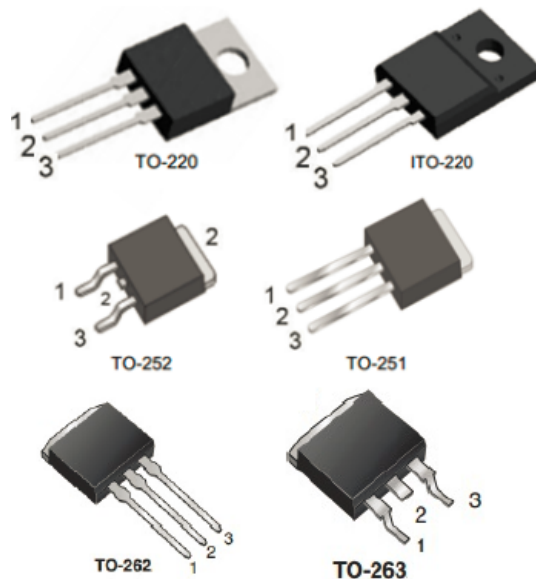


Features

- $R_{DS(ON)} < 1.5\Omega$ @ $V_{GS}=10V, I_D=2.5A$
- Fast switching capability
- Lead free in compliance with EU RoHS directive.
- Green molding compound

Mechanical Data

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



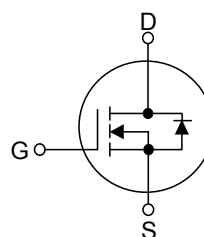
Pin Definition:

1. Gate
2. Drain
3. Source

Ordering Information

Part No.	Package	Packing
5N50P	TO-251	75pcs / Tube
5N50D	TO-252	75pcs / Tube
5N50T	TO-220	50pcs / Tube
5N50F	ITO-220	50pcs / Tube
5N50K	TO-262	50pcs / Tube
5N50G	TO-263	50pcs / Tube

Block Diagram



Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise specified

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	500	V
Gate-Source Voltage		V_{GSS}	± 30	V
Continuous Drain Current		I_D	5.0	A
Pulsed Drain Current (Note 2)		I_{DM}	20	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	250	mJ
Power Dissipation	TO-220/TO-262/TO-263	P_D	106	W
	ITO-220		38	W
	TO-251/TO-252		54	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Operating Temperature		T_{OPR}	-55 ~ +150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

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. $L = 10\text{mH}$, $I_{AS} = 7.1\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 2.4\Omega$, Starting $T_J = 25^\circ\text{C}$



THERMAL DATA

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

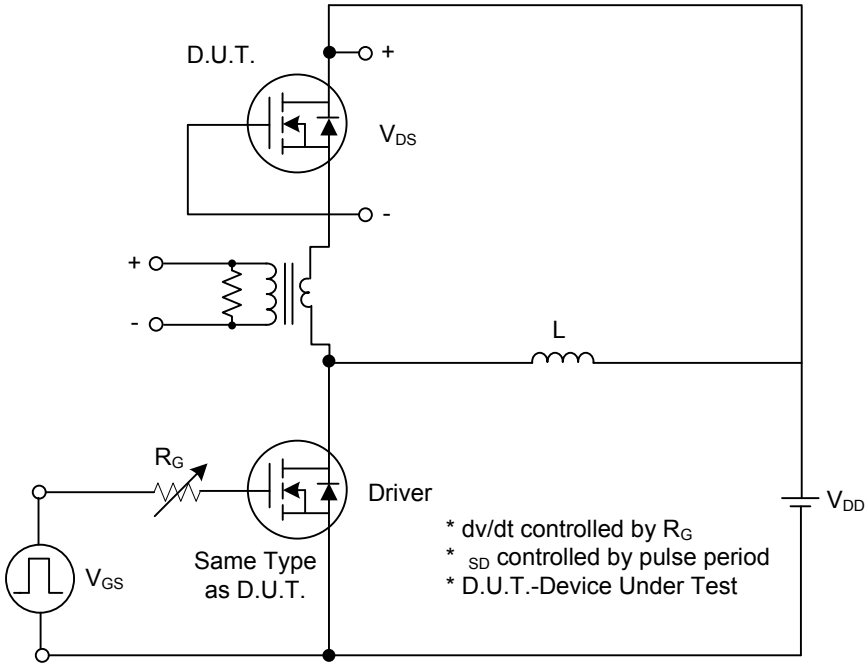
ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} = 0V, I _D = 250μA	600			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} = 500V, 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	
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			1.5	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{DS} = 25V, V _{GS} = 0V, f = 1MHz		584		pF
Output Capacitance		C _{OSS}			80		pF
Reverse Transfer Capacitance		C _{RSS}			30		pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		t _{D(ON)}	V _{DD} =30V, I _D =0.5A, R _G =25Ω (Note 1, 2)		30		ns
Turn-On Rise Time		t _R			50		ns
Turn-Off Delay Time		t _{D(OFF)}			145		ns
Turn-Off Fall Time		t _F			70		ns
Total Gate Charge		Q _G	V _{GS} = 10V,I _D = 1.3A, V _{GS} = 50V (Note 1, 2)		20		nC
Gate-Source Charge		Q _{GS}			4		nC
Gate-Drain Charge		Q _{GD}			5		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V,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

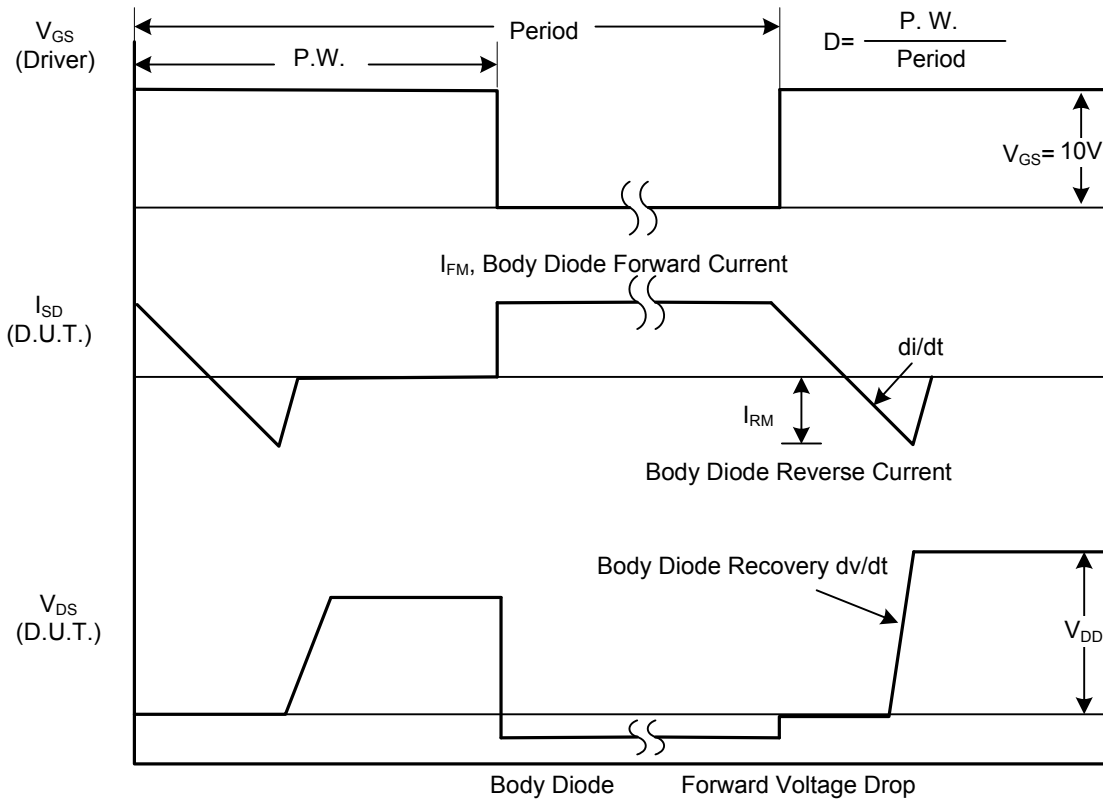
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
2. Essentially independent of operating temperature



TEST CIRCUITS AND WAVEFORMS

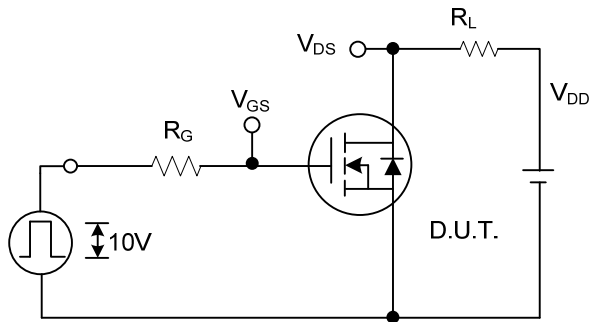


Peak Diode Recovery dv/dt Test Circuit

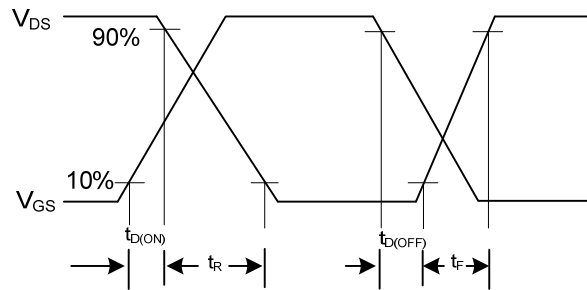


Peak Diode Recovery dv/dt Waveforms

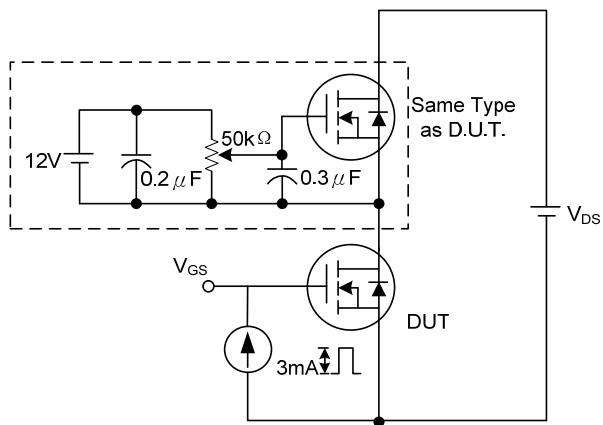
TEST CIRCUITS AND WAVEFORMS(Cont.)



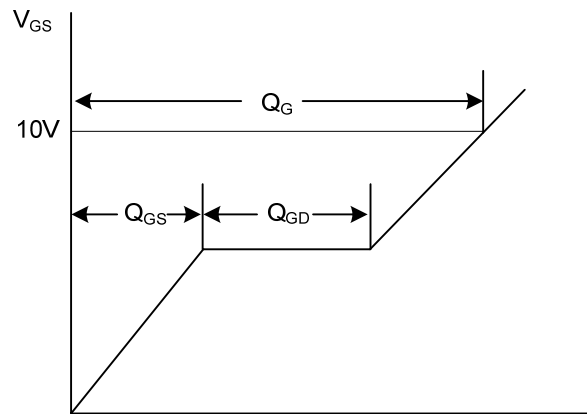
Switching Test Circuit



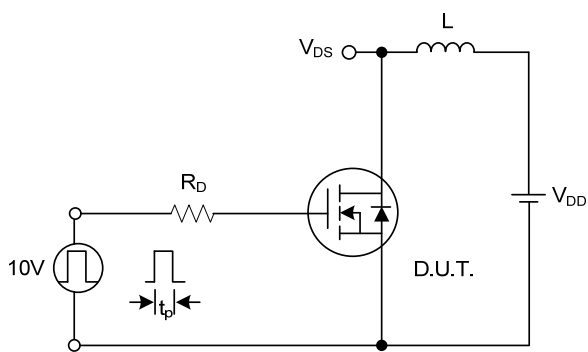
Switching Waveforms



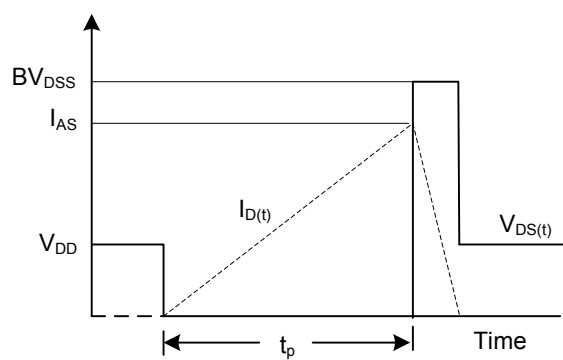
Gate Charge Test Circuit



Gate Charge Waveform



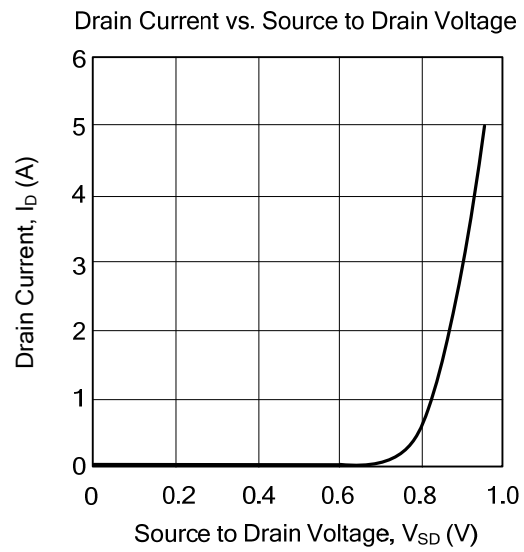
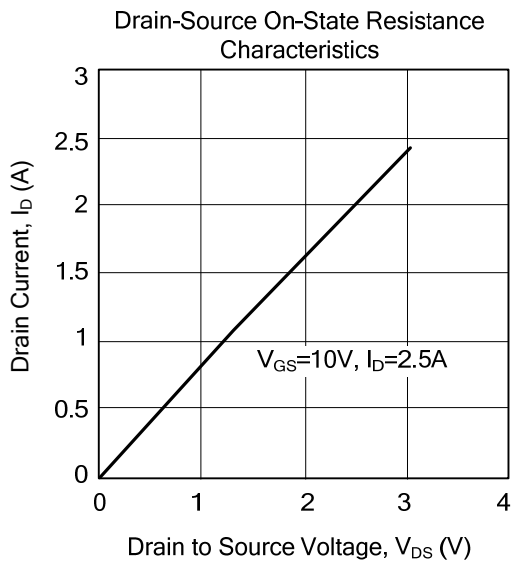
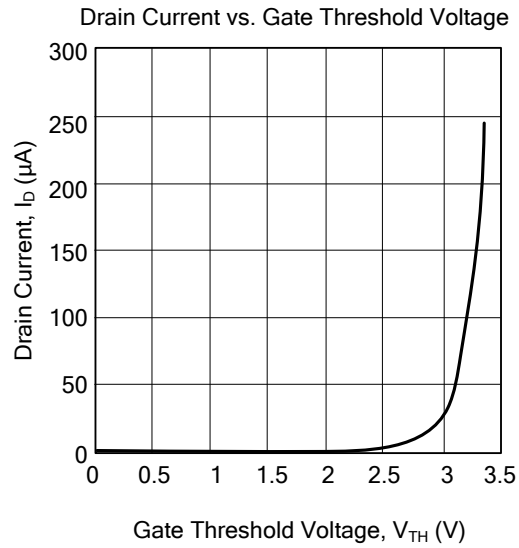
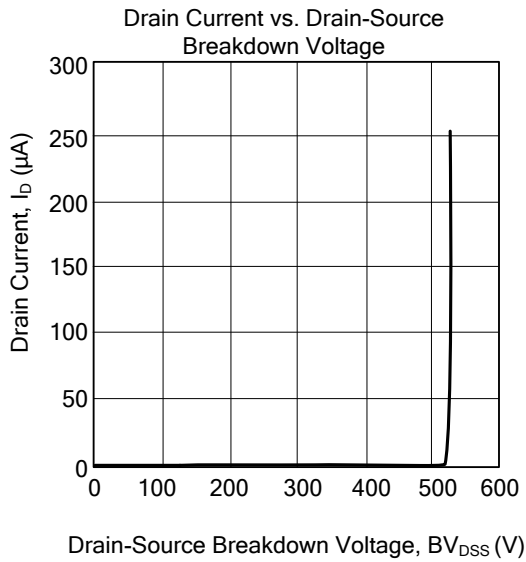
Unclamped Inductive Switching Test Circuit



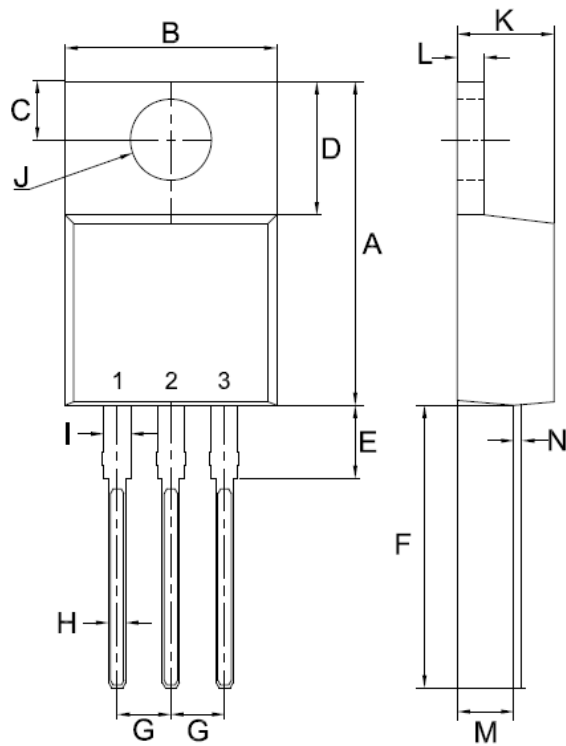
Unclamped Inductive Switching Waveforms



TYPICAL CHARACTERISTICS

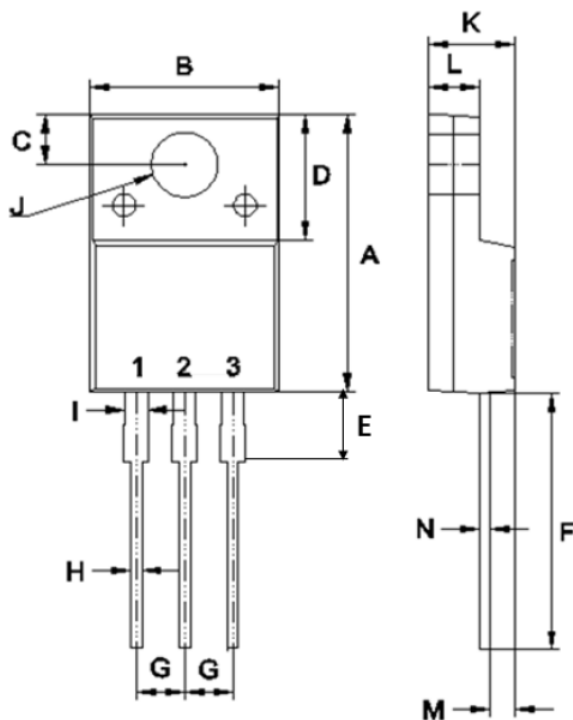


TO-220 Mechanical Drawing



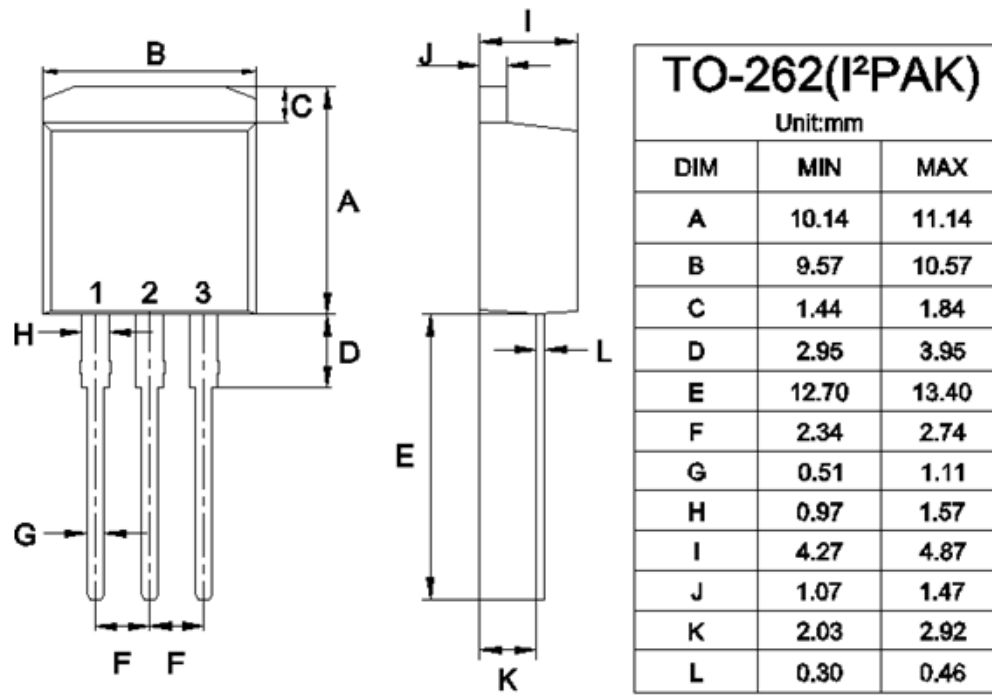
TO-220AB		
Unit:mm		
DIM	MIN	MAX
A	14.80	15.80
B	9.57	10.57
C	2.54	2.94
D	5.80	6.80
E	2.95	3.95
F	12.70	13.40
G	2.34	2.74
H	0.51	1.11
I	0.97	1.57
J	3.54 ϕ	4.14 ϕ
K	4.27	4.87
L	1.07	1.47
M	2.03	2.92
N	0.30	0.64

ITO-220 Mechanical Drawing

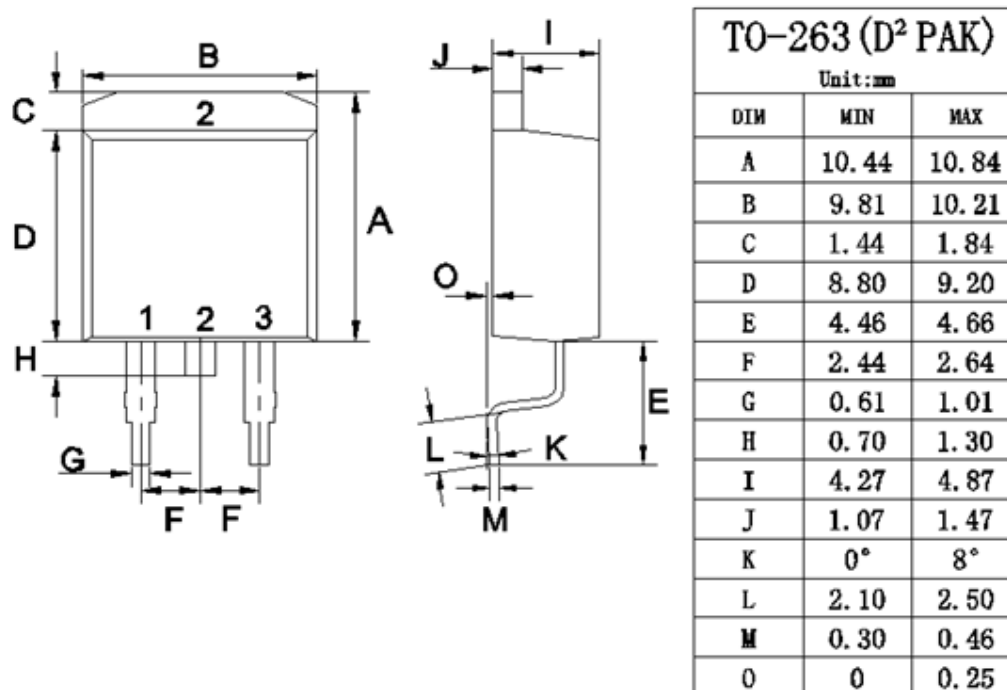


ITO-220AB Unit:mm		
DIM	MIN	MAX
A	14.50	15.50
B	9.50	10.50
C	2.50	2.90
D	6.30	7.30
E	3.30	4.30
F	13.00	14.00
G	2.35	2.75
H	0.30	0.90
I	0.90	1.50
J	3.20	3.80
K	4.24	4.84
L	2.52	2.92
M	1.09	1.49
N	0.47	0.64

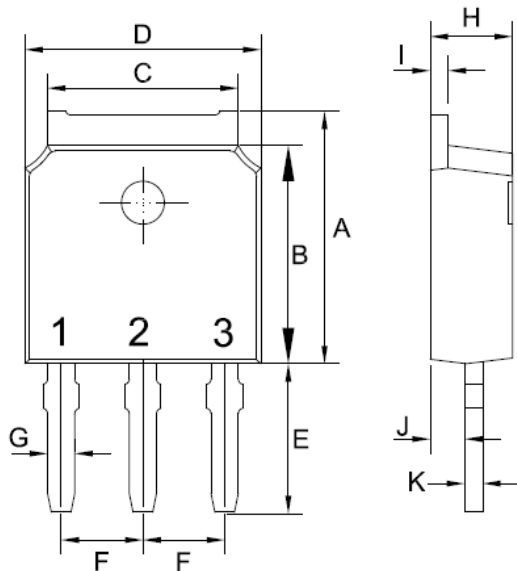
TO-262 Mechanical Drawing



TO-263 Mechanical Drawing

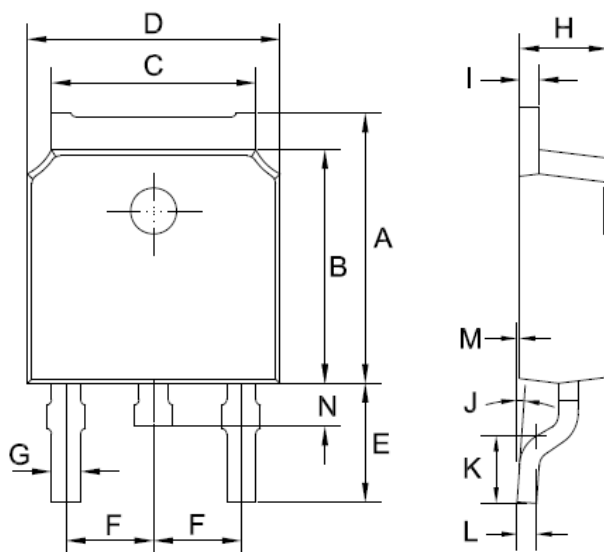


TO-251 Mechanical Drawing



TO-251 (IPAK)		
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-252 Mechanical Drawing



TO-252 (DPAK)		
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