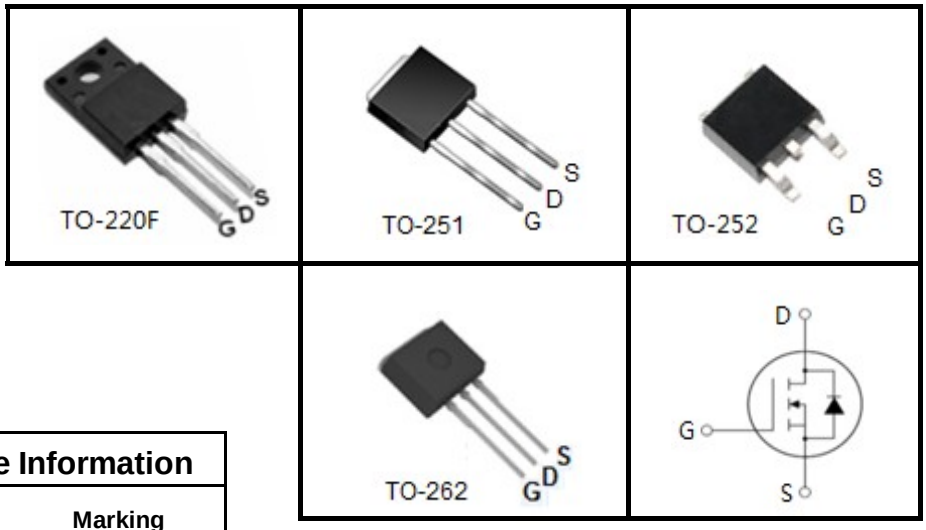
600V N-Channel Enhancement Mode Field Effect Transistor

FEATURES

- Fast switching
- Integrate fast recovery diode
- Fast switching speed
- 100% avalanche tested
- Improved dv/dt capability

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Motor Controls
- Power Factor Correction (PFC)



Device Marking and Package Information		
Device	**Package**	**Marking**
ADFR6N60F	TO-220F	ADFR6N60F
ADFR6N60GL	TO-262	ADFR6N60GL
ADFR6N60D	TO-251	ADFR6N60D
ADFR6N60E	TO-252	ADFR6N60E

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter	Symbol	Value				Unit
		TO-220	TO-220F	TO-252	TO-251	
Drain-Source Voltage (V_{GS} = 0V)	V_{DSS}	600				V
Continuous Drain Current	I_D	6				A
Pulsed Drain Current (note1)	I_{DM}	24				A
Gate-Source Voltage	V_{GSS}	±30				V
Single Pulse Avalanche Energy (note2)	E_{AS}	88				mJ
Avalanche Current (note1)	I_{AR}	4.2				A
Repetitive Avalanche Energy (note1)	E_{AR}	52				mJ
Power Dissipation (T_C = 25ºC)	P_D	54	83			W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150				ºC

Thermal Resistance

Parameter	Symbol	Value				Unit
		TO-220F	TO-251	TO-252	TO-262	
Thermal Resistance, Junction-to-Case	R_{thJC}	2.3	1.5			ºC/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62.5	60			

Specifications T_J = 25ºC, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	600	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 600V, V_{GS} = 0V, T_J = 25ºC	--	--	1	μA
Gate-Source Leakage	I_{GSS}	V_{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = = 250μA	3.0	--	4.0	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	V_{GS} = 10V, I_D = 3.0A	--	1.7	2.0	Ω
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1.0MHz	--	644	--	pF
Output Capacitance	C_{oss}		--	65	--	
Reverse Transfer Capacitance	C_{rss}		--	7	--	
Total Gate Charge	Q_g	V_{DD} =480V, I_D = 6A, V_{GS} = 10V	--	19	--	nC
Gate-Source Charge	Q_{gs}		--	3.5	--	
Gate-Drain Charge	Q_{gd}		--	11	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 300V, I_D =6A, R_G = 25 Ω	--	37	--	ns
Turn-on Rise Time	t_r		--	9	--	
Turn-off Delay Time	$t_{d(off)}$		--	108	--	
Turn-off Fall Time	t_f		--	40	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25 ºC	--	--	6	A
Pulsed Diode Forward Current	I_{SM}		--	--	24	
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 3A, V_{GS} = 0V	--	--	1.4	V
Reverse Recovery Time	t_{rr}	V_{GS} = 0V,I_S = 6A, di_F/dt =100A /μs	--	87	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.42	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 10.0mH, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25 ºC
3. Pulse Test: Pulse width ≤ 300 μs, Duty Cycle ≤ 1%

Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics (T_J = 25ºC)

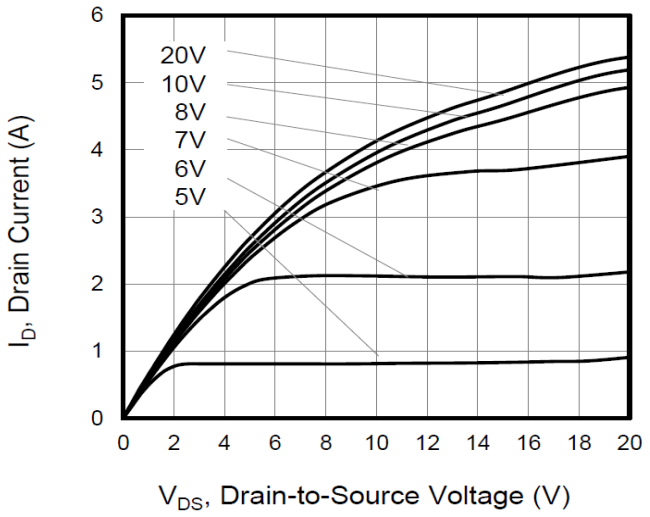


Figure 2. Body Diode Forward Voltage

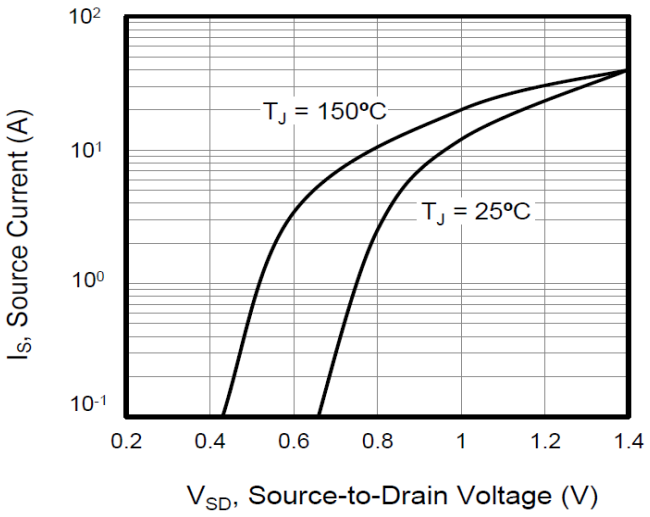


Figure 3. Drain Current vs. Temperature

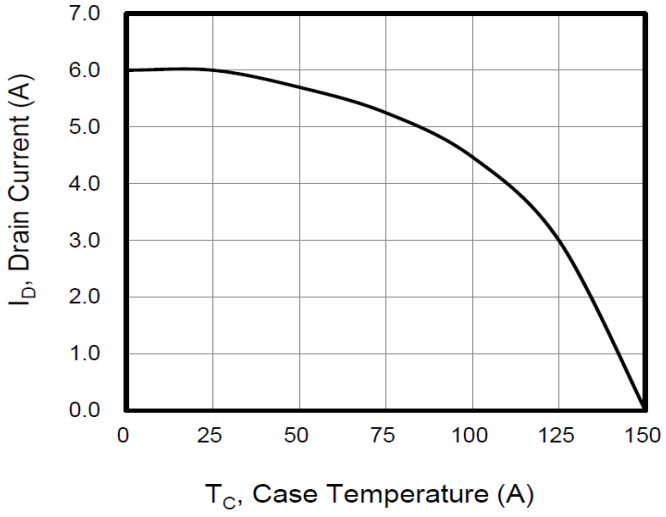


Figure 4. BV_{DSS} Variation vs. Temperature

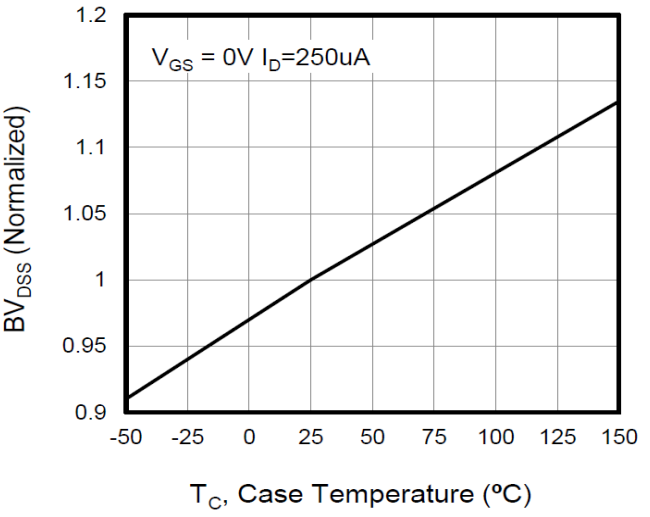


Figure 5. Transfer Characteristics

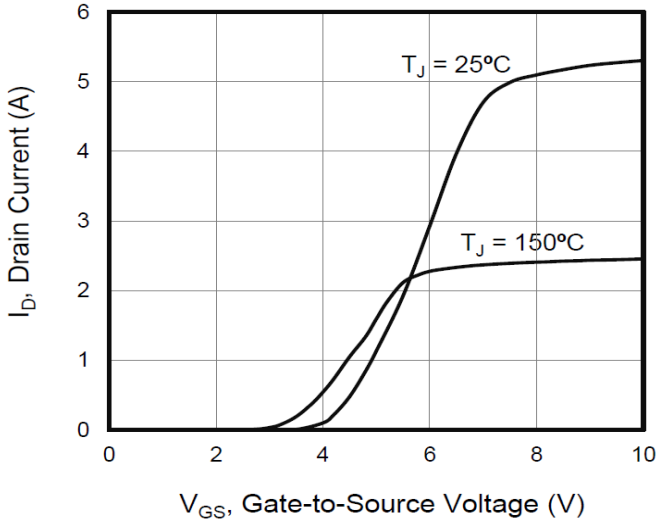


Figure 6. On-Resistance vs. Temperature

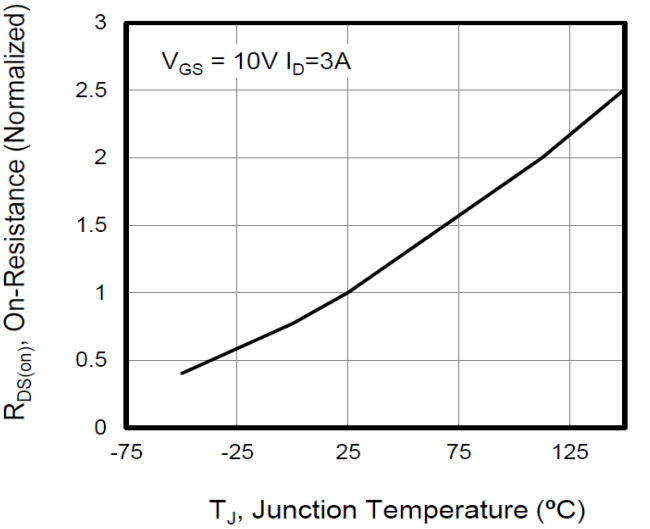


Figure 7. Capacitance

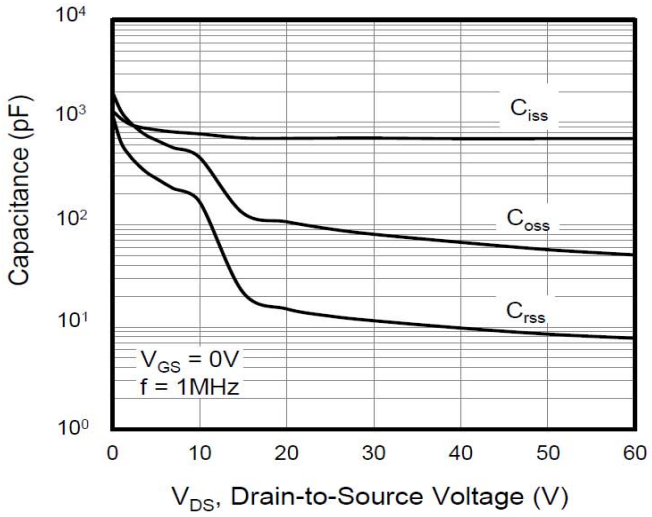


Figure 8. Gate Charge

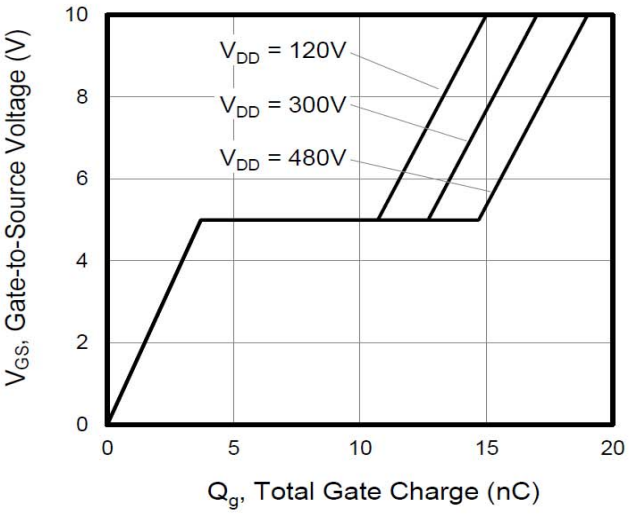


Figure 9. Transient Thermal Impedance
TO-262,TO-251,TO-252

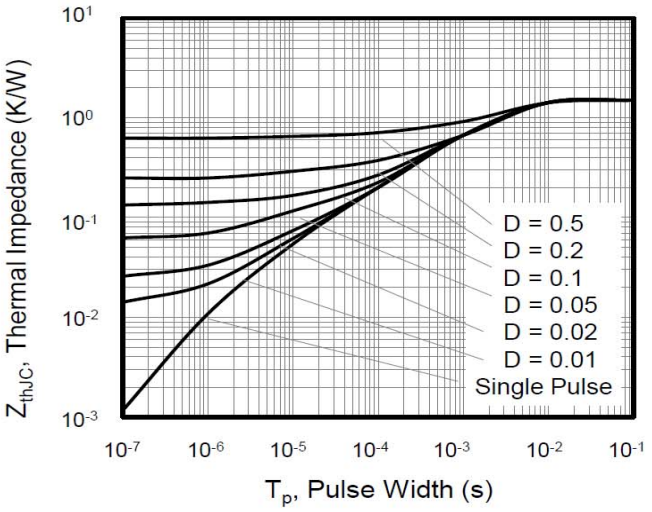


Figure 10. Transient Thermal Impedance
TO-220F

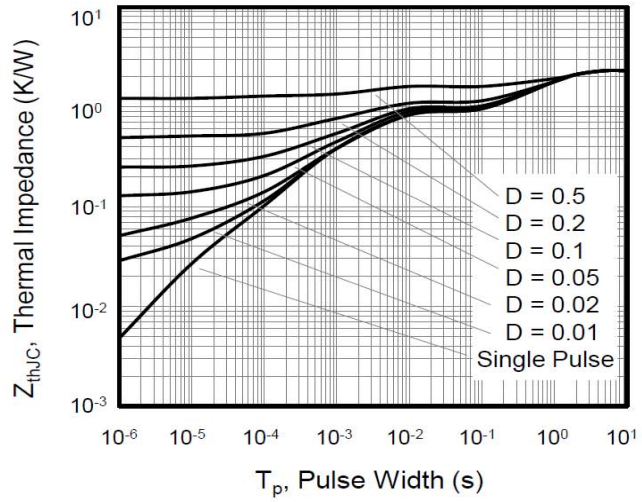


Figure A: Gate Charge Test Circuit and Waveform

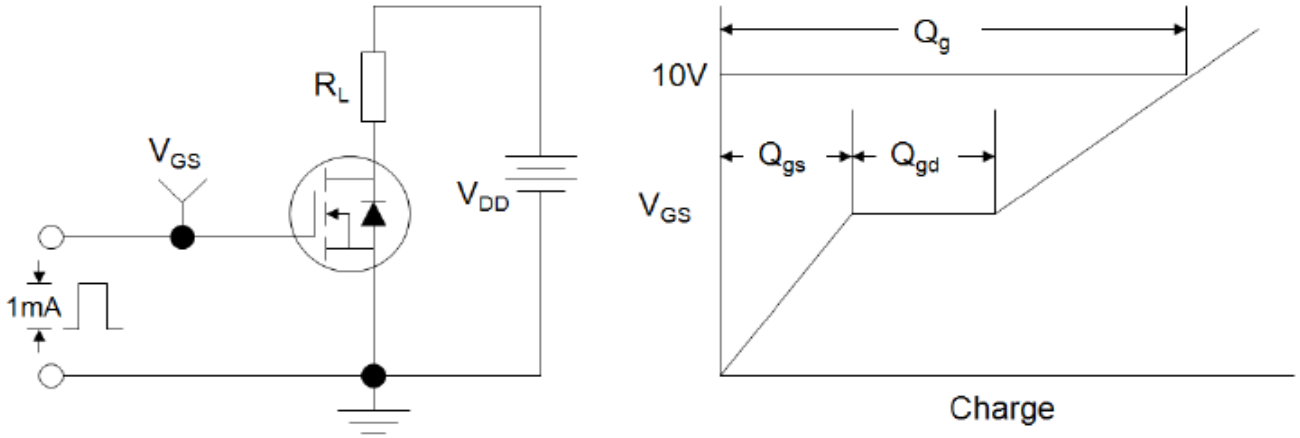


Figure B: Resistive Switching Test Circuit and Waveform

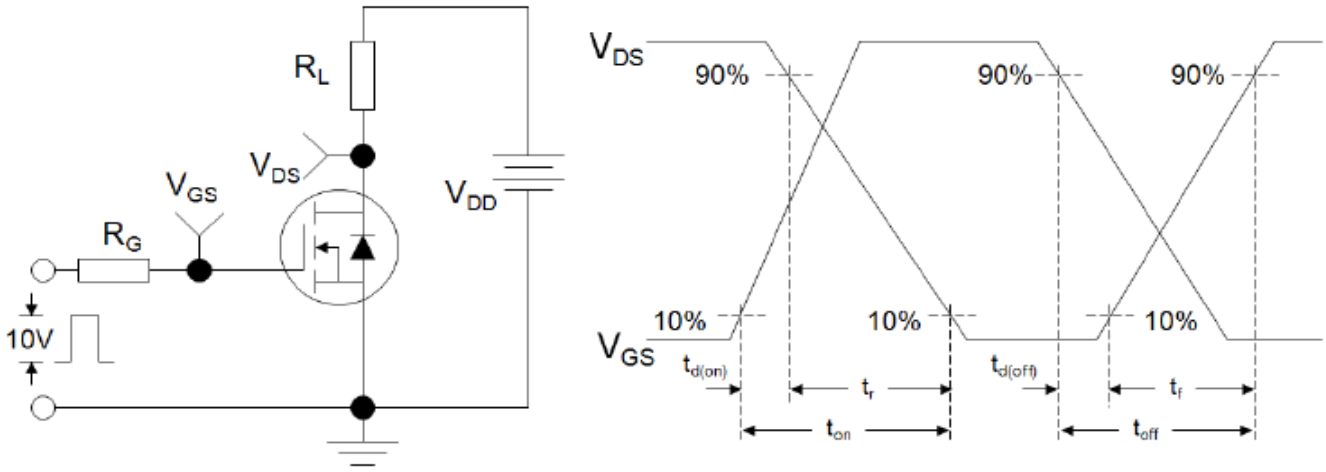
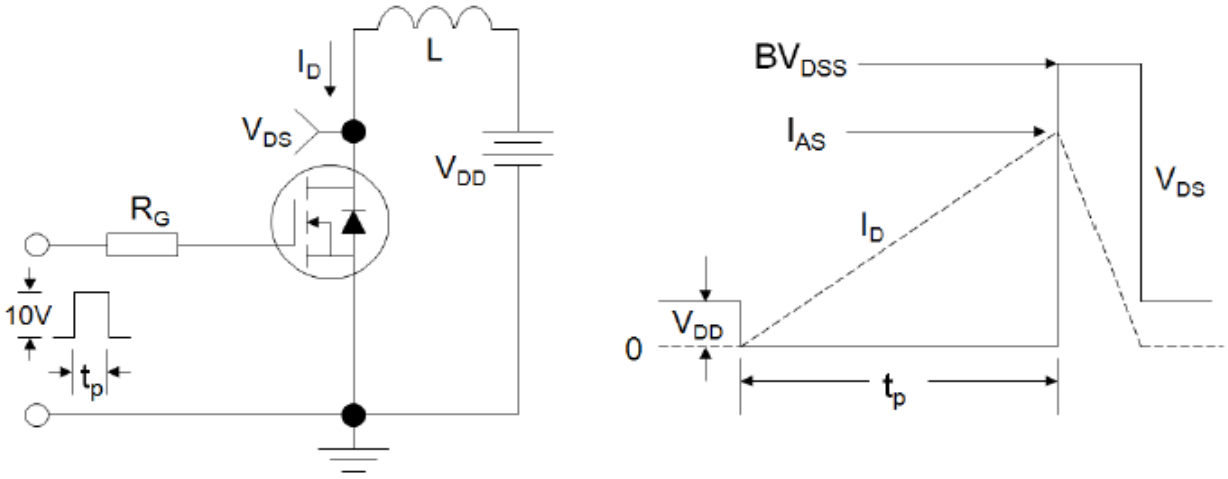
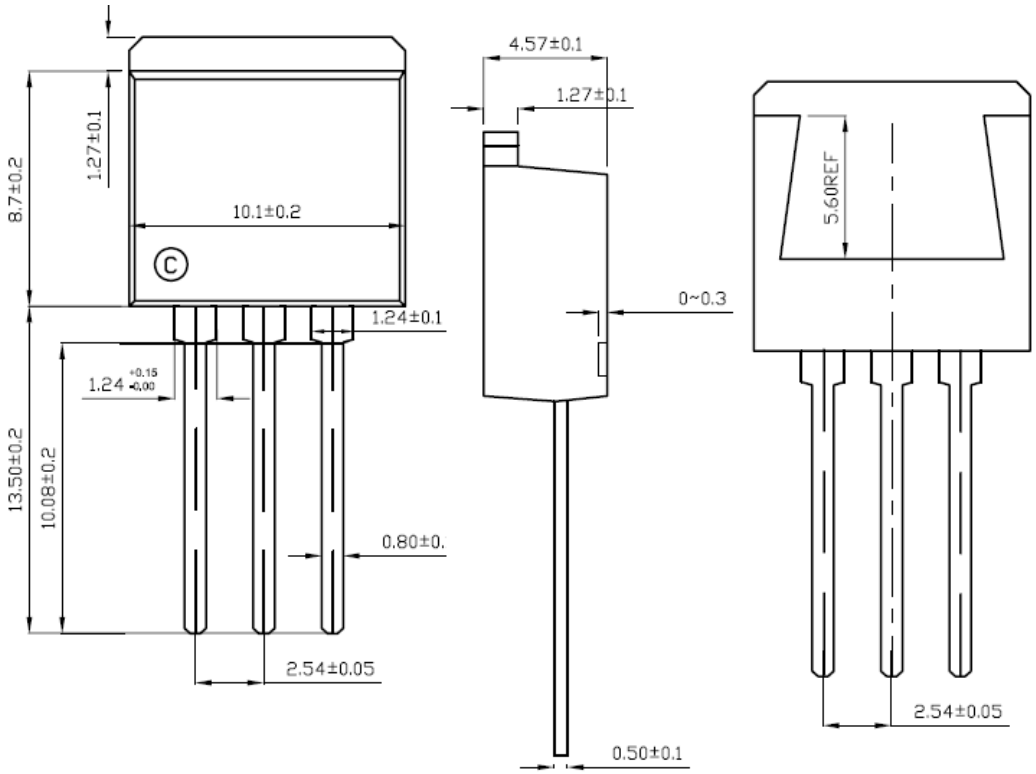


Figure C: Unclamped Inductive Switching Test Circuit and Waveform

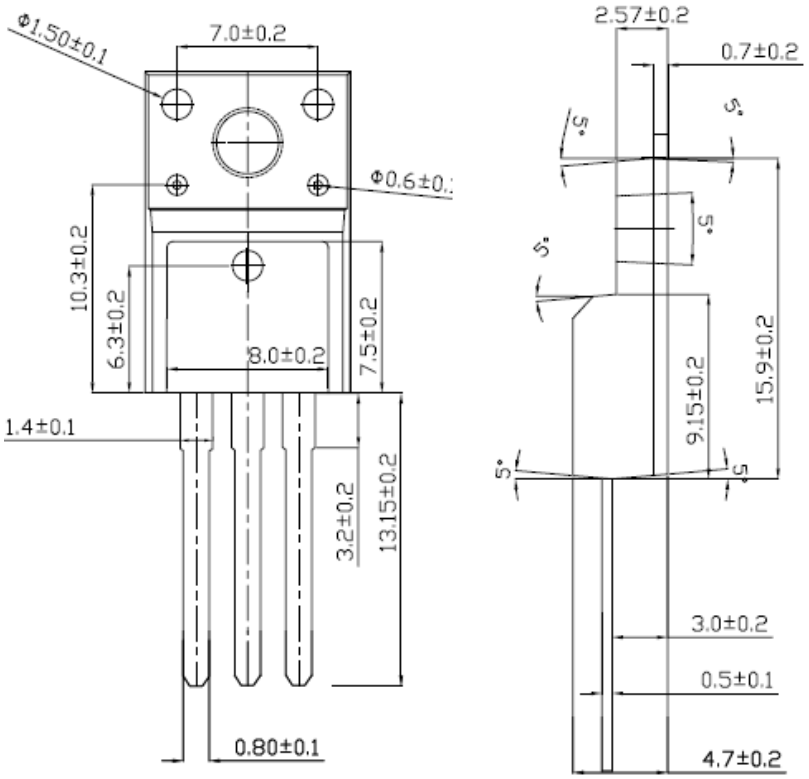


PACKAGE MECHANICAL DATA

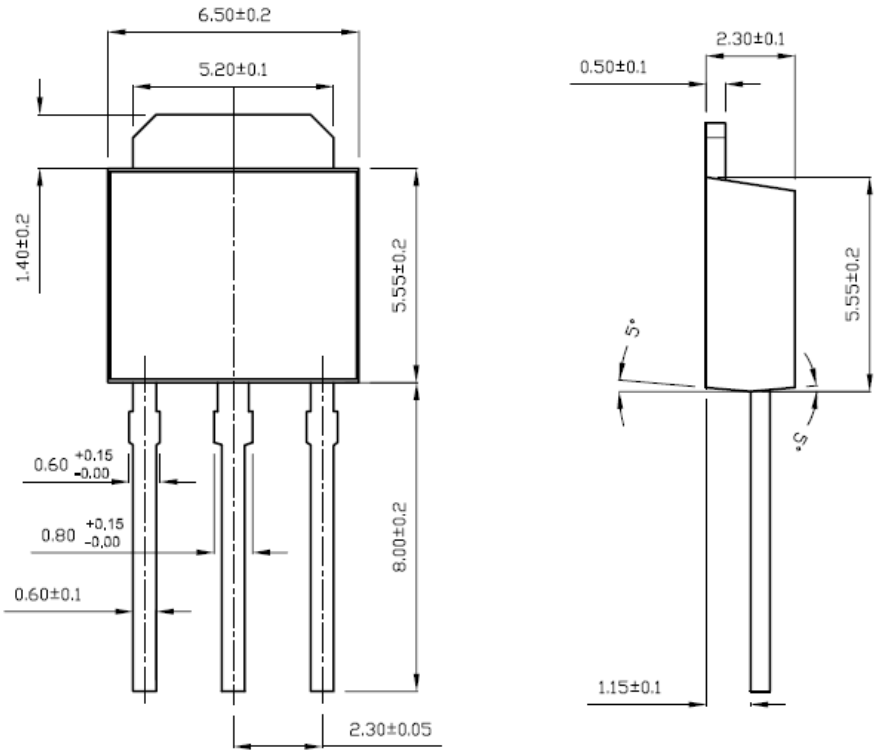
TO-262 Package Dimension



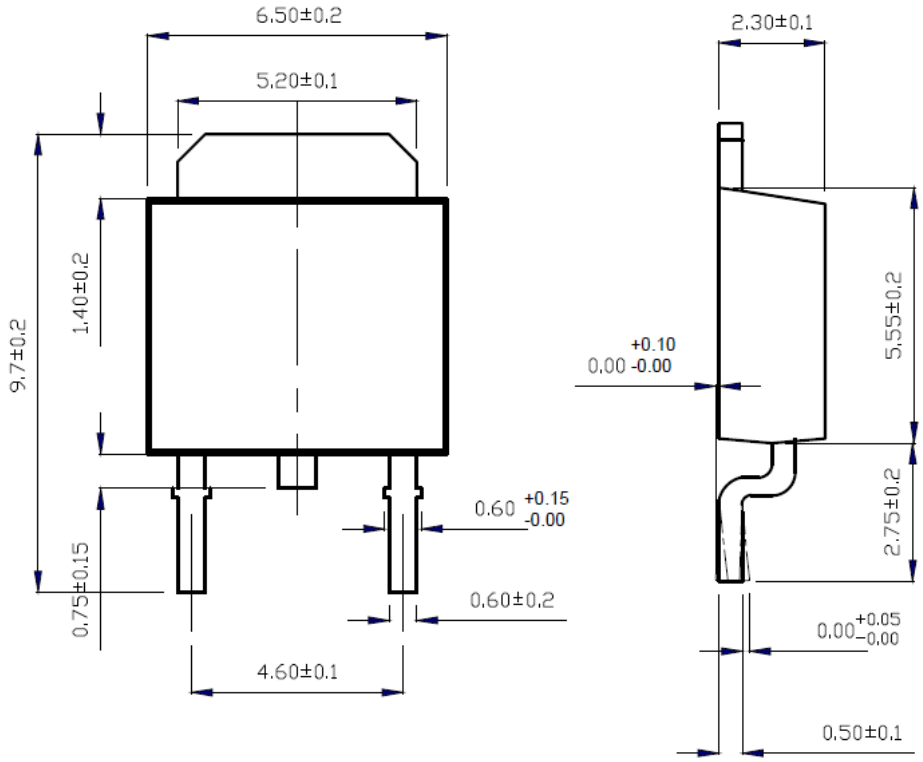
TO-220F Package Dimension



TO-251 Package Dimension



TO-252 Package Dimension



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