

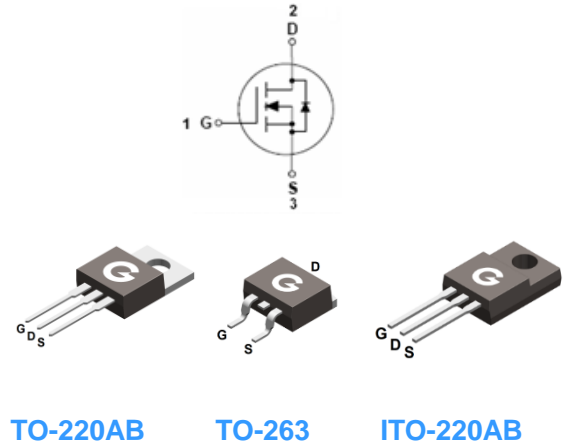
### Features

- Low  $R_{DS(ON)}$
- Fast switching
- Low gate charge
- Low Reverse transfer capacitances

**HF**

### Mechanical Data

- Case: TO-220AB, TO-263, ITO-220AB
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matted-Tin plated; Solderable Per MIL-STD-202, Method 208



### Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
BL5N90	TO-220AB	50 pcs / Tube	5N90
BL5N90B	TO-263	50 pcs / Tube or 800 pcs / Tape & Reel	5N90B
BL5N90F	ITO-220AB	50 pcs / Tube	5N90F

### Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DSS}$	900	V
Gate-to-Source Voltage	$V_{GSS}$	$\pm 30$	V
Continuous Drain Current ( $T_C = 25^\circ\text{C}$ )	$I_D$	5	A
Continuous Drain Current ( $T_C = 100^\circ\text{C}$ )		3.2	A
Pulsed Drain Current ( $t_p = 10\mu\text{s}$ , $T_C = 25^\circ\text{C}$ )	$I_{DM}$	20	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	180	mJ
Power Dissipation (TO-220AB, $T_C = 25^\circ\text{C}$ )	$P_D$	156	W
Power Dissipation (TO-263, $T_C = 25^\circ\text{C}$ )		156	W
Power Dissipation (ITO-220AB, $T_C = 25^\circ\text{C}$ )		33	W
Operating Junction Temperature Range	$T_J$	-55 ~ +150	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

### Thermal Characteristics

Parameter	Symbol	TO-220AB/TO-263	ITO-220AB	Unit
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.8	3.8	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Air	$R_{\theta JA}$	50	62.5	$^\circ\text{C/W}$

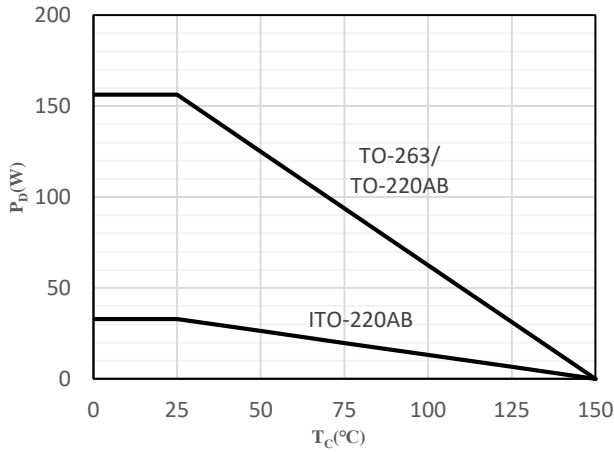
### Electrical Characteristics (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
$V_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	900	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 900V, V_{GS} = 0V$	-	-	25	$\mu A$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$R_{DS(ON)}$	Drain-Source On-resistance *1	$V_{GS} = 10V, I_D = 2.5A$	-	-	2.5	$\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2	-	4	V
<b>Dynamic Characteristics</b>						
$C_{ISS}$	Input Capacitance	$V_{GS} = 0V$	-	1156	-	pF
$C_{OSS}$	Output Capacitance	$V_{DS} = 25V$	-	90	-	
$C_{RSS}$	Reverse Transfer Capacitance	$f = 1MHz$	-	6.4	-	
<b>Switching Characteristics</b>						
$t_{d(ON)}$	Turn-on Delay Time *3	$V_{DD} = 450V$ $I_D = 5A$ $R_G = 10\Omega$	-	17	-	ns
$t_r$	Turn-on Rise Time *3		-	14	-	
$t_{d(OFF)}$	Turn-Off Delay Time *3		-	40	-	
$t_f$	Turn-Off Fall Time *3		-	19	-	
$Q_G$	Total Gate-Charge	$V_{DD} = 720V$	-	30	-	nC
$Q_{GS}$	Gate to Source Charge	$V_{GS} = 10V$	-	5	-	
$Q_{GD}$	Gate to Drain (Miller) Charge	$I_D = 5A$	-	15	-	
<b>Source-Drain Diode Characteristics</b>						
$V_{SD}$	Diode Forward Voltage *1	$I_{SD} = 5A, V_{GS} = 0V$	-	-	1.5	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 5A, V_{GS} = 0V$	-	590	-	ns
$Q_{rr}$	Reverse Recovery Charge	$di/dt = 100A/\mu s$	-	2.6	-	$\mu C$

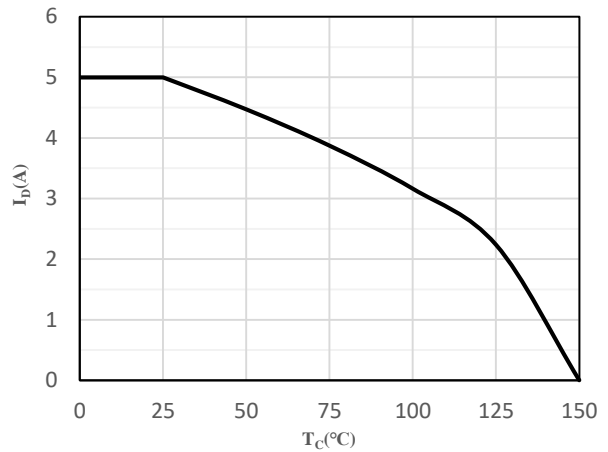
Notes:

1. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
2. The  $E_{AS}$  data shows Max. rating. The test condition is  $V_{DD} = 100V, V_{GS} = 15V, L = 10mH$
3. Guaranteed by design, not subject to production

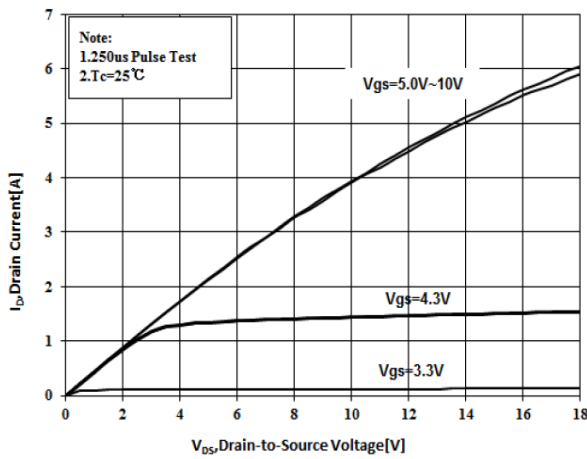
**Ratings and Characteristics Curves** (@  $T_A = 25^\circ\text{C}$  unless otherwise specified)



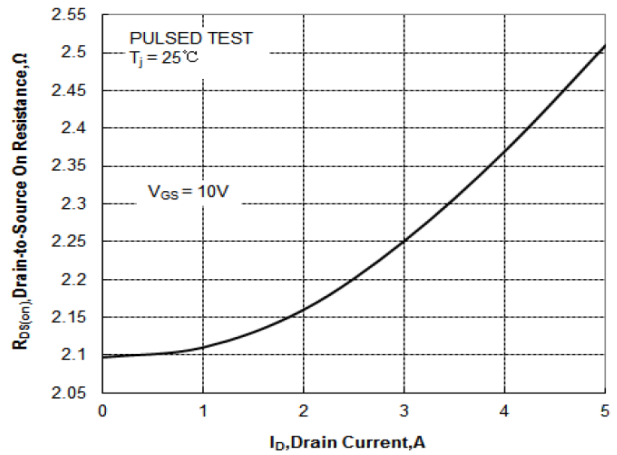
**Fig 1 Power Dissipation**



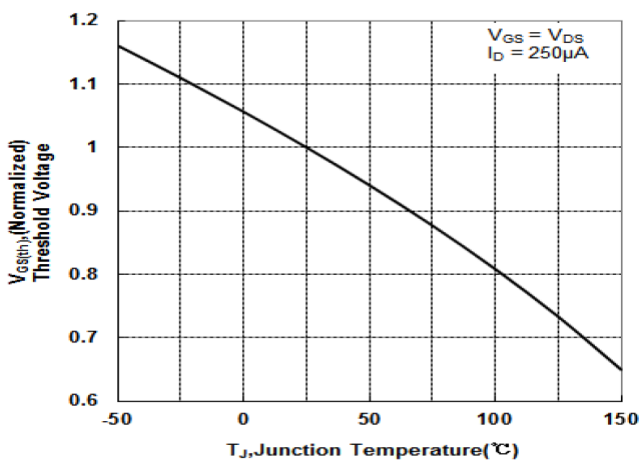
**Fig 2 Drain Current**



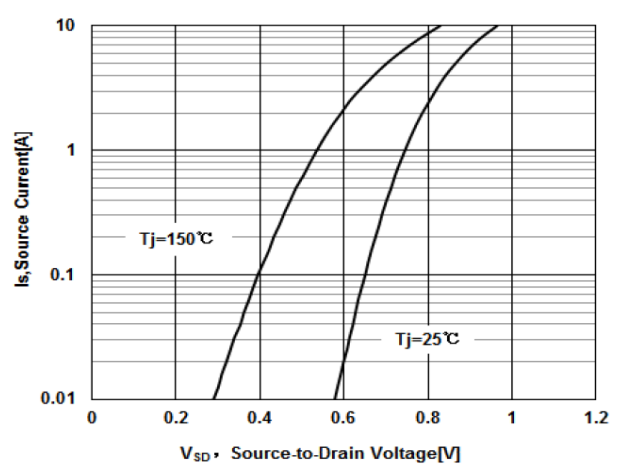
**Fig 3 Typical Output Characteristics**



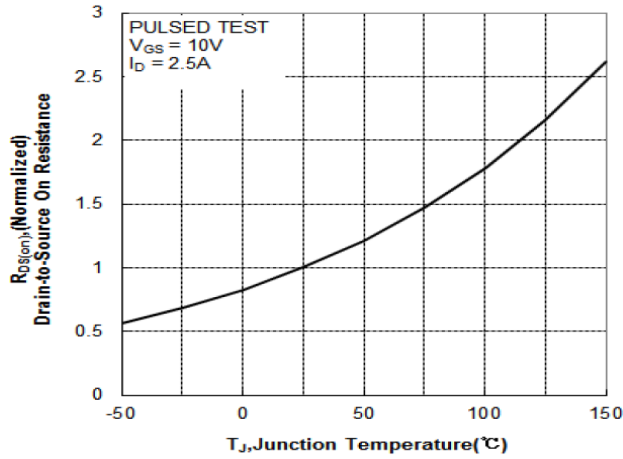
**Fig 4 On-Resistance vs. Drain Current and Gate Voltage**



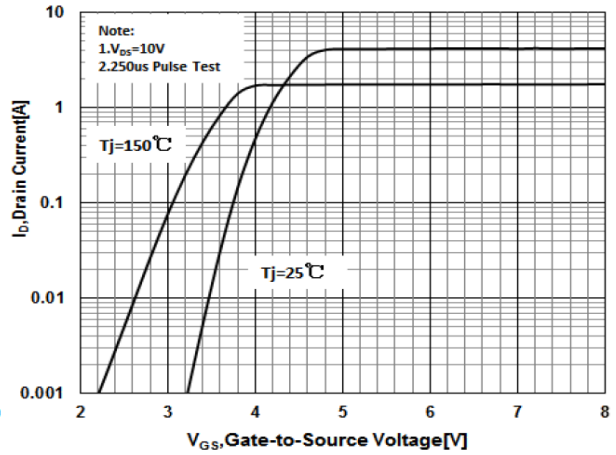
**Fig 5 Normalized  $V_{GS(th)}$  vs. Junction Temperature**



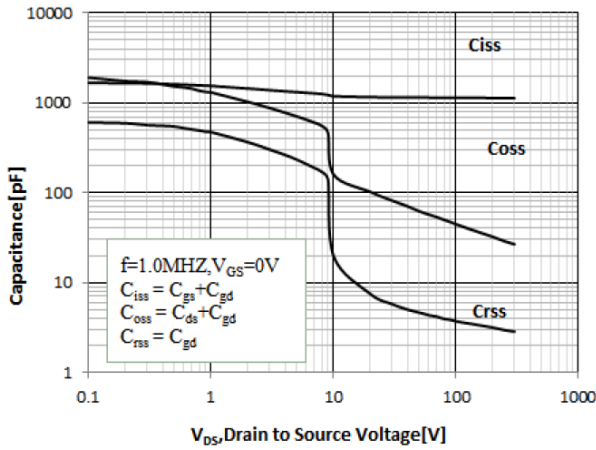
**Fig 6 Body-Diode Characteristics**



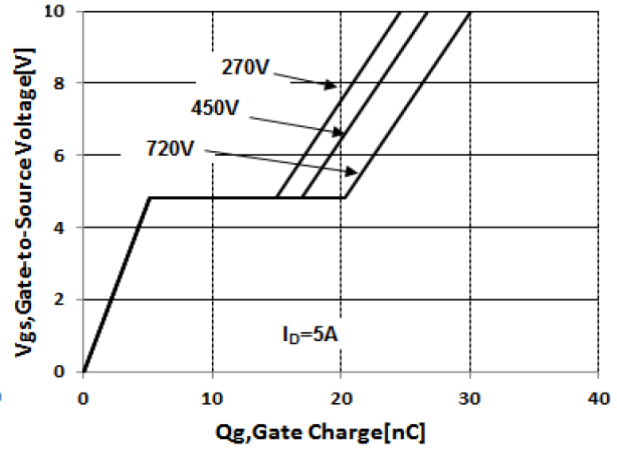
**Fig 7 Normalized On-Resistance vs. Junction Temperature**



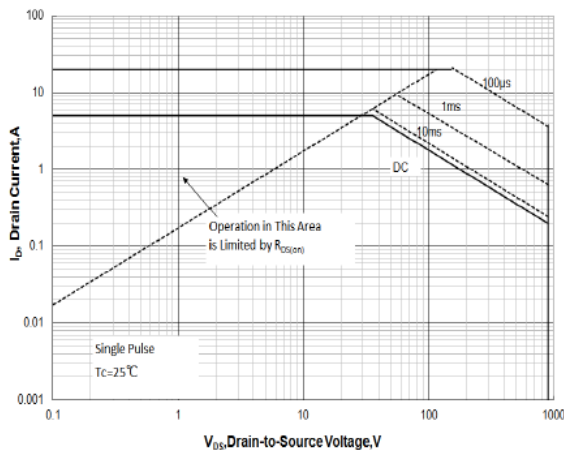
**Fig 8 Transfer Characteristics**



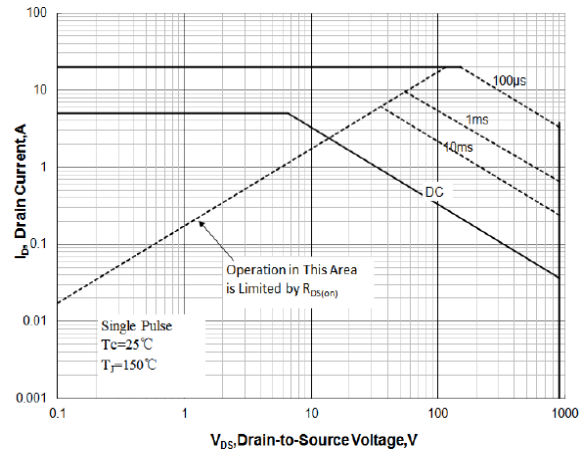
**Fig 9 Capacitance Characteristics**



**Fig 10 Gate-Charge Characteristics**

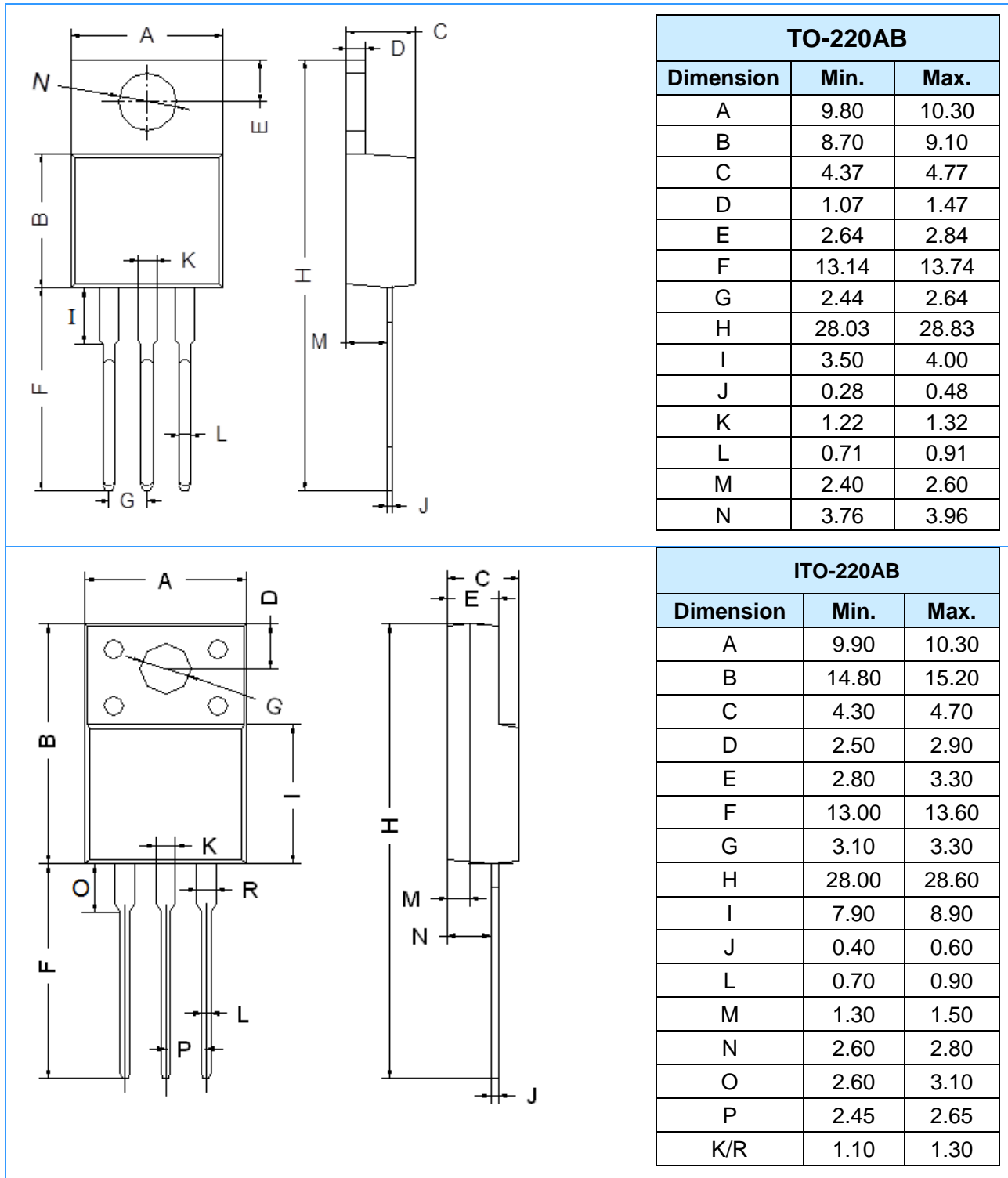


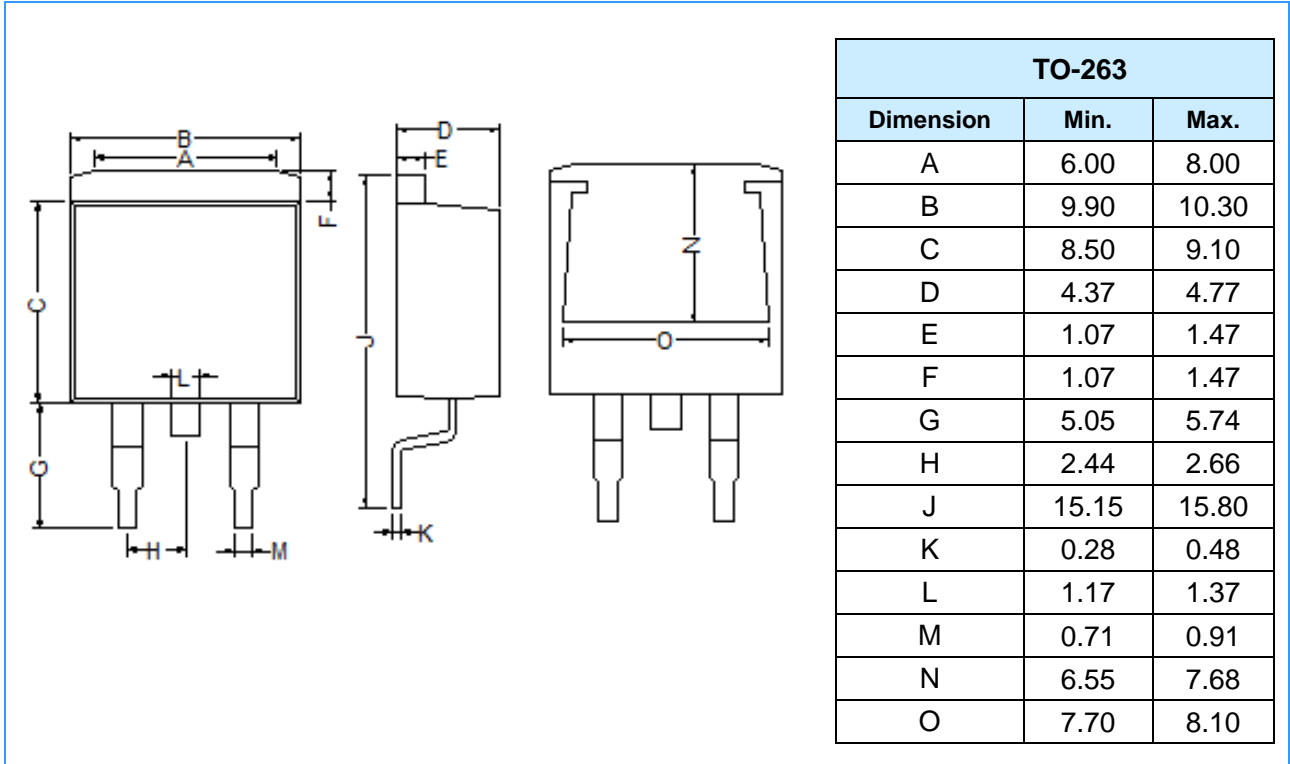
**Fig 11 Safe Operation Area (TO-220AB / TO-263)**



**Fig 12 Safe Operation Area (ITO-220AB)**

### Package Outline Dimensions (Unit: mm)





**Mounting Pad Layout** (Unit: mm)

