

Silicon N-Channel Power MOSFET

Description

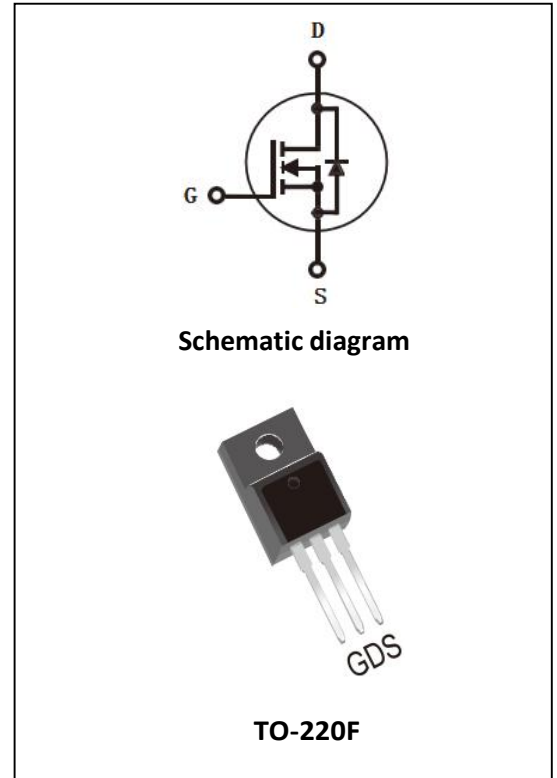
The MPF4N65 uses advanced trench technology and design to provide excellent RDS(ON)with low gate charge. It can be used in a wide variety of applications.

General Features

- ① $V_{DS}=4A, I_D=650V$
- ② $R_{DS(on)(typ)}=2\Omega@V_{GS}=10V, I_D=2A$
- ③ Low Crss:4.5pF@25V
- ④ Fast switching
- ⑤ Improved dv/dt capability

Application

- ① Switch Mode Power Supply (SMPS)
- ② Uninterruptible Power Supply (UPS)
- ③ Power Factor Correction (PFC)



Package Marking and Ordering Information

Ordering Codes	Package	Product Code	Packing
MPF4N65	TO-220F	MPF4N65	Tube

Electronic Characteristics (Tc=25°C)

Parameter	Symbol	Value		Unit
		TO-220F		
Drain-Source Voltage ($V_{GS} = 0V$)	V_{DSS}	650		V
Continuous Drain Current	I_D	4		A
Pulsed Drain Current (note1)	I_{DM}	16		A
Gate-Source Voltage	V_{GSS}	± 20		V
Single Pulse Avalanche Energy (note2)	E_{AS}	76		mJ
Avalanche Current (note1)	I_{AS}	4		A
Repetitive Avalanche Energy (note1)	E_{AR}	45		mJ
Power Dissipation ($T_c = 25^\circ C$)	P_D	20	25	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150		°C

Thermal Resistance						
Parameter	Symbol	Value			Unit	
		TO-220F				
Thermal Resistance, Junction-to-Case	R_{thJC}	6.25	5		K/W	
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62.5	60			

Specifications $T_J = 25^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	650	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 650V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	μA
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	--	4.0	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 2A$	--	2	2.4	Ω
Dynamic						
Input Capacitance	C_{iss}	$V_{GS}=0V,$ $V_{DS} = 25V,$ $f = 1.0\text{MHz}$	--	545	--	pF
Output Capacitance	C_{oss}		--	53	--	
Reverse Transfer Capacitance	C_{rss}		--	4.5	--	
Total Gate Charge	Q_g	$V_{DD} = 520V, I_D = 4A,$ $V_{GS} = 10V$	--	15	--	nC
Gate-Source Charge	Q_{gs}		--	3	--	
Gate-Drain Charge	Q_{gd}		--	7	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 250V, I_D = 4A,$ $R_G = 25 \Omega$	--	36	--	ns
Turn-on Rise Time	t_r		--	13	--	
Turn-off Delay Time	$t_{d(off)}$		--	80	--	
Turn-off Fall Time	t_f		--	24	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^\circ\text{C}$	--	--	4	A
Pulsed Diode Forward Current	I_{SM}		--	--	16	
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{SD} = 2.0A, V_{GS} = 0V$	--	--	1.4	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 4A,$ $di_f/dt = 100A/\mu s$	--	550	--	ns
Reverse Recovery Charge	Q_{rr}		--	1.38	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L = 10.0\text{mH}, V_{DD} = 50V, R_G = 25 \Omega$, Starting $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics ($T_J = 25^\circ\text{C}$)

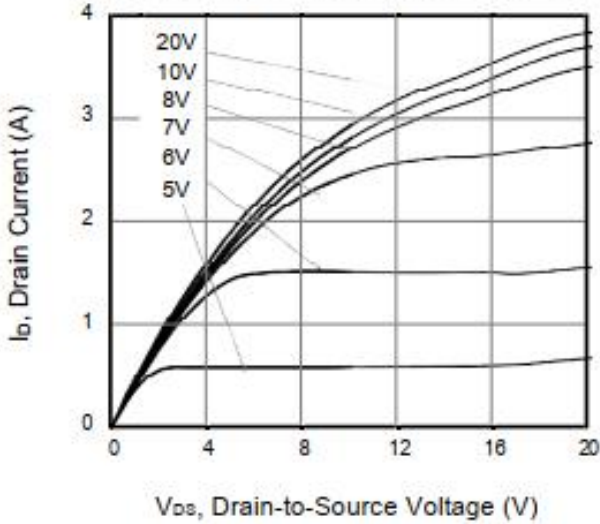


Figure 2. Body Diode Forward Voltage

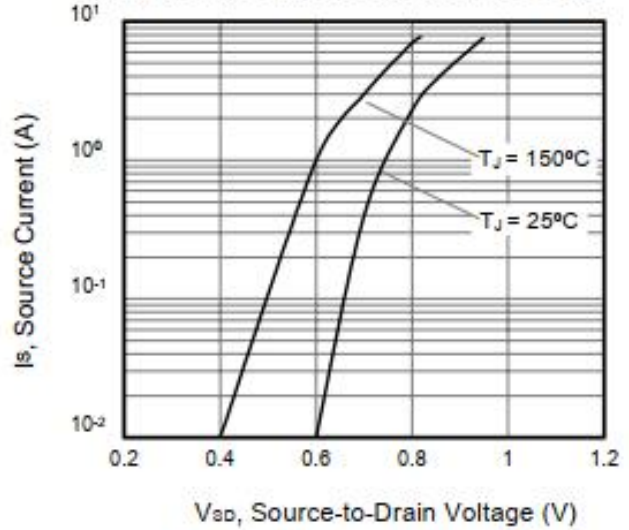


Figure 3. Drain Current vs. Temperature

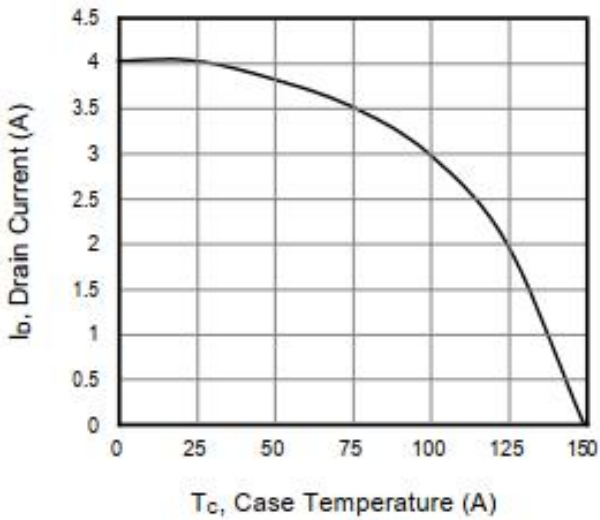


Figure 4. Power Dissipation vs. Temperature

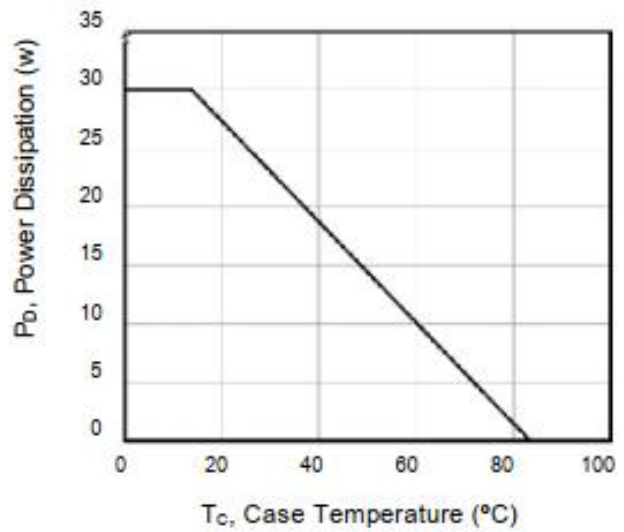


Figure 5. Transfer Characteristics

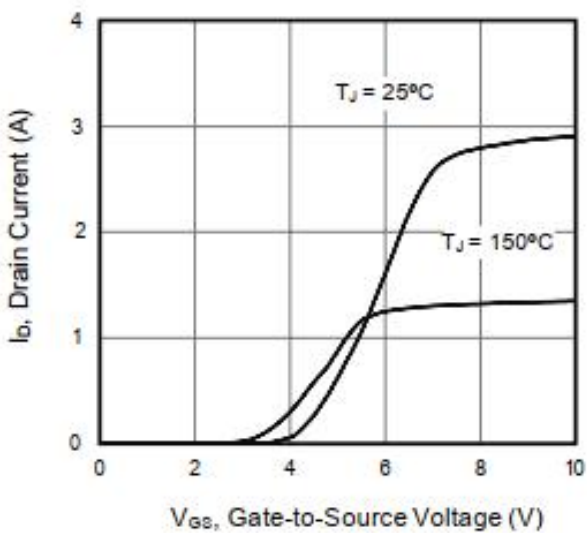
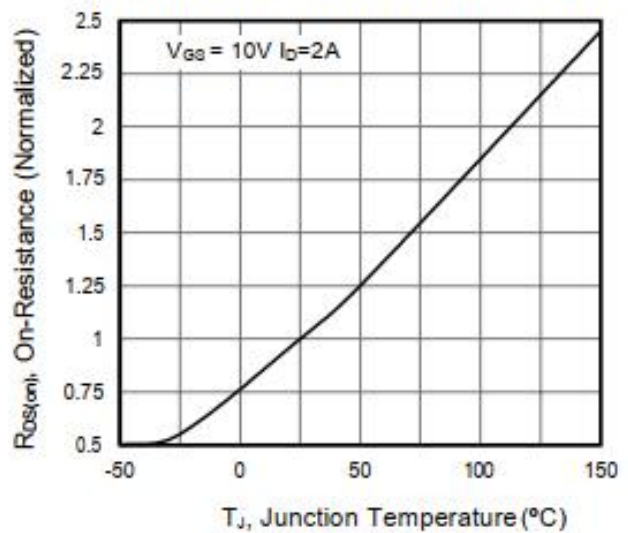


Figure 6. On-Resistance vs. Temperature



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. Capacitance

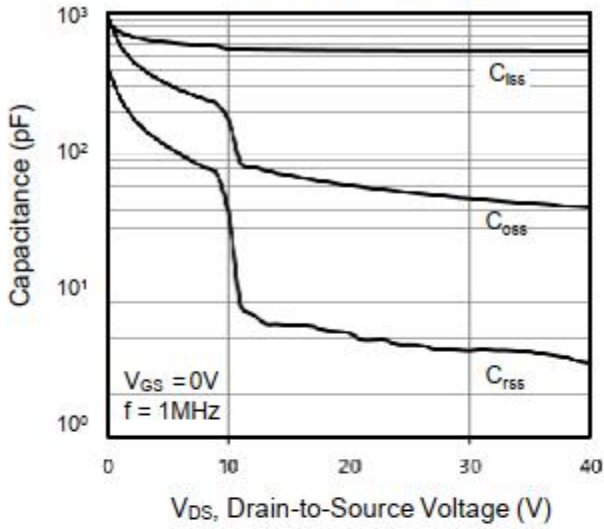


Figure 8. Gate Charge

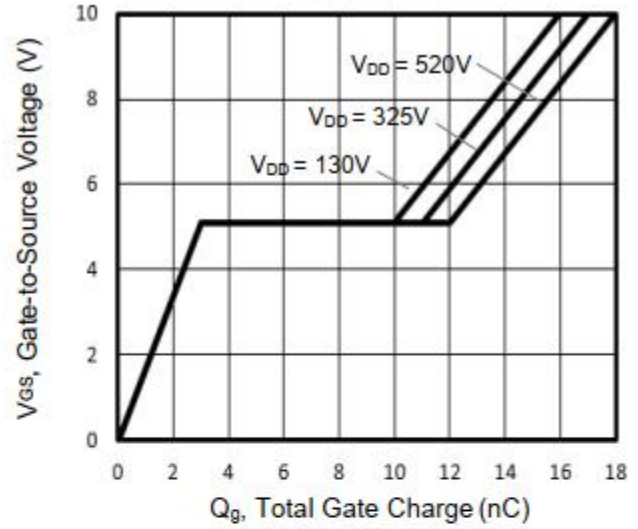


Figure 9. Transient Thermal Impedance TO-251, TO-252

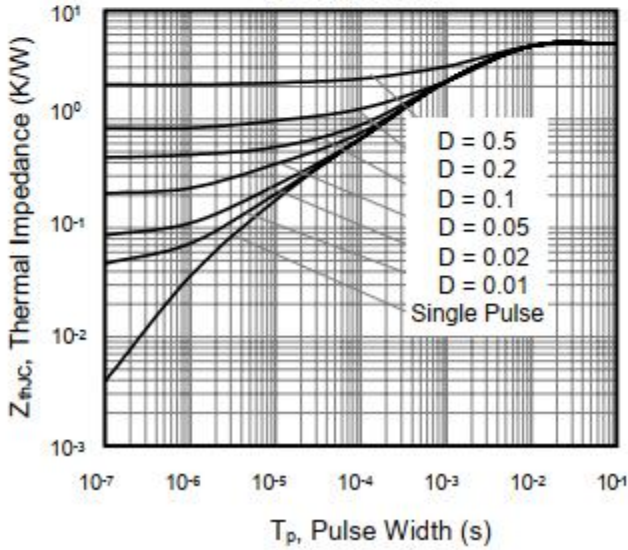
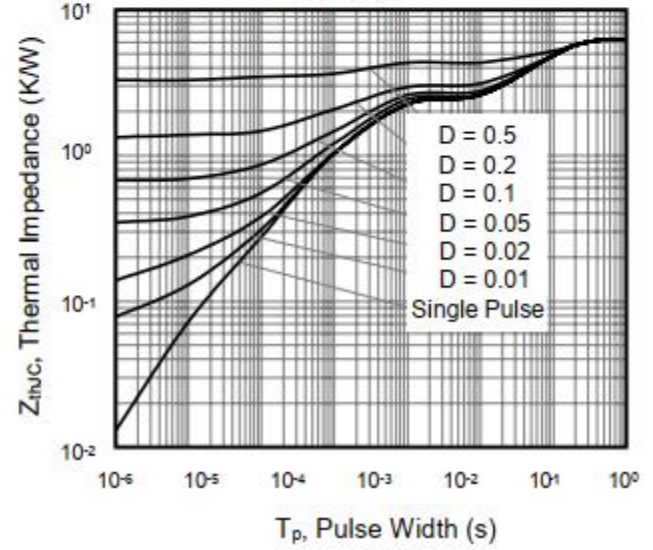
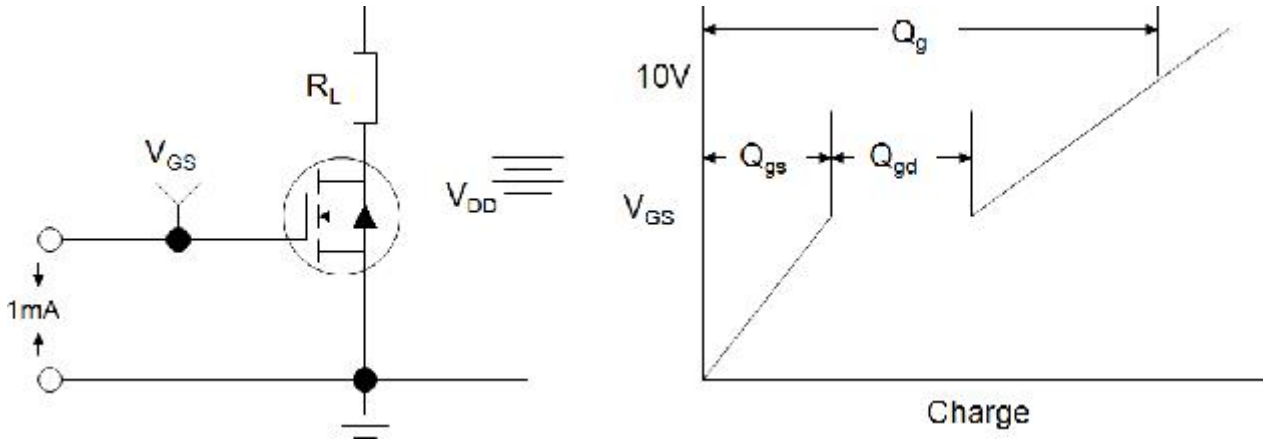


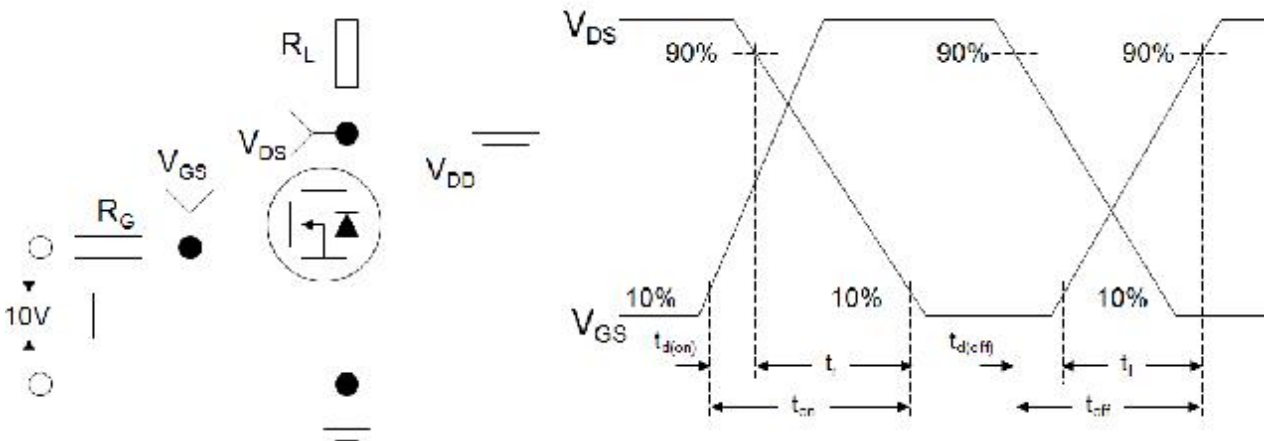
Figure 10. Transient Thermal Impedance TO-220F



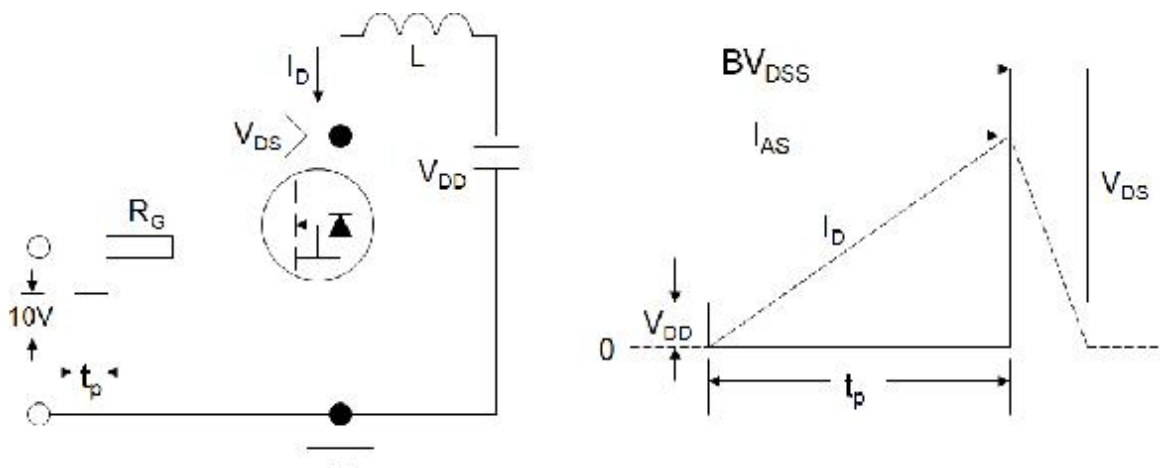
FigureA: GateChargeTestCircuitand Waveform



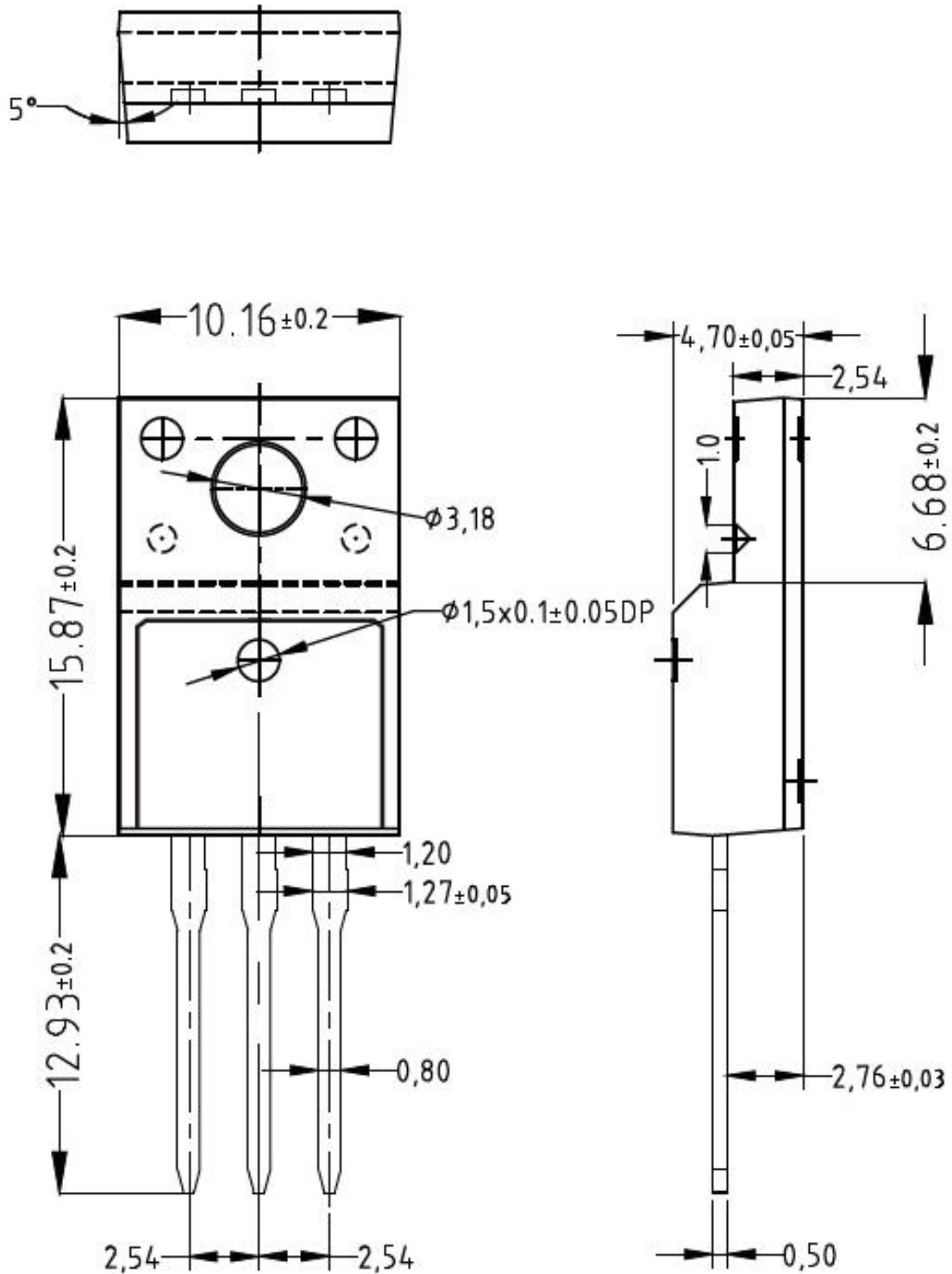
FigureB: ResistiveSwitchingTestCircuitandWaveform



FigureC: UnclampedInductiveSwitchingTestCircuitandWaveform



Package Information:



TO-220F 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 without prior notice.

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