

**5NM95-Q**

Preliminary

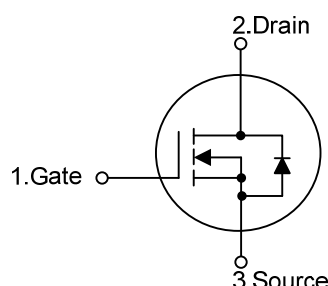
Power MOSFET**5.0A, 950V N-CHANNEL
SUPER-JUNCTION MOSFET****DESCRIPTION**

The UTC **5NM95-Q** 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

* $R_{DS(ON)} \leq 2.3 \Omega$ @ $V_{GS}=10V$, $I_D=2.5A$

* High Switching Speed

SYMBOL**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
5NM95L-AA2-R	5NM95G-AA2-R	SOT-223-2	G	D	S	Tape Reel
5NM95L-TA3-T	5NM95G-TA3-T	TO-220	G	D	S	Tube
5NM95L-TF1-T	5NM95G-TF1-T	TO-220F1	G	D	S	Tube
5NM95L-TM3-T	5NM95G-TM3-T	TO-251	G	D	S	Tube
5NM95L-TN3-R	5NM95G-TN3-R	TO-252	G	D	S	Tape Reel
5NM95L-T2Q-T	5NM95G-T2Q-T	TO-262	G	D	S	Tube
5NM95L-TQ2-R	5NM95G-TQ2-R	TO-263	G	D	S	Tape Reel

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

5NM95G-AA2-R (1) Packing Type (2) Package Type (3) Green Package	(1) R: Tape Reel, T: Tube (2) AA2: SOT-223-2, TA3: TO-220, TF1: TO-220F1 TM3: TO-251, TN3: TO-252, TQ2: TO-263 (3) G: Halogen Free and Lead Free, L: Lead Free
--	---

MARKING

SOT-223-2	TO-220 / TO-220F1 TO-251 / TO-252 / TO-263
5NM95 Lot Code L: Lead Free G: Halogen Free Date Code	UTC 5NM95 Lot Code L: Lead Free G: Halogen Free Date Code 1

■ **ABSOLUTE MAXIMUM RATINGS** ($T_C=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	950	V
Gate-Source Voltage		V_{GSS}	± 30	V
Continuous Drain Current	Continuous	I_D	5	A
	Pulsed	I_{DM}	10	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	128	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	2.8	V/ns
Power Dissipation	SOT-223-2	P_D	5	W
	TO-220/TO-263		38	W
	TO-220F1		23	W
	TO-251/TO-252		24	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. $L = 100\text{mH}$, $I_{AS} = 1.6\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$ Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD} \leq 5.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223-2	θ_{JA}	150	$^{\circ}\text{C}/\text{W}$
	TO-220/TO-220F1		62.5	$^{\circ}\text{C}/\text{W}$
	TO-263			
	TO-251/TO-252		110	$^{\circ}\text{C}/\text{W}$
Junction to Case	SOT-223-2	θ_{JC}	25 (Note)	$^{\circ}\text{C}/\text{W}$
	TO-220/TO-263		3.29	$^{\circ}\text{C}/\text{W}$
	TO-220F1		5.43	$^{\circ}\text{C}/\text{W}$
	TO-251/TO-252		5.2(Note)	$^{\circ}\text{C}/\text{W}$

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

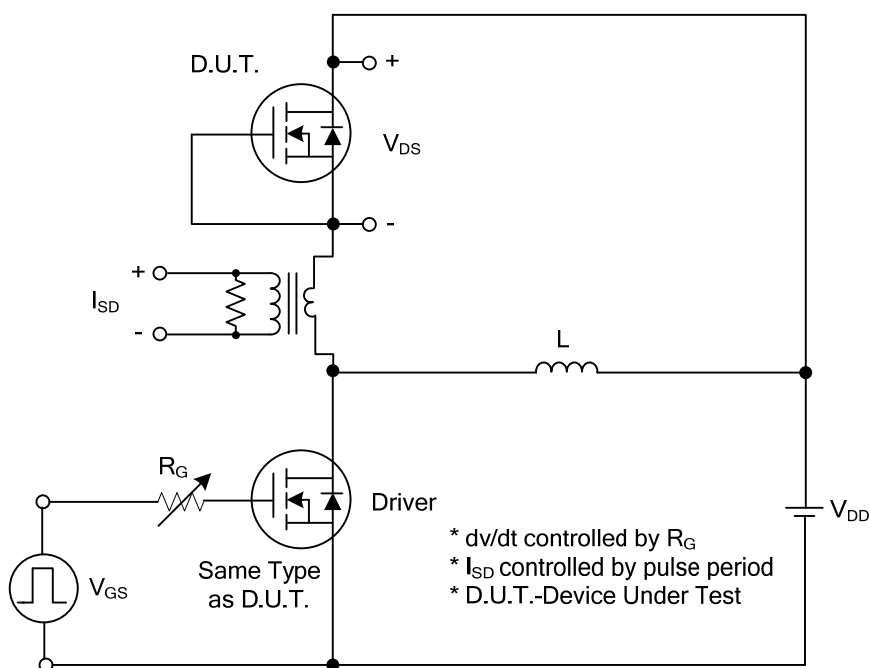
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	950			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =950V, V _{GS} =0V			10	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
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 =2.5A			2.3	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =50V, f=1.0MHz		338		pF
Output Capacitance		C _{OSS}			40		pF
Reverse Transfer Capacitance		C _{RSS}			2.8		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =760V, V _{GS} =10V, I _D =5.0A (Note 1, 2)		22		nC
Gate to Source Charge		Q _{GS}			6.2		nC
Gate to Drain Charge		Q _{GD}			5.5		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =5.0A, R _G =25Ω (Note 1, 2)		6		ns
Rise Time		t _R			17		ns
Turn-OFF Delay Time		t _{D(OFF)}			50		ns
Fall-Time		t _F			40		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				5	A
Maximum Body-Diode Pulsed Current		I _{SM}				10	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =5.0A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time		t _{rr}	I _S =5.0A, V _{GS} =0V,		356		ns
Reverse Recovery Charge		Q _{rr}	dI _F /dt=100A/μs (Note 1)		3.1		μC

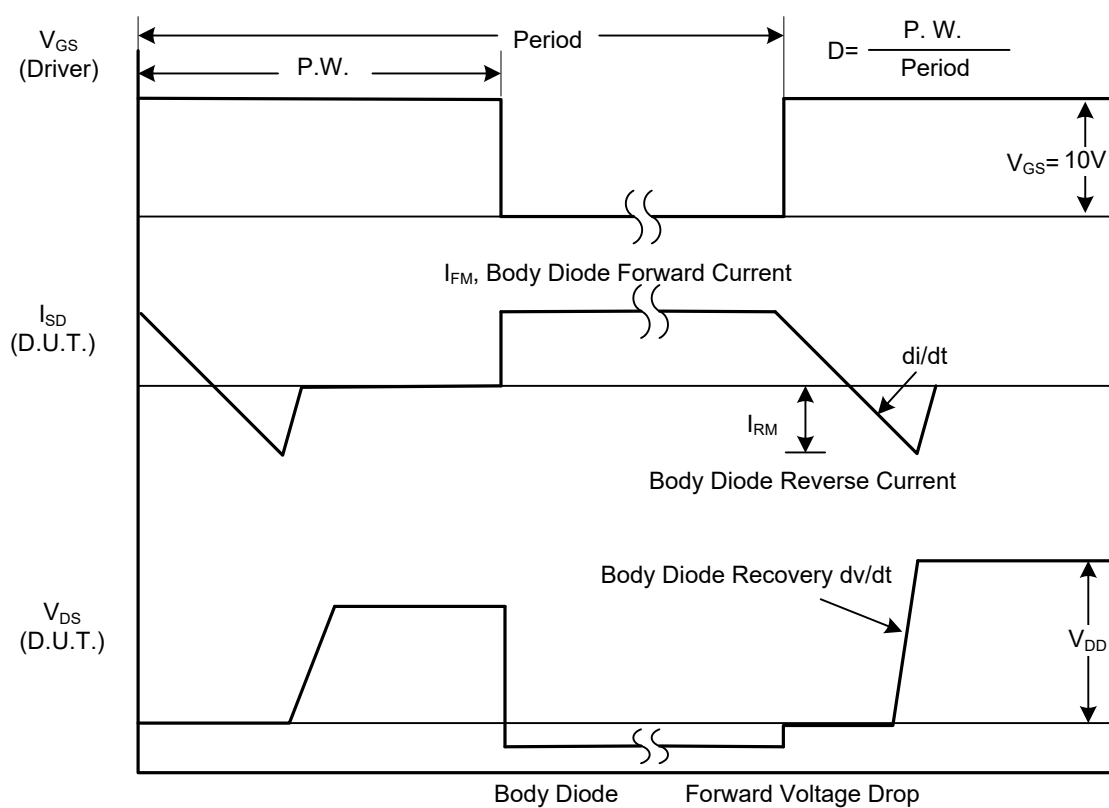
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

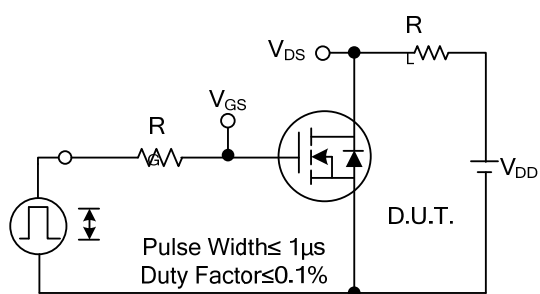


Peak Diode Recovery dv/dt Test Circuit

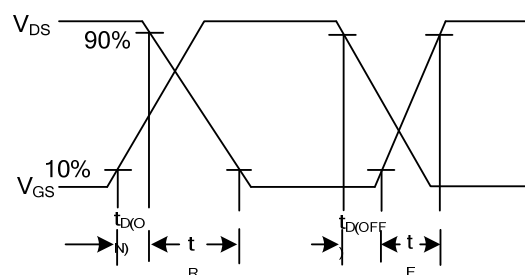


Peak Diode Recovery dv/dt Waveforms

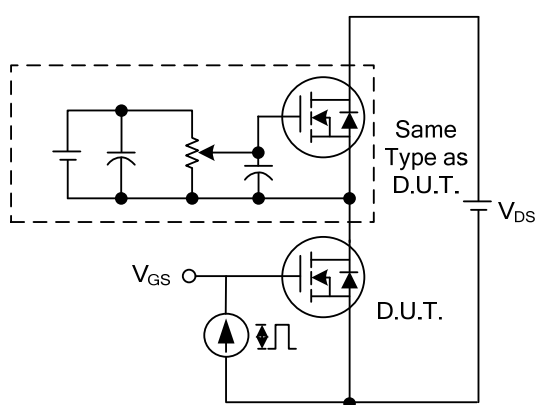
■ TEST CIRCUITS AND WAVEFORMS



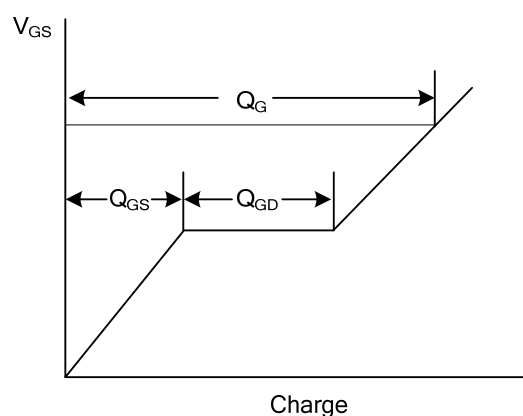
Switching Test Circuit



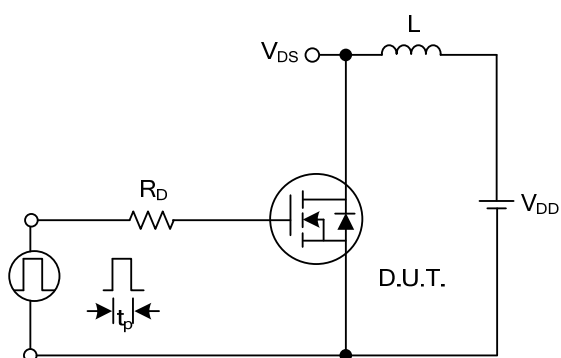
Switching Waveforms



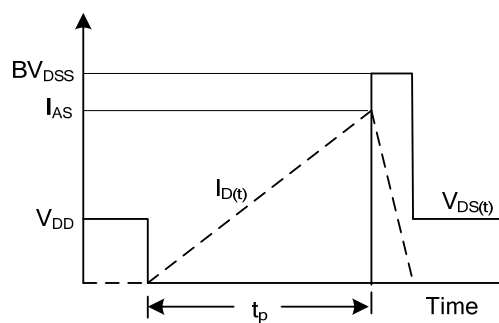
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.