



**1NM70-V**

Preliminary

*Power MOSFET*

**1.0A, 700V N-CHANNEL SUPER-JUNCTION MOSFET**

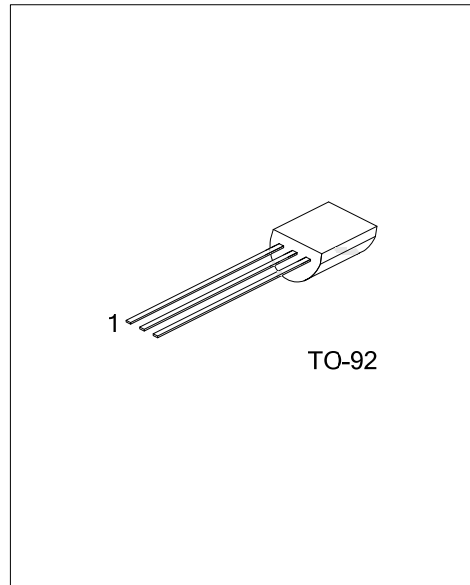
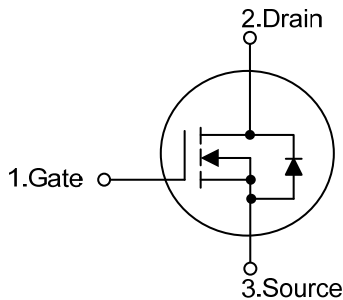
■ DESCRIPTION

The **UTC 1NM70-V** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

■ FEATURES

- \*  $R_{DS(on)} \leq 3.5 \Omega @ V_{GS}=10V, I_D=0.5A$
- \* Fast switching capability
- \* Avalanche energy specified
- \* Improved dv/dt capability, high ruggedness

■ SYMBOL



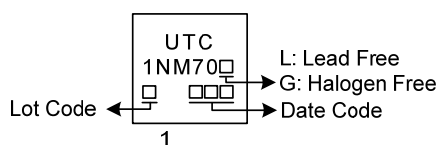
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
1NM70L-T92-B	1NM70G-T92-B	TO-92	G	D	S	Tape Box
1NM70L-T92-K	1NM70G-T92-K	TO-92	G	D	S	Bulk

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

<p>1NM70G-T92-B</p>	<p>(1) B: Tape Box, K: Bulk (2) T92: TO-92 (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	$V_{GSS}$	$\pm 30$	V
Continuous Drain Current	$I_D$	1	A
Pulsed Drain Current (Note 2)	$I_{DM}$	2	A
Avalanche Energy (Note 3)   Single Pulsed	$E_{AS}$	22	mJ
Peak Diode Recovery dv/dt (Note 4)	dv/dt	4.8	V/ns
Power Dissipation ( $T_A=25^\circ\text{C}$ )	$P_D$	1.6	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.  $L=138\text{mH}$ ,  $I_{AS}=0.5\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\ \Omega$ , 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	$\theta_{JA}$	180	$^\circ\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	75	$^\circ\text{C}/\text{W}$

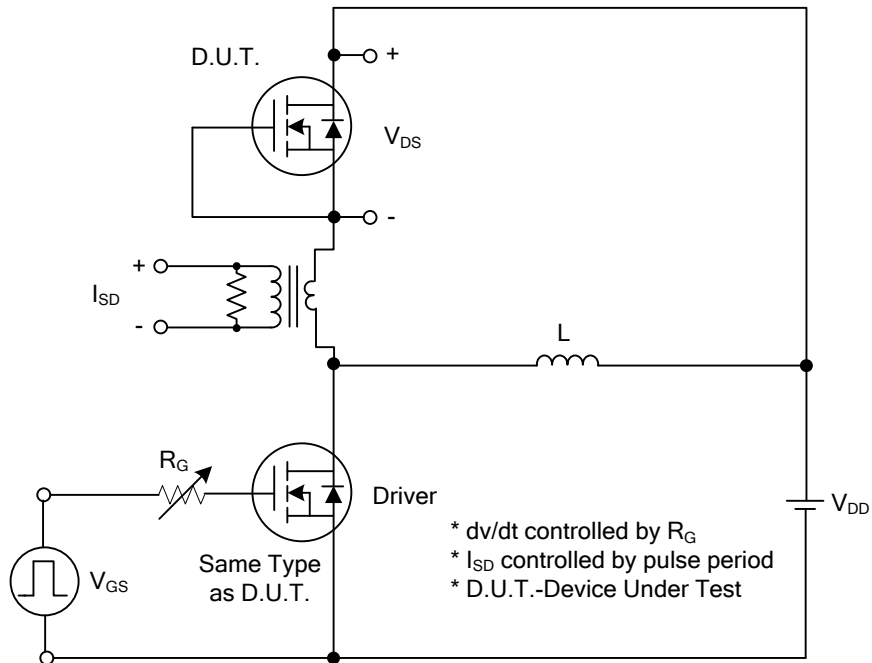
■ ELECTRICAL CHARACTERISTICS (T<sub>C</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	700			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = 700V, V <sub>GS</sub> = 0V			10	μA
Gate-Source Leakage Current	Forward	I <sub>GSS</sub>			100	nA
	Reverse					
		V <sub>GS</sub> = -30V, V <sub>DS</sub> = 0V			-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	2.5		4.5	V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 0.5A			3.5	Ω
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1MHz		124.7		pF
Output Capacitance	C <sub>OSS</sub>			69.4		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			6.2		pF
<b>SWITCHING CHARACTERISTICS</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> = 560V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 1A, I <sub>G</sub> = 1mA (Note 1, 2)		9.8		nC
Gate-Source Charge	Q <sub>GS</sub>			2.8		nC
Gate-Drain Charge	Q <sub>GD</sub>			1.5		nC
Turn-On Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> = 100V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 1A, R <sub>G</sub> = 25Ω (Note 1, 2)		3.6		ns
Turn-On Rise Time	t <sub>R</sub>			16.7		ns
Turn-Off Delay Time	t <sub>D(OFF)</sub>			19		ns
Turn-Off Fall Time	t <sub>F</sub>			38.3		ns
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>				1	A
Maximum Pulsed Drain-Source Diode Forward Current	I <sub>SD</sub>				2	A
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = 1.0A, V <sub>GS</sub> = 0V			1.4	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 1.0A, V <sub>DD</sub> = 100V		128		ns
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 100A/μs		0.6		μC

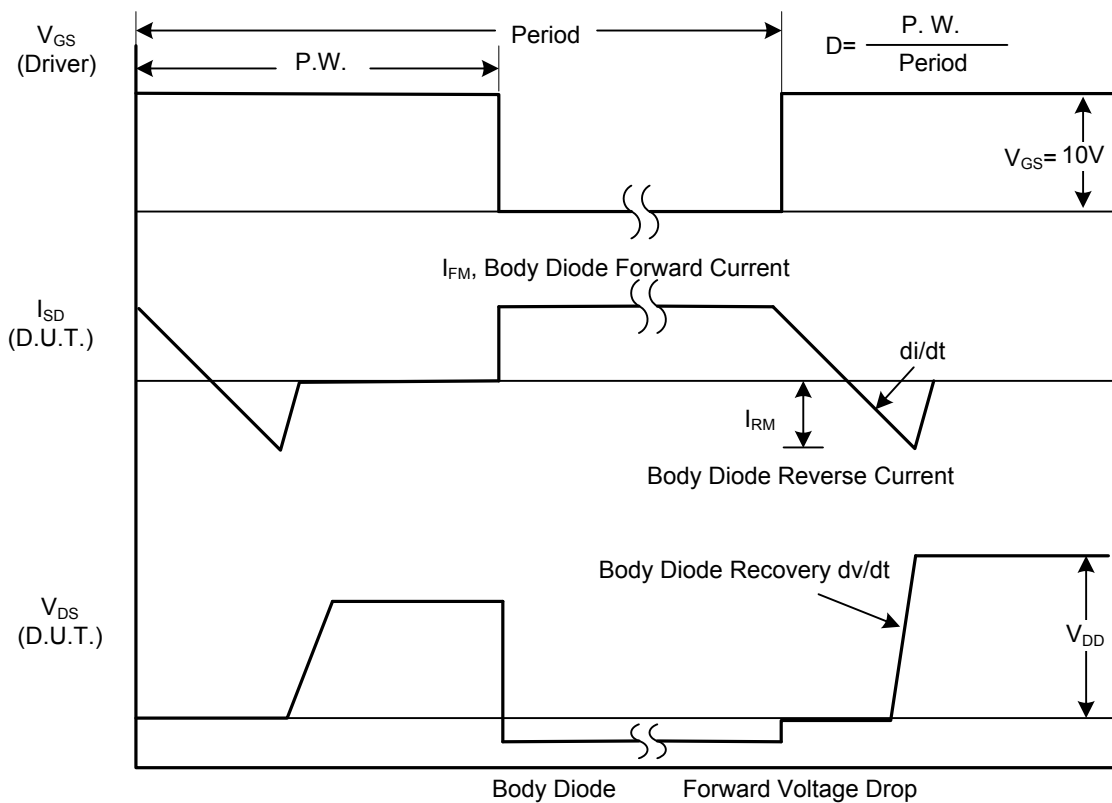
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

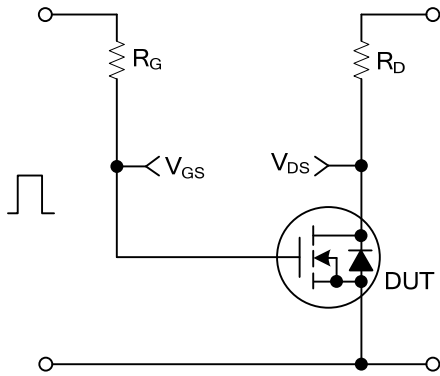


Peak Diode Recovery dv/dt Test Circuit

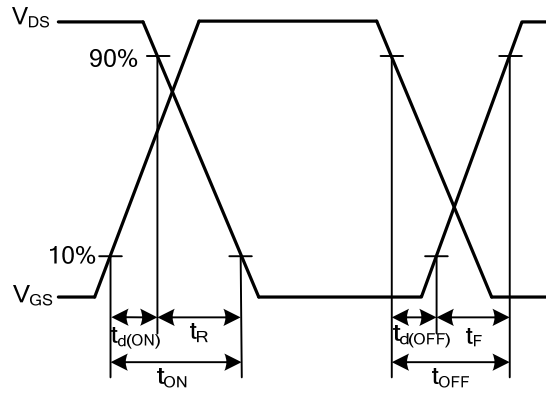


Peak Diode Recovery dv/dt Waveforms

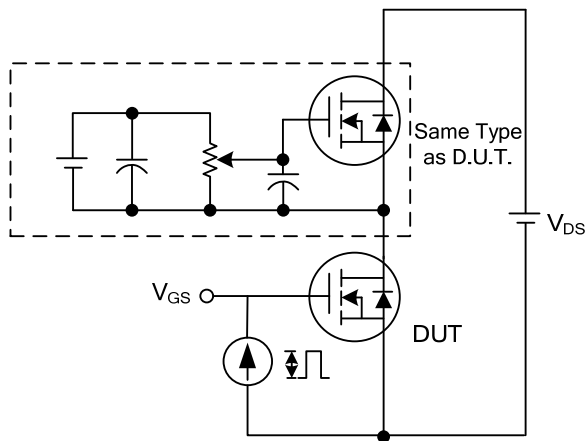
■ TEST CIRCUITS AND WAVEFORMS



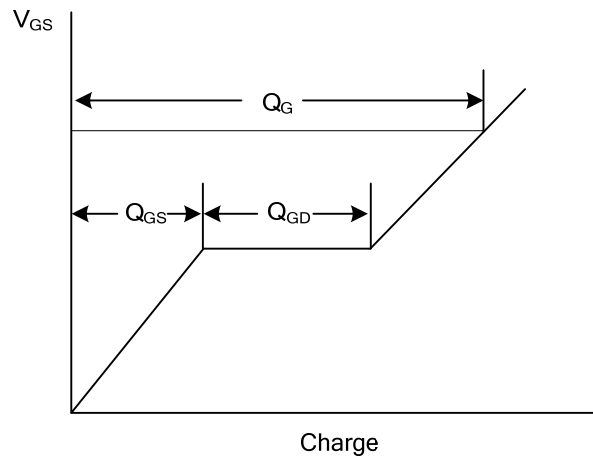
Switching Test Circuit



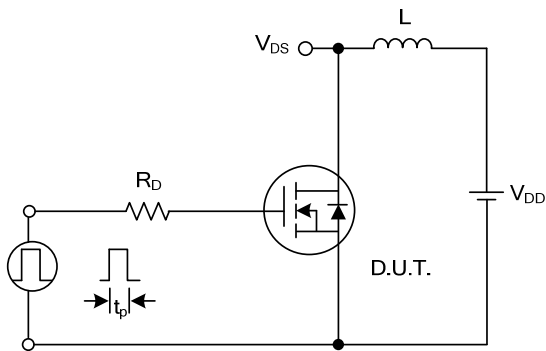
Switching Waveforms



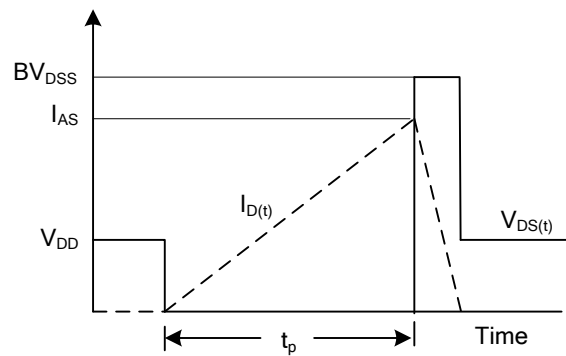
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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