



10NM70-U2

Power MOSFET

10A, 700V N-CHANNEL SUPER-JUNCTION MOSFET

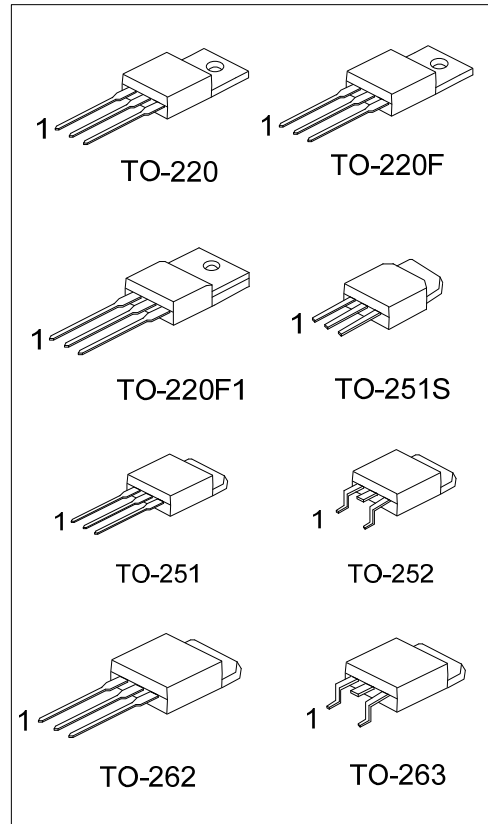
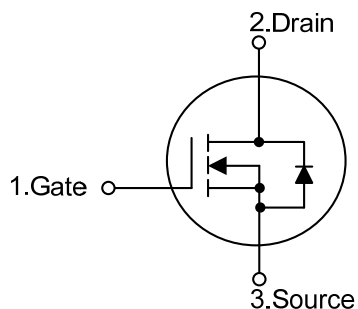
DESCRIPTION

The **UTC 10NM70-U2** 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

- * $R_{DS(ON)} \leq 0.69 \Omega$ @ $V_{GS}=10V$, $I_D=5.0A$
- * By using Super Junction Structure
- * Fast Switching
- * With 100% Avalanche Tested

SYMBOL



Power MOSFET

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
10NM70L-TA3-T	10NM70G-TA3-T	TO-220	G	D	S	Tube
10NM70L-TF3-T	10NM70G-TF3-T	TO-220F	G	D	S	Tube
10NM70L-TF1-T	10NM70G-TF1-T	TO-220F1	G	D	S	Tube
10NM70L-TM3-T	10NM70G-TM3-T	TO-251	G	D	S	Tube
10NM70L-TMS-T	10NM70G-TMS-T	TO-251S	G	D	S	Tube
10NM70L-TN3-R	10NM70G-TN3-R	TO-252	G	D	S	Tape Reel
10NM70L-T2Q-T	10NM70G-T2Q-T	TO-262	G	D	S	Tube
10NM70L-TQ2-T	10NM70G-TQ2-T	TO-263	G	D	S	Tube
10NM70L-TQ2-R	10NM70G-TQ2-R	TO-263	G	D	S	Tape Reel

10NM70G-TF1-T  (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TM3: TO-251, TMS: TO-251S, TN3: TO-252 T2Q: TO-262, TQ2: TO-263 (3) G: Halogen Free and Lead Free, L: Lead Free
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The diagram shows a 10NM70 package with the following markings:

- UTC**: Universal Time Code
- 10NM70**: Package type
- Lot Code**: A 7-digit code (represented by 7 squares) on the left side.
- Date Code**: A 4-digit code (represented by 4 squares) on the right side.

Additional information:

- L: Lead Free**
- G: Halogen Free**

■ 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	10	A
	Pulsed (Note 2)	I_{DM}	40	A
Avalanche Current (Note 2)		I_{AR}	2.4	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	208	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	5.2	V/ns
Power Dissipation	TO-220/TO-262 TO-263	P_D	80	W
	TO-220F/TO-220F1		28	W
	TO-251/TO-251S TO-252		57	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature Range		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. $L=79\text{mH}$, $I_{AS}=2.3\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

4. $I_{SD}\leq 10\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-262 TO-263	θ_{JA}	62.5	$^\circ\text{C/W}$
	TO-251/TO-251S TO-252		110	
Junction to Case	TO-220/TO-262 TO-263	θ_{JC}	1.56	$^\circ\text{C/W}$
	TO-220F/TO-220F1		4.46	
	TO-251/TO-251S TO-252		2.19	

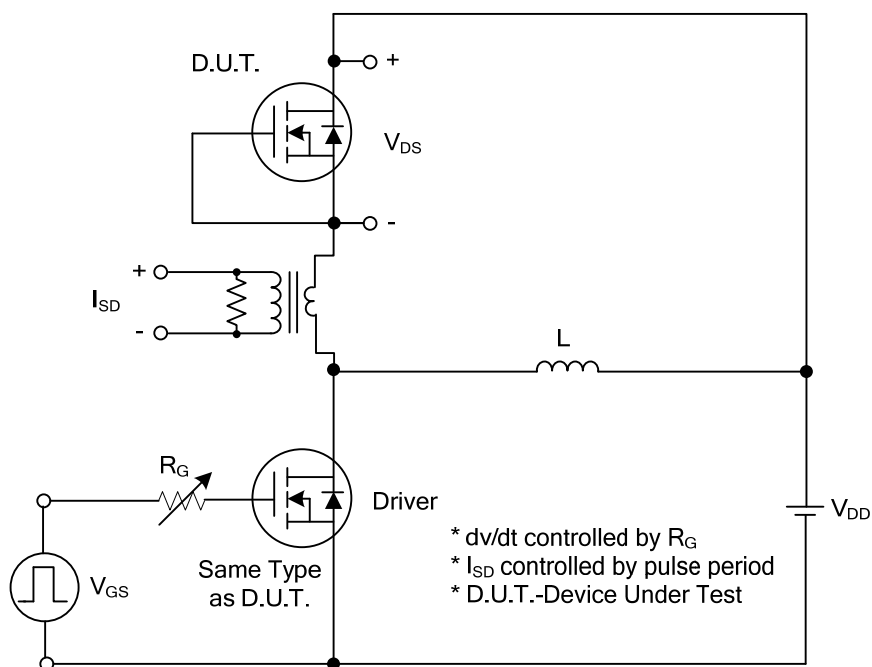
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

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 _{DS} =0V ,V _{GS} =30V			100	nA
	Reverse		V _{DS} =0V ,V _{GS} =-30V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} = V _{GS} , I _D =250μA	2.5		4.5	V
Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =5.0A		0.53	0.69	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		620		pF
Output Capacitance		C _{OSS}			239		pF
Reverse Transfer Capacitance		C _{RSS}			20		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =560V, V _{GS} =10V, I _D =10A , I _G =1mA (Note 1, 2)		21		nC
Gate to Source Charge		Q _{GS}			3.5		nC
Gate to Drain Charge		Q _{GD}			3.8		nC
Turn-ON Delay Time (Note 1)		t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =10A, R _G =25Ω (Note 1, 2)		12		ns
Rise Time		t _R			24		ns
Turn-OFF Delay Time		t _{D(OFF)}			66		ns
Fall-Time		t _F			48		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				10	A
Maximum Body-Diode Pulsed Current		I _{SM}				40	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =10A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)		t _{rr}	I _S =10A, V _{GS} =0V,		360		ns
Body Diode Reverse Recovery Charge		Q _{rr}	dl _F /dt=100A/μs		4.4		μC

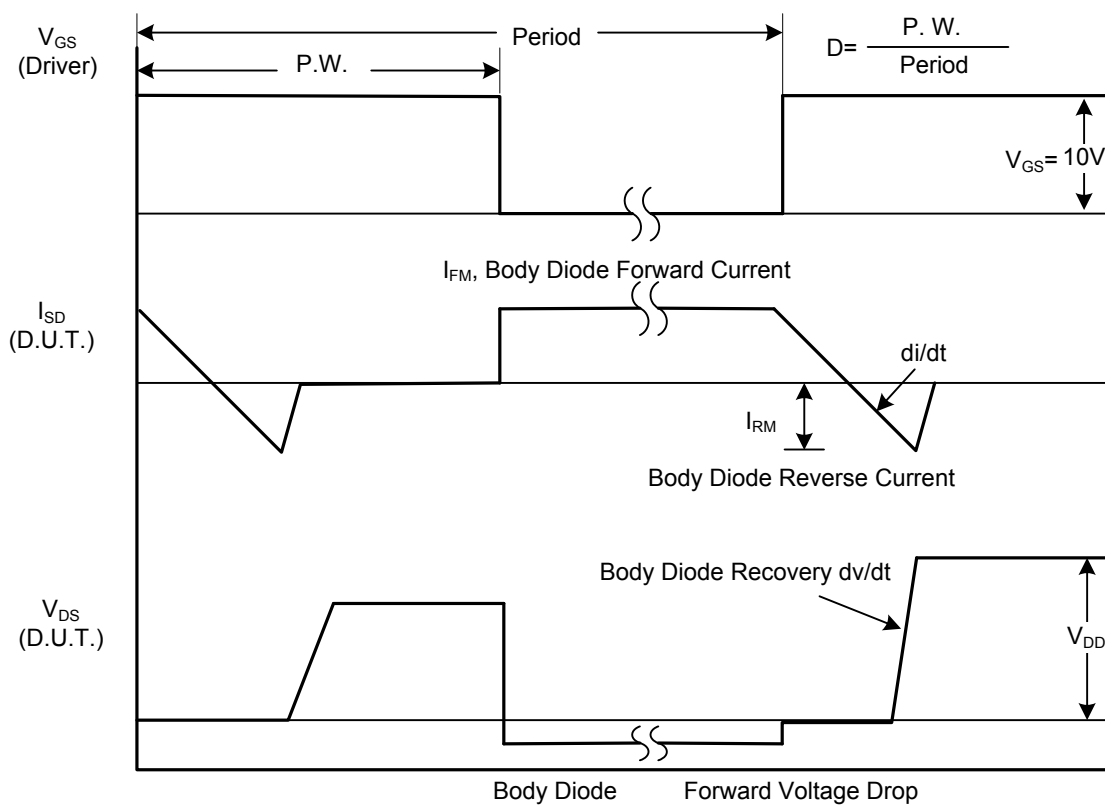
Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

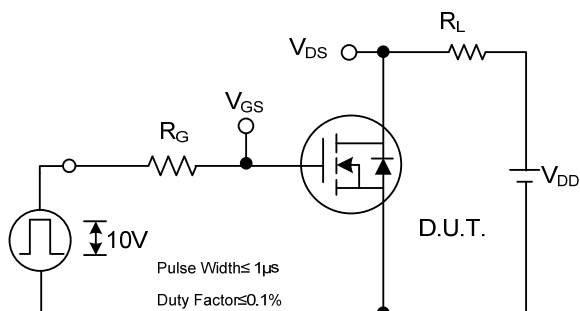


Peak Diode Recovery dv/dt Test Circuit

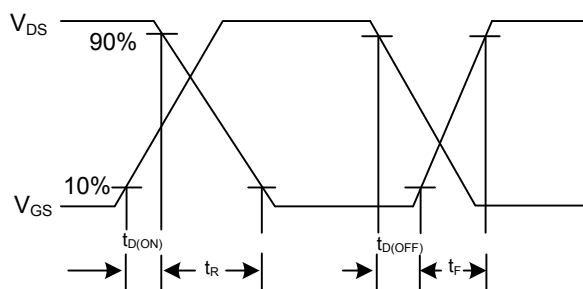


Peak Diode Recovery dv/dt Waveforms

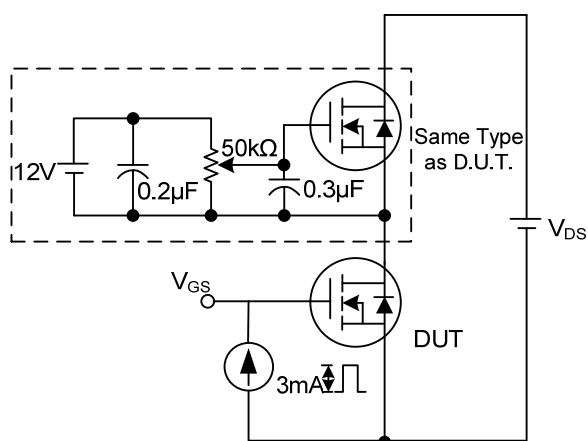
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



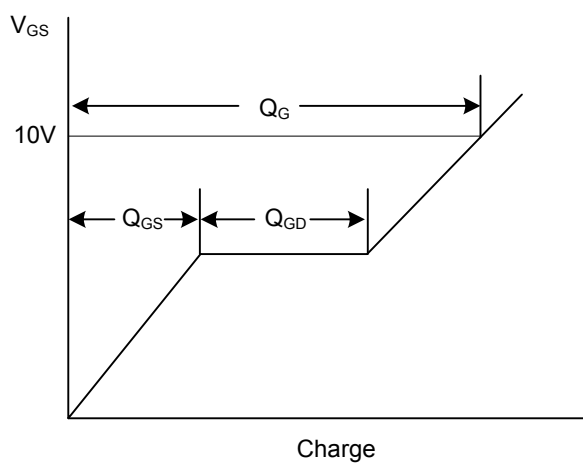
Switching Test Circuit



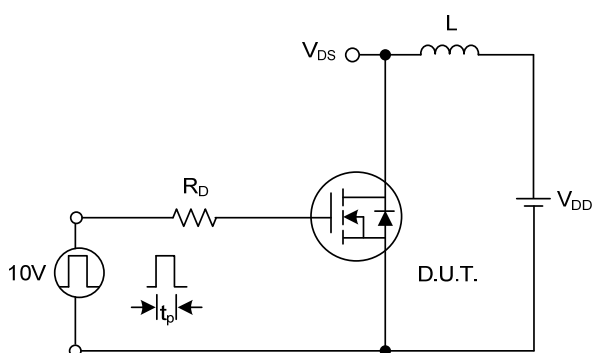
Switching Waveforms



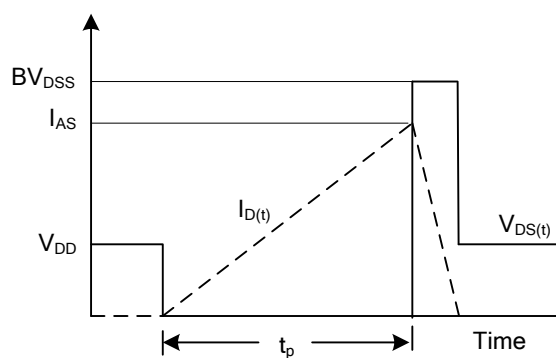
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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