



11NM70

Power MOSFET

11A, 700V N-CHANNEL SUPER-JUNCTION MOSFET

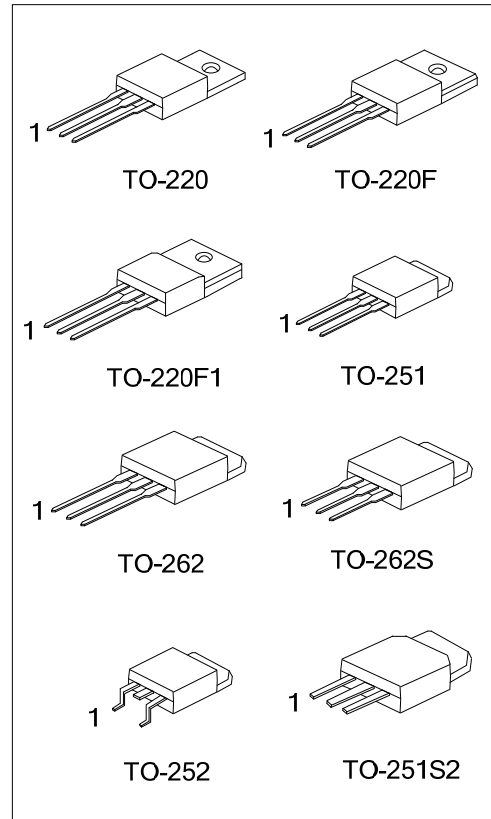
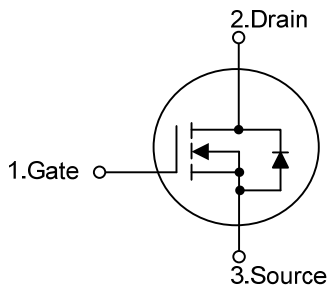
DESCRIPTION

The **UTC 11NM70** 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

- * $R_{DS(ON)} < 0.58\Omega @ V_{GS}=10V, I_D=5.5A$
- * By using Super Junction Structure
- * Fast Switching
- * With 100% Avalanche Tested

SYMBOL



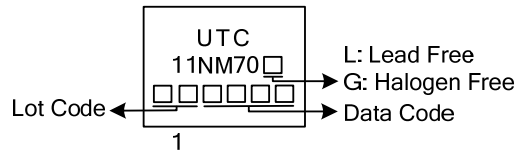
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
11NM70L-TA3-T	11NM70G-TA3-T	TO-220	G	D	S	Tube
11NM70L-TF3-T	11NM70G-TF3-T	TO-220F	G	D	S	Tube
11NM70L-TF1-T	11NM70G-TF1-T	TO-220F1	G	D	S	Tube
11NM70L-TM3-T	11NM70G-TM3-T	TO-251	G	D	S	Tube
11NM70L-TMS2-T	11NM70G-TMS2-T	TO-251S2	G	D	S	Tube
11NM70L-TN3-R	11NM70G-TN3-R	TO-252	G	D	S	Tape Reel
11NM70L-T2Q-T	11NM70G-T2Q-T	TO-262	G	D	S	Tube
11NM70L-T2S-T	11NM70G-T2S-T	TO-262S	G	D	S	Tube

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

<p>11NM70L-TA3-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF3: TO-220F, TM3: TO-251, TMS2: TO-251S2, TN3: TO-252, T2Q: TO-262, T2S: TO-262S (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}	± 30	V
Continuous Drain Current	Continuous	I_D	11	A
Pulsed Drain Current	Pulsed (Note 2)	I_{DM}	44	A
Avalanche Current		I_{AR}	2.9	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	273	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220/TO-262 TO-262S	P_D	162	W
	TO-220F/TO-220F1		24	W
	TO-251/TO-251S2 TO-252		80	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. $L=65\text{mH}$, $I_{AS}=2.9\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$.

4. $I_{SD}\leq 11\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220F/TO-220F1	θ_{JC}	5.2	$^\circ\text{C}/\text{W}$
	TO-220/TO-262 TO-262S		0.77	$^\circ\text{C}/\text{W}$
	TO-251/TO-252 TO-251S2		1.56	$^\circ\text{C}/\text{W}$

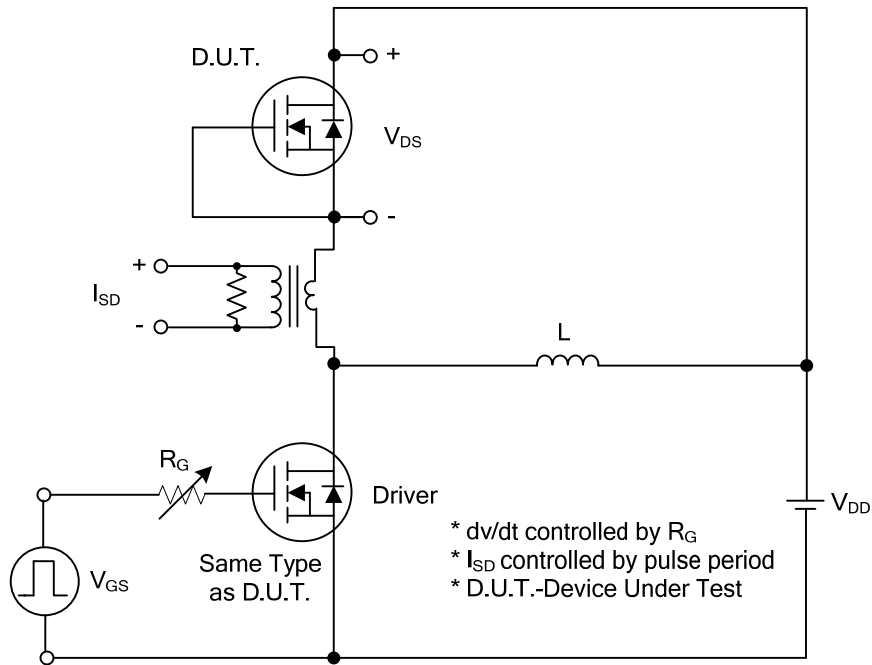
■ ELECTRICAL CHARACTERISTICS ($T_J=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	700			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=700V, V_{GS}=0V$			10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 30V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5		4.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5.5A$			0.58	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1.0\text{MHz}$		850		pF
Output Capacitance	C_{OSS}			220		pF
Reverse Transfer Capacitance	C_{RSS}			12		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=50V, V_{GS}=10V, I_D=1.3A, I_G=100\mu A$ (Note 1, 2)		70		nC
Gate to Source Charge	Q_{GS}			8		nC
Gate to Drain Charge	Q_{GD}			18		nC
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$	$V_{DD}=30V, V_{GS}=10V, I_D=0.5A, R_G=25\Omega$ (Note 1, 2)		65		ns
Rise Time	t_R			62		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			220		ns
Fall-Time	t_F			78		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				11	A
Maximum Body-Diode Pulsed Current	I_{SM}				44	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_S=11A, V_{GS}=0V$			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t_{rr}	$I_S=11A, V_{GS}=0V$		400		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$di/dt=100A/\mu s$		5.4		μC

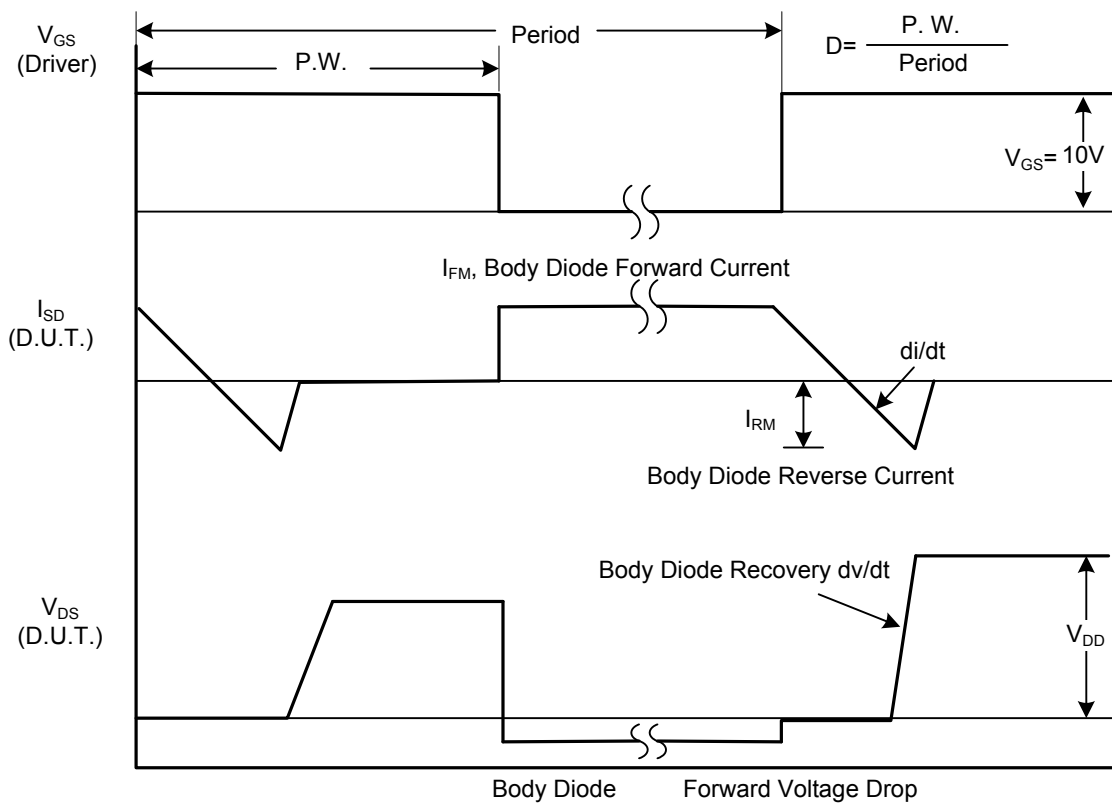
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS



Peak Diode Recovery dv/dt Test Circuit

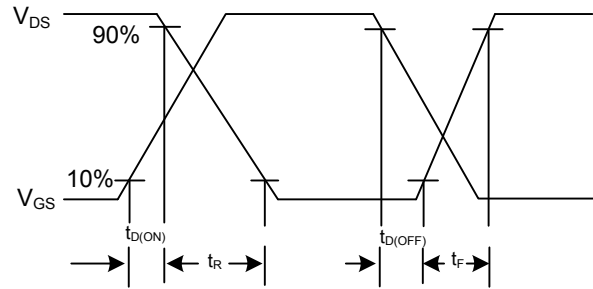


Peak Diode Recovery dv/dt Waveforms

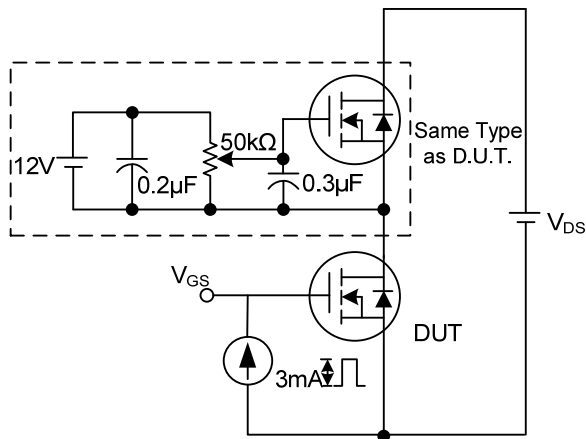
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



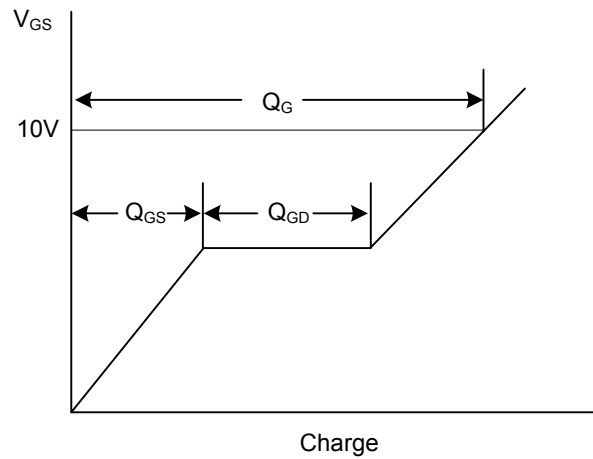
Switching Test Circuit



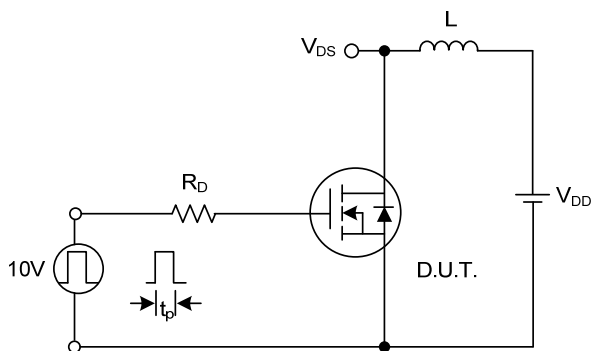
Switching Waveforms



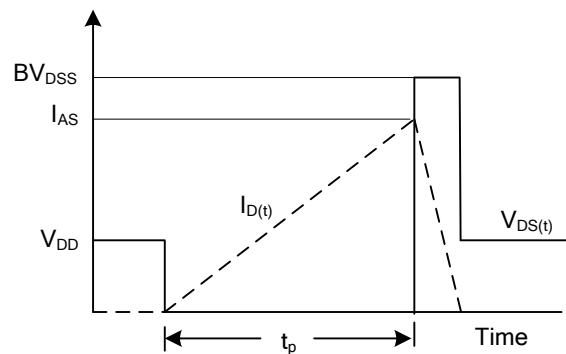
Gate Charge Test Circuit



Gate Charge Waveform

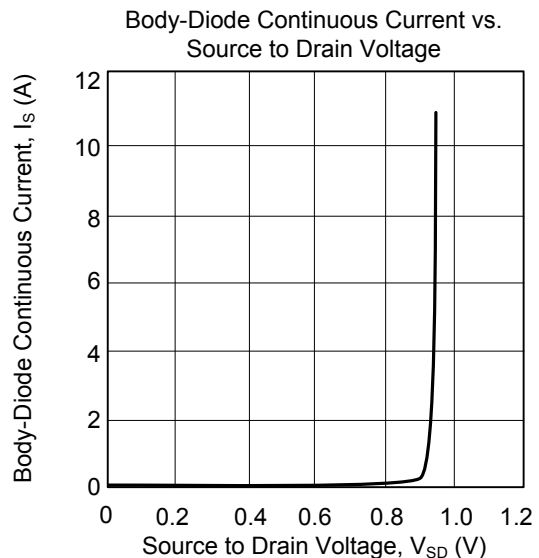
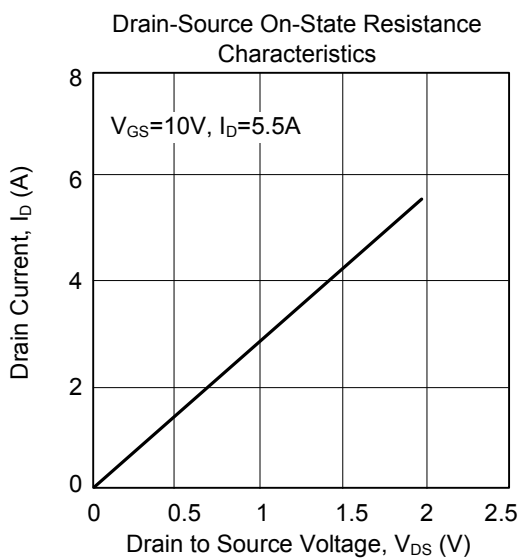
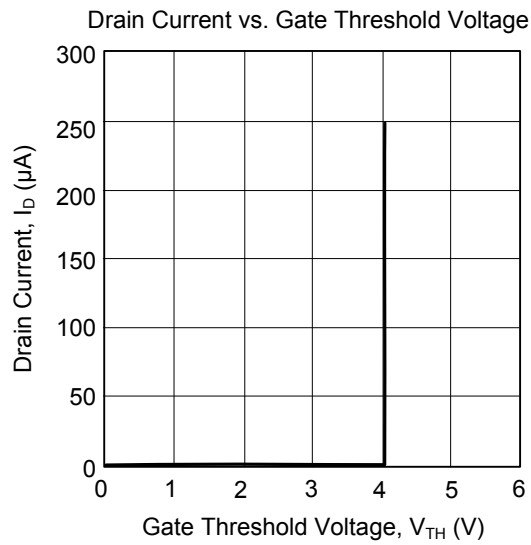
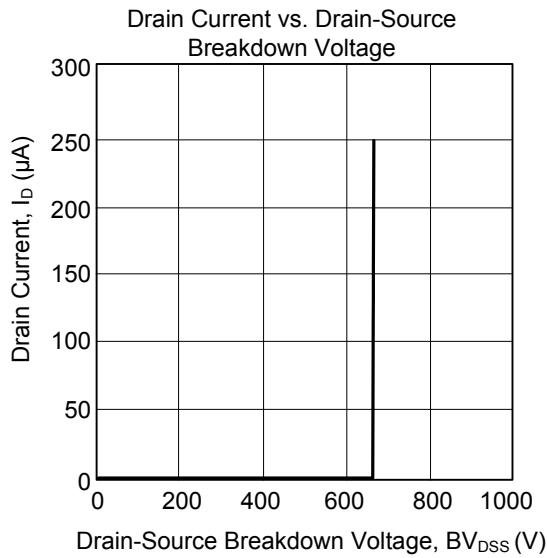


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS



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