



18NM70Z-U3

Preliminary

Power MOSFET

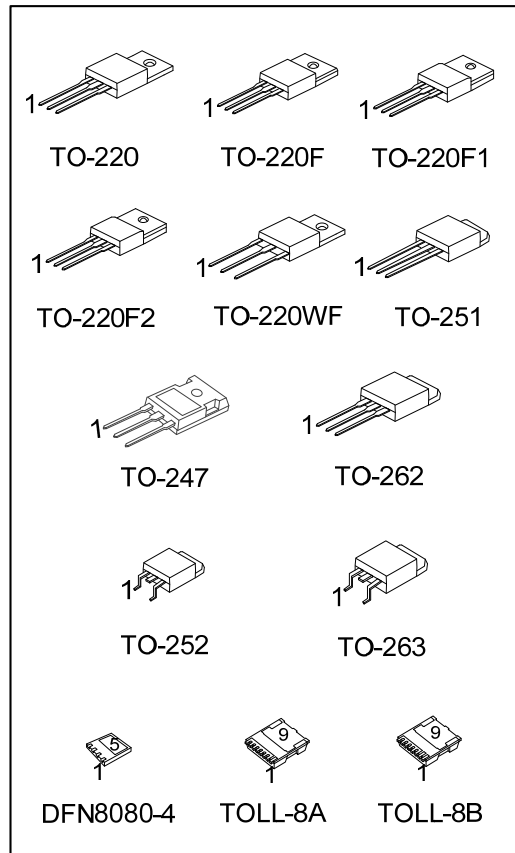
18A, 700V N-CHANNEL SUPER-JUNCTION MOSFET

DESCRIPTION

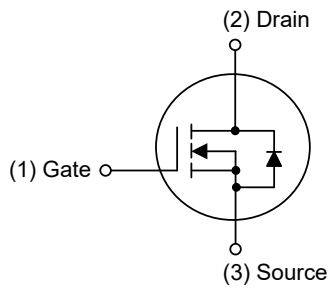
The **UTC 18NM70Z-U3** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

FEATURES

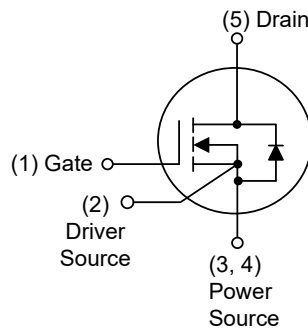
- * $R_{DS(ON)} \leq 0.3 \Omega @ V_{GS}=10V, I_D=9.0A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness
- * With ESD Protected



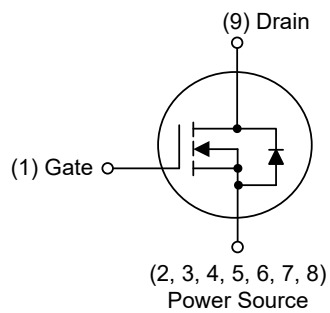
■ SYMBOL



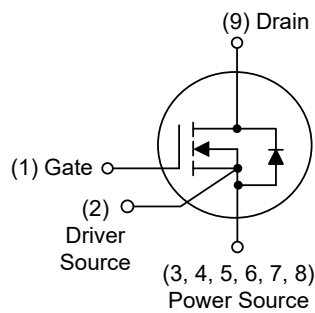
TO-220 / TO-220F / TO-220F1
TO-220F2 / TO-220WF / TO-251
TO-252 / TO-247 / TO-262 / TO-263



DFN8080-4



TOLL-8A

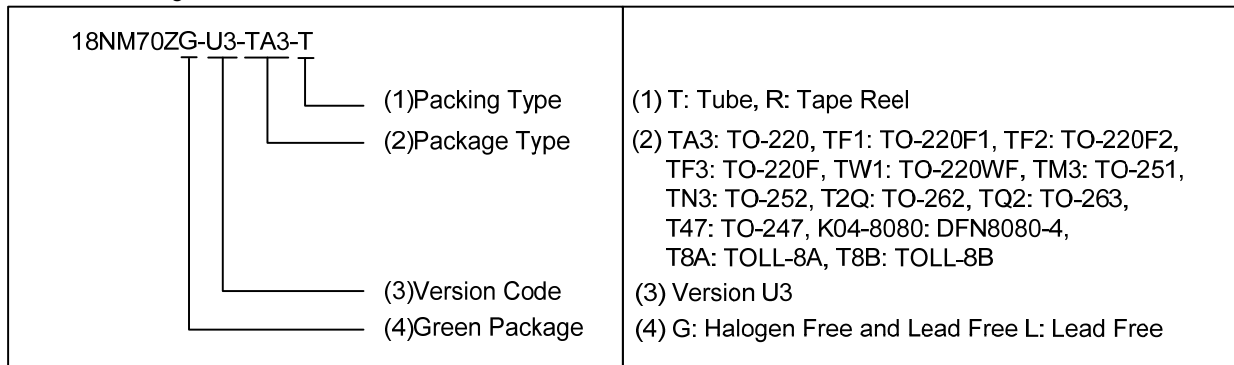


TOLL-8B

ORDERING INFORMATION

Ordering Number		Package	Pin Assignment									Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	9	
18NM70ZL-U3-TA3-T	18NM70ZG-U3-TA3-T	TO-220	G	D	S	-	-	-	-	-	-	Tube
18NM70ZL-U3-TF1-T	18NM70ZG-U3-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	-	Tube
18NM70ZL-U3-TF2-T	18NM70ZG-U3-TF2-T	TO-220F2	G	D	S	-	-	-	-	-	-	Tube
18NM70ZL-U3-TF3-T	18NM70ZG-U3-TF3-T	TO-220F	G	D	S	-	-	-	-	-	-	Tube
18NM70ZL-U3-TW1-T	18NM70ZG-U3-TW1-T	TO-220WF	G	D	S	-	-	-	-	-	-	Tube
18NM70ZL-U3-TM3-T	18NM70ZG-U3-TM3-T	TO-251	G	D	S	-	-	-	-	-	-	Tube
18NM70ZL-U3-TN3-R	18NM70ZG-U3-TN3-R	TO-252	G	D	S	-	-	-	-	-	-	Tape Reel
18NM70ZL-U3-T2Q-T	18NM70ZG-U3-T2Q-T	TO-262	G	D	S	-	-	-	-	-	-	Tube
18NM70ZL-U3-TQ2-T	18NM70ZG-U3-TQ2-T	TO-263	G	D	S	-	-	-	-	-	-	Tube
18NM70ZL-U3-TQ2-R	18NM70ZG-U3-TQ2-R	TO-263	G	D	S	-	-	-	-	-	-	Tape Reel
18NM70ZL-U3-T47-T	18NM70ZG-U3-T47-T	TO-247	G	D	S	-	-	-	-	-	-	Tube
18NM70ZL-U3-K04-8080-R	18NM70ZG-U3-K04-8080-R	DFN8080-4	G	S	S	S	D	-	-	-	-	Tape Reel
18NM70ZL-U3-T8A-R	18NM70ZG-U3-T8A-R	TOLL-8A	G	S	S	S	S	S	S	S	D	Tape Reel
18NM70ZL-U3-T8B-R	18NM70ZG-U3-T8B-R	TOLL-8B	G	S	S	S	S	S	S	S	D	Tape Reel

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



MARKING

TO-220 / TO-220F / TO-220F1 TO-220F2 / TO-220WF / TO-251 TO-252 / TO-247 / TO-262 / TO-263	DFN8080-4
<p>UTC 18NM70Z U3 Date Code</p> <p>L: Lead Free G: Halogen Free</p> <p>1</p>	<p>UTC 18NM70Z U3 Date Code</p>
TOLL-8A / TOLL-8B	-
<p>UTC 18NM70Z U3 Date Code</p> <p>L: Lead Free G: Halogen Free</p> <p>1</p>	-

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

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		V_{DSS}	700	V	
Gate-Source Voltage		V_{GSS}	± 20	V	
Drain Current	Continuous	I_D	$T_C=25^\circ\text{C}$	18	A
			$T_C=100^\circ\text{C}$	11.7	A
	Pulsed (Note 2)		I_{DM}	36	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	25	mJ	
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.6	V/ns	
Power Dissipation	TO-220/TO-262/TO-263	P_D	100	W	
	TO-220F/TO-220F1 TO-220F2/TO-220WF		29	W	
	TO-251/TO-252		61	W	
	TO-247		115	W	
	DFN8080-4		56	W	
	TOLL-8A/TOLL-8B		181	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. $L = 10\text{mH}$, $I_{AS} = 2.2\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$ 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 TO-220F1/TO-220F2 TO-220WF/TO-262/TO-263	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-247		40	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		110	$^\circ\text{C}/\text{W}$
	DFN8080-4		35	$^\circ\text{C}/\text{W}$
	TOLL-8A/TOLL-8B		35	$^\circ\text{C}/\text{W}$
	Junction to Case		TO-220/TO-262/TO-263	θ_{JC}
Junction to Case	TO-220F/TO-220F1 TO-220F2/TO-220WF	4.31	$^\circ\text{C}/\text{W}$	
	TO-251/TO-252	2.05 (Note)	$^\circ\text{C}/\text{W}$	
	TO-247	1.08	$^\circ\text{C}/\text{W}$	
	DFN8080-4	2.23 (Note)	$^\circ\text{C}/\text{W}$	
	TOLL-8A/TOLL-8B	0.69 (Note)	$^\circ\text{C}/\text{W}$	

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

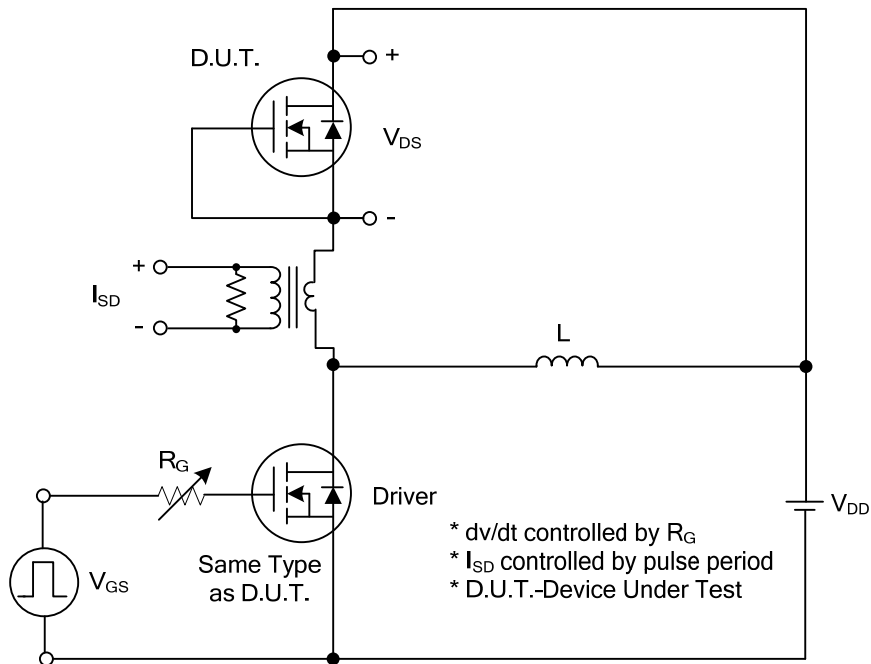
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	700			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =700V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±10	μA
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 =9.0A			0.3	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =50V, f=1MHz		937		pF
Output Capacitance	C _{OSS}			328		pF
Reverse Transfer Capacitance	C _{RSS}			14		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q _G	V _{DS} =560V, V _{GS} =10V, I _D =9A (Note 1, 2)		42		nC
Gate-Source Charge	Q _{GS}			7		nC
Gate-Drain Charge	Q _{DD}			20		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)		11		ns
Turn-On Rise Time	t _R			31		ns
Turn-Off Delay Time	t _{D(OFF)}			132		ns
Turn-Off Fall Time	t _F			62		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}				36	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		364		nS
Body Diode Reverse Recovery Charge	Q _{rr}			5281		μC

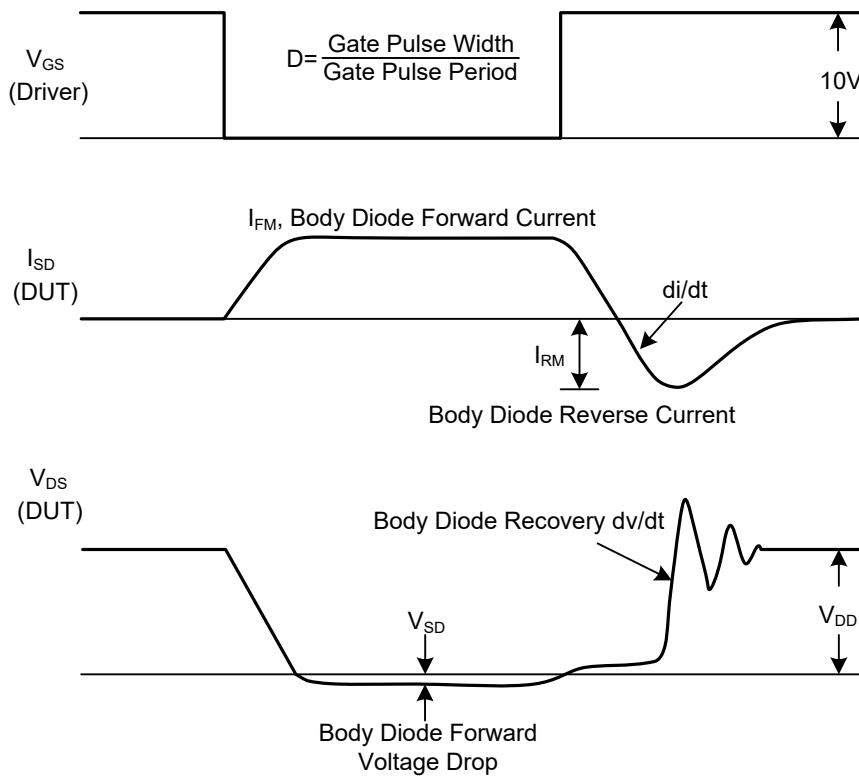
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

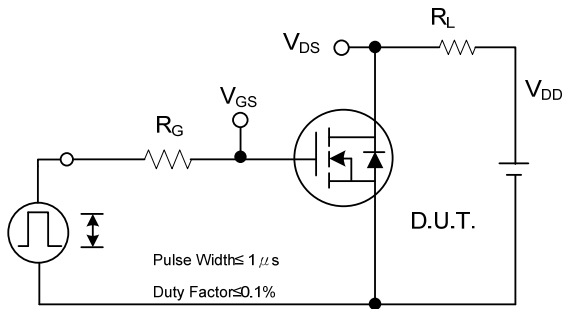


Peak Diode Recovery dv/dt Test Circuit

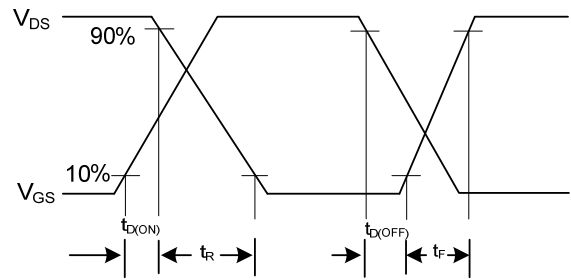


Peak Diode Recovery dv/dt Waveforms

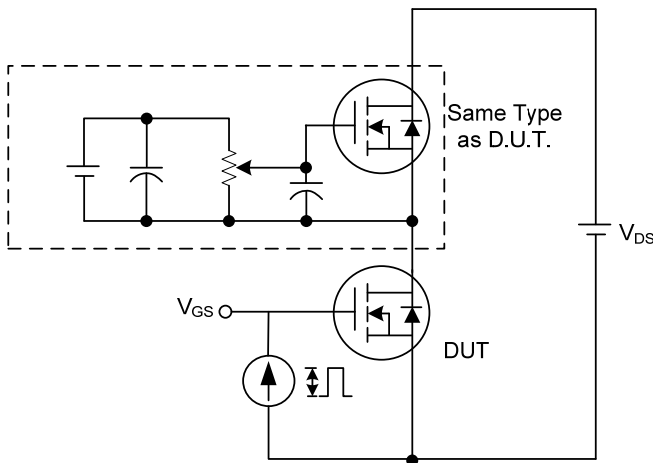
■ TEST CIRCUITS AND WAVEFORMS



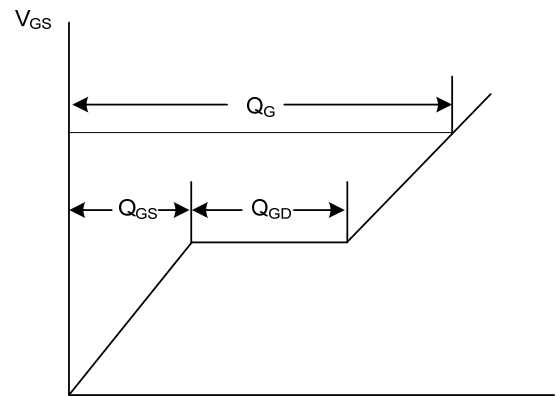
Switching Test Circuit



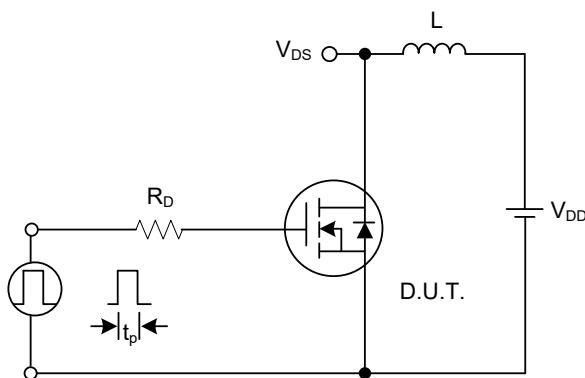
Switching Waveforms



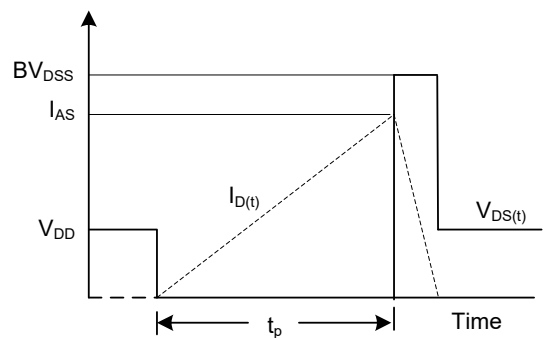
Gate Charge Test Circuit



Charge
Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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