10N65

650V N-Channel Power MOSFET

Features

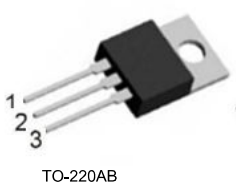
- $R_{DS(ON)}$<1Ω @ V_{GS}=10V
- Fast switching capability
- Low gate charge
- Lead free in compliance with EU RoHS directive.
- Green molding compound

PRODUCT SUMMARY

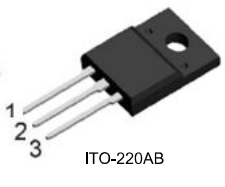
V_{DS} (V)	$R_{DS(on)}$(Ω)	I_D (A)
650	1 @ V_{GS} =10V	10

Mechanical Data

- Case: TO-220AB,ITO-220AB Package



TO-220AB



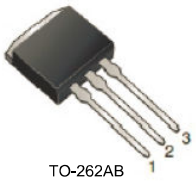
ITO-220AB

Pin Definition:

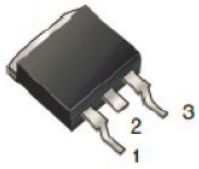
1. Gate
2. Drain
3. Source

Ordering Information

Part No.	Package	Packing
AT10N65S	TO-220AB	50pcs / Tube
AF10N65S	ITO-220AB	50pcs / Tube
AK10N65S	TO-262AB	50pcs / Tube
AG10N65S	TO-263AB	800pcs / 13" Reel

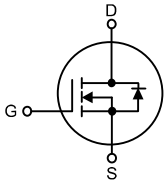


TO-262AB



TO-263AB

Block Diagram



ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	650	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current		I_D	10	A
Pulsed Drain Current (Note 2)		I_{DM}	38	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	608	mJ
Power Dissipation	TO-220AB/TO-262AB TO-263AB	P_D	156	W
	ITO-220AB		50	W
Junction Temperature		T_J	+150	°C
Operating Temperature		T_{OPR}	-55 ~ +150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repetitive Rating : Pulse width limited by T_J

3. L = 30mH, I_{AS} = 6.2A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C

THERMAL DATA

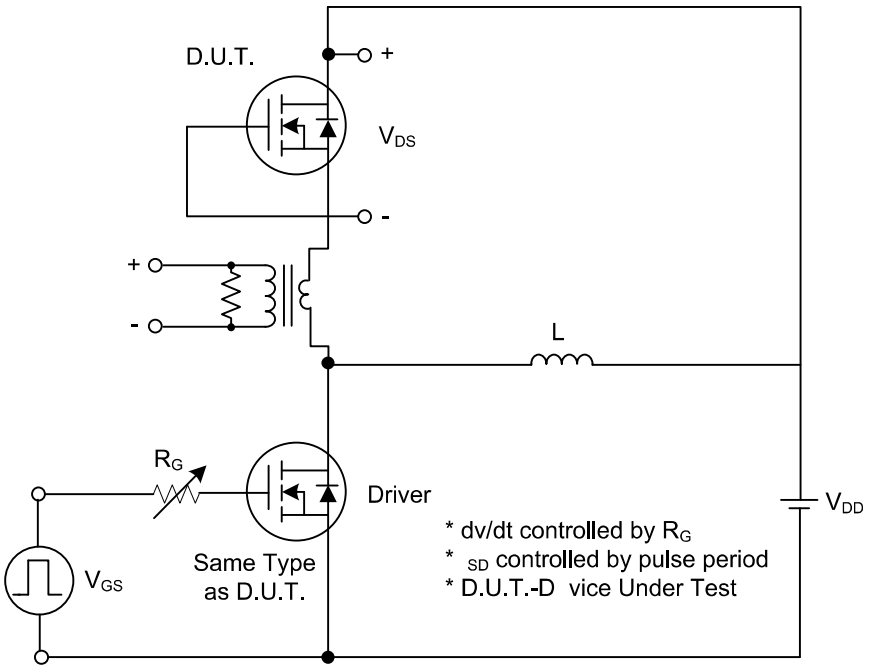
PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220AB/ITO-220AB TO-262ABTO-263AB	θ_{JA}	62.5	°C/W
Junction to Case	TO-220AB	θ_{JC}	0.85	°C/W
	ITO-220AB		2.6	

ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

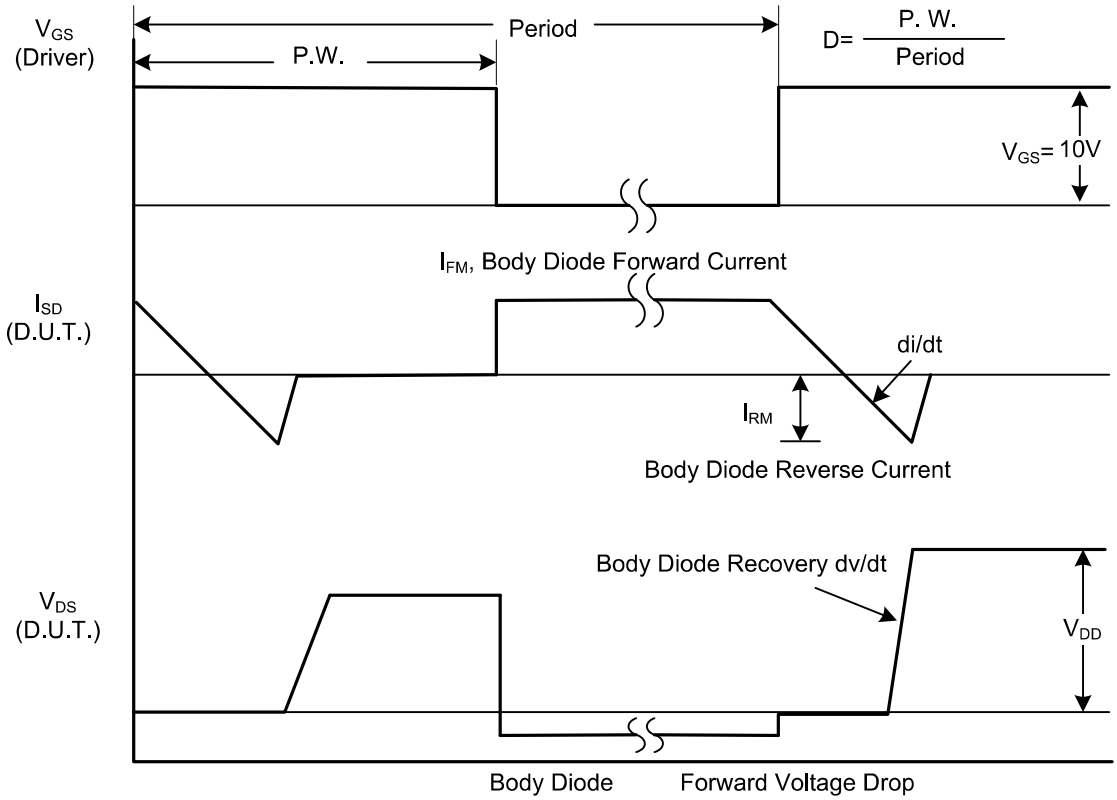
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	650			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=650V, V_{GS}=0V			1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_G=30V, V_{DS}=0V			100	nA
	Reverse		V_{GS}=-30V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=5A		0.88	1.0	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0 MHz		1200		pF
Output Capacitance		C_{OSS}			166		pF
Reverse Transfer Capacitance		C_{RSS}			8		pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	V_{DD} =325V, I_D =10A, R_G =25Ω (Note 1, 2)		40		ns
Turn-On Rise Time		t_R			74		ns
Turn-Off Delay Time		$t_{D(OFF)}$			52		ns
Turn-Off Fall Time		t_F			35		ns
Total Gate Charge		Q_G	V_{DS}=520V, I_D=10A, V_{GS}=10V (Note 1, 2)		24		nC
Gate-Source Charge		Q_{GS}			8		nC
Gate-Drain Charge		Q_{GD}			7		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0 V, I_S =10A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I_S				10	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				40	A
Reverse Recovery Time		t_{rr}	V_{GS}=0V, I_S=10A, dI_F/dt =100 A/μs (Note 1)		570		ns
Reverse Recovery Charge		Q_{RR}			4.7		μC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

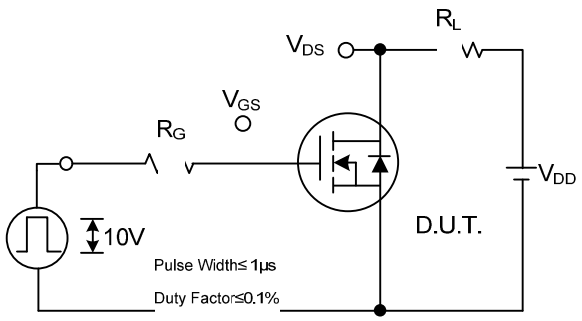


Peak Diode Recovery dv/dt Test Circuit

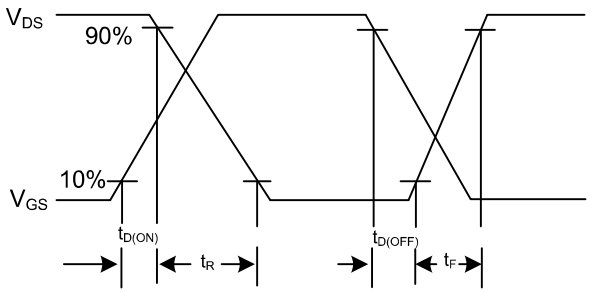


Peak Diode Recovery dv/dt Waveforms

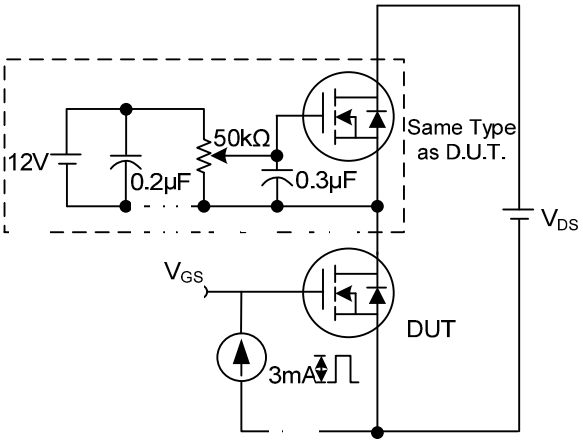
TEST CIRCUITS AND WAVEFORMS(Cont.)



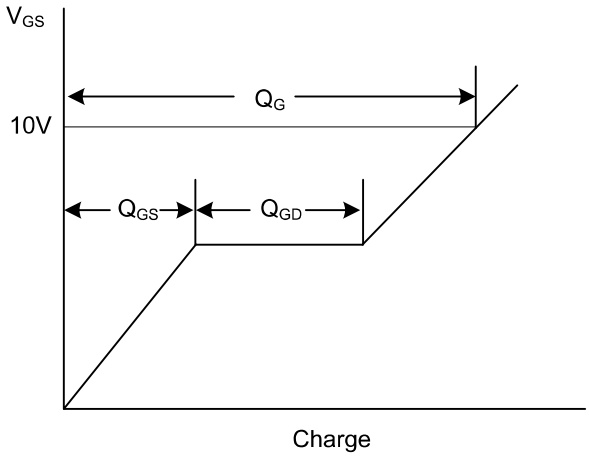
Switching Test Circuit



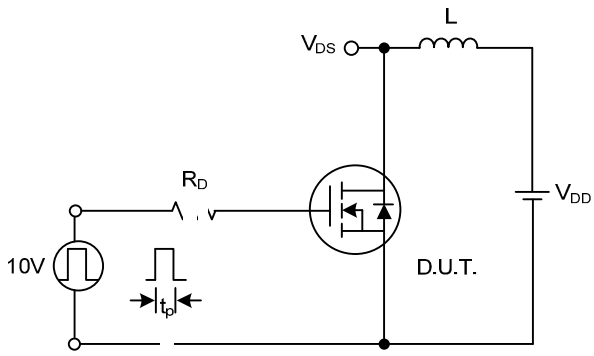
Switching Waveforms



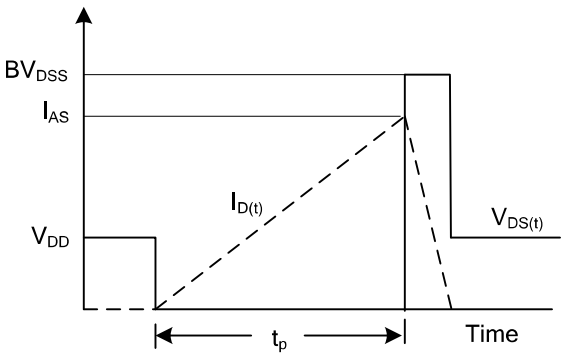
Gate Charge Test Circuit



Gate Charge Waveform

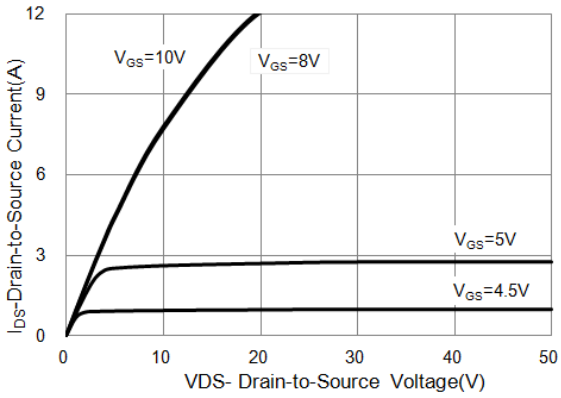


Unclamped Inductive Switching Test Circuit

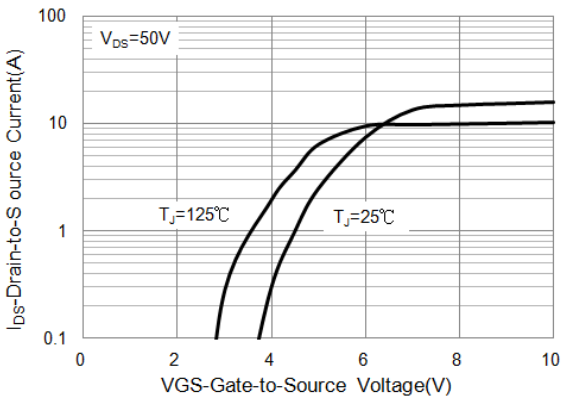


Unclamped Inductive Switching Waveforms

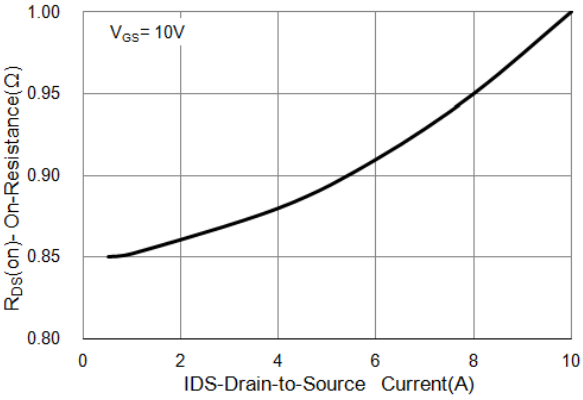
TYPICAL CHARACTERISTICS



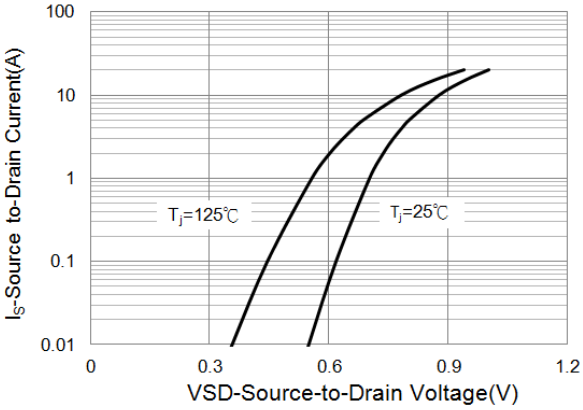
Output Characteristics



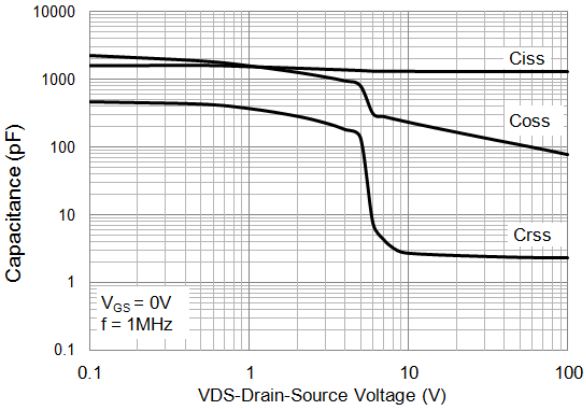
Transfer Characteristics



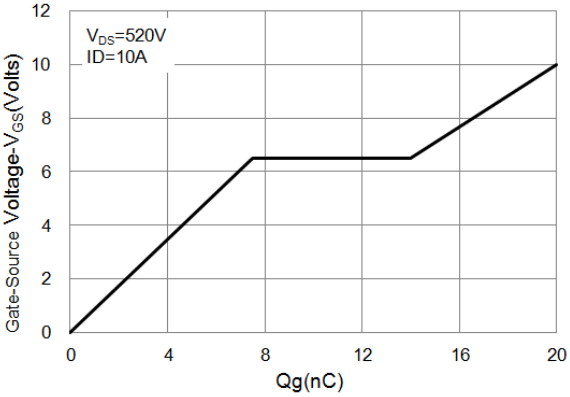
On-Resistance vs. Drain Current



Source-Drain Diode Forward Voltage

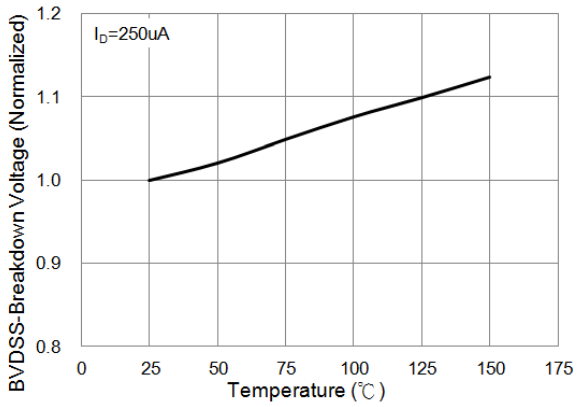


Capacitance vs. Drain-Source Voltage

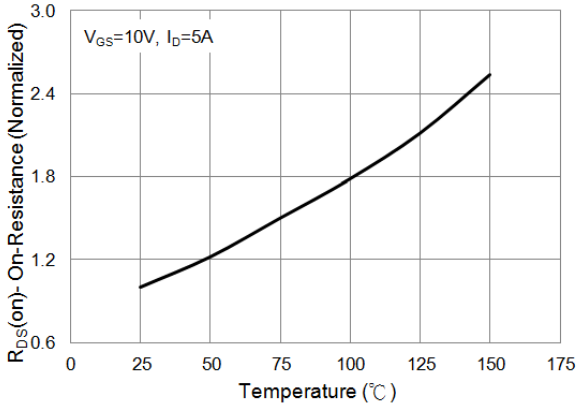


Gate Charge

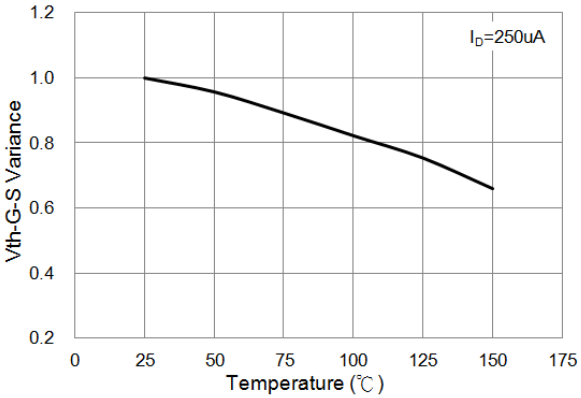
TYPICAL CHARACTERISTICS



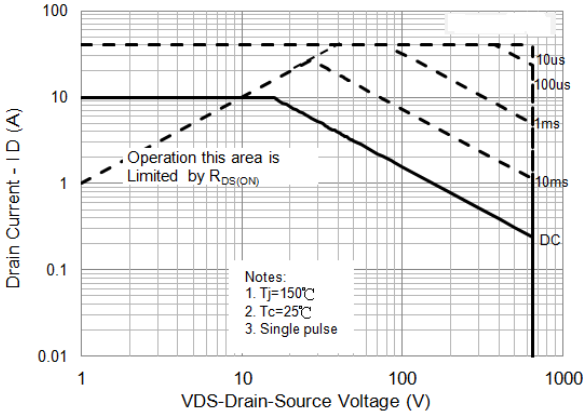
BV_{DSS} vs. Junction Temperature



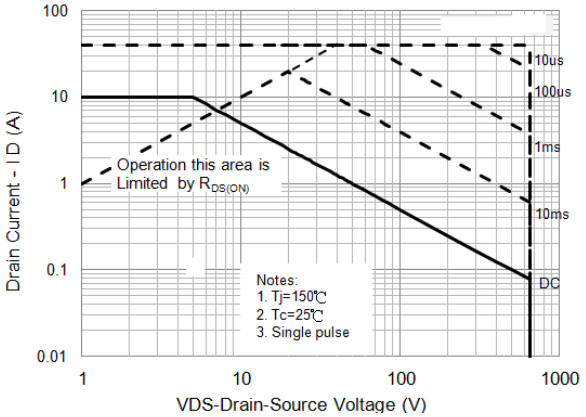
On-Resistance vs. Junction Temperature



Threshold Voltage Variation with Temperature

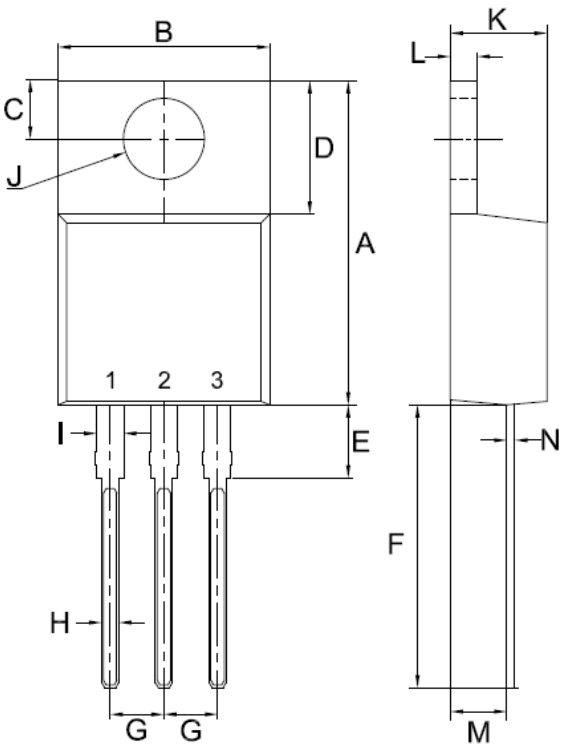


Maximum Safe Operating Area



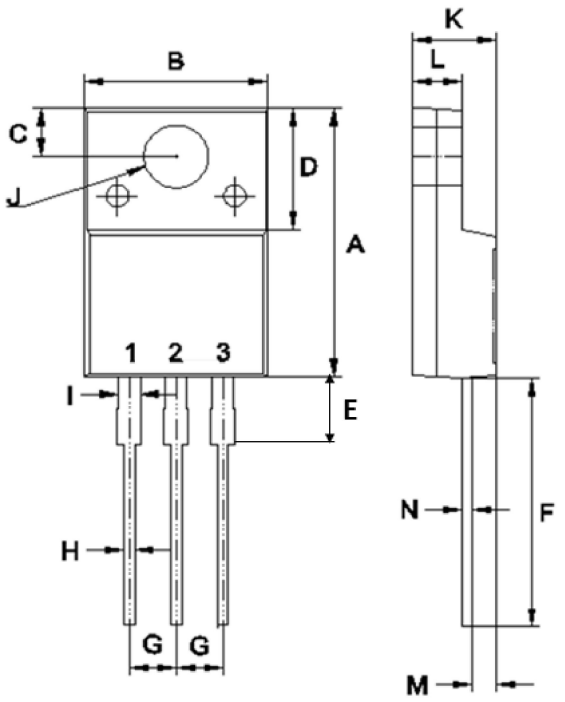
Maximum Safe Operating Area

TO-220AB Mechanical Drawing



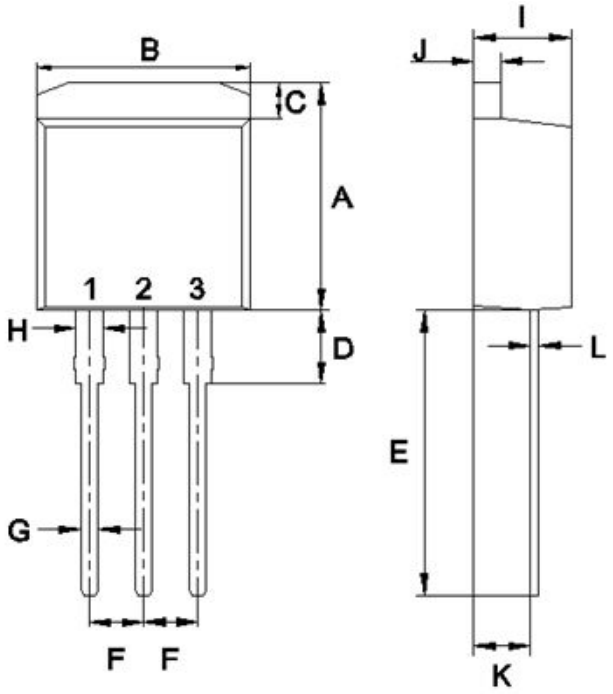
TO-220AB Unit:mm		
DIM	MIN	MAX
A	14.80	15.80
B	9.57	10.57
C	2.54	2.94
D	5.80	6.80
E	2.95	3.95
F	12.70	13.40
G	2.34	2.74
H	0.51	1.11
I	0.97	1.57
J	3.54ϕ	4.14ϕ
K	4.27	4.87
L	1.07	1.47
M	2.03	2.92
N	0.30	0.64

ITO-220AB Mechanical Drawing



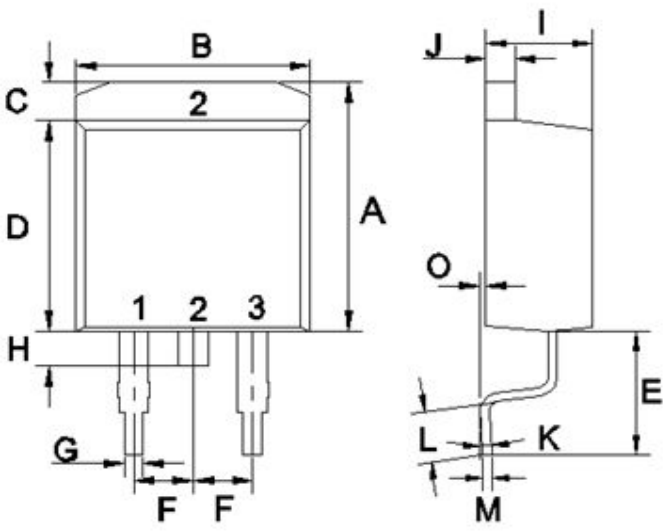
ITO-220AB Unit:mm		
DIM	MIN	MAX
A	14.50	15.50
B	9.50	10.50
C	2.50	2.90
D	6.30	7.30
E	3.30	4.30
F	13.00	14.00
G	2.35	2.75
H	0.30	0.90
I	0.90	1.50
J	3.20	3.80
K	4.24	4.84
L	2.52	2.92
M	1.09	1.49
N	0.47	0.64

TO-262AB Mechanical Drawing



Unit:mm		
DIM	MIN	MAX
A	10.14	11.14
B	9.57	10.57
C	1.44	1.84
D	2.95	3.95
E	12.70	13.40
F	2.34	2.74
G	0.51	1.11
H	0.97	1.57
I	4.27	4.87
J	1.07	1.47
K	2.03	2.92
L	0.30	0.46

TO-263AB Mechanical Drawing



Unit:mm		
DIM	MIN	MAX
A	10.44	10.84
B	9.81	10.21
C	1.44	1.84
D	8.80	9.20
E	4.46	4.66
F	2.44	2.64
G	0.61	1.01
H	0.70	1.30
I	4.27	4.87
J	1.07	1.47
K	0°	8°
L	2.10	2.50
M	0.30	0.46
O	0	0.25