PFP7N80E / PFF7N80E

800V N-Channel MOSFET

FEATURES

- Originative New Design
- 100% EAS Test
- Rugged Gate Oxide Technology
- Extremely Low Intrinsic Capacitances
- Remarkable Switching Characteristics
- Unequalled Gate Charge : 30 nC (Typ.)
- Extended Safe Operating Area
- Lower $R_{DS(ON)}$: 1.45 Ω (Typ.) @V_{GS}=10V

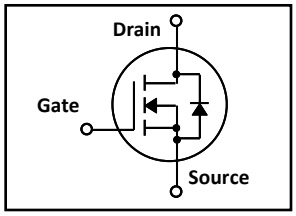
APPLICATION

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

BV_{DSS} = 800 V

$R_{DS(on)}$ = 1.45 Ω

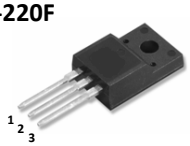
I_D = 6.7 A



TO-220

1.Gate 2. Drain 3. Source

TO-220F



1.Gate 2. Drain 3. Source

Absolute Maximum Ratings

T_C=25°C unless otherwise specified

Symbol	Parameter	PFP7N80E	PFF7N80E	Units
V_{DSS}	Drain-Source Voltage	800		V
I_D	Drain Current – Continuous (T_C = 25°C)	6.7	6.7*	A
	Drain Current – Continuous (T_C = 100°C)	4.2	4.2*	A
I_{DM}	Drain Current – Pulsed (Note 1)	26.8	26.8*	A
V_{GS}	Gate-Source Voltage	±30		V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	596		mJ
I_{AR}	Avalanche Current (Note 1)	6.7		A
E_{AR}	Repetitive Avalanche Energy (Note 1)	16.7		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5		V/ns
P_D	Power Dissipation (T_C = 25°C)	167	55.6	W
	- Derate above 25°C	1.33	0.44	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150		°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300		°C

* Drain current limited by maximum junction temperature.

Thermal Resistance Characteristics

Symbol	Parameter	PFP7N80E	PFF7N80E	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.75	2.25	°C/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 °C unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
On Characteristics						
V_{GS}	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 uA	2.5	--	4.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 3.5 A	--	1.45	1.85	Ω
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 uA	800	--	--	V
ΔBV_{DSS} /ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 uA, Referenced to25°C	--	0.9	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 800 V, V_{GS} = 0 V	--	--	10	uA
		V_{DS} = 640 V, T_C = 125°C	--	--	100	uA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	1665	2165	pF
C_{oss}	Output Capacitance		--	110	140	pF
C_{rss}	Reverse Transfer Capacitance		--	7	9	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Time	V_{DS} = 400 V, I_D = 7.0 A, R_G = 25 Ω (Note 4,5)	--	20	40	ns
t_r	Turn-On Rise Time		--	21	42	ns
$t_{d(off)}$	Turn-Off Delay Time		--	54	108	ns
t_f	Turn-Off Fall Time		--	22	44	ns
Q_g	Total Gate Charge	V_{DS} = 640 V, I_D = 7.0 A, V_{GS} = 10 V (Note 4,5)	--	30	40	nC
Q_{gs}	Gate-Source Charge		--	10	--	nC
Q_{gd}	Gate-Drain Charge		--	7	--	nC
Source-Drain Diode Maximum Ratings and Characteristics						
I_S	Continuous Source-Drain Diode Forward Current		--	--	6.7	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		--	--	26.8	
V_{SD}	Source-Drain Diode Forward Voltage	I_S = 7.0 A, V_{GS} = 0 V	--	--	1.4	V
trr	Reverse Recovery Time	I_S = 7.0 A, V_{GS} = 0 V di_F/dt = 100 A/us (Note 4)	--	490	--	ns
Qrr	Reverse Recovery Charge		--	5.2	--	uC

Notes ;

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L=21mH, I_{AS}=7.0A, V_{DD}=50V, R_G=25Ω, Starting T_J =25°C
3. I_{SD}≤7.0A, di/dt≤200A/us, V_{DD}≤BV_{DSS} , Starting T_J =25 °C
4. Pulse Test : Pulse Width ≤ 300us, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature

Typical Characteristics

Fig.1 On Region Characteristics

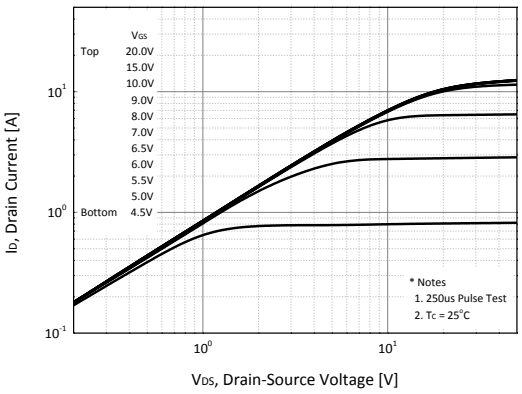


Fig.2 Transfer Characteristics

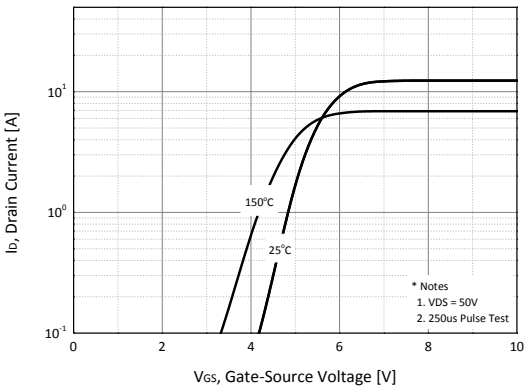


Fig.3 Static Drain-Source On Resistance

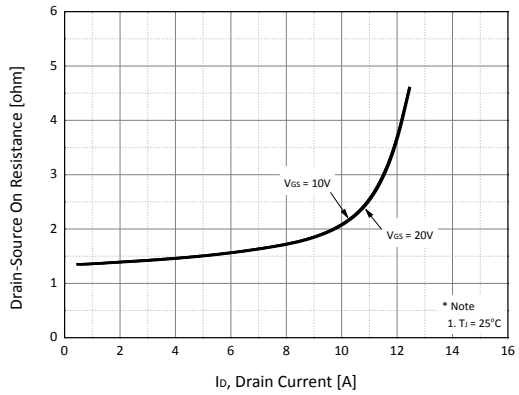


Fig.4 Body Diode Forward Voltage

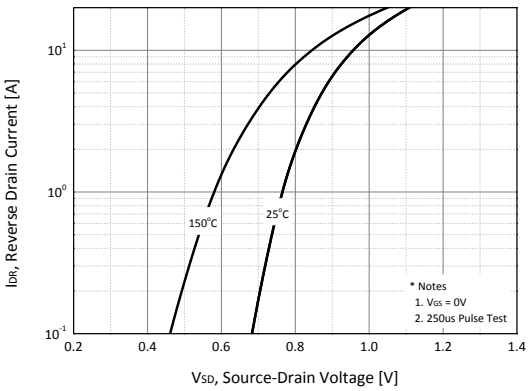


Fig.5 Capacitance Characteristics

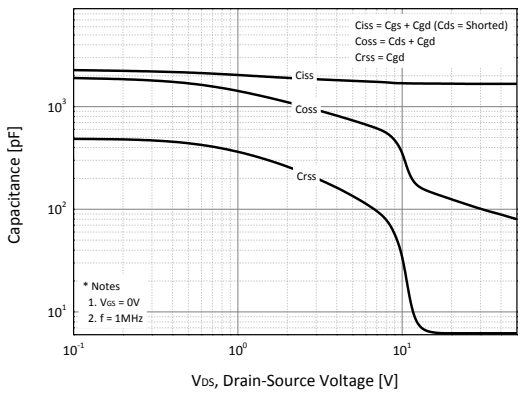
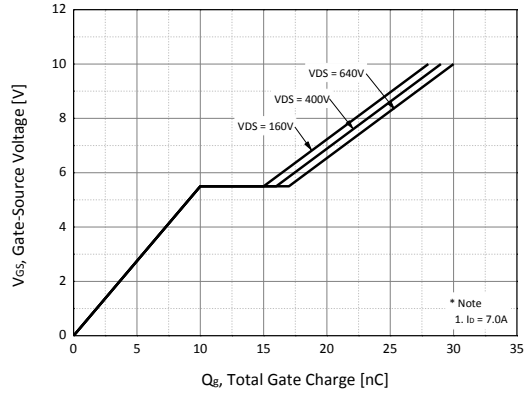


Fig.6 Gate Charge Characteristics



Typical Characteristics

Fig.7 BV_{DSS} Variation vs. Temperature

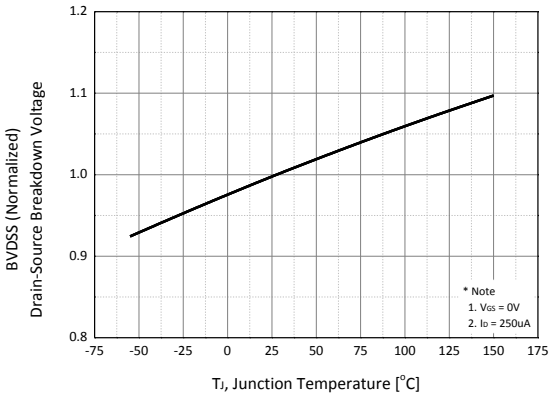


Fig.8 On-Resistance Variation vs. Temperature

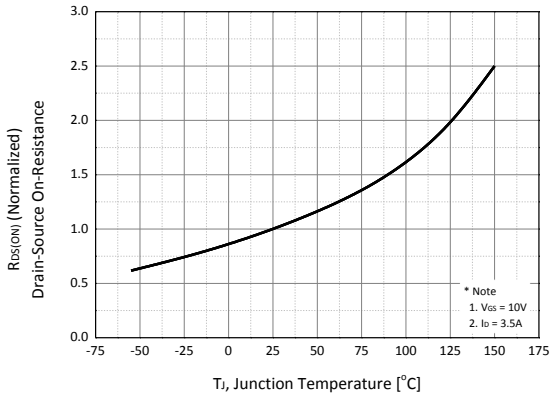


Fig.9-1 Safe Operation Area for TO-220

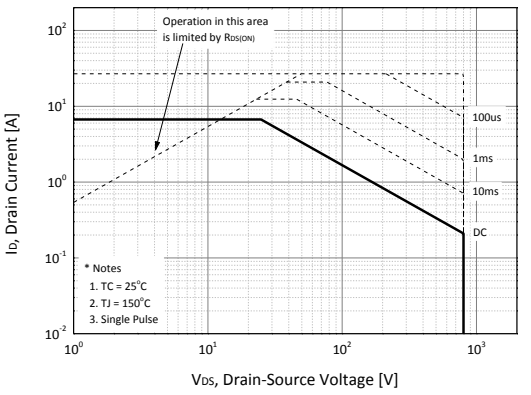


Fig.9-2 Safe Operation Area for TO-220F

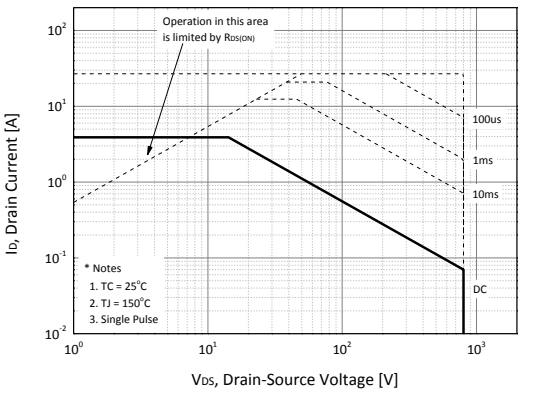
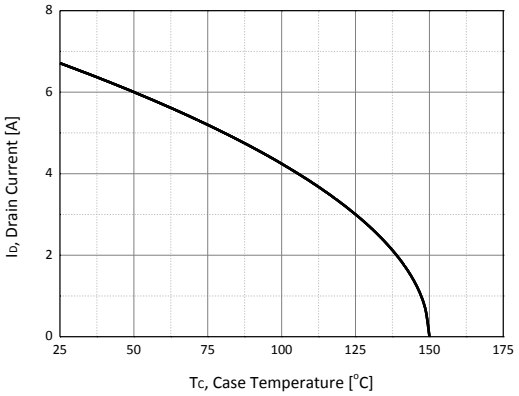


Fig.10 Maximum I_D vs. Case Temperature



Typical Characteristics

Fig.11-1 Transient Thermal Response Curve

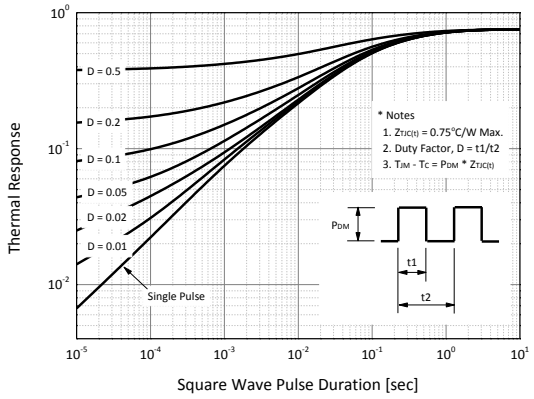
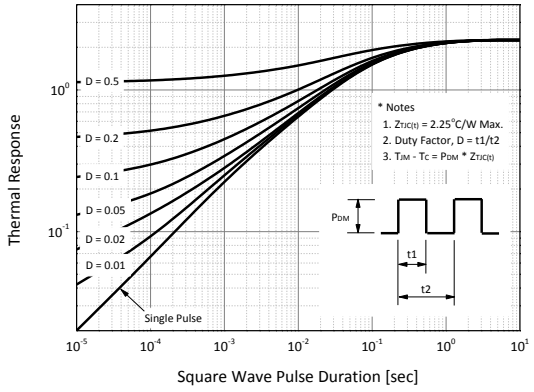


Fig.11-2 Transient Thermal Response Curve



Characteristics Test Circuit & Waveform

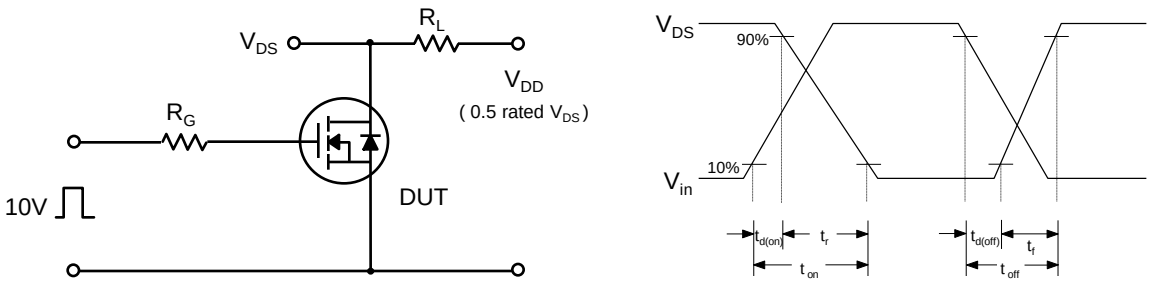


Fig 14. Resistive Switching Test Circuit & Waveforms

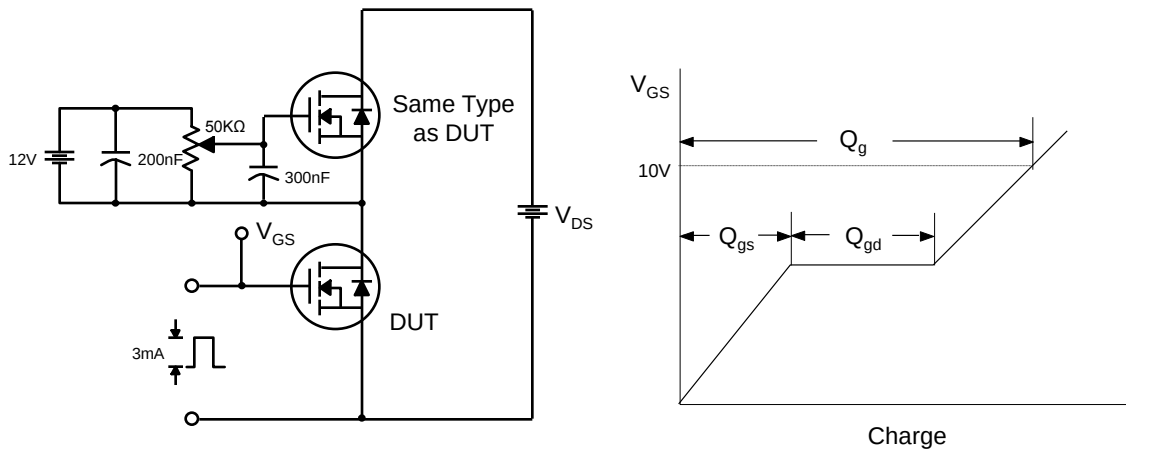


Fig 15. Gate Charge Test Circuit & Waveform

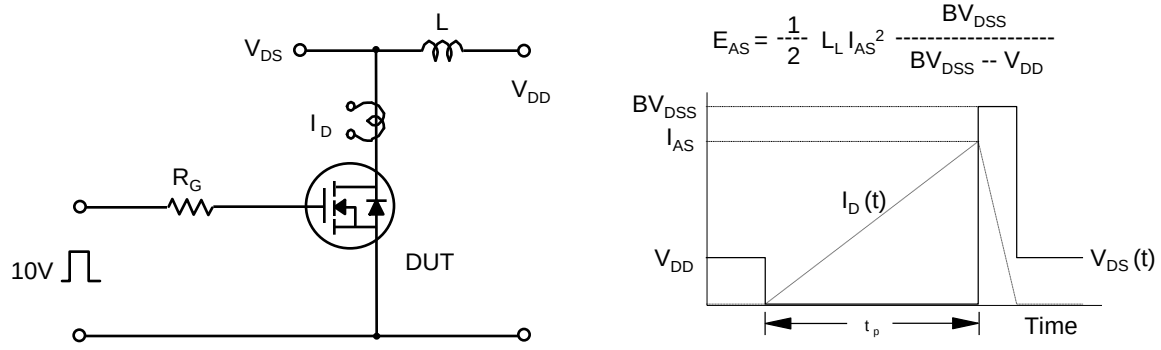
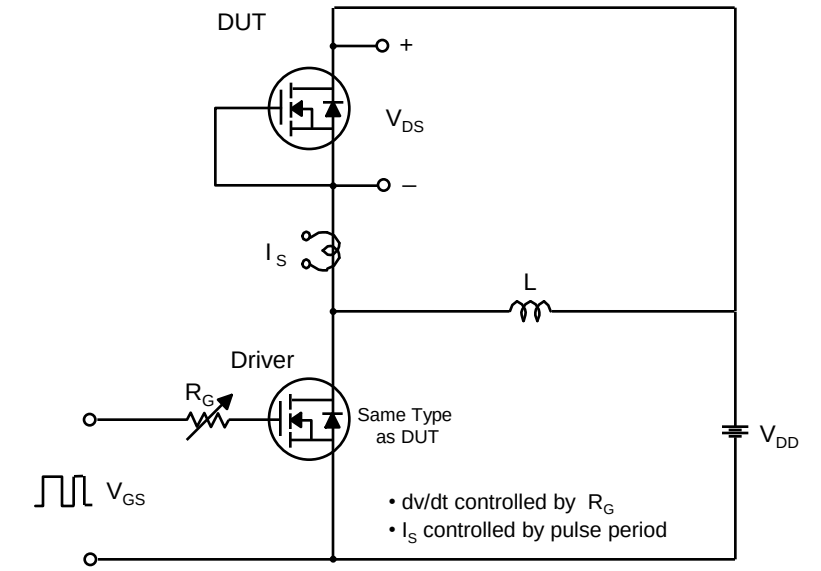


Fig 16. Unclamped Inductive Switching Test Circuit & Waveforms

Characteristics Test Circuit & Waveform (continued)



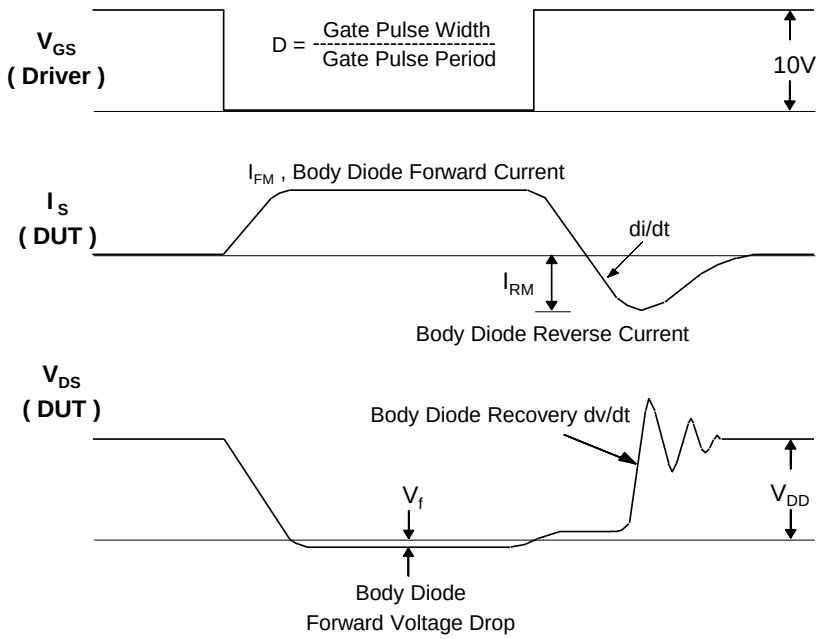
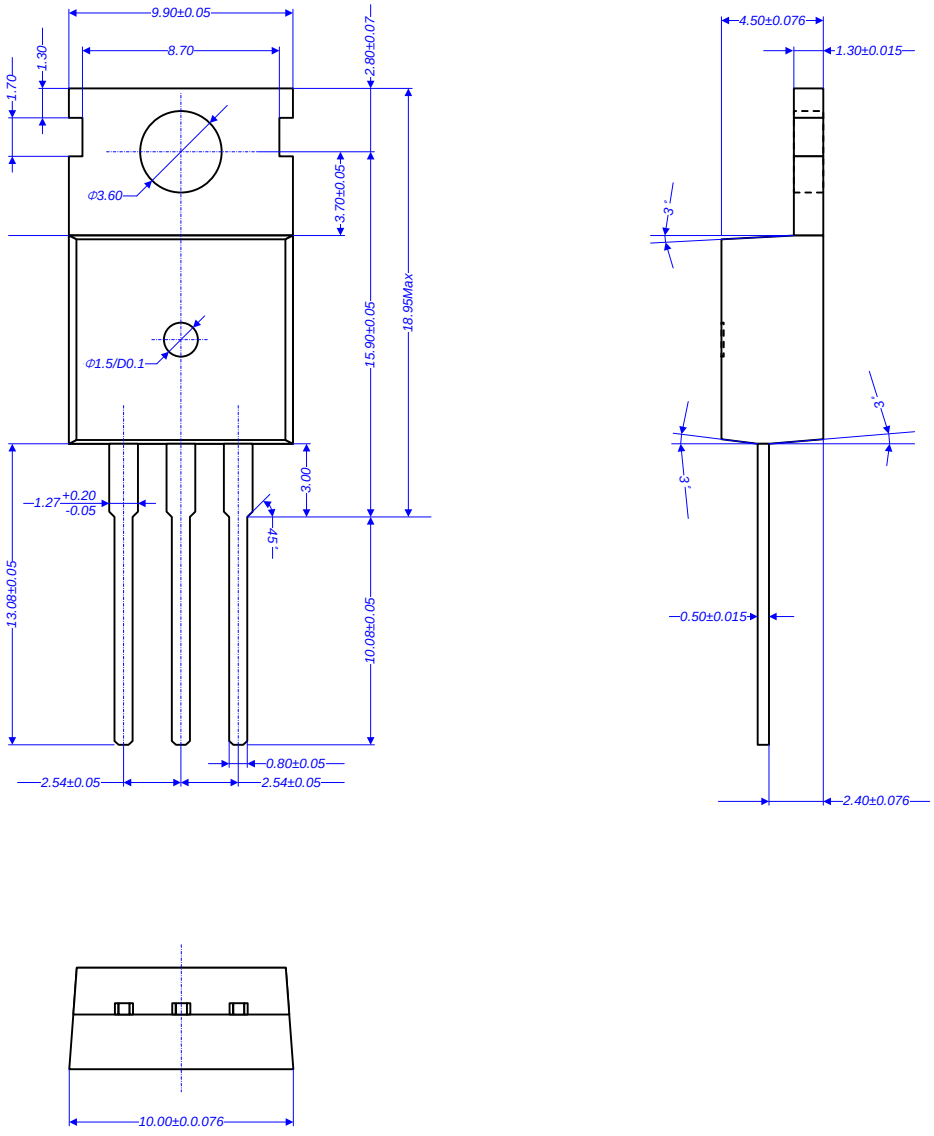


Fig 17. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Package Dimension

Z

TO-220



Package Dimension

Z

TO-220F