650V N-Channel Planar MOSFET

MOSFET

Metal Oxide Semiconductor Field Effect Transistor

650V N-Channel Planar MOSFET

650V N-Channel Planar MOSFET Power Transistor

DD65N07ANx Data Sheet

Rev. 2024 V1.0

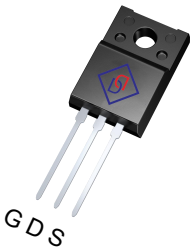
650V N-Channel Planar MOSFET

Description

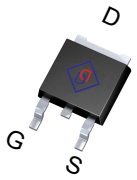
650V N-Channel Planar MOSFET

DD65N07ANx 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.

TO-220F



TO-252

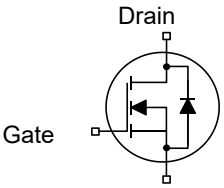


Features

- RDSON=1.2Ω @Vgs=10V, Id=3.5A
- Low gate Charge(typical 25.9nC)
- Low Crss (typical 3 pF)
- 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



RoHS

Key Performance Parameters

Parameter	Value	Unit
V_{DS}	650	V
$R_{DS(on),typ}$	1.2	Ω
$Q_{g,typ}$	25.9	nC
I_D	7	A
$I_{D,pulse}$	28	A

Device Marking and Package Information

Device	Package	Marking
DD65N07ANFT	TO-220F	65N07ANFT
DD65N07AND	TO-252	65N07AND

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted				
Parameter		**Symbol**	**Value**	**Unit**
Drain-Source Voltage(V_{GS}=0V)		V_{DS}	650	V
Continuous Drain Current [1]	T_C = 25ºC	I_D	7	A
	T_C = 100ºC		4.2	
Pulsed Drain Current [2]		$I_{D,pulse}$	28	A
Gate-Source Voltage		V_{GS}	±30	V
Single Pulse Avalanche Energy [3]		E_{AS}	490	mJ
Peak Diode Recovery dv/dt [4]		dv/dt	5	V/ns
Power Dissipation For TO-220F		P_D	41	W
Power Dissipation For TO-252			104	W
Continuous Diode Forward Current		I_S	7	A
Diode Pulsed Current [2]		$I_{S,pulse}$	28	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55~+150	ºC

Thermal Resistance For TO-220F			
Parameter	**Symbol**	**Value**	**Unit**
Thermal Resistance, Junction-to-Case	R_{thJC}	3.0	ºC/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	80	

Thermal Resistance For TO-252			
Parameter	**Symbol**	**Value**	**Unit**
Thermal Resistance, Junction-to-Case	R_{thJC}	1.2	ºC/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62	

Notes

1) Limited by maximum junction temperature.

2) Repetitive Rating: Pulse width limited by maximum junction temperature.

3) L=20mH, I_{AS}=7A,RG=25Ω,VDD=80V, Start TJ=25℃.

4) I_{SD} ≤7A, di/dt≤100A/μs, VDD≤BV_{DSS}, Start T_J=25℃.

Electrical Characteristics T_J = 25ºC, 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 = 25ºC	--	--	1	μA
		V_{DS} = 650V, V_{GS} = 0V, T_J = 150ºC	--	--	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 = 3.5A	--	1.2	1.4	Ω
Gate Resistance	R_G	f = 1.0MHz open drain	--	1.7	--	Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} =25V f = 1.0MHz	--	1191	--	pF
Output Capacitance	C_{oss}		--	86	--	
Reverse Transfer Capacitance	C_{rss}		--	3	--	
Total Gate Charge	Q_g	V_{DD} = 520V, I_D = 7A V_{GS} = 10V	--	25.9	--	nC
Gate-Source Charge	Q_{gs}		--	7.1	--	
Gate-Drain Charge	Q_{gd}		--	8.0	--	
Gate Plateau Voltage	$V_{Plateau}$		--	4.9	--	V
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 325V, I_D = 7A R_G = 25Ω	--	20		ns
Turn-on Rise Time	t_r		--	50		
Turn-off Delay Time	$t_{d(off)}$		--	90		
Turn-off Fall Time	t_f		--	55		
Drain-Source Body Diode Characteristics						
Body Diode Forward Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 7A V_{GS} = 0V	--	--	1.2	V
Reverse Recovery Time	t_{rr}	V_R = 400V I_F = 7A, di_F/dt = 100A/μs	--	351	--	ns
Reverse Recovery Charge	Q_{rr}		--	3.3	--	μC

Typical Characteristics T_J = 25ºC, unless otherwise noted

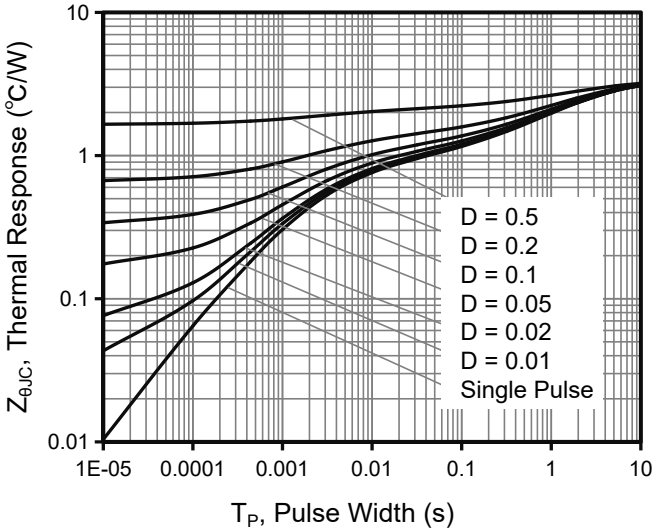


Figure 1. Transient Thermal Impedance For TO-220F

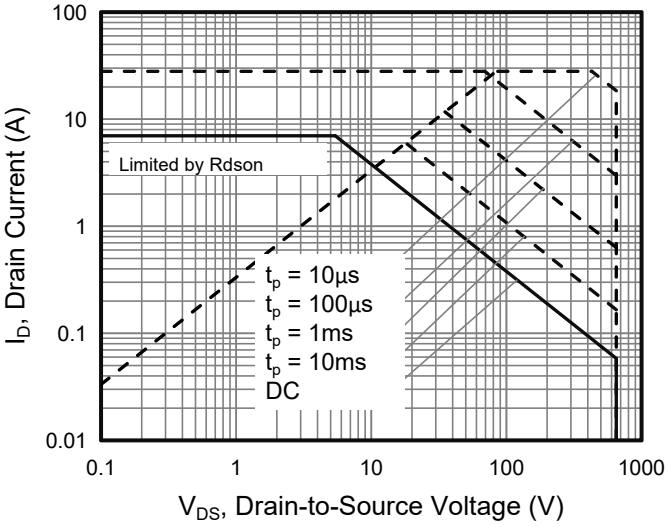


Figure 2. Safe Operation Area For TO-220F

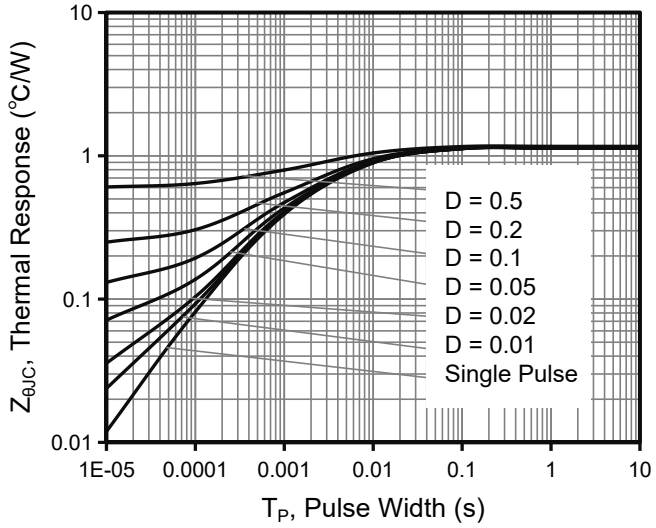


Figure 3. Transient Thermal Impedance For TO-252

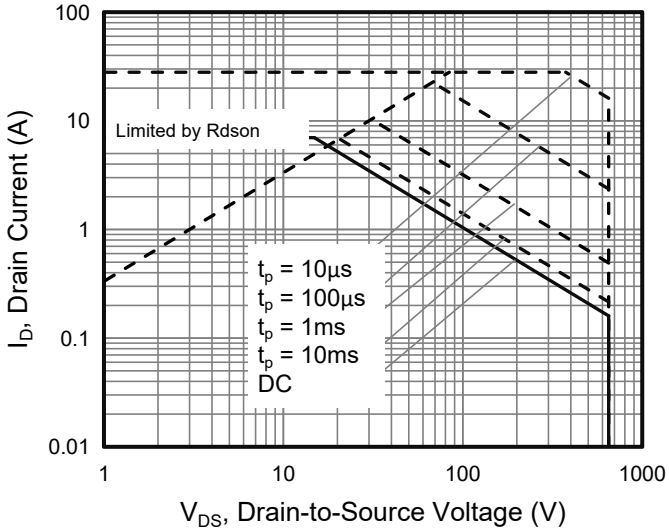


Figure 4. Safe Operation Area For TO-252

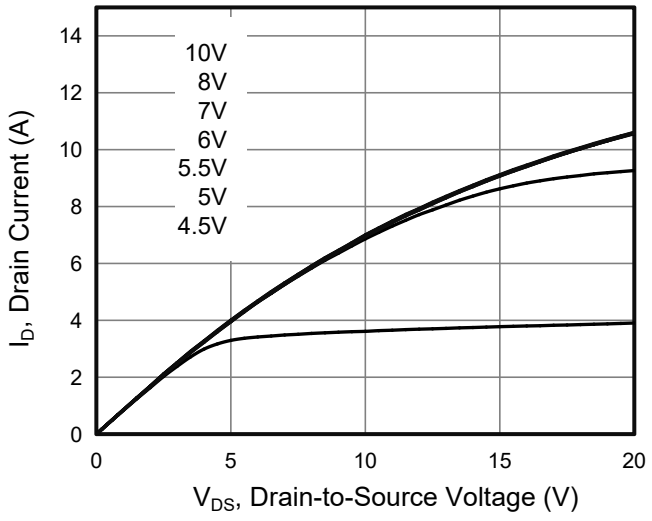


Figure 5. Output Characteristics

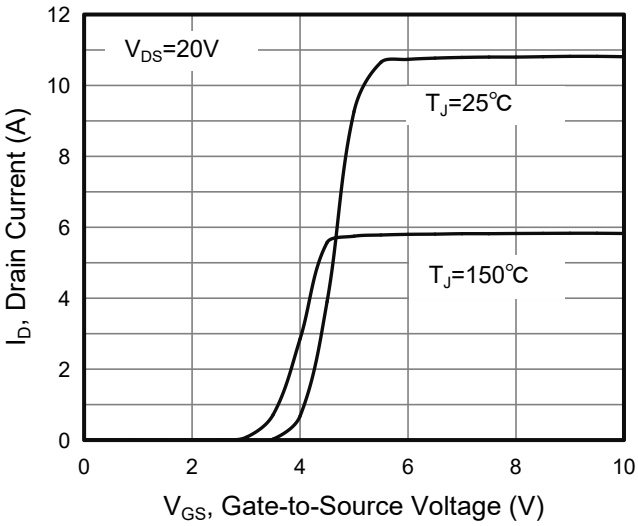


Figure 6. Transfer Characteristics

Typical Characteristics T_J = 25ºC, unless otherwise noted

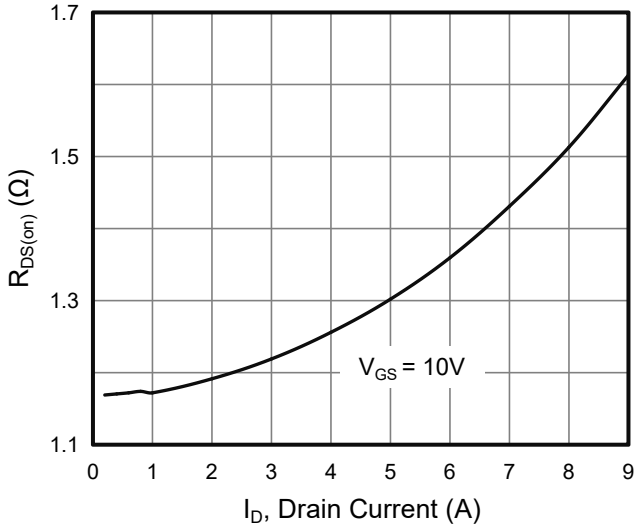


Figure 7. On-Resistance vs Drain Current

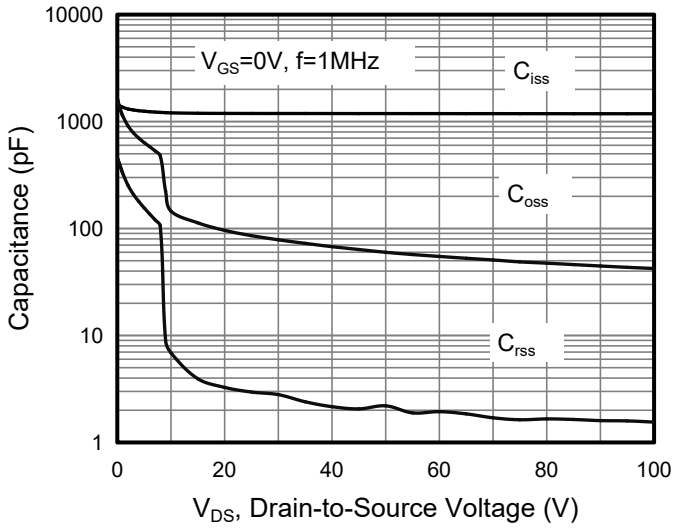


Figure 8. Capacitance

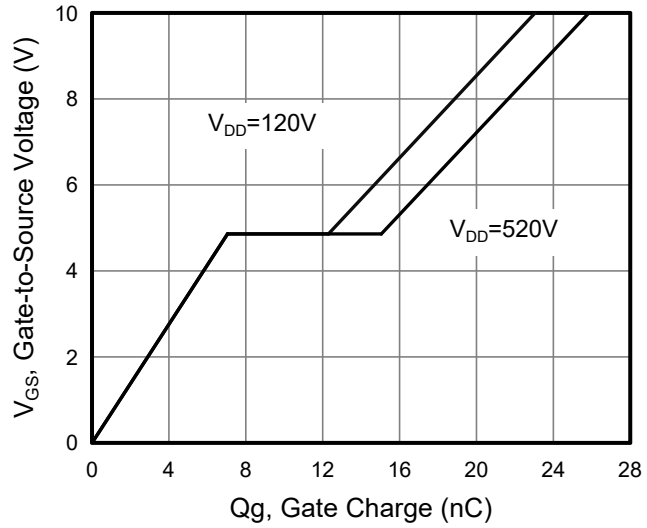


Figure 9. Gate Charge

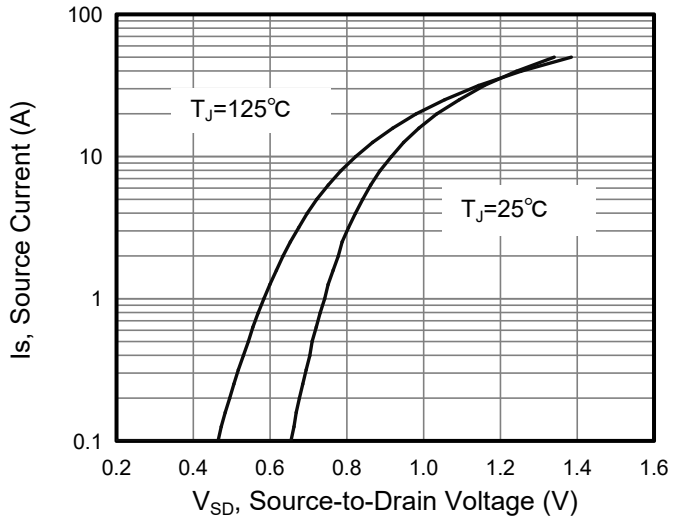


Figure 10. Body Diode Forward Voltage

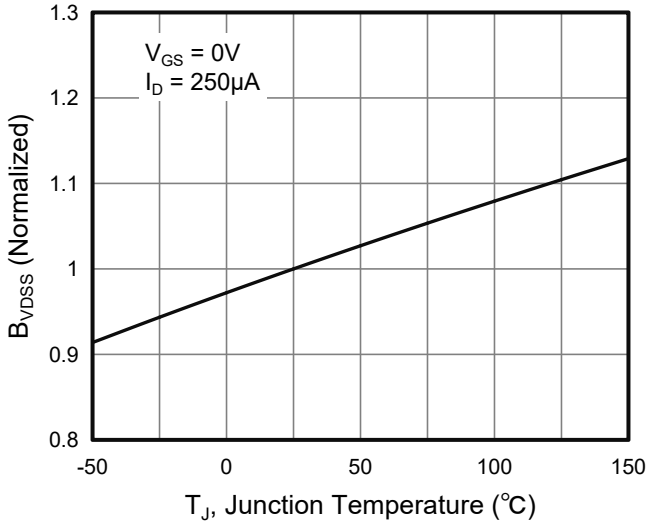


Figure 11. Breakdown Voltage vs Junction Temperature

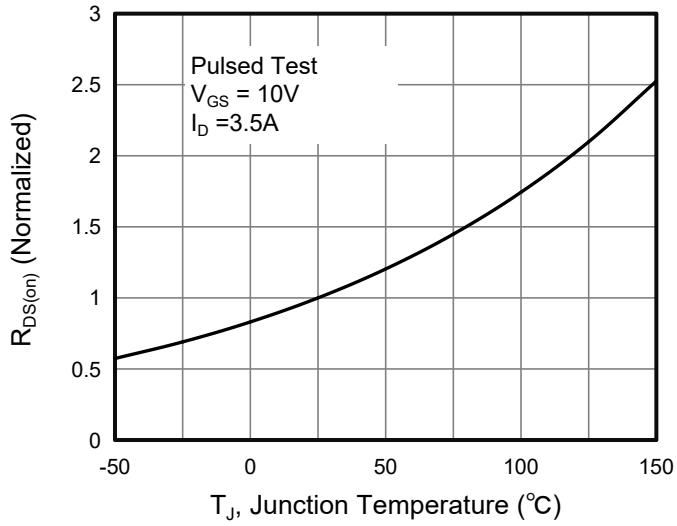


Figure 12. On-Resistance vs Temperature

Figure A：Gate Charge Test Circuit and Waveform

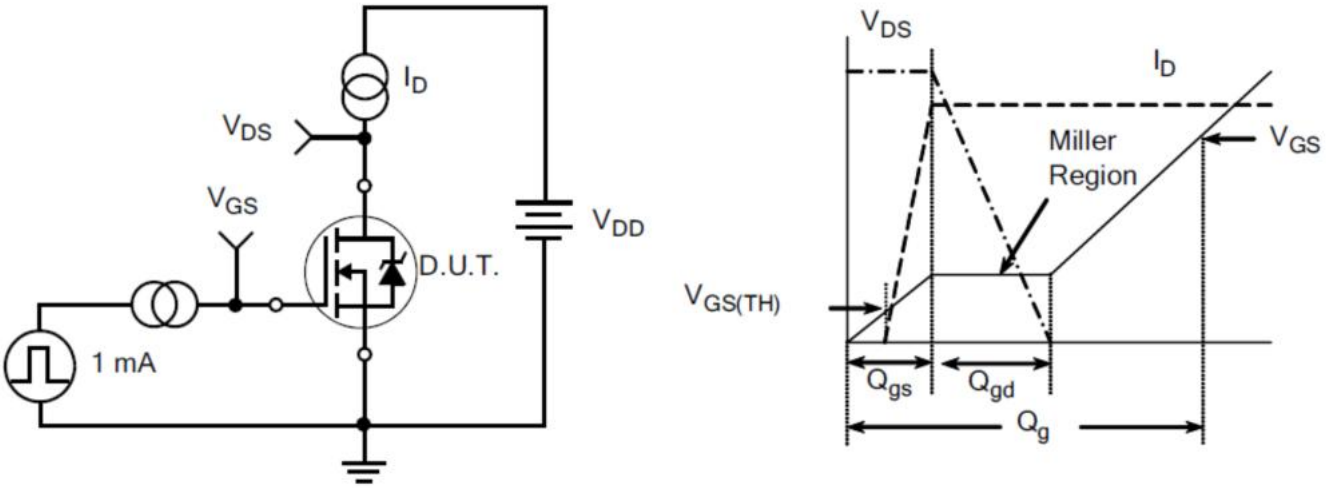


Figure B：Resistive Switching Test Circuit and Waveform

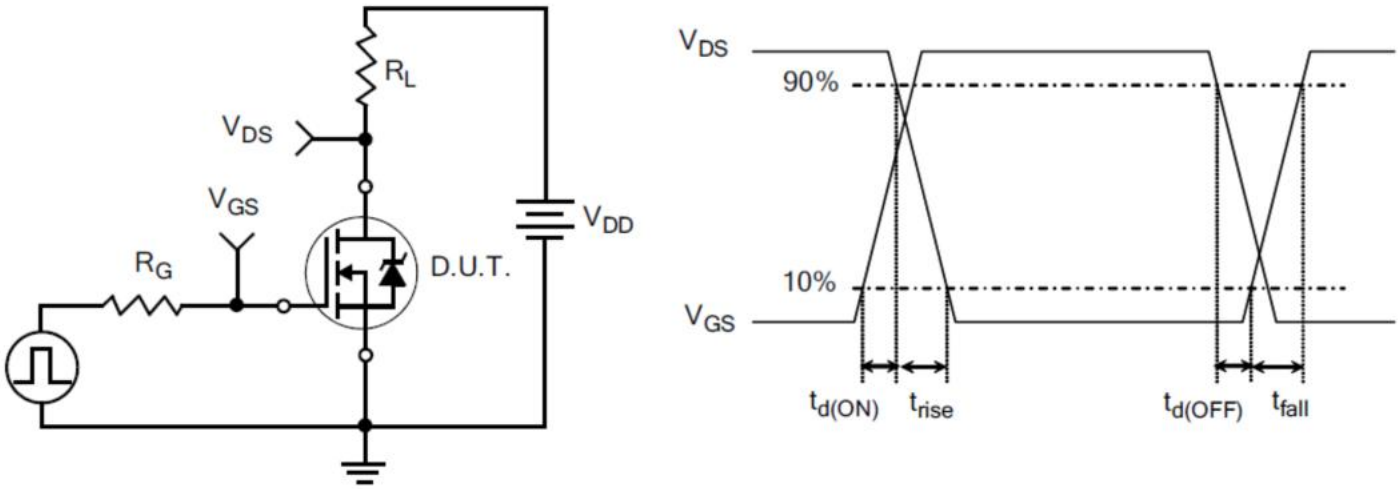
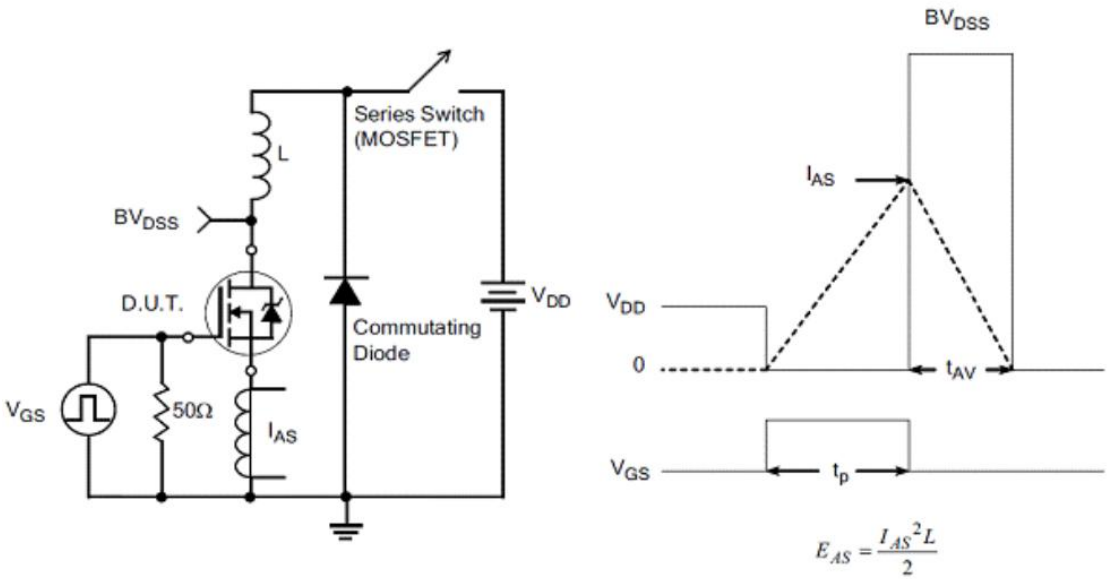
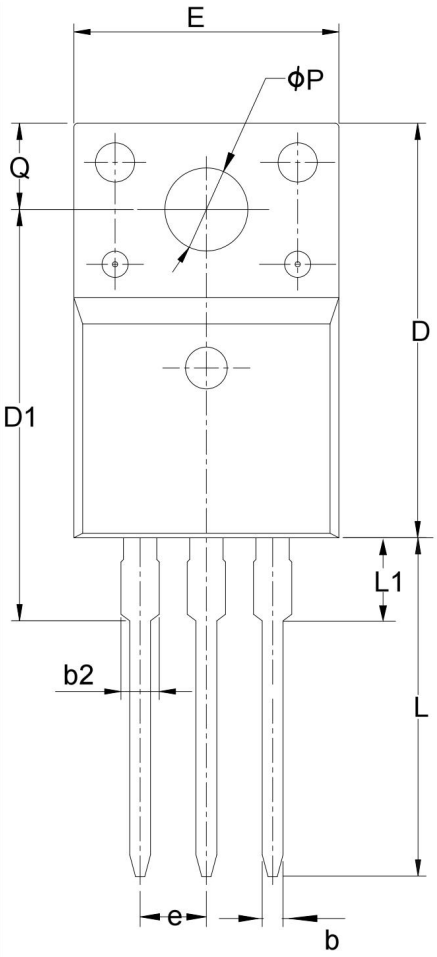
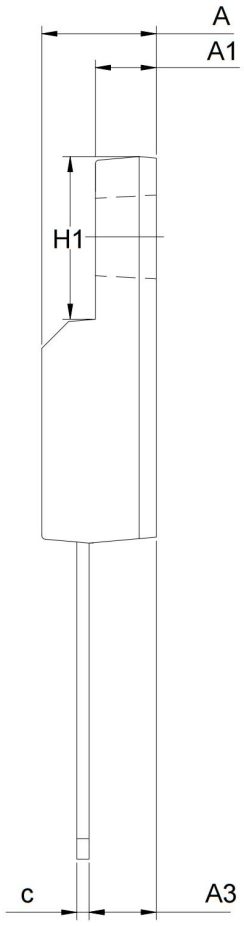


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



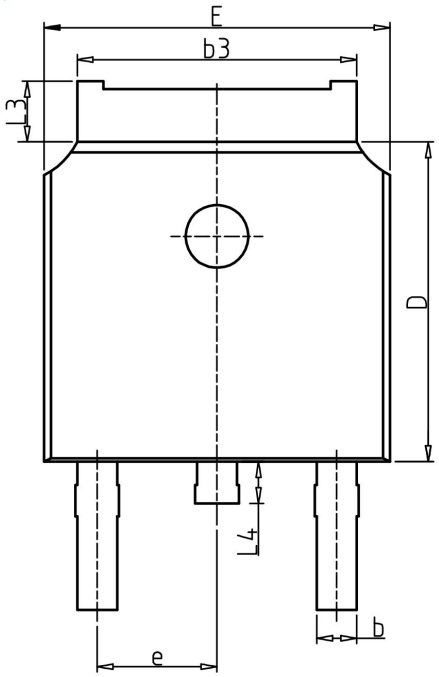
Outlines TO-220F Package

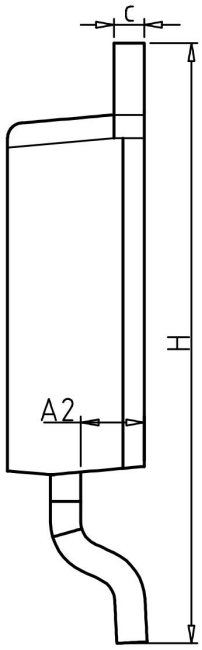


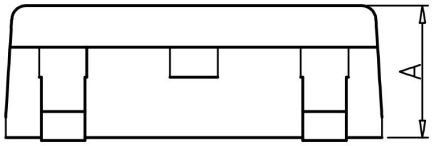


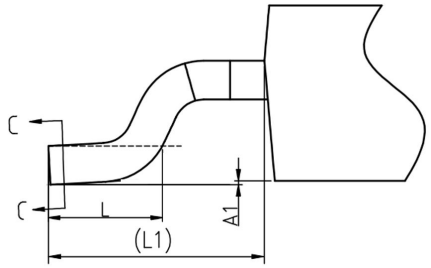
SYMBOL	Unit: mm	
	MIN	MAX
A	4.45	4.9
A1	2.3	2.8
A3	2.5	3.03
b	0.65	0.95
b2	1.28	1.56
c	0.4	0.65
D	15.5	16.24
D1	15.27	16.07
E	9.91	10.36
e	2.54BSC	
H1	6.48	6.88
L	12.5	13.6
L1	2.6	3.5
ΦP	3.03	3.48
Q	3.1	3.5

Outlines TO-252 Package









SYMBOL	Unit: mm	
	MIN	MAX
A	2.1	2.5
A1	0	0.2
A2	0.88	1.17
b	0.5	0.9
b3	5.1	5.53
c	0.4	0.62
D	5.4	6.4
E	6.3	6.9
e	2.286BSC	
H	9.25	10.5
L	1.35	1.8
L1	2.4	3.4
L3	0.82	1.412
L4	0.5	1

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