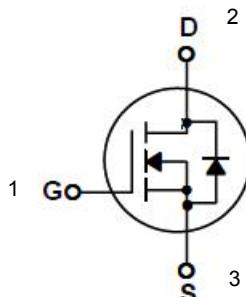
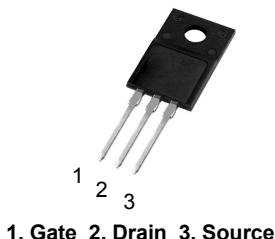


Features

- 12A, 670V, RDS(on) = 0.615Ω @VGS = 10 V
- Low gate charge (typical 26 nC)
- Low Crss (typical 4.4pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

TO-220F Package



1. Gate 2. Drain 3. Source

General Description

This Power MOSFET is produced by WPM using its own advanced planar stripe DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies, active power factor correction based on half bridge topology.

Device	Package	Marking	Packaging
WTM12N65VF	TO-220F	WPM 20N65VF XXX YYWW	50pcs/Tube

Symbol	Parameter	Value	Units
V _{DSS}	Drain-Source Voltage	670	V
I _D	Drain Current - Continuous (TC= 25°C)	12	A
	- Continuous (TC= 100°C)	6.7*	A
I _{DM}	Drain Current - Pulsed (Note 1)	48*	A
V _{GSS}	Gate-Source Voltage	± 30	V
E _{AS}	Single Pulsed Avalanche Energy (Note 2)	490	mJ
I _{AR}	Avalanche Current (Note 1)	12	A
E _{AR}	Repetitive Avalanche Energy (Note 1)	40	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5	V/ns
P _D	Power Dissipation (TC = 25°C)	27.8	W
	- Derate above 25°C	0.23	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 Characteristics

Symbol	Parameter	Value	Units
R _{θJC}	Thermal Resistance, Junction-to-Case	4.48	°C/W
R _{θJS}	Thermal Resistance, Case-to-Sink Typ.	--	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	37.0	°C/W

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$	670			V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, Referenced to 25°C		0.62		$^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 670 \text{ V}$, $V_{GS} = 0 \text{ V}$		1		μA
		$V_{DS} = 536 \text{ V}$, $T_C = 125^\circ\text{C}$			10	μA
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
On Characteristics						
$V_{GS(TH)}$	Gate Threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$	2.0		4.0	V
$R_{DS(On)}$	Drain-Source on-state resistance	$V_{GS} = 10 \text{ V}$, $I_D = 6 \text{ A}$, $T_J = 25^\circ\text{C}$		0.615	0.760	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 40 \text{ V}$, $I_D = 6 \text{ A}$ (Note 4)		12		S
Dynamic Characteristics						
C_{iss}	Input capacitance	$V_{DS} = 25 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1.0 \text{ MHz}$		1183		pF
C_{oss}	Output capacitance			172		pF
C_{rss}	Reverse transfer capacitance			4.4		pF
Switching Characteristics						
$t_{d(on)}$	Turn On Delay Time	$V_{DD} = 335 \text{ V}$, $I_D = 12 \text{ A}$, $R_G = 25 \Omega$ (Note 4, 5)		15		ns
t_r	Rising Time			30		ns
$t_{d(off)}$	Turn Off Delay Time			63		ns
t_f	Fall Time			36		ns
Q_g	Total Gate Charge	$V_{DS} = 536 \text{ V}$, $I_D = 12 \text{ A}$, $V_{GS} = 10 \text{ V}$ (Note 4, 5)		26		nC
Q_{gs}	Gate-Source Charge			5.6		nC
Q_{gd}	Gate-Drain Charge			10		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current			12		A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current			48		A
V_{SD}	Diode Forward Voltage	$V_{GS} = 0 \text{ V}$, $I_S = 12 \text{ A}$		1.2		V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0 \text{ V}$, $I_S = 12 \text{ A}$, $dI_F / dt = 100 \text{ A}/\mu\text{s}$ Note 4)		389		ns
Q_{rr}	Reverse Recovery Charge			3.4		μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 9.6 mH, IAS = 12 A, VDD = 50V, RG = 25 Ω , Starting TJ = 25°C
3. ISD \leq 12A, di/dt \leq 200A/us, VDD \leq BVDSS, Starting TJ = 25°C
4. Pulse Test : Pulse width \leq 300us, Duty cycle \leq 2%
5. Essentially independent of operating temperature

Typical Characteristics

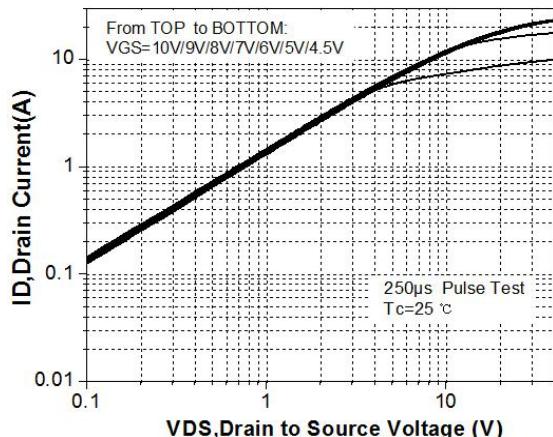


Figure 1. On-Region Characteristics

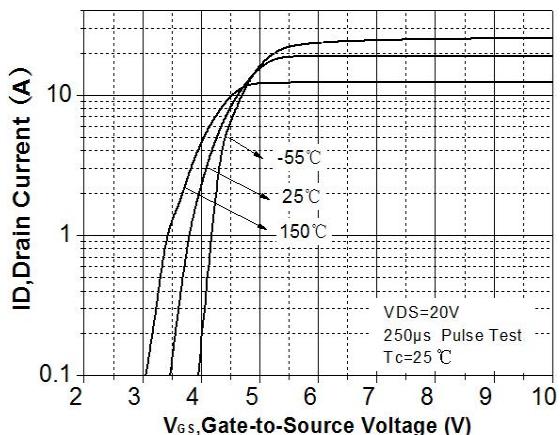


Figure 2. Transfer Characteristics

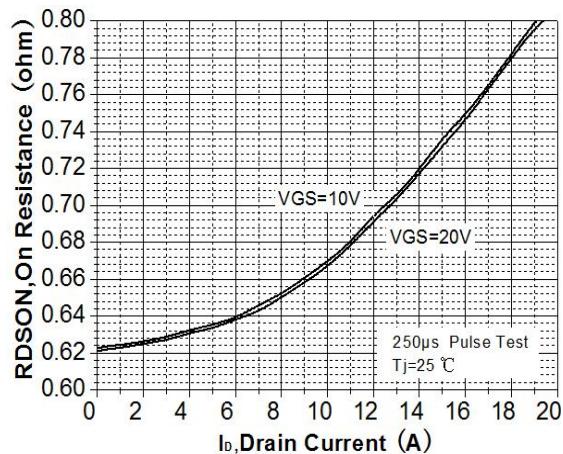


Figure 3. On-Resistance Variation vs
Drain Current and Gate Voltage

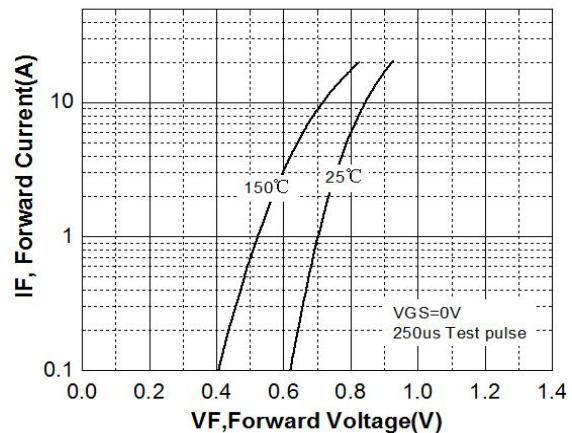


Figure 4. Body Diode Forward Voltage
Variation with Source Current
and Temperature

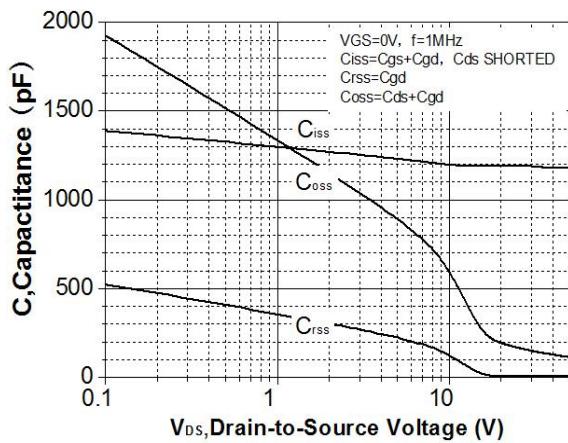


Figure 5. Capacitance Characteristics

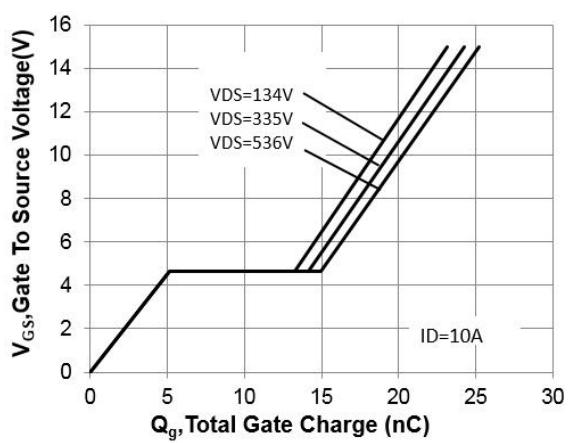
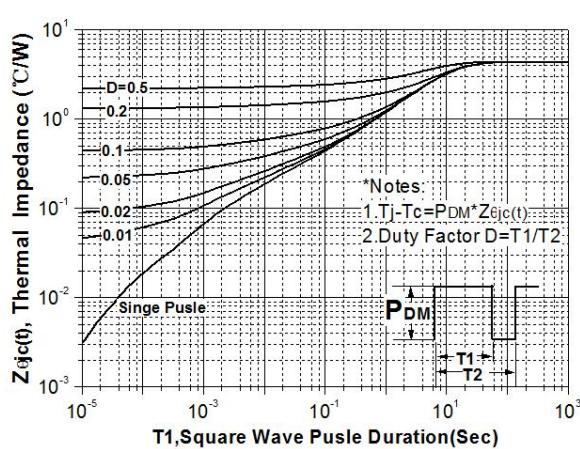
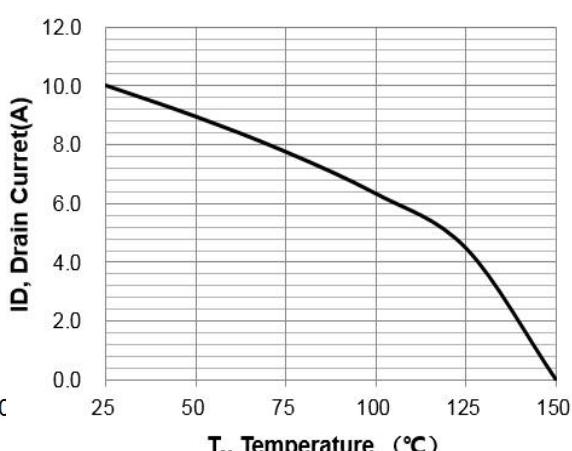
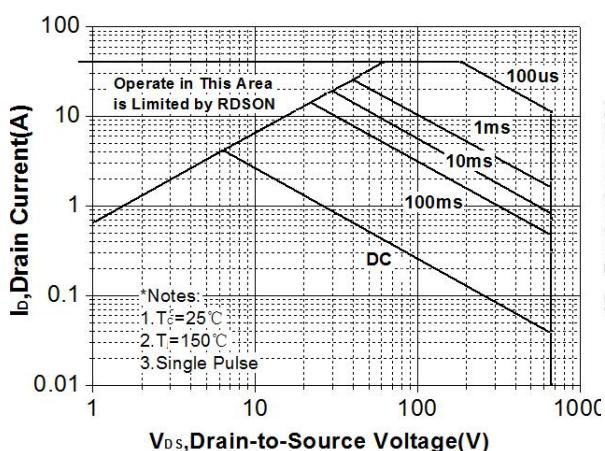
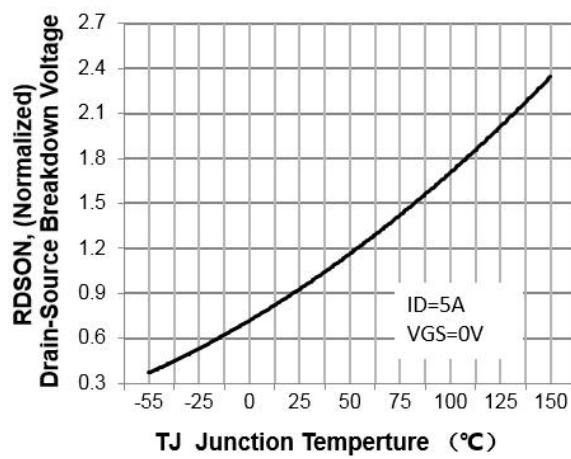
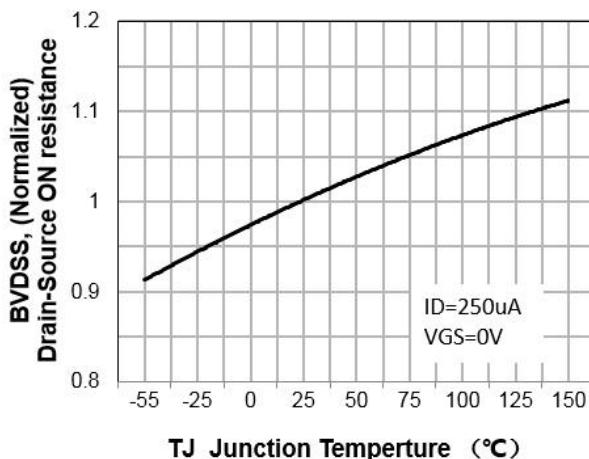
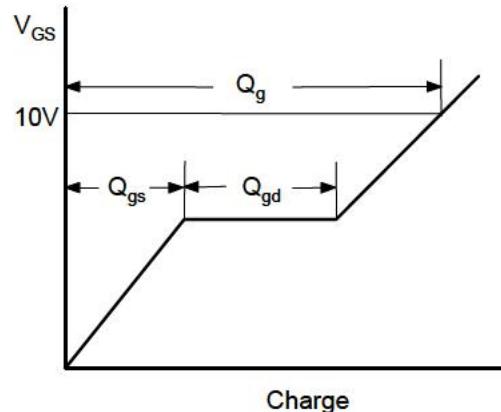
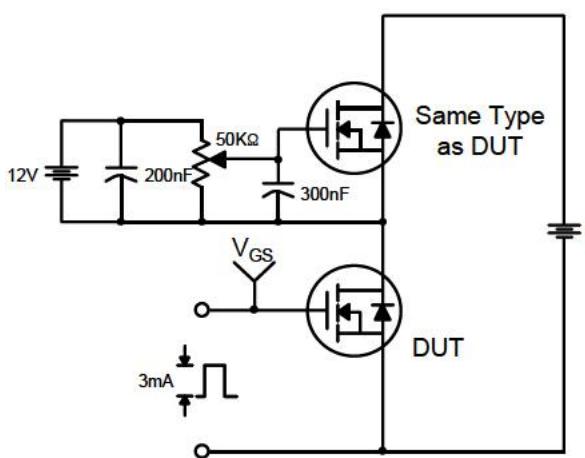


Figure 6. Gate Charge Characteristics

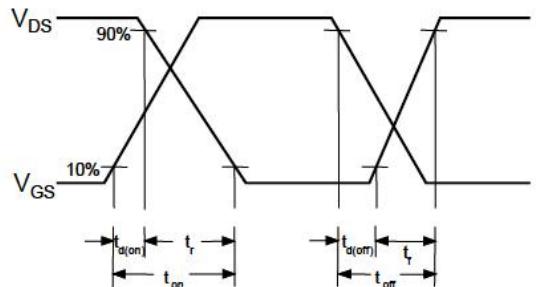
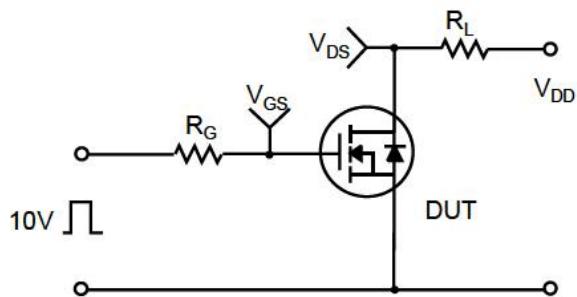
Typical Characteristics (Continued)



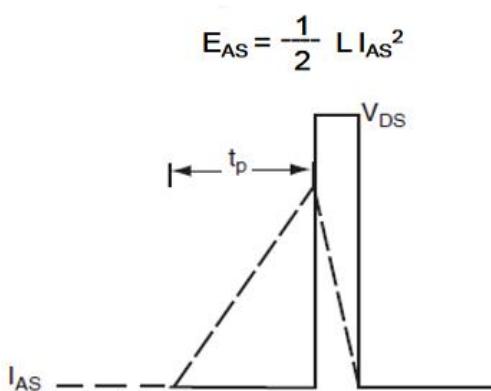
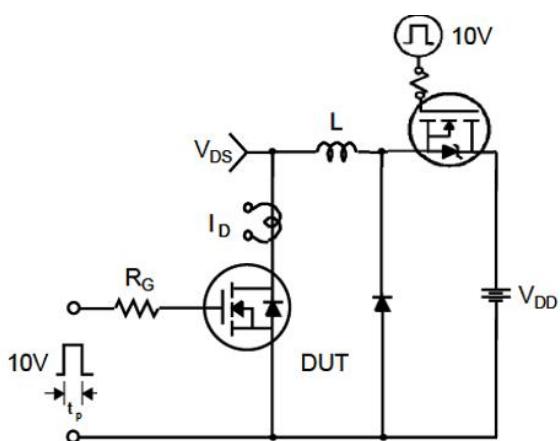
Gate Charge Test Circuit & Waveform



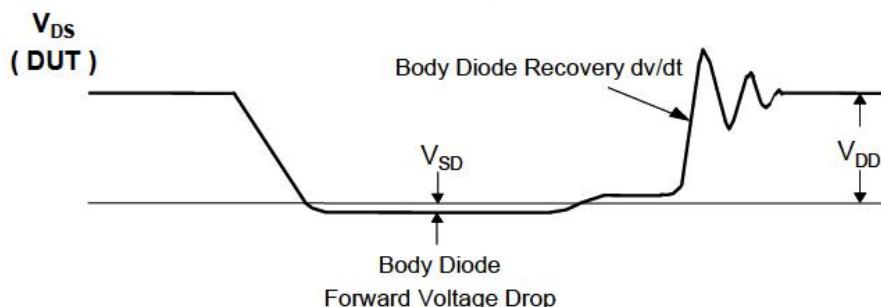
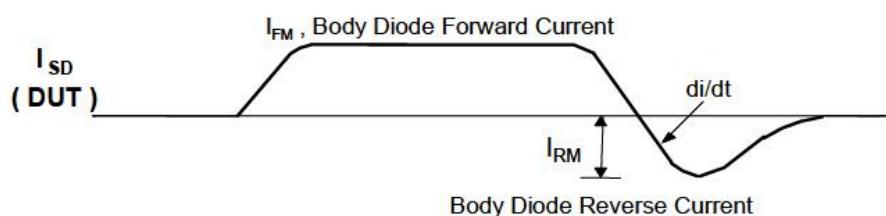
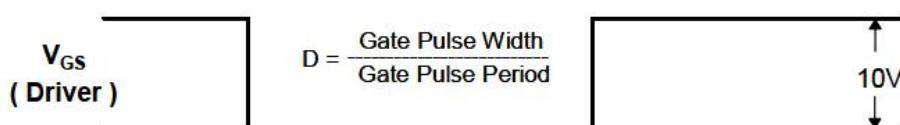
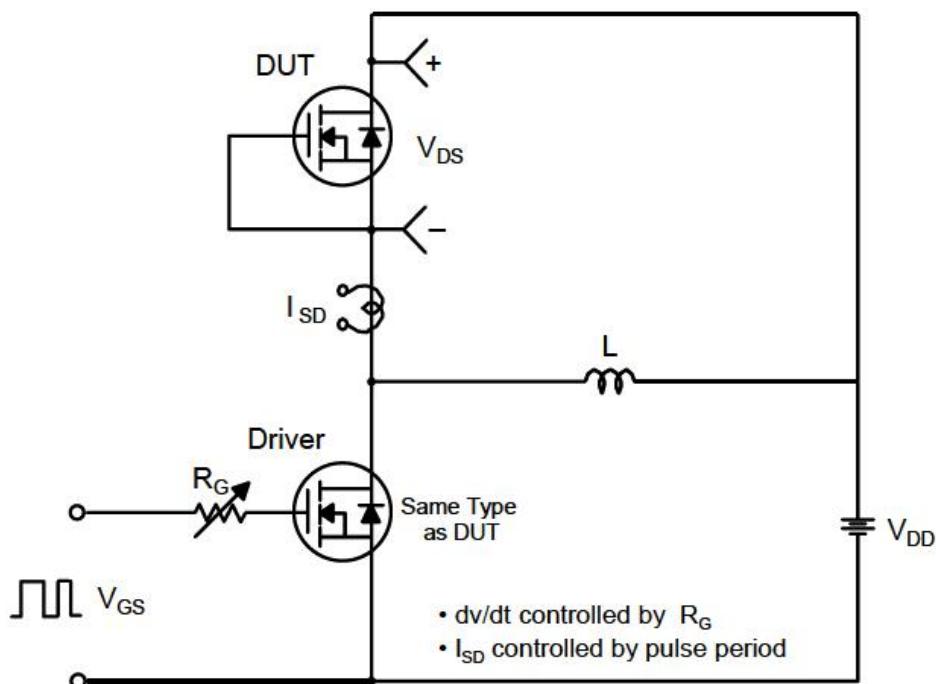
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

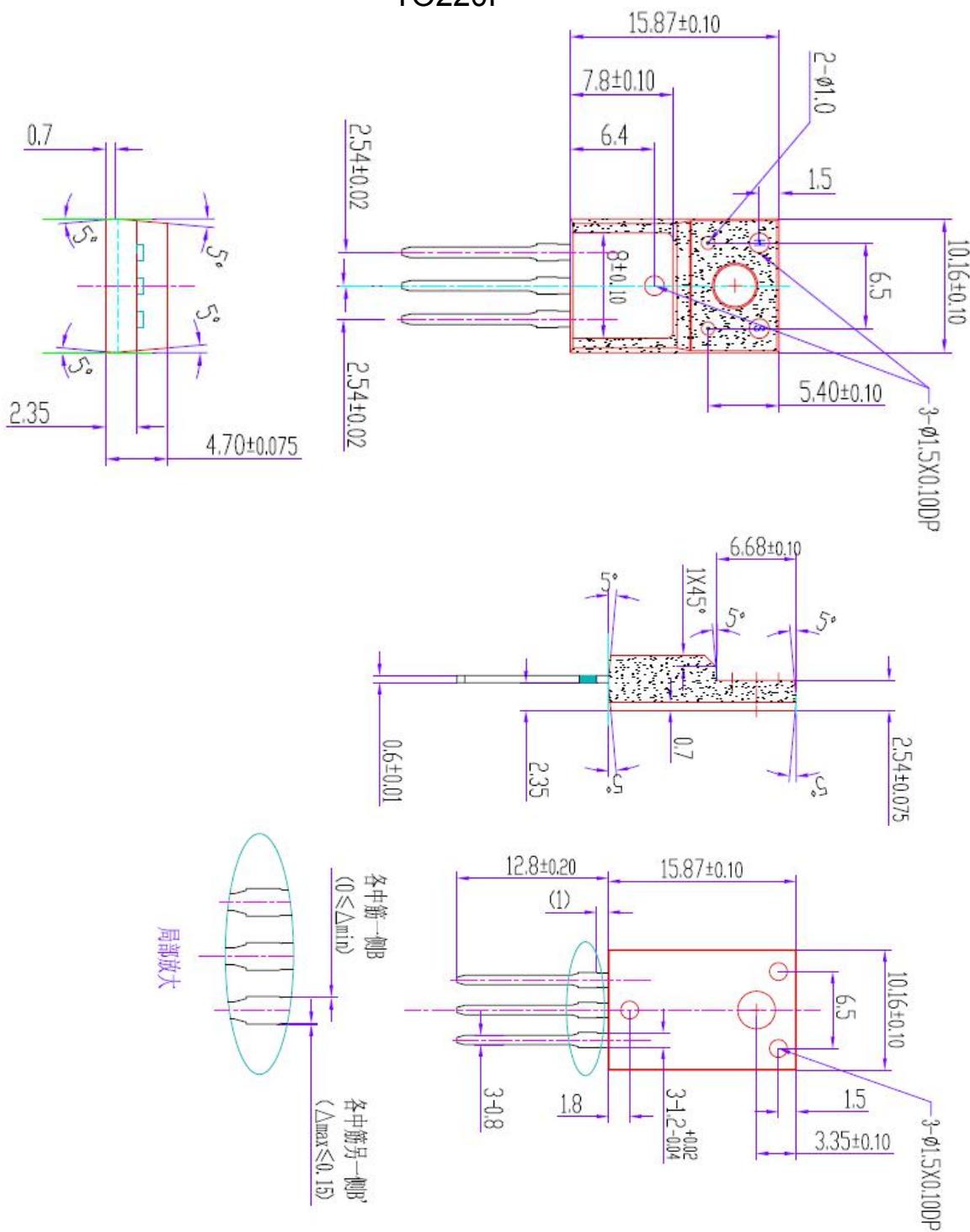


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Dimensions

TO220F



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