



## 2NM80-Q

Power MOSFET

### 2.0A, 800V N-CHANNEL SUPER-JUNCTION MOSFET

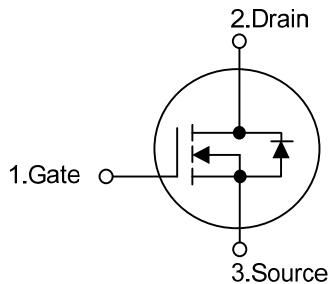
#### DESCRIPTION

The **UTC 2NM80-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

- \*  $R_{DS(ON)} \leq 3.8 \Omega$  @  $V_{GS}=10V$ ,  $I_D=1.0A$
- \* Fast switching capability
- \* Avalanche energy tested
- \* Improved dv/dt capability, high ruggedness

#### SYMBOL

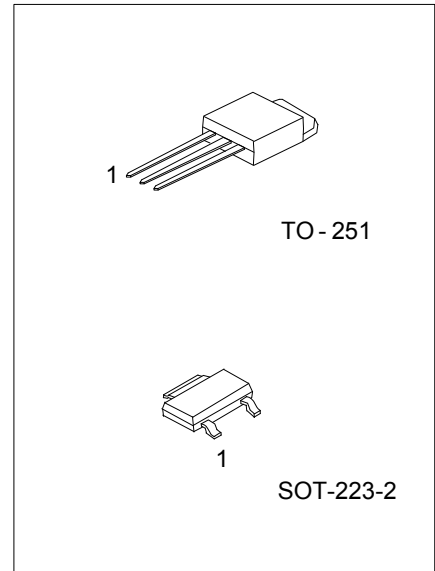


#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
2NM80L-AA2-R	2NM80G-AA2-R	SOT-223-2	G	D	S	Tape Reel
2NM80L-TM3-T	2NM80G-TM3-T	TO-251	G	D	S	Tube

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

2NM80G-AA2-R	(1)Packing Type	(1) R: Tape Reel, T: Tube
	(2)Package Type	(2) AA2: SOT-223-2, TM3: TO-251
	(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free



MARKING

SOT-223-2	TO-251
<div><div>2NM80</div><div>Lot Code ← 1 → Date Code</div><div>L: Lead Free G: Halogen Free</div></div>	<div><div>UTC 2NM80</div><div>Lot Code ← 1 → Date Code</div><div>L: Lead Free G: Halogen Free</div></div>

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	800	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Continuous Drain Current	Continuous	$I_D$	2	A
Pulsed Drain Current	Pulsed (Note 2)	$I_{DM}$	4	A
Single Pulsed Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	50	mJ
Peak Diode Recovery $dv/dt$ (Note 4)		$dv/dt$	3.69	V/ns
Power Dissipation	SOT-223-2	$P_D$	1.5	W
	TO-251		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.  $L = 100\text{mH}$ ,  $I_{AS} = 1.0\text{A}$ ,  $V_{DD} = 90\text{V}$ ,  $R_G = 25\Omega$ , 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	$\theta_{JA}$	150	$^\circ\text{C}/\text{W}$
	TO-251		110	$^\circ\text{C}/\text{W}$
Junction to Case	SOT-223-2	$\theta_{JC}$	83.3	$^\circ\text{C}/\text{W}$
	TO-251		10.4	$^\circ\text{C}/\text{W}$

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

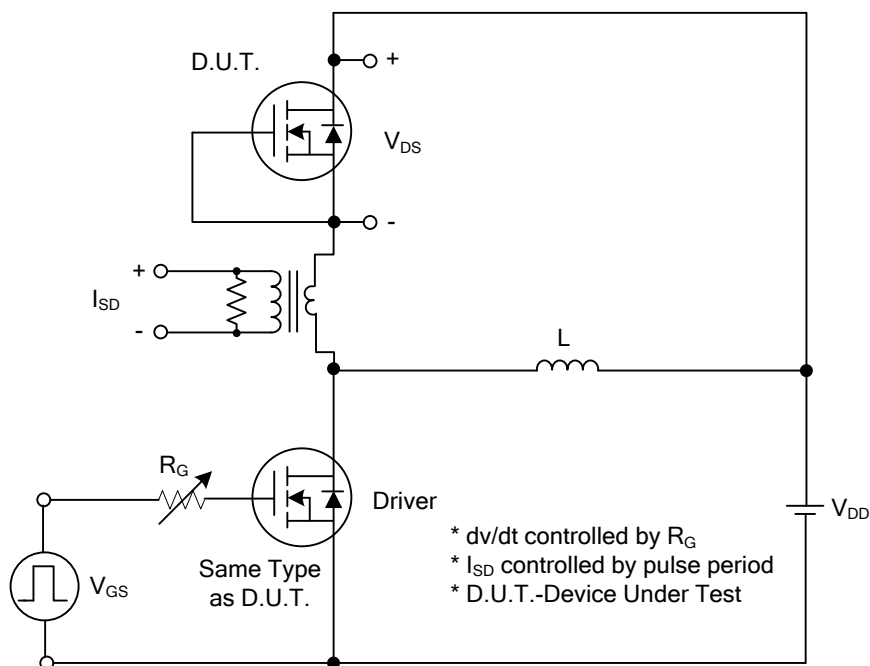
■ ELECTRICAL CHARACTERISTICS ( $T_J=25^{\circ}\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	800			V
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =800V, V <sub>GS</sub> =0V			10	μA
Gate-Source Leakage Current	Forward	I <sub>GSS</sub>	V <sub>GS</sub> =30V, V <sub>DS</sub> =0V			100	nA
	Reverse		V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.5		4.5	V
Static Drain-Source On-State Resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =1.0A			3.8	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =50V, f=1.0MHz		150		pF
Output Capacitance		C <sub>OSS</sub>			23		pF
Reverse Transfer Capacitance		C <sub>RSS</sub>			2.5		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		Q <sub>G</sub>	V <sub>DS</sub> =640V, V <sub>GS</sub> =10V, I <sub>D</sub> =2.0A (Note 1, 2)		13.5		nC
Gate to Source Charge		Q <sub>GS</sub>			5.2		nC
Gate to Drain Charge		Q <sub>GD</sub>			2.8		nC
Turn-ON Delay Time (Note 1)		t <sub>D(ON)</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =10V, I <sub>D</sub> =2.0A, R <sub>G</sub> =25Ω (Note 1, 2)		4		nS
Rise Time		t <sub>R</sub>			17		nS
Turn-OFF Delay Time		t <sub>D(OFF)</sub>			25		nS
Fall-Time		t <sub>F</sub>			30		nS
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I <sub>S</sub>				2	A
Maximum Pulsed Drain-Source Diode Forward Current		I <sub>SM</sub>				4	A
Drain-Source Diode Forward Voltage (Note 1)		V <sub>SD</sub>	I <sub>S</sub> =2.0A, V <sub>GS</sub> =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)		t <sub>rr</sub>	I <sub>S</sub> =2.0A, V <sub>GS</sub> =0V,		230		nS
Body Diode Reverse Recovery Charge		Q <sub>rr</sub>	dl <sub>F</sub> /dt=100A/μs		1.1		μC

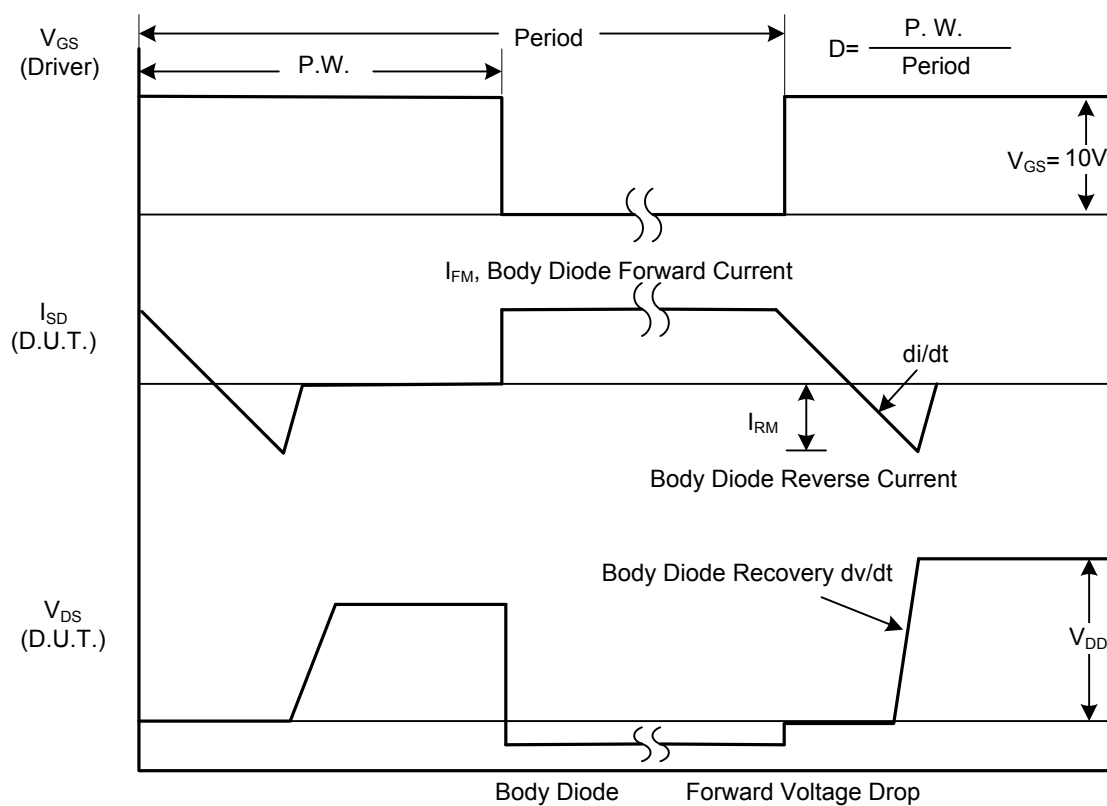
Notes: 1. Pulse Test : Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating ambient temperature.

# ■ TEST CIRCUITS AND WAVEFORMS

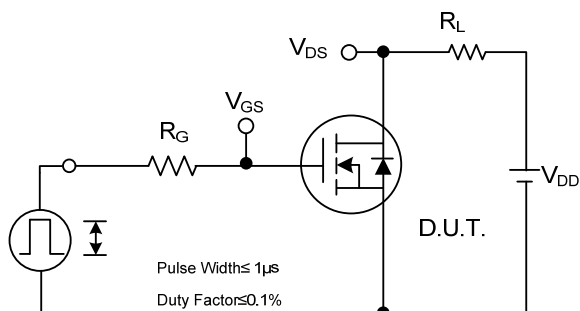


Peak Diode Recovery  $dv/dt$  Test Circuit

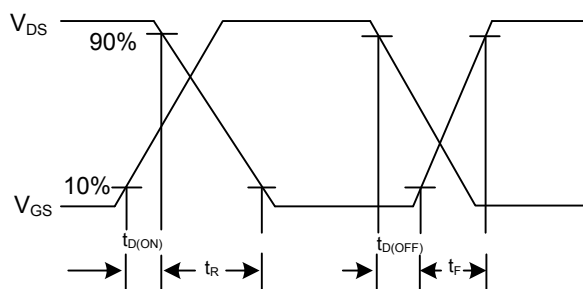


Peak Diode Recovery  $dv/dt$  Waveforms

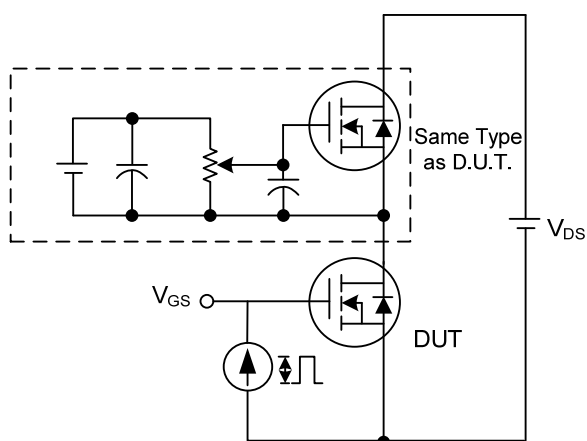
## ■ TEST CIRCUITS AND WAVEFORMS



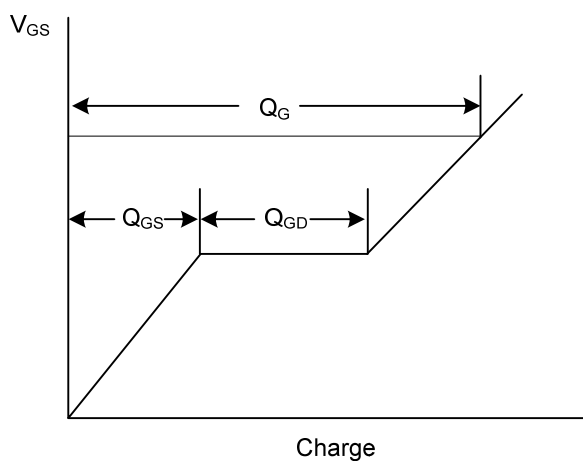
**Switching Test Circuit**



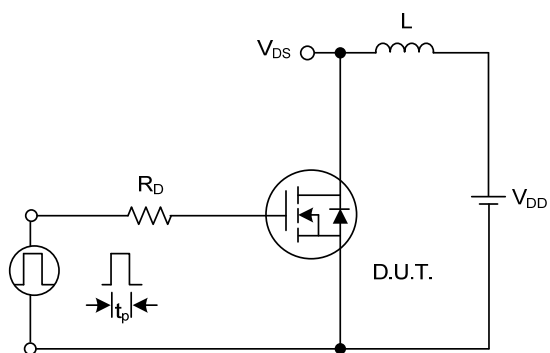
**Switching Waveforms**



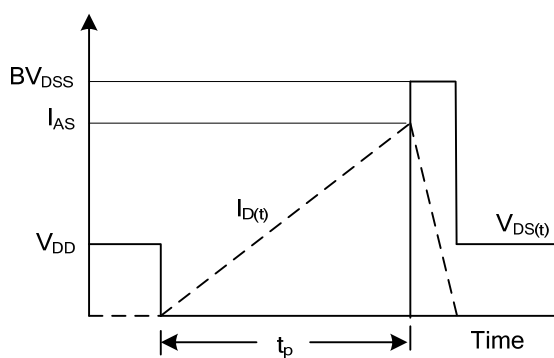
**Gate Charge Test Circuit**



**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.