

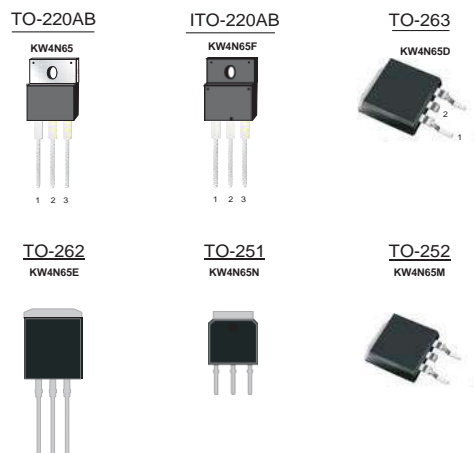
650V N-Channel Power MOSFET

Features:

- RDS(ON)<2.4Ω @ VGS=10V
- Fast switching capability
- Lead free in compliance with EU RoHS directive.
- Green molding compound

Mechanical Data:

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



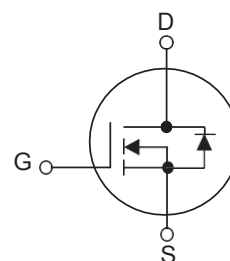
Ordering Information

Part No.	Package	Packing
KW4N65-TU	TO-220	50pcs / Tube
KW4N65F-TU	ITO-220	50pcs / Tube
KW4N65E-TU	TO-262	50pcs / Tube
KW4N65D-TU	TO-263	50pcs / Tube
KW4N65D-TR	TO-263	800pcs / 13"Reel
KW4N65N-TU	TO-251	75pcs / Tube
KW4N65M-TU	TO-252	75pcs / Tube
KW4N65M-TR	TO-252	2.5Kpcs / 13"Reel

Block Diagram

Pin Definition:

1. Gate
2. Drain
3. Source



PRODUCT SUMMARY

V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)
650	2.4 @ V _{GS} =10V	4

ABSOLUTE MAXIMUM RATINGS (T_C=25 C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V _{DSS}	650	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	E _{AS}	260	mJ
Power Dissipation	TO-220/TO-263/TO-262	106	W
	ITO-220	35	
	TO-251/TO-252	50	
Junction Temperature	T _J	+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=30mH, I_{AS}=3.6A, V_{DD}=50V, R_G=25Ω, Starting T_J=25 C

THERMAL DATA

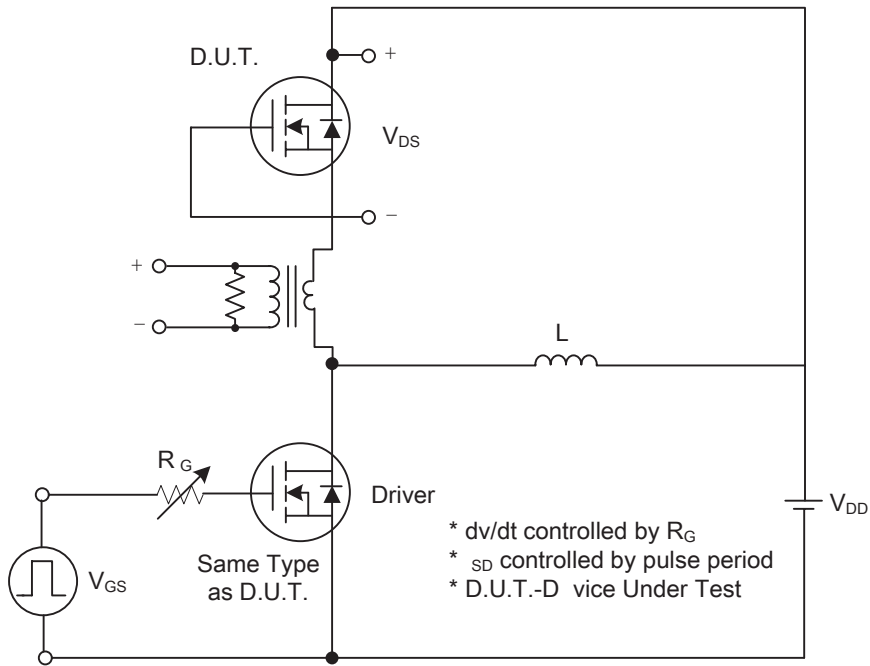
PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/ITO-220 TO-262/TO-263	θ_{JA}	62.5	C/W
	TO-251/TO-252		110	
	TO-220/TO-263/TO-262		2.35	
Junction to Case	ITO-220	θ_{JC}	5.5	C/W
	TO-251/TO-252		2.9	

ELECTRICAL CHARACTERISTICS (T_c=25 C, unless otherwise specified)

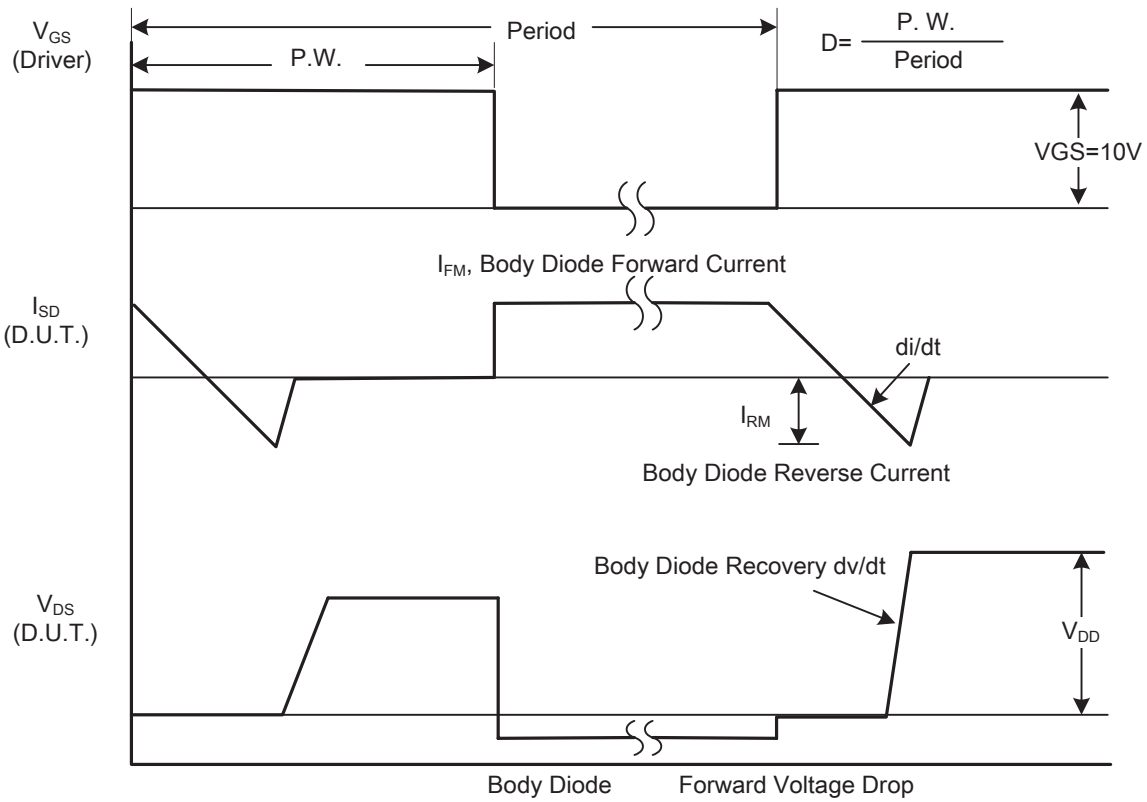
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650			V
Drain-Source Leakage Current		I_{DSS}	$V_{DS}=650V, V_{GS}=0V$			1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	$V_G=30V, V_{DS}=0V$			100	nA
	Reverse		$V_{GS}=-30V, V_{DS}=0V$			-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		$R_{DS(ON)}$	$V_{GS}=10V, I_D=2.0A$		2.0	2.4	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1MHz$		300		pF
Output Capacitance		C_{OSS}			45		pF
Reverse Transfer Capacitance		C_{RSS}			2		pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	$V_{DD}=325V, I_D=4.0A,$ $R_G=25\Omega$ (Note 1, 2)		45		ns
Turn-On Rise Time		t_R			100		ns
Turn-Off Delay Time		$t_{D(OFF)}$			200		ns
Turn-Off Fall Time		t_F			130		ns
Total Gate Charge		Q_G	$V_{DS}=520V, I_D=4.0A,$ $V_{GS}=10V$ (Note 1, 2)		100		nC
Gate-Source Charge		Q_{GS}			17		nC
Gate-Drain Charge		Q_{GD}			20		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
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				4.0	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				16	A
Reverse Recovery Time		t_{rr}	$V_{GS}=0V, I_S=4A$		260		ns
Reverse Recovery Charge		Q_{RR}	$dI_F/dt=100A/\mu s$ (Note 1)		2.5		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

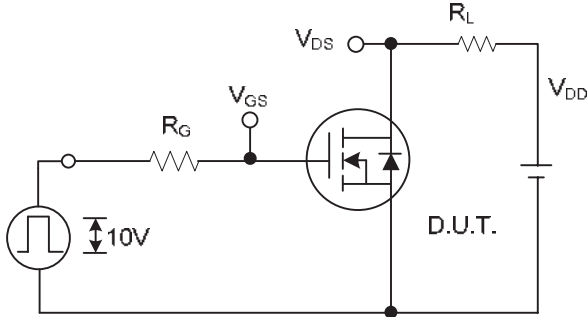


Peak Diode Recovery dv/dt Test Circuit

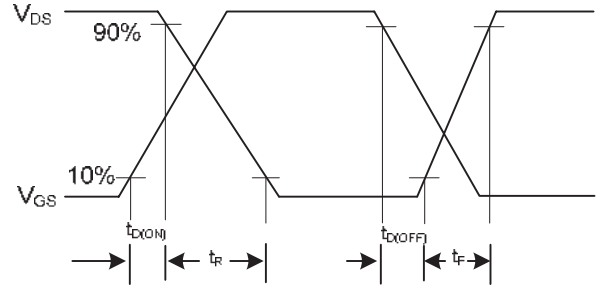


Peak Diode Recovery dv/dt Waveforms

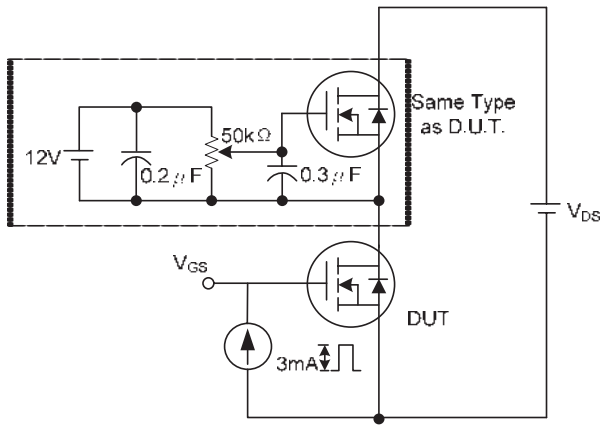
TEST CIRCUITS AND WAVEFORMS(Cont.)



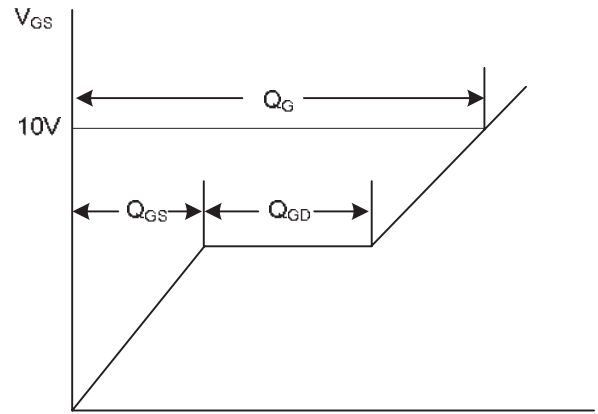
Switching Test Circuit



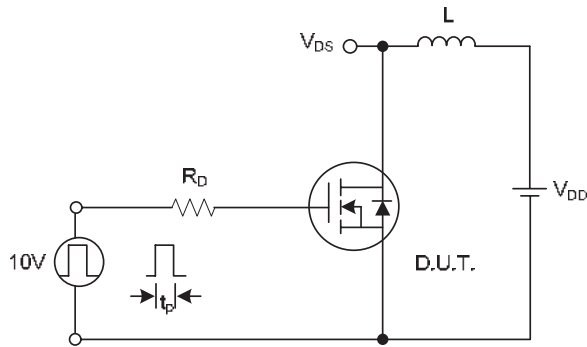
Switching Waveforms



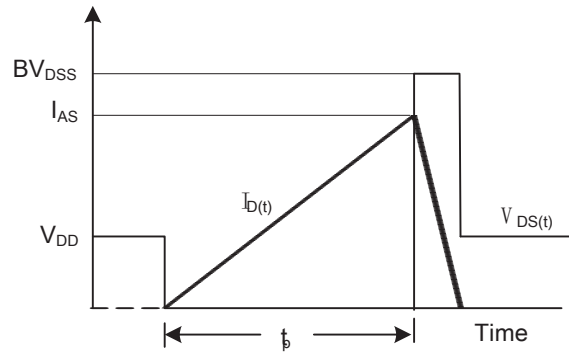
Gate Charge Test Circuit



Charge
Gate Charge Waveform

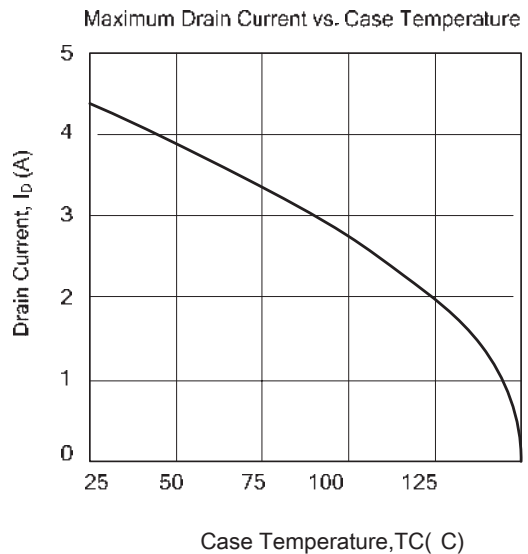
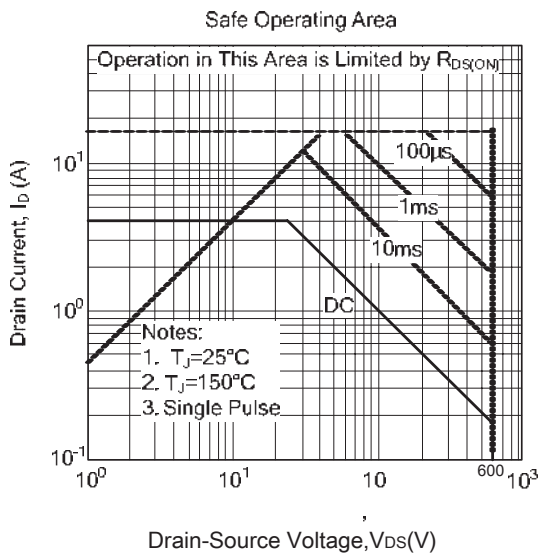
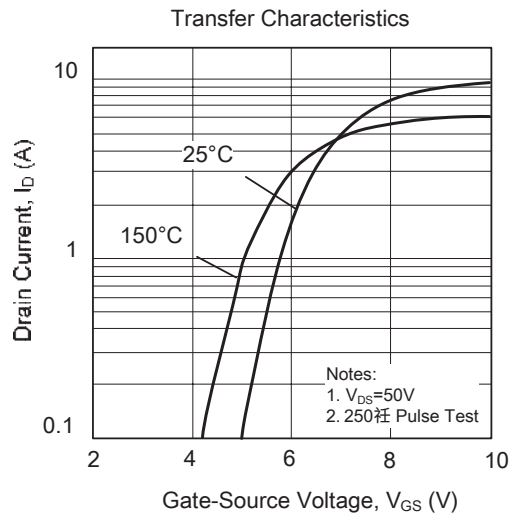
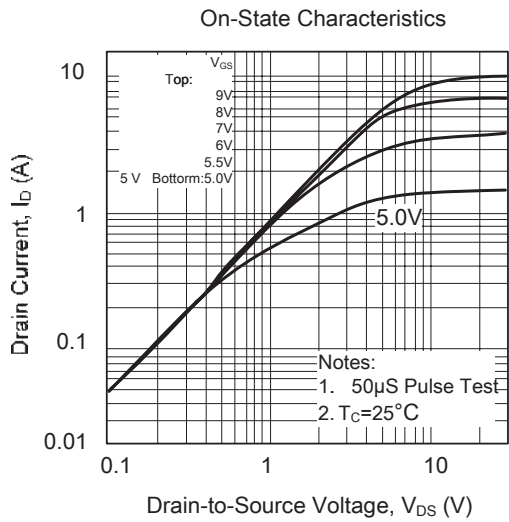
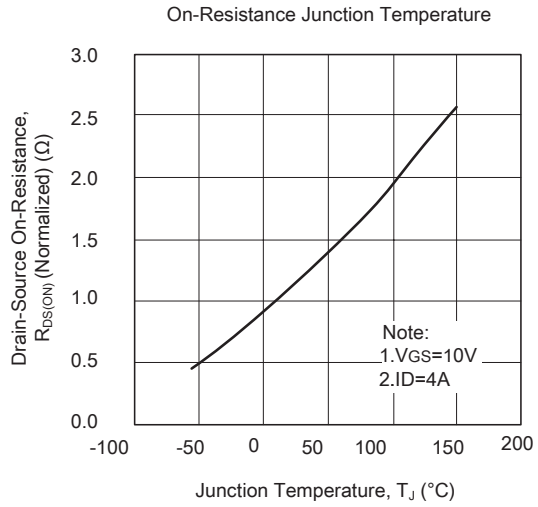
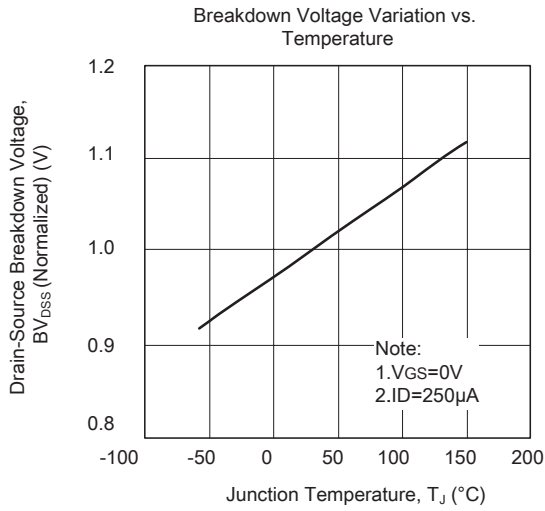


Unclamped Inductive Switching Test Circuit

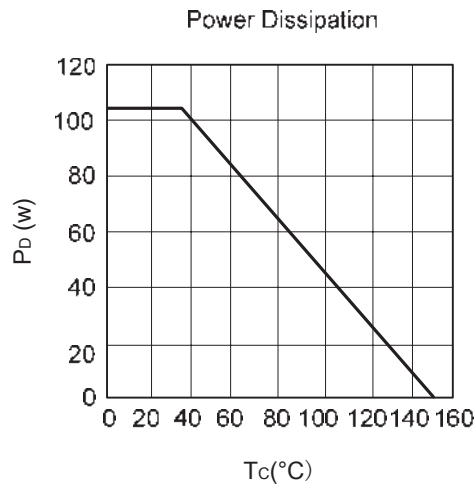
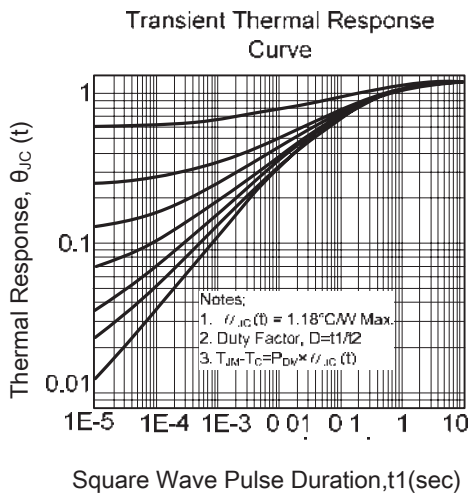
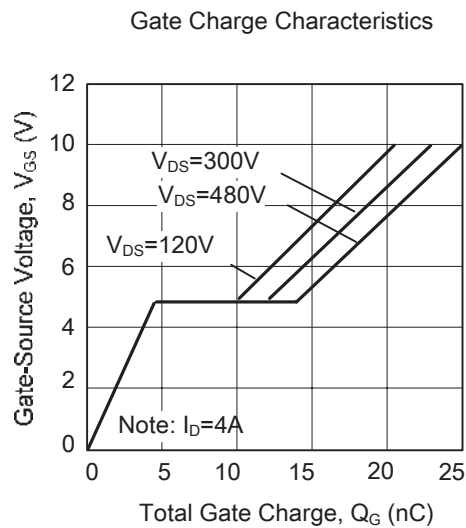
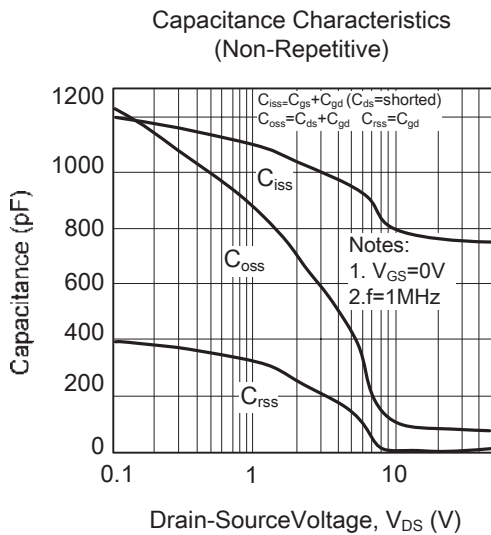
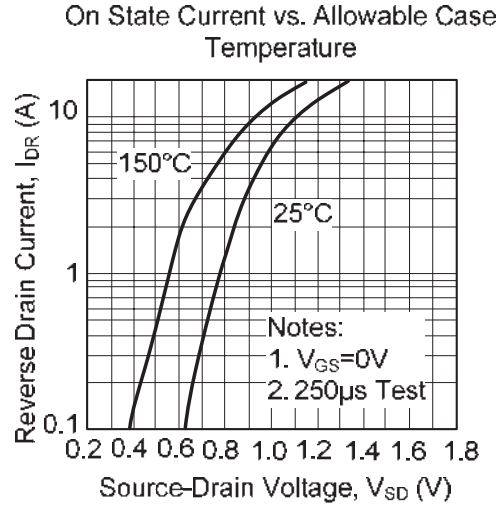
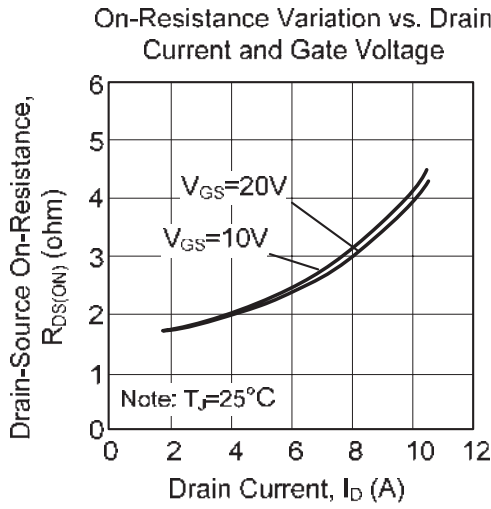


Unclamped Inductive Switching Waveforms

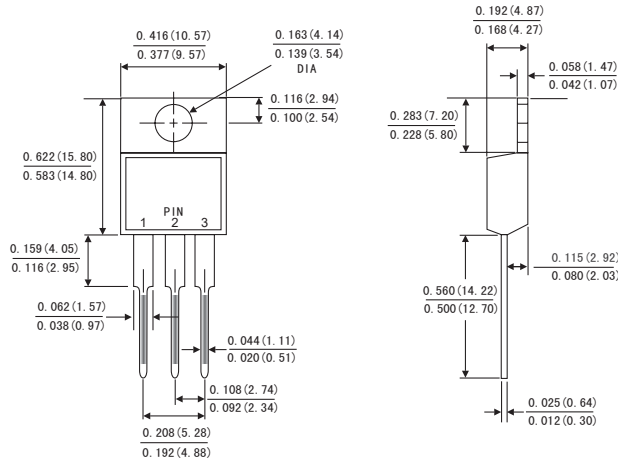
TYPICAL CHARACTERISTICS



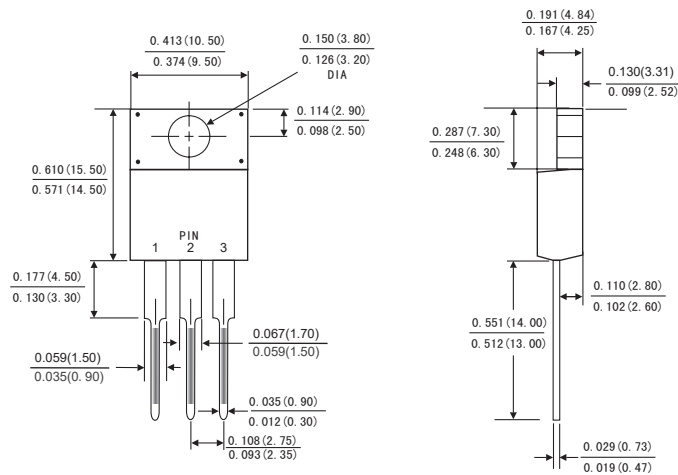
TYPICAL CHARACTERISTICS



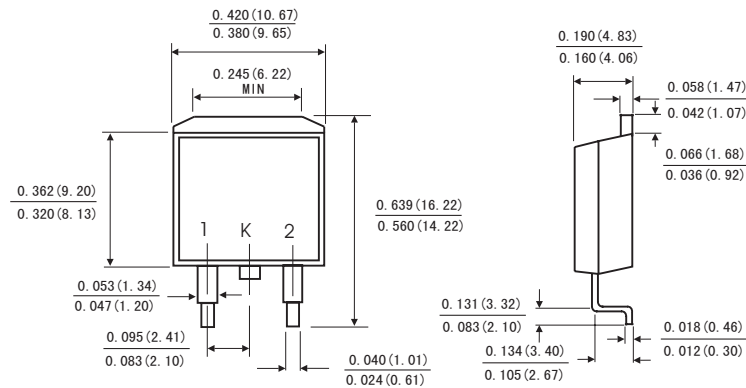
TO-220AB



ITO-220AB

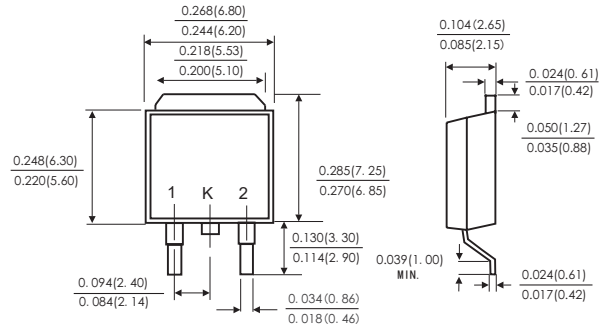


TO-263



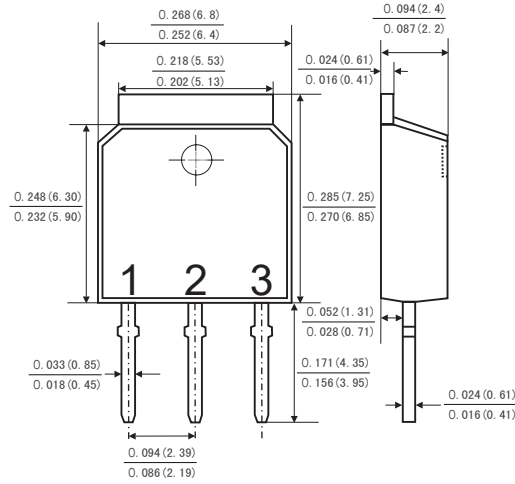
Dimensions in inches and (millimeters)

TO-252
(DPAK)



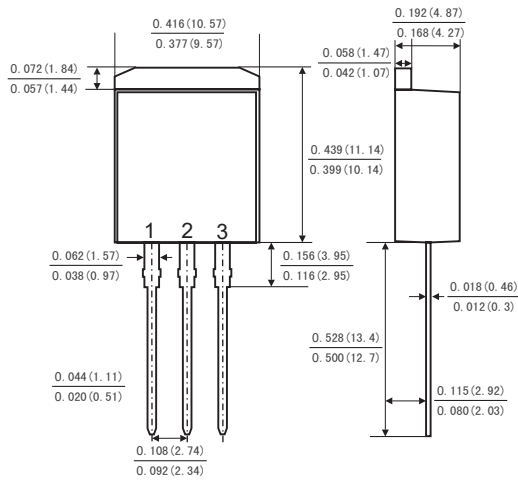
Dimensions in inches and (millimeters)

TO-251



Dimensions in inches and (millimeters)

TO-262



Dimensions in inches and (millimeters)