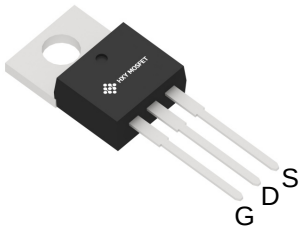
IRFB9N65A

Silicon N-Channel Power MOSFET

Description

The IRFB9N65A can be used in various power swithching circuit for system miniaturization and higher efficiency.The package form is TO-220H, which accords with the RoHS standard.

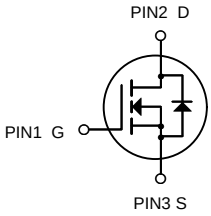


TO-220H

General Features

V_{DS} = 650V,I_D =10A

$R_{DS(ON)}$ < 1.05Ω@ V_{GS}=10V



N-Channel MOSFET

Application

- Power switch circuit of adaptor and charger.

Ordering Information

Product ID	Pack	Brand	Units Tube
IRFB9N65A	TO-220H	HXY MOSFET	50

Absolute Maximum Ratings @T_j=25°C(unless otherwise specified)

Symbol	Parameter	Rating	Units
VDS	Drain-Source Voltage	650	V
VGS	Gate-Source Voltage	±30	V
I_D@T_C=25℃	Drain Current, V_{GS} @ 10V	10	A
I_D@T_C=100℃	Drain Current, V_{GS} @ 10V	6.3	A
IDM	Pulsed Drain Current[1]	38	A
P_D@T_C=25℃	Total Power Dissipation	130	W
TSTG	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Electrical Characteristics (Tc= 25°C unless otherwise specified):

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	650	--	--	V
I_{DSS}	Drain to Source Leakage Current	V_{DS} =650V, V_{GS}= 0V, T_a = 25°C	--	--	1	μA
		V_{DS} =520V, V_{GS}= 0V, T_a = 125°C	--	--	100	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	V_{GS} =+30V	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	V_{GS} =-30V	--	--	-100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	V_{GS}=10V,I_D=1A	--	0.8	1.05	Ω
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	2.0	--	4.0	V
Pulse width tp≤300μs,δ≤2%						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1.0MHz	--	1570	--	pF
C_{oss}	Output Capacitance		--	136	--	
C_{rss}	Reverse Transfer Capacitance		--	10.5	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	I_D =10A V_{DD} = 325V R_G =25Ω	--	23	--	ns
tr	Rise Time		--	25	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	64	--	
t_f	Fall Time		--	28	--	
Q_g	Total Gate Charge	I_D =10A V_{DD} =520V V_{GS} = 10V	--	44	--	nC
Q_{gs}	Gate to Source Charge		--	6.7	--	
Q_{gd}	Gate to Drain (“Miller”)Charge		--	18.5	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	10	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	38	A
V_{SD}	Diode Forward Voltage	I_S=10A ,V_{GS}=0V	--	--	1.4	V
Pulse width tp≤300μs,δ≤2%						

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case	0.96	°C/W
$R_{\theta JA}$	Junction-to-Ambient	62.5	°C/W

[a1]: Repetitive rating; pulse width limited by maximum junction temperature
[a2]: L=10mH, I_D=6.3A, Start T_J=25°C
[a3]: I_{SD} =4A,di/dt ≤100A/us,V_{DD}≤$BV_{DS,}$ Start T_J=25°C

Characteristies Curve

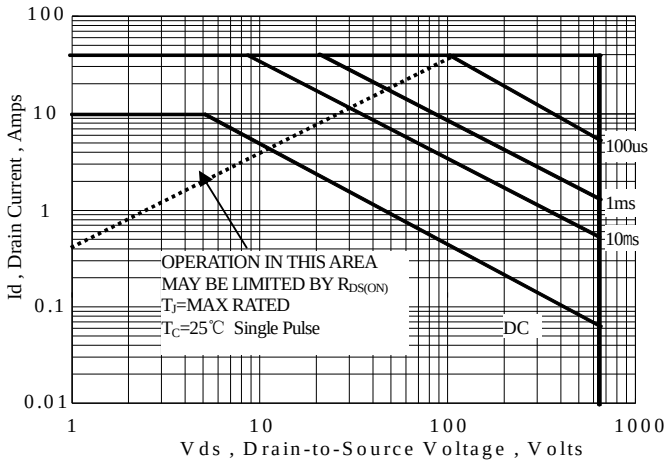


Figure 1 Maximum Forward Bias Safe Operating Area

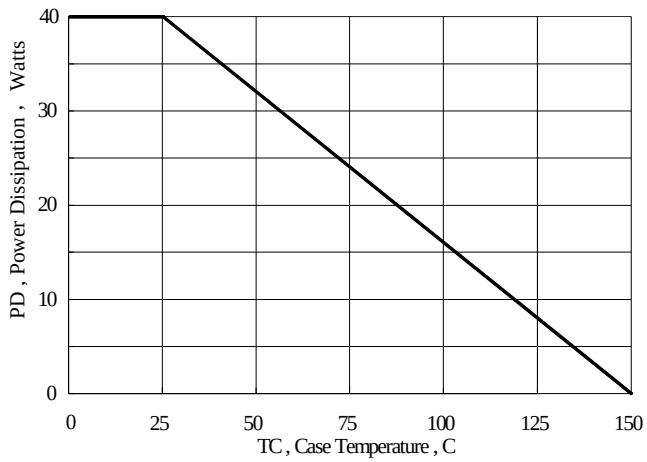


Figure 2 Maximum Power Dissipation vs Case Temperature

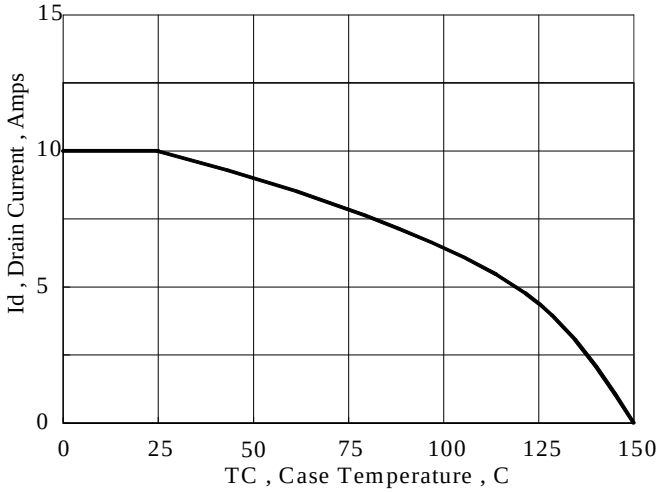


Figure 3 Maximum Continuous Drain Current vs Case Temperature

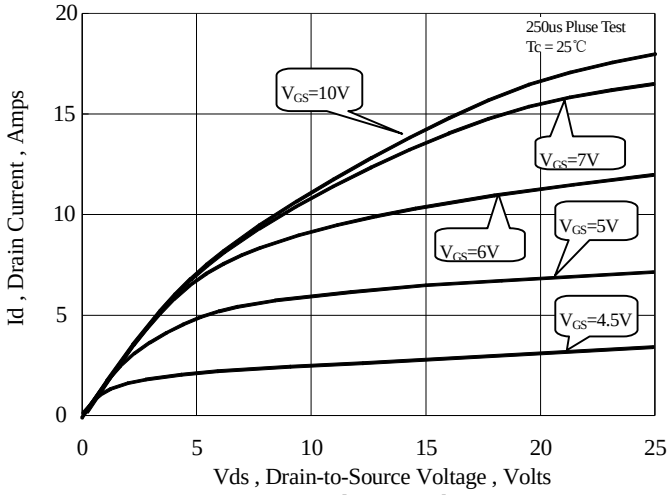


Figure 4 Typical Output Characteristics

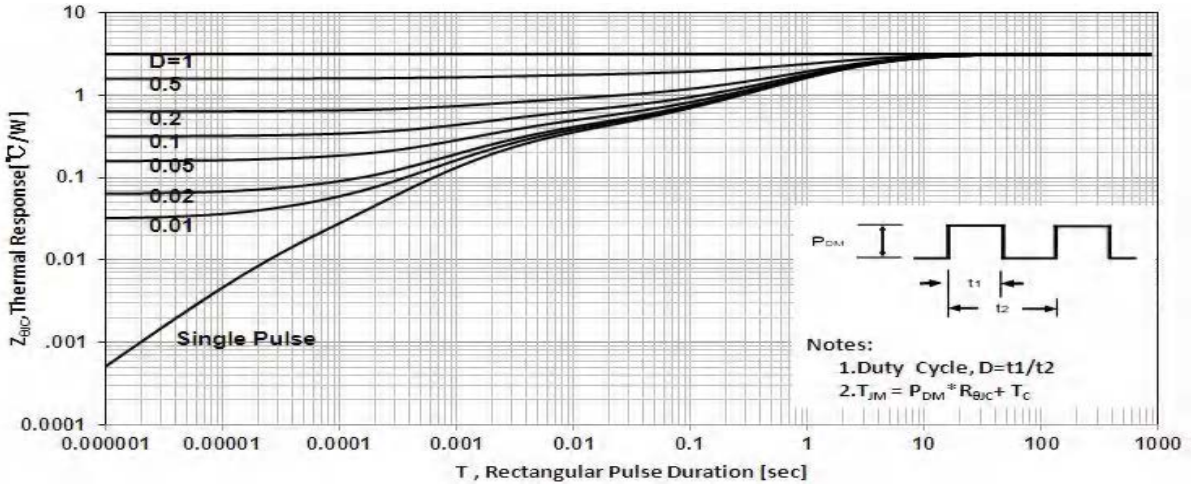


Figure 5 Maximum Effective Thermal Impendance , Junction to Case

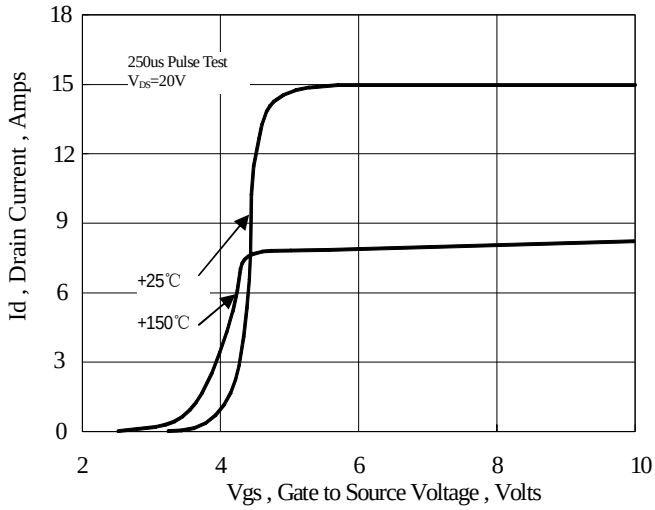


Figure 6 Typical Transfer Characteristics

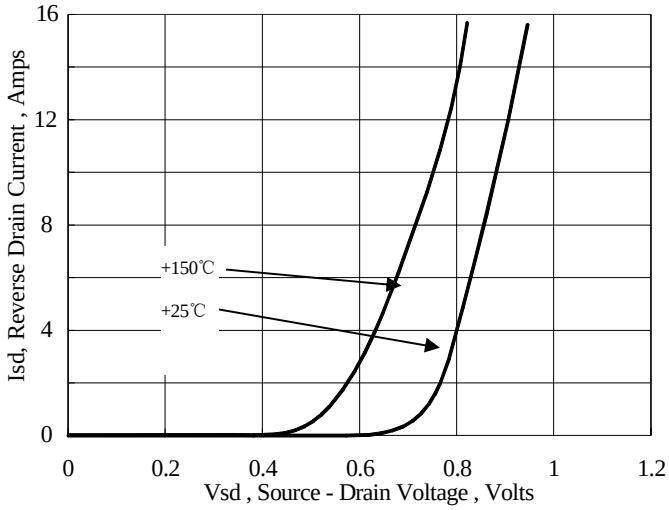


Figure 7 Typical Body Diode Transfer Characteristics

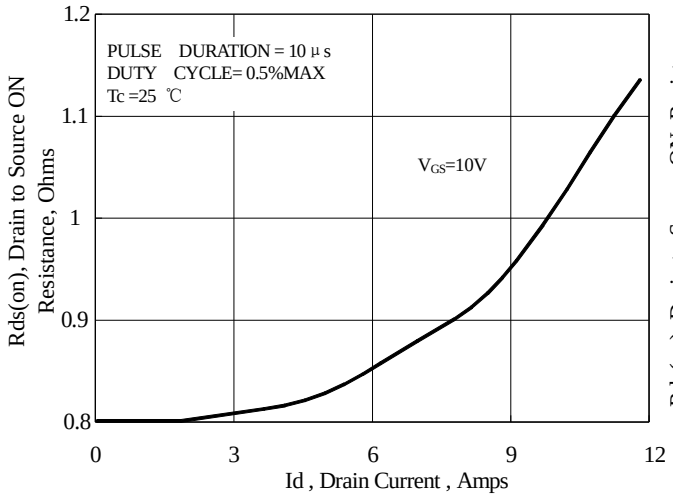


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

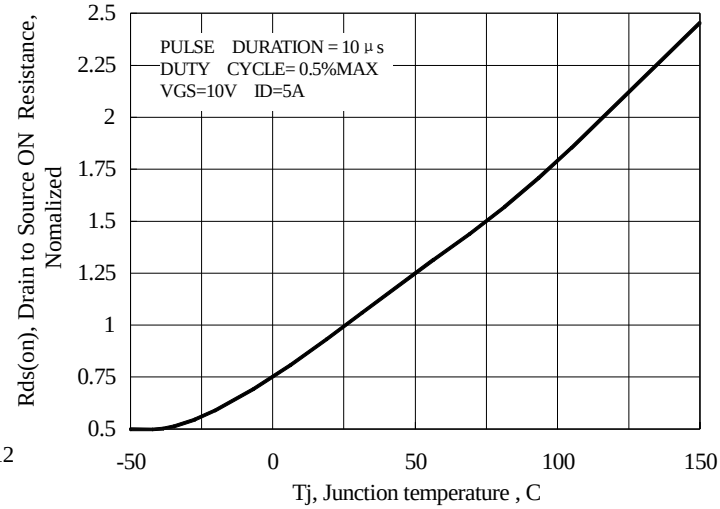


Figure 9 Typical Drian to Source on Resistance vs Junction Temperature

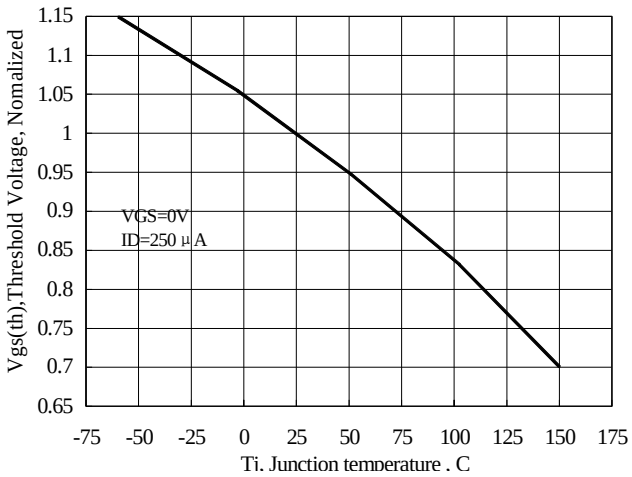


Figure 10 Typical Theshold Voltage vs Junction Temperature

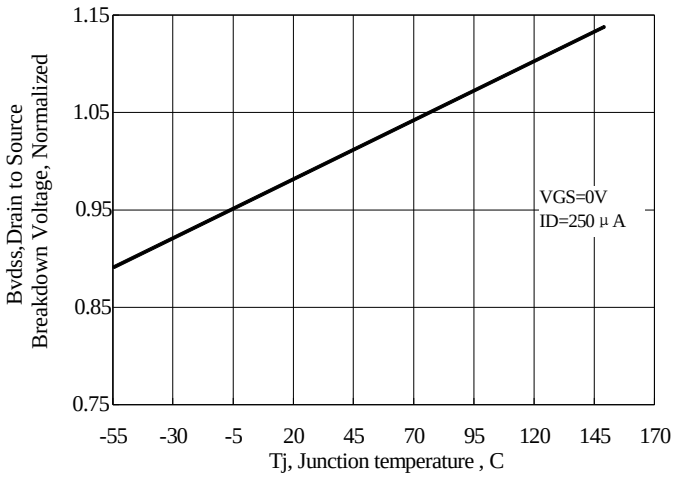


Figure 11 Typical Breakdown Voltage vs Junction Temperature

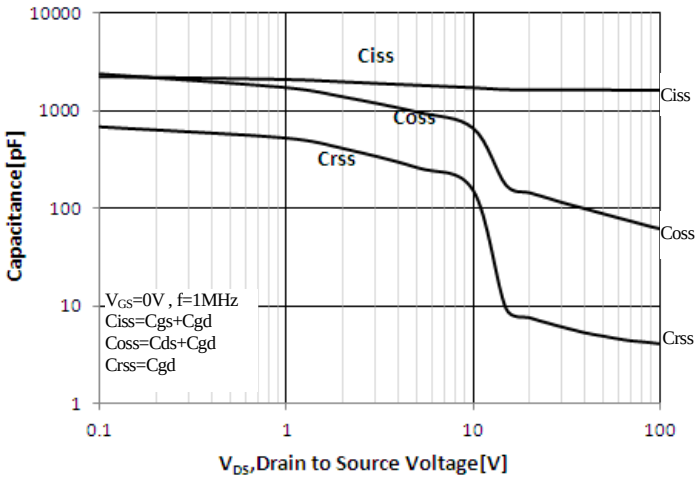


Figure 12 Typical Capacitance vs Drain to Source Voltage

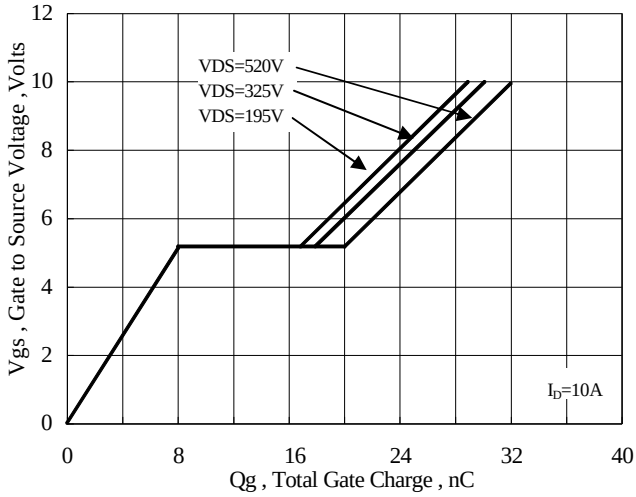


Figure 13 Typical Gate Charge vs Gate to Source Voltage

Test Circuit and Waveform

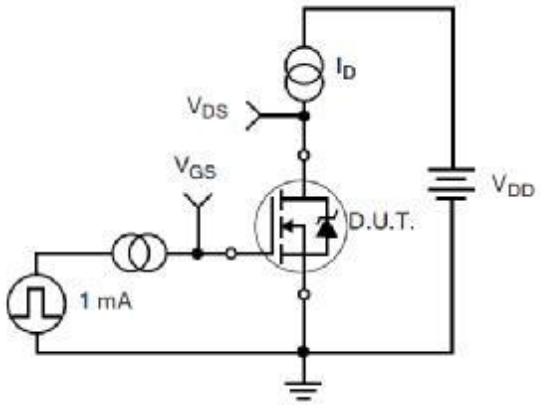


Figure 17. Gate Charge Test Circuit

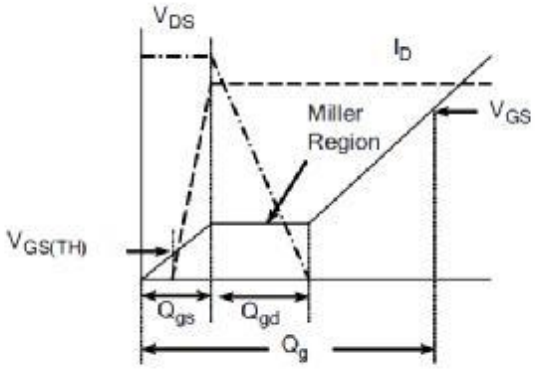


Figure 18. Gate Charge Waveform

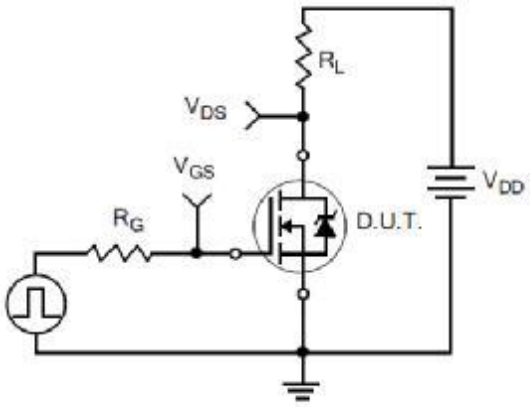


Figure 19. Resistive Switching Test Circuit

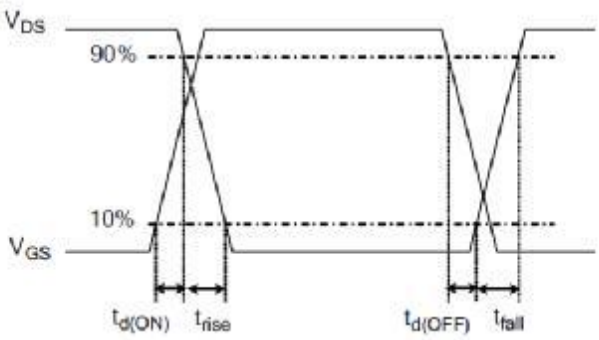


Figure 20. Resistive Switching Waveforms

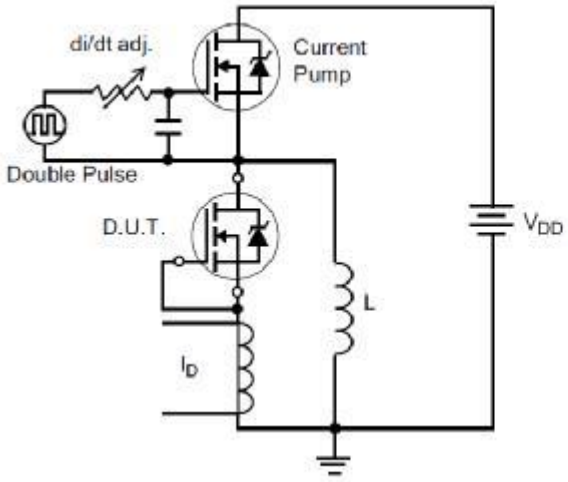


Figure 21. Diode Reverse Recovery Test Circuit

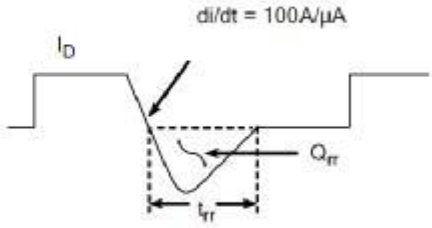


Figure 22. Diode Reverse Recovery Waveform

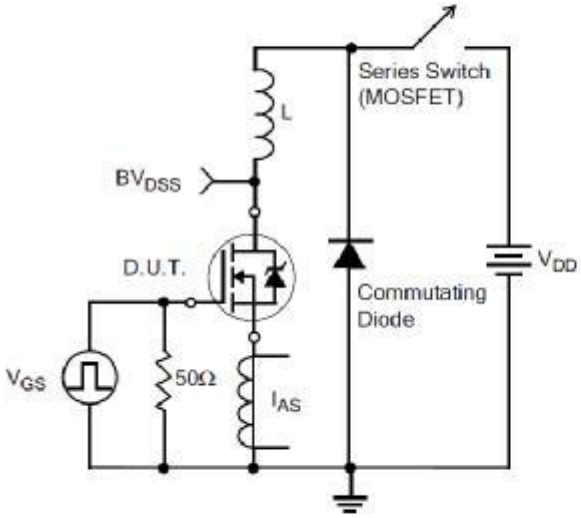
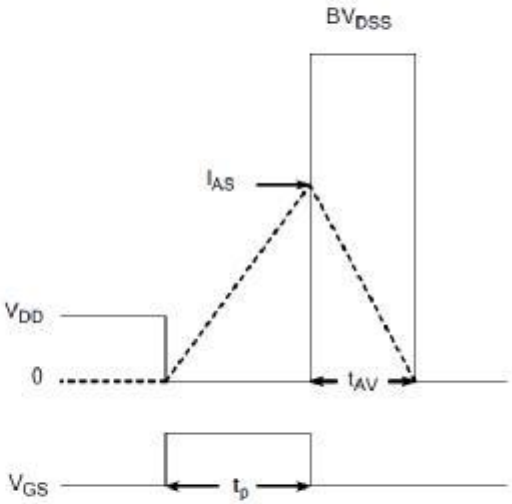


Figure 23. Unclamped Inductive Switching Test Circuit

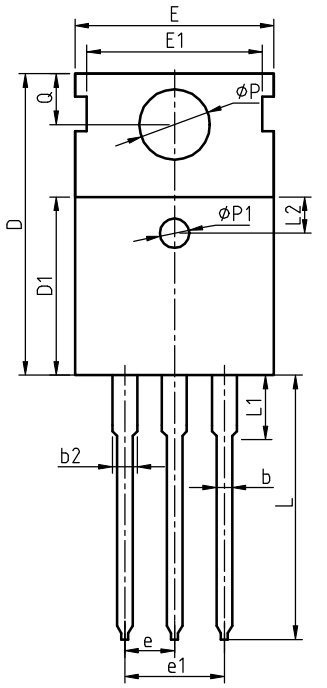


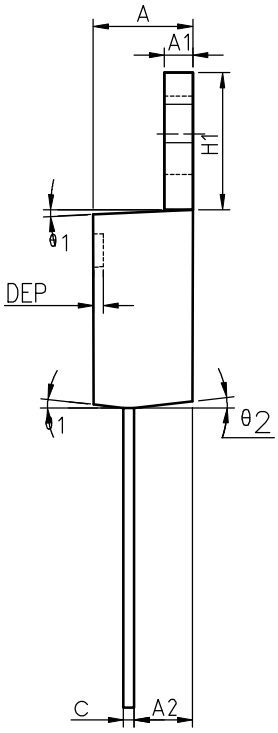
$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

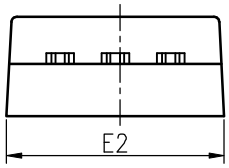
Figure 24. Unclamped Inductive Switching Waveforms

Package Information

TO-220H







COMMON DIMENSIONS

SYMBOL	MIN	NOM	MAX	MIN	NOM	MAX
A	4.40	4.57	4.70	0.173	0.180	0.185
A1	1.27	1.30	1.33	0.050	0.051	0.052
A2	2.35	2.40	2.50	0.093	0.094	0.098
b	0.77	0.80	0.90	0.030	0.031	0.035
b2	1.17	1.27	1.36	0.046	0.050	0.054
c	0.48	0.50	0.56	0.019	0.020	0.022
D	15.40	15.60	15.80	0.606	0.614	0.622
D1	9.00	9.10	9.20	0.354	0.358	0.362
DEP	0.05	0.10	0.20	0.002	0.004	0.008
E	9.80	10.00	10.20	0.386	0.394	0.402
E1	-	8.70	-	-	0.343	-
E2	9.80	10.00	10.20	0.386	0.394	0.402
e		2.54	BSC		0.100	BSC
e1		5.08	BSC		0.200	BSC
H1	6.40	6.50	6.60	0.252	0.256	0.260
L	12.75	13.50	13.65	0.502	0.531	0.537
L1	-	3.10	3.30	-	0.122	0.130
L2		2.50	REF		0.098	REF
P	3.50	3.60	3.63	0.138	0.142	0.143
P1	3.50	3.60	3.63	0.138	0.142	0.143
Q	2.73	2.80	2.87	0.107	0.110	0.113
θ1	5°	7°	9°	5°	7°	9°
θ2	1°	3°	5°	1°	3°	5°
θ3	1°	3°	5°	1°	3°	5°

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