



1N70Q-TA

Power MOSFET

1.0A, 700V N-CHANNEL POWER MOSFET

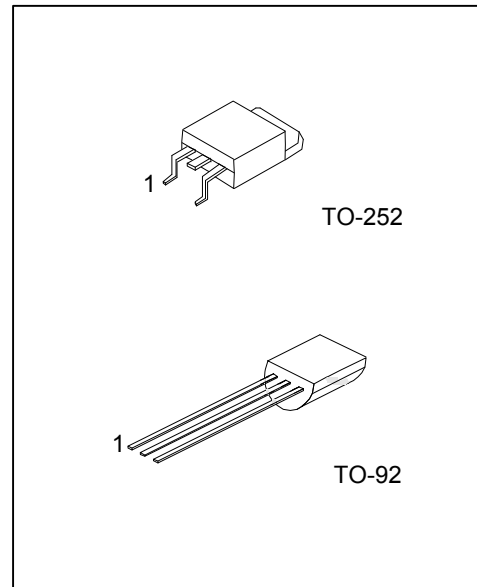
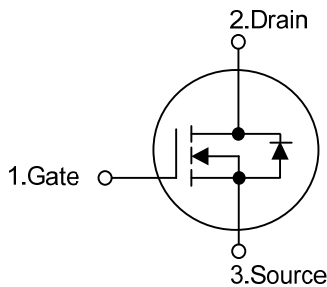
DESCRIPTION

The UTC **1N70Q-TA** 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 AC to DC converters and bridge circuits.

FEATURES

- * $R_{DS(ON)} \leq 12 \Omega$ @ $V_{GS} = 10V, I_D = 0.5A$
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

SYMBOL



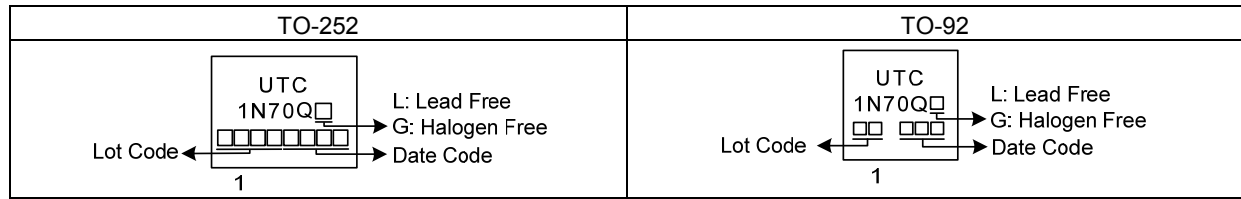
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
1N70QL-TN3-R	1N70QG-TN3-R	TO-252	G	D	S	Tape Reel
1N70QL-T92-B	1N70QG-T92-B	TO-92	G	D	S	Tape Box
1N70QL-T92-K	1N70QG-T92-K	TO-92	G	D	S	Bulk

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

<p>1N70QG-TN3-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) R: Tape Reel, B: Tape Box, K: Bulk</p> <p>(2) TN3: TO-252, T92: TO-92</p> <p>(3) G: Halogen Free and Lead Free, L: 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	A
	Pulsed (Note 2)	I_{DM}	2	A
Avalanche Current (Note 2)		I_{AR}	1.3	A
Avalanche Energy (Note 3)	Single Pulsed	E_{AS}	27	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.2	V/ns
Power Dissipation	TO-252	P_D	39.5	W
	TO-92		2.2	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. $L = 30\text{mH}$, $I_{AS} = 1.3\text{A}$, $V_{DD} = 60\text{V}$, $R_G = 25\Omega$, 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

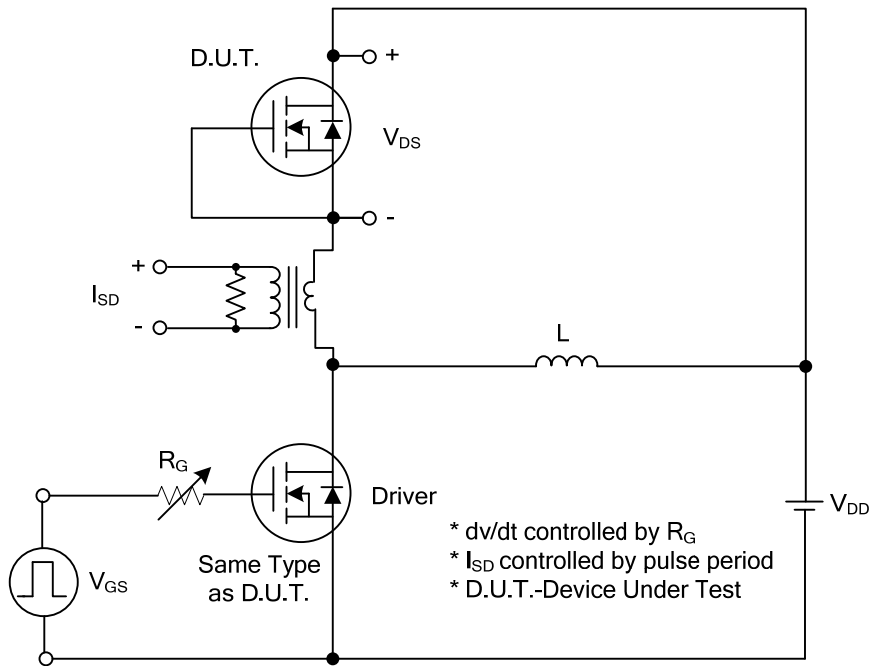
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-252	θ_{JA}	110	$^\circ\text{C}/\text{W}$
	TO-92		160	$^\circ\text{C}/\text{W}$
Junction to Case	TO-252	θ_{JC}	3.16	$^\circ\text{C}/\text{W}$
	TO-92		56.8	$^\circ\text{C}/\text{W}$

■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified.)

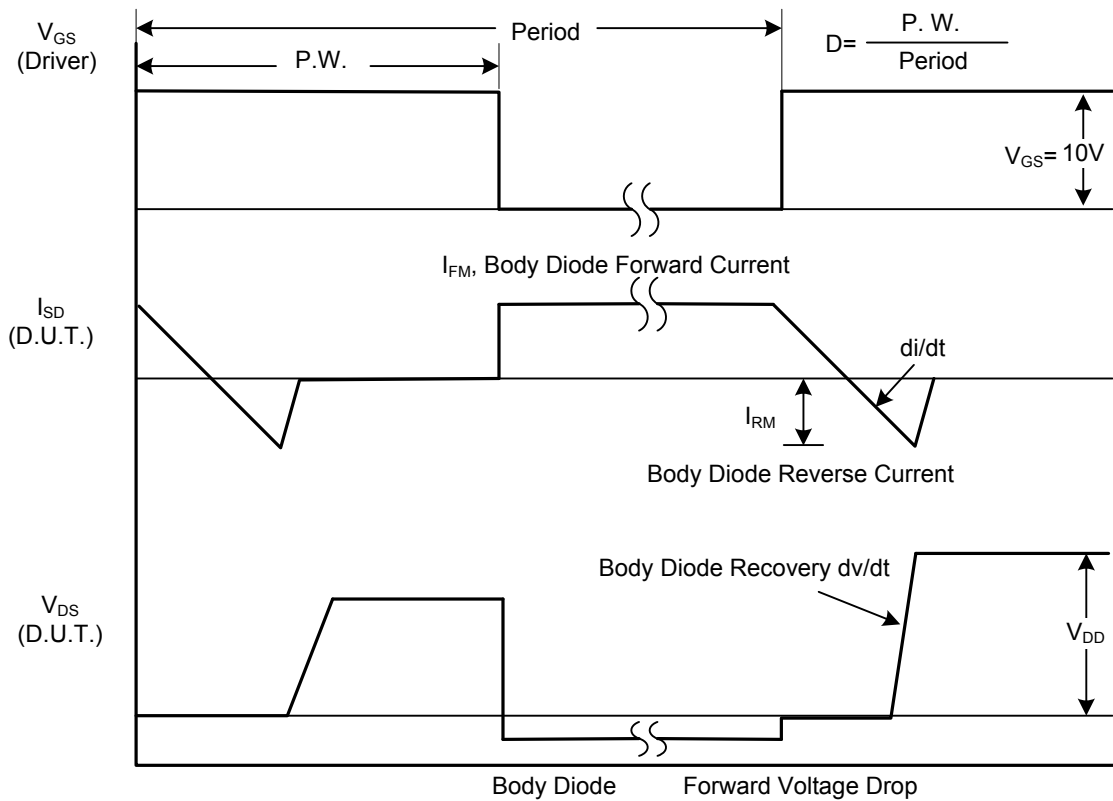
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D = 250μA	700			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} = 700V, V _{GS} = 0V			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}			100	nA
	Reverse					
		V _{GS} = -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	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1MHz		140.1		pF
Output Capacitance	C _{OSS}			20.3		pF
Reverse Transfer Capacitance	C _{RSS}			2.3		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q _G	V _{DS} =560V, V _{GS} =10V, I _D =1A, I _G =1mA (Note 1, 2)		8.9		nC
Gate to Source Charge	Q _{GS}			3.7		nC
Gate to Drain Charge	Q _{GD}			1.1		nC
Turn-ON Delay Time (Note 1)	t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =1A, R _G =25Ω(Note 1, 2)		4.1		ns
Rise Time	t _R			16.3		ns
Turn-OFF Delay Time	t _{D(OFF)}			16.4		ns
Fall-Time	t _F			38.3		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				1	A
Maximum Body-Diode Pulsed Current	I _{SM}				2	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	V _{GS} =0V, I _S =1.0A			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t _{rr}	V _{GS} =0V, I _S =1.0A, dI _F / dt =100A/μs		166		nS
Body Diode Reverse Recovery Charge	Q _{rr}				952.3	

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

TEST CIRCUITS AND WAVEFORMS

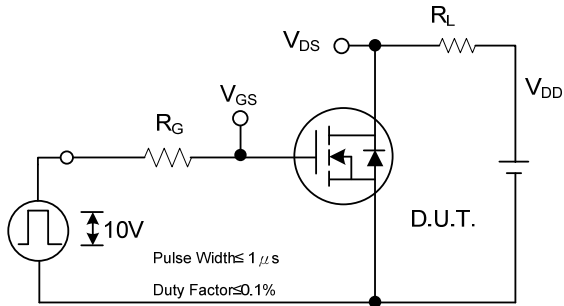


Peak Diode Recovery dv/dt Test Circuit

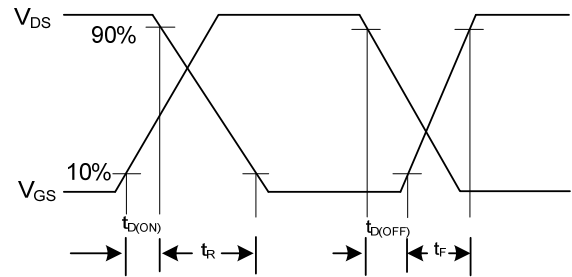


Peak Diode Recovery dv/dt Waveforms

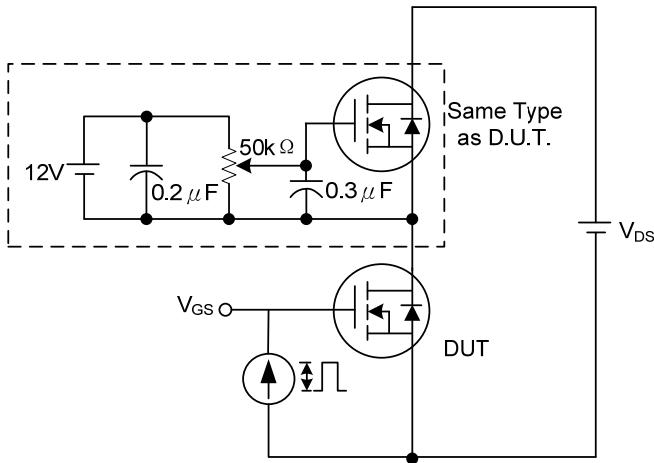
TEST CIRCUITS AND WAVEFORMS



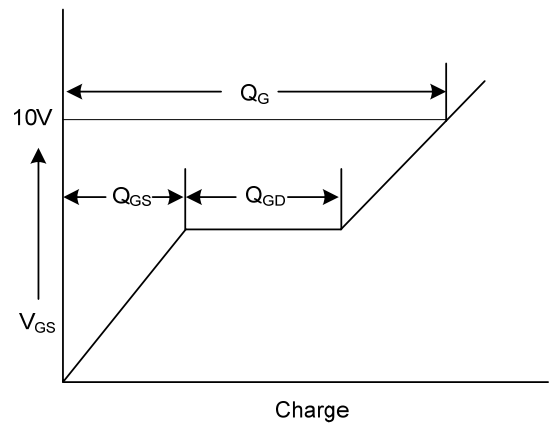
Switching Test Circuit



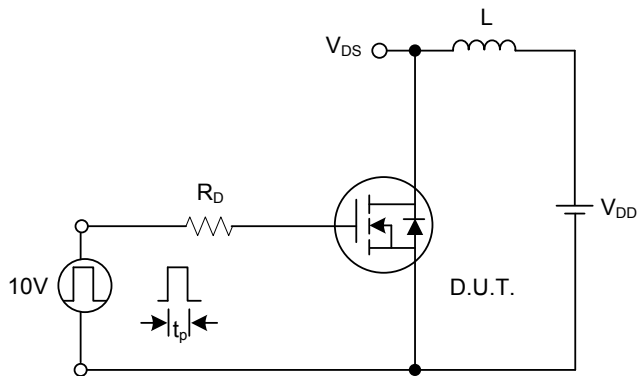
Switching Waveforms



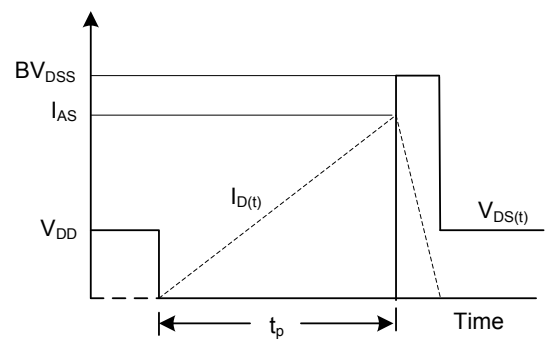
Gate Charge Test Circuit



Gate Charge Waveform

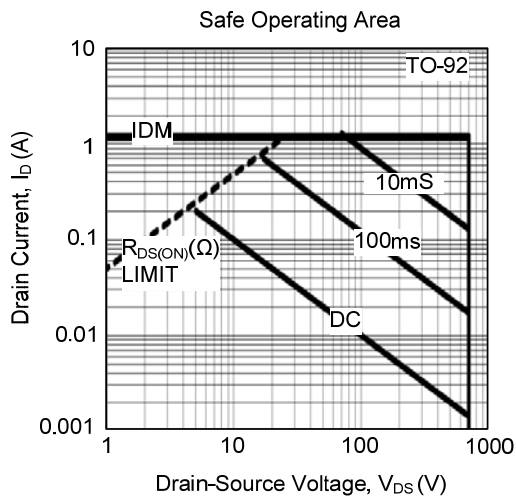


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



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