WLP7N65F

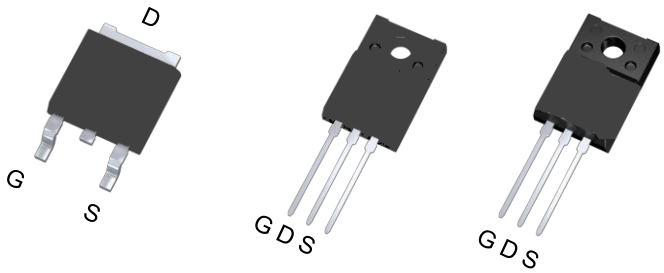
650V N-Channel Planar MOSFET

Description

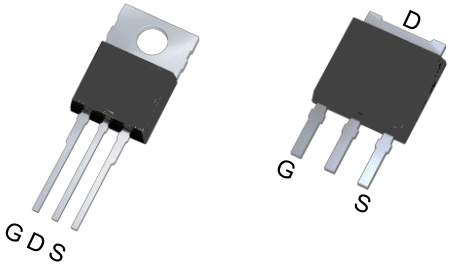
650V N-Channel Planar MOSFET

WLP7N65F 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.

TO-252 TO-220F TO-220FT



TO-220 TO-251

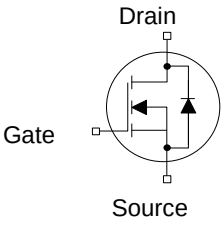


Features

- RDSON≤1.4Ω @Vgs=10V, Id=3.5A
- Low gate Charge(typical 23.05nC)
- Low Crss (typical 2.2pF)
- Fast switching capability
- 100% avalanche tested
- Improved dv/dt capability

Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC) (PFC)
- Charger



Key Performance Parameters

Parameter	Value	Unit
V_{DS} @ $T_{J,max}$	700	V
$R_{DS(on),max}$	1.4	Ω
$Q_{g,typ}$	23.1	nC
I_D	7	A
$I_{D,pulse}$	28	A

Device Marking and Package Information

Device	Package	Marking
WLU7N65	TO-252	WLU7N65
WLP7N65F	TO-220F	WLP7N65F
WLP7N65FT	TO-220FT	WLP7N65FT
WLP7N65	TO-220	WLP7N65
WLP7N65	TO-251	WLP7N65

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted				
Parameter		**Symbol**	**Value**	**Unit**
Drain-Source Voltage(V_{GS}=0V)		V_{DS}	650	V
Continuous Drain Current[1)]	T_C = 25ºC	I_D	7	A
	T_C = 100ºC		4.2	
Pulsed Drain Current[2)]		$I_{D,pulse}$	28	A
Gate-Source Voltage		V_{GS}	±30	V
Single Pulse Avalanche Energy[3)]		E_{AS}	211	mJ
MOSFET dv/dt Ruggedness, V_{DS} = 0...480V		dv/dt	5	V/ns
Power Dissipation For TO-220F、TO220-FT		P_D	78	W
Power Dissipation For TO-252、TO-220、TO-251			104	W
Continuous Diode Forward Current		I_S	7	A
Diode Pulsed Current[2)]		$I_{S,pulse}$	28	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55~+150	ºC

Thermal Resistance For TO-220F、TO-220FT			
Parameter	**Symbol**	**Value**	**Unit**
Thermal Resistance, Junction-to-Case	R_{thJC}	1.6	ºC/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	80	

Thermal Resistance For TO-252、TO-220、TO-251			
Parameter	**Symbol**	**Value**	**Unit**
Thermal Resistance, Junction-to-Case	R_{thJC}	1.2	ºC/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62	

Notes

1) Limited by maximum junction temperature.

2) Repetitive Rating: Pulse width limited by maximum junction temperature.

3）L=10mH, ID=5.5A, Start TJ=25℃

Electrical Characteristics T_J = 25ºC, 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 = 250μA	650	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 650V V_{GS} = 0V, T_J = 25ºC	--	--	1	μA
		V_{DS} = 650V, V_{GS} = 0V, T_J = 150ºC	--	--	100	
Gate-Source Leakage Current	I_{GSS}	V_{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2	--	4	V
Drain-Source On-State-Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 3.5A	--	1.2	1.4	Ω
Gate Resistance	R_G	f = 1.0MHz open drain	--	1.7	--	Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} =25V f = 1.0MHz	--	1191	--	pF
Output Capacitance	C_{oss}		--	86	--	
Reverse Transfer Capacitance	C_{rss}		--	3	--	
Total Gate Charge	Q_g	V_{DD} = 520V, I_D = 7A V_{GS} = 10V	--	25.9	--	nC
Gate-Source Charge	Q_{gs}		--	7.1	--	
Gate-Drain Charge	Q_{gd}		--	8.0	--	
Gate Plateau Voltage	$V_{Plateau}$		--	4.9	--	V
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 325V, I_D = 7A R_G = 25Ω	--	20		ns
Turn-on Rise Time	t_r		--	50		
Turn-off Delay Time	$t_{d(off)}$		--	90		
Turn-off Fall Time	t_f		--	55		
Drain-Source Body Diode Characteristics						
Body Diode Forward Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 7A V_{GS} = 0V	--	--	1.2	V
Reverse Recovery Time	t_{rr}	V_R = 400V I_F = 7A, di_F/dt = 100A/μs	--	351	--	ns
Reverse Recovery Charge	Q_{rr}		--	3.3	--	μC

Typical Characteristics T_J = 25ºC, unless otherwise noted

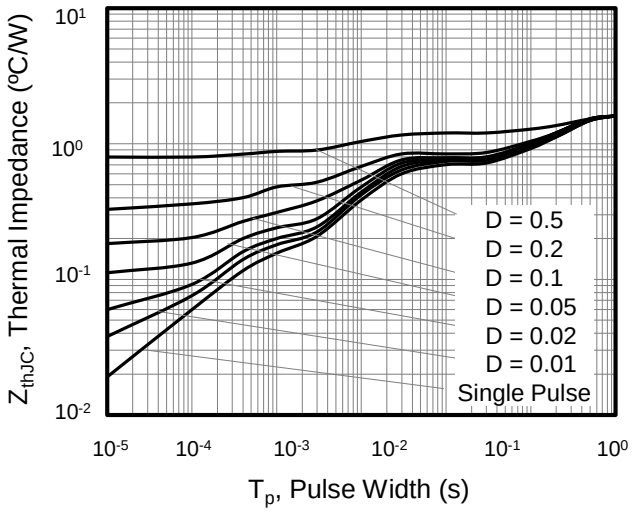


Figure 1. Transient Thermal Impedance For TO-220F、TO-220FT

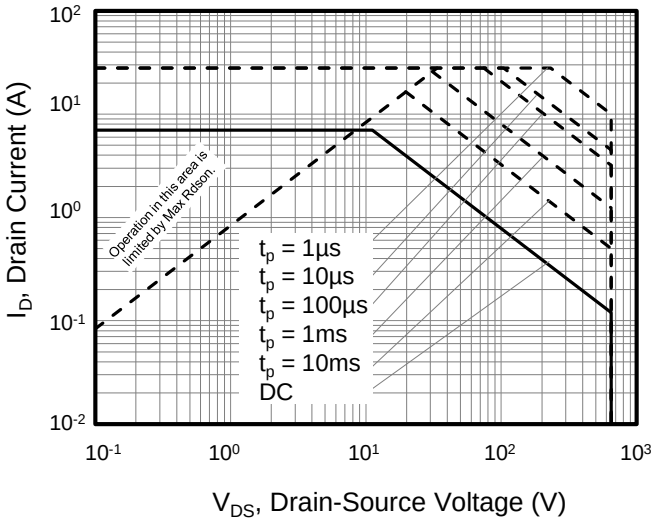


Figure 2. Safe Operation Area For TO-220F、TO-220FT

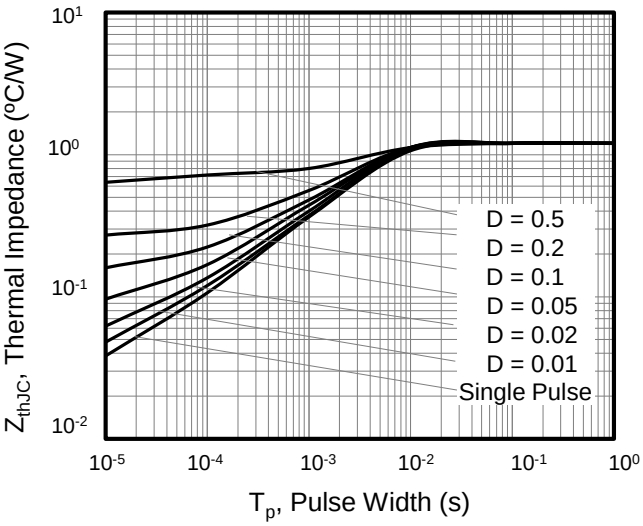


Figure 3. Transient Thermal Impedance For TO-252、TO-220、TO-251

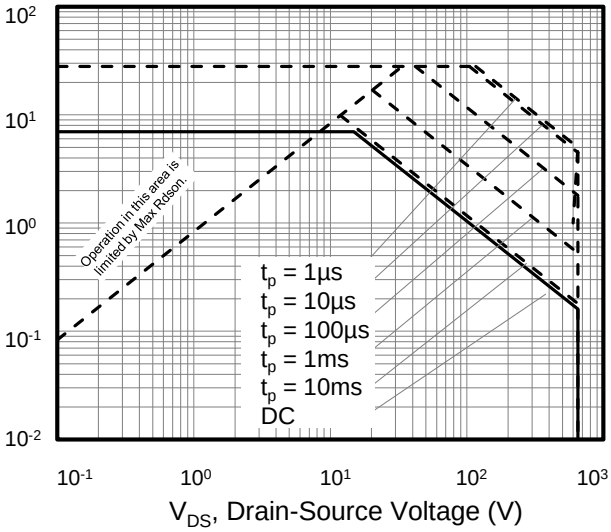


Figure 4. Safe Operation Area For TO-252、TO-220、TO-251

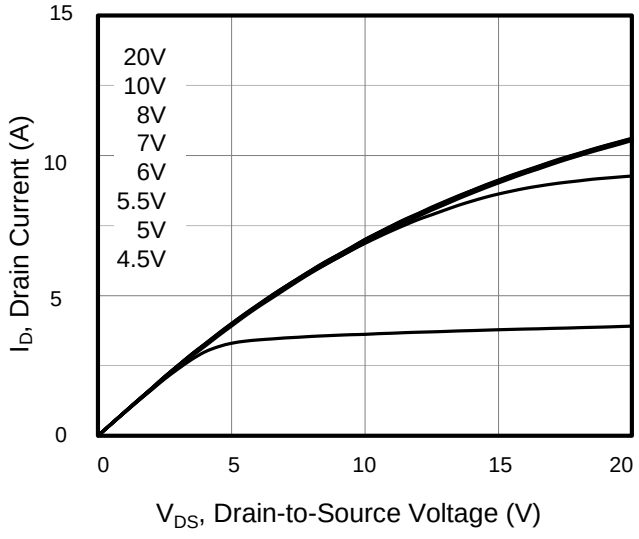


Figure 5. Output Characteristics

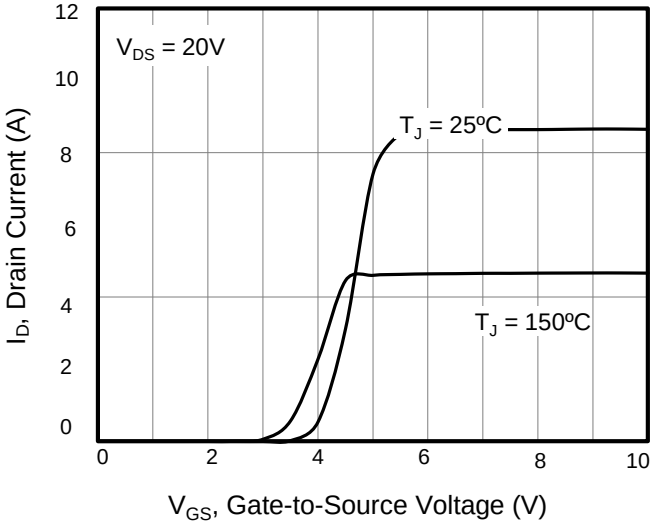


Figure 6. Transfer Characteristics

Typical Characteristics T_J = 25ºC, unless otherwise noted

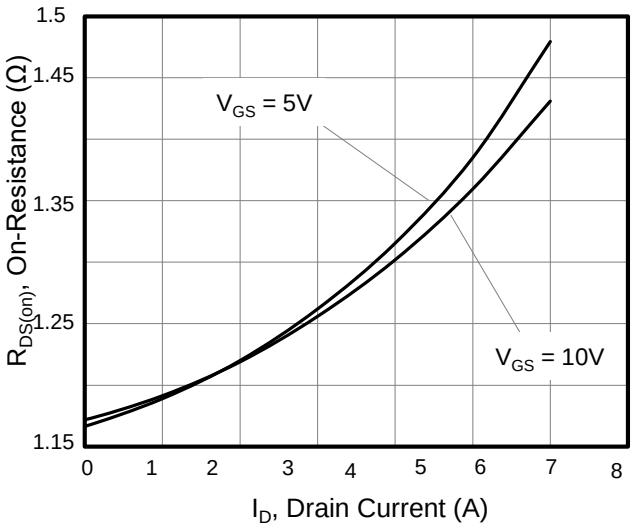


Figure 7. On-Resistance vs Drain Current

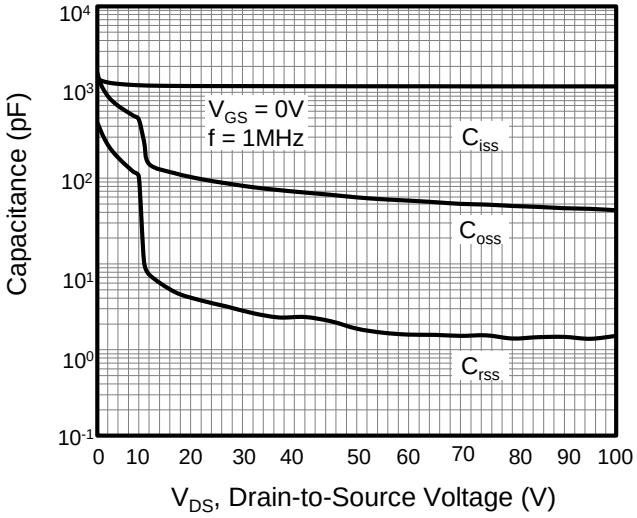


Figure 8. Capacitance

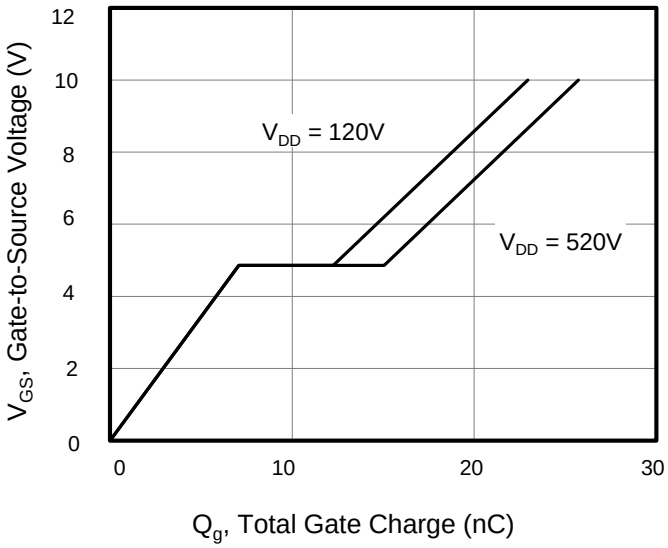


Figure 9. Gate Charge

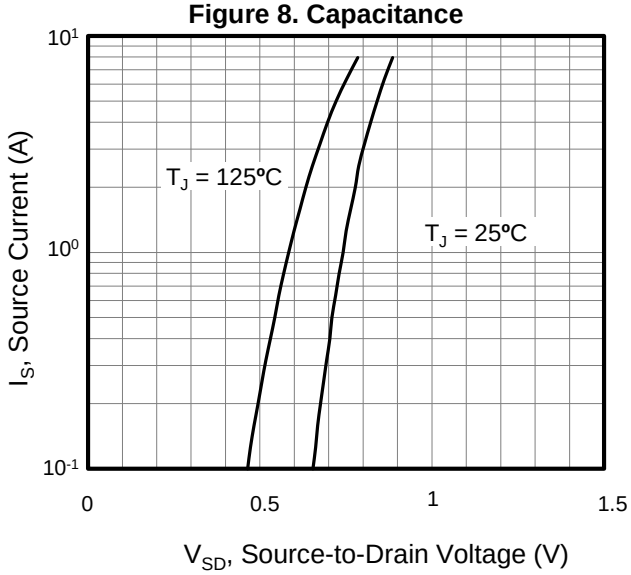


Figure 10. Body Diode Forward Voltage

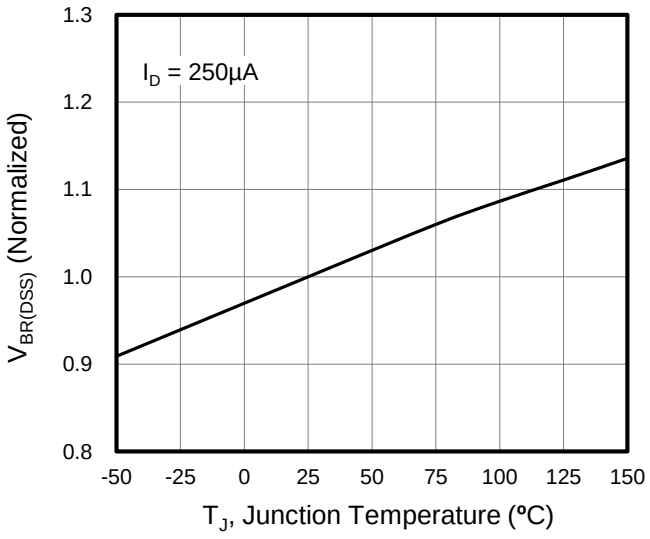


Figure 11. Breakdown Voltage vs Junction Temperature

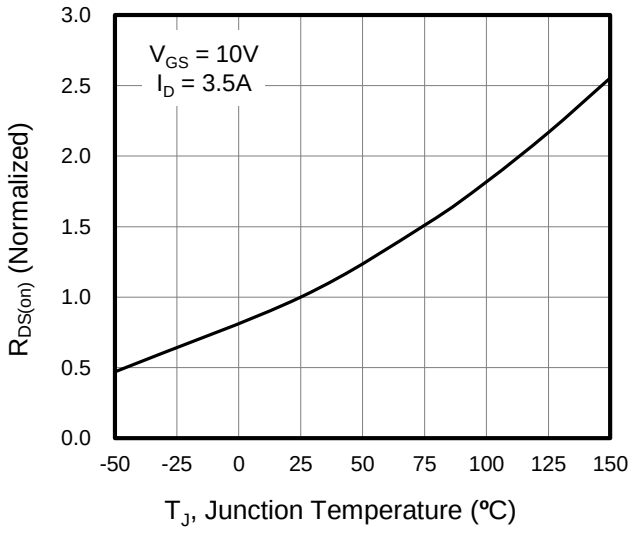


Figure 112. On-Resistance vs Temperature

Figure A：Gate Charge Test Circuit and Waveform

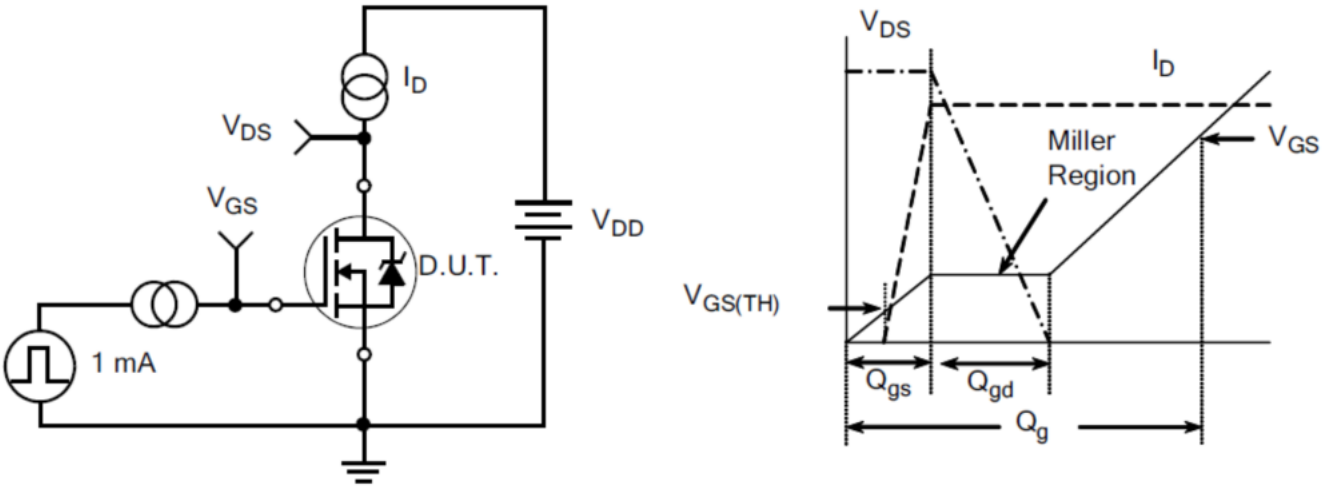


Figure B：Resistive Switching Test Circuit and Waveform

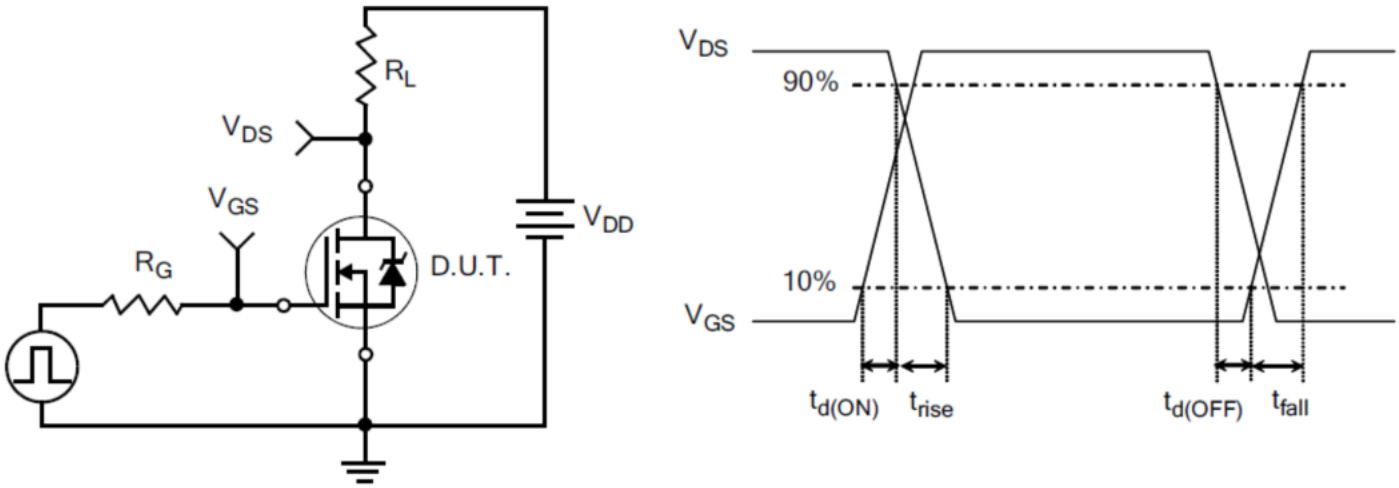
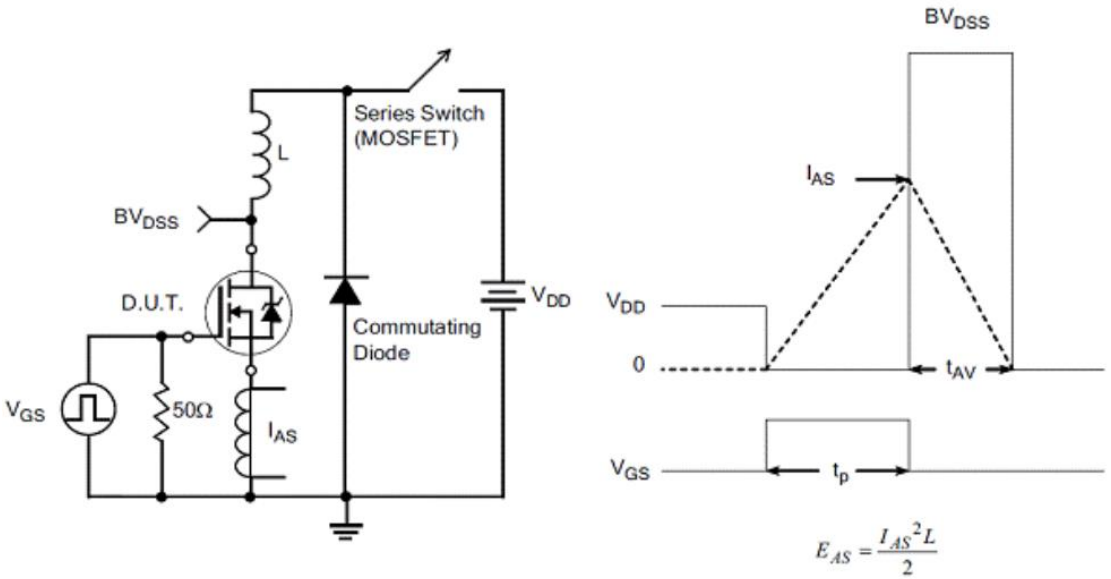
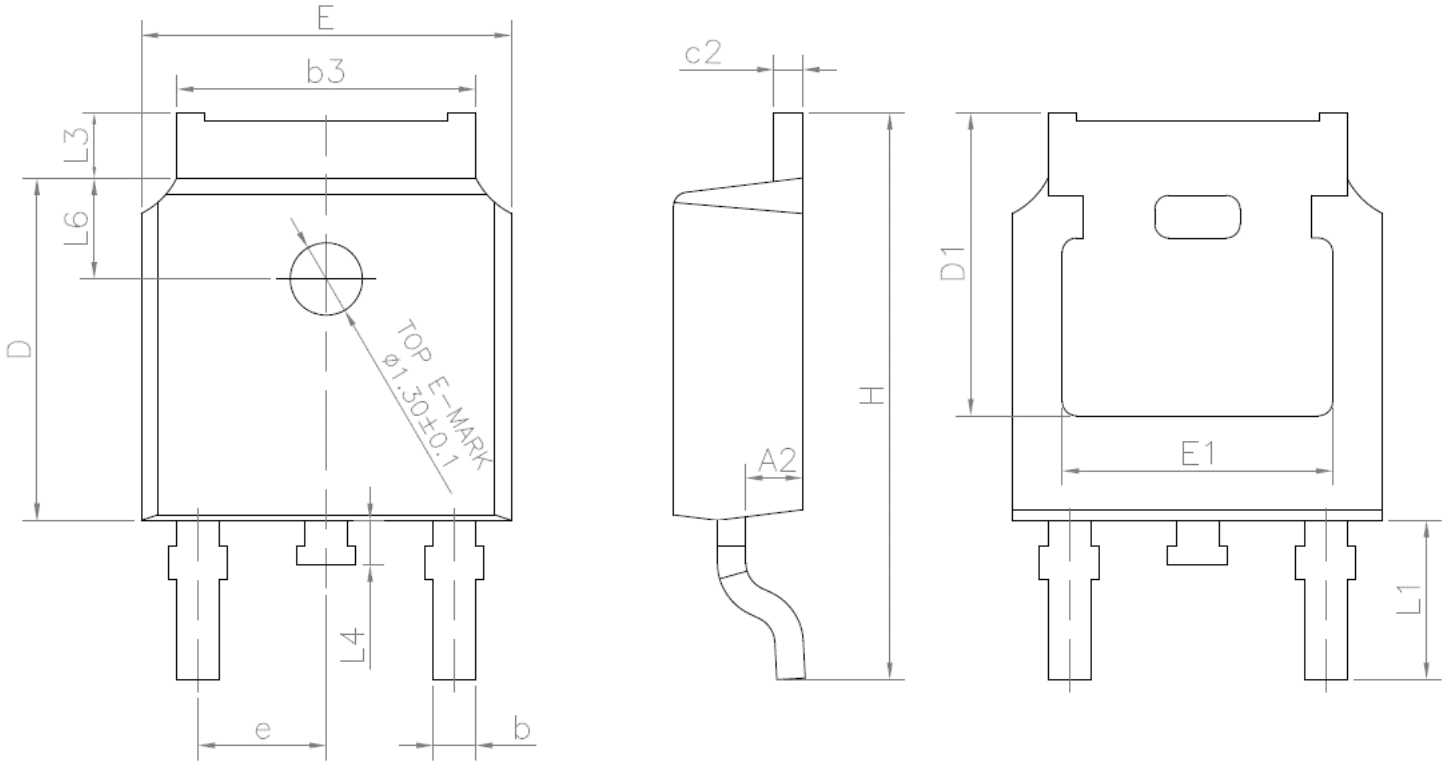


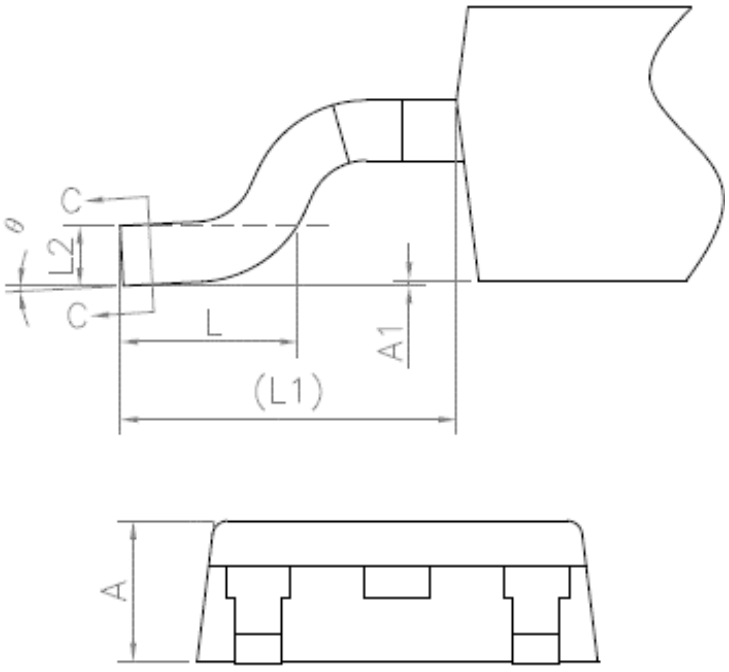
Figure C：Unclamped Inductive Switching Test Circuit and Waveform



$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

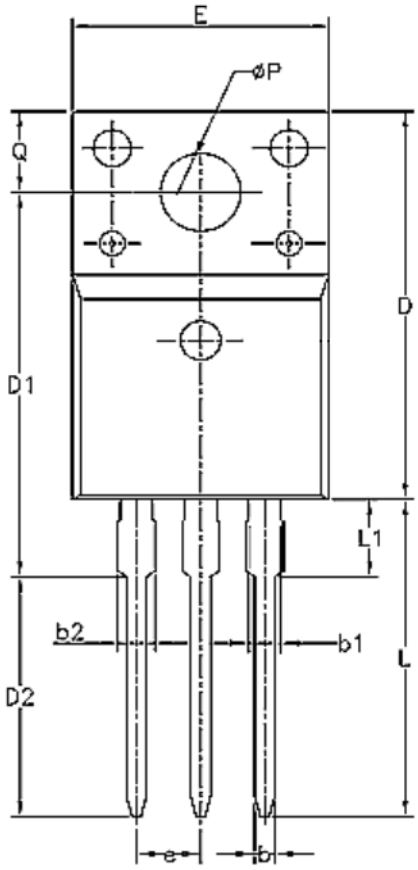
Outlines TO-252 Package

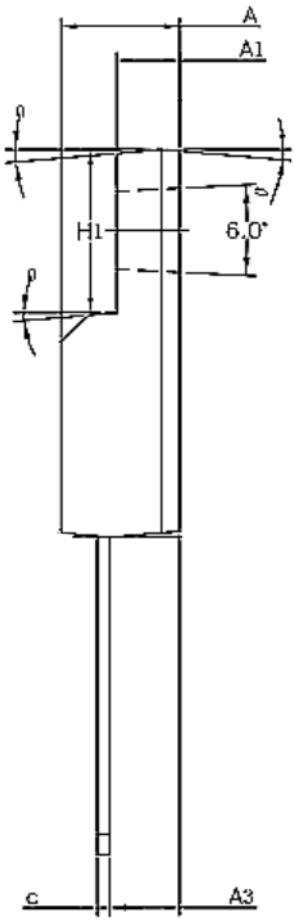


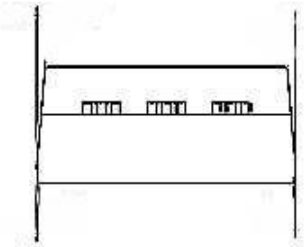


SYMBOL	MIN	NOM	MAX
A	2.2	2.3	2.4
A1	0	--	0.2
A2	0.9	1.035	1.17
b	0.645	--	0.9
b3	5.13	5.326	5.46
c	0.43	--	0.61
c2	0.41	--	0.61
D	5.98	6.1	6.22
D1	5.244	--	--
E	6.4	6.6	6.73
E1	4.63	--	--
e	2.186	2.286	2.386
H	9.4	10.04	10.5
L	1.38	1.5	1.75
L1	2.6	2.872	3
L2	0.5	0.509	0.52
L3	0.88	--	1.28
L4	0.5	--	1
L6	1.5	1.7	1.95
θ	0°	--	10°

Outlines TO-220F Package

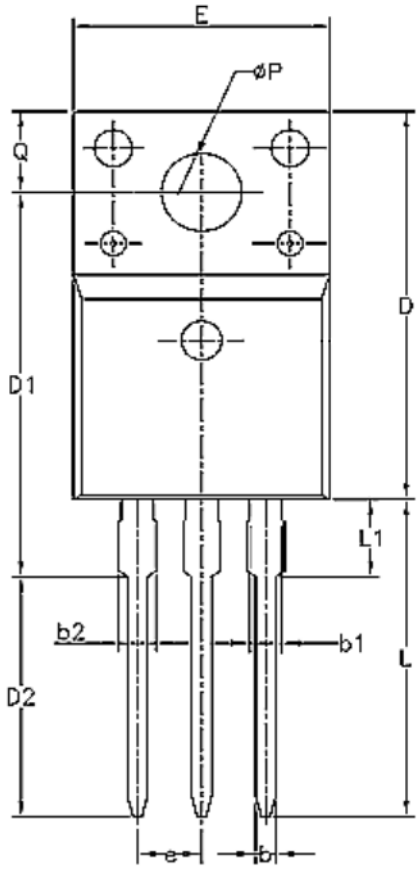


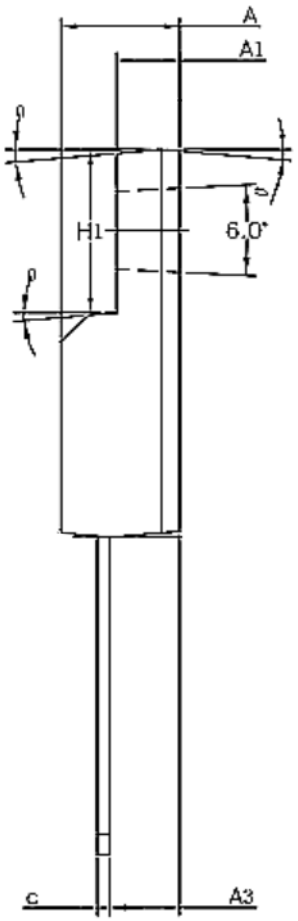


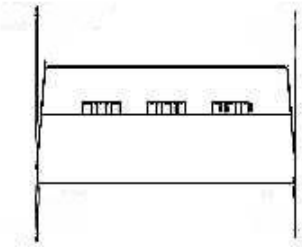


SYMBOL	MIN	NOM	MAX
A	4.5	4.7	4.9
A1	2.34	2.54	2.74
A3	2.56	2.76	2.96
b	0.7	---	0.95
b1	1.18	---	1.43
b2	---	---	1.55
c	0.4	0.5	0.65
D	15.57	15.87	16.17
D1	15.35	15.675	15.95
D2	9.6	9.875	10.15
E	9.96	10.16	10.36
e	2.54 BSC		
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	---	---	3.5

Outlines TO-220FT Package

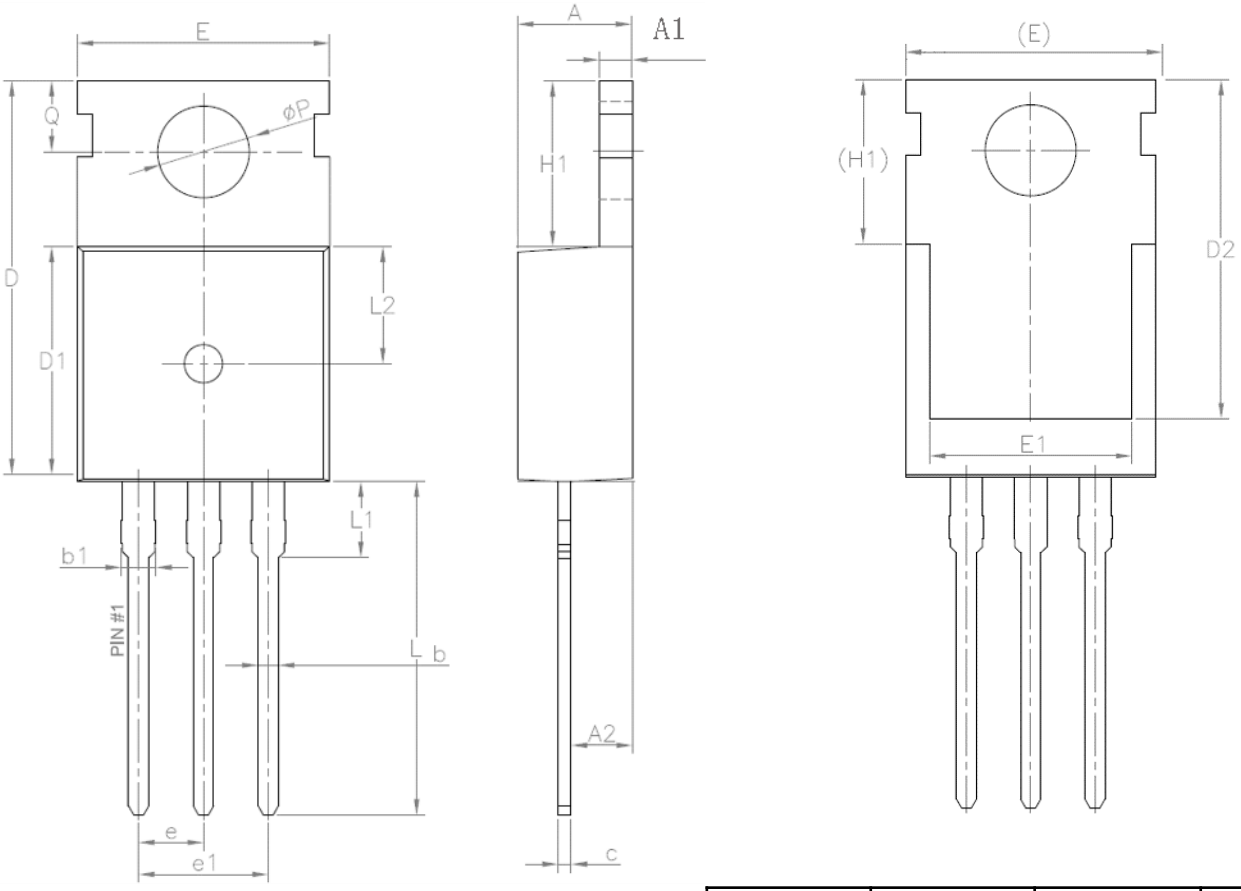


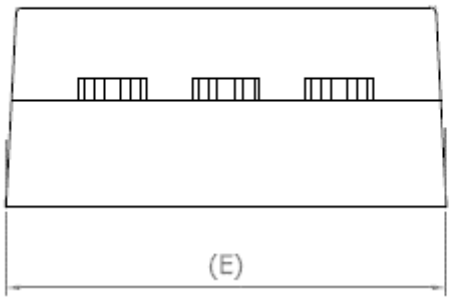




SYMBOL	MIN	NOM	MAX
A	4.5	4.7	4.9
A1	2.34	2.54	2.74
A3	2.56	2.76	2.96
b	0.7	---	0.95
b1	1.18	---	1.43
b2	---	---	1.55
c	0.4	0.5	0.65
D	15.57	15.87	16.17
D1	15.35	15.675	15.95
D2	9.6	9.875	10.15
E	9.96	10.16	10.36
e	2.54 BSC		
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	---	---	3.5

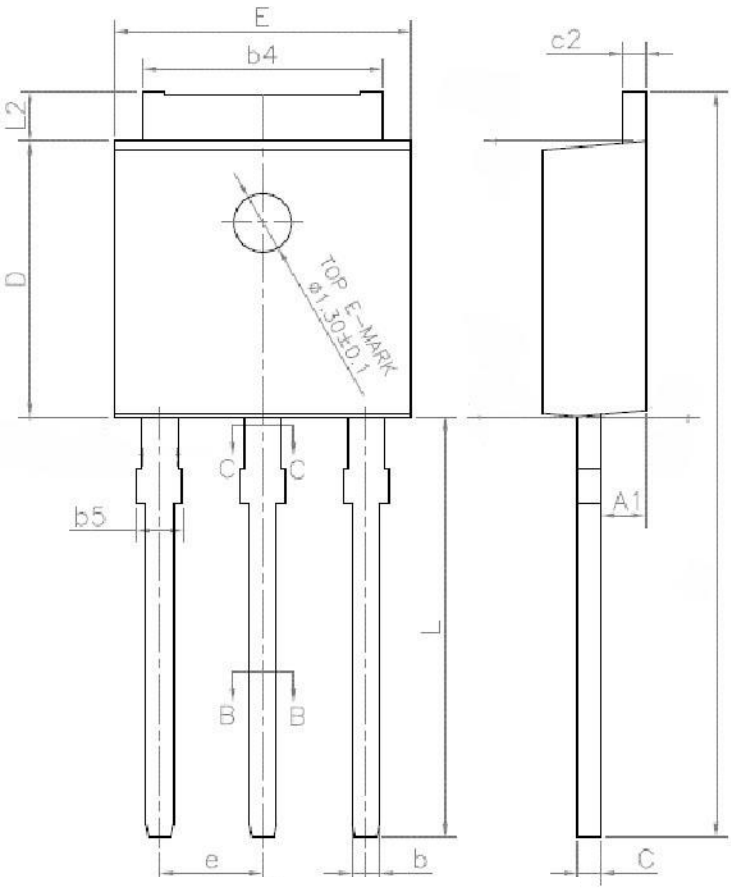
Outlines TO-220 Package

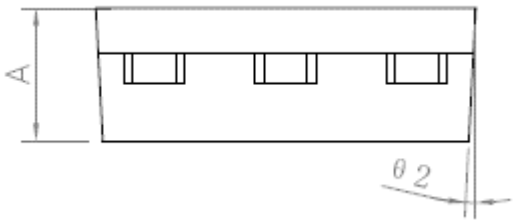


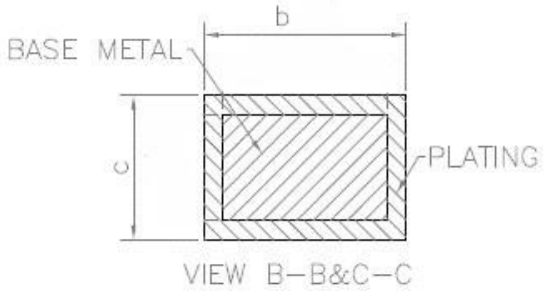


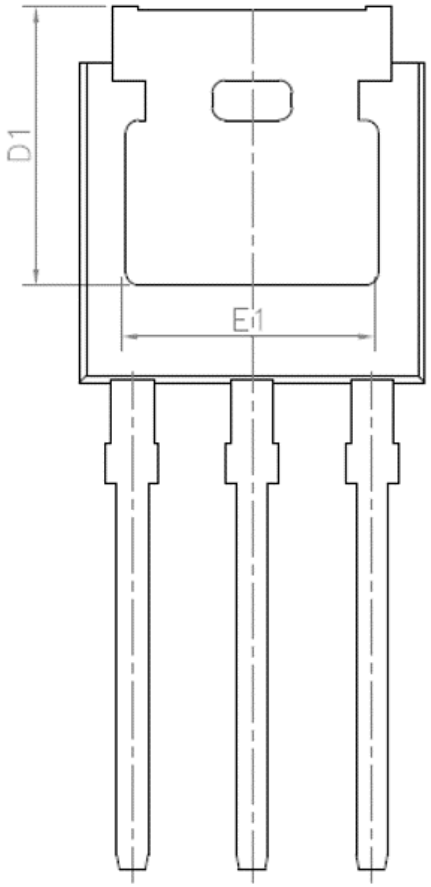
SYMBOL	MIN	NOM	MAX
A	4.37	4.535	4.7
A1	1.25	1.3	1.4
A2	2.2	2.4	2.6
b	0.7	---	0.95
b1	1.17	---	1.47
c	0.45	0.5	0.6
D	15.1	15.65	16.1
D1	8.8	9.15	9.4
D2	11.8	---	---
E	9.7	9.95	10.3
E1	7	---	---
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.5	6.85
L	12.75	13.29	13.8
L1	---	---	3.5
ΦP	3.4	3.67	3.8
Q	2.6	---	3

Outlines TO-251 Package









SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0.90	1.04	1.17
b	0.56	--	0.90
b4	5.20	5.33	5.46
b5	--	--	1.05
c	0.43	--	0.61
c2	0.43	--	0.61
D	5.98	6.10	6.22
D1	5.2	--	--
E	6.40	6.60	6.73
E1	4.60	--	--
e	2.24	2.29	2.34
e1	4.47	4.57	4.67
H	16.18	16.50	16.82
L	9	9.35	9.65
L2	0.88	1.05	1.28