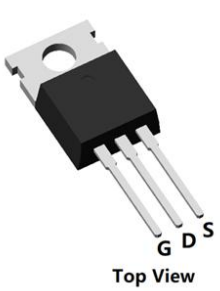
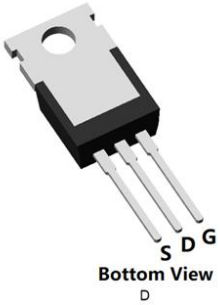
N-Channel Enhancement Mode Field Effect Transistor

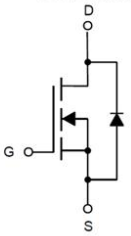


Top View



Bottom View

TO-220



Product Summary

- V_{DS} 40V
- I_D 180A
- $R_{DS(ON)}$(at V_{GS}=10V) ＜2.0mΩ
- $R_{DS(ON)}$(at V_{GS}=4.5V) ＜2.5mΩ
- 100% EAS Tested
- 100% ▽V_{DS} Tested

General Description

- Split gate trench MOSFET technology
- Excellent stability and uniformity
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

Applications

- Power switching application
- Portable equipment

■ Absolute Maximum Ratings (T_A=25℃ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-source Voltage		V_{DS}	40	V
Gate-source Voltage		V_{GS}	±20	V
Drain Current	T_A=25℃	I_D	30	A
	T_A=100℃		19	
	T_C=25℃		180	
	T_C =100℃		113	
Pulsed Drain Current [A]		I_{DM}	720	A
Avalanche energy [B]		EAS	864	mJ
Total Power Dissipation [C]	T_A=25℃	P_D	6.2	W
	T_A=100℃		2.5	
	T_C=25℃		312	
	T_C =100℃		125	
Junction and Storage Temperature Range		T_J ,T_{STG}	-55～+150	℃

■Thermal resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient [D]	Steady-State	$R_{\theta JA}$	15	20	℃/W
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	0.3	0.4	

■ Ordering Information (Example)

PREFERED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
P180G04C	B1	P180G04C	50	/	5000	Tube

■ Electrical Characteristics (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}= 0V, I_D=250μA	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=40V, V_{GS}=0V	-	-	1	μA
		V_{DS}=40V, V_{GS}=0V, Tj=150℃	-	-	100	
Gate-Body Leakage Current	I_{GSS}	V_{GS}= ±20V, V_{DS}=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}= V_{GS}, I_D=250μA	1.0	1.8	2.5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=90A	-	1.6	2.0	mΩ
		V_{GS}=10V, I_D=20A		1.6	2.0	
		V_{GS}=4.5V, I_D=20A	-	2.0	2.5	
Diode Forward Voltage	V_{SD}	I_S=90A, V_{GS}=0V	-	0.95	1.2	V
Gate resistance	R_G	f=1MHz, Open drain	-	1.5	-	Ω
Maximum Body-Diode Continuous Current	I_S		-	-	180	A
Dynamic Parameters						
Input Capacitance	C_{iss}	V_{DS}=20V, V_{GS}=0V, f=1MHz	-	7400	-	pF
Output Capacitance	C_{oss}		-	1350	-	
Reverse Transfer Capacitance	C_{rss}		-	70	-	
Switching Parameters						
Total Gate Charge	Q_g	V_{GS}=10V, V_{DS}=20V, I_D=90A	-	115	-	nC
Gate-Source Charge	Q_{gs}		-	17	-	
Gate-Drain Charge	Q_{gd}		-	24	-	
Reverse Recovery Charge	Q_{rr}	I_F=30A, di/dt=100A/us	-	130	-	nC
Reverse Recovery Time	t_{rr}		-	75	-	ns
Turn-on Delay Time	$t_{D(on)}$	V_{GS}=10V, V_{DD}=20V, I_D=90A R_{GEN}=2.2Ω	-	19	-	ns
Turn-on Rise Time	t_r		-	74	-	
Turn-off Delay Time	$t_{D(off)}$		-	52	-	
Turn-off fall Time	t_f		-	14	-	

A. Repetitive rating; pulse width limited by max. junction temperature.
B. T_J=25℃, V_{DD}=30V, V_G=10V, R_G=25Ω, L=3mH, IAS=24A.
C. P_d is based on max. junction temperature, using junction-case thermal resistance.
D. The value of $R_{\theta JA}$ is measured with the device mounted on the minimum recommend pad size, in the still air environment with T_A =25℃. The maximum allowed junction temperature of 150℃. The value in any given application depends on the user's specific board design.

■Typical Electrical and Thermal Characteristics Diagrams

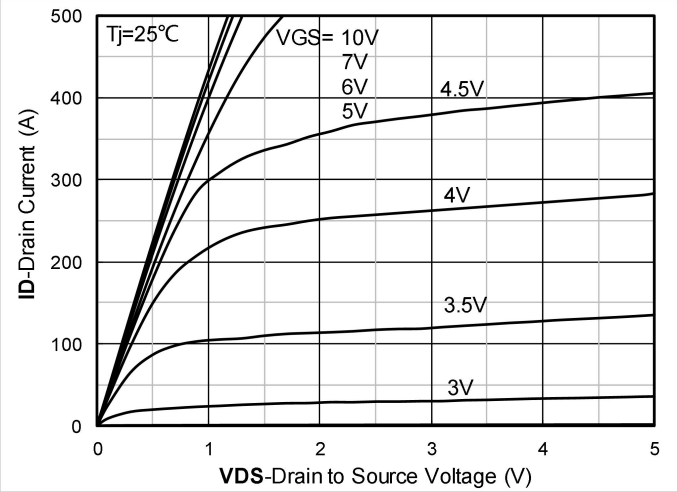


Figure 1. Output Characteristics

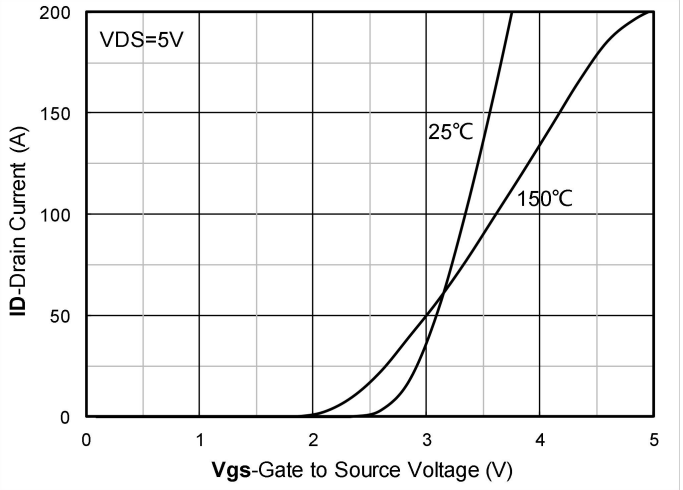


Figure 2. Transfer Characteristics

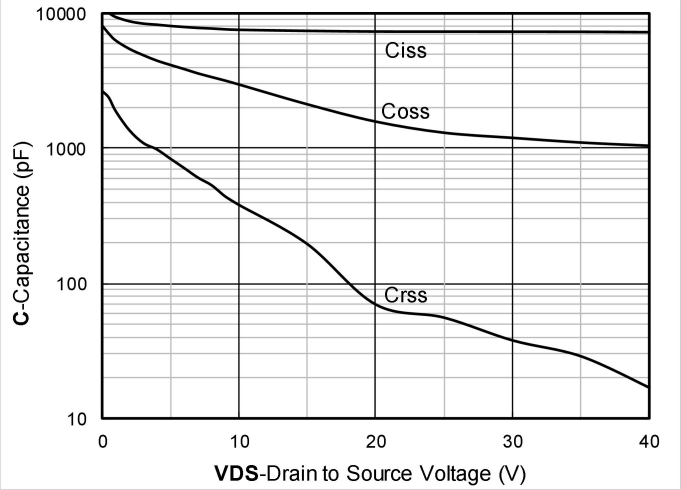


Figure 3. Capacitance Characteristics

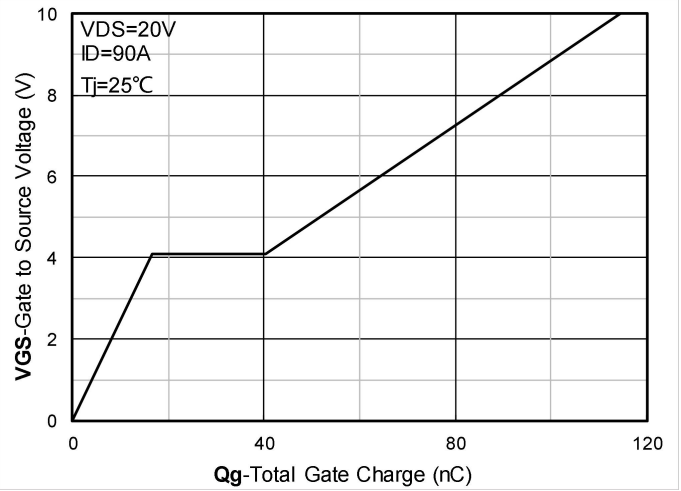


Figure 4. Gate Charge

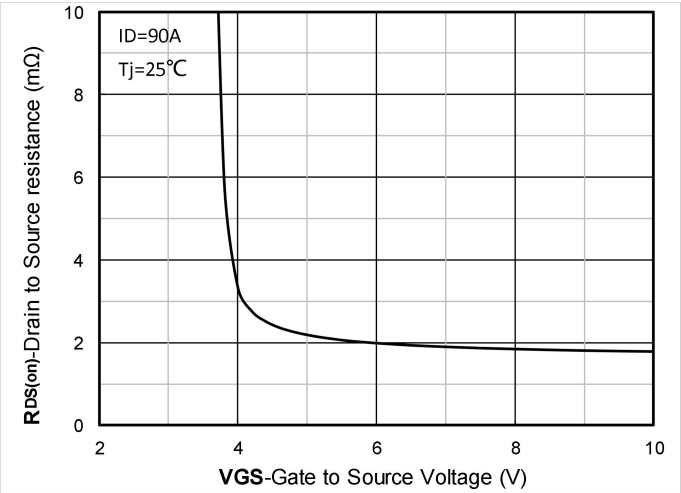


Figure 5. On-Resistance vs Gate to Source Voltage

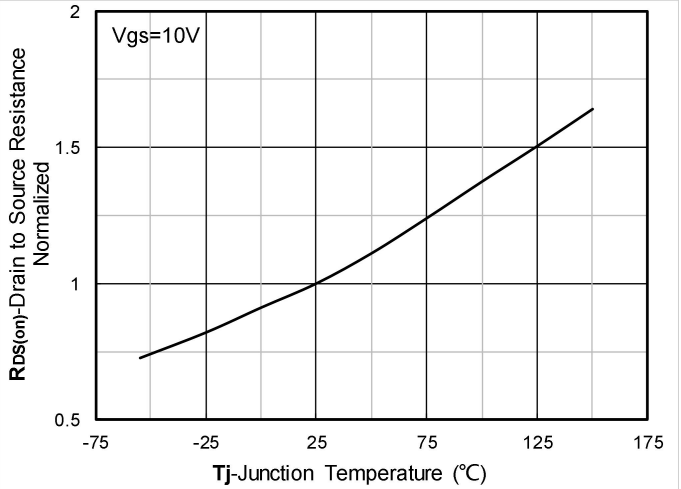


Figure 6. Normalized On-Resistance

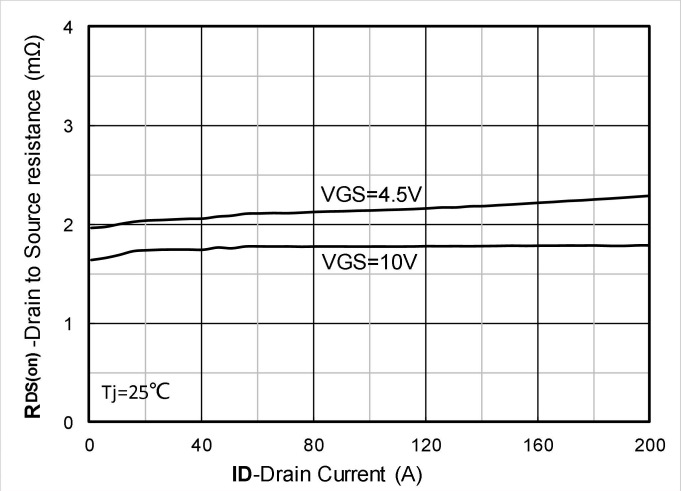


Figure 7. RDS(on) VS Drain Current

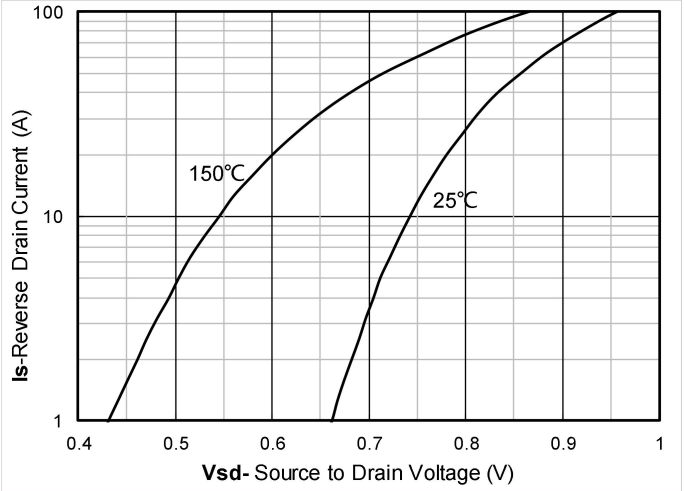


Figure 8. Forward characteristics of reverse diode

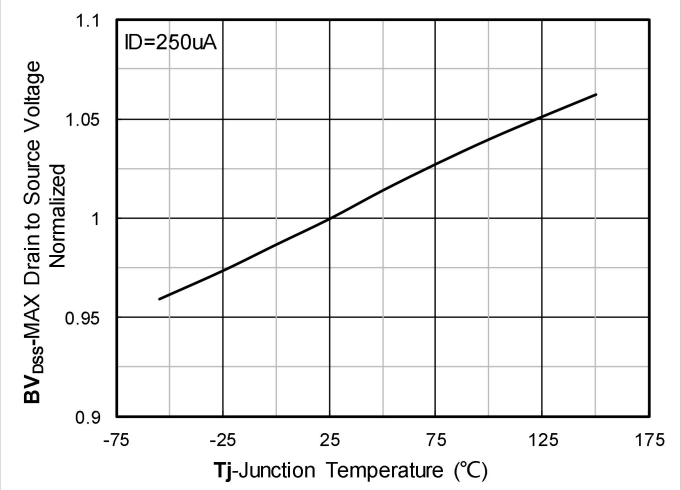


Figure 9. Normalized breakdown voltage

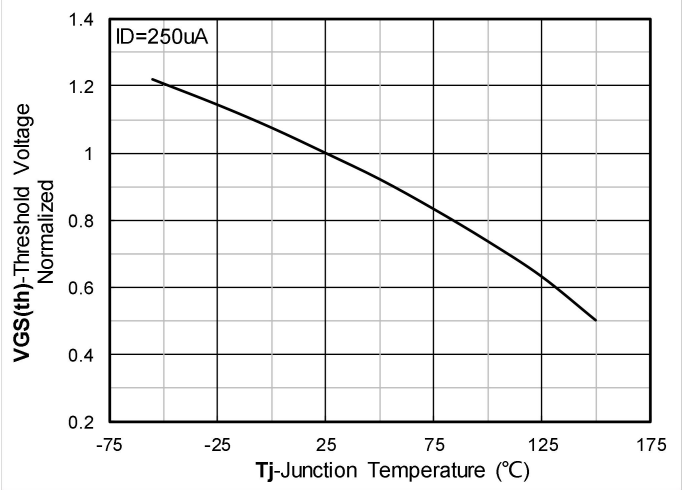


Figure 10. Normalized Threshold voltage

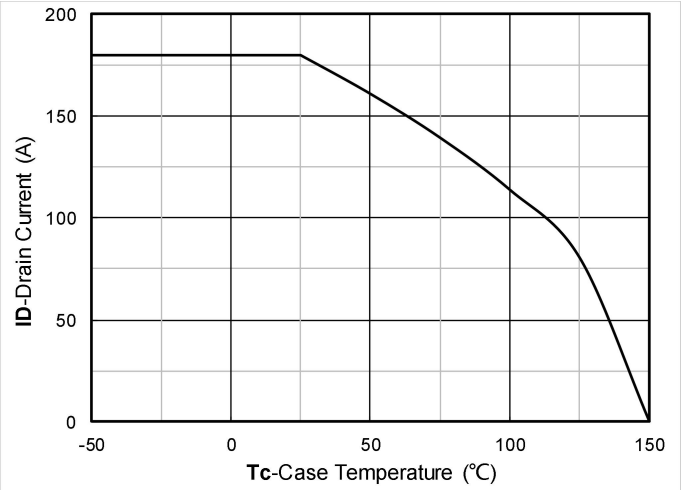


Figure 11. Current dissipation

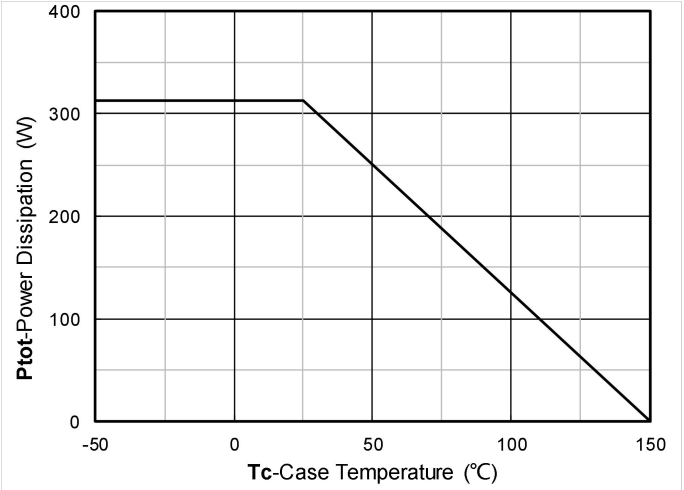


Figure 12. Power dissipation

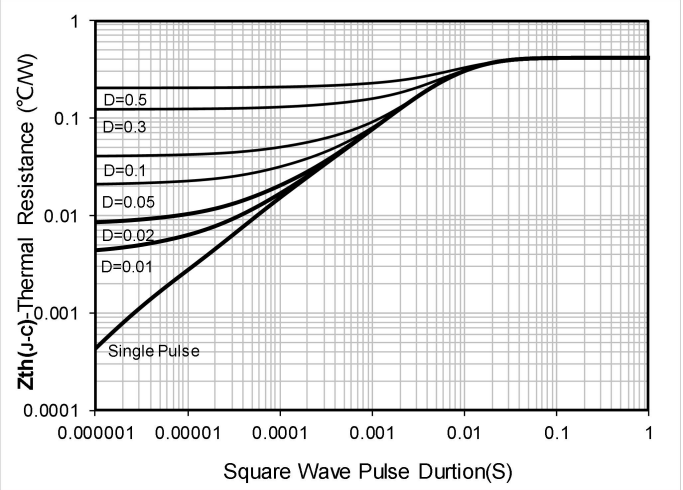


Figure 13. Maximum Transient Thermal Impedance

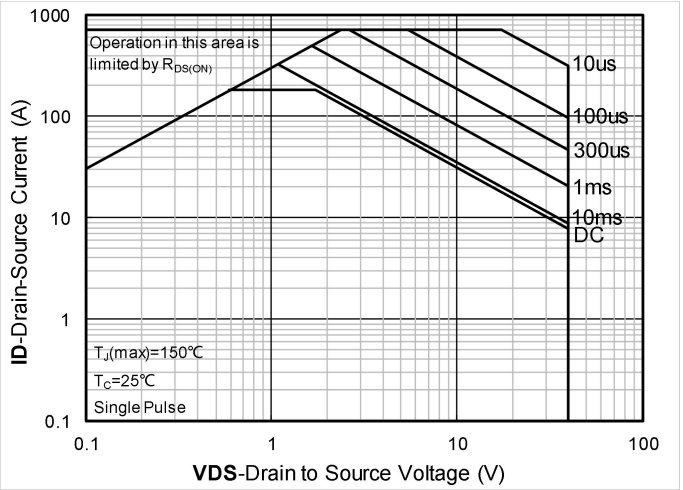
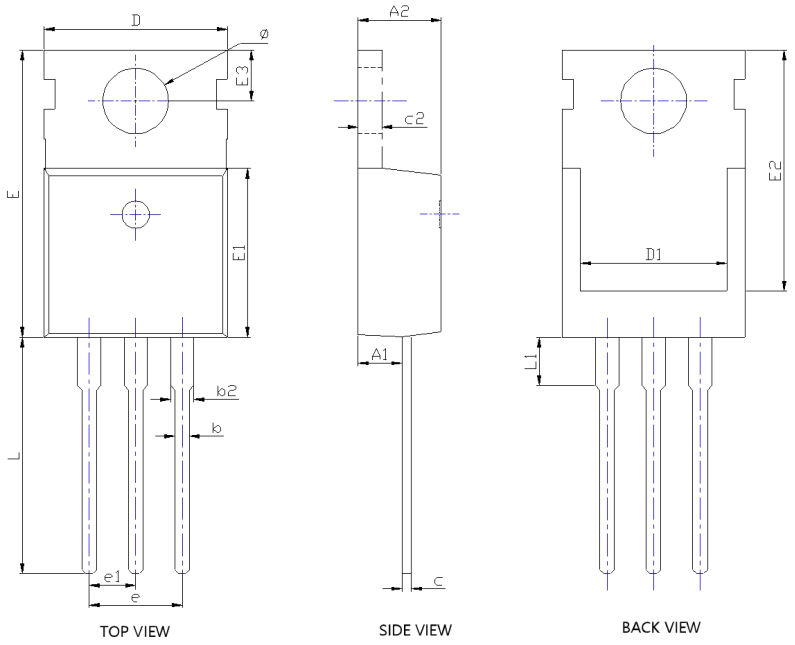


Figure 14. Safe Operation Area

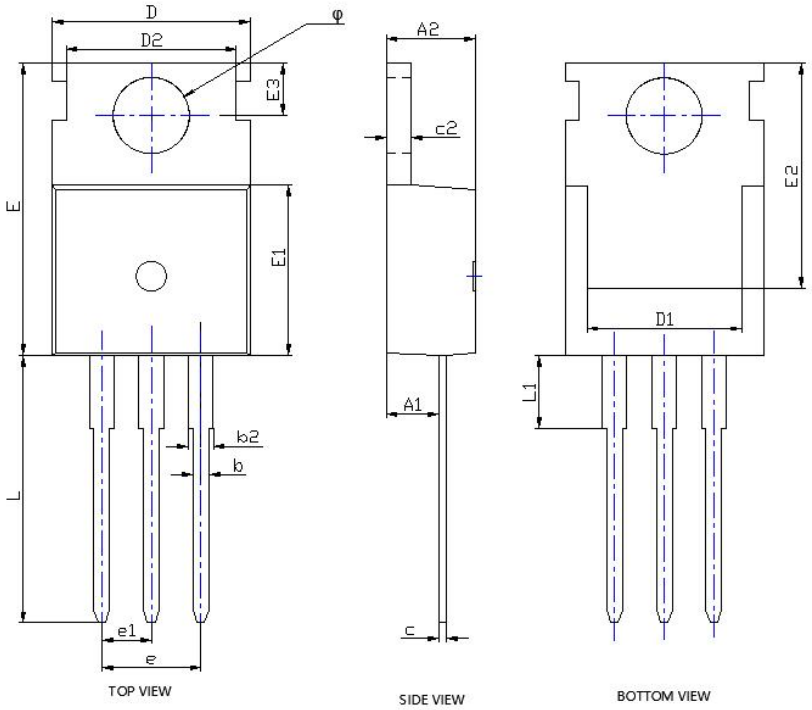
■ TO-220AB-D Package information



DIMENSIONS				
SYMBOL	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A1	0.091	0.098	2.300	2.500
A2	0.175	0.183	4.450	4.650
b	0.030	0.033	0.750	0.850
b2	0.048	0.052	1.220	1.320
c	0.018	0.022	0.450	0.550
c2	0.050	0.052	1.270	1.330
D	0.386	0.402	9.800	10.200
D1	0.303	0.327	7.700	8.300
E	0.614	0.630	15.600	16.000
E1	0.360	0.372	9.150	9.450
E2	0.510	0.533	12.950	13.550
E3	0.110BSC		2.800BSC	
e	0.200BSC		5.080BSC	
e1	0.100BSC		2.540BSC	
L	0.506	0.518	12.850	13.150
L1	0.093	0.117	2.360	2.960
ø	0.138	0.146	3.500	3.700

NOTE:
1.PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
2.TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.

■ TO-220AB-C Package information



DIMENSIONS				
SYMBOL	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A1	0.091	0.098	2.300	2.500
A2	0.173	0.181	4.400	4.600
b	0.028	0.035	0.700	0.900
b2	0.049	0.056	1.250	1.420
c	0.018	0.022	0.450	0.550
c2	0.049	0.053	1.250	1.350
D	0.382	0.402	9.700	10.200
D1	0.295	0.331	7.500	8.400
D2	0.335	0.350	8.500	8.900
E	0.602	0.634	15.300	16.100
E1	0.358	0.366	9.100	9.300
E2	0.497	0.525	12.630	13.330
E3	0.108BSC		2.750BSC	
e	0.200BSC		5.080BSC	
e1	0.100BSC		2.540BSC	
L	0.512	0.531	13.000	13.500
L1	---	0.138	---	3.500
ø	0.140	0.148	3.550	3.750

NOTE:
1.PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
2.TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.

Notice

All products, product specifications and data are subject to change without notice to improve reliability, function or design or otherwise.Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in STARSEA's terms and conditions of sale for such products, STARSEA assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of STARSEA products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.