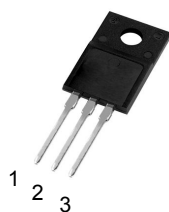


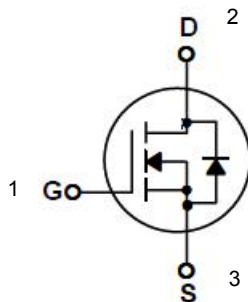
Features

- 12A, 670V, $R_{DS(on)} = 0.615\Omega @ V_{GS} = 10V$
- Low gate charge (typical 26 nC)
- Low C_{rss} (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
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	4.48	°C/W
$R_{\theta JS}$	Thermal Resistance, Case-to-Sink Typ.	--	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	37.0	°C/W

Electrical Characteristics

TC = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	670			V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenc ed to 25°C		0.62		V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 670 V, V _{GS} = 0 V			1	μA
		V _{DS} = 536 V, TC = 125° C			10	μA
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
On Characteristics						
V _{GS(TH)}	Gate Threshold voltage	V _{DS} =V _{GS} , I _D =250 uA	2.0		4.0	V
R _{DS(On)}	Drain-Source on-state resistance	V _{GS} =10 V, I _D = 6 A, T _J = 25°C		0.615	0.760	Ω
g _{FS}	Forward Transconductance	V _{DS} = 40 V, I _D = 6 A (Note 4)		12		S
Dynamic Characteristics						
C _{iss}	Input capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 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 V, ID = 12 A, R _G = 25 Ω (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 V, ID = 12 A, V _{GS} = 10 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 V, I _S = 12 A			1.2	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 12 A, dI _F / dt = 100 A/μs		389		ns
Q _{rr}	Reverse Recovery Charge	Note 4)		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≤12A, di/dt ≤200A/us, VDD ≤ BVDSS, Starting TJ = 25°C
4. Pulse Test : Pulse width ≤ 300us, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

Typical Characteristics

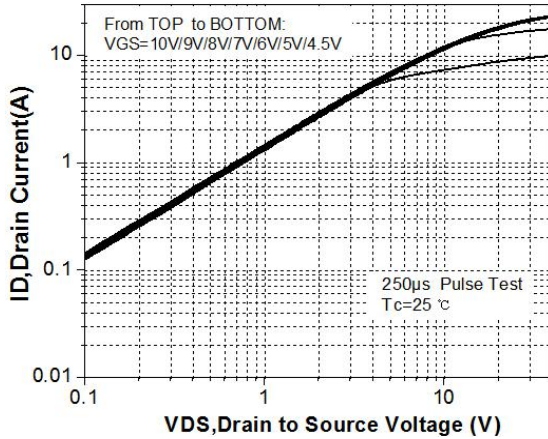


Figure 1. On-Region Characteristics

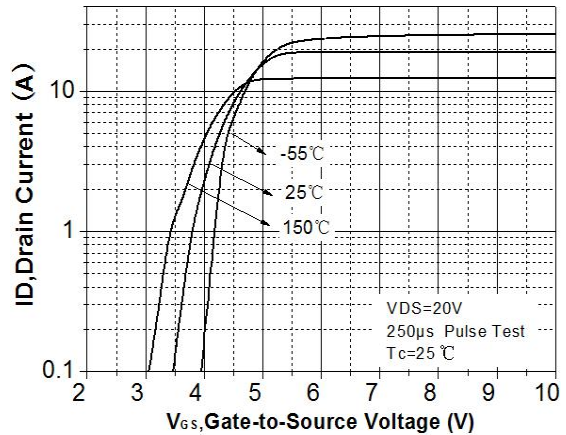


Figure 2. Transfer Characteristics

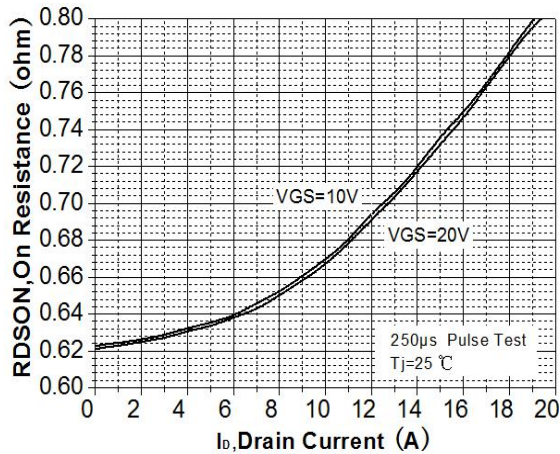


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

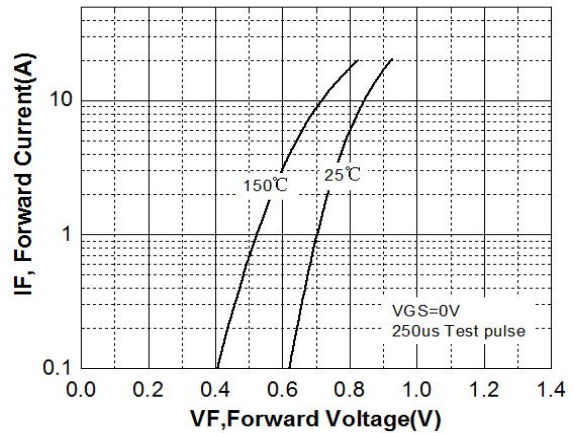


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

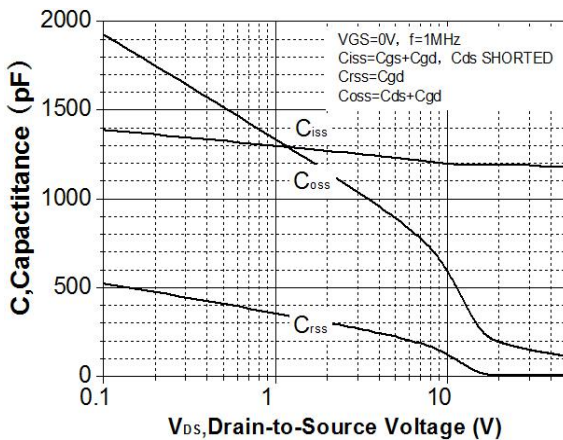


Figure 5. Capacitance Characteristics

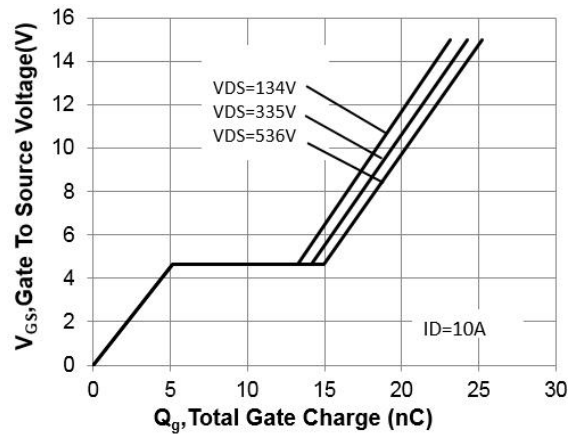


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

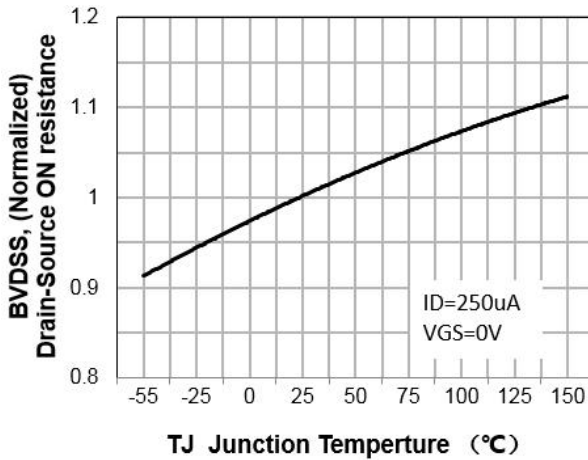


Figure 7. Breakdown Voltage Variation vs Temperature

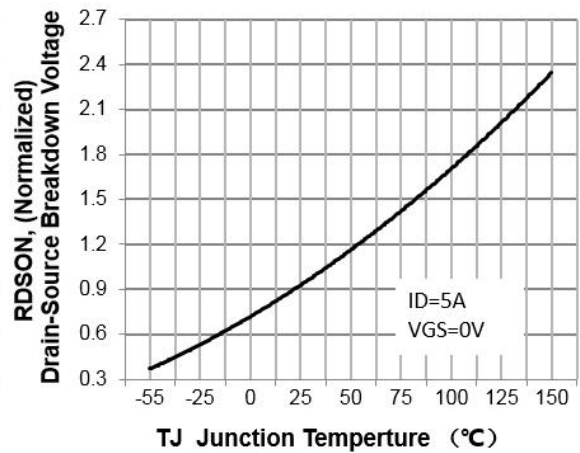


Figure 8. On-Resistance Variation vs Temperature

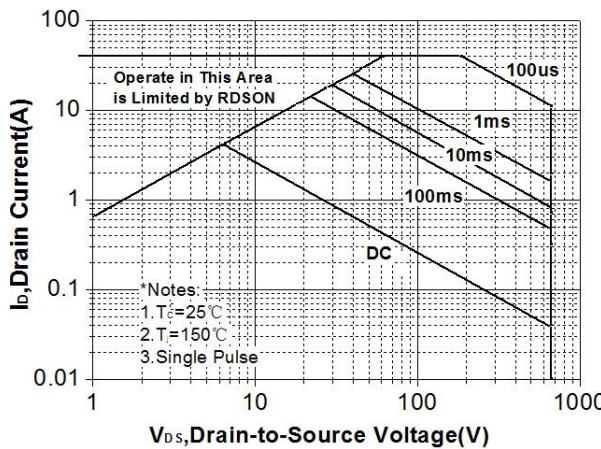


Figure 9. Maximum Safe Operating Area

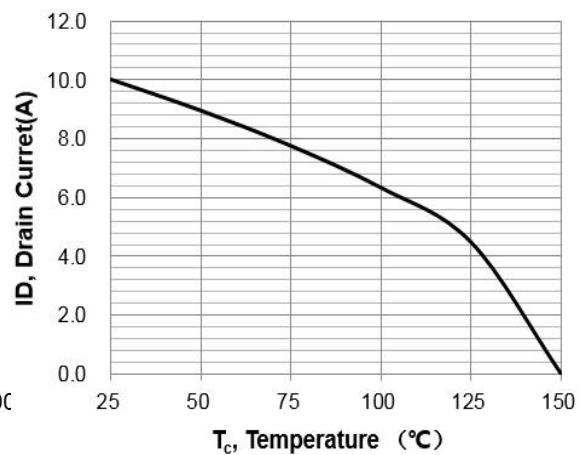


Figure 10. Maximum Drain Current vs Case Temperature

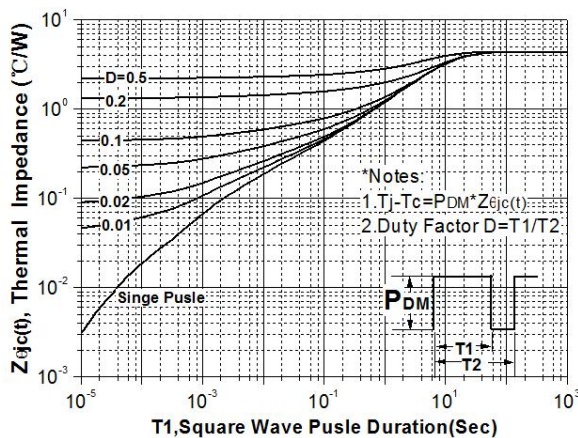
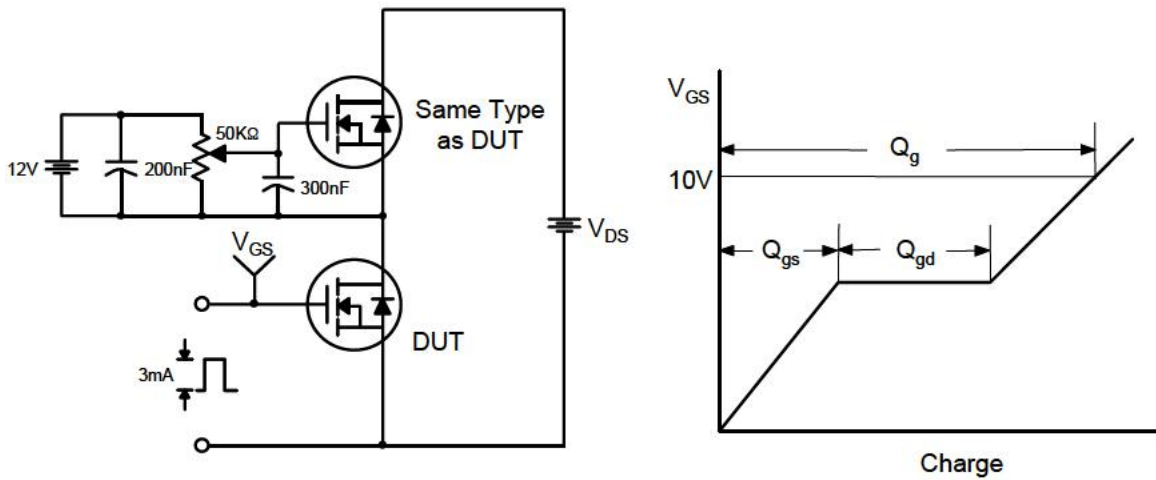
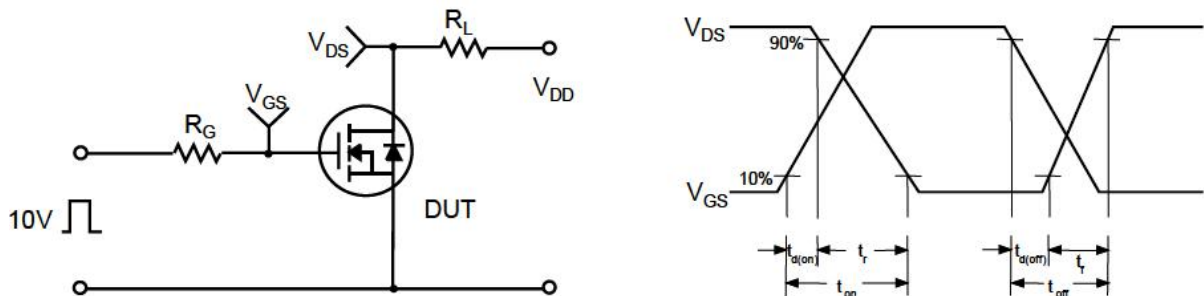


Figure 11. Transient Thermal Response Curve

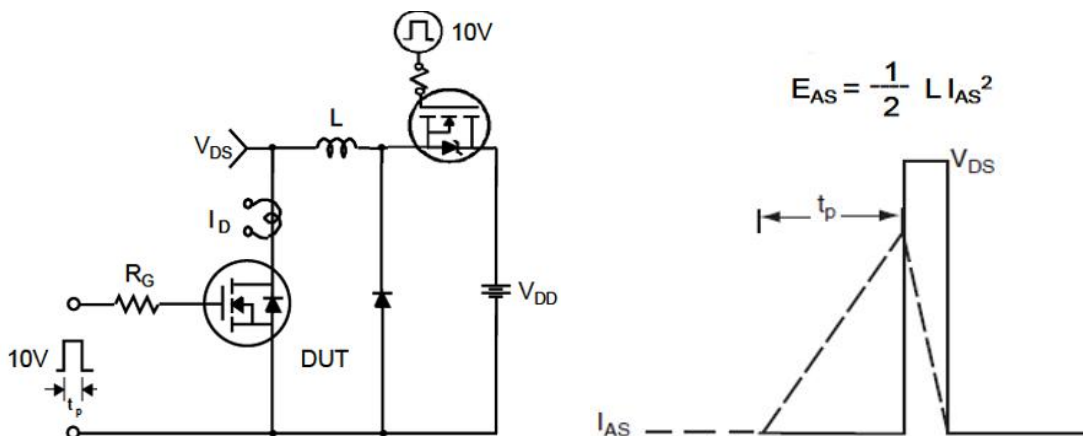
Gate Charge Test Circuit & Waveform



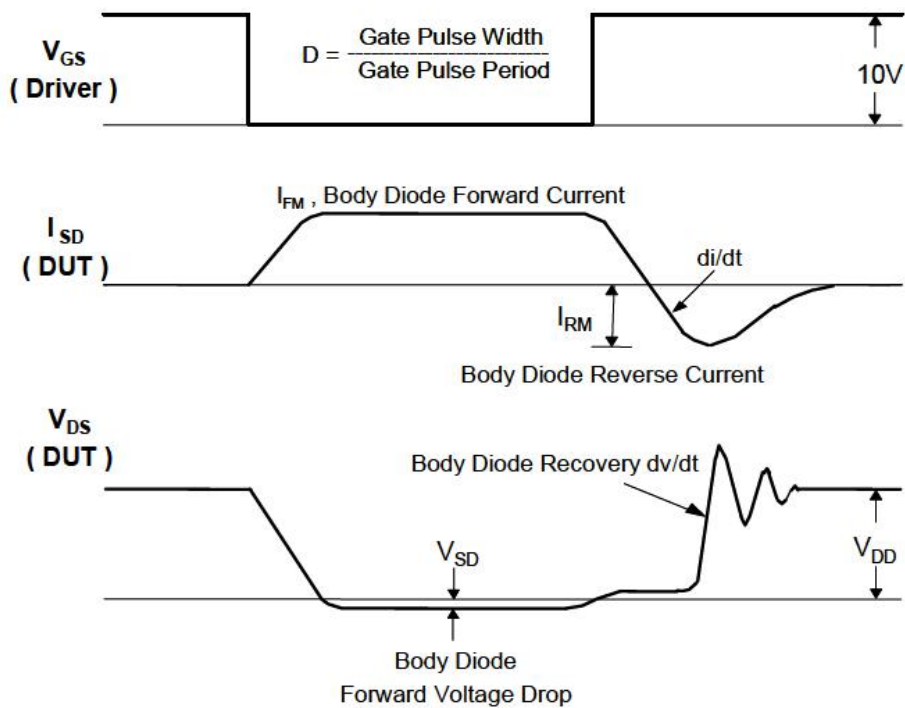
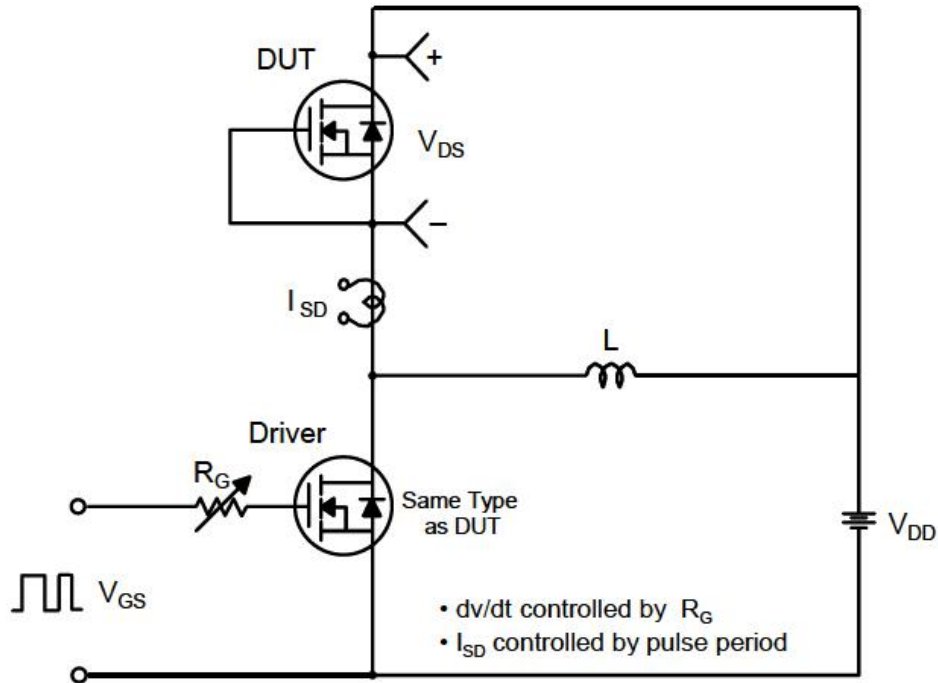
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

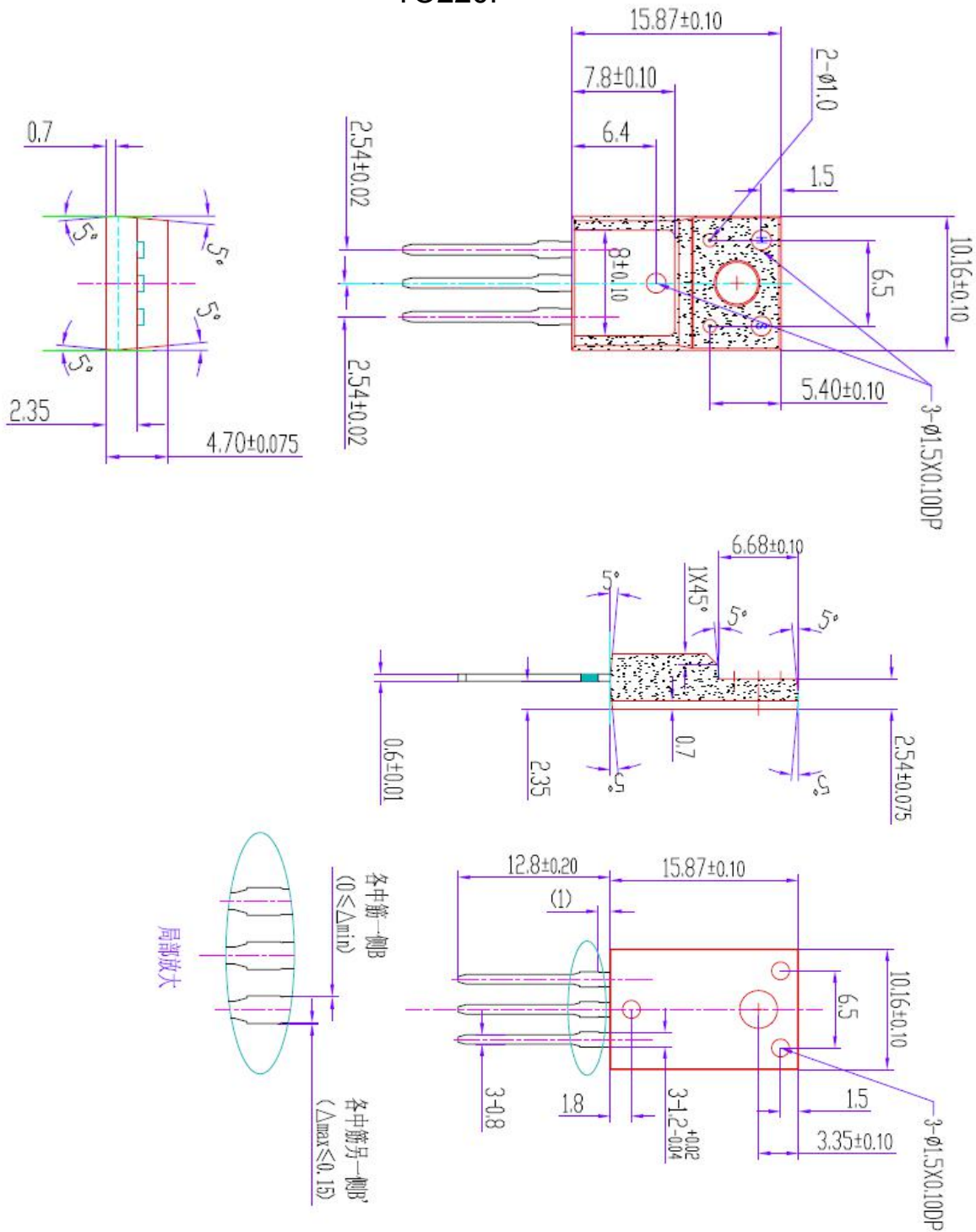


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Dimensions

TO220F



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