

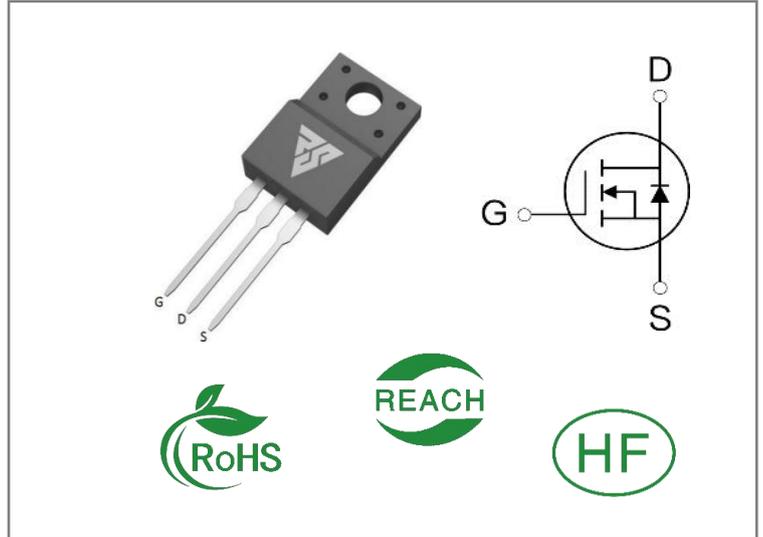
ID	R <sub>DS(ON)</sub> (Typ)	VDSS
12A	0.65Ω	650V

**Applications:**

- High efficiency mode power supplies
- Electronic lamp ballasts
- UPS

**Features:**

- Low Crss
- Low gate charge
- Fast switching
- Improved ESD capability
- Improved dv/dt capability
- 100% avalanche energy test


**Ordering Information**

Part Number	Package	Marking	Packing	Qty.
RS12N65HF	T0-220F	RS12N65HF	Tube	50 PCS

**Absolute Maximum Ratings** Tc= 25°C unless otherwise specified

Symbol	Parameter	RS12N65HF	Units
VDSS	Drain-to-Source Voltage	650	V
ID	Continuous Drain Current TC=25°C	12*	A
	Continuous Drain Current TC=100°C	6.8*	
IDM	Pulsed Drain Current (Note*1)	48	
PD	Power Dissipation	50	W
PD(DF)	PowerDissipationDeratingFactor	0.4	W/°C
VGS	Gate- to- Source Voltage	±30	V
EAS	Single Pulse Avalanche Energy L=9mH, VDD=50V, RG=25Ω, IAS=11A	540	mJ
IAR	AvalancheCurrent(note1)	11	A
EAR	RepetitiveAvalancheEnergy (note1)	20	mJ
dv/dt	PeakDiodeRecovery ISD≤12A, di/dt≤300A/μs, VDD≤BVDSS, Starting TJ=25°C	4.5	V/ns
TL	Maximum Temperature for Soldering	300	°C
TJ and TSTG	Operating Junction and Storage Temperature Range	-55 to 150	

\* Drain Current Limited by Maximum Junction Temperature

Caution: Stresses greater than those listed in the " Absolute Maximum Ratings" Table may cause permanent damage to the device.

REV:H-B01-09-2025

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**Thermal Resistance**

Symbol	Parameter	RS12N65HF	Units	Test Conditions
R $\theta$ JC	Junction-to-Case	2.5	$^{\circ}\text{C} / \text{W}$	Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of + 150 $^{\circ}\text{C}$
R $\theta$ JA	Junction-to-Ambient	62.5		1 cubic foot chamber, free air.

**OFF Characteristics** T<sub>J</sub>= 25 $^{\circ}\text{C}$  unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BVDSS	Drain- to- source Breakdown Voltage	650	--	--	V	VGS=0V ID=250 $\mu\text{A}$
IDSS	Drain- to- Source Leakage Current	--	--	1	$\mu\text{A}$	VDS=650V VGS=0V
IGSS	Gate- to- Source Forward Leakage	--	--	100	nA	VGS=30V VDS=0V
	Gate- to- Source Reverse Leakage	--	--	-100		VGS=-30V VDS=0V

**ON Characteristics** T<sub>J</sub>=25 $^{\circ}\text{C}$  unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
RDS(on)	Static Drain- to- Source On-Resistance(Note*2)	--	0.65	0.75	$\Omega$	VGS=10V ID=6A
VGS (TH)	Gate Threshold Voltage	2	--	4	V	VGS=VDS ID=250 $\mu\text{A}$
Gfs	Forward Transconductance	--	6	--	S	VDS=40V ID=6A

**Resistive Switching Characteristics** Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
td(ON)	Turn- on Delay Time	--	42	--	nS	VDS=325V ID=12A RG=25 $\Omega$
trise	Rise Time	--	20	--		
td(OFF)	Turn- OFF Delay Time	--	120	--		
tfall	Fall Time	--	45	--		

**Dynamic Characteristics** Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Ciss	Input Capacitance	--	2100	2500	pF	VGS=0V VDS=25V f=1.0MHz
Coss	Output Capacitance	--	150	200		
Crss	Reverse Transfer Capacitance	--	10	15		
Qg	Total Gate Charge	--	50	70	nC	VDS=520V ID=12A VGS=10V
Qgs	Gate- to- Source Charge	--	10	--		
Qgd	Gate-to-Drain(" Miller") Charge	--	15	--		

**Source- Drain Diode Characteristics**

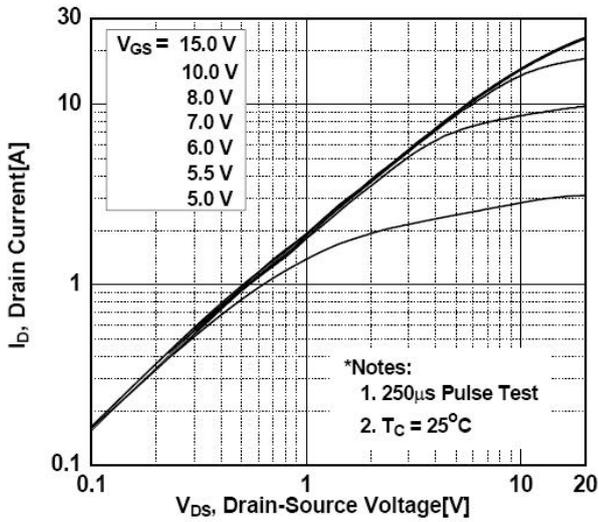
Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
IS	Continuous Source Current	--	--	12	A	Integral pn- diode in MOSFET
ISM	Maximum Pulsed Current	--	--	48	A	
VSD	Diode Forward Voltage	--	--	1.4	V	IS=12A, VGS=0V
trr	Reverse Recovery Time	--	400	--	nS	VGS=0V IS=12A di/dt=100A/μs
Qrr	Reverse Recovery Charge	--	4.9	--	μC	

**Notes:**

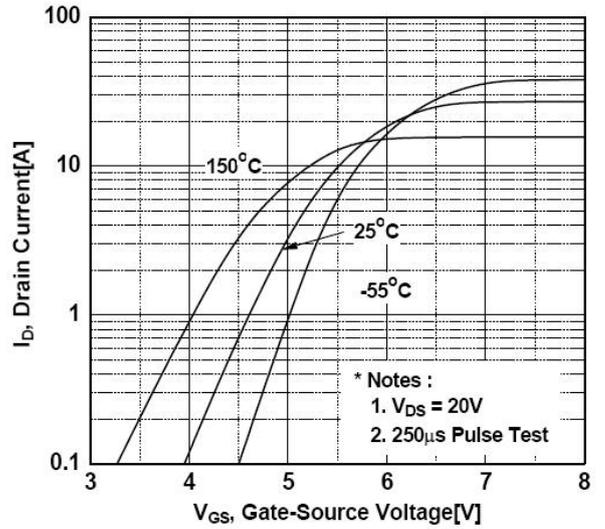
- \* 1. Repetitive rating, pulse width limited by maximum junction temperature.
- \* 2. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$

**Typical Feature Curve**

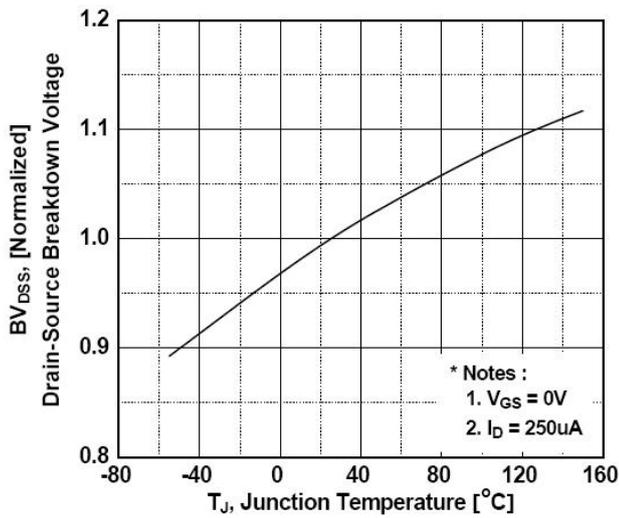
**Fig. 1 On-State Characteristics**



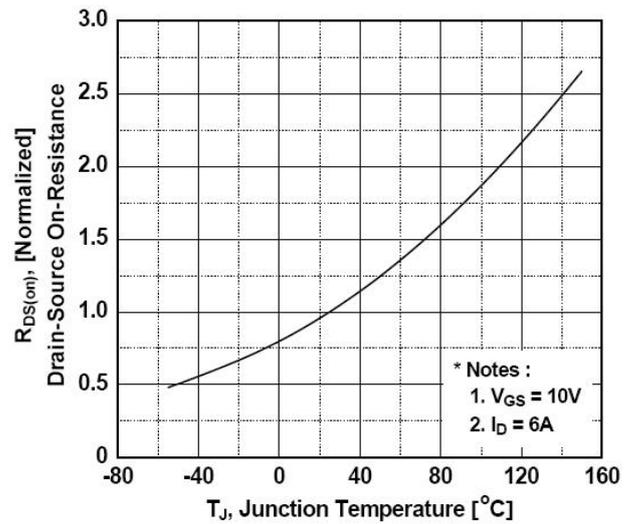
**Fig. 2 Transfer Characteristics**



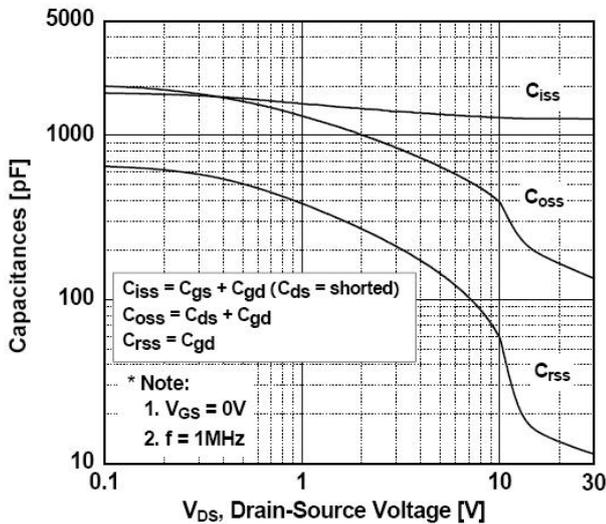
**Fig.3 Breakdown Voltage Variation vs Temperature**



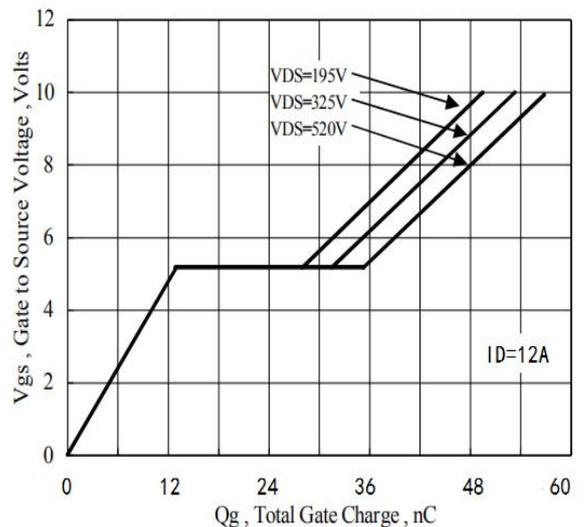
**Fig. 4 On-Resistance Variation vs Temperature**



**Fig. 5 Capacitance Characteristics**

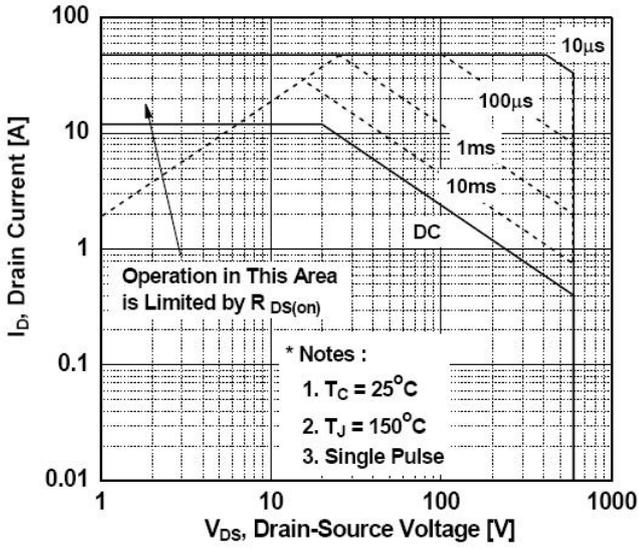


**Fig. 6 Gate Charge Characteristics**

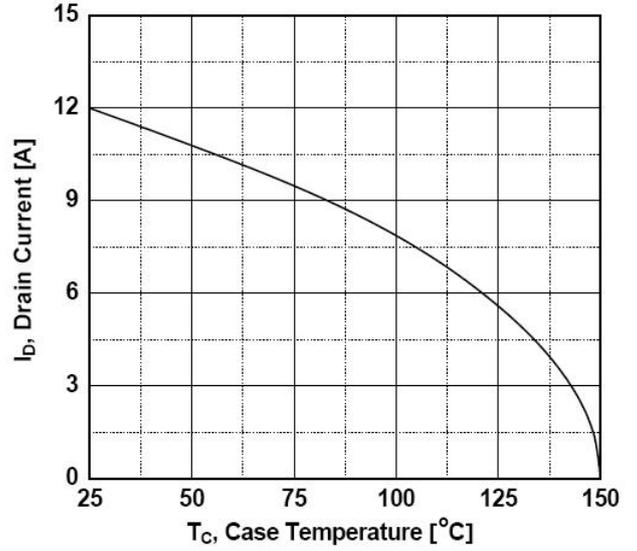


**Typical Feature Curve**

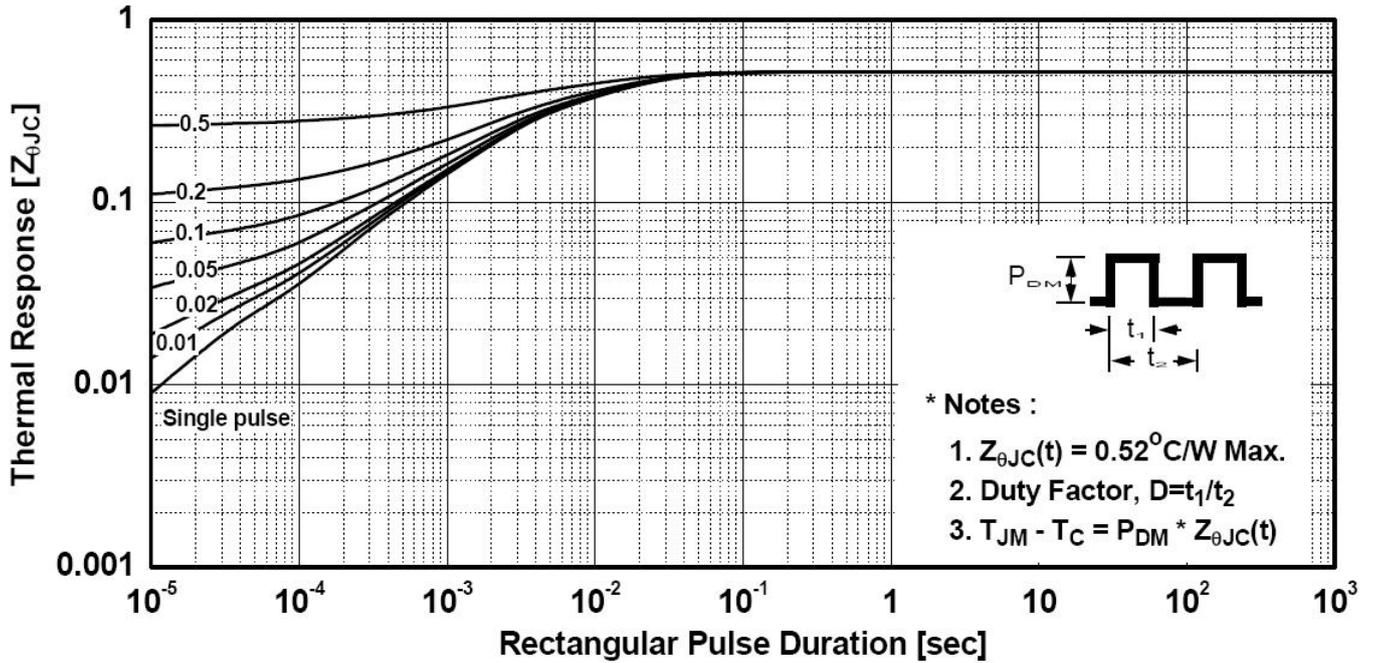
**Fig.7 Maximum Safe Operating Area**



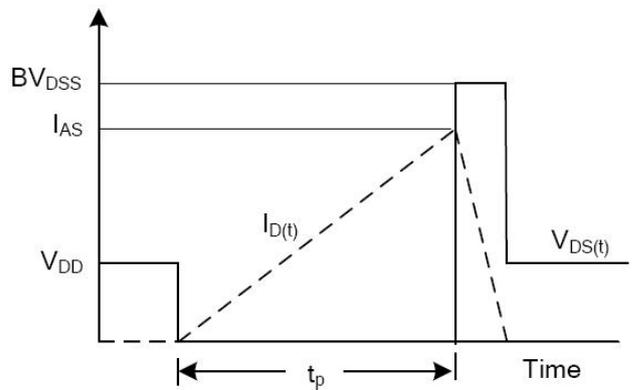
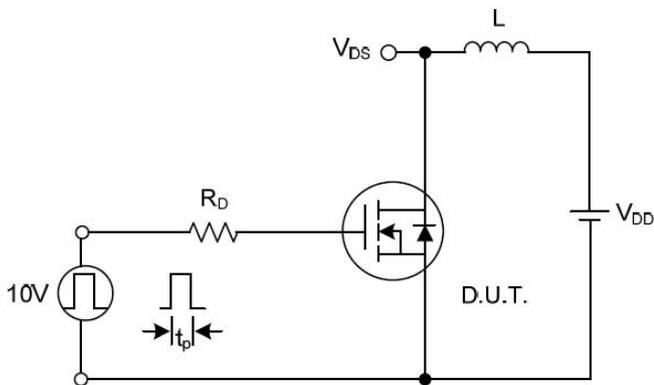
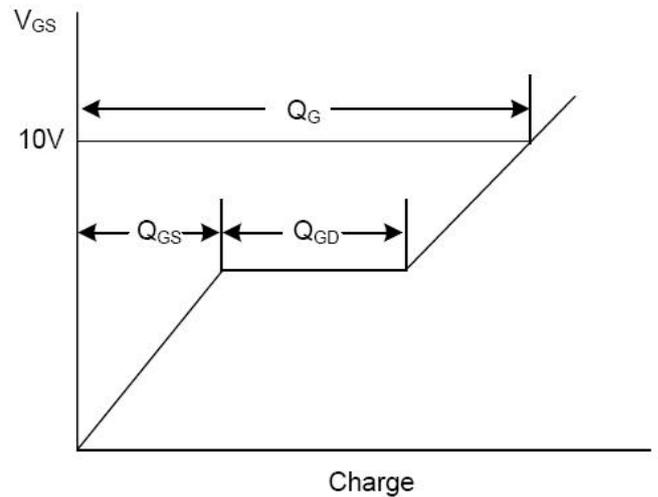
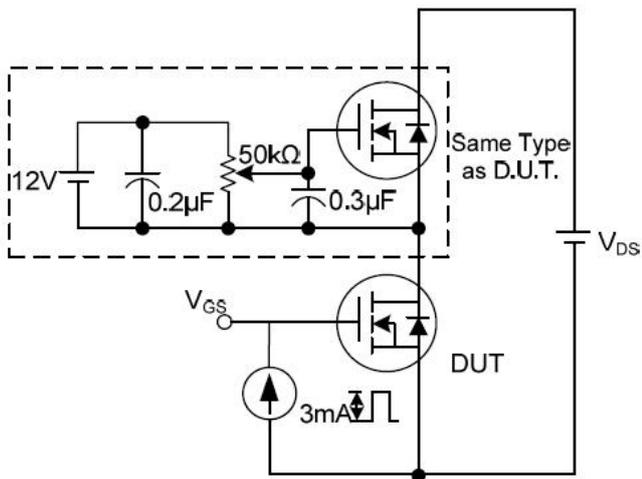
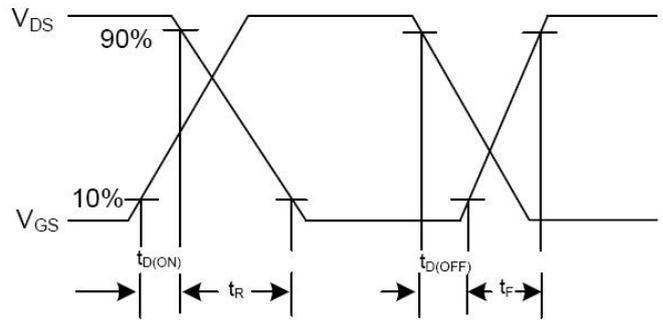
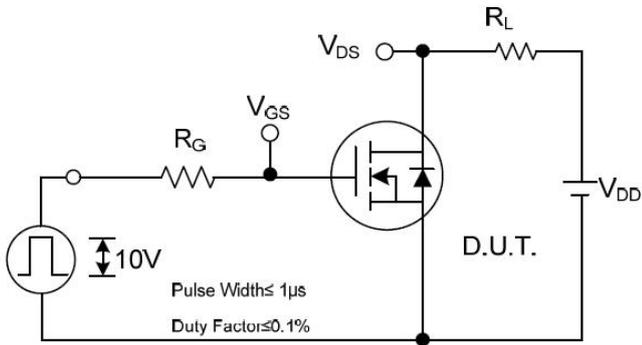
**Fig. 8 Maximum Drain Current vs Case Temperature**



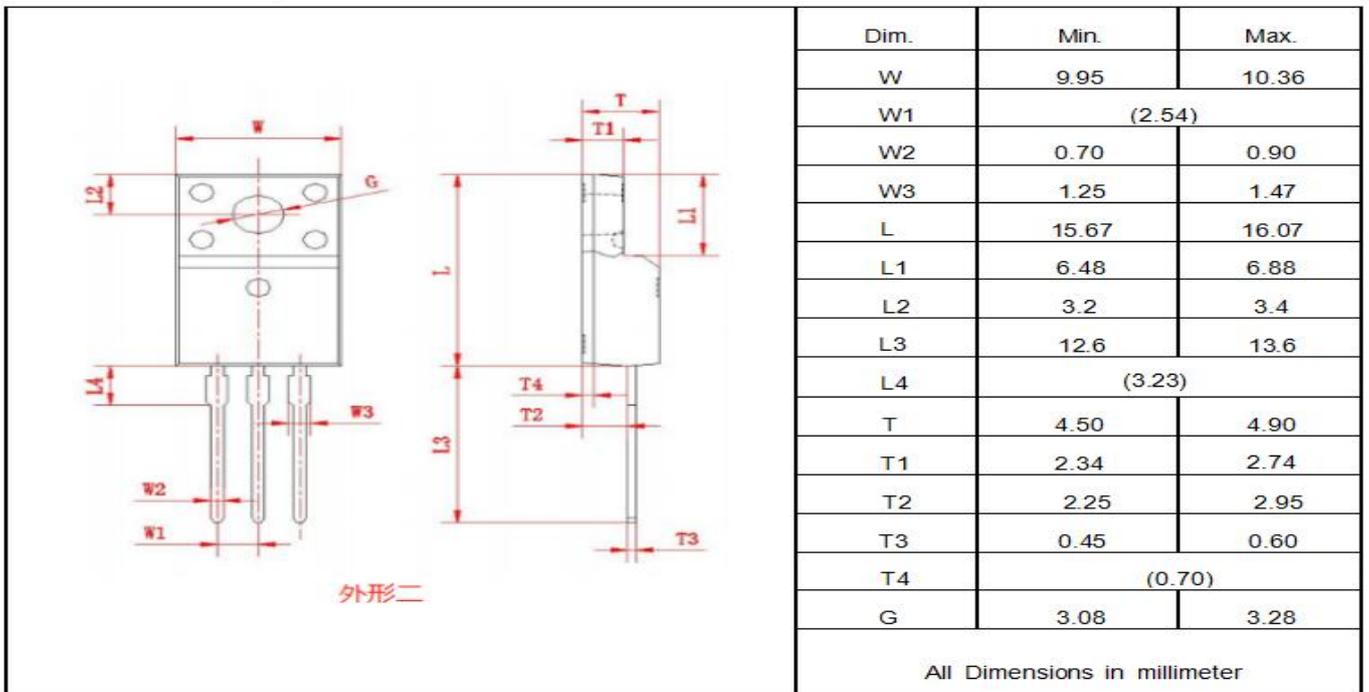
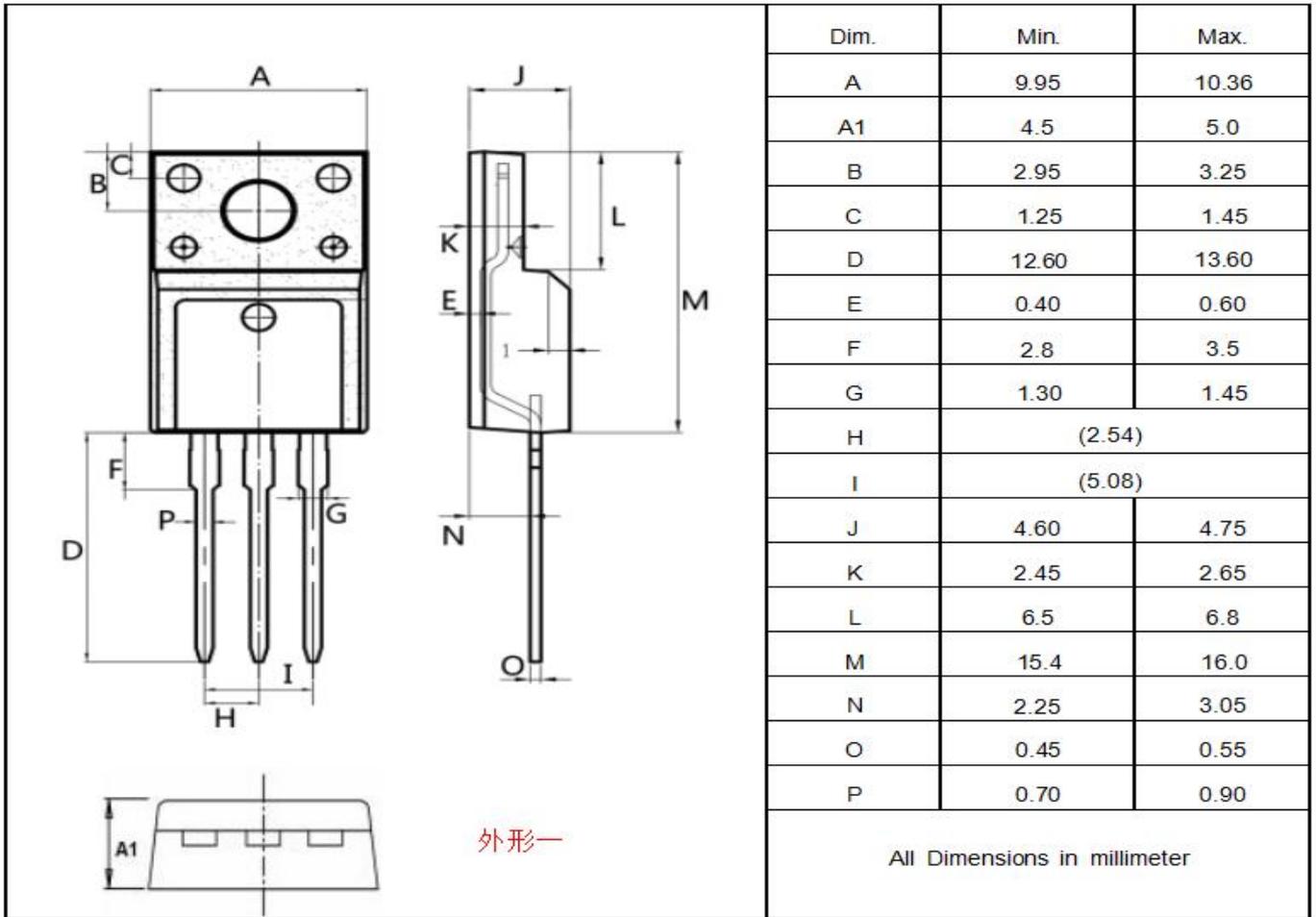
**Fig. 9 Transient Thermal Response Curve**



**Test Circuits and Waveforms**



Package outline drawing(TO-220F Unit: mm )



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