



50NM60Z-U3

Preliminary

Power MOSFET

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

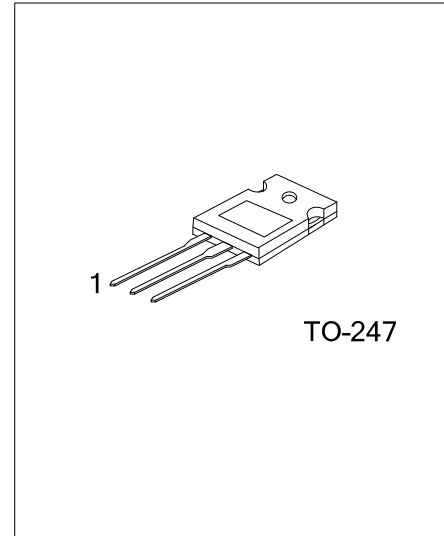
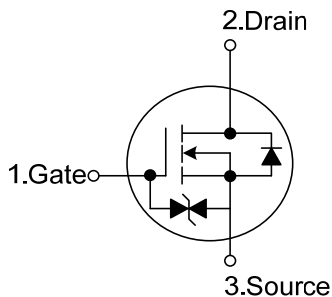
DESCRIPTION

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

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

SYMBOL



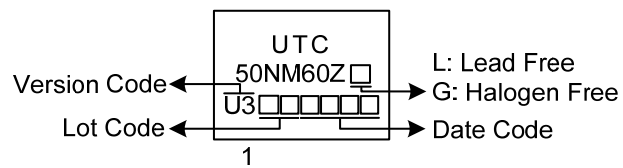
ORDERING INFORMATION

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

50NM60ZG-U3-T47-T	(1)Packing Type	(1) T: Tube
	(2)Package Type	(2) T47: TO-247
	(3)Version Code	(3) Version U3
	(4)Green Package	(4) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



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

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V_{DS}	600	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current	Continuous ($T_C=25^{\circ}\text{C}$)	I_D	50
	Pulsed (Note 2)	I_{DM}	150
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	306
Peak Diode Recovery dv/dt (Note 4)	dv/dt	1.9	V/ns
Power Dissipation	P_D	220	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 values only and functional device operation is not implied.

2. Repetitive Rating: Pulse width limited by maximum junction temperature.

3. $L = 100\text{mH}$, $I_{AS} = 2.5\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$ Starting $T_J = 25^{\circ}\text{C}$.

4. $I_{SD} \leq 30\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DS}$, Starting $T_J = 25^{\circ}\text{C}$.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	40	$^{\circ}\text{C}/\text{W}$
Junction to Case	θ_{JC}	0.56	$^{\circ}\text{C}/\text{W}$

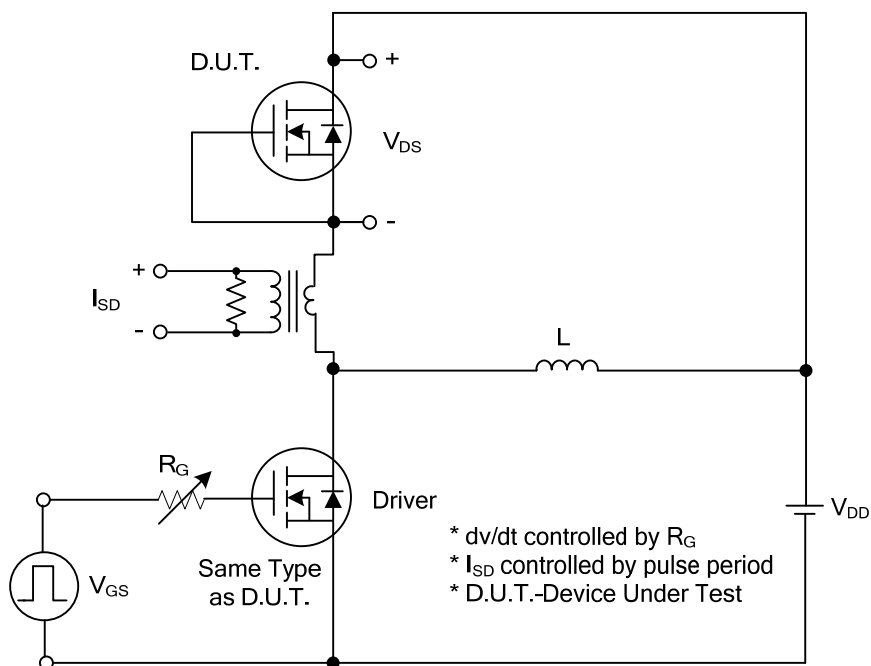
■ ELECTRICAL CHARACTERISTICS ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

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} =±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

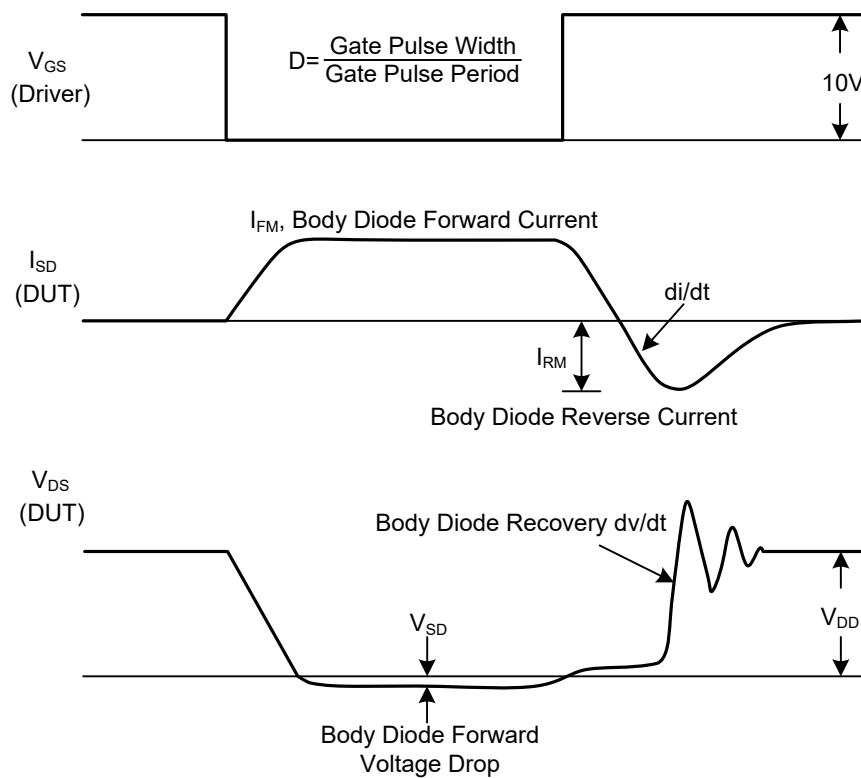
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

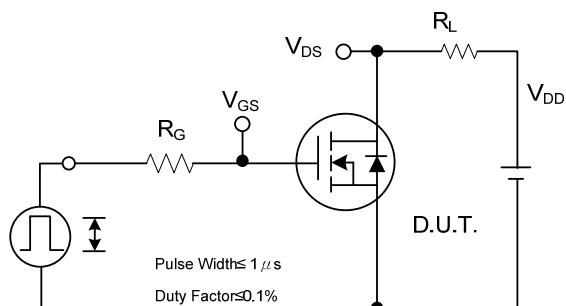


Peak Diode Recovery dv/dt Test Circuit

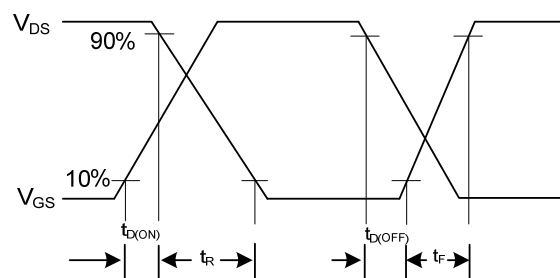


Peak Diode Recovery dv/dt Waveforms

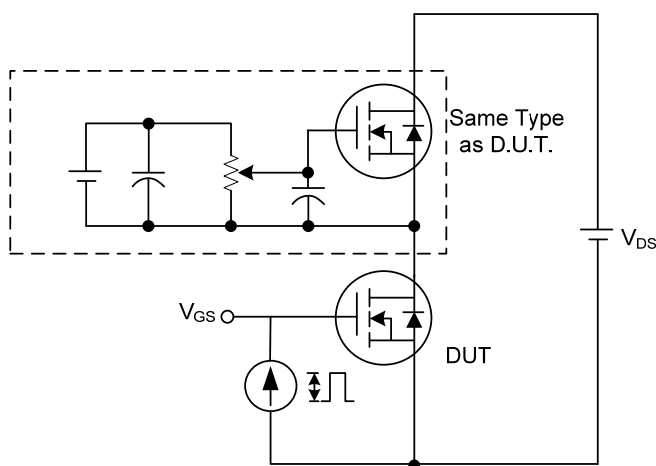
■ TEST CIRCUITS AND WAVEFORMS



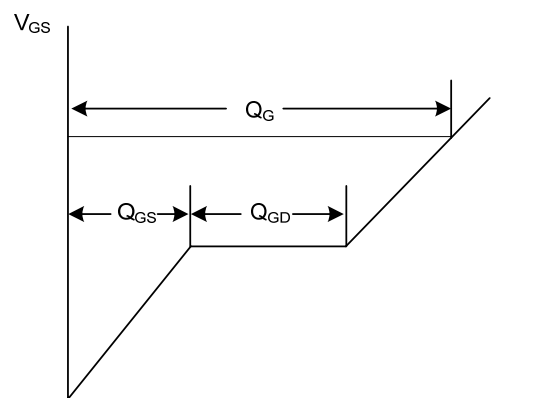
Switching Test Circuit



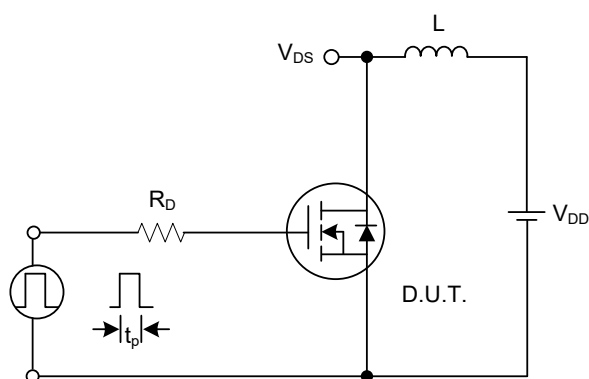
Switching Waveforms



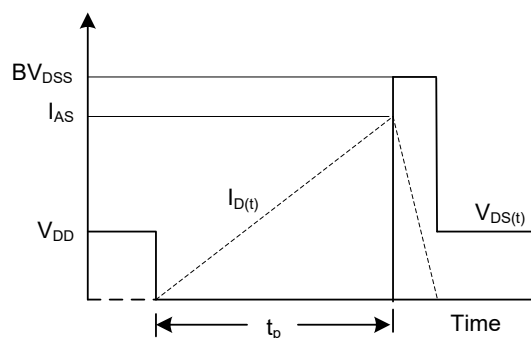
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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