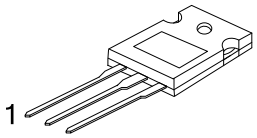
50NM60Z-U3

Preliminary ***Power MOSFET***

50A, 600V N-CHANNEL SUPER-JUNCTION MOSFET



TO-247

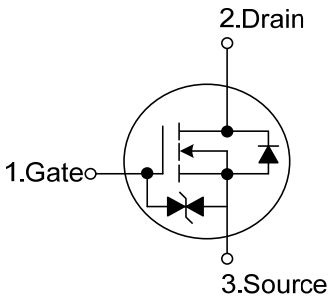
■ DESCRIPTION

The **UTC 50NM60Z-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

* $R_{DS(ON)} \leq 67\ m\Omega$ @ V_{GS}=10V, I_D=25A
* Fast switching capability
* Avalanche energy tested
* Improved dv/dt capability, high ruggedness
* With ESD Protected

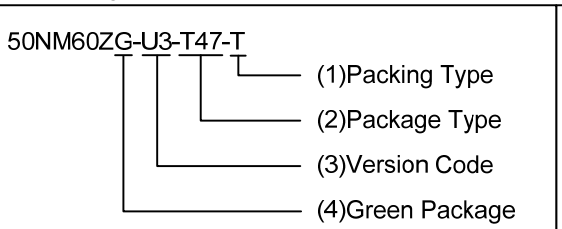
■ SYMBOL



■ ORDERING INFORMATION

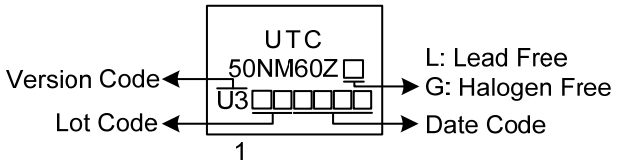
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
50NM60ZL-U3-T47-T	50NM60ZG-U3-T47-T	TO-247	G	D	S	Tube

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



(1) T: Tube
(2) T47: TO-247
(3) Version U3
(4) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING


UTC
50NM60Z□
U3□□□□□□
Version Code
Lot Code
L: Lead Free
G: Halogen Free
Date Code
1

■ ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous (T_C=25°C)	I_D	50	A
	Pulsed (Note 2)	I_{DM}	150	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	306	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.9	V/ns
Power Dissipation		P_D	220	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 = 100mH, I_{AS} = 2.5A, V_{DD} = 50V, R_G = 25Ω Starting T_J = 25°C.
4. I_{SD} ≤30A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C.

■ THERMAL DATA

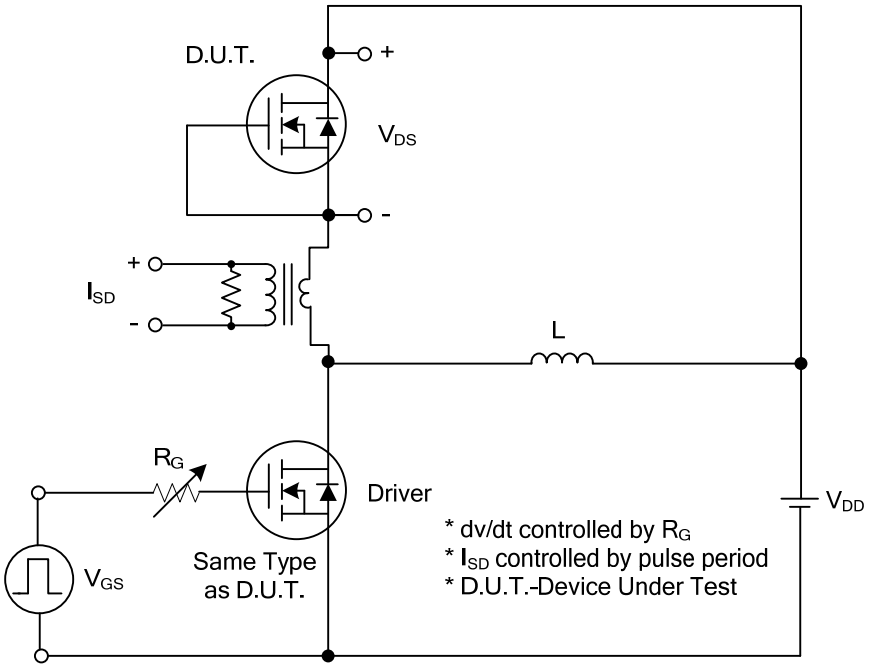
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	40	°C/W
Junction to Case	θ_{JC}	0.56	°C/W

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

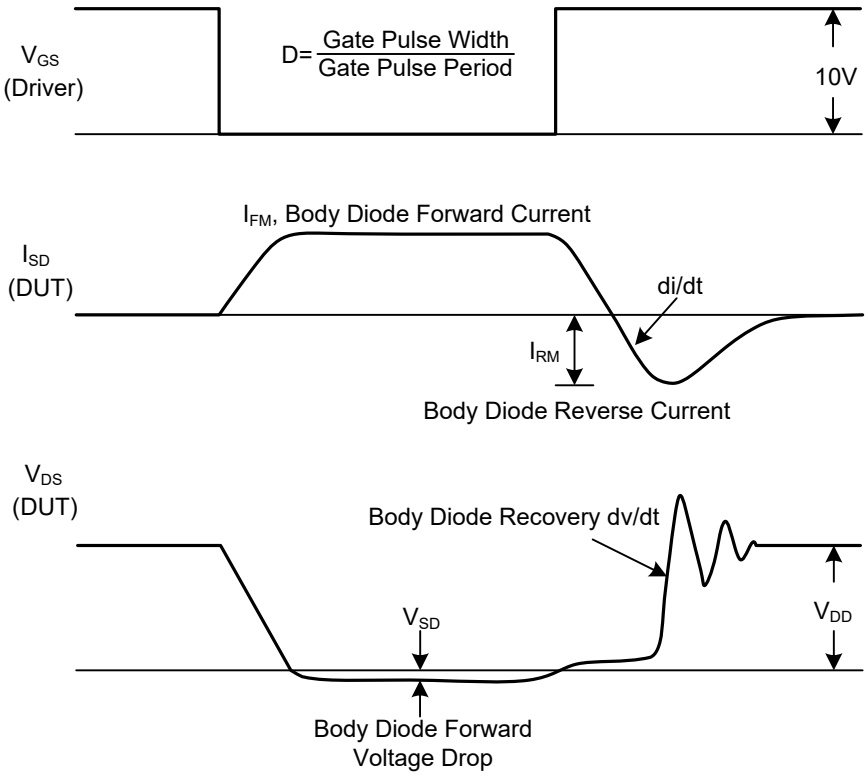
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	600			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=600V, V_{GS}=0V			10	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±10	μA
ON CHARACTERISTICS						
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=25A			67	mΩ
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=50V, f=1MHz		3939		pF
Output Capacitance	C_{OSS}			652		pF
Reverse Transfer Capacitance	C_{RSS}			23		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q_G	V_{DS}=480V, V_{GS}=10V, I_D=50A (Note 1, 2)		145		nC
Gate-Source Charge	Q_{GS}			26		nC
Gate-Drain Charge	Q_{DD}			70		nC
Turn-On Delay Time (Note 1)	$t_{D(ON)}$	V_{DD}=100V, V_{GS}=10V, I_D=50A, R_G =25Ω (Note 1, 2)		51		ns
Turn-On Rise Time	t_R			76		ns
Turn-Off Delay Time	$t_{D(OFF)}$			544		ns
Turn-Off Fall Time	t_F			125		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				50	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	I_S=50A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t_{rr}	I_S=30A, V_{GS}=0V, dI_F/dt=100A/μs		230		nS
Body Diode Reverse Recovery Charge	Q_{rr}			2445		nC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

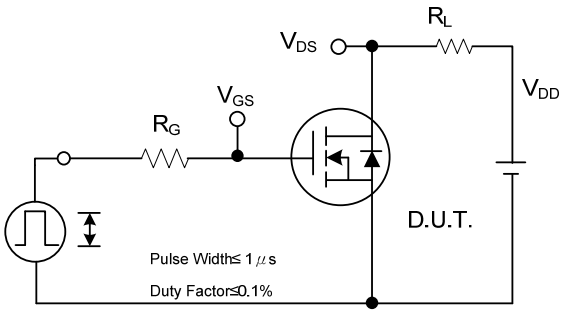


Peak Diode Recovery dv/dt Test Circuit

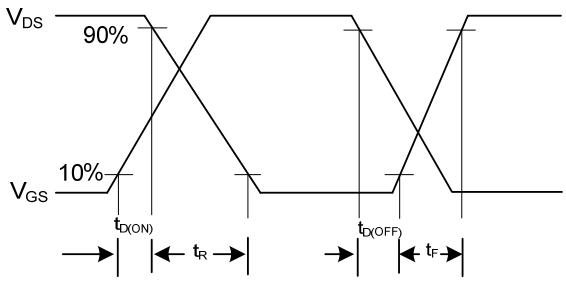


Peak Diode Recovery dv/dt Waveforms

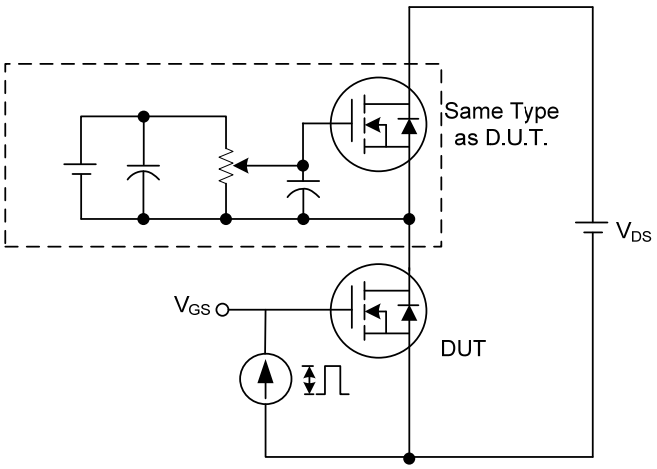
■ TEST CIRCUITS AND WAVEFORMS



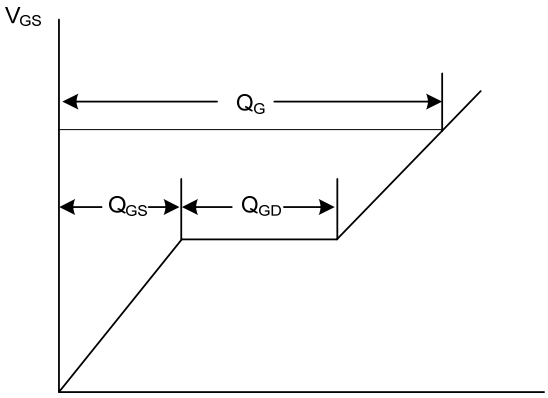
Switching Test Circuit



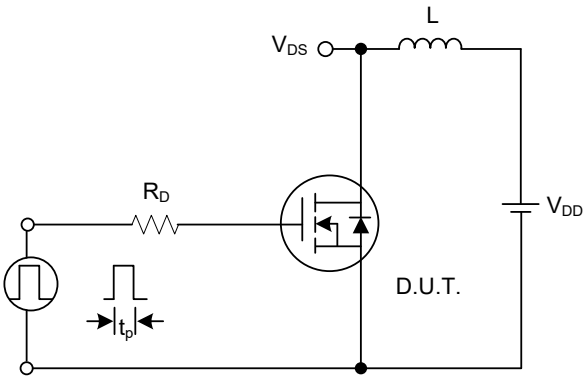
Switching Waveforms



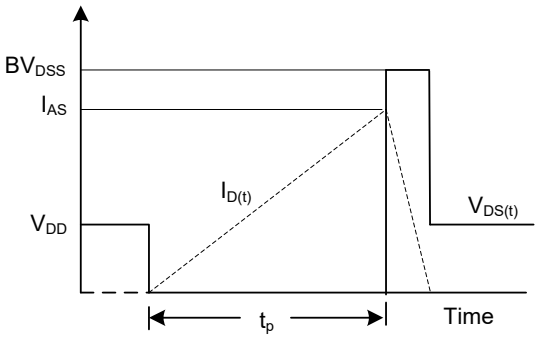
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms