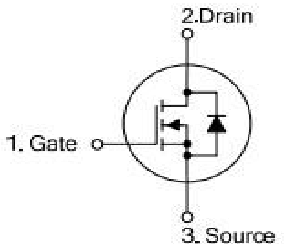
Silicon N-Channel Power MOSFET

Description

IRF3205, the silicon N-channel Enhanced MOSFETS, is obtained by advanced MOSFET technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor is suitable device for Synchronous Rectification, inverter systems ,high speed switching and general purpose applications.



TO-220

KEY CHARACTERISTICS

① V_{DS}=55V,ID=110A $R_{DS(ON)}$<9mΩ@V_{GS}=10V
② Fast Switching
③ Low Crss
④ 100% avalanche tested
⑤ Improved dv/dt capability
⑥ RoHS product

APPLICATIONS

① Power management for 12V inverter systems
② Synchronous Rectification

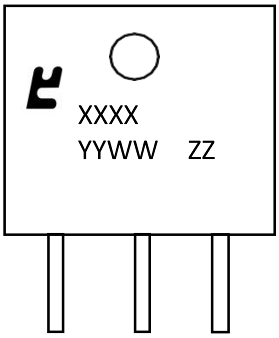
ORDERING INFORMATION

Ordering Codes	Package	Product Code	Packing
IRF3205	TO-220	IRF3205	Tube

IRF3205

(2) Package type
(1) Chip name

(1) IRF3205:55V 110A
(2) Package type:TO-220



XXXX： Product Code

YYWW： Year&Week

ZZ： Assembly Code

ABSOLUTE RATINGS at TC = 25°C, unless otherwise specified

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	55	V
I_D	Continuous Drain Current	110	A
	Continuous Drain Current TC = 100 °C	80	A
I_{DM}	Pulsed Drain Current(Note1)	440	A
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulse Avalanche Energy(Note2)	1500	mJ
I_{AR}	Avalanche Current	25	A
E_{AR}	Repetitive Avalanche Current	20	mJ
dv/dt	Peak Diode Recovery dv/dt(Note3)	5.0	V/ns
P_D	Power Dissipation TO-220	210	W
	Derating Factor above 25°C	1.25	W/℃
T_J，T_{stg}	Operating Junction and Storage Temperature Range	175，–55 to 175	℃
T_L	Maximum Temperature for Soldering	300	℃

Thermal characteristics

Thermal characteristics (No FullPAK) TO-220

Symbol	Parameter	RATINGS	Units
$R_{\theta JC}$	Junction-to-Case	0.75	℃/W
$R_{\theta JA}$	Junction-to-Ambient	62.5	℃/W

Electrical Characteristics at TC = 25°C, unless otherwise specified

OFF Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
VDSS	Drain to Source Breakdown Voltage	VGS=0V, ID=250μA	55	--	--	V
ΔBV$_{DSS}$/Δ TJ	Bvdss Temperature Coefficient	ID=250uA, Reference25℃	--	0.055	--	V/℃
I_{DSS}	Drain to Source Leakage Current	VDS =55V, VGS= 0V, Tj = 25℃	--	--	1	μA
		VDS =44V, VGS= 0V, Tj = 125℃	--	--	10	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	V_{GS} =+20V	--	--	100	nA

$I_{GSS(R)}$	Gate to Source Reverse Leakage	V_{GS} =-20V	--	--	100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On- Resistance	V_{GS}=10V, I_D=40A	--	7.2	9	mΩ
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = VGS, I_D = 250μA	2	--	4	V
gfs	Forward Transconductance	V_{DS}=20V, I_D =40A(Note4)	--	65	--	S

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
Rg	Gate resistance	f = 1.0MHz	--	1.7	--	Ω
Ciss	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1.0MHz	--	3247	--	PF
Coss	Output Capacitance		--	781	--	
Crss	Reverse Transfer Capacitance		--	211	--	

Switching Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
td(ON)	Turn-on Delay Time	I_D =62A V_{DD} =28V V_{GS} = 10V R_G =4.5Ω	--	14	--	ns
tr	Rise Time		--	101	--	
td(OFF)	Turn-Off Delay Time		--	50	--	
tf	Fall Time		--	65	--	
Qg	Total Gate Charge	I_D =62A V_{DD} =44V V_{GS} = 10V	--	146	--	nC
Qgs	Gate to Source Charge		--	10	--	
Qgd	Gate to Drain ("Miller")Charge		--	17.5	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)	T_C=25 °C	--	--	110	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	440	A
V_{SD}	Diode Forward Voltage	I_S=62A, V_{GS}=0V	--	0.9	1.3	V

Trr	Reverse Recovery Time	I_S=62A, T_j = 25°C d_{IF}/d_t=100A/us, V_{GS}=0V	--	69	--	ns
Qrr	Reverse Recovery Charge		--	143	--	nC

Note1:Pulse width limited by maximum junction temperature

Note2: L=1mH, V_{Ds}=44V, Start T_J=25℃

Note3: I_{SD}≤110A,d_i/d_t ≤300A/us,V_{DD}≤BVDS, Start T_J=25℃

Note4:Pulse width tp≤300μs,δ≤2%

Characteristics Curves

Figure 1 Safe Operating Area

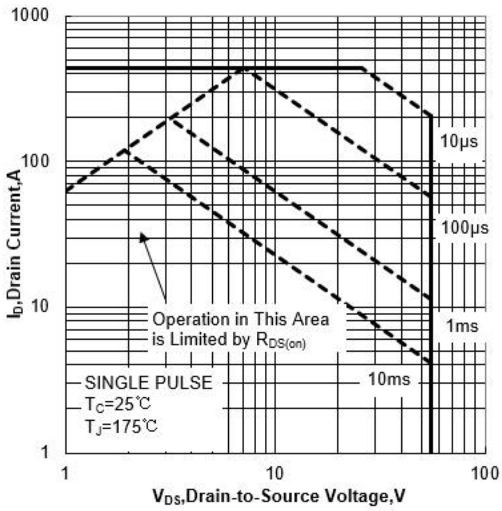


Figure 2 Max Thermal Impendance

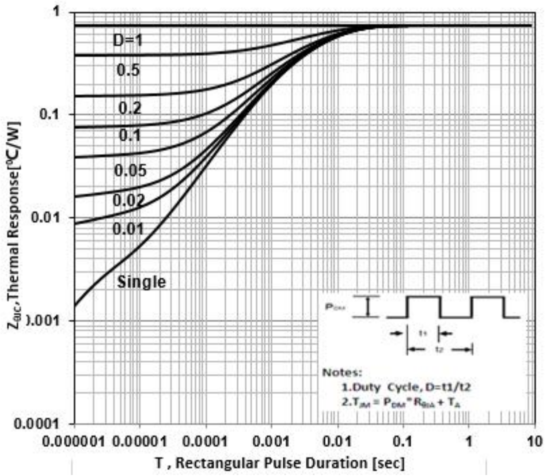


Figure 3 Typical Output Characteristics

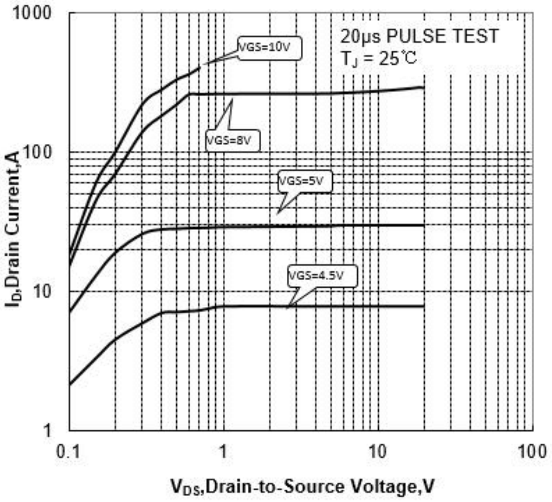


Figure 4 Typical Output Characteristics

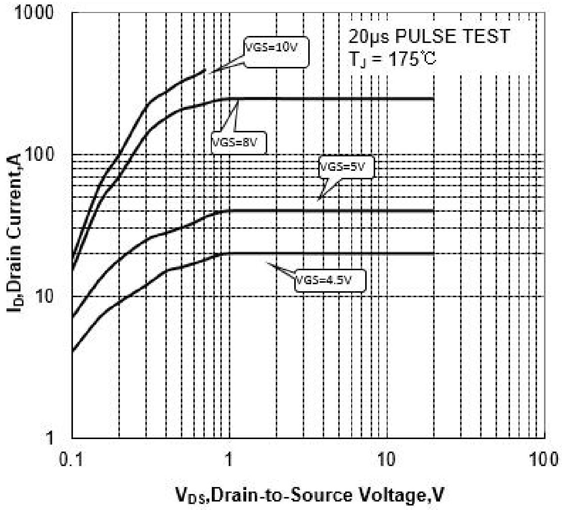


Figure 5 Typical Transfer Characteristics

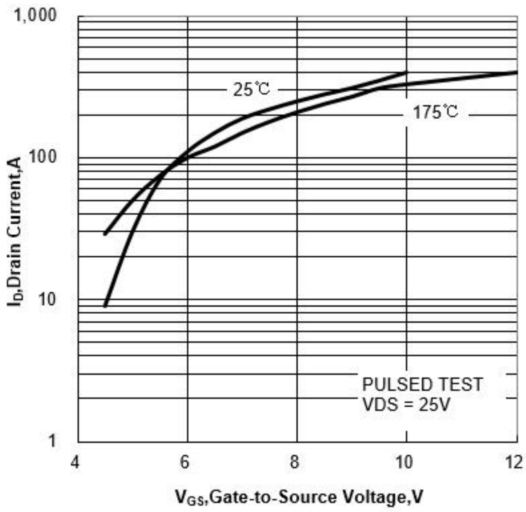


Figure 6 Typical Drian to Source on Resistance vs Junction Temperature

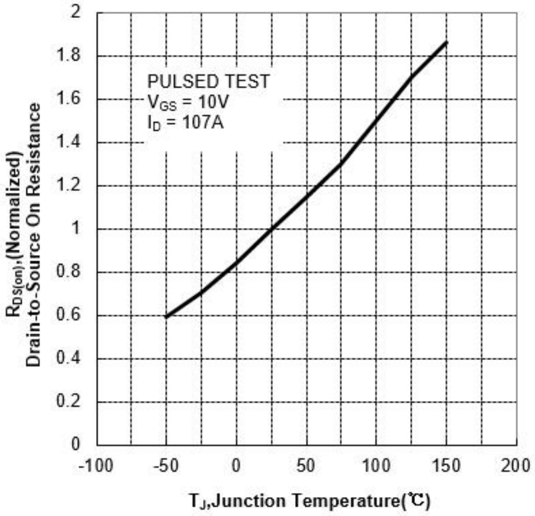


Figure 7 Maximum Drain Current vs Case Temperature

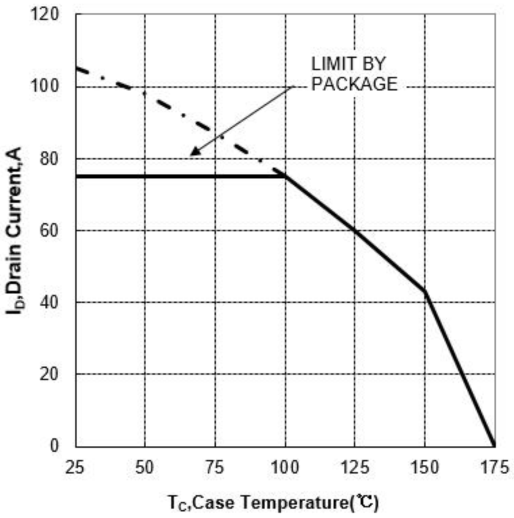


Figure 8 Typical Sourse-Drain Diode Forward Voltage

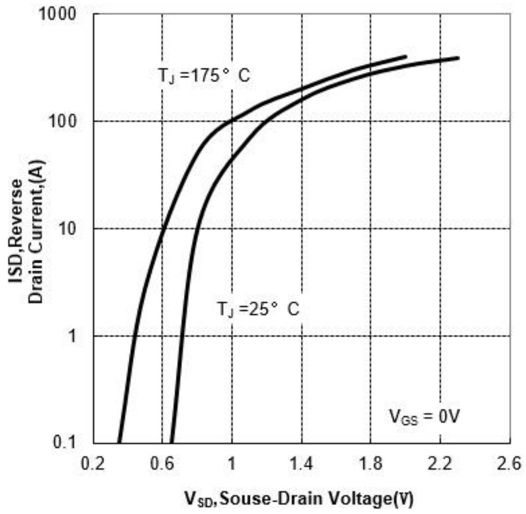


Figure 9 Typical Capacitance vs Drain-to-Source Voltage

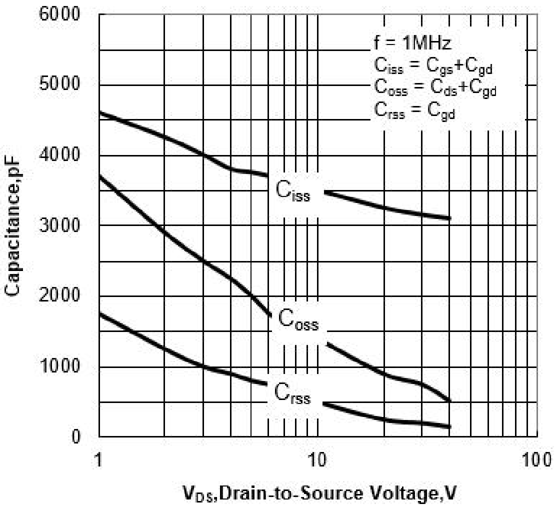
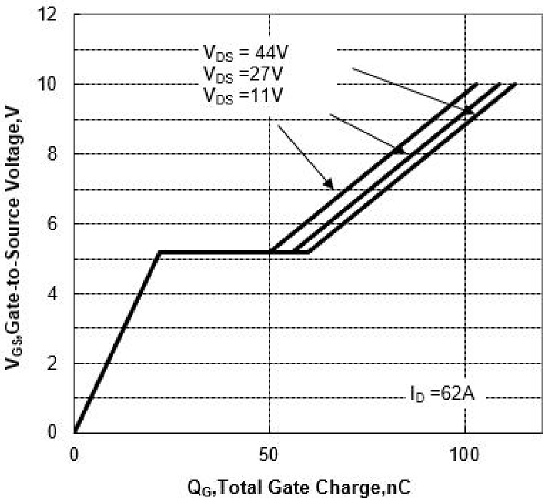


Figure 10 Typical Gate Charge vs Gate-to-Source Voltage



Test Circuit and Waveform

Figure 12 Gate Charge Test Circuit

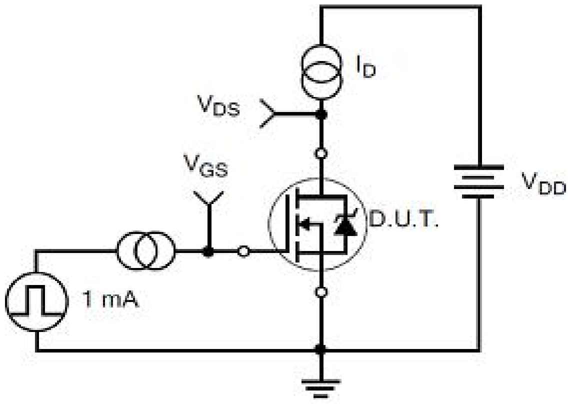


Figure 13 Gate Charge Waveforms

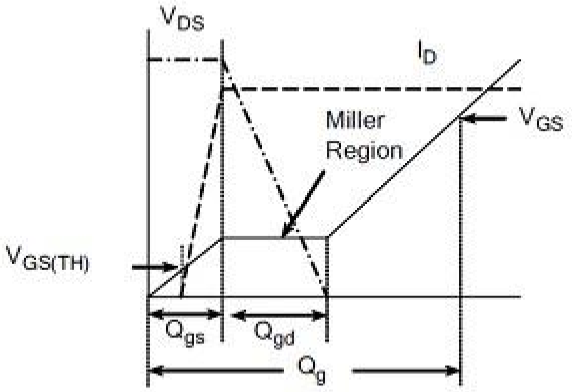


Figure 14 Resistive Switching Test Circuit

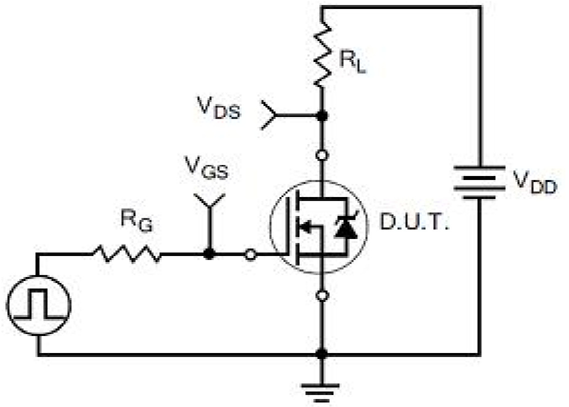


Figure 15 Resistive Switching Waveforms

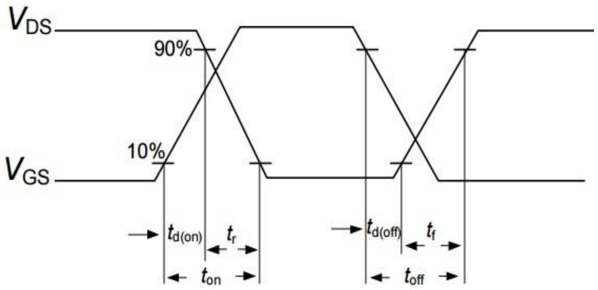


Figure 16 Diode Reverse Recovery Test Circuit

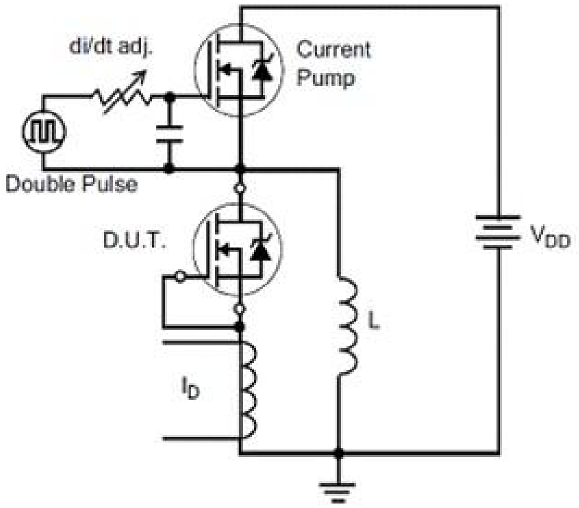


Figure 17 Diode Reverse Recovery Waveform

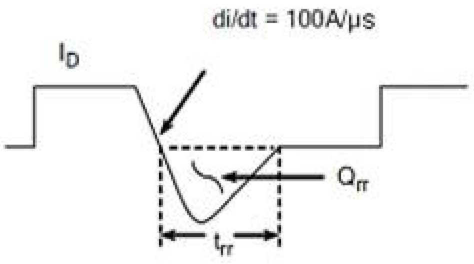


Figure 18 Unclamped Inductive Switching Test

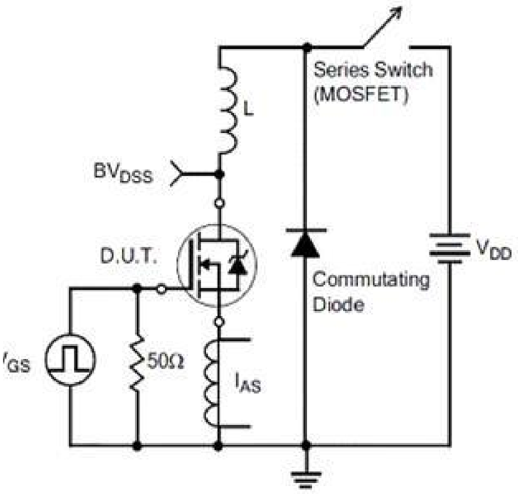
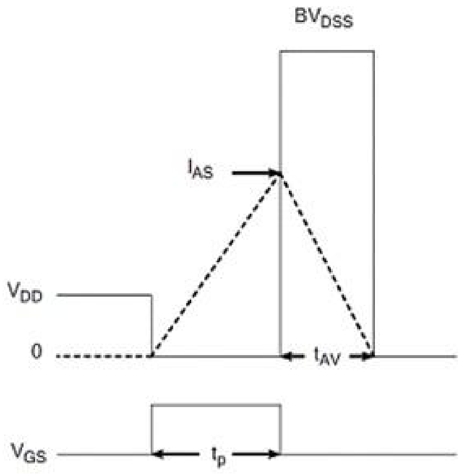
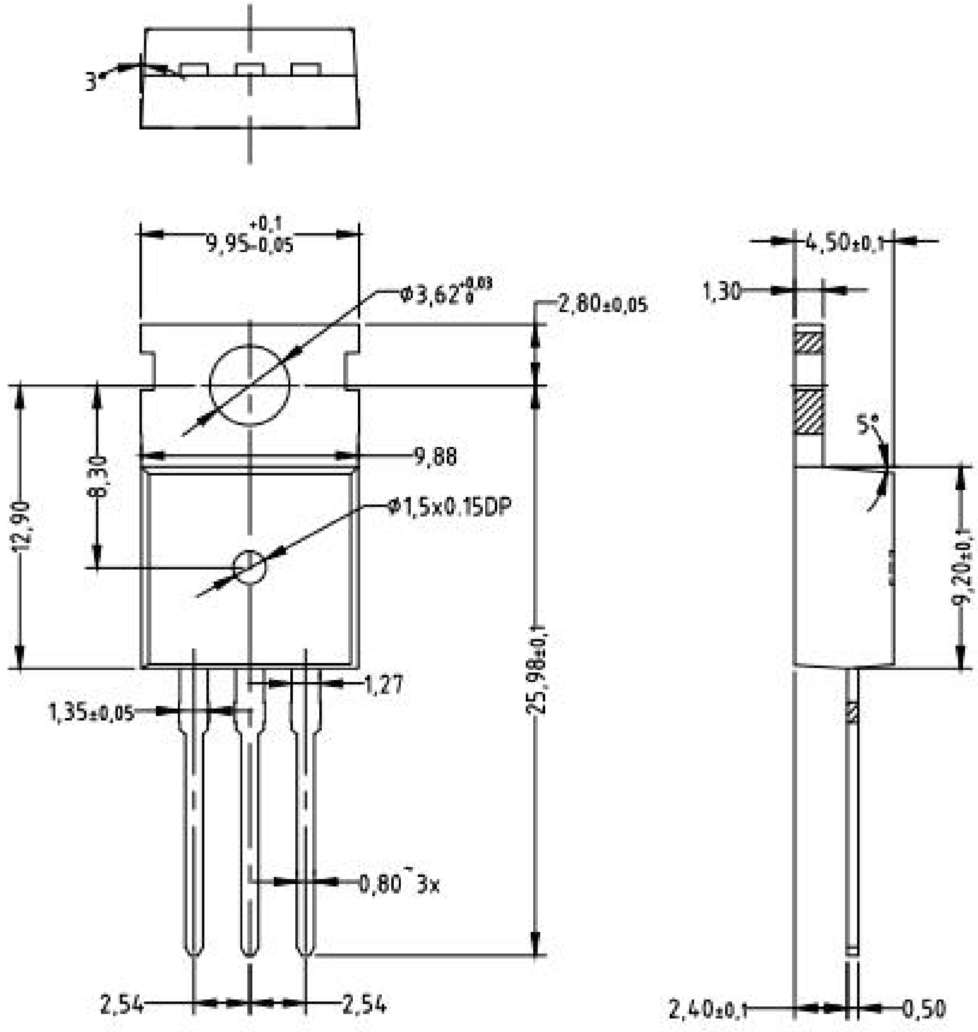


Figure 19 Unclamped Inductive Switching



Package Description



TO-220 Package

NOTE:

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. Please do not exceed the absolute maximum ratings of the device when circuit designing.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. MOSFETs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. Shenzhen Minos reserves the right to make changes in this specification sheet and is subject to change withoutprior notice.

CONTACT:

深圳市迈诺斯科技有限公司（总部）

地址：深圳市福田区华富街道田面社区深南中路4026号田面城市大厦22B-22C
邮编：518025
电话：0755-83273777