



1D5N70K-TB

Preliminary

Power MOSFET

1.5A, 700V N-CHANNEL POWER MOSFET

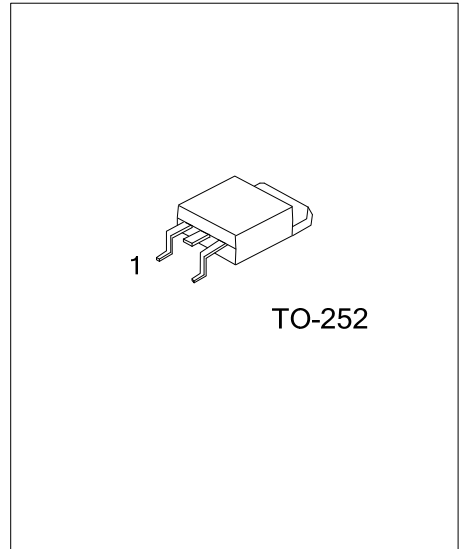
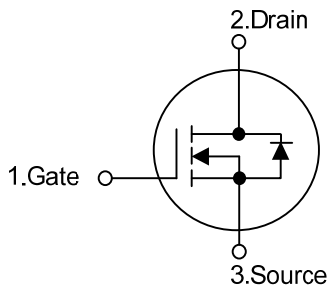
DESCRIPTION

The UTC **1D5N70K-TB** is a high voltage MOSFET designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and 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

- * $R_{DS(ON)} < 10\Omega @ V_{GS} = 10V, I_D = 1.5 A$
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

SYMBOL



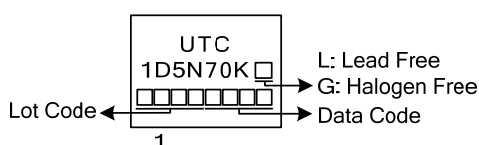
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
1D5N70KL-TN3-R	1D5N70KG-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>1D5N70KL-TN3-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) TN3: TO-252</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
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MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	700	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	1.5	A
	Pulsed (Note 2)	I_{DM}	6	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	57	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation		P_D	27	W
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. Repetitive Rating : Pulse width limited by T_J .

3. $L=45\text{mH}$, $I_{AS}=1.5\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 1.5\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	110	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	4.5	$^\circ\text{C}/\text{W}$

■ 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}	$V_{GS} = 0\text{V}$, $I_D = 250\ \mu\text{A}$	700			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 700\text{V}$, $V_{GS} = 0\text{V}$			10	μA
Gate-Source Leakage Current	Forward Reverse	I_{GSS} $V_{GS} = 30\text{V}$, $V_{DS} = 0\text{V}$ $V_{GS} = -30\text{V}$, $V_{DS} = 0\text{V}$			100	nA
					-100	nA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D = 250\ \mu\text{A}$, Referenced to 25°C		0.4		$\text{V}/^\circ\text{C}$
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$	3.5		5.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{V}$, $I_D = 1.5\text{A}$			10	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$		270		pF
Output Capacitance	C_{OSS}			30		pF
Reverse Transfer Capacitance	C_{RSS}			13		pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=30\text{V}$, $I_D=0.5\text{A}$, $R_G=25\ \Omega$ (Note 1, 2)		45		ns
Turn-On Rise Time	t_R			23		ns
Turn-Off Delay Time	$t_{D(OFF)}$			47		ns
Turn-Off Fall Time	t_F			8		ns
Total Gate Charge	Q_G	$V_{DS}=50\text{V}$, $I_D=1.3\text{A}$, $V_{GS}=10\text{V}$ (Note 1, 2)		17.5		nC
Gate-Source Charge	Q_{GS}			3.2		nC
Gate-Drain Charge	Q_{GD}			1.9		nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{V}$, $I_{SD} = 1.5\text{A}$			1.4	V
Continuous Drain-Source Current	I_{SD}				1.5	A
Pulsed Drain-Source Current	I_{SM}				6.0	A

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

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

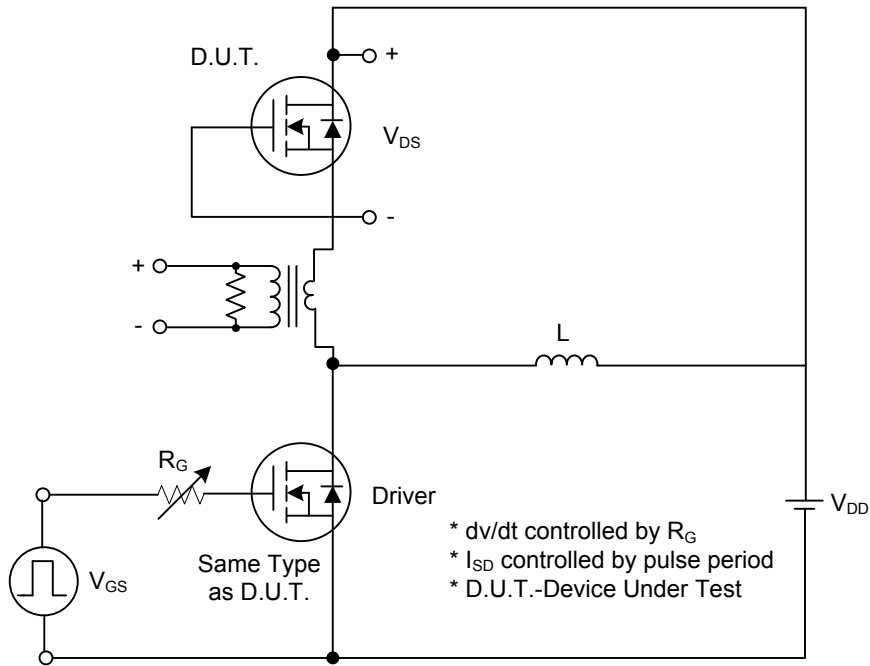


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

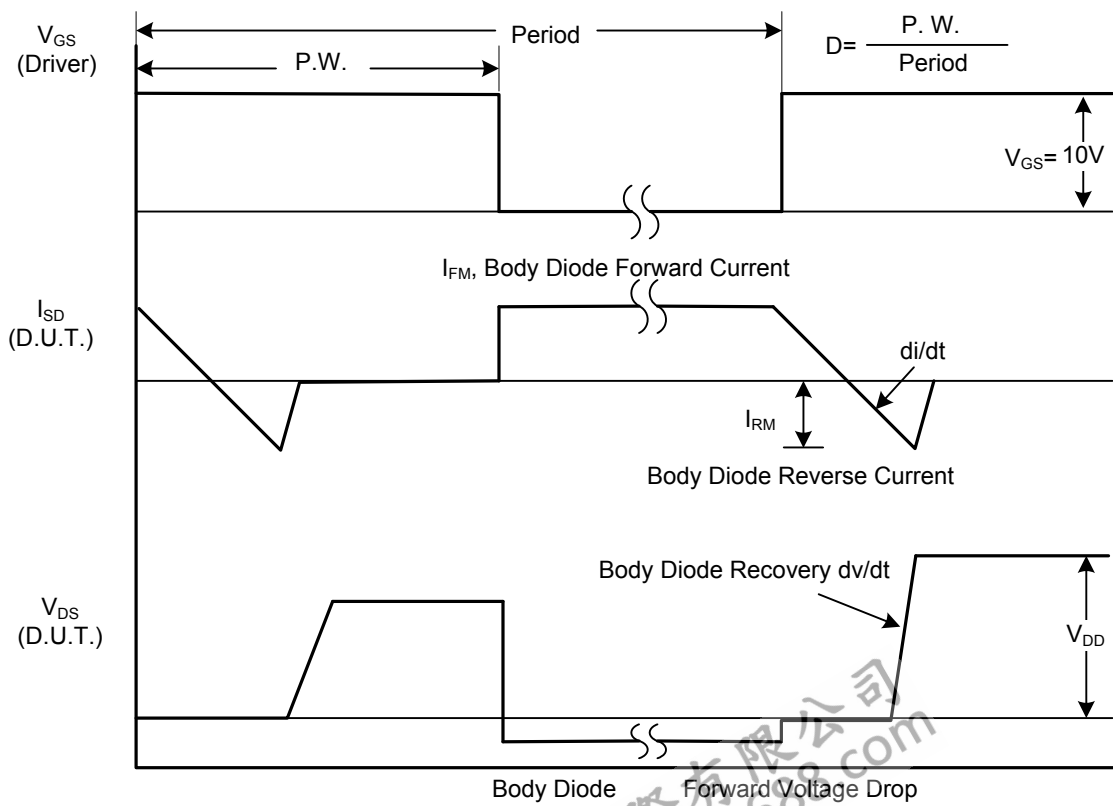


Fig. 1B Peak Diode Recovery dv/dt Waveforms

TEST CIRCUITS AND WAVEFORMS (Cont.)

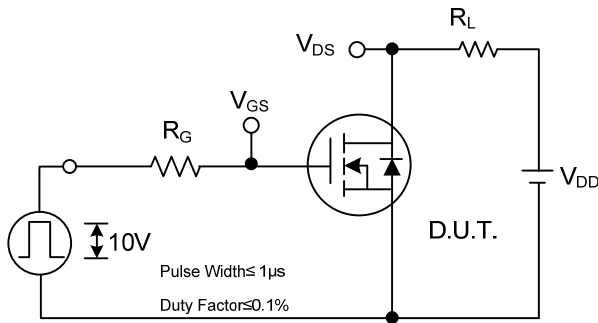


Fig. 2A Switching Test Circuit

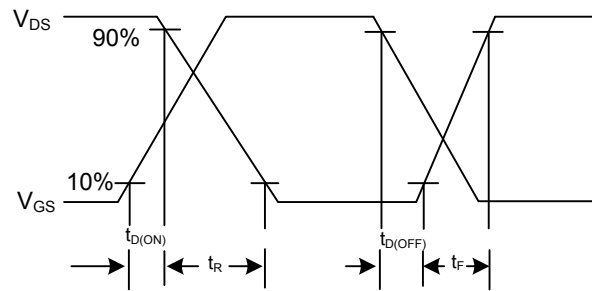


Fig. 2B Switching Waveforms

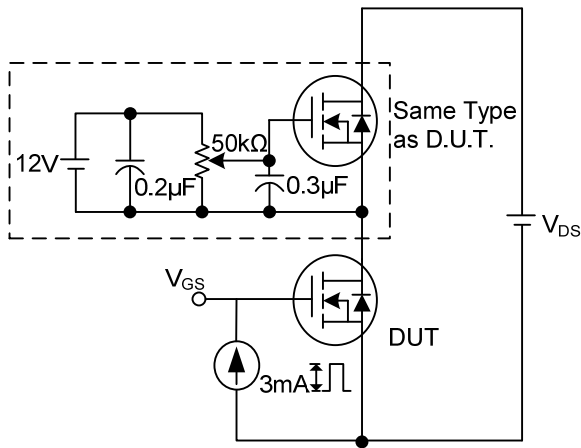


Fig. 3A Gate Charge Test Circuit

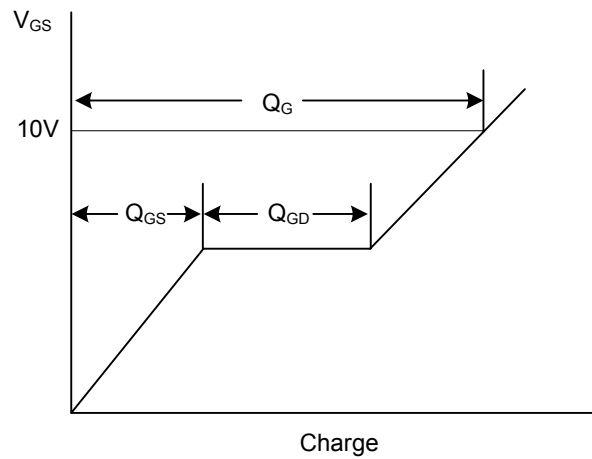


Fig. 3B Gate Charge Waveform

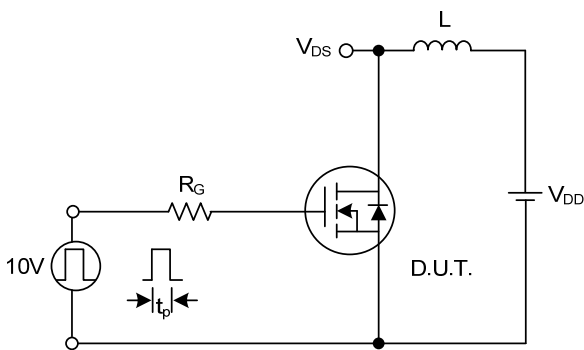


Fig. 4A Unclamped Inductive Switching Test Circuit

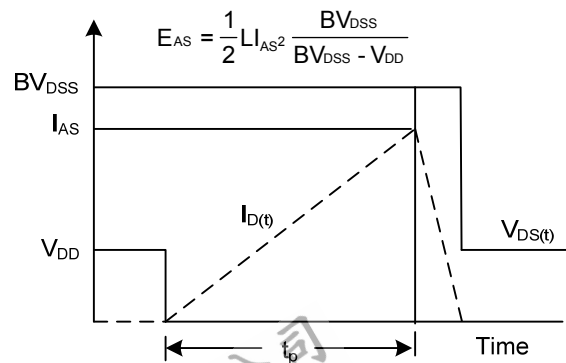


Fig. 4B Unclamped Inductive Switching Waveforms

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