

BYD Microelectronics Co., Ltd.

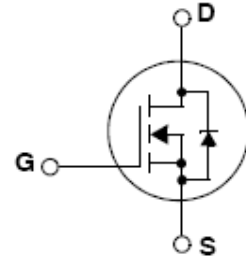
BF92N60/BF92N60L/BF92N60R/BF92N60T

600V N-Channel MOSFET

General Description

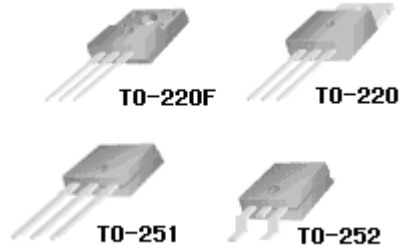
These N-Channel enhancement mode power field effect transistors are produced using DMOS technology.

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

- $V_{DS} = 600\text{ V}$
- $I_D = 2\text{ A}$
- $R_{DS(ON)} = 3.6\Omega$ TYP ($V_{GS} = 10\text{ V}, I_D = 1\text{ A}$)
- 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 $T_c = 25^\circ\text{C}$	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	PeakDiodeRecovery dv/dt (Note3)	5			V/ns
P_D	Power Dissipation ($T_c = 25^\circ\text{C}$)	46	54	24	W
T_{stg}	Storage Temperature Range	-55 to +150			
T_L	Maximum Lead Temperature for Soldering Purpose	300			$^\circ\text{C}$

**Ordering Information**

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

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°C)

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			1	uA
		V _{DS} =600V, V _{GS} =0V, T _c =125°C			10	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 =4.7 Ω (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°C unless noted)

Figure 1 Output Characteristics

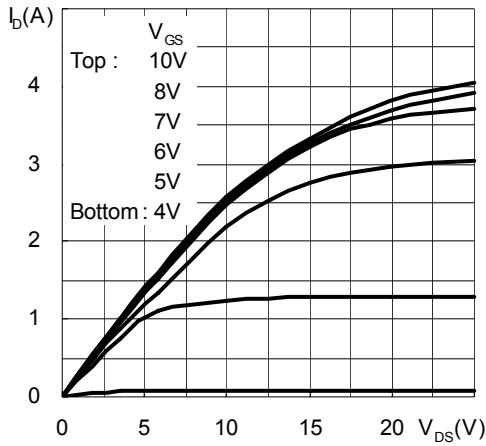


Figure 2 Transfer Characteristics

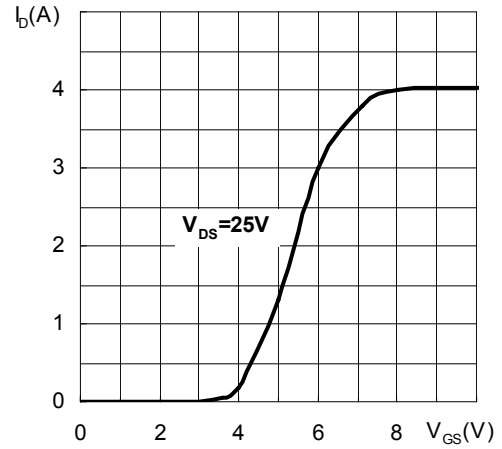


Figure 3 Normalized Threshold Voltage Vs Temperature

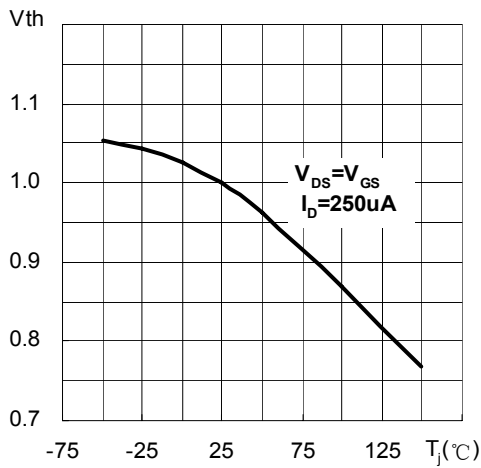


Figure 4 Normalized BV_{DSS} vs Temperature

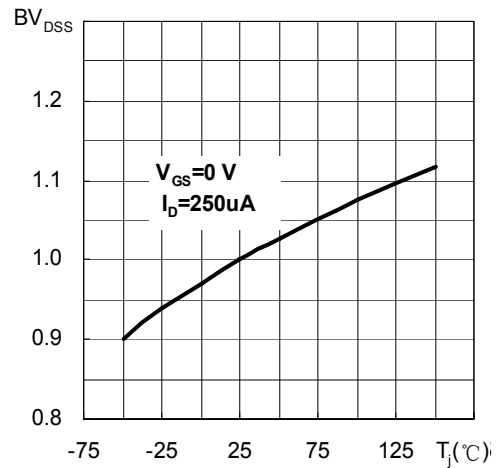


Figure 5 Normalized on Resistance vs Temperature

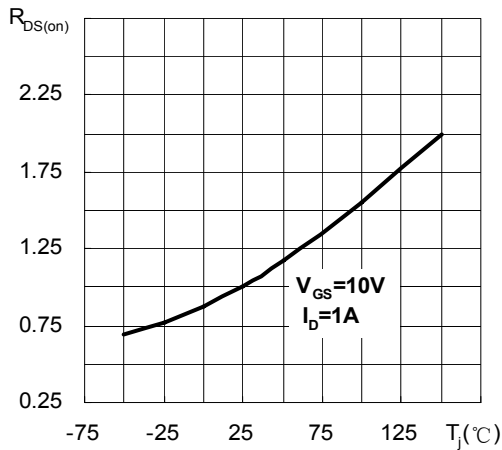


Figure 6 Source-Drain Diode Forward Characteristics

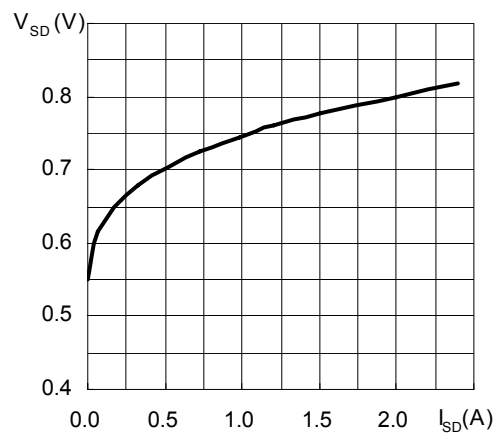




Figure 7 Capacitance

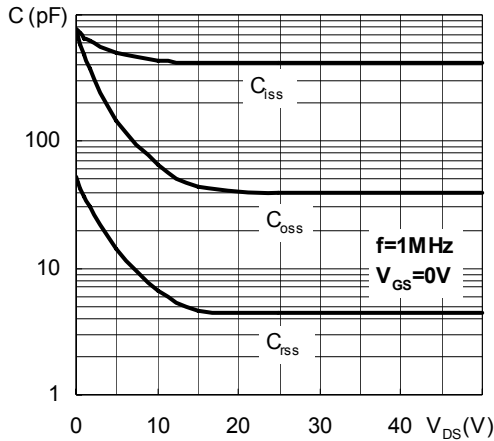


Figure 8 Gate Charge

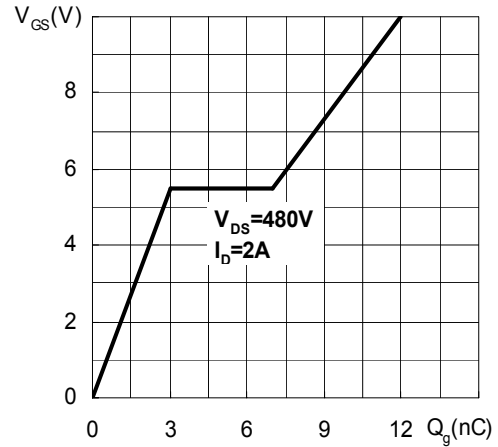


Figure 9-1 Maximum Safe Operating Area For BF92N60R/BF92N60T

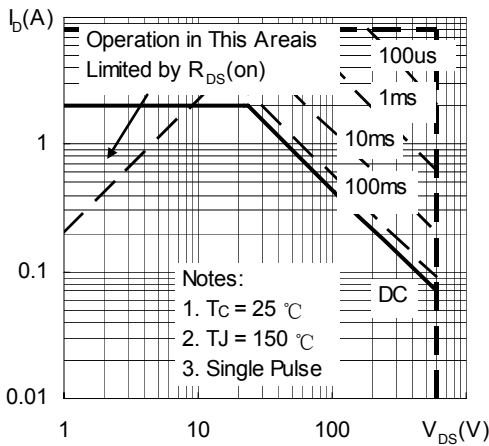


Figure 9-2 Maximum Safe Operating Area For BF92N60L

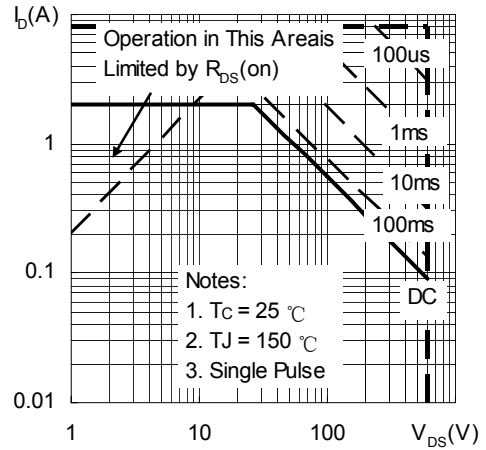


Figure 9-3 Maximum Safe Operating Area For BF92N60

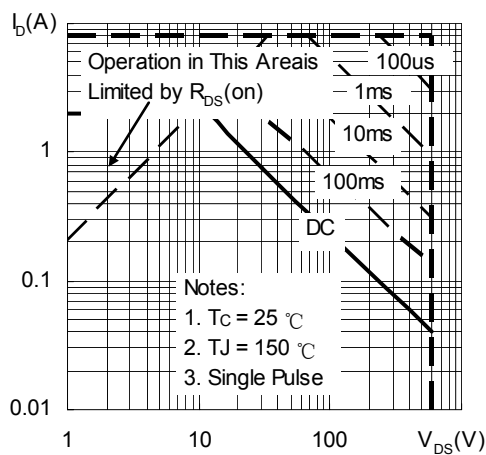


Figure 10 Maximum Drain Current vs Case Temperature

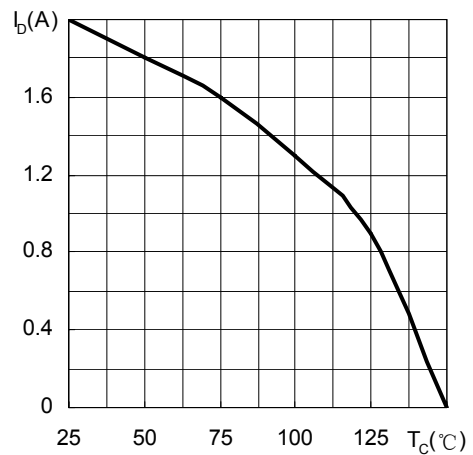


Figure 11-1 Maximum Transient Thermal Impedance For BF92N60R/BF92N60T

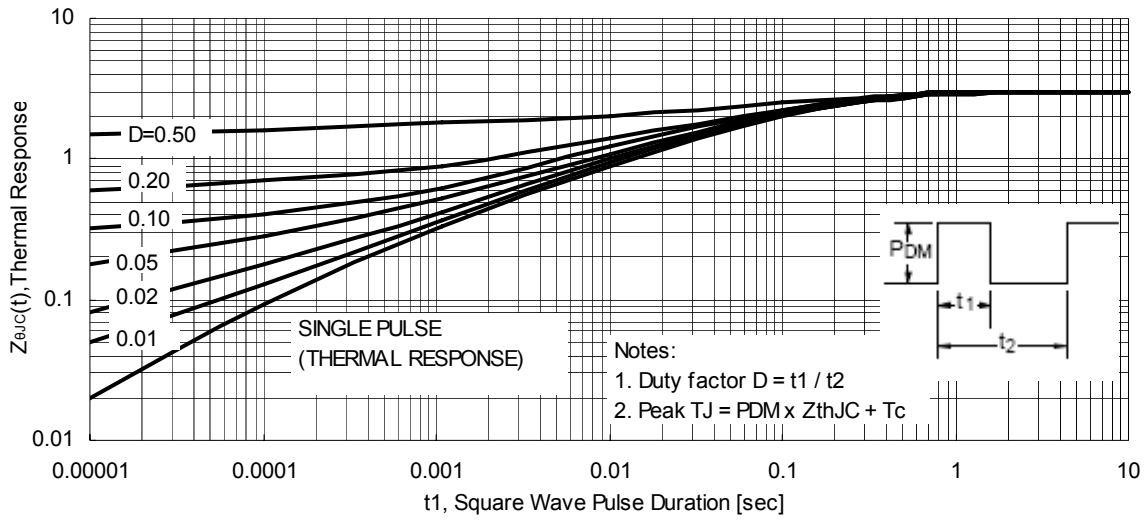


Figure 11-2 Maximum Transient Thermal Impedance For BF92N60L

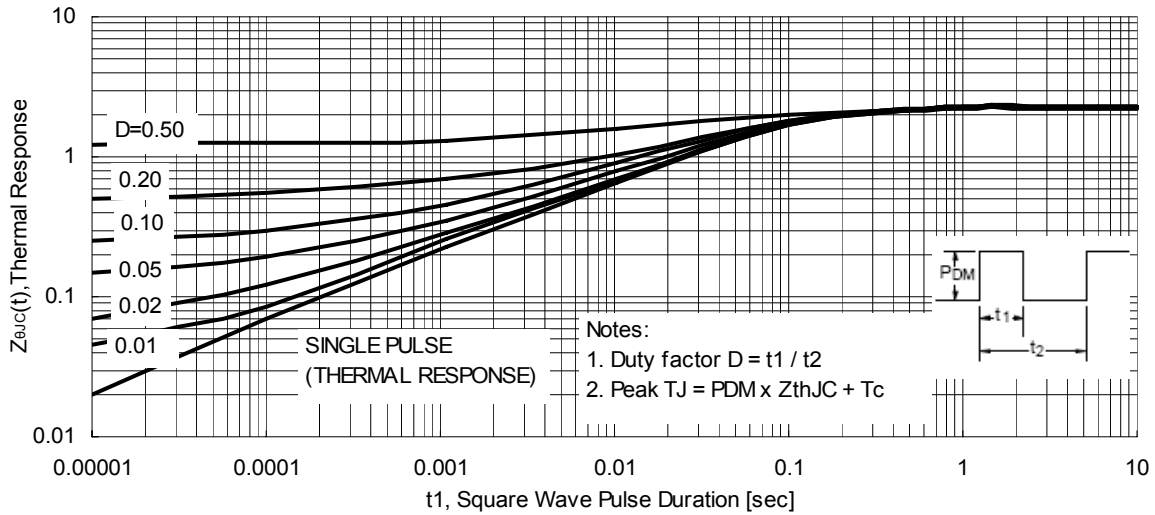
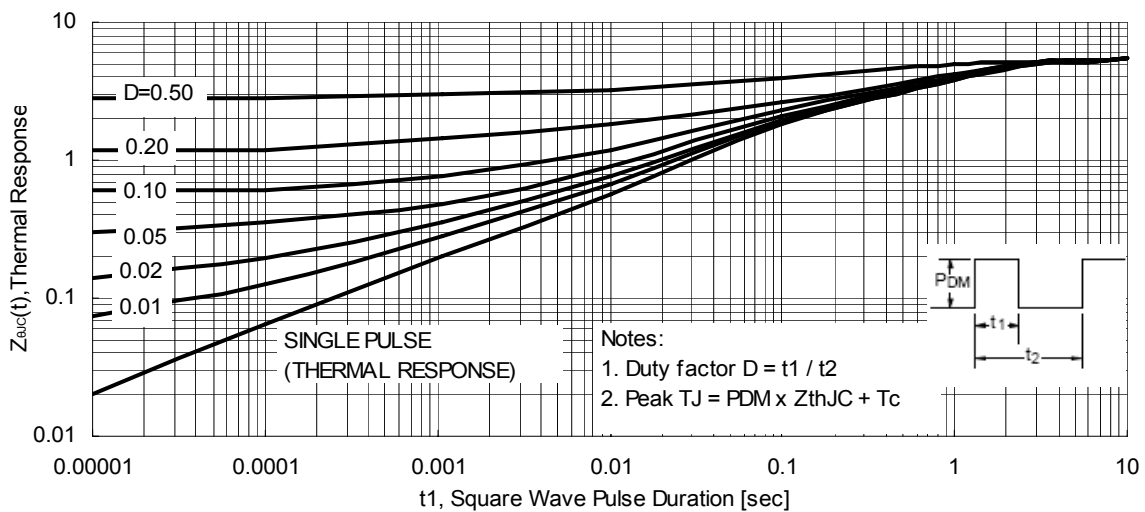
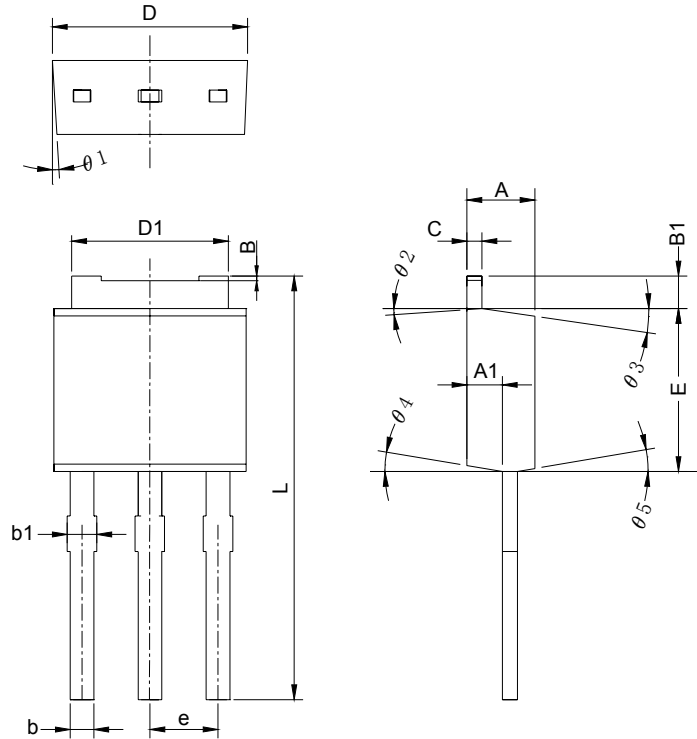


Figure 11-3 Maximum Transient Thermal Impedance For BF92N60



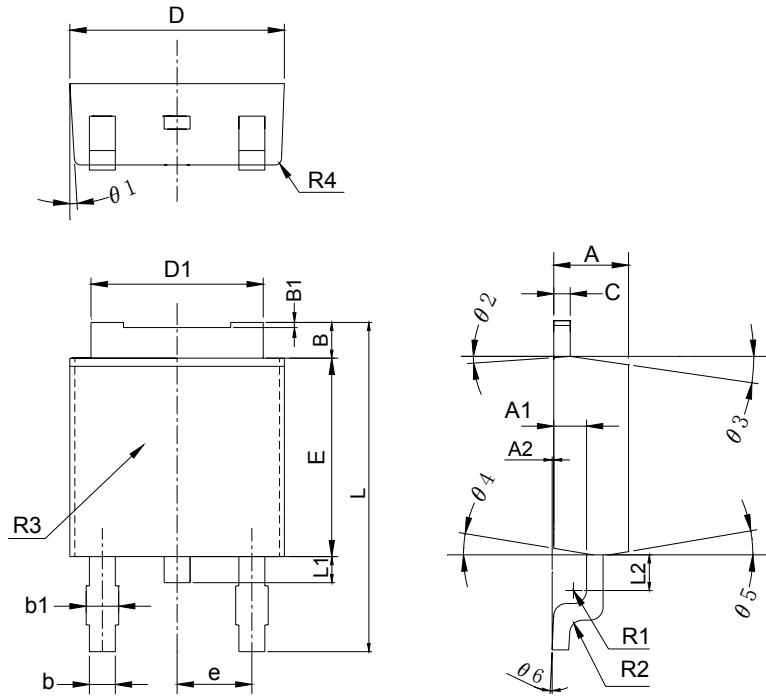
Package Drawing

TO-251



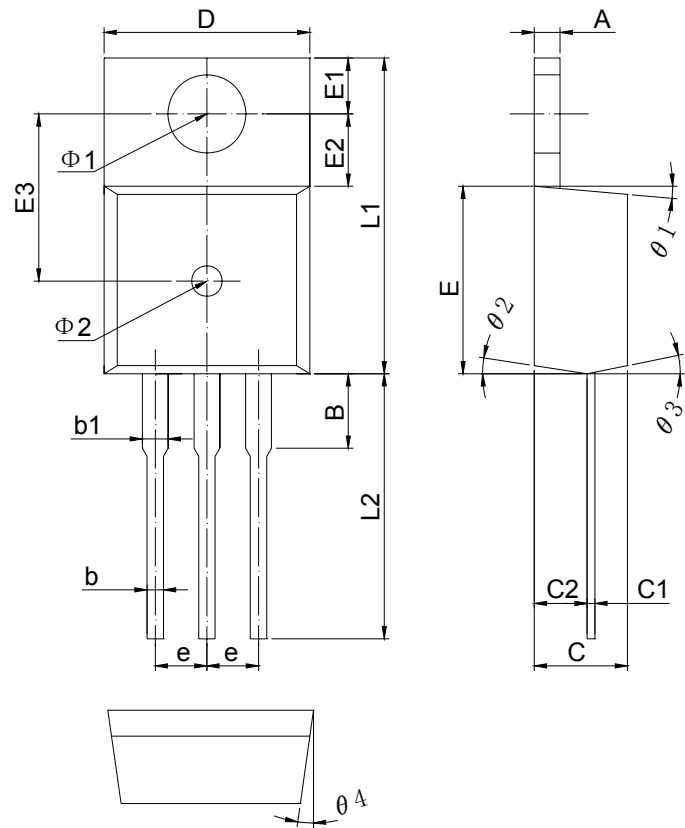
Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	2.25	2.30	2.35	0.089	0.091	0.093
A1	0.96	1.01	1.06	0.038	0.040	0.042
B	-	0.16	-	-	0.006	-
B1	0.98	1.08	1.18	0.039	0.043	0.046
b	0.712	0.812	0.912	0.028	0.032	0.036
b1	-	-	1.10	-	-	0.043
C	0.46	0.51	0.56	0.018	0.020	0.022
D	6.55	6.60	6.65	0.258	0.260	0.262
D1	5.28	5.33	5.38	0.208	0.210	0.212
E	6.05	6.10	6.15	0.238	0.240	0.242
e	2.261	2.286	2.311	0.089	0.090	0.091
L	14.40	14.50	14.60	0.567	0.571	0.575
θ_1	3°			3°		
θ_2	3°			3°		
θ_3	5°			5°		
θ_4	5°			5°		
θ_5	5°			5°		

TO-252



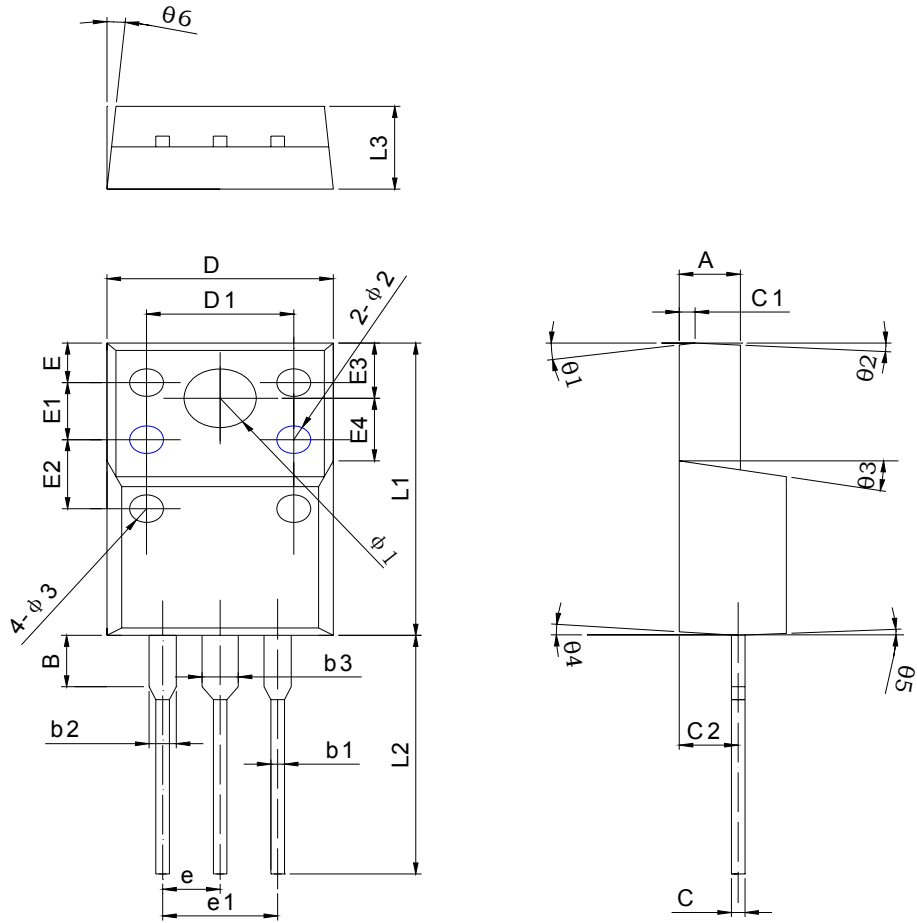
Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	2.25	2.30	2.35	0.089	0.091	0.093
A1	0.96	1.01	1.06	0.038	0.040	0.042
A2	0	0.05	0.1	0.000	0.002	0.004
B	0.98	1.08	1.18	0.039	0.043	0.046
B1	-	0.16	-	-	0.006	-
b	0.712	0.812	0.912	0.028	0.032	0.036
b1	-	-	1.10	-	-	0.043
C	0.46	0.51	0.56	0.018	0.020	0.022
D	6.55	6.60	6.65	0.258	0.260	0.262
D1	5.28	5.33	5.38	0.208	0.210	0.212
E	6.05	6.1	6.15	0.238	0.240	0.242
e	2.261	2.286	2.311	0.089	0.090	0.091
L	10.00	10.10	10.2	0.394	0.398	0.402
L1	0.7	0.8	0.9	0.028	0.031	0.035
L2	0.65	0.75	0.85	0.026	0.030	0.033
R1	0.35	0.4	0.45	0.014	0.016	0.018
R2	0.35	0.4	0.45	0.014	0.016	0.018
R3	1.12	1.14	1.16	0.044	0.045	0.046
R4		0.2			0.008	
θ1		3°			3°	
θ2		3°			3°	
θ3		5°			5°	
θ4		5°			5°	
θ5		5°			5°	
θ6		0.8°			0.8°	

TO-220



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	-	1.27	-	-	0.050	-
B	-	3.65	-	-	0.144	-
b	-	0.81	-	-	0.032	-
b1	-	1.27	-	-	0.050	-
C	-	4.58	-	-	0.180	-
C1	-	0.38	-	-	0.015	-
C2	-	2.60	-	-	0.102	-
D	10.10	10.12	10.14	0.398	0.398	0.399
E	-	9.20	-	-	0.362	-
E1	-	2.74	-	-	0.108	-
E2	-	3.55	-	-	0.140	-
E3	-	8.20	-	-	0.323	-
e	2.515	2.54	2.565	0.099	0.100	0.101
L1	15.47	15.49	15.51	0.609	0.610	0.611
L2	13.00	-	-	0.512	-	-
$\theta 1$	3°			3°		
$\theta 2$	3°			3°		
$\theta 3$	3°			3°		
$\theta 4$	3°			3°		
$\phi 1$	3.84			0.151		
$\phi 2$	1.5			0.059		

TO-220F





Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	2.50	2.70	2.90	0.098	0.106	0.114
B	2.60	2.80	3.00	0.102	0.110	0.118
b1	0.50	0.60	0.70	0.020	0.024	0.028
b2	1.10	1.20	1.30	0.043	0.047	0.051
b3	-	1.60	-	-	0.063	-
C	0.55	0.60	0.65	0.022	0.024	0.026
C1	-	0.60	-	-	0.024	-
C2	2.40	2.60	2.80	0.094	0.102	0.110
D	9.80	10.00	10.20	0.386	0.394	0.402
D1	-	6.50	-	-	0.256	-
E	-	2.15	-	-	0.085	-
E1	-	3.10	-	-	0.122	-
E2	-	3.75	-	-	0.148	-
E3	2.90	3.00	3.10	0.114	0.118	0.122
E4	3.30	3.40	3.50	0.130	0.134	0.138
e	-	2.54	-	-	0.100	-
e1	4.98	5.08	5.18	0.196	0.200	0.204
L1	14.80	15.00	15.20	0.583	0.591	0.598
L2	13.00	13.20	13.40	0.512	0.520	0.528
L3	4.30	4.50	4.70	0.169	0.177	0.185
Θ1	5°			5°		
Θ2	3°			3°		
Θ3	10°			10°		
Θ4	5°			5°		
Θ5	3°			3°		
Θ6	5°			5°		
φ1	3.00	3.20	3.40	0.118	0.126	0.134
φ2	1.50 深 1.2 头部 160°			1.50 深 1.2 头部 160°		
φ3	1.50 深 0.1			1.50 深 0.1		



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