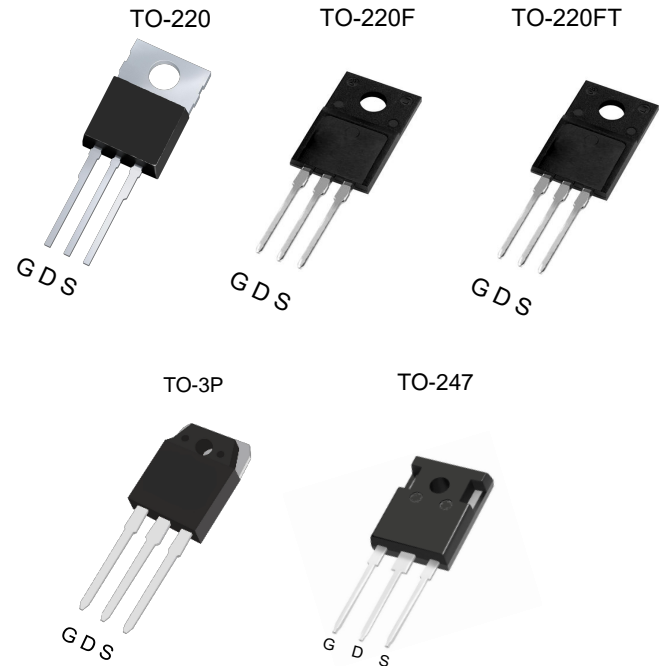


Features

- $R_{DS(on)} \leq 0.065\Omega$ @ $V_{GS}=10V, I_D=20A$
- Low gate Charge (typical 58.6nC)
- Low Crss (typical 13.6pF)
- Fast switching capability
- 100% avalanche tested
- Improved dv/dt capability

Applications

- Switch Mode Power Supply
- Uninterruptible Power Supply (UPS)
- TV Power
- A dapter/Charger



Key Performance Parameters		
Parameter	Value	Unit
$V_{DS} @ T_{J,max}$	250	V
$R_{DS(on),max}$	0.065	Ω
$Q_{g,typ}$	58.6	nC
I_D	40	A
$I_{D,pulse}$	160	A
Device Marking and Package Information		
Device	Package	Marking
WLP40N20F	TO-220F	40N20F
WLP40N20FT	TO-220FT	40N20FT
WLP40N20	TO-220	40N20
WLP40N20G	TO-3P	40N20G
WLP40N20E	TO-247	40N20E



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted			
Parameter	Symbol	Value	Unit
Drain-Source Voltage($V_{GS}=0\text{V}$)	V_{DS}	200	V
Continuous Drain Current ¹⁾	I_D	$T_C = 25^\circ\text{C}$	40
		$T_C = 100^\circ\text{C}$	25.2
Pulsed Drain Current ²⁾	$I_{D,pulse}$	160	A
Gate-Source Voltage	V_{GS}	± 30	V
Single Pulse Avalanche Energy ³⁾	E_{AS}	1280	mJ
MOSFET dv/dt Ruggedness, $V_{DS} = 0 \dots 160\text{V}$	dv/dt	5	V/ns
Power Dissipation For TO-220F、TO220-FT	P_D	104	W
Power Dissipation For TO-220/3P/247		260	W
Continuous Diode Forward Current	I_S	40	A
Diode Pulsed Current ²⁾	$I_{S,pulse}$	160	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	$^\circ\text{C}$

Thermal Resistance For TO-220F、TO-220FT			
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	1.2	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	80	

Thermal Resistance For TO-220/3P/247			
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	0.48	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62	



Electrical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	200	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 200V$ $V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	μA
		$V_{DS} = 200V$, $V_{GS} = 0V, T_J = 150^\circ\text{C}$	--	--	100	
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = \pm 30V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2	--	4	V
Drain-Source On-State-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$	--	0.053	0.065	Ω
Gate Resistance	R_G	$f = 1.0\text{MHz}$ open drain	--	1.3	--	Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{GS} = 0V, V_{DS} = 25V$ $f = 1.0\text{MHz}$	--	3341	--	μF
Output Capacitance	C_{oss}		--	586	--	
Reverse Transfer Capacitance	C_{rss}		--	13.6	--	
Total Gate Charge	Q_g	$V_{DD} = 160V, I_D = 40A$ $V_{GS} = 10V$	--	58.6	--	nC
Gate-Source Charge	Q_{gs}		--	21.2	--	
Gate-Drain Charge	Q_{gd}		--	16.8	--	
Gate Plateau Voltage	$V_{plateau}$		--	6.1	--	V
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 100V, I_D = 40A$ $R_G = 25\Omega$	--	69		ns
Turn-on Rise Time	t_r		--	139		
Turn-off Delay Time	$t_{d(off)}$		--	148		
Turn-off Fall Time	t_f		--	104		
Drain-Source Body Diode Characteristics						
Body Diode Forward Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{SD} = 40A$ $V_{GS} = 0V$	--	--	1.2	V
Reverse Recovery Time	t_{rr}	$V_R = 200V$ $I_F = 40A, di_F/dt = 100A/\mu s$	--	569	--	ns
Reverse Recovery Charge	Q_{rr}		--	9.9	--	μC



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

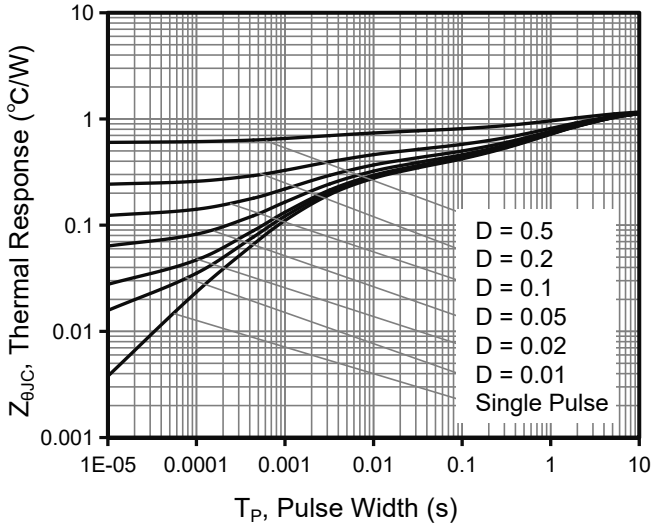


Figure 1. Transient Thermal Impedance For TO-220F, TO-220FT

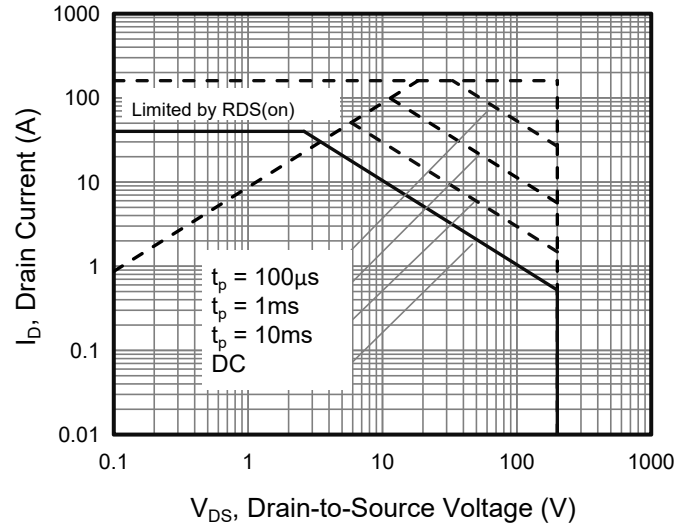


Figure 2. Safe Operation Area For TO-220F, TO-220FT

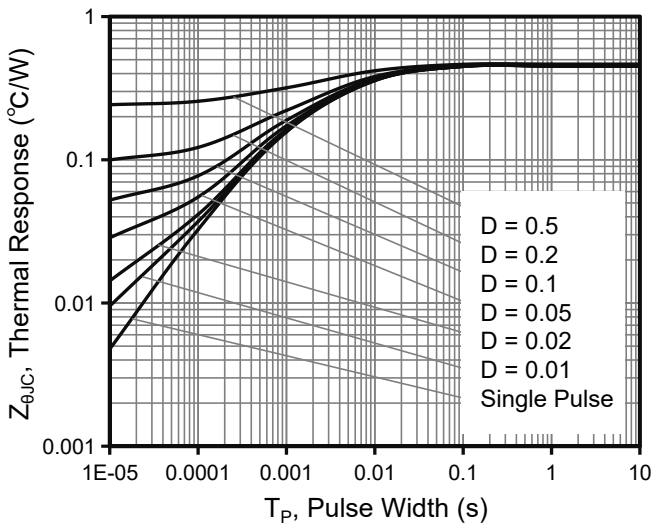


Figure 3. Transient Thermal Impedance For TO-220/3P/247

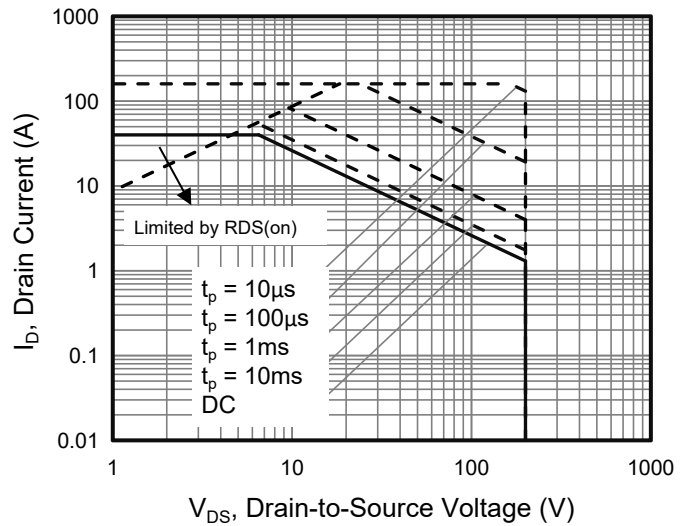


Figure 4. Safe Operation Area For TO-220/3P/247

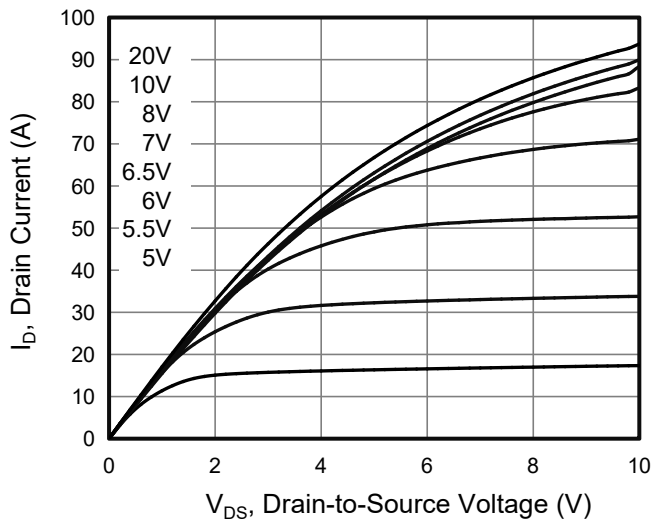


Figure 5. Output Characteristics

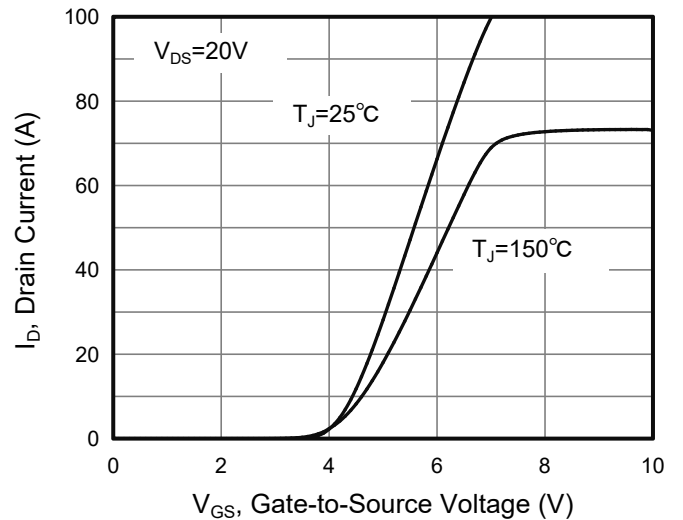


Figure 6. Transfer Characteristics



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

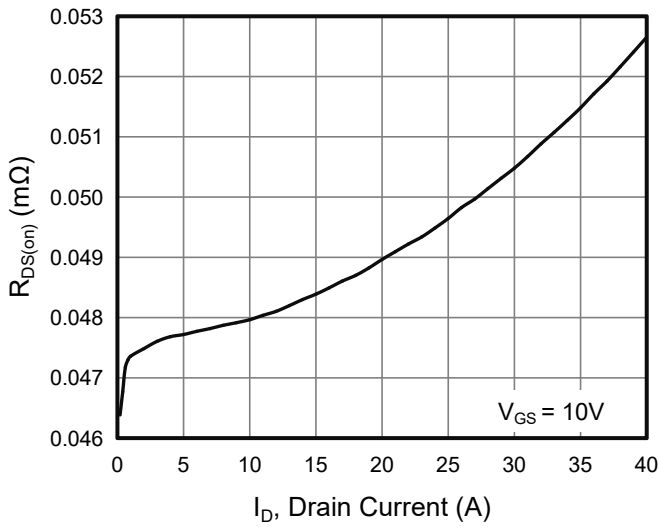


Figure 7. On-Resistance vs Drain Current

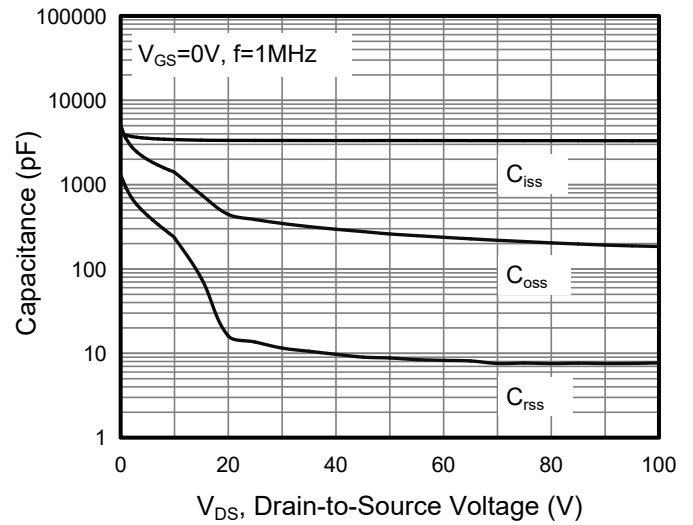


Figure 8. Capacitance

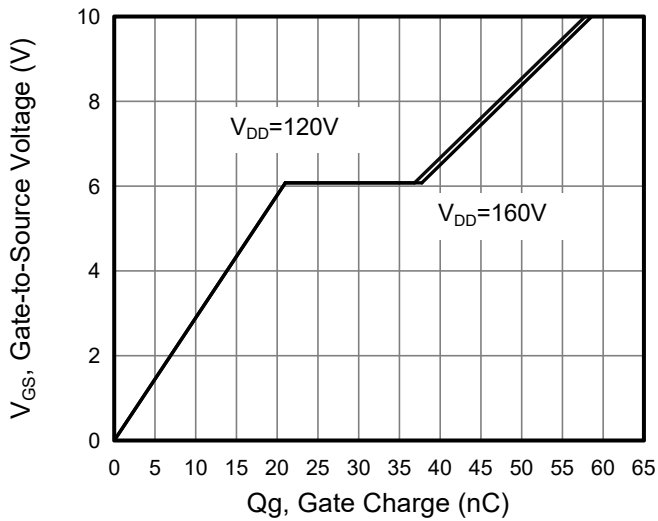


Figure 9. Gate Charge

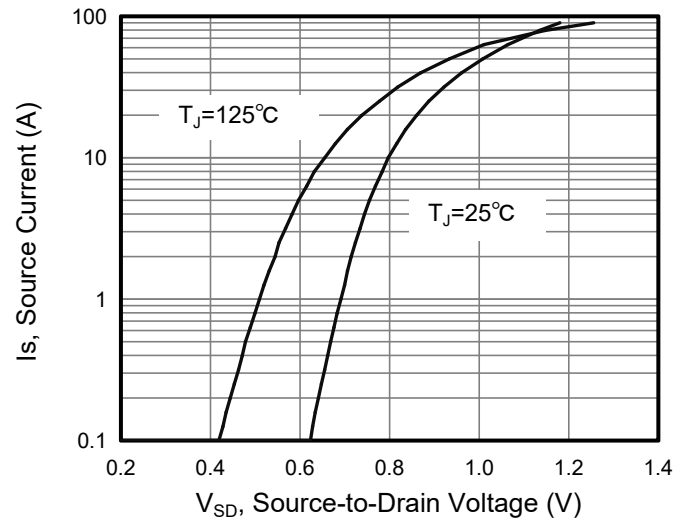


Figure 10. Body Diode Forward Voltage

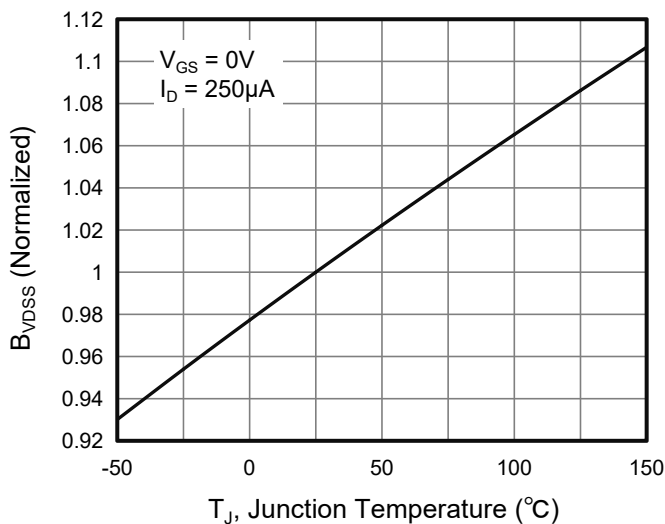


Figure 11. Breakdown Voltage vs Junction Temperature

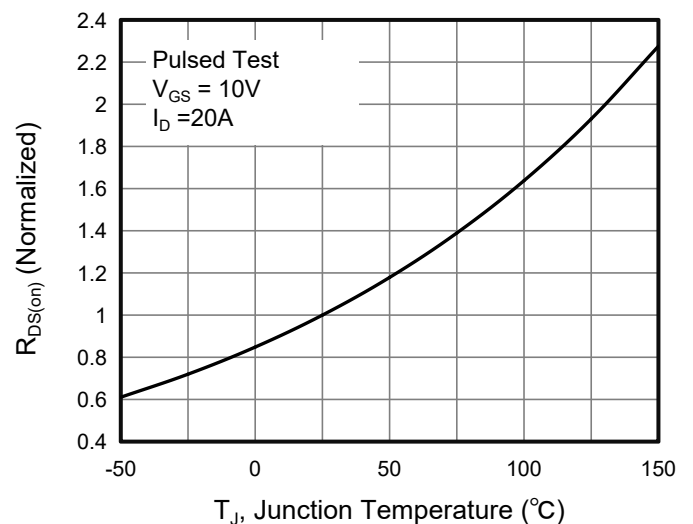


Figure 12. On-Resistance vs Temperature



Figure A: Gate Charge Test Circuit and Waveform

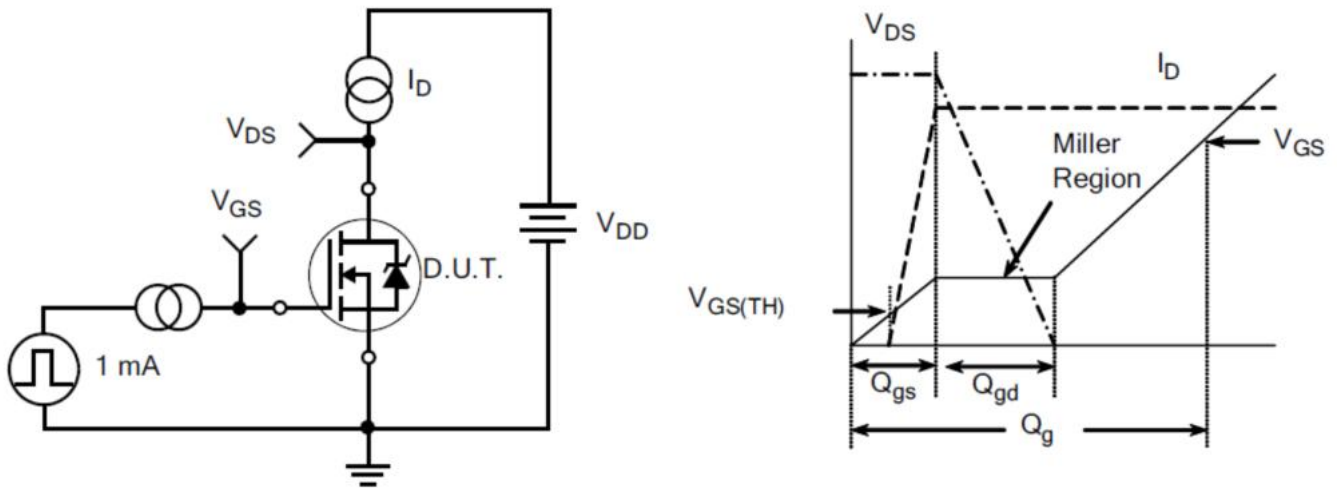


Figure B: Resistive Switching Test Circuit and Waveform

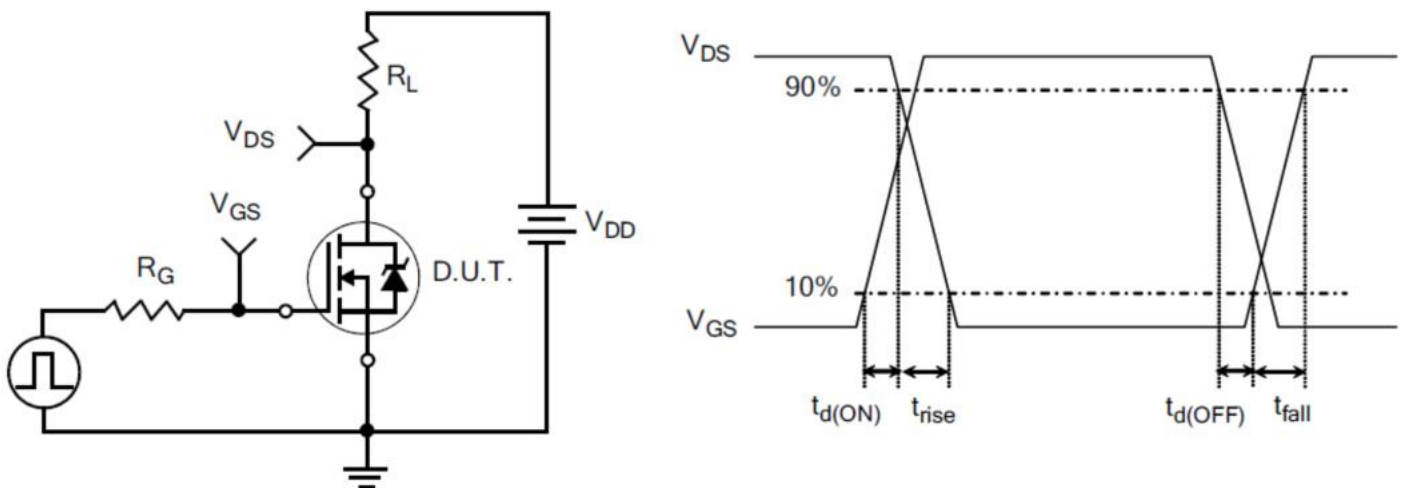
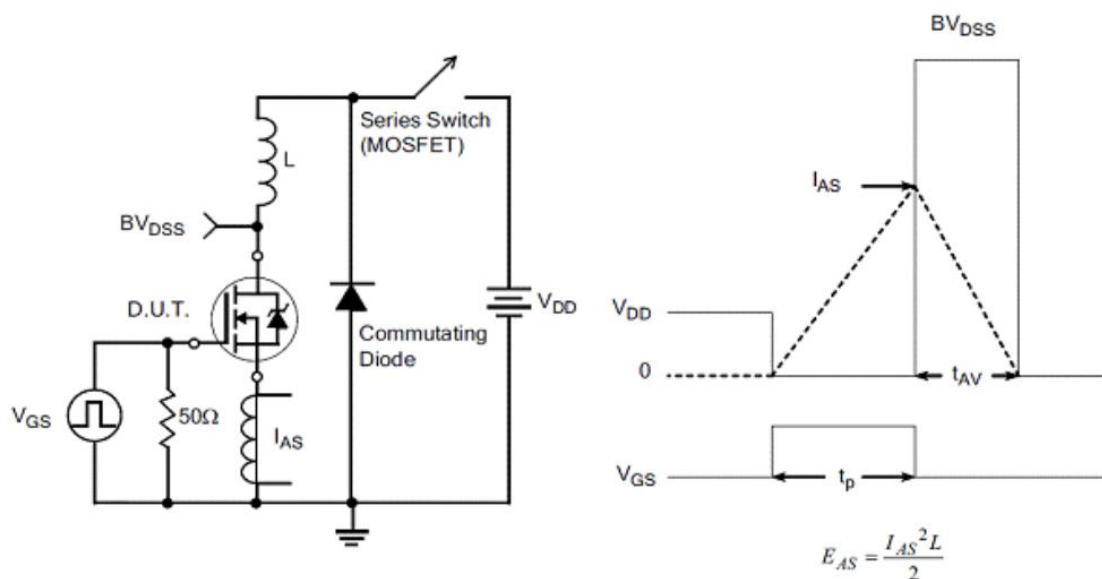
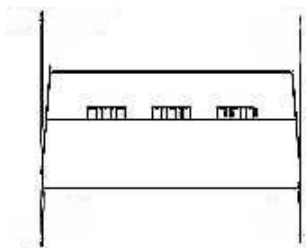
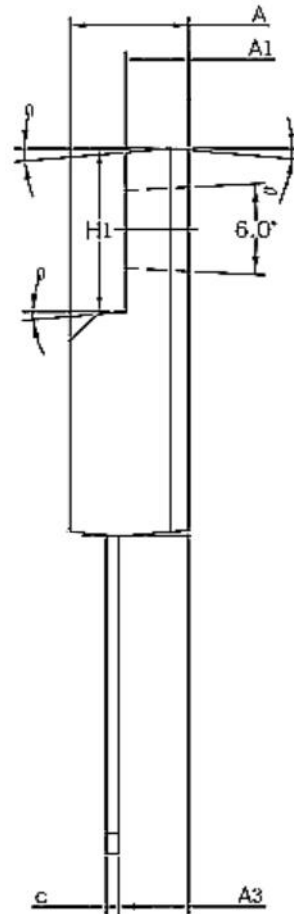
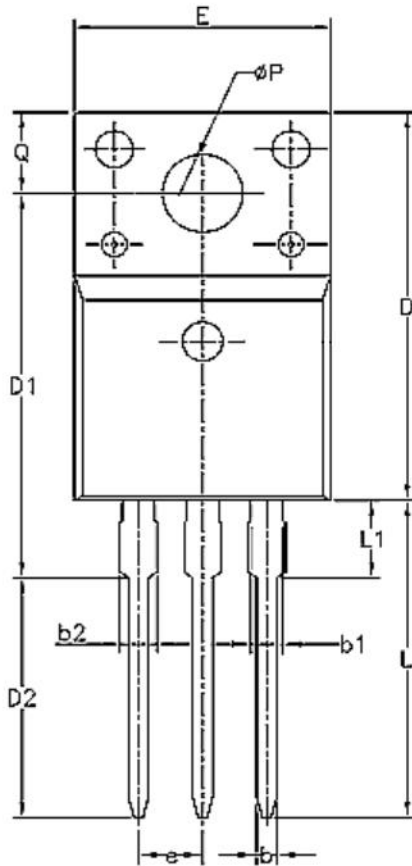


Figure C: Unclamped Inductive Switching Test Circuit and Waveform





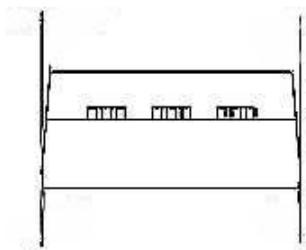
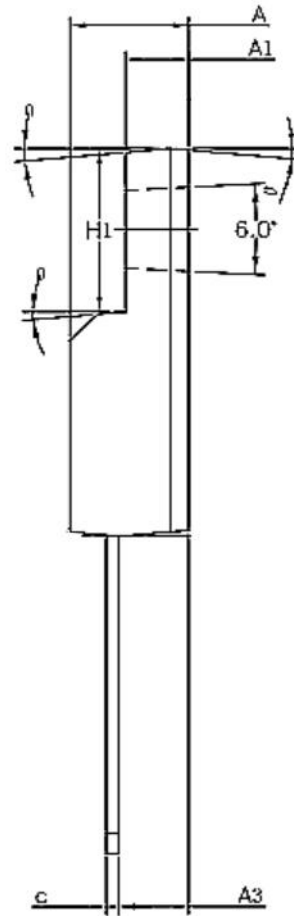
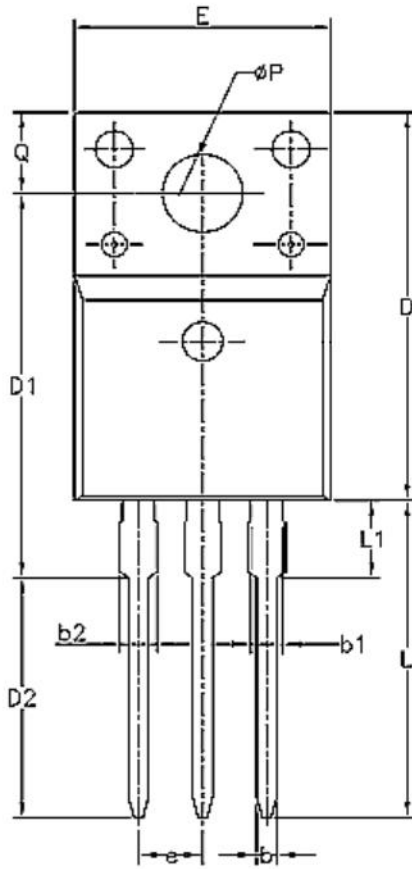
Outlines TO-220F Package



SYMBOL	MIN	NOM	MAX
A	4.5	4.7	4.9
A1	2.34	2.54	2.74
A3	2.56	2.76	2.96
b	0.7	---	0.95
b1	1.18	---	1.43
b2	---	---	1.55
c	0.4	0.5	0.65
D	15.57	15.87	16.17
D1	15.35	15.675	15.95
D2	9.6	9.875	10.15
E	9.96	10.16	10.36
e	2.54 BSC		
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	---	---	3.5



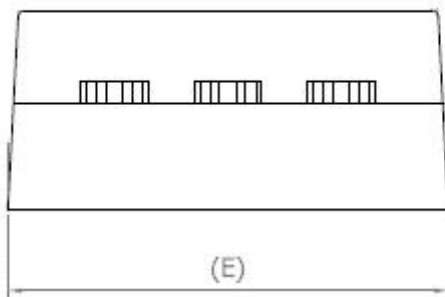
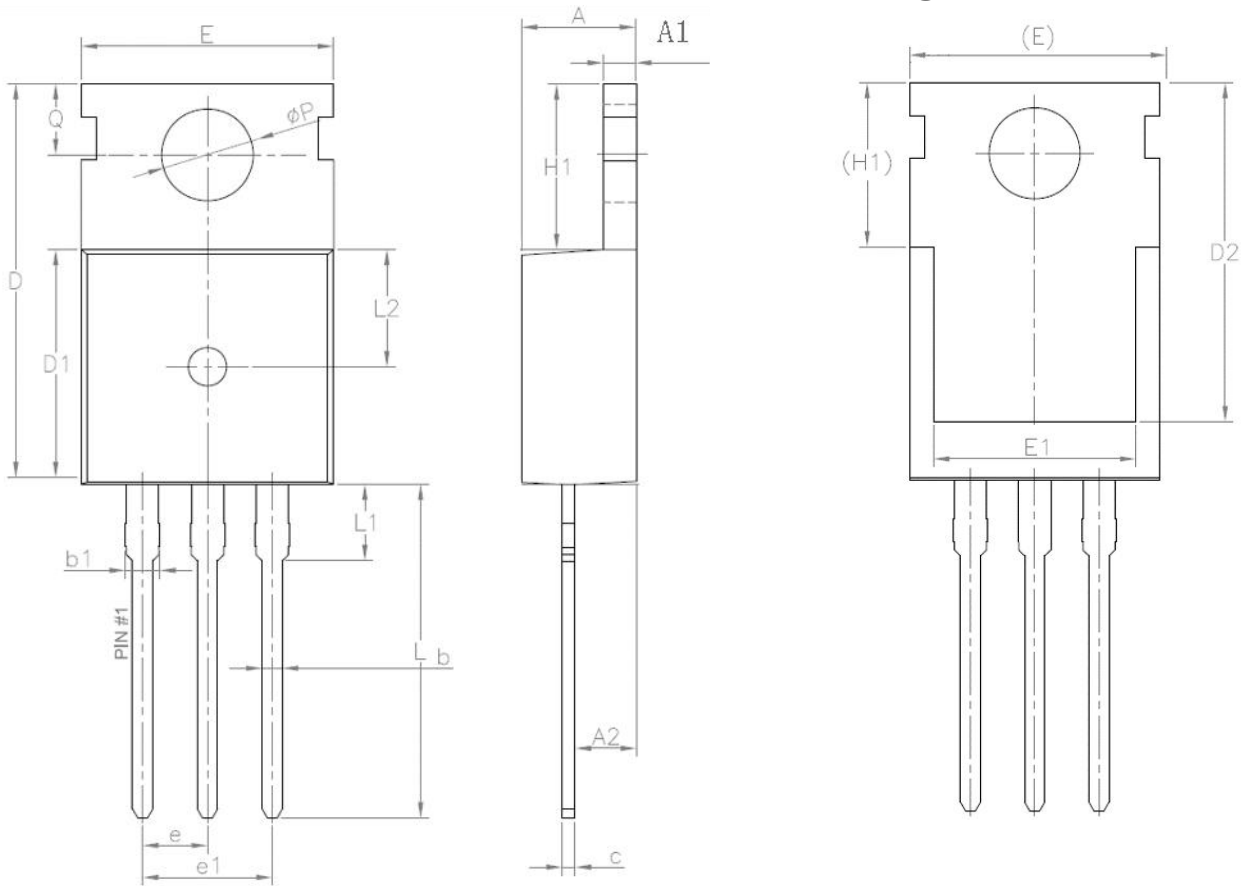
Outlines TO-220FT Package



SYMBOL	MIN	NOM	MAX
A	4.5	4.7	4.9
A1	2.34	2.54	2.74
A3	2.56	2.76	2.96
b	0.7	---	0.95
b1	1.18	---	1.43
b2	---	---	1.55
c	0.4	0.5	0.65
D	15.57	15.87	16.17
D1	15.35	15.675	15.95
D2	9.6	9.875	10.15
E	9.96	10.16	10.36
e	2.54 BSC		
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	---	---	3.5



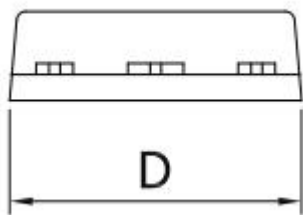
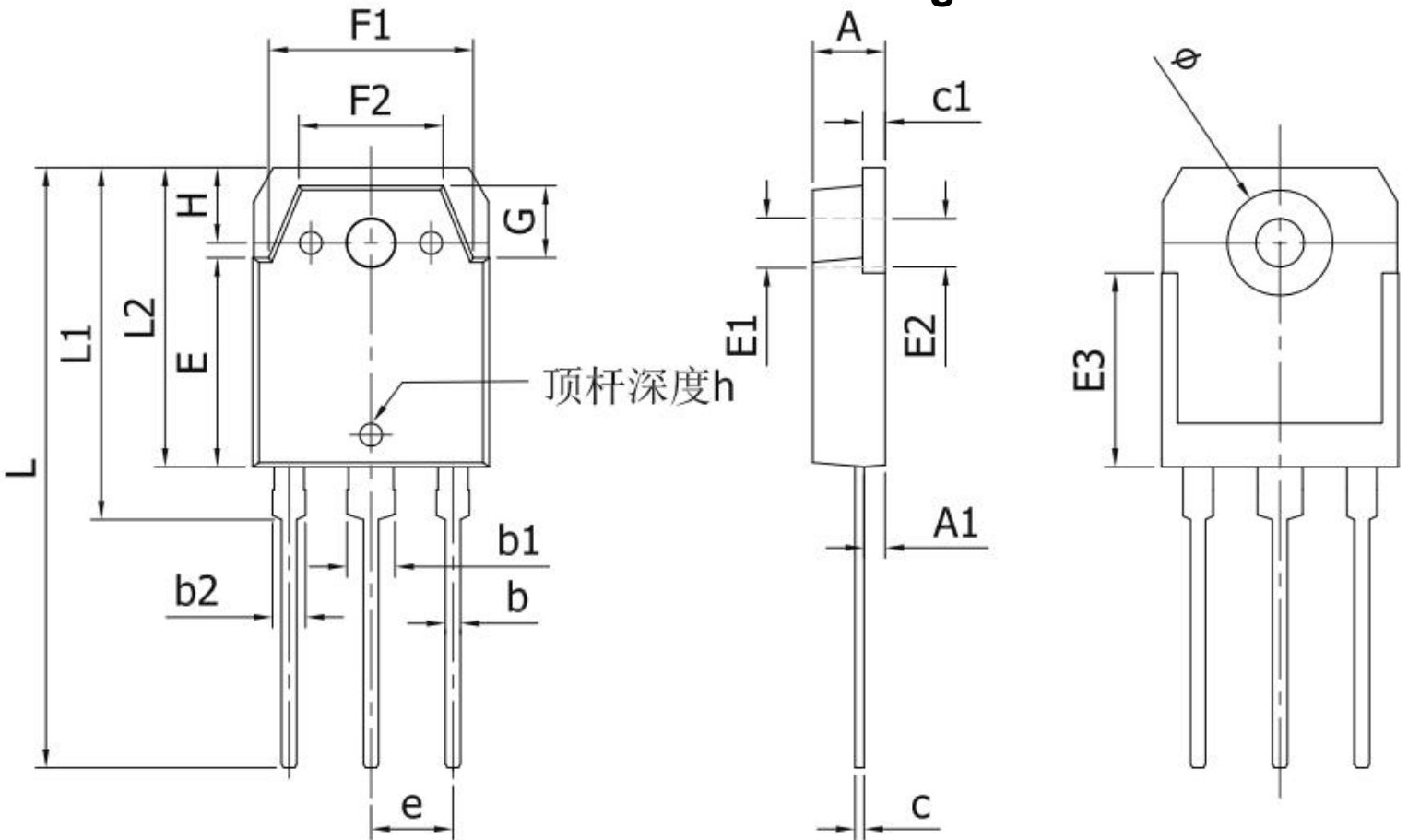
Outlines TO-220 Package



SYMBOL	MIN	NOM	MAX
A	4.37	4.535	4.7
A1	1.25	1.3	1.4
A2	2.2	2.4	2.6
b	0.7	---	0.95
b1	1.17	---	1.47
c	0.45	0.5	0.6
D	15.1	15.65	16.1
D1	8.8	9.15	9.4
D2	11.8	---	---
E	9.7	9.95	10.3
E1	7	---	---
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.5	6.85
L	12.75	13.29	13.8
L1	---	---	3.5
ΦP	3.4	3.67	3.8
Q	2.6	---	3



Outlines TO-3P Package

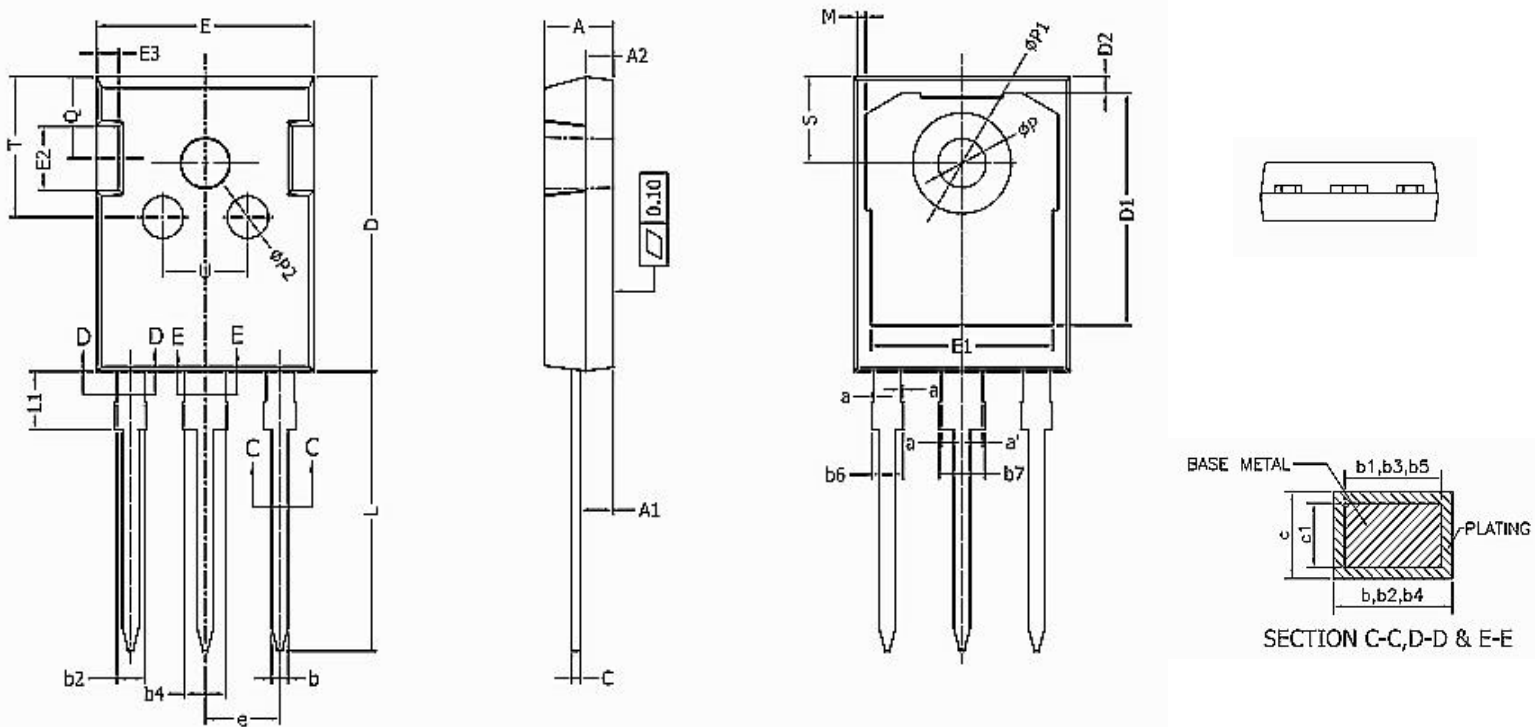


SYMBOL	MIN	NOM	MAX
A	4.6	4.8	5.0
A1	1.2	1.4	1.6
b	0.8	1	1.2
b1	2.8	3	3.2
b2	1.8	2	2.2
c	0.5	0.6	0.7
c1	1.45	1.55	1.65
D	15.45	15.65	15.85
E	13.7	13.9	14.1
E1	3.3REF		
E2	3.2REF		

SYMBOL	MIN	NOM	MAX
E3	12.9REF		
F1	13.4	13.6	13.8
F2	9.4	9.6	9.8
L	39.7	39.9	40.1
L1	23.2	23.4	23.6
L2	19.7	19.9	20.1
ø	6.9	7	7.1
G	4.6	4.8	5.0
e	5.45TYP		
H	5.0REF		
h	0.0	0.15	0.3



Outlines TO-247 Package



SYMBOL	MIN	NOM	MAX
A	4.9	5	5.1
A1	2.31	2.41	2.51
A2	1.9	2	2.1
a	0	---	0.15
a'	0	---	0.15
b	1.16	---	1.26
b1	1.15	1.2	1.22
b2	1.96	---	2.06
b3	1.95	2	2.02
b4	2.96	---	3.06
b5	2.96	3	3.02
b6	---	---	2.25
b7	---	---	3.25
c	0.59	---	0.66
c1	0.58	0.6	0.62
D	20.9	21	21.1
D1	16.25	16.55	16.85

SYMBOL	MIN	NOM	MAX
D2	1.05	1.17	1.35
E	15.7	15.8	15.9
E1	13.1	13.3	13.5
E2	4.4	4.5	4.6
E3	2.4	2.5	2.6
e	5.436 BSC		
L	19.8	19.92	20.1
L1	---	---	4.3
M	0.35	---	0.95
P	3.4	3.5	3.6
P1	7	---	7.4
P2	2.4	2.5	2.6
Q	5.6	---	6
S	6.05	6.15	6.25
T	9.8	---	10.2
U	6	---	6.4



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