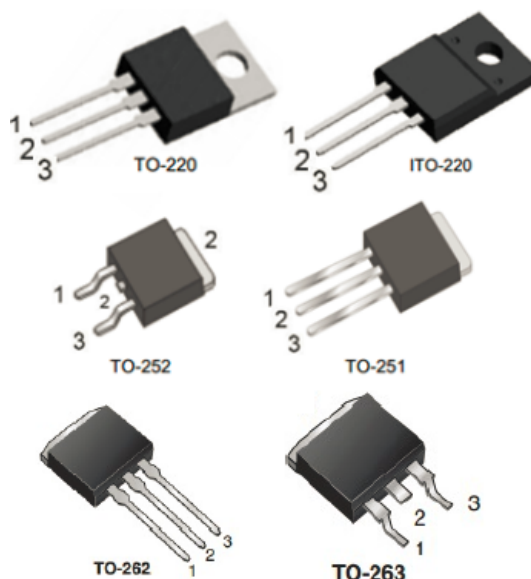


Features

- $R_{DS(ON)} < 2.2\Omega$ @ $V_{GS}=10V, I_D=2.5A$
- 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



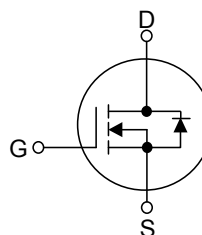
Pin Definition:

1. Gate
2. Drain
3. Source

Ordering Information

Part No.	Package	Packing
5N60P	TO-251	75pcs / Tube
5N60D	TO-252	75pcs / Tube
5N60T	TO-220	50pcs / Tube
5N60F	ITO-220	50pcs / Tube
5N60K	TO-262	50pcs / Tube
5N60G	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}	600	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}	210	mJ
Power Dissipation	TO-220/TO-262/TO-263	P_D	100	W
	ITO-220		36	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. $L = 16.8\text{mH}$, $I_{AS} = 5A$, $V_{DD} = 50V$, $R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$



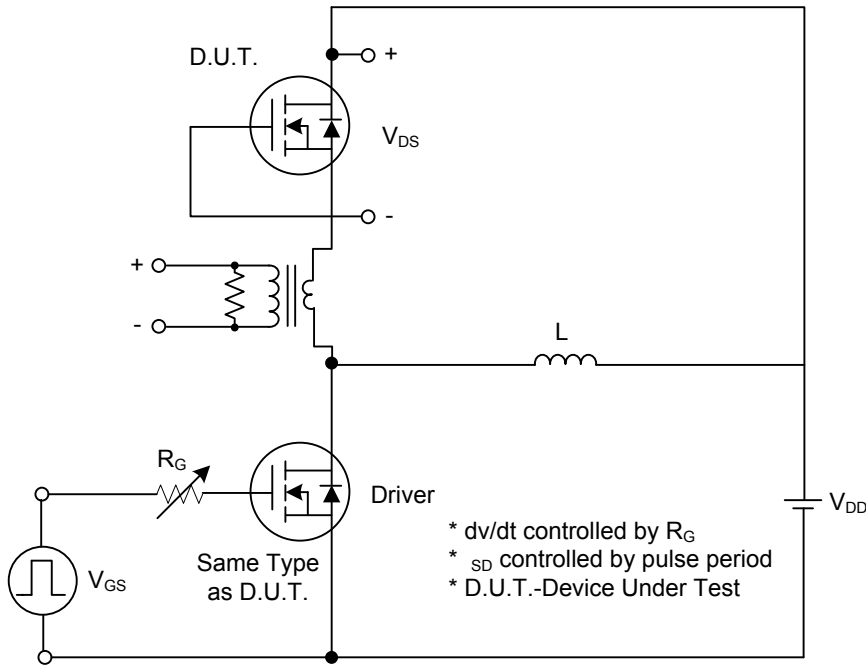
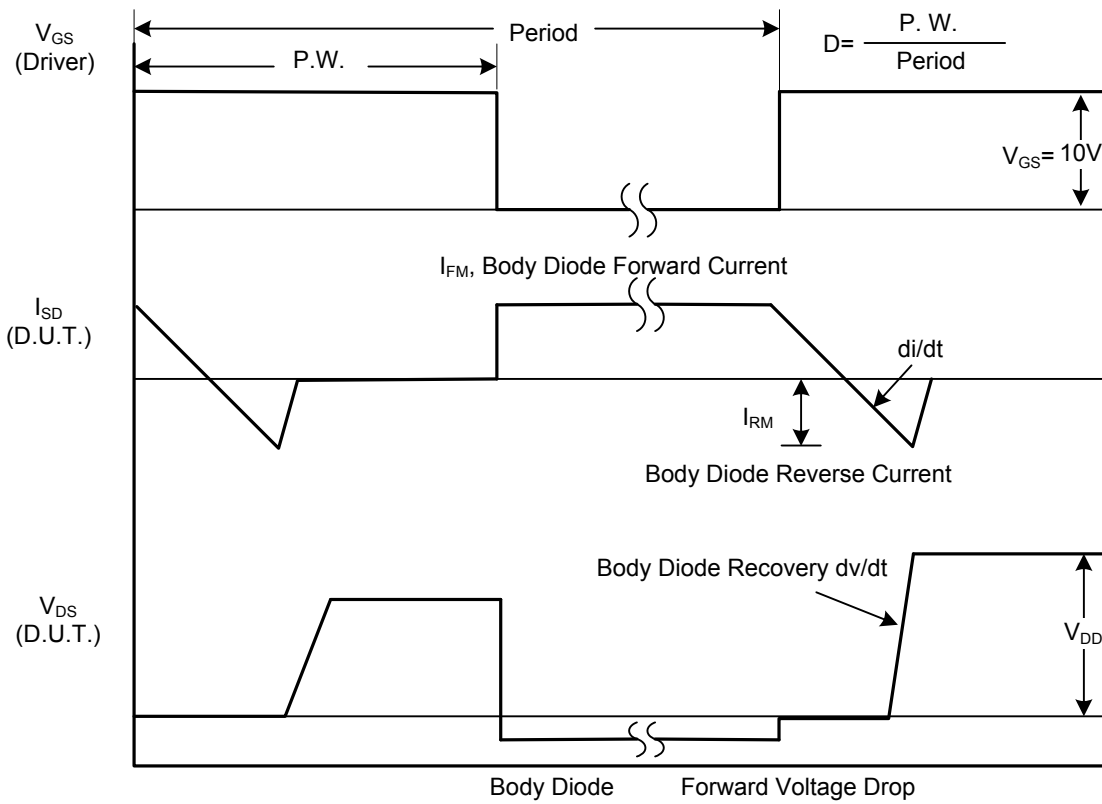
THERMAL DATA

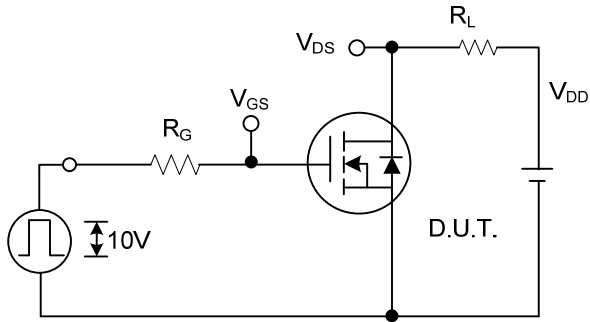
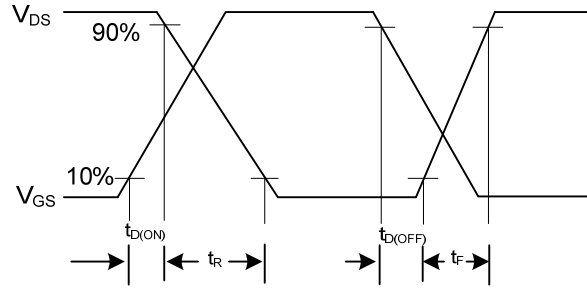
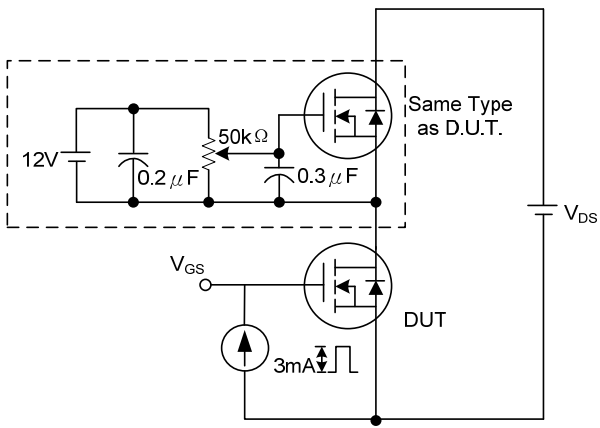
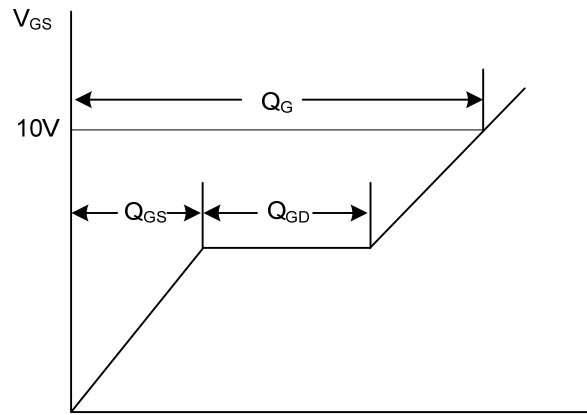
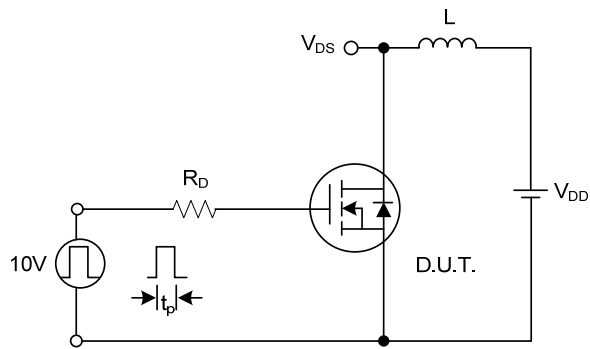
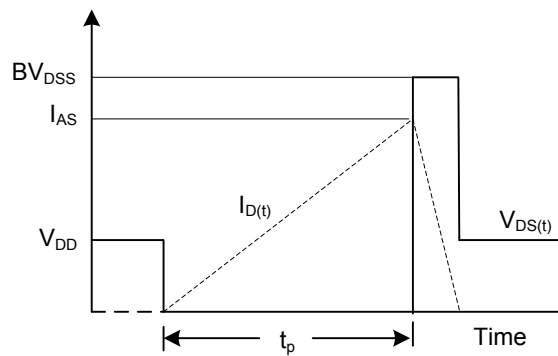
PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/ITO-220 TO-262/TO-263	θ_{JA}	62.5	°C/W
	TO-251/ TO-252		110	
Junction to Case	TO-220/ITO-220 TO-262/TO-263	θ_{JC}	2.35	°C/W
	ITO-220		5.5	
	TO-251/ TO-252		2.9	

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}	$V_{GS} = 0V, I_D = 250\mu A$	600			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 600V, V_{GS} = 0V$			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}			100	nA
	Reverse				$V_{GS} = -30V, V_{DS} = 0V$	-100
ON CHARACTERISTICS						
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	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 2.5A$		1.9	2.2	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1MHz$		520		pF
Output Capacitance	C_{OSS}			70		pF
Reverse Transfer Capacitance	C_{RSS}			7		pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = 300V, I_D = 5A,$ $R_G = 25\Omega$ (Note 1, 2)		20		ns
Turn-On Rise Time	t_R			70		ns
Turn-Off Delay Time	$t_{D(OFF)}$			60		ns
Turn-Off Fall Time	t_F			120		ns
Total Gate Charge	Q_G	$V_{DS} = 480V, I_D = 5.0A,$ $V_{GS} = 10V$ (Note 1, 2)		20		nC
Gate-Source Charge	Q_{GS}			1.5		nC
Gate-Drain Charge	Q_{GD}			10		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
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 5A,$		300		ns
Reverse Recovery Charge	Q_{RR}	$di_F/dt = 100 A/\mu s$ (Note 1)		2.2		μC

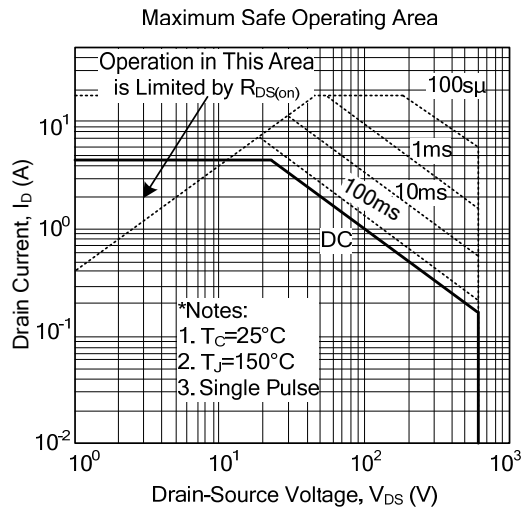
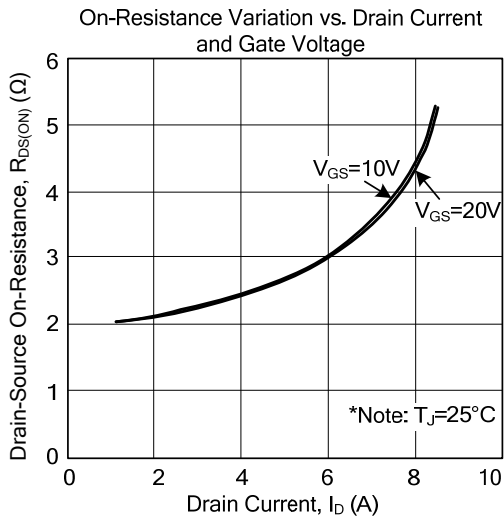
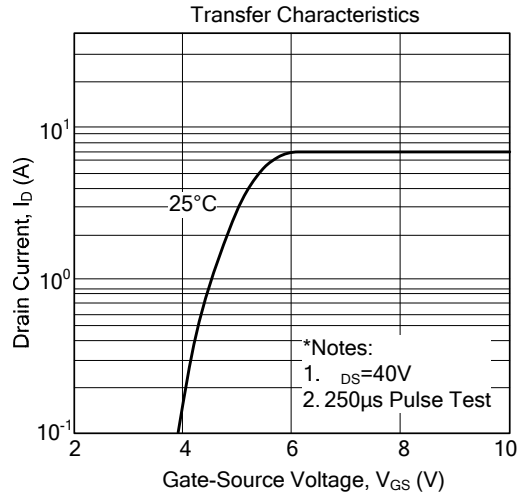
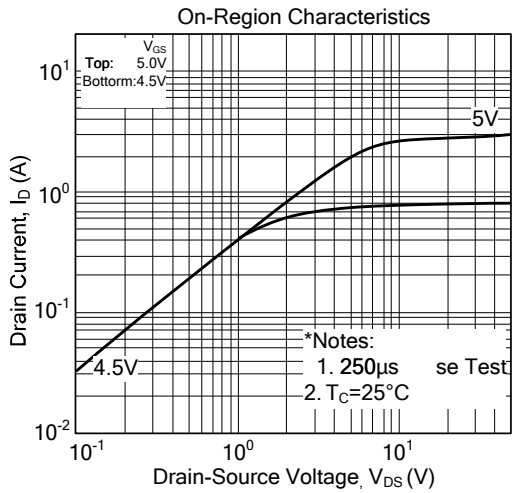
- Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
 2. Essentially independent of operating temperature

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



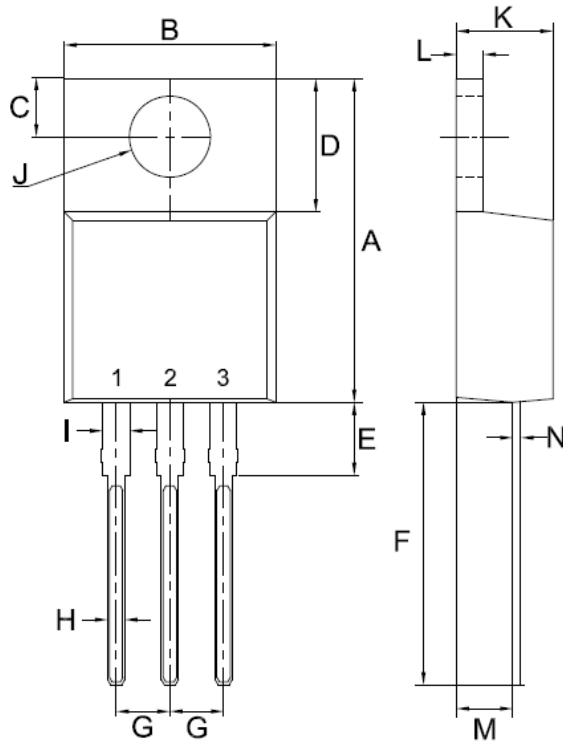
TYPICAL CHARACTERISTICS





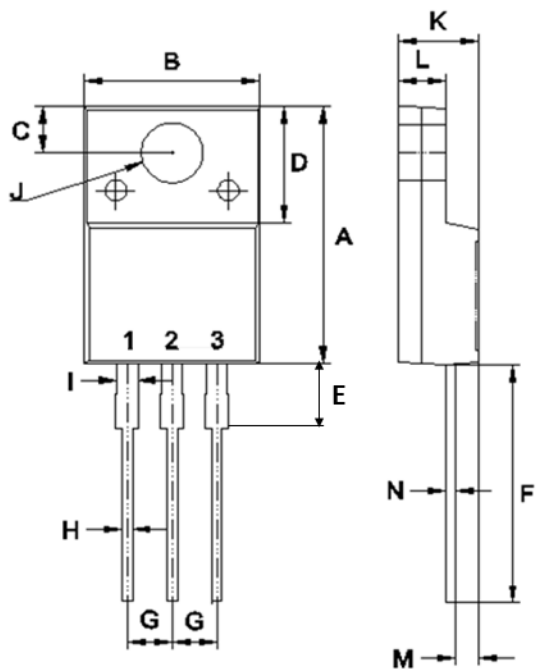
SUMITOMO

TO-220 Mechanical Drawing



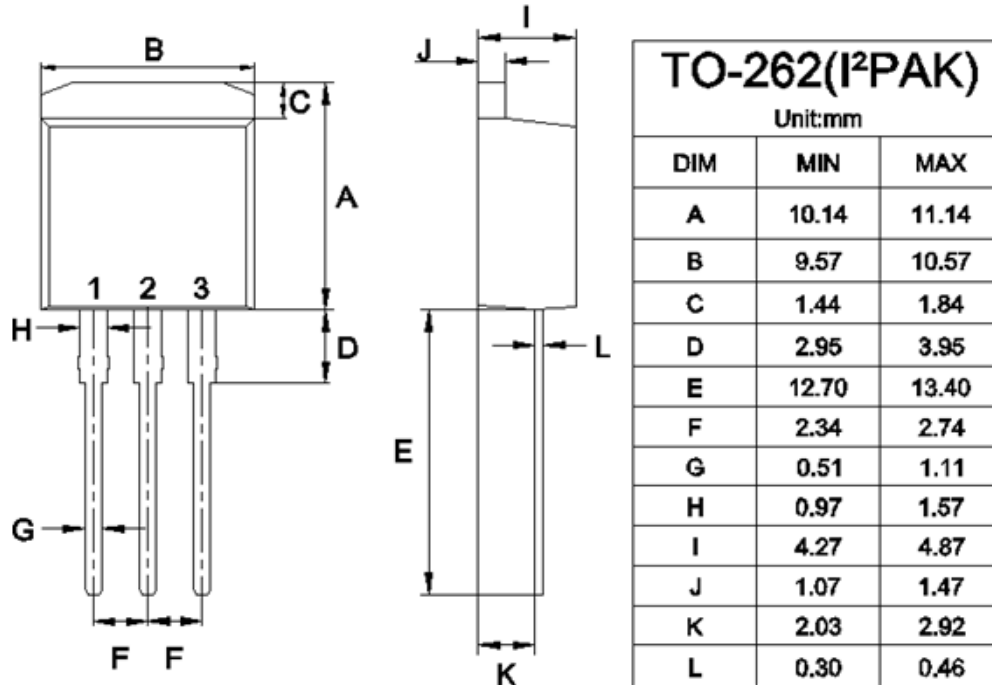
TO-220AB		
Unit:mm		
DIM	MIN	MAX
A	14.80	15.80
B	9.57	10.57
C	2.54	2.94
D	5.80	6.80
E	2.95	3.95
F	12.70	13.40
G	2.34	2.74
H	0.51	1.11
I	0.97	1.57
J	3.54 ϕ	4.14 ϕ
K	4.27	4.87
L	1.07	1.47
M	2.03	2.92
N	0.30	0.64

ITO-220 Mechanical Drawing

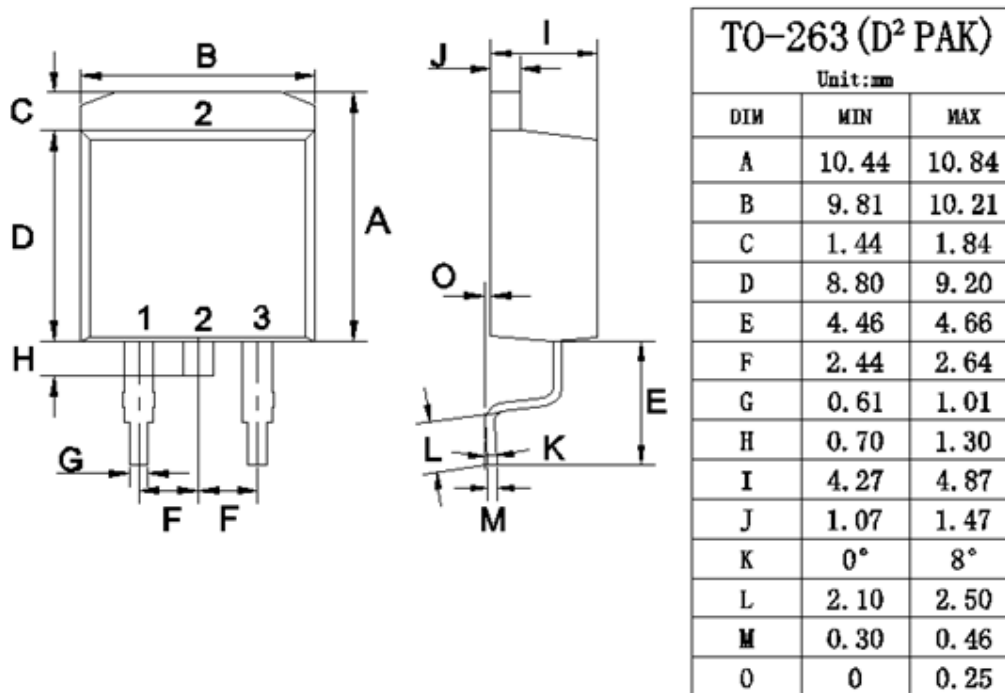


ITO-220AB Unit:mm		
DIM	MIN	MAX
A	14.50	15.50
B	9.50	10.50
C	2.50	2.90
D	6.30	7.30
E	3.30	4.30
F	13.00	14.00
G	2.35	2.75
H	0.30	0.90
I	0.90	1.50
J	3.20	3.80
K	4.24	4.84
L	2.52	2.92
M	1.09	1.49
N	0.47	0.64

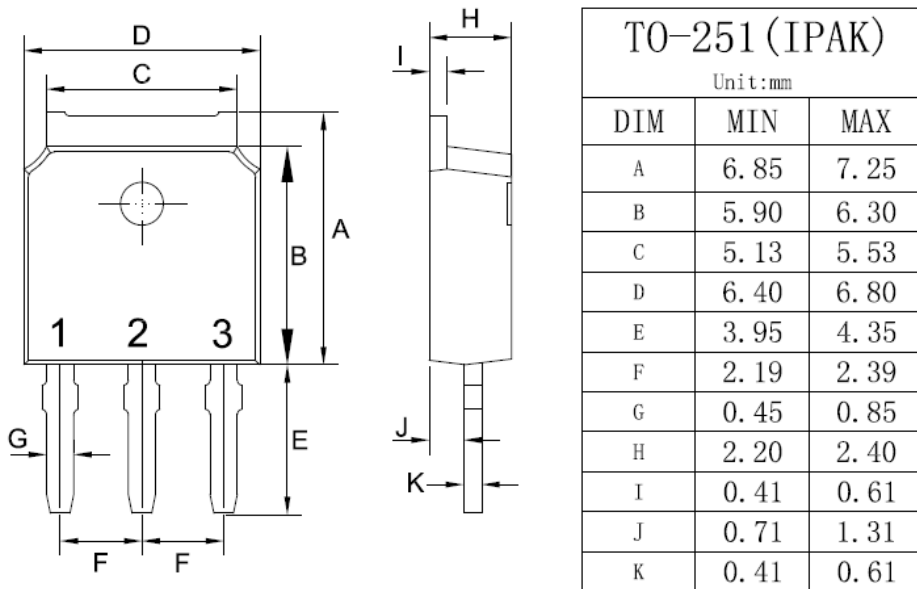
TO-262 Mechanical Drawing



TO-263 Mechanical Drawing



TO-251 Mechanical Drawing



TO-252 Mechanical Drawing

