



DESCRIPTION

The AM09N20 is available in TO-220, TO-220F, TO-251 and TO-252 packages.

BVDSS	RDSON	ID
200V	0.26Ω	9A

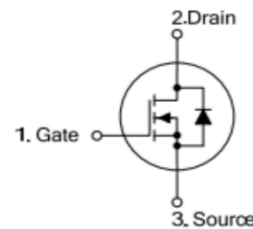
FEATURE

- Fast Switching
- Low Crss
- Improved dv/dt Capability

APPLICATION

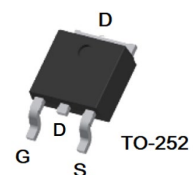
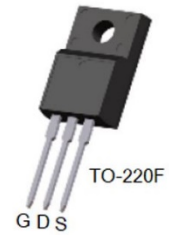
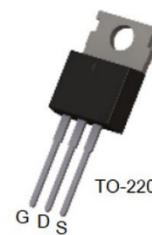
- High Frequency Switching Mode Power Supply

PIN DESCRIPTION



ORDERING INFORMATION

Package Type	Part Number	
TO-220 SPQ: 50pcs/Tube	T3	AM09N20T3U
		AM09N20T3VU
TO-220F SPQ: 50pcs/Tube	T3F	AM09N20T3FU
		AM09N20T3FVU
TO-251 SPQ: 75pcs/Tube	TD3	AM09N20TD3U
		AM09N20TD3VU
TO-252 SPQ: 2,500pcs/Reel	D	AM09N20DR
		AM09N20DVR
Note	U: Tube R: Tape & Reel V: Halogen free Package	
AiT provides all RoHS products		



Symbol	Function
G	Gate
D	Drain
S	Source

**ABSOLUTE MAXIMUM RATINGS** $T_C = 25^\circ\text{C}$, unless otherwise specified

V_{DSS} , Drain-to-Source Voltage		200V
I_D , Continuous Drain Current	$T_C=25^\circ\text{C}$	9A
	$T_C=100^\circ\text{C}$	5.5A
I_{DM} , Pulsed Drain Current ⁽¹⁾		36A
V_{GS} , Gate-to-Source Voltage		$\pm 30\text{V}$
E_{AS} , Single Pulse Avalanche Energy ⁽²⁾		200mJ
dv/dt , Peak Diode Recovery dv/dt ⁽³⁾		5.0V/ns
P_D , Power Dissipation	TO-220, TO-251, TO-252	75W
	TO-220F	30W
P_D , Derating Factor above 25°C	TO-220, TO-251, TO-252	0.6 W/ $^\circ\text{C}$
	TO-220F	0.24 W/ $^\circ\text{C}$
T_J , Operating Junction Temperature Range		150°C
T_{STG} , Storage Temperature Range		$-55^\circ\text{C}\sim+150^\circ\text{C}$
T_L , Maximum Temperature for Soldering		300°C

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

(1) Pulse width limited by maximum junction temperature

(2) $L=20\text{mH}$, $V_{DS}=50\text{V}$, Start $T_J=25^\circ\text{C}$

(3) $I_{SD} = 9\text{A}$ $di/dt < 100\text{ A}/\mu\text{s}$, $V_{DD} < BV_{DSS}$, Start $T_J=25^\circ\text{C}$.

THERMAL CHARACTERISTICS

Parameter	Symbol	TO-220, TO-251, TO-252	TO-220F	Units
Junction-to-Case	$R_{\theta JC}$	1.67	4.17	$^\circ\text{C}/\text{W}$
Junction-to-Ambient	$R_{\theta JA}$	62.5	62.5	



ELECTRICAL CHARACTERISTICS

T_C = 25°C, unless otherwise specified

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
OFF Characteristics						
Drain to Source Breakdown Voltage	V _{DSS}	V _{GS} =0V, I _D =250μA	200	-	-	V
BV _{DSS} Temperature Coefficient	ΔBV _{DSS} /Δ T _J	I _D =250μA, Reference 25°C	-	0.25	-	V/°C
Drain to Source Leakage Current	I _{DSS}	V _{DS} =200V, V _{GS} =0V, T _J =25°C	-	-	1	μA
		V _{DS} =160V, V _{GS} =0V, T _J =125°C	-	-	100	
Gate to Source Forward Leakage	I _{GSS(F)}	V _{GS} =+30V	-	-	100	nA
Gate to Source Reverse Leakage	I _{GSS(R)}	V _{GS} =-30V	-	-	100	
ON Characteristics						
Drain-to-Source On-Resistance*	R _{DS(ON)}	V _{GS} =10V, I _D =4A	-	0.26	0.32	Ω
Gate Threshold Voltage *	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.0	-	4.0	V
Dynamic Characteristics						
Gate Resistance	R _g	f=1.0MHz	-	3.5	-	Ω
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz	-	550	-	pF
Output Capacitance	C _{oss}		-	90	-	
Reverse Transfer Capacitance	C _{rss}		-	8.6	-	
Switching Characteristics						
Turn-on Delay Time	t _{d(ON)}	I _D =9A, V _{DD} =100V, V _{GS} =10V, R _G =5Ω	-	10	-	nS
Rise Time	t _r		-	5	-	
Turn-Off Delay Time	t _{d(OFF)}		-	20	-	
Fall Time	t _f		-	7	-	
Total Gate Charge	Q _g	I _D =9A, V _{DD} =160V, V _{GS} =10V	-	12	-	nC
Gate to Source Charge	Q _{gs}		-	3	-	
Gate to Drain ("Miller") Charge	Q _{gd}		-	6	-	
Source-Drain Diode Characteristics						
Continuous Source Current (Body Diode)	I _S	T _C =25°C	-	-	9	A
Maximum Pulsed Current (Body Diode)	I _{SM}		-	-	36	
Diode Forward Voltage *	V _{SD}	I _S =9A, V _{GS} =0V	-	-	1.2	V
Reverse Recovery Time	T _{rr}	I _S =9A, T _J =25°C	-	110	-	ns
Reverse Recovery Charge	Q _{rr}	dI _F /dt=100A/μs, V _{GS} =0V	-	465	-	nC

*Pulse width t_p≤300μs, δ≤2%



TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1. Safe Operating Area (TO-220)

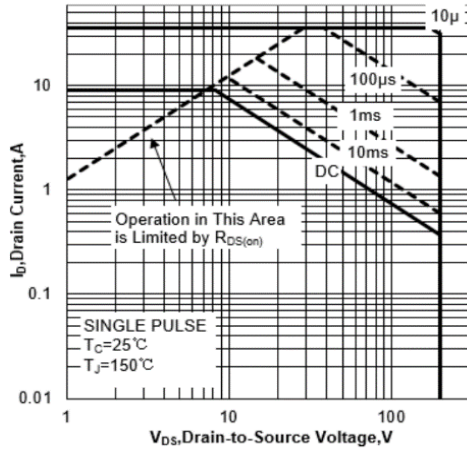


Fig 2. Safe Operating Area (TO-220F)

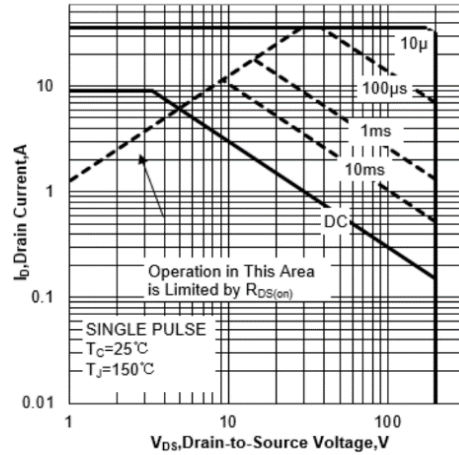


Fig 3. Power Dissipation (TO-220)

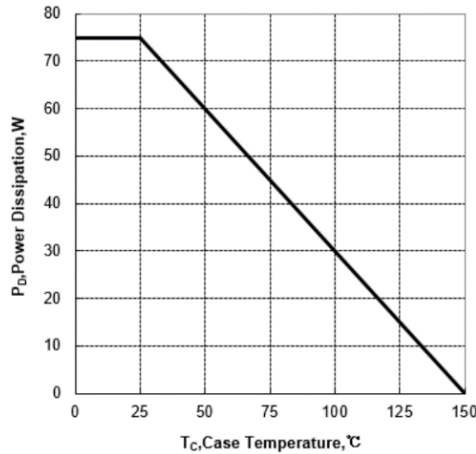


Fig 4. Power Dissipation (TO-220F)

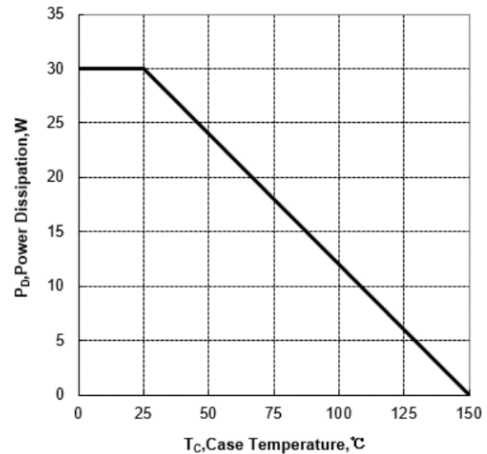


Fig 5. Max Thermal Impedence (TO-220)

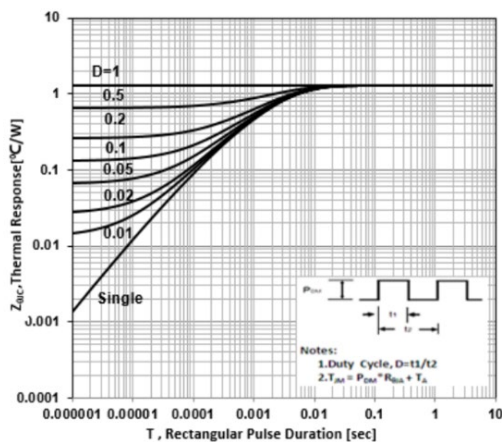


Fig 6. Max Thermal Impedence (TO-220F)

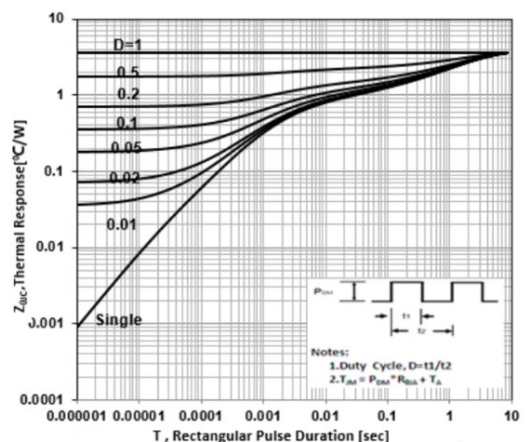




Fig 7. Typical Output Characteristics

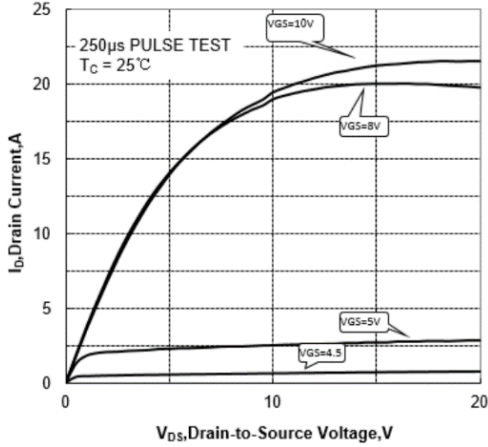


Fig 8. Typical Transfer Characteristics

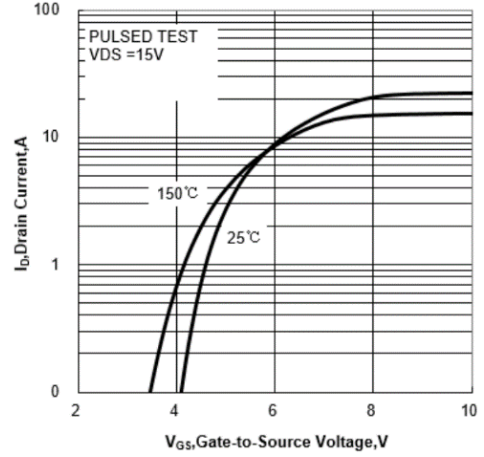


Fig 9. Typical Drain to Source on Resistance vs. Drain Current

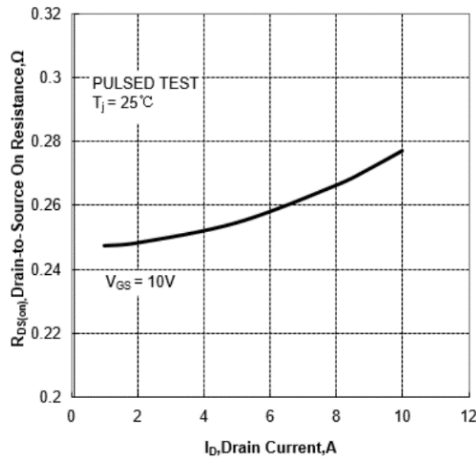


Fig 10. Typical Drain to Source on Resistance vs. Junction Temperature

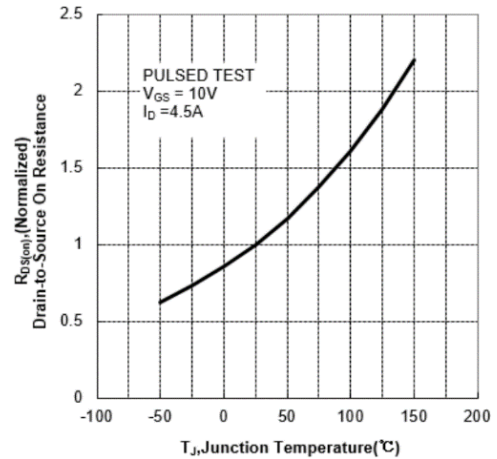


Fig 11. Typical Threshold Voltage vs. Junction Temperature

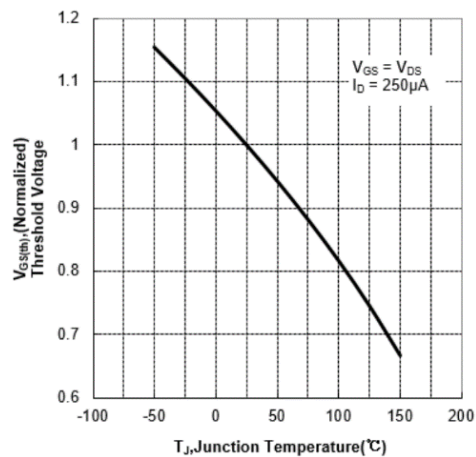


Fig 12. Typical Breakdown Voltage vs. Junction Temperature

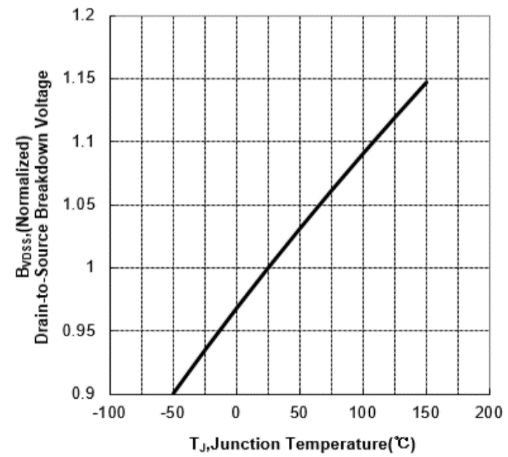




Fig13. Typical Capacitance vs. Drain to Source Voltage

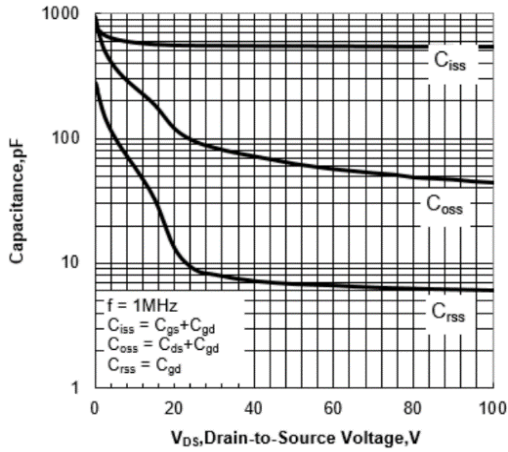


Fig14. Typical Gate Charge vs. Gate to Source Voltage

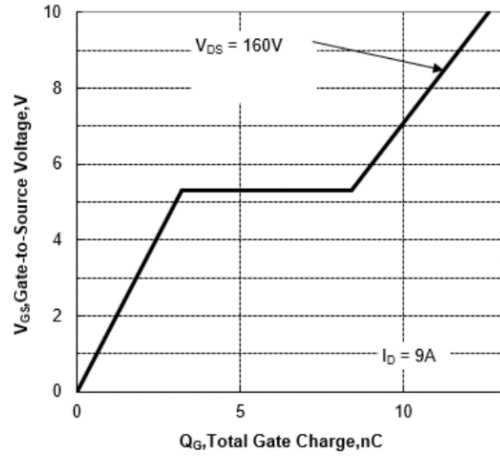


Fig 15. Gate Charge Test Circuit

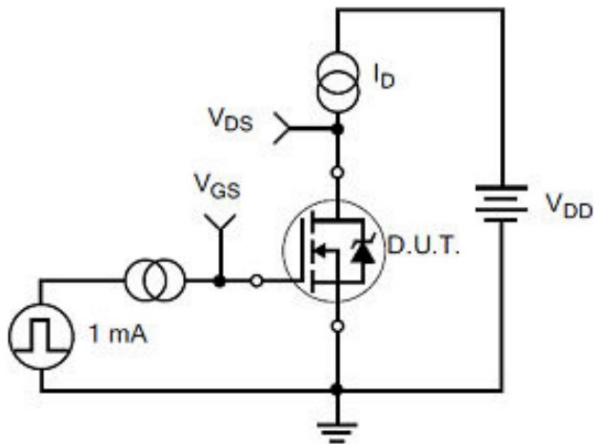


Fig 16. Gate Charge Waveforms

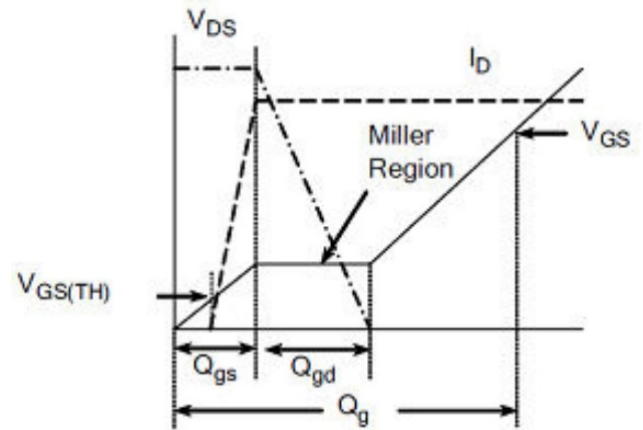


Fig 17. Resistive Switching Test Circuit

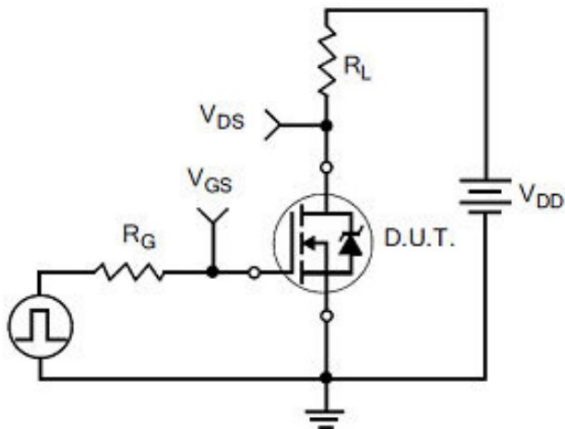


Fig 18. Resistive Switching Waveforms

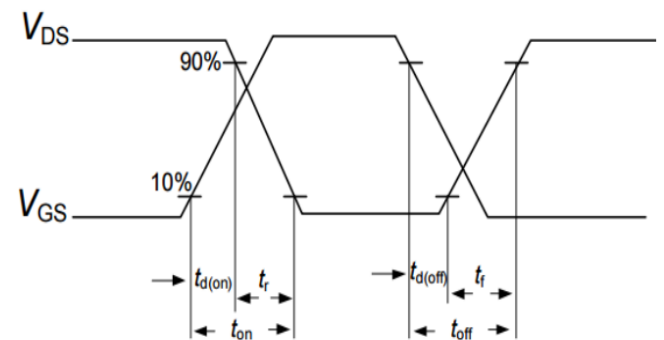




Fig 19. Diode Reverse Recovery Test Circuit

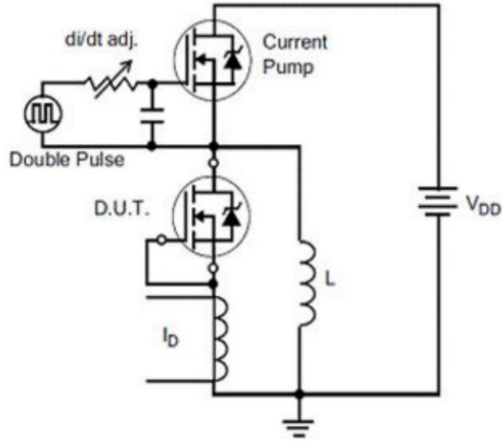


Fig 20. Diode Reverse Recovery Waveform

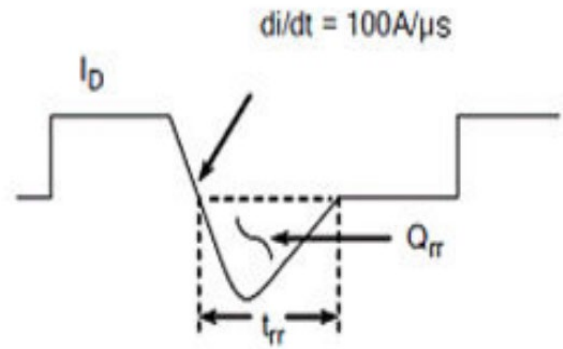


Fig 21. Unclamped Inductive Switching Test Circuit

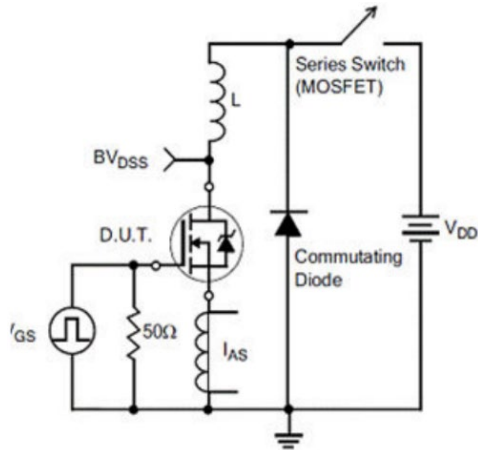
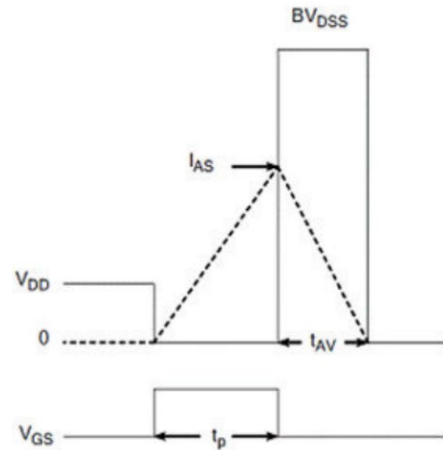


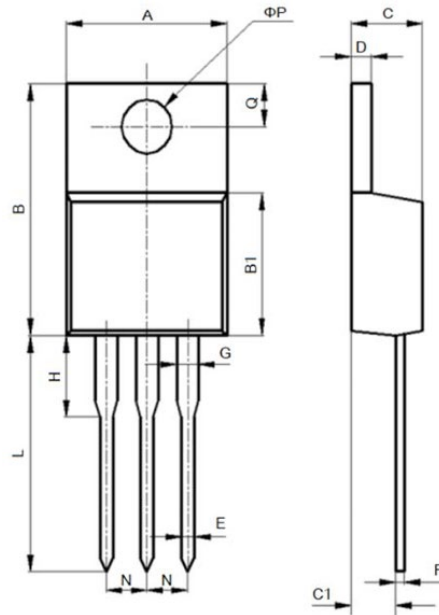
Fig 22. Unclamped Inductive Switching Waveform





PACKAGE INFORMATION

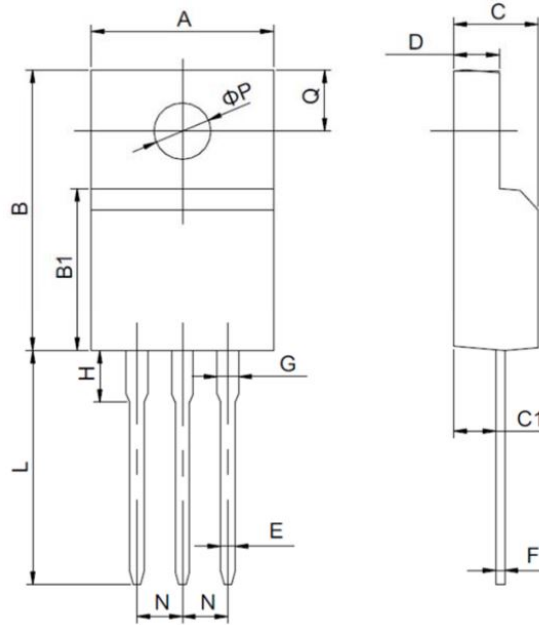
Dimension in TO-220 (Unit: mm)



Symbol	Min.	Max.
A	9.600	10.600
B	15.000	16.000
B1	8.900	9.500
C	4.300	4.800
C1	2.300	3.100
D	1.200	1.400
E	0.700	0.900
F	0.300	0.600
G	1.170	1.370
H	2.700	3.800
L	12.600	14.800
N	2.340	2.740
Q	2.400	3.000
ΦP	3.500	3.900



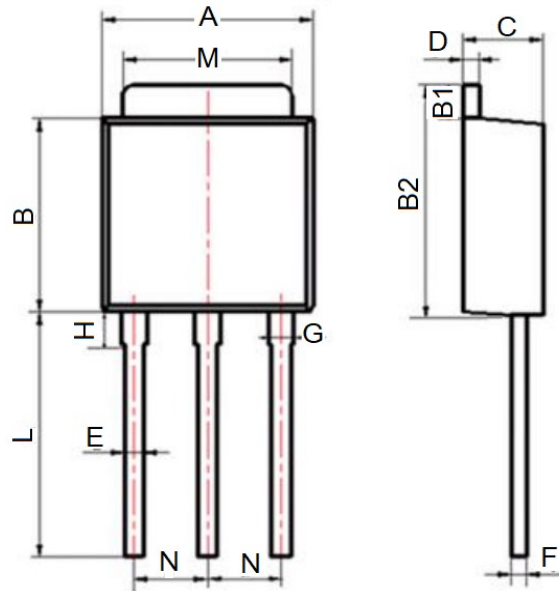
Dimension in TO-220F (Unit: mm)



Symbol	Min.	Max.
A	9.600	10.400
B	15.400	16.200
B1	8.900	9.500
C	4.300	4.900
C1	2.100	3.000
D	2.400	3.000
E	0.600	1.000
F	0.300	0.600
G	1.120	1.420
H	1.600	3.800
L	12.000	14.000
N	2.340	2.740
Q	3.150	3.550
ΦP	2.900	3.300



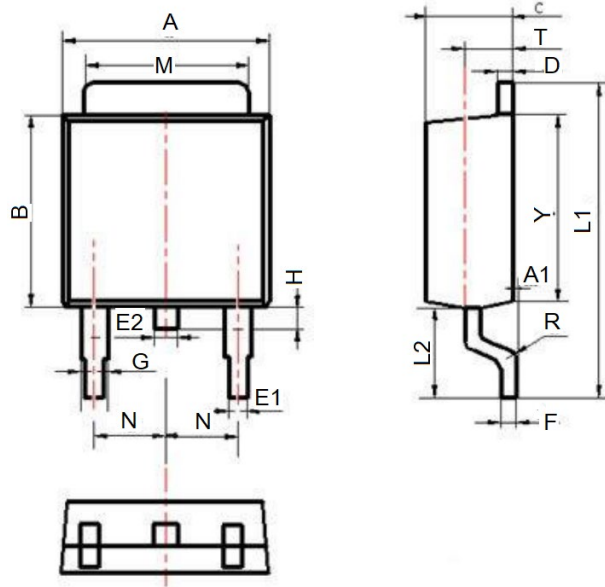
Dimension in TO-251 (Unit: mm)



Symbol	Min.	Max.
A	6.300	6.900
B	5.700	6.300
B1	1.000	1.200
B2	6.800	7.400
C	2.100	2.500
D	0.300	0.600
E	0.500	0.700
F	0.300	0.600
G	0.700	1.000
H	1.600	2.400
L*	3.900	4.300
M	5.100	5.500
N	2.090	2.490



Dimension in TO-252 (Unit: mm)



Symbol	Min.	Max.
A	6.300	6.900
A1	0.000	0.130
B	5.700	6.300
C	2.100	2.500
D	0.300	0.600
E1	0.600	0.900
E2	0.700	1.000
F	0.300	0.600
G	0.700	1.200
L1	9.600	10.500
L2	2.700	3.100
H	0.600	1.000
M	5.100	5.500
N	2.090	2.490
R	0.300	
T	1.400	1.600
Y	5.100	6.300



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