

650V N-Channel Power MOSFET

Features :

- $R_{DS(ON)} < 4.4\Omega$ @ $V_{GS}=10V, I_D=1A$
- Fast switching capability
- Lead free in compliance with EU RoHS directive.
- Improved dv/dt capability, high ruggedness

Mechanical Data :

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

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
650	4.4 @ $V_{GS}=10V$	2

Ordering Information

Part No.	Package	Packing
KW2N65-TU	TO-220	50pcs / Tube
KW2N65F-TU	ITO-220	50pcs / Tube
KW2N65E-TU	TO-262	50pcs / Tube
KW2N65D-TU	TO-263	50pcs / Tube
KW2N65D-TR	TO-263	800pcs / 13"Reel
KW2N65N-TU	TO-251	75pcs / Tube
KW2N65M-TU	TO-252	75pcs / Tube
KW2N65M-TR	TO-252	2.5Kpcs / 13"Reel

ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ\text{C}$, 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	2.0	A
Pulsed Drain Current (Note 2)		I_{DM}	8.0	A
Avalanche Energy		E_{AS}	115	mJ
Power Dissipation	TO-220/TO-263/TO-262	P_D	44	W
	ITO-220		23	
	TO-251/TO-252		34	
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

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.

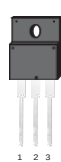
2. Repetitive Rating : Pulse width limited by maximum junction temperature

3. $L=30\text{mH}$, $I_{AS}=2.7A$, $V_{DD}=50V$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

TO-220AB
KW2N65



ITO-220AB
KW2N65F



TO-263
KW2N65D



TO-262
KW2N65E



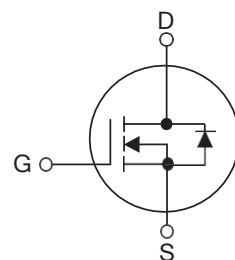
TO-251
KW2N65N



TO-252
KW2N65M



Block Diagram



Pin Definition:

1. Gate
2. Drain
3. Source

THERMAL DATA

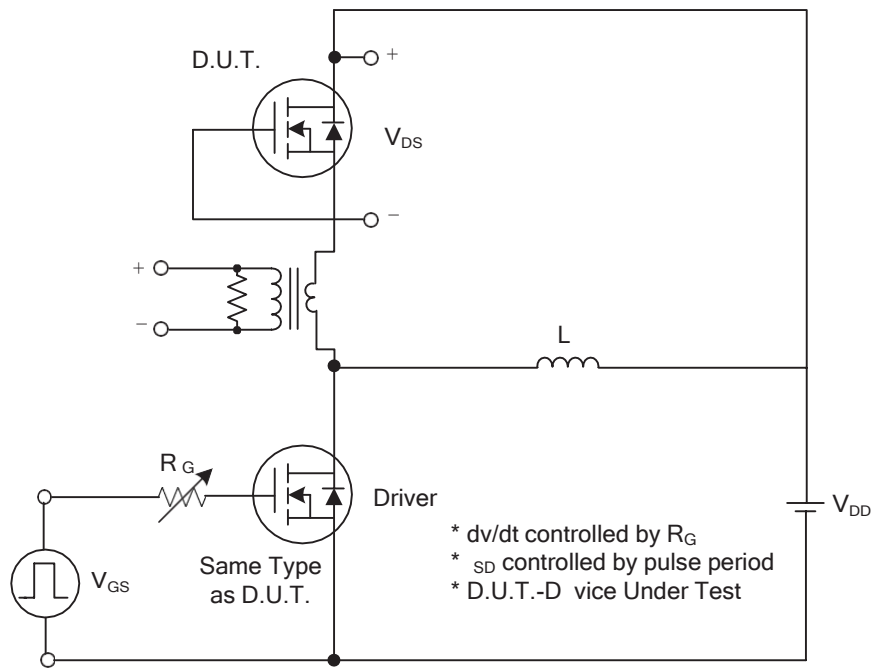
PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/ITO-220	θ_{JA}	62.5	C/W
	TO-262/TO-263			
	TO-251/TO-252		110	
Junction to Case	TO-220/TO-263/TO-262	θ_{JC}	2.35	C/W
	ITO-220		5.5	
	TO-251/TO-252		2.9	

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

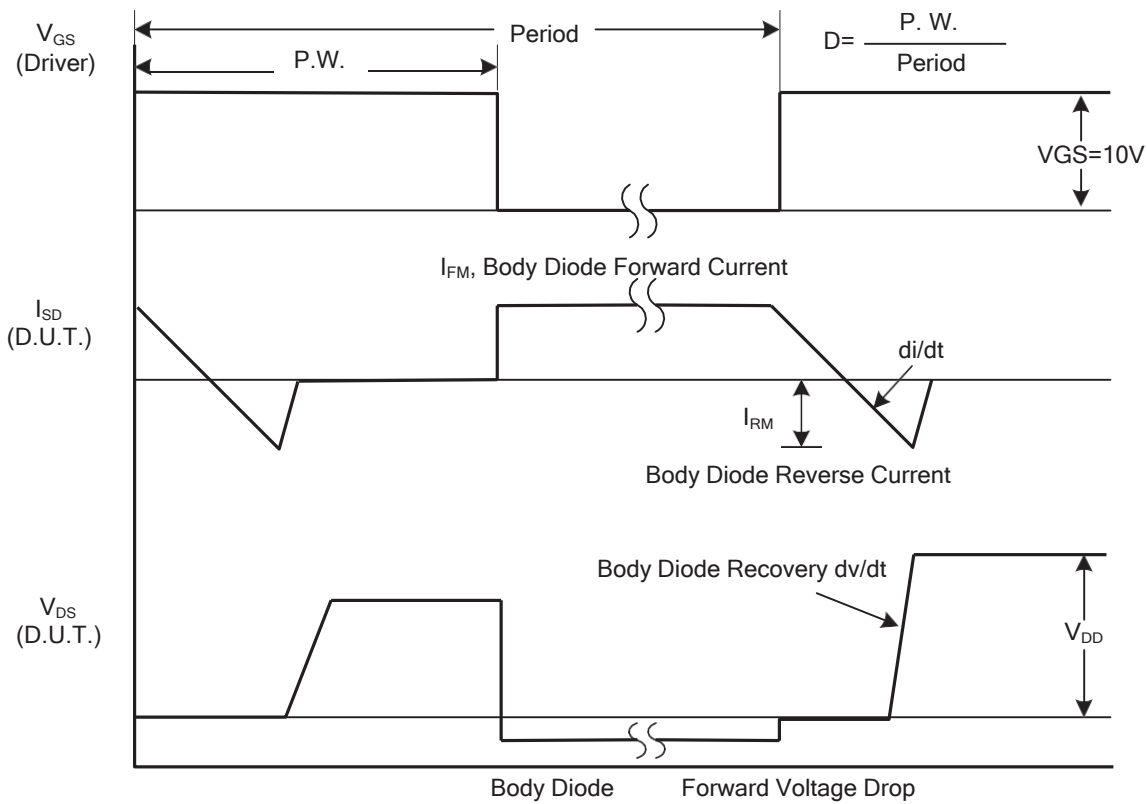
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	650			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =650V, V _{GS} =0V			10	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _G =30V, V _{DS} =0V			100	nA
	Reverse		V _{GS} =-30V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =1.0A		4	4.4	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} =300V, I _D =2A, R _G =25Ω(Note1, 2)		10		ns
Turn-On Rise Time		t _R			25		ns
Turn-Off Delay Time		t _{D(OFF)}			20		ns
Turn-Off Fall Time		t _F			25		ns
Total Gate Charge		Q _G	V _{DS} =480V, I _D =2.4A, V _{GS} =10V(Note1, 2)		5.7		nC
Gate-Source Charge		Q _{GS}			1.8		nC
Gate-Drain Charge		Q _{GD}			2		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V, I _S =2.0A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I _S				2.0	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				8.0	A
Reverse Recovery Time		t _{rr}	V _{GS} =0V, I _S =2A		357		ns
Reverse Recovery Charge		Q _{RR}	diF/dt=100A/μs (Note 1)		2		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

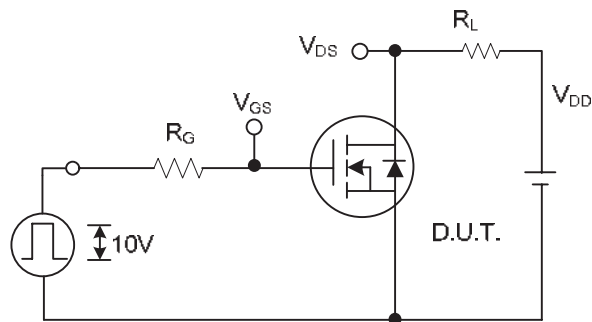


Peak Diode Recovery dv/dt Test Circuit

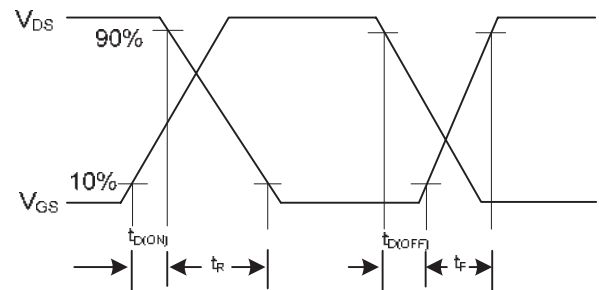


Peak Diode Recovery dv/dt Waveforms

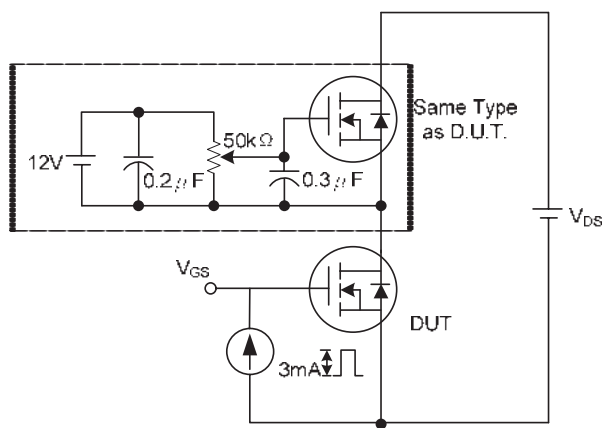
TEST CIRCUITS AND WAVEFORMS(Cont.)



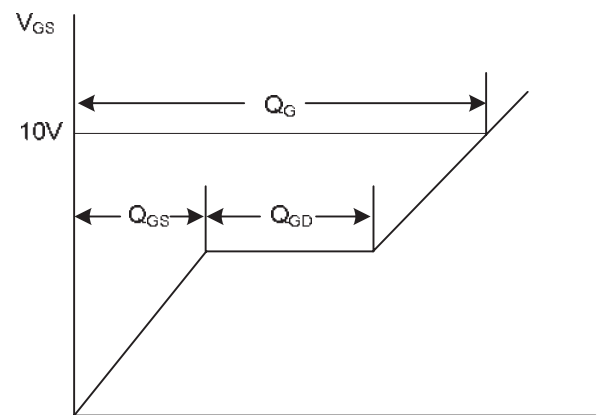
Switching Test Circuit



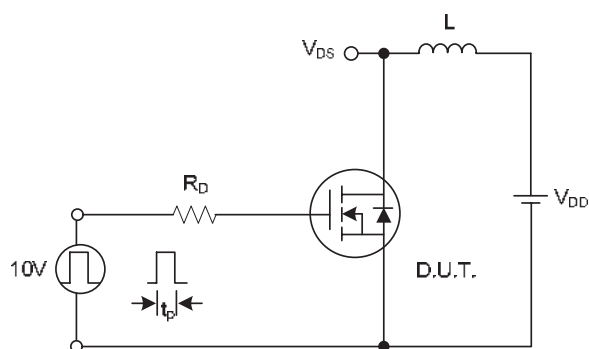
Switching Waveforms



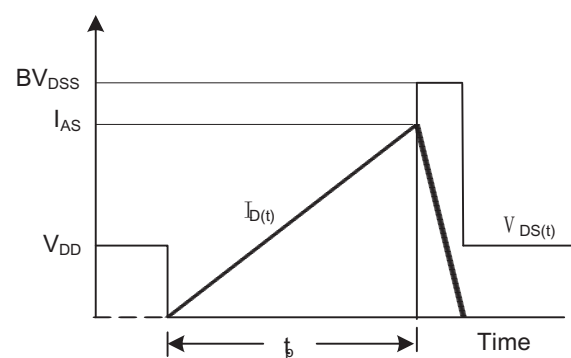
Gate Charge Test Circuit



Charge
Gate Charge Waveform

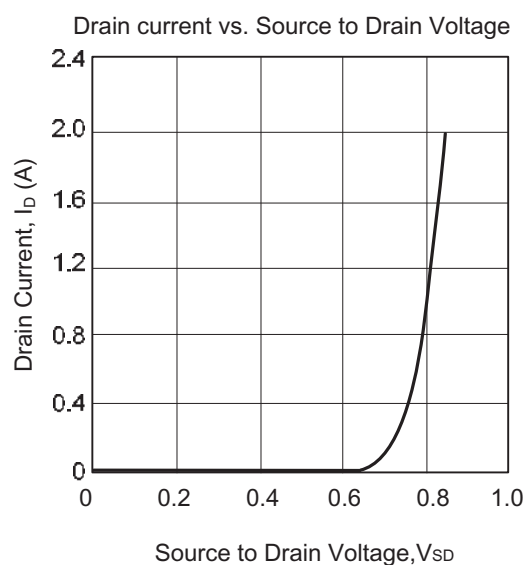
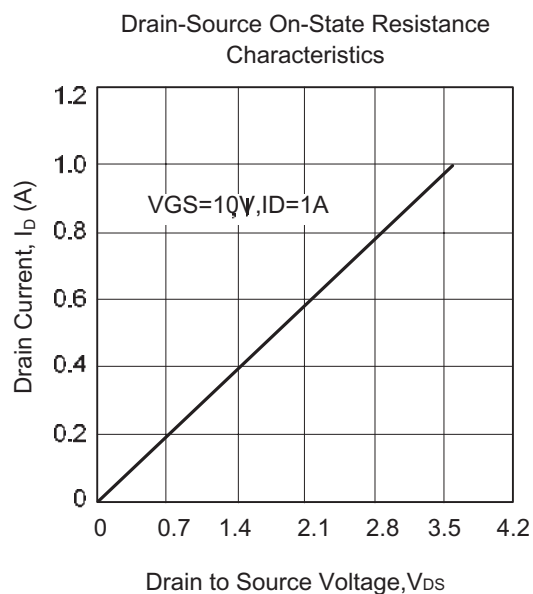
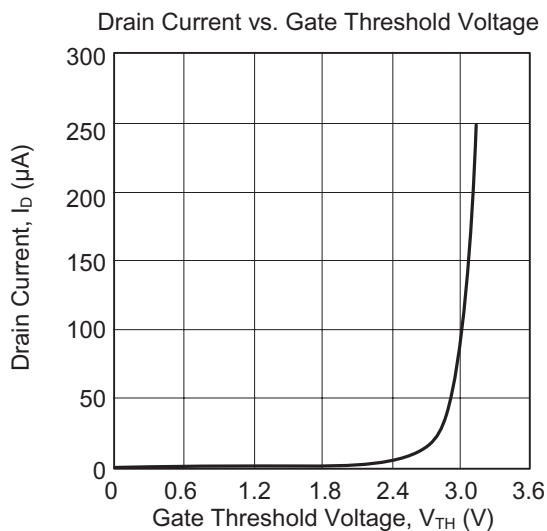
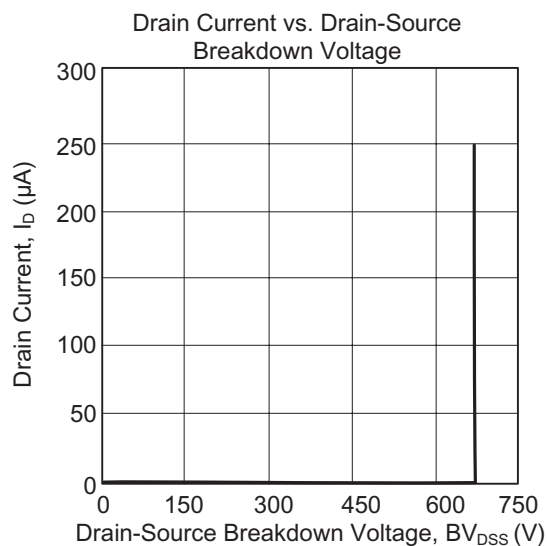


Unclamped Inductive Switching Test Circuit

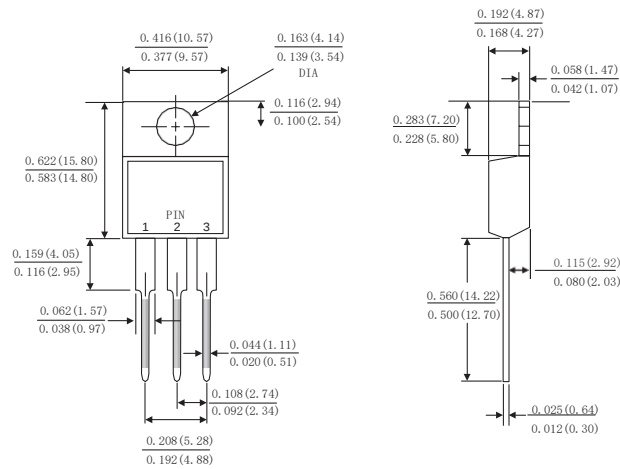


Unclamped Inductive Switching Waveforms

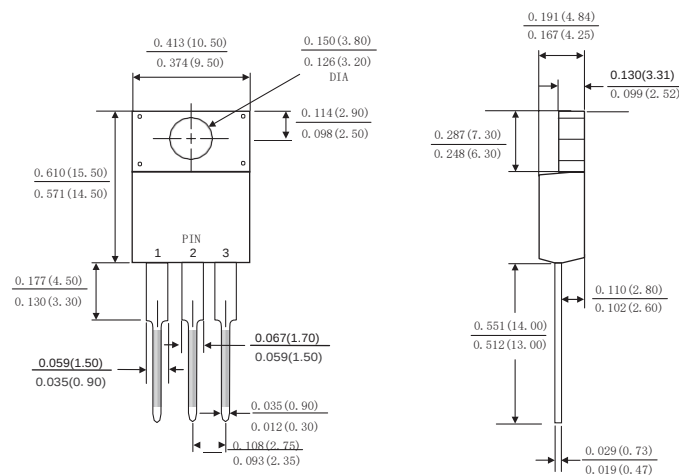
TYPICAL CHARACTERISTICS



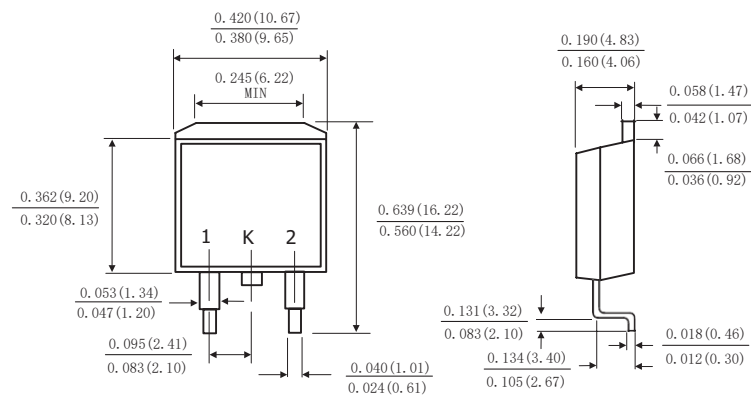
TO-220AB



ITO-220AB



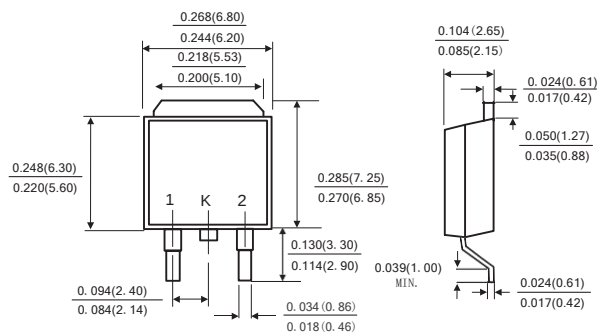
TO-263



Dimensions in inches and (millimeters)

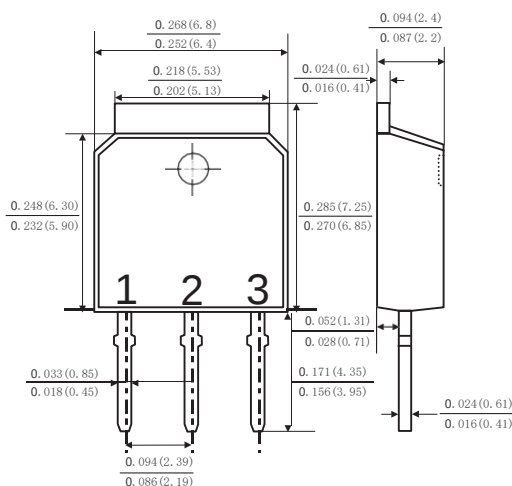
TO-252

(DPAK)



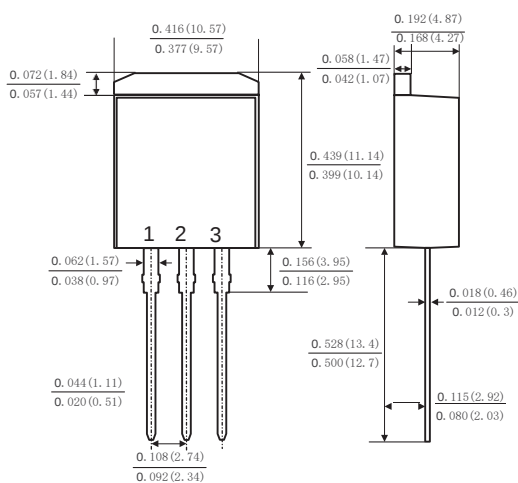
Dimensions in inches and (millimeters)

TO-251



Dimensions in inches and (millimeters)

TO-262



Dimensions in inches and (millimeters)