N-channel 800V, 5A, 0.98Ω Power MOSFET

Description

BT Power MOSFET is fabricated using advanced super junction technology. The resulting device has extremely low on resistance, making it especially suitable for applications which require superior power density and outstanding efficiency.

Features

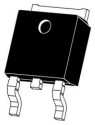
- Ultra low $R_{DS(on)}$
- Ultra low gate charge (typ. Q_g = 14.5nC)
- 100% UIS tested
- RoHS compliant

Applications

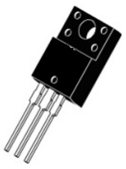
- Power faction correction (PFC).
- Switched mode power supplies (SMPS).
- Uninterruptible power supply (UPS).

Product Summary

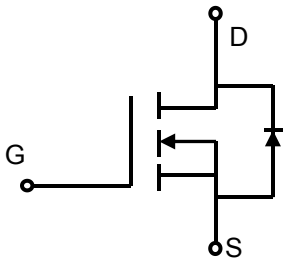
V_{DS} @ $T_{j,max}$	850V
$R_{DS(on),max}$	0.98Ω
I_D	5A
$Q_{g,typ}$	14.5nC



TO-252



TO-220F



N-Channel MOSFET

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	800	V
Continuous drain current (T_C = 25°C)	I_D	5	A
(T_C = 100°C)		3	A
Pulsed drain current [1]	I_{DM}	15	A
Gate-Source voltage	V_{GSS}	±30	V
Avalanche energy, single pulse [2]	E_{AS}	120	mJ
Avalanche current, repetitive [3]	I_{AR}	5	A
Power Dissipation TO-220F (T_C = 25°C)	P_D	29	W
- Derate above 25°C		0.23	W/°C
Power Dissipation TO-252 (T_C = 25°C)		50	W
- Derate above 25°C		0.4	W/°C
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C
Continuous diode forward current	I_S	5	A
Diode pulse current	$I_{S,pulse}$	15	A

Thermal Characteristics TO-252

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.5	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	°C/W
Soldering temperature, wavesoldering only allowed at leads. (1.6mm from case for 10s)	T_{sold}	260	°C

Thermal Characteristics TO-220F

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4.3	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	80	°C/W
Soldering temperature, wavesoldering only allowed at leads. (1.6mm from case for 10s)	T_{sold}	260	°C

Package Marking and Ordering Information

Device	Device Package	Marking	Units/Tube	Units/Reel
BTF80R980A	TO-220F	BTF80R980	50	
BTD80R980A	TO-252	BTD80R980		2500

Electrical Characteristics

T_c = 25°C unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0 V, I_D=0.25 mA	800	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=0.25mA	2.5	3.5	4.5	V
Drain cut-off current	I_{DSS}	V_{DS}=800 V, V_{GS}=0 V, T_j = 25°C T_j = 125°C	 - -	 - 10	 1 -	µA
Gate leakage current, Forward	I_{GSSF}	V_{GS}=30 V, V_{DS}=0 V	-	-	100	nA
Gate leakage current, Reverse	I_{GSSR}	V_{GS}=-30 V, V_{DS}=0 V	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=2.5 A T_j = 25°C T_j = 150°C	- - -	 0.85 1.9	 0.98 -	Ω
Gate resistance	R_G	f=1 MHz, open drain	-	7.5	-	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS} = 100 V, V_{GS} = 0 V, f = 250 kHz	-	614	-	pF
Output capacitance	C_{oss}		-	20	-	
Reverse transfer capacitance	C_{rss}		-	2	-	

Turn-on delay time	$t_{d(on)}$	V_{DD} = 400V, I_D = 2.5A R_G = 10Ω, V_{GS}=10V	-	13.5	-	ns
Rise time	t_r		-	30	-	
Turn-off delay time	$t_{d(off)}$		-	56	-	
Fall time	t_f		-	27	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=640 V, I_D=2.5A, V_{GS}=0 to 10 V	-	3.5	-	nC
Gate to drain charge	Q_{gd}		-	5.5	-	
Gate charge total	Q_g		-	14.5	-	
Gate plateau voltage	$V_{plateau}$		-	5	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=2.5A	-	-	1.4	V
Reverse recovery time	t_{rr}	V_R=400 V, I_F=2.5A, dI_F/dt=100 A/μs	-	250	-	ns
Reverse recovery charge	Q_{rr}		-	1.69	-	μC
Peak reverse recovery current	I_{rrm}		-	13.5	-	A

Notes:

1. Limited by maximum junction temperature, maximum duty cycle is 0.75.

2. I_{AS} = 2A, V_{DD} = 60V, Starting T_j= 25°C.

3. Repetitive Rating: Pulse width limited by maximum junction temperature.

Electrical Characteristics Diagrams

Figure 1. On-Region Characteristics

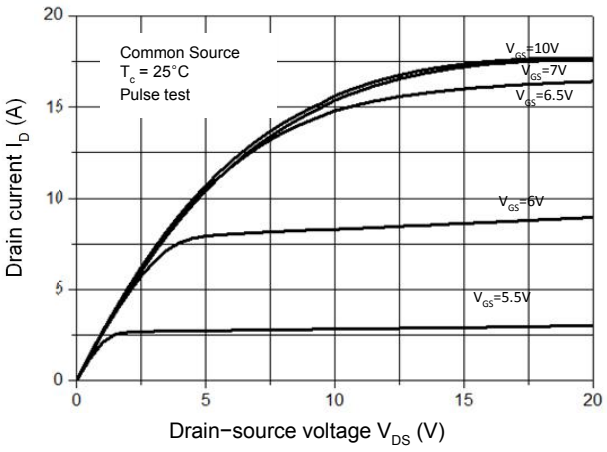


Figure 2. Transfer Characteristics

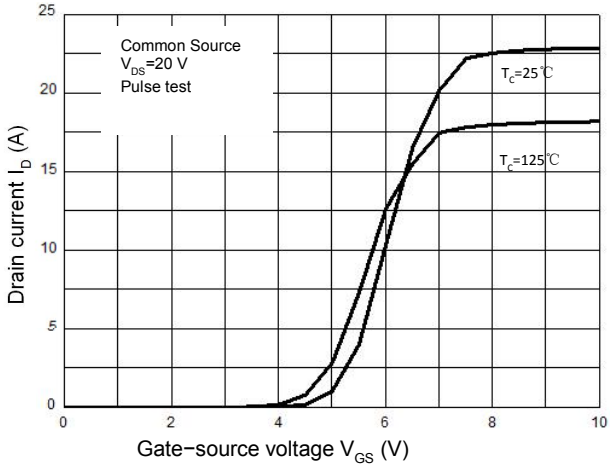


Figure 3. On-Resistance Variation vs. Drain Current

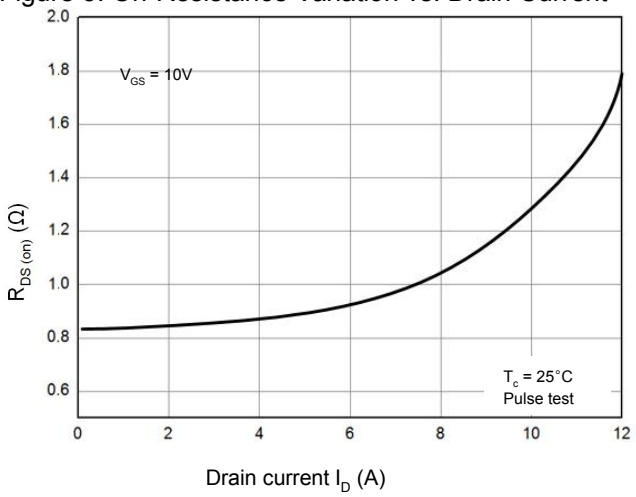


Figure 4. Threshold Voltage vs. Temperatur

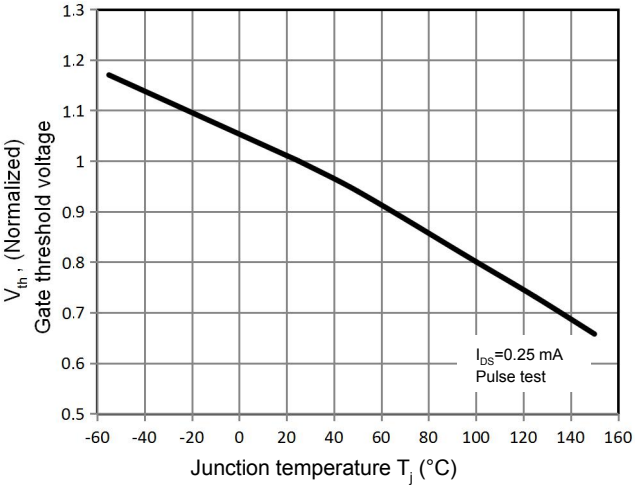


Figure 5. Breakdown Voltage vs. Temperature

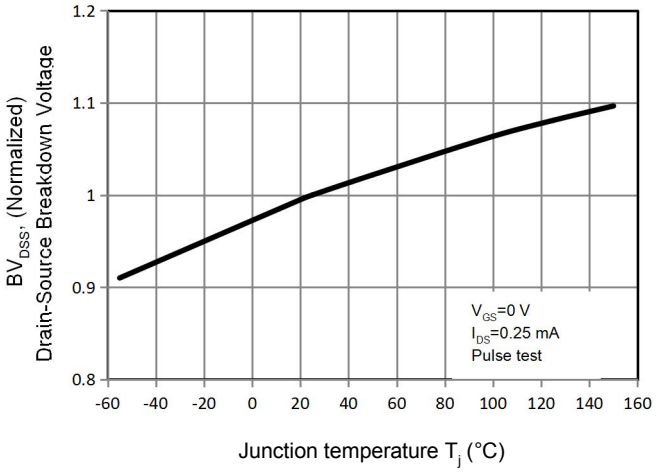


Figure 6. On-Resistance vs. Temperature

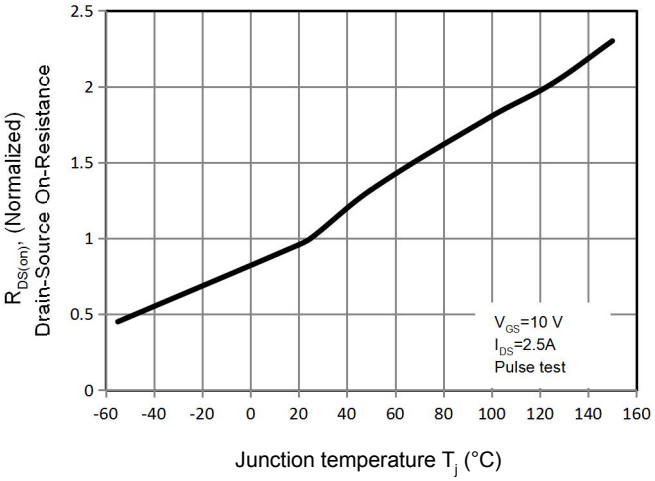


Figure 7. Capacitance Characteristics

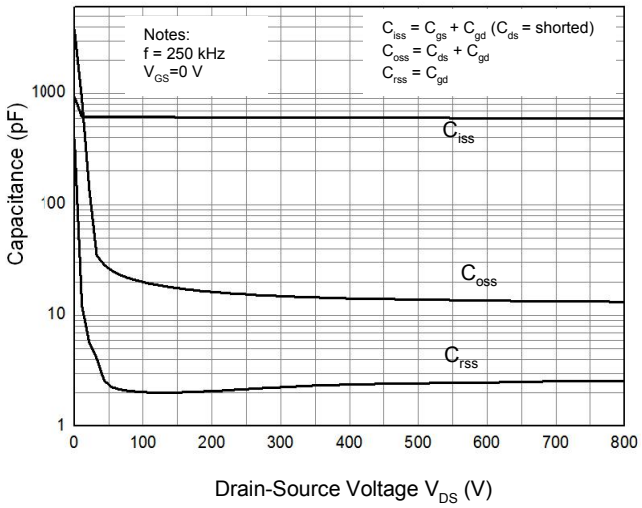


Figure 8. Gate Charge Characterist

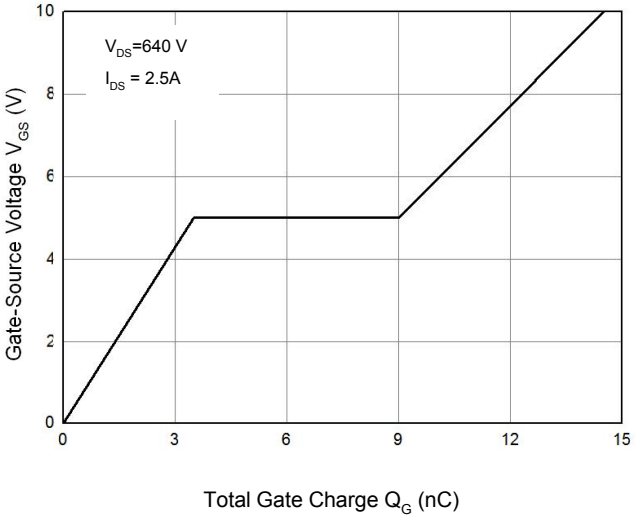


Figure 9.1 Maximum Safe Operating Area
TO-220F

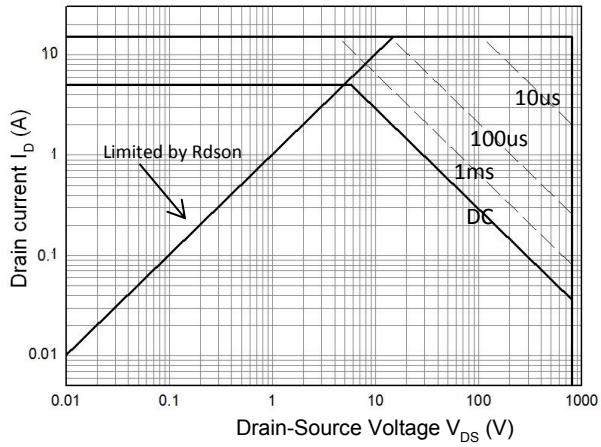


Figure 9.2 Maximum Safe Operating Area
TO-252

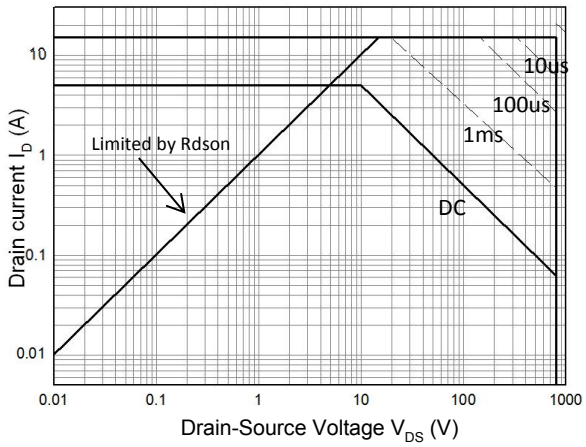


Figure 10.1 Power Dissipation vs. Temperature
TO-220F

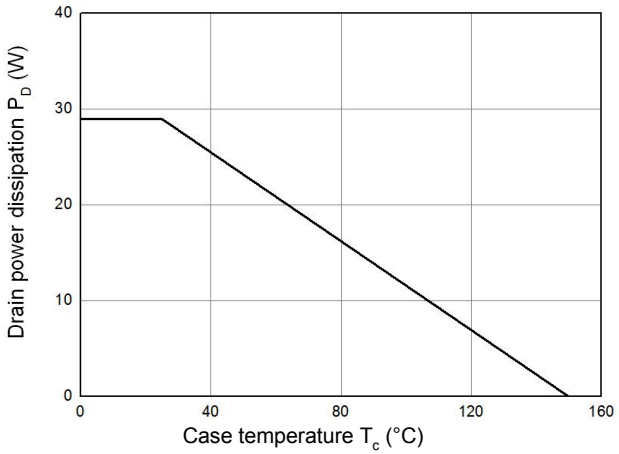
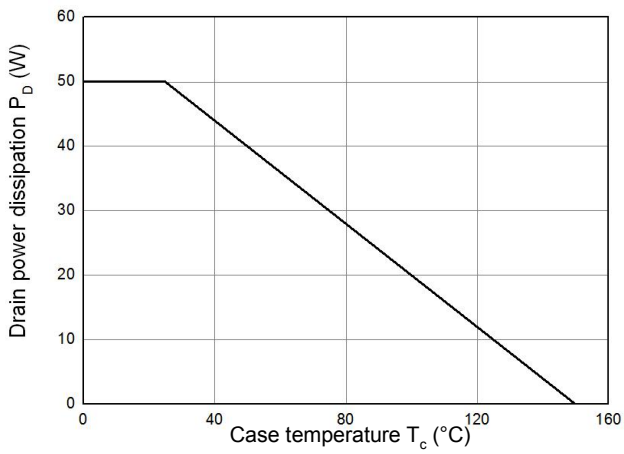
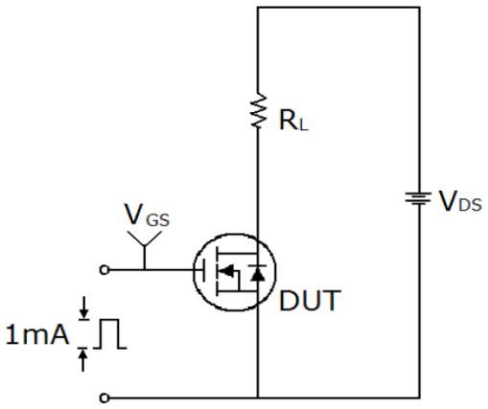
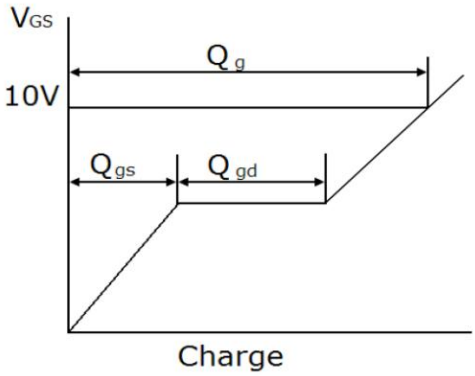


Figure 10.2 Power Dissipation vs. Temperature
TO-252

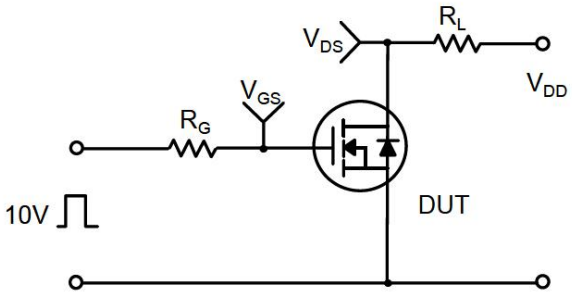


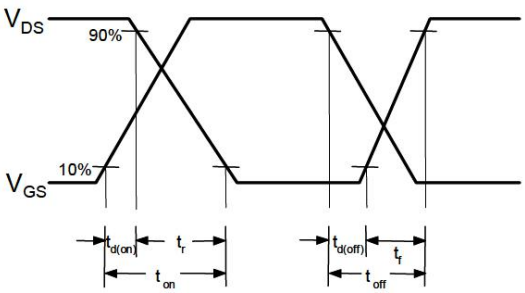
Gate Charge Test Circuit & Waveform



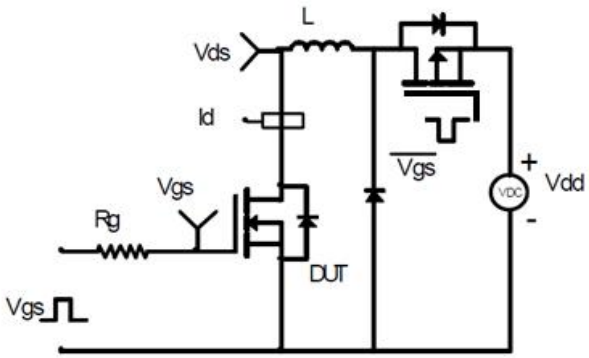


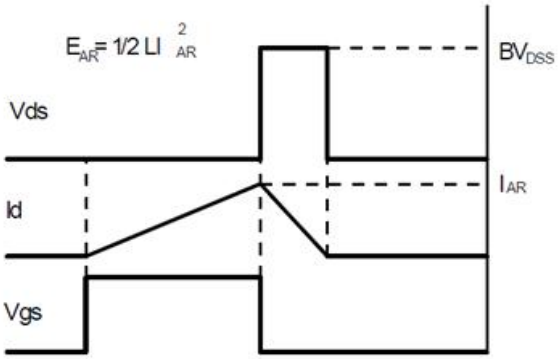
Switching Test Circuit & Waveforms



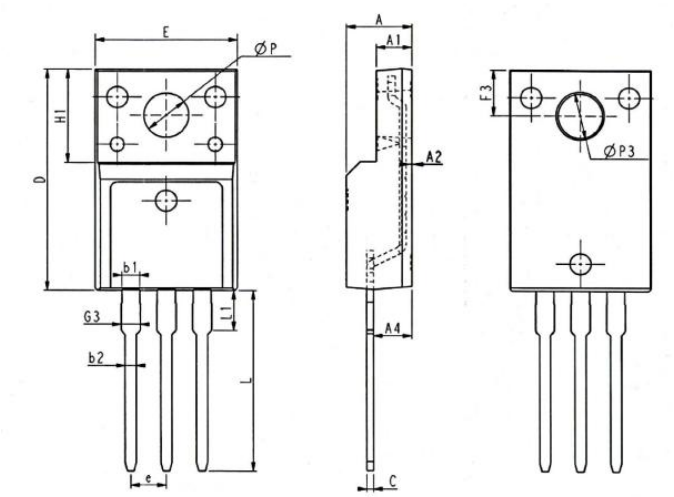


Unclamped Inductive Switching Test Circuit & Waveforms



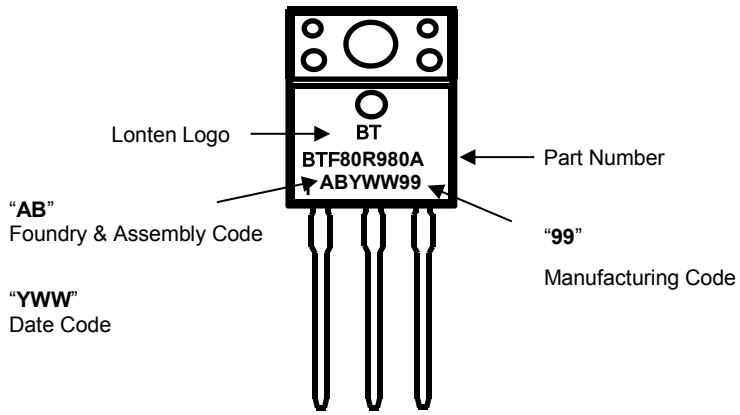


Mechanical Dimensions for TO-220F

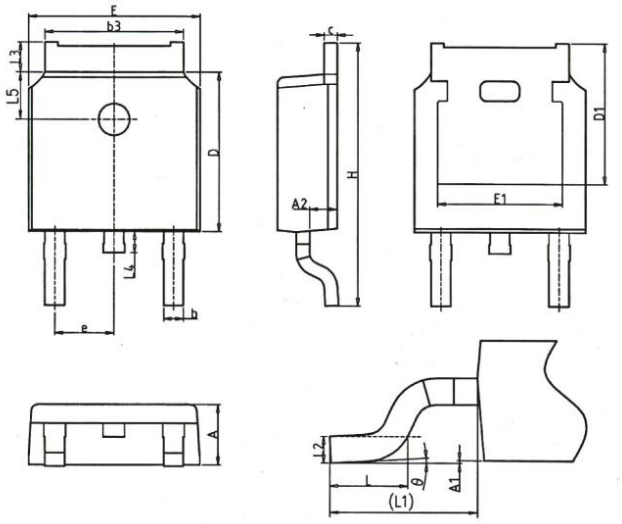


COMMON DIMENSIONS						
SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NO	MA
E	9.96	10.1	10.3	0.39	0.40	0.40
A	4.50	4.70	4.90	0.17	0.18	0.19
A1	2.34	2.54	2.74	0.09	0.10	0.10
A2	0.30	0.45	0.60	0.01	0.00	0.02
A4	2.65	2.76	2.96	0.10	0.10	0.11
C	0.40	0.50	0.60	0.01	0.02	0.02
D	15.57	15.8	16.1	0.61	0.62	0.63
H1	6.70REF			0.264REF		
e	2.54BSC			0.1BSC		
ØP	3.03	3.18	3.38	0.11	0.12	0.13
L	12.68	12.9	13.2	0.49	0.51	0.52
L1	2.88	3.03	3.18	0.11	0.11	0.12
ØP3	3.15REF			0.124REF		
F3	3.15	3.30	3.45	0.12	0.13	0.13
G3	1.25	1.35	1.55	0.04	0.05	0.06
b1	1.18	1.28	1.43	0.04	0.05	0.05
b2	0.70	0.80	0.95	0.02	0.03	0.03

TO-220F Part Marking Information



Mechanical Dimensions for TO-252



COMMON DIMENSIONS			
SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0.00	—	0.20
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.73
E1	4.63	—	—
e	2.286BSC		
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90REF		
L2	0.51BSC		
L3	0.88	—	1.28
L4	0.50	—	1.00
L5	1.65	1.80	1.95
θ	0°	—	8°

TO-252 Part Marking Information