5N65

650V N-Channel Power MOSFET

Features

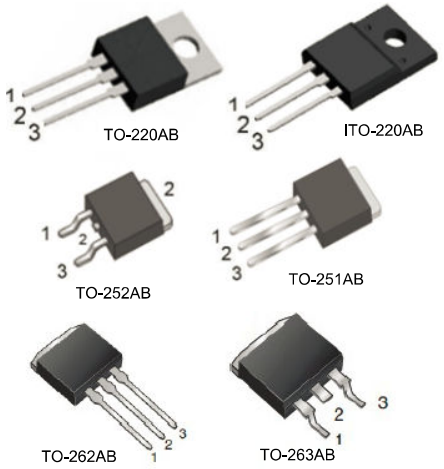
- RDS(ON) < 2.4Ω @ VGS =10V, ID = 2.5A
- Fast switching capability
- Lead free in compliance with EU RoHS directive.
- Green molding compound

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$(Ω)	I_D (A)
650	2.4 @ V_{GS} =10V	5

Mechanical Data

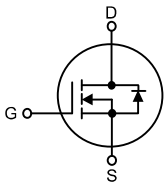
- Case: TO-251AB,TO-252AB,TO-220,ITO-220AB
  TO-262AB,TO-263AB Package



Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram



Ordering Information

Part No.	Package	Packing
AU5N65S	TO-251AB	75pcs / Tube
AD5N65S	TO-252AB	2.5Kpcs / 13" Reel
AT5N65S	TO-220AB	50pcs / Tube
AF5N65S	ITO-220AB	50pcs / Tube
AK5N65S	TO-262AB	50pcs / Tube
AG5N65S	TO-263AB	800pcs / 13" Reel

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
Avalanche Current (Note 2)		I_{AR}	5	A
Continuous Drain Current		I_D	5	A
Pulsed Drain Current (Note 2)		I_{DM}	20	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	210	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220AB/TO-262AB/TO-263AB	P_D	100	W
	ITO-220AB		36	W
	TO-251AB/TO-252AB		54	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 maximum junction temperature
3. L = 16.8mH, I_{AS} = 5A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
4. I_{SD}≤5A, di/dt ≤200A/μs, V_{DD}≤BV_{DSS}, Starting T_J = 25°C

THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220AB/ITO-220AB TO-262AB/TO-263AB	θ_{JA}	62.5	°C/W
	TO-251AB/TO-252AB		110	
Junction to Case	TO-220AB TO-262AB/TO-263AB	θ_{JC}	2.35	°C/W
	ITO-220AB		5.5	
	TO-251AB/TO-252AB		2.9	

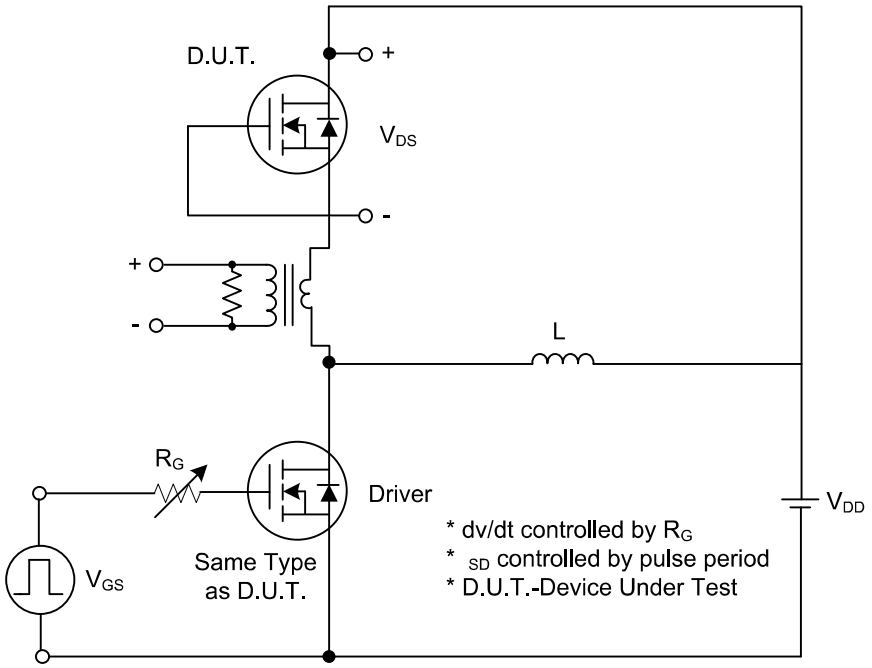
ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

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_{GS} = 30V, V_{DS} = 0V			100	nA
	Reverse		V_{GS} = -30V, V_{DS} = 0V			-100	nA
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	I_D=250μA,Referenced to 25°C		0.6		V/°C
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 = 2.5A		2.0	2.4	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz		515	670	pF
Output Capacitance		C_{OSS}			55	72	pF
Reverse Transfer Capacitance		C_{RSS}			6.5	8.5	pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	V_{DD} = 325V, I_D =5A, R_G = 25Ω (Note 1, 2)		10	30	ns
Turn-On Rise Time		t_R			42	90	ns
Turn-Off Delay Time		$t_{D(OFF)}$			38	85	ns
Turn-Off Fall Time		t_F			46	100	ns
Total Gate Charge		Q_G	V_{DS}= 520V,I_D= 5.0A, V_{GS}= 10V (Note 1, 2)		15	19	nC
Gate-Source Charge		Q_{GS}			2.5		nC
Gate-Drain Charge		Q_{GD}			6.6		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS} = 0 V, I_S = 5A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I_S				5	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				20	A
Reverse Recovery Time		t_{rr}	V_{GS} = 0 V, I_S = 5A, dI_F/dt = 100 A/ μs (Note 1)		300		ns
Reverse Recovery Charge		Q_{RR}			2.2		μC

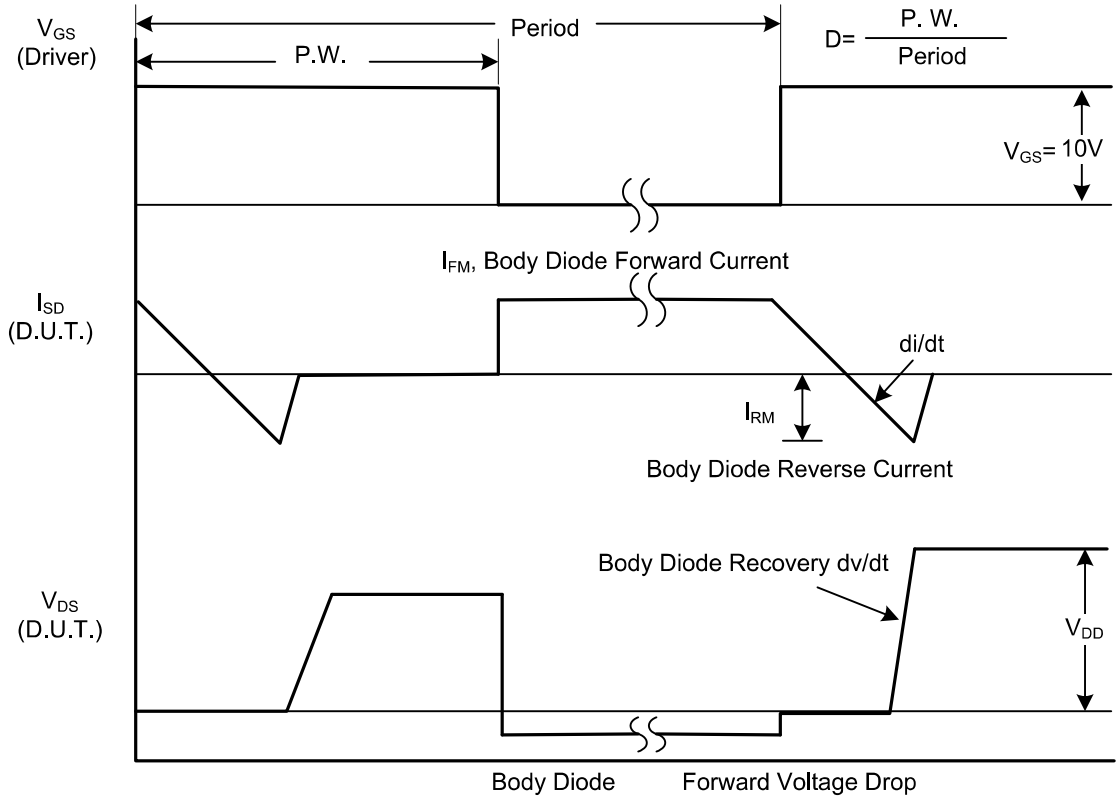
Notes: 1. Pulse Test: Pulse width≤300μs, Duty cycle≤2%

2. Essentially independent of operating temperature

TEST CIRCUITS AND WAVEFORMS

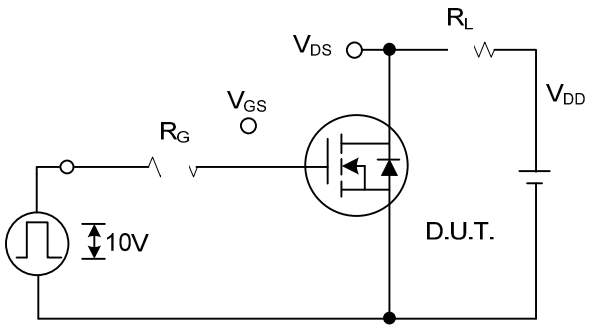


Peak Diode Recovery dv/dt Test Circuit

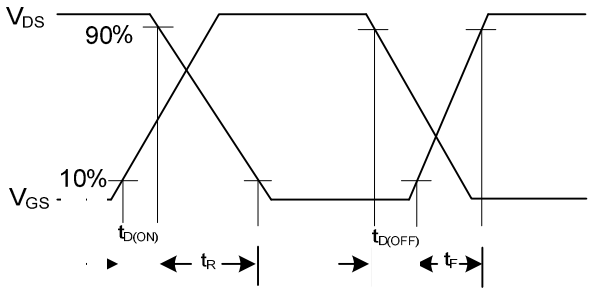


Peak Diode Recovery dv/dt Waveforms

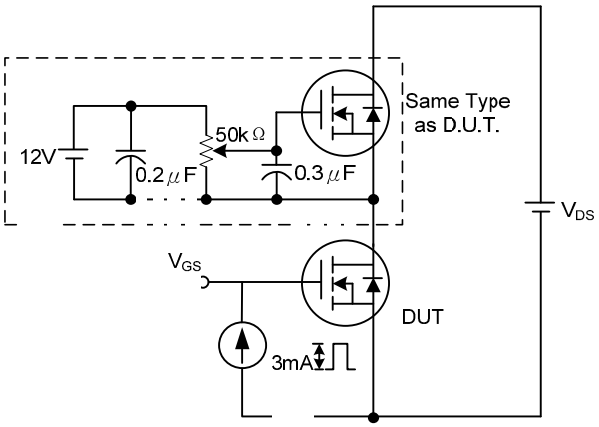
TEST CIRCUITS AND WAVEFORMS(Cont.)



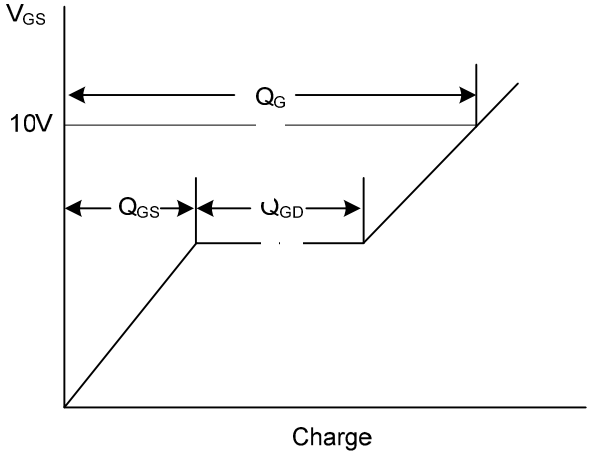
Switching Test Circuit



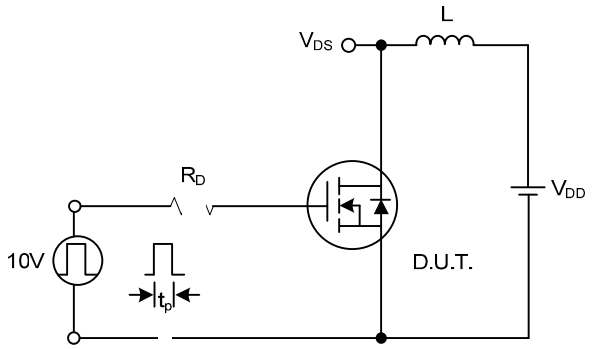
Switching Waveforms



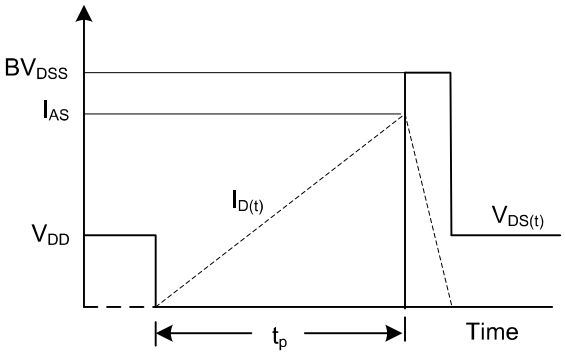
Gate Charge Test Circuit



Gate Charge Waveform

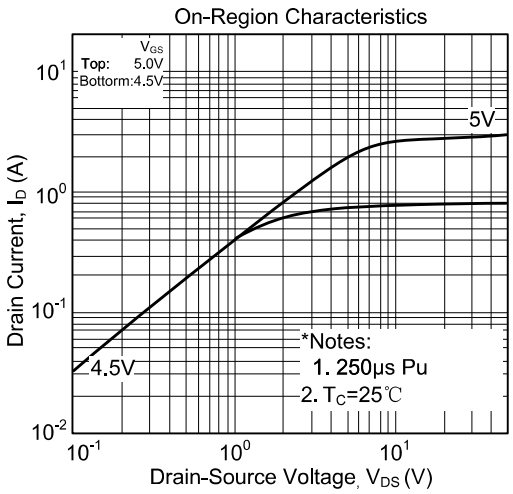


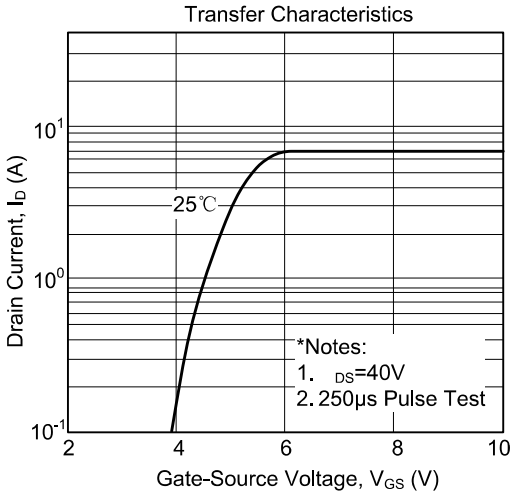
Unclamped Inductive Switching Test Circuit

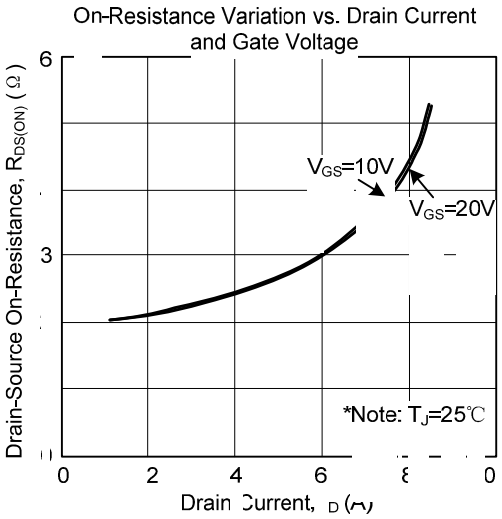


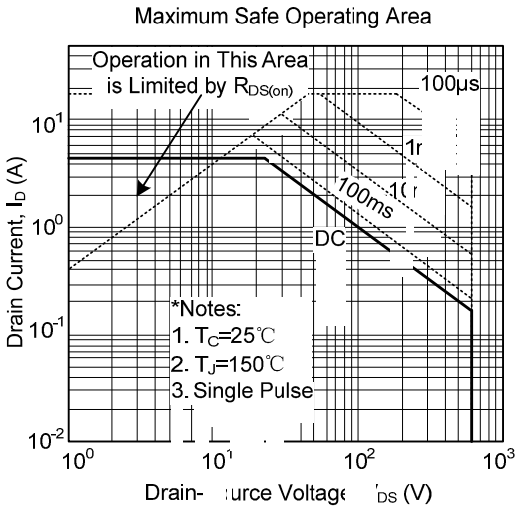
Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS

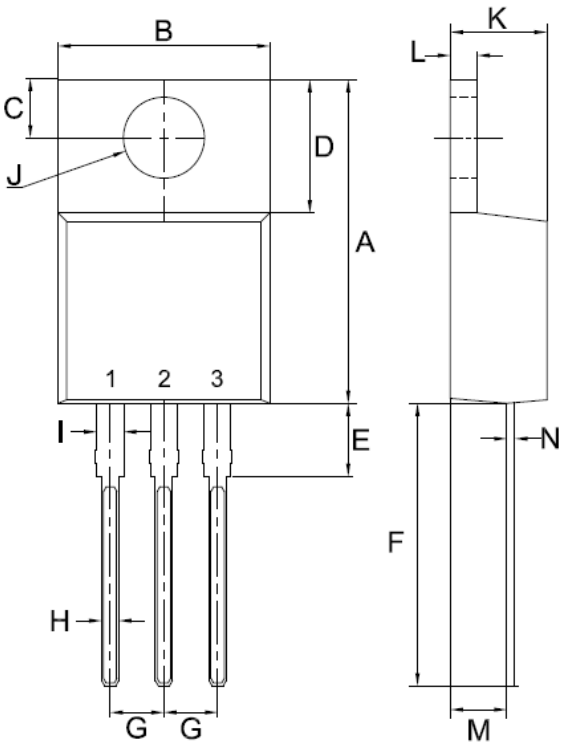






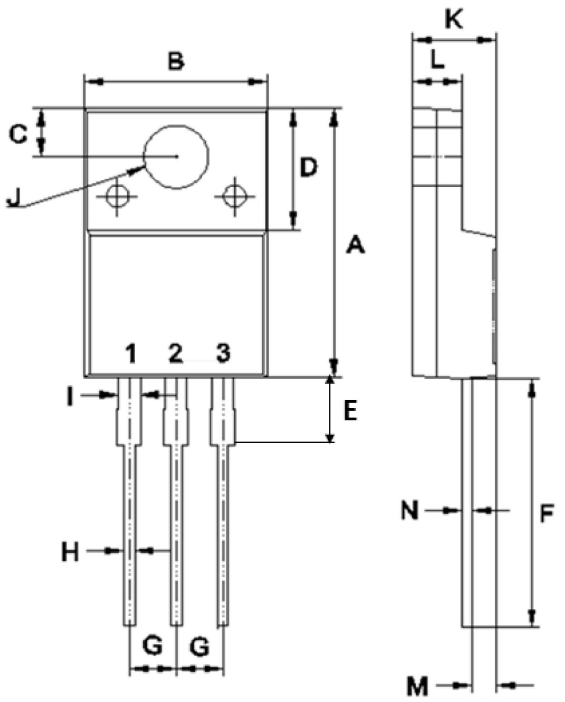


TO-220AB Mechanical Drawing



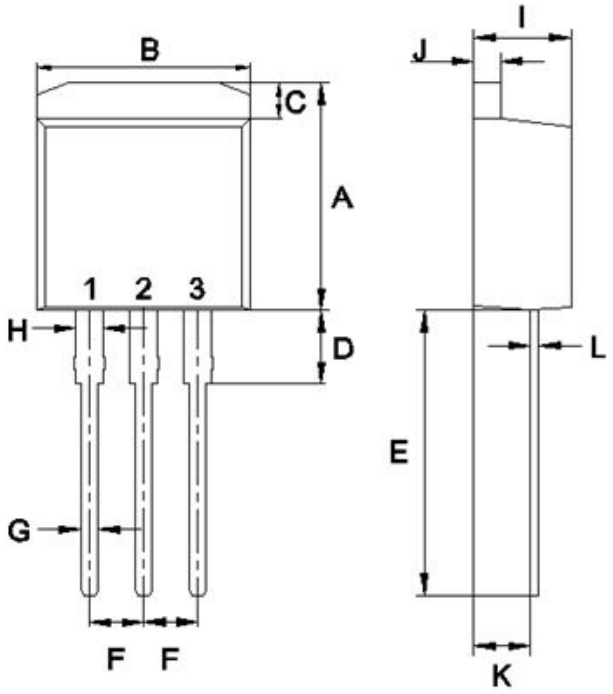
TO-220AB Unit:mm		
DIM	MIN	MAX
A	14.80	15.80
B	9.57	10.57
C	2.54	2.94
D	5.80	6.80
E	2.95	3.95
F	12.70	13.40
G	2.34	2.74
H	0.51	1.11
I	0.97	1.57
J	3.54ϕ	4.14ϕ
K	4.27	4.87
L	1.07	1.47
M	2.03	2.92
N	0.30	0.64

ITO-220AB Mechanical Drawing



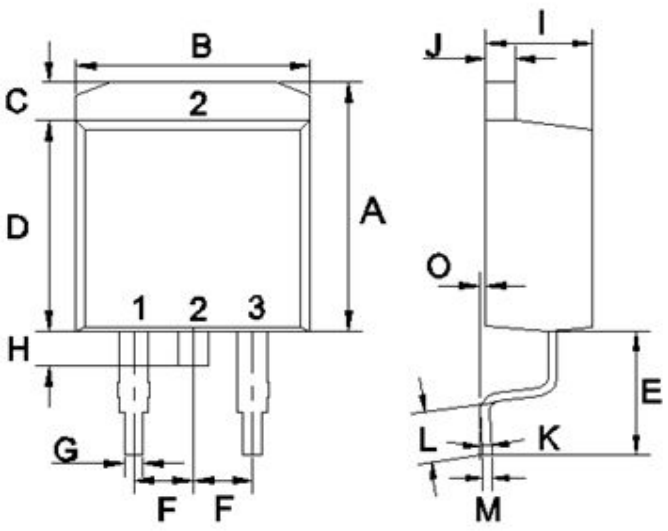
ITO-220AB Unit:mm		
DIM	MIN	MAX
A	14.50	15.50
B	9.50	10.50
C	2.50	2.90
D	6.30	7.30
E	3.30	4.30
F	13.00	14.00
G	2.35	2.75
H	0.30	0.90
I	0.90	1.50
J	3.20	3.80
K	4.24	4.84
L	2.52	2.92
M	1.09	1.49
N	0.47	0.64

TO-262AB Mechanical Drawing



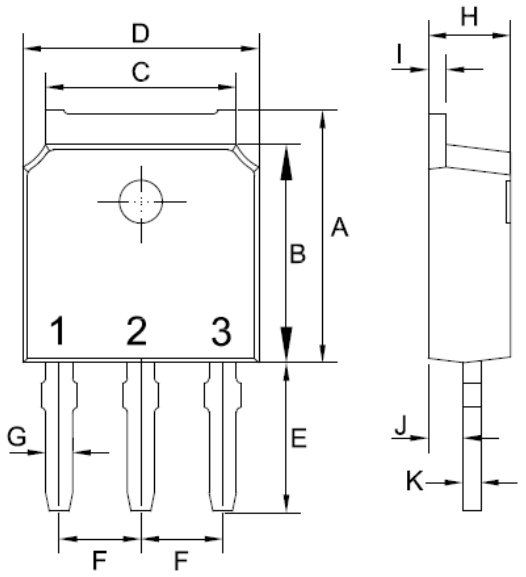
Unit:mm		
DIM	MIN	MAX
A	10.14	11.14
B	9.57	10.57
C	1.44	1.84
D	2.95	3.95
E	12.70	13.40
F	2.34	2.74
G	0.51	1.11
H	0.97	1.57
I	4.27	4.87
J	1.07	1.47
K	2.03	2.92
L	0.30	0.46

TO-263AB Mechanical Drawing



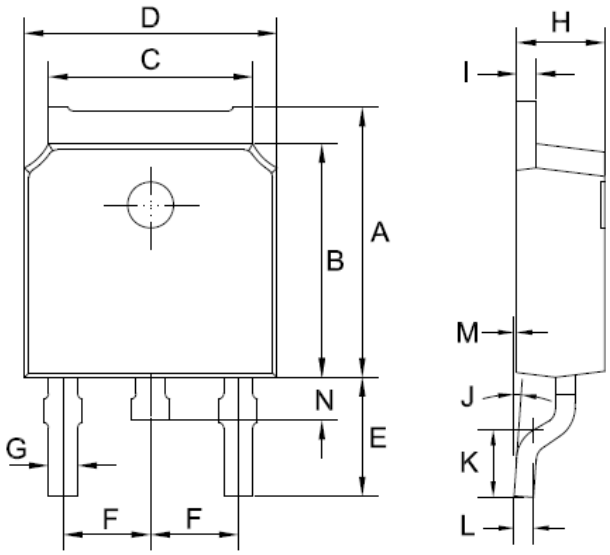
Unit:mm		
DIM	MIN	MAX
A	10.44	10.84
B	9.81	10.21
C	1.44	1.84
D	8.80	9.20
E	4.46	4.66
F	2.44	2.64
G	0.61	1.01
H	0.70	1.30
I	4.27	4.87
J	1.07	1.47
K	0°	8°
L	2.10	2.50
M	0.30	0.46
O	0	0.25

TO-251AB Mechanical Drawing



Unit:mm		
DIM	MIN	MAX
A	6.85	7.25
B	5.90	6.30
C	5.13	5.53
D	6.40	6.80
E	3.95	4.35
F	2.19	2.39
G	0.45	0.85
H	2.20	2.40
I	0.41	0.61
J	0.71	1.31
K	0.41	0.61

TO-252AB Mechanical Drawing



Unit:mm		
DIM	MIN	MAX
A	6.85	7.25
B	5.90	6.30
C	5.13	5.53
D	6.40	6.80
E	2.90	3.30
F	2.19	2.39
G	0.45	0.85
H	2.20	2.40
I	0.41	0.61
J	0°	8°
K	1.45	1.85
L	0.41	0.61
M	0.00	0.12
N	0.60	1.00