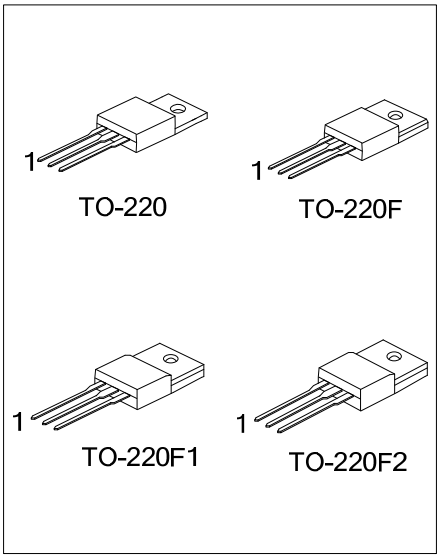
8NM65-SH

Preliminary ***Power MOSFET***

8A, 650V N-CHANNEL POWER MOSFET



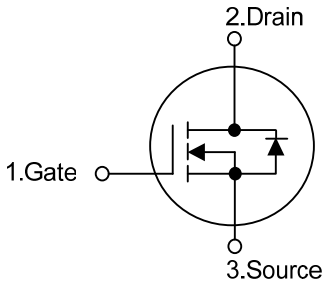
■ DESCRIPTION

The UTC **8NM65-SH** is a high voltage super junction MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in switching power supplies and adaptors.

■ FEATURES

* $R_{DS(ON)}$ < 0.78Ω @ V_{GS} = 10V, I_D = 4.0A
* Fast Switching Capability
* Avalanche Energy Tested
* Improved dv/dt Capability, High Ruggedness

■ SYMBOL



■ ORDERING INFORMATION

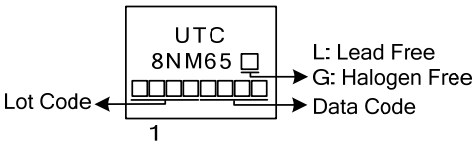
Order Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
8NM65L-TA3-T	8NM65G-TA3-T	TO-220	G	D	S	Tube
8NM65L-TF1-T	8NM65G-TF1-T	TO-220F1	G	D	S	Tube
8NM65L-TF2-T	8NM65G-TF2-T	TO-220F2	G	D	S	Tube
8NM65L-TF3-T	8NM65G-TF3-T	TO-220F	G	D	S	Tube

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

8NM65L-TA3-T
(1)Packing Type
(2)Package Type
(3)Green Package

(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2
TF3: TO-220F
(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-Source Voltage		V_{DSS}	650	V
Gate-Source Voltage		V_{GSS}	±30	V
Avalanche Current (Note 2)		I_{AR}	8.0	A
Drain Current	Continuous	I_D	8.0	A
	Pulsed (Note 2)	I_{DM}	32	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	270	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220	P_D	130	W
	TO-220F/TO-220F1 TO-220F2		48	W
Derate above 25°C	TO-220		1.04	W/°C
	TO-220F/TO-220F1 TO-220F2		0.384	W/°C
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 T_J.
3. L=150mH, I_{AS}=1.6A, V_{DD}=50V, R_G=25 Ω, Starting T_J = 25°C
4. I_{SD}≤8A, di/dt≤200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

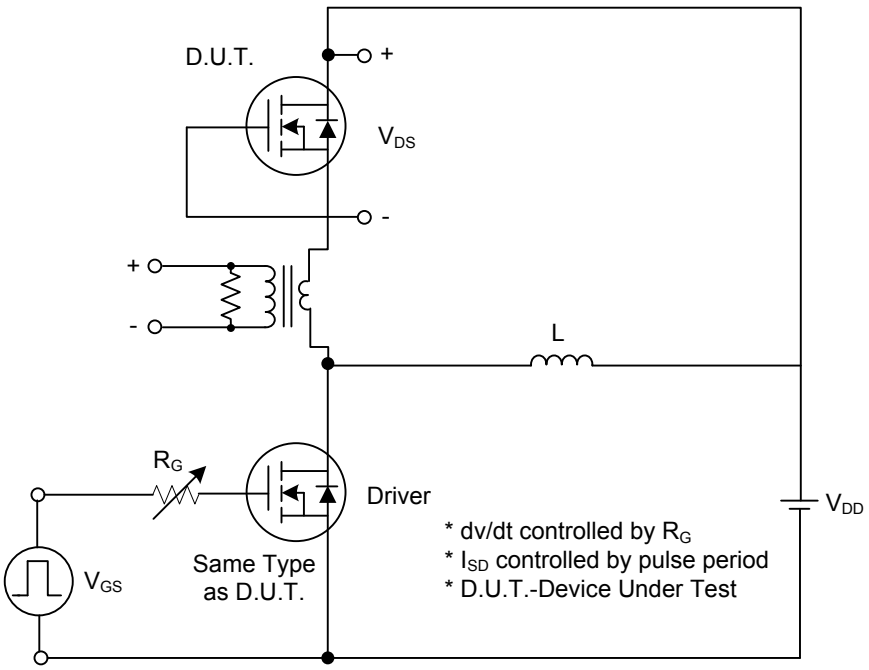
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	62.5	°C/W
Junction to Case	TO-220	θ_{JC}	0.9	°C/W
	TO-220F/TO-220F1 TO-220F2		2.54	°C/W

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

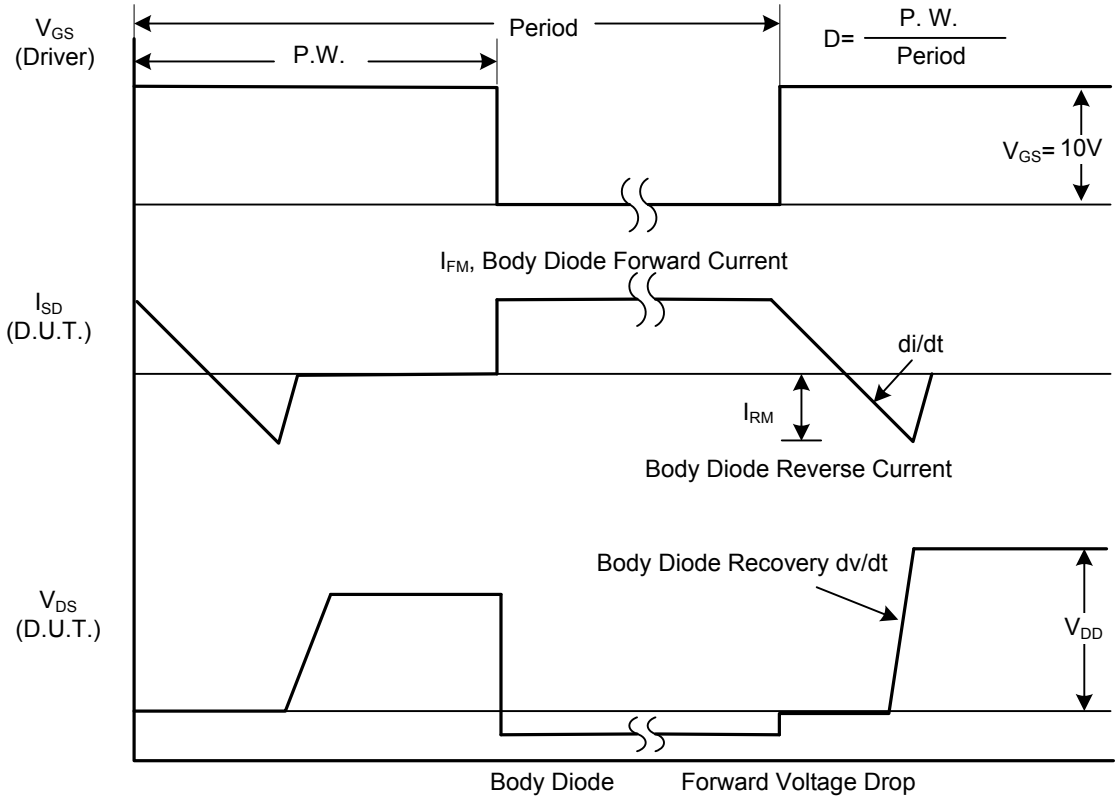
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS} = 0V, I_D = 250μA	650			V
Drain-Source Leakage Current		I_{DSS}	V_{DS} = 650V, V_{GS} = 0V			1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS} = 30V, V_{DS} = 0V			100	nA
	Reverse		V_{GS} = -30V, V_{DS} = 0V			-100	nA
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	I_D=250μA,Referenced to 25°C		0.67		V/°C
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS} = V_{GS}, I_D = 250μA	2.5		4.5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS} = 10V, I_D = 4.0A			0.78	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0 MHz		332		pF
Output Capacitance		C_{OSS}			252		pF
Reverse Transfer Capacitance		C_{RSS}			3.5		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge		Q_G	V_{DS}=50V, V_{GS}=10V, I_D=1.3A, I_G=100μA (Note 1, 2)		78		nC
Gate-Source Charge		Q_{GS}			5.6		nC
Gate-Drain Charge		Q_{GD}			14.4		nC
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	V_{DD}=30V, V_{GS}=10V, I_D=0.5A, R_G =25Ω (Note 1, 2)		48		ns
Turn-On Rise Time		t_R			72		ns
Turn-Off Delay Time		$t_{D(OFF)}$			168		ns
Turn-Off Fall Time		t_F			50		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS} = 0V, I_S = 8A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I_S				8	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				32	A
Reverse Recovery Time		t_{rr}	V_{GS} = 0 V, I_{SD} = 8A, di/dt = 100 A/μs (Note 1)		330		ns
Reverse Recovery Charge		Q_{RR}			3.8		μC

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

■ TEST CIRCUITS AND WAVEFORMS

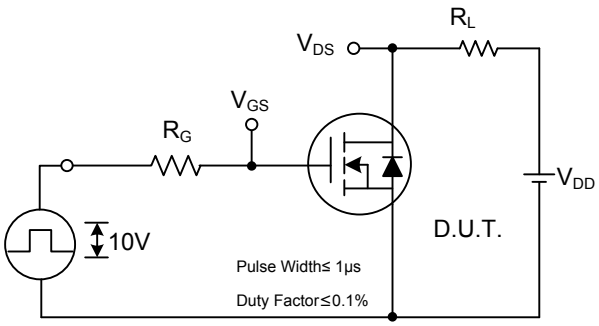


Peak Diode Recovery dv/dt Test Circuit

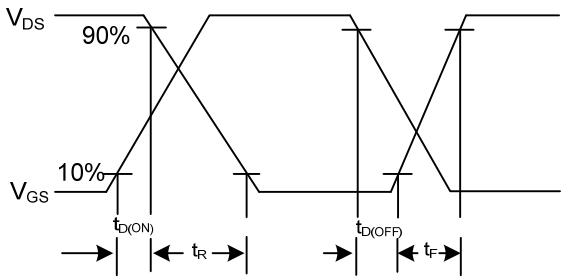


Peak Diode Recovery dv/dt Waveforms

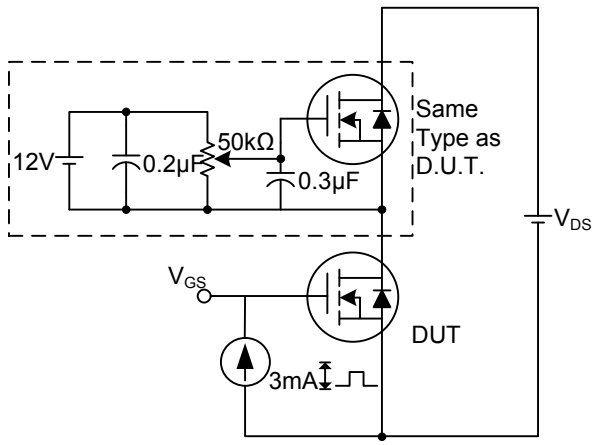
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



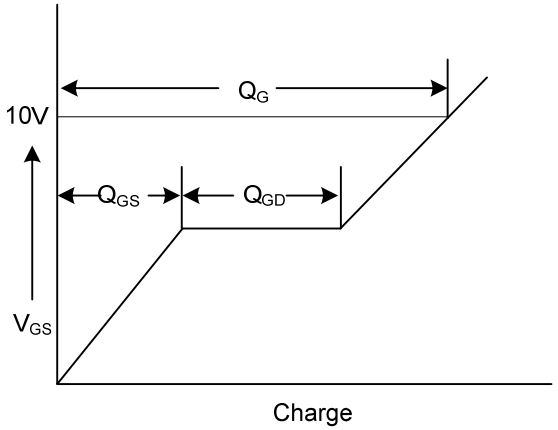
Switching Test Circuit



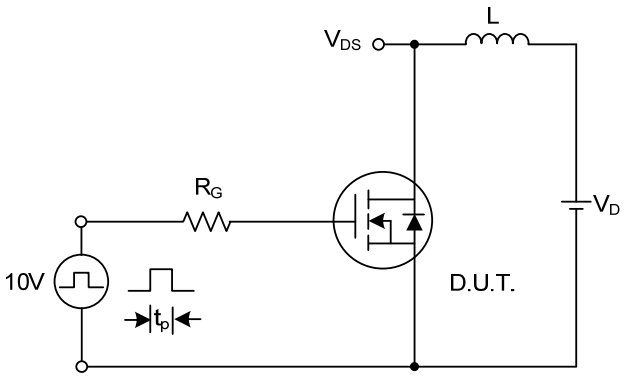
Switching Waveforms



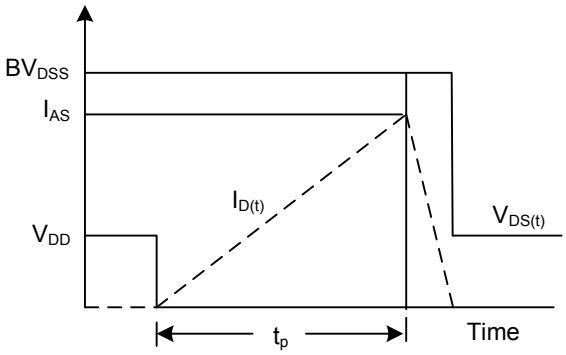
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms