

650V N-Channel Planar MOSFET

MOSFET

Metal Oxide Semiconductor Field Effect Transistor

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650V N-Channel Planar MOSFET Power Transistor

DD65N12ANx Data Sheet

Rev. 2024 V1.0



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Description

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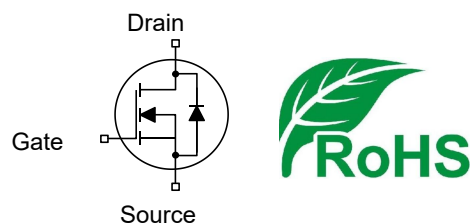
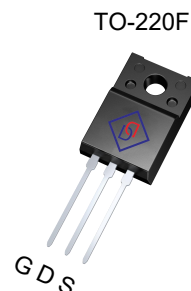
DD65N12ANx is HRM high voltage MOSFET family based on advanced planar stripe DMOS technology. This advanced MOSFET family has optimized on-state resistance, and also provides superior switching performance and higher avalanche energy strength. This device family is suitable for high efficiency switch mode power supplies.

Features

- $R_{DS(on)}=0.64\Omega$ @ $V_{gs}=10V$, $I_d=6A$
- Ultra Low gate Charge(typical 42.2nC)
- Low C_{rss} (typical 4.6pF)
- Fast switching capability
- 100% avalanche tested
- Improved dv/dt capability
- RoHS compliant

Applications

- Switch Mode Power Supply
- Uninterruptible Power Supply (UPS)
- TV Power
- A dapter/Charger



Key Performance Parameters

Parameter	Value	Unit
V_{DS}	650	V
$R_{DS(on),typ}$	0.64	Ω
$Q_{g,typ}$	42.2	nC
I_D	12	A
$I_{D,pulse}$	48	A

Device Marking and Package Information

Device	Package	Marking
DD65N12ANF	TO-220F	65N12ANF
DD65N12ANFT	TO-220F	65N12ANFT

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted			
Parameter	Symbol	Value	Unit
Drain-Source Voltage($V_{GS}=0V$)	V_{DS}	650	V
Continuous Drain Current ¹⁾	I_D	12	A
		7.5	
Pulsed Drain Current ²⁾	$I_{D,pulse}$	48	A
Gate-Source Voltage	V_{GS}	± 30	V
Single Pulse Avalanche Energy ³⁾	E_{AS}	792	mJ
Peak Diode Recovery dv/dt ⁴⁾	dv/dt	5	V/ns
Power Dissipation For TO-220F	P_D	55	W
Continuous Diode Forward Current	I_S	12	A
Diode Pulsed Current ²⁾	$I_{S,pulse}$	48	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	$^\circ\text{C}$

Thermal Resistance For TO-220F			
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	2.2	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	80	

Notes

- 1) Limited by maximum junction temperature.
- 2) Repetitive Rating: Pulse width limited by maximum junction temperature.
- 3) $L=11\text{mH}$, $I_D=12\text{A}$, $R_G=25\Omega$, $V_{DD}=100\text{V}$, Start $T_J=25^\circ\text{C}$.
- 4) $I_{SD} \leq 12\text{A}$, $di/dt \leq 100\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Start $T_J=25^\circ\text{C}$.



Electrical Characteristics T _J = 25°C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Characteristics						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	650	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 650V V _{GS} = 0V, T _J = 25°C	--	--	1	μA
		V _{DS} = 650V, V _{GS} = 0V, T _J = 150°C	--	--	100	
Gate-Source Leakage Current	I _{GSS}	V _{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	2	--	4	V
Drain-Source On-State-Resistance	R _{DS(on)}	V _{GS} = 10V, I _D = 6A	--	0.64	0.8	Ω
Gate Resistance	R _G	f = 1.0MHz open drain	--	2	--	Ω
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = 25V f = 1.0MHz	--	2133	--	pF
Output Capacitance	C _{oss}		--	152	--	
Reverse Transfer Capacitance	C _{rss}		--	4.6	--	
Total Gate Charge	Q _g	V _{DD} = 520V, I _D = 10A V _{GS} = 10V	--	42.2	--	nC
Gate-Source Charge	Q _{gs}		--	10.8	--	
Gate-Drain Charge	Q _{gd}		--	12.4	--	
Gate Plateau Voltage	V _{Plateau}		--	4.7	--	V
Turn-on Delay Time	t _{d(on)}	V _{DD} = 325V, I _D = 12A R _G = 25Ω, V _{GS} = 10V	--	31	--	ns
Turn-on Rise Time	t _r		--	27	--	
Turn-off Delay Time	t _{d(off)}		--	61	--	
Turn-off Fall Time	t _f		--	47	--	
Drain-Source Body Diode Characteristics						
Body Diode Forward Voltage	V _{SD}	T _J = 25°C, I _{SD} = 12A V _{GS} = 0V	--	--	1.2	V
Reverse Recovery Time	t _{rr}	V _R = 400V I _F = 12A, di _F /dt = 100A/μs	--	870	--	ns
Reverse Recovery Charge	Q _{rr}		--	9.6	--	μC

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

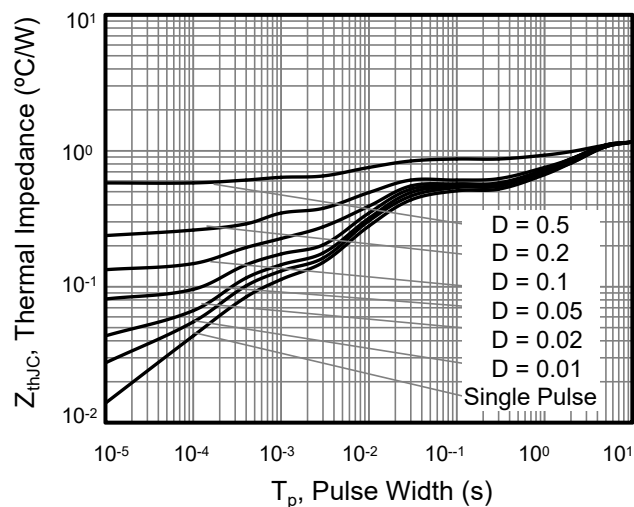


Figure 1. Transient Thermal Impedance For TO-220F

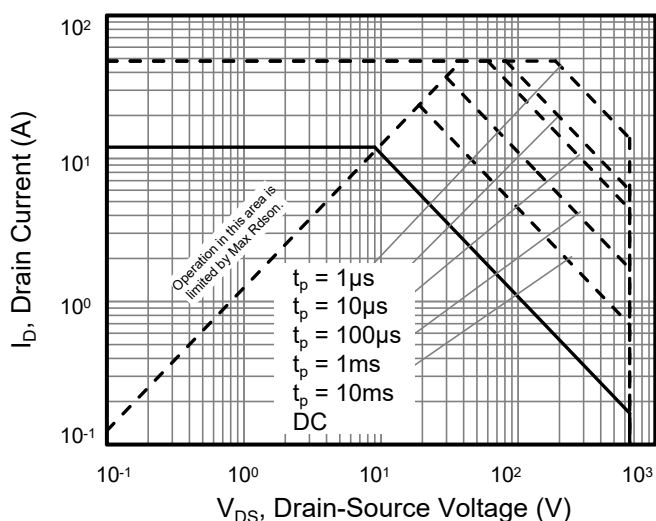


Figure 2. Safe Operation Area For TO-220F

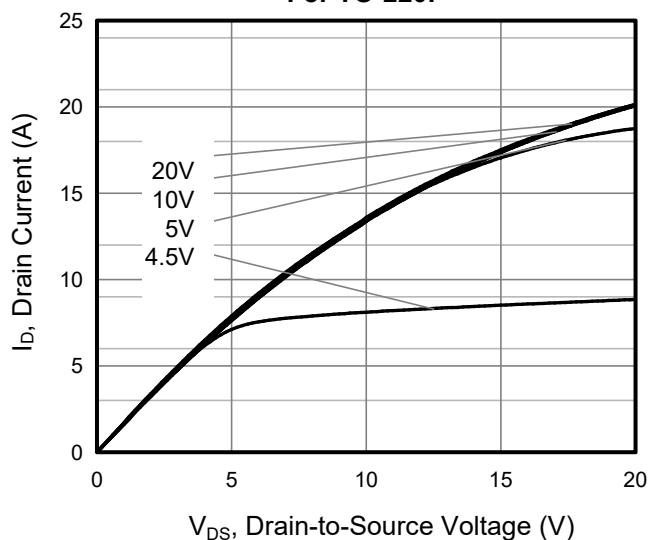


Figure 3. Output Characteristics

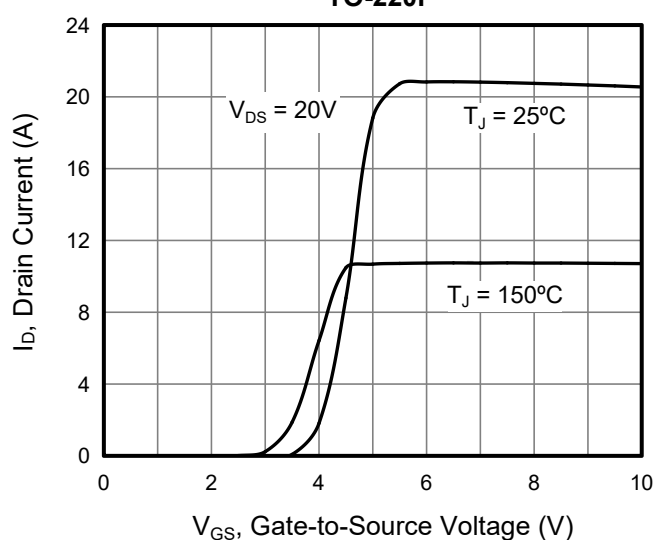


Figure 4. Transfer Characteristics

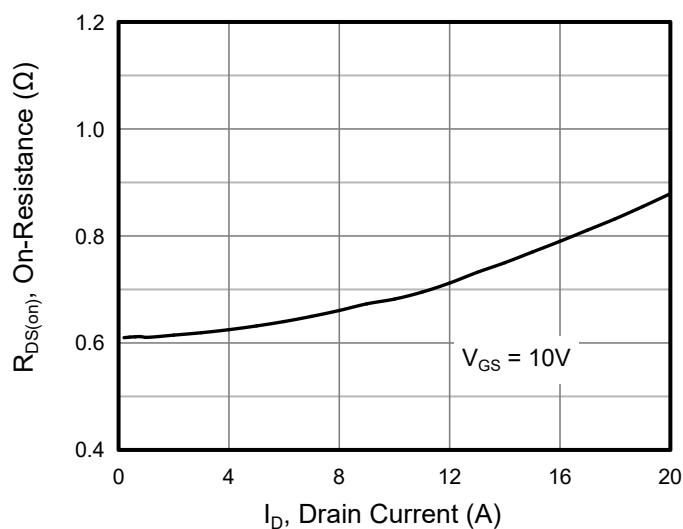


Figure 5. On-Resistance vs Drain Current

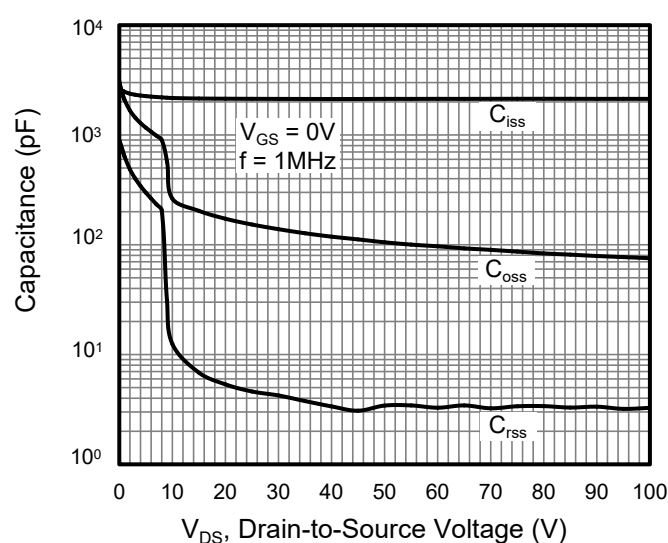


Figure 6. Capacitance

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

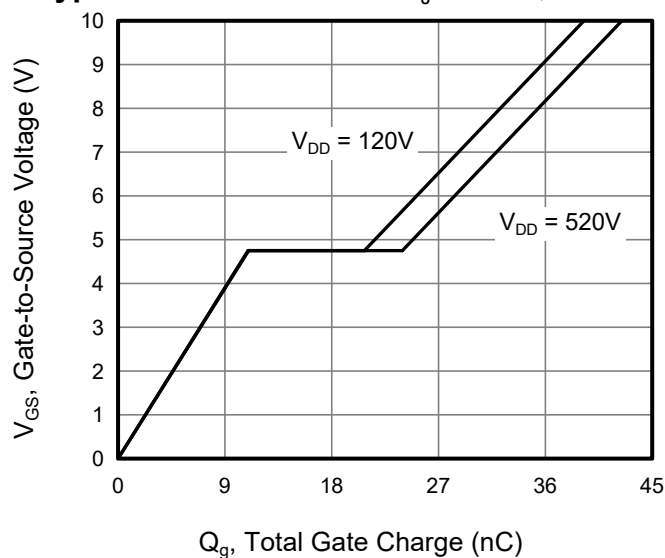


Figure 7. Gate Charge

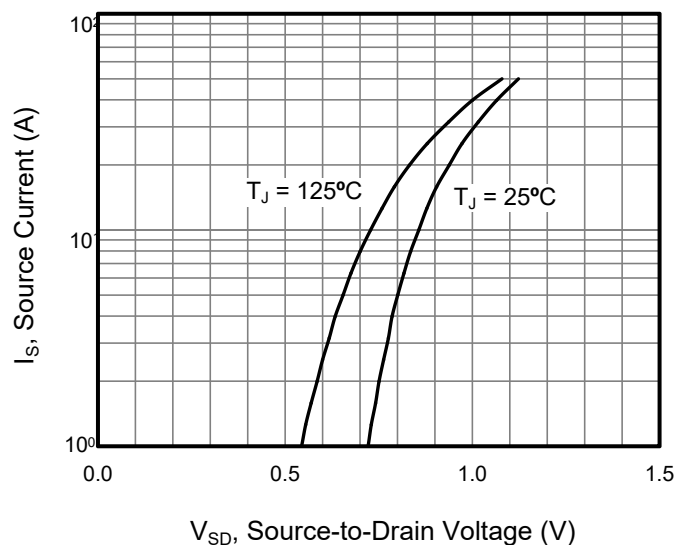


Figure 8. Body Diode Forward Voltage

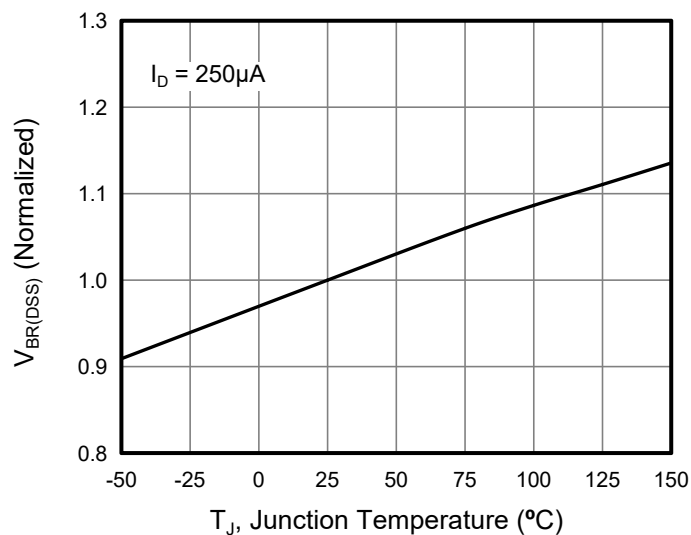


Figure 9. Breakdown Voltage vs Junction Temperature

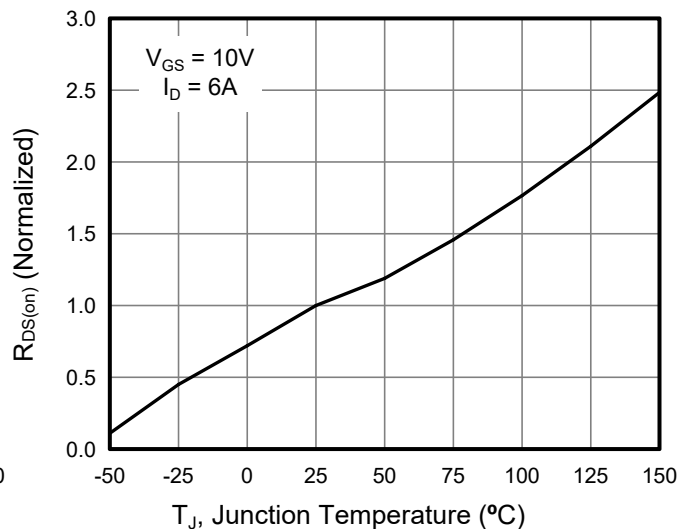


Figure 10. On-Resistance vs Temperature

Figure A: Gate Charge Test Circuit and Waveform

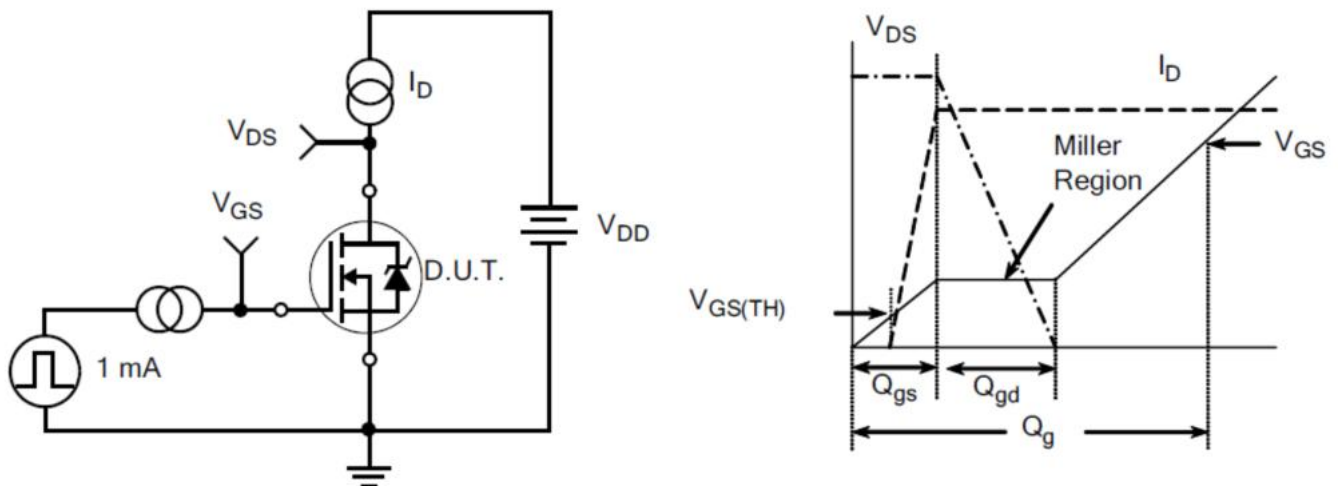


Figure B: Resistive Switching Test Circuit and Waveform

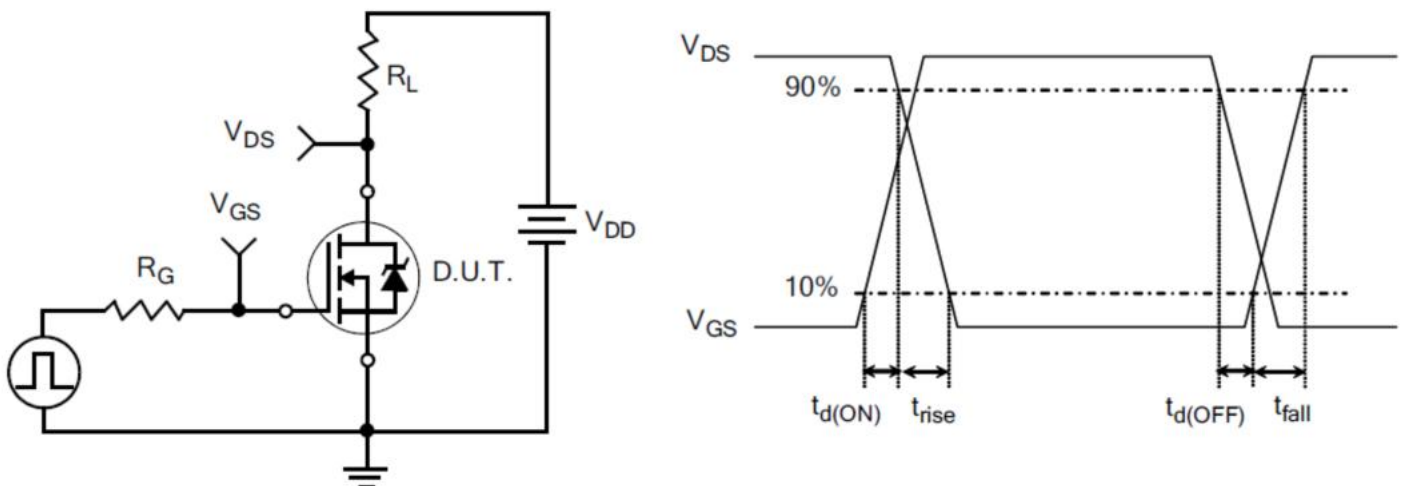
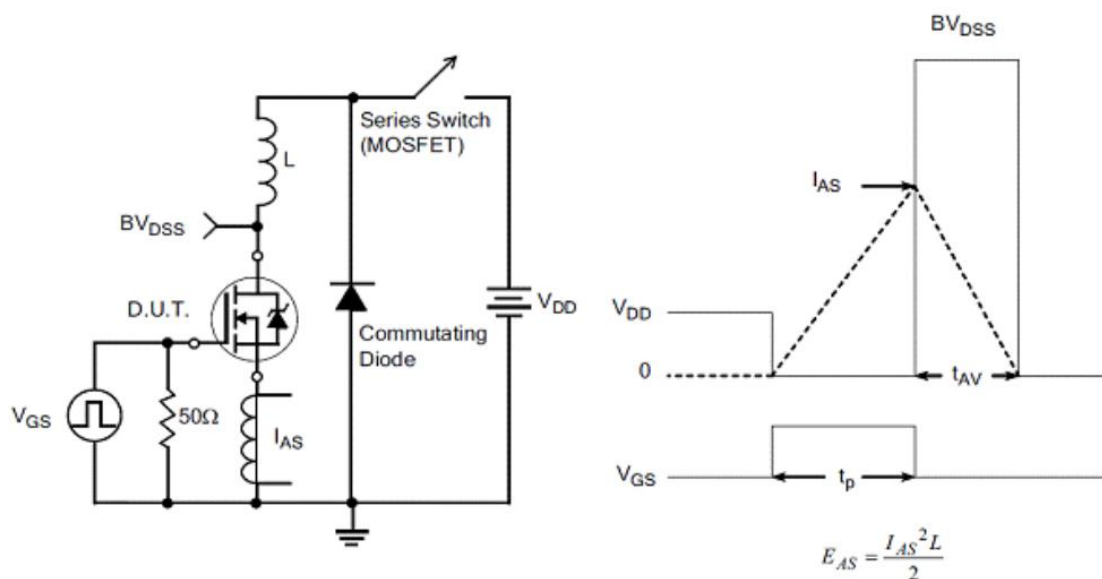
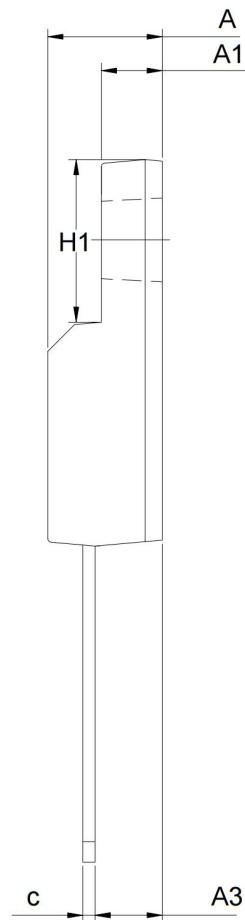
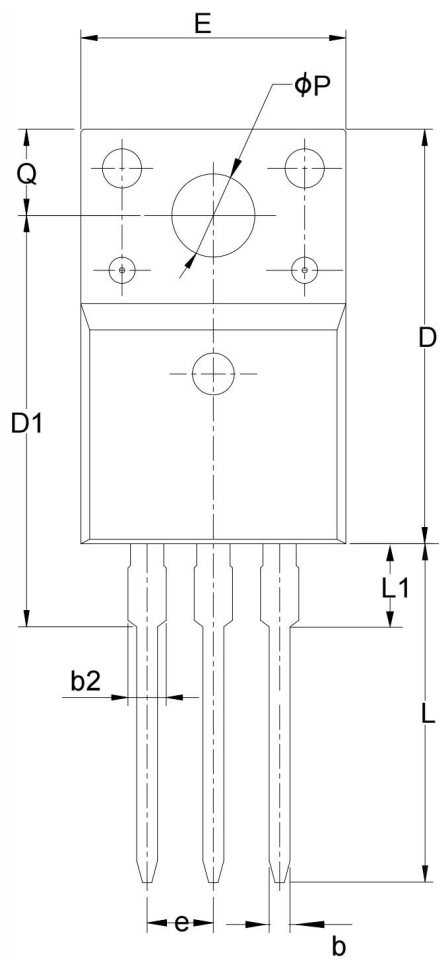


Figure C: Unclamped Inductive Switching Test Circuit and Waveform





Outlines TO-220F Package



SYMBOL	Unit: mm	
	MIN	MAX
A	4.45	4.9
A1	2.3	2.8
A3	2.5	3.03
b	0.65	0.95
b2	1.28	1.56
c	0.4	0.65
D	15.5	16.24
D1	15.27	16.07
E	9.91	10.36
e	2.54BSC	
H1	6.48	6.88
L	12.5	13.6
L1	2.6	3.5
\phi P	3.03	3.48
Q	3.1	3.5



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