



18NM60-U3

Preliminary

Power MOSFET

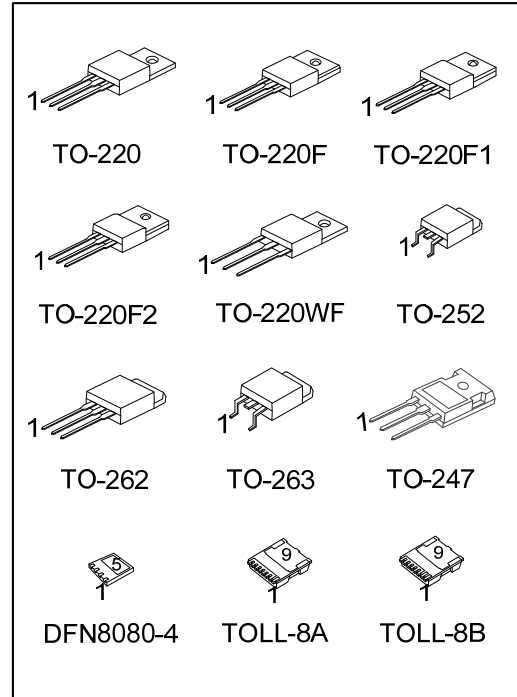
18A, 600V N-CHANNEL SUPER-JUNCTION MOSFET

DESCRIPTION

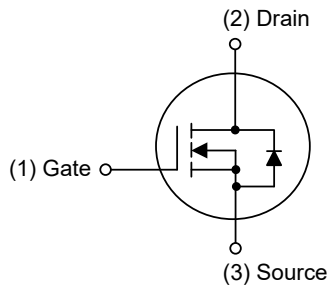
The **UTC 18NM60-U3** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

FEATURES

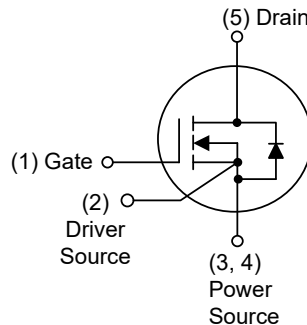
- * $R_{DS(ON)} \leq 0.28 \Omega$ @ $V_{GS}=10V$, $I_D=6.5A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness



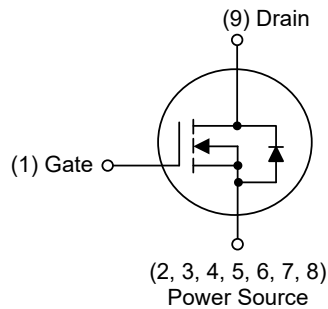
SYMBOL



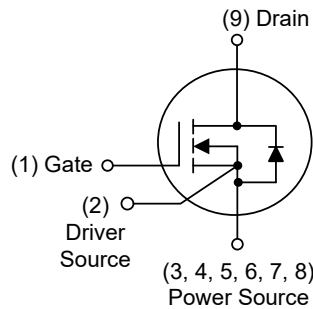
TO-220 / TO-220F / TO-220F1
TO-220F2 / TO-220WF / TO-252
TO-247 / TO-262 / TO-263



DFN8080-4



TOLL-8A



TOLL-8B

■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment									Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	9	
18NM60L-TA3-T	18NM60G-TA3-T	TO-220	G	D	S	-	-	-	-	-	-	Tube
18NM60L-TF1-T	18NM60G-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	-	Tube
18NM60L-TF2-T	18NM60G-TF2-T	TO-220F2	G	D	S	-	-	-	-	-	-	Tube
18NM60L-TF3-T	18NM60G-TF3-T	TO-220F	G	D	S	-	-	-	-	-	-	Tube
18NM60L-TW1-T	18NM60G-TW1-T	TO-220WF	G	D	S	-	-	-	-	-	-	Tube
18NM60L-TN3-R	18NM60G-TN3-R	TO-252	G	D	S	-	-	-	-	-	-	Tape Reel
18NM60L-T2Q-T	18NM60G-T2Q-T	TO-262	G	D	S	-	-	-	-	-	-	Tube
18NM60L-TQ2-T	18NM60G-TQ2-T	TO-263	G	D	S	-	-	-	-	-	-	Tube
18NM60L-TQ2-R	18NM60G-TQ2-R	TO-263	G	D	S	-	-	-	-	-	-	Tape Reel
18NM60L-T47-T	18NM60G-T47-T	TO-247	G	D	S	-	-	-	-	-	-	Tube
18NM60L-K04-8080-R	18NM60G-K04-8080-R	DFN8080-4	G	S	S	S	D	-	-	-	-	Tape Reel
18NM60L-T8A-R	18NM60G-T8A-R	TOLL-8A	G	S	S	S	S	S	S	S	D	Tape Reel
18NM60L-T8B-R	18NM60G-T8B-R	TOLL-8B	G	S	S	S	S	S	S	S	D	Tape Reel

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

18NM60G-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, TW1: TO-220WF, TN3: TO-252, TN3: TO-252, T2Q: TO-262, TQ2: TO-263, T47: TO-247, T474: TO-247-4, K04-8080: DFN8080-4, T8A: TOLL-8A, T8B: TOLL-8B (3) G: Halogen Free and Lead Free L: Lead Free
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■ MARKING

TO-220 / TO-220F / TO-220F1 TO-220F2 / TO-220WF / TO-252 TO-252 / TO-247 / TO-262 / TO-263	DFN8080-4
UTC 18NM60 Lot Code → Date Code 1 L: Lead Free G: Halogen Free	UTC 18NM60 Lot Code → Date Code
TOLL-8A / TOLL-8B	-
UTC 18NM60 Lot Code → Date Code 1 L: Lead Free G: Halogen Free	-

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

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V _{DSS}	600	V
Gate-Source Voltage			V _{GSS}	±30	V
Drain Current	Continuous	T _C =25°C	I _D	18	A
		T _C =100°C		11.7	A
	Pulsed (Note 2)		I _{DM}	54	A
Avalanche Energy	Single Pulsed (Note 3)		E _{AS}	420	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	1.6	V/ns
Power Dissipation	TO-220/TO-262/TO-263		P _D	92	W
	TO-220F/TO-220F1			30	W
	TO-220F2/TO-220WF				
	TO-247			100	W
	TO-252			60	W
	DFN8080-4			56	W
	TOLL-8A /TOLL-8A			175	W
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 maximum junction temperature.

3. $L = 100\text{mH}$, $I_{AS} = 2.9\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$ Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 18\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-220F1/TO-220F2			
	TO-220WF/TO-262/TO-263			
	TO-247		40	$^\circ\text{C}/\text{W}$
	TO-252		110	$^\circ\text{C}/\text{W}$
	DFN8080-4		35 (Note)	$^\circ\text{C}/\text{W}$
	TOLL-8A /TOLL-8A		35 (Note)	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220/TO-262/TO-263	θ_{JC}	1.35	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		4.16	$^\circ\text{C}/\text{W}$
	TO-220F2/TO-220WF			
	TO-247		1.25	$^\circ\text{C}/\text{W}$
	TO-252		2.08 (Note)	$^\circ\text{C}/\text{W}$
	DFN8080-4		2.23 (Note)	$^\circ\text{C}/\text{W}$
	TOLL-8A /TOLL-8A		0.71 (Note)	$^\circ\text{C}/\text{W}$

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

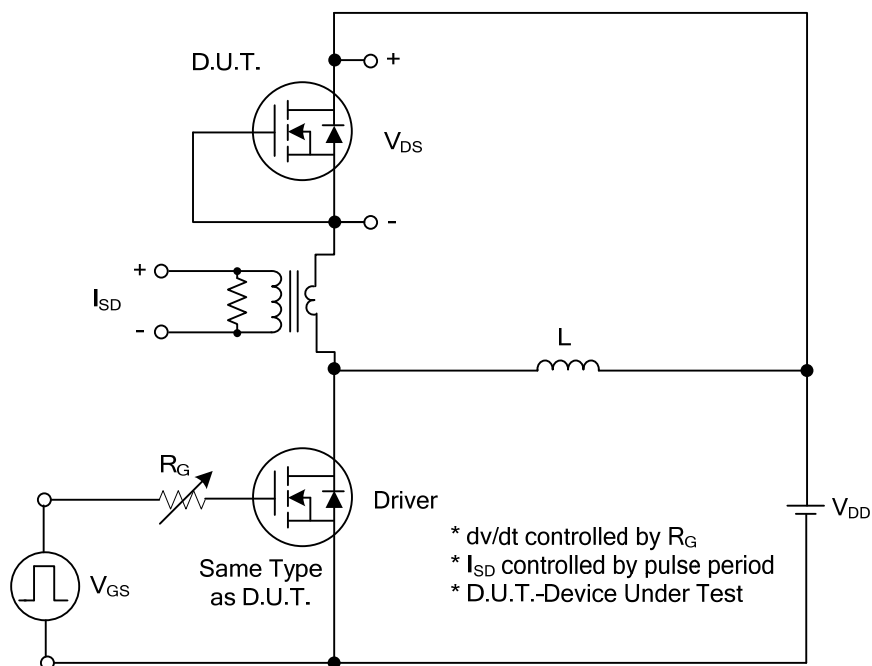
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	600			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =600V, 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 =6.5A		0.26	0.28	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =50V, f=1MHz		809		pF
Output Capacitance	C _{OSS}			244		pF
Reverse Transfer Capacitance	C _{RSS}			11.8		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q _G	V _{DS} =480V, V _{GS} =10V, I _D =18A (Note 1, 2)		42		nC
Gate-Source Charge	Q _{GS}			9.2		nC
Gate-Drain Charge	Q _{DD}			23		nC
Turn-On Delay Time (Note 1)	t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =9A, R _G =25Ω (Note 1, 2)		13		ns
Turn-On Rise Time	t _{tr}			26		ns
Turn-Off Delay Time	t _{D(OFF)}			102		ns
Turn-Off Fall Time	t _f			50		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				18	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				54	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =18A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t _{rr}	I _S =18A, V _{GS} =0V, dI _F /dt=100A/μs		386		nS
Body Diode Reverse Recovery Charge	Q _{rr}			5818		nC

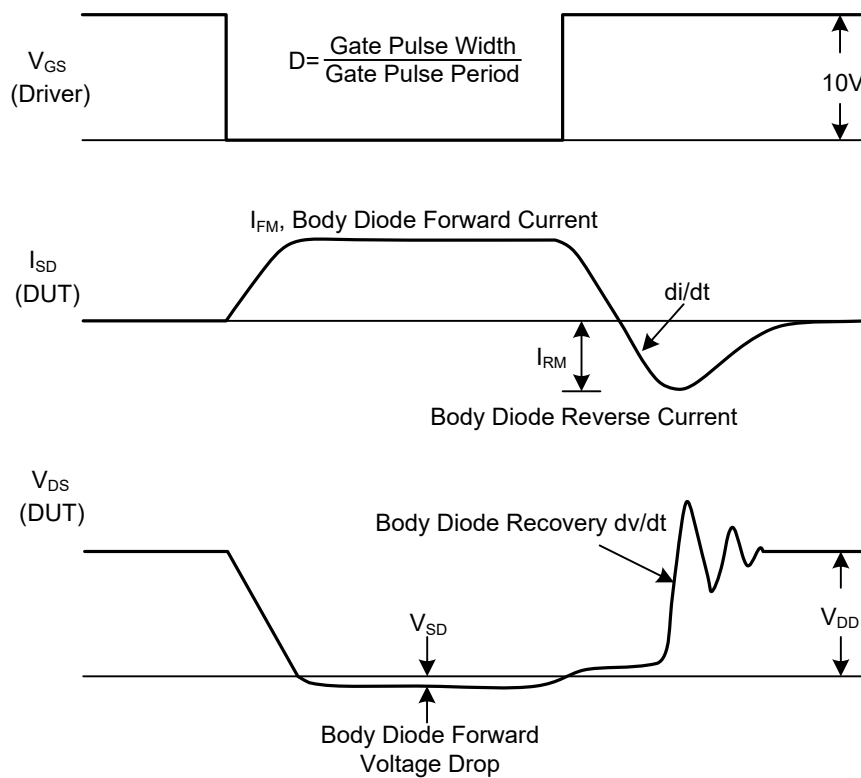
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

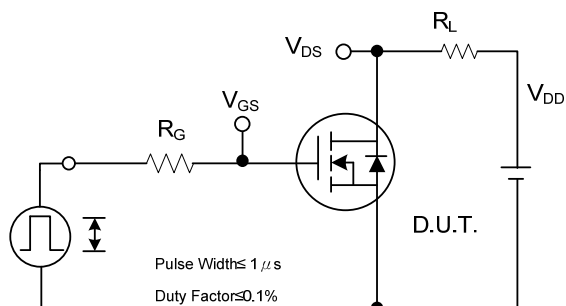


Peak Diode Recovery dv/dt Test Circuit

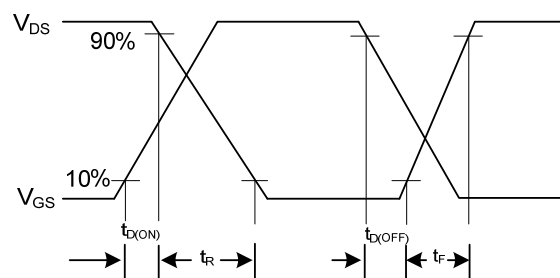


Peak Diode Recovery dv/dt Waveforms

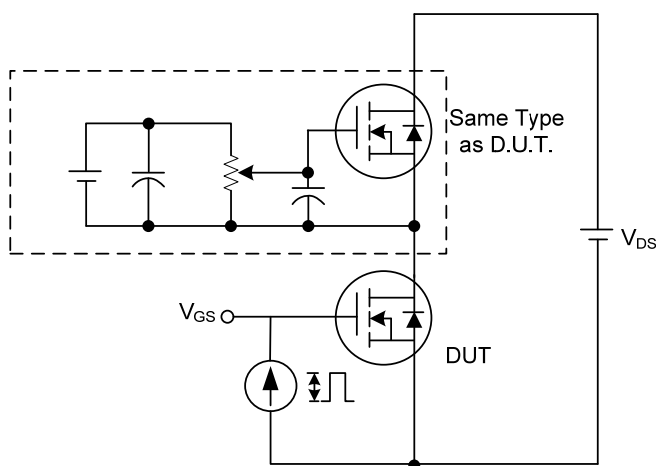
■ TEST CIRCUITS AND WAVEFORMS



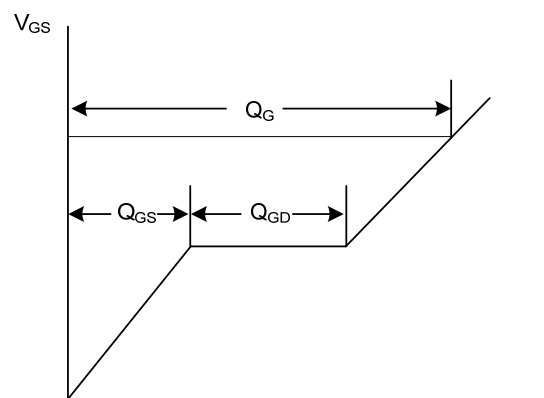
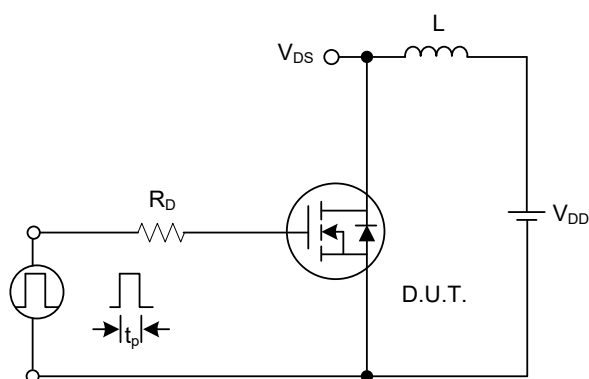
Switching Test Circuit



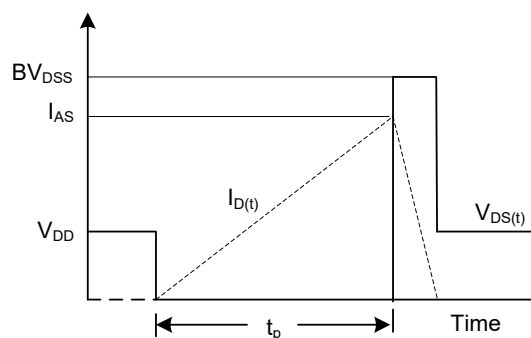
Switching Waveforms



Gate Charge Test Circuit

Charge
Gate Charge Waveform

Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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