HUASHUO SEMICONDUCTOR

HSF10N65

Description

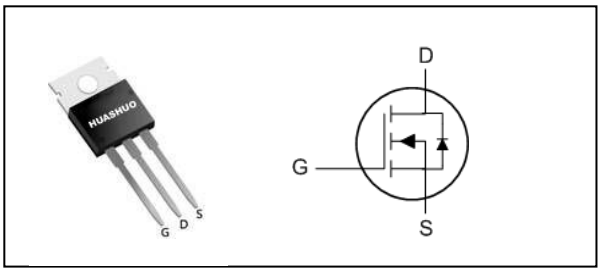
The HSF10N65 utilizes the advanced technology and low resistance package to achieve extremely low on-resistance device which makes the system design an efficient and reliable solution for use in a wide variety of applications.

Product Summary

V_{DS}	650	V
$R_{DS(ON),typ}$	800	mΩ
I_D	10	A

- High Efficiency
- 100% EAS Guaranteed
- Improved dv/dt,di/dt capability
- Green Device

TO220F Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Gate-Source Voltage	±30	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	10	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	6.5	A
I_{DM}	Pulsed Drain Current[2]	40	A
EAS	Single Pulse Avalanche Energy[3]	700	mJ
I_{AS}	Avalanche Current	16	A
P_D@T_C=25℃	Total Power Dissipation[4]	48	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	122	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	2.6	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	650	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BVDSS Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.0193	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance2	V_{GS}=10V , I_D=6.5A	---	800	1000	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	2	---	4	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-3.97	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=650V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=520V , V_{GS}=0V , T_J=125℃	---	---	100	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±30V , V_{DS}=0V	---	---	±100	nA
Q_g	Total Gate Charge (4.5V)	V_{DD}=520V , V_{GS}=10V , I_D=10A	---	32	---	nC
Q_{gs}	Gate-Source Charge		---	6.3	---	
Q_{gd}	Gate-Drain Charge		---	10	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=325V , V_{GS}=10V , R_G=10Ω I_D=10A	---	60	---	ns
T_r	Rise Time		---	103	---	
$T_{d(off)}$	Turn-Off Delay Time		---	200	---	
T_f	Fall Time		---	77	---	
C_{iss}	Input Capacitance	V_{DS}=25V , V_{GS}=0V , f=1MHz	---	1310	---	pF
C_{oss}	Output Capacitance		---	140	---	
C_{rss}	Reverse Transfer Capacitance		---	20	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current1,5	V_G=V_D=0V , Force Current	---	---	10	A
I_{SM}	Pulsed Source Current2,5		---	---	40	A
V_{SD}	Diode Forward Voltage2	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.4	V
t_{rr}	Reverse Recovery Time	I_F=10A , dI/dt=100A/μs , T_J=25℃	---	470	---	nS
Q_{rr}	Reverse Recovery Charge		---	4.8	---	nC

Note: 4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%

5. Essentially independent of operating temperature

Typical Characteristics

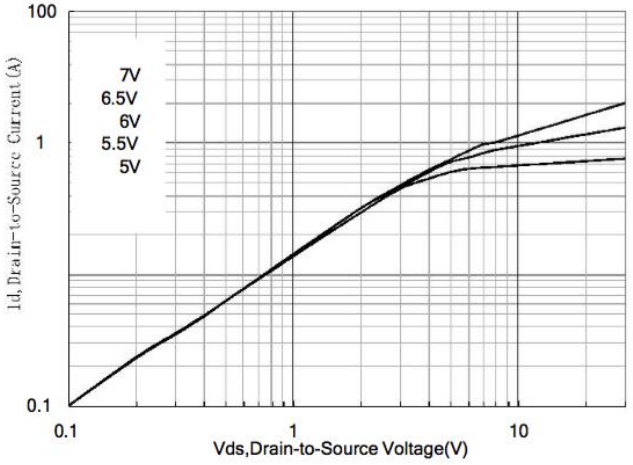


Figure 1.Typical Output Characteristics

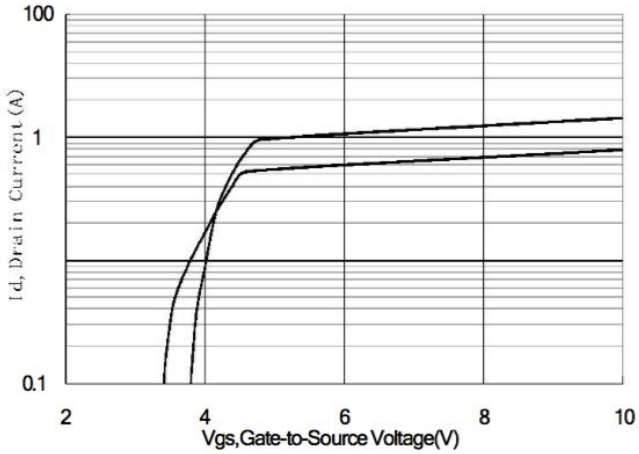


Figure2.TypicalTransferCharacteristics

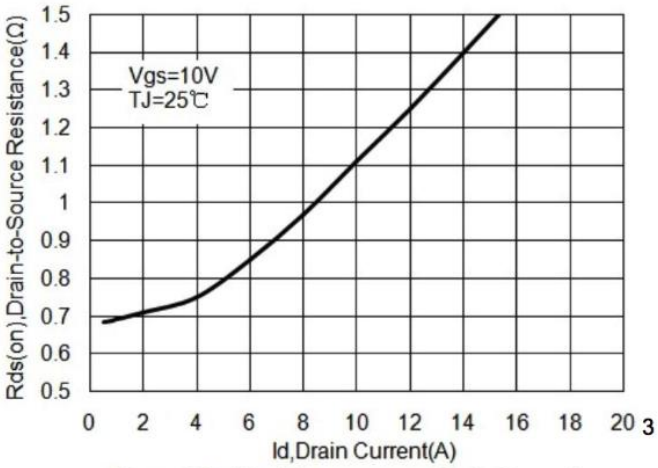


Figure 3.On-Resistance versus Drain Current

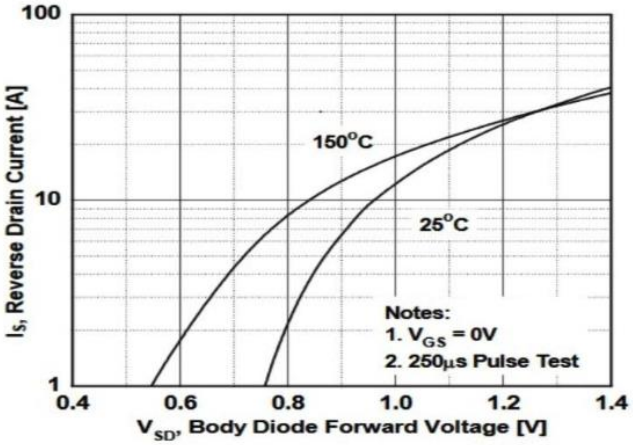


Figure4.Diode ForwardVoltage versus Current

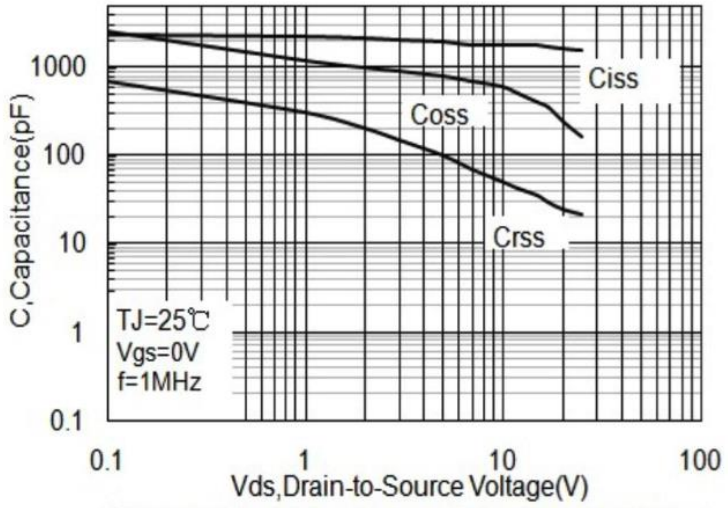


Figure 5.Typical Capacitance vs.Drian-to-Source Voltage

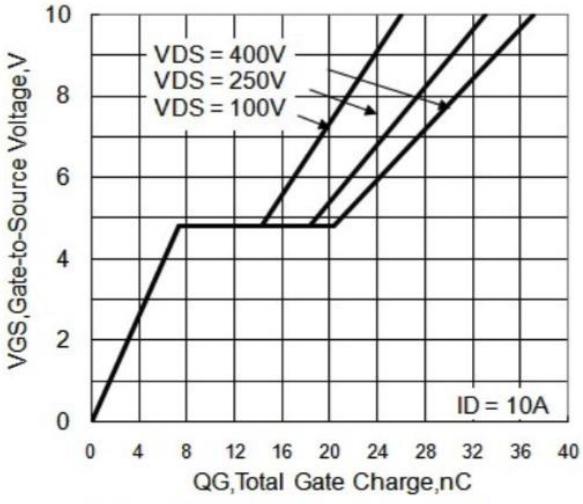


Figure 6.Typical Gate Charge vs.Vgs

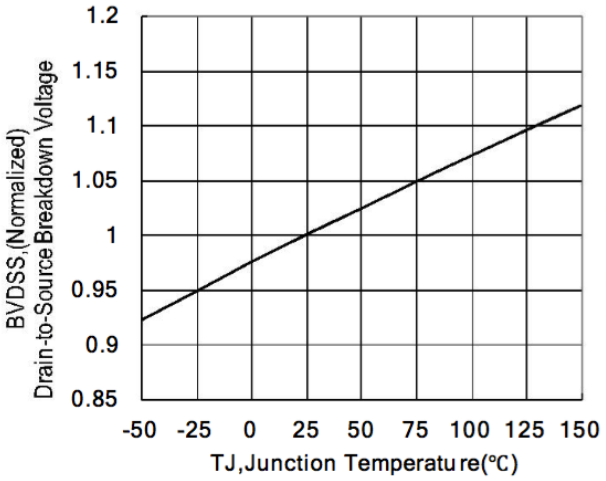


Figure 7.Bvdss Variation with Temperature

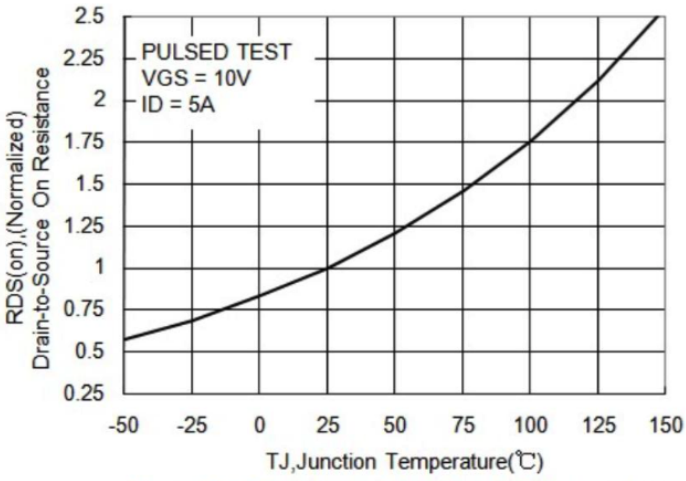


Figure 8.On-Resistance Variation with Temperature

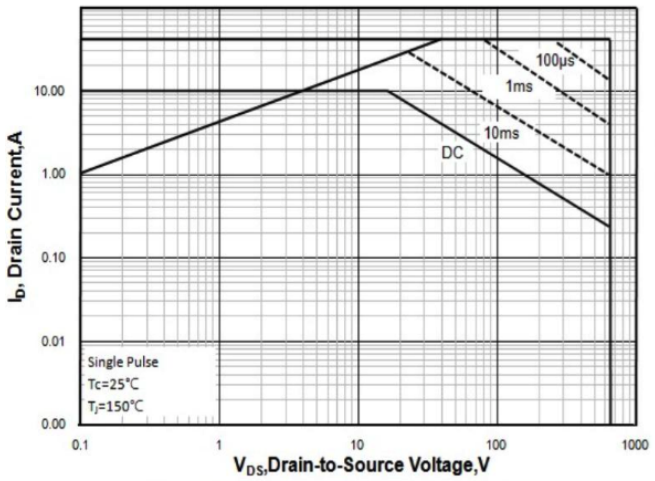


Figure 9. Maximum Safe Operating Area

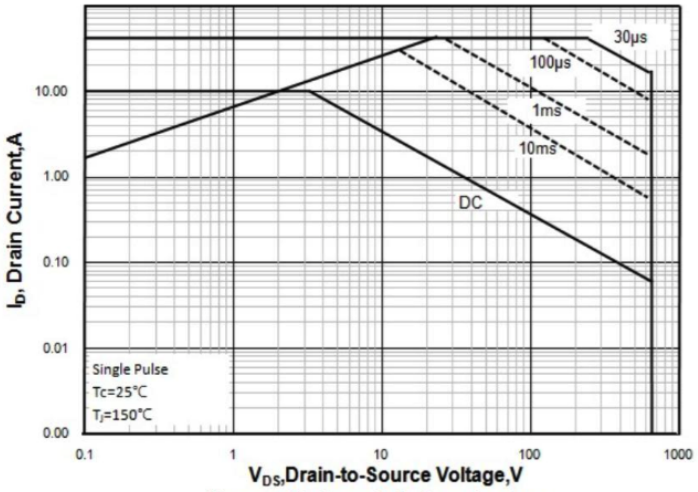


Figure 9. Maximum Safe Operating Area

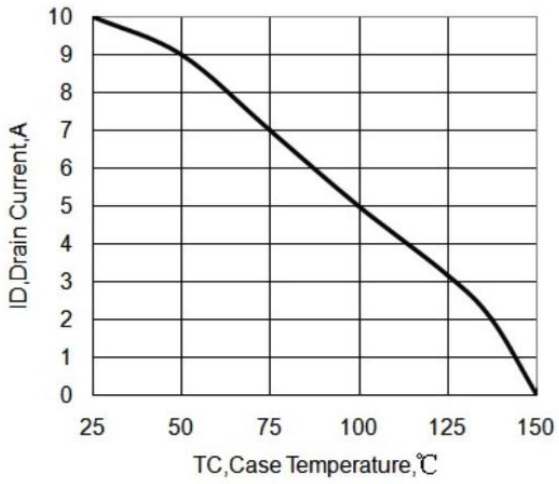
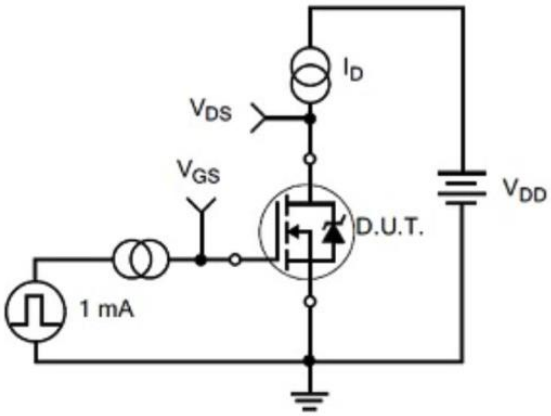
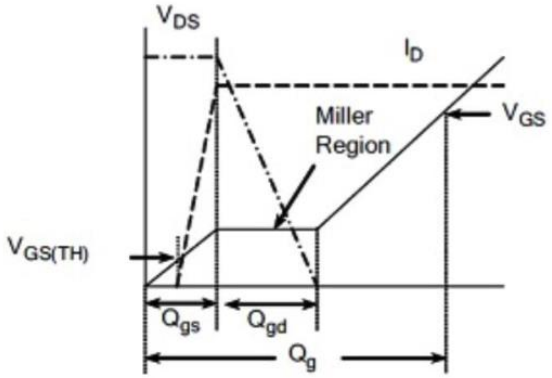


Figure 10. Maximum Continuous Drain Current vs Case Temperature

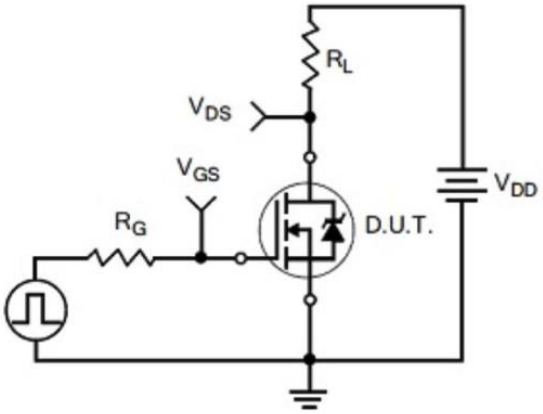
TEST CIRCUITS AND WAVEFORMS



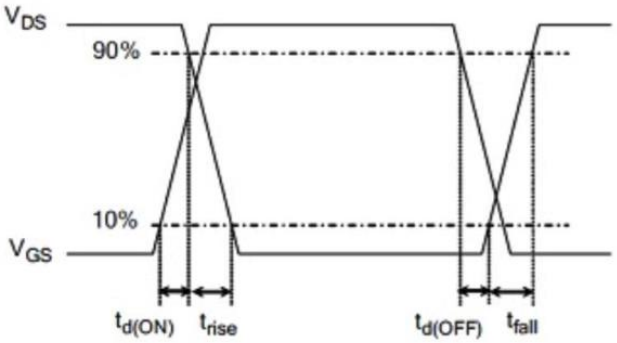
Gate Charge Test Circuit



Gate Charge Waveform

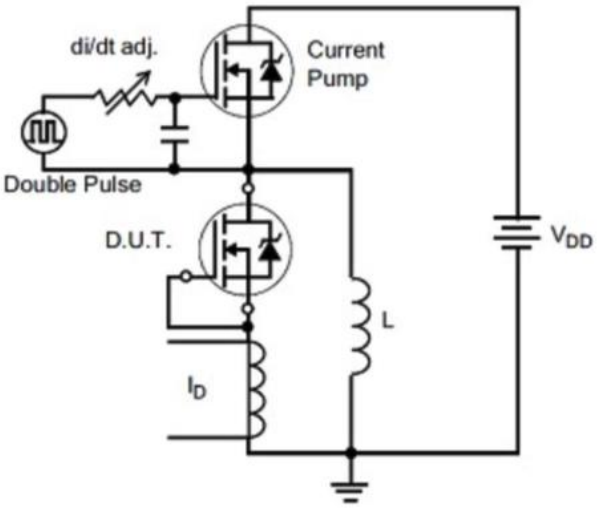


Resistive Switching Test Circuit

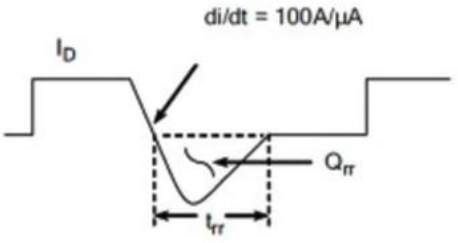


Resistive Switching Waveforms

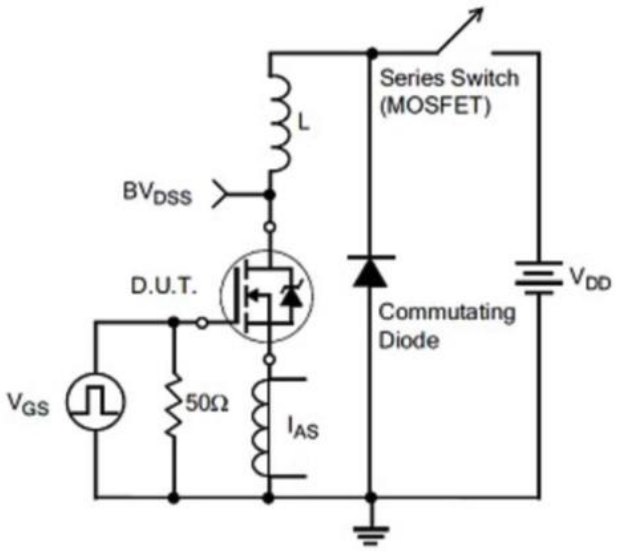
TEST CIRCUITS AND WAVEFORMS(Cont.)



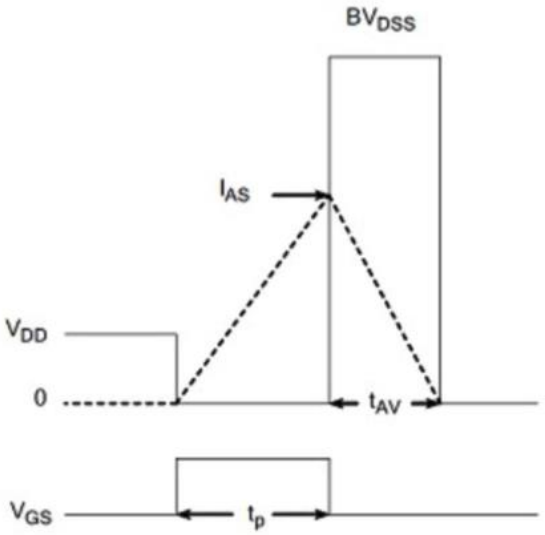
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform

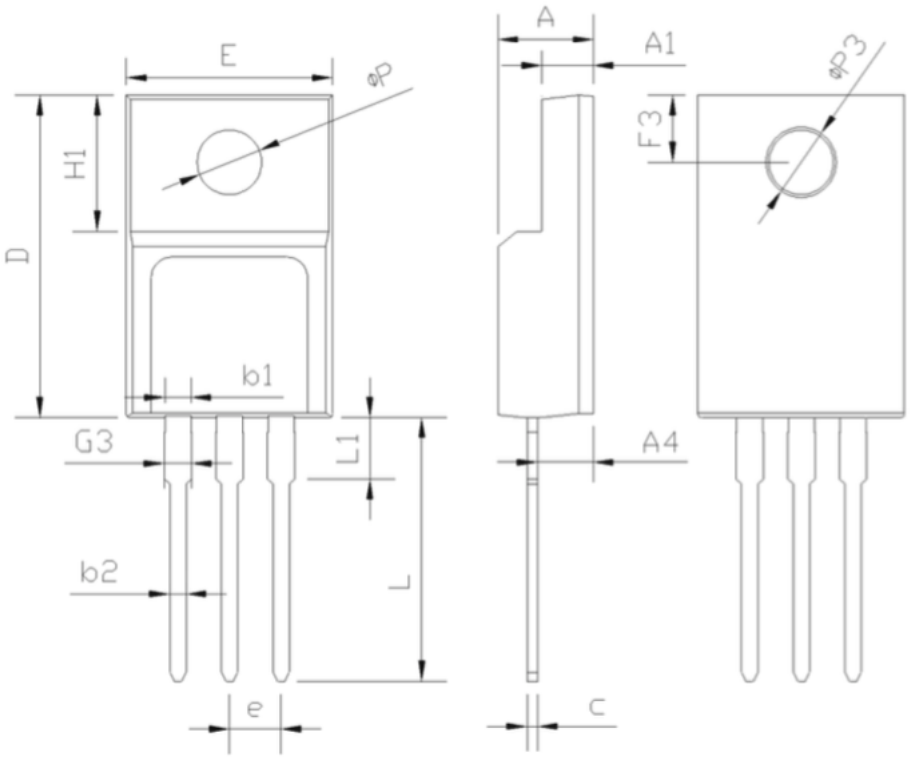


Unclamped Inductive Switching Test Circuit



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

Unclamped Inductive Switching Waveforms



SYMBOL	mm		
	MIN	NOM	MAX
E	9.96	10.16	10.36
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A4	2.56	2.76	2.96
c	0.40	0.50	0.65
D	15.57	15.87	16.17
H1		6.70REF	
e		2.54BSC	
L	12.68	12.98	13.28
L1	2.88	3.03	3.18
ΦP	3.03	3.18	3.38
ΦP3	3.15	3.45	3.65
F3	3.15	3.30	3.45
G3	1.25	1.35	1.55
b1	1.18	1.28	1.43
b2	0.70	0.80	0.95