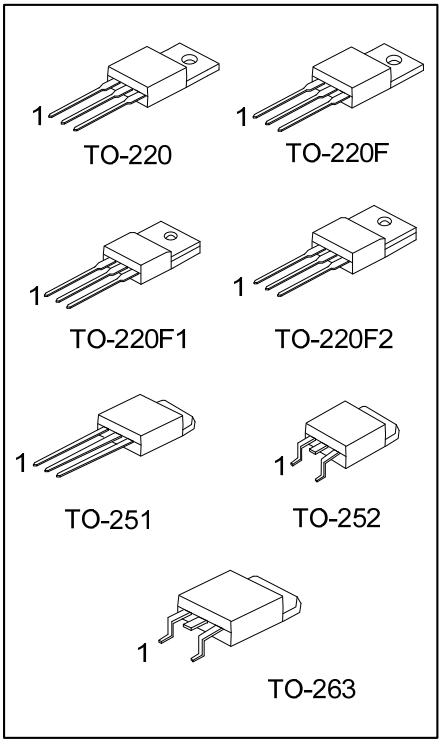
15NM70

Power MOSFET

15A, 700V N-CHANNEL SUPER-JUNCTION MOSFET



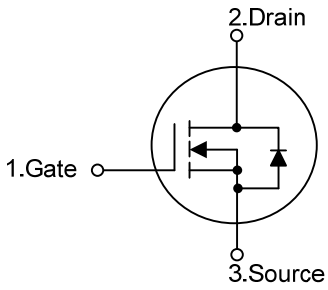
■ DESCRIPTION

The **UTC 15NM70** 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

* $R_{DS(ON)}$ < 0.5Ω @ V_{GS}=10V, I_D=7.5A
* By using Super Junction Structure
* Fast Switching
* With 100% Avalanche Tested

■ SYMBOL



■ ORDERING INFORMATION

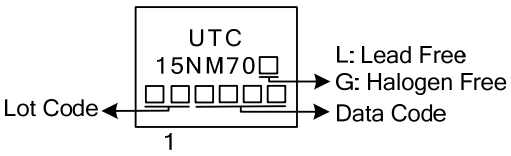
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
15NM70L-TA3-T	15NM70G-TA3-T	TO-220	G	D	S	Tube
15NM70L-TF1-T	15NM70G-TF1-T	TO-220F1	G	D	S	Tube
15NM70L-TF3-T	15NM70G-TF3-T	TO-220F2	G	D	S	Tube
15NM70L-TF3-T	15NM70G-TF3-T	TO-220F	G	D	S	Tube
15NM70L-TM3-T	15NM70G-TM3-T	TO-251	G	D	S	Tube
15NM70L-TN3-R	15NM70G-TN3-R	TO-252	G	D	S	Tape Reel
15NM70L-TQ2-T	15NM70G-TQ2-T	TO-263	G	D	S	Tube
15NM70L-TQ2-R	15NM70G-TQ2-R	TO-263	G	D	S	Tape Reel

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

15NM70L-TA3-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, TF2: TO-220F2, TM3: TO-251, TN3: TO-252 TQ2: TO-263
(3) L: Lead Free, G: Halogen Free and Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°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	15	A
Pulsed Drain Current	Pulsed (Note 2)	I_{DM}	60	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	4.5	V/ns
Power Dissipation	TO-220/TO-263	P_D	260	W
	TO-220F/TO-220F1 TO-220F2		54	W
	TO-251/TO-252		90	W
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°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=65mH, I_{AS}=4.1A, V_{DD}= 50V, R_G=25Ω, Starting T_J=25°C.
4. I_{SD} ≤10A, di/dt ≤200A/μs, V_{DD} ≤BV_{DSS}, Starting T_J=25°C.

■ THERMAL DATA

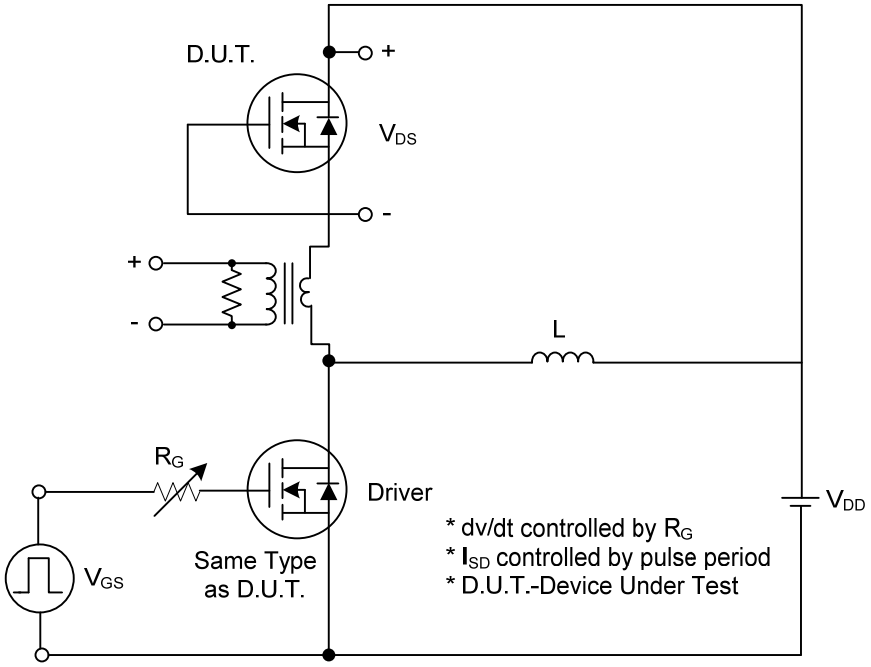
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2 TO-263	θ_{JA}	62.5	°C/W
	TO-251/TO-252		110	°C/W
Junction to Case	TO-220/TO-263	θ_{JC}	0.4	°C/W
	TO-220F/TO-220F1 TO-220F2		2.31	°C/W
	TO-251/TO-252		1.39	°C/W

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

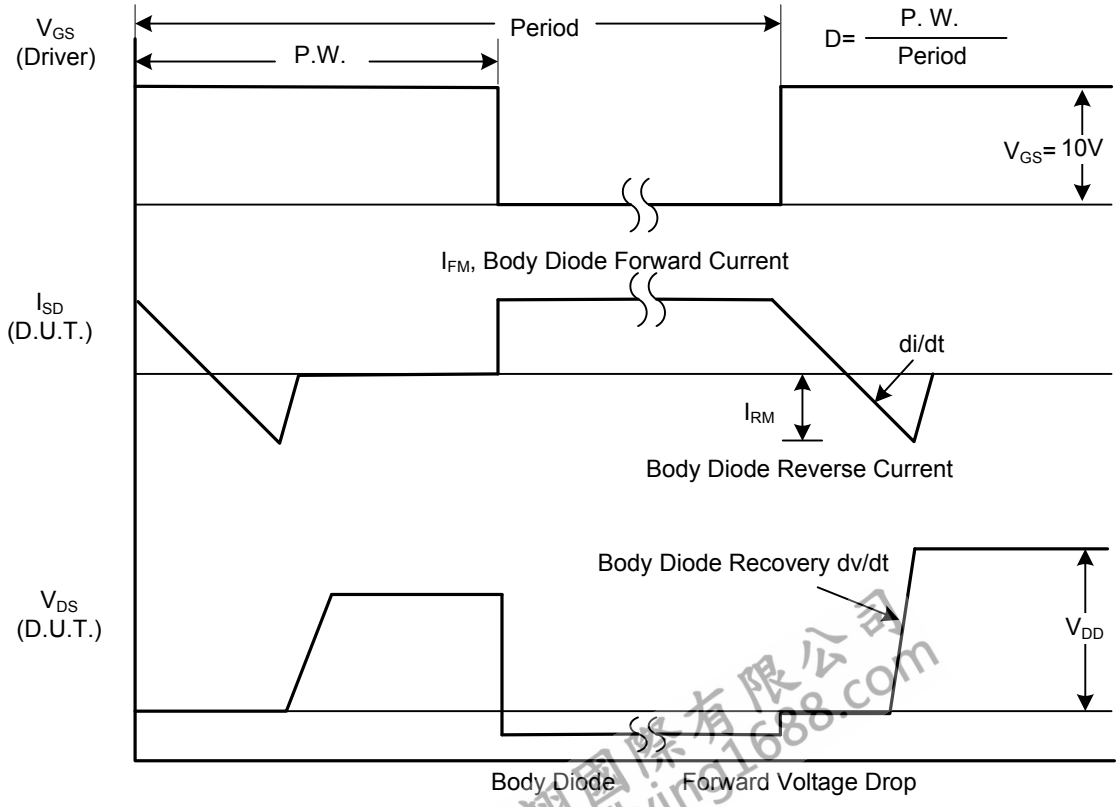
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	700			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=700V, V_{GS}=0V			10	μA
		V_{DS}=700V, T_J=125°C			100	μA
Gate-Source Leakage Current	I_{GSS}	V_{DS}=0V ,V_{GS}=±30V			±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=7.5A			0.50	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{DS}=25V,V_{GS}=0V, f=1.0MHz		960		pF
Output Capacitance	C_{OSS}			685		pF
Reverse Transfer Capacitance	C_{RSS}			30		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	V_{DS}=50V, V_{GS}=10V, I_D=1.3A , I_G=100μA (Note 1, 2)		108		nC
Gate-Source Charge	Q_{GS}			6		nC
Gate-Drain Charge	Q_{GD}			28		nC
Turn-ON Delay Time	$t_{D(ON)}$	V_{DD}=30V, I_D=0.5A, R_G=25Ω V_{GS}=10V (Note 1, 2)		60		ns
Turn-ON Rise Time	t_R			112		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			328		ns
Turn-OFF Fall Time	t_F			184		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				15	A
Maximum Body-Diode Pulsed Current	I_{SM}				60	A
Drain-Source Diode Forward Voltage	V_{SD}	I_S =15A, V_{GS}=0V			1.4	V
Reverse Recovery Time	t_{rr}	I_S=15A, V_{GS}=0V di/dt=200A/μs (Note 1)		420		ns
Reverse Recovery Charge	Q_{rr}			7.1		μC

Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%
2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

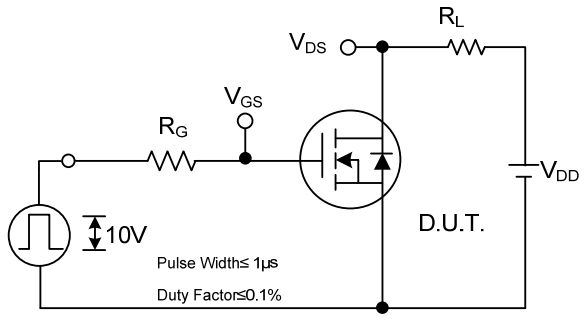


Peak Diode Recovery dv/dt Test Circuit

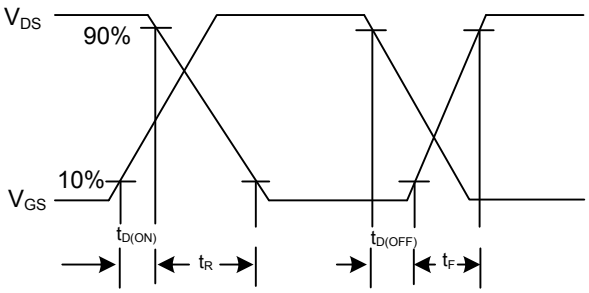


Peak Diode Recovery dv/dt Waveforms

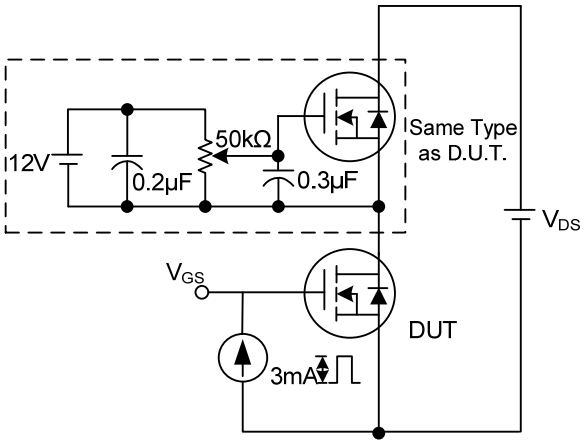
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



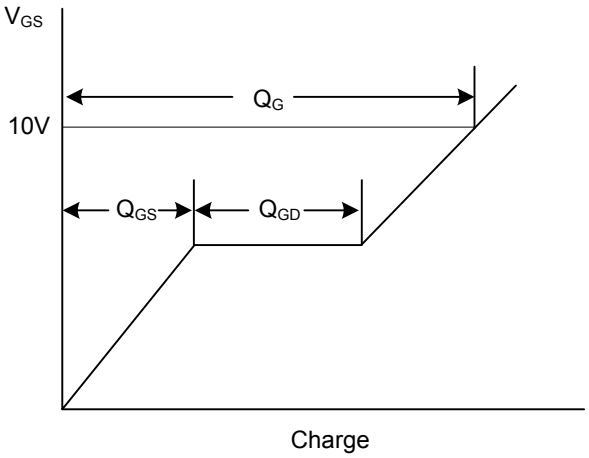
Switching Test Circuit



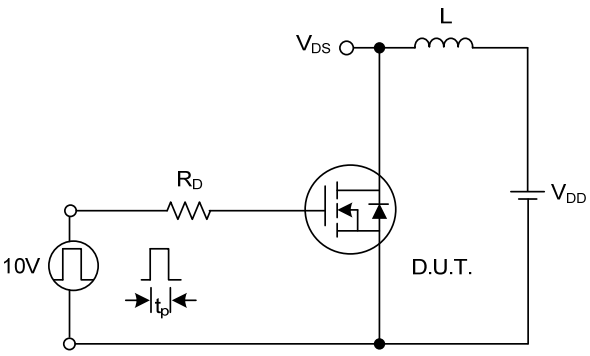
Switching Waveforms



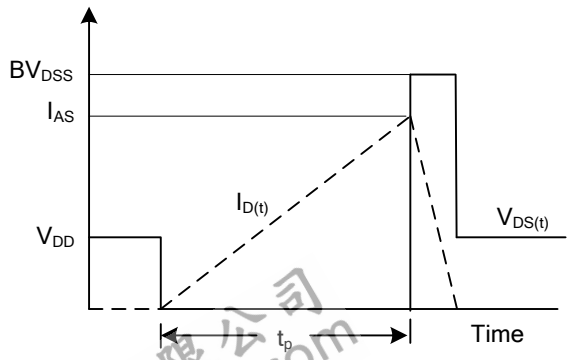
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms