



24NM80-Q

Preliminary

Power MOSFET

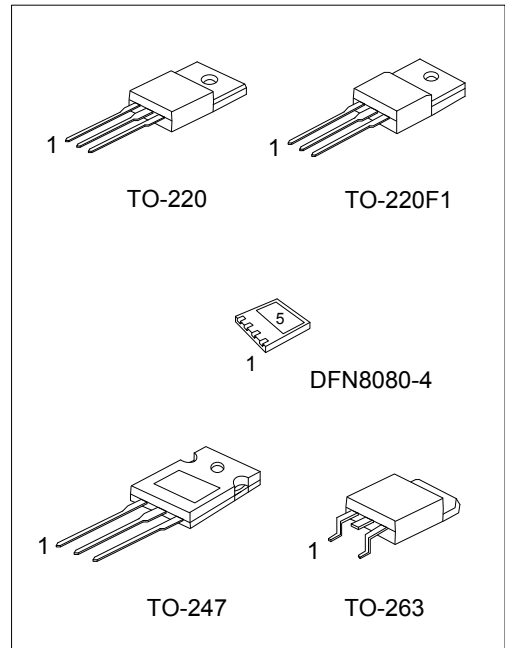
24A, 800V N-CHANNEL SUPER-JUNCTION MOSFET

DESCRIPTION

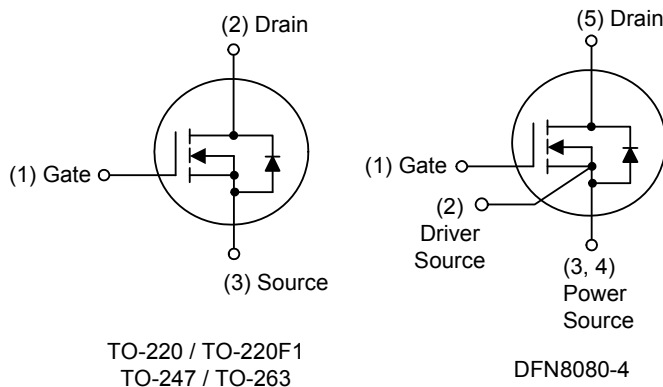
The **UTC 24NM80-Q** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

FEATURES

- * $R_{DS(ON)} \leq 0.26 \Omega @ V_{GS}=10V, I_D=12A$
- * 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	4	5	
24NM80L-TA3-T	24NM80G-TA3-T	TO-220	G	D	S	-	-	Tube
24NM80L-TF1-T	24NM80G-TF1-T	TO-220F1	G	D	S	-	-	Tube
24NM80L-T47-T	24NM80G-T47-T	TO-247	G	D	S	-	-	Tube
24NM80L-TQ2-T	24NM80G-TQ2-T	TO-263	G	D	S	-	-	Tube
24NM80L-TQ2-R	24NM80G-TQ2-R	TO-263	G	D	S	-	-	Tape Reel
24NM80L-K04-8080-R	24NM80G-K04-8080-R	DFN8080-4	G	S	S	S	D	Tape Reel

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

<p>24NM80G-TA3-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, T47: TO-247 TQ2: TO-263, K04-8080: DFN8080-4 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING

TO-220 / TO-220F1 / TO-247 / TO-263	DFN8080-4
<p>UTC 24NM80</p> <p>Lot Code ← [] [] [] [] [] [] → Date Code</p> <p>L: Lead Free G: Halogen Free</p> <p>1</p>	<p>UTC 24NM80</p> <p>Lot Code ← [•] [] [] [] [] [] → Date Code</p>

■ 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}	± 30	V	
Drain Current	Continuous	I_D	$T_C=25^\circ\text{C}$	24	A
			$T_C=100^\circ\text{C}$	15.6	A
	Pulsed (Note 2)		I_{DM}	72	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	264	mJ	
Peak Diode Recovery dv/dt (Note 4)		dv/dt	6.7	V/ns	
Power Dissipation	TO-220/TO-263		120	W	
	TO-220F1		36	W	
	TO-247		140	W	
	DFN8080-4		67	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. $L=30\text{mH}$, $I_{AS}=4.2\text{A}$, $V_{DD}=90\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 24\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F1	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-263			
	TO-247			
	DFN8080-4			
Junction to Case	TO-220/ TO-263	θ_{JC}	1.04 (Note)	$^\circ\text{C}/\text{W}$
	TO-220F1			
	TO-247			
	DFN8080-4			

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

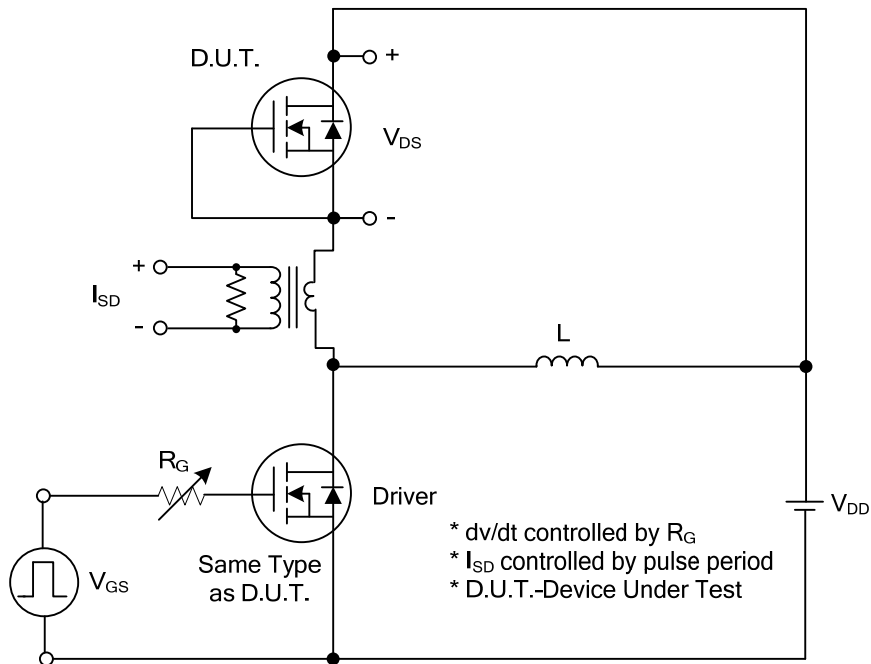
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	800			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =800V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	I _{GSS}	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 =12A			0.26	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =50V, f=1MHz		1880		pF
Output Capacitance	C _{OSS}			235		pF
Reverse Transfer Capacitance	C _{RSS}			4.5		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q _G	V _{DS} =640V, V _{GS} =10V, I _D =24A (Note 1, 2)		81		nC
Gate-Source Charge	Q _{GS}			17		nC
Gate-Drain Charge	Q _{DD}			32		nC
Turn-On Delay Time	t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =24A, R _G =25Ω (Note 1, 2)		22		ns
Turn-On Rise Time	t _R			31		ns
Turn-Off Delay Time	t _{D(OFF)}			270		ns
Turn-Off Fall Time	t _F			100		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				24	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				72	A
Drain-Source Diode Forward Voltage	V _{SD}	I _S =24A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time	t _{rr}	I _S =24A, V _{GS} =0V, dI _F /dt=100A/μs		512		nS
Body Diode Reverse Recovery Charge	Q _{rr}				9.6	

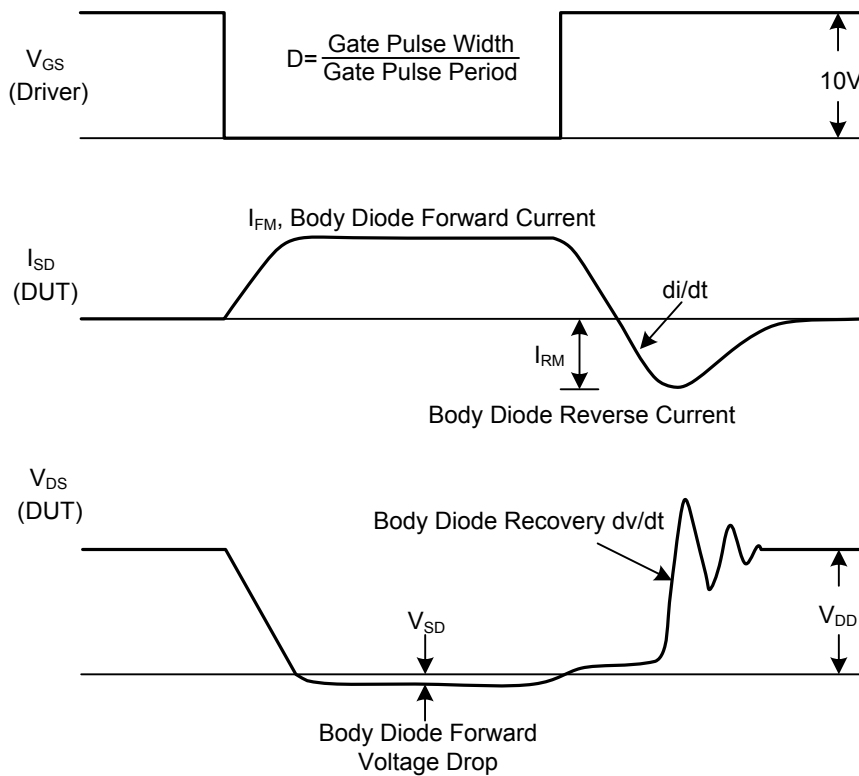
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

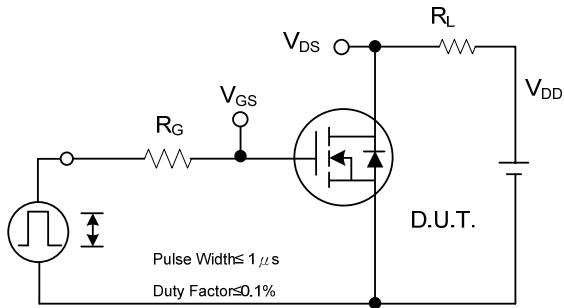


Peak Diode Recovery dv/dt Test Circuit

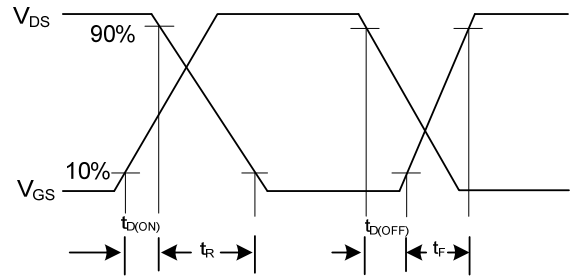


Peak Diode Recovery dv/dt Waveforms

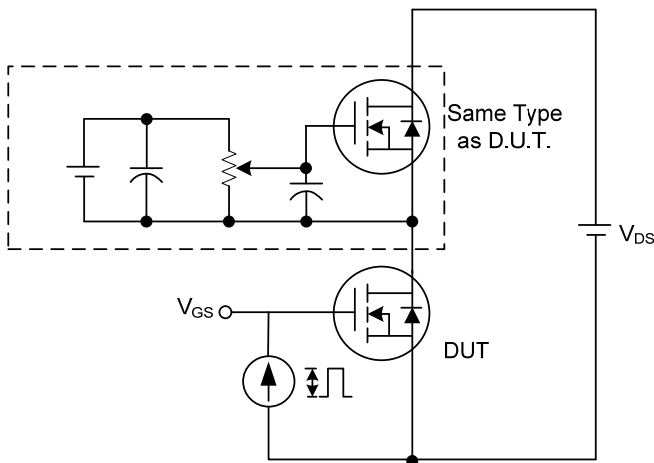
■ TEST CIRCUITS AND WAVEFORMS



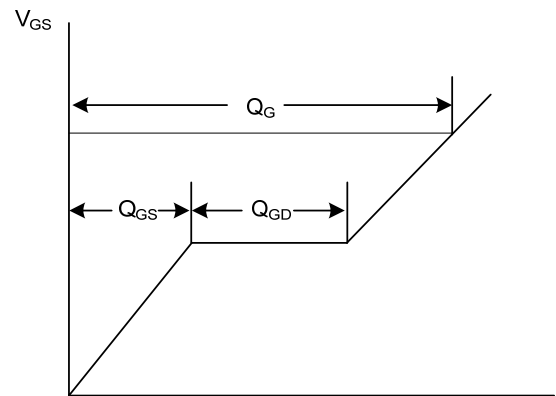
Switching Test Circuit



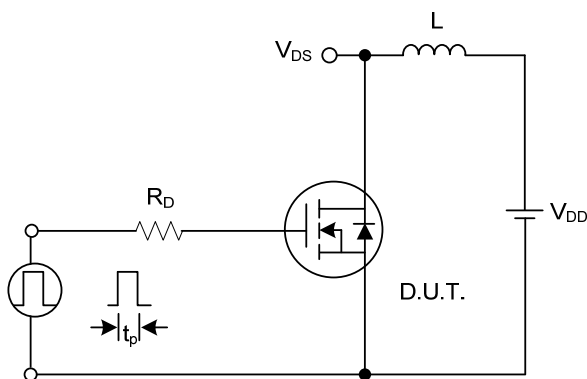
Switching Waveforms



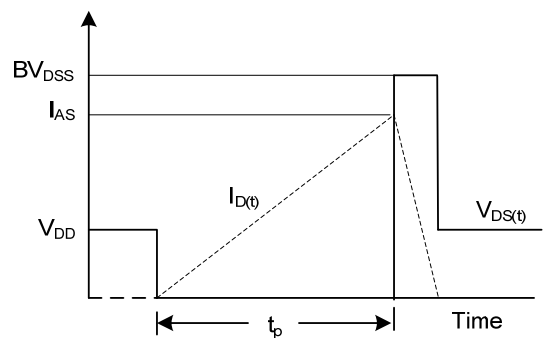
Gate Charge Test Circuit



Charge Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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