



DESCRIPTION

The AM20N65 is available in TO-220 and TO220F Packages.

BVDSS	RDSON	ID
650V	380mΩ	20A

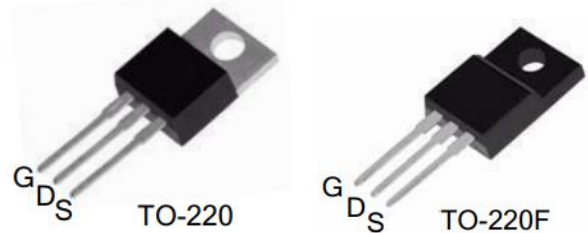
FEATURE

- Proprietary New Planar Technology
- $R_{DS(ON),typ.}=0.38\ \Omega@V_{GS}=10V$
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

APPLICATIONS

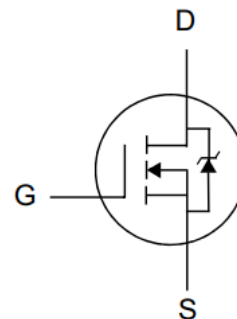
- Adaptor
- TV Main Power
- SMPS Power Supply
- LCD Panel Power

PIN DESCRIPTION



ORDERING INFORMATION

Package Type	Part Number	
TO-220 SPQ: 50pcs/Tube	T3	AM20N65T3U
		AM20N65T3VU
TO220F SPQ: 50pcs/ Tube	T3F	AM20N65T3FU
		AM20N65T3FVU
Note	V: Halogen free Package U: Tube	
AiT provides all RoHS products		



Pin#	Symbol	Function
1	G	Gate
2	D	Drain
3	S	Source



ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise specified.

Parameter	Symbol	TO-220	TO-220F	Unit
Drain-to-Source Voltage ⁽¹⁾	V _{DSS}	650		V
Gate-to-Source Voltage	V _{GSS}	±30		
Continuous Drain Current	I _D	20		A
Continuous Drain Current @ T _c =100°C	I _{D @ T_c=100°C}	Fig 3		
Pulsed Drain Current at V _{GS} =10V ⁽²⁾	I _{DM}	Fig 6		
Single Pulse Avalanche Energy	E _{AS}	1200		mJ
Peak Diode Recovery dv/dt ⁽³⁾	dv/dt	5.0		V/ns
Power Dissipation	P _D	160	65	W
Derating Factor above 25°C		1.28	0.52	W/°C
Maximum Temperature for Soldering Leads at 0.063in (1.6mm) from Case for 10 seconds, Package Body for 10 seconds	T _L	300		°C
	T _{PAK}	260		
Operating and Storage Temperature Range	T _J & T _{STG}	-55 to 150		
THERMAL RESISTANCE				
Parameter	Symbol	TO-220	TO-220F	Unit
Thermal Resistance, Junction-to-Case	R _{θJC}	0.78	1.92	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	62	100	

(1) T_J=+25°C to +150°C

(2) Repetitive rating; pulse width limited by maximum junction temperature.

(3) I_{SD}= 20A di/dt < 100 A / μs , V_{DD} < BV_{DSS}, T_J=+150°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.

**ELECTRICAL CHARACTERISTICS**T_J = 25°C, unless otherwise specified.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	B _{VDS}	V _{GS} =0V, I _D =250μA	650			V
Drain-to-Source Leakage Current	I _{DSS}	V _{DS} =650V, V _{GS} =0V			1	μA
		V _{DS} =520V, V _{GS} =0V, T _J =125°C			100	
Gate-to-Source Leakage Current	I _{GSS}	V _{GS} =+30V, V _{DS} =0V			+100	nA
		V _{GS} =-30V, V _{DS} =0V			-100	
ON CHARACTERISTICS						
Static Drain-to-Source On-Resistance ⁽⁴⁾	R _{DS(ON)}	V _{GS} =10V, I _D =4.0A		0.38	0.50	Ω
Gate Threshold Voltage,	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.0		4.0	V
Forward Transconductance ⁽⁴⁾	g _{fs}	V _{DS} =20V, I _D =10A		15		S
Dynamic CHARACTERISTICS						
Input Capacitance	C _{iss}	V _{GS} =0V,		2600		pF
Reverse Transfer Capacitance	C _{rss}	V _{DS} =25V,		36		
Output Capacitance	C _{oss}	f=1.0MHz		230		
Total Gate Charge	Q _g	V _{DD} =325V, I _D =20A, V _{GS} =0 to 10V		65		nC
Gate-to-Source Charge	Q _{gs}			12		
Gate-to-Drain (Miller) Charge	Q _{gd}			25		
Resistive Switching CHARACTERISTICS						
Turn-on Delay Time	t _{d(ON)}	V _{DD} =325V, I _D =20A, V _{GS} = 10V R _G =25Ω		35		nS
Rise Time	t _{rise}			190		
Turn-Off Delay Time	t _{d(OFF)}			75		
Fall Time	t _{fall}			130		
Source-Drain Diode CHARACTERISTICS						
Continuous Source Current ⁽⁴⁾	I _{SD}	Integral PN-diode in MOSFET			20	A
Pulsed Source Current ⁽⁴⁾	I _{SM}				80	
Diode Forward Voltage	V _{SD}	I _S =20A, V _{GS} =0V			1.5	V
Reverse Recovery Time	t _{rr}	V _{GS} =0V, I _F =20A,		800		ns
Reverse Recovery Charge	Q _{rr}	diF/dt=100A/μs		3.5		μC

(4) Pulse width≤380μs; duty cycle≤2%.



TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1. Maximum Effective Thermal Impedance, Junction -to-Case

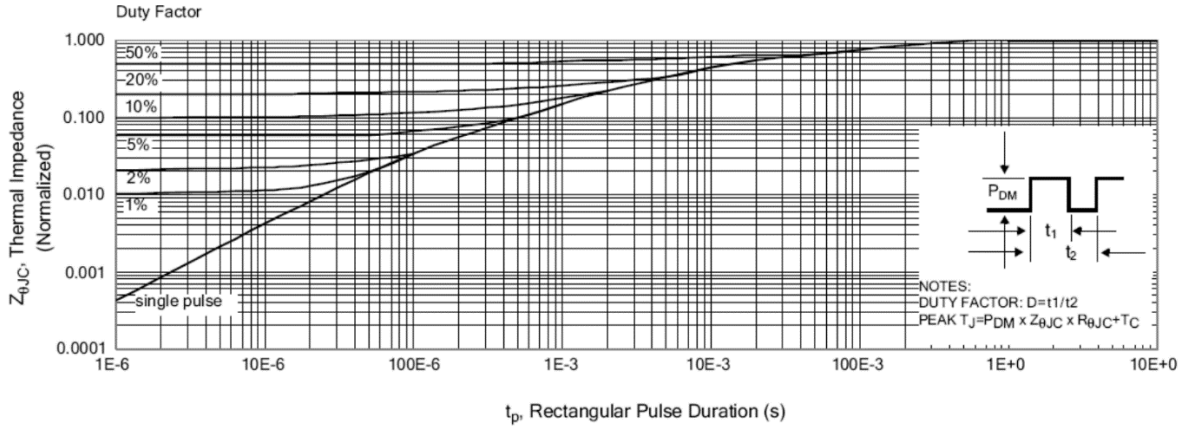


Fig 2. Maximum Power Dissipation Vs Case Temperature

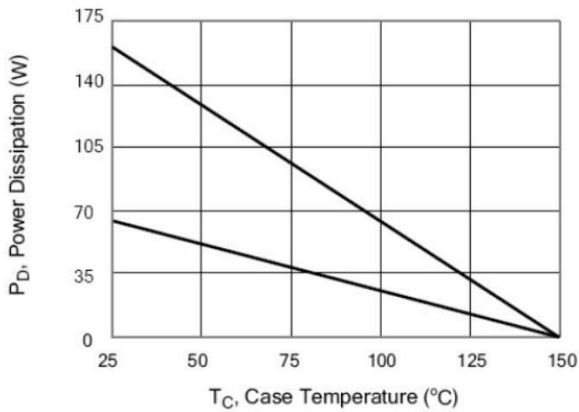


Fig 3. Maximum Continuous Drain Current Vs Case Temperature

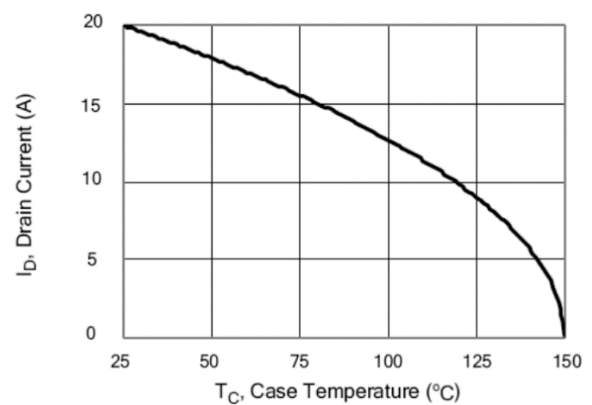


Fig 4. Typical Output Characteristics

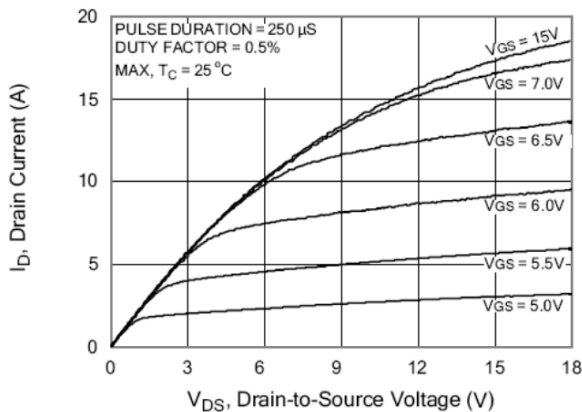


Fig 5. Typical Drain-to-Source ON Resistance Vs Gate Voltage and Drain Current

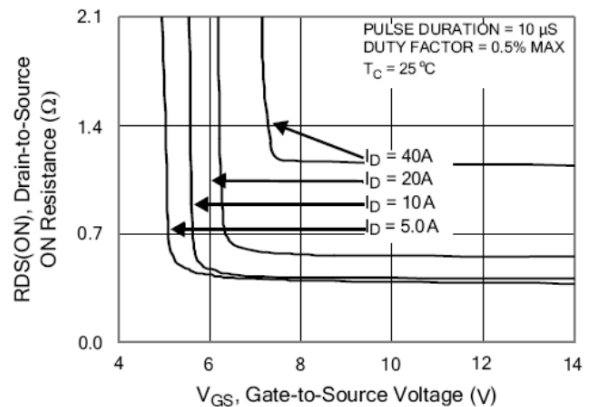




Fig 6. Maximum Peak Current Capability

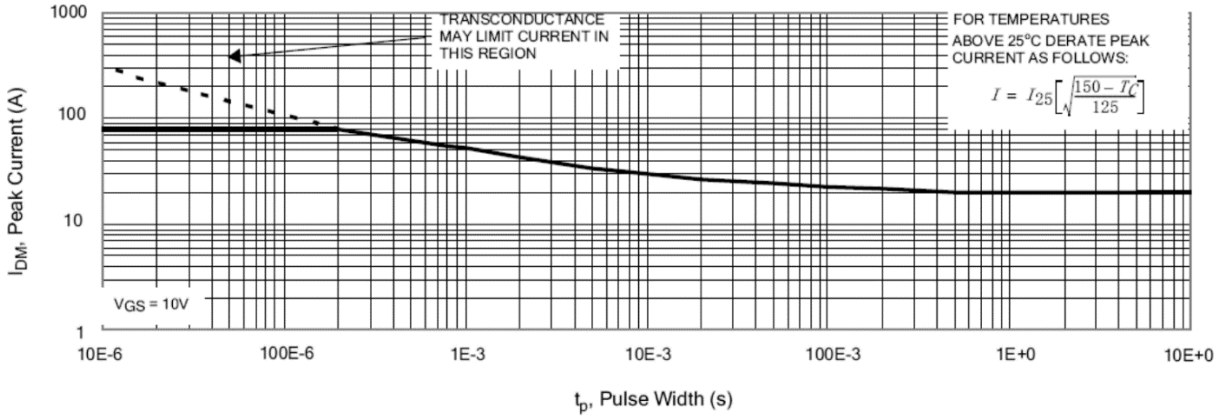


Fig 7. Typical Transfer Characteristics

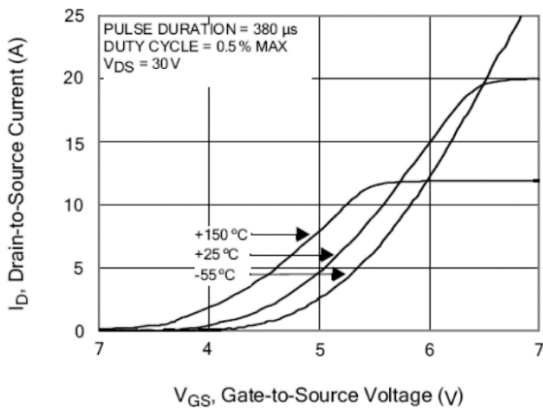


Fig 8. Unclamped Inductive Switching Capability

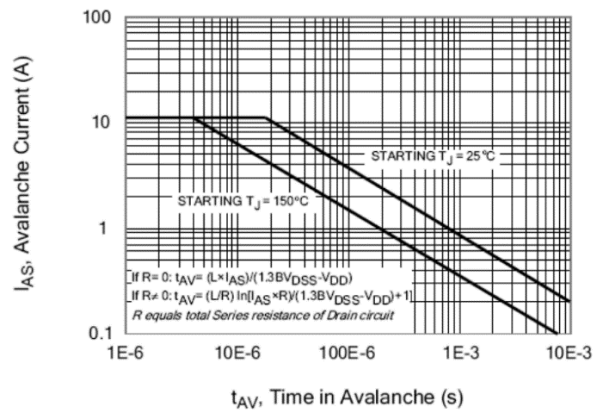


Fig 9. Typical Drain-to-Source ON Resistance Vs Drain Current

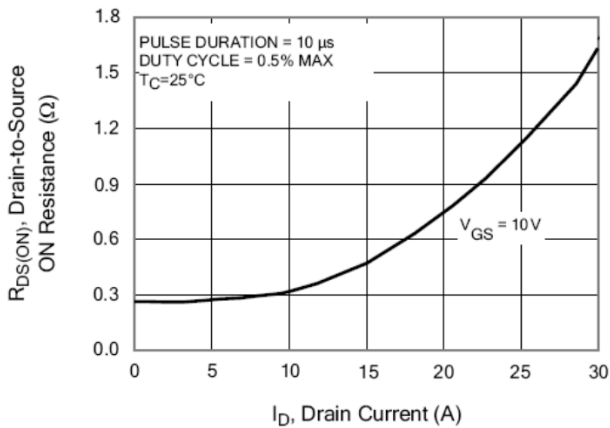


Fig 10. Typical Drain-to-Source ON Resistance Vs Junction Temperature

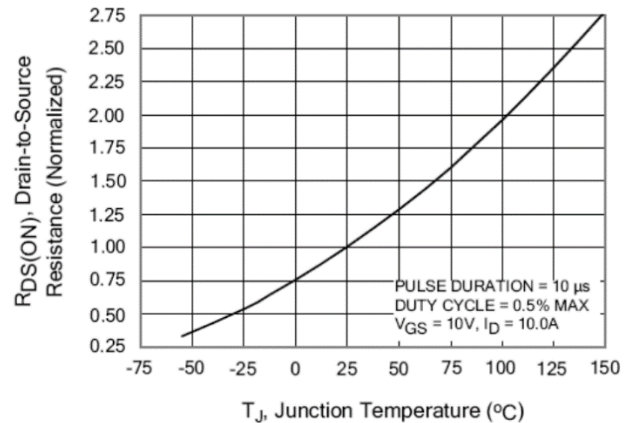




Fig 11. Typical Breakdown Voltage
Vs Junction Temperature

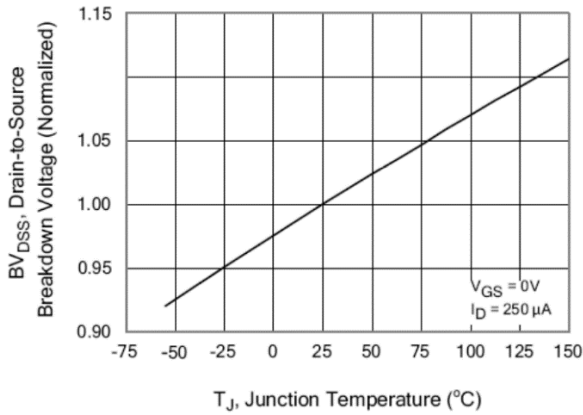


Fig 12. Typical Threshold Voltage
Vs Junction Temperature

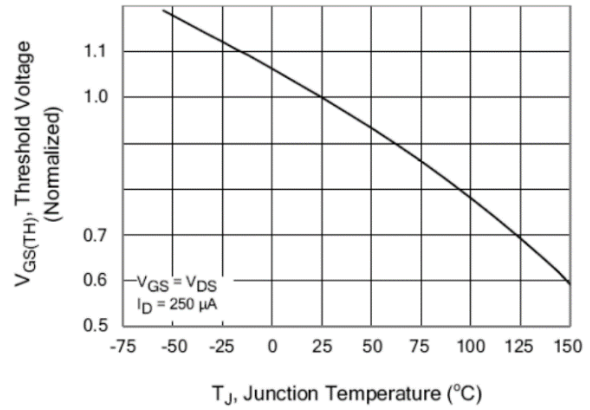


Fig13. Maximum Forward Bias Safe Operating Area

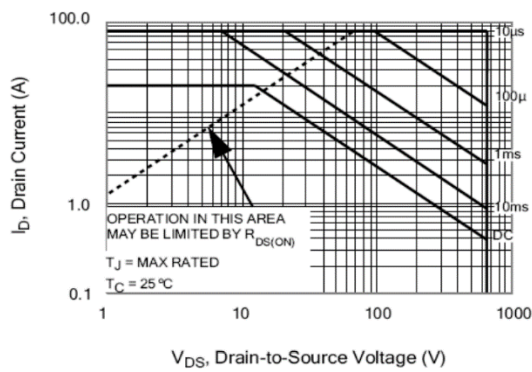


Fig14. Capacitance Vs Vds

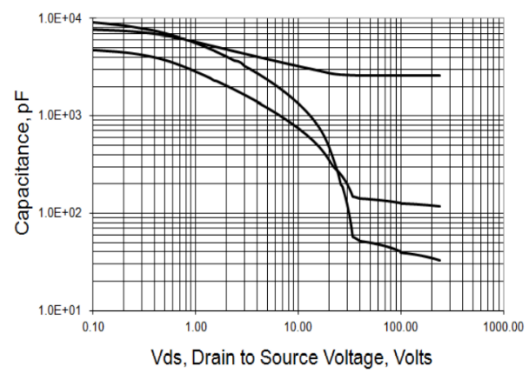


Fig15. Typical Gate Charge

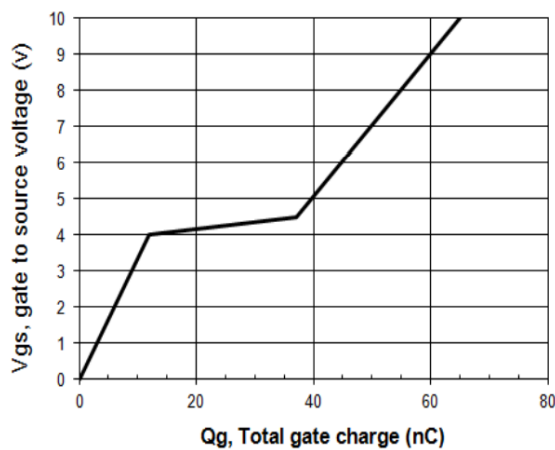
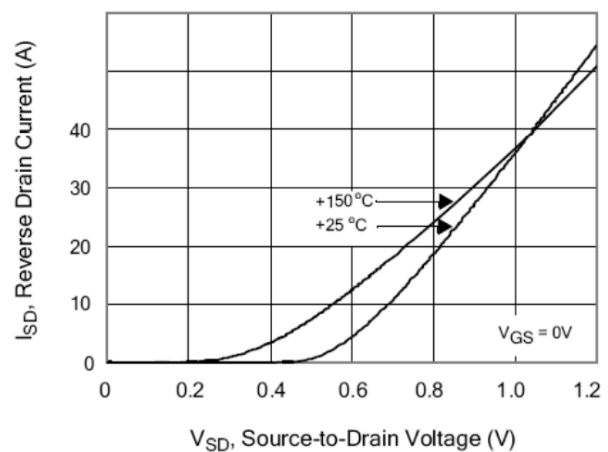


Fig16. Typical Body Diode Transfer Characteristics





TEST CIRCUITS AND WAVEFORMS

Fig 17. Peak Diode Recovery dv/dt Test Circuit

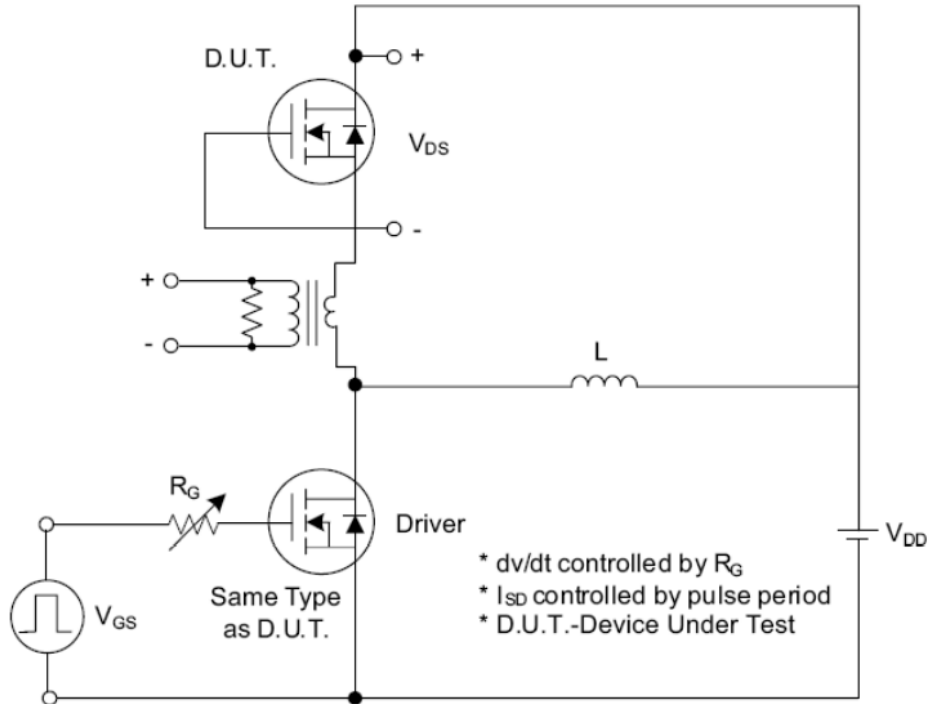


Fig 18. Peak Diode Recovery dv/dt Waveforms

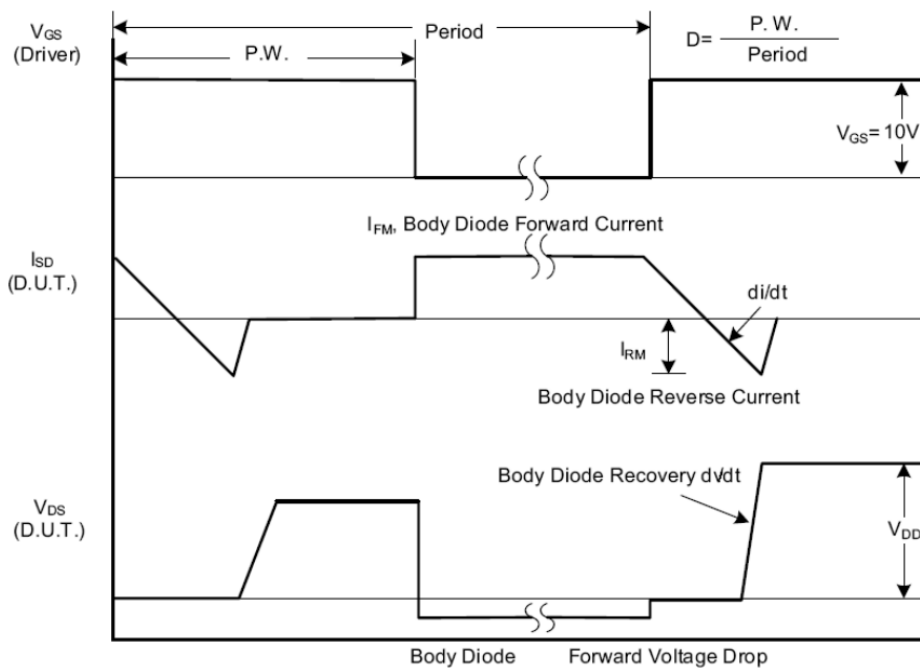




Fig19. Switching Test Circuit

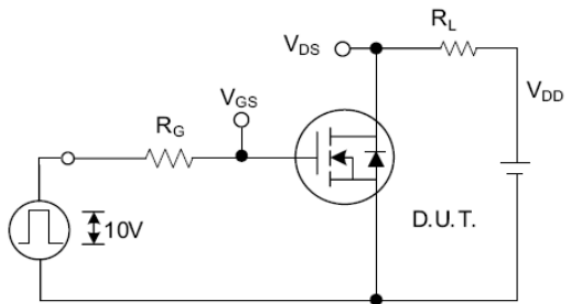


Fig 20. Switching Waveforms

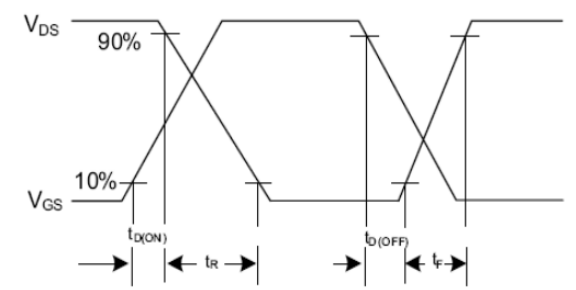


Fig 21. Gate Charge Test Circuit

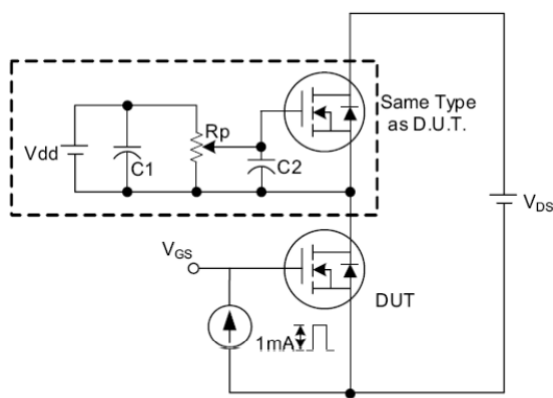


Fig 22. Gate Charge Waveform

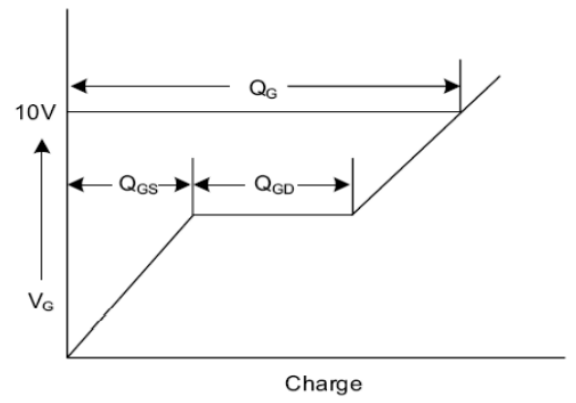


Fig 23. Unclamped Inductive Switching Test Circuit

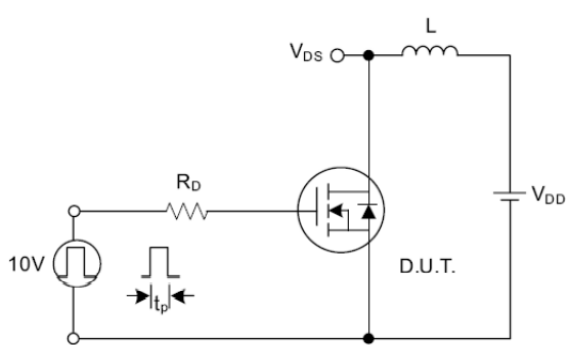
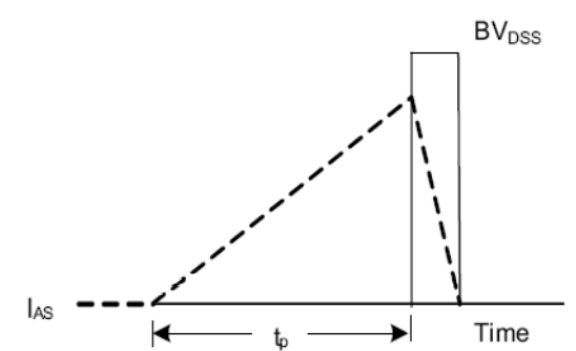


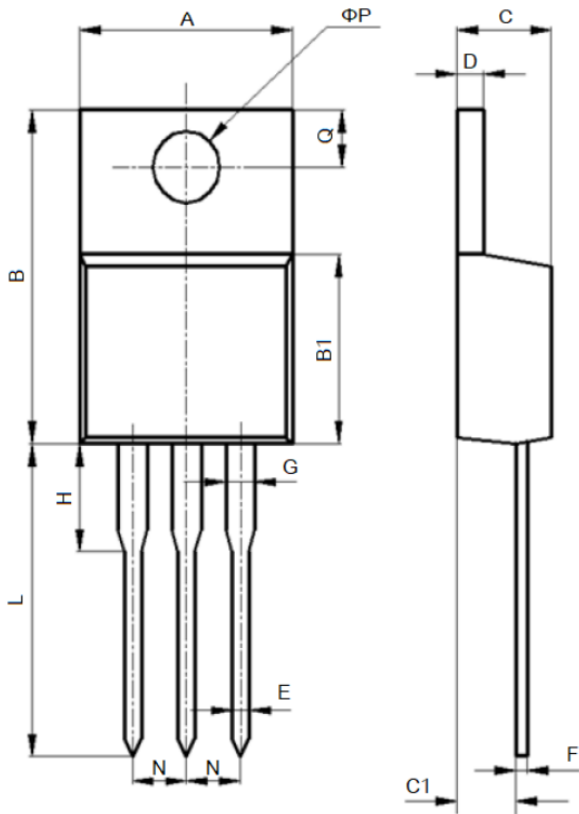
Fig 24. Unclamped Inductive Switching Waveforms





PACKAGE INFORMATION

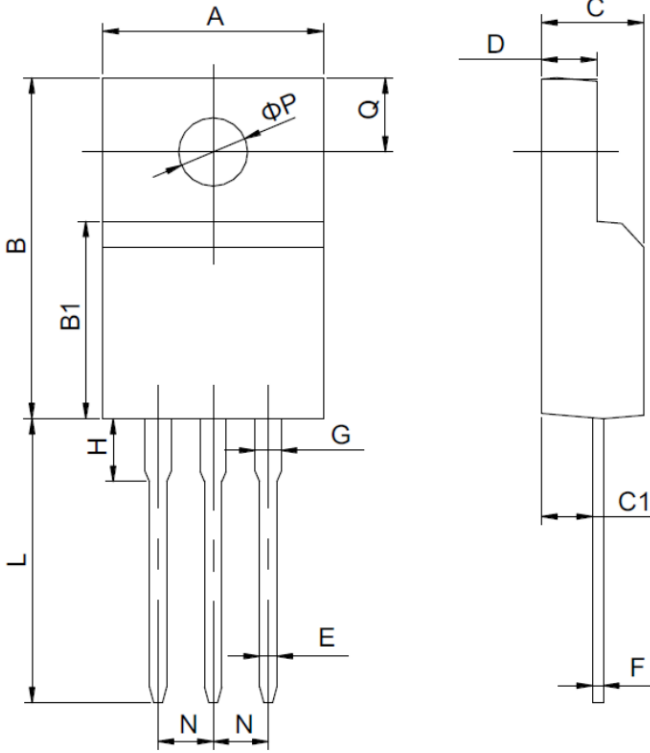
Dimension in TO-220 (Unit: mm)



Symbol	Min.	Max.
A	10.1	10.5
B	15.2	15.6
B1	9.00	9.40
C	4.40	4.60
C1	2.40	3.00
D	1.20	1.40
E	0.70	0.90
F	0.40	0.60
G	1.17	1.37
H	3.30	3.80
L	13.1	13.7
N	2.34	2.74
Q	2.40	3.00
ΦP	3.70	3.90



Dimension in TO-220F (Unit: mm)



Symbol	Min.	Max.
A	9.70	10.30
B	15.50	16.10
B1	8.99	9.39
C	4.40	4.80
C1	2.15	2.55
D	2.50	2.90
E	0.70	0.90
F	0.40	0.60
G	1.12	1.42
H	3.40	3.80
L	12.6	13.6
N	2.34	2.74
Q	3.15	3.55
ΦP	3.00	3.30



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