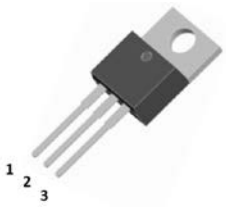
V_{DS}	=	**650 V**
I_D(T_C=25℃)	=	**12A**
$R_{DS(on),max}$	=	**0.8Ω@V_{GS}=10V**
$Q_{g,typ}$	=	**41.9nC**

TO-220F-3L

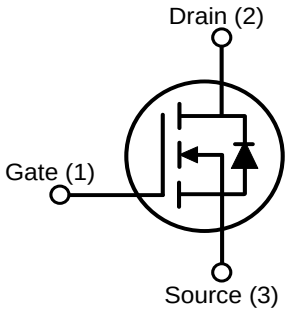
TO-220



Features

- Low Gate Charge
- Low Capacitance Fast Switching
- Halogen Free, RoHS Compliant
- 100% UIS tested

Schematic Diagram



Applications

- High Frequency Switching Mode Power Supply
- Motor Driver
- LED Power Supply

Package Marking and Ordering Information

Part Number	Marking	Package	Form	MOQ
15N65-TD	15N65-TD	TO-220F	Tube	1000
15N65-TD	15N65-TD	TO-220	Tube	1000

Maximum Ratings(T_C=25℃ Unless Otherwise Noted)

Symbol	Parameter		Value	Unit
V_{DSS}	Drain-Source Voltage		650	V
V_{GSS}	Gate-Source Voltage		±30	V
I_D ①	Continuous Drain Current(V_{GS}=10V)	T_C=25℃	12	A
		T_C=100℃	7.5	
T_j	Maximum Junction Temperature		150	℃
T_{stg}	Storage Temperature Range		-55 to 150	℃
P_D	Power Dissipation TO-220F		42	W
	Power Dissipation TO-220		150	
E_{AS} ②	Avalanche Energy, Single Pulsed		500	mJ

Thermal Characteritics

Symbol	Parameter	Value		Unit
		TO-220F	TO-220	
$R_{th(j-c)}$	Thermal Resistance-Junction to Case	2.98	0.83	℃/W
$R_{th(j-a)}$	Thermal Resistance-Junction to Ambient	110	62.5	℃/W

Electrical Characteristics (Defined at T_j=25℃ Unless OtherwiseSpecified)

Static Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	650			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=650V, V_{GS}=0V			1	μA
		V_{DS}=650V, V_{GS}= 0V, T_j = 125℃			100	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	2		4	V
I_{GSS}	Gate Leakage Current	V_{GS}=±30V, V_{DS}=0V			±100	nA
$R_{DS(on)}$ ③	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=6A		0.64	0.8	Ω

Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{SD} ③	Diode Forward Voltage	I_F=12A, V_{GS}=0V			1.5	V
I_S	Continuous Source Current(Body Diode)				12	A
I_{SM}	Maximum Pulsed Current(Body Diode)				48	A
t_{rr}	Reverse Recovery Time	I_F=12A, -di_F/dt =100A/μs, V_{GS}=0V, T_j= 25℃		450.4		ns
Q_{rr}	Reverse Recovery Charge			4.75		μC

Dynamic Characteristics ④

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz		2000		pF
C_{oss}	Output Capacitance			164		
C_{rss}	Reverse Transfer Capacitance			7.4		
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=325V,I_D=12A, R_G=10Ω,V_{GS}=15V		14.6		ns
t_r	Turn-on Rise Time			37.8		
$t_{d(off)}$	Turn-off Delay Time			69.3		
t_f	Turn-off Fall Time			15.8		

Gate Charge Characteristics④

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge	V_{DS}=400V, V_{GS}=10V, I_{DS}=12A		41.9		nC
Q_{gs}	Gate-Source Charge			15		
Q_{gd}	Gate-Drain Charge			10.8		

Notes: ①Calculated continuous current based on maximum allowable junction temperature.
②Limited by T_{jmax}, L=10mH, V_{DD}=50V, R_G=25Ω,StartingT_j=25℃.
③Pulse test;Pulse width≤300μs, duty cycle≤2%.
④Guaranteed by design, not subjected to production test.

Electrical Characteristics Diagrams

Figure.1 Output Characteristics

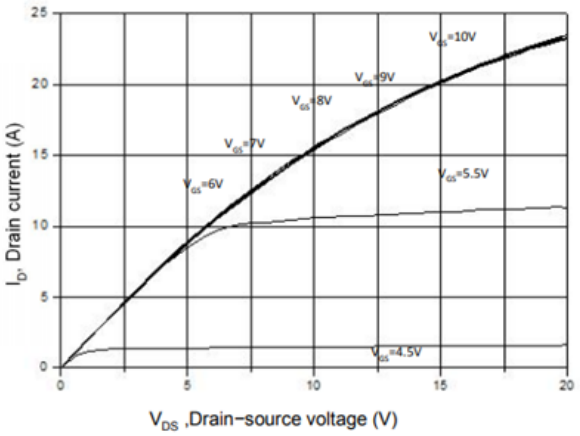


Figure.2 Typical Capacitance

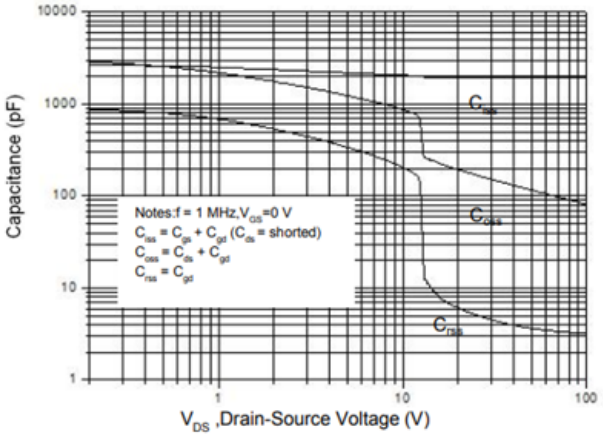


Figure.3 Source-Drain Diode Forward Voltage

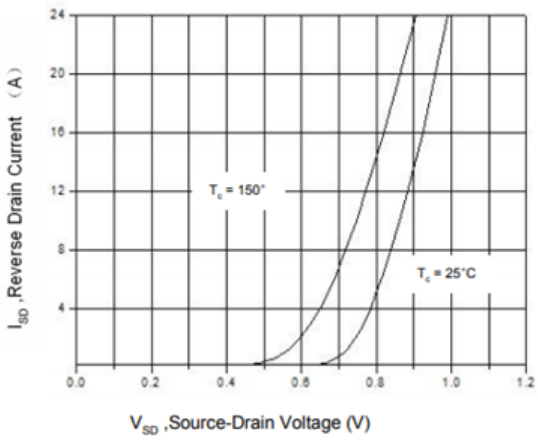


Figure.4 Typical Gate Charge

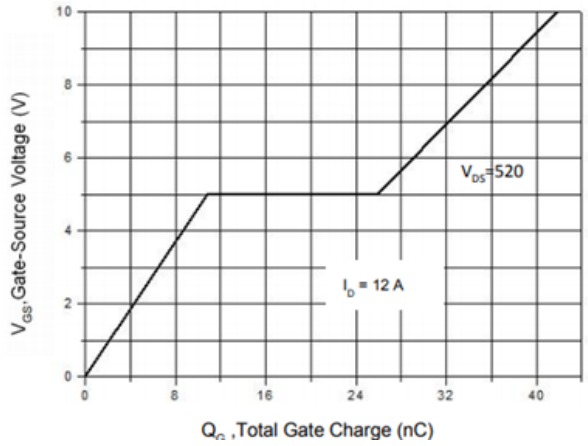


Figure.5 Drain Current Vs. Temperature

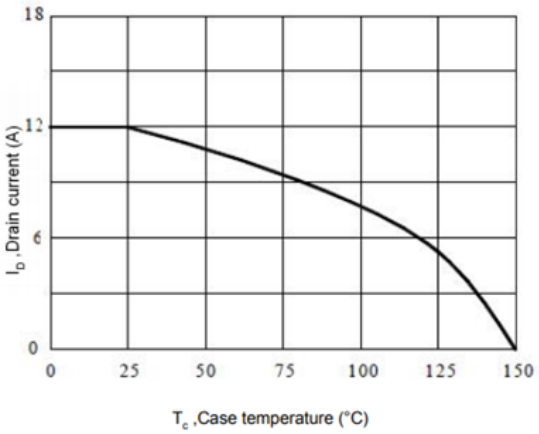
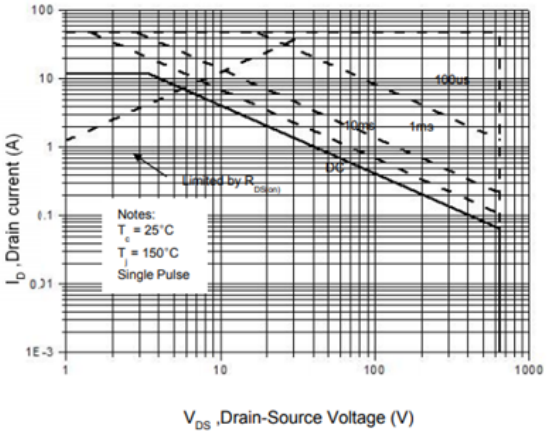
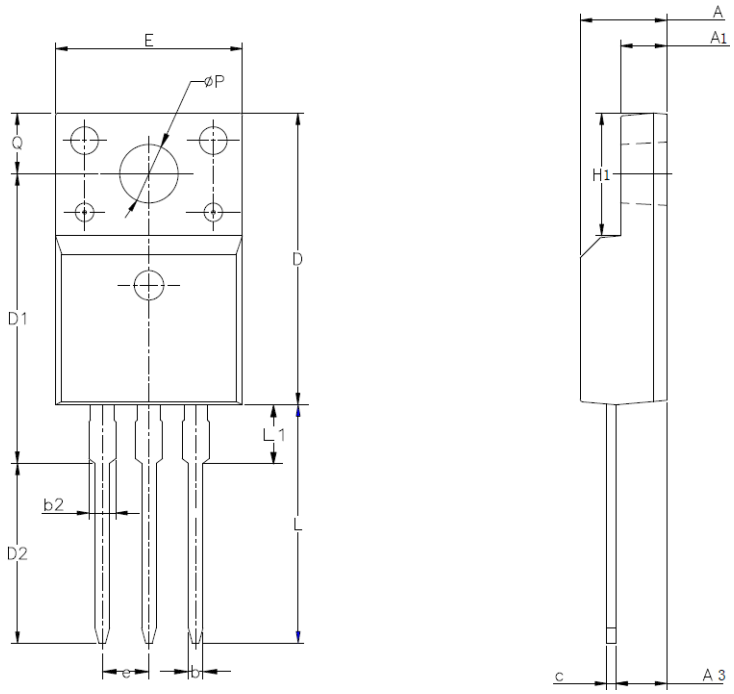


Figure.6 Safe Operating Area

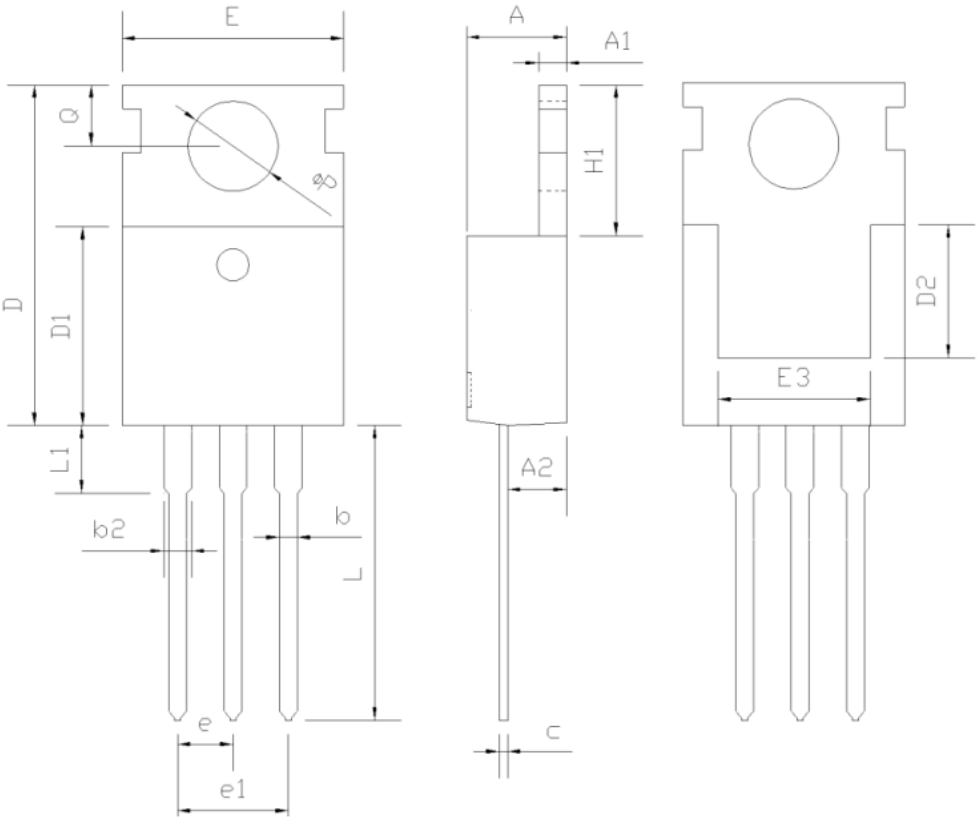


Mechanical Dimensions for TO-220F-3L



SYMBOL	MIN	NOM	MAX
A	4.42	4.70	5.02
A1	2.30	2.54	2.80
A3	2.50	2.76	3.10
b	0.70	0.80	0.90
b2	—	—	1.47
c	0.35	0.50	0.65
D	15.25	15.87	16.25
D1	15.30	15.75	16.30
D2	9.30	9.80	10.30
E	9.73	10.16	10.36
e	2.54BCS		
H1	6.40	6.68	7.00
L	12.48	12.98	13.48
L1	/	/	3.50
øP	3.00	3.18	3.40
Q	3.05	3.30	3.55

Mechanical Dimensions for TO-220



SYMBOL	mm		
	MIN.	NOM.	MAX.
A	4.37	4.57	4.70
A1	1.25	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.17	1.27	1.47
c	0.45	0.50	0.60
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	-	-
E	9.70	10.00	10.30
E3	7.00	-	-
e	2.54BSC		
e1	5.08BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	-	3.10	3.40
ΦP	3.40	3.60	3.80
Q	2.60	2.80	3.00