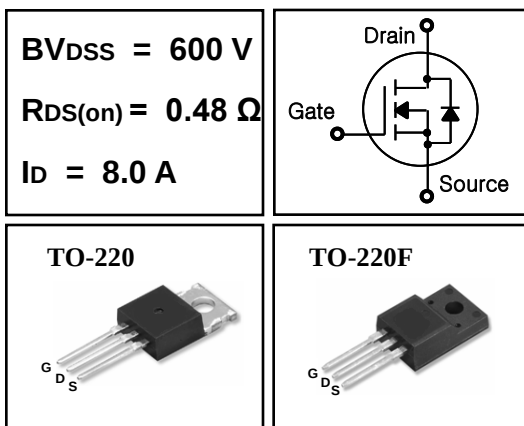


PFP60R540 / PFF60R540 N-Channel Super Junction MOSFET

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



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	PFP60R540	PFF60R540	Units
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	600		V
I_D	Drain Current – Continuous ($T_c = 25^{\circ}\text{C}$)	8.0	8.0*	A
	Drain Current – Continuous ($T_c = 100^{\circ}\text{C}$)	5.2	5.2*	A
$I_{DM(pulse)}$	Drain Current – Pulsed * Note 1	24	24*	A
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	± 30		V
E_{AS}	Single Pulsed Avalanche Energy * Note 2	185		mJ
I_{AR}	Avalanche Current * Note 1	4.0		A
E_{AR}	Repetitive Avalanche Energy * Note 1	0.4		mJ
dv/dt	Drain Source Voltage Slope, $V_{DS} \leq 480V$	50		V/ns
	Reverse Diode dv/dt, $V_{DS} \leq 480V$	15		V/ns
P_D	Maximum Power Dissipation ($T_c = 25^{\circ}\text{C}$)	80	31.7	W
	Derate above 25°C	0.64	0.25	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	PFP60R540	PFF60R540	Units
$R_{\theta JC}$	Junction-to-Case (Maximum)	1.56	3.94	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	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 = 4.0 A	--	480	540	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 = 4.0A	--	5.5	--	S
R _G	Intrinsic Gate Resistance	f = 1.0 MHz, open drain	--	2	--	ohm
C _{iss}	Input Capacitance	V _{DS} = 50 V, V _{GS} = 0 V, f = 1.0 MHz	--	680	--	pF
C _{oss}	Output Capacitance		--	58	--	pF
C _{rss}	Reverse Transfer Capacitance		--	4	--	pF
Q _g	Total Gate Charge	V _{DS} = 480 V, I _D = 8.0 A, V _{GS} = 10 V	--	14.5	22	nC
Q _{gs}	Gate-Source Charge		--	2.8	--	nC
Q _{gd}	Gate-Drain Charge		--	5.5	--	nC
Switching Characteristics						
t _{d(on)}	Turn-On Time	V _{DS} = 380 V, I _D = 4.0 A, R _G = 12 Ω, V _{GS} = 10V	--	5.5	--	ns
t _r	Turn-On Rise Time		--	3.5	--	ns
t _{d(off)}	Turn-Off Delay Time		--	55	75	ns
t _f	Turn-Off Fall Time		--	6.5	10	ns
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		--	--	23.4	
V _{SD}	Source-Drain Diode Forward Voltage	I _S = 8.0 A, V _{GS} = 0 V	--	0.9	1.2	V
t _{rr}	Reverse Recovery Time	I _S = 8.0 A	--	220	--	ns
Q _{rr}	Reverse Recovery Charge	di/dt = 100 A/μs	--	2.2	--	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

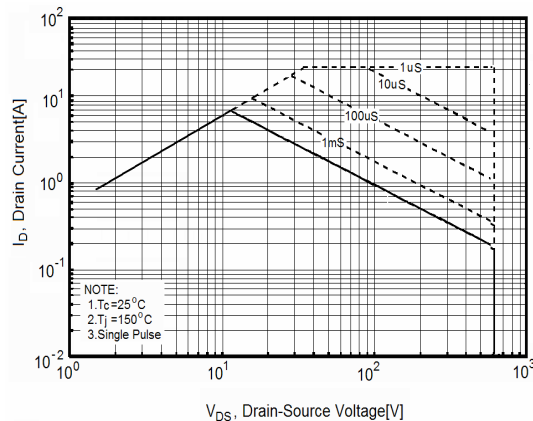


Figure 1. Safe Operating Area(TO-220)

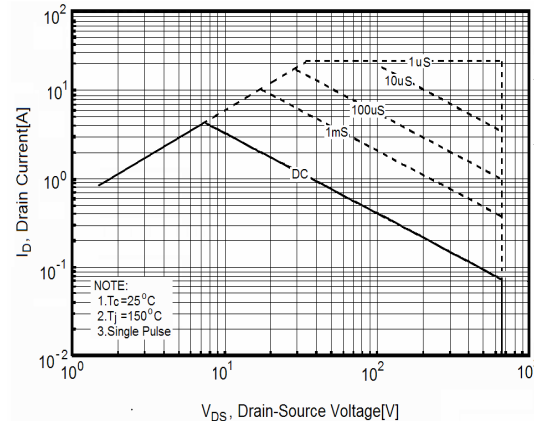


Figure 2. Safe Operating Area(TO-220F)

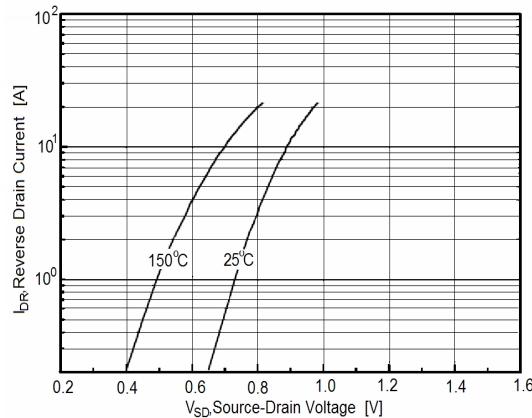


Figure 3. Source-Drain Diode Forward Voltage

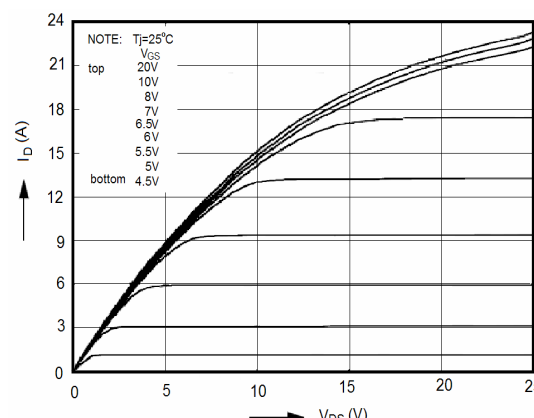


Figure 4. Output Characteristics

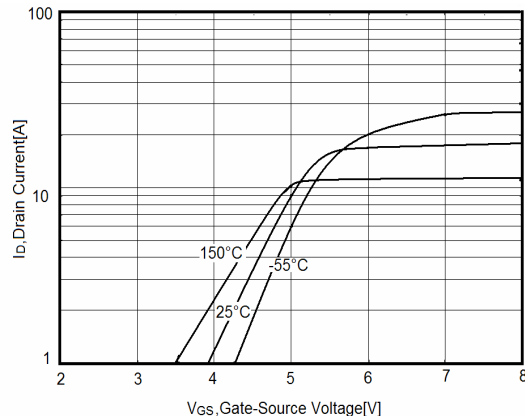


Figure 5. Transfer Characteristics

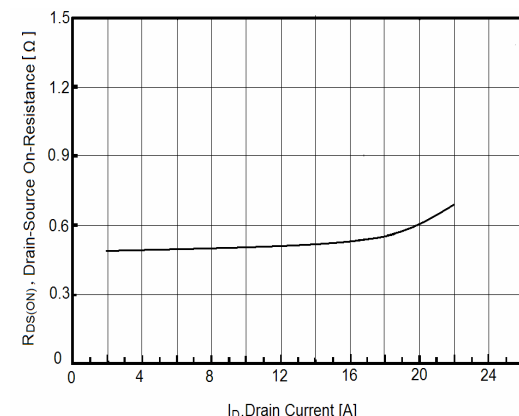


Figure 6. Static Drain-Source On Resistance

Typical Characteristics (continued)

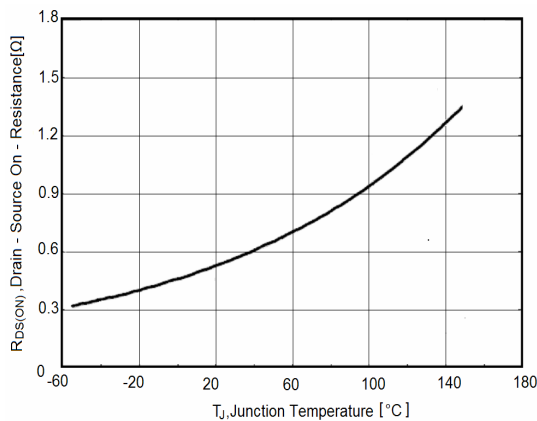


Figure 7. $R_{DS(on)}$ vs. Junction Temperature

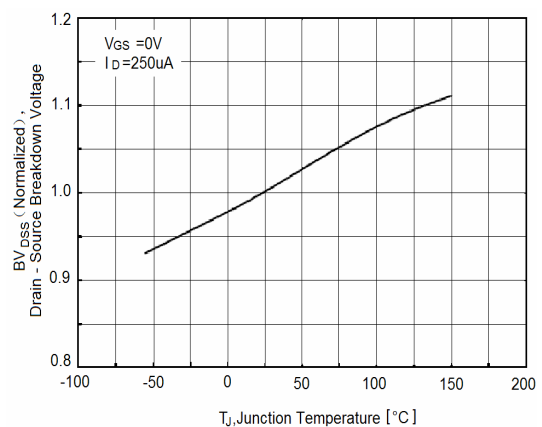


Figure 8. BV_{DSS} vs. Junction Temperature

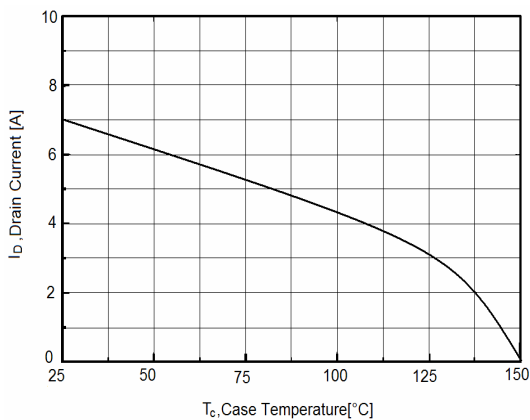


Figure 9. Maximum I_D vs. Junction Temperature

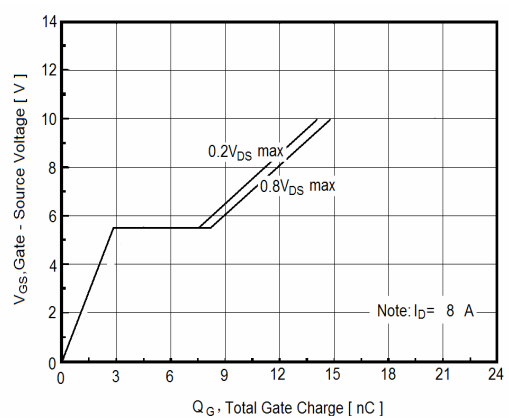


Figure 10. Gate Charge Waveforms

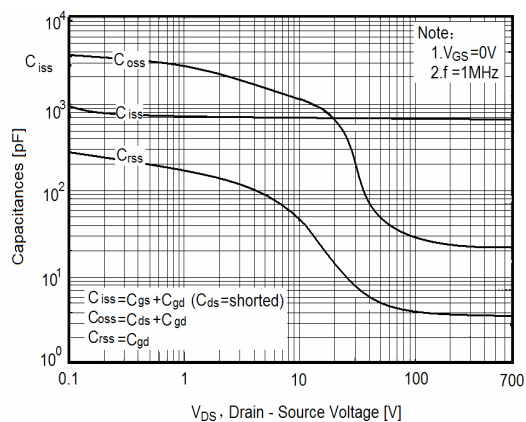


Figure 11. Capacitance

Typical Characteristics (continued)

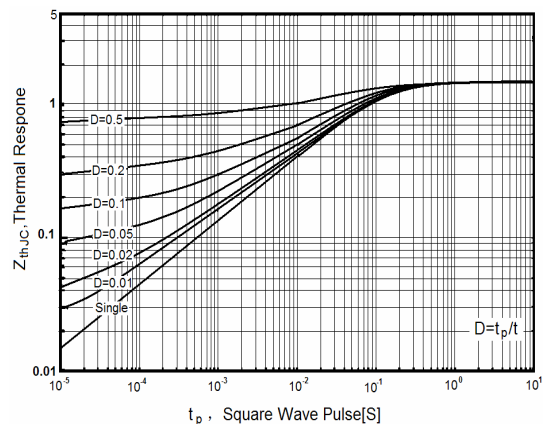


Figure 12. Transient Thermal Response Curve (TO-220)

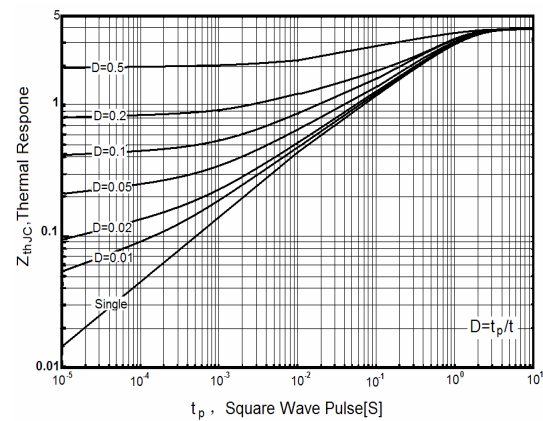
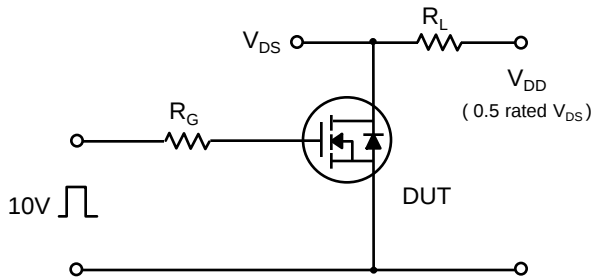
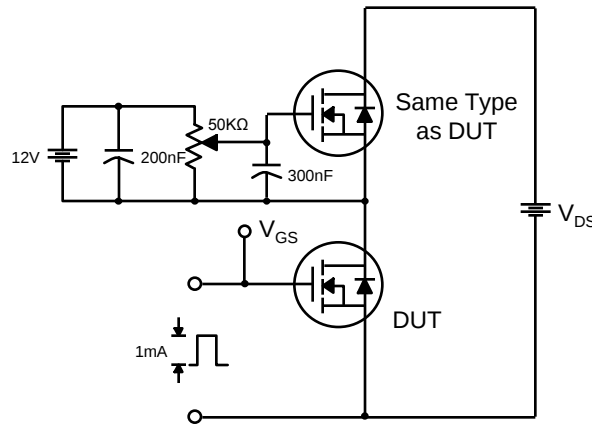


Figure 13. Transient Thermal Response Curve (TO-220F)

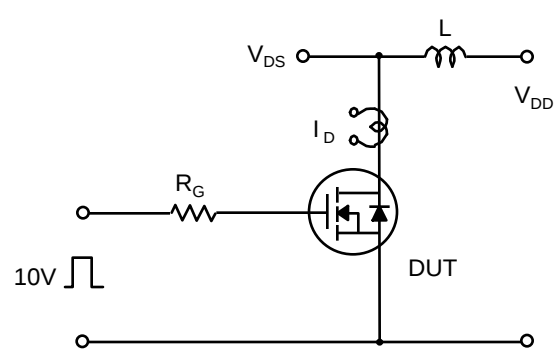
Characteristics Test Circuit & Waveform



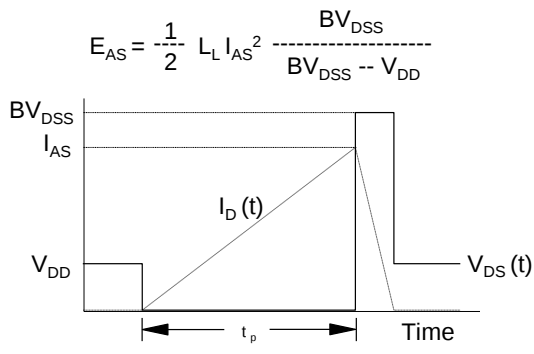
Switching Time Test Circuit & Waveforms



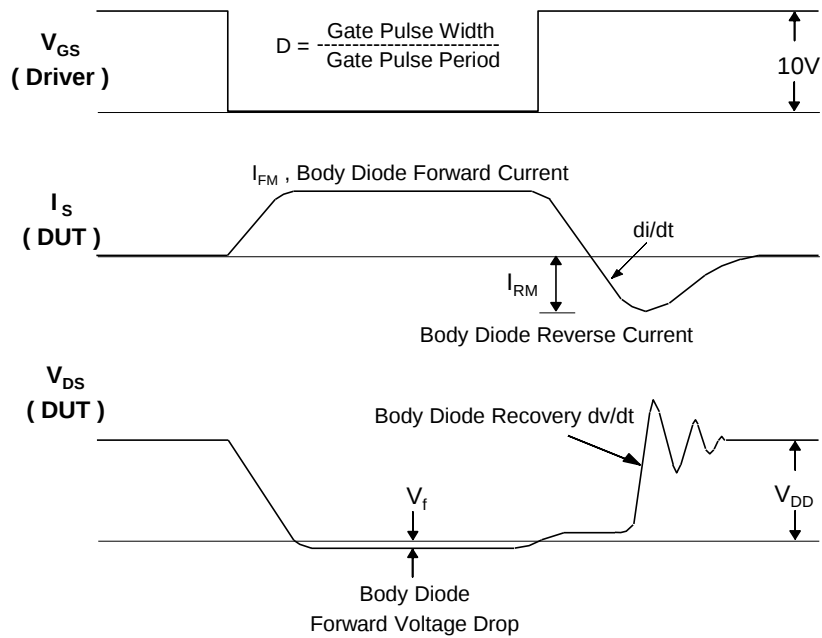
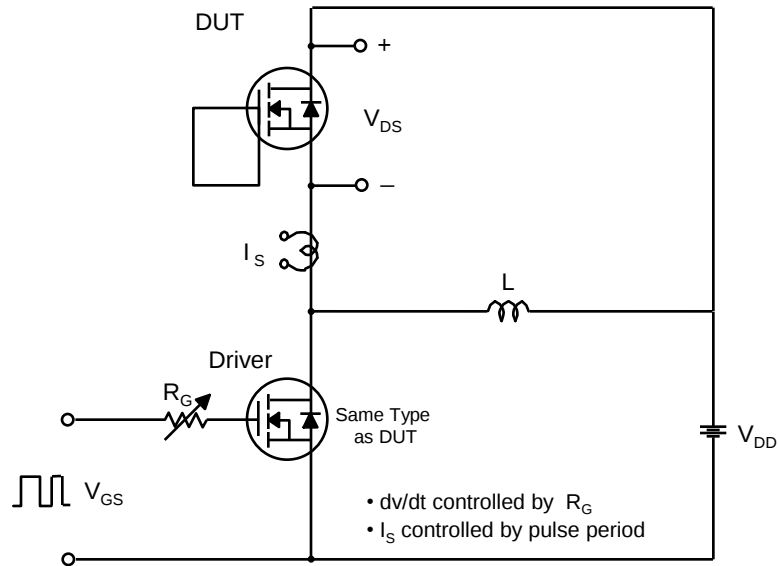
Gate Charge Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveforms



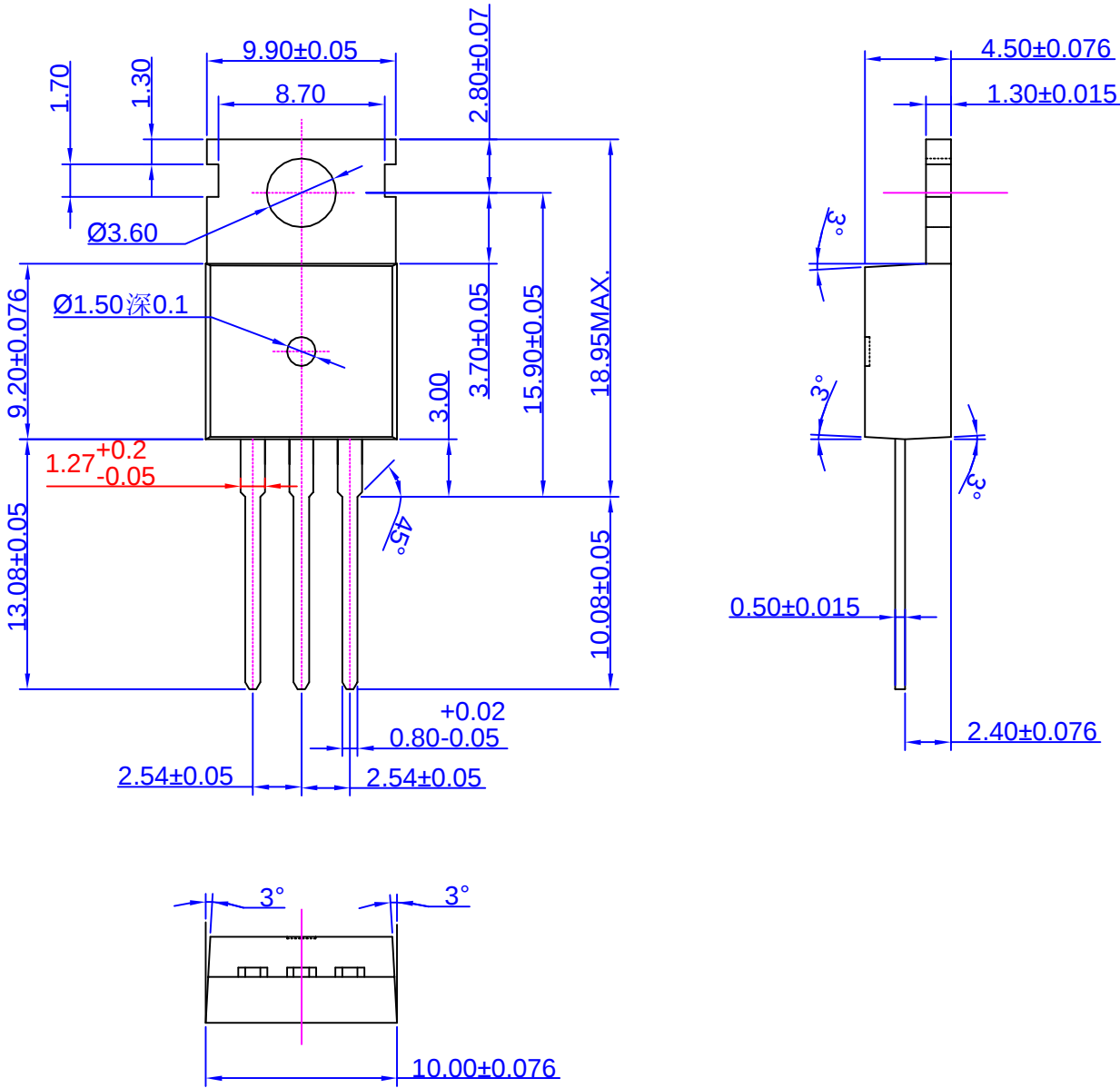
Characteristics Test Circuit & Waveform (continued)



Peak Diode Recovery dv/dt Test Circuit & Waveforms

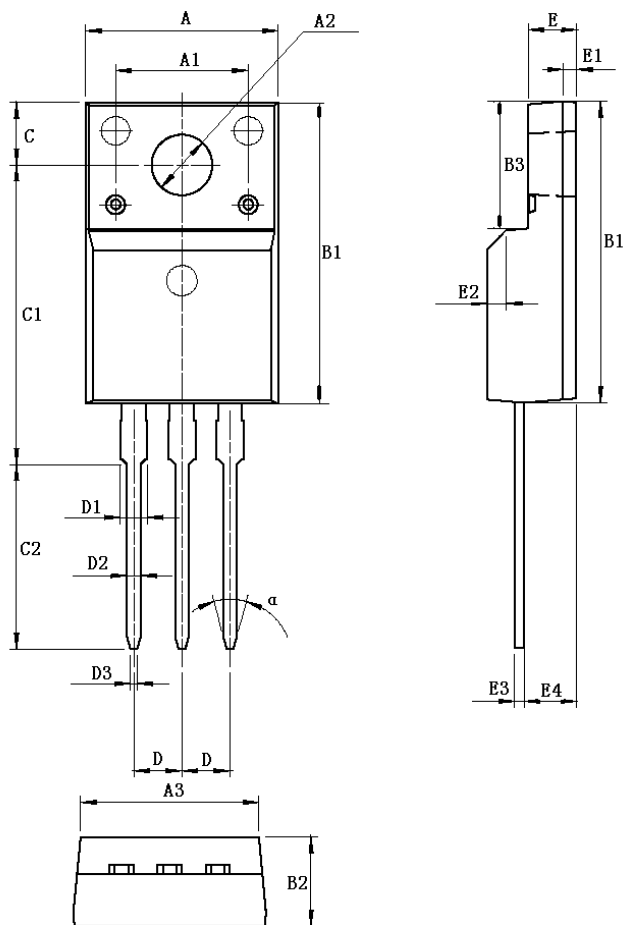
Package Dimension

TO-220 Type 1



Package Dimension

TO-220F Type 1



unit : mm

Symbol	Dimensions	
	Min	Max
A	9.96	10.36
A1	7.00	
A2(Φ)	3.08	3.28
A3	9.26	9.66
B1	15.67	16.07
B2	4.50	4.90
B3	6.48	6.88
C	3.20	3.40
C1	15.60	16.00
C2	9.55	9.95
D	2.54	
D1	--	1.47
D2	0.70	0.90
D3	0.25	0.45
E	2.34	2.74
E1	0.70	
E2	1.0 * 45°	
E3	0.45	0.60
E4	2.56	2.96
α	30°	