



# 2N65

## 650V N-Channel Power MOSFET

### Features

- $R_{DS(ON)} < 4.4\Omega @ V_{GS} = 10V, I_D = 1A$
- Fast switching capability
- Lead free in compliance with EU RoHS directive.
- Improved dv/dt capability, high ruggedness

### PRODUCT SUMMARY

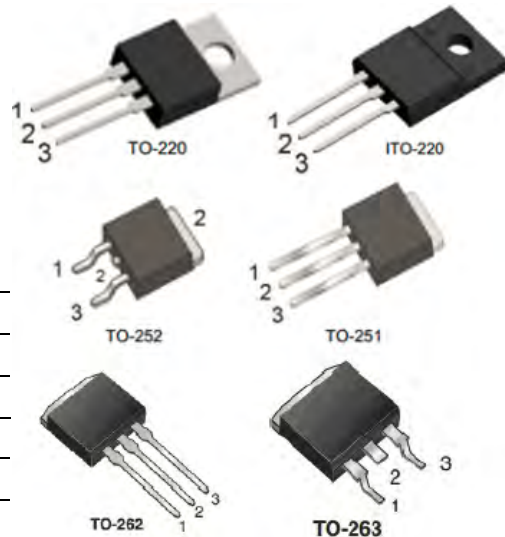
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	Current
650	4.4 @ $V_{GS} = 10V$	2A

### Mechanical Data

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

### Ordering Information

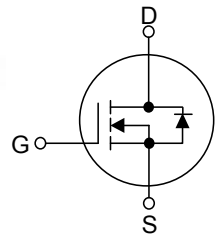
Part No.	Package	Packing
DMP2N65-TU	TO-251	75pcs / Tube
DMD2N65-TR	TO-252	2.5Kpcs / 13" Reel
DMD2N65-TU	TO-252	75pcs / Tube
DMT2N65-TU	TO-220	50pcs / Tube
DMF2N65-TU	ITO-220	50pcs / Tube
DMK2N65-TU	TO-262	50pcs / Tube
DMG2N65-TU	TO-263	50pcs / Tube
DMG2N65-TR	TO-263	800pcs / 13" Reel



Pin Definition:

1. Gate
2. Drain
3. Source

### Block Diagram



### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ C$ , unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	650	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Avalanche Current (Note 2)		$I_{AR}$	2.0	A
Continuous Drain Current		$I_D$	2.0	A
Pulsed Drain Current (Note 2)		$I_{DM}$	8.0	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	115	mJ
Power Dissipation	TO-220/TO-262/TO-263	$P_D$	44	W
	ITO-220		23	W
	TO-251/TO-252		34	W
Junction Temperature		$T_J$	+150	$^\circ C$
Operating Temperature		$T_{OPR}$	-55 ~ +150	$^\circ C$
Storage Temperature		$T_{STG}$	-55 ~ +150	$^\circ C$

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.  $L = 30mH, I_{AS} = 2.7A, V_{DD} = 50V, R_G = 25 \Omega$ , Starting  $T_J = 25^\circ C$

**THERMAL DATA**

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

**ELECTRICAL CHARACTERISTICS** ( $T_C=25^\circ\text{C}$ , unless otherwise specified)

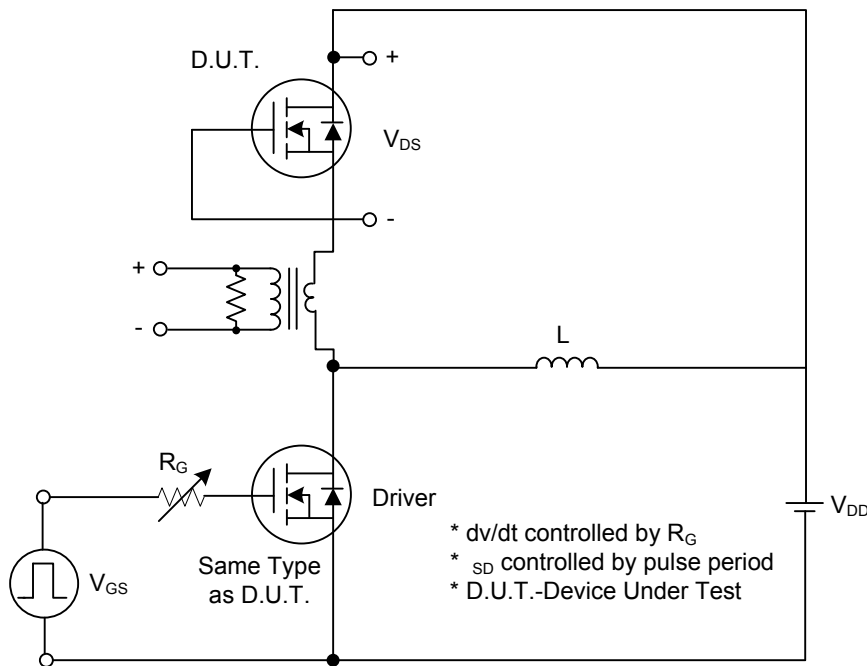
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage		$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	650			V
Drain-Source Leakage Current		$I_{DSS}$	$V_{DS} = 650V, V_{GS} = 0V$			10	$\mu A$
Gate-Source Leakage Current	Forward	$I_{GSS}$	$V_{GS} = 30V, V_{DS} = 0V$			100	nA
	Reverse		$V_{GS} = -30V, V_{DS} = 0V$			-100	nA
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 1A$		4	4.4	$\Omega$
<b>DYNAMIC CHARACTERISTICS</b>							
Input Capacitance		$C_{ISS}$	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1MHz$		300	-	pF
Output Capacitance		$C_{OSS}$			45	-	pF
Reverse Transfer Capacitance		$C_{RSS}$			2	-	pF
<b>SWITCHING CHARACTERISTICS</b>							
Turn-On Delay Time		$t_{D(ON)}$	$V_{DD} = 300V, I_D = 2A,$ $R_G = 25\Omega$ (Note 1, 2)		10	-	ns
Turn-On Rise Time		$t_R$			25	-	ns
Turn-Off Delay Time		$t_{D(OFF)}$			20	-	ns
Turn-Off Fall Time		$t_F$			25	-	ns
Total Gate Charge		$Q_G$	$V_{DS} = 480V, I_D = 2.4A,$ $V_{GS} = 10V$ (Note 1, 2)		5.7	-	nC
Gate-Source Charge		$Q_{GS}$			1.8	-	nC
Gate-Drain Charge		$Q_{GD}$			2	-	nC
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>							
Drain-Source Diode Forward Voltage		$V_{SD}$	$V_{GS} = 0V, I_{SD} = 2.0A$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		$I_S$				2.0	A
Maximum Pulsed Drain-Source Diode Forward Current		$I_{SM}$				8.0	A
Reverse Recovery Time		$t_{rr}$	$V_{GS} = 0V, I_S = 2A,$		357		ns
Reverse Recovery Charge		$Q_{RR}$	$di_F/dt = 100A/\mu s$ (Note 1)		2		$\mu C$

Notes: 1. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ 

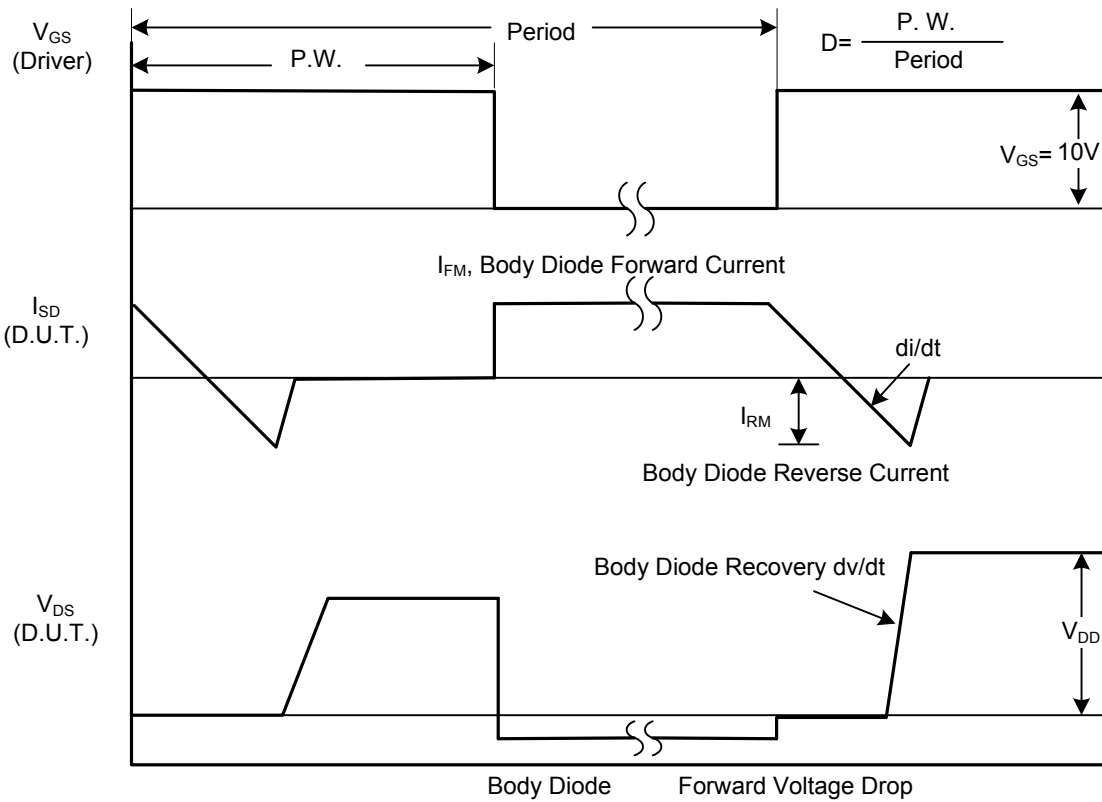
2. Essentially independent of operating temperature



TEST CIRCUITS AND WAVEFORMS



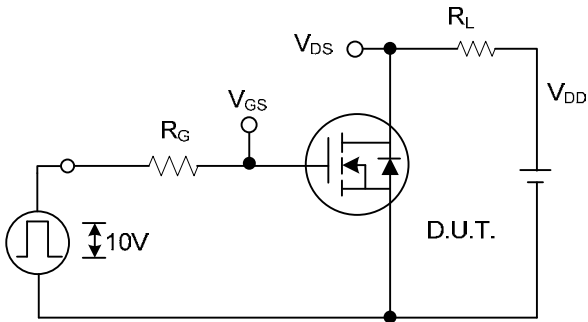
Peak Diode Recovery dv/dt Test Circuit



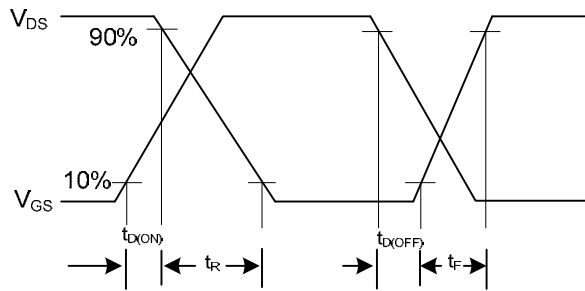
Peak Diode Recovery dv/dt Waveforms



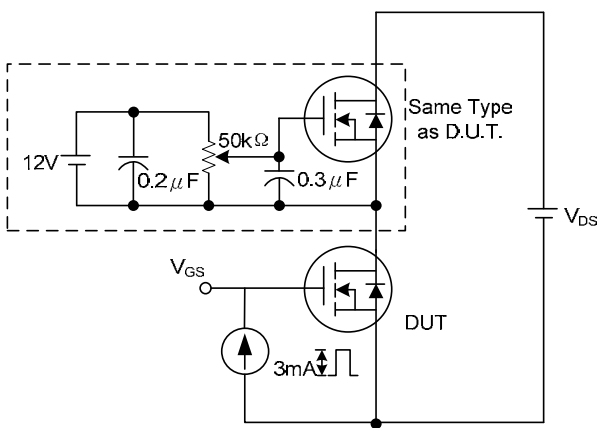
### TEST CIRCUITS AND WAVEFORMS(Cont.)



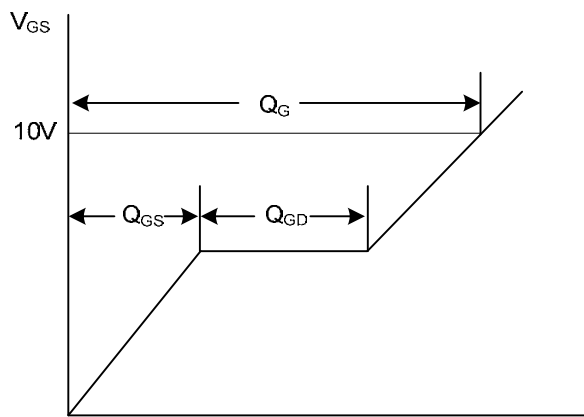
Switching Test Circuit



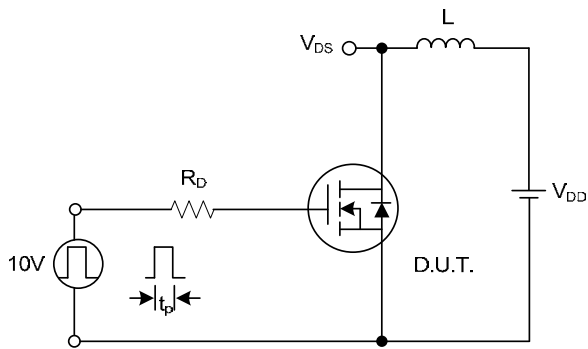
Switching Waveforms



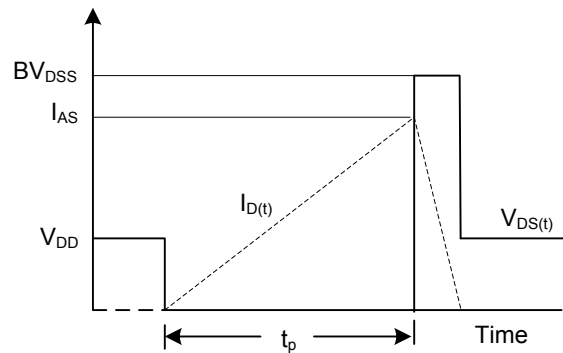
Gate Charge Test Circuit



Charge  
Gate Charge Waveform



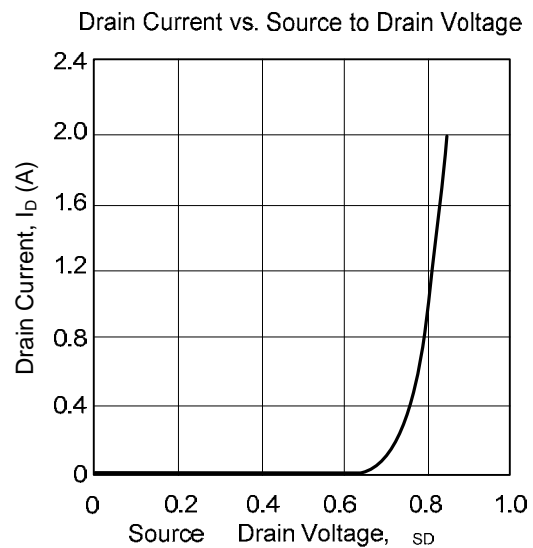
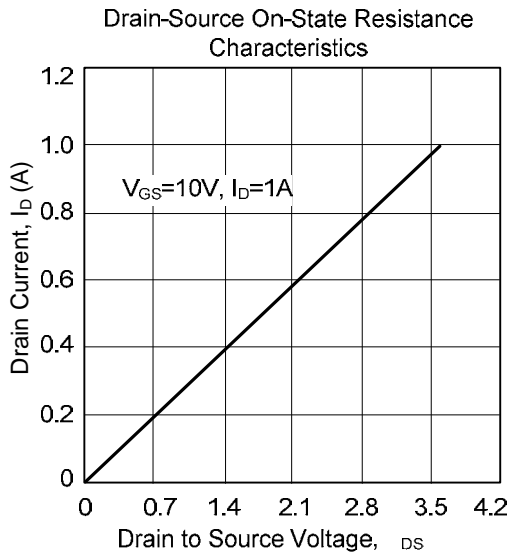
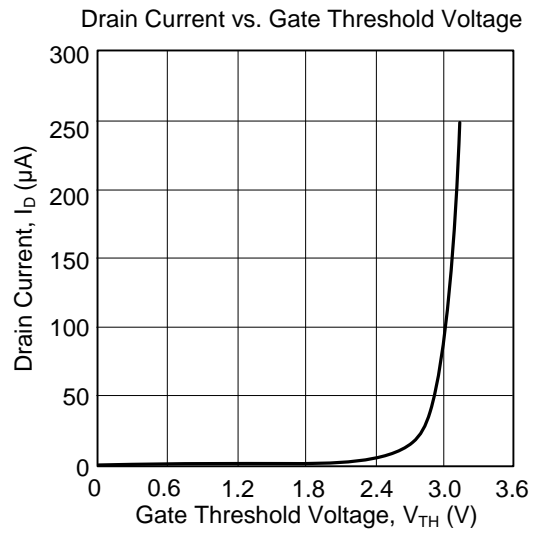
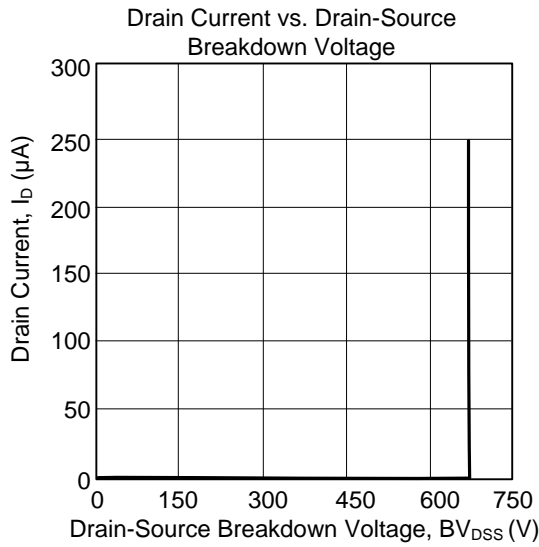
Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

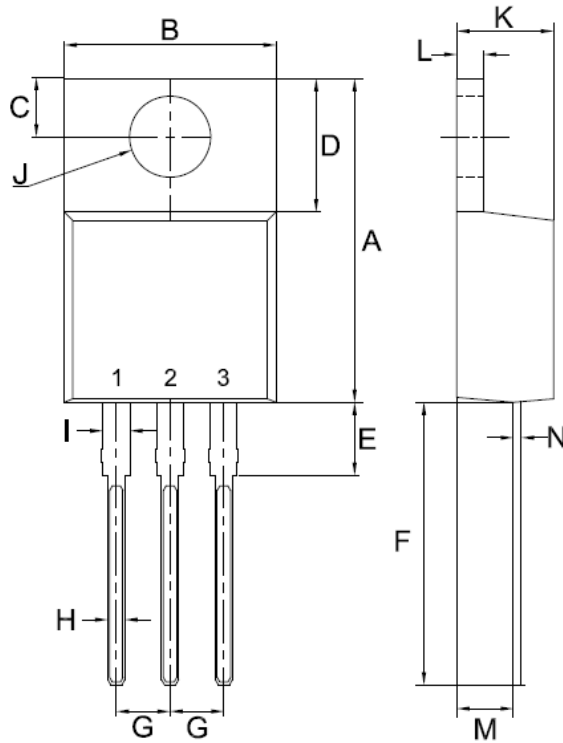


### TYPICAL CHARACTERISTICS



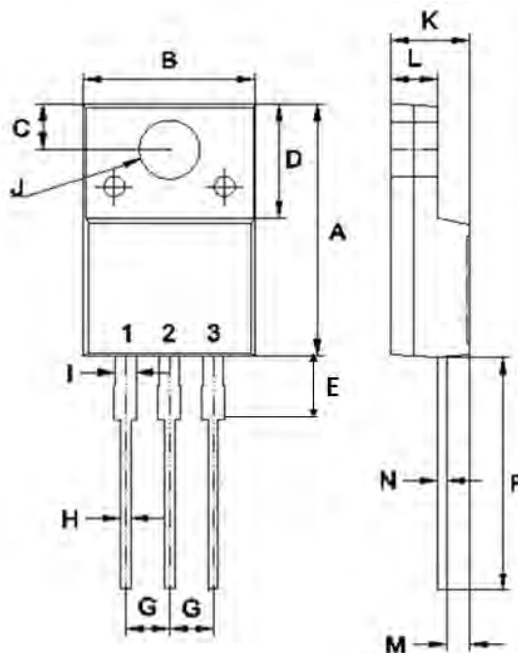


**TO-220 Mechanical Drawing**



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	3.54 $\phi$	4.14 $\phi$
K	4.27	4.87
L	1.07	1.47
M	2.03	2.92
N	0.30	0.64

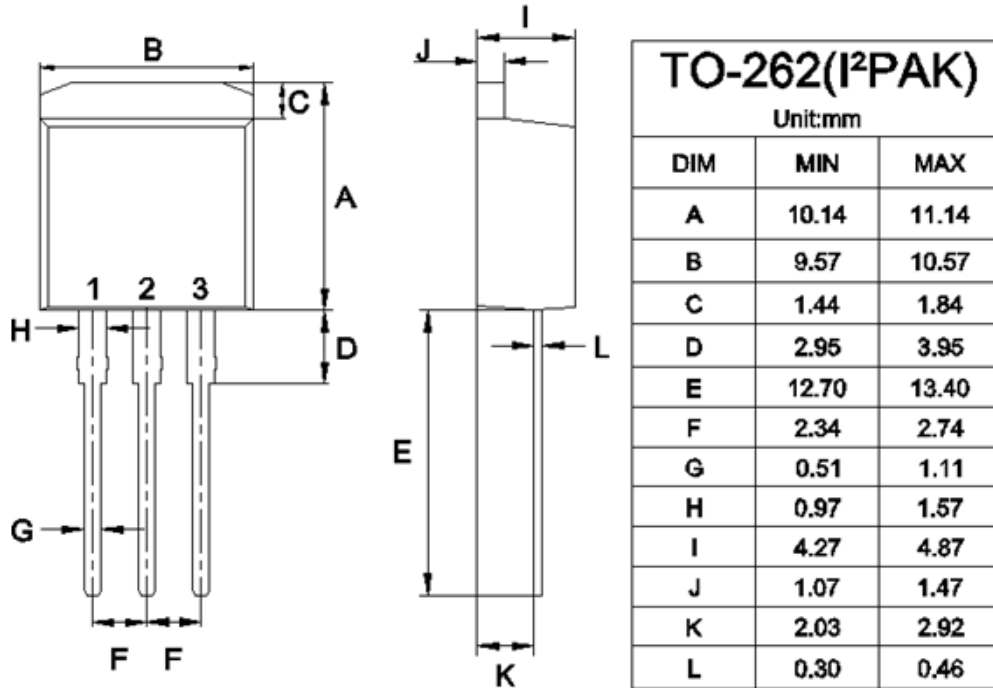
**ITO-220 Mechanical Drawing**



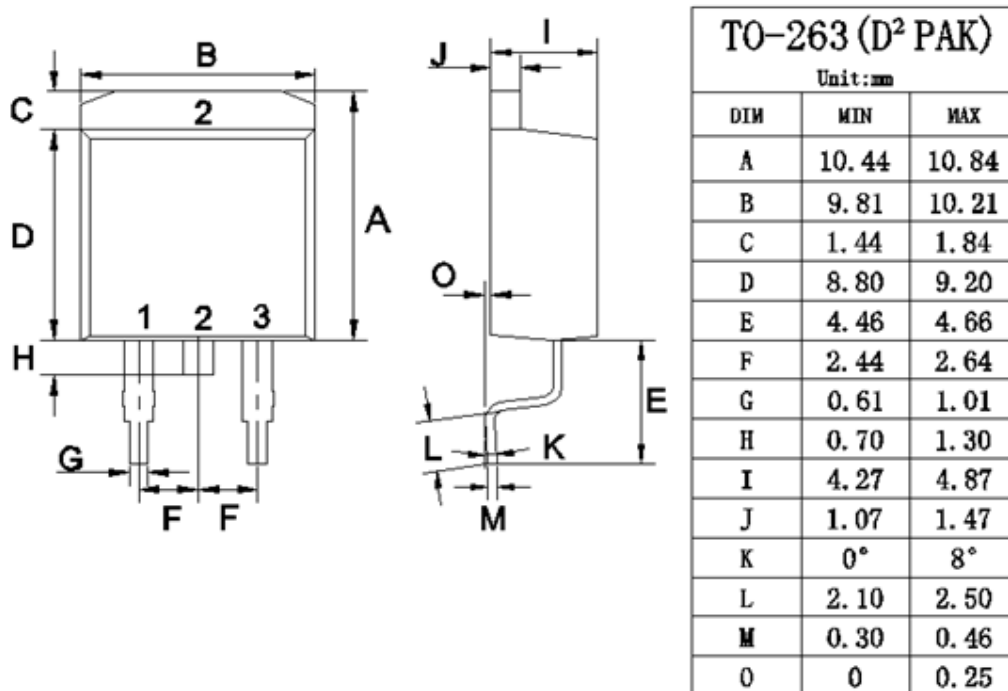
ITO-220AB Unit:mm		
DIM	MIN	MAX
A	14.50	15.50
B	9.50	10.50
C	2.50	2.90
D	6.30	7.30
E	3.30	4.30
F	13.00	14.00
G	2.35	2.75
H	0.30	0.90
I	0.90	1.50
J	3.20	3.80
K	4.24	4.84
L	2.52	2.92
M	1.09	1.49
N	0.47	0.64



**TO-262 Mechanical Drawing**

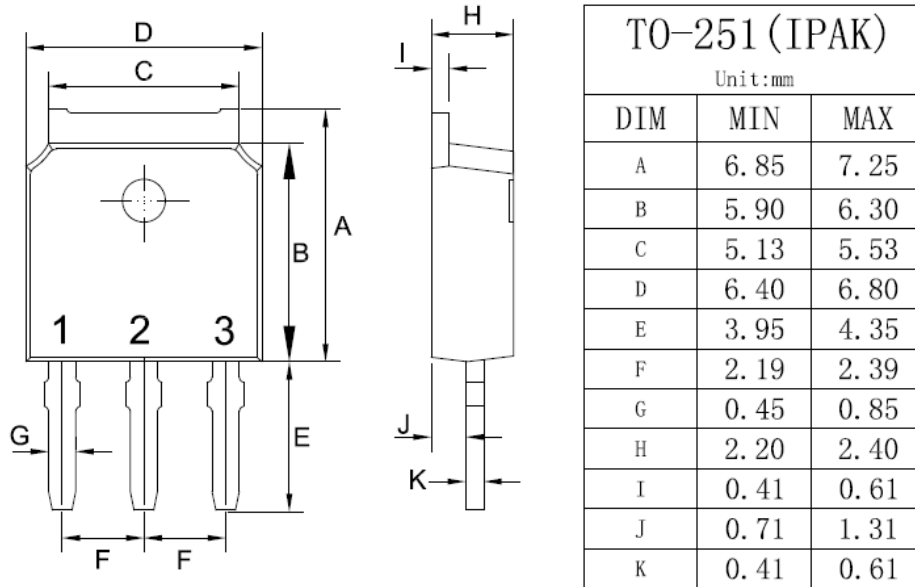


**TO-263 Mechanical Drawing**





### TO-251 Mechanical Drawing



### TO-252 Mechanical Drawing

