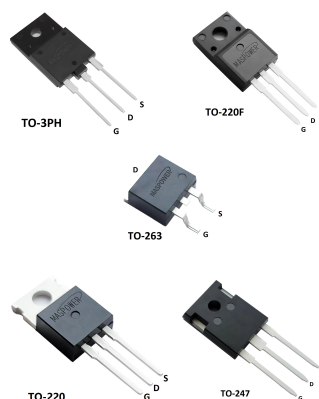
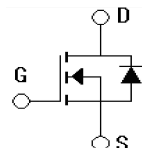


Features

- $V_{DS}=1500V, I_D=4A$
 $R_{DS(on)} < 7\Omega @ V_{GS}=10V$
- 100% avalanche tested
- Intrinsic capacitances and Q_g minimized
- High speed switching



Applications

- Switching applications

Absolute Ratings ($T_c=25^\circ C$)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DSS}	1500	V
Transient Gate-Source Voltage	V_{GSS}	± 30	V
Continuous Gate-Source Voltage(DC)	V_{GSS}	± 20	V
Drain Current-continuous	I_D	4	A
Drain Current-pulse(note 1)	I_{DM}	16	A
Single Pulsed Avalanche Energy (note 2)	E_{AS}	460	mJ
Maximum Power Dissipation (TO-3PH)	PD	73	W
Maximum Power Dissipation (TO-220F)	PD	29	W
Maximum Power Dissipation (TO-263/TO-247/TO-22)	PD	336	W
Operating and Storage Temperature Range	T_J, T_{STG}	$-55 \sim +150$	$^\circ C$

Electrical Characteristics($T_{CASE}=25^\circ C$ unless otherwise specified)

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Drain-Source Voltage	BV_{DSS}	$I_D=250\mu A, V_{GS}=0V$	1500	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=V_{DSS}, V_{GS}=0V$	-	-	10	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA

On-Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	3.5	-	5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=1A$ (note 3)	-	5.5	7	Ω
Forward Transconductance	g_{fs}	$V_{DS}=30V, I_D=3A$ (note 3)	-	5.8	-	S
Dynamic Characteristics						
Input capacitance	C_{iss}	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1.0MHz$	-	824	-	pF
Output capacitance	C_{oss}		-	127	-	pF
Reverse transfer capacitance	C_{rss}		-	29	-	pF

Electrical Characteristics($T_{CASE}=25^{\circ}C$ unless otherwise specified)

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Switching-Characteristics						
Turn-On delay time	t _{d(on)}	V _{DS} =750V, I _D =3A, V _{GS} =10V R _G =25Ω	-	31	-	ns
Turn-On rise time	t _r		-	56	-	ns
Turn-Off delay time	t _{d(Off)}		-	105	-	ns
Turn-Off rise time	t _f		-	115	-	ns
Total Gate Charge	Q _g	V _{DS} =750V,I _D =3A, V _{GS} =10V R _G =25Ω	-	37	-	nC
Gate-Source charge	Q _{gs}		-	6	-	nC
Gate-Drain charge	Q _{gd}		-	22	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} =0V,I _S =1A (note 3)	-	-	1.4	V
Diode Forward Current	I _S	T _C =25℃	-	-	4	A
Reverse recovery time	T _{rr}	I _S =3A, -di/dt=100A/μs	-	376	-	ns
Reverse recovery charge	Q _{rr}		-	2.1	-	μC

Thermal Characteristic

Parameter	Symbol	TO-3PH	TO-263	TO-220F	TO-220 TO-247	Unit
Thermal Resistance, junction to Case,Max	$R_{th(j-C)}$	1.7	0.371	4.2	0.371	$^{\circ}\text{C/W}$
Thermal Resistance, junction to Ambient,Max	$R_{th(j-A)}$	50	35	58	50	$^{\circ}\text{C/W}$

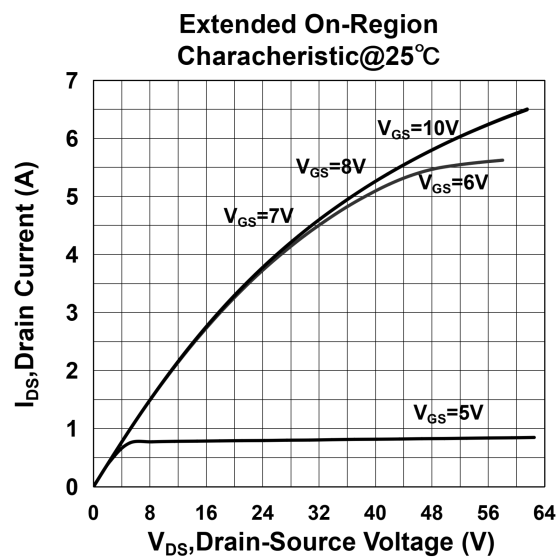
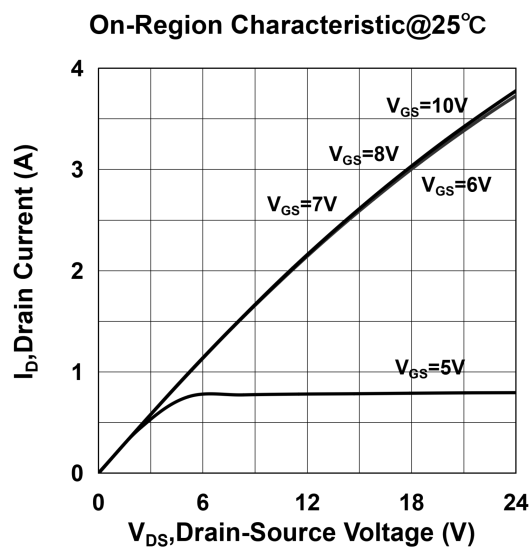
Note:

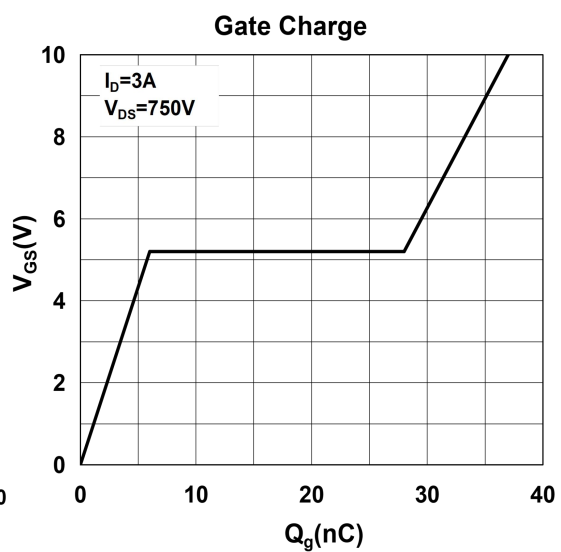
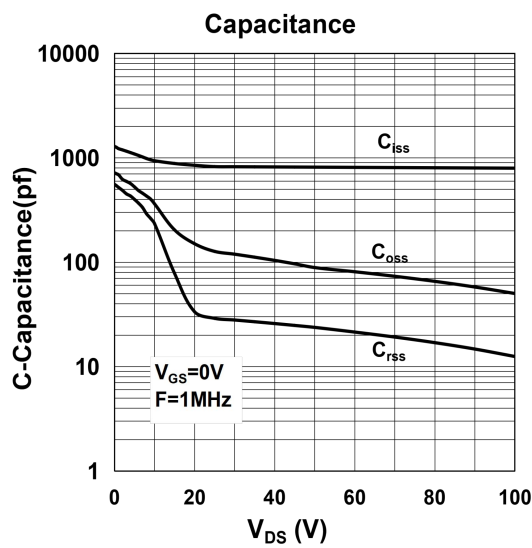
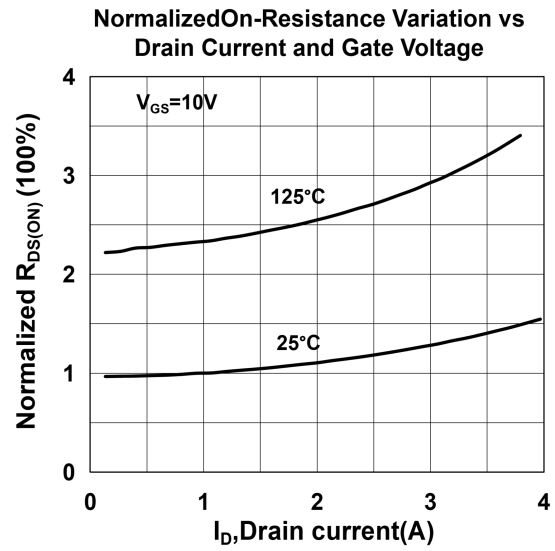
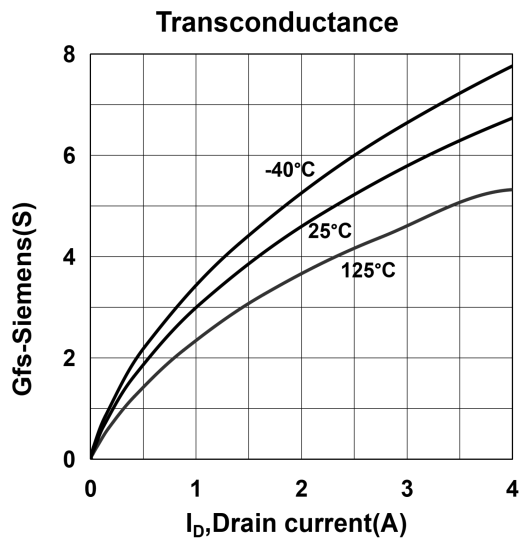
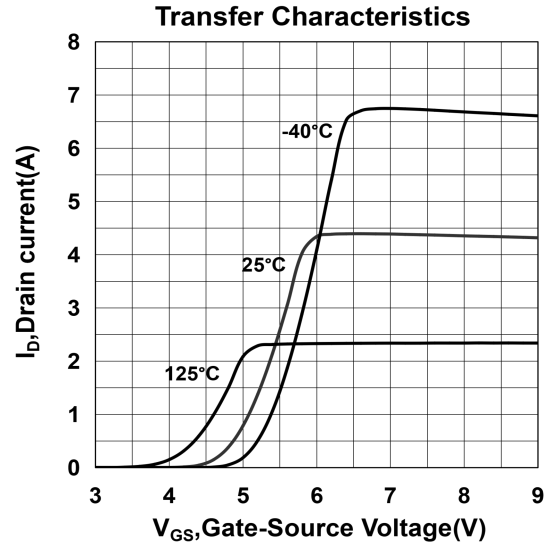
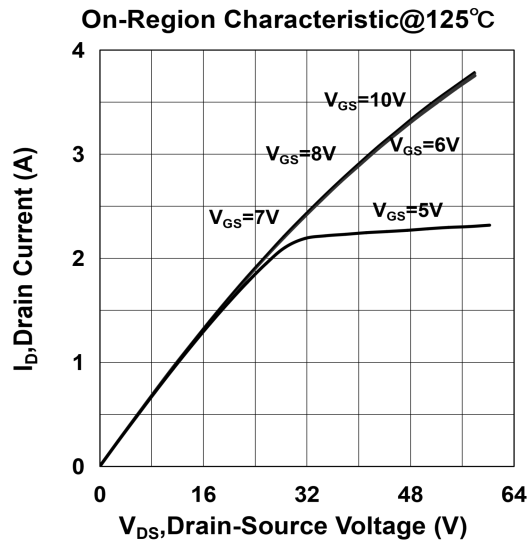
1. Pulse width limited by maximum junction temperature
2. $L=57.5\text{mH}$, $I_{AS}=4\text{A}$, $R_G=25\Omega$, starting $T_J=25^{\circ}\text{C}$
3. Pulse test: Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$

Order Message

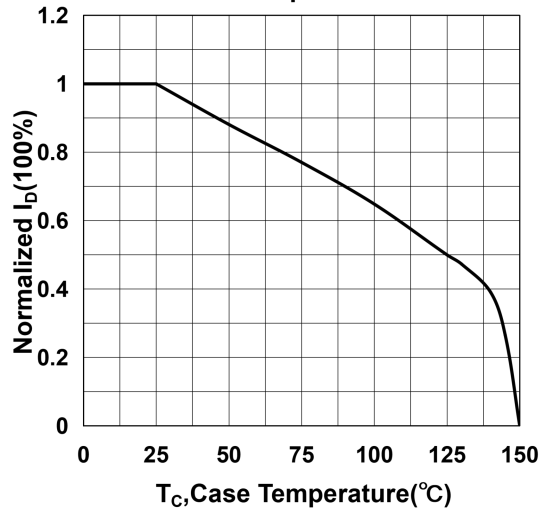
Marking	Package
MS4N1350	TO-3PH
MS4N1350S	TO-220F
MS4N1350E	TO-263
MS4N1350W	TO-247
MS4N1350T	TO-220

Electrical Characteristics

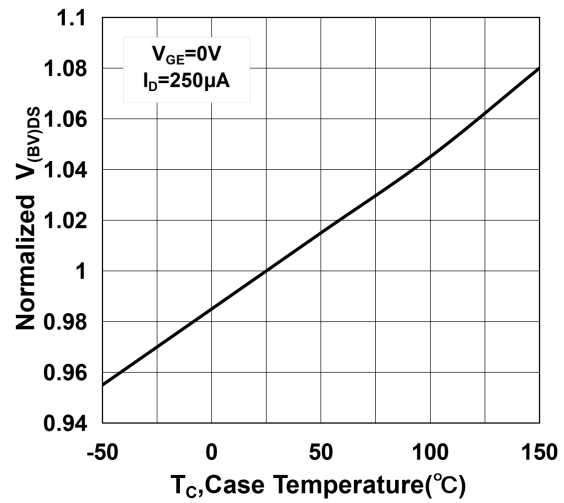




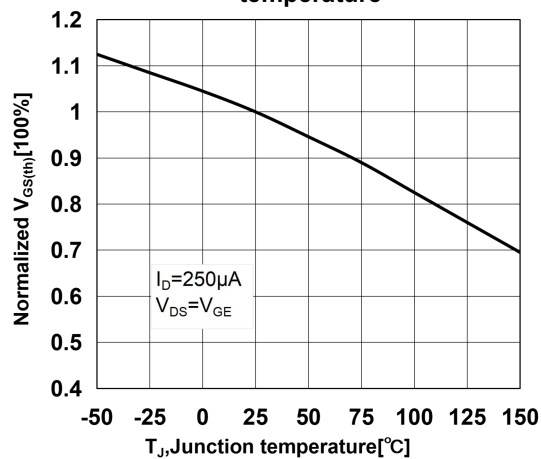
Maximum Drain Current vs Case Temperature



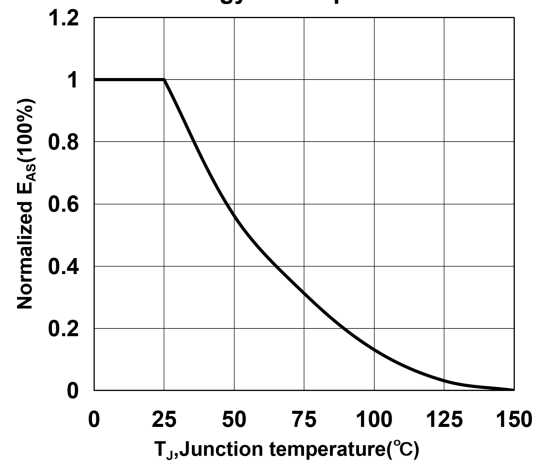
Normalized V_{(BV)DS} vs temperature



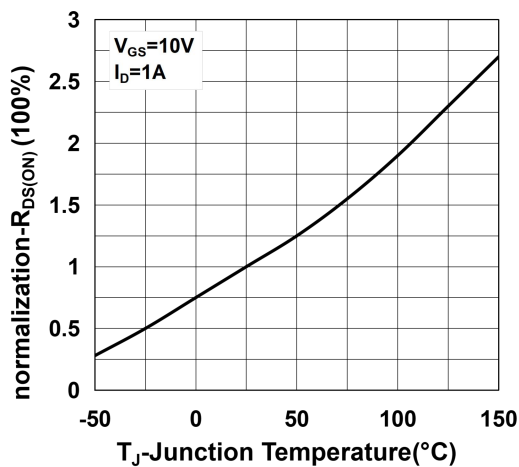
Normalized gate threshold voltage vs temperature



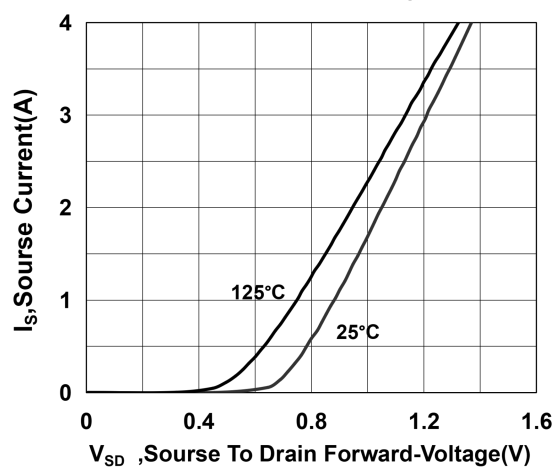
Normalized maximum avalanche energy vs temperature



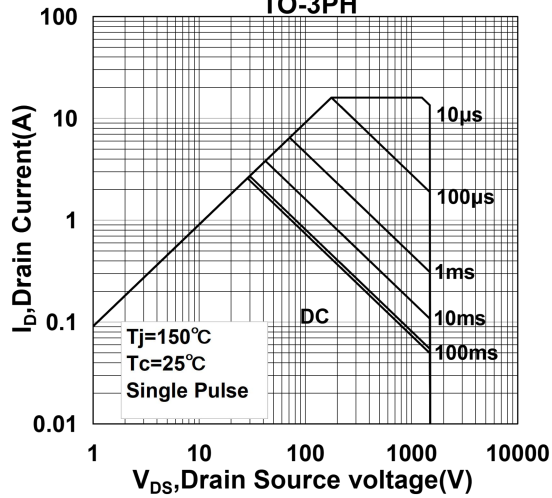
Normalization On-Resistance Variation vs Junction Temperature



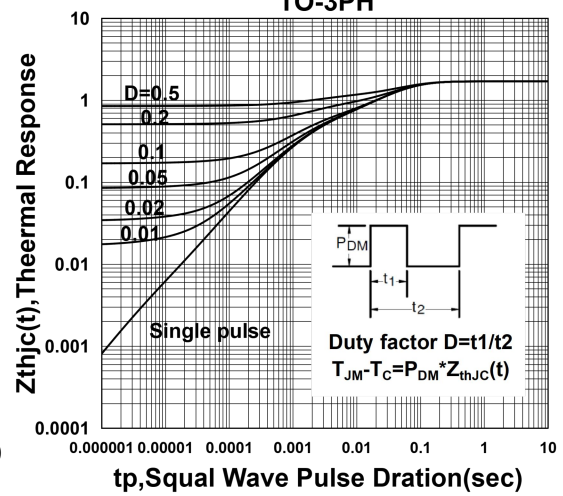
Body Diode Forward Voltage Variation with Source Current and Temperature



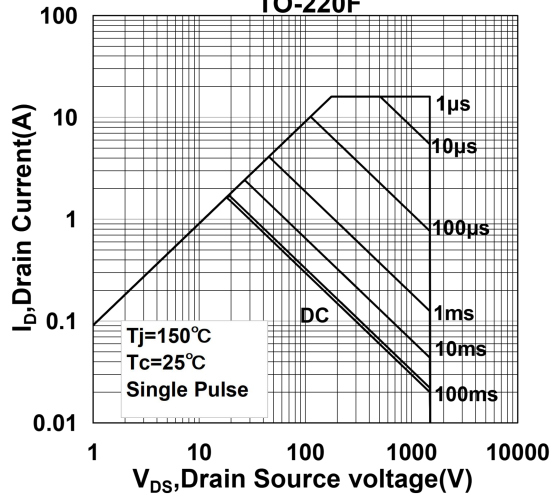
Safe Operating Area for
TO-3PH



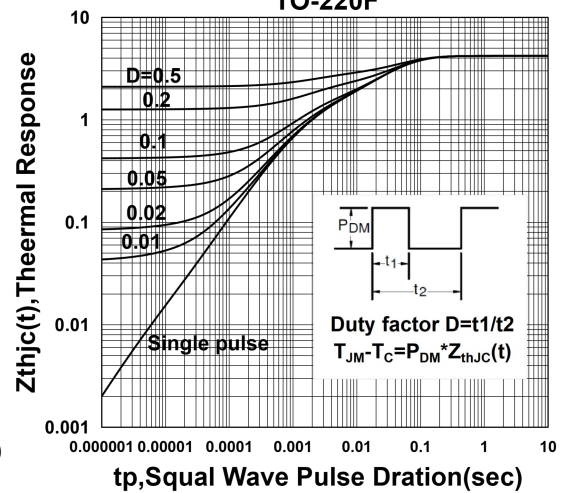
Transient response Curve for
TO-3PH



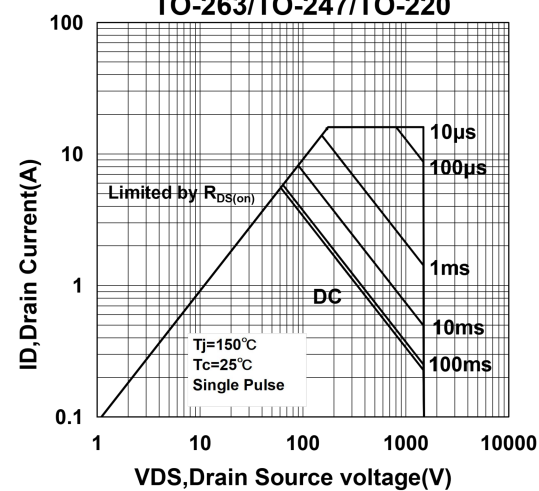
Safe Operating Area for
TO-220F



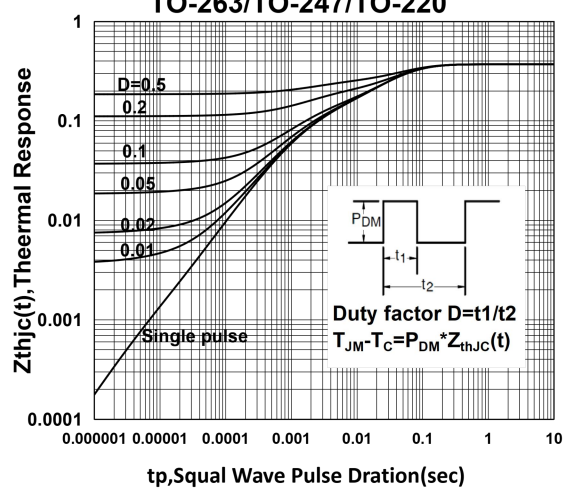
Transient response Curve for
TO-220F



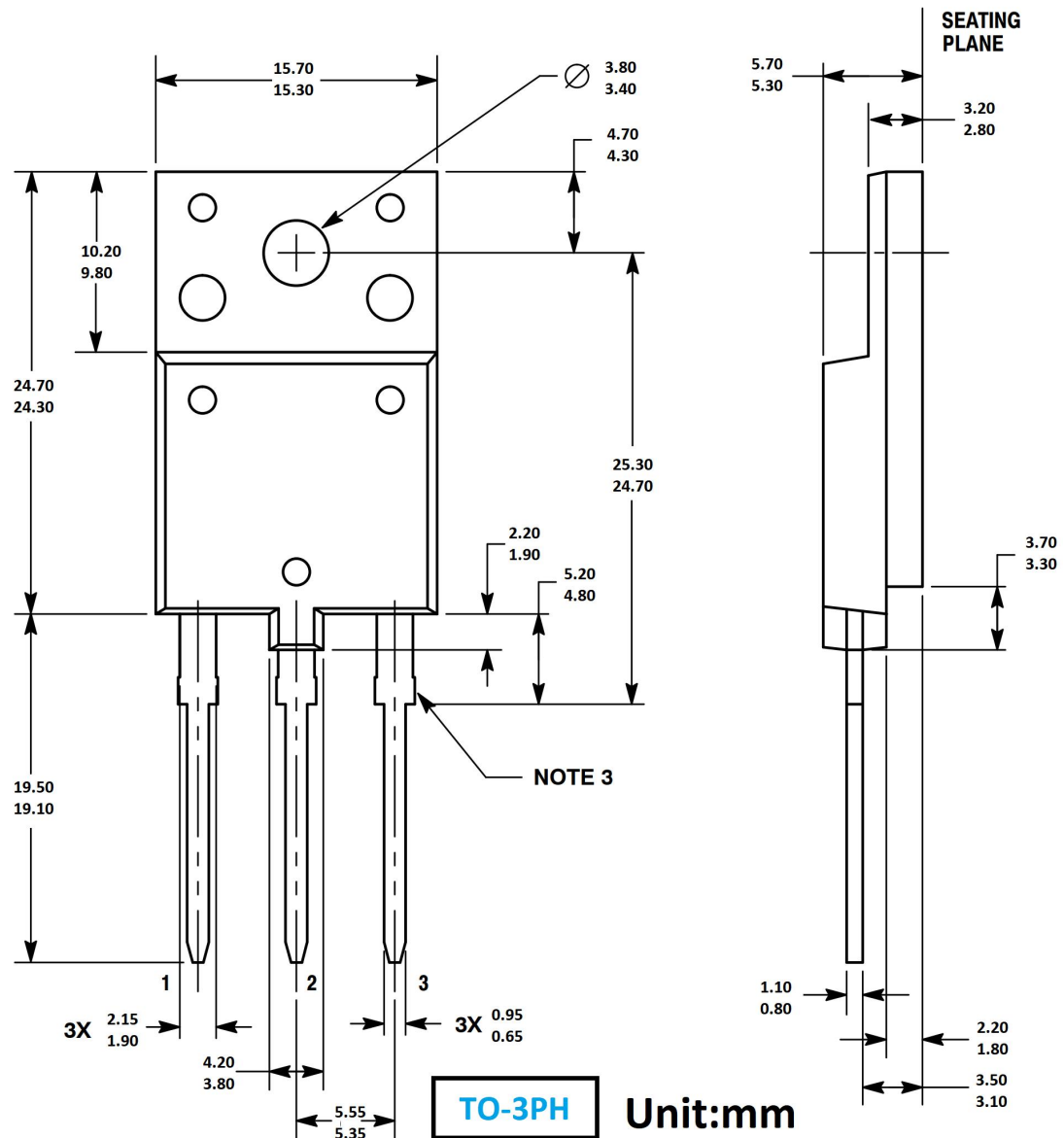
Safe Operating Area for
TO-263/TO-247/TO-220

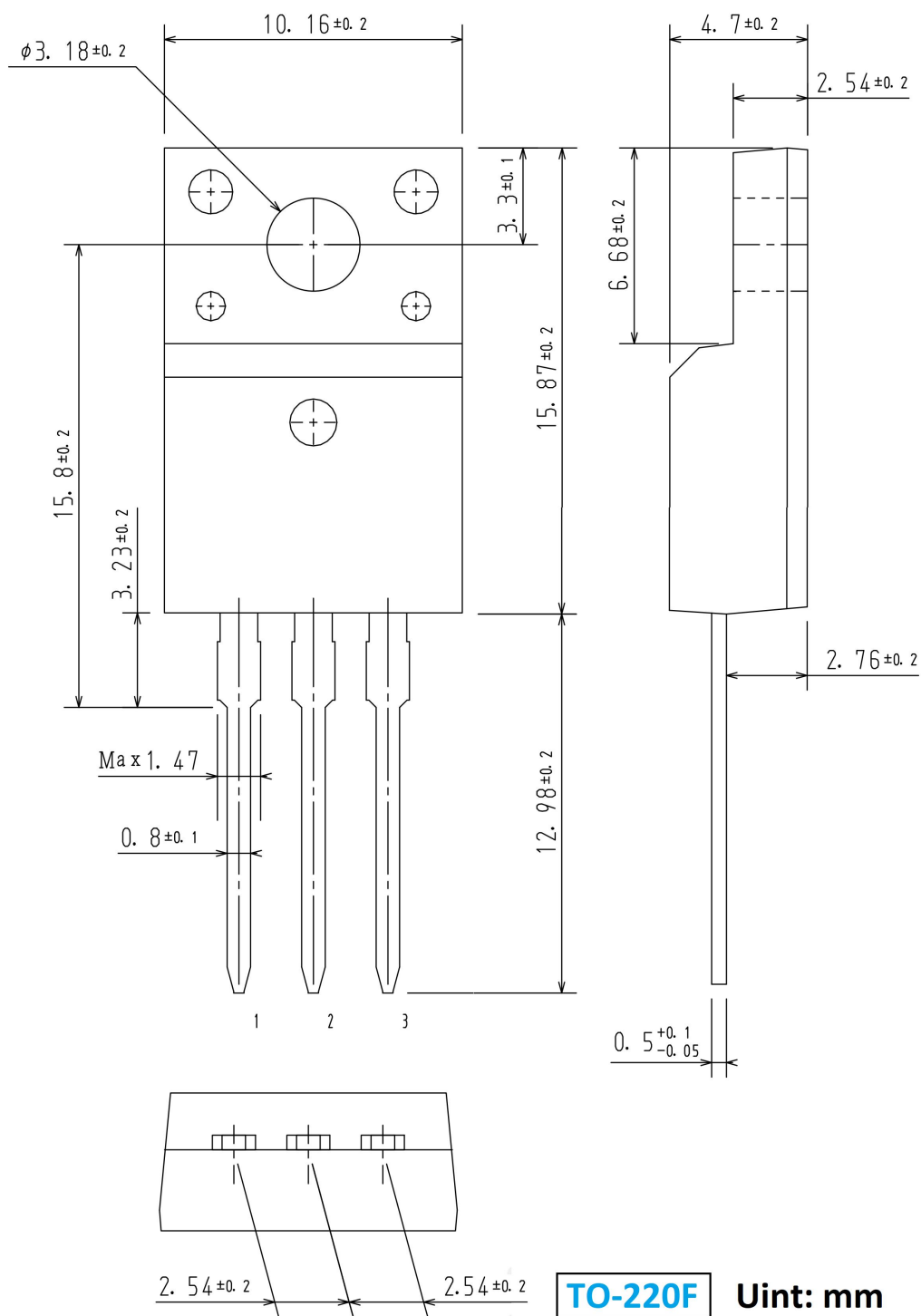


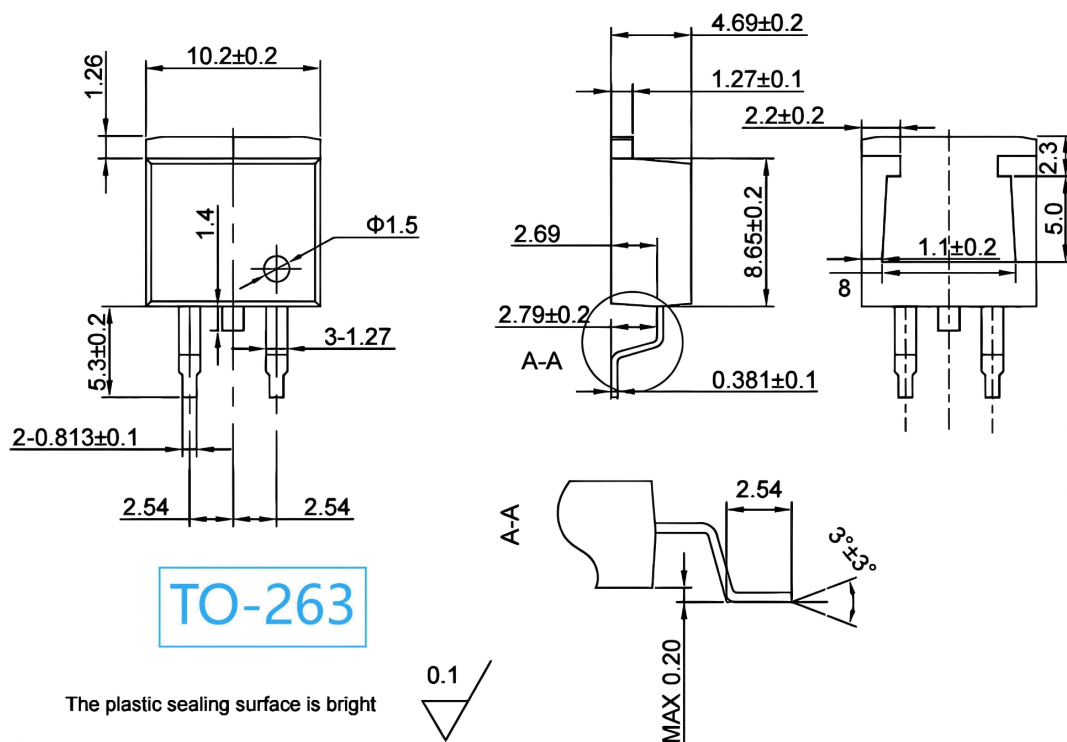
Transient response Curve for
TO-263/TO-247/TO-220



Package Mechanical DATA

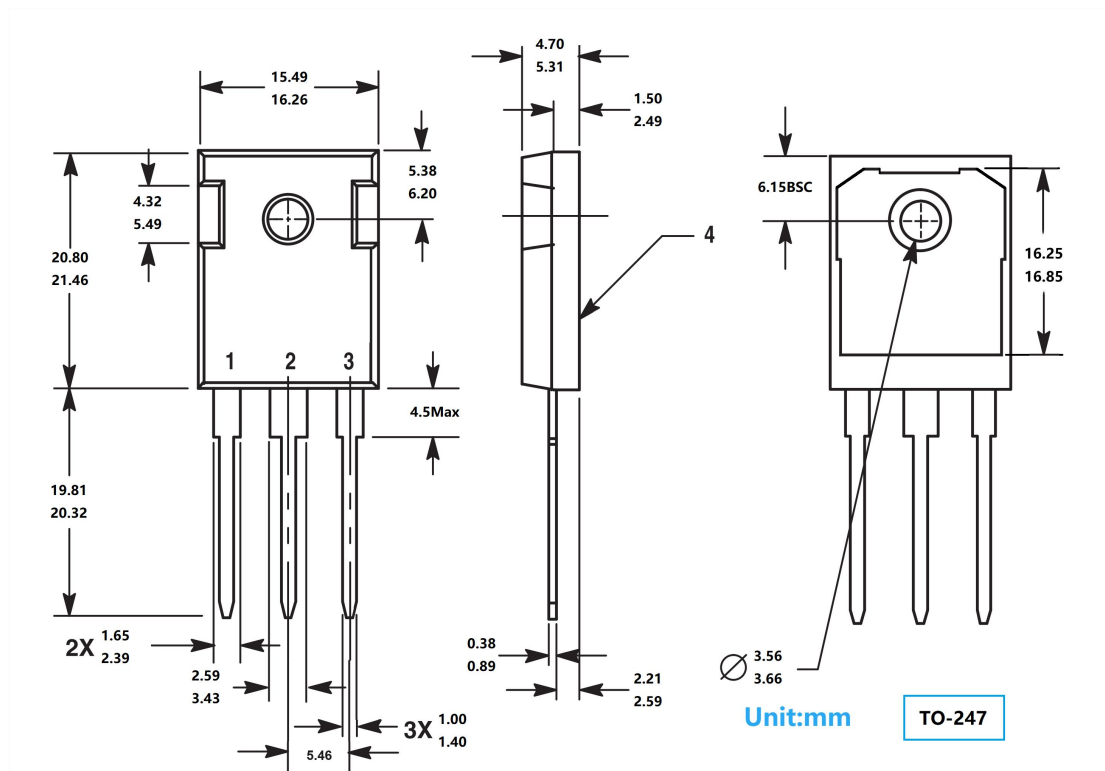


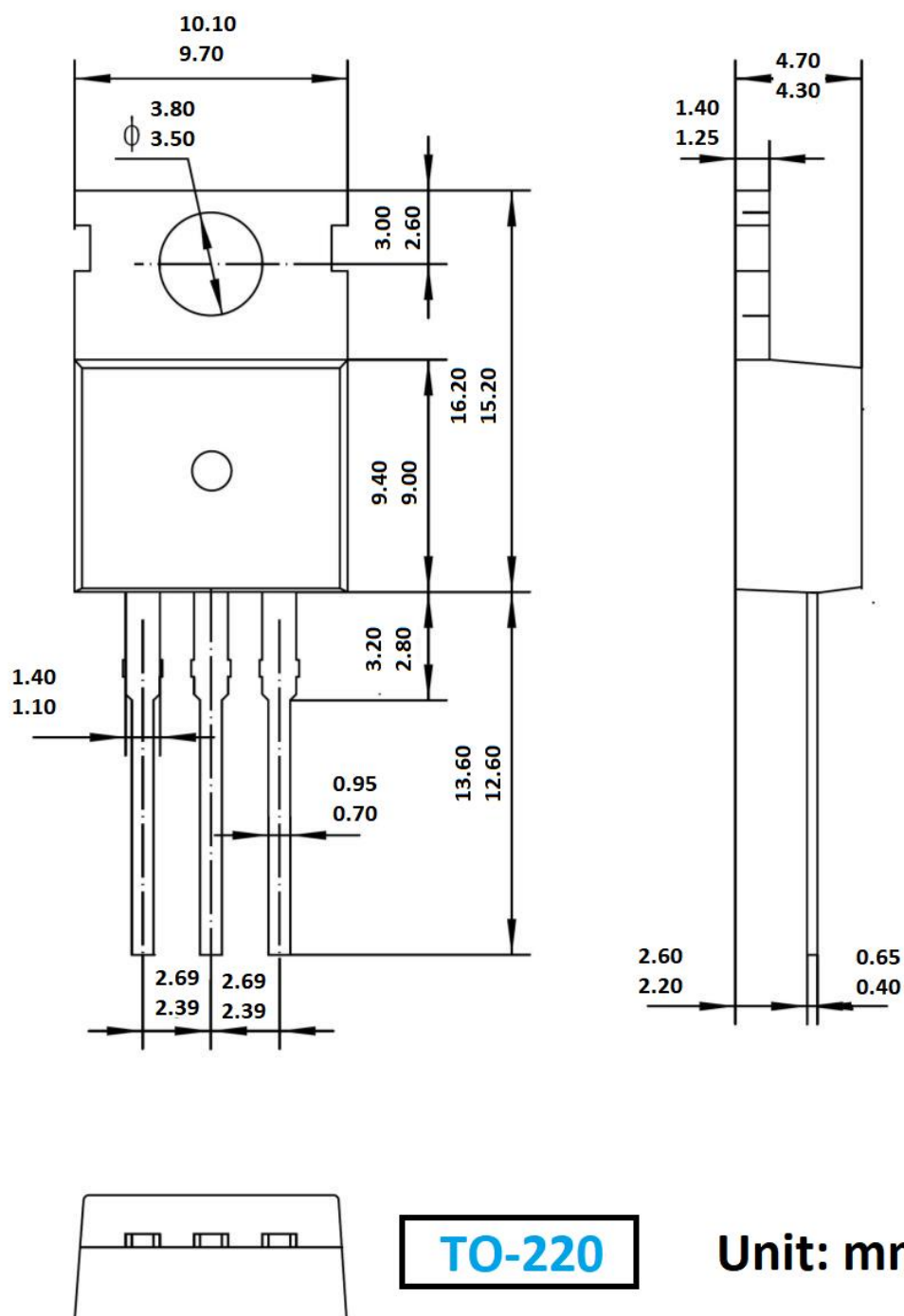




Notes:

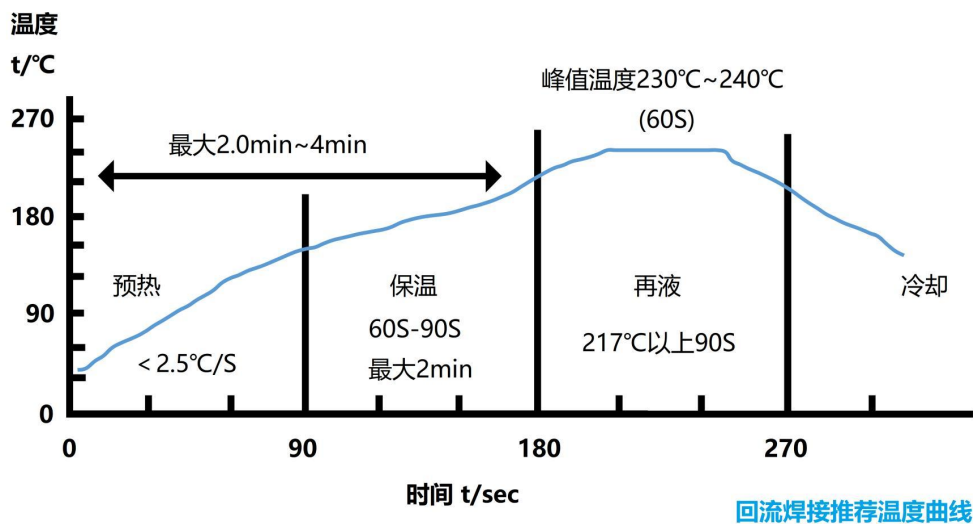
1. Unmarked tolerance ± 0.15 mm; unmarked $R < 0.15$ mm
2. The resin body is not allowed to have defects, shrinkage holes, cracks, bubbles and other harmful defects
3. The drawing indicates that the leg has reinforcement
4. Unit : mm





Welding temperature curve

- Reflow Solder temperature curve(MSL 3, SMD)



- Wave soldering temperature curve(Tube)

