

Features

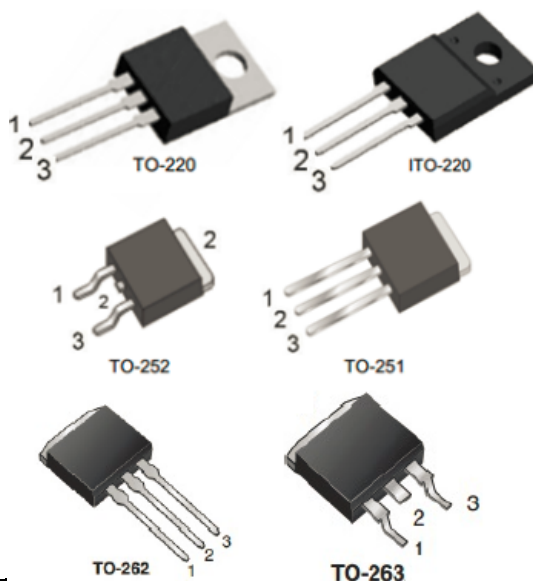
- $R_{DS(ON)} < 1.3\Omega$ @ $V_{GS} = 10V$, $I_D = 3.5A$
- Fast switching capability
- Lead free in compliance with EU RoHS directive.
- Green molding compound

Mechanical Data

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

Ordering Information

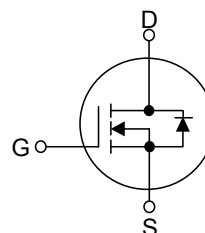
Part No.	Package	Packing
7N60P	TO-251	75pcs / Tube
7N60D	TO-252	75pcs / Tube
7N60T	TO-220	50pcs / Tube
7N60F	ITO-220	50pcs / Tube
7N60K	TO-262	50pcs / Tube
7N60G	TO-263	50pcs / Tube



Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram



Maximum Ratings $T_A = 25^\circ C$ 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	$^\circ C$
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. $L = 19.5mH$, $I_{AS} = 7A$, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting $T_J = 25^\circ C$

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



THERMAL DATA

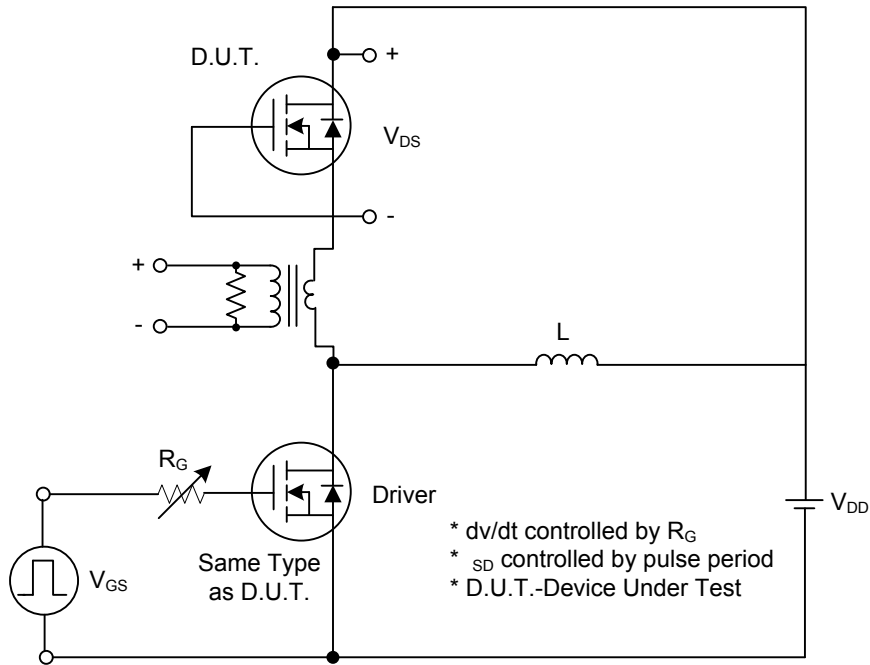
PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/ITO-220	θ_{JA}	62.5	°C/W
	TO-262/TO-263			
	TO-251/ TO-252		160	
Junction to Case	TO-220/TO-262/TO-263	θ_{JC}	1.25	°C/W
	ITO-220		3.5	
	TO-251/ TO-252		2.5	

ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

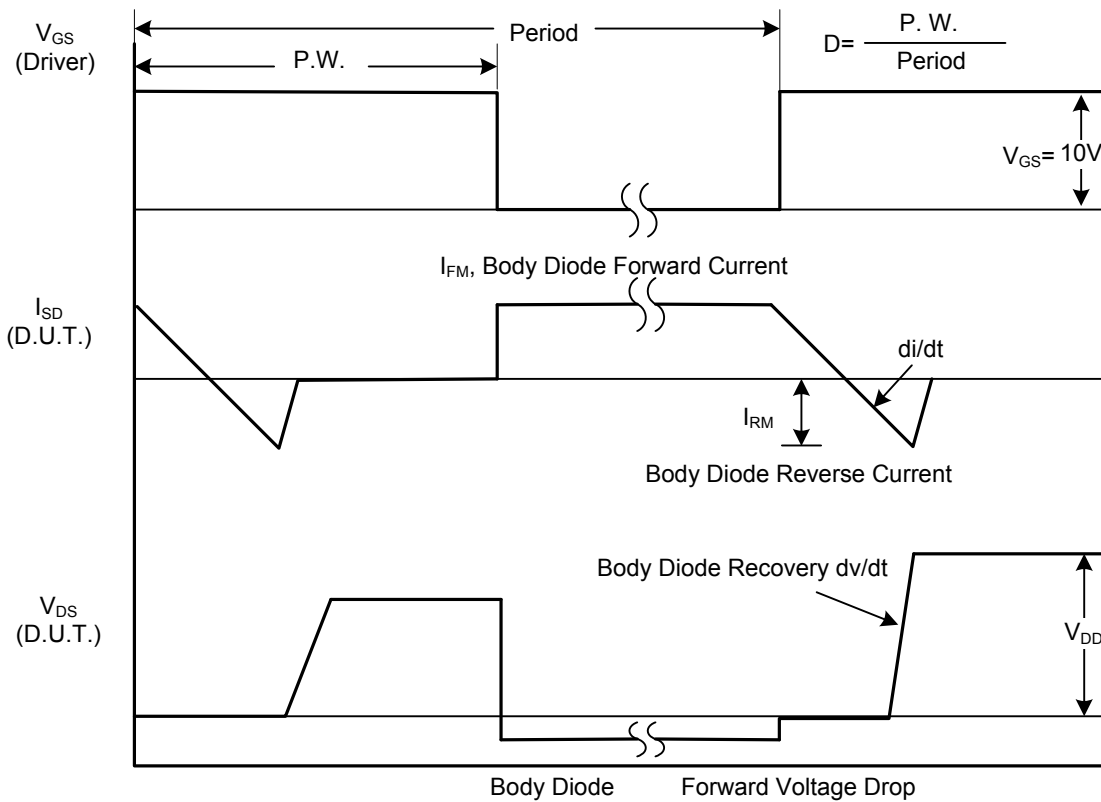
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} = 0V, I _D = 250μA	600			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} = 600V, V _{GS} = 0V			1	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} = 30V, V _{DS} = 0V			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}	dl _F /dt = 100 A/ μs (Note 1)		2.4		μC

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

TEST CIRCUITS AND WAVEFORMS

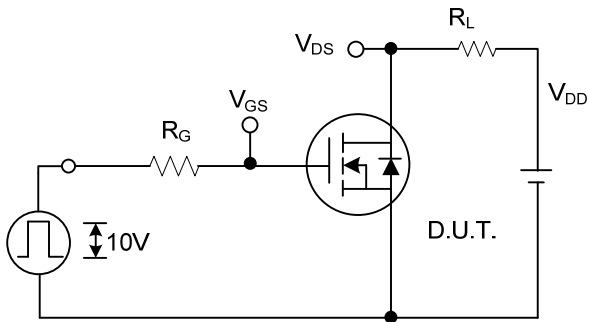


Peak Diode Recovery dv/dt Test Circuit

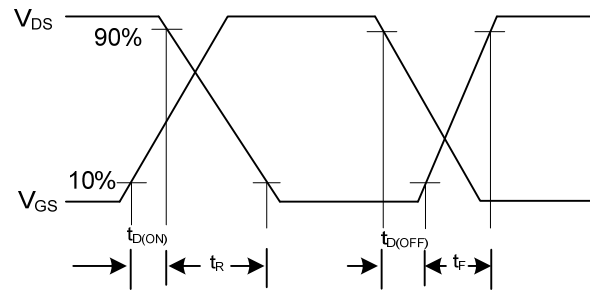


Peak Diode Recovery dv/dt Waveforms

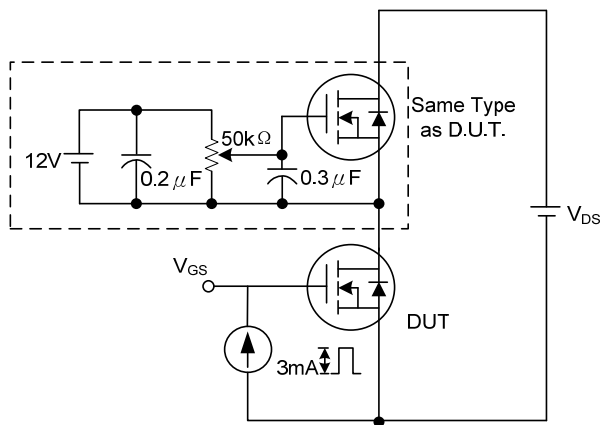
TEST CIRCUITS AND WAVEFORMS(Cont.)



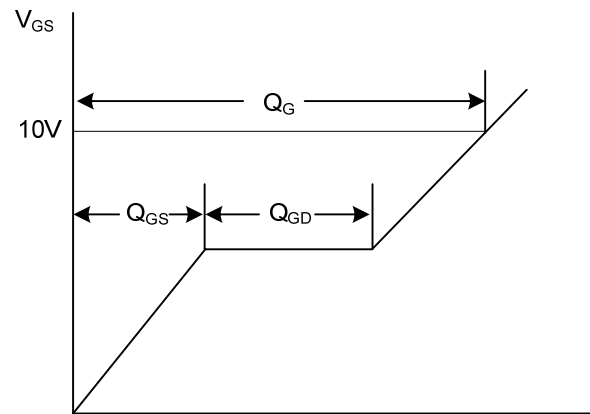
Switching Test Circuit



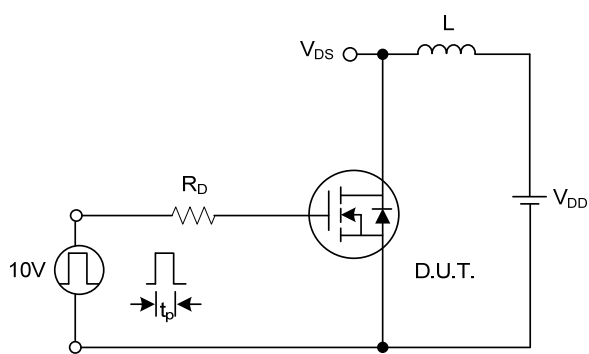
Switching Waveforms



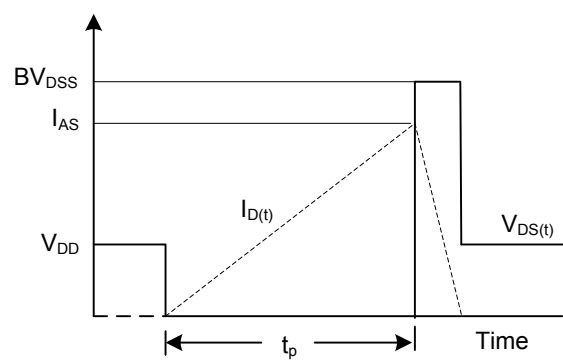
Gate Charge Test Circuit



Gate Charge Waveform



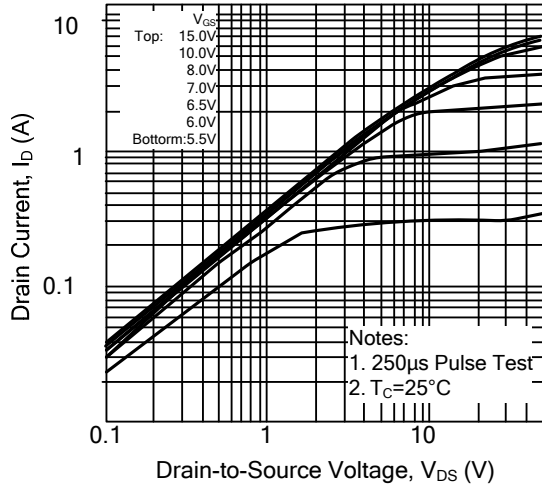
Unclamped Inductive Switching Test Circuit



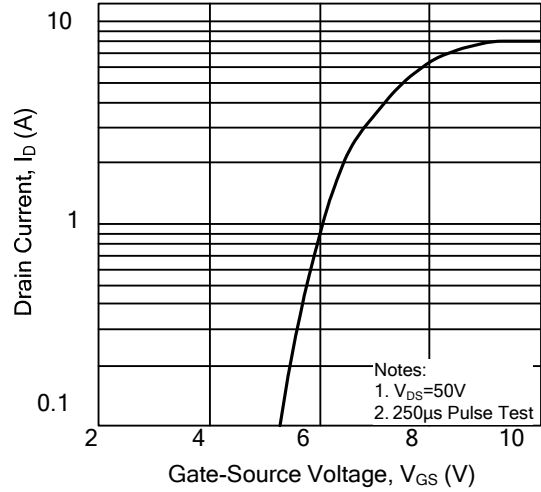
Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS

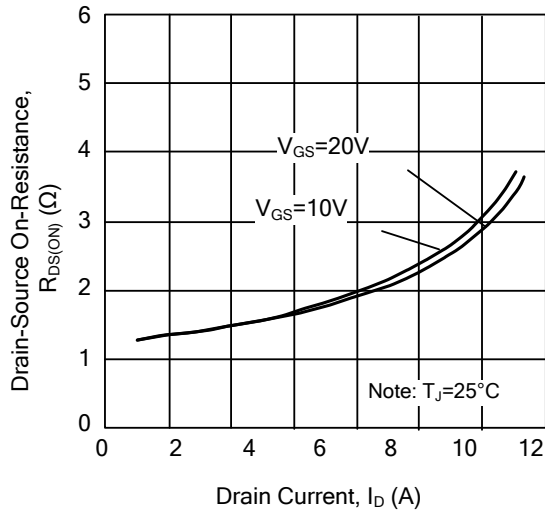
On-State Characteristics



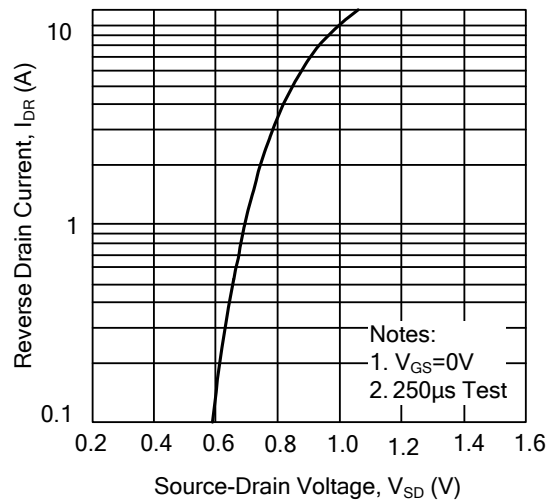
Transfer Characteristics



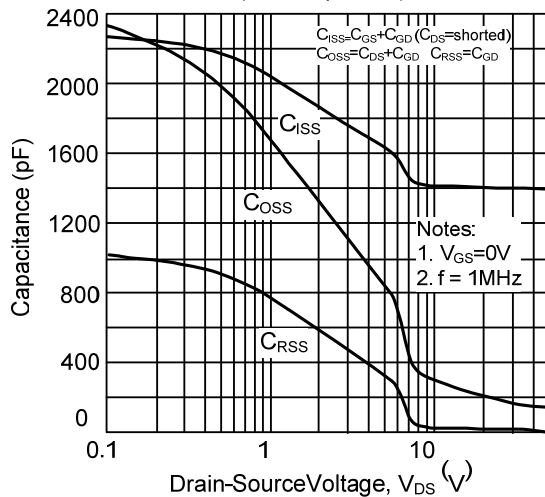
On-Resistance Variation vs. Drain Current and Gate Voltage



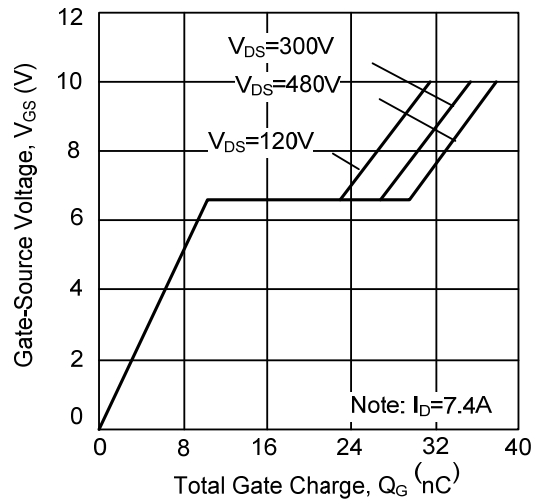
On State Current vs. Allowable Case Temperature



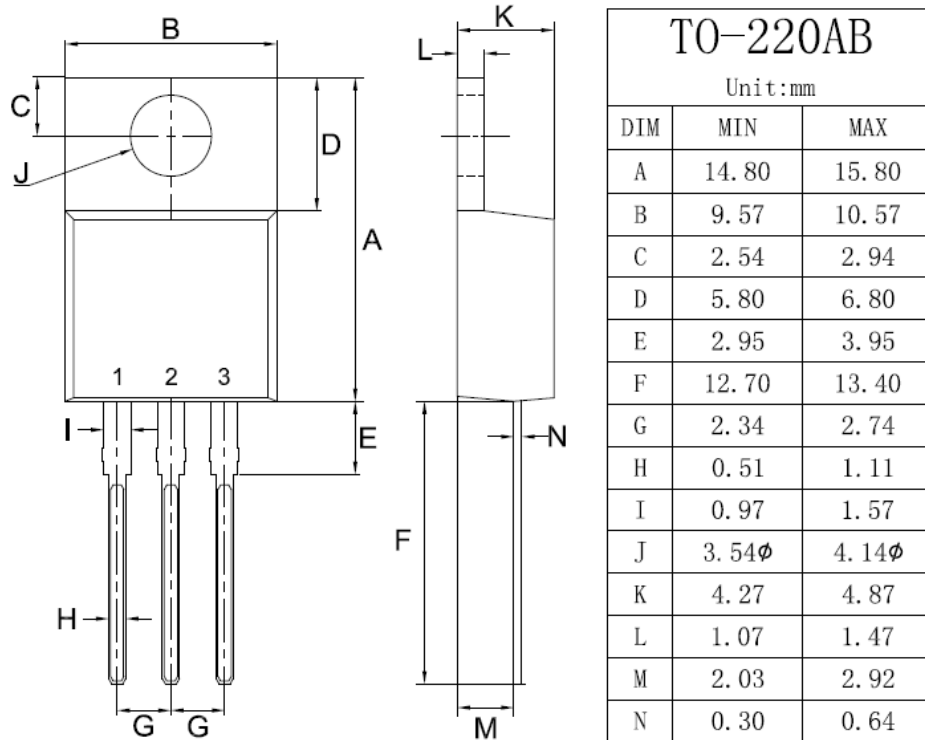
Capacitance Characteristics (Non-Repetitive)



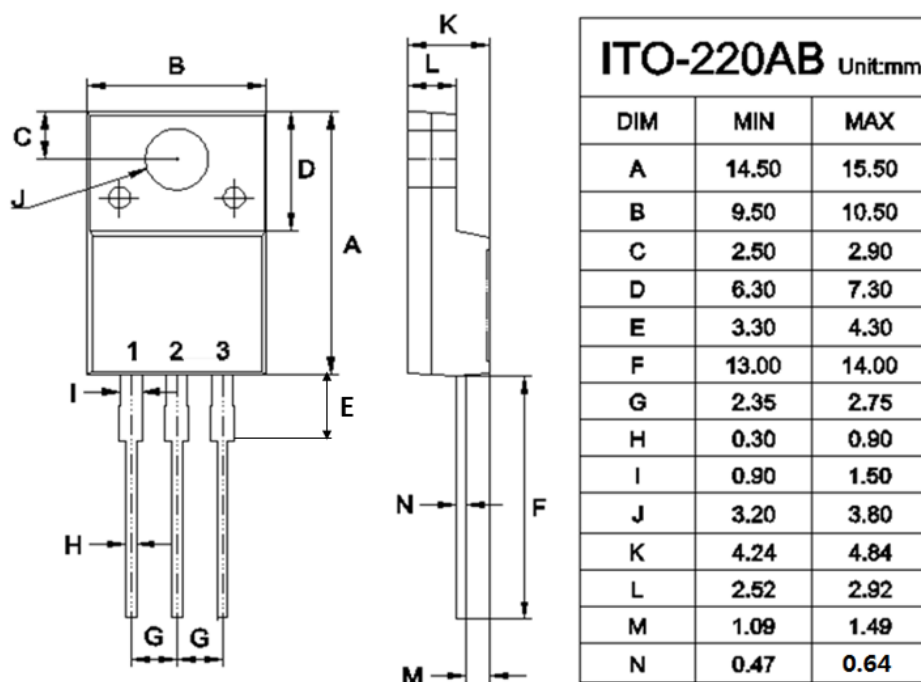
Gate Charge Characteristics



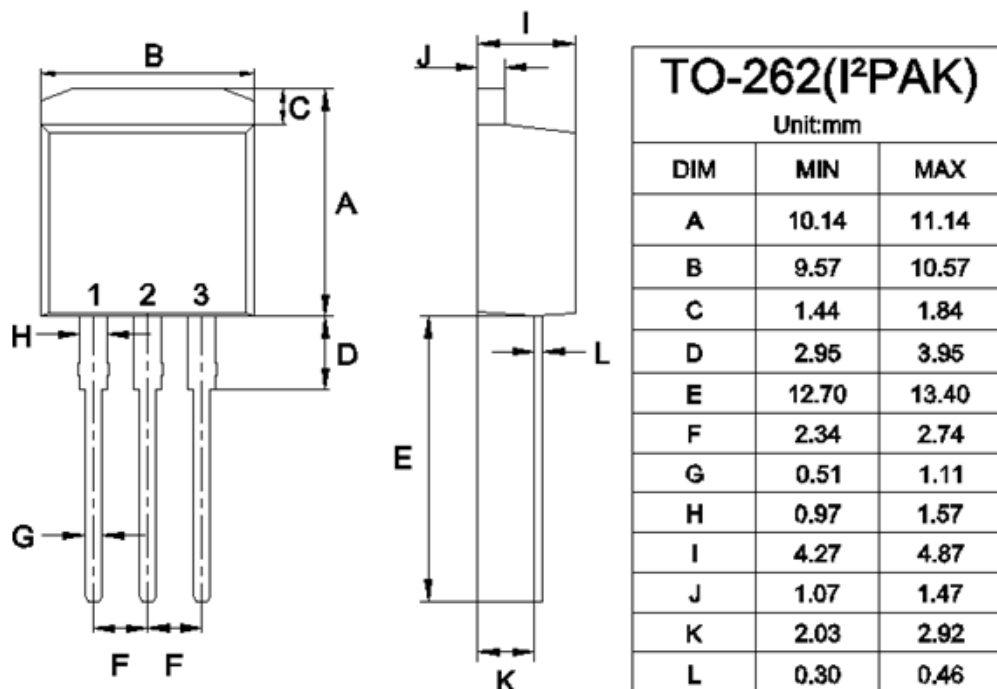
TO-220 Mechanical Drawing



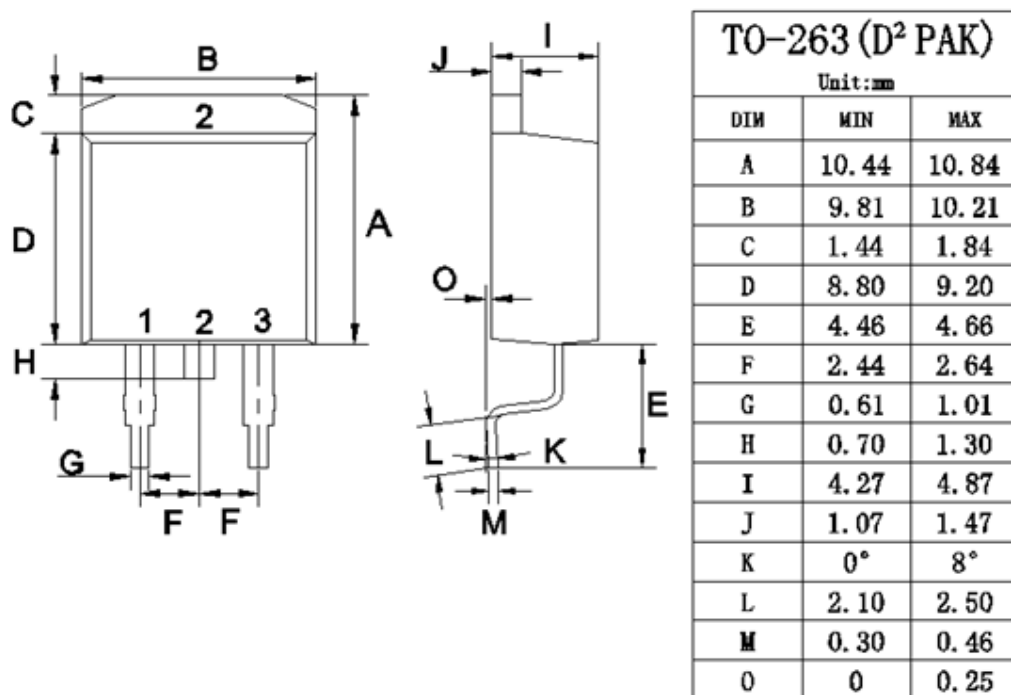
ITO-220 Mechanical Drawing



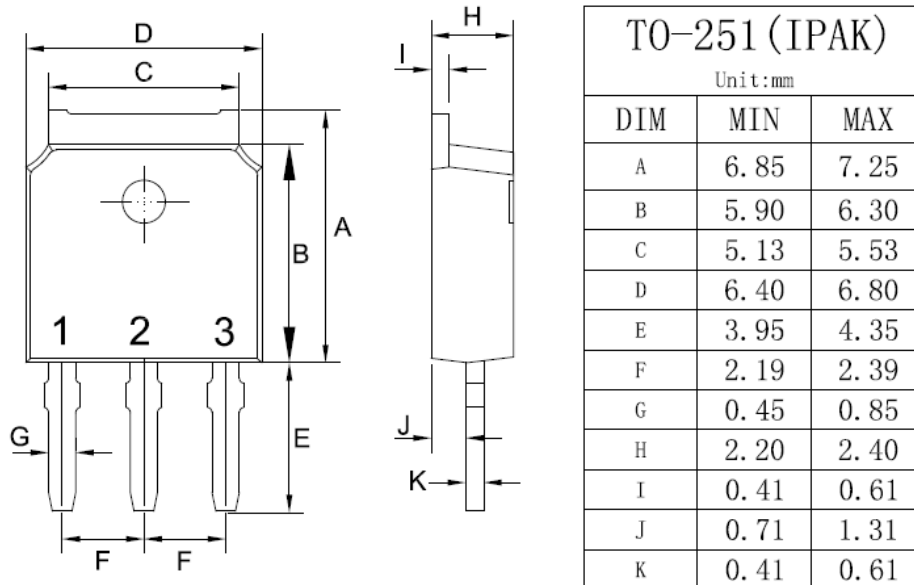
TO-262 Mechanical Drawing



TO-263 Mechanical Drawing



TO-251 Mechanical Drawing



TO-252 Mechanical Drawing

