Feactures

- Typ.RDS(on)=0.35Ω@VGS=10V
- 100% avalanche tested
- RoHS Compliant

Applications

- SMPS
- Charger
- DC-DC

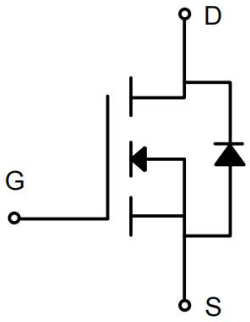
Descriptions

This CT13N50XX is generation VDMOS family that is dramatic reduction in on-resistance and ultra-low gate charge for applications requiring high power density and high efficiency. And it is very robust and RoHS compliant.

TO-220

TO-220F

RoHS compliant



Absolute Maximum Ratings（TC=25℃）

Parameter	Symbol	CT13N50RA	CT13N50FA	Unit
Drain-source voltage	V_{DSS}	500		V
Gate-source voltage	V_{GS}	±30		V
Continuous drain current	I_D	13		A
Pulsed drain current [1]	I_{DM}	52		A
Avalanche energy, single pulse [2]	E_{AS}	720		mJ
Power dissipation	P_D	150	41	W
Derate above 25°C		1.2	0.33	W/℃
Operating junction temperature	T_j	-55~150		℃
Storage temperature	T_{stg}	-55~150		℃
Continuous diode forward current	I_S	13		A
Diode pulse current [1]	I_{Spulse}	52		A

Thermal Characteristic

Parameter	Symbol	CT13N50RA	CT13N50FA	Unit
Thermal resistance,junction-to-case	$R_{\theta JC}$	0.83	3	℃/W
Thermalresistance,junction-to-ambient	$R_{\theta JA}$	62.5	62.5	℃/W

Electrical Characteristics of MOSFET

Parameter	Symbol	Test Condition	Test Condition	Min	Typ	Max	Unit
Drain-source break down voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	T_C=25℃	500	-	-	V
Gate threshold voltage	$V_{GS(th)}$	I_D=250μA, V_{DS}=V_{GS}	T_J=25℃	2.0	-	4.0	V
Drain-source leakage current	I_{DSS}	V_{DS}=500V, V_{GS}=0V	T_J=25℃	-	-	1	μA
Gate-source leakage current,forward		V_{DS}=400V, V_{GS}=0V	T_J=125℃	-	-	100	μA
Gate-source leakage current,forward	I_{GSSF}	V_{DS}=0V, V_{GS}=30V	T_J=25℃	-	-	100	nA
Gate-source leakage current,reverse	I_{GSSR}	V_{DS}=0V, V_{GS}=-30V	T_J=25℃	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=6.5A	T_J=25℃	-	0.35	0.48	Ω

Dynamic Characteristics of MOSFET（TC=25℃）

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Input capacitance	C_{iss}	f=1MHz, V_{DS}=25V, V_{GS}=0V	-	1978	-	pF
Output capacitance	C_{oss}		-	185	-	pF
Reverse transfer capacitance	C_{rss}	V_{DD}=120V	-	9	-	pF
Gate to source charge	Q_{gs}	I_D=13A	-	10	-	nC
Gate to drain charge [3]	Q_{gd}	V_{GS}= 0 to10V	-	9	-	nC
Total gate charge [3]	Q_g		-	34	-	nC

Switching Characteristics of MOSFET（TC=25℃）

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Turn-on delay time	$t_{d\ on}$	V_{DS}=250V, I_D=13A, R_G=10Ω, V_{GS}=0 to 10V	-	14	-	ns
Rise time	t_r		-	11	-	ns
Turn-off delay time	$t_{d\ off}$		-	39	-	ns
Fall time	t_f		-	18	-	ns

Characteristics of Body Diode（TC=25℃）

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Forward voltage	V_{SD}	I_{SD}=13A, V_{GS}=0V	-	-	1.5	V
Reverse recovery time	t_{rr}	V_{DS}=250V, I_S=13A, V_{GS}=0V -di/dt=100A/μs	-	274	-	ns
Reverse recovery current	I_{rr}		-	18	-	A
Recovery charge	Q_{rr}		-	2.5	-	μC

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$ =150°C.
2. The E_{AS} data shows Max. rating . The test condition is V_{DD} =50V, V_{GS} =10V, L=10mH, I_{AS} =12A,Tc=25℃.
3. The data tested by pulsed , pulse width ≤ 300μs , duty cycle ≤ 2%.

Electrical Characteristic Curve

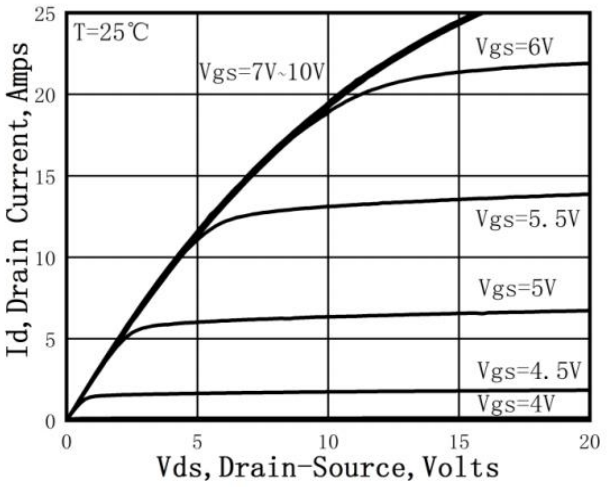


Figure 1.On-Region Characteristics

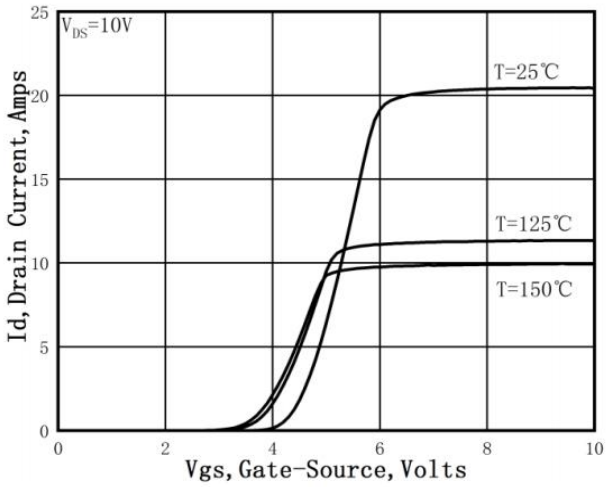


Figure 2. Transfer Characteristics

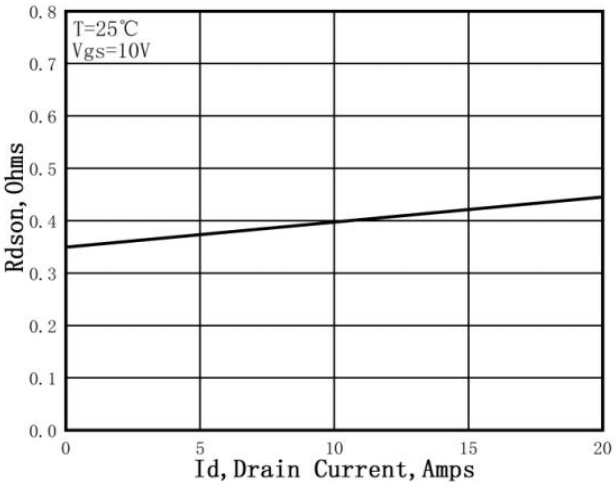


Figure 3.Static Drain-Source On Resistance

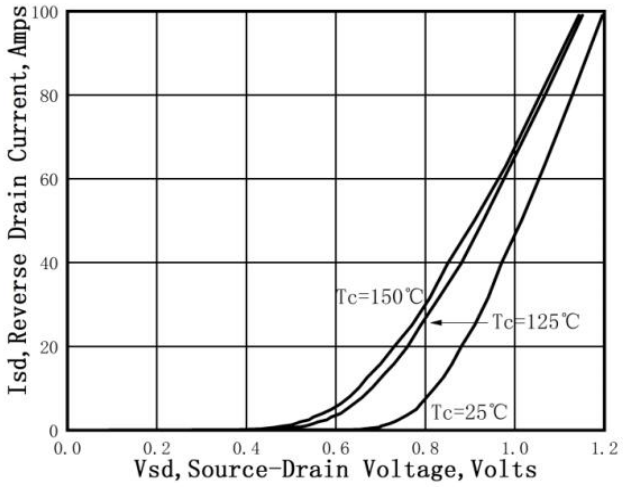


Figure 4. Typical Body Diode Transfer Characteristics

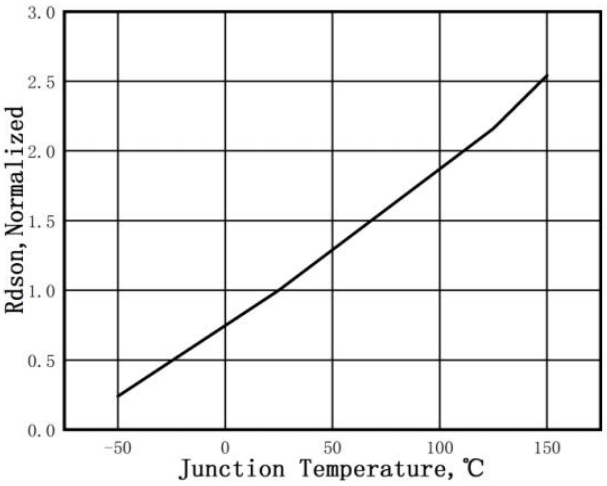


Figure 5. Normalized $R_{DS(on)}$ vs.Temperature

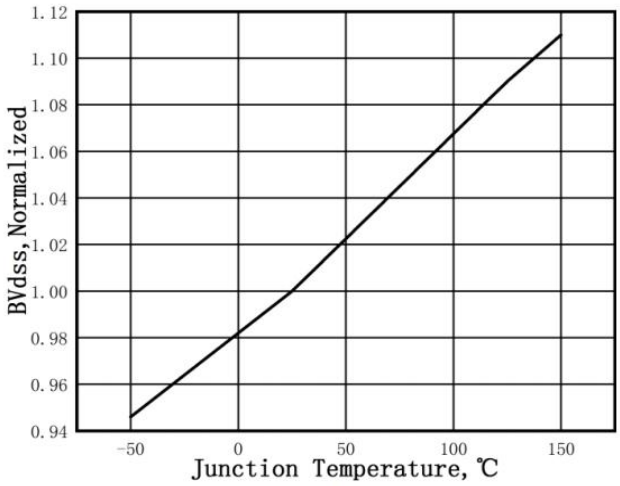


Figure 6. Normalized BV_{DSS} vs.Temperature

Electrical Characteristic Curve

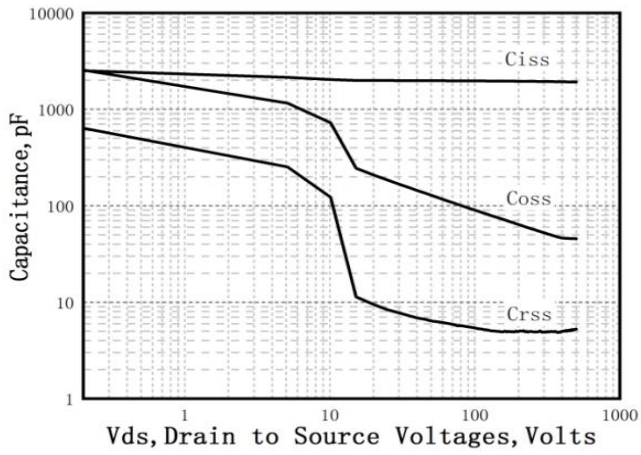


Figure 7. Capacitance Characteristics

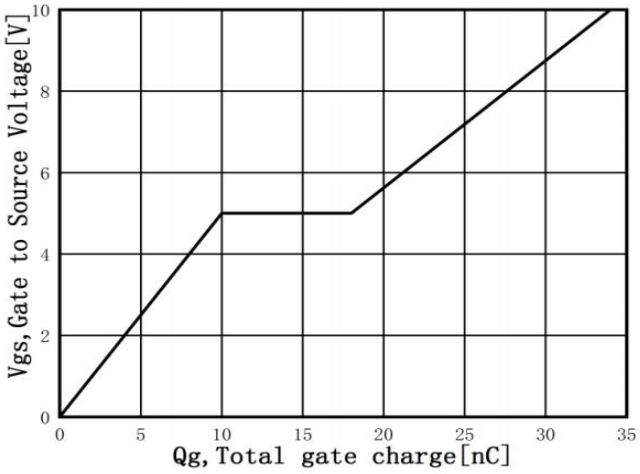


Figure 8. Gate Charge Characteristics

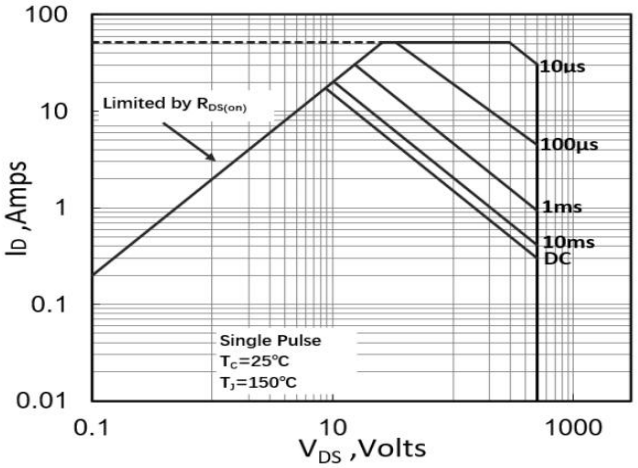


Figure 9. Maximum Safe Operating Area
(TO-220)

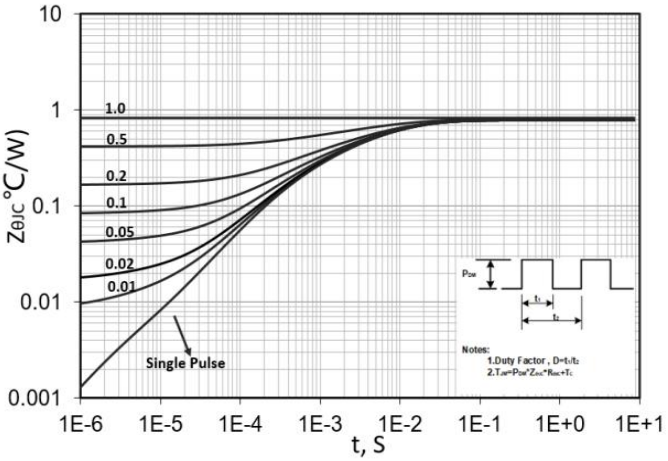


Figure 10. Transient Thermal Response Curve
(TO-220)

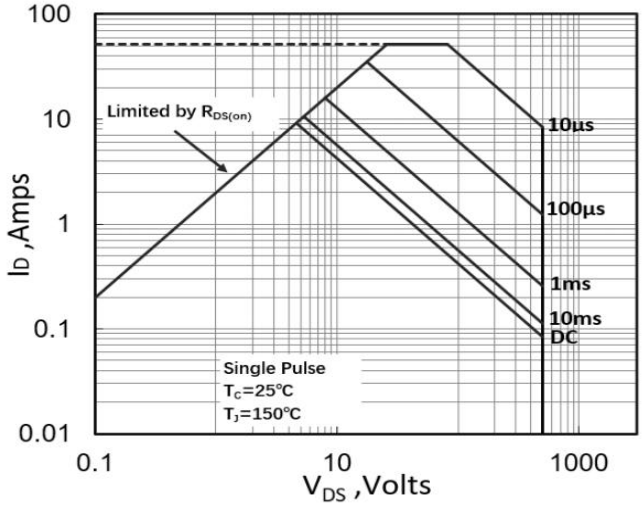


Figure 11. Maximum Safe Operating Area
(TO-220F)

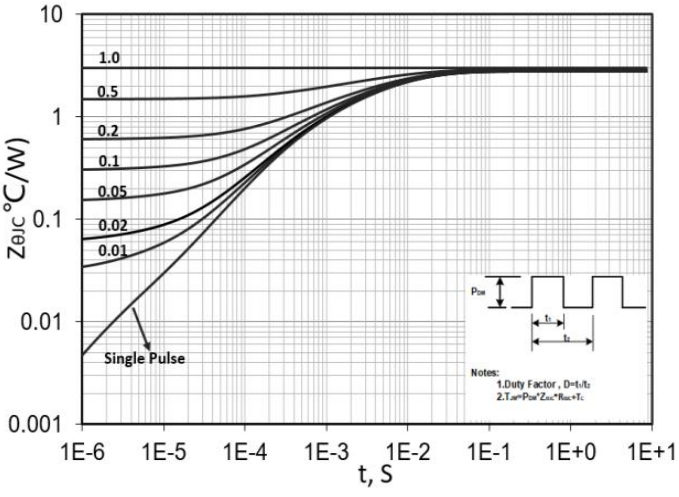
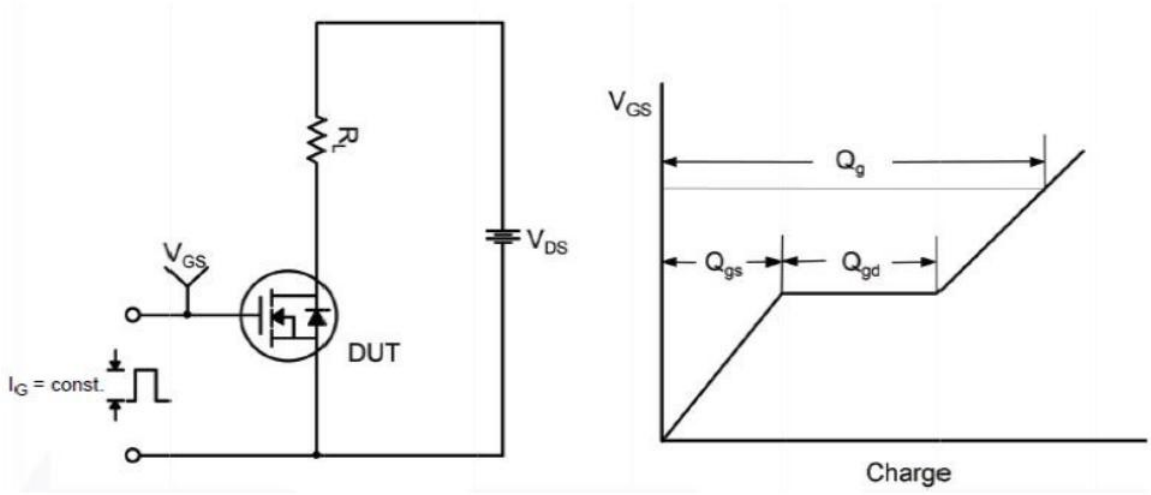


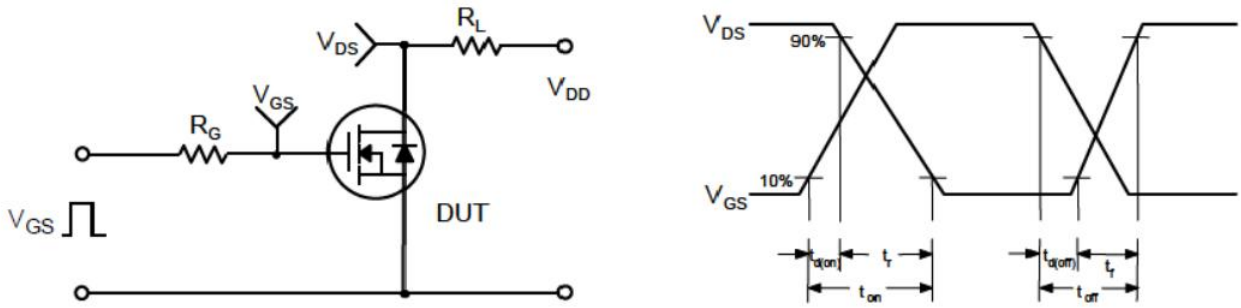
Figure 12. Transient Thermal Response Curve
(TO-220F)

Electrical Characteristic Curve

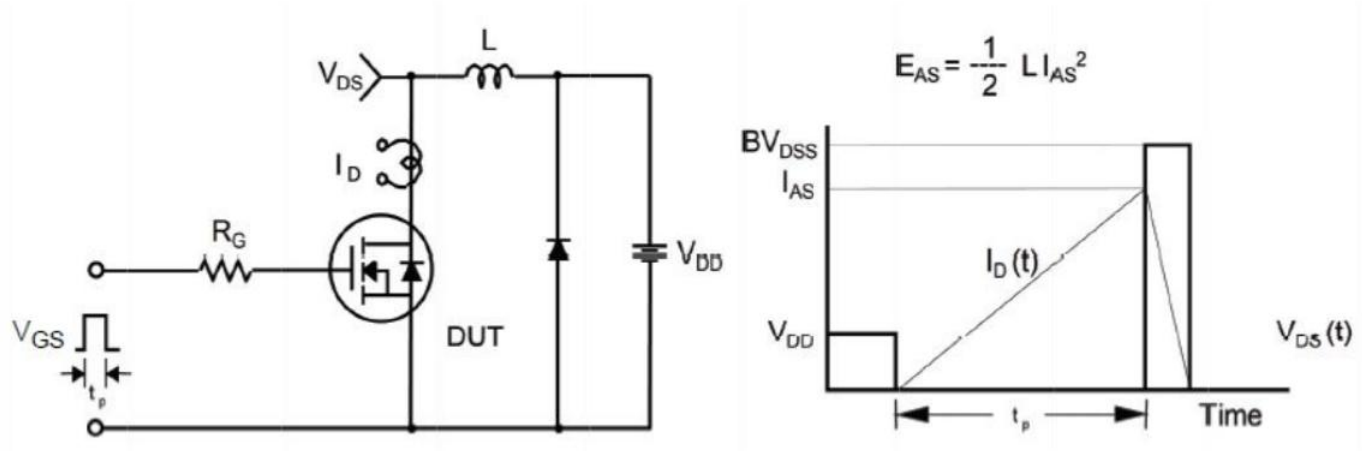
Gate Charge Test Circuit &Waveform



Switching Test Circuit &Waveforms



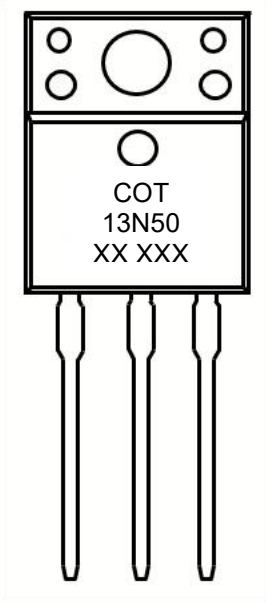
Unclamped Inductive Switching Test Circuit &Waveforms



Ordering Information

Part	Package	Marking	Packing method
CT13N50RA	TO-220	13N50	Tube
CT13N50FA	TO-220F	13N50	Tube

Marking Information



Note:

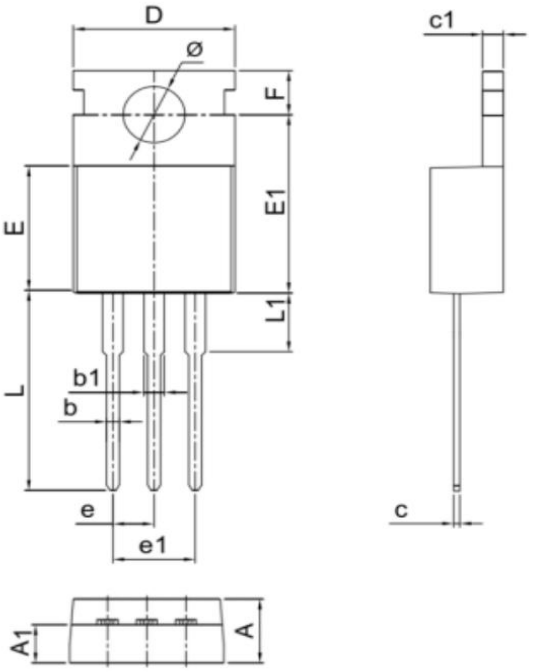
COT: Company Logo

13N50: Part Number

XXXXX : Monthly Code

Mechanical Dimensions

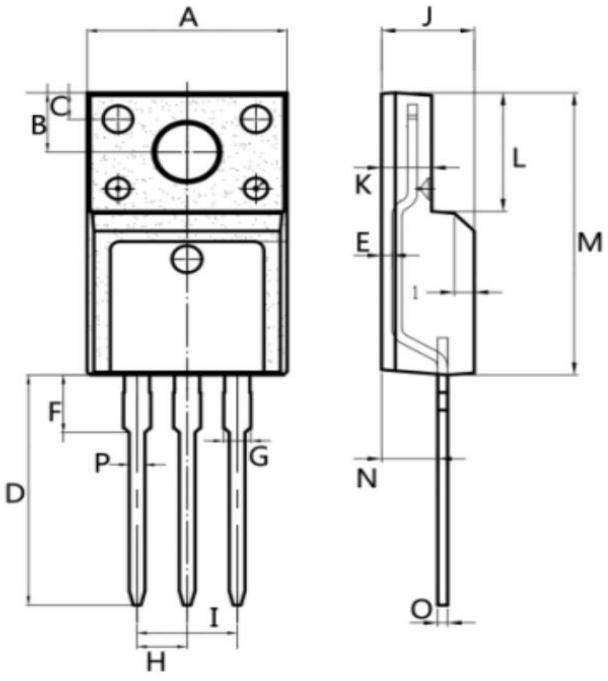
Mechanical Dimensions for TO-220



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	4.30	4.70
A1	2.30	2.82
b	0.70	0.94
b1	1.17	1.41
c	0.30	0.64
c1	1.17	1.44
D	9.70	10.20
E	8.50	9.30
E1	12.00	12.50
e	2.44	2.64
e1	4.88	5.26
F	2.60	2.94
L	13.00	14.00
L1	3.385	4.20
Ø	3.74	3.95

Mechanical Dimensions for TO-220F



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	9.95	10.36
B	2.95	3.55
C	1.25	1.6
D	12.64	13.5
E	0.40	0.60
F	2.80	3.80
G	1.14	1.58
H	2.44	2.64
I	4.88	5.26
J	4.50	4.90
K	2.34	2.80
L	6.48	6.90
M	15.40	16.07
N	2.66	3.50
O	0.40	0.64
P	0.70	0.94