

**1N65-CBS**

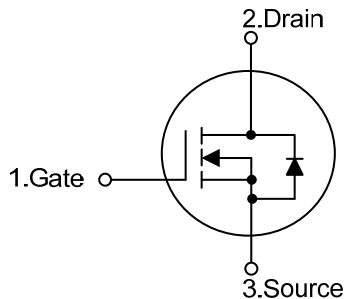
Preliminary

Power MOSFET**1.0A, 650V N-CHANNEL
POWER MOSFET****DESCRIPTION**

The UTC **1N65-CBS** is a high voltage power 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

- * $R_{DS(ON)} < 12.5\Omega$ @ $V_{GS} = 10V$, $I_D = 0.5A$
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

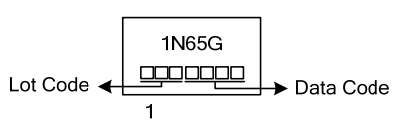
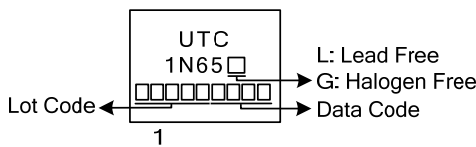
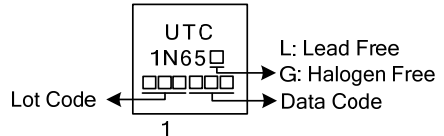
SYMBOL**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
-	1N65G-AA3-R	SOT-223	G	D	S	Tape Reel
1N65L-TM3-T	1N65G-TM3-T	TO-251	G	D	S	Tube
1N65L-TN3-R	1N65G-TN3-R	TO-252	G	D	S	Tape Reel
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

	(1) Packing Type	(1) B: Tape Box, K: Bulk, T: Tube, R: Tape Reel
	(2) Package Type	(2) AA3: SOT-223, TM3: TO-251, TN3: TO-252, T92: TO-92
	(3) Green Package	(3) L: Lead Free, G: Halogen Free and Lead Free

MARKING

PACKAGE	MARKING
SOT-223	
TO-251 / TO-252	
TO-92	

■ **ABSOLUTE MAXIMUM RATINGS** ($T_C=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	± 30	V
Drain Current	Continuous	I_D	1.0	A
	Pulsed (Note 2)	I_{DM}	4.0	A
Avalanche Current (Note 3)		I_{AR}	1.4	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	10	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.9	V/ns
Power Dissipation	SOT-223	P_D	8	W
	TO-251/TO-252		28	W
	TO-92		1.5	W
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. $L=10\text{mH}$, $I_{AS}=1.4\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD}\leq 1.0\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223	θ_{JA}	150	$^{\circ}\text{C}/\text{W}$
	TO-251/TO-252		110	$^{\circ}\text{C}/\text{W}$
	TO-92		140	$^{\circ}\text{C}/\text{W}$
Junction to Case	SOT-223	θ_{JC}	15.6	$^{\circ}\text{C}/\text{W}$
	TO-251/TO-252		4.46	$^{\circ}\text{C}/\text{W}$
	TO-92		83.3	$^{\circ}\text{C}/\text{W}$

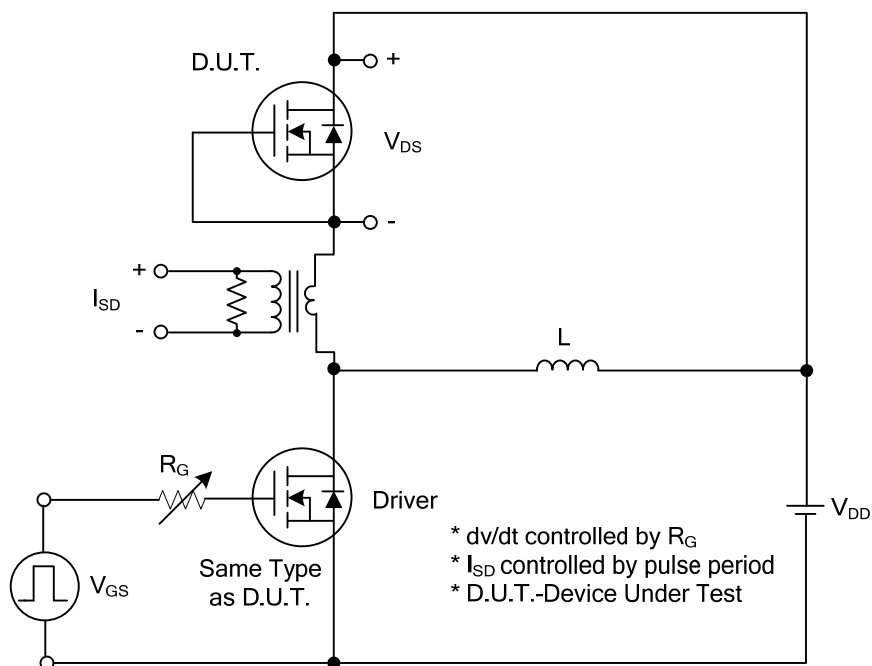
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

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			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 =250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =0.5A			12.5	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0 MHz		155		pF
Output Capacitance		C _{OSS}			30		pF
Reverse Transfer Capacitance		C _{RSS}			14		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =30V, V _{GS} =10V, I _D =0.5A I _G =100μA (Note 1, 2)		13		nC
Gate to Source Charge		Q _{GS}			1.5		nC
Gate to Drain Charge		Q _{GD}			1.3		nC
Turn-ON Delay Time (Note 1)		t _{D(ON)}	V _{DD} =30V, V _{GS} =10V, I _D =0.5A R _G =25Ω (Note 1, 2)		37		ns
Rise Time		t _R			15		ns
Turn-OFF Delay Time		t _{D(OFF)}			71		ns
Fall-Time		t _F			12		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Body-Diode Continuous Current		I _S				1.0	A
Maximum Body-Diode Pulsed Current (Note 1)		I _{SM}				4.0	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =1.0A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time		t _{rr}	I _S =1.0A, V _{GS} =0V,		265		ns
Body Diode Reverse Recovery Charge		Q _{rr}	di/dt=100A/μs		0.42		μC

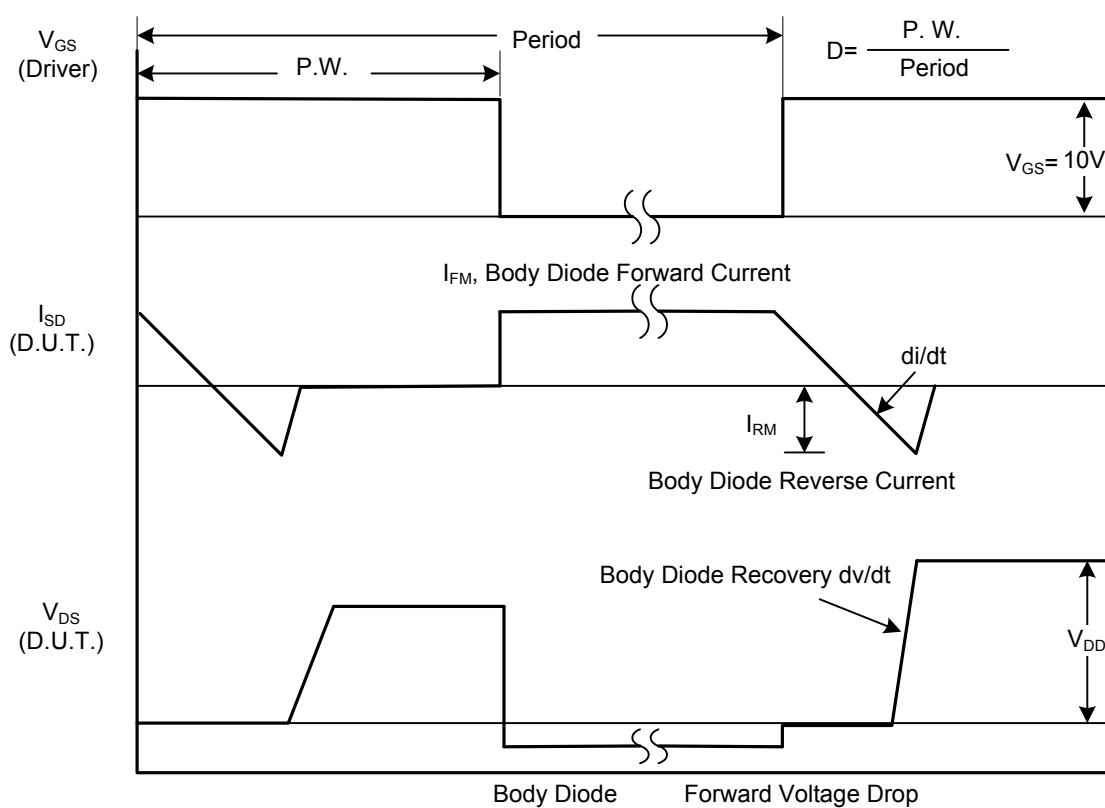
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

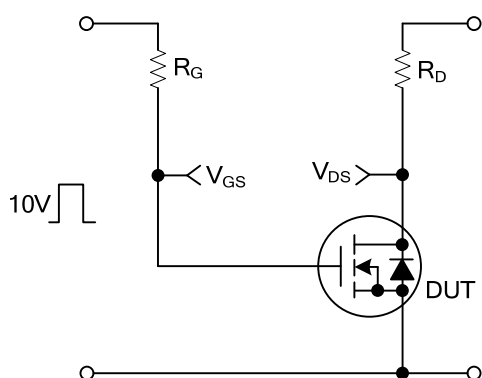


Peak Diode Recovery dv/dt Test Circuit

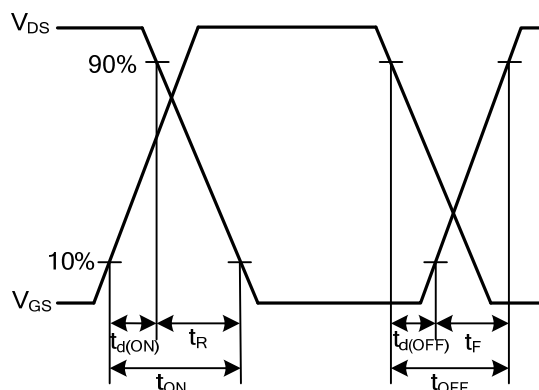


Peak Diode Recovery dv/dt Waveforms

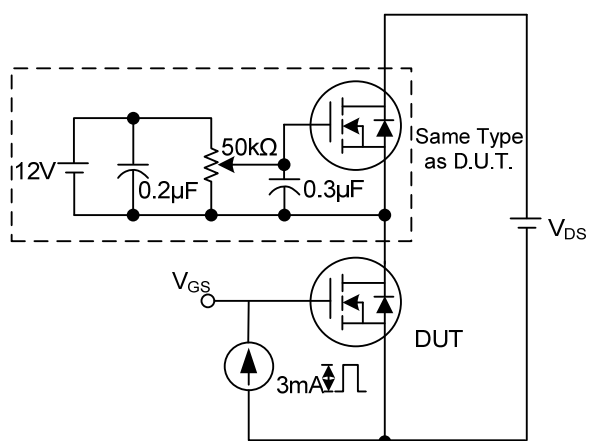
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



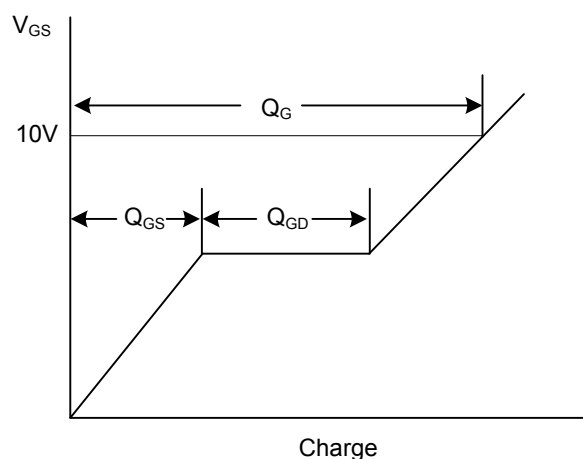
Switching Test Circuit



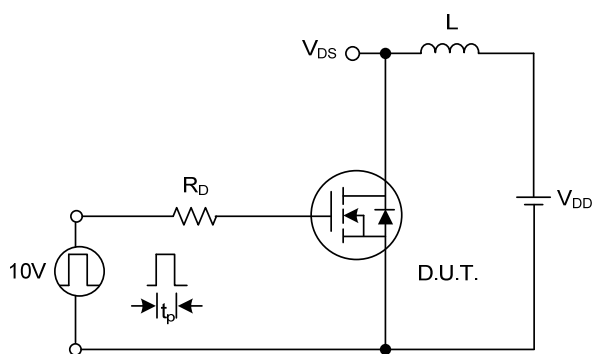
Switching Waveforms



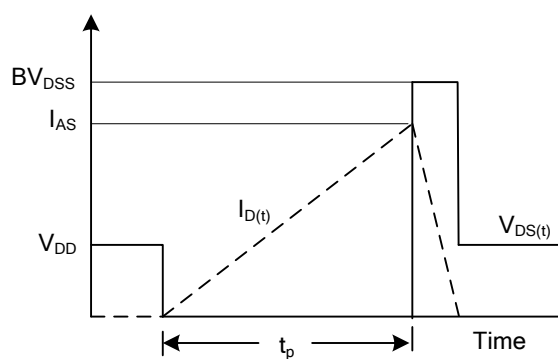
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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