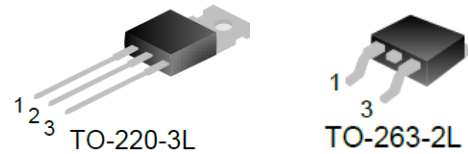


180A,100V N-CHANNEL POWER MOSFET

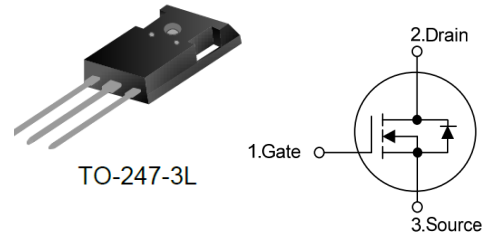
Features

- $R_{DS(on)}=2.5m\Omega$ (Typ.) @ $V_{GS}=10V, I_D=180A$
- New technology for high voltage device
- Low on-resistance
- Fast switching



Applications

- Power factor correction (PFC)
- Switched mode power supplies (SMPS)
- Uninterruptible Power Supply (UPS)



Key Performance and Package Parameters

Order codes	V_{DS}	I_D	$R_{DS(ON)}$, Typ	T_{vjmax}	Marking	Package
XD2R5S010AK1R3	100V	180A	2.5m Ω	150 $^{\circ}C$	D2R5S10AK1	TO263-2L
XD2R5S010AK1L3	100V	180A	2.5m Ω	150 $^{\circ}C$	D2R5S10AK1	TO220-3L
XD2R5S010AK1S3	100V	180A	2.5m Ω	150 $^{\circ}C$	D2R5S10AK1	TO247-3L

Absolute Maximum Ratings ($T_c=25^{\circ}C$ unless otherwise noted.)

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	100	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current ($T_c=25^{\circ}C$)	180	A
I_{DM}	Pulsed Drain Current	720	A
P_D	Maximum Power Dissipation ($T_c=25^{\circ}C$) TO263, TO220 TO247	223	W
		278	
E_{AS}	Avalanche Energy, Single Pulse (note1)	961	mJ
T_J	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$
T_{STG}	Storage Temperature Range	-55 to 150	$^{\circ}C$

Thermal Data

Symbol	Parameter	Conditions	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Steady State)	TO263-3L	0.56	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Steady State)	TO220-3L	0.56	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Steady State)	TO247-3L	0.45	$^{\circ}C/W$

Electrical Characteristics ($T_c=25^\circ\text{C}$ unless otherwise noted.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	100	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=100V, V_{GS}=0V$	---	---	1	μA
I_{GSS}	Gate Leakage Current, Forward	$V_{GS}=20V, V_{DS}=0V$	---	---	100	nA
	Gate Leakage Current, Reverse	$V_{GS}=-20V, V_{DS}=0V$	---	---	-100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	2.2	---	3.8	V
$R_{DS(ON)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=90A$	---	2.5	3.0	m Ω
Q_g	Total Gate Charge	$V_{DD}=50V$	---	171	---	nC
Q_{gs}	Gate-Source Charge	$V_{GS}=10V$	---	61	---	nC
Q_{gd}	Gate-Drain Charge	$I_D=90A$	---	47	---	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=50V, V_{GS}=10V$ $I_D=90A, R_G=3\Omega$	---	44	---	ns
t_r	Turn-on Rise Time		--	70	--	ns
$t_{d(off)}$	Turn-off Delay Time		---	99	---	ns
t_f	Turn-off Fall Time		---	46	---	ns
C_{iss}	Input Capacitance	$V_{DS}=50V$	---	10542	---	pF
C_{oss}	Output Capacitance	$V_{GS}=0V$	---	1264	---	pF
C_{rss}	Reverse Transfer Capacitance	$f=1\text{MHz}$	---	38	---	pF

Diode Characteristics ($T_c=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{SD}	Diode Forward Voltage	$I_S=90A, V_{GS}=0V$	---	---	1.4	V
t_{rr}	Diode Reverse Recovery Time	$I_S=90A, V_{GS}=0V$ $di_f/dt=100A/\mu s$	---	97	---	ns
Q_{rr}	Diode Reverse Recovery Charge		---	0.28	---	μC

Notes:

1. $V_{DD}=80V, L=0.5\text{mH}, R_G=25\Omega$, starting, $T_J=25^\circ\text{C}$.

Typical Characteristics

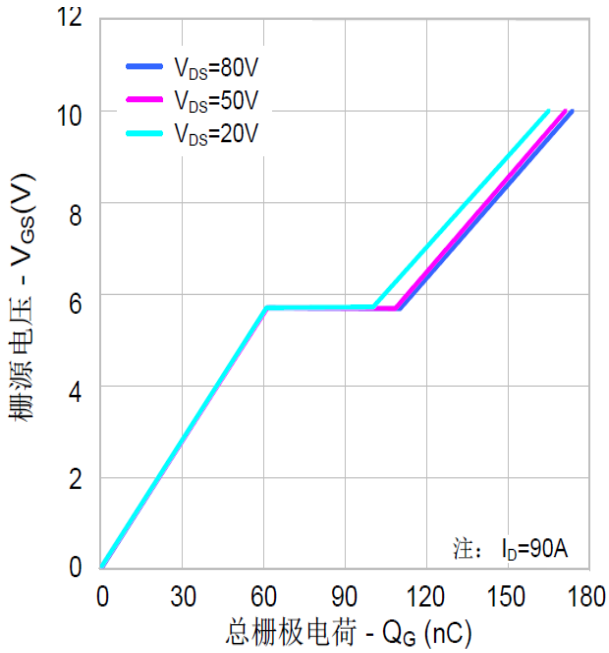


Fig.1 Gate Charge

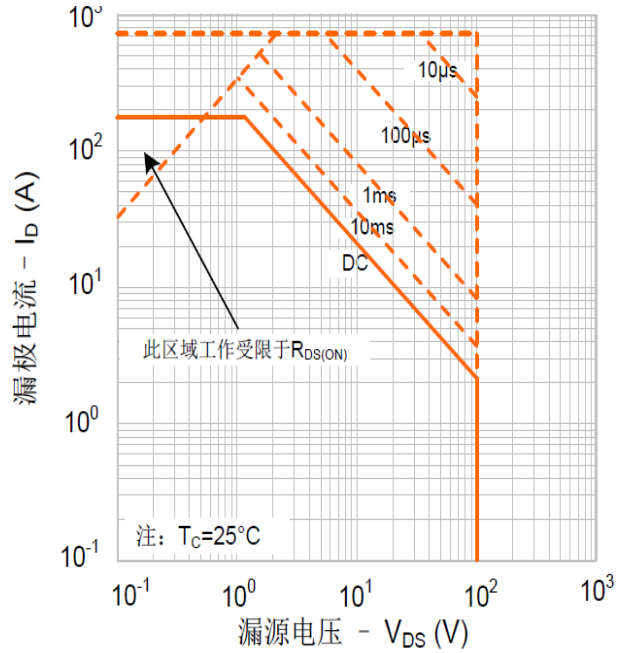


Fig.2 Safe Operation Area

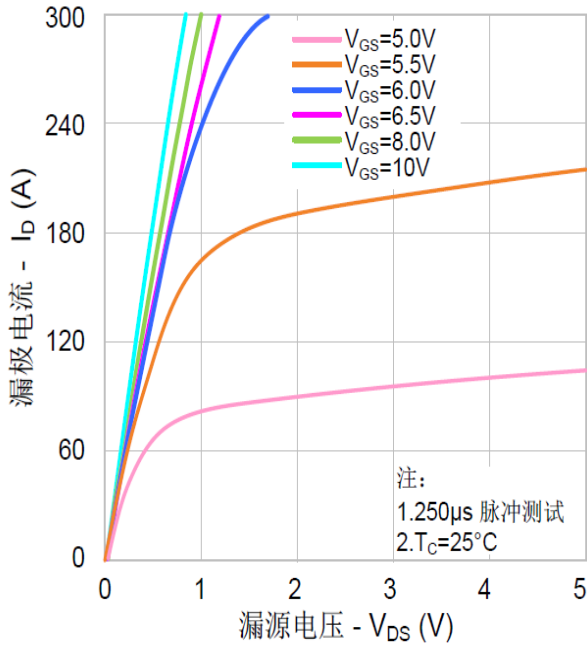


Fig.3 Output Characteristics

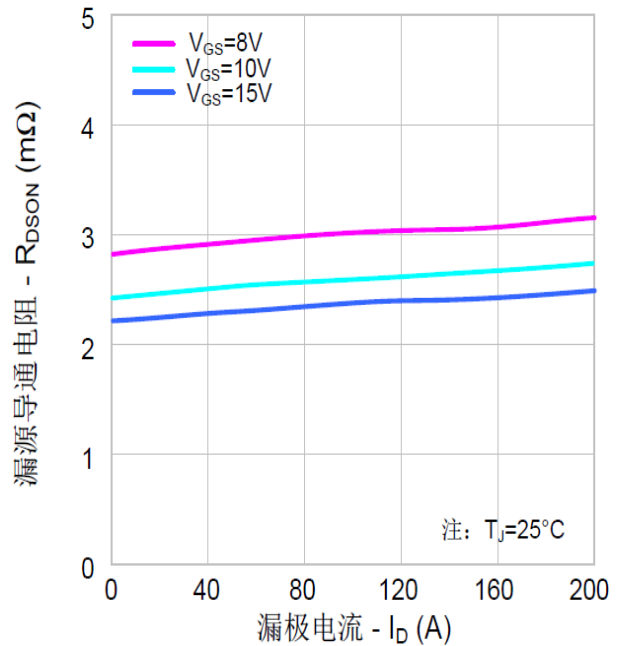


Fig.4 Drain-Source On Resistance

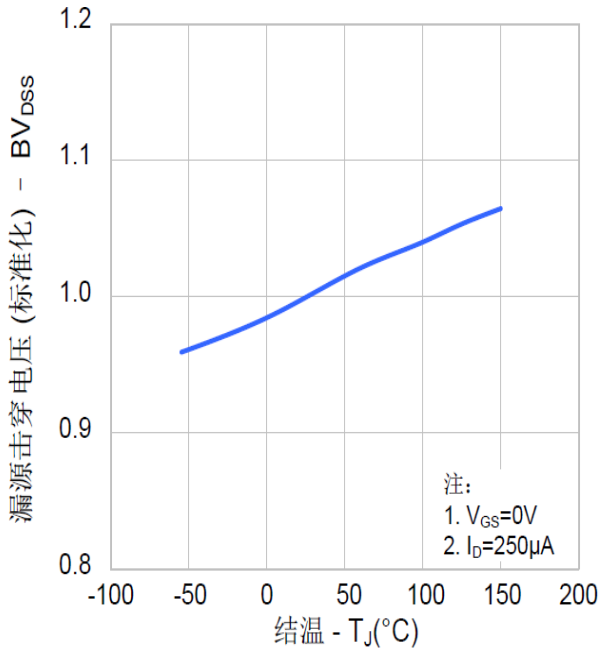


Fig.5 Drain-Source Breakdown Voltage

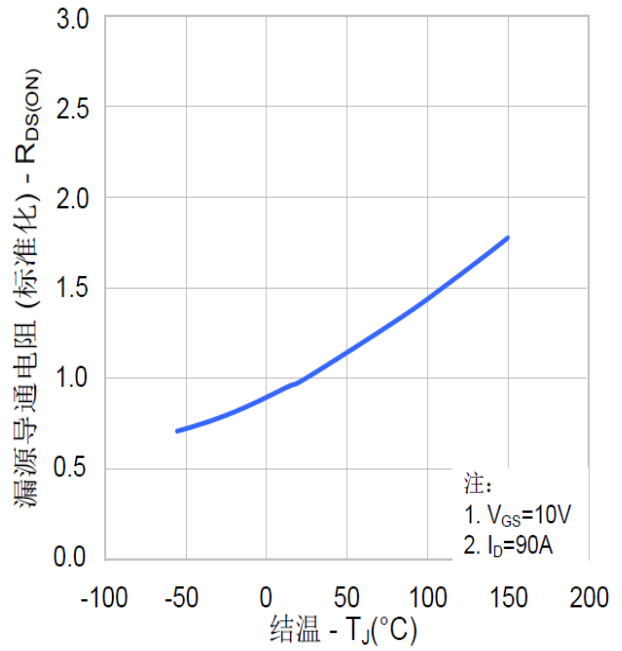


Fig.6 Drain-Source On Resistance

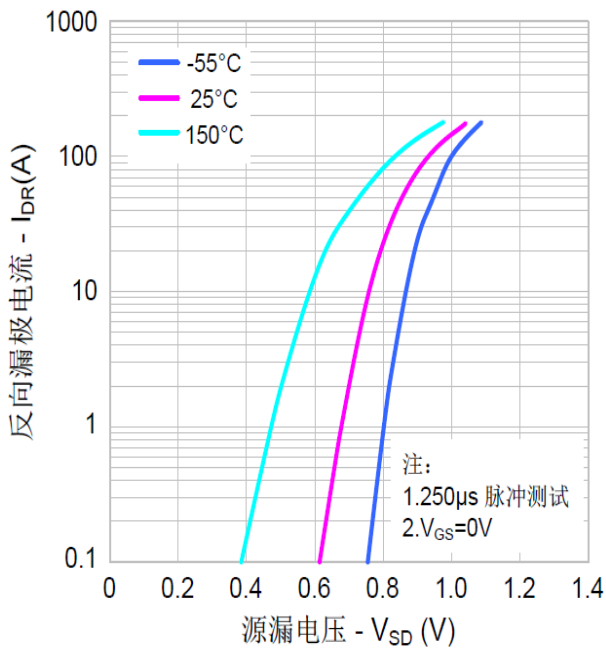


Fig.7 Source-Drain Diode Forward Current

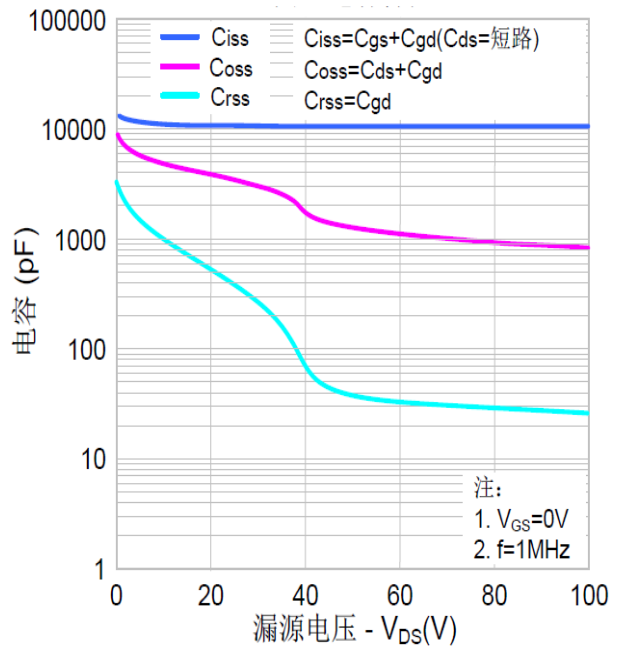


Fig.8 Capacitance

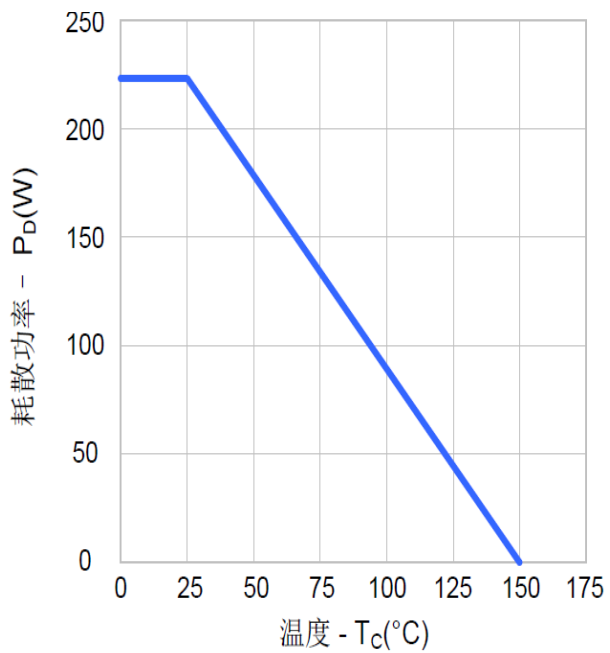


Fig.9 Power Dissipation(TO220,TO263)

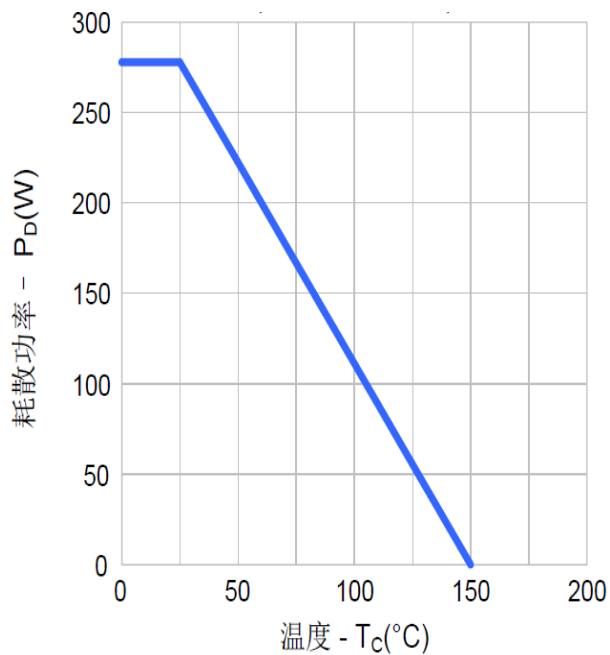
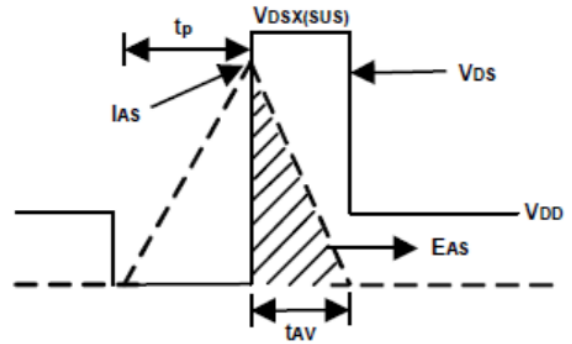
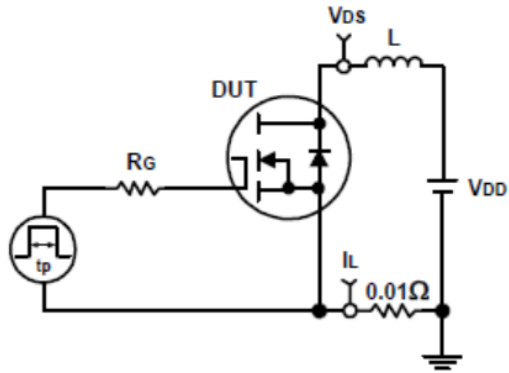
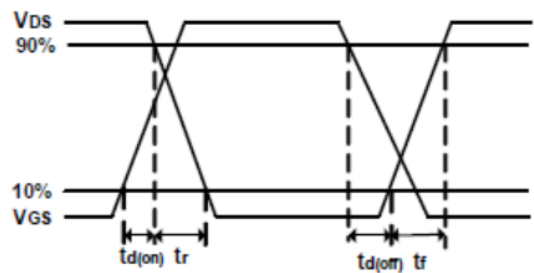
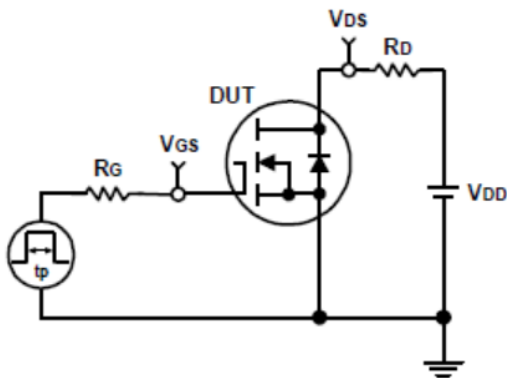


Fig.8 Power Dissipation(TO247)

Avalanche Test Circuit and Waveforms

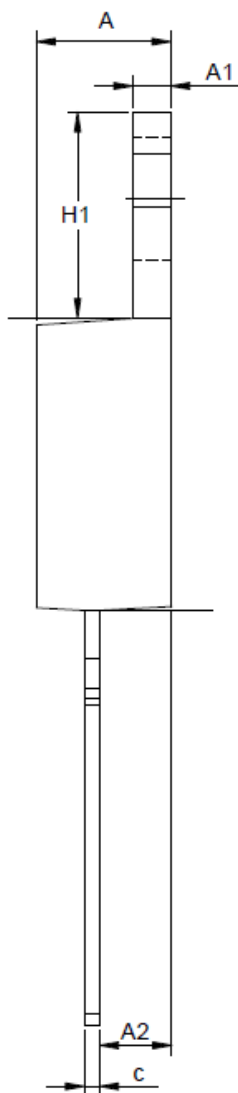
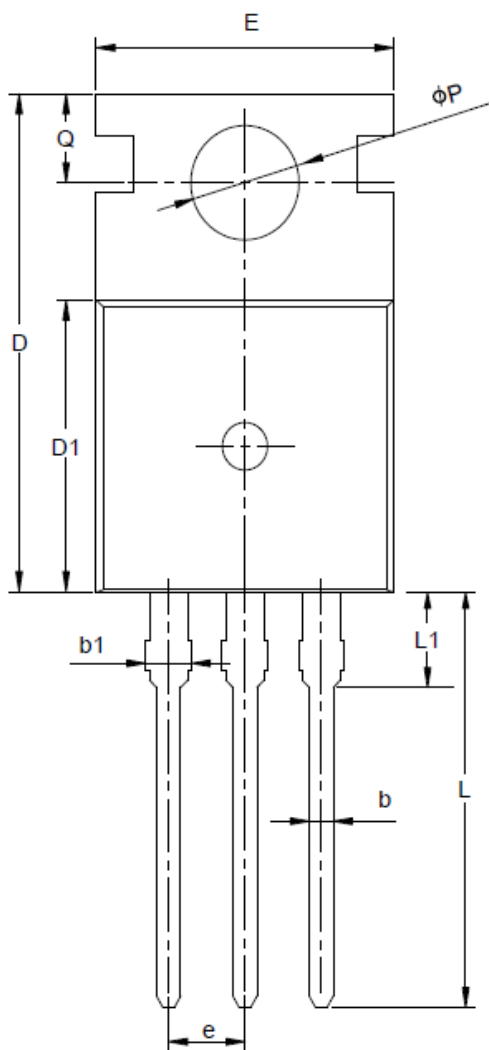


Switching Time Test Circuit and Waveforms



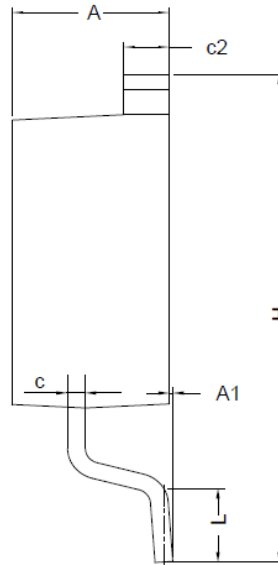
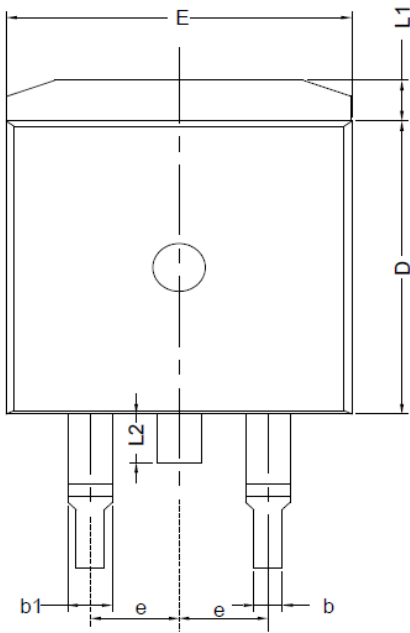
Package Information

TO-220-3



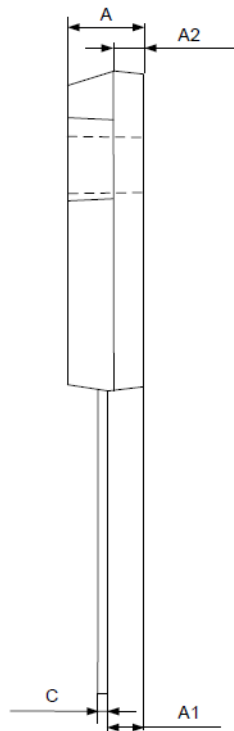
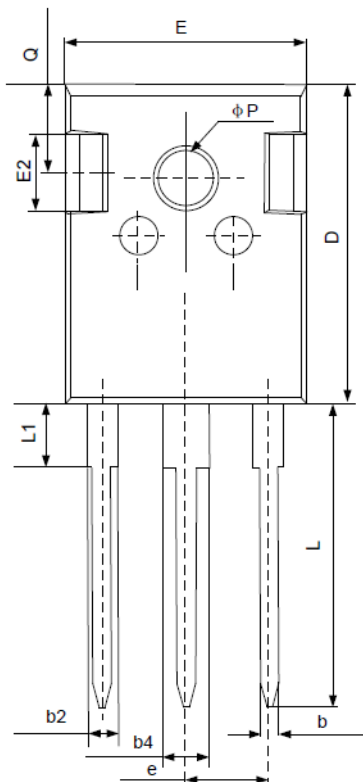
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.30	4.50	4.70
A1	1.00	1.30	1.50
A2	1.80	2.40	2.80
b	0.60	0.80	1.00
b1	1.00	—	1.60
c	0.30	—	0.70
D	15.10	15.70	16.10
D1	8.10	9.20	10.00
E	9.60	9.90	10.40
e	2.54BSC		
H1	6.10	6.50	7.00
L	12.60	13.08	13.60
L1	—	—	3.95
ϕP	3.40	3.70	3.90
Q	2.60	—	3.20

TO-263-2



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.30	4.57	4.72
A1	0	0.10	0.25
b	0.71	0.81	0.91
b1	1.17	—	1.50
c	0.30	—	0.60
c2	1.17	1.27	1.37
D	8.50	—	9.35
E	9.80	—	10.45
e	2.54BSC		
H	14.70	—	15.75
L	2.00	2.30	2.74
L1	1.12	1.27	1.42
L2	—	—	1.75

TO247-3



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	—	1.36
b2	1.91	—	2.25
b4	2.91	—	3.25
c	0.51	—	0.75
D	20.80	21.00	21.30
E	15.50	15.80	16.10
E2	4.40	5.00	5.20
e	5.44 BSC		
L	19.72	19.92	20.22
L1	—	—	4.30
Q	5.60	5.80	6.00
P	3.40	—	3.80