

Description

This is 650V 20A N-ch Power MOSFET in a TO-220/220F plastic package.

The 20N65 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.

Features

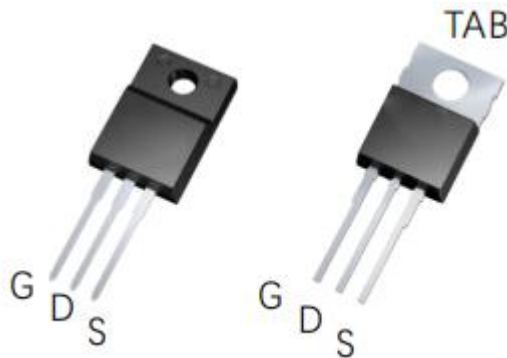
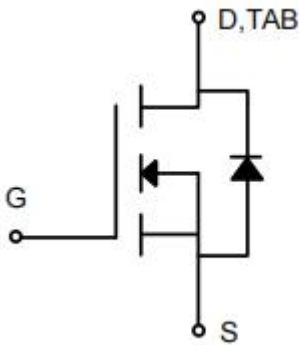
- $V_{DS}=700V@T_{jmax}$
- $Typ.R_{DS(on)}=0.36\Omega@V_{GS}=10V$
- 100% avalanche tested
- Pb-free, Halogen free

Applications

- SMPS
- Charger
- DC-DC

V_{DSS}	$R_{DS(on)}$	I_D
650V	0.36 Ω	20 A

Equivalent Circuit & Pinning



TO-220F

TO-220

Absolute Maximum Ratings(Ta=25°C)

Parameter	Symbol	CT20N65FA	CT20N65RA	Unit
Drain-source voltage	V_{DS}	650		V
Gate-source voltage	V_{GS}	± 30		V
Continuous drain current	I_D	20		A
Pulsed drain current	I_{DM}	80		A
Avalanche energy, single pulse	E_{AS}	1200		mJ
Power dissipation	P_D	104	208	W
Derate above 25°C		0.83	1.66	W/°C
Operating junction temperature	T_J	-55~150		°C
Storage temperature	T_{stg}	-55~150		°C
Continuous diode forward current	I_S	20		A
Diode pulse current	I_{Spulse}	80		A

Thermal Characteristic

Thermal resistance,junction-to-case	$R_{\theta JC}$	1.2	0.6	°C/W
Thermal resistance,junction-to-ambient	$R_{\theta JA}$	62.5	62.5	°C/W

Electrical Characteristics of MOSFET

Drain-source break down voltage	BV_{DSS}	$I_D=250\mu A, V_{GS}=0V$	$T_C=25^\circ C$	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu A, V_{DS}=V_{GS}$	$T_J=25^\circ C$	2.0	3.0	4.0	V
Drain-source leakage current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$	$T_J=25^\circ C$	-	-	1	μA
		$V_{DS}=520V, V_{GS}=0V$	$T_J=125^\circ C$	-	-	100	μA
Gate-source leakage current,forward	I_{GSSF}	$V_{DS}=0V, V_{GS}=30V$	$T_J=25^\circ C$	-	-	100	nA
Gate-source leakage current,reverse	I_{GSSR}	$V_{DS}=0V, V_{GS}=-30V$	$T_J=25^\circ C$	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=10A$	$T_J=25^\circ C$	-	0.36	0.44	Ω
Transconductance	G_{fs}	$V_{DS}=20V$	$T_J=25^\circ C$	-	28	-	S

Dynamic Characteristics of MOSFET (TC=25°C)

Input capacitance	C_{iss}	$f=1\text{MHz}, V_{DS}=25\text{V}, V_{GS}=0\text{V}$	-	2680	-	pF
Output capacitance	C_{oss}		-	254	-	pF
Reverse transfer capacitance	C_{rss}		-	26	-	pF
Gate to source charge	Q_{gs}	$V_{DD}=320$	-	12	-	nC
Gate to drain charge	Q_{gd}	$V_{ID}=20\text{A}$	-	22	-	nC
Total gate charge	Q_g	$V_{GS}=0\text{ to }10\text{V}$	-	63	-	nC

Switching Characteristics of MOSFET (TC=25°C)

Turn-on delay time	$t_{d\ on}$	$V_{DS}=320\text{V}, I_D=20\text{A},$ $R_G=25\Omega, V_{GS}=0\text{ to }10\text{V}$	-	18	-	ns
Rise time	t_r		-	33	-	ns
Turn-off delay time	$t_{d\ off}$		-	104	-	ns
Fall time	t_f		-	50	-	ns

Characteristics of Body Diode (TC=25°C)

Forward voltage	V_{SD}	$I_{SD}=20\text{A}, V_{GS}=0\text{V}$	-	-	1.5	V
Reverse recovery time	t_{rr}	$V_{DS}=320\text{V}, I_S=20\text{A}, V_{GS}=10\text{V}$ $-di/dt=100\text{A/us}$	-	420	-	ns
Reverse recovery current	I_{rr}		-	20	-	A
Recovery charge	Q_{rr}		-	4.2	-	uC

Electrical Characteristic Curve

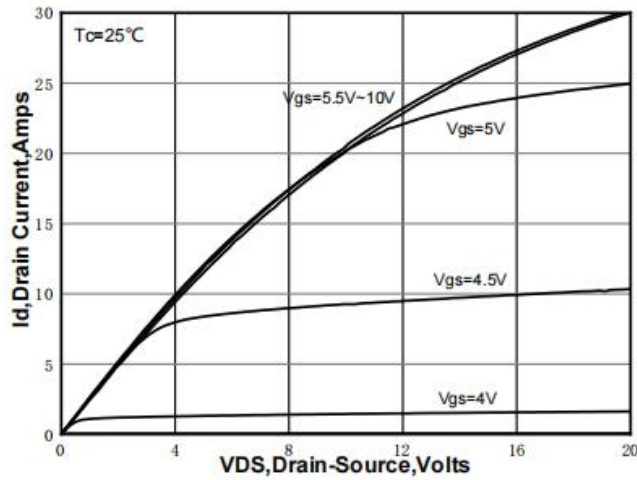


Figure 1. On-Region Characteristics

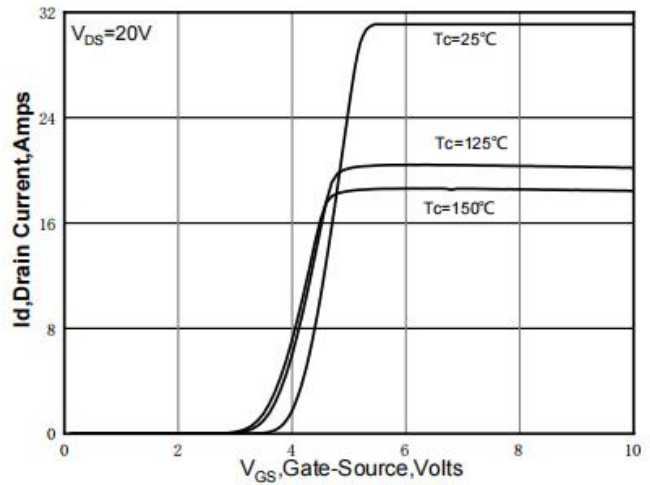


Figure 2. Transfer Characteristics

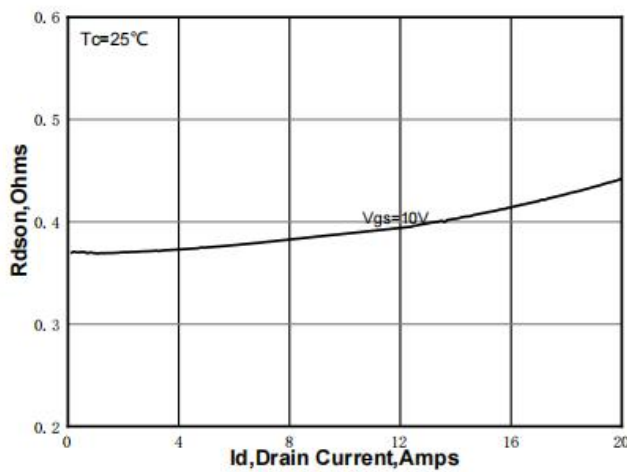


Figure 3. Static Drain-Source On Resistance

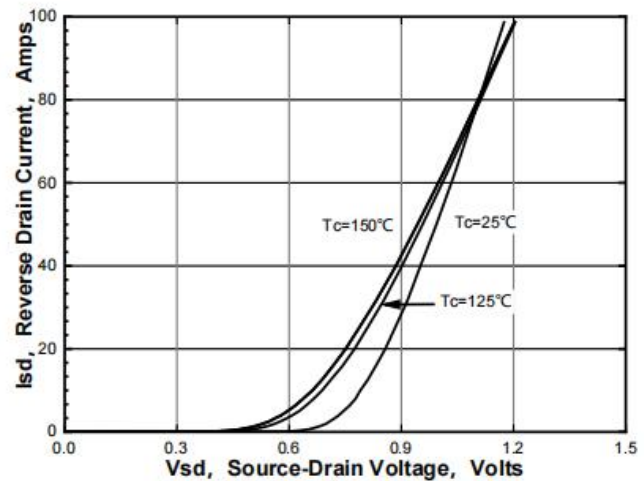


Figure 4. Typical Body Diode Transfer Characteristics

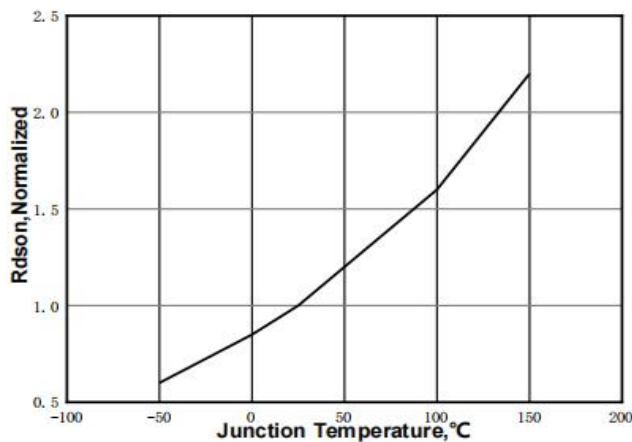


Figure 5. Normalized $R_{DS(on)}$ vs. Temperature

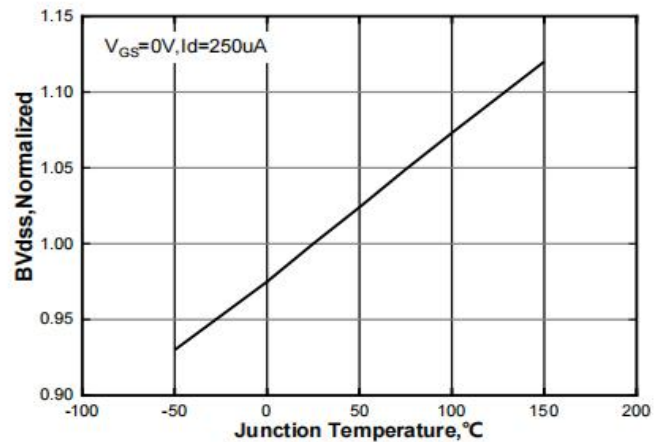


Figure 6. Normalized BV_{DS} vs. Temperature

Electrical Characteristic Curve

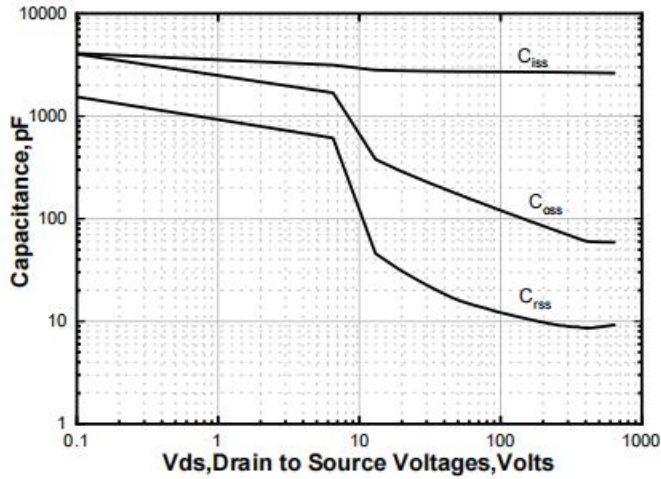


Figure 7. Capacitance Characteristics

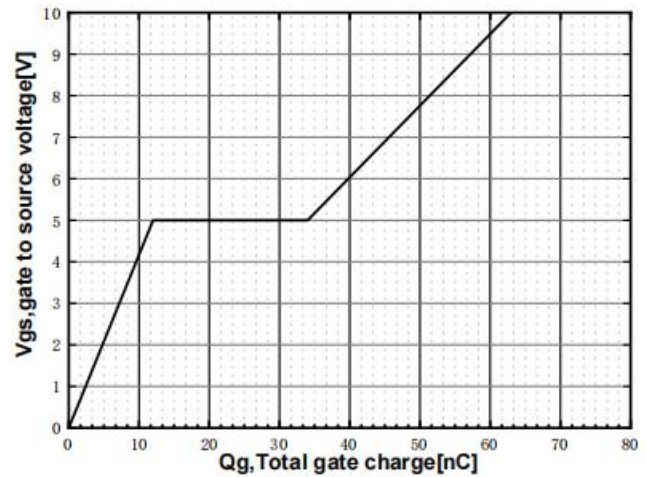


Figure 8. Gate Charge Characteristics

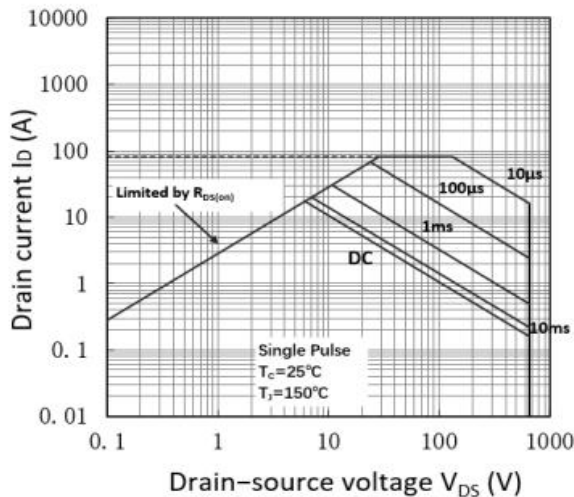


Figure 9. Maximum Safe Operating Area
(TO-220F)

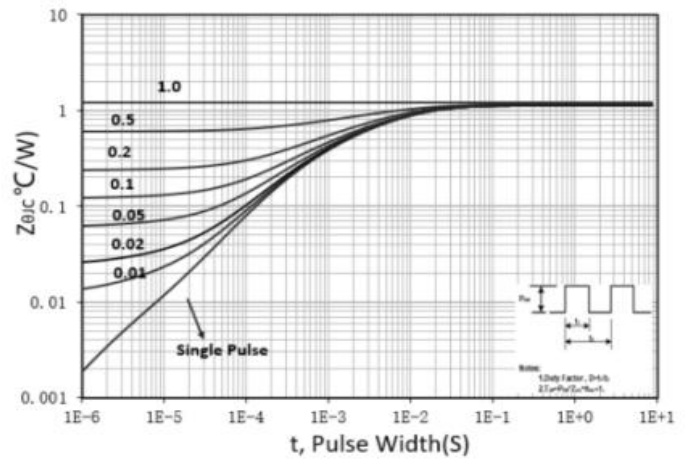


Figure 10. Transient Thermal Response Curve
(TO-220F)

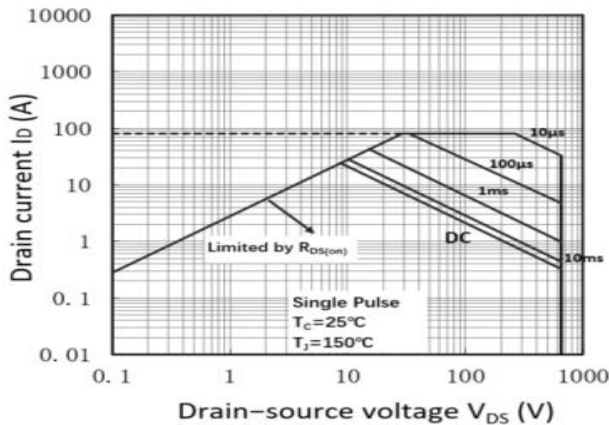


Figure 11. Maximum Safe Operating Area
(TO-220)

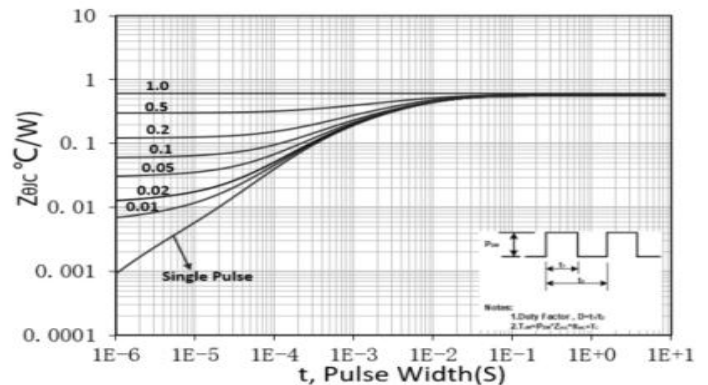
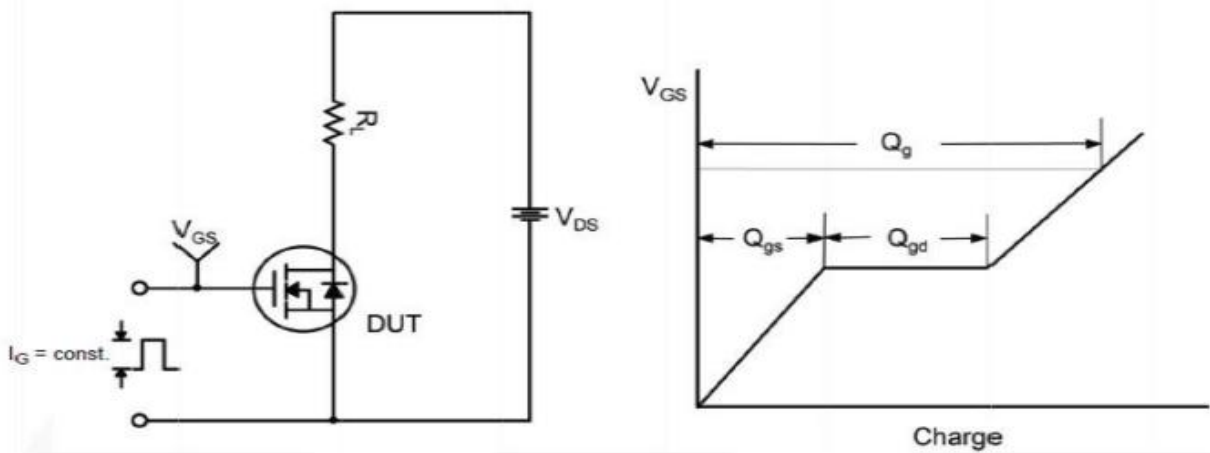


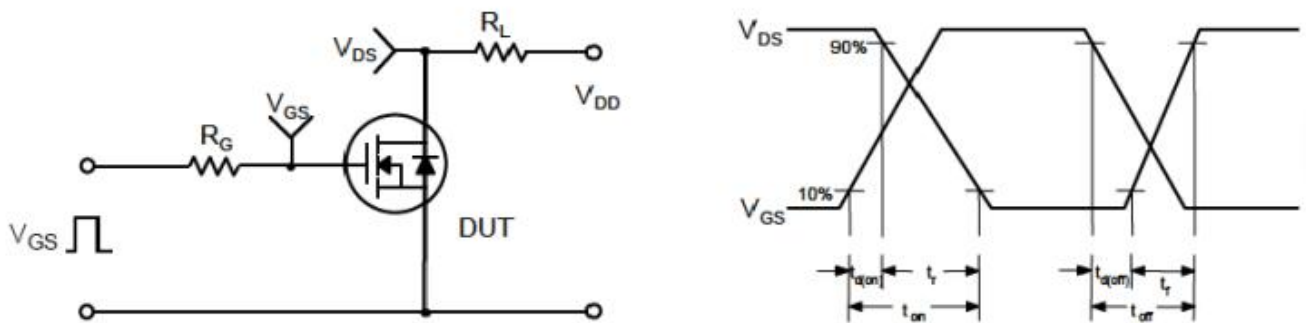
Figure 12. Transient Thermal Response Curve
(TO-220)

Electrical Characteristic Curve

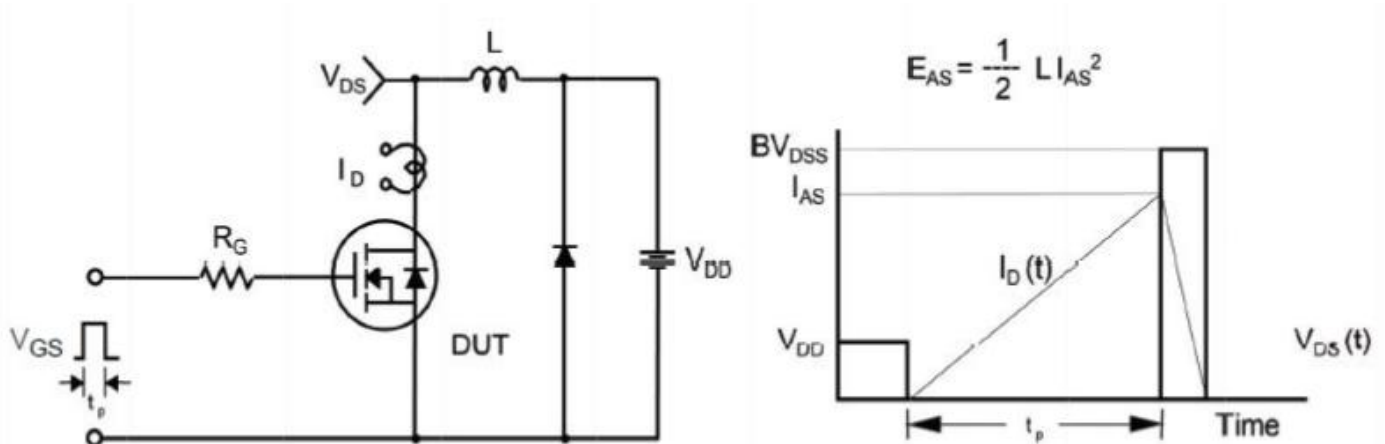
Gate Charge Test Circuit & Waveform



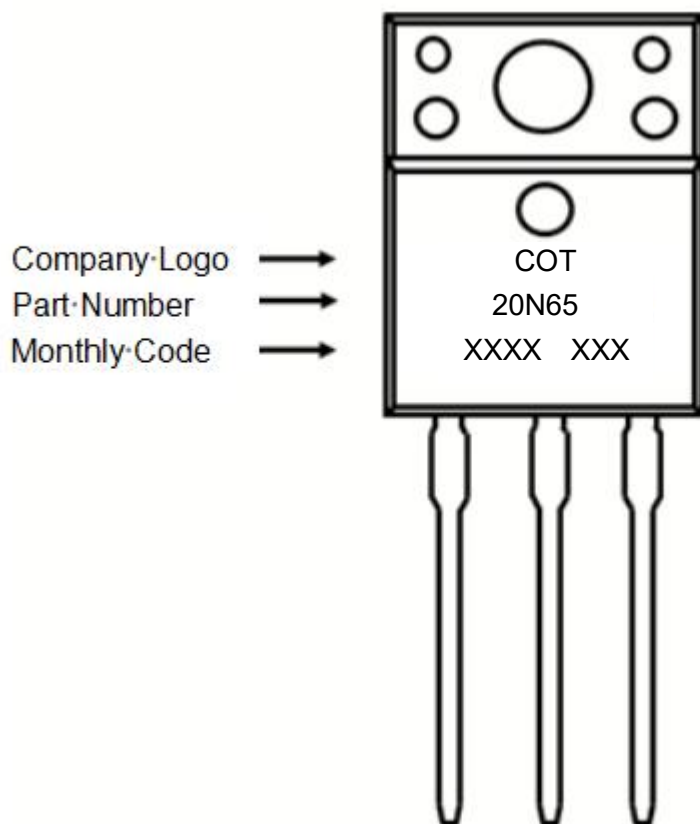
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

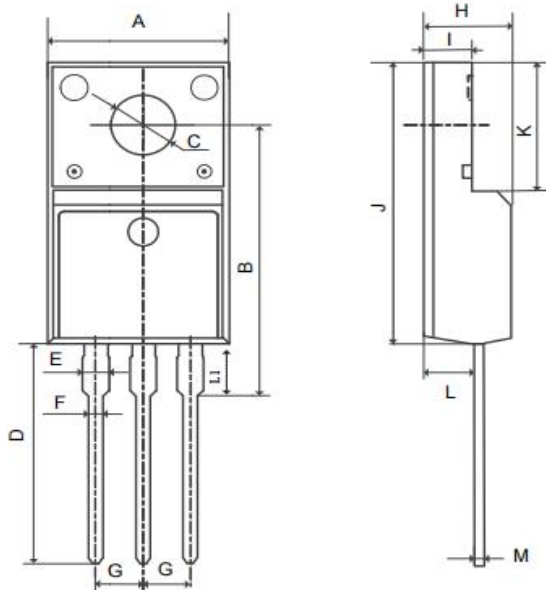


Marking Codes



Part	Package	Marking	Packing method
CT20N65FA	TO-220F	20N65	Tube
CT20N65RA	TO-220	20N65	Tube

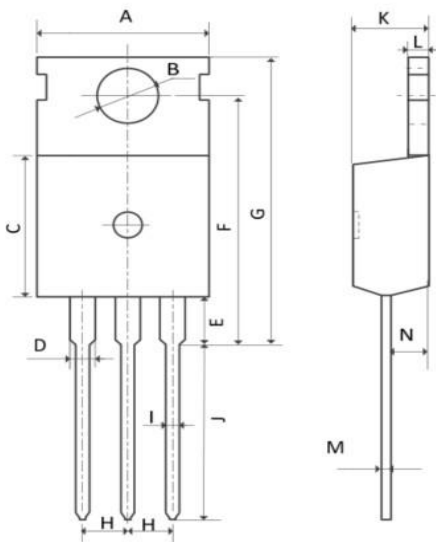
Outline Drawing – TO-220F



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	9.96	10.36
B	15.10	16.10
C	3.03	3.38
D	12.64	13.28
E	1.18	1.58
F	0.70	0.95
G	2.54REF	
H	4.50	4.90
I	2.34	2.74
J	15.57	16.17
K	6.70REF	
L	2.56	2.96
M	0.40	0.65
L1	2.85	3.45

Outline Drawing – TO-220



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	9.70	10.20
B	3.40	3.80
C	8.90	9.40
D	1.17	1.47
E	2.60	3.40
F	15.10	16.70
G	19.55MAX	
H	2.54REF	
I	0.70	0.95
J	9.35	11.00
K	4.30	4.77
L	1.20	1.45
M	0.40	0.65
N	2.20	2.60