



Description

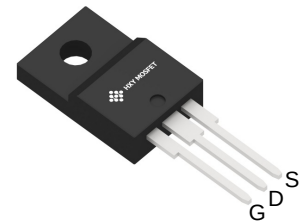
The AP65AN1K2IN can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-220F, which accords with the RoHS standard.

General Features

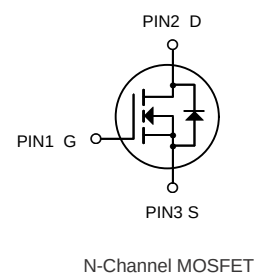
$V_{DS} = 650V, I_D = 10A$
 $R_{DS(ON)} < 1.05\Omega @ V_{GS}=10V$

Application

- Power switch circuit of adaptor and charger.



TO-220F



Package Marking and Ordering Information

Product ID	Pack	Brand	Units Tube
AP65AN1K2IN	TO-220F	HXY MOSFET	50

Absolute Maximum Ratings@ $T_J=25^{\circ}C$ (unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Gate-Source Voltage	± 30	V
$I_D @ T_C=25^{\circ}C$	Drain Current, $V_{GS} @ 4.5V$	10	A
$I_D @ T_C=100^{\circ}C$	Drain Current, $V_{GS} @ 4.5V$	6.3	A
I_{DM}	Pulsed Drain Current ¹	40	A
$P_D @ T_C=25^{\circ}C$	Total Power Dissipation	40	W
E_{AS}	Single Pulse Avalanche Energy ⁴	500	mJ
TSTG	Storage Temperature Range	-55 to 150	$^{\circ}C$
T_J	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$



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	$V_{GS}=0V, I_D=250\mu A$	650	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Bvdss Temperature Coefficient	$I_D=250\mu A, \text{Reference } 25^\circ C$	--	0.7	--	V/°C
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=650V, V_{GS}=0V, T_a=25^\circ C$	--	--	1	μA
		$V_{DS}=520V, V_{GS}=0V, T_a=125^\circ C$	--	--	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	$V_{GS}=10V, I_D=5A$	--	0.86	1.05	Ω
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	--	4.0	V
Pulse width $t_p \leq 300\mu s, \delta \leq 2\%$						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g_{fs}	Forward Transconductance	$V_{DS}=15V, I_D=5A$	--	9.5	--	S
C_{iss}	Input Capacitance	$V_{GS}=0V$ $V_{DS}=25V$ $f=1.0MHz$	--	1642	--	pF
C_{oss}	Output Capacitance		--	128	--	
C_{rss}	Reverse Transfer Capacitance		--	7	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=10A$ $V_{DD}=325V$ $R_G=10\Omega$	--	27	--	ns
t_r	Rise Time		--	22	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	53	--	
t_f	Fall Time		--	24	--	
Q_g	Total Gate Charge	$I_D=10A$ $V_{DD}=520V$ $V_{GS}=10V$	--	32	--	nC
Q_{gs}	Gate to Source Charge		--	8	--	
Q_{gd}	Gate to Drain ("Miller") Charge		--	12	--	



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)		--	--	40	A
V _{SD}	Diode Forward Voltage	I _S =10A, V _{GS} =0V	--	--	1.5	V
t _{rr}	Reverse Recovery Time	I _S =10A, T _j = 25℃ dI _F /dt=100A/us, V _{GS} =0V	--	528	--	ns
Q _{rr}	Reverse Recovery Charge		--	3220	--	nC
I _{RRM}	Reverse Recovery Current		--	12.2	--	A
Pulse width tp≤300μs,δ≤2%						

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case	3.13	$^{\circ}C/W$
$R_{\theta JA}$	Junction-to-Ambient	62.5	$^{\circ}C/W$

^{a1}: Repetitive rating; pulse width limited by maximum junction

temperature ^{a2}: $L=10mH, I_D=10A$, Start $T_J=25^{\circ}C$

^{a3}: $I_{SD}=10A, di/dt \leq 100A/us, V_{DD} \leq BV_{DS}$, Start $T_J=25^{\circ}C$



Characteristics Curve:

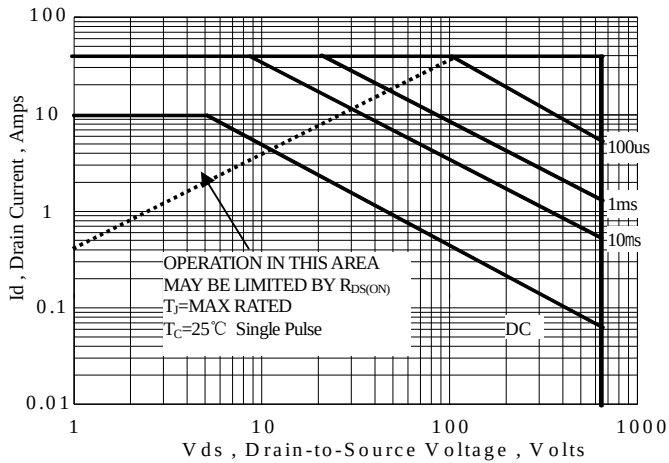


Figure 1 Maximum Forward Bias Safe Operating Area

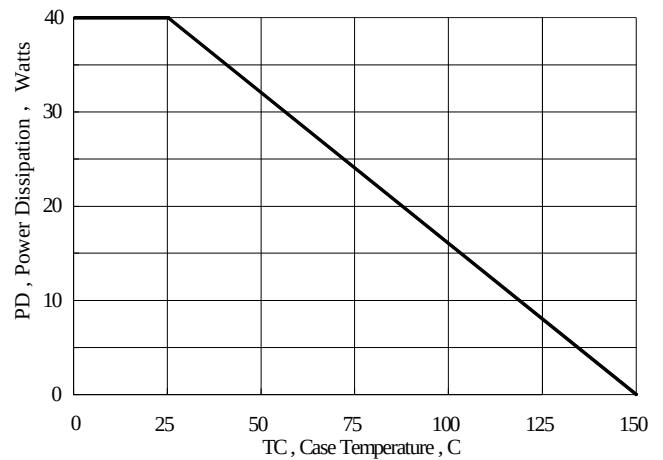


Figure 2 Maximum Power Dissipation vs Case Temperature

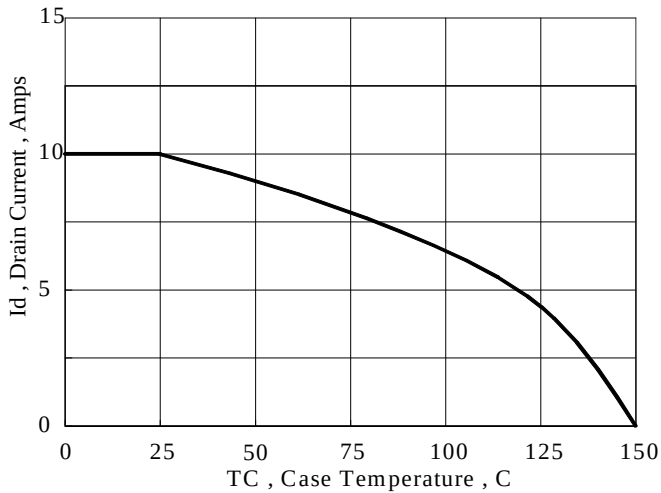


Figure 3 Maximum Continuous Drain Current vs Case Temperature

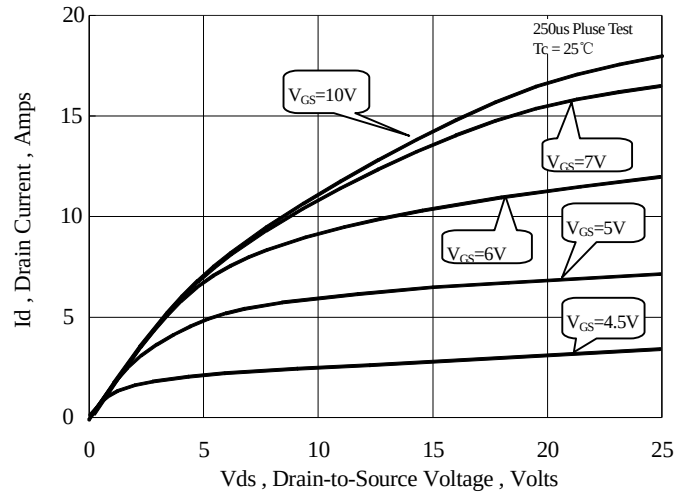


Figure 4 Typical Output Characteristics

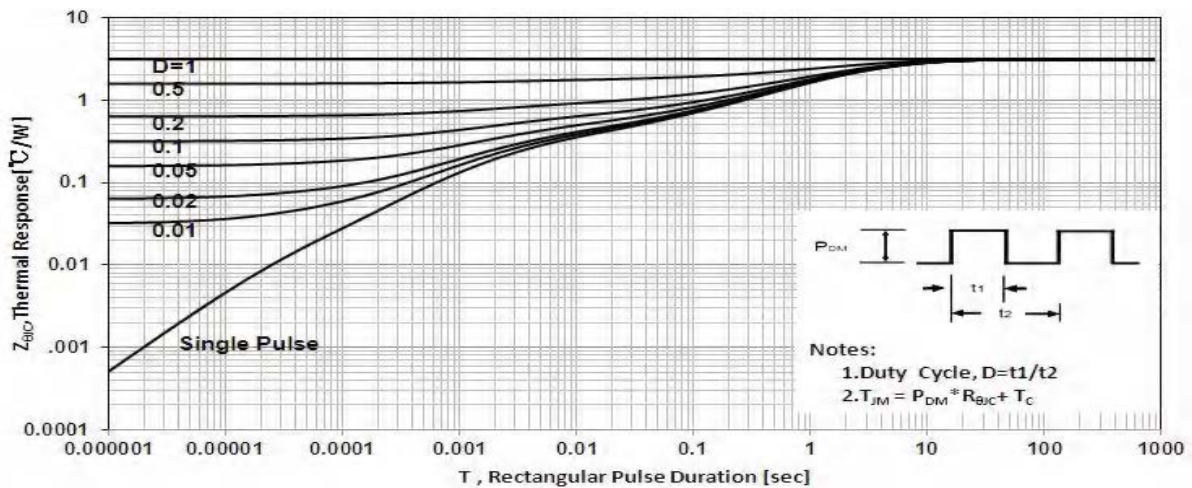


Figure 5 Maximum Effective Thermal Impedance, Junction to Case

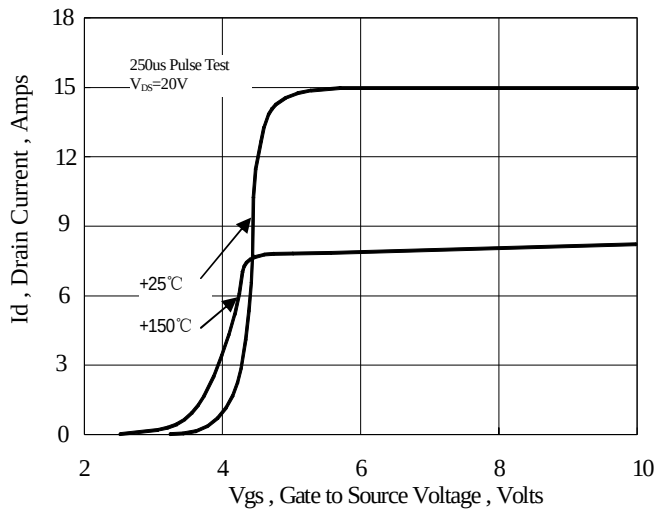


Figure 6 Typical Transfer Characteristics

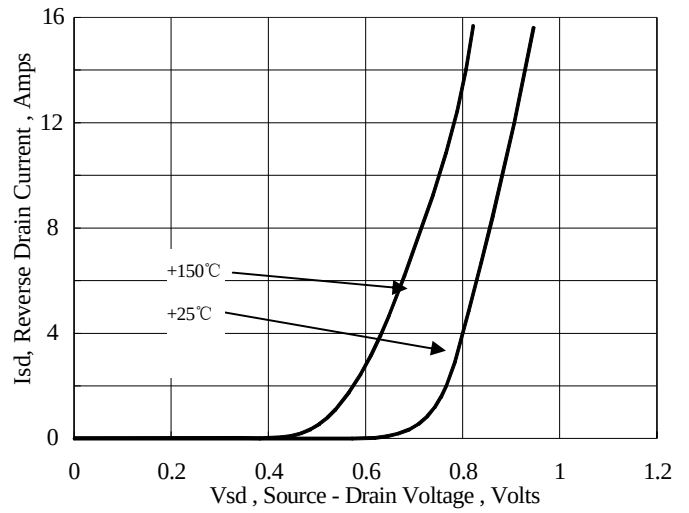


Figure 7 Typical Body Diode Transfer Characteristics

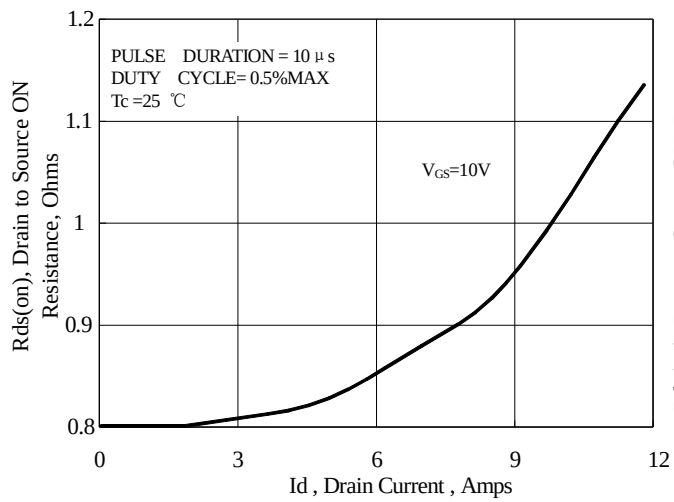


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

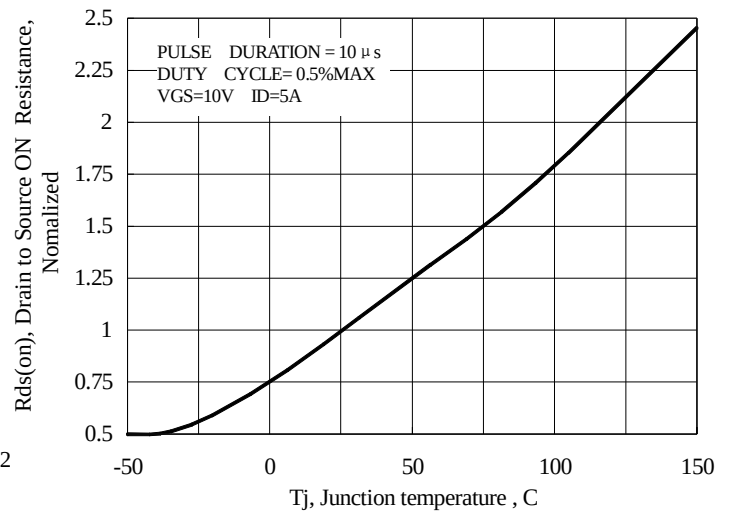


Figure 9 Typical Drain to Source on Resistance vs Junction Temperature

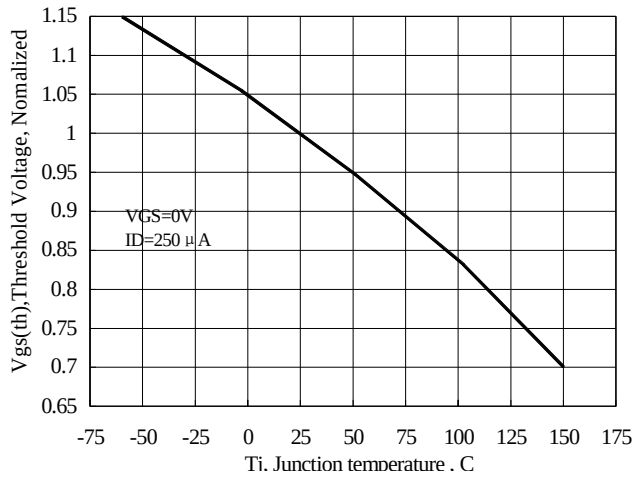


Figure 10 Typical Theshold Voltage vs Junction Temperature

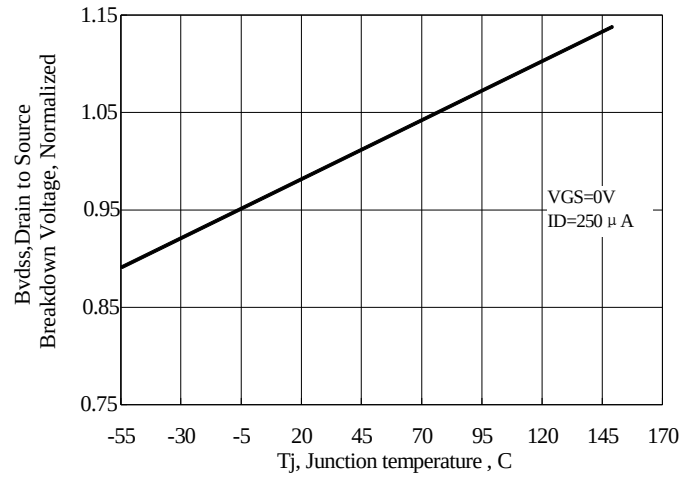


Figure 11 Typical Breakdown Voltage vs Junction Temperature

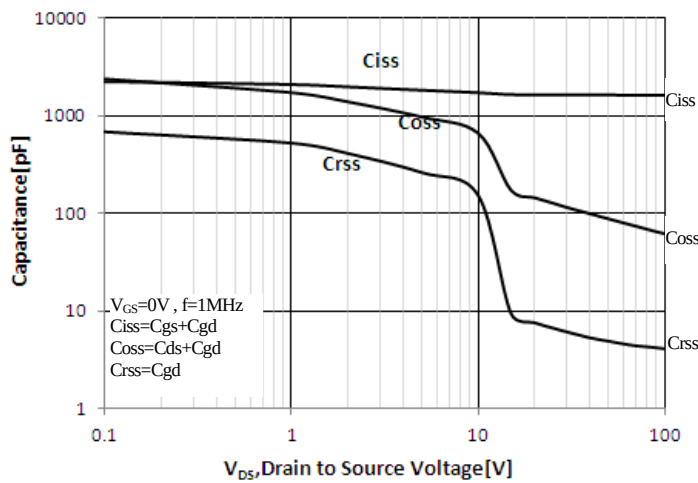


Figure 12 Typical Capacitance vs Drain to Source Voltage

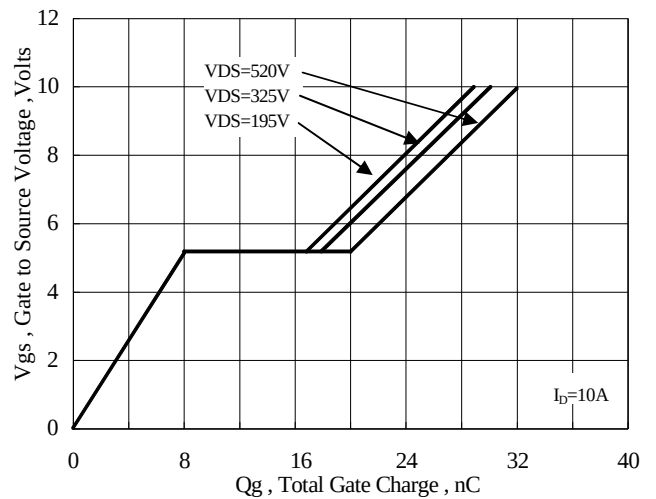


Figure 13 Typical Gate Charge vs Gate to Source Voltage



Test Circuit and Waveform

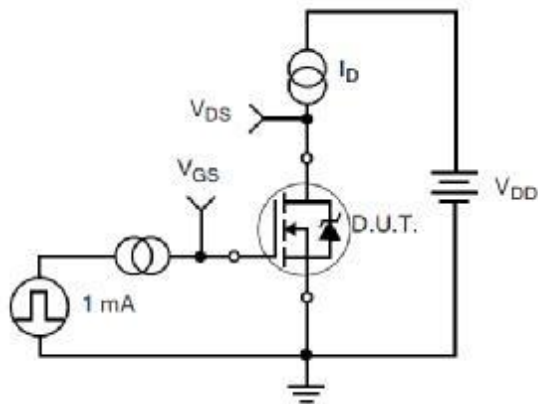


Figure 17. Gate Charge Test Circuit

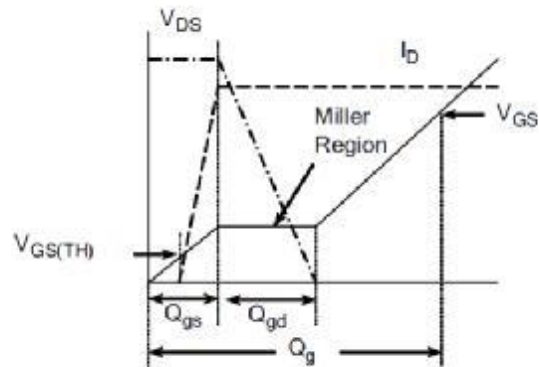


Figure 18. Gate Charge Waveform

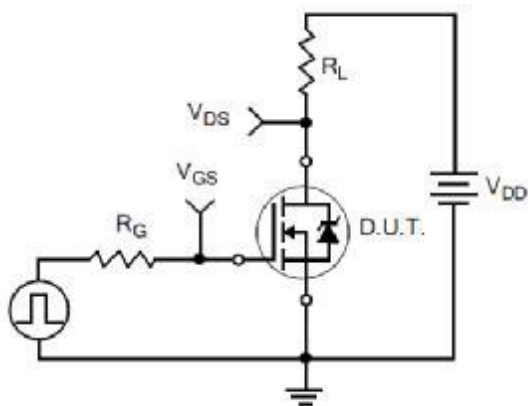


Figure 19. Resistive Switching Test Circuit

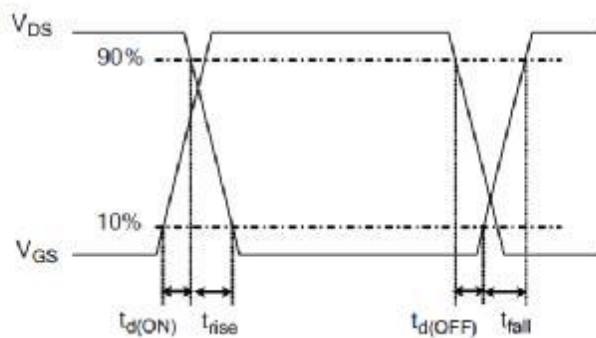


Figure 20. Resistive Switching Waveforms

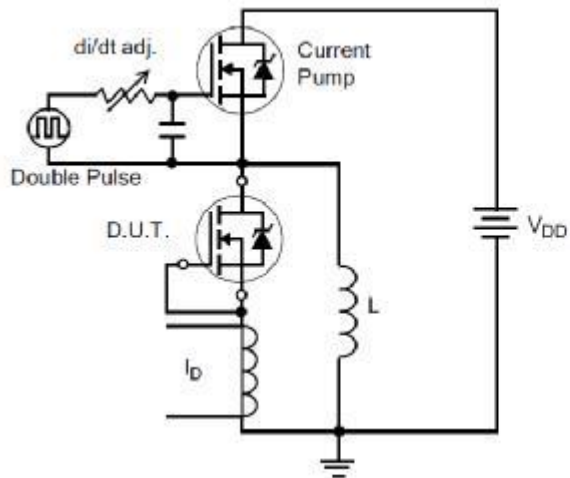


Figure 21. Diode Reverse Recovery Test Circuit

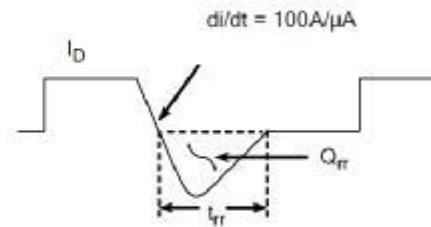


Figure 22. Diode Reverse Recovery Waveform

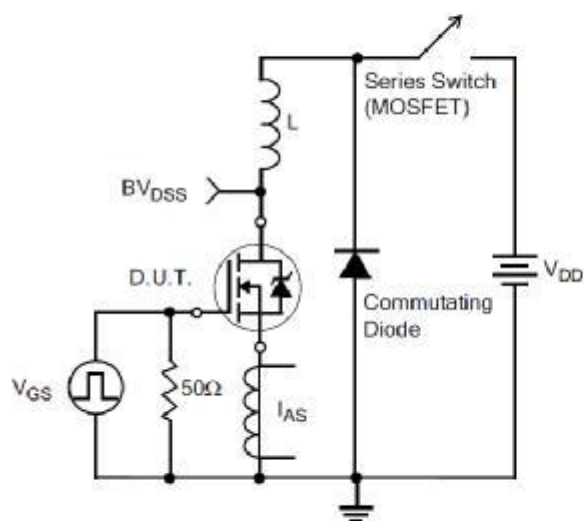


Figure 23. Unclamped Inductive Switching Test Circuit

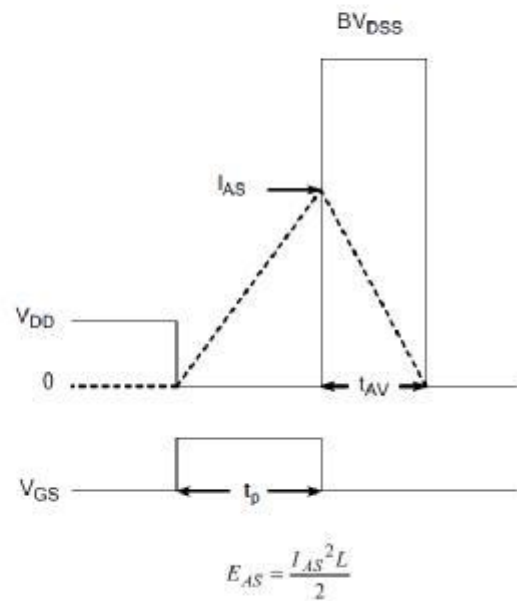
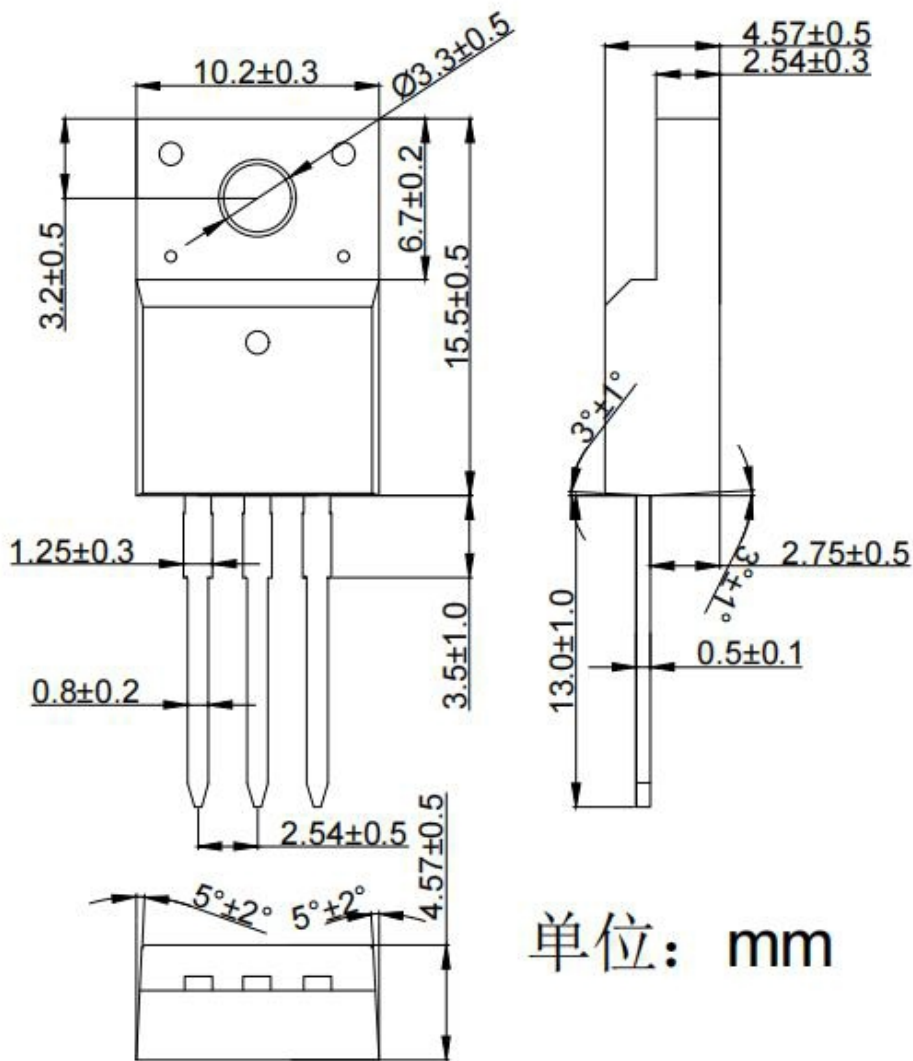


Figure 24. Unclamped Inductive Switching Waveforms



Package Information

TO-220F



单位: mm



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