



# 18NM70

**Power MOSFET**

## 18A, 700V N-CHANNEL SUPER-JUNCTION MOSFET

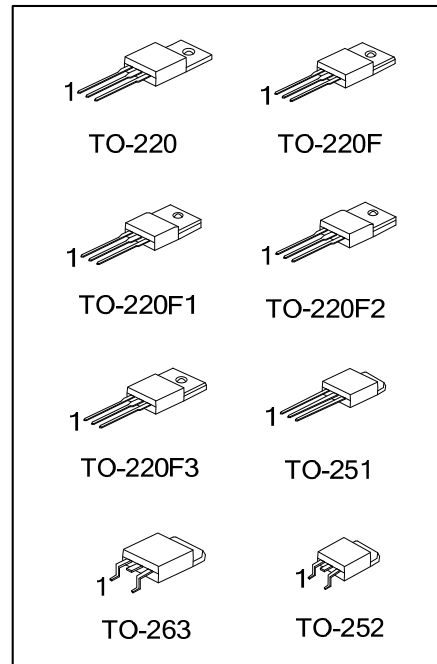
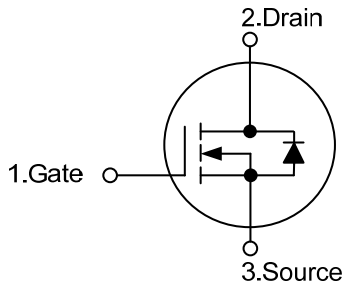
■ DESCRIPTION

The **UTC 18NM70** 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 DC-DC, AC-DC converters for power applications.

■ FEATURES

- \*  $R_{DS(ON)} < 0.35\Omega @ V_{GS}=10V, I_D=9.0A$
- \* Fast Switching Capability
- \* Avalanche Energy Specified
- \* Improved dv/dt Capability, High Ruggedness

■ SYMBOL



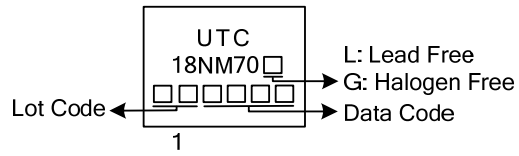
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
18NM70L-TA3-T	18NM70G-TA3-T	TO-220	G	D	S	Tube
18NM70L-TF3-T	18NM70G-TF3-T	TO-220F	G	D	S	Tube
18NM70L-TF1-T	18NM70G-TF1-T	TO-220F1	G	D	S	Tube
18NM70L-TF2-T	18NM70G-TF2-T	TO-220F2	G	D	S	Tube
18NM70L-TF3T-T	18NM70G-TF3T-T	TO-220F3	G	D	S	Tube
18NM70L-TM3-T	18NM70G-TM3-T	TO-251	G	D	S	Tube
18NM70L-TN3-R	18NM70G-TN3-R	TO-252	G	D	S	Tape Reel
18NM70L-TQ2-T	18NM70G-TQ2-T	TO-263	G	D	S	Tube
18NM70L-TQ2-R	18NM70G-TQ2-R	TO-263	G	D	S	Tape Reel

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

<p>18NM70L-TA3-T</p>	<p>(1) T: Tube, R: Tape Reel                  (2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TF3T: TO-220F3, TM3: TO-251, TN3: TO-252, TQ2: TO-263                  (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 to Source Voltage		$V_{DSS}$	700	V
Gate to Source Voltage		$V_{GSS}$	$\pm 30$	V
Continuous Drain Current	Continuous	$I_D$	18	A
Pulsed Drain Current	Pulsed (Note 2)	$I_{DM}$	45	A
Avalanche Current		$I_{AR}$	4.1	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	546	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.0	V/ns
Power Dissipation	TO-220/TO-263	$P_D$	235	W
	TO-220F/TO-220F1 TO-220F2/ TO-220F3		39	W
	TO-251/TO-252		192	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.  $L=65\text{mH}$ ,  $I_{AS}=4.1\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$ .

4.  $I_{SD} \leq 18\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$ .

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2 TO-220F3/TO-263	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		110	
	TO-220/TO-263		0.53	
	TO-220F/TO-220F1 TO-220F2/TO-220F3		3.2	
Junction to Case	TO-251/TO-252		0.65	$^\circ\text{C}/\text{W}$

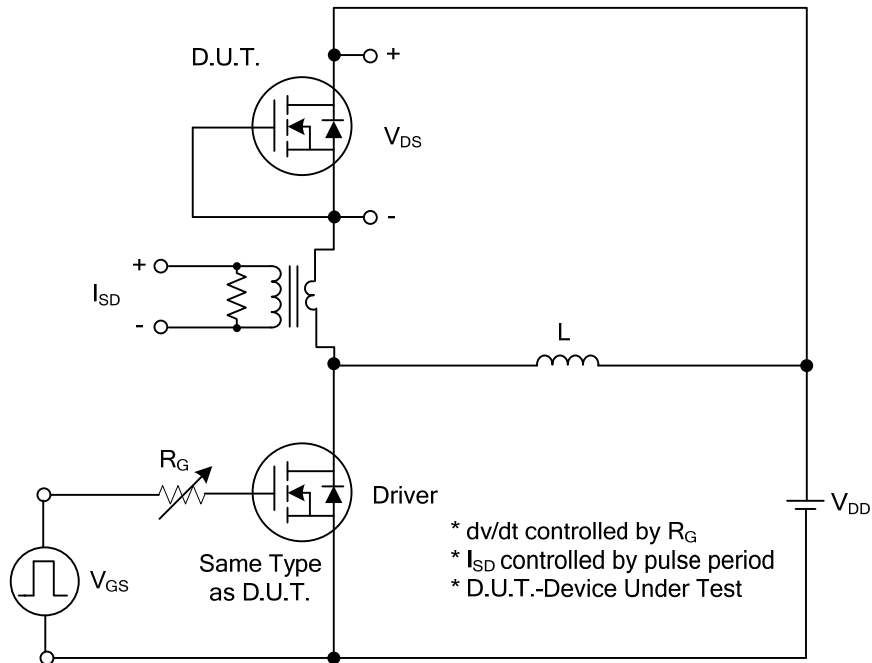
■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub> =25°C, unless otherwise specified)

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-Body Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±30V			±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-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =9.0A			0.35	Ω
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz		340		pF
Output Capacitance	C <sub>OSS</sub>			295		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			30		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge (Note 1)	Q <sub>G</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =1.3A, I <sub>G</sub> =100μA (Note 1, 2)		200		nC
Gate to Source Charge	Q <sub>GS</sub>			11		nC
Gate to Drain Charge	Q <sub>GD</sub>			30		nC
Turn-ON Delay Time (Note 1)	t <sub>D(ON)</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, I <sub>D</sub> =0.5A, R <sub>G</sub> =25Ω (Note 1, 2)		70		ns
Rise Time	t <sub>R</sub>			175		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			300		ns
Fall-Time	t <sub>F</sub>			175		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>				18	A
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				54	A
Drain-Source Diode Forward Voltage (Note 1)	V <sub>SD</sub>	I <sub>S</sub> =18A, V <sub>GS</sub> =0V			1.5	V
Body Diode Reverse Recovery Time (Note 1)	t <sub>rr</sub>	I <sub>S</sub> =18A, V <sub>GS</sub> =0V dI <sub>F</sub> /dt=100A/μs		440		ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>				7.8	

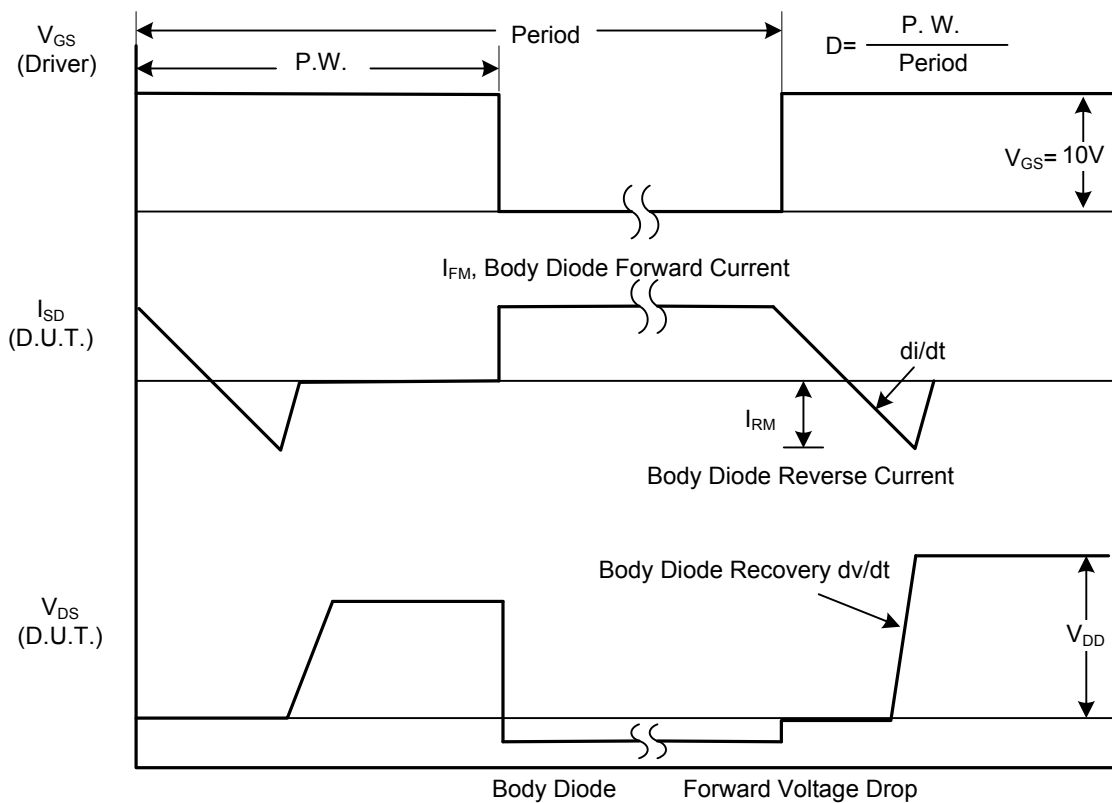
Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating ambient temperature.

## TEST CIRCUITS AND WAVEFORMS

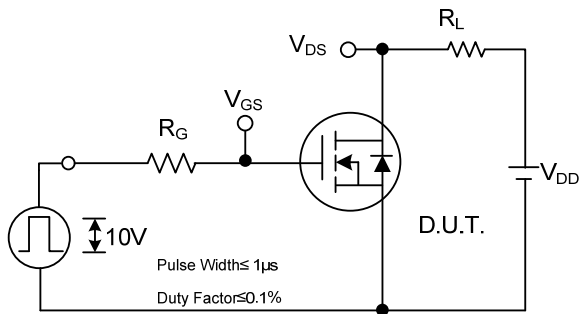


**Peak Diode Recovery  $dv/dt$  Test Circuit**

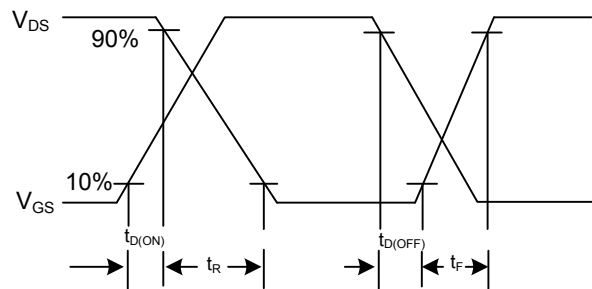


**Peak Diode Recovery  $dv/dt$  Waveforms**

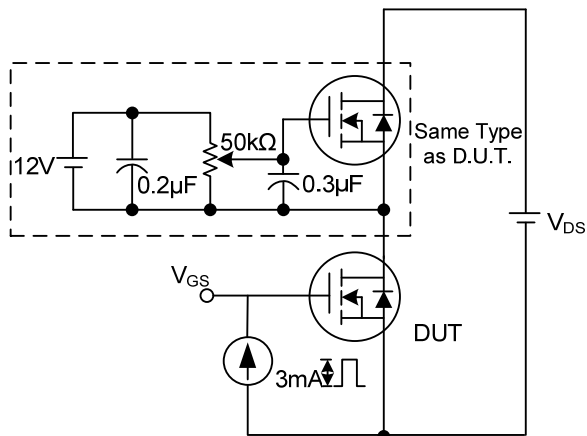
## TEST CIRCUITS AND WAVEFORMS (Cont.)



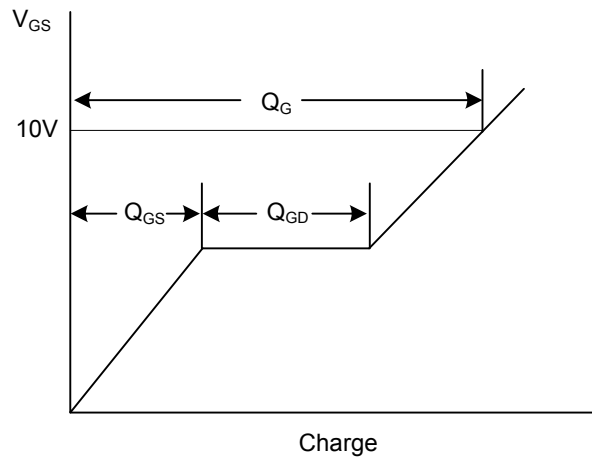
**Switching Test Circuit**



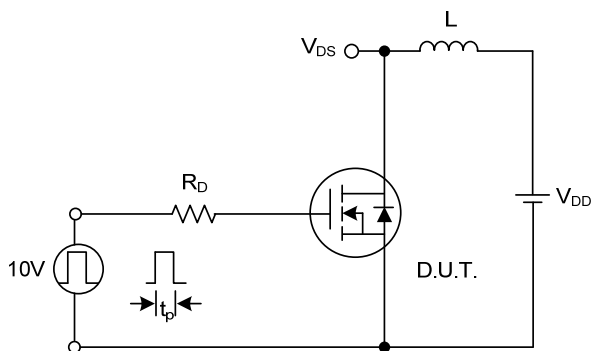
**Switching Waveforms**



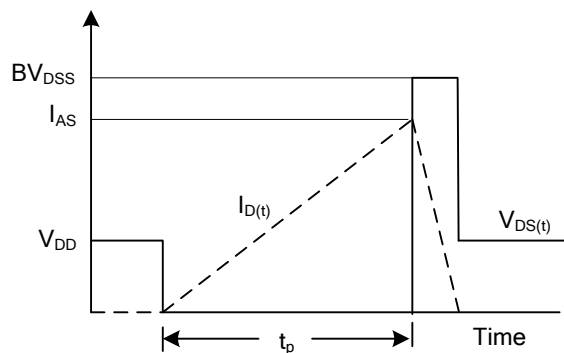
**Gate Charge Test Circuit**



**Gate Charge Waveform**



**Unclamped Inductive Switching Test Circuit**



**Unclamped Inductive Switching Waveforms**

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