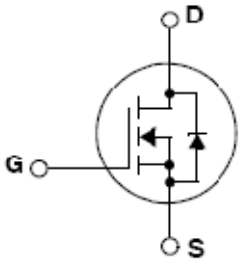
BYD Microelectronics Co., Ltd.

BF92N60/BF92N60L/BF92N60R/BF92N60T

600V N-Channel MOSFET

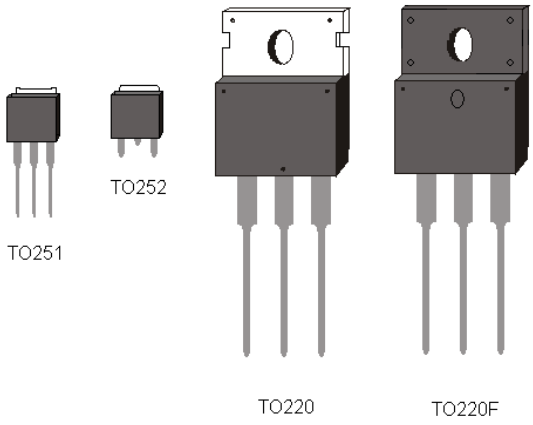
General Description

These N-Channel enhancement mode power field effect transistors are produced using DMOS technology.
This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies, active power factor correction, electronic lamp ballasts based on half bridge topology.



Features

- V_{DS} =600 V
- I_D =2A
- $R_{DS(ON)}$ =3.6Ω TYP(V_{GS}=10V,I_D=1A)
- Low C_{RSS} (typical 4.5pF)
- Fast switching



Absolute Maximum Ratings

Symbol	Parameter		BF92N60R/ BF92N60T	BF92N60L	BF92N60	Unit
V_{DS}	Drain-Source Voltage		600			V
I_D	Drain Current(continuous)at Tc=25°C		2			A
I_{DM}	Drain Current (pulsed)	(Note1)	8			A
V_{GS}	Gate-Source Voltage		±30			V
E_{AS}	SinglePulseAvalanche Energy	(Note2)	130			mJ
I_{AR}	Avalanche Current	(Note1)	2.0			A
E_{AR}	RepetitiveAvalancheEnergy	(Note1)	5.4			mJ
dv/dt	PeakDiodeRecoverydv/dt	(Note3)	5			V/ns
P_D	Power Dissipation (T_C = 25°C)		46	54	24	W
Tstg	Storage Temperature Range		-55 to +150			
T_L	Maximum Lead Temperature for Soldering Purpose		300			°C

Ordering Information

Part Number	Package	Packaging
BF92N60	TO-220F	Tube
BF92N60L	TO-220	Tube
BF92N60R	TO-251	Tube
BF92N60T	TO-252	Tape&Reel

Thermal Data

Symbol	Parameter	TO-251/TO-252	TO-220F	TO-220	Unit
Rthj-case	Thermal Resistance Junction-case	2.7	5.3	2.3	°C /W
Rthj-amb	Thermal Resistance Junction-ambient	62.5	62.5	62.5	°C /W

Electrical Characteristics(T_c = 25℃)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D=250uA V_{GS}=0V	600			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=600V ,V_{GS}=0V			10	uA
		V_{DS}=600V,V_{GS}=0V,Tc=125℃			100	uA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±30V,V_{DS}=0V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} ,I_D=250uA	2.0		4.0	V
$R_{DS(on)}$	Static Drain-Source On Resistance	V_{GS}=10V ,I_D=1.0A		3.6	4.2	Ω
C_{iss}	Input Capacitance	V_{DS}=25V,f=1MHZ,V_{GS}=0V		420		pF
C_{oss}	Output Capacitance			40		pF
C_{rss}	Reverse Transfer Capacitance			4.5		pF
$t_{d(on)}$	Turn-On Delay Time	V_{DD}=300V,I_D=1A V_{GS}=10V ,R_G=4.7Ω (Note4,5)		11		ns
t_r	Rise Time			9.5		ns
$t_{d(off)}$	Turn-Off Delay Time			40		ns
t_f	Fall Time			13		ns
Q_g	Total Gate Charge	V_{DD}=480V, I_D=2A V_{GS}=10V (Note4,5)		12		nC
Q_{gs}	Gate-Source Charge			3		nC
Q_{gd}	Gate-Drain Charge			4		nC
V_{SD}(*)	Forward On Voltage	I_S=2A V_{GS}=0V		0.8	1.2	V
T_{rr}	Reverse Recovery Time	V_{DD}=300V,I_F=2A,di/dt=100A/us (Note4)		176		ns

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 60mH, I_{AS} = 2 A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
3. I_{SD} ≤ 2A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test : Pulse width ≤ 300μs, duty cycle ≤ 2%
5. Essentially independent of operating temperature

(*).Pulsed:Pulse duration

Typical characteristics (25℃ unless noted)

Figure 1 Output Characteristics

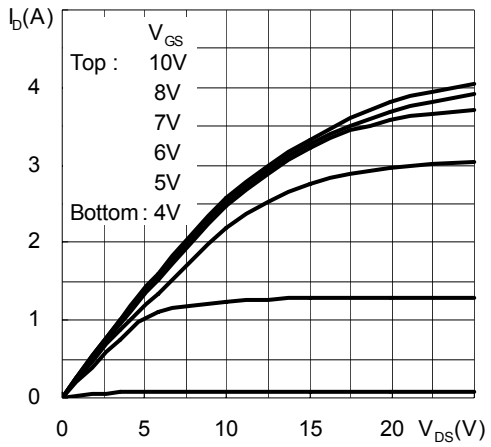


Figure 2 Transfer Characteristics

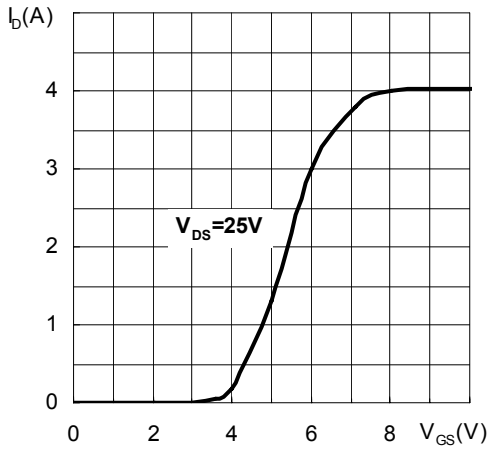


Figure 3 Normalized Threshold Voltage Vs Temperature

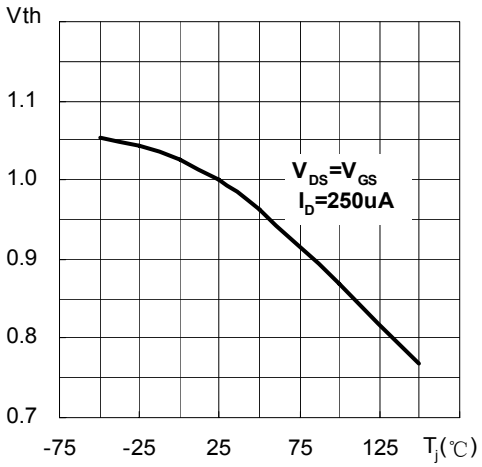


Figure 4 Normalized BV_{DSS} vs Temperature

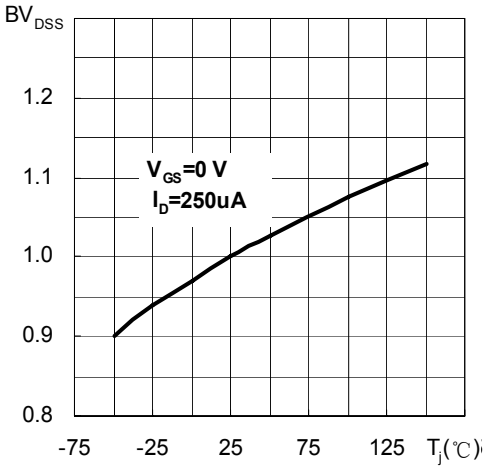


Figure 5 Normalized on Resistance vs Temperature

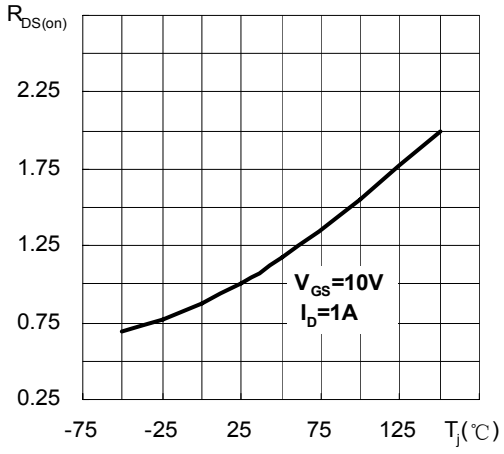


Figure 6 Source-Drain Diode Forward Characteristics

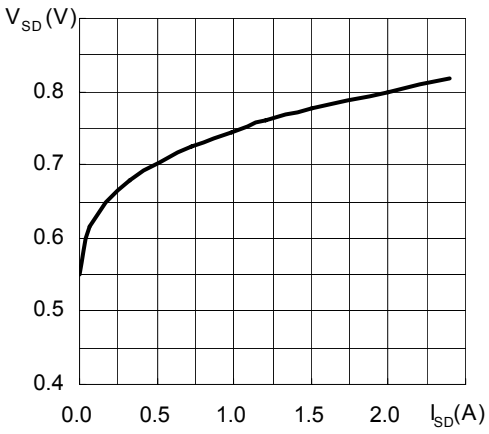


Figure 7 Capacitance

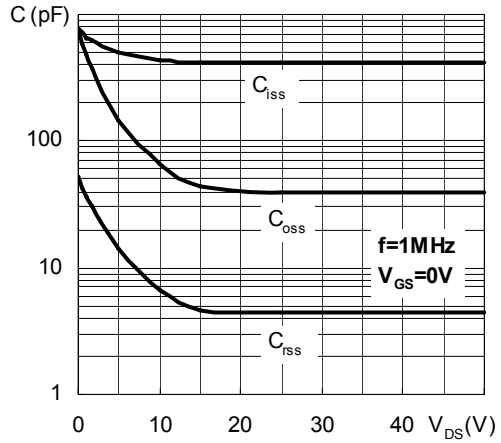


Figure 8 Gate Charge

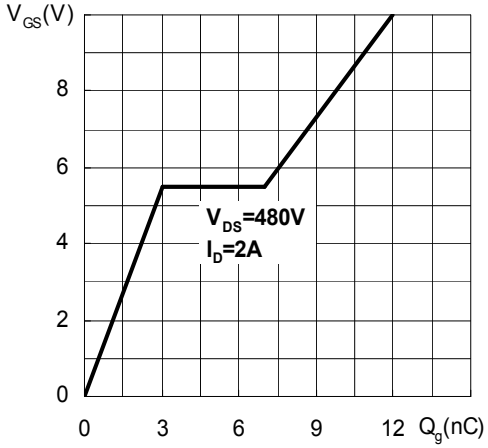


Figure 9-1 Maximum Safe Operating Area For BF92N60R/BF92N60T

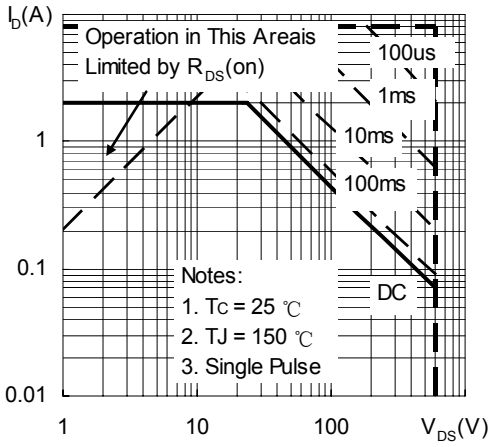


Figure 9-2 Maximum Safe Operating Area For BF92N60L

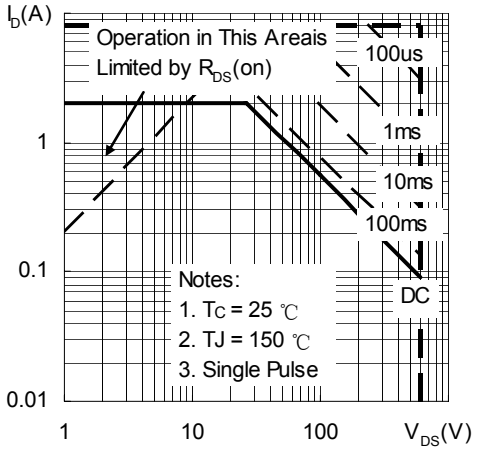


Figure 9-3 Maximum Safe Operating Area For BF92N60

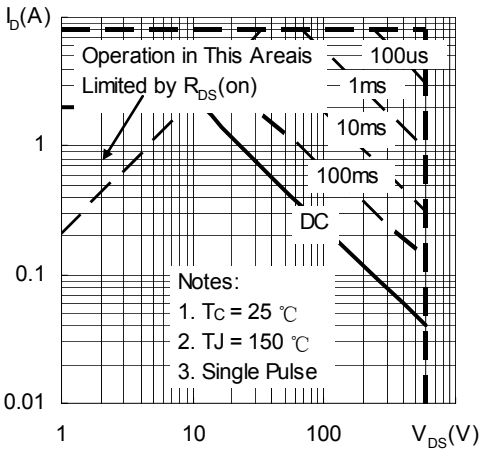


Figure 10 Maximum Drain Current vs Case Temperature

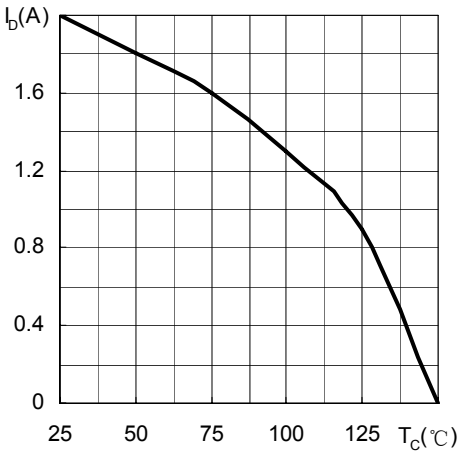


Figure 11-1 Maximum Transient Thermal Impedance For BF92N60R/BF92N60T

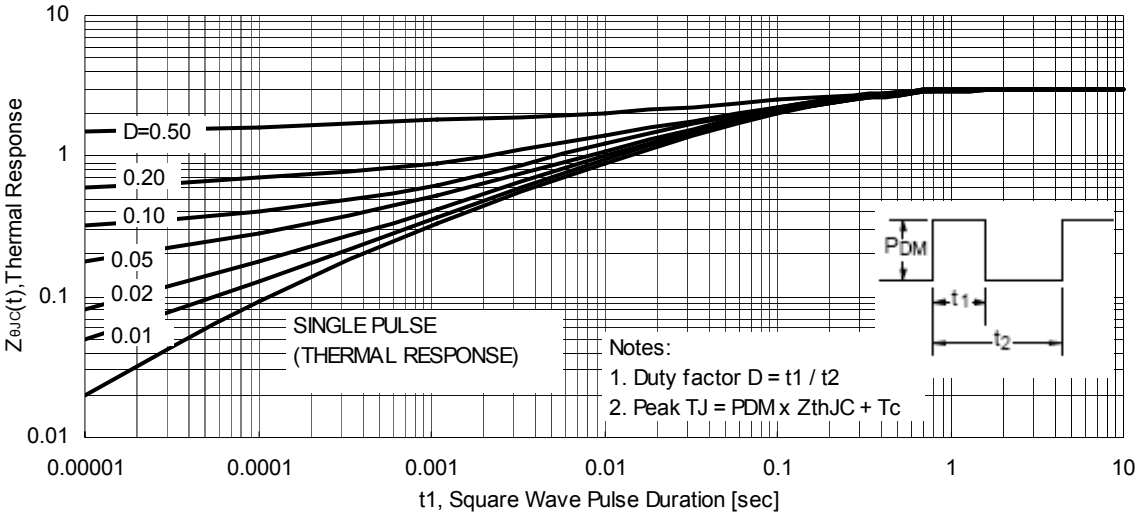


Figure 11-2 Maximum Transient Thermal Impedance For BF92N60L

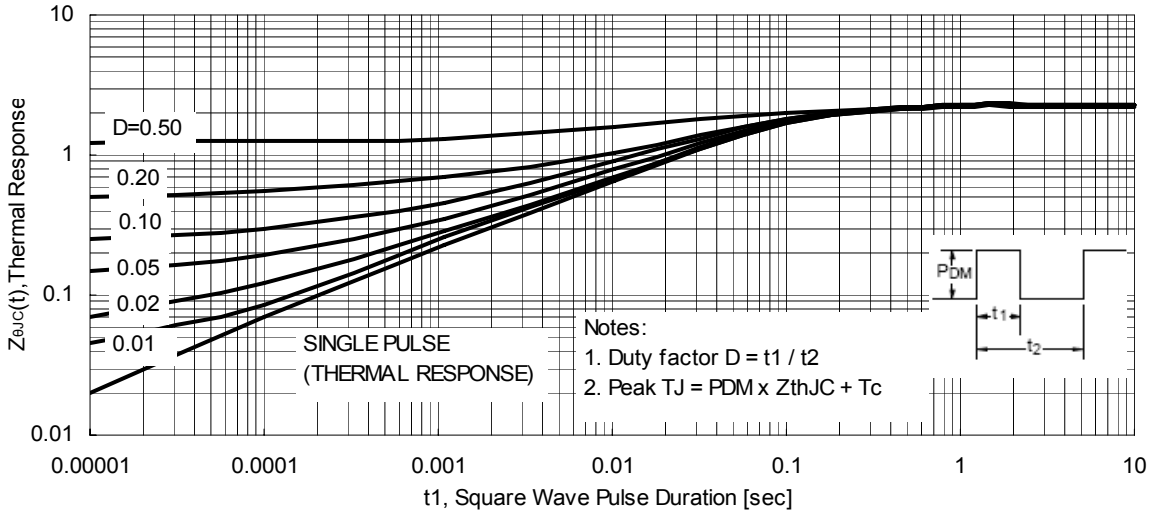
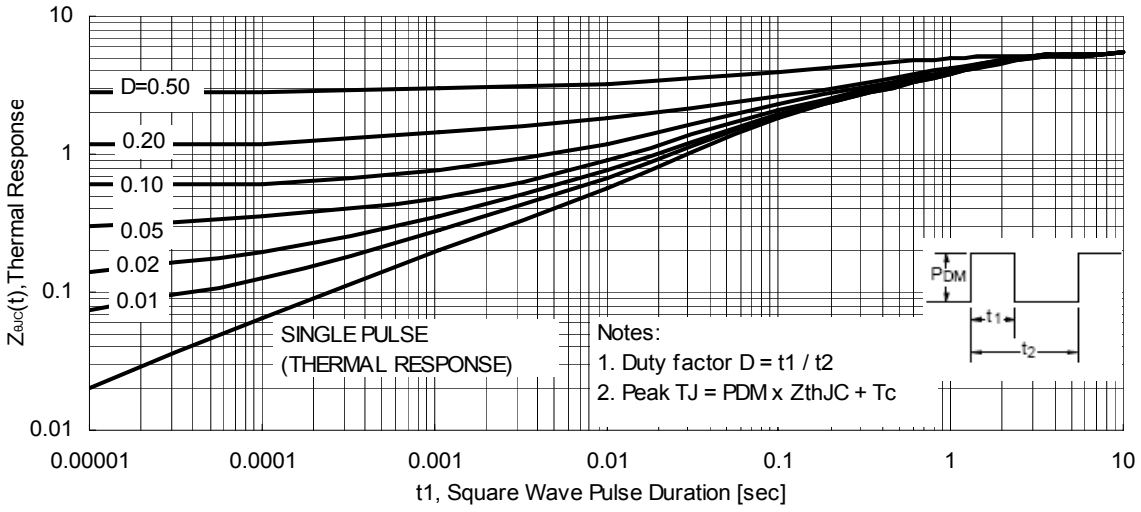
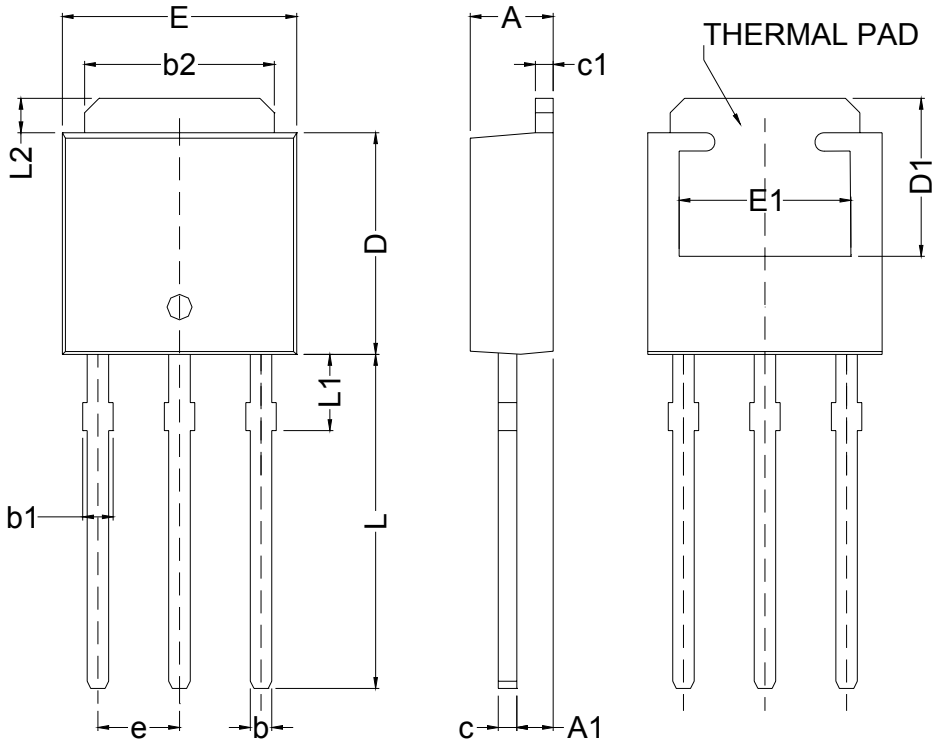


Figure 11-3 Maximum Transient Thermal Impedance For BF92N60



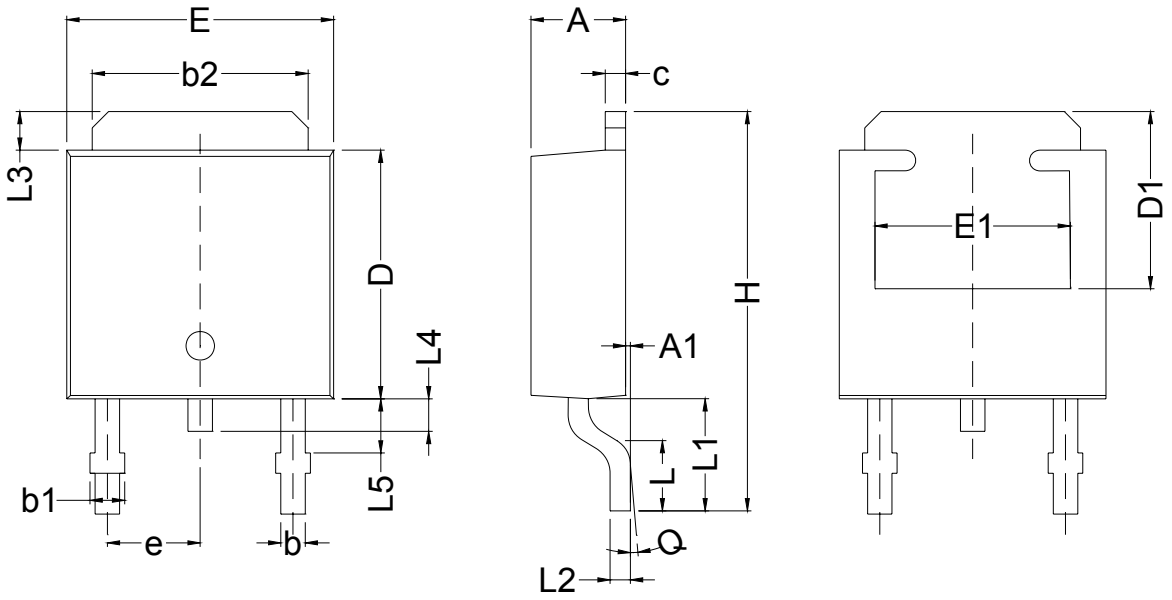
Package Drawing

TO-251



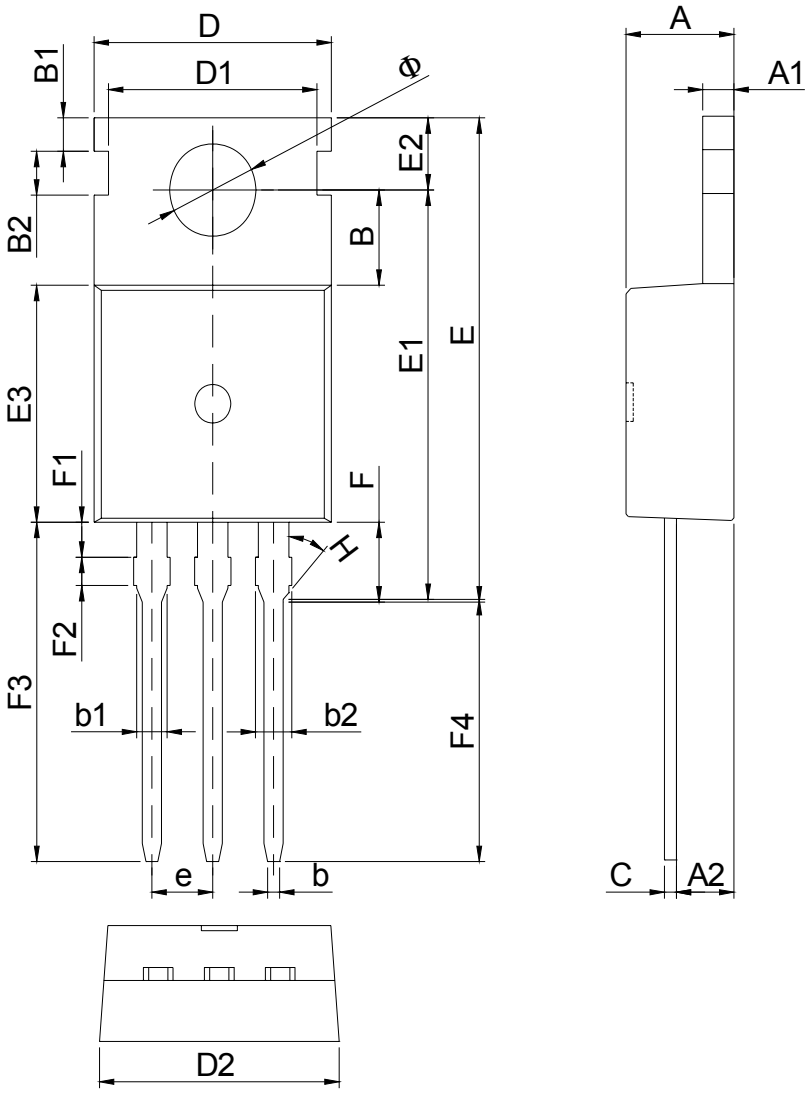
Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	2.22	2.32	2.42	0.087	0.091	0.095
A1	0.89	1.02	1.140	0.035	0.040	0.045
b	0.55	0.61	0.67	0.022	0.024	0.026
b1	0.76	0.86	0.96	0.030	0.034	0.038
b2	5.20	5.30	5.40	0.205	0.209	0.213
c	0.46	0.52	0.57	0.018	0.020	0.022
c1	0.45	0.50	0.55	0.018	0.020	0.022
D	5.95	6.10	6.25	0.234	0.240	0.246
D1	4.20	4.35	4.50	0.165	0.171	0.177
E	6.40	6.55	6.70	0.252	0.258	0.264
E1	4.75	4.80	4.85	0.187	0.189	0.191
e	2.28REF			0.09REF		
L	8.90	9.20	9.50	0.350	0.362	0.374
L1	1.90	2.10	2.29	0.075	0.082	0.090
L2	0.90	0.95	1.00	0.035	0.037	0.039

TO-252



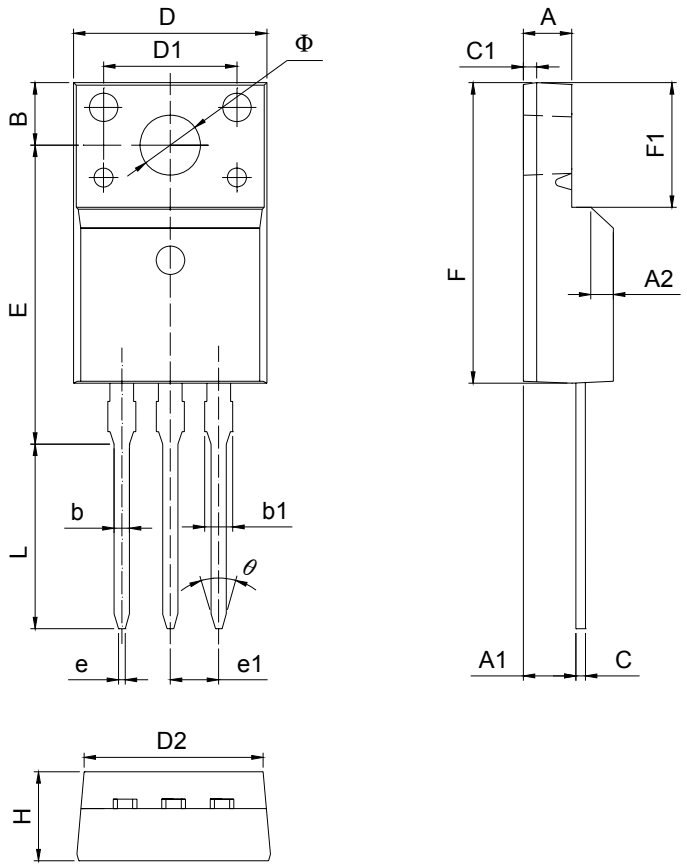
Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	2.22	2.32	2.42	0.087	0.091	0.095
A1	-	-	0.125	-	-	0.005
b	0.55	0.61	0.67	0.022	0.024	0.026
b1	0.76	0.86	0.96	0.030	0.034	0.038
b2	5.20	5.30	5.40	0.205	0.209	0.213
c	0.45	0.50	0.55	0.018	0.020	0.022
D	5.95	6.10	6.25	0.234	0.240	0.246
D1	4.20	4.35	4.50	0.165	0.171	0.177
E	6.40	6.55	6.70	0.252	0.258	0.264
E1	4.75	4.80	4.85	0.187	0.189	0.191
e	2.28REF			0.09REF		
H	9.44	9.79	10.14	0.372	0.385	0.399
L	1.37	1.52	1.67	0.054	0.060	0.066
L1	2.75REF			0.108REF		
L2	0.50REF			0.020REF		
L3	0.90	0.95	1.00	0.035	0.037	0.039
L4	0.65	0.80	0.95	0.026	0.031	0.037
L5	1.14	1.33	1.52	0.045	0.052	0.060
Q	0°	-	6°	0°	-	6°

TO-220



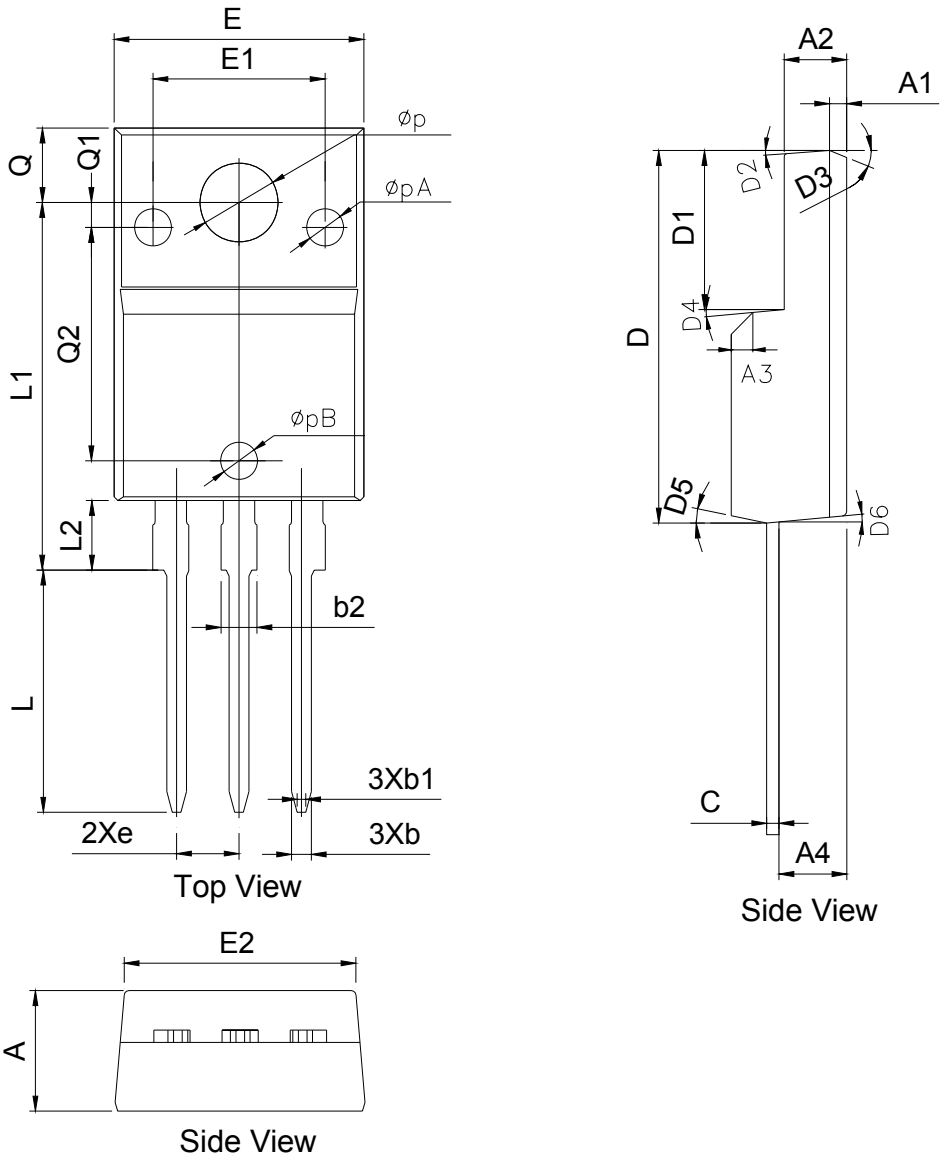
Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	4.45	4.50	4.55	0.175	0.177	0.179
A1	1.25	1.30	1.35	0.049	0.051	0.053
A2	2.20	2.40	2.60	0.087	0.094	0.102
B	-	3.70	-	-	0.146	-
B1	-	1.30	-	-	0.051	-
B2	-	1.70	-	-	0.067	-
b	0.70	0.80	0.90	0.028	0.031	0.035
b1	1.25	1.27	1.29	0.049	0.050	0.051
b2	1.42	1.52	1.62	0.056	0.060	0.064
C	0.45	0.50	0.55	0.018	0.020	0.022
D	9.85	9.90	9.95	0.388	0.390	0.392
D1	-	8.70	-	-	0.343	-
D2	9.98	10.00	10.02	0.393	0.394	0.394
E	-	-	18.95	-	-	0.746
E1	-	15.90	-	-	0.626	-
E2	-	2.80	-	-	0.110	-
E3	-	9.20	-	-	0.362	-
e	2.54 TYP			0.1 BSC		
F	-	3.00	-	-	0.118	-
F1	-	1.36	-	-	0.054	-
F2	-	1.10	-	-	0.043	-
F3	-	13.08	-	-	0.515	-
F4	10.03	10.08	10.13	0.395	0.397	0.399
ϕ	2.58	3.60	3.62	0.102	0.142	0.143
H	45°			45°		

TO-220F(A)



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	-	2.54	-	-	0.100	-
A1	-	2.76	-	-	0.109	-
A2	1.10*45°			1.10*45°		
B	-	3.3	-	-	0.130	-
b	0.78	0.80	0.82	0.031	0.031	0.032
b1	-		1.45	-		0.057
C	0.48	0.50	0.52	0.019	0.020	0.020
C1	-	0.70	-	-	0.028	-
D	10.15	10.16	10.17	0.400	0.400	0.400
D1	-	7.00	-	-	0.276	-
D2	-	9.32	-	-	0.367	-
e1	2.54 TYP			0.1 BSC		
e	0.30	0.35	0.40	0.012	0.014	0.016
E	15.52	15.57	15.62	0.611	0.613	0.615
F	15.55	15.60	15.65	0.612	0.614	0.616
F1	-	6.68	-	-	0.263	-
L	9.75	9.80	9.85	0.384	0.386	0.388
H	4.55	4.60	4.65	0.179	0.181	0.183
ϕ	3.19	3.24	3.29	0.126	0.128	0.130
Θ	30°			30°		

TO-220F(B)


E
E1
Q
Q1
øp
øpA
L1
Q2
øpB
L2
b2
L
3Xb1
2Xe
3Xb
Top View
A2
A1
D2
D3
D1
D
D4
A3
D5
D6
C
A4
Side View
E2
A
Side View

Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	4.50	4.70	4.90	0.177	0.185	0.193
A1	-	0.70	-	-	0.028	-
A2	2.34	2.54	2.74	0.092	0.100	0.108
A3	-	-	-	-	-	-
A4	2.66	2.76	2.86	0.105	0.109	0.113
b	0.70	0.80	0.90	0.028	0.031	0.035
b1	0.25	0.35	0.45	0.010	0.014	0.018
b2	-	-	1.47	-	-	0.058
C	0.40	0.50	0.60	0.016	0.020	0.024
D	14.80	15.00	15.20	0.583	0.591	0.598
D1	6.20	6.40	6.60	0.244	0.252	0.260
D2	-	-	-	-	-	-
D3	-	-	-	-	-	-
D4	-	-	-	-	-	-
D5	-	-	-	-	-	-
D6	-	-	-	-	-	-
e	2.54 BSC			0.1 BSC		
E	9.96	10.16	10.36	0.392	0.400	0.408
E1	-	-	-	-	-	-
E2	9.26	9.46	9.66	0.365	0.372	0.380
L	9.55	9.75	9.95	0.376	0.384	0.392
L1	14.60	14.80	15.00	0.575	0.583	0.591
L2	2.60	2.80	3.00	0.102	0.110	0.118
Q	2.90	3.00	3.10	0.114	0.118	0.122
Q1	-	-	-	-	-	-
Q2	-	-	-	-	-	-
ØP	3.08	3.18	3.28	0.121	0.125	0.129
ØPA	-	-	-	-	-	-
ØPB	-	-	-	-	-	-

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