

Features

- $R_{DS(ON)} < 2.4\Omega$ @ $V_{GS} = 10V$
- Fast switching capability
- Lead free in compliance with EU RoHS directive.
- Green molding compound

PRODUCT SUMMARY

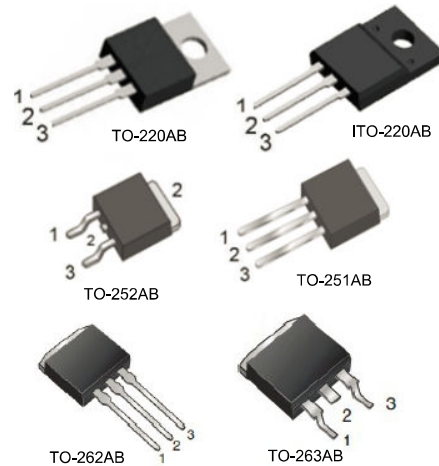
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
600	2.4 @ $V_{GS} = 10V$	4

Mechanical Data

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

Ordering Information

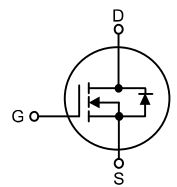
Part No.	Package	Packing
AU4N60S	TO-251AB	75pcs / Tube
AD4N60S	TO-252AB	2.5Kpcs / 13" Reel
AT4N60S	TO-220AB	50pcs / Tube
AF4N60S	ITO-220AB	50pcs / Tube
AK4N60S	TO-262AB	50pcs / Tube
AG4N60S	TO-263AB	800pcs / 13" Reel



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
Continuous Drain Current		I_D	4.0	A
Pulsed Drain Current (Note 2)		I_{DM}	16	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	217	mJ
Power Dissipation	TO-220AB/TO-262AB/TO-263AB	P_D	106	W
	ITO-220AB		44	W
	TO-251AB/TO-252AB		77	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. $L = 30mH$, $I_{AS} = 3.7A$, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting $T_J = 25^\circ C$

THERMAL DATA

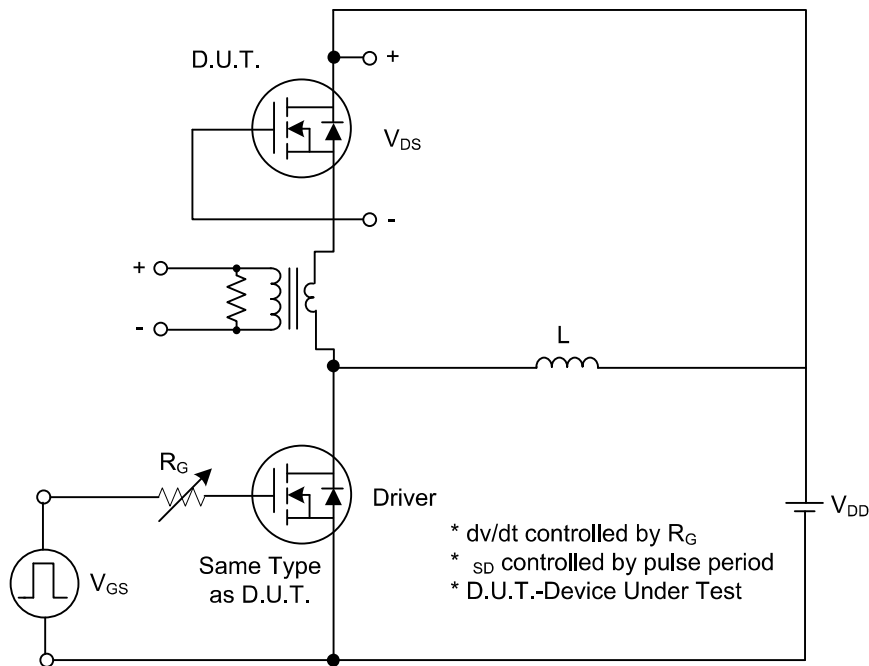
PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220AB/ITO-220AB TO-262AB/TO-263AB	θ_{JA}	62.5	°C/W
	TO-251AB/TO-252AB		110	
	TO-220AB TO-262AB/TO-263AB		2.35	
Junction to Case	ITO-220AB	θ_{JC}	5.5	°C/W
	TO-251AB/TO-252AB		2.9	

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

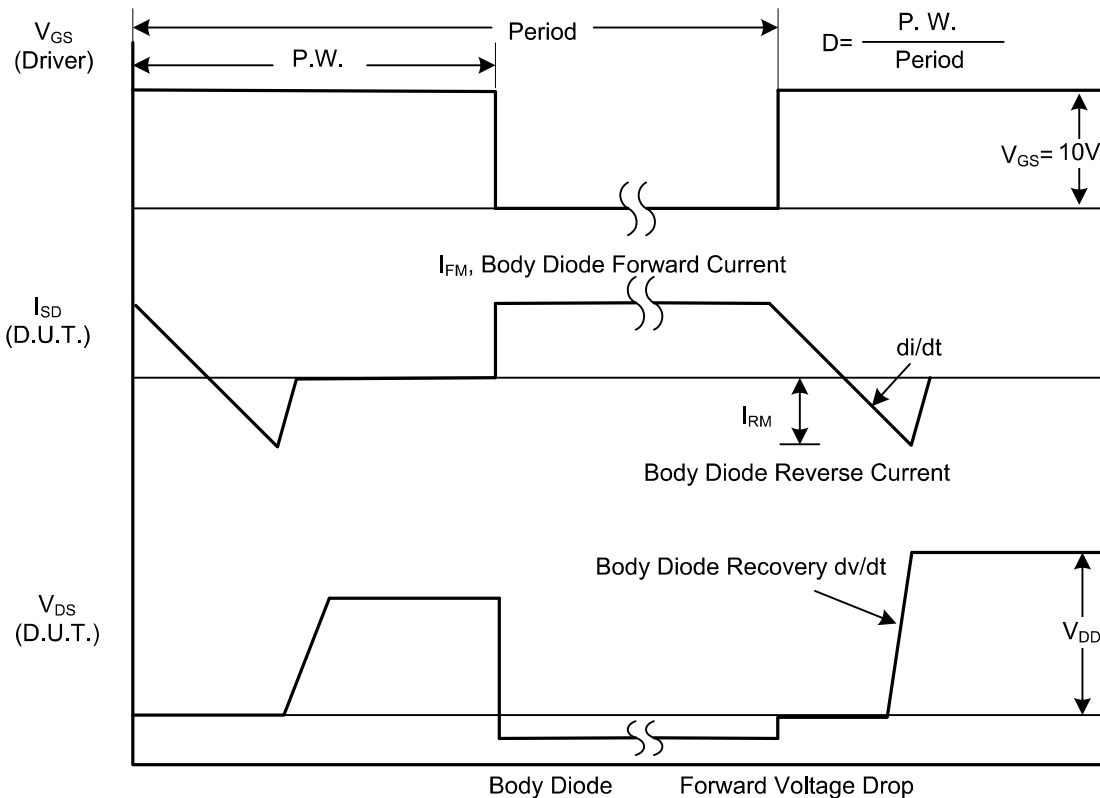
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	600			V
Drain-Source Leakage Current		I_{DSS}	$V_{DS} = 600V, V_{GS} = 0V$			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	$V_{GS} = 30V, V_{DS} = 0V$			100	nA
	Reverse		$V_{GS} = -30V, V_{DS} = 0V$			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS}=10V, I_D = 2.0A$		1.9	2.4	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1MHz$		550		pF
Output Capacitance		C_{OSS}			80		pF
Reverse Transfer Capacitance		C_{RSS}			30		pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	$V_{DD} = 300V, I_D = 4.0A,$ $R_G = 25\Omega$ (Note 1, 2)		35		ns
Turn-On Rise Time		t_R			80		ns
Turn-Off Delay Time		$t_{D(OFF)}$			160		ns
Turn-Off Fall Time		t_F			120		ns
Total Gate Charge		Q_G	$V_{DS}= 480V, I_D= 4.0A,$ $V_{GS}= 10V$ (Note 1, 2)		80		nC
Gate-Source Charge		Q_{GS}			5		nC
Gate-Drain Charge		Q_{GD}			20		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage		V_{SD}	$V_{GS}=0V, I_S=4A$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I_S				4	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				16	A
Reverse Recovery Time		t_{rr}	$V_{GS} = 0V, I_S = 4A,$		400		ns
Reverse Recovery Charge		Q_{RR}	$di/dt = 100 A/\mu s$ (Note 1)		1.7		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

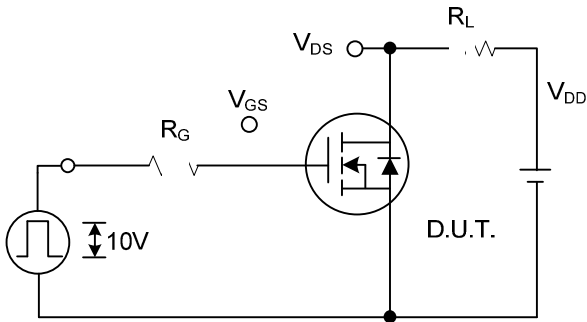


Peak Diode Recovery dv/dt Test Circuit

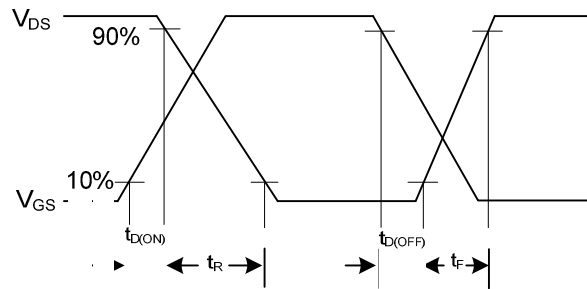


Peak Diode Recovery dv/dt Waveforms

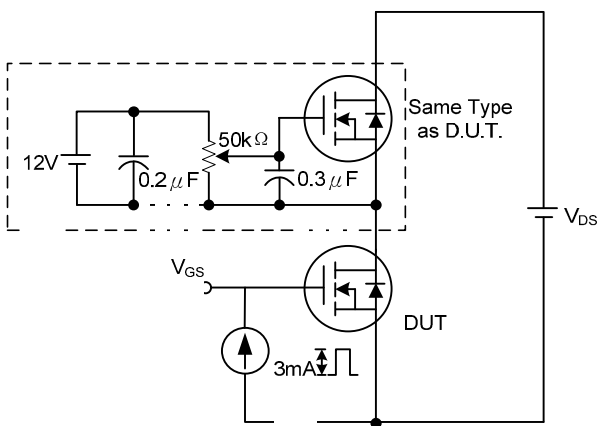
TEST CIRCUITS AND WAVEFORMS(Cont.)



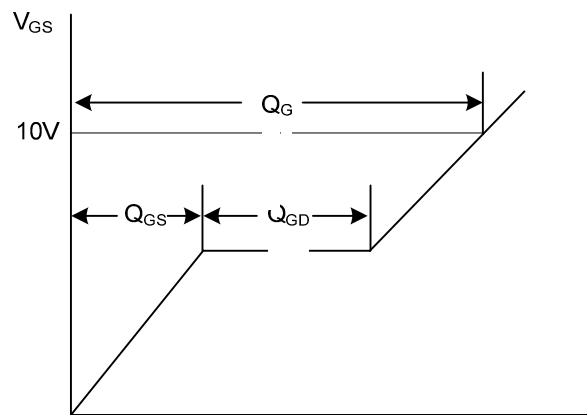
Switching Test Circuit



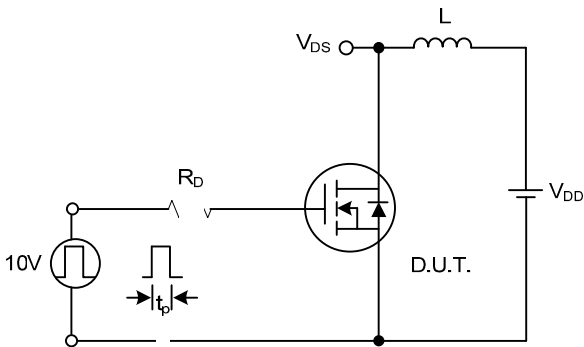
Switching Waveforms



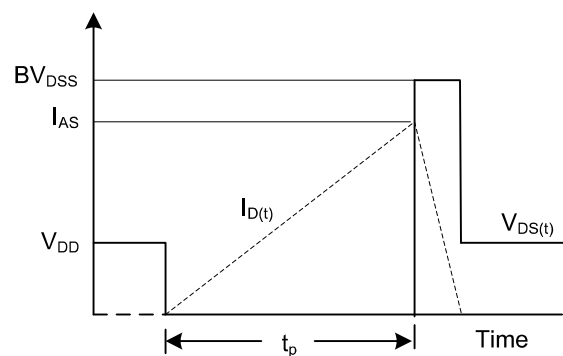
Gate Charge Test Circuit



Gate Charge Waveform



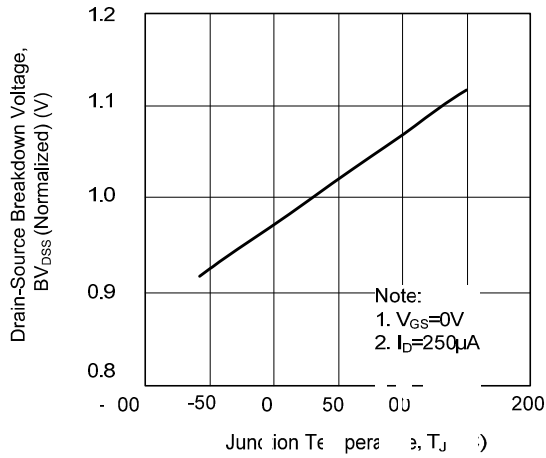
Unclamped Inductive Switching Test Circuit



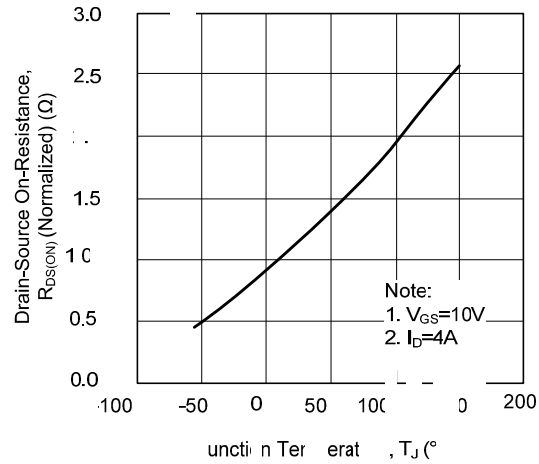
Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS

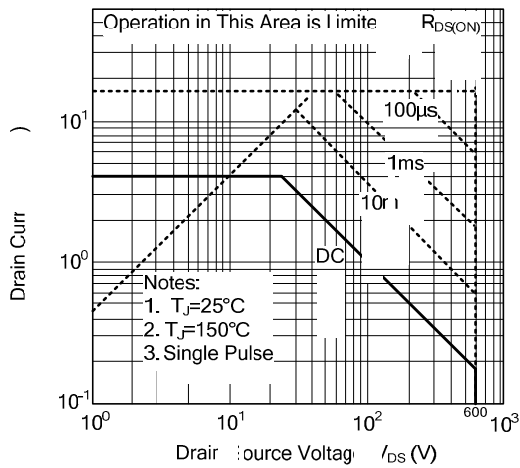
Breakdown Voltage Variation vs. Temperature



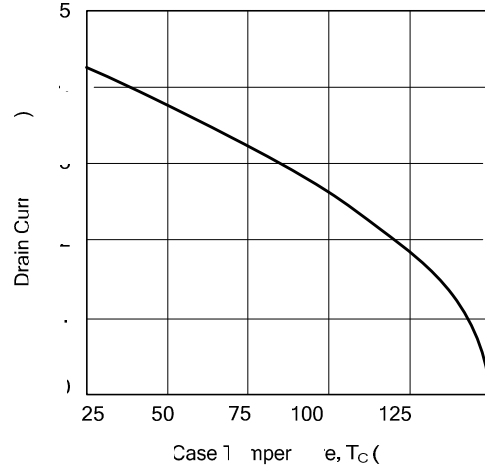
On-Resistance Junction Temperature



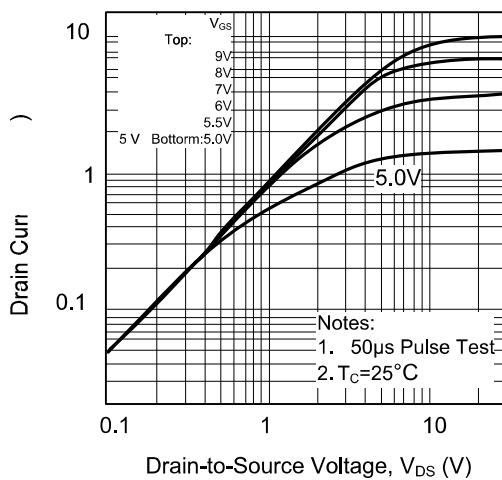
Safe Operating Area - 600V



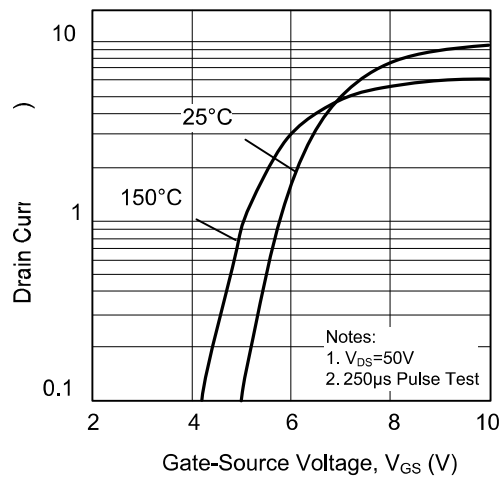
Maximum Drain Current vs. Case Temperature



On-State Characteristics

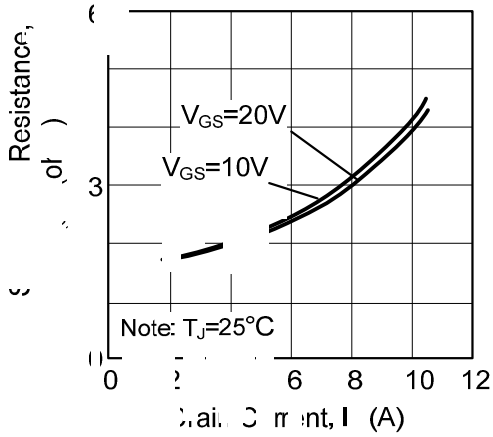


Transfer Characteristics

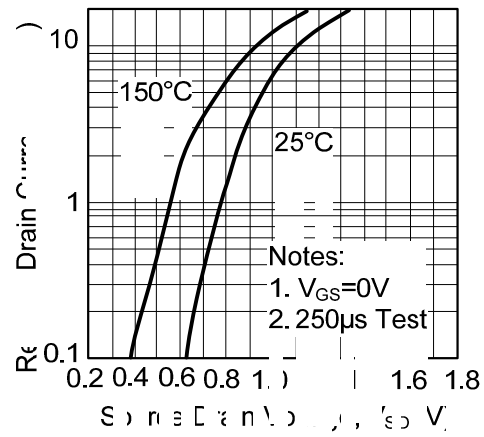


TYPICAL CHARACTERISTICS(Cont.)

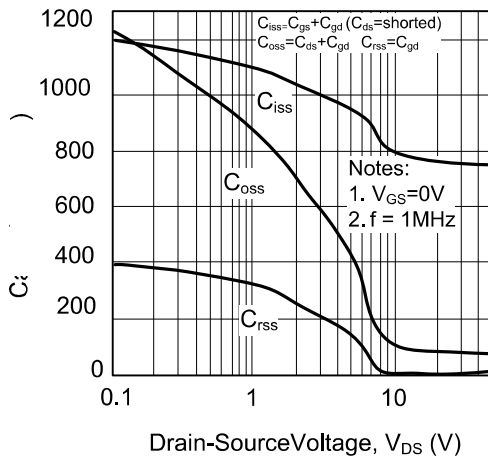
On-Resistance Variation vs. Drain Current and Gate Voltage



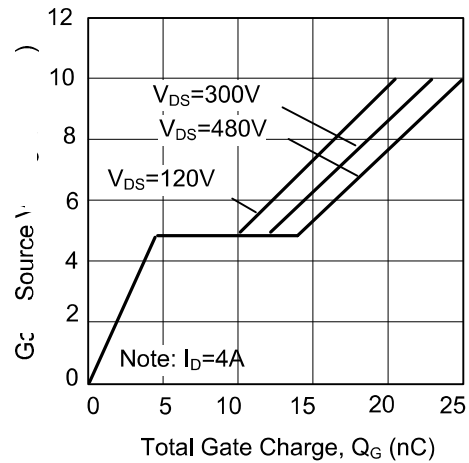
On State Current vs. Allowable Case Temperature



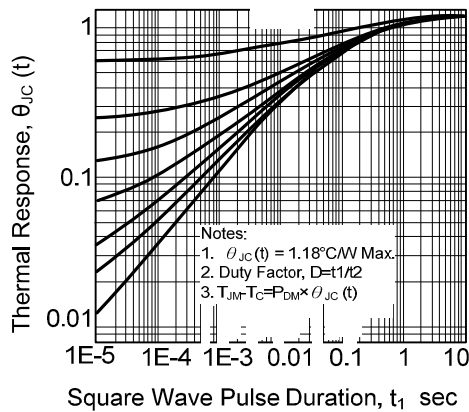
Capacitance Characteristics (Non-Repetitive)



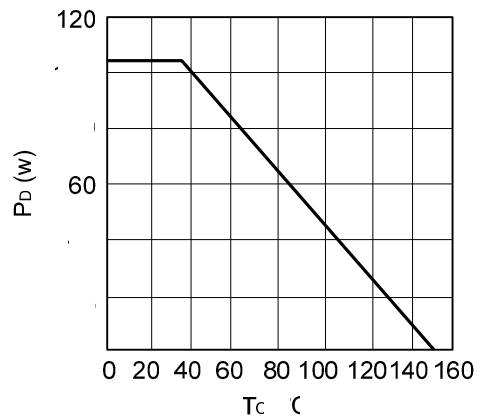
Gate Charge Characteristics



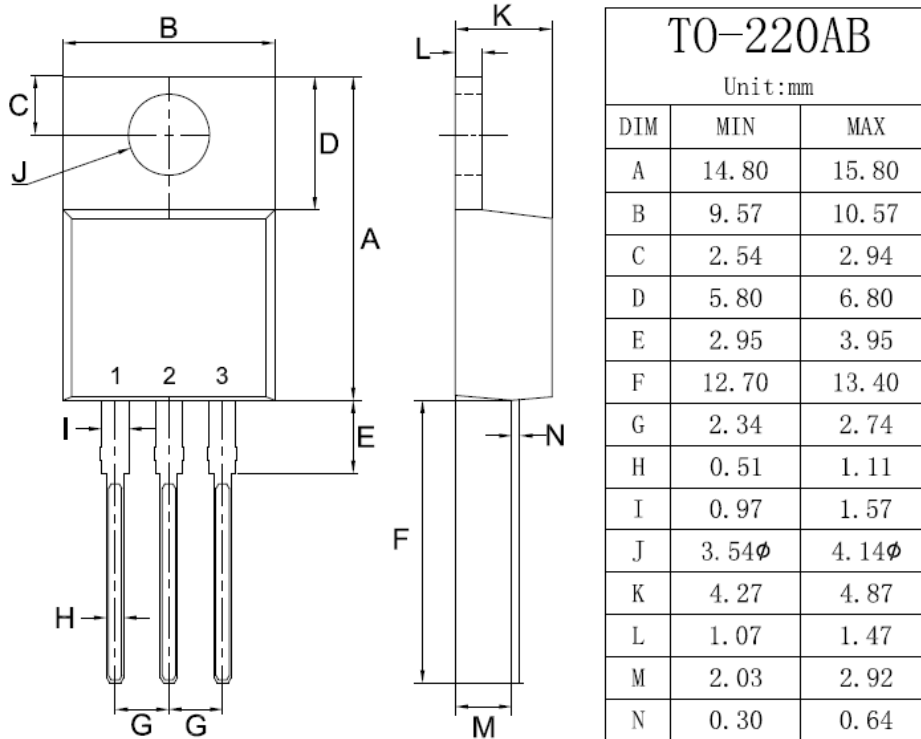
Transient Thermal Response Curve



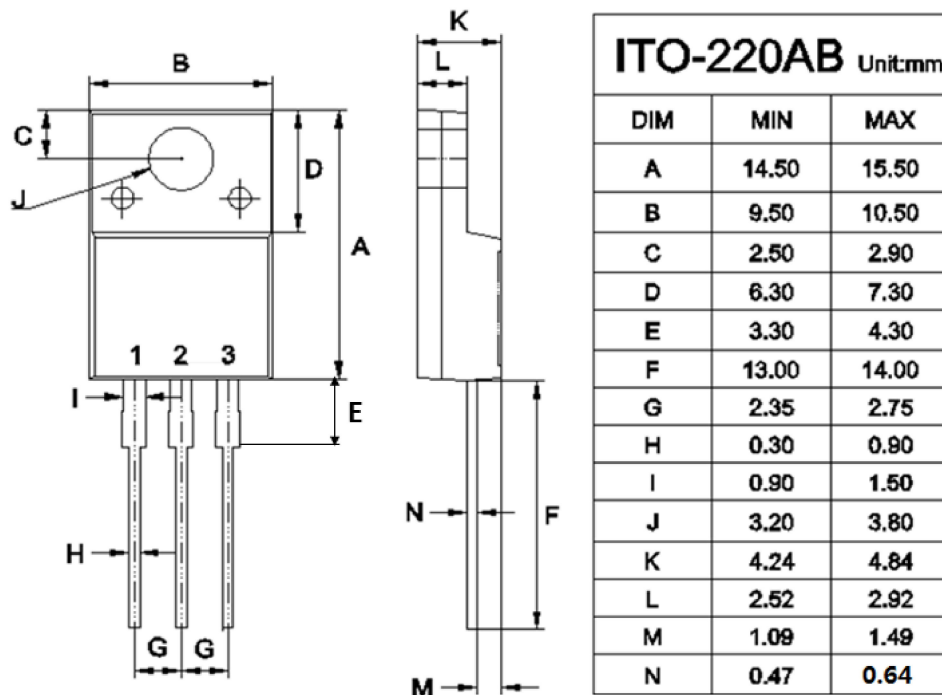
Power Dissipation



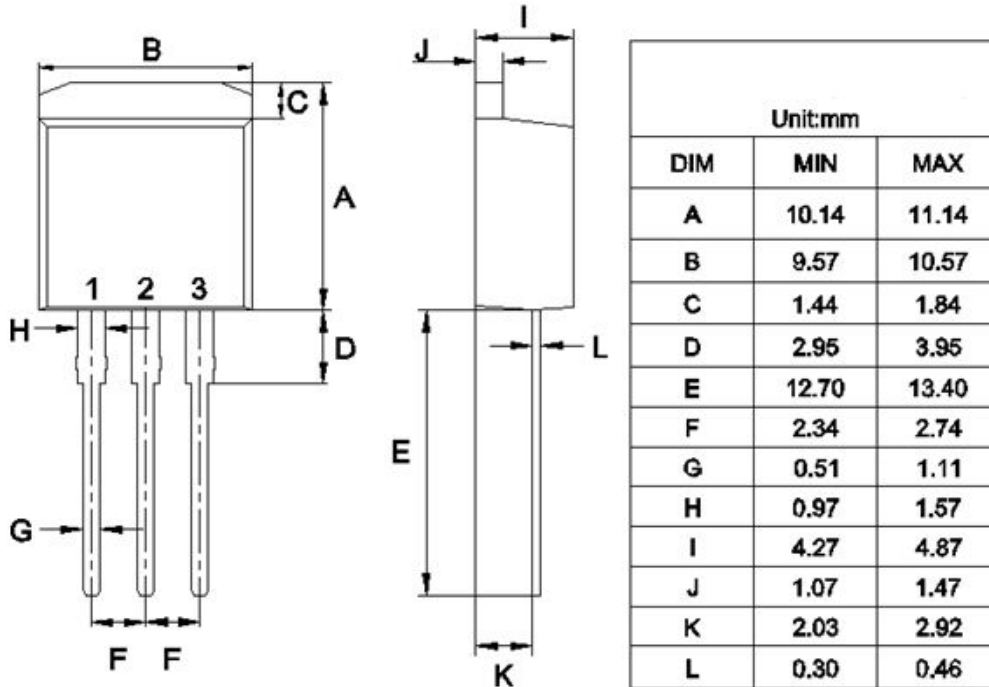
TO-220AB Mechanical Drawing



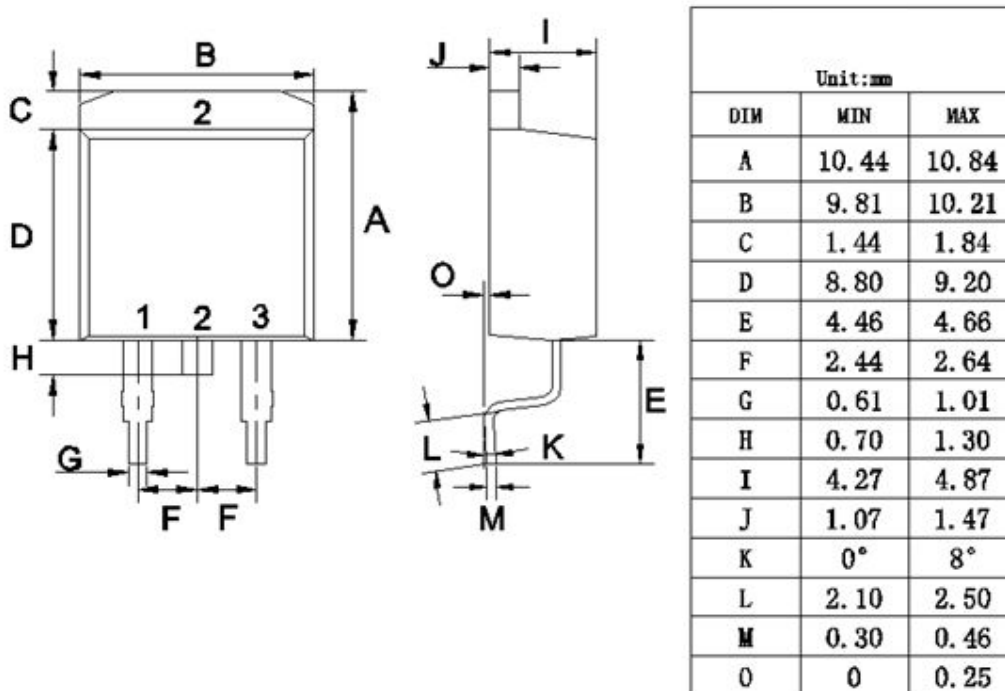
ITO-220AB Mechanical Drawing



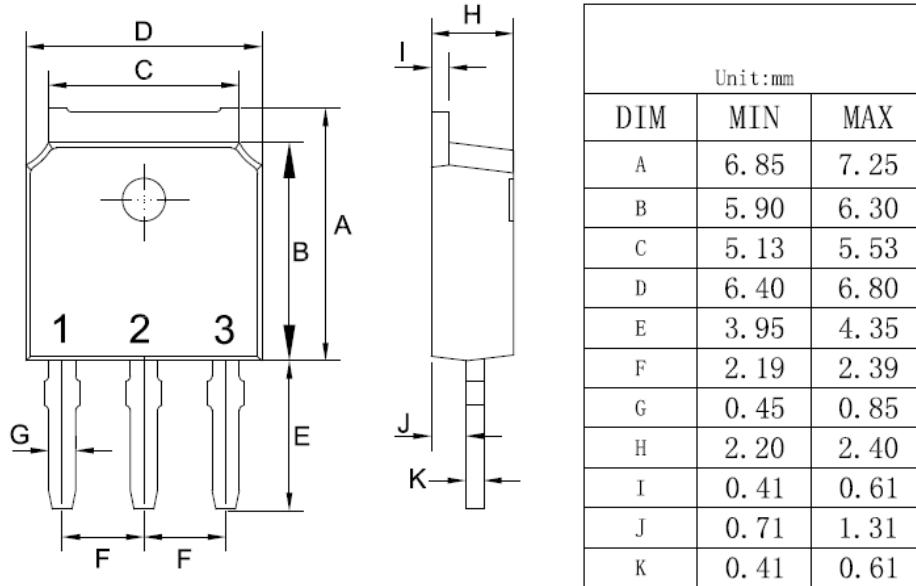
TO-262AB Mechanical Drawing



TO-263AB Mechanical Drawing



TO-251AB Mechanical Drawing



TO-252AB Mechanical Drawing

