



# 7N65

## 650V N-Channel Power MOSFET

### Features

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

### Mechanical Data

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

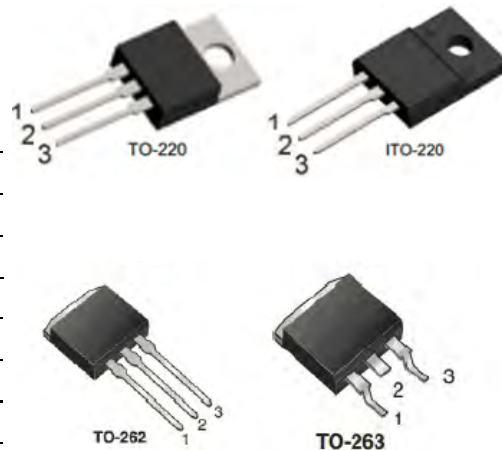
Part No.	Package	Packing
DMP7N65-TU	TO-251	75pcs / Tube
DMD7N65-TR	TO-252	2.5Kpcs / 13" Reel
DMD7N65-TU	TO-252	75pcs / Tube
DMT7N65-TU	TO-220	50pcs / Tube
DMF7N65-TU	ITO-220	50pcs / Tube
DMK7N65-TU	TO-262	50pcs / Tube
DMG7N65-TU	TO-263	50pcs / Tube
DMG7N65-TR	TO-263	800pcs / 13" Reel

### PRODUCT SUMMARY

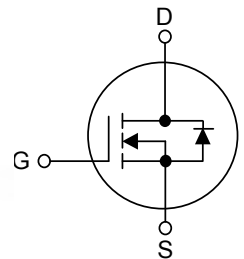
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
650	1.5 @ $V_{GS} = 10V$	7

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	
Continuous Drain Current	$I_D$	7	A	
Pulsed Drain Current (Note 2)	$I_{DM}$	28	A	
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	435	mJ
Power Dissipation	TO-220/TO-262/TO-263	$P_D$	142	W
	ITO-220		48	W
	TO-251/TO-252		32	W
Junction Temperature	$T_J$	+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  $T_J$

3.  $L = 30mH$ ,  $I_{AS} = 5.25A$ ,  $V_{DD} = 50V$ ,  $R_G = 25 \Omega$ , Starting  $T_J = 25^\circ C$



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## 650V N-Channel Power MOSFET

### 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	

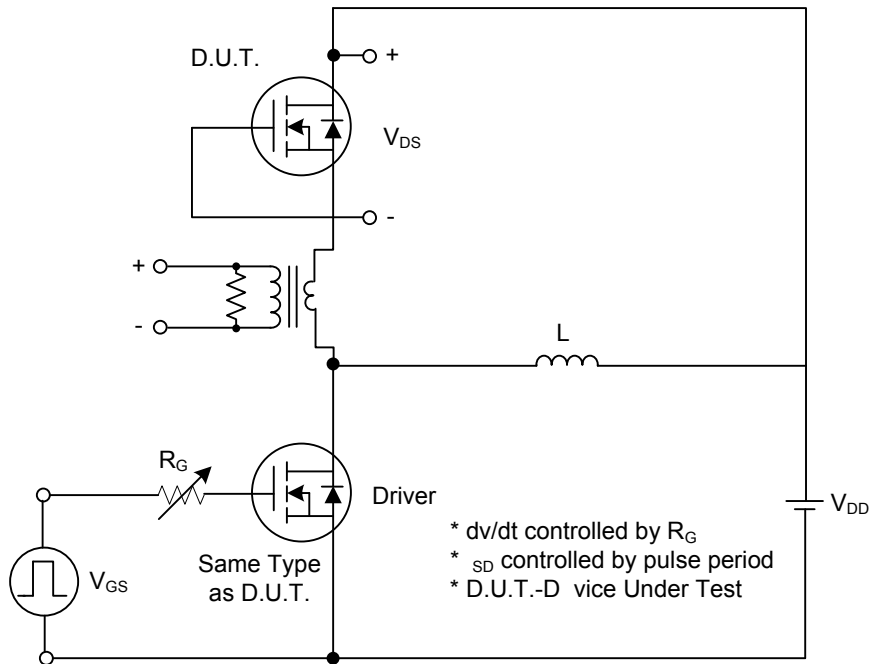
### ELECTRICAL CHARACTERISTICS (T<sub>C</sub>=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	650			V
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V			1	μA
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>	V <sub>GS</sub> =30V, V <sub>DS</sub> =0V			100	nA
	Reverse		V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V			-100	nA
Breakdown Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	I <sub>D</sub> =250μA, Referenced to 25°C		0.67		V/°C
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage		V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 3.5A		1.35	1.5	Ω
<b>DYNAMIC CHARACTERISTICS</b>							
Input Capacitance		C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0 MHz		1210	1400	pF
Output Capacitance		C <sub>OSS</sub>			140	180	pF
Reverse Transfer Capacitance		C <sub>RSS</sub>			40	50	pF
<b>SWITCHING CHARACTERISTICS</b>							
Turn-On Delay Time		t <sub>D(ON)</sub>	V <sub>DD</sub> =300V, I <sub>D</sub> =7A, R <sub>G</sub> =25Ω (Note 1, 2)		50	70	ns
Turn-On Rise Time		t <sub>R</sub>			150	180	ns
Turn-Off Delay Time		t <sub>D(OFF)</sub>			380	410	ns
Turn-Off Fall Time		t <sub>F</sub>			180	220	ns
Total Gate Charge		Q <sub>G</sub>	V <sub>DS</sub> =520V, I <sub>D</sub> =7A, V <sub>GS</sub> =10V (Note 1, 2)		29	38	nC
Gate-Source Charge		Q <sub>GS</sub>			9		nC
Gate-Drain Charge		Q <sub>GD</sub>			19		nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>							
Drain-Source Diode Forward Voltage		V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> = 7A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I <sub>S</sub>				7	A
Maximum Pulsed Drain-Source Diode Forward Current		I <sub>SM</sub>				28	A
Reverse Recovery Time		t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =7.0A, dI <sub>F</sub> /dt =100 A/μs (Note 1)		490		ns
Reverse Recovery Charge		Q <sub>RR</sub>			3.2		μC

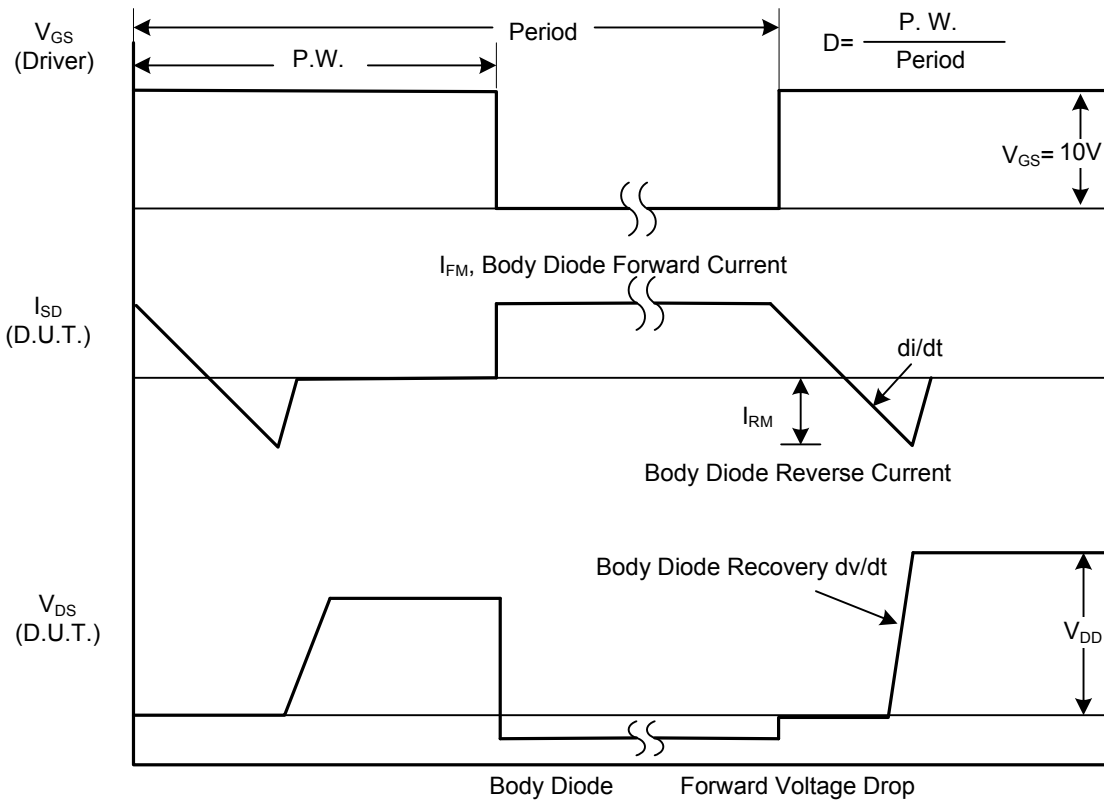
- Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.  
 2. Essentially independent of operating temperature.



### TEST CIRCUITS AND WAVEFORMS



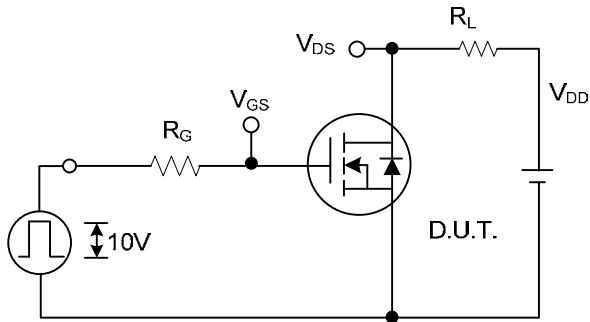
**Peak Diode Recovery  $dv/dt$  Test Circuit**



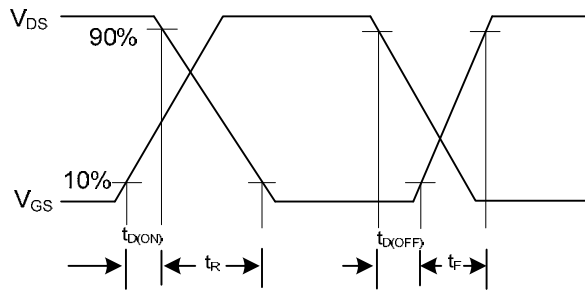
**Peak Diode Recovery  $dv/dt$  Waveforms**



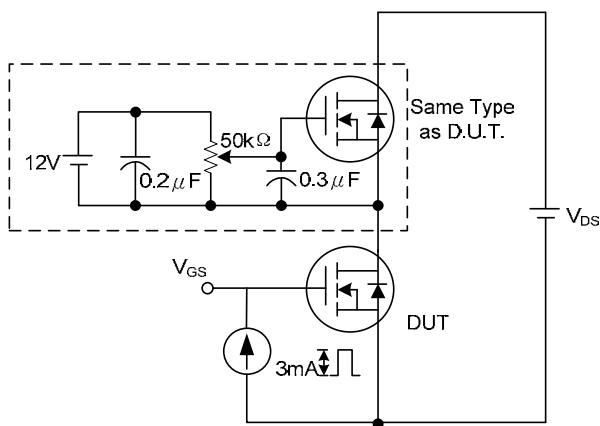
### TEST CIRCUITS AND WAVEFORMS(Cont.)



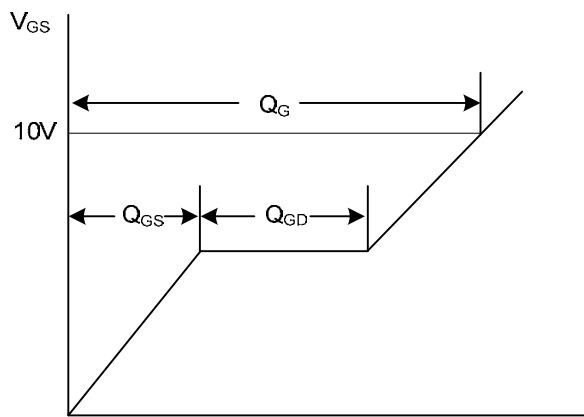
Switching Test Circuit



Switching Waveforms

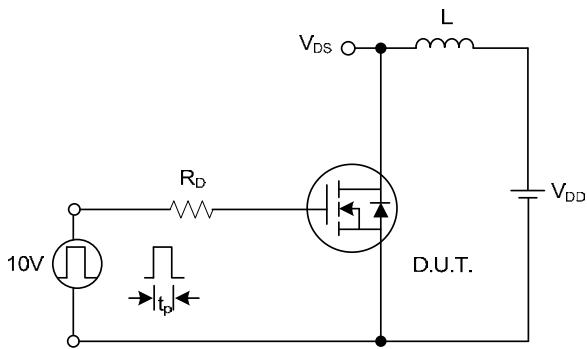


Gate Charge Test Circuit

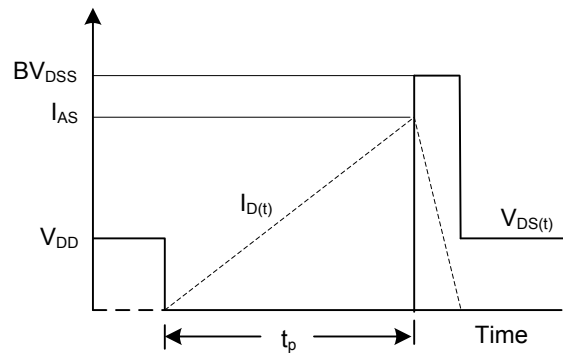


Charge

Gate Charge Waveform



Unclamped Inductive Switching Test Circuit

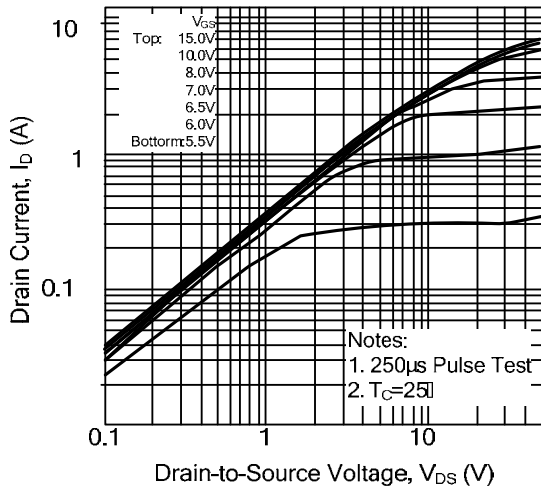


Unclamped Inductive Switching Waveforms

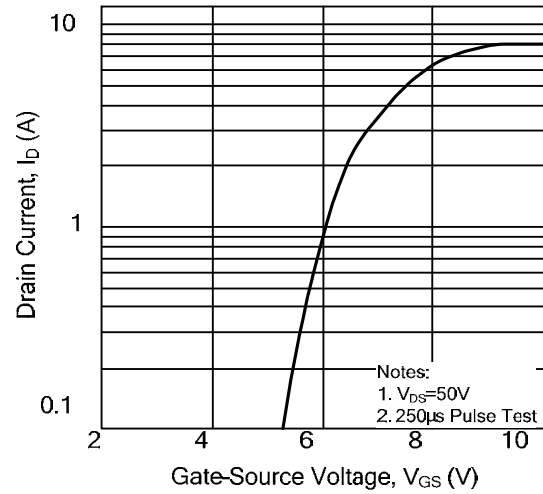


### TYPICAL CHARACTERISTICS

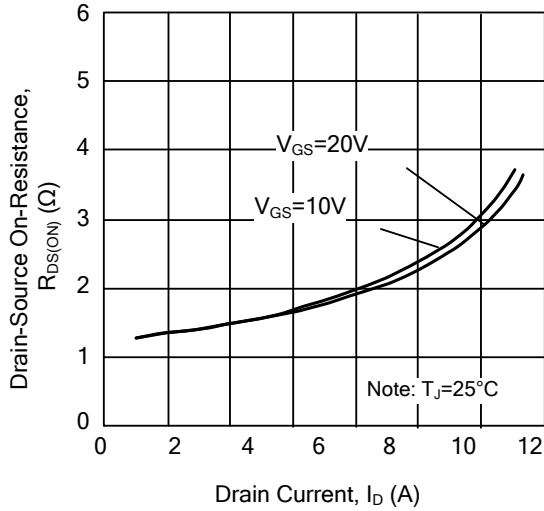
On-State Characteristics



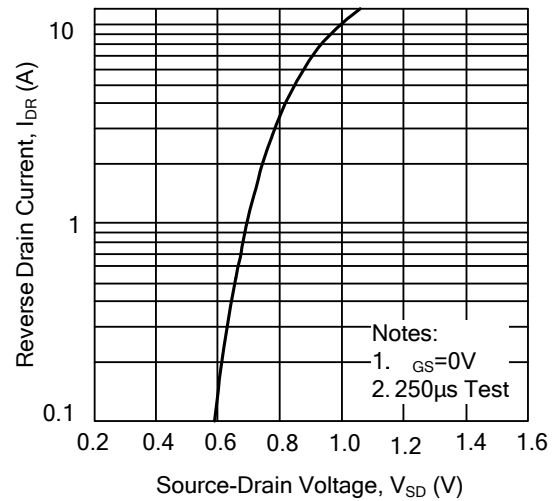
Transfer Characteristics



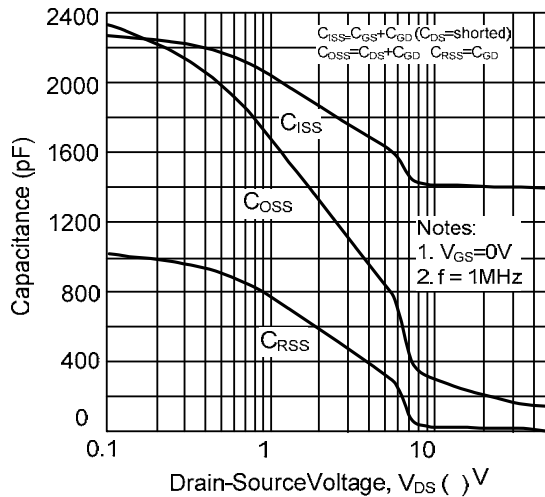
On-Resistance Variation vs. Drain Current and Gate Voltage



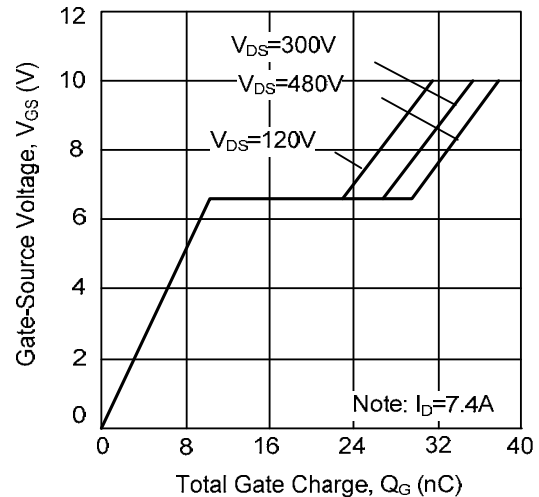
On State Current vs. Allowable Case Temperature



Capacitance Characteristics (Non-Repetitive)

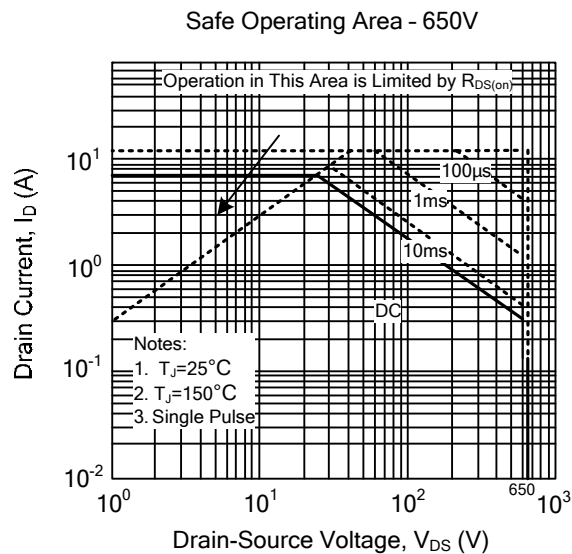
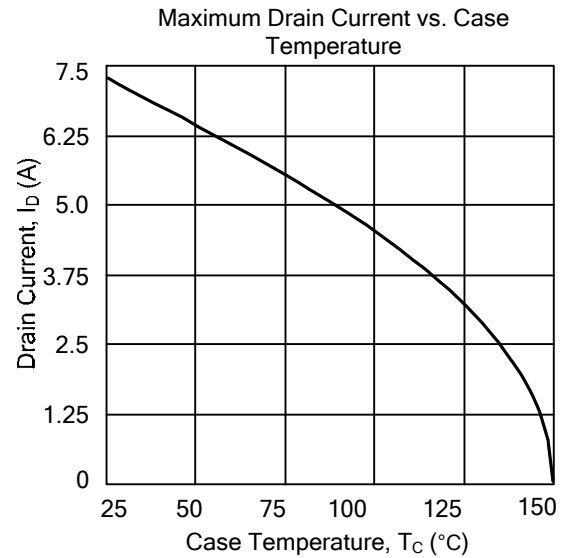
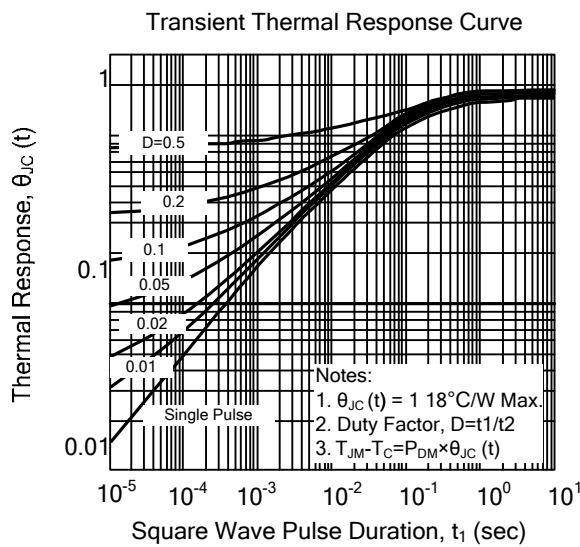
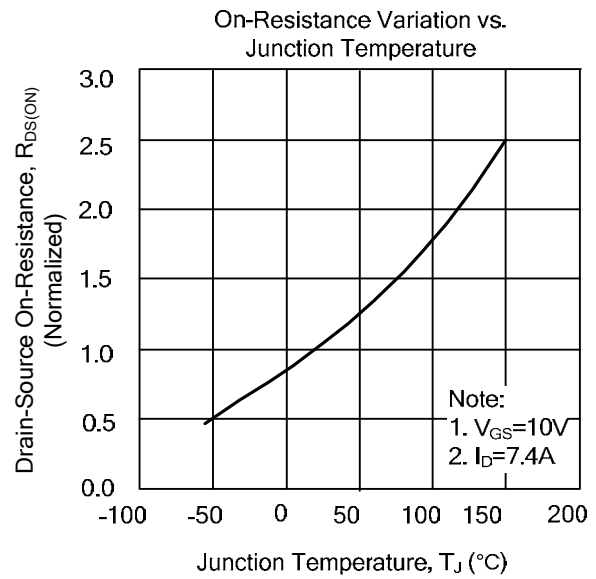
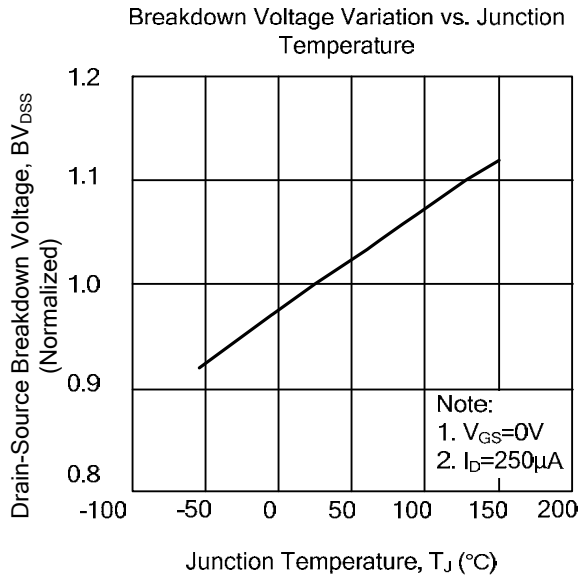


Gate Charge Characteristics



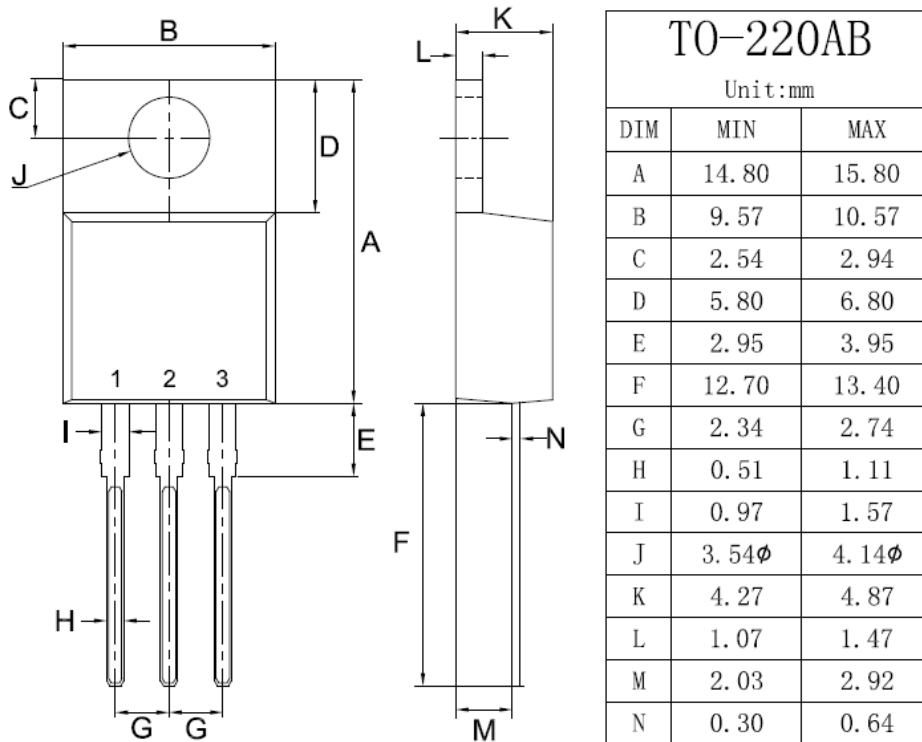


### TYPICAL CHARACTERISTICS

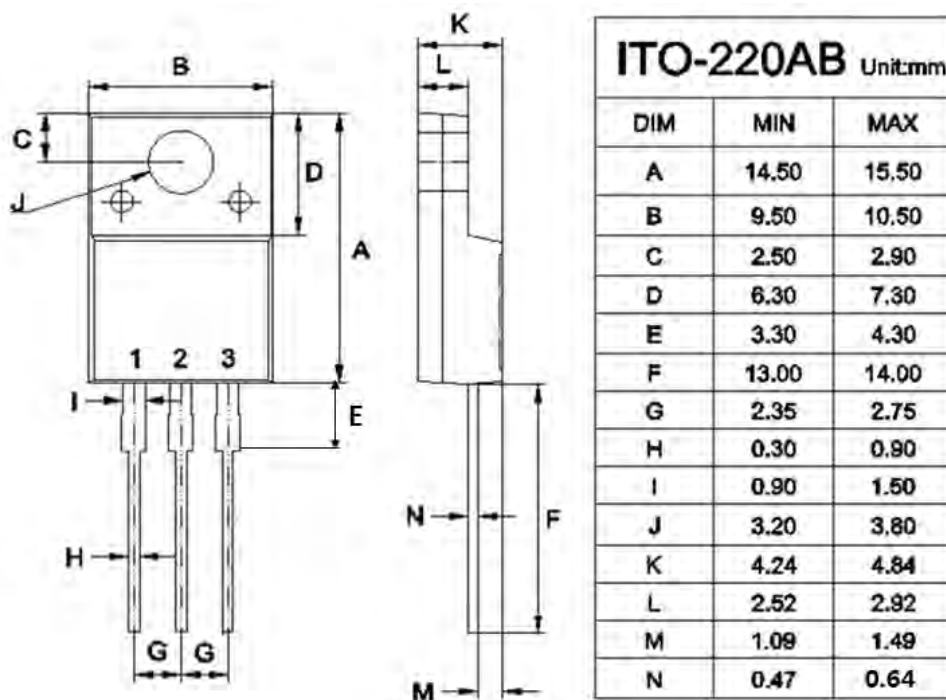




### TO-220 Mechanical Drawing

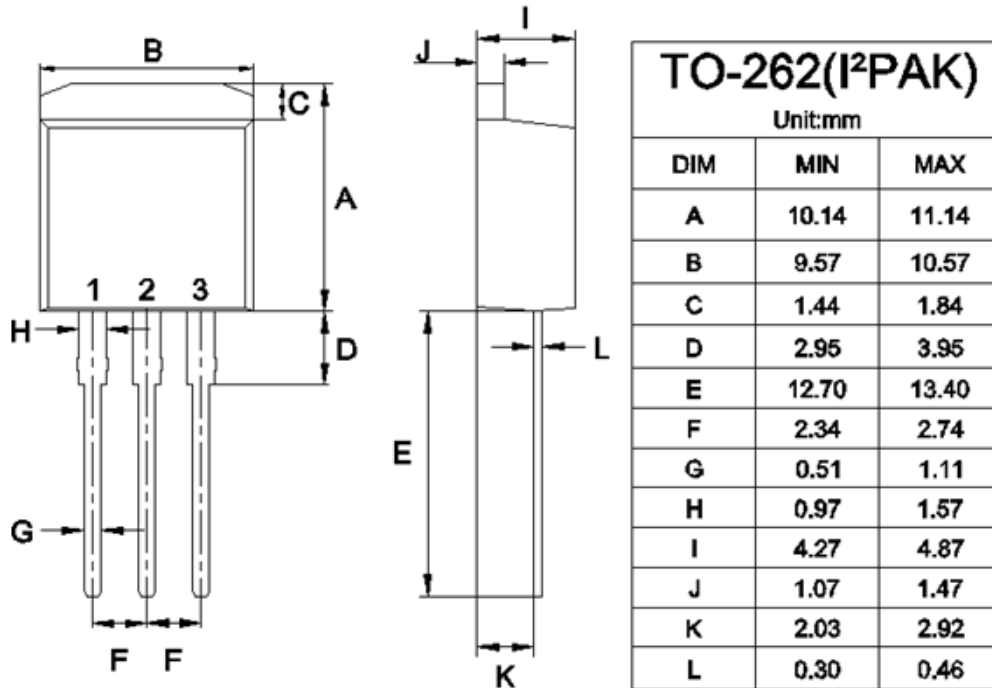


### ITO-220 Mechanical Drawing

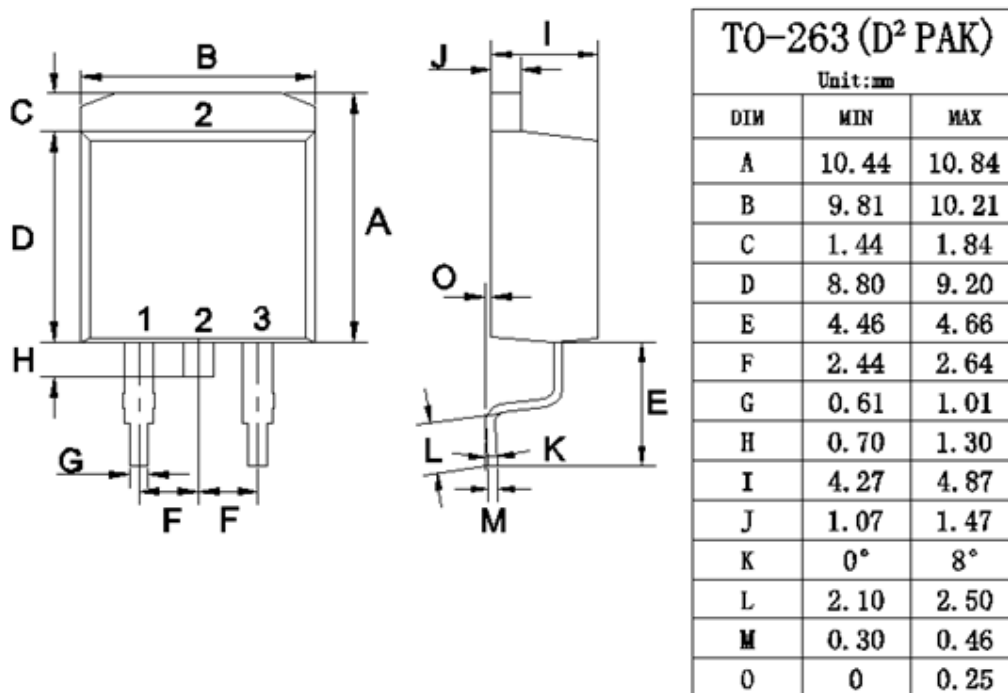




**TO-262 Mechanical Drawing**



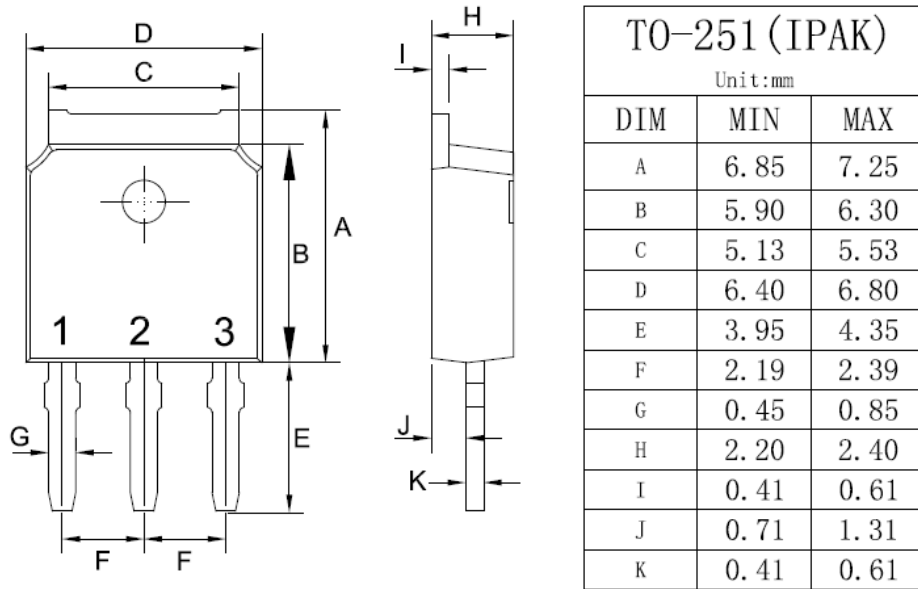
**TO-263 Mechanical Drawing**







**TO-251 Mechanical Drawing**



**TO-252 Mechanical Drawing**

