



## 650, 4A, 2.3Ω N-Channel MOSFETs

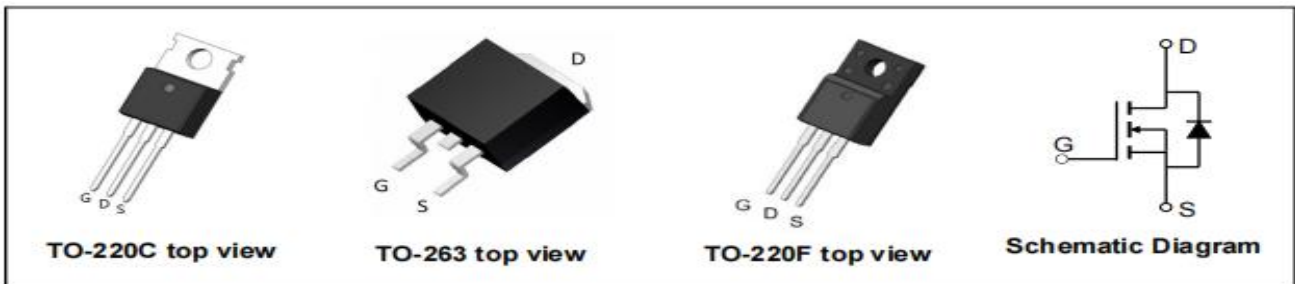
### Features

- Low Gate Charge
- Excellent  $R_{DS(ON)}$
- Great current Capability
- Green product RoHS compliant

### Product Summary

RoHS

$V_{DS}$	650	V
$V_{GS(th\_Typ)}$	3.4	V
$R_{DS(ON\_Typ)}$ (@ $V_{GS} = 10V$ )	2.3	$\Omega$
$I_D$ (at $V_{GS} = 10V$ ) <sup>(1)</sup>	4	A



Type	Package	Marking	Outline	Media	Quantity(pcs)
4N65	TO-220C	-	-	Tube	50
4N65	TO-263	-	Tape	13"Reel	800
4N65	TO-220F	-	-	Tube	50

### Absolute Maximum Ratings ( $T_J = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	SDM4N65AC/ Y	SDM4N65AF	Unit
Drain-Source Voltage	$V_{DS}$	650		V
Gate-Source Voltage	$V_{GS}$	$\pm 30$		V
Continuous Drain Current <sup>(1)</sup>	$T_C = 25^\circ C$	4	4*	A
	$T_C = 100^\circ C$	2.6	2.6*	A
Pulsed Drain Current <sup>(2)</sup>	$I_{DM}$	16		A
Avalanche Energy <sup>(3)</sup>	$E_{AS}$	84		mJ
Power Dissipation <sup>(4)</sup>	$T_C = 25^\circ C$	114	30	W
	$T_C = 100^\circ C$	45	12	
Body-Diode Continuous Current	$I_S$	4		A
Avalanche Current <sup>(3)</sup>	$I_{AS}$	4.6		A
Junction and Storage Temperature Range	$T_{STG}, T_J$	-55 to 150		$^\circ C$
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	62	63	$^\circ C/W$
Thermal Resistance Junction-Case	$R_{\theta JC}$	1.1	4.2	$^\circ C/W$



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

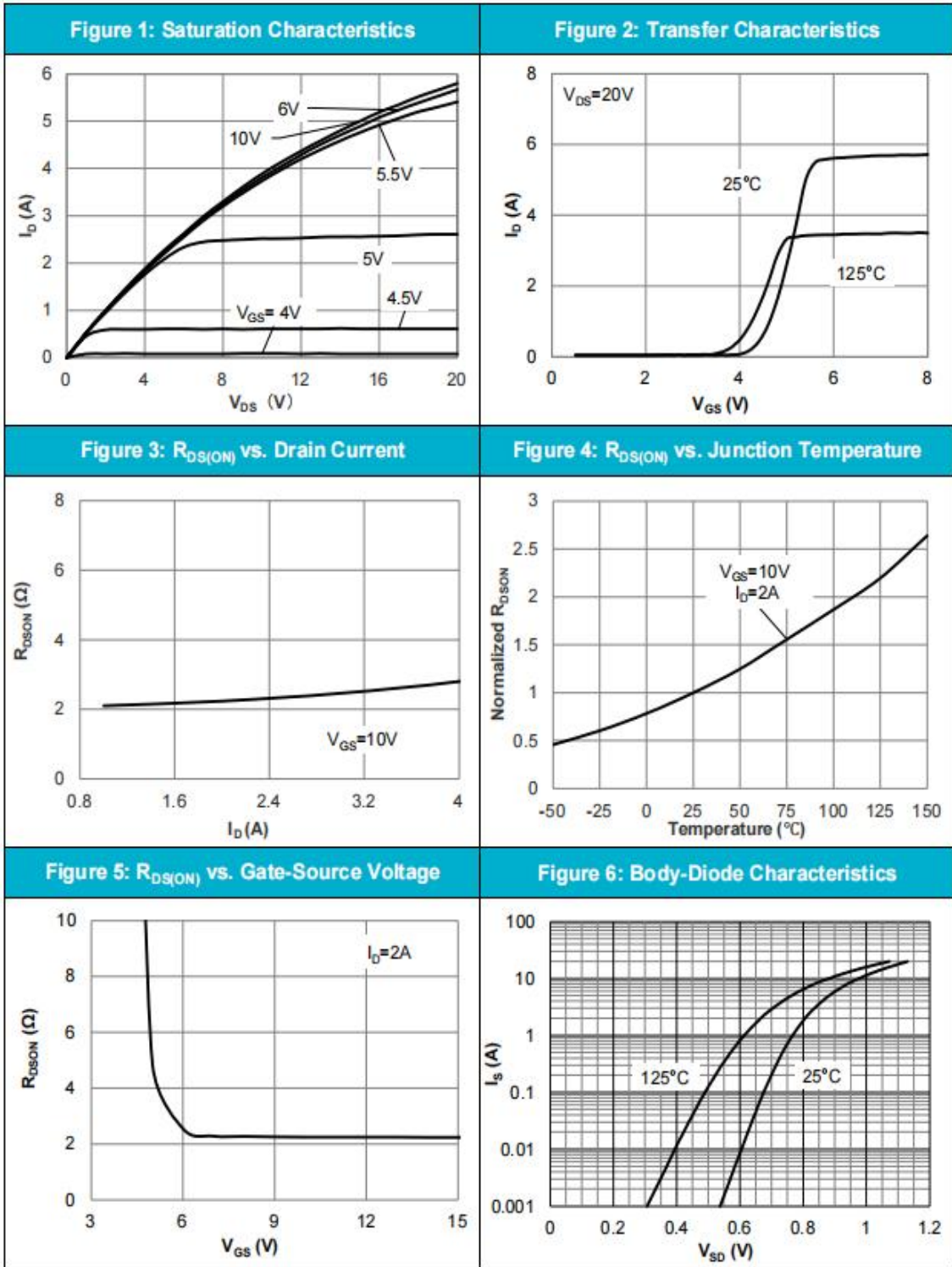
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	650	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V, T_J=25^\circ\text{C}$	-	-	1	$\mu A$
		$V_{DS}=650V, V_{GS}=0V, T_J=55^\circ\text{C}$	-	-	5	
Gate Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	3.5	4.5	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=2A$	-	2.2	2.6	$\Omega$
Forward Trans conductance <sup>4</sup>	$g_{fs}$	$V_{DS}=5V, I_D=2A$	-	3	-	S
Input Capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=25V,$ $f=1.0\text{MHz}$	-	525	-	pF
Output Capacitance	$C_{oss}$		-	53	-	
Reverse Transfer Capacitance	$C_{rss}$		-	5.7	-	
Gate Resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V,$ $f=1.0\text{MHz}$	-	1.1	-	$\Omega$
Total Gate Charge	$Q_g$	$V_{DS}=520V, I_D=4A,$ $V_{GS}=10V$	-	17.9	-	nC
Gate-Source Charge	$Q_{gs}$		-	7.5	-	
Gate-Drain Charge	$Q_{gd}$		-	4.3	-	
Turn-on Delay Time	$T_{d(on)}$	$R_G=25\Omega, V_{DS}=325V,$ $I_D=4A$	-	17	-	nS
Turn-on Rise Time	$t_r$		-	27	-	
Turn-Off Delay Time	$T_{d(off)}$		-	31	-	
Turn-Off Fall Time	$T_f$		-	21	-	
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=2A$	-	0.8	1.2	V
Body Diode Reverse Recovery Time	$T_{rr}$	$V_R=400V, I_F=4A,$ $di/dt=100A/\mu s$	-	213	-	Ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	1.5	-	$\mu C$

Note :

1. Computed continuous current assumes the condition of  $T_{J\_Max}$  while the actual continuous depends on the thermal & electro mechanical application board design.
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
3. This single-pulse measurement was taken under the following condition [ $L=10\text{mH}, V_{GS}=10V, V_{DS}=50V$ ] while its value is limited by  $T_{J\_Max}=150^\circ\text{C}$ .
4. The power dissipation  $P_D$  is based on  $T_{J\_Max}=150^\circ\text{C}$ .
5. This value is guaranteed by design hence it is not included in the production test.

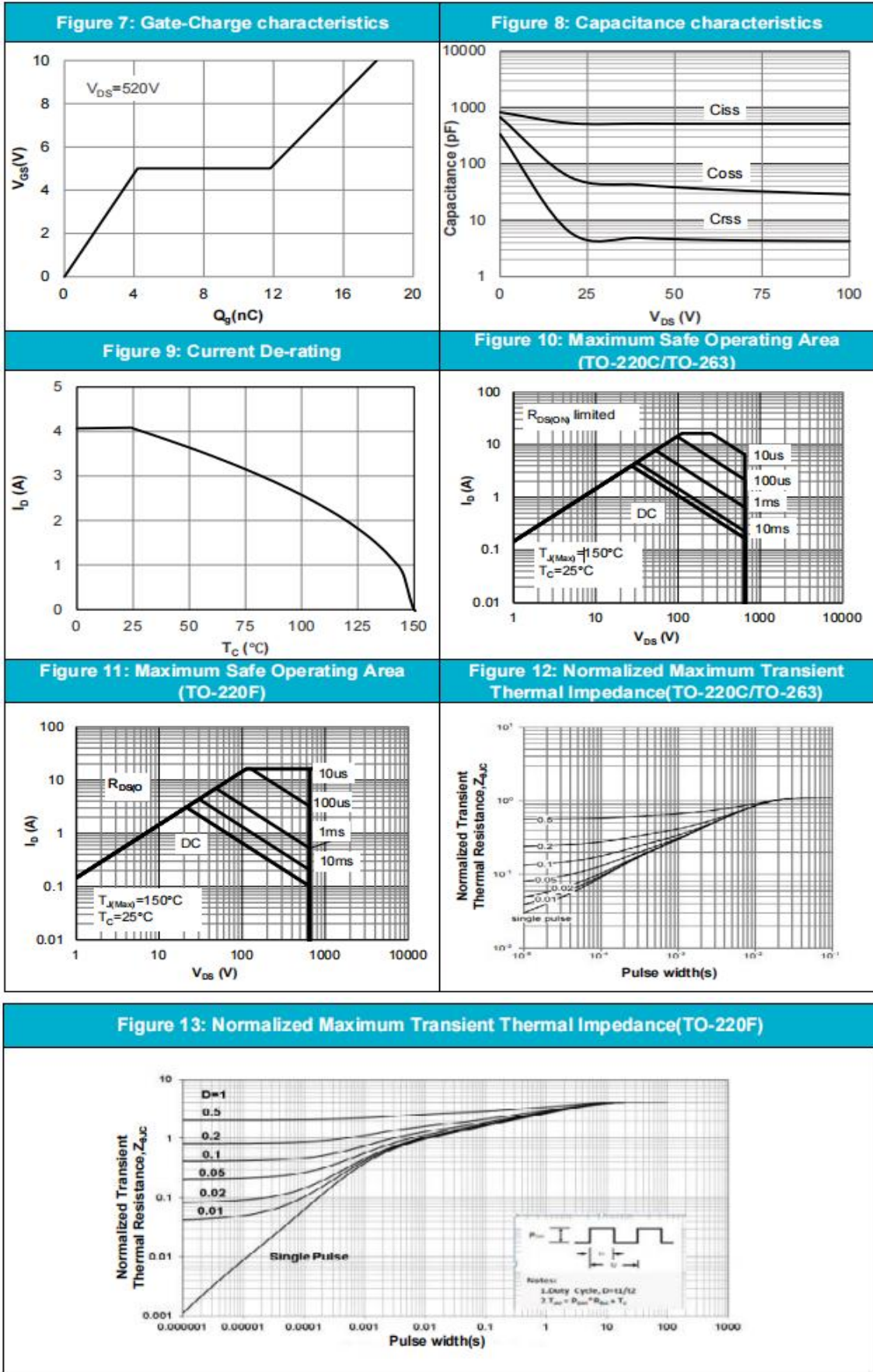


Typical Electrical and Thermal Characteristics



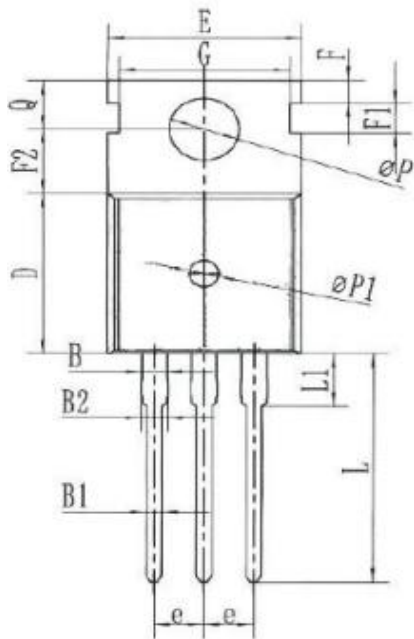


Typical Electrical and Thermal Characteristics

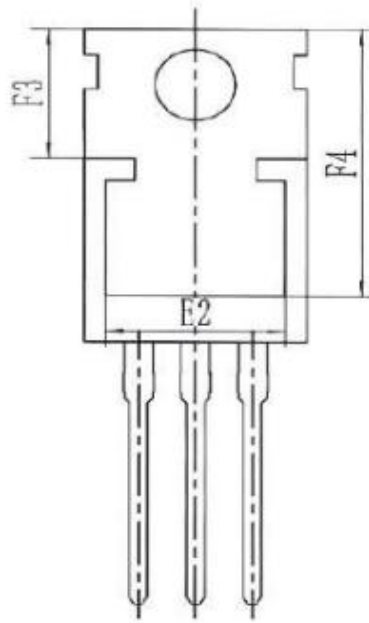




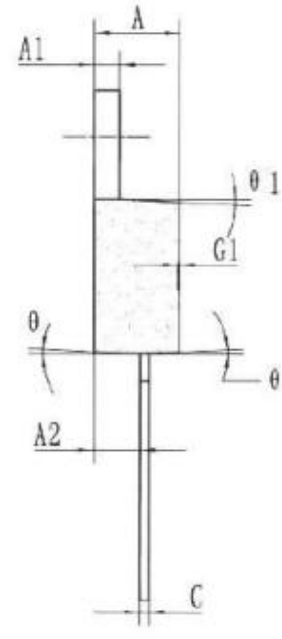
**TO-220C Package Information**



**TOP VIEW**



**BOTTOM VIEW**



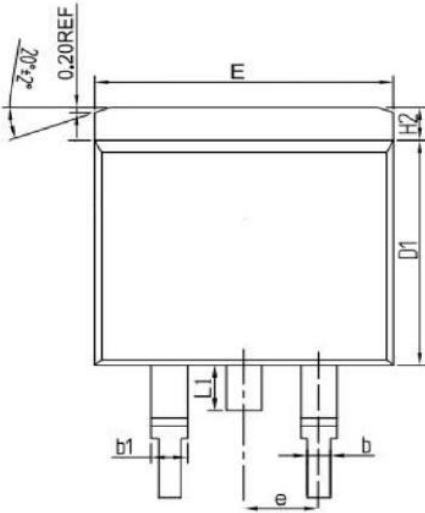
**SIDE VIEW**

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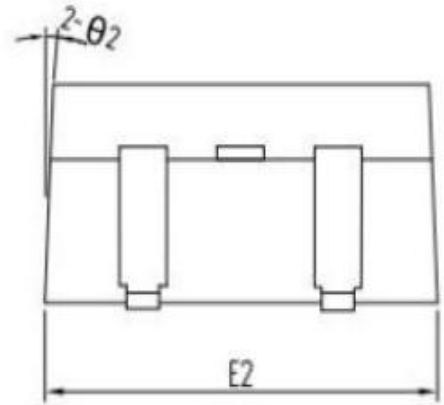
SYMBOL	MILLIMETER		
	MIN	TYP.	MAX
A	4.40	4.50	4.60
A1	1.25	1.30	1.35
A2	2.30	2.40	2.50
B	1.22	1.27	1.32
B1	0.70	0.80	0.90
B2	1.32	1.37	1.42
C	0.45	0.50	0.55
D	9.10	9.20	9.30
E	9.70	9.90	10.1
E1	9.90	10.00	10.10
E2	7.80	8.00	8.20
e	2.54 BSC		
F	1.22	1.30	1.38
F1	1.60	1.70	1.80
F2	3.60	3.70	3.80
F3	6.30	6.50	6.70
F4	13.10	13.40	13.70
G	8.60	8.70	8.80
G1	0.05	0.10	0.15
L	12.80	13.10	13.40
L1	2.80	3.00	3.20
$\phi P$	3.50	3.60	3.70
Q	2.70	2.80	2.90



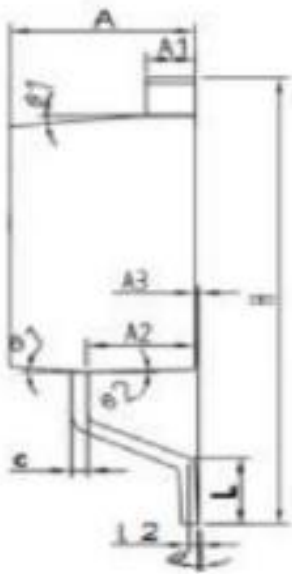
**TO-263 Package Information**



TOP VIEW



SIDE VIEW

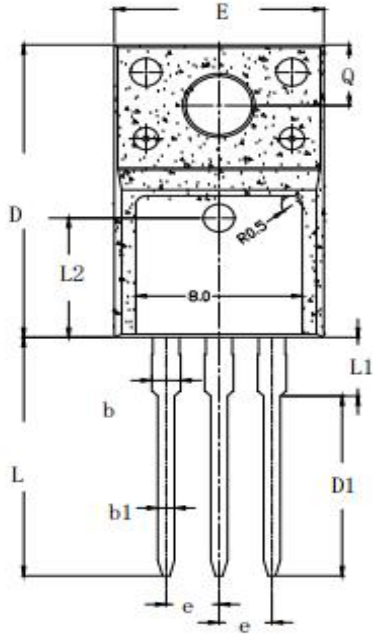


SIDE VIEW

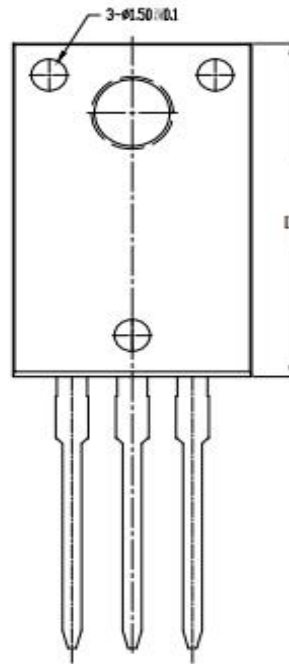
SYMBOL	MILLIMETER		
	MIN	TYP.	MAX
A	4.40	4.57	4.70
A1	1.22	1.27	1.32
A3	0.00	-	0.10
b	0.74	0.78	0.87
c	0.34	0.38	0.47
E	9.93	10.03	10.13
e	2.54BSC		
H	14.7	15.1	15.5
L	2.00	2.3	2.6



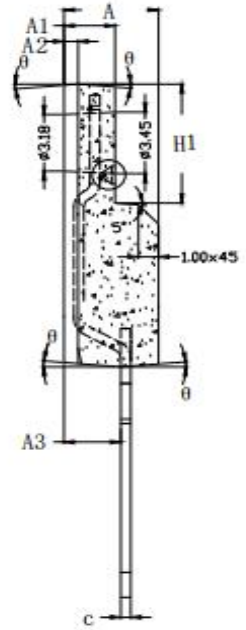
**TO-220F Package Information**



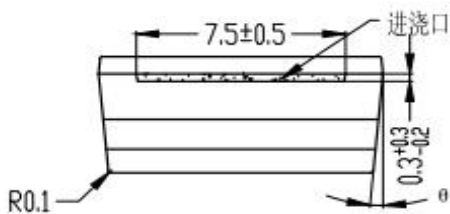
**TOP VIEW**



**BOTTOM VIEW**



**SIDE VIEW**



**SIDE VIEW**

SYMBOL	MILLIMETER		
	MIN	TYP.	MAX
A	4.60	4.70	4.80
A1	2.39	2.54	2.69
A2	0.60	0.70	0.80
A3	2.81	2.82	2.83
b	1.61	1.62	1.63
b1	-	0.80	-
c	-	0.50	-
D	15.72	15.87	16.02
D1	-	9.75	-
E	9.91	10.06	10.21
e	2.54 BSC		
H1	6.67	6.68	6.69
L	12.90	12.93	12.96
L1	-	3.18	-
L2	6.47 REF		
Q	-	3.30	-
θ1	1°	3°	5°