



30NM70

Power MOSFET

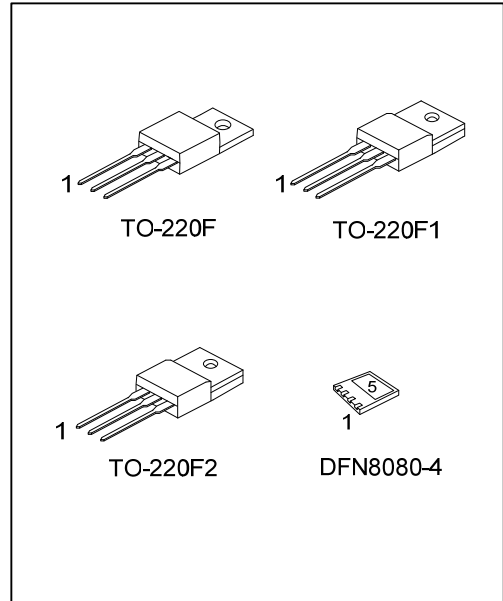
30A, 700V N-CHANNEL SUPER-JUNCTION MOSFET

■ DESCRIPTION

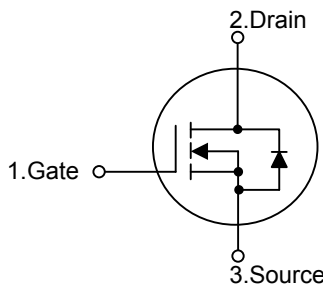
The **UTC 30NM70** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

■ FEATURES

- * $R_{DS(ON)} \leq 170 \text{ m}\Omega @ V_{GS}=10V, I_D=15A$
- * High Switching Speed
- * 100% Avalanche Tested



■ SYMBOL



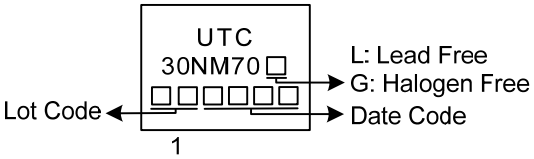
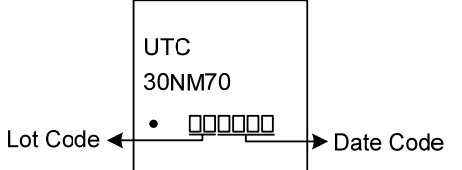
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment					Packing
Lead Free	Halogen Free		1	2	3	4	5	
30NM70L-TF1-T	30NM70G-TF1-T	TO-220F1	G	D	S	-	-	Tube
30NM70L-TF2-T	30NM70G-TF2-T	TO-220F2	G	D	S	-	-	Tube
30NM70L-TF3-T	30NM70G-TF3-T	TO-220F	G	D	S	-	-	Tube
30NM70L-K04-8080-R	30NM70G-K04-8080-R	DFN8080-4	G	S	S	S	D	Tape Reel

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

<p>30NM70G-TF1-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F, K04-8080: DFN8080-4</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING

TO-220F / TO-220F1 / TO-220F2	DFN8080-4
 <p>UTC 30NM70</p> <p>Lot Code ←</p> <p>→ Date Code</p> <p>L: Lead Free G: Halogen Free</p> <p>1</p>	 <p>UTC 30NM70</p> <p>Lot Code ←</p> <p>•</p> <p>→ Date Code</p>

■ 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	30	A
	Pulsed (Note 2)	I_{DM}	120	A
Avalanche Current (Note 2)		I_{AR}	5.86	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	1116	mJ
Peak Diode Recovery dv/dt		dv/dt	16.5	V/ns
Power Dissipation	TO-220F/TO-220F1	P_D	40	W
	TO-220F2			
	DFN8080-4		160	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. $L = 65\text{mH}$, $I_{AS} = 5.86\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 30\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F/TO-220F1	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-220F2			
	DFN8080-4		35 (Note)	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220F/TO-220F1	θ_{JC}	3.12	$^\circ\text{C}/\text{W}$
	TO-220F2			
	DFN8080-4		0.78 (Note)	$^\circ\text{C}/\text{W}$

Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

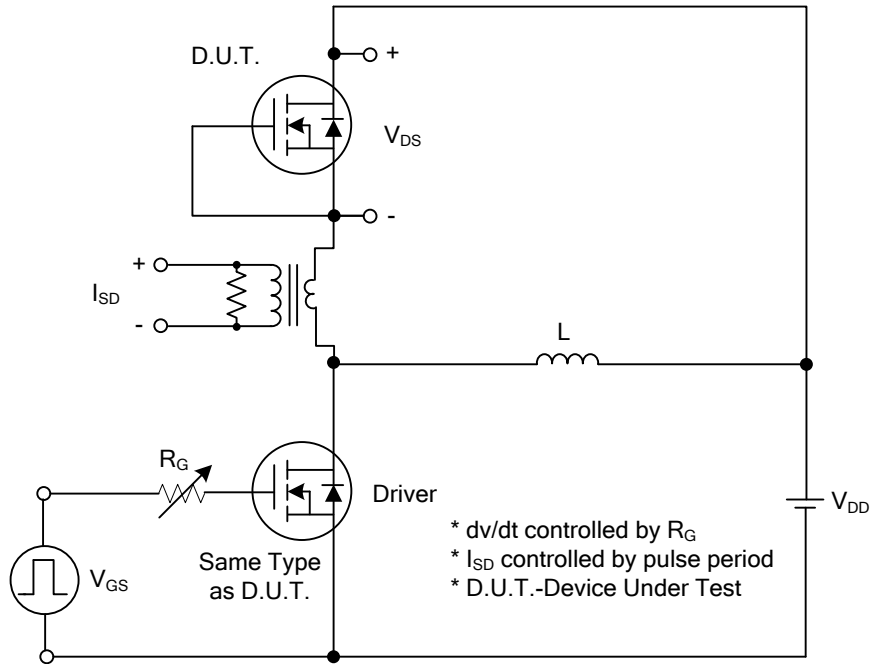
■ ELECTRICAL CHARACTERISTICS ($T_J=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	700			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=700\text{V}$, $V_{GS}=0\text{V}$			50	μA
Gate- Source Leakage Current	Forward	I_{GSS}			+100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	2.5		4.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=15\text{A}$			170	m Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$, $f=1.0\text{MHz}$		2400		pF
Output Capacitance	C_{OSS}			1100		pF
Reverse Transfer Capacitance	C_{RSS}			125		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=100\text{V}$, $V_{GS}=10\text{V}$, $I_D=30\text{A}$, $I_G=1\text{mA}$ (Note 1,2)		88		nC
Gate to Source Charge	Q_{GS}			20		nC
Gate to Drain Charge	Q_{GD}			36		nC
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$	$V_{DD}=100\text{V}$, $V_{GS}=10\text{V}$, $I_D=30\text{A}$, $R_G=25\Omega$, (Note 1,2)		38		ns
Rise Time	t_R			40		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			230		ns
Fall-Time	t_F			100		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				30	A
Maximum Body-Diode Pulsed Current	I_{SM}				120	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_S=30\text{A}$, $V_{GS}=0\text{V}$			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t_{rr}	$I_S=30\text{A}$, $V_{GS}=0\text{V}$, $di_F/dt=100\text{A}/\mu\text{s}$		610		ns
Body Diode Reverse Recovery Charge	Q_{rr}			12.3		μC

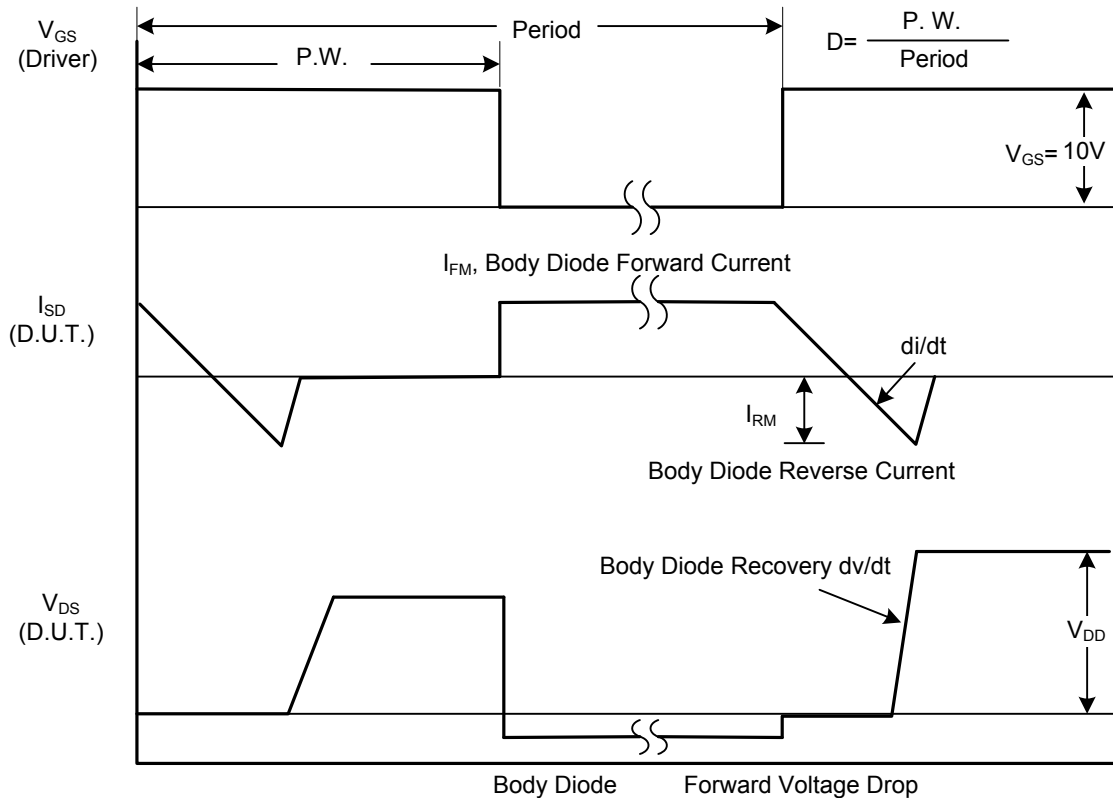
Notes: 1. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS



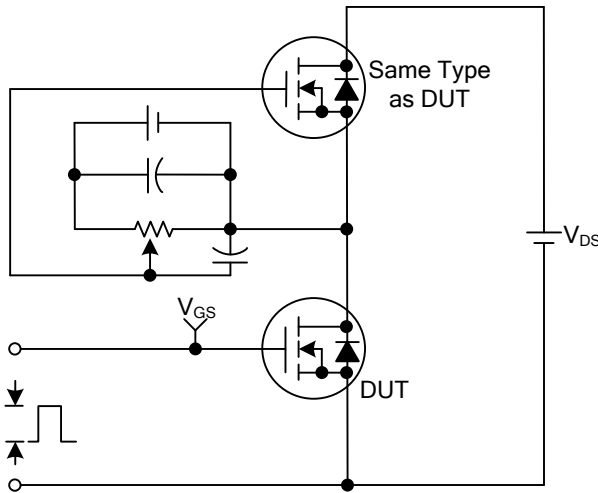
Peak Diode Recovery dv/dt Test Circuit



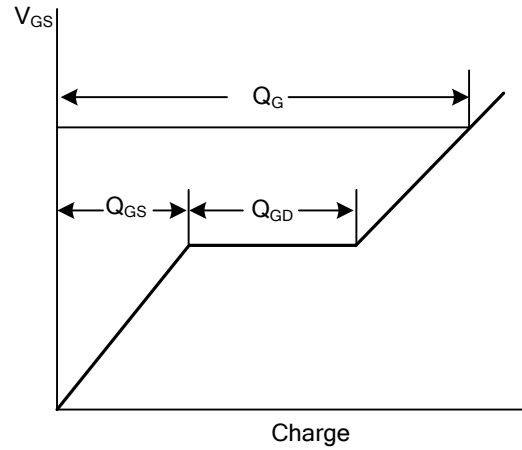
Peak Diode Recovery dv/dt Waveforms

TEST CIRCUITS AND WAVEFORMS

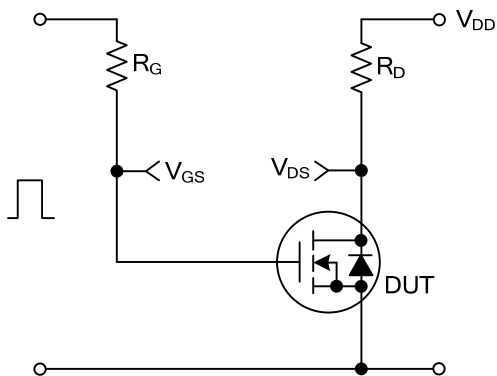
Gate Charge Test Circuit



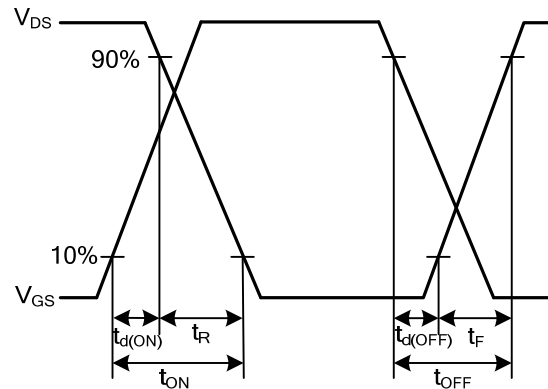
Gate Charge Waveforms



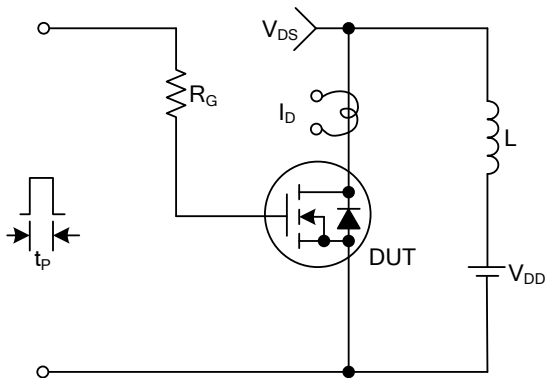
Resistive Switching Test Circuit



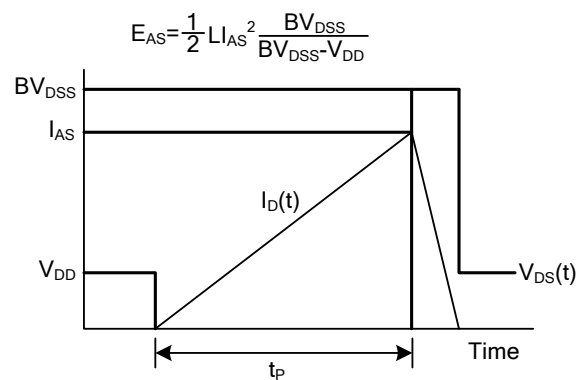
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



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