



2NM95Z

Preliminary

Power MOSFET

2.0A, 950V N-CHANNEL SUPER-JUNCTION MOSFET

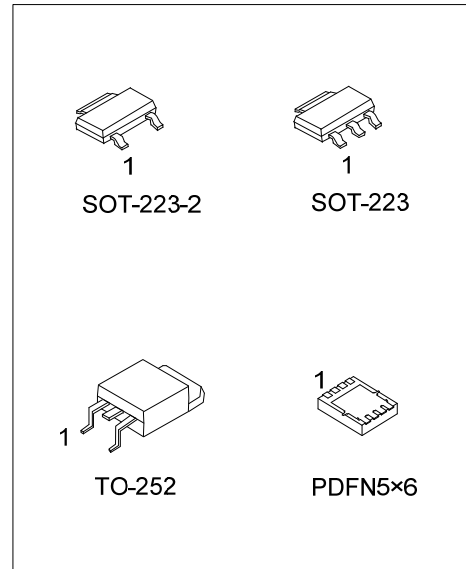
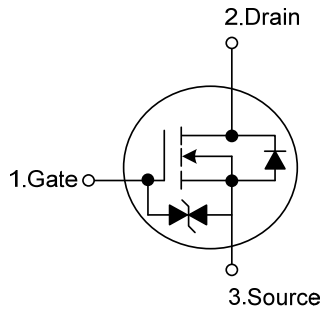
■ DESCRIPTION

The UTC **2NM95Z** 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

- * $R_{DS(ON)} \leq 4.1 \Omega @ V_{GS}=10V, I_D=1.0A$
- * High Switching Speed
- * With ESD Protected

■ SYMBOL



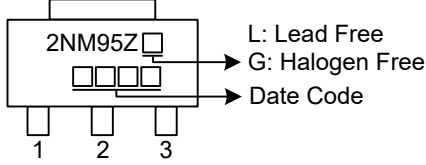
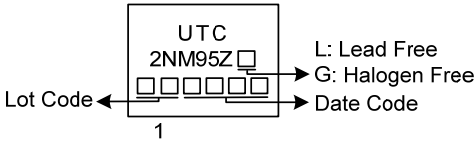
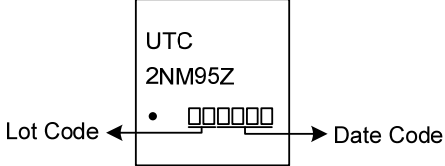
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
2NM95ZL-AA2-R	2NM95ZG-AA2-R	SOT-223-2	G	D	S	-	-	-	-	-	Tape Reel
2NM95ZL-AA3-R	2NM95ZG-AA3-R	SOT-223	G	D	S	-	-	-	-	-	Tape Reel
2NM95ZL-TN3-R	2NM95ZG-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
2NM95ZL-P5060-R	2NM95ZG-P5060-R	PDFN5x6	S	S	S	G	D	D	D	D	Tape Reel

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

<p>2NM95ZG-AA2-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AA2: SOT-223-2, AA3: SOT-223, TN3: TO-252, P5060: PDFN5x6 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING

PACKAGE	MARKING
<p>SOT-223-2 SOT-223</p>	
<p>TO-252</p>	
<p>PDFN5x6</p>	

■ 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}	± 20	V
Drain Current	Continuous	I_D	2	A
	Pulsed (Note 2)	I_{DM}	4	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	4	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.8	V/ns
Power Dissipation	SOT-223-2/SOT-223	P_D	1.7	W
	TO-252		14	W
	PDFN5x6		12	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. $L = 100\text{mH}$, $I_{AS} = 0.28\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$.

4. $I_{SD} \leq 2.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223-2/SOT-223	θ_{JA}	150	$^\circ\text{C}/\text{W}$
	TO-252		110	$^\circ\text{C}/\text{W}$
	PDFN5x6		35 (Note)	$^\circ\text{C}/\text{W}$
Junction to Case	SOT-223-2/SOT-223	θ_{JC}	73.5 (Note)	$^\circ\text{C}/\text{W}$
	TO-252		8.92 (Note)	$^\circ\text{C}/\text{W}$
	PDFN5x6		10.4 (Note)	$^\circ\text{C}/\text{W}$

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

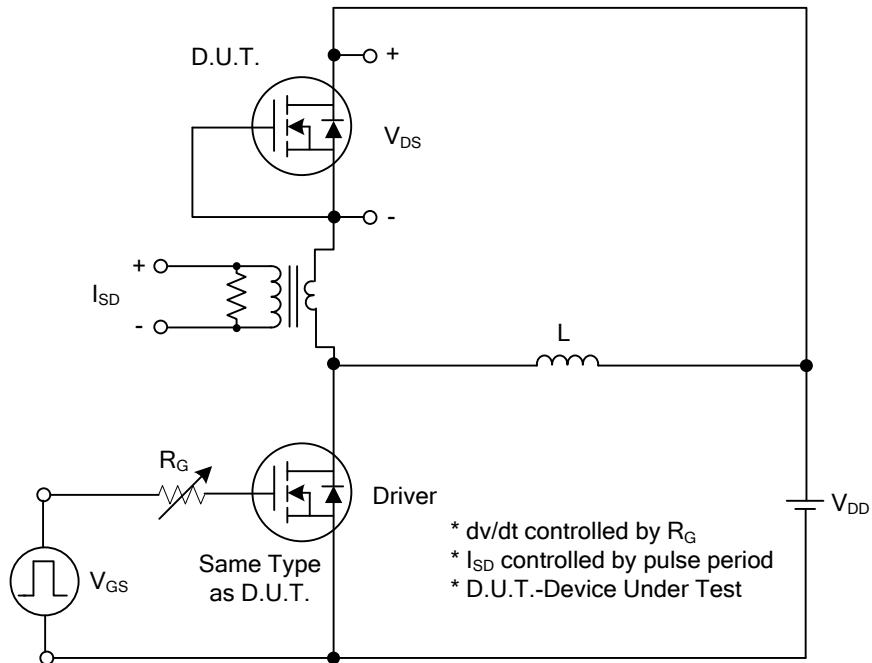
■ ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	950			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=950V, V_{GS}=0V$			10	μA
Gate-Source Leakage Current	Forward	$V_{GS}=20V, V_{DS}=0V$			10	μA
	Reverse		$V_{GS}=-20V, V_{DS}=0V$			-10
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=1.0A$			4.1	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{GS}=0V, V_{DS}=50V, f=1.0\text{ MHz}$		176		pF
Output Capacitance	C_{OSS}			21		pF
Reverse Transfer Capacitance	C_{RSS}			2.2		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=760V, V_{GS}=10V, I_D=0.5A$ (Note 1, 2)		15		nC
Gate-source Charge	Q_{GS}			3.6		nC
Gate-drain Charge	Q_{GD}			8		nC
Turn-on Delay Time (Note 1)	$t_{D(ON)}$	$V_{DS}=100V, V_{GS}=10V,$ $I_D=1.0A, R_G=25\Omega$ (Note 1, 2)		4.7		ns
Rise Time	t_R			18.7		ns
Turn-off Delay Time	$t_{D(OFF)}$			44		ns
Fall-Time	t_F			63		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				2	A
Maximum Body-Diode Pulsed Current	I_{SM}				4	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_S=2.0A, V_{GS}=0V$			1.4	V
Reverse Recovery Time	t_{rr}	$I_S=2.0A, V_{GS}=0V$		424		ns
Reverse Recovery Charge	Q_{rr}	$di/dt=100A/\mu s$ (Note1)		4.1		μC

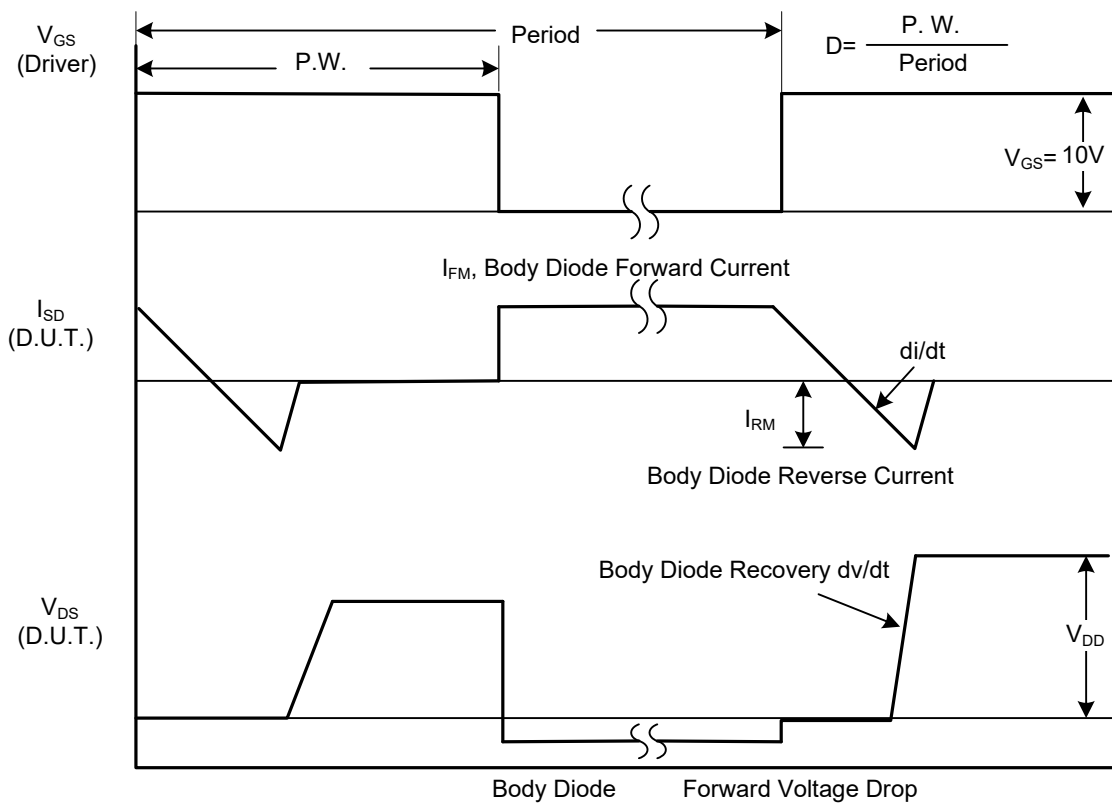
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

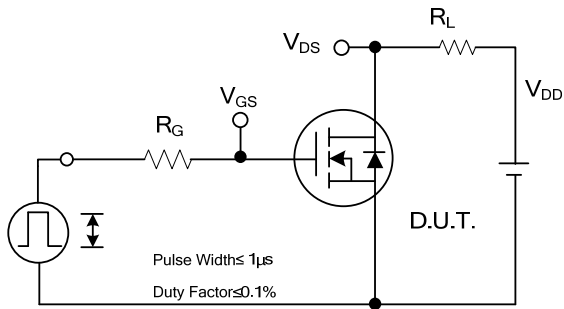


Peak Diode Recovery dv/dt Test Circuit

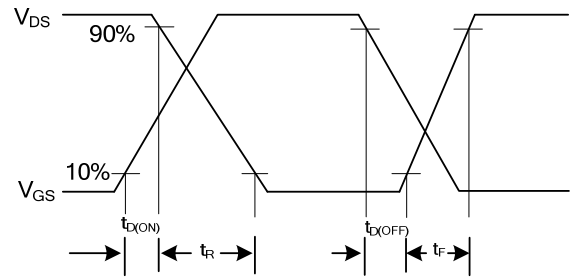


Peak Diode Recovery dv/dt Waveforms

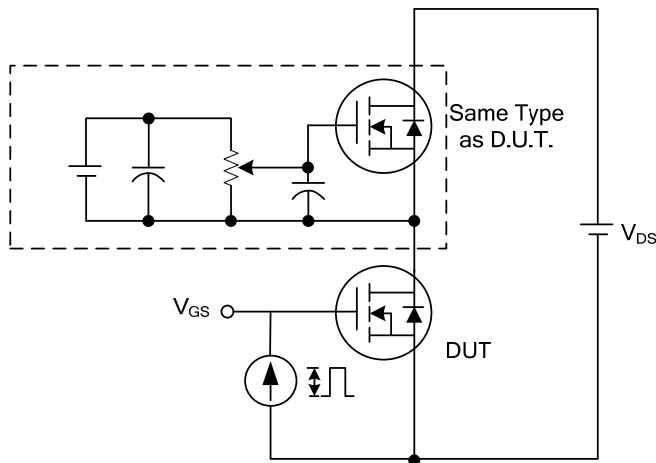
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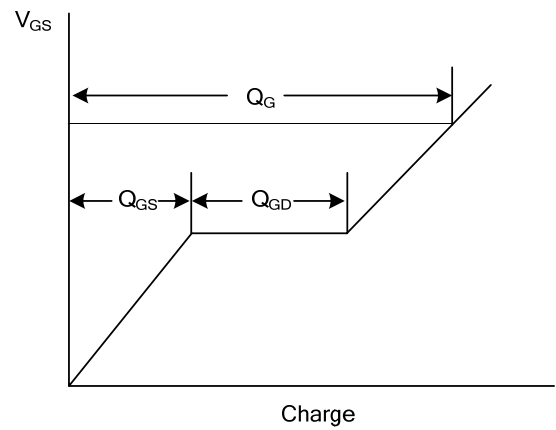
Switching Test Circuit



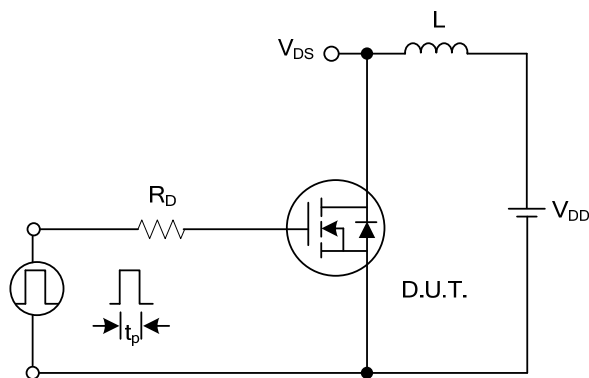
Switching Waveforms



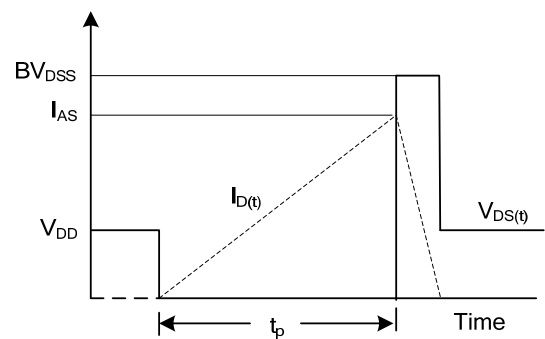
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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