

**FEATURES**

- Originative New Design
- 100% EAS Test
- Rugged Gate Oxide Technology
- Extremely Low Intrinsic Capacitances
- Remarkable Switching Characteristics
- Unequalled Gate Charge : 28.0 nC (Typ.)
- Extended Safe Operating Area
- Lower  $R_{DS(ON)}$  : 1.48  $\Omega$  (Typ.) @  $V_{GS}=10V$

**APPLICATION**

- High current, High speed switching
- Suitable for power supplies, adaptors and PFC
- SMPS (Switched Mode Power Supplies)

**PFP8N80 / PFF8N80**  
**800V N-Channel MOSFET**

$BV_{DSS} = 800\text{ V}$ $R_{DS(on)} = 1.48\ \Omega$ $I_D = 8.0\text{ A}$	
<b>TO-220</b>  1.Gate 2. Drain 3. Source	<b>TO-220F</b>  1.Gate 2. Drain 3. Source

**Absolute Maximum Ratings**  $T_C=25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter	PFP8N80	PFF8N80	Units
$V_{DSS}$	Drain-Source Voltage	800		V
$I_D$	Drain Current – Continuous ( $T_C = 25^\circ\text{C}$ )	8.0	8.0*	A
	Drain Current – Continuous ( $T_C = 100^\circ\text{C}$ )	5.1	5.1*	A
$I_{DM}$	Drain Current – Pulsed (Note 1)	32	32*	A
$V_{GS}$	Gate-Source Voltage	$\pm 30$		V
$E_{AS}$	Single Pulsed Avalanche Energy (Note 2)	800		mJ
$I_{AR}$	Avalanche Current (Note 1)	8.0		A
$E_{AR}$	Repetitive Avalanche Energy (Note 1)	17.8		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5		V/ns
$P_D$	Power Dissipation ( $T_C = 25^\circ\text{C}$ )	178	59.5	W
	- Derate above $25^\circ\text{C}$	1.43	0.48	W/ $^\circ\text{C}$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150		$^\circ\text{C}$
$T_L$	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300		$^\circ\text{C}$

\* Drain current limited by maximum junction temperature.

**Thermal Resistance Characteristics**

Symbol	Parameter	PFP8N80	PFF8N80	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.7	2.1	$^\circ\text{C}/\text{W}$
$R_{\theta JS}$	Thermal Resistance, Junction-to-Sink	0.5	--	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	62.5	

**Electrical Characteristics**  $T_C=25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>On Characteristics</b>						
$V_{GS}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	2.5	--	4.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 10 \text{ V}, I_D = 4.0 \text{ A}$	--	1.48	1.65	$\Omega$

**Off Characteristics**

$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	800	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$ , Referenced to $25^\circ\text{C}$	--	0.5	--	$\text{V}/^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 800 \text{ V}, V_{GS} = 0 \text{ V}$	--	--	10	$\mu\text{A}$
		$V_{DS} = 640 \text{ V}, T_C = 125^\circ\text{C}$	--	--	100	$\mu\text{A}$
$I_{GSSF}$	Gate-Body Leakage Current, Forward	$V_{GS} = 30 \text{ V}, V_{DS} = 0 \text{ V}$	--	--	100	nA
$I_{GSSR}$	Gate-Body Leakage Current, Reverse	$V_{GS} = -30 \text{ V}, V_{DS} = 0 \text{ V}$	--	--	-100	nA

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V},$ $f = 1.0 \text{ MHz}$	--	1515	1970	pF
$C_{oss}$	Output Capacitance		--	120	160	pF
$C_{rss}$	Reverse Transfer Capacitance		--	12	16	pF

**Switching Characteristics**

$t_{d(on)}$	Turn-On Time	$V_{DS} = 400 \text{ V}, I_D = 8.0 \text{ A},$ $R_G = 25 \Omega$  (Note 4,5)	--	28	56	ns
$t_r$	Turn-On Rise Time		--	24	48	ns
$t_{d(off)}$	Turn-Off Delay Time		--	75	150	ns
$t_f$	Turn-Off Fall Time		--	28	56	ns
$Q_g$	Total Gate Charge	$V_{DS} = 640 \text{ V}, I_D = 8.0 \text{ A},$ $V_{GS} = 10 \text{ V}$  (Note 4,5)	--	28	35	nC
$Q_{gs}$	Gate-Source Charge		--	9	--	nC
$Q_{gd}$	Gate-Drain Charge		--	10	--	nC

**Source-Drain Diode Maximum Ratings and Characteristics**

$I_S$	Continuous Source-Drain Diode Forward Current	--	--	8.0	A	
$I_{SM}$	Pulsed Source-Drain Diode Forward Current	--	--	32		
$V_{SD}$	Source-Drain Diode Forward Voltage	$I_S = 8.0 \text{ A}, V_{GS} = 0 \text{ V}$	--	--	1.4	V
$t_{rr}$	Reverse Recovery Time	$I_S = 8.0 \text{ A}, V_{GS} = 0 \text{ V}$	--	490	--	ns
$Q_{rr}$	Reverse Recovery Charge	$di_f/dt = 100 \text{ A}/\mu\text{s}$ (Note 4)	--	4.7	--	$\mu\text{C}$

**Notes ;**

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2.  $L=25\text{mH}, I_{AS}=8.0\text{A}, V_{OD}=50\text{V}, R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$
3.  $I_{SD}\leq 8.0\text{A}, di/dt\leq 300\text{A}/\mu\text{s}, V_{DD}\leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$
4. Pulse Test : Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$
5. Essentially Independent of Operating Temperature

# Typical Characteristics

Figure 1. On Region Characteristics

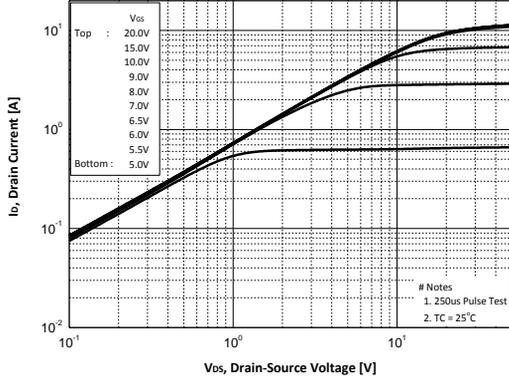


Figure 2. Transfer Characteristics

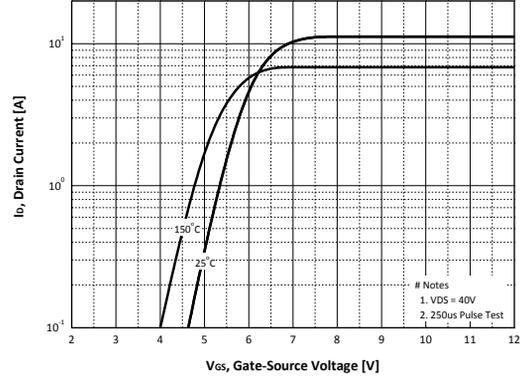


Figure 3. Static Drain-Source On Resistance

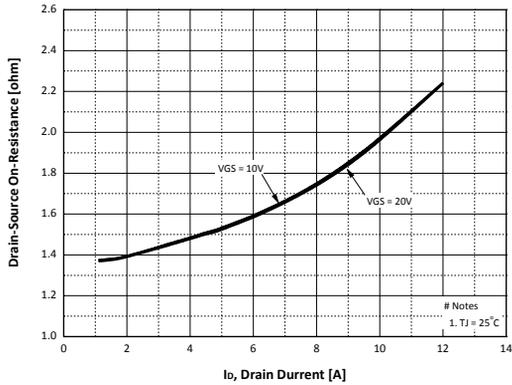


Figure 4. Body Diode Forward Voltage

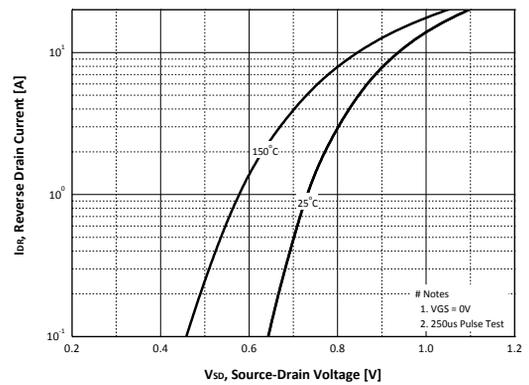


Figure 5. Capacitance Characteristics

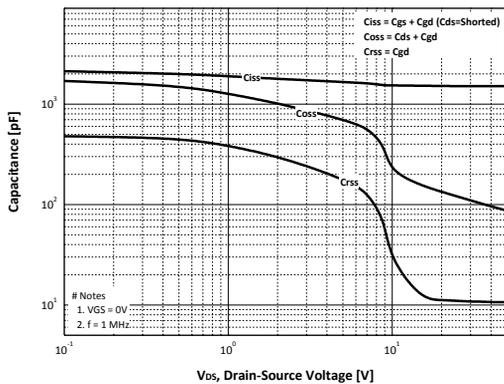
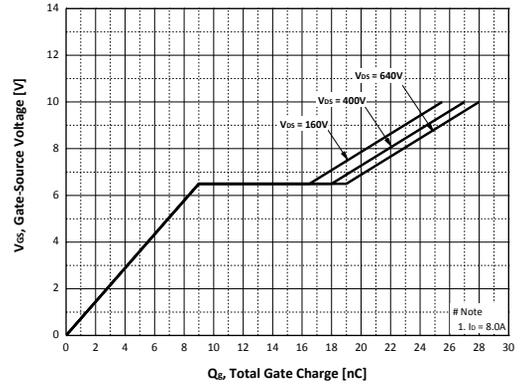
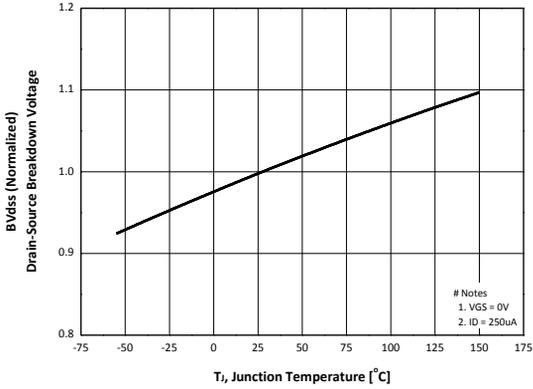


Figure 6. Gate Charge Characteristics

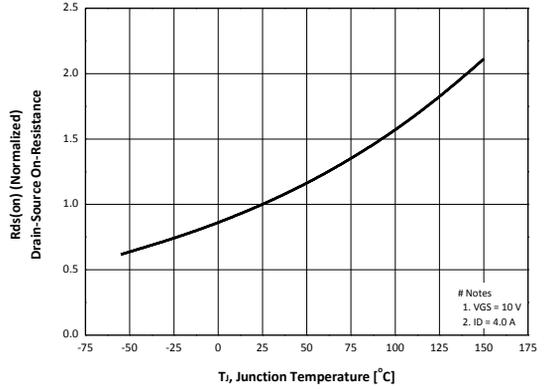


# Typical Characteristics

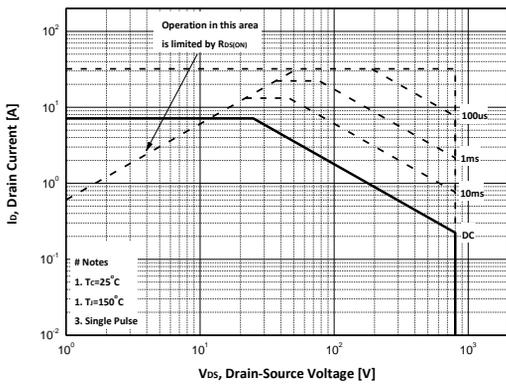
**Figure 7. Breakdown Voltage Variation vs. Temperature**



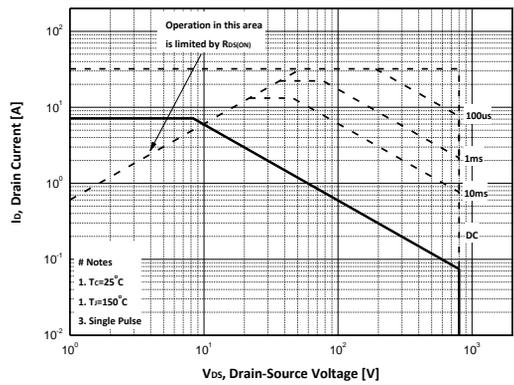
**Figure 8. On-Resistance Variation vs. Temperature**



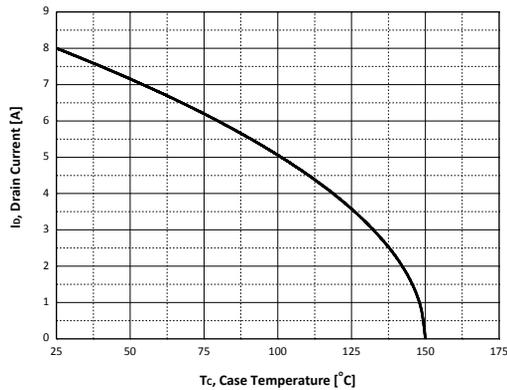
**Figure 9-1. Safe Operation Area for PFP8N80**



**Figure 9-2. Safe Operation Area for PFF8N80**



**Figure 10. Maximum Drain Current vs. Case Temperature**



Typical Characteristics

Figure 11-1. Transient Thermal Response Curve for PFP8N80

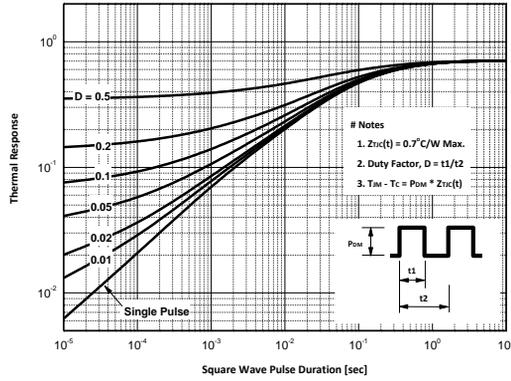
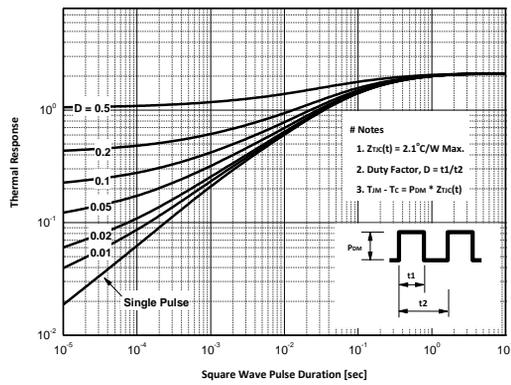


Figure 11-2. Transient Thermal Response Curve for PFF8N80



Characteristics Test Circuit & Waveform

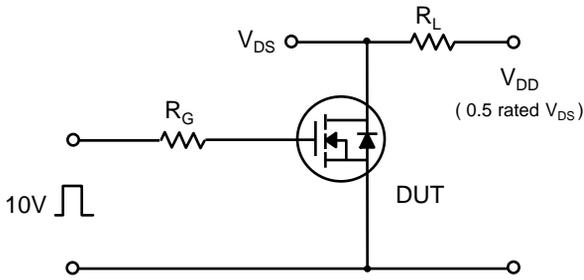


Fig 14. Resistive Switching Test Circuit & Waveforms

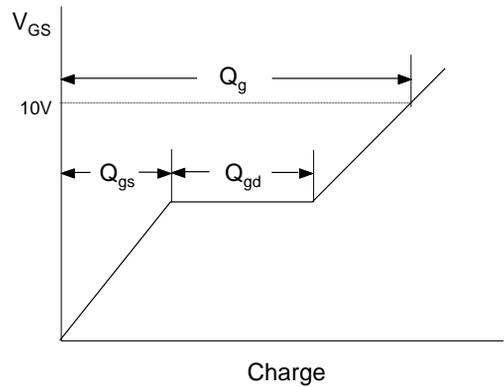
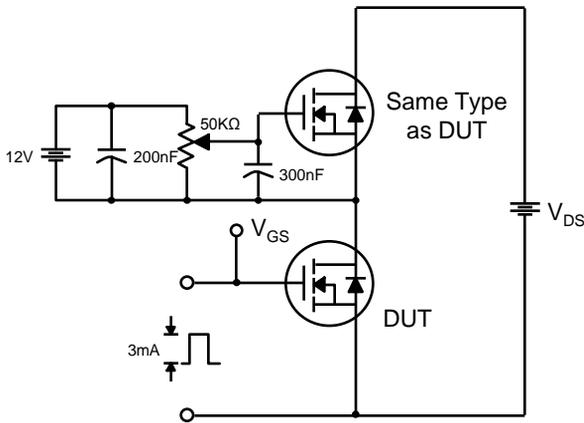


Fig 15. Gate Charge Test Circuit & Waveform

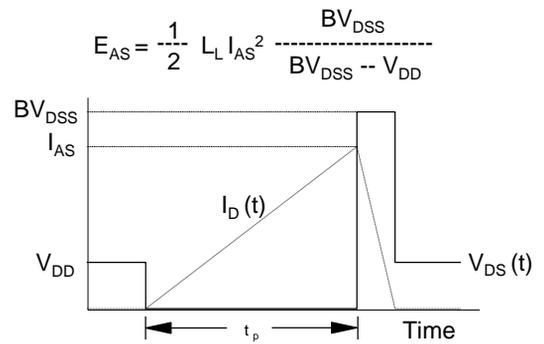
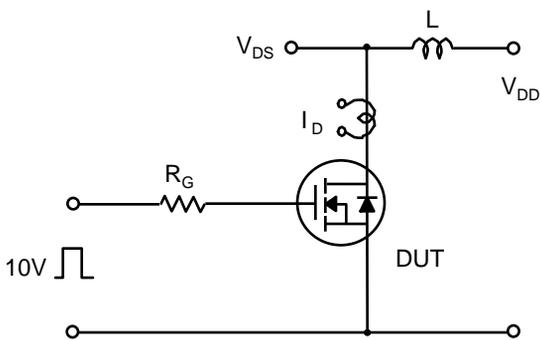


Fig 16. Unclamped Inductive Switching Test Circuit & Waveforms

Characteristics Test Circuit & Waveform (continued)

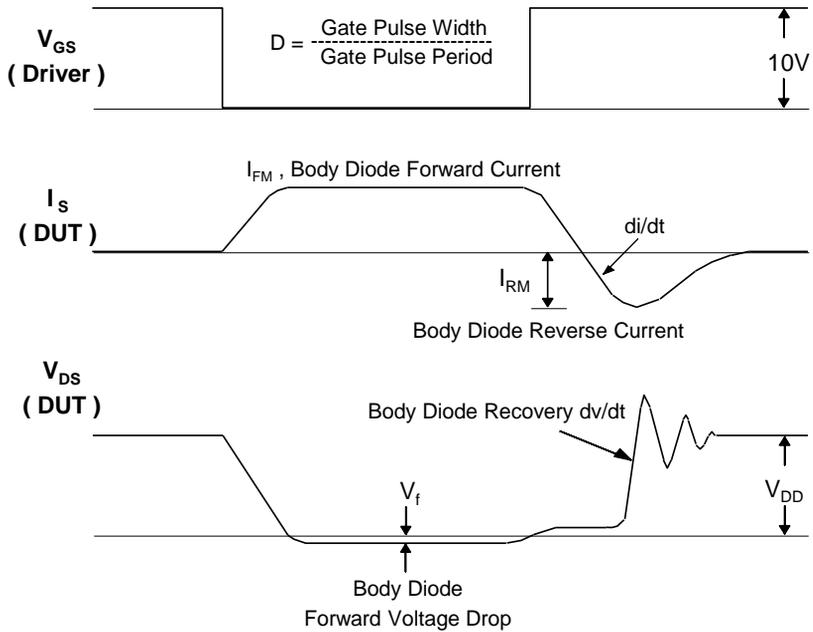
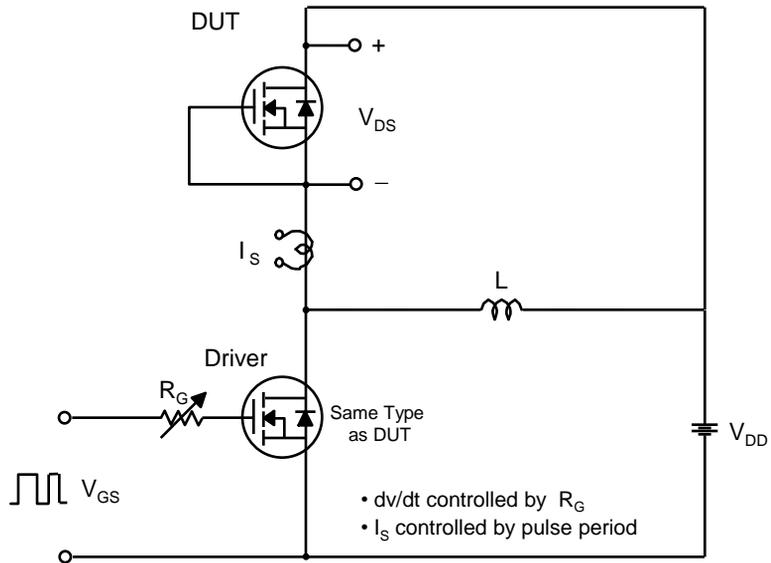
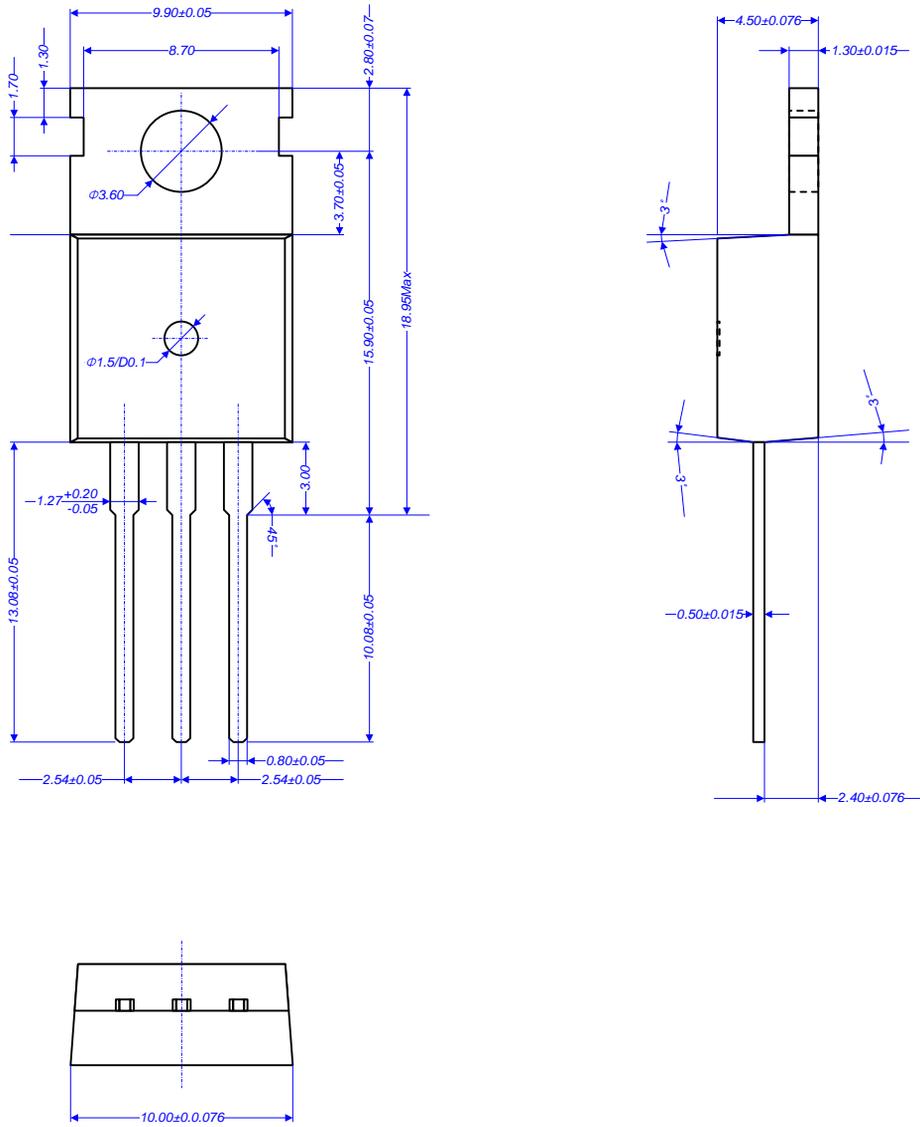


Fig 17. Peak Diode Recovery  $dv/dt$  Test Circuit & Waveforms

# Package Dimension

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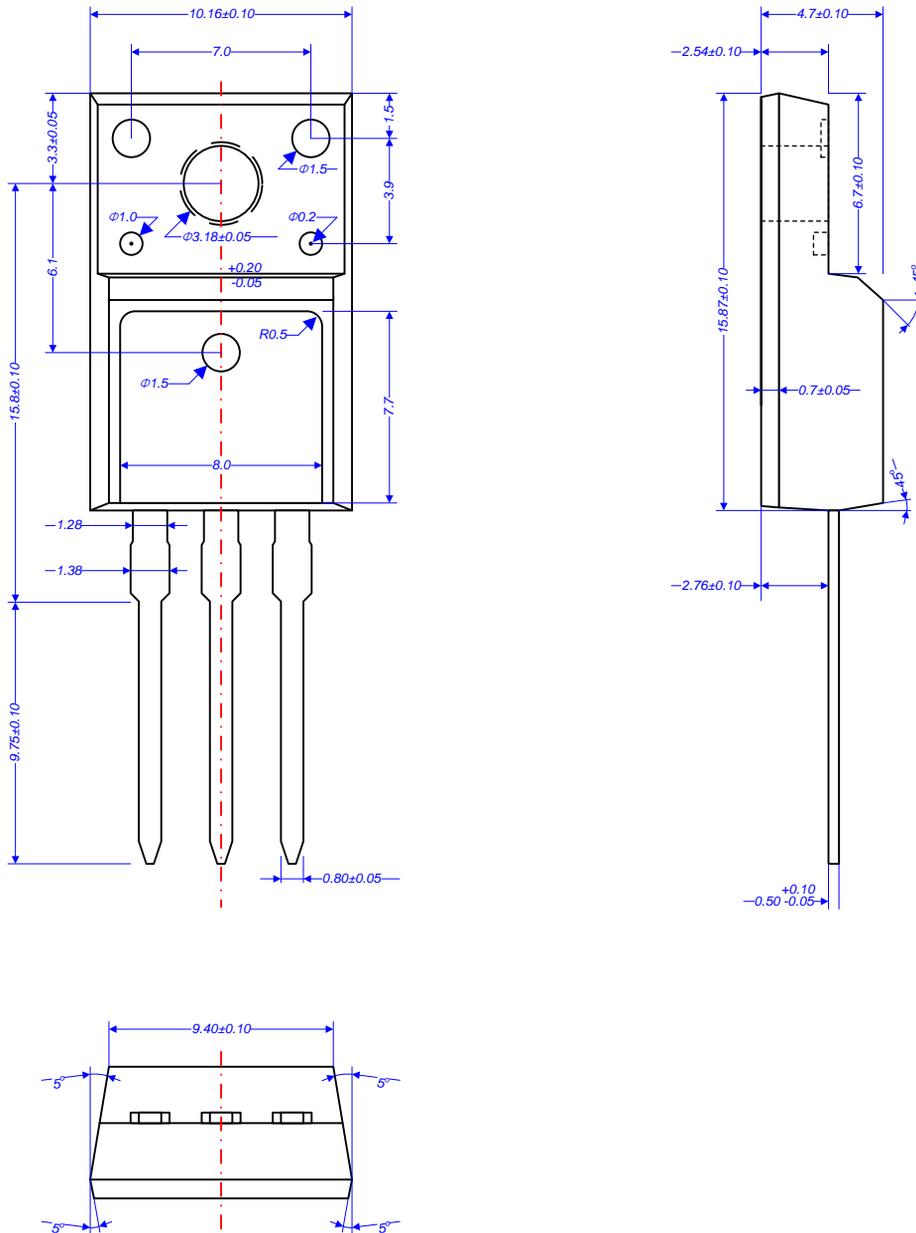
## TO-220



# Package Dimension

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## TO-220F



PFP8N80 / PFF8N80