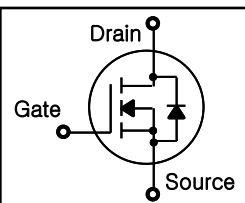


PFP60R180 / PFF60R180

N-Channel Super Junction MOSFET

FEATURES

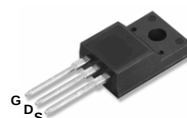
- ❑ New technology for high voltage device
- ❑ Low $R_{DS(on)}$ low conduction losses
- ❑ Small package
- ❑ Ultra low gate charge cause lower driving requirement
- ❑ 100% avalanche tested
- ❑ RoHS

 $BV_{DSS} = 600\text{ V}$
 $R_{DS(on)} = 0.15\ \Omega$
 $I_D = 21\text{ A}$


TO-220



TO-220F



APPLICATION

- ❑ Power Factor Correction(PFC)
- ❑ Switched mode power supply (SMPS)
- ❑ Uninterruptible Power Supply (UPS)

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

Symbol	Parameter	PFP60R180	PFF60R180	Units
V_{DS}	Drain-Source Voltage ($V_{GS}=0\text{V}$)	600		V
I_D	Drain Current – Continuous ($T_c = 25^\circ\text{C}$)	21	21*	A
	Drain Current – Continuous ($T_c = 100^\circ\text{C}$)	13.2	13.2*	A
$I_{DM}(\text{pulse})$	Drain Current – Pulsed * Note 1	63	63*	A
V_{GS}	Gate-Source Voltage ($V_{DS}=0\text{V}$)	± 30		V
E_{AS}	Single Pulsed Avalanche Energy * Note 2	690		mJ
I_{AR}	Avalanche Current * Note 1	7.0		A
E_{AR}	Repetitive Avalanche Energy * Note 1	1.0		mJ
dv/dt	Drain Source Voltage Slope, $V_{DS} \leq 480\text{V}$	50		V/ns
	Reverse Diode dv/dt, $V_{DS} \leq 480\text{V}$	15		V/ns
P_D	Maximum Power Dissipation ($T_c = 25^\circ\text{C}$)	200	34	W
	Derate above 25°C	1.6	0.27	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150		$^\circ\text{C}$

* Limited by maximum junction temperature

Thermal Resistance Characteristics

Symbol	Parameter	PFP60R180	PFF60R180	Units
$R_{\theta JC}$	Junction-to-Case (Maximum)	0.62	3.67	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction-to-Ambient (Maximum)	62	80	

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 uA	2.5	3.0	3.5	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 10.5 A	--	150	180	m.ohm
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 uA	600	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 600 V, V _{GS} = 0 V	--	--	1	uA
		V _{DS} = 600 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						
g _{FS}	Forward Transconductance	V _{DS} = 20V, I _D = 10.5 A	--	17.5	--	S
R _G	Intrinsic Gate Resistance	f = 1.0 MHz, open drain	--	1.0	--	ohm
C _{iss}	Input Capacitance	V _{DS} = 50 V, V _{GS} = 0 V, f = 1.0 MHz	--	1950	--	pF
C _{oss}	Output Capacitance		--	150	--	pF
C _{rss}	Reverse Transfer Capacitance		--	5.0	--	pF
Q _g	Total Gate Charge	V _{DS} = 480 V, I _D = 21 A, V _{GS} = 10 V	--	45	70	nC
Q _{gs}	Gate-Source Charge		--	9	--	nC
Q _{gd}	Gate-Drain Charge		--	18	--	nC
Switching Characteristics						
t _{d(on)}	Turn-On Time	V _{DS} = 380 V, I _D = 11 A, R _G = 4 Ω, V _{GS} = 10V	--	11	--	ns
t _r	Turn-On Rise Time		--	6	--	ns
t _{d(off)}	Turn-Off Delay Time		--	61	100	ns
t _f	Turn-Off Fall Time		--	4.5	12	ns
Source-Drain Diode Maximum Ratings and Characteristics						
I _S	Continuous Source-Drain Diode Forward Current		--	--	21	A
I _{SM}	Pulsed Source-Drain Diode Forward Current		--	--	63	
V _{SD}	Source-Drain Diode Forward Voltage	I _S = 21 A, V _{GS} = 0 V	--	0.9	1.3	V
t _{rr}	Reverse Recovery Time	I _S = 21 A	--	310	--	ns
Q _{rr}	Reverse Recovery Charge	di/dt = 100 A/μs	--	5	--	μC

Notes ;

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $V_{DD}=50\text{ V}$, $R_G=25\text{ }\Omega$, Starting $T_J=25\text{ }^{\circ}\text{C}$

Typical Characteristics

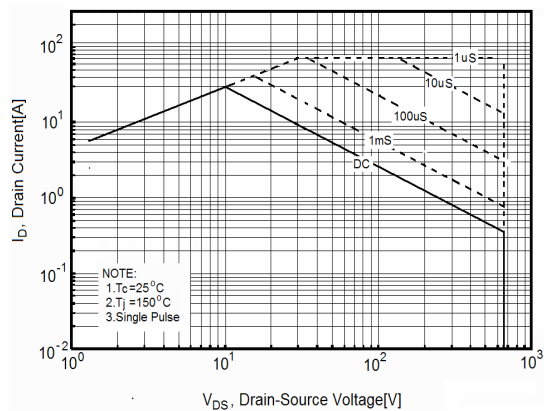


Figure 1. Safe Operating Area(TO-220)

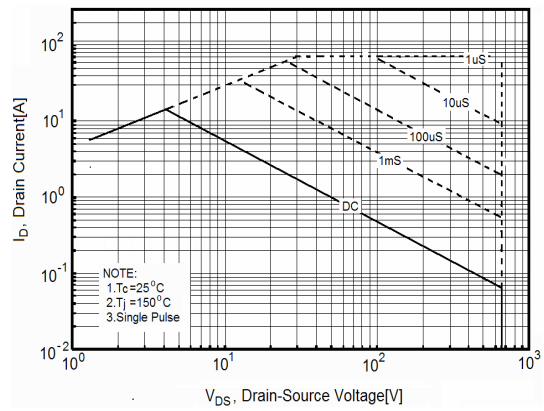


Figure 2. Safe Operating Area(TO-220F)

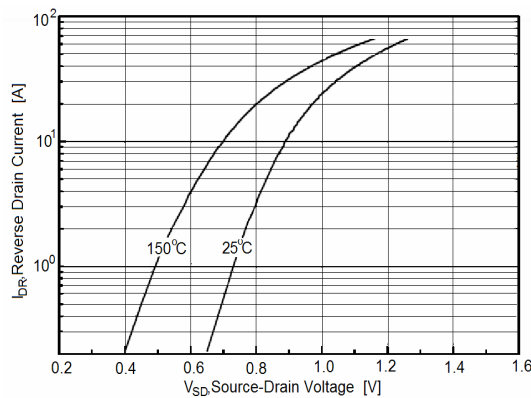


Figure 3. Source-Drain Diode Forward Voltage

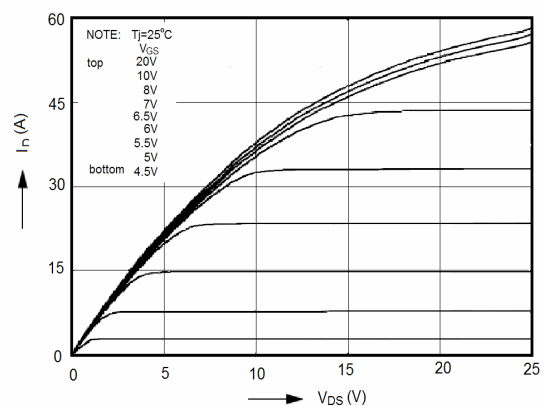


Figure 4. Output Characteristics

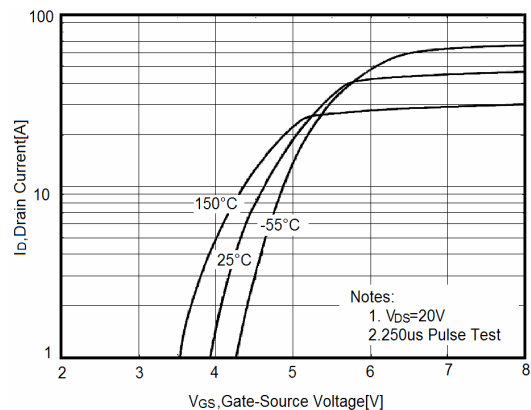


Figure 5. Transfer Characteristics

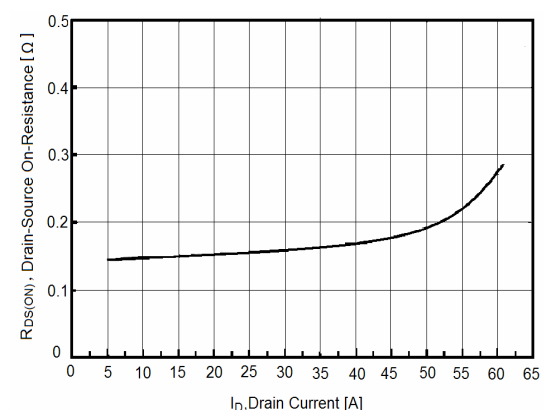


Figure 6. Static Drain-Source On Resistance

Typical Characteristics (continued)

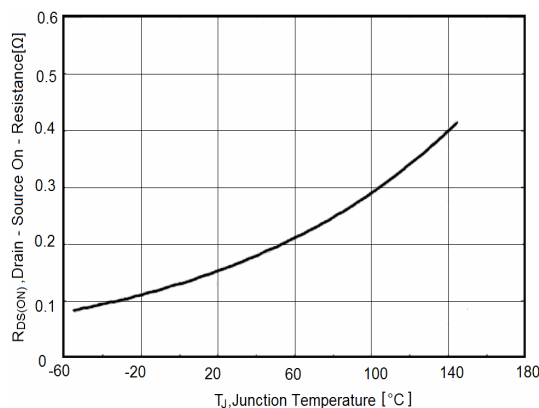


Figure 7. $R_{DS(on)}$ vs. Junction Temperature

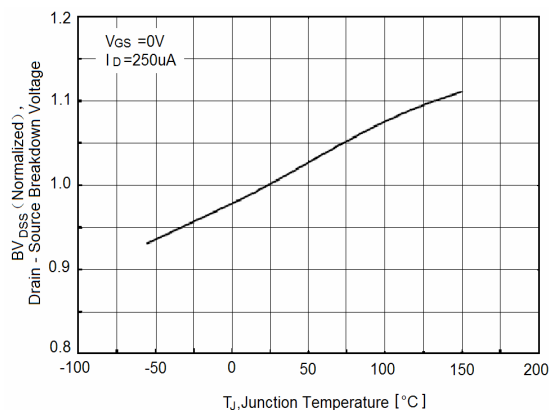


Figure 8. BV_{DSS} vs. Junction Temperature

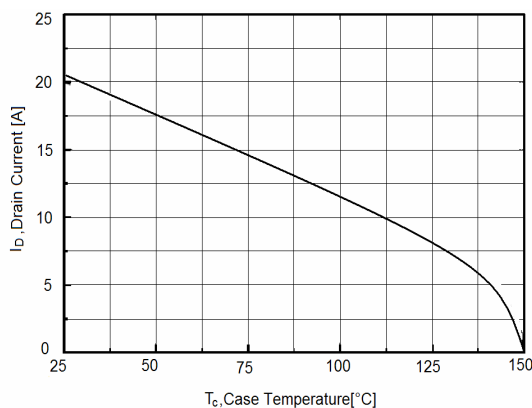


Figure 9. Maximum I_D vs. Junction Temperature

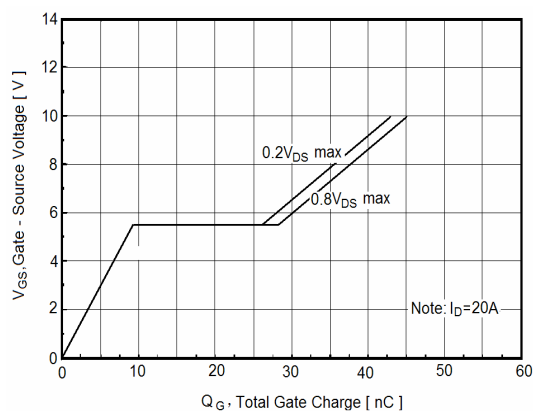


Figure 10. Gate Charge Waveforms

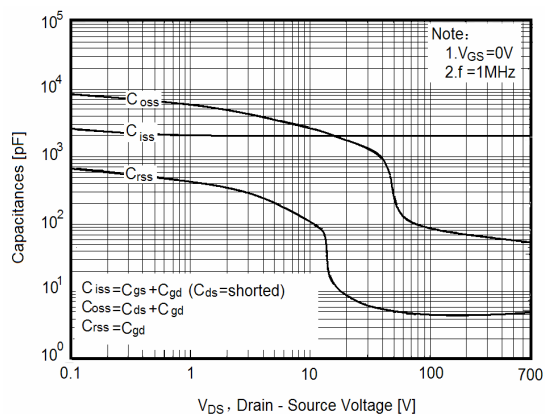


Figure 11. Capacitance

Typical Characteristics (continued)

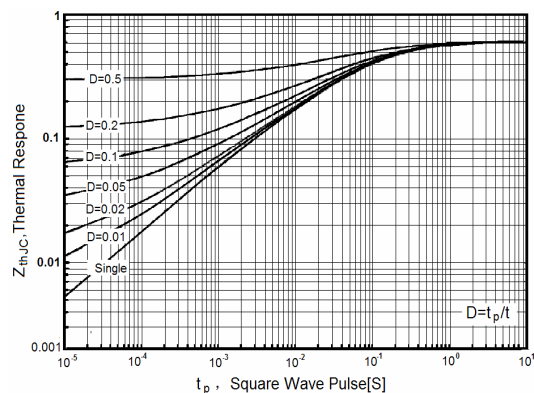


Figure 12. Transient Thermal Response Curve (TO-220)

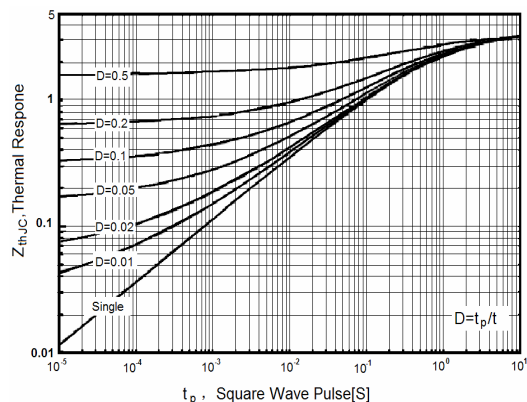
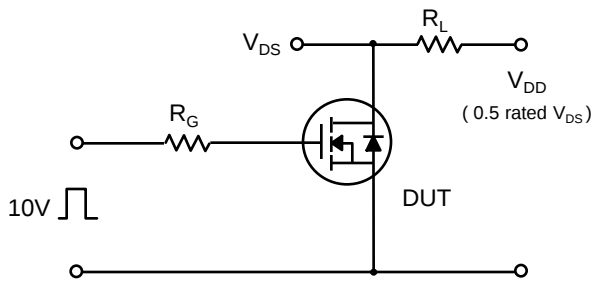
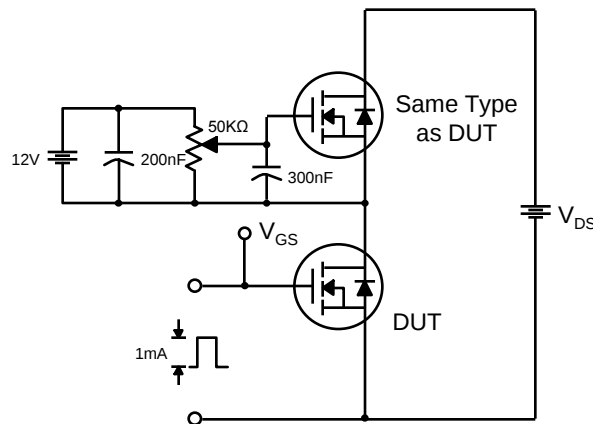


Figure 13. Transient Thermal Response Curve (TO-220F)

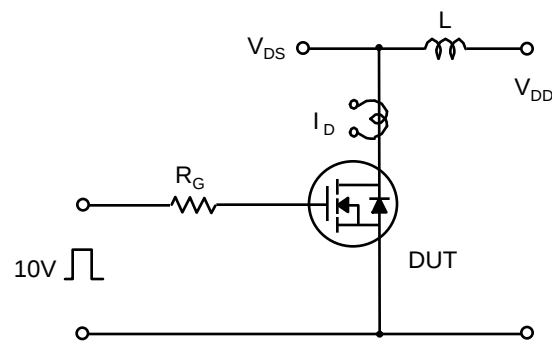
Characteristics Test Circuit & Waveform



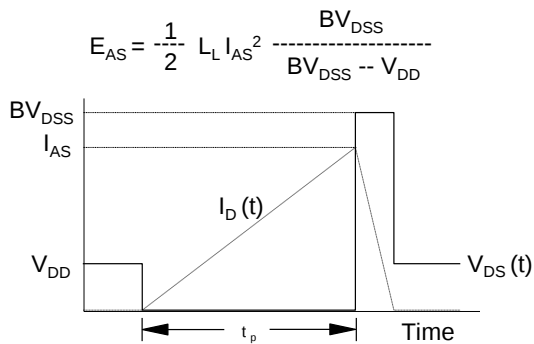
Switching Time Test Circuit & Waveforms



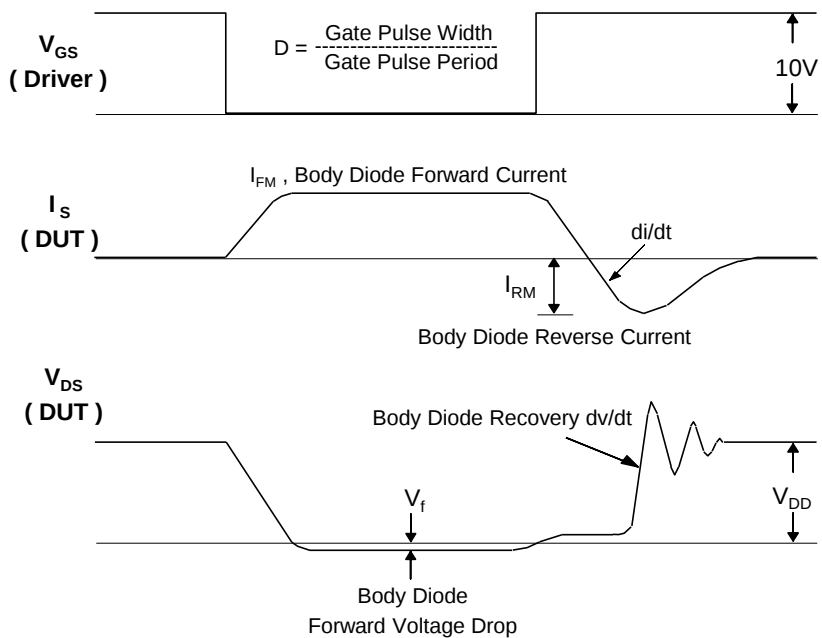
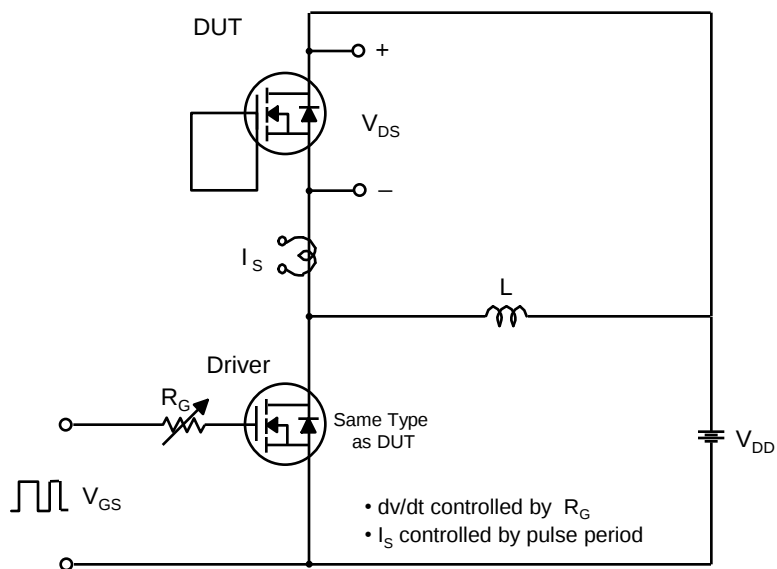
Gate Charge Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveforms



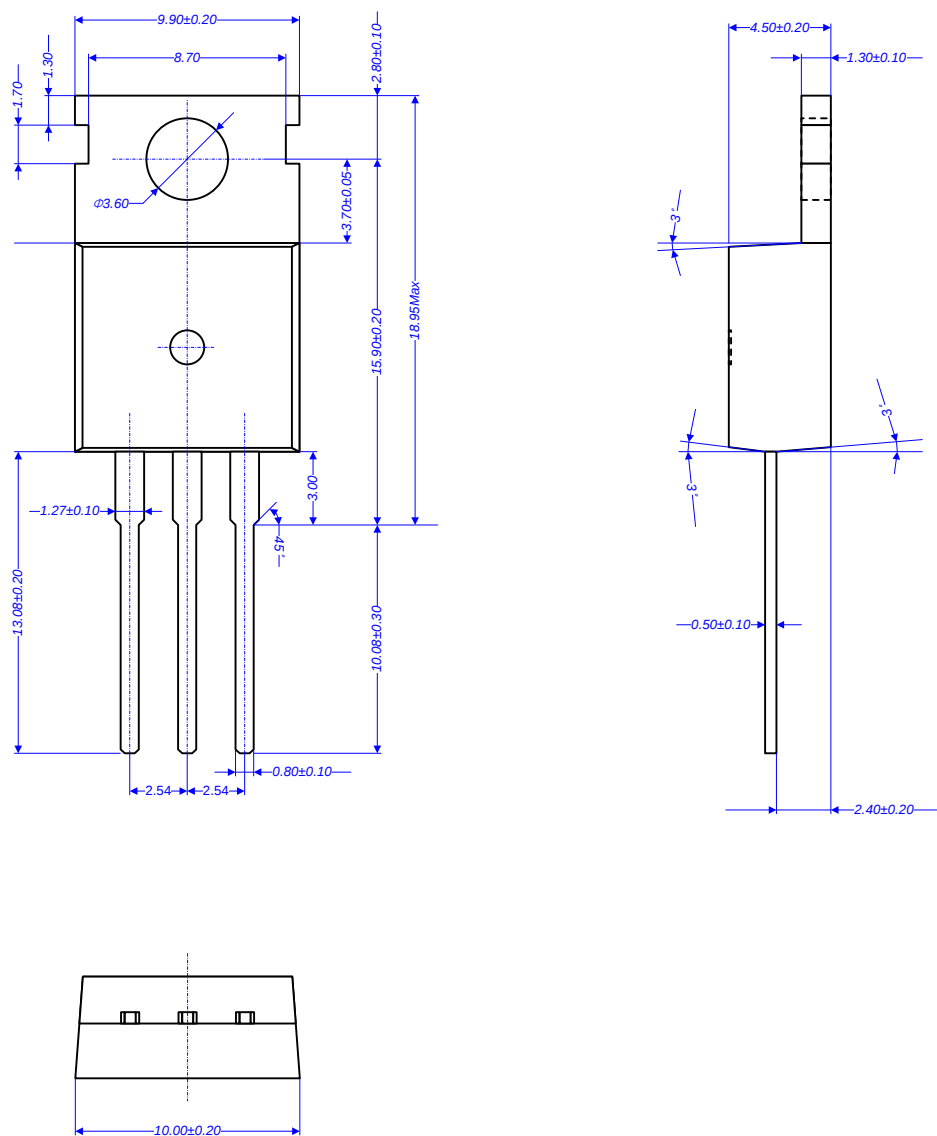
Characteristics Test Circuit & Waveform (continued)



Peak Diode Recovery dv/dt Test Circuit & Waveforms

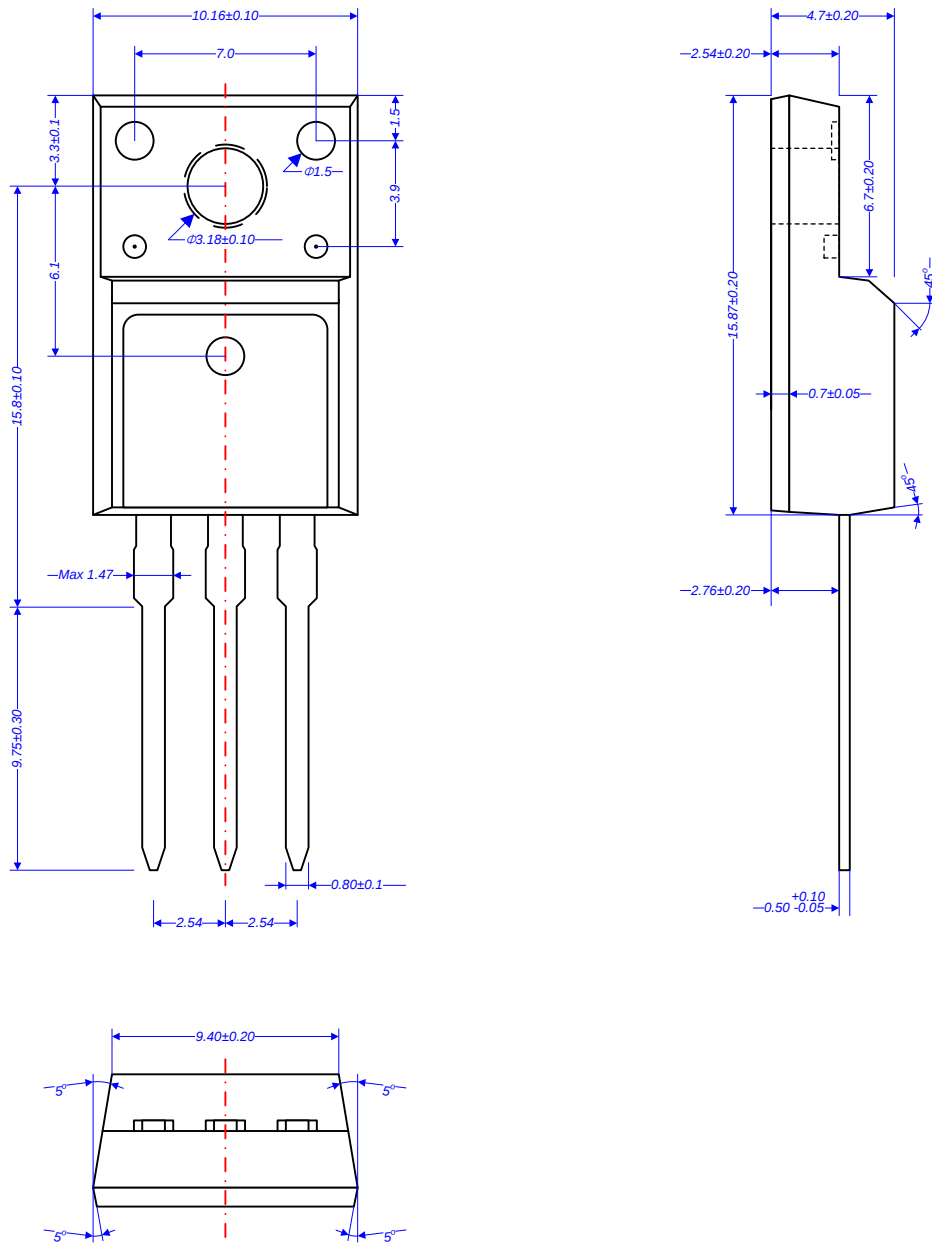
Package Dimension

TO-220 Type 1



Package Dimension

TO-220F Type 1



Package Dimension

TO-220F Type 2

