



1N65-KW

Power MOSFET

1A, 650V N-CHANNEL POWER MOSFET

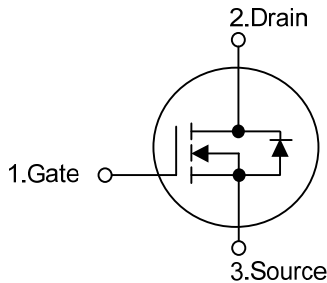
DESCRIPTION

The UTC 1N65-KW is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

FEATURES

- * $R_{DS(ON)} < 15\Omega$ @ $V_{GS}=10V, I_D=0.5A$
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

SYMBOL

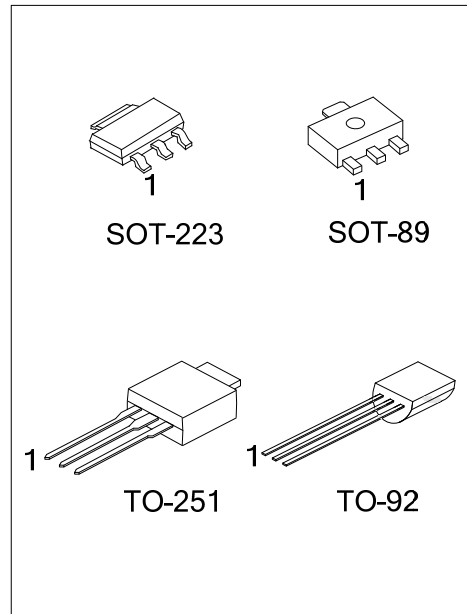


ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
-	1N65G-AA3-R	SOT-223	G	D	S	Tape Reel
-	1N65G-AB3-R	SOT-89	G	D	S	Tape Reel
1N65L-TM3-T	1N65G-TM3-T	TO-251	G	D	S	Tube
1N65L-T92-B	1N65G-T92-B	TO-92	G	D	S	Tape Box
1N65L-T92-K	1N65G-T92-K	TO-92	G	D	S	Bulk

Note: Pin Assignment: G: Gate D: Drain S: Source

<p>1N65G-AA3-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel, B: Tape Box, K: Bulk (2) AA3: SOT-223, AB3: SOT-89, TM3: TO-251 T92: TO-92 (3) L: Lead Free, G: Halogen Free and Lead Free</p>
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■ **MARKING**

<p style="text-align: center;">SOT-223</p>	<p style="text-align: center;">SOT-89</p>
<p style="text-align: center;">TO-251</p>	<p style="text-align: center;">TO-92</p>

■ **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	1	A
Avalanche Energy	Single Pulsed (Note 2)	E_{AS}	23
Peak Diode Recovery dv/dt (Note 3)	dv/dt	4.5	V/ns
Power Dissipation ($T_A=25^\circ\text{C}$)	SOT-89	P_D	0.69
	SOT-223		0.8
	TO-251		1.1
	TO-92		0.6
Junction Temperature	T_J	+150	$^\circ\text{C}$
Operating Temperature	T_{OPR}	-55 ~ +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. $L = 46\text{mH}$, $I_{AS} = 1\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

3. $I_{SD} \leq 1.2\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	SOT-89	180
		SOT-223	150
		TO-251	110
		TO-92	180
Junction to Case	θ_{JC}	SOT-89	38
		SOT-223	14
		TO-251	4.53
		TO-92	88

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

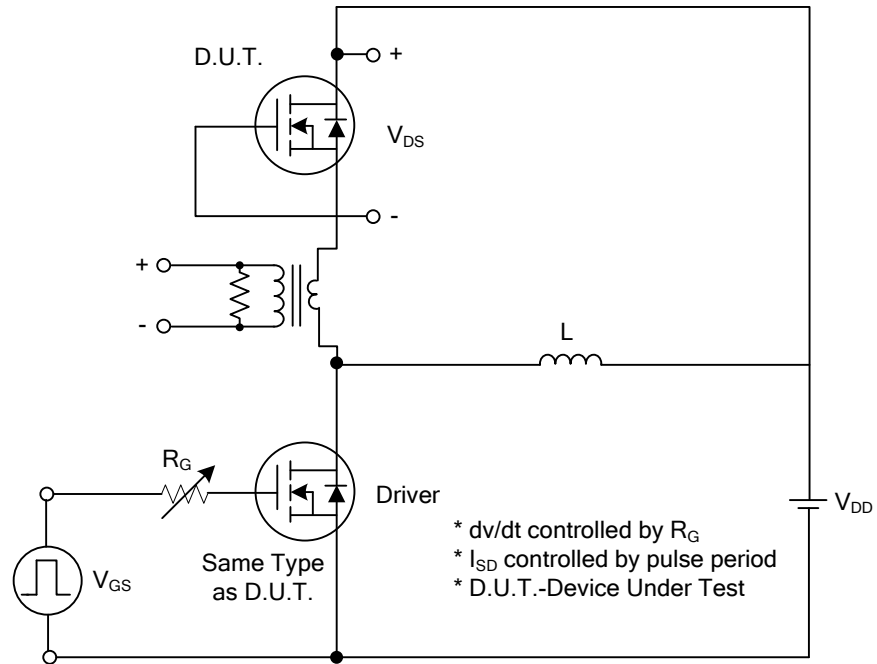
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}			100	nA
	Reverse				-100	nA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu A$		0.4		$V/^\circ C$
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	$R_{DS(ON)}$	$V_{GS}=10V, I_D=0.5A$		12	15	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$		150		pF
Output Capacitance	C_{OSS}			17.5		pF
Reverse Transfer Capacitance	C_{RSS}			4.6		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q_G	$V_{DS}=50V, I_D=1.3A, R_G=3.3k\Omega$ $V_{GS}=10V, (\text{Note } 2,3)$		8		nC
Gate-Source Charge	Q_{GS}			1.8		nC
Gate-Drain Charge	Q_{GD}			1.3		nC
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=30V, I_D=1A, R_G=25\Omega,$ $V_{GS}=10V (\text{Note } 2,3)$		15		ns
Turn-On Rise Time	t_R			30		ns
Turn-Off Delay Time	$t_{D(OFF)}$			26		ns
Turn-Off Fall Time	t_F			35		ns
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=1A$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I_S				1.0	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				4.0	A

Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

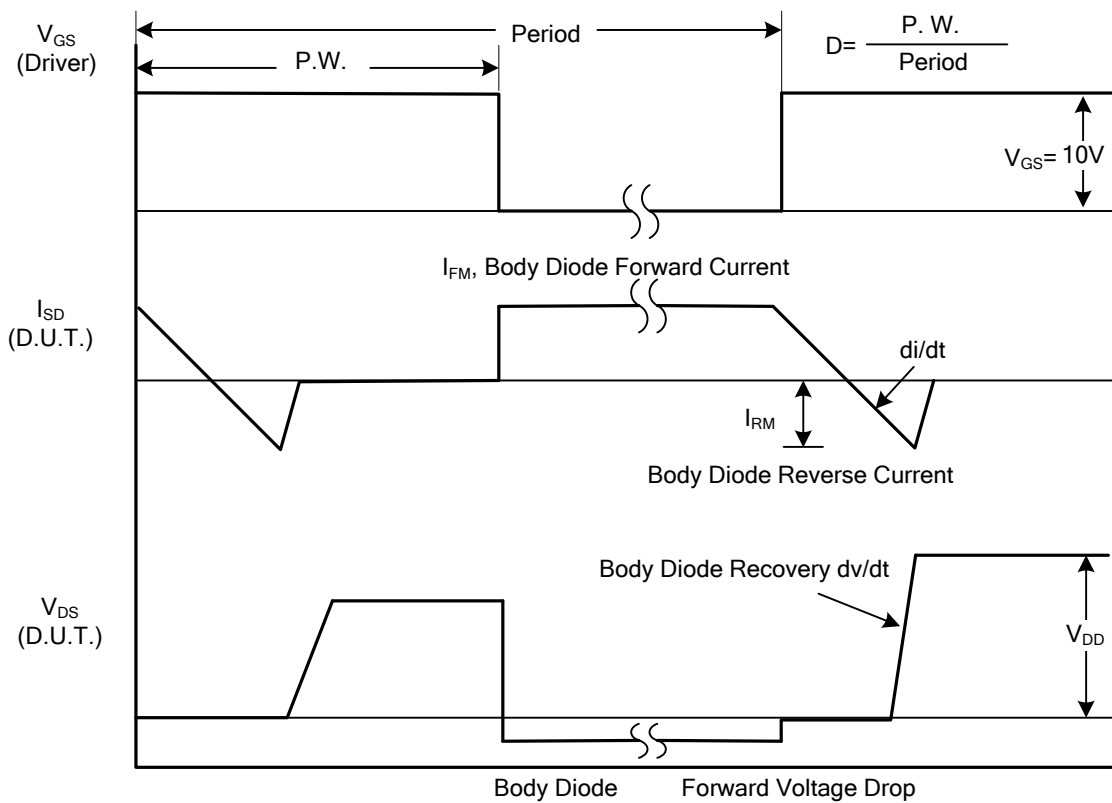
2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

3. Essentially Independent of Operating Temperature

■ TEST CIRCUITS AND WAVEFORMS

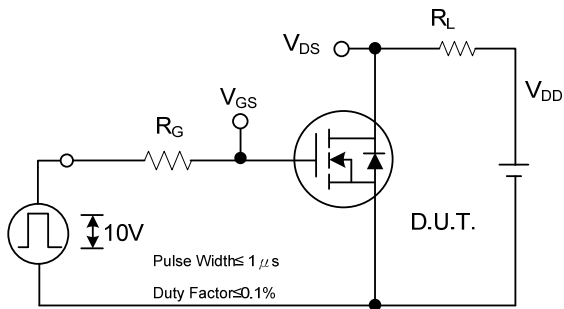


Peak Diode Recovery dv/dt Test Circuit

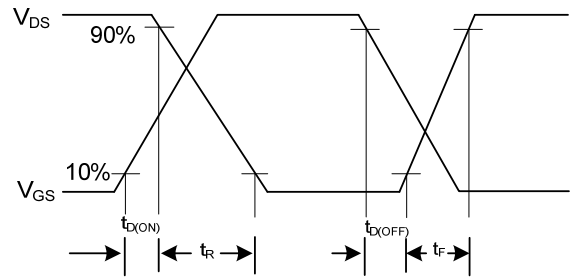


Peak Diode Recovery dv/dt Waveforms

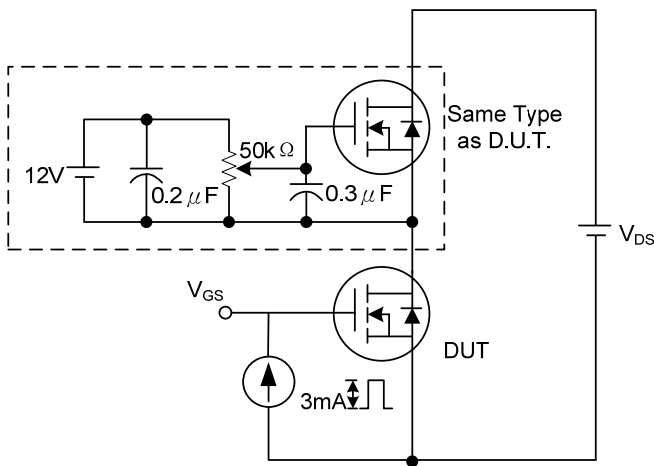
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



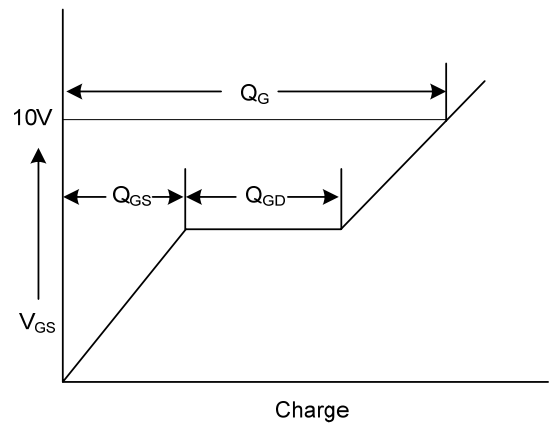
Switching Test Circuit



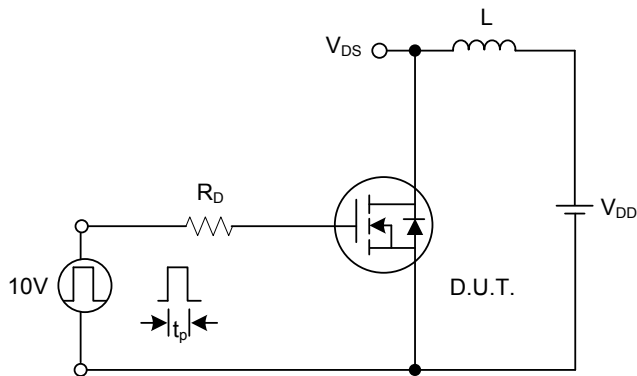
Switching Waveforms



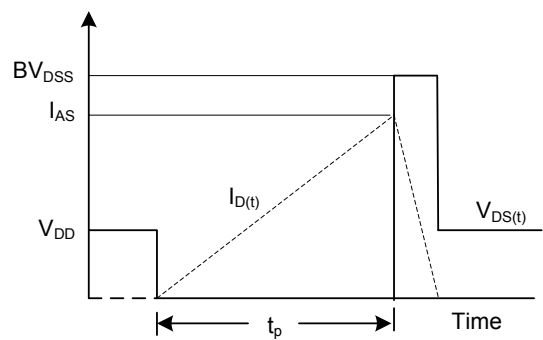
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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