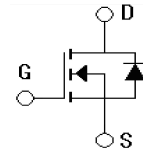
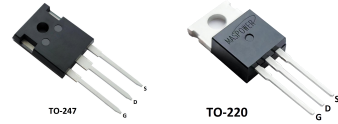
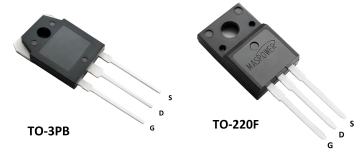


Features

- Low On-Resistance
- Fast switching
- High Input Resistance
- RoHS Compliant



Applications

- Electronic ballasts
- Electronic Transformer
- Switch Mode Power Supply

Absolute Ratings (Tc=25°C)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	500	V
Transient Gate-Source Voltage	V_{GSM}	±30	V
Continuous Gate-Source Voltage	V_{GSS}	±20	V
Drain Current -continuous	$I_D, T=25^{\circ}\text{C}$ $T=100^{\circ}\text{C}$	20*	A
		15	A
Drain Current - pulse (note 1)	I_{DM}	80	A
Single Pulsed Avalanche Energy (note 2)	E_{AS}	1000	mJ
Power Dissipation (TO-3PB\TO-247\TO-220)	P_D derating factor	290	W
		2.17	W/°C
Power Dissipation(TO-220F)	P_D derating factor	31.7	W
		0.25	W/°C
Storage Temperature	T_{STG}	-55~+150	°C
Junction Temperature	T_j	150	°C
Maximum lead temperature for soldering purpose	T_L	300	°C

*Drain current limited by maximum junction temperature

Electrical Characteristics(T_{CASE}=25°C unless otherwise specified)

Parameter	Symbol	Tests conditions	Min	Type	Max	Units
Off-Characteristics						
Drain-Source Voltage	BV_{DSS}	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	500	-	-	V

Breakdown Voltage Temperature Coefficient	ΔBV_{DSS} / ΔT_J	ID=250μA, referenced to 25°C	-	0.6	-	V/°C
Drain cut-off current	IDSS	VDS=500V,VGS=0V	-	-	1	μA
		VDS=400V,Tj=125°C	-	-	10	
Gate-body leakage current,forward	IGSSF	VDS=0V,VGS=30V	-	-	100	nA
Gate-body leakage current,reverse	IGSSR	VDS=0V,VGS=-30V	-	-	-100	nA
On-Characteristics						
Gate Threshold Voltage	VGS(th)	VDS=VGS,ID=250uA	2.0	-	4.0	V
Static Drain-Source On-Resistance	RDS(ON)	VGS=10V,ID=12A (note 3)	-	0.2	0.25	Ω
Forward Transconductance	gfs	VDS =40V , ID=9.5A (note 3)	-	19.7	-	S
Dynamic Characteristics						
Input capacitance	Ciss	VDS=25V, VGS=0V, f=1.0MHZ	-	2850	3900	pF
Output capacitance	Coss		-	260	355	
Reverse transfer capacitance	Crss		-	7	23	
Switching Characteristics						
Turn-On delay time	td(on)	VDD=250V,ID=20A, RG=25Ω, VGS=10V(note 4,5)	-	30	92	ns
Turn-On rise time	tr			43	170	ns
Turn-Off delay time	td(off)			110	265	ns
Turn-Off Fall time	tf			50	122	ns
Total Gate Charge	Qg	VDS=400V, ID=20A, VGS=10V(note4,5)	-	48.7	59.3	nC
Gate-Source charge	Qgs		-	9.5	-	nC
Gate-Drain charge	Qgd		-	20.6	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	VSD	VGS=0V,IS=20A (note 3)	-	-	1.4	V
Maximum Continuous Drain-Source Diode Forward Current	IS		-	-	20	A
Reverse recovery time	trr	VGS=0V,IF=20A dIF/dt=100A/us(note 3)	-	400	-	ns
Reverse recovery charge	Qrr		-	4.2	-	uC

Thermal Characteristic

Parameter	Symbol	Value		Unit
		MS20N50FB \FC\FT	MS20N50FS	
Thermal Resistance, Junction-to-Case,Max	$R_{\theta JC}$	0.43	3.94	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient,Max	$R_{\theta JA}$	40	80	$^{\circ}\text{C}/\text{W}$

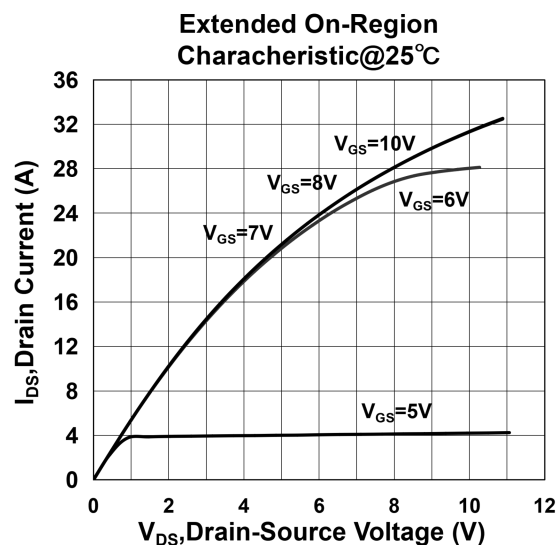
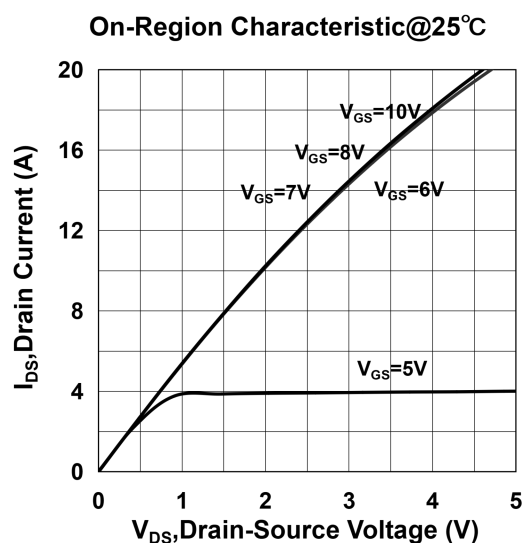
Order Message

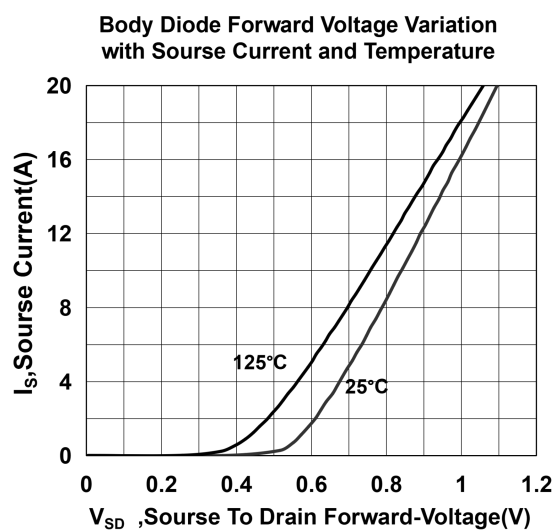
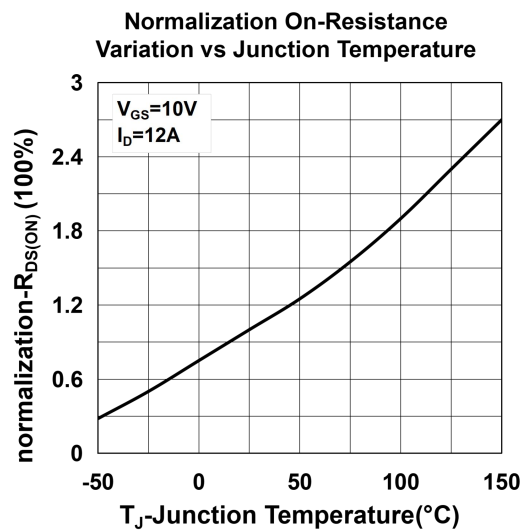
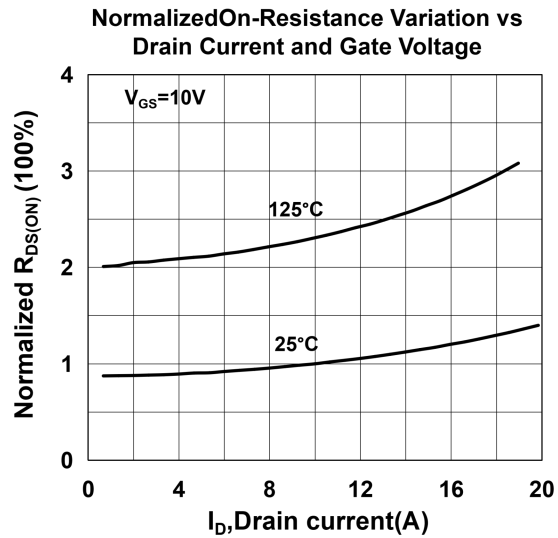
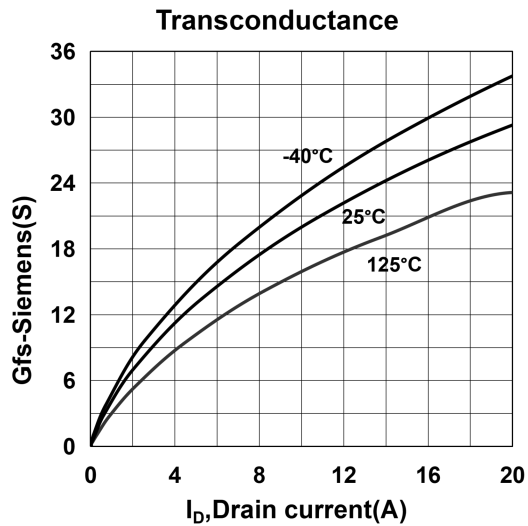
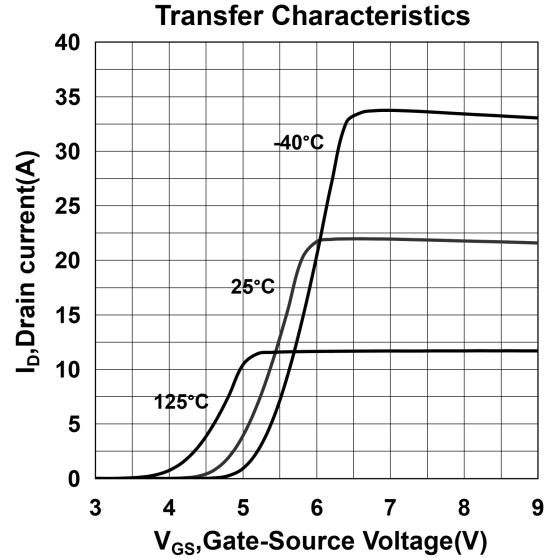
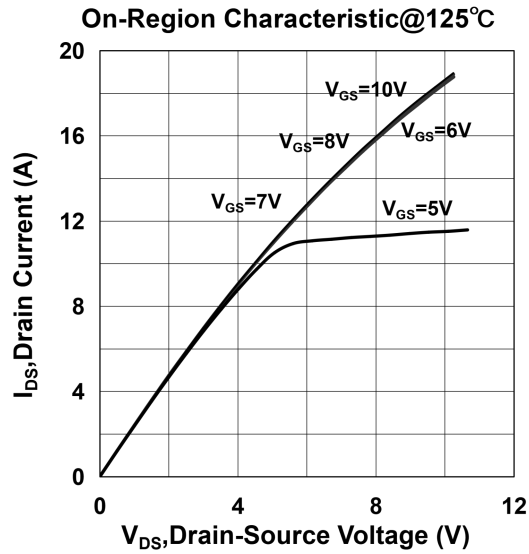
Order codes	Package	Packaging
MS20N50FB	TO-3PB	Tube
MS20N50FC	TO-247	Tube
MS20N50FS	TO-220F	Tube
MS20N50FT	TO-220	Tube

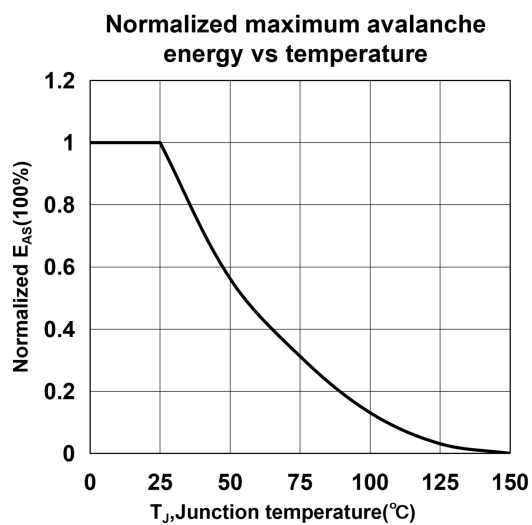
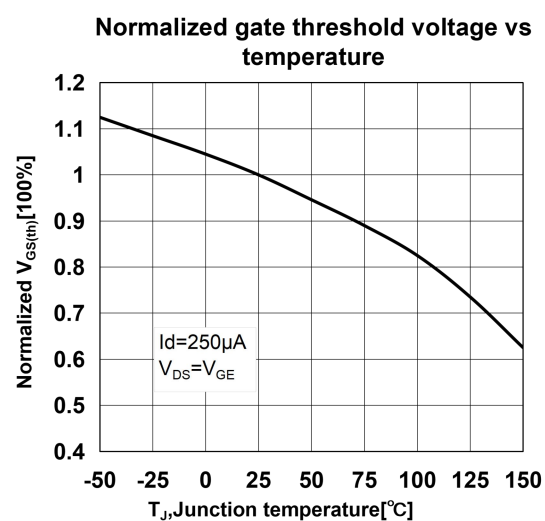
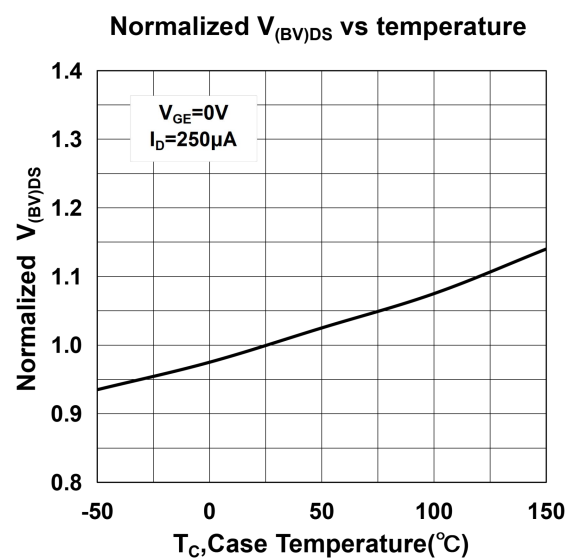
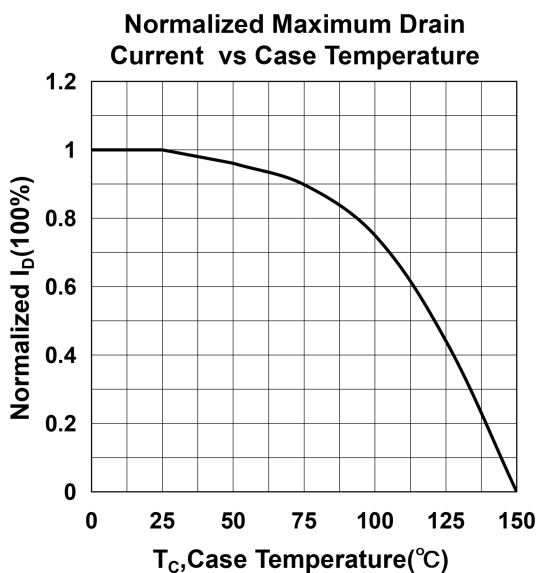
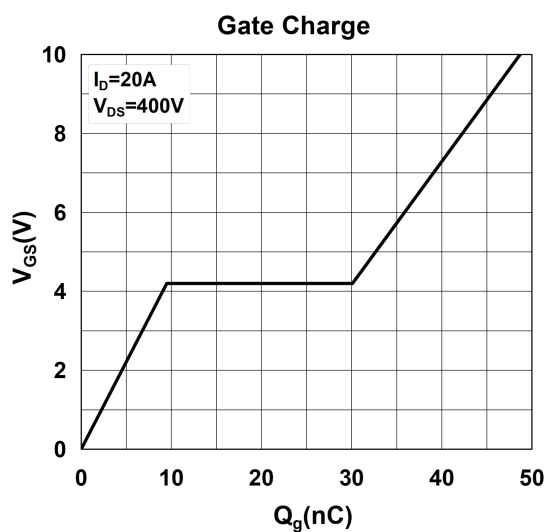
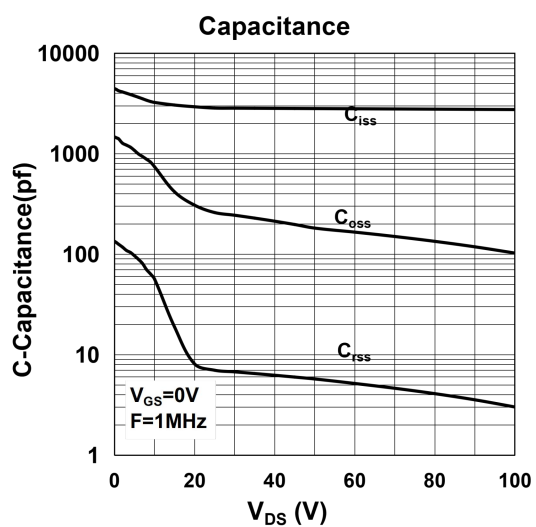
Notes:

1. Repetitive rating: Pulse width limited by maximum junction temperature
2. Starting $T_j=25^{\circ}\text{C}$, $V_{DD}=50\text{V}$, $L=3\text{mH}$, $R_G=25\Omega$, $I_{AS}=20\text{A}$
3. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

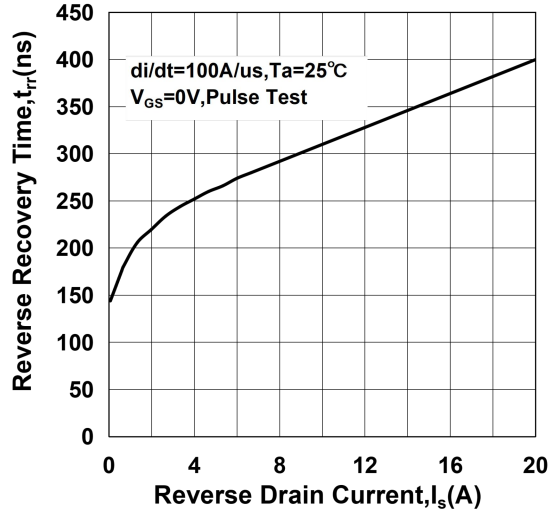
Electrical Characteristics



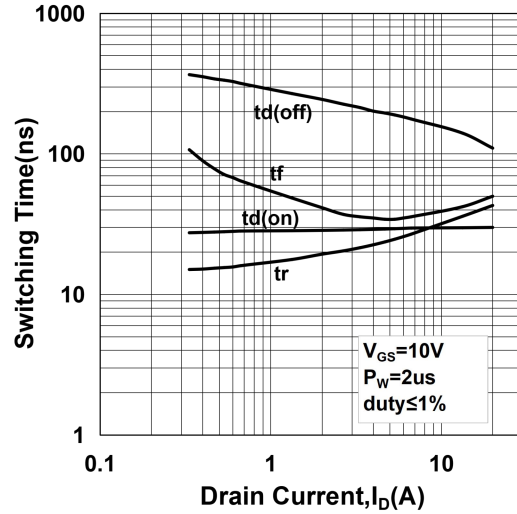




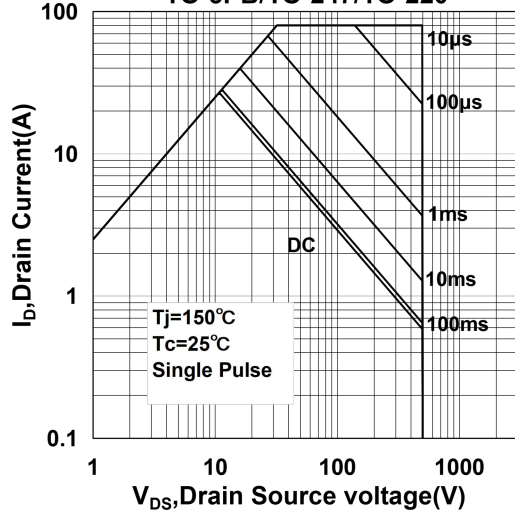
Body Diode Reverse Recovery Time vs Source to Drain Current



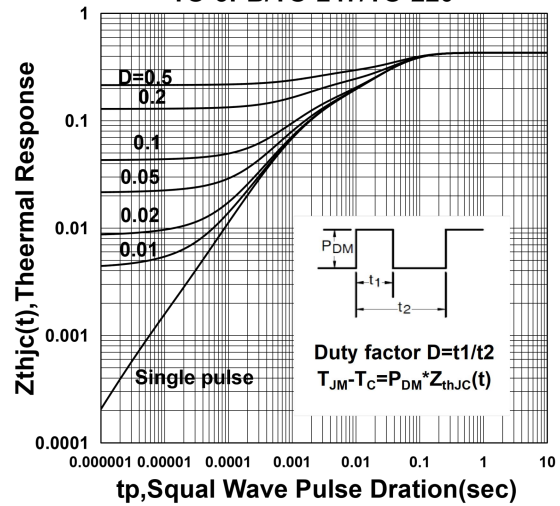
Switching Characteristics



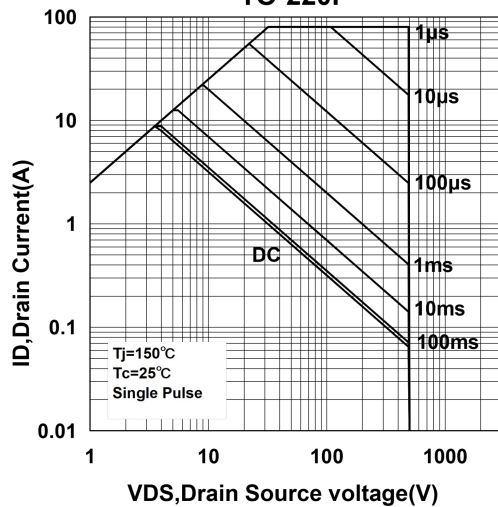
Safe Operating Area for TO-3PB/TO-247/TO-220



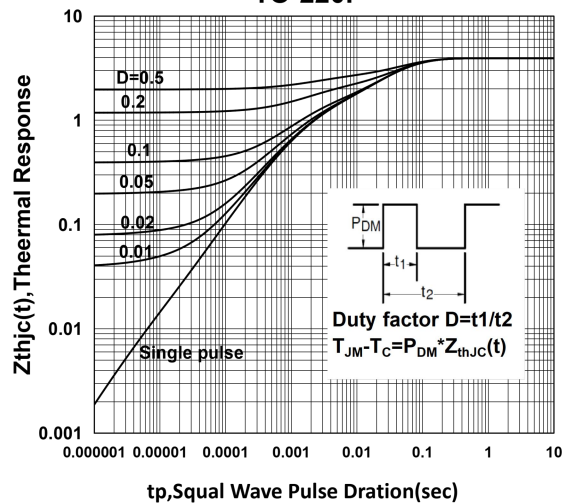
Transient response Curve for TO-3PB/TO-247/TO-220



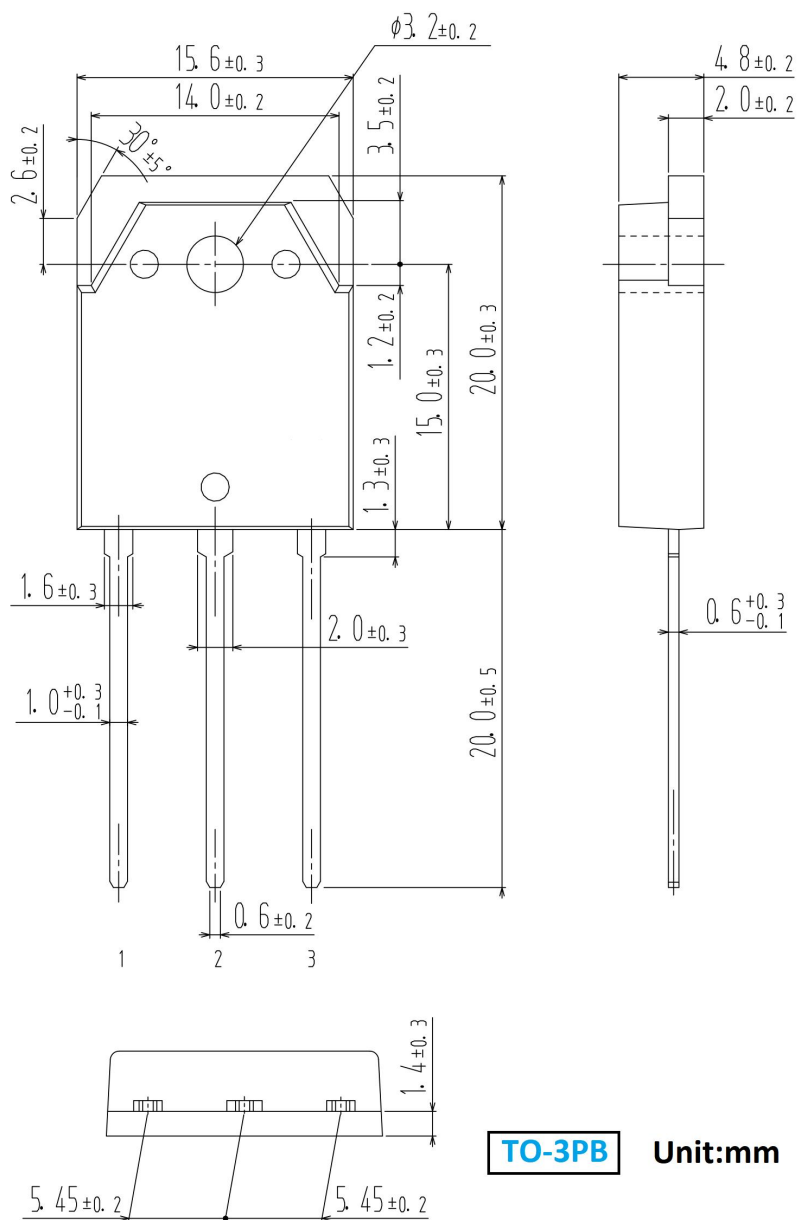
Safe Operating Area for TO-220F

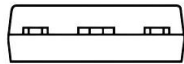
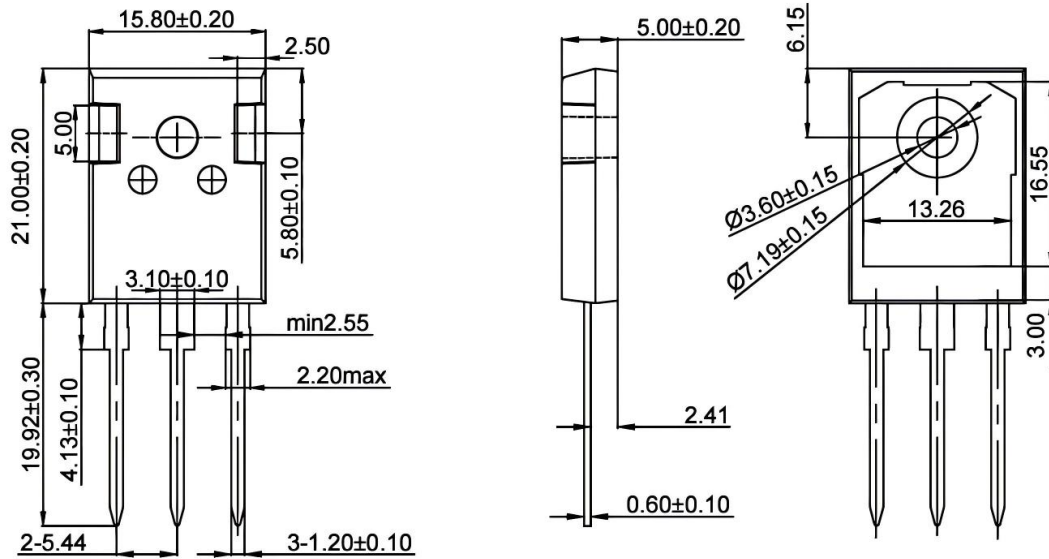


Transient response Curve for TO-220F

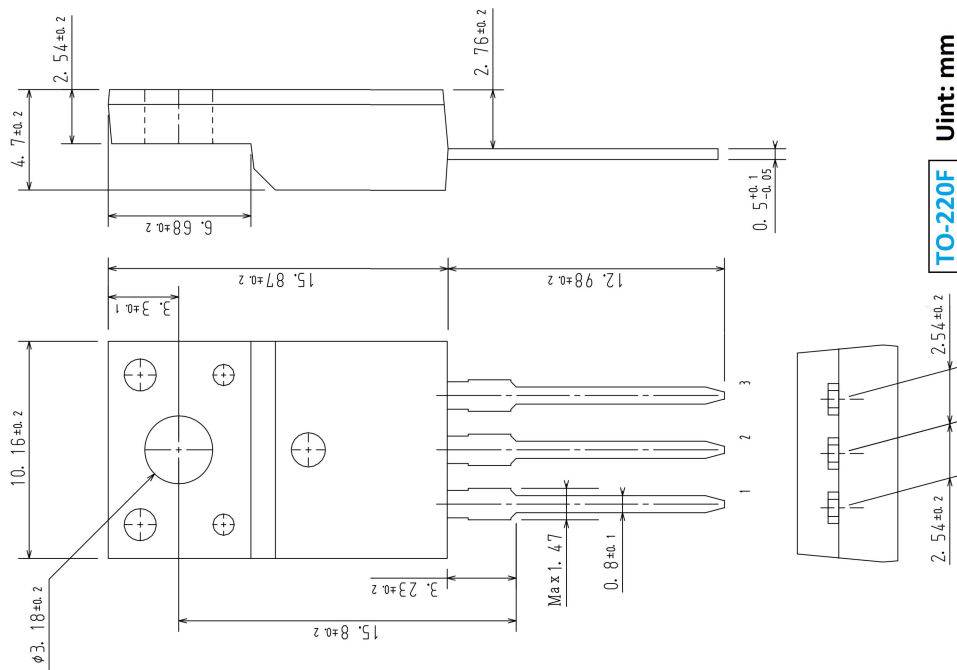


Package Mechanical DATA



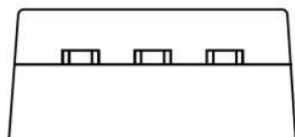
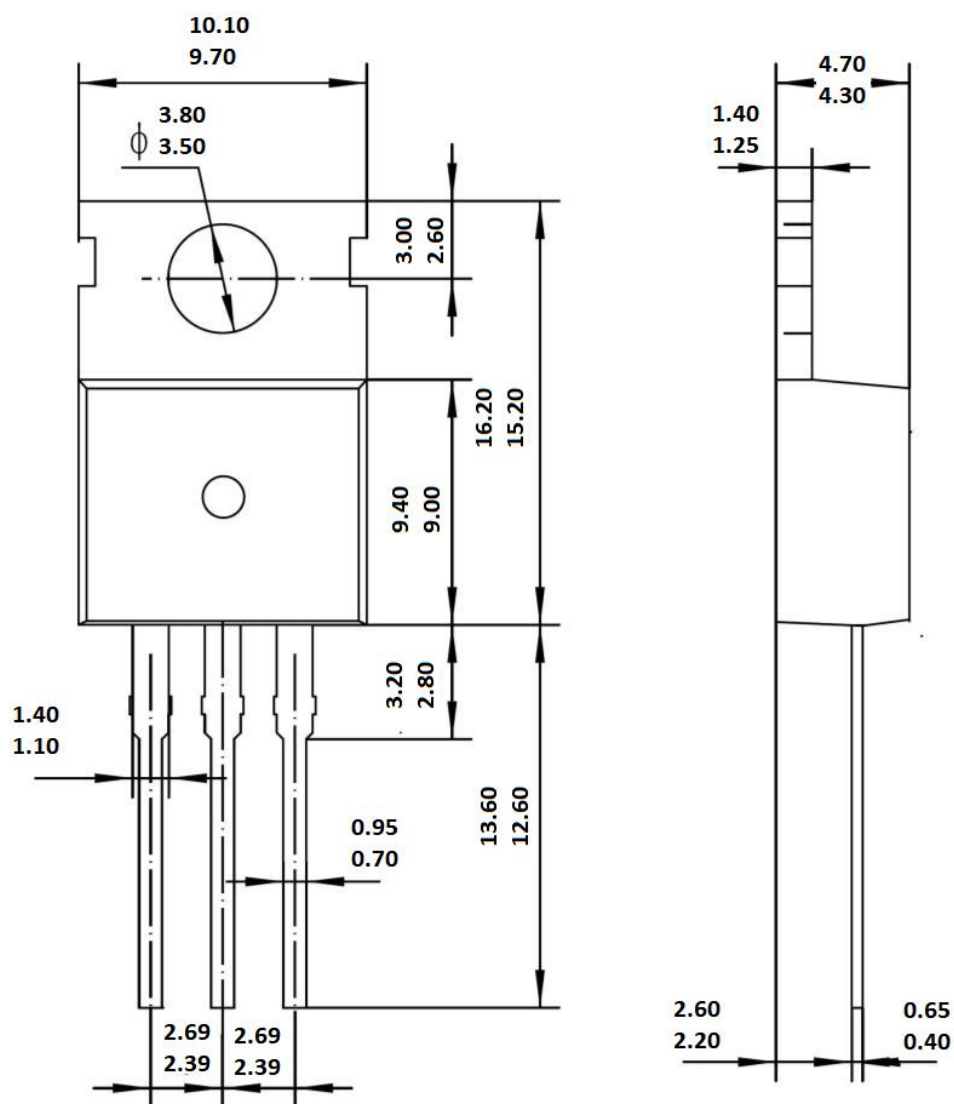


NOTES: 1. surface roughness $Ra = 1.14 \pm 0.20 \mu m$
 2. Unmarked tolerance ± 0.15
 3. unit: mm



Unit: mm

TO-220F



TO-220

Unit: mm