



7N60

600V N-Channel Power MOSFET

Features

- $R_{DS(ON)} < 1.3\Omega$ @ $V_{GS} = 10V$, $I_D = 3.5A$
- 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)
600	1.3 @ $V_{GS} = 10V$	7

Mechanical Data

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

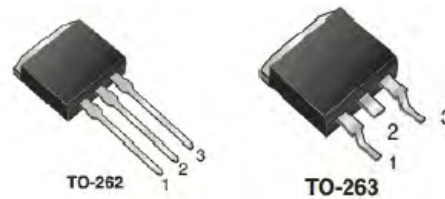
Ordering Information

Part No.	Package	Packing
DMP7N60-TU	TO-251	75pcs / Tube
DMD7N60-TR	TO-252	2.5Kpcs / 13" Reel
DMD7N60-TU	TO-252	75pcs / Tube
DMT7N60-TU	TO-220	50pcs / Tube
DMF7N60-TU	ITO-220	50pcs / Tube
DMK7N60-TU	TO-262	50pcs / Tube
DMG7N60-TU	TO-263	50pcs / Tube
DMG7N60-TR	TO-263	800pcs / 13" Reel

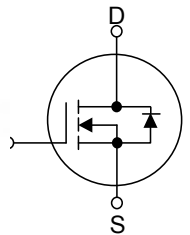


Pin Definition:

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}	600	V
Gate-Source Voltage		V _{GSS}	±30	V
Avalanche Current (Note 2)		I _{AR}	7	A
Continuous Drain Current		I _D	7	A
Pulsed Drain Current (Note 2)		I _{DM}	30.8	A
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	500	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220/TO-262/ TO-263	P _D	140	W
	ITO-220		36	W
	TO-251/TO-252		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. $L = 19.5mH$, $I_{AS} = 7A$, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting $T_J = 25^\circ C$

4. $I_{SD} \leq 7A$, $di/dt \leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ C$



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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		160	
Junction to Case	TO-220/TO-262/TO-263	θ_{JC}	1.25	$^{\circ}\text{C/W}$
	ITO-220		3.5	
	TO-251/ TO-252		2.5	

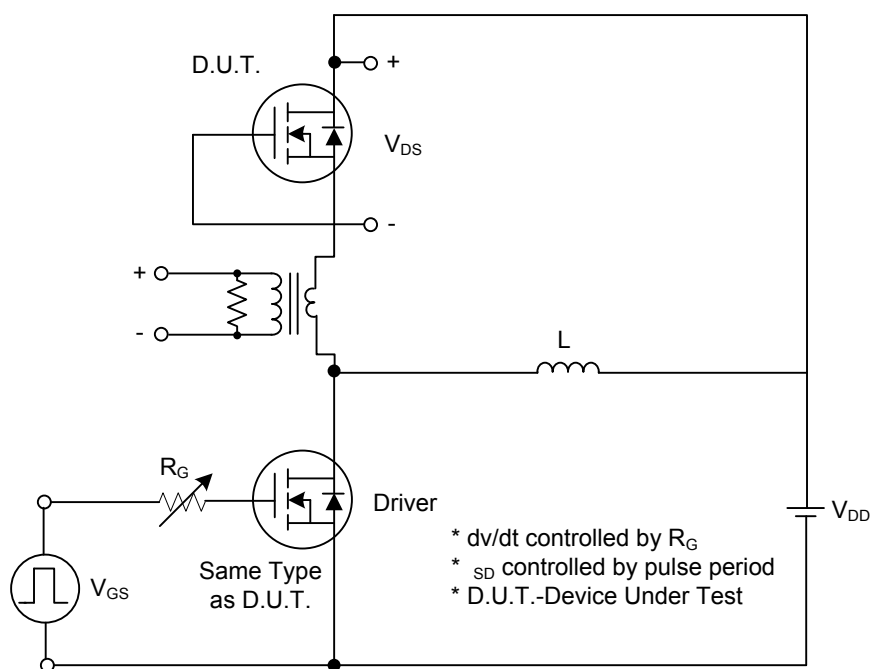
ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$, unless otherwise specified)

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} = 600V, 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		ΔBV _{DSS} /ΔT _J	I _D =250μA,Referenced to 25°C		0.67		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 =3.5A			1.3	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{DS} = 25V, V _{GS} = 0V, f = 1MHz		1200	1400	pF
Output Capacitance		C _{OSS}			125	155	pF
Reverse Transfer Capacitance		C _{RSS}			40	50	pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		t _{D(ON)}	V _{DD} = 300V, I _D =7A, R _G = 25Ω (Note 1, 2)		65	95	ns
Turn-On Rise Time		t _R			180	210	ns
Turn-Off Delay Time		t _{D(OFF)}			320	360	ns
Turn-Off Fall Time		t _F			220	260	ns
Total Gate Charge		Q _G	V _{DS} = 480V,I _D = 7A, V _{GS} = 10V (Note 1, 2)		210	230	nC
Gate-Source Charge		Q _{GS}			11		nC
Gate-Drain Charge		Q _{GD}			38		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V,I _S =7A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I _S				7	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				25	A
Reverse Recovery Time		t _{rr}	V _{GS} = 0 V, I _S = 7A,		320		ns
Reverse Recovery Charge		Q _{RR}	dI _F /dt = 100 A/ μs (Note 1)		2.4		μC

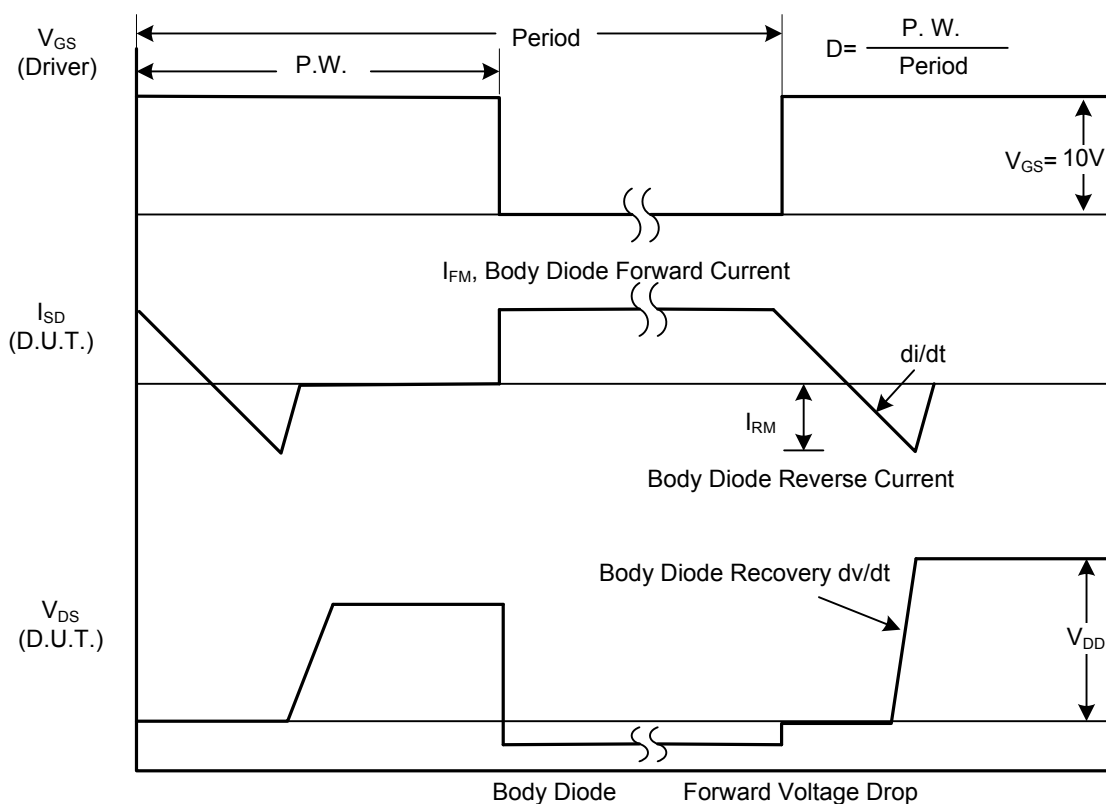
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
2. Essentially independent of operating temperature



TEST CIRCUITS AND WAVEFORMS



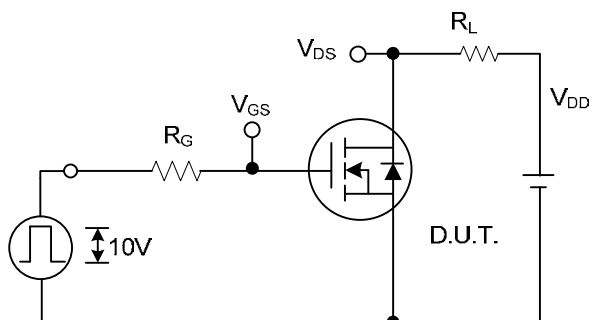
Peak Diode Recovery dv/dt Test Circuit



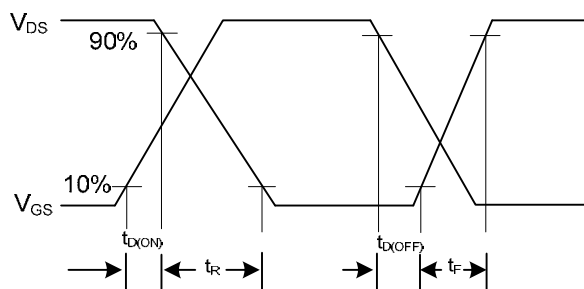
Peak Diode Recovery dv/dt Waveforms



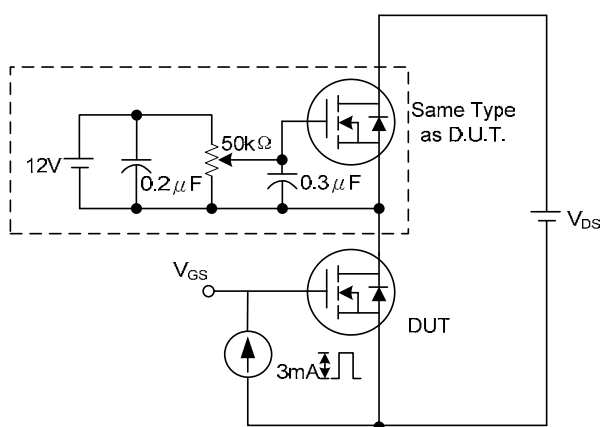
TEST CIRCUITS AND WAVEFORMS(Cont.)



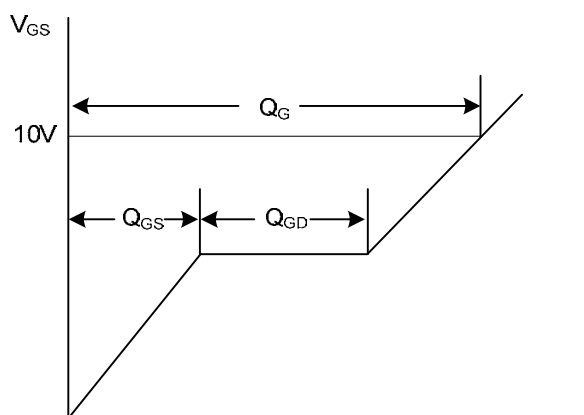
Switching Test Circuit



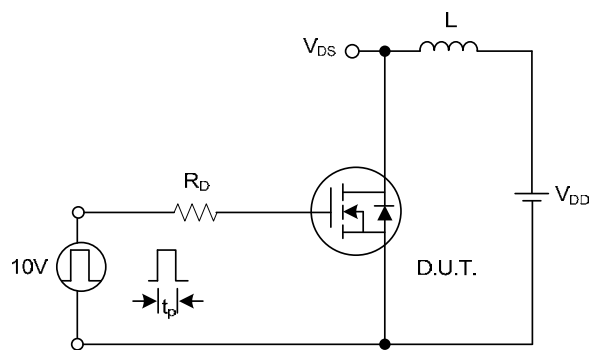
Switching Waveforms



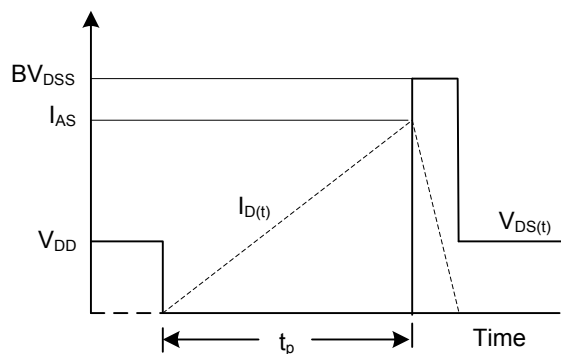
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit

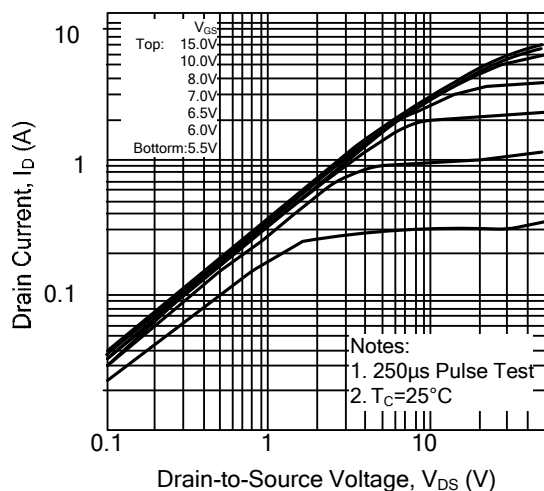


Unclamped Inductive Switching Waveforms

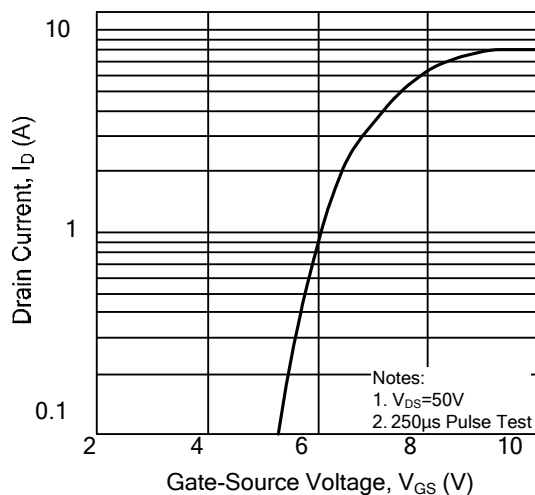


TYPICAL CHARACTERISTICS

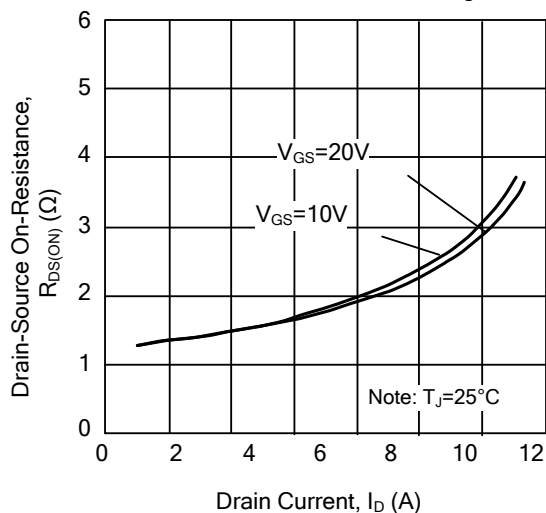
On-State Characteristics



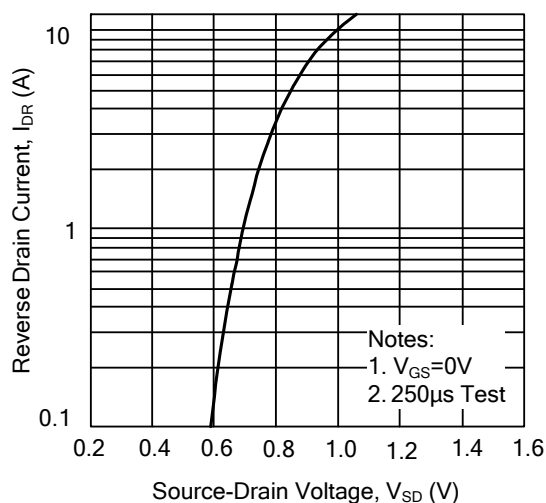
Transfer Characteristics



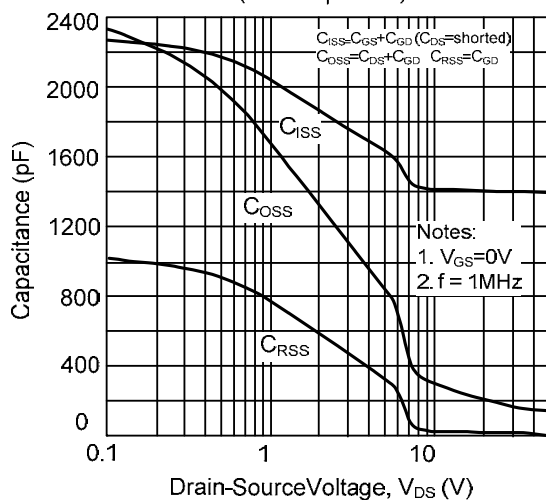
On-Resistance Variation vs. Drain Current and Gate Voltage



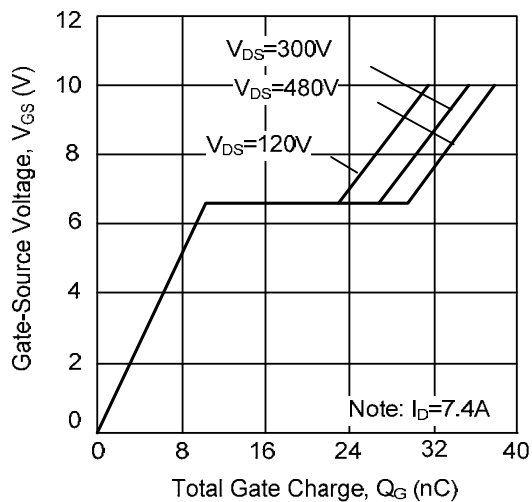
On State Current vs. Allowable Case Temperature



Capacitance Characteristics (Non-Repetitive)

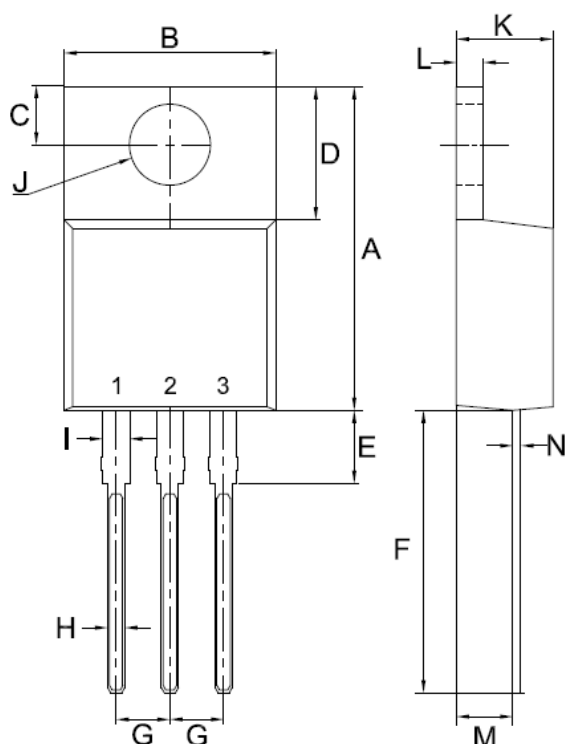


Gate Charge Characteristics



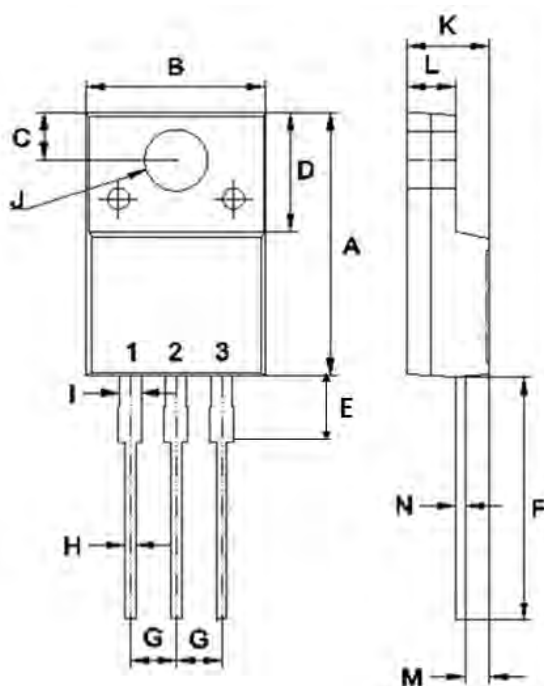


TO-220 Mechanical Drawing



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

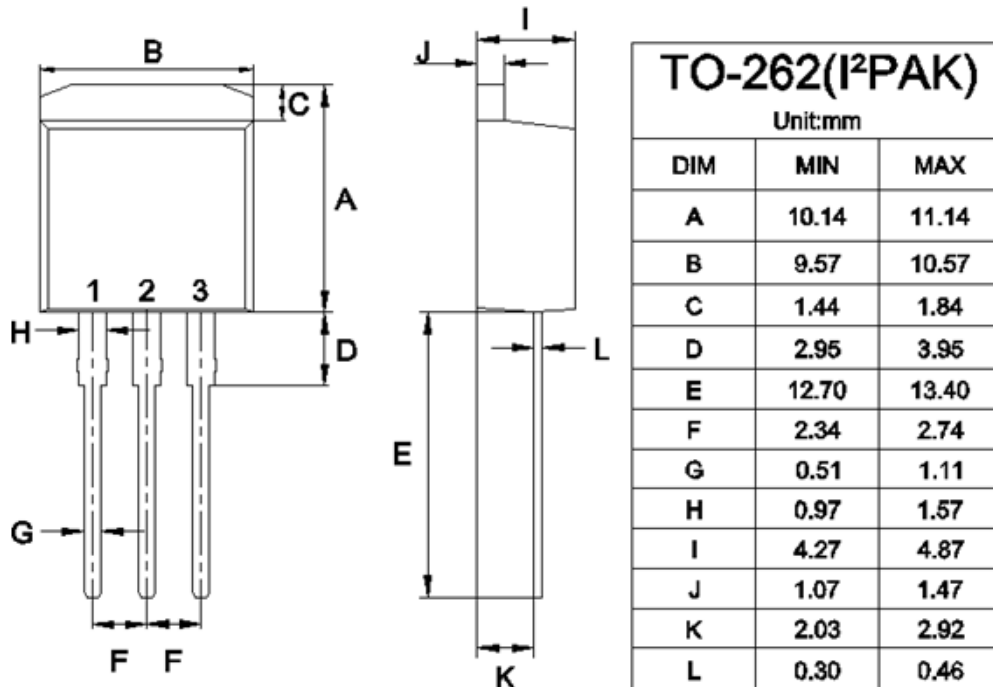
ITO-220 Mechanical Drawing



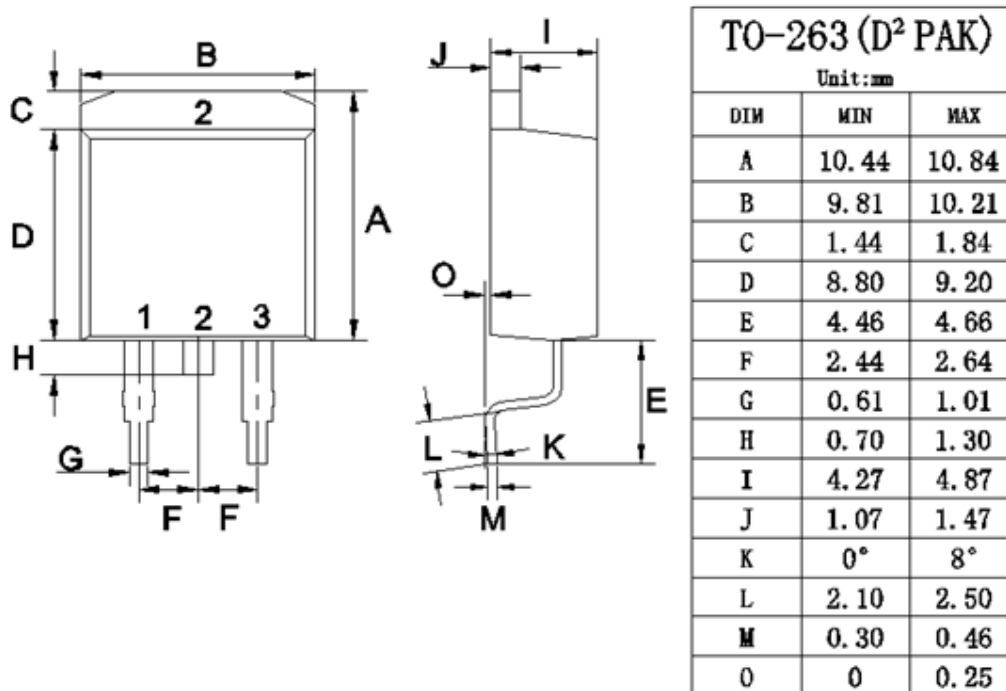
ITO-220AB Unit:mm		
DIM	MIN	MAX
A	14.50	15.50
B	9.50	10.50
C	2.50	2.90
D	6.30	7.30
E	3.30	4.30
F	13.00	14.00
G	2.35	2.75
H	0.30	0.90
I	0.90	1.50
J	3.20	3.80
K	4.24	4.84
L	2.52	2.92
M	1.09	1.49
N	0.47	0.64



TO-262 Mechanical Drawing

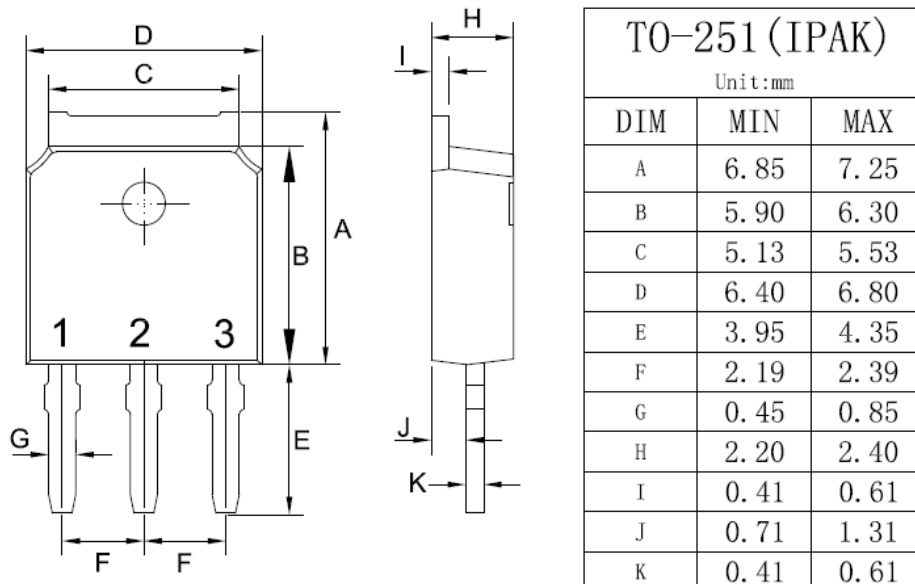


TO-263 Mechanical Drawing





TO-251 Mechanical Drawing



TO-252 Mechanical Drawing

