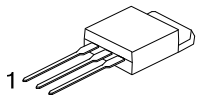
2N70Z

Power MOSFET

2A, 700V N-CHANNEL POWER MOSFET



TO-251

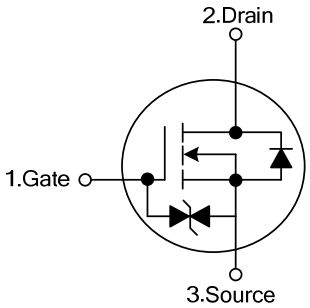
■ DESCRIPTION

The UTC **2N70Z** 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 in the high speed switching applications of power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

■ FEATURES

* $R_{DS(ON)}$ = 6.3Ω@V_{GS} = 10V
* Ultra Low gate charge (typical 8.1nC)
* Low reverse transfer capacitance (C_{RSS} = typical 5.0 pF)
* 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	
2N70ZL-TM3-T	2N70ZG-TM3-T	TO-251	G	D	S	Tube

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

2N70ZL-TA3-T (1)Packing Type (2)Package Type (3)Lead Plating	(1) T: Tube (2) TM3: TO-251 (3) L: Lead Free, G: Halogen Free

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	700	V
Gate-Source Voltage		V_{GSS}	±20	V
Avalanche Current (Note 2)		I_{AR}	2.0	A
Drain Current	Continuous	I_D	2.0	A
	Pulsed (Note 2)	I_{DM}	8.0	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	140	mJ
	Repetitive (Note 2)	E_{AR}	2.8	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation		P_D	30	W
Junction Temperature		T_J	+150	°C
Operating Temperature		T_{OPR}	-55 ~ +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 T_J
3. L=45mH, I_{AS}=2.0A, V_{DD}=50V, R_G=25 Ω, Starting T_J = 25°C
4. I_{SD}≤2.0A, di/dt≤200A/μs, V_{DD}≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	110	°C/W
Junction to Case	θ_{Jc}	4.24	°C/W

■ ELECTRICAL CHARACTERISTICS (T_J=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 = 250μA	700			V
Drain-Source Leakage Current		I_{DSS}	V_{DS} = 700V, V_{GS} = 0V			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS} = 20V, V_{DS} = 0V			5	μA
	Reverse		V_{GS} = -20V, V_{DS} = 0V			-5	μA
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	I_D = 250 μA, Referenced to 25°C		0.4		V/°C
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 =1A		5.0	6.3	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS} =25V, V_{GS} =0V, f =1MHz		270	350	pF
Output Capacitance		C_{OSS}			38	50	pF
Reverse Transfer Capacitance		C_{RSS}			5	7	pF

■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(ON)}$	V_{DD} =350V, I_D =2.0A, R_G=25Ω (Note 1, 2)			30	ns
Turn-On Rise Time	t_R				80	ns
Turn-Off Delay Time	$t_{D(OFF)}$				50	ns
Turn-Off Fall Time	t_F				70	ns
Total Gate Charge	Q_G	V_{DS}=560V, V_{GS}=10V, I_D=2.0A (Note 1, 2)		8.1	11	nC
Gate-Source Charge	Q_{GS}			1.7		nC
Gate-Drain Charge	Q_{GD}			4.4		nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_{SD} = 2.0 A			1.4	V
Continuous Drain-Source Current	I_{SD}				2.0	A
Pulsed Drain-Source Current	I_{SM}				8.0	A
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, I_{SD} = 2.0A di/dt = 100 A/μs (Note1)		260		ns
Reverse Recovery Charge	Q_{RR}			1.09		μC

Notes: 1. Pulse Test: Pulse width≤300μs, Duty cycle≤2%
2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

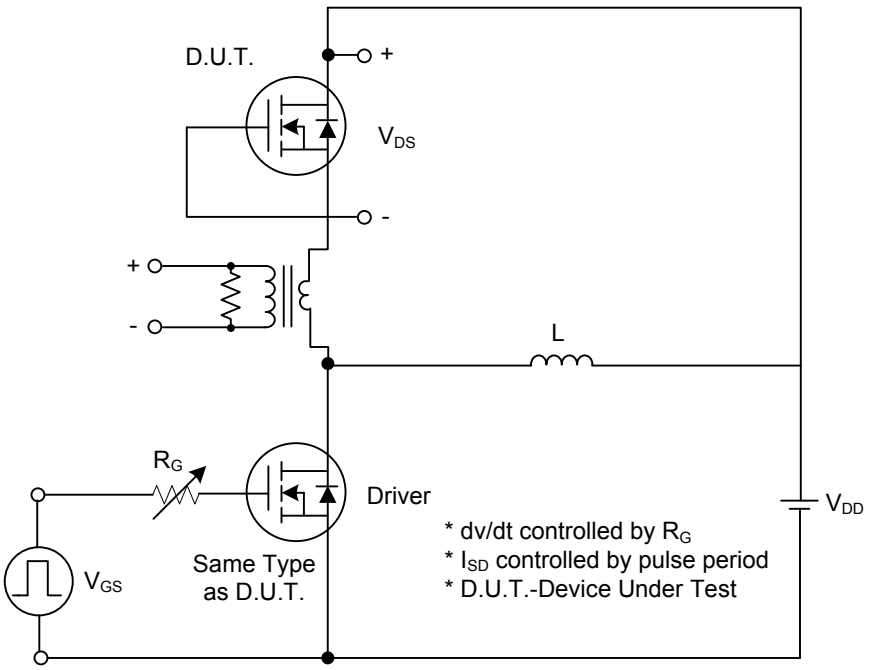


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

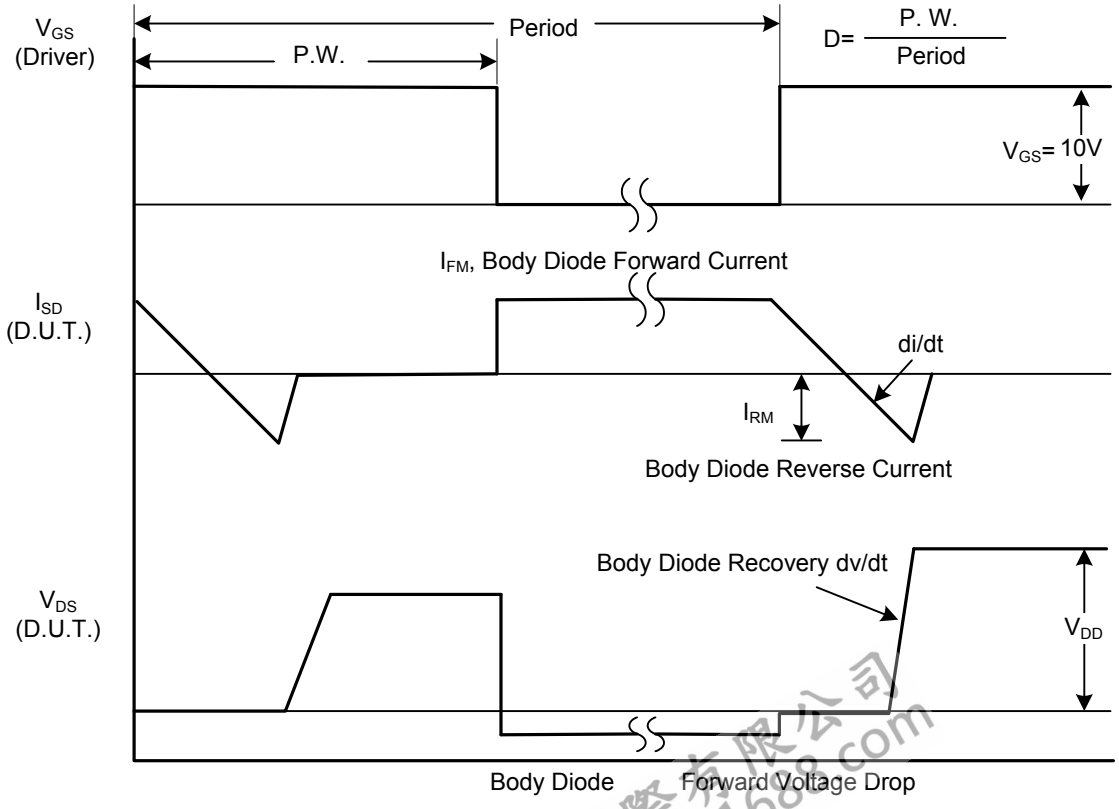


Fig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

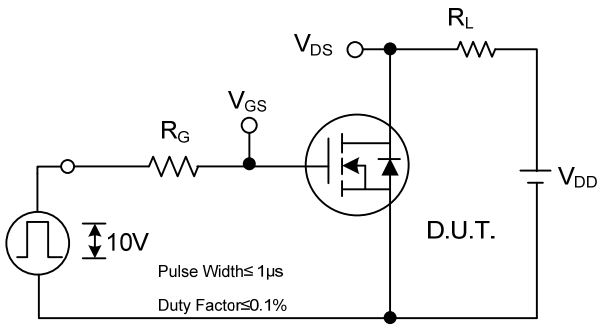


Fig. 2A Switching Test Circuit

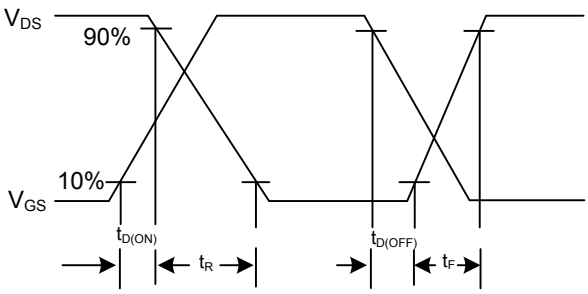


Fig. 2B Switching Waveforms

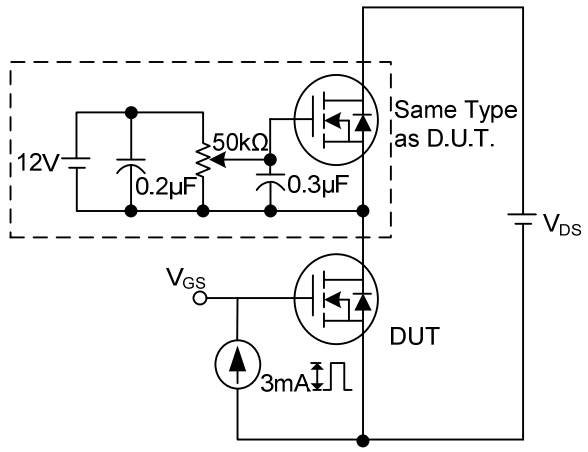


Fig. 3A Gate Charge Test Circuit

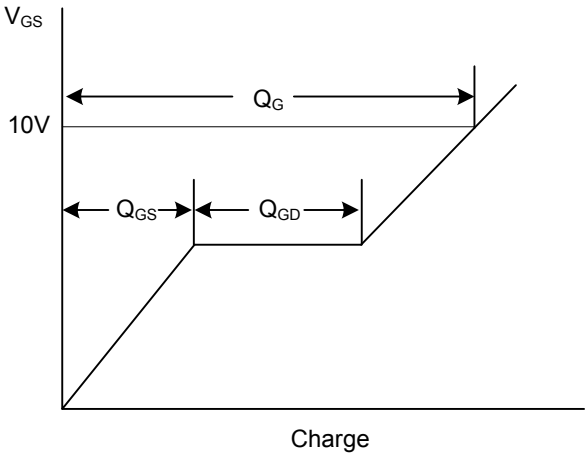


Fig. 3B Gate Charge Waveform

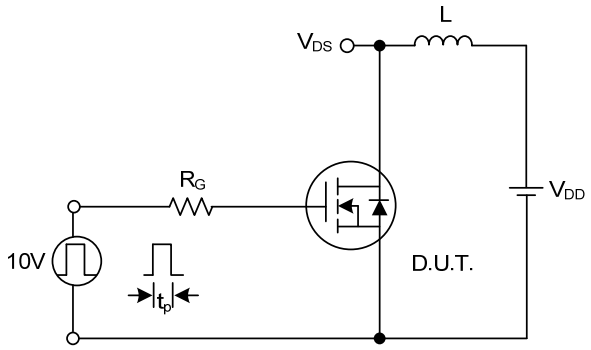


Fig. 4A Unclamped Inductive Switching Test Circuit

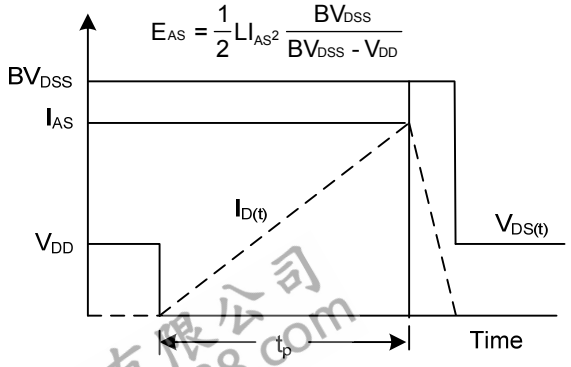


Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS