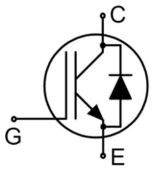
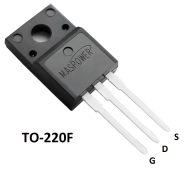
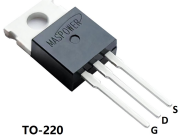
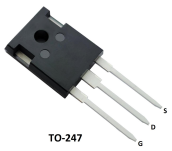
Features

- Low gate charge
- Trench FS Technology,
- saturation voltage: $V_{CE(sat)}$, type =1.75V,I_C=30A and TC =25°C
- RoHS product









Applications

- General purpose inverters
- UPS

Absolute Ratings（Tc=25℃）

Parameter	Symbol		Value	Unit
Collector-Emmiter Voltage	Vces		650	V
*Collector Current-continuous	Ic	T=25℃	60	A
		T=100℃	30	A
Collector Current-pulse(note 1)	I_{CM}		120	A
Diode RMS forward current	I_F	T=25℃	60	A
		T=100℃	30	A
Gate-Emmiter Voltage	V_{GES}		±20	V
Turn-off safe area	-		120	A
Surge non repetitive forward current tp=10ms sinusoidal	I_{FSM}		120	A
Power Dissipation(TO-220)	P_D	T_C=25℃	63	W
Power Dissipation(TO-247)	P_D	T_C=25℃	160	W
Power Dissipation(TO-220F)	P_D	T_C=25℃	46	W
Operating Temperature Range	T_J		-55~175	℃
Storage Temperature Range	T_{STG}		-55~+150	℃
Maximum Lead Temperature for Soldering Purposes	T_L		300	℃

*Collector current limited by maximum Junction temperature

*Notes:

1.Pulse width limited by maximum junction temperature

Thermal Characteristic

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Off-Characteristics						

Collector-Emmiter Voltage	BV_{CES}	I_C=250μA,V_{GE}=0V	650	-	-	V
Breakdown Voltage Temperature Coefficient	$\triangle BV_{CES}/\triangle T_J$	I_C=0.5mA,referenced to 25℃	-	0.6	-	V/℃
Zero Gate Voltage Collector Current	I_{CES}	V_{CE}=650V,V_{GE}=0V,T_C=25℃	-	-	20	μA
		V_{CE}=650V,V_{GE}=0V,T_C=175℃	-	-	2	mA
Gate-body leakage current	I_{GES}	V_{CE}=0V,V_{GE}=±20V	-	-	±200	nA
On-Characteristics						
Gate-Emmiter Threshold Voltage	$V_{GE(th)}$	VCE=VGE, Ic=250uA	4.5	-	6.5	V
Collector-Emmiter saturation Voltage	V_{CESAT}	V_{GE}=15V,I_C=30A, T_C=25℃	-	1.75	2.1	V
		Tc=125℃		1.95	-	
		T_C=175℃		2.1	-	
Dynamic Characteristics						
Input capacitance	Cies	VCE=25V, VGE=0V, f=1.0MHZ, Tc=25℃	-	1830	-	pF
Output capacitance	Coes		-	160	-	pF
Reverse transfer capacitance	Cres		-	50.3	-	pF
Total Gate Charge	Qg	VCC=520V,IC=30A, RG=7.9Ω,VGE=15V, T_C=25°C	-	64.5	-	nC
Gate to emitter charge	Qge		-	18.1	-	
Gate to collector charge	Qgc		-	23.7	-	
Gate resistance	Rg	f=1MHz,open collector	-	1.1	-	Ω
Short current	Isc	VGE=15V,VCE=360V, TJstart≤150°C,t≤10μs	-	150	-	A
Switching Characteristics						
Turn-On delay time	t_d(on)	V_{CC}=400V,Ic=30A,R_G =7.9Ω,V_{GE}=15V Tc=25℃	-	27.0	-	ns
Turn-On rise time	t_r		-	67.0	-	ns
Turn-off delay time	t_d(off)		-	67.0	-	ns
Turn-off Fall time	t_f		-	44.0	-	ns
Turn-on energy	E_{on}		-	0.83	-	mJ
Turn-off energy	E_{off}		-	0.36	-	mJ
Total switching Energy	E_{tot}		-	1.19	-	mJ
Turn-On delay time	t_d(on)	V_{CC}=400V,Ic=30A,R_G	-	27.0	-	ns

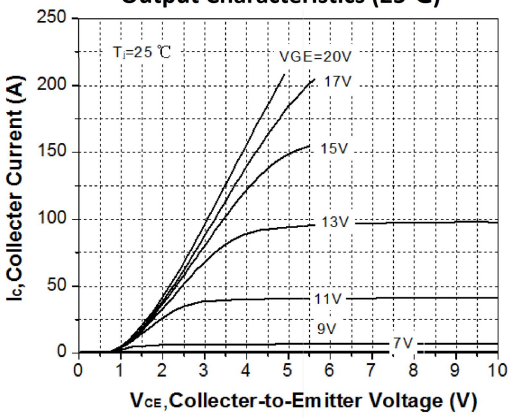
Turn-On rise time	t_r	=7.9Ω,V_{GE}=15V Tc=175℃	-	68.0	-	ns
Turn-off delay time	t_d(off)		-	90.0	-	ns
Turn-off Fall time	t_f		-	59.0	-	ns
Turn-on energy	E_{on}		-	1.09	-	mJ
Turn-off energy	E_{off}		-	0.58	-	mJ
Total switching Energy	E_{tot}		-	1.67	-	mJ
Anti-Paraller Diode Characteristics and Maximum Ratings						
Diode Forward Voltage	V_F	V_{GE}=0V,I_F=15A.	-	1.5	2.2	V
Diode Reverse recovery time	t_{rr}	VGE=0V, VR=400V,IF=30A dI=/dt=100A/us Tc=25℃	-	155	-	ns
Reverse recovery charge	Q_{rr}		-	85.0	-	uC
Diode Reverse recovery Current	Irrm		-	1.14	-	A
Diode Reverse recovery time	t_{rr}	VGE=0V,VR=400V, IF=30A dI=/dt=100A/us Tc=175℃	-	307	-	ns
Reverse recovery charge	Q_{rr}		-	685	-	uC
Diode Reverse recovery Current	Irrm		-	3.98	-	A

Parameter	Symbol	Value	Unit
Thermal Resistance,Junction to Case(TO-220/TO-247)	$R_{th(j-c)}$	0.77	℃/W
Thermal Resistance,Junction to Ambitent (TO-220/TO-247)	$R_{th(j-A)}$	63	℃/W
Thermal Resistance,Junction to Case(TO-220F)	$R_{th(j-c)}$	3.2	℃/W
Thermal Resistance,Junction to Ambitent(TO-220F)	$R_{th(j-A)}$	43.2	℃/W

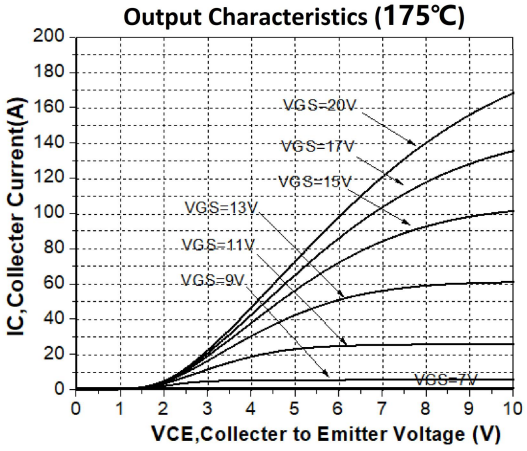
Marking	Package
MSG30T65FT	TO-220
MSG30T65FS	TO-220F
MSG30T65FC	TO-247

Electrical Characteristics(curves)

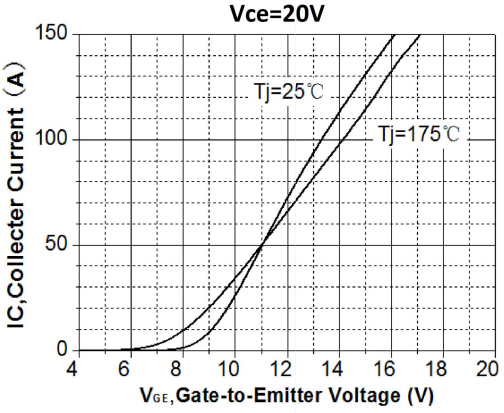
Output Characteristics (25℃)



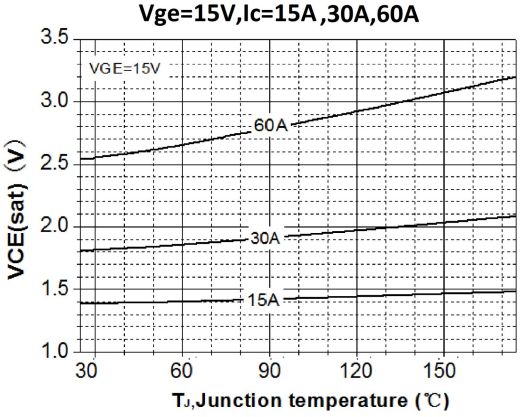
Output Characteristics (175℃)



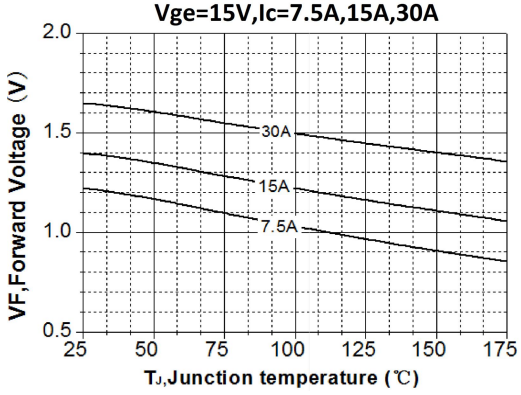
Transfer Characteristics
Vce=20V



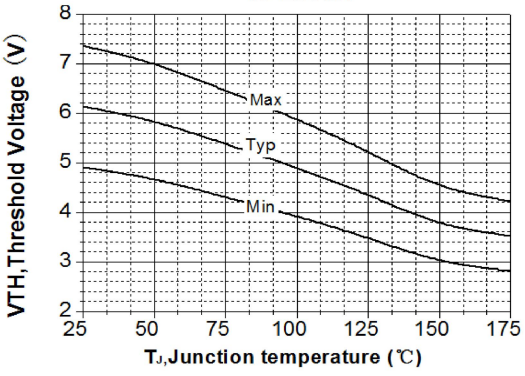
Vcesat vs. Tj
Vge=15V,Ic=15A,30A,60A



VF vs. Tj
Vge=15V,Ic=7.5A,15A,30A

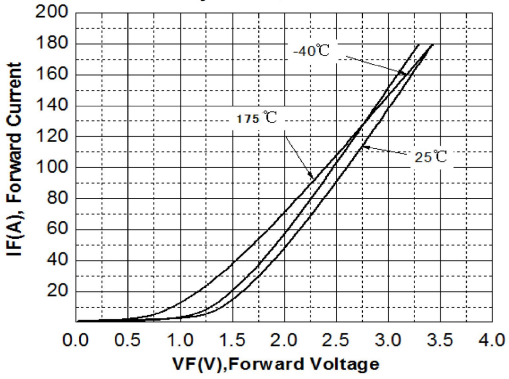


VTH vs. Tj
Ic=250uA



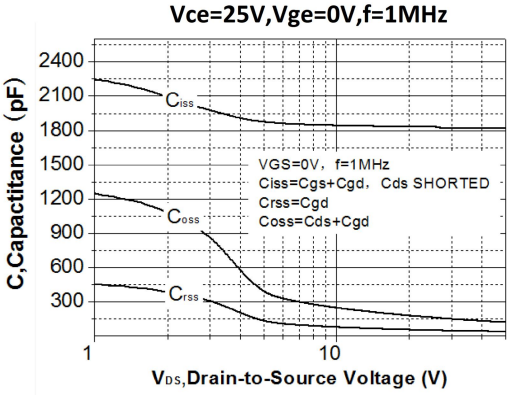
Diode Characteristics

Tj=25℃、175℃



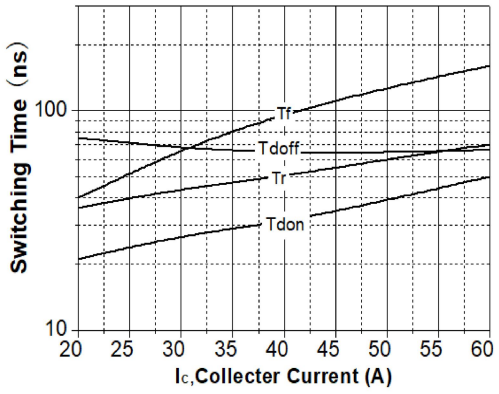
Capacitance Characteristics

Vce=25V,Vge=0V,f=1MHz



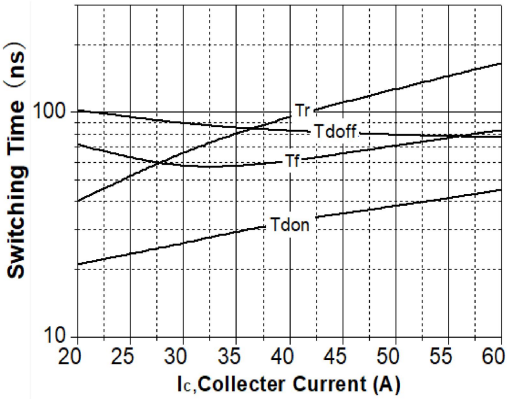
Switching Time vs.IC(25℃)

Vce=400V,Vge=15V,RG=7.9ohm



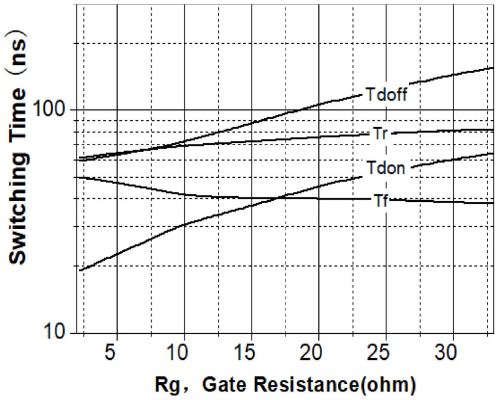
Switching Time vs.IC(175℃)

Vce=400V,Vge=15V,RG=7.9ohm



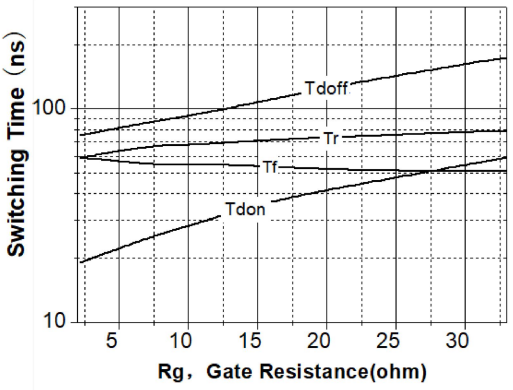
Switching Time vs. Rg(25℃)

Vge=15V,Vce=400V,IC=30A

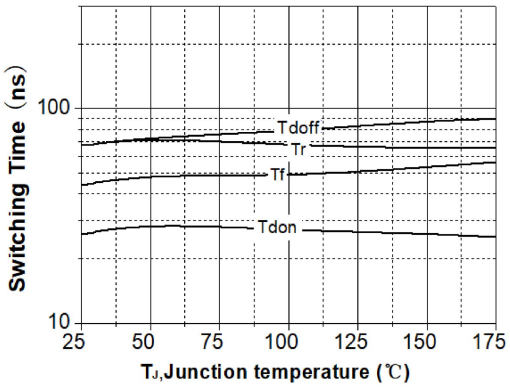


Switching Time vs. Rg(175℃)

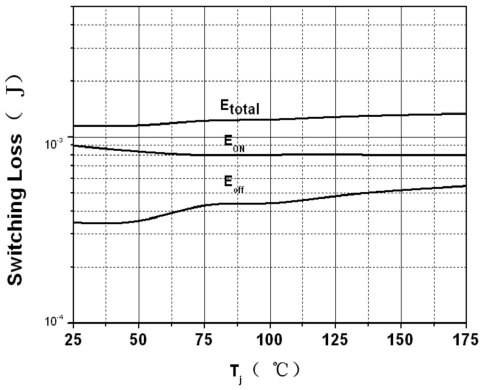
Vge=15V,Vce=400V,IC=30A



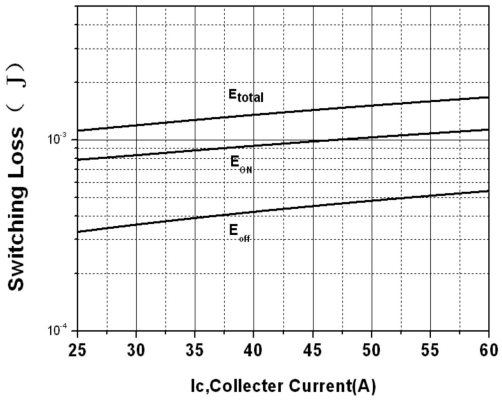
Switching Time vs. Tj
Vge=15V,Vce=400V,IC=30A,Rg=7.9ohm



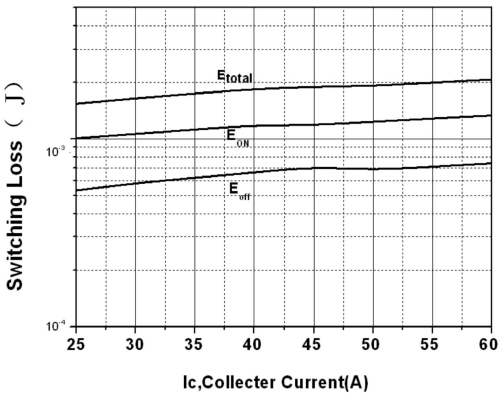
Switching Loss vs. Tj
Vge=15V,Vce=400V,IC=30A,Rg=7.9ohm



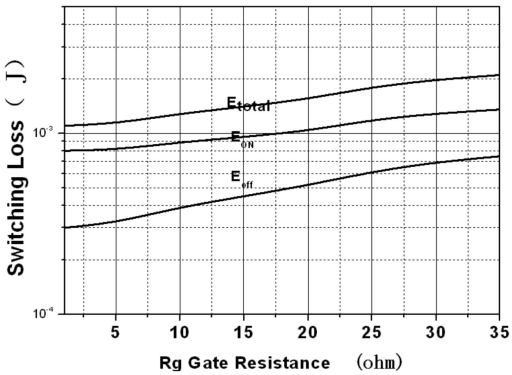
Switching Loss vs.IC(25℃)
Vge=15V,Vce=400V,Rg=7.9ohm



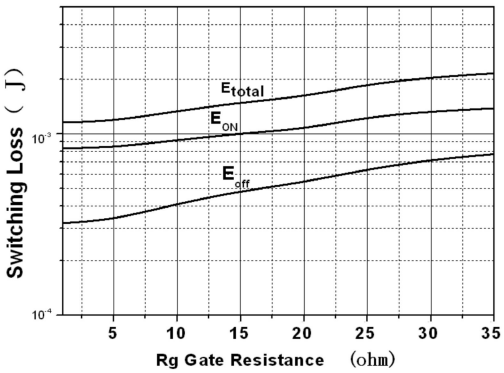
Switching Loss vs.IC(175℃)
Vge=15V,Vce=400V,Rg=7.9ohm



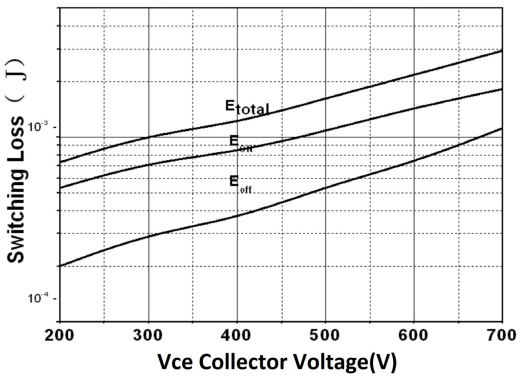
Switching Loss vs. Rg(25℃)
Vge=15V,Vce=400V,IC=30A



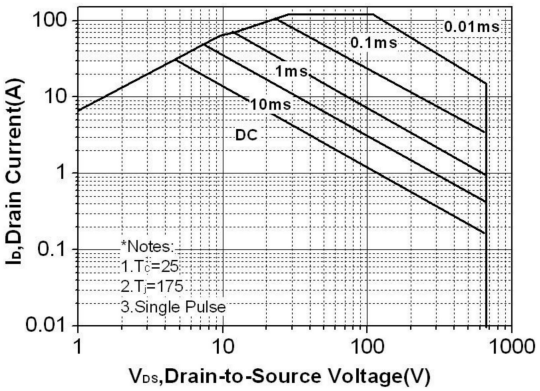
Switching Loss vs. Rg(175℃)
Vge=15V,Vce=400V,IC=30A



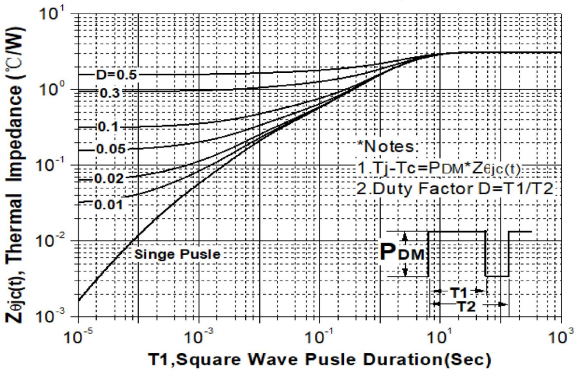
Switching Loss vs. VCE(175℃)
Vge=15V,IC=30A,Rg=7.9ohm



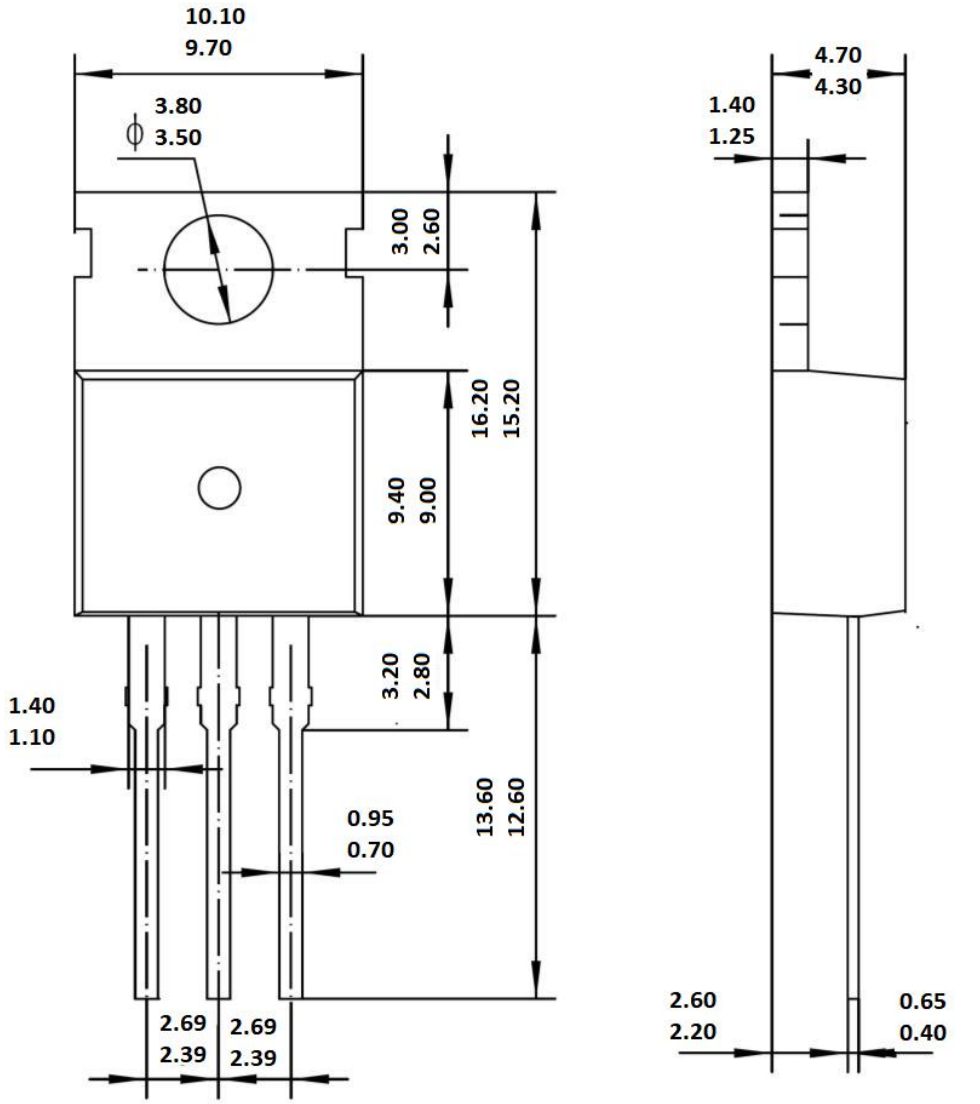
Safe Operating Area
Tc=25℃,Vge=15V

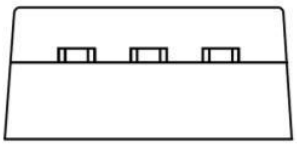


Transient Thermal Impedance

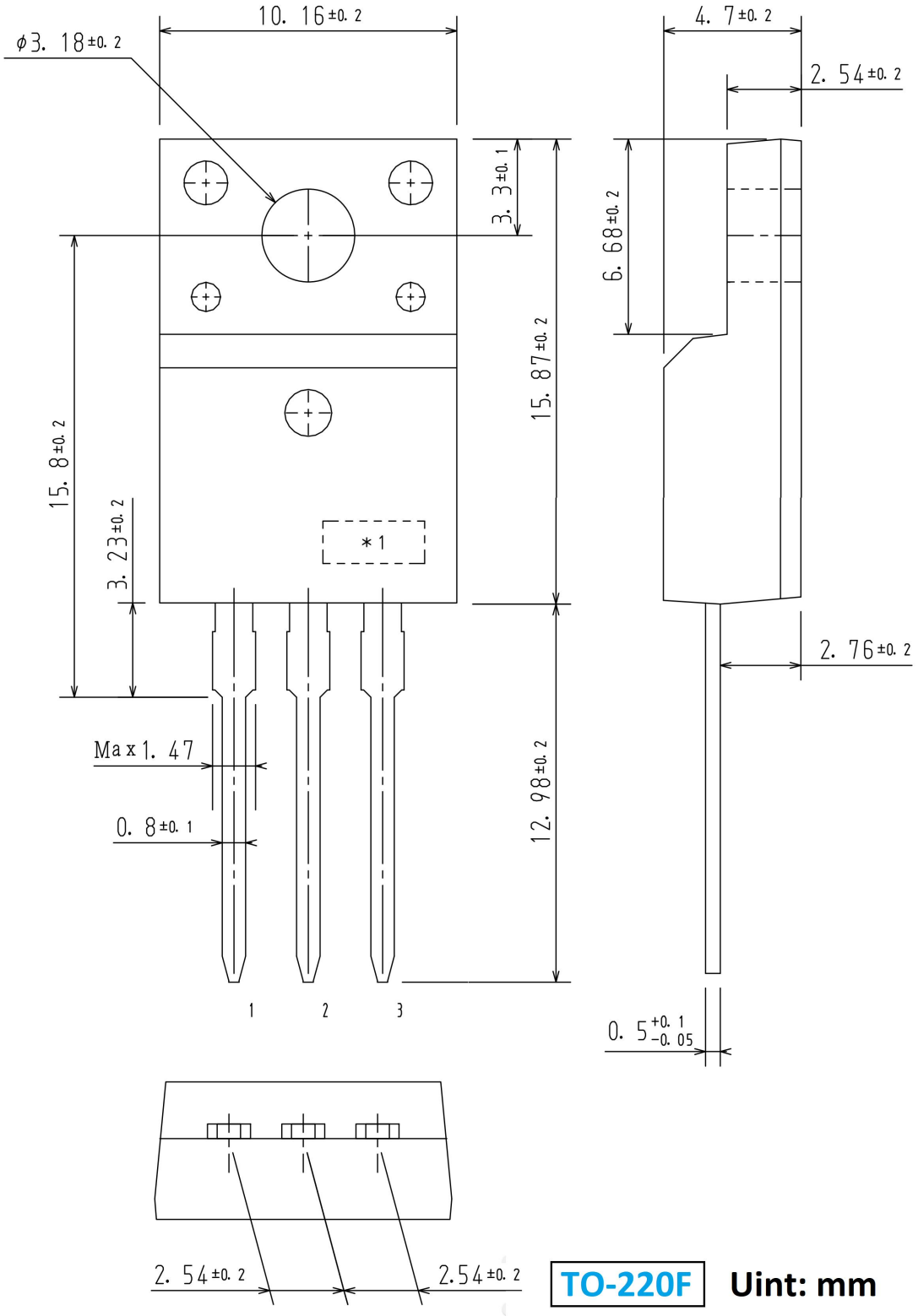


Package Mechanical DATA





TO-220 **Unit: mm**



TO-220F **Uint: mm**

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