



General Description

AFN12N60 is an N-channel enhancement mode Power MOSFET which is produced using VDMOS technology. The improved planar stripe cell and the improved guard ring terminal have been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

These devices are widely used in AC-DC power suppliers, DC-DC converters and H-bridge PWM motor drivers.

Features

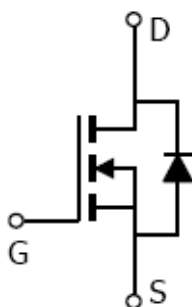
- 600V/6A, $R_{DS(ON)}=0.75\Omega_{(MAX)}@V_{GS}=10V$
- Low gate charge
- Low Crss
- Fast switching
- Improved dv/dt capability

Application

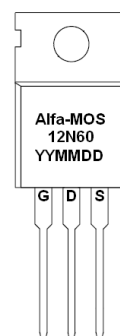
- AC-DC Switching Power Supply
- LCD / LED / PDP TV Lighting
- Solar Inverter

Pin Description

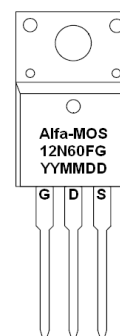
SYMBOL



TO-220-3L



TO-220F-3L



Absolute Maximum Ratings

($T_c=25^\circ\text{C}$ Unless otherwise noted)

Parameter	Symbol	Typical		Unit
		TO-220-3L	TO-220F-3L	
Drain-Source Voltage	V_{DSS}	600		V
Gate –Source Voltage	V_{GSS}	± 30		V
Continuous Drain Current	I_D	$T_c=25^\circ\text{C}$	12	A
		$T_c=100^\circ\text{C}$	9	A
Pulsed Drain Current	I_{DM}	48		A
Single Pulsed Avalanche Energy $L=30\text{mH}$, $I_{AS}=6.6\text{A}$, $V_{DD}=140\text{V}$, $R_G=25\Omega$, starting $T_J=25^\circ\text{C}$	E_{AS}	795		mJ
Power Dissipation	P_D	225	51	W
Power Dissipation Derate		$T_c=25^\circ\text{C}$	1.8	0.41
Operating Junction Temperature	T_J	-55/150		$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55/150		$^\circ\text{C}$
Thermal Resistance-Junction to Case	$R_{\theta JC}$	0.56	2.44	$^\circ\text{C}/\text{W}$
Thermal Resistance-Junction to Ambient	$R_{\theta JA}$	62.5	120	$^\circ\text{C}/\text{W}$



Pin Define

Pin	Symbol	Description
1	G	Gate
2	S	Source
3	D	Drain

Ordering Information

Part Ordering No.	Part Marking	Package	Material	Unit	Quantity
AFN12N60T220T	Alfa-MOS 12N60 YYMMDD	TO-220-3L	Pb Free	Tube	50 EA
AFN12N60T220FT	Alfa-MOS 12N60F YYMMDD	TO-220F-3L	Pb Free	Tube	50 EA
AFN12N60T220FTG	Alfa-MOS 12N60FG YYMMDD	TO-220F-3L	Halogen Free	Tube	50 EA

※ YYMMDD Date Code

Electrical Characteristics

(T_c:25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =250μA	600			V	
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2.0		4.0		
Gate Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±30V			±100	nA	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =600V, V _{GS} =0V			1.0	μA	
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =10V, I _D =6.0A		0.6	0.75	Ω	
Continuous Source Current	I _S	Integral Reverse p-n Junction Diode in the MOSFET			12	A	
Pulsed Source Current	I _{SM}				48	A	
Diode Forward Voltage	V _{SD}	I _S = 12A, V _{GS} =0V			1.3	V	
Reverse Recovery Time	T _{rr}	I _S = 12A, V _{GS} = 0V, dI _F /dt=100A/μs		450		ns	
Reverse Recovery Charge	Q _{rr}	Pulse width ≤300μs, Duty cycle≤2%		4.2		μC	
Dynamic							
Total Gate Charge	Q _g	V _{DS} =480V, V _{GS} =10V, I _D ≅12A Pulse width ≤300μs, Duty cycle≤2%		24.35		nC	
Gate-Source Charge	Q _{gs}			7.79			
Gate-Drain Charge	Q _{gd}			7.34			
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V f=1MHz		1445		pF	
Output Capacitance	C _{oss}			413			
Reverse Transfer Capacitance	C _{rss}			6.13			
Turn-On Time	t _{d(on)}	V _{DD} =300V, I _D =12A, R _G =25Ω Pulse width ≤300μs, Duty cycle≤2%		37		ns	
	t _r			71.67			
Turn-Off Time	t _{d(off)}				80		
	t _f				43.67		



Typical Characteristics

Figure 1. On-Region Characteristics

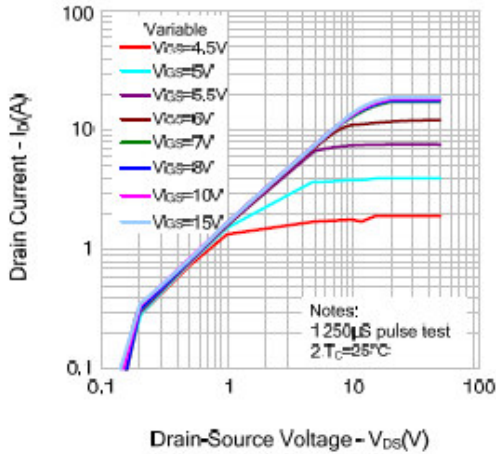


Figure 2. Transfer Characteristics

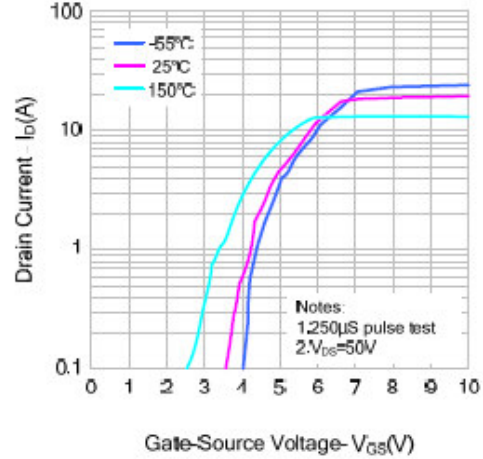


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

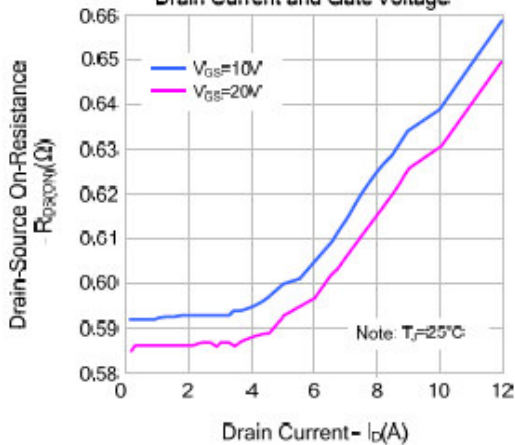


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

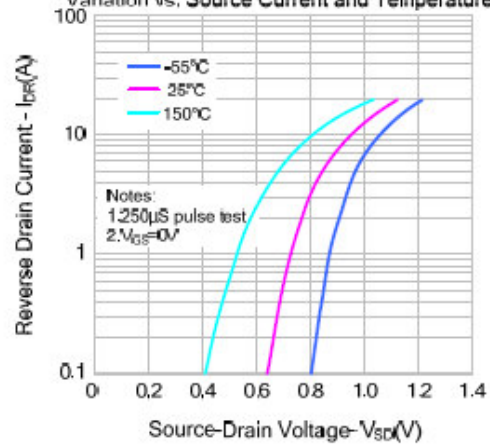


Figure 5. Capacitance Characteristics

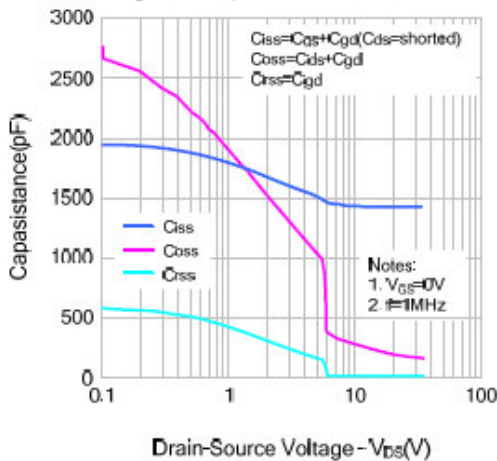
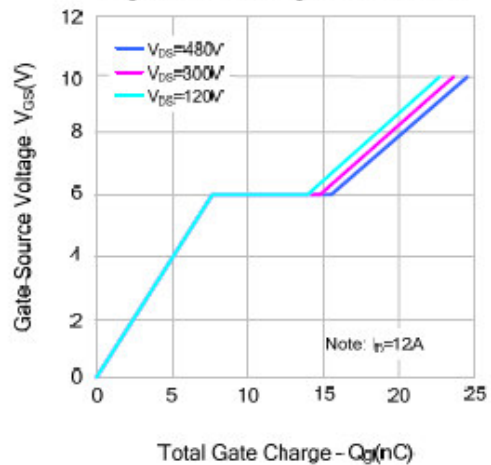
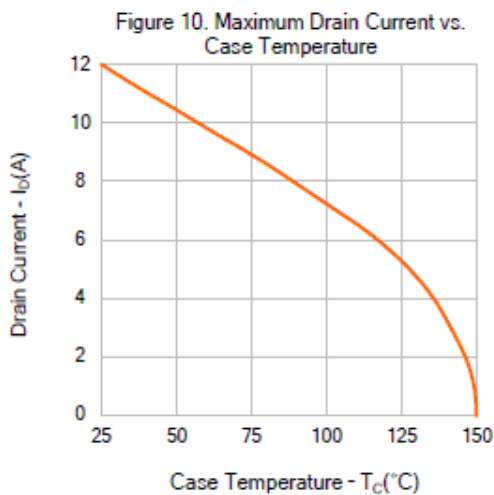
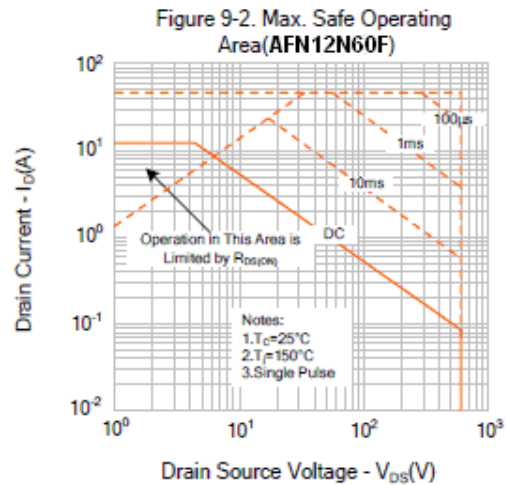
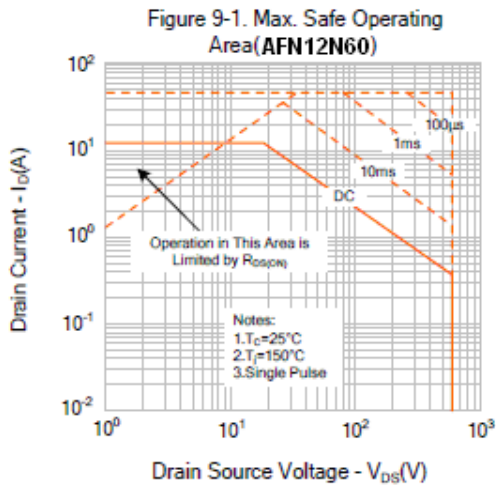
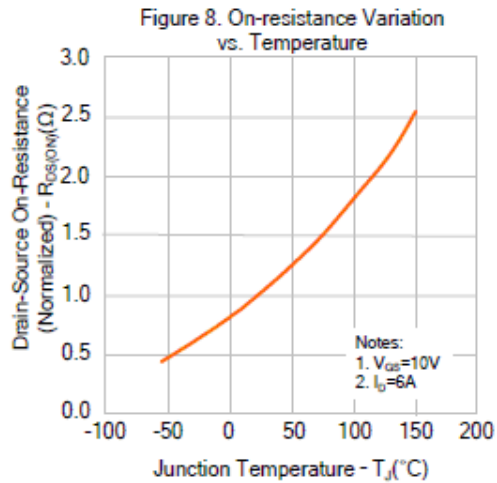
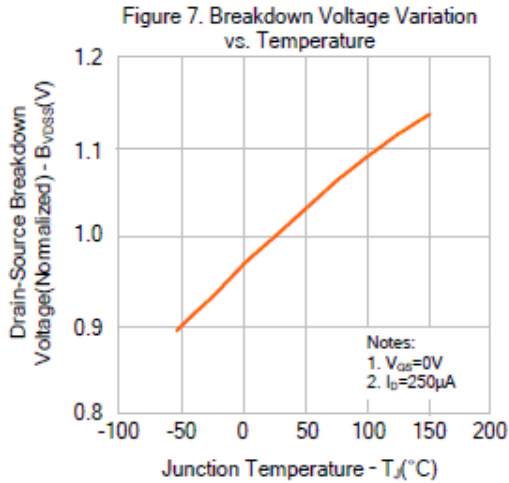


Figure 6. Gate Charge Characteristics





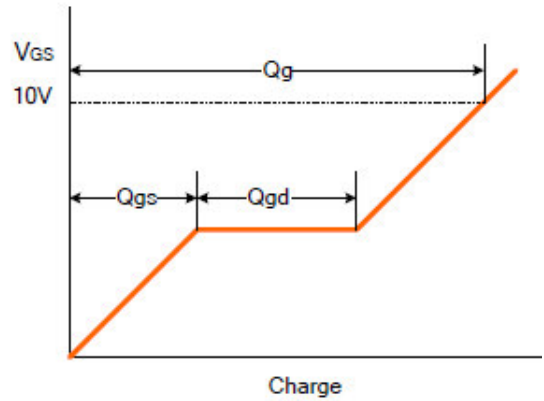
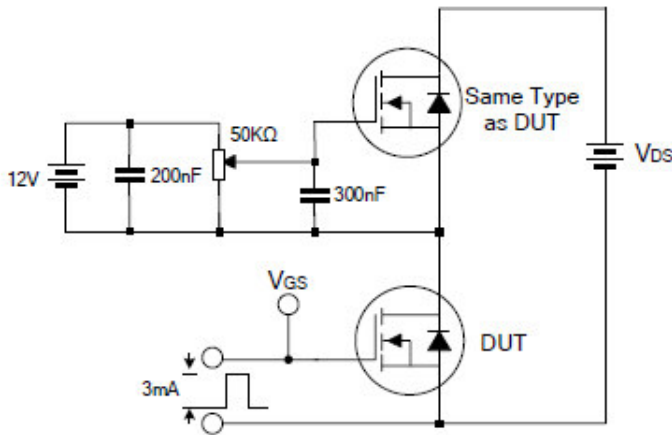
Typical Characteristics



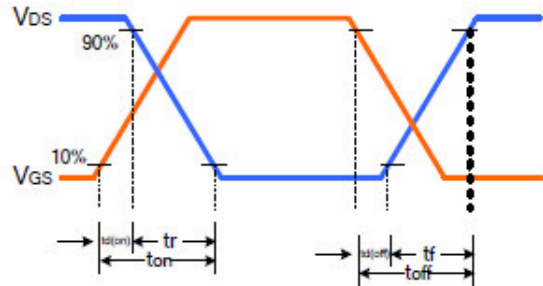
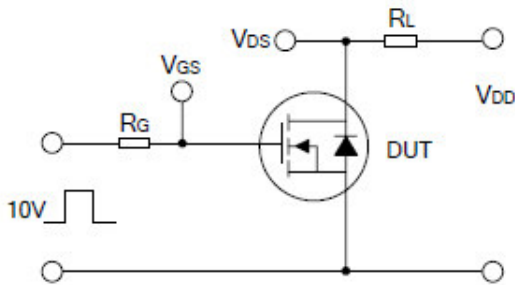


Typical Characteristics

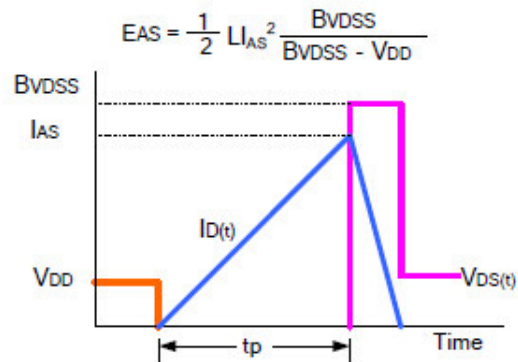
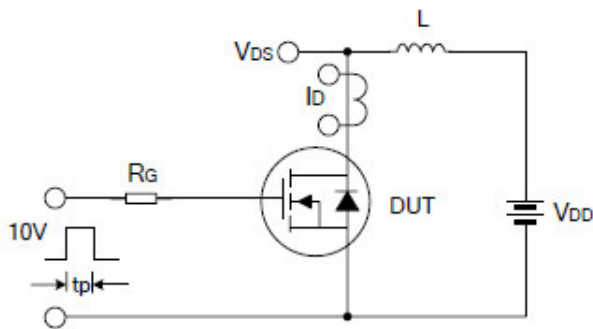
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

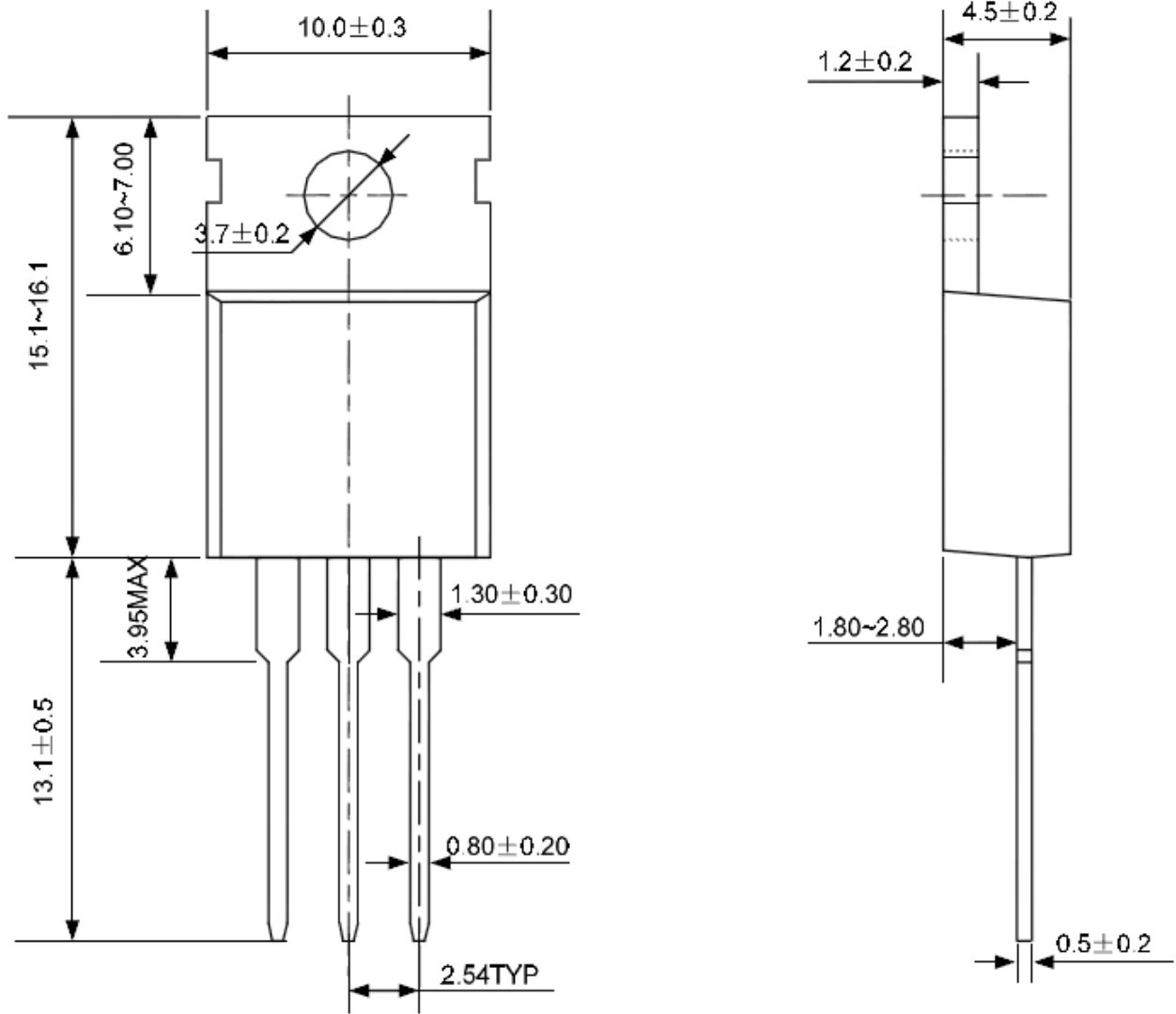


Unclamped Inductive Switching Test Circuit & Waveform





Package Information (TO-220-3L)

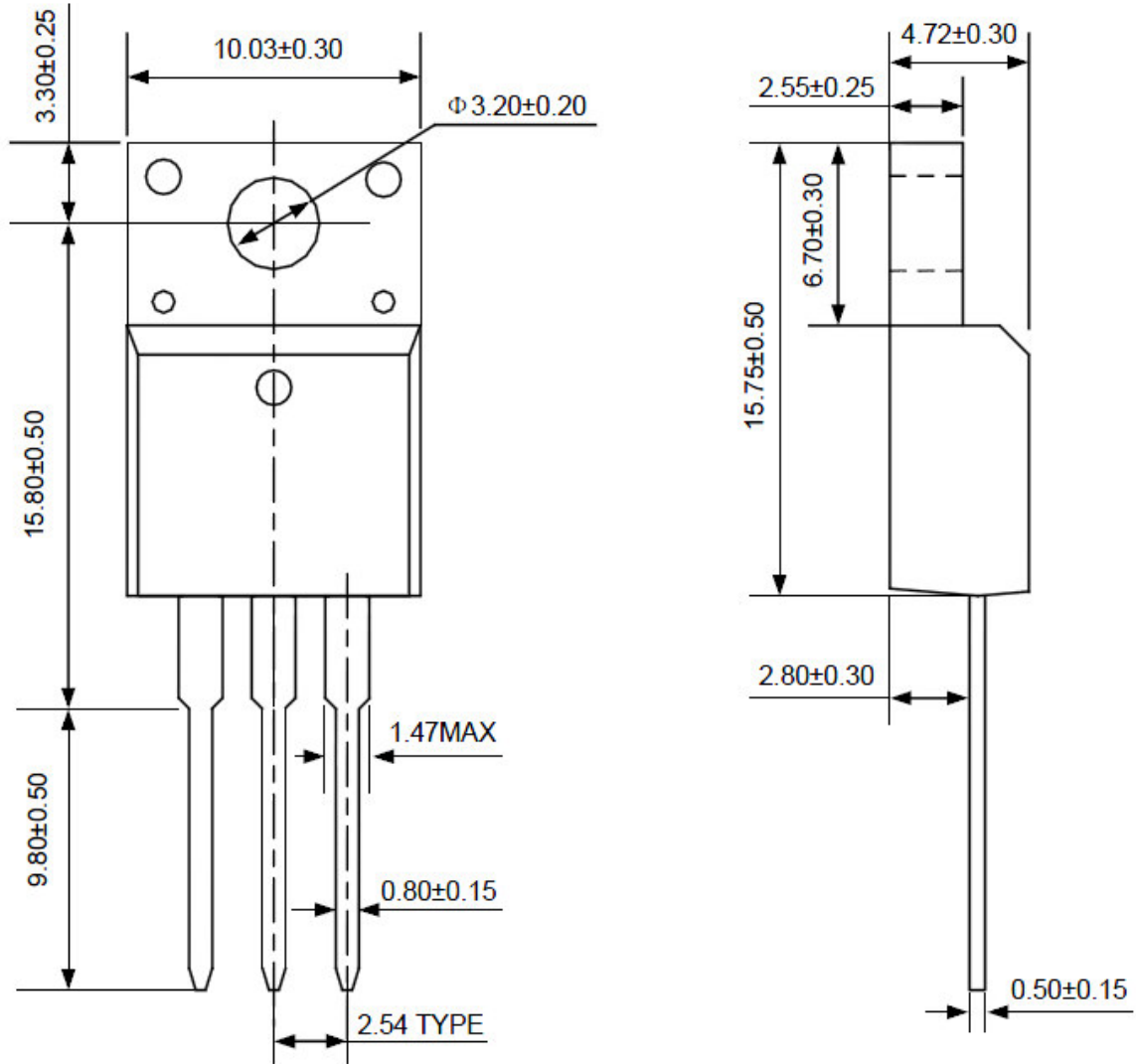


(Unit : mm)

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