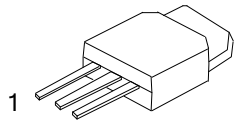
9NM70-FDS

Power MOSFET

9A, 700V N-CHANNEL SUPER-JUNCTION MOSFET



TO-251S

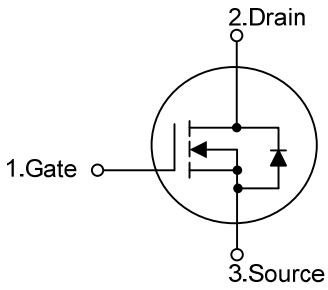
■ DESCRIPTION

The **UTC 9NM70-FDS** 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

* $R_{DS(ON)}$ < 0.8Ω @ V_{GS}=10V, I_D=4.5A
* By using Super Junction Structure
* Fast Switching
* With 100% Avalanche Tested

■ SYMBOL



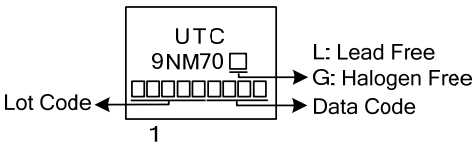
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
9NM70L-TMS-T	9NM70G-TMS-T	TO-251S	G	D	S	Tube

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

9NM70G-TMS-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube (2) TMS: TO-251S (3) G: Halogen Free and Lead Free, L: 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	9	A
Pulsed Drain Current	Pulsed (Note 2)	I_{DM}	36	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	160	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	8.5	V/ns
Power Dissipation		P_D	100	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=60mH, I_{AS}=2.3A, V_{DD}= 50V, R_G=25Ω, Starting T_J=25°C.
4. I_{SD} ≤9A, di/dt ≤200A/μs, V_{DD} ≤BV_{DSS}, Starting T_J=25°C.

■ THERMAL DATA

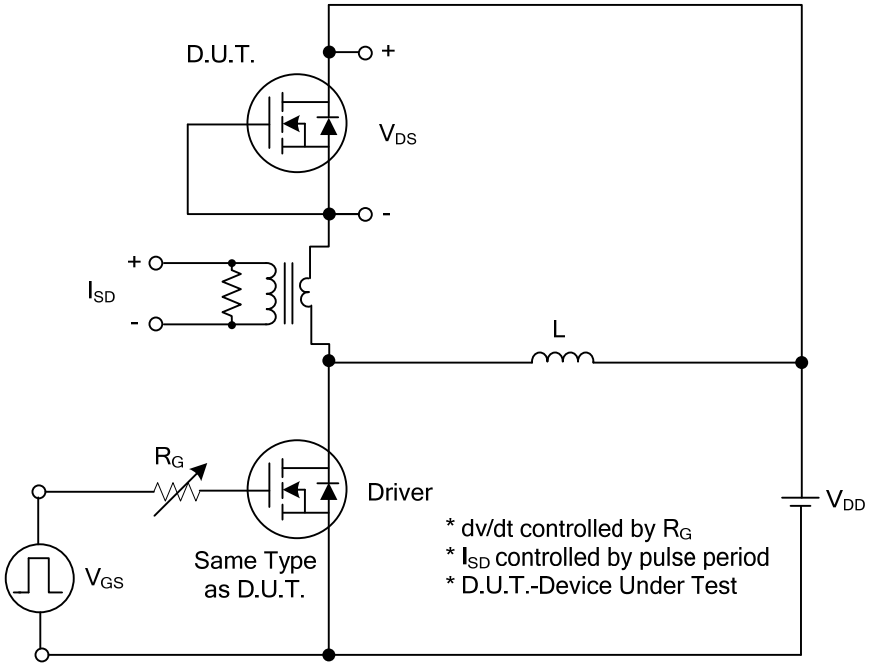
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	110	°C/W
Junction to Case	θ_{JC}	1.25	°C/W

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

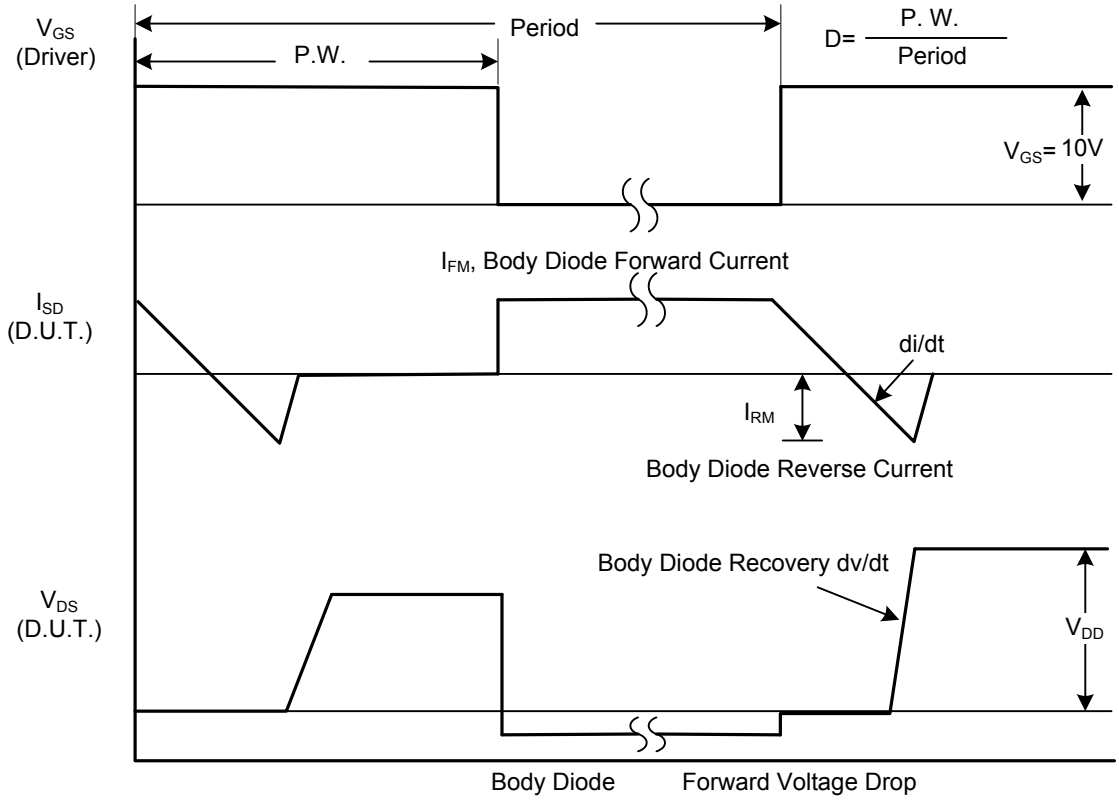
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	700			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=700V, V_{GS}=0V			10	μA
Gate-Source Leakage Current	I_{GSS}	V_{DS}=0V ,V_{GS}=±30V			±100	nA
ON CHARACTERISTICS						
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=4.5A			0.8	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{DS}=25V,V_{GS}=0V, f=1.0MHz		557		pF
Output Capacitance	C_{OSS}			508		pF
Reverse Transfer Capacitance	C_{RSS}			52		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q_G	V_{DS}=200V, V_{GS}=10V, I_D=9.0A , I_G=1mA (Note 1, 2)		28		nC
Gate to Source Charge	Q_{GS}			10		nC
Gate to Drain Charge	Q_{GD}			9.6		nC
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$	V_{DD}=350V, V_{GS}=10V, I_D=3.5A, R_G=25Ω (Note 1, 2)		9.4		ns
Rise Time	t_R			16.4		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			68		ns
Fall-Time	t_F			27.2		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				9	A
Maximum Body-Diode Pulsed Current	I_{SM}				36	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	I_S =9.0A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t_{rr}	I_S =9.0A, V_{GS}=0V dI$_F$/dt=100A/μs		153.2		ns
Body Diode Reverse Recovery Charge	Q_{rr}			0.94		μC

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

■ TEST CIRCUITS AND WAVEFORMS

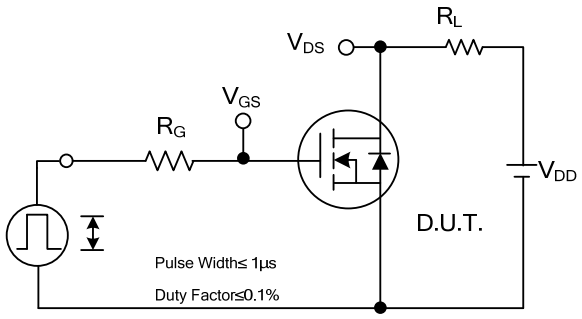


Peak Diode Recovery dv/dt Test Circuit

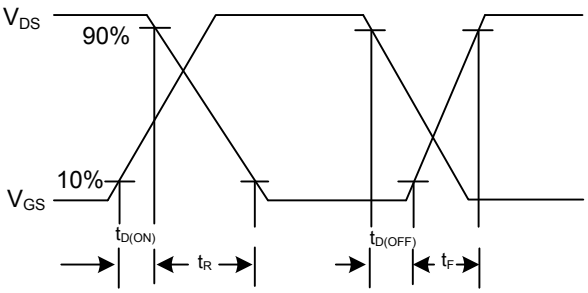


Peak Diode Recovery dv/dt Waveforms

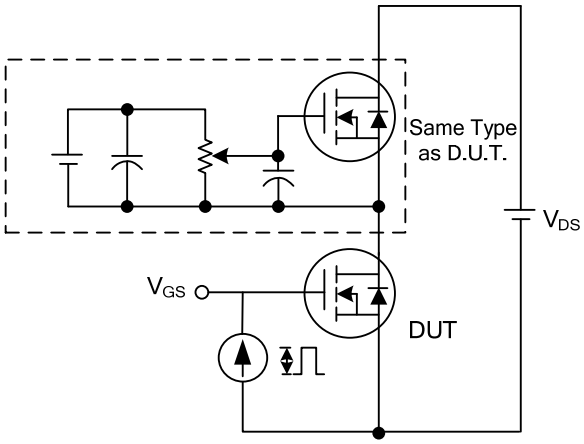
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



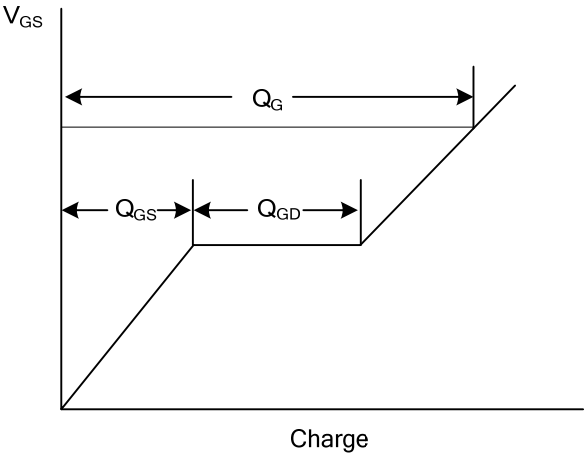
Switching Test Circuit



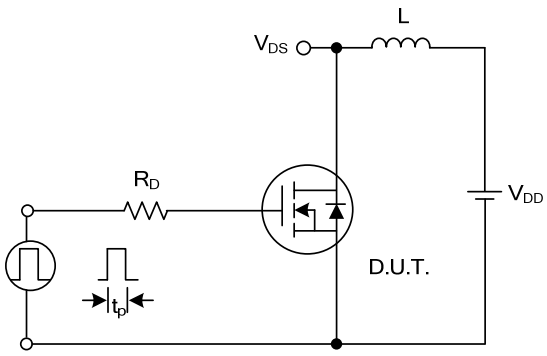
Switching Waveforms



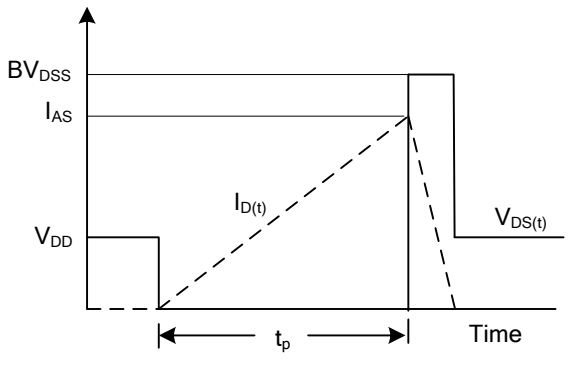
Gate Charge Test Circuit



Gate Charge Waveform



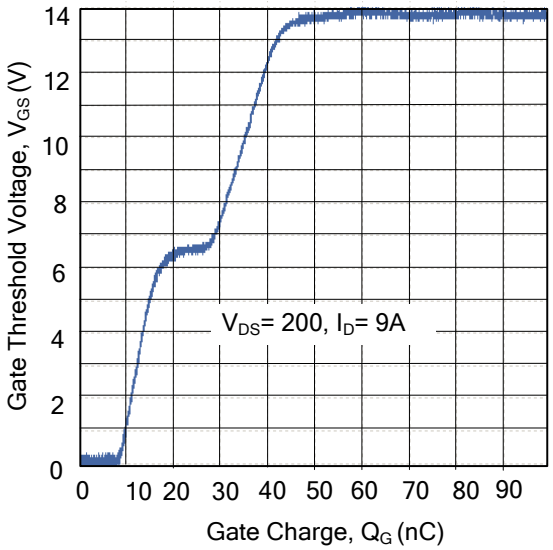
Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

Gate Charge vs. Gate to Source Voltage



Capacitance Characteristics